Attachment 1

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

License Renewal Commitment List – Revision 0

## JAF List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments. This list will be revised as necessary in subsequent amendments to reflect changes resulting from audit questions and RAI responses.

| # | COMMITMENT | IMPLEMENTATION SCHEDULE | SOURCE | Related LRA Section No./ Comments |
|---|---|---|---|---|
| 1 | Implement the Buried Piping and Tanks Inspection Program as described in LRA Section B.1.1. | October 17, 2014 | JAFP-06-0109 | A.2.1.1<br>B.1.1 |
| 2 | Enhance the BWR CRD Return Line Nozzle Program to examine the CRDRL nozzle-to-vessel weld and the CRDRL nozzle inside radius section per Section XI Table IWB-2500-1 Category B-D Items B3.10 and B3.20. | October 17, 2014 | JAFP-06-0109 | A.2.1.2<br>B.1.2 |
| 3 | Enhance the Diesel Fuel Monitoring Program to include periodic draining, cleaning, visual inspections, and ultrasonic measurement of the bottom surfaces of the fire pump diesel fuel oil tanks, EDG day tanks, and EDG fuel oil storage tanks to ensure that significant degradation is not occurring.<br><br>Enhance the Diesel Fuel Monitoring Program to specify acceptance criteria for UT measurements of diesel generator fuel storage tanks within the scope of this program. | October 17, 2014 | JAFP-06-0109 | A.2.1.9<br>B.1.9 |
| 4 | Enhance the External Surfaces Monitoring Program to include periodic inspections of systems in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(1) and (a)(3). Inspections shall include areas surrounding the subject systems to identify hazards to those systems. Inspections of nearby systems that could impact the subject systems will include SSCs that are in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(2). | October 17, 2014 | JAFP-06-0109 | A.2.1.11<br>B.1.11 |
| 5 | Enhance the Fire Protection Program to inspect accessible fire barrier walls, ceilings, and floors at least once every refueling outage. Inspection results will be acceptable if there are no visual indications of degradation such as cracks, holes, spalling, or gouges.<br><br>Enhance the Fire Protection Program to inspect at least one seal of each type every 24 months. | October 17, 2014 | JAFP-06-0109 | A.2.1.13<br>B.1.13.1 |

| # | COMMITMENT | IMPLEMENTATION SCHEDULE | SOURCE | Related LRA Section No./ Comments |
|---|---|---|---|---|
| 6 | Enhance the Fire Water System Program to include inspection of hose reels for corrosion. Acceptance criteria will be enhanced to verify no significant corrosion.<br><br>Enhance Fire Water System Program to include visual inspection of spray and sprinkler system internals for evidence of corrosion. Acceptance criteria will be enhanced to verify no significant corrosion.<br><br>Enhance Fire Water System Program to include that a sample of sprinkler heads will be inspected using guidance of NFPA 25 (2002 Edition) Section 5.3.1.1.1. NFPA 25 also contains guidance to repeat sampling every 10 years after initial field service testing.<br><br>Enhance Fire Water System Program to include that wall thickness evaluations of fire water piping will be performed on system components using non-intrusive techniques to identify evidence of loss of material due to corrosion. These inspections will be performed before the end of the current operating term and at intervals thereafter during the period of extended operation. Results of the initial evaluations will be used to determine the appropriate inspection interval to ensure aging effects are identified prior to loss of intended function. | October 17, 2014 | JAFP-06-0109 | A.2.1.14<br>B.1.13.2 |
| 7 | Implement the Heat Exchanger Monitoring Program as described in LRA Section B.1.15. | October 17, 2014 | JAFP-06-0109 | A.2.1.16<br>B.1.15 |
| 8 | Implement the Metal-Enclosed Bus Inspection Program as described in LRA Section B.1.17. | October 17, 2014 | JAFP-06-0109 | A.2.1.19<br>B.1.17 |
| 9 | Implement the Non-EQ Instrumentation Circuits Test Review Program as described in LRA Section B.1.18. | October 17, 2014 | JAFP-06-0109 | A.2.1.20<br>B.1.18 |
| 10 | Implement the Non-EQ Insulated Cables and Connections Program as described in LRA Section B.1.19. | October 17, 2014 | JAFP-06-0109 | A.2.1.21<br>B.1.19 |

| # | COMMITMENT | IMPLEMENTATION SCHEDULE | SOURCE | Related LRA Section No./ Comments |
|---|---|---|---|---|
| 11 | Enhance the Oil Analysis Program to periodically sample the oil in the underground oil-filled cable, the security generator, and the fire pump diesel.<br>Enhance the Oil Analysis Program to include viscosity and neutralization number determination of oil samples from components that do not have regular oil changes.<br>Enhance the Oil Analysis Program to include particulate and water content for oil replaced periodically. | October 17, 2014 | JAFP-06-0109 | A.2.1.22<br>B.1.20 |
| 12 | Implement the One-Time Inspection Program as described in LRA Section B.1.21. | Will be implemented within the 10 years prior to October 17, 2014 | JAFP-06-0109 | A.2.1.23<br>B.1.21 |
| 13 | Enhance the Periodic Surveillance and Preventive Maintenance Program as necessary to assure that the effects of aging will be managed as described in LRA Section B.1.22. | October 17, 2014 | JAFP-06-0109 | A.2.1.24<br>B.1.22 |
| 14 | Enhance the Reactor Vessel Surveillance Program to include the data analysis, acceptance criteria, and corrective actions described in LRA Section B.1.24. | October 17, 2014 | JAFP-06-0109 | A.2.1.26<br>B.1.24 |
| 15 | Implement the Selective Leaching Program as described in LRA Section B.1.25. | October 17, 2014 | JAFP-06-0109 | A.2.1.27<br>B.1.25 |

| # | COMMITMENT | IMPLEMENTATION SCHEDULE | SOURCE | Related LRA Section No./ Comments |
|---|---|---|---|---|
| 16 | Enhance the Structures Monitoring Program procedure to specify that manholes, duct banks, underground fuel oil tank foundations, manway seals and gaskets, hatch seals and gaskets, underwater concrete in the intake structure, and crane rails and girders are included in the program.<br><br>Enhance the Structures Monitoring Program procedure to include guidance for performing structural examinations of elastomers and rubber components to identify cracking and change in material properties.<br><br>Enhance the Structures Monitoring Program procedure to include guidance for performing periodic inspections to confirm the absence of aging effects for lubrite surfaces in the torus radial beam seats and for lubrite surfaces in the torus support saddles.<br><br>(Note: This is a change to the LRA Appendix B enhancement that states the Containment ISI Program will include inspection of the lubrite surfaces of the torus support saddles. The corresponding change to LRA Appendix B will be provided in a later amendment.)<br><br>Enhance the Structures Monitoring Program to perform an engineering evaluation on a periodic basis (at least once every five years) of groundwater samples to assess aggressiveness (pH < 5.5, chloride > 500 ppm and Sulfate > 1500) of groundwater to concrete.<br><br>Enhance the Structures Monitoring Program to inspect any inaccessible concrete areas that may be exposed by excavation for any reason, or any inaccessible area where observed conditions in accessible areas, which are exposed to the same environment, show that significant concrete degradation is occurring. | October 17, 2014 | JAFP-06-0109 | A.2.1.30<br>B.1.27.2<br><br>Audit Item 201<br><br>Audit Item 207 |
| 17 | Implement the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program as described in LRA Section B.1.28. | October 17, 2014 | JAFP-06-0109 | A.2.1.31<br>B.1.28 |
| 18 | Enhance the Water Chemistry Control – Auxiliary Systems Program to include guidance for sampling the control room and relay room chilled water, decay heat removal cooling water, and the security generator jacket cooling water. | October 17, 2014 | JAFP-06-0109 | A.2.1.32<br>B.1.29.1 |

| # | COMMITMENT | IMPLEMENTATION SCHEDULE | SOURCE | Related LRA Section No./ Comments |
|---|---|---|---|---|
| 19 | Enhance the Bolting Integrity Program to include guidance from EPRI NP-5769 and EPRI TR-104213.<br><br>Enhance the Bolting Integrity Program to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC and to clarify the prohibition on use of lubricants containing $MoS_2$ for bolting. | October 17, 2014 | JAFP-06-0109 | A.2.1.35<br><br>B.1.30 |
| 20 | Prior to entering the period of extended operation, for each location that may exceed a CUF of 1.0 when considering environmental effects, JAFNPP will implement one or more of the following:<br><br>(1) further refinement of the fatigue analyses to lower the predicted CUFs to less than 1.0 using an NRC-approved method;<br>(2) management of fatigue at the affected locations by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method acceptable to the NRC);<br>(3) repair or replacement of the affected locations.<br><br>Should JAFNPP select the option to manage environmentally assisted fatigue during the period of extended operation, details of the aging management program such as scope, qualification, method, and frequency will be submitted to the NRC prior to the period of extended operation. | October 17, 2014<br><br>October 17, 2012 | JAFP-06-0167 | 4.3.3/audit item 317 |
| 21 | Enhance the BWR Vessel Internals Program to perform inspections of the core plate rim hold down bolts in accordance with ASME Section XI Table IWB-2500-1, Examination Category B-N-2 or in accordance with a future NRC-approved revision of BWRVIP-25 that provides a feasible method of inspection. | October 17, 2014 | JAFP-06-0167 | A.2.1.7 and B.1.7/audit item 252 |
| 22 | Enhance the BWR Vessel Internals Program to ensure the effects of aging on the steam dryer are managed in accordance with the guidelines of BWRVIP-139 as approved by the NRC and accepted by the BWRVIP Executive Committee. | October 17, 2014 | JAFP-06-0167 | A.2.1.7 and B.1.7/audit item 245 |
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Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

Response to Requests for Additional Information

**James A. Fitzpatrick Nuclear Power Plant (JAFNPP)**
**Response to Requests for Additional Information**
**Part 1 Questions**

**RAI E-1-a** Aquatic Ecology Additional information required pursuant to 51.41, 51.45(c), 51.53(c)(3)(ii)(B), 51.53(c)(3)(iii), 51.70(b). Provide drawings and a detailed description of the circulating water intake structure (both the offshore and onshore structures) showing a plan view and an elevation view of the front of the structure with the intake bars and their spacing, a cross-section of the intake structure and the location of the fish deterrent system transducers.

**RAI E-1-a Response:**

Section 3.2.2.3 of the JAFNPP LRA Environmental Report provides the circulating water intake structure information required pursuant to 51.41, 51.45(c), 51.53(c)(3)(ii)(B), 51.53(c)(3)(iii), 51.70(b). See ER Section 3.2.2.3 for a detailed description of the intake structure. See attached Figure E-1-a-1 for reference (see Attachment 4).

**RAI E-1-b** Aquatic Ecology, Provide drawings and a detailed description of the circulating water intake tunnel providing distances and direction from the plant.

**RAI E-1-b Response:**

ER Section 3.2.2.4 provides a detailed description of the circulating water intake tunnel. See attached Figure E-1-b-1 for reference (see Attachment 4).

**RAI E-1-c** Aquatic Ecology, Provide drawings and a detailed description of the circulating water intake traveling screens and collection buckets and their spacing.

**RAI E-1-c Response:**

The traveling water screens are furnished by Jeffrey Manufacturing Company of Columbus, Ohio. Three 12 foot wide traveling screens, fabricated from No. 10 gauge 304 stainless steel wire with 3/8 inch clear openings, are situated between the trash racks and the pump intake sluice gates. See attached Figure E-1-c-1 in Attachment 4 for reference. Each screen has a design capacity of 125,000 gpm, is 12'-0" wide and 43'-4" high, and has a design approach velocity of 1.2 fps. Screen rotation speed ranges from 10 fpm to 20 fpm. The traveling screens retain debris ≥3/8 inches and dump it into a collection trough. The steel trash trough has flanged ends for each screen section designed so that the ends will mate for bolting when the screens are installed in place to form one continuous pitched trash trough mated to a trough extension. The bottom flange of each panel forms a trash shelf extending the entire width of the panel. The shelf design includes a substantial dredging leaf rake extending the width of each panel at the panel midpoint for refuse removal and is designed for minimum reduction of free area. This rake has tines to engage and raise moss and other lake vegetation. The carrying ledge portion of the lip is able to retain fish and is perforated to drain water. The panels are constructed and attached to the chain so that there is no opening larger than the screen cloth opening for debris to get through at the line of articulation along the sides or bottom when they are stationary or moving.

Two 100% capacity (1 running, 1 standby) screen wash pumps take suction from the SW discharge header to provide backwash spray water for the traveling screens. The spray system utilizes non-clogging, wear resistant deflector type nozzles, designed to project overlapping fan shaped jets of spray water across the width of the screen so that all material picked up on the screen, trash shelf, and the special dredging leaf rake will be jetted off when the panels are ascending. Debris is jetted in a direction opposite the direction of flow of water in the intake channel. The design screen wash pumps spray flow rate is 720 gpm/screen at a minimum of 80 psi gauge pressure. Water is sprayed on all screens simultaneously from two screen wash headers whenever the traveling screens are rotating.

The traveling screens and screen wash pumps are equipped with an automatic differential level control to limit debris loading and can be operated manually or in automatic mode. When in the automatic mode, the pumps will start when either of two conditions occur:

1. High screen differential level, 4 inches W.C., as sensed by level detectors across the screens, or

2. 10-minute exercise timer is initiated.

The traveling screens start when pump discharge pressure is > 100 psig.

Design debris loading conditions for the traveling screens correspond to 1.6 inches differential W.C. clean, up to 6 inches differential W.C. fully loaded. The traveling screens will automatically stop if the screen differential level is <2 inches W.C, for 10 minutes. An adjustable timer is included to ensure that the screen will run for at least 1-1/3 revolutions after minimum level differential is attained to assure that debris is completely removed and not just lifted out of the water and allowed to dry on the panels. If any of the screens runs continuously for 30 minutes or if the differential level across the screens reaches 6 inches W.C., an alarm is sounded in the main control room. The traveling screens are operated at least once per shift, either in "automatic" mode, or manually in "continuous" mode.

**RAI E-1-d** Aquatic Ecology, Provide drawings and a detailed description of the circulating water discharge structure showing a plan view as well as an elevation view of the front of the structure.

**RAI E-1-d Response:**

ER Section 3.2.2.5 provides a detailed description of the discharge structure. See attached figures, Figure E-1-b-1 and Figures E-1-d-1, for reference (see Attachment 4).

**RAI E-1-e** Aquatic Ecology, Provide drawings and a detailed description of the circulating water discharge tunnel distances and relative direction from the plant.

**RAI E-1-e Response:**

ER Section 3.2.2.5 provides a detailed description of the circulating water discharge tunnel distances. See attached figure E-1-b-1 for reference (see Attachment 4).

**RAI E-1-f** Aquatic Ecology, Provide a detailed description of the characteristics and operation of the Fish Deterrent System.

**RAI E-1-f Response:**

The fish deterrent system (FDS) was specifically designed to repel alewives (*Alosa pseudoharengus)* from the vicinity of the intake structure using high frequency sound (122-128 kHz) at a source level (in decibels [dB] in reference to 1µPa) of 190 dB. The system, installed in the mid-1990's, consists of nine integrated projector assemblies (IPAs) located around the perimeter of the intake structure. The IPAs are configured such that their sonified zones overlap, thereby completely enveloping the intake structure.

The FDS computer is located in the screenwell at the 255' elevation. The computer communicates with each IPA independently and allows users to start and stop the system and to test IPAs individually or the system as a whole.

Per the site SPDES permit, the system is installed (dewinterized) by the first week of April each year and is removed from service (winterized) each October, except for years with an October refueling outage when the system can be removed from service in September. Upon installation each April, all nine IPAs must be fully operational (communicating with the FDS computer and producing at least 190 dB/µPa at 1 meter from the source). Because computer modeling showed sufficient sonified zone overlap, the SPDES permit mid-cycle operational criteria are that at least five of the nine IPAs must be operational, with no two adjacent IPAs out of service.

The current SPDES permit fact sheet states that "... a reduction in impingement of onshore-migrant alewives of between 80 and 87% can be achieved. Based in part on the demonstrated performance of the fish deterrent system with alewives, and the fact that such a large percentage of the fish impinged here are alewives, the fish deterrent system was determined to be the Best Technology Available to mitigate fish impacts at this intake."

Since the FDS was installed there have been no significant alewife impingement events at JAFNPP.

**RAI E-1-g** Aquatic Ecology, Provide a description of when intake flow reduction occurs and explain its impact on entrainment. The application states that in addition to acoustic FDS, JAFNPP "also utilizes additional operational measures and technological design features to further minimize already small entrainment impacts". Measures include: intake flow reductions resulting from pump differentials, maintenance outages, and recirculation of heated condenser flow to temper incoming winter water; and the design of the intake structure.

**RAI E-1-g Response:**

JAFNPP has a maximum total raw water withdrawal flow rate from Lake Ontario of 596.16 million gallons per day ("mgd") through the cooling water intake structure, representing the combined 518.4 mgd of cooling water flow (three circulating water pumps each operating at a design capacity of 120,000 gallons per minute, "gpm") and 77.76 mgd of service water flow (three service water pumps each operating at a design capacity of 18,000 gpm). The actual JAFNPP raw water intake flow rates in each month throughout the year based on 2001 through 2005 historical data, range from an average of 4.4% below the maximum withdrawal rate in November to 35.1% below the maximum withdrawal rate in October (Figures E-1-g-1 and E-1-g-2 in Reference for RAI E-1-g-1). JAFNPP schedules refueling outages during October once every 24 months and these outages typically last for most of the month. Scheduling outages in October reduces the actual average total intake flow by an average of 35.1% for October over the 2001 through 2005 period of available historical data (Figures E-1-g-1 and E-1-g-2 in Attachment E-1-g-1). During the January through March period of cold weather in each year, when inlet water temperature is below approximately 45°F, warm discharge water is recirculated via a tempering gate to obtain proper temperature of the circulating and service inlet water. This flow path delivers some of the water in the discharge tunnel to the intake bay, upstream of the traveling screens. The tempering gate can be controlled from 0%-100% open from the main control room. The JAFNPP raw water intake from Lake Ontario has been effectively reduced by 16% to 18% from the maximum intake flow during the months of January through March when the plant is using this tempering mode of operation, based on 2001 through 2005 historical data (Figures E-1-g-1 and E-1-g-2 in Attachment E-1-g-1). Flow reductions in the remaining months typically occur by running one or two instead of three service water pumps.

Total entrainment abundance is directly proportional to both the density of ichthyoplankton eggs and larvae in the nearfield source water and to the raw water intake flow during the period of consideration. Therefore, the monthly flow reductions described in the previous paragraph will reduce total entrainment in each month because total entrainment is the product of nearfield density (numbers of eggs or larvae per unit volume) and the volume of water withdrawn. Historical data suggests that the temporal distribution of eggs and larvae in the Nine Mile Point nearfield area is characterized by two basic spawning groups: species typically spawning in the winter and early spring (e.g. burbot, *Coregonus* spp., rainbow smelt, yellow perch), and late spring and summer spawning species (e.g. alewife, white perch, carp; TI 1979). Eggs and larvae of the first group are most abundant during April through early June and larvae of the second group are most abundant in July and August.

To demonstrate compliance with federal 316(b) regulations, JAFNPP is presently conducting a year-long entrainment sampling program to determine the abundance of entrained fish eggs and larvae by sampling the intake flow in the JAFNPP cooling water intake structure. Sampling began in April 2006 and continued weekly through October 2006 for a total of 30 sampling weeks. Sampling will then continue twice per month during November 2006 through March 2007 for an additional 10 sampling weeks. Once completed, this data along with additional lake impingement and entrainment data will be submitted to NYSDEC in the form of a Comprehensive Demonstration Study (CDS). The CDS must be submitted by January 7, 2008.

<u>Reference:</u>

Texas Instruments Incorporated (TI). 1979. 1978 Nine Mile Point Aquatic Ecology Studies. Report provided for Niagara Mohawk Power Corporation, Syracuse, NY and the Power Authority of the State of New York. (see attached Reference for RAI E-1-g-2)

**RAI E-1-h** Aquatic Ecology, Provide drawings and a description of seasonal lake currents in the vicinity of the station and how these currents affect the cumulative impingement and thermal impacts of JAFNPP and Nine Mile Point.

**RAI E-1-h Response:**

There are two sources of information that can be used to address this request for additional information; first, literature describing the Lake Ontario water circulation patterns at a gross (whole-lake) scale, and second the results of a site-specific three-dimensional computational fluid dynamics (CFD) model of the JAFNPP intake structure operating in these Lake Ontario water circulation currents which defined the hydraulic zone of influence (HZOI) of the intake structure. These independent sources reveal no cumulative impingement or cumulative thermal impacts of JAFNPP and Nine Mile Point Nuclear Station (NMPNS).

Entergy considers “cumulative impacts” to occur when there is evidence that the impact of two facilities is more than the sum of the individual impacts, more than additive. If the impingement losses from JAFNPP and NMPNS are represented by the sum of the impingement losses at each plant, there is no cumulative impact. Otherwise, the sum of impingement losses of any two power plants on the same body of water (even one as large as Lake Ontario where the plants may be separated by more than one hundred miles) could be considered to be a cumulative impact. For example, if JAFNPP impinges 100 fish per year and NMPNS impinges 100 fish per year, then the combined impingement losses for the two stations is 200 fish per year, representing an additive effect. A cumulative impact would occur if there is an interaction between the stations due to their close proximity, such that NMPNS's operation increased the likelihood of impingement at the JAFNPP intake. For example, if JAFNPP impinges 200 fish per year and NMPNS impinges 100 fish per year, when both are expected to impinge 100 fish per year based on the density of fish exposed to impingement in HZOI, then the combined impingement losses for the two stations is 300 fish per year and the cumulative impact is 100 fish impinged above the expected number. The cumulative impingement impact in this example could occur if free swimming fish become stunned after encountering the thermal plume of NMPNS and are carried in this stunned condition by lake currents into the HZOI of JAFNPP where they are more likely to be impinged then if swimming freely without the influence of NMPNS's thermal plume.

Lake Ontario currents are likely to have little effect on impingement because the juvenile and adult fish of the size subjected to impingement are capable of freely swimming independently of the relatively weak lake currents. However, fish eggs and larvae have no (eggs) or weak (larvae) swimming ability and are likely to be directionally dispersed by lake currents from the spawning habitat. Therefore, this response explores the relationship between seasonal lake currents and both entrainment and impingement.

The interaction of seasonal lake currents with the cooling water withdrawal and discharge at JAFNPP is dependent on the intake and discharge locations for both JAFNPP and NMPNS. JAFNPP and NMPNS are located on adjacent properties on a small promontory of land projection out into Lake Ontario along its southeastern shore called Nine Mile Point (see attached Reference for RAI E-1-h-1). Proceeding from west to east along the Nine Mile Point shoreline you first encounter the offshore, mid-water discharge and intake structures for NMPNS Unit 1, then the discharge and intake structures for NMPNS Unit 2, then the offshore mid-water intake structure for JAFNPP, followed by the diffuser discharge pipe for JAFNPP. The thermal discharges are located to minimize recirculation of heated effluent back into the intakes, and they discharge below the surface in the middle of the water column. The JAFNPP intake is located about 3000 feet to the east of the nearest NMPNS discharge (see attached Reference for RAI E-1-h-1).

Lake Ontario Water Circulation Patterns

Water currents typically move in an eastward direction along the south shore of Lake Ontario in a relatively narrow band. Inflow from the Niagara River causes the water level at the western end of Lake Ontario to be higher than the eastern. The resulting flow down gradient is held against the lake's south shore by the Coriolis Effect. Wind stress averaged over the year tends to further accelerate the flow to the east due to the prevailing west-northwest winds.

Long-term circulation in the Great Lakes is driven primarily by wind stress and surface heat flux which causes density-driven currents. Winter circulation patterns are simpler than summer due to the absence of temperature stratification (generally from November to April). Therefore winter currents are almost entirely wind driven. Winter circulation is stronger than summer because of the stronger winds in winter. Southeastern Lake Ontario has some of the strongest mean winter currents (up to 9.5 cm/sec) observed in the Great Lakes. Mean circulation in winter consists of a two-gyre pattern, with counter-clockwise flow in the south-eastern part of the Lake and net surface flow is eastward. (TI 1979)

Lake Ontario circulation patterns in the summer are more complex, due to variations in depth caused by stratification (generally from May-October). The mean summer circulation consists of a combination of a large cyclonic gyre where current speed reaches a maximum of 2.5 cm/sec. and a smaller anti-cyclonic gyre in the western part of the Lake (Figure E-1-h-2 in Reference for RAI E-1-h-2).

Patterns described above are long term, lake-wide patterns. Local currents at any given time are more complex and strongly influenced by transient wind. Sometimes a major wind shift can alter the currents in a matter of hours. Preoperational studies at JAFNPP measured currents off Nine Mile Point from May to October 1969 and from July to October 1970 (TI 1979). This data clearly illustrated a correlation between summer currents and wind speed (TI 1979). The predominant direction of currents was alongshore, on those occasions when onshore or offshore currents were observed, their magnitudes were substantially less than alongshore currents. During the summer, alongshore currents from either the west or east were equally frequent about 33% of the time. Onshore and offshore currents each accounted for nearly 5 % of the observations; the remaining 30% of the observations were below the flowmeter threshold of 2.5 cm/sec. Mid-water current measurements at the 46 foot depth contour had a mean onshore current speed of 3.0 cm/sec, mean offshore current speed was 6.0 cm/sec, and alongshore currents from the west and east averaged 9.0 cm/sec. Lake currents measured in the vicinity of the Oswego Steam Station (about 6 miles west of Nine Mile Point) for 5 days between 12 October and 19 November 1970 also found surface currents to be primarily alongshore, with speeds ranging from < 2.5 cm/sec to 15.0 cm/sec (TI 1979).

Impingement and Entrainment

With respect to entrainment and impingement exposure, the prevailing west to east currents along the Lake Ontario shore in the vicinity of JAFNPP suggest that the source of fish exposed to entrainment and impingement is more likely to be from the west of the intake, particularly for passively transported eggs and larvae subjected to entrainment. Organisms carried in these west to east Lake Ontario currents may originate from the lake itself or from the Oswego River which discharges into Lake Ontario about six miles to the west of Nine Mile Point. Since most of the fish taxa found in Lake Ontario in the nearshore habitat in the vicinity of Nine Mile Point have demersal, adhesive eggs, larvae represents the pelagic dispersal stage that is most subjected to entrainment. Historical sampling for entrainment at JAFNPP from 1973-1979 (TI 1979) revealed that eggs from two nearshore spawning fishes (alewife and rainbow smelt) consistently dominated the collections. Larvae of these two species were also most abundant in the entrainment samples, however larvae of Morone spp. (white perch and white bass), yellow perch, Cottus spp. (mottled and slimy sculpins) and carp and tessellated darter were also abundant among the 22 taxa of fish larvae found in the entrainment samples (TI 1979). Enrichment of the larval fauna diversity exposed to entrainment may result from the transport of pelagic larvae from fish species spawning offshore in deeper water which may be transported to the near-shore intakes at JAFNPP and at NMPNS by local wind driven currents. Fish species that utilize deepwater as well as nearshore spawning habitat like burbot (Lota lota), slimy and mottled sculpins and lake herring (Coregonus artedii) may be more exposed to entrainment at the JAFNPP intake than would be assumed when you consider the near-shore location of the intake.

Since the NMPNS offshore intake is nearby but west of the JAFNPP offshore intake by about 3000 feet (Figure E-1-h-1), organisms carried in the predominantly west to east currents along the Lake Ontario shoreline would potentially be exposed to entrainment first at NMPNS and subsequently at JAFNPP. However, the percentage of water withdrawal is diminishingly small relative to the volume carried in these currents such that no difference in density of exposure was observed in the waters sampled by towed ichthyoplankton nets in the vicinity of either intake. Analyses of fish egg and larval catches in the thermally influenced and control areas along the 20 ft and 40 foot depth contours along four transects arranged east to west of the NMPNS and JAFNPP intake structures did not reveal any consistent temporal or spatial density patterns during the 1973-1979 period (TI 1979). Similar results were observed sampling juvenile and adult fish with gill nets and trawls representing the source population of impingement. No consistent trend in catch per unit effort, length-frequency, age and growth, fecundity, or diet analysis with respect to experimental and control areas along the east-west gradient in the Nine Mile Point vicinity from 1969-1979 was observed (TI 1979). Therefore, based on the sampling results from the 1970's, there is unlikely to be a measurable cumulative effect of entrainment or impingement on the fish community in the vicinity of Nine Mile Point.

The prevailing west to east currents along the Nine Mile Point shoreline suggest that the thermal discharge from both the NMPNS and JAFNPP offshore diffusers will be distributed from the diffuser ports in a predominantly easterly direction. The theoretical possibility exists of an interaction between the NMPNS thermal discharges from Unit 2, which is west of the JAFNPP intake by about 3000 feet (Figure E-1-h-1), and the JAFNPP thermal discharge such that the two plumes may converge to make one large surface plume. However, the closest NMPNS Unit 2 discharge is from a unit that relies on a cooling tower for primary condenser cooling and therefore contributes only a small thermal discharge. The once-through NMPNS Unit 1 thermal discharge is located about 400 feet offshore and more than 4000 feet west of the JAFNPP intake, which is 900 feet offshore (Figure E-1-h-1), making it unlikely that the two thermal plumes converge by the west to east currents before the thermal effluent is cooled by dilution to ambient conditions. Therefore, there is no evidence of cumulative thermal impacts due to interaction of the non-contact cooling water discharged from these two adjacent generating stations.

<u>Hydraulic Zone Of Influence (HZOI)</u>

A comprehensive Computational Fluid Dynamics (CFD) analysis was performed to estimate the HZOI for the JAFNPP with its CWIS (cooling water intake structure) located 900 feet offshore along the 25 foot depth contour in Lake Ontario (Entergy 2006). The objective was to delimit the HZOI so that ichthyoplankton and juvenile fish sampling efforts near the offshore intake structure would sample the water mass subjected to the direct influence of flow vectors established near the intake due to the cooling water withdrawal. Sampling in the HZOI compared to nearshore (10 foot contour) will be used to evaluate the difference in fish abundance between a calculation baseline established for a hypothetical shoreline bulkhead intake compared to the existing offshore, mid-water, remote intake location as part of the plant's efforts to comply with the U.S. EPA's Clean Water Act, Section 316b Phase II Regulations.

In general, the HZOI is affected by overall flow patterns in the source water body, lake bottom topography, CWIS geometry, and CWIS intake flow rates. In the context of the 316(b) regulations, the primary reason for determining an intake's HZOI is to establish where water entering the intake comes from and to use this information to improve the design of biological sampling procedures meant to assess the impact of the intake's operation on organisms found in the surrounding areas. For example, CFD predicts local velocities in the vicinity of the CWIS subject to all of variables listed above, and establishes the three-dimensional shape of the intake influence. These predicted velocities can, in turn, be compared to sustained and burst swimming speed for organisms living near the CWIS to evaluate the likelihood for the entrainment into the CWIS. The HZOI boundary for entrainment of fish eggs and larvae was operationally defined in this work as the calculated Lake Ontario 5% current greater than the ambient lake currents due to the influence of water withdrawal activities into the JAF CWIS. Also, the HZOI boundary for impingement of juvenile and older fish was defined as a calculated nearfield velocity of 0.5 feet per second (fps) or more compared to the ambient lake currents.

Results from the HZOI modeling of the JAFNPP CWIS revealed that the overall flow patterns for the lake from west to east had a dominant effect. The predicted HZOI was asymmetric around the CWIS and aligned along a southwest vector originating at the intake with a maximum extent of about 600 feet (Figure E-1-h-3 in Reference for RAI E-1-h-3; reproduced from Entergy 2006, Figure 4.8.11). Given the separation of the intake and discharge structures for NMPNS and JAFNPP of 3000 feet or more, and the assumption that the NMPNS HZOI exhibits a similar shape and extent as the HZOI for JAFNPP, there is no evidence that the two HZOI's interact to produce cumulative effects on entrainment or impingement.

References:

Entergy Nuclear FitzPatrick, LLC. (Entergy). March 2006. Hydraulic zone of influence (estimated calculation) supporting the sampling plan included within the Proposal for Information Collection Clean Water Act §316(b) Phase II Regulations James A. Fitzpatrick Nuclear Power Plant (SPDES Permit No. NY 0020109). Lycoming, New York. (see attached Reference for RAI E-1-h-4)

Texas Instruments Incorporated (TI). 1979. 1978 Nine Mile Point Aquatic Ecology Studies. Report provided for Niagara Mohawk Power Corporation, Syracuse, NY and the Power Authority of the State of New York. (see attached Reference for RAI E-1-g-2)

**RAI E-1-i** Aquatic Ecology, Provide a copy of the current Clean Water Act 316(b) and 316(a) determinations and data appendices.

**RAI E-1-i Response:**

A copy of the current Clean Water Act 316(a) determination and data appendices is included in Reference for RAI E-1-i-1. The 316(a) demonstration was submitted to the EPA approximately 1976. However, the cover letter transmitting this demonstration could not be located. NYSDEC's approval of alternative effluent limitations pursuant to Section 316(a) of the Clean Water Act is described in Additional Requirements, Item 8 of JAFNPP SPDES Permit NY-0020109, which is included in ER Attachment C.

**RAI E-1-j** Aquatic Ecology, Provide a general summary of the aquatic and terrestrial monitoring programs at JAFNPP.

**RAI E-1-j Response:**

Other than terrestrial monitoring associated with the JAFNPP radiological environmental monitoring program described in Section 2.7.3 of the JAFNPP FSAR, there are no other terrestrial monitoring programs conducted at the site.

Current aquatic monitoring programs at the JAFNPP site consist of impingement, zebra mussel, and activities associated with 316(b) performance standards as discussed below.

Impingement Monitoring Program

The aquatic monitoring program is required by a condition outlined in Additional Requirements, Item 10 of JAFNPP SPDES Permit NY-0020109, which involves conducting a one year impingement monitoring program to determine the numbers and total weights by species of aquatic organisms impinged on all intake traveling screens. This program must be completed before the end of the fourth year of the permit. Additional details regarding this program are discussed in Additional Requirements, Item 10 in JAFNPP SPDES Permit NY-0020109. Reference for RAI E-1-j-1 contains a copy of the most recent impingement report submitted to NYSDEC.

Collections are made 78 days each year monitoring is required, provided that the circulating water system is in operation. When scheduled collection days coincide with zero water circulation, collection is not necessary. Table E-1-j-2 lists the number of collections required per month.

| Table E-1-j-2<br>Impingement Sampling Regime | |
|---|---|
| **Month** | **Number of Collections** |
| January | 4 |
| February | 4 |
| March | 4 |
| April | 16 |
| May | 20 |
| June | 4 |
| July | 4 |
| August | 6 |
| September | 4 |
| October | 4 |
| November | 4 |
| December | 4 |
| **Note: Days assigned each month is selected by contractor using a random methodology.** | |

Impingement sampling is conducted for a minimum of 24 hours beginning on each randomly selected day. Impingement data is collected and reported on a 24-hour basis, with impinged fish/organisms or subsamples identified and enumerated.

For each month, the following data is obtained:

- Gross power output (MWe) per hour and 24-hour average
- Number of circulating water pumps running per 24-hour period and average daily volume (gallons) for all days of the month.
- Number of service water pumps running per 24-hour period and average daily volume (gallons) for all days of the month.
- Daily average intake and discharge water temperature (from plant computer printouts when the circulating pumps are operational).
- Percent tempering for all days of the month (average value).

Before sample collection, the traveling screens are rotated and washed for a minimum of 15 minutes, after which the collection basket, with a 9.5-mm (3/8-in.) stretch mesh liner, is positioned at the end of the sluiceway. The collection basket remains in place for a minimum of 24 hours, unless high impingement or debris loads require that it be emptied; in which case it is removed, emptied and repositioned. A subsampling routine is utilized for occasions when high impingement rates or high debris loads are encountered. The subsampling technique is based on volume, and the total 24-hour catch is estimated using the following formula:

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

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

An extrapolation routine may be employed on occasions when one of the three rotating screens that are initially cycled at the onset of the sample becomes immobilized due to maintenance or other reason before the completion of the sample. The total numbers of impinged organisms are extrapolated for the remaining screen using the following formula:

$$\textit{Estimated No. of Fish in Total Sample} = \frac{\textit{Number of Fish in Sample} \times \textit{Number of Screens Rotated at Start of Sample}}{\textit{Number of Screens Rotated at End of Sample}}$$

Each impingement sample is returned to the laboratory where all organisms are sorted, identified, and enumerated. Identification is made to the lowest possible taxonomic level, in most cases, down to species.

A maximum of 25 individuals of the following species are weighed and measured: white perch, alewife, and rainbow smelt. All individuals collected of yellow perch, smallmouth bass, and salmonids are individually weighed and measured. Other fish are enumerated and weighed to obtain a total count and total weight for each species or taxonomic group. Total lengths are measured to the nearest millimeter (mm). Age analysis is not a requirement except in a general sense. Data on species of special interest attain a total length between 65 and 102 mm at the end of the first year growth. Young-of-year (YOY) are considered those individuals of species of special interest whose lengths are less than 100 mm and which are generally collected from late summer through winter. Young fish collected in spring impingement samples are considered yearlings, even if they have not attained a length greater than 100 mm, they have completed a full year of growth and are not classified as YOY.

Weights are recorded to the nearest 0.1 g for specimens weighing <1,000 g, 1 g for specimens weighing between 1,000 g and 2,000 g, and 5 g for specimens weighing greater than 2,000 g. Specimens with any unusual conditions, abnormalities, or presence of fish tags are noted on data sheets. Zebra mussel volumes for each sample are also noted on the data sheets.

A report of the impingement monitoring program is submitted to the NYSDEC within six months from the calendar year of collection (see Reference for RAI E-1-j-1). This report includes monthly totals of impingement by species and grand total over all species and a comparison of previous impingement levels with levels obtained during the permit period.

As required by correspondence from JAFNPP to the Nuclear Regulatory Commission, all impingement samples are also checked for the presence of the Asiatic clam (*Corbicula* sp.).

Zebra Mussel Monitoring Program

Circulating water is monitored for the presence and abundance of veligers during the growth and reproduction period of each year (spring through fall). Veliger abundance is typically determined by weekly water sampling when lake temperature is >50°F. Settling racks may be used to evaluate settling density and growth rates. In addition, monitoring of susceptible components for the presence and abundance of zebra mussels are performed periodically when they are opened for scheduled maintenance. When visual inspection results are unexpected or severe, samples are obtained to determine abundance of mussels, and corrective actions taken as necessary.

To minimize the build-up of zebra mussels in plant components needed to support plant operation, chlorination with hypochlorite is used as a routine preventive chemical control for service water, RHR service water, emergency service water, fire protection and raw water makeup. Molluscide treatment is also available as a preventive chemical control on the circulating water system and components, if needed. Mechanical/physical cleaning of the circulating water inlet system, and other susceptible components (i.e., intake and forebay), are also implemented as needed to prevent excessive accumulation of mussels.

316(b) Performance Standards

Since JAFNPP is located on a Great Lake, the facility must address both the impingement and entrainment 316(b) standards of the Clean Water Act at existing electricity-generating stations (the "Phase II Regulations"). The Phase II regulations establish performance standards for the reduction of impingement mortality by 80 to 95 percent and, under certain circumstances, for the reduction of entrainment by 60 to 90 percent. The applicability of these performance standards is determined by several factors, including the type of water body from which a plant withdraws cooling water and the plant's capacity utilization factor. Under the Phase II Regulations, applicable performance standards can be met by design and construction technologies, operational measures, restoration measures, or some combination of these compliance alternatives.

Monitoring in response to the Phase II regulations is in the early stages and is described in Section 8.0 of the Proposal for Information Collection to Address Compliance with the Clean Water Act, §316(b) Phase II Regulations at James A. FitzPatrick Nuclear Power Plant (see attached Reference for RAI E-1-j-3).

**RAI E-2-a** Cultural Resources, Additional information required pursuant to 51.41, 51.45(c), 51.53(c)(3)(ii)(K), 51.70(b). If available, provide copies of aerial photos of the site prior to, during, and post construction.

**RAI E-2-a Response:**

Regulations in 51.41, 51.45(c), 51.53(c)(3)(ii)(K), 51.53(c)(3)(iii), 51.70(b) do not specifically require the requested aerial photos, however, available photos are attached. See attached Reference for RAI E-2-a-1.

**RAI E-2-b** Cultural Resources, If available, provide copies of any old maps and any description relating to prior use of the site and any structures onsite prior to plant construction.

**RAI E-2-b Response:**

Prior to the construction of JAFNPP, the area surrounding the plant was used as an artillery range and as farmland. See attached map (Reference for RAI E-2-b-1) showing prior land owners.

**RAI E-2-c** Cultural Resources, If available, provide a copy of any readable map showing ground disturbances as a result of initial construction and subsequent operation activities.

**RAI E-2-c Response:**

Refer to attached Reference for RAI E-2-c-1.

**RAI E-2-d** Cultural Resources, If available, provide copies of any previous archaeological surveys of the JAFNPP site.

**RAI E-2-d Response:**

There were no archaeological surveys conducted prior to construction of the plant based on agency discussions in Appendix I of the JAFNPP Final Environmental Statement. In addition, based on discussions with plant personnel, there have been no surveys conducted during the operational period. However, surveys have been conducted by third parties that involve portions of the site as discussed below. JAFNPP is attempting to obtain copies of these archaeological assessments.

In 1977, Pratt & Pratt Archaeological Consultants, Inc. performed a Phase I investigation (literature search) of the Nine Mile 2 – Volney 765 kV transmission line, which included a small portion of the JAFNPP area. This project was revisited and reviewed again by Pratt & Pratt Associates in 1983 for construction of the Scriba substation, which involved a new transmission line 10 miles in length to the Scriba substation.

A second Phase IA literature review and archaeological sensitivity assessment was conducted by Hartgen Archaeological Associates (HAA), Inc. in 2003, involving new water lines for the Town of Scriba and which included a portion of the JAFNPP property.

A more comprehensive literature review and sensitivity assessment of the plant property is being conducted by JAFNPP in order to provide better information for land management purposes.

**RAI E-2-e** Cultural Resources, Provide copies of all procedures (including stop work procedures) related to the protection of historic and archaeological resources, for sites and structures.

**RAI E-2-e Response:**

A copy of Entergy Nuclear procedures related to the protection of potential historic and archaeological resources on site are included in attached Reference for RAI E-2-e-1.

**RAI E-3** Transportation of Spent Fuel, Additional information required pursuant to Table B-1 Appendix B Subpart A of Part 51, 51.41, 51.45(c), 51.70(b). Provide information to support the applicability of Table B-1 for transportation of spent fuel, specifically provide the maximum fuel enrichment level and the peak rod average burn-up level at JAFNPP.

**RAI E-3 Response:**

Fuel enrichment will not exceed 5 percent uranium-235 by weight and the average burnup of the peak rod (burnup averaged over the length of the rod) will not exceed 60,000 MWD/MTU.

**RAI E-4** Zoning Regulations, Additional information required pursuant to 51.41, 51.45(c), 51.45(d), 51.70(b). Provide information regarding the status of compliance with applicable zoning and land-use regulations imposed by state or local agencies. Specifically, identify how the site and areas immediately surrounding the site are zoned and the restrictions or requirements associated with this zoning.

**RAI E-4 Response:**

See ER Section 2.8.1 which discusses zoning in Scriba, NY. Also, Section 2.2.2 of the Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding Nine Mile Point Nuclear Station, Units 1 and 2 (NUREG-1437, Supplement 24) Final Report.

**Comment E-5** *Severe Accident Mitigation Alternatives*
Additional information required pursuant to 51.41, 51.45(c), 51.53(c)(3)(ii)(L), 51.70(b). The staff continues to have concerns with the level of information Entergy is submitting for the Severe Accident Mitigation Alternatives (SAMA) portion of the ER. After performing the acceptance review of the application, the NRC staff has concluded that RAIs similar to RAIs issued for other Entergy applications are warranted. It is evident from the SAMA section that the SAMA review guidance developed by NEI and endorsed by the NRC has not been consistently followed, and no lessons learned from previous SAMA reviews were incorporated in the FitzPatrick Environmental Report.

- The staff expects to issue RAIs related to the FitzPatrick SAMA analysis through separate correspondence by December 2006.

**Comment E-5 Response:**

The JAFNPP LRA Environmental Report provides the SAMA information required pursuant to 51.41, 51.45(c), 51.53(c)(3)(ii)(L), 51.53(c)(3)(iii), 51.70(b). The VYNPS and PNPS SAMA analyses and ERs were completed before NRC comments were incorporated in NEI 05-01, "Severe Accident Mitigation Alternative (SAMA) Analysis Guidance Document". Therefore, some of the RAIs on these analyses stemmed from changes made to the guidance after the analyses were completed.

Although the JAFNPP LRA was not submitted until July 31, 2006, the JAFNPP SAMA analysis was also completed before NRC comments were incorporated in the guidance document. The VYNPS and PNPS RAIs were reviewed and those items that applied to JAFNPP and could be resolved during the ER review process were resolved before the ER was submitted. The lessons learned with the highest potential of altering the conclusions of the SAMA analysis were incorporated in the ER before it was submitted for NRC review. Attachment 3 provides a list of changes incorporating lessons learned before ER submittal and supplemental information to address the remaining lessons learned.

## RAI Appendix A-1

SRP-LR states that the reviewer should confirm that the applicant has identified and committed in the LRA to any future aging management activities, including enhancements and commitments, to be completed before entering into the period of extended operation.

The Nuclear Energy Institute letter dated Feb. 26, 2006, in response to NRC letter dated Dec. 16, 2002, the industry has agreed to identify the high level future commitments in their updated final safety report supplement (Appendix A of the LRA).

JAF LRA did not include a "Commitment List"; therefore, descriptions of any proposed new aging management programs (AMPs) and AMP "enhancements" are incomplete. The staff requests the applicant to provide a commitment list to show all regulatory commitments. In addition, for each commitment that is placed on the application in either the original version or subsequent revisions of the commitment list, the staff requests that the applicant amend the applicable UFSAR Supplement summary description section in the JAF LRA Appendix A for each of the respective AMP or TLAA. This will provide the appropriate reference for each of the specific commitment that has been placed on the LRA for the AMP or TLAA under review.

## RAI Appendix A-1 Response

LRA Appendix A is revised as follows to identify commitments associated with new and enhanced programs.

Section A.2.1.1, Buried Piping and Tanks Inspection Program, add

> "This program will be implemented prior to the period of extended operation."

Section A.2.1.2, BWR CRD Return Line Nozzle Program, add

> "This program will be enhanced to examine the CRDRL nozzle-to-vessel weld and the CRDRL nozzle inside radius section per Section XI Table IWB-2500-1 category B-D items B3.10 and B3.20. This enhancement will be implemented prior to the period of extended operation."

Section A.2.1.7, BWR Vessel Internals Program, add

> "This program will be enhanced to perform inspections of the core plate rim hold down bolts in accordance with ASME Section XI Table IWB-2500-1, Examination Category B-N-2 or in accordance with a NRC approved revision of BWRVIP-25 that provides a feasible method of inspection.
> This program will be enhanced to ensure the effects of aging on the steam dryers are managed in accordance with the guidelines of BWRVIP-139 as approved by the NRC and accepted by the BWRVIP Executive Committee.
> These enhancements will be implemented prior to the period of extended operation."

Section A.2.1.9, Diesel Fuel Monitoring Program, add

"This program will be enhanced to include periodic draining, cleaning, visual inspections, and ultrasonic measurement of the bottom surfaces of the fire pump diesel fuel oil tanks, EDG day tanks, and EDG fuel oil storage tanks. Also, this program will be enhanced to specify acceptance criteria for UT measurements of diesel generator fuel storage tanks within the scope of this program. These enhancements will be implemented prior to the period of extended operation."

Section A.2.1.11, External Surfaces Monitoring Program, add

"This program will be enhanced to include periodic inspections of systems in scope and subject to aging management review in accordance with 10 CFR 54.4(a)(1) and (a)(3). Inspections shall include areas surrounding the subject systems to identify hazards to those systems. Inspections of nearby systems that could impact the subject systems will include SSCs that are in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(2). These enhancements will be implemented prior to the period of extended operation."

Section A.2.1.13, Fire Protection Program, add

"This program will be enhanced to inspect fire barrier walls, ceilings, and floors at least once every refueling outage. Inspection results will be acceptable if there are no visual indications of degradation such as cracks, holes, spalling, or gouges. This program will be enhanced to inspect at least one randomly selected seal of each type every 24 months. These enhancements will be implemented prior to the period of extended operation."

Section A.2.1.14, Fire Water System Program, add

"This program will be enhanced to include inspection of hose reels and spray and sprinkler systems internals for evidence of corrosion. The acceptance criteria will be enhanced to verify no unacceptable signs of degradation. A sample of sprinkler heads will be inspected using guidance of NFPA 25 (2002 Edition) Section 5.3.1.1.1. This program will also be enhanced to include wall thickness evaluations of fire protection piping using non-intrusive techniques (e.g., volumetric testing) to identify evidence of loss of material due to corrosion. Wall thickness inspections will be performed before the end of the current operating term and at intervals thereafter during the period of extended operation. Results of the initial wall thickness evaluations will be used to determine the appropriate inspection interval to ensure aging effects are identified prior to loss of intended function.

These enhancements will be implemented prior to the period of extended operation."

Section A.2.1.16, Heat Exchanger Monitoring Program, add

"This program will be implemented prior to the period of extended operation."

Section A.2.1.19, Metal-Enclosed Bus Inspection Program, add

"This program will be implemented prior to the period of extended operation."

Section A.2.1.20, Non-EQ Instrumentation Circuits Test Review Program, add

"This program will be implemented prior to the period of extended operation."

Section A.2.1.21, Non-EQ Insulated Cables and Connections Program, add
"This program will be implemented prior to the period of extended operation."

Section A.2.1.22, Oil Analysis Program, add
"This program will be enhanced to periodically sample oil in the oil-filled cable system, the security generator, and the fire pump diesel. This program will be enhanced to include viscosity and neutralization number determination of oil samples from components that do not have regular oil changes. This program will be enhanced to include particulate and water content for oil replaced periodically. These enhancements will be implemented prior to the period of extended operation."

Section A.2.1.23, One-Time Inspection Program, add
"The inspections will be performed within the 10 years prior to the period of extended operation."

Section A.2.1.24, Periodic Surveillance and Preventive Maintenance Program, add
"This program will be enhanced as necessary to assure that the effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis. These enhancements will be implemented prior to the period of extended operation."

Section A.2.1.26, Reactor Vessel Surveillance Program, add
"This program will be enhanced to proceduralize the data analysis, acceptance criteria, and corrective actions to meet the requirements of the ISP as found in BWRVIP-86-A, 102, 116, and 135. This enhancement will be implemented prior to the period of extended operation."

Section A.2.1.27, Selective Leaching Program, add
"This program will be implemented prior to the period of extended operation."

Section A.2.1.30, Structures Monitoring – Structures Monitoring Program, add
"This program will be enhanced to specify that manholes, duct banks, underground fuel oil tank foundations, manway seals and gaskets, hatch seals and gaskets, underwater concrete in the intake structure, and crane rails and girders are included.
This program will be enhanced to provide guidance for performing structural examinations of elastomers and rubber components to identify cracking and change in material properties.
This program will be enhanced to provide guidance for performing periodic inspections to confirm the absence of aging effects for lubrite surfaces in the torus radial beam seats and for lubrite surfaces in the torus support saddles.
This program will be enhanced to perform an engineering evaluation on a periodic basis of groundwater samples to assess aggressiveness of groundwater to concrete. This program will be enhanced to inspect any inaccessible concrete areas that may be exposed by excavation for any reason, or any inaccessible area where observed conditions in accessible areas, which are exposed to the same environment, show that significant concrete degradation is occurring.

These enhancements will be implemented prior to the period of extended operation."

Section A.2.1.31, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program, add
"This program will be implemented prior to the period of extended operation."

Section A.2.1.32, Water Chemistry Control – Auxiliary Systems Program, add
"This program will be enhanced to provide guidance for sampling the control room and relay room chilled water, decay heat removal cooling water, and security generator jacket cooling water. This enhancement will be implemented prior to the period of extended operation."

Section A.2.1.35, Bolting Integrity Program, add
"This program will be enhanced to include guidance from EPRI NP-5769 and EPRI TR-104213. This program will be enhanced to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC and to clarify the prohibition on use of lubricants containing $MoS_2$ for bolting. These enhancements will be implemented prior to the period of extended operation."

A JAF "Commitment List" is provided with this letter.

**RAI B.1.16.2-1**

The "scope of program" attribute for AMP B.1.16.2 states that the program implements applicable requirements of ASME Section XI, Subsections IWA, IWB, IWC, IWD and IWF, and other requirements specified in 10 CFR 50.55a with NRC approved relief requests.

The staff notes that there is no regulatory basis to include previously granted inservice inspection (ISI) relief requests within the scope of a license renewal application because the NRC's approval of the relief requests does not extend beyond the scope of the current operating period and because these requests are not subject to processing under the requirements of 10 CFR Part 54. The same holds true for alternative programs that have previously been granted on applicable ASME Section XI inservice testing (IST) requirements.

The staff therefore requests that the applicant either amend the LRA to delete any and all references to relief requests for ASME ISI or IST requirements or amend the LRA to provide a commitment that any new or renewed relief requests that are sought for during the period of extended operation will be processed through the NRC's 10 CFR 50.55a relief request provisions after the operating license for the facility has been renewed.

**RAI B.1.16.2-1 Response**

Since ASME code relief requests have their own process under 10 CFR 50.55a, reference to relief requests in the LRA is unnecessary. The following changes are made to the LRA to remove reference to relief requests.

- Table of Contents, Page xx, replace "Relief" with "Exemption" in the title of Section 4.2.5.

- Table 4.1-1, Page 4.1-3, replace "relief" with "exemption" in the row for section 4.2.5, first column.
- Section 4.2.5, Page 4.2-8, replace "Relief" with "Exemption" in the title. Also replace the words "relief" and "relief request" with "exemption" in the text.
- Table 4.2-4, Page 4.2-9, revise the second Plant / Parameter Description as follows (strike-outs deleted).

  Neutron fluence at the end of the
  ~~requested relief~~ period, n/cm2

- Section 4.2.6, Page 4.2-10, replace the word "relief" with "exemption" in the text.
- Section 4.7.3.5, Page 4.7-3, replace the word "relief" with "exemption" in text of item (4).
- Appendix A Table of Contents, Page A-ii, replace "Relief" with "Exemption" in the title of Section A.2.2.1.5.
- Section A.2.2.1.5, Page A-22, replace "Relief" with "Exemption" in the title. Also replace the words "relief" and "relief request" with "exemption" in the text.
- Section A.2.2.1.6, Page A-23, replace the word "relief" with "exemption."
- Section B.1.6, Page B-26, in exception Note 1, delete the last sentence.
- Section B.1.7, Page B-29, in exception Note 3, delete the last sentence.
- Section B.1.16.2, page B-58, first paragraph in Scope of Program is revised as shown below (strike-outs deleted).

The ISI Program manages cracking, loss of material, and reduction of fracture toughness of reactor coolant system piping, components, and supports. The program implements applicable requirements of ASME Section XI, Subsections IWA, IWB, IWC, IWD and IWF, and other requirements specified in 10 CFR 50.55a ~~with approved alternatives and relief requests~~. Every 10 years the ISI Program is updated to the latest ASME Section XI code edition and addendum approved by the NRC in 10 CFR 50.55a.

**RAI 3.6.1-4-1**

In JAFNPP LRA Table 3.6.1-4, the applicant states that aging effects defined in NUREG 1801 are not applicable to the inaccessible medium-voltage cables which are not subject to 10 CFR 50.49 EQ requirements. The staff requests the applicant to provide the following information:

a. A detailed explanation of how the review was conducted and the criteria used to determine that JAFNPP has no inaccessible medium-voltage cables requiring aging management. Provide a list of cables considered for the review.

b. If medium-voltage safety-related cable such as residual heat removal service water pump is inaccessible, provide a technical justification of why an AMP is not required or provide an AMP that contains the required ten elements.

**RAI 3.6.1-4-1 Response**

a. The cables that are susceptible to water treeing are those exposed to significant moisture and subject to significant voltage (energized at least 25% of the time at 2kV to 35kV). In Section 2.5 of the LRA, inaccessible medium-voltage cables were excluded from aging management review based on the statement, "JAFNPP does not have any inaccessible underground medium volt cables that perform a license renewal intended function."

The method used for identifying medium-voltage cables was to review the electrical cable and raceway information system for all "H" level cables. At JAFNPP, the "H" designation is for 2kV to 35kV insulated cables. A review of JAFNPP drawings and cable information system identified inaccessible medium voltage cables. The medium-voltage cables were then screened for exposure to moisture (was the routing underground), and type of service (was the cable energized > 25%). The core spray pump motor cables and the residual heat removal pump motor cables are the only inaccessible medium-voltage cables that have a license renewal intended function, are potentially exposed to moisture, and are energized greater than 25% of the time. These cables are in the EQ program and therefore, are replaced based on qualified life and are not subject to aging management review.

JAFNPP has no non-EQ inaccessible medium voltage cables that support an intended function.

b. The RHR service water pump motor cables are not exposed to moisture; therefore, they were screened out. As stated previously, the only cables that met the criteria for inaccessible medium-voltage cables are subject to 10 CFR 50.49 EQ requirements. EQ cables are replaced based on qualified life, therefore, in accordance with 10 CFR 54.21(a)(1)(ii), they are not subject to aging management review.

**RAI 3.6.2-1**

In JAFNPP LRA Table 3.6.2-1, the applicant states that 115 KV oil-filled cable (passive electrical for station blackout) has no aging effect requiring management for meeting the component's electrical intended function. The staff requests the applicant to provide a technical justification of why an AMP is not required or provide a plant-specific AMP that contains the required ten elements to manage the aging effects due to aging mechanisms such as insulation degradation, moisture intrusion, elevated operating temperature, and galvanic corrosion. In addition, explain what periodic tests are planned prior to and during the extended period of operation.

**RAI 3.6.2-1 Response**

The JAFNPP aging management review determined there were no aging effects requiring management for the oil-filled cables for the "provide electrical connection" function.

The underground oil-filled cable environment is constant temperature soil, ambient temperature, and moisture. The underground oil-filled cables are 350 MCM hollow core copper, oil with impregnated paper / copper wall / intercalated with paper tape / copper bearing lead wall and a polyethylene protective jacket. The underground oil-filled cables use a lead sheath to prevent effects of moisture on the cables. This cable is designed with a thick layer of lead over the cable insulation and an overall jacket over the lead and insulation. Lead sheath cables are designed for submergence for extended periods.

Operating experience was reviewed by searching JAF condition reports and interviewing knowledgeable plant staff. No failures were identified. This is consistent with the industry operating experience for this type of cable system.

The mechanisms / stressor identified in this question are not an issue for this type of cable. A lead-sheathed cable is not susceptible to moisture intrusion. There are no environment issues associated with degradation of the paper insulation. This is supported by plant and industry OE. Elevated operating temperature is not an issue since the cables are designed for the load and do not operate in an area of elevated temperatures. There are no dissimilar metal connections, so galvanic corrosion is not an issue. Since the cable is lead-sheathed, the insulation material is protected from moisture

Since there are no aging effects requiring management, an aging management program is not required. This is consistent with the position accepted by the staff for the Joseph M. Farley Nuclear Plant, which is documented in Section 3.6.2.3.5 of NUREG-1825. The staff agreed that no AMP for the electrical connection function of the oil-static cables at Farley is required since plant-specific and industry operating experience reviews identified no cases where failure of the oil impregnated paper insulation system occurred and since the connections between the oil filled cables and the switchyard conductors were subject to aging management review as part of the switchyard bus component type. Since JAFNPP has experienced no failures of the oil-filled cable insulation, since the industry operating experience cited by Farley is also applicable to JAFNPP, and since the connections at JAFNPP are subject to aging management review as part of the switchyard bus component type, this conclusion is also applicable to JAFNPP.

**RAI Appendix B-1**

In JAF LRA Section B.0.6, "Correlation with NUREG- 1801 Aging Management Programs", the applicant states that the following NUREG AMPs are not applicable to JAFNPP:

1. XI.S7 - Regulatory Guide (RG) 1.127 Water Control Structures
2. XI.S8 - Protective Coating
3. XI.M23 - Inspection of Overhead Heavy Load and Light Load Handling Systems

1. Degradation of water-control structures has been detected, through RG 1.127 programs, at a number of nuclear power plants, and in some cases, required remedial actions. The staff requests the applicant to provide an AMP that contains the required ten elements or provide a technical justification of why an AMP is not required.
2. NRC Generic Letter 98-04 and RG 1.54, Rev. 1 describe industry experience pertaining to coatings degradation inside containment and the consequential

clogging of sump strainers. Monitoring and maintenance of Service Level I coatings conducted in accordance with Regulatory Position C4 is expected to be an effective program for managing degradation of Service Level I coatings, and consequently an effective means to manage loss of material due to corrosion of carbon steel structural elements inside containment. The staff requests the applicant to provide a technical justification of why an AMP is not required or provide an AMP that contains the required ten elements.

3. Explain how the effects of general corrosion on the crane and trolley structural components for those cranes that are within the scope of 10 CFR 54.4, and the effects of wear on the rails in the rail system are managed at JAFNPP. The staff requests the applicant to provide a technical justification of why an AMP is not required or provide an AMP that contains the required ten elements.

**RAI Appendix B-1 Response**

1. The AMP that addresses water-control structures is the Structures Monitoring Program (SMP). The water-control structures at JAFNPP are the intake structure, intake canal, and discharge canal. The intake structure, intake canal, and discharge canal are not an earthen structures, but comprise typical structural elements and commodities that are the same as those included in the Structures Monitoring Program. The attributes of the NUREG-1801 XI.S7 AMP applicable to the intake structure, intake canal, and discharge canal structural elements and commodities are included in the Structures Monitoring Program, Section B.1.27.2 of Appendix B. Attributes of the NUREG-1801 XI.S7 AMP that are not included in the Structures Monitoring Program apply to earthen structures and are not applicable to the intake structure, intake canal, and discharge canal.

2: The Containment Inservice Inspection (LRA Section B.1.16.1) and Containment Leak Rate programs (LRA Section B.1.8) are credited for managing loss of material due to corrosion for the drywell steel shell and attachments. Coatings are not credited for managing degradation of the drywell shell and preventive measures to protect the drywell shell are not dependent on coating condition.

However, JAFNPP coatings applications are controlled and inspected per site specification IS-M-01. Accordingly, drywell and torus interior coating (service level 1) are inspected under the IWE Program every refueling outage for signs of degradation such as flaking, peeling, cracking, blisters, and discoloration.

3: Loss of material due to general corrosion on crane and trolley structural components for cranes that are within the scope of 10 CFR 54.4 and loss of material due to wear on the rails in the rail system are managed via visual inspection under the plant-specific Periodic Surveillance and Preventive Maintenance Program, LRA Section B.1.22 and the Structures Monitoring Program, LRA Section B.1.27.2 enhancements.. For managing loss of material, the preventive maintenance task and structures monitoring are consistent with the program described in XI.M23, Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems, which states that crane rails and structural components are visually inspected on a routine basis for degradation.

**RAI B.1.16-1**

The staff notes that the "operating experience" attribute for containment inservice inspection aging management program (LRA AMP B.1.16.1) did not identify the recent operating experience related to torus cracking identified in 2005 at JAFNPP. The staff requests the applicant to provide a detailed discussion of the plant-specific operating experience and its impact on the aging management of the torus in LRA.

**RAI B.1.16-1 Response**

The root cause of the cracking leading to the torus leak identified at JAFNPP on June 27, 2005, was the design of the torus in the area of the HPCI exhaust line.
The physical cause of the torus crack initiation was a localized stress, high cycle fatigue from pressure pulses due to rapid condensation of HPCI turbine exhaust (condensation oscillation) during HPCI operation in combination with a high stress concentration at the torus ring girder gusset weld and increased mean stress levels from residual welding stress in the weld heat-affected zone. Fatigue occurred in the torus shell area immediately adjacent to large, highly restrained attachment welds on the inner and outer diameter of the torus shell. Once crack initiation began, crack propagation was mainly due to continuing condensation oscillation loads during HPCI operation. The lack of an end return for the torus ring girder gusset welds, which created a stress riser due to the discontinuity at this location, was identified as a contributing cause.

Corrective actions included the following.

- Forensic analysis and NDE were completed for this location and other areas considered potentially susceptible.
- The fatigued portion of the torus shell was repaired, tested, and inspected.
- A steam exhaust sparger assembly was added to the end of the HPCI exhaust line, and a modification was made in the area of the ring girder gusset attachment.

A latent root cause was inadequate information transfer to JAFNPP from General Electric and other nuclear facilities due to a lack of formality in sharing operating experience prior to the advent of General Electric Service Information Letters (SILs) and the JAFNPP operating experience (OE) program. Ten of the thirteen stations having Mark I containments and HPCI systems had already installed condensing spargers to prevent this problem. Since these stations had four different architect-engineering firms, there is an implication that the information leading to sparger installation was obtained from General Electric although no documentation was found that confirms this.

Corrective actions included the following:

- An organizational and programmatic evaluation was performed. The results indicated that no additional corrective actions were required as the error relates to inadequate organizational interface prior to establishing SILS and the JAFNPP OE program.

Industry containment inspection programs (such as ASME Section XI, IWE for Class MC Components), which rely on visual examinations without identification of areas subject to fatigue due to high local stresses for augmented inspections, were identified as a contributing cause of this failure.

Corrective actions included the following:

- The Containment ISI program was revised to incorporate augmented inspections of the torus based on the results of this failure analysis.
- Other nuclear stations were notified of the results of this JAFNPP investigation by a report issued to the EPRI Risk Informed ISI Project Manager, a Licensee Event Report, and an updated Industry Operating Experience message.

Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

Reference for RAI E-1-g-1

**Figure E-1-g-1**

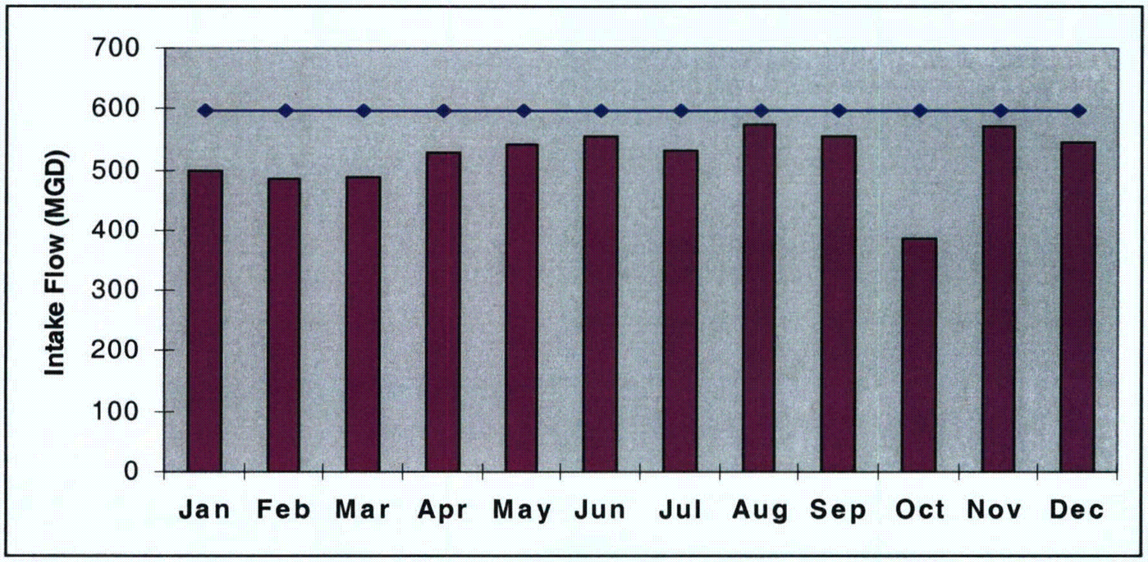


Figure E-1-g-1. Actual average monthly total intake water withdrawal flow rate (millions of gallons per day) at JAFNPP (red bars) compared to the maximum permitted total intake water withdrawal flow rate (blue line) for the period 2001-2005.

**Figure E-1-g-2**

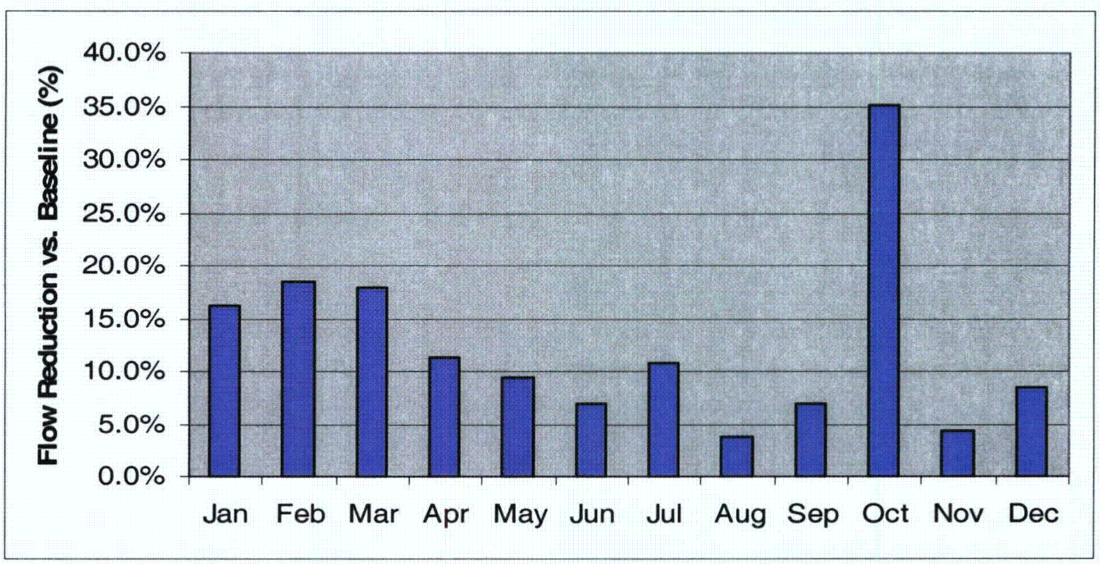


Figure E-1-g-2. Percent flow reduction for the actual average monthly total intake water withdrawal at JAFNPP compared to the maximum permitted total intake water withdrawal for the period 2001-2005.

Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

Reference for RAI E-1-g-2

NIAGARA MOHAWK POWER CORPORATION

POWER AUTHORITY OF THE STATE OF NEW YORK

# 1978
# NINE MILE POINT AQUATIC ECOLOGY STUDIES

MAY 1979

TEXAS INSTRUMENTS INCORPORATED
ECOLOGICAL SERVICES
P.O. Box 225621
Dallas, Texas 75265

FORM 1[illegible]2 R 1-51

NIAGARA MOHAWK

B. Gorman
DCC

FROM J. M. Toennies

TO Mr. R. C. Clancy

DISTRICT Syracuse

DATE June 5, 1979 FILE CODE

SUBJECT 1978 Nine Mile Point Aquatic Ecology Studies

The attached report entitled, "1978 Nine Mile Point Aquatic Ecology Studies," was submitted to the NRC on May 31, 1979 in accordance with the Environmental Technical Specifications for Nine Mile Point Unit 1 and the James A. Fitzpatrick Nuclear Power Plant.

J M Toennies

CAB/mal

Attachment

cc: Messrs. W. C. Hiestand
J. L. Hilke
T. J. Perkins
M. Hedrick (2)
J. Leonard
B. Gorman (2)
Public Relations
Energy Information Center
Engineering Library

1978

# NINE MILE POINT AQUATIC ECOLOGY STUDIES

Prepared for

NIAGARA MOHAWK POWER CORPORATION
Syracuse, N.Y.
and
POWER AUTHORITY OF THE STATE OF NEW YORK
New York, N.Y.

Prepared by

TEXAS INSTRUMENTS INCORPORATED
Ecological Services
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Dallas, Texas 75265

May 1979

FOREWORD

This 1978 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 1978. 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 December and impingement and entrainment studies at both power stations during the entire year. The ecological studies were conducted in accordance with the Environmental Technical Specifications prepared by the U. S. Nuclear Regulatory Commission.

The objective of this report is to sumarize the results of the 1978 program, presenting data on the major biotic components in the lake in the vicinity of the plant, including phytoplankton, zooplankton, periphyton, benthic invertebrates, and fish (including eggs and larvae). Emphasis in this report is placed on descriptions of the composition of each biotic component and the distribution of these biotic groups with respect to time and space. Comparisons are made among samples from the discharge plume areas, from areas of the lake that are outside the 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 the biota and on water quality in the area.

The data base for the 1978 studies has been presented previously in tabulated form (1978 Data Report, Texas Instruments Incorporated 1979) and provides supportive information for this report.

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SECTION I

SUMMARY

A. SUMMARY OF LAKE ONTARIO STUDIES

1. Phytoplankton

During the 1978 study, 223 phytoplankton taxa were observed in the vicinity of Nine Mile Point, but only 51 accounted for 2 percent or more of the number of organisms collected during any one sampling period. Blue-green and green algae and diatoms represented 78 percent of the taxa observed. Diatoms dominated the phytoplankton community during the months of April, May, June, and December, while blue-green algae dominated from July through November. The second most abundant groups were green algae in July-October and phytoflagellates in April and November.

Total phytoplankton cell densities were lowest in April and highest in November. A late-spring peak in cell densities occurred in May and June.

No spatial trends in abundance with respect to stations or control and experimental areas in the vicinity of Nine Mile Point were observed for total phytoplankton or major groups, although, based on annual contour means for total phytoplankton, there was a slight decreasing density gradient from the 10- to the 60-foot contour. Wind-induced turbulence tends to prevent significant monthly differences in spatial distribution.

Examination of the temporal distribution of chlorophyll a revealed peak concentrations in May and June (coinciding with spring cell density peaks) and lowest concentrations in September when phytoplankton densities were low. There were no spatial distribution trends among stations or between control and experimental areas. Based on annual contour means, chlorophyll a concentrations slightly decreased from the 10- to the 60-foot depth contour.

Primary production rates were highest in June and lowest in September, generally exhibiting trends similar to those of phytoplankton cell densities. There were no monthly spatial differences among stations, but annual mean primary production values along depth contours indicated that the 60-foot depth contour had the lowest and the 20-foot depth contour the highest.

The phytoplankton study during 1978 revealed no appreciable influence by power-plant operations in the Nine Mile Point vicinity on the number of taxa, temporal or spatial distribution, chlorophyll a concentrations, or primary production.

2. Microzooplankton

During 1978 sampling, 47 microzooplankton taxa were collected with rotifers dominating the samples. Number of organisms peaked in July following gradual monthly increases from the initiation of sampling in April. Rotifers were typically more abundant in samples from the shallower depth contours (10- and 20-foot) than from the deeper ones (40- and 60-foot) and, at those shallower contours, higher numbers of total microzooplankton also were observed during July and August.

No differences between transects or experimental (NMPP and FITZ) and control (NMPW and NMPE) areas were observed, indicating that operations of the power plants had no effect on the microzooplankton community.

3. Macrozooplankton

Cladocerans were the dominant group of macrozooplankton collected during the 1978 sampling regime. However, calanoid copepods represented virtually 100 percent of the organisms collected during April and May.

Macrozooplankton densities peaked three times: April, dominated by calanoid copepods; June, with a mixed dominance of copepods and cladocerans; and September, dominated by cladocerans. Densities of copepods were slightly greater at the 60-, 80-, and 100-foot contours than at the 20- and 40-foot contours, but no onshore-offshore trends were discerned for total macrozooplankton. The differences noted between transects were transient, probably representing natural variation in local populations and nearshore current effects. There were no differences between experimental and control areas, indicating little or no power-plant impact on the macrozooplankton populations.

4. Periphyton

In both bottom and suspended periphyton samples, green algae were the most diverse (greatest number of taxa), while the blue-greens were numerically dominant. In both bottom and suspended samples a blue-green, Lyngbya sp., was the numerically dominant taxon, often representing more than 90 percent of the total density. Suspended periphyton densities were greatest in June, while bottom periphyton densities were greatest in August and October. Biomass was greatest during August (suspended) and May (bottom) sampling.

Density and biomass for both bottom and suspended periphyton generally decreased with depth and the concomitant loss of light for photosynthetic activity. Although suspended periphyton density and biomass were slightly greater at experimental than at control transects, no differences between control and experimental areas were found for bottom periphyton.

Although the thermal plume may stimulate growth of suspended periphyton, this probably has little biological consequence in the natural lake ecosystem because suspended periphyton is an artificial situation (i.e., the sampling technique provides substrates within the water column where none exist naturally). Also, bottom periphyton are not affected by power-plant discharges because light is limited at the discharge (20-foot) contour and the plume mixes efficiently and moves upward to the surface.

5. Benthic Invertebrates

The 1978 benthic invertebrate samples were numerically dominated by amphipods (scuds) and oligochaetes (aquatic earthworms). The scud, Gammarus fasciatus comprised 40 percent of the total number of benthic organisms collected and was most numerous at the experimental transects.

Total annual biomass appeared to be dominated by Bryozoa; however, this resulted from collection of a large mass of colonies in a single June sample. Without the influence of this single sample, scuds represented the greatest biomass.

In general, numbers and biomass per sample increased from May through September and decreased with increasing water depth. Experimental and control areas showed no real differences in total benthic densities. Taxonomic composition differences between transects apparently resulted from differences in substrate type.

6. Ichthyoplankton

The eggs of five fish taxa were collected in the vicinity of Nine Mile Point from early May through mid-August. Alewife eggs dominated the collections, peaking in density in mid-July and exhibiting consistently more abundance at night. No consistent trend was observed in egg distribution at stations along the 20- and 40-foot depth contours, suggesting no apparent influence of thermal discharges from the two power stations.

The larvae of 20 taxa were collected from April through November. Alewives dominated larval catches. Densities were greatest during July and August, but two minor peaks occurred prior to July: the first, in mid-May, was due primarily to an increase in yellow perch; the second, in mid-June, was the result of increasing densities of rainbow smelt and Morone spp. The number of larvae decreased rapidly during late August, and densities were low after mid-September. Larval densities were greatest at night. Younger larvae generally decreased in density as distance from shore increased (i.e., at deeper depth contours), whereas older larvae were more uniformly distributed with respect to depth contours. A similar onshore- offshore distribution of younger larvae was observed in previous years at Nine Mile Point. Prolarvae and postlarvae distribution along the 20- and 40-foot depth contours was relatively uniform and exhibited no consistent trend, suggesting no distributional trend with respect to the thermal plumes from the two power stations.

Species composition and temporal and spatial distribution patterns suggested that operation of the two power stations had no detrimental effect on fish eggs and larvae in the area.

7. Fish

Gill net, trawl, beach seine, and box trap caught 37 species in the Nine Mile Point vicinity during the 1978 study. Relative to frequency of occurrence, ten species were present in the area during every month of sampling, and five other species occurred during at least seven of the nine months. The species that dominated were alewife, spottail shiner, rainbow smelt, white perch, and yellow perch.

Temporal distribution varied according to gear. Gill-net catches; dominated by alewives, rainbow smelt, spottail shiners, white perch, and yellow perch were largest during May-July and October-November, and were significantly larger at night than during the day. Largest trawl catches were in May, when threespine stickleback comprised the majority of the catch, and in August and September, when young-of-the-year alewives and rainbow smelt dominated; night catches were usually larger than day catches. Beach-seine catches were small from April through July and increased markedly in August and September as young-of-the-year alewives became vulnerable to the gear. Young-of-the-year and adult spottail shiners were abundant in seine hauls during August and September, and threespine stickleback and brown trout were relatively abundant in May and June. The temporal distribution patterns were typical for fish populations in eastern Lake Ontario: large catches during spring and the first part of summer; small catches during mid-summer; and secondary peaks in abundance during late summer and fall when young-of-the-year grew to catchable size.

Spatial distribution based on gill-net catches indicated that fish were most abundant along the 15-foot depth contour and least abundant along the 60-foot contour. Catches along the 15-foot depth contour were usually smallest at the westernmost station (NMPW). Catches at the four stations along the 30- and 40-foot contours displayed no distinct abundance trends during spring and summer, although catches were usually larger at the easternmost stations (FITZ and NMPE) during fall. Catches along the 60-foot depth contour were largest at FITZ during eight of the nine months of the study but varied from month to month, displaying no consistent temporal trend. Overall, spatial distribution of gill-netted fish displayed no consistent trends with respect to the experimental and control areas. Trawl catches along the 20-foot contour were generally larger at stations NMPW and NMPP/FITZ during May-August and at stations NMPW/FITZ and NMPE during September. Along the 40-foot contour, abundances were greater at stations NMPW and NMPP/FITZ during April-September, and along the 60-foot contour, they were largest at experimental transect NMPP/FITZ during May-July and September and were equally large at control transects NMPW and NMPE in August. After September, trawl catches at all depth contours were small and sporadic. Beach-seine annual mean catch rates were highest at experimental station NMPP, primarily because of an extremely large catch of alewife during September. During May, June and August when seine catches were also relatively large, the catch was larger at control transect NMPE than at the other three seining locations.

8. Water Quality

Evaluation of temperature and water quality data revealed that values were well within normal ranges for the Nine Mile Point area specifically and Lake Ontario generally. Neither the thermal cycle nor the physicochemical conditions appeared to be disrupted by operation of the Nine Mile Point and James A. FitzPatrick power plants. No consistent differences in thermal or physicochemical conditions existed between control and experimental transects. Thermal effects 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.

Although not specifically determined, the greatest influences in the Nine Mile Point area appeared to come from the Oswego River, the west-to-east longshore currents, and the upwelling and inshore movement of colder hypolimnetic waters.

## B. SUMMARY OF IMPINGEMENT AND ENTRAINMENT STUDIES

### 1. Impingement — Nine Mile Point Unit I

There were 41 taxa in impingement samples collected at the Nine Mile Point power plant during 1978. Estimated annual impingement was approximately 267,000 fish weighing approximately 4,350 kilograms, and compared with previous years this estimated total impingement was low. No threatened or endangered species were collected during 1978.

Numerically, threespine sticklebacks, alewives, or rainbow smelt dominated the catch during each month. In terms of biomass, however, gizzard shad, alewives, and rainbow smelt were dominant. Impingement rates were highest in spring (April) and winter (January and December). Length-frequency distribution showed that primarily adults and subadults were impinged in winter and spring while impingement samples were primarily young-of-the-year in summer and fall. Impingement was usually greater at night than during the day.

2. Impingement - James A. FitzPatrick

At the James A. FitzPatrick power plant during 1978 an estimated 424,000 fish of 45 taxa weighing approximately 6,400 kilograms were impinged. As at Nine Mile Point, impingement at James A. FitzPatrick during 1978 was low compared with most of the previous years and no threatened or endangered species were collected.

Numerically, threespine sticklebacks, rainbow smelt, and alewives dominated impingement sampling; gizzard shad and alewives comprised approximately 65 percent of the total biomass. Impingement rates were highest during spring and lowest during late summer. Most fish impinged during winter and spring were adults and subadults; during summer and fall, most were young-of-the-year. Impingement was greater at night than during the day.

3. Entrainment - Nine Mile Point Unit 1

Compared with the variety of fish egg and larval species observed in Lake Ontario samples, few were collected in entrainment samples taken at Nine Mile Point. Low numbers of eggs were collected in entrainment samples from late June through early August, and only alewife and unidentified eggs were represented. Larvae were entrained from May through August, but samples contained only four taxa: alewife, rainbow smelt, yellow perch, and tessellated darter.

4. Entrainment and Viability — James A. FitzPatrick

a. Phytoplankton

Chlorophyll a concentrations of intake samples for the 7-hour incubation period ranged from a high of 13.72 micrograms per liter in May to lows of 0.47 and 0.61 micrograms per liter in February and September respectively. Lake chlorophyll a concentrations reflected a similar temporal trend. The samples incubated for 24, 48, and 72 hours exhibited temporal trends similar to the 7-hour incubation-period samples. No consistent differences in chlorophyll a concentrations among day and night samples were observed.

Chlorophyll a discharge/intake ratios (a measure of the effects of plant entrainment) for the 7-, 24-, and 48-hour incubation periods revealed a small reduction in concentrations at the discharge during approximately 60 percent of the sampling periods, indicating that chlorophyll a within the phytoplankton community was reduced somewhat due to entrainment through the plant. The plume simulation/intake ratios, suggested that entrainment into the thermal plume in the lake had no effect on chlorophyll a.

Primary production values for intake samples were low during January-March and early September. Production peaked during April-August. Lake samples exhibited a similar temporal trend for primary production. When day and night primary production data at the intake were compared, 60 to 79 percent of the day samples had higher production than night samples.

Discharge/intake ratios indicated a slight decrease in primary production values in the discharge when compared with the intake, suggesting some impact during plant entrainment. Plume simulation/intake ratios indicated that plume entrainment decreased primary production slightly.

b. Zooplankton

Rotifers, copepods, cladocerans, and protozoans were the dominant groups of organisms found in entrainment samples taken in 1978 at the James A. FitzPatrick intake. A total of 70 taxa were identified. Density estimates exhibited temporal trends similar to those observed in Lake Ontario microzooplankton samples from the 20-foot depth contour (approximate area where intake cooling water is taken).

Entrained organisms are subject to mortality as a result of thermal and mechanical stresses. For only a portion of the 1978 sampling season was there a direct relationship between plant operations (water volume, $\Delta T$, and discharge temperature) and zooplankton mortality. Changes in modes of plant operation confounded results of the viability studies. No consistent relationships were observed between $\Delta T$ and percent mortality. However, high discharge temperatures, especially in some summer samples, coincided with high percent mortality of zooplankton.

c. Ichthyoplankton

Fish eggs, including those of alewife, tessellated darter, and white perch, were collected from the James A. FitzPatrick intake or discharge during July and August. Nine taxa of larvae were observed in entrainment samples, but only alewife and rainbow smelt larvae were present during more than two sampling periods. Eggs and larvae were generally observed in entrainment samples when they were most abundant in the lake. Average larval densities in entrainment samples were lower than in Lake Ontario and represented fewer taxa (9 versus 20).

Viability sampling yielded primarily alewife and rainbow smelt. The low numbers of eggs and larvae in viability samples precluded any conclusions with respect to mortality or survivability following entrainment.

## SECTION II
## INTRODUCTION

### A. STUDY OBJECTIVES

Ecological studies in the vicinity of the Nine Mile Point promontory during 1978 represent continuing efforts begun in the late 1960s by the Power Authority of the State of New York (PASNY) and Niagara Mohawk Power Corporation (NMPC) 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. A third nuclear station (Nine Mile Point Nuclear Station Unit 2) is under construction at this site.

This annual report fulfills the utility's commitment to assess changes, if any, in the aquatic ecosystem caused by power plant operations. The studies fulfill monitoring requirements imposed by the Nuclear Regulatory Commission (NRC) in licenses issued to the Nine Mile Point Unit 1 and James A. FitzPatrick plants. Other aspects of these studies fulfill the requirements of a Stipulation Agreement between the utilities and the Aquatic Advisory Committee for the Nine Mile Point site.

In addition to the requirements noted above, the program is designed to provide the following information:

- Postoperational data relating to aquatic ecology in the vicinity of the Nine Mile Point Unit 1 and James A. FitzPatrick plants
- Analyses to support future recommendations for more cost-effective monitoring of the aquatic environment that would still assure protection of the ecosystem over the life of the stations

## B. NINE MILE POINT AND JAMES A. FITZPATRICK POWER STATIONS

Nine Mile Point Nuclear Station Unit 1 uses a boiling water reactor to provide 610 MWe (net) of electrical power capacity. The maximum cooling water flow of 597 cubic feet per second (cfs) for this unit is taken from the lake through a submerged intake approximately 850 feet offshore of the site (Table II-1). This flow is returned to the lake through a submerged discharge at temperatures up to 17.3°C (31.2°F) higher than the intake temperature.

Table II-1

Operating and Structural Characteristics of Nine Mile Point Unit 1 and James A. FitzPatrick Nuclear Power Stations*

| Operating Characteristics | Nine Mile Point UNIT 1 | | James A. FitzPatrick | |
|---|---|---|---|---|
| Generating capacity (MWe) | 610 | | 821 | |
| Cooling water flow (gpm)<br>Condenser (all pumps)<br>Service water/pump | <br>250,000<br>18,000 | | <br>352,300<br>17,900 | |
| Heat rejection (BTU/hr) | $4.0 \times 10^9$ | | $5.7 \times 10^9$ | |
| Cooling water temperature rise (°F) | 31.2 | | 31.5 | |
| **Structural Characteristics** | **Intake** | **Discharge** | **Intake** | **Discharge** |
| Length of main tunnel from existing shoreline | 850 ft | 335 ft | 900 ft | 1260 ft |
| Number of openings | 6 | 6 | 4 | 12 |
| Size of opening | 5.5 ft high x 10.3 ft wide | 3.5 ft high x 7.3 ft wide | 8 ft high x 17.7 ft wide | 2.5 ft (inside diameter) |
| Other dimensions | 3-ft sill<br>6-in. roof | 3-ft sill<br>2-ft roof | 3-ft sill<br>6-in. roof | 5-6 ft above lake bed<br>Double ports at 150-ft spacing |
| Velocity through openings | 1.8 fps | 4 fps | 1.2 fps | 14 fps |
| Tunnel velocity | 8 fps | 8 fps | 1.4 fps (maximum) | 4.7 fps |
| Tunnel cross-section | 78 $ft^2$ | 78 $ft^2$ | 117 $ft^2$ | 117 $ft^2$ |
| Water velocity at screens | 0.85 fps | - | 1.4 fps | - |
| Water depth at structure | 24.5 ft (LWD) | 17 ft (LWD) | 24 ft (LWD) | 30 ft (LWD) (aver.) |
| Water depth to top of structure | 15.3 ft (LWD) | 10.0 ft (LWD) | 10 ft (LWD) | 23 ft (LWD) (aver.) |
| Total flow | 268,000 gpm (597 cfs) | 268,000 gpm (597 cfs) | 370,200 gpm (825 cfs) | 370,200 gpm (825 cfs) |

*Based on LMS (1975a)

The James A. FitzPatrick plant uses a boiling water reactor to provide 821 MWe (net) of electrical power capacity. The maximum cooling water flow of 825 cfs for this unit is taken from the lake approximately 900 feet offshore of the site (Table II-1). This flow is returned to the lake through a high-speed, submerged diffuser-type discharge at temperatures up to 17.5°C (31.5°F) higher than the intake temperature.

The James A. FitzPatrick plant intake is in approximately 24 feet of water. The intake openings face toward shore. The Nine Mile Point Unit 1 intake is in approximately 25 feet of water about 0.5-mile to the west of the FitzPatrick intake and discharge. The Nine Mile Point Unit 1 intake withdraws water from 360° in the horizontal plane. The Nine Mile Point discharge design is for a lower velocity than the FitzPatrick design and subsequently achieves less initial dilution of the discharge waters. The FitzPatrick discharge is designed with submerged jets to achieve rapid dilution of the discharge waters with ambient lake water. The locations of the intakes and discharges of the two plants are such that the main influence of plant operations would be at the 20- and 40-foot depth contours in the lake at the NMPP and FITZ transects (Figure II-1). The 316(a) Demonstrations for these two power stations (NMPC 1975, LMS 1976b) describe plant facilities in detail.

The James A. FitzPatrick Nuclear Station achieved criticality in November 1974 and began commercial operation on 28 July 1975. Table II-2 summarizes the plant generation outages for 1978. The average daily power output during 1978 for the James A. FitzPatrick Nuclear Station is given in Appendix Table H-2. Since commercial operation began, the plant has almost always operated above 500 MWe (gross output) when the unit was on line.

Nine Mile Point Unit 1 began commercial operation on 14 December 1969. Table II-2 summarizes the plant generation outages for 1978 and Appendix Table H-1 gives the average daily power output during 1978 for Unit 1. When the plant is on line, power generation usually exceeds 500 MWe and, like the FitzPatrick station, at least one circulating water pump (278 cfs) is usually running whenever power production is off.

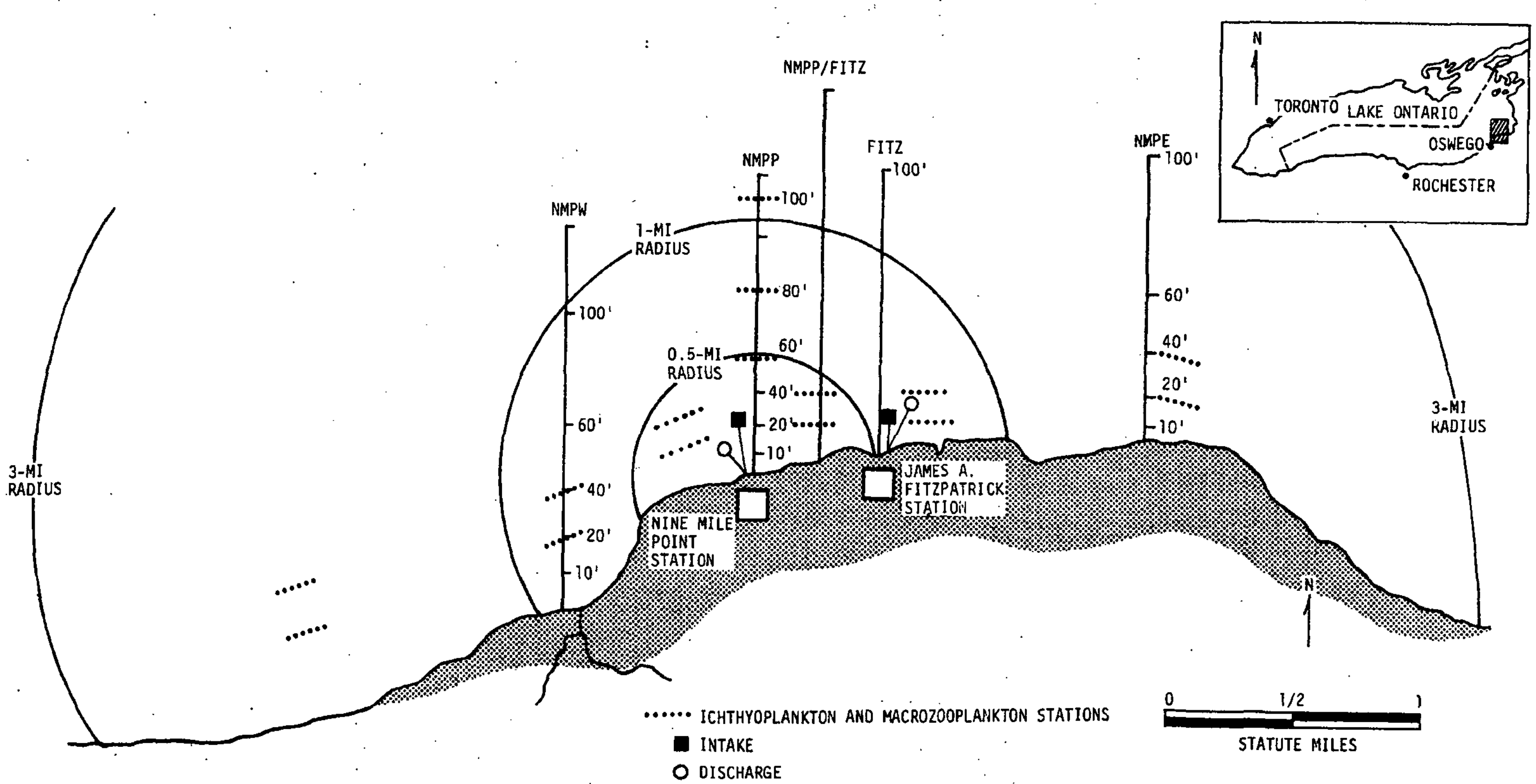



Figure II-1. Sampling Area for Nine Mile Point Aquatic Ecology Studies Showing Location of Sampling Transects and Intake and Discharge Structures

Table II-2

Record of Outages during 1978 at the Two Power Stations Located on the Nine Mile Point Promontory

| Nine Mile Point Unit I | | James A. FitzPatrick | |
|---|---|---|---|
| Start Date | Duration Generator Off* (days) | Start Date | Duration Generator Off* (days) |
| Jan 20 | 3 | Feb 24 | 7 |
| Feb 6 | 2 | Mar 17 | 2 |
| May 16 | 2 | Apr 18 | 4 |
| 20 | 7 | 26 | 6 |
| Aug 3 | 2 | Jun 21 | 2 |
| Sep 30 | 7 | Sep 8 | 1 |
| | | 16 | 85 |
| | | Dec 17 | 2 |
| | | 24 | 3 |

*Dates are inclusive in the outage duration. An outage could span two consecutive dates but have a total duration ranging from less than 2 hours to more than 47 hours. The incident on 20 January, for example, could be 1 complete day plus a few hours on the first and third days, or nearly 3 complete days.

Figure II-1 is a map of the area showing the general location of the two nuclear power stations, their submerged intakes and discharges, and sampling transects. The exact sampling locations and methods for each task of this study are presented in Section III of this report. For the purpose of this study, the "vicinity" of Nine Mile Point is defined as the area within a 3-mile radius of the generating stations.

## C. LAKE ONTARIO

### 1. Physical and Limnological Characteristics

Lake Ontario, the easternmost of the five Great Lakes, is roughly oval, 193 miles long, and 53 miles (maximum) wide. The maximum reported depth is approximately 840 feet, and average depth is around 300 feet. Lake Ontario has a surface area of 7,340 square miles and a volume of 390 cubic miles (U.S. Atomic Energy Commission 1973).

Approximately 80 percent of the water supplied to Lake Ontario enters through its natural inlet, the Niagara River, which discharges approximately 200,000 cfs into the lake. The outflow from the lake into the St. Lawrence River averages about 239,000 cfs. Presently, Lake Ontario has a consumptive use near 300 cfs.

The levels and outflows of Lake Ontario are regulated by control structures on the St. Lawrence River under the supervision of the St. Lawrence River Board of Control. The mean monthly water levels of Lake Ontario are maintained between a minimum elevation of 243.06 feet above mean sea level and a maximum elevation of 248.04 feet.

Lake level data for 1978 showed minimum and maximum elevations of 243.7 and 246.6 feet respectively. The average elevation of Lake Ontario during 1900-1977 was 244.0 feet above mean sea level (U.S. Army Corps of Engineers 1979).

The temperature of Lake Ontario varies from about 0°C to 24°C and has a mean value of 7°C. During winter, the temperature of the lake is usually above 0°C. Normally, the lake freezes only along the shore and in sheltered bays; the center of the lake remains open and maintains a temperature near 4°C. The lake begins to warm by May, reaching highest summer temperatures in late July or early August. The temperature declines during the fall, reaching winter levels in middle to late December.

Lake Ontario was formed about 10,000 years ago during periods of severe glaciation and today is underlain by marine sedimentary rock-strata composed largely of shale and limestone. The shoreline is eroding at a relatively rapid rate, contributing a source of unconsolidated sands, clays, and gravels, which, with other sources, has deposited a sediment layer that is as thick as 35 feet in the deeper regions of the lake but is generally thinner elsewhere. There is very little sediment deposition along the New York shoreline near Nine Mile Point, especially in areas where water depth is less than 40 feet. Bottom substrates within the study area are composed primarily of bedrock overlain with large boulders or rubble (see Section IV, Table IV-20). Some sand and gravel deposits exist at the 40- and 60-foot depth contours.

The large area of Lake Ontario and its heat capacity provide periodic onshore and offshore breezes due to the heat differential of land and water surfaces. The exposure of the surrounding area to Lake Ontario and the flatness of the terrain allow wind speeds to be higher near the lake than in most inland areas [International Joint Commission (IJC) 1969].

Major cities on Lake Ontario include Toronto and Hamilton in the northwestern region and Rochester and Oswego in the southeastern region.

The major source of most pollutants in Lake Ontario is Lake Erie and its watershed via the Niagara River. The Oswego River, which empties into Lake Ontario about 6 miles west of the Nine Mile Point area, is also a major point source of several pollutants. The Oswego River drains some 5,100 square miles and receives municipal wastes equivalent to that of some 500,000 people (IJC 1969).

The water quality of Lake Ontario is dependent upon the interaction of numerous factors, including geomorphology and hydrology, hydrodynamics, meteorology, and man-made inputs. Intensive interest in Lake Ontario water quality has been a fairly recent phenomenon. Studies of Lake Ontario were completed around 1915 and again in 1947, but truly comprehensive studies were not undertaken until the early 1960s. A number of studies were executed throughout the 1960s, and studies are continuing. Lake Ontario generally has the highest concentration of inorganic pollutants of all of the Great Lakes; this is because inorganic pollutant concentrations in the other Great Lakes have been increasing steadily since about 1910, and much of this flows through the lakes into Lake Ontario.

Because of its great depth and dilution capacity, adverse eutrophication effects have been minimal in Lake Ontario compared with those for parts of Lake Erie. Oxygen saturation is usually above 80 percent in the hypolimnion during the summer and averages over 90 percent in the epilimnion throughout the year. Epilimnion values may exceed 120 percent, suggesting high primary productivity or wind-induced mixing (most probably the latter). During thermal stratification, significant chemical stratification may occur, but at relatively low mean values of nutrients. This chemical stratification is a result of seasonal variation in productivity and chemical composition. Nutrients such as orthophosphate, nitrate, and silica generally increase from surface to bottom, reflecting uptake by phytoplankton in the photosynthetic zone and perhaps release from the bottom sediments. During spring and fall overturns, the lake becomes homogeneous. Based on an assessment of oxygen saturation, transparency, nutrient concentrations, nutrient loadings, morphometry, and biological populations, Lake Ontario has been estimated to be between oligotrophic and mesotrophic (IJC 1969).

Data from many studies have been analyzed and are presented in Table II-4 as values representative of offshore waters of Lake Ontario under mixed conditions (QLM 1974). As discussed above, some of the nutrient values vary temporally and vertically. The major ionic species vary little, but the trace elements and compounds may vary greatly. For example, copper was found to range between 5 and 177 micrograms per liter during 1968 (Weiler and Chawla 1969) and between 0 and 2,200 micrograms per liter during 1967 (IJC 1969).

Water quality of nearshore stations has been found to vary from that of offshore stations in an irregular manner, affected by local sources of pollution, increased productivity of shallow waters, and the vagaries of currents. Nevertheless, water quality of stations several hundred to several thousand feet from shore and several thousand feet from pollutant sources would be expected to be similar to that presented in Table II-4. Contamination of certain game and nongame fish in Lake Ontario by Mirex and polychlorinated biphenyls (PCBs) has led New York to closely monitor the levels of these chemicals in fish. Neither Mirex nor PCB levels have been found in concentrations that would make Lake Ontario waters unsafe for consumption or recreation.

Table II-3

Water Quality Values Characteristic of Offshore Waters of Lake Ontario under Mixed Conditions*

| Parameter | Concentration (mg/l unless shown otherwise) |
|---|---|
| Calcium | 40 |
| Magnesium | 8 |
| Sodium | 12 |
| Potassium | 1.5 |
| Chloride | 28 |
| Sulfate | 30 |
| Bicarbonate | 115 |
| pH | 8.0 (units) |
| Total dissolved solids | 200 |
| Specific conductance | 300 (μmhos/cm) |
| Orthophosphate phosphorus | 0.015 |
| Total phosphate phosphorus | 0.025 |
| Ammonia nitrogen | 0.03 |
| Nitrate nitrogen | 0.20 |
| Nitrite nitrogen | 0.002 |
| Total Kjeldahl nitrogen | 0.2 |
| Silicon dioxide | 0.5 |
| Turbidity | 2 (JTU) |
| Total suspended solids | 3 |
| Phenol | 0.002 |
| Total coliform | <1 (counts per 100 ml) |
| Cadmium | 0.0001 |
| Chromium | 0.001 |
| Cobalt | 0.0001 |
| Copper | 0.01 |
| Iron | 0.01 |
| Lead | 0.003 |
| Lithium | 0.002 |
| Manganese | 0.001 |
| Nickel | 0.002 |
| Strontium | 0.18 |
| Zinc | 0.01 |

*Based on QLM (1974)

2. General Lake Currents**

In its simplest form, the large-scale general circulation of Lake Ontario is counterclockwise (cyclonic flow) with flow to the east along the south shore in a relatively narrow band and a somewhat less pronounced flow to the west along the north shore. The conceptual model that explains this average circulation is presented here with a minimum of detail.

**Most of this material is extrapolated from PASNY (1977).

a. Summer Circulation

A cool mound of water extends from surface to bottom in spring and from below the thermocline to the bottom in summer and fall (Sweers 1969). The baroclinic flow resulting from the horizontal temperature differences is initially directed outward from midlake toward shore. Although the flow is turned clockwise by the Coriolis effect, it is diminished due to bottom friction. This outward flow brings water inshore, where it begins to pile up. A surface slope (higher inshore than in midlake) develops into a barotropic current initially directed lakeward. The barotropic current is bent clockwise because of the Coriolis effect. The result is that the Coriolis effect and the barrier effect of the coastline trap the flow against the shoreline. Generally, the flow continues along the shoreline in an easterly direction as long as the surface slope is maintained.

Inflow from the Niagara River causes the water level at the western end of the lake to be higher than it is at the eastern end (on the average). The resulting flow down the gradient is held against the lake's south shore by the Coriolis effect, thereby enhancing the already existing barotropic flow along the south shore. Wind stress averaged over the year tends further to accelerate the flow to the east and decelerate the flow to the west.

b. Winter Circulation

The general circulation in winter is less well-documented. In late fall after overturn has occurred, the lake is essentially isothermal, thereby permitting a free exchange of water from surface to bottom. Average wind direction in winter is primarily from the west-northwest. The net surface flow that results is eastward, with westward return flow developing below the surface. The surface layer in the western end is advected to the east and is replaced by subsurface water (Sweers 1969). This large-scale upwelling at the upwind end of the lake and downwelling at the downwind end mix the surface and subsurface water on a scale that is not likely to occur during the rest of the year.

Pollutants that are limited to the upper layer during the time of a well-developed thermocline are diluted when the hypolimnetic water is made available for mixing. In spring, with the development of the thermocline, the bottom water is again partially insulated from the surface layer.

c. Transient Response

The general circulation just described is documented by observations collected over long periods (months). The circulation patterns that are observed at any given time, however, are more complex as a result of the transient wind distribution and the lake's response to the nonsteady wind. Sometimes, a major wind shift can alter the currents in a matter of hours; at other times, some features of the current pattern continue, even with an opposing wind (Csanady 1972). The response time of the currents to a shift in wind distribution is partially related to the scale of the current: large features such as the coastal jet respond more sluggishly, whereas the response nearer to shore is more rapid — 6 hours or less. Additionally, the deeper the current, the more slowly it responds. A shift in the currents as a result of wind shifts eventually changes the lake surface slope and the temperature field, forcing an alteration in much of the lake's circulation pattern.

3. Local Currents

In the course of preoperational studies for the James A. FitzPatrick plant, currents off the Nine Mile Point promontory were measured from May to October 1969 and from July to October 1970 (Gunwaldson et al 1970, PASNY 1971). The field data clearly illustrated a correlation between summer currents and wind speed. The correlation, an accepted principle of hydrodynamics, was theorized by Ekman (1928) and subsequently has been verified by numerous oceanographers (e.g., Neumann and Pierson 1966). Measurements of wind currents at lightships (Haight 1942) have been analyzed to determine the ratio of current speed to wind speed; reported values, commonly called the "wind factor," range between 0.005 and 0.030.

Wind-speed frequency data averaged over a 6-hour period indicate that winds exceeding 32 kilometers per hour (20 miles per hour) occurred 21.6 percent of the time over the year. For the summer months (June through September), winds exceeding 32 km/hr (20 mph) occurred 13.9 percent of the time. The current speed of 6-hour duration that was exceeded with comparable frequency in 14 meters (46 feet) of water was about 15 centimeters per second (0.5 feet per second). For a persistence of 24 hours, the current speed that was exceeded 13.9 percent of the time was 13.7 cm/sec (0.45 fps).

The predominant direction of currents in the studies previously described was alongshore, as dictated by continuity. On those occasions when onshore or offshore currents were observed, their magnitudes were substantially less than those of alongshore currents. During the summer, alongshore currents from both the west or east were equally frequent about 33 percent of the time. Onshore and offshore currents each accounted for nearly 5 percent of the observations; the remaining 30 percent of the observations were below the flowmeter threshold, 0.05 knots (2.5 cm/sec, 0.09 fps). At the 6.4-meter (21-foot) depth in 14.0 meters (46 feet) of water, the mean onshore current speed was 3.0 cm/sec (0.09 fps) and the mean offshore current speed was 6.0 cm/sec (0.2 fps). On the other hand, alongshore currents from the west and east averaged 9 cm/sec (0.3 fps).

Lake currents were measured at selected locations in the immediate vicinity of the Oswego Steam Station (about 6 miles west of Nine Mile Point) for 5 days between 12 October and 19 November 1970. These surface current velocities were mostly alongshore, with speeds ranging from less than 2.5 cm/sec (0.08 fps) to 15 cm/sec (0.50 fps). These data were consistent with measurements at Nine Mile Point and with wind current frequencies reported by Palmer and Izatt (1970) for Ontario waters of similar depth near Toronto, Canada.

## D. PREVIOUS STUDIES

In order to assess the effects of an electric generating station on the aquatic communities of a water body, the water quality of the area and the abundance, species composition, and distribution of the biota in relation to power plant operation must be delineated. This section provides background information for the Nine Mile Point area based on studies there as well as at other areas of Lake Ontario. Previous studies dealing with the major biological groups present in the study area are considered.

Prior to 1971, ecological investigations in the vicinity of Nine Mile Point were conducted by Dr. J.F. Storr under contract to Niagara Mohawk Power Corporation (Storr 1973). Dr. Storr collected data concerning the basic current flow patterns and the plankton, benthos, and fish populations observed in the area from 1963 to the early 1970s. In addition, Dr. Storr has continued to conduct extensive fish movement (tagging) studies in the area (Storr 1977).

Lawler, Matusky, and Skelly (LMS) conducted investigations of the aquatic ecosystem in the vicinity of Nine Mile Point from 1972 through early 1977. These studies were associated with Niagara Mohawk Power Corporation's fossil-fueled Oswego Steam Station as well as the two nuclear stations at Nine Mile Point. Because the generating stations at Oswego and Nine Mile Point are in close proximity (Oswego is approximately 6 miles to the west), ecological data from both sites are utilized to establish ecological conditions in the nearshore area.

The programs conducted by LMS (QLM 1973a, 1973b, and 1974; LMS 1975a, 1976a, and 1977a) at Nine Mile Point consisted of surveys of plankton (phytoplankton, zooplankton, and ichthyoplankton), benthos, and fish populations during spring through fall at various depths and transect locations. Impingement and entrainment of nektonic and planktonic populations were also monitored at the stations' intakes. Water quality was investigated by LMS through 1976 in the vicinity of Nine Mile Point, including monthly determinations of inorganic nutrients, metals, dissolved oxygen (DO), temperature, pH, and BOD concentrations.

Other studies in the immediate vicinity of the study area have been conducted by the Lake Ontario Environmental Laboratory (LOTEL) for Rochester Gas and Electric (RGE 1974) and by McNaught and Fenlon (1972) and McNaught and Buzzard (1973). The latter studies were concerned with the effects of plant operation on phytoplankton productivity and zooplankton populations.

1. Phytoplankton

There is a limited amount of information available on the phytoplankton community of the Great Lakes, especially Lake Ontario. Some of the more recent studies have been listed in literature reviews or previous environmental reports by Davis (1966, 1969), QLM (1972, 1974), and LMS (1975a). These studies showed that all phytoplankton divisions are present in Lake Ontario. Diatoms make up as much as 80 percent of the nearshore phytoplankton during the winter and spring. Summer phytoplankton consists of green and blue-green algae and a few diatoms. Over the entire yearly cycle, the most important constituents of the phytoplankton are the diatoms, phytoflagellates, and green algae. Previous taxonomic studies indicate that more than 300 phytoplankton taxa exist in Lake

Ontario, the majority being green algae (Munawar and Nauwerck 1971). Primary production ($^{14}C$) and chlorophyll a estimates place Lake Ontario in a state between oligotrophy and mesotrophy (Wetzel 1975).

Several investigators have described seasonal patterns of phytoplankton occurrence in Lake Ontario (Davis 1966; Nalewajko 1966, 1967; Munawar and Nauwerck 1971; QLM 1972, 1974). The seasonal patterns are correlated closely with natural changes in physical conditions, i.e., water temperature and light intensity, and with the supply of dissolved inorganic nutrients. Although there is some phytoplankton growth throughout the year, the annual cycle is usually characterized by two periods of rapid and unusually intense phytoplankton growth, termed "pulses" or "blooms." One pulse occurs during the spring and is dominated by diatoms; the other pulse occurs during the fall and is usually dominated by green and/or blue-green algae.

The seasonal patterns of phytoplankton observed in the vicinity of Nine Mile Point reflect those previously reported in Lake Ontario. The diatom community during winter and spring is composed principally of *Asterionella* spp., *Fragilaria* spp., *Cyclotella* spp., *Melosira* spp., and *Tabellaria* spp. During the summer and fall, blue-green algae such as *Oscillatoria* spp. and *Microcystis* spp. and green algae such as *Scenedesmus* spp., *Pediastrum* spp., and *Ankistrodesmus* spp. are the major taxa of the community. *Cryptomonas* spp. and *Rhodomonas* spp., both phytoflagellates, appear as members of the community throughout the year exhibiting their greatest density during winter.

During previous years, the larger aquatic vegetation in Lake Ontario at Nine Mile Point has been dominated by *Cladophora glomerata* (IJC 1975). *Cladophera* is a long filamentous alga attached by a holdfast to rocks and other submerged substrates. Colonization and propagation of *Cladophora* extends out to a depth of about 20 feet, and the long, growing strands of *Cladophora* in water 5 feet deep or less are constantly being broken off by wave activity. Maximum growth usually occurs in water about 10-15 feet deep, but this will vary, depending upon turbidity (Wezernak et al 1974). *Cladophora* grows at water temperatures ranging from 53°F to 77°F, but has an optimum growing temperature of 64°F. Growth of *Cladophora* begins in late May, reaches a peak in late June or early July, and declines during the warmer summer period of late July and early

August (Storr and Sweeney 1971). As temperatures drop, a secondary peak may occur in late August. Growth ceases in September due to decreasing light and temperature.

2. Zooplankton

Classifications according to size are widely used for distinguishing smaller and larger members of the zooplankton community. For the purposes of surveys in the Nine Mile Point vicinity, the term "macrozooplankton" is defined as those invertebrate zooplankton retained in a 571-micrometer mesh plankton net. Microzooplankton are functionally defined as the zooplankton ranging in size from 76 to 571 micrometers. However, invertebrate crustaceans of the same species may be found in both the macrozooplankton and microzooplankton collections due to the wide range of sizes encompassed by the developmental stages of these organisms.

Eleven major macrozooplankton taxa have been identified from collections made in the vicinity of Nine Mile Point and Oswego (QLM 1974; LMS 1975a, 1976a). The dominant macrozooplankton groups are cladocerans, copepods, and amphipods; and the macrozooplankton community is frequently dominated by the cladoceran Leptodora kindtii. The amphipod Gammarus fasciatus is also abundant. Nematodes, hydroids, insect larvae (mainly Diptera), gastropods, and isopods are observed occasionally in macrozooplankton samples. Two macrozooplankton, Pontoporeia affinis and Mysis oculata relicta, which are cold-water glacial relict species, are observed primarily during periods of cold-water upwellings.

Some macrozooplankton typically exhibit diel vertical migrations. For example, Gammarus fasciatus and Leptodora kindtii move into the water column during the night, but are found mostly in an epibenthic habitat (LMS 1977a) during the day. A decrease in the relative abundance of Leptodora kindtii and Gammarus fasciatus during 1977-78 in comparison to 1973-76 data was related to changes in the field program (for example, night collections were discontinued in 1977).

The microzooplankton component of the total zooplankton community in the vicinity of Nine Mile Point is typically composed of four major taxonomic groups: rotifers, cladocerans, copepods, and protozoans (LMS 1975a, 1975b, 1976a, 1976b, 1977a, 1977b; Storr 1973).

Rotifers generally contribute the greatest percentage of microzooplankton abundance. Members of this group exhibit a bimodal pattern of seasonal abundance, with the first and normally largest pulse occurring during July and a second pulse in early fall. Sampling conducted by both Storr (1973) and QLM (1974) indicated that the dominant rotifer was Keratella spp.

Cladocerans generally form the second highest percentage of the total microzooplankton population (QLM 1974). The seasonal pattern of cladoceran abundance is bimodal: the first peak occurs during July; the second and usually greater peak during October or November. Storr (1973) found Bosmina longirostris to be the dominant cladoceran, its abundance peaking in late summer/early fall; and Daphnia spp. to be the most abundant spring cladoceran. The Oswego River may influence biotic communities along Nine Mile Point, especially the western end of the study area. Differences have been noted in species composition and seasonal trends between the Oswego and Nine Mile Point areas, and were most likely the result of Oswego River influence on the lake biota (Storr 1973).

Copepods in the vicinity of Nine Mile Point exhibit a seasonal cycle similar to cladocerans, with nauplii typically abundant during the spring and adults in late summer (LMS 1976a).

Protozoan abundance has been found to be highly variable; however, the general trend is for abundance to be lowest during winter and highest during summer (LMS 1975a). The dominant protozoans identified belong to the family Vorticellidae.

Glooschenko et al (1972) found a bimodal pattern in the seasonal abundance of zooplankton at a station in eastern Lake Ontario. The occurrence of two peaks of abundance was similar to that observed by LMS in the vicinity of the Nine Mile Point Nuclear Station, but the number of organisms found by Glooschenko et al was about an order of magnitude less than the number of organisms found in the vicinity of the Nine Mile Point Nuclear Station (QLM 1972, 1974).

3. Benthic Invertebrates

Studies of the benthic community in Lake Ontario show that several organisms exhibit distinct distributional patterns. Brinkhurst (1969, 1970) reported that the general distribution of benthos in Lake Ontario followed the distribution of benthos in temperate oligotrophic water bodies having some inshore areas supporting eutrophic forms. Historically, benthic studies have been concentrated in the eastern portion of Lake Ontario (Johnson and Matheson 1968; Johnson and Brinkhurst 1971a, 1971b). Hiltunen (1969) and Kinney (1972) sampled the entire lake, including some stations in the Nine Mile Point area, while other studies concentrated entirely in and around Oswego (Judd and Gemmel 1971, Storr 1973, QLM 1972).

The species composition and abundance of benthic macroinvertebrates in Lake Ontario have been shown to vary with depth. For example, benthic fauna was reported to increase in abundance and diversity with increasing depth (Judd and Gemmel 1971), and Brinkhurst (1969) reported the presence of eutrophic species in the inshore area of the lake.

In the deeper portions of Lake Ontario, benthic populations are dominated primarily by the amphipod *Pontoporeia affinis* and oligochaetes (Cook and Johnson 1974). In the nearshore zone, the natural assemblage apparently consists of *Pontoporeia affinis*, *Stylodrilus* spp., *Limnodrilus* spp., *Tubifex* spp., plus a variety of chironomids and sphaeriids.

Species of seven phyla (Nematoda, Mollusca, Platyhelminthes, Arthropoda, Annelida, Coelenterata, and Nemertea) constitute the benthic community in the Nine Mile Point vicinity (LMS 1977a). These phyla include approximately 85 genera.

Phylum Arthropoda, represented by 45 species, includes the most abundant organisms in the area; for example, *Gammarus fasciatus* is frequently the dominant species collected. Members of the class Oligochaeta are relatively abundant throughout the year, and tubificid worms (Family Tubificidae) are abundant in all seasons and at most transects. The majority of the organisms collected represent species associated primarily with the surface of the substrate, i.e., epibenthic species such as *Gammarus fasciatus*. However, several infaunal forms, including members of the class Nematoda, have been collected.

Differences observed in the distribution and species abundance of benthic invertebrates among stations and transects are attributed to animal/substrate relationships. For example, *Gammarus* and *Manayunkia* are associated with bedrock substrate, while the nematode *Dorylaimus*, tubificids, and the dipteran *Cryptochironomus* are abundant where substrates are mostly sand and silt.

Benthic invertebrates in the Nine Mile Point vicinity have a seasonal growth and reproduction pattern similar to that reported by Fretwell (1972) and Odum (1971) for temperate zones. Seasonally, the abundance of benthic macroinvertebrates may exhibit the following typical sequence: polychaetes and gastropods dominate in the spring, while oligochaetes and ostracods are abundant in early summer. The amphipod *Gammarus fasciatus* is frequently the dominant organism during late summer and through the fall (October-December), but polychaetes and oligochaetes also may be common in the fall.

The trend of greater benthic invertebrate abundance during spring and fall may be due in part to the presence of actively growing *Cladophora*, a filamentous green alga which provides food and refuge for many invertebrate populations, but is most probably the result of life-stage changes with seasons and the subsequent abundance of adults and larger immatures. During 1974 and 1975, *Cladophora* exhibited a maximum seasonal abundance in June (LMS 1976a). *Cladophora* biomass decreased rapidly with depth and was either scarce or nonexistent at depths of 30 and 40 feet. This was previously noted by Neil and Owen (1964). Christie (1974) attributes the increased productivity observed in Lake Ontario during recent years to the growth of *Cladophora* and its associated fauna.

### 4. Ichthyoplankton

Fish eggs and larvae are most abundant in the Nine Mile Point area of Lake Ontario from April through September; however, some eggs have been collected as early as February and larvae have been collected in December. Published data on the abundance and distribution of ichthyoplankton in the eastern end of Lake Ontario are limited primarily to annual reports of aquatic ecology studies in the vicinity of Nine Mile Point (QLM 1974; LMS 1975a, 1976a, and 1977a) and studies related to the effects of entrainment and thermal discharges at the three existing power stations in the Oswego-Nine Mile Point area (NMPC 1975, 1976b, 1976c, and 1976d; LMS 1976b, 1977b). However, information on distribution of ichthyoplankton near Mexico Bay just east of Nine Mile Point has recently been published by NYSEG (1978). Additional information on fish eggs and larvae in the Great Lakes includes studies on Lake Michigan (Norden 1968, Jude et al 1975, Jude 1976, TI 1976, Consumers Power 1975 and 1976, Detroit Edison 1976, and Cole et al 1978), Lake Erie (Nelson and Cole 1975; TI 1977a, 1977b, 1977c; Wolfert et al 1977), Lake Huron (O'Gorman 1975) and Lake St. Clair (Detroit Edison 1977).

Over the last 5 years, annual surveys have reported between 15 and 22 taxa of eggs and larvae in the Nine Mile Point area. Alewife has consistently dominated the ichthyoplankton community (LMS 1977a, 1977b). Other relatively abundant species in the area are rainbow smelt, white perch, sculpin, and johnny (tessellated) darter. The temporal distribution of eggs and larvae in the Nine Mile Point area is characterized by two basic spawning groups: species typically spawning in the winter and early spring, e.g., burbot, Coregonus spp., rainbow smelt, and yellow perch; and late spring and summer spawning species, e.g., alewife, white perch, and carp. Eggs and larvae of the first group are most abundance during April, May, and early June. The larvae of the species in the second group are most abundant in July and August.

Eggs and young larvae are apparently more abundant at the 20-foot than the 40-foot depth contour near Nine Mile Point (LMS 1975a), but larvae tend to move offshore into deeper water as they mature. A similar onshore-offshore distribution for larvae was observed during an ecological study in Lake Erie (NMPC 1976a).

Egg and larvae densities in the Nine Mile Point area are relatively low except for alewives. During a review of Nine Mile Point studies, Williams et al (1975) indicated that the area does not contain desirable spawning and nursery sites because of nearshore wave action, bedrock/rubble substrate, and sometimes extensive beds of Cladophora.

5. Fish (Nekton)

The Great Lakes contain an extensive fish fauna which includes representatives of most of the important families of North American freshwater fishes. Hubbs and Lagler (1958) list 173 species of native and introduced fish in 28 families for the Great Lakes and their tributaries.

Lake Ontario has one of the most diverse fish communities of the five Laurentian Great Lakes consisting of 112 species in 25 families (Ryder 1972). Historically, the offshore fish community in Lake Ontario was composed principally of oligotrophic or cold-water fish such as *Coregonus* spp. (whitefish, ciscos, and chubs), lake trout, and burbot, while the nearshore waters contained a more diverse fish fauna composed of many varieties of basically warm-water fish (Christie 1974). However, the combined effects of commercial fishing, modification of the drainage basin through construction of dams and canals, invasion of marine species such as the alewife and sea lamprey, cultural eutrophication (Smith 1972a, 1972b), and possibly other factors changed the Lake Ontario fish community so that it is dominated now by alewife, rainbow smelt, white perch, and yellow perch (Christie 1973, 1974). Associated with this shift in species composition was a corresponding change in the use of Lake Ontario by the present fish community. Whereas the historically prominent fish species were wide-ranging piscivores (feed on fish) and pelagic (open water) plankton feeders that utilized the entire area of the lake, the present fish community has definite patterns of movement that vacate areas of the lake during certain seasons. During spring, alewife and rainbow smelt migrate extensively from the depths of the lake to spawn in nearshore areas or in tributaries and small streams. After spawning, these species migrate out into the lake and occupy varying strata of water during summer. During fall, alewives migrate to the deeper waters to overwinter while rainbow smelt migrate to and overwinter in nearshore areas.

The fish community in the Nine Mile Point area of Lake Ontario was intensively sampled from March 1973 through December 1978 by trawling, gill netting, and seining (QLM 1974; LMS 1975a, 1976a, 1977a; TI 1978b, 1979). Prior to 1973, fish were collected intermittently by Storr (1973) using gill nets and trap nets. Approximately 50 species were identified in samples taken during this period (1969-1978), and alewife was the dominant species collected. Other abundant species were rainbow smelt, spottail shiner, yellow perch, and white perch.

Seasonal abundance of fish in the Nine Mile Point vicinity is typical of that observed for the Lake Ontario fish community. The greatest abundance of fish is usually observed during the spring months, corresponding with the spawning of rainbow smelt and the shoreward spawning migration of alewives. Abundance and diversity are lowest during the warm summer months and then increase, especially diversity, during the fall. Lower abundance and diversity during summer are due, in part, to postspawning migrations from the area by adults and selectivity of the sampling gear in relation to collecting the smaller juvenile fish.

Studies concerning fish impingement at power stations prior to 1970 are limited, but substantial data on this subject have become available in recent years. Edsall and Yocum (1972) provided a fairly complete summary of the earlier industry-related fish impingement studies on the Great Lakes, and Sharma and Freeman (1977) presented a more recent review. Impingement of fish has been documented in Lake Huron (Edsall and Yocum 1972), Lake Erie (TI 1977b, 1977c), Lake Michigan (TI 1976), and at various locations in Lake Ontario (LMS 1977b).

Impingement monitoring studies in the Nine Mile Point area of Lake Ontario were initiated in 1972 at the Nine Mile Point Nuclear Station and in 1975 at the James A. FitzPatrick Nuclear Station and have continued to the present (QPM 1973b, 1974; LMS 1975b, 1976b, 1977a, 1977b; TI 1978b, 1979). Approximately 60 species have been identified from samples taken at the two nuclear plants during this period. Alewife, rainbow smelt, and, in later years, threespine stickleback have been the dominant species collected. Other relatively abundant species have been gizzard shad, emerald shiner, spottail shiner, and sculpin. The total number of fish impinged has ranged from less than 0.5 to 5 million fish annually at the Nine Mile Point Nuclear Station and was approximately 4 million fish during the first complete year 1976) of sampling at the James A. FitzPatrick Nuclear Station.

Impingement rates are usually highest during spring, coinciding with the spawning of rainbow smelt and the inshore spawning migration of alewives. Impingement rates are lowest during summer, probably reflecting postspawning migrations by adults to deeper water. Fall rates usually show a secondary peak in impingement rates as the young-of-the-year fish become large enough to be impinged.

Murarka (1976) recommended gathering additional fisheries data on Lake Ontario populations for properly determining the ecological significance of fish impingement in the vicinity of Nine Mile Point on the Lake Ontario fishery. However, in a report evaluating the potential impact of impingement at the James A. FitzPatrick station, LMS (1977b) indicated that current impingement losses attributable to power plants on Lake Ontario, including both Nine Mile Point and James A FitzPatrick, have no measurable direct or indirect impact on the present sport or commercial fisheries.

## SECTION III

## METHODS AND MATERIALS

### A. LAKE ONTARIO STUDIES

The sampling design and methods described in this section represent a program that has evolved during several years of ecological studies on Lake Ontario in the vicinity of Nine Mile Point. Two nuclear power stations, Nine Mile Point Unit 1 (NMP) and James A. FitzPatrick (JAF), which began operation in December 1969 and July 1975, respectively, are located on the Nine Mile Point promontory. Biological surveys began in this area of Lake Ontario in the mid-1960s, and intensive ecological studies that employed methods similar to those described in this section have been conducted since the early 1970s.

Most sampling for the 1978 program was conducted along four transects extending perpendicular from the Lake Ontario shoreline (Figure III-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 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 from the discharge structures with respect to the prevailing currents and represents an area that might be influenced by the thermal discharges; this zone has been referred to as the farfield or control area. A transect called NMPP/FITZ is intermediate between the two experimental-zone transects (Figure III-1); it represents the trawling stations in the experimental zone, since trawling was conducted along depth contours and normally began near the FITZ transect and terminated near the NMPP transect. Also, along the NMPP/FITZ transect, some water quality samples were collected.

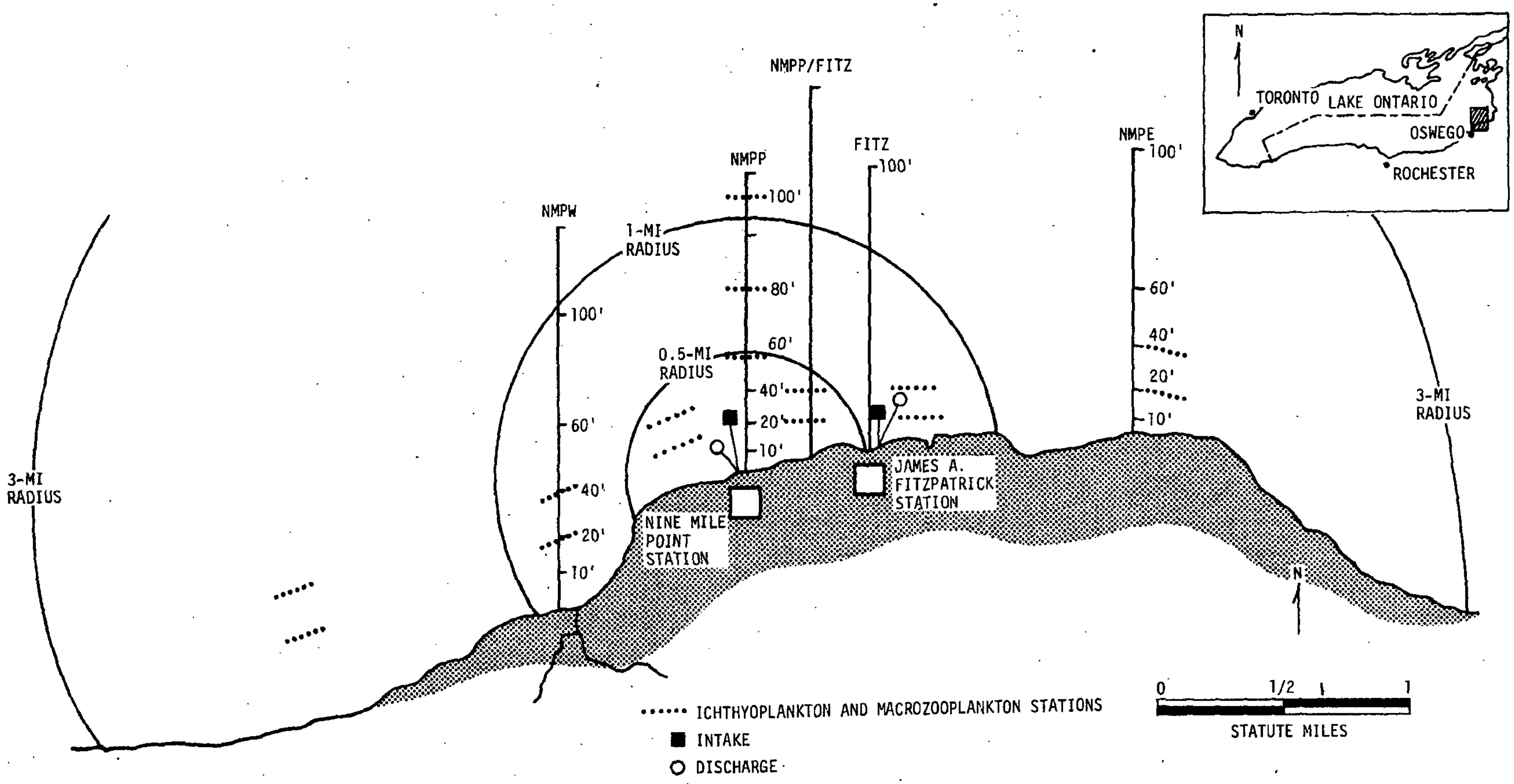



Figure III-1. Sampling Locations for Lake Ontario Ecological Studies near Nine Mile Point and James A. FitzPatrick Power Plants, 1978

## Table III-1

## Sampling Schedule for Aquatic Ecology Studies in Lake Ontario near Nine Mile Point and James A. FitzPatrick Power Plants, 1978

| Task | Frequency* | Season | Depth Contour (ft) | Transect | Depth | Samples per Year** | Comments |
|---|---|---|---|---|---|---|---|
| Phytoplankton | | | | | | | |
| Densities | Monthly (D) | Apr-Dec | 10,20,40,60 | NMPW,NMPP,FITZ,NMPE | Surface and light levels | 342 | At the 40-ft contour on the NMPE transect, phytoplankton, chlorophyll a, and $^{14}C$ samples are collected at the 50, 25, and 1 percent light transmittance levels in addition to surface samples. |
| Chlorophyll a | Monthly (D) | Apr-Dec | 10,20,40,60 | NMPW,NMPP,FITZ,NMPE | | 342 | |
| Primary production ($^{14}C$) | Monthly (D) | Apr-Dec | 10,20,40,60 | NMPW,NMPP,FITZ,NMPE | | 513 | Primary production sampling involves a larger number of samples per year because there are two light and one dark bottle per sampling location. |
| Zooplankton | | | | | | | |
| Microzooplankton | Monthly (D) | Apr-Dec | 10,20,40,60 | NMPW,NMPP,FITZ,NMPE | Oblique tows | 288 | |
| Macrozooplankton | Monthly (D) | Apr-Dec | 20,40,60,80,100 | 0.5-, 1-, 3-mi radii | Composite of surface mid-depth, bottom tows | 135 | There are six sampling stations along both the 20- and 40-ft contours within areas bounded by 0.5-, 1-, and 3-mile radii and single stations at the 60-, 80-, and 100-ft contours along NMPP (Figure III-1). |
| Periphyton | | | | | | | |
| Bottom substrates | Monthly (D) | Apr-Dec | 5,10,20,30,40 | NMPW,NMPP,FITZ,NMPE | Bottom | 640 | Artificial substrates are set in April and retrieved for the first time in May. |
| Suspended substrates | Monthly (D) | May-Sep | 40 | NMPW,NMPE,FITZ | 2, 7, 12, 17 ft from surface | 120 | The NMPP/FITZ transect is located midway between the two transects extending offshore from the Nine Mile Point and James A. FitzPatrick Power Plants (Figure III-1). |
| Benthic Invertebrates | Bimonthly† (D) | Apr-Dec | 10,20,30,40,60 | NMPW,NMPP,FITZ,NMPE | Bottom | 200 | |
| Ichthyoplankton | Weekly (D)<br>Weekly (N)<br>Semimonthly†(D) | Apr-Nov (D)<br>Jun to mid-Sep (N)<br>Dec | 20,40,60,80,100 | 0.5, 1-, 3-mi radii | Surface, mid-depth, bottom tows | 2340 | See Figure III-1 for transect locations. |
| Fisheries | | | | | | | |
| Trawls | Semimonthly (D/N) | Apr-Dec | 20,40,60 | NMPW,NMPE,NMPP/FITZ | Bottom | 324 | Trawl tows for the NMPP/FITZ transect begin near the FITZ transect and end near the NMPP transect. |
| Gill net | Semimonthly (D/N) | Apr-Dec | 15,20,30,40,60 | NMPW,NMPP,FITZ,NMPE | Bottom | 1260 | Along the 20-ft contour, the NMPP transect is not sampled. Each gill net sample is approximately 12 hr long, representing the time between sunrise and sunset or between sunset and sunrise. |
| Beach seine | Semimonthly (D) | Apr-Dec | Shoreline | NMPW,NMPP,FITZ,NMPE | Bottom | 72 | |
| Trap net | Semimonthly (N) | Apr-Dec | 20 | NMPW,NMPP,FITZ,NMPE | Bottom | 72 | |
| Water Quality | | | | | | | |
| 11 parameters (Group I) | Monthly (D) | Apr-Dec | 20,40 | NMPW,FITZ,NMPE | Surface | 54 | |
| 17 parameters (Group II) | Semimonthly (D) | Apr-Dec | 20,60 | NMPW,NMPP,NMPE | Surface | 108 | |
| 48 parameters (Group III) | Monthly (D) | Apr-Dec | 25,45 | NMPP/FITZ | Surface,bottom | 36 | |
| Temperature Profiles | Weekly (D) | Apr-Dec | 100 | NMPW,FITZ,NMPE | At 1-m intervals from surface to bottom | 117 | |

*(D) = day sampling
(N) = night sampling
**Details on sampling requirements (number of replicates, samples per month, etc) are presented in Section II of the SOP for the Nine Mile Point Ecological Monitoring Program.
†Bimonthly is defined as every other month; semimonthly as twice per month.

Ichthyoplankton (fish eggs and larvae) samples were collected at 15 stations shown in Figure III-1. Along the 20- and 40-foot contours, tows were made both to the east and west within zones located approximately 0.5, 1, and 3 miles from the Nine Mile Point station. Directly north of the Nine Mile Point station, ichthyoplankton tows were made at the 60-, 80-, and 100-foot contours on the NMPP transect. Macrozooplankton were sampled at the same locations used for ichthyoplankton (Table III-1).

The periphyton community and planktonic components of the aquatic ecosystem except ichthyoplankton were sampled monthly (Table III-1). To monitor life stages that may be in the area for only a few weeks, ichthyoplankton were sampled weekly except in December. The fish community was sampled twice per month; the relatively sedentary benthic invertebrate community every other month. Various water quality parameters were measured monthly or twice per month, and temperature profiles were obtained weekly at three stations on the 100-foot contour to determine the temperature structure offshore of the power plants and document the extent of stratification.

1. Phytoplankton

Phytoplankton are primary producers, forming the base of the food chain in most aquatic ecosystems. They are usually microscopic and suspended in the water column. In this study, the phytoplankton community was characterized by determining cell densities, chlorophyll *a* concentrations, and primary production rates in the control and experimental areas.

a. Field Sampling

Replicate whole-water samples were collected with a Van Dorn water bottle from 1 meter below the surface along the four principal transects at the 10-, 20-, 40-, and 60-foot depth contours (Figure III-1 and Table III-1). In addition, on the 40-foot contour of the NMPE transect, samples were collected at the 50-, 25-, and 1-percent light-transmittance levels determined with a Kahlsico Model 268WA310 submarine photometer. Water temperatures were measured *in situ* at all phytoplankton sampling locations.

The two replicate samples at each location were composited before subsamples were removed. For phytoplankton densities, two 3.8-liter subsamples were withdrawn and preserved with acid Lugol's (1:100 concentration) solution. Two 2-liter subsamples were withdrawn for chlorophyll a analysis and were placed on ice in the dark. For primary productivity, one dark and two light BOD bottles (300 milliliters) were filled from each composite sample and allowed to overflow at least once. The water was passed through a 300-micrometer mesh net to exclude larger zooplankton and detritus. The capped BOD bottles were placed on ice in the dark to reduce productivity and respiration of phytoplankton until lab processing could begin. A 100-milliliter water sample was collected at each location for alkalinity determinations required for productivity analyses, and two 300-milliliter water samples used for primary productivity background analysis were collected at each of the 20-foot contour locations. The alkalinity and background samples were placed on ice in the dark.

b. Laboratory Processing

1) Phytoplankton Density

At the field laboratory, the phytoplankton density samples, each consisting of about 2 liters of thoroughly mixed sample placed in an individual chamber with one drop of dishwashing detergent, were settled in aluminum-covered glass settling chambers (Weber 1973). After each sample had settled for 48 to 72 hours, approximately 1800 milliliters of the cell-free water was drawn off with a vacuum pump and the remaining 200 milliliters centrifuged at 2000 rpm for 12 minutes until a small pellet of organisms remained. All except 10 milliliters of the centrifuged sample was drawn off, leaving the pellet intact. The pellet was then resuspended into the remaining volume and emptied into an 8-dram glass vial. Then, 3 to 4 milliliters of a solution of three parts 95 percent ethanol and one part formalin was added as a final preservative.

Phytoplankton identification and enumeration were performed at 400X magnification using a Palmer cell (APHA 1976) and 20 randomly picked fields (10 fields per subsample).

2) Chlorophyll a Concentration

Filtration of water samples to determine the chlorophyll a concentration was initiated immediately after return from the field. Between 500 and 2000 milliliters was filtered through a Whatman GF/A glass-fiber filter at approximately 15 pounds per square inch. Before the last 50 milliliters of the sample were filtered, 1 milliliter of magnesium carbonate suspension (1.0 gram in 100 milliliters of distilled water) was added. The filter was folded carefully with the plankton to the inside, placed into an 8-dram glass vial, and frozen at -18°C (0°F).

Chlorophyll was extracted from the phytoplankton cells using 90 percent acetone and a tissue grinder to break up the cells. Samples were placed in a darkened refrigerator at 4-8°C for 24 hours, then centrifuged to remove any filter fragments from the extract. The extracted chlorophyll was then placed into a Beckman Model 26 spectrophotometer using a 5-centimeter path-length spectrophotometer cell, and extinction values were measured at 665 and 750 nanometers Next, two drops of 50 percent hydrochloric acid were added to the cell, the contents agitated, and extinction values measured again at 665 and 750 nanometers for the degradation product, phaeophytin a. The mathematical conversion of extinction values to chlorophyll a concentrations is presented in the discussion on data reduction that follows (subsection c).

3) Primary Productivity

As soon as they had been returned to the field laboratory, all light and dark bottles were inoculated with 5 microcuries of radioactive carbon ($^{14}C$) in the form of sodium bicarbonate. After the radioactive material was added, the bottles were inverted several times and placed in an incubator at ambient lake surface temperature under a fluorescent light at approximately 200 foot-candles for 4 hours, then fixed with 1 milliliter of neutral full-strength formalin to stop all production. Each sample was filtered slowly through a Gelman membrane filter composed of a blend of nitrocellulose and cellulose acetate. After all excess liquid had been drawn through the filter, the sample was removed using forceps and placed into a scintillation vial to dry for 4-6 hours at 20-25°C. After drying, 10 milliliters of Aquasol (New England Nuclear) was added to the vial, which was shaken until the filter pad broke into small pieces; 2 milliliters of water was immediately added, forming a gel, with the broken filter pad in suspension. Vials were sealed and labeled.

Primary productivity samples were analyzed with liquid scintillation techniques using a Beckman LS-100 scintillation counter. Counts per minute were used to calculate primary productivity values according to the formula presented in the data reduction discussion that follows. Sample disposal was according to established procedures for handling radioactive material.

c. Data Reduction

1) Phytoplankton Density

Densities (number per milliliter) of individual taxa and major summary groups (divisions) were calculated for each sample.

Mean density of two replicate samples from the same location on the same date was calculated with the following estimators:

$$\text{Density of sample} = \frac{x}{f} \cdot \frac{s}{V} \tag{1}$$

where

x = number of organisms within the microscopic fields (or aliquot analyzed)

f = total volume of the microscopic fields (or aliquot analyzed)

s = volume of lab sample

V = total volume of lake water sampled

and

$$\text{Mean density at specific location} = \frac{(d_1+d_2+\ldots d_x)}{r_x} \tag{2}$$

where

d = density of replicates

r = number of replicates

The standard error of the means of replicate samples (Snedecor and Cochran 1967) was calculated to indicate variation between replicates using the following estimator:

$$\text{Standard error} = \frac{|D_1-D_2|}{2} \tag{3}$$

where

$D_1$ = density in replicate 1

$D_2$ = density in replicate 2

To evaluate temporal and spatial distributions of the phytoplankton, the following estimator was used to calculate each taxon's mean density by individual sampling periods for the site (all stations combined), specific contour, and area (experimental or control):

$$\text{Mean density} = \frac{\sum_{i=1}^{n} d_i}{n} \qquad (4)$$

where

$d_i$ = density for $i^{th}$ location

$n$ = number of locations sampled

The variation among phytoplankton densities at the sampling locations was determined by calculating standard errors of the contour means, the control and experimental area means, and the site means using the following estimator for each summary group:

$$\text{Standard error} = \sqrt{\frac{\sum_{i=1}^{n} d_i^2 - \frac{\left(\sum_{i=1}^{n} d_i\right)^2}{n}}{n\ (n-1)}} \qquad (5)$$

where

$d_i$ = density for $i^{th}$ location (or $i^{th}$ replicate)

$n$ = number of station locations sampled (or number of replicates)

The formula assumed that selected stations, contours, and control and experimental areas were approximately equivalent to randomly selected stations, contours, and control and experimental areas.

2) Chlorophyll a Concentration

The concentration of chlorophyll a and phaeophytin a in each sample was derived using extinction values (spectrophotometer readings) for acidified and unacidified samples. Individual sample concentrations were calculated using equations provided by Strickland and Parsons (1972). Values were reported as micrograms per liter:

$$\text{Chlorophyll } \underline{a} = \frac{26.7\ (665_o - 665_a) \times v}{V \times \ell} \tag{6}$$

$$\text{Phaeophytin } \underline{a} = \frac{26.7\ (1.7[665_a - 665_o]) \times v}{V \times \ell} \tag{7}$$

where

$665_a$ = extinction at 665 nanometers after acidification
$665_o$ = extinction at 665 nanometers before acidification
$v$ = volume of acetone used for extraction (milliliters)
$V$ = volume of water filtered (liters)
$\ell$ = cell path length (centimeters)

Equations 2 and 3 were used to calculate the mean concentration and standard error, respectively, at each location. Equations 4 and 5 were used to calculate the means and standard errors of the contours, control and experimental areas, and site.

3) Primary Productivity

Primary production was calculated using the following equation and was reported as milligrams of carbon assimilated per cubic meter during the incubation period:

$$\text{Production} = \frac{(cpm_L - cpm_D)\left(\dfrac{\text{volume of bottle}}{\text{volume filtered}}\right)}{\text{Stock cpm}} \cdot (1000)\ (IC)\ (1.06) \tag{8}$$

where

Production = amount of carbon assimilated per cubic meter per unit time
$cpm_L$ = counts per minute of light bottle

$cpm_D$ = counts per minute of dark bottle

Stock cpm = counts per minute determined from stock solution

IC = available carbon as determined using bicarbonate alkalinity values (micrograms per liter)

The 1.06 in Equation 8 represents the factor accounting for the isotopic effect of carbon.

2. Zooplankton

Zooplankton, or invertebrate animal plankton, are at an intermediate stage in the food web; i.e., they feed upon phytoplankton or other zooplankton and are fed upon by larger organisms. Most zooplankton, like phytoplankton, cannot sustain mobility against water currents.

a. Field Sampling

A 12-centimeter-diameter Wisconsin net with 76-micrometer mesh net and length-to-mouth diameter ratio of 3:1 was used to sample zooplankton. An electronic flowmeter towed alongside the boat to determine towing speed was checked frequently via a readout in the boat cabin and was calibrated each month.

Duplicate microzooplankton samples were collected simultaneously by towing two nets obliquely for 2 to 4 minutes at a velocity of 1.0 to 1.5 meters per second. Four depth contours along the NMPW, NMPP, FITZ, and NMPE transects were sampled monthly during the day (Figure III-1 and Table III-1), and surface and bottom temperatures were recorded at the end of each tow.

Fifteen minutes after being fixed with a rose bengal stain/acid Lugol's solution, microzooplankton samples were preserved by adding buffered formalin to achieve a 10 percent formalin concentration.

Larger zooplankton (macrozooplankton) were collected once per month during the day (usually the second week) in conjunction with ichthyoplankton sampling by horizontally towing a 1-meter-diameter Hensen net having a 571-micrometer mesh and a length:diameter ratio of 6:1. Two digital flowmeters mounted near the center of the net mouth provided volumetric data, and an electronic flowmeter determined towing velocity. The tows (5 minutes at a velocity of 1 meter per second) were at subsurface, mid-depth, and off-bottom at the locations indicated in Figure III-1 and Table III-1. At each sampling location, surface and bottom water temperatures were taken; if the difference between the two was more than 2°C, a mid-depth temperature was also taken.

b. Laboratory Processing

The two microzooplankton samples from each location were composited prior to laboratory processing. Two subsamples were removed from each composite sample for density analysis. The samples were mixed thoroughly. An aliquot was withdrawn using a wide-bore pipette and was placed in a Sedgwick-Rafter cell. All microzooplankton within five strips of each chamber for three Sedgwick-Rafter chambers (cells) were identified to species level whenever practical and were enumerated at 100X magnification. Densities were reported as number per cubic meter. Additional strips were counted if necessary to obtain a 200-organism minimum.

Macrozooplankton densities were determined using ichthyoplankton samples. After the ichthyoplankton in subsurface, mid-depth, and off-bottom samples had been analyzed, the three depth samples were composited into one sample for each location and the composited sample split in half using a modified Folsom splitter. Each fraction was analyzed within a gridded petri dish. Macrozooplankton were identified to species level whenever practical and data recorded as organisms per 1000 cubic meters.

c. Data Reduction

Individual taxon densities in each microzooplankton or macrozooplankton sample were calculated. Equation 2 (subsection A.1.c) was used to calculate the mean density for the two replicate microzooplankton samples collected at each location. Equation 3 (subsection A.1.c) was used to determine the standard error of the mean density of these replicates. The densities of each major group were obtained from the sums of the mean densities of each taxon within the group, while total densities (all taxa combined) were obtained by summing group densities.

Temporal and spatial distributions of zooplankton (either micro- or macrozooplankton) were determined by calculating contour, site, and experimental and control area mean densities for individual sampling periods using Equation 4 (subsection A.1.c). To indicate variation among densities at these locations, standard errors were calculated using Equation 5 (subsection A.1.c).

3. Periphyton

For purposes of density estimation, periphyton were defined as the assemblage of algae growing on surfaces of submerged objects such as colonization slides. The species composition of this sessile community can provide important information relative to the quality of the aquatic environment. For purposes of biomass determination, periphyton were defined as organisms, including algae and smaller invertebrates, present on the surface of colonization slides.

a. Field Sampling

Periphyton were collected monthly in the vicinity of Nine Mile Point on Lake Ontario using 51.6-square-centimeter plexiglass slides. Collections from the artificial substrates were used to determine seasonal patterns, community composition, and spatial distribution of periphyton. Bottom samples were from five depth contours on the NMPW, NMPP, FITZ, and NMPE transects (Figure III-1 and Table III-1). In addition, samplers were suspended at depths of 2, 7, 12, and 17 feet along the 40-foot contour on the NMPW, NMPP, and FITZ transects. Four plexiglass slides for bottom periphyton samples and two slides for suspended periphyton were placed into position at each location each month and harvested approximately 30 days later. Bottom periphyton samples were collected from May through December, while suspended periphyton samples were collected from May through September. Periphyton samples were scraped from both sides of each substrate, placed in individual vials, fixed with 1 percent acid Lugol's solution, and preserved with 10 percent buffered formalin.

b. Laboratory Processing

Periphyton were identified and enumerated in a Sedgwick-Rafter cell at 200X magnification. Sample vials were inverted several times to gently homogenize the samples just before their transfer to the Sedgwick-Rafter cell. Randomly chosen fields were analyzed until 200 organisms had been counted. Density was reported as number of cells per square millimeter of substrate surface.

To obtain biomass data, samples were dried at 105°C for 36 hours (or until a constant weight had been attained), then cooled in a desiccator for 2 hours before being weighed to the nearest $10^{-5}$ gram on an analytical balance. Then, the dried samples were heated for 0.5 hour in a muffle furnace at 500°C, cooled in a desiccator for 2 hours, and reweighed to the nearest $10^{-5}$ gram. The difference in weight represented the ash-free dry weight of periphyton (all species combined) per square decimeter.

c. Data Reduction

The density of each identified taxon was calculated using the following estimate:

$$\text{Density (No./cm}^2) = \frac{x}{f} \cdot \frac{s}{a} \tag{9}$$

where

x = number of specimens in each taxon within aliquot

f = volume of aliquot enumerated

s = volume of sample

a = area of slide surface (51.6 $cm^2$)

Total biomass was calculated using the following equation:

$$\text{Total biomass (mg/dm}^2) = \left(\frac{\text{total ash-free dry weight}}{\text{area of slide (51.6 cm}^2)}\right) \cdot 100 \tag{10}$$

Mean densities and mean total biomass for each location were calculated using Equation 2 (subsection A.1.c). The density of each major group was obtained from the sums of the mean densities of the taxa within a group, and total density was obtained from the sums of the major groups.

Equation 3 (subsection A.1.c) was used to estimate the standard error of the mean of replicate suspended periphyton samples. Equation 5 was used to estimate the standard error of bottom periphyton.

Trends in temporal and spatial distribution were examined from the mean densities (using Equation 4) for specific contours, the entire site, and the experimental and control areas. The standard errors of these mean densities were calculated using Equation 5.

4. Benthic Invertebrates

a. Field Sampling

Benthic macroinvertebrates live part or all of their life cycle within or upon available substrates in the aquatic environment. These consumers, like zooplankton, are at an intermediate stage in the food web.

To sample benthos in the Nine Mile Point area, a scuba diver used a self-contained, 0.166-square-meter submersible suction sampler similar to that described by Gale and Thompson (1975).

Duplicate benthic samples were collected every 2 months from the substrate present at 20 stations (Figure III-1 and Table III-1), and attempts were made to sample the same substrate type from month to month. Bottom water temperature was taken at each station.

Samples were washed in the field on a U.S. Standard No. 30 sieve (590-micrometer mesh) and preserved with buffered formalin.

b. Laboratory Processing

In the laboratory, samples were sieved through a U.S. Standard No. 35 (500-micrometer mesh) to supplement field sieving and wash off the formalin. Then the benthic organisms were separated from the remaining debris and placed in vials of 70 percent ethanol. All benthic organisms were subsequently identified to the lowest practical taxon and enumerated using a dissecting microscope.

To obtain the wet-weight biomass, organisms were sorted by major group, blotted to remove excess alcohol, and weighed immediately to the nearest 0.1 milligram. Biomass was reported in grams per square meter. A group of only a few individuals in a sample was combined with the same group from the replicate sample or with individuals from stations along the same depth contour if necessary to obtain a sufficient number for weight determination.

Since all benthic organisms within each sample were analyzed, the density or biomass of benthic invertebrates in each sample was simply the number (or weight) of organisms divided by the cross-sectional area of the sampler.

The mean density or biomass and standard error at each station were derived using Equations 2 and 3 respectively (subsection A.1.c). The density of each major group was obtained from the sums of the mean densities of the taxa within the group, and group densities were summed to obtain total densities (all taxa combined).

To determine temporal and spatial distributions of the benthic invertebrates, mean densities and associated standard errors were calculated by sample periods for the entire site, various depth contours, and control and experimental areas using Equations 4 and 5 (subsection A.1.c).

5. Ichthyoplankton

Ichthyoplankton are the early developmental stages (eggs and larvae) of fish. The larvae of most fish species are planktonic (drifting or suspended in water), whereas the eggs are either planktonic or demersal (heavier than water).

a. Field Sampling

Ichthyoplankton samples were collected from subsurface, mid-depth, and off-bottom strata using the same sampling techniques and locations (Figure III-1 and Table III-1) described for macrozooplankton sampling (subsection 2). During each sampling period, one horizontal tow was made at each depth strata at all stations. Day samples were collected weekly from April through November and night samples weekly from June through mid-September. In December, samples were collected twice per month during the day.

b. Laboratory Processing

Ichthyoplankton samples were strained with a 300-micrometer screen to remove silt and preservative. The following definitions were established for life stages:

| | |
|---|---|
| Egg | Prior to hatching |
| Prolarvae | From time of hatching until absorption of the yolk sac (yolk-sac larvae) |

Postlarvae — From time of yolk-sac absorption until acquisition of fin-ray complement, body form, and pigmentation of an adult (post yolk-sac larvae)

If there were more than 400 specimens per sample, the sample was divided into two aliquots with a modified Folsom plankton splitter (Lewis and Garriott 1970). The larger debris was removed prior to splitting. Splitting continued until about 200 fish eggs and larvae remained in each reduced portion. The whole sample or aliquot was examined and the ichthyoplankton separated by life stage. Each life stage was identifed to species level when possible and enumerated. Juveniles (the life stage following postlarvae) were not considered to be ichthyoplankton because they are free-swimming organisms.

c. Data Reduction

The density of each species collected at each depth strata was calculated using Equation 1 (subsection A.1.c) and reported as number of eggs, prolarvae, or postlarvae per 1000 cubic meters of water sampled. A mean density for each sampling station (subsurface, mid-depth, and off-bottom depth strata combined) and a mean density for each depth strata along the 20- and 40-foot depth contours were calculated using Equation 2. The station mean densities were averaged to obtain mean densities for the 20- and 40-foot depth contours and a site density. Since there was only one station each at the 60-, 80-, and 100-foot depth contours, the station mean density at these locations was equivalent to the contour mean density.

6. Fisheries

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

a. Field Sampling

To reduce the selectivity that is inherent in the use of only one gear, adult and juvenile fish populations in the Nine Mile Point study area were sampled with a variety of gear including experimental gill nets, bottom trawls, beach seines, and trap nets.

The experimental gill 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. Gill net sets were made twice monthly from April through December at 19 locations. The nets were set parallel to shore around sunrise or sunset and retrieved at approximately 12-hour intervals for 48 hours (Table III-1) except at the 20-foot depth contour where there were two 12-hour sets. As each net was retrieved, bottom water temperature was recorded.

The otter trawl had 1-inch mesh wings and body and a 30-foot foot rope, a 27-foot head rope, and a vertical mouth opening of about 6 feet; the cod end was equipped with a 0.25-inch mesh liner. Trawl samples were taken twice per month during both day and night at nine sampling locations. Day trawling began about sunrise; night trawling about sunset. Trawls were towed parallel to the shoreline along the respective depth contour at 1 meter per second for approximately 15 minutes. Bottom water temperatures were taken with each sample.

The 50-foot beach seine was 8 feet deep with a bag or pocket of 0.25-inch mesh nylon centered between wings of the same mesh. A brail attached to each end of the net maintained maximum separation between the lead and float lines during the seine haul. A small boat was used to deploy the beach seine parallel to and 100 feet offshore; then, the wings were hauled simultaneously toward shore with ropes, forcing the catch into the bag. Surface water temperature was taken 100 feet offshore at each seine location. Beach seining was done twice each month during daylight hours from April through December (Table III-I). Shoreline samples were taken at the following four locations:

- NMPW transect: 10 yards west of a creek on an open, gradually sloping beach
- NMPP transect: approximately 10 yards west of the storm-drain discharge pipe by the Nine Mile Point Visitors Center within a small bay-like area
- FITZ transect: on the small pebble beach by the James A. FitzPatrick power station
- NMPE transect: at the base of Shore Oaks Road on an open beach

Trap nets were used in this study to supplement data collected with the gill nets, trawls, and seines. The box trap had 0.25-inch mesh nylon netting supported on a 3- x 3- x 6-foot aluminum pipe frame. The box trap had 25-foot wings and a 50-foot center lead. The trap was deployed on the lake bottom at the 20-foot contour with the lead stretched perpendicular to the shoreline and the wings set at 45° angles to the lead. The trap nets were set twice monthly from April through December on transects NMPW, NMPP, FITZ, and NMPE (Table III-1) around sunset and were picked up shortly after sunrise.

After being removed from the nets, the fish were placed in labeled plastic bags and stored in a cooler for later processing. During the expected spawning season of several select species (alewife, rainbow smelt, white perch, yellow perch, and smallmouth bass), there were checks to see if either milt or eggs could be stripped from the gonads to indicate that spawning was progressing. All fish selected for analysis of stomach contents were injected with 10 percent formalin (through the body wall into the stomach and through the mouth into the pharynx) to abate gastric digestion.

b. Laboratory Processing

1) General Analyses

All fish were identified to the species level and enumerated. Total lengths (millimeters) and total weights (grams) were determined for a maximum of 40 individuals per species per catch. Three key species (white perch, yellow perch, and smallmouth bass) were further processed to determine age, stomach contents, and coefficient of maturity. Gonads from these key species as well as from rainbow smelt and alewife were removed, placed in Gilson's fluid, and used to estimate fecundity.

The sex and the stage of sexual maturity were determined for individuals of the three key species to supplement the age and coefficient-of-condition and maturity data.

2) Coefficients of Condition and Maturity

Coefficients of condition and maturity were calculated by sex for yellow perch, white perch, and smallmouth bass randomly subsampled from net catches. If available, 50 males and 50 females of each species were obtained each month from the experimental area (NMPP and FITZ) and from the control area (NMPW and NMPE).

3) Fecundity

During the spring spawning season (April through June), there was an attempt to collect gonads from 25 gravid females of five species (alewife, rainbow smelt, yellow perch, white perch, and smallmouth bass) for estimating fecundity. Females of several different sizes were used so results would not be biased toward larger or smaller fish.

Fecundity, defined as the number of ripening ova in a female prior to spawning (Ricker 1971), was determined using a gravimetric procedure. The eggs (both immature and mature for alewife and white perch) within a subsample were counted and this number then multiplied by a factor representing the ratio between subsample weight and total gonad weight to estimate the total number of eggs in both ovaries.

Ova in the following size (diameter) classes were enumerated:

| | |
|---|---|
| Alewife | 0.5-0.8 mm (and 0.2-0.4 mm) |
| White perch | 0.5-0.9 mm (and 0.2-0.4 mm) |
| Rainbow smelt | 0.4-1.1 mm |
| Smallmouth bass | 1.2-2.5 mm |
| Yellow perch | 0.6-1.5 mm |

The percentage of the total number of ova in each of two size categories was determined by measuring the diameters of 75 randomly selected ova with an ocular micrometer.

4) Age

Fish selected for age analysis were distributed over the size classes present in the Lake Ontario population. Fifty fish were taken from samples collected in the area potentially affected by the thermal plumes of the two plants (transects NMPP and FITZ), while another 50 were from the transects farthest from the power stations (NMPW and NMPE). Scales were removed and analyzed. Scales of yellow perch and smallmouth bass were removed from the left side below the lateral line at the distal tip of the depressed pectoral fin (Lagler 1956). Scales of white perch were removed from the left side above the lateral line and below the gap between the spinous and softrayed dorsal fins (Mansueti 1960).

To prepare the scales for analysis, wet mounts or cellulose acetate impressions were made. Annuli on the scales were identified and counted using a Tri-Simplex microprojector. All fish were considered to have been born on 1 January; therefore, fish caught between 1 January and the current year's annulus formation were aged as the number of annuli plus 1 year. After annulus formation for the current year, the age of the fish was equal to the number of annuli.

5) Stomach Contents

Knowledge of the food habits of fish is important in determining food-web interrelationships among the fish and forage components of the aquatic ecosystem. Fifty fish of each key species (yellow perch, white perch, and smallmouth bass) were captured in gill nets during August 1978 at stations along the 15-foot contour for stomach-contents analysis. As in the age studies, half of the fish were obtained from the area near the power stations (NMPP and FITZ) and the other half from the two outside transects (NMPW and NMPE).

Stomach contents were teased out into a petri dish and the food items identified to the lowest practical taxon and enumerated. Quantitative data were used to determine each taxon's frequency and percentage with respect to total number of organisms counted. Qualitative estimates of stomach fullness and degree of digestion were also recorded for each fish examined. To more accurately represent each food item's importance, food items were "weighted" by multiplying the individual percentage volume of each food item by the percent stomach fullness of each individual stomach. Thus, a food organism representing 50 percent of the volume in a stomach would be rated 37.5 percent in a 75 percent full stomach (i.e., 0.50 x 0.75 = 0.375). Importance indices for each species were added and the food items' importance expressed as a percentage of the total food values in all stomachs.

c. Data Reduction

Catch data for the various gear were expressed as a catch-per-unit effort (C/f) based on the following definitions:

| | |
|---|---|
| Beach seine | Number of individuals per seine haul |
| Trap net | Number of individuals per overnight set |

| | |
|---|---|
| Trawl | Number of individuals per 15-minute tow |
| Gill net | Number of individuals per gill net set standardized to a 12-hour set |

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

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

where

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

$T_1$ = duration of set in hours

Fecundity estimates for each fish were calculated using the equation:

$$\text{Fecundity} = \frac{N \cdot W_1}{W_2} \qquad (13)$$

where

N = number of ova in subsample

$W_1$ = weight of both right and left ovaries

$W_2$ = weight of subsample

Aged fish were grouped by area of capture (experimental or control) and by age class. Mean total length for each age class was calculated using the equation:

$$\overline{X} = \frac{\sum_{i=1}^{n} x_i}{N} \qquad (14)$$

where

N = number of fish

$x_i$ = value of $i^{th}$ fish

Coefficients of maturity for the three key species were expressed as the simple percentage of gonad weight to total body weight. Maturity values were grouped by sex (male or female), month, and location of capture (experimental or control area), and an average value was calculated using Equation 14.

Length and weight data for individuals of the three key species were grouped by sex (male or female), season (spring, summer, fall), and location of capture (experimental or control area). For each group, length-weight relationships were calculated from the logarithms (base 10) of the lengths and weights using the equation:

$$\log W = \log \alpha + \beta \log (TL) \tag{15}$$

where

$W$ = weight in grams

$\alpha$ and $\beta$ = empirically derived constants

$TL$ = total length in millimeters

Condition factors (K) also were calculated for these same groups of fish using the equation:

$$K_{(TL)} = \frac{W \times 10^5}{TL^3} \tag{16}$$

where

$W$ = weight in grams

$TL$ = total length in millimeters

Equation 14 was used to average the condition factors of each group.

7. Water Quality and Thermal Profiles

The water quality sampling program was developed to monitor water quality in the vicinity of the two operating power plants. A 9-liter PVC Van Dorn water bottle was used to collect samples for general chemical analyses. For tasks such as coliform bacteria and biochemical oxygen demand (BOD), specialized techniques (described below) were used. Holding times, required preservatives, and analytical methods are indicated in Tables III-2 and III-3.

Table III-2

Recommended Sampling and Preservative Methods and Analysis Locations for Water Quality Samples Collected in Vicinity of Nine Mile Point on Lake Ontario

| Group | Parameter | Volume Required (mℓ) | Collection: Container Material† | Collection: Preservative | Holding Time* | Analysis Location |
|---|---|---|---|---|---|---|
| III | Alkalinity | 100 | P,G | 4°C | 24 hr | Field |
| II,III | $BOD_5$ | 1000 | P,G | 4°C | 6 hr | Field |
| II,III | COD | 50 | P,G | $H_2SO_4$ | 7 days | Dallas |
| I,II,III | Total solids | 100 | P,G | None | 7 days | Dallas |
| III | Total dissolved solids | 100 | P,G | 4°C | 7 days | Dallas |
| I,II,III | Total suspended solids | 100 | P,G | 4°C | 7 days | Dallas |
| III | Total volatile solids | 100 | P,G | 4°C | 7 days | Dallas |
| II,III | Total Kjeldahl nitrogen | 500 | P,G | 4°C,$H_2SO_4$ | 24 hr | Dallas |
| II,III | Ammonia nitrogen | 400 | P,G | 4°C,$H_2SO_4$ | 24 hr | Dallas |
| II,III | Nitrate nitrogen | 100 | P,G | 4°C,$H_2SO_4$ | 24 hr | Dallas |
| I,II,III | Total phosphorus | 50 | P,G | 4°C | 7 days | Dallas |
| III | Color | 50 | P,G | 4°C | 24 hr | Dallas |
| II,III | Specific conductance | 100 | P,G | 4°C | 24 hr | Field |
| III | Total coliform bacteria | 100 | G | 4°C | 6 hr | Subcontract |
| III | Fecal coliform bacteria | 100 | G | 4°C | 6 hr | Subcontract |
| III | Organic nitrogen | 500 | P,G | 4°C,$H_2SO_4$ | 24 hr | Dallas |
| II,III | Orthophosphate | 50 | P,G | 4°C | 24 hr | Dallas |
| I, III | Sulfate | 50 | P,G | 4°C | 7 days | Dallas |
| III | Chloride | 50 | P,G | None | 7 days | Dallas |
| III | Aluminum | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Cadmium | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| I, III | Calcium | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| I, III | Chromium | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Copper | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Beryllium | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Iron | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Lead | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Magnesium | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Mercury | 100** | P | $HNO_3$ | 13 days | Dallas |
| III | Nickel | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Potassium | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| I, III | Sodium | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Zinc | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Phenols | 500 | G | 4°C,$H_3PO_4$ 1.0 g $CuSO_4$ | 24 hr | Dallas |
| III | Vanadium | 100* | P,G | $HNO_3$ | 6 mo | Dallas |
| II,III | Silica | 50 | P | 4°C | 7 days | Dallas |
| III | ABS | 250 | P,G | 4°C | 24 hr | Dallas |
| III | Arsenic | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Barium | 100** | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Carbon chloroform extract | 60ℓ | G | None | 48 hr | Dallas |
| III | Cyanide | 500 | P,G | 4°C,NaOH | 24 hr | Dallas |
| III | Fluoride | 300 | P,G | 4°C | 7 days | Dallas |
| III | Manganese | 100 | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Selenium | 100 | P,G | $HNO_3$ | 6 mo | Dallas |
| III | Ferro- and ferricyanide | 500 | P,G | 4°C,NaOH | 24 hr | Dallas |
| III | Silver | 100 | P,G | $HNO_3$ | 6 mo | Dallas |
| II,III | Turbidity | 100 | P,G | 4°C | 7 days | Field |
| II | $CO_2$ | 500 | G | 4°C | 6 hr | Field |
| I, III | Radioactivity | 8ℓ | P,G | None | 6 mo | Subcontract |
| I,II | pH | In situ | | | | Field |
| I,II | Temperature | In situ | | | | Field |
| I,II | Dissolved oxygen | In situ or 300 | G | see Winkler Method | 4 hr | Field |

†P = plastic, G = glass
*Samples properly preserved may be held for extended periods beyond recommended holding time.
**One 100-mℓ sample preserved with $HNO_3$ is sufficient sample for all metals.

## Table III-3

### Analytical Methods and Detection Limits for Selected Physicochemical Parameters

| Parameter | Method | Reference* | Detection Limits |
|---|---|---|---|
| Temperature | Thermistor | SM 162 | 0.1°C |
| Dissolved oxygen | Polarographic probe (in situ) or titration | EPA p.56 & 51 | 0.1 mg/ℓ |
| Specific conductance (salinity) | Wheatstone bridge | SM 154 | 5 µmhos |
| Turbidity | Nephelometric | SM 163A | 1 FTU |
| pH | Electrometric (in situ) | SM 144A | 0.01 units |
| Alkalinity | Electrometric titration | SM 102 | 0.1 mg/ℓ |
| Total dissolved solids | Gravimetric (105°C) | SM 148B | 1 mg/ℓ |
| Total suspended solids | Glass-fiber filter (103-105°C) | SM 148C | 0.1 mg/ℓ |
| Color | Automated (APHA) | SM 118 | 5 APHA |
| Carbon chloroformextract (CCE) | Gravimetric | SM 506 | 0.2 mg/ℓ |
| Ammonia nitrogen | Automated (phenolate) | EPA p. 168 | 0.002 mg/ℓ |
| Nitrate nitrogen | Automated (cadmium reduced) | EPA p. 201 | 0.02 mg/ℓ |
| Nitrite nitrogen | Automated (diazo) | EPA p. 215 | 0.002 mg/ℓ |
| Organic nitrogen | Manual (digestion distillation), automated digestion phenolate | EPA p. 182 | 0.03 mg/ℓ |
| Total inorganic phosphate | Digestion (acid) + automated | EPA p. 256 | 0.002 mg/ℓ |
| Total phosphate | Digestion (persulfate) + automated | EPA 1. 256 | 0.002 mg/ℓ |
| Sulfide | Automated | EPA p. 280 | 0.005 mg/ℓ |
| Silica | Automated (molybdosilicate method) | EPA p. 281 | 0.05 mg/ℓ |
| Biochemical oxygen demand | Polarographic probe | EPA p. 11 | 0.1 mg/ℓ |
| Total coliform bacteria | Multiple tube fermentation | SM 408D | -- |
| Fecal coliform bacteria | Multiple tube fermentation | SM 408C | -- |
| Sulfates | Automated (barium, chloranilate) | EPA p. 279 | 0.2 mg/ℓ |
| Chlorides | Titration (mercuric nitrate), automated | | |
| Hardness | EDTA titrimetric | SM 122B | 0.1 mg/ℓ |
| Surfactants | Methelene blue method | SM 159A | 0.01 mg/ℓ |
| Phenols | 4-aminoantipyrine method | EPA p. 256 | 0.005 mg/ℓ |
| Oil and grease | Trichloratrifluoroethane extraction | EPA p. 229 | 0.1 mg/ℓ |
| Aluminum | Atomic absorption | SM 129A | 0.001 mg/ℓ |
| Beryllium | Atomic absorption | SM 123A | 0.001 mg/ℓ |
| Boron | Carmine method, automated | SM 107B | 0.1 mg/ℓ |
| Cadmium | Atomic absorption | SM 109A | 0.001 mg/ℓ |
| Calcium | Atomic absorption | EPA p. 103 | 0.002 mg/ℓ |
| Chromium | Atomic absorption | SM 117A | 0.001 mg/ℓ |
| Cobalt | Atomic absorption | SM 116A | 0.001 mg/ℓ |
| Copper | Atomic absorption | SM 119A | 0.001 mg/ℓ |
| Cyanide | Pyridine-pyrazalone method | SM 207C | 0.005 mg/ℓ |
| Fluoride | Ion selective electrode | EPA p. 61 | 0.04 mg/ℓ |
| Iron | Atomic absorption | EPA p. 147 | 0.001 mg/ℓ |
| Lead | Atomic absorption | SM 125B | 0.001 mg/ℓ |
| Magnesium | Atomic absorption | SM 127B | 0.0001 mg/ℓ |
| Manganese | Atomic absorption | SM 128A | 0.001 mg/ℓ |
| Molybdenum | Atomic absorption | EPA p. 139 | 0.03 mg/ℓ |
| Nickel | Atomic absorption | EPA p. 141 | 0.005 mg/ℓ |
| Potassium | Flame emission | SM 147A | 0.005 mg/ℓ |
| Selenium | Atomic absorption | EPA p. 145 | 0.0003 mg/ℓ |
| Sodium | Flame emission | SM 153A | 0.0007 mg/ℓ |
| Titanium | Atomic absorption | EPA p. 143 | 0.001 mg/ℓ |
| Tin | Atomic absorption | EPA p. 143 | 0.001 mg/ℓ |
| Vanadium | Atomic absorption | EPA p. 144 | 0.001 mg/ℓ |
| Zinc | Atomic absorption | SM 165A | 0.001 mg/ℓ |
| Radioactivity | Gas-flow proportional counter, scintillation counter, and gamma spec. | RMC | -- |

*ASTM - Annual Book of ASTM Standards, Part 31 Water. American Society for Testing and Materials. Philadelphia.

SM - Standard Methods for the Examination of Water and Wastewater, 14th ed., 1976, APHA, AWWA, WPCF.

EPA - Methods for Chemical Analysis of Water and Wastes, 1976a, and various technical leaflets:

RMC - Radiation Management Corporation Analytical and Quality Control Procedures, RMC-TM-75-3, July 1976

Sampling regimes for the water quality tasks required different parameters and frequencies. For convenience, the sampling regimes were categorized into three groups.

a. Group I

Water samples were collected monthly at the 20- and 40-foot depth contours on the NMPW, FITZ, and NMPE transects and examined for the 11 parameters specified in Table III-2. Whole-water samples were collected from 0.5 meter below the surface in a 9-liter PVC Van Dorn water bottle, then dispensed into polyethylene containers and placed on ice. Temperature, dissolved oxygen (D.O.), and pH were determined *in situ* with a Yellow Springs Instruments (YSI) Model 57 D.O. meter or titration and an Instrumentation Laboratories (IL) Model 175 Portomatic pH meter (or equivalent). Except for radioactivity samples, which were analyzed by Radiation Management Corporation (RMC 1976), samples were sent via airfreight to Dallas and analyzed according to techniques described in Tables III-2 and III-3.

b. Group II

Samples were collected at the 20- and 60-foot depth contours of the NMPW, NMPP, and NMPE transects and were examined for the 16 parameters specified in Table III-2, as well as for chlorophyll *a* concentrations. Whole-water samples were collected from the 0.5-meter depth in a 9-liter PVC Van Dorn water bottle, then dispensed into polyethylene containers and placed on ice. Temperature, dissolved oxygen, conductivity, and pH were measured *in situ*. Free carbon dioxide was determined with standard titration techniques. Samples for BOD analysis were placed in sterilized glass BOD bottles, which were allowed to overflow at least three times their volume. The BOD samples were placed on ice in the dark, and incubation was begun within 6 hours. Turbidity was determined at the field lab with a Hach Model 2100A turbidimeter. Chlorophyll *a* samples were prepared according to methods described in subsection A.1.b, then frozen and shipped to Dallas, along with the remaining Group-II parameters for analyses (Table III-3).

c. Group III

Water quality samples were collected monthly from April through December along the NMPP/FITZ transect. Whole-water samples were taken from 0.5 meter below the surface and 0.5 meter off the bottom at the 25- and 45-foot depth contours and analyzed for the 48 parameters listed in Table III-2. At each location, surface and bottom water temperatures were recorded and specific conductance measured in situ. For general water chemistry and analysis, six 1-liter polyethylene containers were filled and placed on ice. Samples for phenol determination were placed in a precleaned 500-milliliter glass container with a teflon-lined cap. Samples for BOD determination were collected as described for Group II, and water for coliform analysis was collected in sterilized glass bottles using a J-Z sampler. Incubation of coliform samples was initiated within 6 hours. For carbon chloroform extract (CCE) analysis, 60 liters of water was collected at each station and stored in glass containers. These samples were subsequently passed (for 48 hours) through a miniature CAM II-A sampler having a sample column packed with 70.0 grams of activated carbon. The activated-carbon samples were then shipped to Dallas for analysis according to the method in Table III-3.

d. Thermal Profiles

Three temperature profiles were made weekly during the day from April through December. Temperatures were recorded at 1-meter intervals from surface to bottom at the 100-foot depth contour of the NMPW, FITZ, and NMPE transects.

## B. IN-PLANT STUDIES

Both the Nine Mile Point and James A. FitzPatrick power stations use once-through cooling-water systems to dissipate waste heat. In accord with the requirements of NRC's Environmental Technical Specifications, impingement rates were monitored three times a week at both power stations (Table III-4).

Planktonic organisms such as phytoplankton, zooplankton, and fish eggs and larvae pass through the screening devices and subsequently through the entire cooling-water system. This passive incorporation of planktonic organisms into a circulating water system is referred to as entrainment.

Table III-4

Schedule for Impingement and Entrainment/Viability Studies at Nine Mile Point and James A. FitzPatrick Power Plants, Lake Ontario, 1978

| Task | Frequency* | Season | Location | Depth | Samples per Year** | Comments |
|---|---|---|---|---|---|---|
| Impingement | | | | | | |
| Nine Mile Point | Three times/week (hourly on Wed) | Jan-Dec | Traveling screens and bar racks | Entire water column | 156 | On Mondays and Fridays, a composite 24-hr sample is collected; on Wednesdays, sampling is hourly until 24 one-hr samples are obtained. |
| J.A. FitzPatrick | Three times/week (D/N on Wed) | Jan-Dec | Traveling screens and bar racks | Entire water column | 156 | On Mondays and Fridays, a composite 24-hr sample is collected; on Wednesdays, separate day and night samples corresponding with sunrise and sunset are taken. |
| Entrainment | | | | | | |
| Nine Mile Point | | | | | | |
| Ichthyoplankton | Semimonthly† (D) | Apr-Oct | Intake forebay | 2 and 7 ft below surface | 28 | Intake samples taken by drift nets set in forebay just upcurrent from traveling screens. |
| J.A. FitzPatrick | | | | | | |
| Ichthyoplankton | Semimonthly (D/N) | Jan-Dec | Intake forebay | 14 and 20 ft below surface | 96 | Intake samples taken by drift nets set in central area of intake. |
| Zooplankton | Semimonthly (D/N) | Jan-Dec | Intake forebay | 5 ft below surface | 96 | Zooplankton samples pumped from central area of intake. |
| Viability | | | | | | |
| J.A. FitzPatrick | | | | | | |
| Phytoplankton | | | | | | |
| Chlorophyll a | Semimonthly (D/N) | Jan-Dec | Intake, discharge, 2° and 3° ΔT, and lake samples | 5 ft below surface | 1536 | |
| Primary production ($^{14}C$) | Semimonthly (D/N) | Jan-Dec | Intake, discharge, 2° and 3° ΔT, and lake samples | 5 ft below surface | 1536 | Lab processing for primary production involves a larger number of samples per year because each sample is represented by one light bottle and one dark bottle. |
| Zooplankton | Semimonthly (D/N) | Jan-Dec | Intake, discharge, 2° and 3° ΔT, and lake samples | 5 ft below surface | 384 | |
| Ichthyoplankton | Semimonthly (D/N) | Jan-Dec | Intake, discharge, 2° and 3° ΔT, and lake samples | 14 and 20 ft below surface at intake; 5 ft below surface at discharge | 384 | |

*(D) = day sampling; (N) = night sampling

**Details on sampling requirements are presented in Section II of the SOP for the Nine Mile Point Ecological Monitoring Program.

†Semimonthly is defined as twice per month.

Entrainment of ichthyoplankton was monitored at the Nine Mile Point plant by collecting intake samples twice per month from April through October. At the James A. FitzPatrick plant, entrainment rates and percent mortality due to entrainment were documented twice per month during the entire year (Table III-4). Entrainment rates for zooplankton and ichthyoplankton were documented by determining the number of organisms in intake samples per volume of cooling water used.

To estimate the mortality of phytoplankton, zooplankton, and ichthyoplankton caused by entrainment through the James A. FitzPatrick plant, intake and discharge samples were collected from the same water mass and the percent mortality of the two then compared. To estimate mortality due to plume entrainment the percentage of dead organisms in samples from a simulated or the actual discharge plume was compared to the percent mortality in the intake samples (Table III-4).

1. Impingement

a. Field Sampling

Impingement was monitored concurrently at both power stations (Table III-4) for a 24-hour period on Monday, Wednesday, and Friday of each week from January through December. Monday and Friday samples at both stations were cummulative 24-hour samples; the collection baskets remained in sampling position until the end of the 24-hour period. Each Wednesday, impinged fish were collected at the end of each hour throughout the 24-hour period at Nine Mile Point and at the end of day and night photoperiods at James A. FitzPatrick. Impingement monitoring generally began at 0001 (military time) on each sampling day.

Just before the fish collection basket was placed into sampling position, the bar racks and traveling screens were cleaned and the debris and fish discarded. The collection basket, a large rectangular metal basket constructed of 1-inch stretch mesh hardware cloth and lined with 3/8-inch mesh nylon netting, was placed at the end of the screen washwater sluiceway where it dumps into the discharge canal. All fish and debris washed off the traveling screens were collected in the basket, and the fish were identified and enumerated to document impingement.

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

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 enumerated as soon as possible after collection. Total numbers and weights for each species and individual total lengths (millimeter) and weights (nearest 0.1 gram) for a maximum of 60 fish of each species from each day, night, or 24-hour sample (or for 10 individuals of each species collected in each hourly sample) were recorded. Unusual conditions (e.g., damaged individuals or presence of fish tags) were documented.

Impinged fish were used also for fecundity and age analysis. There was an attempt to remove gonads from 25 gravid females of five species (alewife, rainbow smelt, yellow perch, white perch, and smallmouth bass) during the spring spawning season (April through June) to estimate the fecundity of these fish. Gonads were selected and analyzed using the same procedure described for fecundity analysis of lake fish (subsection A.6.b).

Scales for age analysis were removed from 25 individuals of the two most abundant species collected during each season sampled during 1978: winter (January-March), spring (April-June), summer (July-September), and fall (October-December).

When alewives were selected, scales were removed from the left side below the lateral line and above the vent (Marcy 1969). When rainbow smelt were selected, scales were removed from the left side midway between the lateral line and dorsal fin, but from the area just posterior to the dorsal fin (Burbidge 1969, McKenzie 1958). Ages of threespine sticklebacks were determined using length-frequency data.

Age analysis was by the same procedure described for Lake Ontario fish (subsection A.6.b).

*NOTE: At the James A. FitzPatrick there is also a plan for additional impingement sampling to meet New York DEC requirements.

c. Data Reduction and Analysis

Data were tabulated to present impingement rates (number and weight) for each species as well as all species combined. Two estimation techniques were used to calculate monthly impingement from the Monday, Wednesday, and Friday catches:

$$\text{No}\cdot_m = \frac{(x_n)\ (N)}{n} \tag{17}$$

where

$\text{No}\cdot_m$ = estimated impingement for month (number or weight)

$x_n$ = total number (or weight) of species (or all species combined) collected during n sample days

N = number of days in sample month

n = number of days sampled during sample month

and

$$\text{No}\cdot_{mr} = \left(\frac{(x_n)\ (G)}{g}\right)\cdot 1000 \tag{18}$$

where

$\text{No}\cdot_{mr}$ = estimated number of fish impinged per 1000 cubic meters of cooling water used

$x_n$ = total number (or weight) of species (or all species combined) collected during n sample days

G = total number of cubic meters of water taken into plant during sampling month

g = total number of cubic meters of water taken into plant during days sampled

Annual impingement was estimated by summing the monthly impingement values calculated by Equation 17.

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

$$\text{No}\cdot_d = \frac{(x_n)\cdot V}{f}$$

where

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

$x_n$ = total number (or weight) of species (or all species combined) within 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.

Age composition data were grouped by season of capture and by age class. Mean total lengths by age class and season were calculated using Equation 14 (subsection A.6.c).

Fecundity was calculated using the same procedure that was used for Lake Ontario fish (Equation 13, subsection A.6.c).

2. Entrainment/Viability

a. Nine Mile Point

Sampling within the Nine Mile Point plant documented entrainment of ichthyoplankton. Twice per month from April through October, two samples were collected during the day from the intake forebay at the Nine Mile Point (Unit 1) plant (Table III-4) by lowering two 0.5-meter-diameter 571-micrometer mesh plankton nets simultaneously into the center forebay and setting them at depths of 2 and 7 feet. The stationary nets were set for 15 to 30 minutes, depending on how many pumps were running. The volume of water sampled was determined with a center-mounted digital flowmeter. The samples were preserved in 5 percent buffered formalin. Lab processing and data analysis techniques were the same as those used for Lake Ontario ichthyoplankton samples (subsection A.5).

b. James A. FitzPatrick

At the James A. FitzPatrick plant, entrainment and viability samples were collected twice monthly from January through December. Sampling involved all three major components of the planktonic biota in Lake Ontario: ichthyoplankton (fish eggs and larvae), zooplankton, and phytoplankton (Table III-4).

1) Ichthyoplankton

a) Field Sampling

To document entrainment rates for ichthyoplankton at the James A. FitzPatrick plant, day and night samples were collected from the intake forebay twice each month (Table III-4) by simultaneously lowering two 0.5-meter-diameter plankton nets (571-micrometer mesh) into the common forebay area. The metered nets were set for about 5 to 15 minutes approximately 14 and 20 feet below the water surface. Upon retrieval, the samples were processed first as viability samples (see below), then preserved with formalin and processed later for entrainment data. For entrainment, all ichthyoplankton were identified and enumerated by life stage using procedures described in subsection A.5.b.

To estimate mortality due to plant entrainment, the percentage of dead eggs and larvae in intake and discharge samples were compared. To insure that the same water mass was sampled at both the intake and discharge, a calculated time lag (Table III-5) was used between discharge and intake sampling. Discharge samples (two from day and two from night) were taken by pumping water with a 750-gallon-per-minute centrifugal pump for about 5 minutes from a depth of 5 feet. After the pumped samples were filtered through a 571-micrometer mesh net, they were held at the ambient discharge temperature for a period comparable to the travel time required for discharge water to flow from the point of collection to the discharge outlet in the lake (Table III-5). The samples then were diluted with filtered intake water to simulate the temperature change experienced by ichthyoplankton traveling from the discharge outlet to the 2°F isotherm in the plume (Figure III-2). The samples were then processed to determine the percentage of live and dead eggs and larvae.

Table III-5

Time Required for Mass of Cooling Water To Flow from Intake Forebay to Discharge Aftbay and from Aftbay to Lake Ontario Discharge Structure

| No. of Circulating Water Pumps Operating | Approximate Travel Time (minutes) | |
|---|---|---|
| | Intake Forebay to Discharge Aftbay | Discharge Aftbay to Lake Discharge Structure |
| 1 | 9-12 | 18 |
| 2 | 5-6 | 9 |
| 3 | 3-4 | 6 |

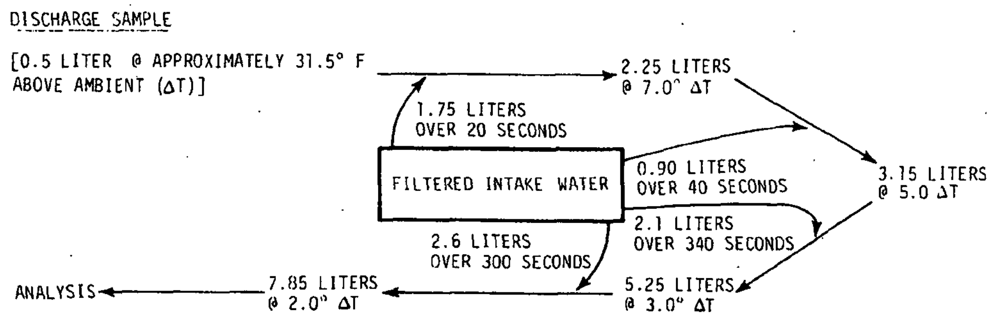



Figure III-2. Serial Dilution Sequence Used To Simulate Temperature Reduction in Thermal Plume from Discharge Outlet to 2°F Isotherm

To estimate mortality due to entrainment of Lake Ontario ichthyoplankton in the thermal plume, the percentage of dead eggs and larvae in simulated or actual plume samples was compared with mortality in the intake samples. Actual lake plume samples were collected from a depth of 5 feet by towing two 0.5-meter-diameter 571-micrometer mesh nets from the visible boil area above the discharge structure through the plume toward the 2°F isotherm. Sampling duration and tow velocity were similar to those during intake sampling. Two replicate plume simulation samples were obtained by collecting intake samples as previously described and simulating increasing and decreasing temperatures within the plume by adding filtered discharge water and then ambient filtered intake water (see Appendix II and Table II-7, LMS 1977).

b) Laboratory Processing

Viability samples were examined under a dissecting microscope soon after being collected. Dead eggs and larvae were removed, identified, enumerated, and preserved in 10 percent buffered formalin in a labeled vial. Live eggs and larvae were placed in a separate vial, preserved, and later identified and enumerated. Fish eggs were considered dead if they were opaque, had disrupted membrane structure or obvious surface abrasions, or were infected with fungus. The live/dead status of fish larvae was based primarily on movements, but larvae infected with fungus or exhibiting surface abrasions also were considered to be dead.

2) Zooplankton

a) Field Sampling

Zooplankton samples for documenting entrainment during the day and night were collected from the intake forebay twice each month (Table III-4). Replicate zooplankton samples were pumped from approximately 5 feet below the surface of the forebay into a 76-micrometer mesh plankton net suspended in a barrel of ambient water. The pump was calibrated before each sampling period, and sufficient water was pumped to yield a concentration of approximately 200 zooplankton per counting chamber (Davies and Jensen 1974). The net contents were washed into a incubation container, held in a water bath at ambient intake temperature for 8 to 10 hours, and then used as both viability and entrainment samples. Densities were determined with lab techniques identical to those used for lake zooplankton samples (subsection A.2.b).

Discharge aftbay samples were collected using the same procedures previously described for intake samples, and intake and discharge samples were compared to estimate mortality due to plant entrainment. To insure that the intake and discharge samples came from the same mass of water, the replicate discharge samples were collected after the proper lag time (Table III-5). After the discharge samples were collected, they were held at the discharge water temperature to simulate travel time to the discharge structure in Lake Ontario; then, to lower the temperature of the zooplankton samples to lake ambient, the samples were diluted with filtered intake water (Figure III-2). The samples were transferred to incubation chambers and held at ambient intake temperature for 8 to 10 hours before live/dead counts were made.

Procedures for measuring the effects of plume entrainment on zooplankton were similar to those used for ichthyoplankton (see Appendix II and Table II-5, LMS 1977).

b) Laboratory Processing

After the 8- to 10-hour incubation period, the viability sample was carefully washed into a 250-milliliter graduated beaker and uniformly mixed. A 1-milliliter aliquot was withdrawn with a wide-bore pipette and placed in a clean Sedgwick-Rafter cell. All nonmotile organisms in the chamber were identified to major taxonomic groups and counted using a Whipple grid and 100X magnification. Motility was defined as the ability of zooplankton to show any movement or activity whatsoever (e.g., appendicular and visceral movements). After the nonmotile organisms were counted, the Sedgwick-Rafter cell was placed on a hot plate for 5 minutes at 65°C to heat-kill all live organisms. Then, the entire chamber was examined again and all zooplankton identified to major taxonomic groups and counted. Live/dead counts from the two replicate samples at each location were used to calculate a mean percent mortality.

3) Phytoplankton

a) Field Sampling

The effect of entrainment on the phytoplankton community was determined by examining chlorophyll a concentrations and primary production rates ($^{14}C$ method) in the intake forebay, the discharge aftbay, the 3°F mixing zone in Lake Ontario near the diffuser discharge, and ambient Lake Ontario waters near the 2°F isotherm (or 3° and 2°F simulation samples). Phytoplankton viability samples were collected twice per month both day and night (Table III-4).

At the intake forebay, two water samples were collected with a pump from a depth of about 5 feet. From each sample, four 2-liter aliquots were withdrawn for chlorophyll a determinations. The four chlorophyll a samples were placed inside a black plastic bag and held at ambient temperature for temporary storage, then transferred to the lab for further processing. For primary production measurements, four sets of BOD bottles (one light and one dark bottle per set) were filled and each bottle allowed to overflow at least once its volume before being capped. These light and dark bottles were stored temporarily in a cool, dark area, then transported to the lab for additional processing.

After the appropriate lag time (Table III-5), two discharge aftbay samples were pumped from approximately 5 feet below the water surface. The two discharge samples were held at the discharge water temperature for 6 to 18 minutes to simulate the travel time to the discharge structure. Then, both samples were placed in an ice bath until their temperatures approached to within 3°F of the intake (ambient) water temperature; at that time, four 2-liter aliquots were removed from each sample for chlorophyll a analysis and four sets of light/dark bottles were prepared using procedures identical to those used for the intake samples.

To determine the effect of plume entrainment, samples were collected from the 3°F and 2°F isotherms in the discharge area of the lake or thermal plume conditions were simulated. Lake samples were obtained by pumping the required water from 5 feet below the surface and prepared in the same manner used for intake samples. For a simulation sample, approximately 30 liters of unfiltered intake water was mixed with 2.5 liters of discharge water (at prevailing discharge temperature) using a serial dilution scheme similar to that used for zooplankton simulation samples (LMS 1977).

b) Laboratory Processing

The light and dark bottles for primary production were brought into the laboratory within 2 hours of collection. These samples were injected immediately with 1 milliliter of $NaH^{14}CO_3$ (5 microcuries per milliliter) and placed in an incubator at ambient (intake) temperature under fluorescent lighting (about 200 foot-candles). Two sets (one light and one dark bottle per set) from each sampling location (intake, discharge, plume, simulation) were removed after 7, 24, 48, and 72 hours' incubation and processed according to the methods described in subsection A.1.b. Primary production was reported as milligrams of carbon assimilated per cubic meter during the incubation period (Equation 8, subsection A.1.c).

The chlorophyll a samples were incubated with the productivity samples. Two 2-liter samples per location were removed after the 7, 24, 48, and 72 hours' incubation and filtered using the same techniques described for Lake Ontario samples (subsection A.1.b). Chlorophyll a and phaeophytin a concentrations were determined spectrophotometrically following laboratory and data reduction procedures described in subsection A.1.b and A.1.c.

# SECTION IV

## RESULTS AND DISCUSSION - LAKE ONTARIO STUDIES

Two nuclear electric generating plants, Nine Mile Point Unit I and James A. FitzPatrick, are located on the New York shoreline of southeastern Lake Ontario on a promontory called Nine Mile Point. Both plants withdraw cooling water from the lake for once-through cooling systems and discharge into the lake.

This section presents results of ecological studies conducted in the vicinity of Nine Mile Point during 1978 to monitor the lake ecosystem in order to detect potential plant influences, if any, and assess their importance. The 1978 results represent the most recent ecological data available from a continuing program that has been administered by the utilities operating the stations - Niagara Mohawk Power Corporation and the Power Authority of the State of New York.

The Lake Ontario monitoring program was designed to describe the composition and relative abundance, both spatially and temporally, of the major components of the aquatic biota, including phytoplankton, zooplankton, periphyton, benthic invertebrates, and fish. The program also monitored water quality in the area.

The study has two major objectives:

- Monitor the aquatic ecosystem in the vicinity of the two plants following guidelines established by the Nuclear Regulatory Commission in the Environmental Technical Specifications for the plants

- Compare abundance, species composition, and distribution of aquatic biota in the vicinity of Nine Mile Point, especially in the area immediately adjacent to the power stations (the experimental area) and in areas farther away from the stations (the control area) that usually are not influenced by plant operations.

A. PHYTOPLANKTON

Phytoplankton, which are minute aquatic plants and the primary food source for higher levels of organisms in an aquatic ecosystem, use the sun as an energy source for biochemically incorporating carbon needed for respiration and reproduction.

1. Phytoplankton Densities

In this study, cell density estimates for species composition and temporal and spatial distribution were used to describe the phytoplankton community. Chlorophyll a concentrations and rates of carbon assimilation (utilizing radioactive carbon$^{-14}$ tracer methods) were used as an estimate of phytoplankton biomass and productivity.

a. Species Composition

Changes in species composition may indicate changes in those physical and chemical factors that affect the composition of the phytoplankton community (Schelske et al 1971). In the vicinity of Nine Mile Point, 223 phytoplankton taxa were observed from April through December 1978 (Appendix Table A-1), however only 51 of these taxa comprised 2 percent or more of th total number of phytoplankton collected during any sampling month (Table IV-1). The most abundant taxa during the 9-month sampling period (Table IV-1) were Microcystis sp. (a blue-green alga) and Rhodomonas minuta (a phytoflagellate). Although all major phytoplankton divisions were observed, the majority of the taxa were blue-green algae (Cyanophyta), green algae (Chlorophyta), and diatoms (Bacillariophyta-Centric and Pennate combined); these three divisions were represented by 21, 107, and 47 taxa, respectively.

Several taxa of nuisance algae were identified throughout the study, but none were at levels high enough to create nuisance problems. Cladophora, a filamentous green alga capable of producing nuisance blooms, was not encountered in phytoplankton samples during 1978. Although it was observed in nearshore waters by divers during benthic sampling, Cladophora did not exhibit extensive large mats of growth along the shoreline as it has in previous years (Mantai 1974).

## Table IV-1

**Monthly Occurrence and Relative Abundance of the More Abundant Phytoplankton Collected in Whole Water Samples in Vicinity of Nine Mile Point, April-December 1978**

| Taxa | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| Cyanophyta | | | | | | | | | | |
| Chroococcales | | | | | | | | | | |
| Aphanothece sp. | | | | T* | | 14 | | | | 1 |
| Gomphosphaeria aponina | T | | | | | | 10 | | 1 | 1 |
| Gomphosphaeria lacustris | | | | T | | | 27 | 4 | | 4 |
| Gomphosphaeria naegelianun | | | | | | 8 | 7 | | | 2 |
| Microcystis sp. | 1 | 7 | 7 | 24 | 47 | 14 | 14 | 17 | | 18 |
| Oscillatoriales | | | | | | | | | | |
| Lyngbya contorta | | | | | | 11 | | | | 1 |
| Lyngbya sp. | | T | T | | T | 3 | 2 | 1 | 2 | 1 |
| Oscillatoria sp. | 4 | 8 | 5 | 10 | 3 | 9 | 1 | 2 | 22 | 5 |
| Nostocales | | | | | | | | | | |
| Anabaena circinalis | | | 1 | 1 | T | 4 | T | T | | 1 |
| Anabaena sp. | | 1 | T | T | 2 | 2 | T | 9 | T | 2 |
| Aphanizomenon flos-aquae | | | | 2 | 1 | 1 | 1 | 6 | 2 | 2 |
| Chlorophyta | | | | | | | | | | |
| Volvocales | | | | | | | | | | |
| Chlamydomonas sp. | 2 | 2 | 1 | 1 | 1 | 1 | T | 1 | 1 | 1 |
| Chlorococcales | | | | | | | | | | |
| Ankistrodesmus convolutus | 1 | 1 | T | T | 1 | T | | T | | T |
| Ankistrodesmus falcatus | T | T | T | 1 | | T | T | T | 3 | T |
| Coelastrum microporum | | | 1 | 2 | 2 | 3 | 4 | 1 | T | 2 |
| Dictyosphaerium sp. | T | T | | | 2 | | | | | T |
| Micractinium sp. | T | | 1 | T | 2 | 1 | 2 | 1 | 2 | 1 |
| Oocystis sp. | | 1 | 2 | T | T | | | | | 1 |
| Pediastrum boryanum | | 1 | T | 2 | 2 | 1 | 1 | | 1 | 1 |
| Pediastrum duplex | | | 1 | 2 | 3 | 1 | T | | T | 1 |
| Scenedesmus ecornis | 3 | 1 | 1 | 1 | 1 | ~~3~~ | 1 | T | 2 | 1 |
| Scenedesmus quadricauda | | 1 | 1 | 4 | 1 | 1 | 1 | 1 | 1 | 1 |
| Scenedesmus sp. | T | T | 1 | 2 | T | T | T | T | 2 | T |
| Sphaerocystis schroeteri | | | | | 2 | | 1 | | | T |
| Chlorococcales unid. | | 1 | 8 | 8 | 2 | T | 1 | T | | 2 |
| Ulotrichales | | | | | | | | | | |
| Ulothrix zonata | | 4 | | | | | | | | 1 |
| Oedogoniales | | | | | | | | | | |
| Oedogonium sp. | | 3 | T | | T | 4 | 1 | 6 | 1 | 2 |
| Chlorophyta unid. | | | | | 1 | T | | | | 1 |
| Xanthophyta | | | | | | | | | | |
| Rhizochloridales | | | | | | | | | | |
| Stipitococcus sp. | | | 13 | 1 | 4 | T | | T | T | 3 |
| Chrysophyta | | | | | | | | | | |
| Chrysomonadales | | | | | | | | | | |
| Chrysochromulina parva | 2 | T | T | 3 | T | T | T | T | | T |
| Dinobryon sociale | | | 6 | | | T | | | | 1 |
| Chrysomonadales unid. | T | | 2 | 1 | T | T | | | T | T |
| Monosigales | | | | | | | | | | |
| Stelexomonas dichotoma | 1 | T | | | | | | | 6 | T |
| Bacillariophyta-Centric | | | | | | | | | | |
| Eupodiscales | | | | | | | | | | |
| Cyclotella sp. | T | 4 | T | T | | | T | T | T | 1 |
| Melosira islandica | 1 | 2 | 1 | | | | | | 3 | 1 |
| Melosira sp. | | T | | T | | 3 | | T | T | T |
| Stephanodiscus astraea | 3 | T | | | | T | | | | T |
| Stephanodiscus binderana | | | 4 | | | T | | | 2 | 1 |
| Stephanodiscus sp. | 48 | T | T | T | | T | T | T | T | 2 |
| Eupodiscales unid. | T | 16 | 7 | 5 | T | T | T | 1 | 13 | 4 |
| Bacillariophyta-Pennate | | | | | | | | | | |
| Fragilariales | | | | | | | | | | |
| Asterionella formosa | 4 | 4 | 3 | | | T | 1 | T | 4 | 2 |
| Diatoma tenue | 3 | 21 | 2 | | T | T | T | T | 4 | 4 |
| Fragilaria capucina | | | 2 | | | | | | | T |
| Fragilaria crotonensis | T | 1 | 10 | T | T | 2 | 3 | 1 | 2 | 3 |
| Fragilaria sp. | T | 2 | 1 | T | | 1 | 1 | 1 | 1 | 1 |
| Cryptophyta | | | | | | | | | | |
| Cryptomonadales | | | | | | | | | | |
| Chroomonas sp. | T | T | T | 4 | 1 | T | 1 | T | | 1 |
| Cryptomonas marssonii | T | | T | T | T | 1 | 2 | 10 | 3 | 3 |
| Cryptomonas sp. | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 1 | 2 |
| Rhodomonas minuta | 15 | 5 | 3 | 8 | 3 | 2 | 6 | 23 | 4 | 8 |
| Cryptomonadales unid. | T | T | T | 2 | T | T | T | 1 | T | T |
| Unidentified alga | T | 1 | 1 | 1 | 1 | 1 | T | T | 4 | 1 |
| Density (No./mℓ) | 1016.1 | 4029.2 | 4168.6 | 1206.7 | 4970.1 | 1899.8 | 3801.3 | 5357.9 | 1490.3 | 3104.4 |

*T = <0.5%.

b. Temporal Distribution

Total phytoplankton cell densities fluctuated throughout the 1978 sampling season (Table IV-2). Phytoplankton cell densities were lowest in April and highest in November. A late spring peak (total cell densities of 4000-4200 per milliliter) was observed in May and June and a late summer peak (nearly 5000 cells per milliliter) in August. A total cell density of more than 5300 cells per milliliter was observed in November.

The three most abundant groups in the vicinity of the Nine Mile Point and James A. FitzPatrick plants during 1978 were blue-green algae, which accounted for about 39 percent of the algae collected, and green algae and diatoms, which accounted for 20 percent each (Appendix Tables A-2 through A-5). Phytoflagellates (Cryptophyta) were fourth in abundance (Appendix Table A-6).

Diatoms were dominant during April, May, June, and December when water temperatures were low (Table IV-2). Blue-green algae dominated the community from July through November; during July through October, the greens were second in abundance. These two groups typically peak during warmer-water periods. Phytoflagellates (Cryptophyta) were second in abundance during April and codominated with the blue-green algae during November. Other phytoplankton divisions collected included the Euglenophyta, Chrysophyta, Xanthophyta, and Pyrrhophyta (dinoflagellates). Densities of these groups were low throughout the study period (Table IV-2 and Section I-A, pages I-A 1 through I-A 20 of the 1978 Data Report prepared by Texas Instruments Incorporated 1979).

The presence of a filamentous red alga, Batrachospermum sp. (Rhodophyta) in April was atypical. This genus is usually found within cool, flowing streams rather than in open waters of a lake (Hynes 1972) and perhaps it was washed into the lake by spring runoff.

c. Spatial Distribution

There were no apparent spatial trends among sampling stations within each sampling month for either individual divisions or total phytoplankton densities, nor were there specific trends among depth contours (Appendix Tables A-2 through A-7). In addition, there were no apparent differences of monthly

Table IV-2

Mean Density and Relative Abundance* of Major Phytoplankton Groups Collected in Surface Samples, and Associated Chlorophyll a Concentrations and Primary Production Rates, Nine Mile Point Vicinity, April-December, 1978

| Division | Apr** No./mℓ | Apr** % | May No./mℓ | May % | Jun No./mℓ | Jun % | Jul No./mℓ | Jul % | Aug No./mℓ | Aug % | Sep No./mℓ | Sep % | Oct No./mℓ | Oct % | Nov No./mℓ | Nov % | Dec No./mℓ | Dec % | Annual Mean No./mℓ | Annual Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyanophyta | 55.0 | 5.4 | 662.3 | 16.4 | 643.7 | 15.4 | 494.4 | 41.0 | 2795.6 | 56.2 | 1249.1 | 65.7 | 2476.1 | 65.1 | 2097.0 | 39.1 | 410.3 | 27.5 | 1209.3 | 38.9 |
| Chlorophyta | 96.7 | 9.5 | 860.1 | 21.3 | 913.6 | 21.9 | 372.5 | 30.9 | 1437.6 | 28.9 | 384.7 | 20.2 | 661.5 | 17.4 | 706.4 | 13.2 | 259.7 | 17.4 | 632.5 | 20.4 |
| Euglenophyta | 1.6 | 0.2 | 1.4 | <0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | <0.1 |
| Chrysophyta | 31.6 | 3.1 | 42.7 | 1.1 | 378.1 | 9.1 | 42.9 | 3.6 | 12.7 | 0.3 | 14.1 | 0.7 | 1.7 | <0.1 | 22.5 | 0.4 | 89.1 | 6.0 | 70.6 | 2.3 |
| Xanthophyta | 0.0 | 0.0 | 0.0 | 0.0 | 532.9 | 12.8 | 7.1 | 0.6 | 204.9 | 4.1 | 3.9 | 0.2 | 14.0 | 0.4 | 12.9 | 0.2 | 3.0 | 0.2 | 86.5 | 2.8 |
| Bacillariophyta | 626.5 | 61.7 | 2096.7 | 52.0 | 1401.0 | 33.6 | 75.3 | 6.2 | 54.9 | 1.1 | 123.6 | 6.5 | 233.4 | 6.1 | 483.2 | 9.0 | 528.1 | 35.4 | 624.7 | 20.1 |
| Pyrrhophyta-Dinophyceae | 14.8 | 1.5 | 41.3 | 1.0 | 9.7 | 0.2 | 0.8 | <0.1 | 11.5 | 0.3 | 12.2 | 0.6 | 2.1 | <0.1 | 8.4 | 0.2 | 7.4 | 0.5 | 12.0 | 0.4 |
| Cryptophyta | 176.1 | 17.3 | 277.9 | 6.9 | 252.3 | 6.1 | 199.0 | 16.5 | 412.4 | 8.3 | 96.4 | 5.1 | 398.9 | 10.5 | 2011.1 | 37.5 | 127.5 | 8.6 | 439.1 | 14.1 |
| Unidentified algae | 0.8 | < 0.1 | 46.8 | 1.2 | 37.3 | 0.9 | 14.7 | 1.2 | 40.5 | 0.8 | 15.8 | 0.8 | 13.6 | 0.4 | 16.4 | 0.3 | 65.2 | 4.4 | 27.9 | 0.9 |
| Total density | 1016.1 | | 4029.2 | | 4168.6 | | 1206.7 | | 4970.1 | | 1899.8 | | 3801.3 | | 5357.9 | | 1490.3 | | 3104.4 | |
| Chlorophyll a (mg/ℓ) | 3.01 | | 8.69 | | 9.08 | | 2.29 | | 5.01 | | 0.73 | | 2.34 | | 4.07 | | 4.98 | | 4.47 | |
| Primary production ($mgC/m^3/4$ hr) | 9.63 | | 18.58 | | 21.86 | | 8.53 | | 19.78 | | 1.06 | | 7.69 | | 18.26 | | 9.07 | | 12.72 | |

*Mean density based on 32 samples per sampling date, and relative abundance equals major group density divided by total density times 100.

**The occurrence of Rhodophyta (red algae) during April is discussed in the text (Section IV A 1.b.). Batrachospermum sp comprised of 13.0 cells/mℓ approximately 1.3% of the monthly density.

total phytoplankton among the control (transects NMPW and NMPE) and experimental areas (transects NMPP and FITZ). Turbulence is probably the most important condition influencing short-term variations, and it tends to negate physical and chemical factors that are necessary for spatial differences to develop within individual sampling periods.

Observation of annual mean data for all depth contours combined revealed no apparent differences between the control and experimental areas, but comparison of individual transect means for total phytoplankton cell densities suggested a west to east gradient; that is, cell densities at NMPW and NMPP transects were approximately 30 percent higher than the FITZ and NMPE transects. This west-to-east density gradient was not apparent in monthly samples. A gradient with respect to depth contours was observed in surface samples, showing the density at the 10- and 20-foot contours was higher than the density at the 40- and 60-foot contours based on annual mean values (Appendix Table A-7).

Spatial distribution data for the total phytoplankton community at depths equivalent to the 50, 25, and 1 percent light penetration levels along the 40-foot depth contour indicated a general trend of equally abundant densities at the three light penetration levels (Appendix A-7).

2. Chlorophyll a and Phaeophytin a

a. Temporal Distribution

Chlorophyll a and phaeophytin a concentrations are presented in Appendix Tables A-8 and A-9.

Highest monthly averages for chlorophyll a concentration occurred during May and June, coinciding with the late spring peak in cell densities (Table IV-2). A smaller late-fall peak in chlorophyll a was observed in November when cell densities peaked. The lower than expected chlorophyll a values were probably a result of peak phaeophytin values in November. Lowest chlorophyll a concentrations occurred in September when densities were also low. Generally, phytoplankton cell densities can be directly correlated to chlorophyll a concentrations; however, during certain periods when the chlorophyll a degradation product (phaeophytin a) is present, the determination of the chlorophyll a concentrations may be affected because phaeophytin a is spectrophotometrically inactive. The monthly mean phaeophytin a concentrations were generally low throughout the study, but during November high phaeophytin concentrations were found. These results support the low chlorophyll a concentrations in relation to high cell density which occurred in November.

Chlorophyll a/phaeophytin a concentrations were surveyed with water quality collections semimonthly at the 20- and 60-foot depth contours. Throughout the study, trends in chlorophyll a concentrations at the 20- and 60-foot contours were similar to trends observed in concurrent lake phytoplankton samples (Appendix Table G-3). Peaks in chlorophyll a concentrations in May and June water quality samples were similar to those in lake samples collected with phytoplankton. Phaeophytin a concentrations at the 20- and 60-foot water quality stations were low throughout the study.

b. Spatial Distribution

There were no distinct spatial distribution differences for chlorophyll a or phaeophytin a concentrations among sampling stations within a monthly sampling period (Appendix Tables A-8 and A-9). From the 10- out to the 60-foot depth contours, chlorophyll a concentrations slightly decreased (based on an annual mean). There were no overall differences among control and experimental transects for chlorophyll a and phaeophytin a (Appendix Tables A-8 and A-9).

Sampling at the 50, 25, and 1 percent light-transmittance levels showed that chlorophyll a concentrations were generally higher at the 50 percent level and lowest at the 25 percent level. Phaeophytin a values showed a distinct trend; based on the annual mean concentrations, phaeophytin a concentrations were higher at the 25 percent level than at the 50 or 1 percent levels.

3. Primary Production

a. Temporal Distribution

Primary productivity is a measure of the amount of carbon assimilated per unit of time by the phytoplankton community. Rates of productivity for lake samples were highest in June and lowest in September (Appendix Table A-10).

Monthly primary productivity rates followed the same seasonal trend that total phytoplankton cell densities exhibited during 1978. However, primary productivity rates frequently do not follow cell density trends because productivity rates will respond to short-term effects that may not produce a change in cell densities. Results of the primary production studies conducted by Vollenweider et al (1974) on Lake Ontario near Oswego support this year's results.

b. Spatial Distribution

Primary productivity values along the depth contours were lowest at the 60-foot depth contour and highest at the 20-foot contour (Appendix Table A-10). There were no consistent trends in productivity among stations within each monthly sampling, nor trends among stations based on annual means. There were also no consistent differences in productivity rates among experimental and control transects. Productivity rates were higher at the 50 percent light-transmittance level than at the 25 and 1 percent levels, and rates at the latter two levels were similar.

The overall results indicate that there were no discernable temporal or spatial patterns of rates of carbon assimilation during the 1978 study in the Nine Mile Point vicinity.

4. Overview of Year-to-Year Results

Phytoplankton samples have been collected in the vicinity of Nine Mile Point since 1973 to document species composition, temporal and spatial distribution, chlorophyll a concentrations, and primary production ($^{14}C$ tracer method). Species composition has been similar from year to year, and the number of taxa has ranged between 223 and 254. The majority of the taxa were Chlorophyta (green algae), followed by Bacillariophyta (diatoms), and Cyanophyta (blue-green algae). Other taxa included representatives of 6 Cryptophyta, Pyrrhophyta, Euglenophyta, Xanthophyta, Chrysophyta, and Rhodophyta.

Total phytoplankton cell densities usually increased in April and exhibited a spring pulse (generally in May) and a large late-summer pulse in August. In addition to similar temporal patterns among years, total phytoplankton cell densities were similar from year to year. The diatoms generally dominated during spring, while the combination of green and blue-green algae was characteristically most abundant during the summer pulse. The phytoflagellates were present during most of the year, but were usually more abundant during fall. Based on annual mean densities, spatial distribution trends were similar from year to year. Total phytoplankton cell densities decreased from west to east, and it was generally noted that densities decreased from the 10-foot to the 60-foot depth contours.

Chlorophyll a and phaeophytin a concentrations have been measured since 1973. Chlorophyll a showed a similar temporal distribution each year with peaks in late spring and late summer. However, no consistent spatial trends were observed from year to year. Phaeophytin a concentrations were generally low throughout all of the years.

Primary production was variable within a given year and from year to year. Temporal distribution generally followed total phytoplankton cell density.

## B. ZOOPLANKTON

The zooplankton community in the vicinity of Nine Mile Point was sampled using two different types of gear: a 12-centimeter-diameter Wisconsin net with 76-micrometer mesh to sample microzooplankton (smaller zooplankton); and a 1-meter-diameter Hensen net with 571-micrometer mesh to sample macrozooplankton (larger zooplankton). Micro- and macrozooplankton data are presented independently.

### 1. Microzooplankton

The microzooplankton community is composed of protozoans, rotifers, small microcrustaceans, and early life stages of macrozooplankters. For this study, microzooplankton were defined as invertebrates larger than 76 micrometers but less than 571 micrometers.

a. Species Composition

Of the 47 microzooplankton taxa collected during 1978, Rotifera was the dominant group (Table IV-3). All other taxa combined, including Protozoa, Calanoida, Cyclopoida, Cladocera, and Copepoda nauplii, accounted for only 20 percent of the microzooplankton community sampled. Numbers of microzooplankton taxa fluctuated from month to month in no definite pattern, ranging from a low of 18 in July when density was greatest to a high of 31 in September, the period of lowest density.

b. Temporal Distribution

The seasonal distribution pattern of total microzooplankton abundance was unimodal (Table IV-4); density increased throughout the spring, peaked in July (188,687 organisms per cubic meter), declined precipitously through September, and increased slightly in October and November. No samples were collected in December because of severe winter weather and ice.

Rotifers totally dominated the microzooplankton community throughout the study except during April when five taxonomic groups shared dominance. In percent composition, rotifers ranged from 13 percent in April to 90 percent in August (Table IV-4). Rotifera density was highest in July, accounting for the major portion of the peak in total density observed for that period (Appendix Table B-1). The most abundant organism throughout this survey was the rotifer Keratella sp., which ranged in percent composition from 1 percent in April to 56 percent in June and had an annual mean of 35 percent (Table IV-3). Copepoda nauplii was the second most abundant major group during 1978, but accounted for only 8 percent of the microzooplankton community (Table IV-4). The Cladocera group had an annual mean of only 5 percent, with peak relative abundance during October. Cyclopoida and Protozoa accounted for only 3 and 4 percent, respectively.

c. Spatial Distribution

Among individual transects and between experimental and control transects, no salient differences were observed in total microzooplankton density (Table IV-5). With respect to depth contours, there were more organisms in inshore waters except during July and August (Table IV-5).

Table IV-3 (Page 1 of 2)

Monthly Occurrence and Relative Abundance (by Number) of Microzooplankton from Wisconsin Net (76 Micrometers) Oblique Tows, Nine Mile Point Vicinity, 1978

| Taxa | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| Protozoa | | | | | | | | | | |
| Mastigophora | 9 | 19 | | T* | | T | 1 | T | | 2 |
| Ciliophora | | T | | | | T | T | 1 | | T |
| Suctoria | 11 | T | T | | T | | | | | T |
| Protozoa unid. | 1 | 10 | 2 | | | | | | | 1 |
| Coelenterata (Cnideria) | | | | | | | | | | T |
| *Hydra* sp. | | T | | | | | | | | T |
| Rotifera | | | | | | | | | | |
| Brachionidae | | | | | | | | | | |
| *Keratella* sp. | 1 | 2 | 56 | 36 | 27 | 21 | 21 | 52 | | 35 |
| *Brachionus* sp. | T | 1 | 1 | T | T | 9 | 1 | T | | 1 |
| *Euchlanis* sp. | T | | | | | | | | | T |
| *Kellicottia* sp. | 3 | 3 | 5 | 3 | 5 | 3 | | 3 | | 4 |
| *Notholca* sp. | 3 | 6 | T | | | T | | | | 1 |
| *Lecane* sp. | T | | T | | | T | | | | T |
| *Lepadella* sp. | | T | T | | | | | | | T |
| *Monostyla* sp. | | | T | | | | | | | T |
| Conochilidae | | | | | | | | | | |
| *Conochilus* sp. | | | 1 | 11 | 1 | T | | | | 5 |
| Filinidae | | | | | | | | | | |
| *Filinia* sp. | | T | T | T | T | T | | | | T |
| Asplanchnidae | | | | | | | | | | |
| *Asplanchna* sp. | | | 1 | | | T | 1 | T | | T |
| Synchaetidae | | | | | | | | | | |
| *Polyarthra* sp. | T | 1 | 11 | 24 | 55 | 14 | 31 | 8 | | 23 |
| *Synchaeta* sp. | | T | 2 | | | T | | | | T |
| Trichoceridae | | | | | | | | | | |
| *Trichocerca* sp. | | | T | | T | T | 1 | T | | T |
| Ploesomatidae | | | | | | | | | | |
| *Ploesoma* sp. | | | T | 1 | T | 2 | T | | | 1 |
| Rotifer unid. | 6 | 58 | 13 | 4 | 1 | 21 | 7 | 7 | | 11 |
| Nematoda | | | | | | | | | | |
| Nematoda unid. | T | | T | | | | | | | T |

Table IV-3 (Page 2 of 2)

| Taxa | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| Nematoda (Cont) | | | | | | | | | | |
| Cladocera | | | | | | | | | | |
| Bosminidae unid. | T | T | 2 | 6 | T | 4 | 13 | 6 | | 4 |
| Chydoridae | | | | | | | | | | |
| *Alona* sp. | | | | | | T | | | | T |
| *Chydorus* sp. | T | T | T | T | | 1 | | | | T |
| Daphnidae | | | | | | | | | | |
| *Daphnia retrocurva* | T | | T | T | 1 | 1 | 6 | 1 | | 1 |
| *Daphnia* sp. | T | | T | T | | T | | T | | T |
| *Ceriodaphnia* sp. | | | | T | T | T | T | T | | T |
| Leptodoridae | | | | | | | | | | |
| *Leptodora kindtii* | | | T | T | T | T | | | | T |
| Sididae | | | | | | | | | | |
| *Diaphanosoma* sp. | | | | | | T | | | | T |
| Copepoda | | | | | | | | | | |
| Calanoida | | | | | | | | | | |
| *Diaptomus oregonensis* | | | | | | T | | | | T |
| *Diaptomus ashlandi* | T | | | | | | | | | T |
| *Diaptomus sicilis* | 2 | T | | | | | | | | T |
| *Diaptomus minutus* | T | | | | | | | | | T |
| *Diaptomus* sp. | 1 | | T | | | | | T | | T |
| *Eurytemora* sp. | | | | | | | T | | | T |
| *Limnocalanus macrarus* | 13 | T | | | | | T | | | T |
| Calanoida (Copepodids) unid. | 3 | T | T | T | T | T | T | 5 | | 1 |
| Cyclopoida | | | | | | | | | | |
| *Cyclops bicuspidatus thomasi* | 5 | | T | T | T | 1 | T | T | | T |
| *Cyclops* sp. | | | | | | T | | 3 | | T |
| *Tropocyclops prasinus mexicana* | | | | | T | T | | | | T |
| *Tropocyclops* sp. | | | | | | T | 1 | | | T |
| Cyclopoida (Copepodids) unid. | 18 | T | 3 | 2 | 2 | 2 | 7 | 9 | | 3 |
| Cyclopoida unid. | | | | | T | | | | | T |
| Harpacticoida | | | | | | | | | | |
| *Longipedia* sp. | | | | T | | | | | | T |
| *Caligus* sp. | | | | | T | | | | | T |
| Copepoda nauplii unid. | 25 | 3 | 2 | 10 | 8 | 20 | 9 | 8 | | 8 |
| Total density (No./$m^3$) | 4,938 | 37,615 | 87,782 | 188,687 | 58,550 | 3,477 | 16,315 | 11,424 | | 51,099 |
| Number of taxa | 25 | 21 | 28 | 20 | 21 | 31 | 19 | 19 | | 47 |

*T = <0.5%.

Table IV-4

Percent Relative Abundance of Major Microzooplankton Groups and Total Density of Microzooplankton from Wisconsin Net Oblique Tows, Nine Mile Point Vicinity, 1978

| Taxa | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec* | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| Protozoa | 21 | 29 | 2 | T** | T | T | 1 | 1 | | 4 |
| Rotifera | 13 | 68 | 90 | 80 | 88 | 71 | 70 | 71 | | 80 |
| Cladocera | T | T | 3 | 7 | 2 | 5 | 16 | 7 | | 5 |
| Calanoida | 19 | T | T | T | T | T | 1 | T | | T |
| Cyclopoida | 23 | T | 3 | 2 | 2 | 3 | 5 | 13 | | 3 |
| Copepoda nauplii | 25 | 3 | 2 | 10 | 8 | 20 | 7 | 8 | | 8 |
| Others | T | T | T | T | 0 | 0 | 0 | 0 | | T |
| Total density (No./$m^3$) | 4,913 | 37,615 | 87,782 | 188,687 | 58,550 | 3,477 | 16,103 | 11,424 | | 51,069 |

*No samples collected due to severe winter weather and ice.
**T = <0.5%.

Depth-related differences in total microzooplankton density were primarily a function of rotifers (Appendix Table B-1). From May through November rotifers comprised a higher percentage of the total microzooplankton community (from 68 to 90 percent) than any other taxonomic group. Generally, numbers of rotifers were inversely related to water-depth contours except in July. Neither major nor consistent density differences between control and experimental transects were observed for the major microzooplankton groups (Appendix Tables B-1 through B-4).

2. Macrozooplankton

a. Species Composition

Of the 33 taxa of macrozooplankton collected during the 1978 study (Table IV-6), cladocerans were dominant; however, calanoid copepods were present to the exclusion of all other macrozooplankton during April and virtually so during May. Although scuds (Amphipoda) _Gammarus fasciatus_ and _Pontoporeia affinis_, and a mysid shrimp, _Mysis oculata relicta_ (Mysidacea), were designated as selected species for this study, only a few _Pontoporeia affinis_ were collected in 1978 macrozooplankton samples (Table IV-6). All three species are epibenthic during the day and migrate up into the water column only during evening hours. Since _G. faciatus_ and _P. affinis_ were common taxa in 1978 benthic collections (Appendix Tables D-2 and D-3), their temporal and spatial distribution is discussed in subsection D.

## Table IV-5

## Total Microzooplankton Abundance (No./$m^3$), Wisconsin Net (76-Micrometer) Oblique Tows, Nine Mile Point Vicinity, 1978

| Depth Contour (ft) | Transect | Apr Mean | Apr S.E.* | May Mean | May S.E. | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. | Oct Mean | Oct S.E.* | Nov Mean | Nov S.E. | Dec Mean | Dec S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 7065.62 | 656.36 | 47148.25 | 4635.17 | 123721 | 4674 | 209167.37 | 17801.47 | 70847.75 | 3484.34 | 4174.60 | 195.77 | 15407 | 125 | 10859 | 558 | No samples taken due to ice and strong winds | |
| | NMPP | 4401.85 | 476.19 | 30163.66 | 3616.07 | 94852 | 2699 | 197545.94 | 2911.25 | 61354.59 | 1560.24 | 4756.40 | 89.74 | 14500 | 989 | 15169 | 1762 | | |
| | FITZ | 7659.65 | 1457.91 | 39307.33 | 1558.44 | 87849 | 3695 | 160435.75 | 14908.81 | 71189.31 | 7523.37 | 3346.01 | 147.75 | 14760 | 211 | 8277 | 519 | | |
| | NMPE | 5332.39 | 212.16 | 66629.62 | 5721.63 | 71955 | 3422 | 156403.62 | 2873.62 | 50091.16 | 4863.22 | 5024.09 | 466.55 | 23370 | 879 | 14566 | 820 | | |
| | Contour mean | 6114.88 | 754.82 | 45812.21 | 7758.54 | 94594 | 10826 | 180888.12 | 13212.96 | 63370.70 | 4978.69 | 4325.27 | 371.47 | 17009 | 2129 | 12218 | 1623 | | |
| 20 | NMPW | 3177.22 | 441.37 | 43247.73 | 651.04 | 92262 | 3770 | 131474.69 | 14169.47 | 89880.87 | 2976.19 | 3121.61 | 11.68 | 12574 | 670 | 12730 | 867 | | |
| | NMPP | 5540.36 | 372.67 | 43513.93 | 2052.54 | 73610 | 7740 | 152406.12 | 24522.53 | 79649.75 | 213.56 | 4931.66 | 111.80 | 16120 | 705 | 14756 | 721 | | |
| | FITZ | 5266.61 | 79.00 | 37598.80 | 3585.22 | 87344 | 4633 | 246059.12 | 17710.97 | 41064.40 | 3753.50 | 2580.42 | 86.91 | 17677 | 738 | 9888 | 535 | | |
| | NMPE | 3401.36 | 583.72 | 44085.45 | 5721.02 | 84454 | 5039 | 190969.31 | 2467.25 | 58730.12 | 3802.14 | 3153.79 | 93.68 | 18362 | 1233 | 16152 | 356 | | |
| | Contour mean | 4346.39 | 614.57 | 42111.48 | 1514.34 | 84418 | 3947 | 180227.31 | 25166.20 | 67331.25 | 10849.02 | 3446.87 | 512.11 | 16183 | 1291 | 13381 | 1360 | | |
| 40 | NMPW | 5569.75 | 55.59 | 26752.98 | 1242.81 | 75317 | 1923 | 120975.37 | 650.41 | 72715.50 | 2252.25 | 4127.57 | 352.94 | 13834 | 533 | 8380 | 326 | | |
| | NMPP | 5506.71 | 183.15 | 35917.77 | 1322.75 | 95635 | 4365 | 126022.87 | 4324.31 | 87155.75 | 1092.22 | 3107.40 | 285.02 | 13256 | 745 | 11334 | 836 | | |
| | FITZ | 3967.52 | 280.88 | 37933.35 | 1122.58 | 100115 | 0.03 | 234026.75 | 9093.06 | 32357.99 | 841.46 | 2541.87 | 177.34 | 13885 | 628 | 15589 | 377 | | |
| | NMPE | 4257.70 | 268.91 | 36688.77 | 3344.92 | 89190 | 2528 | 259258.87 | 9700.12 | 50384.01 | 5529.95 | 3409.30 | 44.47 | 18645 | 201 | 6288 | 72 | | |
| | Contour mean | 4825.42 | 415.98 | 34323.21 | 2557.34 | 90064 | 5403 | 185070.94 | 35934.47 | 60653.31 | 12089.80 | 3296.53 | 330.23 | 14905 | 1255 | 10398 | 2016 | | |
| 60 | NMPW | 3970.81 | 119.60 | 22844.25 | 321.75 | 83616 | 4843 | 120659.94 | 2276.62 | 76385.37 | 1625.12 | 3447.97 | 202.82 | 14663 | 513 | 8102 | 187 | | |
| | NMPP | 4529.00 | 187.15 | 44600.91 | 111.78 | 78760 | 5896 | 192077.87 | 51854.25 | 41727.17 | 2663.44 | 2640.19 | 7.35 | 12130 | 193 | 7074 | 462 | | |
| | FITZ | 5048.76 | 458.98 | 23384.32 | 1700.68 | 92761 | 6662 | 249262.31 | 14406.56 | 23298.41 | 635.74 | 2434.06 | 159.34 | 14750 | 656 | 11099 | 132 | | |
| | NMPE | 3908.26 | 105.11 | 22028.33 | 0.00 | 73072 | 4203 | 272246.12 | 9620.00 | 29966.49 | 390.64 | 2833.53 | 47.23 | 23716 | 1842 | 12528 | 256 | | |
| | Contour mean | 4364.21 | 267.46 | 28214.45 | 5469.26 | 82052 | 4169 | 208561.56 | 33801.73 | 42844.36 | 11811.47 | 2838.94 | 218.78 | 16315 | 2541 | 9701 | 1272 | | |
| Control mean** | | 4585.39 | 463.11 | 38711.92 | 5314.92 | 86698 | 5905 | 182644.41 | 21390.53 | 62370.66 | 6669.11 | 3661.56 | 256.39 | 17571 | 1495 | 11201 | 1208 | | |
| Experimental mean** | | 5240.06 | 398.28 | 36552.51 | 2458.43 | 88866 | 3165 | 194729.59 | 16287.44 | 54724.67 | 8271.61 | 3292.25 | 356.07 | 14635 | 601 | 11648 | 1145 | | |
| Monthly mean | | 4912.72 | 306.88 | 37615.34 | 3943.55 | 87782 | 2825 | 188687.00 | 13080.36 | 58549.92 | 5226.32 | 3476.90 | 217.24 | 16103 | 866 | 11424 | 806 | | |
| Monthly range | | 3177.22—7659.65 | | 21683.64—72351.31 | | 71955—123721 | | 272246.12—120659.94 | | 89880.87-23298.41 | | 2434.06 — 5024.09 | | 12130-23716 | | 6288-16152 | | | |

*Standard error.

**Control represents NMPW and NMPE, experimental represents NMPP and FITZ.

Table IV-6

Monthly Occurrence and Relative Abundance (by number) of Macrozooplankton Collected in the Vicinity of Nine Mile Point, 1978

| Taxa | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| Coelenterata (Cnideria) | | | | | | | | | | |
| Hydrozoa | | | | | | | | | | |
| Hydra sp. | | | | | | | | | 3 | T |
| Cordlyophora lacustris | | | T* | | | | | | | T |
| Nematoda Unid. | | | | | | | | | T | T |
| Annelida | | | | | | | | | | |
| Oligochaeta | | | | | | | | | | |
| Naididae unid. | | | T | | | | | | | T |
| Arachnida | | | | | | | | | | |
| Prostigmata | | | | | | | | | | |
| Hydracarina sp. | | | T | T | | | T | | T | T |
| Arthropoda | | | | | | | | | | |
| Cladocera | | | | | | | | | | |
| Bosminidae unid. | | | T | 1 | | T | T | 1 | 1 | T |
| Eurycercus lamellatus | | | | T | | | | | | T |
| Daphnia ambigua | | | T | T | | | | | | T |
| Daphnia galeata mendotae | | T | 8 | 1 | T | 4 | 2 | 3 | 9 | 2 |
| Daphnia retrocurva | | | 32 | 71 | 67 | 71 | 68 | 91 | 55 | 38 |
| Daphnia parvula | | | T | | T | | T | | | T |
| Daphnia schodleri | | | 4 | T | | | | | | T |
| Ceriodaphnia sp. | | | 3 | 1 | T | | T | T | | T |
| Holopedium gibberum | | | 1 | T | T | 1 | 18 | 3 | T | 1 |
| Leptodora kindtii | | | 30 | 10 | 31 | 24 | 11 | 12 | T | 11 |
| Ilyocryptus sordidis | | | 2 | 1 | | | | | | T |
| Polyphemus pediculus | | | | 3 | | | | | | T |
| Sida crystallina | | | | T | | | | | | T |
| Diaphanosoma sp. | | | T | | | | | | | T |
| Ostracoda unid. | | | 1 | | | | | | T | T |
| Copepoda | | | | | | | | | | |
| Calanoida | | | | | | | | | | |
| Diaptomus oregonensis | | | 1 | | | | T | T | 1 | T |
| Diaptomus ashlandi | | | | | | | | | T | T |
| Diaptomus sicilis | T | T | T | T | | | T | | 5 | T |
| Eurytemora affinis | | | | | | | T | T | T | T |
| Limnocalanus macrurus | 100 | 99 | 12 | 11 | 1 | | T | | 5 | 47 |
| Limnocalanus sp. | | | 4 | | | | | | | T |
| Epischura lacustris | | | T | | | | | T | | T |
| Calanoida immature | T | 1 | T | 1 | | | T | | 1 | T |
| Cyclopoida | | | | | | | | | | |
| Cyclops bicuspidatus thomasi | | | | | T | | T | T | T | T |
| Cyclopoida juvenile | | | 1 | | T | | T | T | T | T |
| Amphipoda | | | | | | | | | | |
| Pontoporeia affinis | | | T | | | | | | T | T |
| Isopoda unid. | | | T | | | | | | | T |
| Insecta | | | | | | | | | | |
| Diptera | | | | | | | | | | |
| Chironomidae unid. | | | T | T | | | | | T | T |
| Total (No./ 1000 $m^3$) | 1,802,877 | 46,336 | 16,191 | 69,782 | 736,339 | 1,214,722 | 169,566 | 405,535 | 98,489 | 506,655 |
| Number of taxan | 3 | 4 | 25 | 17 | 9 | 5 | 15 | 11 | 19 | 33 |

*T = <0.5%

b. Temporal Distribution

The seasonal distribution pattern of total macrozooplankton abundance was essentially trimodal (Table IV-7). Density was highest in April, then declined through June. A second major peak occurred in September. Densities subsequently declined, but another minor peak was observed in November. Calanoid copepods accounted for all of the macrozooplankton during the initial density peak in April, while cladocerans were the only organisms present during September. During the minor peak (November), cladocerans were also predominant.

Table IV-7

Percent Relative Abundance of Major Macrozooplankton Groups and Total Density of Macrozooplankton Collected from Composited Hensen Net Tows in the Vicinity of Nine Mile Point, 1978

| Taxa | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| Cladocera | 0 | T** | 80 | 88 | 99 | 100 | 100 | 100 | 85 | 59 |
| Calanoida | 100 | 100 | 18 | 12 | 1 | 0 | T | T | 11 | 41 |
| Cyclopoida | 0 | 0 | 1 | 0 | T | 0 | T | T | T | T |
| Amphipoda | 0 | 0 | T | 0 | 0 | 0 | 0 | 0 | T | T |
| Diptera | 0 | 0 | T | T | 0 | 0 | 0 | 0 | T | T |
| Other | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | T |
| Density (No./1000 $m^3$) | 1,802,877 | 46,336 | 16,191 | 69,782 | 736,399 | 1,214,722 | 169,566 | 405,535 | 98,489 | 506,655 |

*Composite of surface, mid-depth and bottom horizontal tows.

**T = 0.5%.

Since cladocerans totally dominated the macrozooplankton community during most of the sampling period, the temporal distribution pattern for cladocerans generally (except during April and May) determined monthly total density distributions. Copepods dominated in April and May because of a "bloom" of *Limnocalanus macrurus*. In September, the cladoceran community was composed almost exclusively of *Daphnia retrocurva* and *Leptodora kindtii* (Table IV-6). In December, *Daphnia galeata mendotae*, *D. retrocurva*, and *D. pulex* were the dominant cladocerans and *Diaptomus sicilis* and *Limnocalanus macrurus* were the dominant copepods. Calanoids and/or cladocerans accounted for almost 100 percent of the macrozooplankton collected in monthly samples; in December, however *Hydra* sp. (Coelenterata) represented 4 percent of the density. All other taxa, including cyclopoid copepods, scuds (amphipods), and dipterans, comprised no more than 1 percent of the total macrozooplankton community during any month in 1978.

c. Spatial Distribution

The distribution of total macrozooplankton during 1978 (Table IV-8) was a reflection of the concentrations of cladocerans, which were widely distributed over the study area, and copepods, which were found in slightly higher concentrations off shore (Appendix Table B-5). On an annual basis, cladoceran concentrations were greater in 40 feet of water than in 20 feet; however, no consistent monthly depth-related distribution pattern was evident. There were no apparent cladoceran concentration differences between stations near the thermal discharges [stations on the 20- and 40-foot depth contours within the 0.5-mile radius and within the 1-mile radius east zone (Figure III-1 in Section III, Methods and Materials)] and other stations. Calanoid copepod densities were higher at the deeper contours than at the 20-foot contour and decreased from west to east along all contours.

3. Overview of Year-to-Year Results

Microzooplankton were collected monthly during 1973-78 (except for twice monthly collections during summer 1973-75) at four depth contours (10, 20, 40, and 60-feet) along four transects (NMPW, NMPP, FITZ, and NMPE). Rotifers usually dominated the samples in both density and number of taxa, with species of the genus Keratella numerically the most important. Cladocerans and copepods were of secondary importance (based on annual trends), typically dominating for 1 or 2 months annually in spring (either cladocerans or copepods) and/or early fall (cladocerans). Bosmina sp. was the dominant cladoceran, and Daphnia retrocurva was often a major component of the cladoceran group. Copepods were represented by several genera, including Diaptomus, Limnocalanus, Cyclops, Tropocyclops, and Diacyclops. Temporal trends in abundance were bimodal, with summer and fall peaks and often a late spring peak. Spatial trends included a decrease in abundance from shallow to deeper waters and, during some years of the study (1973), a higher abundance of rotifers at experimental transects than at control transects. Annual fluctuations in densities were apparently related to many complex physicochemical and biological interactions. The

Table IV-8

Abundance* of Macrozooplankton from Composited** Hensen Net Tows, Nine Mile Point Vicinity, 1978

Total Macrozooplankton

| Date | 20-Ft Contour | | | | | | | 40-Ft Contour | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Apr | 380538 | 756036 | 2880809 | 798522 | 348499 | 90833 | 875873 | 3933013 | 4902058 | 4107945 | 1198632 | 1050185 | 642656 | 2639081 | 3395762 | 1375240 | 1182421 | 1802877 |
| May | 20865 | 27143 | 64744 | 164870 | 11695 | 37236 | 54426 | 57446 | 26165 | 40026 | 88382 | 53499 | 59414 | 54155 | 13659 | 6433 | 23457 | 46336 |
| Jun | 22862 | 14278 | 14971 | 14105 | 33713 | 30994 | 21821 | 9730 | 9050 | 11719 | 8924 | 11765 | 18101 | 11548 | 14903 | 8360 | 19387 | 16191 |
| Jul | 50708 | 54563 | 24424 | 70062 | 34096 | 20247 | 42350 | 62666 | 52930 | 60819 | 89920 | 44953 | 61872 | 62193 | 168680 | 150894 | 99896 | 69782 |
| Aug | 751719 | 782222 | 911693 | 339898 | 812168 | 236451 | 639025 | 595749 | 720783 | 572394 | 908814 | 1304006 | 1709249 | 968500 | 538769 | 541405 | 320665 | 736399 |
| Sep | 929048 | 1695454 | 585109 | 2091500 | 926086 | 1428640 | 1275973 | 1404650 | 1530692 | 1620982 | 1280772 | 905144 | 1590894 | 1388856 | 1500273 | 382980 | 348608 | 1214722 |
| Oct | 167116 | 272219 | 149274 | 113195 | 221109 | 140677 | 177265 | 189504 | 122445 | 177643 | 148218 | 186968 | 189471 | 169042 | 173812 | 146592 | 145247 | 169566 |
| Nov | 185612 | 420998 | 162102 | 157338 | 159774 | 1156479 | 373717 | 533786 | 596292 | 419470 | 162790 | 419577 | 1291914 | 570638 | 140553 | 147039 | 129301 | 405535 |
| Dec | 99842 | 270855 | 97735 | 61394 | 108201 | 110964 | 124832 | 107609 | 68648 | 138022 | 139879 | 101477 | 80542 | 106030 | 38195 | 27861 | 26111 | 98489 |

*No./1000 $m^3$.

**Composite of surface, mid-depth, and bottom horizontal tows.

same species have dominated the community throughout the studies (1973-78). Based on findings, the two power plants have had negligible effects on the microzooplankton populations near Nine Mile Point.

Macrozooplankton samples have been collected weekly or monthly in 1-meter nets since 1973 and analyzed weekly through 1974 and monthly since 1975. During 1973-76, Leptodora kindtii was the most abundant organism collected, but large numbers of Gammarus fasciatus were also present. During 1977 and 1978, the dominant organisms were Daphnia galeata mendotae, D. retrocurva, and Limnocalanus macrurus. Leptodora kindtii was abundant but of lesser importance. Differences between the periods (1973-76 vs 1977-78) may be related to changes in the ecological study. Since both L. kindtii and G. fasciatus are epibenthic during the day but migrate vertically into the water column at night, they are frequently more abundant in night samples. Benthic samples taken with a diver-operated suction sampler during both 1977 and 1978 were dominated numerically by Gammarus fasciatus. Over the 6 years of study, macrozooplankton have been variable; some trends indicated slight density increases at deeper depth contours. Operation of the Nine Mile Point and James A. FitzPatrick power plants apparently has had no effect on the macrozooplankton community.

## C. PERIPHYTON

### 1. Bottom Periphyton

#### a. Species Composition

Seven algal divisions were represented in periphyton collected from early May through mid-December from artificial substrates placed on the lake bottom (Table IV-9). Green algae (Chlorophyta) were most numerous taxonomically, followed by blue-green algae (Cyanophyta), then diatoms (Bacillariophyta-Centric and Pennate combined). All other algal divisions combined represented approximately 10 percent of the total number of periphyton taxa present.

In the bottom periphyton community, green algae consistently accounted for higher numbers of taxa than did any of the other divisions. The number of diatom and blue-green taxa were relatively high but variable throughout the study (Appendix Table C-1). All other divisions were represented by relatively few or no taxa during each sampling period.

Of the 206 taxa collected during the study, only 12 accounted for 1 percent or more of the total annual abundance (Table IV-10 and Appendix Table C-1). These 12 comprised 86 percent of the total bottom periphyton. The most abundant alga was Lyngbya spp., a filamentous blue-green making up 72 percent of the bottom periphyton community.

Table IV-9

Percent Relative Abundance of Major Bottom Periphyton Groups Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Division | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|
| Cyanophyta | 5 | 83 | 85 | 86 | 61 | 79 | 56 | 35 | 73 |
| Chlorophyta | 45 | 14 | 14 | 12 | 34 | 9 | 37 | 58 | 17 |
| Euglenophyta | T* | | | | | T | | | T |
| Chrysophyta | T | T | T | T | T | T | | T | T |
| Bacillariophyta | 48 | 3 | 1 | 2 | 5 | 7 | 7 | 6 | 8 |
| Pyrrhophyta-Dinophyceae | T | T | T | T | T | T | T | | T |
| Cryptophyta | 1 | T | T | T | T | 5 | T | T | 2 |
| No. of taxa | 99 | 93 | 77 | 103 | 95 | 89 | 78 | 56 | 206 |

*T = <0.5%

b. Temporal Distribution

Bottom periphyton were most abundant during August and October (Table IV-11). Periphyton biomass exhibited highest values during May, September, and October (Table IV-12). Abundance and biomass were maximum during the spring-summer and summer-fall transition periods, producing a bimodal growth cycle.

Blue-green algae dominated from June through November 1978, comprising 73 percent of the bottom periphyton (Table IV-9). Maximum numbers per unit of area were observed in October, although the highest percent composition occured in August. Green algae had their greatest relative abundance in December but highest numbers of organisms in September. Diatoms were most numerous and had highest relative abundance during May. The only other periphyton group to comprise more than 1 percent of the annual composition was the phytoflagellates (cryptophyta) (Appendix Tables C-1 through C-5).

Table IV-10

Monthly Occurrence and Relative Abundance of Bottom Periphyton Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Taxa | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|
| Cyanophyta | | | | | | | | | |
| Chamaesiphonales | | | | | | | | | |
| Chamaesiphon sp. | T** | T | T | T | T | T | 1 | 12 | T |
| Oscillatoriales | | | | | | | | | |
| Oscillatoria sp. | | 1 | T | T | T | T | T | 1 | T |
| Lyngbya sp. | 3 | 85 | 84 | 85 | 60 | 78 | 55 | 22 | 72 |
| Chlorophyta | | | | | | | | | |
| Chlorococcales | | | | | | | | | |
| Pediastrum boryanum | 2 | T | T | T | T | T | | | T |
| Ulotrichales | | | | | | | | | |
| Ulothrix zonata | 8 | T | | | | T | | | 1 |
| Ulothrix sp. | 17 | | | | | T | T | 1 | 1 |
| Ulotrichales unid. | 9 | | | T | | | T | T | 1 |
| Chaetophorales | | | | | | | | | |
| Gongrosira sp. | | | 4 | | 3 | T | 27 | 1 | 1 |
| Pseudulvella americanum | 2 | | 1 | T | 8 | 1 | 3 | 1 | 1 |
| Stigeoclonium sp. | 3 | 9 | 4 | 9 | 20 | 4 | 5 | 2 | 8 |
| Chaetophorales unid. | T | 1 | 1 | T | | T | T | 52 | 1 |
| Oedogoniales | | | | | | | | | |
| Oedogonium sp. | T | 1 | 2 | T | 2 | T | T | T | T |
| Bacillariophyta-Centric | | | | | | | | | |
| Eupodiscales unid. | 6 | T | T | T | T | T | T | T | T |
| Bacillariophyta-Pennate | | | | | | | | | |
| Fragilariales | | | | | | | | | |
| Diatoma tenue | 20 | T | T | T | T | T | T | T | 2 |
| Fragilaria sp. | 2 | T | T | 1 | T | T | T | T | T |
| Naviculales | | | | | | | | | |
| Navicula sp. | 2 | T | T | T | T | T | T | T | T |
| Bacillariales | | | | | | | | | |
| Nitzchia sp. | 5 | T | T | T | T | 1 | 1 | T | 1 |
| Bacillariophyta-Pennate unid. | 4 | 1 | 1 | 1 | 4 | 3 | 3 | 4 | 2 |
| Cryptophyta | | | | | | | | | |
| Cryptomonodales | | | | | | | | | |
| Rhodomonas minuta | T | T | T | T | T | 4 | T | T | 2 |
| Total density (No./mm$^2$) | 241,063 | 442,364 | 147,337 | 633,392 | 361,695 | 1,151,482 | 59,247 | 35,282 | 383,983 |
| Total number taxa | 17 | 15 | 14 | 16 | 15 | 18 | 17 | 17 | 19 |

*Taxa listed include only those that accounted for at least 1% of the bottom periphyton collected during one or more of the 1977 sampling periods.

**T = <0.5%.

Table IV-11

## Abundance (No./$mm^2$) of Total Bottom Periphyton Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Depth Contour (ft) | Transect | May Mean | May S.E.* | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. | Oct Mean | Oct S.E.* | Nov Mean | Nov S.E. | Dec Mean | Dec S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | NMPW | 227551 | 26746 | 2526958 | 2174393 | 131228 | 51149 | 321608 | 86956 | 421268 | 34791 | 78042† | 38308 | 65756 ‡ | 21757 | ***** | ***** |
| | NMPP | 24098 | 14099 | 697651 | 149405 | ***** | ***** | 9736741 | 6396476 | 457785 | 269699 | 12159371 | 3091294 | ***** | ***** | ***** | ***** |
| | FITZ | 797625 | 300148 | 300946 | 95469 | 206011 | 60474 | 626227 | 175489 | ***** | ***** | 88038 | 28914 | 22671 | 6079 | ***** | ***** |
| | NMPE | 178379 | 222746 | 909792 | 645339 | 187973 | 78233 | ***** | ***** | 4810 | 2412 | 54521 | 42559 | 22251 | 8266 | 2647 ‡ | 775 |
| | Contour mean | 708246 | 394096 | 1108836 | 489255 | 175071 | 22531 | 3561525 | 3088859 | 294621 | 145288 | 3094993 | 3021467 | 36892 | 14432 | 2647 | 775 |
| 10 | NMPW | 291163 | 91778 | 1896836 | 1247809 | 199775 | 90593 | 40580 | 7198 | 1309918 | 538270 | 843733 | 217765 | 219180 | 76060 | 110172 | 49801 |
| | NMPP | 186565 | 62927 | 45557 | 17525 | 239843 | 180614 | 64488 | 40451 | 1083875 | 272525 | 4045925 | 1137524 | 60444 | 15025 | 279728†† | <100 |
| | FITZ | 445658 | 75113 | 157439 | 59202 | 139766 | 52588 | 143146 | 46648 | 711636 | 227456 | 384202 | 218806 | 27381 | 8734 | 62739 | 11217 |
| | NMPE | 391536 | 173923 | 1019193 | 571426 | 28532 | 3631 | 313596 | 148147 | 1175138 | 262417 | 545400 | 287701 | 118960 | 44392 | 15750 | 1454 |
| | Contour mean | 328730 | 57183 | 779756 | 431231 | 151979 | 46001 | 140453 | 61733 | 1070141 | 128203 | 1454815 | 868933 | 106491 | 42064 | 117097 | 57534 |
| 20 | NMPW | 77826 | 6887 | 662540 | 550212 | 31016 | 12799 | 5294 | 2946 | 95215 | 9166 | 170099 | 95228 | 230597 | 104229 | 28528 | 16120 |
| | NMPP | 174805 | 11017 | 128383 | 91984 | 509887 | 390945 | 5599 | 461 | 449289 | 221730 | 53429 | 45216 | 26172 | 13409 | 38873 | 10950 |
| | FITZ | 81349 | 11750 | 19647 | 6826 | 205650 | 109184 | 74810 | 31234 | 189540 | 71357 | 79731 | 9637 | 124741 | 31210 | 13297 | 3879 |
| | NMPE | 98887 | 21476 | 61022 | 34842 | ***** | ***** | ***** | ***** | 288073 | 53955 | 136853 | 76916 | 100066 ‡ | 15635 | 1031 ‡ | 94 |
| | Contour mean | 108217 | 22669 | 222898 | 154844 | 248851 | 139916 | 28568 | 23121 | 255529 | 75640 | 110028 | 26535 | 120394 | 42283 | 20432 | 8331 |
| 30 | NMPW | 20003 | 2861 | 26455 | 3361 | 4020 | 534 | 8524 | 3564 | 9130 | 1723 | 5883 | 1525 | 6317 | 602 | 1629 | 408 |
| | NMPP | 20150 | 4856 | 62085 | 33404 | 5433† | 1370 | 11522 | 7982 | 71049 | 29157 | 13551 | 5285 | 24046 | 13663 | 3885 | 1966 |
| | FITZ | 69977 | 5260 | 139803 | 70196 | 346363 | 276190 | 15253 | 8289 | 215668 | 84387 | 14165 | 1059 | ***** | ***** | ***** | ***** |
| | NMPE | 78417 | 5418 | 62411 | 42856 | 17529 | 9386 | 8847 | 2308 | 5881 | 2106 | 6609 | 3098 | 2603 | 1388 | 2659 | 1111 |
| | Contour mean | 47137 | 15718 | 72689 | 23909 | 93336 | 84397 | 11036 | 1558 | 75432 | 49091 | 10052 | 2206 | 10989 | 6616 | 2724 | 652 |
| 40 | NMPW | 6117 | 1240 | 14880 | 2293 | 384489 | 257637 | 6721 | 1603 | 4529 | 724 | 3768 | 1823 | 5716 | 2179 | 933 | 359 |
| | NMPP | 1791 | 482 | 12158 | 3520 | 7048 | 2436 | 6995 | 1045 | 10118 | 4632 | 5107 | 759 | 3805 | 2330 | 636 | 145 |
| | FITZ | 27805 | 1408 | 21344 | 4122 | 3966 | 1332 | 5571 | 1257 | ***** | ***** | 1434 | 373 | 2286 | 524 | 379 | 83 |
| | NMPE | 16235 | 2611 | 62176 | 54299 | 3541 | 1610 | 5534 | 2117 | 7587 | 3011 | 4799782 | 4796995 | 3459 | 793 | 1628 | 418 |
| | Contour mean | 12987 | 5793 | 27640 | 11672 | 99761 | 94912 | 6205 | 381 | 7411 | 1616 | 1202523 | 1199087 | 3816 | 712 | 894 | 270 |
| Control mean** | | 299144 | 170067 | 726226 | 279964 | 109789 | 43129 | 88838 | 50096 | 332155 | 158581 | 664469 | 467724 | 77491 | 27937 | 18331 | 11901 |
| Experimental mean** | | 182982 | 80240 | 144092 | 61543 | 184885 | 57033 | 1069035 | 964933 | 398620 | 127408 | 1684495 | 1229316 | 36443 | 14101 | 57077 | 38136 |
| Monthly mean | | 241063 | 129077 | 442364 | 154405 | 147337 | 35860 | 633392 | 536904 | 361695 | 102134 | 1151482 | 651731 | 59247 | 17041 | 35282 | 17934 |
| Monthly range | | 1791-178371 | | 12158-2526958 | | 3541-509887 | | 5294-973641 | | 4529-1309918 | | 1434-12159371 | | 2286-230597 | | 379-279728 | |

*Standard error.

**Control represents NMPW and NMPE, experimental represents NMPP and FITZ.

*****Substrates lost during severe weather.

†One of four replicates missing due to weather.

## Table IV-12

## Ash-Free Dry Weight (mg/dm$^2$) of Total Bottom Periphyton Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Depth Contour (ft) | Transect | May Mean | May S.E.* | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. | Oct Mean | Oct S.E.* | Nov Mean | Nov S.E. | Dec Mean | Dec S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | NMPW | 27.46 | 6.50 | 17.57 | 3.96 | 12.39 | 1.79 | 14.49 | 1.39 | 26.06 | 2.71 | 6.52 † | 1.10 | 8.23 † | 1.09 | ***** | ***** |
| | NMPP | 19.24 | 2.86 | 13.04 | 1.70 | ***** | ***** | 49.25 | 13.51 | 28.58 | 2.45 | 59.61 | 7.20 | ***** | ***** | ***** | ***** |
| | FITZ | 72.61 | 2.56 | 12.12 | 1.82 | 12.43 | 1.65 | 23.83 | 6.09 | ***** | ***** | 6.57 | 1.84 | 9.85 | 2.78 | ***** | ***** |
| | NMPE | 96.99 | 9.30 | 22.79 | 12.66 | 8.29 | 1.91 | ***** | ***** | 24.32 | 4.20 | 4.13 | 1.39 | 5.71 | 0.66 | 14.37 † | 2.89 |
| | Contour mean | 54.08 | 18.50 | 16.20 | 2.29 | 11.04 | 1.37 | 29.19 | 10.39 | 26.32 | 1.24 | 19.21 | 13.34 | 7.93 | 1.20 | 14.37 | 2.89 |
| 10 | NMPW | 24.14 | 0.75 | 10.58 | 4.97 | 8.45 | 1.67 | 11.80 | 2.13 | 26.70 | 2.33 | 19.18 | 1.68 | 11.34 | 1.42 | 20.66 | 2.29 |
| | NMPP | 19.59 | 6.59 | 7.59 | 0.43 | 7.14 | 1.22 | 7.28 | 1.27 | 27.95 | 4.04 | 33.95 | 7.56 | 10.35 | 1.89 | 37.97†† | 0 |
| | FITZ | 39.60 | 8.88 | 7.37 | 0.88 | 8.63 | 2.91 | 16.85 | 4.15 | 44.53 | 3.18 | 15.21 | 3.88 | 10.53 | 2.72 | 36.94 | 6.12 |
| | NMPE | 16.72 | 3.72 | 18.39 | 1.52 | 4.94 | 1.47 | 15.37 | 3.17 | 38.73 | 6.07 | 50.15 | 33.33 | 17.27 | 4.05 | 25.19 | 3.38 |
| | Contour mean | 25.01 | 5.10 | 11.26 | 2.66 | 7.29 | 0.85 | 12.82 | 2.13 | 34.48 | 4.30 | 29.62 | 7.49 | 12.33 | 1.64 | 30.19 | 4.30 |
| 20 | NMPW | 36.43 | 2.03 | 8.38 | 1.06 | 3.98 | 0.71 | 14.97 | 2.95 | 15.78 | 4.93 | 35.67 | 3.77 | 16.84 | 3.81 | 17.77 | 6.19 |
| | NMPP | 19.78 | 1.80 | 7.35 | 2.03 | 7.76 | 1.76 | 9.64 | 2.62 | 30.31 | 6.33 | 22.37 | 5.05 | 22.35 | 4.97 | 29.86 | 8.83 |
| | FITZ | 18.48 | 0.91 | 4.79 | 0.75 | 10.08 | 2.92 | 7.96 | 1.10 | 23.71 | 5.77 | 20.88 | 3.27 | 10.79 | 4.56 | 26.96 | 4.41 |
| | NMPE | 16.05 | 3.00 | 10.44 | 1.29 | ***** | ***** | ***** | ***** | 15.95 | 2.35 | 9.60 | 2.37 | 11.38 † | 1.64 | 19.07 † | 5.17 |
| | Contour mean | 22.69 | 4.65 | 7.36 | 1.18 | 7.27 | 1.78 | 10.86 | 2.11 | 21.44 | 3.49 | 22.13 | 5.34 | 15.34 | 2.71 | 23.40 | 2.96 |
| 30 | NMPW | 52.19 | 31.23 | 8.34 | 1.11 | 9.22 | 2.98 | 8.84 | 2.76 | 7.71 | 1.35 | 13.02 | 0.64 | 8.85 | 0.67 | 18.20 | 3.27 |
| | NMPP | 22.03 | 7.98 | 19.22 | 2.10 | 6.91† | 0.50 | 8.98 | 1.52 | 21.95 | 11.59 | 28.45 | 3.95 | 16.34 | 7.46 | 20.26 | 1.49 |
| | FITZ | 13.99 | 3.09 | 26.40 | 1.80 | 17.02 | 1.48 | 9.32 | 1.62 | 40.57 | 5.19 | 34.12 | 7.08 | ***** | ***** | ***** | ***** |
| | NMPE | 13.38 | 1.80 | 20.21 | 6.62 | 5.86 | 1.44 | 12.21 | 5.74 | 5.75 | .90 | 8.92 | 3.42 | 11.32 | 1.00 | 22.44 | 4.28 |
| | Contour mean | 25.40 | 9.15 | 18.67 | 3.64 | 9.75 | 2.52 | 9.84 | 0.80 | 19.00 | 8.05 | 21.12 | 6.04 | 12.17 | 2.20 | 20.30 | 1.22 |
| 40 | NMPW | 16.01 | 5.41 | 11.97 | 0.82 | 8.93 | 1.98 | 3.63 | 0.74 | 7.50 | 2.50 | 22.73 | 6.02 | 27.75 | 9.63 | 18.11 | 2.16 |
| | NMPP | 24.59 | 6.93 | 5.23 | 1.26 | 8.09 | 1.85 | 6.34 | 1.11 | 13.13 | 3.81 | 31.12 | 6.43 | 19.23 | 5.26 | 23.00 | 3.73 |
| | FITZ | 13.12 | 2.16 | 9.59 | 3.13 | 9.10 | 1.05 | 19.20 | 3.99 | ***** | ***** | 10.18 | 0.73 | 10.49 | 0.64 | 16.63 | 4.16 |
| | NMPE | 13.62 | 4.94 | 4.81 | 0.76 | 6.20 | 1.79 | 39.00 | 6.52 | 24.56 | 4.08 | 12.46 | 3.09 | 13.43 | 3.30 | 29.20 | 3.60 |
| | Contour mean | 16.84 | 2.66 | 7.90 | 1.73 | 8.08 | 0.66 | 17.04 | 8.07 | 15.06 | 5.02 | 19.12 | 4.85 | 17.72 | 3.81 | 21.74 | 2.84 |
| Control mean** | | 31.30 | 8.27 | 11.53 | 1.63 | 7.59 | 0.86 | 15.04 | 3.69 | 16.75 | 4.21 | 18.24 | 4.60 | 13.21 | 1.98 | 20.55 | 1.49 |
| Experimental mean** | | 26.30 | 5.64 | 11.38 | 2.14 | 9.68 | 1.08 | 15.86 | 4.14 | 28.84 | 3.55 | 26.25 | 4.80 | 13.75 | 1.73 | 27.37 | 3.07 |
| Monthly mean | | 28.80 | 4.91 | 12.40 | 1.40 | 8.63 | 0.72 | 15.50 | 2.75 | 23.54 | 2.63 | 22.24 | 3.36 | 13.45 | 1.30 | 23.54 | 1.75 |
| Monthly range | | 4.41 — | 57.25 | 4.80 — | 26.40 | 3.98 — | 17.02 | 3.63 — | 49.25 | 7.50 — | 44.53 | 4.13 — | 59.61 | 5.71 — | 27.76 | 14.37 — | 37.97 |

*Standard error.
**Control represents NMPW and NMPE, experimental represents NMPP and FITZ.
*****Substrates lost during severe weather.
†One of four replicates missing due to weather.

The blue-green algae *Lyngbya* sp. was the dominant taxa found in bottom periphyton sampling during 1978. Only during May and December were other taxa relatively more abundant: *Ulothrix* sp., a green alga, and *Diatoma tenue*, a diatom, during May; and an unidentified Chaetophorales during December. *Lyngbya* produced no problems at either the Nine Mile Point or James A. FitzPatrick power plants during 1978, although extensive growths can interfere with passage of cooling waters through power plants (Round 1965).

c. Spatial Distribution

Numerical abundance and biomass of bottom periphyton decreased with increasing water depth, especially during periods when peak densities were observed (Tables IV-11 and IV-12). A comparison of the data from experimental (NMPP and FITZ) and control (NMPW and NMPE) transects indicated that bottom periphyton in both areas exhibited the same temporal trend. Densities and biomass were variable, with monthly changes occurring between control and experimental transects so that no definite annual differences could be determined. Monthly variability masked any differences that could have been attributed to thermal discharges from the power plants (i.e., increases in bottom periphyton at the experimental transects).

2. Suspended Periphyton

a. Species Composition

Taxa from six algal divisions were collected from early May through September from substrates suspended at depths of 2, 7, 12, and 17 feet on the 40-foot contour (Table IV-13). Blue-green algae (Cyanophyta) were most abundant, followed by diatoms (Bacillariophyta), then green algae (Chlorophyta). All other divisions combined accounted for less than 1 percent of total numbers.

During the study, 88 taxa were collected, including seven that had at least 1 percent relative abundance (by number) during any one sampling month (Table IV-14 and Appendix Table C-6); the other 81 taxa combined accounted for less than 1 percent of the total periphyton population.

Table IV-13

Percent Relative Abundance of Major Suspended Periphyton Groups Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Division | May | Jun | Jul | Aug | Sep | Annual Mean |
|---|---|---|---|---|---|---|
| Cyanophyta | T* | 98 | 98 | 99 | 88 | 98 |
| Chlorophyta | 1 | 1 | 1 | 1 | 1 | T |
| Chrysophyta | | | | | T | T |
| Bacillariophyta | 97 | 1 | 1 | 1 | 11 | 1 |
| Pyrrhophyta-Dinophyceae | T | | | | T | T |
| Cryptophyta | T | | T | | T | T |
| No. of taxa | 59 | 24 | 31 | 24 | 60 | 88 |

*T = <0.5%.

b. Temporal Distribution

Both density and biomass of suspended periphyton peaked during June and August (Tables IV-15 and IV-16). Maximum density was in June, while maximum biomass was in August. Only during May did taxa other than Lyngbya reach high abundance. The major suspended periphyton components at this time were the diatoms Gomphonema olivaceum (56 percent), Diatoma tenue (17 percent), and Achnanthes sp. (18 percent). During the remainder of the 1978 sampling program, however, diatoms represented less than 1 percent of the suspended periphyton.

Lyngbya was so dominant that other taxa, although occasionally quite numerous, composed a very small percentage of the suspended periphyton density. However, as previously stated, Lyngbya did not cause problems at either the Nine Mile Point or James A. FitzPatrick power plants during 1978.

Green algae consistently exhibited a greater diversity of taxa than did other divisions, comprising about half of the taxa collected during each sampling period. Diatom and blue-green algal diversity varied throughout the sampling season, (Appendix Table C-6). All other divisions showed little diversity across sampling periods.

Table IV-14

Monthly Occurrences and Relative Abundance of Suspended Periphyton Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Taxa | May | Jun | Jul | Aug | Sep | Annual Mean |
|---|---|---|---|---|---|---|
| Unidentified Algae | 1 | T | T | | T | T |
| Cyanophyta | | | | | | |
| Oscillatoriales | | | | | | |
| Lyngbya sp. | | 98 | 97 | 99 | 88 | 98 |
| Bacillariophyta-Pennate | | | | | | |
| Fragilariales | | | | | | |
| Diatoma tenue | 17 | 1 | T | | | 1 |
| Achnanthales | | | | | | |
| Achnanthes sp. | 18 | T | | | | T |
| Naviculales | | | | | | |
| Gomphonema olivaceum | 56 | | | | | T |
| Gomphonema montana | 1 | | | | | T |
| Bacillariophyta-Pennate unid. | 1 | T | 1 | T | 9 | T |
| Total density (No./mm$^2$) | 602,970 | 273,298,432 | 9,196,302 | 45,290,279 | 9,457,771 | 67,569,151 |
| Total number of taxa | 6 | 5 | 4 | 2 | 3 | 7 |

*Taxa listed accounted for at least 1% of the suspended periphyton collected during one or more of the 1978 sampling periods.

**T = <0.5%

c. Spatial Distribution

Generally, total suspended periphyton density decreased as depth increased from the 2 to 17-foot strata; during May and August, however, densities were highest at the 7- and 12-foot depths respectively (Table IV-15). Biomass of suspended periphyton was highest at the 2-foot depth strata during June, July, and August and at the 7-foot depth during May and September. As expected, biomass typically decreased as water depth increased inasmuch as photosynthesis is limited by decreasing light levels (Table IV-16). During peak densities in June all groups of periphyton were most abundant (by number) at the 2-foot depth strata.

During three of the five sampling months, periphyton densities were noticeably higher at the experimental transects; during the other two sampling periods, densities at control and experimental transects were similiar. Thermal

Table IV-15

Abundance (No./mm$^2$) of Total Suspended Periphyton on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Depth Strata (ft) | Transect | May Mean | May S.E.* | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | NMPW | 460155 | 100476 | 72614352 | 528648 | 23023488 | 14296757 | ***** | ***** | 169772 | 162743 |
| | NMPP | 407221 | 108581 | 1829906940 | 360916480 | 121424† | 110855 | 18309744 | 6096584 | 21853504 | 20700592 |
| | FITZ | 97060 | 13542 | ***** | ***** | 17779200 | 10423715 | ***** | ***** | ***** | ***** |
| | Strata mean | 321479 | 113245 | 951260416 | 878646272 | 13641370 | 6927417 | 18309744 | 9144248 | 11011638 | 10841865 |
| 7 | NMPW | 924108† | 190817 | 43056640 | 21636768 | 1621420† | 82896 | 53002736 | 35954960 | 332098 | 6517 |
| | NMPP | 985751 | 36535 | 47808928 | 25217776 | 4661592 | 185267 | 5849824 | 52780320 | 16462666 | 9027861 |
| | FITZ | 780546 | 178755 | 151183200 | 107907584 | 17393376 | 3226725 | ***** | ***** | 15957325 | 6669891 |
| | Strata mean | 896802 | 60791 | 80682912 | 35276816 | 7892129 | 4831008 | 55826272 | 2823536 | 10917363 | 5294642 |
| 12 | NMPW | 421702 | 49514 | 11708127 | 5733713 | 18787920 | 1954296 | 42847088 | 4809904 | 294775 | 207163 |
| | NMPP | 1150956 | 62165 | 13458926 | 970242 | 10842298 | 7868037 | 135145152 | 125600528 | 14383358 | 5211986 |
| | FITZ | 542955 | 247898 | 122973152 | 65328352 | 8576929 | 2786701 | ***** | ***** | 11669906 | 4115847 |
| | Strata mean | 705204 | 225608 | 49380064 | 36800000 | 12735715 | 3095957 | 88996112 | 46149024 | 8782679 | 4315634 |
| 17 | NMPW | 356568 | 61589 | 2096083 | 268566 | 4664823† | 1082175 | 3565760 | 724447 | 21663 | 7995 |
| | NMPP | 202949† | 60035 | 2158762 | 862727 | 2774192 | 2187045 | 5512351 | 1923863 | 20453568 | 10187500 |
| | FITZ | 905669 | 21420 | 31359040 | 15575384 | 108965 | 14780 | ***** | ***** | 2436848 | 1316900 |
| | Strata mean | 488395 | 213298 | 11871295 | 9743889 | 2515993 | 1321483 | 4539055 | 973294 | 7637359 | 6445920 |
| Control mean** | | 540633 | 129600 | 32368801 | 16013627 | 12024413 | 5236972 | 33138528 | 15092083 | 204577 | 70158 |
| Experimental mean** | | 588326 | 152508 | 314121278 | 253106383 | 7782247 | 2516711 | 54404268 | 29198107 | 14745311 | 2432989 |
| Monthly mean | | 602970 | 125550 | 273298432 | 226424512 | 9196302 | 2354548 | 45290279 | 17133805 | 9457771 | 2671855 |
| Monthly range | | 97060-1150956 | | 2096083-1829906940 | | 108965-18787920 | | 135145152 - 3565760 | | 21663—21853504 | |

*Standard error.
**Control represents NMPW and NMPE, experimental represents NMPP and FITZ.
*****Substrates lost during severe weather.
†One of four replicates missing due to weather.

Table IV-16

Ash-Free Dry Weight ($mg/dm^2$) of Total Suspended Periphyton
Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Depth Strata (ft) | Transect | May Mean | May S.E.* | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | NMPW | 18.23 | 11.91 | 125.87 | 6.53 | 107.04 | 12.57 | ***** | ***** | 21.53 | 3.06 |
| | NMPP | 12.00 | 0.60 | 166.89 | 1.62 | 2.87† | 0 | 344.10 | 38.48 | 253.20 | 70.79 |
| | FITZ | 4.84 | 0.05 | ***** | ***** | 99.47 | 2.49 | ***** | ***** | ***** | ***** |
| | Strata mean | 11.69 | 3.87 | 146.38 | 20.57 | 69.79 | 33.53 | 344.10 | 38.48 | 137.37 | 115.84 |
| 7 | NMPW | 35.14† | 0 | 60.87 | 3.99 | 24.94† | 0 | 141.27 | 27.72 | 72.83 | 36.30 |
| | NMPP | 27.90 | 2.28 | 68.77 | 0.63 | 47.72 | 5.28 | 149.06 | 4.14 | 254.35 | 12.76 |
| | FITZ | 24.48 | 0.39 | 210.53 | 11.64 | 67.22 | 0.07 | ***** | ***** | 130.14 | 4.88 |
| | Strata mean | 27.98 | 1.95 | 113.39 | 48.68 | 46.63 | 12.22 | 145.16 | 3.90 | 152.40 | 53.57 |
| 12 | NMPW | 13.66 | 0.06 | 31.37 | 2.55 | 54.91 | 1.13 | 168.26 | 15.68 | 198.93 | 194.50 |
| | NMPP | 24.06 | 2.68 | 30.23 | 2.81 | 40.26 | 7.86 | 273.97 | 24.46 | 59.66 | 9.47 |
| | FITZ | 30.47 | 5.93 | 216.10 | 58.45 | 38.50 | 4.66 | ***** | ***** | 34.15 | 29.96 |
| | Strata mean | 22.73 | 4.90 | 92.57 | 62.09 | 44.56 | 5.20 | 221.11 | 52.86 | 97.58 | 51.21 |
| 17 | NMPW | 14.73 | 0.73 | 20.20 | 7.78 | 21.43† | 0 | 42.64 | 9.07 | 3.58 | 1.35 |
| | NMPP | 5.02† | 0 | 21.40 | 0.35 | 13.60 | 1.01 | 81.19 | 9.49 | 101.16 | 3.92 |
| | FITZ | 32.82 | 3.42 | 92.17 | 23.99 | 5.13 | 0.90 | ***** | ***** | 28.60 | 1.71 |
| | Strata mean | 20.02 | 5.52 | 44.59 | 23.82 | 13.39 | 4.71 | 61.91 | 19.28 | 44.45 | 29.26 |
| Control mean** | | 18.34 | 2.90 | 59.58 | 23.70 | 52.08 | 19.80 | 117.39 | 38.18 | 74.22 | 44.08 |
| Experimental mean** | | 21.21 | 3.87 | 115.16 | 31.06 | 39.35 | 11.67 | 212.08 | 59.42 | 123.04 | 36.37 |
| Monthly mean | | 20.61 | 3.40 | 94.95 | 22.39 | 43.59 | 9.83 | 171.50 | 39.79 | 105.28 | 27.79 |
| Monthly range | | 4.84 — | 35.14 | 20.20 — | 216.10 | 2.87 — | 107.04 | 42.64 — | 344.10 | 3.58 — | 254.35 |

*Standard error.
**Control represents NMPW and NMPE, experimental represents NMPP and FITZ.
*****Substrates lost during severe weather.
†One of four replicates missing due to weather.

discharges from the power plants may have stimulated periphyton growth on the suspended artificial substrates; however, plant operations would not affect naturally occurring periphyton as they occur only on bottom substrates.

### 3. Overview of Year-to-Year Results

Both bottom and suspended periphyton have been sampled since 1973 using artificial substrates in the control and experimental areas in the vicinity of Nine Mile Point. During the 6 years of study, species compositions have been similar, with Lyngbya sp. always dominating numerically. During 1975, 1976, and 1978, suspended periphyton biomass was greater at the experimental transects than at the control transects. Bottom periphyton sampling data, however (a more realistic measure of the naturally occurring periphyton populations in the area), showed the experimental transects to have higher periphyton densities during only 1 year, but the natural variability observed that year (1977) suggested that the difference was not significant. No consistent trends (increases or decreases) were apparent for bottom periphyton during the 6 years of study, which would indicate no influence from the two power plants on periphyton. Controlling factors for natural periphyton populations are substrate availability and light penetration. Location of the discharges at about the 20-foot contour and the presence of a mixed or floating plume preclude thermal stimulation of the natural periphyton.

## D. BENTHIC INVERTEBRATES

### 1. Species Composition

An average of 50 taxa of benthic invertebrates per month were collected during the 1978 study (Table IV-17), and 24 of these each accounted for at least 1 percent of the total number collected during any one sampling month. The most abundant group was scuds (Amphipoda), which accounted for about 52 percent of all the benthic invertebrates collected (Table IV-18), followed by oligochaete worms, then polychaete worms and midges (Diptera), third and fourth, respectively. All other groups combined accounted for only 12 percent of the total population present (Table IV-18).

## Table IV-17

## Seasonal Occurrence and Relative Abundance of Benthos Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| Taxa | Apr | Jun | Aug | Oct | Annual Mean |
|---|---|---|---|---|---|
| Coelenterata | | | | | |
| Hydrozoa | | | | | |
| *Hydra americana* | | | | T* | T |
| *Hydra* sp. | 1 | 4 | 1 | 4 | 3 |
| *Cordylophora lacustris* | T | T | T | T | T |
| Platyhelminthes | | | | | |
| Turbellaria unid. | T | 2 | T | 1 | 1 |
| Nemertea | | | | | |
| Nemertea unid. | T | T | T | 1 | T |
| Nematoda | | | | | |
| Nematoda unid. | 1 | 2 | 1 | 1 | 1 |
| Annelida | | | | | |
| Polychaeta | | | | | |
| *Manayunkia speciosa* | 42 | 5 | 8 | 7 | 14 |
| Oligochaeta | | | | | |
| *Chaetogaster* sp. | | 6 | | T | 1 |
| *Nais* sp. | | 7 | | | 1 |
| Naididae unid. | | 13 | T | T | 2 |
| Tubificidae unid. | 10 | 8 | 13 | 8 | 10 |
| Hirudinae unid. | T | T | | T | T |
| Mollusca | | | | | |
| Gastropoda | | | | | |
| *Ferrissia* sp. | | | | T | T |
| *Lymnaea* sp. | T | T | T | T | T |
| *Amnicola* sp. | 2 | 2 | 1 | 1 | 1 |
| *Bithinia* sp. | T | | | T | T |
| *Physa* sp. | T | T | T | T | T |
| *Gyraulus* sp. | | 1 | T | T | T |
| *Helisoma* sp. | | | T | | T |
| *Goniobasis* sp. | | T | 1 | T | T |
| Pleurocera sp. | T | T | | | T |
| Pleuroceridae unid. | T | | | T | T |
| Valvata sp. | 2 | 2 | 1 | 1 | 1 |
| *Campeloma* sp. | | | | T | T |
| Gastropoda unid. | | | T | T | T |
| Pelecypoda | | | | | |
| *Sphaerium* sp. | T | 2 | T | T | T |
| *Pisidium* sp. | 7 | 5 | 1 | 1 | 2 |
| Sphaeridae unid. | | | | T | T |
| *Lampsilis* sp. | T | | | T | T |
| Unionicae unid. | | | T | T | T |
| Pelecypoda unid. | | | | T | T |
| Arthropoda | | | | | |
| Arachnida | | | | | |
| Hydracarina unid. | 1 | 2 | T | 1 | 1 |
| Isopoda | | | | | |
| *Erichsonella* sp. | T | | | | T |
| *Asellus* sp. | T | | T | T | T |
| Amphipoda | | | | | |
| *Gammarus mucronatus* | 1 | | T | | T |
| *Gammarus fasciatus* | 7 | 6 | 38 | 65 | 40 |
| *Gammarus* sp. | | | T | 1 | T |
| *Pontoporeia affinis* | 10 | 19 | 14 | 6 | 11 |
| *Hyalella azteca* | T | | | T | T |
| Amphipoda unid. | | | T | T | T |
| Ephemeroptera | | | | | |
| *Caenis* sp. | | T | | | T |
| Trichoptera | | | | | |
| Psychomyiidae unid. | | T | | | T |
| *Hydropsyche* sp. | T | | | | T |
| *Agraylea* sp. | | 1 | T | | T |
| *Oecetis* sp. | | | T | T | T |
| *Athripsodes* sp. | T | 1 | | | T |
| Leptoceridae unid. | | T | T | | T |
| Trichoptera unid. | | | | T | T |
| Diptera | | | | | |
| Ceratopogonidae unid. | | | | T | T |
| *Chironomus* sp. | T | T | 2 | 1 | 1 |
| *Orthocladinus* sp. | T | 3 | | | 1 |
| *Cryptochironomus* sp. | 1 | T | 1 | T | 1 |
| *Cricotopus* sp. | 9 | T | | T | 1 |
| *Tanytarsus* sp. | T | 1 | 6 | T | 2 |
| *Dicrotendipes* sp. | T | 2 | T | T | 1 |
| *Polypedilum* sp. | T | 1 | T | T | T |
| *Ablabesmyia* sp. | T | T | | | T |
| *Microtendipes* sp. | T | | T | 1 | T |
| *Procladius* sp. | T | T | T | 1 | 1 |
| *Parachironomus* sp. | T | T | | | T |
| *Pseudochironomus* sp. | | | T | T | T |
| *Glyptotendipes* sp. | | | T | | T |
| *Phaenopsectra* sp. | | 1 | T | | T |
| *Eukiefferiella* sp. | | T | | | T |
| *Stictochironomus* sp. | | T | | T | T |
| *Nannocladius* sp. | | | T | | T |
| *Endochironomus* sp. | | T | | | T |
| *Psectrocladius* sp. | | 1 | | | T |
| *Micropsectra* sp. | | T | T | | T |
| *Paratendipes* sp. | | T | T | | T |
| *Paracladopeltma* sp. | T | T | T | | T |
| *Potthastia* sp. | T | | | T | T |
| *Heterotrissocladius* sp. | | T | T | | T |
| Chironomidae unid. | 3 | 1 | 2 | T | 1 |
| Bryozoa | | | | | |
| *Lophopodella carteri* | T | | | | T |
| *Lophopodella* sp. | | T | | | T |
| *Plumatella repens* | | T | | T | T |
| *Fredecella sultana* | T | | T | T | T |
| *Paludicella articulata* | T | T | | T | T |
| *Cristatella* sp. | | | | T | T |
| Invertebrate unid. | | T | | | T |
| Density (No./$m^2$) | 927 | 1499 | 2259 | 3378 | 2016 |

## Table IV-18

## Percent Composition of Benthic Invertebrate Groups and Total Density of Benthic Organisms Collected by Suction Sampler in the Vicinity of Nine Mile Point, 1978#

| Group | April Contour Depth (ft) 10 | 20 | 30 | 40 | 60 | Monthly Mean | June Contour Depth (ft) 10 | 20 | 30 | 40 | 60 | Monthly Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coelenterata | 5.8 | 1.9 | 0.4 | 0.9 | 0.5 | 1.5 | 3.2 | 11.8 | 6.2 | 1.0 | 2.7 | 4.3 |
| Platyhelminthes | 0.4 | | T* | 0.3 | | 0.1 | 1.6 | 0.5 | 0.4 | 5.4 | 3.2 | 2.3 |
| Nemertea | | 0.6 | 0.2 | | | 0.2 | | | 0.4 | | T | 0.1 |
| Nematoda | 0.6 | | 0.2 | 1.5 | 1.4 | 0.6 | 1.4 | 1.6 | 1.0 | 2.0 | 3.9 | 2.2 |
| Polychaeta | 4.1 | 66.5 | 73.8 | 0.3 | 0.1 | 41.9 | 0.2 | 3.1 | 34.3 | 1.5 | | 5.4 |
| Oligochaeta | 0.1 | 1.2 | 6.4 | 21.4 | 28.1 | 10.2 | 59.8 | 56.6 | 16.4 | 16.0 | 15.3 | 34.2 |
| Hirudinea | | | | 0.6 | 0.1 | 0.1 | | | | 0.3 | | 0.1 |
| Gastropoda | 0.6 | 0.8 | 1.9 | 5.0 | 11.1 | 3.5 | 1.5 | 1.5 | 0.9 | 13.2 | 8.2 | 5.1 |
| Pelecypoda | | 0.7 | 2.2 | 19.6 | 23.1 | 7.2 | T | T | 0.2 | 15.4 | 16.7 | 7.1 |
| Hydracarina | 0.1 | 0.9 | 0.7 | 0.6 | 0.3 | 0.6 | 0.2 | 2.5 | 4.4 | 3.0 | 2.1 | 2.0 |
| Isopoda | 0.1 | | 0.1 | 0.2 | | 0.1 | | | | | | |
| Amphipoda | 22.0 | 11.7 | 11.9 | 44.9 | 30.6 | 20.1 | 5.9 | 9.9 | 23.8 | 36.2 | 44.0 | 24.3 |
| Ephemeroptera | | | | | | | | | | 0.1 | | T |
| Trichoptera | 0.1 | | 0.2 | | | 0.1 | 1.4 | 3.7 | 1.8 | 1.2 | 0.3 | 1.4 |
| Diptera | 65.8 | 15.7 | 1.9 | 4.4 | 4.9 | 13.8 | 24.7 | 8.6 | 9.7 | 4.2 | 3.5 | 11.4 |
| Bryzoa | 0.2 | 0.1 | 0.2 | 0.2 | | 0.2 | 0.1 | 0.1 | 0.3 | 0.4 | T | 0.2 |
| Total density (No./m$^2$) | 643 | 761 | 1905 | 492 | 833 | 927 | 2208 | 1009 | 1025 | 1117 | 2135 | 1499 |

| Group | August Contour Depth (ft) 10 | 20 | 30 | 40 | 60 | Monthly Mean | October Contour Depth (ft) 10 | 20 | 30 | 40 | 60 | Monthly Mean | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coelenterata | 0.1 | 2.7 | 0.2 | | | 0.6 | 1.0 | 10.8 | 4.3 | 2.7 | 1.2 | 4.5 | 3.0 |
| Platyhelminthes | 0.4 | 0.1 | | 0.1 | | 0.2 | 0.4 | 0.3 | 0.9 | 1.2 | T | 0.6 | 0.7 |
| Nemertea | | 0.4 | | | | 0.1 | | 0.7 | 0.6 | 0.4 | | 0.4 | 0.3 |
| Nematoda | 0.1 | 0.3 | 3.0 | 3.0 | 1.6 | 1.1 | | | 1.4 | 1.4 | 2.4 | 0.7 | 1.1 |
| Polychaeta | 4.8 | 73.5 | 12.0 | 0.6 | 2.0 | 17.9 | 0.2 | 3.2 | 29.7 | 5.0 | 0.6 | 6.6 | 13.6 |
| Oligochaeta | 0.9 | 6.7 | 34.2 | 39.3 | 16.1 | 13.7 | T | 0.3 | 20.1 | 22.6 | 15.2 | 8.1 | 14.8 |
| Hirudinea | | | | | | | | | | 0.2 | 0.2 | T | T |
| Gastropoda | 0.8 | 4.3 | 3.3 | 2.0 | 1.4 | 2.0 | 0.5 | 2.4 | 5.8 | 3.8 | 2.7 | 2.4 | 2.9 |
| Pelecypoda | T | 0.5 | 2.6 | 1.7 | 1.0 | 0.8 | T | T | 2.9 | 1.5 | 2.1 | 0.9 | 2.8 |
| Hydracarina | | 0.6 | 0.1 | 0.1 | | 0.1 | 0.2 | 1.0 | 0.6 | 1.1 | 5.5 | 1.1 | 1.0 |
| Isopoda | | | | 0.1 | 0.1 | T | T | | | T | T | T | 0.3 |
| Amphipoda | 92.3 | 6.3 | 23.3 | 33.2 | 52.9 | 52.4 | 96.9 | 80.1 | 31.1 | 56.6 | 56.8 | 71.8 | 51.6 |
| Ephemeroptera | | | | | | | | | | | | | |
| Trichoptera | T | | 0.4 | | | 0.1 | | | | T | 0.1 | T | 0.3 |
| Diptera | 0.7 | 4.6 | 21.0 | 20.2 | 25.0 | 11.1 | 0.7 | 1.1 | 3.5 | 3.2 | 12.9 | 2.8 | 8.0 |
| Bryzoa | | | 0.1 | | | T | | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | T |
| Total density (No./m$^2$) | 4091 | 2211 | 1180 | 1474 | 2341 | 2260 | 5448 | 4617 | 2803 | 2384 | 1638 | 3378 | 2016 |

T* = <0.1%.
#No samples collected during December due to winter weather.

Bryozoa accounted for 41 percent of the annual benthic biomass (wet-weight) during 1978 (Table IV-19) due to the fact that large colonies were collected in a single sample at the 40-foot depth contour in June. Scuds, snails (Gastropoda), and clams (Pelecypoda) followed respectively in decreasing biomass, while all other groups of benthic invertebrates comprised only about 6 percent of total biomass.

2. Temporal Distribution

The number of invertebrates per area of substrate steadily increased from April through October (Table IV-18 and Figure IV-1). Scuds and polychaete worms were dominant in April, with oligochaete worms and scuds dominant in June. During August and October, scuds dominated (52 percent), with *Gammarus fasciatus* being the most numerous species of this group (41 percent) and *Pontoporeia affinis* of secondary numerical importance (11 percent annually). Oligochaetes and polychaetes decreased in number in October (Figure IV-1). Immature flies (midges, Diptera) were found in similar numbers throughout all sampling periods (Figure IV-1). Ice formation and severe winds precluded the collection of December benthic samples.

Total biomass, excluding the large weight of bryozoan colonies collected in June, increased consistently throughout the collection period (April, June, August, October). Only biomass was determined for the June bryozoan colonies, accurate determination of density is almost impossible because of the nature of the gelatinous mass. Density and biomass during June, then, do not represent an actual organism-weight relationship.

Biomass of clams was highest in April and October. Snail biomass increased through August, then decreased slightly in October. Scud (amphipod) biomass increased throughout the 1978 sampling period, peaking in October (Figure IV-2).

3. Spatial Distribution

During April, total densities were lowest at the 10- and 40-foot depth contours, but this trend did not continue and more organisms were found at the 10-foot contour during the remainder of the study than at other contours

## Table IV-19

### Percent Composition of Benthic Invertebrate Groups and Total Biomass of Benthic Organisms Collected by Suction Sampler in the Vicinity of Nine Mile Point, 1978 #

| Group | April Contour Depth (ft) | | | | | April Monthly Mean | June Contour Depth (ft) | | | | | June Monthly Mean | August Contour Depth (ft) | | | | | August Monthly Mean | October Contour Depth (ft) | | | | | October Monthly Mean | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 20 | 30 | 40 | 60 | | 10 | 20 | 30 | 40 | 60 | | 10 | 20 | 30 | 40 | 60 | | 10 | 20 | 30 | 40 | 60 | | |
| Coelenterata | 0.8 | 0.3 | T | 0.2 | 0.1 | 0.1 | 0.1 | 0.5 | 0.2 | 0.2 | 0.2 | 0.2 | T | 0.2 | 0.1 | | | 0.1 | 0.1 | 1.5 | 0.3 | 0.2 | 0.1 | 0.4 | 0.2 |
| Platyhelminthes | 0.1 | | T | 0.2 | | T | 3. | 0.5 | T | T | 0.5 | 0.2 | 0.1 | T | | T | | 0.1 | 0.4 | T | 0.6 | 1.4 | T | 0.4 | 0.2 |
| Nemertea | | T | | | | T | | | T | | T | T | | 0.5 | | | T | 0.1 | | 0.1 | T | 1. | | 0.2 | 0.1 |
| Nematoda | 0.3 | | T | 0.6 | 0.6 | 0.2 | 0.1 | T | T | T | T | T | T | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | | | 0.2 | 0.1 | 0.1 | T | T |
| Polychaeta | 1.1 | 8.8 | 3.4 | 0.2 | 0.1 | 3.0 | 0.1 | 0.3 | 1.3 | T | | 0.1 | T | 3.2 | 0.7 | T | 0.2 | 0.9 | T | 0.2 | 1.6 | 0.2 | T | 0.3 | 0.5 |
| Oligochaeta | T | 0.4 | 1.1 | 1.7 | 5.4 | 1.6 | 6.4 | 6.2 | 11.7 | 0.1 | 4.1 | 0.9 | 0.1 | 4.0 | 10.4 | 19.3 | 10.4 | 6.6 | T | T | 8.6 | 7.9 | 2.0 | 2.6 | 2.3 |
| Hirudinea | | | 0.1 | 0.2 | | 0.1 | | | | T | | T | | | | | | | | | | T | | T | T |
| Gastropoda | 6.1 | 65.1 | 1.4 | 39.7 | 26.5 | 14.3 | 60.6 | 36.8 | 9.7 | 2.9 | 31.6 | 7.7 | 35.1 | 88.5 | 15.5 | 8.5 | 7.3 | 37.8 | 12.1 | 29.8 | 50.4 | 24.5 | 12.7 | 22.5 | 16.5 |
| Pelecypoda | | 0.8 | 88.6 | 24.6 | 21.1 | 58.2 | 0.1 | 0.3 | 0.2 | 1.2 | 41.0 | 4.0 | 0.1 | 0.6 | 52.4 | 22.9 | 10.3 | 11.8 | 0.2 | 0.1 | 11.0 | 24.2 | 42.8 | 12.8 | 11.8 |
| Hydracarina | T | 0.5 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.5 | 0.3 | T | 0.2 | T | | 0.1 | | | | T | 0.1 | 0.1 | T | 0.2 | 0.5 | 0.2 | 0.1 |
| Isopoda | 0.4 | | T | T | | T | | | | | | | | | | T | 0.2 | T | | | | T | T | T | T |
| Amphipoda | 47.0 | 10.3 | 3.6 | 30.9 | 43.8 | 16.0 | 13.5 | 39.5 | 16.8 | 1.1 | 21.4 | 3.7 | 64.6 | 1.3 | 11.1 | 41.8 | 57.1 | 37.2 | 86.8 | 67.6 | 23.9 | 37.9 | 35.4 | 58.5 | 22.4 |
| Ephemeroptera | | | | | | | | | | | | | | | | 0.1 | | T | | | | | | | T |
| Trichoptera | 0.4 | | T | | | T | 2.0 | 8.6 | 1.5 | 0.3 | 0.4 | 0.5 | 0.1 | | 1.7 | | | 0.3 | | | | T | 0.3 | T | 0.3 |
| Diptera | 44.0 | 10.5 | 0.4 | 1.4 | 2.2 | 5.5 | 14.0 | 5.4 | 6.1 | T | 0.4 | 0.8 | 0.3 | 2.0 | 7.8 | 7.5 | 14.6 | 5.2 | 0.2 | 0.5 | 2.4 | 2.5 | 6.1 | 1.9 | 2.2 |
| Bryzoa | T | T | T | T | T | T | T | T | 51.9 | 93.8 | 0.2 | 81.9 | | | 0.4 | | | 0.1 | | 0.2 | 0.8 | 0.7 | 0.1 | 0.3 | 41.3 |
| Total biomass ($gm/m^2$) | 0.74 | 0.77 | 5.01 | 0.65 | 1.21 | 1.67 | 1.88 | 0.37 | 1.15 | 41.77 | 3.39 | 9.71 | 5.11 | 4.21 | 2.25 | 1.82 | 3.03 | 3.28 | 7.13 | 4.49 | 2.54 | 3.24 | 3.81 | 4.24 | 4.73 |

T* = <0.1%.
#No samples collected during December due to winter weather.

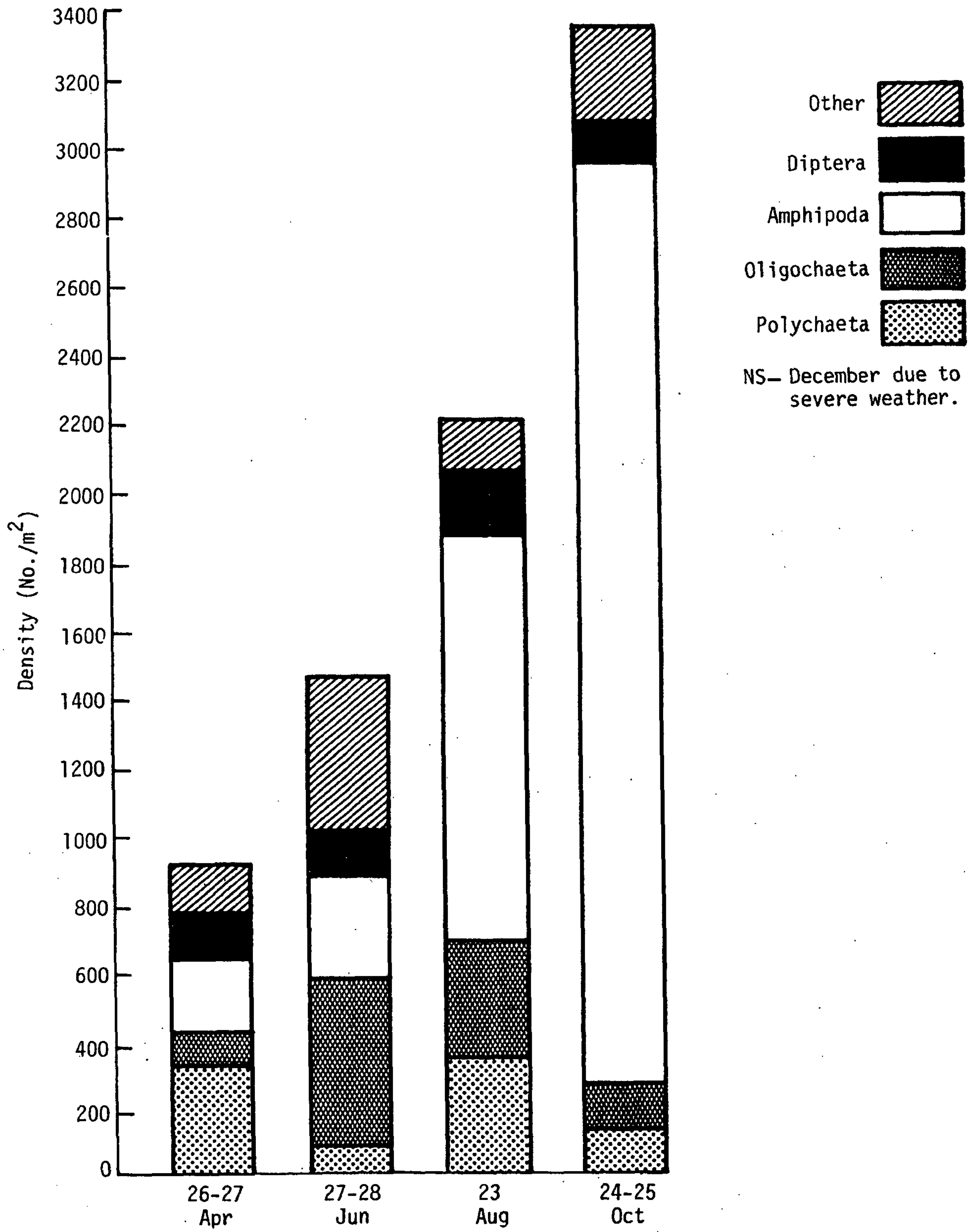



Figure IV-1. Temporal Distribution in Abundance of Benthic Invertebrate Groups Collected in the Vicinity of Nine Mile Point, 1978

(Appendix Table D-1). Densities at all contours generally increased throughout 1978, and there were only small, inconsistent differences between control and experimental transects.

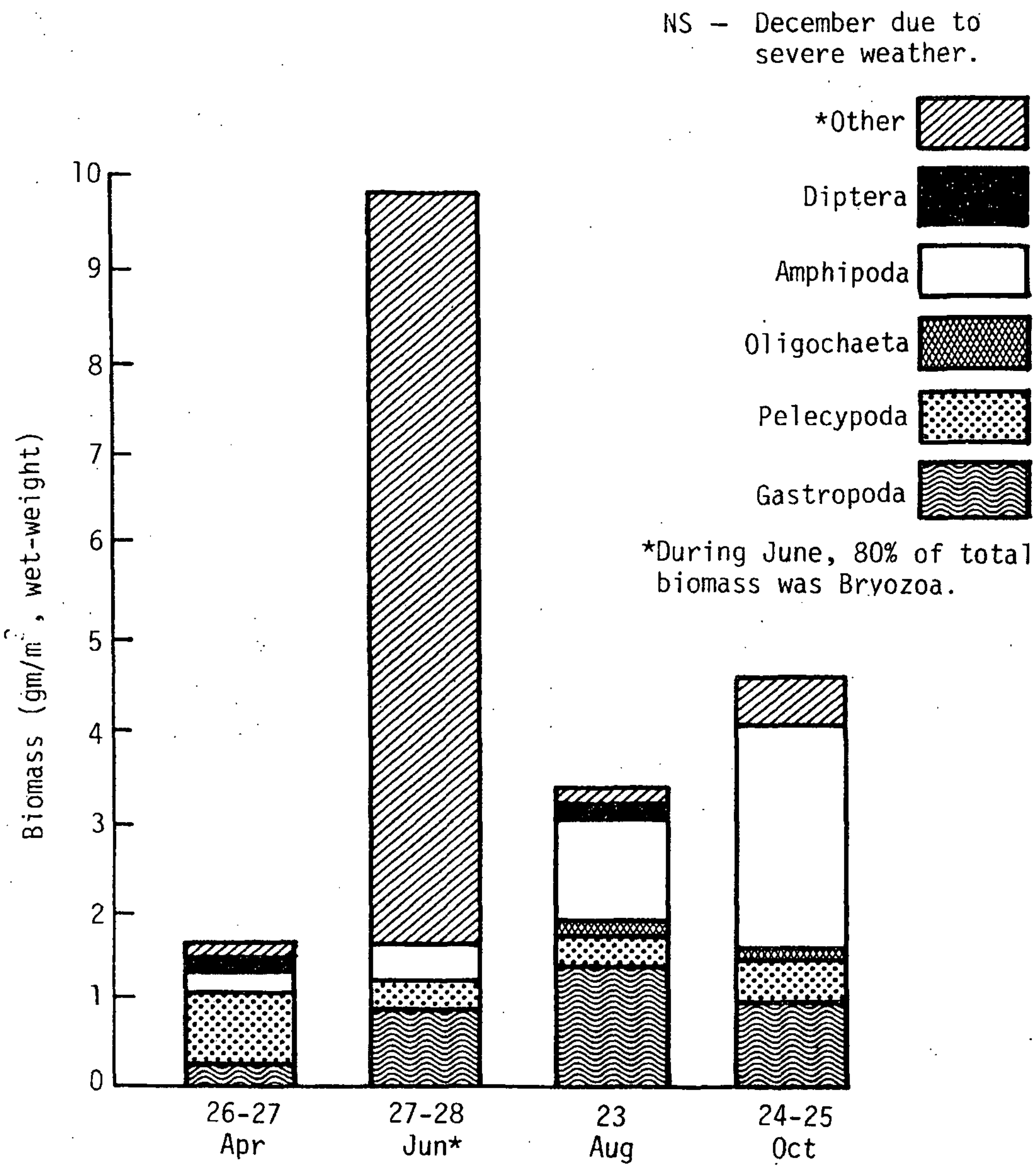



Figure IV-2. Temporal Distribution in Biomass of Benthic Invertebrate Groups Collected in the Vicinity of Nine Mile Point, 1978

Scuds (all species combined) were more numerous at the 10- and 20-foot contours than at the deeper sampling locations. The dominant organism collected, Gammarus fasciatus, was most numerous at the shallow-water locations. Pontoporeia affinis, the second most abundant scud, was most abundant at the deeper sampling locations. Numbers of G. fasciatus and P. affinis were typically higher at the two experimental transects (NMPP and FITZ) than at the two control transects (Appendix Tables D-2, and D-3).

Oligochaetes were distributed over the entire study area but, except for June samples, were more numerous at the deeper sampling locations; numbers also increased from west to east. Except for October, monthly mean densities were greater at experimental transects (NMPP and FITZ) than at the controls (Appendix Table D-4). Variability between samples was noted throughout the study; however, the differences noted were probably well within the natural variability of the existing benthic community.

Midges were collected in increasing numbers during the course of the year at progressively deeper contours (Appendix Table D-5). This phenomenon was probably related to an increase in bottom-water temperatures outward from shallower to deeper contours as the summer progressed. Emergence occurred first at the shallow depth contours, therefore decreasing densities of immature flies in this area, while at deeper contours apparent densities increased as immature flies developed to larger instars and became susceptible to the sampling gear.

In general, benthic invertebrates were distributed over the entire study area. The high variabilities observed in samples preclude all but the broadest generalities. Total densities at control and experimental transects showed no real differences that could be attributed to plant operations.

4. Description of Bottom Sediment

Visual observations of the bottom sediments in the vicinity of Nine Mile Point indicated that the area is primarily bedrock, which is covered in some areas with boulders and rubble (Table IV-20).

Table IV-20

Composition of Bottom Sediment Determined by Visual Examination at Benthic Sampling Stations in the Vicinity of Nine Mile Point, 1978

| Depth Contour (ft) | Transect | Description* | Comments |
|---|---|---|---|
| 10 | NMPW | 100% bedrock | |
| | NMPP | 70% boulders, 20% rubble, 10% gravel | Some algae on rocks |
| | FITZ | 80% boulders, 10% gravel, 10% sand | Some algae |
| | NMPE | 70% boulders, 20% gravel, 10% sand | Some algae |
| 20 | NMPW | 50% bedrock, 50% rubble | |
| | NMPP | 50% boulders, 30% rubble, 20% gravel | All lying on bedrock |
| | FITZ | 50% boulders, 20% gravel, 20% rubble, 10% sand | |
| | NMPE | 40% bedrock, 30% boulders, 25% gravel, 5% sand | |
| 30 | NMPW | 100% bedrock | Some rubble |
| | NMPP | 100% bedrock | Some boulders |
| | FITZ | 80% bedrock, 20% rubble | Some sand |
| | NMPE | 100% bedrock | Some rubble and sand |
| 40 | NMPW | 50% bedrock, 30% rubble, 20% sand | |
| | NMPP | 80% boulders, 20% bedrock | |
| | FITZ | 50% bedrock, 20% boulders, 50% rubble | |
| | NMPE | 100% bedrock | Some scattered sand |
| 60 | NMPW | 100% bedrock | |
| | NMPP | 80% boulders, 10% rubble, 10% gravel | |
| | FITZ | 80% bedrock, 20% boulders | Some rubble |
| | NMPE | 80% bedrock, 20% rubble | Some sand |

*Description based on USEPA (1973) field evaluation method for categorizing soils.

5. Overview of Year-to-Year Results

Benthic invertebrates in the Nine Mile Point vicinity have been investigated since 1973. Differences in species composition and density were generally related to substrate differences: on the NMPW and NMPP transects, substrates are primarily bedrock and rubble; at NMPE and FITZ, they are bedrock and rubble inshore and sand and silt offshore. Maximum abundances were observed in mid-summer, with densities increasing from west to east (i.e., NMPW to NMPE). Annually, Gammarus fasciatus was the dominant organism collected. The control and experimental areas exhibited no differences that could be attributed to operation of the power plants.

## E. ICHTHYOPLANKTON

### 1. Species Composition

Samples from Lake Ontario in the vicinity of Nine Mile Point in 1978 yielded five taxa of eggs and 20 taxa of larvae [prolarvae (yolk-sac stage) and postlarvae (post yolk-sac stage) combined] (Table IV-21). April samples contained only burbot and lake herring (cisco) larvae. During May, larvae of early spring spawners such as rainbow smelt and yellow perch were collected, along with eggs of rainbow smelt and *Morone* spp. The highest diversity (number of taxa) of ichthyoplankton occurred during June and July when 15 taxa were present. After mid-September, only alewife larvae were captured in the study area; no eggs or larvae were observed in December samples.

### 2. Temporal Distribution

#### a. Eggs

Fish eggs of five taxa were collected in the study area from 2 May through 14 August (Table IV-22). Rainbow smelt eggs, which are adhesive and demersal, were collected only during May; average site densities were always less than one egg per 1000 cubic meters of water sampled. Similarly, very few eggs of *Morone* spp. and carp were collected, the former being captured in late May and early June and the latter observed in June and late July.

Alewife eggs were present from mid-June through mid-August, accounting for 99 percent of the fish eggs collected in 1978. Egg densities peaked during night sampling on 24-25 July when average site density for alewife eggs was slightly more than 160 eggs per cubic meter. Alewife egg densities were usually higher in night than in day samples, perhaps the result of greater spawning activity during the night (LMS 1975a). The low catches for the other species exhibited no day/night trends.

#### b. Larvae

Larvae were present in ichthyoplankton samples from early April through late November (Tables IV-21 and IV-23). Only prolarvae were collected during April, but both prolarvae and postlarvae were common from May through

Table IV-21

Seasonal Occurrence of Fish Eggs and Larvae Collected
in Vicinity of Nine Mile Point, Lake Ontario, April-December 1978

| Species* | Apr | | | | May | | | | | Jun | | | | Jul | | | | Aug | | | | | Sep | | | | Oct | | | | Nov | | | | | Dec++ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1** | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | |
| Alewife | | | | | | | | | | | E*** | E | E | E | E | E | E | E | E | E | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | L*** | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | L | | |
| Bluegill | | | | | | | | | | | | | | | | | | | | | | L | | | | | | | | | | | | | | |
| Burbot | | L | L | L | L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Carp | | | | | | | | | | E | E | | E | | | | E | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | L | L | L | L | L | L | L | L | L | L | L | | | | | | | | | | | | | | | | |
| Clupeidae† | | | | | | | | | | | | | | L | L | L | L | L | L | L | L | L | L | L | | | | | | | | | | | | |
| Freshwater drum | | | | | | | | | | | | | | | E | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | L | | | | | | | | | | | | | L | | | | | | | | | | | | |
| Goldfish | | | | | | | | | | L | L | L | | L | | L | L | | L | | | | | | | | | | | | | | | | | |
| Gizzard shad | | | | | | | | | | | L | | | | | L | L | | | | | | | | | | | | | | | | | | | |
| Lake herring | | L | L | L | | | | L | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Minnows†† | | | | | | | | | | L | L | L | L | L | L | L | L | | L | L | | | | | | | | | | | | | | | | |
| Morone sp.††† | | | | | | | | E | | E | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | L | | L | L | L | L | L | L | L | L | L | L | L | | | | | | | | | | | | | | | | |
| Rainbow smelt | | | | | E | | E | E | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | L | | L | L | L | L | L | L | L | L | L | L | | | L | | L | L | | L | L | | | | | | | | | | | |
| Sculpin# | | | | | | | | | | | L | L | L | L | L | L | L | L | L | L | | | | | | | | | | | | | | | | |
| Spottail shiner | | | | | | | | | | | | | | | | | L | | | | | | | | | | | | | | | | | | | |
| Sunfish## | | | | | | | | | | | L | L | | L | L | | L | L | | | | | | | | | | | | | | | | | | |
| Tessellated darter+ | | | | | | | | | | | L | | L | L | L | L | L | L | L | | | | | | | | | | | | | | | | | |
| Threespine stickleback | | | | | | | | | | | | | L | L | L | | | | | | | | | | | | | | | | | | | | | |
| Trout-perch | | | | | | | | | | | L | L | L | L | L | | | | | | | | | | | | | | | | | | | | | |
| White perch | | | | | | | | | | | L | L | | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow perch | | | | | | | L | L | L | L | L | L | | | | | | | | | | | | | | | | | | | | | | | | |

*Common names are those recognized by the American Fisheries Society (Bailey et al 1970).

**Weeks of the month.

***E = eggs, L = larvae (prolarvae and postlarvae combined).

†Most Clupeidae are probably alewife.

††Includes species of Cyprinidae, except carp and goldfish.

†††Most Morone sp. are probably white perch.

#Includes the mottled sculpin and a few slimy sculpins.

##Includes species of Centrarchidae,

+Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

++No ichthyoplankton caught during December.

## Table IV-22

### Temporal Distribution in Density* of Fish Eggs Collected in Vicinity of Nine Mile Point, Lake Ontario, April-December 1978**

| Taxa | May 2 D† | May 8 D | May 15 D | May 22 D | May 30 D | June 5 D | June 6-7 N† | June 12 D | June 15-16 N | June 19 D | June 19-20 N | June 26 D | June 26 N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alewife | NC | NC | NC | NC | NC | NC | NC | 0.1 | 12.6 | 0.4 | 0.9 | 0.3 | 5.2 |
| Carp | NC | NC | NC | NC | NC | NC | 0.2 | 0.3 | NC | NC | NC | NC | 0.6 |
| Freshwater drum | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| *Morone* sp. | NC | NC | NC | 0.1 | NC | 0.2 | NC | NC | NC | NC | NC | NC | NC |
| Rainbow smelt | 0.9 | NC | 0.1 | 0.2 | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| Unidentified | NC | NC | NC | NC | NC | NC | NC | 0.1 | 0.4 | 0.1 | NC | NC | 0.3 |
| Total | 0.9 | NC | 0.1 | 0.3 | NC | 0.2 | 0.2 | 0.5 | 13.0 | 0.5 | 0.9 | 0.3 | 6.1 |

| Taxa | Jul 5 D | Jul 5-6 N | Jul 10 D | Jul 12-13 N | Jul 17 D | Jul 17-18 N | Jul 24 D | Jul 24-25 N | Jul 31 D | Aug 31-1 N | Aug 7 D | Aug 7-8 N | Aug 14 D | Aug 14 N | Aug 21 D | Aug 21 N | Aug 28 D | Aug 28 N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alewife | 1.1 | 17.0 | 12.0 | 1.2 | 1.1 | 5.6 | 12.3 | 161.6 | 0.4 | NC | 2.6 | 46.7 | NC | 0.1 | NC | NC | NC | NC |
| Carp | NC | NC | NC | NC | NC | NC | NC | 0.1 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| Freshwater drum | NC | NC | 0.2 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| *Morone* sp. | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| Rainbow smelt | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| Unidentified | 1.4 | NC | NC | 0.1 | NC | NC | NC | T†† | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| Total | 2.5 | 17.0 | 12.2 | 1.3 | 1.1 | 5.6 | 12.3 | 161.7 | 0.4 | NC | 2.6 | 46.7 | NC | 0.1 | NC | NC | NC | NC |

*Mean density (No./1000 $m^3$) of all surface, mid-depth, and bottom tows at 15 stations.

**No fish eggs collected during April or after August.

†D = day collections, N = night collections.

††T = trace (<0.1).

NC = No catch.

Table IV-23

Relative Numerical Abundance of 11 Most Abundant Prolarvae and Postlarvae Collected in Vicinity of Nine Mile Point, Lake Ontario, April-December 1978

| | Apr | | | | May | | | | | Jun | | | | | | | | Jul | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1* | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 1 | | 2 | | 3 | | 4 | | 1 | | 2 | | 3 | | 4 | |
| | D** | D | D | D | D | D | D | D | D | D | N** | D | N | D | N | D | N | D | N | D | N | D | N | D | N |
| Prolarvae | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alewife† | | | | | | | | | | | | | | 6 | 1 | 89 | 28 | 97 | 46 | 94 | 11 | 99 | 81 | 99 | 78 |
| Burbot | | 82 | 31 | 50 | 88 | | | | | | | | | | | | | | | | | | | | |
| Carp-Goldfish | | | | | | | | | | | 93 | | 10 | | 4 | | 32 | 2 | 42 | 6 | 35 | 1 | 8 | T | 10 |
| Lake herring | | 18 | 69 | 50 | | | | | | | | | | | | | | | | | | | | | |
| Minnows†† | | | | | | | | | | | 2 | | 5 | | 1 | | 19 | | 1 | | 2 | | 2 | T | 2 |
| Morone sp.††† | | | | | | | | | | 26 | 2 | | 59 | 92 | 92 | 10 | 9 | 1 | 1 | T | 5 | T | T | | |
| Rainbow smelt | | | | | 12 | | 100 | 73 | 100 | 72 | 4 | 100 | 11 | 2 | 1 | 1 | | | | | | | | | |
| Sculpin# | | | | | | | | | | | | | 6 | | 1 | | 8 | | T | | T | | | | |
| Sunfish## | | | | | | | | | | | | | | | | | | | | | | | | T | |
| Tesselated darter### | | | | | | | | | | | | | 1 | | | | 3 | T | 9 | | 46 | | 9 | | 11 |
| Yellow perch | | | | | | | | 27 | | | | | 1 | | | | | | | | | T | | | |
| Postlarvae | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alewife | | | | | | | | | | | | | 1 | 3 | 2 | 36 | 30 | 98 | 98 | 99 | 99 | 100 | 100 | 100 | 99 |
| Burbot | | | | | 100 | | | | | | | | | | | | | | | | | | | | |
| Carp-Goldfish | | | | | | | | | | | | | | | | 3 | 8 | T | 1 | T | T | | T | T | T |
| Lake herring | | | | | | | | T | | | | | | | | | | | | | | | | | |
| Minnows | | | | | | | | | | | | | | | | 2 | | T | T | T | | T | | T | T |
| Morone sp. | | | | | | | | T | | 9 | 31 | 18 | 15 | 3 | 17 | 10 | 10 | T | | T | T | T | | T | T |
| Rainbow smelt | | | | | | | | 1 | 72 | 89 | 69 | 74 | 78 | 85 | 77 | 48 | 39 | T | 1 | T | T | | T | | |
| Sculpin | | | | | | | | | | | | | 1 | | | | 12 | | 1 | | T | | T | | T |
| Sunfish | | | | | | | | | | | | 7 | 1 | 3 | 1 | | | T | T | T | T | | | T | |
| Tesselated darter | | | | | | | | | | | | | | | | | | | T | T | T | | T | | T |
| Yellow perch | | | | | | | 100 | 98 | 27 | 2 | | | T | 4 | 2 | | | 1 | T | | | T | | | |

| | Aug | | | | | | | | | | Sep | | | | | | Oct | | | | Nov | | | | | Dec*** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | | 4 | | 5 | | 1 | | 2 | | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 5 | 1 | 3 |
| | D | N | D | N | D | N | D | N | D | N | D | N | D | N | D | D | D | D | D | D | D | D | D | D | D | D | D |
| Prolarvae | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alewife | 44 | | 76 | 9 | 100 | 97 | | | | | | | | | | | | | | | | | | | | | |
| Burbot | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Carp-Goldfish | 56 | 97 | 23 | 90 | | 3 | | | | | | | | | | | | | | | | | | | | | |
| Lake herring | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Minnows | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Morone sp. | | | 1 | T | | | | | | | | | | | | | | | | | | | | | | | |
| Rainbow smelt | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sculpin | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sunfish | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tesselated darter | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow perch | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Postlarvae | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alewife | 100 | 99 | 100 | 99 | 100 | 100 | 100 | 100 | 94 | 98 | 99 | 99 | 100 | 30 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | | 100 | | |
| Burbot | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Carp-Goldfish | | T | T | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| Lake herring | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Minnows | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Morone sp. | T | | T | T | T | | | | | | | | | | | | | | | | | | | | | | |
| Rainbow smelt | | | | T | | | | T | 5 | 1 | 1 | 1 | | 70 | | | | | | | | | | | | | |
| Sculpin | | 1 | | T | | T | | | | | | | | | | | | | | | | | | | | | |
| Sunfish | | | | | T | | | | | T | | | | | | | | | | | | | | | | | |
| Tesselated darter | | T | | T | | | | | | | | | | | | | | | | | | | | | | | |
| Yellow perch | | | | | | | | | | | | | | | | | | | | | | | | | | | |

* Weeks of the month.
** D = day, N = Night.
*** No larvae collected during December.
† Alewife includes the unidentified herring since most Clupeidae in the area were alewifes.
†† Minnows include the unidenified species of Cyprinidae except for carp and goldfish.
††† Morone sp. includes white perch and white bass.
\# Sculpin includes the mottled and the slimy sculpin.
\## Includes species of Centrarchidae.
\### Includes tessellated and johnny darters, previously considered as subspecies and reported under the name johnny darter in earlier Nine Mile Point studies.
T = Trace ( <0.5% )

mid-August. After mid-August, alewife postlarvae dominated ichthyoplankton samples.

Table IV-23 illustrates that for several species (e.g., alewife and Morone spp.) the prolarval and postlarval stages attained maximum relative abundance at about the same time. Prolarvae of burbot and rainbow smelt, however, were abundant in the area for a week or more before substantial numbers of postlarvae were collected.

Highest densities of larvae (all species of prolarvae and postlarvae combined) were observed during July and August; however, two minor peaks occurred prior to July (Figure IV-3) as a result of the sequential spawning of several species. The first minor peak was due primarily to yellow perch, which accounted for 98 percent of the postlarvae collected on 22 May (Table IV-23). The second minor peak occurred in mid-June when rainbow smelt and Morone spp. larvae densities were at their highest. After June, alewife larvae completely dominated the ichthyoplankton population, accounting for most of the prolarvae and almost all of the postlarvae collected from July through November. Larvae densities decreased rapidly during late August, and no larvae were collected (Figure IV-3) after November.

Day/night sampling indicated that larvae densities were generally higher at night, based on total catch (all species combined) and on catches of alewife larvae, the most abundant taxa during the summer months. There was also a distinct day/night difference in the catches of several species that were not very abundant in the area; these species, including sculpin, tesselated darter, and trout-perch, were frequently present in night collections but often were not found in day samples (Table IV-23). These day/night differences reflect both diel movement or behavior patterns and daytime gear avoidance.

3. Spatial Distribution

a. Eggs

The small catches of eggs prevented analysis of spatial distribution except for alewife (Appendix Tables E-1 through E-4). Alewife eggs were consistently more abundant along the 20- than the 40-foot depth contour during

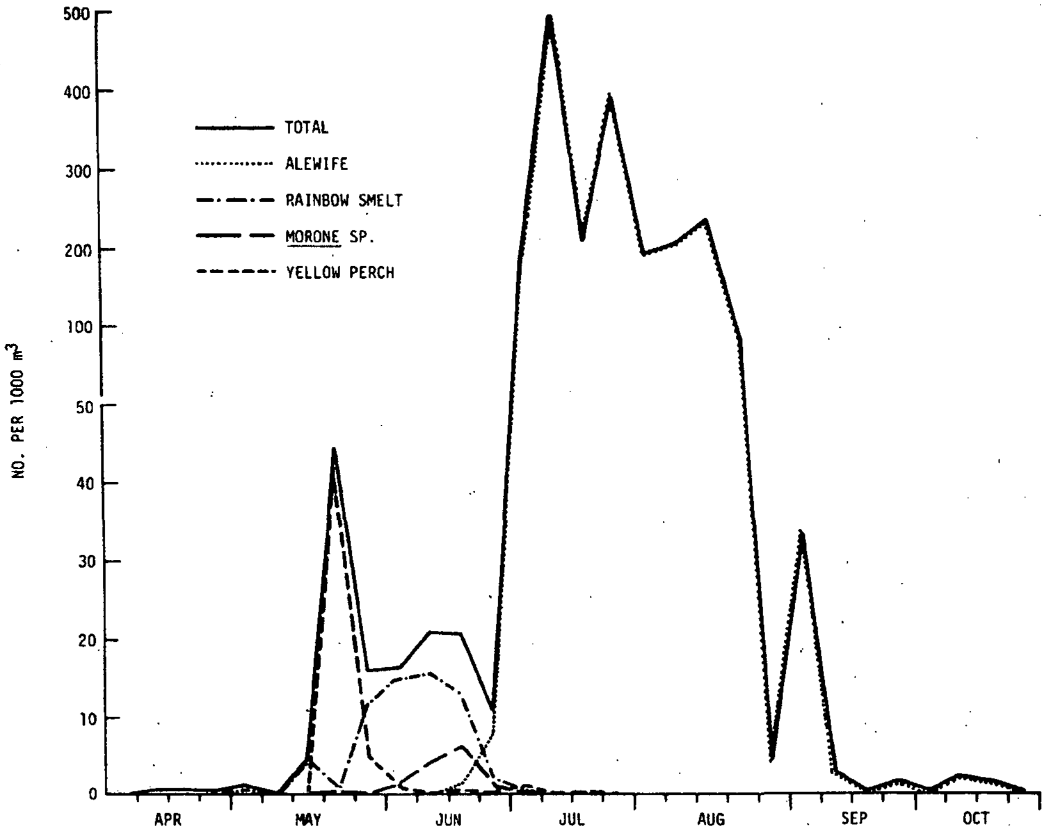



Figure IV-3. Daytime Temporal Distribution of Larvae in Vicinity of Nine Mile Point, Lake Ontario, April-September 1978

night sampling; also, egg densities were highest at the stations to the west of the power plants (upcurrent of the intake and discharge structures) along both the 20- and 40-foot depth contours (Appendix Table E-4). Alewife egg distribution exhibited no consistent trend with respect to the three depth (surface, mid-depth, and bottom) strata.

b. Larvae

Data collected from June through mid-September were used to illustrate the spatial distribution of fish larvae within the study area, because both day and night data were available and total larvae densities were highest during this period. Prolarvae are purely planktonic while postlarvae attain the ability to maintain or change their position in a moving water medium as they develop.

Densities of prolarvae (all species combined) decreased from the 20- to the 100-foot contour (Figure IV-4). This trend was uniform both day and night. Although postlarvae catches were somewhat greater at the 100-foot contour during night sampling, postlarvae densities overall were relatively equal at all contours during both day and night sampling (Figure IV-5). As observed during previous studies (LMS 1975a, NMPC 1976a, TI 1978), the larvae of several species common in the study area, including rainbow smelt and alewife, move farther offshore as they mature. The relative similarity in postlarvae densities observed at all depth contours may result from offshore movement of the older postlarvae.

Data from six stations along the 20- and 40-foot depth contours were used to determine the influence, if any, of the two plant discharges on the spatial distribution of larvae (Section III.A.5 and Figure III-1). Based on day samples, mean densities of prolarvae along the 20- and 40-foot depth contours were slightly higher at stations just east of the Nine Mile Point Unit I discharge (Figure IV-6 and Appendix Tables E-5 and E-6). Night sampling, however, indicated that average densities were highest at stations west (1/2 and 1 mile west, upstream with respect to the prevailing current) of the Nine Mile Point and James A. FitzPatrick discharges. No consistent trends were observed in prolarvae densities along the 40-foot contour during night collections.

Mean station densities of postlarvae along the 20-foot contour were fairly uniform during the day but generally higher at night at the western most stations (1 and 3 miles west) (Figure IV-7 and Appendix Tables E-13 and E-14). Along the 40-foot contour, average postlarvae densities at all stations were fairly uniform, at night but higher both to the east and west of the discharge area during the day.

From June through August when larvae were most abundant, both prolarvae and postlarvae were usually more abundant in surface than in mid-depth and bottom samples (Appendix Tables E-5 through E-22). Alewives usually accounted for more than 90 percent of the catches during this period. Prior to the influx of the alewives, rainbow smelt larvae were usually most abundant, their densities being generally highest in the bottom or mid-depth water strata (Appendix Tables E-11, E-12, E-19, and E-20). No pattern was observed in the vertical distribution of yellow perch larvae.

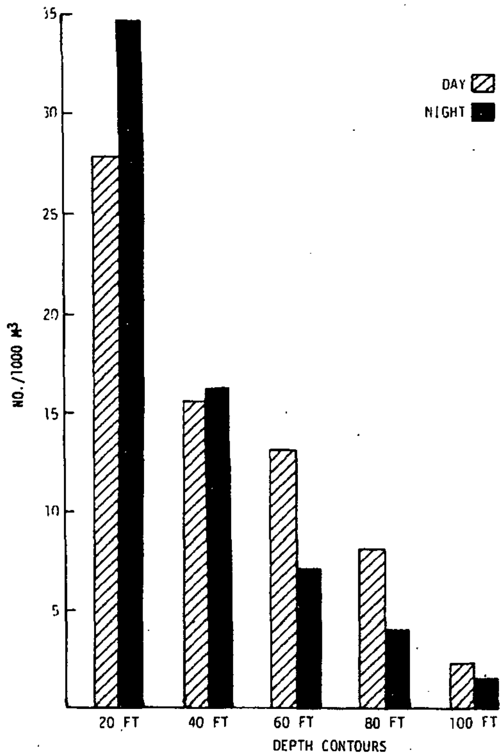



Figure IV-4. Distribution of Total Prolarvae Densities in Vicinity of Nine Mile Point, June through mid-September 1978

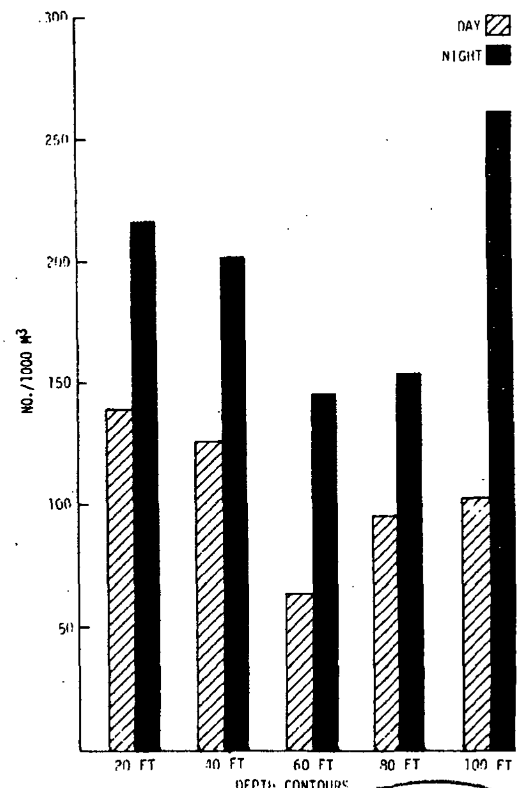



Figure IV-5. Distribution of Total Postlarvae Densities in Vicinity of Nine Mile Point, June through mid-September 1978

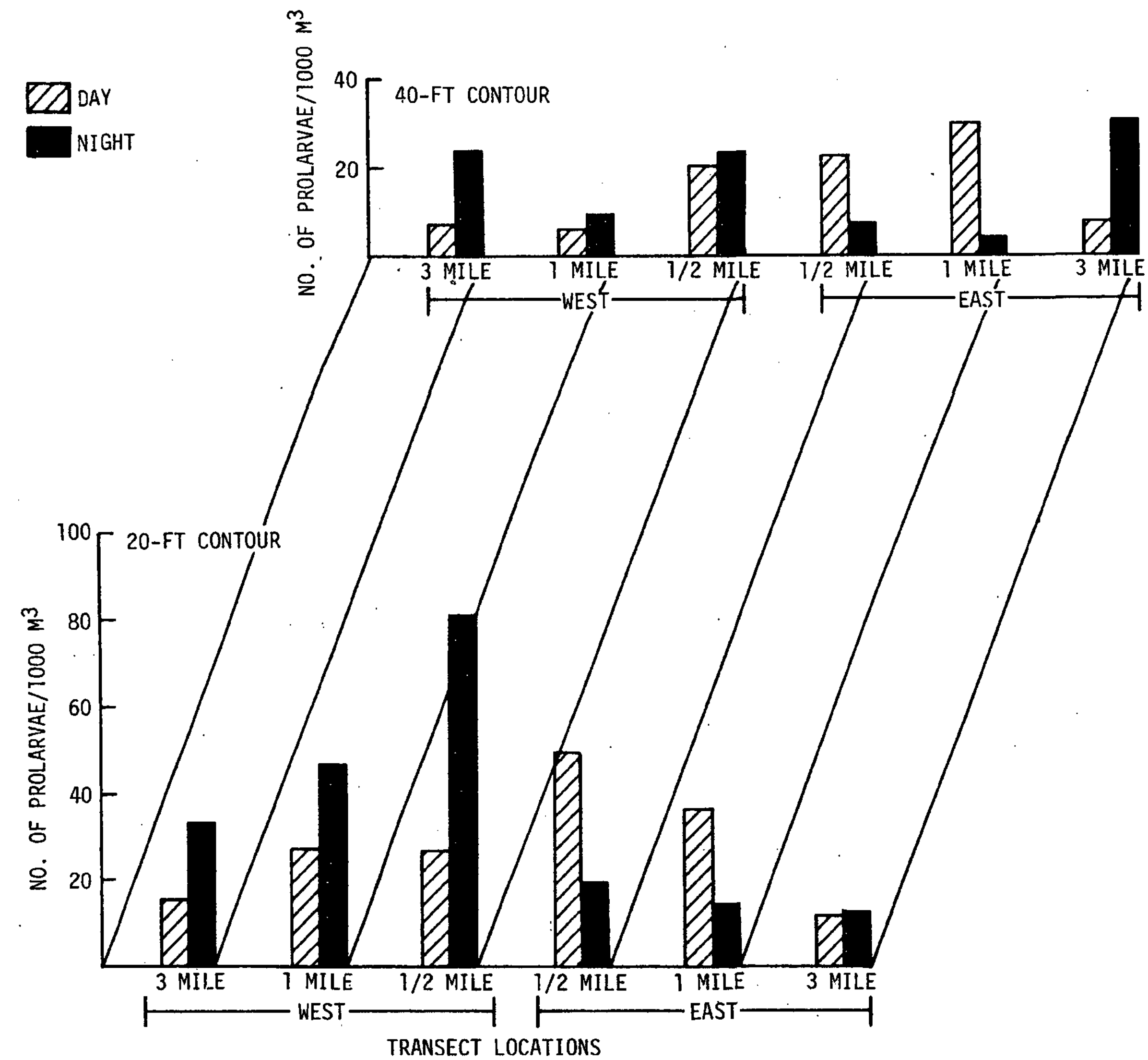



Figure IV-6. Spatial Distribution of Prolarvae in Vicinity of Nine Mile Point, June through mid-September 1978

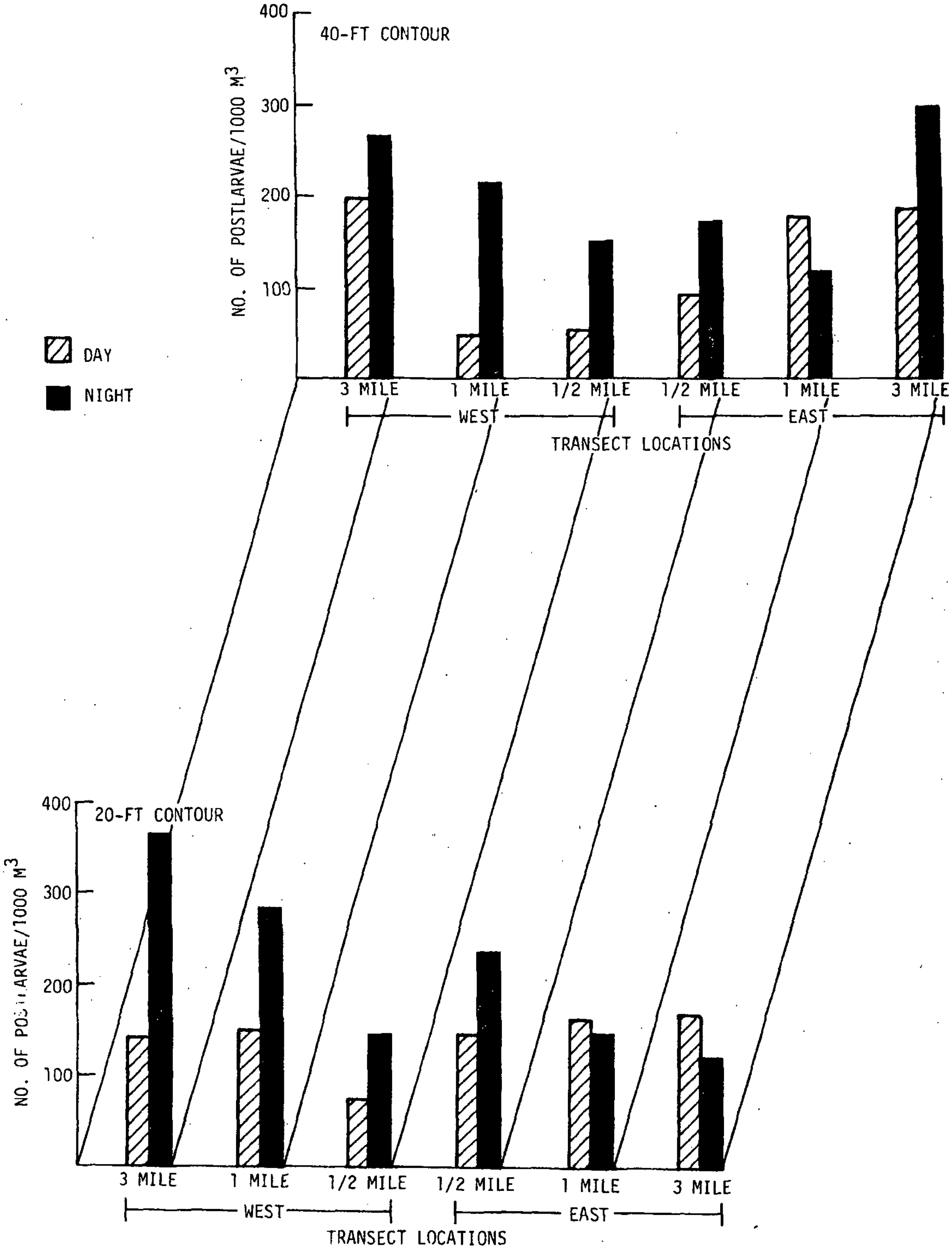



Figure IV-7. Spatial Distribution of Postlarvae in Vicinity of Nine Mile Point, June through mid-September 1978

4. Overview of Year-to-Year Results

The distribution of fish eggs and larvae was monitored weekly at depths ranging from 20 to 100 feet in the Nine Mile Point vicinity during April-December 1973-78. Thermally influenced and control areas were sampled over a range of depths in order to characterize the temporal and spatial distribution of the ichthyoplankton community in the Nine Mile Point vicinity and to detect potential effects attributable to Nine Mile Point and James A. FitzPatrick station operations.

Egg collections, which included up to six species during any one year, were consistently dominated by alewife and rainbow smelt; the eggs of other species were collected infrequently and/or in relatively low numbers. Larval samples, also dominated by alewife, included up to 22 species in a given year. Although yellow perch, rainbow smelt, and Morone spp. (white bass and white perch) larvae were consistently present over the years, they and other species generally occurred either in low numbers or were collected infrequently during each year. These data indicate that significant spawning in the study area is limited to the two introduced species, alewife and rainbow smelt, and that the Nine Mile Point area is not a major spawning habitat for the majority of the Lake Ontario fish community.

Two major periods of egg and larval occurrence and abundance were observed in the Nine Mile Point vicinity during each of the 6 years studied: a spring peak in late April or early May and a summer peak during July-August. This temporal pattern, reflecting the seasonal abundance of dominant species, was similar to patterns observed at other southeastern Lake Ontario locations and could not be directly attributed to plant operations. Late fall and early spring spawners, including burbot, yellow perch, and rainbow smelt, comprised the majority of catches during the spring peak period, while alewife, Morone spp., and sometimes rainbow smelt accounted for the greatest portion of the summer spawning peak.

Eggs and larvae were more abundant along the 20-foot than 40-foot depth contour during at least the past 6 years. Additionally, egg and larvae densities were usually lowest at the deeper (60-, 80-, and 100-foot) stations. Older larvae consistently displayed a pattern of offshore migration to deeper waters; during the spawning season, however, no consistent spatial distribution patterns attributable to plant operation were discerned.

Relative to diel distribution in the Nine Mile Point vicinity, alewife eggs were more abundant in night samples (generally near the bottom) during the 6-year study. Alewife larvae also were more abundant during the night (generally near the surface). These findings were consistent with data from studies performed in other Great Lakes areas. Although the vertical distribution of rainbow smelt eggs was not consistent from year to year, smelt larvae proved more abundant more often near the bottom, especially at night.

In conclusion, analyses of egg and larval catches in the thermally influenced and control areas along the 20- and 40-foot depth contours uncovered no consistent temporal or spatial patterns that indicate plant-induced alterations of normal spawning patterns or egg and larval abundance and distribution in the vicinity of the Nine Mile Point study area over the past 6 years (1973-78).

## F. FISHERIES

### 1. Species Composition

From the approximately 45,700 fish collected in the Nine Mile Point vicinity during 1978, 37 taxa were identified (Table IV-24). The highest number and diversity of fish were collected by beach seine and gill net, respectively; box traps collected the least number of species and individuals. Alewives dominated beach-seine collections and were second most abundant in gill-net and trawl catches. Spottail shiners and alewives accounted for 56 percent of gill-net collections, while rainbow smelt and alewives comprised almost 70 percent of trawl catches. The five most abundant species in the Nine Mile Point area, ranked in decreasing order of abundance based on the combined data from all gear, were alewife, spottail shiner, rainbow smelt, white perch, and yellow perch (Table IV-24). Ten taxa — alewife, brown trout, gizzard shad, lake chub, rainbow smelt, <u>Salvelinus</u> spp., spottail shiner, white perch, white sucker, and yellow perch — were collected during each month of the study; and 5 other species were collected during at least seven of the nine months (Figure IV-8).

## Table IV-24

### Numbers and Percent Composition of Fish Collected by Each Sampling Gear, Nine Mile Point Vicinity, 1978

| | Gill Net | | Trawl | | Beach Seine | | Box Trap | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| Species* | No. | % | No. | % | No. | % | No. | % | No. | % |
| Alewife | 4,216 | 23.7 | 1,172 | 23.9 | 22,578 | 98.4 | | | 27,966 | 61.1 |
| American eel | 8 | T** | 1 | T | | | | | 9 | T |
| Banded killifish | | | | | 3 | T | | | 3 | T |
| Black bullhead | 1 | T | | | | | | | 1 | T |
| Brook stickleback | | | | | 1 | T | | | 1 | T |
| Brown bullhead | 67 | 0.4 | | | | | | | 67 | 0.1 |
| Brown trout | 117 | 0.7 | 1 | T | 11 | T | | | 129 | 0.3 |
| Burbot | 12 | 0.1 | | | | | | | 12 | T |
| Carp | 4 | T | | | | | | | 4 | T |
| Chinook salmon | 11 | 0.1 | | | 3 | T | | | 14 | T |
| Coho salmon | 4 | T | | | 2 | T | | | 6 | T |
| Emerald shiner | | | 1 | T | 12 | T | | | 13 | T |
| Gizzard shad | 258 | 1.5 | 4 | 0.1 | 10 | T | | | 272 | 0.6 |
| Golden shiner | | | | | 3 | T | | | 3 | T |
| Lake chub | 123 | 0.7 | | | | | | | 123 | 0.3 |
| Largemouth bass | | | | | 3 | T | | | 3 | T |
| Longnose dace | | | | | 1 | T | | | 1 | T |
| Northern pike | 2 | T | | | | | | | 2 | T |
| Pumpkinseed | 6 | T | | | | | | | 6 | T |
| Rainbow smelt | 2,031 | 11.4 | 2,246 | 45.9 | 1 | T | | | 4,278 | 9.4 |
| Rainbow trout | 13 | 0.1 | | | 3 | T | | | 16 | T |
| Rock bass | 154 | 0.9 | | | | | 112 | 86.8 | 266 | 0.6 |
| Sculpin | 11 | 0.1 | 95 | 1.9 | | | 1 | 0.8 | 107 | 0.2 |
| Salvelinus spp. | 189 | 1.1 | | | | | | | 189 | 0.4 |
| Sea lamprey | 3 | T | | | | | | | 3 | T |
| Shorthead redhorse | 1 | T | | | | | | | 1 | T |
| Smallmouth bass | 126 | 0.7 | | | 3 | T | 1 | 0.8 | 130 | 0.3 |
| Spottail shiner | 5,777 | 32.5 | 12 | 0.2 | 192 | 0.8 | 7 | 5.4 | 5,988 | 13.1 |
| Stonecat | 96 | 0.5 | | | | | | | 96 | 0.2 |
| Tessellated darter† | | | 242 | 4.9 | | | | | 242 | 0.5 |
| Threespine stickleback | 3 | T | 894 | 18.3 | 72 | 0.3 | 3 | 2.3 | 972 | 2.1 |
| Trout-perch | 657 | 3.7 | 226 | 4.6 | | | | | 883 | 1.9 |
| Walleye | 8 | T | | | 1 | T | | | 9 | T |
| White bass | 18 | 0.1 | | | 1 | T | | | 19 | T |
| White perch | 1,757 | 9.9 | 4 | 0.1 | 16 | 0.1 | 2 | 1.6 | 1,779 | 3.9 |
| White sucker | 473 | 2.7 | | | 2 | T | 2 | 1.6 | 477 | 1.0 |
| Yellow perch | 1,636 | 9.2 | | | 21 | 0.1 | 1 | 0.8 | 1,658 | 3.6 |
| Total | 17,782 | | 4,898 | | 22,939 | | 129 | | 45,748 | |

*Common names according to the American Fisheries Society (Bailey et al 1970).

**T = <0.1%

†Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

| SPECIES | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|
| Alewife | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| American eel | | ▨ | ▨ | ▨ | ▨ | | | | |
| Banded killifish | | | ▨ | ▨ | ▨ | | | | |
| Black bullhead | | | | | ▨ | | | | |
| Brook stickleback | | ▨ | | | | | | | |
| Brown bullhead | | | ▨ | ▨ | ▨ | ▨ | | | |
| Brown trout | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Burbot | | | ▨ | ▨ | | ▨ | ▨ | ▨ | |
| Carp | ▨ | ▨ | | | ▨ | | | | ▨ |
| Chinook salmon | ▨ | ▨ | ▨ | ▨ | | ▨ | | | |
| Coho salmon | ▨ | ▨ | | | | | | | |
| Emerald shiner | ▨ | ▨ | | | ▨ | | ▨ | ▨ | |
| Gizzard shad | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Golden shiner | | ▨ | | | | | | | |
| Lake chub | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Largemouth bass | | | | | ▨ | | | | |
| Longnose dace | | | | | ▨ | | | | |
| Northern pike | | | | | ▨ | | | | |
| Pumpkinseed | | | | | ▨ | | | | |
| Rainbow smelt | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Rainbow trout | | ▨ | | | | ▨ | ▨ | ▨ | |
| Rock bass | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | |
| Sculpin | ▨ | ▨ | ▨ | ▨ | | ▨ | | ▨ | ▨ |
| Salvelinus spp. | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Sea lamprey | | | ▨ | ▨ | | | | | |
| Shorthead redhorse | | | | | | | ▨ | | |
| Smallmouth bass | | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Spottail shiner | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Stonecat | | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Tessellated darter* | | | ▨ | ▨ | ▨ | ▨ | | | |
| Threespine stickleback | ▨ | ▨ | ▨ | ▨ | | | ▨ | | |
| Trout-perch | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | |
| Walleye | | | | ▨ | | ▨ | ▨ | ▨ | ▨ |
| White bass | ▨ | ▨ | | | | | | ▨ | ▨ |
| White perch | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| White sucker | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |
| Yellow perch | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ |

*Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

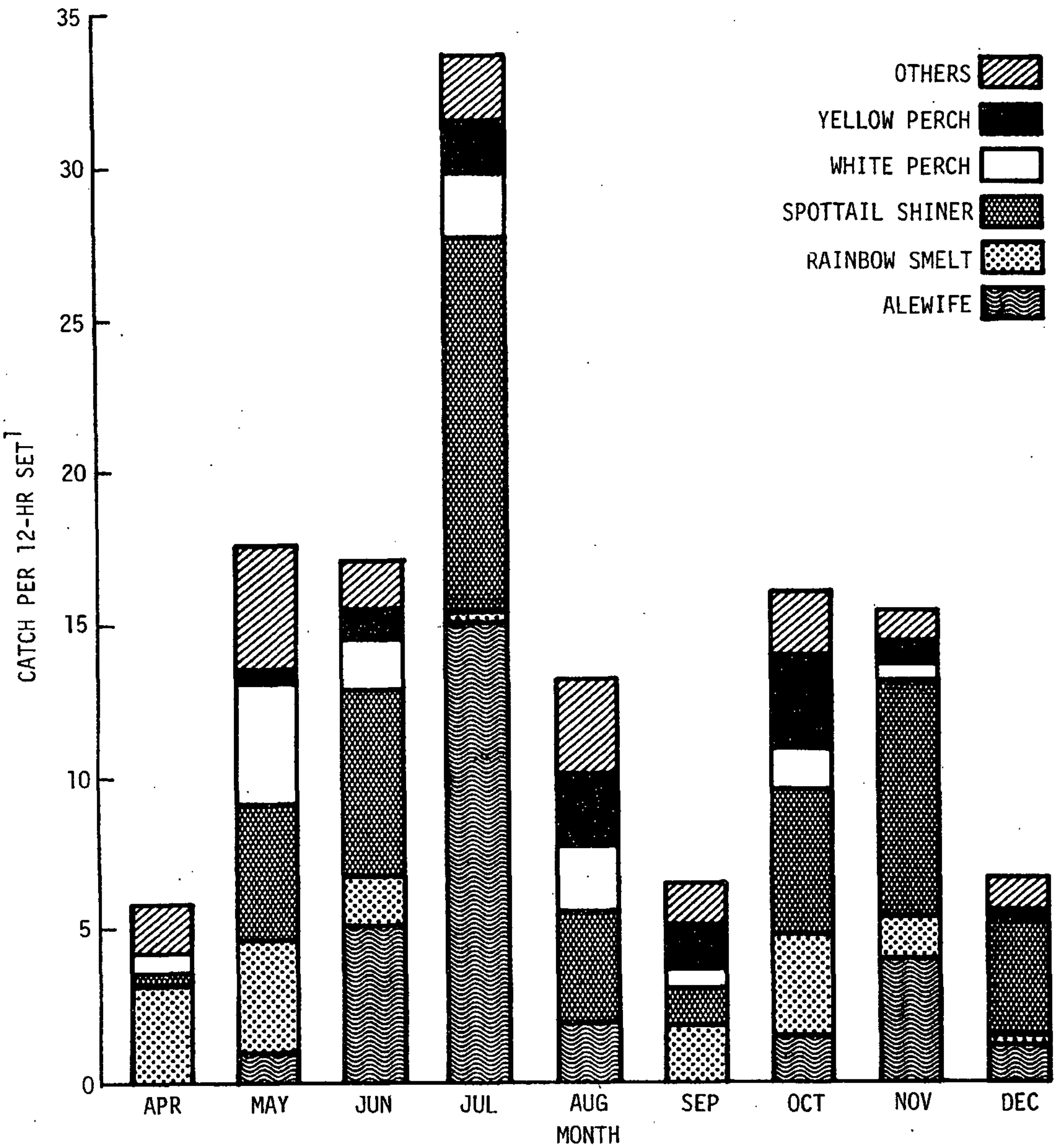
▨ – Species present

Figure IV-8. Monthly Occurrence of Fish Collected by All Gear, Nine Mile Point Vicinity, 1978

## 2. Temporal and Spatial Distribution

### a. Gill Net

The temporal distribution of fish collected by gill nets was characterized by periods of peak abundance (catch per 12-hour set) during May-July and October-November and low catch rates during April, September, and December (Figure IV-9). Alewives, rainbow smelt, spottail shiners, white perch, and yellow perch dominated monthly catches.




¹MONTHLY MEAN CATCH RATES FOR SAMPLES COLLECTED AT THE 15-, 30-, 40-, AND 60-FT DEPTH CONTOURS ON FOUR TRANSECTS.

Figure IV-9. Temporal Abundance of Fish Collected by Gill Net, Nine Mile Point Vicinity, 1978

Because of weather conditions and catch sizes, the time expended setting and retrieving gill nets at all stations varied during the study period, precluding the use of all gill-net data for describing day/night catch differences (Appendix Tables F-1 through F-10); therefore, additional effort was made at the 15- and 40-foot depth contours to insure better representation of day/night catch rates at these locations. At stations along these two contours, catch rates were considerably higher at night than during the day (Figure IV-10). In all cases, total catches as well as day/night differences were greater along the shallower contour.

Based on catch data from both day and night collections (combined) and equal effort at all four depth contours, fish were more abundant at stations along the 15-foot contour than along the 30-, 40-, and 60-foot contours (Figure IV-11). Gill-net catch rates (catch per 12-hour set) for samples taken at stations on the 20-foot depth contour are excluded from this discussion because catch data at this contour were based on two rather than four samples of approximately 12-hour duration, as were taken at the other four depth contours. Catch data for the 20-foot depth contour and more detailed gill-net data for all contours appear in the 1978 Data Report (Texas Instruments 1979).

Catch rates at stations along the 15-foot contour (Figure IV-11) were frequently lowest at control station NMPW (the westernmost station, which was not subject to thermal influence from power plant discharges). Largest catches along the 15-foot depth contour were usually at the station farthest east (control station NMPE) in May, July, August, and December or at the station near the James A. FitzPatrick plant (experimental station FITZ) in April, September, October, and November.

Gill-net catches at stations along the 30-foot depth contour exhibited seasonal peaks in abundance (similar to that displayed in Figure IV-9) during July and October-November. Distribution of largest catches along the 30-foot contour was variable during spring and summer; during October-December, however, catches were larger in the eastern portion of the study area (FITZ and NMPE transects).

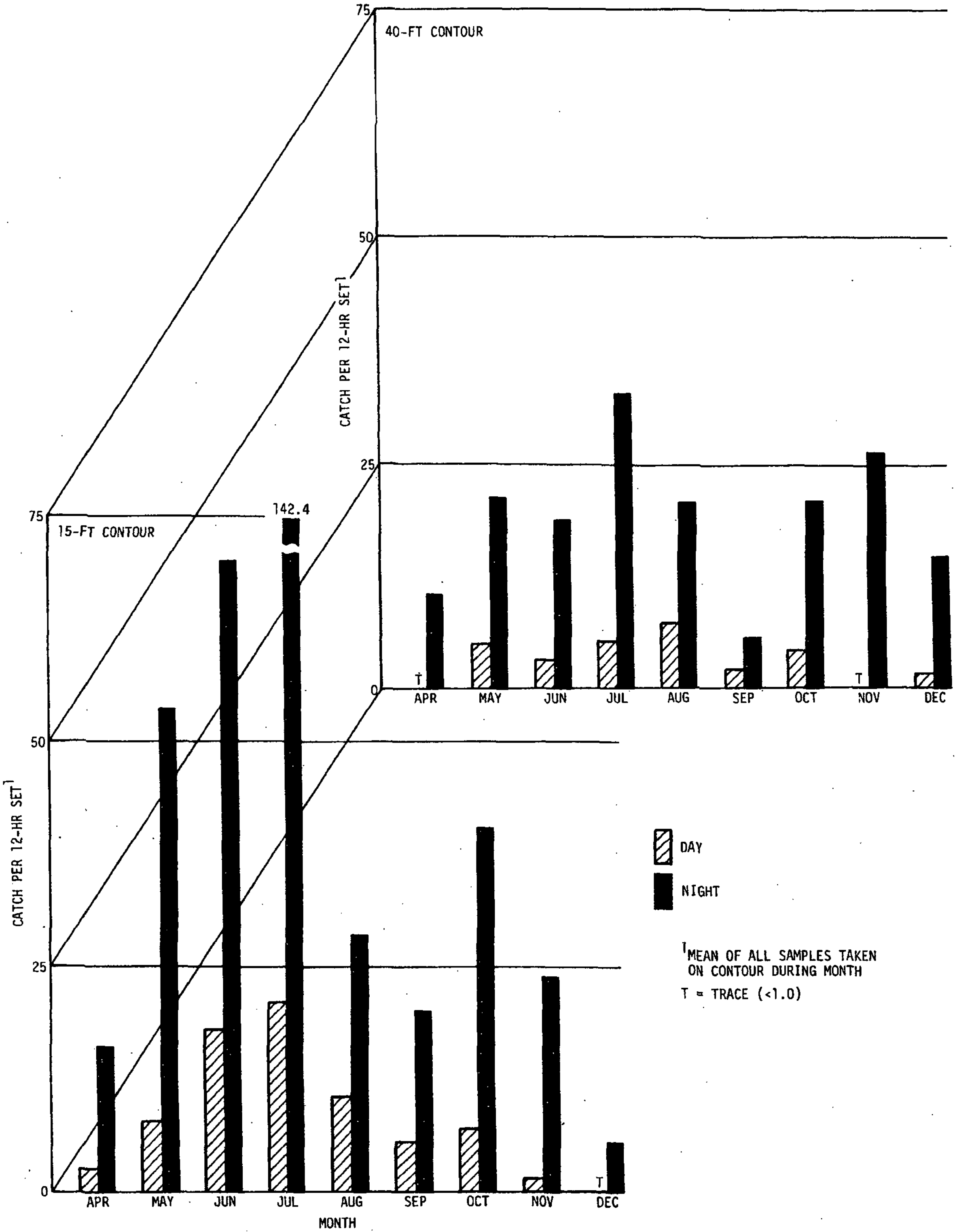



Figure IV-10. Day and Night Catch Rates for Total Fish Collected by Gill Net, Nine Mile Point Vicinity, 1978

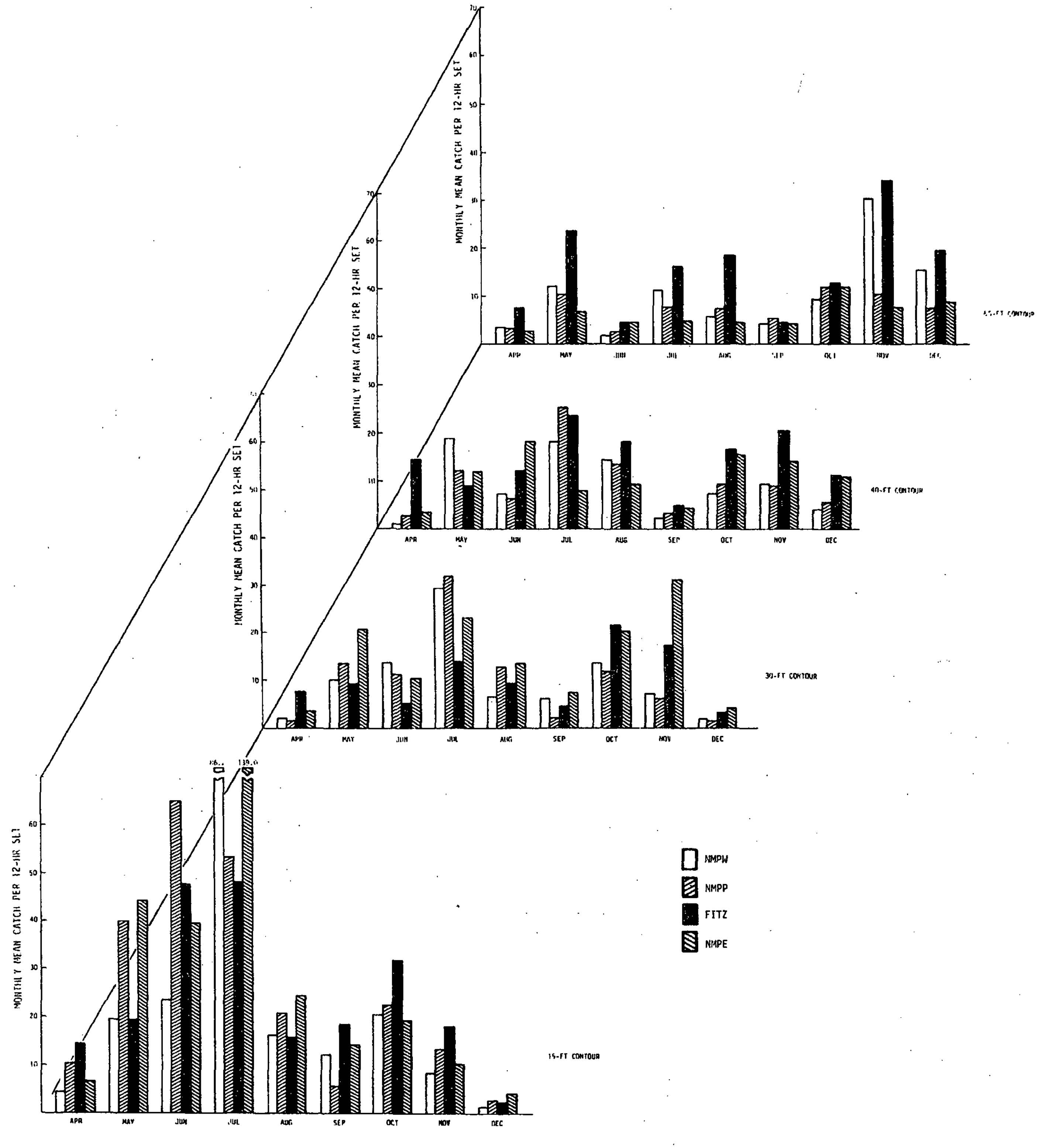



Figure IV-11. Spatial Distribution of Total Fish Collected by Gill Net, Nine Mile Point Vicinity, 1978

Catch data for the 40-foot contour displayed lower numbers but the same seasonal abundance trend and fall dominance of eastern stations (FITZ and NMPE transects) that were observed at the 30-foot contour.

Abundances along the 60-foot contour were variable, displaying no consistent temporal trend, but catches were largest at station FITZ during eight of the nine months of the study.

b. Trawls

Trawl catches (catch per 15-minute tow) were largest during May, August, and September (Table IV-25). Threespine stickleback comprised the majority of the catch during May, while young-of-the-year alewives and rainbow smelt dominated August and September collections (Appendix Tables F-16 through F-19).

A comparison of day and night trawl catch rates during the 9-month study period revealed predominantly larger night than day catches for individual sampling dates along the three depth contours sampled. However, a comparison of mean monthly catches revealed significantly larger night than day catches during only five of the nine months (Appendix Table F-16).

Table IV-25

Temporal Distribution* of Fish Collected by Bottom Trawl, Nine Mile Point Vicinity, 1978

| Species | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec** |
|---|---|---|---|---|---|---|---|---|---|
| Alewife | 0 | 0.3 | 2.3 | 0.3 | 22.8 | 6.3 | 0.4 | 0.4 | 0.1 |
| Rainbow smelt | 0.5 | 0.2 | 2.6 | 5.8 | 13.3 | 37.8 | 0.8 | 0.1 | 3.7 |
| Threespine stickleback | 0.7 | 22.6 | 1.5 | 0.1 | 0 | 0 | 0 | 0 | 0 |
| Other | 0 | 0 | 5.6*** | 6.5† | 1.3 | 2.6 | 0 | 0 | 0.2 |
| Total catch | 1.2 | 23.1 | 12.0 | 12.7 | 37.4 | 46.7 | 1.2 | 0.4 | 4.0 |

*Mean monthly catch per 15-min tow.
**Day samples in late December missed due to weather.
***Mostly tessellated darters.
†Mostly trout-perch.

Trawl catches along the 20-foot contour were generally larger at stations NMPW and NMPP/FITZ during May-August and at stations NMPP/FITZ and NMPE during September. Catches during April and October-December were small and sporadic, yielding no discernible spatial patterns (Appendix Table F-16).

Trawls captured highest numbers at stations NMPW and NMPP/FITZ along the 40-foot contour during April-September. Monthly abundances were highest at experimental station NMPP/FITZ during April-August and at control station NMPW during September. As at the 20-foot contour, catches during October-December were small and sporadic, displaying no obvious trends.

Along the 60-foot contour, trawl catches were largest at experimental transect NMPP/FITZ during May-July and in September and were equally large at control transects NMPW and NMPE in August. No spatial differences were discerned from the small and sporadic catches taken during October-December.

c. Beach Seine

Beach-seine catches were small from April through July, then increased markedly in August and September as young-of-the-year alewives became available to the seining effort (Table IV-26). Spottail shiners (both young-of-the-year and adults) were also common in August and September seine catches. Catches were again small from October through December. Threespine stickleback and brown trout were relatively abundant in May and June catches.

Table IV-26

Temporal Distribution of Fish in Beach Seines, Nine Mile Point Vicinity, 1978

| Species | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec** |
|---|---|---|---|---|---|---|---|---|---|
| Alewife | 0 | 0 | 0 | 0 | 286.5 | 2535.0 | 0.3 | 0 | 0 |
| Spottail shiner | 0 | 0.2 | 0.4 | 0 | 9.6 | 13.6 | 0.6 | 0 | 0 |
| Threespine stickleback | 0 | 2.4 | 6.4 | 0 | 0 | 0 | 0.3 | 0 | 0 |
| Other | 1.2 | 3.7 | 1.0 | 1.2 | 3.9 | 0.7 | 0.6 | 0.3 | 0 |
| Total catch | 1.2 | 6.3 | 7.8 | 1.2 | 300.0 | 2549.3 | 1.8 | 0.3 | 0 |

*Mean monthly number of fish collected per seine haul.
**Samples not collected in late December due to weather.

Annual mean catch rates (number of fish per beach-seine haul) were highest at experimental station NMPP, primarily because of an extremely large catch of alewives (15,575 fish) during September (Appendix Tables F-20 and 21). As noted in TI's interpretive report for 1977 data (TI 1978b), NMPP was located on a section of shoreline that was visibly different from the other three seining sites; it possessed within its boundaries a relatively large, shallow vegetated area generally protected from the surf. However, an examination of monthly catches indicates that fish were abundant also at NMPE. During three of the 4 months when seine catches were relatively substantial (May, June, August, September; see Appendix Table F-20), NMPE yielded larger catches than did the other three seining stations.

d. Box Trap

Box-trap catches were largest in June, July and September (Appendix Table F-24). Rock bass, spottail shiners, and threespine sticklebacks accounted for almost 95 percent of all fish collected in trap nets (Table IV-24). Frequency of capture was highest at control station NMPW, while experimental stations FITZ and NMPP displayed the largest annual mean catches (Appendix Table F-24).

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 chosen because of 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, length-frequency distribution, spawning season, and fecundity of each species, as well as the age-class structure, coefficients of maturity, length-weight relationships, and stomach contents of white perch, yellow perch, and smallmouth bass.

a. Alewife

1) Temporal and Spatial Distribution

Gill-net catches (catch per 12-hour set) of alewives increased during May and June, reached peak levels in July, then declined sharply during late summer and exhibited a minor peak in the fall (Figure IV-9). Very few alewives were collected by gill net in April and September. Alewives were usually most abundant along the 15-foot contour. Annual mean catch rates were highest at experimental transect NMPP along the 15-, 30-, and 40-foot contours and at experimental transect FITZ along the 60-foot contour (Appendix Table F-11).

In bottom-trawl catches, alewife abundance peaked in August and declined through the fall; no alewives were collected in April (Table IV-25). Catches along the 20-foot contour were quite sporadic throughout the study period. Greatest numbers occurred at experimental transect NMPP/FITZ and control transect NMPW in August and at easternmost transect NMPE in September (Appendix Table F-17). Alewife catches after September were quite small and displayed no discernible spatial patterns. Along the 40- and 60-foot contours, numbers of alewives were highest at transects NMPW and NMPP/FITZ during May–mid August and at eastern control transect NMPE during late August. Catches at the 40- and 60-foot contours after August were small.

Beach seines captured alewives only in August, September, and October (Table IV-26 and Appendix Table F-21). Less than half the seine hauls in August and September captured alewives, but they usually contained several hundred individuals. This reflects recruitment of young-of-the-year alewives into a catchable size range, as well as the schooling nature of this typically pelagic species.

2) Length-Frequency Distribution

Alewives collected by gill net during 1978 ranged from approximately 51 to 220 millimeters in total length and were primarily adult and subadult fish (Appendix Table F-25). Modal lengths of alewives collected in June and July were slightly greater than those collected during the remainder of the study.

Adult and subadult alewives were collected by trawl during May-December and by beach seine during October (Appendix Tables F-30 and F-33). Young-of-the-year alewives first occurred in seine and trawl collections in August, the same month in which this age class appeared in impingement samples at the Nine Mile Point and James A. FitzPatrick plants (Appendix Tables H-6 and H-15).

3) Spawning and Fecundity

Adult alewives in Lake Ontario reside in the open lake but migrate inshore during spring and summer to spawn. Spawning occurs in streams or near-shore shallows with sand and gravel bottoms generally when water temperatures are between $16^{\circ}$ and $28^{\circ}C$. Spawning females randomly broadcast from 10,000 to 22,400 (Scott and Crossman 1973, Norden 1967) eggs that are demersal and essentially nonadhesive (Mansueti 1956).

Alewife spawning in the Nine Mile Point vicinity was first detected on 12 June (when eggs were first collected) and continued through mid-August (Appendix Tables E-3 and E-4). During this period, surface water temperatures at the 20-foot depth contour ranged from approximately $14.9^{\circ}$ to $24^{\circ}C$ (Appendix Tables G-2 and G-3). Fecundity (total number of yolk eggs) of alewives selected for analysis ranged from approximately 5,400 to 44,900 (Appendix Table F-38). Alewife fecundity was extremely variable; however, data indicated a general increase in fecundity with increasing specimen length.

b. Rainbow Smelt

1) Temporal and Spatial Distribution

Gill-net catches of rainbow smelt were largest in April and May, declining during the summer and increasing somewhat in early fall (Figure IV-9). Few rainbow smelt were caught in gill nets during August. Smelt abundance apparently shifted from nearshore stations (15-foot contour) in early spring to offshore stations (30-, 40-, 60-foot contours) during June-August, probably reflecting an offshore movement of postspawning adults (Appendix Table F-12). Catches along all contours increased during early fall, possibly reflecting movement associated with lower water temperatures. Mean monthly catches were generally largest at experimental station FITZ and control transect NMPE during the study period; annual mean catches were largest at these two stations along all depth-contours (Appendix Table F-12).

In trawl catches, rainbow smelt abundance increased from April through September (37.8 fish per haul) and fluctuated during October-December (Table IV-25). Along the 20-foot contour, catches were sporadic and displayed no discernible abundance trends. Along the 40-foot contour, catches were more or less evenly distributed among the three transects through August, but were significantly larger at control transect NMPW than at either NMPP/FITZ or NMPE (Appendix Table F-18) during September, the month of peak abundance. After September, catches became quite sporadic at all transects along the 40-foot contour. Based on relatively sporadic trawl catch data, rainbow smelt appeared to be most numerous along the 60-foot contour during July-September, primarily at control transect NMPW and experimental transect NMPP/FITZ. After September, catches of rainbow smelt declined sharply at all stations along this contour.

Only one rainbow smelt was collected by beach seine (Table IV-26), suggesting that this species was not abundant in the vicinity of the seining stations.

2) Length-Frequency Distribution

Rainbow smelt collected by gill nets ranged from approximately 111 to 260 millimeters in total length. During the spring, the predominant size class was from 131 to 160 millimeters in total length, plus a slight second peak in the 181- to 220-millimeter length range. Few specimens were collected during July or August but the predominant size range captured during late summer was 151 to 180 millimeters (Appendix Table F-26).

Trawls collected rainbow smelt ranging from 21 to 200 millimeters in total length. During early spring, a slight bimodal length-frequency was apparent in trawl catches, with individuals grouped in the 51- to 80-millimeter and 151- to 180-millimeter length ranges. Yearling (age I) and older fish dominated trawl catches during late spring and early summer; young-of-the-year smelt dominated trawl catches beginning in August and continuing through December (Appendix Table F-31).

3) Spawning and Fecundity

Rainbow smelt leave the open water of lakes in spring and spawn in streams or shallow lakeshore waters over gravel shoals (Rupp 1965). Spawning migrations or "runs" of ripe smelt usually begin in March and continue through May when water temperatures range from $8.9^{\circ}$ to $18.3^{\circ}C$ (McKenzie 1964). The number of demersal (and adhesive) eggs spawned depend on the size of the female but ranges from approximately 8,000 to 30,000 eggs (Scott and Crossman 1973).

Smelt spawning in the Nine Mile Point vicinity was documented by small catches of eggs in ichthyoplankton samples during May and sporadic catches of prolarvae from 2 May through 26 June (Appendix Tables E-11 and E-12). Fecundity of smelt collected for analysis ranged between approximately 8,200 and 39,000 eggs for individuals in the 129- to 226 millimeter length range. Increased fecundity estimates correlated well with increasing rainbow smelt length (Appendix Table F-38).

c. White Perch

1) Temporal and Spatial Distribution

White perch, which comprised approximately 10 percent of the 1978 gill-net catch in the Nine Mile Point area, were most abundant during May-August and least abundant during November and December (Figure IV-9). Abundance was greatest along the shallowest (15-foot) depth contour; catch rates decreased with increasing depth (Appendix Table F-13). Along the 15-foot depth contour, the highest annual mean catch was at experimental station NMPP and control station NMPE. Along the 30-, 40-, and 60-foot contours, catch data indicated no obvious spatial patterns with respect to experimental and control areas.

Seine hauls in 1978 took 16 white perch (0.1 percent of the total seine catch). Trawling took only four individuals and trap nets only two specimens. No temporal or spatial trends could be discerned from these low catches (Table IV-24).

2) Length-Frequency Distribution

Adult and subadult white perch were collected by gill net during each month of the study (Appendix Table F-27). Young-of-the-year white perch first appeared in gill nets during September, occurred in greatest abundance during October, and remained in catches through December.

3) Age-Class Distributon

White perch collected at control (NMPW and NMPE) and experimental (NMPP and FITZ) transects ranged in age from young-of-the-year to age XI (Appendix Table F-39). Few age-II perch were collected. Based on the mean total length for each age class and the length-frequency distribution for gill-netted fish (Appendix Table F-27), most fish in the Nine Mile Point vicinity were in age classes III through V. Mean total lengths of fish from control and experimental transects were similar for ages 0 through V. Based on relatively few data points, mean total length at control transects was greatest for ages VI through VIII, while at experimental transects it was greatest for age X.

4) Spawning and Fecundity

Lake Ontario white perch spawn in shallow water over a variety of substrates from mid-May through June (Sheri and Powers 1968). Spawning usually occurs over a period of 1 to 2 weeks when water temperatures are 11° to 15°C. The number of demersal and adhesive eggs spawned depends on the size of the female but may range from 20,000 to 300,000 eggs (Scott and Crossman 1973).

Spawning activity in the vicinity of Nine Mile Point was documented by the collection of *Morone* spp. (white perch and/or white bass) eggs during late May and early June when water temperatures along the 20-foot depth contour ranged between 9.9° and 15.5°C. *Morone* spp. prolarvae were collected from 5 June through 7-8 August (Appendix Tables E-9 and E-10) when surface-water temperatures ranged between approximately 15.5° and 23.8°C (Appendix Table G-3).

Coefficients of maturity, an indication of gonad development, rose from April to May, then declined through August or September, reflecting a peak and general decline in spawning activity during this period (Appendix Table F-35). Coefficients increased through November, reflecting development of white perch gonads for spawning the following spring. Predictably, coefficients of maturity during any given month were higher for females than for males, while male gonad development increased at a faster rate than females' during the fall. Coefficients of maturity each month were similar at control and experimental transects.

Fecundity (total number of yolk eggs) determined for fish ranging from 204 to 321 millimeters in total length was 43,800-463,900 eggs. Fecundity values displayed a general increase with increasing fish length, although some variability was noted (Appendix Table F-38).

5) Length-Weight Relationships

Length-weight relationships were calculated for white perch males, females, and male, female, and undefined sexes combined from gill-net samples taken at control (NMPW and NMPE) and experimental (NMPP and FITZ) transects (Table IV-27). Coefficients of determination ($r^2$), a measure of the linear association of length and weight, were generally high for length-weight relationships calculated for white perch during spring, summer, and fall, indicating that a high degree of the variation in fish weight was due to variaton in length. The low coefficient in spring for white perch males from the experimental transects may have resulted from collecting fish in various stages of gonad development during the spawning season, since mature, gravid, ripe, and spent white perch of similar lengths can vary considerably in weight. During the spring, the slope (b) of the length-weight relationship for males from control transects was steeper than the slope for males from the experimental area, indicating that males taken at control transects proportionally grew faster in weight per unit increase in length than those from the experimental transects. This difference in length-weight relationships between control and experimental areas may have been an artifact of collecting fish in different stages of gonad development or collecting fish over a narrow range of lengths (e.g., an adult population during the spawning season). Length-weight relationships for females, males, and the sexes combined during summer and fall were similar (Table IV-27).

Condition factors, an indication of the relative plumpness or well-being of the fish, were calculated for the same white perch used for length-weight relationships. Condition factors for males, females, and the sexes combined generally decreased from spring through fall. This seasonal pattern

## Table IV-27

### Length-Weight Relationships and Condition Factors for White Perch Collected by Gill Net at Control and Experimental Transects, Nine Mile Point Vicinity, 1978

| | | Control Transects (NMPE and NMPW) | | | | Experimental Transects (NMPP and FITZ) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Season | Sex | Length-Weight Relationship | No. | $r^{2*}$ | $K_{TL}$ ± S.D.** | Length-Weight Relationship | No. | $r^2$ | $K_{TL}$ ± S.D. |
| Spring | Males | log w =-5.21 + 3.18 log TL | 110 | 0.92 | 1.65 ± 0.14 | log w = -2.82 + 2.17 log TL | 126 | 0.65 | 1.81 ± 1.22 |
| (Apr-Jun) | Females | log w =-4.76 + 3.00 log TL | 124 | 0.88 | 1.77 ± 0.43 | log w = -5.49 + 3.30 log TL | 185 | 0.95 | 1.72 ± 0.18 |
| | Pooled*** | log w =-5.11 + 3.14 log TL | 310 | 0.91 | 1.70 ± 0.30 | log w = -4.17 + 2.75 log TL | 409 | 0.82 | 1.76 ± 0.81 |
| Summer | Males | log w =-3.77 + 2.57 log TL | 135 | 0.79 | 1.72 ± 0.93 | log w = -4.74 + 2.98 log TL | 80 | 0.96 | 1.64 ± 0.13 |
| (Jul-Sep) | Females | log w =-5.00 + 3.10 log TL | 130 | 0.97 | 1.71 ± 0.13 | log w = -5.09 + 3.14 log TL | 144 | 0.97 | 1.70 ± 0.14 |
| | Pooled | log w =-4.95 + 3.07 log TL | 417 | 0.92 | 1.67 ± 0.54 | log w = -4.74 + 2.98 log TL | 303 | 0.92 | 1.71 ± 0.63 |
| Fall | Males | log w =-5.21 + 3.18 log TL | 18 | 0.97 | 1.65 ± 0.11 | log w = -5.55 + 3.33 log TL | 22 | 0.99 | 1.54 ± 0.15 |
| (Oct-Dec) | Females | log w =-5.58 + 3.35 log TL | 71 | 1.00 | 1.62 ± 0.19 | log w = -5.31 + 3.22 log TL | 40 | 0.99 | 1.57 ± 0.15 |
| | Pooled | log w =-5.56 + 3.34 log TL | 132 | 1.00 | 1.47 ± 0.23 | log w = -5.50 + 3.30 log TL | 141 | 1.00 | 1.43 ± 0.20 |

* Coefficient of Determination.
** Condition factor (based on total length in mm)±standard deviation.
*** Males, females and undefined sex.

was expected, since mature fish with gravid gonads (in spring) weigh more per unit length than do spent or maturing fish during summer and fall. Condition factors calculated for males, females, and pooled sexes were similar at control and experimental transects during each season (Table IV-27).

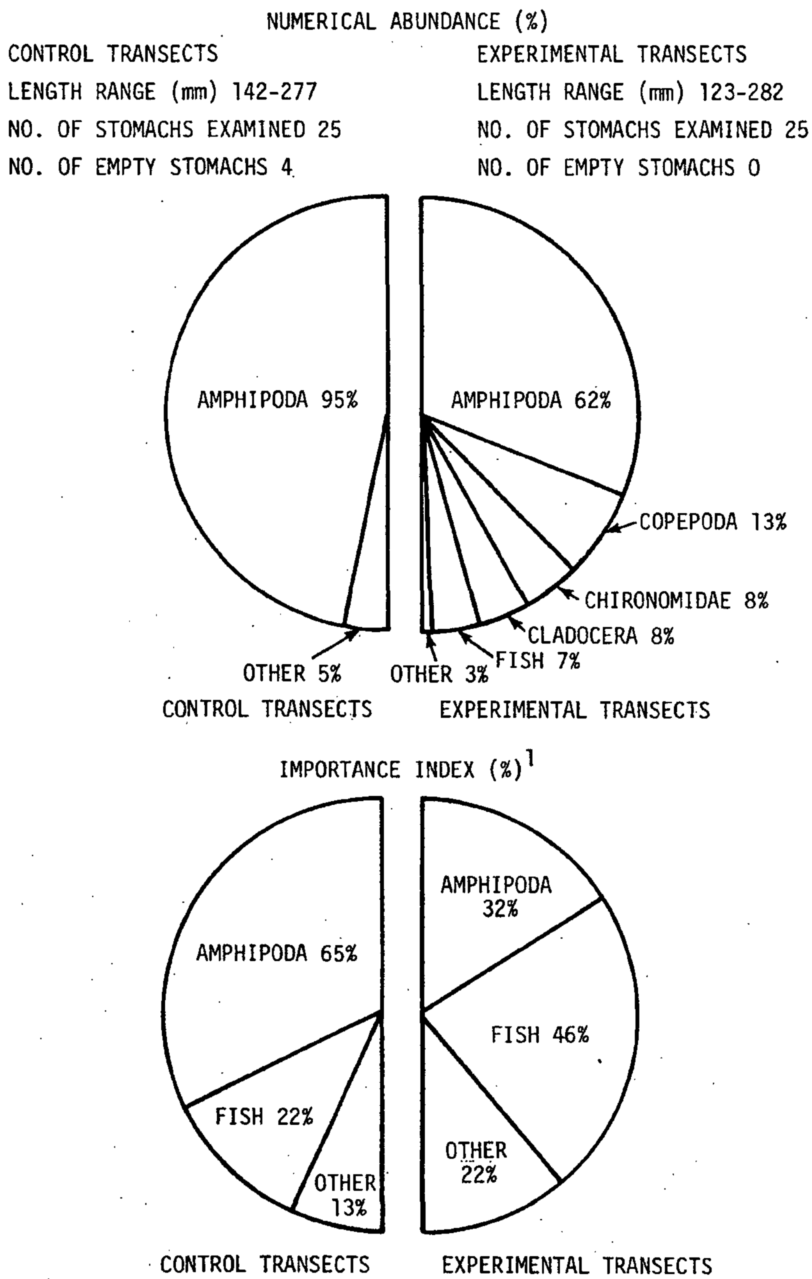
6) Stomach Contents

The stomach contents of 50 adult white perch ranging in size from 123 to 282 millimeters in total length were examined to determine what food items were ingested by fish collected at control and experimental areas (Figure IV-12 and Appendix Table F-42). Numerically, Amphipoda comprised 95 percent of the stomach contents of perch collected in the control and 62 percent in the experimental areas. Dominant amphipods included *Gammarus faciatus* and unidentified amphipods. In experimental areas, amphipods, copepods, cladocerans, and chironomids accounted for the majority of stomach contents. *Gammarus faciatus* and unidentified amphipods, cyclopoid copepods, chironomid pupae, and bosminid and chydorid cladocerans were the dominant forms encountered. In terms of frequency of occurrence, *Gammarus faciatus* and filamentous algae were encountered in 86 percent and 67 percent respectively, of the stomachs examined from control transects NMPW and NMPE, while *Gammarus fasciatus*, cyclopoid copepods, filamentous algae, and unidentified fish each occurred in at least 40 percent of the white perch taken from experimental transects NMPP and FITZ. Importance indices (Section III.A.6) calculated for food items in stomachs of white perch from control and experimental transects were highest for *Gammarus fasciatus* and postlarval and older fish (Appendix Table F-42). In terms of volume occupied, *Gammarus fasciatus* appeared to be more important to white perch at control than at experimental transects (56.9 percent versus 24.3 percent); postlarval and older fish were more important to white perch at experimental than at control transects (46 percent versus 22 percent).

d. Yellow Perch

1) Temporal and Spatial Distribution

Catches of yellow perch increased steadily in number through spring and early summer. Peak gill-net catches occurred in August and October, then declined through late fall (Figure IV-9). Gill-net catches indicated that yellow perch were more abundant along the nearshore (15-foot) depth contour




1) Importance index = (% stomach fullness) x
(% stomach volume occupied by a particular food item).

Figure IV-12. Analysis of Stomach Contents of White Perch Collected by Gill Net at Control and Experimental Transects, Nine Mile Vicinity, 1978 than along the deeper contours (Appendix Table F-14). Based on annual mean catches, yellow perch abundance tended to increase from west to east at nearshore stations. Catches were largest at the two control stations (NMPW and NMPE) along the 30- and 40-foot depth contours, but yellow perch were equally abundant at all four stations along the 60-foot contour.

No yellow perch were collected by trawling during 1978 in the Nine Mile Point area, and trap nets caught only one specimen. Seines caught 21 yellow perch, representing 0.1 percent of the total catch, during June-September (Appendix Table F-23); 10 of these occurred during August in a single haul at control station NMPE.

2) Length-Frequency Distribution

Adult yellow perch were collected by gill net during each month (Appendix Table F-28) of the study; the predominant total-length range during the spring (April-June) was 181 to 210 millimeters, representing primarily age-III and some age-IV fish. Bimodal peaks were observed during July and August, predominantly in the 81- to 140-millimeter and 171- to 230-millimeter size ranges. The predominant total-length range in gill-net catches during late summer and fall was 131 to 160 millimeters, primarily representing age-II and age-III fish. Persisting throughout the study was a small group of fish with a length-frequency range of 251 to 270 millimeters in total length, representing ages IV through VI.

3) Age-Class Distribution

Ages of yellow perch collected at control and experimental transects ranged from (young-of-the-year) to VII (Appendix Table F-40). Based on the mean total length of each age class and the length-frequency distribution of gill-netted fish (Appendix Table F-28), most yellow perch collected at control and experimental transects were ages I, III, IV, and V. The mean total length of age-V perch collected at the control transects was somewhat greater than for fish of the same age collected at experimental transects, while age-II and age-III fish were slightly longer at experimental transects. Age-I, -IV, and -VI fish were similar in length at both areas.

4) Spawning and Fecundity

Yellow perch migrate into the shallows of lakes to spawn during spring (usually mid-April to early May) when water temperatures range from 8.9$^{o}$ to 12.2$^{o}$C, however, spawning may extend into July in some areas (Scott and Crossman 1973). Yellow perch eggs are extruded in long gelatinous, accordian-folded strings that usually become entangled in rooted vegetation or other substrates over which spawning occurs. Fecundity of yellow perch from the Bay of Quinte, Lake Ontario, ranges from approximately 3,000 to 61,000 eggs for fish 131 to 250 millimeters in fork length (Sheri and Power 1969). Hatching usually takes approximately 8 to 10 days but has been reported to take as long as 27 days at 8.3$^{o}$C (Scott and Crossman 1973).

No yellow perch eggs were collected in the Nine Mile Point study area during 1978, but yellow perch larvae were collected from 15 May through 20 June (Appendix Table E-21 and E-22) when surface water temperatures along the 20-foot depth contour ranged from approximately 9.9$^{o}$ to 14.7$^{o}$C (Appendix Table G-3). Highest concentrations of prolarvae occurred in late May (Texas Instruments 1979).

Coefficients of maturity were highest in April, declining steadily through July and August for males and females, respectively (Appendix Table F-36). The apparent lag between peak coefficients of maturity and peak larval catches suggests relatively long egg incubation times because of the relatively low water temperatures (as previously noted by Scott and Crossman 1973). In 1978, maturity values for both sexes generally increased through December; some minor fluctuations reflected the development or maturation of yellow perch gonads for spawning early the following spring. Low maturity coefficients for yellow perch males and females during December at experimental and control transects, respectively, perhaps were the result of low specimen numbers. Overall, coefficients of maturity at control and experimental transects were similar.

Fecundity estimates determined for three yellow perch females ranging from 146 to 270 millimeters in total length were approximately 6,700 to 33,800 yolk eggs (Appendix Table F-38). Trends could not be established from this low number of specimens. Four gravid yellow perch from impingement samples exhibited a similar range in fecundity — from 10,600 eggs for a 118-millimeter-long perch to approximately 54,700 for a perch of 255 millimeter (Appendix Table H-25).

5) Length-Weight Relationships

All length-weight relationships calculated for yellow perch displayed high coefficients of determination ($r^2$), indicating that a high degree of the variation in weight was due to variation in length (Table IV-28) and that gonadal weight differences due to spawning occurred prior to spring collections for length-weight analysis. All length-weight relationships displayed values of more than 3 for the slope, indicating allometric growth, i.e., increasing in weight (becoming plumper) faster than in length (becoming longer). Length-weight relationships and condition factors calculated for yellow perch at control and experimental transects were similar (Table IV-28).

6) Stomachs Contents

The stomach contents of 50 yellow perch ranging from 102 to 286 millimeters in total length were examined to determine the food items that had been ingested by fish at control and experimental transects (Figure IV-13 and Appendix Table F-43). Numerically, amphipods (unidentified adult amphipods and Gammarus fasciatus) were the dominant food items (94 percent) in stomachs of yellow perch taken from control and experimental transects. These food items, as well as filamentous algae, unidentified fish, and ostracods, occurred frequently in fish taken from experimental transects NMPP and FITZ, while filamentous algae, gastropods, and unidentified fish occurred frequently in fish collected at control transects NMPW and NMPE. Importance indices (Section III. A.6) ranked Amphipoda, fish, and crayfish as the most important food items in stomachs of fish collected at both control and experimental transects.

e. Smallmouth Bass

1) Temporal and Spatial Distribution

Gill nets captured 126 smallmouth bass, comprising 0.7 percent of the total catch (Table IV-24). Catches were small except in August and September, and no smallmouth bass were caught in April or May (Appendix Table F-15). Catches were largest along the nearshore (15-foot) contour and generally decreased with depth. No distinct distribution pattern at control and experimental stations could be discerned because of the low catches. Beach seines captured three smallmouth bass, and box traps collected a single specimen. No smallmouth bass were collected by bottom trawl during the 1978 study.

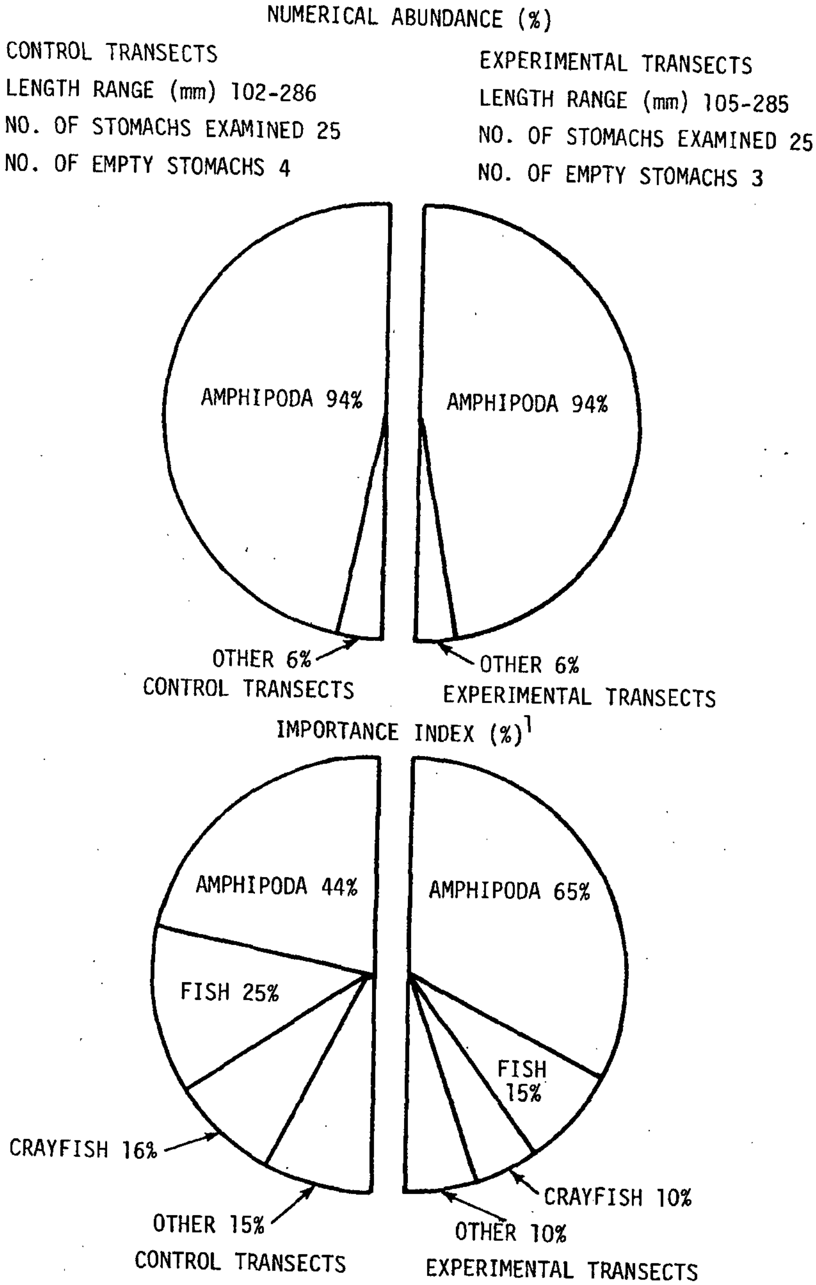
Table IV-28

Length-Weight Relationships and Condition Factors for Yellow Perch Collected at Control and Experimental Transects, Nine Mile Point Vicinity, 1978

Length-Weight Relationships and Condition Factors ($K_{TL}$) for Yellow Perch Collected by Gill Net at Control and Experimental Transects.

| | | Control Transects (NMPE and NMPW) | | | | Experimental Transects (NMPP and FITZ) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Season | Sex | Length-Weight Relationship | No. | $r^2$* | $K_{TL}$ ± S.D** | Length-Weight Relationship | No. | $r^2$ | $K_{TL}$ ± S.D. |
| Spring | Males | log w = -5.75 + 3.37 log TL | 21 | 0.98 | 1.21 ± 0.18 | log w = -5.37 + 3.20 log TL | 38 | 0.98 | 1.23 ± 0.13 |
| (Apr-Jun) | Females | log w = -5.69 + 3.34 log TL | 67 | 0.99 | 1.29 ± 0.15 | log w = -5.50 + 3.27 log TL | 54 | 0.99 | 1.28 ± 0.14 |
| | Pooled*** | log w = -5.66 + 3.33 log TL | 107 | 0.98 | 1.26 ± 0.17 | log w = -5.50 + 3.26 log TL | 95 | 0.99 | 1.25 ± 0.15 |
| Summer | Males | log w = -5.57 + 3.31 log TL | 96 | 0.99 | 1.33 ± 0.17 | log w = -5.39 + 3.23 log TL | 96 | 0.99 | 1.35 ± 0.14 |
| (Jul-Sep) | Females | log w = -5.46 + 3.27 log TL | 262 | 0.98 | 1.38 ± 0.65 | log w = -5.64 + 3.35 log TL | 193 | 0.92 | 1.41 ± 0.86 |
| | Pooled | log w = -5.52 + 3.29 log TL | 483 | 0.98 | 1.35 ± 0.49 | log w = -5.63 + 3.34 log TL | 356 | 0.95 | 1.36 ± 0.64 |
| Fall | Males | log w = -5.42 + 3.24 log TL | 76 | 0.99 | 1.29 ± 0.12 | log w = -5.71 + 3.37 log TL | 50 | 0.96 | 1.29 ± 0.15 |
| (Oct-Dec) | Females | log w = -5.61 + 3.32 log TL | 178 | 0.98 | 1.27 ± 0.14 | log w = -5.41 + 3.23 log TL | 178 | 0.99 | 1.30 ± 0.12 |
| | Pooled | log w = -5.57 + 3.30 log TL | 313 | 0.98 | 1.27 ± 0.14 | log w = -5.50 + 3.27 log TL | 261 | 0.98 | 1.30 ± 0.13 |

*Coefficient of determination.
**Condition factor (based on total length in mm) ± standard deviation.
***Males, females and undefined sex.




1) Importance index = (% stomach fullness) x (% stomach volume occupied by a particular food item).

Figure IV-13. Analysis of Stomach Contents of Yellow Perch Collected by Gill Net at Control and Experimental Transects, Nine Mile Point Vicinity, 1978

2) Length-Frequency Distribution

Smallmouth bass captured in gill nets ranged from approximately 181 to 430 millimeters in total length (Appendix Table F-29). Few smallmouth bass were collected during spring and fall, but those captured during the summer were distributed rather uniformly across a range of lengths (241 to 430 millimeters). Based on length-frequency distribution data all smallmouth bass collected by gill net were yearlings and older.

3) Age-Class Distribution

Ages of smallmouth bass collected at control and experimental transects ranged from 0 (young-of-the-year) to XI (Appendix Table F-41). Based on mean total length at a given age, the majority of smallmouth bass collected in the vicinity of Nine Mile Point were ages III, IV, and V. No consistent mean length differences in a given age class were observed at either control or experimental transects, and in both areas mean total lengths of males, females, and pooled sexes, ages III through VIII, were similar (Appendix Table F-41). Small catches of ages 0, I, II, and IX through XI precluded their comparison at control and experimental areas.

4) Spawning and Fecundity

Smallmouth bass spawn in late spring and early summer (usually from late May to early July) in 2 to 20 feet of water over a sandy, gravel, or rocky-substrate often near rocks or logs and sometimes in dense vegetation (Scott and Crossman 1973). Nest-building occurs over a wide range of temperatures (12.8 to 20.0°C), but actual spawning most often occurs when temperatues range from 16.1° to 18.3°C. The number of eggs spawned (fecundity) varies with the size of the female, ranging from 5,000 to 14,000 eggs.

During the 1978 study, no smallmouth bass eggs or larvae occurred in ichthyoplankton samples from the Nine Mile Point vicinity (Section IV.E). Although relatively few smallmouth bass were captured in 1978, coefficients of maturity for these specimens appeared to peak during June and decline through November and September for males and females, respectively (Appendix Table F-37). Maturity coefficients for females increased through October and November, based on single specimens taken during each month. No smallmouth bass were processed for coefficients of maturity during December. During months in which smallmouth were collected at both control and experimental transects, coefficients of maturity were similar.

Fecundities for four females (333 to 398 millimeters in total length) collected from Lake Ontario ranged from approximately 2,500 to 7,300 yolk eggs per female (Appendix Table F-38). Fecundities for an additional 12 females collected during impingement sampling at the James A. FitzPatrick plant ranged from approximately 5,300 to 33,800 yolk eggs per female (Appendix Table H-25).

5) Length-Weight Relationships

Length-weight relationships were calculated for males, females, and both sexes combined (Table IV-29). No smallmouth bass were processed for length-weight relationships analysis during the spring. The high coefficients of determination for smallmouth bass collected during summer and fall indicated that the variation in weight for males, females, and pooled sexes was due to variations in length. All length-weight equations for bass collected during the summer displayed slopes higher than 3, indicating allometric growth, i.e, increasing in weight faster than in length. Length-weight relationships and condition factors ($K_{TL}$) for bass collected at experimental and control transects were similar during the summer and fall (Table IV-29).

6) Stomach Contents

The stomach contents of 15 adult smallmouth bass ranging from 250 to 382 millimeters in total length were examined to determine what food items had been ingested by fish at control and experimental transects (Figure IV-14 and Appendix Table F-44). Of the 15 stomachs examined, three were empty. Unidentified postlarval and older fish and crayfish (Astacidae) were the only food items encountered in bass stomachs. Although fish were found more frequently than crayfish in bass taken at control stations NMPW and NMPE, fish ranked second to crayfish in numerical abundance. This pattern was reversed at experimental transects NMPP and FITZ, where crayfish occurred more frequently but fish numerically dominated the contents (Figure IV-14). Importance index patterns displayed by fish and crayfish food items at control and experimental transects were the opposite of numerical abundance trends, showing that fish

Table IV-29

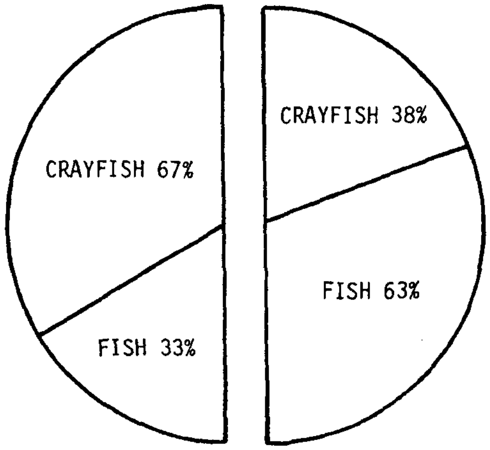
Length-Weight Relationships and Condition Factors for Smallmouth Bass Collected at Control and Experimental Transects, Nine Mile Point Vicinity, 1978

| Season | Sex | Control Transects (NMPE and NMPW) Length-Weight Relationship | No. | $r^{2*}$ | $K_{TL}$ ± S.D.** | Experimental Transects (NMPP and FITZ) Length-Weight Relationship | No. | $r^2$ | $K_{TL}$ ± S.D. |
|---|---|---|---|---|---|---|---|---|---|
| Spring | Males | NC | | | | NC | | | |
| (Apr-Jun) | Females | NC | | | | NC | | | |
| | Pooled*** | NC | | | | NC | | | |
| Summer | Males | log w = -5.21 + 3.17 log TL | 25 | 0.98 | 1.61 ± 0.18 | log w = -5.30 + 3.20 log TL | 20 | 0.97 | 1.59 ± 0.16 |
| (Jul-Sep) | Females | log w = -5.19 + 3.15 log TL | 21 | 0.99 | 1.60 ± 0.11 | log w = -4.94 + 3.06 log TL | 21 | 0.98 | 1.65 ± 0.15 |
| | Pooled | log w = -5.25 + 3.18 log TL | 55 | 0.98 | 1.61 ± 0.15 | log w = -5.00 + 3.08 log TL | 49 | 0.99 | 1.61 ± 0.15 |
| Fall | Males | NC | | | | log w = -4.80 + 3.00 log TL | 6 | 1.00 | 1.64 ± 0.15 |
| (Oct-Dec) | Females | log w = -5.24 + 3.18 log TL | 4 | 0.95 | 1.68 ± 0.24 | log w = -5.13 + 3.13 log TL | 4 | 0.99 | 1.56 ± 0.10 |
| | Pooled | NC | | | | NC | | | |

* Coefficient of determination.
** Condition factor (based on total length in mm) ±standard deviation
*** Males, females, and undefined sex.
NC= Relationship was not calculated because of low catches.

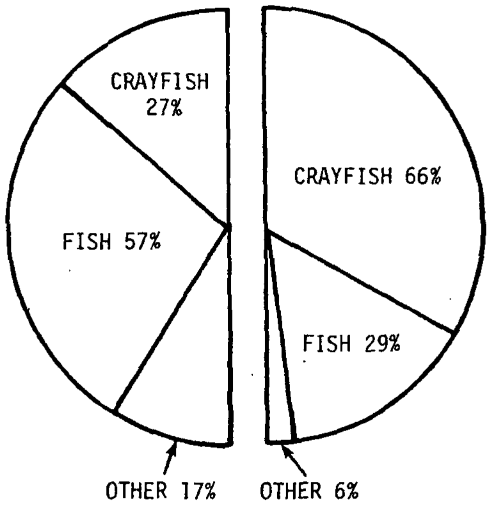
NUMERICAL ABUNDANCE (%)

| CONTROL TRANSECTS | EXPERIMENTAL TRANSECTS |
|---|---|
| LENGTH RANGE (mm) 250-342 | LENGTH RANGE (mm) 250-382 |
| NO. OF STOMACHS EXAMINED 7 | NO. OF STOMACHS EXAMINED 8 |
| NO. OF EMPTY STOMACHS 2 | NO. OF EMPTY STOMACHS 1 |




CONTROL TRANSECTS EXPERIMENTAL TRANSECTS

IMPORTANCE INDEX (%)[1]




CONTROL TRANSECTS EXPERIMENTAL TRANSECTS

1) Importance index = (% stomach fullness) x (% stomach volume occupied by a particular food item).

Figure IV-14. Analysis of Stomach Contents of Smallmouth Bass Collected by Gill Net at Control and Experimental Transects, Nine Mile Point Vicinity, 1978 were more important volumetrically at control transects NMPW and NMPE and that crayfish were more important at experimental transects NMPP and FITZ. This finding, which indicates that numerical abundance is not necessarily important in terms of stomach volume occupied, emphasizes the need for more than a single analysis method to fully describe food habits via stomach contents.

4. Overview of Year-to-Year Results

The 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 1978. Preoperational and early postoperational studies (1969-72) used fathometric techniques, gill nets, and traps. Subsequent higher-intensity postoperational surveys (1973-78) employed a combination of gear (gill nets, trawls, seines, and traps), depending on sample location and desired information. 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 varied seasonally during any given year, changing from a simple system in winter and early spring to a highly complex community in late spring, summer, and fall. Data provided by preoperational and postoperational studies indicated that the fish community in this area of Lake Ontario is not diverse; rather, for most of the year, it is dominated by one or two species and has a small number of other species in low and intermediate numbers. Species diversity proved to be highest in spring because of an inshore movement of a number of lake fish species. During months in which alewives are most abundant, typically June-August, diversity values remain low. Diversity usually rebounded in the fall, coinciding with the offshore movement of alewives.

During the past 10 years, sampling in the vicinity of Nine Mile Point has collected 72 fish species. During a typical sampling year, alewives comprised a majority of the total catch at lake stations, 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 have depended on the species, the stage of development, and the temporal and longitudinal temperature patterns and gradients.

Seasonally, fish have been collected in greatest numbers during the spring, coinciding with the shoreward migration of the two most abundant species, alweife and rainbow smelt. Abundances typically decline during the warmer summer months and rise 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 alweives. Cyprinids, primarily 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 two easternmost transects, control transect NMPE and experimental transect FITZ, and lowest at control transect NMPW; typically, abundances at experimental transect NMPP were intermediate between these high and low values.

Yearly gill-net catch data for rainbow smelt, white perch, and smallmouth bass in the Nine Mile Point vicinity displayed no significant changes among years (1969-78). Alweife abundance oscillated, displaying highest numbers in 1974 and 1976 and declining through 1977 and 1978; abundance trends based on gill-net data generally mimicked the patterns displayed for impingement catches at the Nine Mile Point and FitzPatrick plants. The yellow perch population declined from 1969 through 1974 but rebounded threefold in 1975, then declined slightly from 1977 through 1978. Data on gizzard shad indicated a generally increasing population in the Nine Mile Point vicinity through 1975 and a decline during 1977 and 1978; greatest concentrations were at the NMPP and FITZ transects (vicinity of plant thermal discharges) during the fall. Salmonids such as brown trout, chinook, and coho salmon appeared infrequently in gill-net catches through the years and typically reflected stocking intensity for any given year.

To date, no incidents of cold-shock fish mortality due to plant shutdown at either the Nine Mile Point or the James A. FitzPatrick stations have been reported; nor have rare, endangered, or threatened fish species been collected in the Nine Mile Point area since the onset of preoperational studies. In summary, comparisons of temporal and spatial abundances based on catch-per-effort data as well as length-frequency distribution, age and growth, fecundity, gonad maturity, and diet analysis between experimental and control areas in the Nine Mile Point vicinity for 1969-78 have revealed 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.

## G.. WATER QUALITY

During 1978, water was sampled and temperature measured in Lake Ontario in the vicinity of Nine Mile Point to monitor and evaluate the effects of operation of the Nine Mile Point and James A. FitzPatrick power plants on nearshore water quality.

### 1. Lake Ontario Thermal Profiles

Thermal profiles were obtained at the 100-foot contour of the NMPW, FITZ, and NMPE transects each week during the study (Appendix Table G-1). Examination of these profiles and of the temperature of surface (3-foot) and bottom (100-foot) strata at these three transects revealed the presence of cold, hypolimnetic water intrusions during the summer (Figure IV-15). Comparisons of weekly temperature profiles among the three transects revealed that surface water temperatures at the FITZ transect (nearest the discharges) exceeded those at either or both the NMPW and NMPE transects by 1°C or more on only four occasions (once each in May, July, August, and September).

Surface temperatures taken during collection of monthly and semimonthly water quality samples at the FITZ transect (near the James A. FitzPatrick discharge) were elevated only on one occasion at the 20-foot contour and on four sampling days at the 40-foot contour, and maximum elevation was only 3°C (Appendix Appendix Tables G-2 and G-3.) At the NMPP transect near the Nine Mile Point discharge, surface temperatures exceeded by at least 1°C those of one or both control transects, NMPW and NMPE, on 15 of 18 and 7 of 18 sampling dates at the 20-foot and 60-foot contours, respectively. The maximum

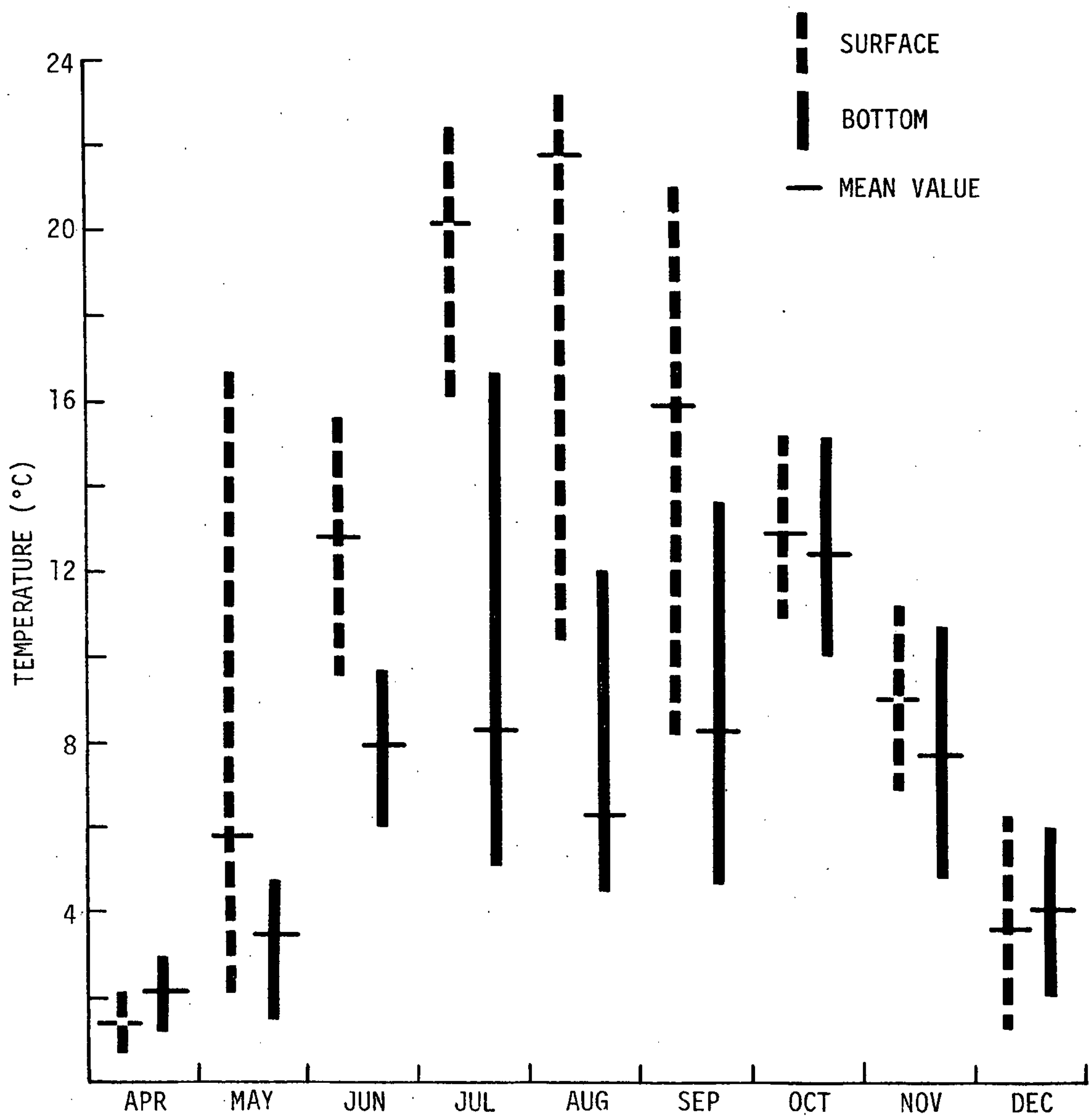



Figure IV-15. Seasonal Variation in Water Temperatures at Surface and Bottom Strata along the 100-Foot Depth Contour thermal difference between experimental and control transects occurred on April 11, when the NMPP 20-foot contour surface temperature was 5°C higher than that recorded at the NMPE transect (Appendix Tables G-2 and G-3). The thermal plume at the NMPP transect is more pronounced, probably because of the difference between the Nine Mile Point and James A. FitzPatrick discharge structures (jet diffusion at the FitzPatrick plant).

2. Temporal and Spatial Distribution of Selected Parameters, Including Radiological Data

Three water quality sampling programs were conducted during the 1978 study. (Refer to subsection III.A.7 for a complete description of the sampling programs.) To describe spatial and temporal trends in the water quality parameters, the 20- and 25-foot contour surface data were compared with combined surface data from the 40-, 45-, and 60-foot contours for each transect. Bottom samples from the 25- and 45-foot contours were evaluated individually inasmuch as no bottom samples were collected at the other contours. The groupings were made in order to compare inshore versus offshore areas in the Nine Mile Point vicinity. Of the water quality parameters measured, nine are discussed in detail — dissolved oxygen (DO), nitrate nitrogen, total and orthophosphorus, silica, calcium, sulfate, and total and suspended solids — because of their roles in the biological processes in the waters around Nine Mile Point or their importance in general water quality evaluations. Also briefly discussed are toxic and trace metals, organic contaminants and radioactivity data.

a. Dissolved Oxygen

Dissolved oxygen concentrations were lowest during July and August, dropping to 7.4 milligrams per liter (mg/l) during the latter month (Table IV-30). 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 and not because of increases in oxygen demand from organic or reduced metals contamination.

There were no observed differences between inshore (20- and 25-foot) and offshore (40-, 45-, and 60-foot) or between control and experimental areas (Table IV-31).

## Table IV-30

### Monthly Variation in Selected Water Quality Parameters Collected in the Vicinity of Nine Mile Point, 1978

| Parameter | Unit | | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dissolved oxygen | mg/ℓ-DO | Mean | 14.9 | 15.1 | 13.1 | 8.8 | 8.6 | 9.3 | 9.1 | 10.7 | 13.6 |
| | | Range | 14.2-15.5 | 14.2-16.7 | 12.0-14.6 | 8.3-9.7 | 7.4-9.0 | 8.5-11.1 | 8.8-9.7 | 10.2-11.3 | 13.3-14.0 |
| | | Std dev* | 0.5 | 0.6 | 1.0 | 0.5 | 0.6 | 1.0 | 0.3 | 0.4 | 0.2 |
| | | No | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| Nitrate | mg/ℓ-N | Mean | 0.31 | 0.26 | 0.18 | 0.03 | <0.04 | 0.13 | 0.14 | 0.18 | 0.29 |
| | | Range | 0.28-0.38 | 0.20-0.35 | 0.15-0.27 | <0.01-0.06 | <0.04 | 0.05-0.17 | 0.12-0.19 | 0.16-0.22 | 0.27-0.33 |
| | | Std dev | 0.04 | 0.05 | 0.03 | 0.02 | 0.00 | 0.04 | 0.02 | 0.02 | 0.02 |
| | | No | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| Total phosphorus | mg/ℓ-P | Mean | 0.021 | 0.018 | 0.024 | 0.028 | 0.012 | 0.013 | 0.027 | 0.012 | 0.038 |
| | | Range | 0.005-0.048 | 0.008-0.033 | 0.018-0.033 | 0.017-0.044 | 0.004-0.022 | 0.008-0.020 | 0.016-0.048 | 0.005-0.022 | 0.008-0.110 |
| | | Std dev | 0.009 | 0.008 | 0.005 | 0.007 | 0.005 | 0.003 | 0.010 | 0.004 | 0.030 |
| | | No | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| Orthophosphorus | mg/ℓ-P | Mean | 0.009 | 0.011 | 0.004 | 0.004 | 0.004 | 0.003 | 0.002 | 0.004 | 0.008 |
| | | Range | 0.004-0.019 | 0.006-0.018 | 0.003-0.006 | <0.002-0.008 | <0.002-0.012 | <0.002-0.004 | <0.002-0.006 | 0.002-0.006 | <0.003-0.022 |
| | | Std dev | 0.004 | 0.005 | 0.001 | 0.002 | 0.004 | 0.001 | 0.001 | 0.002 | 0.007 |
| | | No | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| Silica | mg/ℓ-$SiO_3$ | Mean | 0.37 | 0.08 | 0.11 | 0.19 | 0.18 | 0.21 | 0.14 | 0.18 | 0.29 |
| | | Range | 0.31-0.49 | <0.05-0.13 | <0.05-0.17 | 0.09-0.30 | 0.11-0.30 | 0.13-0.27 | 0.10-0.17 | 0.11-0.25 | 0.14-0.37 |
| | | Std dev | 0.08 | 0.03 | 0.05 | 0.08 | 0.07 | 0.05 | 0.02 | 0.04 | 0.07 |
| | | No | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| Calcium | mg/ℓ-Ca | Mean | 37.0 | 41.3 | 41.9 | 44.7 | 40.9 | 33.0 | 36.7 | 41.0 | 34.6 |
| | | Range | 33.1-38.4 | 36.4-50.6 | 39.2-45.3 | 37.5-53.8 | 38.8-43.8 | 30.7-37.8 | 30.5-50.0 | 36.4-47.0 | 28.6-43.0 |
| | | Std dev | 1.9 | 5.7 | 2.1 | 4.6 | 2.0 | 2.2 | 7.1 | 3.6 | 6.0 |
| | | No | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Sulfate | mg/ℓ-$SO_4$ | Mean | 33.4 | 31.5 | 27.9 | 25.0 | 25.8 | 27.9 | 28.8 | 31.1 | 27.6 |
| | | Range | 27.7-40.7 | 27.2-42.0 | 25.8-30.9 | 24.3-25.9 | 23.7-28.2 | 24.6-30.7 | 27.6-29.7 | 29.9-32.9 | 25.8-30.8 |
| | | Std dev | 5.9 | 5.8 | 1.7 | 0.5 | 1.8 | 1.9 | 0.8 | 1.2 | 1.7 |
| | | No | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Total solids | mg/ℓ-TS | Mean | 204 | 251 | 212 | 168 | 185 | 233 | 202 | 226 | 217 |
| | | Range | 146-248 | 176-419 | 167-251 | 136-222 | 147-211 | 163-316 | 160-225 | 196-266 | 178-249 |
| | | Std dev | 29 | 62 | 20 | 25 | 34 | 55 | 14 | 17 | 18 |
| | | No | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| Total suspended solids | mg/ℓ-TSS | Mean | 1.6 | 3.1 | 1.4 | 4.8 | 1.1 | 0.3 | 1.1 | 2.0 | 7.3 |
| | | Range | <0.1-4.0 | 0.8-15.8 | 0.2-4.0 | 0.6-7.4 | <0.1-4.0 | <0.1-1.2 | <0.1-3.8 | <0.1-7.6 | <0.1-21.0 |
| | | Std dev | 1.3 | 3.5 | 0.9 | 2.3 | 1.0 | 0.5 | 0.9 | 2.2 | 8.0 |
| | | No | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |

* Standard deviation

Table IV-31

Spatial Distribution of Selected Water Quality Parameters Collected from Experimental and Control Areas, Nine Mile Point Vicinity, 1978

| Parameter | Unit | | Surface (20- and 25-ft contours) | | | Surface (40- to 45- and 60-ft contours) | | |
|---|---|---|---|---|---|---|---|---|
| | | | West Control* (NMPW) | Experimental (NMPP-FITZ) | East Control (NMPE) | West Control (NMPW) | Experimental (NMPP-FITZ) | East Control (NMPE) |
| Dissolved oxygen | mg/ℓ-DO | Mean | 11.3 | 11.5 | 11.6 | 11.4 | 11.4 | 11.6 |
| | | Range | 8.2-14.8 | 8.2-15.5 | 8.1-15.4 | 8.2-16.7 | 7.4-15.5 | 8.3-16.6 |
| | | Std dev** | 2.5 | 2.6 | 2.7 | 2.8 | 2.7 | 2.7 |
| | | No. | 27 | 27 | 27 | 27 | 27 | 27 |
| Nitrate | mg/ℓ-N | Mean | 0.17 | 0.18 | 0.17 | 0.17 | 0.18 | 0.17 |
| | | Range | <0.01-0.33 | <0.01-0.37 | <0.01-0.34 | <0.01-0.37 | 0.01-0.37 | <0.01-0.37 |
| | | Std dev | 0.10 | 0.11 | 0.10 | 0.10 | 0.10 | 0.10 |
| | | No. | 18 | 27 | 18 | 18 | 27 | 18 |
| Total phosphorus | mg/ℓ-P | Mean | 0.021 | 0.022 | 0.018 | 0.019 | 0.025 | 0.019 |
| | | Range | 0.009-0.044 | 0.005-0.047 | 0.009-0.033 | 0.004-0.052 | 0.005-0.110 | 0.004-0.044 |
| | | Std dev | 0.010 | 0.010 | 0.008 | 0.011 | 0.025 | 0.010 |
| | | No. | 27 | 36 | 27 | 27 | 36 | 27 |
| Orthophosphorus | mg/ℓ-P | Mean | 0.005 | 0.006 | 0.004 | 0.004 | 0.005 | 0.005 |
| | | Range | <0.002-0.017 | <0.002-0.022 | <0.002-0.012 | <0.002-0.012 | <0.002-0.016 | <0.003-0.016 |
| | | Std dev | 0.005 | 0.006 | 0.003 | 0.003 | 0.004 | 0.004 |
| | | No. | 18 | 27 | 18 | 18 | 27 | 18 |
| Silica | mg/ℓ-$SiO_2$ | Mean | 0.19 | 0.20 | 0.19 | 0.20 | 0.19 | 0.19 |
| | | Range | <0.05-0.44 | <0.05-0.49 | <0.05-0.46 | <0.05-0.49 | <0.05-0.45 | 0.05-0.44 |
| | | Std dev | 0.11 | 0.11 | 0.11 | 0.11 | 0.10 | 0.10 |
| | | No. | 18 | 27 | 18 | 18 | 27 | 18 |
| Calcium | mg/ℓ-Ca | Mean | 37.6 | 39.5 | 36.0 | 38.2 | 39.2 | 37.0 |
| | | Range | 29.2-48.8 | 29.2-50.6 | 28.6-41.9 | 29.9-53.8 | 31.1-43.8 | 30.7-48.8 |
| | | Std dev | 6.5 | 5.7 | 4.3 | 7.6 | 4.5 | 5.8 |
| | | No. | 9 | 18 | 9 | 9 | 18 | 9 |
| Sulfate | mg/ℓ-$SO_4$ | Mean | 27.8 | 29.4 | 27.7 | 28.0 | 28.7 | 27.4 |
| | | Range | 25.0-30.7 | 24.4-42.0 | 24.4-30.2 | 24.6-30.9 | 24.4-39.9 | 24.6-31.7 |
| | | Std dev | 1.9 | 4.7 | 2.1 | 2.0 | 3.9 | 2.6 |
| | | No. | 9 | 18 | 9 | 9 | 18 | 9 |
| Total solids | mg/ℓ-TS | Mean | 216 | 223 | 212 | 207 | 203 | 206 |
| | | Range | 153-337 | 139-419 | 154-300 | 139-282 | 144-300 | 153-294 |
| | | Std dev | 42 | 57 | 35 | 36 | 39 | 30 |
| | | No. | 27 | 36 | 27 | 27 | 36 | 27 |
| Total suspended solids | mg/ℓ-TSS | Mean | 2.0 | 2.6 | 2.2 | 2.0 | 2.3 | 2.1 |
| | | Range | <0.1-10.6 | <0.1-19.0 | <0.1-15.8 | <0.1-21.0 | <0.1-15.8 | <0.1-6.6 |
| | | Std dev | 2.6 | 4.2 | 3.2 | 4.0 | 3.6 | 2.0 |
| | | No. | 27 | 36 | 27 | 27 | 36 | 27 |

*See section III.A.7 for details of sampling locations.

**Standard deviation.

b. Nitrate

Nitrate concentrations at all transects decreased from April through August and increased from September through December (Table IV-30). Monthly mean values were highest in April and December. There were no observed differences between control and experimental areas or between inshore (20- and 25-foot) contours and offshore (40- 45-, and 60-foot) contours (Table IV-31 and Appendix Tables G-3 and G-4).

c. Phosphorus

Highest total phosphorus occurred in December, lowest in August and November (Table IV-30). The December values (maximum, 0.110 mg/l) came from samples collected at the 45- and 60-foot contours on the experimental transects (Appendix Tables G-3 and G-4). These high values at the offshore contours produced a higher annual mean at the experimental transects than at the control transects. These higher experimental transect levels could not be directly attributed to power-plant operation.

Orthophosphorus was low throughout 1978, with April, May, and December exhibiting highest values (Table IV-30). There were no observed spatial differences among transects, between inshore and offshore groups, or with depth (Table IV-31 and Appendix Table G-4).

d. Silica

Silica values were lowest during May and June, and many were at or near the 0.05-mg/l detection limit (Table IV-30). No differences could be seen between inshore and offshore samples or between control and experimental transects (Table IV-31). Temporal changes and variability in silica could not be attributed to power-plant operation.

e. Calcium and Sulfate

Only small monthly variations occurred in the concentrations of these two parameters. No specific temporal trends were apparent (Table IV-30). Levels of both were only slightly elevated from the 1977 data base, (Table IV-31, Appendix Tables G-2 and G-4, and TI 1978b). The levels found during the 1978 program were well within ranges expected for Lake Ontario and no effects of plant operation could be determined.

f. Solids

In 1978, total solids were lowest during July and August; during the rest of the year, mean monthly values exhibited only slight variation (Table IV-30). Mean monthly suspended solid concentrations were at a low in September and reached a high in December (Table IV-30). Relatively calm weather in September and winter storms in December played a major role in creating these extremes. Winter storms with high winds were significant because the absence of the usual shoreline ice cover created extreme wave-action, which increased the suspended sediment load.

Total and suspended sediments in nearshore transect samples (20- and 25-foot contours) were only slightly higher than in offshore transect samples (Table IV-31), and there were no apparent differences between experimental and control transects, indicating that plant operation had no effect on suspended or total solids (Table IV-31 and Appendix Tables G-2, G-3, and G-4).

g. Common, Trace, and Toxic Metals

Concentrations of nickel and magnesium relative to the other common metals were very uniform throughout 1978, while sodium, iron, and manganese were somewhat more variable (Appendix Table G-2 and G-4). Sodium levels were highest in May and December at the 25- and 45-foot contours. Iron was generally more variable from sample to sample than were the other metals, but there were no apparent temporal trends. Manganese concentrations fluctuated monthly and were below detection ( 0.001 mg/l) in June (Appendix Table G-3).

Of the trace metals, beryllium and vanadium had levels during the entire year that were at or below the detectability limit. Selenium was detectable only during August, September, and December (Appendix Table G-4). Cadmium and silver concentrations never exceeded their detection limits. Chromium levels at or only slightly above detection limits were noted only in November and December; during all other months, concentrations were below detection. Detectable levels of mercury were very low (Appendix Table G-4) and occurred only in December. Copper, lead, zinc, and arsenic were commonly encountered at levels above those of minimum detection but never at levels harmful to organisms in the area or exceeding EPA standards (USEPA 1976b).

No spatial trends could be determined among transects, since metal analyses were conducted only on samples from the NMPP/FITZ transect (Appendix Table G-4). No inshore-offshore or surface-bottom differences were found for any of the trace metals.

### h. Indicators of Organic Pollution

No temporal or spatial trends among transects were apparent for biological oxygen demand ($BOD_5$), chemical oxygen demand (COD), total coliform bacteria, or carbon chloroform extract (CCE). Phenols and MBAS (analysis for anionic surfactants) were at or below limits of detection except during August when phenols were slightly elevated (Appendix Table G-4).

Total coliform bacteria counts were slightly higher in nearshore than in offshore samples. No pollution problem was indicated from either coliform or COD analyses, because no monthly value exceeded either state or federal regulations. No effects of plant operations on these parameters were observed.

### i. Radioactivity

Gross alpha and gamma radiation values were below detection limits except for some very low gross alpha counts in October. Gross beta counts and tritium concentrations were low and did not exceed ambient Lake Ontario levels. No differences were determined between experimental and control areas (Appendix Tables G-2 and G-4).

## 3. Overview of Year-to-Year Results

Monthly and semimonthly water quality sampling programs conducted in the Nine Mile Point vicinity from 1973 through 1978 included weekly thermal profiles at the 100-foot depth contour. Although many of the parameters analyzed fluctuated monthly and annually, there were no persistent trends. During any given year, there were temporal cycles for many of the parameters, particularly nutrients (nitrogen and phosphorus compounds) and water temperatures. For example, inorganic nitrogen and phosphorus characteristically increased during winter and decreased during summer with a corresponding summer increase in organic nitrogen and organic phosphorus compounds. Annual and monthly parameter means were typical of those reported by other investigators for the Nine Mile Point area of Lake Ontario. Data collected over the past 6 years showed no short-term or long-term effects from operation of the Nine Mile Point Unit 1 and James A. FitzPatrick power plants. The Oswego River, west-to-east longshore currents, and hypolimnetic upwellings of cold, often nutrient-rich waters exert the most influence on the physicochemical parameters at Nine Mile Point.

## 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, larger invertebrates, and small planktonic organisms are drawn into the cooling-water system. The debris, fish, and large invertebrates are impinged on the bar racks and traveling screens and consequently removed from the cooling water. The small planktonic organisms, on the other hand, pass through the screens and subsequently through the entire cooling-water system (entrainment).

Both the Nine Mile Point and James A. FitzPatrick power stations have once-through cooling systems with offshore submerged intakes and discharges (see Section II). 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) respectivley, 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. The impinged fish are removed from the Lake Ontario ecosystem since neither plant has facilities for returning them to the lake.

Phytoplankton, zooplankton, and fish eggs and larvae in the cooling water pass through the traveling screens and subsequently through the circulating pumps, condenser tubes, and discharge structures. These organisms are exposed to such stresses as temperature changes, mechanical abrasion, shear forces, pressure changes, and exposure to biocides, which act independently or synergistically to affect the entrained organisms. Although entrainment kills some of the aquatic biota in the cooling water, it may also produce subtle nonlethal short- or long-term effects, benefits, or in some cases no identifiable response. Phytoplankton, as a group, can survive higher temperatures than can zooplankton and ichthyoplankton (Marcy 1975) and are less vulnerable to mechanical damage because of their smaller size. Not only are phytoplankton more tolerant to entrainment effects, but they also have the greatest capacity to regenerate losses following entrainment (Morgan and Stross 1969). Zooplankton also have relatively short regeneration times and can replace entrainment losses quickly (Churchill and Wojtalik 1969, Heinle 1969).

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 in order to estimate total loss of fish, in terms of numbers and weights, each year. In addition to estimating annnual impingement, the principal objectives of the 1978 impingement program were to:

- Determine species composition of impinged fish
- Describe seasonal patterns of impingement rates
- Characterize daily variations in impingement rates

Entrainment studies at the Nine Mile Point and James A. FitzPatrick plants were initiated about the same time as the impingement studies, with comprehensive results appearing in the 1973 Nine Mile Point Report (QLM 1974) and the 1976 Annual Report for Nine Mile Point (LMS 1977a). The 1978 entrainment program at Nine Mile Point was conducted to document the species composition and seasonal variation in entrainment of ichthyoplankton. Previous entrainment studies at Nine Mile Point on phytoplankton and microzooplankton (QLM 1974 and LMS 1975a), established no significant impact on these two biotic groups. At the James A. FitzPatrick plant, the 1978 program included both entrainment and viability (mortality) studies on phytoplankton, zooplankton, and ichthyoplankton. The major objectives were to:

- Determine entrainment rates for the zooplankton and ichthyoplankton communities at the FitzPatrick plant
- Describe the potential effect of entrainment on the phytoplankton community by monitoring chlorophyll *a* levels and primary production ($^{14}C$ tracer method) at several locations at the plant and in the lake

- Estimate the percent mortality due to entrainment in the zooplankton and ichthyoplankton components of the aquatic biota

Since plant operations have a direct impact on the effects of impingement and entrainment (i.e., changing intake velocities and discharge temperatures), certain parameters describing plant operation for each day of 1978 are presented in Appendix Tables H-1 and H-2.

The results presented in this section of the report document the entrainment and impingement at both power stations during 1978, satisfying the NRC and NPDES permit requirements to monitor the plants for potential effects on the aquatic biota.

## B. IMPINGEMENT

### 1. Nine Mile Point Unit 1

#### a. Species Composition

Impingement sampling at Nine Mile Point during 1978 resulted in the collection of 41 fish taxa, 36 of which were identified to species (Table V-1). Of the total number of fish collected, threespine sticklebacks and rainbow smelt comprised approximately 74 percent (Appendix Table H-3); threespine sticklebacks dominated February-July samples, while rainbow smelt were dominant in mid-winter (January and December) and late summer (August and September). Threespine sticklebacks were absent only during September. During October and November, alewife was the most abundant species in impingement collections. Eight species — alewife, gizzard shad, rainbow smelt, smallmouth bass, spottail shiner, trout-perch, white perch, yellow perch — and specimens of the genus Cottus were consistently present in impingement samples and seven other species were found during at least 10 of the 12 months.

Gizzard shad, alewife, and rainbow smelt comprised 77 percent of the total fish biomass collected (Table V-1 and Appendix Table H-4) during impingement sampling: gizzard shad dominated during January-April and October-December. Alewife were dominant during May and June, and rainbow smelt during September. White sucker and burbot were the dominant species, respectively, in July and August.

## Table V-1

Number and Weight of Fish Collected during Impingement Sampling and Estimated Annual Impingement, Nine Mile Point Unit 1, 1978

| Common Name* | Number Collected | Weight Collected (g) | Estimated Number | Estimated Weight (g) |
|---|---|---|---|---|
| Alewife | 8,074 | 218,728.2 | 18,252 | 488,260.9 |
| American eel | 39 | 17,472.2 | 90 | 40,827.7 |
| Black crappie | 1 | 3.0 | 2 | 7.2 |
| Bluegill | 16 | 178.7 | 38 | 426.1 |
| Brook stickleback | 17 | 27.3 | 41 | 66.3 |
| Brown bullhead | 28 | 2,128.1 | 65 | 5,024.1 |
| Brown trout | 5 | 12,477.5 | 11 | 29,754.1 |
| Burbot | 29 | 32,604.4 | 68 | 76,773.2 |
| Central mudminnow | 28 | 135.9 | 68 | 333.3 |
| Cisco | 1 | 74.7 | 15 | 502.3 |
| Cottus sp.** | 2,098 | 7,254.3 | 4,919 | 17,011.9 |
| Cyprinidae | 3 | 7.3 | 7 | 17.4 |
| Emerald shiner | 1,312 | 3,456.5 | 3,051 | 8,017.1 |
| Fathead minnow | 4 | 15.5 | 10 | 35.6 |
| Freshwater drum | 11 | 3,005.6 | 25 | 6,793.9 |
| Gizzard shad | 4,282 | 1,047,236.7 | 10,167 | 2,487,502.2 |
| Golden shiner | 2 | 12.3 | 5 | 30.0 |
| Goldfish | 18 | 618.5 | 43 | 1,411.5 |
| Lake chub | 39 | 598.1 | 79 | 1,079.6 |
| Largemouth bass | 2 | 28.5 | 5 | 68.0 |
| Lepomis sp. | 1 | 1.3 | 2 | 3.1 |
| Longnose dace | 1 | 17.9 | 2 | 41.8 |
| Longnose gar | 1 | 131.3 | 2 | 313.1 |
| Oncorhynchus sp. | 1 | 865.7 | 2 | 2064.4 |
| Pumpkinseed | 24 | 152.3 | 57 | 363.2 |
| Rainbow smelt | 25,331 | 155,338.6 | 59,866 | 366,469.5 |
| Rainbow trout | 2 | 1,407.0 | 4 | 3,309.7 |
| Rock bass | 176 | 22,218.0 | 417 | 52,579.6 |
| Salvelinus sp.*** | 44 | 4,807.7 | 103 | 11,232.2 |
| Sea lamprey | 20 | 3,177.5 | 47 | 7,522.3 |
| Smallmouth bass | 136 | 27,159.5 | 320 | 63,622.4 |
| Spottail shiner | 1,325 | 6,296.1 | 3,097 | 14,754.0 |
| Stonecat | 68 | 3,656.1 | 159 | 8,568.9 |
| Tessellated darter† | 375 | 712.9 | 867 | 1,630.4 |
| Threespine stickleback | 57,857 | 83,821.7 | 139,579 | 201,788.7 |
| Trout-perch | 1,027 | 6,910.2 | 2,349 | 15,743.2 |
| Walleye | 11 | 715.4 | 27 | 1,694.7 |
| White bass | 2,350 | 34,308.0 | 5,550 | 80,631.6 |
| White perch | 3,784 | 96,655.3 | 8,830 | 226,053.3 |
| White sucker | 58 | 24,168.9 | 137 | 57,608.4 |
| Yellow perch | 3,992 | 29,055.9 | 8,951 | 67,600.0 |
| Unidentified | 3 | NA | 7 | NA |
| Total | 112,596 | 1,847,640.6 | 267,336 | 4,347,536.9 |

*Common names are according to the American Fisheries Society list of common and scientific names of fishes from the United States and Canada (Bailey et al 1970).

**Primarily mottled sculpin.

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

†Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

b. Temporal Distribution

The temporal distribution for total catch rate (number collected per 1000 cubic meters cooling of water used) during 1978 was characterized by peak periods of abundance (Figure V-1) in spring (April) and winter (January and December). Threespine sticklebacks accounted for 96 percent of the fish impinged during the April peak and were a major component of impingement samples from January through June. Rainbow smelt were most abundant during the winter (January and December) but also exhibited a minor peak in abundance during September. The catch rate for alewife was highest during May (Figure V-1).

Diel variations in catch rates (number impinged per hour) were observed in day and night samples collected each Wednesday during 1978. Generally, catch per hour was greater at night than during the day but the magnitude of this difference varied from month to month (Figure V-2). During the peak in impingement rates in April when threespine sticklebacks dominated catches, catch rates were higher during the day than at night.

c. Estimated Impingement

The total number of fish impinged at Nine Mile Point Unit 1 during January-December 1978 was estimated to be approximately 267,000 (Table V-1) over half of which were threespine sticklebacks. Total weight was estimated to be approximately 4,350 kilograms, with gizzard shad contributing 57 percent of the total biomass. The estimated numbers and weights of fish impinged during each month of 1978 are presented in Appendix Table H-5.

d. Length Frequency

Alewife, rainbow smelt, smallmouth bass, threespine stickleback, white perch, and yellow perch length-frequency distibutions (Appendix Tables H-6 through H-11) showed that adults and subadults generally were impinged during January-July. Young-of-the-year were first encountered during summer (usually July or August) and dominated samples from September through December. Bimodal length-frequency distributions of alewives during May and June suggested that impinged alewives were predominantly yearlings with an adult contingent.

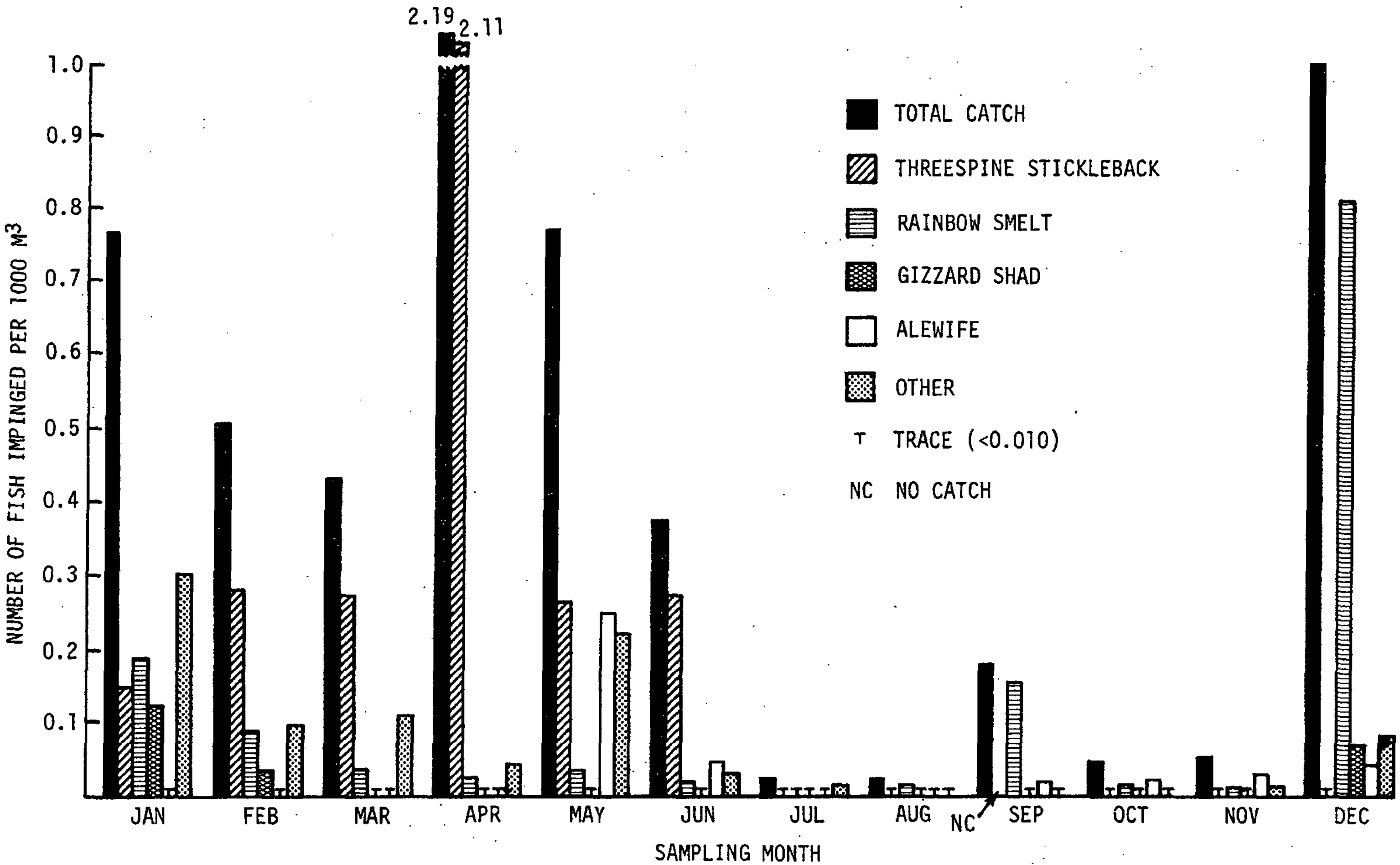



Figure V-1. Seasonal Variation in Impingement Rates at Nine Mile Point Unit 1, January-December 1978

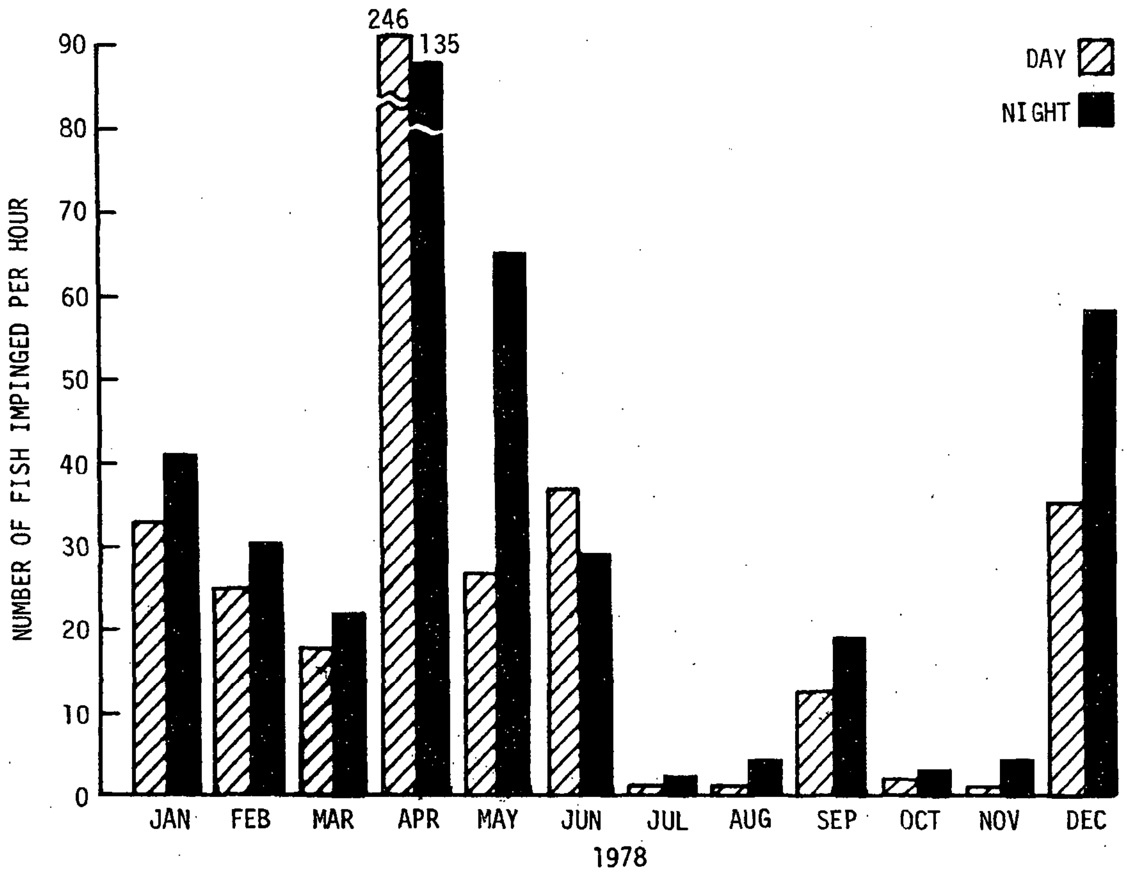



Figure V-2. Diel Variation in Impingement Rates at Nine Mile Point Unit 1 during 1978

Total lengths of impinged threespine sticklebacks fell within a range of 31 to 80 millimeters (Appendix Table H-9), but most sticklebacks were between 50 and 64 millimeters.

2. James A. FitzPatrick Nuclear Station

a. Species Composition

Impingement sampling at James A. FitzPatrick in 1978 resulted in the collection of 45 fish taxa, 42 of which were identified to species (Table V-2).

Of the total number of fish collected, threespine sticklebacks, rainbow smelt, and alewives comprised approximately 86 percent. Threespine sticklebacks dominated impingement samples from February through June, rainbow smelt in January and September-December, and alewives in July and August (Appendix Table H-12). Two species — rainbow smelt and spottail shiner — and specimens of the genus Cottus were consistently present in impingement samples, and 11 other species were found during at least 10 of the 12 months.

Gizzard shad and alewives comprised approximately 65 percent of the total fish biomass collected at FitzPatrick (Table V-2 and Appendix Table H-13). Gizzard shad was the dominant species collected during January-April and was a major component of the biomass in November and December. Alewives dominated samples from May through July and contributed much of the biomass during September and December. Smallmouth bass dominated in August, American eel in October; alewives and rainbow smelt were equally dominant in September.

b. Temporal Distribution

The temporal distribution of impingement rates (number of fish impinged per 1000 cubic meters of water sampled) was characterized (Figure V-3) by highest catch rates during the spring (March and May) and lowest rates in late summer (July). Although catch rates were also low during October and November, cooling-water flow rates were down at least 50 percent during these months while the reactor was being refueled. Impingement rates were intermediate during the fall (September) and winter. Most of the fish impinged during the spring maxima were threespine sticklebacks. Catch rates for rainbow smelt were highest during the winter (January) and during the late fall (September through December). Although alewives were common in catches from May through August and in December, impingement rates for alewives were highest in August. Since the traveling screens were inoperable from 8 to 13 November, the November catch rates are based on approximately 3 weeks of data.

Diel variations in catch rates (number impinged per hour) were observed in day and night impingement samples collected each Wednesday during 1978 (Figure V-4). Although catch per hour was greater at night than during the day during 10 of the 12 months, day/night differences were frequently small. The noticeably higher night than day catch rates during September,

Table V-2

Number and Weight of Fish Collected during Impingement Sampling and the Estimated Annual Impingement, James A. FitzPatrick Nuclear Station, 1978

| Common Name* | Number Collected | Weight Collected (g) | Estimated Number | Estimated Weight (g) |
|---|---|---|---|---|
| Alewife | 28,691 | 580,593.5 | 67,311 | 1,354,300.5 |
| American eel | 12 | 3,863.3 | 28 | 9,174.5 |
| Black crappie | 4 | 307.5 | 9 | 766.6 |
| Bluegill | 20 | 468.5 | 47 | 1,116.0 |
| Bowfin | 1 | 350.8 | 2 | 836.5 |
| Brook stickleback | 30 | 40.6 | 74 | 100.9 |
| Brown bullhead | 24 | 2,430.8 | 56 | 5,747.9 |
| Brown trout | 21 | 51,957.1 | 49 | 122,816.8 |
| Burbot | 12 | 6,013.4 | 28 | 14,333.1 |
| Carp | 5 | 305.1 | 11 | 724.5 |
| Central mudminnow | 44 | 203.2 | 105 | 487.4 |
| Channel catfish | 2 | 80.3 | 4 | 177.9 |
| Cisco | 1 | 36.2 | 2 | 86.3 |
| _Cottus_ sp.** | 1,452 | 4,502.7 | 3,425 | 10,627.0 |
| Cyprinidae | 9 | 19.8 | 21 | 47.8 |
| Emerald shiner | 2,416 | 5,488.4 | 5,715 | 12,984.4 |
| Fathead minnow | 13 | 30.1 | 30 | 68.4 |
| Freshwater drum | 20 | 4,988.0 | 47 | 11,802.6 |
| Gizzard shad | 6,497 | 1,185,250.1 | 15,468 | 2,805,680.3 |
| Golden shiner | 17 | 61.2 | 41 | 106.4 |
| Goldfish | 27 | 1,744.6 | 64 | 4,197.6 |
| Lake chub | 81 | 422.3 | 193 | 1,001.5 |
| Lake chubsucker | 1 | 524.0 | 2 | 1,209.2 |
| Logperch | 4 | 24.8 | 10 | 59.1 |
| Longnose dace | 10 | 103.3 | 24 | 243.5 |
| Longnose gar | 2 | 141.3 | 5 | 326.1 |
| Northern pike | 3 | 3,088.8 | 7 | 7,134.9 |
| Pirate perch | 1 | 12.9 | 3 | 32.3 |
| Pumpkinseed | 38 | 3,474.5 | 90 | 8,280.3 |
| Rainbow smelt | 31,992 | 152,700.6 | 74,962 | 359,488.7 |
| Rock bass | 529 | 98,569.4 | 1,258 | 233,910.2 |
| _Salvelinus_ sp.*** | 28 | 1,876.9 | 65 | 4,472.4 |
| Sea lamprey | 10 | 1,059.6 | 24 | 2,512.7 |
| Smallmouth bass | 478 | 231,498.3 | 1,135 | 549,622.0 |
| Spottail shiner | 2,732 | 11,805.9 | 6,459 | 27,954.9 |
| Stonecat | 58 | 1,834.2 | 135 | 4,313.2 |
| Tadpole madtom | 5 | 13.4 | 12 | 32.0 |
| Tessellated darter† | 917 | 1,390.2 | 2,157 | 3,253.9 |
| Threespine stickleback | 98,347 | 167,216.6 | 222,837 | 378,514.8 |
| Trout-perch | 1,510 | 11,262.0 | 3,479 | 25,815.6 |
| Walleye | 20 | 1,446.5 | 47 | 3,449.4 |
| White bass | 1,197 | 18,152.7 | 2,843 | 43,047.7 |
| White perch | 2,488 | 81,447.1 | 5,863 | 190,309.0 |
| White sucker | 72 | 26,372.5 | 172 | 63,322.9 |
| Yellow perch | 4,403 | 39,624.2 | 9,874 | 93,157.3 |
| Total | 184,244 | 2,702,797.2 | 424,193 | 6,357,647.0 |

*Common names are according to the American Fisheries Society list of common and scientific names of fishes from the United States and Canada (Bailey et al 1970).

**Primarily mottled sculpin.

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

†Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

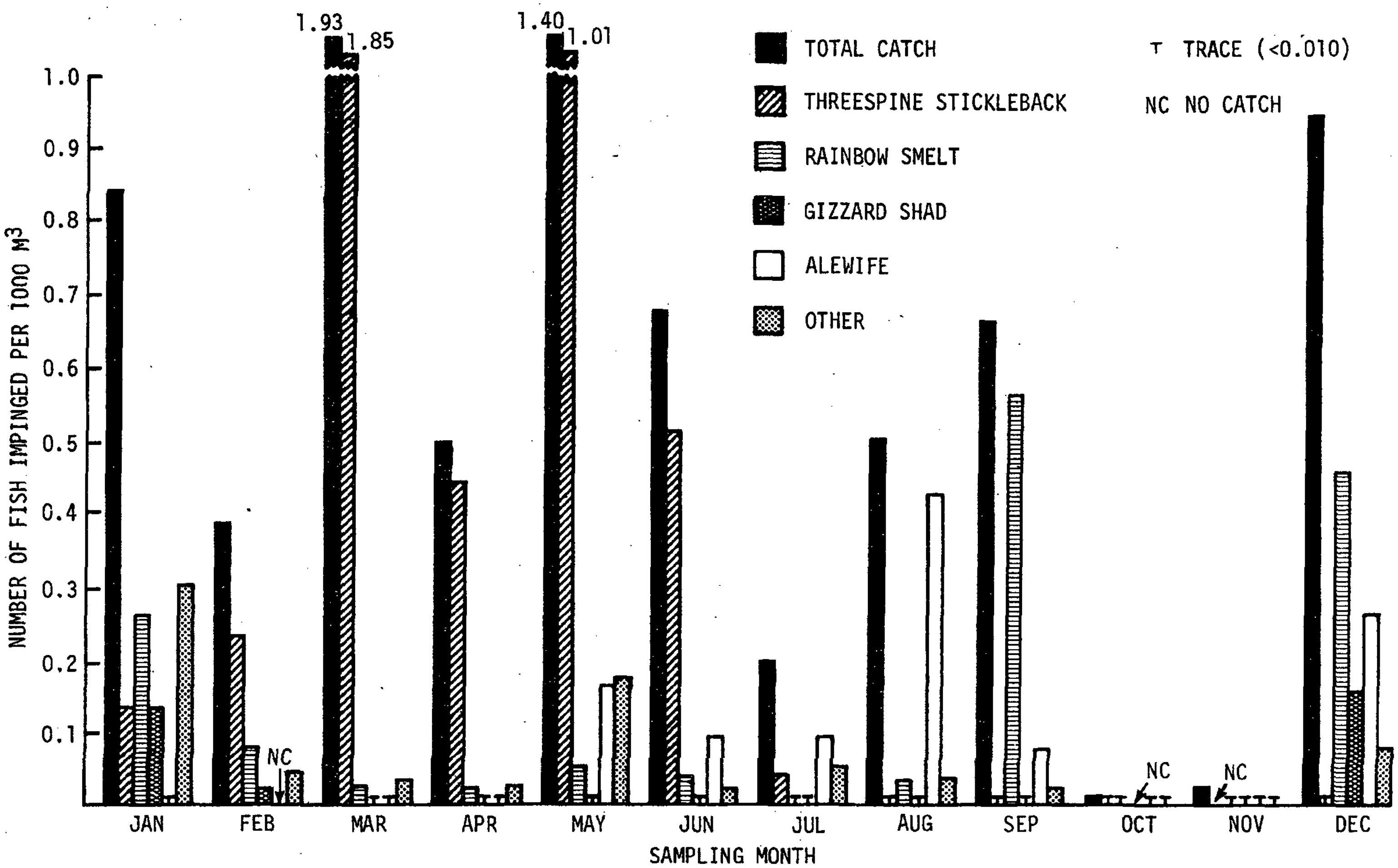



Figure V-3. Seasonal Variation in Impingement Rates at James A. FitzPatrick Nuclear Station, January-December 1978

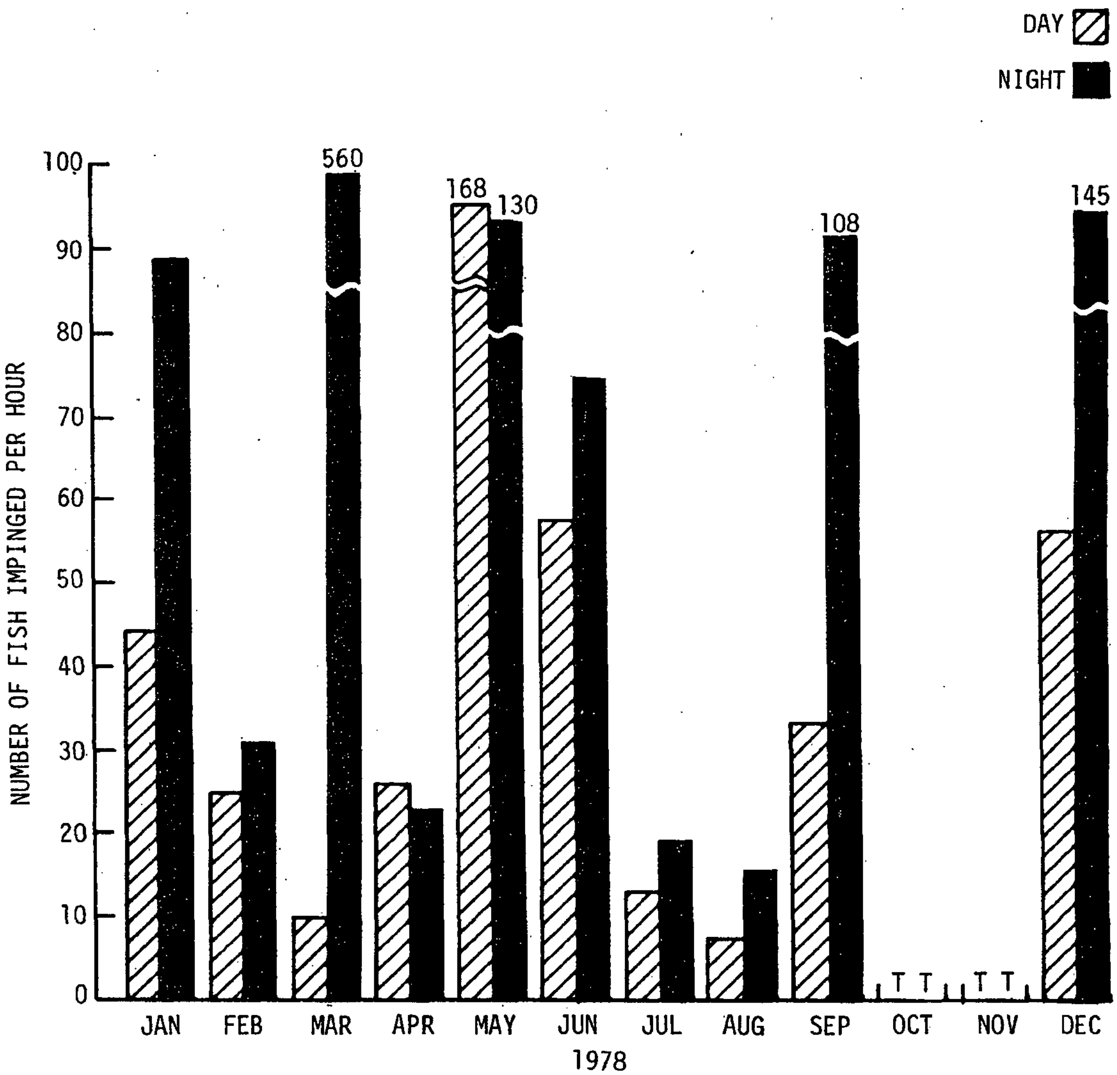



Figure V-4. Diel Variation in Impingement Rates at James A. FitzPatrick Nuclear Station during 1978

December, and January probably were related to the high relative abundance of rainbow smelt during these 3 months. Although the very high night impingement rate in April occurred when threespine sticklebacks dominated samples, day/night differences were negligible during May and June when sticklebacks again dominated catches.

c. Estimated Impingement

The total number of fish impinged at James A. Fitzpatrick during 1978 was estimated to be approximately 424,000 (Table V-2), over half of which were threespine sticklebacks. The total weight of all impinged fish was estimated to be approximately 6,400 kilograms, with gizzard shad contributing 44 percent of the total biomass. The estimated numbers and weights of fish impinged during each month of 1978 are presented in Appendix Table H-14).

d. Length Frequency

Alewife, rainbow smelt, smallmouth bass, threespine stickleback, white perch, and yellow perch length-frequency distributions (Appendix Tables H-15 through H-20) showed the general trends that have already been discussed for these same species in Nine Mile Point plant impingement samples.

e. Age Composition

During each season of impingement sampling, the two most abundant species were chosen for age analysis to define the relative sizes of the fish in the age classes observed. These data, combined with length-frequency data, provided an estimation of ages for the more frequently impinged fish. Rainbow smelt and threespine sticklebacks were chosen for age analysis for winter (January-March) and spring (April-June). The most frequently impinged species during summer (July-September) were alewife and threespine stickleback; and during fall (October-December), alewife and rainbow smelt. As noted by Eddy (1969), sticklebacks have no scales so they are typically aged by examining otoliths (Jones and Hynes 1950, cited in Scott and Crossman 1973) or length frequencies (Greenbank and Nelson 1959, cited in Carlander 1969). The latter method was used to age threespine sticklebacks impinged at the James A. FitzPatrick plant.

Alewives collected for age analysis ranged during the summer from young-of-the-year (age class 0) to age class IV and during the fall from young-of-the-year to III. The seasonal age-class distributions (Appendix Tables H-23 and H-24) and the length frequency for impinged alewives (Appendix Table H-15) indicated that ages 0, I, and II dominated impingement samples during the summer and that young-of-the-year (age 0) and age III dominated in the fall. The strong contingent of young-of-the-year alewives in August and September was the result of young-of-the-year recruitment into an impingeable size range (Appendix Table H-15).

Rainbow smelt from impingement collections ranged from yearlings to age VI during winter and spring and from young-of-the-year to age IV in the fall (Appendix Tables H-21, H-22, and H-24). Length-frequency distributions during the winter (January-March), spring (April-June), and fall (October-December) were distinctly bimodal (Appendix Table H-16), with large numbers in the 51- to 100-millimeter and 131- to 180-millimeter length ranges. Age-class data indicated that fish in the 51- to 100-millimeter length range were predominantly yearlings during winter and spring and young-of-the-year (age 0) during the fall (Appendix Tables H-21, H-22, and H-24). Individuals in the 131- to 180-millimeter length range during winter and spring were mostly ages II and III; in the fall, yearlings and 2-year-olds (age classes I and II) comprised most of the smelt in the larger category (131 to 180 millimeters).

Length frequencies of threespine stickleback, a dominant species in impingement catches at FitzPatrick from January through September, ranged from about 25 millimeters to 84 millimeters, representing young-of-the-year (age 0) to age-IV fish [Jones and Hynes 1950 (for Alaskan waters) and Greenbank and Nelson (for English waters), cited in Carlander 1969]. The predominant threespine stickleback year classes impinged during the winter through summer were a mixture of predominantly age-II and yearling (age-I) fish plus some age-III and possibly age-IV specimens. Otolith data from English waters indicate that sticklebacks probably don't live longer than 3.5 years. Although 2.5 years is the typical lifespan in Alaskan lakes, some age-IV threespine sticklebacks (approximately 75-millimeter mean fork length) have been reported, with all age-IV specimens being females (Rogers 1962, cited in Carlander 1969). Therefore, the impinged threespine sticklebacks that were longer (total length) than 75 millimeters may have included some age-IV individuals (probably females).

f. Fecundity

Alewives generally spawn in late spring when water temperatures are between 16° and 28°C. Spawning females randomly broadcast from 10,000 to 22,400 (Scott and Crossman 1973, Norden 1967) demersal and essentially non-adhesive eggs (Mansueti 1956). During the 1978 study, fecundity estimates of impinged alewives were extremely variable; however, larger specimens generally possessed the most yolk eggs. Fecundity estimates for alewives collected by gill net from the lake ranged from 5,400 to 44,900 eggs (Appendix Table F-38). Estimates for lake-caught specimens were also highly variable, but data indicated a general increase in fecundity with increasing fish length.

Rainbow smelt spawn in streams or shallow lakeshore waters (Rupp 1965) over gravel shoals. Spawning runs of ripe smelt usually begin in March and continue through May when water temperatures range from 8.9° to 18.3°C (McKenzie 1964). The number of demersal and adhesive eggs spawned depends on the size of the female but generally ranges from approximately 8,000 to 30,000 (Scott and Crossman 1973). In 1978, the fecundity (total number of yolk eggs) of impinged rainbow smelt 133 to 224 millimeters in total length ranged from approximately 6,000 to 30,600 eggs. Fecundity estimates displayed some variation among individuals of comparable sizes but generally followed a pattern of increasing numbers of yolk eggs with increasing length and weight (Appendix Table H-25). Fecundity of smelt 129 to 226 millimeters in length collected from the lake ranged from approximately 8,200 to 39,000 eggs and displayed a positive correlation between increasing fecundity and total length (Appendix Table F-38).

White perch usually spawn over a period of 1 to 8 weeks in the spring when water temperatures range from 11° to 15°C. The number of eggs produced per female may range from 20,000 to 300,000 (Scott and Crossman 1973). At the James A. FitzPatrick station in 1978, the total number of yolk eggs for impinged white perch 205 to 305 millimeters in total length ranged from approximately 35,400 to 267,400 (Appendix Table H-25). Although fecundity estimates for certain fish of comparable lengths varied, there was generally an increase with increasing length and weight. Estimates of fecundity for lake-caught white perch 204 to 321 millimeters in total length varied from 43,800 to 463,900 yolk eggs.

Yellow perch spawn from mid-April to early May when water temperatures range from 8.9° to 12.2°C (Scott and Crossman 1973). Yellow perch eggs are extruded in long, gelatinous masses that frequently become entangled in aquatic vegetation. Fecundity of four yellow perch 118-255 millimeters impinged at the James A. FitzPatrick plant ranged from approximately 10,600 to 54,700 yolk eggs (Appendix Table H-35). Fecundity of three yellow perch ranging from 146 to 270 millimeters in total length taken from Lake Ontario during the 1978 study ranged from approximately 6,000 to 33,800 yolk eggs (Appendix Table F-38). Fecundity of Lake Ontario yellow perch from the Bay of Quinte (131-257 millimeters in fork length) ranged from 3,035 to 61,465 eggs (Sheri and Power 1969). Fecundity of Maryland yellow perch 147 to 254 millimeters in total length was 36,600 to 109,000 eggs (Scott and Crossman 1973).

Smallmouth bass spawn in late spring and early summer, often near rocks, or logs and sometimes in dense vegetation (Scott and Crossman 1973). Nest building takes place over a wide range of temperatures (12.9° to 20.0°C), but actual spawning usually occurs at temperatures between 16.1° and 18.3°C. The number of eggs spawned (fecundity) per female ranges from 5,000 to 14,000 and is reported to average 7,000 eggs per pound of female (Scott and Crossman 1973). The total number of yolk eggs for 12 smallmouth bass impinged at the Fitzpatrick station in 1978 ranged from approximately 5,300 to 33,800 (Appendix Table H-25). Fecundity for 58 percent of these fish were between 11,000 and 16,000. Fecundity estimates for four smallmouth bass 333 to 398 millimeters for total length, collected from Lake Ontario in the vicinity of Nine Mile Point during 1978 ranged from approximately 2,500 to 7,300 eggs (Appendix Table F-38).

### 3. Overview of Year-to-Year Results

Fish have been collected from the traveling screens at Nine Mile Point Unit 1 since 1972 and at the James A. FitzPatrick plant since late 1975. Samples have been taken every Monday, Wednesday, and Friday since June 1973 and at James A. FitzPatrick since January 1976. On Mondays and Fridays impingement was monitored for a 24-hour period; Wednesday sampling was divided into day and night photoperiods. Nine Mile Point impingement collections have yielded between 37 and 48 species of fish each year since 1973; the James A. FitzPatrick power 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 James A. FitzPatrick. Rainbow smelt have been second in abundance at both power plants except in 1976 when threespine sticklebacks 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 J.A. FitzPatrick; alewives comprised 48 percent and 56 percent of the annual catch respectively at the plants in 1977. In 1978, threespine sticklebacks were very abundant in impingement samples, replacing alewife as the dominant species, while smelt again were second in abundance; e.g., sticklebacks, smelt, and alewives comprised 52, 22, and 7 percent, respectively, of the total 1978 catch, at Nine Mile Point.

Estimated annual 1974-78 impingement at Nine Mile Point Unit 1 ranged between 135,000 and 3.4 million fish with 1976 exhibiting the largest impingement. James A. Fitzpatrick also had its largest estimated annual impingement in 1976 (compared with other years), when 4.3 million fish were impinged on the traveling screens. Additionally, FitzPatrick has had higher impingement rates than Nine Mile Point since 1976.

Both power plants exhibited a major spring peak in impingement, corresponding with the onshore movement and spawning season of many of the major species. Impingement rates typically decreased through the summer and increased to a minor peak in the fall. Alewives and rainbow smelt characteristically dominated the spring peak. Alewives were most abundant in the vicinity of the power stations (and therefore in impingement samples) from April or May through the summer. Rainbow smelt, in contrast, were most abundant in late fall and winter (December-March). Impingement rates were usually higher at night than during the day. During several years, the day/night difference was statistically significant for rainbow smelt.

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 harvests. Based on individual species analysis using the above comparisons, the numbers of fish impinged at Nine Mile Point Unit 1 and James A. FitzPatrick represent a negligible portion of the Lake Ontario fish community and the existing fish populations are not expected to be altered by power plant operations.

## C. ENTRAINMENT/VIABILITY

### 1. Nine Mile Point Unit 1

The cooling-water system at the Nine Mile Point power station was sampled at the intake forebay from April through October 1978 to determine the abundance and composition of entrained fish eggs and larvae. Eggs, mostly those of alewife, occurred only during June and August (Table V-3). Larvae were collected from early May through late August, with peak abundance occurring in early August. Except for some tessellated darters in early July, alewives comprised the entire July and August catches. The entire early June catch was rainbow smelt, and the May catch was yellow perch. Except for some prolarval tessellated darters, postlarvae predominated larval catches [Table V-3 and Section VI.A of the 1978 Data Report (TI 1979)].

The abundance of eggs and larvae in entrainment samples did not correspond closely with periods of peak ichthyoplankton abundance in Lake Ontario. Day catches of both eggs and larvae in Lake Ontario peaked in July, whereas entrainment sampling yielded eggs only in late June and early August, with the peak in abundance occurring in early August.

Although egg densities were slightly higher in entrainment samples than along the 20-foot depth contour in Lake Ontario, larval densities were usually lower inside the plant intakes than in the lake. Lake samples from the 20-foot contour were chosen for comparison with intake (entrainment) samples because the submerged offshore intakes for both stations are located near the 24-foot depth contour. Lake egg densities along the 20-foot contour ranged between 0 and 5 eggs per 1000 cubic meters on 26 June and between 0 and 43 per 1000 cubic meters on 7 August compared with densities of 87 and 47 per 1000

Table V-3

Occurrence of Fish Eggs and Larvae in Entrainment Samples from the Cooling-Water Intakes of the Nine Mile Point and James A. Fitzpatrick Nuclear Stations, Lake Ontario, 1978

| | | Apr | | May | | Jun | | Jul | | Aug | | Sep** | | Oct | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Location* | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| Alewife | NMP | | | | | | E** | L*** | L | E/L | L | | | | |
| | JAF | | | | | | | E/L | E/L | E/L | E/L | L† | | | |
| Carp | NMP | | | No carp caught at NMP | | | | | | | | | | | |
| | JAF | | | | | | L | | | | | | | | |
| Goldfish | NMP | | | No goldfish caught at NMP | | | | | | | | | | | |
| | JAF | | | | | | L | L | | | | | | | |
| Herring, unid.# | NMP | | | No herring caught at NMP | | | | | | | | | | | |
| | JAF | | | | | | | | L | L | L | L | | | |
| Minnows unid. | NMP | | | No minnows caught at NMP | | | | | | | | | | | |
| | JAF | | | | | | L | | | | | | | | |
| Rainbow smelt | NMP | | | | | L | | | | | | | | | |
| | JAF | | | | | L | L | L | | | | | | | |
| Sculpin | NMP | | | No sculpin caught at NMP | | | | | | | | | | | |
| | JAF | | | | | | L | | | | | | | | |
| Sunfish | NMP | | | No sunfish caught at NMP | | | | | | | | | | | |
| | JAF | | | | | | | | | | L | | | | |
| Tessellated darter | NMP | | | | | | | L | | | | | | | |
| | JAF | | | | | | | E/L | | | | | | | |
| Trout-perch | NMP | | | No trout-perch caught at NMP | | | | | | | | | | | |
| | JAF | | | | | | | L | | | | | | | |
| White perch | NMP | | | No white perch caught at NMP | | | | | | | | | | | |
| | JAF | | | | | | | E | | | | | | | |
| Yellow perch | NMP | | | L | L | | | | | | | | | | |
| | JAF | | | | L | | | | | | | | | | |
| Unidentified eggs | NMP | | | | | | E | | | | | | | | |
| | JAF | | | | | | | E | E | | | | | | |

* Nine Mile Point or James A. FitzPatrick Power Plant.
** JAF shut down in late September and intake velocity was insufficient for sampling.
*** E=eggs, L=larvae.
† Eggs or larvae collected during viability studies but not in intake samples.
†† Most were probably alewife.

cubic meters in entrainment samples on 27 June and 8 August, respectively (Table V-4 and Appendix Table E-1). In early and late August when larval abundance peaked in entrainment samples at 383 and 140 larvae per 1000 cubic meters, larvae densities in the lake ranged from about 50 to more than 400 per 1000 cubic meters in early August and from 5 to more than 650 per 1000 cubic meters in late August (Appendix Tables E-5 and E-13). In addition to differences in densities, entrainment samples contained only a few taxa in contrast to the 20 taxa of eggs and larvae identified in Lake Ontario samples.

Table V-4

Density of Eggs and Larvae Entrained at the Nine Mile Point Nuclear Station, Lake Ontario, 1978

| Life Stage | Apr 3 | Apr 17 | May 9 | May 23 | Jun 16 | Jun 27 | Jul 11 | Jul 25 | Aug 8 | Aug 22 | Sep 13 | Sep 29 | Oct 10 | Oct 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eggs | 0 | 0 | 0 | 0 | 0 | 87 | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 |
| Larvae | 0 | 0 | 10 | 26 | 132 | 0 | 16 | 11 | 383 | 140 | 0 | 0 | 0 | 0 |

*Mean density of two daytime samples per date, expressed as No./1000 $m^3$.

2. James A. FitzPatrick Nuclear Station

a. Phytoplankton

The potential effect of the James A. FitzPatrick power station operation on the phytoplankton community in the vicinity of the station was monitored by determining chlorophyll a concentrations and primary production levels inside the power station (intake and discharge) and within the thermal plume (actual lake samples or simulation of the thermal plume; refer to Section III.B.2 and LMS 1977a). Concentrations of chlorophyll a, a photosynthetic pigment, were measured as an estimate of phytoplankton abundance. Also determined were levels of phaeophytin a (a degradation product of chlorophyll a), which optically interferes with the quantitative measurement of chlorophyll a, and also provides an estimate of chlorophyll molecule loss due to either entrainment effects or oxidation during cellular respiration. A radioactive carbon tracer ($^{14}C$) technique was used to determine the amount of carbon that the phytoplankton community can incorporate (primary production) per unit of time.

Chlorophyll a and primary production samples were collected within the intake forebay to monitor the relationship between in-plant samples and monthly lake phytoplankton samples. Discharge samples were compared with intake samples to measure the potential effects of passage of the phytoplankton through the power station. In addition, simulation studies were conducted to estimate the effects of entrainment in the thermal plume out to the 3°F and 2°F isotherms. These simulation studies were made by collecting phytoplankton samples at the intake and subjecting them to temperature changes simulating the temperature regime within the thermal plume. The methods are further described in Section III.B.2.

1) Chlorophyll *a* and Phaeophytin *a*

a) Temporal Distribution

Chlorophyll *a* concentrations in the cooling-water intake, based on the average of two replicate samples incubated at ambient intake temperature for 7 hours, ranged from a low of 0.47 micrograms per liter in February day collections to a high of 13.72 in May night samples (Appendix Table J-1). Chlorophyll *a* concentrations were low in the winter (December-February) and mid-summer (July) and peaked in May. April-December lake surface samples exhibited similar seasonal changes, with chlorophyll *a* concentrations ranging from 0.73 micrograms per liter in September to 9.08 in June (Appendix Table A-9). Estimates of chlorophyll *a* concentrations at the intake forebay were comparable with results from lake surface waters. Chlorophyll *a* concentrations for intake samples incubated for 24, 48, and 72 hours revealed a temporal distribution pattern and concentrations similar to the 7-hour incubation samples (Appendix Tables J-2 through J-4).

Phaeophytin *a* concentrations in the samples collected semimonthly (twice per month) and incubated for 7 hours (Appendix Table J-5) ranged from below detection limits (<0.10 micrograms per liter) in early March, April, and early November to a high of 3.71 in early June. Phaeophytin *a* monthly mean concentrations from surface lake samples ranged from a low of 0.24 micrograms per liter in September to a high of 1.73 in November. A comparison of the monthly means of lake (Appendix Table A-10) and intake (7-hour incubation) samples indicated no consistent pattern among them. Intake phaeophytin *a* results for the 24-, 48-, and 72-hour incubation periods indicated a temporal distribution pattern similar to that of the 7-hour incubation samples (Appendix Tables J-6 through J-8). There was no significant increase in phaeophytin *a* concentrations with increase in incubation time.

There were no consistent differences among day and night samples collected at the intake or discharge for chlorophyll a and phaeophytin a during any of the incubation periods.

b) Plant Entrainment

Discharge and intake concentrations of chlorophyll a and phaeophytin a were compared (as a ratio of discharge to intake) to evaluate the entrainment effect of the plant on the phytoplankton community. Discharge samples were collected after intake samples at a specific time interval, depending on the time required for the water to pass through the plant, to insure that the same mass of water would be sampled at both the intake and discharge. A ratio of less than 1 represents a decrease in chlorophyll during plant passage while a ratio greater than 1 indicates potential stimulation of the phytoplankton community.

Chlorophyll a discharge/intake ratios for the 7-hour incubated samples revealed that approximately 60 percent of the sampling periods showed a small reduction in chlorophyll a concentration at the discharge (Appendix Table J-1). Although discharge/intake ratios were frequently less than 1, the loss to the phytoplankton community was not great, as indicated by the frequency of ratios that fell within the range of 0.80-0.99. Results of the chlorophyll a discharge/intake ratios for the 24- and 48-hour incubations revealed a trend that was similar to that of the 7-hour incubation period (Appendix Tables J-2 through J-3). However, only about 54 percent of the samples incubated for 72 hours exhibited a reduction in chlorophyll a concentrations at the discharge (Appendix Table J-4). These results may indicate that phytoplankton losses to entrainment are small and that possibly, over a long incubation period, the phytoplankton begin to partially replace chlorophyll a lost during entrainment.

Throughout the 1978 study, discharge/intake ratios for phaeophytin a concentrations were variable for the four incubation periods. A majority of the discharge/intake ratios were greater than 1 (Appendix Tables J-5 through J-8). The ratios showed that there was an increase in phaeophytin concentrations in the discharge, indicating that the phytoplankton community had lost some chlorophyll a as a result of passage through the plant.

c) Plume Entrainment

To estimate the effect of entrainment of lake phytoplankton into the thermal plume, 3° and 2° simulation/intake ratios were determined. A ratio of less than 1 indicates a decrease in chlorophyll a due to entrainment into the thermal plume; a ratio greater than 1 indicates that entrainment of phytoplankton in the thermal discharge may stimulate the production of more chlorophyll and/or increase cell reproduction because of the elevated water temperatures.

Chlorophyll a results based on 7-hour incubation indicated that approximately 60 percent of the 3° simulation/intake ratios and 50 percent of the 2° simulation/intake ratios were greater than 1 (Appendix Table J-1). Ratios from the 24-, 48-, and 72-hour incubation periods showed similar results (Appendix J-2 through J-4). The 3° and 2° simulation/intake ratios for the four incubation periods suggested no affect or only a slight increase in chlorophyll a values in the plume area.

The 3° and 2° simulation/intake ratios for the four incubation periods indicated that phaeophytin a increased in approximately 57 percent of the thermal-plume samples (Appendix Tables J-5 through J-8).

Comparison of chlorophyll a samples collected in the 3° and 2° ΔT areas of the thermal plume in Lake Ontario indicated an overall slight increase in chlorophyll a concentrations, as was observed in the simulation studies. These comparisons also indicated an overall small loss in phaeophytin a concentrations.

Discharge/intake ratios indicated a small overall decrease in chlorophyll a concentrations, which may have been indicative of a slight depression in chlorophyll a in the phytoplankton community due to entrainment through the plant or into the thermal plume. The slight increase in phaeophytin a concentration tends to support the chlorophyll a observations. Although this depression may represent a loss of phytoplankton cells, the phytoplankton community typically exhibits rapid regeneration, which probably negates any entrainment effects within a few hours to several days.

Simulation/intake ratios for the 3° and 2° simulations (or the 3° and 2° lake plume samples) indicated an overall increase in chlorophyll a and phaeophytin a as a result of the temperature increase in the plume area.

2) Primary Production ($^{14}C$)

a) Temporal Distribution

Primary productivity samples were collected to determine the amount of carbon the phytoplankton community incorporates per unit of time, and to estimate plant and plume entrainment effects. These samples were collected and incubated at ambient intake temperatures for periods of 7, 24, 48, and 72 hours. The temporal distribution of primary production values for intake samples incubated for 7 hours showed that lowest production occurred during January-early March and again during early September. Production peaked during April-August (Appendix Table J-9).

Surface samples collected in the lake during phytoplankton surveys exhibited peak primary production values in June and secondary peaks in May, August, and November. Lowest monthly values for lake phytoplankton production were observed in September. The peaks and valleys observed in the lake samples were reflected in the intake samples during April-December. This indicated that the samples collected in the forebay area were representative samples for the viability studies.

Comparisons of day and night primary production data at the intake were made, considering each of the four incubation periods individually. Samples from the 7-hour incubation period indicated that day values were higher than night values on 60 percent of the sampling dates (Appendix Table J-9). For the 24-, 48-, and 72-hour incubation periods, production was higher during the day on 67, 71, and 79 percent of the sampling dates respectively (Appendix Tables J-10 through J-12). The trend for higher carbon uptake during the day would appear to be a natural phenomenon since phytoplankton utilize sunlight for their energy source and have their highest rate of respiration during the day. It should be noted, however, that during both short and long incubation periods the samples were incubated under a continuous light source.

b) Plant Entrainment

About 70 percent of the discharge/intake ratios from the 7-hour incubation series over the 12-month study were less than 1, indicating a loss in phytoplankton abundance and/or productivity, probably because of plant entrainment (Appendix Table J-9). For the 24-, 48-, and 72-hour incubation periods, 65 percent of the discharge/intake ratios were less than 1 (Appendix Tables J-10 through J-12). However, the results for the longer incubation periods tended to be more variable than for the 7-hour incubation and therefore may not reflect actual depression in the rates of phytoplankton production as accurately as the 7-hour incubation. Data from all four incubation periods suggested that primary production was slightly lower in the discharge than in the intake.

c) Plume Entrainment

Approximately 55 percent of the $3^{o}$ and $2^{o}$ simulation/intake primary production ratios for the 7-hour incubation period were less than 1 (Appendix Table J-9). The plume simulation studies showed a slight decrease in production in the 7-hour incubation period. For the 24- and 48-hour incubation periods, 50 percent of the $3^{o}$ and $2^{o}$ simulation/intake ratios were less than 1, while about 63 percent of the 72-hour incubation ratios were less than 1. These data indicate that entrainment in the plume for a long period tends to decrease production. In many natural systems, entrainment in slightly higher water temperatures would stimulate phytoplankton production; however, if a loss in phytoplankton cells occurs, a decrease in production should also occur.

Primary production samples collected from the lake in the $3^{o}$ and $2^{o}$ $\Delta T$ plume areas exhibited rates of production that were similar to those of the simulation samples. An average of 63 percent of the $3^{o}$ and $2^{o}$ lake/intake ratios for the four incubation periods were less than 1. As in the simulation studies, entrainment in the actual plume area during 1978 decreased the rate of production.

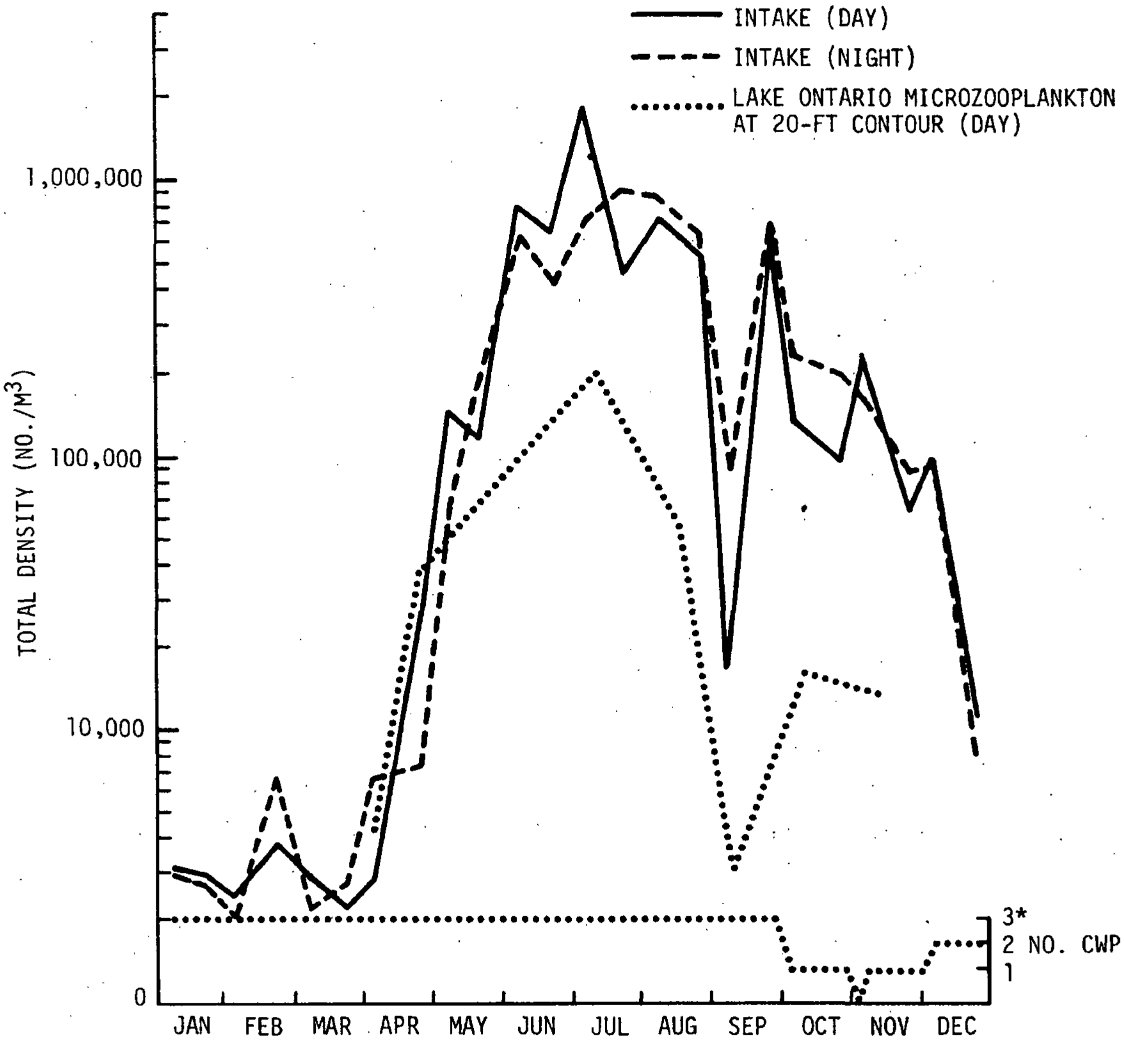
b. Zooplankton

1) Entrainment (Intake)

Entrainment sampling (day and night) at the James A. FitzPatrick Power station intake during 1978 yielded 79 zooplankton taxa comprising primarily Rotifera, Copepoda (Calanoida, Cyclopoida, and copepod nauplii), Cladocera, and Protozoa (Appendix Tables J-13 and J-14). No single group of organisms dominated 1978 collections. Three calanoid copepods — Diaptomus oregonensis, D. sicilis, and Limnocalanus macrurus — were most numerous during January-April, and rotifers began to dominate samples in April, maintaining this dominance through September. The numerically dominant rotifers were in the genera Asplanchna, Keratella (most species), Polyarthra, and Synchaeta. A cladoceran, Bosmina sp., was abundant in July and became the dominant taxon in October. A variety of rotifers — primarily Keratella sp., Polyarthra spp., and Synchaeta spp. — dominated the remainder of the year (November and December).

The temporal distribution of total zooplankton density (Figure V-5 and Appendix Table J-15) was characterized by an initial period of slightly fluctuating low levels from January through the first of April, followed by a sharp increase in late April and early May. High densities were sustained from June through August. After a secondary peak in late September, densities decreased through the remainder of the study. Density estimates ranged from a low of $1945/m^3$ in February (night samples) to a high of $1,721,938/m^3$ in June (day samples). Temporal distribution of zooplankton densities in day and night collections were quite similar through the study.

A comparison of zooplankton entrainment densities with Lake Ontario microzooplankton densities along the 20-foot depth contour (chosen as a basis for comparison because the intake structure is located in water approximately 24 feet deep) indicated close similarity in seasonal distributions although actual densities were often quite different (Figure V-5). A comparison of intake zooplankton density with operational data for the main circulating water pumps (Figure V-5) indicated no consistent cause/effect relationship between the number of pumps running and zooplankton density at the intake; i.e., density peaks at the intake occurred during periods of both high and low plant circulating-water intake.




*NUMBER OF CIRCULATING WATER PUMPS OPERATING: DURING SEPTEMBER, 1 OR 2 CIRCULATING PUMPS WERE OPERATING AT NIGHT; DURING DECEMBER, 3 CIRCULATING PUMPS WERE OPERATING AT NIGHT ON THE FIRST SAMPLING DATES.

Figure V-5. Temporal Distribution of Total Zooplankton Density in Day and Night Entrainment Samples and in Lake Ontario Samples from the 20-Foot Depth Contour, Nine Mile Point Vicinity, 1978

2) Viability (Intake and Discharge)

Intake and discharge samples at the James A. FitzPatrick Power Station were examined to determine the number of live and dead organisms. The temporal distribution pattern of zooplankton mortality (percent dead) was characterized by a series of peaks and valleys occurring irregularly throughout the year (Table V-5 and Appendix Table J-16). Periods of highest zooplankton percent dead at the intake, a reflection of natural and sampling-induced mortality, occurred in July, August, and September in both day and night samples. Lowest intake percent dead generally occurred in late winter and early spring (February-May). In most respects, estimates of percent dead at the discharge, a reflection of natural and sampling-induced mortality and mortality due to plant passage, followed a temporal pattern similar to that described for intake samples. Estimates of percent dead at the discharge were similar for both day and night samples; however, at the intake, mortality was greatest during the daytime.

To estimate the impact of thermal-plume entrainment upon zooplankton, a series of experiments were conducted to simulate thermal-plume effects in Lake Ontario at the $3^{o}F$ and $2^{o}F$ isotherms (Section III.B). In general, no salient differences in mortality (percent dead) between the two isotherm simulations were observed (Table V-5). Seasonal distribution of zooplankton percent dead in simulation samples followed that of intake and discharge, with major peaks occurring in August and September. A comparison of day and night simulation data revealed no consistent trends in the $2^{o}$ simulations, but mortality (percent dead) was frequently higher during the day in the $3^{o}$ simulations. A comparison of discharge mortality (percent dead) with plume-entrainment mortality (percent dead) indicated that mortality was higher in the discharge samples than in either the $2^{o}$ or $3^{o}$ simulation samples throughout 1978. This indicated that mortality (percent dead) due to plant entrainment in 1978 was higher than mortality due to entrainment into the lake thermal plume.

As an estimate of zooplankton mortality due to plant passage, mortality was computed as the difference between intake and discharge survival divided by intake survival. This method of estimating zooplankton mortality was used because it compensates for the effects of sampling-induced mortality.

# Table V-5

## Percent of Zooplankton Dead* in the Zooplankton Collections Taken at the Intake and Discharge, or Subject to Thermal Plume Simulation, James A. FitzPatrick Plant, 1978

| | | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sep | | Oct | | Nov | | Dec | Jan** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Location | Period | 17-18 | 25-26 | 7-8 | 21-23 | 7-8 | 21-22 | 6-10 | 21-22 | 11-12 | 25-26 | 18-19 | 27-30 | 13-14 | 27-28 | 10-11 | 24-25 | 15-17 | 27-28 | 12-13 | 26-27 | 8-9 | 29-30 | 20-21 | 4-6 |
| Intake | Day | 53 | 56 | 43 | 27 | 23 | 49 | 39 | 11 | 30 | 37 | 58 | 29 | 43 | 53 | 79 | 56 | 69 | 75 | 44 | 69 | 44 | 36 | 24 | 70 |
| | Night | 50 | 47 | 43 | 17 | 40 | 34 | 15 | 27 | 19 | 32 | 50 | 37 | 73 | 59 | 71 | 41 | 79 | 57 | 35 | 21 | 41 | 39 | 31 | 41 |
| Discharge | Day | 63 | 65 | 71 | 52 | 29 | 73 | 61 | 31 | 61 | 57 | 47 | 66 | 84 | 98 | 92 | 90 | 81 | 70 | 63 | 51 | 90 | 62 | 66 | 84 |
| | Night | 68 | 80 | 76 | 21 | 74 | 61 | 44 | 64 | 62 | 56 | 78 | 66 | 84 | 96 | 98 | 66 | 84 | 73 | 62 | 28 | 75 | 56 | 60 | 77 |
| 3° Simulation | Day | 53 | 66 | 53 | 53 | 25 | 67 | 32 | 18 | 56 | 34 | 58 | 42 | 51 | 61 | 86 | 59 | 67 | 65 | 35 | 49 | 49 | 54 | 39 | 65 |
| | Night | 71 | 46 | 81 | 34 | 64 | 35 | 28 | 18 | 20 | 35 | 45 | 43 | 46 | 48 | 68 | 63 | 82 | 64 | 37 | 38 | 38 | 41 | 41 | 63 |
| 2° Simulation | Day | 76 | 60 | 56 | 58 | 7 | 43 | 45 | 23 | 52 | 46 | 71 | 54 | 61 | 63 | 84 | 61 | 66 | 73 | 61 | 44 | 65 | 48 | 53 | 77 |
| | Night | 58 | 77 | 62 | 27 | 56 | 49 | 49 | 39 | 22 | 47 | 57 | 52 | 64 | 54 | 77 | 69 | 78 | 70 | 61 | 23 | 56 | 54 | 42 | 61 |

$* \frac{\text{Number dead}}{\text{Total}} \times 100$

** Samples for late December were collected in early January 1979 because of heavy detrital loads and plant operations.

Percent mortality within the major zooplankton groups was generally highest among the Protozoa (Table V-6); Rotifera and Cladocera were intermediate and total Copepoda lowest. Within the Copepoda group, cyclopoids reflected the lowest percent mortality. In general, the percent mortality among the major zooplankton groups exhibited no consistent trend in day/night differences. Highest mortality for each of the major groups occurred in July and August.

Temporal distribution in percent mortality due to plant passage for all zooplankton taxa combined was characterized by several peaks (Figure V-6, which plots combined day and night mean values because of their close similarity). Total zooplankton percent mortality ranged from negative values in June, September, and October (a result of the intake percent dead exceeding the discharge percent dead), to a high of 95 percent in July (Figure V-6 and Table V-6). A close relationship between zooplankton mortality and plant operation was observed only during late June-September and December. Most noticeable was the sustained peak in total zooplankton mortality that occurred during July and August when discharge temperatures exceeded 30°C. No real relationship existed between $\Delta T$ and zooplankton mortality.

It should be noted that thermal stress was not the only factor affecting zooplankton mortality at the James A. FitzPatrick power station. During October and November when there was no increase in temperature (Figure V-6), mortality was high simply because of mechanical stresses due to plant passage and sample collection. Additionally, on November 7 and 8 no circulating-water pumps were operating, thereby stranding entrained zooplankton in the intake forebay and discharge aftbay; this, combined with sampling, resulted in higher than expected mortality.

c. Ichthyoplankton

1) Entrainment

To monitor entrainment of fish eggs and larvae in the cooling-water system at the James A. FitzPatrick power station, samples were collected from the intake forebay day and night twice monthly throughout 1978.

## Table V-6

### Percent Mortality* of Major Zooplankton Groups Due to Plant Passage, James A. FitzPatrick Plant, 1978

| Taxa | Period | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sep | | Oct | | Nov | | Dec | Jan** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 17-18 | 25-26 | 7-8 | 21-23 | 7-8 | 21-22 | 6-10 | 21-22 | 11-12 | 25-26 | 18-19 | 27-30 | 13-14 | 27-28 | 10-11 | 24-25 | 15-17 | 27-28 | 12-13 | 26-27 | 8-9 | 29-30 | 20-21 | 4-6 |
| Protozoa | Day | N | 17 | N | ND | N | N | N | ND | 48 | N | N | 57 | N | ND | ND | 100 | ND | N | 75 | ND | 100 | 40 | 50 | N |
| | Night | N | 26 | 66 | ND | 80 | 12 | N | 53 | N | N | 50 | N | ND | ND | ND | ND | 100 | 14.3 | 78 | 100 | 100 | 100 | 100 | 14 |
| Rotifera | Day | 61 | 12 | 62 | 71 | N | 29 | 27 | 28 | 44 | 36 | N | 63 | 77 | 94 | 54 | 82 | 30 | N | 79 | 27 | 87 | 43 | 57 | 48 |
| | Night | 84 | 20 | 78 | N | 60 | 24 | 64 | 61 | 54 | 33 | 61 | 59 | N | 95 | 94 | 41 | 78 | 61 | 75 | 24 | 78 | 35 | 65 | 62 |
| Cladocera | Day | 100 | N | 50 | ND | ND | 100 | ND | 33 | ND | ND | 5 | 26 | 24 | 54 | 83 | 34 | N | 2 | 14 | N | 68 | ND | 33 | N |
| | Night | 58 | N | 100 | ND | ND | 100 | ND | ND | N | ND | 22 | 23 | 68 | 79 | 86 | 44 | 13 | 8 | 13 | 4 | 17 | 10 | N | 33 |
| Calanoida | Day | N | N | 23 | 28 | 1 | 59 | N | 9 | N | 100 | 100 | 0 | 0 | 100 | 100 | ND | N | 100 | 0 | 0 | 0 | ND | 0 | ND |
| | Night | 65 | N | 21 | 6 | 52 | 11 | 21 | 33 | 0 | N | ND | ND | 100 | 75 | 100 | 100 | N | 40 | 100 | 11 | ND | 0 | 0 | ND |
| Cyclopoida | Day | 26 | 18 | 79 | N | N | N | 49 | 33 | N | 43 | N | 33 | 51 | 94 | 87 | 42 | 45 | 3 | 18 | N | 68 | 29 | 0 | 50 |
| | Night | N | 43 | 89 | N | N | 54 | 73 | 62 | 7 | N | 46 | 44 | 68 | 84 | 95 | 27 | 5 | 9 | 37 | 43 | 25 | 7 | 13 | 59 |
| Copepoda nauplii | Day | N | 1 | 50 | 33 | 10 | 60 | 44 | N | N | 43 | 2 | 21 | 91 | 100 | 67 | 85 | 63 | N | 5 | 52 | 67 | 39 | 100 | N |
| | Night | 59 | 47 | 51 | 5 | 55 | 48 | 34 | 46 | 42 | 60 | 52 | 67 | 74 | 90 | 86 | 71 | 20 | 51 | N | N | 1 | 53 | 78 | 37 |
| Total Copepoda | Day | N | N | 52 | N | 11 | N | 71 | N | N | 46 | N | 33 | 74 | 97 | 51 | 78 | 42 | N | 14 | N | 67 | 34 | 22 | 9 |
| | Night | 74 | 78 | N | N | 59 | 55 | 59 | 28 | 53 | 76 | 56 | 78 | 73 | 100 | 94 | 63 | 16 | 28 | 19 | 12 | 20 | N | 12 | 59 |
| Total Zooplankton | Day | 21 | 19 | 49 | 34 | 7 | 46 | 36 | 22 | 44 | 31 | N | 52 | 73 | 95 | 59 | 76 | 38 | N | 35 | N | 82 | 41 | 55 | 45 |
| | Night | 36 | 62 | 58 | 5 | 57 | 41 | 34 | 50 | 53 | 35 | 56 | 46 | 40 | 91 | 93 | 42 | 24 | 37 | 42 | 8 | 57 | 29 | 42 | 61 |

$$*\% \text{ Mortality} = \frac{\% \text{ Live}_I - \% \text{ Live}_D}{\% \text{ Live}_I};$$ I = intake sample; D = discharge sample.

**Samples for late December were collected in early January 1979 because of heavy detrital loads and plant operations.

N = Intake/discharge comparisons not possible; intake mortality ≥ discharge mortality.

ND = No organisms collected at discharge.

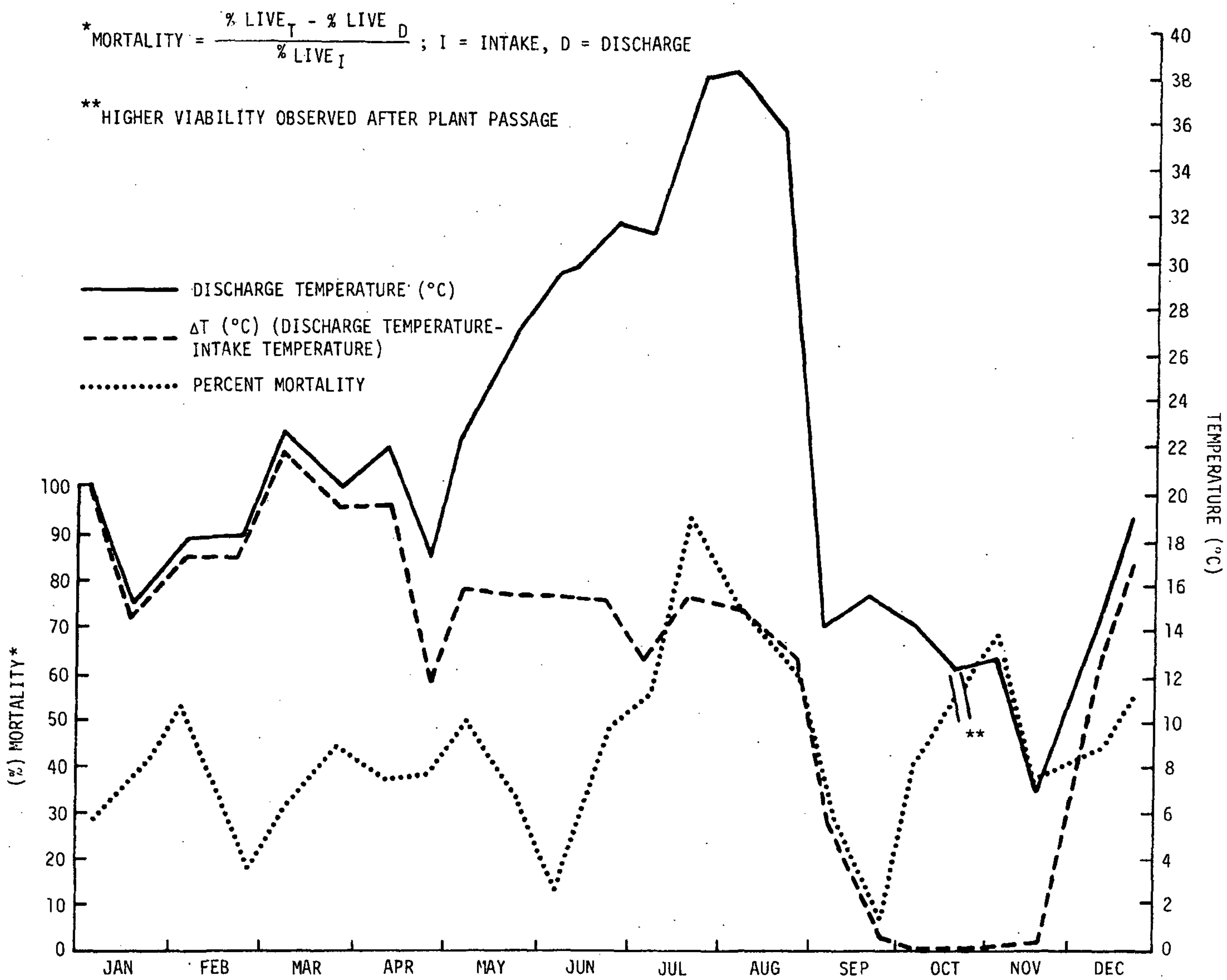



Figure V-6. Percent Mortality of Total Zooplankton Due to Plant Entrainment at James A. FitzPatrick Power Station, 1978

Alewife and unidentified eggs occurred in entrainment (intake) samples from early July through early August (Table V-3); also during the same months, tessellated darter, white perch, and alewife eggs occurred in viability samples (from the discharge or intake). Almost all of the eggs in entrainment samples were those of alewife (Table V-3). Egg densities were highest in late July (Table V-7).

Table V-7

Densities* of Eggs and Larvae Entrained at James A. FitzPatrick Nuclear Station, Lake Ontario, 1978**

| Life Stage | May | Jun | | Jul | | Aug | |
|---|---|---|---|---|---|---|---|
| | 23 | 16 | 27 | 11 | 25 | 8 | 22 |
| Eggs | 0 | 0 | 0 | 5 | 87 | 11 | 0 |
| Larvae | 10 | 79 | 4 | 90 | 34 | 54 | 159 |

*Mean density of two daytime and two nighttime samples per sampling date, expressed as No./1000 $m^3$.

**No fish eggs or larvae were collected in entrainment samples during January through April and September through December.

Larvae occurred in entrainment samples from late May through August. In addition to the nine taxa identified in entrainment samples, some herring and sunfish larvae were present in viability samples during late July through early September (Table V-3). Alewives dominated entrainment collections, especially in July and August. Larval density peaked in late August and was made up entirely of alewives. Rainbow smelt larvae made up the entire catch during the first half of June and were present also in early July (Table V-3). Yellow perch comprised the smaller May catch. Carp, sculpin, some unidentifiable minnows, tesselated darter, goldfish, and trout-perch larvae were collected in small numbers in late June and early July.

The monthly occurrence of eggs in entrainment samples reflected a period of peak abundance in Lake Ontario; during that period (July and early August), densities within intake samples and lake collections were not apparently different (Table V-7 and Appendix Tables E-1 through E-4). The temporal distribution of larvae in entrainment samples also generally coincided with changes in larval densities in lake samples, but densities in the lake were usually higher. For example, the peak density of yellow perch in entrainment samples in late May (10 larvae per 1000 cubic meters) coincided with the highest yellow perch densities in the lake (average of 72.8 larvae per 1000 cubic meters along the 20-foot depth contour); likewise, rainbow smelt densities were highest during mid-June in both lake and entrainment samples (Table V-7 and Appendix Tables E-19 and E-20). During July and early August, lake samples (from along the 20-foot depth contour) had significantly higher densities of alewife than did entrainment samples, but lake and entrainment densities of alewife were similar in late August (Table V-7 and Appendix Tables E-7, E-8, E-15, and E-16). Surprisingly, the larval density reported in entrainment samples in late August was the highest observed for larvae during 1978 entrainment sampling. In addition to the lower densities of larvae in entrainment samples compared with lake samples, egg and larval diversity (number of species) also was lower in entrainment samples.

2) Viability

A comparison of the percent mortality of eggs and larvae, primarily alewife and rainbow smelt, in intake and discharge samples during 1978 was made to estimate the effect of entrainment. In addition, eggs and larvae from intake samples were subjected to temperature changes to simulate the potential impact of entrainment in the thermal plume in Lake Ontario. These mortality data have been presented in the 1978 Data Report for the Nine Mile Point aquatic ecology studies (TI 1979). Unfortunately, the numbers of eggs and larvae in viability samples were quite low, precluding any conclusions with respect to mortality or survivability following entrainment.

### 3. Overview of Year-to-Year Results

#### a. Ichthyoplankton Entrainment at Nine Mile Point

Entrainment of ichthyoplankton at the Nine Mile Point Unit 1 plant has been monitored either weekly or twice per month since 1973. Generally, the species in entrainment samples reflected the lake's species composition, except that species occurring infrequently or in low numbers often were not observed in entrainment samples. The temporal abundance of eggs and larvae in intake samples was generally similar to temporal patterns observed in Lake Ontario samples. However, densities in entrainment samples were sometimes lower than corresponding densities in lake samples, particularly larval densities in 1977 and 1978. Also, the diversity (number of species) of eggs and larvae was frequently lower in entrainment than in Lake Ontario samples. Although 100 percent mortality of entrained ichthyoplankton was assumed for the purposes of impact evaluation, station operation over the past 5 years had a minimal effect on ichthyoplankton populations in the vicinity of Nine Mile Point. For example, cropping estimates for larvae indicated that only about 0.26 percent of the alewives and rainbow smelt in Lake Ontario that were available for entrainment during 1976 were actually entrained, assuming both Nine Mile Point and the James A. FitzPatrick plant to be operating at full intake flow.

#### b. Phytoplankton Entrainment/Viability at James A. FitzPatrick

Phytoplankton entrainment and viability studies have been conducted at the James A. FitzPatrick plant since 1976. These studies used estimated phytoplankton cell densities (1976 only), chlorophyll a concentrations, and primary production rates ($^{14}C$ tracer method), to measure potential effects on the phytoplankton community of entrainment through the power plant or into the thermal plume. To determine both short-term and longer-term effects of entrainment, viability studies have been conducted using incubation periods of 7, 24, 48, and 72 hours.

Each year, temporal changes in chlorophyll a concentrations were similar. Chlorophyll a concentrations in intake samples were generally low during January-March, then exhibited a spring peak in late April and May and smaller peaks in mid-summer. Chlorophyll a concentrations were low during

October-December. The temporal trend of intake concentrations was similar to that of chlorophyll a concentrations in Lake Ontario. Overall, 1976-78 sampling results indicated lower chlorophyll a concentrations in the discharge compared with the intake. Concurrently, slightly higher concentrations of phaeophytin a (a degradation product of chlorophyll a) were observed in the discharge area. These results indicated that entrainment through the plant had some adverse impact on the entrained phytoplankton. The 3° and 2°F simulation samples and samples from the thermal plume itself (conducted to measure the effect of plume entrainment) revealed no noticeable differences in chlorophyll a concentrations between intake and plume samples. Although plant entrainment had an adverse effect on phytoplankton, the lake phytoplankton community has the potential to regenerate losses quickly and therefore negate the possible adverse affects of plant entrainment.

Primary production rates at the intake were low during March and exhibited peaks during late spring (May) and late summer (August). Temporal distribution patterns for intake production rates were similar to those in the lake. During all 3 years of sampling there was an overall yearly reduction in productivity in the discharge aftbay relative to intake rates prior to plant entrainment; however, when water temperatures were low, there was a tendency for production to be stimulated in the discharge area. The 3° and 2°F simulation and thermal plume studies in 1976 and 1977 showed that entrainment of lake phytoplankton in the thermal plume increased production; in 1978, however, increased production rates were not observed.

In summary, entrainment and viability study results showed that the power plant had little lasting effect on the phytoplankton community in the vicinity of Nine Mile Point. The ability of the phytoplankton community to quickly replace cells lost to either plant or plume entrainment resulted in negligible overall impact.

c. Zooplankton Entrainment/Viability at James A. FitzPatrick

Samples taken from the power-plant intakes contained zooplankton populations that were generally similar to those in lake samples collected during the same time period. Zooplankton entrainment typically increased from spring to summer, then decreased from fall to winter, following the temporal trend in the lake. Densities of entrained zooplankton during a typical year ranged from less than $10^4$ to more than $10^6$ organisms per cubic meter, with a maximum usually occurring in late summer (July or August). Entrainment samples were dominated by rotifers, followed by copepods, cladocerans, and protozoans. The latter three groups varied in numerical importance from year to year.

Mortality of zooplankton passing through the plant ranged from near 0 to almost 100 percent. Mortality after plant passage was generally less than 50 percent and was typically greatest during summer. Evaluation of plume entrainment mortality showed it to be considerably less than plant mortality. The greatest overall mortality was exacted upon the protozoan group. From the overall stability of the zooplankton population, as measured in lake samples, operation of the power plants had no discernible effects on these organisms, regardless of mortality caused by plant passage.

d. Ichthyoplankton Entrainment/Viability at James A. FitzPatrick

Entrainment of ichthyoplankton at the James A. FitzPatrick plant has been thoroughly monitored since 1976. During the first 8 months of 1976, replicate samples were collected every 6 hours on sampling dates twice per month. Replicate day and night samples have been collected twice per month since late September 1976. In addition to collecting samples from the intake to determine entrainment densities, samples were collected from the discharge and lake thermal plume (or thermal plume conditions were simulated) and compared with intake samples to determine egg and larval viability.

The number of species observed in entrainment samples in 1976 was similar to the diversity reported in Lake Ontario ichthyoplankton samples; also, peak densities of eggs and larvae in entrainment samples corresponded closely with those in lake samples. During 1977 and 1978, the temporal distribution of eggs and larvae in entrainment samples continued to reflect the temporal abundance in Lake Ontario, but the entrainment samples generally had fewer species. A comparison of egg and larval densities in entrainment and lake samples during 1976-78 indicated that egg concentrations within the intake were similar to or higher than those in the lake but that larval densities within the intake were frequently lower than in the lake. The number of eggs and larvae in viability samples was low during all 3 years of monitoring, precluding any conclusions with respect to mortality or survivability following entrainment. Assuming 100 percent mortality, the impact of cropping eggs and larvae of alewife and rainbow smelt (the two most abundant fish species in entrainment samples) has been estimated to represent an extremely small percentage of the reproductive potential of Lake Ontario populations. Thus, normal compensatory mechanisms should offset these minimal losses.

## SECTION VI

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APPENDIX A

PHYTOPLANKTON

Table A-1

Taxonomic List of Phytoplankton Collected in Whole-Water Samples in Vicinity of Nine Mile Point, April-December 1978

- Cyanophyta
  - Chroococcales
    - Agmenellum sp.
    - Aphanocapsa sp.
    - Aphanothece sp.
    - Chroococcus limneticus
    - Chroococcus sp.
    - Gomphosphaeria aponina
    - Gomphosphaeria lacustris
    - Gomphosphaeria naegelianum
    - Gomphosphaeria sp.
    - Marssoniella sp.
    - Microcystis sp.
    - Chroococcales unid.
  - Oscillatoriales
    - Lyngbya contorta
    - Lyngbya sp.
    - Oscillatoria limnetica
    - Oscillatoria sp.
    - Oscillatoriales unid.
  - Nostocales
    - Anabaena circinales
    - Anabaena sp.
    - Aphanizomenon flos-aquae
    - Aphanizomenon sp.
  - Cyanophyta unid.
- Chlorophyta
  - Volvocales
    - Carteria sp.
    - Chlamydomonas sp.
    - Eudorina sp.
    - Pandorina sp.
    - Pedinopera sp.
    - Volvocales unid.
  - Tetrasporales
    - Elakatothrix gelatinosa
    - Elakatothrix sp.
    - Gloeocystis sp.
    - Stylosphaeridium sp.
    - Tetrasporales unid.
  - Chlorococcales
    - Actinastrum hantzschii
    - Actinastrum sp.
    - Ankistrodesmus convolutus
    - Ankistrodesmus falcatus
    - Ankistrodesmus sp.
    - Ankyra sp.
    - Chlorella sp.
    - Chlorococcum sp.
    - Chodatella ciliata
    - Chodatella longiseta
    - Chodatella quadriseta
    - Chodatella subsalsa
    - Chodatella sp.
    - Closteriopsis longissima
    - Closteriopsis sp.
    - Coelastrum cambricum
    - Coelastrum microporum
    - Coelastrum sp.
    - Crucigenia apiculata
    - Crucigenia quadrata
    - Crucigenia rectangularis
    - Crucigenia tetrapedia
    - Crucigenia sp.
    - Dicellula sp.
    - Dictyosphaerium ehrenbergianum
    - Dictyosphaerium pulchellum
    - Dictyosphaerium sp.
    - Franceia druescheri
    - Franceia sp.
    - Golenkinia radiata
    - Golenkinia sp.
    - Kirschneriella contorta
    - Kirschneriella lunaris
    - Kirschneriella obesa
    - Kirschneriella subsolitaria
    - Kirschneriella sp.
    - Micractinium pusillum
    - Micractinium sp.
    - Oocystis borgei
    - Oocystis novae-semliae
    - Oocystis sp.
    - Paradoxia multiseta
    - Pediastrum biradiatum
    - Pediastrum boryanum
    - Pediastrum duplex
    - Pediastrum simplex
    - Pediastrum tetras
    - Pediastrum sp.

- Chlorophyta (Contd)
    - Pseudochlorella sp.
    - Quadrigula chodatii
    - Quadrigula closterioides
    - Quadrigula lacustris
    - Quadrigula sp.
    - Scenedesmus acuminatus
    - Scenedesmus acutus
    - Scenedesmus arcuatus
    - Scenedesmus armatus
    - Scenedesmus bicaudatus
    - Scenedesmus denticulatus
    - Scenedesmus ecornis
    - Scenedesmus intermedius
    - Scenedesmus opoliensis
    - Scenedesmus quadricauda
    - Scenedesmus spinosus
    - Scenedesmus sp.
    - Schroederia setigera
    - Schroederia sp.
    - Selenastrum sp.
    - Sphaerocystis schroeteri
    - Sphaerocystis sp.
    - Tetraedron caudatum
    - Tetraedron minimum
    - Tetrastrum staurogeniaeforme
    - Tetrastrum sp.
    - Treubaria setigerum
    - Treubaria triappendiculata
    - Treubaria sp.
    - Westella sp.
    - Chlorococcales unid.
  - Ulotrichales
    - Ulothrix zonata
    - Ulothrix sp.
  - Chaetophorales
    - Chaetophora sp.
    - Stigeoclonium sp.
  - Oedogoniales
    - Oedogonium sp.
  - Zygnematales
    - Zygnemataceae
      - Mougeotia sp.
      - Spirogyra sp.
    - Desmidiaceae
      - Closterium moniliferum
      - Closterium sp.
      - Cosmarium botryis
      - Cosmarium cyclicum
      - Cosmarium sp.
      - Staurastrum longiradiatum
      - Staurastrum paradoxum
      - Staurastrum tetracerum
      - Staurastrum sp.
  - Chlorophyta unid.
- Euglenophyta
  - Euglenales
    - Euglena sp.
    - Phacus sp.
- Xanthophyta
  - Heterococcales
    - Peroniella sp.
    - Heterococcales unid.
  - Rhizochloridales
    - Stipitococcus sp.
- Chrysophyta
  - Chrysomonadales
    - Chrysochromulina parva
    - Chrysochromulina sp.
    - Chrysococcus sp.
    - Dinobryon cylindricum
    - Dinobryon divergens
    - Dinobryon sertularia
    - Dinobryon sociale
    - Dinobryon sp.
    - Kephyrion sp.
    - Mallamonas tonsurata
    - Mallamonas sp.
    - Synura uvella
    - Synura sp.
    - Chrysomonadales unid.
  - Rhizochrysidales
    - Lagynion sp.
    - Rhizochrysis sp.
  - Isochrysidales
    - Isochrysidales unid.
  - Monosigales
    - Stelexomona dichotoma
  - Chrysophyta unid.

- Bacillariophyta-Centric
  - Eupodiscales
    - Actinocyclus normanii
    - Coscinodiscus lacustris
    - Cyclotella meneghiniana
    - Cyclotella caspia
    - Cyclotella sp.
    - Melosira granulata
    - Melosira islandica
    - Melosira italica
    - Melosira sp.
    - Skeletonema potamus
    - Skeletonema subsalsa
    - Skeletonema sp.
    - Stephanodiscus astraea
    - Stephanodiscus astraea var. minuta
    - Stephanodiscus binderana
    - Stephanodiscus niagarae
    - Stephanodiscus tenuis
    - Stephanodiscus sp.
    - Eupodiscales unid.
- Bacillariophyta-Pennate
  - Fragilariales
    - Asterionella formosa
    - Diatoma tenue
    - Fragilaria capucina
    - Fragilaria crotonensis
    - Fragilaria sp.
    - Meridion circulare
    - Synedra ulna
    - Synedra sp.
    - Tabellaria flocculosa
    - Tabellaria sp.
    - Fragilariales unid.
  - Achnanthales
    - Cocconeis sp.
    - Rhoicosphenia curvata
  - Naviculales
    - Amphora sp.
    - Cymbella sp.
    - Gomphonema sp.
    - Gyrosigma sp.
    - Navicula sp.
    - Pinnularia sp.
    - Naviculales unid.
  - Bacillariales
    - Nitzschia acicularis
    - Nitzschia holsatica
    - Nitzschia sigmoidae
    - Nitzschia sp.
  - Surirellales
    - Cymatopleura solea
    - Surirella ovata
    - Surirella sp.
  - Bacillariophyta-Pennate unid.
- Rhodophyta-Florideophycidae
  - Nemalionales
    - Batrachospermum sp.
- Pyrrhophyta-Dinophyceae
  - Gymnodiniales
    - Gymnodinium fuscum
    - Gymnodinium helveticum
    - Gymnodinium sp.
  - Peridinales
    - Ceratium hirundinella
    - Peridinium aciculiferum
    - Peridinium gatunense
    - Peridinium gymnodinium
    - Peridinium inconspicuum
    - Peridinium sp.
  - Pyrrhophyta-Dinophyceae unid.
- Cryptophyta
  - Cryptomonadales
    - Chroomonas sp.
    - Cryptomonas erosa
    - Cryptomonas marssonii
    - Cryptomonas ovata
    - Cryptomonas sp.
    - Cyanomonas sp.
    - Rhodomonas lens
    - Rhodomonas minuta
    - Rhodomonas sp.
    - Cryptomonales unid.
  - Cryptophyta unid.
- Alga unid.

Table A-2 (Page 1 of 2)

Abundance (Cells/mℓ) of Phytoplankton in Whole Water Collections, Nine Mile Point Vicinity, 1978

Cyanophyta

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 761.5 | 587.7 | 780.4 | 780.4 | 1002.6 | 894.5 | 3587.7 | 2321.4 | 2562.7 | 811.0 | 0.0 | 0.0 |
| | NMPP | 0.0 | 0.0 | 0.0 | 0.0 | 777.4 | 777.4 | 42.9 | 42.9 | 2236.9 | 1069.8 | 378.8 | 378.8 |
| | FITZ | 0.0 | 0.0 | 667.1 | 667.1 | 264.9 | 264.9 | 119.4 | 26.0 | 5070.7 | 102.3 | 217.9 | 191.3 |
| | NMPE | 0.0 | 0.0 | 1841.6 | 1685.4 | 37.6 | 37.6 | 1109.2 | 513.3 | 1276.8 | 920.5 | 8746.9 | 87.7 |
| CONTOUR | MEAN | 190.4 | 190.4 | 822.3 | 380.9 | 520.6 | 223.0 | 1214.8 | 827.4 | 2786.8 | 808.7 | 2335.9 | 2138.4 |
| 20 | NMPW | 0.0 | 0.0 | 1418.5 | 780.9 | 821.4 | 385.4 | 326.1 | 326.1 | 1370.0 | 1276.6 | 240.7 | 37.1 |
| | NMPP | 0.0 | 0.0 | 2788.1 | 1689.4 | 2158.2 | 2158.2 | 0.0 | 0.0 | 7970.6 | 5034.5 | 3723.0 | 1713.5 |
| | FITZ | 0.0 | 0.0 | 640.4 | 640.4 | 1424.1 | 168.1 | 346.9 | 346.9 | 1003.5 | 657.4 | 1213.5 | 1213.5 |
| | NMPE | 11.8 | 11.8 | 0.0 | 0.0 | 91.9 | 91.9 | 0.0 | 0.0 | 13.4 | 13.4 | 19.9 | 19.9 |
| CONTOUR | MEAN | 3.0 | 3.0 | 1211.7 | 600.2 | 1123.9 | 439.4 | 168.3 | 97.2 | 2589.4 | 1816.5 | 1299.3 | 848.5 |
| 40 | NMPW | 41.0 | 41.0 | 392.5 | 327.6 | 205.7 | 205.7 | 49.0 | 49.0 | 1731.5 | 356.1 | 95.0 | 39.9 |
| | NMPP | 22.9 | 22.9 | 946.2 | 707.7 | 957.0 | 502.8 | 0.0 | 0.0 | 1077.9 | 7.3 | 77.0 | 77.0 |
| | FITZ | 0.0 | 0.0 | 30.3 | 30.3 | 128.9 | 42.4 | 0.0 | 0.0 | 568.3 | 568.3 | 154.7 | 5.5 |
| | NMPE | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 91.7 | 91.7 | 303.4 | 243.7 | 453.0 | 453.0 |
| CONTOUR | MEAN | 16.0 | 9.9 | 342.3 | 220.2 | 322.9 | 215.6 | 35.2 | 22.1 | 920.3 | 314.6 | 194.9 | 87.6 |
| 41# | NMPE 50% | 0.0 | 0.0 | 1282.6 | 1282.6 | 418.4 | 418.4 | 91.7 | 91.7 | 303.4 | 243.7 | 59.0 | 59.0 |
| | 25% | 0.0 | 0.0 | 10.1 | 10.1 | 1571.0 | 1571.0 | 260.8 | 260.8 | 284.5 | 258.5 | 171.5 | 27.5 |
| | 1% | 58.4 | 58.4 | 0.0 | 0.0 | 940.3 | 940.3 | 13.3 | 13.3 | 618.5 | 618.5 | 32.4 | 32.4 |
| 60 | NMPW | 0.0 | 0.0 | 289.8 | 106.9 | 864.1 | 401.0 | 124.6 | 124.6 | 16965.1 | 15484.8 | 219.8 | 62.0 |
| | NMPP | 0.0 | 0.0 | 0.0 | 0.0 | 238.3 | 143.2 | 1922.6 | 917.0 | 1466.3 | 791.5 | 490.1 | 135.0 |
| | FITZ | 11.0 | 11.0 | 667.5 | 310.0 | 177.3 | 84.2 | 174.8 | 174.8 | 624.2 | 372.4 | 3880.4 | 3740.3 |
| | NMPE | 31.6 | 31.6 | 134.9 | 134.9 | 1149.7 | 507.4 | 15.7 | 15.7 | 488.0 | 428.3 | 74.7 | 3.8 |
| CONTOUR | MEAN | 10.7 | 7.4 | 273.1 | 144.2 | 607.4 | 238.3 | 559.4 | 455.6 | 4885.9 | 4032.2 | 1166.3 | 908.8 |
| CONTROL MEAN** | | 105.7 | 93.8 | 607.2 | 243.5 | 521.6 | 170.3 | 663.0 | 437.5 | 3088.9 | 2004.0 | 1231.3 | 1074.9 |
| EXP. MEAN** | | 4.2 | 3.0 | 717.4 | 323.3 | 765.8 | 256.7 | 325.8 | 232.0 | 2502.3 | 937.2 | 1266.9 | 567.1 |
| MONTHLY MEAN | | 55.0 | 47.2 | 662.3 | 196.0 | 643.7 | 152.1 | 494.4 | 243.1 | 2795.6 | 1071.3 | 1249.1 | 587.1 |
| MONTHLY RANGE | | 0.0- 761.5 | | 0.0- 2788.1 | | 0.0- 2158.2 | | 0.0- 3587.7 | | 13.4-16965.1 | | 0.0- 8746.9 | |

* STANDARD ERROR

** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-2 (Page 2 of 2)

Cyanophyta

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 3196.7 | 120.7 | 1996.8 | 1996.8 | 563.6 | 44.3 |
| | NMPP | 7333.8 | 1569.1 | 442.0 | 442.0 | 234.7 | 234.7 |
| | FITZ | 1316.3 | 1119.7 | 354.5 | 190.1 | 925.8 | 925.8 |
| | NMPE | 753.7 | 355.8 | 276.0 | 276.0 | 0.0 | 0.0 |
| CONTOUR MEAN | | 3150.2 | 1489.2 | 767.3 | 411.2 | 431.0 | 201.4 |
| 20 | NMPW | 5157.7 | 5043.5 | 1370.4 | 1197.4 | 40.7 | 40.7 |
| | NMPP | 4677.8 | 1439.0 | 15065.0 | 14532.5 | 1028.9 | 775.9 |
| | FITZ | 2873.6 | 2572.3 | 2188.9 | 2188.9 | 109.2 | 9.7 |
| | NMPE | 5536.8 | 4232.4 | 1570.0 | 1570.0 | 78.9 | 78.9 |
| CONTOUR MEAN | | 4561.5 | 589.4 | 5048.6 | 3343.3 | 314.4 | 238.6 |
| 40 | NMPW | 2434.9 | 1169.4 | 907.7 | 907.7 | 192.6 | 145.6 |
| | NMPP | 1377.5 | 1377.5 | 252.2 | 252.2 | 143.8 | 143.8 |
| | FITZ | 2035.3 | 82.9 | 3792.4 | 2324.4 | 1796.9 | 652.5 |
| | NMPE | 0.0 | 0.0 | 1473.4 | 184.1 | 527.8 | 527.8 |
| CONTOUR MEAN | | 1461.9 | 533.8 | 1606.4 | 770.2 | 665.3 | 386.7 |
| 41# | NMPE 50% | 0.0 | 0.0 | 1473.4 | 184.1 | 527.8 | 527.8 |
| | 25% | 1248.5 | 908.8 | 1473.4 | 184.1 | 527.8 | 527.8 |
| | 1% | 4123.4 | 2258.9 | 0.0 | 0.0 | 311.5 | 11.8 |
| 60 | NMPW | 1565.4 | 1565.4 | 1324.0 | 1324.0 | 350.0 | 301.1 |
| | NMPP | 330.7 | 74.7 | 926.1 | 926.1 | 173.4 | 64.8 |
| | FITZ | 287.5 | 245.4 | 169.4 | 169.4 | 17.6 | 17.6 |
| | NMPE | 739.6 | 674.7 | 1443.4 | 1443.4 | 381.5 | 381.5 |
| CONTOUR MEAN | | 730.8 | 296.3 | 965.7 | 287.5 | 230.6 | 84.5 |
| CONTROL MEAN** | | 2423.1 | 731.9 | 1295.2 | 180.1 | 266.9 | 77.8 |
| EXP. MEAN** | | 2529.1 | 852.7 | 2898.8 | 1793.7 | 553.8 | 224.0 |
| MONTHLY MEAN | | 2476.1 | 543.0 | 2097.0 | 895.1 | 410.3 | 120.4 |
| MONTHLY RANGE | | 0.0- 7333.8 | | 0.0-15065.0 | | 0.0- 1796.9 | |

* STANDARD ERROR
** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ
\# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-3 (Page 1 of 2)

Abundance (Cells/mℓ) of Phytoplankton in Whole Water Collections, Nine Mile point Vicinity, 1978

Chlorophyta

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 378.8 | 152.9 | 3837.1 | 2015.8 | 1747.0 | 147.5 | 1116.5 | 522.8 | 1278.8 | 104.5 | 811.5 | 152.6 |
| | NMPP | 136.5 | 19.5 | 1207.7 | 567.9 | 464.8 | 186.6 | 23.8 | 23.8 | 1707.9 | 109.8 | 59.7 | 5.2 |
| | FITZ | 133.7 | 20.1 | 1007.7 | 68.3 | 800.4 | 231.7 | 454.2 | 90.8 | 1398.9 | 40.8 | 94.8 | 1.8 |
| | NMPE | 77.5 | 19.0 | 1000.2 | 167.9 | 1187.9 | 159.4 | 347.8 | 17.2 | 1538.1 | 837.3 | 657.1 | 293.8 |
| CONTOUR | MEAN | 181.6 | 67.1 | 1763.2 | 693.0 | 1050.0 | 275.3 | 485.6 | 229.4 | 1480.9 | 92.4 | 405.8 | 192.4 |
| 20 | NMPW | 125.1 | 53.5 | 589.8 | 210.1 | 1013.8 | 212.4 | 1036.6 | 240.9 | 478.1 | 338.5 | 588.6 | 192.0 |
| | NMPP | 67.9 | 58.4 | 2405.9 | 511.7 | 2067.5 | 467.2 | 236.2 | 33.7 | 2789.2 | 358.2 | 878.0 | 125.2 |
| | FITZ | 75.5 | 30.0 | 1557.0 | 153.5 | 1298.2 | 41.6 | 448.2 | 240.0 | 1216.4 | 387.7 | 303.1 | 133.8 |
| | NMPE | 29.9 | 26.9 | 548.4 | 64.5 | 1440.4 | 300.6 | 99.0 | 17.7 | 1345.3 | 1027.5 | 396.9 | 188.0 |
| CONTOUR | MEAN | 74.6 | 19.6 | 1275.3 | 443.1 | 1455.0 | 222.6 | 455.0 | 206.7 | 1457.2 | 483.3 | 541.6 | 126.9 |
| 40 | NMPW | 25.8 | 13.2 | 284.0 | 46.5 | 167.6 | 123.9 | 421.5 | 205.4 | 1347.2 | 74.9 | 66.7 | 6.0 |
| | NMPP | 27.6 | 10.4 | 820.8 | 338.9 | 958.0 | 525.5 | 238.3 | 53.6 | 791.7 | 490.8 | 496.6 | 119.0 |
| | FITZ | 116.1 | 31.5 | 33.4 | 15.8 | 796.2 | 277.2 | 59.8 | 21.6 | 3210.2 | 590.9 | 163.9 | 134.4 |
| | NMPE | 102.1 | 33.2 | 117.6 | 4.7 | 662.4 | 77.2 | 162.5 | 36.0 | 501.4 | 192.0 | 502.2 | 75.7 |
| CONTOUR | MEAN | 67.9 | 24.0 | 313.9 | 176.8 | 646.1 | 170.6 | 220.5 | 76.3 | 1462.6 | 608.4 | 307.4 | 112.7 |
| 41# | NMPE 50% | 102.1 | 33.2 | 187.3 | 59.0 | 314.3 | 254.6 | 162.5 | 36.0 | 501.4 | 192.0 | 217.6 | 208.6 |
| | 25% | 28.0 | 4.0 | 77.2 | 16.8 | 147.1 | 63.6 | 181.6 | 64.8 | 559.8 | 382.0 | 90.4 | 57.6 |
| | 1% | 36.5 | 21.9 | 199.0 | 42.7 | 627.9 | 262.9 | 186.3 | 84.1 | 689.5 | 182.0 | 357.9 | 195.7 |
| 60 | NMPW | 134.7 | 40.7 | 85.1 | 52.0 | 150.3 | 14.0 | 285.6 | 122.1 | 1731.8 | 704.4 | 322.6 | 121.3 |
| | NMPP | 33.1 | 3.5 | 140.6 | 80.2 | 402.8 | 284.1 | 694.1 | 181.6 | 1218.7 | 706.9 | 408.1 | 26.0 |
| | FITZ | 55.0 | 31.8 | 38.1 | 12.1 | 411.9 | 255.0 | 66.1 | 19.5 | 1120.7 | 389.9 | 252.6 | 135.8 |
| | NMPE | 28.5 | 15.9 | 68.4 | 4.4 | 1048.6 | 54.2 | 269.7 | 34.0 | 1327.8 | 1042.8 | 153.0 | 7.5 |
| CONTOUR | MEAN | 62.8 | 24.7 | 88.0 | 21.0 | 503.4 | 191.6 | 328.9 | 131.6 | 1349.7 | 134.2 | 284.1 | 54.0 |
| CONTROL MEAN** | | 112.8 | 41.0 | 818.8 | 445.6 | 927.2 | 201.6 | 467.4 | 137.7 | 1193.5 | 162.1 | 437.3 | 89.5 |
| EXP. MEAN** | | 80.7 | 15.3 | 901.4 | 295.3 | 900.0 | 199.1 | 277.6 | 83.8 | 1681.7 | 304.2 | 332.1 | 94.2 |
| MONTHLY MEAN | | 96.7 | 21.6 | 860.1 | 258.4 | 913.6 | 136.9 | 372.5 | 81.7 | 1437.6 | 178.0 | 384.7 | 64.2 |
| MONTHLY RANGE | | 25.8- 378.8 | | 33.4- 3837.1 | | 147.1- 2067.5 | | 23.8- 1116.5 | | 478.1- 3210.2 | | 59.7- 878.0 | |

* STANDARD ERROR

** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

\# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-3 (Page 2 of 2)

Chlorophyta

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 1769.5 | 1610.2 | 612.9 | 255.3 | 224.9 | 3.9 |
| | NMPP | 584.6 | 141.5 | 988.1 | 582.0 | 209.3 | 82.0 |
| | FITZ | 261.0 | 105.5 | 409.3 | 30.4 | 407.5 | 155.2 |
| | NMPE | 564.8 | 350.4 | 357.8 | 195.1 | 151.1 | 8.1 |
| CONTOUR MEAN | | 795.0 | 333.2 | 592.0 | 143.1 | 248.2 | 55.4 |
| 20 | NMPW | 263.6 | 10.4 | 842.3 | 626.1 | 525.8 | 288.7 |
| | NMPP | 407.0 | 40.2 | 1277.3 | 976.0 | 92.9 | 0.8 |
| | FITZ | 795.2 | 439.2 | 478.8 | 152.6 | 150.0 | 41.8 |
| | NMPE | 1323.5 | 918.0 | 377.2 | 112.1 | 385.4 | 22.4 |
| CONTOUR MEAN | | 697.3 | 237.0 | 743.9 | 203.9 | 288.5 | 101.3 |
| 40 | NMPW | 316.1 | 118.0 | 593.8 | 432.3 | 249.8 | 11.0 |
| | NMPP | 887.8 | 88.0 | 690.0 | 49.7 | 247.8 | 97.1 |
| | FITZ | 1022.3 | 355.7 | 473.0 | 269.1 | 315.3 | 25.4 |
| | NMPE | 547.6 | 84.4 | 980.3 | 269.9 | 154.9 | 29.7 |
| CONTOUR MEAN | | 693.5 | 160.6 | 684.3 | 108.2 | 241.9 | 33.0 |
| 41# | NMPE 50% | 547.6 | 84.4 | 980.3 | 269.9 | 154.9 | 29.7 |
| | 25% | 421.3 | 73.4 | 980.3 | 269.9 | 154.9 | 29.7 |
| | 1% | 811.1 | 413.7 | 1888.6 | 1225.6 | 165.9 | 21.6 |
| 60 | NMPW | 648.8 | 235.0 | 752.4 | 9.9 | 197.7 | 91.7 |
| | NMPP | 255.2 | 136.3 | 493.2 | 180.3 | 219.2 | 1.9 |
| | FITZ | 450.9 | 6.9 | 315.7 | 315.7 | 409.8 | 88.8 |
| | NMPE | 486.4 | 153.4 | 1660.5 | 319.2 | 214.0 | 116.1 |
| CONTOUR MEAN | | 460.3 | 80.8 | 805.5 | 298.8 | 260.2 | 50.1 |
| CONTROL MEAN** | | 740.0 | 186.5 | 772.1 | 147.8 | 263.0 | 45.6 |
| EXP. MEAN** | | 583.0 | 102.7 | 640.7 | 116.8 | 256.5 | 40.4 |
| MONTHLY MEAN | | 661.5 | 104.8 | 706.4 | 92.5 | 259.7 | 29.5 |
| MONTHLY RANGE | | 255.2- 1769.5 | | 315.7- 1888.6 | | 92.9- 525.8 | |

* STANDARD ERROR
** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ
\# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-4 (Page 1 of 2)

Abundance (Cells/mℓ) of Phytoplankton in Whole Water Collections, Nine Mile Point Vicinity, 1978

Bacillariophyta-Centric

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 2370.8 | 129.2 | 4381.0 | 1147.9 | 914.9 | 93.1 | 330.6 | 259.2 | 40.3 | 4.6 | 175.4 | 23.5 |
| | NMPP | 398.1 | 18.0 | 1546.1 | 221.3 | 672.1 | 79.7 | 82.9 | 15.1 | 89.4 | 50.7 | 0.0 | 0.0 |
| | FITZ | 736.8 | 12.5 | 1167.3 | 44.5 | 544.1 | 72.7 | 23.4 | 23.4 | 14.1 | 3.2 | 0.0 | 0.0 |
| | NMPE | 501.8 | 84.1 | 450.9 | 60.2 | 822.7 | 135.3 | 149.2 | 89.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| CONTOUR | MEAN | 1001.9 | 461.8 | 1886.8 | 861.9 | 738.5 | 81.9 | 146.5 | 66.5 | 35.9 | 19.7 | 43.9 | 43.9 |
| 20 | NMPW | 1098.7 | 187.1 | 1371.7 | 685.6 | 970.3 | 96.3 | 12.7 | 1.4 | 28.0 | 22.2 | 127.3 | 127.3 |
| | NMPP | 179.2 | 10.2 | 1500.8 | 184.3 | 1246.7 | 622.2 | 7.8 | 7.8 | 15.8 | 15.8 | 0.0 | 0.0 |
| | FITZ | 651.1 | 237.7 | 1729.6 | 35.3 | 1213.4 | 501.6 | 40.3 | 8.3 | 13.0 | 13.0 | 134.8 | 21.5 |
| | NMPE | 357.5 | 49.7 | 484.9 | 68.6 | 815.0 | 98.1 | 0.0 | 0.0 | 51.3 | 51.3 | 49.2 | 49.2 |
| CONTOUR | MEAN | 571.6 | 200.8 | 1271.7 | 272.5 | 1061.4 | 102.6 | 15.2 | 8.8 | 27.0 | 8.7 | 77.8 | 32.4 |
| 40 | NMPW | 139.8 | 0.9 | 533.2 | 88.3 | 391.3 | 82.7 | 37.4 | 21.4 | 5.3 | 5.3 | 38.6 | 38.6 |
| | NMPP | 146.9 | 43.4 | 940.9 | 68.4 | 378.5 | 151.4 | 18.7 | 5.5 | 19.7 | 19.7 | 90.0 | 63.9 |
| | FITZ | 568.1 | 110.3 | 60.9 | 6.9 | 204.6 | 33.3 | 144.0 | 86.6 | 0.0 | 0.0 | 76.7 | 76.7 |
| | NMPE | 469.3 | 13.2 | 156.9 | 0.9 | 129.8 | 13.0 | 51.7 | 36.8 | 0.0 | 0.0 | 37.1 | 37.1 |
| CONTOUR | MEAN | 331.0 | 110.2 | 423.0 | 200.5 | 276.0 | 64.7 | 63.0 | 27.9 | 6.3 | 4.7 | 60.6 | 13.4 |
| 41# | NMPE 50% | 469.3 | 13.2 | 238.6 | 46.2 | 421.7 | 421.7 | 51.7 | 36.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 25% | 291.3 | 83.6 | 139.3 | 4.3 | 168.3 | 49.7 | 77.4 | 38.5 | 0.0 | 0.0 | 4.0 | 4.0 |
| | 1% | 272.3 | 60.6 | 233.8 | 64.6 | 281.6 | 127.2 | 102.6 | 35.3 | 14.1 | 14.1 | 0.0 | 0.0 |
| 60 | NMPW | 376.3 | 128.1 | 135.4 | 31.8 | 240.9 | 128.9 | 14.8 | 8.5 | 36.1 | 12.1 | 0.0 | 0.0 |
| | NMPP | 198.8 | 49.4 | 120.6 | 11.9 | 272.6 | 39.0 | 29.1 | 7.5 | 22.1 | 9.1 | 122.7 | 103.0 |
| | FITZ | 203.0 | 96.9 | 41.2 | 27.8 | 182.1 | 101.7 | 14.3 | 2.4 | 66.5 | 25.0 | 16.2 | 16.2 |
| | NMPE | 231.6 | 65.2 | 74.1 | 21.2 | 675.0 | 142.1 | 0.0 | 0.0 | 7.5 | 7.5 | 9.3 | 2.2 |
| CONTOUR | MEAN | 252.4 | 41.9 | 92.8 | 21.6 | 342.7 | 112.4 | 14.5 | 5.9 | 33.0 | 12.6 | 37.1 | 28.7 |
| CONTROL MEAN** | | 693.2 | 260.4 | 948.5 | 511.4 | 620.0 | 114.0 | 74.5 | 40.4 | 21.1 | 7.2 | 54.6 | 22.6 |
| EXP. MEAN** | | 385.3 | 84.0 | 888.7 | 253.2 | 589.3 | 151.7 | 45.0 | 16.4 | 30.1 | 10.9 | 55.0 | 20.4 |
| MONTHLY MEAN | | 539.2 | 138.0 | 918.6 | 275.8 | 604.6 | 91.8 | 59.8 | 21.4 | 25.6 | 6.4 | 54.8 | 14.7 |
| MONTHLY RANGE | | 139.8- 2370.8 | | 41.2- 4381.0 | | 129.8- 1246.7 | | 0.0- 330.6 | | 0.0- 89.4 | | 0.0- 175.4 | |

* STANDARD ERROR
** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ
\# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-4 (Page 2 of 2)

Bacillariophyta-Centric

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 0.0 | 0.0 | 178.8 | 178.8 | 278.8 | 159.9 |
| | NMPP | 9.8 | 9.8 | 83.2 | 41.1 | 159.0 | 8.5 |
| | FITZ | 4.5 | 4.5 | 236.8 | 236.8 | 260.5 | 169.7 |
| | NMPE | 5.3 | 5.3 | 361.4 | 233.0 | 423.8 | 299.7 |
| CONTOUR | MEAN | 4.9 | 2.0 | 215.1 | 58.2 | 280.5 | 54.6 |
| 20 | NMPW | 0.0 | 0.0 | 180.5 | 180.5 | 277.7 | 169.3 |
| | NMPP | 0.0 | 0.0 | 19.7 | 19.7 | 191.3 | 59.2 |
| | FITZ | 31.2 | 23.3 | 1529.9 | 182.8 | 279.9 | 8.5 |
| | NMPE | 0.0 | 0.0 | 428.2 | 61.2 | 489.6 | 18.7 |
| CONTOUR | MEAN | 7.8 | 7.8 | 539.6 | 340.6 | 309.6 | 63.4 |
| 40 | NMPW | 0.0 | 0.0 | 547.6 | 478.4 | 316.6 | 16.6 |
| | NMPP | 0.0 | 0.0 | 215.7 | 133.5 | 247.4 | 10.5 |
| | FITZ | 0.0 | 0.0 | 836.0 | 305.8 | 498.4 | 2.5 |
| | NMPE | 28.3 | 11.2 | 628.1 | 36.1 | 781.0 | 206.5 |
| CONTOUR | MEAN | 7.1 | 7.1 | 556.8 | 128.9 | 460.9 | 119.1 |
| 41# | NMPE 50% | 28.3 | 11.2 | 628.1 | 36.1 | 781.0 | 206.5 |
| | 25% | 2.7 | 2.7 | 628.1 | 36.1 | 781.0 | 206.5 |
| | 1% | 0.0 | 0.0 | 498.1 | 238.6 | 186.5 | 60.0 |
| 60 | NMPW | 0.0 | 0.0 | 0.0 | 0.0 | 291.4 | 34.9 |
| | NMPP | 0.0 | 0.0 | 408.2 | 239.8 | 178.2 | 8.1 |
| | FITZ | 5.6 | 5.6 | 399.9 | 399.9 | 159.8 | 112.8 |
| | NMPE | 0.0 | 0.0 | 21.7 | 21.7 | 211.2 | 45.7 |
| CONTOUR | MEAN | 1.4 | 1.4 | 207.5 | 113.6 | 210.1 | 29.1 |
| CONTROL MEAN** | | 4.2 | 3.5 | 293.3 | 82.9 | 383.8 | 64.9 |
| EXP. MEAN** | | 6.4 | 3.8 | 466.2 | 176.1 | 246.8 | 39.6 |
| MONTHLY MEAN | | 5.3 | 2.5 | 379.7 | 96.7 | 315.3 | 40.7 |
| MONTHLY RANGE | | 0.0- | 31.2 | 0.0- | 1529.9 | 159.0- | 781.0 |

* STANDARD ERROR

** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

\# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-5 (Page 1 of 2)

Abundance (Cells/mℓ) of Phytoplankton in Whole Water Collections, Nine Mile Point Vicinity, 1978

Bacillariophyta-Pennate

| DEPTH CONTOUR | TRANSECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 706.0 | 110.7 | 5773.0 | 354.9 | 434.9 | 67.3 | 37.3 | 11.3 | 16.4 | 5.2 | 13.1 | 0.7 |
| | NMPP | 192.5 | 84.9 | 1648.5 | 24.0 | 688.3 | 350.8 | 1.8 | 1.8 | 19.3 | 19.3 | 2.4 | 2.4 |
| | FITZ | 50.7 | 16.1 | 1243.9 | 115.2 | 487.0 | 99.0 | 11.4 | 6.7 | 4.5 | 4.5 | 9.3 | 9.3 |
| | NMPE | 103.1 | 103.1 | 1260.5 | 294.6 | 793.7 | 480.1 | 23.3 | 8.0 | 102.8 | 83.9 | 0.0 | 0.0 |
| CONTOUR MEAN | | 263.0 | 150.5 | 2481.4 | 1101.2 | 601.0 | 84.3 | 18.4 | 7.7 | 35.8 | 22.6 | 6.2 | 3.0 |
| 20 | NMPW | 101.5 | 57.2 | 1530.3 | 972.7 | 1180.7 | 238.2 | 16.2 | 4.9 | 0.0 | 0.0 | 452.4 | 73.6 |
| | NMPP | 46.0 | 21.9 | 2383.8 | 815.4 | 797.6 | 157.5 | 45.9 | 45.9 | 15.6 | 0.2 | 23.7 | 8.7 |
| | FITZ | 13.3 | 0.3 | 1543.6 | 468.1 | 424.8 | 148.8 | 19.2 | 19.2 | 20.8 | 20.8 | 6.5 | 6.5 |
| | NMPE | 12.6 | 8.1 | 402.2 | 102.1 | 1659.3 | 859.1 | 20.3 | 20.3 | 6.4 | 6.4 | 165.9 | 36.6 |
| CONTOUR MEAN | | 43.4 | 20.9 | 1465.0 | 406.6 | 1015.6 | 264.3 | 25.4 | 6.9 | 10.7 | 4.6 | 162.1 | 103.2 |
| 40 | NMPW | 3.8 | 0.1 | 855.4 | 258.5 | 401.3 | 133.9 | 4.9 | 4.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| | NMPP | 1.4 | 1.4 | 1290.2 | 21.8 | 604.5 | 239.0 | 38.8 | 20.6 | 88.8 | 88.8 | 0.0 | 0.0 |
| | FITZ | 26.6 | 5.5 | 91.8 | 8.8 | 275.2 | 184.4 | 0.0 | 0.0 | 162.8 | 162.8 | 170.0 | 161.5 |
| | NMPE | 88.5 | 77.0 | 201.4 | 2.3 | 1291.2 | 51.8 | 0.0 | 0.0 | 0.0 | 0.0 | 22.1 | 22.1 |
| CONTOUR MEAN | | 30.1 | 20.3 | 609.7 | 282.6 | 643.0 | 226.4 | 10.9 | 9.4 | 62.9 | 39.3 | 48.0 | 41.0 |
| 41# | NMPE 50% | 88.5 | 77.0 | 391.3 | 95.0 | 673.4 | 472.6 | 0.0 | 0.0 | 0.0 | 0.0 | 7.9 | 7.9 |
| | 25% | 44.2 | 36.7 | 204.9 | 73.5 | 1812.5 | 424.6 | 12.4 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 1% | 16.1 | 7.3 | 507.3 | 102.2 | 413.7 | 162.3 | 568.8 | 24.9 | 0.0 | 0.0 | 0.6 | 0.6 |
| 60 | NMPW | 0.0 | 0.0 | 224.2 | 56.7 | 739.5 | 272.6 | 3.9 | 3.9 | 16.0 | 8.0 | 163.8 | 104.6 |
| | NMPP | 11.6 | 11.6 | 247.4 | 73.6 | 891.5 | 283.2 | 5.4 | 5.4 | 13.0 | 13.0 | 38.3 | 20.9 |
| | FITZ | 4.9 | 4.9 | 46.0 | 20.5 | 838.0 | 264.1 | 8.3 | 8.3 | 3.1 | 3.1 | 8.1 | 8.1 |
| | NMPE | 33.7 | 30.1 | 107.2 | 52.0 | 1235.6 | 72.8 | 11.7 | 11.7 | 0.0 | 0.0 | 25.0 | 25.0 |
| CONTOUR MEAN | | 12.5 | 7.4 | 156.2 | 47.9 | 926.2 | 107.9 | 7.3 | 1.7 | 8.0 | 3.8 | 58.8 | 35.5 |
| CONTROL MEAN** | | 131.1 | 83.5 | 1294.2 | 666.2 | 967.0 | 157.4 | 14.7 | 4.3 | 17.7 | 12.4 | 105.3 | 55.4 |
| EXP. MEAN** | | 43.4 | 22.2 | 1061.9 | 300.2 | 625.9 | 77.0 | 16.4 | 6.1 | 41.0 | 19.9 | 32.3 | 20.2 |
| MONTHLY MEAN | | 87.3 | 43.3 | 1178.1 | 354.2 | 796.4 | 95.4 | 15.5 | 3.6 | 29.3 | 11.7 | 68.8 | 30.0 |
| MONTHLY RANGE | | 0.0- 706.0 | | 46.0- 5773.0 | | 275.2- 1812.5 | | 0.0- 568.8 | | 0.0- 162.8 | | 0.0- 452.4 | |

* STANDARD ERROR

** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-5 (Page 2 of 2)

Bacillariophyta-Pennate

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 4.3 | 1.4 | 21.7 | 21.7 | 108.1 | 5.4 |
| | NMPP | 103.5 | 62.3 | 238.3 | 238.3 | 184.2 | 25.3 |
| | FITZ | 123.2 | 27.6 | 52.9 | 29.3 | 194.2 | 3.6 |
| | NMPE | 134.4 | 132.2 | 15.6 | 15.6 | 302.3 | 140.5 |
| CONTOUR MEAN | | 91.3 | 29.7 | 82.1 | 52.7 | 197.2 | 40.0 |
| 20 | NMPW | 156.3 | 156.3 | 21.6 | 21.6 | 177.2 | 65.4 |
| | NMPP | 166.7 | 152.9 | 0.0 | 0.0 | 143.9 | 5.2 |
| | FITZ | 179.1 | 102.2 | 42.1 | 42.1 | 199.2 | 165.2 |
| | NMPE | 147.6 | 134.5 | 210.0 | 6.1 | 269.7 | 188.1 |
| CONTOUR MEAN | | 162.4 | 6.8 | 68.4 | 48.0 | 197.5 | 26.6 |
| 40 | NMPW | 32.9 | 32.9 | 0.0 | 0.0 | 417.3 | 124.8 |
| | NMPP | 64.0 | 11.4 | 276.2 | 111.8 | 386.9 | 323.9 |
| | FITZ | 450.8 | 245.9 | 0.0 | 0.0 | 133.0 | 31.8 |
| | NMPE | 682.0 | 668.2 | 136.7 | 136.7 | 318.9 | 16.5 |
| CONTOUR MEAN | | 307.4 | 156.9 | 103.2 | 66.1 | 314.0 | 63.7 |
| 41# | NMPE 50% | 682.0 | 668.2 | 136.7 | 136.7 | 318.9 | 16.5 |
| | 25% | 84.5 | 83.9 | 136.7 | 136.7 | 318.9 | 16.5 |
| | 1% | 68.0 | 40.5 | 18.4 | 18.4 | 126.8 | 93.0 |
| 60 | NMPW | 591.2 | 267.5 | 260.8 | 260.8 | 88.1 | 27.7 |
| | NMPP | 166.5 | 118.4 | 22.3 | 22.3 | 138.1 | 37.2 |
| | FITZ | 116.4 | 28.0 | 357.8 | 357.8 | 90.8 | 69.2 |
| | NMPE | 530.8 | 378.4 | 0.0 | 0.0 | 253.6 | 105.7 |
| CONTOUR MEAN | | 351.2 | 122.2 | 160.2 | 88.4 | 142.6 | 38.7 |
| CONTROL MEAN** | | 284.9 | 95.7 | 83.3 | 37.0 | 241.9 | 39.4 |
| EXP. MEAN** | | 171.3 | 42.2 | 123.7 | 50.7 | 183.8 | 31.8 |
| MONTHLY MEAN | | 228.1 | 52.6 | 103.5 | 30.7 | 212.8 | 25.6 |
| MONTHLY RANGE | | 4.3- | 682.0 | 0.0- | 357.8 | 88.1- | 417.3 |

* STANDARD ERROR

** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-6 (Page 1 of 2)

Abundance (Cells/mℓ) of Phytoplankton in Whole Water Collections, Nine Mile Point Vicinity, 1978

Cryptophyta

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 200.5 | 37.6 | 651.1 | 246.3 | 299.7 | 35.6 | 207.6 | 122.0 | 201.5 | 42.5 | 64.9 | 9.7 |
| | NMPP | 176.4 | 37.7 | 288.3 | 7.7 | 164.1 | 24.4 | 262.0 | 95.5 | 160.2 | 24.8 | 36.7 | 20.5 |
| | FITZ | 195.9 | 53.9 | 252.2 | 75.2 | 71.1 | 58.7 | 149.2 | 22.1 | 459.8 | 48.0 | 92.0 | 71.6 |
| | NMPE | 254.7 | 4.1 | 334.7 | 96.0 | 254.2 | 44.4 | 579.3 | 314.5 | 601.7 | 118.1 | 190.2 | 122.7 |
| CONTOUR MEAN | | 206.9 | 16.8 | 381.6 | 91.4 | 197.3 | 50.6 | 299.6 | 96.1 | 355.8 | 105.4 | 96.0 | 33.4 |
| 20 | NMPW | 240.2 | 122.9 | 622.4 | 152.3 | 271.2 | 1.3 | 141.3 | 6.3 | 202.0 | 178.1 | 93.0 | 17.3 |
| | NMPP | 69.8 | 24.9 | 225.8 | 9.1 | 175.5 | 14.8 | 71.4 | 2.9 | 391.1 | 114.0 | 140.9 | 20.9 |
| | FITZ | 139.5 | 58.1 | 210.9 | 123.2 | 190.3 | 43.8 | 362.3 | 314.3 | 510.6 | 69.4 | 64.9 | 0.2 |
| | NMPE | 130.5 | 0.3 | 156.2 | 51.9 | 192.3 | 8.4 | 103.9 | 1.8 | 561.8 | 413.0 | 147.1 | 100.3 |
| CONTOUR MEAN | | 145.0 | 35.3 | 303.8 | 107.2 | 207.3 | 21.6 | 169.7 | 65.8 | 416.4 | 79.9 | 111.5 | 19.7 |
| 40 | NMPW | 138.6 | 34.4 | 396.2 | 13.5 | 99.4 | 12.0 | 53.4 | 5.4 | 284.9 | 20.0 | 0.0 | 0.0 |
| | NMPP | 128.1 | 5.1 | 439.2 | 74.6 | 302.8 | 108.1 | 183.8 | 58.4 | 452.5 | 86.2 | 85.2 | 7.1 |
| | FITZ | 217.6 | 70.0 | 48.7 | 3.2 | 390.1 | 89.5 | 122.2 | 84.0 | 532.7 | 222.0 | 20.7 | 20.7 |
| | NMPE | 297.5 | 77.0 | 172.4 | 7.2 | 325.5 | 21.0 | 188.3 | 20.6 | 347.9 | 80.3 | 185.1 | 74.6 |
| CONTOUR MEAN | | 195.5 | 39.4 | 264.1 | 92.6 | 279.4 | 62.8 | 136.9 | 31.7 | 404.5 | 55.0 | 72.8 | 41.6 |
| 41# | NMPE 50% | 297.5 | 77.0 | 280.2 | 43.0 | 290.8 | 211.2 | 188.3 | 20.6 | 347.9 | 80.3 | 96.4 | 77.3 |
| | 25% | 161.9 | 12.8 | 76.2 | 9.1 | 309.8 | 10.1 | 262.3 | 59.5 | 461.1 | 115.9 | 31.9 | 7.9 |
| | 1% | 118.6 | 38.3 | 326.6 | 113.9 | 364.9 | 113.5 | 283.0 | 190.6 | 698.1 | 342.1 | 9.1 | 9.1 |
| 60 | NMPW | 172.9 | 41.4 | 188.9 | 56.7 | 335.6 | 131.5 | 167.5 | 23.2 | 305.5 | 127.8 | 96.3 | 2.4 |
| | NMPP | 211.5 | 58.6 | 245.2 | 23.8 | 232.5 | 85.4 | 220.8 | 15.4 | 685.1 | 363.3 | 164.6 | 26.4 |
| | FITZ | 70.6 | 45.8 | 51.1 | 14.8 | 303.0 | 33.5 | 79.7 | 20.2 | 477.2 | 163.7 | 68.6 | 60.8 |
| | NMPE | 172.8 | 51.4 | 162.5 | 15.1 | 429.1 | 8.0 | 290.8 | 141.3 | 424.6 | 33.6 | 91.5 | 56.9 |
| CONTOUR MEAN | | 157.0 | 30.2 | 161.9 | 40.8 | 325.1 | 40.8 | 189.7 | 44.5 | 473.1 | 79.3 | 105.2 | 20.7 |
| CONTROL MEAN** | | 201.0 | 20.8 | 335.6 | 72.7 | 275.9 | 35.0 | 216.5 | 57.5 | 366.2 | 53.8 | 108.5 | 22.5 |
| EXP. MEAN** | | 151.2 | 20.9 | 220.2 | 44.8 | 228.7 | 35.5 | 181.4 | 34.8 | 458.6 | 52.4 | 84.2 | 17.2 |
| MONTHLY MEAN | | 176.1 | 15.6 | 277.9 | 43.8 | 252.3 | 24.8 | 199.0 | 32.8 | 412.4 | 38.2 | 96.4 | 14.0 |
| MONTHLY RANGE | | 69.8- | 297.5 | 48.7- | 651.1 | 71.1- | 429.1 | 53.4- | 579.3 | 160.2- | 698.1 | 0.0- | 190.2 |

* STANDARD ERROR

** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

\# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-6 (Page 2 of 2)

Cryptophyta

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 343.9 | 84.4 | 1489.4 | 550.8 | 67.5 | 54.1 |
| | NMPP | 311.7 | 130.3 | 2478.0 | 878.4 | 44.0 | 9.3 |
| | FITZ | 335.7 | 27.3 | 770.5 | 162.4 | 76.5 | 36.1 |
| | NMPE | 400.4 | 120.9 | 1232.7 | 331.6 | 244.8 | 116.9 |
| CONTOUR | MEAN | 347.9 | 18.8 | 1492.7 | 360.5 | 108.2 | 46.1 |
| 20 | NMPW | 492.8 | 197.4 | 2573.5 | 475.7 | 186.1 | 98.0 |
| | NMPP | 340.5 | 130.1 | 1757.2 | 1025.0 | 68.5 | 23.5 |
| | FITZ | 399.8 | 217.4 | 2450.5 | 664.4 | 75.5 | 18.6 |
| | NMPE | 839.6 | 337.2 | 2314.2 | 438.4 | 203.2 | 33.5 |
| CONTOUR | MEAN | 518.2 | 111.6 | 2273.8 | 180.2 | 133.3 | 35.6 |
| 40 | NMPW | 366.6 | 146.4 | 928.0 | 374.3 | 103.6 | 14.1 |
| | NMPP | 461.6 | 184.8 | 1378.1 | 453.5 | 72.2 | 14.7 |
| | FITZ | 496.7 | 151.5 | 1916.6 | 570.9 | 244.9 | 31.3 |
| | NMPE | 439.8 | 143.5 | 3314.9 | 592.0 | 133.0 | 43.5 |
| CONTOUR | MEAN | 441.2 | 27.5 | 1884.4 | 517.9 | 138.4 | 37.6 |
| 41# | NMPE 50% | 439.8 | 143.5 | 3314.9 | 592.0 | 133.0 | 43.5 |
| | 25% | 283.4 | 53.3 | 3314.9 | 592.0 | 133.0 | 43.5 |
| | 1% | 245.0 | 14.9 | 1744.5 | 1017.9 | 136.5 | 40.0 |
| 60 | NMPW | 498.8 | 176.8 | 2839.4 | 972.1 | 134.2 | 28.9 |
| | NMPP | 143.9 | 69.4 | 1779.7 | 796.4 | 129.4 | 10.3 |
| | FITZ | 276.2 | 76.4 | 1665.8 | 649.4 | 81.8 | 18.4 |
| | NMPE | 234.4 | 223.6 | 3289.6 | 204.9 | 174.9 | 6.7 |
| CONTOUR | MEAN | 288.3 | 75.4 | 2393.6 | 398.8 | 130.1 | 19.0 |
| CONTROL MEAN** | | 452.1 | 63.1 | 2247.7 | 328.2 | 155.9 | 20.3 |
| EXP. MEAN** | | 345.8 | 39.2 | 1774.5 | 195.9 | 99.1 | 22.5 |
| MONTHLY MEAN | | 398.9 | 38.4 | 2011.1 | 194.5 | 127.5 | 16.3 |
| MONTHLY RANGE | | 143.9- | 839.6 | 770.5- | 3314.9 | 44.0- | 244.9 |

* STANDARD ERROR
** MEANS ARE FOR SURFACE SAMPLES ONLY; CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ
# 40-FT SAMPLES COLLECTED AT VARIOUS LIGHT PENETRATION LEVELS

Table A-7 (Page 1 of 2)

Abundance (Cells/mℓ) of Phytoplankton in Whole Water Collection,
Nine Mile Point Vicinity, 1978

Total Phytoplankton

| Depth Contour (ft) | Transect | Apr Mean | Apr S.E.* | May Mean | May S.E. | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 4526.6 | 862.3 | 15979.3 | 1205.9 | 4943.2 | 1067.8 | 5364.9 | 1357.8 | 4223.4 | 1081.1 | 1098.1 | 128.4 |
| | NMPP | 976.0 | 98.8 | 4727.3 | 758.3 | 3477.1 | 1141.8 | 485.8 | 128.9 | 4456.0 | 881.0 | 482.1 | 396.2 |
| | FITZ | 1214.8 | 68.7 | 4620.2 | 238.9 | 2519.9 | 291.5 | 792.6 | 84.1 | 7041.2 | 5.5 | 464.5 | 294.3 |
| | NMPE | 1013.5 | 186.5 | 5044.4 | 1018.8 | 3600.6 | 670.5 | 2285.3 | 339.7 | 3787.1 | 1906.9 | 9664.0 | 506.7 |
| | Contour mean | 1932.7 | 866.2 | 7592.8 | 2797.0 | 3635.2 | 498.4 | 2232.2 | 1115.8 | 4876.9 | 734.6 | 2927.2 | 2250.4 |
| 20 | NMPW | 1836.5 | 685.3 | 5640.4 | 2843.8 | 5043.1 | 1490.8 | 1552.5 | 546.0 | 2078.1 | 1815.3 | 1582.1 | 326.9 |
| | NMPP | 370.6 | 107.7 | 9707.1 | 3101.9 | 6948.1 | 3365.1 | 380.3 | 13.7 | 11982.7 | 5862.8 | 4796.7 | 1869.5 |
| | FITZ | 918.9 | 304.2 | 5766.6 | 222.8 | 5979.2 | 859.8 | 1234.2 | 427.6 | 2778.0 | 1136.2 | 1786.1 | 1304.3 |
| | NMPE | 551.6 | 60.3 | 1668.6 | 128.2 | 4807.5 | 1027.0 | 223.3 | 4.4 | 2312.8 | 1765.7 | 783.5 | 251.3 |
| | Contour mean | 919.4 | 326.3 | 5695.7 | 1641.1 | 5694.5 | 488.5 | 847.6 | 323.3 | 4787.9 | 2402.7 | 2237.1 | 880.2 |
| 40 | NMPW | 369.7 | 78.6 | 2526.9 | 571.4 | 3460.2 | 959.2 | 830.6 | 550.6 | 3402.7 | 438.7 | 222.1 | 4.1 |
| | NMPP | 339.4 | 41.3 | 4504.0 | 215.5 | 4892.9 | 1075.9 | 492.2 | 96.4 | 2801.6 | 1052.0 | 937.4 | 455.5 |
| | FITZ | 983.8 | 188.6 | 285.2 | 7.9 | 2494.6 | 502.8 | 443.4 | 264.7 | 5569.7 | 360.5 | 598.5 | 391.8 |
| | NMPE | 1039.9 | 12.3 | 693.2 | 4.7 | 3726.4 | 353.4 | 662.4 | 150.6 | 1168.6 | 512.1 | 1306.9 | 398.1 |
| | Contour mean | 683.2 | 190.2 | 2002.3 | 965.9 | 3643.5 | 493.4 | 607.1 | 88.1 | 3235.7 | 910.0 | 766.2 | 232.0 |
| 41*** | NMPE-50% | 1039.9 | 12.3 | 2592.2 | 1051.6 | 2737.4 | 1352.6 | 662.4 | 150.6 | 1168.6 | 512.1 | 388.8 | 242.6 |
| | -25% | 540.3 | 126.5 | 538.7 | 91.2 | 4624.7 | 1727.2 | 868.1 | 275.1 | 1390.2 | 841.3 | 315.8 | 24.3 |
| | - 1% | 516.5 | 175.6 | 1356.2 | 230.7 | 3746.9 | 1318.8 | 1450.7 | 166.6 | 2026.9 | 1150.0 | 459.8 | 166.5 |
| 60 | NMPW | 755.6 | 99.6 | 958.5 | 81.2 | 3967.1 | 1764.9 | 625.5 | 67.4 | 19106.5 | 16357.2 | 809.2 | 49.5 |
| | NMPP | 490.7 | 98.5 | 904.8 | 82.7 | 2825.9 | 454.4 | 2903.9 | 1126.2 | 3528.4 | 1978.5 | 1251.0 | 224.9 |
| | FITZ | 356.6 | 174.2 | 846.3 | 236.7 | 2559.7 | 236.8 | 351.6 | 194.6 | 2930.1 | 0.4 | 4254.0 | 3981.6 |
| | NMPE | 514.0 | 165.4 | 593.9 | 199.5 | 5453.6 | 1126.4 | 678.1 | 178.3 | 2355.1 | 1559.7 | 360.7 | 83.2 |
| | Contour mean | 529.2 | 83.0 | 825.9 | 80.6 | 3701.6 | 659.0 | 1139.8 | 592.4 | 6980.0 | 4049.3 | 1668.7 | 880.7 |
| Control mean** | | 1325.9 | 485.3 | 4138.2 | 1825.3 | 4375.2 | 272.0 | 1527.8 | 594.3 | 4804.3 | 2073.4 | 1978.3 | 1109.8 |
| Experimental mean** | | 706.4 | 124.6 | 3920.2 | 1119.3 | 3962.2 | 620.8 | 885.5 | 306.3 | 5136.0 | 1115.1 | 1821.3 | 612.6 |
| Monthly mean | | 1016.1 | 254.9 | 4029.2 | 1034.5 | 4168.7 | 331.7 | 1206.7 | 333.4 | 4970.1 | 1138.0 | 1899.8 | 612.6 |
| Monthly range | | 339.4– 4526.6 | | 285.2–15979.3 | | 2494.6– 6948.1 | | 223.3– 5364.9 | | 1168.6–19106.5 | | 222.1– 9664.0 | |

*Standard error.

**Means are for surface samples only; control represents NMPW and NMPE, experimental represents NMPP and FITZ.

***40-ft samples collected at various light penetration levels.

Table A-7 (Page 2 of 2)

## Total Phytoplankton

| Depth Contour (ft) | Transect | Oct Mean | Oct S.E.* | Nov Mean | Nov S.E. | Dec Mean | Dec S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 5401.9 | 1650.5 | 4364.7 | 2711.0 | 1333.3 | 183.8 |
| | NMPP | 8366.0 | 1886.6 | 4457.7 | 319.9 | 1019.7 | 428.1 |
| | FITZ | 2090.8 | 1014.6 | 1835.8 | 541.5 | 1989.7 | 1176.2 |
| | NMPE | 1986.1 | 327.1 | 2243.5 | 109.2 | 1403.9 | 428.0 |
| | Contour Mean | 4461.2 | 1524.2 | 3225.4 | 689.9 | 1436.7 | 202.4 |
| 20 | NMPW | 6106.3 | 5052.9 | 4988.3 | 2458.1 | 1474.3 | 486.3 |
| | NMPP | 5592.1 | 1502.1 | 18273.9 | 16635.3 | 1687.6 | 922.0 |
| | FITZ | 4288.1 | 3363.5 | 6690.2 | 2865.2 | 1119.7 | 150.8 |
| | NMPE | 7847.5 | 5353.2 | 4899.5 | 1311.0 | 1559.7 | 337.7 |
| | Contour Mean | 5958.5 | 736.8 | 8713.0 | 3213.5 | 1460.3 | 121.7 |
| 40 | NMPW | 3155.3 | 1461.9 | 3016.5 | 2232.2 | 1427.7 | 91.4 |
| | NMPP | 2817.2 | 1635.4 | 2812.2 | 901.5 | 1212.2 | 293.2 |
| | FITZ | 4037.5 | 803.6 | 7058.8 | 2891.2 | 3164.6 | 688.1 |
| | NMPE | 1716.3 | 714.9 | 6710.7 | 712.3 | 2049.5 | 617.9 |
| | Contour Mean | 2931.6 | 479.9 | 4899.5 | 1149.1 | 1963.5 | 437.9 |
| 41** | NMPE-50% | 1716.3 | 714.9 | 6710.7 | 712.3 | 2049.5 | 617.9 |
| | -25% | 2040.4 | 1116.7 | 6710.7 | 712.3 | 2049.5 | 617.9 |
| | - 1% | 5251.0 | 2620.9 | 4168.0 | 67.7 | 1047.7 | 233.4 |
| 60 | NMPW | 3304.2 | 1891.1 | 5250.2 | 2573.4 | 1163.8 | 372.7 |
| | NMPP | 938.2 | 13.4 | 3629.5 | 1640.6 | 1032.0 | 61.9 |
| | FITZ | 1137.7 | 196.7 | 2992.8 | 1637.6 | 814.1 | 145.4 |
| | NMPE | 2036.3 | 1452.4 | 6503.3 | 1392.9 | 1396.2 | 399.1 |
| | Contour Mean | 1854.1 | 539.1 | 4594.0 | 794.3 | 1101.5 | 121.8 |
| Control mean*** | | 3944.2 | 796.4 | 4747.1 | 545.9 | 1476.1 | 91.4 |
| Experimental mean*** | | 3658.5 | 880.1 | 5968.9 | 1874.8 | 1505.0 | 273.7 |
| Monthly mean | | 3801.3 | 574.4 | 5358.0 | 956.2 | 1490.5 | 139.4 |
| Monthly range | | 938.2– 8366.0 | | 1835.8– 18273.9 | | 814.1– 3164.6 | |

*Standard error.

**40-ft samples collected at various light penetration levels.

***Means are for surface samples only; control represents NMPW and NMPE, experimental represents NMPP and FITZ.

Table A-8 (Page 1 of 2)

Chlorophyll a Concentration (μg/ℓ) in Whole Water Collections, Nine Mile Point Vicinity, 1978

| Depth Contour (ft) | Transect | Apr Mean | Apr S.E.* | May Mean | May S.E. | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 6.45 | 0.12 | 14.77 | 0.41 | 12.32 | 1.21 | 3.53 | 0.69 | 7.32 | 0.54 | 0.51 | 0.14 |
| | NMPP | 2.82 | 0.10 | 11.99 | 0.03 | 8.79 | 0.30 | 1.44 | 0.16 | 6.09 | 0.06 | 0.86 | 0.06 |
| | FITZ | 3.48 | 0.00 | 2.95 | 0.00 | 10.41 | 2.51 | 2.01 | 0.51 | 5.82 | 0.96 | 0.72 | 0.08 |
| | NMPE | 5.37 | 2.21 | 6.76 | 0.19 | 11.57 | 4.25 | 4.36 | 0.52 | 3.58 | 0.80 | 1.20 | 0.03 |
| | Contour mean | 4.53 | 0.84 | 9.12 | 2.64 | 10.77 | 0.77 | 2.84 | 0.67 | 5.70 | 0.78 | 0.82 | 0.14 |
| 20 | NMPW | 4.01 | 1.01 | 13.57 | 1.61 | 6.57 | 0.43 | 3.37 | 0.17 | 6.86 | 0.83 | 0.45 | 0.08 |
| | NMPP | 2.76 | 0.12 | 12.18 | 1.82 | 14.07 | 0.88 | 1.26 | 0.30 | 4.49 | 0.70 | 0.64 | 0.11 |
| | FITZ | 2.82 | 0.06 | 12.02 | 2.30 | 11.83 | 1.15 | 1.74 | 0.19 | 4.86 | 0.86 | 0.62 | 0.03 |
| | NMPE | 2.68 | 0.32 | 8.28 | 0.70 | 16.00 | 2.81 | 2.27 | 0.03 | 4.03 | 1.15 | 1.04 | 0.24 |
| | Contour mean | 3.07 | 0.32 | 11.51 | 1.31 | 12.12 | 2.04 | 2.16 | 0.45 | 5.06 | 0.62 | 0.69 | 0.12 |
| 40 | NMPW | 2.46 | 0.06 | 14.85 | 8.92 | 7.53 | 1.18 | 2.70 | 0.14 | 6.38 | 0.19 | 0.56 | 0.03 |
| | NMPP | 2.44 | 0.12 | 15.51 | 0.83 | 8.84 | 0.46 | 1.66 | 0.27 | 6.11 | 0.24 | 0.51 | 0.14 |
| | FITZ | 2.68 | 0.16 | 10.08 | 1.09 | 7.53 | 1.76 | 1.63 | 0.51 | 4.04 | 0.30 | 0.24 | 0.14 |
| | NMPE | 2.68 | 0.12 | 2.43 | 0.19 | 5.40 | 0.11 | 2.56 | 0.16 | 3.98 | 0.14 | 1.23 | 0.06 |
| | Contour mean | 2.57 | 0.07 | 10.72 | 3.02 | 7.33 | 0.71 | 2.14 | 0.29 | 5.13 | 0.65 | 0.64 | 0.21 |
| 41*** | NMPE-50% | 2.68 | 0.12 | 2.22 | 0.19 | 6.94 | 0.75 | 2.56 | 0.16 | 3.98 | 0.14 | 1.50 | 0.00 |
| | -25% | 2.60 | 0.20 | 2.51 | 0.05 | 8.68 | 0.78 | 1.63 | 0.08 | 2.30 | 0.22 | 0.75 | 0.16 |
| | - 1% | 2.48 | 0.36 | 2.51 | 0.11 | 7.91 | 0.06 | 2.24 | 0.16 | 2.70 | 0.14 | 0.48 | 0.05 |
| 60 | NMPW | 1.86 | 0.38 | 5.55 | 0.16 | 6.62 | 0.43 | 1.71 | 0.11 | 5.26 | 0.24 | 0.56 | 0.08 |
| | NMPP | 2.30 | 0.14 | 2.86 | 0.19 | 7.51 | 0.14 | 2.27 | 0.67 | 5.58 | 0.13 | 0.70 | 0.22 |
| | FITZ | 1.36 | 1.20 | 2.81 | 0.14 | 6.30 | 0.64 | 1.98 | 0.16 | 3.10 | 0.96 | 0.59 | 0.16 |
| | NMPE | 2.00 | 0.56 | 2.46 | 0.32 | 4.03 | 0.67 | 2.19 | 0.05 | 2.64 | 0.56 | 1.20 | 0.08 |
| | Contour mean | 1.88 | 0.20 | 3.42 | 0.72 | 6.12 | 0.74 | 2.04 | 0.13 | 4.15 | 0.74 | 0.76 | 0.15 |
| Control mean** | | 3.44 | 0.59 | 8.58 | 1.84 | 8.76 | 1.45 | 2.84 | 0.30 | 5.01 | 0.60 | 0.84 | 0.12 |
| Experimental mean** | | 2.58 | 0.21 | 8.80 | 1.81 | 9.41 | 0.91 | 1.74 | 0.12 | 5.01 | 0.38 | 0.61 | 0.06 |
| Monthly mean | | 3.01 | 0.32 | 8.69 | 1.25 | 9.08 | 0.83 | 2.29 | 0.21 | 5.01 | 0.35 | 0.73 | 0.07 |
| Monthly range | | 1.36 – 6.45 | | 2.43 – 15.51 | | 4.03 – 16.00 | | 1.26 – 4.36 | | 2.64 – 7.32 | | 0.24 – 1.50 | |

*Standard error.

**Means are for surface samples only; control represents NMPW and NMPE, experimental represents NMPP and FITZ.

***40-ft samples collected at various light penetration levels.

Table A-8 (Page 2 of 2)

Chlorophyll *a*

| Depth Contour (ft) | Transect | Oct Mean | Oct S.E.* | Nov Mean | Nov S.E. | Dec Mean | Dec S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 2.39 | 0.12 | 4.49 | 0.04 | 4.66 | 1.41 |
| | NMPP | 2.34 | 0.29 | 4.29 | 0.32 | 5.09 | 0.43 |
| | FITZ | 3.03 | 0.18 | 2.89 | 1.17 | 5.30 | 0.31 |
| | NMPE | 3.75 | 0.19 | 4.23 | 0.61 | 5.64 | 0.26 |
| | Contour Mean | 2.88 | 0.33 | 3.98 | 0.37 | 5.17 | 0.20 |
| 20 | NMPW | 2.82 | 0.08 | 4.71 | 0.51 | 4.94 | 0.03 |
| | NMPP | 1.72 | 0.50 | 3.64 | 0.04 | 5.72 | 0.23 |
| | FITZ | 1.99 | 0.64 | 2.60 | 0.13 | 5.90 | 0.12 |
| | NMPE | 1.27 | 1.17 | 1.48 | 0.97 | 5.21 | 0.14 |
| | Contour Mean | 1.95 | 0.33 | 3.11 | 0.69 | 5.44 | 0.22 |
| 40 | NMPW | 2.31 | 0.93 | 4.15 | 0.02 | 6.39 | 0.63 |
| | NMPP | 2.55 | 0.24 | 6.23 | 0.98 | 4.15 | 0.29 |
| | FITZ | 2.39 | 1.24 | 4.31 | 0.47 | 4.46 | 0.25 |
| | NMPE | 2.16 | 0.40 | 5.21 | 0.34 | 4.97 | 0.70 |
| | Contour Mean | 2.35 | 0.08 | 4.98 | 0.48 | 4.99 | 0.50 |
| 41** | NMPE-50% | 2.16 | 0.40 | 5.21 | 0.34 | 4.97 | 0.70 |
| | -25% | 1.03 | 0.93 | 5.21 | 0.34 | 4.97 | 0.70 |
| | - 1% | 3.16 | 0.40 | 2.97 | 0.31 | 5.99 | 0.18 |
| 60 | NMPW | 2.53 | 0.13 | 5.03 | 1.06 | 4.91 | 0.00 |
| | NMPP | 1.95 | 0.16 | 2.75 | 2.59 | 3.37 | 0.26 |
| | FITZ | 2.71 | 1.65 | 5.29 | 1.03 | 4.56 | 0.10 |
| | NMPE | 1.60 | 0.03 | 3.86 | 0.37 | 4.64 | 0.03 |
| | Contour Mean | 2.20 | 0.26 | 4.23 | 0.58 | 4.37 | 0.34 |
| Control mean*** | | 2.35 | 0.27 | 4.15 | 0.41 | 5.17 | 0.21 |
| Experimental mean*** | | 2.34 | 0.15 | 4.00 | 0.46 | 4.82 | 0.30 |
| Monthly mean | | 2.34 | 0.15 | 4.07 | 0.30 | 4.98 | 0.18 |
| Monthly range | | 1.27-3.75 | | 1.48-6.23 | | 3.37-6.39 | |

*Standard error.

**40-ft samples collected at various light penetration levels.

***Means are for surface samples only; control represents NMPW and NMPE, experimental represents NMPP and FITZ.

Table A-9 (Page 1 of 2)

Phaeophytin a Concentration (μg/ℓ) in Whole Water Collections, Nine Mile Point Vicinity, 1978

| Depth Contour (ft) | Transect | Apr Mean | Apr S.E.* | May Mean | May S.E. | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 0.20 | 0.10 | 4.90 | 0.05 | 2.09 | 1.99 | 2.77 | 0.36 | 1.47 | 0.46 | 0.24 | 0.14 |
| | NMPP | <0.10 | 0.00 | 2.80 | 0.18 | <0.10 | 0.00 | 0.86 | 0.14 | 1.99 | 0.10 | 0.12 | 0.02 |
| | FITZ | <0.10 | 0.00 | 0.53 | 0.07 | 2.77 | 2.67 | 1.00 | 0.21 | 1.55 | 0.91 | 0.16 | 0.03 |
| | NMPE | 0.53 | 0.43 | 1.58 | 0.00 | 2.82 | 2.72 | 2.98 | 0.41 | 0.95 | 0.10 | 0.50 | 0.14 |
| | Contour mean | 0.23 | 0.10 | 2.45 | 0.94 | 1.95 | 0.64 | 1.90 | 0.56 | 1.49 | 0.21 | 0.26 | 0.09 |
| 20 | NMPW | 0.93 | 0.83 | <0.10 | 0.00 | 3.04 | 0.28 | 1.77 | 0.21 | 1.57 | 0.09 | 0.37 | 0.12 |
| | NMPP | 0.18 | 0.08 | 0.22 | 0.12 | 0.47 | 0.37 | 0.95 | 0.12 | 1.40 | 0.22 | 0.35 | 0.02 |
| | FITZ | <0.10 | 0.00 | 0.28 | 0.18 | <0.10 | 0.00 | 1.56 | 0.12 | 1.14 | 0.40 | 0.20 | 0.10 |
| | NMPE | <0.10 | 0.00 | 0.34 | 0.24 | 0.10 | 0.00 | 1.15 | 0.12 | 0.94 | 0.20 | 0.21 | 0.11 |
| | Contour mean | 0.33 | 0.20 | 0.24 | 0.05 | 0.93 | 0.71 | 1.36 | 0.19 | 1.26 | 0.14 | 0.28 | 0.04 |
| 40 | NMPW | <0.10 | 0.00 | 0.45 | 0.35 | <0.28 | 0.18 | 1.40 | 0.04 | 1.98 | 0.51 | <0.10 | 0.00 |
| | NMPP | 0.13 | 0.01 | 0.50 | 0.40 | <0.10 | 0.00 | 0.93 | 0.19 | 1.55 | 0.02 | 0.11 | 0.01 |
| | FITZ | 0.21 | 0.01 | 2.17 | 0.56 | 1.02 | 0.92 | 1.06 | 0.09 | 1.02 | 0.11 | 0.73 | 0.24 |
| | NMPE | <0.10 | 0.00 | 0.22 | 0.12 | 2.63 | 1.29 | 1.03 | 0.41 | 1.03 | 0.17 | <0.10 | 0.00 |
| | Contour mean | 0.14 | 0.03 | 0.84 | 0.45 | 1.01 | 0.58 | 1.11 | 0.10 | 1.40 | 0.23 | 0.26 | 0.16 |
| 41*** | NMPE-50% | <0.10 | 0.00 | 0.18 | 0.08 | 0.38 | 0.28 | 1.03 | 0.41 | 1.03 | 0.17 | <0.10 | 0.00 |
| | -25% | 0.14 | 0.04 | 0.44 | 0.06 | <0.10 | 0.00 | 1.36 | 0.07 | 0.64 | 0.03 | 0.43 | 0.10 |
| | - 1% | <0.10 | 0.00 | 0.35 | 0.06 | <0.10 | 0.00 | 1.55 | 0.16 | 0.92 | 0.04 | 0.31 | 0.02 |
| 60 | NMPW | <0.10 | 0.00 | 0.64 | 0.05 | <0.10 | 0.00 | 1.15 | 0.02 | 1.43 | 0.21 | 0.12 | 0.01 |
| | NMPP | 0.11 | 0.01 | <0.10 | 0.00 | 0.42 | 0.32 | 1.60 | 0.10 | 1.19 | 0.24 | 0.17 | 0.07 |
| | FITZ | 2.24 | 2.14 | <0.10 | 0.00 | 0.63 | 0.36 | 1.21 | 0.24 | 1.06 | 0.39 | 0.23 | 0.13 |
| | NMPE | <0.10 | 0.00 | 0.22 | 0.12 | 4.87 | 0.26 | 1.61 | 0.16 | 0.37 | 0.10 | 0.13 | 0.02 |
| | Contour mean | 0.64 | 0.53 | 0.27 | 0.13 | 1.51 | 1.13 | 1.39 | 0.12 | 1.01 | 0.23 | 0.16 | 0.02 |
| Control mean** | | 0.27 | 0.11 | 1.06 | 0.57 | 1.99 | 0.61 | 1.73 | 0.27 | 1.22 | 0.18 | 0.22 | 0.05 |
| Experimental mean** | | 0.40 | 0.26 | 0.84 | 0.37 | 0.70 | 0.32 | 1.15 | 0.10 | 1.36 | 0.12 | 0.26 | 0.07 |
| Monthly mean | | 0.33 | 0.14 | 0.95 | 0.33 | 1.35 | 0.37 | 1.44 | 0.16 | 1.29 | 0.10 | 0.24 | 0.04 |
| Monthly range | | <0.10 – 2.24 | | <0.10 – 4.90 | | <0.10 – 4.87 | | 0.86 – 2.98 | | 0.37 – 1.99 | | <0.10 – 0.73 | |

*Standard error.

**Means are for surface samples only; control represents NMPW and NMPE, experimental represents NMPP and FITZ.

***40-ft samples collected at various light penetration levels.

Table A-9 (Page 2 of 2)

Phaeophytin a

| Depth Contour (ft) | Transect | Oct Mean | Oct S.E.* | Nov Mean | Nov S.E. | Dec Mean | Dec S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 0.41 | 0.18 | 1.94 | 0.64 | 1.04 | 0.51 |
| | NMPP | 0.38 | 0.28 | 0.52 | 0.42 | 1.46 | 0.55 |
| | FITZ | 0.23 | 0.13 | 3.36 | 0.40 | 0.36 | 0.26 |
| | NMPE | 0.33 | 0.23 | 1.64 | 0.06 | 0.92 | 0.04 |
| | Contour Mean | 0.34 | 0.04 | 1.87 | 0.58 | 0.95 | 0.23 |
| 20 | NMPW | 0.65 | 0.05 | 0.30 | 0.20 | 1.19 | 0.61 |
| | NMPP | 0.62 | 0.14 | 1.45 | 0.12 | 0.79 | 0.37 |
| | FITZ | 0.70 | 0.52 | 1.30 | 0.48 | 0.64 | 0.24 |
| | NMPE | 0.18 | 0.08 | 5.32 | 1.40 | 1.21 | 0.19 |
| | Contour Mean | 0.54 | 0.12 | 2.09 | 1.11 | 0.96 | 0.14 |
| 40 | NMPW | 0.46 | 0.36 | 0.66 | 0.12 | 0.28 | 0.18 |
| | NMPP | 0.73 | 0.31 | 0.36 | 0.26 | 1.14 | 0.25 |
| | FITZ | 1.26 | 1.16 | 1.92 | 0.44 | 0.83 | 0.34 |
| | NMPE | 1.64 | 0.70 | 0.94 | 0.16 | 1.77 | 1.56 |
| | Contour Mean | 1.02 | 0.26 | 0.97 | 0.34 | 1.01 | 0.31 |
| 41** | NMPE-50% | 1.64 | 0.70 | 0.94 | 0.16 | 1.77 | 1.56 |
| | -25% | 3.65 | 1.69 | 0.94 | 0.16 | 1.77 | 1.56 |
| | - 1% | 0.39 | 0.29 | 1.38 | 0.59 | 0.47 | 0.28 |
| 60 | NMPW | 0.32 | 0.15 | 1.41 | 1.31 | 0.42 | 0.28 |
| | NMPP | 0.47 | 0.05 | 3.67 | 2.52 | 1.07 | 0.02 |
| | FITZ | 1.05 | 0.95 | 0.86 | 0.35 | 0.34 | 0.06 |
| | NMPE | 1.06 | 0.14 | 2.00 | 0.44 | 0.53 | 0.40 |
| | Contour Mean | 0.73 | 0.19 | 1.99 | 0.61 | 0.59 | 0.16 |
| Control mean*** | | 0.63 | 0.17 | 1.78 | 0.55 | 0.92 | 0.17 |
| Experimental mean*** | | 0.68 | 0.12 | 1.68 | 0.44 | 0.83 | 0.14 |
| Monthly mean | | 0.66 | 0.10 | 1.73 | 0.34 | 0.87 | 0.11 |
| Monthly range | | 0.18-1.64 | | 0.30-5.32 | | 0.28-1.77 | |

*Standard error.

**40-ft samples collected at various light penetration levels.

***Means are for surface samples only; control represents NMPW and NMPE, experimental represents NMPP and FITZ.

Table A-10 (Page 1 of 2)

Primary Production (mg C/m$^3$/4 hr) in Whole Water Collections
Nine Mile Point Vicinity, 1978

| Depth Contour (ft) | Transect | Apr Mean | Apr S.E.* | May Mean | May S.E. | Jun Mean | Jun S.E. | Jul Mean | Jul S.E. | Aug Mean | Aug S.E. | Sep Mean | Sep S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 26.02 | 1.51 | 16.96 | 3.27 | 10.06 | 2.87 | 11.81 | 4.31 | 31.84 | 8.43 | 1.48 | 0.41 |
| | NMPP | 4.86 | 0.00 | 26.87 | 2.55 | 34.53 | 2.75 | 7.29 | 0.19 | 17.05 | 2.71 | 0.35 | 0.10 |
| | FITZ | 12.54 | 7.76 | 22.73 | 2.66 | 30.79 | 9.32 | 7.68 | 1.98 | 9.81 | 1.29 | 1.10 | 0.26 |
| | NMPE | 12.18 | 5.41 | 10.64 | 2.07 | 26.06 | 6.75 | 13.21 | 0.98 | 9.92 | 1.56 | 3.74 | 0.27 |
| | Contour mean | 13.90 | 4.41 | 19.30 | 3.53 | 25.36 | 5.39 | 10.00 | 1.48 | 17.16 | 5.18 | 1.67 | 0.73 |
| 20 | NMPW | 17.70 | 9.85 | 37.00 | 9.38 | 21.04 | 3.68 | 11.97 | 1.56 | 22.99 | 3.61 | 0.54 | 0.31 |
| | NMPP | 8.84 | 0.77 | 33.49 | 5.16 | 19.99 | 4.99 | 8.14 | 2.55 | 28.72 | 18.94 | 0.73 | 0.25 |
| | FITZ | 5.74 | 0.58 | 33.17 | 7.82 | 12.66 | 2.04 | 8.74 | 2.89 | 20.35 | 8.02 | 0.77 | 0.22 |
| | NMPE | 13.80 | 0.20 | 11.49 | 0.07 | 32.03 | 0.70 | 8.37 | 0.66 | 9.79 | 5.71 | 0.86 | 0.16 |
| | Contour mean | 11.52 | 2.65 | 28.79 | 5.83 | 21.43 | 3.99 | 9.31 | 0.90 | 20.46 | 3.96 | 0.73 | 0.07 |
| 40 | NMPW | 5.18 | 1.22 | 23.57 | 7.71 | 14.09 | 5.07 | 7.22 | 2.26 | 36.01 | 11.61 | 0.11 | 0.00 |
| | NMPP | 9.92 | 2.19 | 35.28 | 9.61 | 15.52 | 3.72 | 5.82 | 2.40 | 30.06 | 10.41 | 0.35 | 0.31 |
| | FITZ | 10.99 | 5.95 | 4.63 | 0.50 | 33.82 | 6.06 | 4.60 | 0.16 | 16.48 | 6.80 | 0.83 | 0.11 |
| | NMPE | 10.32 | 3.04 | 8.27 | 2.57 | 23.84 | 3.82 | 6.56 | 2.70 | 12.58 | 6.87 | 2.76 | 0.03 |
| | Contour mean | 9.10 | 1.33 | 17.94 | 7.09 | 21.82 | 4.54 | 6.05 | 0.56 | 23.78 | 5.54 | 1.01 | 0.60 |
| 41*** | NMPE-50% | 10.32 | 3.04 | 11.56 | 2.27 | 11.93 | 0.46 | 6.56 | 2.70 | 12.58 | 6.87 | 2.66 | 1.06 |
| | -25% | 7.78 | 0.02 | 5.35 | 2.10 | 14.10 | 3.18 | 7.18 | 0.27 | 5.37 | 2.43 | 1.15 | 0.31 |
| | - 1% | 5.94 | 3.43 | 5.94 | 0.65 | 17.20 | 7.18 | 4.21 | 0.55 | 19.71 | 8.05 | 0.46 | 0.12 |
| 60 | NMPW | 3.98 | 0.55 | 13.76 | 8.67 | 7.04 | 2.46 | 10.07 | 1.80 | 12.68 | 0.79 | 0.57 | 0.02 |
| | NMPP | 8.07 | 1.00 | 3.12 | 0.54 | 14.59 | 4.56 | 13.75 | 1.42 | 17.46 | 7.25 | 0.85 | 0.23 |
| | FITZ | 2.02 | 0.20 | 2.95 | 0.46 | 11.41 | 2.91 | 6.14 | 0.23 | 24.66 | 11.01 | 0.15 | 0.06 |
| | NMPE | 1.97 | 1.82 | 13.30 | 1.67 | 42.34 | 2.71 | 5.10 | 0.44 | 16.03 | 2.02 | 1.82 | 0.31 |
| | Contour mean | 4.01 | 1.43 | 8.28 | 3.03 | 18.85 | 7.98 | 8.77 | 1.98 | 17.71 | 2.52 | 0.85 | 0.35 |
| Control mean** | | 11.39 | 2.82 | 16.87 | 3.31 | 22.06 | 4.15 | 9.29 | 1.03 | 18.97 | 3.60 | 1.49 | 0.44 |
| Experimental mean** | | 7.87 | 1.23 | 20.28 | 5.10 | 21.66 | 3.47 | 7.77 | 0.98 | 20.57 | 2.42 | 0.64 | 0.11 |
| Monthly mean | | 9.63 | 1.55 | 18.58 | 2.97 | 21.86 | 2.61 | 8.53 | 0.71 | 19.78 | 2.11 | 1.06 | 0.25 |
| Monthly range | | 1.97 – 26.02 | | 2.95 – 37.00 | | 7.04 – 42.34 | | 4.60 – 13.75 | | 9.79 – 36.01 | | 0.11 – 3.74 | |

*Standard error.

**Means are for surface samples only; control represents NMPW and NMPE, experimental represents NMPP and FITZ.

***40-ft samples collected at various light penetration levels.

Table A-10 (Page 2 of 2)

| Depth Contour (ft) | Transect | Oct Mean | Oct S.E.* | Nov Mean | Nov S.E. | Dec Mean | Dec S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 2.42 | 0.32 | 13.75 | 0.42 | 2.24 | 0.14 |
| | NMPP | 4.15 | 0.21 | 16.55 | 3.23 | 4.79 | 0.89 |
| | FITZ | 6.65 | 3.33 | 12.43 | 0.85 | 13.07 | 4.54 |
| | NMPE | 6.10 | 1.08 | 12.79 | 0.81 | 2.99 | 0.00 |
| | Contour Mean | 4.83 | 0.97 | 13.88 | 0.93 | 5.77 | 2.49 |
| 20 | NMPW | 6.57 | 0.43 | 19.43 | 1.14 | 4.18 | 0.00 |
| | NMPP | 3.34 | 1.05 | 21.72 | 0.51 | 9.06 | 2.32 |
| | FITZ | 8.83 | 0.90 | 15.57 | 4.75 | 10.34 | 2.87 |
| | NMPE | 16.06 | 7.31 | 18.24 | 0.79 | 6.82 | 0.81 |
| | Contour Mean | 8.70 | 2.70 | 18.74 | 1.28 | 7.60 | 1.35 |
| 40 | NMPW | 7.98 | 0.35 | 18.78 | 4.18 | 9.42 | 2.41 |
| | NMPP | 9.77 | 0.38 | 20.28 | 2.40 | 4.05 | 0.92 |
| | FITZ | 9.92 | 0.76 | 25.95 | 0.14 | 13.46 | 7.35 |
| | NMPE | 16.28 | 4.65 | 21.35 | 4.91 | 17.30 | 3.47 |
| | Contour Mean | 10.99 | 1.82 | 21.59 | 1.55 | 11.06 | 2.84 |
| 41** | NMPE-50% | 16.28 | 4.65 | 21.35 | 4.91 | 17.30 | 3.47 |
| | -25% | 7.83 | 1.16 | 21.35 | 4.91 | 17.30 | 3.47 |
| | - 1% | 8.03 | 2.90 | 13.22 | 1.49 | 12.57 | 4.99 |
| 60 | NMPW | 4.10 | 0.67 | 22.32 | 4.95 | 9.42 | 1.72 |
| | NMPP | 6.15 | 1.15 | 21.89 | 3.41 | 5.54 | 0.90 |
| | FITZ | 6.55 | 1.36 | 17.48 | 0.93 | 17.17 | 3.21 |
| | NMPE | 8.16 | 2.44 | 13.68 | 9.79 | 15.23 | 1.24 |
| | Contour Mean | 6.24 | 0.84 | 18.84 | 2.04 | 11.84 | 2.67 |
| Control mean*** | | 8.46 | 1.81 | 17.54 | 1.30 | 8.45 | 1.96 |
| Experimental mean*** | | 6.92 | 0.87 | 18.98 | 1.52 | 9.69 | 1.67 |
| Monthly mean | | 7.69 | 0.99 | 18.26 | 0.98 | 9.07 | 1.25 |
| Monthly range | | 2.42-16.28 | | 12.43-25.95 | | 2.24 - 17.30 | |

*Standard error.
**40-ft samples collected at various light penetration levels.
***Means are for surface samples only; control represents NMPW and NMPE, experimental represents NMPP and FITZ.

APPENDIX B

ZOOPLANKTON

Table B-1 (Page 1 of 2)

Abundance (No./$m^3$) of Rotifera (Microzooplankton), Wisconsin Net (76-μ) Oblique Tows, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 1130. | 242. | 35416. | 2970. | 110758. | 4938. | 153538. | 10236. | 64045. | 3650. | 3485. | 120. |
| | NMPP | 720. | 93. | 20818. | 1057. | 82128. | 3084. | 132668. | 2914. | 56070. | 2228. | 3833. | 218. |
| | FITZ | 235. | 9. | 32381. | 2078. | 82307. | 1847. | 134179. | 15354. | 64971. | 7219. | 2512. | 44. |
| | NMPE | 651. | 85. | 55832. | 3784. | 65087. | 3829. | 117405. | 1642. | 44742. | 4701. | 3104. | 351. |
| CONTOUR | MEAN | 684. | 183. | 36112. | 7287. | 85070. | 9467. | 134447. | 7406. | 57457. | 4686. | 3233. | 283. |
| 20 | NMPW | 980. | 212. | 25205. | 1581. | 82936. | 4762. | 108130. | 8246. | 80556. | 5159. | 2185. | 10. |
| | NMPP | 547. | 25. | 21962. | 205. | 65870. | 8196. | 118946. | 13063. | 72817. | 212. | 3714. | 162. |
| | FITZ | 382. | 39. | 24821. | 3309. | 78936. | 4461. | 201169. | 11807. | 34118. | 1513. | 1897. | 51. |
| | NMPE | 450. | 94. | 32391. | 3449. | 78408. | 2217. | 151493. | 2467. | 55592. | 3322. | 1991. | 23. |
| CONTOUR | MEAN | 590. | 135. | 26095. | 2220. | 76537. | 3697. | 144934. | 20887. | 60771. | 10303. | 2447. | 427. |
| 40 | NMPW | 678. | 33. | 18184. | 1047. | 67278. | 1922. | 101789. | 2276. | 67728. | 1448. | 2858. | 216. |
| | NMPP | 696. | 37. | 22385. | 1221. | 85516. | 4960. | 99150. | 3398. | 76234. | 4150. | 2322. | 139. |
| | FITZ | 448. | 9. | 24306. | 1593. | 87233. | 1472. | 195262. | 7656. | 23867. | 0. | 1721. | 184. |
| | NMPE | 695. | 314. | 21781. | 764. | 81607. | 359. | 208994. | 11464. | 39836. | 4609. | 2231. | 126. |
| CONTOUR | MEAN | 629. | 61. | 21664. | 1279. | 80408. | 4532. | 151299. | 29485. | 51916. | 12159. | 2283. | 233. |
| 60 | NMPW | 671. | 40. | 16538. | 322. | 71186. | 4358. | 91804. | 13489. | 68584. | 2275. | 2566. | 168. |
| | NMPP | 378. | 54. | 29622. | 111. | 70295. | 4989. | 156462. | 43230. | 33737. | 2260. | 1868. | 103. |
| | FITZ | 566. | 76. | 13563. | 1148. | 81999. | 4783. | 211796. | 10105. | 17944. | 791. | 1275. | 88. |
| | NMPE | 621. | 86. | 11450. | 109. | 66565. | 2847. | 224627. | 4329. | 21652. | 670. | 1708. | 87. |
| CONTOUR | MEAN | 559. | 64. | 17793. | 4079. | 72511. | 3317. | 171172. | 30309. | 35479. | 11539. | 1854. | 268. |
| CONTROL MEAN** | | 735. | 76. | 27100. | 4983. | 77978. | 5294. | 144722. | 17611. | 55342. | 6719. | 2516. | 212. |
| EXP. MEAN** | | 496. | 59. | 23732. | 2017. | 79285. | 2630. | 156204. | 14833. | 47470. | 8069. | 2393. | 329. |
| MONTHLY MEAN | | 616. | 56. | 25416. | 2633. | 78632. | 2861. | 150463. | 11220. | 51406. | 5173. | 2454. | 190. |
| MONTHLY RANGE | | 235.- | 1130. | 11450.- | 55832. | 65087.- | 110758. | 91804.- | 224627. | 17944.- | 80556. | 1275.- | 3833. |

* STANDARD ERROR

** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

Table B-1 (Page 2 of 2)

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 9473. | 344. | 7475. | 397. | No samples taken due to ice and strong winds | |
| | NMPP | 10842. | 758. | 7894. | 572. | | |
| | FITZ | 11984. | 316. | 7602. | 606. | | |
| | NMPE | 18679. | 826. | 12174. | 401. | | |
| CONTOUR MEAN | | 12744. | 2044. | 8786. | 1133. | | |
| 20 | NMPW | 7545. | 937. | 9026. | 821. | | |
| | NMPP | 10710. | 778. | 6610. | 31. | | |
| | FITZ | 15041. | 914. | 8371. | 414. | | |
| | NMPE | 14457. | 1233. | 12013. | 432. | | |
| CONTOUR MEAN | | 11938. | 1751. | 9005. | 1125. | | |
| 40 | NMPW | 8709. | 573. | 6079. | 211. | | |
| | NMPP | 9102. | 176. | 7709. | 422. | | |
| | FITZ | 10117. | 628. | 10856. | 325. | | |
| | NMPE | 14420. | 469. | 5044. | 157. | | |
| CONTOUR MEAN | | 10587. | 1312. | 7422. | 1269. | | |
| 60 | NMPW | 8000. | 770. | 6258. | 80. | | |
| | NMPP | 7784. | 28. | 4813. | 51. | | |
| | FITZ | 9482. | 342. | 8146. | 237. | | |
| | NMPE | 14918. | 1376. | 9843. | 537. | | |
| CONTOUR MEAN | | 10046. | 1667. | 7265. | 1097. | | |
| CONTROL MEAN** | | 12025. | 1452. | 8489. | 962. | | |
| EXP. MEAN** | | 10633. | 772. | 7750. | 600. | | |
| MONTHLY MEAN | | 11329. | 814. | 8120. | 556. | | |
| MONTHLY RANGE | | 7545.- | 18679. | 4813.- | 12174. | | |

* STANDARD ERROR
** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

Table B-2 (Page 1 of 2)

Abundance (No./$m^3$) of Copepoda nauplii (Microzooplankton), Wisconsin Net (76-μ) Oblique Tows, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 1150. | 223. | 742. | 199. | 1631. | 573. | 36938. | 3116. | 3982. | 332. | 492. | 26. |
| | NMPP | 1022. | 70. | 967. | 223. | 3085. | 386. | 8734. | 416. | 3626. | 162. | 692. | 77. |
| | FITZ | 1142. | 32. | 693. | 0. | 1437. | 205. | 15799. | 1113. | 5001. | 217. | 695. | 87. |
| | NMPE | 1216. | 113. | 1661. | 0. | 718. | 718. | 28325. | 2053. | 5025. | 162. | 1404. | 15. |
| CONTOUR | MEAN | 1133. | 40. | 1016. | 223. | 1718. | 496. | 22449. | 6303. | 4409. | 357. | 821. | 200. |
| 20 | NMPW | 768. | 202. | 465. | 465. | 2381. | 397. | 14111. | 1916. | 6548. | 992. | 502. | 24. |
| | NMPP | 1391. | 149. | 1026. | 205. | 1062. | 759. | 11001. | 5500. | 5552. | 0. | 733. | 62. |
| | FITZ | 1501. | 184. | 827. | 92. | 1544. | 515. | 24728. | 4678. | 4650. | 952. | 563. | 96. |
| | NMPE | 1135. | 42. | 1262. | 252. | 605. | 202. | 22699. | 2961. | 2455. | 388. | 960. | 39. |
| CONTOUR | MEAN | 1199. | 163. | 895. | 169. | 1398. | 380. | 18135. | 3309. | 4801. | 873. | 690. | 102. |
| 40 | NMPW | 1319. | 15. | 1047. | 262. | 1747. | 0. | 10081. | 325. | 3378. | 161. | 821. | 66. |
| | NMPP | 1477. | 12. | 1221. | 407. | 1389. | 198. | 11429. | 2162. | 5898. | 2403. | 577. | 132. |
| | FITZ | 1132. | 61. | 1331. | 78. | 1288. | 184. | 20579. | 478. | 7650. | 459. | 519. | 59. |
| | NMPE | 964. | 874. | 1370. | 105. | 542. | 181. | 33951. | 1323. | 7066. | 717. | 778. | 52. |
| CONTOUR | MEAN | 1223. | 112. | 1242. | 72. | 1242. | 253. | 19010. | 5499. | 5998. | 946. | 674. | 74. |
| 60 | NMPW | 1182. | 23. | 1737. | 193. | 1453. | 807. | 9941. | 1442. | 4713. | 163. | 591. | 9. |
| | NMPP | 1397. | 0. | 1453. | 112. | 907. | 605. | 22734. | 4301. | 4843. | 161. | 574. | 59. |
| | FITZ | 1430. | 84. | 1318. | 383. | 1708. | 683. | 16920. | 1354. | 2693. | 898. | 544. | 115. |
| | NMPE | 1424. | 48. | 1363. | 491. | 678. | 136. | 27417. | 1443. | 5208. | 595. | 740. | 31. |
| CONTOUR | MEAN | 1358. | 59. | 1468. | 94. | 1186. | 238. | 19253. | 3774. | 4364. | 567. | 612. | 44. |
| CONTROL MEAN** | | 1145. | 72. | 1206. | 154. | 1219. | 240. | 22933. | 3729. | 4797. | 545. | 786. | 105. |
| EXP. MEAN** | | 1312. | 65. | 1105. | 95. | 1553. | 237. | 16490. | 2071. | 4989. | 526. | 612. | 29. |
| MONTHLY MEAN | | 1228. | 52. | 1155. | 88. | 1386. | 169. | 19712. | 2222. | 4893. | 367. | 699. | 57. |
| MONTHLY RANGE | | 768.- | 1501. | 465.- | 1737. | 542.- | 3085. | 8734.- | 36938. | 2455.- | 7650. | 492.- | 1404. |

* STANDARD ERROR

** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

Table B-2 (Page 2 of 2)

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 1333. | 308. | 1502. | 167. | No samples taken due to ice and strong winds | |
| | NMPP | 989. | 0. | 1373. | 0. | | |
| | FITZ | 668. | 387. | 173. | 35. | | |
| | NMPE | 914. | 141. | 259. | 111. | | |
| CONTOUR | MEAN | 976. | 137. | 827. | 354. | | |
| 20 | NMPW | 1391. | 573. | 1594. | 47. | | |
| | NMPP | 1334. | 148. | 1504. | 251. | | |
| | FITZ | 668. | 35. | 653. | 141. | | |
| | NMPE | 719. | 445. | 1213. | 6. | | |
| CONTOUR | MEAN | 1028. | 194. | 1241. | 212. | | |
| 40 | NMPW | 952. | 468. | 614. | 77. | | |
| | NMPP | 984. | 141. | 992. | 81. | | |
| | FITZ | 837. | 70. | 1385. | 19. | | |
| | NMPE | 1341. | 201. | 210. | 116. | | |
| CONTOUR | MEAN | 1029. | 109. | 800. | 252. | | |
| 60 | NMPW | 1656. | 23. | 553. | 90. | | |
| | NMPP | 880. | 55. | 600. | 188. | | |
| | FITZ | 998. | 230. | 685. | 0. | | |
| | NMPE | 2493. | 484. | 767. | 102. | | |
| CONTOUR | MEAN | 1507. | 370. | 651. | 47. | | |
| CONTROL MEAN** | | 1350. | 196. | 839. | 190. | | |
| EXP. MEAN** | | 920. | 76. | 921. | 167. | | |
| MONTHLY MEAN | | 1135. | 116. | 880. | 122. | | |
| MONTHLY RANGE | | 668.- | 2493. | 173.- | 1594. | | |

* STANDARD ERROR
** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

Table B-3 (Page 1 of 2)

Abundance (No./$m^3$) of Cyclopoida (Microzooplankton), Wisconsin Net (76-μ) Oblique Tows
Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 347. | 39. | 36. | 36. | 3660. | 573. | 6676. | 445. | 1161. | 498. | 0. | 0. |
| | NMPP | 1034. | 128. | 491. | 253. | 771. | 0. | 2495. | 2. | 406. | 406. | 26. | 0. |
| | FITZ | 1214. | 185. | 0. | 0. | 411. | 411. | 779. | 111. | 609. | 261. | 9. | 9. |
| | NMPE | 1627. | 156. | 92. | 92. | 0. | 0. | 7389. | 1642. | 81. | 81. | 274. | 66. |
| CONTOUR MEAN | | 1055. | 267. | 155. | 114. | 1210. | 831. | 4335. | 1603. | 564. | 227. | 77. | 66. |
| 20 | NMPW | 583. | 84. | 0. | 0. | 2183. | 198. | 3020. | 1858. | 1190. | 794. | 112. | 24. |
| | NMPP | 1391. | 50. | 411. | 205. | 3035. | 304. | 1261. | 573. | 214. | 214. | 75. | 0. |
| | FITZ | 1685. | 53. | 184. | 184. | 2402. | 3. | 1114. | 1114. | 560. | 560. | 19. | 4. |
| | NMPE | 733. | 233. | 168. | 0. | 0. | 0. | 9869. | 1974. | 277. | 18. | 101. | 23. |
| CONTOUR MEAN | | 1098. | 263. | 191. | 84. | 1905. | 660. | 3816. | 2064. | 560. | 223. | 77. | 21. |
| 40 | NMPW | 901. | 78. | 0. | 0. | 4194. | 699. | 3252. | 1301. | 1126. | 483. | 113. | 26. |
| | NMPP | 1404. | 256. | 102. | 102. | 4167. | 595. | 2471. | 618. | 2840. | 218. | 49. | 7. |
| | FITZ | 1115. | 79. | 78. | 78. | 5337. | 1288. | 5743. | 0. | 612. | 306. | 158. | 13. |
| | NMPE | 1423. | 78. | 105. | 105. | 3430. | 181. | 5732. | 441. | 2355. | 102. | 148. | 89. |
| CONTOUR MEAN | | 1211. | 125. | 71. | 25. | 4282. | 394. | 4299. | 845. | 1733. | 519. | 117. | 25. |
| 60 | NMPW | 843. | 53. | 0. | 0. | 6780. | 323. | 285. | 285. | 1950. | 325. | 150. | 9. |
| | NMPP | 1402. | 71. | 224. | 0. | 4384. | 454. | 3138. | 1163. | 2098. | 2. | 118. | 29. |
| | FITZ | 1469. | 92. | 0. | 0. | 4783. | 683. | 7058. | 1644. | 1471. | 125. | 269. | 49. |
| | NMPE | 640. | 105. | 164. | 164. | 2169. | 1. | 4329. | 481. | 1972. | 409. | 165. | 39. |
| CONTOUR MEAN | | 1088. | 205. | 97. | 57. | 4529. | 945. | 3702. | 1404. | 1873. | 138. | 176. | 33. |
| CONTROL MEAN** | | 887. | 153. | 71. | 25. | 2802. | 795. | 5069. | 1055. | 1264. | 286. | 133. | 27. |
| EXP. MEAN** | | 1339. | 74. | 186. | 64. | 3161. | 651. | 3007. | 802. | 1101. | 333. | 90. | 31. |
| MONTHLY MEAN | | 1113. | 101. | 128. | 37. | 2982. | 498. | 4038. | 694. | 1183. | 213. | 112. | 21. |
| MONTHLY RANGE | | 347.- | 1685. | 0.- | 491. | 0.- | 6780. | 285.- | 9869. | 81.- | 2840. | 0.- | 274. |

* STANDARD ERROR
** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 1348. | 117. | 1254. | 219. | No samples taken due to ice and strong winds | |
| | NMPP | 527. | 0. | 3106. | 498. | | |
| | FITZ | 246. | 35. | 121. | 17. | | |
| | NMPE | 158. | 53. | 641. | 25. | | |
| CONTOUR | MEAN | 570. | 271. | 1281. | 651. | | |
| 20 | NMPW | 893. | 0. | 1284. | 64. | | |
| | NMPP | 630. | 111. | 5232. | 407. | | |
| | FITZ | 141. | 70. | 555. | 90. | | |
| | NMPE | 685. | 206. | 1327. | 260. | | |
| CONTOUR | MEAN | 587. | 159. | 2099. | 1059. | | |
| 40 | NMPW | 1259. | 355. | 1074. | 192. | | |
| | NMPP | 822. | 91. | 1409. | 29. | | |
| | FITZ | 767. | 0. | 2366. | 26. | | |
| | NMPE | 469. | 67. | 533. | 31. | | |
| CONTOUR | MEAN | 830. | 163. | 1346. | 385. | | |
| 60 | NMPW | 1664. | 47. | 856. | 277. | | |
| | NMPP | 1183. | 27. | 1148. | 257. | | |
| | FITZ | 747. | 21. | 1503. | 132. | | |
| | NMPE | 2065. | 279. | 895. | 128. | | |
| CONTOUR | MEAN | 1414. | 286. | 1100. | 149. | | |
| CONTROL MEAN** | | 1068. | 225. | 983. | 106. | | |
| EXP. MEAN** | | 633. | 117. | 1930. | 578. | | |
| MONTHLY MEAN | | 850. | 135. | 1456. | 309. | | |
| MONTHLY RANGE | | 141.- | 2065. | 121.- | 5232. | | |

* STANDARD ERROR

** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

Table B-4 (Page 1 of 2)

Abundance (No./$m^3$) of Cladocera (Microzooplankton), Wisconsin Net (76-μ) Oblique Tows, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | MAY MEAN | MAY S.E. | JUN MEAN | JUN S.E. | JUL MEAN | JUL S.E. | AUG MEAN | AUG S.E. | SEP MEAN | SEP S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 0. | 0. | 0. | 0. | 2249. | 926. | 12016. | 4005. | 1659. | 664. | 198. | 49. |
| | NMPP | 12. | 12. | 0. | 0. | 2313. | 2. | 53649. | 417. | 974. | 108. | 141. | 90. |
| | FITZ | 0. | 0. | 87. | 87. | 1642. | 1232. | 9680. | 1669. | 391. | 43. | 96. | 9. |
| | NMPE | 0. | 0. | 0. | 0. | 2584. | 287. | 2874. | 1232. | 243. | 81. | 185. | 0. |
| CONTOUR | MEAN | 3. | 3. | 22. | 22. | 2197. | 199. | 19555. | 11529. | 817. | 322. | 155. | 23. |
| 20 | NMPW | 13. | 13. | 0. | 0. | 3175. | 3. | 5923. | 2439. | 1587. | 397. | 287. | 32. |
| | NMPP | 12. | 12. | 0. | 0. | 1670. | 152. | 20283. | 4469. | 1068. | 641. | 373. | 0. |
| | FITZ | 13. | 13. | 0. | 0. | 2574. | 172. | 18602. | 1894. | 1625. | 616. | 94. | 49. |
| | NMPE | 0. | 0. | 84. | 84. | 1814. | 1008. | 4935. | 987. | 406. | 111. | 55. | 23. |
| CONTOUR | MEAN | 10. | 3. | 21. | 21. | 2308. | 350. | 12436. | 4065. | 1171. | 285. | 202. | 76. |
| 40 | NMPW | 56. | 33. | 0. | 0. | 1398. | 699. | 5854. | 0. | 483. | 161. | 315. | 96. |
| | NMPP | 49. | 0. | 0. | 0. | 2183. | 595. | 12355. | 1853. | 1966. | 1092. | 153. | 14. |
| | FITZ | 0. | 0. | 0. | 0. | 5521. | 0. | 11486. | 2871. | 229. | 76. | 138. | 33. |
| | NMPE | 11. | 11. | 0. | 0. | 1986. | 903. | 10141. | 2205. | 1024. | 205. | 215. | 37. |
| CONTOUR | MEAN | 29. | 14. | 0. | 0. | 2772. | 931. | 9959. | 1442. | 926. | 384. | 205. | 40. |
| 60 | NMPW | 19. | 1. | 0. | 0. | 3228. | 3. | 6792. | 1100. | 1138. | 163. | 141. | 35. |
| | NMPP | 46. | 29. | 0. | 0. | 1209. | 0. | 9436. | 2853. | 1049. | 242. | 74. | 0. |
| | FITZ | 27. | 4. | 0. | 0. | 3075. | 342. | 11748. | 435. | 1091. | 305. | 308. | 0. |
| | NMPE | 10. | 10. | 0. | 0. | 2440. | 1085. | 13468. | 2886. | 1079. | 37. | 181. | 39. |
| CONTOUR | MEAN | 25. | 8. | 0. | 0. | 2488. | 459. | 10361. | 1448. | 1089. | 18. | 176. | 49. |
| CONTROL MEAN** | | 14. | 6. | 11. | 11. | 2359. | 226. | 7750. | 1310. | 952. | 188. | 197. | 29. |
| EXP. MEAN** | | 20. | 7. | 11. | 11. | 2523. | 476. | 18405. | 5229. | 1049. | 202. | 172. | 38. |
| MONTHLY MEAN | | 17. | 5. | 11. | 7. | 2441. | 255. | 13078. | 2945. | 1001. | 134. | 184. | 23. |
| MONTHLY RANGE | | 0.- | 56. | 0.- | 87. | 1209.- | 5521. | 2874.- | 53649. | 229.- | 1966. | 55.- | 373. |

* STANDARD ERROR
** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

Table B-4 (Page 2 of 2)

| DEPTH CONTOUR | TRAN-SECT | OCT MEAN | OCT S.E.* | NOV MEAN | NOV S.E. | DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 10 | NMPW | 3128. | 51. | 506. | 46. | No samples taken due to ice and strong winds | |
| | NMPP | 2010. | 165. | 2717. | 658. | | |
| | FITZ | 1792. | 176. | 260. | 87. | | |
| | NMPE | 3514. | 70. | 1196. | 395. | | |
| CONTOUR | MEAN | 2611. | 420. | 1170. | 552. | | |
| 20 | NMPW | 2552. | 350. | 774. | 70. | | |
| | NMPP | 3261. | 371. | 1284. | 94. | | |
| | FITZ | 1757. | 70. | 237. | 88. | | |
| | NMPE | 2432. | 240. | 1435. | 292. | | |
| CONTOUR | MEAN | 2501. | 308. | 933. | 272. | | |
| 40 | NMPW | 2817. | 170. | 518. | 19. | | |
| | NMPP | 2130. | 513. | 1123. | 308. | | |
| | FITZ | 1919. | 105. | 813. | 33. | | |
| | NMPE | 2012. | 335. | 363. | 13. | | |
| CONTOUR | MEAN | 2219. | 204. | 704. | 168. | | |
| 60 | NMPW | 2900. | 288. | 389. | 100. | | |
| | NMPP | 1980. | 220. | 445. | 69. | | |
| | FITZ | 3314. | 314. | 580. | 158. | | |
| | NMPE | 3683. | 781. | 793. | 128. | | |
| CONTOUR | MEAN | 2969. | 366. | 552. | 90. | | |
| CONTROL MEAN** | | 2880. | 197. | 747. | 138. | | |
| EXP. MEAN** | | 2270. | 226. | 932. | 288. | | |
| MONTHLY MEAN | | 2575. | 165. | 840. | 156. | | |
| MONTHLY RANGE | | 1757.- | 3683. | 237.- | 2717. | | |

* STANDARD ERROR

** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

Table B-5 (Page 1 of 2)

Abundance (No./1000 $m^3$) of Cladocera, Calanoida, and Cyclopoida (Macrozooplankton), Composited*
1-m Henson Net (571-μ) Tows, Nine Mile Point Vicinity, 1978

## Cladocera

| Date | 20-Ft Contour | | | | | | | 40-Ft Contour | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Apr | | | No Catch | | | | | | | | No Catch | | | | | No Catch | | |
| May | 85 | 0 | 0 | 0 | 0 | 0 | 14 | 689 | 0 | 0 | 0 | 0 | 0 | 115 | 0 | 0 | 109 | 59 |
| Jun | 22457 | 14003 | 14752 | 13966 | 33430 | 30185 | 21466 | 8967 | 8571 | 11498 | 7788 | 10952 | 17705 | 10914 | 12519 | 5788 | 9968 | 14837 |
| Jul | 50708 | 53943 | 24424 | 70062 | 34096 | 20155 | 42231 | 62666 | 52724 | 60415 | 89204 | 43908 | 61872 | 61798 | 143874 | 141092 | 73493 | 65509 |
| Aug | 751719 | 782222 | 907372 | 338505 | 809358 | 236451 | 637604 | 590764 | 720783 | 572396 | 908818 | 1304007 | 1709249 | 967670 | 538769 | 519257 | 311428 | 733406 |
| Sep | 929048 | 1695454 | 585109 | 2091500 | 926086 | 1428640 | 1275973 | 1404650 | 1530692 | 1620982 | 1280772 | 905144 | 1590894 | 1388856 | 1500273 | 382980 | 348608 | 1214722 |
| Oct | 166411 | 272219 | 149274 | 112756 | 219087 | 140677 | 176737 | 188844 | 122057 | 177643 | 145421 | 186968 | 189471 | 168401 | 172557 | 145935 | 144071 | 168893 |
| Nov | 184587 | 420998 | 162103 | 156641 | 159124 | 1156480 | 373322 | 533786 | 596292 | 4181179 | 162790 | 419577 | 1291914 | 570423 | 139934 | 146371 | 128126 | 405127 |
| Dec | 95908 | 266244 | 91341 | 56157 | 93384 | 107726 | 118460 | 95696 | 62715 | 131418 | 133678 | 95733 | 72568 | 98634 | 30244 | 11121 | 14921 | 90590 |

## Calanoida

| Date | 20-Ft 3-West | 20-Ft 1-West | 20-Ft 1/2-West | 20-Ft 1/2-East | 20-Ft 1-East | 20-Ft 3-East | 20-Ft Mean | 40-Ft 3-West | 40-Ft 1-West | 40-Ft 1/2-West | 40-Ft 1/2-East | 40-Ft 1-East | 40-Ft 3-East | 40-Ft Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr | 380538 | 756036 | 2880809 | 798522 | 348499 | 90833 | 875873 | 3933013 | 4902058 | 4107945 | 1198632 | 1050185 | 642656 | 2639081 | 3395762 | 1375240 | 1182421 | 1802877 |
| May | 20780 | 27143 | 64744 | 164870 | 11695 | 37236 | 54411 | 56757 | 26165 | 40026 | 88382 | 53499 | 59414 | 54041 | 13659 | 6433 | 23348 | 46277 |
| Jun | 303 | 206 | 73 | 0 | 142 | 809 | 255 | 572 | 420 | 221 | 1038 | 759 | 247 | 543 | 2325 | 2429 | 7771 | 1154 |
| Jul | | | No Catch | | | | | 0 | 0 | 404 | 717 | 1045 | 0 | 361 | 24806 | 9802 | 26403 | 4212 |
| Aug | | | No Catch | | | | | | | | No Catch | | | | 0 | 22148 | 9237 | 2092 |
| Sep | | | No Catch | | | | | | | | No Catch | | | | | No Catch | | |
| Oct | 0 | 0 | 0 | 0 | 674 | 0 | 112 | 660 | 387 | 0 | 699 | 0 | 0 | 291 | 1255 | 0 | 0 | 245 |
| Nov | 513 | 0 | 0 | 0 | 0 | 0 | 86 | | | | No Catch | | | | 619 | 0 | 1175 | 256 |
| Dec | 3935 | 4610 | 5480 | 5237 | 14473 | 3238 | 6162 | 11914 | 5085 | 5944 | 6202 | 5265 | 7576 | 6998 | 7667 | 6077 | 9792 | 6833 |

*Composite of surface, mid-depth, and bottom horizontal tows.

**T = density less than 0.05/cubic meter.

## Table B-5 (Page 2 of 2)

### Cyclopoida

| Date | 20-Ft Contour | | | | | | | 40-Ft Contour | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
| Apr | | | No Catch | | | | | | | No Catch | | | | | | No Catch | | |
| May | | | No Catch | | | | | | | No Catch | | | | | | No Catch | | |
| Jun | 101 | 69 | 0 | 140 | 142 | 0 | 75 | 191 | 0 | 0 | 65 | 54 | 148 | 76 | 60 | 143 | 628 | 116 |
| Jul | 0 | 0 | 0 | 0 | 0 | 92 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| Aug | 0 | 0 | 4321 | 1393 | 2810 | 0 | 1421 | 4985 | 0 | 0 | 0 | 0 | 0 | 831 | 0 | 0 | 0 | 901 |
| Sep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oct | 705 | 0 | 0 | 439 | 1348 | 0 | 415 | 0 | 0 | 0 | 1398 | 0 | 0 | 233 | 0 | 657 | 1176 | 382 |
| Nov | 513 | 0 | 0 | 696 | 649 | 0 | 309 | 0 | 0 | 1291 | 0 | 0 | 0 | 215 | 0 | 668 | 0 | 254 |
| Dec | 0 | 0 | 913 | 0 | 345 | 0 | 210 | 0 | 848 | 660 | 0 | 479 | 399 | 398 | 142 | 0 | 0 | 252 |

*Composite of surface, mid-depth, and bottom horizontal tows.

APPENDIX C

PERIPHYTON

- Bottom
- Suspended

Table C-1

Species List of Bottom Periphyton Collected on Artificial Substrates in the Vicinity of Nine Mile Point, 1978

Taxa

Cyanophyta
Chroococcales
Agmenellum sp.
Chroococcus sp.
Gomphosphaeria aponina
Gomphosphaeria lacustris
Gomphosphaeria naegelianum
Gomphosphaeria sp.
Microcystis sp.
Chroococcales unid.
Chamaesiphonales
Chamaesiphon sp.
Pleurocapsa sp.
Oscillatoriales
Oscillatoria sp.
Lyngbya martensiana
Lyngbya sp.
Oscillatoriales unid.
Nostocales
Anabaena circinalis
Anabaena sp.
Aphanizomenon flos-aque
Chlorophyta
Volvocales
Carteria sp.
Chlamydomonas sp.
Eudorina sp.
Pandorina morum
Pandorina sp.
Volvocales unid
Tetrasporales
Gloeocystis sp.
Tetrasporales unid.
Chlorococcales
Actinastrum hantzschii
Actinastrum sp.
Ankistrodesmus convolutus
Ankistrodesmus falcatus
Ankistrodesmus sp.
Ankyra sp.
Characium sp.
Chlorella sp.
Chodatella citriformis
Chodetella ciliata
Chodetella quadriseta
Coelastrum cambrium
Coelastrum microporum
Coelastrum sp.
Crucigenia rectangularis
Crucigenia tetrapedia
Dictyosphaerium ehrenbergianum
Dictyosphaerium sp.
Francia sp.
Golenkinia sp.
Micractinium pusillum
Micractinium sp.
Nephrocytium sp.
Oocystis sp.
Pediastrum boryanum
Pediastrum duplex
Pediastrum simplex
Pediastrum tetras
Pediastrum sp.
Quadrigula chodatii
Quadrigula sp.
Scenedesmus acuminatus
Scenedesmus acutus
Scenedesmus arcuatus
Scenedesmus bicaudatus
Scenedesmus denticulatus
Scenedesmus ecornis
Scenedesmus incrassatulus
Scenedesmus intermedius
Scenedesmus opoliensis
Scenedesmus quadricauda
Scenedesmus spinosus
Scenedesmus sp.
Schroederia setigera

Taxa

Chlorophyta (Contd)
Schroederja sp.
Selenastrum sp.
Sphaerocystis sp.
Tetraedron candatum
Tetraedron minimum
Tetraedron sp.
Treubaria triappendiculata
Westella sp.
Chlorococcales unid.
Ulotricales
Geminella interrupta
Geminella sp.
Microspora sp.
Schizomeris sp.
Ulothrix zonata
Ulothrix sp.
Ulotricales unid.
Chaetophorales
Chaetophora sp.
Draparnaldia sp.
Gongrosira sp.
Leptosira sp.
Pseudulvella americana
Pseudulvella sp.
Stigeoclonium tenue
Stigeoclonium sp.
Chaetophorales unid.
Oedongoniales
Oedogonium sp.
Cladophorales
Cladophora sp.
Cladophorales unid.
Zygnematales
Closterium moniliferum
Closterium sp.
Cosmarium botrytis
Cosmarium cosmetum
Cosmarium cyclicum
Cosmarium sp.
Mougeotia sp.
Spirogyra sp.
Spondylosium sp.
Staurastrum longiradiatum
Staurastrum paradoxum
Staurastrum tetracerum
Staurastrum sp.
Chlorophyta unid.
Euglenophyta
Euglenales
Euglena sp.
Trachelomonas sp.
Xanthophyta
Rhizochloridales
Stipitococcus sp.
Chrysophyta
Chrysomonadales
Chrysochromulina parva
Chrysochromulina sp.
Dinobryon sertularia
Dinobryon sociale
Dinobryon sp.
Mallamonas sp.
Synura sp.
Monosigales
Codosiga sp.
Monosiga sp.
Stelexomonas dichotoma
Monosigales unid.
Bacillariophyta-Centric
Eupodiscaies
Cyclotella sp.
Melosira granulata
Melosira herzogii
Melosira islandica
Melosira varians
Melosira sp.
Skeletonema potamus

Taxa

Bacillariophyta-Centric (Contd)
Skeletonema subsalsa
Skeletonema sp.
Stephanodiscus astraea
Stephanodiscus binderana
Stephanodiscus niagarae
Stephanodiscus sp.
Eupodiscales unid.
Bacillariophyta-Pennate
Fragilariales
Asterionella formosa
Asterionella sp.
Diatoma tenue
Diatoma vulgare
Diatoma sp.
Fragilaria crotonensis
Fragilaria capucina
Fragilaria vaucheriae
Fragilaria sp.
Meridion circulare
Synedra tabulata
Synedra ulna
Synedra sp.
Tabellaria flocculosa
Tabellaria sp.
Fragilariales unid.
Eunotiales
Eunotia sp.
Achnanthales
Achnanthes sp.
Cocconeis sp.
Rhoicosphenia curvata
Naviculales
Amphora sp.
Cymbella prostrata
Cymbella sp.
Gomphonema auminatum
Gomphonema olivaceum
Gyrosigma sp.
Navicula cryptocephala
Navicula platystoma
Navicula sp.
Pinnularia sp.
Pleurosigma sp.
Naviculaes unid.
Bacillariales
Epithemia sp.
Nitzchia acicularis
Nitzchia holsatica
Nitzchia sigmoideae
Nitzchia sp.
Surirellales
Cymtopleura solea
Cymtopleura sp.
Surirella ovata
Surirella sp.
Bacillariophyta-Pennate unid.
Pyrrhophyta-Dinophyceae
Gymnodiniales
Gymnodinium fuscum
Peridiniales
Ceratium hirundinella
Peridinium aciculiferum
Peridinium cinctum
Peridinium gymnodinium
Peridinium sp.
Peridiniales unid.
Pyrrhophyta-Dinophyceae unid.
Cryptophyta
Cryptomonodales
Chroomonas sp.
Cryptomonas marssonii
Cryptomonas ovata
Cryptomonas sp.
Cyanomonas sp.
Rhodomonas lens
Rhodomonas minuta
Rhodomonas sp.
Cryptomonadales unid.
Alga unid.

Table C-2 (Page 1 of 2)

Abundance (No./$mm^2$) of Cyanophyta (Bottom Periphyton) Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | MAY 23-23 MAY MEAN | S.E.* | JUN 28-28 JUN MEAN | S.E. | JUL 25-26 JUL MEAN | S.E. | AUG 24-24 AUG MEAN | S.E. | SEP 27-27 SEP MEAN | S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | NMPW | 32431. | 16894. | 2392675. | 2145155. | 93037. | 49591. | 100828. | 47620. | 166930. | 17374. |
| | NMPP | 3023. | 3023. | 556123. | 79249. | ******* | 0. | 8715516. | 6072561. | 430756. | 258174. |
| | FITZ | 58772. | 49547. | 181009. | 81620. | 103565. | 48339. | 417495. | 62020. | ******* | 0. |
| | NMPE | 17275. | 17275. | 851186. | 634888. | 94097. | 46427. | ******* | 0. | 3581. | 1760. |
| CONTOUR | MEAN | 27875. | 11921. | 995248. | 485573. | 96900. | 3347. | 3077946. | 2820266. | 200422. | 124447. |
| 10 | NMPW | 9831. | 4127. | 1759791. | 1222723. | 165642. | 95976. | 34997. | 8065. | 729038. | 321783. |
| | NMPP | 41548. | 20294. | 16901. | 10586. | 223874. | 173050. | 48609. | 33267. | 633638. | 104469. |
| | FITZ | 15790. | 9484. | 69443. | 42763. | 109527. | 43778. | 48274. | 10514. | 309243. | 78241. |
| | NMPE | 50876. | 45238. | 941760. | 578438. | 21608. | 3864. | 288790. | 142615. | 783558. | 207458. |
| CONTOUR | MEAN | 29511. | 9903. | 696974. | 412896. | 130163. | 43061. | 105168. | 61289. | 613869. | 106163. |
| 20 | NMPW | 3496. | 3496. | 296206. | 238021. | 12621. | 5437. | 4322. | 2303. | 55665. | 6303. |
| | NMPP | 4451. | 2650. | 18179. | 13352. | 505168. | 389693. | 3481. | 216. | 224854. | 70409. |
| | FITZ | 3351. | 2011. | 10068. | 5866. | 193398. | 103926. | 43813. | 16584. | 155700. | 59425. |
| | NMPE | 0. | 0. | 48707. | 34545. | ******* | 0. | ******* | 0. | 228660. | 47829. |
| CONTOUR | MEAN | 2824. | 973. | 93290. | 68148. | 237062. | 143852. | 17205. | 13306. | 166220. | 40486. |
| 30 | NMPW | 0. | 0. | 8937. | 1048. | 2001. | 650. | 5963. | 2490. | 2673. | 618. |
| | NMPP | 0. | 0. | 36582. | 28585. | 2330 † | 898. | 9100. | 6999. | 25275. | 11720. |
| | FITZ | 2504. | 2504. | 70375. | 55229. | 335153. | 274045. | 10507. | 7271. | 176515. | 80563. |
| | NMPE | 0. | 0. | 45529. | 39394. | 16554. | 9404. | 4576. | 2268. | 3025. | 1975. |
| CONTOUR | MEAN | 626. | 626. | 40356. | 12680. | 89010. | 82118. | 7537. | 1370. | 51872. | 41883. |
| 40 | NMPW | 64. | 64. | 4545. | 1777. | 380648. | 257413. | 3629. | 1591. | 2602. | 583. |
| | NMPP | 0. | 0. | 5966. | 2177. | 4768. | 2200. | 5411. | 1217. | 7172. | 4722. |
| | FITZ | 0. | 0. | 7903. | 3648. | 1489. | 369. | 3906. | 1346. | ******* | 0. |
| | NMPE | 232. | 232. | 57289. | 53814. | 2836. | 1642. | 1445. | 818. | 4088. | 2103. |
| CONTOUR | MEAN | 74. | 55. | 18926. | 12806. | 97435. | 94407. | 3598. | 818. | 4621. | 1346. |
| CONTROL | MEAN** | 11420. | 5521. | 640662. | 267172. | 87671. | 41092. | 55569. | 35400. | 197982. | 96425. |
| EXP. | MEAN** | 12944. | 6498. | 97255. | 53684. | 164363. | 57089. | 930611. | 865903. | 245394. | 74112. |
| MONTHLY | MEAN | 12182. | 4153. | 368958. | 146540. | 126017. | 35365. | 541703. | 481536. | 219054. | 61420. |
| MONTHLY | RANGE | 0.- | 58772. | 4545.- | 2392675. | 1489.- | 505168. | 1445.- | 8715516. | 2602.- | 783558. |

* Standard error

** Control represents NMPW & NMPE, experimental represents NMPP & FITZ

******* Substrates lost during severe weather

† One of four replicates missing due to weather

Table C-2 (Page 2 of 2)

| DEPTH CONTOUR | TRAN-SECT | OCT 24-25 OCT MEAN | S.E. | NOV 22-22 NOV MEAN | S.E.* | DEC 20-22 DEC MEAN | S.E. |
|---|---|---|---|---|---|---|---|
| 5 | NMPW | 33789.† | 13643. | 42155.‡ | 17888. | ******* | 0. |
| | NMPP | 12159371. | 3073998. | ******** | 0. | ******* | 0. |
| | FITZ | 37557. | 15841. | 13861. | 3140. | ******* | 0. |
| | NMPE | 46625. | 39099. | 15564. | 7120. | 2210.‡ | 808. |
| CONTOUR | MEAN | 2971819. | 2932497. | 23860. | 9161. | 2210. | 2210. |
| 10 | NMPW | 588334. | 197465. | 100366. | 24973. | 67826. | 44118. |
| | NMPP | 3098367. | 866004. | 45831. | 11313. | 6376.†† | 0. |
| | FITZ | 349512. | 222370. | 16723. | 4451. | 45512. | 8804. |
| | NMPE | 260369. | 99253. | 12926. | 4650. | 10361. | 3054. |
| CONTOUR | MEAN | 1074145. | 678283. | 43961. | 20187. | 32519. | 14691. |
| 20 | NMPW | 142806. | 91862. | 107080. | 65880. | 23491. | 16319. |
| | NMPP | 48981. | 45243. | 18979. | 14208. | 25167. | 7284. |
| | FITZ | 67673. | 10327. | 111717. | 29711. | 9790. | 3357. |
| | NMPE | 120753. | 71379. | 72776.‡ | 1400. | 579.‡ | 135. |
| CONTOUR | MEAN | 95053. | 22010. | 77638. | 21394. | 14757. | 5848. |
| 30 | NMPW | 3510. | 1188. | 4296. | 562. | 919. | 343. |
| | NMPP | 7486. | 4499. | 20027. | 13400. | 2752. | 1461. |
| | FITZ | 6927. | 1732. | ******* | 0. | ******* | 0. |
| | NMPE | 3231. | 2037. | 1975. | 1237. | 834. | 422. |
| CONTOUR | MEAN | 5288. | 1115. | 8766. | 5670. | 1502. | 626. |
| 40 | NMPW | 2132. | 1565. | 4042. | 1934. | 461. | 232. |
| | NMPP | 1589. | 761. | 2711. | 2270. | 235. | 36. |
| | FITZ | 925. | 321. | 1459. | 378. | 233. | 41. |
| | NMPE | 1981536. | 1979939. | 1832. | 969. | 527. | 158. |
| CONTOUR | MEAN | 496545. | 494997. | 2511. | 574. | 364. | 76. |
| CONTROL MEAN** | | 318308. | 193377. | 36301. | 13286. | 11912. | 7444. |
| EXP. MEAN** | | 1538832. | 1176468. | 28914. | 12773. | 12867. | 6344. |
| MONTHLY MEAN | | 928570. | 596880. | 33018. | 9087. | 12330. | 4866. |
| MONTHLY RANGE | | 925.- | 12159371. | 1459.- | 111717. | 233.- | 67826. |

* Standard error
** Control represents NMPW & NMPE, experimental represents NMPP & FITZ
******* Substrates lost during severe weather
† One of four replicates missing due to weather
‡ One of four replicates lost during shipment ††Three of four replicates missing due to weather.

Table C-3 (Page 1 of 2)

Abundance (No./$mm^2$) of Chlorophyta (Bottom Periphyton) Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRANSECT | MAY 23-23 MAY MEAN | S.E.* | JUN 28-28 JUN MEAN | S.E. | JUL 25-26 JUL MEAN | S.E. | AUG 24-24 AUG MEAN | S.E. | SEP 27-27 SEP MEAN | S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | NMPW | 68619. | 18080. | 120363. | 32777. | 32748. | 4202. | 216160. | 42129. | 250778. | 25428. |
| | NMPP | 14832. | 7094. | 121289. | 88794. | ******* | 0. | 771997. | 278083. | 3353. | 2466. |
| | FITZ | 389936. | 188655. | 114791. | 34165. | 100086. | 30650. | 203928. | 118038. | ******* | 0. |
| | NMPE | 1084737. | 264775. | 32932. | 20896. | 84976. | 38037. | ******* | 0. | 168. | 64. |
| CONTOUR | MEAN | 389531. | 246085. | 97344. | 21518. | 72604. | 20399. | 397361. | 187351. | 84766. | 83011. |
| 10 | NMPW | 152245. | 89047. | 117747. | 57032. | 32741. | 13595. | 5047. | 2438. | 568142. | 219887. |
| | NMPP | 93316. | 22688. | 24681. | 7821. | 14857. | 8131. | 15625. | 7341. | 375091. | 171208. |
| | FITZ | 207687. | 0. | 81052. | 35518. | 25182. | 10359. | 93429. | 35701. | 380326. | 202016. |
| | NMPE | 143798. | 78949. | 44666. | 20080. | 4626. | 910. | 15903. | 5589. | 351087. | 56922. |
| CONTOUR | MEAN | 149262. | 23420. | 67037. | 20539. | 19351. | 6126. | 32501. | 20466. | 418661. | 50232. |
| 20 | NMPW | 7321. | 3217. | 373589. | 309773. | 18179. | 13575. | 1862. | 687. | 20469. | 8587. |
| | NMPP | 4076. | 1718. | 99485. | 74392. | 2048. | 1379. | 1440. | 279. | 180767. | 157713. |
| | FITZ | 9277. | 3451. | 5207. | 1566. | 8915. | 5575. | 28506. | 26347. | 16896. | 11618. |
| | NMPE | 10898. | 3479. | 3455. | 900. | ******* | 0. | ******* | 0. | 46078. | 16667. |
| CONTOUR | MEAN | 7893. | 1468. | 120434. | 87315. | 9714. | 4674. | 10603. | 8952. | 66053. | 38786. |
| 30 | NMPW | 417. | 274. | 3630. | 337. | 914. | 343. | 2063. | 1499. | 1025. | 216. |
| | NMPP | 532. | 276. | 7535. | 2043. | 2159.† | 1094. | 2084. | 960. | 9753. | 4451. |
| | FITZ | 4481. | 718. | 23511. | 11165. | 4534. | 2357. | 3686. | 953. | 7137. | 2588. |
| | NMPE | 2846. | 950. | 7595. | 3371. | 549. | 257. | 3092. | 308. | 1098. | 771. |
| CONTOUR | MEAN | 2069. | 979. | 10568. | 4413. | 2039. | 900. | 2731. | 399. | 4753. | 2197. |
| 40 | NMPW | 937. | 763. | 4110. | 1150. | 628. | 291. | 2158. | 761. | 1101. | 279. |
| | NMPP | 123. | 51. | 1557. | 522. | 705. | 279. | 850. | 231. | 897. | 104. |
| | FITZ | 971. | 378. | 4163. | 879. | 439. | 292. | 1068. | 268. | ******* | 0. |
| | NMPE | 763. | 182. | 2061. | 717. | 299. | 141. | 3480. | 1345. | 1786. | 557. |
| CONTOUR | MEAN | 698. | 197. | 2973. | 680. | 517. | 92. | 1889. | 603. | 1261. | 269. |
| CONTROL MEAN** | | 147258. | 105859. | 71015. | 36617. | 19518. | 9347. | 31221. | 26471. | 124173. | 63008. |
| EXP. MEAN** | | 72523. | 41047. | 48327. | 15729. | 17658. | 10656. | 112261. | 76110. | 121778. | 59735. |
| MONTHLY MEAN | | 109890. | 55916. | 59671. | 19568. | 18588. | 6879. | 76243. | 43902. | 123108. | 42670. |
| MONTHLY RANGE | | 123.-1084737. | | 1557.- 373589. | | 299.- 100086. | | 850.- 771997. | | 168.- 568142. | |

* Standard error

** Control represents NMPW & NMPE, experimental represents NMPP & FITZ

******* Substrates lost during severe weather

† One of four replicates missing due to weather

Table C-3 (Page 2 of 2)

| DEPTH CONTOUR | TRAN-SECT | OCT 24-25 OCT MEAN | S.E. | NOV 22-22 NOV MEAN | S.E.* | DEC 20-22 DEC MEAN | S.E. |
|---|---|---|---|---|---|---|---|
| 5 | NMPW | 41009.† | 24505. | 12047.‡ | 1091. | ******* | 0. |
| | NMPP | 8563. | 4946. | ******* | 0. | ******* | 0. |
| | FITZ | 49105. | 19956. | 6757. | 2540. | ******* | 0. |
| | NMPE | 3962. | 1348. | 4851. | 2709. | 237. | 147. |
| CONTOUR MEAN | | 25660. | 11359. | 7885. | 2152. | 237.‡ | 237. |
| 10 | NMPW | 242137. | 102214. | 115322. | 52608. | 41387. | 23382. |
| | NMPP | 716614. | 319907. | 7918. | 3047. | 267112.†† | 0. |
| | FITZ | 20756. | 8638. | 8192. | 7556. | 7512. | 2433. |
| | NMPE | 265009. | 200687. | 105048. | 41571. | 3946. | 2180. |
| CONTOUR MEAN | | 311129. | 145952. | 59120. | 29557. | 79989. | 62942. |
| 20 | NMPW | 6288. | 1897. | 110019. | 91797. | 2373. | 1956. |
| | NMPP | 1563. | 626. | 1477. | 873. | 4073. | 2176. |
| | FITZ | 2780. | 1168. | 506. | 297. | 942. | 329. |
| | NMPE | 4593. | 1795. | 23073.‡ | 14231. | 291.‡ | 166. |
| CONTOUR MEAN | | 3806. | 1035. | 33769. | 25945. | 1920. | 839. |
| 30 | NMPW | 596. | 126. | 258. | 51. | 48. | 20. |
| | NMPP | 2390. | 695. | 1000. | 293. | 50. | 35. |
| | FITZ | 1797. | 996. | ******* | 0. | ******* | 0. |
| | NMPE | 1622. | 789. | 177. | 86. | 1283. | 703. |
| CONTOUR MEAN | | 1601. | 373. | 478. | 262. | 460. | 411. |
| 40 | NMPW | 897. | 376. | 616. | 201. | 61. | 34. |
| | NMPP | 1512. | 376. | 390. | 102. | 50. | 27. |
| | FITZ | 47. | 20. | 315. | 109. | 52. | 18. |
| | NMPE | 837197. | 837000. | 674. | 344. | 607. | 309. |
| CONTOUR MEAN | | 209913. | 209095. | 499. | 87. | 192. | 138. |
| CONTROL MEAN** | | 140331. | 83970. | 37208. | 16089. | 5581. | 4497. |
| EXP. MEAN** | | 80512. | 70840. | 3319. | 1275. | 39970. | 37872. |
| MONTHLY MEAN | | 110421. | 53904. | 22147. | 9649. | 20627. | 16627. |
| MONTHLY RANGE | | 47.- 837197. | | 177.- 115322. | | 48.- 267112. | |

* Standard error
** Control represents NMPW & NMPE, experimental represents NMPP & FITZ
******* Substrates lost during severe weather
† One of four replicates missing due to weather
‡ One of four replicates lost during shipment ††Three of four replicates missing due to weather.

Table C-4 (Page 1 of 2)

Abundance (No./$mm^2$) of Bacillariophyta-Centric (Bottom Periphyton) Collected on Artificial Substrates, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRANSECT | MAY 23-23 MAY MEAN | S.E.* | JUN 28-28 JUN MEAN | S.E. | JUL 25-26 JUL MEAN | S.E. | AUG 24-24 AUG MEAN | S.E. | SEP 27-27 SEP MEAN | S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | NMPW | 20449. | 8577. | 484. | 402. | 0. | 0. | 985. | 985. | 297. | 297. |
| | NMPP | 1191. | 1139. | 2451. | 1492. | ******* | 0. | 0. | 0. | 0. | 0. |
| | FITZ | 82877. | 37654. | 1580. | 1081. | 0. | 0. | 0. | 0. | ******* | 0. |
| | NMPE | 104599. | 20436. | 472. | 472. | 0. | 0. | ******* | 0. | 0. | 0. |
| CONTOUR MEAN | | 52279. | 24659. | 1247. | 478. | 0. | 0. | 328. | 328. | 99. | 99. |
| 10 | NMPW | 17105. | 7691. | 2533. | 2168. | 0. | 0. | 0. | 0. | 0. | 0. |
| | NMPP | 5016. | 2447. | 1163. | 872. | 0. | 0. | 0. | 0. | 0. | 0. |
| | FITZ | 60622. | 0. | 1482. | 1405. | 357. | 274. | 0. | 0. | 0. | 0. |
| | NMPE | 14768. | 8851. | 2999. | 1890. | 37. | 37. | 112. | 112. | 524. | 524. |
| CONTOUR MEAN | | 24378. | 12362. | 2044. | 432. | 98. | 86. | 28. | 28. | 131. | 131. |
| 20 | NMPW | 5341. | 1712. | 2874. | 2105. | 8. | 8. | 5. | 5. | 0. | 0. |
| | NMPP | 14260. | 2236. | 484. | 343. | 0. | 0. | 14. | 8. | 469. | 469. |
| | FITZ | 2678. | 500. | 80. | 29. | 0. | 0. | 0. | 0. | 89. | 89. |
| | NMPE | 4134. | 1858. | 1944. | 521. | ******* | 0. | ******* | 0. | 0. | 0. |
| CONTOUR MEAN | | 6603. | 2610. | 1345. | 648. | 3. | 3. | 7. | 4. | 140. | 112. |
| 30 | NMPW | 542. | 139. | 940. | 321. | 0. | 0. | 30. | 17. | 56. | 47. |
| | NMPP | 879. | 247. | 2143. | 728. | 15.† | 15. | 75. | 56. | 405. | 366. |
| | FITZ | 3019. | 1000. | 4288. | 458. | 173. | 139. | 75. | 53. | 913. | 913. |
| | NMPE | 2497. | 607. | 1441. | 528. | 47. | 40. | 155. | 14. | 0. | 0. |
| CONTOUR MEAN | | 1734. | 604. | 2203. | 737. | 59. | 39. | 84. | 26. | 343. | 210. |
| 40 | NMPW | 330. | 150. | 1699. | 663. | 165. | 145. | 3. | 3. | 7. | 7. |
| | NMPP | 27. | 15. | 931. | 562. | 271. | 222. | 29. | 15. | 46. | 22. |
| | FITZ | 1146. | 114. | 3097. | 1570. | 21. | 8. | 26. | 14. | ******* | 0. |
| | NMPE | 961. | 511. | 154. | 69. | 38. | 24. | 48. | 12. | 230. | 176. |
| CONTOUR MEAN | | 616. | 263. | 1470. | 627. | 124. | 59. | 26. | 9. | 94. | 69. |
| CONTROL MEAN** | | 17073. | 10005. | 1554. | 327. | 33. | 18. | 167. | 118. | 111. | 57. |
| EXP. MEAN** | | 17171. | 9335. | 1770. | 400. | 93. | 46. | 22. | 10. | 240. | 117. |
| MONTHLY MEAN | | 17122. | 6659. | 1662. | 253. | 63. | 25. | 87. | 54. | 169. | 61. |
| MONTHLY RANGE | | 27.- | 104599. | 80.- | 4288. | 0.- | 357. | 0.- | 985. | 0.- | 913. |

* Standard error
** Control represents NMPW & NMPE, experimental represents NMPP & FITZ
******* Substrates lost during severe weather
† One of four replicates missing due to weather

Table C-4 (Page 2 of 2)

| DEPTH CONTOUR | TRAN-SECT | OCT 24-25 OCT MEAN | OCT 24-25 OCT S.E. | NOV 22-22 NOV MEAN | NOV 22-22 NOV S.E.* | DEC 20-22 DEC MEAN | DEC 20-22 DEC S.E. |
|---|---|---|---|---|---|---|---|
| 5 | NMPW | 0. † | 0. | 0.‡ | 0. | ******* | 0. |
| | NMPP | 0. | 0. | ******* | 0. | ******* | 0. |
| | FITZ | 33. | 33. | 100. | 100. | ******* | 0. |
| | NMPE | 7. | 7. | 150. | 108. | 8.‡ | 6. |
| CONTOUR | MEAN | 10. | 8. | 83. | 44. | 8. | 8. |
| 10 | NMPW | 0. | 0. | 0. | 0. | 0.†† | 0. |
| | NMPP | 0. | 0. | 0. | 0. | 0. | 0. |
| | FITZ | 0. | 0. | 11. | 11. | 0. | 0. |
| | NMPE | 0. | 0. | 316. | 259. | 140. | 140. |
| CONTOUR | MEAN | 0. | 0. | 82. | 78. | 35. | 35. |
| 20 | NMPW | 45. | 45. | 0. | 0. | 0. | 0. |
| | NMPP | 17. | 17. | 0. | 0. | 0. | 0. |
| | FITZ | 90. | 90. | 751. | 751. | 6. | 6. |
| | NMPE | 19. | 19. | 0.‡ | 0. | 15.‡ | 14. |
| CONTOUR | MEAN | 43. | 17. | 188. | 188. | 5. | 4. |
| 30 | NMPW | 3. | 3. | 12. | 7. | 0. | 0. |
| | NMPP | 86. | 86. | 8. | 8. | 2. | 2. |
| | FITZ | 106. | 106. | ******* | 0. | ******* | 0. |
| | NMPE | 0. | 0. | 75. | 29. | 21. | 19. |
| CONTOUR | MEAN | 49. | 28. | 32. | 21. | 8. | 7. |
| 40 | NMPW | 18. | 16. | 7. | 4. | 1. | 1. |
| | NMPP | 15. | 8. | 107. | 79. | 12. | 12. |
| | FITZ | 2. | 2. | 127. | 51. | 0. | 0. |
| | NMPE | 81665. | 81663. | 161. | 100. | 1. | 1. |
| CONTOUR | MEAN | 20425. | 20413. | 100. | 33. | 4. | 3. |
| CONTROL MEAN** | | 8176. | 8165. | 72. | 34. | 21. | 15. |
| EXP. MEAN** | | 35. | 13. | 138. | 90. | 3. | 2. |
| MONTHLY MEAN | | 4105. | 4082. | 101. | 43. | 13. | 9. |
| MONTHLY RANGE | | 0.- | 81665. | 0.- | 751. | 0.- | 140. |

* Standard error
** Control represents NMPW & NMPE, experimental represents NMPP & FITZ
******* Substrates lost during severe weather
† One of four replicates missing due to weather
‡ One of four replicates lost during shipment
†† Three of four replicates missing due to weather.

Table C-5 (Page 1 of 2)

Abundance (No./$mm^2$) of Bacillariophyta-Pennate (Bottom Periphyton) Collected on Aritficial Substrates, Nine Mile Point Vicinity, 1978

| | | MAY | | JUN | | JUL | | AUG | | SEP | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 23-23 MAY | | 28-28 JUN | | 25-26 JUL | | 24-24 AUG | | 27-27 SEP | |
| DEPTH CONTOUR | TRAN-SECT | MEAN | S.E.* | MEAN | S.E. | MEAN | S.E. | MEAN | S.E. | MEAN | S.E. |
| 5 | NMPW | 94258. | 18296. | 6682. | 4019. | 3999. | 365. | 1473. | 1115. | 3263. | 2019. |
| | NMPP | 4237. | 2113. | 11890. | 4944. | ******* | 0. | 245796. | 234567. | 23675. | 13073. |
| | FITZ | 258839. | 55163. | 3499. | 1345. | 2233. | 1298. | 3841. | 1784. | ******* | 0. |
| | NMPE | 525125. | 17400. | 20830. | 15156. | 7194. | 5507. | ******* | 0. | 953. | 516. |
| CONTOUR | MEAN | 220615. | 114373. | 10725. | 3786. | 4475. | 1452. | 83704. | 81049. | 9297. | 7220. |
| 10 | NMPW | 99816. | 11546. | 11643. | 11101. | 1050. | 208. | 255. | 167. | 11363. | 1939. |
| | NMPP | 41745. | 16207. | 1899. | 587. | 553. | 217. | 26. | 15. | 75147. | 40810. |
| | FITZ | 299046. | 0. | 4623. | 1189. | 4416. | 3242. | 1410. | 511. | 21727. | 1255. |
| | NMPE | 179645. | 51751. | 29598. | 8023. | 835. | 660. | 8169. | 4157. | 38807. | 13426. |
| CONTOUR | MEAN | 155063. | 55699. | 11941. | 6233. | 1713. | 907. | 2465. | 1925. | 36761. | 13990. |
| 20 | NMPW | 59774. | 5906. | 7052. | 3499. | 79. | 38. | 409. | 181. | 16986. | 3596. |
| | NMPP | 146941. | 8345. | 9431. | 4356. | 2672. | 1903. | 539. | 18. | 41360. | 14779. |
| | FITZ | 64477. | 13267. | 3088. | 608. | 2760. | 393. | 2247. | 663. | 16125. | 1385. |
| | NMPE | 82018. | 22744. | 6435. | 1927. | ******* | 0. | ******* | 0. | 12245. | 3142. |
| CONTOUR | MEAN | 88302. | 20123. | 6502. | 1308. | 1837. | 879. | 1065. | 592. | 21679. | 6641. |
| 30 | NMPW | 18518. | 2732. | 11956. | 2428. | 443. | 44. | 270. | 127. | 3628. | 1494. |
| | NMPP | 18377. | 4481. | 14673. | 2739. | 280.+ | 139. | 123. | 26. | 33291. | 14550. |
| | FITZ | 59187. | 7317. | 37496. | 6633. | 5667. | 2303. | 807. | 405. | 30213. | 7653. |
| | NMPE | 71528. | 4273. | 6564. | 929. | 86. | 67. | 558. | 147. | 1534. | 348. |
| CONTOUR | MEAN | 41903. | 13774. | 17672. | 6819. | 1619. | 1351. | 440. | 152. | 17167. | 8455. |
| 40 | NMPW | 4578. | 1206. | 3301. | 602. | 2663. | 2241. | 540. | 121. | 400. | 204. |
| | NMPP | 1530. | 395. | 3288. | 560. | 369. | 135. | 124. | 57. | 932. | 305. |
| | FITZ | 23425. | 956. | 4461. | 272. | 207. | 120. | 176. | 88. | ******* | 0. |
| | NMPE | 13241. | 2472. | 684. | 243. | 38. | 16. | 229. | 183. | 1204. | 292. |
| CONTOUR | MEAN | 10694. | 4916. | 2933. | 799. | 819. | 618. | 267. | 94. | 845. | 236. |
| CONTROL MEAN** | | 114850. | 48411. | 10474. | 2752. | 1821. | 808. | 1488. | 965. | 9038. | 3779. |
| EXP. MEAN** | | 91780. | 34008. | 9435. | 3398. | 2128. | 658. | 25509. | 24479. | 30309. | 7704. |
| MONTHLY MEAN | | 103315. | 28914. | 9955. | 2131. | 1975. | 507. | 14833. | 13594. | 18492. | 4651. |
| MONTHLY RANGE | | 1530.- | 525125. | 684.- | 37496. | 38.- | 7194. | 26.- | 245796. | 400.- | 75147. |

* Standard error

** Control represents NMPW & NMPE, experimental represents NMPP & FITZ

******* Substrates lost during severe weather

\+ One of four replicates missing due to weather

Table C-5 (Page 2 of 2)

| DEPTH CONTOUR | TRAN-SECT | OCT 24-25 OCT MEAN | OCT S.E. | NOV 22-22 NOV MEAN | NOV S.E.* | DEC 20-22 DEC MEAN | DEC S.E. |
|---|---|---|---|---|---|---|---|
| 5 | NMPW | 2743.† | 569. | 11366.ǂ | 3051. | ******* | 0. |
| | NMPP | 380408. | 45462. | ******* | 0. | ******* | 0. |
| | FITZ | 1221. | 346. | 1876. | 872. | ******* | 0. |
| | NMPE | 3711. | 2534. | 1671. | 446. | 168.ǂ | 82. |
| CONTOUR MEAN | | 97021. | 94464. | 4971. | 3198. | 168. | 168. |
| 10 | NMPW | 13262. | 7668. | 3179. | 835. | 958. | 480. |
| | NMPP | 230946. | 39846. | 6621. | 2793. | 5969.†† | 0. |
| | FITZ | 13885. | 3676. | 2012. | 658. | 9714. | 4106. |
| | NMPE | 18545. | 5256. | 630. | 197. | 1283. | 153. |
| CONTOUR MEAN | | 69159. | 53942. | 3110. | 1281. | 4481. | 2086. |
| 20 | NMPW | 20854. | 7311. | 13279. | 6542. | 1760. | 265. |
| | NMPP | 2528. | 171. | 5614. | 1061. | 9633. | 1792. |
| | FITZ | 9033. | 2769. | 11766. | 1633. | 2558. | 1249. |
| | NMPE | 11051. | 4266. | 4176. | 856.ǂ | 117.ǂ | 24. |
| CONTOUR MEAN | | 10866. | 3793. | 8709. | 2243. | 3517. | 2101. |
| 30 | NMPW | 1737. | 431. | 1648. | 193. | 467. | 114. |
| | NMPP | 2990. | 265. | 2972. | 539. | 1079. | 533. |
| | FITZ | 4963. | 484. | ******* | 0. | ******* | 0. |
| | NMPE | 911. | 278. | 370. | 113. | 447. | 136. |
| CONTOUR MEAN | | 2650. | 881. | 1663. | 751. | 664. | 207. |
| 40 | NMPW | 563. | 390. | 1010. | 240. | 332. | 97. |
| | NMPP | 1620. | 728. | 521. | 82. | 338. | 79. |
| | FITZ | 167. | 55. | 376. | 47. | 62. | 18. |
| | NMPE | 735511. | 734791. | 681. | 196. | 487. | 60. |
| CONTOUR MEAN | | 184465. | 183682. | 647. | 136. | 305. | 89. |
| CONTROL MEAN** | | 80889. | 72774. | 3801. | 1476. | 669. | 184. |
| EXP. MEAN** | | 64776. | 41687. | 3970. | 1366. | 4193. | 1600. |
| MONTHLY MEAN | | 72832. | 40858. | 3876. | 991. | 2211. | 814. |
| MONTHLY RANGE | | 167.- | 735511. | 370.- | 13279. | 62.- | 9714. |

* Standard error
** Control represents NMPW & NMPE, experimental represents NMPP & FITZ
******* Substrates lost during severe weather
† One of four replicates missing due to weather
ǂ One of four replicates lost during shipment
†† Three of four replicates missing due to weather.

Table C-6

Taxonomic List of All Suspended Periphyton Collected on Artificial Substrates in the Vicinity of Nine Mile Point, May-September 1978

Taxa

Cyanophyta
- Chroococcaceae
  - *Gomphosphaeria lacustris*
  - *Microcystis* sp.
- Chamaesiphonaceae
  - *Chamaesiphon* sp.
- Oscillatoriaceae
  - *Lyngbya* sp.
  - *Oscillatoria* sp.
  - *Pseudoanabaena* sp.
- Oscillatoriaceae unid.
- Nostocaceae
  - *Anabaena circinalis*
  - *Anabaena* sp.

Chlorophyta
- Volvocales
  - *Chlamydomonas* sp.
  - *Pandorina* sp.
- Chlorococcales
  - *Actinastrum hantzschii*
  - *Ankistrodesmus convolutus*
  - *Ankistrodesmus falcatus*
  - *Ankistrodesmus* sp.
  - *Chodatella quadrisetta*
  - *Coelastrum microporum*
  - *Coelastrum* sp.
  - *Crucigenia rectangularis*
  - *Oocystis* sp.
  - *Pediastrum boryanum*
  - *Pediastrum duplex*
  - *Pediastrum simplex*
  - *Pediastrum tetras*
  - *Quadrigula chodatii*
  - *Scenedesmus acuminatus*
  - *Scenedesmus acutus*
  - *Scenedesmus bicaudatus*
  - *Scenedesmus ecornis*
  - *Scenedesmus intermedius*
  - *Scenedesmus quadricauda*
  - *Scenedesmus spinosus*
  - *Scenedesmus* sp.
  - *Schroederia setigera*
  - *Sphaerocystis* sp.
  - *Tetraedron caudatum*
  - *Tetraedron minimum*
  - *Tetraedron trigonum*
- Chlorococcales unid.
- Ulotrichales
  - *Ulothrix zonata*
  - *Ulothrix* sp.
- Chaetophorales
  - *Stigeoclonium* sp.
- Chaetophorales unid.
- Oedogoniales
  - *Oedogonium* sp.
- Zygnematales
  - *Closterium moniliferum*
  - *Cosmarium botrytis*
  - *Cosmarium* sp.

Taxa

Chlorophyta (Contd)
  - *Mougeotia* sp.
  - *Spirogyra* sp.

Chlorophyta unid.

Chrysophyta

Chrysophyta unid.

Bacillariophyta
- Eupodiscales
  - *Cyclotella* sp.
  - *Melosira variens*
  - *Melosira* sp.
  - *Stephanodiscus banderana*
- Eupodiscales unid.
- Fragilariales
  - *Asterionella formosa*
  - *Diatoma vulgare*
  - *Diatoma tenue*
  - *Fragilaria crotonensis*
  - *Fragilaria vaucheriae*
  - *Fragilaria* sp.
  - *Meridion* sp.
  - *Synedra cyclopum*
  - *Synedra* sp.
  - *Tabellaria* sp.
- Fragilariales unid.
- Achnanthales
  - *Achnanthes* sp.
  - *Cocconeis* sp.
- Naviculales
  - *Cymbella prostrata*
  - *Cymbella* sp.
  - *Gomphonema olivaceum*
  - *Gomphonema montanum*
  - *Gomphonema* sp.
  - *Gyrosigma* sp.
  - *Navicula* sp.
- Naviculales unid.
- Bacillariales
  - *Nitzchia acicularis*
  - *Nitzchia holsatica*
  - *Nitzchia* sp.

Bacillariophyta unid.

Pyrrhophyta-Dinophyceae
- Gymnodiniales
  - *Gymnodinium fuscum*
  - *Gymnodinium* sp.
- Peridiniales
  - *Peridinium* sp.
  - *Ceratium hirudinella*

Pyrrhophyta-Dinophyceae unid.

Cryptophyta
- Cryptomonodales
  - *Chroomonas* sp.
  - *Cryptomonas marssoni*
  - *Cryptomonas* sp.
  - *Rhodomonas minuta*
  - *Cyanomonas* sp.

Table C-7

Abundance (No./$mm^2$) of Cyanophyta (Suspended Periphyton) on Artificial Substrates, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | MAY 23-23 MAY MEAN | S.E.* | JUN 29-29 JUN MEAN | S.E. | JUL 26-26 JUL MEAN | S.E. | AUG 23-23 AUG MEAN | S.E. | SEP 27-27 SEP MEAN | S.E.* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | NMPW | 0. | 0. | 71314672. | 461087. | 22819520. | 14460224. | ******* | 0. | 131599. | 129496. |
| | NMPP | 0. | 0. | 1792603650. | 363120128. | 102206.† | 92212. | 17405440. | 6108069. | 20765072. | 19647392. |
| | FITZ | 0. | 0. | ******* | 0. | 17560432. | 10399363. | ******* | 0. | ******* | 0. |
| CONTOUR MEAN | | 0. | 0. | 931959040. | 860644608. | 13494048. | 6865876. | 17405440. | 17405440. | 10448328. | 10316740. |
| 7 | NMPW | 0. | 0. | 41861120. | 21775216. | 1440879. | 54132. | 52579888. | 35975232. | 228782. | 1425. |
| | NMPP | 0. | 0. | 46460720. | 24784160. | 4627345. | 1861370. | 58568496. | 52802992. | 14306312. | 8844728. |
| | FITZ | 0. | 0. | 149635200. | 106601600. | 16880816. | 3443331. | ******* | 0. | 11344736. | 6760549. |
| CONTOUR MEAN | | 0. | 0. | 79325680. | 35180048. | 7649680. | 4706331. | 55574192. | 2994285. | 8626608. | 4285066. |
| 12 | NMPW | 0. | 0. | 11243152. | 5529218. | 18486896. | 1733068. | 42405088. | 5039831. | 218029. | 187591. |
| | NMPP | 0. | 0. | 13066704. | 1115857. | 10620128. | 7741371. | 133482064. | 124285232. | 13847648. | 4967149. |
| | FITZ | 0. | 0. | 121975184. | 65762512. | 8306373. | 2581570. | ******* | 0. | 9761864. | 3627848. |
| CONTOUR MEAN | | 0. | 0. | 48761680. | 36610528. | 12471130. | 3081143. | 87943568. | 45538496. | 7942512. | 4038321. |
| 17 | NMPW | 6149. | 6149. | 1868752. | 301247. | 4396642. | 1288688. | 3528016. | 713745. | 13329. | 8290. |
| | NMPP | 0. | 0. | 1852685. | 811159. | 2752942. | 2169536. | 5428029. | 1930175. | 18773104. | 10165688. |
| | FITZ | 0. | 0. | 30208832. | 15598046. | 100977. | 11902. | ******* | 0. | 1756337. | 976044. |
| CONTOUR MEAN | | 2050. | 2050. | 11310085. | 9449373. | 2416853. | 1251385. | 4478022. | 950003. | 6847589. | 5983942. |
| CONTROL MEAN** | | 1537. | 1537. | 31571920. | 15760925. | 11785980. | 5230239. | 32837664. | 14946272. | 147934. | 49862. |
| EXP. MEAN** | | 0. | 0. | 307974400. | 248327776. | 7618898. | 2463096. | 53720992. | 28919952. | 12936436. | 2368779. |
| MONTHLY MEAN | | 512. | 512. | 207464480. | 159186880. | 9007925. | 2326256. | 44770960. | 16990432. | 8286068. | 2434590. |
| MONTHLY RANGE | | 0.- | 6149. | 99999.- | 1792603650. | 99999.- | 22819520. | 99999.- | 133482064. | 13329.- | 20765072. |

* Standard error
** Control represents NMPW & NMPE, experimental represents NMPP & FITZ
******* Substrates lost during severe weather
† One of four replicates missing due to weather

Table C-8

Abundance (No./$mm^2$) of Chlorophyta (Suspended Periphyton) on Artivicial Substrates, Nine Mile Point Vicinity, 1978

| | | MAY | | JUN | | JUL | | AUG | | SEP | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 23-23 MAY | | 29-29 JUN | | 26-26 JUL | | 23-23 AUG | | 27-27 SEP | |
| DEPTH CONTOUR | TRAN-SECT | MEAN | S.E.* | MEAN | S.E. | MEAN | S.E. | MEAN | S.E. | MEAN | S.E.* |
| 2 | NMPW | 2492. | 2492. | 213619. | 213619. | 167237. | 126716. | ******* | 0. | 969. | 969. |
| | NMPP | 3869. | 3869. | 9108328. | 5516673. | 16733.† | 16523. | 512458. | 87259. | 256070. | 256070. |
| | FITZ | 1665. | 250. | ******* | 0. | 40504. | 40504. | ******* | 0. | ******* | 0. |
| CONTOUR | MEAN | 2675. | 643. | 4660973. | 4447354. | 74825. | 46713. | 512458. | 512458. | 128519. | 127551. |
| 7 | NMPW | 0. | 0. | 433991. | 328283. | 158693. | 20709. | 291170. | 10807. | 4598. | 1342. |
| | NMPP | 0. | 0. | 266341. | 2064. | 17180. | 17180. | 68299. | 35706. | 315934. | 54044. |
| | FITZ | 30472. | 8669. | 1349085. | 1187910. | 456659. | 210007. | ******* | 0. | 168682. | 168682. |
| CONTOUR | MEAN | 10157. | 10157. | 683139. | 336472. | 210844. | 129519. | 179735. | 111435. | 163071. | 89919. |
| 12 | NMPW | 0. | 0. | 70472. | 70472. | 149225. | 149225. | 338440. | 235550. | 3085. | 3085. |
| | NMPP | 33602. | 7175. | 0. | 0. | 54390. | 40747. | 585690. | 497364. | 14729. | 3079. |
| | FITZ | 6822. | 1008. | 477390. | 477390. | 8178. | 8178. | ******* | 0. | 35236. | 35236. |
| CONTOUR | MEAN | 13475. | 10255. | 182621. | 148782. | 70598. | 41515. | 462065. | 123625. | 17683. | 9398. |
| 17 | NMPW | 9439. | 6960. | 0. | 0. | 0. | 0. | 10485. | 8894. | 2164. | 2056. |
| | NMPP | 5082. | 5082. | 30832. | 30832. | 935. | 935. | 28104. | 14676. | 192052. | 17460. |
| | FITZ | 9271. | 9271. | 157700. | 124189. | 3692. | 1137. | ******* | 0. | 8262. | 8262. |
| CONTOUR | MEAN | 7930. | 1425. | 62844. | 48256. | 1542. | 1108. | 19295. | 8809. | 67493. | 62305. |
| CONTROL MEAN** | | 2983. | 2231. | 179520. | 95759. | 118789. | 39767. | 213365. | 102354. | 2704. | 766. |
| EXP. MEAN** | | 11348. | 4636. | 1627096. | 1259007. | 74784. | 54943. | 298638. | 145592. | 141567. | 46793. |
| MONTHLY MEAN | | 8559. | 3314. | 1100704. | 809142. | 89452. | 38257. | 262092. | 88598. | 91071. | 35809. |
| MONTHLY RANGE | | 0.- | 33602. | 0.- | 9108328. | 0.- | 456659. | 10485.- | 585690. | 969.- | 315934. |

* Standard error

** Control represents NMPW & NMPE, experimental represents NMPP & FITZ

******* Substrates lost during severe weather

† One of four replicates missing due to weather

Table C-9

Abundance (No./mm$^2$) of Bacillariophyta-Centric (Suspended Periphyton) on Artificial Substrates, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | MAY 23-23 MAY MEAN | S.E.* | JUN 29-29 JUN MEAN | S.E. | JUL 26-26 JUL MEAN | S.E. | AUG 23-23 AUG MEAN | S.E. | SEP 27-27 SEP MEAN | S.E.* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | NMPW | 0. | 0. | 42724. | 42724. | 0. | 0. | ******* | 0. | 66. | 66. |
| | NMPP | C | 0. | 3591666. | 3591667. | 0.† | 0. | 21260. | 21260. | 0. | 0. |
| | FITZ | 0. | 0. | ******* | 0. | 0. | 0. | ******* | 0. | ******* | 0. |
| CONTOUR | MEAN | 0. | 0. | 1817194. | 1774471. | 0. | 0. | 21260. | 21260. | 33. | 33. |
| 7 | NMPW | 0. | 0. | 71911. | 33797. | 3738. | 3738. | 12582. | 12582. | 271. | 271. |
| | NMPP | 7267. | 7267. | 132135. | 132135. | 0. | 0. | 0. | 0. | 8809. | 8809. |
| | FITZ | 15262. | 15262. | 0. | 0. | 0. | 0. | ******* | 0. | 39690. | 39690. |
| CONTOUR | MEAN | 7510. | 4407. | 68015. | 38194. | 1246. | 1246. | 6291. | 6291. | 16257. | 11973. |
| 12 | NMPW | 0. | 0. | 16279. | 16279. | 0. | 0. | 14000. | 14000. | 0. | 0. |
| | NMPP | 0. | 0. | 30354. | 477. | 0. | 0. | 0. | 0. | 5825. | 5825. |
| | FITZ | 5369. | 2462. | 0. | 0. | 0. | 0. | ******* | 0. | 0. | 0. |
| CONTOUR | MEAN | 1790. | 1790. | 15544. | 8770. | 0. | 0. | 7000. | 7000. | 1942. | 1942. |
| 17 | NMPW | 4719. | 3480. | 3605. | 3605. | 0. | 0. | 4393. | 1971. | 653. | 544. |
| | NMPP | 1270. | 1270. | 0. | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| | FITZ | 15375. | 1468. | 16755. | 16755. | 183. | 183. | ******* | 0. | 0. | 0. |
| CONTOUR | MEAN | 7121. | 4245. | 6787. | 5092. | 61. | 61. | 2197. | 2197. | 218. | 218. |
| CONTROL MEAN** | | 1180. | 1180. | 33630. | 15140. | 934. | 934. | 10325. | 2994. | 247. | 147. |
| EXP. MEAN** | | 5568. | 2332. | 538701. | 509139. | 23. | 23. | 5315. | 5315. | 7761. | 5489. |
| MONTHLY MEAN | | 4105. | 1680. | 355039. | 323889. | 327. | 310. | 7462. | 3221. | 5029. | 3579. |
| MONTHLY RANGE | | 0.- | 15375. | 0.- | 3591666. | 0.- | 3738. | 0.- | 21260. | 0.- | 39690. |

* Standard error
** Control represents NMPW & NMPE, experimental represents NMPP & FITZ
******* Substrates lost during severe weather
\+ One of four replicates missing due to weather

Table C-10

Abundance (No. $mm^2$) of Bacillariophyta-Pennate (Suspended Periphyton) on Artificial Substrates, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | MAY 23-23 MAY MEAN | S.E.* | JUN 29-29 JUN MEAN | S.E. | JUL 26-26 JUL MEAN | S.E. | AUG 23-23 AUG MEAN | S.E. | SEP 27-27 SEP MEAN | S.E.* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | NMPW | 456838. | 98809. | 1043354. | 188880. | 36744. | 36744. | ******* | 0. | 34983. | 34096. |
| | NMPP | 395615. | 96975. | 21679152. | 7054164. | 2407.† | 2198. | 370633. | 54566. | 832033. | 797502. |
| | FITZ | 95155. | 13052. | ******* | 0. | 178270. | 64859. | ******* | 0. | ******* | 0. |
| CONTOUR MEAN | | 315870. | 111763. | 11361248. | 10317898. | 72474. | 53819. | 370633. | 370633. | 433508. | 398525. |
| 7 | NMPW | 919218. | 185929. | 689629. | 156037. | 18112. | 4313. | 119143. | 43648. | 96791. | 3457. |
| | NMPP | 978484. | 29269. | 929777. | 303485. | 17068. | 8478. | 13037. | 13037. | 1831639. | 246017. |
| | FITZ | 723912. | 161261. | 198856. | 118268. | 31250. | 31250. | ******* | 0. | 4404234. | 117720. |
| CONTOUR MEAN | | 873871. | 76906. | 606087. | 215093. | 22143. | 4563. | 66090. | 53053. | 2110887. | 1251266. |
| 12 | NMPW | 421702. | 49514. | 378224. | 150317. | 151809. | 72029. | 89659. | 19661. | 70987. | 25330. |
| | NMPP | 1099045. | 63107. | 361867. | 146046. | 167780. | 85920. | 1077400. | 817946. | 515158. | 242094. |
| | FITZ | 523216. | 244147. | 520584. | 43194. | 262378. | 213309. | ******* | 0. | 1872801. | 452778. |
| CONTOUR MEAN | | 681321. | 210908. | 420225. | 50402. | 193989. | 34504. | 583530. | 493870. | 819649. | 541962. |
| 17 | NMPW | 332161. | 40900. | 216518. | 43495. | 268182. | 206519. | 22869. | 3778. | 3537. | 2655. |
| | NMPP | 180371. | 38147. | 275246. | 20737. | 20315. | 18445. | 56219. | 20989. | 1488405. | 39281. |
| | FITZ | 851742. | 1448. | 975764. | 130098. | 3748. | 2288. | ******* | 0. | 672251. | 349118. |
| CONTOUR MEAN | | 454758. | 203271. | 489176. | 243884. | 97415. | 85517. | 39544. | 16675. | 721398. | 429348. |
| CONTROL MEAN** | | 532479. | 131557. | 581931. | 182468. | 118712. | 57934. | 77224. | 28479. | 51574. | 20421. |
| EXP. MEAN** | | 605943. | 130203. | 3563028. | 3021557. | 85402. | 35888. | 379322. | 245959. | 1659502. | 502537. |
| MONTHLY MEAN | | 581455. | 94205. | 2478989. | 1922293. | 96505. | 29562. | 249851. | 145346. | 1074801. | 395347. |
| MONTHLY RANGE | | 95155.- | 1099045. | 99999.- | 21679152. | 2407.- | 268182. | 13037.- | 1077400. | 3537.- | 4404234. |

* Standard error
** Control represents NMPW & NMPE, experimental represents NMPP & FITZ
******* Substrates lost during severe weather
† One of four replicates missing due to weather

APPENDIX D

BENTHIC INVERTEBRATES

Table D-1

Abundance (No. $m^2$) of Total Benthos in 0.17-$m^2$ Suction Sampler, Nine Mile Point Vicinity, 1978

| Depth Contour (ft) | Transect | Apr Mean | Apr S.E.* | Jun Mean | Jun S.E. | Aug Mean | Aug S.E. | Oct Mean | Oct S.E. | Dec Mean | Dec S.E. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 610.8 | 129.4 | 1143.3 | 66.2 | 3107.9 | 989.8 | 4076.7 | 346.0 | No samples taken due to ice and strong winds | |
| | NMPP | 418.2 | 183.5 | 2091.0 | 1170.3 | 7518.5 | 1802.1 | 11444.7 | 1594.6 | | |
| | FITZ | 436.3 | 99.3 | 2891.3 | 664.9 | 3772.8 | 2864.2 | 845.4 | 652.9 | | |
| | NMPE | 1107.2 | 950.7 | 2707.7 | 812.3 | 1964.6 | 21.1 | 5424.5 | 201.6 | | |
| | Contour mean | 643.1 | 160.7 | 2208.3 | 394.1 | 4090.9 | 1202.0 | 5447.8 | 2217.8 | | |
| 20 | NMPW | 833.4 | 520.5 | 285.8 | 75.2 | 7377.1 | 6961.9 | 3640.4 | 1414.0 | | |
| | NMPP | 475.4 | 60.2 | 1149.3 | 1016.9 | 478.4 | 171.5 | 5574.9 | 3095.8 | | |
| | FITZ | 1645.7 | 791.3 | 547.6 | 451.3 | 782.2 | 228.6 | 6188.7 | 490.4 | | |
| | NMPE | 90.3 | 12.0 | 2051.9 | 162.5 | 207.6 | 129.4 | 3065.8 | 2229.4 | | |
| | Contour mean | 761.2 | 331.6 | 1008.6 | 391.1 | 2211.3 | 1725.9 | 4617.4 | 749.9 | | |
| 30 | NMPW | 2906.3 | 198.6 | 291.8 | 135.4 | 499.4 | 288.8 | 3691.6 | 1651.7 | | |
| | NMPP | 3116.9 | 1299.7 | 1868.3 | 1140.3 | 1414.0 | 12.0 | 3285.4 | 679.9 | | |
| | FITZ | 791.3 | 57.2 | 965.8 | 39.1 | 1197.4 | 391.1 | 1056.0 | 33.1 | | |
| | NMPE | 806.3 | 282.8 | 974.8 | 192.5 | 1609.6 | 580.7 | 3180.1 | 2091.0 | | |
| | Contour mean | 1905.2 | 640.2 | 1025.2 | 323.4 | 1180.1 | 242.0 | 2803.3 | 592.8 | | |
| 40 | NMPW | 99.3 | 9.0 | 174.5 | 168.5 | 1016.9 | 968.8 | 111.3 | 69.2 | | |
| | NMPP | 51.2 | 33.1 | 60.2 | 48.1 | 189.5 | 15.0 | 4488.8 | 842.4 | | |
| | FITZ | 1381.0 | 382.1 | 1290.7 | 1086.1 | 3174.1 | 1477.2 | 2966.5 | 36.1 | | |
| | NMPE | 436.3 | 418.2 | 2942.4 | 108.3 | 1516.3 | 1251.6 | 1970.6 | 574.6 | | |
| | Contour mean | 491.9 | 308.5 | 1116.9 | 668.8 | 1474.2 | 629.2 | 2384.3 | 917.7 | | |
| 60 | NMPW | 3.0 | 3.0 | 162.5 | 126.4 | 1609.6 | 3.0 | 120.3 | 6.0 | | |
| | NMPP | 36.1 | 6.0 | 216.6 | 162.5 | 547.6 | 102.3 | 899.6 | 117.3 | | |
| | FITZ | 2160.2 | 403.2 | 3366.6 | 1459.2 | 3011.6 | 2223.3 | 1778.1 | 436.3 | | |
| | NMPE | 1134.2 | 195.6 | 4792.7 | 550.6 | 4197.0 | 941.7 | 3754.7 | 60.2 | | |
| | Contour mean | 833.4 | 514.5 | 2134.6 | 1160.1 | 2341.4 | 798.2 | 1638.2 | 782.6 | | |
| Control mean** | | 802.7 | 267.5 | 1552.7 | 489.2 | 2310.6 | 674.7 | 2903.6 | 538.9 | | |
| Experimental mean** | | 1051.2 | 319.2 | 1444.7 | 348.9 | 2208.6 | 712.9 | 3852.8 | 1040.6 | | |
| Monthly mean | | 927.0 | 251.3 | 1498.7 | 292.7 | 2259.6 | 477.8 | 3378.2 | 580.6 | | |
| Monthly range | | 3.0 – 3116.9 | | 60.2 - 4792.7 | | 7518.5 – 207.6 | | 111.3–11444.7 | | | |

*Standard error.

**Control represents NMPW and NMPE, experimental represents NMPP and FITZ.

Table D-2

Abundance (No./$m^2$) of *Gammarus fasciatus* Collected by Suction Sampler, Nine Mile Point Vicinity, 1977

| Depth Contour (ft) | Transect | Apr | Jun | Aug | Oct | Dec* |
|---|---|---|---|---|---|---|
| 10 | NMPW | 150 | 72 | 3,054 | 4,032 | |
| | NMPP | 69 | 268 | 7,380 | 11,303 | |
| | FITZ | 238 | 12 | 3,559 | 779 | |
| | NMPE | 108 | 144 | 1,104 | 4,384 | |
| | Contour mean | 141 | 124 | 3,774 | 5,124 | |
| 20 | NMPW | 117 | 0 | 238 | 2,891 | |
| | NMPP | 78 | 93 | 6 | 3,902 | |
| | FITZ | 114 | 18 | 129 | 5,301 | |
| | NMPE | 42 | 241 | 21 | 2,587 | |
| | Contour mean | 88 | 88 | 99 | 3,670 | |
| 30 | NMPW | 15 | 30 | 18 | 1,555 | |
| | NMPP | 51 | 36 | 18 | 1,155 | |
| | FITZ | 36 | 21 | 78 | 162 | |
| | NMPE | 0 | 0 | 45 | 196 | |
| | Contour mean | 29 | 22 | 40 | 767 | |
| 40 | NMPW | 63 | 12 | 6 | 51 | |
| | NMPP | 6 | 3 | 36 | 3,496 | |
| | FITZ | 60 | 554 | 999 | 475 | |
| | NMPE | 0 | 3 | 36 | 108 | |
| | Contour mean | 32 | 143 | 269 | 1,033 | |
| 60 | NMPW | 0 | 0 | 6 | 12 | |
| | NMPP | 12 | 12 | 30 | 475 | |
| | FITZ | 27 | 199 | 21 | 469 | |
| | NMPE | 30 | 3 | 289 | 460 | |
| | Contour mean | 17 | 53 | 87 | 354 | |
| Control** | | 53 | 51 | 499 | 1,628 | |
| Experimental mean** | | 69 | 122 | 1,226 | 2,752 | |
| Monthly mean | | 62 | 86 | 854 | 2,190 | |
| Monthly range | | 0-238 | 0-554 | 6-7380 | 12-11303 | |

*Samples not taken due to ice and severe weather.
**Control represents NMPW and NMPE; experimental represents NMPP and FITZ.

Table D-3

Abundance (No./$m^2$) of *Pontoporeia affinis* Collected by Suction Sampler, Nine Mile Point Vicinity, 1978

| Depth Contour (ft) | Transect | Apr | Jun | Aug | Oct | Dec* |
|---|---|---|---|---|---|---|
| 10 | NMPW | 0 | 0 | 0 | 0 | |
| | NMPP | 0 | 0 | 0 | 0 | |
| | FITZ | 0 | 24 | 0 | 9 | |
| | NMPE | 0 | 0 | 0 | 0 | |
| | Contour mean | 0 | 6 | 0 | 2 | |
| 20 | NMPW | 0 | 12 | 0 | 0 | |
| | NMPP | 0 | 6 | 0 | 0 | |
| | FITZ | 0 | 27 | 36 | 0 | |
| | NMPE | 3 | 3 | 27 | 12 | |
| | Contour mean | 1 | 12 | 16 | 3 | |
| 30 | NMPW | 0 | 3 | 3 | 0 | |
| | NMPP | 0 | 3 | 51 | 3 | |
| | FITZ | 499 | 433 | 379 | 235 | |
| | NMPE | 294 | 451 | 508 | 150 | |
| | Contour mean | 200 | 223 | 235 | 97 | |
| 40 | NMPW | 0 | 0 | 0 | 0 | |
| | NMPP | 0 | 3 | 3 | 18 | |
| | FITZ | 120 | 165 | 469 | 683 | |
| | NMPE | 138 | 879 | 403 | 569 | |
| | Contour mean | 65 | 262 | 219 | 317 | |
| 60 | NMPW | 0 | 15 | 27 | 6 | |
| | NMPP | 0 | 3 | 298 | 33 | |
| | FITZ | 614 | 1,273 | 1,835 | 397 | |
| | NMPE | 244 | 2,253 | 2,419 | 1,871 | |
| | Contour mean | 212 | 886 | 1,145 | 577 | |
| Control mean** | | 63 | 362 | 339 | 261 | |
| Experimental mean** | | 123 | 194 | 307 | 138 | |
| Monthly mean | | 95 | 278 | 323 | 199 | |
| Monthly range | | 0-614 | 0-2253 | 0-2419 | 0-1871 | |

*Samples not taken due to ice and severe weather.
**Control represents NMPW and NMPE; experimental represents NMPP and FITZ.

Table D-4

Abundance (No./$m^2$) of Oligochaeta (Benthic Invertebrates) in 0.17-$m^2$ Suction Sampler, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRANSECT | APR MEAN | APR S.E.* | JUN MEAN | JUN S.E. | AUG MEAN | AUG S.E. | OCT MEAN | OCT S.E. | DEC MEAN | DEC SE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 3.0 | 3.0 | 550.6 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | No samples taken due to ice and strong winds. | |
| | NMPP | 0.0 | 0.0 | 1308.7 | 604.7 | 30.1 | 18.1 | 0.0 | 0.0 | | |
| | FITZ | 0.0 | 0.0 | 2220.3 | 607.7 | 114.3 | 66.2 | 3.0 | 3.0 | | |
| | NMPE | 0.0 | 0.0 | 1203.4 | 324.9 | 6.0 | 6.0 | 6.0 | 6.0 | | |
| CONTOUR | MEAN | 0.8 | 0.8 | 1320.8 | 343.6 | 37.6 | 26.4 | 2.3 | 1.4 | | |
| 20 | NMPW | 15.0 | 15.0 | 27.1 | 27.1 | 6.0 | 6.0 | 0.0 | 0.0 | | |
| | NMPP | 0.0 | 0.0 | 643.8 | 643.8 | 63.2 | 15.0 | 0.0 | 0.0 | | |
| | FITZ | 12.0 | 12.0 | 291.8 | 231.7 | 508.5 | 159.5 | 27.1 | 15.0 | | |
| | NMPE | 9.0 | 3.0 | 1320.8 | 15.0 | 12.0 | 12.0 | 27.1 | 27.1 | | |
| CONTOUR | MEAN | 9.0 | 3.2 | 570.9 | 280.1 | 147.4 | 121.0 | 13.5 | 7.8 | | |
| 30 | NMPW | 0.0 | 0.0 | 33.1 | 33.1 | 3.0 | 3.0 | 3.0 | 3.0 | | |
| | NMPP | 0.0 | 0.0 | 36.1 | 6.0 | 303.9 | 261.7 | 18.1 | 12.0 | | |
| | FITZ | 207.6 | 51.1 | 424.2 | 21.1 | 607.7 | 367.0 | 418.2 | 15.0 | | |
| | NMPE | 279.8 | 57.2 | 180.5 | 90.3 | 698.0 | 312.9 | 1805.2 | 1353.9 | | |
| CONTOUR | MEAN | 121.8 | 71.9 | 168.5 | 91.9 | 403.2 | 157.8 | 561.1 | 425.7 | | |
| 40 | NMPW | 3.0 | 3.0 | 0.0 | 0.0 | 87.2 | 87.2 | 30.1 | 6.0 | | |
| | NMPP | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 | 3.0 | | |
| | FITZ | 327.9 | 99.3 | 57.2 | 57.2 | 1465.2 | 947.7 | 1447.1 | 57.2 | | |
| | NMPE | 90.3 | 84.2 | 658.9 | 99.3 | 764.2 | 577.7 | 676.9 | 39.1 | | |
| CONTOUR | MEAN | 105.3 | 77.1 | 179.0 | 160.5 | 579.2 | 341.2 | 539.3 | 340.3 | | |
| 60 | NMPW | 0.0 | 0.0 | 252.7 | 0.0 | 18.1 | 18.1 | 6.0 | 6.0 | | |
| | NMPP | 0.0 | 0.0 | 6.0 | 6.0 | 0.0 | 0.0 | 99.3 | 81.2 | | |
| | FITZ | 640.8 | 9.0 | 848.4 | 559.6 | 613.8 | 252.7 | 388.1 | 45.1 | | |
| | NMPE | 294.8 | 6.0 | 321.9 | 171.5 | 878.5 | 294.8 | 502.4 | 33.1 | | |
| CONTOUR | MEAN | 233.9 | 152.4 | 357.3 | 177.2 | 377.6 | 219.6 | 249.0 | 117.3 | | |
| CONTROL MEAN** | | 69.5 | 37.3 | 454.9 | 151.4 | 247.3 | 117.4 | 305.7 | 183.7 | | |
| EXP. MEAN** | | 118.8 | 68.3 | 583.7 | 227.1 | 370.7 | 144.8 | 240.4 | 143.5 | | |
| MONTHLY MEAN | | 94.2 | 38.3 | 519.3 | 133.6 | 309.0 | 91.8 | 273.0 | 113.7 | | |
| MONTHLY RANGE | | 0.0- 640.8 | | 0.0- 2220.3 | | 0.0- 1465.2 | | 0.0- 1805.2 | | | |

* STANDARD ERROR
** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

Table D-5

Abundance (No./$m^2$) of Diptera (Benthic Invertebrates) in 0.17-$m^2$ Suction Sampler, Nine Mile Point Vicinity, 1978

| DEPTH CONTOUR | TRAN-SECT | APR MEAN | APR S.E.* | JUN MEAN | JUN S.E. | AUG MEAN | AUG S.E. | OCT MEAN | OCT S.E. | DEC MEAN | DEC SE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | NMPW | 442.3 | 165.5 | 337.0 | 18.1 | 6.0 | 6.0 | 9.0 | 9.0 | No samples taken due to ice and strong winds. | |
| | NMPP | 207.6 | 21.1 | 252.7 | 96.3 | 69.2 | 21.1 | 6.0 | 6.0 | | |
| | FITZ | 66.2 | 18.1 | 388.1 | 39.1 | 18.1 | 6.0 | 0.0 | 0.0 | | |
| | NMPE | 977.8 | 863.5 | 1200.4 | 484.4 | 15.0 | 15.0 | 132.4 | 102.3 | | |
| CONTOUR | MEAN | 423.5 | 200.4 | 544.6 | 220.4 | 27.1 | 14.3 | 36.9 | 31.9 | | |
| 20 | NMPW | 30.1 | 24.1 | 87.2 | 27.1 | 162.5 | 66.2 | 9.0 | 9.0 | | |
| | NMPP | 291.8 | 15.0 | 24.1 | 0.0 | 69.2 | 63.2 | 0.0 | 0.0 | | |
| | FITZ | 138.4 | 66.2 | 60.2 | 54.2 | 93.3 | 21.1 | 60.2 | 30.1 | | |
| | NMPE | 18.1 | 0.0 | 174.5 | 18.1 | 84.2 | 42.1 | 141.4 | 135.4 | | |
| CONTOUR | MEAN | 119.6 | 63.5 | 86.5 | 32.1 | 102.3 | 20.7 | 52.7 | 32.4 | | |
| 30 | NMPW | 36.1 | 18.1 | 42.1 | 36.1 | 45.1 | 15.0 | 3.0 | 3.0 | | |
| | NMPP | 15.0 | 3.0 | 54.2 | 42.1 | 752.1 | 150.4 | 0.0 | 0.0 | | |
| | FITZ | 36.1 | 6.0 | 42.1 | 6.0 | 48.1 | 0.0 | 87.2 | 3.0 | | |
| | NMPE | 54.2 | 0.0 | 258.7 | 60.2 | 144.4 | 90.3 | 297.9 | 189.5 | | |
| CONTOUR | MEAN | 35.4 | 8.0 | 99.3 | 53.2 | 247.5 | 169.8 | 97.0 | 69.9 | | |
| 40 | NMPW | 3.0 | 3.0 | 12.0 | 12.0 | 884.5 | 860.5 | 6.0 | 6.0 | | |
| | NMPP | 9.0 | 9.0 | 3.0 | 3.0 | 141.4 | 27.1 | 21.1 | 15.0 | | |
| | FITZ | 66.2 | 0.0 | 96.3 | 84.2 | 84.2 | 42.1 | 180.5 | 0.1 | | |
| | NMPE | 9.0 | 9.0 | 75.2 | 21.1 | 78.2 | 66.2 | 105.3 | 27.1 | | |
| CONTOUR | MEAN | 21.8 | 14.9 | 46.6 | 23.1 | 297.1 | 196.3 | 78.2 | 40.5 | | |
| 60 | NMPW | 0.0 | 0.0 | 18.1 | 0.0 | 1480.2 | 84.2 | 84.2 | 0.0 | | |
| | NMPP | 9.0 | 3.0 | 54.2 | 12.0 | 189.5 | 87.2 | 108.3 | 12.0 | | |
| | FITZ | 63.2 | 15.0 | 117.3 | 9.0 | 352.0 | 261.7 | 207.6 | 69.2 | | |
| | NMPE | 90.3 | 24.1 | 120.3 | 60.2 | 315.9 | 147.4 | 445.3 | 0.0 | | |
| CONTOUR | MEAN | 40.6 | 21.6 | 77.5 | 25.0 | 584.4 | 300.6 | 211.4 | 82.4 | | |
| CONTROL MEAN** | | 166.1 | 99.4 | 232.6 | 112.6 | 321.6 | 152.8 | 123.4 | 46.0 | | |
| EXP. MEAN** | | 90.3 | 29.9 | 109.2 | 38.0 | 181.7 | 70.2 | 67.1 | 24.5 | | |
| MONTHLY MEAN | | 128.2 | 51.3 | 170.9 | 59.5 | 251.7 | 83.4 | 95.2 | 26.2 | | |
| MONTHLY RANGE | | 0.0- 977.8 | | 3.0- 1200.4 | | 6.0- 1480.2 | | 0.0- 445.3 | | | |

* STANDARD ERROR
** CONTROL REPRESENTS NMPW & NMPE, EXPERIMENTAL REPRESENTS NMPP & FITZ

APPENDIX E

ICHTHYOPLANKTON

Table E-1 (Page 1 of 3)

Abundance* of Total Eggs (All Species Combined) in Day Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No fish eggs were collected in day samples after August)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| APR 4 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| APR 10 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| APR 17 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| APR 24 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| MAY 2 | S | 0 | 0 | 0 | 3.8 | 4.1 | 0 | 1.3 | 0 | 0 | 4.2 | 4.2 | 0 | 0 | 1.4 | 3.6 | 0 | 0 | 1.3 |
| | M | 0 | 4.9 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | B | 0 | 0 | 0 | 4.5 | 4.5 | 0 | 1.5 | 4.5 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0.9 |
| | Mean | 0 | 1.6 | 0 | 2.8 | 2.9 | 0 | 1.2 | 1.5 | 0 | 1.4 | 1.4 | 0 | 0 | 0.7 | 1.2 | 0 | 0 | 0.9 |
| MAY 8 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| MAY 15 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | | | | |
| | S | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 |
| | M | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 |
| | B | | | | | | | | | | | | | | | 0 | 4.0 | 0 | 0.3 |
| | Mean | | | | | | | | | | | | | | | 0 | 1.3 | 0 | 0.1 |
| MAY 22 | S | 0 | 0 | 0 | 0 | 4.4 | 0 | 0.7 | No Catch | | | | | | | No Catch | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0 |
| | B | 0 | 0 | 9.8 | 0 | 0 | 0 | 1.6 | | | | | | | | | | | 0.6 |
| | Mean | 0 | 0 | 3.2 | 0 | 1.5 | 0 | 0.8 | | | | | | | | | | | 0.3 |
| MAY 30 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-1 (Page 2 of 3)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JUN 5 | S | 0 | 9.2 | 0 | 0 | 0 | 0 | 1.5 | No Catch | | | | | | | No Catch | | | 0.6 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | | | | 0.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | | | | 0.0 |
| | Mean | 0 | 3.1 | 0 | 0 | 0 | 0 | 0.5 | | | | | | | | | | | 0.2 |
| JUN 12 | S | 0 | 0 | 12.6 | 0 | 0 | 0 | 2.1 | No Catch | | | | | | | No Catch | | | 0.8 |
| | M | 0 | 5.5 | 0 | 5.7 | 0 | 0 | 1.9 | | | | | | | | | | | 0.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | | | | 0.0 |
| | Mean | 0 | 1.8 | 4.2 | 1.9 | 0 | 0 | 1.3 | | | | | | | | | | | 0.5 |
| JUN 19 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | No Catch | | | 0.0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | 0 | 10.2 | 4.7 | 0 | 0 | 0 | 2.5 | 0 | 0 | 5.7 | 0 | 0 | 0 | 1.0 | | | | 1.4 |
| | Mean | 0 | 3.4 | 1.6 | 0 | 0 | 0 | 0.8 | 0 | 0 | 1.9 | 0 | 0 | 0 | 0.3 | | | | 0.5 |
| JUN 26 | S | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | No Catch | | | | | | | 0 | 4.9 | 0 | 0.7 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | 0 | 0 | 0 | 0.0 |
| | B | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | | | | | | | | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 0 | 0 | 3.3 | 0 | 0 | 0.6 | | | | | | | | 0 | 1.6 | 0 | 0.3 |
| JUL 5 | S | 4.8 | 0 | 4.7 | 4.2 | 0 | 0 | 2.3 | 4.5 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 1.2 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 |
| | B | 0 | 0 | 0 | 21.6 | 26.4 | 25.4 | 12.2 | 0 | 0 | 6.2 | 0 | 0 | 5.1 | 1.9 | 10.1 | 0 | 0 | 6.4 |
| | Mean | 1.6 | 0 | 1.6 | 8.6 | 8.8 | 8.5 | 4.8 | 1.5 | 0 | 2.1 | 0 | 0 | 1.7 | 0.9 | 3.4 | 0 | 0 | 2.5 |
| JUL 10 | S | 0 | 294.3 | 0 | 0 | 0 | 0 | 49.1 | 4.6 | 10.2 | 0 | 0 | 0 | 0 | 2.5 | 0 | 3.9 | 0 | 20.9 |
| | M | 0 | 56.1 | 0 | 0 | 0 | 0 | 9.4 | 0 | 0 | 0 | 0 | 5.2 | 0 | 0.9 | 11.6 | 0 | 0 | 4.9 |
| | B | 0 | 145.5 | 0 | 0 | 0 | 0 | 24.3 | 0 | 19.0 | 0 | 0 | 0 | 0 | 3.2 | 0 | 0 | 0 | 11.0 |
| | Mean | 0 | 165.3 | 0 | 0 | 0 | 0 | 27.6 | 1.5 | 9.7 | 0 | 0 | 1.7 | 0 | 2.2 | 3.9 | 1.3 | 0 | 12.2 |
| JUL 17 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 16.5 | 0 | 0 | 2.8 | 0 | 0 | 0 | 1.1 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 4.6 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0.3 |
| | B | 0 | 0 | 0 | 9.0 | 0 | 0 | 1.5 | 0 | 0 | 0 | 19.2 | 0 | 0 | 3.2 | 0 | 0 | 0 | 1.9 |
| | Mean | 0 | 0 | 0 | 3.0 | 0 | 0 | 0.5 | 0 | 0 | 0 | 13.4 | 0 | 0 | 2.2 | 0 | 0 | 0 | 1.1 |
| JUL 24 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 77.3 | 0 | 0 | 12.9 | No Catch | | | 5.2 |
| | M | 0 | 0 | 0 | 5.6 | 0 | 0 | 0.9 | 0 | 0 | 0 | 143.3 | 0 | 0 | 23.9 | | | | 9.9 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 327.7 | 0 | 0 | 54.6 | | | | 21.8 |
| | Mean | 0 | 0 | 0 | 1.9 | 0 | 0 | 0.3 | 0 | 0 | 0 | 182.8 | 0 | 0 | 30.5 | | | | 12.3 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-1 (Page 3 of 3)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| 31 July | S | NO CATCH | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | | | | | | | 0 | 0 | 0 | 0 | 4.7 | 4.7 | 0 | 1.6 | | | | 0.6 |
| | B | | | | | | | 0 | 0 | 0 | 0 | 0 | 8.7 | 0 | 1.5 | | | | 0.6 |
| | Mean | | | | | | | 0 | 0 | 0 | 0 | 1.6 | 4.5 | 0 | 1.0 | | | | 0.4 |
| 7 Aug | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.2 | 0 | 0 | 2.0 | NO CATCH | | | 0.8 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | | | | 0.3 |
| | B | 0 | 0 | 0 | 43.4 | 0 | 9.8 | 8.9 | 0 | 0 | 0 | 45.5 | 0 | 0 | 7.6 | | | | 6.6 |
| | Mean | 0 | 0 | 0 | 14.5 | 0 | 3.3 | 3.0 | 0 | 0 | 0 | 20.9 | 0 | 0 | 3.5 | | | | 2.6 |
| 14 Aug | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 21 Aug | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 28 Aug | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 5 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | - |
| 11 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 18 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 26 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-2 (Page 1 of 2)

Abundance* of Total Eggs (All Species Combined) in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JUN 6-7 | S | 0 | 0 | 0 | 4.0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | No Catch | | 0.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | | | | 0.3 |
| | Mean | 0 | 0 | 0 | 1.3 | 0 | 0 | 0.2 | 0 | 0 | 0 | 1.6 | 0 | 0 | 0.3 | | | | 0.2 |
| JUN 15-16 | S | 0 | 118.2 | 0 | 0 | 0 | 0 | 19.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 4.4 | 0 | 0 | 8.2 |
| | M | 0 | 102.8 | 4.6 | 0 | 0 | 0 | 17.9 | 0 | 0 | 4.5 | 0 | 0 | 0 | 0.8 | 5.5 | 0 | 0 | 7.8 |
| | B | 0 | 334.3 | 0 | 0 | 0 | 0 | 55.7 | 0 | 5.1 | 4.9 | 0 | 0 | 0 | 1.7 | 0 | 0 | 0 | 23.0 |
| | Mean | 0 | 185.1 | 1.5 | 0 | 0 | 0 | 31.1 | 0 | 1.7 | 3.1 | 0 | 0 | 0 | 0.8 | 3.3 | 0 | 0 | 13.0 |
| JUN 19-20 | S | 0 | 0 | 0 | 4.8 | 0 | 0 | 0.8 | 0 | 4.7 | 0 | 4.4 | 0 | 0 | 1.5 | | | | 0.9 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | No Catch | | 0.0 |
| | B | 0 | 8.8 | 15.9 | 0 | 0 | 0 | 4.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 1.6 |
| | Mean | 0 | 2.9 | 5.3 | 1.6 | 0 | 0 | 1.6 | 0 | 1.6 | 0 | 1.5 | 0 | 0 | 0.5 | | | | 0.9 |
| JUN 26 | S | 0 | 40.9 | 14.0 | 0 | 0 | 0 | 9.2 | 0 | 0 | 4.4 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 4.0 |
| | M | 9.6 | 33.3 | 0 | 0 | 0 | 19.3 | 10.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 4.2 |
| | B | 0 | 61.5 | 4.8 | 10.0 | 0 | 26.6 | 17.2 | 0 | 14.7 | 25.5 | 0 | 0 | 9.1 | 8.2 | 0 | 0 | 5.0 | 10.5 |
| | Mean | 3.2 | 45.2 | 6.2 | 3.3 | 0 | 15.3 | 12.2 | 0 | 4.9 | 10.0 | 0 | 0 | 3.0 | 3.0 | 0 | 0 | 1.7 | 6.2 |
| JUL 5-6 | S | 86.3 | 48.9 | 0 | 0 | 294.7 | 41.3 | 78.5 | 27.8 | 137.1 | 0 | 0 | 0 | 0 | 27.5 | 0 | 87.9 | 0 | 48.3 |
| | M | 18.5 | 9.9 | 0 | 0 | 0 | 0 | 4.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 1.9 |
| | B | 0 | 0 | 0 | 0 | 5.4 | 0 | 0.9 | 5.4 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0.7 |
| | Mean | 34.9 | 19.6 | 0 | 0 | 100.0 | 13.8 | 28.0 | 11.1 | 45.7 | 0 | 0 | 0 | 0 | 9.5 | 0 | 29.3 | 0 | 17.0 |
| JUL 12-13 | S | 8.3 | 0 | 3.9 | 0 | 0 | 0 | 2.0 | 3.7 | 14.2 | 0 | 0 | 0 | 0 | 3.0 | | | | 2.0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | No Catch | | 0.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 29.1 | 0 | 0 | 0 | 0 | 4.9 | | | | 1.9 |
| | Mean | 2.8 | 0 | 1.3 | 0 | 0 | 0 | 0.7 | 1.2 | 14.4 | 0 | 0 | 0 | 0 | 2.6 | | | | 1.3 |
| JUL 17-18 | S | 207.9 | 4.2 | 8.1 | 0 | 0 | 0 | 36.7 | 8.6 | 0 | 0 | 0 | 0 | 0 | 1.4 | | | | 15.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | No Catch | | 0.0 |
| | B | 5.3 | 5.7 | 4.9 | 0 | 0 | 0 | 2.7 | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | | | | 1.4 |
| | Mean | 71.1 | 3.3 | 4.3 | 0 | 0 | 0 | 13.1 | 4.6 | 0 | 0 | 0 | 0 | 0 | 0.8 | | | | 5.6 |
| JUL 24-25 | S | 0 | 231.9 | 0 | 115.3 | 0 | 0 | 57.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 23.1 |
| | M | 4021.7 | 1063.7 | 0 | 85.1 | 0 | 0 | 861.8 | 6.3 | 90.5 | 0 | 0 | 0 | 0 | 16.1 | | No Catch | | 351.2 |
| | B | 10.7 | 1179.5 | 0 | 172.8 | 0 | 0 | 227.2 | 21.7 | 277.8 | 0 | 0 | 0 | 0 | 49.9 | | | | 110.8 |
| | Mean | 1344.1 | 825.0 | 0 | 124.4 | 0 | 0 | 382.3 | 9.3 | 122.8 | 0 | 0 | 0 | 0 | 22.0 | | | | 161.7 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-2 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| 31 July & 1 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 7-8 Aug | S | 4.2 | 206.1 | 0 | 0 | 0 | 0 | 35.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 14.0 |
| | M | 1333.9 | 82.7 | 0 | 0 | 0 | 0 | 236.1 | 0 | 4.3 | 0 | 0 | 0 | 0 | 0.7 | | | | 94.7 |
| | B | 0 | 459.1 | 0 | 0 | 0 | 0 | 76.5 | 0 | 14.0 | 0 | 0 | 0 | 0 | 2.3 | | | | 31.5 |
| | Mean | 446.0 | 249.3 | 0 | 0 | 0 | 0 | 115.9 | 0 | 6.1 | 0 | 0 | 0 | 0 | 1.0 | | | | 46.7 |
| 14 Aug | S | NO CATCH | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | | | | | | | | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | | | | 0.3 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | | | | | | | | 1.7 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | 0.1 |
| 21 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 28 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 5 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 14 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-3 (Page 1 of 2)

Abundance* of Alewife Eggs in Day Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No alewife eggs were collected in day samples before June and after August)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 5 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUN 12 | S | 0 | 0 | 4.2 | 0 | 0 | 0 | 0.7 | No Catch | | | | | | | No Catch | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | | | | 0.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | | | | 0.0 |
| | Mean | 0 | 0 | 1.4 | 0 | 0 | 0 | 0.2 | | | | | | | | | | | 0.1 |
| JUN 19 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | No Catch | | | 0.0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | 0 | 10.2 | 0 | 0 | 0 | 0 | 1.7 | 0 | 0 | 5.6 | 0 | 0 | 0 | 0.9 | | | | 1.1 |
| | Mean | 0 | 3.4 | 0 | 0 | 0 | 0 | 0.6 | 0 | 0 | 1.9 | 0 | 0 | 0 | 0.3 | | | | 0.4 |
| JUN 26 | S | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | No Catch | | | | | | | 0 | 4.9 | 0 | 0.7 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | 0 | 0 | 0 | 0.0 |
| | B | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | | | | | | | | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 0 | 0 | 3.3 | 0 | 0 | 0.6 | | | | | | | | 0 | 1.6 | 0 | 0.3 |
| JUL 5 | S | 4.8 | 0 | 4.7 | 4.2 | 0 | 0 | 2.3 | 4.5 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 1.2 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 |
| | B | 0 | 0 | 0 | 21.6 | 0 | 0 | 3.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 10.1 | 0 | 0 | 2.1 |
| | Mean | 1.6 | 0 | 1.6 | 8.6 | 0 | 0 | 2.0 | 1.5 | 0 | 0 | 0 | 0 | 0 | 0.3 | 3.4 | 0 | 0 | 1.1 |
| JUL 10 | S | 0 | 294.3 | 0 | 0 | 0 | 0 | 49.1 | 4.6 | 10.2 | 0 | 0 | 0 | 0 | 2.5 | 0 | 0 | 0 | 20.6 |
| | M | 0 | 56.1 | 0 | 0 | 0 | 0 | 9.4 | 0 | 0 | 0 | 0 | 5.2 | 0 | 0.9 | 5.8 | 0 | 0 | 4.5 |
| | B | 0 | 145.5 | 0 | 0 | 0 | 0 | 24.3 | 0 | 19.0 | 0 | 0 | 0 | 0 | 3.2 | 0 | 0 | 0 | 11.0 |
| | Mean | 0 | 165.3 | 0 | 0 | 0 | 0 | 27.6 | 1.5 | 9.7 | 0 | 0 | 1.7 | 0 | 2.2 | 1.9 | 0 | 0 | 12.0 |
| JUL 17 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 16.5 | 0 | 0 | 2.8 | No Catch | | | 1.1 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 4.6 | 0 | 0 | 0.8 | | | | 0.3 |
| | B | 0 | 0 | 0 | 9.1 | 0 | 0 | 1.5 | 0 | 0 | 0 | 19.2 | 0 | 0 | 3.2 | | | | 1.9 |
| | Mean | 0 | 0 | 0 | 3.0 | 0 | 0 | 0.5 | 0 | 0 | 0 | 13.4 | 0 | 0 | 2.2 | | | | 1.1 |
| JUL 24 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 77.3 | 0 | 0 | 12.9 | No Catch | | | 5.2 |
| | M | 0 | 0 | 0 | 5.6 | 0 | 0 | 0.9 | 0 | 0 | 0 | 143.3 | 0 | 0 | 23.9 | | | | 9.9 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 327.7 | 0 | 0 | 54.6 | | | | 21.8 |
| | Mean | 0 | 0 | 0 | 1.9 | 0 | 0 | 0.3 | 0 | 0 | 0 | 182.8 | 0 | 0 | 30.5 | | | | 12.3 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-3 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 20-Ft Contour*** 1-West | 20-Ft Contour*** 1/2-West | 20-Ft Contour*** 1/2-East | 20-Ft Contour*** 1-East | 20-Ft Contour*** 3-East | 20-Ft Contour*** Mean | 40-Ft Contour*** 3-West | 40-Ft Contour*** 1-West | 40-Ft Contour*** 1/2-West | 40-Ft Contour*** 1/2-East | 40-Ft Contour*** 1-East | 40-Ft Contour*** 3-East | 40-Ft Contour*** Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July | S | NO CATCH | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | | | | | | | 0 | 0 | 0 | 0 | 4.7 | 4.7 | 0 | 1.6 | | | | 0.6 |
| | B | | | | | | | 0 | 0 | 0 | 0 | 0 | 8.7 | 0 | 1.5 | | | | 0.6 |
| | Mean | | | | | | | 0 | 0 | 0 | 0 | 1.6 | 4.5 | 0 | 1.0 | | | | 0.4 |
| 7 Aug | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12.2 | 0 | 0 | 2.0 | NO CATCH | | | 0.8 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | | | | 0.3 |
| | B | 0 | 0 | 0 | 43.4 | 0 | 9.8 | 8.9 | 0 | 0 | 0 | 45.5 | 0 | 0 | 7.6 | | | | 6.6 |
| | Mean | 0 | 0 | 0 | 14.5 | 0 | 3.3 | 3.0 | 0 | 0 | 0 | 20.9 | 0 | 0 | 3.5 | | | | 2.6 |
| 14 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 21 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 28 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 5 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 11 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 18 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 26 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-4 (Page 1 of 2)

Abundance* of Alewife Eggs in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 6-7 | S | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUN 15-16 | S | 0 | 118.2 | 0 | 0 | 0 | 0 | 19.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | No Catch | | 7.9 |
| | M | 0 | 102.8 | 4.6 | 0 | 0 | 0 | 17.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 6.9 |
| | B | 0 | 329.3 | 0 | 0 | 0 | 0 | 54.9 | 0 | 5.1 | 4.9 | 0 | 0 | 0 | 1.7 | | | | 22.6 |
| | Mean | 0 | 183.4 | 1.5 | 0 | 0 | 0 | 30.8 | 0 | 1.7 | 1.6 | 0 | 0 | 0 | 0.6 | | | | 12.5 |
| JUN 19-20 | S | 0 | 0 | 0 | 4.8 | 0 | 0 | 0.8 | 0 | 4.7 | 0 | 4.4 | 0 | 0 | 1.5 | | No Catch | | 0.9 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | 0 | 8.8 | 15.9 | 0 | 0 | 0 | 4.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 1.7 |
| | Mean | 0 | 2.9 | 5.3 | 1.6 | 0 | 0 | 1.6 | 0 | 1.6 | 0 | 1.5 | 0 | 0 | 0.5 | | | | 0.9 |
| JUN 26 | S | 0 | 40.9 | 14.0 | 0 | 0 | 0 | 9.2 | 0 | 0 | 4.4 | 0 | 0 | 0 | 0.7 | | No Catch | | 4.0 |
| | M | 0 | 33.3 | 0 | 0 | 0 | 0 | 5.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 2.2 |
| | B | 0 | 61.5 | 4.8 | 10.0 | 0 | 26.6 | 17.2 | 0 | 14.7 | 25.5 | 0 | 0 | 0 | 6.7 | | | | 9.5 |
| | Mean | 0 | 45.2 | 6.2 | 3.3 | 0 | 8.9 | 10.6 | 0 | 4.9 | 10.0 | 0 | 0 | 0 | 2.5 | | | | 5.2 |
| JUL 5-6 | S | 86.3 | 48.9 | 0 | 0 | 294.7 | 41.3 | 78.5 | 27.8 | 137.1 | 0 | 0 | 0 | 0 | 27.5 | 0 | 87.9 | 0 | 48.3 |
| | M | 18.5 | 9.9 | 0 | 0 | 0 | 0 | 4.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.9 |
| | B | 0 | 0 | 0 | 0 | 5.4 | 0 | 0.9 | 5.4 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0.7 |
| | Mean | 34.9 | 19.6 | 0 | 0 | 100.0 | 13.8 | 28.0 | 11.1 | 45.7 | 0 | 0 | 0 | 0 | 9.5 | 0 | 29.3 | 0 | 17.0 |
| JUL 12-13 | S | 8.3 | 0 | 0 | 0 | 0 | 0 | 1.4 | 3.7 | 14.2 | 0 | 0 | 0 | 0 | 3.0 | | No Catch | | 1.7 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29.1 | 0 | 0 | 0 | 0 | 4.9 | | | | 1.9 |
| | Mean | 2.8 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1.2 | 14.4 | 0 | 0 | 0 | 0 | 2.6 | | | | 1.2 |
| JUL 17-18 | S | 207.9 | 4.2 | 8.1 | 0 | 0 | 0 | 36.7 | 8.6 | 0 | 0 | 0 | 0 | 0 | 1.4 | | No Catch | | 15.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | 5.3 | 5.7 | 4.9 | 0 | 0 | 0 | 2.7 | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | | | | 1.4 |
| | Mean | 71.1 | 3.3 | 4.3 | 0 | 0 | 0 | 13.1 | 4.6 | 0 | 0 | 0 | 0 | 0 | 0.8 | | | | 5.6 |
| JUL 24-25 | S | 0 | 231.9 | 0 | 115.3 | 0 | 0 | 57.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | No Catch | | 23.1 |
| | M | 4021.7 | 1063.7 | 0 | 85.1 | 0 | 0 | 861.8 | 6.3 | 90.5 | 0 | 0 | 0 | 0 | 16.1 | | | | 351.2 |
| | B | 10.7 | 1179.5 | 0 | 167.2 | 0 | 0 | 226.2 | 21.7 | 277.8 | 0 | 0 | 0 | 0 | 49.9 | | | | 110.5 |
| | Mean | 1344.1 | 825.0 | 0 | 122.5 | 0 | 0 | 382.0 | 9.3 | 122.8 | 0 | 0 | 0 | 0 | 22.0 | | | | 161.6 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-4 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July & 1 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 7-8 Aug | S | 4.2 | 206.1 | 0 | 0 | 0 | 0 | 35.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 14.0 |
| | M | 1333.9 | 82.7 | 0 | 0 | 0 | 0 | 236.1 | 0 | 4.3 | 0 | 0 | 0 | 0 | 0.7 | | | | 94.7 |
| | B | 0 | 459.1 | 0 | 0 | 0 | 0 | 76.5 | 0 | 14.0 | 0 | 0 | 0 | 0 | 2.3 | | | | 31.5 |
| | Mean | 446.0 | 249.3 | 0 | 0 | 0 | 0 | 115.9 | 0 | 6.1 | 0 | 0 | 0 | 0 | 1.0 | | | | 46.7 |
| 14 Aug | S | NO CATCH | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | | | | | | | | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | | | | 0.3 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | | | | | | | | 1.7 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | 0.1 |
| 21 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 28 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 5 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 14 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-5 (Page 1 of 3)

Abundance* of Total Prolarvae (All Species Combined) in Day Ichthyoplankton Collections
Nine Mile Point Vicinity, 1978

(No prolarvae were collected in day samples after August)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Apr 4 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 10 | S | 0 | 0 | 4.0 | 0 | 0 | 0 | 0.7 | 0 | 3.9 | 0 | 0 | 0 | 0 | 0.7 | 4.1 | 0 | 0 | 0.8 |
| | M | 0 | 0 | 0 | 5.3 | 0 | 5.3 | 1.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Mean | 0 | 0 | 1.3 | 1.8 | 0 | 1.8 | 0.8 | 0 | 1.3 | 0 | 0 | 0 | 0 | 0.2 | 1.4 | 0 | 0 | 0.5 |
| Apr 17 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | | 0 | 0 | 0 | 0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | 0 | 0 | 4.9 | 0.3 |
| | B | 0 | 0 | 0 | 5.2[1] | 5.5 | 0 | 1.8 | | | | | | | | 0 | 0 | 0 | 0.7 |
| | Mean | 0 | 0 | 0 | 1.7 | 1.8 | 0 | 0.6 | | | | | | | | 0 | 0 | 1.6 | 0.3 |
| Apr 24 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | | No Catch | | | 0 |
| | M | 0 | 4.7 | 0 | 0 | 0 | 0 | 0.8 | | | | | | | | | | | 0.3 |
| | B | 4.6 | 0 | 0 | 0 | 0 | 0 | 0.8 | | | | | | | | | | | 0.3 |
| | Mean | 1.5 | 1.6 | 0 | 0 | 0 | 0 | 0.5 | | | | | | | | | | | 0.2 |
| May 2 | S | 0 | 0 | 0 | 0 | 4.1 | 0 | 0.7 | 4.0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0.5 |
| | M | 4.4 | 4.9 | 0 | 0 | 0 | 0 | 1.6 | 4.7 | 0 | 4.7 | 5.2 | 0 | 0 | 2.4 | 0 | 0 | 0 | 1.6 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.5 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0.3 |
| | Mean | 1.5 | 1.6 | 0 | 0 | 1.4 | 0 | 0.8 | 2.9 | 0 | 3.1 | 1.7 | 0 | 0 | 1.3 | 0 | 0 | 0 | 0.8 |
| May 8 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| May 15 | S | 0 | 0 | 13.1 | 13.8 | 0 | 0 | 4.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | 1.8 |
| | M | 0 | 0 | 14.4 | 69.1 | 0 | 0 | 13.9 | 0 | 0 | 4.7 | 0 | 0 | 0 | 0.8 | | | | 5.9 |
| | B | 0 | 0 | 8.9 | 59.7 | 0 | 0 | 11.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 4.6 |
| | Mean | 0 | 0 | 12.1 | 47.6 | 0 | 0 | 10.0 | 0 | 0 | 1.6 | 0 | 0 | 0 | 0.3 | | | | 4.1 |
| May 22 | S | 4.4 | 0 | 0 | 0 | 0 | 0 | 0.7 | No Catch | | | | | | | No Catch | | | 0.3 |
| | M | 0 | 5.0 | 0 | 0 | 5.0 | 5.6 | 2.6 | | | | | | | | | | | 1.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 15.5 | 2.6 | | | | | | | | | | | 1.0 |
| | Mean | 1.5 | 1.7 | 0 | 0 | 1.7 | 7.0 | 2.0 | | | | | | | | | | | 0.8 |
| May 30 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.8 | 0 | 0.2 |
| | M | 0 | 0 | 0 | 0 | 4.9 | 0 | 0.8 | 0 | 0 | 4.9 | 0 | 4.4 | 0 | 1.6 | 0 | 0 | 0 | 0.9 |
| | B | 0 | 0 | 0 | 0 | 0 | 9.7 | 1.6 | 5.3 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 1.0 |
| | Mean | 0 | 0 | 0 | 0 | 1.6 | 3.2 | 0.8 | 1.8 | 0 | 1.6 | 0 | 1.5 | 0 | 0.8 | 0 | 1.3 | 0 | 0.7 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

[1]Surface and bottom samples at 1/2 east mislabeled; Prolarvae assigned to bottom sample.

## Table E-5 (Page 2 of 3)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JUN 5 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 4.1 | 0.3 |
| | M | 5.1 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 4.8 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0.4 |
| | Mean | 1.7 | 0 | 0 | 0 | 0 | 0 | 0.3 | 1.7 | 1.6 | 0 | 0 | 0 | 0 | 0.6 | 0 | 0 | 1.4 | 0.5 |
| JUN 12 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | No Catch | | | 0.0 |
| | M | | | | | | | | 5.6 | 0 | 0 | 0 | 0 | 0 | 0.9 | | | | 0.4 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | | | | | | | | 1.9 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | 0.1 |
| JUN 19 | S | 56.1 | 36.6 | 10.9 | 0 | 0 | 0 | 17.3 | 9.2 | 0 | 0 | 0 | 0 | 0 | 1.5 | 7.5 | 4.6 | 0 | 8.3 |
| | M | 5.7 | 0 | 0 | 0 | 0 | 0 | 1.0 | 11.6 | 0 | 37.2 | 0 | 5.7 | 0 | 9.1 | 0 | 0 | 0 | 4.0 |
| | B | 49.4 | 10.2 | 4.7 | 0 | 5.4 | 5.3 | 12.5 | 5.5 | 5.3 | 5.6 | 0 | 0 | 0 | 2.7 | 0 | 0 | 0 | 6.1 |
| | Mean | 37.1 | 15.6 | 5.2 | 0 | 1.8 | 1.8 | 10.2 | 8.8 | 1.8 | 14.3 | 0 | 1.9 | 0 | 4.5 | 2.5 | 1.5 | 0 | 6.1 |
| JUN 26 | S | 13.8 | 0 | 10.0 | 0 | 46.7 | 0 | 11.8 | 9.6 | 8.8 | 0 | 20.9 | 34.6 | 0 | 12.3 | 9.5 | 0 | 0 | 10.3 |
| | M | 0 | 0 | 0 | 55.0 | 0 | 5.3 | 10.1 | 5.0 | 0 | 4.9 | 5.2 | 0 | 4.6 | 3.3 | 0 | 0 | 4.4 | 5.6 |
| | B | 19.3 | 4.8 | 0 | 14.7 | 5.0 | 0 | 7.3 | 4.7 | 14.2 | 14.7 | 10.3 | 19.9 | 0 | 10.6 | 0 | 0 | 0 | 7.2 |
| | Mean | 11.0 | 1.6 | 3.3 | 23.2 | 17.3 | 1.8 | 9.7 | 6.5 | 7.7 | 6.6 | 12.2 | 18.2 | 1.5 | 8.8 | 3.2 | 0 | 1.5 | 7.7 |
| JUL 5 | S | 0 | 5.2 | 9.3 | 67.1 | 453.9 | 155.9 | 115.2 | 4.5 | 22.3 | 43.2 | 498.7 | 451.5 | 107.3 | 187.9 | 130.2 | 58.9 | 20.6 | 135.2 |
| | M | 0 | 0 | 0 | 1320.0 | 462.9 | 74.7 | 309.6 | 0 | 0 | 0 | 44.9 | 165.6 | 0 | 35.1 | 0 | 0 | 0 | 137.9 |
| | B | 0 | 0 | 29.8 | 420.7 | 79.2 | 30.5 | 93.4 | 0 | 0 | 0 | 18.2 | 20.3 | 20.4 | 9.8 | 5.0 | 5.3 | 0 | 42.0 |
| | Mean | 0 | 1.7 | 13.0 | 602.6 | 332.0 | 87.0 | 172.7 | 1.5 | 7.4 | 14.4 | 187.3 | 212.5 | 42.6 | 77.6 | 45.1 | 21.4 | 6.9 | 105.0 |
| JUL 10 | S | 23.1 | 413.1 | 46.5 | 34.4 | 208.8 | 12.9 | 123.1 | 36.4 | 15.3 | 0 | 204.5 | 327.3 | 13.3 | 99.5 | 126.0 | 172.1 | 23.8 | 110.5 |
| | M | 0 | 0 | 0 | 0 | 22.3 | 21.8 | 7.4 | 0 | 5.4 | 0 | 14.5 | 15.5 | 0 | 5.9 | 0 | 12.5 | 6.2 | 6.5 |
| | B | 41.1 | 6.1 | 20.4 | 5.4 | 23.1 | 0 | 16.0 | 6.2 | 19.0 | 38.6 | 5.6 | 14.6 | 5.4 | 14.9 | 26.2 | 41.3 | 20.1 | 18.2 |
| | Mean | 21.4 | 139.7 | 22.3 | 13.3 | 84.7 | 11.6 | 48.8 | 14.2 | 13.2 | 12.9 | 74.9 | 119.1 | 6.2 | 40.1 | 50.7 | 75.3 | 16.7 | 45.1 |
| JUL 17 | S | 176.4 | 453.5 | 680.8 | 0 | 4.7 | 0 | 219.2 | 67.4 | 37.0 | 76.3 | 0 | 0 | 0 | 30.1 | 8.1 | 4.2 | 0 | 100.6 |
| | M | 49.4 | 103.7 | 208.6 | 0 | 9.0 | 0 | 61.8 | 84.6 | 53.9 | 629.6 | 0 | 0 | 0 | 128.0 | 0 | 0 | 4.2 | 76.2 |
| | B | 86.4 | 109.8 | 145.2 | 27.3 | 13.4 | 5.1 | 64.5 | 0 | 4.0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 3.7 | 26.3 |
| | Mean | 104.1 | 222.3 | 344.9 | 9.1 | 9.0 | 1.7 | 115.2 | 50.7 | 31.6 | 235.3 | 0 | 0 | 0 | 52.9 | 2.7 | 1.4 | 2.6 | 67.7 |
| JUL 24 | S | 70.2 | 27.2 | 9.5 | 53.2 | 99.0 | 122.0 | 63.5 | 0 | 12.6 | 17.3 | 65.7 | 72.3 | 88.5 | 42.7 | 136.1 | 12.9 | 0 | 52.4 |
| | M | 22.2 | 20.5 | 0 | 116.6 | 76.8 | 31.2 | 44.6 | 19.4 | 9.7 | 20.4 | 60.1 | 92.5 | 10.1 | 35.4 | 76.4 | 19.8 | 0 | 38.4 |
| | B | 70.1 | 23.0 | 14.0 | 93.9 | 85.1 | 56.1 | 57.0 | 18.6 | 9.1 | 4.6 | 41.0 | 60.8 | 4.4 | 23.1 | 37.3 | 17.9 | 0 | 35.7 |
| | Mean | 54.2 | 23.6 | 7.8 | 87.9 | 87.0 | 69.8 | 55.0 | 12.7 | 10.5 | 14.1 | 55.6 | 75.2 | 34.3 | 33.7 | 83.3 | 16.9 | 0 | 42.2 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-5 (Page 3 of 3)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| 31 July | S | 0 | 0 | 0 | 0 | 4.5 | 8.1 | 2.1 | 0 | 0 | 4.5 | 0 | 0 | 4.3 | 1.5 | 0 | 4.0 | 0 | 1.7 |
| | M | 0 | 0 | 0 | 0 | 0 | 4.5 | 0.8 | 4.6 | 0 | 0 | 0 | 0 | 4.5 | 1.5 | 0 | 0 | 0 | 0.9 |
| | B | 4.4 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 4.2 | 0.7 | 0 | 0 | 0 | 0.6 |
| | Mean | 1.5 | 0 | 0 | 0 | 1.5 | 4.2 | 1.2 | 1.5 | 0 | 1.5 | 0 | 0 | 4.3 | 1.2 | 0 | 1.3 | 0 | 1.1 |
| 7 Aug | S | 4.2 | 21.3 | 0 | 12.2 | 41.8 | 0 | 13.3 | 3.9 | 10.6 | 4.4 | 4.1 | 49.9 | 78.1 | 25.2 | 30.0 | 7.5 | 17.1 | 19.0 |
| | M | 9.0 | 0 | 0 | 0 | 0 | 0 | 1.5 | 4.6 | 24.6 | 0 | 4.9 | 5.6 | 0 | 6.6 | 0 | 0 | 0 | 3.2 |
| | B | 0 | 0 | 5.9 | 0 | 0 | 0 | 1.0 | 4.2 | 8.4 | 27.8 | 9.1 | 14.7 | 0 | 10.7 | 0 | 0 | 0 | 4.7 |
| | Mean | 4.4 | 7.1 | 2.0 | 4.1 | 14.0 | 0 | 5.2 | 4.2 | 14.5 | 10.7 | 6.0 | 23.4 | 26.0 | 14.2 | 10.0 | 2.5 | 5.7 | 9.0 |
| 14 Aug | S | 4.5 | 0 | 0 | 0 | 0 | 0 | 0.8 | NO CATCH | | | | | | 0 | 0 | 0 | 0 | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 | 8.3 | 0 | 0.6 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 |
| | Mean | 1.5 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | | | | 0 | 0 | 2.8 | 0 | 0.3 |
| 21 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 28 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 5 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 11 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 18 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 26 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-6 (Page 1 of 2)

Abundance* of Total Prolarvae (All Species Combined) in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 6-7 | S | 0 | 3.9 | 81.2 | 4.0 | 4.1 | 4.2 | 16.2 | 8.4 | 3.5 | 27.3 | 0 | 0 | 0 | 6.5 | No Catch | | | 9.1 |
| | M | 4.8 | 0 | 89.7 | 0 | 5.0 | 0 | 16.6 | 4.5 | 0 | 4.7 | 0 | 0 | 0 | 1.5 | | | | 7.3 |
| | B | 0 | 0 | 5.0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.3 |
| | Mean | 1.6 | 1.3 | 58.6 | 1.3 | 3.0 | 1.4 | 11.2 | 4.3 | 1.2 | 10.7 | 0 | 0 | 0 | 2.7 | | | | 5.6 |
| JUN 15-16 | S | 21.1 | 38.0 | 30.4 | 9.0 | 14.1 | 15.6 | 21.4 | 12.8 | 0 | 8.7 | 0 | 9.7 | 0 | 5.2 | 4.4 | 4.5 | 3.7 | 11.5 |
| | M | 0 | 15.4 | 18.5 | 14.9 | 5.1 | 25.8 | 13.3 | 0 | 19.5 | 22.6 | 4.8 | 5.2 | 0 | 8.7 | 5.4 | 0 | 0 | 9.1 |
| | B | 5.0 | 5.0 | 9.7 | 9.9 | 10.7 | 17.8 | 9.7 | 5.5 | 0 | 4.9 | 10.6 | 0 | 0 | 3.5 | 0 | 5.7 | 8.5 | 6.2 |
| | Mean | 8.7 | 19.5 | 19.5 | 11.3 | 10.0 | 19.8 | 14.8 | 6.1 | 6.5 | 12.1 | 5.1 | 4.9 | 0 | 5.8 | 3.3 | 3.4 | 4.1 | 9.0 |
| JUN 19-20 | S | 27.8 | 84.5 | 97.5 | 57.0 | 22.6 | 4.4 | 49.0 | 13.6 | 32.9 | 40.8 | 0 | 66.9 | 0 | 25.7 | 25.5 | 17.4 | 0 | 32.7 |
| | M | 10.1 | 46.9 | 64.0 | 16.7 | 31.2 | 4.8 | 29.0 | 0 | 0 | 4.1 | 0 | 5.3 | 0 | 1.6 | 0 | 0 | 0 | 12.2 |
| | B | 9.9 | 39.4 | 15.9 | 41.9 | 9.9 | 4.6 | 20.3 | 5.1 | 4.9 | 3.9 | 0 | 0 | 4.5 | 3.1 | 0 | 0 | 4.8 | 9.7 |
| | Mean | 16.0 | 56.9 | 59.1 | 38.5 | 21.2 | 4.6 | 32.7 | 6.2 | 12.6 | 16.3 | 0 | 24.1 | 1.5 | 10.1 | 8.5 | 5.8 | 1.6 | 18.2 |
| JUN 26 | S | 4.6 | 290.8 | 37.2 | 4.8 | 8.8 | 0 | 57.7 | 15.1 | 9.3 | 13.2 | 4.4 | 12.7 | 4.6 | 9.9 | 14.9 | 9.4 | 27.2 | 30.5 |
| | M | 4.8 | 71.4 | 24.2 | 0 | 0 | 0 | 16.7 | 4.3 | 9.7 | 8.6 | 0 | 0 | 0 | 3.8 | 0 | 0 | 0 | 8.2 |
| | B | 0 | 66.2 | 4.8 | 0 | 4.8 | 0 | 12.6 | 0 | 9.8 | 21.2 | 8.9 | 0 | 0 | 6.7 | 0 | 15.2 | 0 | 8.7 |
| | Mean | 3.1 | 142.8 | 22.1 | 1.6 | 4.5 | 0 | 29.0 | 6.5 | 9.6 | 14.3 | 4.4 | 4.2 | 1.5 | 6.8 | 5.0 | 8.2 | 9.1 | 15.8 |
| JUL 5-6 | S | 298.0 | 93.4 | 251.1 | 51.8 | 60.6 | 251.9 | 167.8 | 412.2 | 18.3 | 47.1 | 15.2 | 8.9 | 21.7 | 87.2 | 16.1 | 0 | 0 | 103.1 |
| | M | 161.5 | 24.8 | 250.7 | 5.4 | 16.6 | 64.8 | 87.3 | 42.3 | 0 | 9.7 | 0 | 4.8 | 0 | 9.5 | 0 | 0 | 0 | 38.7 |
| | B | 134.9 | 44.1 | 120.8 | 0 | 10.9 | 17.7 | 54.7 | 21.4 | 21.7 | 4.9 | 0 | 0 | 0 | 8.0 | 0 | 0 | 0 | 25.1 |
| | Mean | 198.1 | 54.1 | 207.5 | 19.1 | 29.3 | 111.5 | 103.3 | 158.6 | 13.3 | 20.6 | 5.1 | 4.6 | 7.2 | 34.9 | 5.4 | 0 | 0 | 55.6 |
| JUL 12-13 | S | 116.6 | 36.6 | 62.8 | 25.9 | 34.2 | 4.3 | 46.7 | 36.8 | 35.5 | 26.9 | 35.1 | 19.8 | 4.0 | 26.4 | 11.3 | 7.0 | 0 | 30.5 |
| | M | 181.4 | 41.9 | 69.9 | 25.7 | 115.5 | 0 | 72.4 | 47.7 | 8.5 | 21.3 | 5.9 | 5.3 | 0 | 14.8 | 0 | 0 | 0 | 34.9 |
| | B | 96.8 | 41.5 | 55.8 | 21.7 | 107.0 | 14.4 | 56.2 | 34.4 | 4.2 | 8.5 | 10.9 | 0 | 0 | 9.7 | 0 | 0 | 3.9 | 26.6 |
| | Mean | 131.6 | 40.0 | 62.8 | 24.4 | 85.6 | 6.2 | 58.4 | 39.6 | 16.1 | 18.9 | 17.3 | 8.4 | 1.3 | 16.9 | 3.8 | 2.3 | 1.3 | 30.6 |
| JUL 17-18 | S | 76.4 | 33.3 | 153.2 | 110.6 | 33.6 | 8.4 | 69.3 | 43.0 | 25.8 | 35.9 | 75.7 | 12.6 | 195.8 | 64.8 | 67.4 | 16.1 | 0 | 59.2 |
| | M | 24.7 | 25.0 | 104.2 | 79.6 | 39.5 | 5.3 | 46.4 | 13.8 | 21.8 | 23.9 | 22.3 | 20.9 | 907.6 | 168.4 | 10.2 | 0 | 0 | 86.6 |
| | B | 15.8 | 39.7 | 112.0 | 295.8 | 51.9 | 30.7 | 91.0 | 57.3 | 5.9 | 5.3 | 80.1 | 0 | 140.3 | 48.2 | 5.7 | 0 | 0 | 56.0 |
| | Mean | 39.0 | 32.7 | 123.1 | 162.0 | 41.7 | 14.8 | 68.9 | 38.0 | 17.8 | 21.7 | 59.4 | 11.2 | 414.6 | 93.8 | 27.8 | 5.4 | 0 | 67.3 |
| JUL 24-25 | S | 9.1 | 50.0 | 8.3 | 73.0 | 16.2 | 53.0 | 34.9 | 0 | 75.3 | 9.4 | 28.0 | 12.5 | 16.7 | 23.7 | 82.5 | 85.6 | 21.0 | 36.0 |
| | M | 15.2 | 49.6 | 33.8 | 17.0 | 23.4 | 12.0 | 25.2 | 37.7 | 51.7 | 26.7 | 22.4 | 0 | 5.1 | 23.9 | 27.5 | 16.2 | 0 | 22.6 |
| | B | 16.0 | 17.5 | 10.1 | 27.9 | 21.5 | 29.5 | 20.4 | 10.8 | 0 | 27.9 | 0 | 0 | 6.3 | 7.5 | 0 | 0 | 0 | 11.2 |
| | Mean | 13.4 | 39.0 | 17.4 | 39.3 | 20.3 | 31.5 | 26.8 | 16.2 | 42.3 | 21.3 | 16.8 | 4.2 | 9.4 | 18.4 | 36.7 | 33.9 | 7.0 | 23.3 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

(Table E-6 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| 31 July 1 Aug | S | 53.7 | 112.9 | 8.7 | 0 | 0 | 0 | 29.2 | 137.4 | 0 | 0 | 0 | 0 | 0 | 22.9 | 0 | 0 | 0 | 20.8 |
| | M | 94.2 | 77.8 | 4.8 | 0 | 0 | 0 | 29.5 | 14.2 | 4.5 | 0 | 0 | 0 | 0 | 3.1 | 4.4 | 0 | 0 | 13.3 |
| | B | 10.1 | 116.4 | 0 | 0 | 0 | 0 | 21.1 | 0 | 0 | 13.3 | 0 | 0 | 0 | 2.2 | 4.1 | 0 | 0 | 9.6 |
| | Mean | 52.7 | 102.4 | 4.5 | 0 | 0 | 0 | 26.6 | 50.5 | 1.5 | 4.5 | 0 | 0 | 0 | 9.4 | 2.8 | 0 | 0 | 14.6 |
| 7&8 Aug | S | 8.4 | 185.9 | 535.5 | 0 | 4.2 | 0 | 122.3 | 4.0 | 12.5 | 337.0 | 3.7 | 0 | 8.7 | 61.0 | 23.4 | 7.5 | 7.5 | 75.9 |
| | M | 68.5 | 300.3 | 1055.4 | 0 | 0 | 0 | 237.4 | 45.3 | 13.0 | 253.3 | 8.4 | 5.0 | 32.8 | 59.6 | 11.6 | 0 | 0 | 119.6 |
| | B | 14.5 | 126.5 | 314.6 | 0 | 0 | 0 | 75.9 | 4.5 | 0 | 8.7 | 0 | 0 | 0 | 2.2 | 0 | 0 | 3.4 | 31.5 |
| | Mean | 30.5 | 204.2 | 635.2 | 0 | 1.4 | 0 | 145.2 | 17.9 | 8.5 | 199.7 | 4.0 | 1.7 | 13.8 | 40.9 | 11.7 | 2.5 | 3.6 | 75.7 |
| 14 Aug | S | 9.7 | 42.4 | 0 | 0 | 0 | 0 | 8.7 | 34.0 | 34.5 | 4.3 | 0 | 0 | 0 | 12.1 | 8.5 | 0 | 0 | 8.9 |
| | M | 5.7 | 4.7 | 0 | 0 | 0 | 0 | 1.7 | 5.2 | 4.9 | 4.9 | 0 | 0 | 0 | 2.5 | 0 | 0 | 0 | 1.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Mean | 5.2 | 15.7 | 0 | 0 | 0 | 0 | 3.5 | 13.1 | 13.1 | 3.1 | 0 | 0 | 0 | 4.9 | 2.8 | 0 | 0 | 3.5 |
| 21 Aug | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 28 Aug | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 5 Sept | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 14 Sept | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-7 (Page 1 of 2)

Abundance* of Alewife Prolarvae in Day Ichthyoplankton Collections,
Nine Mile Point Vicinity, 1978

(No alewife prolarvae were collected in day samples before June or after August)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 5 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUN 12 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUN 19 | S | 0 | 0 | 7.3 | 0 | 0 | 0 | 1.2 | No Catch | | | | | | 0.0 | No Catch | | | 0.5 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | 0.0 | | | | 0.0 |
| | B | 0 | 10.2 | 0 | 0 | 0 | 0 | 1.7 | | | | | | | 0.0 | | | | 0.7 |
| | Mean | 0 | 3.4 | 2.4 | 0 | 0 | 0 | 1.0 | | | | | | | 0.0 | | | | 0.4 |
| JUN 26 | S | 13.8 | 0 | 5.0 | 0 | 46.7 | 0 | 10.9 | 4.8 | 8.8 | 0 | 20.9 | 34.6 | 0 | 11.5 | 9.5 | 4.9 | 0 | 9.9 |
| | M | 0 | 0 | 0 | 55.0 | 0 | 5.3 | 10.1 | 5.0 | 0 | 0 | 5.2 | 0 | 4.6 | 2.5 | 0 | 0 | 0 | 5.0 |
| | B | 19.3 | 4.8 | 0 | 9.8 | 5.0 | 0 | 6.5 | 0 | 9.5 | 9.8 | 10.3 | 19.9 | 0 | 8.3 | 0 | 0 | 0 | 5.9 |
| | Mean | 11.0 | 1.6 | 1.7 | 21.6 | 17.3 | 1.8 | 9.2 | 3.3 | 6.1 | 3.3 | 12.2 | 18.2 | 1.5 | 7.4 | 3.2 | 1.6 | 0 | 6.9 |
| JUL 5 | S | 0 | 0 | 9.3 | 62.9 | 439.6 | 151.5 | 110.6 | 4.5 | 17.9 | 43.2 | 494.0 | 425.9 | 103.4 | 181.5 | 126.1 | 54.4 | 20.6 | 130.2 |
| | M | 0 | 0 | 0 | 1320.0 | 441.7 | 74.7 | 306.1 | 0 | 0 | 0 | 44.9 | 155.5 | 0 | 33.4 | 0 | 0 | 0 | 135.8 |
| | B | 0 | 0 | 29.8 | 420.7 | 79.2 | 30.5 | 93.4 | 0 | 0 | 0 | 12.1 | 10.1 | 10.2 | 5.4 | 5.0 | 5.3 | 0 | 40.2 |
| | Mean | 0 | 0 | 13.0 | 601.2 | 320.2 | 85.6 | 170.0 | 1.5 | 6.0 | 14.4 | 183.7 | 197.2 | 37.9 | 73.4 | 43.7 | 19.9 | 6.9 | 102.1 |
| JUL 10 | S | 23.1 | 413.1 | 46.5 | 30.1 | 204.2 | 12.9 | 121.7 | 36.4 | 15.3 | 0 | 187.5 | 323.1 | 13.3 | 95.9 | 126.0 | 168.2 | 7.9 | 107.2 |
| | M | 0 | 0 | 0 | 0 | 16.7 | 21.8 | 6.4 | 0 | 5.4 | 0 | 9.7 | 5.2 | 0 | 3.4 | 0 | 0 | 0 | 3.9 |
| | B | 41.1 | 6.1 | 20.4 | 0 | 23.1 | 0 | 15.1 | 6.2 | 19.0 | 38.6 | 5.6 | 14.6 | 5.4 | 14.9 | 19.7 | 34.4 | 0 | 15.6 |
| | Mean | 21.4 | 139.7 | 22.3 | 10.0 | 81.3 | 11.6 | 47.7 | 14.2 | 13.2 | 12.9 | 67.6 | 114.3 | 6.2 | 38.1 | 48.6 | 67.5 | 2.6 | 42.2 |
| JUL 17 | S | 176.4 | 453.5 | 671.8 | 0 | 4.7 | 0 | 217.7 | 63.4 | 37.0 | 76.3 | 0 | 0 | 0 | 29.5 | 8.1 | 4.2 | 0 | 99.7 |
| | M | 49.4 | 95.4 | 208.6 | 0 | 9.0 | 0 | 60.4 | 84.6 | 53.9 | 629.6 | 0 | 0 | 0 | 128.0 | 0 | 0 | 4.2 | 75.6 |
| | B | 86.4 | 109.8 | 140.8 | 27.3 | 13.4 | 5.1 | 63.8 | 0 | 4.0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 3.7 | 26.0 |
| | Mean | 104.1 | 219.6 | 340.4 | 9.1 | 9.0 | 1.7 | 114.0 | 49.3 | 31.6 | 235.3 | 0 | 0 | 0 | 52.7 | 2.7 | 1.4 | 2.7 | 67.1 |
| JUL 24 | S | 70.2 | 27.2 | 9.5 | 44.3 | 99.0 | 122.0 | 62.0 | 0 | 12.6 | 17.3 | 61.9 | 72.3 | 88.5 | 42.1 | 132.0 | 12.9 | 0 | 51.3 |
| | M | 22.2 | 20.5 | 0 | 116.6 | 76.8 | 31.2 | 44.6 | 19.4 | 9.7 | 20.4 | 50.8 | 87.7 | 10.1 | 33.0 | 76.4 | 19.8 | 0 | 37.4 |
| | B | 70.1 | 23.0 | 14.0 | 93.9 | 85.1 | 56.1 | 57.0 | 18.6 | 9.1 | 4.6 | 41.0 | 60.8 | 4.4 | 23.1 | 37.3 | 17.9 | 0 | 35.7 |
| | Mean | 54.2 | 23.6 | 7.8 | 84.9 | 87.0 | 69.8 | 54.5 | 12.7 | 10.4 | 14.1 | 51.2 | 73.6 | 34.3 | 32.7 | 81.9 | 16.9 | 0 | 41.5 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-7 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July | S | 0 | 0 | 0 | 0 | 0 | 8.1 | 1.4 | 0 | 0 | 4.5 | 0 | 0 | 0 | 0.8 | 0 | 4.0 | 0 | 1.1 |
| | M | 0 | 0 | 0 | 0 | 0 | 4.5 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 4.2 | 0.7 | 0 | 0 | 1.5 | 0 | 0 | 0 | 0.3 | 0 | 1.3 | 0 | 0.5 |
| 7 Aug | S | 4.2 | 17.1 | 0 | 12.2 | 37.7 | 0 | 11.9 | 0 | 7.1 | 4.4 | 4.1 | 49.9 | 78.1 | 23.9 | 30.0 | 7.5 | 17.1 | 18.0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.9 | 5.6 | 0 | 1.8 | 0 | 0 | 0 | 0.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.1 | 14.7 | 0 | 4.0 | 0 | 0 | 0 | 1.6 |
| | Mean | 1.4 | 5.7 | 0 | 4.1 | 12.6 | 0 | 4.0 | 0 | 2.4 | 1.5 | 6.0 | 23.4 | 26.0 | 9.9 | 10.0 | 2.5 | 5.7 | 6.7 |
| 14 Aug | S | 4.5 | 0 | 0 | 0 | 0 | 0 | 0.8 | NO CATCH | | | | | | 0 | 0 | 0 | 0 | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 | 8.3 | 0 | 0.6 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 |
| | Mean | 1.5 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | | | | 0 | 0 | 2.8 | 0 | 0.3 |
| 21 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 28 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 5 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 11 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 18 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 26 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-8 (Page 1 of 2)

Abundance* of Alewife Prolarvae in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 20-Ft 1-West | 20-Ft 1/2-West | 20-Ft 1/2-East | 20-Ft 1-East | 20-Ft 3-East | 20-Ft Mean | 40-Ft Contour*** 3-West | 40-Ft 1-West | 40-Ft 1/2-West | 40-Ft 1/2-East | 40-Ft 1-East | 40-Ft 3-East | 40-Ft Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JUN 6-7 | S, M, B, Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| JUN 15-16 | S, M, B, Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| JUN 19-20 | S | 4.6 | 0 | 4.1 | 0 | 0 | 0 | 1.5 | No Catch | | | | | | | No Catch | | | 0.6 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0 |
| | Mean | 1.5 | 0 | 1.4 | 0 | 0 | 0 | 0.5 | | | | | | | | | | | 0.2 |
| JUN 26 | S | 0 | 45.4 | 27.9 | 4.8 | 4.4 | 0 | 13.8 | 0 | 0 | 13.2 | 4.4 | 12.7 | 4.6 | 5.8 | 9.9 | 9.4 | 22.7 | 10.6 |
| | M | 0 | 0 | 4.8 | 0 | 0 | 0 | 0.8 | 0 | 0 | 4.3 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0.6 |
| | B | 0 | 28.4 | 0 | 0 | 0 | 26.6 | 9.2 | 0 | 0 | 0 | 4.5 | 0 | 0 | 0.8 | 0 | 0 | 0 | 4.0 |
| | Mean | 0 | 24.6 | 10.9 | 1.6 | 1.5 | 8.9 | 7.9 | 0 | 0 | 5.8 | 3.0 | 4.2 | 1.5 | 2.4 | 3.3 | 3.1 | 7.6 | 5.1 |
| JUL 5-6 | S | 133.3 | 57.8 | 155.2 | 37.7 | 52.5 | 251.9 | 114.7 | 217.7 | 9.1 | 43.2 | 15.2 | 8.9 | 21.7 | 52.6 | 16.1 | 87.9 | 0 | 73.9 |
| | M | 0 | 0 | 0 | 0 | 0 | 64.8 | 10.8 | 5.3 | 0 | 9.7 | 0 | 4.8 | 0 | 3.3 | 0 | 0 | 0 | 5.6 |
| | B | 4.8 | 4.9 | 19.3 | 0 | 0 | 17.7 | 7.8 | 0 | 0 | 4.9 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 3.4 |
| | Mean | 46.0 | 20.9 | 58.2 | 12.6 | 17.5 | 111.5 | 44.4 | 74.3 | 3.1 | 19.3 | 5.1 | 4.6 | 7.2 | 18.9 | 5.4 | 29.3 | 0 | 27.6 |
| JUL 12-13 | S | 16.7 | 6.7 | 0 | 0 | 0 | 4.3 | 4.6 | 0 | 7.1 | 0 | 17.5 | 11.9 | 4.0 | 6.8 | 3.8 | 0 | 0 | 4.8 |
| | M | 20.7 | 9.3 | 0 | 6.4 | 0 | 0 | 6.1 | 8.7 | 4.3 | 0 | 0 | 5.3 | 0 | 3.1 | 0 | 0 | 0 | 3.6 |
| | B | 17.6 | 0 | 0 | 0 | 0 | 0 | 2.9 | 4.3 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 1.5 |
| | Mean | 18.3 | 5.3 | 0 | 2.1 | 0 | 1.4 | 4.5 | 4.3 | 3.8 | 0 | 5.8 | 5.7 | 1.3 | 3.5 | 0 | 0 | 0 | 3.3 |
| JUL 17-18 | S | 29.7 | 25.0 | 125.0 | 84.1 | 33.6 | 8.4 | 51.0 | 12.9 | 8.6 | 18.0 | 60.6 | 12.6 | 195.8 | 51.4 | 67.4 | 16.1 | 0 | 46.5 |
| | M | 19.8 | 15.0 | 58.9 | 58.4 | 34.6 | 5.3 | 32.0 | 4.6 | 5.4 | 14.4 | 0 | 20.9 | 907.6 | 158.8 | 5.1 | 0 | 0 | 76.7 |
| | B | 0 | 5.7 | 87.6 | 262.3 | 36.3 | 30.7 | 70.4 | 36.5 | 0 | 0 | 12.3 | 0 | 140.3 | 31.5 | 0 | 0 | 0 | 40.8 |
| | Mean | 16.5 | 15.2 | 90.5 | 134.9 | 34.8 | 14.8 | 51.2 | 18.0 | 4.7 | 10.8 | 24.3 | 11.2 | 414.6 | 80.6 | 24.2 | 5.4 | 0 | 54.7 |
| JUL 24-25 | S | 9.1 | 22.7 | 8.3 | 61.5 | 8.1 | 53.0 | 27.1 | 0 | 70.9 | 9.4 | 24.0 | 4.2 | 16.7 | 20.9 | 82.5 | 81.5 | 21.0 | 31.5 |
| | M | 10.2 | 36.1 | 24.2 | 5.7 | 17.5 | 12.0 | 17.6 | 31.4 | 45.3 | 16.0 | 16.8 | 0 | 5.1 | 19.1 | 27.5 | 16.2 | 0 | 17.6 |
| | B | 10.7 | 0 | 10.1 | 11.2 | 5.4 | 17.7 | 9.2 | 0 | 0 | 5.6 | 0 | 0 | 6.3 | 2.0 | 0 | 0 | 0 | 4.5 |
| | Mean | 10.0 | 19.6 | 14.2 | 26.1 | 10.3 | 27.6 | 18.0 | 10.5 | 38.7 | 10.3 | 13.6 | 1.4 | 9.4 | 14.0 | 36.7 | 32.6 | 7.0 | 17.9 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-8 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 20-Ft Contour*** 1-West | 20-Ft Contour*** 1/2-West | 20-Ft Contour*** 1/2-East | 20-Ft Contour*** 1-East | 20-Ft Contour*** 3-East | 20-Ft Contour*** Mean | 40-Ft Contour*** 3-West | 40-Ft Contour*** 1-West | 40-Ft Contour*** 1/2-West | 40-Ft Contour*** 1/2-East | 40-Ft Contour*** 1-East | 40-Ft Contour*** 3-East | 40-Ft Contour*** Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July 1 Aug | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 7-8 July | S | 4.2 | 4.0 | 4.4 | 0 | 4.2 | 0 | 2.8 | 0 | 8.4 | 11.1 | 3.7 | 0 | 8.7 | 5.3 | 11.7 | 7.5 | 7.5 | 5.0 |
| | M | 59.4 | 39.2 | 33.4 | 0 | 0 | 0 | 22.0 | 20.6 | 4.3 | 24.9 | 8.4 | 5.0 | 32.8 | 16.0 | 11.6 | 0 | 0 | 16.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.4 | 0.2 |
| | Mean | 21.2 | 14.4 | 12.6 | 0 | 1.4 | 0 | 8.3 | 6.9 | 4.2 | 12.0 | 4.0 | 1.7 | 13.8 | 7.1 | 7.8 | 2.5 | 3.6 | 7.1 |
| 14 Aug | S | 9.7 | 38.2 | 0 | 0 | 0 | 0 | 8.0 | 34.0 | 34.5 | 4.3 | 0 | 0 | 0 | 12.1 | 8.5 | 0 | 0 | 8.6 |
| | M | 5.7 | 4.7 | 0 | 0 | 0 | 0 | 1.7 | 5.2 | 4.9 | 4.9 | 0 | 0 | 0 | 2.5 | 0 | 0 | 0 | 1.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Mean | 5.2 | 14.3 | 0 | 0 | 0 | 0 | 3.2 | 13.1 | 13.1 | 3.1 | 0 | 0 | 0 | 4.9 | 2.8 | 0 | 0 | 3.4 |
| 21 Aug | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 28 Aug | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 5 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 14 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-9 (Page 1 of 2)

Abundance* of Morone sp. Prolarvae in Day Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No Morone sp. prolarvae were collected in day samples before June or after August)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Jun 5 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | No Catch | | | | | | | No Catch | | | 0.0 |
| | M | 5.1 | 0 | 0 | 0 | 0 | 0 | 0.9 | | | | | | | | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | | | | 0.0 |
| | Mean | 1.7 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | | | | | | | | 0.1 |
| Jun 12 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Jun 19 | S | 56.1 | 36.6 | 3.6 | 0 | 0 | 0 | 16.1 | 9.2 | 0 | 0 | 0 | 0 | 0 | 1.5 | 7.5 | 4.6 | 0 | 7.8 |
| | M | 5.7 | 0 | 0 | 0 | 0 | 0 | 1.0 | 11.6 | 0 | 37.2 | 0 | 5.7 | 0 | 9.1 | 0 | 0 | 0 | 4.0 |
| | B | 49.4 | 0 | 4.7 | 0 | 0 | 5.3 | 9.9 | 5.5 | 5.3 | 5.6 | 0 | 0 | 0 | 2.7 | 0 | 0 | 0 | 5.1 |
| | Mean | 37.1 | 12.2 | 2.8 | 0 | 0 | 1.8 | 9.0 | 8.8 | 1.8 | 14.2 | 0 | 1.9 | 0 | 4.5 | 2.5 | 1.6 | 0 | 5.6 |
| Jun 26 | S | 0 | 0 | 5.0 | 0 | 0 | 0 | 0.8 | 4.8 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0.7 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 4.4 | 0.3 |
| | B | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | 4.7 | 4.7 | 4.9 | 0 | 0 | 0 | 2.4 | 0 | 0 | 0 | 1.3 |
| | Mean | 0 | 0 | 1.7 | 1.6 | 0 | 0 | 0.6 | 3.2 | 1.6 | 1.6 | 0 | 0 | 0 | 1.1 | 0 | 0 | 1.5 | 0.7 |
| Jul 5 | S | 0 | 0 | 0 | 0 | 0 | 4.5 | 0.8 | 0 | 4.5 | 0 | 4.7 | 0 | 0 | 1.5 | No Catch | | | 0.9 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6.1 | 0 | 10.2 | 2.7 | | | | 1.1 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 1.5 | 0.3 | 0 | 1.5 | 0 | 3.6 | 0 | 3.4 | 1.4 | | | | 0.7 |
| Jul 10 | S | 0 | 0 | 0 | 0 | 4.5 | 0 | 0.8 | No Catch | | | | | | 0 | 0 | 3.9 | 0 | 0.6 |
| | M | 0 | 0 | 0 | 5.0 | 0 | 0 | 0.8 | | | | | | | 0 | 0 | 0 | 0 | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 |
| | Mean | 0 | 0 | 0 | 1.7 | 1.5 | 0 | 0.5 | | | | | | | 0 | 0 | 1.3 | 0 | 0.3 |
| Jul 17 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | 0 | No Catch | | | 0 |
| | M | 0 | 4.2 | 0 | 0 | 0 | 0 | 0.7 | | | | | | | 0 | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | | | | 0 |
| | Mean | 0 | 1.4 | 0 | 0 | 0 | 0 | 0.2 | | | | | | | 0 | | | | 0.1 |
| Jul 24 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-9 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 20-Ft 1-West | 20-Ft 1/2-West | 20-Ft 1/2-East | 20-Ft 1-East | 20-Ft 3-East | 20-Ft Mean | 40-Ft Contour*** 3-West | 40-Ft 1-West | 40-Ft 1/2-West | 40-Ft 1/2-East | 40-Ft 1-East | 40-Ft 3-East | 40-Ft Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 7 Aug | S | NO CATCH | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | | | | | | | | 0 | 4.1 | 0 | 0 | 0 | 0 | 0.7 | | | | 0.3 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | | | | | | | | 0 | 1.4 | 0 | 0 | 0 | 0 | 0.2 | | | | 0.1 |
| 14 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 21 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 28 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 5 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 11 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 18 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 26 Sept | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-10 (Page 1 of 2)

Abundance* of Morone sp. Prolarvae in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 6-7 | S | No Catch | | | | | | | 0 | 0 | 4.6 | 0 | 0 | 0 | 0.8 | No Catch | | | 0.3 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | | | | | | | | 0 | 0 | 1.5 | 0 | 0 | 0 | 0.3 | | | | 0.1 |
| JUN 15-16 | S | 16.9 | 33.8 | 8.7 | 9.0 | 14.1 | 15.6 | 16.4 | 12.8 | 0 | 0 | 0 | 9.7 | 0 | 3.8 | 0 | 0 | 3.7 | 8.3 |
| | M | 0 | 5.1 | 9.3 | 0 | 5.1 | 25.8 | 7.6 | 0 | 19.5 | 13.6 | 0 | 5.2 | 0 | 6.4 | 0 | 0 | 0 | 5.6 |
| | B | 0 | 5.0 | 0 | 0 | 5.3 | 11.9 | 3.7 | 0 | 0 | 0 | 5.3 | 0 | 0 | 0.9 | 0 | 0 | 0 | 1.8 |
| | Mean | 5.6 | 14.6 | 6.0 | 3.0 | 8.2 | 17.8 | 9.2 | 4.3 | 6.5 | 4.5 | 1.6 | 4.9 | 0 | 3.7 | 0 | 0 | 1.2 | 5.2 |
| JUN 19-20 | S | 23.2 | 80.0 | 89.4 | 52.2 | 18.8 | 4.4 | 44.7 | 13.6 | 32.9 | 40.8 | 0 | 66.9 | 0 | 25.7 | 25.5 | 17.4 | 0 | 31.0 |
| | M | 10.1 | 42.2 | 50.3 | 16.7 | 31.2 | 4.8 | 25.9 | 0 | 0 | 0 | 0 | 5.3 | 0 | 0.9 | 0 | 0 | 0 | 10.7 |
| | B | 9.9 | 39.4 | 7.9 | 36.6 | 9.9 | 4.6 | 18.1 | 5.1 | 0 | 3.9 | 0 | 0 | 4.5 | 2.3 | 0 | 0 | 4.8 | 8.4 |
| | Mean | 14.4 | 53.9 | 49.2 | 35.2 | 20.0 | 4.6 | 29.5 | 1.2 | 11.0 | 14.9 | 0 | 24.1 | 1.5 | 9.6 | 8.5 | 5.8 | 1.6 | 16.7 |
| JUN 26 | S | 0 | 0 | 4.7 | 0 | 4.4 | 0 | 1.5 | 15.1 | 0 | 0 | 0 | 0 | 0 | 2.5 | 5.0 | 0 | 4.5 | 2.3 |
| | M | 0 | 0 | 4.8 | 0 | 0 | 0 | 0.8 | 4.3 | 9.7 | 0 | 0 | 0 | 0 | 2.3 | 0 | 0 | 0 | 1.3 |
| | B | 0 | 4.7 | 4.8 | 0 | 4.8 | 0 | 2.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 1.0 |
| | Mean | 0 | 1.6 | 4.8 | 0 | 3.1 | 0 | 1.6 | 6.5 | 3.3 | 0 | 0 | 0 | 0 | 1.6 | 1.7 | 0 | 1.5 | 1.5 |
| JUL 5-6 | S | 0 | 0 | 9.1 | 0 | 4.0 | 0 | 2.2 | 0 | 9.1 | 0 | 0 | 0 | 0 | 1.5 | No Catch | | | 1.5 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | 0 | 0 | 3.0 | 0 | 1.3 | 0 | 0.7 | 0 | 3.0 | 0 | 0 | 0 | 0 | 0.5 | | | | 0.5 |
| JUL 12-13 | S | 8.3 | 3.3 | 0 | 4.3 | 4.3 | 0 | 3.4 | 0 | 10.7 | 3.9 | 4.4 | 0 | 0 | 3.2 | No Catch | | | 2.6 |
| | M | 5.2 | 0 | 0 | 12.9 | 5.8 | 0 | 4.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 1.6 |
| | B | 0 | 4.2 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.3 |
| | Mean | 4.5 | 2.5 | 0 | 5.7 | 3.4 | 0 | 2.7 | 0 | 3.6 | 1.3 | 1.5 | 0 | 0 | 1.1 | | | | 1.5 |
| JUL 17-18 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | No Catch | | | 0.0 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | | | | | | | | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | | | | 0.3 |
| | Mean | | | | | | | | 1.7 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | 0.1 |
| JUL 24-25 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-10 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| 31 July 1 Aug | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 7-8 Aug | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | | | | | NO CATCH | | | 0 |
| | M | 0 | 8.7 | 0 | 0 | 0 | 0 | 1.5 | | | | | | | | | | | 0.6 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0 |
| | Mean | 0 | 2.9 | 0 | 0 | 0 | 0 | 0.5 | | | | | | | | | | | 0.2 |
| 14 Aug | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 21 Aug | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 28 Aug | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 5 Sept | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 14 Sept | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-11 (Page 1 of 2)

Abundance* of Rainbow Smelt Prolarvae in Day Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No rainbow smelt prolarvae were collected in day samples after June).

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Apr 4 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 10 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 17 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 24 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| May 2 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | | No Catch | | | 0 |
| | M | 4.4 | 0 | 0 | 0 | 0 | 0 | 0.7 | | | | | | | | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0 |
| | Mean | 1.5 | 0 | 0 | 0 | 0 | 0 | 0.2 | | | | | | | | | | | 0.1 |
| May 8 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| May 15 | S | 0 | 0 | 13.1 | 13.8 | 0 | 0 | 4.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | 1.8 |
| | M | 0 | 0 | 14.4 | 69.1 | 0 | 0 | 13.9 | 0 | 0 | 4.7 | 0 | 0 | 0 | 0.8 | | | | 5.9 |
| | B | 0 | 0 | 8.9 | 59.7 | 0 | 0 | 11.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 4.6 |
| | Mean | 0 | 0 | 12.1 | 47.6 | 0 | 0 | 10.0 | 0 | 0 | 1.6 | 0 | 0 | 0 | 0.3 | | | | 4.1 |
| May 22 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | | No Catch | | | 0 |
| | M | 0 | 5.0 | 0 | 0 | 5.0 | 5.6 | 2.6 | | | | | | | | | | | 1.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 10.3 | 1.7 | | | | | | | | | | | 0.7 |
| | Mean | 0 | 1.7 | 0 | 0 | 1.7 | 5.3 | 1.4 | | | | | | | | | | | 0.6 |
| May 30 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.8 | 0 | 0.2 |
| | M | 0 | 0 | 0 | 0 | 4.9 | 0 | 0.8 | 0 | 0 | 4.9 | 0 | 4.4 | 0 | 1.6 | 0 | 0 | 0 | 0.9 |
| | B | 0 | 0 | 0 | 0 | 0 | 9.7 | 1.6 | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 1.0 |
| | Mean | 0 | 0 | 0 | 0 | 1.6 | 3.2 | 0.8 | 1.8 | 0 | 1.6 | 0 | 1.5 | 0 | 0.8 | 0 | 1.3 | 0 | 0.7 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-11 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 5 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.1 | 0.3 |
| | M | | | | | | | | 0 | 0 | 4.8 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0.3 |
| | B | | | | | | | | 0 | 5.2 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0.4 |
| | Mean | | | | | | | | 0 | 1.7 | 1.6 | 0 | 0 | 0 | 0.6 | 0 | 0 | 1.4 | 0.3 |
| JUN 12 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | 0 |
| | M | | | | | | | | 5.6 | 0 | 0 | 0 | 0 | 0 | 0.9 | | | | 0.4 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | | | | | | | | 1.9 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | 0.1 |
| JUN 19 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | | No Catch | | | 0.0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0.0 |
| | B | 0 | 0 | 0 | 0 | 5.4 | 0 | 0.9 | | | | | | | | | | | 0.4 |
| | Mean | 0 | 0 | 0 | 0 | 1.8 | 0 | 0.3 | | | | | | | | | | | 0.1 |
| JUN 26 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | 0 |
| | M | | | | | | | | 0 | 0 | 4.9 | 0 | 0 | 0 | 0.8 | | | | 0.3 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | | | | | | | | 0 | 0 | 1.6 | 0 | 0 | 0 | 0.3 | | | | 0.1 |
| JUL 5 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 10 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 17 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 24 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-12

Abundance* of Rainbow Smelt Prolarvae in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No rainbow smelt prolarvae were collected in night samples after June)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 20-Ft 1-West | 20-Ft 1/2-West | 20-Ft 1/2-East | 20-Ft 1-East | 20-Ft 3-East | 20-Ft Mean | 40-Ft Contour*** 3-West | 40-Ft 1-West | 40-Ft 1/2-West | 40-Ft 1/2-East | 40-Ft 1-East | 40-Ft 3-East | 40-Ft Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JUN 6-7 | S | 0 | 0 | 0 | 0 | 0 | 4.2 | 0.7 | No Catch | | | | | | | No Catch | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 5.0 | 0 | 0.8 | | | | | | | | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | | | | 0.0 |
| | Mean | 0 | 0 | 0 | 0 | 1.7 | 1.4 | 0.5 | | | | | | | | | | | 0.2 |
| JUN 15-16 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 4.4 | 4.5 | 0 | 0.6 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 5.5 | 0 | 0 | 0.4 |
| | B | | | | | | | | 5.5 | 0 | 4.9 | 5.3 | 0 | 0 | 2.6 | 0 | 5.7 | 8.5 | 2.0 |
| | Mean | | | | | | | | 1.8 | 0 | 1.6 | 1.8 | 0 | 0 | 0.9 | 3.3 | 3.4 | 2.8 | 1.0 |
| JUN 19-20 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | No Catch | | | 0.0 |
| | M | | | | | | | | 0 | 0 | 4.1 | 0 | 0 | 0 | 0.7 | | | | 0.3 |
| | B | | | | | | | | 0 | 4.9 | 0 | 0 | 0 | 0 | 0.8 | | | | 0.3 |
| | Mean | | | | | | | | 0 | 1.6 | 1.4 | 0 | 0 | 0 | 0.5 | | | | 0.2 |
| JUN 26 | S, M, B, Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| JUL 5-6 | S, M, B, Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| JUL 12-13 | S, M, B, Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| JUL 17-18 | S, M, B, Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| JUL 24-25 | S, M, B, Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-13 (Page 1 of 4)

Abundance* of Total Postlarvae (All Species Combined) in Day Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No postlarvae were collected in day samples after November)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Apr 4 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 10 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 17 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 24 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| May 2 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | | No Catch | | | 0 |
| | M | 0 | 0 | 0 | 0 | 5.4 | 0 | 0.9 | | | | | | | | | | | 0.4 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0 |
| | Mean | 0 | 0 | 0 | 0 | 1.8 | 0 | 0.3 | | | | | | | | | | | 0.1 |
| May 8 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| May 15 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | | No Catch | | | 0 |
| | M | 0 | 0 | 0 | 5.3 | 0 | 0 | 0.9 | | | | | | | | | | | 0.4 |
| | B | 0 | 0 | 0 | 10.0 | 0 | 0 | 1.7 | | | | | | | | | | | 0.7 |
| | Mean | 0 | 0 | 0 | 5.1 | 0 | 0 | 0.8 | | | | | | | | | | | 0.3 |
| May 22 | S | 48.6 | 21.3 | 35.0 | 98.9 | 122.8 | 45.4 | 62.0 | 34.3 | 16.8 | 91.2 | 20.1 | 33.6 | 45.1 | 40.2 | 37.6 | 0 | 0 | 43.4 |
| | M | 94.1 | 59.9 | 34.1 | 118.4 | 135.4 | 61.3 | 83.9 | 30.5 | 21.3 | 25.8 | 42.8 | 35.2 | 30.5 | 31.0 | 27.6 | 4.9 | 0 | 48.1 |
| | B | 66.8 | 130.2 | 24.4 | 55.4 | 91.2 | 87.8 | 76.0 | 11.3 | 15.8 | 22.6 | 5.6 | 52.9 | 32.7 | 23.5 | 5.4 | 0 | 0 | 40.2 |
| | Mean | 69.8 | 70.5 | 31.2 | 90.9 | 116.5 | 64.8 | 74.0 | 25.4 | 18.0 | 46.5 | 22.8 | 40.6 | 36.1 | 31.6 | 23.6 | 1.6 | 0 | 43.9 |
| May 30 | S | 8.4 | 0 | 8.2 | 4.4 | 8.4 | 8.0 | 6.2 | 22.6 | 12.0 | 4.2 | 3.6 | 7.5 | 3.8 | 9.0 | 3.9 | 11.3 | 11.0 | 7.8 |
| | M | 48.7 | 20.6 | 10.2 | 34.2 | 73.0 | 24.5 | 35.2 | 31.7 | 25.2 | 4.9 | 25.3 | 39.9 | 22.0 | 24.8 | 14.6 | 0 | 4.9 | 25.3 |
| | B | 78.8 | 5.1 | 19.4 | 14.1 | 9.5 | 24.2 | 25.2 | 0 | 0 | 0 | 0 | 8.7 | 13.9 | 3.8 | 0 | 0 | 4.5 | 11.9 |
| | Mean | 45.3 | 8.6 | 12.6 | 17.6 | 30.3 | 18.9 | 22.2 | 18.1 | 12.4 | 3.0 | 9.6 | 18.7 | 13.2 | 12.5 | 6.2 | 3.8 | 6.8 | 15.0 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-13 (Page 2 of 4)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JUN 5 | S | 4.8 | 22.9 | 16.1 | 0 | 9.6 | 11.2 | 10.8 | 51.2 | 30.6 | 61.3 | 9.1 | 14.0 | 48.0 | 35.7 | 0.7 | 25.7 | 16.3 | 21.4 |
| | M | 5.1 | 21.5 | 0 | 0 | 0 | 9.1 | 6.0 | 29.2 | 14.5 | 48.1 | 5.0 | 36.2 | 26.1 | 26.5 | 24.9 | 30.8 | 20.4 | 18.1 |
| | B | 5.0 | 21.0 | 0 | 0 | 0 | 10.3 | 6.1 | 31.0 | 14.8 | 0 | 0 | 5.6 | 15.5 | 11.2 | 14.5 | 4.9 | 5.2 | 8.5 |
| | Mean | 4.9 | 21.8 | 5.4 | 0 | 3.2 | 10.2 | 7.6 | 37.1 | 20.0 | 36.5 | 4.7 | 18.6 | 29.9 | 24.5 | 13.4 | 20.5 | 14.0 | 16.0 |
| JUN 12 | S | 21.0 | 17.2 | 16.8 | 21.7 | 9.2 | 0 | 14.3 | 4.5 | 0 | 18.0 | 4.4 | 26.0 | 36.0 | 14.8 | 29.6 | 42.5 | 13.3 | 17.3 |
| | M | 29.1 | 10.9 | 11.5 | 0 | 29.1 | 0 | 13.4 | 16.8 | 5.7 | 16.5 | 19.3 | 72.9 | 73.0 | 34.0 | 39.6 | 39.5 | 6.0 | 24.7 |
| | B | 23.4 | 52.0 | 57.4 | 20.9 | 25.3 | 10.3 | 31.6 | 0 | 21.1 | 10.1 | 16.9 | 29.2 | 30.2 | 17.9 | 5.1 | 0 | 10.8 | 20.8 |
| | Mean | 24.5 | 26.7 | 28.5 | 14.2 | 21.2 | 3.4 | 19.8 | 7.1 | 8.9 | 14.8 | 13.5 | 42.7 | 46.4 | 22.2 | 24.7 | 27.3 | 10.1 | 20.9 |
| JUN 19 | S | 4.7 | 5.2 | 0 | 4.5 | 4.4 | 4.6 | 3.9 | 0 | 5.2 | 14.2 | 14.5 | 28.4 | 4.4 | 11.1 | 7.5 | 0 | 4.4 | 6.8 |
| | M | 11.4 | 17.3 | 5.3 | 11.5 | 5.7 | 23.3 | 12.4 | 28.9 | 81.4 | 15.9 | 54.4 | 28.5 | 58.1 | 44.5 | 51.2 | 0 | 0 | 26.2 |
| | B | 11.0 | 5.1 | 14.1 | 16.0 | 16.1 | 21.1 | 13.9 | 16.6 | 5.3 | 11.1 | 10.0 | 11.4 | 19.6 | 12.3 | 4.9 | 0 | 5.2 | 11.2 |
| | Mean | 9.0 | 9.2 | 6.5 | 10.6 | 8.8 | 16.3 | 10.1 | 15.2 | 30.6 | 13.8 | 26.3 | 22.8 | 27.4 | 22.7 | 21.2 | 0 | 3.2 | 14.7 |
| JUN 26 | S | 0 | 0 | 0 | 0 | 5.2 | 9.3 | 2.4 | 0 | 0 | 0 | 0 | 9.9 | 4.3 | 2.4 | 0 | 9.7 | 9.3 | 3.2 |
| | M | 4.6 | 0 | 0 | 20.0 | 0 | 0 | 4.1 | 5.0 | 9.7 | 0 | 10.5 | 9.9 | 4.6 | 6.6 | 0 | 9.4 | 4.4 | 5.2 |
| | B | 0 | 0 | 5.0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 5.2 | 0 | 12.4 | 2.9 | 0 | 0 | 14.8 | 2.5 |
| | Mean | 1.5 | 0 | 1.7 | 6.7 | 1.7 | 3.1 | 2.5 | 1.7 | 3.2 | 0 | 5.2 | 6.6 | 7.1 | 4.0 | 0 | 6.4 | 9.5 | 3.6 |
| JUL 5 | S | 203.2 | 232.9 | 18.6 | 21.0 | 315.3 | 329.7 | 186.8 | 211.8 | 75.9 | 9.6 | 214.4 | 668.7 | 473.0 | 275.6 | 97.7 | 49.9 | 20.6 | 196.2 |
| | M | 55.2 | 29.9 | 0 | 81.9 | 234.1 | 90.7 | 82.0 | 5.4 | 11.1 | 0 | 39.3 | 130.5 | 41.5 | 38.0 | 5.5 | 0 | 0 | 48.3 |
| | B | 21.6 | 5.8 | 6.0 | 70.1 | 31.7 | 30.5 | 27.6 | 0 | 0 | 43.2 | 12.1 | 25.3 | 10.2 | 15.1 | 0 | 5.3 | 0 | 17.5 |
| | Mean | 93.3 | 89.5 | 8.2 | 57.6 | 193.7 | 150.3 | 98.8 | 72.4 | 29.0 | 17.6 | 88.6 | 274.8 | 174.9 | 109.6 | 34.4 | 18.4 | 6.9 | 87.3 |
| JUL 10 | S | 1268.0 | 1544.0 | 139.6 | 124.7 | 517.4 | 98.8 | 615.4 | 6207.6 | 305.6 | 32.0 | 1610.3 | 495.2 | 256.1 | 1484.5 | 723.5 | 1416.2 | 2588.0 | 1154.9 |
| | M | 314.4 | 39.2 | 36.6 | 34.8 | 94.8 | 27.2 | 91.2 | 244.5 | 64.2 | 28.5 | 82.4 | 31.0 | 21.4 | 78.7 | 127.6 | 49.9 | 92.9 | 86.0 |
| | B | 522.0 | 48.5 | 20.4 | 21.6 | 109.6 | 31.6 | 125.6 | 124.5 | 19.0 | 231.4 | 133.9 | 58.3 | 32.1 | 99.9 | 98.3 | 165.3 | 211.2 | 121.8 |
| | Mean | 701.5 | 543.9 | 65.5 | 60.4 | 240.6 | 52.5 | 277.4 | 2192.2 | 129.6 | 97.3 | 608.9 | 194.8 | 103.2 | 554.3 | 316.4 | 543.8 | 964.0 | 454.3 |
| JUL 17 | S | 176.4 | 528.5 | 825.1 | 270.1 | 165.1 | 327.7 | 382.2 | 154.5 | 106.8 | 136.5 | 49.3 | 670.9 | 351.6 | 244.9 | 40.5 | 326.5 | 242.6 | 291.5 |
| | M | 103.3 | 33.2 | 63.1 | 126.6 | 251.9 | 210.6 | 131.5 | 56.4 | 41.4 | 117.8 | 27.7 | 48.6 | 85.6 | 62.9 | 4.2 | 17.9 | 8.5 | 79.8 |
| | B | 4.3 | 300.2 | 294.9 | 40.9 | 138.2 | 40.4 | 136.5 | 8.3 | 8.0 | 4.1 | 7.7 | 33.2 | 37.8 | 16.5 | 3.6 | 15.8 | 18.6 | 63.7 |
| | Mean | 94.7 | 287.3 | 394.4 | 145.9 | 185.1 | 192.9 | 216.7 | 73.1 | 52.1 | 86.1 | 28.3 | 250.9 | 158.3 | 108.1 | 16.1 | 120.0 | 89.9 | 145.0 |
| JUL 24 | S | 83.4 | 54.5 | 255.4 | 948.9 | 582.4 | 1519.1 | 574.0 | 137.9 | 163.7 | 394.5 | 297.7 | 980.0 | 1297.5 | 545.2 | 523.7 | 358.0 | 513.0 | 540.6 |
| | M | 110.7 | 20.5 | 151.9 | 972.0 | 788.9 | 826.5 | 478.4 | 174.3 | 53.1 | 137.8 | 101.7 | 292.2 | 81.1 | 140.0 | 203.8 | 49.5 | 14.0 | 265.2 |
| | B | 144.5 | 68.9 | 121.6 | 896.8 | 497.7 | 607.5 | 389.5 | 283.4 | 149.3 | 131.9 | 188.4 | 295.4 | 149.5 | 199.7 | 182.4 | 66.9 | 52.8 | 255.8 |
| | Mean | 112.9 | 48.0 | 176.3 | 939.2 | 623.0 | 984.4 | 480.6 | 198.5 | 122.1 | 221.4 | 195.9 | 522.5 | 509.4 | 295.0 | 303.3 | 158.2 | 193.3 | 353.9 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-13 (Page 3 of 4)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 20-Ft Contour*** 1-West | 20-Ft Contour*** 1/2-West | 20-Ft Contour*** 1/2-East | 20-Ft Contour*** 1-East | 20-Ft Contour*** 3-East | 20-Ft Contour*** Mean | 40-Ft Contour*** 3-West | 40-Ft Contour*** 1-West | 40-Ft Contour*** 1/2-West | 40-Ft Contour*** 1/2-East | 40-Ft Contour*** 1-East | 40-Ft Contour*** 3-East | 40-Ft Contour*** Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July | S | 40.3 | 17.9 | 40.3 | 1611.7 | 330.5 | 1010.6 | 508.6 | 32.2 | 14.2 | 71.9 | 259.3 | 235.9 | 1448.2 | 343.6 | 171.8 | 489.0 | 691.0 | 431.0 |
| | M | 21.3 | 8.5 | 41.0 | 207.7 | 43.0 | 277.1 | 99.8 | 41.3 | 17.3 | 32.7 | 74.3 | 51.3 | 103.3 | 53.4 | 22.6 | 530.5 | 20.2 | 99.5 |
| | B | 8.7 | 19.9 | 8.7 | 174.6 | 40.9 | 263.6 | 86.1 | 8.3 | 8.7 | 12.3 | 56.6 | 13.1 | 63.1 | 27.0 | 18.0 | 71.8 | 48.1 | 54.5 |
| | Mean | 23.4 | 15.4 | 30.0 | 664.7 | 138.1 | 517.1 | 231.5 | 27.3 | 13.4 | 38.9 | 130.1 | 100.1 | 538.2 | 141.3 | 70.8 | 363.8 | 253.1 | 195.0 |
| 7 Aug | S | 215.8 | 89.5 | 76.3 | 301.2 | 368.2 | 189.6 | 206.8 | 271.5 | 92.0 | 91.6 | 97.9 | 844.1 | 2061.8 | 576.5 | 154.5 | 175.3 | 170.9 | 346.7 |
| | M | 373.3 | 137.0 | 127.9 | 48.7 | 140.9 | 52.6 | 146.7 | 110.6 | 73.8 | 46.9 | 103.0 | 100.3 | 309.8 | 124.1 | 84.3 | 30.6 | 33.7 | 118.2 |
| | B | 337.9 | 144.8 | 184.1 | 82.0 | 282.1 | 147.2 | 196.4 | 41.9 | 33.6 | 23.2 | 218.3 | 185.9 | 256.4 | 126.6 | 51.2 | 23.3 | 21.6 | 135.6 |
| | Mean | 309.0 | 123.8 | 129.5 | 143.9 | 263.7 | 129.8 | 183.3 | 141.4 | 66.5 | 53.9 | 139.7 | 376.8 | 876.0 | 275.7 | 96.7 | 76.4 | 75.4 | 200.2 |
| 14 Aug | S | 998.3 | 1055.5 | 174.7 | 44.4 | 324.3 | 213.4 | 468.4 | 178.7 | 279.3 | 106.0 | 223.9 | 1140.8 | 412.8 | 390.3 | 35.9 | 116.3 | 95.6 | 360.0 |
| | M | 700.5 | 1665.9 | 309.1 | 37.3 | 254.7 | 241.5 | 534.8 | 120.0 | 224.1 | 20.3 | 46.5 | 100.2 | 41.7 | 92.1 | 0 | 45.7 | 17.7 | 255.0 |
| | B | 327.7 | 320.8 | 193.2 | 16.2 | 101.5 | 112.4 | 178.6 | 153.5 | 142.1 | 10.6 | 34.7 | 93.0 | 53.8 | 81.3 | 15.7 | 5.2 | 4.6 | 105.7 |
| | Mean | 675.5 | 1014.1 | 225.7 | 32.6 | 226.8 | 189.1 | 394.0 | 150.8 | 215.2 | 45.6 | 101.7 | 444.7 | 169.4 | 187.9 | 17.2 | 55.8 | 39.3 | 240.2 |
| 21 Aug | S | 4.0 | 15.3 | 3.8 | 106.0 | 545.3 | 285.4 | 160.0 | 13.6 | 27.1 | 4.3 | 36.6 | 925.2 | 166.5 | 195.6 | 35.4 | 56.7 | 72.5 | 153.2 |
| | M | 8.8 | 36.1 | 13.2 | 168.7 | 651.4 | 189.9 | 178.0 | 44.6 | 4.8 | 12.7 | 43.0 | 157.4 | 61.9 | 54.1 | 22.4 | 7.5 | 0 | 94.8 |
| | B | 21.4 | 8.4 | 8.7 | 32.2 | 147.5 | 143.5 | 60.3 | 12.2 | 13.9 | 4.1 | 8.1 | 65.6 | 46.8 | 25.1 | 3.7 | 0 | 0 | 34.4 |
| | Mean | 11.4 | 20.0 | 8.7 | 102.3 | 448.1 | 206.3 | 132.8 | 23.5 | 15.3 | 7.0 | 29.2 | 382.7 | 91.8 | 91.6 | 20.5 | 21.4 | 24.2 | 94.1 |
| 28 Aug | S | 0 | 3.9 | 0 | 4.3 | 52.2 | 28.1 | 14.8 | 3.9 | 4.4 | 0 | 28.4 | 17.2 | 11.6 | 10.9 | 11.4 | 30.2 | 0 | 13.0 |
| | M | 0 | 4.2 | 0 | 8.5 | 31.6 | 12.9 | 9.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.8 |
| | B | 0 | 0 | 4.6 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 2.7 | 1.5 | 4.3 | 27.9 | 13.7 | 8.4 | 1.3 | 1.5 | 0 | 9.5 | 5.7 | 3.9 | 3.6 | 3.8 | 10.1 | 0 | 5.7 |
| 5 Sept | S | 68.3 | 80.8 | 52.6 | 31.8 | 97.5 | 15.9 | 57.8 | 12.5 | 16.3 | 574.3 | 38.4 | 32.5 | 8.1 | 113.7 | 7.2 | 0 | 0 | 69.1 |
| | M | 113.7 | 86.2 | 33.4 | 26.5 | 13.9 | 28.5 | 50.4 | 13.8 | 26.1 | 26.5 | 4.3 | 8.4 | 4.8 | 14.0 | 0 | 4.1 | 0 | 26.0 |
| | B | 10.0 | 24.4 | 18.3 | 0 | 11.7 | 0 | 10.7 | 4.7 | 4.5 | 4.5 | 5.1 | 0 | 0 | 3.1 | 5.0 | 0 | 0 | 5.9 |
| | Mean | 64.0 | 63.8 | 34.8 | 19.4 | 41.0 | 14.8 | 39.6 | 10.3 | 15.6 | 201.8 | 15.9 | 13.6 | 4.3 | 43.6 | 4.1 | 1.4 | 0 | 33.7 |
| 11 Sept | S | 4.0 | 0 | 7.6 | 0 | 3.9 | 26.5 | 7.0 | 0 | 0 | 7.3 | 0 | 8.2 | 8.0 | 3.9 | 3.8 | 0 | 0 | 4.6 |
| | M | 0 | 0 | 4.2 | 0 | 4.7 | 24.3 | 5.5 | 4.7 | 0 | 12.1 | 0 | 13.8 | 0 | 5.1 | 0 | 0 | 0 | 4.3 |
| | B | 0 | 0 | 0 | 4.5 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | Mean | 1.3 | 0 | 3.9 | 1.5 | 2.9 | 16.9 | 4.4 | 1.6 | 0 | 6.5 | 0 | 7.3 | 2.7 | 3.0 | 1.3 | 0 | 0 | 3.1 |
| 18 Sept | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | 0 | 0 | 0 | 5.0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 4.6 | 0.8 | | | | 0.6 |
| | Mean | 0 | 0 | 0 | 1.7 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 1.5 | 0.3 | | | | 0.2 |
| 26 Sept | S | 0 | 4.4 | 0 | 4.5 | 0 | 4.8 | 2.3 | 0 | 0 | 0 | 4.9 | 9 | 4.4 | 1.6 | 0 | 0 | 0 | 1.6 |
| | M | 5.0 | 0 | 0 | 5.0 | 4.7 | 10.2 | 4.2 | 0 | 4.9 | 0 | 0 | 25.0 | 0 | 5.0 | 0 | 0 | 0 | 3.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 9.6 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 |
| | Mean | 1.7 | 1.5 | 0 | 3.2 | 1.6 | 8.2 | 2.7 | 0 | 1.6 | 0 | 1.6 | 8.4 | 1.5 | 2.2 | 0 | 0 | 0 | 1.9 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-13 (Page 4 of 4)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 Oct | S | 0 | 0 | 4.5 | 8.3 | 4.3 | 0 | 2.9 | 0 | 4.2 | 0 | 0 | 0 | 0 | 0.7 | No Catch | | | 1.4 |
| | M | 5.1 | 0 | 5.0 | 0 | 0 | 0 | 1.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | 1.7 | 0 | 3.2 | 2.8 | 1.4 | 0 | 1.5 | 0 | 1.4 | 0 | 0 | 0 | 0 | 0.2 | | | | 0.7 |
| 9 Oct | S | 15.7 | 0 | 4.1 | 0 | 3.8 | 0 | 3.9 | 0 | 0 | 8.5 | 0 | 0 | 14.9 | 3.9 | 0 | 0 | 0 | 3.1 |
| | M | 5.3 | 0 | 4.8 | 5.4 | 4.7 | 4.7 | 4.2 | 0 | 0 | 0 | 5.0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 2.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 25.5 | 4.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 |
| | Mean | 7.0 | 0 | 2.9 | 1.8 | 2.9 | 10.1 | 4.1 | 0 | 0 | 2.8 | 1.7 | 0 | 5.0 | 1.6 | 0 | 0 | 0 | 2.3 |
| 16 Oct | S | 0 | 3.6 | 3.6 | 17.0 | 0 | 0 | 4.0 | 0 | 0 | 26.5 | 4.0 | 0 | 0 | 5.1 | 0 | 0 | 0 | 3.6 |
| | M | 0 | 0 | 8.5 | 0 | 0 | 0 | 1.4 | 0 | 0 | 8.5 | 0 | 3.9 | 0 | 2.1 | 0 | 3.9 | 0 | 1.7 |
| | B | 0 | 0 | 0 | 4.8 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 1.2 | 4.1 | 7.3 | 0 | 0 | 2.1 | 0 | 0 | 11.7 | 1.3 | 1.3 | 0 | 2.4 | 0 | 1.3 | 0 | 1.9 |
| 24 Oct | S | 0 | 0 | 0 | 0 | 0 | 4.7 | 0.8 | 0 | 4.1 | 0 | 0 | 0 | 0 | 0.7 | 4.6 | 0 | 0 | 0.9 |
| | M | 0 | 0 | 0.6 | 0 | 0 | 0 | 0.1 | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0.4 |
| | B | 0 | 0 | 4.9 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 0 | 1.8 | 0 | 0 | 1.6 | 0.6 | 1.7 | 1.4 | 0 | 0 | 0 | 0 | 0.5 | 1.5 | 0 | 0 | 0.5 |
| 30 Oct | S | 4.2 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 4.2 | 0 | 0 | 0.7 | No Catch | | | 0.6 |
| | M | 0 | 0 | 0 | 5.5 | 0 | 5.9 | 1.9 | 4.4 | 0 | 0 | 0 | 0 | 0 | 0.7 | | | | 1.6 |
| | B | 5.3 | 0 | 0 | 5.5 | 0 | 0 | 1.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0.7 |
| | Mean | 3.2 | 0 | 0 | 3.7 | 0 | 2.0 | 1.5 | 1.5 | 0 | 0 | 1.4 | 0 | 0 | 0.5 | | | | 0.8 |
| 6 Nov | S | 0 | 0 | 0 | 0 | 0 | 3.9 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.6 | 0 | 0.8 | | | | 0.3 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 1.3 | 0.2 | 0 | 0 | 0 | 0 | 1.5 | 0 | 0.3 | | | | 0.2 |
| 13 Nov | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | 0 | No Catch | | | 0 |
| | M | 0 | 0 | 4.5 | 0 | 5.0 | 0 | 1.6 | | | | | | | 0 | | | | 0.6 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | | | | 0 |
| | Mean | 0 | 0 | 1.5 | 0 | 1.7 | 0 | 0.5 | | | | | | | 0 | | | | 0.2 |
| 21 Nov | S | No Catch | | | | | | | 4.1 | 0 | 0 | 0 | 0 | 0 | 0.7 | No Catch | | | 0.3 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | | | | | | | | 0 | 12.6 | 0 | 0 | 0 | 0 | 2.1 | | | | 0.8 |
| | Mean | | | | | | | | 1.4 | 4.2 | 0 | 0 | 0 | 0 | 0.9 | | | | 0.4 |
| 28 Nov | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

## Table E-14 (Page 1 of 2)

### Abundance* of Total Postlarvae (All Species Combined) in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 6-7 | S | 17.6 | 30.8 | 28.4 | 8.0 | 8.2 | 21.0 | 19.0 | 46.3 | 3.5 | 36.5 | 0 | 29.5 | 0 | 19.3 | 4.3 | 11.8 | 0 | 16.4 |
| | M | 14.5 | 33.4 | 22.4 | 18.8 | 99.6 | 9.2 | 33.0 | 35.9 | 31.8 | 23.6 | 9.0 | 35.1 | 23.2 | 26.6 | 4.7 | 0 | 0 | 24.1 |
| | B | 5.3 | 20.7 | 10.0 | 24.3 | 35.8 | 27.7 | 20.6 | 4.7 | 19.1 | 9.9 | 14.8 | 29.1 | 39.2 | 19.5 | 5.0 | 0 | 0 | 16.4 |
| | Mean | 12.5 | 28.3 | 20.3 | 17.0 | 47.9 | 19.3 | 24.2 | 29.0 | 18.2 | 23.3 | 7.9 | 31.2 | 20.8 | 21.8 | 5.0 | 3.9 | 0 | 19.0 |
| JUN 15-16 | S | 92.8 | 152.0 | 52.1 | 153.1 | 46.8 | 78.0 | 95.8 | 29.8 | 94.0 | 43.2 | 25.2 | 24.1 | 32.4 | 41.5 | 35.3 | 13.4 | 18.6 | 59.4 |
| | M | 120.9 | 108.0 | 50.9 | 69.6 | 41.1 | 51.7 | 73.7 | 19.6 | 58.6 | 49.7 | 33.7 | 67.0 | 24.8 | 42.2 | 43.6 | 32.6 | 31.0 | 53.5 |
| | B | 123.9 | 144.7 | 48.4 | 182.8 | 74.6 | 106.8 | 113.5 | 120.2 | 132.0 | 73.6 | 121.6 | 116.2 | 60.4 | 104.0 | 87.4 | 159.1 | 0 | 103.5 |
| | Mean | 112.5 | 134.9 | 50.5 | 135.2 | 54.2 | 78.8 | 94.3 | 56.5 | 94.9 | 55.5 | 60.2 | 69.1 | 39.2 | 62.6 | 55.4 | 68.4 | 16.5 | 72.1 |
| JUN 19-20 | S | 13.9 | 4.5 | 8.1 | 4.8 | 0 | 17.5 | 8.1 | 4.5 | 4.7 | 11.1 | 21.9 | 0 | 4.0 | 7.7 | 0 | 8.7 | 8.1 | 7.5 |
| | M | 0 | 4.7 | 9.1 | 5.6 | 5.2 | 9.7 | 5.7 | 10.2 | 10.1 | 20.7 | 9.6 | 5.3 | 19.7 | 12.6 | 14.1 | 14.6 | 0 | 9.2 |
| | B | 9.9 | 0 | 27.7 | 15.7 | 4.9 | 9.2 | 11.2 | 25.3 | 9.7 | 19.6 | 0 | 17.0 | 4.5 | 12.7 | 8.8 | 18.7 | 4.8 | 11.7 |
| | Mean | 8.0 | 3.0 | 15.0 | 8.7 | 3.4 | 12.1 | 8.4 | 13.4 | 8.2 | 17.1 | 10.5 | 7.4 | 9.4 | 11.0 | 7.6 | 14.0 | 4.3 | 9.5 |
| JUN 26 | S | 45.5 | 22.7 | 4.7 | 4.8 | 0 | 3.7 | 13.6 | 20.1 | 18.7 | 30.8 | 0 | 4.2 | 0 | 12.3 | 0 | 4.7 | 77.1 | 15.8 |
| | M | 28.9 | 19.0 | 9.7 | 0 | 5.3 | 0 | 10.5 | 17.2 | 14.6 | 4.3 | 0 | 0 | 5.7 | 7.0 | 0 | 15.4 | 10.0 | 8.7 |
| | B | 5.0 | 18.9 | 19.0 | 0 | 0 | 0 | 7.2 | 15.4 | 14.7 | 34.0 | 4.5 | 0 | 0 | 11.4 | 13.7 | 5.1 | 0 | 8.7 |
| | Mean | 26.4 | 20.2 | 11.1 | 1.6 | 1.8 | 1.2 | 10.4 | 17.6 | 16.0 | 23.0 | 1.5 | 1.4 | 1.7 | 10.2 | 4.6 | 8.4 | 29.1 | 11.1 |
| JUL 5-6 | S | 776.4 | 907.5 | 561.6 | 37.7 | 32.3 | 334.5 | 441.7 | 1306.1 | 635.2 | 321.9 | 396.1 | 93.3 | 230.3 | 497.2 | 329.5 | 298.2 | 164.7 | 428.4 |
| | M | 230.7 | 634.6 | 113.1 | 10.8 | 22.1 | 39.9 | 175.2 | 343.8 | 309.9 | 320.5 | 164.1 | 338.3 | 55.2 | 255.3 | 239.7 | 14.3 | 5.3 | 189.5 |
| | B | 477.0 | 465.3 | 850.1 | 25.5 | 38.0 | 57.4 | 318.9 | 342.2 | 200.9 | 231.4 | 15.6 | 29.1 | 92.9 | 152.0 | 9.7 | 4.6 | 18.8 | 190.6 |
| | Mean | 494.7 | 669.1 | 508.2 | 24.6 | 30.8 | 143.9 | 311.9 | 664.1 | 382.0 | 291.3 | 191.9 | 153.5 | 126.1 | 301.5 | 193.0 | 105.7 | 62.9 | 269.5 |
| JUL 12-13 | S | 2114.8 | 977.3 | 176.7 | 470.0 | 499.8 | 901.5 | 856.7 | 2059.7 | 848.9 | 496.2 | 890.1 | 130.8 | 161.9 | 764.6 | 585.5 | 2000.7 | 8093.4 | 1360.5 |
| | M | 1244.0 | 456.3 | 69.9 | 90.0 | 335.1 | 1029.3 | 537.4 | 606.7 | 187.5 | 217.5 | 117.4 | 132.2 | 384.8 | 274.4 | 105.2 | 168.1 | 305.0 | 363.3 |
| | B | 906.4 | 257.2 | 94.3 | 102.9 | 275.1 | 509.8 | 357.6 | 154.8 | 108.0 | 55.5 | 70.9 | 52.7 | 39.8 | 80.3 | 34.6 | 98.5 | 277.1 | 202.5 |
| | Mean | 1421.7 | 563.6 | 113.6 | 221.0 | 370.0 | 813.5 | 583.9 | 940.4 | 381.5 | 256.4 | 359.5 | 105.2 | 195.5 | 373.1 | 241.8 | 755.8 | 2891.8 | 642.1 |
| JUL 17-18 | S | 555.8 | 241.6 | 310.4 | 66.4 | 33.6 | 101.0 | 218.1 | 296.9 | 266.2 | 236.9 | 295.3 | 155.7 | 3482.3 | 788.9 | 301.0 | 186.8 | 65.2 | 439.7 |
| | M | 351.0 | 80.1 | 172.2 | 42.5 | 59.3 | 10.6 | 119.3 | 244.6 | 342.5 | 143.6 | 139.5 | 366.4 | 1790.9 | 504.6 | 525.6 | 596.3 | 249.7 | 341.0 |
| | B | 538.2 | 289.3 | 97.4 | 83.7 | 51.8 | 81.9 | 190.4 | 197.9 | 76.5 | 106.3 | 184.8 | 396.4 | 736.7 | 283.1 | 113.2 | 68.4 | 42.6 | 204.3 |
| | Mean | 481.7 | 203.7 | 193.3 | 64.2 | 48.3 | 64.5 | 175.9 | 246.5 | 228.4 | 162.3 | 206.6 | 306.2 | 2003.3 | 525.5 | 313.3 | 283.8 | 119.1 | 328.3 |
| JUL 24-25 | S | 242.3 | 504.7 | 91.5 | 434.4 | 525.7 | 119.3 | 319.7 | 174.1 | 576.0 | 193.5 | 1170.5 | 716.8 | 404.4 | 539.2 | 1220.8 | 1458.4 | 710.1 | 569.5 |
| | M | 71.1 | 234.4 | 145.0 | 839.3 | 583.6 | 89.8 | 327.2 | 961.9 | 1480.4 | 869.6 | 1311.3 | 681.7 | 798.2 | 1017.2 | 1070.8 | 546.6 | 290.4 | 664.9 |
| | B | 639.3 | 432.1 | 723.3 | 875.0 | 687.6 | 206.3 | 593.9 | 135.4 | 228.8 | 212.4 | 396.3 | 356.2 | 62.7 | 232.0 | 309.9 | 167.2 | 97.7 | 368.7 |
| | Mean | 317.6 | 390.4 | 319.9 | 716.2 | 599.0 | 138.5 | 413.6 | 423.8 | 761.8 | 425.2 | 959.4 | 584.9 | 421.8 | 596.1 | 867.2 | 724.1 | 366.1 | 534.4 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-14 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| 31 | S | 327.3 | 361.4 | 26.1 | 40.1 | 156.9 | 29.9 | 157.0 | 257.0 | 36.1 | 43.5 | 9.5 | 5.0 | 21.8 | 62.2 | 13.9 | 9.5 | 34.6 | 91.5 |
| July | M | 199.0 | 272.2 | 4.8 | 53.3 | 136.3 | 29.7 | 115.9 | 199.2 | 17.9 | 35.5 | 0 | 30.0 | 4.7 | 47.9 | 0 | 35.7 | 99.8 | 74.5 |
| 1 | B | 171.7 | 321.4 | 41.2 | 65.9 | 219.3 | 19.9 | 139.9 | 102.5 | 65.5 | 31.1 | 8.5 | 9.3 | 9.1 | 37.7 | 8.2 | 12.3 | 60.2 | 76.4 |
| Aug | Mean | 232.7 | 318.3 | 24.0 | 53.1 | 170.8 | 26.5 | 137.6 | 186.3 | 39.8 | 36.7 | 6.0 | 14.8 | 11.9 | 49.2 | 7.4 | 19.2 | 64.9 | 80.8 |
| 7-8 | S | 158.7 | 238.4 | 159.3 | 924.6 | 572.7 | 386.2 | 406.7 | 154.2 | 46.0 | 181.5 | 285.3 | 223.4 | 2419.5 | 551.7 | 428.8 | 345.0 | 240.6 | 450.9 |
| Aug | M | 246.7 | 317.7 | 350.4 | 1369.1 | 458.2 | 537.4 | 546.6 | 342.0 | 250.7 | 739.2 | 611.8 | 394.8 | 781.3 | 520.0 | 208.1 | 130.3 | 132.8 | 458.0 |
| | B | 812.5 | 590.3 | 562.4 | 1219.2 | 604.9 | 55.6 | 640.8 | 59.0 | 121.4 | 65.5 | 127.0 | 171.8 | 275.4 | 136.7 | 78.9 | 23.0 | 87.9 | 323.7 |
| | Mean | 406.0 | 382.2 | 357.4 | 1170.9 | 545.3 | 326.4 | 531.4 | 185.1 | 139.4 | 328.7 | 341.4 | 263.3 | 1158.7 | 402.8 | 238.6 | 166.1 | 153.8 | 410.9 |
| 14 | S | 976.6 | 1026.0 | 276.1 | 169.6 | 203.9 | 18.3 | 445.1 | 412.8 | 846.3 | 201.4 | 289.9 | 69.5 | 90.6 | 318.4 | 256.0 | 16.5 | 93.1 | 329.8 |
| Aug | M | 1809.0 | 1248.4 | 304.6 | 916.2 | 80.6 | 41.5 | 733.4 | 1576.7 | 1418.6 | 394.8 | 193.9 | 51.9 | 51.7 | 614.6 | 121.8 | 55.8 | 85.0 | 556.7 |
| | B | 2433.8 | 1543.5 | 666.5 | 850.7 | 27.5 | 23.6 | 924.3 | 917.0 | 543.2 | 559.9 | 173.7 | 38.4 | 70.0 | 383.7 | 54.4 | 0 | 47.3 | 530.0 |
| | Mean | 1739.8 | 1272.6 | 415.7 | 645.5 | 104.0 | 27.8 | 700.9 | 968.8 | 936.0 | 385.4 | 219.2 | 53.3 | 70.8 | 438.9 | 144.1 | 24.1 | 75.1 | 472.1 |
| 21 | S | 8.6 | 18.4 | 12.5 | 30.6 | 61.4 | 144.3 | 46.0 | 25.7 | 51.8 | 14.0 | 27.5 | 140.6 | 267.4 | 87.8 | 76.4 | 91.4 | 65.5 | 69.1 |
| Aug | M | 16.4 | 9.8 | 5.4 | 30.9 | 117.8 | 83.5 | 44.0 | 41.2 | 70.1 | 26.7 | 113.9 | 26.2 | 99.8 | 63.0 | 39.4 | 28.7 | 36.2 | 49.7 |
| | B | 0 | 5.3 | 26.5 | 36.7 | 317.6 | 127.1 | 85.5 | 177.6 | 117.8 | 137.5 | 39.8 | 66.6 | 53.3 | 98.8 | 42.2 | 0 | 8.4 | 77.1 |
| | Mean | 8.3 | 11.2 | 14.8 | 32.8 | 165.6 | 118.3 | 58.5 | 81.5 | 79.9 | 59.4 | 60.4 | 77.8 | 140.2 | 83.2 | 52.6 | 40.0 | 36.7 | 65.3 |
| 28 | S | 201.8 | 241.1 | 116.1 | 114.4 | 53.8 | 37.3 | 127.4 | 133.2 | 197.0 | 255.4 | 157.9 | 154.5 | 107.2 | 167.5 | 118.5 | 145.4 | 250.1 | 152.2 |
| Aug | M | 99.0 | 156.9 | 38.3 | 59.2 | 57.2 | 15.1 | 71.0 | 39.3 | 29.3 | 50.6 | 33.6 | 68.6 | 54.3 | 46.0 | 4.7 | 26.2 | 3.9 | 49.1 |
| | B | 86.1 | 32.3 | 5.6 | 104.1 | 42.5 | 9.1 | 46.6 | 5.7 | 15.5 | 25.6 | 10.4 | 18.0 | 17.1 | 15.4 | 4.8 | 13.5 | 8.1 | 26.6 |
| | Mean | 129.0 | 143.5 | 53.3 | 92.6 | 51.2 | 20.5 | 81.7 | 59.4 | 80.6 | 110.5 | 67.3 | 80.4 | 59.5 | 76.3 | 42.7 | 61.7 | 87.4 | 76.0 |
| 5 | S | 84.9 | 154.7 | 138.9 | 1076.1 | 13.5 | 8.2 | 246.1 | 97.4 | 70.2 | 109.6 | 143.5 | 4.0 | 4.2 | 71.5 | 42.5 | 26.4 | 8.4 | 132.2 |
| Sept | M | 47.1 | 90.8 | 125.1 | 31.7 | 8.9 | 0 | 50.6 | 114.6 | 34.6 | 25.5 | 15.8 | 0 | 0 | 31.8 | 19.5 | 0 | 9.9 | 34.9 |
| | B | 27.1 | 87.9 | 12.2 | 30.6 | 0 | 0 | 26.3 | 143.8 | 48.0 | 77.5 | 9.2 | 0 | 0 | 46.4 | 4.2 | 25.9 | 0 | 31.1 |
| | Mean | 53.0 | 111.1 | 92.1 | 379.4 | 7.5 | 2.7 | 107.6 | 118.6 | 50.9 | 70.9 | 56.2 | 1.3 | 1.4 | 49.9 | 22.1 | 17.4 | 6.1 | 66.1 |
| 14 | S | 0 | 4.3 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 4.3 | 0 | 0 | 0.7 | NO CATCH | | | 0.6 |
| Sept | M | 15.3 | 0 | 6.0 | 0 | 21.7 | 0 | 7.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 2.9 |
| | B | 0 | 4.9 | 0 | 0 | 5.1 | 0 | 1.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0.7 |
| | Mean | 5.1 | 3.1 | 2.0 | 0 | 8.9 | 0 | 3.2 | 0 | 0 | 0 | 1.4 | 0 | 0 | 0.2 | | | | 1.4 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-15 (Page 1 of 3)

Abundance* of Alewife Postlarvae in Day Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No alewife postlarvae were collected in day samples before June or after November)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jun 5 | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Jun 12 | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Jun 19 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.8 | 0 | 0 | 0 | 0 | 0 | 1.0 | 4.7 | 0 | 0 | 0.7 |
| | B | 0 | 0 | 4.7 | 0 | 0 | 0 | 0.8 | 0 | 5.3 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0.7 |
| | Mean | 0 | 0 | 1.6 | 0 | 0 | 0 | 0.3 | 1.9 | 1.8 | 0 | 0 | 0 | 0 | 0.6 | 1.6 | 0 | 0 | 0.5 |
| Jun 26 | S | 0 | 0 | 0 | 0 | 5.2 | 9.3 | 2.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.9 | 4.6 | 1.6 |
| | M | 0 | 0 | 0 | 20.0 | 0 | 0 | 3.3 | 0 | 4.9 | 0 | 0 | 9.9 | 0 | 2.5 | 0 | 0 | 0 | 2.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 |
| | Mean | 0 | 0 | 0 | 6.7 | 1.7 | 3.1 | 1.9 | 0 | 1.6 | 0 | 0 | 3.3 | 0 | 0.8 | 0 | 1.6 | 1.6 | 1.3 |
| Jul 5 | S | 203.2 | 227.7 | 18.6 | 21.0 | 315.3 | 329.7 | 185.9 | 193.8 | 71.5 | 9.6 | 209.7 | 651.6 | 453.2 | 264.9 | 97.7 | 45.3 | 20.6 | 191.2 |
| | M | 55.2 | 29.9 | 0 | 81.9 | 234.1 | 80.1 | 80.2 | 5.4 | 11.1 | 0 | 39.3 | 130.5 | 36.3 | 37.1 | 5.5 | 0 | 0 | 47.3 |
| | B | 16.2 | 5.8 | 6.0 | 70.1 | 31.7 | 30.5 | 26.7 | 0 | 0 | 0 | 6.1 | 25.3 | 10.2 | 6.9 | 0 | 5.3 | 0 | 13.8 |
| | Mean | 91.5 | 87.8 | 8.2 | 57.6 | 193.7 | 146.8 | 97.6 | 66.4 | 27.5 | 3.2 | 85.0 | 269.1 | 166.6 | 103.0 | 34.4 | 16.9 | 6.9 | 84.1 |
| Jul 10 | S | 1171.2 | 1471.7 | 139.6 | 124.7 | 499.2 | 94.5 | 583.5 | 6207.6 | 305.6 | 32.0 | 1610.3 | 482.6 | 247.3 | 1480.9 | 715.4 | 1404.4 | 2524.5 | 1135.4 |
| | M | 309.0 | 39.2 | 36.6 | 29.8 | 83.7 | 21.8 | 86.7 | 244.5 | 64.2 | 28.5 | 77.5 | 25.8 | 21.4 | 77.0 | 110.2 | 43.7 | 86.7 | 81.5 |
| | B | 522.0 | 48.5 | 15.3 | 21.6 | 109.6 | 31.6 | 124.8 | 124.5 | 19.0 | 244.9 | 133.9 | 58.3 | 26.7 | 101.2 | 98.3 | 165.3 | 201.1 | 121.4 |
| | Mean | 667.4 | 519.8 | 63.8 | 58.7 | 230.8 | 49.3 | 265.0 | 2192.2 | 129.6 | 95.1 | 607.3 | 188.9 | 98.5 | 553.0 | 308.0 | 537.8 | 937.4 | 446.1 |
| Jul 17 | S | 168.7 | 513.5 | 780.0 | 209.1 | 160.4 | 322.7 | 359.1 | 146.6 | 102.7 | 136.5 | 49.3 | 662.8 | 328.7 | 237.8 | 40.5 | 313.8 | 242.6 | 278.5 |
| | M | 103.3 | 33.2 | 63.1 | 103.2 | 251.9 | 210.6 | 127.6 | 56.4 | 37.3 | 117.8 | 27.7 | 48.6 | 85.6 | 62.2 | 4.2 | 17.9 | 0 | 77.4 |
| | B | 4.3 | 300.2 | 294.9 | 40.9 | 138.2 | 40.4 | 136.5 | 8.3 | 8.0 | 4.1 | 7.7 | 29.0 | 37.8 | 15.8 | 3.6 | 15.8 | 11.2 | 63.0 |
| | Mean | 92.1 | 282.3 | 379.3 | 117.7 | 183.5 | 191.1 | 207.7 | 70.4 | 49.3 | 86.1 | 28.2 | 246.8 | 150.7 | 105.3 | 16.1 | 115.8 | 84.6 | 139.6 |
| Jul 24 | S | 83.4 | 54.5 | 250.7 | 935.6 | 574.8 | 1493.9 | 565.5 | 129.5 | 163.7 | 385.8 | 289.9 | 968.0 | 1293.3 | 538.4 | 523.7 | 353.7 | 504.4 | 533.7 |
| | M | 110.7 | 20.5 | 151.9 | 955.4 | 778.7 | 816.1 | 472.2 | 174.3 | 53.1 | 137.8 | 101.7 | 263.0 | 81.1 | 135.2 | 193.7 | 49.5 | 14.0 | 260.1 |
| | B | 131.3 | 68.9 | 116.9 | 882.7 | 472.2 | 598.2 | 378.4 | 274.1 | 149.3 | 131.9 | 180.3 | 291.0 | 149.5 | 196.0 | 182.4 | 66.9 | 48.4 | 249.6 |
| | Mean | 108.5 | 48.0 | 173.2 | 924.5 | 608.6 | 969.4 | 472.0 | 192.6 | 122.1 | 218.5 | 190.6 | 507.3 | 508.0 | 289.9 | 299.9 | 156.7 | 188.9 | 347.8 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-15 (Page 2 of 3)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 20-Ft 1-West | 20-Ft 1/2-West | 20-Ft 1/2-East | 20-Ft 1-East | 20-Ft 3-East | 20-Ft Mean | 40-Ft Contour*** 3-West | 40-Ft 1-West | 40-Ft 1/2-West | 40-Ft 1/2-East | 40-Ft 1-East | 40-Ft 3-East | 40-Ft Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July | S | 40.3 | 17.9 | 35.8 | 1448.4 | 326.1 | 978.4 | 474.5 | 32.2 | 14.2 | 71.9 | 254.5 | 227.2 | 1366.8 | 327.8 | 168.0 | 489.0 | 678.8 | 410.0 |
| | M | 17.0 | 8.5 | 41.0 | 194.2 | 43.0 | 277.1 | 96.8 | 36.7 | 17.3 | 28.6 | 60.4 | 51.3 | 103.3 | 49.6 | 22.6 | 522.7 | 20.2 | 96.3 |
| | B | 8.7 | 19.9 | 8.7 | 174.6 | 40.9 | 254.7 | 84.6 | 8.3 | 8.7 | 12.3 | 56.6 | 13.1 | 63.1 | 27.0 | 18.0 | 68.0 | 44.7 | 53.4 |
| | Mean | 22.0 | 15.4 | 28.5 | 605.7 | 136.7 | 503.4 | 218.6 | 25.8 | 13.4 | 37.6 | 123.6 | 97.2 | 511.1 | 134.8 | 69.5 | 359.9 | 247.9 | 186.5 |
| 7 Aug | S | 211.7 | 89.5 | 71.3 | 301.2 | 368.2 | 189.6 | 205.3 | 267.7 | 81.4 | 87.2 | 97.9 | 827.5 | 2061.8 | 570.6 | 154.5 | 175.3 | 170.9 | 343.7 |
| | M | 373.3 | 137.0 | 121.8 | 48.7 | 135.2 | 47.4 | 143.9 | 106.0 | 73.8 | 36.5 | 103.0 | 100.3 | 309.8 | 121.6 | 84.3 | 30.6 | 33.7 | 116.1 |
| | B | 333.5 | 144.8 | 172.3 | 82.0 | 271.9 | 147.2 | 192.0 | 41.9 | 33.6 | 23.2 | 209.2 | 185.9 | 237.1 | 121.8 | 51.2 | 23.3 | 21.6 | 131.9 |
| | Mean | 306.2 | 123.8 | 121.8 | 143.9 | 258.4 | 128.1 | 180.4 | 138.5 | 62.9 | 49.0 | 136.7 | 371.2 | 869.6 | 271.3 | 96.7 | 76.4 | 75.4 | 197.2 |
| 14 Aug | S | 998.3 | 992.3 | 122.8 | 44.4 | 290.9 | 209.3 | 443.0 | 170.2 | 237.0 | 101.5 | 214.2 | 1092.7 | 396.6 | 368.7 | 35.9 | 116.3 | 72.8 | 339.7 |
| | M | 700.5 | 1638.9 | 299.6 | 37.3 | 254.7 | 231.9 | 527.2 | 115.0 | 144.4 | 20.3 | 46.5 | 95.2 | 41.7 | 77.2 | 0 | 45.7 | 17.7 | 246.0 |
| | B | 327.7 | 307.3 | 193.2 | 16.2 | 86.2 | 112.4 | 173.8 | 153.5 | 142.1 | 10.6 | 34.7 | 87.6 | 53.8 | 80.4 | 15.7 | 5.2 | 4.6 | 103.4 |
| | Mean | 675.5 | 979.5 | 205.2 | 32.6 | 210.6 | 184.5 | 381.3 | 146.3 | 174.5 | 44.2 | 98.5 | 425.2 | 164.0 | 175.4 | 17.2 | 55.8 | 31.7 | 229.7 |
| 21 Aug | S | 0 | 15.3 | 3.8 | 89.7 | 545.3 | 260.7 | 152.5 | 13.6 | 27.1 | 4.3 | 28.5 | 921.3 | 162.4 | 192.9 | 31.9 | 56.7 | 72.5 | 148.9 |
| | M | 8.8 | 36.1 | 13.2 | 164.4 | 632.5 | 189.9 | 174.1 | 44.6 | 0 | 12.7 | 43.0 | 147.9 | 57.1 | 50.9 | 22.4 | 7.5 | 0 | 92.0 |
| | B | 21.4 | 8.4 | 8.7 | 32.2 | 143.1 | 139.3 | 58.9 | 12.2 | 13.9 | 4.1 | 8.1 | 65.6 | 46.8 | 25.1 | 3.7 | 0 | 0 | 33.8 |
| | Mean | 10.1 | 20.0 | 8.7 | 95.4 | 440.3 | 196.6 | 128.5 | 23.5 | 13.7 | 7.0 | 26.5 | 378.3 | 88.8 | 89.6 | 19.3 | 21.4 | 24.2 | 91.6 |
| 28 Aug | S | 0 | 3.9 | 0 | 4.3 | 44.1 | 28.1 | 13.4 | 3.9 | 4.4 | 0 | 28.4 | 17.2 | 11.6 | 10.9 | 7.6 | 30.2 | 0 | 12.2 |
| | M | 0 | 4.2 | 0 | 4.3 | 31.6 | 12.9 | 8.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.5 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Mean | 0 | 2.7 | 0 | 2.9 | 25.2 | 13.7 | 7.4 | 1.3 | 1.5 | 0 | 9.5 | 5.7 | 3.9 | 3.6 | 2.5 | 10.1 | 0 | 5.3 |
| 5 Sept | S | 64.0 | 80.8 | 48.9 | 27.2 | 97.5 | 15.9 | 55.7 | 12.5 | 16.3 | 574.3 | 38.4 | 32.5 | 8.1 | 113.7 | 7.2 | 0 | 0 | 68.2 |
| | M | 113.7 | 86.2 | 33.4 | 26.5 | 13.9 | 23.8 | 49.6 | 13.8 | 26.1 | 26.5 | 4.3 | 8.4 | 4.7 | 14.0 | 0 | 4.1 | 0 | 25.7 |
| | B | 10.0 | 24.4 | 18.3 | 0 | 11.7 | 0 | 10.7 | 4.7 | 4.5 | 4.5 | 5.1 | 0 | 0 | 3.1 | 5.0 | 0 | 0 | 5.9 |
| | Mean | 62.6 | 63.8 | 33.5 | 17.9 | 41.0 | 13.2 | 38.7 | 10.3 | 15.6 | 201.8 | 15.9 | 13.6 | 4.3 | 43.6 | 4.1 | 1.4 | 0 | 33.3 |
| 11 Sept | S | 4.0 | 0 | 3.8 | 0 | 3.9 | 26.5 | 6.4 | 0 | 0 | 7.3 | 0 | 8.2 | 8.0 | 3.9 | 3.8 | 0 | 0 | 4.4 |
| | M | 0 | 0 | 4.2 | 0 | 4.7 | 24.3 | 5.5 | 4.7 | 0 | 12.1 | 0 | 13.8 | 0 | 5.1 | 0 | 0 | 0 | 4.3 |
| | B | 0 | 0 | 0 | 4.5 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | Mean | 1.3 | 0 | 2.7 | 1.5 | 2.9 | 16.9 | 4.2 | 1.6 | 0 | 6.5 | 0 | 7.3 | 2.7 | 3.0 | 1.3 | 0 | 0 | 3.0 |
| 18 Sept | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | 0 | 0 | 0 | 5.0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 4.6 | 0.8 | | | | 0.6 |
| | Mean | 0 | 0 | 0 | 1.7 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 1.5 | 0.3 | | | | 0.2 |
| 26 Sept | S | 0 | 4.4 | 0 | 4.5 | 0 | 4.8 | 2.3 | 0 | 0 | 0 | 4.9 | 0 | 4.4 | 1.6 | 4.2 | 0 | 0 | 1.8 |
| | M | 5.0 | 0 | 0 | 5.0 | 4.7 | 10.2 | 4.2 | 0 | 4.9 | 0 | 0 | 25.0 | 0 | 5.0 | 0 | 0 | 0 | 3.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 9.6 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 |
| | Mean | 1.7 | 1.5 | 0 | 3.2 | 1.6 | 8.2 | 2.7 | 0 | 1.6 | 0 | 1.6 | 8.4 | 1.5 | 2.2 | 1.4 | 0 | 0 | 2.0 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-15 (Page 3 of 3)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 Oct | S | 0 | 0 | 4.5 | 8.3 | 4.3 | 0 | 2.9 | 0 | 4.2 | 0 | 0 | 0 | 0 | 0.7 | No Catch | | | 1.4 |
| | M | 5.1 | 0 | 5.0 | 0 | 0 | 0 | 1.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | 1.7 | 0 | 3.2 | 2.8 | 1.4 | 0 | 1.5 | 0 | 1.4 | 0 | 0 | 0 | 0 | 0.2 | | | | 0.7 |
| 9 Oct | S | 15.7 | 0 | 4.1 | 0 | 3.8 | 0 | 3.9 | 0 | 0 | 8.5 | 0 | 0 | 14.9 | 3.9 | 0 | 0 | 0 | 3.1 |
| | M | 5.3 | 0 | 4.8 | 5.4 | 4.7 | 4.7 | 4.2 | 0 | 0 | 0 | 5.0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 2.0 |
| | B | 0 | 0 | 0 | 0 | 0 | 25.5 | 4.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.7 |
| | Mean | 7.0 | 0 | 2.9 | 1.8 | 2.9 | 10.1 | 4.1 | 0 | 0 | 2.8 | 1.7 | 0 | 5.0 | 1.6 | 0 | 0 | 0 | 2.3 |
| 16 Oct | S | 0 | 3.6 | 3.6 | 17.0 | 0 | 0 | 4.0 | 0 | 0 | 26.5 | 4.0 | 0 | 0 | 5.1 | 0 | 0 | 0 | 3.6 |
| | M | 0 | 0 | 8.5 | 0 | 0 | 0 | 1.4 | 0 | 0 | 8.5 | 0 | 3.9 | 0 | 2.1 | 0 | 3.9 | 0 | 1.7 |
| | B | 0 | 0 | 0 | 4.8 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 1.2 | 4.1 | 7.3 | 0 | 0 | 2.1 | 0 | 0 | 11.7 | 1.3 | 1.3 | 0 | 2.4 | 0 | 1.3 | 0 | 1.9 |
| 24 Oct | S | 0 | 0 | 0 | 0 | 0 | 4.7 | 0.8 | 0 | 4.1 | 0 | 0 | 0 | 0 | 0.7 | 4.6 | 0 | 0 | 0.9 |
| | M | 0 | 0 | 0.6 | 0 | 0 | 0 | 0.1 | 5.2 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0.4 |
| | B | 0 | 0 | 4.9 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 0 | 1.8 | 0 | 0 | 1.6 | 0.6 | 1.7 | 1.4 | 0 | 0 | 0 | 0 | 0.5 | 1.5 | 0 | 0 | 0.5 |
| 30 Oct | S | 4.2 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 4.2 | 0 | 0 | 0.7 | No Catch | | | 0.6 |
| | M | 0 | 0 | 0 | 5.5 | 0 | 5.9 | 1.9 | 4.4 | 0 | 0 | 0 | 0 | 0 | 0.7 | | | | 1.1 |
| | B | 5.3 | 0 | 0 | 5.5 | 0 | 0 | 1.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0.7 |
| | Mean | 3.2 | 0 | 0 | 3.7 | 0 | 2.0 | 1.5 | 1.5 | 0 | 0 | 1.4 | 0 | 0 | 0.5 | | | | 0.8 |
| 6 Nov | S | 0 | 0 | 0 | 0 | 0 | 3.9 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.6 | 0 | 0.8 | | | | 0.3 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 1.3 | 0.2 | 0 | 0 | 0 | 0 | 1.5 | 0 | 0.3 | | | | 0.2 |
| 13 Nov | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | 0 | No Catch | | | 0 |
| | M | 0 | 0 | 4.5 | 0 | 5.0 | 0 | 1.6 | | | | | | | 0 | | | | 0.6 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | | | | 0 |
| | Mean | 0 | 0 | 1.5 | 0 | 1.7 | 0 | 0.5 | | | | | | | 0 | | | | 0.2 |
| 21 Nov | S | No Catch | | | | | | | 4.1 | 0 | 0 | 0 | 0 | 0 | 0.7 | No Catch | | | 0.3 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | | | | | | | | 0 | 12.6 | 0 | 0 | 0 | 0 | 2.1 | | | | 0.8 |
| | Mean | | | | | | | | 1.4 | 4.2 | 0 | 0 | 0 | 0 | 0.9 | | | | 0.4 |
| 28 Nov | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-16 (Page 1 of 2)

Abundance* of Alewife Postlarvae in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jun 6-7 | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Jun 15-16 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.9 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0.3 |
| | M | 0 | 0 | 0 | 5.0 | 5.1 | 0 | 1.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.7 |
| | B | 5.0 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 5.8 | 0 | 0 | 0.7 |
| | Mean | 1.7 | 0 | 0 | 1.7 | 1.7 | 0 | 0.8 | 0 | 1.3 | 0 | 0 | 0 | 0 | 0.2 | 1.9 | 0 | 0 | 0.6 |
| Jun 19-20 | S | 0 | 0 | 0 | 0 | 0 | 4.4 | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | NO CATCH | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 4.8 | 0 | 0 | 0.8 | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 1.5 | 0.2 | 0 | 0 | 0 | 1.6 | 0 | 0 | 0.3 | | | | 0.2 |
| Jun 26 | S | 0 | 18.2 | 0 | 4.8 | 0 | 3.7 | 4.5 | 10.1 | 4.7 | 13.2 | 0 | 0 | 0 | 4.7 | 0 | 4.7 | 54.4 | 7.6 |
| | M | 4.8 | 0 | 0 | 0 | 0 | 0 | 0.8 | 12.9 | 0 | 0 | 0 | 0 | 0 | 2.2 | 0 | 5.2 | 0 | 1.5 |
| | B | 0 | 0 | 4.8 | 0 | 0 | 0 | 0.8 | 0 | 4.9 | 0 | 4.5 | 0 | 0 | 1.6 | 0 | 0 | 0 | 0.9 |
| | Mean | 1.6 | 6.1 | 1.6 | 1.6 | 0 | 1.2 | 2.0 | 7.7 | 3.2 | 4.4 | 1.5 | 0 | 0 | 2.8 | 0 | 3.3 | 18.1 | 3.4 |
| Jul 5-6 | S | 756.8 | 871.9 | 479.4 | 33.0 | 24.2 | 330.4 | 416.0 | 1278.3 | 626.1 | 318.0 | 392.3 | 88.8 | 230.3 | 489.0 | 329.5 | 137.6 | 164.7 | 404.1 |
| | M | 216.9 | 629.6 | 113.1 | 5.4 | 22.1 | 39.9 | 171.2 | 333.2 | 297.7 | 306.0 | 158.9 | 338.3 | 55.2 | 248.2 | 220.9 | 9.5 | 5.3 | 183.5 |
| | B | 477.0 | 450.6 | 825.9 | 25.5 | 38.0 | 57.4 | 312.4 | 326.2 | 168.3 | 221.5 | 15.6 | 29.0 | 87.4 | 141.3 | 0 | 4.6 | 9.4 | 182.4 |
| | Mean | 483.6 | 650.7 | 472.8 | 21.3 | 28.1 | 142.6 | 299.8 | 645.9 | 364.0 | 281.8 | 189.0 | 152.1 | 124.3 | 292.8 | 183.5 | 50.6 | 59.8 | 256.7 |
| Jul 12-13 | S | 1448.7 | 924.1 | 168.9 | 457.2 | 495.5 | 884.3 | 729.8 | 1044.5 | 706.8 | 273.1 | 881.3 | 118.9 | 161.9 | 531.1 | 578.0 | 1931.2 | 8093.4 | 1211.2 |
| | M | 1212.9 | 451.6 | 55.9 | 77.2 | 323.5 | 1018.8 | 523.3 | 585.1 | 93.8 | 213.2 | 105.7 | 126.9 | 384.8 | 251.6 | 95.6 | 159.4 | 287.6 | 346.1 |
| | B | 888.8 | 248.9 | 94.3 | 102.9 | 270.1 | 509.8 | 352.5 | 133.3 | 95.5 | 42.7 | 60.0 | 42.2 | 34.1 | 68.0 | 34.6 | 86.7 | 254.0 | 193.2 |
| | Mean | 1183.5 | 541.5 | 106.4 | 212.4 | 363.0 | 804.3 | 535.2 | 587.6 | 298.7 | 176.3 | 349.0 | 96.0 | 193.6 | 283.5 | 236.1 | 725.8 | 2878.3 | 583.5 |
| Jul 17-18 | S | 543.1 | 233.3 | 310.4 | 66.4 | 33.6 | 101.0 | 214.6 | 232.4 | 261.9 | 233.3 | 295.3 | 155.7 | 3426.3 | 767.5 | 301.0 | 180.3 | 65.2 | 429.3 |
| | M | 351.0 | 75.1 | 172.2 | 42.5 | 59.3 | 10.6 | 118.5 | 244.6 | 342.5 | 143.6 | 139.5 | 361.2 | 1790.9 | 503.7 | 525.6 | 596.3 | 249.7 | 340.3 |
| | B | 506.5 | 272.3 | 92.5 | 83.7 | 51.9 | 81.9 | 181.9 | 192.7 | 58.9 | 100.9 | 184.8 | 390.9 | 723.6 | 275.3 | 102.0 | 68.4 | 38.7 | 196.6 |
| | Mean | 466.9 | 193.5 | 191.7 | 64.2 | 48.3 | 64.5 | 171.5 | 223.2 | 221.1 | 159.3 | 206.6 | 302.6 | 1980.3 | 515.5 | 309.5 | 281.7 | 117.8 | 322.1 |
| Jul 24-25 | S | 228.6 | 491.0 | 79.0 | 372.9 | 420.5 | 114.9 | 284.5 | 165.4 | 562.7 | 193.5 | 1170.5 | 679.3 | 400.2 | 528.6 | 1160.0 | 1376.9 | 668.1 | 538.9 |
| | M | 71.1 | 221.0 | 135.3 | 748.5 | 531.1 | 89.8 | 299.5 | 892.8 | 1415.8 | 858.9 | 1277.7 | 670.6 | 783.1 | 983.3 | 1070.8 | 546.6 | 285.1 | 639.9 |
| | B | 617.7 | 408.7 | 663.0 | 841.5 | 633.9 | 206.3 | 561.9 | 124.6 | 217.9 | 212.4 | 381.0 | 350.5 | 62.7 | 224.9 | 244.9 | 167.2 | 83.7 | 347.7 |
| | Mean | 305.8 | 373.6 | 292.4 | 654.3 | 528.5 | 137.0 | 381.9 | 394.2 | 732.1 | 421.6 | 943.1 | 566.8 | 415.3 | 578.9 | 825.2 | 696.9 | 345.6 | 508.8 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-16 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July 1 Aug | S | 322.4 | 356.9 | 21.7 | 40.1 | 152.3 | 29.9 | 153.9 | 257.0 | 32.1 | 43.5 | 9.5 | 5.0 | 21.8 | 61.5 | 13.9 | 9.5 | 34.6 | 90.0 |
| | M | 188.5 | 272.2 | 4.8 | 53.3 | 136.3 | 29.7 | 114.1 | 199.2 | 17.9 | 35.5 | 0 | 30.0 | 4.7 | 47.9 | 0 | 35.7 | 99.8 | 73.8 |
| | B | 171.7 | 321.4 | 41.2 | 65.9 | 214.5 | 19.9 | 139.1 | 98.4 | 65.5 | 31.1 | 4.2 | 9.3 | 9.1 | 36.3 | 8.2 | 12.3 | 31.9 | 73.6 |
| | Mean | 227.5 | 316.8 | 22.6 | 53.1 | 167.7 | 26.5 | 135.7 | 184.9 | 38.5 | 36.7 | 4.6 | 14.8 | 11.9 | 48.5 | 7.4 | 19.2 | 55.4 | 79.2 |
| 7-8 Aug | S | 150.4 | 214.2 | 119.5 | 830.6 | 506.3 | 372.4 | 365.6 | 134.4 | 46.0 | 140.7 | 252.0 | 201.5 | 2358.3 | 522.2 | 421.0 | 337.5 | 225.6 | 420.7 |
| | M | 228.4 | 300.3 | 296.2 | 1318.5 | 418.8 | 537.4 | 516.6 | 321.4 | 220.5 | 714.3 | 590.9 | 369.8 | 729.8 | 491.1 | 196.6 | 126.1 | 128.8 | 433.2 |
| | B | 812.5 | 562.2 | 552.9 | 1195.9 | 590.5 | 55.8 | 628.3 | 59.0 | 107.4 | 52.4 | 127.0 | 171.8 | 275.4 | 132.2 | 70.6 | 15.3 | 87.9 | 315.8 |
| | Mean | 397.1 | 358.9 | 322.9 | 1115.0 | 505.2 | 321.8 | 503.5 | 171.6 | 124.6 | 302.5 | 323.3 | 247.7 | 1121.2 | 381.8 | 229.4 | 159.7 | 147.4 | 389.9 |
| 14 Aug | S | 962.0 | 1026.0 | 258.3 | 169.6 | 199.6 | 18.3 | 439.0 | 395.8 | 811.8 | 201.4 | 263.1 | 69.5 | 90.6 | 305.4 | 256.0 | 16.5 | 93.1 | 322.1 |
| | M | 1786.1 | 1225.1 | 289.6 | 899.2 | 80.6 | 41.5 | 720.4 | 1504.5 | 1399.2 | 394.8 | 193.9 | 51.9 | 41.4 | 597.6 | 117.0 | 55.8 | 80.6 | 544.1 |
| | B | 2428.1 | 1519.6 | 635.2 | 840.1 | 27.5 | 17.7 | 911.4 | 906.6 | 532.9 | 555.1 | 168.8 | 38.4 | 70.0 | 378.6 | 49.9 | 0 | 39.4 | 522.0 |
| | Mean | 1725.4 | 1256.9 | 394.4 | 636.3 | 102.6 | 25.8 | 690.2 | 935.7 | 914.6 | 383.8 | 208.6 | 53.3 | 67.3 | 427.2 | 140.9 | 24.1 | 71.0 | 462.7 |
| 21 Aug | S | 4.3 | 18.4 | 12.5 | 30.6 | 61.4 | 144.3 | 45.3 | 25.7 | 47.1 | 14.0 | 27.5 | 128.9 | 258.3 | 83.6 | 68.3 | 91.4 | 61.7 | 66.3 |
| | M | 10.9 | 9.8 | 5.4 | 25.8 | 117.8 | 83.5 | 42.2 | 41.2 | 70.1 | 26.7 | 113.9 | 21.0 | 99.8 | 62.1 | 39.4 | 28.7 | 36.2 | 48.7 |
| | B | 0 | 5.3 | 26.5 | 36.7 | 305.7 | 127.1 | 83.6 | 177.6 | 117.8 | 137.5 | 39.8 | 66.6 | 53.3 | 98.8 | 42.2 | 0 | 8.4 | 76.3 |
| | Mean | 5.1 | 11.2 | 14.8 | 31.1 | 161.6 | 118.3 | 57.0 | 81.5 | 78.3 | 59.4 | 60.4 | 72.2 | 137.1 | 81.5 | 49.9 | 40.0 | 35.4 | 63.8 |
| 28 Aug | S | 192.9 | 232.0 | 106.5 | 114.4 | 53.8 | 37.3 | 122.8 | 128.7 | 188.9 | 250.6 | 157.9 | 154.5 | 107.2 | 164.6 | 113.9 | 145.4 | 242.5 | 148.4 |
| | M | 99.0 | 156.9 | 38.3 | 59.2 | 57.2 | 15.1 | 71.0 | 39.3 | 29.3 | 50.6 | 33.6 | 68.6 | 54.3 | 46.0 | 4.7 | 26.2 | 3.9 | 49.1 |
| | B | 86.1 | 32.3 | 5.6 | 104.1 | 42.5 | 9.1 | 46.6 | 0 | 15.5 | 25.6 | 5.2 | 18.0 | 17.1 | 13.6 | 4.8 | 13.5 | 8.1 | 25.8 |
| | Mean | 126.0 | 140.4 | 50.1 | 92.6 | 51.2 | 20.5 | 80.1 | 56.0 | 77.9 | 108.9 | 65.6 | 80.4 | 59.5 | 74.7 | 41.1 | 61.7 | 84.9 | 74.4 |
| 5 Sept | S | 84.9 | 154.7 | 130.0 | 1071.9 | 13.5 | 8.2 | 243.9 | 97.4 | 65.8 | 109.6 | 143.5 | 4.0 | 4.2 | 70.8 | 38.3 | 26.4 | 8.4 | 130.8 |
| | M | 41.9 | 85.7 | 125.1 | 31.7 | 8.9 | 0 | 48.9 | 114.6 | 34.6 | 25.5 | 10.5 | 0 | 0 | 30.9 | 19.5 | 0 | 9.9 | 33.9 |
| | B | 22.6 | 87.9 | 12.2 | 30.6 | 0 | 0 | 25.6 | 119.9 | 48.0 | 73.4 | 9.2 | 0 | 0 | 41.8 | 4.2 | 25.9 | 0 | 29.0 |
| | Mean | 49.8 | 109.4 | 89.1 | 378.1 | 7.5 | 2.7 | 106.1 | 110.6 | 49.5 | 69.5 | 54.4 | 1.3 | 1.4 | 47.8 | 20.7 | 17.4 | 6.1 | 64.6 |
| 14 Sept | S | 0 | 4.3 | 0 | 0 | 0 | 0 | 0.7 | NO CATCH | | | | | | 0 | NO CATCH | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | | | | 0 |
| | B | 0 | 4.9 | 0 | 0 | 5.1 | 0 | 1.7 | | | | | | | 0 | | | | 0.7 |
| | Mean | 0 | 3.1 | 0 | 0 | 1.7 | 0 | 0.8 | | | | | | | 0 | | | | 0.3 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-17 (Page 1 of 3)

Abundance* of Morone sp. Postlarvae in Day Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No Morone sp. postlarvae were collected in day samples before May or after August)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Apr 4 | S<br>M<br>B<br>Mean | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |
| Apr 10 | S<br>M<br>B<br>Mean | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |
| Apr 17 | S<br>M<br>B<br>Mean | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |
| Apr 24 | S<br>M<br>B<br>Mean | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |
| May 2 | S<br>M<br>B<br>Mean | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |
| May 8 | S<br>M<br>B<br>Mean | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |
| May 15 | S<br>M<br>B<br>Mean | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |
| May 22 | S | 0 | 0 | 0 | 0 | 0 | 4.1 | 0.7 | | | | No Catch | | | | | No Catch | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | 0 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 1.4 | 0.2 | | | | | | | | | | | 0.1 |
| May 30 | S<br>M<br>B<br>Mean | | | | No Catch | | | | | | | No Catch | | | | | No Catch | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Jun 5 | S | 0 | 4.6 | 0 | 0 | 0 | 0 | 0.8 | 5.1 | 0 | 4.1 | 0 | 0 | 0 | 1.5 | 0 | 4.3 | 0 | 1.2 |
| | M | 5.1 | 0 | 0 | 0 | 0 | 0 | 0.9 | 4.9 | 0 | 4.1 | 0 | 0 | 4.4 | 2.2 | 5.0 | 0 | 0 | 1.6 |
| | B | 0 | 0 | 0 | 0 | 0 | 10.3 | 1.7 | 0 | 4.9 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 5.2 | 1.4 |
| | Mean | 1.7 | 1.5 | 0 | 0 | 0 | 3.4 | 1.1 | 3.3 | 1.7 | 3.0 | 0 | 0 | 1.5 | 1.5 | 1.7 | 1.4 | 1.7 | 1.4 |
| Jun 12 | S | 0 | 0 | 4.1 | 0 | 4.6 | 0 | 1.5 | 0 | 0 | 13.5 | 0 | 8.7 | 8.0 | 5.0 | 4.2 | 0 | 4.4 | 3.0 |
| | M | 0 | 5.5 | 11.5 | 0 | 5.8 | 0 | 3.8 | 0 | 0 | 5.5 | 0 | 0 | 5.2 | 1.8 | 17.0 | 5.7 | 6.0 | 4.2 |
| | B | 0 | 5.2 | 28.7 | 0 | 0 | 5.1 | 6.5 | 0 | 10.5 | 0 | 0 | 0 | 8.6 | 3.2 | 0 | 0 | 0 | 3.9 |
| | Mean | 0 | 3.6 | 14.8 | 0 | 3.5 | 1.7 | 3.9 | 0 | 3.5 | 6.3 | 0 | 2.9 | 7.3 | 3.3 | 7.1 | 1.9 | 3.5 | 3.7 |
| Jun 19 | S | 4.7 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 4.7 | 0 | 0 | 0 | 0.8 | NO CATCH | | | 0.6 |
| | M | 0 | 5.6 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.4 |
| | B | 0 | 5.1 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.3 |
| | Mean | 1.6 | 3.6 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 1.6 | 0 | 0 | 0 | 0.3 | | | | 0.4 |
| Jun 26 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | NO CATCH | | | 0.0 |
| | M | 4.6 | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 12.4 | 2.1 | | | | 0.8 |
| | Mean | 1.5 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 4.1 | 0.7 | | | | 0.4 |
| Jul 5 | S | NO CATCH | | | | | | 0.0 | 0 | 0 | 0 | 4.7 | 0 | 0 | 0.8 | NO CATCH | | | 0.3 |
| | M | | | | | | | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | | | | | | | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | | | | | | | 0.0 | 0 | 0 | 0 | 1.6 | 0 | 0 | 0.3 | | | | 0.1 |
| Jul 10 | S | 4.6 | 0 | 0 | 0 | 0 | 0 | 0.8 | NO CATCH | | | | | | 0.0 | 4.1 | 3.9 | 0 | 0.8 |
| | M | 0 | 0 | 0 | 5.0 | 0 | 0 | 0.8 | | | | | | | 0.0 | 0 | 0 | 0 | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | 0.0 | 0 | 0 | 0 | 0.0 |
| | Mean | 1.5 | 0 | 0 | 1.7 | 0 | 0 | 0.5 | | | | | | | 0.0 | 1.4 | 1.3 | 0 | 0.4 |
| Jul 17 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 4.1 | 0 | 0.7 | NO CATCH | | | 0.3 |
| | M | 0 | 0 | 0 | 4.7 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | 0 | 0 | 0 | 1.6 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 1.4 | 0 | 0.2 | | | | 0.2 |
| Jul 24 | S | NO CATCH | | | | | | 0.0 | 0 | 0 | 0 | 0 | 0 | 4.2 | 0.7 | NO CATCH | | | 0.3 |
| | M | | | | | | | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | | | | | | | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | | | | | | | 0.0 | 0 | 0 | 0 | 0 | 0 | 1.4 | 0.2 | | | | 0.1 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-17 (Page 3 of 3)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| 31 July | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | | | | | NO CATCH | | | |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | | | |
| | B | 0 | 0 | 0 | 0 | 0 | 4.5 | 0.3 | | | | | | | | | | | 0.1 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 1.5 | 0.3 | | | | | | | | | | | |
| 7 Aug | S | NO CATCH | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | | | | | | | | 0 | 0 | 5.2 | 0 | 0 | 0 | 0.9 | | | | 0.3 |
| | B | | | | | | | | 0 | 0 | 0 | 4.6 | 0 | 0 | 0.8 | | | | 0.3 |
| | Mean | | | | | | | | 0 | 0 | 1.7 | 1.5 | 0 | 0 | 0.5 | | | | 0.2 |
| 14 Aug | S | NO CATCH | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | | | | | | | | 5.0 | 0 | 0 | 0 | 0 | 0 | 0.8 | | | | 0.3 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | | | | | | | | 1.7 | 0 | 0 | 0 | 0 | 0 | 0.3 | | | | 0.1 |
| 21 Aug | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 28 Aug | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 5 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 11 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 18 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 26 Sept | S, M, B, Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Abundance* of Morone sp. Postlarvae in Night Ichthyoplankton Collections
Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Jun 6-7 | S | 13.2 | 11.6 | 20.3 | 8.0 | 4.1 | 0 | 9.5 | 4.2 | 0 | 27.4 | 0 | 8.4 | 0 | 6.7 | NO CATCH | | | 6.5 |
| | M | 4.8 | 0 | 9.0 | 18.8 | 29.9 | 0 | 10.4 | 4.5 | 9.1 | 4.7 | 0 | 4.4 | 0 | 3.8 | | | | 5.7 |
| | B | 0 | 5.2 | 5.0 | 9.7 | 25.6 | 13.9 | 9.9 | 0 | 4.8 | 0 | 4.9 | 9.7 | 5.0 | 4.1 | | | | 5.6 |
| | Mean | 6.0 | 5.6 | 11.4 | 12.2 | 19.8 | 4.6 | 9.9 | 2.9 | 4.6 | 10.7 | 1.6 | 7.5 | 1.6 | 4.8 | | | | 5.9 |
| Jun 15-16 | S | 12.7 | 38.0 | 34.7 | 27.0 | 28.1 | 5.2 | 24.3 | 4.3 | 11.8 | 17.3 | 8.4 | 14.5 | 3.6 | 10.0 | 0 | 4.5 | 0 | 14.0 |
| | M | 15.1 | 15.4 | 27.8 | 5.0 | 10.3 | 10.3 | 14.0 | 0 | 0 | 27.1 | 4.8 | 36.1 | 0 | 11.3 | 0 | 0 | 0 | 10.1 |
| | B | 14.9 | 10.0 | 0 | 39.5 | 0 | 0 | 10.7 | 0 | 40.6 | 5.0 | 0 | 0 | 9.3 | 9.2 | 0 | 0 | 0 | 8.0 |
| | Mean | 14.2 | 21.1 | 20.8 | 23.8 | 12.8 | 5.2 | 16.3 | 1.4 | 17.5 | 16.4 | 4.4 | 16.9 | 4.3 | 10.1 | 0 | 1.5 | 0 | 10.7 |
| Jun 19-20 | S | 0 | 4.5 | 8.1 | 0 | 0 | 0 | 2.1 | 4.5 | 0 | 0 | 17.5 | 0 | 0 | 3.7 | 0 | 4.4 | 4.0 | 2.9 |
| | M | 0 | 0 | 4.6 | 0 | 5.2 | 0 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.7 |
| | B | 5.0 | 0 | 4.0 | 0 | 0 | 0 | 1.5 | 0 | 0 | 0 | 0 | 5.7 | 0 | 1.0 | 0 | 0 | 0 | 1.0 |
| | Mean | 1.7 | 1.5 | 5.6 | 0 | 1.7 | 0 | 1.7 | 1.5 | 0 | 0 | 5.8 | 1.9 | 0 | 1.5 | 0 | 1.4 | 1.3 | 1.5 |
| Jun 26 | S | 9.1 | 0 | 4.7 | 0 | 0 | 0 | 2.3 | 5.0 | 0 | 4.4 | 0 | 0 | 0 | 1.6 | NO CATCH | | | 1.6 |
| | M | 4.8 | 0 | 0 | 0 | 5.3 | 0 | 1.7 | 0 | 4.9 | 0 | 0 | 0 | 0 | 0.8 | | | | 1.0 |
| | B | 0 | 4.7 | 4.8 | 0 | 0 | 0 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.6 |
| | Mean | 4.6 | 1.6 | 3.1 | 0 | 1.8 | 0 | 1.9 | 1.7 | 1.6 | 1.5 | 0 | 0 | 0 | 0.8 | | | | 1.1 |
| Jul 5-6 | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Jul 12-13 | S | 0 | 3.3 | 0 | 4.3 | 0 | 0 | 1.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 13.9 | 0 | 1.4 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 5.9 | 5.3 | 0 | 1.9 | 4.8 | 0 | 0 | 1.1 |
| | B | 0 | 0 | 0 | 0 | 5.1 | 0 | 0.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 1.1 | 0 | 1.4 | 1.7 | 0 | 0.7 | 0 | 0 | 0 | 2.0 | 1.8 | 0 | 0.6 | 1.6 | 4.6 | 0 | 0.9 |
| Jul 17-18 | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Jul 24-25 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 4.4 | 0 | 0 | 0 | 0 | 0.7 | NO CATCH | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | 0 | 0 | 5.0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0 | 5.7 | 0 | 1.0 | | | | 0.7 |
| | Mean | 0 | 0 | 1.7 | 0 | 0 | 0 | 0.3 | 0 | 1.5 | 0 | 0 | 1.9 | 0 | 0.6 | | | | 0.3 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-18 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| 31 July 1 Aug | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 7-8 Aug | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3.7 | 0 | 0 | 0.6 | NO CATCH | | | 0.2 |
| | M | 9.1 | 0 | 4.2 | 0 | 0 | 0 | 2.2 | 4.1 | 0 | 0 | 0 | 0 | 0 | 0.7 | | | | 1.2 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | 3.1 | 0 | 1.4 | 0 | 0 | 0 | 0.7 | 1.4 | 0 | 0 | 1.2 | 0 | 0 | 0.4 | | | | 0.5 |
| 14 Aug | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 21 Aug | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 28 Aug | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 5 Sept | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 14 Sept | S M B Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-19 (Page 1 of 3)

Abundance* of Rainbow Smelt Postlarvae in Day Ichthyoplankton Collections
Nine Mile Point Vicinity, 1978

(No rainbow smelt postlarvae were collected in day samples before May or after September)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr 4 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| Apr 10 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| Apr 17 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| Apr 24 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| May 2 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| May 8 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| May 15 | S<br>M<br>B<br>Mean | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| May 22 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | 0 |
| | M | 0 | 0 | 0 | 0 | 0 | 5.6 | 0.9 | 5.1 | 0 | 0 | 0 | 0 | 0 | 0.8 | | | | 0.7 |
| | B | 0 | 0 | 0 | 5.0 | 0 | 5.2 | 1.7 | 0 | 5.3 | 0 | 0 | 0 | 0 | 0.9 | | | | 1.0 |
| | Mean | 0 | 0 | 0 | 1.7 | 0 | 3.6 | 0.9 | 1.7 | 1.8 | 0 | 0 | 0 | 0 | 0.6 | | | | 0.6 |
| May 30 | S | 8.4 | 0 | 8.2 | 0 | 0 | 8.0 | 4.1 | 22.6 | 12.0 | 0 | 3.6 | 3.7 | 3.8 | 7.6 | 3.9 | 7.6 | 11.0 | 6.2 |
| | M | 43.3 | 10.3 | 0 | 0 | 9.7 | 9.8 | 12.2 | 31.7 | 25.2 | 4.9 | 20.3 | 31.1 | 22.0 | 22.5 | 14.6 | 0 | 4.9 | 15.2 |
| | B | 78.8 | 5.1 | 14.5 | 14.1 | 4.8 | 24.2 | 23.6 | 0 | 0 | 0 | 0 | 8.7 | 13.9 | 3.8 | 0 | 0 | 4.5 | 11.2 |
| | Mean | 43.5 | 5.1 | 7.6 | 4.7 | 4.8 | 14.0 | 13.3 | 18.1 | 12.4 | 1.6 | 8.0 | 14.5 | 13.2 | 11.3 | 6.2 | 2.5 | 6.8 | 10.9 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-19 (Page 2 of 3)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 5 | S | 4.8 | 18.3 | 16.1 | 0 | 9.6 | 0 | 8.1 | 46.0 | 30.6 | 57.2 | 9.1 | 14.0 | 48.0 | 34.2 | 0.7 | 21.4 | 16.3 | 19.5 |
| | M | 0 | 21.5 | 0 | 0 | 0 | 4.5 | 4.3 | 24.3 | 14.5 | 43.3 | 5.0 | 36.2 | 21.8 | 24.2 | 19.3 | 30.8 | 20.4 | 16.1 |
| | B | 5.0 | 21.0 | 0 | 0 | 0 | 0 | 4.3 | 31.0 | 9.9 | 0 | 0 | 5.6 | 15.5 | 10.3 | 14.5 | 4.9 | 0 | 7.2 |
| | Mean | 3.2 | 20.3 | 5.4 | 0 | 3.2 | 1.5 | 5.6 | 33.8 | 18.3 | 33.5 | 4.7 | 18.6 | 28.4 | 22.9 | 11.7 | 19.1 | 12.2 | 14.3 |
| JUN 12 | S | 16.8 | 12.9 | 8.4 | 21.7 | 4.6 | 0 | 10.7 | 4.5 | 0 | 0 | 4.4 | 13.0 | 24.0 | 7.7 | 16.9 | 39.0 | 8.8 | 11.7 |
| | M | 23.3 | 5.5 | 0 | 0 | 17.5 | 0 | 7.7 | 16.8 | 5.7 | 11.0 | 19.3 | 72.9 | 67.8 | 32.3 | 22.6 | 33.9 | 0 | 19.8 |
| | B | 23.4 | 36.4 | 23.9 | 15.7 | 25.3 | 5.1 | 21.6 | 0 | 10.5 | 10.1 | 16.9 | 24.3 | 21.6 | 13.9 | 5.1 | 0 | 10.8 | 15.3 |
| | Mean | 21.1 | 18.3 | 10.8 | 12.4 | 15.8 | 1.7 | 13.3 | 7.1 | 5.4 | 7.0 | 13.5 | 36.7 | 37.8 | 17.9 | 14.9 | 24.3 | 6.6 | 15.6 |
| JUN 19 | S | 0 | 5.2 | 0 | 4.5 | 4.4 | 0 | 2.4 | 0 | 0 | 0 | 14.5 | 23.7 | 4.4 | 7.1 | 7.5 | 0 | 4.4 | 4.6 |
| | M | 11.4 | 11.5 | 5.3 | 11.5 | 5.7 | 17.5 | 10.5 | 17.3 | 75.6 | 10.6 | 48.9 | 28.5 | 58.1 | 39.8 | 46.5 | 0 | 0 | 23.2 |
| | B | 11.0 | 0 | 9.4 | 16.0 | 16.1 | 15.8 | 11.4 | 16.6 | 0 | 11.1 | 10.0 | 11.4 | 19.6 | 11.5 | 4.8 | 0 | 5.2 | 9.8 |
| | Mean | 7.5 | 5.6 | 4.9 | 10.6 | 8.8 | 11.1 | 8.1 | 11.3 | 25.2 | 7.6 | 24.5 | 21.2 | 27.4 | 19.5 | 19.6 | 0 | 3.2 | 12.5 |
| JUN 26 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 9.9 | 0 | 1.7 | 0 | 0 | 4.6 | 1.0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 5.0 | 4.9 | 0 | 10.5 | 0 | 4.6 | 4.2 | 0 | 9.4 | 4.4 | 2.6 |
| | B | 0 | 0 | 4.9 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 5.2 | 0 | 0 | 0.9 | 0 | 0 | 14.8 | 1.7 |
| | Mean | 0 | 0 | 1.7 | 0 | 0 | 0 | 0.3 | 1.7 | 1.6 | 0 | 5.2 | 3.3 | 1.5 | 2.2 | 0 | 3.2 | 8.0 | 1.8 |
| JUL 5 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 4.3 | 0 | 0.7 | No Catch | | | 0.3 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 5.2 | 0.9 | | | | 0.3 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | | | | | | | | 0 | 0 | 0 | 0 | 1.4 | 1.7 | 0.5 | | | | 0.1 |
| JUL 10 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 5.2 | 0 | 0.9 | 0 | 0 | 0 | 0.3 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 5.0 | 0.3 |
| | Mean | | | | | | | | 0 | 0 | 0 | 0 | 1.7 | 0 | 0.3 | 0 | 0 | 1.7 | 0.2 |
| JUL 17 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 24 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-19 (Page 3 of 3)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 7 Aug | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 14 Aug | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 21 Aug | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 28 Aug | S | 0 | 0 | 0 | 0 | 4.0 | 0 | 0.7 | NO CATCH | | | | | | 0 | 3.8 | 0 | 0 | 0.5 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 |
| | B | 0 | 0 | 4.6 | 0 | 0 | 0 | 0.8 | | | | | | | 0 | 0 | 0 | 0 | 0.3 |
| | Mean | 0 | 0 | 1.5 | 0 | 1.3 | 0 | 0.5 | | | | | | | 0 | 1.3 | 0 | 0 | 0.3 |
| 5 Sept | S | 0 | 0 | 3.8 | 0 | 0 | 0 | 0.6 | NO CATCH | | | | | | 0 | NO CATCH | | | 0.3 |
| | M | 0 | 0 | 0 | 0 | 0 | 4.8 | 0.8 | | | | | | | 0 | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | | | | 0 |
| | Mean | 0 | 0 | 1.3 | 0 | 0 | 1.6 | 0.5 | | | | | | | 0 | | | | 0.2 |
| 11 Sept | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 18 Sept | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| 26 Sept | S<br>M<br>B<br>Mean | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |

*Number per 1000 m$^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-20 (Page 1 of 2)

Abundance* of Rainbow Smelt Postlarvae in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 6-7 | S | 4.4 | 19.3 | 8.1 | 0 | 4.1 | 21.9 | 9.5 | 42.1 | 3.5 | 9.1 | 0 | 21.1 | 0 | 12.6 | 4.3 | 11.8 | 0 | 9.7 |
| | M | 9.7 | 33.4 | 13.5 | 0 | 69.7 | 9.2 | 22.6 | 31.4 | 22.7 | 18.9 | 9.0 | 30.7 | 23.2 | 22.7 | 4.7 | 0 | 0 | 18.4 |
| | B | 5.3 | 15.6 | 5.0 | 14.6 | 10.2 | 13.9 | 10.7 | 4.7 | 14.3 | 10.0 | 9.9 | 19.4 | 34.3 | 15.4 | 5.0 | 0 | 0 | 10.8 |
| | Mean | 6.5 | 22.7 | 8.9 | 4.9 | 28.0 | 14.7 | 14.3 | 26.1 | 13.5 | 12.6 | 6.3 | 23.7 | 19.2 | 16.9 | 4.7 | 3.9 | 0 | 13.0 |
| JUN 15-16 | S | 63.3 | 109.8 | 13.0 | 121.6 | 14.1 | 72.8 | 65.8 | 25.5 | 74.5 | 25.9 | 4.2 | 4.8 | 21.6 | 26.1 | 30.8 | 4.5 | 18.6 | 40.3 |
| | M | 100.7 | 87.4 | 23.1 | 59.6 | 25.7 | 36.2 | 55.5 | 14.7 | 48.8 | 13.6 | 19.2 | 20.6 | 14.9 | 22.0 | 43.6 | 32.6 | 26.6 | 37.8 |
| | B | 104.1 | 134.7 | 43.6 | 138.4 | 63.9 | 106.8 | 98.6 | 114.7 | 86.3 | 68.7 | 116.3 | 116.2 | 51.1 | 92.2 | 81.6 | 142.1 | 0 | 91.2 |
| | Mean | 89.4 | 110.6 | 26.6 | 106.5 | 34.6 | 71.9 | 73.3 | 51.6 | 69.9 | 36.1 | 46.6 | 47.2 | 29.2 | 46.8 | 52.0 | 59.7 | 15.1 | 56.4 |
| JUN 19-20 | S | 13.9 | 0 | 0 | 4.8 | 0 | 13.1 | 5.3 | 0 | 4.7 | 11.1 | 4.4 | 0 | 4.0 | 4.0 | 0 | 4.4 | 4.0 | 4.3 |
| | M | 0 | 4.7 | 4.6 | 5.6 | 0 | 9.7 | 4.1 | 10.2 | 10.1 | 20.7 | 0 | 5.0 | 19.7 | 11.0 | 14.1 | 14.6 | 0 | 7.9 |
| | B | 0 | 0 | 19.8 | 15.7 | 0 | 9.2 | 7.5 | 25.3 | 4.9 | 19.6 | 0 | 11.4 | 4.5 | 11.0 | 8.8 | 18.7 | 4.8 | 9.5 |
| | Mean | 4.6 | 1.6 | 8.1 | 8.7 | 0 | 10.7 | 5.6 | 11.8 | 6.6 | 17.1 | 1.5 | 5.5 | 9.4 | 8.7 | 7.6 | 12.5 | 2.9 | 7.2 |
| JUN 26 | S | 13.6 | 0 | 0 | 0 | 0 | 0 | 2.3 | 5.0 | 9.3 | 13.2 | 0 | 4.2 | 0 | 5.3 | 0 | 0 | 22.7 | 4.5 |
| | M | 4.8 | 0 | 9.7 | 0 | 0 | 0 | 2.4 | 4.3 | 4.9 | 4.3 | 0 | 0 | 5.1 | 3.1 | 0 | 10.3 | 10.0 | 3.6 |
| | B | 0 | 9.5 | 4.8 | 0 | 0 | 0 | 2.4 | 15.4 | 4.9 | 17.0 | 0 | 0 | 0 | 6.2 | 13.7 | 5.1 | 0 | 4.7 |
| | Mean | 6.2 | 3.2 | 4.8 | 0 | 0 | 0 | 2.4 | 8.2 | 6.4 | 11.5 | 0 | 1.4 | 1.7 | 4.9 | 4.6 | 5.1 | 10.9 | 4.3 |
| JUL 5-6 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.6 | 0 | 0 | 3.8 | 4.4 | 0 | 2.1 | 0 | 0 | 0 | 0.9 |
| | M | 0 | 0 | 0 | 5.4 | 0 | 0 | 0.9 | 0 | 6.1 | 4.9 | 5.1 | 0 | 0 | 2.7 | 14.1 | 4.8 | 0 | 2.7 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.4 | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 4.7 | 0.7 |
| | Mean | 0 | 0 | 0 | 1.8 | 0 | 0 | 0.3 | 3.3 | 2.0 | 1.6 | 3.0 | 1.5 | 0 | 1.9 | 4.7 | 1.6 | 1.6 | 1.4 |
| JUL 12-13 | S | No Catch | | | | | | | 0 | 0 | 3.9 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0 | 0.3 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 8.7 | 0.6 |
| | B | | | | | | | | 0 | 4.2 | 4.3 | 0 | 0 | 0 | 1.4 | 0 | 3.9 | 3.9 | 1.1 |
| | Mean | | | | | | | | 0 | 1.4 | 2.7 | 0 | 0 | 0 | 0.7 | 0 | 1.3 | 4.2 | 0.6 |
| JUL 17-18 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | B | | | | | | | | 0 | 5.9 | 5.3 | 0 | 0 | 0 | 1.9 | 0 | 0 | 3.9 | 1.0 |
| | Mean | | | | | | | | 0 | 2.0 | 1.8 | 0 | 0 | 0 | 0.6 | 0 | 0 | 1.3 | 0.3 |
| JUL 24-25 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-20 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 40-Ft Contour*** 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31 July 1 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 7-8 Aug | S | NO CATCH | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NO CATCH | | | 0 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | | | | | | | | 0 | 0 | 13.1 | 0 | 0 | 0 | 2.2 | | | | 0.9 |
| | Mean | | | | | | | | 0 | 0 | 4.4 | 0 | 0 | 0 | 0.7 | | | | 0.3 |
| 14 Aug | S | NO CATCH | | | | | | | NO CATCH | | | | | | | NO CATCH | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| 21 Aug | S | NO CATCH | | | | | | | 0 | 0 | 0 | 0 | 0 | 4.5 | 0.8 | NO CATCH | | | 0.3 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | | | | | | | | 0 | 0 | 0 | 0 | 0 | 1.5 | 0.3 | | | | 0.1 |
| 28 Aug | S | 4.5 | 4.5 | 9.7 | 0 | 0 | 0 | 3.1 | 4.4 | 8.0 | 4.7 | 0 | 0 | 0 | 2.9 | 4.6 | 0 | 3.8 | 2.9 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5.7 | 0 | 0 | 0 | 0 | 0 | 1.0 | 0 | 0 | 0 | 0.4 |
| | Mean | 1.5 | 1.5 | 3.2 | 0 | 0 | 0 | 1.0 | 3.4 | 2.7 | 1.6 | 0 | 0 | 0 | 1.3 | 1.5 | 0 | 1.3 | 1.1 |
| 5 Sept | S | NO CATCH | | | | | | | 0 | 4.4 | 0 | 0 | 0 | 0 | 0.7 | NO CATCH | | | 0.3 |
| | M | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | B | | | | | | | | 24.0 | 0 | 0 | 0 | 0 | 0 | 4.0 | | | | 1.6 |
| | Mean | | | | | | | | 8.0 | 1.5 | 0 | 0 | 0 | 0 | 1.6 | | | | 0.6 |
| 14 Sept | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.3 | 0 | 0 | 0.7 | NO CATCH | | | 0.3 |
| | M | 15.3 | 0 | 6.0 | 0 | 21.7 | 0 | 7.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 2.9 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 |
| | Mean | 5.1 | 0 | 2.0 | 0 | 7.2 | 0 | 2.4 | 0 | 0 | 0 | 1.4 | 0 | 0 | 0.2 | | | | 1.1 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-21 (Page 1 of 2)

Abundance* of Yellow Perch Postlarvae in Day Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No yellow perch postlarvae were collected in day samples before May and after June)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| Apr 4 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 10 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 17 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| Apr 24 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| May 2 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| May 8 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| May 15 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No Catch | | | | | | | No Catch | | | 0 |
| | M | 0 | 0 | 0 | 5.3 | 0 | 0 | 0.9 | | | | | | | | | | | 0.4 |
| | B | 0 | 0 | 0 | 10.0 | 0 | 0 | 1.7 | | | | | | | | | | | 0.7 |
| | Mean | 0 | 0 | 0 | 5.1 | 0 | 0 | 0.8 | | | | | | | | | | | 0.3 |
| May 22 | S | 48.6 | 21.3 | 35.0 | 98.9 | 122.8 | 41.2 | 61.3 | 34.3 | 16.8 | 91.2 | 20.1 | 33.6 | 45.1 | 40.2 | 37.6 | 0 | 0 | 43.1 |
| | M | 94.1 | 59.9 | 34.1 | 118.4 | 135.4 | 55.8 | 83.0 | 25.4 | 21.3 | 25.8 | 42.8 | 30.2 | 30.5 | 29.3 | 27.6 | 4.9 | 0 | 47.1 |
| | B | 66.8 | 130.2 | 24.4 | 50.3 | 91.2 | 82.7 | 74.3 | 11.3 | 10.5 | 22.6 | 5.6 | 52.9 | 32.7 | 22.6 | 5.4 | 0 | 0 | 39.1 |
| | Mean | 69.8 | 70.5 | 31.2 | 89.2 | 116.5 | 59.9 | 72.8 | 23.7 | 16.2 | 46.5 | 22.8 | 38.9 | 36.1 | 30.7 | 23.6 | 1.6 | 0 | 43.1 |
| May 30 | S | 0 | 0 | 0 | 4.4 | 8.4 | 0 | 2.1 | 0 | 0 | 4.2 | 0 | 3.7 | 0 | 1.3 | 0 | 0 | 0 | 1.4 |
| | M | 5.4 | 10.3 | 10.2 | 34.2 | 63.3 | 14.7 | 23.0 | 0 | 0 | 0 | 5.1 | 8.9 | 0 | 2.3 | 0 | 0 | 0 | 10.1 |
| | B | 0 | 0 | 4.8 | 0 | 4.8 | 0 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 |
| | Mean | 1.8 | 3.4 | 5.0 | 12.9 | 25.5 | 4.9 | 8.9 | 0 | 0 | 1.4 | 1.7 | 4.2 | 0 | 1.2 | 0 | 0 | 0 | 4.0 |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-21 (Page 2 of 2)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 5 | S | 0 | 0 | 0 | 0 | 0 | 11.2 | 1.9 | No Catch | | | | | | | No Catch | | | 0.8 |
| | M | 0 | 0 | 0 | 0 | 0 | 4.5 | 0.8 | | | | | | | | | | | 0.3 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | | | | | | | | 0.0 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 5.2 | 0.9 | | | | | | | | | | | 0.4 |
| JUN 12 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUN 19 | S | 0 | 0 | 0 | 0 | 0 | 4.6 | 0.8 | 0 | 0 | 0 | 0 | 4.7 | 0 | 0.8 | No Catch | | | 0.6 |
| | M | 0 | 0 | 0 | 0 | 0 | 5.8 | 1.0 | 0 | 5.8 | 5.3 | 0 | 0 | 0 | 1.9 | | | | 1.1 |
| | B | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | Mean | 0 | 0 | 0 | 0 | 0 | 3.5 | 0.6 | 0 | 1.9 | 1.8 | 0 | 1.6 | 0 | 0.9 | | | | 0.6 |
| JUN 26 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 5 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 10 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 17 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 24 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

Table E-22

Abundance* of Yellow Perch Postlarvae in Night Ichthyoplankton Collections, Nine Mile Point Vicinity, 1978

(No yellow perch postlarvae were collected in night samples after June)

| Date | Sample Depth** | 20-Ft Contour*** | | | | | | | 40-Ft Contour*** | | | | | | | 60-Ft NMPP | 80-Ft NMPP | 100-Ft NMPP | Grand Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | 3-West | 1-West | 1/2-West | 1/2-East | 1-East | 3-East | Mean | | | | |
| JUN 6-7 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUN 15-16 | S | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | No Catch | | | 0.0 |
| | M | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | | | | 0.0 |
| | B | 0 | 0 | 0 | 4.9 | 0 | 0 | 0.8 | 0 | 5.1 | 0 | 0 | 0 | 0 | 0.9 | | | | 0.7 |
| | Mean | 0 | 0 | 0 | 1.7 | 0 | 0 | 0.3 | 0 | 1.7 | 0 | 0 | 0 | 0 | 0.3 | | | | 0.2 |
| JUN 19-20 | S | No Catch | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | No Catch | | | 0.0 |
| | M | | | | | | | | 0 | 0 | 0 | 4.8 | 0 | 0 | 0.8 | | | | 0.3 |
| | B | | | | | | | | 0 | 4.9 | 0 | 0 | 0 | 0 | 0.8 | | | | 0.3 |
| | Mean | | | | | | | | 0 | 1.6 | 0 | 1.6 | 0 | 0 | 0.5 | | | | 0.2 |
| JUN 26 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 5-6 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 12-13 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 17-18 | S | No Catch | | | | | | | No Catch | | | | | | | No Catch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |
| JUL 24-25 | S | No Catch | | | | | | | No Catch | | | | | | | No CAtch | | | |
| | M | | | | | | | | | | | | | | | | | | |
| | B | | | | | | | | | | | | | | | | | | |
| | Mean | | | | | | | | | | | | | | | | | | |

*Number per 1000 $m^3$.

**S = surface, M = mid-depth, B = bottom.

***Stations along contours are established within 3-, 1-, and 1/2-mile radii east and west of Nine Mile Point Station, Unit 1.

APPENDIX F

FISHERIES

- Catch Rate Data
- Length - Frequency
- Coefficient of Maturity and Fecundity
- Age
- Stomach Contents

Table F-1

Time Table for Gill Nets Set at 15-Ft Depth Contour during the Day, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | NMPP Date | NMPP Dur. | NMPP Time | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-6-78 | 12.3 | 0545-1800 | 4-6-78 | 12.3 | 0600-1815 | 4-6-78 | 12.3 | 0545-1800 | 4-6-78 | 12.5 | 0600-1830 |
| | 4-10-78 | 12.3 | 0545-1800 | 4-10-78 | 12.3 | 0600-1815 | 4-10-78 | 12.3 | 0545-1800 | 4-10-78 | 12.3 | 0600-1815 |
| Apr II[4] | 4-18-78 | 12.3 | 0545-1800 | 4-18-78 | 12.5 | 0545-1815 | 4-18-78 | 12.3 | 0545-1800 | 4-18-78 | 12.3 | 0600-1815 |
| | 4-19-78 | 11.8 | 0600-1745 | 4-19-78 | 12.0 | 0615-1815 | 4-19-78 | 12.3 | 0545-1800 | 4-19-78 | 12.0 | 0615-1815 |
| May I | 5-2-78 | 13.5 | 0615-1945 | 5-2-78 | 13.8 | 0630-2015 | 5-2-78 | 14.8 | 0600-2045 | 5-2-78 | 14.8 | 0615-2100 |
| | 5-3-78 | 13.0 | 0545-1845 | 5-3-78 | 13.3 | 0615-1930 | 5-3-78 | 12.8 | 0630-1915 | 5-3-78 | 13.0 | 0700-2000 |
| May II | 5-16-78 | 13.5 | 0545-1915 | 5-16-78 | 13.5 | 0600-1930 | 5-16-78 | 13.5 | 0545-1915 | 5-16-78 | 13.3 | 0615-1930 |
| | 5-17-78 | 14.0 | 0530-1930 | 5-17-78 | 12.8 | 0630-1915 | 5-17-78 | 13.5 | 0545-1915 | 5-17-78 | 13.3 | 0615-1930 |
| Jun I | 6-6-78 | 14.8 | 0530-2015 | 6-6-78 | 14.5 | 0600-2030 | 6-6-78 | 14.8 | 0545-2030 | 6-6-78 | 14.8 | 0600-2045 |
| | 6-7-78 | 14.3 | 0530-1945 | 6-7-78 | 13.8 | 0615-2000 | 6-7-78 | 13.8 | 0615-2000 | 6-7-78 | 13.5 | 0700-2030 |
| Jun II | 6-20-78 | 14.8 | 0530-2015 | 6-20-78 | 14.8 | 0545-2030 | 6-20-78 | 14.8 | 0530-2015 | 6-20-78 | 15.0 | 0545-2045 |
| | 6-21-78 | 14.3 | 0530-1945 | 6-21-78 | 14.0 | 0615-2015 | 6-21-78 | 14.0 | 0545-1945 | 6-21-78 | 13.8 | 0615-2000 |
| Jul I | 7-5-78 | 14.8 | 0515-2000 | 7-5-78 | 14.5 | 0545-2015 | 7-5-78 | 14.8 | 0515-2000 | 7-5-78 | 14.5 | 0545-2015 |
| | 7-6-78 | 14.5 | 0530-2000 | 7-6-78 | 14.0 | 0615-2015 | 7-6-78 | 14.8 | 0515-2000 | 7-6-78 | 14.3 | 0615-2030 |
| Jul II | 7-18-78 | 14.3 | 0545-2000 | 7-18-78 | 14.5 | 0600-2030 | 7-18-78 | 14.0 | 0600-2000 | 7-18-78 | 14.5 | 0615-2045 |
| | 7-19-78 | 14.5 | 0530-2000 | 7-19-78 | 14.0 | 0615-2015 | 7-19-78 | 14.3 | 0545-2000 | 7-19-78 | 13.5 | 0645-2015 |
| Aug I | 8-1-78 | 13.3 | 0615-1930 | 8-1-78 | 13.5 | 0630-2000 | 8-1-78 | 13.3 | 0615-1930 | 8-1-78 | 13.5 | 0630-2000 |
| | 8-2-78 | 13.5 | 0600-1930 | 8-2-78 | 13.3 | 0645-2000 | 8-2-78 | 13.8 | 0545-1930 | 8-2-78 | 12.8 | 0715-2000 |
| Aug II | 8-16-78 | 13.3 | 0600-1915 | 8-16-78 | 13.5 | 0615-1945 | 8-16-78 | 14.0 | 0600-2000 | 8-16-78 | 12.8 | 0630-1915 |
| | 8-18-78 | 13.3 | 0630-1945 | 8-18-78 | 12.5 | 0730-2000 | 8-18-78 | 13.5 | 0630-2000 | 8-18-78 | 13.0 | 0715-2015 |
| Sep I | 9-6-78 | 11.5 | 0715-1845 | 9-6-78 | 11.8 | 0730-1915 | 9-6-78 | 11.8 | 0715-1900 | 9-6-78 | 12.0 | 0730-1930 |
| | 9-10-78 | 10.8 | 0715-1800 | 9-10-78 | 10.5 | 0745-1815 | 9-10-78 | 10.5 | 0730-1800 | 9-10-78 | 10.3 | 0800-1815 |
| Sep II | 9-19-78 | 11.3 | 0700-1815 | 9-19-78 | 11.0 | 0730-1830 | 9-19-78 | 11.0 | 0915-1815 | 9-19-78 | 11.0 | 0745-1845 |
| | 9-20-78 | 12.0 | 0615-1815 | 9-20-78 | 12.0 | 0645-1845 | 9-20-78 | 12.0 | 0615-1815 | 9-20-78 | 12.3 | 0630-1845 |
| Oct I | 10-3-78 | 10.5 | 0745-1815 | 10-3-78 | 10.8 | 0745-1830 | 10-3-78 | 10.8 | 0730-1815 | 10-3-78 | 10.8 | 0745-1830 |
| | 10-4-78 | 11.0 | 0715-1815 | 10-4-78 | 10.5 | 0800-1830 | 10-4-78 | 10.8 | 0730-1815 | 10-4-78 | 10.5 | 0800-1830 |
| Oct II | 10-17-78 | 11.0 | 0730-1830 | 10-17-78 | 11.0 | 0745-1845 | 10-17-78 | 10.8 | 0745-1830 | 10-17-78 | 11.0 | 0800-1900 |
| | 10-18-78 | 11.3 | 0715-1830 | 10-18-78 | 10.8 | 0800-1845 | 10-18-78 | 11.0 | 0730-1830 | 10-18-78 | 10.5 | 0815-1845 |
| Nov I | 10-31-78 | 9.3 | 0700-1615 | 10-31-78 | 9.8 | 0715-1700 | 10-31-78 | 9.3 | 0700-1615 | 10-31-78 | 9.8 | 0700-1645 |
| | 11-1-78 | 9.0 | 0730-1630 | 11-1-78 | 9.0 | 0800-1700 | 11-1-78 | 8.8 | 0745-1630 | 11-1-78 | 8.8 | 0815-1700 |
| Nov II | 11-16-78 | 8.8 | 0745-1630 | 11-16-78 | 9.0 | 0800-1700 | 11-16-78 | 9.0 | 0800-1700 | 11-16-78 | 8.8 | 0800-1645 |
| | 11-17-78 | 8.8 | 0745-1630 | 11-17-78 | 8.8 | 0815-1700 | 11-17-78 | 9.0 | 0730-1630 | 11-17-78 | 10.3 | 0715-1730 |
| Dec I | 12-6-78 | 8.8 | 0715-1600 | 12-6-78 | 9.3 | 0730-1645 | 12-6-78 | 8.8 | 0730-1615 | 12-6-78 | 8.8 | 0745-1630 |
| | 12-7-78 | 9.3 | 0715-1630 | 12-7-78 | 9.0 | 0745-1645 | 12-7-78 | 8.5 | 0800-1630 | 12-7-78 | 9.3 | 0730-1645 |
| Dec II | | | | | No samples taken due to weather | | | | | | | |

[1] Pick-up date
[2] Dur. = duration in hours
[3] Set time and pick-up time
[4] I = first sampling period; II = second sampling period.

# Table F-2

## Time Table for Gill Nets Set at 15-Ft Depth Contour during the Night, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | NMPP Date | NMPP Dur. | NMPP Time | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-7-78 | | Missed Sample[5] | | 11.0 | 1830-0530 | 4-7-78 | 11.0 | 1815-0515 | 4-7-78 | 11.8 | 1830-0615 |
| | 4-11-78 | 11.5 | 1800-0530 | 4-11-78 | 12.0 | 1815-0615 | 4-11-78 | 11.5 | 1800-0530 | 4-11-78 | 11.8 | 1815-0600 |
| Apr II[4] | 4-19-78 | 12.0 | 1800-0600 | 4-19-78 | 12.0 | 1815-0615 | 4-19-78 | 11.5 | 1800-0530 | 4-19-78 | 12.0 | 1815-0615 |
| | 4-20-78 | 11.5 | 1800-0530 | 4-20-78 | 11.5 | 1830-0600 | 4-20-78 | 11.5 | 1800-0530 | 4-20-78 | 11.5 | 1815-0545 |
| May I | 5-3-78 | 9.5 | 2000-0530 | 5-3-78 | 9.5 | 2030-0600 | 5-3-78 | 9.8 | 2045-0630 | 5-3-78 | 9.5 | 2115-0645 |
| | 5-4-78 | 10.5 | 1900-0530 | 5-4-78 | 10.5 | 1930-0600 | 5-4-78 | 10.5 | 1915-0545 | 5-4-78 | 10.0 | 2000-0600 |
| May II | 5-17-78 | 10.0 | 1915-0515 | 5-17-78 | 10.0 | 1945-0545 | 5-17-78 | 10.0 | 1915-0515 | 5-17-78 | 10.5 | 1930-0600 |
| | 5-18-78 | 9.8 | 1945-0530 | 5-18-78 | 10.8 | 1915-0600 | 5-18-78 | 10.3 | 1915-0530 | 5-18-78 | 10.5 | 1930-0600 |
| Jun I | 6-7-78 | 9.0 | 2015-0515 | 6-7-78 | 9.3 | 2045-0600 | 6-7-78 | 9.5 | 2030-0600 | 6-7-78 | 9.8 | 2100-0645 |
| | 6-8-78 | 13.3 | 1945-0900 | 6-8-78 | 12.8 | 2000-0845 | 6-8-78 | 12.3 | 2000-0815 | 6-8-78 | 11.0 | 2045-0745 |
| Jun II | 6-21-78 | 9.0 | 2015-0515 | 6-21-78 | 9.0 | 2045-0545 | 6-21-78 | 9.0 | 2015-0515 | 6-21-78 | 9.0 | 2100-0600 |
| | 6-22-78 | 9.8 | 1945-0530 | 6-22-78 | 9.5 | 2030-0600 | 6-22-78 | 10.5 | 1945-0615 | 6-22-78 | 10.3 | 2015-0630 |
| Jul I | 7-6-78 | 9.0 | 2000-0500 | 7-6-78 | 9.5 | 2030-0600 | 7-6-78 | 9.0 | 2000-0500 | 7-6-78 | 9.0 | 2030-0530 |
| | 7-7-78 | 9.3 | 2000-0515 | 7-7-78 | 9.3 | 2030-0545 | 7-7-78 | 9.5 | 2000-0530 | 7-7-78 | 9.8 | 2030-0615 |
| Jul II | 7-19-78 | 9.3 | 2000-0515 | 7-19-78 | 9.3 | 2045-0600 | 7-19-78 | 9.5 | 2000-0530 | 7-19-78 | 9.5 | 2045-0615 |
| | 7-20-78 | 9.5 | 2000-0530 | 7-20-78 | 9.5 | 2030-0600 | 7-20-78 | 9.3 | 2000-0515 | 7-20-78 | 9.3 | 2030-0545 |
| Aug I | 8-2-78 | 10.3 | 1930-0545 | 8-2-78 | 10.5 | 2000-0630 | 8-2-78 | 10.0 | 1945-0545 | 8-2-78 | 10.3 | 2015-0630 |
| | 8-3-78 | 10.0 | 1945-0545 | 8-3-78 | 10.5 | 2000-0630 | 8-3-78 | 10.0 | 1945-0545 | 8-3-78 | 10.0 | 2000-0600 |
| Aug II | 8-17-78 | 10.3 | 1930-0545 | 8-17-78 | 10.8 | 1945-0630 | 8-17-78 | 10.0 | 2000-0600 | 8-17-78 | 10.8 | 1930-0615 |
| | 8-19-78 | 9.5 | 1945-0515 | 8-19-78 | 9.8 | 2015-0600 | 8-19-78 | 10.0 | 2015-0615 | 8-19-78 | 10.0 | 2100-0700 |
| Sep I | 9-10-78 | 11.3 | 1930-0645 | 9-10-78 | 11.5 | 2000-0730 | 9-10-78 | 11.3 | 1945-0700 | 9-10-78 | 10.3 | 2130-0745 |
| | 9-11-78 | 12.5 | 1800-0630 | 9-11-78 | 12.5 | 1830-0700 | 9-11-78 | 12.8 | 1800-0645 | 9-11-78 | 13.0 | 1815-0715 |
| Sep II | 9-19-78 | 12.8 | 1800-0645 | 9-19-78 | 12.8 | 1830-0715 | 9-19-78 | 14.8 | 1815-0900 | 9-19-78 | 13.0 | 1830-0730 |
| | 9-20-78 | 11.8 | 1830-0615 | 9-20-78 | 12.0 | 1845-0645 | 9-20-78 | 12.0 | 1815-0615 | 9-20-78 | 11.8 | 1845-0630 |
| Oct I | 10-4-78 | 12.8 | 1815-0700 | 10-4-78 | 13.0 | 1830-0730 | 10-4-78 | 12.8 | 1815-0700 | 10-4-78 | 13.0 | 1845-0745 |
| | 10-5-78 | 12.3 | 1830-0645 | 10-5-78 | 12.5 | 1845-0715 | 10-5-78 | 12.5 | 1815-0645 | 10-5-78 | 12.8 | 1845-0730 |
| Oct II | 10-18-78 | 12.5 | 1830-0700 | 10-18-78 | 13.3 | 1845-0800 | 10-18-78 | 12.3 | 1845-0700 | 10-18-78 | 13.0 | 1900-0800 |
| | 10-19-78 | 12.3 | 1830-0645 | 10-19-78 | 12.3 | 1900-0715 | 10-19-78 | 12.5 | 1830-0700 | 10-19-78 | 12.3 | 1900-0715 |
| Nov I | 11-1-78 | 14.8 | 1630-0715 | 11-1-78 | 14.8 | 1700-0745 | 11-1-78 | 15.0 | 1630-0730 | 11-1-78 | 15.3 | 1645-0800 |
| | 11-2-78 | 15.0 | 1630-0730 | 11-2-78 | 14.8 | 1700-0745 | 11-2-78 | 14.0 | 1645-0645 | 11-2-78 | 13.8 | 1715-0700 |
| Nov II | 11-16-78 | 14.5 | 1700-0730 | 11-16-78 | 14.3 | 1730-0745 | 11-16-78 | 15.0 | 1700-0800 | 11-16-78 | 14.5 | 1715-0745 |
| | 11-17-78 | 15.0 | 1630-0730 | 11-17-78 | 15.0 | 1700-0800 | 11-17-78 | 14.3 | 1715-0730 | 11-17-78 | 14.3 | 1700-0715 |
| Dec I | 12-7-78 | 15.3 | 1600-0715 | 12-7-78 | 15.0 | 1645-0745 | 12-7-78 | 15.5 | 1615-0745 | 12-7-78 | 14.5 | 1645-0715 |
| | 12-8-78 | 15.0 | 1630-0730 | 12-8-78 | 15.0 | 1645-0745 | 12-8-78 | 15.0 | 1630-0730 | 12-8-78 | 14.8 | 1700-0745 |
| Dec II | | | | | | No samples taken due to weather | | | | | | |

[1] Pick-up date
[2] Dur. = duration in hours
[3] Set time and pick-up time
[4] I = first sampling period; II = second sampling period.
[5] Sample voided due to damaged net.

Table F-3

Time Table for Gill Nets Set at 20-Ft Depth Contour during the Day, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-6-78 | 13.0 | 0645-1945 | 4-6-78 | 13.3 | 0645-2000 | 4-6-78 | 12.8 | 0630-1915 |
| Apr II[4] | 4-18-78 | 12.5 | 0630-1900 | 4-18-78 | 12.5 | 0645-1915 | 4-18-78 | 12.5 | 0615-1845 |
| May I | 5-2-78 | 16.0 | 0730-2330 | 5-2-78 | 15.3 | 0700-2215 | 5-2-78 | 12.3 | 0645-1900 |
| May II | 5-16-78 | 12.0 | 0630-1830 | 5-16-78 | 12.0 | 0700-1900 | 5-16-78 | 11.8 | 0630-1815 |
| Jun I | 6-6-78 | 12.5 | 0645-1915 | 6-6-78 | 13.0 | 0645-1945 | 6-6-78 | 12.8 | 0615-1900 |
| Jun II | 6-20-78 | 13.0 | 0630-1930 | 6-20-78 | 13.3 | 0630-1945 | 6-20-78 | 13.5 | 0615-1945 |
| Jul I | 7-5-78 | 12.8 | 0630-1915 | 7-5-78 | 12.8 | 0630-1915 | 7-5-78 | 12.5 | 0600-1830 |
| Jul II | 7-18-78 | 12.8 | 0645-1930 | 7-18-78 | 12.5 | 0700-1930 | 7-18-78 | 12.5 | 0630-1900 |
| Aug I | 8-1-78 | 12.5 | 0645-1915 | 8-1-78 | 11.8 | 0730-1915 | 8-1-78 | 11.8 | 0700-1845 |
| Aug II | 8-16-78 | 12.3 | 0700-1915 | 8-16-78 | 12.8 | 0715-2000 | 8-16-78 | 12.3 | 0700-1915 |
| Sep I | 9-6-78 | 11.8 | 0815-2100 | 9-6-78 | 13.3 | 0830-2145 | 9-6-78 | 12.5 | 0800-2030 |
| Sep II | 9-19-78 | 10.5 | 0900-1930 | 9-19-78 | 12.8 | 0700-1945 | 9-19-78 | 10.5 | 0845-1915 |
| Oct I | 10-3-78 | 11.3 | 0830-1945 | 10-3-78 | 11.3 | 0830-1945 | 10-3-78 | 11.0 | 0815-1915 |
| Oct II | 10-17-78 | 13.8 | 0815-2000 | 10-17-78 | 11.8 | 0845-2030 | 10-17-78 | 11.5 | 0830-2000 |
| Nov I | 10-31-78 | 11.5 | 0700-1830 | 10-31-78 | 11.5 | 0645-1815 | 10-31-78 | 11.0 | 0630-1730 |
| Nov II | 11-16-78 | 10.5 | 0900-1930 | 11-16-78 | 10.8 | 0900-1945 | 11-16-78 | 11.0 | 0745-1845 |
| Dec I | 12-6-78 | 10.8 | 0815-1900 | 12-6-78 | 10.8 | 0845-1930 | 12-6-78 | 10.0 | 0815-1815 |
| Dec II | No samples taken due to weather | | | | | | | | |

[1]Pick-up date

[2]Dur. = Duration in hours

[3]Set time and pick-up time

[4]I = first sampling period; II = second sampling period.

Table F-4

Time Table for Gill Nets Set at 20-Ft Depth Contour during the Night, Nine Mile Point Vicinity, 1978

| | NMPW | | | FITZ | | | NMPE | | |
|---|---|---|---|---|---|---|---|---|---|
| Sampling Period | Date[1] | Dur.[2] | Time[3] | Date | Dur. | Time | Date | Dur. | Time |
| Apr I[4] | 4-7-78 | 11.5 | 1945-0715 | 4-7-78 | 11.8 | 2015-0800 | 4-7-78 | 12.0 | 1930-0730 |
| Apr II[4] | 4-19-78 | 12.3 | 1915-0730 | 4-19-78 | 12.5 | 1915-0745 | 4-19-78 | 12.0 | 1900-0700 |
| May I | 5-3-78 | 8.0 | 2345-0745 | 5-3-78 | 8.3 | 2215-0630 | 5-3-78 | 12.3 | 1915-0730 |
| May II | 5-17-78 | 13.3 | 1845-0800 | 5-17-78 | 12.8 | 1900-0745 | 5-17-78 | 12.5 | 1830-0700 |
| Jun I | 6-7-78 | 12.0 | 1915-0715 | 6-7-78 | 12.3 | 1945-0800 | 6-7-78 | 12.5 | 1915-0745 |
| Jun II | 6-21-78 | 12.0 | 1930-0730 | 6-21-78 | 11.5 | 2000-0730 | 6-21-78 | 10.8 | 2000-0645 |
| Jul I | 7-6-78 | 12.3 | 1930-0745 | 7-6-78 | 13.0 | 1915-0815 | 7-6-78 | 12.3 | 1845-0700 |
| Jul II | 7-19-78 | 12.3 | 1945-0800 | 7-19-78 | 12.8 | 1945-0830 | 7-19-78 | 12.5 | 1900-0730 |
| Aug I | 8-2-78 | 12.8 | 1915-0800 | 8-2-78 | 13.3 | 1930-0845 | 8-2-78 | 13.3 | 1845-0800 |
| Aug II | 8-17-78 | 13.5 | 1915-0845 | 8-17-78 | 12.8 | 2000-0845 | 8-17-78 | 12.0 | 1915-0715 |
| Sep I | 9-10-78 | 10.3 | 2245-0900 | 9-10-78 | 9.0 | 0115-1015 | 9-10-78 | 9.3 | 2330-0845 |
| Sep II | 9-19-78 | 13.5 | 1915-0845 | 9-19-78 | 11.0 | 1945-0645 | 9-19-78 | 13.3 | 1915-0830 |
| Oct I | 10-4-78 | 13.0 | 2000-0900 | 10-4-78 | 13.5 | 2000-0930 | 10-4-78 | 13.8 | 1915-0900 |
| Oct II | 10-18-78 | 13.8 | 2015-1000 | 10-18-78 | 13.8 | 2030-1015 | 10-18-78 | 13.3 | 2000-0915 |
| Nov I | 11-1-78 | 13.8 | 1845-0830 | 11-1-78 | 13.0 | 1830-0730 | 11-1-78 | 13.3 | 1745-0700 |
| Nov II | 11-16-78 | 14.0 | 1900-0900 | 11-16-78 | 14.3 | 1845-0900 | 11-16-78 | 13.5 | 1800-0730 |
| Dec I | 12-7-78 | 13.5 | 1900-0830 | 12-7-78 | 12.8 | 1945-0830 | 12-7-78 | 12.8 | 1830-0715 |
| Dec II | No samples taken due to weather | | | | | | | | |

[1]Pick-up date

[2]Dur. = Duration in hours

[3]Set time and pick-up time

[4]I = first sampling period; II = second sampling period.

## Table F-5

### Time Table for Gill Nets Set at 30-Ft Depth Contour during the Day, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | NMPP Date | NMPP Dur. | NMPP Time | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-6-78 | 12.8 | 0645-1930 | 4-6-78 | 12.5 | 0630-1900 | 4-6-78 | 13.0 | 0645-1945 | 4-6-78 | 13.0 | 0615-1915 |
| | 4-10-78 | 9.8 | 0700-1645 | 4-10-78 | 12.0 | 0630-1830 | 4-10-78 | 12.0 | 0700-1900 | 4-10-78 | 12.3 | 0630-1845 |
| Apr II[4] | 4-18-78 | 12.5 | 0630-1900 | 4-18-78 | 12.3 | 0615-1830 | 4-18-78 | 12.8 | 0630-1915 | 4-18-78 | 12.5 | 0615-1845 |
| | 4-19-78 | 11.8 | 0730-1915 | 4-19-78 | 11.8 | 0700-1845 | 4-19-78 | 11.5 | 0745-1915 | 4-19-78 | 11.8 | 0700-1845 |
| May I | 5-2-78 | 16.0 | 0715-2315 | 5-2-78 | 15.8 | 0700-2245 | 5-2-78 | 15.0 | 0700-2000 | 5-2-78 | 12.0 | 0645-1845 |
| | 5-4-78 | 12.3 | 0715-1930 | 5-4-78 | 11.3 | 0645-1800 | 5-4-78 | 11.5 | 0700-1830 | 5-4-78 | 11.8 | 0730-1915 |
| May II | 5-16-78 | 12.0 | 0630-1830 | 5-16-78 | 12.0 | 0600-1800 | 5-16-78 | 12.8 | 0700-1845 | 5-16-78 | 11.8 | 0630-1815 |
| | 5-17-78 | 11.0 | 0745-1845 | 5-17-78 | 10.5 | 0730-1800 | 5-17-78 | 10.8 | 0745-1830 | 5-17-78 | 11.0 | 0700-1800 |
| Jun I | 6-6-78 | 14.3 | 0645-1900 | 6-6-78 | 12.5 | 0615-1845 | 6-6-78 | 13.0 | 0630-1930 | 6-6-78 | 12.8 | 0615-1900 |
| | 6-7-78 | 12.0 | 0715-1915 | 6-7-78 | 12.3 | 0645-1900 | 6-7-78 | 11.5 | 0815-1945 | 6-7-78 | 11.8 | 0730-1915 |
| Jun II | 6-20-78 | 12.8 | 0630-1915 | 6-20-78 | 12.8 | 0615-1900 | 6-20-78 | 13.3 | 0630-1945 | 6-20-78 | 13.3 | 0615-1930 |
| | 6-21-78 | 11.5 | 0730-1900 | 6-21-78 | 11.5 | 0700-1830 | 6-21-78 | 11.8 | 0730-1915 | 6-21-78 | 12.0 | 0645-1845 |
| Jul I | 7-5-78 | 12.8 | 0615-1900 | 7-5-78 | 12.5 | 0600-1830 | 7-5-78 | 12.8 | 0615-1900 | 7-5-78 | 12.3 | 0600-1815 |
| | 7-6-78 | 11.8 | 0730-1915 | 7-6-78 | 11.8 | 0700-1845 | 7-6-78 | 11.0 | 0800-1900 | 7-6-78 | 11.8 | 0700-1845 |
| Jul II | 7-18-78 | 12.8 | 0630-1915 | 7-18-78 | 12.5 | 0615-1845 | 7-18-78 | 12.5 | 0645-1915 | 7-18-78 | 12.3 | 0630-1845 |
| | 7-19-78 | 11.3 | 0800-1915 | 7-19-78 | 11.5 | 0715-1845 | 7-19-78 | 11.0 | 0830-1930 | 7-19-78 | 11.8 | 0715-1900 |
| Aug I | 8-1-78 | 12.3 | 0645-1900 | 8-1-78 | 12.0 | 0630-1830 | 8-1-78 | 11.8 | 0730-1915 | 8-1-78 | 11.5 | 0700-1830 |
| | 8-2-78 | 10.8 | 0830-1915 | 8-2-78 | 11.8 | 0715-1900 | 8-2-78 | 10.3 | 0845-1900 | 8-2-78 | 11.0 | 0745-1845 |
| Aug II | 8-16-78 | 12.3 | 0645-1900 | 8-16-78 | 12.3 | 0630-1845 | 8-16-78 | 12.8 | 0715-2000 | 8-16-78 | 12.0 | 0700-1900 |
| | 8-18-78 | 9.8 | 0945-1930 | 8-18-78 | 10.3 | 0845-1900 | 8-18-78 | 10.5 | 0915-1945 | 8-18-78 | 10.8 | 0830-1915 |
| Sep I | 9-6-78 | 12.5 | 0800-2030 | 9-6-78 | 12.3 | 0745-2000 | 9-6-78 | 13.3 | 0815-2130 | 9-6-78 | 12.3 | 0800-2015 |
| | 9-10-78 | 10.3 | 0900-1915 | 9-10-78 | 10.3 | 0815-1830 | 9-10-78 | 9.3 | 1000-1915 | 9-10-78 | 10.5 | 0830-1900 |
| Sep II | 9-19-78 | 10.8 | 0845-1930 | 9-19-78 | 10.8 | 0815-1900 | 9-19-78 | 10.3 | 0915-1930 | 9-19-78 | 10.5 | 0830-1900 |
| | 9-20-78 | 12.0 | 0730-1930 | 9-20-78 | 11.8 | 0715-1900 | 9-20-78 | 12.0 | 0730-1930 | 9-20-78 | 12.0 | 0715-1915 |
| Oct I | 10-3-78 | 11.0 | 0815-1915 | 10-3-78 | 11.0 | 0800-1900 | 10-3-78 | 11.3 | 0830-1945 | 10-3-78 | 11.0 | 0800-1900 |
| | 10-4-78 | 10.5 | 0900-1930 | 10-4-78 | 10.5 | 0830-1900 | 10-4-78 | 9.8 | 0930-1915 | 10-4-78 | 10.3 | 0845-1900 |
| Oct II | 10-17-78 | 11.5 | 0815-1945 | 10-17-78 | 11.3 | 0800-1915 | 10-17-78 | 11.5 | 0845-2015 | 10-17-78 | 11.5 | 0815-1945 |
| | 10-18-78 | 10.8 | 1000-2045 | 10-18-78 | 11.3 | 0900-2015 | 10-18-78 | 10.8 | 1015-2100 | 10-18-78 | 11.5 | 0915-2045 |
| Nov I | 10-31-78 | 11.5 | 0645-1815 | 10-31-78 | 11.3 | 0630-1745 | 10-31-78 | 11.3 | 0645-1800 | 10-31-78 | 11.0 | 0630-1730 |
| | 11-1-78 | 10.3 | 0845-1900 | 11-1-78 | 11.5 | 0645-1815 | 11-1-78 | 10.8 | 0730-1815 | 11-1-78 | 11.0 | 0645-1745 |
| Nov II | 11-16-78 | 10.3 | 0845-1900 | 11-16-78 | 10.5 | 0715-1745 | 11-16-78 | 10.8 | 0845-1930 | 11-16-78 | 11.0 | 0730-1830 |
| | 11-21-78 | 10.3 | 0645-1700 | 11-21-78 | 10.3 | 0700-1715 | 11-21-78 | 10.3 | 0730-1745 | 11-21-78 | 10.0 | 0800-1800 |
| Dec I | 12-6-78 | 10.5 | 0815-1845 | 12-6-78 | 10.0 | 0800-1800 | 12-6-78 | 10.8 | 0830-1915 | 12-6-78 | 10.0 | 0800-1800 |
| | 12-7-78 | 11.0 | 0815-1915 | 12-7-78 | 10.0 | 0715-1715 | 12-7-78 | 10.3 | 0830-1845 | 12-7-78 | 10.5 | 0700-1730 |
| Dec II | No samples taken due to weather | | | | | | | | | | | |

[1] Pick-up date
[2] Dur. = duration in hours
[3] Set time and pick-up time
[4] I = first sampling period; II = second sampling period.

Table F-6

Time Table for Gill Nets Set at 30-Ft Depth Contour during the Night, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | NMPP Date | NMPP Dur. | NMPP Time | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-7-78 | 11.5 | 1930-0700 | 4-7-78 | 11.3 | 1900-0615 | 4-7-78 | 12.0 | 2000-0800 | 4-7-78 | 11.8 | 1915-0700 |
| | 4-11-78 | 14.5 | 1700-0730 | 4-11-78 | 12.5 | 1830-0700 | 4-11-78 | 12.0 | 1900-0700 | 4-11-78 | 11.8 | 1845-0630 |
| Apr II[4] | 4-19-78 | 12.3 | 1900-0715 | 4-19-78 | 12.5 | 1830-0700 | 4-19-78 | 12.3 | 1915-0730 | 4-19-78 | 12.0 | 1845-0645 |
| | 4-20-78 | 10.0 | 1930-0530 | 4-20-78 | 11.3 | 1900-0615 | 4-20-78 | 11.3 | 1915-0630 | 4-20-78 | 11.5 | 1845-0615 |
| May I | 5-3-78 | 8.0 | 2330-0730 | 5-3-78 | 8.3 | 2245-0700 | 5-3-78 | 8.3 | 2200-0615 | 5-3-78 | 12.5 | 1900-0730 |
| | 5-4-78 | 12.3 | 1845-0700 | 5-4-78 | 12.0 | 1830-0630 | 5-4-78 | 12.3 | 1830-0645 | 5-4-78 | 12.3 | 1900-0715 |
| May II | 5-17-78 | 13.3 | 1830-0745 | 5-17-78 | 12.8 | 1815-0700 | 5-17-78 | 12.8 | 1845-0730 | 5-17-78 | 12.5 | 1815-0645 |
| | 5-18-78 | 12.0 | 1900-0700 | 5-18-78 | 12.5 | 1800-0630 | 5-18-78 | 12.3 | 1845-0700 | 5-18-78 | 12.5 | 1815-0645 |
| Jun I | 6-7-78 | 11.8 | 1915-0700 | 6-7-78 | 11.8 | 1845-0630 | 6-7-78 | 12.3 | 1945-0800 | 6-7-78 | 12.5 | 1900-0730 |
| | 6-8-78 | 12.3 | 1930-0945 | 6-8-78 | 13.8 | 1900-0845 | 6-8-78 | 12.5 | 1945-0815 | 6-8-78 | 12.5 | 1915-0745 |
| Jun II | 6-21-78 | 12.0 | 1915-0715 | 6-21-78 | 11.8 | 1900-0645 | 6-21-78 | 11.8 | 1945-0730 | 6-21-78 | 11.0 | 1945-0645 |
| | 6-22-78 | 12.3 | 1900-0715 | 6-22-78 | 12.0 | 1845-0645 | 6-22-78 | 12.0 | 1915-0715 | 6-22-78 | 12.3 | 1845-0700 |
| Jul I | 7-6-78 | 12.3 | 1900-0715 | 7-6-78 | 12.0 | 1845-0645 | 7-6-78 | 12.5 | 1915-0745 | 7-6-78 | 12.3 | 1830-0645 |
| | 7-7-78 | 11.8 | 1915-0700 | 7-7-78 | 11.8 | 1845-0630 | 7-7-78 | 12.3 | 1915-0730 | 7-7-78 | 12.5 | 1845-0715 |
| Jul II | 7-19-78 | 12.3 | 1915-0730 | 7-19-78 | 12.3 | 1845-0700 | 7-19-78 | 12.8 | 1930-0815 | 7-19-78 | 12.3 | 1845-0700 |
| | 7-20-78 | 10.5 | 1915-0545 | 7-20-78 | 12.3 | 1845-0700 | 7-20-78 | 11.3 | 1945-0700 | 7-20-78 | 11.5 | 1900-0630 |
| Aug I | 8-2-78 | 12.8 | 1900-0745 | 8-2-78 | 12.8 | 1830-0715 | 8-2-78 | 13.3 | 1915-0830 | 8-2-78 | 12.8 | 1845-0730 |
| | 8-3-78 | 12.3 | 1930-0745 | 8-3-78 | 12.0 | 1990-0700 | 8-3-78 | 12.0 | 1915-0715 | 8-3-78 | 12.0 | 1845-0645 |
| Aug II | 8-17-78 | 13.0 | 1915-0815 | 8-17-78 | 13.0 | 1845-0745 | 8-17-78 | 12.0 | 2015-0815 | 8-17-78 | 12.0 | 1900-0700 |
| | 8-19-78 | 11.8 | 1930-0715 | 8-19-78 | 11.5 | 1915-0645 | 8-19-78 | 10.3 | 1945-0600 | 8-19-78 | 10.3 | 1930-0545 |
| Sep I | 9-10-78 | 9.5 | 2215-0845 | 9-10-78 | 11.0 | 2115-0815 | 9-10-78 | 9.0 | 0045-0945 | 9-10-78 | 9.5 | 2245-0815 |
| | 9-11-78 | 12.8 | 1915-0800 | 9-11-78 | 13.0 | 1830-0730 | 9-11-78 | 12.5 | 1930-0800 | 9-11-78 | 12.5 | 1900-0730 |
| Sep II | 9-19-78 | 13.5 | 1900-0830 | 9-19-78 | 13.3 | 1845-0800 | 9-19-78 | 13.5 | 1930-0900 | 9-19-78 | 13.3 | 1900-0815 |
| | 9-20-78 | 12.0 | 1930-0730 | 9-20-78 | 12.0 | 1900-0700 | 9-20-78 | 11.8 | 1945-0730 | 9-20-78 | 12.0 | 1915-0715 |
| Oct I | 10-4-78 | 13.0 | 1945-0845 | 10-4-78 | 13.5 | 1900-0830 | 10-4-78 | 13.5 | 1945-0915 | 10-4-78 | 13.5 | 1915-0845 |
| | 10-5-78 | 13.0 | 1945-0845 | 10-5-78 | 13.0 | 1915-0815 | 10-5-78 | 13.0 | 1930-0830 | 10-5-78 | 13.0 | 1900-0800 |
| Oct II | 10-18-78 | 13.5 | 2000-0930 | 10-18-78 | 13.3 | 1930-0845 | 10-18-78 | 13.5 | 2030-1000 | 10-18-78 | 13.3 | 1945-0900 |
| | 10-19-78 | 12.0 | 2045-0845 | 10-19-78 | 11.8 | 2015-0800 | 10-19-78 | 11.0 | 2115-0815 | 10-19-78 | 11.0 | 2045-0745 |
| Nov I | 11-1-78 | 14.0 | 1830-0830 | 11-1-78 | 12.8 | 1745-0630 | 11-1-78 | 13.0 | 1815-0715 | 11-1-78 | 13.0 | 1730-0630 |
| | 11-2-78 | 12.3 | 1915-0730 | 11-2-78 | 12.0 | 1830-0630 | 11-2-78 | 13.3 | 1830-0745 | 11-2-78 | 12.8 | 1745-0630 |
| Nov II | 11-16-78 | 13.8 | 1845-0830 | 11-16-78 | 13.3 | 1745-0700 | 11-16-78 | 14.3 | 1830-0845 | 11-16-78 | 13.5 | 1800-0730 |
| | 11-17-78 | 12.0 | 1915-0715 | 11-17-78 | 13.0 | 1745-0645 | 11-17-78 | 12.8 | 1930-0815 | 11-17-78 | 12.3 | 1830-0645 |
| Dec I | 12-7-78 | 13.5 | 1845-0815 | 12-7-78 | 13.0 | 1800-0700 | 12-7-78 | 13.0 | 1930-0830 | 12-7-78 | 12.5 | 1815-0645 |
| | 12-8-78 | 13.3 | 1915-0830 | 12-8-78 | 15.0 | 1715-0815 | 12-8-78 | 13.8 | 1845-0830 | 12-8-78 | 14.5 | 1745-0815 |
| Dec II | | | | | | No samples taken due to weather | | | | | | |

[1]Pick-up date

[2]Dur. = duration in hours

[3]Set time and pick-up time

[4]I = first sampling period; II = second sampling period.

Table F-7

Time Table for Gill Nets Set at 40-Ft Depth Contour during the Day, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | NMPP Date | NMPP Dur. | NMPP Time | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-6-78 | 12.3 | 0600-1815 | 4-6-78 | 12.3 | 0615-1830 | 4-6-78 | 12.5 | 0545-1815 | 4-6-78 | 12.8 | 0600-1845 |
| | 4-10-78 | 12.0 | 0600-1800 | 4-10-78 | 12.0 | 0615-1815 | 4-10-78 | 12.0 | 0600-1800 | 4-10-78 | 12.0 | 0615-1815 |
| Apr II[4] | 4-18-78 | 12.3 | 0545-1800 | 4-18-78 | 12.3 | 0600-1815 | 4-18-78 | 12.3 | 0545-1800 | 4-18-78 | 12.5 | 0600-1830 |
| | 4-19-78 | 12.0 | 0600-1800 | 4-19-78 | 12.0 | 0630-1830 | 4-19-78 | 11.8 | 0615-1800 | 4-19-78 | 12.0 | 0630-1830 |
| May I | 5-2-78 | 13.8 | 0615-2000 | 5-2-78 | 14.0 | 0630-2030 | 5-2-78 | 14.5 | 0615-2045 | 5-2-78 | 14.8 | 0630-2115 |
| | 5-3-78 | 13.0 | 0600-1900 | 5-3-78 | 13.3 | 0630-1945 | 5-3-78 | 12.8 | 0645-1930 | 5-3-78 | 13.0 | 0715-2015 |
| May II | 5-16-78 | 13.8 | 0545-1930 | 5-16-78 | 13.8 | 0600-1945 | 5-16-78 | 13.3 | 0600-1915 | 5-16-78 | 12.3 | 0615-1930 |
| | 5-17-78 | 14.3 | 0530-1945 | 5-17-78 | 12.5 | 0645-1915 | 5-17-78 | 13.5 | 0545-1915 | 5-17-78 | 13.3 | 0630-1945 |
| Jun I | 6-6-78 | 14.5 | 0545-2015 | 6-6-78 | 14.8 | 0600-2045 | 6-6-78 | 14.5 | 0545-2015 | 6-6-78 | 14.8 | 0600-2045 |
| | 6-7-78 | 14.3 | 0545-2000 | 6-7-78 | 14.0 | 0615-2015 | 6-7-78 | 13.8 | 0600-1945 | 6-7-78 | 13.5 | 0645-2015 |
| Jun II | 6-20-78 | 14.5 | 0545-2015 | 6-20-78 | 15.0 | 0600-2100 | 6-20-78 | 14.8 | 0545-2030 | 6-20-78 | 15.0 | 0600-2100 |
| | 6-21-78 | 14.5 | 0530-2000 | 6-21-78 | 14.3 | 0615-2030 | 6-21-78 | 13.8 | 0600-1945 | 6-21-78 | 13.8 | 0630-2015 |
| Jul I | 7-5-78 | 14.5 | 0530-2000 | 7-5-78 | 14.8 | 0545-2030 | 7-5-78 | 14.5 | 0530-2000 | 7-5-78 | 15.0 | 0545-2045 |
| | 7-6-78 | 14.5 | 0545-2015 | 7-6-78 | 14.0 | 0630-2030 | 7-6-78 | 14.8 | 0530-2015 | 7-6-78 | 14.3 | 0630-2045 |
| Jul II | 7-18-78 | 14.5 | 0545-2015 | 7-18-78 | 14.8 | 0600-2045 | 7-18-78 | 14.3 | 0600-2015 | 7-18-78 | 14.8 | 0615-2100 |
| | 7-19-78 | 14.0 | 0600-2000 | 7-19-78 | 14.0 | 0630-2030 | 7-19-78 | 14.0 | 0600-2000 | 7-19-78 | 13.5 | 0700-2030 |
| Aug I | 8-1-78 | 13.5 | 0615-1945 | 8-1-78 | 13.5 | 0630-2000 | 8-1-78 | 13.5 | 0615-1945 | 8-1-78 | 13.8 | 0630-2015 |
| | 8-2-78 | 13.5 | 0615-1945 | 8-2-78 | 13.3 | 0700-2015 | 8-2-78 | 13.5 | 0615-1945 | 8-2-78 | 12.8 | 0715-2000 |
| Aug II | 8-16-78 | 13.3 | 0615-1930 | 8-16-78 | 13.0 | 0630-1930 | 8-16-78 | 13.8 | 0615-2000 | 8-16-78 | 13.0 | 0630-1930 |
| | 8-18-78 | 12.8 | 0700-1945 | 8-18-78 | 12.5 | 0800-2030 | 8-18-78 | 12.8 | 0700-1945 | 8-18-78 | 13.3 | 0745-2100 |
| Sep I | 9-6-78 | 11.5 | 0730-1900 | 9-6-78 | 12.0 | 0730-1930 | 9-6-78 | 11.8 | 0730-1915 | 9-6-78 | 12.0 | 0745-1945 |
| | 9-10-78 | 10.5 | 0730-1800 | 9-10-78 | 10.5 | 0800-1830 | 9-10-78 | 9.0 | 0900-1800 | 9-10-78 | 10.3 | 0815-1830 |
| Sep II | 9-19-78 | 11.3 | 0715-1830 | 9-19-78 | 11.0 | 0745-1845 | 9-19-78 | 11.0 | 0730-1830 | 9-19-78 | 10.8 | 0800-1845 |
| | 9-20-78 | 12.0 | 0630-1830 | 9-20-78 | 11.8 | 0700-1845 | 9-20-78 | 12.0 | 0630-1830 | 9-20-78 | 11.8 | 0700-1845 |
| Oct I | 10-3-78 | 10.5 | 0745-1815 | 10-3-78 | 10.5 | 0800-1830 | 10-3-78 | 10.8 | 0730-1815 | 10-3-78 | 11.0 | 0745-1845 |
| | 10-4-78 | 11.0 | 0730-1830 | 10-4-78 | 10.5 | 0815-1845 | 10-4-78 | 10.8 | 0745-1830 | 10-4-78 | 10.5 | 0815-1845 |
| Oct II | 10-17-78 | 11.0 | 0730-1830 | 10-17-78 | 11.3 | 0745-1900 | 10-17-78 | 11.0 | 0745-1845 | 10-17-78 | 11.0 | 0800-1900 |
| | 10-18-78 | 11.0 | 0745-1845 | 10-18-78 | 10.8 | 0815-1900 | 10-18-78 | 11.0 | 0745-1845 | 10-18-78 | 10.5 | 0830-1900 |
| Nov I | 10-31-78 | 9.8 | 0700-1645 | 10-31-78 | 10.0 | 0715-1715 | 10-31-78 | 9.5 | 0700-1630 | 10-31-78 | 10.0 | 0700-1700 |
| | 11-1-78 | 9.3 | 0730-1645 | 11-2-78 | 10.3 | 0645-1700 | 11-1-78 | 8.8 | 0800-1645 | 11-1-78 | 9.0 | 0830-1730 |
| Nov II | 11-16-78 | 9.3 | 0730-1645 | 11-16-78 | 9.3 | 0800-1715 | 11-16-78 | 8.8 | 0830-1715 | 11-16-78 | 9.5 | 0715-1645 |
| | 11-17-78 | 8.8 | 0800-1645 | 11-17-78 | 9.5 | 0815-1745 | 11-17-78 | 9.0 | 0745-1645 | 11-17-78 | 10.0 | 0715-1715 |
| Dec I | 12-6-78 | 8.8 | 0730-1615 | 12-6-78 | 9.0 | 0745-1645 | 12-6-78 | 9.0 | 0730-1630 | 12-6-78 | 9.0 | 0745-1645 |
| | 12-7-78 | 9.0 | 0730-1630 | 12-7-78 | 8.8 | 0800-1645 | 12-7-78 | 8.5 | 0815-1645 | 12-7-78 | 9.3 | 0745-1700 |
| Dec II | No samples taken due to weather | | | | | | | | | | | |

[1] Pick-up date

[2] Dur. = duration in hours

[3] Set time and pick-up time

[4] I = first sampling period; II = second sampling period.

Table F-8

Time Table for Gill Nets Set at 40-Ft Depth Contour during the Night, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | NMPP Date | NMPP Dur. | NMPP Time | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-7-78 | 11.0 | 1815-0515 | 4-7-78 | 11.0 | 1845-0545 | 4-7-78 | 11.5 | 1815-0545 | 4-7-78 | 11.5 | 1900-0630 |
| | 4-11-78 | 11.5 | 1815-0545 | 4-11-78 | 12.3 | 1815-0630 | 4-11-78 | 11.8 | 1800-0545 | 4-11-78 | 12.0 | 1815-0615 |
| Apr II[4] | 4-19-78 | 12.0 | 1800-0600 | 4-19-78 | 12.3 | 1815-0630 | 4-19-78 | 12.0 | 1800-0600 | 4-19-78 | 11.8 | 1830-0615 |
| | 4-20-78 | 12.3 | 1815-0630 | 4-20-78 | 11.5 | 1830-0600 | 4-20-78 | 11.3 | 1815-0530 | 4-20-78 | 11.5 | 1830-0600 |
| May I | 5-3-78 | 9.5 | 2015-0545 | 5-3-78 | 9.8 | 2030-0615 | 5-3-78 | 9.8 | 2100-0645 | 5-3-78 | 9.5 | 2130-0700 |
| | 5-4-78 | 10.5 | 1915-0545 | 5-4-78 | 10.0 | 2000-0600 | 5-4-78 | 10.3 | 1930-0545 | 5-4-78 | 9.8 | 2030-0615 |
| May II | 5-17-78 | 10.0 | 1930-0530 | 5-17-78 | 10.5 | 2000-0630 | 5-17-78 | 10.5 | 1915-0545 | 5-17-78 | 10.8 | 1945-0630 |
| | 5-18-78 | 9.5 | 2000-0530 | 5-18-78 | 10.8 | 1930-0615 | 5-18-78 | 10.3 | 1930-0545 | 5-18-78 | 10.5 | 1945-0615 |
| Jun I | 6-7-78 | 9.0 | 2030-0530 | 6-7-78 | 9.5 | 2045-0615 | 6-7-78 | 9.5 | 2015-0545 | 6-7-78 | 9.8 | 2045-0630 |
| | 6-8-78 | 13.8 | 2000-0945 | 6-8-78 | 12.3 | 2030-0845 | 6-8-78 | 12.5 | 2000-0830 | 6-8-78 | 11.5 | 2015-0745 |
| June II | 6-21-78 | 9.0 | 2030-0530 | 6-21-78 | 9.3 | 2100-0615 | Missed Sample[5] | | | 6-21-78 | 9.5 | 2100-0630 |
| | 6-22-78 | 9.8 | 2000-0545 | 6-22-78 | 9.5 | 2030-0600 | 6-22-78 | 10.3 | 2000-0615 | 6-22-78 | 10.0 | 2030-0630 |
| Jul I | 7-6-78 | 9.5 | 2015-0545 | 7-6-78 | 9.5 | 2045-0615 | 7-6-78 | 9.3 | 2015-0530 | 7-6-78 | 9.3 | 2100-0615 |
| | 7-7-78 | 9.5 | 2015-0545 | 7-7-78 | 9.3 | 2045-0600 | 7-7-78 | 9.8 | 2015-0600 | 7-7-78 | 10.3 | 2045-0700 |
| Jul II | 7-19-78 | 9.3 | 2015-0530 | 7-19-78 | 9.3 | 2100-0615 | 7-19-78 | 9.3 | 2030-0545 | 7-19-78 | 9.8 | 2100-0645 |
| | 7-20-78 | 11.0 | 2015-0715 | 7-20-78 | 9.8 | 2030-0615 | 7-20-78 | 9.3 | 2015-0530 | 7-20-78 | 9.3 | 2045-0600 |
| Aug I | 8-2-78 | 10.3 | 1945-0600 | 8-2-78 | 10.8 | 2000-0645 | 8-2-78 | 10.0 | 2000-0600 | 8-2-78 | 11.0 | 2015-0715 |
| | 8-3-78 | 10.3 | 1945-0600 | 8-3-78 | 11.0 | 2015-0715 | 8-3-78 | 10.3 | 1945-0600 | 8-3-78 | 10.3 | 2000-0615 |
| Aug II | 8-17-78 | 10.8 | 1930-0615 | 8-17-78 | 11.5 | 1930-0700 | 8-17-78 | 9.8 | 2015-0600 | 8-17-78 | 10.8 | 1945-0630 |
| | 8-19-78 | 9.8 | 2000-0545 | 8-19-78 | 9.8 | 2030-0615 | 8-19-78 | 10.5 | 2000-0630 | 8-19-78 | 10.3 | 2100-0715 |
| Sep I | 9-10-78 | 11.5 | 1945-0715 | 9-10-78 | 11.3 | 2030-0745 | 9-15-78 | 13.8 | 1800-0745 | Missed Sample[5] | | |
| | 9-11-78 | 12.5 | 1815-0645 | 9-11-78 | 12.8 | 1830-0715 | 9-11-78 | 12.8 | 1815-0700 | 9-11-78 | 13.3 | 1830-0745 |
| Sep II | 9-19-78 | 12.8 | 1815-0700 | 9-19-78 | 13.0 | 1830-0730 | 9-19-78 | 13.0 | 1815-0715 | 9-19-78 | 13.0 | 1845-0745 |
| | 9-20-78 | 12.0 | 1830-0630 | 9-20-78 | 12.0 | 1845-0645 | 9-20-78 | 12.0 | 1830-0630 | 9-20-78 | 12.0 | 1845-0645 |
| Oct I | 10-4-78 | 12.8 | 1830-0715 | 10-4-78 | 13.3 | 1845-0800 | 10-4-78 | 13.0 | 1830-0730 | 10-4-78 | 13.0 | 1900-0800 |
| | 10-5-78 | 12.5 | 1830-0700 | 10-5-78 | 13.0 | 1845-0745 | 10-5-78 | 12.8 | 1830-0715 | 10-5-78 | 13.0 | 1845-0745 |
| Oct II | 10-18-78 | 12.8 | 1845-0730 | 10-18-78 | 13.0 | 1915-0815 | 10-18-78 | 12.8 | 1845-0730 | 10-18-78 | 13.0 | 1915-0815 |
| | 10-19-78 | 12.3 | 1845-0700 | 10-19-78 | 12.0 | 1915-0715 | 10-19-78 | 12.3 | 1845-0700 | 10-19-78 | 12.5 | 1900-0730 |
| Nov I | 11-1-78 | 14.8 | 1645-0730 | 11-2-78 | 13.8 | 1815-0800 | 11-1-78 | 15.0 | 1645-0745 | 11-1-78 | 15.3 | 1700-0815 |
| | 11-2-78 | 14.5 | 1645-0715 | 11-3-78 | 14.3 | 1700-0715 | 11-2-78 | 13.8 | 1700-0645 | 11-2-78 | 13.5 | 1745-0715 |
| Nov II | 11-16-78 | 14.0 | 1715-0715 | 11-16-78 | 13.5 | 1730-0800 | 11-16-78 | 15.3 | 1700-0815 | 11-16-78 | 13.8 | 1715-0700 |
| | 11-17-78 | 12.8 | 1700-0745 | 11-17-78 | 13.0 | 1715-0815 | 11-17-78 | 14.3 | 1730-0745 | 11-17-78 | 14.3 | 1645-0700 |
| Dec I | 12-7-78 | 15.0 | 1630-0730 | 12-7-78 | 14.8 | 1700-0745 | 12-7-78 | 15.5 | 1630-0800 | 12-7-78 | 14.8 | 1645-0730 |
| | 12-8-78 | 15.0 | 1630-0730 | 12-8-78 | 15.0 | 1645-0745 | 12-8-78 | 14.8 | 1645-0730 | 12-8-78 | 14.5 | 1715-0745 |
| Dec II | No samples taken due to weather | | | | | | | | | | | |

[1]Pick-up date

[2]Dur. = duration in hours

[3]Set time and pick-up time

[4]I = first sampling period; II = second sampling period

[5]Net tangled and moved off station by current.

## Table F-9

## Time Table for Gill Nets Set at 60-Ft Depth Contour during the Day, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | NMPP Date | NMPP Dur. | NMPP Time | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-6-78 | 12.8 | 0630-1915 | 4-6-78 | 12.5 | 0615-1845 | 4-6-78 | 13.0 | 0630-1930 | 4-6-78 | 12.8 | 0615-1900 |
| | 4-10-78 | 11.8 | 0700-1845 | 4-10-78 | 12.0 | 0630-1830 | 4-10-78 | 12.0 | 0645-1845 | 4-10-78 | 12.3 | 0615-1813 |
| Apr II[4] | 4-18-78 | 12.3 | 0630-1845 | 4-18-78 | 12.3 | 0615-1830 | 4-18-78 | 12.5 | 0630-1900 | 4-18-78 | 12.5 | 0615-1845 |
| | 4-19-78 | 11.8 | 0715-1900 | 4-19-78 | 12.0 | 0645-1845 | 4-19-78 | 11.5 | 0730-1900 | 4-19-78 | 12.3 | 0630-1845 |
| May I | 5-2-78 | 16.0 | 0700-2300 | 5-2-78 | 15.8 | 0645-2230 | 5-2-78 | 14.8 | 0700-2145 | 5-2-78 | 11.8 | 0630-1815 |
| | 5-4-78 | 12.5 | 0700-1930 | 5-4-78 | 11.5 | 0630-1800 | 5-4-78 | 11.5 | 0645-1815 | 5-4-78 | 11.8 | 0715-1900 |
| May II | 5-16-78 | 11.8 | 0630-1815 | 5-16-78 | 12.0 | 0600-1800 | 5-16-78 | 11.8 | 0645-1830 | 5-16-78 | 11.8 | 0615-1800 |
| | 5-17-78 | 10.5 | 0745-1815 | 5-17-78 | 10.8 | 0700-1745 | 5-17-78 | 11.0 | 0730-1830 | 5-17-78 | 11.0 | 0645-1745 |
| Jun I | 6-6-78 | 12.5 | 0630-1900 | 6-6-78 | 12.5 | 0615-1845 | 6-6-78 | 12.8 | 0630-1915 | 6-6-78 | 12.8 | 0600-1845 |
| | 6-7-78 | 12.3 | 0700-1915 | 6-7-78 | 12.3 | 0630-1845 | 6-7-78 | 11.5 | 0800-1930 | 6-7-78 | 11.8 | 0715-1900 |
| Jun II | 6-20-78 | 12.8 | 0615-1900 | 6-20-78 | 12.8 | 0600-1845 | 6-20-78 | 13.3 | 0615-1930 | 6-20-78 | 12.8 | 0615-1900 |
| | 6-21-78 | 11.8 | 0700-1845 | 6-21-78 | 12.0 | 0630-1830 | 6-21-78 | 11.5 | 0730-1900 | 6-21-78 | 11.8 | 0645-1830 |
| Jul I | 7-5-78 | 12.5 | 0615-1845 | 7-5-78 | 12.5 | 0545-1815 | 7-5-78 | 12.5 | 0615-1845 | 7-5-78 | 12.0 | 0600-1800 |
| | 7-6-78 | 11.8 | 0715-1900 | 7-6-78 | 11.8 | 0645-1830 | 7-6-78 | 11.3 | 0745-1900 | 7-6-78 | 11.8 | 0645-1830 |
| Jul II | 7-18-78 | 12.5 | 0630-1900 | 7-18-78 | 12.3 | 0615-1830 | 7-18-78 | 12.3 | 0645-1900 | 7-18-78 | 12.0 | 0630-1830 |
| | 7-19-78 | 11.5 | 0730-1900 | 7-19-78 | 11.8 | 0645-1830 | 7-19-78 | 13.0 | 0815-1915 | 7-19-78 | 11.5 | 0700-1830 |
| Aug I | 8-1-78 | 12.0 | 0645-1845 | 8-1-78 | 11.8 | 0630-1815 | 8-1-78 | 11.8 | 0715-1900 | 8-1-78 | 11.5 | 0700-1830 |
| | 8-2-78 | 11.3 | 0745-1900 | 8-2-78 | 11.5 | 0700-1830 | 8-2-78 | 13.3 | 0815-1900 | 8-2-78 | 11.0 | 0730-1830 |
| Aug II | 8-16-78 | 12.3 | 0645-1900 | 8-16-78 | 12.0 | 0630-1830 | 8-16-78 | 12.8 | 0700-1945 | 8-16-78 | 12.0 | 0645-1845 |
| | 8-18-78 | 10.0 | 0915-1915 | 8-18-78 | 10.8 | 0815-1900 | 8-18-78 | 10.5 | 0900-1930 | 8-18-78 | 10.8 | 0815-1900 |
| Sep I | 9-6-78 | 12.3 | 0800-2015 | 9-6-78 | 12.3 | 0730-1945 | 9-6-78 | 13.0 | 0815-2115 | 9-6-78 | 14.3 | 0745-2200 |
| | 9-10-78 | 10.8 | 0830-1900 | 9-10-78 | 9.0 | 0945-1845 | 9-10-78 | 9.5 | 0945-1915 | 9-10-78 | 9.8 | 0845-1830 |
| Sep II | 9-19-78 | 10.8 | 0830-1915 | 9-19-78 | 11.0 | 0800-1900 | 9-19-78 | 10.5 | 0900-1930 | 9-19-78 | 12.8 | 0815-1900 |
| | 9-20-78 | 12.0 | 0715-1915 | 9-20-78 | 12.0 | 0700-1900 | 9-20-78 | 12.0 | 0730-1930 | 9-20-78 | 12.0 | 0700-1900 |
| Oct I | 10-3-78 | 10.8 | 0815-1900 | 10-3-78 | 10.8 | 0800-1845 | 10-3-78 | 11.3 | 0815-1930 | 10-3-78 | 11.0 | 0800-1900 |
| | 10-4-78 | 10.8 | 0845-1930 | 10-4-78 | 10.5 | 0815-1845 | 10-4-78 | 9.8 | 0915-1900 | 10-4-78 | 10.3 | 0830-1845 |
| Oct II | 10-17-78 | 11.5 | 0800-1930 | 10-17-78 | 11.3 | 0800-1915 | 10-17-78 | 11.8 | 0830-2015 | 10-17-78 | 11.3 | 0815-1930 |
| | 10-18-78 | 11.0 | 0930-2030 | 10-18-78 | 11.3 | 0845-2000 | 10-18-78 | 11.0 | 1000-2100 | 10-18-78 | 11.5 | 0900-2030 |
| Nov I | 10-31-78 | 11.3 | 0645-1800 | 10-31-78 | 11.3 | 0615-1730 | 10-31-78 | 11.3 | 0645-1800 | 10-31-78 | 10.8 | 0630-1715 |
| | 11-1-78 | 11.3 | 0715-1830 | 11-1-78 | 10.8 | 0630-1715 | 11-1-78 | 10.8 | 0715-1800 | 11-1-78 | 10.8 | 0630-1715 |
| Nov II | 11-16-78 | 10.0 | 0830-1830 | 11-16-78 | 10.5 | 0700-1730 | 11-16-78 | 10.3 | 0845-1900 | 11-16-78 | 11.3 | 0700-1815 |
| | 11-21-78 | 10.0 | 0645-1645 | 11-21-78 | 10.0 | 0715-1715 | 11-21-78 | 10.0 | 0745-1745 | 11-21-78 | 10.0 | 0815-1815 |
| Dec I | 12-6-78 | 10.3 | 0800-1815 | 12-8-78 | 10.3 | 0745-1800 | 12-6-78 | 10.3 | 0830-1845 | 12-6-78 | 10.0 | 0800-1800 |
| | 12-7-78 | 10.8 | 0815-1900 | 12-6-78 | 10.0 | 0700-1700 | 12-7-78 | 10.0 | 0830-1830 | 12-7-78 | 10.0 | 0715-1715 |
| Dec II | | | | | | No samples taken due to weather | | | | | | |

[1] Pick-up date
[2] Dur. = duration in hours
[3] Set time and pick-up time
[4] I = first sampling period; II = second sampling period.

Table F-10

Time Table for Gill Nets Set at 60-Ft Depth Contour during the Night, Nine Mile Point Vicinity, 1978

| Sampling Period | NMPW Date[1] | NMPW Dur.[2] | NMPW Time[3] | NMPP Date | NMPP Dur. | NMPP Time | FITZ Date | FITZ Dur. | FITZ Time | NMPE Date | NMPE Dur. | NMPE Time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Apr I[4] | 4-7-78 | 11.5 | 1915-0645 | 4-7-78 | 11.0 | 1900-0600 | 4-7-78 | 12.0 | 1945-0745 | 4-7-78 | 11.8 | 1900-0645 |
| | 4-11-78 | 12.5 | 1845-0715 | 4-11-78 | 12.3 | 1830-0645 | 4-11-78 | 12.0 | 1900-0700 | 4-11-78 | 12.0 | 1830-0630 |
| Apr II[4] | 4-19-78 | 12.3 | 1845-0700 | 4-19-78 | 12.3 | 1830-0645 | 4-19-78 | 12.3 | 1900-0715 | 4-19-78 | 11.8 | 1845-0630 |
| | 4-20-78 | 11.5 | 1915-0645 | 4-20-78 | 11.5 | 1845-0615 | 4-20-78 | 11.5 | 1900-0630 | 4-20-78 | 11.3 | 1845-0600 |
| May I | 5-3-78 | 8.0 | 2315-0715 | 5-3-78 | 8.3 | 2230-0645 | 5-3-78 | 8.0 | 2200-0600 | 5-3-78 | 13.0 | 1815-0715 |
| | 5-4-78 | 12.0 | 1845-0645 | 5-4-78 | 11.8 | 1830-0615 | 5-4-78 | 12.0 | 1830-0630 | 5-4-78 | 12.5 | 1845-0700 |
| May II | 5-17-78 | 13.0 | 1830-0730 | 5-17-78 | 13.0 | 1800-0700 | 5-17-78 | 12.8 | 1830-0715 | 5-17-78 | 12.5 | 1800-0630 |
| | 5-18-78 | 12.5 | 1815-0645 | 5-18-78 | 12.5 | 1800-0630 | 5-18-78 | 12.5 | 1830-0700 | 5-18-78 | 12.5 | 1800-0630 |
| Jun I | 6-7-78 | 11.8 | 1900-0645 | 6-7-78 | 11.5 | 1845-0615 | 6-7-78 | 12.5 | 1930-0800 | 6-7-78 | 12.3 | 1845-0700 |
| | 6-8-78 | 14.8 | 1915-1000 | 6-8-78 | 14.3 | 1845-0900 | 6-8-78 | 13.0 | 1930-0830 | 6-8-78 | 13.0 | 1900-0800 |
| Jun II | 6-21-78 | 12.0 | 1900-0700 | 6-21-78 | 11.8 | 1845-0630 | 6-21-78 | 11.8 | 1930-0715 | 6-21-78 | 11.5 | 1900-0630 |
| | 6-22-78 | 12.3 | 1845-0700 | 6-22-78 | 12.0 | 1830-0630 | 6-22-78 | 12.3 | 1900-0715 | 6-22-78 | 12.3 | 1830-0645 |
| Jul I | 7-6-78 | 12.3 | 1900-0715 | 7-6-78 | 12.0 | 1830-0630 | 7-6-78 | 12.5 | 1900-0730 | 7-6-78 | 12.3 | 1815-0630 |
| | 7-7-78 | 12.0 | 1900-0700 | 7-7-78 | 11.5 | 1845-0615 | 7-7-78 | 12.5 | 1900-0730 | 7-7-78 | 12.8 | 1830-0715 |
| Jul II | 7-19-78 | 12.3 | 1900-0715 | 7-19-78 | 12.0 | 1830-0630 | 7-19-78 | 12.8 | 1915-0800 | 7-19-78 | 12.3 | 1845-0700 |
| | 7-20-78 | 12.3 | 1900-0715 | 7-20-78 | 12.0 | 1845-0645 | 7-20-78 | 11.3 | 1930-0645 | 7-20-78 | 11.5 | 1845-0615 |
| Aug I | 8-2-78 | 12.8 | 1845-0730 | 8-2-78 | 12.8 | 1815-0700 | 8-2-78 | 13.3 | 1900-0815 | 8-2-78 | 13.0 | 1830-0730 |
| | 8-3-78 | 12.3 | 1915-0730 | 8-3-78 | 13.0 | 1845-0745 | 8-3-78 | 12.0 | 1900-0700 | 8-3-78 | 12.0 | 1830-0630 |
| Aug II | 8-17-78 | 13.0 | 1900-0800 | 8-17-78 | 12.8 | 1830-0715 | 8-17-78 | 12.0 | 2000-0800 | 8-17-78 | 11.8 | 1900-0645 |
| | 8-19-78 | 11.3 | 1930-0645 | 8-19-78 | 11.3 | 1900-0615 | 8-19-78 | 11.0 | 1945-0645 | 8-19-78 | 10.3 | 1915-0630 |
| Sep I | 9-10-78 | 10.8 | 2145-0830 | 9-10-78 | 10.0 | 2315-0915 | 9-10-78 | 9.0 | 0030-0930 | 9-10-78 | 8.3 | 0015-0830 |
| | 9-11-78 | 12.8 | 1915-0800 | 9-11-78 | 12.8 | 1845-0730 | 9-11-78 | 12.8 | 1915-0800 | 9-11-78 | 12.8 | 1900-0745 |
| Sep II | 9-19-78 | 13.3 | 1900-0815 | 9-19-78 | 13.0 | 1845-0745 | 9-19-78 | 11.5 | 1915-0845 | 9-19-78 | 13.0 | 1900-0800 |
| | 9-20-78 | 12.0 | 1915-0715 | 9-20-78 | 12.0 | 1900-0700 | 9-20-78 | 11.8 | 1930-0715 | 9-20-78 | 12.0 | 1900-0700 |
| Oct I | 10-4-78 | 12.8 | 1945-0830 | 10-4-78 | 13.3 | 1900-0815 | 10-4-78 | 13.5 | 1930-0900 | 10-4-78 | 13.5 | 1900-0830 |
| | 10-5-78 | 13.0 | 1930-0830 | 10-5-78 | 13.0 | 1900-0800 | 10-5-78 | 13.0 | 1915-0815 | 10-5-78 | 13.0 | 1900-0800 |
| Oct II | 10-18-78 | 13.3 | 1945-0900 | 10-18-78 | 13.3 | 1915-0830 | 10-18-78 | 13.5 | 2015-0945 | 10-18-78 | 13.0 | 1945-0845 |
| | 10-19-78 | 11.5 | 2045-0815 | 10-19-78 | 11.8 | 2000-0745 | 10-19-78 | 11.0 | 2100-0800 | 10-19-78 | 11.0 | 2030-0730 |
| Nov I | 11-1-78 | 12.8 | 1815-0700 | 11-1-78 | 12.5 | 1730-0600 | 11-1-78 | 13.0 | 1800-0700 | 11-1-78 | 13.0 | 1715-0615 |
| | 11-2-78 | 12.0 | 1900-0700 | 11-2-78 | 13.0 | 1715-0615 | 11-2-78 | 13.3 | 1815-0730 | 11-2-78 | 12.8 | 1715-0600 |
| Nov II | 11-16-78 | 13.8 | 1830-0815 | 11-16-78 | 12.8 | 1800-0645 | 11-16-78 | 14.0 | 1830-0830 | 11-16-78 | 12.8 | 1800-0645 |
| | 11-17-78 | 12.3 | 1845-0700 | 11-17-78 | 12.8 | 1730-0615 | 11-17-78 | 12.8 | 1915-0800 | 11-17-78 | 12.0 | 1830-0630 |
| Dec I | 12-7-78 | 13.5 | 1830-0800 | 12-9-78 | 13.0 | 1815-0715 | 12-7-78 | 13.3 | 1900-0815 | 12-7-78 | 12.8 | 1815-0700 |
| | 12-8-78 | 13.0 | 1915-0815 | 12-7-78 | 15.0 | 1700-0800 | 12-8-78 | 13.8 | 1830-0815 | 12-8-78 | 14.8 | 1715-0800 |
| Dec II | No samples taken due to weather | | | | | | | | | | | |

[1]Pick-up date

[2]Dur. = duration in hours

[3]Set time and pick-up time

[4]I = first sampling period; II = second sampling period.

## Table F-11

### Spatial Distribution of Alewife Collected by Gill Net(1), Nine Mile Point Vicinity, 1978

| Month | 15-ft Contour | | | | 30-ft Contour | | | | 40-ft Contour | | | | 60-ft Contour | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE |
| April | 0 | 0 | 0.25 | 0 | 0 | 0 | 0 | 0 | 0.13 | 0 | 0 | 0.13 | 0.13 | 0 | 0 | 0.13 |
| May | 1.03 | 1.58 | 0.30 | 1.73 | 1.35 | 0.23 | 0.80 | 1.23 | 0.28 | 0 | 0.13 | 2.98 | 0.78 | 0.13 | 2.58 | 0.98 |
| June | 4.43 | 34.90 | 15.93 | 9.58 | 2.85 | 2.68 | 1.00 | 1.80 | 0.75 | 3.40 | 0.73 | 2.18 | 0.13 | 0.13 | 0.25 | 0.38 |
| July | 51.08 | 33.53 | 26.78 | 58.13 | 14.88 | 16.80 | 1.10 | 1.38 | 8.53 | 9.85 | 5.78 | 1.88 | 5.23 | 1.13 | 3.88 | 1.23 |
| August | 1.28 | 3.67 | 2.43 | 5.03 | 0.73 | 4.53 | 0.13 | 0.98 | 1.18 | 3.85 | 0.75 | 1.20 | 1.85 | 0.88 | 3.00 | 0.25 |
| September | 0 | 0 | 0.93 | 0.25 | 0 | 0.13 | 0 | 0.38 | 0 | 0 | 0 | 0.13 | 0 | 1.70 | 0 | 0 |
| October | 5.10 | 1.05 | 1.93 | 0 | 1.03 | 2.60 | 0.13 | 0.85 | 0.25 | 0.85 | 4.73 | 1.45 | 0.48 | 0.35 | 1.98 | 0.93 |
| November | 5.35 | 9.23 | 11.20 | 2.90 | 1.73 | 1.00 | 2.83 | 16.78 | 1.55 | 0 | 4.15 | 4.30 | 0.13 | 0 | 1.35 | 0.83 |
| December | 0 | 0 | 0.40 | 3.10 | 0 | 0 | 0 | 2.30 | 2.20 | 2.00 | 0.60 | 4.10 | 1.30 | 0.70 | 0.30 | 0.45 |
| Annual Mean | 8.15 | 9.88 | 7.05 | 9.31 | 2.66 | 3.29 | 0.70 | 2.89 | 1.62 | 2.23 | 1.97 | 1.94 | 1.10 | 0.55 | 1.55 | 0.58 |

(1) Mean Monthly Catch per 12-hr set.

Table F-12

Spatial Distribution of Rainbow Smelt Collected by Gill Net(1), Nine Mile Point Vicinity 1978

| | 15-ft Contour | | | | 30-ft Contour | | | | 40-ft Contour | | | | 60-ft Contour | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE |
| April | 0 | 6.30 | 9.10 | 3.18 | 0.75 | 0.78 | 5.25 | 1.43 | 0.38 | 2.10 | 11.40 | 1.68 | 2.23 | 0.50 | 4.70 | 1.38 |
| May | 1.01 | 3.65 | 1.78 | 14.58 | 1.10 | 1.00 | 4.83 | 7.65 | 5.30 | 0.40 | 2.80 | 3.78 | 1.95 | 0.93 | 5.13 | 1.90 |
| June | 0.15 | 0.35 | 0 | 0 | 2.78 | 1.53 | 0.38 | 0.85 | 2.88 | 0.75 | 5.18 | 6.18 | 0.50 | 1.35 | 1.45 | 0.98 |
| July | 0 | 0 | 0 | 0 | 0.13 | 0.38 | 0.13 | 0 | 0.15 | 0.58 | 0 | 0 | 0.13 | 0.50 | 0.40 | 0.25 |
| August | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.13 | 0 | 0 | 0.13 | 0.75 | 0.38 | 0.35 |
| September | 0.13 | 0.23 | 0.40 | 0.23 | 1.40 | 0.73 | 0.95 | 1.75 | 0.85 | 1.08 | 3.15 | 2.85 | 2.40 | 3.03 | 1.93 | 3.70 |
| October | 0.85 | 1.05 | 9.08 | 0 | 1.05 | 0.9 | 4.73 | 7.35 | 1.33 | 1.10 | 5.30 | 6.05 | 1.80 | 1.55 | 3.93 | 6.35 |
| November | 0 | 0.63 | 1.48 | 0.20 | 0.35 | 0.13 | 0.28 | 3.15 | 0.35 | 0.10 | 3.50 | 2.20 | 0.78 | 0.13 | 3.78 | 1.20 |
| December | 0 | 0.20 | 0.80 | 0 | 0 | 0 | 0 | 0.30 | 0 | 0 | 0 | 0.85 | 0 | 0.45 | 0.26 | 0.85 |
| Annual Mean | 0.26 | 1.45 | 2.62 | 2.14 | 0.89 | 0.64 | 1.95 | 2.63 | 1.32 | 0.73 | 3.74 | 2.77 | 1.17 | 1.12 | 2.57 | 1.95 |

(1) Mean Monthly Catch per 12-hr set.

Table F-13

Spatial Distribution of White Perch Collected by Gill Net(1), Nine Mile Point Vicinity, 1978

| Month | 15-ft Contour | | | | 30-ft Contour | | | | 40-ft Contour | | | | 60-ft Contour | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE |
| April | 1.00 | 2.08 | 1.83 | 1.30 | 0.25 | 0.28 | 0.38 | 0.75 | 0.13 | 0.13 | 0.25 | 0.38 | 0 | 0.13 | 0.13 | 0.25 |
| May | 3.38 | 25.80 | 9.22 | 15.90 | 0.25 | 1.65 | 1.05 | 1.45 | 0.25 | 1.45 | 0.58 | 0.45 | 0 | 0 | 0.73 | 0 |
| June | 1.65 | 11.10 | 1.78 | 4.20 | 3.10 | 0.73 | 0.35 | 0.85 | 0.48 | 0.45 | 0.20 | 0 | 0 | 0 | 0 | 0 |
| July | 3.15 | 6.13 | 3.35 | 12.80 | 2.00 | 2.10 | 1.45 | 2.28 | 0.25 | 0.63 | 0.43 | 0.15 | 0.13 | 0 | 0 | 0 |
| August | 4.73 | 7.63 | 3.30 | 8.73 | 1.20 | 1.65 | 1.68 | 2.65 | 0.80 | 1.05 | 0.25 | 1.03 | 0 | 0.40 | 0.13 | 0.15 |
| September | 0.90 | 0.25 | 2.70 | 2.43 | 0.28 | 0.28 | 0.45 | 0.55 | 0 | 0 | 0 | 0.15 | 0 | 0 | 0 | 0 |
| October | 1.23 | 4.78 | 1.23 | 4.13 | 1.23 | 1.23 | 1.18 | 0.85 | 0.13 | 0.73 | 1.13 | 0.85 | 0.58 | 0.13 | 0.70 | 0.78 |
| November | 0.60 | 1.13 | 0.68 | 0.38 | 0.25 | 0.25 | 0.38 | 0.25 | 0.31 | 0.99 | 0.10 | 0.52 | 0.60 | 0.63 | 0.34 | 0.35 |
| December | 0 | 0 | 0 | 0 | 0 | 0 | 0.22 | 0.24 | 0 | 0.21 | 0.40 | 0.41 | 0 | 0 | 0.45 | 0.30 |
| Annual Mean | 1.97 | 6.90 | 2.83 | 5.87 | 1.01 | 0.96 | 0.83 | 1.15 | 0.28 | 0.65 | 0.37 | 0.44 | 0.15 | 0.15 | 0.27 | 0.20 |

(1) Mean Monthly Catch per 12-hr set.

Table F-14

Spatial Distribution of Yellow Perch Collected by Gill Net[1], Nine Mile Point Vicinity, 1978

| Month | 15-ft Contour | | | | 30-ft Contour | | | | 40-ft Contour | | | | 60-ft Contour | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE |
| April | 0.25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.13 | 0 | 0 | 0 | 0 | 0 | 0 |
| May | 0.75 | 1.75 | 1.35 | 1.53 | 0 | 0.10 | 0 | 0.13 | 0 | 0.13 | 0.15 | 0.28 | 0 | 0 | 0 | 0 |
| June | 2.68 | 4.45 | 2.05 | 3.10 | 1.10 | 0.25 | 0.25 | 0.35 | 0.10 | 0.20 | 0.10 | 0 | 0.35 | 0.98 | 0.50 | 1.13 |
| July | 4.85 | 5.28 | 2.45 | 5.70 | 0.84 | 0.63 | 0.73 | 2.25 | 0.63 | 0 | 0.73 | 1.93 | 0.75 | 0.75 | 0.85 | 0.53 |
| August | 7.53 | 4.65 | 6.33 | 4.48 | 1.20 | 0.78 | 0.25 | 3.45 | 2.33 | 1.08 | 1.10 | 2.17 | 0 | 0.28 | 2.55 | 1.23 |
| September | 4.68 | 3.78 | 8.83 | 3.70 | 1.63 | 0.13 | 0.30 | 0.70 | 0.25 | 0.15 | 0 | 0.15 | 0.13 | 0 | 0.13 | 0 |
| October | 2.28 | 7.18 | 10.25 | 9.83 | 5.25 | 1.80 | 1.68 | 3.98 | 1.83 | 1.28 | 0.48 | 0.68 | 0.78 | 1.20 | 0.40 | 0.38 |
| November | 0.20 | 0.90 | 1.13 | 2.73 | 0.78 | 0.53 | 1.05 | 0.45 | 0.52 | 0.63 | 0.10 | 0.11 | 1.55 | 0.52 | 0.11 | 0 |
| December | 0 | 0 | 0.20 | 0 | 0 | 0 | 0.28 | 0 | 0.20 | 0 | 1.15 | 0.87 | 0.28 | 0.53 | 0.23 | 0.30 |
| Annual Mean | 2.77 | 3.29 | 3.82 | 3.66 | 1.27 | 0.50 | 0.52 | 1.33 | 0.68 | 0.42 | 0.38 | 0.68 | 0.44 | 0.47 | 0.55 | 0.40 |

(1) Mean Monthly Catch per 12-hr set.

## Table F-15

### Spatial Distribution of Smallmouth Bass Collected by Gill Net[1], Nine Mile Point Vicinity, 1978

| | 15-ft Contour | | | | 30-ft Contour | | | | 40-ft Contour | | | | 60-ft Contour | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE | NMPW | NMPP | FITZ | NMPE |
| April | | | | | | | | No Catch | | | | | | | | |
| May | | | | | | | | No Catch | | | | | | | | |
| June | 0.13 | 0.15 | 0 | 0.15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| July | 0 | 0.10 | 0 | 0.15 | 0 | 0 | 0 | 0.25 | 0 | 0 | 0.10 | 0 | 0 | 0 | 0.13 | 0 |
| August | 0.23 | 0.93 | 0.10 | 0.60 | 0 | 0.53 | 0.60 | 0.63 | 0.10 | 0.10 | 0.55 | 0.68 | 0 | 0 | 0.28 | 0.55 |
| September | 0.13 | 0.38 | 0.13 | 0.40 | 0.35 | 0 | 0.13 | 0.38 | 0.40 | 0.50 | 0.13 | 0.25 | 0.13 | 0 | 0 | 0 |
| October | 0 | 0 | 0 | 0 | 0.10 | 0 | 0.58 | 0 | 0.28 | 0.38 | 0 | 0 | 0.15 | 0 | 0 | 0 |
| November | 0 | 0 | 0 | 0 | 0.15 | 0 | 0 | 0 | 0 | 0 | 0 | 0.10 | 0 | 0 | 0 | 0 |
| December | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.30 | 0 | 0 | 0 |
| Annual Mean | 0.06 | 0.18 | 0.03 | 0.15 | 0.07 | 0.06 | 0.15 | 0.15 | 0.09 | 0.12 | 0.09 | 0.12 | 0.05 | 0 | 0.05 | 0.06 |

(1) Mean Monthly Catch per 12-hr set.

Table F-16

Abundance* of Total Catch (All Species Combined) in Bottom Trawl Collections, Nine Mile Point Vicinity, 1978

| Date | Time | 20-Ft Depth Contour | | | | 40-Ft Depth Contour | | | | 60-Ft Depth Contour | | | | Daily Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | |
| 6 Apr | Day | 0 | 0 | 1 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 Apr | Night | 5 | 9 | 8 | 7.3 | 0 | 3 | 0 | 1.0 | 6 | 3 | 2 | 3.7 | 2.1 |
| 25 Apr | Day | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.3 | 0 | 0 | 0 | 0 | |
| 25 Apr | Night | 1 | 0 | 0 | 0.3 | 0 | 3 | 0 | 1.0 | 0 | 0 | 0 | 0 | 0.3 |
| 4 May | Day | 0 | 37 | 7 | 14.7 | 0 | 455 | 0 | 151.7 | 0 | 256 | 0 | 85.3 | |
| 4-5 May | Night | 0 | 48 | 1 | 16.3 | 5 | 14 | 1 | 6.7 | 1 | 0 | 1 | 0.7 | 45.9 |
| 16 May | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15-16 May | Night | 1 | 1 | 1 | 1.0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.3 | 0.2 |
| 8 Jun | Day | 0 | 0 | 0** | 0 | 0 | 0 | 0** | 0 | 0 | 2** | 0** | 0.7 | |
| 8-9 Jun | Night | 7 | 0 | 0 | 2.3 | 22 | 5 | 0 | 9.0 | 6 | 164 | 0 | 56.7 | 11.4 |
| 22 Jun | Day | 5 | 10 | 4 | 6.3 | 0 | 1 | 0 | 0.3 | 0 | 20 | 0 | 6.7 | |
| 22 Jun | Night | 23 | 22 | 0 | 15.0 | 20 | 89 | 15 | 41.3 | 9 | 7 | 0 | 5.3 | 12.5 |
| 6 Jul | Day | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 0 | 0 | 0 | 0 | |
| 6 Jul | Night | 3 | 1 | 0 | 1.3 | 19 | 0 | 0 | 6.3 | 43 | 0 | 0 | 14.3 | 3.7 |
| 20 Jul | Day | 0 | 0 | 1 | 0.3 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 2.0 | |
| 20-21 Jul | Night | 0 | 0 | 0 | 0 | 2 | 2 | 6 | 3.3 | 80 | 293 | 0 | 124.3 | 21.7 |
| 3 Aug | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 Aug | Night | 7 | 7 | 0 | 4.7 | 20 | 112 | 3 | 45.0 | 103 | 41 | 1 | 48.3 | 16.3 |
| 22 Aug | Day | 260 | 292 | 0 | 184.0 | 0 | 0 | 0 | 0 | 0 | 0 | 58 | 19.3 | |
| 22 Aug | Night | 53 | 4 | 0 | 19.0 | 15 | 13 | 39 | 22.3 | 119 | 36 | 162 | 105.7 | 58.4 |

*Catch per 15-min effort (± 1 min).

**Reduced tow (10 min ± 1 min) due to weather; numbers adjusted to catch per 15-min effort.

Table F-16 (Page 2 of 2)

| Date | Time | 20-Ft Depth Contour | | | | 40-Ft Depth Contour | | | | 60-Ft Depth Contour | | | | Daily Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | |
| 13 Sep*** | Day | 4 | 0 | 0 | 1.3 | 88 | 0 | 0 | 29.3 | 11 | 0 | 0 | 3.7 | 17.4 |
| 15 Sep | Night | 2 | 5 | 163 | 56.7 | 1 | 2 | 9 | 4.0 | 6 | 22 | 0 | 9.3 | |
| 21 Sep | Day | 0 | 55 | 0 | 18.3 | 171 | 0 | 0 | 57.0 | 1 | 1004 | 6 | 337.0 | 76.0 |
| 20 Sep | Night | 6 | 0 | 0 | 2.0 | 10 | 4 | 0 | 4.7 | 107 | 4 | 0 | 37.0 | |
| 3 Oct | Day | 0 | 1 | 0 | 0.3 | 0 | 0 | 1 | 0.3 | 0 | 1 | 0 | 0.3 | 2.1 |
| 2 Oct | Night | 1 | 4 | 0 | 1.7 | 14 | 0 | 2 | 5.3 | 7 | 7 | 0 | 4.7 | |
| 17 Oct | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 |
| 16-17 Oct | Night | 0*** | 0 | 0 | 0 | 0*** | 0*** | 0 | 0 | 6*** | 0*** | 0 | 2.0 | |
| 31 Oct | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 |
| 30 Oct | Night | 0 | 0 | 0 | 0 | 8 | 1 | 0 | 3.0 | 3 | 0 | 0 | 1.0 | |
| 14 Nov | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| 13 Nov | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | |
| 6 Dec | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.2 |
| 6-7 Dec | Night | 0 | 3 | 2 | 1.7 | 0 | 0 | 2 | 0.7 | 0 | 0 | 32 | 10.7 | |
| Dec | Day | | NS** | | | | NS** | | | | NS** | | | 7.6**** |
| 16 Dec | Night | 2 | 4 | 0 | 2.0 | 3 | 0 | 8 | 3.7 | 12 | 22 | 17 | 17.0 | |

*Catch per 15-min effort (± 1 min).

**No samples collected due to weather.

***Reduced tow (8 min ± 1 min) due to weather; numbers adjusted to catch per 15-min effort.

****Mean of night samples only.

Table F-17

Abundance* of Alewife in Bottom Trawl Collections, Nine Mile Point Vicinity, 1978

| Date | Time | 20-Ft Depth Contour | | | | 40-Ft Depth Contour | | | | 60-Ft Depth Contour | | | | Daily Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | |
| 6 Apr | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 Apr | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25 Apr | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 25 Apr | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 May | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4-5 May | Night | 0 | 1 | 0 | 0.3 | 0 | 5 | 0 | 1.7 | 1 | 0 | 0 | 0.3 | 0.4 |
| 16 May | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15-16 May | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.3 | 0.1 |
| 8 Jun | Day | 0 | 0 | 0** | 0 | 0 | 0 | 0** | 0 | 0 | 0** | 0** | | |
| 8-9 Jun | Night | 2 | 0 | 0 | 0.7 | 19 | 3 | 0 | 7.3 | 5 | 5 | 0 | 3.3 | 1.9 |
| 22 Jun | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 1.7 | |
| 22 Jun | Night | 4 | 5 | 0 | 3.0 | 2 | 25 | 0 | 9.0 | 5 | 3 | 0 | 2.7 | 2.7 |
| 6 Jul | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 Jul | Night | 1 | 0 | 0 | 0.3 | 4 | 0 | 0 | 1.3 | 1 | 0 | 0 | 0.3 | 0.3 |
| 20 Jul | Day | 0 | 0 | 1 | 0.3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | |
| 20-21 Jul | Night | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1.3 | 0 | 0 | 0 | 0 | 0.3 |
| 3 Aug | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 Aug | Night | 6 | 7 | 0 | 4.3 | 20 | 64 | 3 | 29.0 | 1 | 26 | 0 | 9.0 | 7.1 |
| 22 Aug | Day | 260 | 292 | 0 | 184.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 22 Aug | Night | 52 | 4 | 0 | 18.7 | 8 | 2 | 34 | 14.7 | 11 | 4 | 24 | 13.0 | 38.4 |

*Catch per 15-min effort (± 1 min).

**Reduced tow (10 min ± 1 min) due to weather; numbers adjusted to catch per 15-min effort.

Table F-17 (Page 2 of 2)

| Date | Time | 20-Ft Depth Contour NMPW | NMPP/ FITZ | NMPE | Mean | 40-Ft Depth Contour NMPW | NMPP/ FITZ | NMPE | Mean | 60-Ft Depth Contour NMPW | NMPP/ FITZ | NMPE | Mean | Daily Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 Sep*** | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9.9 |
| 15 Sep | Night | 0 | 0 | 161 | 53.7 | 0 | 0 | 9 | 3.0 | 1 | 7 | 0 | 2.7 | |
| 21 Sep | Day | 0 | 45 | 0 | 15.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.6 |
| 20 Sep | Night | 1 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | |
| 3 Oct | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 |
| 2 Oct | Night | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 2.0 | 3 | 3 | 0 | 2.0 | |
| 17 Oct | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| 16-17 Oct | Night | 0*** | 0 | 0 | 0 | 0*** | 0*** | 0 | 0 | 2*** | 0*** | 0 | 0.7 | |
| 31 Oct | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 |
| 30 Oct | Night | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 2.7 | 3 | 0 | 0 | 1.0 | |
| 14 Nov | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| 13 Nov | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.3 | |
| 6 Dec | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| 6-7 Dec | Night | 0 | 0 | 1 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Dec | Day | | NS** | | | | NS | | | | NS | | | 0.0**** |
| 16 Dec | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |

*Catch per 15-min effort (± 1 min).

**No samples collected due to weather.

***Reduced tow (8 min ± 1 min) due to weather; numbers adjusted to catch per 15-min effort.

****Mean of night samples only.

Table F-18

Abundance* of Rainbow Smelt in Bottom Trawl Collections,
Nine Mile Point Vicinity, 1978

| Date | Time | 20-Ft Depth Contour | | | | 40-Ft Depth Contour | | | | 60-Ft Depth Contour | | | | Daily Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | |
| 6 Apr | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 Apr | Night | 2 | 4 | 0 | 2.0 | 0 | 2 | 0 | 0.7 | 5 | 0 | 1 | 2.0 | 0.8 |
| 25 Apr | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 25 Apr | Night | 1 | 0 | 0 | 0.3 | 0 | 3 | 0 | 1.0 | 0 | 0 | 0 | 0 | 0.2 |
| 4 May | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4-5 May | Night | 0 | 1 | 0 | 0.3 | 0 | 1 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0.1 |
| 16 May | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15-16 May | Night | 1 | 1 | 1 | 1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 |
| 8 Jun | Day | 0 | 0 | 0** | 0 | 0 | 0 | 0** | 0 | 0 | 2** | 0** | 0.7 | |
| 8-9 Jun | Night | 3 | 0 | 0 | 1.0 | 3 | 0 | 0 | 1.0 | 0 | 8 | 0 | 2.7 | 0.9 |
| 22 Jun | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 3.0 | |
| 22 Jun | Night | 8 | 6 | 0 | 4.7 | 16 | 19 | 14 | 16.3 | 3 | 3 | 0 | 2.0 | 4.3 |
| 6 Jul | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 Jul | Night | 2 | 0 | 0 | 0.7 | 15 | 0 | 0 | 5.0 | 1 | 0 | 0 | 0.3 | 1.0 |
| 20 Jul | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 1.3 | |
| 20-21 Jul | Night | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 1.7 | 80 | 102 | 0 | 60.7 | 10.6 |
| 3 Aug | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 Aug | Night | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 2.0 | 99 | 15 | 1 | 38.3 | 6.7 |
| 22 Aug | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 58 | 19.3 | |
| 22 Aug | Night | 0 | 0 | 0 | 0 | 6 | 11 | 5 | 7.3 | 108 | 30 | 138 | 92.0 | 19.8 |

*Catch per 15-min effort (± 1 min).

**Reduced tow (10 min ± 1 min) due to weather; numbers adjusted to catch per 15-min effort.

Table F-18 (Page 2 of 2)

| Date | Time | 20-Ft Depth Contour NMPW | NMPP/ FITZ | NMPE | Mean | 40-Ft Depth Contour NMPW | NMPP/ FITZ | NMPE | Mean | 60-Ft Depth Contour NMPW | NMPP/ FITZ | NMPE | Mean | Daily Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 Sep*** | Day | 4 | 0 | 0 | 1.3 | 86 | 0 | 0 | 28.7 | 11 | 0 | 0 | 3.7 | 7.3 |
| 15 Sep | Night | 1 | 5 | 2 | 2.7 | 1 | 2 | 0 | 1.0 | 5 | 15 | 0 | 6.7 | |
| 21 Sep | Day | 0 | 10 | 0 | 3.3 | 171 | 0 | 0 | 57.0 | 1 | 968 | 6 | 325.0 | 68.3 |
| 20 Sep | Night | 5 | 0 | 0 | 1.7 | 10 | 4 | 0 | 4.7 | 50 | 4 | 0 | 18.0 | |
| 3 Oct | Day | 0 | 1 | 0 | 0.3 | 0 | 0 | 1 | 0.3 | 0 | 1 | 0 | 0.3 | 1.4 |
| 2 Oct | Night | 1 | 4 | 0 | 1.7 | 8 | 0 | 2 | 3.3 | 4 | 4 | 0 | 2.7 | |
| 17 Oct | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 |
| 16-17 Oct | Night | 0*** | 0 | 0 | 0 | 0*** | 0*** | 0 | 0 | 4*** | 0*** | 0 | 1.3 | |
| 31 Oct | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| 30 Oct | Night | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.3 | 0 | 0 | 0 | 0 | |
| 14 Nov | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 Nov | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 6 Dec | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 |
| 6-7 Dec | Night | 0 | 2 | 0 | 0.6 | 0 | 0 | 2 | 0.6 | 0 | 0 | 32 | 10.7 | |
| Dec | Day | | NS** | | | | NS** | | | | NS** | | | 7.2**** |
| 16 Dec | Night | 2 | 4 | 0 | 2.0 | 3 | 0 | 8 | 3.7 | 11 | 21 | 16 | 16.0 | |

*Catch per 15-min effort (± 1 min).

**No samples collected due to weather.

***Reduced tow (8 min ± 1 min) due to weather; numbers adjusted to catch per 15-min effort.

****Mean of night samples only.

Table F-19

Abundance* of Threespine Stickleback in Bottom Trawl Collections, Nine Mile Point Vicinity, 1978

(No threespine stickleback were collected in bottom trawl after August)

| Date | Time | 20-Ft Depth Contour | | | | 40-Ft Depth Contour | | | | 60-Ft Depth Contour | | | | Daily Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | NMPW | NMPP/ FITZ | NMPE | Mean | |
| 6 Apr | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 4 Apr | Night | 3 | 5 | 8 | 5.3 | 0 | 1 | 0 | 0.3 | 1 | 3 | 1 | 1.7 | 1.2 |
| 25 Apr | Day | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.3 | 0 | 0 | 0 | 0 | |
| 25 Apr | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| 4 May | Day | 0 | 37 | 6 | 14.3 | 0 | 455 | 0 | 151.7 | 0 | 256 | 0 | 85.3 | |
| 4-5 May | Night | 0 | 44 | 1 | 15.0 | 5 | 8 | 1 | 4.7 | 0 | 0 | 1 | 0.3 | 45.2 |
| 16 May | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 15-16 May | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 Jun | Day | 0 | 0 | 0** | 0 | 0 | 0 | 0** | 0 | 0 | 0** | 0** | 0 | |
| 8-9 Jun | Night | 2 | 0 | 0 | 0.7 | 0 | 2 | 0 | 0.7 | 1 | 0 | 0 | 0.3 | 0.3 |
| 22 Jun | Day | 5 | 10 | 4 | 6.3 | 0 | 1 | 0 | 0.3 | 0 | 2 | 0 | 0.7 | |
| 22 Jun | Night | 11 | 11 | 0 | 7.3 | 2 | 0 | 1 | 1.0 | 1 | 1 | 0 | 0.7 | 2.7 |
| 6 Jul | Day | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.3 | 0 | 0 | 0 | 0 | |
| 6 Jul | Night | 0 | 1 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| 20 Jul | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 20-21 Jul | Night | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0.1 |
| 3 Aug | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 3 Aug | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 Aug | Day | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 22 Aug | Night | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Catch per 15-min effort (± 1 min).

**Reduced tow (10 min ± 1 min) due to weather; numbers adjusted to catch per 15-min effort.

Table F-20

Abundance* of Total Catch (All Species Combined) in Seine Collections, Nine Mile Point Vicinity, 1978

| Date | Stations | | | | Daily Mean |
|---|---|---|---|---|---|
| | NMPW | NMPP | FITZ | NMPE | |
| 10 Apr | 1 | 2 | 7 | 0 | 2.5 |
| 26 Apr | 0 | 0 | 0 | 0 | 0 |
| 11 May | 3 | 15 | 4 | 27 | 12.3 |
| 24 May | 0 | 0 | 0 | 1 | 0.3 |
| 16 Jun | 3 | 3 | 0 | 34 | 10.0 |
| 27 Jun | 1 | 1 | 4 | 16 | 5.5 |
| 13 Jul | 2 | 2 | 0 | 2 | 1.5 |
| 25 Jul | 0 | 0 | 2 | 1 | 0.8 |
| 8 Aug | 583 | 18 | 136 | 1655 | 598.0 |
| 22 Aug | 0 | 3 | 2 | 1 | 1.5 |
| 14 Sep | 34 | 19606 | 712 | 39 | 5097.8 |
| 26 Sep | 0 | 1 | 2 | 0 | 0.8 |
| 9 Oct | 3 | 2 | 0 | 2 | 1.8 |
| 25 Oct | 1 | 4 | 2 | 0 | 1.8 |
| 6 Nov | 0 | 1 | 0 | 0 | 0.3 |
| 21 Nov | 0 | 0 | 0 | 1 | 0.3 |
| 8 Dec | 0 | 0 | 0 | 0 | 0 |
| Dec | NS** | | | | |

*Number of fish per haul.

**No samples collected due to weather.

Table F-21

Abundance* of Alewife in Seine Collections, Nine Mile Point Vicinity, 1-78

| Date | Stations | | | | Daily Mean |
|---|---|---|---|---|---|
| | NMPW | NMPP | FITZ | NMPE | |
| 10 Apr | 0 | 0 | 0 | 0 | 0 |
| 26 Apr | 0 | 0 | 0 | 0 | 0 |
| 11 May | 0 | 0 | 0 | 0 | 0 |
| 24 May | 0 | 0 | 0 | 0 | 0 |
| 16 Jun | 0 | 0 | 0 | 0 | 0 |
| 27 Jun | 0 | 0 | 0 | 0 | 0 |
| 13 Jul | 0 | 0 | 0 | 0 | 0 |
| 25 Jul | 0 | 0 | 0 | 0 | 0 |
| 8 Aug | 549 | 11 | 115 | 1619 | 573.5 |
| 22 Aug | 0 | 0 | 0 | 0 | 0 |
| 14 Sep | 0 | 19575 | 707 | 0 | 5070.5 |
| 26 Sep | 0 | 0 | 0 | 0 | 0 |
| 9 Oct | 0 | 1 | 0 | 1 | 0.5 |
| 25 Oct | 0 | 0 | 0 | 0 | 0 |
| 6 Nov | 0 | 0 | 0 | 0 | 0 |
| 21 Nov | 0 | 0 | 0 | 0 | 0 |
| 8 Dec | 0 | 0 | 0 | 0 | 0 |
| Dec | NS** | | | | |

*Number of fish per haul.

**No samples collected due to weather.

Table F-22

Abundance* of Spottail Shiner in Seine Collections, Nine Mile Point Vicinity, 1978

| Date | Stations | | | | Daily Mean |
|---|---|---|---|---|---|
| | NMPW | NMPP | FITZ | NMPE | |
| 10 Apr | 0 | 0 | 0 | 0 | 0 |
| 26 Apr | 0 | 0 | 0 | 0 | 0 |
| 11 May | 0 | 1 | 0 | 0 | 0.3 |
| 24 May | 0 | 0 | 0 | 0 | 0 |
| 16 Jun | 0 | 2 | 0 | 0 | 0.5 |
| 27 Jun | 0 | 1 | 0 | 0 | 0.3 |
| 13 Jul | 0 | 0 | 0 | 0 | 0 |
| 25 Jul | 0 | 0 | 0 | 0 | 0 |
| 8 Aug | 31 | 0 | 21 | 23 | 18.8 |
| 22 Aug | 0 | 0 | 0 | 1 | 0.3 |
| 14 Sep | 33 | 30 | 5 | 39 | 26.8 |
| 26 Sep | 0 | 0 | 1 | 0 | 0.3 |
| 9 Oct | 0 | 0 | 0 | 1 | 0.3 |
| 25 Oct | 0 | 2 | 1 | 0 | 0.8 |
| 6 Nov | 0 | 0 | 0 | 0 | 0 |
| 21 Nov | 0 | 0 | 0 | 0 | 0 |
| 8 Dec | 0 | 0 | 0 | 0 | 0 |
| Dec | NS** | | | | |

*Number of fish per haul.

**No samples collected due to weather.

Table F-23

Abundance* of Yellow Perch in Seine Collections,
Nine Mile Point Vicinity, 1978

| Date | Stations | | | | Daily Mean |
|---|---|---|---|---|---|
| | NMPW | NMPP | FITZ | NMPE | |
| 10 Apr | 0 | 0 | 0 | 0 | 0 |
| 26 Apr | 0 | 0 | 0 | 0 | 0 |
| 11 May | 0 | 0 | 0 | 0 | 0 |
| 24 May | 0 | 0 | 0 | 0 | 0 |
| 16 Jun | 2 | 1 | 0 | 0 | 0.8 |
| 27 Jun | 0 | 0 | 1 | 2 | 0.8 |
| 13 Jul | 0 | 2 | 0 | 0 | 0.5 |
| 25 Jul | 0 | 0 | 1 | 0 | 0.3 |
| 8 Aug | 0 | 1 | 0 | 10 | 2.8 |
| 22 Aug | 0 | 0 | 0 | 0 | 0 |
| 14 Sep | 0 | 0 | 0 | 0 | 0 |
| 26 Sep | 0 | 0 | 1 | 0 | 0.3 |
| 9 Oct | 0 | 0 | 0 | 0 | 0 |
| 25 Oct | 0 | 0 | 0 | 0 | 0 |
| 6 Nov | 0 | 0 | 0 | 0 | 0 |
| 21 Nov | 0 | 0 | 0 | 0 | 0 |
| 8 Dec | 0 | 0 | 0 | 0 | 0 |
| Dec | NS** | | | | |

*Number of fish per haul.

**No samples collected due to weather.

Table F-24

Abundance* of Total Catch (All Species Combined) in Trap Net Collections, Nine Mile Point Vicinity, 1978

| Date | Stations | | | | Daily Mean |
|---|---|---|---|---|---|
| | NMPW | NMPP | FITZ | NMPE | |
| 13 Apr | 0 | 0 | 0 | 0 | 0 |
| 26 Apr | 1 | 0 | 1 | 0 | 0.5 |
| 10 May | 0 | 0 | 1 | 0 | 0.3 |
| 24 May | 1 | 2 | 0 | 0 | 0.8 |
| 16 Jun | 0 | 3 | 0 | 1 | 1.0 |
| 28 Jun | 1 | 3 | 15 | 7 | 6.5 |
| 13 Jul | 1 | 7 | 0 | 1 | 2.3 |
| 26 Jul | 0 | 5 | 0 | 11 | 4.0 |
| 9 Aug | 3 | 0 | 0 | 0 | 0.8 |
| 23 Aug | 3 | 6 | 4 | 1 | 3.5 |
| 15 Sep | 0 | 1 | 0 | 0 | 0.3 |
| 27 Sep | 4 | 9 | 14 | 5 | 8.0 |
| 10 Oct | 1 | 0 | 2 | 0 | 0.8 |
| 26 Oct | 1 | 1 | 1 | 3 | 1.5 |
| 7 Nov | 1 | 0 | 1 | 0 | 0.5 |
| 22 Nov | 0 | 0 | 0 | 0 | 0 |
| 8 Dec | 0 | 0 | 7 | 0 | 1.8 |
| Dec | NS** | | | | |

*Number of fish per overnight set.

**No samples collected due to weather.

Table F-25

Length Frequency of Alewife Collected by Gill Net, Nine Mile Point Vicinity, 1978

| Length Range (mm) | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|
| 51- 60 | | | | | | | 2 | | |
| 61- 70 | | | 2 | | | | 1 | | |
| 71- 80 | | | | | | | 1 | | |
| 81- 90 | | | | | | | | | |
| 91- 100 | | 1 | 4 | 12 | | | 2 | 1 | |
| 101- 110 | | 4 | 31 | 44 | 9 | | 1 | 1 | |
| 111- 120 | | | 18 | 15 | 9 | | | | |
| 121- 130 | | | 1 | | 8 | | | 1 | |
| 131- 140 | | | | 1 | 2 | 2 | 10 | 10 | 1 |
| 141- 150 | | 4 | | 19 | 3 | 2 | 48 | 84 | 15 |
| 151- 160 | 1 | 31 | 60 | 208 | 22 | | 41 | 152 | 24 |
| 161- 170 | 1 | 43 | 161 | 544 | 53 | 8 | 36 | 104 | 16 |
| 171- 180 | 1 | 24 | 135 | 284 | 41 | 6 | 38 | 90 | 14 |
| 181- 190 | | 15 | 29 | 76 | 12 | 6 | 24 | 61 | 12 |
| 191- 200 | 4 | 12 | 15 | 38 | 6 | 1 | 17 | 48 | 13 |
| 201- 210 | | 3 | 4 | 11 | | | 1 | 15 | 1 |
| 211- 220 | | | | 2 | | | | 3 | |

Table F-26

Length Frequency of Rainbow Smelt Collected by Gill Net, Nine Mile Point Vicinity, 1978

| Length Range (mm) | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|
| 111- 120 | | | | | 1 | | | | |
| 121- 130 | 3 | 4 | | | | | | | |
| 131- 140 | 35 | 58 | 20 | | | 4 | 2 | | |
| 141- 150 | 109 | 145 | 62 | 3 | 2 | 35 | 9 | 4 | |
| 151- 160 | 94 | 108 | 36 | 7 | 1 | 72 | 81 | 14 | 2 |
| 161- 170 | 35 | 27 | 11 | | | 52 | 149 | 52 | 2 |
| 171- 180 | 14 | 12 | 7 | | 1 | 14 | 112 | 38 | 4 |
| 181- 190 | 20 | 29 | 2 | 1 | | 3 | 40 | 25 | 1 |
| 191- 200 | 26 | 20 | | | | 5 | 15 | 14 | |
| 201- 210 | 23 | 22 | | | | 3 | 6 | 9 | 2 |
| 211- 220 | 19 | 8 | 2 | | | 8 | 5 | 3 | 2 |
| 221- 230 | 4 | 9 | 1 | | | 2 | 4 | 4 | 1 |
| 231- 240 | 1 | | | | | 1 | 1 | 2 | 1 |
| 241- 250 | 1 | 1 | | 1 | | | | | |
| 251- 260 | | 1 | | | | | | | |

Table F-27

Length Frequency of White Perch Collected by Gill Net, Nine Mile Point Vicinity, 1978

| Length Range (mm) | APR | | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|
| 71- 80 | | | | | | | 1 | 5 | | |
| 81- 90 | | | | | | | 5 | 43 | 8 | 2 |
| 91- 100 | | | 1 | | 1 | | 2 | 23 | 11 | 7 |
| 101- 110 | 1 | 1 | | | 1 | | | 13 | 4 | |
| 111- 120 | 1 | 1 | 2 | | | | | 12 | 4 | |
| 121- 130 | | | | 1 | 1 | 4 | | | 2 | |
| 131- 140 | | | | | 1 | 3 | | | 1 | |
| 141- 150 | | | | | 1 | 7 | | 3 | 2 | |
| 151- 160 | | | | | | 2 | 2 | 8 | 1 | |
| 161- 170 | | | 1 | | | | 1 | 15 | 8 | 3 |
| 171- 180 | | | | 1 | 3 | 3 | 1 | 12 | 4 | |
| 181- 190 | | | 6 | 3 | 11 | 8 | 1 | 4 | 2 | |
| 191- 200 | | | 7 | 4 | 10 | 22 | | 1 | | |
| 201- 210 | 3 | | 28 | 21 | 35 | 47 | 5 | 1 | 2 | |
| 211- 220 | 12 | | 69 | 30 | 42 | 77 | 10 | 10 | 5 | |
| 221- 230 | 8 | | 82 | 40 | 60 | 68 | 11 | 10 | 9 | |
| 231- 240 | 6 | | 63 | 43 | 74 | 31 | 10 | 9 | 5 | |
| 241- 250 | 9 | | 42 | 30 | 48 | 17 | 2 | 9 | 2 | |
| 251- 260 | 10 | | 35 | 13 | 14 | 15 | 4 | 2 | 2 | |
| 261- 270 | 8 | | 16 | 9 | 7 | 2 | 2 | 2 | 1 | |
| 271- 280 | 12 | | 25 | 4 | 16 | 2 | 1 | | 1 | |
| 281- 290 | 2 | | 15 | 5 | 10 | 2 | 1 | 1 | 1 | |
| 291- 300 | 1 | | 10 | 3 | 6 | 1 | | | | |
| 301- 310 | | | 12 | 4 | 3 | 1 | | | | |
| 311- 320 | 3 | | 7 | 2 | 1 | | | 1 | | |
| 321- 330 | 1 | | 2 | 1 | 1 | | | | | |
| 331- 340 | 1 | | 1 | 1 | 2 | | | | 1 | |
| 341- 350 | 1 | | | | 1 | | | | | |
| 351- 360 | | | | | | | | | 1 | |
| 361- 370 | | | | | | | | | | |
| 371- 380 | | | | | | | | | | |
| 381- 390 | | | 1 | | | | | | | |

Table F-28

Length Frequency of Yellow Perch Collected by Gill Net, Nine Mile Point Vicinity, 1978

| Length Range (mm) | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|
| 81- 90 | | | | 8 | 1 | | | 1 | |
| 91- 100 | | | 7 | 49 | 14 | 1 | 1 | | |
| 101- 110 | | | 8 | 42 | 54 | 1 | 1 | | 1 |
| 111- 120 | | | 1 | 4 | 39 | 3 | 4 | 1 | |
| 121- 130 | | | | 2 | 16 | 5 | 5 | 1 | |
| 131- 140 | | 1 | 4 | | 56 | 46 | 50 | 11 | 6 |
| 141- 150 | | 1 | 4 | 4 | 31 | 44 | 101 | 26 | 6 |
| 151- 160 | | | 6 | 3 | 16 | 29 | 85 | 30 | 2 |
| 161- 170 | | 1 | 4 | 4 | 9 | 15 | 35 | 8 | 1 |
| 171- 180 | | | 6 | 27 | 7 | 16 | 35 | 5 | 1 |
| 181- 190 | 1 | 10 | 26 | 20 | 4 | 17 | 36 | 5 | |
| 191- 200 | | 13 | 19 | 33 | 14 | 10 | 21 | 2 | |
| 201- 210 | | 7 | 18 | 26 | 11 | 7 | 7 | 3 | |
| 211- 220 | | 1 | 8 | 6 | 17 | 4 | 6 | 6 | |
| 221- 230 | | 2 | 8 | 6 | 10 | 3 | 4 | 3 | |
| 231- 240 | | | 5 | 2 | 8 | 4 | 8 | 1 | |
| 241- 250 | | 2 | 4 | 3 | 5 | 9 | 5 | | |
| 251- 260 | 1 | 8 | 5 | 8 | 8 | 11 | 14 | 3 | |
| 261- 270 | 1 | 4 | 7 | 13 | 5 | 4 | 12 | 5 | |
| 271- 280 | | | 3 | 6 | 7 | 2 | 6 | 4 | |
| 281- 290 | | 1 | 2 | 4 | 4 | 1 | 3 | 1 | |
| 291- 300 | | | 1 | | | | 1 | | |
| 301- 310 | | | 1 | | | | 1 | | |
| 311- 320 | | | 1 | | | | | | |
| 321- 330 | | | | 1 | | | | | |

Table F-29

Length Frequency of Smallmouth Bass Collected by Gill Net, Nine Mile Point Vicinity, 1978

| Length Range (mm) | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|
| 81- 90 | | | | | | 2 | | | |
| 91- 100 | | | | | 1 | | | | |
| 101- 110 | | | | | | | | | |
| 111- 120 | | | | | | | | | |
| 121- 130 | | | | | | | | | |
| 131- 140 | | | | | | | | | |
| 141- 150 | | | | | | | | | |
| 151- 160 | | | | | | | | | |
| 161- 170 | | | 1 | | | | | | |
| 171- 180 | | | 1 | | | | | | |
| 181- 190 | | | | | | | | | |
| 191- 200 | | | | | | | | | |
| 201- 210 | | | | | | | | | |
| 211- 220 | | | | | | | | | |
| 221- 230 | | | | 1 | | | | | |
| 231- 240 | | | | | | | | | |
| 241- 250 | | | | 4 | 1 | | | | |
| 251- 260 | | | | 4 | 2 | | | | |
| 261- 270 | | | 4 | 4 | 5 | 1 | | | |
| 271- 280 | | 1 | | 3 | 1 | 1 | | | |
| 281- 290 | | | | 4 | 1 | | | | |
| 291- 300 | | | | 1 | 2 | | | | |
| 301- 310 | | | | 2 | 2 | | | | |
| 311- 320 | | | | 2 | 1 | 1 | | | |
| 321- 330 | | 1 | | 6 | 3 | 4 | 1 | | |
| 331- 340 | | | | 7 | 3 | 1 | | | |
| 341- 350 | | | | 4 | 1 | 1 | | | |
| 351- 360 | | | | 2 | 3 | | | 1 | |
| 361- 370 | | | | 2 | 1 | | | | |
| 371- 380 | | | 1 | 5 | 1 | | | | |
| 381- 390 | 1 | 1 | | 6 | 3 | 2 | | | |
| 391- 400 | 1 | | 1 | 2 | | | | | |
| 401- 410 | | | | 1 | 1 | | | | |
| 411- 420 | 1 | | | 1 | 1 | 1 | 1 | | |
| 421- 430 | | | | 2 | | | | | |

Table F-30

Length Frequency of Alewife Collected by Trawling in Vicinity of Nine Mile Point, 1978

| Length Range (mm) | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|
| 11-20 | | | | | 2 | | | | |
| 21-30 | | | | | 144 | | | | |
| 31-40 | | | | | 104 | 3 | | | |
| 41-50 | | | | | 39 | 62 | | | |
| 51-60 | | | | | 20 | 36 | 2 | 1 | |
| 61-70 | | | 3 | | 8 | 4 | 3 | | |
| 71-80 | | | 21 | | | 1 | 1 | 1 | |
| 81-90 | | | 41 | 6 | | | | | |
| 91-100 | | | 11 | 1 | 2 | | 1 | | |
| 101-110 | | | 2 | | 2 | | | | |
| 111-120 | | | | | 4 | | | | |
| 121-130 | | | | | | | | | |
| 131-140 | | | | | | | 1 | | |
| 141-150 | | | | | | 1 | | | |
| 151-160 | | | | | 1 | | | | |
| 161-170 | | 5 | | 1 | 3 | | | | |
| 171-180 | | 2 | | 2 | 2 | | 3 | 6 | |
| 181-190 | | 1 | 1 | 2 | 6 | | 1 | | |
| 191-200 | | | | 1 | 1 | | | 4 | 1 |

Table F-31

Length Frequency of Rainbow Smelt Collected by Trawling in Vicinity of Nine Mile Point, 1978

| Length Range (mm) | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|
| 11-20 | | | | | | | | | |
| 21-30 | | | | | 2 | | | | |
| 31-40 | | | | | 51 | 1 | | | |
| 41-50 | | | 2 | | 112 | 77 | 1 | | 3 |
| 51-60 | 2 | | 9 | 1 | 17 | 125 | 8 | | 43 |
| 61-70 | | | 16 | 2 | 3 | 49 | 16 | 1 | 41 |
| 71-80 | 1 | 1 | 30 | 9 | 9 | 4 | 1 | | 5 |
| 81-90 | | 2 | 16 | 18 | 12 | | | | 3 |
| 91-100 | | | 11 | 32 | 17 | | 1 | | |
| 101-110 | | | 1 | 23 | 5 | | | | 1 |
| 111-120 | | | 1 | 12 | 4 | | 1 | | |
| 121-130 | 1 | | 2 | 4 | 2 | | | | 2 |
| 131-140 | | 2 | 1 | 1 | 1 | | | | 1 |
| 141-150 | 1 | | | 1 | 2 | 1 | 1 | | |
| 151-160 | 3 | | 1 | 2 | 1 | 1 | | | 1 |
| 161-170 | 8 | | 1 | | | | 1 | | 1 |
| 171-180 | 2 | | | | | | | | |
| 181-190 | | | | | | 1 | | | |
| 191-200 | 1 | | | | | | | | |

Table F-32

Length Frequency of Threespine Stickleback Collected by Trawling in Vicinity of Nine Mile Point, 1978

| Length Range (mm) | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|
| 21-30 | | | | 1 | | | | | |
| 31-40 | | | | | | | | | |
| 41-50 | 4 | 14 | 2 | | | | | | |
| 51-60 | 11 | 117 | 35 | 1 | | | | | |
| 61-70 | 6 | 49 | 16 | 1 | | | | | |
| 71-80 | | 10 | | | | | | | |

Table F-33

Length Frequency of Alewife Collected by Seining in Vicinity of Nine Mile Point, 1978

| Length Range (mm) | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|
| 21-30 | | | | | 77 | | | | |
| 31-40 | | | | | 60 | 3 | 1 | | |
| 41-50 | | | | | 1 | 33 | | | |
| 51-60 | | | | | | 49 | | | |
| 61-70 | | | | | | 2 | | | |
| 71-80 | | | | | | | | | |
| 81-90 | | | | | | | | | |
| 91-100 | | | | | | | | | |
| 101-110 | | | | | | | | | |
| 111-120 | | | | | | | | | |
| 121-130 | | | | | | | | | |
| 131-140 | | | | | | | | | |
| 141-150 | | | | | | | 1 | | |

Table F-34

Length Frequency of Spottail Shiner Collected by Seining in Vicinity of Nine Mile Point, 1978

| Length Range (mm) | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|
| 11-20 | | | | | 21 | | | | |
| 21-30 | | | | | 18 | | | | |
| 31-40 | | | | | 11 | 1 | | | |
| 41-50 | | | | | | 29 | 1 | | |
| 51-60 | | | 1 | | | 55 | 2 | | |
| 61-70 | | | 1 | | 15 | 3 | | | |
| 71-80 | | | | | 9 | 5 | | | |
| 81-90 | | | | | 2 | 11 | | | |
| 91-100 | | | | | | 4 | 1 | | |
| 101-110 | | | | | | | | | |
| 111-120 | | 1 | | | | | | | |
| 121-130 | | | 1 | | | | | | |

Table F-35

Coefficients of Maturity* for White Perch Collected by Gill Net at Control (NMPW AND NMPE) and Experimental (NMPP and FITZ) Transects, Nine Mile Point Vicinity, 1978

| Month | Males | | Females | |
|---|---|---|---|---|
| | Control Transects | Experimental Transects | Control Transects | Experimental Transects |
| April | 4.81 ± 0.99 | 4.96 ± 1.13 | 6.68 ± 2.35 | 7.47 ± 2.79 |
| May | 5.98 ± 1.49 | 5.95 ± 1.31 | 8.35 ± 3.13 | 8.89 ± 2.75 |
| June | 4.38 ± 1.39 | 5.30 ± 2.02 | 7.26 ± 3.60 | 6.69 ± 2.26 |
| July | 3.15 ± 1.01 | 3.06 ± 1.16 | 3.29 ± 1.92 | 2.94 ± 1.76 |
| August | 0.50 ± 0.40 | 0.35 ± 0.38 | 1.19 ± 0.73 | 0.86 ± 0.28 |
| September | 0.79 ± 0.39 | 0.69 ± 0.55 | 0.86 ± 0.40 | 0.97 ± 0.20 |
| October | 2.58 ± 1.46 | 1.56 ± 1.49 | 1.25 ± 0.74 | 0.68 ± 0.55 |
| November | 3.93 ± 1.14 | 3.47 ± 1.07 | 2.18 ± 1.50 | 2.20 ± 1.64 |
| December | 1.40** | NS | NS | NS |

*Mean monthly coefficient of maturity ±standard deviation.
**Based on one specimen.
NS = No specimens were processed for coefficients of maturity.

## Table F-36

Coefficients of Maturity* for Yellow Perch Collected by Gill Net at Control (NMPW and NMPE) and Experimental (NMPP and FITZ) Transects, Nine Mile Point Vicinity, 1978

| Month | Males | | Females | |
|---|---|---|---|---|
| | Control Transects | Experimental Transects | Control Transects | Experimental Transects |
| April | NS | 6.06** | 23.45 ± 4.26*** | NS |
| May | 1.38 ± 0.98 | 1.19 ± 0.57 | 2.44 ± 0.09 | 4.84 ± 6.13 |
| June | 0.68 ± 0.36 | 0.64 ± 0.50 | 0.87 ± 0.36 | 0.85 ± 0.25 |
| July | 0.43 ± 0.34 | 0.33 ± 0.39 | 0.76 ± 0.19 | 0.91 ± 1.15 |
| August | 0.47 ± 0.28 | 0.38 ± 0.21 | 0.55 ± 0.23 | 0.50 ± 0.26 |
| September | 1.41 ± 1.78 | 1.19 ± 1.23 | 1.10 ± 0.69 | 0.76 ± 0.56 |
| October | 7.12 ± 2.04 | 6.93 ± 2.53 | 2.20 ± 1.70 | 1.95 ± 1.62 |
| November | 5.14 ± 1.38 | 6.09 ± 1.44 | 2.65 ± 3.25 | 5.26 ± 2.87 |
| December | 7.01 ± 0.02*** | 2.83** | 0.59 ± 0.07 | 5.92 ± 3.46 |

*Mean monthly coefficient of maturity ± standard deduction.
**Based on one specimen.
***Based on two specimens.
NS = No specimens were processed for coefficients of maturity.

## Table F-37

Coefficients of Maturity* for Smallmouth Bass Collected by Gill Net at Control (NMPW and NMPE) and Experimental (NMPP and FITZ) Transects, Nine Mile Point Vicinity, 1978

| Month | Males | | Females | |
|---|---|---|---|---|
| | Control Transects | Experimental Transects | Control Transects | Experimental Transects |
| April | NS | NS | NS | NS |
| May | 0.58 ± 0.05** | NS | NS | NS |
| June | NS | NS | 4.93 ± 5.02** | NS |
| July | 0.41*** | NS | 3.67 ± 2.66 | NS |
| August | 0.25 ± 0.09 | 0.19 ± 0.11 | 1.38 ± 2.10 | 1.17 ± 0.88 |
| September | 0.57 ± 0.36 | 0.63 ± 0.28 | 1.07 ± 0.58 | 0.87 ± 0.29 |
| October | 0.46*** | 0.49 ± 0.37 | 2.33*** | 1.36 ± 0.65 |
| November | 0.40*** | NS | 3.75*** | NS |
| December | NS | NS | NS | NS |

*Mean monthly coefficient of maturity ± standard deviation.
**Based on two specimens.
***Based on one specimen.
NS = No specimens were processed for coefficients of maturity.

Table F-38

Fecundity of Selected Fish Species Collected by Gill Net in the Vicinity of Nine Mile Point, 1978

White Perch

| Length (mm) | Weight (g) | Yolk Eggs (No.) |
|---|---|---|
| 204 | 160.2 | 52,479 |
| 214 | 157.6 | 84,492 |
| 228 | 182.3 | 43,863 |
| 230 | 180.1 | 86,237 |
| 233 | 228.7 | 86,629 |
| 233 | 190.6 | 99,470 |
| 236 | 226.1 | 112,889 |
| 242 | 227.3 | 249,807 |
| 245 | 281.2 | 153,041 |
| 253 | 274.0 | 164,467 |
| 272 | 385.1 | 292,593 |
| 272 | 374.2 | 325,367 |
| 273 | 396.4 | 463,952 |
| 274 | 357.6 | 445,641 |
| 275 | 420.5 | 169,031 |
| 282 | 482.5 | 397,503 |
| 288 | 446.4 | 295,873 |
| 303 | 478.6 | 376,693 |
| 321 | 670.3 | 402,927 |

Alewife

| Length (mm) | Weight (g) | Yolk Eggs (No.) |
|---|---|---|
| 145 | 33.9 | 21,879 |
| 159 | 37.1 | 10,282 |
| 160 | 33.5 | 17,597 |
| 160 | 36.4 | 5,472 |
| 162 | 42.1 | 5,778 |
| 164 | 42.7 | 30,494 |
| 164 | 43.5 | 28,575 |
| 168 | 39.0 | 29,064 |
| 170 | 46.1 | 21,048 |
| 174 | 40.6 | 16,487 |
| 176 | 39.6 | 24,530 |
| 182 | 47.9 | 27,679 |
| 189 | 54.9 | 42,217 |
| 191 | 47.3 | 28,899 |
| 195 | 63.8 | 18,058 |
| 197 | 71.9 | 16,361 |
| 202 | 66.3 | 44,896 |

Rainbow Smelt

| Length (mm) | Weight (g) | Yolk Eggs (No.) |
|---|---|---|
| 129 | 15.3 | 9,162 |
| 142 | 17.5 | 12,631 |
| 146 | 20.4 | 11,819 |
| 146 | 18.8 | 12,720 |
| 147 | 19.1 | 8,258 |
| 148 | 18.4 | 11,039 |
| 151 | 21.3 | 12,724 |
| 155 | 23.1 | 15,466 |
| 155 | 23.4 | 13,555 |
| 158 | 26.5 | 13,863 |
| 160 | 25.5 | 12,639 |
| 161 | 28.1 | 16,374 |
| 162 | 25.3 | 19,382 |
| 163 | 27.2 | 15,350 |
| 164 | 27.3 | 15,819 |
| 175 | 35.1 | 19,705 |
| 178 | 37.9 | 21,179 |
| 181 | 43.1 | 25,025 |
| 191 | 43.5 | 25,737 |
| 195 | 51.6 | 31,725 |
| 200 | 52.4 | 30,664 |
| 201 | 55.1 | 30,779 |
| 203 | 54.7 | 28,282 |
| 215 | 65.7 | 30,617 |
| 226 | 76.0 | 39,011 |

Smallmouth Bass

| Length (mm) | Weight (g) | Yolk Eggs (No.) |
|---|---|---|
| 333 | 587.7 | 3,444 or 1603 $\bar{x}$ = 2524 |
| 379 | 897.3 | 6,008 |
| 388 | 927.7 | 2,203 |
| 398 | 978.8 | 7,359 |

Yellow Perch

| Length (mm) | Weight (g) | Yolk Eggs (No.) |
|---|---|---|
| 146 | 42.1 | 6,792 |
| 183 | 70.5 | 9,000 |
| 270 | 286.5 | 33,777 |

## Table F-39

Age-Class Distribution of White Perch Collected by Gill Net at Control (NMPW and NMPE) and Experimental (NMPP and FITZ) Transects, Nine Mile Point Vicinity, 1978

| | Control Transects | | | | | | | | | Experimental Transects | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | | Female | | | Total* | | | Male | | | Female | | | Total* | | |
| | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | |
| Age Class | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range |
| 0 | 0 | - | - | 1 | 118.0 | - | 7 | 93.6 | 84-118 | 0 | - | - | 0 | - | - | 7 | 87.1 | 80.96 |
| I | 1 | 125.0 | - | 1 | 161.0 | - | 3 | 140.1 | 125-161 | 2 | 128.5 | 92-165 | 4 | 143.8 | 113-175 | 7 | 137.7 | 92-175 |
| II | 1 | 175.0 | - | 0 | - | - | 1 | 175.0 | - | 1 | 170.0 | - | 0 | - | - | 1 | 170.0 | - |
| III | 6 | 192.8 | 180-215 | 2 | 207.0 | 202-212 | 8 | 196.4 | 180-215 | 3 | 201.0 | 190-208 | 2 | 220.0 | 210-230 | 5 | 208.6 | 190-230 |
| IV | 7 | 223.6 | 197-249 | 3 | 220.0 | 210-229 | 10 | 222.5 | 197-249 | 6 | 206.8 | 195-222 | 3 | 216.0 | 209-221 | 9 | 209.9 | 195-222 |
| V | 6 | 220.1 | 192-240 | 4 | 239.3 | 203-273 | 12 | 232.2 | 194-273 | 3 | 237.3 | 227-247 | 5 | 233.4 | 220-242 | 9 | 236.7 | 220-251 |
| VI | 0 | - | - | 5 | 279.0 | 264-301 | 6 | 279.2 | 264-301 | 1 | 233.0 | - | 2 | 265.0 | 258-272 | 3 | 254.3 | 233-272 |
| VII | 0 | - | - | 3 | 290.1 | 283-305 | 3 | 290.1 | 283-305 | 3 | 265.7 | 242-285 | 4 | 286.3 | 278-300 | 7 | 277.5 | 242-300 |
| VIII | 0 | - | - | 4 | 312.3 | 271-386 | 4 | 312.3 | 271-386 | 1 | 257.0 | - | 2 | 320.0 | 320-320 | 3 | 299.0 | 257-320 |
| IX | 0 | - | - | 4 | 319.3 | 297-336 | 4 | 319.3 | 297-336 | | | | 1 | 315.0 | - | 1 | 315.0 | - |
| X | 0 | - | - | 2 | 313.0 | 305-321 | 2 | 313.0 | 305-321 | 0 | - | - | 1 | 335.0 | - | 1 | 335.0 | - |
| XI | | | | | | | | | | | | | 0 | - | - | 0 | 344.0 | - |

*Includes fish of undetermined sex.

Table F-40

Age-Class Distribution of Yellow Perch Collected by Gill Net at Control (NMPW and NMPE) and Experimental (NMPP and FITZ) Transects, Nine Mile Point Vicinity, 1978

| | Control Transects | | | | | | | | | Experimental Transects | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | | Female | | | Total* | | | Male | | | Female | | | Total* | | |
| | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | |
| Age Class | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range |
| 0 | 0 | - | - | 1 | 86.0 | - | 2 | 91.0 | 86-96 | 0 | - | - | 0 | - | - | 0 | - | - |
| I | 1 | 135.0 | - | 0 | - | - | 2 | 116.5 | 98-135 | 2 | 144.0 | 140-148 | 6 | 102.2 | 92-116 | 10 | 109.2 | 92-148 |
| II | 2 | 137.0 | 125-149 | 2 | 135.5 | 120-151 | 4 | 136.3 | 120-151 | 2 | 181.0 | 176-186 | 1 | 184.0 | - | 3 | 182.0 | 176-186 |
| III | 7 | 185.7 | 140-206 | 7 | 173.0 | 131-202 | 15 | 177.3 | 131-206 | 6 | 166.8 | 141-196 | 4 | 230.3 | 184-253 | 10 | 192.2 | 141-253 |
| IV | 2 | 235.5 | 215-256 | 10 | 223.1 | 184-271 | 12 | 225.2 | 184-271 | 6 | 200.3 | 188-223 | 10 | 231.0 | 182-274 | 16 | 219.5 | 182-274 |
| V | 1 | 251.0 | - | 11 | 272.6 | 199-323 | 13 | 270.0 | 199-323 | 2 | 217.0 | 213-221 | 4 | 237.5 | 199-251 | 6 | 230.1 | 199-251 |
| VI | 0 | - | - | 2 | 253.0 | 249-257 | 4 | 266.3 | 249-280 | 1 | 271.0 | - | 3 | 268.7 | 260-276 | 4 | 269.3 | 260-276 |
| VII | | | | | | | | | | 1 | 296.0 | - | 0 | - | - | 1 | 296.0 | - |

*Includes fish of undetermined sex.

## Table F-41

Age-Class Distribution of Smallmouth Bass Collected by Gill Net at Control (NMPW and NMPE) and Experimental (NMPP and FITZ) Transects, Nine Mile Point Vicinity, 1978

| | Control Transects | | | | | | | | | Experimental Transects | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | | Female | | | Total* | | | Male | | | Female | | | Total* | | |
| | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | | | Total Length(mm) | |
| Age Class | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range |
| 0 | 0 | - | - | 0 | - | - | 1 | 85.0 | - | 1 | 85.0 | - | 0 | - | - | 2 | 90.0 | 85-95 |
| I | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - | - | 1 | 172.0 | - | 1 | 172.0 | - |
| II | 1 | 161.0 | - | 0 | - | - | 1 | 161.0 | - | 0 | - | - | 0 | - | - | 0 | - | - |
| III | 3 | 255.7 | 252-262 | 2 | 255.5 | 250-261 | 5 | 255.6 | 250-262 | 5 | 262.4 | 245-276 | 3 | 248.7 | 222-274 | 9 | 257.7 | 222-276 |
| IV | 4 | 303.8 | 264-330 | 2 | 274.5 | 267-282 | 6 | 294.0 | 264-330 | 2 | 303.0 | 267-339 | 2 | 296.0 | 271-321 | 6 | 301.2 | 267-339 |
| V | 5 | 323.0 | 278-357 | 7 | 305.9 | 266-342 | 14 | 311.9 | 266-357 | 9 | 311.6 | 243-345 | 8 | 323.5 | 285-368 | 18 | 317.4 | 243-368 |
| VI | 1 | 371.0 | - | 1 | 411.0 | - | 3 | 393.3 | 371.411 | 3 | 336.7 | 280-385 | 1 | 382.0 | - | 4 | 348.0 | 280-385 |
| VII | 1 | 405.0 | - | 2 | 401.0 | 387-415 | 5 | 388.6 | 355-415 | 0 | - | - | 1 | 337.0 | - | 2 | 354.5 | 337-372 |
| VIII | 1 | 381.0 | - | 2 | 380.0 | 364-396 | 3 | 380.3 | 364-396 | 2 | 388.5 | 382-395 | 3 | 410.0 | 388-424 | 5 | 401.4 | 382-424 |
| IX | 2 | 404.0 | 380-428 | 3 | 375.3 | 355-388 | 5 | 386.8 | 355-428 | 0 | - | - | 2 | 382.5 | 375-390 | 2 | 382.5 | 375-390 |
| X | 1 | 415.0 | - | 1 | 408.0 | - | 2 | 411.5 | 408-415 | 1 | 412.0 | - | 0 | - | - | 1 | 412.0 | - |
| XI | | | | | | | | | | 0 | - | - | 1 | 398.0 | - | 1 | 398.0 | - |

*Includes fish of undetermined sex.

Table F-42

Stomach Content Analysis for Smallmouth Bass Collected by Gill Net, Nine Mile Point Vicinity, 1978

| Transects | Food Item | Life Stage | Occurrences No. | Occurrences % | Abundance No. | Abundance % | Importance Index |
|---|---|---|---|---|---|---|---|
| Control* (NMPW and NMPE) | Astacidae | Undetermined | 1 | 20.00 | 4 | 66.67 | 26.67 |
| | Unid. fish | Undetermined | 3 | 60.00 | 2 | 33.33 | 56.67 |
| | Digest matter | Undetermined | 2 | 40.00 | 0 | 0.0 | 16.67 |
| Experimental** (NMPP and FITZ) | Astacidae | Undetermined | 7 | 100.00 | 3 | 37.50 | 65.79 |
| | Unid. fish | Undetermined | 3 | 42.86 | 1 | 12.50 | 26.37 |
| | Unid. fish | Postlarvae | 1 | 14.29 | 4 | 50.00 | 2.14 |
| | Digest. matter | Undetermined | 1 | 14.29 | 0 | 0.0 | 5.70 |

* Size Range (mm) = 250-342; No. of Stomachs Examined = 7; No. of Empty Stomachs = 2.
** Size Range (mm) = 250-382; No. of Stomachs Examined = 8; No. of Empty Stomachs = 1.

## Table F-43

## Stomach Content Analysis for White Perch Collected by Gill Net, Nine Mile Point Vicintiy, 1978

| Transects | Food Item | Life Stage | Occurrences No. | Occurrences % | Abundance No. | Abundance % | Importance Index |
|---|---|---|---|---|---|---|---|
| Control* (NMPW and NMPE) | Filament.algae | Undetermined | 14 | 66.67 | 0 | 0.0 | 0.74 |
| | Physa | Adult | 1 | 4.76 | 2 | 0.05 | 0.08 |
| | Bosminidae | Adult | 1 | 4.76 | 5 | 0.13 | 0.03 |
| | Chydoridae | Adult | 2 | 9.52 | 2 | 0.05 | 0.05 |
| | Leptodora kindtii | Adult | 2 | 9.52 | 33 | 0.85 | 0.06 |
| | Cladocera | Larvae | 1 | 4.76 | 1 | 0.03 | 0.08 |
| | Cladocera | Adult | 1 | 4.76 | 1 | 0.03 | 0.03 |
| | Ostracoda | Adult | 5 | 23.81 | 8 | 0.21 | 0.29 |
| | Cyclopoida | Adult | 5 | 23.81 | 6 | 0.15 | 0.19 |
| | Cyclopoida | Pupae | 1 | 4.76 | 1 | 0.03 | 0.08 |
| | Copepoda | Undetermined | 1 | 4.76 | 1 | 0.03 | 0.03 |
| | Gammarus fasciatus | Adult | 18 | 85.71 | 3395 | 87.03 | 56.94 |
| | Pontoporeia affinis | Adult | 1 | 4.76 | 3 | 0.08 | 0.03 |
| | Amphipoda | Adult | 17 | 80.95 | 313 | 8.02 | 7.61 |
| | Astacidae | Undetermined | 2 | 9.52 | 1 | 0.03 | 1.52 |
| | Astacidae | Juvenile | 1 | 4.76 | 7 | 0.18 | 0.97 |
| | Heptageniidae | Nymph | 2 | 9.52 | 1 | 0.03 | 0.11 |
| | Agraylea sp. | Larvae | 1 | 4.76 | 2 | 0.05 | 0.08 |
| | Hydroptilidae | Larvae | 3 | 14.29 | 3 | 0.08 | 0.13 |
| | Hydroptilidae | Pupae | 3 | 14.29 | 8 | 0.21 | 0.19 |
| | Hydroptilidae | Undetermined | 3 | 14.29 | 3 | 0.08 | 0.26 |
| | Athripsodes sp. | Larvae | 5 | 23.81 | 10 | 0.26 | 0.44 |
| | Chironomus sp. | Larvae | 6 | 28.57 | 13 | 0.33 | 0.29 |
| | Cryptochironomous sp. | Larvae | 4 | 19.05 | 4 | 0.10 | 0.11 |
| | Cricotopus sp. | Larvae | 2 | 9.52 | 2 | 0.05 | 0.16 |
| | Tanytarus sp. | Larvae | 2 | 9.52 | 3 | 0.08 | 0.11 |
| | Dicrotendipes sp. | Larvae | 4 | 19.05 | 7 | 0.18 | 0.18 |
| | Dicrotendipes sp. | Adult | 1 | 4.76 | 1 | 0.03 | 0.02 |
| | Polypedilum sp. | Larvae | 2 | 9.52 | 11 | 0.28 | 0.11 |
| | Ablabesymia sp. | Larvae | 4 | 19.05 | 4 | 0.10 | 0.27 |
| | Ablabesymia sp. | Undetermined | 1 | 4.76 | 1 | 0.03 | 0.16 |
| | Microtendipes sp. | Larvae | 2 | 9.52 | 2 | 0.05 | 0.16 |
| | Procladius sp. | Larvae | 1 | 4.76 | 1 | 0.03 | 0.03 |
| | Phaenopsectra sp. | Larvae | 2 | 9.52 | 5 | 0.13 | 0.08 |
| | Microspectra | Larvae | 1 | 4.76 | 3 | 0.08 | 0.03 |
| | Chironomidae | Pupae | 7 | 33.33 | 17 | 0.44 | 0.29 |
| | Chironomidae | Larvae | 9 | 42.86 | 11 | 0.28 | 0.50 |
| | Unid. fish | Undetermined | 5 | 23.81 | 3 | 0.08 | 10.34 |
| | Alewife | Postlarvae | 1 | 4.76 | 1 | 0.03 | 3.23 |
| | Tessellated darter | Adult | 1 | 4.76 | 1 | 0.03 | 1.29 |
| | Mottled sculpin | Juvenile | 1 | 4.76 | 2 | 0.05 | 4.04 |
| | Mottled sculpin | Juvenile | 2 | 9.52 | 3 | 0.08 | 3.55 |
| | Digest matter | Undetermined | 7 | 33.33 | 0 | 0.0 | 4.52 |
| | Fish scales | Undetermined | 1 | 4.76 | 0 | 0.0 | 0.03 |
| | Aquat. insect rem. | Undetermined | 1 | 4.76 | 0 | 0.0 | 0.08 |
| | Pebbles-stones | Undetermined | 5 | 23.81 | 0 | 0.0 | 0.29 |
| | Sand Grains | Undetermined | 4 | 19.05 | 0 | 0.0 | 0.15 |
| Experimental** (NMPP and FITZ) | Filament.algae | Undetermined | 10 | 40.00 | 0 | 0.0 | 2.80 |
| | Bosminidae | Adult | 6 | 24.00 | 63 | 3.41 | 0.25 |
| | Chydorus sp. | Adult | 1 | 4.00 | 1 | 0.05 | 0.05 |
| | Chydoridae | Adult | 4 | 16.00 | 29 | 1.57 | 0.20 |
| | Daphnia sp. | Adult | 4 | 16.00 | 7 | 0.38 | 0.17 |
| | Leptodora kindtii | Adult | 1 | 4.00 | 1 | 0.05 | 0.01 |
| | Cladocera | Adult | 7 | 28.00 | 36 | 1.95 | 0.26 |
| | Cladocera | Undetermined | 1 | 4.00 | 4 | 0.22 | 0.06 |
| | Ostracoda | Adult | 7 | 28.00 | 31 | 1.68 | 0.32 |
| | Calanoida | Adult | 1 | 4.00 | 2 | 0.11 | 0.06 |
| | Cyclopoida | Adult | 12 | 48.00 | 206 | 11.15 | 0.47 |
| | Copepoda | Undetermined | 3 | 12.00 | 22 | 1.19 | 0.16 |
| | Copepoda | Adult | 1 | 4.00 | 4 | 0.22 | 0.01 |
| | Asellus sp. | Adult | 1 | 4.00 | 1 | 0.05 | 0.12 |
| | Gammarus fasciatus | Adult | 13 | 52.00 | 930 | 50.32 | 24.34 |
| | Amphipoda | Adult | 17 | 68.00 | 224 | 12.12 | 7.85 |
| | Astacidae | Juvenile | 4 | 16.00 | 7 | 0.38 | 0.67 |
| | Stenonema sp. | Nymph | 1 | 4.00 | 1 | 0.05 | 0.37 |
| | Heptageniidae | Nymph | 1 | 4.00 | 1 | 0.05 | 0.05 |
| | Athripsodes sp. | Larvae | 2 | 8.00 | 1 | 0.05 | 0.12 |
| | Leptoceridae | Larvae | 1 | 4.00 | 1 | 0.05 | 0.02 |
| | Chironomus sp. | Larvae | 4 | 16.00 | 5 | 0.27 | 0.16 |
| | Cryptochironomous sp. | Larvae | 1 | 4.00 | 1 | 0.05 | 0.06 |
| | Cricotopus sp. | Larvae | 1 | 4.00 | 1 | 0.05 | 0.06 |
| | Dicrotendipes sp. | Larvae | 3 | 12.00 | 3 | 0.16 | 0.12 |
| | Ablabesymia sp. | Larvae | 1 | 4.00 | 1 | 0.05 | 0.05 |
| | Phaenopsectra sp. | Larvae | 3 | 12.00 | 5 | 0.27 | 0.16 |
| | Chironomidae | Larvae | 7 | 28.00 | 10 | 0.54 | 0.32 |
| | Chironomidae | Pupae | 6 | 24.00 | 122 | 6.60 | 0.97 |
| | Formicidae | Adult | 1 | 4.00 | 1 | 0.05 | 0.55 |
| | Pectinatella sp. | Statoblast | 1 | 4.00 | 1 | 0.05 | 0.02 |
| | Plumatella repens | Colony | 1 | 4.00 | 0 | 0.0 | 0.02 |
| | Invertebrate | Egg | 2 | 8.00 | 5 | 0.27 | 0.07 |
| | Unid. fish | Undetermined | 14 | 56.00 | 28 | 1.52 | 16.31 |
| | Unid. fish | Postlarvae | 3 | 12.00 | 15 | 0.81 | 10.41 |
| | Alewife | Egg | 2 | 8.00 | 33 | 1.79 | 0.10 |
| | Spottail shiner | Juvenile | 1 | 4.00 | 1 | 0.05 | 0.06 |
| | Cyprinidae | Juvenile | 1 | 4.00 | 4 | 0.22 | 3.10 |
| | Tessellated darter | Juvenile | 3 | 12.00 | 32 | 1.73 | 7.93 |
| | Mottled sculpin | Juvenile | 2 | 8.00 | 2 | 0.11 | 4.09 |
| | Cottus sp. | Juvenile | 1 | 4.00 | 1 | 0.05 | 3.10 |
| | Digest. matter | Undetermined | 10 | 40.00 | 0 | 0.0 | 11.11 |
| | Aquat. insect rem. | Undetermined | 7 | 28.00 | 0 | 0.0 | 1.52 |
| | Pebbles-stones | Undetermined | 2 | 8.00 | 0 | 0.0 | 0.04 |
| | Sand Grains | Undetermined | 6 | 24.00 | 0 | 0.0 | 0.27 |

*Size Range (mm) = 142-277; No. of Stomachs Examined = 25; No. of Empty Stomachs 4.
**Size Range (mm) = 123-282; No. of Stomachs Examined = 25; No. of Empty Stomachs 0.

Table F-44

Stomach Content Analysis for Yellow Perch Collected by Gill Net, Nine Mile Point Vicinity, 1978

| Transects | Food Item | Life Stage | Occurrences No. | Occurrences % | Abundance No. | Abundance % | Importance Index |
|---|---|---|---|---|---|---|---|
| Control* (NMPW and NMPE) | Filament algae | Undetermined | 7 | 33.33 | 0 | 0.0 | 0.47 |
| | Physa | Adult | 1 | 4.76 | 1 | 0.15 | 1.01 |
| | Gastropoda | Adult | 3 | 14.29 | 3 | 0.46 | 0.89 |
| | Bivalvia | Undetermined | 1 | 4.76 | 0 | 0.0 | 0.08 |
| | Ostracoda | Adult | 1 | 4.76 | 1 | 0.15 | 0.07 |
| | Asellus sp. | Adult | 1 | 4.76 | 1 | 0.15 | 0.07 |
| | Gammarus fasciatus | Adult | 11 | 52.38 | 492 | 76.16 | 32.50 |
| | Amphipoda | Adult | 12 | 57.14 | 112 | 17.34 | 11.44 |
| | Astacidae | Undetermined | 1 | 4.76 | 0 | 0.0 | 0.50 |
| | Astacidae | Juvenile | 2 | 9.52 | 3 | 0.46 | 1.39 |
| | Astacidae | Adult | 3 | 14.29 | 3 | 0.46 | 13.76 |
| | Hypdroptila sp. | Larvae | 1 | 4.76 | 1 | 0.15 | 0.08 |
| | Hydroptilidae | Pupae | 1 | 4.76 | 2 | 0.31 | 0.07 |
| | Hydroptilidae | Undetermined | 2 | 9.52 | 1 | 0.15 | 0.22 |
| | Chironomus sp. | Larvae | 1 | 4.76 | 1 | 0.15 | 0.67 |
| | Dicrotendipes sp. | Larvae | 2 | 9.52 | 2 | 0.31 | 0.13 |
| | Microtendipes sp. | Larvae | 1 | 4.76 | 1 | 0.15 | 0.08 |
| | Chironomidae | Pupae | 4 | 19.05 | 3 | 0.46 | 0.97 |
| | Chironomidae | Larvae | 3 | 14.29 | 1 | 0.15 | 0.64 |
| | Unid. fish | Undetermined | 6 | 28.57 | 0 | 0.0 | 5.50 |
| | Unid. fish | Juvenile | 6 | 28.57 | 15 | 2.32 | 13.76 |
| | Unid. fish | Juvenile | 1 | 4.76 | 1 | 0.15 | 0.05 |
| | Cottus sp. | Undetermined | 2 | 9.52 | 2 | 0.31 | 5.70 |
| | Digest matter | Undetermined | 3 | 14.29 | 0 | 0.0 | 9.40 |
| | Fish scales | Undetermined | 1 | 4.76 | 0 | 0.0 | 0.03 |
| | Aquat. insect remains | Undetermined | 2 | 9.52 | 0 | 0.0 | 0.10 |
| | Pebbles-stones | Undetermined | 6 | 28.57 | 0 | 0.0 | 0.40 |
| Experimental** (NMPP and FITZ) | Filament algae | Undetermined | 4 | 18.18 | 0 | 0.0 | 0.14 |
| | Physa | Adult | 1 | 4.55 | 1 | 0.23 | 0.08 |
| | Goniobasis sp. | Adult | 1 | 4.55 | 1 | 0.23 | 0.04 |
| | Gastropoda | Undetermined | 1 | 4.55 | 3 | 0.70 | 0.08 |
| | Daphnia sp. | Adult | 1 | 4.55 | 1 | 0.23 | 2.01 |
| | Ostracoda | Adult | 3 | 13.64 | 3 | 0.70 | 0.24 |
| | Gammarus fasciatus | Adult | 15 | 68.18 | 270 | 62.65 | 42.41 |
| | Amphipoda | Adult | 13 | 59.09 | 133 | 30.86 | 22.17 |
| | Astacidae | Undetermined | 1 | 4.55 | 0 | 0.0 | 0.10 |
| | Astacidae | Juvenile | 1 | 4.55 | 1 | 0.23 | 1.01 |
| | Astacidae | Adult | 1 | 4.55 | 1 | 0.23 | 9.05 |
| | Hydroptilidae | Larvae | 1 | 4.55 | 1 | 0.23 | 0.06 |
| | Dicrotendipes sp. | Larvae | 1 | 4.55 | 2 | 0.46 | 0.02 |
| | Microtendipes sp. | Larvae | 1 | 4.55 | 2 | 0.46 | 0.08 |
| | Phaenopsectra sp. | Larvae | 1 | 4.55 | 1 | 0.23 | 0.02 |
| | Chironomidae | Larvae | 1 | 4.55 | 1 | 0.23 | 2.01 |
| | Chironomidae | Pupae | 2 | 9.09 | 2 | 0.46 | 0.18 |
| | Unid. fish | Undetermined | 4 | 18.18 | 5 | 1.16 | 10.75 |
| | Unid. fish | Juvenile | 1 | 4.55 | 1 | 0.23 | 0.10 |
| | Unid. fish | Juvenile | 1 | 4.55 | 2 | 0.46 | 4.22 |
| | Digest. matter | Undetermined | 5 | 22.73 | 0 | 0.0 | 5.09 |
| | Pebbles-Stones | Undetermined | 2 | 9.09 | 0 | 0.0 | 0.14 |

* Size Range (mm) = 102-286; No. of Stomachs Examined = 25; No. of Empty Stomachs 4.
** Size Range (mm) = 105-285; No. of Stomachs Examined = 25; No. of Empty Stomachs 3.

APPENDIX G

WATER QUALITY

Table G-1 (Page 1 of 9)

Weekly Temperature (°C) Profiles at 30-m (100-ft) Contour,
Nine Mile Point Vicinity, April-December 1978

## April

| Sample Depth (meters) | Week 1 - 4/03/78 | | | Week 2 - 4/10/78 | | | Week 3 - 4/17/78 | | | Week 4 - 4/24/78 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 0.8 | 1.0 | 1.0 | 1.3 | 1.1 | 1.0 | 1.7 | 1.9 | 2.1 | 2.0 | 1.9 | 1.8 |
| 1 | 0.8 | 1.0 | 1.1 | 1.3 | 1.1 | 1.1 | 1.7 | 1.9 | 2.1 | 1.9 | 1.9 | 1.8 |
| 2 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.1 | 1.7 | 1.9 | 2.0 | 1.9 | 1.9 | 1.8 |
| 3 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.2 | 1.7 | 1.9 | 2.0 | 1.9 | 1.8 | 1.8 |
| 4 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.2 | 1.7 | 1.9 | 2.0 | 1.9 | 1.8 | 1.7 |
| 5 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.2 | 1.7 | 1.9 | 2.0 | 1.9 | 1.8 | 1.7 |
| 6 | 0.8 | 1.0 | 1.1 | 1.2 | 1.2 | 1.2 | 1.7 | 1.9 | 2.0 | 1.9 | 1.8 | 1.7 |
| 7 | 0.8 | 1.0 | 1.1 | 1.2 | 1.2 | 1.2 | 1.7 | 1.9 | 2.0 | 1.9 | 1.8 | 1.7 |
| 8 | 0.8 | 1.0 | 1.1 | 1.2 | 1.2 | 1.2 | 1.7 | 1.9 | 2.0 | 1.9 | 1.9 | 1.8 |
| 9 | 0.8 | 1.0 | 1.1 | 1.2 | 1.2 | 1.3 | 1.7 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 |
| 10 | 0.8 | 1.0 | 1.1 | 1.2 | 1.2 | 1.3 | 1.7 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 |
| 11 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.3 | 1.7 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 |
| 12 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.3 | 1.7 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 |
| 13 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.3 | 1.7 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 |
| 14 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.3 | 1.7 | 1.9 | 2.0 | 1.9 | 1.9 | 2.0 |
| 15 | 0.8 | 1.0 | 1.1 | 1.3 | 1.2 | 1.3 | 1.7 | 2.0 | 2.0 | 1.9 | 1.9 | 2.0 |
| 16 | 0.8 | 1.0 | 1.1 | 1.3 | 1.3 | 1.3 | 1.7 | 2.1 | 2.0 | 1.9 | 1.9 | 2.0 |
| 17 | 0.8 | 1.0 | 1.1 | 1.3 | 1.3 | 1.3 | 1.8 | 2.2 | 2.0 | 1.9 | 1.9 | 2.0 |
| 18 | 0.8 | 1.0 | 1.1 | 1.4 | 1.3 | 1.3 | 1.8 | 2.3 | 2.0 | 2.1 | 2.0 | 2.0 |
| 19 | 0.8 | 1.0 | 1.1 | 1.4 | 1.3 | 1.3 | 1.8 | 2.4 | 2.0 | 2.2 | 2.0 | 2.0 |
| 20 | 0.8 | 1.0 | 1.1 | 1.4 | 1.3 | 1.3 | 1.9 | 2.6 | 2.0 | 2.3 | 2.0 | 2.0 |
| 21 | 0.8 | 1.0 | 1.2 | 1.4 | 1.4 | 1.3 | 1.9 | 2.8 | 2.0 | 2.4 | 2.1 | 2.0 |
| 22 | 1.0 | 1.0 | 1.2 | 1.5 | 1.4 | 1.3 | 1.9 | 2.8 | 2.0 | 2.4 | 2.2 | 2.1 |
| 23 | 1.0 | 1.0 | 1.2 | 1.5 | 1.4 | 1.4 | 2.1 | 2.8 | 2.0 | 2.5 | 2.4 | 2.1 |
| 24 | 1.1 | 1.2 | 1.2 | 1.5 | 1.4 | 1.4 | 2.4 | 2.9 | 2.0 | 2.7 | 2.4 | 2.1 |
| 25 | 1.1 | 1.3 | 1.3 | 1.5 | 1.5 | 1.4 | 2.5 | 2.9 | 2.0 | 2.8 | 2.5 | 2.4 |
| 26 | 1.2 | 1.3 | 1.3 | 1.6 | 1.7 | 1.4 | 2.6 | 2.9 | 2.0 | 2.9 | 2.6 | 2.5 |
| 27 | 1.2 | 1.3 | 1.3 | 1.7 | 2.1 | 1.4 | 2.7 | 2.9 | 2.0 | 2.9 | 2.6 | 2.5 |
| 28 | 1.2 | 1.3 | 1.3 | 1.8 | 2.2 | 1.4 | 2.8 | 2.9 | 2.0 | 3.1 | 2.6 | 2.6 |
| 29 | 1.2 | 1.3 | 1.3 | 1.8 | 2.3 | 1.6 | 2.8 | 3.0 | 2.1 | 3.1 | 2.6 | 2.7 |
| 30 | 1.2 | 1.3 | 1.3 | 1.8 | 2.4 | 1.8 | 2.8 | 3.0 | 2.2 | 3.1 | 2.6 | 2.8 |

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May

| Sample Depth (meters) | Week 1 — 5/2 | | | Week 2 — 5/8 | | | Week 3 — 5/15 | | | Week 4 — 5/22 | | | Week 5 — 5/30 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 2.2 | 2.5 | 2.0 | 2.5 | 6.2 | 5.8 | 3.1 | 3.1 | 3.1 | 3.1 | 3.3 | 3.9 | 16.8 | 14.7 | 15.5 |
| 1 | 2.1 | 2.5 | 2.0 | 2.5 | 6.3 | 5.7 | 3.1 | 3.1 | 3.1 | 3.1 | 3.3 | 3.9 | 16.7 | 14.7 | 15.5 |
| 2 | 2.1 | 2.5 | 2.0 | 2.5 | 6.3 | 5.7 | 3.1 | 3.1 | 3.0 | 3.1 | 3.3 | 3.9 | 16.6 | 14.6 | 12.6 |
| 3 | 2.1 | 2.5 | 2.0 | 2.5 | 6.3 | 5.7 | 3.1 | 3.1 | 3.0 | 3.1 | 3.3 | 3.9 | 8.9 | 11.5 | 10.5 |
| 4 | 2.1 | 2.5 | 2.0 | 2.5 | 6.1 | 5.5 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.9 | 7.7 | 9.1 | 8.6 |
| 5 | 2.1 | 2.6 | 2.0 | 2.4 | 5.9 | 4.1 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.9 | 6.9 | 7.4 | 8.3 |
| 6 | 2.1 | 2.6 | 2.0 | 2.4 | 4.7 | 3.9 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.9 | 6.4 | 6.8 | 7.1 |
| 7 | 2.1 | 2.6 | 2.0 | 2.5 | 4.3 | 3.9 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.9 | 6.3 | 6.5 | 7.0 |
| 8 | 2.2 | 2.6 | 2.0 | 2.5 | 4.1 | 3.8 | 3.0 | 3.0 | 3.0 | 3.1 | 3.3 | 3.9 | 5.9 | 6.1 | 6.8 |
| 9 | 2.2 | 2.6 | 2.0 | 2.5 | 4.1 | 3.8 | 3.0 | 3.0 | 3.0 | 3.1 | 3.3 | 3.9 | 5.8 | 5.9 | 6.6 |
| 10 | 2.3 | 2.6 | 2.0 | 2.5 | 4.1 | 3.7 | 3.0 | 3.0 | 3.0 | 3.1 | 3.3 | 3.9 | 5.7 | 5.8 | 6.4 |
| 11 | 2.4 | 2.7 | 2.0 | 2.5 | 4.1 | 3.7 | 3.0 | 3.0 | 3.0 | 3.1 | 3.3 | 3.9 | 5.7 | 5.8 | 6.2 |
| 12 | 2.4 | 2.7 | 2.1 | 2.6 | 4.1 | 3.7 | 3.0 | 3.0 | 3.0 | 3.1 | 3.3 | 3.8 | 5.6 | 5.7 | 6.1 |
| 13 | 2.4 | 2.7 | 2.1 | 2.6 | 4.1 | 3.7 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.8 | 5.6 | 5.7 | 5.9 |
| 14 | 2.4 | 2.7 | 2.2 | 2.7 | 4.1 | 3.7 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.8 | 5.5 | 5.6 | 5.8 |
| 15 | 2.5 | 2.8 | 2.2 | 2.7 | 4.0 | 3.7 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.8 | 5.5 | 5.6 | 5.8 |
| 16 | 2.5 | 2.8 | 2.2 | 2.7 | 4.0 | 3.7 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.8 | 5.5 | 5.5 | 5.5 |
| 17 | 2.6 | 2.9 | 2.2 | 2.9 | 3.9 | 3.7 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.8 | 5.5 | 5.5 | 5.5 |
| 18 | 2.7 | 3.0 | 2.2 | 3.0 | 3.9 | 3.7 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.8 | 5.5 | 5.4 | 5.4 |
| 19 | 2.7 | 3.0 | 2.2 | 3.1 | 3.9 | 3.7 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.8 | 5.4 | 5.1 | 5.3 |
| 20 | 2.7 | 3.0 | 2.2 | 3.1 | 3.8 | 3.7 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.8 | 5.4 | 4.9 | 5.2 |
| 21 | 2.7 | 3.0 | 2.3 | 3.1 | 3.8 | 3.7 | 3.0 | 3.1 | 3.0 | 3.2 | 3.3 | 3.8 | 5.4 | 4.9 | 5.1 |
| 22 | 2.7 | 3.0 | 2.3 | 3.2 | 3.8 | 3.7 | 3.0 | 3.1 | 3.0 | 3.2 | 3.3 | 3.8 | 5.4 | 4.9 | 5.0 |
| 23 | 2.7 | 3.0 | 2.3 | 3.2 | 3.7 | 3.7 | 3.0 | 3.1 | 3.0 | 3.3 | 3.3 | 3.8 | 5.4 | 4.8 | 4.8 |
| 24 | 2.9 | 3.0 | 2.4 | 3.2 | 3.7 | 3.7 | 3.0 | 3.1 | 3.0 | 3.6 | 3.3 | 3.8 | 5.4 | 4.8 | 4.8 |
| 25 | 3.0 | 3.1 | 2.5 | 3.2 | 3.7 | 3.7 | 3.0 | 3.0 | 3.0 | 3.6 | 3.3 | 3.8 | 5.4 | 4.7 | 4.8 |
| 26 | 3.0 | 3.1 | 2.5 | 3.2 | 3.7 | 3.7 | 3.0 | 3.0 | 3.0 | 3.7 | 3.3 | 3.8 | 5.4 | 4.7 | 4.7 |
| 27 | 3.1 | 3.1 | 2.5 | 3.3 | 3.7 | 3.7 | 3.0 | 3.0 | 3.0 | 3.7 | 3.3 | 3.8 | 5.3 | 4.6 | 4.7 |
| 28 | 3.1 | 3.1 | 2.5 | 3.3 | 3.7 | 3.6 | 3.0 | 3.0 | 3.0 | 3.8 | 3.3 | 3.8 | 5.2 | 4.6 | 4.7 |
| 29 | 3.1 | 3.1 | 2.5 | 3.3 | 3.7 | 3.6 | 3.0 | 3.0 | 3.0 | 3.9 | 3.3 | 3.8 | 5.1 | 4.6 | 4.6 |
| 30 | 3.1 | 3.1 | 2.5 | 3.4 | 3.7 | 3.6 | 3.0 | 3.0 | 3.0 | 3.9 | 3.3 | 3.8 | 4.3 | 4.6 | 4.6 |

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June

| Sample Depth (meters) | Week 1 – 6/5/78 | | | Week 2 – 6/12/78 | | | Week 3 – 6/19/78 | | | Week 4 – 6/26/78 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 10.5 | 10.1 | 9.7 | 12.5 | 13.1 | 14.5 | 12.3 | 12.9 | 12.5 | 15.4 | 15.2 | 15.8 |
| 1 | 10.5 | 10.1 | 9.6 | 12.4 | 13.0 | 14.3 | 12.3 | 12.8 | 12.5 | 15.4 | 15.2 | 15.7 |
| 2 | 10.5 | 10.1 | 9.6 | 12.3 | 12.9 | 14.3 | 12.2 | 12.8 | 12.5 | 14.8 | 15.1 | 15.6 |
| 3 | 10.5 | 10.1 | 9.6 | 12.3 | 12.9 | 14.3 | 12.2 | 12.8 | 12.5 | 14.1 | 14.6 | 13.6 |
| 4 | 10.4 | 10.1 | 9.6 | 12.1 | 12.8 | 14.0 | 12.2 | 12.8 | 12.5 | 13.4 | 14.0 | 13.1 |
| 5 | 10.2 | 9.9 | 9.6 | 12.1 | 12.3 | 13.5 | 12.3 | 12.7 | 12.5 | 13.2 | 12.8 | 12.9 |
| 6 | 10.1 | 9.8 | 9.5 | 12.0 | 12.1 | 13.1 | 12.2 | 12.7 | 12.5 | 13.1 | 12.7 | 12.8 |
| 7 | 9.4 | 9.5 | 9.2 | 11.6 | 11.5 | 12.3 | 12.2 | 12.7 | 12.4 | 13.1 | 12.6 | 12.6 |
| 8 | 8.9 | 8.6 | 8.6 | 11.2 | 11.4 | 11.6 | 12.2 | 12.7 | 12.4 | 12.8 | 12.6 | 12.5 |
| 9 | 8.1 | 7.8 | 8.1 | 10.7 | 11.2 | 11.2 | 12.2 | 12.6 | 12.4 | 12.8 | 12.5 | 12.5 |
| 10 | 8.0 | 7.2 | 7.9 | 9.8 | 10.7 | 11.0 | 12.1 | 12.5 | 12.4 | 12.8 | 12.5 | 12.4 |
| 11 | 7.5 | 7.1 | 7.7 | 9.4 | 10.2 | 10.8 | 12.0 | 12.5 | 12.4 | 12.8 | 12.4 | 12.4 |
| 12 | 7.3 | 7.0 | 7.6 | 8.5 | 10.0 | 10.7 | 11.8 | 12.4 | 12.4 | 12.8 | 12.4 | 12.4 |
| 13 | 7.1 | 6.9 | 7.6 | 8.3 | 9.9 | 10.5 | 11.8 | 12.3 | 12.4 | 12.8 | 12.4 | 12.2 |
| 14 | 7.1 | 6.7 | 7.6 | 8.2 | 9.8 | 10.5 | 11.6 | 12.1 | 12.4 | 12.2 | 12.3 | 12.1 |
| 15 | 7.1 | 6.6 | 7.5 | 8.1 | 9.8 | 10.3 | 11.2 | 11.8 | 12.4 | 11.5 | 11.6 | 12.0 |
| 16 | 7.0 | 6.5 | 7.5 | 8.0 | 9.7 | 10.0 | 11.0 | 11.2 | 12.4 | 11.1 | 11.4 | 12.0 |
| 17 | 6.9 | 6.5 | 7.3 | 8.0 | 9.6 | 9.9 | 10.8 | 11.1 | 12.4 | 11.0 | 11.3 | 11.9 |
| 18 | 6.9 | 6.4 | 7.1 | 7.9 | 9.0 | 9.5 | 10.6 | 10.6 | 12.3 | 10.9 | 11.2 | 11.9 |
| 19 | 6.9 | 6.4 | 7.1 | 7.9 | 8.9 | 9.5 | 10.1 | 10.4 | 12.3 | 10.6 | 11.2 | 11.9 |
| 20 | 6.9 | 6.3 | 7.0 | 7.9 | 8.8 | 9.4 | 9.8 | 10.2 | 12.3 | 10.4 | 10.7 | 11.9 |
| 21 | 6.9 | 6.3 | 6.8 | 7.9 | 8.7 | 9.4 | 9.7 | 10.1 | 12.3 | 10.3 | 10.6 | 11.9 |
| 22 | 6.9 | 6.1 | 6.6 | 7.8 | 8.7 | 9.4 | 9.6 | 10.0 | 12.2 | 10.3 | 10.4 | 11.9 |
| 23 | 6.9 | 6.1 | 6.5 | 7.8 | 8.6 | 9.3 | 9.4 | 9.9 | 12.1 | 10.2 | 10.0 | 11.6 |
| 24 | 6.9 | 6.0 | 6.4 | 7.7 | 8.6 | 9.1 | 9.4 | 9.9 | 11.9 | 10.2 | 9.8 | 10.7 |
| 25 | 6.9 | 6.0 | 6.4 | 7.7 | 8.5 | 8.9 | 9.3 | 9.8 | 11.8 | 10.2 | 9.7 | 10.3 |
| 26 | 6.9 | 6.0 | 6.4 | 7.7 | 8.5 | 8.9 | 9.3 | 9.6 | 11.8 | 10.2 | 9.5 | 10.2 |
| 27 | 6.9 | 6.0 | 6.4 | 7.6 | 8.5 | 8.9 | 9.3 | 9.6 | 11.0 | 10.1 | 9.3 | 10.2 |
| 28 | 6.9 | 6.0 | 6.4 | 7.5 | 8.3 | 8.8 | 9.2 | 9.6 | 10.5 | 10.1 | 9.3 | 9.5 |
| 29 | 6.9 | 6.0 | 6.4 | 7.4 | 8.2 | 8.7 | 9.3 | 9.6 | 9.1 | 10.0 | 8.9 | 9.2 |
| 30 | 6.9 | 6.0 | 6.3 | 7.4 | 8.1 | 8.5 | 9.3 | 9.5 | 8.8 | 9.9 | 8.4 | 9.0 |

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July

| Sample Depth (meters) | Week 1 – 7/5/78 | | | Week 2 – 7/10/78 | | | Week 3 – 7/17/78 | | | Week 4 – 7/24/78 | | | Week 5 – 7/31/78 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 16.1 | 17.1 | 17.1 | 19.3 | 19.4 | 19.9 | 21.5 | 20.9 | 21.1 | 22.0 | 22.0 | 22.4 | 21.4 | 21.4 | 21.9 |
| 1 | 16.1 | 17.1 | 17.1 | 19.3 | 19.4 | 19.9 | 21.4 | 20.9 | 21.1 | 22.0 | 22.0 | 22.4 | 21.4 | 21.4 | 21.9 |
| 2 | 16.1 | 17.1 | 17.1 | 19.3 | 19.4 | 19.9 | 21.3 | 20.9 | 21.1 | 22.0 | 22.0 | 22.4 | 21.4 | 21.4 | 21.9 |
| 3 | 16.0 | 17.0 | 17.1 | 19.3 | 19.4 | 19.9 | 20.2 | 20.9 | 21.1 | 22.0 | 22.0 | 22.4 | 21.4 | 21.4 | 21.9 |
| 4 | 15.2 | 15.8 | 17.1 | 19.3 | 19.4 | 19.9 | 19.3 | 20.8 | 21.0 | 22.0 | 22.0 | 22.4 | 21.4 | 21.4 | 21.9 |
| 5 | 14.2 | 14.6 | 17.0 | 19.3 | 19.4 | 19.7 | 18.3 | 20.4 | 20.9 | 22.0 | 22.0 | 22.3 | 21.4 | 21.4 | 21.9 |
| 6 | 13.5 | 13.6 | 16.8 | 19.2 | 19.3 | 19.5 | 17.9 | 20.0 | 20.8 | 22.0 | 22.0 | 21.9 | 21.4 | 21.4 | 21.7 |
| 7 | 11.9 | 13.0 | 16.7 | 19.2 | 19.2 | 19.4 | 17.7 | 19.7 | 20.8 | 22.0 | 22.0 | 21.8 | 21.4 | 21.4 | 21.4 |
| 8 | 10.9 | 11.5 | 16.1 | 19.1 | 19.0 | 19.2 | 17.5 | 19.4 | 20.7 | 22.0 | 22.0 | 21.8 | 21.4 | 21.4 | 21.4 |
| 9 | 10.7 | 10.9 | 15.0 | 18.2 | 18.8 | 19.0 | 17.4 | 19.2 | 20.5 | 22.0 | 22.0 | 21.7 | 21.3 | 21.4 | 21.3 |
| 10 | 10.4 | 10.7 | 14.4 | 16.9 | 18.2 | 18.7 | 17.4 | 19.0 | 20.4 | 22.1 | 21.9 | 21.7 | 21.2 | 21.4 | 21.2 |
| 11 | 10.1 | 10.5 | 13.6 | 16.5 | 17.7 | 18.3 | 17.3 | 18.8 | 20.2 | 22.1 | 21.7 | 21.7 | 21.2 | 21.4 | 21.2 |
| 12 | 9.7 | 10.3 | 13.4 | 16.1 | 16.8 | 17.8 | 17.3 | 18.6 | 19.9 | 22.1 | 21.7 | 21.7 | 21.2 | 21.4 | 21.2 |
| 13 | 9.6 | 10.2 | 12.4 | 15.2 | 16.0 | 17.3 | 17.2 | 18.4 | 19.4 | 22.0 | 21.7 | 21.7 | 20.9 | 21.4 | 21.2 |
| 14 | 9.4 | 10.0 | 12.1 | 14.1 | 15.7 | 17.0 | 17.1 | 18.2 | 19.3 | 18.7 | 21.5 | 21.7 | 20.9 | 21.4 | 21.2 |
| 15 | 9.2 | 9.8 | 11.3 | 12.5 | 14.8 | 16.7 | 17.1 | 18.1 | 18.6 | 17.9 | 19.8 | 19.3 | 20.8 | 21.4 | 21.0 |
| 16 | 9.0 | 9.3 | 11.0 | 11.6 | 13.1 | 15.6 | 17.0 | 18.0 | 18.4 | 16.9 | 18.2 | 18.0 | 20.7 | 21.4 | 20.8 |
| 17 | 8.9 | 9.1 | 10.9 | 10.9 | 11.4 | 14.0 | 16.9 | 17.9 | 18.3 | 16.5 | 16.6 | 16.9 | 20.6 | 21.3 | 20.2 |
| 18 | 8.8 | 8.9 | 10.8 | 10.6 | 10.9 | 12.8 | 16.8 | 17.9 | 18.2 | 16.3 | 16.2 | 15.9 | 20.4 | 19.7 | 19.0 |
| 19 | 8.8 | 8.8 | 10.8 | 10.2 | 10.4 | 11.6 | 16.7 | 17.8 | 18.1 | 15.4 | 15.7 | 14.8 | 20.3 | 19.3 | 18.5 |
| 20 | 8.7 | 8.6 | 10.5 | 9.6 | 9.9 | 10.7 | 15.1 | 17.6 | 18.0 | 13.3 | 15.2 | 13.9 | 20.3 | 18.7 | 18.2 |
| 21 | 8.6 | 8.4 | 10.3 | 9.2 | 9.5 | 9.9 | 12.6 | 17.6 | 17.8 | 13.2 | 14.0 | 13.4 | 20.2 | 18.6 | 17.4 |
| 22 | 8.3 | 8.3 | 10.2 | 9.0 | 9.4 | 8.3 | 11.9 | 17.4 | 17.5 | 12.3 | 12.4 | 13.1 | 20.2 | 18.6 | 16.9 |
| 23 | 8.0 | 8.2 | 9.8 | 8.8 | 9.1 | 7.0 | 9.5 | 17.2 | 17.4 | 11.1 | 11.2 | 12.7 | 20.1 | 17.2 | 16.6 |
| 24 | 7.8 | 8.1 | 9.3 | 8.5 | 8.5 | 6.2 | 8.8 | 17.0 | 17.2 | 10.2 | 10.3 | 11.9 | 20.0 | 16.8 | 16.4 |
| 25 | 7.6 | 8.0 | 8.9 | 8.4 | 8.1 | 6.4 | 7.3 | 16.8 | 17.1 | 9.0 | 9.4 | 11.5 | 20.0 | 16.5 | 16.2 |
| 26 | 7.4 | 7.9 | 8.5 | 7.8 | 7.9 | 6.2 | 6.8 | 16.6 | 16.9 | 8.4 | 9.0 | 8.7 | 19.9 | 16.2 | 16.1 |
| 27 | 7.2 | 7.8 | 8.4 | 7.3 | 7.7 | 6.1 | 6.6 | 16.3 | 16.8 | 7.5 | 8.2 | 7.7 | 19.6 | 15.5 | 15.9 |
| 28 | 7.2 | 7.6 | 8.1 | 7.1 | 7.5 | 6.0 | 6.5 | 15.6 | 16.8 | 6.1 | 7.9 | 7.0 | 19.6 | 14.2 | 15.0 |
| 29 | 7.0 | 7.3 | 7.8 | 6.7 | 7.4 | 5.9 | 6.5 | 14.1 | 16.8 | 5.8 | 6.2 | 5.7 | 18.9 | 12.9 | 14.8 |
| 30 | 7.0 | 7.1 | 7.7 | 6.5 | 7.2 | 5.8 | 6.1 | 12.5 | 16.7 | 5.4 | 5.5 | 5.3 | 18.8 | 12.3 | 13.9 |

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August

| Sample Depth (meters) | Week 1 - 8/7/78 | | | Week 2 - 8/14/78 | | | Week 3 - 8/21/78 | | | Week 4 - 8/28/78 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 22.3 | 22.5 | 21.6 | 22.7 | 23.2 | 22.5 | 22.2 | 22.5 | 22.2 | 18.2 | 20.7 | 21.1 |
| 1 | 22.3 | 22.5 | 21.6 | 22.7 | 23.2 | 22.4 | 22.2 | 22.4 | 22.3 | 18.2 | 20.1 | 21.2 |
| 2 | 22.3 | 22.2 | 21.6 | 22.9 | 23.2 | 22.4 | 22.2 | 22.2 | 22.3 | 18.2 | 18.8 | 20.8 |
| 3 | 22.3 | 22.2 | 21.6 | 22.9 | 23.2 | 22.4 | 22.2 | 22.1 | 22.3 | 10.4 | 15.2 | 15.5 |
| 4 | 21.8 | 21.7 | 21.6 | 22.8 | 23.2 | 22.4 | 22.2 | 22.1 | 22.3 | 9.3 | 11.1 | 13.6 |
| 5 | 21.5 | 21.7 | 21.3 | 22.7 | 23.1 | 22.3 | 22.2 | 22.1 | 22.3 | 8.8 | 10.2 | 12.1 |
| 6 | 21.3 | 21.8 | 21.2 | 22.7 | 23.0 | 22.2 | 22.1 | 22.1 | 22.3 | 8.4 | 9.8 | 11.0 |
| 7 | 21.2 | 21.7 | 21.1 | 22.7 | 22.7 | 22.0 | 22.0 | 22.1 | 22.2 | 8.1 | 9.4 | 9.8 |
| 8 | 21.0 | 21.6 | 20.9 | 22.2 | 22.6 | 21.8 | 22.0 | 22.1 | 22.2 | 7.7 | 9.2 | 9.1 |
| 9 | 20.9 | 21.4 | 20.7 | 22.1 | 22.3 | 21.8 | 22.0 | 22.1 | 22.1 | 7.5 | 9.1 | 8.3 |
| 10 | 20.6 | 21.3 | 20.7 | 22.0 | 21.8 | 21.6 | 22.0 | 22.1 | 22.1 | 6.9 | 9.1 | 8.0 |
| 11 | 17.4 | 21.3 | 20.7 | 21.8 | 21.3 | 21.6 | 21.9 | 22.1 | 22.1 | 6.5 | 8.0 | 7.8 |
| 12 | 16.2 | 21.2 | 20.7 | 21.7 | 21.2 | 21.6 | 21.9 | 22.0 | 22.1 | 6.1 | 8.3 | 7.7 |
| 13 | 15.0 | 21.0 | 20.6 | 21.5 | 21.1 | 21.5 | 21.9 | 22.0 | 22.1 | 5.8 | 7.8 | 7.4 |
| 14 | 13.4 | 20.9 | 20.5 | 21.3 | 21.1 | 21.4 | 21.9 | 21.9 | 22.1 | 5.7 | 7.5 | 7.2 |
| 15 | 10.6 | 20.9 | 18.3 | 21.3 | 21.0 | 21.2 | 21.9 | 21.9 | 22.1 | 5.6 | 7.0 | 6.5 |
| 16 | 9.0 | 20.7 | 15.5 | 21.2 | 19.2 | 21.1 | 21.9 | 21.9 | 22.1 | 5.6 | 6.6 | 6.2 |
| 17 | 7.9 | 20.3 | 10.2 | 20.3 | 16.1 | 21.0 | 21.9 | 21.8 | 22.0 | 5.5 | 6.5 | 6.7 |
| 18 | 6.6 | 17.7 | 8.6 | 19.6 | 12.6 | 20.1 | 21.7 | 21.7 | 21.9 | 5.4 | 6.3 | 6.3 |
| 19 | 5.5 | 12.3 | 7.2 | 19.1 | 10.5 | 17.9 | 21.6 | 21.6 | 21.9 | 5.3 | 6.2 | 6.3 |
| 20 | 5.1 | 10.7 | 5.6 | 17.5 | 9.2 | 13.7 | 21.5 | 21.5 | 21.8 | 5.1 | 6.1 | 6.3 |
| 21 | 4.6 | 9.4 | 4.9 | 11.5 | 8.6 | 11.9 | 21.5 | 21.5 | 21.5 | 5.1 | 6.1 | 6.2 |
| 22 | 4.6 | 7.6 | 4.9 | 10.6 | 7.5 | 10.7 | 21.5 | 21.5 | 21.5 | 5.0 | 6.1 | 6.1 |
| 23 | 4.6 | 6.4 | 4.9 | 10.3 | 6.7 | 9.8 | 21.5 | 21.4 | 21.1 | 5.0 | 6.1 | 6.0 |
| 24 | 4.5 | 5.1 | 4.8 | 10.1 | 6.4 | 7.9 | 19.6 | 20.1 | 21.0 | 5.0 | 6.1 | 5.7 |
| 25 | 4.5 | 4.9 | 4.8 | 9.9 | 6.1 | 7.2 | 18.7 | 18.4 | 20.3 | 5.0 | 6.1 | 5.5 |
| 26 | 4.5 | 4.8 | 4.8 | 9.2 | 5.8 | 6.9 | 13.1 | 16.5 | 17.1 | 5.0 | 6.0 | 5.4 |
| 27 | 4.5 | 4.8 | 4.8 | 8.8 | 5.6 | 6.2 | 12.3 | 14.5 | 13.7 | 4.9 | 6.0 | 5.4 |
| 28 | 4.5 | 4.6 | 4.8 | 7.8 | 5.2 | 6.0 | 12.1 | 12.8 | 12.8 | 4.8 | 6.0 | 5.3 |
| 29 | 4.5 | 4.6 | 4.7 | 7.4 | 5.1 | 5.9 | 12.1 | 11.8 | 10.3 | 4.7 | 5.8 | 5.0 |
| 30 | 4.5 | 4.5 | 4.7 | 7.1 | 5.0 | 5.8 | 12.0 | 9.5 | 9.5 | 4.6 | 5.7 | 4.8 |

September

| Sample Depth (meters) | Week 1 – 9/5/78 | | | Week 2 – 9/11/78 | | | Week 3 – 9/18/78 | | | Week 4 – 9/26/78 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 20.8 | 21.0 | 20.7 | 18.1 | 17.9 | 18.4 | 8.2 | 12.8 | 12.8 | 13.8 | 13.6 | 13.4 |
| 1 | 20.8 | 21.0 | 20.7 | 18.1 | 17.9 | 18.4 | 8.1 | 12.6 | 12.8 | 13.8 | 13.6 | 13.4 |
| 2 | 20.8 | 21.0 | 20.7 | 18.0 | 17.9 | 18.4 | 8.0 | 11.5 | 12.7 | 13.8 | 13.6 | 13.4 |
| 3 | 20.8 | 21.0 | 20.6 | 17.9 | 17.9 | 18.4 | 7.7 | 8.6 | 12.0 | 13.8 | 13.7 | 13.4 |
| 4 | 20.8 | 21.0 | 20.6 | 17.8 | 17.9 | 18.4 | 7.4 | 8.0 | 11.2 | 13.8 | 13.7 | 13.4 |
| 5 | 20.8 | 21.0 | 20.6 | 17.5 | 17.9 | 18.4 | 7.3 | 7.2 | 11.1 | 13.8 | 13.7 | 13.4 |
| 6 | 20.8 | 21.0 | 20.6 | 17.4 | 17.9 | 18.4 | 7.1 | 6.3 | 7.4 | 13.8 | 13.7 | 13.4 |
| 7 | 20.8 | 21.0 | 20.6 | 16.8 | 17.9 | 18.4 | 6.9 | 6.2 | 7.2 | 13.8 | 13.7 | 13.4 |
| 8 | 20.8 | 21.0 | 20.6 | 16.2 | 17.8 | 18.4 | 6.4 | 6.1 | 6.2 | 13.8 | 13.7 | 13.4 |
| 9 | 20.8 | 20.9 | 20.6 | 15.3 | 17.8 | 18.3 | 5.5 | 6.0 | 5.8 | 13.8 | 13.7 | 13.4 |
| 10 | 20.8 | 20.9 | 20.6 | 14.5 | 17.8 | 18.1 | 5.4 | 5.9 | 5.7 | 13.8 | 13.7 | 13.4 |
| 11 | 20.8 | 20.9 | 20.6 | 13.9 | 17.7 | 16.3 | 5.0 | 5.8 | 5.5 | 13.8 | 13.6 | 13.4 |
| 12 | 20.8 | 20.9 | 20.6 | 13.6 | 17.5 | 15.8 | 4.9 | 5.7 | 5.5 | 13.8 | 13.5 | 13.4 |
| 13 | 20.8 | 20.9 | 20.6 | 13.2 | 16.1 | 15.1 | 4.7 | 5.6 | 5.4 | 13.8 | 13.5 | 13.4 |
| 14 | 20.8 | 20.9 | 20.6 | 12.1 | 14.5 | 14.1 | 4.7 | 5.5 | 5.4 | 13.8 | 13.4 | 13.3 |
| 15 | 20.8 | 20.9 | 20.6 | 11.2 | 13.2 | 13.7 | 4.7 | 5.4 | 5.4 | 13.8 | 13.4 | 13.2 |
| 16 | 20.8 | 20.9 | 20.6 | 9.6 | 12.5 | 13.3 | 4.7 | 5.4 | 5.3 | 13.8 | 13.4 | 13.2 |
| 17 | 20.8 | 20.8 | 20.6 | 9.1 | 12.0 | 13.1 | 4.7 | 5.2 | 5.3 | 13.7 | 13.4 | 13.2 |
| 18 | 20.8 | 19.8 | 20.6 | 8.7 | 11.5 | 12.2 | 4.7 | 5.2 | 5.3 | 13.7 | 13.4 | 13.2 |
| 19 | 20.8 | 19.1 | 20.6 | 8.4 | 11.4 | 11.3 | 4.7 | 5.1 | 5.3 | 13.7 | 13.4 | 13.2 |
| 20 | 20.8 | 17.2 | 20.6 | 8.2 | 11.3 | 10.8 | 4.6 | 5.1 | 5.3 | 13.7 | 13.4 | 13.1 |
| 21 | 16.9 | 15.7 | 20.4 | 6.7 | 11.2 | 10.6 | 4.6 | 5.1 | 5.3 | 13.7 | 13.4 | 13.1 |
| 22 | 15.8 | 15.2 | 14.5 | 6.2 | 10.9 | 9.6 | 4.6 | 5.1 | 5.3 | 13.7 | 13.4 | 13.1 |
| 23 | 14.5 | 13.7 | 13.4 | 5.8 | 9.5 | 8.6 | 4.6 | 5.0 | 5.3 | 13.7 | 13.3 | 13.1 |
| 24 | 13.2 | 13.3 | 13.0 | 5.6 | 9.1 | 8.0 | 4.6 | 4.9 | 5.3 | 13.7 | 13.3 | 13.1 |
| 25 | 12.2 | 12.8 | 12.0 | 5.5 | 8.3 | 7.7 | 4.6 | 4.9 | 5.3 | 13.7 | 13.3 | 13.0 |
| 26 | 11.3 | 11.7 | 11.6 | 5.4 | 7.7 | 7.5 | 4.6 | 4.9 | 5.3 | 13.7 | 13.2 | 13.0 |
| 27 | 10.7 | 11.0 | 11.3 | 5.4 | 7.5 | 7.2 | 4.6 | 4.9 | 5.3 | 13.7 | 13.1 | 13.0 |
| 28 | 10.2 | 10.5 | 10.8 | 5.1 | 7.2 | 6.8 | 4.6 | 4.8 | 5.3 | 13.7 | 13.1 | 13.0 |
| 29 | 9.7 | 10.4 | 9.8 | 5.0 | 7.0 | 6.6 | 4.6 | 4.8 | 5.3 | 13.6 | 13.1 | 12.9 |
| 30 | 9.6 | 10.3 | 9.4 | 4.9 | 6.9 | 6.5 | 4.6 | 4.8 | 5.3 | 13.6 | 13.1 | 12.9 |

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October

| Sample Depth (meters) | Week 1 – 10/2/78 | | | Week 2 – 10/9/78 | | | Week 3 – 10/16/78 | | | Week 4 – 10/23/78 | | | Week 5 – 10/30/78 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 10.9 | 11.0 |
| 1 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 10.9 | 11.0 |
| 2 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 10.9 | 11.0 |
| 3 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 10.9 | 11.0 |
| 4 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 10.9 | 11.0 |
| 5 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 11.0 | 11.0 |
| 6 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 11.0 | 11.0 |
| 7 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 11.0 | 11.0 |
| 8 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 11.0 | 11.0 |
| 9 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.1 | 12.1 | 12.2 | 11.1 | 11.0 | 11.0 |
| 10 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.8 | 12.7 | 12.7 | 12.7 | 12.0 | 12.1 | 12.2 | 11.1 | 11.0 | 11.0 |
| 11 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.7 | 12.7 | 12.6 | 12.0 | 12.0 | 12.2 | 11.1 | 11.0 | 11.0 |
| 12 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.7 | 12.7 | 12.6 | 11.9 | 12.0 | 12.2 | 11.1 | 11.0 | 11.0 |
| 13 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.6 | 12.7 | 12.6 | 11.9 | 12.0 | 12.2 | 11.0 | 11.0 | 11.0 |
| 14 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.6 | 12.7 | 12.6 | 11.9 | 11.9 | 12.2 | 11.0 | 11.0 | 11.0 |
| 15 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.6 | 12.7 | 12.6 | 11.9 | 11.9 | 12.2 | 11.0 | 11.0 | 11.0 |
| 16 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.6 | 12.7 | 12.6 | 11.8 | 11.9 | 12.2 | 11.0 | 11.0 | 11.0 |
| 17 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.6 | 12.7 | 12.6 | 11.8 | 11.9 | 12.1 | 11.0 | 11.0 | 11.0 |
| 18 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.6 | 12.7 | 12.6 | 11.8 | 11.9 | 12.1 | 10.9 | 10.9 | 11.0 |
| 19 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.6 | 12.7 | 12.5 | 11.8 | 11.9 | 12.0 | 10.9 | 10.9 | 11.0 |
| 20 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.5 | 12.7 | 12.5 | 11.8 | 11.9 | 11.9 | 10.9 | 10.9 | 10.9 |
| 21 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.4 | 12.7 | 12.5 | 11.7 | 11.9 | 11.8 | 10.9 | 10.9 | 10.9 |
| 22 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 21.3 | 12.7 | 12.5 | 11.7 | 11.9 | 11.8 | 10.6 | 10.9 | 10.9 |
| 23 | 15.2 | 15.2 | 15.1 | 13.8 | 13.8 | 13.9 | 12.3 | 12.7 | 12.4 | 11.7 | 11.9 | 11.8 | 10.4 | 10.9 | 10.9 |
| 24 | 15.2 | 15.1 | 15.1 | 13.8 | 13.8 | 13.9 | 12.2 | 12.7 | 12.4 | 11.7 | 11.9 | 11.8 | 10.3 | 10.9 | 10.9 |
| 25 | 15.2 | 15.1 | 15.1 | 13.8 | 13.8 | 13.9 | 12.0 | 12.7 | 12.4 | 11.7 | 11.9 | 11.7 | 10.2 | 10.9 | 10.9 |
| 26 | 15.2 | 15.1 | 15.1 | 13.8 | 13.8 | 13.9 | 11.4 | 12.7 | 12.3 | 11.7 | 11.8 | 11.7 | 10.1 | 10.9 | 10.9 |
| 27 | 15.2 | 15.1 | 15.1 | 13.8 | 13.8 | 13.9 | 11.2 | 12.7 | 12.3 | 11.7 | 11.8 | 11.6 | 10.1 | 10.7 | 10.8 |
| 28 | 15.2 | 15.0 | 15.1 | 13.8 | 13.8 | 13.9 | 11.0 | 12.7 | 12.3 | 11.7 | 11.8 | 11.6 | 10.1 | 10.6 | 10.5 |
| 29 | 15.1 | 14.6 | 15.1 | 13.8 | 13.8 | 13.9 | 10.9 | 12.5 | 12.3 | 11.7 | 11.8 | 11.6 | 10.1 | 10.5 | 10.3 |
| 30 | 15.1 | 14.1 | 14.9 | 13.8 | 13.8 | 13.9 | 10.8 | 12.4 | 12.3 | 11.7 | 11.8 | 11.6 | 10.1 | 10.3 | 10.1 |

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November

| Sample Depth (meters) | Week 1 – 11/6/78 | | | Week 2 –11/14/78 | | | Week 3 –11/21/78 | | | Week 4 –11/27/78 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 10.9 | 11.2 | 10.9 | 9.2 | 9.9 | 9.7 | 8.3 | 8.5 | 8.5 | 7.4 | 6.8 | 6.9 |
| 1 | 10.9 | 11.2 | 10.8 | 9.2 | 9.9 | 9.7 | 8.3 | 8.5 | 8.5 | 7.4 | 6.9 | 6.9 |
| 2 | 10.9 | 11.2 | 10.8 | 9.2 | 9.9 | 9.7 | 8.3 | 8.5 | 8.5 | 7.4 | 7.0 | 7.0 |
| 3 | 10.9 | 11.1 | 10.8 | 9.2 | 9.8 | 9.7 | 8.4 | 8.5 | 8.5 | 7.4 | 7.0 | 7.0 |
| 4 | 10.9 | 11.1 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.5 | 8.5 | 7.4 | 7.0 | 7.0 |
| 5 | 10.9 | 11.1 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.5 | 8.6 | 7.4 | 7.0 | 7.0 |
| 6 | 10.9 | 11.1 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.5 | 8.6 | 7.5 | 7.1 | 7.0 |
| 7 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.5 | 8.6 | 7.5 | 7.1 | 7.0 |
| 8 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 9 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 10 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 11 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 12 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 13 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.7 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 14 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.6 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 15 | 10.9 | 11.0 | 10.9 | 9.2 | 9.8 | 9.6 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 16 | 10.9 | 10.9 | 10.9 | 9.2 | 9.8 | 9.6 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 17 | 10.9 | 10.9 | 10.9 | 9.1 | 9.8 | 9.6 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 18 | 10.9 | 10.9 | 10.9 | 9.1 | 9.8 | 9.6 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 19 | 10.9 | 10.9 | 10.9 | 8.8 | 9.8 | 9.5 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 20 | 10.9 | 10.9 | 10.9 | 8.8 | 9.8 | 9.5 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 21 | 10.9 | 10.9 | 10.8 | 7.9 | 9.8 | 9.4 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 22 | 10.9 | 10.9 | 10.8 | 7.7 | 9.8 | 9.4 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 23 | 10.9 | 10.9 | 10.8 | 7.5 | 9.8 | 9.4 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 24 | 10.9 | 10.9 | 10.8 | 7.4 | 9.7 | 9.3 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 25 | 10.9 | 10.8 | 10.8 | 7.2 | 9.1 | 9.3 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 26 | 10.9 | 10.7 | 10.8 | 6.9 | 7.5 | 9.2 | 8.4 | 8.6 | 8.6 | 7.5 | 7.1 | 7.0 |
| 27 | 10.8 | 10.7 | 10.8 | 6.8 | 6.5 | 8.0 | 8.4 | 8.6 | 8.4 | 7.5 | 7.1 | 7.0 |
| 28 | 10.8 | 10.7 | 10.7 | 6.7 | 5.5 | 6.0 | 8.4 | 8.6 | 8.3 | 7.5 | 7.1 | 7.0 |
| 29 | 10.8 | 10.7 | 10.7 | 6.0 | 5.1 | 5.5 | 8.4 | 8.6 | 8.3 | 7.5 | 7.1 | 6.9 |
| 30 | 10.8 | 10.7 | 10.7 | 4.8 | 4.8 | 4.8 | 8.4 | 8.6 | 8.3 | 7.5 | 7.1 | 6.9 |

December

| Sample Depth (meters) | Week 1 – Dec.4 | | | Week 2 – | | | Week 3 – Dec.20 | | | Week 4 – | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| Surface | 6.0 | 6.2 | 5.7 | No temperatures obtained due to inclement weather | | | 1.5 | 1.1 | 1.5 | No temperatures obtained due to inclement weather | | |
| 1 | 6.0 | 6.2 | 5.7 | | | | 1.5 | 1.1 | 1.5 | | | |
| 2 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.2 | 1.5 | | | |
| 3 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.2 | 1.5 | | | |
| 4 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.2 | 1.5 | | | |
| 5 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.2 | 1.5 | | | |
| 6 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.2 | 1.5 | | | |
| 7 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.2 | 1.6 | | | |
| 8 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.2 | 1.6 | | | |
| 9 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.3 | 1.6 | | | |
| 10 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.5 | 1.6 | | | |
| 11 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.5 | 1.6 | | | |
| 12 | 6.0 | 6.2 | 5.7 | | | | 1.6 | 1.4 | 1.6 | | | |
| 13 | 6.0 | 6.2 | 5.7 | | | | 1.7 | 1.5 | 1.5 | | | |
| 14 | 6.0 | 6.2 | 5.7 | | | | 1.7 | 1.4 | 1.5 | | | |
| 15 | 6.0 | 6.2 | 5.7 | | | | 1.7 | 1.3 | 1.5 | | | |
| 16 | 6.0 | 6.2 | 5.7 | | | | 1.7 | 1.4 | 1.5 | | | |
| 17 | 6.0 | 6.2 | 5.7 | | | | 1.7 | 1.5 | 1.5 | | | |
| 18 | 6.0 | 6.2 | 5.7 | | | | 1.7 | 1.6 | 1.5 | | | |
| 19 | 6.0 | 6.2 | 5.7 | | | | 1.7 | 1.7 | 1.5 | | | |
| 20 | 6.0 | 6.2 | 5.7 | | | | 1.8 | 1.7 | 1.5 | | | |
| 21 | 6.0 | 6.2 | 5.7 | | | | 1.8 | 1.7 | 1.6 | | | |
| 22 | 6.0 | 6.2 | 5.7 | | | | 1.8 | 1.8 | 1.7 | | | |
| 23 | 6.0 | 6.2 | 5.7 | | | | 1.8 | 1.9 | 1.7 | | | |
| 24 | 6.0 | 6.2 | 5.7 | | | | 1.8 | 1.9 | 1.7 | | | |
| 25 | 6.0 | 6.2 | 5.6 | | | | 1.8 | 2.0 | 1.7 | | | |
| 26 | 6.0 | 6.2 | 5.6 | | | | 1.8 | 2.0 | 1.7 | | | |
| 27 | 6.0 | 6.2 | 5.6 | | | | 1.8 | 2.1 | 1.7 | | | |
| 28 | 6.0 | 6.2 | 5.6 | | | | 1.8 | 2.1 | 1.8 | | | |
| 29 | 6.0 | 6.2 | 5.6 | | | | 2.0 | 2.1 | 1.8 | | | |
| 30 | 6.0 | 6.0 | 5.6 | | | | 2.1 | 2.1 | 1.9 | | | |

Table G-2 (Page 1 of 2)

Monthly Water Quality Parameters from Surface Samples at 20- and 40-ft Contours in Vicinity of Nine Mile Point and James A. FitzPatrick Power Plants, 1978

| | 20-Ft Contour | | | 40-Ft Contour | | |
|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| **DO (mg/l)** | | | | | | |
| 11 Apr | 14.5 | 15.5 | 15.4 | 15.1 | 15.2 | 15.4 |
| 8 May | 14.8 | 14.7 | 14.9 | 14.9 | 14.7 | 14.9 |
| 12 Jun | 12.1 | 13.0 | 13.0 | 12.2 | 12.2 | 12.6 |
| 11 Jul | 8.5 | 9.0 | 9.1 | 8.7 | 9.3 | 9.1 |
| 7 Aug | 9.6 | 9.0 | 9.6 | 9.2 | 8.2 | 9.4 |
| 11 Sep | 8.6 | 8.6 | 8.7 | 8.6 | 8.5 | 8.8 |
| 9 Oct | 8.9 | 9.0 | 8.8 | 9.0 | 8.8 | 8.9 |
| 6 Nov | 11.1 | 10.8 | 11.3 | 10.8 | 10.7 | 11.0 |
| 6 Dec | 13.7 | 13.7 | 13.6 | 13.8 | 13.6 | 13.5 |
| **Water Temperature (C°)** | | | | | | |
| 11 Apr | 4.0 | 3.4 | 3.5 | 5.0 | 6.0 | 3.0 |
| 8 May | 5.3 | 5.6 | 7.0 | 5.3 | 6.6 | 5.6 |
| 12 Jun | 14.6 | 14.5 | 14.0 | 24.7 | 15.0 | 13.0 |
| 11 Jul | 22.0 | 22.9 | 20.1 | 20.7 | 21.5 | 19.8 |
| 7 Aug | 22.7 | 23.5 | 23.4 | 24.9 | 22.3 | 22.5 |
| 11 Sep | 18.5 | 18.4 | 17.8 | 18.8 | 18.8 | 18.1 |
| 9 Oct | 12.0 | 14.1 | 13.5 | 14.0 | 12.3 | 12.5 |
| 6 Nov | 10.5 | 12.5 | 11.0 | 10.5 | 12.0 | 11.0 |
| 6 Dec | 4.9 | 5.8 | 5.6 | 4.8 | 5.6 | 5.7 |
| **pH (Units)** | | | | | | |
| 11 Apr | 8.2 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 |
| 8 May | 8.4 | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 |
| 12 Jun | 8.6 | 8.7 | 8.6 | 8.6 | 8.7 | 8.7 |
| 11 Jul | 8.5 | 8.5 | 8.4 | 8.5 | 8.7 | 8.6 |
| 7 Aug | 8.6 | 8.5 | 8.6 | 8.5 | 8.4 | 8.6 |
| 11 Sep | 8.3 | 8.3 | 8.3 | 8.4 | 8.3 | 8.4 |
| 9 Oct | 8.3 | 8.3 | 8.3 | 8.4 | 8.4 | 8.4 |
| 6 Nov | 8.2 | 8.2 | 8.3 | 8.2 | 8.2 | 8.3 |
| 6 Dec | 7.9 | 8.0 | 8.0 | 7.9 | 8.0 | 8.0 |

| | 20-Ft Contour | | | 40-Ft Contour | | |
|---|---|---|---|---|---|---|
| | NMPW | FITZ | NMPE | NMPW | FITZ | NMPE |
| **Total Solids (mg/l)** | | | | | | |
| 11 Apr | 236 | 240 | 226 | 213 | 190 | 249 |
| 8 May | 214 | 419 | 195 | 201 | 202 | 176 |
| 12 Jun | 210 | 206 | 205 | 225 | 218 | 220 |
| 11 Jul | 222 | 171 | 154 | 196 | 136 | 171 |
| 7 Aug | 211 | 185 | 199 | 205 | 206 | 188 |
| 11 Sep | 281 | 316 | 284 | 282 | 300 | 261 |
| 9 Oct | 190 | 199 | 202 | 182 | 160 | 191 |
| 6 Nov | 227 | 218 | 214 | 217 | 215 | 220 |
| 6 Dec | 220 | 216 | 202 | 210 | 212 | 208 |
| **TSS (mg/l)** | | | | | | |
| 11 Apr | 2.3 | 2.8 | 2.8 | 3.0 | 3.5 | 4.0 |
| 8 May | 1.4 | 0.8 | 1.0 | 1.4 | 1.2 | 1.0 |
| 12 Jun | 0.8 | 0.6 | 0.4 | 0.2 | 0.4 | 0.6 |
| 11 Jul | 3.4 | 5.4 | 5.2 | 1.2 | 3.4 | 5.2 |
| 7 Aug | <0.1 | 0.6 | 0.6 | 0.2 | 1.6 | 1.6 |
| 11 Sep | 0.8 | 1.2 | 2.2 | 0.6 | 0.6 | <0.1 |
| 9 Oct | 1.2 | <0.1 | 1.0 | 0.4 | <0.1 | <0.1 |
| 6 Nov | 1.6 | 0.8 | 0.8 | 1.4 | 0.8 | 2.2 |
| 6 Dec | 0.8 | 0.2 | <0.1 | 0.2 | 0.8 | <0.1 |
| **Total Phos. (mg/l-P)** | | | | | | |
| 11 Apr | 0.048 | 0.022 | 0.018 | 0.032 | 0.021 | 0.020 |
| 8 May | 0.015 | 0.015 | 0.013 | 0.011 | 0.008 | 0.013 |
| 12 Jun | 0.019 | 0.028 | 0.020 | 0.021 | 0.020 | 0.023 |
| 11 Jul | 0.044 | 0.028 | 0.030 | 0.030 | 0.022 | 0.029 |
| 7 Aug | 0.012 | 0.013 | 0.009 | 0.008 | 0.012 | 0.006 |
| 11 Sep | 0.013 | 0.014 | 0.014 | 0.014 | 0.014 | 0.014 |
| 9 Oct | 0.023 | 0.024 | 0.031 | 0.021 | 0.021 | 0.014 |
| 6 Nov | 0.015 | 0.012 | 0.011 | 0.010 | 0.009 | 0.010 |
| 6 Dec | 0.035 | 0.020 | 0.014 | 0.052 | 0.031 | 0.017 |

Table G-2 (Page 2 of 2)

| | 20-Ft Contour NMPW | 20-Ft Contour FITZ | 20-Ft Contour NMPE | 40-Ft Contour NMPW | 40-Ft Contour FITZ | 40-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| Calcium (mg/l-Ca) | | | | | | |
| 11 Apr | 36.3 | 38.8 | 33.1 | 38.1 | 37.5 | 34.3 |
| 8 May | 36.4 | 37.0 | 37.7 | 37.7 | 37.7 | 37.7 |
| 12 Jun | 40.5 | 39.2 | 40.5 | 40.5 | 43.0 | 40.5 |
| 11 Jul | 48.8 | 48.5 | 37.5 | 53.8 | 43.8 | 48.8 |
| 7 Aug | 43.8 | 41.2 | 41.9 | 43.8 | 41.9 | 41.2 |
| 11 Sep | 30.7 | 32.5 | 34.3 | 30.9 | 32.1 | 30.7 |
| 9 Oct | 31.7 | 31.9 | 31.9 | 30.5 | 31.1 | 31.7 |
| 6 Nov | 40.6 | 38.5 | 38.5 | 38.5 | 38.5 | 36.4 |
| 6 Dec | 29.2 | 29.2 | 28.6 | 29.9 | 31.8 | 31.7 |
| Sodium (mg/l-Na) | | | | | | |
| 11 Apr | 12.3 | 12.9 | 12.6 | 13.0 | 12.7 | 12.7 |
| 8 May | 15.6 | 14.6 | 15.0 | 17.8 | 15.3 | 15.1 |
| 12 Jun | 13.5 | 13.0 | 13.1 | 16.0 | 13.3 | 13.5 |
| 11 Jul | 20.5 | 16.5 | 16.5 | 19.2 | 14.5 | 19.5 |
| 7 Aug | 20.0 | 17.2 | 17.5 | 17.5 | 16.2 | 14.2 |
| 11 Sep | 12.9 | 14.5 | 12.0 | 12.0 | 14.3 | 12.0 |
| 9 Oct | 12.0 | 12.9 | 13.1 | 11.8 | 11.8 | 12.0 |
| 6 Nov | 13.3 | 12.8 | 12.5 | 13.2 | 13.0 | 13.2 |
| 6 Dec | 12.7 | 13.1 | 11.0 | 12.0 | 12.4 | 11.2 |
| Chromium (mg/l-Cr) | | | | | | |
| 11 Apr | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| 8 May | 0.002 | 0.002 | 0.001 | 0.001 | 0.001 | 0.001 |
| 12 Jun | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| 11 Jul | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| 7 Aug | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| 11 Sep | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | <0.001 |
| 9 Oct | <0.001 | 0.002 | 0.002 | 0.003 | 0.002 | 0.003 |
| 6 Nov | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| 6 Dec | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| Sulfate (mg/l-$SO_4$) | | | | | | |
| 11 Apr | 28.0 | 29.5 | 27.7 | 29.1 | 27.7 | 31.7 |
| 8 May | 27.2 | 27.8 | 27.7 | 27.8 | 28.1 | 27.7 |
| 12 Jun | 28.3 | 28.2 | 29.4 | 30.9 | 28.8 | 29.2 |
| 11 Jul | 25.9 | 25.0 | 25.1 | 25.8 | 24.5 | 25.3 |
| 7 Aug | 25.0 | 24.4 | 24.4 | 24.6 | 24.4 | 23.7 |
| 11 Sep | 29.8 | 30.7 | 29.8 | 28.8 | 27.4 | 24.6 |
| 9 Oct | 29.5 | 28.2 | 28.7 | 27.9 | 28.4 | 27.6 |
| 6 Nov | 30.7 | 30.1 | 30.2 | 30.2 | 29.9 | 30.0 |
| 6 Dec | 26.2 | 25.8 | 26.2 | 26.6 | 27.0 | 26.6 |

| | 20-Ft Contour NMPW | 20-Ft Contour FITZ | 20-Ft Contour NMPE | 40-Ft Contour NMPW | 40-Ft Contour FITZ | 40-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| Gross Alpha (pCi/l) | | | | | | |
| 11 Apr | <1.71 | <1.71 | <1.71 | <1.73 | <1.71 | <1.74 |
| 8 May | <1.05 | <1.06 | <1.04 | <1.06 | <1.08 | <1.07 |
| 12 Jun | <0.88 | <0.91 | <0.94 | <0.96 | <0.93 | <0.80 |
| 11 Jul | <1.27 | <1.23 | <1.21 | <1.23 | <1.16 | <1.23 |
| 7 Aug | <0.79 | <0.79 | <0.79 | <0.82 | <0.78 | <0.76 |
| 11 Sep | <0.80 | <0.76 | <0.70 | <0.70 | <0.80 | <0.70 |
| 9 Oct | 2.97 | <0.33 | 0.88 | <0.33 | 0.77 | 0.99 |
| 6 Nov | <0.58 | <0.58 | <0.53 | <0.53 | <0.58 | <0.56 |
| 6 Dec | <1.33 | <1.28 | <1.26 | <1.31 | <1.36 | <1.31 |
| Gross Beta (pCi/l) | | | | | | |
| 11 Apr | 5.54 | 4.65 | 3.18 | 4.48 | 4.24 | 6.77 |
| 8 May | 3.00 | 2.95 | 3.32 | 3.10 | 2.50 | 6.06 |
| 12 Jun | 4.08 | 2.82 | 3.64 | 3.04 | 3.31 | 2.48 |
| 11 Jul | 3.21 | 5.29 | 3.34 | 3.16 | 4.17 | 3.26 |
| 7 Aug | 2.75 | 2.90 | 2.36 | 2.78 | 2.63 | 2.86 |
| 11 Sep | 3.11 | 2.98 | 2.84 | 2.90 | 2.92 | 3.09 |
| 9 Oct | 2.95 | 3.48 | 3.02 | 3.04 | 2.91 | 3.63 |
| 6 Nov | 3.38 | 3.09 | 2.71 | 3.55 | 3.57 | 3.04 |
| 6 Dec | 2.84 | 2.08 | 1.91 | 2.92 | 2.33 | 2.79 |
| Gamma Spectroscopy (pCi/l) | | | | | | |
| 11 Apr | BELOW DETECTION* | | | BELOW DETECTION | | |
| 8 May | BELOW DETECTION | | | BELOW DETECTION | | |
| 12 Jun | BELOW DETECTION | | | BELOW DETECTION | | |
| 11 Jul | BELOW DETECTION | | | BELOW DETECTION | | |
| 7 Aug | BELOW DETECTION | | | BELOW DETECTION | | |
| 11 Sep | BELOW DETECTION | | | BELOW DETECTION | | |
| 9 Oct | BELOW DETECTION | | | BELOW DETECTION | | |
| 6 Nov | BELOW DETECTION | | | BELOW DETECTION | | |
| 6 Dec | BELOW DETECTION | | | BELOW DETECTION | | |
| Tritium (pCi/Liter) | | | | | | |
| 11 Apr | 193 | 276 | <160 | 291 | 191 | <160 |
| 8 May | 375 | 342 | 189 | 297 | 335 | 562 |
| 12 Jun | 141 | 288 | 202 | 269 | 127 | 127 |
| 11 Jul | 314 | 223 | 277 | 274 | 344 | 393 |
| 7 Aug | 183 | 176 | 157 | 191 | 160 | 127 |
| 11 Sep | 194 | 326 | 378 | 191 | 276 | 265 |
| 9 Oct | 293 | 213 | 283 | 272 | 253 | 239 |
| 6 Nov | 198 | 178 | 200 | 178 | 180 | 349 |
| 6 Dec | 227 | <187 | <187 | <187 | <187 | 185 |

*Minimum Detection Limits (MDL's in pCi/liter) for representative isotopes in Gamma Spectrometric Analysis: Mn - 54 = 1.0; Fe - 59 = 3.0; Co - 58 = 1.0; Co - 60 = 2.0; Zn - 65 = 2.0 - 3.0; Zr - Nb - 95 = 2.0; I - 131 = 1.0; Cs - 134 = 1.0; Cs - 137 = 1.0; Ba - La - 140 = 2.0.

Table G-3 (Page 1 of 3)

Semimonthly Water Quality Parameters from Surface Samples at 20- and 60-ft Contours in Vicinity of Nine Mile Point and James A. FitzPatrick Power Plants, 1978

| | 20-Ft Contour | | | 60-Ft Contour | | |
|---|---|---|---|---|---|---|
| | NMPW | NMPP | NMPE | NMPW | NMPP | NMPE |
| **DO (mg/l)** | | | | | | |
| 11 Apr | 14.5 | 14.6 | 15.4 | 15.2 | 15.5 | 15.4 |
| 24 Apr | 14.5 | 14.2 | 14.4 | 14.6 | 14.5 | 14.4 |
| 8 May | 14.8 | 14.8 | 14.9 | 14.9 | 14.7 | 15.0 |
| 22 May | 14.2 | 14.6 | 15.3 | 16.7 | 15.6 | 16.6 |
| 12 Jun | 12.1 | 12.4 | 13.0 | 12.0 | 12.1 | 12.9 |
| 26 Jun | 14.1 | 14.3 | 14.5 | 14.2 | 14.5 | 14.6 |
| 11 Jul | 8.5 | 9.7 | 9.1 | 9.0 | 9.3 | 9.5 |
| 29 Jul | 8.4 | 8.4 | 8.3 | 8.4 | 8.4 | 8.3 |
| 7 Aug | 8.4 | 8.4 | 8.1 | 8.4 | 7.4 | 9.0 |
| 21 Aug | 8.2 | 8.2 | 8.4 | 8.2 | 8.2 | 8.4 |
| 13 Sep | 8.6 | 8.5 | 8.7 | 8.6 | 8.6 | 8.8 |
| 27 Sep | 10.4 | 10.8 | 11.1 | 10.0 | 10.6 | 11.1 |
| 9 Oct | 8.9 | 9.0 | 8.8 | 9.0 | 9.0 | 8.9 |
| 26 Oct | 9.4 | 9.7 | 9.7 | 9.4 | 9.5 | 9.4 |
| 6 Nov | 11.1 | 10.7 | 10.8 | 10.7 | 11.3 | 11.3 |
| 21 Nov | 10.2 | 10.2 | 10.4 | 10.2 | 10.2 | 10.1 |
| 6 Dec | 13.7 | 13.7 | 13.4 | 13.6 | 13.8 | 13.3 |
| 20 Dec | 13.7 | 14.0 | 13.3 | 13.7 | 13.5 | 13.0 |
| **Water Temperature (C°)** | | | | | | |
| 11 Apr | 4.0 | 8.5 | 3.5 | 2.8 | 2.8 | 2.8 |
| 24 Apr | 2.4 | 7.1 | 2.3 | 2.5 | 2.5 | 2.2 |
| 8 May | 5.3 | 9.0 | 7.0 | 5.3 | 5.4 | 5.7 |
| 22 May | 11.1 | 10.0 | 8.8 | 9.3 | 9.8 | 7.5 |
| 12 Jun | 14.6 | 18.0 | 14.0 | 15.0 | 14.5 | 13.0 |
| 26 Jun | 15.2 | 14.8 | 14.0 | 14.5 | 14.5 | 15.2 |
| 11 Jul | 22.0 | 23.4 | 20.1 | 20.7 | 23.5 | 20.0 |
| 29 Jul | 23.6 | 24.9 | 23.4 | 24.3 | 24.4 | 23.5 |
| 7 Aug | 22.7 | 25.4 | 23.4 | 24.5 | 22.5 | 22.6 |
| 21 Aug | 23.0 | 26.0 | 23.0 | 23.0 | 23.0 | 23.5 |
| 13 Sep | 18.5 | 21.0 | 17.8 | 18.9 | 19.5 | 18.1 |
| 27 Sep | 14.5 | 14.0 | 14.0 | 14.0 | 14.5 | 13.0 |
| 9 Oct | 12.0 | 15.0 | 13.5 | 13.0 | 14.0 | 12.0 |
| 26 Oct | 11.5 | 13.2 | 11.2 | 11.5 | 11.7 | 11.2 |
| 6 Nov | 10.5 | 12.5 | 11.0 | 10.5 | 12.5 | 11.5 |
| 21 Nov | 11.5 | 14.0 | 11.0 | 12.5 | 11.5 | 11.5 |
| 6 Dec | 4.9 | 6.5 | 5.6 | 5.3 | 5.6 | 5.7 |
| 20 Dec | 1.0 | 0.8 | 0.7 | 1.4 | 1.4 | 1.2 |
| **pH (Units)** | | | | | | |
| 11 Apr | 8.2 | 8.5 | 8.3 | 8.3 | 8.3 | 8.3 |
| 24 Apr | 8.0 | 8.3 | 8.1 | 8.3 | 8.2 | 7.7 |
| 8 May | 8.4 | 8.5 | 8.6 | 8.6 | 8.5 | 8.6 |
| 22 May | 8.3 | 8.4 | 8.4 | 8.6 | 8.5 | 8.5 |
| 12 Jun | 8.6 | 8.6 | 8.6 | 8.5 | 8.6 | 8.6 |
| 26 Jun | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.5 |
| 11 Jul | 8.5 | 8.6 | 8.4 | 8.6 | 8.7 | 8.7 |
| 29 Jul | 8.5 | 8.6 | 8.5 | 8.5 | 8.5 | 8.5 |
| 7 Aug | 8.6 | 8.4 | 8.6 | 8.5 | 8.5 | 8.6 |
| 21 Aug | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 | 8.4 |
| 13 Sep | 8.3 | 8.3 | 8.3 | 8.4 | 8.3 | 8.3 |
| 27 Sep | 8.4 | 8.4 | 8.5 | 8.4 | 8.4 | 8.4 |
| 9 Oct | 8.3 | 8.3 | 8.3 | 8.4 | 8.4 | 8.4 |
| 26 Oct | 8.2 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 |
| 6 Nov | 8.2 | 8.2 | 8.3 | 8.3 | 8.3 | 8.3 |
| 21 Nov | 8.1 | 8.2 | 8.2 | 8.2 | 8.2 | 8.2 |
| 6 Dec | 7.9 | 8.1 | 8.0 | 8.0 | 8.0 | 8.0 |
| 20 Dec | 8.0 | 8.2 | 8.2 | 8.2 | 8.2 | 8.2 |

| | 20-Ft Contour | | | 60-Ft Contour | | |
|---|---|---|---|---|---|---|
| | NMPW | NMPP | NMPE | NMPW | NMPP | NMPE |
| **Sp. Cond. (μmhos)** | | | | | | |
| 11 Apr | 310 | 390 | 380 | 390 | 380 | 390 |
| 24 Apr | 380 | 375 | 335 | 360 | 340 | 350 |
| 8 May | 410 | 325 | 380 | 365 | 305 | 390 |
| 22 May | 600 | 510 | 440 | 410 | 460 | 390 |
| 12 Jun | 300 | 350 | 380 | 400 | 370 | 360 |
| 26 Jun | 380 | 350 | 390 | 380 | 370 | 430 |
| 11 Jul | 383 | 339 | 360 | 375 | 340 | 345 |
| 29 Jul | 320 | 370 | 300 | 330 | 320 | 340 |
| 7 Aug | 410 | 340 | 320 | 375 | 320 | 320 |
| 21 Aug | 310 | 310 | 330 | 310 | 310 | 330 |
| 13 Sep | 340 | 290 | 320 | 320 | 340 | 320 |
| 27 Sep | 320 | 320 | 330 | 320 | 320 | 320 |
| 9 Oct | 340 | 340 | 350 | 330 | 340 | 340 |
| 26 Oct | 400 | 390 | 380 | 400 | 380 | 380 |
| 6 Nov | 400 | 395 | 400 | 400 | 400 | 400 |
| 21 Nov | 410 | 420 | 390 | 380 | 380 | 360 |
| 6 Dec | 370 | 390 | 355 | 400 | 330 | 325 |
| 20 Dec | 340 | 370 | 360 | 340 | 330 | 335 |
| **Turbidity (NTU)** | | | | | | |
| 11 Apr | 3.6 | 3.1 | 3.3 | 3.2 | 3.4 | 2.6 |
| 24 Apr | 1.9 | 1.5 | 2.3 | 1.6 | 1.8 | 2.3 |
| 8 May | 1.4 | 3.5 | 2.3 | 1.8 | 2.7 | 3.3 |
| 22 May | 2.6 | 3.3 | 2.3 | 1.8 | 2.4 | 1.6 |
| 12 Jun | 2.4 | 2.0 | 2.7 | 2.5 | 2.3 | 2.1 |
| 26 Jun | 2.7 | 3.8 | 4.4 | 2.6 | 4.3 | 4.4 |
| 11 Jul | 3.4 | 2.4 | 2.1 | 2.6 | 2.0 | 2.0 |
| 29 Jul | 1.1 | 1.3 | 1.9 | 1.2 | 1.0 | 1.0 |
| 7 Aug | 2.3 | 2.8 | 2.7 | 2.2 | 2.1 | 1.9 |
| 21 Aug | 3.4 | 3.3 | 3.0 | 3.2 | 2.8 | 2.8 |
| 13 Sep | 2.1 | 2.2 | 2.7 | 1.8 | 2.2 | 2.3 |
| 27 Sep | 2.1 | 2.9 | 2.6 | 2.3 | 2.7 | 2.3 |
| 9 Oct | 1.8 | 1.8 | 2.7 | 1.6 | 2.1 | 2.4 |
| 26 Oct | 2.6 | 2.2 | 2.2 | 2.0 | 2.4 | 1.9 |
| 6 Nov | 2.8 | 2.2 | 2.2 | 2.2 | 2.4 | 2.7 |
| 21 Nov | 2.3 | 2.3 | 2.2 | 1.6 | 2.1 | 1.4 |
| 6 Dec | 2.1 | 2.6 | 2.1 | 1.9 | 1.6 | 1.5 |
| 20 Dec | 3.7 | 5.0 | 4.0 | 3.5 | 3.3 | 4.8 |
| **Carbon Dioxide (mg/l)** | | | | | | |
| 11 Apr | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 24 Apr | 4.6 | 0.0 | 1.6 | 0.0 | 1.0 | 5.8 |
| 8 May | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 22 May | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 12 Jun | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 26 Jun | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 11 Jul | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 29 Jul | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 7 Aug | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 21 Aug | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 13 Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 27 Sep | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 Oct | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 26 Oct | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 6 Nov | 0.4 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| 21 Nov | 0.5 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 |
| 6 Dec | 0.5 | 0.3 | 0.4 | 0.4 | 0.6 | 0.5 |
| 20 Dec | 0.4 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |

# Table G-3 (Page 2 of 3)

| Total Phos (mg/l-P) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 0.024 | 0.025 | 0.024 | 0.019 | 0.027 | 0.021 |
| 24 Apr | 0.018 | 0.019 | 0.018 | 0.027 | 0.016 | 0.016 |
| 8 May | 0.013 | 0.008 | 0.008 | 0.010 | 0.008 | 0.010 |
| 22 May | 0.027 | 0.025 | 0.033 | 0.025 | 0.030 | 0.026 |
| 12 Jun | 0.021 | 0.019 | 0.018 | 0.023 | 0.021 | 0.019 |
| 26 Jun | 0.028 | 0.022 | 0.028 | 0.026 | 0.031 | 0.033 |
| 11 Jul | 0.037 | 0.030 | 0.034 | 0.037 | 0.028 | 0.031 |
| 29 Jul | 0.019 | 0.019 | 0.028 | 0.017 | 0.017 | 0.024 |
| 7 Aug | 0.010 | 0.010 | 0.004 | 0.004 | 0.005 | 0.004 |
| 21 Aug | 0.017 | 0.016 | 0.017 | 0.014 | 0.015 | 0.015 |
| 13 Sep | 0.011 | 0.014 | 0.014 | 0.015 | 0.015 | 0.016 |
| 27 Sep | 0.008 | 0.016 | 0.011 | 0.009 | 0.011 | 0.016 |
| 9 Oct | 0.021 | 0.036 | 0.018 | 0.016 | 0.022 | 0.022 |
| 26 Oct | 0.020 | 0.020 | 0.025 | 0.028 | 0.026 | 0.038 |
| 6 Nov | 0.009 | 0.009 | 0.013 | 0.011 | 0.009 | 0.011 |
| 21 Nov | 0.013 | 0.011 | 0.010 | 0.009 | 0.006 | 0.005 |
| 6 Dec | 0.020 | 0.037 | 0.016 | 0.012 | 0.083 | 0.028 |
| 20 Dec | 0.021 | 0.047 | 0.014 | 0.008 | 0.110 | 0.044 |

| Orthophosphorus (mg/l-P) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 0.007 | 0.008 | 0.006 | 0.008 | 0.008 | 0.008 |
| 24 Apr | 0.017 | 0.019 | 0.012 | 0.009 | 0.012 | 0.008 |
| 8 May | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |
| 22 May | 0.018 | 0.014 | 0.012 | 0.012 | 0.016 | 0.018 |
| 12 Jun | 0.004 | 0.003 | 0.003 | 0.005 | 0.005 | 0.006 |
| 26 Jun | 0.004 | 0.003 | 0.004 | 0.003 | 0.003 | 0.004 |
| 11 Jul | 0.004 | 0.008 | 0.003 | 0.006 | 0.005 | 0.005 |
| 29 Jul | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| 7 Aug | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| 21 Aug | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| 13 Sep | 0.004 | 0.004 | 0.004 | 0.004 | 0.004 | 0.004 |
| 27 Sep | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| 9 Oct | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| 26 Oct | <0.002 | <0.002 | <0.002 | 0.003 | <0.002 | <0.002 |
| 6 Nov | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| 21 Nov | 0.005 | 0.005 | 0.006 | 0.004 | 0.003 | 0.002 |
| 6 Dec | 0.002 | 0.002 | 0.003 | 0.002 | 0.005 | <0.003 |
| 20 Dec | 0.008 | 0.012 | 0.010 | 0.004 | 0.003 | 0.003 |

| Silica (mg/l-$SiO_2$) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 0.44 | 0.49 | 0.46 | 0.49 | 0.45 | 0.44 |
| 24 Apr | 0.31 | 0.32 | 0.33 | 0.31 | 0.33 | 0.29 |
| 8 May | 0.10 | 0.13 | 0.10 | 0.10 | 0.13 | 0.11 |
| 22 May | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | 0.06 |
| 12 Jun | 0.05 | <0.05 | 0.05 | 0.07 | 0.05 | <0.05 |
| 26 Jun | 0.17 | 0.14 | 0.16 | 0.16 | 0.14 | 0.12 |
| 11 Jul | 0.30 | 0.26 | 0.26 | 0.27 | 0.26 | 0.27 |
| 29 Jul | 0.11 | 0.09 | 0.16 | 0.11 | 0.11 | 0.12 |
| 7 Aug | 0.30 | 0.16 | 0.16 | 0.28 | 0.23 | 0.17 |
| 21 Aug | 0.13 | 0.12 | 0.14 | 0.13 | 0.12 | 0.11 |
| 13 Sep | 0.13 | 0.14 | 0.15 | 0.18 | 0.16 | 0.19 |
| 27 Sep | 0.25 | 0.25 | 0.27 | 0.25 | 0.23 | 0.24 |
| 9 Oct | 0.12 | 0.12 | 0.10 | 0.12 | 0.13 | 0.13 |
| 26 Oct | 0.15 | 0.12 | 0.17 | 0.17 | 0.14 | 0.15 |
| 6 Nov | 0.11 | 0.14 | 0.11 | 0.17 | 0.14 | 0.14 |
| 21 Nov | 0.18 | 0.20 | 0.19 | 0.20 | 0.21 | 0.25 |
| 6 Dec | 0.33 | 0.35 | 0.33 | 0.31 | 0.34 | 0.33 |
| 20 Dec | 0.21 | 0.31 | 0.26 | 0.14 | 0.16 | 0.21 |

| Nitrate (mg/l-N) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 0.33 | 0.37 | 0.34 | 0.37 | 0.37 | 0.38 |
| 24 Apr | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 |
| 8 May | 0.20 | 0.22 | 0.20 | 0.20 | 0.22 | 0.21 |
| 22 May | 0.35 | 0.34 | 0.30 | 0.23 | 0.29 | 0.26 |
| 12 Jun | 0.15 | 0.16 | 0.17 | 0.19 | 0.17 | 0.17 |
| 26 Jun | 0.19 | 0.20 | 0.19 | 0.18 | 0.18 | 0.17 |
| 11 Jul | 0.06 | 0.05 | 0.05 | 0.06 | 0.06 | 0.05 |
| 29 Jul | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 7 Aug | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 |
| 21 Aug | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 | <0.04 |
| 13 Sep | 0.08 | 0.09 | 0.10 | 0.05 | 0.09 | 0.06 |
| 27 Sep | 0.15 | 0.17 | 0.16 | 0.16 | 0.16 | 0.15 |
| 9 Oct | 0.12 | 0.14 | 0.12 | 0.12 | 0.12 | 0.13 |
| 26 Oct | 0.12 | 0.13 | 0.12 | 0.18 | 0.13 | 0.14 |
| 6 Nov | 0.16 | 0.18 | 0.15 | 0.16 | 0.16 | 0.16 |
| 21 Nov | 0.18 | 0.19 | 0.18 | 0.17 | 0.17 | 0.17 |
| 6 Dec | 0.27 | 0.27 | 0.27 | 0.27 | 0.28 | 0.28 |
| 20 Dec | 0.28 | 0.30 | 0.30 | 0.27 | 0.28 | 0.29 |

| Chlorophyll a (µg/l) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 2.84 | 2.28 | 2.88 | 2.24 | 2.28 | 2.68 |
| 24 Apr | 2.95 | 2.92 | 2.68 | 2.72 | 2.20 | 3.64 |
| 8 May | 5.81 | 3.64 | 6.01 | 5.49 | 4.29 | 4.65 |
| 22 May | 32.92 | 8.57 | 7.85 | 11.29 | 11.41 | 10.13 |
| 12 Jun | 4.53 | 6.65 | 7.26 | 10.01 | 8.93 | 6.45 |
| 26 Jun | 4.70 | 5.02 | 6.19 | 5.23 | 5.34 | 6.30 |
| 11 Jul | 2.56 | 2.24 | 1.82 | 2.40 | 1.28 | 1.52 |
| 29 Jul | 1.48 | 1.52 | 3.52 | 1.56 | 1.48 | 4.37 |
| 7 Aug | 7.96 | 5.02 | 2.24 | 4.06 | 4.27 | 2.35 |
| 21 Aug | 2.67 | 3.74 | 6.27 | 3.14 | 3.34 | 5.14 |
| 13 Sep | 5.18 | 4.81 | 7.10 | 3.20 | 4.91 | 2.78 |
| 27 Sep | 2.99 | 8.86 | 7.32 | 3.68 | 4.43 | 7.85 |
| 9 Oct | 3.56 | 0.10 | 3.36 | 1.76 | 2.64 | 2.08 |
| 26 Oct | 4.78 | 3.74 | 4.41 | 5.34 | 3.98 | 7.18 |
| 6 Nov | 4.48 | 4.13 | 6.98 | 3.17 | 3.72 | 3.78 |
| 21 Nov | 2.60 | 2.90 | 2.67 | 2.90 | 3.04 | 3.57 |
| 6 Dec | 3.52 | 3.64 | 3.57 | 2.90 | 2.00 | 3.10 |
| 20 Dec | 4.86 | 8.25 | 4.21 | 5.09 | 5.92 | 6.79 |

| Phaeophytin a (µg/l) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | <0.10 | <0.10 | <0.10 | <0.10 | 0.20 | 0.15 |
| 24 Apr | 0.10 | 0.33 | 0.26 | <0.10 | 0.12 | <0.10 |
| 8 May | 1.06 | 0.81 | <0.10 | <0.10 | <0.10 | 0.74 |
| 22 May | <0.10 | 0.40 | <0.10 | 1.71 | 6.61 | <0.10 |
| 12 Jun | 1.56 | 0.53 | <0.10 | <0.10 | <0.10 | 1.18 |
| 26 Jun | 1.39 | 1.45 | 1.51 | 1.53 | 0.90 | 1.66 |
| 11 Jul | 1.98 | 2.07 | 0.65 | 2.25 | 1.07 | 1.45 |
| 29 Jul | 0.48 | 0.89 | 1.35 | 0.34 | 0.76 | 1.24 |
| 7 Aug | 0.68 | 1.90 | 0.78 | 1.32 | 1.30 | 0.49 |
| 21 Aug | 1.02 | 1.07 | 1.01 | 1.82 | 1.05 | 0.56 |
| 13 Sep | 0.76 | 0.46 | <0.10 | 2.10 | <0.10 | 2.98 |
| 27 Sep | 0.90 | <0.10 | 0.46 | 0.50 | <0.10 | 0.82 |
| 9 Oct | 0.53 | 4.93 | 1.29 | 1.85 | 0.30 | 1.53 |
| 26 Oct | 0.23 | 0.69 | 1.84 | 0.68 | 2.08 | <0.10 |
| 6 Nov | 1.56 | 0.26 | <0.10 | 0.75 | <0.10 | 2.52 |
| 21 Nov | 1.04 | 0.90 | 0.58 | 0.90 | 0.23 | 0.12 |
| 6 Dec | 0.34 | 0.41 | 0.54 | 1.04 | 2.04 | 0.35 |
| 20 Dec | 0.19 | <0.10 | 0.62 | 0.41 | 0.60 | 0.33 |

Table G-3 (Page 3 of 3)

| Total Solids (mg/l) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 242 | 248 | 200 | 213 | 218 | 190 |
| 24 Apr | 153 | 199 | 187 | 173 | 199 | 181 |
| 8 May | 216 | 185 | 189 | 184 | 273 | 294 |
| 22 May | 337 | 336 | 300 | 221 | 267 | 244 |
| 12 Jun | 215 | 226 | 212 | 251 | 224 | 215 |
| 26 Jun | 216 | 237 | 242 | 212 | 167 | 207 |
| 11 Jul | 154 | 139 | 226 | 139 | 164 | 177 |
| 29 Jul | 156 | 159 | 156 | 151 | 144 | 174 |
| 7 Aug | 213 | 225 | 201 | 268 | 215 | 211 |
| 21 Aug | 148 | 168 | 171 | 128 | 147 | 153 |
| 13 Sep | 302 | 307 | 269 | 260 | 263 | 214 |
| 27 Sep | 203 | 188 | 170 | 185 | 180 | 181 |
| 9 Oct | 197 | 193 | 203 | 190 | 204 | 203 |
| 26 Oct | 212 | 217 | 200 | 212 | 207 | 207 |
| 6 Nov | 214 | 223 | 222 | 239 | 220 | 212 |
| 21 Nov | 217 | 236 | 247 | 215 | 196 | 208 |
| 6 Dec | 211 | 219 | 202 | 202 | 216 | 190 |
| 20 Dec | 217 | 246 | 239 | 212 | 178 | 211 |

| TSS (mg/l) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 0.6 | 1.4 | 1.4 | 2.0 | 2.6 | 2.8 |
| 24 Apr | 0.2 | 0.2 | <0.1 | 0.8 | 0.4 | 1.8 |
| 8 May | 1.0 | 0.6 | 1.0 | 0.4 | 15.8 | 5.8 |
| 22 May | 7.6 | 6.6 | 3.4 | 1.6 | 3.2 | 1.8 |
| 12 Jun | 0.6 | 1.2 | 1.0 | 1.6 | 0.8 | 1.2 |
| 26 Jun | 2.0 | 1.4 | 2.0 | 1.8 | 1.4 | 2.4 |
| 11 Jul | 7.4 | 6.6 | 7.2 | 7.0 | 4.8 | 6.6 |
| 29 Jul | 3.2 | 2.4 | 4.0 | 0.6 | 2.0 | 1.6 |
| 7 Aug | 1.8 | 0.6 | 1.6 | 2.6 | 4.0 | 3.0 |
| 21 Aug | 0.4 | 0.8 | 0.6 | 0.8 | 0.2 | 0.2 |
| 13 Sep | 0.2 | 0.4 | <0.1 | 0.4 | 0.2 | <0.1 |
| 27 Sep | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.2 |
| 9 Oct | 0.4 | 1.2 | 1.2 | <0.1 | 0.4 | 1.0 |
| 26 Oct | 1.4 | 0.8 | 0.8 | 1.0 | 1.8 | 2.6 |
| 6 Nov | 0.6 | 1.0 | 1.2 | 1.0 | 1.2 | 1.2 |
| 21 Nov | 1.0 | 9.4 | 2.6 | 1.4 | 0.0 | 1.4 |
| 6 Dec | 2.4 | 1.6 | 0.8 | 0.2 | 0.8 | 1.6 |
| 20 Dec | 10.6 | 15.0 | 15.8 | 21.0 | 8.6 | 6.6 |

| BOD-5 Day (mg/l) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 2.5 | 2.5 | 2.6 | 2.7 | 3.1 | 2.6 |
| 24 Apr | 2.5 | 2.2 | 2.4 | 2.2 | 2.3 | 2.4 |
| 8 May | 2.3 | 2.3 | 2.4 | 3.9 | 1.4 | 1.8 |
| 22 May | 3.8 | 4.2 | 4.2 | 4.3 | 4.0 | 4.2 |
| 12 Jun | 1.8 | 2.4 | 3.2 | 3.2 | 2.4 | 2.6 |
| 26 Jun | 1.9 | 2.7 | 3.3 | 2.1 | 2.7 | 3.4 |
| 11 Jul | 1.5 | 1.5 | 1.7 | 2.4 | 1.1 | 1.3 |
| 29 Jul | 0.2 | 0.2 | 1.1 | 0.4 | 0.2 | 1.5 |
| 7 Aug | 1.2 | 0.3 | 1.3 | 0.7 | 1.3 | 0.1 |
| 21 Aug | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.5 |
| 13 Sep | 0.6 | 0.9 | 0.9 | 0.9 | 0.8 | 1.2 |
| 27 Sep | 1.1 | 1.6 | 1.7 | 0.5 | 0.8 | 1.7 |
| 9 Oct | 0.4 | 0.3 | 0.4 | 0.5 | 0.6 | 0.4 |
| 26 Oct | 0.5 | 0.2 | 0.6 | 0.2 | 0.5 | 0.3 |
| 6 Nov | 0.5 | 2.1 | 1.8 | 1.8 | 2.2 | 2.4 |
| 21 Nov | 1.5 | 1.0 | 0.9 | 0.1 | 1.4 | 1.0 |
| 6 Dec | 3.2 | 3.3 | 3.2 | 3.4 | 3.4 | 3.1 |
| 20 Dec | 3.3 | 4.5 | 3.8 | 3.0 | 3.3 | 3.5 |

| COD (mg/l) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 1.0 | 2.8 | 3.9 | 4.0 | 2.2 | 4.5 |
| 24 Apr | 4.0 | 6.5 | 4.5 | 4.2 | 5.0 | 4.5 |
| 8 May | 4.8 | 5.0 | 5.7 | 4.7 | 4.5 | 6.0 |
| 22 May | 2.2 | <2.0 | 2.4 | <2.0 | <2.0 | <2.0 |
| 12 Jun | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| 26 Jun | 5.4 | 4.2 | 3.6 | 4.1 | 2.2 | 5.9 |
| 11 Jul | 9.0 | 7.8 | 8.8 | 8.3 | 7.5 | 7.6 |
| 29 Jul | 7.3 | 7.2 | 8.0 | 7.5 | 7.1 | 7.9 |
| 7 Aug | 8.2 | 8.2 | 8.2 | 8.9 | 8.1 | 7.8 |
| 21 Aug | 2.5 | 3.0 | 2.5 | 2.6 | 3.0 | 3.0 |
| 13 Sep | 11.0 | 9.0 | 14.0 | 15.0 | 23.0 | 19.0 |
| 27 Sep | 7.4 | 7.1 | 7.1 | 6.9 | 5.3 | 5.7 |
| 9 Oct | 4.0 | 6.0 | 6.0 | 6.0 | 5.0 | 7.0 |
| 26 Oct | 5.2 | 5.1 | 6.6 | 7.7 | 6.9 | 5.9 |
| 6 Nov | 7.8 | 6.5 | 7.0 | 6.7 | 7.2 | 7.0 |
| 21 Nov | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 |
| 6 Dec | 6.5 | 6.4 | 6.4 | 6.3 | 6.3 | 6.3 |
| 20 Dec | <2.0 | 2.0 | 2.3 | <2.0 | <2.0 | <2.0 |

| TKN (mg/l-N) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 0.12 | 0.15 | 0.12 | 0.18 | 0.05 | 0.03 |
| 24 Apr | 0.30 | 0.20 | 0.12 | 0.22 | 0.30 | 0.25 |
| 8 May | 0.21 | 0.24 | 0.16 | 0.19 | 0.36 | 0.15 |
| 22 May | 0.37 | 0.36 | 0.26 | 0.07 | 0.13 | 0.04 |
| 12 Jun | 0.45 | 0.39 | 0.37 | 0.46 | 0.37 | 0.35 |
| 26 Jun | 0.63 | 0.47 | 0.44 | 0.39 | 0.46 | 0.56 |
| 11 Jul | 0.22 | 0.29 | 0.41 | 0.38 | 0.26 | 0.28 |
| 29 Jul | 0.30 | 0.27 | 0.33 | 0.32 | 0.20 | 0.64 |
| 7 Aug | 0.14 | 0.17 | 0.38 | 0.40 | 0.39 | 0.15 |
| 21 Aug | 0.30 | 0.40 | 0.34 | 0.43 | 0.41 | 0.42 |
| 13 Sep | 0.17 | 0.32 | 0.21 | 0.16 | 0.17 | 0.18 |
| 27 Sep | 0.09 | 0.06 | 0.08 | 0.06 | 0.06 | 0.08 |
| 9 Oct | 0.10 | 0.08 | 0.14 | 0.08 | 0.11 | 0.11 |
| 26 Oct | 0.26 | 0.18 | 0.20 | 0.18 | 0.17 | 0.21 |
| 6 Nov | 0.34 | 0.38 | 0.37 | 0.36 | 0.37 | 0.41 |
| 21 Nov | 0.25 | 0.26 | 0.24 | 0.23 | 0.21 | 0.19 |
| 6 Dec | <0.03 | 0.19 | 0.13 | 0.08 | 0.32 | 0.14 |
| 20 Dec | 0.10 | 0.22 | <0.03 | <0.03 | 0.21 | 0.15 |

| Ammonia (mg/l-N) | 20-Ft Contour NMPW | 20-Ft Contour NMPP | 20-Ft Contour NMPE | 60-Ft Contour NMPW | 60-Ft Contour NMPP | 60-Ft Contour NMPE |
|---|---|---|---|---|---|---|
| 11 Apr | 0.006 | 0.007 | 0.004 | 0.008 | 0.009 | 0.012 |
| 24 Apr | 0.008 | 0.005 | 0.004 | 0.003 | 0.003 | 0.004 |
| 8 May | 0.016 | 0.025 | 0.016 | 0.017 | 0.017 | 0.017 |
| 22 May | 0.067 | 0.053 | 0.031 | 0.029 | 0.055 | 0.033 |
| 12 Jun | 0.014 | 0.016 | 0.014 | 0.017 | 0.016 | 0.018 |
| 26 Jun | 0.033 | 0.026 | 0.038 | 0.029 | 0.036 | 0.043 |
| 11 Jul | 0.051 | 0.062 | 0.085 | 0.072 | 0.046 | 0.050 |
| 29 Jul | 0.032 | 0.045 | 0.034 | 0.036 | 0.041 | 0.042 |
| 7 Aug | 0.028 | 0.027 | 0.060 | 0.011 | 0.006 | 0.002 |
| 21 Aug | 0.027 | 0.028 | 0.017 | 0.022 | 0.027 | 0.019 |
| 13 Sep | 0.011 | 0.013 | 0.030 | 0.009 | 0.023 | 0.012 |
| 27 Sep | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.002 |
| 9 Oct | 0.002 | <0.002 | 0.006 | <0.002 | 0.008 | 0.010 |
| 26 Oct | 0.010 | 0.017 | 0.014 | 0.022 | 0.017 | 0.023 |
| 6 Nov | 0.004 | 0.002 | 0.010 | 0.005 | 0.012 | 0.010 |
| 21 Nov | 0.020 | 0.037 | 0.035 | 0.036 | 0.015 | 0.006 |
| 6 Dec | 0.027 | 0.040 | 0.027 | 0.032 | 0.046 | 0.040 |
| 20 Dec | 0.020 | 0.047 | 0.036 | 0.016 | 0.037 | 0.046 |

Table G-4 (Page 1 of 7)

Monthly Water Quality Parameters at 25- and 45-ft Contours
on NMPP/FITZ Transect, Nine Mile Point Vicinity, 1978

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Alkalinity (mg/l)** | | | | |
| 24 Apr | 98 | 96 | 96 | 96 |
| 22 May | 112 | 106 | 104 | 100 |
| 26 Jun | 94 | 97 | 95 | 97 |
| 24 Jul | 83 | 82 | 83 | 82 |
| 21 Aug | 83 | 82 | 80 | 80 |
| 27 Sep | 98 | 98 | 99 | 99 |
| 26 Oct | 98 | 98 | 98 | 98 |
| 21 Nov | 87 | 88 | 88 | 89 |
| 20 Dec | 100 | 103 | 101 | 101 |
| **Color (APHA units)** | | | | |
| 24 Apr | 1 | 1 | 1 | 1 |
| 22 May | 1 | 1 | 1 | 1 |
| 26 Jun | 1 | 1 | 1 | 1 |
| 24 Jul | 1 | 1 | 1 | 1 |
| 21 Aug | 1 | 1 | 1 | 1 |
| 27 Sep | 1 | 1 | 1 | 1 |
| 26 Oct | 1 | 1 | 1 | 1 |
| 21 Nov | 1 | 1 | 1 | 1 |
| 20 Dec | 1 | 1 | 1 | 1 |
| **Sp. Cond. (µmhos)** | | | | |
| 24 Apr | 350 | 340 | 340 | 340 |
| 22 May | 510 | 440 | 410 | 340 |
| 26 Jun | 320 | 380 | 370 | 380 |
| 24 Jul | 365 | 360 | 360 | 340 |
| 21 Aug | 320 | 320 | 310 | 310 |
| 27 Sep | 320 | 330 | 320 | 320 |
| 26 Oct | 360 | 370 | 360 | 370 |
| 21 Nov | 430 | 430 | 380 | 430 |
| 20 Dec | 380 | 380 | 355 | 385 |
| **Turbidity (NTU)** | | | | |
| 24 Apr | 2.8 | 3.7 | 2.6 | 3.4 |
| 22 May | 2.8 | 2.5 | 1.9 | 1.7 |
| 26 Jun | 3.3 | 3.0 | 2.2 | 2.6 |
| 24 Jul | 3.2 | 2.6 | 2.4 | 1.7 |
| 21 Aug | 3.6 | 3.4 | 3.9 | 3.6 |
| 27 Sep | 2.0 | 2.2 | 1.5 | 7.8 |
| 26 Oct | 1.4 | 2.2 | 1.4 | 1.8 |
| 21 Nov | 2.5 | 3.3 | 2.3 | 6.4 |
| 20 Dec | 3.6 | 4.9 | 4.0 | 5.4 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Total Solids (mg/l)** | | | | |
| 24 Apr | 194 | 146 | 189 | 209 |
| 22 May | 299 | 284 | 263 | 229 |
| 26 Jun | 190 | 191 | 188 | 183 |
| 24 Jul | 185 | 165 | 156 | 207 |
| 21 Aug | 147 | 154 | 155 | 164 |
| 27 Sep | 163 | 171 | 173 | 175 |
| 26 Oct | 225 | 214 | 214 | 215 |
| 21 Nov | 255 | 266 | 232 | 257 |
| 20 Dec | 249 | 242 | 227 | 243 |
| **TDS (mg/l)** | | | | |
| 24 Apr | 194 | 146 | 189 | 209 |
| 22 May | 295 | 280 | 261 | 227 |
| 26 Jun | 187 | 187 | 186 | 181 |
| 24 Jul | 183 | 162 | 155 | 205 |
| 21 Aug | 147 | 153 | 154 | 163 |
| 27 Sep | 163 | 171 | 173 | 175 |
| 26 Oct | 224 | 210 | 213 | 213 |
| 21 Nov | 253 | 258 | 230 | 253 |
| 20 Dec | 230 | 222 | 212 | 224 |
| **TSS (mg/l)** | | | | |
| 24 Apr | 0.2 | <0.1 | 0.2 | 1.0 |
| 22 May | 4.4 | 4.2 | 2.0 | 2.0 |
| 26 Jun | 2.6 | 4.0 | 1.8 | 2.0 |
| 24 Jul | 1.8 | 6.4 | 0.6 | 1.6 |
| 21 Aug | <0.1 | 1.0 | 1.2 | 0.6 |
| 27 Sep | <0.1 | <0.1 | <0.1 | <0.1 |
| 26 Oct | 1.0 | 3.8 | 1.2 | 1.6 |
| 21 Nov | 1.6 | 7.6 | 1.8 | 3.6 |
| 20 Dec | 19.0 | 20.2 | 14.6 | 19.2 |
| **TVS (mg/l)** | | | | |
| 24 Apr | 87 | 68 | 78 | 75 |
| 22 May | 224 | 157 | 135 | 166 |
| 26 Jun | 165 | 178 | 164 | 163 |
| 24 Jul | 136 | 114 | 122 | 98 |
| 21 Aug | 102 | 76 | 83 | 76 |
| 27 Sep | 37 | 62 | 56 | 66 |
| 26 Oct | 105 | 93 | 84 | 80 |
| 21 Nov | 83 | 10 | 56 | 14 |
| 20 Dec | 108 | 91 | 88 | 87 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **TKN (mg/l-N)** | | | | |
| 24 Apr | 0.14 | 0.10 | 0.14 | 0.20 |
| 22 May | 0.11 | 0.15 | 0.08 | 0.03 |
| 26 Jun | 0.43 | 0.66 | 0.44 | 0.50 |
| 24 Jul | 0.35 | 0.34 | 0.44 | 0.50 |
| 21 Aug | 0.47 | 0.45 | 0.42 | 0.44 |
| 27 Sep | 0.08 | 0.07 | 0.11 | 0.10 |
| 26 Oct | 0.25 | 0.23 | 0.25 | 0.23 |
| 21 Nov | 0.27 | 0.27 | 0.25 | 0.27 |
| 20 Dec | 0.16 | 0.33 | 0.18 | 0.14 |
| **Organic N (mg/l-N)** | | | | |
| 24 Apr | 0.14 | 0.10 | 0.14 | 0.20 |
| 22 May | 0.06 | 0.10 | 0.02 | 0.01 |
| 26 Jun | 0.40 | 0.63 | 0.41 | 0.49 |
| 24 Jul | 0.32 | 0.31 | 0.41 | 0.46 |
| 21 Aug | 0.41 | 0.40 | 0.37 | 0.38 |
| 27 Sep | 0.08 | 0.06 | 0.11 | 0.10 |
| 26 Oct | 0.22 | 0.19 | 0.22 | 0.21 |
| 21 Nov | 0.21 | 0.23 | 0.22 | 0.23 |
| 20 Dec | 0.08 | 0.27 | 0.15 | 0.08 |
| **Ammonia (mg/l-N)** | | | | |
| 24 Apr | 0.004 | <0.002 | <0.002 | 0.002 |
| 22 May | 0.053 | 0.053 | 0.058 | 0.023 |
| 26 Jun | 0.026 | 0.026 | 0.033 | 0.011 |
| 24 Jul | 0.032 | 0.027 | 0.028 | 0.038 |
| 21 Aug | 0.056 | 0.050 | 0.047 | 0.058 |
| 27 Sep | <0.002 | 0.009 | 0.003 | 0.005 |
| 26 Oct | 0.026 | 0.042 | 0.030 | 0.024 |
| 21 Nov | 0.060 | 0.039 | 0.032 | 0.040 |
| 20 Dec | 0.084 | 0.060 | 0.032 | 0.062 |
| **Nitrate (mg/l-N)** | | | | |
| 24 Apr | 0.28 | 0.28 | 0.28 | 0.28 |
| 22 May | 0.30 | 0.29 | 0.25 | 0.23 |
| 26 Jun | 0.18 | 0.18 | 0.27 | 0.17 |
| 24 Jul | 0.01 | 0.01 | 0.01 | 0.02 |
| 21 Aug | <0.04 | <0.04 | <0.04 | <0.04 |
| 27 Sep | 0.15 | 0.16 | 0.16 | 0.16 |
| 26 Oct | 0.13 | 0.13 | 0.19 | 0.15 |
| 21 Nov | 0.22 | 0.21 | 0.19 | 0.19 |
| 20 Dec | 0.32 | 0.33 | 0.31 | 0.33 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Total Phos. (mg/l-P)** | | | | |
| 24 Apr | 0.005 | 0.006 | 0.016 | 0.018 |
| 22 May | 0.028 | 0.027 | 0.023 | 0.020 |
| 26 Jun | 0.030 | 0.022 | 0.018 | 0.027 |
| 24 Jul | 0.037 | 0.026 | 0.030 | 0.026 |
| 21 Aug | 0.017 | 0.019 | 0.017 | 0.022 |
| 27 Sep | 0.016 | 0.008 | 0.010 | 0.020 |
| 26 Oct | 0.044 | 0.040 | 0.044 | 0.048 |
| 21 Nov | 0.015 | 0.022 | 0.016 | 0.017 |
| 20 Dec | 0.025 | 0.018 | 0.106 | 0.077 |
| **Silica (mg/l-$SiO_2$)** | | | | |
| 24 Apr | 0.30 | 0.30 | 0.30 | 0.30 |
| 22 May | <0.05 | <0.05 | <0.05 | 0.10 |
| 26 Jun | 0.12 | 0.16 | 0.11 | 0.14 |
| 24 Jul | 0.21 | 0.13 | 0.17 | 0.28 |
| 21 Aug | 0.29 | 0.16 | 0.24 | 0.11 |
| 27 Sep | 0.23 | 0.24 | 0.25 | 0.24 |
| 26 Oct | 0.14 | 0.16 | 0.13 | 0.14 |
| 21 Nov | 0.21 | 0.22 | 0.21 | 0.21 |
| 20 Dec | 0.33 | 0.37 | 0.23 | 0.36 |
| **Orthophosphorus (mg/l-P)** | | | | |
| 24 Apr | 0.004 | 0.004 | 0.010 | 0.009 |
| 22 May | 0.016 | 0.015 | 0.012 | 0.012 |
| 26 Jun | 0.003 | 0.003 | 0.004 | 0.003 |
| 24 Jul | 0.005 | 0.004 | 0.004 | 0.006 |
| 21 Aug | 0.011 | 0.010 | 0.009 | 0.012 |
| 27 Sep | <0.002 | <0.002 | <0.002 | <0.002 |
| 26 Oct | 0.002 | 0.006 | 0.002 | 0.002 |
| 21 Nov | 0.006 | 0.004 | 0.004 | 0.006 |
| 20 Dec | 0.022 | 0.019 | 0.012 | 0.017 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Sodium (mg/l)** | | | | |
| 24 Apr | 12.4 | 13.2 | 12.6 | 13.1 |
| 22 May | 28.6 | 27.1 | 21.7 | 16.3 |
| 26 Jun | 13.1 | 12.9 | 12.9 | 12.6 |
| 24 Jul | 15.5 | 15.8 | 17.5 | 13.8 |
| 21 Aug | 13.0 | 12.3 | 12.6 | 12.1 |
| 27 Sep | 11.9 | 12.0 | 12.0 | 12.0 |
| 26 Oct | 13.8 | 14.2 | 12.5 | 12.8 |
| 21 Nov | 16.2 | 16.5 | 13.2 | 15.8 |
| 20 Dec | 27.3 | 27.7 | 24.1 | 26.6 |
| **Potassium (mg/l)** | | | | |
| 24 Apr | 1.48 | 1.48 | 1.48 | 1.52 |
| 22 May | 1.74 | 1.74 | 1.61 | 1.50 |
| 26 Jun | 1.51 | 1.65 | 1.59 | 1.65 |
| 24 Jul | 1.75 | 1.50 | 1.63 | 1.50 |
| 21 Aug | 1.31 | 1.37 | 1.31 | 1.31 |
| 27 Sep | 1.40 | 1.38 | 1.40 | 1.40 |
| 26 Oct | 1.75 | 1.75 | 1.85 | 1.75 |
| 21 Nov | 1.90 | 1.90 | 1.80 | 1.90 |
| 20 Dec | 1.20 | 2.10 | 2.10 | 1.70 |
| **Calcium (mg/l)** | | | | |
| 24 Apr | 37.8 | 38.4 | 38.4 | 37.2 |
| 22 May | 50.6 | 50.6 | 46.1 | 41.4 |
| 26 Jun | 45.3 | 45.3 | 42.7 | 41.4 |
| 24 Jul | 43.7 | 42.5 | 43.8 | 41.2 |
| 21 Aug | 38.8 | 38.8 | 38.8 | 38.8 |
| 27 Sep | 32.8 | 33.9 | 33.9 | 37.8 |
| 26 Oct | 42.2 | 50.0 | 41.1 | 44.4 |
| 21 Nov | 43.4 | 45.8 | 42.7 | 47.0 |
| 20 Dec | 40.3 | 41.8 | 40.5 | 43.0 |
| **Aluminum (mg/l)** | | | | |
| 24 Apr | 0.071 | 0.065 | 0.070 | 0.073 |
| 22 May | 0.061 | 0.050 | 0.028 | 0.022 |
| 26 Jun | 0.092 | 0.193 | 0.069 | 0.141 |
| 24 Jul | 0.203 | 0.174 | 0.268 | 0.139 |
| 21 Aug | 0.065 | 0.100 | 0.084 | 0.074 |
| 27 Sep | 0.051 | 0.041 | 0.048 | 0.177 |
| 26 Oct | 0.061 | 0.027 | 0.034 | 0.048 |
| 21 Nov | 0.144 | 0.230 | 0.163 | 0.232 |
| 20 Dec | 0.275 | 0.188 | 0.137 | 0.126 |
| **Iron (mg/l)** | | | | |
| 24 Apr | 0.059 | 0.041 | 0.049 | 0.035 |
| 22 May | 0.098 | 0.097 | 0.091 | 0.070 |
| 26 Jun | 0.016 | 0.016 | 0.013 | 0.006 |
| 24 Jul | 0.106 | 0.104 | 0.100 | 0.070 |
| 21 Aug | 0.060 | 0.106 | 0.066 | 0.140 |
| 27 Sep | 0.154 | 0.134 | 0.100 | 0.220 |
| 26 Oct | 0.128 | 0.060 | 0.040 | 0.043 |
| 21 Nov | 0.159 | 0.167 | 0.184 | 0.178 |
| 20 Dec | 0.100 | 0.110 | 0.077 | 0.082 |
| **Nickel (mg/l)** | | | | |
| 24 Apr | 0.002 | 0.002 | 0.002 | 0.002 |
| 22 May | 0.007 | 0.007 | 0.002 | 0.001 |
| 26 Jun | 0.009 | 0.008 | 0.010 | 0.009 |
| 24 Jul | 0.003 | 0.003 | 0.003 | 0.003 |
| 21 Aug | 0.003 | 0.003 | 0.003 | 0.003 |
| 27 Sep | 0.009 | 0.005 | 0.006 | 0.006 |
| 26 Oct | 0.005 | 0.005 | <0.001 | 0.001 |
| 21 Nov | <0.001 | <0.001 | <0.001 | <0.001 |
| 20 Dec | 0.007 | 0.007 | 0.006 | 0.005 |
| **Manganese (mg/l)** | | | | |
| 24 Apr | 0.002 | 0.002 | 0.002 | 0.002 |
| 22 May | 0.037 | 0.027 | 0.016 | 0.010 |
| 26 Jun | <0.001 | <0.001 | <0.001 | <0.001 |
| 24 Jul | 0.009 | 0.012 | 0.008 | 0.010 |
| 21 Aug | 0.010 | 0.013 | 0.011 | 0.004 |
| 27 Sep | 0.025 | 0.024 | 0.038 | 0.070 |
| 26 Oct | 0.047 | 0.022 | 0.007 | 0.010 |
| 21 Nov | 0.015 | 0.020 | 0.014 | 0.019 |
| 20 Dec | 0.012 | 0.097 | 0.015 | 0.021 |
| **Magnesium (mg/l)** | | | | |
| 24 Apr | 6.76 | 7.30 | 7.09 | 7.47 |
| 22 May | 9.93 | 9.76 | 9.04 | 8.63 |
| 26 Jun | 8.71 | 8.71 | 8.71 | 8.71 |
| 24 Jul | 8.60 | 8.50 | 8.40 | 8.40 |
| 21 Aug | 7.95 | 7.95 | 7.95 | 7.95 |
| 27 Sep | 7.15 | 7.15 | 7.15 | 7.50 |
| 26 Oct | 8.44 | 8.83 | 8.31 | 8.31 |
| 21 Nov | 7.00 | 7.00 | 6.70 | 6.80 |
| 20 Dec | 7.36 | 7.12 | 7.51 | 7.36 |

# Table G-4 (Page 4 of 7)

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Cadmium (mg/l)** | | | | |
| 24 Apr | <0.001 | <0.001 | <0.001 | <0.001 |
| 22 May | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Jun | <0.001 | <0.001 | <0.001 | <0.001 |
| 24 Jul | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Aug | <0.001 | <0.001 | <0.001 | <0.001 |
| 27 Sep | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Oct | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Nov | <0.001 | <0.001 | <0.001 | <0.001 |
| 20 Dec | <0.001 | <0.001 | <0.001 | <0.001 |
| **Chromium (mg/l)** | | | | |
| 24 Apr | <0.001 | <0.001 | <0.001 | <0.001 |
| 22 May | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Jun | <0.001 | <0.001 | <0.001 | <0.001 |
| 24 Jul | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Aug | <0.001 | <0.001 | <0.001 | <0.001 |
| 27 Sep | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Oct | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Nov | 0.001 | 0.001 | 0.001 | 0.001 |
| 20 Dec | 0.002 | 0.002 | 0.002 | 0.002 |
| **Copper (mg/l)** | | | | |
| 24 Apr | 0.003 | 0.003 | 0.004 | 0.004 |
| 22 May | 0.003 | 0.003 | 0.003 | 0.003 |
| 26 Jun | 0.007 | 0.005 | 0.005 | 0.002 |
| 24 Jul | 0.096 | 0.044 | 0.052 | 0.070 |
| 21 Aug | 0.040 | 0.036 | 0.048 | 0.116 |
| 27 Sep | 0.007 | 0.015 | 0.015 | 0.014 |
| 26 Oct | 0.013 | 0.006 | 0.010 | 0.009 |
| 21 Nov | 0.001 | 0.004 | <0.001 | <0.001 |
| 20 Dec | 0.013 | 0.013 | 0.009 | 0.007 |
| **Mercury (mg/l)** | | | | |
| 24 Apr | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 22 May | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| 26 Jun | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| 24 Jul | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 21 Aug | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 27 Sep | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 26 Oct | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 21 Nov | <0.0001 | <0.0002 | <0.0001 | <0.0003 |
| 20 Dec | 0.0004 | 0.0002 | <0.0002 | <0.0002 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Silver (mg/l)** | | | | |
| 24 Apr | <0.001 | <0.001 | <0.001 | <0.001 |
| 22 May | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Jun | <0.001 | <0.001 | <0.001 | <0.001 |
| 24 Jul | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Aug | <0.001 | <0.001 | <0.001 | <0.001 |
| 27 Sep | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Oct | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Nov | <0.001 | <0.001 | <0.001 | <0.001 |
| 20 Dec | <0.001 | <0.001 | <0.001 | <0.001 |
| **Lead (mg/l)** | | | | |
| 24 Apr | <0.001 | <0.001 | <0.001 | <0.001 |
| 22 May | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Jun | 0.001 | 0.002 | 0.001 | <0.001 |
| 24 Jul | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Aug | <0.001 | <0.001 | <0.001 | <0.001 |
| 27 Sep | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Oct | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Nov | 0.015 | 0.015 | 0.006 | 0.006 |
| 20 Dec | <0.001 | <0.001 | <0.001 | <0.001 |
| **Zinc (mg/l)** | | | | |
| 24 Apr | <0.011 | <0.008 | <0.009 | <0.009 |
| 22 May | 0.150 | 0.150 | 0.675 | 0.150 |
| 26 Jun | 0.040 | 0.037 | 0.034 | 0.031 |
| 24 Jul | 0.034 | 0.036 | 0.029 | 0.035 |
| 21 Aug | 0.004 | 0.004 | 0.006 | 0.011 |
| 27 Sep | 0.009 | 0.008 | 0.007 | 0.019 |
| 26 Oct | 0.038 | 0.036 | 0.029 | 0.031 |
| 21 Nov | 0.012 | 0.015 | 0.020 | 0.017 |
| 20 Dec | 0.012 | 0.003 | <0.001 | <0.001 |
| **Arsenic (mg/l)** | | | | |
| 24 Apr | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 22 May | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 26 Jun | 0.0016 | 0.0015 | 0.0012 | 0.0016 |
| 24 Jul | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 21 Aug | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 27 Sep | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| 26 Oct | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| 21 Nov | 0.0006 | 0.0007 | 0.0003 | 0.0004 |
| 20 Dec | 0.0005 | 0.0002 | 0.0001 | 0.0004 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Fluoride (mg/l-F)** | | | | |
| 24 Apr | 0.22 | 0.23 | 0.22 | 0.24 |
| 22 May | 0.15 | 0.14 | 0.14 | 0.13 |
| 26 Jun | 0.14 | 0.14 | 0.13 | 0.13 |
| 24 Jul | 0.13 | 0.12 | 0.12 | 0.12 |
| 21 Aug | 0.09 | 0.11 | 0.10 | 0.10 |
| 27 Sep | 0.24 | 0.30 | 0.09 | 0.13 |
| 26 Oct | 0.08 | 0.19 | 0.14 | 0.06 |
| 21 Nov | 0.21 | 0.21 | 0.21 | 0.22 |
| 20 Dec | 0.13 | 0.12 | 0.13 | 0.12 |
| **Chloride (mg/l-Cl)** | | | | |
| 24 Apr | 36.2 | 32.4 | 30.2 | 30.0 |
| 22 May | 64.5 | 61.8 | 47.8 | 37.3 |
| 24 Jun | 29.5 | 34.3 | 34.5 | 31.3 |
| 24 Jul | 35.2 | 30.8 | 32.6 | 28.4 |
| 21 Aug | 29.6 | 26.5 | 29.6 | 26.5 |
| 27 Sep | 27.5 | 28.2 | 28.1 | 28.8 |
| 26 Oct | 27.4 | 27.6 | 27.1 | 27.4 |
| 21 Nov | 46.0 | 49.4 | 44.8 | 51.3 |
| 20 Dec | 39.8 | 37.9 | 33.4 | 39.9 |
| **Sulfate (mg/l-$SO_4$)** | | | | |
| 24 Apr | 39.7 | 39.9 | 39.9 | 40.7 |
| 22 May | 42.0 | 40.7 | 35.5 | 30.8 |
| 26 Jun | 26.2 | 26.3 | 26.2 | 25.8 |
| 24 Jul | 25.3 | 24.5 | 24.6 | 24.4 |
| 21 Aug | 28.2 | 27.7 | 28.1 | 27.4 |
| 27 Sep | 27.6 | 27.2 | 26.1 | 27.2 |
| 26 Oct | 28.6 | 29.7 | 29.7 | 29.4 |
| 21 Nov | 32.2 | 32.9 | 31.7 | 32.9 |
| 20 Dec | 29.4 | 30.8 | 28.7 | 29.0 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Cyanide (mg/l)** | | | | |
| 24 Apr | <0.005 | <0.005 | <0.005 | <0.005 |
| 22 May | <0.005 | <0.005 | <0.005 | <0.005 |
| 26 Jun | <0.005 | <0.005 | <0.005 | <0.005 |
| 24 Jul | <0.005 | <0.005 | <0.005 | <0.005 |
| 21 Aug | <0.005 | <0.005 | <0.005 | <0.005 |
| 27 Sep | <0.005 | 0.005 | 0.005 | 0.007 |
| 26 Oct | <0.005 | <0.005 | <0.005 | <0.005 |
| 21 Nov | <0.005 | <0.005 | <0.005 | <0.005 |
| 20 Dec | <0.005 | <0.005 | <0.005 | <0.005 |
| **Ferro CN (mg/l)** | | | | |
| 24 Apr | <0.04 | <0.04 | <0.04 | <0.04 |
| 22 May | <0.04 | <0.04 | <0.04 | <0.04 |
| 26 Jun | <0.04 | <0.04 | <0.04 | <0.04 |
| 24 Jul | <0.04 | <0.04 | <0.04 | <0.04 |
| 21 Aug | <0.04 | <0.04 | <0.04 | <0.04 |
| 27 Sep | <0.04 | <0.04 | <0.04 | <0.04 |
| 26 Oct | <0.04 | <0.04 | <0.04 | <0.04 |
| 21 Nov | <0.04 | <0.04 | <0.04 | <0.04 |
| 20 Dec | <0.04 | <0.04 | <0.04 | <0.04 |
| **Ferri CN (mg/l)** | | | | |
| 24 Apr | <0.04 | <0.04 | <0.04 | <0.04 |
| 22 May | <0.04 | <0.04 | <0.04 | <0.04 |
| 26 Jun | <0.04 | <0.04 | <0.04 | <0.04 |
| 24 Jul | <0.04 | <0.04 | <0.04 | <0.04 |
| 21 Aug | <0.04 | <0.04 | <0.04 | <0.04 |
| 27 Sep | <0.04 | <0.04 | <0.04 | <0.04 |
| 26 Oct | <0.04 | <0.04 | <0.04 | <0.04 |
| 21 Nov | <0.04 | <0.04 | <0.04 | <0.04 |
| 20 Dec | <0.04 | <0.04 | <0.04 | <0.04 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Beryllium (mg/l)** | | | | |
| 24 Apr | <0.001 | <0.001 | <0.001 | <0.001 |
| 22 May | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Jun | <0.001 | <0.001 | <0.001 | <0.001 |
| 24 Jul | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Aug | <0.001 | <0.001 | <0.001 | <0.001 |
| 27 Sep | <0.001 | <0.001 | <0.001 | <0.001 |
| 26 Oct | <0.001 | <0.001 | <0.001 | <0.001 |
| 21 Nov | <0.001 | <0.001 | <0.001 | <0.001 |
| 20 Dec | <0.001 | <0.001 | <0.001 | <0.001 |
| **Barium (mg/l)** | | | | |
| 24 Apr | 0.022 | 0.022 | 0.022 | 0.022 |
| 22 May | 0.034 | 0.030 | 0.026 | 0.026 |
| 26 Jun | 0.022 | 0.022 | 0.021 | 0.020 |
| 24 Jul | 0.039 | 0.038 | 0.043 | 0.038 |
| 21 Aug | 0.036 | 0.034 | 0.036 | 0.036 |
| 27 Sep | 0.054 | 0.056 | 0.058 | 0.065 |
| 26 Oct | 0.066 | 0.066 | 0.058 | 0.057 |
| 21 Nov | 0.034 | 0.035 | 0.032 | 0.036 |
| 20 Dec | 0.060 | 0.063 | 0.049 | 0.041 |
| **Vanadium (mg/l)** | | | | |
| 24 Apr | <0.002 | <0.002 | <0.002 | <0.002 |
| 22 May | <0.002 | <0.002 | <0.002 | <0.002 |
| 26 Jun | <0.002 | <0.002 | <0.002 | <0.002 |
| 24 Jul | <0.002 | <0.002 | <0.002 | <0.002 |
| 21 Aug | <0.002 | <0.002 | <0.002 | <0.002 |
| 27 Sep | <0.002 | <0.002 | <0.002 | <0.002 |
| 26 Oct | <0.002 | <0.002 | <0.002 | <0.002 |
| 21 Nov | <0.002 | <0.002 | <0.002 | <0.002 |
| 20 Dec | <0.002 | <0.002 | <0.002 | <0.002 |
| **Selenium (mg/l)** | | | | |
| 24 Apr | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 22 May | <0.0002 | <0.0002 | <0.0002 | <0.0002 |
| 26 Jun | <0.0006 | <0.0006 | <0.0006 | <0.0006 |
| 24 Jul | 0.0014 | 0.0020 | 0.0012 | 0.0015 |
| 21 Aug | 0.0014 | 0.0015 | 0.0012 | 0.0020 |
| 27 Sep | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| 26 Oct | <0.0003 | <0.0003 | <0.0003 | <0.0003 |
| 21 Nov | 0.0011 | 0.0010 | 0.0011 | 0.0011 |
| 20 Dec | 0.0006 | 0.0005 | 0.0005 | 0.0008 |

| | 25-Ft Contour | | 45-Ft Contour | |
|---|---|---|---|---|
| | Surface | Bottom | Surface | Bottom |
| **Gross Alpha (pCi/l)** | | | | |
| 24 Apr | <1.42 | <1.41 | <1.31 | <1.36 |
| 22 May | <1.63 | <1.61 | <1.52 | <1.36 |
| 12 Jun | <1.20 | <1.20 | <1.25 | <1.23 |
| 24 Jul | <1.26 | <1.27 | <1.27 | <1.23 |
| 21 Aug | <0.64 | <0.64 | <0.64 | <0.64 |
| 27 Sep | <0.87 | <0.87 | <0.92 | <0.15 |
| 26 Oct | <0.60 | <0.60 | <0.60 | <0.60 |
| 21 Nov | <0.74 | <0.74 | <0.74 | <0.74 |
| 20 Dec | <1.52 | <1.53 | <1.63 | <1.59 |
| **Gross Beta (pCi/l)** | | | | |
| 24 Apr | <2.81 | <2.81 | <2.81 | <2.81 |
| 22 May | 3.25 | 3.26 | 3.78 | 3.06 |
| 12 Jun | 2.48 | 3.00 | 2.95 | 2.54 |
| 24 Jul | 2.37 | 3.33 | 2.60 | 2.41 |
| 21 Aug | 2.87 | 3.02 | 3.38 | 3.62 |
| 27 Sep | 2.78 | 3.36 | 2.84 | 8.06 |
| 26 Oct | 3.77 | 3.17 | 3.27 | 3.19 |
| 21 Nov | 3.25 | 3.72 | 2.31 | 3.43 |
| 20 Dec | 2.44 | 3.32 | 2.67 | 2.92 |
| **Gamma Spectroscopy (pCi/l)** | | | | |
| 24 Apr | BELOW DETECTION* | | BELOW DETECTION | |
| 22 May | BELOW DETECTION | | BELOW DETECTION | |
| 12 Jun | BELOW DETECTION | | BELOW DETECTION | |
| 24 Jul | BELOW DETECTION | | BELOW DETECTION | |
| 21 Aug | BELOW DETECTION | | BELOW DETECTION | |
| 27 Sep | BELOW DETECTION | | BELOW DETECTION | |
| 26 Oct | BELOW DETECTION | | BELOW DETECTION | |
| 21 Nov | BELOW DETECTION | | BELOW DETECTION | |
| 20 Dec | BELOW DETECTION | | BELOW DETECTION | |
| **Tritium (pCi/l)** | | | | |
| 24 Apr | 357 | 403 | 367 | 390 |
| 22 May | 335 | 313 | <141 | 345 |
| 12 Jun | 225 | 352 | 292 | 325 |
| 24 Jul | 251 | 240 | 234 | 230 |
| 21 Aug | 285 | 182 | <102 | <102 |
| 27 Sep | 241 | 281 | 221 | 213 |
| 26 Oct | 234 | 333 | 262 | 241 |
| 21 Nov | 236 | 254 | <183. | 378 |
| 20 Dec | <177 | <177 | 218 | 262 |

*Minimum Detection Limits (MDL's in pCi/liter) for representative isotopes in Gamma Spectrometric Analysis: Mn - 54 = 1.0; Fe - 59 = 3.0; Co - 58 = 1.0; Co - 60 = 2.0; Zn - 65 = 2.0 - 3.0; Zr - Nb - 95 = 2.0; I - 131 = 1.0; Cs - 134 = 1.0; Cs - 137 = 1.0; Ba - La - 140 = 2.0.

| | 25-Ft Contour Surface | 25-Ft Contour Bottom | 45-Ft Contour Surface | 45-Ft Contour Bottom |
|---|---|---|---|---|
| **BOD-5 Day (mg/l)** | | | | |
| 24 Apr | 2.3 | 2.4 | 2.0 | 2.1 |
| 22 May | 3.9 | 3.9 | 4.0 | 2.7 |
| 26 Jun | 3.0 | 1.8 | 2.2 | 2.0 |
| 24 Jul | 1.1 | 0.6 | 0.8 | 0.0 |
| 21 Aug | 0.3 | 0.2 | 0.5 | 0.3 |
| 27 Sep | 1.5 | 1.3 | 1.5 | 2.7 |
| 26 Oct | 0.3 | 0.3 | 0.2 | 0.4 |
| 21 Nov | 1.1 | 1.1 | 0.9 | 0.0 |
| 20 Dec | 2.9 | 3.6 | 2.9 | 3.6 |
| **COD (mg/l)** | | | | |
| 24 Apr | 5.3 | 5.3 | 5.8 | 5.0 |
| 22 May | 2.3 | 2.2 | <2.0 | <2.0 |
| 26 Jun | 8.5 | 6.4 | 6.1 | 3.2 |
| 24 Jul | 8.1 | 7.4 | 8.0 | 7.3 |
| 21 Aug | 3.0 | 3.0 | 3.0 | 2.8 |
| 27 Sep | 5.9 | 6.0 | 8.3 | 7.3 |
| 26 Oct | 8.0 | 8.8 | 9.6 | 7.6 |
| 21 Nov | 5.7 | 5.7 | 5.7 | 5.7 |
| 20 Dec | <2.0 | <2.0 | <2.0 | <2.0 |
| **T. Colif. (MPN/100 ml)** | | | | |
| 24 Apr | 5 | 7 | 2 | 8 |
| 22 May | 13 | 17 | 240 | 130 |
| 26 Jun | <2 | 8 | 8 | 2 |
| 24 Jul | 1800 | 49 | 1800 | 17 |
| 21 Aug | 23 | 49 | 70 | 13 |
| 27 Sep | 13 | 23 | 49 | 23 |
| 26 Oct | 23 | 17 | 13 | 13 |
| 21 Nov | 348 | 278 | 221 | 900 |
| 20 Dec | 1600 | 240 | 350 | 550 |
| **F. Colif. (MPN/100 ml)** | | | | |
| 24 Apr | <2 | <2 | <2 | <2 |
| 22 May | 4 | 3 | 33 | 13 |
| 26 Jun | <2 | <2 | <2 | <2 |
| 24 Jul | 550 | 21 | 250 | 2 |
| 21 Aug | 2 | 2 | 5 | 2 |
| 27 Sep | 8 | 8 | 5 | 8 |
| 26 Oct | 4 | 2 | 2 | 5 |
| 21 Nov | 79 | 348 | 94 | 140 |
| 20 Dec | 70 | 80 | 130 | 50 |

| | 25-Ft Contour Surface | 25-Ft Contour Bottom | 45-Ft Contour Surface | 45-Ft Contour Bottom |
|---|---|---|---|---|
| **Phenols (mg/l)** | | | | |
| 24 Apr | <0.005 | <0.005 | <0.005 | <0.005 |
| 22 May | <0.005 | <0.005 | <0.005 | <0.005 |
| 26 Jun | <0.005 | <0.005 | <0.005 | <0.005 |
| 24 Jul | <0.005 | <0.005 | <0.005 | <0.005 |
| 21 Aug | 0.018 | 0.014 | 0.013 | 0.018 |
| 27 Sep | <0.005 | <0.005 | <0.005 | <0.005 |
| 26 Oct | <0.005 | <0.005 | <0.005 | <0.005 |
| 21 Nov | <0.005 | <0.005 | <0.005 | <0.005 |
| 20 Dec | <0.005 | <0.005 | <0.005 | <0.005 |
| **MBAS (mg/l-LAS)** | | | | |
| 24 Apr | <0.02 | <0.02 | <0.02 | <0.02 |
| 22 May | <0.02 | <0.02 | <0.02 | <0.02 |
| 26 Jun | <0.02 | <0.02 | <0.02 | <0.02 |
| 24 Jul | <0.02 | <0.02 | <0.02 | <0.02 |
| 21 Aug | <0.02 | <0.02 | <0.02 | <0.02 |
| 27 Sep | <0.02 | <0.02 | <0.02 | <0.02 |
| 26 Oct | <0.01 | <0.01 | <0.01 | <0.01 |
| 21 Nov | <0.02 | <0.02 | <0.02 | <0.02 |
| 20 Dec | <0.02 | <0.02 | <0.02 | <0.02 |
| **CCE (mg/l)** | | | | |
| 24 Apr | 1.4 | 2.0 | 1.2 | 1.8 |
| 22 May | 2.8 | 0.7 | 1.0 | 1.4 |
| 26 Jun | 1.1 | 0.8 | 0.7 | 0.4 |
| 24 Jul | 0.9 | 0.7 | 1.1 | 1.2 |
| 21 Aug | 0.8 | 0.7 | 1.6 | 1.4 |
| 27 Sep | 1.3 | 1.4 | 1.0 | 1.3 |
| 26 Oct | 2.5 | 1.0 | 1.7 | 1.1 |
| 21 Nov | 1.6 | 2.0 | 1.4 | 1.7 |
| 20 Dec | 0.2 | 0.3 | <0.2 | <0.2 |

APPENDIX H

IMPINGEMENT

- Nine Mile Point
- James A. FitzPatrick

Table H-1 (Page 1 of 7)

Plant Operating Conditions at Nine Mile Point
Nuclear Plant Unit 1 during 1978

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Jan | 2 | 1 | 1,259,175 | 471 | 17.7 | 1.7 | 16.0 |
| 2 Jan | 2 | 1 | 1,259,175 | 553 | 19.6 | 1.2 | 18.4 |
| 3 Jan | 2 | 1 | 1,259,175[a] | 584 | 18.8 | 0.3 | 18.5 |
| 4 Jan | 2 | 1 | 1,324,587[a] | 585 | 18.5 | 6.0 | 12.5 |
| 5 Jan | 2 | 1 | 1,259,175 | 608 | 23.3 | 0.8 | 22.5 |
| 6 Jan | 2 | 1 | 1,259,175 | 608 | 22.1 | 0.9 | 21.2 |
| 7 Jan | 2 | 1 | 1,226,470 | 609 | 22.5 | 2.6 | 19.9 |
| 8 Jan | 2 | 1 | 1,226,470 | 609 | 24.7 | 4.3 | 20.4 |
| 9 Jan | 2 | 1 | 1,210,117 | 610 | 22.0 | 1.6 | 20.4 |
| 10 Jan | 2 | 1 | 1,346,391 | 609 | 18.7 | 0.2 | 18.5 |
| 11 Jan | 2 | 1 | 1,346,391 | 609 | 18.7 | 0.1 | 18.6 |
| 12 Jan | 2 | 1 | 1,362,744 | 608 | 19.1 | 1.6 | 17.5 |
| 13 Jan | 2 | 1 | 1,362,744 | 602 | 20.5 | 2.3 | 18.2 |
| 14 Jan | 2 | 1 | 1,362,744 | 551 | 19.5 | -0.9 | 20.4 |
| 15 Jan | 2 | 1 | 1,362,744 | 598 | 18.6 | 0.4 | 18.2 |
| 16 Jan | 2 | 1 | 1,362,744 | 609 | 18.8 | 0.2 | 18.6 |
| 17 Jan | 2 | 1 | 1,362,744 | 611 | 19.1 | 0.3 | 18.8 |
| 18 Jan | 2 | 1 | 1,362,744 | 610 | 19.1 | 0.3 | 18.8 |
| 19 Jan | 2 | 1 | 1,362,744 | 610 | 19.5 | 0.8 | 18.7 |
| 20 Jan | 2 | 1 | 1,362,744 | 278[b] | 9.1 | 0.8 | 8.3 |
| 21 Jan | 2 | 1 | 1,362,744 | 0 | -0.2 | 0.3 | -0.5 |
| 22 Jan | 2 | 1 | 1,362,744 | 64 | 3.3 | 0.3 | 3.0 |
| 23 Jan | 2 | 1 | 1,362,744 | 215 | 7.7 | 0.5 | 7.2 |
| 24 Jan | 2 | 1 | 1,362,744 | 218 | 8.3 | 0.1 | 8.2 |
| 25 Jan | 2 | 1 | 1,362,744 | 346 | 12.1 | 0.8 | 11.3 |
| 26 Jan | 2 | 1 | 1,395,450 | 537 | 17.1 | 0.8 | 16.3 |
| 27 Jan | 2 | 1 | 1,395,450 | 579 | 18.0 | 0.2 | 17.8 |
| 28 Jan | 2 | 1 | 1,379,097 | 573 | 17.6 | 0.2 | 17.4 |
| 29 | 2 | 1 | 1,379,097 | 577 | 18.0 | 0.3 | 17.7 |
| 30 Jan | 2 | 1 | 1,379,097 | 582 | 18.0 | 0.1 | 17.9 |
| 31 Jan | 2 | 1 | 1,379,097 | 598 | 18.6 | 2.0 | 16.6 |
| 1 Feb | 2 | 1 | 1,362,744 | 598 | 18.7 | 1.2 | 17.5 |
| 2 Feb | 2 | 1 | 1,362,744 | 599 | 18.7 | 0.5 | 18.2 |
| 3 Feb | 2 | 1 | 1,362,744 | 564 | 19.1 | 1.2 | 17.9 |
| 4 Feb | 2 | 1 | 1,362,744 | 591 | 19.7 | 2.4 | 17.3 |
| 5 Feb | 2 | 1 | 1,362,744 | 594 | 19.5 | 1.5 | 18.0 |
| 6 Feb | 2 | 1 | 1,362,744 | 593 | 18.0 | 1.1 | 16.9 |
| 7 Feb | 2 | 1 | 1,362,744 | 161[c] | 2.3 | 0.5 | 1.8 |
| 8 Feb | 2 | 1 | 1,362,744 | 552 | 15.0 | 2.2 | 12.8 |
| 9 Feb | 2 | 1 | 1,362,744 | 584 | 18.7 | 2.2 | 16.5 |
| 10 Feb | 2 | 1 | 1,362,744 | 604 | 18.9 | 0.7 | 18.2 |
| 11 Feb | 2 | 1 | 1,362,744 | 607 | 19.0 | 0.5 | 18.5 |
| 12 Feb | 2 | 1 | 1,362,744 | 608 | 18.6 | 0.2 | 18.4 |
| 13 Feb | 2 | 1 | 1,362,744 | 607 | 19.0 | 0.5 | 18.5 |
| 14 Feb | 2 | 1 | 1,362,744 | 605 | 19.1 | 0.7 | 18.4 |
| 15 Feb | 2 | 1 | 1,351,842 | 604 | 20.5 | 1.9 | 18.6 |
| 16 Feb | 2 | 1 | 1,362,744 | 606 | 19.2 | 0.8 | 18.4 |
| 17 Feb | 2 | 1 | 1,362,744 | 608 | 19.0 | 0.5 | 18.5 |
| 18 Feb | 2 | 1 | 1,362,744 | 609 | 18.7 | 0.2 | 18.5 |
| 19 Feb | 2 | 1 | 1,362,744 | 610 | 19.1 | 0.7 | 18.4 |
| 20 Feb | 2 | 1 | 1,362,744 | 610 | 19.4 | 1.0 | 18.4 |
| 21 Feb | 2 | 1 | 1,362,744 | 610 | 19.1 | 0.5 | 18.6 |
| 22 Feb | 2 | 1 | 1,362,744 | 609 | 19.2 | 0.8 | 18.4 |
| 23 Feb | 2 | 1 | 1,362,744 | 609 | 18.8 | 0.5 | 18.3 |
| 24 Feb | 2 | 1 | 1,362,744 | 610 | 19.0 | 0.6 | 18.4 |
| 25 Feb | 2 | 1 | 1,362,744 | 591 | 18.7 | 0.8 | 17.9 |
| 26 Feb | 2 | 1 | 1,362,744 | 609 | 19.2 | 1.4 | 17.8 |
| 27 Feb | 2 | 1 | 1,362,744 | 607 | 19.8 | 0.0 | 19.8 |
| 28 Feb | 2 | 1 | 1,362,744 | 608 | 19.2 | 0.8 | 18.4 |

Table H-1 (Page 2 of 7)

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Mar | 2 | 1 | 1,330,038 | 607 | 18.5 | 1.3 | 17.2 |
| 2 Mar | 2 | 1 | 1,330,038 | 609 | 19.1 | 0.8 | 18.3 |
| 3 Mar | 2 | 1 | 1,330,038 | 609 | 17.9 | -0.5 | 18.4 |
| 4 Mar | 2 | 1 | 1,330,038 | 609 | 18.3 | -0.2 | 18.5 |
| 5 Mar | 2 | 1 | 1,330,038 | 610 | 20.3 | 1.7 | 18.6 |
| 6 Mar | 2 | 1 | 1,330,038 | 608 | 20.0 | 0.5 | 19.5 |
| 7 Mar | 2 | 1 | 1,330,038 | 607 | 20.2 | 1.3 | 18.9 |
| 8 Mar | 2 | 1 | 1,330,038 | 607 | 20.0 | 1.3 | 18.7 |
| 9 Mar | 2 | 1 | 1,330,038 | 605 | 20.0 | 3.6 | 16.4 |
| 10 Mar | 2 | 1 | 1,330,038 | 606 | 20.1 | 2.6 | 17.5 |
| 11 Mar | 2 | 1 | 1,330,038 | 606 | 20.1 | 2.3 | 17.8 |
| 12 Mar | 2 | 1 | 1,330,038 | 591 | 20.0 | 2.2 | 17.8 |
| 13 Mar | 2 | 1 | 1,330,038 | 605 | 21.7 | 3.3 | 18.4 |
| 14 Mar | 2 | 1 | 1,330,038 | 607 | 20.9 | 2.3 | 18.6 |
| 15 Mar | 2 | 1 | 1,330,038 | 610 | 20.2 | 0.8 | 19.4 |
| 16 Mar | 2 | 1 | 1,330,038 | 607 | 20.5 | 2.1 | 18.4 |
| 17 Mar | 2 | 1 | 1,330,038 | 608 | 22.7 | 3.6 | 19.1 |
| 18 Mar | 2 | 1 | 1,330,038 | 608 | 21.1 | 2.2 | 18.9 |
| 19 Mar | 2 | 1 | 1,330,038 | 610 | 19.9 | 1.3 | 18.6 |
| 20 Mar | 2 | 1 | 1,330,038 | 607 | 20.1 | 0.9 | 19.2 |
| 21 Mar | 2 | 1 | 1,330,038 | 608 | 20.5 | 1.6 | 18.9 |
| 22 Mar | 2 | 1 | 1,330,038 | 606 | 20.4 | 1.2 | 19.2 |
| 23 Mar | 2 | 1 | 1,330,038 | 573 | 19.4 | 1.3 | 18.1 |
| 24 Mar | 2 | 1 | 1,330,038 | 273 | 10.9 | 1.8 | 9.1 |
| 25 Mar | 2 | 1 | 1,330,038 | 414 | 15.1 | 1.3 | 13.8 |
| 26 Mar | 2 | 1 | 1,330,038 | 519 | 18.5 | 2.6 | 15.9 |
| 27 Mar | 2 | 1 | 1,330,038 | 575 | 20.6 | 3.3 | 17.3 |
| 28 Mar | 2 | 1 | 1,330,038 | 596 | 20.3 | 1.4 | 18.9 |
| 29 Mar | 2 | 1 | 1,330,038 | 587 | 20.2 | 1.4 | 18.8 |
| 30 Mar | 2 | 1 | 1,330,038 | 588 | 20.5 | 1.6 | 18.9 |
| 31 Mar | 2 | 1 | 1,330,038 | 579 | 20.0 | 2.1 | 17.9 |
| 1 Apr | 2 | 1 | 1,330,038 | 315 | 12.2 | 2.3 | 9.9 |
| 2 Apr | 2 | 1 | 1,330,038 | 322 | 12.6 | 3.3 | 9.3 |
| 3 Apr | 2 | 1 | 1,330,038 | 494 | 17.3 | 2.0 | 15.3 |
| 4 Apr | 2 | 1 | 1,330,038 | 573 | 30.0 | 4.0 | 26.0 |
| 5 Apr | 2 | 1 | 1,330,048 | 589 | 20.5 | 3.6 | 16.9 |
| 6 Apr | 2 | 1 | 1,330,038 | 585 | 20.4 | 2.7 | 17.7 |
| 7 Apr | 2 | 1 | 1,330,038 | 600 | 21.1 | 3.5 | 17.6 |
| 8 Apr | 2 | 1 | 1,346,391 | 494 | 18.7 | 3.1 | 15.6 |
| 9 Apr | 2 | 1 | 1,346,391 | 556 | 19.4 | 2.6 | 16.8 |
| 10 Apr | 2 | 1 | 1,373,646 | 584 | 20.8 | 3.2 | 17.6 |
| 11 Apr | 2 | 1 | 1,373,646 | 584 | 20.6 | 2.9 | 17.7 |
| 12 Apr | 2 | 1 | 1,373,646 | 587 | 20.7 | 2.9 | 17.8 |
| 13 Apr | 2 | 1 | 1,373,646 | 586 | 21.4 | 3.3 | 18.1 |
| 14 Apr | 2 | 1 | 1,389,999 | 585 | 22.3 | 4.7 | 17.6 |
| 15 Apr | 2 | 1 | 1,389,999 | 585 | 22.6 | 5.1 | 17.5 |
| 16 Apr | 2 | 1 | 1,389,999 | 586 | 21.1 | 3.6 | 17.5 |
| 17 Apr | 2 | 1 | 1,389,999 | 584 | 21.1 | 3.5 | 17.6 |
| 18 Apr | 2 | 1 | 1,389,999 | 592 | 21.3 | 3.4 | 17.9 |
| 19 Apr | 2 | 1 | 1,406,352 | 604 | 22.4 | 4.6 | 17.8 |
| 20 Apr | 2 | 1 | 1,406,352 | 605 | 23.2 | 5.6 | 17.6 |
| 21 Apr | 2 | 1 | 1,406,352 | 605 | 22.5 | 4.7 | 17.8 |
| 22 Apr | 2 | 1 | 1,406,352 | 603 | 21.2 | 3.4 | 17.8 |
| 23 Apr | 2 | 1 | 1,406,352 | 602 | 21.5 | 3.7 | 17.8 |
| 24 Apr | 2 | 1 | 1,406,352 | 604 | 22.0 | 4.2 | 17.8 |
| 25 Apr | 2 | 1 | 1,406,352 | 606 | 22.0 | 4.2 | 17.8 |
| 26 Apr | 2 | 1 | 1,406,352 | 605 | 21.2 | 3.4 | 17.8 |
| 27 Apr | 2 | 1 | 1,406,352 | 604 | 22.0 | 4.1 | 17.9 |
| 28 Apr | 2 | 1 | 1,406,352 | 603 | 23.0 | 5.1 | 17.9 |
| 29 Apr | 2 | 1 | 1,406,352 | 513 | 21.5 | 5.9 | 15.6 |
| 30 Apr | 2 | 1 | 1,406,352 | 566 | 20.6 | 3.6 | 17.0 |

Table H-1 (Page 3 of 7)

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 May | 2 | 1 | 1,406,352 | 590 | 24.5 | 6.9 | 17.6 |
| 2 May | 2 | 1 | 1,406,352 | 585 | 24.5 | 7.0 | 17.5 |
| 3 May | 2 | 1 | 1,406,352 | 470 | 22.4 | 7.7 | 14.7 |
| 4 May | 2 | 1 | 1,417,254 | 479 | 20.6 | 5.8 | 14.8 |
| 5 May | 2 | 1 | 1,406,352 | 477 | 20.3 | 5.4 | 14.9 |
| 6 May | 2 | 1 | 1,406,352 | 475 | 20.6 | 5.7 | 14.9 |
| 7 May | 2 | 1 | 1,406,352 | 475 | 20.4 | 5.8 | 14.6 |
| 8 May | 2 | 1 | 1,406,352 | 474 | 20.4 | 5.4 | 15.0 |
| 9 May | 2 | 1 | 1,417,254 | 476 | 21.0 | 6.2 | 14.8 |
| 10 May | 2 | 1 | 1,433,607 | 474 | 22.7 | 8.1 | 14.6 |
| 11 May | 2 | 1 | 1,433,607 | 474 | 22.8 | 8.0 | 14.8 |
| 12 May | 2 | 1 | 1,417,254 | 481 | 20.2 | 5.5 | 14.7 |
| 13 May | 2 | 1 | 1,433,607 | 477 | 20.8 | 6.3 | 14.5 |
| 14 May | 2 | 1 | 1,449,960 | 477 | 21.3 | 7.5 | 13.8 |
| 15 May | 2 | 1 | 1,449,960 | 478 | 20.6 | 6.3 | 14.3 |
| 16 May | 2 | 1 | 1,449,960 | 369 | 16.9 | 5.8 | 11.1 |
| 17 May | 2 | 1 | 1,455,411 | 117[d] | 10.1 | 5.6 | 4.5 |
| 18 May | 2 | 1 | 1,455,411 | 454 | 20.1 | 6.3 | 13.8 |
| 19 May | 2 | 1 | 1,477,214 | 429 | 20.2 | 6.4 | 13.8 |
| 20 May | 2 | 1 | 1,509,920 | 0[e] | 7.3 | 8.3 | -1.0 |
| 21 May | 2 | 1 | 1,509,920 | 0 | 7.0 | 8.2 | -1.2 |
| 22 May | 2 | 1 | 1,509,920 | 0 | 7.8 | 8.9 | -1.1 |
| 23 May | 2 | 1 | 1,509,920 | 0 | 7.7 | 8.8 | -1.1 |
| 24 May | 2 | 1 | 1,509,920 | 0 | 8.3 | 9.4 | -1.1 |
| 25 May | 2 | 1 | 1,509,920 | 0 | 8.9 | 10.1 | -1.2 |
| 26 May | 2 | 1 | 1,509,920 | 304 | 19.8 | 11.1 | 8.7 |
| 27 May | 2 | 1 | 1,509,920 | 357 | 20.4 | 10.3 | 10.1 |
| 28 May | 2 | 1 | 1,509,920 | 382 | 20.9 | 10.1 | 10.8 |
| 29 May | 2 | 1 | 1,509,920 | 419 | 21.6 | 9.7 | 11.9 |
| 30 May | 2 | 1 | 1,509,920 | 509 | 22.8 | 8.8 | 14.0 |
| 31 May | 2 | 1 | 1,509,920 | 533 | 24.1 | 9.1 | 15.0 |
| 1 Jun | 2 | 1 | 1,357,293 | 553 | 26.4 | 10.7 | 15.7 |
| 2 Jun | 2 | 1 | 1,357,293 | 586 | 26.1 | 9.6 | 16.5 |
| 3 Jun | 2 | 1 | 1,357,293 | 585 | 28.2 | 11.4 | 16.8 |
| 4 Jun | 2 | 1 | 1,357,293 | 578 | 27.8 | 11.2 | 16.6 |
| 5 Jun | 2 | 1 | 1,357,293 | 587 | 26.4 | 10.9 | 15.5 |
| 6 Jun | 2 | 1 | 1,357,293 | 589 | 28.2 | 10.8 | 17.4 |
| 7 Jun | 2 | 1 | 1,357,293 | 592 | 27.7 | 10.6 | 17.1 |
| 8 Jun | 2 | 1 | 1,357,293 | 595 | 28.8 | 11.1 | 17.7 |
| 9 Jun | 2 | 1 | 1,357,293 | 590 | 29.6 | 11.7 | 17.9 |
| 10 Jun | 2 | 1 | 1,357,293 | 499 | 26.5 | 11.1 | 15.4 |
| 11 Jun | 2 | 1 | 1,357,293 | 540 | 27.8 | 11.2 | 16.6 |
| 12 Jun | 2 | 1 | 1,357,293 | 578 | 30.0 | 12.2 | 17.8 |
| 13 Jun | 2 | 1 | 1,357,293 | 595 | 32.1 | 13.8 | 18.3 |
| 14 Jun | 2 | 1 | 1,357,293 | 595 | 32.0 | 13.8 | 18.2 |
| 15 Jun | 2 | 1 | 1,357,293 | 595 | 32.0 | 13.7 | 18.3 |
| 16 Jun | 2 | 1 | 1,357,293 | 586 | 30.4 | 12.5 | 17.9 |
| 17 Jun | 2 | 1 | 1,357,293 | 500 | 27.0 | 11.4 | 15.6 |
| 18 Jun | 2 | 1 | 1,357,293 | 543 | 29.8 | 12.9 | 16.9 |
| 19 Jun | 2 | 1 | 1,357,293 | 550 | 30.5 | 13.3 | 17.2 |
| 20 Jun | 2 | 1 | 1,357,293 | 578 | 30.5 | 12.6 | 17.9 |
| 21 Jun | 2 | 1 | 1,357,293 | 575 | 30.4 | 12.6 | 17.8 |
| 22 Jun | 2 | 1 | 1,357,293 | 576 | 30.8 | 13.1 | 17.7 |
| 23 Jun | 2 | 1 | 1,357,293 | 577 | 31.5 | 13.5 | 18.0 |
| 24 Jun | 2 | 1 | 1,357,293 | 562 | 31.1 | 13.5 | 17.6 |
| 25 Jun | 2 | 1 | 1,357,293 | 492 | 29.1 | 13.2 | 15.9 |
| 26 Jun | 2 | 1 | 1,357,293 | 546 | 31.3 | 13.7 | 17.6 |
| 27 Jun | 2 | 1 | 1,357,293 | 568 | 34.0 | 15.7 | 18.3 |
| 28 Jun | 2 | 1 | 1,357,293 | 571 | 34.8 | 16.2 | 18.6 |
| 29 Jun | 2 | 1 | 1,357,293 | 562 | 32.8 | 14.8 | 18.0 |
| 30 Jun | 2 | 1 | 1,357,293 | 565 | 33.5 | 15.3 | 18.2 |

Table H-1 (Page 4 of 7)

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Jul | 2 | 1 | 1,335,489 | 381 | 27.2 | 16.2 | 11.0 |
| 2 Jul | 2 | 1 | 1,351,842 | 488 | 32.5 | 16.4 | 16.1 |
| 3 Jul | 2 | 1 | 1,362,744 | 514 | 31.3 | 14.5 | 16.8 |
| 4 Jul | 2 | 1 | 1,362,744 | 535 | 32.0 | 14.6 | 17.4 |
| 5 Jul | 2 | 1 | 1,362,744 | 556 | 34.0 | 15.8 | 18.2 |
| 6 Jul | 2 | 1 | 1,362,744 | 554 | 35.6 | 17.2 | 18.4 |
| 7 Jul | 2 | 1 | 1,362,744 | 551 | 36.1 | 17.5 | 18.6 |
| 8 Jul | 2 | 1 | 1,362,744 | 549 | 37.1 | 18.6 | 18.5 |
| 9 Jul | 2 | 1 | 1,362,744 | 545 | 37.6 | 19.2 | 18.4 |
| 10 Jul | 2 | 1 | 1,400,901 | 541 | 37.9 | 19.7 | 18.2 |
| 11 Jul | 2 | 2 | 1,422,705 | 544 | 37.9 | 19.3 | 18.6 |
| 12 Jul | 2 | 2 | 1,422,705 | 545 | 36.6 | 19.0 | 17.6 |
| 13 Jul | 2 | 2 | 1,422,705 | 550 | 35.4 | 17.7 | 17.7 |
| 14 Jul | 2 | 2 | 1,422,705 | 541 | 36.0 | 18.5 | 17.5 |
| 15 Jul | 2 | 2 | 1,422,705 | 477 | 34.0 | 18.7 | 15.3 |
| 16 Jul | 2 | 2 | 1,422,705 | 519 | 36.1 | 19.2 | 16.9 |
| 17 Jul | 2 | 2 | 1,422,705 | 533 | 36.6 | 19.6 | 17.0 |
| 18 Jul | 2 | 2 | 1,422,705 | 531 | 37.0 | 19.7 | 17.3 |
| 19 Jul | 2 | 2 | 1,422,705 | 538 | 37.1 | 19.7 | 17.4 |
| 20 Jul | 2 | 2 | 1,422,705 | 538 | 38.6 | 21.0 | 17.6 |
| 21 Jul | 2 | 2 | 1,422,705 | 532 | 39.6 | 22.0 | 17.6 |
| 22 Jul | 2 | 2 | 1,422,705 | 520 | 40.3 | 22.9 | 17.4 |
| 23 Jul | 2 | 2 | 1,406,352 | 461 | 38.5 | 22.7 | 15.8 |
| 24 Jul | 2 | 2 | 1,422,705 | 523 | 39.9 | 22.5 | 17.4 |
| 25 Jul | 2 | 2 | 1,422,705 | 531 | 39.4 | 21.9 | 17.5 |
| 26 Jul | 2 | 2 | 1,422,705 | 533 | 39.3 | 21.7 | 17.6 |
| 27 Jul | 2 | 2 | 1,422,705 | 536 | 39.4 | 22.0 | 17.4 |
| 28 Jul | 2 | 2 | 1,422,705 | 533 | 39.5 | 22.1 | 17.4 |
| 29 Jul | 2 | 2 | 1,455,411 | 534 | 39.0 | 21.6 | 17.4 |
| 30 Jul | 2 | 2 | 1,455,411 | 536 | 39.0 | 21.7 | 17.3 |
| 31 Jul | 2 | 2 | 1,439,058 | 539 | 38.1 | 20.8 | 17.3 |
| 1 Aug | 2 | 2 | 1,439,058 | 538 | 38.3 | 21.0 | 17.3 |
| 2 Aug | 2 | 2 | 1,439,058 | 538 | 38.6 | 21.1 | 17.5 |
| 3 Aug | 2 | 2 | 1,439,058 | 26[f] | 22.2 | 20.9 | 1.3 |
| 4 Aug | 2 | 2 | 1,455,411 | 224 | 30.5 | 21.5 | 9.0 |
| 5 Aug | 2 | 2 | 1,471,764 | 438 | 35.8 | 21.2 | 14.6 |
| 6 Aug | 2 | 2 | 1,471,764 | 466 | 36.9 | 21.6 | 15.3 |
| 7 Aug | 2 | 2 | 1,471,764 | 525 | 38.3 | 21.4 | 16.9 |
| 8 Aug | 2 | 2 | 1,471,764 | 532 | 38.9 | 21.8 | 17.1 |
| 9 Aug | 2 | 2 | 1,471,764 | 536 | 39.3 | 22.1 | 17.2 |
| 10 Aug | 2 | 2 | 1,471,764 | 539 | 39.2 | 22.1 | 17.1 |
| 11 Aug | 2 | 2 | 1,471,764 | 535 | 39.0 | 22.0 | 17.0 |
| 12 Aug | 2 | 2 | 1,471,764 | 499 | 37.9 | 21.9 | 16.0 |
| 13 Aug | 2 | 2 | 1,471,764 | 534 | 39.7 | 22.6 | 17.1 |
| 14 Aug | 2 | 2 | 1,471,764 | 533 | 40.2 | 23.1 | 17.1 |
| 15 Aug | 2 | 2 | 1,471,764 | 532 | 40.3 | 23.3 | 17.0 |
| 16 Aug | 2 | 2 | 1,471,764 | 538 | 40.4 | 23.4 | 17.0 |
| 17 Aug | 2 | 2 | 1,471,764 | 533 | 40.5 | 23.6 | 16.9 |
| 18 Aug | 2 | 2 | 1,471,764 | 538 | 39.6 | 22.7 | 16.9 |
| 19 Aug | 2 | 2 | 1,471,764 | 531 | 38.9 | 22.2 | 16.7 |
| 20 Aug | 2 | 2 | 1,471,764 | 493 | 38.3 | 22.6 | 15.7 |
| 21 Aug | 2 | 2 | 1,471,764 | 523 | 38.6 | 22.2 | 16.4 |
| 22 Aug | 2 | 2 | 1,471,764 | 522 | 38.7 | 22.3 | 16.4 |
| 23 Aug | 2 | 2 | 1,471,764 | 525 | 39.2 | 22.7 | 16.5 |
| 24 Aug | 2 | 2 | 1,471,764 | 535 | 39.6 | 23.0 | 16.6 |
| 25 Aug | 2 | 2 | 1,471,764 | 571 | 34.5 | 18.4 | 16.1 |
| 26 Aug | 2 | 2 | 1,471,764 | 541 | 38.6 | 21.9 | 16.7 |
| 27 Aug | 2 | 2 | 1,471,764 | 522 | 36.3 | 20.0 | 16.3 |
| 28 Aug | 2 | 2 | 1,471,764 | 493 | 25.3 | 16.2 | 9.1 |
| 29 Aug | 2 | 2 | 1,471,764 | 488 | 34.8 | 19.5 | 15.3 |
| 30 Aug | 2 | 2 | 1,471,764 | 484 | 35.8 | 20.5 | 15.3 |
| 31 Aug | 2 | 2 | 1,471,764 | 481 | 35.9 | 20.7 | 15.2 |

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Sep | 2 | 2 | 1,471,764 | 482 | 35.9 | 20.6 | 15.3 |
| 2 Sep | 2 | 2 | 1,471,764 | 480 | 36.2 | 21.0 | 15.2 |
| 3 Sep | 2 | 2 | 1,471,764 | 481 | 36.0 | 20.8 | 15.2 |
| 4 Sep | 2 | 2 | 1,471,764 | 482 | 35.0 | 19.6 | 15.4 |
| 5 Sep | 2 | 2 | 1,471,764 | 458 | 35.5 | 20.8 | 14.7 |
| 6 Sep | 2 | 2 | 1,471,764 | 484 | 35.9 | 20.6 | 15.3 |
| 7 Sep | 2 | 2 | 1,471,764 | 480 | 36.0 | 20.9 | 15.1 |
| 8 Sep | 2 | 2 | 1,471,764 | 479 | 35.1 | 20.2 | 14.9 |
| 9 Sep | 2 | 2 | 1,471,764 | 403 | 31.8 | 19.7 | 12.1 |
| 10 Sep | 2 | 2 | 1,471,764 | 499 | 32.1 | 17.1 | 15.0 |
| 11 Sep | 2 | 2 | 1,471,764 | 527 | 34.1 | 19.0 | 15.1 |
| 12 Sep | 2 | 2 | 1,471,764 | 531 | 30.8 | 14.8 | 16.0 |
| 13 Sep | 2 | 2/1[g] | 1,433,607 | 348 | 17.3 | 6.5 | 10.8 |
| 14 Sep | 2 | 1 | 1,406,352 | 311 | 16.4 | 5.6 | 10.8 |
| 15 Sep | 2 | 1 | 1,406,352 | 480 | 21.1 | 7.5 | 13.6 |
| 16 Sep | 2 | 1 | 1,406,352 | 536 | 24.7 | 8.8 | 15.9 |
| 17 Sep | 2 | 1 | 1,406,352 | 541 | 24.3 | 8.2 | 16.1 |
| 18 Sep | 2 | 1 | 1,406,352 | 544 | 22.4 | 6.3 | 16.1 |
| 19 Sep | 2 | 1 | 1,406,352 | 543 | 22.2 | 6.2 | 16.0 |
| 20 Sep | 2 | 1 | 1,406,352 | 546 | 22.9 | 6.8 | 16.1 |
| 21 Sep | 2 | 1 | 1,406,352 | 545 | 25.3 | 9.2 | 16.1 |
| 22 Sep | 2 | 1 | 1,406,352 | 539 | 26.2 | 10.2 | 16.0 |
| 23 Sep | 2 | 1 | 1,406,352 | 465 | 23.4 | 9.4 | 14.0 |
| 24 Sep | 2 | 1 | 1,406,352 | 518 | 26.7 | 11.3 | 15.4 |
| 25 Sep | 2 | 1 | 1,406,352 | 531 | 29.4 | 12.2 | 17.2 |
| 26 Sep | 2 | 1 | 1,406,352 | 538 | 30.1 | 14.1 | 16.0 |
| 27 Sep | 2 | 1 | 1,406,352 | 538 | 30.8 | 14.7 | 16.1 |
| 28 Sep | 2 | 1 | 1,406,352 | 539 | 31.3 | 15.3 | 16.0 |
| 29 Sep | 2 | 1 | 1,406,352 | 503 | 30.3 | 15.7 | 14.6 |
| 30 Sep | 2 | 1 | 1,406,352 | 88[h] | 15.6 | 14.9 | 0.7 |
| 1 Oct | 2 | 1 | 1,466,313 | 0 | 15.3 | 14.9 | 0.4 |
| 2 Oct | 2/0[i] | 1 | 615,960 | 0 | 17.3 | 15.1 | 2.2 |
| 3 Oct | 0 | 1 | 59,961 | 0 | 18.5 | 14.9 | 3.6 |
| 4 Oct | 0/2[j] | 1 | 615,960 | 0 | 17.0 | 14.7 | 2.3 |
| 5 Oct | 2 | 1 | 1,466,313 | 0 | 14.9 | 14.7 | 0.2 |
| 6 Oct | 2 | 1 | 1,466,313 | 84 | 18.3 | 14.6 | 3.7 |
| 7 Oct | 2 | 1 | 1,482,665 | 381 | 26.5 | 14.3 | 12.2 |
| 8 Oct | 2 | 1 | 1,482,665 | 390 | 25.7 | 13.8 | 11.9 |
| 9 Oct | 2 | 1 | 1,482,665 | 431 | 26.6 | 13.8 | 12.8 |
| 10 Oct | 2 | 1 | 1,482,665 | 474 | 27.8 | 13.7 | 14.1 |
| 11 Oct | 2 | 1 | 1,493,567 | 521 | 29.1 | 13.8 | 15.3 |
| 12 Oct | 2 | 1 | 1,493,567 | 549 | 29.6 | 13.8 | 15.8 |
| 13 Oct | 2 | 1 | 1,493,567 | 550 | 29.8 | 14.0 | 15.8 |
| 14 Oct | 2 | 1 | 1,493,567 | 543 | 29.0 | 13.5 | 15.5 |
| 15 Oct | 2 | 1 | 1,493,567 | 531 | 26.4 | 13.1 | 13.3 |
| 16 Oct | 2 | 1 | 1,493,567 | 545 | 28.4 | 12.9 | 15.5 |
| 17 Oct | 2 | 1 | 1,493,567 | 551 | 27.3 | 11.7 | 15.6 |
| 18 Oct | 2 | 1 | 1,493,567 | 552 | 27.1 | 11.3 | 15.8 |
| 19 Oct | 2 | 1 | 1,493,567 | 554 | 27.4 | 11.6 | 15.8 |
| 20 Oct | 2 | 1 | 1,493,567 | 551 | 27.8 | 12.0 | 15.8 |
| 21 Oct | 2 | 1 | 1,493,567 | 543 | 27.5 | 11.9 | 15.6 |
| 22 Oct | 2 | 1 | 1,493,567 | 529 | 27.3 | 11.9 | 15.4 |
| 23 Oct | 2 | 1 | 1,493,567 | 550 | 27.9 | 12.1 | 15.8 |
| 24 Oct | 2 | 1 | 1,493,567 | 550 | 27.7 | 11.9 | 15.8 |
| 25 Oct | 2 | 1 | 1,493,567 | 549 | 27.5 | 11.7 | 15.8 |
| 26 Oct | 2 | 1 | 1,493,567 | 554 | 27.0 | 11.2 | 15.8 |
| 27 Oct | 2 | 1 | 1,493,567 | 553 | 26.7 | 10.8 | 15.9 |
| 28 Oct | 2 | 1 | 1,493,567 | 449 | 26.8 | 10.9 | 15.9 |
| 29 Oct | 2 | 1 | 1,493,567 | 511 | 25.8 | 11.0 | 14.8 |
| 30 Oct | 2 | 1 | 1,493,567 | 545 | 26.3 | 10.7 | 15.6 |
| 31 Oct | 2 | 1 | 1,493,567 | 548 | 26.3 | 10.5 | 15.8 |

Table H-1 (Page 6 of 7)

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Nov | 2 | 1 | 1,493,567 | 552 | 26.6 | 10.8 | 15.8 |
| 2 Nov | 2 | 1 | 1,493,567 | 551 | 26.5 | 10.6 | 15.9 |
| 3 Nov | 2 | 1 | 1,493,567 | 554 | 26.5 | 10.7 | 15.8 |
| 4 Nov | 2 | 1 | 1,493,567 | 551 | 26.6 | 10.8 | 15.8 |
| 5 Nov | 2 | 1 | 1,477,214 | 552 | 26.6 | 11.0 | 15.6 |
| 6 Nov | 2 | 1 | 1,493,567 | 555 | 26.7 | 10.8 | 15.9 |
| 7 Nov | 2 | 1 | 1,493,567 | 553 | 26.7 | 10.9 | 15.8 |
| 8 Nov | 2 | 1 | 1,493,567 | 551 | 27.0 | 11.1 | 15.9 |
| 9 Nov | 2 | 1 | 1,471,764 | 555 | 26.5 | 10.7 | 15.8 |
| 10 Nov | 2 | 1 | 1,471,764 | 540 | 26.0 | 10.5 | 15.5 |
| 11 Nov | 2 | 1 | 1,460,862 | 551 | 26.6 | 10.8 | 15.8 |
| 12 Nov | 2 | 1 | 1,460,862 | 537 | 23.5 | 9.9 | 13.6 |
| 13 Nov | 2 | 1 | 1,460,862 | 553 | 25.1 | 9.3 | 15.8 |
| 14 Nov | 2 | 1 | 1,471,764 | 551 | 24.1 | 8.3 | 15.8 |
| 15 Nov | 2 | 1 | 1,471,764 | 555 | 25.0 | 9.1 | 15.9 |
| 16 Nov | 2 | 1 | 1,471,764 | 553 | 25.5 | 9.7 | 15.8 |
| 17 Nov | 2 | 1 | 1,471,764 | 554 | 25.0 | 9.2 | 15.8 |
| 18 Nov | 2 | 1 | 1,471,764 | 554 | 24.5 | 8.7 | 15.8 |
| 19 Nov | 2 | 1 | 1,471,764 | 553 | 24.0 | 8.2 | 15.8 |
| 20 Nov | 2 | 1 | 1,471,764 | 553 | 24.1 | 8.3 | 15.8 |
| 21 Nov | 2 | 1 | 1,471,764 | 552 | 24.0 | 8.2 | 15.8 |
| 22 Nov | 2 | 1 | 1,471,764 | 548 | 24.0 | 8.1 | 15.9 |
| 23 Nov | 2 | 1 | 1,471,764 | 548 | 23.9 | 8.3 | 15.6 |
| 24 Nov | 2 | 1 | 1,471,764 | 383 | 19.1 | 7.5 | 11.6 |
| 25 Nov | 2 | 1 | 1,471,764 | 391 | 18.7 | 6.9 | 11.8 |
| 26 Nov | 2 | 1 | 1,471,764 | 422 | 19.6 | 7.0 | 12.6 |
| 27 Nov | 2 | 1 | 1,471,764 | 497 | 21.1 | 6.7 | 14.4 |
| 28 Nov | 2 | 1 | 1,471,764 | 551 | 22.2 | 6.5 | 15.7 |
| 29 Nov | 2 | 1 | 1,471,764 | 555 | 21.8 | 5.9 | 15.9 |
| 30 Nov | 2 | 1 | 1,471,764 | 554 | 20.5 | 5.3 | 15.2 |
| 1 Dec | 2 | 1 | 1,488,116 | 553 | 21.0 | 5.1 | 15.9 |
| 2 Dec | 2 | 1 | 1,488,116 | 554 | 21.4 | 5.5 | 15.9 |
| 3 Dec | 2 | 1 | 1,488,116 | 555 | 20.1 | 4.3 | 15.8 |
| 4 Dec | 2 | 1 | 1,488,116 | 552 | 20.6 | 4.8 | 15.8 |
| 5 Dec | 2 | 1 | 1,488,116 | 552 | 19.7 | 3.9 | 15.8 |
| 6 Dec | 2 | 1 | 1,488,116 | 562 | 20.4 | 4.6 | 15.8 |
| 7 Dec | 2 | 1 | 1,488,116 | 550 | 21.1 | 5.3 | 15.8 |
| 8 Dec | 2 | 1 | 1,488,116 | 547 | 21.9 | 6.2 | 15.7 |
| 9 Dec | 2 | 1 | 1,488,116 | 545 | 21.5 | 5.9 | 15.6 |
| 10 Dec | 2 | 1 | 1,488,116 | 543 | 19.7 | 4.2 | 15.5 |
| 11 Dec | 2 | 1 | 1,488,116 | 545 | 18.7 | 3.1 | 15.6 |
| 12 Dec | 2 | 1 | 1,488,116 | 543 | 19.2 | 4.8 | 14.4 |
| 13 Dec | 2 | 1 | 1,488,116 | 542 | 18.1 | 2.6 | 15.5 |
| 14 Dec | 2 | 1 | 1,488,116 | 540 | 17.0 | 1.6 | 15.4 |
| 15 Dec | 2 | 1 | 1,488,116 | 538 | 17.7 | 2.3 | 15.4 |
| 16 Dec | 2 | 1 | 1,488,116 | 536 | 17.7 | 2.3 | 15.4 |
| 17 Dec | 2 | 1 | 1,488,116 | 532 | 17.3 | 1.9 | 15.4 |
| 18 Dec | 2 | 1 | 1,488,116 | 532 | 16.0 | 0.9 | 15.1 |
| 19 Dec | 2 | 1 | 1,231,921 | 530 | 18.1 | 0.1 | 18.0 |
| 20 Dec | 2 | 1 | 1,204,666 | 526 | 20.2 | 2.0 | 18.2 |
| 21 Dec | 2 | 1 | 1,204,666 | 526 | 19.2 | 1.5 | 17.7 |
| 22 Dec | 2 | 1 | 1,204,666 | 516 | 19.8 | 2.2 | 17.6 |
| 23 Dec | 2 | 1 | 1,204,666 | 523 | 18.7 | 0.4 | 18.3 |
| 24 Dec | 2 | 1 | 1,204,666 | 517 | 19.8 | 2.4 | 17.4 |
| 25 Dec | 2 | 1 | 1,204,666 | 520 | 18.9 | 0.8 | 18.1 |
| 26 Dec | 2 | 1 | 1,204,666 | 518 | 18.5 | 0.5 | 18.0 |
| 27 Dec | 2 | 1 | 1,204,666 | 516 | 17.8 | 0.0 | 17.8 |
| 28 Dec | 2 | 1 | 1,204,666 | 515 | 18.0 | 0.2 | 17.8 |
| 29 Dec | 2 | 1 | 1,204,666 | 509 | 19.3 | 1.5 | 17.8 |
| 30 Dec | 2 | 1 | 1,204,666 | 508 | 20.6 | 2.9 | 17.7 |
| 31 Dec | 2 | 1 | 1,204,666 | 508 | 21.6 | 3.9 | 17.7 |

Table H-1 (Page 7 of 7)

FOOTNOTES: Plant Operating Conditions at Nine Mile Point Nuclear Plant, Unit 1, during 1978.

[1] Number of pumps operating based on pump data collected daily from the control room at Nine Mile Point Unit 1.

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

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

[4] Water temperatures during Jan-Mar are average daily lake temperatures from Nine Mile Point Unit 1 periodic logs. After March, water temperatures are from Nine Mile Point Unit 1 "401" monthly reports.

[a] Flow through intakes reversed to prevent icing from approximately 2300 on 3 Jan to 0500 on 4 Jan.

[b] Unit down at 1058, 20 Jan to approximately 1530, 22 Jan.

[c] Unit down at 2229, 6 Feb to 1859. 7 Feb.

[d] Unit down at 1838, 16 May to 1250, 17 May.

[e] Unit down at 0007, 20 May to 0505, 26 May.

[f] Unit down at 0108, 3 Aug to 0655, 4 Aug.

[g] On 13 Sep, two pumps were operating from 0001 to 1320 and one pump was operating from 1320 to 2400.

[h] Unit down from 0251, 30 Sep to 1520, 6 Oct.

[i] On 2 Oct, two pumps were operating from 0001 to 0251 and no pumps were operating from 0251 to 2400.

[j] On 4 Oct, no pumps were operating from 0001 to 1455 and two pumps were operating from 1455 to 2400.

Table H-2 (Page 1 of 8)

Plant Operating Conditions at James A. FitzPatrick Nuclear Plant during 1978

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Jan | 3 | 1 | 1,588,622 | 819 | 23.5 | 4.8 | 18.7 |
| 2 Jan | 3 | 1 | 1,588,622 | 818 | 24.0 | 5.4 | 18.6 |
| 3 Jan | 3 | 1 | 1,588,622 | 818 | 22.6 | 3.9 | 18.7 |
| 4 Jan | 3 | 1 | 1,588,622 | 818 | 22.9 | 3.8 | 19.1 |
| 5 Jan | 3 | 1 | 1,588,622 | 781 | 22.2 | 4.2 | 18.0 |
| 6 Jan | 3 | 1 | 1,588,622 | 731 | 19.8 | 2.9 | 16.9 |
| 7 Jan | 3 | 1 | 1,588,622 | 783 | 22.9 | 5.3 | 17.6 |
| 8 Jan | 3 | 1 | 1,588,622 | 780 | 23.4 | 5.7 | 17.7 |
| 9 Jan | 3 | 1 | 1,588,622 | 821 | 24.1 | 5.7 | 18.4 |
| 10 Jan | 3 | 1 | 1,588,622 | 823 | 23.0 | 4.3 | 18.7 |
| 11 Jan | 3 | 1 | 1,588,622 | 823 | 23.0 | 4.3 | 18.7 |
| 12 Jan | 3 | 1 | 1,588,622 | 823 | 23.0 | 4.4 | 18.6 |
| 13 Jan | 3 | 1 | 1,588,622 | 820 | 23.8 | 5.3 | 18.5 |
| 14 Jan | 3 | 1 | 1,588,622 | 822 | 22.9 | 4.2 | 18.7 |
| 15 Jan | 3 | 1 | 1,588,622 | 823 | 23.0 | 4.3 | 18.7 |
| 16 Jan | 3 | 1 | 1,588,622 | 823 | 22.9 | 4.2 | 18.7 |
| 17 Jan | 3 | 1 | 1,588,622 | 822 | 22.9 | 4.2 | 18.7 |
| 18 Jan | 3 | 1 | 1,588,622 | 823 | 23.1 | 4.4 | 18.7 |
| 19 Jan | 3 | 1 | 1,588,622 | 823 | 23.9 | 5.3 | 18.6 |
| 20 Jan | 3 | 1 | 1,588,622 | 816 | 22.2 | 3.7 | 18.5 |
| 21 Jan | 3 | 1 | 1,588,622 | 796 | 23.2 | 5.3 | 17.9 |
| 22 Jan | 3 | 1 | 1,588,622 | 821 | 24.1 | 5.6 | 18.5 |
| 23 Jan | 3 | 1 | 1,588,622 | 821 | 23.9 | 5.4 | 18.5 |
| 24 Jan | 3 | 1 | 1,588,622 | 774 | 23.4 | 5.8 | 17.6 |
| 25 Jan | 3 | 1 | 1,588,622 | 493 | 16.1 | 3.8 | 12.3 |
| 26 Jan | 3 | 1 | 1,588,622 | 600 | 18.8 | 5.0 | 13.8 |
| 27 Jan | 3 | 1 | 1,588,622 | 655 | 19.8 | 4.7 | 15.1 |
| 28 Jan | 3 | 1 | 1,588,622 | 721 | 21.2 | 5.0 | 16.2 |
| 29 Jan | 3 | 1 | 1,588,622 | 792 | 23.1 | 5.4 | 17.7 |
| 30 Jan | 3 | 1 | 1,588,622 | 590 | 18.7 | 4.2 | 14.5 |
| 31 Jan | 3 | 1 | 1,588,622 | 705 | 20.7 | 4.7 | 16.0 |
| 1 Feb | 3 | 1 | 1,621,589 | 790 | 23.4 | 5.4 | 18.0 |
| 2 Feb | 3 | 1 | 1,621,589 | 820 | 23.9 | 5.5 | 18.4 |
| 3 Feb | 3 | 1 | 1,621,589 | 762 | 22.7 | 5.2 | 17.5 |
| 4 Feb | 3 | 1 | 1,621,589 | 598 | 19.5 | 4.7 | 14.8 |
| 5 Feb | 3 | 1 | 1,621,589 | 624 | 20.3 | 5.0 | 15.3 |
| 6 Feb | 3 | 1 | 1,621,589 | 627 | 20.7 | 5.3 | 15.4 |
| 7 Feb | 3 | 1 | 1,621,589 | 631 | 20.0 | 4.6 | 15.4 |
| 8 Feb | 3 | 1 | 1,621,589 | 632 | 20.0 | 4.4 | 15.6 |
| 9 Feb | 3 | 1/2[a] | 1,621,589 | 633 | 20.1 | 4.7 | 15.4 |
| 10 Feb | 3 | 2[b] | 1,621,589 | 620 | 19.6 | 4.4 | 15.2 |
| 11 Feb | 3 | 1 | 1,621,589 | 576 | 17.8 | 3.9 | 13.9 |
| 12 Feb | 3 | 1 | 1,621,589 | 630 | 19.8 | 4.4 | 15.4 |
| 13 Feb | 3 | 1 | 1,621,589 | 632 | 19.7 | 4.4 | 15.3 |
| 14 Feb | 3 | 1 | 1,621,589 | 632 | 20.0 | 4.7 | 15.3 |
| 15 Feb | 3 | 1 | 1,621,589 | 633 | 20.1 | 4.6 | 15.5 |
| 16 Feb | 3 | 1 | 1,621,589 | 633 | 20.1 | 4.6 | 15.5 |
| 17 Feb | 3 | 1 | 1,621,589 | 633 | 20.0 | 4.6 | 15.4 |
| 18 Feb | 3 | 1 | 1,621,589 | 634 | 20.3 | 4.9 | 15.4 |
| 19 Feb | 3 | 1 | 1,621,589 | 635 | 20.1 | 4.6 | 15.5 |
| 20 Feb | 3 | 1 | 1,621,589 | 636 | 20.2 | 4.8 | 15.4 |
| 21 Feb | 3 | 1 | 1,621,589 | 636 | 20.1 | 4.7 | 15.4 |
| 22 Feb | 3 | 1 | 1,621,589 | 634 | 20.2 | 4.8 | 15.4 |
| 23 Feb | 3 | 1 | 1,621,589 | 633 | 20.3 | 4.8 | 15.5 |
| 24 Feb | 3/2[c] | 1 | 1,621,589 | 304[ee] | 13.7 | 3.6 | 10.1 |
| 25 Feb | 2/1[d] | 1 | 1,033,868[5] | 0 | 5.2 | 2.3 | 2.9 |
| 26 Feb | 1 | 1 | 752,235[5] | 0 | 4.5 | 3.2 | 1.3 |
| 27 Feb | 1 | 1 | 752,235[5] | 0 | 5.6 | 4.3 | 1.3 |
| 28 Feb | 1 | 1 | 752,235[5] | 0 | 4.4 | 3.2 | 1.2 |

Table H-2 (Page 2 of 8)

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Mar | 1 | 1 | 752,235[5] | 0 | 2.9 | 2.0 | 0.9 |
| 2 Mar | 1 | 1 | 752,235[5] | 5 | 4.8 | 0.1 | 4.7 |
| 3 Mar | 1/2[e] | 1 | 819,857 | 383 | 18.5 | 3.9 | 14.6 |
| 4 Mar | 2/3[f] | 1 | 1,338,573 | 647 | 19.8 | 4.5 | 15.3 |
| 5 Mar | 3 | 1 | 1,633,952 | 727 | 21.5 | 5.0 | 16.5 |
| 6 Mar | 3 | 1 | 1,633,952 | 812 | 24.0 | 5.9 | 18.1 |
| 7 Mar | 3 | 1 | 1,633,952 | 824 | 24.2 | 5.8 | 18.4 |
| 8 Mar | 3 | 1 | 1,633,952 | 825 | 24.2 | 5.7 | 18.5 |
| 9 Mar | 3 | 1 | 1,633,952 | 825 | 24.2 | 5.7 | 18.5 |
| 10 Mar | 3 | 1 | 1,633,952 | 816 | 24.0 | 5.7 | 18.3 |
| 11 Mar | 3 | 1 | 1,633,952 | 794 | 23.5 | 5.8 | 17.7 |
| 12 Mar | 3 | 1 | 1,633,952 | 825 | 24.2 | 5.8 | 18.4 |
| 13 Mar | 3 | 1 | 1,633,952 | 825 | 24.5 | 6.0 | 18.5 |
| 14 Mar | 3 | 1 | 1,633,952 | 825 | 24.8 | 6.4 | 18.4 |
| 15 Mar | 3 | 1 | 1,633,952 | 825 | 24.1 | 5.6 | 18.5 |
| 16 Mar | 3 | 1 | 1,633,952 | 826 | 24.1 | 5.6 | 18.5 |
| 17 Mar | 3/2[g] | 1 | 1,633,952 | 754[ff] | 15.6 | 3.6 | 12.0 |
| 18 Mar | 2/3[h] | 1 | 1,338,573 | 3 | 3.2 | 1.2 | 2.0 |
| 19 Mar | 3 | 1 | 1,043,193 | 450 | 22.4 | 8.2 | 14.2 |
| 20 Mar | 3 | 1 | 1,043,193 | 539 | 22.9 | 6.6 | 16.3 |
| 21 Mar | 3 | 1 | 1,338,573 | 738 | 24.0 | 7.1 | 16.9 |
| 22 Mar | 3 | 1 | 1,633,952 | 777 | 23.0 | 5.4 | 17.6 |
| 23 Mar | 3 | 1 | 1,633,952 | 820 | 24.2 | 5.6 | 18.6 |
| 24 Mar | 3 | 1 | 1,633,952 | 820 | 24.0 | 5.4 | 18.6 |
| 25 Mar | 3 | 1 | 1,633,952 | 822 | 23.7 | 5.1 | 18.6 |
| 26 Mar | 3 | 1 | 1,633,952 | 820 | 24.0 | 5.3 | 18.7 |
| 27 Mar | 3 | 1 | 1,633,952 | 821 | 24.1 | 5.4 | 18.7 |
| 28 Mar | 3 | 1 | 1,633,952 | 819 | 24.3 | 5.8 | 18.5 |
| 29 Mar | 3 | 1 | 1,633,952 | 819 | 24.3 | 5.8 | 18.5 |
| 30 Mar | 3 | 1 | 1,633,952 | 816 | 24.4 | 5.9 | 18.5 |
| 31 Mar | 3 | 1 | 1,633,952 | 783 | 23.6 | 5.8 | 17.8 |
| 1 Apr | 3 | 1 | 1,759,641 | 324 | 15.3 | 4.1 | 11.2 |
| 2 Apr | 3 | 1 | 1,759,641 | 480 | 16.8 | 4.7 | 12.1 |
| 3 Apr | 3 | 1 | 1,759,641 | 550 | 17.5 | 4.1 | 13.4 |
| 4 Apr | 3 | 1 | 1,759,641 | 621 | 19.5 | 4.9 | 14.6 |
| 5 Apr | 3 | 1 | 1,759,641 | 706 | 22.4 | 6.4 | 16.0 |
| 6 Apr | 3 | 1 | 1,759,641 | 787 | 23.4 | 5.7 | 17.7 |
| 7 Apr | 3 | 1 | 1,759,641 | 821 | 24.5 | 6.1 | 18.4 |
| 8 Apr | 3 | 1 | 1,759,641 | 777 | 24.5 | 7.1 | 17.4 |
| 9 Apr | 3 | 1 | 1,759,641 | 820 | 24.7 | 6.2 | 18.5 |
| 10 Apr | 3 | 1 | 1,759,641 | 819 | 24.8 | 6.3 | 18.5 |
| 11 Apr | 3 | 1 | 1,759,641 | 819 | 25.4 | 6.9 | 18.5 |
| 12 Apr | 3 | 1 | 1,759,641 | 628 | 21.5 | 6.4 | 15.1 |
| 13 Apr | 3 | 1 | 1,759,641 | 500 | 19.0 | 5.8 | 13.2 |
| 14 Apr | 3 | 1 | 1,759,641 | 536 | 21.1 | 7.8 | 13.3 |
| 15 Apr | 3 | 1 | 1,759,641 | 741 | 25.5 | 9.0 | 16.5 |
| 16 Apr | 3 | 1 | 1,759,641 | 792 | 24.5 | 6.7 | 17.8 |
| 17 Apr | 3 | 1 | 1,759,641 | 819 | 23.5 | 4.6 | 18.9 |
| 18 Apr | 3/2[i] | 1 | 1,687,986[5] | 605[gg] | 18.7 | 3.3 | 15.4 |
| 19 Apr | 2 | 1 | 1,315,502[5] | 0 | 5.6 | 4.8 | 0.8 |
| 20 Apr | 2 | 1 | 1,315,502[5] | 0 | 6.4 | 4.9 | 1.5 |
| 21 Apr | 2 | 1 | 1,315,502[5] | 341 | 16.9 | 4.8 | 12.1 |
| 22 Apr | 2/3[j] | 1 | 1,315,502[5] | 658 | 20.2 | 3.0 | 17.2 |
| 23 Apr | 3 | 1 | 1,687,986[5] | 760 | 21.4 | 3.3 | 18.1 |
| 24 Apr | 3 | 1 | 2,060,469[5] | 817 | 22.9 | 3.4 | 19.5 |
| 25 Apr | 3 | 1 | 2,060,469[5] | 819 | 23.0 | 3.5 | 19.5 |
| 26 Apr | 3/2[k] | 1 | 1,687,986 | 145[hh] | 5.2 | 4.3 | 0.9 |
| 27 Apr | 2 | 1 | 1,315,502 | 0 | 5.6 | 4.6 | 1.0 |
| 28 Apr | 2 | 1 | 1,315,502 | 0 | 4.9 | 4.2 | 0.7 |
| 29 Apr | 2 | 1 | 1,315,502 | 0 | 8.7 | 5.9 | 2.8 |
| 30 Apr | 2 | 1 | 1,315,502 | 0 | 5.5 | 4.2 | 1.3 |

Table H-2 (Page 3 of 8)

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 May | 2/3[m] | 1 | 1,687,986 | 444 | 20.1 | 6.7 | 13.4 |
| 2 May | 3 | 1 | 2,060,469 | 703 | 22.6 | 6.1 | 16.5 |
| 3 May | 3 | 1 | 2,060,469 | 701 | 25.1 | 6.8 | 18.3 |
| 4 May | 3 | 1 | 2,060,469 | 817 | 25.2 | 6.4 | 18.8 |
| 5 May | 3 | 1 | 2,060,469 | 813 | 24.3 | 5.6 | 18.7 |
| 6 May | 3 | 1 | 2,060,469 | 788 | 23.6 | 5.4 | 18.2 |
| 7 May | 3 | 1 | 2,060,469 | 787 | 23.9 | 5.7 | 18.2 |
| 8 May | 3 | 1 | 2,060,469 | 782 | 23.4 | 5.3 | 18.1 |
| 9 May | 3 | 1 | 2,060,469 | 779 | 23.6 | 5.6 | 18.0 |
| 10 May | 3 | 1 | 2,060,469 | 779 | 25.1 | 7.2 | 17.9 |
| 11 May | 3 | 1 | 2,060,469 | 778 | 25.5 | 7.7 | 17.8 |
| 12 May | 3 | 1 | 2,060,469 | 778 | 23.1 | 4.9 | 18.2 |
| 13 May | 3 | 1 | 2,060,469 | 781 | 24.0 | 5.8 | 18.2 |
| 14 May | 3 | 1 | 2,060,469 | 779 | 24.7 | 6.7 | 18.0 |
| 15 May | 3 | 1 | 2,060,469 | 778 | 23.6 | 5.4 | 18.2 |
| 16 May | 3 | 1 | 2,060,469 | 779 | 23.4 | 5.2 | 18.2 |
| 17 May | 3 | 1 | 2,060,469 | 780 | 23.4 | 5.2 | 18.2 |
| 18 May | 3 | 1 | 2,060,469 | 779 | 23.5 | 5.3 | 18.2 |
| 19 May | 3 | 1 | 2,060,469 | 778 | 24.4 | 6.3 | 18.1 |
| 20 May | 3 | 1 | 2,060,469 | 779 | 25.2 | 7.2 | 18.0 |
| 21 May | 3 | 1 | 2,060,469 | 780 | 25.5 | 7.5 | 18.0 |
| 22 May | 3 | 1 | 2,060,469 | 783 | 25.6 | 7.5 | 18.1 |
| 23 May | 3 | 1 | 2,060,469 | 782 | 26.1 | 8.1 | 18.0 |
| 24 May | 3 | 1 | 2,060,469 | 780 | 27.0 | 9.1 | 17.9 |
| 25 May | 3 | 1 | 2,060,469 | 781 | 27.4 | 9.5 | 17.9 |
| 26 May | 3 | 1 | 2,018,678 | 781 | 27.8 | 10.0 | 17.8 |
| 27 May | 3 | 1 | 2,158,586 | 493 | 22.7 | 10.5 | 12.2 |
| 28 May | 3 | 1/2[n] | 2,158,586 | 468 | 21.6 | 10.1 | 11.5 |
| 29 May | 3 | 2 | 2,158,586 | 529 | 23.1 | 10.6 | 12.5 |
| 30 May | 3 | 2 | 2,158,586 | 566 | 24.2 | 9.8 | 14.4 |
| 31 May | 3 | 2/1[p] | 2,158,586 | 640 | 27.7 | 12.2 | 15.5 |
| 1 Jun | 3 | 1 | 2,158,586 | 679 | 25.9 | 10.1 | 15.8 |
| 2 Jun | 3 | 1 | 2,158,586 | 688 | 25.6 | 9.6 | 16.0 |
| 3 Jun | 3 | NA | 2,158,586 | 772 | 28.4 | 11.2 | 17.2 |
| 4 Jun | 3 | NA | 2,158,586 | 813 | 29.2 | 10.6 | 18.6 |
| 5 Jun | 3 | 2[q] | 2,158,586 | 809 | 29.1 | 10.5 | 18.6 |
| 6 Jun | 3 | 2 | 2,158,586 | 806 | 30.0 | 11.5 | 18.5 |
| 7 Jun | 3 | 2 | 2,158,586 | 805 | 29.7 | 11.2 | 18.5 |
| 8 Jun | 3 | 2 | 2,158,586 | 802 | 30.4 | 11.8 | 18.6 |
| 9 Jun | 3 | 2 | 2,158,586 | 798 | 30.3 | 12.0 | 18.3 |
| 10 Jun | 3 | 2 | 2,158,586 | 798 | 30.5 | 12.1 | 18.4 |
| 11 Jun | 3 | 2 | 2,158,586 | 796 | 30.0 | 11.7 | 18.3 |
| 12 Jun | 3 | 2 | 2,158,586 | 674 | 30.5 | 12.3 | 18.2 |
| 13 Jun | 3 | 2 | 2,158,586 | 793 | 29.8 | 12.5 | 17.3 |
| 14 Jun | 3 | 2 | 2,158,586 | 795 | 31.8 | 13.7 | 18.1 |
| 15 Jun | 3 | 2 | 2,158,586 | 757 | 31.3 | 14.1 | 17.2 |
| 16 Jun | 3 | 2 | 2,158,586 | 782 | 30.8 | 13.1 | 17.7 |
| 17 Jun | 3 | 2 | 2,158,586 | 688 | 27.6 | 12.0 | 15.6 |
| 18 Jun | 3 | 2 | 2,158,586 | 771 | 30.9 | 13.5 | 17.4 |
| 19 Jun | 3 | 2 | 2,158,586 | 804 | 32.5 | 14.2 | 18.3 |
| 20 Jun | 3 | 2 | 2,158,586 | 799 | 31.7 | 13.5 | 18.2 |
| 21 Jun | 3/2[r] | 2 | 1,831,528 | 455[ii] | 24.4 | 13.3 | 11.1 |
| 22 Jun | 2 | 2 | 1,504,469 | 51 | 17.2 | 13.3 | 3.9 |
| 23 Jun | 2/3[s] | 2 | 1,831,528 | 632 | 29.7 | 13.7 | 16.0 |
| 24 Jun | 3 | 2 | 2,158,586 | 630 | 28.4 | 13.9 | 14.5 |
| 25 Jun | 3 | 2 | 2,158,586 | 713 | 30.8 | 14.3 | 16.5 |
| 26 Jun | 3 | 2 | 2,158,586 | 788 | 32.4 | 14.5 | 17.9 |
| 27 Jun | 3 | 2 | 2,158,586 | 789 | 34.6 | 16.5 | 18.1 |
| 28 Jun | 3 | 2 | 2,158,586 | 791 | 34.8 | 16.6 | 18.2 |
| 29 Jun | 3 | 2 | 2,158,586 | 798 | 33.3 | 15.1 | 18.2 |
| 30 Jun | 3 | 2 | 2,158,586 | 798 | 34.5 | 16.3 | 18.2 |

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Jul | 3 | 2 | 2,158,586 | 797 | 31.9 | 16.8 | 15.1 |
| 2 Jul | 3 | 2 | 2,158,586 | 794 | 32.6 | 17.5 | 15.1 |
| 3 Jul | 3 | 2 | 2,158,586 | 795 | 31.0 | 16.0 | 15.0 |
| 4 Jul | 3 | 2 | 2,158,586 | 794 | 31.0 | 16.1 | 14.9 |
| 5 Jul | 3 | 2 | 2,158,586 | 786 | 32.1 | 16.8 | 15.3 |
| 6 Jul | 3 | 2 | 2,158,586 | 776 | 33.7 | 18.8 | 14.9 |
| 7 Jul | 3 | 2 | 2,158,586 | 753 | 33.9 | 18.4 | 15.5 |
| 8 Jul | 3 | 2 | 2,158,586 | 577 | 31.2 | 19.2 | 12.0 |
| 9 Jul | 3 | 2 | 2,158,586 | 662 | 33.4 | 19.8 | 13.6 |
| 10 Jul | 3 | 2 | 2,158,586 | 732 | 35.2 | 20.2 | 15.0 |
| 11 Jul | 3 | 2 | 2,158,586 | 764 | 35.9 | 20.3 | 15.6 |
| 12 Jul | 3 | 2 | 2,158,586 | 784 | 35.8 | 24.9 | 10.9 |
| 13 Jul | 3 | 2 | 2,158,586 | 787 | 34.4 | 18.5 | 15.9 |
| 14 Jul | 3 | 2 | 2,158,586 | 784 | 35.4 | 19.4 | 16.0 |
| 15 Jul | 3 | 2 | 2,158,586 | 782 | 36.5 | 20.4 | 16.1 |
| 16 Jul | 3 | 2 | 2,158,586 | 781 | 36.3 | 20.3 | 16.0 |
| 17 Jul | 3 | 2 | 2,158,586 | 776 | 37.0 | 21.2 | 15.8 |
| 18 Jul | 3 | 2 | 2,158,586 | 775 | 36.5 | 20.7 | 15.8 |
| 19 Jul | 3 | 2 | 2,158,586 | 769 | 36.3 | 20.4 | 15.9 |
| 20 Jul | 3 | 2 | 2,158,586 | 724 | 37.6 | 21.8 | 15.8 |
| 21 Jul | 3 | 2 | 2,158,586 | 427 | 37.8 | 22.6 | 15.2 |
| 22 Jul | 3 | 2 | 2,158,586 | 474 | 33.0 | 23.6 | 9.4 |
| 23 Jul | 3 | 2 | 2,158,586 | 522 | 33.4 | 23.3 | 10.1 |
| 24 Jul | 3 | 2 | 2,158,586 | 642 | 34.1 | 23.2 | 10.9 |
| 25 Jul | 3 | 2 | 2,158,586 | 732 | 36.0 | 22.7 | 13.3 |
| 26 Jul | 3 | 2 | 2,158,586 | 761 | 37.2 | 21.7 | 15.5 |
| 27 Jul | 3 | 2 | 2,158,586 | 757 | 37.5 | 22.3 | 15.2 |
| 28 Jul | 3 | 2 | 2,158,586 | 758 | 38.1 | 22.8 | 15.3 |
| 29 Jul | 3 | 2 | 2,158,586 | 757 | 37.6 | 22.2 | 15.4 |
| 30 Jul | 3 | 2 | 2,158,586 | 757 | 37.8 | 22.1 | 15.7 |
| 31 Jul | 3 | 2 | 2,158,586 | 757 | 39.1 | 21.5 | 17.6 |
| 1 Aug | 3 | 2 | 2,158,586 | 757 | 39.2 | 21.5 | 17.7 |
| 2 Aug | 3 | 2 | 2,158,586 | 752 | 39.7 | 22.1 | 17.6 |
| 3 Aug | 3 | 2 | 2,158,586 | 751 | 39.1 | 21.5 | 17.6 |
| 4 Aug | 3 | 2 | 2,158,586 | 746 | 39.3 | 21.7 | 17.6 |
| 5 Aug | 3 | 2 | 2,158,586 | 745 | 39.6 | 22.2 | 17.4 |
| 6 Aug | 3 | 2 | 2,158,586 | 741 | 40.0 | 22.5 | 17.5 |
| 7 Aug | 3 | 2 | 2,158,586 | 736 | 40.1 | 22.6 | 17.5 |
| 8 Aug | 3 | 2 | 2,158,586 | 732 | 39.9 | 22.4 | 17.5 |
| 9 Aug | 3 | 2 | 2,158,586 | 727 | 40.2 | 22.7 | 17.5 |
| 10 Aug | 3 | 2 | 2,158,586 | 722 | 40.5 | 23.0 | 17.5 |
| 11 Aug | 3 | 2 | 2,158,586 | 713 | 40.3 | 23.0 | 17.3 |
| 12 Aug | 3 | 2 | 2,158,586 | 660 | 38.9 | 22.8 | 16.1 |
| 13 Aug | 3 | 2 | 2,158,586 | 721 | 40.9 | 23.5 | 17.4 |
| 14 Aug | 3 | 2 | 2,158,586 | 716 | 41.7 | 24.2 | 17.5 |
| 15 Aug | 3 | 2 | 2,158,586 | 714 | 41.8 | 24.4 | 17.4 |
| 16 Aug | 3 | 2 | 2,158,586 | 712 | 41.5 | 24.1 | 17.4 |
| 17 Aug | 3 | 2 | 2,158,586 | 707 | 41.5 | 24.1 | 17.4 |
| 18 Aug | 3 | 2 | 2,158,586 | 667 | 40.3 | 23.8 | 16.5 |
| 19 Aug | 3 | 2 | 2,158,586 | 546 | 36.4 | 22.9 | 13.5 |
| 20 Aug | 3 | 2 | 2,158,586 | 577 | 37.6 | 23.3 | 14.3 |
| 21 Aug | 3 | 2 | 2,158,586 | 546 | 36.6 | 23.1 | 13.5 |
| 22 Aug | 3 | 2 | 2,158,586 | 576 | 37.7 | 23.4 | 14.3 |
| 23 Aug | 3 | 2 | 2,158,586 | 581 | 38.4 | 24.0 | 14.4 |
| 24 Aug | 3 | 2 | 2,158,586 | 578 | 37.9 | 23.6 | 14.3 |
| 25 Aug | 3 | 2 | 2,158,586 | 579 | 36.6 | 22.4 | 14.2 |
| 26 Aug | 3 | 2 | 2,158,586 | 582 | 36.9 | 22.6 | 14.3 |
| 27 Aug | 3 | 2 | 2,158,586 | 580 | 35.3 | 22.2 | 13.1 |
| 28 Aug | 3 | 2 | 2,158,586 | 587 | 26.4 | 11.6 | 14.8 |
| 29 Aug | 3 | 2 | 2,158,586 | 583 | 34.1 | 19.7 | 14.4 |
| 30 Aug | 3 | 2 | 2,158,586 | 581 | 35.4 | 20.9 | 14.5 |
| 31 Aug | 3 | 2 | 2,158,586 | 580 | 35.8 | 21.2 | 14.6 |

Table H-2 (Page 5 of 8)

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Sep | 3 | 2 | 2,158,586 | 579 | 35.8 | 21.4 | 14.4 |
| 2 Sep | 3 | 2 | 2,158,586 | 585 | 36.1 | 21.7 | 14.4 |
| 3 Sep | 3 | 2 | 2,158,586 | 584 | 35.9 | 21.5 | 14.4 |
| 4 Sep | 3 | 2 | 2,158,586 | 582 | 35.6 | 21.2 | 14.4 |
| 5 Sep | 3 | 2 | 2,158,586 | 580 | 36.0 | 21.6 | 14.4 |
| 6 Sep | 3 | 2 | 2,158,586 | 580 | 35.5 | 21.1 | 14.4 |
| 7 Sep | 3 | 2 | 2,158,586 | 578 | 35.8 | 21.4 | 14.4 |
| 8 Sep | 3/2[t] | 2 | 1,831,528 | 185[jj] | 26.4 | 20.5 | 5.9 |
| 9 Sep | 2 | 2 | 1,504,469 | 363 | 33.5 | 20.4 | 13.1 |
| 10 Sep | 2/3[u] | 2 | 1,831,528 | 485 | 33.6 | 18.1 | 15.5 |
| 11 Sep | 3 | 2 | 2,158,586 | 497 | 31.1 | 18.4 | 12.7 |
| 12 Sep | 3 | 2 | 2,158,586 | 513 | 31.1 | 18.1 | 13.0 |
| 13 Sep | 3 | 2/1[p] | 2,109,528 | 514 | 26.6 | 13.4 | 13.2 |
| 14 Sep | 3 | 1 | 2,060,469 | 517 | 21.2 | 7.1 | 14.1 |
| 15 Sep | 3 | 1 | 2,060,469 | 482 | 20.0 | 6.3 | 13.7 |
| 16 Sep | 3/2[w] | 1 | 1,687,986 | 37[kk] | 13.2 | 10.2 | 3.0 |
| 17 Sep | 2 | 1 | 1,315,502 | 0 | 9.4 | 8.7 | 0.7 |
| 18 Sep | 2 | 1 | 1,315,502 | 0 | 9.0 | 8.2 | 0.8 |
| 19 Sep | 2 | 1 | 1,315,502 | 0 | 6.1 | 6.4 | -0.3 |
| 20 Sep | 2 | 1 | 1,315,502 | 0 | 8.1 | 7.3 | 0.8 |
| 21 Sep | 2 | 1 | 1,315,502 | 0 | 10.0 | 9.2 | 0.8 |
| 22 Sep | 2/1[x] | 1 | 1,033,868 | 0 | 11.4 | 10.7 | 0.7 |
| 23 Sep | 1 | 1 | 752,235 | 0 | 10.8 | 10.0 | 0.8 |
| 24 Sep | 1 | 1 | 752,235 | 0 | 13.1 | 11.3 | 1.8 |
| 25 Sep | 1 | 1 | 752,235 | 0 | 16.0 | 15.2 | 0.8 |
| 26 Sep | 1 | 1 | 752,235 | 0 | 16.3 | 15.5 | 0.8 |
| 27 Sep | 1 | 1 | 752,235 | 0 | 17.0 | 16.2 | 0.8 |
| 28 Sep | 1 | 1 | 752,235 | 0 | 17.8 | 17.0 | 0.8 |
| 29 Sep | 1 | 1 | 752,235 | 0 | 17.7 | 16.7 | 1.0 |
| 30 Sep | 1 | 1 | 752,235 | 0 | 17.3 | 16.4 | 0.9 |
| 1 Oct | 1 | 1 | 752,235 | 0 | 17.1 | 16.2 | 0.9 |
| 2 Oct | 1 | 1 | 752,235 | 0 | 17.2 | 16.3 | 0.9 |
| 3 Oct | 1 | 1 | 752,235 | 0 | 16.9 | 16.1 | 0.8 |
| 4 Oct | 1 | 1 | 752,235 | 0 | 16.3 | 15.5 | 0.8 |
| 5 Oct | 1 | 1 | 752,235 | 0 | 16.2 | 15.0 | 1.2 |
| 6 Oct | 1 | 1 | 752,235 | 0 | 16.4 | 15.2 | 1.2 |
| 7 Oct | 1 | 1 | 752,235 | 0 | 17.2 | 15.9 | 1.3 |
| 8 Oct | 1 | 1 | 752,235 | 0 | 17.0 | 15.5 | 1.5 |
| 9 Oct | 1 | 1 | 752,235 | 0 | 16.6 | 15.0 | 1.6 |
| 10 Oct | 1 | 1 | 752,235 | 0 | 16.6 | 15.1 | 1.5 |
| 11 Oct | 1 | 1 | 752,235 | 0 | 16.5 | 14.6 | 1.9 |
| 12 Oct | 1 | 1 | 752,235 | 0 | 16.6 | 15.0 | 1.6 |
| 13 Oct | 1 | 1 | 752,235 | 0 | 16.7 | 15.2 | 1.5 |
| 14 Oct | 1 | 1 | 752,235 | 0 | 16.2 | 14.8 | 1.4 |
| 15 Oct | 1 | 1 | 752,235 | 0 | 15.7 | 14.3 | 1.4 |
| 16 Oct | 1 | 1 | 752,235 | 0 | 15.4 | 14.1 | 1.3 |
| 17 Oct | 1 | 1 | 752,235 | 0 | 14.8 | 13.7 | 1.1 |
| 18 Oct | 1 | 1 | 752,235 | 0 | 14.7 | 13.2 | 1.5 |
| 19 Oct | 1 | 1 | 752,235 | 0 | 14.8 | 13.3 | 1.5 |
| 20 Oct | 1 | 1 | 752,235 | 0 | 15.1 | 13.6 | 1.5 |
| 21 Oct | 1 | 1 | 752,235 | 0 | 15.3 | 13.8 | 1.5 |
| 22 Oct | 1 | 1 | 752,235 | 0 | 15.3 | 13.9 | 1.4 |
| 23 Oct | 1 | 1 | 752,235 | 0 | 15.5 | 14.0 | 1.5 |
| 24 Oct | 1 | 1 | 752,235 | 0 | 15.2 | 13.6 | 1.6 |
| 25 Oct | 1 | 1 | 752,235 | 0 | 15.2 | 13.6 | 1.6 |
| 26 Oct | 1 | 1 | 752,235 | 0 | 15.8 | 15.3 | 0.5 |
| 27 Oct | 1 | 1 | 752,235 | 0 | 16.2 | 15.0 | 1.2 |
| 28 Oct | 1 | 1 | 752,235 | 0 | 14.7 | 14.5 | 0.2 |
| 29 Oct | 1 | 1 | 752,235 | 0 | 14.5 | 13.8 | 0.7 |
| 30 Oct | 1 | 1 | 752,235 | 0 | 13.8 | 13.3 | 0.5 |
| 31 Oct | 1 | 1 | 752,235 | 0 | 13.8 | 14.6 | -0.8 |

Table H-2 (page 6 of 8)

| Date | No. of Circulating Water Pumps[1] | No. of Service Water Pumps[1] | Total Volume of Water Pumped[2] ($m^3$) | Mean Electrical Outputs[3] (MWe) | Temperature[4] (°C) Discharge | Intake | Δ |
|---|---|---|---|---|---|---|---|
| 1 Nov | 1 | 1 | 752,235 | 0[kk] | 14.0 | 15.5 | -1.5 |
| 2 Nov | 1 | 1 | 752,235 | 0 | 14.4 | 14.2 | 0.2 |
| 3 Nov | 1 | 1 | 752,235 | 0 | 15.0 | 14.6 | 0.4 |
| 4 Nov | 1 | 1 | 752,235 | 0 | 15.0 | 15.0 | 0.0 |
| 5 Nov | 1 | 1 | 752,235 | 0 | 14.8 | 13.4 | 1.4 |
| 6 Nov | 1 | 1 | 752,235 | 0 | 15.3 | 13.6 | 1.7 |
| 7 Nov | 1/0[y] | 1 | 425,176 | 0 | 17.1 | 15.8 | 1.3 |
| 8 Nov | 0 | 1 | 98,116 | 0 | 19.3 | 18.7 | 0.6 |
| 9 Nov | 0 | 1 | 98,116 | 0 | 19.8 | 19.1 | 0.7 |
| 10 Nov | 0 | 1 | 98,116 | 0 | 20.2 | 19.5 | 0.7 |
| 11 Nov | 0 | 1 | 98,116 | 0 | 20.3 | 19.6 | 0.7 |
| 12 Nov | 0 | 1 | 98,116 | 0 | 20.3 | 19.5 | 0.8 |
| 13 Nov | 0 | 1 | 98,116 | 0 | 19.8 | 19.3 | 0.5 |
| 14 Nov | 0/1[p] | 1 | 425,176 | 0 | 12.7 | 11.2 | 1.5 |
| 15 Nov | 1 | 1 | 752,235 | 0 | 11.1 | 9.8 | 1.3 |
| 16 Nov | 1 | 1 | 752,235 | 0 | 11.1 | 9.8 | 1.3 |
| 17 Nov | 1 | 1 | 752,235 | 0 | 9.7 | 9.0 | 0.7 |
| 18 Nov | 1 | 1 | 752,235 | 0 | 9.7 | 9.0 | 0.7 |
| 19 Nov | 1 | 1 | 752,235 | 0 | 9.7 | 8.8 | 0.9 |
| 20 Nov | 1 | 1 | 752,235 | 0 | 9.7 | 8.8 | 0.9 |
| 21 Nov | 1 | 1 | 752,235 | 0 | 8.5 | 7.6 | 0.9 |
| 22 Nov | 1 | 1 | 752,235 | 0 | 8.8 | 7.8 | 1.0 |
| 23 Nov | 1 | 1 | 752,235 | 0 | 8.7 | 7.3 | 1.4 |
| 24 Nov | 1 | 1/2[p] | 801,293 | 0 | 9.3 | 7.8 | 1.5 |
| 25 Nov | 1 | 2 | 850,352 | 0 | 8.4 | 7.4 | 1.0 |
| 26 Nov | 1 | 2 | 850,352 | 0 | 8.6 | 7.1 | 1.5 |
| 27 Nov | 1 | 2 | 850,352 | 0 | 7.2 | 5.8 | 1.4 |
| 28 Nov | 1 | 2 | 850,352 | 0 | 6.6 | 5.6 | 1.0 |
| 29 Nov | 1 | 2 | 850,352 | 0 | 7.9 | 6.7 | 1.2 |
| 30 Nov | 1/0[z] | 2 | 850,352 | 0 | 8.2 | 8.1 | 0.1 |
| 1 Dec | 0/1[aa] | 2 | 850,352 | 0 | 7.5 | 6.8 | 0.7 |
| 2 Dec | 1 | 2 | 850,352 | 0 | 4.7 | 5.4 | -0.7 |
| 3 Dec | 1 | 2 | 850,352 | 0 | 4.9 | 5.2 | -0.3 |
| 4 Dec | 1 | 2 | 850,352 | 0 | 2.8 | 3.3 | -0.5 |
| 5 Dec | 1 | 2 | 850,352 | 0 | 5.9 | 5.6 | 0.3 |
| 6 Dec | 1/2[bb] | 2 | 1,177,411 | 0 | 7.1 | 3.9 | 3.2 |
| 7 Dec | 2 | 2 | 1,504,469 | 0 | 5.1 | 5.5 | -0.4 |
| 8 Dec | 2 | 2 | 1,504,469 | 20 | 11.0 | 6.1 | 4.9 |
| 9 Dec | 2 | 2 | 1,504,469 | 148 | 11.8 | 5.8 | 6.0 |
| 10 Dec | 2 | 2 | 1,504,469 | 211 | 11.1 | 3.7 | 7.4 |
| 11 Dec | 2 | 2 | 1,504,469 | 258 | 12.8 | 3.6 | 9.2 |
| 12 Dec | 2 | 2 | 1,504,469 | 385 | 16.3 | 4.0 | 12.3 |
| 13 Dec | 2 | 2 | 1,504,469 | 433 | 17.3 | 3.0 | 14.3 |
| 14 Dec | 2 | 2 | 1,504,469 | 512 | 18.2 | 2.1 | 16.1 |
| 15 Dec | 2 | 2 | 1,504,469 | 553 | 19.8 | 2.9 | 16.9 |
| 16 Dec | 2 | 2 | 1,504,469 | 556 | 19.5 | 2.9 | 16.6 |
| 17 Dec | 2 | 2 | 1,504,469 | 316[mm] | 11.5 | 2.4 | 9.1 |
| 18 Dec | 2 | 2 | 1,504,469 | 171 | 7.9 | 1.4 | 6.5 |
| 19 Dec | 2 | 2 | 1,504,469 | 439 | 15.2 | 1.3 | 13.9 |
| 20 Dec | 2/3[cc] | 2 | 1,831,528[5] | 557 | 17.5 | 1.7 | 15.8 |
| 21 Dec | 3 | 2 | 1,845,591 | 640 | 19.5 | 5.2 | 14.3 |
| 22 Dec | 3 | 2 | 1,845,591 | 588 | 18.9 | 6.2 | 12.7 |
| 23 Dec | 3 | 2 | 1,565,956 | 430 | 16.7 | 2.9 | 13.8 |
| 24 Dec | 3/2[dd] | 2 | 1,504,469[5] | 14[nn] | 1.8 | 1.7 | 0.1 |
| 25 Dec | 2 | 2 | 1,504,469[5] | 70 | 4.9 | 1.2 | 3.7 |
| 26 Dec | 2 | 2 | 1,504,469[5] | 239 | 16.6 | 4.3 | 12.3 |
| 27 Dec | 2 | 2 | 1,504,469[5] | 232 | 14.9 | 2.1 | 12.8 |
| 28 Dec | 2 | 2 | 1,504,469[5] | 416 | 17.2 | 1.8 | 15.4 |
| 29 Dec | 2 | 2 | 1,319,419 | 518 | 20.1 | 3.9 | 16.2 |
| 30 Dec | 2 | 2 | 1,319,419 | 587 | 23.8 | 7.1 | 16.7 |
| 31 Dec | 2 | 2 | 1,319,419 | 599 | 23.5 | 6.3 | 17.2 |

FOOTNOTES: Plant Operating Conditions at James A. FitzPatrick Nuclear Plant during 1978.

[1] Number of pumps operating based on pump data collected daily from the control room at James A. FitzPatrick Station.

[2] Volume of water pumped each day derived from gross circulating water flow data in James A. FitzPatrick "401" monthly reports. For 1 Jan through 24 Apr and 20-31 Dec, volumes have been corrected for % tempering when data were available.

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

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

[5] Percent tempering data not available. Volume of water pumped in from James A. FitzPatrick "401" monthly reports.

[a] Pump change outside sampling period (data not collected).

[b] Two pumps operating from 1000 when sampling began on 10 Feb to 1000 on 11 Feb.

[c] On 24 Feb, three pumps operating from 0001 to 0920 and two pumps operating from 0920 to 2400.

[d] On 25 Feb, two pumps operating from 0001 to 0448 and one pump operating from 0448 to 2400.

[e] On 3 Mar, one pump operating from 0001 to 0037 and two pumps operating from 0037 to 2400.

[f] On 4 Mar, two pumps operating from 0001 to 0126 and three pumps operating from 0126 to 2400.

[g] On 17 Mar, three pumps operating from 0001 to 2208 and two pumps operating from 2208 to 2400.

[h] On 18 Mar, two pumps operating from 0001 to approximately 2335 and three pumps operating from approximately 2335 to 2400.

[i] On 18 Apr, three pumps operating from 0001 to 1800 and two pumps operating from 1800 to 2400.

[j] On 22 Apr, two pumps operating from 0001 to 0905 and three pumps operating from 0905 to 2400.

[k] On 26 Apr, three pumps operating from 0001 to 1152 and two pumps operating from 1152 to 2400.

[m] On 1 May, two pumps operating from 0001 to 1535 and three pumps operating from 1535 to 2400.

[n] On 28 May, one pump operating from 0001 to 1010 and two pumps operating from 1010 to 2400.

[p] Time of pump change not available.

[q] On 5 Jun, two pumps operating at the beginning (0001 hrs) of the sample period.

[r] On 21 Jun, three pumps operating from 0001 to 1350 and two pumps operating from 1350 to 2400.

[s] On 23 Jun, two pumps operating from 0001 to 0840 and three pumps operating from 0840 to 2400.

[t] On 8 Sep, three pumps operating from 0001 to 0735 and two pumps operating from 0735 to 2400.

[u] On 10 Sep, two pumps operating from 0001 to 2055 and three pumps operating from 2055 to 2400.

[w] On 16 Sep, three pumps operating from 0001 to 0040 and two pumps operating from 0040 to 2400.

[x] On 22 Sep, two pumps operating from 0001 to 1510 and one pump operating from 1510 to 2400.

[y] On 7 Nov, one pump operating from 0001 to 0615 and no pumps operating from 0615 to 2400.

[z] On 30 Nov, one pump operating from 0001 to 1554 and no pumps operating from 1554 to 2400.

[aa] On 1 Dec, no pumps operating from 0001 to 1225 and one pump operating from 1225 to 2400.

[bb] On 6 Dec, one pump operating from 0001 to 1100 and two pumps operating from 1100 to 2400.

[cc] On 20 Dec, two pumps operating from 0001 to 1940 and three pumps operating from 1940 to 2400.

[dd] On 24 Dec, three pumps operating from 0001 to 0039 and two pumps operating from 0039 to 2400.

[ee] Unit down from 1515, 24 Feb to 2245, 2 Mar.

[ff] Unit down from 2208, 17 Mar to 2335, 18 Mar.

[gg] Unit down from 2226, 18 Apr to 0315, 21 Apr.

[hh] Unit down from 1200, 26 Apr to 0259, 1 May.

[ii] Unit down from 1350, 21 Jun to 1417, 22 Jun.

[jj] Unit down from 0735, 8 Sep to approximately 0001, 9 Sep.

[kk] Unit down from approximately 0040, 16 Sep to approximately 2000, 8 Dec (scheduled outage for refueling).

[mm] Unit down from 1200, 17 Dec to approximately 1200, 18 Dec.

[nn] Unit down from 0039, 24 Dec to approximately 1430, 26 Dec.

NA = not available

Table H-3

## Numerical Abundance and Percent Composition of Impinged Fish Collected at Nine Mile Point Nuclear Plant Unit 1, Jan-Dec 1978

| Species | 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 | 7 | 0.1 | 1 | T | 10 | 0.1 | 56 | 0.2 | 5,114 | 32.3 | 856 | 12.9 | 60 | 12.2 | 58 | 12.5 | 351 | 10.5 | 338 | 39.8 | 531 | 53.2 | 692 | 3.9 | 8,074 | 7.2 |
| American eel | 7 | 0.1 | 4 | 0.1 | 6 | 0.1 | 3 | T | 5 | T | 4 | 0.1 | 2 | 0.4 | 1 | 0.2 | 4 | 0.1 | 2 | 0.2 | 1 | 0.1 | | | 39 | T |
| Black crappie | | | | | | | | | | | | | | | | | | | 1 | 0.1 | | | | | 1 | T |
| Bluegill | | | | | | | | | | | | | | | 1 | 0.2 | | | | | | | 15 | 0.1 | 16 | T |
| Brook stickleback | | | 1 | T | 1 | T | 11 | T | 3 | T | 1 | T | | | | | | | | | | | | | 17 | T |
| Brown bullhead | 1 | T | | | 2 | T | 1 | T | 4 | T | 1 | T | 7 | 1.4 | | | 1 | T | | | 3 | 0.3 | 8 | T | 28 | T |
| Brown trout | 1 | T | | | | | | | | | | | 1 | 0.2 | 3 | 0.7 | | | | | | | | | 5 | T |
| Burbot | 6 | T | 1 | T | | | 1 | T | 1 | T | 2 | T | 3 | 0.6 | 8 | 1.7 | 5 | 0.2 | 1 | 0.1 | 1 | 0.1 | | | 29 | T |
| Central mudminnow | | | | | 2 | T | 21 | 0.1 | 1 | T | | | | | | | | | | | 1 | 0.1 | 3 | T | 28 | T |
| Cisco (lake herring) | | | | | | | | | | | | | | | | | | | | | | | 1 | T | 1 | T |
| Cottus sp. (sculpin) | 549 | 3.8 | 572 | 6.9 | 84 | 1.0 | 207 | 0.6 | 312 | 2.0 | 55 | 0.8 | 28 | 5.7 | 11 | 2.4 | 30 | 0.9 | 35 | 4.1 | 60 | 6.0 | 155 | 0.9 | 2,098 | 1.9 |
| Cyprinidae (minnows) | | | | | | | 2 | T | 1 | T | | | | | | | | | | | | | | | 3 | T |
| Emerald shiner | 586 | 4.4 | 261 | 3.1 | 388 | 4.8 | 36 | 0.1 | 5 | T | | | | | 1 | 0.2 | 1 | T | | | | | 34 | 0.2 | 1,312 | 1.2 |
| Fathead minnow | | | | | | | 1 | T | 3 | T | | | | | | | | | | | | | | | 4 | T |
| Freshwater drum | 6 | T | 3 | T | 2 | T | | | | | | | | | | | | | | | | | | | 11 | T |
| Gizzard shad | 2,168 | 16.3 | 599 | 7.2 | 110 | 1.4 | 94 | 0.3 | 10 | 0.1 | 3 | 0.1 | 1 | 0.2 | 3 | 0.7 | 2 | 0.1 | 28 | 3.3 | 53 | 5.3 | 1,211 | 6.7 | 4,282 | 3.8 |
| Golden shiner | 1 | T | | | | | 1 | T | | | | | | | | | | | | | | | | | 2 | T |
| Goldfish | 14 | 0.1 | | | 3 | T | 1 | T | | | | | | | | | | | | | | | | | 18 | T |
| Lake chub | 17 | 0.1 | 8 | 0.1 | 6 | 0.1 | 2 | T | 3 | T | | | | | | | | | | | | | 3 | T | 39 | T |
| Largemouth bass | | | | | | | | | | | | | | | | | | | | | | | 2 | T | 2 | T |
| Lepomis sp. (sunfish) | | | | | | | | | | | | | | | | | | | | | | | 1 | T | 1 | T |
| Longnose dace | | | 1 | T | | | | | | | | | | | | | | | | | | | | | 1 | T |
| Longnose gar | | | | | | | | | | | | | | | | | | | | | | | 1 | T | 1 | T |
| Oncorhynchus sp. (salmon) | | | | | | | | | | | | | 1 | 0.2 | | | | | | | | | | | 1 | T |
| Pumpkinseed | 1 | T | | | | | | | | | | | | | | | | | | | | | 24 | 0.1 | 25 | T |
| Rainbow smelt | 3,279 | 24.6 | 1,480 | 17.8 | 719 | 8.9 | 455 | 1.3 | 736 | 4.7 | 373 | 5.6 | 9 | 1.8 | 304 | 65.7 | 2,907 | 86.6 | 249 | 29.3 | 194 | 19.4 | 14,626 | 81.3 | 25,331 | 22.5 |
| Rainbow trout | | | | | 1 | T | | | | | | | | | | | | | | | | | 1 | T | 2 | T |
| Rock bass | 39 | 0.3 | 10 | 0.1 | 17 | 0.2 | 1 | T | | | 5 | 0.1 | 57 | 11.6 | 11 | 2.4 | 2 | 0.1 | | | 2 | 0.2 | 31 | 0.2 | 175 | 0.2 |
| Salvelinus sp. (trout) | 21 | 0.1 | | | 5 | 0.1 | | | 1 | T | | | | | | | | | 1 | 0.1 | | | 16 | 0.1 | 44 | T |
| Sea lamprey | 4 | T | 1 | T | | | | | 1 | T | | | 7 | 1.4 | 1 | 0.2 | | | | | 1 | 0.1 | 5 | T | 20 | T |
| Smallmouth bass | 14 | 0.1 | 3 | T | 2 | T | 1 | T | 2 | T | 11 | 0.2 | 7 | 1.4 | 8 | 1.7 | 7 | 0.2 | 1 | 0.1 | 10 | 1.0 | 70 | 0.4 | 136 | 0.1 |
| Spottail shiner | 411 | 3.1 | 42 | 0.5 | 243 | 3.0 | 86 | 0.2 | 96 | 0.6 | 114 | 1.7 | 14 | 2.9 | 13 | 2.8 | 9 | 0.3 | 59 | 6.9 | 52 | 5.2 | 186 | 1.0 | 1,325 | 1.2 |
| Stonecat | 12 | 0.1 | 1 | T | | | 4 | T | 19 | 0.1 | 5 | 0.1 | 14 | 2.9 | 2 | 0.4 | 2 | 0.1 | | | 4 | 0.4 | 5 | T | 68 | 0.1 |
| Tessellated darter[1] | 3 | T | | | | | 5 | T | 87 | 0.6 | 179 | 2.7 | 80 | 16.3 | 10 | 2.2 | 1 | T | 4 | 0.5 | 5 | 0.5 | 1 | T | 375 | 0.3 |
| Threespine stickleback | 2,610 | 19.6 | 4,636 | 55.8 | 5,140 | 63.7 | 34,880 | 96.2 | 5,435 | 34.3 | 4,838 | 72.8 | 158 | 32.2 | 2 | 0.4 | | | 114 | 13.4 | 17 | 1.7 | 27 | 0.2 | 57,857 | 51.4 |
| Trout-perch | 83 | 0.6 | 17 | 0.2 | 100 | 1.2 | 127 | 0.4 | 507 | 3.2 | 155 | 2.3 | 2 | 0.4 | 2 | 0.4 | 7 | 0.2 | 4 | 0.5 | 3 | 0.3 | 20 | 0.1 | 1,027 | 0.9 |
| Walleye | 7 | 0.1 | 2 | T | | | | | | | | | | | | | | | | | | | 2 | T | 11 | T |
| White bass | 1,851 | 13.9 | 162 | 2.0 | 272 | 3.4 | 11 | T | 2 | T | | | | | | | | | | | | | 52 | 0.3 | 2,350 | 2.1 |
| White perch | 1,428 | 10.7 | 502 | 6.0 | 944 | 11.7 | 224 | 0.6 | 175 | 1.1 | 3 | 0.1 | 7 | 1.4 | 11 | 2.4 | 22 | 0.7 | 2 | 0.2 | 17 | 1.7 | 449 | 2.5 | 3,784 | 3.4 |
| White sucker | 14 | 0.1 | 1 | T | 3 | T | 2 | T | | | 1 | T | 21 | 4.3 | 3 | 0.7 | | | 8 | 0.9 | 3 | 0.3 | 2 | T | 58 | 0.1 |
| Yellow perch | 204 | 1.5 | 6 | 0.1 | 5 | 0.1 | 18 | 0.1 | 3,304 | 20.9 | 36 | 0.5 | 10 | 2.0 | 10 | 2.2 | 7 | 0.2 | 3 | 0.4 | 41 | 4.1 | 348 | 1.9 | 3,992 | 3.5 |
| Unidentified | | | 1 | T | | | | | | | | | 2 | 0.4 | | | | | | | | | | | 3 | T |
| Total | 13,344 | | 8,315 | | 8,065 | | 36,251 | | 15,827 | | 6,642 | | 491 | | 463 | | 3,358 | | 850 | | 999 | | 17,991 | | 112,596 | |
| No. fish/1000 $m^3$ [2] | 0.768 | | 0.509 | | 0.433 | | 2.198 | | 0.776 | | 0.376 | | 0.027 | | 0.024 | | 0.180 | | 0.048 | | 0.052 | | 1.003 | | 0.517 | |

[1]Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

[2]Number per 1000 $m^3$ based on water volumes recorded on 401 Monthly Report for Nine Mile Point Unit No. 1.

T = trace

# Table H-4

## Biomass (g) and Percent Composition of Impinged Fish Collected at Nine Mile Point Nuclear Plant Unit 1, Jan-Dec 1978

| Species | 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 | 28.7 | T | 6.9 | T | 76.0 | 0.1 | 263.9 | 0.2 | 188,742.2 | 75.1 | 12,512.3 | 31.5 | 1,484.9 | 3.3 | 73.0 | 0.2 | 841.7 | 3.0 | 1,950.9 | 10.7 | 2,134.6 | 9.7 | 10,613.1 | 3.5 | 218,728.2 | 11.8 |
| American eel | 6,049.7 | 0.9 | 1,367.7 | 0.9 | 3,105.8 | 2.8 | 1,094.3 | 0.7 | 687.5 | 0.3 | 1,410.3 | 3.6 | 1,205.2 | 2.6 | 680.8 | 1.9 | 1,748.1 | 6.1 | 74.1 | 0.4 | 48.7 | 0.2 | | | 17,472.2 | 0.9 |
| Black crappie | | | | | | | | | | | | | | | | | | | 3.0 | T | | | | | 3.0 | T |
| Bluegill | | | | | | | | | | | | | | | 150.9 | 0.4 | | | | | | | 27.8 | T | 178.7 | T |
| Brook stickleback | | | 0.9 | T | 1.9 | T | 19.5 | T | 4.1 | T | 0.9 | T | | | | | | | | | | | | | 27.3 | T |
| Brown bullhead | 10.2 | T | | | 98.0 | 0.1 | 346.8 | 0.2 | 22.2 | T | 96.1 | 0.2 | 512.8 | 1.1 | | | 219.1 | 0.8 | | | 597.6 | 2.7 | 225.3 | 0.1 | 2,128.1 | 0.1 |
| Brown trout | 2,175.0 | 0.3 | | | | | | | | | | | 1,490.0 | 3.3 | 8,812.5 | 24.9 | | | | | | | | | 12,477.5 | 0.7 |
| Burbot | 3,442.0 | 0.5 | 25.6 | T | | | 29.2 | T | 737.2 | 0.3 | 2,407.6 | 6.1 | 4,500.5 | 9.9 | 12,700.2 | 35.9 | 6,873.5 | 24.1 | 88.6 | 0.5 | 1,800.0 | 8.1 | | | 32,604.4 | 1.8 |
| Central mudminnow | | | | | 8.2 | T | 99.8 | 0.1 | 4.5 | T | | | | | | | | | | | 3.1 | T | 20.3 | T | 135.9 | T |
| Cisco (lake herring) | | | | | | | | | | | | | | | | | | | | | | | 74.7 | T | 74.7 | T |
| *Cottus* sp. (sculpin) | 1,806.5 | 0.3 | 2,197.0 | 1.5 | 317.5 | 0.3 | 771.9 | 0.5 | 1,045.5 | 0.4 | 140.2 | 0.4 | 68.5 | 0.2 | 29.4 | 0.1 | 101.0 | 0.4 | 82.0 | 0.4 | 162.6 | 0.7 | 532.2 | 0.2 | 7,254.3 | 0.4 |
| Cyprinidae (minnows) | | | | | | | 4.1 | T | 3.2 | T | | | | | | | | | | | | | | | 7.3 | T |
| Emerald shiner | 1,321.8 | 0.2 | 706.2 | 0.5 | 1,101.5 | 1.0 | 115.5 | 0.1 | 86.1 | T | | | | | NA | | 3.0 | T | | | | | 122.4 | T | 3,456.5 | 0.2 |
| Fathead minnow | | | | | | | 4.3 | T | 11.2 | T | | | | | | | | | | | | | | | 15.5 | T |
| Freshwater drum | 618.3 | 0.1 | 279.8 | 0.2 | 2,107.5 | 1.9 | | | | | | | | | | | | | | | | | | | 3,005.6 | 0.2 |
| Gizzard shad | 579,176.4 | 83.5 | 108,624.6 | 75.3 | 57,389.3 | 51.4 | 67,806.8 | 43.9 | 6,630.8 | 2.6 | 1,728.8 | 4.4 | 788.0 | 1.7 | 2,361.4 | 6.7 | 1,833.1 | 6.4 | 9,774.8 | 53.4 | 10,826.7 | 49.0 | 200,296.0 | 66.1 | 1,047,236.7 | 56.7 |
| Golden shiner | 6.1 | T | | | | | 6.2 | T | | | | | | | | | | | | | | | | | 12.3 | T |
| Goldfish | 218.5 | T | | | 383.2 | 0.3 | 16.8 | T | | | | | | | | | | | | | | | | | 618.5 | T |
| Lake chub | 245.8 | T | 40.8 | T | 146.4 | 0.1 | 94.5 | 0.1 | 37.4 | T | | | | | | | | | | | | | 33.2 | T | 598.1 | T |
| Largemouth bass | | | | | | | | | | | | | | | | | | | | | | | 28.5 | T | 28.5 | T |
| *Lepomis* sp. (sunfish) | | | | | | | | | | | | | | | | | | | | | | | 1.3 | T | 1.3 | T |
| Longnose dace | | | 17.9 | T | | | | | | | | | | | | | | | | | | | | | 17.9 | T |
| Longnose gar | | | | | | | | | | | | | | | | | | | | | | | 131.3 | T | 131.3 | T |
| *Oncorhynchus* sp. (salmon) | | | | | | | | | | | | | 865.7 | 1.9 | | | | | | | | | | | 865.7 | T |
| Pumpkinseed | 2.4 | T | | | | | | | | | | | | | | | | | | | | | 152.3 | 0.1 | 154.7 | T |
| Rainbow smelt | 31,499.9 | 4.5 | 13,848.7 | 9.6 | 9,684.3 | 8.7 | 6,284.9 | 4.1 | 7,091.5 | 2.8 | 1,430.2 | 3.6 | 27.1 | 0.1 | 563.4 | 1.6 | 10,058.8 | 35.3 | 2,658.4 | 14.5 | 2,958.8 | 13.4 | 69,232.6 | 22.8 | 155,338.6 | 8.4 |
| Rainbow trout | | | | | 267.0 | 0.2 | | | | | | | | | | | | | | | | | 1,140.0 | 0.4 | 1,407.0 | 0.1 |
| Rock bass | 2,923.4 | 0.4 | 103.7 | 0.1 | 1,875.8 | 1.7 | 541.3 | 0.4 | | | 1,190.5 | 3.0 | 11,461.6 | 25.2 | 3,301.5 | 9.3 | 480.2 | 1.7 | | | 144.1 | 0.7 | 193.5 | 0.1 | 22,215.6 | 1.2 |
| *Salvelinus* sp. (trout) | 1,856.4 | 0.3 | | | 1,357.9 | 1.2 | | | 6.4 | T | | | | | | | | | 1,398.7 | 7.6 | | | 188.3 | 0.1 | 4,807.7 | 0.3 |
| Sea lamprey | 365.1 | 0.1 | 154.9 | 0.1 | | | | | 159.2 | 0.1 | | | 998.5 | 2.2 | 229.1 | 0.6 | | | | | 255.3 | 1.2 | 1,015.4 | 0.3 | 3,177.5 | 0.2 |
| Smallmouth bass | 6,433.5 | 0.9 | 1,236.2 | 0.9 | 1,561.6 | 1.4 | 950.9 | 0.6 | 1,406.7 | 0.6 | 7,049.0 | 17.7 | 2,724.6 | 6.0 | 2,168.8 | 6.1 | 1,790.0 | 6.3 | NA | | 46.4 | 0.2 | 1,791.8 | 0.6 | 27,159.5 | 1.5 |
| Spottail shiner | 1,258.5 | 0.2 | 230.9 | 0.2 | 667.5 | 0.1 | 381.3 | 0.2 | 511.1 | 0.2 | 809.8 | 2.0 | 183.6 | 0.4 | 64.9 | 0.2 | 39.9 | 0.1 | 352.6 | 1.9 | 337.6 | 1.5 | 1,458.5 | 0.5 | 6,296.1 | 0.3 |
| Stonecat | 827.6 | 0.1 | 83.9 | 0.1 | | | 130.2 | 0.1 | 649.9 | 0.3 | 268.9 | 0.7 | 945.2 | 2.1 | 112.3 | 0.3 | 127.6 | 0.4 | | | 247.0 | 1.1 | 263.5 | 0.1 | 3,656.1 | 0.2 |
| Tessellated darter[1] | 4.5 | T | | | | | 25.5 | T | 261.8 | 0.1 | 349.4 | 0.9 | 37.9 | 0.1 | 11.4 | T | 0.8 | T | 8.4 | 0.1 | 12.5 | 0.1 | 0.7 | T | 712.9 | T |
| Threespine stickleback | 3,614.4 | 0.5 | 6,968.6 | 4.8 | 7,534.6 | 6.7 | 48,648.8 | 31.5 | 8,365.4 | 3.3 | 8,326.1 | 21.0 | 230.7 | 0.5 | 1.6 | T | | | 78.7 | 0.4 | 14.1 | 0.1 | 30.7 | T | 83,821.7 | 4.5 |
| Trout-perch | 482.1 | 0.1 | 117.2 | 0.1 | 393.3 | 0.4 | 871.6 | 0.6 | 4,149.8 | 1.7 | 679.6 | 1.7 | 32.6 | 0.1 | 9.4 | T | 28.2 | 0.1 | 23.0 | 0.1 | 15.7 | 0.1 | 107.7 | T | 6,910.2 | 0.4 |
| Walleye | 410.5 | 0.1 | 220.1 | 0.2 | | | | | | | | | | | | | | | | | | | 84.8 | T | 715.4 | T |
| White bass | 24,651.2 | 3.6 | 2,254.1 | 1.6 | 6,124.8 | 5.5 | 211.3 | 0.1 | 267.1 | 0.1 | | | | | | | | | | | | | 799.5 | 0.3 | 34,308.0 | 1.9 |
| White perch | 19,990.8 | 2.9 | 5,148.3 | 3.6 | 15,695.2 | 14.1 | 22,860.6 | 14.8 | 22,145.8 | 8.8 | 407.3 | 1.0 | 1,538.8 | 3.4 | 1,651.7 | 4.7 | 3,948.2 | 13.9 | 35.9 | 0.2 | 338.5 | 1.5 | 2,894.2 | 1.0 | 96,655.3 | 5.2 |
| White sucker | 1,024.5 | 0.1 | 26.6 | T | 1,290.8 | 1.2 | 2,087.5 | 1.4 | | | NA | | 15,588.0 | 34.3 | 1,227.1 | 3.5 | | | 1,589.5 | 8.7 | 585.9 | 2.7 | 749.0 | 0.2 | 24,168.9 | 1.3 |
| Yellow perch | 3,165.4 | 0.5 | 515.3 | 0.4 | 471.5 | 0.4 | 627.4 | 0.4 | 8,414.2 | 3.3 | 907.1 | 2.3 | 804.8 | 1.8 | 1,179.2 | 3.3 | 380.3 | 1.3 | 174.7 | 1.0 | 1,567.8 | 7.1 | 10,848.2 | 3.6 | 29,055.9 | 1.6 |
| Unidentified | | | NA | | | | | | | | | | NA | | | | | | | | | | | | | |
| Total | 693,609.2 | | 144,175.9 | | 111,659.6 | | 154,294.9 | | 251,440.8 | | 39,714.1 | | 45,489.0 | | 35,328.6 | | 28,473.5 | | 18,293.2 | | 22,097.0 | | 303,064.8 | | 1,847,640.6 | |

[1] Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

NA = damaged specimen, weight not available.

## Table H-5

## Estimated Numbers and Biomass (g) of Fish Impinged at Nine Mile Point Nuclear Station Unit 1, Jan-Dec 1978

| | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sep | | Oct | | Nov | | Dec | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | 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 | 17 | 68.4 | 2 | 16.1 | 22 | 168.3 | 140 | 659.8 | 11,324 | 417,930.0 | 1,975 | 28,874.5 | 143 | 3,540.9 | 138 | 174.1 | 810 | 1,942.4 | 806 | 4,652.2 | 1,225 | 4,926.0 | 1,650 | 25,308.2 | 18,252 | 488,260.9 |
| American eel | 17 | 14,426.2 | 9 | 3,191.3 | 13 | 6,877.1 | 8 | 2,735.8 | 11 | 1,522.3 | 9 | 3,254.5 | 5 | 2,873.9 | 2 | 1,623.4 | 9 | 4,034.1 | 5 | 176.7 | 2 | 112.4 | | | 90 | 40,827.7 |
| Black crappie | | | | | | | | | | | | | | | | | | | 2 | 7.2 | | | | | 2 | 7.2 |
| Bluegill | | | | | | | | | | | | | | | 2 | 359.8 | | | | | | | 36 | 66.3 | 38 | 426.1 |
| Brook stickleback | | | 2 | 2.1 | 2 | 4.2 | 28 | 48.8 | 7 | 9.1 | 2 | 2.1 | | | | | | | | | | | | | 41 | 66.3 |
| Brown bullhead | 2 | 24.3 | | | 4 | 217.0 | 3 | 867.0 | 9 | 49.2 | 2 | 221.8 | 17 | 1,222.8 | | | 2 | 505.6 | | | 7 | 1,379.1 | 19 | 537.3 | 65 | 5,024.1 |
| Brown trout | 2 | 5,186.5 | | | | | | | | | | | 2 | 3,553.1 | 7 | 21,014.5 | | | | | | | | | 11 | 29,754.1 |
| Burbot | 14 | 8,207.9 | 2 | 59.7 | | | 3 | 73.0 | 2 | 1,632.4 | 5 | 5,556.0 | 7 | 10,732.0 | 19 | 30,285.2 | 12 | 15,861.9 | 2 | 211.3 | 2 | 4,153.8 | | | 68 | 76,773.2 |
| Central mudminnow | | | | | 4 | 18.2 | 53 | 249.5 | 2 | 10.0 | | | | | | | | | | | 2 | 7.2 | 7 | 48.4 | 68 | 333.3 |
| Cisco (lake herring) | | | | | 13 | 324.2 | | | | | | | | | | | | | | | | | 2 | 178.1 | 15 | 502.3 |
| Cottus sp. (sculpin) | 1,309 | 4,307.8 | 1,335 | 5,126.4 | 186 | 703.0 | 518 | 1,929.9 | 691 | 2,315.0 | 127 | 323.5 | 67 | 163.3 | 26 | 70.1 | 69 | 233.1 | 83 | 195.5 | 138 | 375.2 | 370 | 1,269.1 | 4,919 | 17,011.9 |
| Cyprinidae (minnows) | | | | | | | 5 | 10.3 | 2 | 7.1 | | | | | | | | | | | | | | | 7 | 17.4 |
| Emerald shiner | 1,397 | 3,152.0 | 609 | 1,647.8 | 859 | 2,439.0 | 90 | 288.8 | 11 | 190.7 | | | | | 2 | NA | 2 | 6.9 | | | | | 81 | 291.9 | 3,051 | 8,017.1 |
| Fathead minnow | | | | | | | 3 | 10.8 | 7 | 24.8 | | | | | | | | | | | | | | | 10 | 35.6 |
| Freshwater drum | 14 | 1,474.4 | 7 | 652.9 | 4 | 4,666.6 | | | | | | | | | | | | | | | | | | | 25 | 6,793.9 |
| Gizzard shad | 5,170 | 1,381,115.6 | 1,398 | 253,457.0 | 244 | 127,076.6 | 235 | 169,517.0 | 22 | 14,682.5 | 7 | 3,989.5 | 2 | 1,879.1 | 7 | 5,631.0 | 5 | 4,230.2 | 67 | 23,309.2 | 122 | 24,984.7 | 2,888 | 477,629.8 | 10,167 | 2,487,502.2 |
| Golden shiner | 2 | 14.5 | | | | | 3 | 15.5 | | | | | | | | | | | | | | | | | 5 | 30.0 |
| Goldfish | 33 | 521.0 | | | 7 | 848.5 | 3 | 42.0 | | | | | | | | | | | | | | | | | 43 | 1,411.5 |
| Lake chub | 41 | 586.1 | 19 | 95.2 | | | 5 | 236.3 | 7 | 82.8 | | | | | | | | | | | | | 7 | 79.2 | 79 | 1,079.6 |
| Largemouth bass | | | | | | | | | | | | | | | | | | | | | | | 5 | 68.0 | 5 | 68.0 |
| Lepomis sp. (sunfish) | | | | | | | | | | | | | | | | | | | | | | | 2 | 3.1 | 2 | 3.1 |
| Longnose dace | | | 2 | 41.8 | | | | | | | | | | | | | | | | | | | | | 2 | 41.8 |
| Longnose gar | | | | | | | | | | | | | | | | | | | | | | | 2 | 313.1 | 2 | 313.1 |
| Oncorhynchus sp. (salmon) | | | | | | | | | | | | | 2 | 2,064.4 | | | | | | | | | | | 2 | 2,064.4 |
| Pumpkinseed | 2 | 5.7 | | | | | | | | | | | | | | | | | | | | | 57 | 363.2 | 59 | 368.9 |
| Rainbow smelt | 7,819 | 75,115.3 | 3,453 | 32,313.6 | 1,592 | 21,443.8 | 1,138 | 15,712.3 | 1,630 | 15,702.6 | 861 | 3,300.5 | 21 | 64.6 | 725 | 1,343.5 | 6,708 | 23,212.6 | 594 | 6,339.3 | 448 | 6,828.0 | 34,877 | 165,093.4 | 59,866 | 366,469.5 |
| Rainbow trout | | | | | 2 | 591.2 | | | | | | | | | | | | | | | | | 2 | 2,718.5 | 4 | 3,309.7 |
| Rock bass | 93 | 6,971.2 | 23 | 242.0 | 38 | 4,153.6 | 3 | 1,353.3 | | | 12 | 2,747.3 | 136 | 27,331.6 | 26 | 7,872.8 | 5 | 1,108.2 | | | 5 | 332.5 | 74 | 461.4 | 415 | 52,573.9 |
| Salvelinus sp. (trout) | 50 | 4,426.8 | | | 11 | 3,006.8 | | | 2 | 14.2 | | | | | | | | | 2 | 3,335.4 | | | 38 | 449.0 | 103 | 11,232.2 |
| Sea lamprey | 10 | 870.6 | 2 | 361.4 | | | | | 2 | 352.5 | | | 17 | 2,381.0 | 2 | 546.3 | | | | | 2 | 589.2 | 12 | 2,421.3 | 47 | 7,522.3 |
| Smallmouth bass | 33 | 15,341.5 | 7 | 2,884.5 | 4 | 3,457.8 | 3 | 2,377.3 | 4 | 3,114.8 | 25 | 16,266.9 | 17 | 6,497.1 | 19 | 5,171.8 | 16 | 4,130.8 | 2 | NA | 23 | 107.1 | 167 | 4,272.8 | 320 | 63,622.4 |
| Spottail shiner | 980 | 3,001.0 | 98 | 538.8 | 538 | 1,478.0 | 215 | 953.3 | 213 | 1,131.7 | 263 | 1,868.8 | 33 | 437.8 | 31 | 154.8 | 21 | 92.1 | 141 | 840.6 | 120 | 779.1 | 444 | 3,478.0 | 3,097 | 14,754.0 |
| Stonecat | 29 | 1,973.5 | 2 | 195.8 | | | 10 | 325.5 | 42 | 1,439.1 | 12 | 620.5 | 33 | 2,253.9 | 5 | 267.8 | 5 | 294.5 | | | 9 | 570.0 | 12 | 628.3 | 159 | 8,568.9 |
| Tesselated darter[1] | 7 | 10.7 | | | | | 13 | 63.8 | 193 | 579.7 | 413 | 806.3 | 191 | 90.4 | 24 | 27.2 | 2 | 1.8 | 10 | 20.0 | 12 | 28.8 | 2 | 1.7 | 867 | 1,630.4 |
| Threespine stickleback | 6,224 | 8,619.0 | 10,817 | 16,260.0 | 11,381 | 16,683.8 | 87,200 | 121,622.0 | 12,035 | 18,523.4 | 11,165 | 19,214.1 | 377 | 550.1 | 5 | 3.8 | | | 272 | 187.7 | 39 | 32.5 | 64 | 92.3 | 139,579 | 201,788.7 |
| Trout-perch | 198 | 1,149.6 | 40 | 273.5 | 221 | 870.9 | 318 | 2,179.0 | 1,123 | 9,188.9 | 358 | 1,568.3 | 5 | 77.7 | 5 | 22.4 | 16 | 65.1 | 10 | 54.8 | 7 | 36.2 | 48 | 256.8 | 2,349 | 15,743.2 |
| Walleye | 17 | 978.9 | 5 | 513.6 | | | | | | | | | | | | | | | | | | | 5 | 202.2 | 27 | 1,694.7 |
| White bass | 4,414 | 58,783.7 | 378 | 5,259.6 | 602 | 13,562.1 | 28 | 528.3 | 4 | 591.4 | | | | | | | | | | | | | 124 | 1,906.5 | 5,550 | 80,631.6 |
| White perch | 3,405 | 47,670.5 | 1,171 | 12,012.7 | 2,090 | 34,753.7 | 560 | 57,151.5 | 388 | 49,037.2 | 7 | 939.9 | 17 | 3,663.5 | 26 | 3,938.7 | 51 | 9,111.2 | 5 | 85.6 | 39 | 781.2 | 1,071 | 6,901.6 | 8,830 | 226,053.3 |
| White sucker | 33 | 2,443.0 | 2 | 62.1 | 7 | 2,858.2 | 5 | 5,218.8 | | | 2 | NA | 50 | 37,171.5 | 7 | 2,926.2 | | | 19 | 3,790.4 | 7 | 1,352.1 | 5 | 1,786.1 | 137 | 57,608.4 |
| Yellow perch | 486 | 7,548.3 | 14 | 1,202.4 | 11 | 1,044.0 | 45 | 1,568.5 | 7,316 | 18,631.5 | 83 | 2,093.3 | 24 | 1,919.1 | 24 | 2,811.9 | 16 | 877.6 | 7 | 416.6 | 95 | 3,618.0 | 830 | 25,868.8 | 8,951 | 67,600.0 |
| Unidentified | | | 2 | NA | | | | | | | | | 5 | NA | | | | | | | | | | | 7 | NA |
| Total | 31,818 | 1,653,994.0 | 19,399 | 336,410.3 | 17,855 | 247,246.6 | 90,635 | 385,738.1 | 35,047 | 556,762.9 | 15,328 | 91,647.8 | 1,171 | 106,473.8 | 1,102 | 84,245.3 | 7,749 | 65,708.1 | 2,027 | 43,622.5 | 2,304 | 50,993.1 | 42,901 | 722,694.4 | 267,336 | 4,347,536.9 |

[1]Includes tessellated and Johnny darters, previously considered as subspecies and reported under the name of Johnny darter in earlier Nine Mile Point studies.

NA = damaged specimen, weight not available.

Table H-6

Length Frequency of Fish Impinged at Nine Mile Point Nuclear Power Plant, Jan-Dec 1978

Alewife

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31- 40 | | | | | | | | 11 | | | 1 | |
| 41- 50 | | | | | | | | 4 | 5 | 4 | 1 | |
| 51- 60 | | | | 1 | 1 | 2 | | 3 | 68 | 64 | 39 | 18 |
| 61- 70 | 1 | | 2 | 13 | 15 | 30 | | | 22 | 71 | 208 | 117 |
| 71- 80 | 2 | | 3 | 24 | 64 | 157 | | | 2 | 14 | 120 | 69 |
| 81- 90 | 2 | | | 7 | 63 | 113 | 3 | | 3 | 2 | 11 | 8 |
| 91- 100 | | 1 | 2 | 4 | 39 | 46 | 9 | | 4 | 2 | 7 | 2 |
| 101- 110 | 1 | | | 1 | 22 | 26 | 6 | | | | | |
| 111- 120 | | | | 1 | 6 | 3 | 1 | 2 | | | 1 | 2 |
| 121- 130 | | | | | 3 | 1 | 1 | | | | | 11 |
| 131- 140 | | | 1 | | 2 | | | | | | 2 | 37 |
| 141- 150 | | | | | 10 | 1 | | | | 2 | 1 | 26 |
| 151- 160 | | | 1 | 1 | 64 | 34 | 2 | | | 1 | 1 | 11 |
| 161- 170 | | | | | 231 | 78 | 8 | | | 1 | 2 | 15 |
| 171- 180 | | | | 1 | 342 | 94 | 7 | | | 1 | 6 | 29 |
| 181- 190 | | | | 1 | 222 | 46 | 11 | | 1 | 8 | 6 | 42 |
| 191- 200 | | | | | 53 | 7 | 2 | | | 1 | | 23 |
| 201- 210 | | | | | 7 | 1 | | | | | 1 | 1 |
| 211- 220 | | | | | | | | | | | 1 | |

Table H-7

Length Frequency of Fish Impinged at Nine Mile Point Nuclear Power Plant, Jan-Dec 1978

Rainbow Smelt

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31- 40 | | | 1 | | | | | 6 | 2 | | | |
| 41- 50 | 6 | 3 | 2 | 4 | | 6 | | 43 | 99 | 1 | | 32 |
| 51- 60 | 69 | 36 | 22 | 6 | 5 | 28 | 1 | 15 | 167 | 25 | 5 | 206 |
| 61- 70 | 114 | 77 | 33 | 18 | 34 | 76 | 1 | 1 | 77 | 24 | 13 | 309 |
| 71- 80 | 149 | 112 | 54 | 56 | 62 | 113 | 4 | 3 | 25 | 11 | 17 | 235 |
| 81- 90 | 140 | 108 | 48 | 49 | 121 | 50 | 1 | 12 | 30 | 5 | 15 | 134 |
| 91- 100 | 67 | 43 | 20 | 18 | 50 | 12 | | 26 | 24 | 5 | 7 | 33 |
| 101- 110 | 15 | 17 | 6 | 4 | 10 | 3 | | 10 | 19 | 10 | 6 | 11 |
| 111- 120 | 17 | 15 | 7 | 4 | 6 | 1 | | 1 | 11 | 6 | 3 | 21 |
| 121- 130 | 89 | 37 | 39 | 16 | 15 | 7 | | | 5 | 4 | 7 | 62 |
| 131- 140 | 223 | 130 | 76 | 37 | 40 | 9 | 1 | 2 | 11 | 7 | 10 | 128 |
| 141- 150 | 186 | 128 | 77 | 54 | 66 | 13 | | | 15 | 9 | 13 | 122 |
| 151- 160 | 109 | 79 | 76 | 53 | 64 | 6 | | 1 | 15 | 17 | 18 | 58 |
| 161- 170 | 48 | 38 | 44 | 51 | 49 | 6 | | 1 | 8 | 10 | 15 | 22 |
| 171- 180 | 36 | 25 | 39 | 19 | 20 | 4 | | 1 | 2 | 3 | 11 | 22 |
| 181- 190 | 21 | 17 | 9 | 13 | 11 | 1 | | | 3 | 5 | 9 | 8 |
| 191- 200 | 5 | 11 | 8 | 3 | 1 | | | | 2 | 5 | 6 | 11 |
| 201- 210 | 4 | 1 | 1 | 2 | | 1 | | | 1 | 2 | 3 | 5 |
| 211- 220 | 1 | 2 | 2 | | 2 | | | | 2 | 1 | 1 | 4 |
| 221- 230 | | | 2 | | | | | | | | 2 | 1 |
| 231- 240 | 2 | | | | | | | | | | | 1 |
| 241- 250 | 1 | 2 | | | | | | | | 10 | | 1 |
| 251- 250 | | 1 | 2 | | | | | | | | | |

## Table H-8

### Length Frequency of Fish Impinged at Nine Mile Point Nuclear Power Plant, Jan-Dec 1978

### Smallmouth Bass

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41- 50 | | | | | | | | 1 | | | | |
| 51- 60 | | | | | | | | 1 | | | 4 | 6 |
| 61- 70 | 1 | | | | | | | 1 | | | 4 | 9 |
| 71- 80 | | | | | | | | | 2 | | | 18 |
| 81- 90 | | | | | | | | | 2 | | 1 | 10 |
| 91- 100 | | | | | | | | | | | 1 | 1 |
| 101- 110 | | | | | | | | | | | | |
| 111- 120 | | 1 | | | | | | | | | | |
| 121- 130 | | | | | | | | | | | | |
| 131- 140 | | | | | | | | | | | | |
| 141- 150 | | | | | | | | | | | | |
| 151- 160 | | | | | | | | | | | | |
| 161- 170 | | | | | | | | | | | | |
| 171- 180 | | | | | | | | | | | | |
| 181- 190 | | | | | | | | | | | | |
| 191- 200 | | | | | | | | | | | | |
| 201- 210 | | | | | | | | | | | | |
| 211- 220 | | | | | | | | | | | | |
| 221- 230 | | | | | | | | | | | | |
| 231- 240 | 1 | | | | | 1 | 1 | 1 | 1 | | | |
| 241- 250 | | | | | | | | | | | | |
| 251- 260 | 1 | | | | | | | | | | | |
| 261- 270 | 1 | | | | | | | | | | | |
| 271- 280 | | | | | | | | | | | | |
| 281- 290 | 1 | | | | | | | | | | | |
| 291- 300 | 1 | | | | | | | | | | | |
| 301- 310 | | | | | | | 1 | | | | | |
| 311- 320 | | | | | | | | | | | | |
| 321- 330 | 1 | | | | | 1 | | 1 | | | | |
| 331- 340 | 1 | | | | | | | 1 | | | | |
| 341- 350 | | | | | | | 1 | | | | | |
| 351- 360 | | | | | 1 | | | 1 | | | | |
| 361- 370 | 1 | | 1 | | | 1 | | | | | | |
| 371- 380 | | | | | | 1 | | | | | | 1 |
| 381- 390 | 3 | 1 | | | 1 | 3 | | | 1 | | | 1 |
| 391- 400 | 1 | | | 1 | | | | 1 | | | | |
| 401- 410 | | | 1 | | | | | | | | | |
| 411- 420 | | | | | | | | | | | | |
| 421- 430 | | | | | | 1 | | | | | | |
| 431- 440 | | | | | | | | | 1 | | | |

## Table H-9

## Length Frequency of Fish Impinged at Nine Mile Point Nuclear Power Plant, Jan-Dec 1978

### Threespine Stickleback

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31- 32 | | | | 1 | | | | | | | | |
| 33- 34 | | | | | | | | | | | | |
| 35- 36 | 1 | | | | | | | 1 | | 3 | 1 | |
| 37- 38 | | | | | | | | | | 1 | | |
| 39- 40 | 2 | | | | | 1 | | | | 8 | | |
| 41- 42 | 2 | 2 | | 3 | | 1 | | | | 11 | 2 | 1 |
| 43- 44 | 9 | 5 | 7 | 5 | 7 | | 1 | | | 15 | 1 | 1 |
| 45- 46 | 16 | 22 | 17 | 23 | 9 | 11 | | | | 17 | 1 | 6 |
| 47- 48 | 51 | 56 | 54 | 53 | 44 | 27 | 3 | | | 7 | 3 | 5 |
| 49- 50 | 58 | 62 | 88 | 107 | 77 | 68 | 12 | | | 3 | 2 | 5 |
| 51- 52 | 94 | 153 | 187 | 170 | 151 | 112 | 8 | | | 1 | 2 | 5 |
| 53- 54 | 108 | 152 | 232 | 218 | 184 | 139 | 17 | | | | 3 | 3 |
| 55- 56 | 101 | 222 | 301 | 210 | 261 | 201 | 19 | | | | 1 | 1 |
| 57- 58 | 82 | 178 | 235 | 187 | 238 | 200 | 14 | 1 | | | 1 | |
| 59- 60 | 40 | 105 | 145 | 123 | 163 | 205 | 18 | | | | 1 | |
| 61- 62 | 36 | 69 | 103 | 102 | 173 | 186 | 13 | | | | | |
| 63- 64 | 15 | 29 | 62 | 44 | 89 | 83 | 15 | | | | | |
| 65- 66 | 8 | 34 | 34 | 26 | 53 | 48 | 6 | | | | | |
| 67- 68 | 10 | 14 | 12 | 17 | 39 | 28 | 1 | | | | | |
| 69- 70 | 5 | 12 | 14 | 14 | 27 | 17 | 2 | | | | | |
| 71- 72 | 7 | 10 | 18 | 10 | 37 | 9 | 1 | | | | | |
| 73- 74 | 1 | 3 | 10 | 3 | 13 | 6 | | | | | | |
| 75- 76 | 1 | 4 | 4 | 6 | 5 | 7 | | | | | | |
| 77- 78 | | 5 | 3 | | 1 | 1 | | | | | | |
| 79- 80 | | | | 1 | 1 | | | | | | | |

## Table H-10

## Length Frequency of Fish Impinged at Nine Mile Point Nuclear Power Plant, Jan-Dec 1978

### White Perch

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41- 50 | 11 | | | | | | | | | | 1 | 2 |
| 51- 60 | 60 | 24 | 4 | 2 | | | | 1 | | | | 27 |
| 61- 70 | 89 | 86 | 42 | 5 | 2 | | | | | | 1 | 99 |
| 71- 80 | 168 | 105 | 59 | 41 | 14 | | | | 1 | | 5 | 123 |
| 81- 90 | 211 | 131 | 110 | 35 | 13 | | | | 1 | 1 | 7 | 92 |
| 91- 100 | 147 | 83 | 143 | 22 | 21 | | | | 2 | | 2 | 35 |
| 101- 110 | 41 | 24 | 57 | 20 | 16 | | | | | | | 12 |
| 111- 120 | 13 | 4 | 7 | 5 | 4 | | | | | | | 3 |
| 121- 130 | 2 | | 4 | | 2 | | | | | | | 1 |
| 131- 140 | | | | 1 | 1 | | | | | 1 | | 1 |
| 141- 150 | | | | 2 | 2 | | | | | | | |
| 151- 160 | | | | 1 | 1 | 1 | | 1 | | | | |
| 161- 170 | | | | 2 | 3 | | | | | | | |
| 171- 180 | | | | 2 | 7 | | | | | | | |
| 181- 190 | | 1 | | 1 | 4 | | | | 1 | | | 1 |
| 191- 200 | 1 | | 1 | 5 | 1 | | 1 | 1 | 1 | | | 1 |
| 201- 210 | 3 | 1 | 7 | 2 | 4 | | 1 | 1 | 3 | | | |
| 211- 220 | 4 | 1 | 5 | 10 | 10 | | | 1 | 2 | | | 1 |
| 221- 230 | 6 | | 9 | 13 | 13 | | 1 | 2 | 4 | | | |
| 231- 240 | 5 | 1 | 1 | 14 | 9 | | | 3 | 2 | | | |
| 241- 250 | 4 | | 3 | 11 | 11 | 1 | | 1 | 2 | | 1 | |
| 251- 260 | 5 | | 3 | 10 | 15 | | 1 | | | | | |
| 261- 270 | 3 | | | 6 | 13 | | 1 | | 1 | | | |
| 271- 280 | 2 | | | 5 | 3 | | | | | | | |
| 281- 290 | | | 1 | | 3 | | | | | | | |
| 291- 300 | 2 | 1 | | 3 | | | | | 2 | | | |
| 301- 310 | | | | 1 | | | 2 | | | | | |
| 311- 320 | | | | | 2 | | | | | | | |
| 321- 330 | 1 | | | | | | | | | | | |
| 331- 340 | | 1 | | 1 | | | | | | | | |
| 341- 350 | | | | 1 | | | | | | | | |
| 351- 360 | | | | | | | | | | | | |
| 361- 370 | | | | 1 | | | | | | | | |

Table H-11
Length Frequency of *Fish Impinged* at Nine Mile Point Nuclear Plant, Jan-Dec 1978

Yellow Perch

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31- 40 | 1 | 1 | | | | | 1 | | | | | |
| 41- 50 | | | | | | 1 | | | | | | 1 |
| 51- 60 | | | | 1 | 42 | 1 | | | | | | |
| 61- 70 | 18 | | | 5 | 265 | 20 | | | | | | 6 |
| 71- 80 | 56 | | | 1 | 73 | 7 | | | 1 | | 1 | 25 |
| 81- 90 | 27 | 1 | | 3 | 2 | 2 | | | 1 | | 1 | 15 |
| 91- 100 | 25 | | | | | 1 | | | | | | 15 |
| 101- 110 | 19 | | | | 2 | | | | | | | 5 |
| 111- 120 | 24 | 2 | | | 2 | | | | | | 1 | 11 |
| 121- 130 | 10 | | | | | | | 1 | 1 | 1 | 2 | 36 |
| 131- 140 | 1 | | | 1 | 2 | | 1 | 2 | 1 | | 8 | 46 |
| 141- 150 | 2 | | | | | | | | | | 11 | 62 |
| 151- 160 | 4 | | 1 | 2 | | | | | | | 6 | 36 |
| 161- 170 | 1 | 1 | | 1 | | | | | 1 | 1 | 7 | 22 |
| 171- 180 | 2 | | 1 | 1 | | 1 | 1 | | 1 | | 2 | 9 |
| 181- 190 | 1 | | 1 | | 1 | 1 | 1 | 3 | | | 1 | 4 |
| 191- 200 | 3 | | | 1 | 2 | | 1 | 1 | | | 1 | 5 |
| 201- 210 | 1 | | 1 | | | | 3 | | | 1 | | 1 |
| 211- 220 | 1 | | | 1 | | | 1 | | | | | 2 |
| 221- 230 | 1 | 1 | 1 | | | | 1 | | | | | |
| 231- 240 | 2 | | | 1 | | | | | | | | |
| 241- 250 | | | | | | | | | | | | 1 |
| 251- 260 | | | | | | | | 1 | 1 | | | 1 |
| 261- 270 | 1 | | | | | | | | | | | |
| 271- 280 | | 1 | | | | | | | | | | |
| 281- 290 | | | | | | | | 1 | | | | |
| 291- 300 | | | | | | | | | | | | |
| 301- 310 | | | | | | | | | | | | |
| 311- 320 | | | | | | | | | | | | |
| 321- 330 | | | | | | | | | | | | 1 |
| 331- 340 | | | | | | 1 | | | | | | |

Table H-12

Numerical Abundance and Percent Composition of Impinged Fish Collected at James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1978

| Species | 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[1] No. | Nov[1] % | Dec No. | Dec % | Total No. | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alewife | 14 | 0.1 | | | 13 | T | 36 | 0.4 | 4,772 | 11.9 | 2,634 | 14.2 | 2,695 | 48.0 | 12,037 | 85.2 | 1,591 | 11.6 | 17 | 16.5 | 46 | 24.7 | 4,836 | 27.4 | 28,691 | 15.6 |
| American eel | | | | | | | | | | | 1 | T | 3 | 0.1 | 2 | T | 4 | T | 2 | 1.9 | | | | | 12 | T |
| Black crappie | 1 | T | | | | | 1 | T | 1 | T | | | | | | | | | | | | | 1 | T | 4 | T |
| Bluegill | 1 | T | | | | | | | 1 | T | | | 1 | T | | | | | | | | | 17 | 0.1 | 20 | T |
| Bowfin | 1 | T | | | | | | | | | | | | | | | | | | | | | | | 1 | T |
| Brook stickleback | 1 | T | | | | | 27 | 0.3 | 2 | T | | | | | | | | | | | | | | | 30 | T |
| Brown bullhead | 9 | 0.1 | | | 2 | T | 1 | T | 2 | T | | | 1 | T | 3 | T | 2 | T | | | | | 4 | T | 24 | T |
| Brown trout | 2 | T | 2 | T | 1 | T | | | 1 | T | 1 | T | 5 | 0.1 | 8 | 0.1 | | | | | | | 1 | T | 21 | T |
| Burbot | 4 | T | | | 2 | T | | | | | | | | | 5 | T | | | | | | | 1 | T | 12 | T |
| Carp | 2 | T | 1 | T | | | | | | | | | 1 | T | | | | | | | | | 1 | T | 5 | T |
| Central mudminnow | | | | | 15 | T | 27 | 0.3 | 1 | T | | | | | | | | | | | | | 1 | T | 44 | T |
| Channel catfish | 1 | T | | | 1 | T | | | | | | | | | | | | | | | | | | | 2 | T |
| Cisco (lake herring) | 1 | T | | | | | | | | | | | | | | | | | | | | | | | 1 | T |
| Cottus sp. (sculpin) | 539 | 3.1 | 218 | 3.1 | 53 | 0.1 | 118 | 1.2 | 168 | 0.4 | 64 | 0.3 | 123 | 2.2 | 27 | 0.2 | 21 | 0.2 | 6 | 5.8 | 10 | 5.4 | 105 | 0.6 | 1,452 | 0.8 |
| Cyprinidae (minnows) | 5 | T | | | 1 | T | 2 | T | 1 | T | | | | | | | | | | | | | | | 9 | T |
| Emerald shiner | 1,882 | 10.8 | 233 | 3.3 | 198 | 0.5 | 25 | 0.3 | 11 | T | 3 | T | | | 6 | T | 13 | 0.1 | 6 | 5.8 | | | 39 | 0.2 | 2,416 | 1.3 |
| Fathead minnow | | | | | | | 3 | T | 10 | T | | | | | | | | | | | | | | | 13 | T |
| Freshwater drum | 14 | 0.1 | 2 | T | 2 | T | 1 | T | | | | | | | | | | | | | | | 1 | T | 20 | T |
| Gizzard shad | 2,795 | 16.0 | 463 | 6.5 | 162 | 0.4 | 87 | 0.9 | 18 | T | 6 | T | 1 | T | 24 | 0.2 | 13 | 0.1 | | | 34 | 18.3 | 2,894 | 16.4 | 6,497 | 3.5 |
| Golden shiner | 2 | T | | | | | 1 | T | 1 | T | | | | | | | | | | | | | 13 | 0.1 | 17 | T |
| Goldfish | 20 | 0.1 | 4 | 0.1 | 1 | T | 1 | T | 1 | T | | | | | | | | | | | | | | | 27 | T |
| Lake chub | 65 | 0.4 | 1 | T | 3 | T | 3 | T | 4 | T | | | | | 4 | T | | | | | | | 1 | T | 81 | T |
| Lake chubsucker | | | | | | | | | | | 1 | T | | | | | | | | | | | | | 1 | T |
| Logperch | | | | | | | | | | | | | 4 | 0.1 | | | | | | | | | | | 4 | T |
| Longnose dace | 2 | T | | | 1 | T | | | | | | | | | | | | | | | | | 7 | T | 10 | T |
| Longnose gar | | | | | | | | | | | | | | | | | 2 | T | | | | | | | 2 | T |
| Northern pike | 1 | T | | | | | | | | | | | | | | | 2 | T | | | | | | | 3 | T |
| Pirate perch | | | | | | | 1 | T | | | | | | | | | | | | | | | | | 1 | T |
| Pumpkinseed | | | | | | | | | | | 3 | T | | | 8 | 0.1 | | | | | | | 27 | 0.2 | 38 | T |
| Rainbow smelt | 5,451 | 31.2 | 1,490 | 20.9 | 578 | 1.5 | 434 | 4.3 | 1,538 | 3.8 | 1,109 | 6.0 | 225 | 4.0 | 988 | 7.0 | 11,609 | 84.9 | 53 | 51.5 | 60 | 32.3 | 8,457 | 48.0 | 31,992 | 17.4 |
| Rock bass | 56 | 0.3 | 2 | T | 9 | T | 2 | T | 10 | T | 18 | 0.1 | 72 | 1.3 | 236 | 1.7 | 4 | T | | | | | 120 | 0.7 | 529 | 0.3 |
| Salvelinus sp. (trout) | 6 | T | | | 1 | T | | | | | 1 | T | 1 | T | | | | | | | | | 19 | 0.1 | 28 | T |
| Sea lamprey | 2 | T | 1 | T | 2 | T | 1 | T | | | | | | | | | | | | | | | 4 | T | 10 | T |
| Smallmouth bass | 16 | 0.1 | | | 5 | T | 2 | T | 10 | T | 15 | 0.1 | 9 | 0.2 | 314 | 2.2 | 46 | 0.3 | | | 4 | 2.1 | 57 | 0.3 | 478 | 0.3 |
| Spottail shiner | 1,212 | 6.9 | 41 | 0.1 | 158 | 0.4 | 74 | 0.7 | 134 | 0.3 | 84 | 0.5 | 155 | 2.8 | 251 | 1.8 | 259 | 1.9 | 4 | 3.9 | 18 | 9.7 | 342 | 1.9 | 2,732 | 1.5 |
| Stonecat | 14 | 0.1 | | | 7 | T | 1 | T | 11 | T | 1 | T | 6 | 0.1 | 4 | T | 7 | 0.1 | | | | | 7 | T | 58 | T |
| Tadpole madtom | 5 | T | | | | | | | | | | | | | | | | | | | | | | | 5 | T |
| Tessellated darter[2] | 10 | 0.1 | 1 | T | | | | | 92 | 0.2 | 188 | 1.0 | 604 | 10.8 | 14 | 0.1 | 4 | T | | | 2 | 1.1 | 2 | T | 917 | 0.5 |
| Threespine stickleback | 2,844 | 16.3 | 4,294 | 60.2 | 38,178 | 96.2 | 8,903 | 89.0 | 28,769 | 71.8 | 14,130 | 76.1 | 1,175 | 20.9 | 6 | T | 7 | 0.1 | 5 | 4.9 | | | 36 | 0.2 | 98,347 | 53.4 |
| Trout-perch | 35 | 0.2 | 9 | 0.1 | 23 | 0.1 | 65 | 0.7 | 597 | 1.5 | 270 | 1.5 | 406 | 7.2 | 51 | 0.4 | 36 | 0.3 | 4 | 3.9 | | | 14 | 0.1 | 1,510 | 0.8 |
| Walleye | 11 | 0.1 | | | | | | | | | | | | | 3 | T | | | | | | | 6 | T | 20 | T |
| White bass | 1,032 | 5.9 | 72 | 1.0 | 51 | 0.1 | 7 | 0.1 | | | | | 1 | T | 2 | T | | | | | | | 32 | 0.2 | 1,197 | 0.6 |
| White perch | 1,212 | 6.9 | 291 | 4.1 | 201 | 0.5 | 166 | 1.7 | 288 | 0.6 | 7 | T | 5 | 0.1 | 54 | 0.4 | 18 | 0.1 | | | | | 306 | 1.7 | 2,488 | 1.4 |
| White sucker | 13 | 0.1 | 4 | 0.1 | 1 | T | 2 | T | 1 | T | | | 27 | 0.5 | 6 | T | 5 | T | 6 | 5.8 | 4 | 2.1 | 3 | T | 72 | T |
| Yellow perch | 163 | 0.9 | 5 | 0.1 | 8 | T | 11 | 0.1 | 3,680 | 9.2 | 31 | 0.2 | 97 | 1.7 | 82 | 0.6 | 37 | 0.3 | | | 8 | 4.3 | 281 | 1.6 | 4,403 | 2.4 |
| Total | 17,444 | | 7,134 | | 39,677 | | 10,002 | | 40,064 | | 18,567 | | 5,617 | | 14,135 | | 13,680 | | 103 | | 186 | | 17,635 | | 184,244 | |
| No. fish/1000 $m^3$ [3] | 0.845 | | 0.390 | | 1.927 | | 0.500 | | 1.399 | | 0.680 | | 0.200 | | 0.504 | | 0.666 | | 0.011 | | 0.023 | | 0.946 | | 0.741 | |

[1]All circulating water pumps and traveling screens shut down on three sampling days, November 8, 10, and 13

[2]Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

[3]Number per 1000 $m^3$ based on water volumes recorded on 401 Monthly Report for James A. FitzPatrick power station, and corrected for tempering during the winter months.

T = trace

# Table H-13

## Biomass (g) and Percent Composition of Impinged Fish Collected at James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1978

| Species | Jan Wt | Jan % | Feb Wt | Feb % | Mar Wt | Mar % | Apr Wt | Apr % | May Wt | May % | Jun Wt | Jun % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alewife | 360.2 | T | | | 62.4 | T | 264.2 | 0.3 | 154,619.6 | 53.6 | 43,654.4 | 46.7 |
| American eel | | | | | | | | | | | 424.2 | 0.5 |
| Black crappie | 8.3 | T | | | | | 293.9 | 0.3 | 3.4 | T | | |
| Bluegill | 218.3 | T | | | | | | | 7.4 | T | | |
| Bowfin | 350.8 | T | | | | | | | | | | |
| Brook stickleback | 0.5 | T | | | | | 37.7 | T | 2.1 | T | | |
| Brown bullhead | 87.3 | T | | | 67.5 | T | 57.6 | 0.1 | 14.1 | T | | |
| Brown trout | 2,380.4 | 0.3 | 6,500.0 | 3.1 | 3,300.0 | 1.8 | | | 804.6 | 0.3 | 630.0 | 0.7 |
| Burbot | 102.1 | T | | | 38.7 | T | | | | | | |
| Carp | 242.3 | T | 60.3 | T | | | | | | | | |
| Central mudminnow | | | | | 66.5 | T | 130.5 | 0.1 | 5.6 | T | | |
| Channel catfish | 0.9 | T | | | 79.4 | T | | | | | | |
| Cisco (lake herring) | 36.2 | T | | | | | | | | | | |
| Cottus spp. (sculpin) | 1,514.1 | 0.2 | 546.9 | 0.3 | 164.8 | 0.1 | 595.4 | 0.6 | 707.5 | 0.2 | 196.3 | 0.2 |
| Cyprinidae (unidentified) | 14.4 | T | | | NA | – | 5.4 | T | NA | | | |
| Emerald shiner | 4,257.0 | 0.6 | 487.4 | 0.2 | 458.8 | 0.2 | 50.3 | T | 19.0 | T | 2.6 | T |
| Fathead minnow | | | | | | | 6.2 | T | 23.9 | T | | |
| Freshwater drum | 701.4 | 0.1 | 664.0 | 0.3 | 1,113.0 | 0.6 | 1,141.9 | 1.1 | | | | |
| Gizzard shad | 652,474.9 | 87.3 | 179,152.4 | 86.1 | 96,561.1 | 52.0 | 58,109.5 | 57.0 | 11,481.4 | 4.0 | 2,697.4 | 2.9 |
| Golden shiner | 18.0 | T | | | 16.6 | T | 1.6 | T | 0.9 | T | | |
| Goldfish | 321.1 | T | 970.7 | 0.5 | | | 446.2 | 0.4 | 6.6 | T | | |
| Lake chub | 318.3 | T | 3.5 | T | 24.1 | T | 34.0 | T | 30.4 | T | | |
| Lake chubsucker | | | | | | | | | | | 524.0 | 0.6 |
| Logperch | | | | | | | | | | | | |
| Longnose dace | 32.4 | T | | | 17.2 | T | | | | | | |
| Longnose gar | | | | | | | | | | | | |
| Northern pike | 88.8 | T | | | | | | | | | | |
| Pirate perch | | | | | | | 12.9 | T | | | | |
| Pumpkinseed | | | | | | | | | | | 65.7 | 0.1 |
| Rainbow smelt | 37,743.4 | 5.1 | 8,970.3 | 4.3 | 7,091.6 | 3.8 | 5,702.7 | 5.6 | 14,066.0 | 4.9 | 5,602.8 | 6.0 |
| Rock bass | 3,245.8 | 0.4 | 80.3 | T | 1,297.1 | 0.7 | 473.8 | 0.5 | 3,213.7 | 1.1 | 4,872.8 | 5.2 |
| Salvelinus sp. (trout) | 50.0 | T | | | 14.1 | T | | | | | 10.9 | T |
| Sea lamprey | 109.0 | T | 126.8 | 0.1 | 53.2 | T | 13.2 | T | | | | |
| Smallmouth bass | 10,051.7 | 1.3 | | | 4,039.5 | 2.2 | 869.6 | 0.9 | 6,585.0 | 2.3 | 7,768.2 | 8.3 |
| Spottail shiner | 3,536.0 | 0.5 | 95.9 | T | 296.3 | 0.2 | 172.2 | 0.2 | 673.8 | 0.2 | 518.8 | 0.6 |
| Stonecat | 27.5 | T | | | 13.6 | T | 1.6 | T | 26.1 | T | 36.4 | T |
| Tadpole madtom | 13.4 | T | | | | | | | | | | |
| Tessellated darter[1] | 9.0 | T | NA | – | | | | | 210.1 | 0.1 | 338.5 | 0.4 |
| Threespine stickleback | 3,802.5 | 0.5 | 6,258.3 | 3.0 | 62,232.7 | 33.5 | 15,102.2 | 14.8 | 54,073.9 | 18.7 | 23,969.9 | 25.6 |
| Trout-perch | 258.6 | T | 49.0 | T | 115.7 | 0.1 | 485.3 | 0.5 | 5,535.8 | 1.9 | 1,519.1 | 1.6 |
| Walleye | 602.9 | 0.1 | | | | | | | | | | |
| White bass | 13,645.8 | 1.8 | 1,024.4 | 0.5 | 1,195.9 | 0.6 | 142.9 | 0.1 | | | | |
| White perch | 8,301.4 | 1.1 | 2,233.6 | 1.1 | 6,340.0 | 3.4 | 16,411.2 | 16.1 | 26,688.5 | 9.3 | 626.9 | 0.7 |
| White sucker | 228.1 | T | 176.2 | 0.1 | 24.2 | T | 344.8 | 0.3 | 159.4 | 0.1 | | |
| Yellow perch | 2,641.6 | 0.4 | 601.0 | 0.3 | 917.2 | 0.5 | 1,105.0 | 1.1 | 9,471.4 | 3.3 | 113.4 | 0.1 |
| Total | 747,794.7 | | 208,001.0 | | 185,601.1 | | 102,011.8 | | 288,430.2 | | 93,572.3 | |

| Species | Jul Wt | Jul % | Aug Wt | Aug % | Sep Wt | Sep % | Oct Wt | Oct % | Nov Wt | Nov % | Dec Wt | Dec % | Total Wt | Total % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alewife | 65,516.2 | 47.7 | 71,941.1 | 18.9 | 13,991.6 | 33.7 | 550.5 | 21.9 | 905.0 | 22.0 | 228,727.8 | 44.8 | 580,593.5 | 21.5 |
| American eel | 213.9 | 0.2 | 2,103.8 | 0.6 | 71.4 | 0.2 | 1,050.0 | 41.8 | | | | | 3,863.3 | 0.1 |
| Black crappie | | | | | | | | | | | 1.9 | T | 307.5 | T |
| Bluegill | 138.0 | 0.1 | | | | | | | | | 104.8 | T | 468.5 | T |
| Bowfin | | | | | | | | | | | | | 350.8 | T |
| Brook stickleback | | | | | | | | | | | | | 40.6 | T |
| Brown bullhead | 259.1 | 0.2 | 1,297.2 | 0.3 | 539.1 | 1.3 | | | | | 108.9 | T | 2,430.8 | 0.1 |
| Brown trout | 17,306.3 | 12.6 | 20,460.0 | 5.4 | | | | | | | 575.8 | 0.1 | 51,957.1 | 1.9 |
| Burbot | | | 4,378.4 | 1.1 | | | | | | | 1,494.2 | 0.3 | 6,013.4 | 0.2 |
| Carp | NA | | | | | | | | | | 2.5 | T | 305.1 | T |
| Central mudminnow | | | | | | | | | | | 0.6 | T | 203.2 | T |
| Channel catfish | | | | | | | | | | | | | 80.3 | T |
| Cisco (lake herring) | | | | | | | | | | | | | 36.2 | T |
| Cottus spp. (sculpin) | 365.3 | 0.3 | 65.9 | T | 37.4 | 0.1 | 6.8 | 0.3 | 25.4 | 0.6 | 276.9 | 0.1 | 4,502.7 | 0.2 |
| Cyprinidae (unidentified) | | | | | | | | | | | | | 19.8 | T |
| Emerald shiner | | | 7.6 | T | 33.6 | 0.1 | 31.2 | 1.2 | | | 140.9 | T | 5,488.4 | 0.2 |
| Fathead minnow | | | | | | | | | | | | | 30.1 | T |
| Freshwater drum | | | | | | | | | | | 1,367.7 | 0.3 | 4,988.0 | 0.2 |
| Gizzard shad | 923.7 | 0.7 | 9,045.0 | 2.4 | 3,141.7 | 7.6 | | | 1,048.4 | 25.5 | 170,614.6 | 33.4 | 1,185,250.1 | 43.9 |
| Golden shiner | | | | | | | | | | | 24.1 | T | 61.2 | T |
| Goldfish | | | | | | | | | | | | | 1,744.6 | 0.1 |
| Lake chub | | | 4.2 | T | | | | | | | 7.8 | T | 422.3 | T |
| Lake chubsucker | | | | | | | | | | | | | 524.0 | T |
| Logperch | 24.8 | T | | | | | | | | | | | 24.8 | T |
| Longnose dace | | | | | | | | | | | 53.7 | T | 103.3 | T |
| Longnose gar | | | | | 141.3 | 0.3 | | | | | | | 141.3 | T |
| Northern pike | | | | | 3,000.0 | 7.2 | | | | | | | 3,088.8 | 0.1 |
| Pirate perch | | | | | | | | | | | | | 12.9 | T |
| Pumpkinseed | | | 1,325.9 | 0.3 | | | | | | | 2,082.9 | 0.4 | 3,474.5 | 0.1 |
| Rainbow smelt | 776.0 | 0.6 | 2,816.4 | 0.7 | 14,035.5 | 33.8 | 255.4 | 10.2 | 442.8 | 10.8 | 55,195.8 | 10.8 | 152,700.6 | 5.6 |
| Rock bass | 15,010.8 | 10.9 | 53,232.0 | 14.0 | 622.2 | 1.5 | | | | | 16,520.4 | 3.2 | 98,569.4 | 3.6 |
| Salvelinus sp. (trout) | 1,552.7 | 1.1 | | | | | | | | | 249.2 | 0.1 | 1,876.9 | 0.1 |
| Sea lamprey | | | | | | | | | | | 757.4 | 0.1 | 1,059.6 | T |
| Smallmouth bass | 5,586.3 | 4.1 | 192,509.8 | 50.5 | 1,560.6 | 3.8 | | | 22.0 | 0.5 | 2,505.1 | 0.5 | 231,498.3 | 8.6 |
| Spottail shiner | 1,811.9 | 1.3 | 1,218.6 | 0.3 | 868.4 | 2.1 | 33.1 | 1.3 | 96.4 | 2.3 | 2,484.5 | 0.5 | 11,805.9 | 0.4 |
| Stonecat | 464.0 | 0.3 | 301.0 | 0.1 | 667.5 | 1.6 | | | | | 296.5 | 0.1 | 1,834.2 | 0.1 |
| Tadpole madtom | | | | | | | | | | | | | 13.4 | T |
| Tessellated darter[1] | 787.2 | 0.6 | 31.8 | T | 7.4 | T | | | 1.8 | T | 4.4 | T | 1,390.2 | 0.1 |
| Threespine stickleback | 1,732.2 | 1.3 | 1.8 | T | 1.7 | T | 4.0 | 0.2 | | | 37.4 | T | 167,216.6 | 6.2 |
| Trout-perch | 2,762.5 | 2.0 | 241.4 | 0.1 | 182.6 | 0.4 | 30.2 | 1.2 | | | 81.8 | T | 11,262.0 | 0.4 |
| Walleye | | | 529.8 | 0.1 | | | | | | | 313.8 | 0.1 | 1,446.5 | 0.1 |
| White bass | 420.3 | 0.3 | 388.1 | 0.1 | | | | | | | 1,335.3 | 0.3 | 18,152.7 | 0.7 |
| White perch | 551.4 | 0.4 | 6,347.5 | 1.7 | 213.7 | 0.5 | | | | | 13,732.9 | 2.7 | 81,447.1 | 3.0 |
| White sucker | 18,414.5 | 13.4 | 3,332.1 | 0.9 | 1,358.3 | 3.3 | 549.3 | 21.9 | 876.8 | 21.3 | 908.8 | 0.2 | 26,372.5 | 1.0 |
| Yellow perch | 2,618.9 | 1.9 | 9,622.7 | 2.5 | 1,014.3 | 2.4 | | | 696.0 | 16.9 | 10,822.8 | 2.1 | 39,624.2 | 1.5 |
| Total | 137,236.9 | | 381,202.1 | | 41,488.3 | | 2,510.5 | | 4,114.6 | | 510,831.7 | | 2,702,797.2 | |

[1] Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

T = trace.

NA = damaged specimen, weight not available.

Table H-14

## Estimated Numbers and Biomass (g) of Fish Impinged at James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1978

| | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sep | | Oct | | Nov | | Dec | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | 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 | 33 | 358.9 | | | 29 | 138.2 | 90 | 660.5 | 10,567 | 342,372.6 | 6,079 | 100,740.8 | 6,427 | 156,232.4 | 28,704 | 171,552.2 | 3,672 | 32,288.3 | 41 | 1,312.7 | 138 | 2,715.0 | 11,532 | 545,428.9 | 57,311 | 1,354,300.5 |
| American eel | | | | | | | | | | | 2 | 978.9 | 7 | 510.1 | 5 | 5,015.8 | 9 | 164.2 | 5 | 2,503.9 | | | | | 28 | 9,174.5 |
| Black crappie | 2 | 19.8 | | | | | 3 | 734.8 | 2 | 7.5 | | | | | | | | | | | | | 2 | 4.5 | 9 | 766.8 |
| Bluegill | 2 | 520.5 | | | | | | | 2 | 16.4 | | | 2 | 329.1 | | | | | | | | | 41 | 249.9 | 47 | 1,116.0 |
| Bowfin | 2 | 836.5 | | | | | | | | | | | | | | | | | | | | | | | 2 | 836.5 |
| Brook stickleback | 7 | 1.3 | | | | | 68 | 94.3 | 4 | 4.7 | | | | | | | | | | | | | | | 79 | 100.9 |
| Brown bullhead | 21 | 208.2 | | | 4 | 149.5 | 3 | 144.0 | 4 | 31.2 | | | 2 | 617.9 | 7 | 3,093.3 | 5 | 1,244.1 | | | | | 10 | 259.7 | 56 | 5,747.9 |
| Brown trout | 6 | 5,676.3 | 5 | 15,166.6 | 3 | 7,307.2 | | | 2 | 1,781.6 | 2 | 1,453.8 | 12 | 41,265.9 | 19 | 48,759.3 | | | | | | | 2 | 1,373.1 | 43 | 122,816.8 |
| Burbot | [illegible] | 343.5 | | | 4 | 85.7 | | | | | | | | | 12 | 10,440.9 | | | | | | | 2 | 3,563.1 | 26 | 14,333.1 |
| Carp | [illegible] | 577.2 | 2 | 140.7 | | | | | | | | | 2 | * | | | | | | | | | 2 | 6.0 | [illegible] | 724.9 |
| Central mudminnow | | | | | 33 | 147.3 | 68 | 326.3 | 2 | 12.4 | | | | | | | | | | | | | 2 | 1.4 | 105 | 487.4 |
| Channel catfish | 2 | 2.1 | | | 2 | 175.8 | | | | | | | | | | | | | | | | | | | 4 | 177.9 |
| Cisco (lake herring) | 2 | 36.3 | | | | | | | | | | | | | | | | | | | | | | | 2 | 36.3 |
| *Cottus* sp. (sculpin) | [illegible] | 3,613.6 | 509 | 1,276.1 | 117 | 364.9 | 295 | 1,486.6 | 372 | 1,566.6 | 148 | 453.0 | 293 | 871.1 | 64 | 157.1 | 48 | 86.3 | 14 | 16.2 | 30 | 76.2 | 250 | 660.3 | [illegible] | 10,627.[illegible] |
| Cyprinidae (minnows) | 12 | 34.3 | | | 2 | * | 5 | 13.5 | 2 | * | | | | | | | | | | | | | | | 21 | 47.8 |
| Emerald shiner | [illegible] | 10,151.1 | 544 | 1,137.2 | 438 | 1,015.9 | 63 | 125.8 | 24 | 42.1 | 7 | 6.0 | | | 14 | 18.1 | 30 | 77.5 | 14 | 74.4 | | | 93 | 336.0 | [illegible] | 12,984.4 |
| Fathead minnow | | | | | | | 8 | 15.5 | 22 | 52.9 | | | | | | | | | | | | | | | 30 | 68.4 |
| Freshwater drum | 33 | 1,672.6 | 5 | 1,549.3 | 4 | 2,464.5 | 3 | 2,854.8 | | | | | | | | | | | | | | | 2 | 3,261.4 | 47 | 11,802.6 |
| Gizzard shad | 6,665 | 1,555,904.7 | 1,089 | 418,021.7 | 359 | 213,814.3 | 218 | 195,273.8 | 40 | 25,423.1 | 14 | 6,224.8 | 2 | 2,202.7 | 57 | 21,568.9 | 30 | 7,250.1 | | | 102 | 3,145.2 | 6,901 | 406,851.0 | 15,468 | 2,805,680.3 |
| Golden shiner | 5 | 42.9 | | | | | 3 | 4.0 | 2 | 2.0 | | | | | | | | | | | | | 31 | 57.5 | 41 | 106.4 |
| | | | | | | | | | | | | | | | | | | | | | | | | | 64 | 4,197.6 |
| Lake chub | 155 | 759.0 | 2 | 8.2 | 7 | 53.4 | 8 | 85.0 | 9 | 67.3 | | | | | 10 | 10.0 | | | | | | | 2 | 18.6 | 193 | 1,001.5 |
| Lake chubsucker | | | | | | | | | | | 2 | 1,209.2 | | | | | | | | | | | | | 2 | 1,209.2 |
| Logperch | | | | | | | | | | | | | 10 | 59.1 | | | | | | | | | | | 10 | 59.1 |
| Longnose dace | 5 | 77.3 | | | 2 | 39.1 | | | | | | | | | | | | | | | | | 17 | 128.1 | 24 | 243.5 |
| Longnose gar | | | | | | | | | | | | | | | | | 5 | 326.1 | | | | | | | 5 | 326.1 |
| Northern pike | 2 | 211.2 | | | | | | | | | | | | | | | 5 | 6,923.1 | | | | | | | 7 | 7,134.9 |
| Pirate perch | | | | | | | 3 | 32.3 | | | | | | | | | | | | | | | | | 3 | 32.3 |
| Pumpkinseed | | | | | | | | | | | [illegible] | 151.6 | | | 19 | 3,161.3 | | | | | | | 64 | 4,966.9 | 90 | 8,280.3 |
| Rainbow smelt | 12,995 | 90,003.7 | 3,477 | 20,930.7 | 1,280 | 15,702.6 | 1,085 | 14,256.8 | 3,406 | 31,146.2 | 2,559 | 12,929.5 | 537 | 1,855.2 | 2,356 | 6,716.0 | 26,790 | 32,389.6 | 126 | 609.0 | 180 | 1,328.4 | 20,167 | 131,621.0 | 74,962 | 359,488.7 |
| Rock bass | 134 | 7,740.0 | 5 | 187.4 | 20 | 2,872.2 | 5 | 1,184.5 | 22 | 7,116.1 | 42 | 11,244.9 | 172 | 35,795.1 | 563 | 126,938.1 | 9 | 1,435.8 | | | | | 286 | 39,396.1 | 1,258 | 233,910.2 |
| *Salvelinus* sp. (trout) | 14 | 119.2 | | | 2 | 31.2 | | | | | 2 | 25.2 | 2 | 3,702.6 | | | | | | | | | 45 | 594.2 | 65 | 4,472.4 |
| Sea lamprey | 5 | 259.9 | 2 | 295.2 | 4 | 117.8 | 3 | 33.0 | | | | | | | | | | | | | | | 10 | 1,806.1 | 34 | 2,512.[illegible] |
| Smallmouth bass | 35 | 23,969.5 | | | 11 | 8,944.6 | 5 | 2,174.0 | 22 | 14,581.1 | 35 | 17,926.6 | 21 | 13,322.[illegible] | 749 | 459,062.[illegible] | 106 | 3,601.4 | | | 12 | 66.0 | 136 | 5,973.7 | 1,135 | 549,622.[illegible] |
| Spottail shiner | 2,892 | 3,432.0 | 96 | 223.3 | 350 | 656.1 | 185 | 430.5 | 297 | 1,492.0 | 194 | 1,197.2 | 370 | 4,320.7 | 599 | 2,905.9 | 598 | 2,004.0 | 10 | 78.9 | 54 | 289.2 | 816 | 5,924.6 | 6,459 | 27,954.9 |
| Stonecat | 23 | 65.6 | | | 16 | 30.1 | 3 | 4.0 | 24 | 57.8 | 2 | 84.0 | 14 | 1,106.5 | 10 | 717.8 | 16 | 1,540.4 | | | | | 17 | 707.0 | 135 | 4,313.2 |
| Tadpole madtom | 12 | 32.0 | | | | | | | | | | | | | | | | | | | | | | | 12 | 32.0 |
| Tessellated darter[1] | 24 | 21.5 | 2 | * | | | | | 204 | 465.2 | 434 | 781.2 | 1,440 | 1,877.2 | 33 | 75.8 | 9 | 17.1 | | | 6 | 5.4 | 5 | 10.5 | 2,157 | 3,253.9 |
| Threespine stickleback | 6,782 | 9,067.5 | 10,019 | 14,602.7 | 84,537 | 137,801.2 | 22,258 | 37,755.5 | 63,703 | 119,735.3 | 32,608 | 55,315.1 | 2,802 | 4,130.6 | 14 | 4.3 | 16 | 3.9 | 12 | 9.5 | | | 86 | 89.2 | 222,837 | 378,514.8 |
| Trout-perch | 53 | 616.7 | 21 | 114.3 | 51 | 256.2 | 163 | 1,213.3 | 1,322 | 12,257.9 | 623 | 3,505.6 | 968 | 6,587.5 | 122 | 575.6 | 83 | 421.4 | 10 | 72.0 | | | 33 | 195.1 | 3,479 | 25,815.6 |
| Walleye | 26 | 1,437.7 | | | | | | | | | | | | | 7 | 1,263.4 | | | | | | | 14 | 748.3 | 47 | 3,449.4 |
| White bass | 2,467 | 32,540.0 | 168 | 2,390.3 | 113 | 2,648.1 | 18 | 357.3 | | | | | 2 | 1,002.3 | 5 | 925.5 | | | | | | | 76 | 3,184.2 | 2,543 | 43,047.7 |
| White perch | 2,890 | 19,795.7 | 679 | 5,213.7 | 445 | 14,038.6 | 415 | 41,028.0 | 505 | 59,096.1 | 16 | 1,446.7 | 12 | 1,314.9 | 129 | 15,136.4 | 42 | 493.2 | | | | | 730 | 32,747.7 | 5,863 | 190,309.0 |
| White sucker | 31 | 543.9 | 9 | 411.1 | 2 | 53.6 | 5 | 862.0 | 2 | 353.0 | | | 64 | 43,911.6 | 14 | 7,945.8 | 12 | 3,134.5 | 14 | 1,309.9 | 12 | 2,630.4 | 7 | 2,167.1 | 172 | 63,322.9 |
| Yellow perch | 323 | 6,299.2 | 12 | 1,402.3 | 18 | 2,030.9 | 28 | 2,762.5 | 8,149 | 20,972.4 | 72 | 261.7 | 231 | 6,244.8 | 196 | 22,946.5 | 95 | 2,340.7 | | | 24 | 2,088.0 | 670 | 25,808.3 | 9,274 | 93,157.3 |
| Total | 41,595 | 1,783,206.2 | 16,646 | 495,335.1 | 87,854 | 410,974.8 | 25,014 | 255,030.1 | 88,712 | 638,668.1 | 42,847 | 215,935.8 | 13,392 | 327,262.7 | 33,708 | 909,022.1 | 31,570 | 95,742.3 | 246 | 5,986.5 | 558 | 12,343.8 | 42,051 | 1,218,139.5 | 424,193 | 6,357,647.0 |

[1] Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

T = trace.

*Damaged specimen, weight not available.

Table H-15

Length Frequency of Fish Impinged at James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1978

Alewife

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21- 30 | | | | | | | | 2 | | | | |
| 31- 40 | | | | | | | | 44 | 29 | | | |
| 41- 50 | | | | | | | | 129 | 63 | | | |
| 51- 60 | | | | | | 3 | 1 | 116 | 119 | | 2 | 38 |
| 61- 70 | 1 | | 3 | 9 | 23 | 38 | 2 | 14 | 58 | 1 | 8 | 77 |
| 71- 80 | 2 | | 5 | 10 | 84 | 193 | 7 | 1 | 8 | | 1 | 30 |
| 81- 90 | | | 4 | 11 | 76 | 201 | 29 | 1 | 1 | | | 8 |
| 91- 100 | | | | 2 | 27 | 74 | 62 | 4 | | | | 2 |
| 101- 110 | | | | | 20 | 30 | 34 | 3 | | | | 4 |
| 111- 120 | | | | | 6 | 5 | 8 | 6 | | | | 2 |
| 121- 130 | | | | | 1 | 2 | 1 | 4 | 1 | | | 18 |
| 131- 140 | | | | | | 1 | 2 | 1 | | | | 52 |
| 141- 150 | | | | | 7 | 2 | 1 | | | | | 26 |
| 151- 160 | 1 | | 1 | 1 | 53 | 37 | 67 | 3 | 1 | 1 | | 15 |
| 161- 170 | 1 | | | 2 | 210 | 139 | 231 | 44 | 10 | | | 14 |
| 171- 180 | 1 | | | | 312 | 150 | 336 | 96 | 21 | 2 | 3 | 44 |
| 181- 190 | | | | 1 | 168 | 68 | 152 | 57 | 16 | 3 | 2 | 70 |
| 191- 200 | | | | | 37 | 14 | 33 | 12 | 8 | | | 47 |
| 201- 210 | | | | | 2 | 1 | 7 | 2 | | 1 | 1 | 25 |
| 211- 220 | | | | | 1 | 1 | 1 | | | | | 2 |
| 221- 250 | | | | | | | | | 1 | | | |

Table H-16

Length Frequency of Fish Impinged at James A. FitzPatrick
Nuclear Power Plant, Jan-Dec 1978

Rainbow Smelt

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 31- 40 | | | [illegible] | 1 | | | | 19 | 5 | | | 1 |
| 41- 50 | 20 | 23 | 23 | 7 | 1 | 2 | 1 | 133 | 144 | 5 | | 28 |
| 51- 60 | 104 | 82 | 84 | 33 | 20 | 27 | 4 | 39 | 377 | 8 | 5 | 127 |
| 61- 70 | 139 | 99 | 51 | 40 | 48 | 120 | 22 | 2 | 162 | 10 | 5 | 152 |
| 71- 80 | 125 | 91 | 53 | 77 | 139 | 201 | 35 | 1 | 17 | 2 | 7 | 155 |
| 81- 90 | 94 | 43 | 36 | 59 | 210 | 148 | 46 | 9 | 14 | | 4 | 93 |
| 91- 100 | 41 | 22 | 12 | 16 | 57 | 54 | 26 | 21 | 10 | | | 23 |
| 101- 110 | 10 | 6 | 3 | 1 | 13 | 7 | 7 | 18 | 11 | | | 8 |
| 111- 120 | 12 | 4 | 1 | 4 | 2 | 3 | | 6 | 5 | | | 16 |
| 121- 130 | 42 | 23 | 14 | 3 | 10 | 8 | 3 | 6 | 5 | | 1 | 50 |
| 131- 140 | 118 | 29 | 34 | 18 | 53 | 28 | 2 | 1 | 6 | 1 | 1 | 102 |
| 141- 150 | 102 | 40 | 39 | 35 | 78 | 42 | 2 | | 8 | | | 58 |
| 151- 160 | 63 | 34 | 58 | 53 | 104 | 33 | 2 | 2 | 10 | 2 | | 29 |
| 161- 170 | 40 | 17 | 36 | 36 | 68 | 25 | 1 | 2 | 4 | | 2 | 21 |
| 171- 180 | 21 | 19 | 20 | 29 | 41 | 11 | 1 | | 3 | 1 | 1 | 8 |
| 181- 190 | 16 | 7 | 13 | 12 | 9 | 7 | | 1 | | | 1 | 7 |
| 191- 200 | 7 | 2 | 2 | 2 | | 4 | | 1 | 2 | | | 2 |
| 201- 210 | 1 | | 2 | 3 | 2 | 1 | | | 2 | 1 | | 1 |
| 211- 220 | 2 | | | 1 | 1 | 2 | | | | | 1 | 1 |
| 221- 230 | | 3 | 1 | | 1 | | | | | | | 2 |
| 231- 240 | 1 | | 1 | 1 | | 1 | | | | | | 1 |
| 241- 250 | 2 | | | | | | | | | | | |
| 251- 260 | 1 | | | | | | | | | | | |
| 261- 270 | | | | | | | | | | | | |
| 271- 280 | | | | 1 | | | | | | | | |

Table H-17

Length Frequency of Fish Impinged at James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1978

Smallmouth Bass

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41- 50 | | | | | | | | 7 | | | | |
| 51- 60 | | | | | | | | 9 | | | | 6 |
| 61- 70 | | | | | | | | 4 | 13 | | 1 | 8 |
| 71- 80 | | | | | | | | | 13 | | 1 | 8 |
| 81- 90 | | | | | | | | | 2 | | | 9 |
| 91- 100 | | | | | | | | | | | | |
| 101- 110 | 1 | | | | | | | | | | | |
| 111- 120 | 1 | | | | | | | | | | | 1 |
| 121- 130 | | | | | | | | | | | | |
| 131- 140 | | | | | | | | | | | | |
| 141- 150 | | | | | | | | | | | | |
| 151- 160 | | | | | | | | | | | | |
| 161- 170 | | | | | | | | | | | | |
| 171- 180 | | | | | | | | | | | | |
| 181- 190 | | | | | | | | | | | | |
| 191- 200 | | | | | | | | | | | | |
| 201- 210 | | | | | 1 | 1 | | | | | | |
| 211- 220 | | | | | | 1 | | | | | | 1 |
| 221- 230 | | | | | | | | | | | | |
| 231- 240 | | | | | | | | 2 | | | | |
| 241- 250 | | | | | | | | 2 | | | | |
| 251- 260 | 1 | | | | | 1 | 2 | 1 | | | | |
| 261- 270 | | | | | | 2 | | 2 | | | | |
| 271- 280 | | | | | | | | | | | | |
| 281- 290 | | | | | 1 | | | 3 | | | | 1 |
| 291- 300 | | | | | 1 | 1 | | 1 | | | | |
| 301- 310 | 2 | | 1 | 2 | | 2 | 1 | 4 | | | | |
| 311- 320 | | | | | | | | 6 | | | | |
| 321- 330 | | | | | | | | 3 | | | | |
| 331- 340 | | | | | 2 | 2 | 1 | 3 | | | | |
| 341- 350 | | | | | | | | 2 | | | | |
| 351- 360 | | | | | | | | 6 | | | | |
| 361- 370 | | | | | 1 | 3 | | 3 | | | | |
| 371- 380 | | | | | | | | 2 | | | | |
| 381- 390 | | | 1 | | | | | 5 | | | | |
| 391- 400 | 2 | | | | 2 | | | 6 | | | | |
| 401- 410 | 1 | | 1 | | | 1 | | 5 | 1 | | | |
| 411- 420 | | | 2 | | 1 | 1 | 3 | 3 | | | | |
| 421- 430 | | | | | | | | | | | | |
| 431- 440 | 1 | | | | 1 | | | | | | | 1 |
| 441- 450 | | | | | | | | | | | | |
| 451- 460 | | | | | | | | | | | | |
| 461- 470 | | | | | | | | | | | | |
| 471- 480 | | | | | | | | | | | | |
| 481- 490 | | | | | | | | 1 | | | | |
| 491- 500 | | | | | | | 1 | | | | | |
| 501- 510 | | | | | | | | | | | | |
| 511- 520 | | | | | | | | | | | | |
| 521- 530 | | | | | | | | | | | | |
| 531- 540 | | | | | | | | | | | | |
| 541- 550 | | | | | | | | | | | | |
| 551- 560 | | | | | | | | | | | | |
| 561- 570 | | | | | | | | 1 | | | | |

Table H-18

Length Frequency of Fish Impinged at James A. FitzPatrick Nuclear Power Plant, Jan-Dec, 1978

Threespine Stickleback

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25- 26 | | | | | | | | 1 | | | | |
| 27- 28 | | | | | | | | | | | | |
| 29- 30 | | | | | | | | | | | | |
| 31- 32 | | | | 1 | | | | | | | | |
| 33- 34 | | | | | | | | 1 | | | | |
| 35- 36 | 1 | | | | | | | | 1 | | | |
| 37- 38 | | | | | | | | | 2 | | | |
| 39- 40 | 2 | 3 | | 1 | | | | | | 1 | | |
| 41- 42 | 12 | 8 | 2 | 5 | | | 1 | | | | | |
| 43- 44 | 16 | 15 | 6 | 7 | 2 | 1 | 1 | | 1 | 1 | | |
| 45- 46 | 64 | 50 | 19 | 33 | 17 | 6 | 5 | | | | | 2 |
| 47- 48 | 69 | 62 | 48 | 45 | 36 | 15 | 5 | | | 1 | | 5 |
| 49- 50 | 89 | 98 | 94 | 80 | 51 | 35 | 23 | | | | | 2 |
| 51- 52 | 114 | 140 | 153 | 139 | 119 | 62 | 39 | | | | | 7 |
| 53- 54 | 90 | 140 | 144 | 146 | 144 | 104 | 39 | | | | | 4 |
| 55- 56 | 96 | 159 | 185 | 170 | 207 | 146 | 71 | | | | | |
| 57- 58 | 49 | 90 | 108 | 115 | 162 | 158 | 53 | | | | | 1 |
| 59- 60 | 26 | 50 | 47 | 94 | 138 | 168 | 42 | | | | | |
| 61- 62 | 22 | 30 | 36 | 62 | 121 | 152 | 44 | | | | | |
| 63- 64 | 6 | 23 | 13 | 34 | 75 | 75 | 16 | | | | | |
| 65- 66 | 16 | 8 | 16 | 20 | 44 | 50 | 14 | | | | | |
| 67- 68 | 13 | 7 | 8 | 6 | 33 | 22 | 8 | | | | | |
| 69- 70 | 3 | 7 | 4 | 6 | 23 | 18 | 3 | | | | | |
| 71- 72 | 3 | 3 | 5 | 7 | 10 | 15 | 4 | | | | | |
| 73- 74 | 1 | 3 | 1 | 9 | 4 | 9 | 2 | | | | | |
| 75- 76 | 2 | 2 | 3 | 4 | 4 | 5 | 1 | | | | | |
| 77- 78 | | | | 1 | 1 | 3 | | | | | | |
| 79- 80 | | | | | 1 | 1 | | | | | | |
| 81- 82 | | | 1 | 2 | | 1 | | | | | | |
| 83- 84 | | | | | | 1 | | | | | | |

Table H-19

Length Frequency of Fish Impinged at James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1978

White Perch

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21- 30 | | | | | | | | | | | | |
| 31- 40 | | | | | 1 | | | | | | | |
| 41- 50 | 26 | 4 | | | | | 1 | | 3 | | | 1 |
| 51- 60 | 75 | 39 | 2 | 3 | 1 | | | 12 | 1 | | | 13 |
| 61- 70 | 136 | 57 | 10 | 11 | 4 | 1 | | 2 | 3 | | | 26 |
| 71- 80 | 142 | 62 | 33 | 32 | 21 | | | 1 | 2 | | | 44 |
| 81- 90 | 175 | 72 | 64 | 19 | 28 | | | 1 | 1 | | | 36 |
| 91- 100 | 99 | 35 | 46 | 19 | 24 | | | | 2 | | | 7 |
| 101- 110 | 36 | 10 | 18 | 10 | 25 | 1 | | | | | | 1 |
| 111- 120 | 4 | 2 | 4 | | 5 | 1 | | | | | | 1 |
| 121- 130 | 2 | 1 | | 1 | | | 1 | | | | | 1 |
| 131- 140 | | | | | 1 | | | | | | | |
| 141- 150 | | | | | | 1 | | | | | | |
| 151- 160 | | | | 1 | 4 | | | 1 | | | | |
| 161- 170 | | | | | 2 | | | | | | | |
| 171- 180 | | | | 1 | 4 | | | | 1 | | | |
| 181- 190 | 1 | | | 3 | 6 | | | | | | | |
| 191- 200 | | 1 | 2 | 6 | 4 | | | | | | | |
| 201- 210 | 1 | | 1 | 3 | 7 | 1 | | | | | | |
| 211- 220 | | 1 | 2 | 10 | 6 | | 1 | 5 | | | | 1 |
| 221- 230 | | 1 | 7 | 8 | 14 | 1 | | 8 | | | | 5 |
| 231- 240 | | | 3 | 15 | 18 | | 1 | | | | | 5 |
| 241- 250 | | | 4 | 12 | 16 | | | 2 | | | | 9 |
| 251- 260 | 1 | | 3 | 2 | 9 | | 1 | | | | | 3 |
| 261- 270 | | | 1 | 3 | 13 | 1 | | 1 | | | | |
| 271- 280 | | | | 3 | 5 | | | 2 | | | | 1 |
| 281- 290 | | | | 2 | 7 | | | | | | | |
| 291- 300 | | | | | 1 | | | | | | | |
| 301- 310 | | | | | 2 | | | 1 | | | | |
| 311- 320 | 1 | | | 1 | | | | | | | | |
| 321- 330 | | | | | | | | | | | | 1 |
| 331- 340 | | | | 1 | | | | | | | | |

Table H-20

Length Frequency of Fish Impinged at James A. FitzPatrick Nuclear Power Plant, Jan-Dec 1978

Yellow Perch

| Length Range (mm) | JAN | FEB | MAR | APR | MAY | JUN | JLY | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41- 50 | | | | | | | 1 | | | | | |
| 51- 60 | | | 1 | 1 | 38 | 1 | | | | | | 1 |
| 61- 70 | 18 | | | 1 | 265 | 15 | | | 2 | | | 6 |
| 71- 80 | 26 | 1 | | | 54 | 3 | 5 | | 2 | | | 15 |
| 81- 90 | 25 | | | 1 | 1 | 3 | 7 | | 3 | | | 14 |
| 91- 100 | 19 | | 1 | | | 3 | 10 | | | | | 2 |
| 101- 110 | 22 | 1 | | | 1 | | 8 | 1 | | | 1 | 2 |
| 111- 120 | 23 | | | | | | 3 | 3 | 3 | | | 4 |
| 121- 130 | 4 | | 1 | | | | 2 | 3 | 2 | | | 11 |
| 131- 140 | 2 | | | | | | | 4 | 4 | | 1 | 16 |
| 141- 150 | 1 | | | 1 | | | 1 | 4 | 3 | | | 11 |
| 151- 160 | | 1 | | | | | 1 | 4 | 1 | | | 11 |
| 161- 170 | 1 | | | 1 | 1 | | | 2 | 1 | | | 5 |
| 171- 180 | 1 | | | 1 | | | 3 | 1 | | | 1 | 7 |
| 181- 190 | | | 1 | 1 | 1 | | 3 | 5 | | | | 2 |
| 191- 200 | 1 | | 1 | | | | 1 | 1 | | | | |
| 201- 210 | 3 | | | | | | 1 | 2 | 1 | | | 4 |
| 211- 220 | | | | 1 | | | 1 | 3 | 1 | | 1 | 1 |
| 221- 230 | 1 | | | | | | 1 | 4 | | | | 2 |
| 231- 240 | 1 | | | | | | 1 | 4 | | | | |
| 241- 250 | | 1 | | | | | 2 | 2 | | | | 1 |
| 251- 260 | | 1 | 1 | | | | | 4 | | | | 1 |
| 261- 270 | | | 1 | 1 | | | | 2 | | | | |
| 271- 280 | | | | 1 | | | | 3 | | | | |
| 281- 290 | | | | | | | | 1 | | | | 1 |
| 291- 300 | 1 | | | | | | | 1 | | | | |
| 301- 310 | | | | | | | | | | | | |
| 311- 320 | | | | | | | | | | | | 1 |

Table H-21

Age Class Distribution of Rainbow Smelt Impinged during Winter (Jan-Mar) at James A. FitzPatrick Nuclear Power Plant, 1978

| | Male | | | Female | | | Sexes Combined* | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total Length (mm) | | | Total Length (mm) | | | Total Length (mm) | |
| Age Class | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range |
| 0 | 0 | – | – | 0 | – | – | 0 | – | – |
| I | 2 | 76.0 | 74-78 | 1 | 125.0 | – | 6 | 82.5 | 60-125 |
| II | 5 | 141.0 | 122-160 | 0 | – | – | 9 | 120.0 | 77-160 |
| III | 5 | 151.6 | 120-173 | 4 | 187.5 | 180-197 | 9 | 167.6 | 120-197 |
| IV | 1 | 231.0 | – | 0 | – | – | 1 | 231.0 | – |

*Includes fish of undetermined sex

Table H-22

Age Class Distribution of Rainbow Smelt Impinged during Spring (Apr-Jun) at James A. FitzPatrick Nuclear Power Plant, 1978

| | Male | Total Length (mm) | | Female | Total Length (mm) | | Sexes Combined* | Total Length (mm) | |
|---|---|---|---|---|---|---|---|---|---|
| Age Class | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range |
| 0 | 0 | – | – | 0 | – | – | 0 | – | – |
| I | 7 | 114.9 | 86-147 | 3 | 104.3 | 84-132 | 13 | 105.6 | 82-147 |
| II | 6 | 163.7 | 139-185 | 5 | 165.6 | 135-181 | 11 | 164.6 | 135-185 |
| III | 1 | 179.0 | – | 1 | 185.0 | – | 2 | 182.0 | 179-185 |
| IV | 0 | – | – | 1 | 175.0 | – | 1 | 175.0 | – |
| V | 0 | – | – | 0 | – | – | 0 | – | – |
| VI | 1 | 221.0 | – | 0 | – | – | 1 | 221.0 | |

*Includes fish of undetermined sex

Table H-23

Age Class Distribution of Alewife Impinged during Summer (Jul-Sep) at James A. FitzPatrick Nuclear Power Plant, 1978

| | Male | | | Female | | | Sexes Combined* | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total Length (mm) | | | Total Length (mm) | | | Total Length (mm) | |
| Age Class | No. | Mean | Range | No. | Mean | Range | No. | Mean | Range |
| 0 | 0 | – | – | 0 | – | – | 6 | 58.2 | 53-65 |
| I | 1 | 107.0 | – | 1 | 115.0 | – | 6 | 101.3 | 87-115 |
| II | 1 | 203.0 | – | 5 | 163.6 | 91-189 | 7 | 161.7 | 91-203 |
| III | 0 | – | – | 2 | 174.5 | 169-180 | 3 | 177.3 | 169-183 |
| IV | 0 | – | – | 3 | 189.0 | 171-202 | 3 | 189.0 | 171-202 |

*Includes fish of undetermined sex

Table H-24

Age Class Distribution of Alewife and Rainbow Smelt Impinged during Fall (Oct-Dec) at James A. FitzPatrick Nuclear Power Plnat, 1978

ALEWIFE

| Age Class | Male No. | Male Total Length (mm) Mean | Male Total Length (mm) Range | Female No. | Female Total Length (mm) Mean | Female Total Length (mm) Range | Sexes Combined* No. | Sexes Combined* Total Length (mm) Mean | Sexes Combined* Total Length (mm) Range |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | – | – | 1 | 78.0 | – | 13 | 70.9 | 55-110 |
| I | 0 | – | – | 1 | 132.0 | – | 1 | 132.0 | – |
| II | 0 | – | – | 1 | 184.0 | – | 1 | 184.0 | – |
| III | 3 | 182.0 | 176-189 | 7 | 189.7 | 173-209 | 10 | 187.4 | 173-209 |

RAINBOW SMELT

| Age Class | Male No. | Male Total Length (mm) Mean | Male Total Length (mm) Range | Female No. | Female Total Length (mm) Mean | Female Total Length (mm) Range | Sexes Combined* No. | Sexes Combined* Total Length (mm) Mean | Sexes Combined* Total Length (mm) Range |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | – | – | 0 | – | – | 5 | 84.4 | 77-90 |
| I | 4 | 144.3 | 128-164 | 0 | – | – | 9 | 133.1 | 107-164 |
| II | 1 | 174.0 | – | 4 | 171.3 | 162-186 | 5 | 171.8 | 162-186 |
| III | 0 | – | – | 4 | 203.0 | 170-225 | 4 | 203.0 | 170-225 |
| IV | 0 | – | – | 2 | 234.0 | 228-240 | 2 | 234.0 | 228-240 |

*Includes fish of undetermined sex

Table H-25

Fecundity of Selected Fish Species Collected in James A. FitzPatrick Impingement Samples during 1978

| Species | Total Length (mm) | Weight (g) | Yolk Eggs (no.) |
|---|---|---|---|
| White Perch | 205 | 151.3 | 56,972 |
| | 205 | 159.6 | 53,868 |
| | 213 | 161.0 | 62,032 |
| | 217 | 188.6 | 53,400 |
| | 224 | 194.0 | 176,840 |
| | 234 | 232.7 | 120,740 |
| | 236 | 250.3 | 109,849 |
| | 242 | 261.0 | 127,648 |
| | 246 | 265.2 | 267,368 |
| | 253 | 298.8 | 35,413 |
| | 255 | 285.3 | 62,860 |
| | 259 | 297.0 | 221,898 |
| | 264 | 308.7 | 143,537 |
| | 275 | 354.6 | 69,388 |
| | 282 | 442.0 | 246,447 |
| | 286 | 431.3 | 131,757 |
| | 288 | 415.3 | 197,308 |
| | 291 | 398.8 | 166,279 |
| | 301 | 462.3 | 197,168 |
| | 305 | 411.6 | 149,694 |
| Smallmouth bass | 209 | 405.3 | 5,285 |
| | 212 | 445.9 | 7,574 |
| | 334 | 545.9 | 10,936 |
| | 339 | 603.2 | 7,209 |
| | 361 | 734.2 | 15,999 |
| | 361 | 692.8 | 11,247 |
| | 366 | 589.9 | 13,394 |
| | 373 | 684.2 | 15,017 |
| | 392 | 1033.9 | 33,791 |
| | 411 | 1093.3 | 27,018 |
| | 412 | 1050.3 | 11,344 |
| | 496 | 831.8 | 7,838 |

| Species | Total Length (mm) | Weight (g) | Yolk Eggs (no.) |
|---|---|---|---|
| Rainbow smelt | 133 | 11.3 | 7,099 |
| | 134 | 16.5 | 12,775 |
| | 135 | 9.9 | 7,452 |
| | 137 | 16.1 | 10,964 |
| | 139 | 15.5 | 6,054 |
| | 139 | 16.8 | 10,843 |
| | 141 | 18.3 | 11,672 |
| | 142 | 15.4 | 8,703 |
| | 143 | 11.5 | 9,153 |
| | 144 | 18.7 | 9,025 |
| | 151 | 22.5 | 15,916 |
| | 153 | 23.7 | 15,500 |
| | 155 | 19.1 | 16,140 |
| | 158 | 25.0 | 19,776 |
| | 159 | 27.3 | 19,300 |
| | 161 | 19.5 | 11,207 |
| | 162 | 29.2 | 17,107 |
| | 172 | 32.8 | 22,441 |
| | 180 | 39.5 | 23,850 |
| | 185 | 40.7 | 26,051 |
| | 186 | 90.8 | 21,560 |
| | 187 | 42.8 | 20,931 |
| | 191 | 39.2 | 26,714 |
| | 208 | 72.7 | 30,663 |
| | 224 | 77.7 | 24,500 |
| Yellow perch | 118 | 63.9 | 10,599 |
| | 151 | 227.1 | 41,013 |
| | 199 | 102.1 | 14,118 |
| | 255 | 289.9 | 54,684 |

APPENDIX J

ENTRAINMENT AND VIABILITY

- James A. FitzPatrick
  - Phytoplankton
  - Zooplankton

Table J-1 (Page 1 of 2)

Chlorophyll a Concentration* in Whole Water Collections after 7-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1976

| Date | Time | Intake Temp (°C) | ΔT | Intake | | Discharge | | D/I Ratio | 3° Simulation | | 3° S/I Ratio | 2° Simulation | | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.E. | Mean | S.E. | | Mean | S.E. | | Mean | S.E. | |
| 16 Jan | 1155 | 0.8 | 19.8 | 1.52 | 0.03 | 1.34 | 0.20 | 0.88 | 1.81 | 0.15 | 1.19 | 1.38 | 0.06 | 0.91 |
| 16 Jan | 2100 | 0.8 | 19.8 | 1.03 | 0.34 | 1.40 | 0.14 | 1.36 | 1.26 | 0.17 | 1.22 | 1.66 | 0.17 | 1.61 |
| 24 Jan | 1045 | 0.9 | 21.0 | 1.25 | 0.11 | 1.14 | 0.04 | 0.91 | 1.27 | 0.22 | 1.02 | 1.16 | 0.02 | 0.93 |
| 24 Jan | 2032 | 2.4 | 21.1 | 1.31 | 0.09 | 1.20 | 0.19 | 0.92 | 1.61 | 0.51 | 1.23 | 1.22 | 0.04 | 0.93 |
| 06 Feb | 1055 | 1.7 | 16.8 | 0.91 | 0.19 | 0.80 | 0.17 | 0.88 | 0.87 | 0.11 | 0.96 | 0.99 | 0.15 | 1.09 |
| 06 Feb | 2040 | 1.3 | 16.9 | 1.29 | 0.66 | 1.06 | 0.09 | 0.82 | 0.76 | 0.00 | 0.59 | 0.85 | 0.05 | 0.66 |
| 20 Feb | 1035 | 0.8 | 17.5 | 0.47 | 0.13 | 0.38 | 0.04 | 0.81 | 0.47 | 0.09 | 1.00 | 0.32 | 0.15 | 0.68 |
| 20 Feb | 2035 | 0.9 | 17.5 | 0.59 | 0.13 | 0.93 | 0.30 | 1.58 | 0.76 | 0.13 | 1.29 | 0.78 | 0.15 | 1.32 |
| 06 Mar | 1035 | 0.3 | 21.9 | 1.25 | 0.07 | 1.31 | 0.00 | 1.05 | 1.06 | 0.09 | 0.85 | 1.25 | 0.11 | 1.00 |
| 06 Mar | 2035 | 1.6 | 21.0 | 1.52 | 0.09 | 0.80 | 0.63 | 0.53 | 1.39 | 0.04 | 0.91 | 1.25 | 0.24 | 0.82 |
| 20 Mar | 1035 | 1.4 | 18.3 | 6.07 | 1.09 | 5.58 | 0.83 | 0.92 | 5.30 | 0.32 | 0.87 | 5.78 | 0.12 | 0.95 |
| 20 Mar | 2005 | 1.2 | 18.6 | 3.69 | 1.00 | 4.09 | 0.77 | 1.11 | 4.92 | 0.11 | 1.33 | 4.98 | 0.00 | 1.35 |
| 04 Apr | 1040 | 2.0 | 15.0 | 7.91 | 0.38 | 5.18 | 5.08 | 0.65 | 7.19 | 0.19 | 0.91 | 5.43 | 0.14 | 0.69 |
| 04 Apr | 1940 | 2.6 | 15.6 | 6.39 | 0.62 | 5.42 | 0.45 | 0.85 | 6.49 | 1.79 | 1.02 | 6.44 | 0.46 | 1.01 |
| 18 Apr | 1035 | 2.9 | 18.4 | 2.38 | 0.19 | 2.70 | 0.09 | 1.13 | 2.66 | 0.17 | 1.12 | 2.43 | 0.11 | 1.02 |
| 18 Apr | 2120 | 4.1 | 5.3 | 2.59 | 0.19 | 2.95 | 0.38 | 1.14 | 2.66 | 0.00 | 1.03 | 2.58 | 0.13 | 1.00 |
| 10 May | 1030 | 7.9 | 15.8 | 12.23 | 0.59 | 12.47 | 0.88 | 1.02 | 11.57 | 0.78 | 0.95 | 11.78 | 0.03 | 0.96 |
| 10 May | 2045 | 8.4 | 15.5 | 13.72 | 0.48 | 14.07 | 0.56 | 1.03 | 14.58 | 0.06 | 1.06 | 12.79 | 0.24 | 0.93 |
| 24 May | 1310 | 8.6 | 16.0 | 9.52 | 0.34 | 9.22 | 0.16 | 0.97 | 9.06 | 0.62 | .95† | 11.03 | 0.06 | 1.16† |
| 24 May | 2135 | 9.7 | 16.2 | 9.24 | 1.60 | 8.32 | 0.13 | 0.90 | 9.43 | 0.00 | 1.02 | 8.44 | 1.97 | 0.91 |
| 17 Jun | 1130 | 11.9 | 13.7 | 6.01 | 0.03 | 4.78 | 0.29 | 0.80 | 5.21 | 1.15 | 0.87 | 4.94 | 1.15 | 0.82 |
| 17 Jun | 2115 | 12.2 | 14.3 | 2.09 | 1.02 | 4.86 | 0.48 | 2.33 | 4.73 | 0.08 | 2.26 | 4.19 | 0.24 | 2.00 |
| 28 Jun | 1400 | 16.4 | 16.2 | 5.07 | 0.64 | 2.89 | 0.06 | 0.57 | 7.03 | 0.46 | 1.39† | 6.46 | 0.05 | 1.27† |
| 28 Jun | 2220 | 16.3 | 16.2 | 7.32 | 0.06 | 3.63 | 0.27 | 0.50 | 5.24 | 1.02 | 0.72 | 5.00 | 1.85 | 0.68 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-1 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3° S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 1.79 | 0.24 | 1.39 | 0.27 | 0.78 | 2.25 | 0.11 | 1.26† | 1.26 | 0.89 | 0.70† |
| 13 Jul | 2145 | 18.8 | 16.0 | 1.74 | 0.14 | 1.90 | 0.08 | 1.09 | 0.99 | 0.11 | 0.57 | 1.77 | 0.06 | 1.02 |
| 26 Jul | 1250 | 22.7 | 14.5 | 2.14 | 0.00 | 1.79 | 0.24 | 0.84 | 1.90 | 0.14 | 0.89 | 2.70 | 0.08 | 1.26 |
| 26 Jul | 2145 | 21.9 | 15.5 | 0.96 | 0.00 | 0.80 | 0.16 | 0.83 | 1.23 | 0.00 | 1.28 | 0.94 | 0.03 | 0.98 |
| 09 Aug | 1115 | 22.6 | 14.7 | 4.38 | 0.48 | 4.14 | 0.24 | 0.95 | 2.51 | 0.21 | 0.57† | 2.83 | 0.64 | 0.65† |
| 09 Aug | 2135 | 22.5 | 15.0 | 3.71 | 0.67 | 3.58 | 0.38 | 0.96 | 4.22 | 0.70 | 1.14 | 7.83 | 0.67 | 2.11 |
| 23 Aug | 1155 | 23.6 | 12.5 | 3.84 | 0.64 | 4.58 | 0.17 | 1.19 | 5.74 | 0.47 | 1.49 | 5.11 | 0.50 | 1.33 |
| 23 Aug | 2100 | 24.6 | 12.4 | 3.64 | 0.77 | 4.11 | 0.24 | 1.13 | 3.64 | 0.57 | 1.00 | 4.41 | 1.21 | 1.21 |
| 14 Sep | 1055 | 5.8 | 10.8 | 0.61 | 0.06 | 0.86 | 0.19 | 1.41 | 0.97 | 0.17 | 1.59 | 0.70 | 0.49 | 1.15 |
| 14 Sep | 2031 | 5.3 | 10.8 | 0.61 | 0.06 | 0.82 | 0.02 | 1.34 | 0.74 | 0.02 | 1.21 | 0.53 | 0.02 | 0.87 |
| 26 Sep | 1051 | 13.9 | 0.5 | 7.35 | 0.34 | 7.08 | 0.14 | 0.96 | 7.28 | 0.34 | 0.99 | 7.64 | 0.70 | 1.04 |
| 26 Sep | 2030 | 14.8 | 0.6 | 4.91 | 0.10 | 4.08 | 0.54 | 0.83 | 5.21 | 0.34 | 1.06 | 4.64 | 0.17 | 0.95 |
| 10 Oct | 1030 | 14.2 | 0.4 | 4.17 | 0.17 | 3.93 | 0.14 | 0.94 | 3.28 | 0.08 | 0.79 | 3.72 | 0.46 | 0.89 |
| 10 Oct | 2035 | 14.6 | 0.2 | 4.01 | 0.11 | 3.58 | 0.22 | 0.89 | 2.80 | 0.08 | 0.70 | 3.58 | 0.48 | 0.89 |
| 25 Oct | 1035 | 11.8 | 0.4 | 2.93 | 0.27 | 3.78 | 1.04 | 1.29 | 4.09 | 1.31 | 1.40 | 3.58 | 0.42 | 1.22 |
| 25 Oct | 2028 | 12.0 | 0.4 | 2.41 | 0.05 | 2.45 | 0.34 | 1.02 | 2.36 | 0.72 | 0.98 | 2.43 | 0.03 | 1.01 |
| 07 Nov | 1140 | 11.3 | 1.4 | 4.99 | 0.43 | 4.31 | 0.20 | 0.86 | 7.26 | 0.05 | 1.45 | 4.64 | 0.08 | 0.93 |
| 07 Nov | 2045 | 11.4 | 1.5 | 3.86 | 0.21 | 4.86 | 0.20 | 1.26 | 3.70 | 0.30 | 0.96 | 2.43 | 2.33 | 0.63 |
| 28 Nov | 1000 | 7.3 | 0.1 | 2.57 | 0.38 | 2.32 | 0.55 | 0.90 | 2.70 | 0.25 | 1.05 | 2.15 | 0.21 | 0.84 |
| 28 Nov | 2028 | 6.1 | 0.4 | 1.88 | 0.07 | 2.55 | 0.32 | 1.36 | 2.55 | 0.40 | 1.36 | 1.65 | 0.17 | 0.88 |
| 12 Dec | 1105 | 4.0 | 11.6 | 2.78 | 0.42 | 2.57 | 0.04 | 0.92 | 2.83 | 0.09 | 1.02 | 2.77 | 0.11 | 1.00 |
| 13 Dec | 2109 | 2.2 | 12.4 | 3.64 | 0.04 | 3.53 | 1.85 | 0.97 | 4.09 | 0.65 | 1.12 | 4.21 | 0.77 | 1.16 |
| 29 Dec | 1100 | 1.8 | 15.6 | 2.37 | 0.23 | 2.71 | 0.17 | 1.14 | 2.54 | 1.81 | 1.07 | 3.61 | 0.27 | 1.52 |
| 29 Dec | 2110 | 2.6 | 16.5 | 2.94 | 0.40 | 2.84 | 0.04 | 0.97 | 3.77 | 1.30 | 1.28 | 3.94 | 1.60 | 1.34 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-2 (Page 1 of 2)

Chlorophyll a Concentration* in Whole Water Collections after 24-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake | | Discharge | | D/I | 3° Simulation | | 3° S/I | 2° Simulation | | 2° S/I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.E. | Mean | S.E. | Ratio | Mean | S.E. | Ratio | Mean | S.E. | Ratio |
| 16 Jan | 1155 | 0.8 | 19.8 | 1.35 | 0.03 | 1.29 | 0.26 | 0.96 | 0.89 | 0.03 | 0.66 | 1.12 | 0.20 | 0.83 |
| 16 Jan | 2100 | 0.8 | 19.8 | 1.35 | 0.03 | 1.15 | 0.06 | 0.85 | 1.12 | 0.15 | 0.83 | 1.32 | 0.06 | 0.98 |
| 24 Jan | 1045 | 0.9 | 21.0 | 1.40 | 0.09 | 1.12 | 0.02 | 0.80 | 1.35 | 0.09 | 0.96 | 1.42 | 0.07 | 1.01 |
| 24 Jan | 2032 | 2.4 | 21.1 | 1.12 | 0.02 | 1.10 | 0.09 | 0.98 | 1.08 | 0.03 | 0.96 | 1.14 | 0.04 | 1.02 |
| 06 Feb | 1055 | 1.7 | 16.8 | 0.76 | 0.09 | 0.64 | 0.34 | 0.84 | 1.06 | 0.05 | 1.39 | 0.72 | 0.30 | 0.95 |
| 06 Feb | 2040 | 1.3 | 16.9 | 0.66 | 0.07 | 0.55 | 0.04 | 0.83 | 0.76 | 0.00 | 1.15 | 0.33 | 0.23 | 0.50 |
| 20 Feb | 1035 | 0.8 | 17.5 | 0.82 | 0.15 | 0.97 | 0.17 | 1.18 | 1.16 | 0.15 | 1.41 | 0.70 | 0.15 | 0.85 |
| 20 Feb | 2035 | 0.9 | 17.5 | 0.42 | 0.21 | 0.59 | 0.13 | 1.40 | 0.51 | 0.13 | 1.21 | 0.47 | 0.26 | 1.12 |
| 06 Mar | 1035 | 0.3 | 21.9 | 1.37 | 0.06 | 1.73 | 0.09 | 1.26 | 1.54 | 0.06 | 1.12 | 1.48 | 0.17 | 1.08 |
| 06 Mar | 2035 | 1.6 | 21.0 | 1.08 | 0.15 | 0.74 | 0.19 | 0.69 | 1.46 | 0.24 | 1.35 | 1.26 | 0.00 | 1.17 |
| 20 Mar | 1035 | 1.4 | 18.3 | 6.45 | 0.28 | 6.69 | 0.28 | 1.04 | 6.81 | 0.40 | 1.06 | 7.05 | 0.24 | 1.09 |
| 20 Mar | 2005 | 1.2 | 18.6 | 7.33 | 0.12 | 5.89 | 0.76 | 0.80 | 6.57 | 0.40 | 0.90 | 7.69 | 0.64 | 1.05 |
| 04 Apr | 1040 | 2.0 | 15.0 | 9.05 | 0.03 | 8.23 | 0.38 | 0.91 | 9.03 | 0.38 | 1.00 | 8.60 | 0.54 | 0.95 |
| 04 Apr | 1940 | 2.6 | 15.6 | 9.67 | 0.59 | 10.90 | 1.29 | 1.13 | 9.14 | 0.70 | 0.95 | 14.02 | 1.52 | 1.45 |
| 18 Apr | 1035 | 2.9 | 18.4 | 2.77 | 0.28 | 3.16 | 0.25 | 1.14 | 3.48 | 0.07 | 1.26 | 3.23 | 0.19 | 1.17 |
| 18 Apr | 2120 | 4.1 | 5.3 | 2.91 | 0.04 | 2.55 | 0.23 | 0.88 | 3.31 | 0.32 | 1.14 | 2.13 | 0.15 | 0.73 |
| 10 May | 1030 | 7.9 | 15.8 | 12.10 | 0.73 | 19.20 | 7.08 | 1.59 | 11.24 | 0.08 | 0.93 | 4.75 | 4.65 | 0.39 |
| 10 May | 2045 | 8.4 | 15.5 | 15.28 | 0.86 | 12.66 | 1.29 | 0.83 | 13.75 | 3.34 | 0.90 | 15.22 | 0.37 | 1.00 |
| 24 May | 1310 | 8.6 | 16.0 | 9.65 | 0.59 | 7.86 | 0.59 | 0.81 | 10.45 | 0.96 | 1.08† | 11.18 | 1.08 | 1.16† |
| 24 May | 2135 | 9.7 | 16.2 | 8.63 | 1.11 | 8.57 | 0.68 | 0.99 | 10.45 | 0.00 | 1.21 | 9.43 | 0.43 | 1.09 |
| 17 Jun | 1130 | 11.9 | 13.7 | 5.74 | 0.35 | 4.41 | 0.30 | 0.77 | 5.05 | 0.35 | 0.88 | 4.57 | 0.30 | 0.80 |
| 17 Jun | 2115 | 12.2 | 14.3 | 5.32 | 0.14 | 4.76 | 0.06 | 0.89 | 4.03 | 0.03 | 0.76 | 3.13 | 1.05 | 0.59 |
| 28 Jun | 1400 | 16.4 | 16.2 | 4.30 | 0.67 | 2.54 | 0.03 | 0.59 | 5.87 | 0.16 | 1.37† | 4.65 | 1.18 | 1.08† |
| 28 Jun | 2220 | 16.3 | 16.2 | 5.26 | 0.40 | 3.12 | 0.08 | 0.59 | 4.36 | 0.30 | 0.83 | 3.96 | 0.54 | 0.75 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-2 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3° S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 2.75 | 0.40 | 2.22 | 0.35 | 0.81 | 2.24 | 0.32 | 0.81† | 1.39 | 0.00 | 0.51† |
| 13 Jul | 2145 | 18.8 | 16.0 | 2.56 | 0.16 | 1.36 | 0.72 | 0.53 | 1.98 | 0.43 | 0.77 | 2.06 | 0.24 | 0.80 |
| 26 Jul | 1250 | 22.7 | 14.5 | 2.11 | 0.13 | 1.82 | 0.22 | 0.86 | 2.16 | 0.24 | 1.02 | 2.51 | 0.80 | 1.19 |
| 26 Jul | 2145 | 21.9 | 15.5 | 1.04 | 0.08 | 0.88 | 0.08 | 0.85 | 1.23 | 0.00 | 1.18 | 1.34 | 0.27 | 1.29 |
| 09 Aug | 1115 | 22.6 | 14.7 | 4.14 | 0.35 | 1.95 | 0.24 | 0.47 | 1.45 | 0.22 | 0.35† | 1.58 | 0.19 | 0.38† |
| 09 Aug | 2135 | 22.5 | 15.0 | 6.09 | 0.43 | 4.30 | 0.72 | 0.71 | 6.57 | 0.11 | 1.08 | 6.57 | 0.11 | 1.08 |
| 23 Aug | 1155 | 23.6 | 12.5 | 5.11 | 0.17 | 4.24 | 0.50 | 0.83 | 5.14 | 0.27 | 1.01 | 5.01 | 0.07 | 0.98 |
| 23 Aug | 2100 | 24.6 | 12.4 | 4.54 | 0.27 | 4.91 | 0.17 | 1.08 | 4.84 | 0.10 | 1.07 | 4.94 | 0.07 | 1.09 |
| 14 Sep | 1055 | 5.8 | 10.8 | 0.59 | 0.04 | 0.41 | 0.11 | 0.69 | 0.80 | 0.04 | 1.36 | 1.14 | 0.59 | 1.93 |
| 14 Sep | 2031 | 5.3 | 10.8 | 0.91 | 0.15 | 0.49 | 0.07 | 0.54 | 0.24 | 0.14 | 0.26 | 0.68 | 0.05 | 0.75 |
| 26 Sep | 1051 | 13.9 | 0.5 | 6.74 | 0.40 | 3.81** | 0.00 | 0.57 | 6.14 | 0.13 | 0.91 | 7.14 | 0.40 | 1.06 |
| 26 Sep | 2030 | 14.8 | 0.6 | 4.51 | 0.17 | 4.11 | 0.37 | 0.91 | 3.97 | 0.10 | 0.88 | 4.48 | 0.07 | 0.99 |
| 10 Oct | 1030 | 14.2 | 0.4 | 4.49 | 0.22 | 3.95 | 0.16 | 0.88 | 3.69 | 0.06 | 0.82 | 3.74 | 0.59 | 0.83 |
| 10 Oct | 2035 | 14.6 | 0.2 | 3.58 | 0.11 | 3.15 | 0.00 | 0.88 | 2.72 | 0.48 | 0.76 | 3.77 | 0.35 | 1.05 |
| 25 Oct | 1035 | 11.8 | 0.4 | 3.56 | 0.36 | 2.09 | 0.11 | 0.59 | 4.58 | 0.32 | 1.29 | 3.84 | 0.13 | 1.08 |
| 25 Oct | 2028 | 12.0 | 0.4 | 1.94 | 0.25 | 2.49 | 0.13 | 1.28 | 2.60 | 0.15 | 1.34 | 2.66 | 0.00 | 1.37 |
| 07 Nov | 1140 | 11.3 | 1.4 | 5.61 | 0.70 | 4.38 | 0.88 | 0.78 | 4.93 | 1.18 | 0.88 | 4.21 | 0.61 | 0.75 |
| 07 Nov | 2045 | 11.4 | 1.5 | 4.06 | 1.06 | 5.69 | 0.08 | 1.40 | 6.14 | 0.13 | 1.51 | 5.69 | 0.28 | 1.40 |
| 28 Nov | 1000 | 7.3 | 0.1 | 2.47 | 0.49 | 2.34 | 0.23 | 0.95 | 2.37 | 0.09 | 0.96 | 2.89 | 0.32 | 1.17 |
| 28 Nov | 2028 | 6.1 | 0.4 | 2.11 | 0.59 | 2.41 | 0.26 | 1.14 | 2.85 | 0.53 | 1.35 | 2.11 | 0.09 | 1.00 |
| 12 Dec | 1105 | 4.0 | 11.6 | 3.61 | 0.19 | 3.15 | 0.75 | 0.87 | 3.82 | 0.35 | 1.06 | 1.58 | 1.37 | 0.44 |
| 13 Dec | 2109 | 2.2 | 12.4 | 2.36 | 1.16 | 3.65 | 1.01 | 1.55 | 5.45 | 0.72 | 2.31 | 4.09 | 0.57 | 1.73 |
| 29 Dec | 1100 | 1.8 | 15.6 | 1.77 | 0.37 | 1.17 | 0.10 | 0.66 | 4.17 | 1.50 | 2.36 | 1.30 | 0.03 | 0.73 |
| 29 Dec | 2110 | 2.6 | 16.5 | 3.11 | 0.17 | 2.31 | 0.44 | 0.74 | 2.27 | 0.13 | 0.73 | 1.54 | 0.41 | 0.50 |

*Micrograms/liter

**Sample broken during shipment

†Samples taken in actual discharge plume rather than simulated

Table J-3 (Page 1 of 2)

Chlorophyll a Concentration* in Whole Water Collections after 48-Hr Incubation Period
James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3° S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 Jan | 1155 | 0.8 | 19.8 | 1.63 | 0.14 | 1.69 | 0.03 | 1.04 | 1.66 | 0.06 | 1.02 | 1.29 | 0.32 | 0.79 |
| 16 Jan | 2100 | 0.8 | 19.8 | 1.49 | 0.12 | 1.34 | 0.20 | 0.90 | 0.45 | 0.35 | 0.30 | 0.80 | 0.70 | 0.54 |
| 24 Jan | 1045 | 0.9 | 21.0 | 0.95 | 0.23 | 1.20 | 0.06 | 1.26 | 1.29 | 0.11 | 1.36 | 1.16 | 0.06 | 1.22 |
| 24 Jan | 2032 | 2.4 | 21.1 | 1.37 | 0.11 | 1.48 | 0.17 | 1.08 | 1.37 | 0.02 | 1.00 | 1.14 | 0.09 | 0.83 |
| 06 Feb | 1055 | 1.7 | 16.8 | 0.80 | 0.00 | 0.76 | 0.17 | 0.95 | 0.76 | 0.04 | 0.95 | 0.86 | 0.19 | 1.08 |
| 06 Feb | 2040 | 1.3 | 16.9 | 0.97 | 0.08 | 0.70 | 0.36 | 0.72 | 1.01 | 0.04 | 1.04 | 0.82 | 0.02 | 0.85 |
| 20 Feb | 1035 | 0.8 | 17.5 | 0.68 | 0.05 | 0.54 | 0.44 | 0.79 | 1.04 | 0.11 | 1.53 | 1.08 | 0.07 | 1.59 |
| 20 Feb | 2035 | 0.9 | 17.5 | 0.61 | 0.02 | 0.38 | 0.00 | 0.62 | 0.55 | 0.00 | 0.90 | 0.55 | 0.04 | 0.90 |
| 06 Mar | 1035 | 0.3 | 21.9 | 1.33 | 0.02 | 1.35 | 0.04 | 1.02 | 1.90 | 0.09 | 1.43 | 1.54 | 0.06 | 1.16 |
| 06 Mar | 2035 | 1.6 | 21.0 | 1.35 | 0.09 | 1.05 | 0.00 | 0.78 | 1.16 | 0.57 | 0.86 | 1.04 | 0.11 | 0.77 |
| 20 Mar | 1035 | 1.4 | 18.3 | 6.69 | 0.84 | 6.61 | 0.12 | 0.99 | 6.97 | 0.40 | 1.04 | 7.13 | 0.64 | 1.07 |
| 20 Mar | 2005 | 1.2 | 18.6 | 6.61 | 0.52 | 6.33 | 0.24 | 0.96 | 7.65 | 0.60 | 1.16 | 7.05 | 0.24 | 1.07 |
| 04 Apr | 1040 | 2.0 | 15.0 | 10.76 | 0.13 | 11.00 | 1.66 | 1.02 | 11.32 | 0.64 | 1.05 | 9.69 | 0.40 | 0.90 |
| 04 Apr | 1940 | 2.6 | 15.6 | 9.80 | 1.58 | 9.54 | 0.30 | 0.97 | 11.62 | 1.85 | 1.19 | 9.78 | 0.27 | 1.00 |
| 18 Apr | 1035 | 2.9 | 18.4 | 4.32 | 0.40 | 3.06 | 0.15 | 0.71 | 4.98 | 0.76 | 1.15 | 3.99 | 0.49 | 0.92 |
| 18 Apr | 2120 | 4.1 | 5.3 | 3.31 | 0.15 | 2.96 | 0.30 | 0.89 | 2.64 | 0.32 | 0.80 | 2.38 | 0.02 | 0.72 |
| 10 May | 1030 | 7.9 | 15.8 | 10.63 | 0.16 | 12.58 | 1.05 | 1.18 | 11.40 | 0.88 | 1.07 | 11.03 | 0.46 | 1.04 |
| 10 May | 2045 | 8.4 | 15.5 | 3.03 | 0.45 | 4.97 | 4.87 | 1.64 | 12.63 | 1.79 | 4.17 | 12.63 | 4.09 | 4.17 |
| 24 May | 1310 | 8.6 | 16.0 | 8.94 | 0.56 | 8.29 | 0.16 | 0.93 | 10.94 | 3.67 | 1.32† | 10.23 | 0.31 | 1.14† |
| 24 May | 2135 | 9.7 | 16.2 | 6.75 | 4.04 | 6.04 | 1.97 | 0.89 | 9.40 | 0.40 | 1.39 | 10.23 | 1.48 | 1.52 |
| 17 Jun | 1130 | 11.9 | 13.7 | 4.97 | 0.27 | 3.98 | 0.24 | 0.80 | 4.38 | 0.21 | 0.88 | 4.92 | 0.38 | 0.99 |
| 17 Jun | 2115 | 12.2 | 14.3 | 5.40 | 0.06 | 3.37 | 0.11 | 0.62 | 3.36 | 0.00 | 0.62 | 3.71 | 0.51 | 0.69 |
| 28 Jun | 1400 | 16.4 | 16.2 | 2.62 | 0.32 | 2.11 | 0.13 | 0.8 | 5.74 | 1.04 | 2.19† | 5.07 | 0.48 | 1.94† |
| 28 Jun | 2220 | 16.3 | 16.2 | 2.99 | 0.11 | 1.87 | 0.32 | 0.63 | 3.07 | 0.03 | 1.03 | 2.09 | 0.11 | 0.70 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-3 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3° S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 2.01 | 0.14 | 1.66 | 0.16 | 0.83 | 1.95 | 0.67 | 0.97† | 1.36 | 0.19 | 0.68† |
| 13 Jul | 2145 | 18.8 | 16.0 | 1.58 | 0.08 | 1.04 | 0.03 | 0.66 | 1.77 | 0.11 | 1.12 | 1.85 | 0.62 | 1.17 |
| 26 Jul | 1250 | 22.7 | 14.5 | 2.16 | 0.83 | 2.38 | 0.08 | 1.10 | 2.19 | 0.86 | 1.01 | 1.74 | 0.08 | 0.81 |
| 26 Jul | 2145 | 21.9 | 15.5 | 0.83 | 0.08 | 0.94 | 0.30 | 1.13 | 1.07 | 0.22 | 1.29 | 1.50 | 0.06 | 1.81 |
| 09 Aug | 1115 | 22.6 | 14.7 | 3.15 | 0.11 | 3.63 | 0.11 | 1.15 | 1.55 | 0.05 | 0.49† | 2.38 | 0.08 | 0.76† |
| 09 Aug | 2135 | 22.5 | 15.0 | 4.62 | 0.13 | 3.66 | 0.72 | 0.79 | 4.62 | 0.35 | 1.00 | 3.90 | 0.06 | 0.84 |
| 23 Aug | 1115 | 23.6 | 12.5 | 2.84 | 0.17 | 3.71 | 0.37 | 1.31 | 2.97 | 0.03 | 1.05 | 3.07 | 0.07 | 1.08 |
| 23 Aug | 2100 | 24.6 | 12.4 | 3.68 | 0.54 | 4.91 | 0.37 | 1.33 | 3.67 | 0.27 | 1.00 | 3.74 | 0.67 | 1.02 |
| 14 Sep | 1055 | 5.8 | 10.8 | 0.72 | 0.21 | 0.70 | 0.28 | 0.97 | 0.85 | 0.13 | 1.18 | 0.72 | 0.09 | 1.00 |
| 14 Sep | 2031 | 5.3 | 10.8 | 1.12 | 0.11 | 0.70 | 0.03 | 0.63 | 0.45 | 0.35 | 0.40 | 0.49 | 0.19 | 0.44 |
| 26 Sep | 1051 | 13.9 | 0.5 | 6.11 | 0.90 | 6.35 | 0.74 | 1.04 | 6.84 | 0.30 | 1.12 | 6.95 | 0.07 | 1.14 |
| 26 Sep | 2030 | 14.8 | 0.6 | 3.67 | 0.07 | 3.84 | 0.17 | 1.05 | 3.57 | 0.17 | 0.97 | 4.44 | 0.37 | 1.21 |
| 10 Oct | 1030 | 14.2 | 0.4 | 4.83 | 0.24 | 4.17 | 0.43 | 0.86 | 3.66 | 0.78 | 0.76 | 4.41 | 0.35 | 0.91 |
| 10 Oct | 2035 | 14.6 | 0.2 | 3.61 | 0.14 | 3.85 | 0.06 | 1.07 | 3.45 | 0.57 | 0.96 | 3.66 | 0.24 | 1.01 |
| 25 Oct | 1035 | 11.8 | 0.4 | 4.54 | 0.87 | 2.87 | 0.34 | 0.63 | 4.16 | 0.45 | 0.92 | 3.25 | 0.55 | 0.72 |
| 25 Oct | 2028 | 12.0 | 0.4 | 1.79 | 0.99 | 1.11 | 1.01 | 0.62 | 2.95 | 0.34 | 1.65 | 2.57 | 0.38 | 1.44 |
| 07 Nov | 1140 | 11.3 | 1.4 | 4.34 | 0.08 | 5.79 | 1.18 | 1.33 | 4.41 | 0.76 | 1.02 | 4.46 | 1.26 | 1.03 |
| 07 Nov | 2045 | 11.4 | 1.5 | 5.16 | 0.35 | 5.19 | 0.53 | 1.01 | 4.59 | 0.33 | 0.89 | 1.40 | 0.05 | 0.27 |
| 28 Nov | 1000 | 7.3 | 0.1 | 2.05 | 0.28 | 1.60 | 0.00 | 0.78 | 2.58 | 0.09 | 1.26 | 1.82 | 0.13 | 0.89 |
| 28 Nov | 2028 | 6.1 | 0.4 | 1.92 | 0.28 | 2.34 | 0.53 | 1.22 | 2.13 | 0.23 | 1.11 | 1.98 | 0.00 | 1.03 |
| 12 Dec | 1105 | 4.0 | 11.6 | 3.47 | 0.48 | 2.11 | 1.04 | 0.61 | 4.35 | 0.08 | 1.25 | 5.08 | 0.06 | 1.46 |
| 13 Dec | 2109 | 2.2 | 12.4 | 3.04 | 0.32 | 2.08 | 0.32 | 0.68 | 2.84 | 0.76 | 0.93 | 2.40 | 0.00 | 0.79 |
| 29 Dec | 1100 | 1.8 | 15.6 | 3.97 | 0.10 | 3.24 | 0.44 | 0.82 | 4.44 | 1.24 | 1.12 | 4.81 | 0.47 | 1.21 |
| 29 Dec | 2110 | 2.6 | 16.5 | 2.71 | 0.04 | 2.87 | 0.67 | 1.06 | 3.84 | 0.37 | 1.42 | 2.74 | 0.34 | 1.01 |

*Micrograms/liter

† Samples taken in actual discharge plume rather than simulated

Table J-4 (Page 1 of 2)

Chlorophyll a Concentration* in Whole Water Collections after 72-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake | | Discharge | | D/I | 3° Simulation | | 3° S/I | 2° Simulation | | 2° S/I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.E. | Mean | S.E. | Ratio | Mean | S.E. | Ratio | Mean | S.E. | Ratio |
| 16 Jan | 1155 | 0.8 | 19.8 | 1.18 | 0.32 | 1.58 | 0.09 | 1.34 | 1.49 | 0.06 | 1.26 | 1.43 | 0.06 | 1.21 |
| 16 Jan | 2100 | 0.8 | 19.8 | 0.95 | 0.32 | 1.29 | 0.15 | 1.36 | 1.18 | 0.09 | 1.24 | 1.43 | 0.29 | 1.51 |
| 24 Jan | 1045 | 0.9 | 21.0 | 1.26 | 0.00 | 1.11 | 0.28 | 0.88 | 1.43 | 0.10 | 1.13 | 1.25 | 0.11 | 0.99 |
| 24 Jan | 2032 | 2.4 | 21.1 | 1.58 | 0.15 | 1.31 | 0.13 | 0.83 | 1.54 | 0.02 | 0.97 | 1.46 | 0.15 | 0.92 |
| 06 Feb | 1055 | 1.7 | 16.8 | 1.06 | 0.47 | 1.25 | 0.28 | 1.18 | 0.74 | 0.19 | 0.70 | 0.64 | 0.13 | 0.60 |
| 06 Feb | 2040 | 1.3 | 16.9 | 1.04 | 0.11 | 0.85 | 0.05 | 0.82 | 1.12 | 0.02 | 1.08 | 0.93 | 0.30 | 0.89 |
| 20 Feb | 1035 | 0.8 | 17.5 | 0.99 | 0.15 | 0.91 | 0.15 | 0.92 | 0.70 | 0.32 | 0.71 | 1.04 | 0.28 | 1.05 |
| 20 Feb | 2035 | 0.9 | 17.5 | 0.70 | 0.11 | 0.38 | 0.17 | 0.54 | 0.59 | 0.25 | 0.84 | 0.53 | 0.02 | 0.76 |
| 06 Mar | 1035 | 0.3 | 21.9 | 1.88 | 0.07 | 1.50 | 0.02 | 0.80 | 1.52 | 0.26 | 0.81 | 1.41 | 0.19 | 0.75 |
| 06 Mar | 2035 | 1.6 | 21.0 | 1.44 | 0.05 | 0.72 | 0.21 | 0.50 | 1.16 | 0.19 | 0.81 | 1.29 | 0.07 | 0.90 |
| 20 Mar | 1035 | 1.4 | 18.3 | 7.25 | 0.20 | 6.89 | 0.96 | 0.95 | 7.41 | 1.08 | 1.02 | 8.05 | 0.20 | 1.11 |
| 20 Mar | 2005 | 1.2 | 18.6 | 5.29 | 1.12 | 6.69 | 0.36 | 1.26 | 6.45 | 0.44 | 1.22 | 5.89 | 0.52 | 1.11 |
| 04 Apr | 1040 | 2.0 | 15.0 | 8.81 | 0.16 | 8.49 | 0.27 | 0.96 | 8.41 | 1.52 | 0.95 | 8.20 | 0.62 | 0.93 |
| 04 Apr | 1940 | 2.6 | 15.6 | 10.20 | 0.48 | 11.67 | 0.46 | 1.14 | 8.71 | 0.11 | 0.85 | 9.56 | 0.22 | 0.94 |
| 18 Apr | 1035 | 2.9 | 18.4 | 3.44 | 0.32 | 2.97 | 0.36 | 0.86 | 3.65 | 0.19 | 1.06 | 3.56 | 0.19 | 1.03 |
| 18 Apr | 2120 | 4.1 | 5.3 | 2.66 | 0.26 | 2.17 | 0.19 | 0.82 | 2.95 | 0.04 | 1.11 | 2.55 | 0.06 | 0.96 |
| 10 May | 1030 | 7.9 | 15.8 | 16.07 | 3.95 | 15.11 | 6.73 | 0.94 | 18.96 | 0.48 | 1.18 | 20.27 | 1.47 | 1.26 |
| 10 May | 2045 | 8.4 | 15.5 | 14.85 | 2.14 | 15.86 | 0.43 | 1.07 | 15.92 | 1.34 | 1.07 | 13.59 | 1.95 | 0.92 |
| 24 May | 1310 | 8.6 | 16.0 | 6.69 | 0.90 | 8.44 | 0.49 | 1.26 | 8.97 | 1.39 | 1.34† | 10.66 | 0.80 | 1.59† |
| 24 May | 2135 | 9.7 | 16.2 | 13.47 | 0.10 | 7.89 | 1.17 | 0.59 | 9.06 | 0.43 | 0.67 | 13.37 | 1.36 | 0.99 |
| 17 Jun | 1130 | 11.9 | 13.7 | 4.19 | 0.40 | 4.00 | 0.00 | 0.95 | 3.93 | 0.09 | 0.94 | 4.41 | 0.19 | 1.05 |
| 17 Jun | 2115 | 12.2 | 14.3 | 4.57 | 0.14 | 3.63 | 0.27 | 0.79 | 4.14 | 0.72 | 0.91 | 3.31 | 0.75 | 0.72 |
| 28 Jun | 1400 | 16.4 | 16.2 | 2.30 | 0.80 | 2.03 | 0.37 | 0.88 | 4.49 | 1.02 | 1.95† | 3.82 | 0.30 | 1.66† |
| 28 Jun | 2220 | 16.3 | 16.2 | 2.40 | 0.00 | 2.40 | 0.16 | 1.00 | 1.98 | 0.64 | 0.83 | 2.14 | 0.16 | 0.89 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-4 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 1.79 | 0.13 | 1.82 | 0.22 | 1.02 | 1.61 | 0.11 | 0.90† | 1.04 | 0.13 | 0.58† |
| 13 Jul | 2145 | 18.8 | 16.0 | 1.52 | 0.40 | 2.06 | 0.30 | 1.36 | 1.98 | 0.11 | 1.30 | 1.74 | 0.41 | 1.14 |
| 26 Jul | 1250 | 22.7 | 14.5 | 1.07 | 0.16 | 1.53 | 0.03 | 1.43 | 1.01 | 0.00 | 0.94 | 1.26 | 0.14 | 1.18 |
| 26 Jul | 2145 | 21.9 | 15.5 | 0.64 | 0.11 | 0.72 | 0.08 | 1.13 | 0.62 | 0.19 | 0.97 | 0.56 | 0.08 | 0.88 |
| 09 Aug | 1115 | 22.6 | 14.7 | 4.22 | 0.48 | 4.27 | 0.27 | 1.01 | 1.69 | 0.19 | 0.40† | 2.22 | 0.56 | 0.53† |
| 09 Aug | 2135 | 22.5 | 15.0 | 3.15 | 0.69 | 3.44 | 0.24 | 1.09 | 3.50 | 0.24 | 1.11 | 2.89 | 0.75 | 0.92 |
| 23 Aug | 1155 | 23.6 | 12.5 | 3.27 | 0.20 | 3.54 | 0.60 | 1.08 | 3.51 | 0.04 | 1.07 | 3.77 | 0.30 | 1.15 |
| 23 Aug | 2100 | 24.6 | 12.4 | 3.04 | 0.37 | 3.07 | 0.33 | 1.01 | 3.31 | 0.04 | 1.09 | 2.74 | 0.40 | 0.90 |
| 14 Sep | 1055 | 5.8 | 10.8 | 0.53 | 0.11 | 0.68 | 0.22 | 1.28 | 0.49 | 0.11 | 0.92 | 0.78 | 0.19 | 1.47 |
| 14 Sep | 2031 | 5.3 | 10.8 | 0.54 | 0.44 | 0.74 | 0.11 | 1.37 | 0.12 | 0.02 | 0.22 | 0.61 | 0.02 | 1.13 |
| 26 Sep | 1051 | 13.9 | 0.5 | 6.24 | 0.43 | 5.01 | 0.07 | 0.80 | 5.74 | 0.53 | 0.92 | 6.31 | 0.17 | 1.01 |
| 26 Sep | 2030 | 14.8 | 0.6 | 4.04 | 1.10 | 2.54 | 0.07 | 0.63 | 2.47 | 0.07 | 0.61 | 2.91 | 0.57 | 0.72 |
| 10 Oct | 1030 | 14.2 | 0.4 | 4.41 | 0.08 | 3.93 | 0.35 | 0.89 | 2.86 | 0.03 | 0.65 | 3.61 | 0.46 | 0.82 |
| 10 Oct | 2035 | 14.6 | 0.2 | 3.34 | 0.08 | 2.70 | 0.51 | 0.81 | 1.39 | 1.02 | 0.42 | 3.47 | 0.21 | 1.04 |
| 25 Oct | 1035 | 11.8 | 0.4 | 2.43 | 0.03 | 3.38 | 0.34 | 1.39 | 5.27 | 2.57 | 2.17 | 3.29 | 0.42 | 1.35 |
| 25 Oct | 2028 | 12.0 | 0.4 | 2.49 | 0.09 | 2.81 | 0.24 | 1.13 | 2.76 | 0.53 | 1.11 | 2.87 | 0.21 | 1.15 |
| 07 Nov | 1140 | 11.3 | 1.4 | 3.71 | 0.86 | 3.08 | 0.23 | 0.83 | 2.75 | 0.75 | 0.74 | 3.63 | 0.48 | 0.98 |
| 07 Nov | 2045 | 11.4 | 1.5 | 5.64 | 0.93 | 4.91 | 0.20 | 0.87 | 5.09 | 0.63 | 0.90 | 5.29 | 0.73 | 0.94 |
| 28 Nov | 1000 | 7.3 | 0.1 | 1.96 | 0.40 | 1.44 | 0.05 | 0.73 | 2.91 | 0.30 | 1.48 | 2.55 | 0.32 | 1.30 |
| 28 Nov | 2028 | 6.1 | 0.4 | 2.03 | 0.30 | 2.43 | 0.15 | 1.20 | 1.69 | 0.26 | 0.83 | 2.74 | 0.17 | 1.35 |
| 12 Dec | 1105 | 4.0 | 11.6 | 4.78 | 0.51 | 4.14 | 1.15 | 0.87 | 5.32 | 0.19 | 1.11 | 3.69 | 0.33 | 0.77 |
| 13 Dec | 2109 | 2.2 | 12.4 | 3.80 | 0.04 | 3.16 | 0.60 | 0.83 | 3.48 | 0.36 | 0.92 | 3.64 | 0.28 | 0.96 |
| 29 Dec | 1100 | 1.8 | 15.6 | 3.17 | 0.50 | 4.08 | 0.14 | 1.29 | 3.54 | 0.74 | 1.12 | 5.78 | 0.57 | 1.82 |
| 29 Dec | 2110 | 2.6 | 16.5 | 2.94 | 0.07 | 2.54 | 0.60 | 0.86 | 2.67 | 0.40 | 0.91 | 3.00 | 0.20 | 1.20 |

*Micrograms/liter.

†Samples taken in actual discharge plume rather than simulated

Table J-5 (Page 1 of 2)

Phaeophytin a Concentration* in Whole Water Collections after 7-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3° S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 Jan | 1155 | 0.8 | 19.8 | 1.19 | 0.03 | 0.76 | 0.26 | 0.64 | 1.12 | 0.06 | 0.94 | 0.65 | 0.40 | 0.55 |
| 16 Jan | 2100 | 0.8 | 19.8 | 1.62 | 0.47 | 1.00 | 0.22 | 0.62 | 1.29 | 0.48 | 0.80 | 1.41 | 0.45 | 0.87 |
| 24 Jan | 1045 | 0.9 | 21.0 | 0.46 | 0.03 | 0.59 | 0.06 | 1.28 | 0.45 | 0.07 | 0.98 | 0.51 | 0.08 | 1.11 |
| 24 Jan | 2032 | 2.4 | 21.1 | 0.23 | 0.01 | 0.50 | 0.21 | 2.17 | 0.42 | 0.23 | 1.83 | 0.48 | 0.09 | 2.09 |
| 06 Feb | 1055 | 1.7 | 16.8 | 0.17 | 0.07 | 0.15 | 0.05 | 0.88 | <0.10 | 0.00 | 0.59 | <0.10 | 0.00 | 0.59 |
| 06 Feb | 2040 | 1.3 | 16.9 | 0.37 | 0.27 | <0.10 | 0.00 | 0.27 | 0.47 | 0.05 | 1.27 | 0.35 | 0.03 | 0.95 |
| 20 Feb | 1035 | 0.8 | 17.5 | 0.62 | 0.09 | 0.66 | 0.08 | 1.06 | 0.56 | 0.13 | 0.90 | 0.59 | 0.08 | 0.95 |
| 20 Feb | 2035 | 0.9 | 17.5 | 0.42 | 0.19 | 0.25 | 0.15 | 0.60 | 0.38 | 0.03 | 0.90 | 0.31 | 0.00 | 0.74 |
| 06 Mar | 1035 | 0.3 | 21.9 | 0.10 | 0.00 | 0.10 | 0.00 | 1.00 | 0.10 | 0.00 | 1.00 | 0.10 | 0.00 | 1.00 |
| 06 Mar | 2035 | 1.6 | 21.0 | 0.10 | 0.00 | 0.85 | 0.75 | 8.50 | 0.10 | 0.00 | 1.00 | 0.31 | 0.21 | 3.10 |
| 20 Mar | 1035 | 1.4 | 18.3 | 0.51 | 0.41 | 0.54 | 0.44 | 1.06 | 0.41 | 0.31 | 0.80 | 0.20 | 0.10 | 0.39 |
| 20 Mar | 2005 | 1.2 | 18.6 | 0.85 | 0.75 | 1.52 | 1.22 | 1.79 | 0.31 | 0.10 | 0.36 | 0.11 | 0.01 | 0.13 |
| 04 Apr | 1040 | 2.0 | 15.0 | <0.10 | 0.00 | 2.10 | 2.00 | 21.00 | <0.10 | 0.00 | 1.00 | 0.68 | 0.58 | 6.80 |
| 04 Apr | 1940 | 2.6 | 15.6 | <0.10 | 0.00 | 0.32 | 0.02 | 3.20 | 0.43 | 0.33 | 4.30 | <0.10 | 0.00 | 1.00 |
| 18 Apr | 1035 | 2.9 | 18.4 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | 0.11 | 0.01 | 1.10 | 0.22 | 0.12 | 2.20 |
| 18 Apr | 2120 | 4.1 | 5.3 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | 0.16 | 0.03 | 1.60 |
| 10 May | 1030 | 7.9 | 15.8 | 3.05 | 0.82 | 1.03 | 0.66 | 0.34 | 1.69 | 0.23 | 0.55 | 1.68 | 0.59 | 0.55 |
| 10 May | 2045 | 8.4 | 15.5 | 3.42 | 0.02 | 2.17 | 0.54 | 0.63 | 1.20 | 0.51 | 0.35 | 3.47 | 0.65 | 1.01 |
| 24 May | 1310 | 8.6 | 16.0 | 0.55 | 0.06 | 0.52 | 0.09 | 0.95 | 0.24 | 0.14 | 0.44† | <0.10 | 0.00 | 0.18† |
| 24 May | 2135 | 9.7 | 16.2 | 1.95 | 1.85 | 1.53 | 1.43 | 0.78 | 1.60 | 0.24 | 0.82 | 1.39 | 1.29 | 0.71 |
| 17 Jun | 1130 | 11.9 | 13.7 | 0.14 | 0.04 | <0.10 | 0.00 | 0.71 | 0.57 | 0.47 | 4.07 | 0.89 | 0.79 | 6.36 |
| 17 Jun | 2115 | 12.2 | 14.3 | 3.71 | 3.11 | 0.11 | 0.01 | 0.03 | 0.57 | 0.25 | 0.15 | 0.93 | 0.13 | 0.25 |
| 28 Jun | 1400 | 16.4 | 16.2 | 1.21 | 0.34 | 1.75 | 0.20 | 1.45 | 0.75 | 0.18 | 0.62† | 1.16 | 0.95 | 0.96† |
| 28 Jun | 2220 | 16.3 | 16.2 | 0.72 | 0.21 | 1.56 | 0.23 | 2.17 | 1.63 | 0.93 | 2.26 | 2.93 | 2.83 | 4.07 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-5 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake | | Discharge | | D/I Ratio | 3° Simulation | | 3° S/I Ratio | 2° Simulation | | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.E. | Mean | S.E. | | Mean | S.E. | | Mean | S.E. | |
| 12 Jul | 1035 | 19.6 | 16.3 | 1.20 | 0.36 | 0.56 | 0.35 | 0.47 | 1.03 | 0.10 | 0.86† | 0.56 | 0.22 | 0.47† |
| 13 Jul | 2145 | 18.8 | 16.0 | 0.49 | 0.00 | 0.70 | 0.09 | 1.43 | 0.61 | 0.42 | 1.24 | 0.95 | 0.30 | 1.94 |
| 26 Jul | 1250 | 22.7 | 14.5 | 0.70 | 0.00 | 0.72 | 0.06 | 1.03 | 0.71 | 0.04 | 1.01 | 1.14 | 0.03 | 1.63 |
| 26 Jul | 2145 | 21.9 | 15.5 | 0.61 | 0.08 | 0.69 | 0.01 | 1.13 | 0.38 | 0.04 | 0.62 | 0.62 | 0.12 | 1.02 |
| 09 Aug | 1115 | 22.6 | 14.7 | 1.96 | 0.44 | 1.58 | 0.10 | 0.81 | 0.71 | 0.09 | 0.36† | 1.13 | 0.37 | 0.58† |
| 09 Aug | 2135 | 22.5 | 15.0 | 1.54 | 0.77 | 1.40 | 0.12 | 0.91 | 1.73 | 0.58 | 1.12 | 3.38 | 0.02 | 2.19 |
| 23 Aug | 1155 | 23.6 | 12.5 | 0.81 | 0.04 | 1.20 | 0.05 | 1.48 | 0.83 | 0.59 | 1.02 | 1.67 | 0.36 | 2.06 |
| 23 Aug | 2100 | 24.6 | 12.4 | 0.66 | 0.07 | 0.66 | 0.14 | 1.00 | 1.13 | 0.34 | 1.71 | 1.21 | 1.11 | 1.83 |
| 14 Sep | 1055 | 5.8 | 10.8 | 0.19 | 0.09 | <0.10 | 0.00 | 0.53 | 0.12 | 0.02 | 0.63 | 0.23 | 0.13 | 1.21 |
| 14 Sep | 2031 | 5.3 | 10.8 | 0.29 | 0.19 | <0.10 | 0.00 | 0.34 | 0.14 | 0.04 | 0.48 | 0.32 | 0.03 | 1.10 |
| 26 Sep | 1051 | 13.9 | 0.5 | 0.67 | 0.34 | 0.60 | 0.50 | 0.90 | 1.23 | 0.57 | 1.84 | 0.53 | 0.43 | 0.79 |
| 26 Sep | 2030 | 14.8 | 0.6 | 0.59 | 0.08 | 0.98 | 0.87 | 1.66 | 0.33 | 0.02 | 0.56 | 0.81 | 0.15 | 1.37 |
| 10 Oct | 1030 | 14.2 | 0.4 | 1.13 | 0.01 | 1.20 | 0.17 | 1.06 | 1.24 | 0.01 | 1.10 | 1.30 | 0.11 | 1.15 |
| 10 Oct | 2035 | 14.6 | 0.2 | 0.97 | 0.22 | 1.28 | 0.29 | 1.32 | 1.48 | 0.21 | 1.53 | 0.91 | 0.15 | 0.94 |
| 25 Oct | 1035 | 11.8 | 0.4 | 1.28 | 0.01 | 0.26 | 0.16 | 0.20 | 0.56 | 0.46 | 0.44 | 0.60 | 0.50 | 0.47 |
| 25 Oct | 2028 | 12.0 | 0.4 | 0.68 | 0.06 | 0.53 | 0.43 | 0.78 | 0.90 | 0.76 | 1.32 | 0.91 | 0.14 | 1.34 |
| 07 Nov | 1140 | 11.3 | 1.4 | 0.65 | 0.55 | 1.29 | 0.15 | 1.98 | 0.10 | 0.00 | 0.15 | 2.17 | 0.04 | 3.34 |
| 07 Nov | 2045 | 11.4 | 1.5 | 2.07 | 0.99 | 0.57 | 0.47 | 0.28 | 0.86 | 0.30 | 0.42 | 3.59 | 2.56 | 1.73 |
| 28 Nov | 1000 | 7.3 | 0.1 | <0.10 | 0.00 | 0.67 | 0.57 | 6.70 | 0.49 | 0.14 | 4.90 | 0.73 | 0.49 | 7.30 |
| 28 Nov | 2028 | 6.1 | 0.4 | 1.43 | 0.30 | 0.28 | 0.18 | 0.20 | 0.89 | 0.62 | 0.62 | 1.82 | 0.30 | 1.27 |
| 12 Dec | 1105 | 4.0 | 11.6 | 0.88 | 0.32 | 1.31 | 0.27 | 1.49 | 1.15 | 0.13 | 1.31 | 1.25 | 0.49 | 1.42 |
| 13 Dec | 2109 | 2.2 | 12.4 | 1.32 | 0.01 | 2.44 | 2.34 | 1.85 | 2.64 | 0.48 | 2.00 | 2.55 | 0.40 | 1.93 |
| 29 Dec | 1100 | 1.8 | 15.6 | 0.15 | 0.05 | 0.68 | 0.58 | 4.53 | 1.69 | 1.59 | 11.27 | 0.83 | 0.22 | 5.53 |
| 29 Dec | 2110 | 2.6 | 16.5 | 0.36 | 0.14 | 0.95 | 0.13 | 2.64 | 0.88 | 0.11 | 2.44 | 0.68 | 0.58 | 1.89 |

*Micrograms/liter.

†Samples taken in actual discharge plume rather than simulated

## Table J-6 (Page 1 of 2)

### Phaeophytin a Concentration* in Whole Water Collections after 24-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3° S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 Jan | 1155 | 0.8 | 19.8 | 0.82 | 0.05 | 0.62 | 0.37 | 0.76 | 0.36 | 0.11 | 0.44 | 0.71 | 0.26 | 0.87 |
| 16 Jan | 2100 | 0.8 | 19.8 | 0.74 | 0.05 | 1.08 | 0.08 | 1.46 | 0.67 | 0.12 | 0.91 | 0.97 | 0.10 | 1.31 |
| 24 Jan | 1045 | 0.9 | 21.0 | 0.46 | 0.11 | 0.44 | 0.13 | 0.96 | 0.39 | 0.12 | 0.85 | 0.49 | 0.02 | 1.07 |
| 24 Jan | 2032 | 2.4 | 21.1 | 0.30 | 0.02 | 0.42 | 0.10 | 1.40 | 0.30 | 0.03 | 1.00 | 0.33 | 0.03 | 1.10 |
| 06 Feb | 1055 | 1.7 | 16.8 | 0.22 | 0.03 | 0.35 | 0.25 | 1.59 | <0.10 | 0.00 | 0.45 | 0.31 | 0.21 | 1.41 |
| 06 Feb | 2040 | 1.3 | 16.9 | <0.10 | 0.00 | 0.11 | 0.01 | 1.10 | <0.10 | 0.00 | 1.00 | 0.48 | 0.38 | 4.80 |
| 20 Feb | 1035 | 0.8 | 17.5 | 0.29 | 0.19 | 0.49 | 0.05 | 1.69 | <0.10 | 0.00 | 0.34 | 0.70 | 0.39 | 2.41 |
| 20 Feb | 2035 | 0.9 | 17.5 | 0.73 | 0.27 | 0.62 | 0.16 | 0.85 | 0.62 | 0.13 | 0.85 | 0.66 | 0.23 | 0.90 |
| 06 Mar | 1035 | 0.3 | 21.9 | 0.15 | 0.05 | <0.10 | 0.00 | 0.67 | <0.10 | 0.00 | 0.67 | <0.10 | 0.00 | 0.67 |
| 06 Mar | 2035 | 1.6 | 21.0 | 0.16 | 0.06 | 0.52 | 0.42 | 3.25 | <0.10 | 0.00 | 0.63 | <0.10 | 0.00 | 0.63 |
| 20 Mar | 1035 | 1.4 | 18.3 | 0.25 | 0.15 | 0.35 | 0.03 | 1.40 | 0.20 | 0.10 | 0.80 | 0.24 | 0.07 | 0.96 |
| 20 Mar | 2005 | 1.2 | 18.6 | 0.48 | 0.38 | 0.15 | 0.05 | 0.31 | 1.45 | 0.46 | 3.02 | 0.54 | 0.44 | 1.13 |
| 04 Apr | 1040 | 2.0 | 15.0 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 |
| 04 Apr | 1940 | 2.6 | 15.6 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | 0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 |
| 18 Apr | 1035 | 2.9 | 18.4 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | 0.13 | 0.03 | 1.30 | <0.10 | 0.00 | 1.00 |
| 18 Apr | 2120 | 4.1 | 5.3 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | 0.41 | 0.30 | 4.10 |
| 10 May | 1030 | 7.9 | 15.8 | 2.02 | 0.46 | 0.98 | 0.88 | 0.49 | 4.09 | 2.51 | 2.02 | 12.72 | 11.61 | 6.30 |
| 10 May | 2045 | 8.4 | 15.5 | 4.54 | 0.41 | 3.79 | 0.46 | 0.83 | 3.99 | 1.98 | 0.88 | 3.12 | 1.03 | 0.69 |
| 24 May | 1310 | 8.6 | 16.0 | 0.84 | 0.54 | 1.85 | 0.37 | 2.20 | <0.10 | 0.00 | 0.12† | 1.30 | 0.02 | 1.55† |
| 24 May | 2135 | 9.7 | 16.2 | 1.43 | 1.31 | 0.99 | 0.64 | 0.69 | 1.46 | 0.05 | 1.02 | 1.36 | 0.26 | 0.95 |
| 17 Jun | 1130 | 11.9 | 13.7 | 0.36 | 0.26 | 0.77 | 0.40 | 2.14 | 0.73 | 0.22 | 2.03 | 0.40 | 0.30 | 1.11 |
| 17 Jun | 2115 | 12.2 | 14.3 | 0.63 | 0.13 | 0.17 | 0.07 | 0.27 | 0.72 | 0.18 | 1.14 | 1.76 | 1.25 | 2.79 |
| 28 Jun | 1400 | 16.4 | 16.2 | 0.99 | 0.57 | 1.19 | 0.07 | 1.20 | 1.73 | 0.44 | 1.75† | 2.76 | 0.06 | 2.79† |
| 28 Jun | 2220 | 16.3 | 16.2 | 0.40 | 0.30 | 0.38 | 0.28 | 0.95 | 1.43 | 0.24 | 3.58 | 1.83 | 0.35 | 4.58 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-6 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3° S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 1.05 | 0.15 | 0.72 | 0.12 | 0.69 | 1.07 | 0.01 | 1.02† | 0.84 | 0.25 | 0.80† |
| 13 Jul | 2145 | 18.8 | 16.0 | 0.75 | 0.07 | 0.75 | 0.34 | 1.00 | 0.79 | 0.06 | 1.05 | 0.81 | 0.12 | 1.08 |
| 26 Jul | 1250 | 22.7 | 14.5 | 0.90 | 0.04 | 0.60 | 0.07 | 0.67 | 0.59 | 0.23 | 0.66 | 0.69 | 0.30 | 0.77 |
| 26 Jul | 2146 | 21.9 | 15.5 | 0.51 | 0.16 | 0.52 | 0.02 | 1.02 | 0.48 | 0.06 | 0.94 | 0.18 | 0.10 | 0.35 |
| 09 Aug | 1115 | 22.6 | 14.7 | 1.66 | 0.16 | 0.44 | 0.21 | 0.27 | 0.61 | 0.31 | 0.37† | 0.91 | 0.06 | 0.55† |
| 09 Aug | 2135 | 22.5 | 15.0 | 2.44 | 1.11 | 2.15 | 0.42 | 0.88 | 2.37 | 1.01 | 0.97 | 2.22 | 0.56 | 0.91 |
| 23 Aug | 1155 | 23.6 | 12.5 | 0.88 | 0.03 | 0.88 | 0.20 | 1.00 | 0.54 | 0.44 | 0.61 | 0.88 | 0.11 | 1.00 |
| 23 Aug | 2100 | 24.6 | 12.4 | 0.91 | 0.25 | 0.33 | 0.07 | 0.36 | 0.60 | 0.45 | 0.66 | 0.53 | 0.40 | 0.58 |
| 14 Sep | 1055 | 5.8 | 10.8 | 0.16 | 0.06 | 0.25 | 0.02 | 1.56 | 0.31 | 0.09 | 1.94 | <0.10 | 0.00 | 0.63 |
| 14 Sep | 2031 | 5.3 | 10.8 | <0.10 | 0.00 | 0.14 | 0.04 | 1.40 | 0.93 | 0.48 | 9.30 | <0.10 | 0.00 | 1.00 |
| 26 Sep | 1051 | 13.9 | 0.5 | 0.88 | 0.17 | 0.47** | 0.00 | 0.53 | 1.20 | 0.70 | 1.36 | 0.89 | 0.26 | 1.01 |
| 26 Sep | 2030 | 14.8 | 0.6 | 0.73 | 0.31 | 0.64 | 0.25 | 0.88 | 0.77 | 0.06 | 1.05 | 0.71 | 0.02 | 0.97 |
| 10 Oct | 1030 | 14.2 | 0.4 | 1.27 | 0.14 | 1.34 | 0.33 | 1.06 | 0.30 | 0.08 | 0.24 | 1.10 | 0.03 | 0.87 |
| 10 Oct | 2035 | 14.6 | 0.2 | 1.21 | 0.45 | 0.94 | 0.02 | 0.78 | 0.70 | 0.17 | 0.58 | 0.66 | 0.56 | 0.55 |
| 25 Oct | 1035 | 11.8 | 0.4 | 0.78 | 0.30 | 1.24 | 0.36 | 1.59 | <0.10 | 0.00 | 0.13 | 0.41 | 0.31 | 0.53 |
| 25 Oct | 2028 | 12.0 | 0.4 | 1.18 | 0.33 | 0.63 | 0.32 | 0.53 | 0.57 | 0.06 | 0.48 | 0.52 | 0.40 | 0.44 |
| 07 Nov | 1140 | 11.3 | 1.4 | 0.51 | 0.41 | 1.16 | 0.88 | 2.27 | 1.33 | 1.23 | 2.61 | 1.96 | 0.18 | 3.84 |
| 07 Nov | 2045 | 11.4 | 1.5 | 1.61 | 1.46 | <0.10 | 0.00 | 0.06 | <0.10 | 0.00 | 0.06 | 0.70 | 0.60 | 0.43 |
| 28 Nov | 1000 | 7.3 | 0.1 | 0.72 | 0.57 | 0.47 | 0.37 | 0.65 | 0.80 | 0.01 | 1.11 | 0.42 | 0.32 | 0.58 |
| 28 Nov | 2028 | 6.1 | 0.4 | 0.44 | 0.34 | 0.70 | 0.26 | 1.59 | 0.49 | 0.39 | 1.11 | 1.39 | 0.14 | 3.16 |
| 12 Dec | 1105 | 4.0 | 11.6 | 0.71 | 0.13 | 0.72 | 0.62 | 1.01 | 0.92 | 0.20 | 1.30 | 2.56 | 1.24 | 3.61 |
| 13 Dec | 2109 | 2.2 | 12.4 | 3.95 | 1.59 | 2.36 | 0.84 | 0.60 | 1.40 | 0.67 | 0.35 | 2.59 | 1.07 | 0.66 |
| 29 Dec | 1100 | 1.8 | 15.6 | 0.59 | 0.08 | 1.89 | 0.31 | 3.20 | 0.54 | 0.44 | 0.92 | 2.18 | 0.36 | 3.69 |
| 29 Dec | 2110 | 2.6 | 16.5 | 0.29 | 0.19 | 1.58 | 0.63 | 5.45 | 1.03 | 0.50 | 3.55 | 1.72 | 0.28 | 5.93 |

*Micrograms/liter

**Sample broken during shipment

†Samples taken in actual discharge plume rather than simulated

Table J-7 (Page 1 of 2)

Phaeophytin a Concentration* in Whole Water Collections after 48-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake | | Discharge | | D/I | 3° Simulation | | 3° S/I | 2° Simulation | | 2° S/I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.E. | Mean | S.E. | Ratio | Mean | S.E. | Ratio | Mean | S.E. | Ratio |
| 16 Jan | 1155 | 0.8 | 19.8 | 0.76 | 0.25 | 0.66 | 0.01 | 0.87 | 0.65 | 0.01 | 0.86 | 1.06 | 0.46 | 1.39 |
| 16 Jan | 2100 | 0.8 | 19.8 | 0.96 | 0.29 | 1.14 | 0.08 | 1.19 | 2.82 | 1.26 | 2.94 | 2.34 | 1.54 | 2.44 |
| 24 Jan | 1045 | 0.9 | 21.0 | 0.23 | 0.13 | 0.32 | 0.17 | 1.39 | 0.24 | 0.06 | 1.04 | 0.36 | 0.01 | 1.57 |
| 24 Jan | 2032 | 2.4 | 21.1 | 0.42 | 0.01 | 0.44 | 0.08 | 1.05 | 0.23 | 0.13 | 0.55 | 0.55 | 0.12 | 1.31 |
| 06 Feb | 1055 | 1.7 | 16.8 | 0.50 | 0.12 | 0.64 | 0.30 | 1.28 | 0.53 | 0.21 | 1.06 | 0.39 | 0.26 | 0.78 |
| 06 Feb | 2040 | 1.3 | 16.9 | 0.13 | 0.03 | 0.28 | 0.18 | 2.15 | <0.10 | 0.00 | 0.77 | 0.13 | 0.03 | 1.00 |
| 20 Feb | 1035 | 0.8 | 17.5 | 0.45 | 0.35 | 1.02 | 0.75 | 2.27 | 0.28 | 0.09 | 0.62 | 0.26 | 0.10 | 0.58 |
| 20 Feb | 2035 | 0.9 | 17.5 | 0.36 | 0.11 | 0.57 | 0.12 | 1.58 | 0.53 | 0.02 | 1.47 | 0.63 | 0.07 | 1.75 |
| 06 Mar | 1035 | 0.3 | 21.9 | 0.31 | 0.09 | 0.14 | 0.04 | 0.45 | 0.10 | 0.00 | 0.32 | 0.11 | 0.01 | 0.35 |
| 06 Mar | 2035 | 1.6 | 21.0 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | 0.55 | 0.45 | 5.50 | 0.43 | 0.15 | 4.30 |
| 20 Mar | 1035 | 1.4 | 18.3 | 0.10 | 0.00 | 0.40 | 0.16 | 4.00 | 0.71 | 0.40 | 7.10 | 0.18 | 0.08 | 1.80 |
| 20 Mar | 2005 | 1.2 | 18.6 | 3.21 | 2.71 | 1.21 | 0.18 | 0.38 | 0.87 | 0.21 | 0.27 | 0.33 | 0.05 | 0.10 |
| 04 Apr | 1040 | 2.0 | 15.0 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 |
| 04 Apr | 1940 | 2.6 | 15.6 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 |
| 18 Apr | 1035 | 2.9 | 18.4 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 |
| 18 Apr | 2120 | 4.1 | 5.3 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | 0.16 | 0.05 | 1.60 |
| 10 May | 1030 | 7.9 | 15.8 | 5.13 | 0.91 | 4.79 | 0.02 | 0.93 | 5.76 | 2.64 | 1.12 | 3.57 | 0.40 | 0.70 |
| 10 May | 2045 | 8.4 | 15.5 | 3.66 | 1.08 | 16.20 | 10.63 | 4.43 | 1.26 | 0.48 | 0.34 | 1.56 | 1.46 | 0.43 |
| 24 May | 1310 | 8.6 | 16.0 | 1.27 | 0.20 | 1.66 | 0.22 | 1.31 | 0.39 | 0.29 | 0.31† | 1.35 | 0.46 | 1.06† |
| 24 May | 2135 | 9.7 | 16.2 | 4.25 | 3.00 | 2.87 | 2.34 | 0.68 | 1.69 | 0.57 | 0.40 | 1.82 | 1.72 | 0.43 |
| 17 Jun | 1130 | 11.9 | 13.7 | 0.41 | 0.31 | 0.87 | 0.19 | 2.12 | 0.97 | 0.14 | 2.37 | 0.68 | 0.58 | 1.66 |
| 17 Jun | 2115 | 12.2 | 14.3 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | 0.31 | 0.21 | 3.10 | 0.26 | 0.16 | 2.60 |
| 28 Jun | 1400 | 16.4 | 16.2 | 1.38 | 0.02 | 1.52 | 0.06 | 1.10 | 1.44 | 0.48 | 1.04† | 0.62 | 0.55 | 0.45† |
| 28 Jun | 2220 | 16.3 | 16.2 | 1.67 | 0.39 | 1.11 | 0.12 | 0.66 | 1.58 | 0.12 | 0.95 | 1.66 | 0.27 | 0.99 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

# Table J-7 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 0.31 | 0.21 | 0.65 | 0.07 | 2.10 | 0.59 | 0.49 | 1.90† | 0.62 | 0.26 | 2.00† |
| 13 Jul | 2145 | 18.8 | 16.0 | 0.54 | 0.03 | 0.51 | 0.03 | 0.94 | 0.50 | 0.06 | 0.93 | 1.67 | 0.91 | 3.09 |
| 26 Jul | 1250 | 22.7 | 14.5 | 0.81 | 0.03 | 0.60 | 0.09 | 0.74 | 0.69 | 0.16 | 0.85 | 1.01 | 0.20 | 1.25 |
| 26 Jul | 2145 | 21.9 | 15.5 | 0.33 | 0.12 | 0.42 | 0.32 | 1.27 | 0.50 | 0.12 | 1.52 | 0.51 | 0.01 | 1.55 |
| 09 Aug | 1115 | 22.6 | 14.7 | 1.13 | 0.29 | 1.28 | 0.36 | 1.13 | 0.84 | 0.06 | 0.74† | 1.35 | 0.14 | 1.19† |
| 09 Aug | 2135 | 22.5 | 15.0 | 2.21 | 0.23 | 1.52 | 0.27 | 0.69 | 2.52 | 0.03 | 1.14 | 2.05 | 0.06 | 0.93 |
| 23 Aug | 1155 | 23.6 | 12.5 | 1.04 | 0.16 | 0.81 | 0.21 | 0.78 | 0.53 | 0.22 | 0.51 | 0.97 | 0.23 | 0.93 |
| 23 Aug | 2100 | 24.6 | 12.4 | 1.12 | 0.15 | 1.22 | 0.42 | 1.09 | 0.72 | 0.27 | 0.64 | 0.81 | 0.71 | 0.72 |
| 14 Sep | 1055 | 5.8 | 10.8 | <0.10 | 0.00 | 0.15 | 0.05 | 1.50 | 0.47 | 0.12 | 4.70 | 0.23 | 0.03 | 2.30 |
| 14 Sep | 2031 | 5.3 | 10.8 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | 0.60 | 0.49 | 6.00 | 0.29 | 0.19 | 2.90 |
| 26 Sep | 1051 | 13.9 | 0.5 | 0.85 | 0.20 | 0.43 | 0.33 | 0.51 | 0.80 | 0.19 | 0.94 | 1.03 | 0.29 | 1.21 |
| 26 Sep | 2030 | 14.8 | 0.6 | 1.10 | 0.08 | 0.77 | 0.24 | 0.70 | 1.12 | 0.05 | 1.02 | 0.52 | 0.06 | 0.47 |
| 10 Oct | 1030 | 14.2 | 0.4 | 1.08 | 0.28 | 1.28 | 0.19 | 1.19 | 1.22 | 0.49 | 1.13 | 0.64 | 0.36 | 0.59 |
| 10 Oct | 2035 | 14.6 | 0.2 | 0.76 | 0.12 | 1.00 | 0.46 | 1.32 | 0.52 | 0.41 | 0.68 | 0.36 | 0.15 | 0.47 |
| 25 Oct | 1035 | 11.8 | 0.4 | 0.31 | 0.21 | 0.72 | 0.06 | 2.32 | 0.63 | 0.53 | 2.03 | 0.92 | 0.55 | 2.97 |
| 25 Oct | 2028 | 12.0 | 0.4 | 1.30 | 1.04 | 2.82 | 1.89 | 2.17 | 0.59 | 0.49 | 0.45 | 0.82 | 0.23 | 0.63 |
| 07 Nov | 1140 | 11.3 | 1.4 | 1.40 | 0.09 | 0.59 | 0.49 | 0.42 | 1.87 | 0.26 | 1.34 | 1.87 | 0.88 | 1.34 |
| 07 Nov | 2045 | 11.4 | 1.5 | 0.79 | 0.69 | 1.15 | 0.13 | 1.46 | 1.01 | 0.45 | 1.28 | 4.12 | 0.85 | 5.22 |
| 28 Nov | 1000 | 7.3 | 0.1 | 0.54 | 0.01 | 0.82 | 0.12 | 1.52 | 0.86 | 0.12 | 1.59 | 1.19 | 0.06 | 2.20 |
| 28 Nov | 2028 | 6.1 | 0.4 | 0.90 | 0.11 | 0.50 | 0.40 | 0.56 | 0.77 | 0.21 | 0.86 | 0.72 | 0.16 | 0.80 |
| 12 Dec | 1105 | 4.0 | 11.6 | 0.72 | 0.01 | 1.85 | 0.93 | 2.57 | 0.53 | 0.43 | 0.74 | 1.19 | 0.12 | 1.65 |
| 13 Dec | 2109 | 2.2 | 12.4 | 0.91 | 0.04 | 1.62 | 0.30 | 1.78 | 0.94 | 0.45 | 1.03 | 1.10 | 0.31 | 1.21 |
| 29 Dec | 1100 | 1.8 | 15.6 | 0.66 | 0.37 | 1.25 | 0.02 | 1.89 | 0.89 | 0.36 | 1.35 | 1.44 | 0.17 | 2.18 |
| 29 Dec | 2110 | 2.6 | 16.5 | 0.69 | 0.20 | 1.90 | 0.39 | 2.75 | 0.88 | 0.32 | 1.28 | 1.28 | 0.24 | 1.86 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-8 (Page 1 of 2)

Phaeophytin a Concentration* in Whole Water Collections after 72-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake | | Discharge | | D/I Ratio | 3° Simulation | | 3° S/I Ratio | 2° Simulation | | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.E. | Mean | S.E. | | Mean | S.E. | | Mean | S.E. | |
| 16 Jan | 1155 | 0.8 | 19.8 | 0.65 | 0.27 | 0.93 | 0.05 | 1.43 | 0.86 | 0.08 | 1.32 | 1.00 | 0.16 | 1.54 |
| 16 Jan | 2100 | 0.8 | 19.8 | 0.22 | 0.12 | 0.46 | 0.36 | 2.09 | 1.29 | 0.13 | 5.86 | 0.92 | 0.06 | 4.18 |
| 24 Jan | 1045 | 0.9 | 21.0 | 0.35 | 0.14 | 0.37 | 0.09 | 1.06 | 0.39 | 0.14 | 1.11 | 0.41 | 0.10 | 1.17 |
| 24 Jan | 2032 | 2.4 | 21.1 | 0.15 | 0.05 | 0.29 | 0.08 | 1.93 | 0.21 | 0.11 | 1.40 | 0.69 | 0.11 | 4.60 |
| 06 Feb | 1055 | 1.7 | 16.8 | 0.19 | 0.09 | <0.10 | 0.00 | 0.53 | 0.19 | 0.06 | 1.00 | 0.26 | 0.16 | 1.37 |
| 06 Feb | 2040 | 1.3 | 16.9 | 0.27 | 0.14 | 0.26 | 0.06 | 0.96 | 0.17 | 0.07 | 0.63 | 0.62 | 0.46 | 2.30 |
| 20 Feb | 1035 | 0.8 | 17.5 | 0.52 | 0.18 | 0.56 | 0.17 | 1.08 | 0.74 | 0.16 | 1.42 | 0.61 | 0.32 | 1.17 |
| 20 Feb | 2035 | 0.9 | 17.5 | 0.55 | 0.17 | 0.62 | 0.11 | 1.13 | 0.48 | 0.26 | 0.87 | 0.63 | 0.01 | 1.15 |
| 06 Mar | 1035 | 0.3 | 21.9 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 |
| 06 Mar | 2035 | 1.6 | 21.0 | 0.12 | 0.02 | 0.65 | 0.54 | 5.42 | 0.12 | 0.02 | 1.00 | 0.15 | 0.05 | 1.25 |
| 20 Mar | 1035 | 1.4 | 18.3 | 0.71 | 0.37 | 1.77 | 1.55 | 2.49 | 1.37 | 0.78 | 1.93 | 0.30 | 0.20 | 0.42 |
| 20 Mar | 2005 | 1.2 | 18.6 | 0.32 | 0.00 | 0.17 | 0.07 | 0.53 | 0.54 | 0.04 | 1.69 | 1.04 | 0.94 | 3.25 |
| 04 Apr | 1040 | 2.0 | 15.0 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | 0.35 | 0.25 | 3.50 | 0.24 | 0.14 | 2.40 |
| 04 Apr | 1940 | 2.6 | 15.6 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 | <0.10 | 0.00 | 1.00 |
| 18 Apr | 1035 | 2.9 | 18.4 | 0.19 | 0.09 | 0.15 | 0.05 | 0.79 | <0.10 | 0.00 | 0.53 | <0.10 | 0.00 | 0.53 |
| 18 Apr | 2120 | 4.1 | 5.3 | <0.10 | 0.00 | <0.10 | 0.00 | 1.00 | 0.13 | 0.03 | 1.30 | 0.17 | 0.01 | 1.70 |
| 10 May | 1030 | 7.9 | 15.8 | 3.13 | 3.03 | 5.24 | 5.14 | 1.67 | 2.93 | 2.18 | 0.94 | <0.10 | 0.00 | 0.03 |
| 10 May | 2045 | 8.4 | 15.5 | 4.63 | 1.50 | 1.39 | 0.48 | 0.30 | 2.52 | 0.22 | 0.54 | 2.90 | 0.35 | 0.63 |
| 24 May | 1310 | 8.6 | 16.0 | 1.73 | 0.81 | 0.88 | 0.45 | 0.51 | <0.10 | 0.00 | 0.06† | 1.18 | 0.77 | 0.68† |
| 24 May | 2135 | 9.7 | 16.2 | <0.10 | 0.00 | 0.64 | 0.54 | 6.40 | 1.68 | 1.12 | 16.80 | <0.10 | 0.00 | 1.00 |
| 17 Jun | 1130 | 11.9 | 13.7 | 0.62 | 0.52 | 0.31 | 0.21 | 0.50 | 0.24 | 0.10 | 0.39 | 0.19 | 0.09 | 0.31 |
| 17 Jun | 2115 | 12.2 | 14.3 | 0.18 | 0.05 | 0.65 | 0.06 | 3.61 | 0.30 | 0.11 | 1.67 | 0.30 | 0.20 | 1.67 |
| 28 Jun | 1400 | 16.4 | 16.2 | 1.26 | 0.13 | 0.37 | 0.12 | 0.29 | 0.90 | 0.57 | 0.71† | 1.85 | 0.17 | 1.47† |
| 28 Jun | 2220 | 16.3 | 16.2 | 1.37 | 0.00 | 1.32 | 0.05 | 0.96 | 1.88 | 0.35 | 1.37 | 1.72 | 0.14 | 1.26 |

*Micrograms/liter

†Samples taken in actual discharge plume rather than simulated

Table J-8 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 0.40 | 0.04 | 0.45 | 0.35 | 1.13 | 0.76 | 0.01 | 1.90† | 0.55 | 0.08 | 1.38† |
| 13 Jul | 2145 | 18.8 | 16.0 | 0.59 | 0.23 | 0.67 | 0.22 | 1.14 | 0.59 | 0.13 | 1.00 | 0.51 | 0.13 | 0.86 |
| 26 Jul | 1250 | 22.7 | 14.5 | 0.19 | 0.09 | 0.46 | 0.10 | 2.42 | 0.48 | 0.15 | 2.53 | 0.56 | 0.04 | 2.95 |
| 26 Jul | 2145 | 21.9 | 15.5 | 0.22 | 0.08 | 0.27 | 0.10 | 1.23 | 0.21 | 0.11 | 0.95 | 0.32 | 0.18 | 1.45 |
| 09 Aug | 1115 | 22.6 | 14.7 | 2.36 | 0.03 | 1.04 | 0.08 | 0.44 | 1.48 | 0.17 | 0.63† | 1.19 | 0.27 | 0.50† |
| 09 Aug | 2135 | 22.5 | 15.0 | 3.90 | 1.76 | 1.45 | 0.06 | 0.37 | 1.31 | 0.23 | 0.34 | 1.66 | 0.28 | 0.43 |
| 23 Aug | 1155 | 23.6 | 12.5 | 0.54 | 0.13 | 0.44 | 0.14 | 0.81 | 0.75 | 0.11 | 1.39 | 0.28 | 0.18 | 0.52 |
| 23 Aug | 2100 | 24.6 | 12.4 | 0.73 | 0.30 | 1.11 | 0.08 | 1.52 | 0.35 | 0.25 | 0.48 | 1.05 | 0.50 | 1.44 |
| 14 Sep | 1055 | 5.8 | 10.8 | 0.20 | 0.10 | <0.10 | 0.00 | 0.50 | 1.27 | 0.36 | 6.35 | <0.10 | 0.00 | 0.50 |
| 14 Sep | 2031 | 5.3 | 10.8 | 0.35 | 0.25 | <0.10 | 0.00 | 0.29 | 1.32 | 1.21 | 3.77 | 0.13 | 0.01 | 0.37 |
| 26 Sep | 1051 | 13.9 | 0.5 | 1.07 | 0.46 | 1.00 | 0.09 | 0.93 | 1.81 | 0.33 | 1.69 | 1.22 | 0.36 | 1.14 |
| 26 Sep | 2030 | 14.8 | 0.6 | 0.38 | 0.28 | 0.74 | 0.07 | 1.95 | <0.10 | 0.00 | 0.26 | 0.29 | 0.19 | 0.76 |
| 10 Oct | 1030 | 14.2 | 0.4 | 0.31 | 0.15 | 0.60 | 0.20 | 1.94 | 0.73 | 0.03 | 2.35 | 0.83 | 0.10 | 2.68 |
| 10 Oct | 2035 | 14.6 | 0.2 | 0.79 | 0.20 | 0.99 | 0.57 | 1.25 | 2.11 | 1.00 | 2.67 | 0.78 | 0.26 | 0.99 |
| 25 Oct | 1035 | 11.8 | 0.4 | 1.93 | 0.20 | 0.72 | 0.62 | 0.37 | 0.50 | 0.40 | 0.26 | 0.85 | 0.37 | 0.44 |
| 25 Oct | 2028 | 12.0 | 0.4 | 0.88 | 0.38 | 0.29 | 0.19 | 0.33 | 0.68 | 0.58 | 0.77 | 0.32 | 0.22 | 0.36 |
| 07 Nov | 1140 | 11.3 | 1.4 | 0.33 | 0.23 | 0.45 | 0.35 | 1.36 | 0.63 | 0.18 | 1.91 | 0.53 | 0.15 | 1.61 |
| 07 Nov | 2045 | 11.4 | 1.5 | 0.82 | 0.72 | 0.41 | 0.31 | 0.50 | 1.00 | 0.90 | 1.22 | <0.10 | 0.00 | 0.13 |
| 28 Nov | 1000 | 7.3 | 0.1 | 0.86 | 0.51 | 0.96 | 0.16 | 1.12 | 0.52 | 0.41 | 0.60 | 0.68 | 0.39 | 0.79 |
| 28 Nov | 2028 | 6.1 | 0.4 | 1.54 | 0.70 | 0.81 | 0.05 | 0.53 | 2.09 | 0.34 | 1.36 | 0.36 | 0.26 | 0.23 |
| 12 Dec | 1105 | 4.0 | 11.6 | 1.07 | 0.52 | 1.45 | 0.46 | 1.36 | 0.42 | 0.32 | 0.39 | 0.54 | 0.44 | 0.50 |
| 13 Dec | 2109 | 2.2 | 12.4 | 2.56 | 0.01 | 2.47 | 0.10 | 0.96 | 2.07 | 0.08 | 0.81 | 2.05 | 0.03 | 0.80 |
| 29 Dec | 1100 | 1.8 | 15.6 | 0.55 | 0.11 | 0.69 | 0.32 | 1.25 | 1.30 | 0.23 | 2.36 | 0.42 | 0.32 | 0.76 |
| 29 Dec | 2110 | 2.6 | 16.5 | 0.82 | 0.05 | 1.41 | 0.39 | 1.72 | 1.19 | 0.20 | 1.45 | 1.20 | 0.13 | 1.46 |

*Micrograms/liter
†Samples taken in actual discharge plume rather than simulated

Table J-9 (Page 1 of 2)

Primary Production* ($C^{14}$) in Whole Water Collections after 7-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 Jan | 1155 | 0.8 | 19.8 | 9.04 | 5.12 | 6.56 | 0.88 | 0.73 | 6.35 | 1.74 | 0.70 | 6.46 | 2.05 | 0.71 |
| 16 Jan | 2100 | 0.8 | 19.8 | 5.29 | 3.07 | 4.72 | 0.52 | 0.89 | 3.78 | 1.26 | 0.71 | 3.29 | 0.30 | 0.62 |
| 24 Jan | 1045 | 0.9 | 21.0 | 2.03 | 1.26 | 3.14 | 1.20 | 1.55 | 2.92 | 0.32 | 1.44 | 4.22 | 0.91 | 2.08 |
| 24 Jan | 2032 | 2.4 | 21.1 | 2.58 | 0.48 | 3.77 | 0.63 | 1.46 | 3.12 | 0.54 | 1.21 | 3.18 | 0.92 | 1.23 |
| 06 Feb | 1055 | 1.7 | 16.8 | 3.93 | 0.23 | 5.21 | 1.27 | 1.33 | 2.58 | 1.66 | 0.66 | 2.73 | 0.00 | 0.69 |
| 06 Feb | 2040 | 1.3 | 16.9 | 4.07 | 0.94 | 1.29 | 1.24 | 0.32 | 2.46 | 0.93 | 0.60 | 1.85 | 1.61 | 0.45 |
| 20 Feb | 1035 | 0.8 | 17.5 | 1.68 | 0.30 | 4.58 | 1.04 | 2.73 | 5.40 | 1.06 | 3.21 | 9.49 | 0.11 | 5.65 |
| 20 Feb | 2035 | 0.9 | 17.5 | 4.23 | 1.85 | 3.97 | 3.29 | 0.94 | 3.26 | 0.53 | 0.77 | 0.45 | 0.00 | 0.11 |
| 06 Mar | 1035 | 0.3 | 21.9 | 4.52 | 0.28 | 4.06 | 1.27 | 0.90 | 5.87 | 0.12 | 1.30 | 3.50 | 0.79 | 0.77 |
| 06 Mar | 2035 | 1.6 | 21.0 | 0.00** | 0.00 | 0.23 | 0.00 | 0.00 | 0.00 | 0.00** | 0.00 | 0.01 | 0.00 | 0.00 |
| 20 Mar | 1035 | 1.4 | 18.3 | 17.28 | 1.79 | 22.91 | 1.26 | 1.33 | 14.20 | 3.37 | 0.82 | 10.95 | 5.46 | 0.63 |
| 20 Mar | 2005 | 1.2 | 18.6 | 18.08 | 4.69 | 15.40 | 3.92 | 0.85 | 25.01 | 8.93 | 1.38 | 33.96 | 4.33 | 1.88 |
| 04 Apr | 1040 | 2.0 | 15.0 | 44.78 | 10.73 | 32.92 | 2.63 | 0.74 | 50.70 | 10.89 | 1.13 | 44.64 | 4.22 | 1.00 |
| 04 Apr | 1940 | 2.6 | 15.6 | 19.97 | 5.19 | 18.90 | 1.74 | 0.95 | 27.92 | 0.30 | 1.40 | 36.66 | 3.81 | 1.84 |
| 18 Apr | 1035 | 2.9 | 18.4 | 11.38 | 0.99 | 6.31 | 0.35 | 0.55 | 9.16 | 2.96 | 0.80 | 9.62 | 0.11 | 0.85 |
| 18 Apr | 2120 | 4.1 | 5.3 | 5.34 | 0.56 | 6.04 | 0.87 | 1.13 | 11.00 | 1.27 | 2.06 | 14.13 | 1.42 | 2.65 |
| 10 May | 1030 | 7.9 | 15.8 | 45.61 | 6.92 | 63.23 | 9.84 | 1.39 | 65.19 | 2.39 | 1.43 | 70.99 | 29.54 | 1.56 |
| 10 May | 2045 | 8.4 | 15.5 | 54.12 | 10.00 | 69.38 | 25.40 | 1.28 | 68.97 | 7.26 | 1.27 | 63.89 | 23.17 | 1.18 |
| 24 May | 1310 | 8.6 | 16.0 | 42.65 | 1.52 | 24.50 | 1.94 | 0.57 | 37.11 | 9.11 | 0.87† | 48.30 | 13.08 | 1.13† |
| 24 May | 2135 | 9.7 | 16.2 | 48.93 | 6.64 | 16.99 | 2.30 | 0.35 | 49.02 | 13.19 | 1.00 | 45.25 | 0.17 | 0.92 |
| 17 Jun | 1130 | 11.9 | 13.7 | 21.26 | 1.98 | 20.61 | 7.68 | 0.97 | 31.84 | 0.35 | 1.50 | 29.00 | 5.44 | 1.36 |
| 17 Jun | 2115 | 12.2 | 14.3 | 33.16 | 0.10 | 26.40 | 7.70 | 0.80 | 31.96 | 7.09 | 0.96 | 25.86 | 1.69 | 0.78 |
| 28 Jun | 1400 | 16.4 | 16.2 | 25.24 | 17.35 | 13.27 | 2.75 | 0.53 | 34.17 | 0.73 | 1.35† | 18.33 | 0.26 | 0.73† |
| 28 Jun | 2220 | 16.3 | 16.2 | 36.22 | 17.51 | 12.53 | 2.31 | 0.35 | 30.47 | 0.64 | 0.84 | 23.15 | 1.99 | 0.64 |

*mg $C/m^3$/incubation period
**dark bottle greater than light bottle
†Samples taken in actual discharge plume rather than simulated.

Table J-9 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°L/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° L/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 21.39 | 5.45 | 13.36 | 0.58 | 0.62 | 25.86 | 3.01 | 1.21† | 19.59 | 1.62 | 0.92† |
| 13 Jul | 2145 | 18.8 | 16.0 | 23.95 | 6.30 | 11.98 | 2.22 | 0.26 | 23.28 | 2.74 | 0.97 | 13.75 | 0.82 | 0.57 |
| 26 Jul | 1250 | 22.7 | 14.5 | 12.52 | 4.19 | 11.17 | 3.19 | 0.89 | 14.35 | 5.86 | 1.15 | 11.63 | 0.01 | 0.93 |
| 26 Jul | 2145 | 21.9 | 15.5 | 8.40 | 1.47 | 7.15 | 1.83 | 0.85 | 10.04 | 1.52 | 1.20 | 10.78 | 4.24 | 1.28 |
| 09 Aug | 1151 | 22.6 | 14.7 | 110.31 | 53.98 | 44.94 | 22.29 | 0.41 | 16.72 | 1.59 | 0.15† | 21.44 | 3.81 | 0.19† |
| 09 Aug | 2135 | 22.5 | 15.0 | 39.91 | 13.98 | 26.13 | 0.54 | 0.65 | 25.70 | 1.63 | 0.64 | 37.13 | 7.10 | 0.93 |
| 23 Aug | 1155 | 23.6 | 12.5 | 45.02 | 15.08 | 23.90 | 0.23 | 0.53 | 25.05 | 10.05 | 0.56 | 27.66 | 1.61 | 0.61 |
| 23 Aug | 2100 | 24.6 | 12.4 | 9.53 | 0.60 | 7.97 | 2.67 | 0.84 | 6.13 | 0.51 | 0.64 | 9.47 | 1.95 | 0.99 |
| 14 Sep | 1055 | 5.8 | 10.8 | 2.84 | 0.99 | 3.21 | 0.55 | 1.13 | 1.50 | 0.22 | 0.53 | 1.83 | 0.83 | 0.64 |
| 14 Sep | 2031 | 5.3 | 10.8 | 1.74 | 0.02 | 1.51 | 0.27 | 0.87 | 1.61 | 0.61 | 0.93 | 0.57 | 0.00 | 0.33 |
| 26 Sep | 1051 | 13.9 | 0.5 | 48.38 | 4.16 | 45.69 | 7.09 | 0.94 | 38.76 | 5.99 | 0.80 | 48.50 | 12.70 | 1.00 |
| 26 Sep | 2030 | 14.8 | 0.6 | 18.09 | 3.50 | 13.17 | 2.44 | 0.73 | 7.02 | 1.32 | 0.39 | 10.48 | 0.67 | 0.58 |
| 10 Oct | 1030 | 14.2 | 0.4 | 17.83 | 0.37 | 18.17 | 5.74 | 1.02 | 20.19 | 6.92 | 1.13 | 19.82 | 1.33 | 1.11 |
| 10 Oct | 2035 | 14.6 | 0.2 | 16.51 | 1.26 | 16.59 | 1.55 | 1.00 | 23.18 | 7.91 | 1.40 | 17.87 | 6.59 | 1.08 |
| 25 Oct | 1035 | 11.8 | 0.4 | 26.55 | 0.09 | 25.32 | 0.09 | 0.95 | 35.63 | 2.50 | 1.34 | 33.00 | 1.90 | 1.24 |
| 25 Oct | 2028 | 12.0 | 0.4 | 9.32 | 8.63 | 11.40 | 0.60 | 1.22 | 9.04 | 0.86 | 0.97 | 10.75 | 0.95 | 1.16 |
| 07 Nov | 1140 | 11.3 | 1.4 | 45.94 | 9.85 | 35.75 | 4.88 | 0.78 | 31.58 | 4.17 | 0.69 | 39.40 | 9.22 | 0.86 |
| 07 Nov | 2045 | 11.4 | 1.5 | 19.97 | 0.40 | 25.54 | 1.97 | 1.28 | 32.25 | 15.48 | 1.61 | 26.99 | 12.21 | 1.35 |
| 28 Nov | 1000 | 7.3 | 0.1 | 14.97 | 2.12 | 13.12 | 3.29 | 0.88 | 12.08 | 1.05 | 0.81 | 9.16 | 1.03 | 0.61 |
| 28 Nov | 2028 | 6.1 | 0.4 | 10.16 | 1.47 | 15.43 | 2.90 | 1.52 | 10.10 | 0.07 | 0.99 | 8.18 | 0.24 | 0.81 |
| 12 Dec | 1105 | 4.0 | 11.6 | 10.54 | 0.53 | 7.08 | 0.26 | 0.67 | 10.11 | 1.50 | 0.96 | 12.67 | 2.68 | 1.20 |
| 13 Dec | 2109 | 2.2 | 12.4 | 4.24 | 0.25 | 2.71 | 0.64 | 0.64 | 6.08 | 2.67 | 1.43 | 6.47 | 0.04 | 1.53 |
| 29 Dec | 1100 | 1.8 | 15.6 | 9.61 | 1.21 | 12.40 | 2.90 | 1.29 | 4.46 | 0.62 | 0.46 | 6.41 | 0.25 | 0.67 |
| 29 Dec | 2110 | 2.6 | 16.5 | 17.75 | 5.31 | 16.17 | 1.27 | 0.91 | 10.86 | 3.48 | 0.61 | 11.52 | 5.58 | 0.65 |

*mg C/m³/incubation period

†Samples taken in actual discharge plume rather than simulated.

Table J-10 (Page 1 of 2)

Primary Production* ($C^{14}$) in Whole Water Collections after 24-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake | | Discharge | | D/I | 3° Simulation | | 3°S/I | 2° Simulation | | 2° S/I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mean | S.E. | Mean | S.E. | Ratio | Mean | S.E. | Ratio | Mean | S.E. | Ratio |
| 16 Jan | 1155 | 0.8 | 19.8 | 10.04 | 5.89 | 10.04 | 1.65 | 1.00 | 12.64 | 0.94 | 1.26 | 14.04 | 0.99 | 1.40 |
| 16 Jan | 2100 | 0.8 | 19.8 | 9.65 | 0.83 | 12.54 | 1.48 | 1.30 | 7.88 | 1.67 | 0.82 | 10.31 | 0.91 | 1.07 |
| 24 Jan | 1045 | 0.9 | 21.0 | 9.80 | 2.22 | 9.81 | 1.18 | 1.00 | 8.02 | 0.06 | 0.82 | 12.69 | 0.22 | 1.29 |
| 24 Jan | 2032 | 2.4 | 21.1 | 3.77 | 0.22 | 9.68 | 0.31 | 2.57 | 8.11 | 0.02 | 2.15 | 7.39 | 2.14 | 1.96 |
| 06 Feb | 1055 | 1.7 | 16.8 | 10.67 | 2.01 | 12.75 | 0.77 | 1.19 | 8.75 | 2.14 | 0.82 | 13.30 | 3.32 | 1.25 |
| 06 Feb | 2040 | 1.3 | 16.9 | 15.04 | 1.13 | 8.20 | 2.08 | 0.55 | 9.87 | 1.35 | 0.66 | 12.30 | 1.91 | 0.82 |
| 20 Feb | 1035 | 0.8 | 17.5 | 4.78 | 1.38 | 5.04 | 3.93 | 1.05 | 3.33 | 0.94 | 0.70 | 9.63 | 6.82 | 2.01 |
| 20 Feb | 2035 | 0.9 | 17.5 | 15.94 | 2.68 | 11.73 | 2.17 | 0.74 | 11.15 | 5.20 | 0.70 | 1.42 | 0.69 | 0.09 |
| 06 Mar | 1035 | 0.3 | 21.9 | 15.20 | 2.70 | 14.83 | 5.33 | 0.98 | 17.95 | 3.37 | 1.18 | 17.80 | 3.82 | 1.17 |
| 06 Mar | 2035 | 1.6 | 21.0 | 10.45 | 1.67 | 16.49 | 6.44 | 1.58 | 15.43 | 2.70 | 1.48 | 22.09 | 6.21 | 2.11 |
| 20 Mar | 1035 | 1.4 | 18.3 | 38.46 | 2.41 | 50.49 | 11.26 | 1.31 | 44.48 | 27.78 | 1.16 | 42.59 | 31.13 | 1.11 |
| 20 Mar | 2005 | 1.2 | 18.6 | 55.38 | 6.61 | 63.02 | 4.76 | 1.14 | 82.63 | 2.45 | 1.49 | 75.09 | 25.56 | 1.36 |
| 04 Apr | 1040 | 2.0 | 15.0 | 84.51 | 3.58 | 130.53 | 22.76 | 1.54 | 102.10 | 44.06 | 1.21 | 94.29 | 9.16 | 1.12 |
| 04 Apr | 1940 | 2.6 | 15.6 | 26.33 | 26.03 | 58.30 | 11.29 | 2.21 | 77.93 | 2.14 | 2.96 | 89.92 | 27.78 | 3.42 |
| 18 Apr | 1035 | 2.9 | 18.4 | 30.84 | 0.00 | 25.71 | 0.83 | 0.85 | 36.18 | 13.57 | 1.17 | 37.48 | 3.62 | 1.22 |
| 18 Apr | 2120 | 4.1 | 5.3 | 25.40 | 6.71 | 8.32 | 0.86 | 0.33 | 35.05 | 4.41 | 1.38 | 17.96 | 1.72 | 0.71 |
| 10 May | 1030 | 7.9 | 15.8 | 190.93 | 58.51 | 217.55 | 45.88 | 1.14 | 209.88 | 29.54 | 1.10 | 247.17 | 96.46 | 1.29 |
| 10 May | 2045 | 8.4 | 15.5 | 217.45 | 1.15 | 256.24 | 55.34 | 1.18 | 235.80 | 78.69 | 1.08 | 210.38 | 47.80 | 0.97 |
| 24 May | 1310 | 8.6 | 16.0 | 150.05 | 27.02 | 128.49 | 22.73 | 0.86 | 190.75 | 3.69 | 1.27† | 143.05 | 7.97 | 0.95† |
| 24 May | 2135 | 9.7 | 16.2 | 107.34 | 12.06 | 50.62 | 1.47 | 0.47 | 112.87 | 28.42 | 1.05 | 65.79 | 13.30 | 0.61 |
| 17 Jun | 1130 | 11.9 | 13.7 | 78.03 | 5.26 | 59.24 | 22.94 | 0.76 | 100.95 | 2.68 | 1.29 | 103.34 | 18.10 | 1.32 |
| 17 Jun | 2115 | 12.2 | 14.3 | 86.66 | 1.48 | 69.04 | 20.24 | 0.80 | 85.60 | 27.44 | 0.99 | 72.58 | 3.32 | 0.84 |
| 28 Jun | 1400 | 16.4 | 16.2 | 71.47 | 43.62 | 15.60 | 12.56 | 0.22 | 75.26 | 22.79 | 1.05† | 90.41 | 12.63 | 1.27† |
| 28 Jun | 2220 | 16.3 | 16.2 | 97.42 | 38.94 | 35.07 | 0.00 | 0.36 | 66.80 | 11.37 | 0.69 | 77.94 | 9.79 | 0.80 |

*mg $C/m^3$/incubation period

†Samples taken in actual discharge plume rather than simulated

## Table J-10 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°L/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° L/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 16.3 | 99.58 | 13.37 | 32.64 | 2.16 | 0.33 | 71.98 | 14.02 | 0.72† | 72.66 | 20.91 | 0.73† |
| 13 Jul | 2145 | 18.8 | 16.0 | 108.75 | 14.59 | 49.00 | 1.22 | 0.45 | 65.26 | 20.94 | 0.60 | 52.58 | 6.84 | 0.48 |
| 26 Jul | 1250 | 22.7 | 14.5 | 59.64 | 5.32 | 41.91 | 14.04 | 0.70 | 40.13 | 9.95 | 0.67 | 49.39 | 2.72 | 0.83 |
| 26 Jul | 2145 | 21.9 | 15.5 | 46.51 | 19.15 | 23.79 | 6.34 | 0.51 | 50.54 | 1.25 | 1.09 | 58.71 | 22.07 | 1.26 |
| 09 Aug | 1151 | 22.6 | 14.7 | 142.35 | 12.58 | 135.98 | 8.87 | 0.96 | 57.81 | 5.33 | 0.41† | 73.52 | 3.50 | 0.52† |
| 09 Aug | 2135 | 22.5 | 15.0 | 96.46 | 40.60 | 63.18 | 0.05 | 0.65 | 65.68 | 3.56 | 0.68 | 96.85 | 13.68 | 1.00 |
| 23 Aug | 1155 | 23.6 | 12.5 | 87.47 | 40.99 | 59.60 | 6.63 | 0.68 | 82.95 | 24.51 | 0.95 | 78.35 | 9.45 | 0.90 |
| 23 Aug | 2100 | 24.6 | 12.4 | 20.54 | 1.77 | 38.00 | 11.48 | 1.85 | 27.37 | 3.87 | 1.33 | 35.05 | 4.42 | 1.71 |
| 14 Sep | 1055 | 5.8 | 10.8 | 10.14 | 1.88 | 10.94 | 2.57 | 1.08 | 10.24 | 1.58 | 1.01 | 10.34 | 3.04 | 1.02 |
| 14 Sep | 2031 | 5.3 | 10.8 | 4.61 | 0.61 | 6.35 | 0.05 | 1.38 | 7.10 | 1.57 | 1.54 | 5.19 | 1.24 | 1.13 |
| 26 Sep | 1051 | 13.9 | 0.5 | 112.86 | 46.19 | 88.59 | 5.75 | 0.78 | 69.11 | 8.45 | 0.61 | 99.50 | 20.32 | 0.88 |
| 26 Sep | 2030 | 14.8 | 0.6 | 43.52 | 8.01 | 33.09 | 1.26 | 0.76 | 15.68 | 7.42 | 0.36 | 30.44 | 0.24 | 0.70 |
| 10 Oct | 1030 | 14.2 | 0.4 | 45.67 | 5.00 | 42.93 | 10.87 | 0.94 | 56.69 | 11.92 | 1.24 | 39.76 | 9.50 | 0.87 |
| 10 Oct | 2035 | 14.6 | 0.2 | 39.63 | 5.15 | 34.28 | 5.37 | 0.87 | 34.28 | 5.19 | 0.87 | 45.79 | 12.22 | 1.16 |
| 25 Oct | 1035 | 11.8 | 0.4 | 67.77 | 25.09 | 59.66 | 6.63 | 0.88 | 50.59 | 2.41 | 0.75 | 48.38 | 11.32 | 0.71 |
| 25 Oct | 2028 | 12.0 | 0.4 | 16.65 | 5.25 | 23.35 | 4.35 | 1.40 | 42.23 | 34.74 | 2.54 | 15.62 | 0.86 | 0.94 |
| 07 Nov | 1140 | 11.3 | 1.4 | 104.09 | 5.82 | 110.59 | 24.83 | 1.06 | 71.36 | 9.77 | 0.69 | 117.72 | 44.57 | 1.13 |
| 07 Nov | 2045 | 11.4 | 1.5 | 58.37 | 12.48 | 91.94 | 44.21 | 1.58 | 67.68 | 23.93 | 1.16 | 71.87 | 8.20 | 1.23 |
| 28 Nov | 1000 | 7.3 | 0.1 | 42.60 | 2.93 | 36.55 | 10.70 | 0.86 | 36.26 | 12.57 | 0.85 | 35.32 | 0.37 | 0.83 |
| 28 Nov | 2028 | 6.1 | 0.4 | 15.82 | 0.26 | 16.11 | 0.62 | 1.02 | 23.25 | 11.76 | 1.47 | 20.51 | 2.07 | 1.30 |
| 12 Dec | 1105 | 4.0 | 11.6 | 49.73 | 2.22 | 38.51 | 15.45 | 0.77 | 49.29 | 7.95 | 0.99 | 68.54 | 8.86 | 1.38 |
| 13 Dec | 2109 | 2.2 | 12.4 | 16.55 | 2.37 | 25.01 | 6.46 | 1.51 | 29.57 | 11.05 | 1.79 | 18.83 | 7.04 | 1.14 |
| 29 Dec | 1100 | 1.8 | 15.6 | 62.63 | 0.10 | 43.22 | 3.51 | 0.69 | 24.80 | 3.99 | 0.40 | 29.37 | 2.41 | 0.47 |
| 29 Dec | 2110 | 2.6 | 16.5 | 74.46 | 4.55 | 49.19 | 5.42 | 0.66 | 55.16 | 13.43 | 0.74 | 55.18 | 20.19 | 0.74 |

*mg C/m³/incubation period

†Samples taken in actual discharge plume rather than simulated

Table J-11 (Page 1 of 2)

Primary Production# ($C^{14}$) in Whole Water Collections after 48-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 Jan | 1155 | 0.8 | 19.8 | 32.93 | 7.61 | 25.02 | 8.90 | 0.76 | 25.13 | 5.72 | 0.76 | 17.33 | 5.42 | 0.53 |
| 16 Jan | 2100 | 0.8 | 19.8 | 14.44 | 2.28 | 23.49 | 3.23 | 1.63 | 22.38 | 2.64 | 1.55 | 15.96 | 0.22 | 1.11 |
| 24 Jan | 1045 | 0.9 | 21.0 | 24.42 | 6.33 | 24.81 | 7.46 | 1.02 | 19.72 | 7.20 | 0.91 | 29.69 | 8.65 | 1.22 |
| 24 Jan | 2032 | 2.4 | 21.1 | 13.40 | 3.11 | 20.28 | 1.46 | 1.51 | 16.76 | 2.85 | 1.25 | 16.82 | 1.15 | 1.26 |
| 06 Feb | 1055 | 1.7 | 16.8 | 35.70 | 4.19 | 21.37 | 6.27 | 0.60 | 25.77 | 2.49 | 0.72 | 36.30 | 10.23 | 1.02 |
| 06 Feb | 2040 | 1.3 | 16.9 | 22.22 | 2.21 | 17.68 | 0.01 | 0.80 | 27.11 | 0.39 | 1.22 | 19.81 | 0.89 | 0.89 |
| 20 Feb | 1035 | 0.8 | 17.5 | 23.88 | 12.30 | 24.66 | 9.34 | 1.03 | 18.87 | 11.23 | 0.79 | 23.35 | 2.80 | 0.98 |
| 20 Feb | 2035 | 0.9 | 17.5 | 24.91 | 6.77 | 14.52 | 5.09 | 0.58 | 21.97 | 6.60 | 0.88 | 3.35 | 0.19 | 0.13 |
| 06 Mar | 1035 | 0.3 | 21.9 | 22.24 | 0.56 | 20.72 | 6.82 | 0.93 | 30.70 | 7.10 | 1.38 | 48.54 | 24.85 | 2.18 |
| 06 Mar | 2035 | 1.6 | 21.0 | 27.21 | 3.17 | 13.95 | 0.26 | 0.51 | 31.89 | 10.96 | 1.17 | 32.02 | 6.78 | 1.18 |
| 20 Mar | 1035 | 1.4 | 18.3 | 83.46 | 36.22 | 86.34 | 3.48 | 1.03 | 76.24 | 27.66 | 0.91 | 76.34 | 50.20 | 0.91 |
| 20 Mar | 2005 | 1.2 | 18.6 | 83.35 | 47.94 | 82.91 | 2.19 | 0.99 | 87.14 | 4.40 | 1.05 | 86.28 | 12.90 | 1.04 |
| 04 Apr | 1040 | 2.0 | 15.0 | 83.07 | 8.43 | 113.90 | 14.31 | 1.37 | 135.84 | 36.95 | 1.64 | 140.61 | 24.06 | 1.69 |
| 04 Apr | 1940 | 2.6 | 15.6 | 157.13 | 58.97 | 145.59 | 52.89 | 0.93 | 239.96 | 85.58 | 1.53 | 126.12 | 17.12 | 0.80 |
| 18 Apr | 1035 | 2.9 | 18.4 | 57.18 | 1.62 | 26.40 | 0.53 | 0.46 | 53.81 | 20.14 | 0.94 | 50.75 | 6.58 | 0.89 |
| 18 Apr | 2120 | 4.1 | 5.3 | 48.69 | 11.30 | 18.82 | 0.86 | 0.39 | 61.09 | 20.53 | 1.25 | 37.42 | 3.38 | 0.77 |
| 10 May | 1030 | 7.9 | 15.8 | 445.35 | 25.97 | 179.41 | 18.08 | 0.40 | 286.80 | 56.40 | 0.64 | 286.18 | 83.42 | 0.64 |
| 10 May | 2045 | 8.4 | 15.5 | 165.57 | 4.21 | 208.55* | 0.00 | 1.26 | 169.84 | 33.58 | 1.03 | 190.25 | 10.70 | 1.15 |
| 24 May | 1310 | 8.6 | 16.0 | 213.40 | 5.49 | 181.22 | 38.32 | 0.85 | 400.43 | 15.73 | 1.88† | 331.72 | 52.23 | 1.55† |
| 24 May | 2135 | 9.7 | 16.2 | 115.11 | 60.48 | 79.68 | 14.25 | 0.69 | 137.35 | 44.28 | 1.19 | 139.93 | 15.72 | 1.22 |
| 17 Jun | 1130 | 11.9 | 13.7 | 170.24 | 16.19 | 113.24 | 42.98 | 0.67 | 163.67 | 47.02 | 0.96 | 165.25 | 43.37 | 0.97 |
| 17 Jun | 2115 | 12.2 | 14.3 | 169.26 | 3.02 | 119.97 | 37.95 | 0.71 | 143.07 | 56.63 | 0.85 | 125.82 | 0.12 | 0.74 |
| 28 Jun | 1400 | 16.4 | 16.2 | 72.39 | 58.62 | 35.49 | 14.33 | 0.49 | 171.92 | 25.67 | 2.37† | 98.34 | 20.72 | 1.36† |
| 28 Jun | 2220 | 16.3 | 16.2 | 189.23 | 71.17 | 87.54 | 30.27 | 0.46 | 133.06 | 23.58 | 0.70 | 157.72 | 11.02 | 0.83 |

#mg $C/m^3$/incubation period

*rep 2 not used, dark bottle greater than light

†Samples taken in actual discharge plume rather than simulated

Table J-11 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°L/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° L/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1035 | 19.6 | 13.3 | 158.44 | 45.28 | 52.13 | 4.14 | 0.33 | 137.34 | 19.59 | 0.87† | 113.73 | 8.83 | 0.72† |
| 13 Jul | 2145 | 18.8 | 16.0 | 287.75 | 136.33 | 58.93 | 18.16 | 0.20 | 208.18 | 39.51 | 0.72 | 147.56 | 32.20 | 0.51 |
| 26 Jul | 1250 | 22.7 | 14.5 | 152.60 | 95.69 | 128.49 | 20.75 | 0.84 | 208.11 | 135.15 | 1.36 | 116.34 | 49.26 | 0.76 |
| 26 Jul | 2145 | 21.9 | 15.5 | 87.52 | 27.57 | 63.74 | 30.48 | 0.73 | 131.47 | 1.21 | 1.50 | 141.13 | 100.35 | 1.61 |
| 09 Aug | 1151 | 22.6 | 14.7 | 386.31 | 190.40 | 232.91 | 113.15 | 0.60 | 93.05 | 7.50 | 0.24† | 110.87 | 7.06 | 0.29† |
| 09 Aug | 2135 | 22.5 | 15.0 | 108.18 | 8.65 | 229.18 | 59.74 | 2.12 | 219.07 | 3.95 | 2.03 | 147.13 | 14.65 | 1.36 |
| 23 Aug | 1151 | 23.6 | 12.5 | 241.50 | 99.69 | 123.07 | 20.25 | 0.51 | 167.80 | 75.63 | 0.69 | 185.14 | 20.51 | 0.77 |
| 23 Aug | 2100 | 24.6 | 12.6 | 30.36 | 0.13 | 33.39 | 13.01 | 1.10 | 32.07 | 7.99 | 1.06 | 29.07 | 5.91 | 0.96 |
| 14 Sep | 1055 | 5.8 | 10.8 | 27.52 | 3.35 | 22.50 | 9.06 | 0.82 | 21.38 | 0.53 | 0.78 | 17.38 | 2.93 | 0.63 |
| 14 Sep | 2031 | 5.3 | 10.8 | 14.11 | 4.67 | 18.17 | 4.62 | 1.29 | 11.12 | 3.16 | 0.79 | 14.43 | 0.40 | 1.02 |
| 26 Sep | 1051 | 13.9 | 0.5 | 185.74 | 70.69 | 161.59 | 12.26 | 0.87 | 151.28 | 57.67 | 0.81 | 133.48 | 21.62 | 0.72 |
| 26 Sep | 2030 | 14.8 | 0.6 | 115.93 | 59.51 | 109.54 | 6.19 | 0.94 | 60.39 | 8.48 | 0.52 | 81.55 | 12.59 | 0.70 |
| 10 Oct | 1030 | 14.2 | 0.4 | 99.55 | 1.09 | 92.28 | 24.68 | 0.93 | 99.98 | 20.55 | 1.00 | 103.86 | 47.41 | 1.04 |
| 10 Oct | 2035 | 14.6 | 0.2 | 37.60 | 18.41 | 19.71 | 7.60 | 0.52 | 32.11 | 1.28 | 0.85 | 39.98 | 2.33 | 1.06 |
| 25 Oct | 1035 | 11.8 | 0.4 | 116.45 | 65.36 | 78.04 | 15.44 | 0.67 | 91.93 | 4.28 | 0.79 | 104.43 | 32.87 | 0.90 |
| 25 Oct | 2028 | 12.0 | 0.4 | 88.00 | 34.82 | 77.60 | 8.81 | 0.88 | 72.98 | 2.00 | 0.83 | 83.70 | 15.42 | 0.95 |
| 7 Nov | 1140 | 11.3 | 1.4 | 135.20 | 42.66 | 165.86 | 21.36 | 1.23 | 189.52 | 52.85 | 1.40 | 155.18 | 57.65 | 1.15 |
| 7 Nov | 2045 | 11.4 | 1.5 | 147.77 | 61.18 | 215.53 | 112.75 | 1.46 | 170.15 | 41.63 | 1.15 | 195.57 | 29.62 | 1.32 |
| 28 Nov | 1000 | 7.3 | 0.1 | 80.60 | 6.45 | 45.56 | 5.91 | 0.57 | 57.76 | 8.13 | 0.72 | 67.83 | 24.92 | 0.84 |
| 28 Nov | 2028 | 6.1 | 0.4 | 23.80 | 2.56 | 46.70 | 4.26 | 1.96 | 41.80 | 7.14 | 1.76 | 44.05 | 13.45 | 1.85 |
| 12 Dec | 1105 | 4.0 | 11.6 | 86.10 | 16.98 | 98.41 | 2.27 | 1.14 | 87.43 | 21.07 | 1.02 | 101.66 | 27.76 | 1.18 |
| 13 Dec | 2109 | 2.2 | 12.4 | 39.34 | 4.72 | 46.73 | 16.51 | 1.19 | 38.24 | 11.99 | 0.97 | 41.90 | 1.27 | 1.07 |
| 29 Dec | 1100 | 1.8 | 15.6 | 71.94 | 8.68 | 66.08 | 9.69 | 0.92 | 33.05 | 4.54 | 0.46 | 44.70 | 2.54 | 0.62 |
| 29 Dec | 2110 | 2.6 | 16.5 | 102.88 | 34.66 | 82.00 | 22.30 | 0.80 | 115.19 | 3.86 | 1.12 | 91.15 | 10.03 | 0.89 |

*mg $C/m^3$/incubation period

†Samples taken in actual discharge plume rather than simulated

Table J-12 (Page 1 of 2)

Primary Production* ($C^{14}$) in Whole Water Collections after 72-Hr Incubation Period, James A. FitzPatrick Nuclear Power Plant, 1978

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°S/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° S/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 Jan | 1155 | 0.8 | 19.8 | 91.81 | 22.69 | 53.95 | 0.79 | 0.59 | 92.86 | 28.93 | 1.01 | 35.01 | 17.18 | 0.38 |
| 16 Jan | 2100 | 0.8 | 19.8 | 40.83 | 5.95 | 54.88 | 23.62 | 1.34 | 59.03 | 10.82 | 1.45 | 38.81 | 9.26 | 0.95 |
| 24 Jan | 1045 | 0.9 | 21.0 | 30.91 | 4.11 | 25.84 | 2.60 | 0.84 | 26.15 | 0.29 | 0.85 | 46.52 | 2.34 | 1.51 |
| 24 Jan | 2032 | 2.4 | 21.1 | 24.65 | 12.15 | 19.32 | 1.54 | 0.78 | 25.28 | 0.74 | 1.03 | 19.25 | 1.59 | 0.78 |
| 06 Feb | 1055 | 1.7 | 16.8 | 42.88 | 0.31 | 64.25 | 5.02 | 1.50 | 37.98 | 0.07 | 0.89 | 73.29 | 16.61 | 1.71 |
| 06 Feb | 2040 | 1.3 | 16.9 | 51.56 | 4.77 | 29.48 | 4.32 | 0.57 | 33.30 | 8.01 | 0.65 | 39.28 | 1.77 | 0.76 |
| 20 Feb | 1035 | 0.8 | 17.5 | 11.40 | 2.09 | 44.11 | 7.13 | 3.87 | 20.20 | 5.57 | 1.77 | 68.27 | 14.55 | 5.99 |
| 20 Feb | 2035 | 0.9 | 17.5 | 73.54 | 8.86 | 38.67 | 5.10 | 0.53 | 48.79 | 8.80 | 0.66 | 9.19 | 0.94 | 0.12 |
| 06 Mar | 1035 | 0.3 | 21.9 | 60.00 | 0.51 | 61.06 | 18.64 | 1.02 | 85.72 | 20.01 | 1.43 | 74.25 | 36.58 | 1.24 |
| 06 Mar | 2035 | 1.6 | 21.0 | 52.49 | 9.03 | 18.57 | 1.30 | 0.35 | 51.35 | 12.50 | 0.98 | 47.11 | 5.01 | 0.90 |
| 20 Mar | 1035 | 1.4 | 18.3 | 258.49 | 68.77 | 183.07 | 4.14 | 0.71 | 162.27 | 49.14 | 0.63 | 147.46 | 86.03 | 0.57 |
| 20 Mar | 2005 | 1.2 | 18.6 | 460.02 | 215.88 | 201.81 | 5.78 | 0.44 | 478.21 | 25.39 | 1.04 | 128.86 | 127.27 | 0.28 |
| 04 Apr | 1040 | 2.0 | 15.0 | 397.13 | 54.96 | 403.31 | **0.00 | 1.02 | 529.53 | 235.79 | 1.33 | 462.12 | 67.11 | 1.16 |
| 04 Apr | 1940 | 2.6 | 15.6 | 298.17 | 65.82 | 268.81 | 25.75 | 0.90 | 436.57 | 69.86 | 1.46 | 723.48 | 14.01 | 2.43 |
| 18 Apr | 1035 | 2.9 | 18.4 | 125.85 | 56.99 | 71.11 | 11.25 | 0.57 | 95.94 | 15.96 | 0.76 | 106.43 | 7.72 | 0.85 |
| 18 Apr | 2120 | 4.1 | 5.3 | 104.49 | 46.78 | 21.93 | 1.86 | 0.21 | 62.87 | 8.49 | 0.60 | 45.05 | 11.47 | 0.43 |
| 10 May | 1030 | 7.9 | 15.8 | 480.04 | 122.85 | 377.07 | 12.32 | 0.79 | 391.49 | 31.04 | 0.82 | 482.02 | 158.40 | 1.00 |
| 10 May | 2045 | 8.4 | 15.5 | 462.84 | 12.52 | 216.46 | 45.96 | 0.47 | 172.13 | 42.86 | 0.37 | 216.88 | 72.03 | 0.47 |
| 24 May | 1310 | 8.6 | 16.0 | 389.81 | 0.07 | 330.66 | 30.56 | 0.85 | 506.83 | 40.65 | 1.30† | 478.39 | 52.70 | 1.23† |
| 24 May | 2135 | 9.7 | 16.2 | 314.96 | 104.45 | 118.33 | 9.31 | 0.38 | 345.88 | 73.20 | 1.10 | 246.17 | 21.15 | 0.78 |
| 17 Jun | 1130 | 11.9 | 13.7 | 233.00 | 73.97 | 207.21 | 58.62 | 0.89 | 299.26 | 1.38 | 1.28 | 309.98 | 103.08 | 1.33 |
| 17 Jun | 2115 | 12.2 | 14.3 | 221.28 | 21.56 | 172.05 | 61.08 | 0.78 | 250.12 | 42.68 | 1.13 | 333.10 | 140.83 | 1.51 |
| 28 Jun | 1400 | 16.4 | 16.2 | 216.94 | 16.12 | 84.68 | 6.01 | 0.39 | 241.91 | 54.14 | 1.12† | 211.78 | 11.06 | 0.98† |
| 28 Jun | 2220 | 16.3 | 16.2 | 182.52 | 98.33 | 49.81 | 13.61 | 0.27 | 96.77 | 62.53 | 0.53 | 110.24 | 19.85 | 0.60 |

*mg $C/m^3$/incubation period
**Rep 2 light bottle broken during incubation
†Samples taken in actual discharge plume rather than simulated

## Table J-12 (Page 2 of 2)

| Date | Time | Intake Temp (°C) | ΔT | Intake Mean | Intake S.E. | Discharge Mean | Discharge S.E. | D/I Ratio | 3° Simulation Mean | 3° Simulation S.E. | 3°L/I Ratio | 2° Simulation Mean | 2° Simulation S.E. | 2° L/I Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Jul | 1023 | 19.6 | 13.3 | 179.18 | 13.91 | 68.22 | 14.50 | 0.38 | 133.10 | R9.69 | 0.74† | 146.42 | Re6.93 | 0.82† |
| 13 Jul | 2145 | 18.8 | 16.0 | 298.13 | 49.37 | 82.24 | 29.77 | 0.28 | 215.50 | 68.00 | 0.72 | 170.56 | 43.14 | 0.57 |
| 26 Jul | 1250 | 22.7 | 14.5 | 645.80 | 327.97 | 162.29 | 86.41 | 0.25 | 299.08 | 180.91 | 0.46 | 226.19 | 129.29 | 0.35 |
| 26 Jul | 2145 | 21.9 | 15.5 | 174.02 | 60.35 | 112.08 | 24.38 | 0.64 | 380.61 | 149.60 | 2.19 | 360.27 | 293.60 | 2.07 |
| 09 Aug | 1151 | 22.6 | 14.7 | 303.20 | 66.23 | 145.17 | 22.35 | 0.48 | 115.42 | 5.79 | 0.38† | 104.77 | 5.02 | 0.35† |
| 09 Aug | 2135 | 22.5 | 15.0 | 327.60 | 136.65 | 149.91 | 8.46 | 0.46 | 321.24 | 147.16 | 0.98 | 294.05 | 4.79 | 0.90 |
| 23 Aug | 1151 | 23.6 | 12.5 | 307.72 | 140.73 | 237.47 | 16.03 | 0.77 | 258.31 | 12.86 | 0.84 | 284.93 | 63.68 | 0.93 |
| 23 Aug | 2100 | 24.6 | 12.6 | 53.52 | 10.42 | 61.12 | 20.99 | 1.14 | 44.50 | 1.13 | 0.83 | 55.04 | 3.63 | 1.03 |
| 14 Sep | 1055 | 5.8 | 10.8 | 40.03 | 12.47 | 42.83 | 13.47 | 1.07 | 39.01 | 0.46 | 0.97 | 26.87 | 2.54 | 0.67 |
| 14 Sep | 2031 | 5.3 | 10.8 | 19.76 | 3.15 | 17.98 | 2.12 | 0.91 | 19.09 | 2.60 | 0.97 | 17.12 | 3.96 | 0.87 |
| 26 Sep | 1051 | 13.9 | 0.5 | 182.29 | 51.49 | 155.17 | 4.70 | 0.85 | 136.52 | 26.69 | 0.75 | 165.93 | 46.42 | 0.91 |
| 26 Sep | 2030 | 14.8 | 0.6 | 87.79 | 37.67 | 122.84 | 37.60 | 1.40 | 62.98 | 1.51 | 0.72 | 83.17 | 18.66 | 0.95 |
| 10 Oct | 1030 | 14.2 | 0.4 | 185.95 | 13.49 | 160.56 | 54.73 | 0.86 | 195.09 | 90.35 | 1.05 | 171.70 | 29.99 | 0.92 |
| 10 Oct | 2035 | 14.6 | 0.2 | 112.93 | 14.25 | 82.60 | 0.02 | 0.73 | 60.66 | 11.34 | 0.54 | 98.84 | 31.83 | 0.88 |
| 25 Oct | 1035 | 11.8 | 0.4 | 189.82 | 77.71 | 122.37 | 14.19 | 0.64 | 175.75 | 9.63 | 0.93 | 135.00 | 19.31 | 0.71 |
| 25 Oct | 2028 | 12.0 | 0.4 | 148.86 | 54.96 | 110.14 | 0.31 | 0.74 | 105.55 | 32.05 | 0.71 | 92.38 | 16.95 | 0.62 |
| 7 Nov | 1140 | 11.3 | 1.4 | 228.24 | 28.32 | 255.94 | 91.52 | 1.12 | 207.88 | 116.24 | 0.91 | 186.17 | 19.80 | 0.82 |
| 7 Nov | 2045 | 11.4 | 1.5 | 167.07 | 34.68 | 273.71 | 120.37 | 1.64 | 197.82 | 73.83 | 1.18 | 206.54 | 71.08 | 1.24 |
| 28 Nov | 1000 | 7.3 | 0.1 | 85.31 | 14.07 | 66.64 | 16.58 | 0.78 | 106.20 | 17.57 | 1.24 | 104.22 | 5.39 | 1.22 |
| 28 Nov | 2028 | 6.1 | 0.4 | 31.02 | 5.37 | 55.44 | 17.35 | 1.79 | 63.97 | 20.99 | 2.06 | 67.86 | 2.39 | 2.19 |
| 12 Dec | 1105 | 4.0 | 11.6 | 127.79 | 10.51 | 108.59 | 32.45 | 0.85 | 116.91 | 36.56 | 0.91 | 141.40 | 32.04 | 1.11 |
| 13 Dec | 2109 | 2.2 | 12.4 | 76.78 | 12.86 | 70.95 | 8.95 | 0.92 | 96.84 | 35.72 | 1.26 | 112.04 | 11.16 | 1.46 |
| 29 Dec | 1100 | 1.8 | 15.6 | 156.65 | 26.80 | 111.67 | 14.99 | 0.71 | 73.30 | 6.74 | 0.47 | 76.41 | 8.15 | 0.49 |
| 29 Dec | 2110 | 2.6 | 16.5 | 55.27 | 8.08 | 54.02 | 0.84 | 0.98 | 47.98 | 6.44 | 0.87 | 52.68 | 2.92 | 0.95 |

*mg C/m³/incubation period

†Samples taken in actual discharge plume rather than simulated

## Table J-13 (Page 1 of 2)

## Percent Relative Abundance of Zooplankton (Day) in Entrainment Samples James A. FitzPatrick Nuclear Power Plant, 1978

| Taxa | Jan 17 | Jan 25 | Feb 7 | Feb 21 | Mar 7 | Mar 21 | Apr 6 | Apr 21 | May 11 | May 25 | Jun 18 | Jun 29 | Jul 13 | Jul 27 | Aug 10 | Aug 24 | Sep 15 | Sep 27 | Oct 12 | Oct 26 | Nov 8 | Nov 29 | Dec 20 | Jan 4 | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Protozoa | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ciliata | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tintinnidae | | | | | | | | | | 1 | T | | | | | | | | | | | | | | T |
| Vorticellidae | 2 | T* | | | 1 | | | | | | | | | | | | | | | | | | | | T |
| Ciliata unid. | | | | | | | | | | | | | | | 3 | | | | | | | | | 2 | T |
| Suctoria | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acinetidae | 2 | 1 | 3 | | 5 | 3 | 1 | T | | | T | | | | | | | | | | | | | | T |
| Suctoria unid. | | | | | | | | | | | | | | | 1 | | | | | 1 | | 2 | | 1 | T |
| Protozoa unid. | | | | | | | 1 | | | 1 | | | | | | | | | | | | | | | T |
| Rotifer | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brachonidae | | | | | | | | | | | | | | | | | | | | | | | | | |
| Keratella cochlearis | 5 | 9 | 1 | 1 | 1 | 3 | 1 | 1 | 2 | 4 | T | T | | | 1 | T | 1 | 4 | 3 | 17 | 32 | 10 | 44 | 51 | 3 |
| Keratella crassa | 2 | 5 | 2 | | | 1 | | 2 | | 1 | 3 | 1 | 1 | 11 | 19 | 38 | 23 | 10 | 5 | 2 | 3 | 3 | 1 | 3 | 8 |
| Keratella earlinea | 9 | 18 | 1 | 1 | 2 | 2 | 1 | | 1 | 3 | 10 | 6 | 4 | 25 | 5 | 6 | 10 | 5 | 8 | 4 | 11 | 3 | 3 | 2 | 7 |
| Keratella hiemalis | T | T | T | | | | | T | 1 | | | T | | | | | | | | | | | 1 | T | T |
| Keratella quadrata | 1 | 1 | | | | 1 | | 1 | T | 10 | 7 | 1 | 1 | 4 | 2 | | T | T | 1 | 3 | 1 | 9 | 5 | 4 | 2 |
| Keratella sp. | | | | | | | | | | | | T | T | | | | | | | | | T | 4 | | T |
| Brachionus angularis | | | | | | | | | | 2 | | | | | | | | | | | | | | 1 | T |
| Brachionus calyciflorus | | | | | | | | | 1 | 4 | T | | | | | | | | | | | 2 | 1 | T | T |
| Brachionus quadridentatus | | | | | | | | | | | | | | | | | | | | | | | | 1 | T |
| Brachionus urceolaris | | | | | | | | | | 1 | | | | | | | | | | | | | | | T |
| Brachionus sp. | | | | | | | | | | T | | | | | | | | | | | | | | 1 | T |
| Euchlanis dilitata | | | | | | | | | | | | T | | | | | | | | | | | | | T |
| Kellicottia longispina | 3 | 5 | 5 | T | 1 | 7 | 2 | 1 | | 8 | 4 | 2 | 2 | 7 | 5 | T | 3 | 1 | 3 | 4 | 5 | 9 | 3 | 5 | 3 |
| Notholca acuminata | | | | | | | | | 7 | 6 | | | | | | | | | | | | | | 1 | T |
| Notholca squamula | | | | | | | | | 3 | 1 | | | | | | | | | | | | | | | T |
| Notholca sp. | | 1 | | | | 10 | 1 | 48 | | | | | | | | | | | | | | | T | | T |
| Lecane sp. | | | | | | | | | | | | | | | | | | | | | | T | | | T |
| Monostyla sp. | | | | | | | | | | | | | | T | | | | | | | | | | | T |
| Cephalodella sp. | T | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | T |
| Conochilus unicornis | | | | | | | | | | 1 | 2 | | 9 | T | 1 | | | | | | | | | | 3 |
| Conochilis sp. | | | | | | | | | | | | 7 | | | | | | | | 3 | | | | | 1 |
| Conochilidae unid. | | | | | | | | | | | | | | | | | | | | T | | | | | T |
| Filinia longiseta | | | | | | | | | | 1 | | | | | T | T | | | | | | T | | | T |
| Ascomorpha sp. | | | | | | | | | | | | | | | | | 1 | 1 | | | | | | | T |
| Asplanchna priodonta | | | | | | | | | | | | | 2 | 1 | | | 2 | T | 1 | T | T | 1 | | | 1 |
| Asplanchna sp. | T | T | | | | | | | | 1 | 9 | | | | | | | 1 | | | | | | | 1 |
| Polyarthra vulgaris | 1 | 2 | T | | | 1 | | | T | | 18 | 15 | 5 | 7 | 21 | 11 | 4 | 44 | 12 | 9 | 8 | | 3 | 3 | 14 |
| Polyarthra dolichoptera | | | | | | | | | 1 | 13 | 28 | 14 | 1 | | | | | | | | 1 | 7 | 12 | 6 | 6 |
| Polyarthra major | | | | | | | | | | | | | T | 2 | 20 | 6 | | 6 | 4 | 3 | 4 | | | | 4 |
| Polyarthra euryeptera | | | | | | | | | | | | | | | 3 | 1 | T | T | | | T | | | | T |
| Polyarthra sp. | | | | | | | | | | | | | | | | | | | | | | 32 | 1 | | T |
| Synchaeta stylata | | | | | | | | | | | | | 56 | | | | | | 3 | 1 | 1 | | | | 16 |
| Synchaeta lackowitziana | | | | | | | | | | | | | | | | | | | | T | | | 5 | 1 | T |
| Synchaeta pectinata | | | | | | | | | | | | | | | | | | T | | 1 | 3 | 5 | 2 | | T |
| Synchaeta sp. | 3 | 4 | T | | | | T | 1 | 68 | 24 | 4 | 20 | | | | | | T | 1 | 1 | 1 | 3 | 10 | 6 | 5 |
| Trichocerca multicrinis | | | | | | | | | | | | | | | | | 1 | T | 3 | 1 | | | | | T |
| Trichocerca sp. | | | | | | | | T | | | 1 | T | | | | 5 | | | T | 6 | 4 | 1 | 1 | | 1 |
| Ploeosoma hudsoni | | | | | | | | | | | | | T | | | | | | T | T | | | | | T |
| Ploeosoma truncatum | | | | | | | | | | | | | 2 | 1 | | T | 1 | | T | | | | | | 1 |
| Ploeosoma lenticulare | | | | | | | | | | | | | | | | | T | | | | | | | | T |
| Ploeosoma sp. | | | | | | | | | | | | 1 | | | | | | | | | | | | | T |
| Collotheca motabilis | | | | | | | | | | | | | | | | | | | 2 | 4 | 2 | 1 | | | T |
| Collotheca sp. | | | T | | | | | | | | | | | | | | | 1 | | | | | | | T |
| Bdelloida sp. | 5 | 1 | T | | | 1 | 1 | 2 | 1 | | T | T | T | 2 | T | | 1 | | | 1 | | T | 1 | 3 | T |
| Rotifera unid. | | | 1 | | | T | 1 | T | 2 | 3 | T | | T | | 2 | T | T | | T | T | 1 | T | T | 2 | T |

Table J-13 (Page 2 of 2)

| Taxa | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sep | | Oct | | Nov | | Dec | Jan | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 17 | 25 | 7 | 21 | 7 | 21 | 6 | 21 | 11 | 25 | 18 | 29 | 13 | 27 | 10 | 24 | 15 | 27 | 12 | 26 | 8 | 29 | 20 | 4 | |
| Arthropoda | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cladocera | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Bosmina* sp. | | | | | | | | | | | 7 | 16 | 13 | 3 | | 4 | 2 | 3 | 31 | 28 | 16 | | | | 9 |
| Bosminidae unid. | 1 | 1 | T | | | 1 | T | T | T | | | | | | 1 | | | | | | | 5 | 2 | 1 | 1 |
| *Alona* sp. | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Chydorus sphaericus* | T | T | | | | T | | T | T | | T | 1 | | | | | | | | | | | | | 1 |
| *Chydorus* sp. | | | | | | | | | | | | | T | 1 | | | | | | | | | | | 1 |
| *Daphnia galeata mendotae* | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Daphnia retrocurva* | | | | | | | | | | | | T | T | 2 | 2 | 5 | 1 | 1 | 3 | T | | | | | 1 |
| *Daphnia pulex* | | | | | | | | | | | | | T | | | | | | | | | | | | T |
| *Daphnia* sp. | | | | | | | | | | | | | | | | | | 1 | 3 | | | T | T | | T |
| *Ceriodaphnia* sp. | | | | | | | | | | | | | | T | 1 | T | T | T | 1 | | T | | | | T |
| Daphnidae immature | | | | | | | | | | | | | | | 2 | 3 | | | | | | | | | T |
| *Diaphanosoma* sp. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cladocera unid. | | | | | | | | | | | T | T | 1 | 2 | 1 | | 1 | T | 1 | | T | | | | 1 |
| Calanoida (Copepoda) | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Diaptomus oregonensis* | 9 | 1 | 1 | | | | | | | | | | | | | | | | | | | | 1 | T | T |
| *Diaptomus ashlandi* | | | 5 | | | | 1 | | | | | | | | | | | | | | | | | | T |
| *Diaptomus sicilis* | | 1 | 8 | 2 | 1 | T | 7 | 2 | | | | | | | | | 1 | | | | | | | | T |
| *Eurytemora affinis* | | | | | | | | | | | | | | | | | | | | T | | T | | | T |
| *Eurytemora* sp. | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Limnocalanus macrurus* | 24 | 16 | 7 | 91 | 77 | 48 | 22 | 25 | T | | | | | | | | T | | | | | | | | T |
| Calanoida juvenile unid. | 10 | 14 | 24 | 4 | 11 | 9 | 13 | 2 | 1 | 1 | T | T | T | 1 | | T | 4 | 1 | 1 | 1 | | T | | | T |
| Calanoida adult unid. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calanoida nauplii unid. | | | | | | | | | T | | | | | | | | | | | | | | | | T |
| Cyclopoida (Copepoda) | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Cyclops bicuspidatus thomasi* | 1 | 1 | 1 | | | | 3 | 6 | T | | T | 1 | T | 2 | 2 | | 10 | 1 | 1 | 1 | T | T | T | | 1 |
| *Cyclops vernalis* | | | | | | | | | | | | | | | | | | | | | | | | | |
| *Tropocyclops prasinus mexicana* | | 1 | T | | | | | | | T | T | | | | T | 1 | | | 2 | | | 2 | | | T |
| Cyclopoida juvenile unid. | | | | | | | 28 | 9 | 3 | 1 | 4 | 5 | 2 | 19 | 6 | 4 | 9 | 7 | 6 | 7 | 3 | 2 | 1 | 1 | 5 |
| Harpacticoida (Copepoda) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Harpacticoida adult unid. | T | | 1 | | | | | | | | | | | | | | | | | | | | | | T |
| Harpacticoida nauplii unid. | | | | | | | | T | | | | | | | | | | | | | | | | | T |
| Harpacticoida juvenile unid. | | | | | | | | T | | | | | | | | | | | | | | | | | T |
| Copepoda nauplii unid. | 21 | 19 | 38 | 1 | 2 | 15 | 17 | 3 | 9 | 16 | 2 | 4 | 3 | 13 | 4 | 13 | 24 | 11 | 6 | 5 | 4 | 2 | 1 | 5 | 6 |
| Tartigrada unid. | | | | | | | | | | | | | | | | | | | | | T | | T | | T |
| Total density (No./$m^3$) | 724 | 3,102 | 2,206 | 3,727 | 2,924 | 2,221 | 2,904 | 18,865 | 150,916 | 126,119 | 782,960 | 572,571 | 1,721,938 | 355,904 | 637,725 | 462,211 | 16,490 | 549,322 | 182,539 | 90,441 | 208,455 | 65,272 | 90,428 | 11,959 | 252,580 |

*T = <0.5%.

Table J-14 (Page 1 of 2)

Percent Relative Abundance of Zooplankton (Night) in Entrainment Samples
James A. FitzPatrick Nuclear Power Plant, 1978

| Taxa | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sep | | Oct | | Nov | | Dec | Jan | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 18 | 26 | 8 | 23 | 8 | 22 | 10 | 22 | 12 | 26 | 19 | 30 | 14 | 27 | 11 | 25 | 17 | 28 | 13 | 27 | 9 | 30 | 21 | 6 | Mean |
| Protozoa | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ciliata | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tintinnidae | | | | 1 | | | | | | 6 | T | T | | | | | | | | | | | | | T |
| Vorticellidae | 14 | | | | | | | 7 | | | | | | | | | | | | | | | | | T |
| Ciliata unid. | | | | | | | | | | | | | | | | | | | | | T | | | 3 | T |
| Suctoria | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acinetidae | 2 | 1 | 3 | 1 | | 1 | | 3 | 1 | T | T | 1 | | | | | | | | | | | | | T |
| Suctoria unid. | | | | | | | | | | | | | | | T | | | | | | | | | | T |
| Protozoa unid. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rotifera | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brachionidae | | | | | | | | | | | | | | | | | | | | | | | | | |
| Keratella cochlearis | 9 | 15 | 3 | | | T | 1 | T | T | 12 | 1 | 1 | | | 1 | T | 4 | 5 | 5 | 20 | 23 | 10 | 49 | 58 | 4 |
| Keratella crassa | 1 | 12 | 2 | | | 3 | | T | | 1 | 3 | 1 | 1 | 11 | 30 | 39 | 11 | 18 | 3 | 1 | 2 | 1 | 1 | 5 | 13 |
| Keratella earlinea | 16 | 13 | 3 | | 2 | 1 | | | T | 4 | 8 | 7 | 4 | 35 | 2 | 4 | 2 | 7 | 9 | 6 | 8 | 3 | 1 | 1 | 10 |
| Keratella hiemalis | | T | 1 | | | | | | T | | | | | | | | | | | | | | | | T |
| Keratella quadrata | T | T | | | | 2 | | T | T | 4 | 6 | 2 | T | 1 | 1 | | T | | T | 1 | 2 | 8 | 3 | 3 | 1 |
| Keratella sp. | 1 | | | | | | | | | | | 1 | | | | | | | | | | | 7 | 1 | T |
| Brachionus angularis | | | | | | | | | | 1 | | | | T | | | | | | | | T | | | T |
| Brachionus calyciflorus | | | | | | | | | 1 | 3 | | | | | | | 1 | | | | | 1 | T | 1 | T |
| Brachionus quadridentatus | | | | | | | | | T | | | | | | | | | | | | | | T | 1 | T |
| Brachionus urceolaris | | | | | | | | | | 1 | | | | | | | | | | | | | | | T |
| Brachionus sp. | | | | | | | | | | | | | | | T | | 2 | | | | | | | 1 | T |
| Euchlanis dilitata | | | | | | | | | | | | | | | | | | | | | | | | | |
| Kellicottia longispina | 2 | 2 | 5 | T | 2 | 4 | T | 2 | 1 | 3 | 4 | 4 | 2 | 3 | 4 | T | 1 | 1 | T | 1 | 3 | 8 | 3 | 6 | 2 |
| Notholca acuminata | | | | | | | | | 9 | 5 | | | | | | | | | | | | | | 1 | T |
| Notholca squamula | | | | | | | | | 2 | T | | | | | | | | | | | | | | 1 | T |
| Notholca sp. | 1 | 1 | | | | 12 | 1 | 65 | | | | | | | | | | T | | | | | | | T |
| Lecane sp. | | | | | | | | | | | | | | | | | | | | | | | T | | T |
| Monostyla sp. | | | | | | | | | | | | | | T | | | | | | | | | | | T |
| Cephalodella sp. | | | | | | | | | | | | | | | | | | | | T | | T | T | 1 | T |
| Conochilus unicornis | | | | | | | | | | 2 | 1 | | 8 | 7 | T | | | | T | | | | | | 2 |
| Conochilis sp. | | | | | | | | | | | | 7 | | | | | | | | | | | | | T |
| Conochilidae unid. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Filinia longiseta | | | | | | | | | | 1 | | | | T | T | T | | | | | | | T | T | T |
| Ascomorpha sp. | | | | | | | | | | | | | | | | T | 2 | | | | | | | | T |
| Asplanchna priodonta | | | | | | | | | | | | | 1 | T | | | 1 | 2 | 1 | T | 1 | 1 | | | T |
| Asplanchna sp. | T | | | | | | | | | T | 18 | 9 | | | | | | | | | | | | | 3 |
| Polyarthra vulgaris | 2 | T | | | | | | | | | 13 | 6 | 17 | 11 | 14 | 21 | 29 | 34 | 15 | 5 | 6 | | 1 | 2 | 15 |
| Polyarthra dolichoptera | | | | | | | | | 2 | 11 | 23 | 4 | 1 | | | | | | | | 1 | 2 | 5 | 3 | 3 |
| Polyarthra major | | | | | | | | | | | | | T | 1 | 19 | 5 | 17 | 4 | 5 | 1 | 1 | | | | 4 |
| Polyarthra euryeptera | | | | | | | | | | | | | | T | | 1 | 2 | | | | | | | | T |
| Polyarthra sp. | | | | | | | | | | | | | | | | | | | | | | 29 | 2 | | T |
| Synchaeta stylata | | | | | | | | | | | | | 8 | T | | T | 1 | | 1 | T | 1 | | | | 1 |
| Synchaeta tackowitziana | | | | | | | | | | | | | | | | | | | | | 1 | | 2 | 2 | T |
| Synchaeta pectinata | | | | | | | | | | | | | | | | | | | | 1 | 4 | 18 | 1 | | T |
| Synchaeta sp. | 4 | 2 | T | | | 1 | | 3 | 63 | 32 | 3 | 15 | 3 | | | | 1 | | 1 | T | T | T | 8 | T | 3 |
| Trichocerca multicrinis | | | | | | | | | | | | | | | T | | | | 3 | 1 | 1 | T | | | T |
| Trichocerca sp. | | | | | | | | | | | 1 | 1 | | | | 4 | | | | 1 | 1 | 1 | 1 | | 1 |
| Ploeosoma hudsoni | | | | | | | | | | | | | T | | | | | | | | | | | | T |
| Ploeosoma truncatum | | | | | | | | | | | | | 11 | 3 | | T | 2 | T | T | | | | | | 2 |
| Ploeosoma lenticulare | | | | | | | | | | | | | | | | | T | | | | | | | | T |
| Ploeosoma sp. | | | | | | | | | | | | T | | | | | | | | | | | | | T |
| Collotheca motabilis | | | | | | | | | | | | | | | | | | | 1 | | 2 | T | | | T |
| Collotheca sp. | | | | | | | | | | | T | 1 | | | | | | | | | | | | | T |
| Bdelloida sp. | 2 | T | T | | T | 2 | | 1 | T | | | T | 1 | 1 | | | 1 | T | | | T | | | 1 | T |
| Rotifera unid. | 1 | | | | | 1 | T | 1 | 4 | 5 | T | | T | | 3 | 1 | 1 | T | T | T | 1 | T | 1 | 6 | 1 |

Table J-14 (Page 2 of 2)

| Taxa | Jan 18 | 26 | Feb. 8 | 23 | Mar 8 | 22 | Apr 10 | 22 | May 12 | 26 | Jun 19 | 30 | Jul 14 | 27 | Aug 11 | 25 | Sep 17 | 28 | Oct 13 | 27 | Nov 9 | 30 | Dec 21 | Jan 6 | Annual Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arthropoda | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cladocera | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bosmina sp. | | | | | | | | | | | 10 | 24 | 25 | 1 | | 5 | 3 | 4 | 27 | 17 | 27 | | | | 9 |
| Bosminidae unid. | 1 | 1 | T | | | | | | | | | | | | T | 5 | | | | | | 4 | 4 | 1 | 1 |
| Alona sp. | | | | | | | | | | | | | | | | T | | T | | | | | | | T |
| Chydorus sphaericus | | T | | | | | | 1 | | | | 1 | | | | | | | | | | | | | T |
| Chydorus sp. | | | | | | | | | | | | | | | T | | T | | | | | | | | T |
| Daphnia galeata mendotae | | | | | | | | | | | | | | | | | | | | | | | T | | T |
| Daphnia retrocurva | | | | | | | | | | | | | 1 | 1 | 5 | 3 | 1 | 1 | 9 | 30 | 1 | T | | | 3 |
| Daphnia pulex | | | | | | | | | | | | | | | | | | | | | | | | | |
| Daphnia sp. | | | | | | | | | | | | | | | | T | | 1 | | | | T | | | T |
| Ceriodaphnia sp. | | | | | | | | | | | | | | 1 | 1 | T | T | T | 1 | T | T | T | | | T |
| Daphnidae immature | | | | | | | | | | | | | | | T | 1 | | | | | | | | | T |
| Diaphanosoma sp. | | | | | | | | | | | | | | | T | | 1 | T | | | | | | | T |
| Cladocera unid. | | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 9 | 3 | 15 | | | T | 2 |
| Calanoida (Copepoda) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Diaptomus oregonensis | 6 | T | T | | | | | | | | | | | | | | | | | | | | 1 | | T |
| Diaptomus ashlandi | 1 | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | T |
| Diaptomus sicilis | 2 | T | 34 | 1 | 1 | | 3 | T | | | | | | | | | T | | | | | | | | T |
| Eurytemora affinis | | | | | | | | | | | | T | | T | | T | 1 | T | T | T | | T | | | T |
| Eurytemora sp. | | | | | | | | | | | | | | T | | | | | | | | | | | T |
| Limnocalanus macrurus | 10 | 26 | 11 | 94 | 55 | 56 | 78 | 1 | | | | | | | | | | | | | | | | | T |
| Calanoida juvenile unid. | | 15 | 21 | 2 | 22 | 10 | 2 | 1 | T | T | 1 | 1 | 1 | 1 | T | 1 | 1 | T | 2 | 1 | | 1 | T | T | T |
| Calanoida adult unid. | | T | | | | | | | T | | | | | | | | | | | | | | | | T |
| Calanoida nauplii unid. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cyclopoida (Copepoda) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cyclops bicuspidatus thomasi | 1 | 1 | 1 | T | | T | 2 | T | T | T | | 1 | 1 | T | 4 | T | 2 | 1 | 1 | 1 | | T | T | | 1 |
| Cyclops vernalis | | | | | | | | | | | | | | T | 1 | | | | | | | | | | T |
| Tropocyclops prasinus mexicana | T | | | | | | T | | | | | | | | | 1 | | T | 1 | 4 | T | 1 | T | | T |
| Cyclopoida juvenile unid. | | | | | | | 12 | 2' | 2 | 1 | 4 | 4 | 4 | 11 | 12 | 2 | 5 | 9 | 3 | 3 | 8 | 8 | 5 | 1 | 6 |
| Harpacticoida (Copepoda) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Harpacticoida adult unid. | | | | | | | | | | | | | | | | | | | | | | | | T | T |
| Harpacticoida nauplii unid. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Harpacticoida juvenile unid. | | | | | | | | T | | 8 | | | | | | | | | | | | | | | T |
| Copepoda nauplii unid. | 16 | 10 | 15 | | 18 | 7 | 1 | 14 | 13 | | 4 | 12 | 11 | 10 | 2 | 5 | 8 | 10 | 3 | 2 | 7 | 5 | 2 | 2 | 7 |
| Tartigrada unid. | | | | | | | | T | | | | | | | | | | | | | | | | | T |
| Total density (No./$m^3$) | 3,269 | 2,343 | 1,945 | 6,900 | 2,098 | 2,644 | 6,794 | 7,477 | 62,731 | 167,321 | 660,804 | 348,243 | 683,566 | 882,793 | 839,746 | 602,073 | 87,956 | 686,066 | 233,928 | 196,984 | 166,841 | 83,789 | 90,447 | 8,553 | 243,138 |

## Table J-15

### Number of Total Zooplankton Collected in Entrainment Samples, James A. FitzPatrick Nuclear Power Plant, 1978

| Day | | | | | | | Night | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | Time (0-2400) | Intake Temp (°C) | ΔT | No. Pumps Circ./Ser.* | Density (No./m³) | Standard Error | Date | Time (0-2400) | Intake Temp (°C) | ΔT | No. Pumps Circ./Ser.* | Density (No./m³) | Standard Error |
| 17 Jan | 1035 | 0.4 | 20.2 | 3/1 | 3472.9 | 155.4 | 18 Jan | 0015 | 0.4 | 20.1 | 3/1 | 3269.0 | 269.0 |
| 25 Jan | 1100 | 0.7 | 14.3 | 3/1 | 3100.5 | 62.3 | 25 Jan | 2345 | 0.4 | 14.7 | 3/1 | 2342.9 | 57.1 |
| 07 Feb | 1035 | 1.2 | 16.8 | 3/1 | 2206.4 | 238.1 | 08 Feb | 0000 | 0.6 | 17.2 | 3/1 | 1945.2 | 135.7 |
| 21 Feb | 1045 | 1.0 | 16.8 | 3/1 | 3727.3 | 645.8 | 23 Feb | 0000 | 1.1 | 17.3 | 3/1 | 6900.2 | 949.1 |
| 07 Mar | 1150 | 0.7 | 21.9 | 3/1 | 2924.1 | 252.1 | 08 Mar | 0000 | 0.9 | 21.7 | 3/1 | 2097.9 | 177.8 |
| 21 Mar | 1100 | 1.4 | 19.4 | 3/1 | 2221.0 | 34.5 | 22 Mar | 0005 | 1.4 | 18.9 | 3/1 | 2644.2 | 272.5 |
| 06 Apr | 1035 | 1.8 | 19.0 | 3/1 | 2904.3 | 433.3 | 10 Apr | 0005 | 2.7 | 19.8 | 3/1 | 6793.9 | 686.0 |
| 21 Apr | 0955 | 4.7 | 9.5 | 2/1 | 18865.0 | 1209.0 | 22 Apr | 0000 | 5.5 | 14.2 | 2/1 | 7477.2 | 247.6 |
| 11 May | 1100 | 7.2 | 16.0 | 3/1 | 150916.2 | 228.5 | 12 May | 0100 | 5.6 | 15.6 | 3/1 | 62731.1 | 15074.0 |
| 25 May | 1110 | 10.2 | 15.6 | 3/1 | 126118.6 | 49484.2 | 26 May | 0000 | 10.6 | 15.7 | 3/1 | 167320.5 | 16827.1 |
| 18 Jun | 1112 | 13.3 | 15.0 | 3/2 | 782959.6 | 21801.3 | 19 Jun | 2400 | 13.7 | 16.3 | 3/2 | 660803.9 | 66962.9 |
| 29 Jun | 1235 | 14.8 | 16.4 | 3/2 | 572570.8 | 26433.9 | 30 Jun | 2400 | 15.4 | 16.2 | 3/2 | 348242.6 | 12052.7 |
| 13 Jul | 1335 | 17.6 | 15.2 | 3/2 | 1721938.0 | 87660.0 | 14 Jul | 2330 | 20.0 | 10.1 | 3/2 | 683565.6 | 11142.7 |
| 27 Jul | 1125 | 22.2 | 15.6 | 3/2 | 355903.9 | 45365.1 | 28 Jul | 2345 | 22.6 | 15.6 | 3/2 | 882793.1 | 41269.9 |
| 10 Aug | 1115 | 22.7 | 15.2 | 3/2 | 637724.5 | 18465.6 | 11 Aug | 0005 | 23.3 | 15.2 | 3/2 | 839745.7 | 45079.3 |
| 24 Aug | 1120 | 23.4 | 12.9 | 3/2 | 462211.2 | 10994.7 | 25 Aug | 0005 | 22.8 | 12.2 | 3/2 | 602073.3 | 21375.6 |
| 15 Sep | 1115 | 6.0 | 10.9 | 3/1 | 16490.3 | 271.6 | 17 Sep | 0000 | 12.5 | 0.2 | 2/1 | 87956.1 | 972.2 |
| 27 Sep | 1200 | 6.0 | 10.9 | 3/1 | 549322.1 | 1442.9 | 28 Sep | 0000 | 15.4 | 0.4 | 1/1 | 686065.8 | 44797.2 |
| 12 Oct | 1109 | 14.4 | 14.4 | 1/1 | 182539.1 | 28730.1 | 13 Oct | 0009 | 14.6 | 14.6 | 1/1 | 233928.1 | 2182.5 |
| 26 Oct | 1051 | 12.3 | 12.3 | 1/1 | 90440.6 | 8694.7 | 27 Oct | 0009 | 12.3 | 12.3 | 1/1 | 196983.6 | 20052.9 |
| 8 Nov | 1100 | 11.0 | 12.8 | 0/1 | 208454.5 | 28349.2 | 9 Nov | 2400 | 11.3 | 12.7 | 0/1 | 166840.7 | 100301.2 |
| 29 Nov | 1041 | 6.5 | 6.8 | 1/2 | 65271.8 | 1386.1 | 30 Nov | 0100 | 7.0 | 7.3 | 1/2 | 83789.2 | 1448.7 |
| 20 Dec | 1035 | 0.9 | 13.9 | 2/2 | 90427.8 | 10181.1 | 21 Dec | 0100 | 1.6 | 14.0 | 3/2 | 90447.0 | 8817.5 |
| 4 Jan | 1000 | 1.6 | 15.9 | 2/2 | 11958.8 | 861.9 | 6 Jan | 0000 | 1.5 | 17.9 | 2/2 | 8552.9 | 124.3 |

*Circulating pumps = 120,000 gpm each; service pumps = 18,000 gpm each.

## Table J-16 (Page 1 of 2)

## Number of Total Microzooplankton in Viability (Dead vs. Live) Samples, James A. FitzPatrick Nuclear Power Plant, 1978

| | | | | Intake | | | | | Discharge | | | | | 3° Simulation | | | | | 2° Simulation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Intake | | Number Dead[c] | | Total Coll'd[d] | | % | Number Dead[c] | | Total Coll'd[d] | | % | Number Dead[c] | | Total Coll'd[d] | | % | Number Dead[e] | | Total Coll'd[d] | | % |
| Date | Time[a] | Temp (°C)[b] | ΔT | R-1 | R-2 | R-1 | R-2 | Dead[e] | R-1 | R-2 | R-1 | R-2 | Dead[e] | R-1 | R-2 | R-1 | R-2 | Dead[e] | R-1 | R-2 | R-1 | R-2 | Dead[e] |
| 17 Jan | 1035 | 0.4 | 20.2 | 53 | 35 | 111 | 56 | 52.7 | 27 | 28 | 36 | 52 | 62.5 | 41 | 77 | 102 | 122 | 52.7 | 42 | 114 | 67 | 136 | 75.9 |
| 18 Jan | 0015 | 0.4 | 20.1 | 51 | 84 | 93 | 175 | 50.4 | 139 | 97 | 197 | 149 | 68.2 | 82 | 76 | 111 | 111 | 71.2 | 119 | 77 | 184 | 156 | 57.6 |
| 25 Jan | 1100 | 0.7 | 14.3 | 57 | 64 | 83 | 132 | 56.3 | 45 | 84 | 75 | 125 | 64.5 | 78 | 44 | 115 | 70 | 65.9 | 85 | 75 | 131 | 136 | 59.9 |
| 25 Jan | 2345 | 0.4 | 14.7 | 47 | 36 | 95 | 82 | 46.9 | 88 | 68 | 118 | 77 | 80.0 | 52 | 80 | 135 | 150 | 46.3 | 109 | 90 | 148 | 111 | 76.8 |
| 07 Feb | 1035 | 1.2 | 16.8 | 39 | 27 | 73 | 80 | 43.1 | 105 | 75 | 130 | 124 | 70.9 | 61 | 58 | 117 | 109 | 52.7 | 34 | 52 | 69 | 85 | 55.8 |
| 08 Feb | 0000 | 0.6 | 17.2 | 40 | 51 | 100 | 111 | 43.1 | 96 | 140 | 124 | 187 | 75.9 | 41 | 95 | 59 | 108 | 81.4 | 65 | 73 | 105 | 116 | 62.4 |
| 21 Feb | 1045 | 1.0 | 16.8 | 24 | 24 | 82 | 94 | 27.3 | 38 | 77 | 103 | 117 | 52.3 | 41 | 47 | 105 | 61 | 53.0 | 82 | 29 | 106 | 86 | 57.8 |
| 23 Feb | 0000 | 1.1 | 17.3 | 15 | 40 | 179 | 144 | 17.0 | 26 | 36 | 142 | 156 | 20.8 | 30 | 42 | 87 | 123 | 34.3 | 26 | 45 | 103 | 157 | 27.3 |
| 07 Mar | 1150 | 0.7 | 21.9 | 20 | 33 | 127 | 101 | 23.2 | 28 | 93 | 180 | 245 | 28.5 | 42 | 34 | 163 | 142 | 24.9 | 12 | 16 | 224 | 161 | 7.3 |
| 08 Mar | 0000 | 0.9 | 21.7 | 66 | 42 | 138 | 132 | 40.0 | 120 | 177 | 175 | 227 | 73.9 | 52 | 65 | 90 | 92 | 64.3 | 65 | 64 | 126 | 106 | 55.6 |
| 21 Mar | 1100 | 1.4 | 19.4 | 36 | 43 | 62 | 98 | 49.4 | 131 | 114 | 180 | 156 | 72.9 | 70 | 55 | 108 | 79 | 66.8 | 62 | 44 | 165 | 81 | 43.1 |
| 22 Mar | 0005 | 1.4 | 18.9 | 20 | 87 | 103 | 214 | 33.8 | 90 | 60 | 124 | 122 | 61.0 | 48 | 46 | 161 | 106 | 35.2 | 51 | 63 | 122 | 111 | 48.9 |
| 06 Apr | 1035 | 1.8 | 19.0 | 30 | 46 | 94 | 103 | 38.6 | 96 | 78 | 145 | 141 | 60.8 | 32 | 26 | 93 | 87 | 32.2 | 68 | 39 | 133 | 103 | 45.3 |
| 10 Apr | 0005 | 2.7 | 19.8 | 25 | 29 | 193 | 174 | 14.7 | 36 | 120 | 122 | 233 | 43.9 | 36 | 49 | 147 | 161 | 27.6 | 102 | 57 | 176 | 151 | 48.6 |
| 21 Apr | 0935 | 4.7 | 9.5 | 36 | 62 | 419 | 472 | 11.0 | 60 | 68 | 165 | 253 | 30.6 | 46 | 64 | 302 | 319 | 17.7 | 114 | 45 | 428 | 265 | 22.9 |
| 22 Apr | 0000 | 5.5 | 14.2 | 35 | 67 | 194 | 184 | 27.0 | 120 | 137 | 224 | 179 | 63.8 | 39 | 37 | 181 | 231 | 18.4 | 86 | 85 | 238 | 196 | 39.4 |
| 11 May | 1100 | 7.2 | 16.0 | 127 | 104 | 459 | 320 | 29.7 | 174 | 163 | 308 | 249 | 60.5 | 188 | 179 | 310 | 346 | 55.9† | 216 | 210 | 349 | 473 | 51.8† |
| 12 May | 0100 | 5.6 | 15.6 | 48 | 60 | 291 | 288 | 18.7 | 86 | 212 | 152 | 330 | 61.8 | 57 | 78 | 290 | 385 | 20.0 | 62 | 53 | 285 | 249 | 21.5 |
| 25 May | 1110 | 10.2 | 15.6 | 113 | 118 | 320 | 299 | 37.3 | 141 | 141 | 233 | 262 | 57.0 | 94 | 102 | 281 | 288 | 34.4 | 139 | 197 | 287 | 438 | 46.3 |
| 26 May | 0000 | 10.6 | 15.7 | 154 | 88 | 497 | 254 | 32.2 | 97 | 138 | 174 | 249 | 55.6 | 87 | 67 | 216 | 219 | 35.4 | 145 | 92 | 281 | 228 | 46.6 |
| 18 Jun | 1112 | 13.3 | 15.0 | 271 | 389 | 493 | 639 | 58.3 | 284 | 240 | 630 | 488 | 46.9 | 257 | 158 | 421 | 300 | 57.6 | 406 | 242 | 520 | 393 | 71.0 |
| 19 Jun | 0000 | 13.7 | 16.3 | 182 | 135 | 367 | 262 | 50.4 | 319 | 204 | 427 | 242 | 78.2 | 141 | 98 | 328 | 206 | 44.8 | 210 | 161 | 390 | 263 | 56.8 |
| 27 Jun | 1305 | 19.3 | 13.4 | - | - | - | - | - | - | - | - | - | - | 113 | 158 | 287 | 362 | 41.8† | 143 | 103 | 210 | 248 | 53.7† |
| 29 Jun | 1229 | 14.8 | 16.4 | 85 | 93 | 276 | 340 | 28.9 | 142 | 150 | 226 | 217 | 65.9 | - | - | - | - | - | - | - | - | - | - |
| 30 Jun | 0000 | 15.4 | 16.2 | 56 | 96 | 194 | 221 | 36.6 | 164 | 164 | 289 | 208 | 66.0 | 103 | 118 | 224 | 289 | 43.1 | 103 | 163 | 250 | 259 | 52.3 |

[a]Time of day and night intake samples (2400 hr clock)

[b]Intake temperature before tempering

[c]Number of dead organisms observed in each sample

[d]Total number of organisms observed in each sample

[e]Mean % dead equal to total of dead observed in R-1 and R-2 divided by total organisms observed in R-1 and R-2

†Samples taken in actual discharge plume rather than simulated

Table J-16 (Page 2 of 2)

| Date | Time[a] | Intake Temp (°C)[b] | ΔT | Intake Number Dead[c] R-1 | Intake Number Dead[c] R-2 | Intake Total Coll'd[d] R-1 | Intake Total Coll'd[d] R-2 | Intake % Dead[e] | Discharge Number Dead[c] R-1 | Discharge Number Dead[c] R-2 | Discharge Total Coll'd[d] R-1 | Discharge Total Coll'd[d] R-2 | Discharge % Dead[e] | 3° Simulation Number Dead[c] R-1 | 3° Simulation Number Dead[c] R-2 | 3° Simulation Total Coll'd[d] R-1 | 3° Simulation Total Coll'd[d] R-2 | 3° Simulation % Dead[e] | 2° Simulation Number Dead[c] R-1 | 2° Simulation Number Dead[c] R-2 | 2° Simulation Total Coll'd[d] R-1 | 2° Simulation Total Coll'd[d] R-2 | 2° Simulation % Dead[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 Jul | 1335 | 17.6 | 15.2 | 155 | 232 | 421 | 481 | 42.9 | 321 | 319 | 379 | 380 | 84.3 | 118 | 205 | 330 | 300 | 51.3 | 181 | 211 | 299 | 340 | 61.3 |
| 14 Jul | 2330 | 20.0 | 10.1 | 113 | 147 | 161 | 195 | 73.0 | 326 | 141 | 395 | 163 | 83.7 | 77 | 47 | 160 | 109 | 46.1 | 42 | 112 | 103 | 138 | 63.9 |
| 27 Jul | 1125 | 22.2 | 15.6 | 88 | 65 | 143 | 145 | 53.1 | 123 | 228 | 129 | 231 | 97.5 | 174 | 116 | 290 | 187 | 60.8† | 220 | 207 | 364 | 319 | 62.5† |
| 28 Jul | 2345 | 22.6 | 15.6 | 204 | 154 | 340 | 264 | 59.3 | 297 | 241 | 309 | 250 | 96.2 | 88 | 85 | 116 | 248 | 47.5 | 128 | 168 | 239 | 308 | 54.1 |
| 10 Aug | 1115 | 22.7 | 15.2 | 153 | 159 | 199 | 195 | 79.2 | 286 | 196 | 292 | 235 | 91.5 | 320 | 242 | 359 | 296 | 85.8 | 311 | 183 | 336 | 250 | 84.3 |
| 11 Aug | 0005 | 23.3 | 15.2 | 149 | 161 | 178 | 260 | 70.8 | 288 | 246 | 295 | 250 | 98.0 | 70 | 127 | 124 | 166 | 67.9† | 175 | 131 | 218 | 180 | 76.9† |
| 24 Aug | 1120 | 23.4 | 12.9 | 56 | 78 | 83 | 157 | 55.8 | 93 | 139 | 113 | 146 | 89.6 | 69 | 60 | 99 | 120 | 58.9 | 89 | 112 | 175 | 157 | 60.5 |
| 25 Aug | 0005 | 22.8 | 12.2 | 56 | 72 | 137 | 176 | 40.9 | 125 | 104 | 184 | 165 | 65.6 | 101 | 152 | 199 | 204 | 62.8 | 83 | 94 | 116 | 139 | 69.4 |
| 15 Sep | 1115 | 6.0 | 10.9 | 90 | 101 | 141 | 137 | 68.7 | 88 | 117 | 113 | 141 | 80.7 | 136 | 157 | 197 | 242 | 66.7 | 113 | 123 | 160 | 197 | 66.1 |
| 17 Sep | 0000 | 12.5 | 0.2 | 149 | 228 | 204 | 271 | 79.4 | 93 | 156 | 118 | 177 | 84.4 | 258 | 269 | 334 | 308 | 82.1 | 185 | 319 | 210 | 435 | 78.1 |
| 27 Sep | 1200 | 15.0 | 0.4 | 342 | 223 | 392 | 360 | 75.1 | 244 | 180 | 384 | 226 | 69.5 | 199 | 242 | 284 | 400 | 64.5 | 217 | 217 | 286 | 309 | 72.9 |
| 28 Sep | 0000 | 15.4 | 0.4 | 196 | 184 | 384 | 339 | 56.6 | 203 | 197 | 260 | 292 | 72.5 | 154 | 180 | 233 | 287 | 64.2 | 229 | 223 | 276 | 366 | 70.4 |
| 12 Oct | 1109 | 14.4 | 0.0 | 143 | 178 | 379 | 355 | 43.7 | 125 | 103 | 212 | 149 | 63.2 | 137 | 139 | 407 | 372 | 35.4 | 156 | 234 | 235 | 404 | 61.0 |
| 13 Oct | 0009 | 14.6 | 0.0 | 61 | 89 | 224 | 208 | 34.7 | 70 | 78 | 109 | 129 | 62.2 | 54 | 65 | 132 | 186 | 37.4 | 130 | 81 | 217 | 130 | 60.8 |
| 26 Oct | 1051 | 12.3 | 0.0 | 81 | 106 | 167 | 202 | 69.0 | 73 | 77 | 181 | 114 | 50.8 | 78 | 70 | 145 | 157 | 49.0 | 95 | 103 | 204 | 251 | 43.5 |
| 27 Oct | 0009 | 12.3 | 0.0 | 69 | 97 | 340 | 435 | 21.4 | 102 | 74 | 223 | 407 | 27.9 | 184 | 81 | 382 | 324 | 37.5 | 70 | 57 | 291 | 260 | 23.0 |
| 8 Nov | 1113 | 12.8 | 0.0 | 201 | 193 | 489 | 402 | 44.2 | 130 | 158 | 142 | 178 | 90.0 | 144 | 212 | 308 | 425 | 48.6 | 201 | 279 | 253 | 488 | 64.8 |
| 9 Nov | 0013 | 12.7 | 0.1 | 119 | 212 | 346 | 461 | 41.0 | 130 | 93 | 163 | 135 | 74.8 | 124 | 127 | 319 | 338 | 38.2 | 188 | 183 | 362 | 300 | 56.0 |
| 29 Nov | 1041 | 6.5 | 0.3 | 149 | 104 | 386 | 317 | 36.0 | 138 | 140 | 197 | 251 | 62.1 | 132 | 117 | 254 | 207 | 54.0 | 142 | 153 | 216 | 398 | 48.0 |
| 30 Nov | 0000 | 7.0 | 0.3 | 156 | 142 | 363 | 408 | 38.7 | 109 | 137 | 210 | 228 | 56.2 | 93 | 202 | 221 | 504 | 40.7 | 146 | 155 | 280 | 279 | 53.8 |
| 20 Dec | 1035 | 0.9 | 13.9 | 62 | 72 | 276 | 288 | 23.8 | 72 | 66 | 99 | 111 | 65.7 | 76 | 94 | 241 | 191 | 39.4 | 124 | 136 | 237 | 253 | 53.1 |
| 21 Dec | 1002 | 1.6 | 12.3 | 51 | 73 | 205 | 201 | 30.5 | 52 | 79 | 96 | 123 | 59.8 | 89 | 84 | 182 | 243 | 40.7 | 159 | 123 | 428 | 247 | 41.8 |
| 4 Jan | 1000 | 1.6 | 15.8 | 63 | 70 | 98 | 91 | 70.4 | 61 | 62 | 78 | 69 | 83.7 | 81 | 82 | 149 | 101 | 65.2 | 107 | 71 | 122 | 108 | 77.4 |
| 6 Jan | 0002 | 1.5 | 17.9 | 40 | 121 | 125 | 264 | 41.4 | 83 | 101 | 126 | 113 | 77.0 | 172 | 115 | 266 | 192 | 62.7 | 93 | 88 | 162 | 133 | 61.4 |

[a]Military time.

[b]Intake temperature before tempering.

[c]Number of dead organisms observed in each sample.

[d]Total number of organisms observed in each sample.

[e]Mean % dead equal to total of dead observed in R-1 and R-2 divided by total organisms observed in R-1 and R-2.

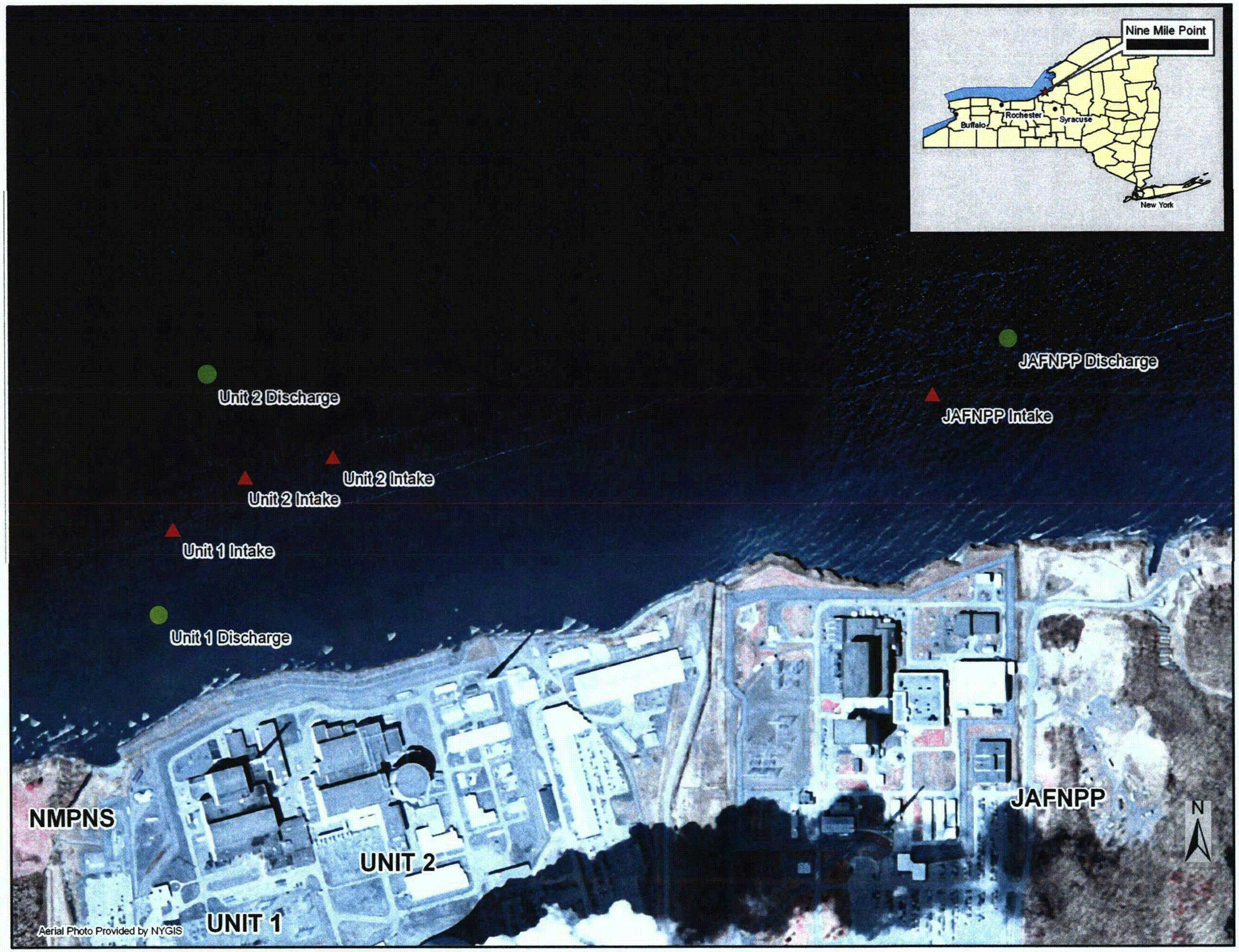
†Samples taken in actual discharge plume rather than simulated

Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

Reference for RAI E-1-h-1


Nine Mile Point
Buffalo
Rochester
Syracuse
New York
JAFNPP Discharge
JAFNPP Intake
Unit 2 Discharge
Unit 2 Intake
Unit 2 Intake
Unit 1 Intake
Unit 1 Discharge
NMPNS
UNIT 2
UNIT 1
JAFNPP
N
Aerial Photo Provided by NYGIS

Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

Reference for RAI E-1-h-2

**Figure E-1-h-2**

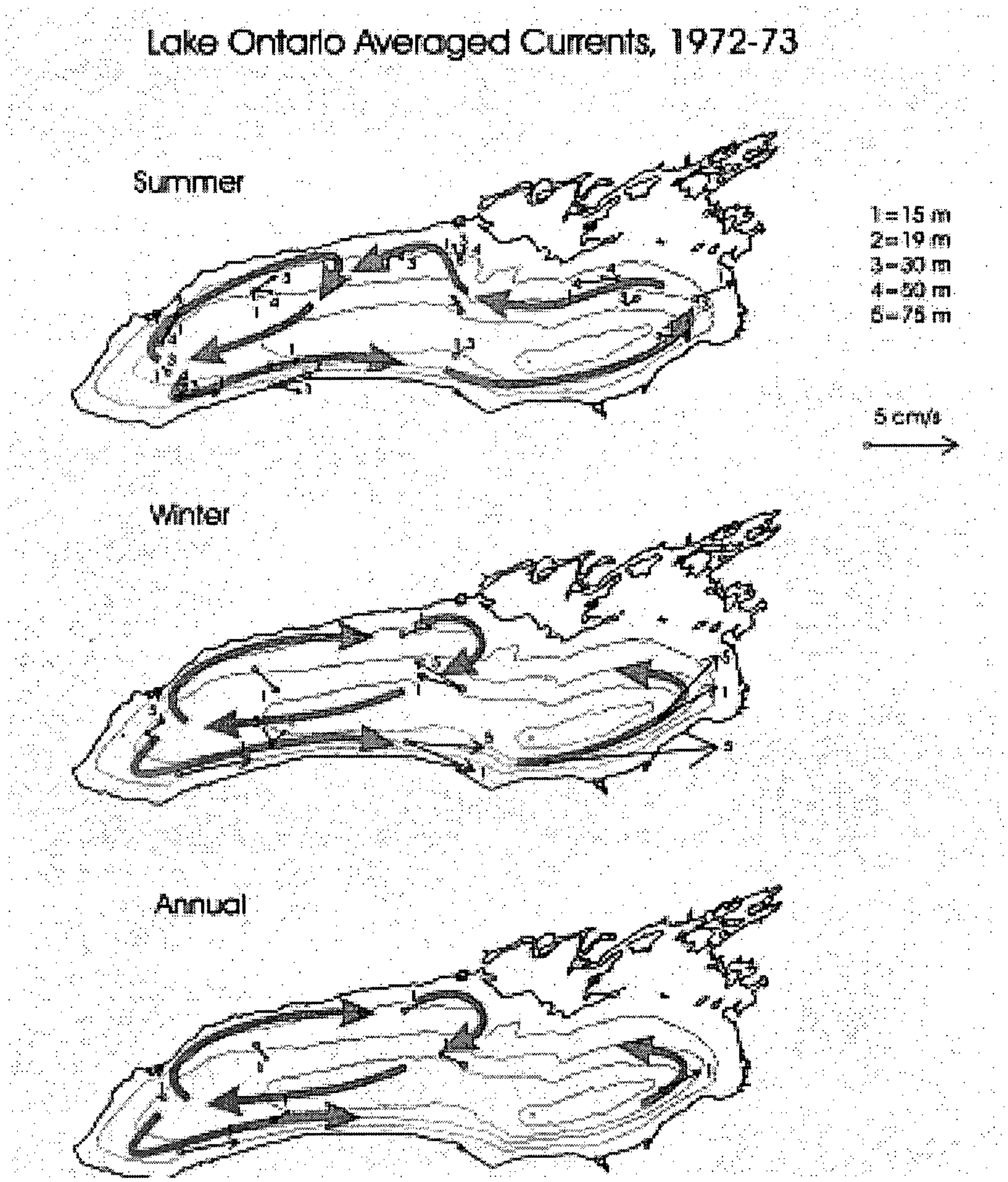



Figure E-1-h-2: Lake Ontario water circulation patterns

Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

Reference for RAI E-1-h-3

**Figure E-1-h-3**

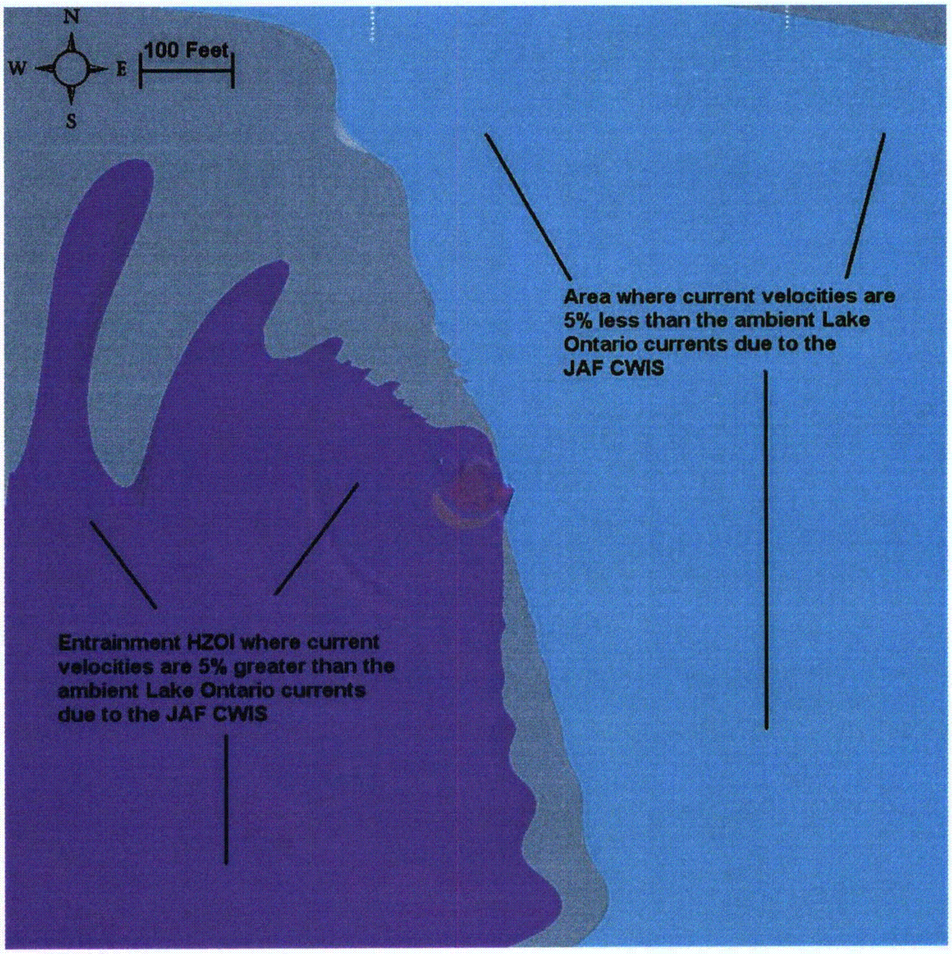



Figure E-1-h-3. Shape and Dimensions of the Hydraulic Zone of Influence for the JAFNPP Cooling Water Intake near nine Mile Point of Lake Ontario.

Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

Reference for RAI E-1-h-4

# HYDRAULIC ZONE OF INFLUENCE (ESTIMATED CALCULATION)

## SUPPORTING THE SAMPLING PLAN INCLUDED WITHIN THE PROPOSAL FOR INFORMATION COLLECTION CLEAN WATER ACT §316(b) PHASE II REGULATIONS

## JAMES A. FITZPATRICK NUCLEAR POWER PLANT (SPDES PERMIT NO. NY 0020109) LYCOMING, NEW YORK

***Submitted By***

Entergy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**277 Lake Road East**
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***Prepared In Consultation with***


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**Kennesaw, GA 30144**

**25 Nashua Road**
**Bedford, NH 03110-5500**


**8 March 2006**

| ALION SCIENCE AND TECHNOLOGY | Design Calculations and Analysis Cover Sheet | | | |
|---|---|---|---|---|
| | Form 3.4.1 | Revision: 2 | Effective: 6/28/05 | Pg. 1 of 1 |

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|---|---|---|
| Document No: ALION-CAL-ENER-3161-01 | Revision: 0 | Page 1 of 37 |
| Document Title: Fitzpatrick CWIS CFD Analysis Calculation | | |
| Project No: 262-0-3161 | | |
| Project Name: Intake Flow Distribution for Fitzpatrick Electric Power Generation Plant | | |
| Client: Enercon Engineering Services Incorporated | | |

Document Purpose/Summary:

The purpose of this document is to present the inputs, assumptions, methodology, and results of a single computational fluid dynamics (CFD) calculation. This calculation was performed to predict the hydraulic zone of influence (HZOI) for the James A. Fitzpatrick Nuclear Power Plant CWIS (cooling water intake structure) as part of the U.S. EPA's Clean Water Act, Section 316b. Based on the CFD analysis, the HZOI is estimated and shown as iso-surfaces around the CWIS.

All software used in the preparation of this calculation was done so in accordance with QAP 3.5, *Use of Computer Software and Error Reporting* latest revision.

Preparer Signature: ______________________ Date: 3/7/06

| Design Verification Method: | QA Applicability Level: |
|---|---|
| _x_ Design Review | ___ Nuclear Safety Related |
| ___ Alternative Calculation | ___ Quality Significant |
| ___ Qualification Testing | _x_ Nuclear Non-Safety Related |

Professional Engineer (if required) Approval ______________________ Date ________

| | Printed/Typed Name | Signature | Date |
|---|---|---|---|
| Prepared By: | Joseph Tezak | | 3/7/06 |
| Reviewed By: | Timothy Sande | | 3/7/06 |
| Approved By: | Joseph Smith | | 3/8/06 |

| Revision | Description |
|---|---|
| 0 | Original Document Issue |
| | |
| | |

# TABLE OF CONTENTS

## LIST OF FIGURES

## DEFINITIONS AND ACRONYMS

| Acronym | Definition |
|---|---|
| CAD | Computer Aided Drafting |
| CFD | Computational Fluid Dynamics |
| CWIS | Cooling Water Intake Structure |
| EPA | Environmental Protection Agency |
| FPS | Feet per Second |
| GPM | Gallons per Minute |
| HZOI | Hydraulic Zone of Influence |
| JAF | James A. Fitzpatrick |
| QA | Quality Assurance |
| RNG | Renormalized Group Theory |
| STL | Stereolithography |

# 1 PURPOSE

The purpose of this document is to present the inputs, assumptions, methodology, and results of a single computational fluid dynamics (CFD) calculation. This calculation was performed to predict the hydraulic zone of influence (HZOI) for the James A. Fitzpatrick (JAF) Nuclear Power Plant CWIS (cooling water intake structure) as part of the U.S. EPA's Clean Water Act, Section 316b.

The (HZOI) of an intake extends through that portion of a source water body that is affected by the intake flows. In the context of the 316(b) rule, the primary reason for determining an intake's HZOI is to establish where water entering the intake comes from and to use this information to improve the design of biological sampling programs meant to assess the impact of the intake's operation on organisms found in the surrounding areas. For example, the results of the CFD model can be used to determine local velocities in the vicinity of the CWIS. These velocities can, in turn, be compared to sustained and burst swimming speed data for organisms living near the CWIS and the likelihood for the entrainment determined.

This report defines the HZOI boundary for entrainment and impingement at the JAF intake structure. The HZOI boundary for entrainment of fish eggs and larvae is defined in this report as the calculated Lake Ontario nearfield current velocity that is 5% or greater than ambient lake currents due to the influence of the JAF CWIS. The HZOI boundary for impingement of juvenile and older fish is defined in this report as the calculated Lake Ontario nearfield current velocity that is 0.5 feet per second (fps) or more greater than ambient lake currents due to the influence of the JAF CWIS. The ambient conditions and CWIS operating conditions are defined in Section 2.

## 2 DESIGN INPUT AND ASSUMPTIONS

This section lists the design inputs used in the debris transport analysis, as well as the major assumptions made.

1) CAD Input
    a. The Fitzpatrick CWIS dimensions were obtained from various drawings [1].
2) CFD Model
    a. The water intake flow rate was set to 388,600 gpm [Attachment 2].
    b. The lake bottom elevation at the intake structure was set as 218.8'. The bottom of the intake opening was set at 222.8'. The top of the intake was set to 232.8'. The water level was set at 246.8', or an elevation of 14' above the top of the intake [Attachment 1].
    c. The water temperature used for the analysis was 54° F which represents the average measured water temperature for 2004 [Attachment 3]. This temperature gives a fluid density of 62.40 $lb/ft^3$ and a fluid viscosity of $8.2593x10^{-4}$ slug/ft/sec. Experience has shown that a large change in water temperature has little to no effect on the results of the CFD calculation.
    d. The lake bottom was modeled as a simple grade of 2° from the shoreline out toward the center of the lake [Attachment 2].
    e. The Fitzpatrick CWIS sits in the southeast portion of Lake Ontario, which has a general counter-clockwise circular flow at an average of 0.29 fps [Attachment 2]. Given this, the western and southern boundaries were set as velocity boundary conditions with a velocity of 0.29 fps introduced at an angle of 20° northeast of the east-west centerline. Also, the entire fluid domain was initialized at this velocity as well. This will be discussed in greater detail in Section 4.3.

## 3 METHODOLOGY

The steps taken to accomplish the Fitzpatrick CWIS analysis were:

1. A 3-dimensional model of the Fitzpatrick CWIS was created using computer aided drafting (CAD) software based on building drawings. The CAD model was then incorporated into the CFD model.
2. The mesh in the CFD model was nodalized to sufficiently resolve the features of the CAD model, but at the same time keep the cell count low enough for the simulation to run in a reasonable amount of time.
3. Boundary and initial conditions in the CFD model were defined consistent with the intake location and flow rate and the lake depth, temperature, and velocity.
4. At the CWIS intake pipe, a mass sink was added to the model to remove the appropriate amount of water.
5. The appropriate turbulence modeling equations were selected for the CFD model.
6. A single calculation was carried out to achieve a steady-state condition. After running the CFD calculation, the mean kinetic energy was checked to verify that the model had been run long enough to reach steady-state conditions.
7. A graphical determination of the HZOI was made from the velocity fields calculated in the CFD calculations.

The CFD calculation for the Fitzpatrick CWIS model was performed using Flow-3D® Version 9.0. Flow-3D® is a commercially available general-purpose computer code for modeling the dynamic behavior of liquids and gasses influenced by a wide variety of physical processes. The program is based on the fundamental laws of mass, momentum, and energy conservation. It has been constructed for the treatment of time-dependent multi-dimensional problems, and is applicable to most flow processes.

# 4 ANALYSIS

Following the basic methodology presented in the previous section, the Fitzpatrick CWIS and subsequent flow patterns produced were analyzed.

## 4.1 CAD Model

The first step in the analysis was to construct a 3-dimensional CAD model of the CWIS. This was done using Autodesk's Inventor® version 10 software based on structural drawings [1]. The CAD model was built from the bottom (elevation 218.8') to the top (elevation 232.8') of the CWIS. The lake bottom was modeled as a simple grade of 2° from the shoreline out toward the center of the lake. These files were exported to a stereolithography (STL) format to be used as input for the CFD model. Figures 4.1.1 through 4.1.4 show various views of the structural information contained in the STL files.

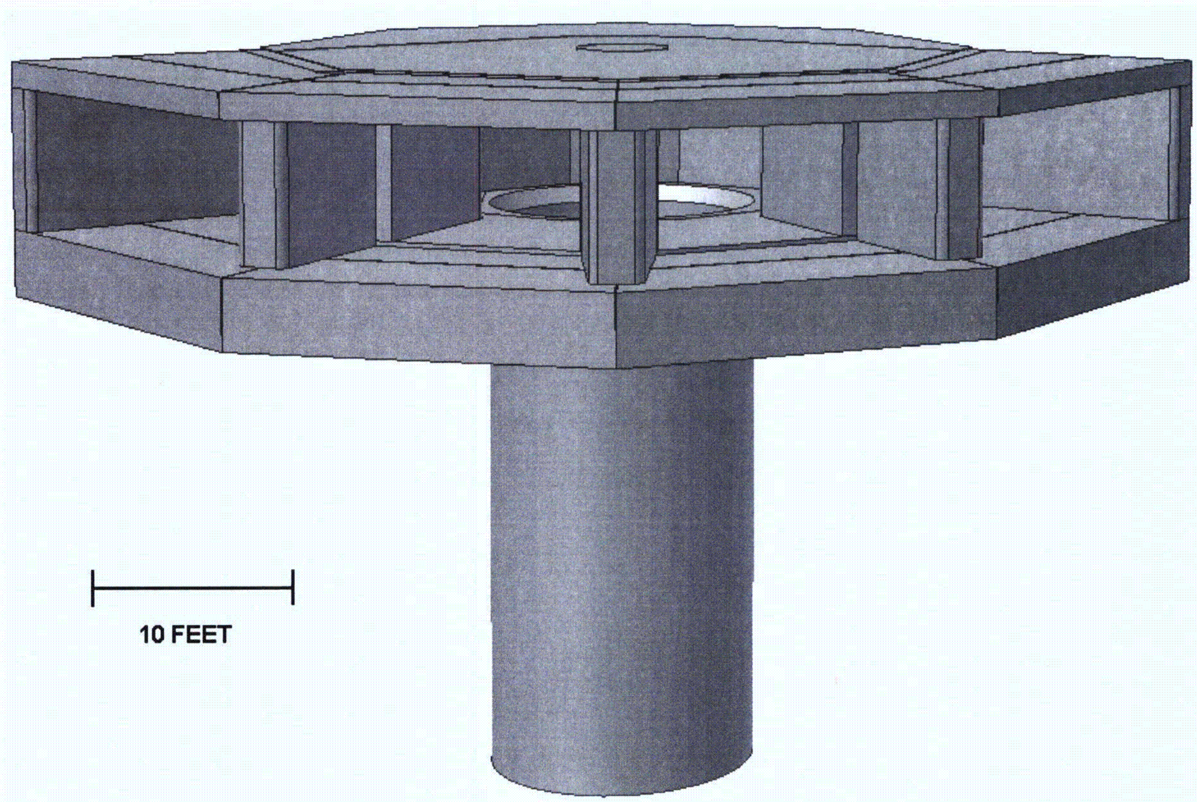


**Figure 4.1.1 – Intake Structure View From Shore Looking North**

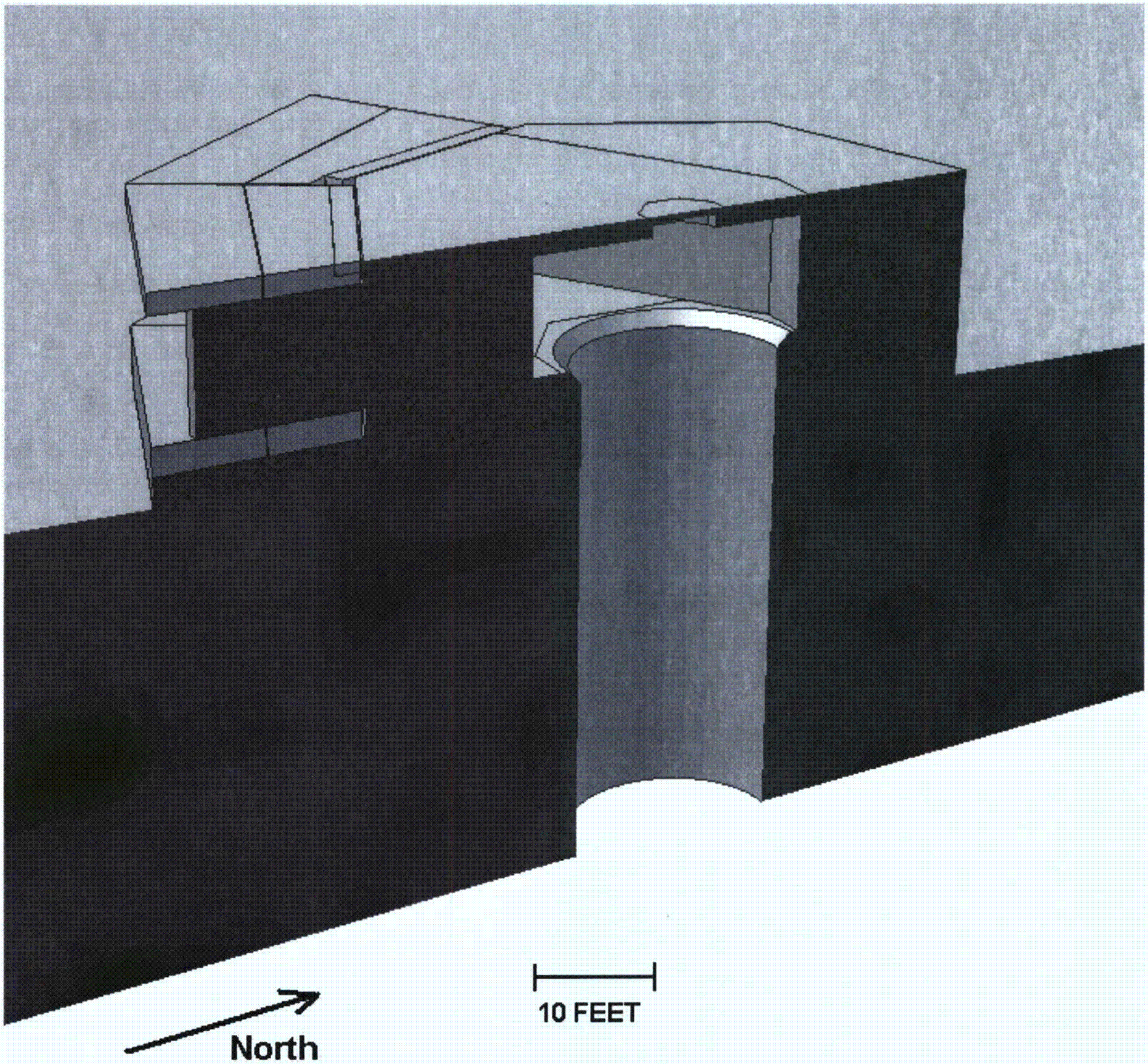


**Figure 4.1.2 – Intake Structure Cut-Away Viewed from the Southeast**

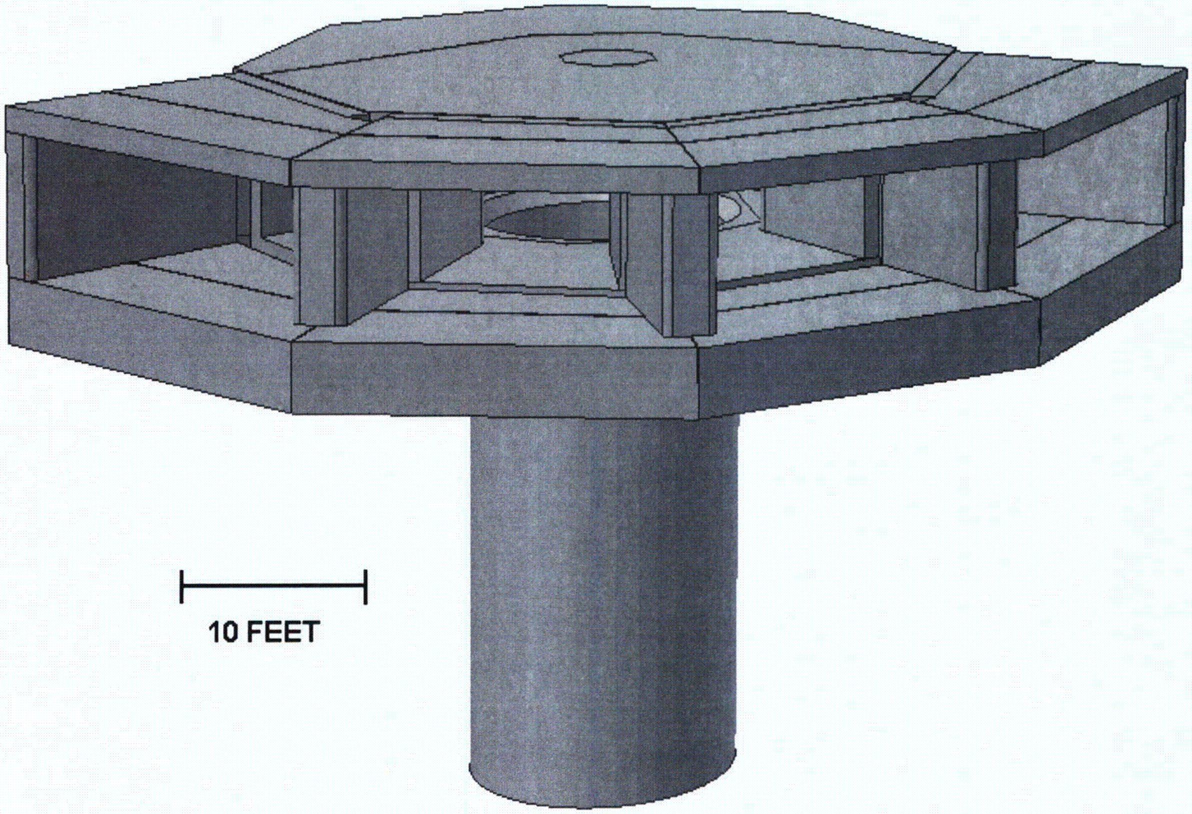


**Figure 4.1.3 – Intake Structure Southwest View from Shore**

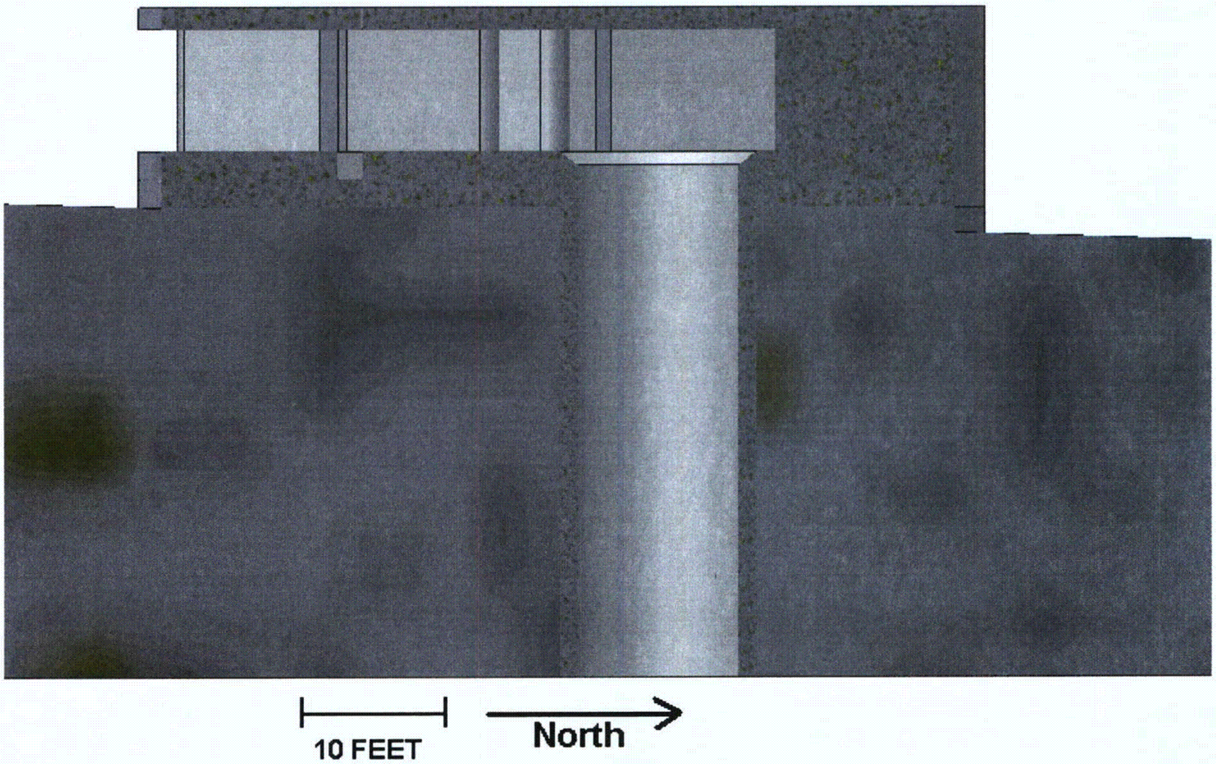


**Figure 4.1.4 – Intake Structure Section View from East Toward West**

## 4.2 Computational Mesh

Four rectangular meshes were defined in the CFD model. The first mesh was set to a resolution of 6" per cell in each direction that was fine enough to resolve the important features of the CWIS and the flow patterns generated by it, but not so fine that the simulation would take a prohibitively long period of time to run. The second mesh was set to a resolution of 1' per cell and bounded the inner mesh. The third mesh was set to 2' per cell and bounded both of the previous two meshes. The 1' and 2' meshes are in the problem to provide a transition from the smallest 6" mesh to the largest and final 4' mesh. Without the inner meshes, there would be too large a gap between the mesh sizes, which can cause numerical errors in the calculation. The final 4' per cell mesh extends 500 feet in each direction from the intake structure. The total number of cells in the problem is 2,943,480 and the computational extents of the problem are shown below in Figure 4.2.1. To summarize, the mesh configuration gives a resolution of 6" (red mesh) in the vicinity of the intake, a 1' resolution (green mesh) out to a distance of 80' in each direction from the intake, a resolution of 2' (blue mesh) out to a distance of 160' in each direction from the intake, and a resolution of 4' (black mesh) out to a distance of 500' in each direction from the intake. The mesh lengths have been labeled in a plan view in Figure 4.3.1.

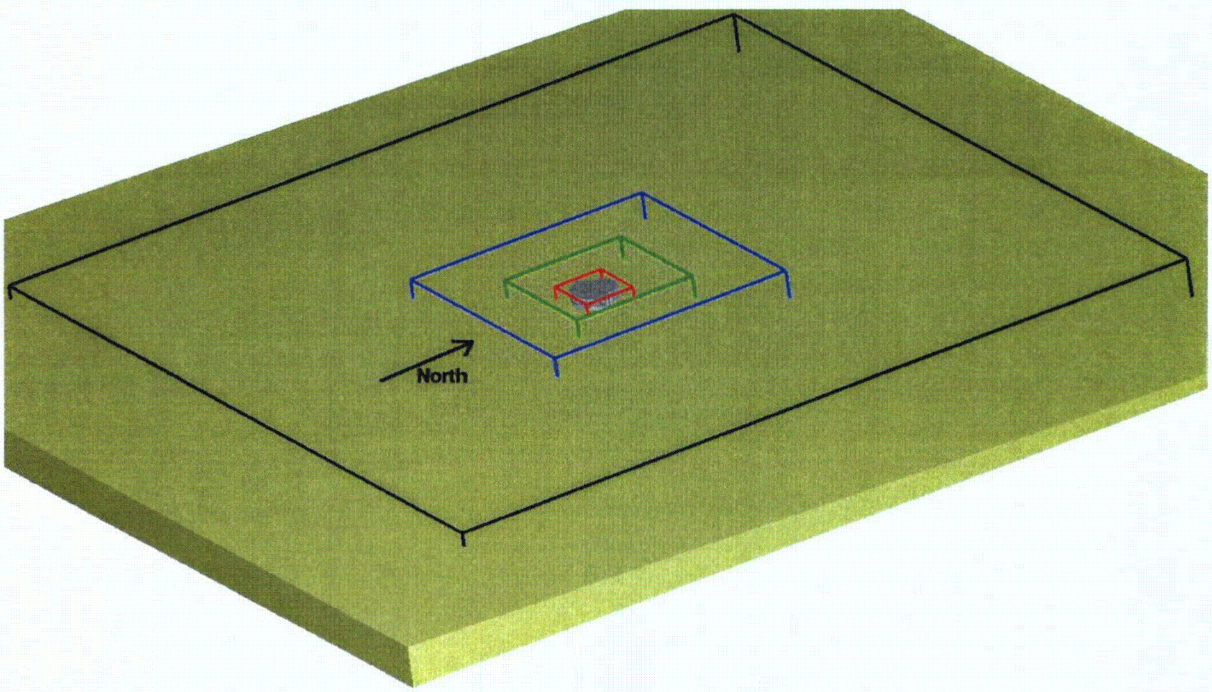


**Figure 4.2.1 – Mesh Configuration**

### 4.3 Boundary Conditions

Boundary conditions are set at the minimum and maximum bounds of the x, y, and z planes. The boundaries of the inner meshes are irrelevant as they are automatically set up as a continuation of the outer mesh. For the outer mesh, the minimum z boundary condition (lake floor) was set to a wall, however this boundary condition is irrelevant as the lake bottom acts as the fluid boundary. The maximum z boundary condition (above the water level) was set as a specified pressure boundary with a null value as the reference pressure for the calculation. The maximum x (west) and maximum y (north, away from shoreline) boundaries were set to pressure boundaries so that fluid could enter or leave the problem as needed. The minimum x (east) and minimum y (south, toward shoreline) boundaries were set as velocity boundary conditions to simulate the counter-clockwise flow of Lake Ontario. The boundaries (and entire initial fluid field) were given a velocity of 0.2725 fps in the x direction and a velocity of 0.0992 in the y direction. This creates velocity vectors that enter the domain and point to an angle of 20° northeast of the east-west centerline of the problem. This boundary condition is illustrated below in Figure 4.3.1. The colored lines are the same mesh boundaries as defined in Section 4.2.

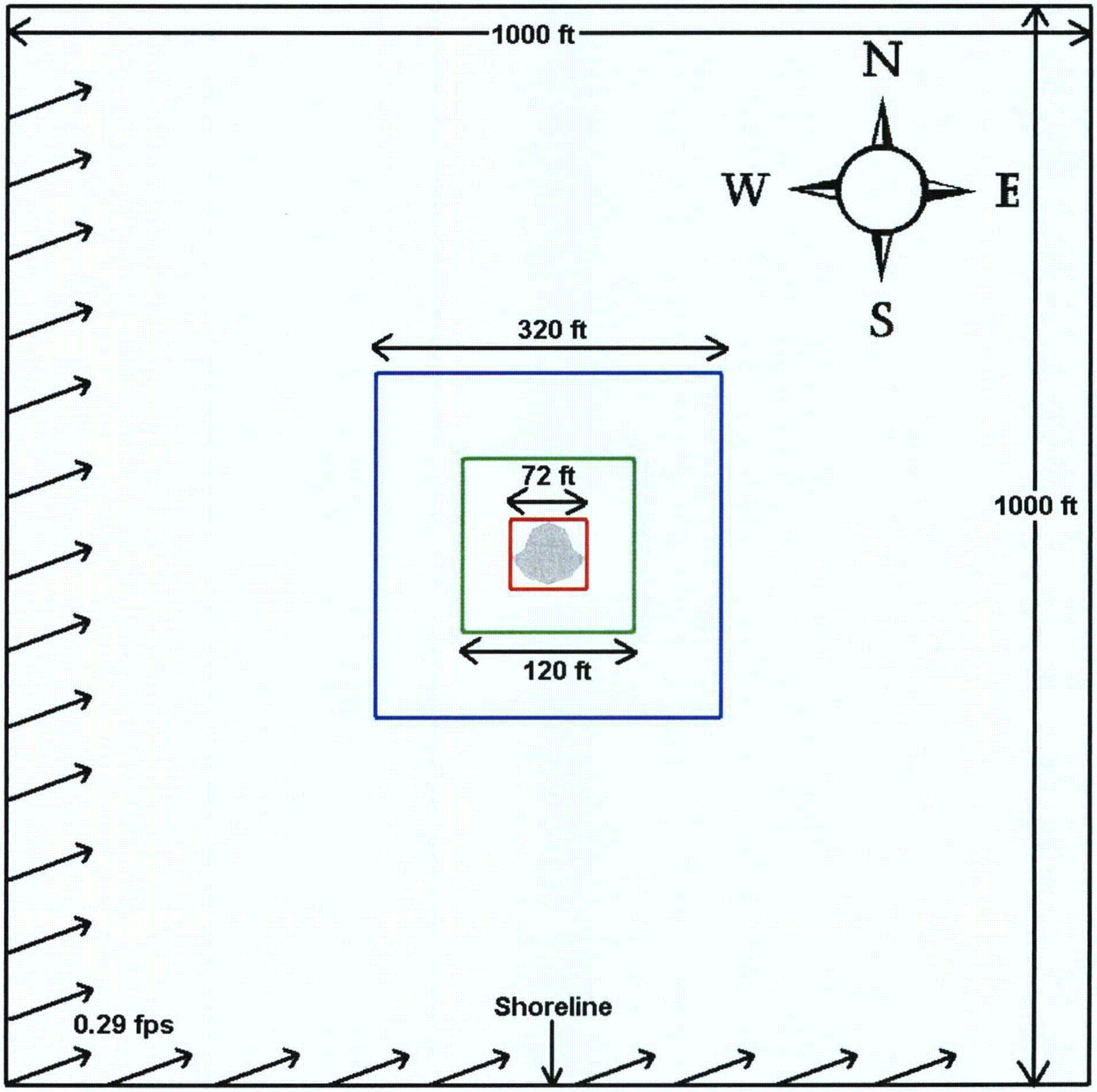


**Figure 4.3.1 – Velocity Boundary Conditions and Problem Setup**

### 4.4 Modeling of the Mass Sink

The Fitzpatrick CWIS draws in water at a flow rate of 388,600 gpm. A cylindrical mass sink was placed at the inlet pipe of the model to draw water through the intake and out of the lake. A "cap" was placed over the bottom of the mass sink in order to prevent it from drawing water out of the problem from the bottom of the intake. The mass sink's placement (blue cylinder) in the CWIS is illustrated below in Figure 4.4.1.

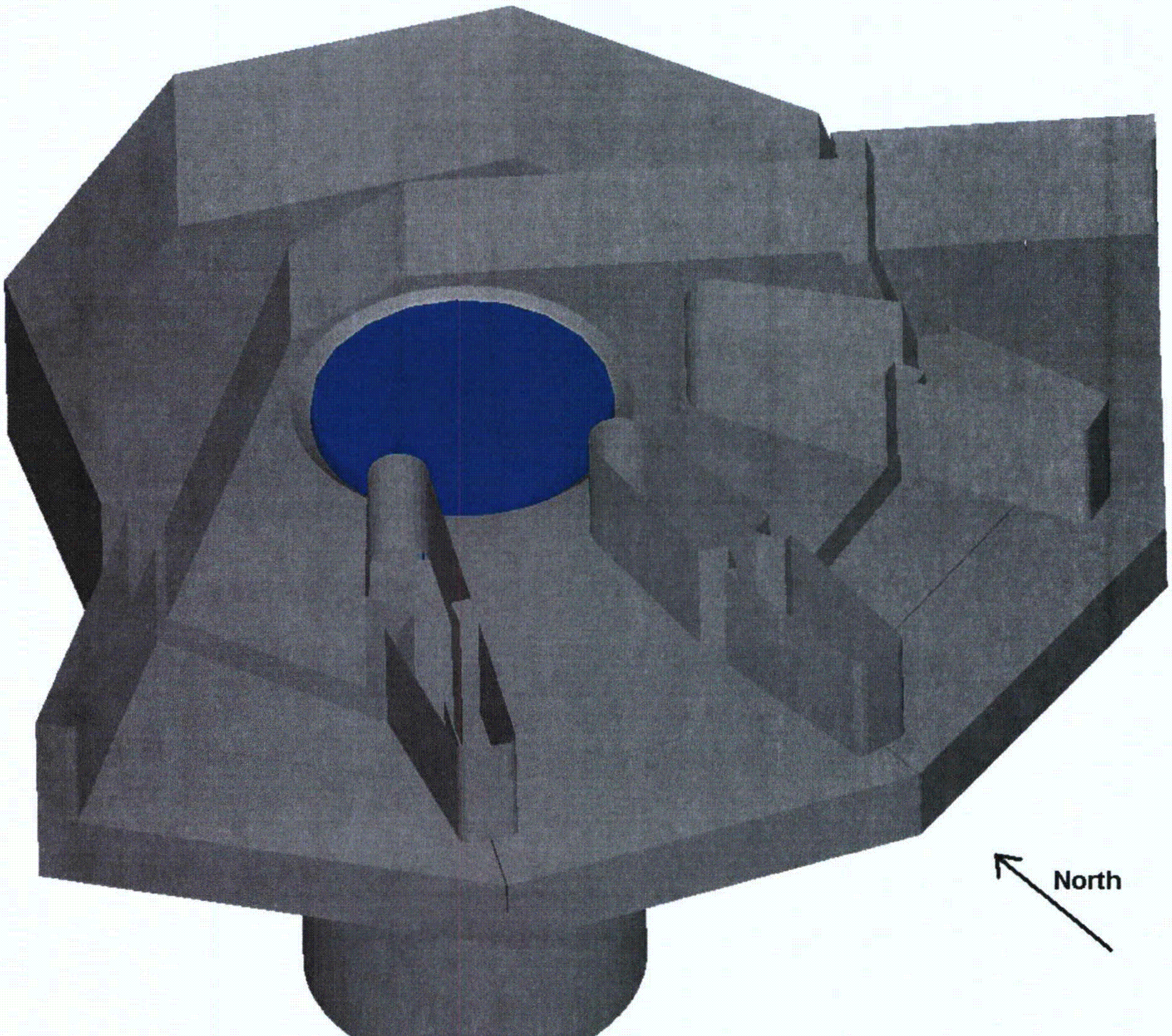


**Figure 4.4.1 – Mass Sink Location**

### 4.5 Turbulence Modeling

Several different turbulence modeling approaches can be selected for a Flow-3D® calculation. The approaches are (ranging from least to most sophisticated):

- Prandtl mixing length
- Turbulent energy model
- Two-equation k-ε model
- Renormalized group theory (RNG) model
- Large eddy simulation model

The RNG turbulence model was judged to be the most appropriate for this CFD analysis due to the large spectrum of length scales that exist in the lake model. The RNG approach applies statistical methods in a derivation of the averaged equations for turbulence quantities (such as turbulent kinetic energy and its dissipation rate). RNG-based turbulence schemes rely less on empirical constants while setting a framework for the derivation of a range of models at different scales. Sensitivity calculations have shown that Flow-3D® calculations utilizing the more sophisticated turbulence models (the RNG model included) give results that differ significantly from calculations utilizing the less sophisticated models. Differences in results between calculations made with the more sophisticated models have been shown to be slight.

## 4.6 Steady-State Calculation

The CFD calculation was initiated with a velocity condition described previously in Section 4.3. The calculation was run long enough for steady-state conditions to develop in order for the results to remain constant over time so the true effects of the CWIS could be analyzed. The time needed for the calculation to reach steady stated amounted to 50 seconds of real time, which took close to 6 days of computer time on a dual Opteron 870 Linux machine. Calculated mean kinetic energy in the flow field as a function of time is shown in Figure 4.6.1. When this parameter stops changing, it is a good indication that steady-state has been achieved and results will remain constant.

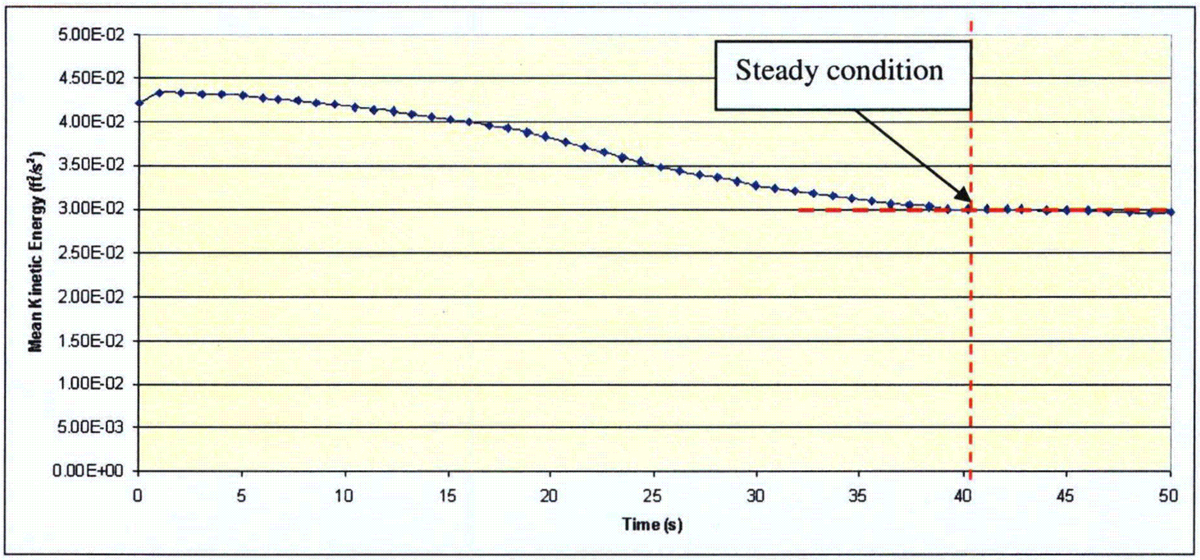


**Figure 4.6.1 – Mean Kinetic Energy Change Over Time**

## 4.7 Graphical Determination of the Hydraulic Zone of Influence

The following steps were taken to determine the HZOI for the Fitzpatrick CWIS.

- The intake was rendered along with velocity magnitude colored streamlines to illustrate where the water entering the intake was coming from and at what velocity it was being drawn in at.
- Colored velocity magnitude maps with x-y velocity unit vectors were created at horizontal elevations throughout the lake to show the velocity and flow direction of the lake.
- 3D iso-surfaces bounded by velocity magnitudes were created at various velocity values to show the near-field effects the intake is having on the lake.
- Velocity magnitude maps with colored contour lines were created at horizontal elevations throughout the lake to show the far-field extents of the effects the intake is having on the lake.
- Colored computational surfaces were created at various lake elevations that show the HZOI as a green area which is defined as an area which has a velocity magnitude greater than 5% of ambient.

## 4.8 CWIS Figures and Results

Figures 4.8.1 through 4.8.3 show an up close rendering of the CWIS with streamlines. The streamlines are seeded on a surface inside the CWIS. These figures show where the intake water is being drawn from. The streamlines are colored by absolute velocity magnitude (not relative to the lake current) where the maximum (red) value is set to 0.5 fps.

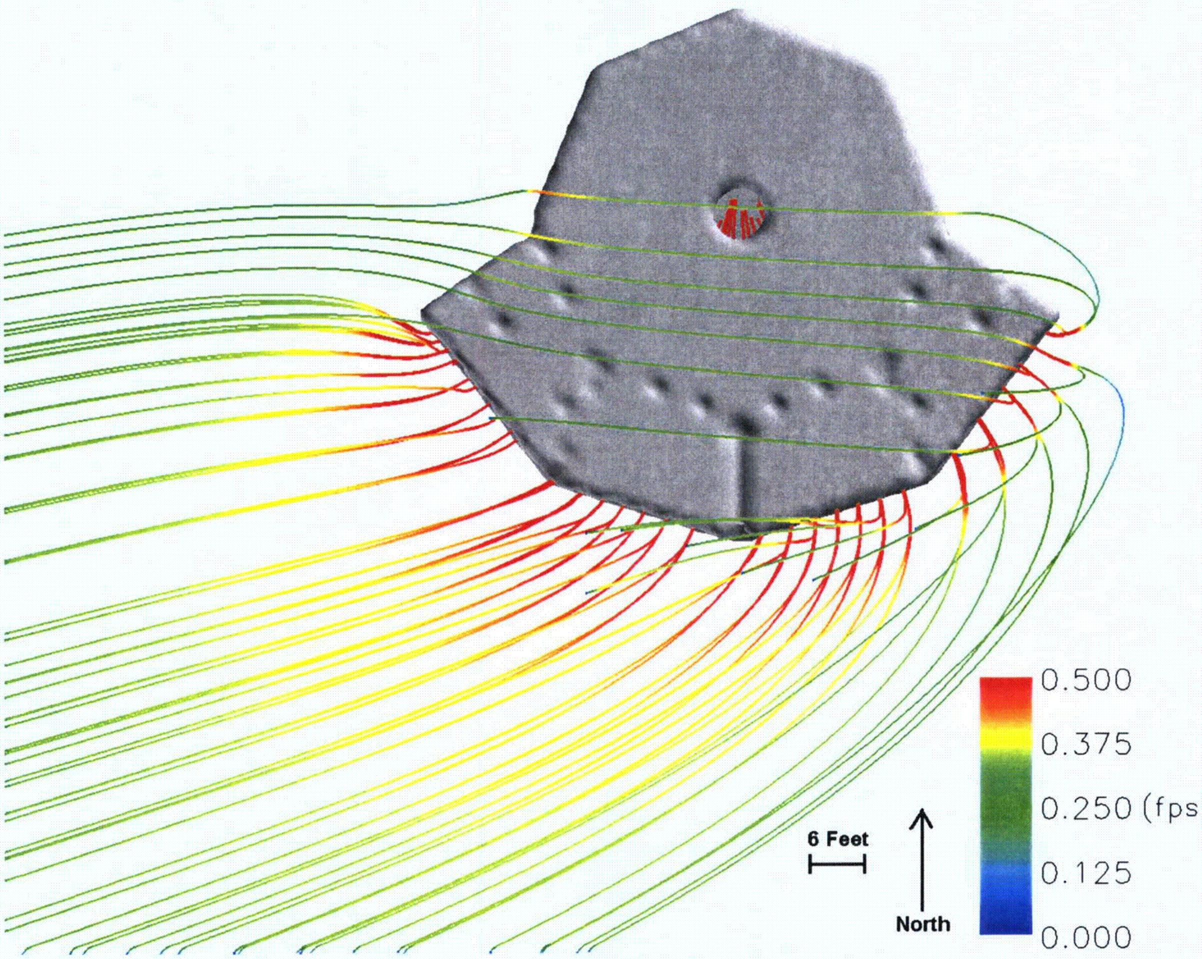


**Figure 4.8.1 – Absolute Velocity Magnitude Streamlines, Overhead View**

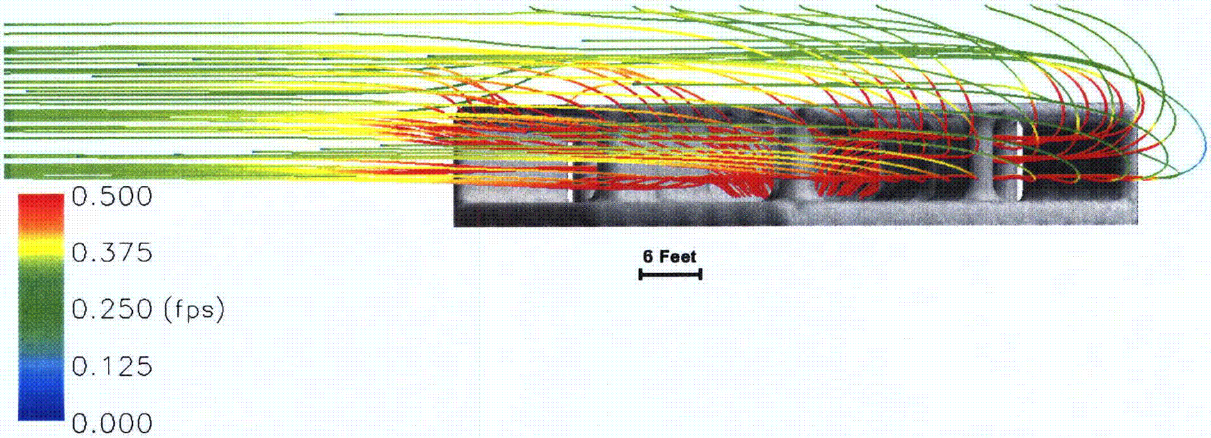


**Figure 4.8.2 – Absolute Velocity Magnitude Streamlines, Front View (North is Into Page)**

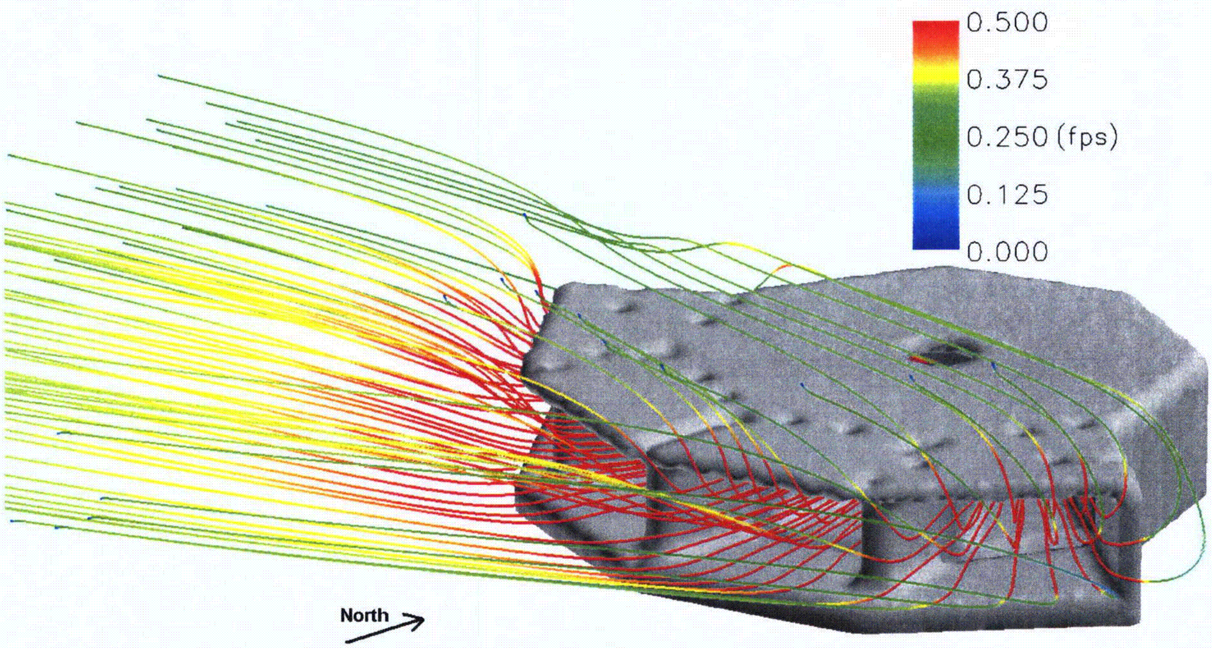


**Figure 4.8.3 – Absolute Velocity Magnitude Streamlines, Southeast View**

Figures 4.8.4 through 4.8.7 show horizontal slices of the lake at various elevations. The vectors are unit vectors representing the velocity magnitude in the x and y directions. The colored surface represents absolute velocity magnitude. Note that in Figures 4.8.4 and 4.8.5, the lake bottom slopes up toward the shore (south), this is the reason why the figure seems "cut off".

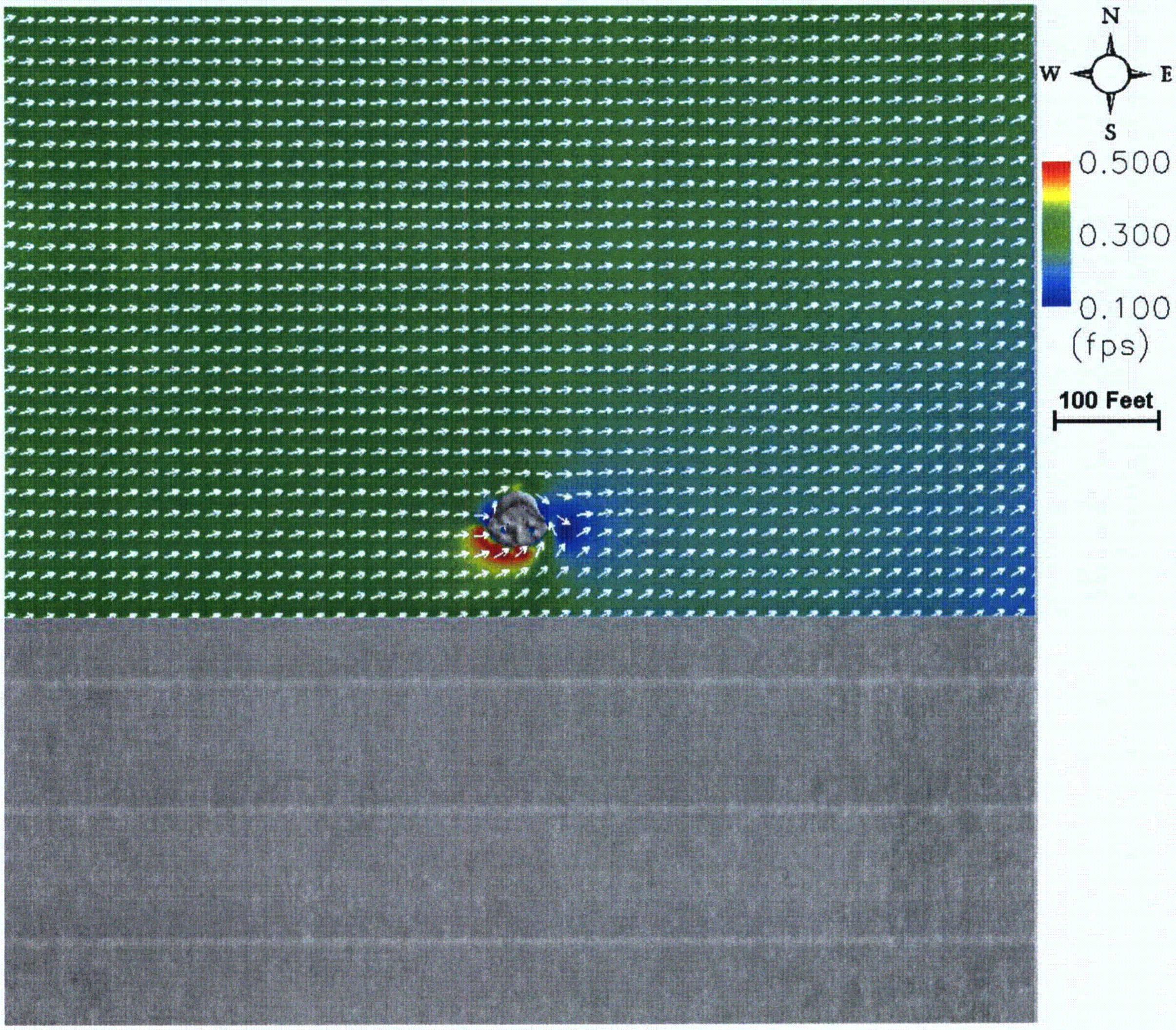


**Figure 4.8.4 – Absolute Lake Velocity Magnitude and Unit Vectors at Bottom of CWIS**

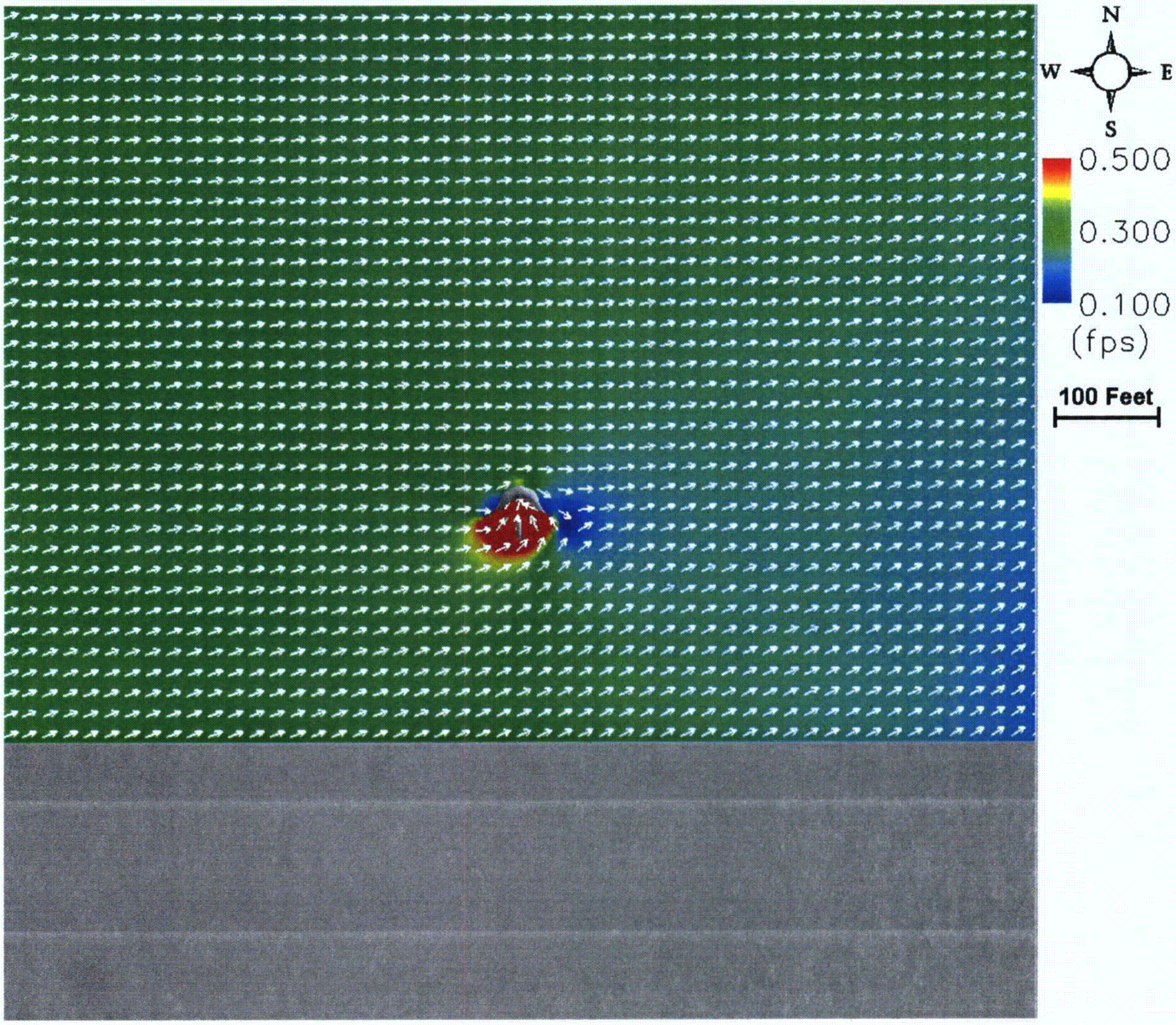


**Figure 4.8.5 – Absolute Lake Velocity Magnitude and Unit Vectors at Centerline of CWIS**

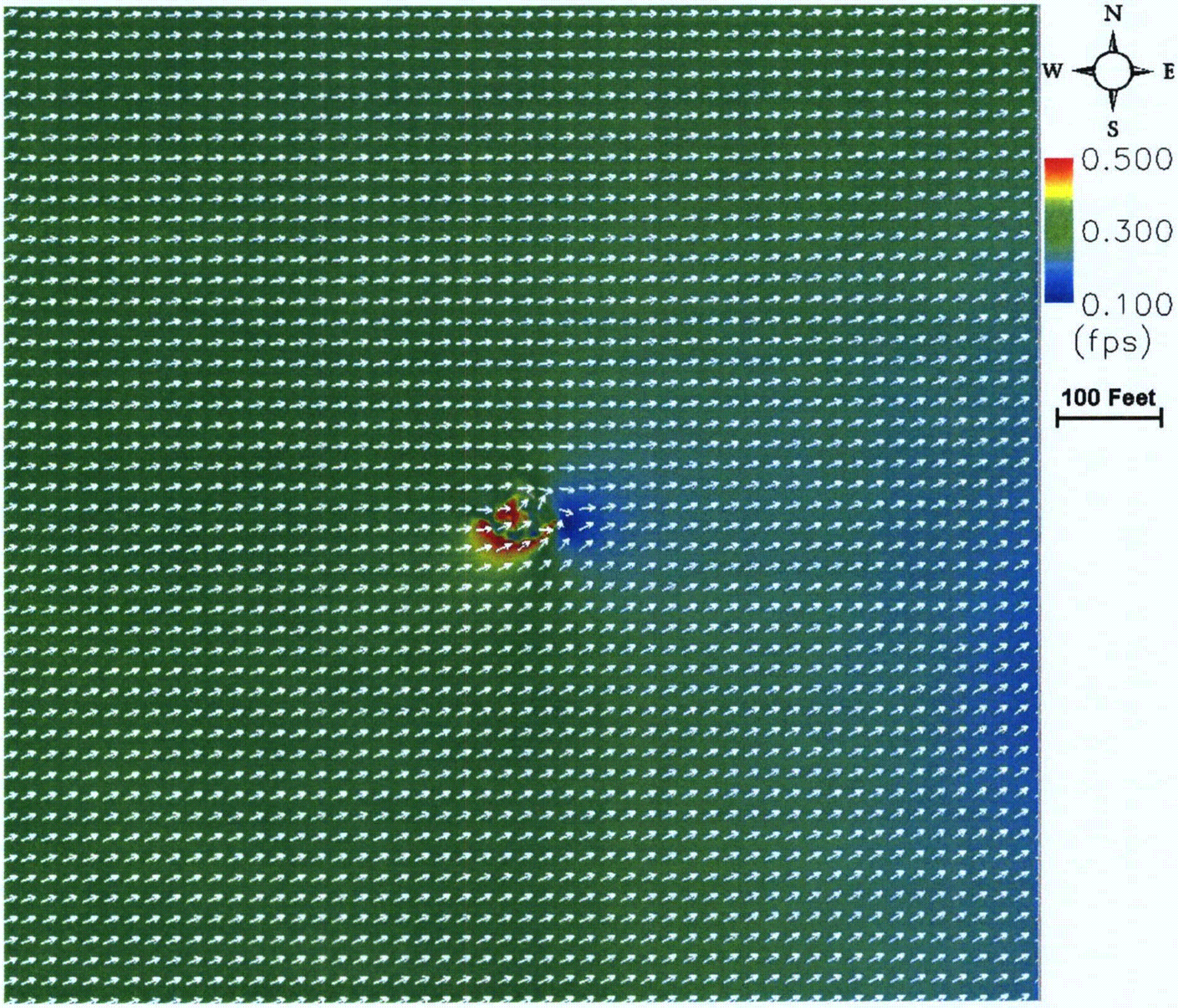


**Figure 4.8.6 – Absolute Lake Velocity Magnitude and Unit Vectors Just Above the CWIS**

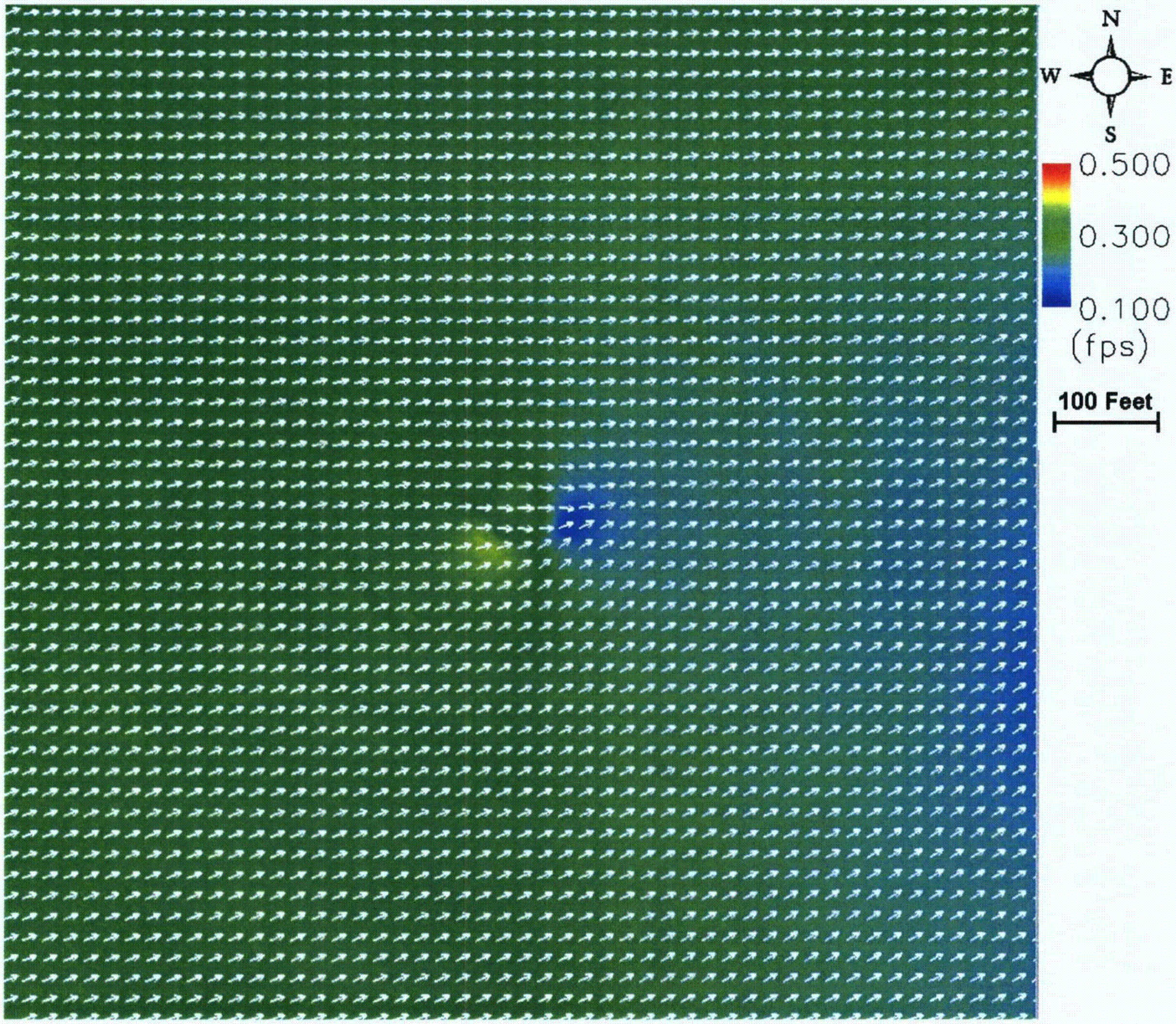


**Figure 4.8.7 – Absolute Lake Velocity Magnitude and Unit Vectors at Lake Surface**

Figures 4.8.8 through 4.8.10 show the CWIS and three iso-surfaces colored by velocity magnitude relative to the lake current. Keep in mind that the lake is flowing in at 0.29 fps toward the east and north of the intake. The inner red surface shows areas where the velocity magnitude is 1 fps or greater than ambient. The middle blue surface shows areas where the velocity magnitude is 0.5 fps or greater than ambient. The outer yellow surface shows areas where the velocity magnitude is 0.4 fps or greater than ambient.

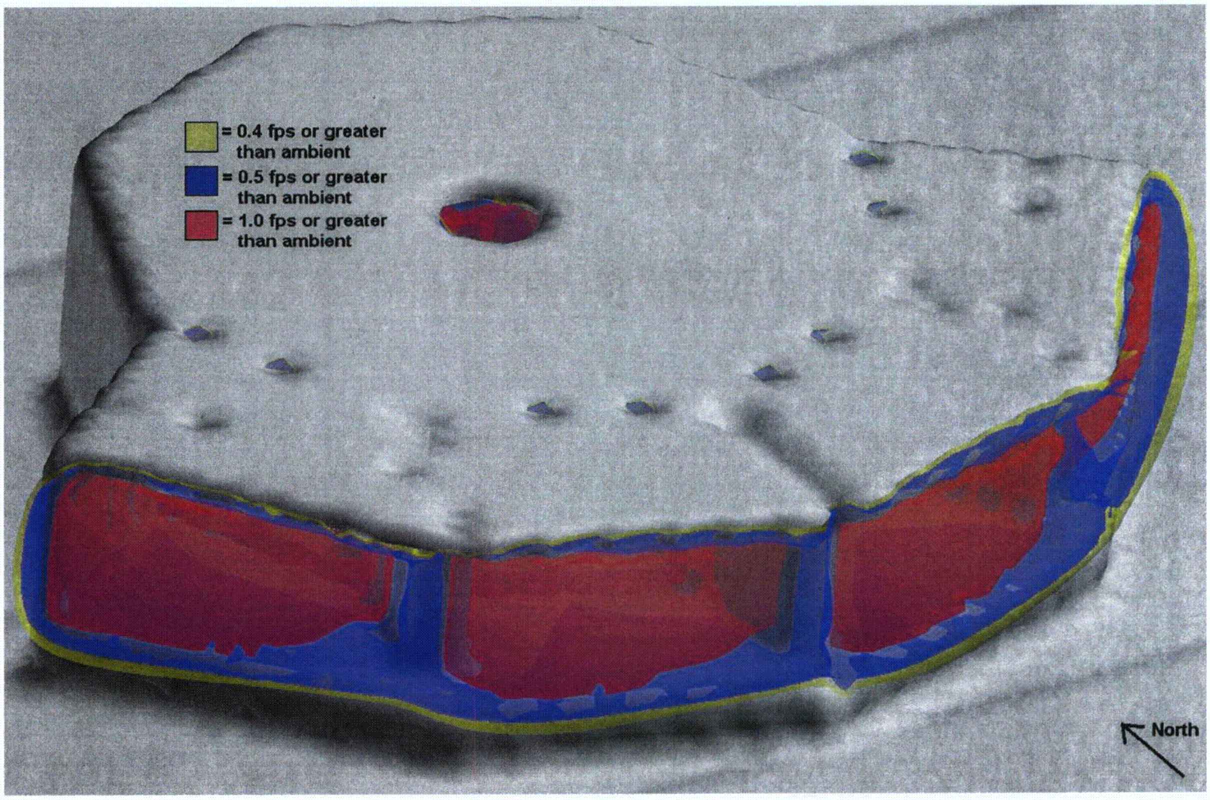


**Figure 4.8.8 – Southwest View of the Velocity Iso-Surfaces Showing the Impingement HZOI (0.5 fps above ambient is blue)**

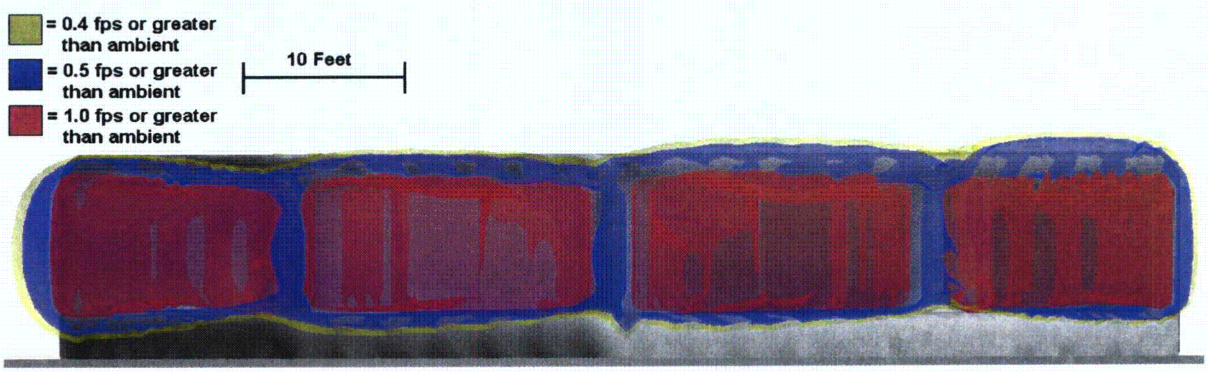


**Figure 4.8.9 – Front View of the Velocity Iso-Surfaces Showing the Impingement HZOI (0.5 fps above ambient is blue)**

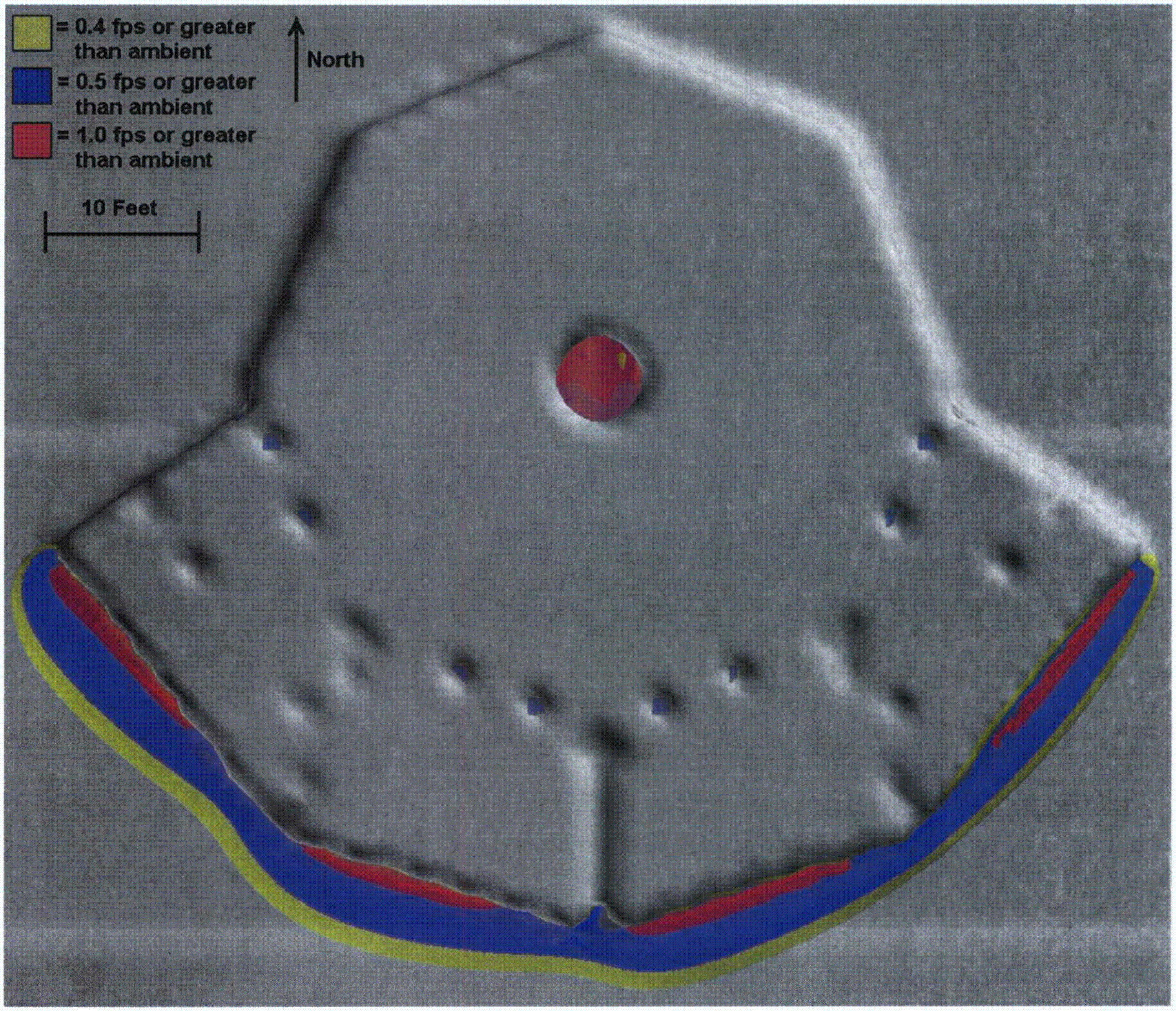


**Figure 4.8.10 – Top View of the Velocity Iso-Surfaces Showing the Impingement HZOI (0.5 fps above ambient is blue)**

Figure 4.8.10 shows the furthest distance from the intake structure for each velocity value. The furthest distance from the intake where the velocity due to the influence of the JAF CWIS is 0.4 fps or higher above ambient is 6 feet. The furthest distance from the intake where the velocity due to the influence of the JAF CWIS is 1 fps or higher above ambient is 1.5 feet. The furthest distance from the intake where the velocity due to the influence of the JAF CWIS is 0.5 fps or higher above ambient is 5 feet.

Figure 4.8.11 shows a zoomed out view of the previous 3 figures. The region in purple is the area of the entrainment HZOI, where the current velocities are greater than 5% above ambient Lake Ontario current due to the JAF CWIS. The region in light blue is the area where the current velocities are less than 5% below ambient Lake Ontario currents due to the JAF CWIS. This leaves the grey area which represents the area in which the current velocities are within ± 5% of the ambient Lake Ontario current.

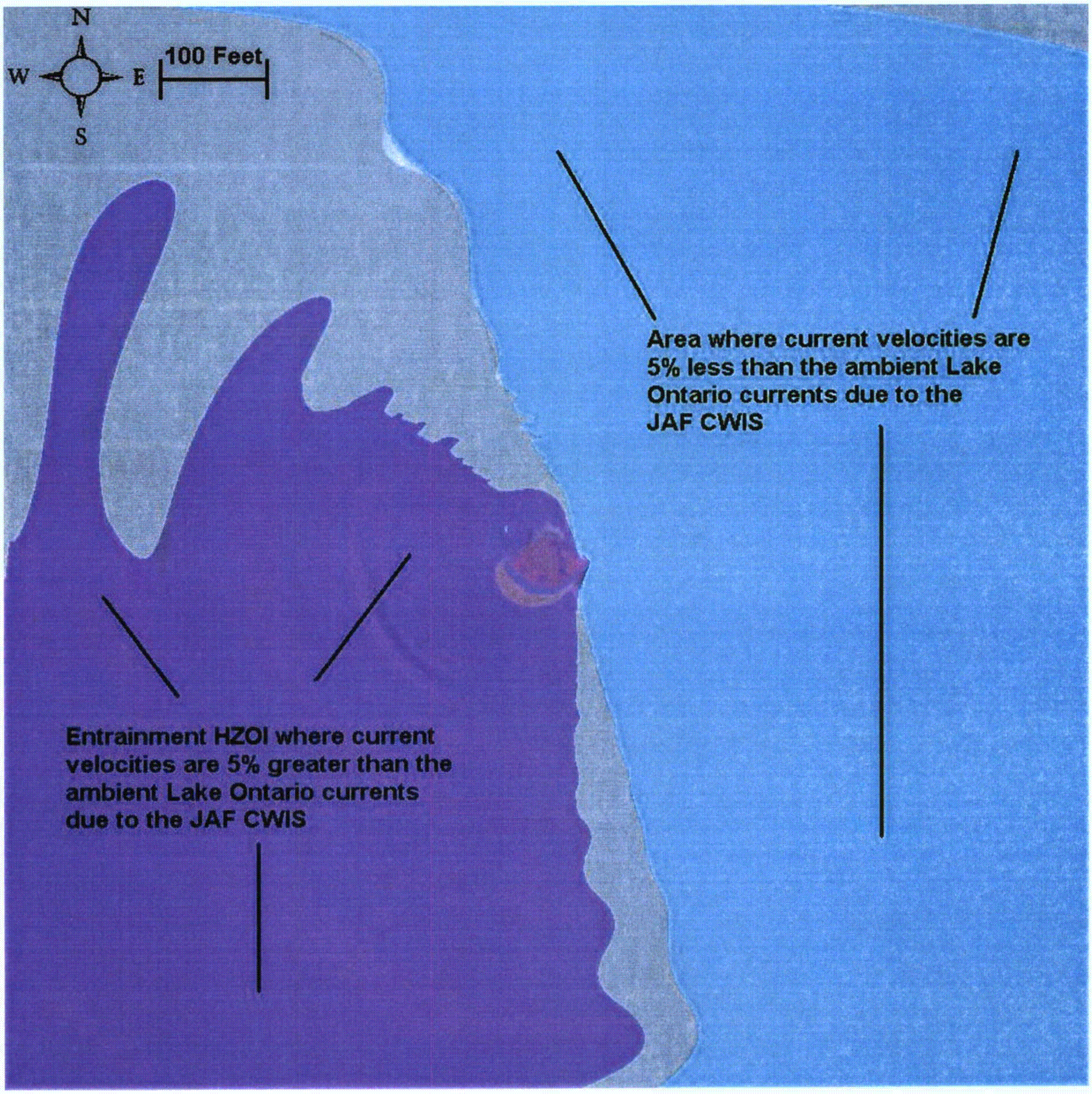


**Figure 4.8.11 – Velocity Iso-Surfaces, Top View**

Figures 4.8.12 through 4.8.14 show the entire range of the CFD problem at different elevations within the lake with colored contour lines spaced in .05 fps intervals from the ambient lake velocity of 0.29 fps. These figures show that water to the far west of the intake for the most part moves along at the ambient lake velocity of 0.29 fps or higher. As water approaches the intake from the west, it of course accelerates. Water to the immediate east, or downstream, of the intake drops down to a lower velocity as the suction of the intake draws against the current of the lake. This effect becomes less and less pronounced the further the water moves from the intake structure. Note that in Figure 4.8.12, the lake bottom slopes up toward the shore (south), this is the reason why the figure seems "cut off".

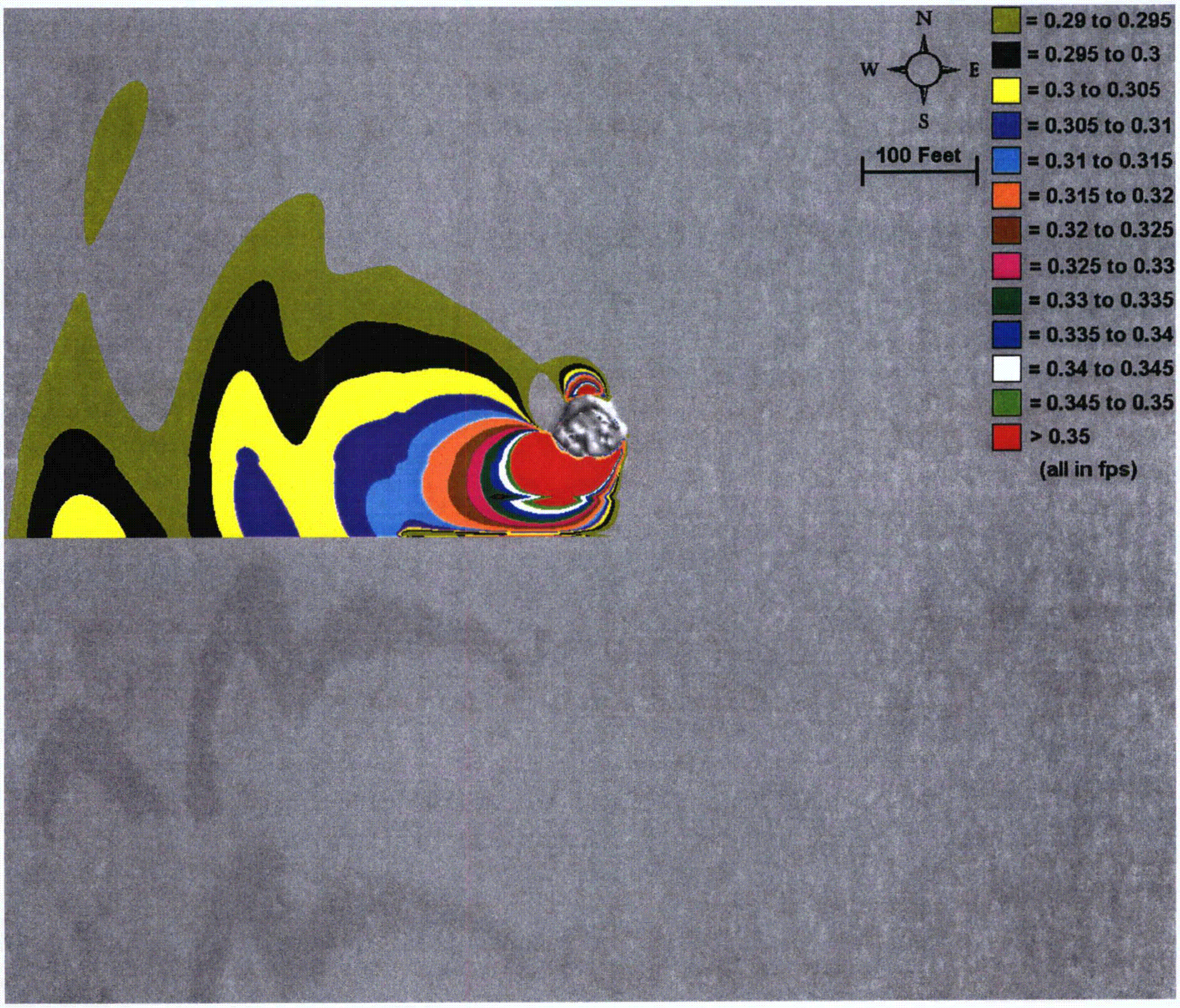


**Figure 4.8.12 – Absolute Velocity Magnitude Contours Above Ambient at Lake Bottom (Near CWIS)**

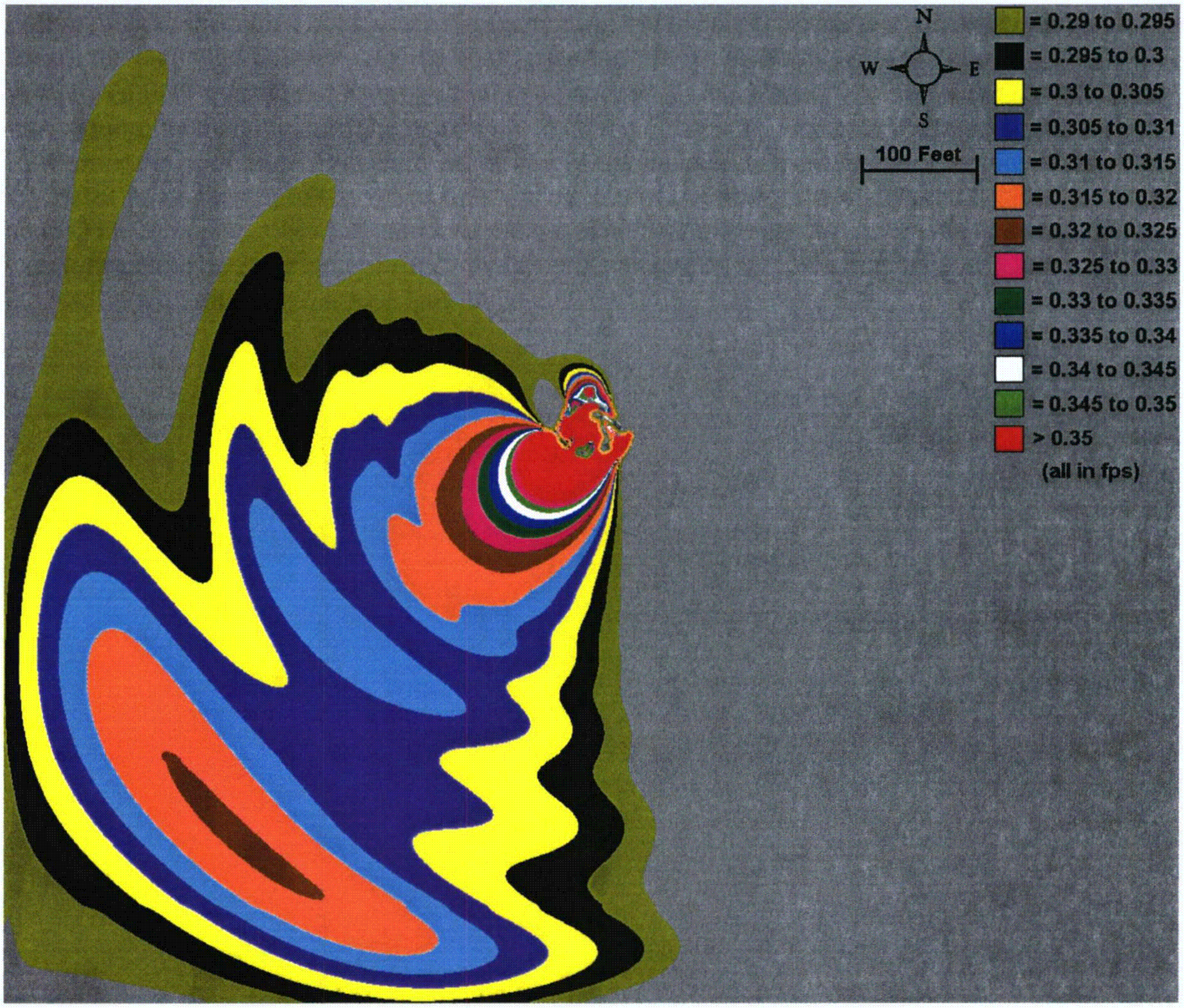


**Figure 4.8.13 – Absolute Velocity Magnitude Contours Above Ambient at Vertical Centerline of Lake**

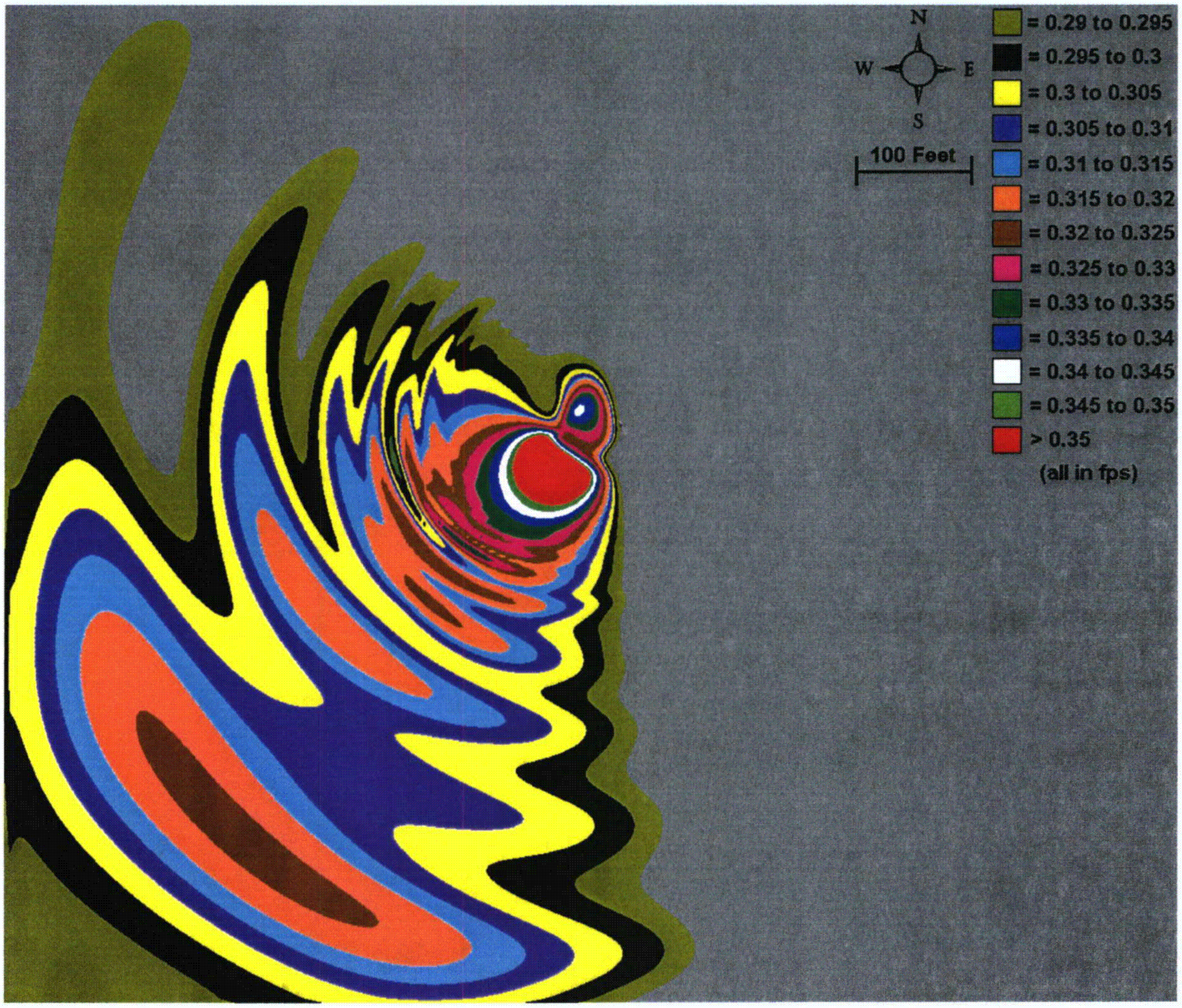


**Figure 4.8.14 – Absolute Velocity Magnitude Contours Above Ambient at Surface of Lake**

Figure 4.8.15 examines the low velocity area directly to the east of the intake structure at a higher resolution. The lowest velocities are experienced at the lake bottom elevation at the intake structure. This area of stall is centered approximately 10 feet east of the intake structure.


**Figure 4.8.15 – Absolute Velocity Magnitude Contours Below Ambient at Lake Bottom**

Figures 4.8.16 through 4.8.18 bound the entrainment HZOI (in green) as a value where the velocity magnitude is greater than 5% (0.3045 fps) of the ambient lake velocity (0.29 fps) at various elevation throughout the lake. Note that in Figure 4.8.16 the lake bottom slopes up toward the shore (south), this is the reason why the figure seems "cut off".


**Figure 4.8.16 – Area in which the Velocity Magnitude is Greater than 5% of Ambient at the Lake Bottom**

Figure 4.8.16 shows that the entrainment HZOI is approximately 30,011 ft$^2$ of the 1,000,000 ft$^2$ in the area near the CWIS at the lake bottom, or 3.0% of the total area, with a velocity 5% greater than the ambient velocity (0.29 fps) of the lake.


**Figure 4.8.17 – Area in which the Velocity Magnitude is Greater than 5% of Ambient at the Centerline of the CWIS**

Figure 4.8.17 shows that the entrainment HZOI is approximately 163,043 $ft^2$ of the 1,000,000 $ft^2$ in the area near the CWIS at the centerline of the CWIS, or 16.3% of the total area, with a velocity 5% greater than the ambient velocity (0.29 fps) of the lake.


**Figure 4.8.18 – Area in which the Velocity Magnitude is Greater than 5% of Ambient at the Lake Surface**

Figure 4.8.18 shows that the entrainment HZOI is approximately 162,716 $ft^2$ of the 1,000,000 $ft^2$ in the area near the CWIS at the surface of the lake, or 16.3% of the total area, with a velocity 5% greater than the ambient velocity (0.29 fps) of the lake.

# 5 SUMMARY AND CONCLUSIONS

The entrainment HZOI (> 0.01 fps above ambient) size varies at various lake elevations. At the lake bottom near the CWIS, only 30,011 $ft^2$, or 3.0% of the entire domain, has a velocity magnitude greater than 5% of the ambient lake current of (0.29 fps). At the centerline of the CWIS, only 163.043 $ft^2$, or 16.3% of the entire domain, has a velocity magnitude greater than 5% of the ambient lake current of (0.29 fps). At the lake surface, only 162.716 $ft^2$, or 16.3% of the entire domain, has a velocity magnitude greater than 5% of the ambient lake current of (0.29 fps).

Areas of higher velocity magnitude are concentrated directly in front of the intake structure, as would be expected. Three higher than ambient velocity values were identified and analyzed.

- A small area (red in Figure 4.8.10) that extends out approximately 1.5 ft (at the greatest) in front of the intake structure has a velocity of 1 fps over the ambient velocity of 0.29 fps.

- A small area (blue in Figure 4.8.10) that extends out approximately 5 ft (at the greatest) in front of the intake structure has a velocity of 0.5 fps over the ambient velocity of 0.29 fps. This area defines the impingement HZOI.

- A small area (yellow in Figure 4.8.10) that extends out approximately 6 ft (at the greatest) in front of the intake structure has a velocity of 0.4 fps over the ambient velocity of 0.29 fps.

Areas of lower velocity magnitude are concentrated to the east and west sides directly next to the intake structure. This zone would not be a good region to take representative samples of fish near the intake.

- The lower velocities are most pronounced at the lake bottom and are less pronounced, or non-existent, as the lake elevation increases.

- The lower velocity zone to the west of the CWIS can be attributed to the water current being drawn toward, and then stalling in, the "wedge" section of the intake to the northwest of where water is actually entering the structure.

- The lower velocity zone to the east of the CWIS can be attributed to the suction of the intake slowing the ambient current of the lake that resides in the downstream "shadow." This low velocity area is centered at a distance of 10 feet from the far eastern point of the CWIS.

# 6 REFERENCES

1) Intake Structure General Arrangement Drawing, Drawing Number 11825-FC-43B, Pages 1-4, Rev 3.

**ATTACHMENT A – DESIGN INPUT EMAIL #1**

The following information should help you develop the model.

Lake Bottom Elevation 218.8
Bottom of Intake Opening 222.8
Top of Intake 232.8
Average Water Level 246.8 (14 feet above top of CWIS)

I think I need to get you some additional CWIS drawing detail and Bathymetry Data. If I can not get the Bathymetry Data by end of day tomorrow, consider the water vector data as null. If I can not get you additional CWIS Drawing Detail by end of day tomorrow, please do the best that you can to model with assumptions. Call me to discuss your assumptions, but we can not let the due date slip.

Please give me a call on my cell phone today if you can.

Thank you for your effort and patience.

Vernon Thompson

**ATTACHMENT B – DESIGN INPUT EMAIL #2**

Joe,
This should explain some of the questions that you raised earlier. Use what you feel is appropriate and defendable. Key points include

- An approximate 4% slope at the intake structure
- Structure is Shore facing about 990 feet off shore
- Lake Ontario Circulation is approx .08 to .5 feet per second counter-clockwise
- Additional info on the bar rack configuration.

The offshore slope at the plant site is steep (5-10% grade) at the beach, flattening to a 2-3% grade at the 15 foot depth contour, then increasing to a 4% slope lakeward. Lake Ontario is relatively deep, with an average depth of 283 ft (86 m) and a maximum depth of 802 ft (244 m). Lake Ontario has a volume of approximately 390 $mi^3$ (1,626 $km^3$). The CWIS at JAF is a submerged, shore-facing, remote intake with a total design intake flow of 388,600 gallons per minute (gpm). The CWIS is shared primarily by the Circulating Water (CW) and Service Water (SW) systems, and is located about 990 feet from the shoreline of Lake Ontario at coordinates N43°31'37" and E76°23'49". The top of the CWIS is at elevation 232.8 feet, approximately 14 feet beneath the lake surface, which typically varies from elevation 244.0 feet to 248.0 feet. The intake consists of four segmented shore-facing openings, each 22 feet wide and 8 feet high, feeding a 14 foot diameter D-shaped intake tunnel that runs beneath the lake bed approximately 1,150 feet to the offshore screenwell and pumphouse. The base mat of the CWIS is at elevation 222.8 feet, approximately four feet above the lake bottom elevation of 218.8 feet.

The heated bar rack at the remote offshore intake consists of 3 inch by 2 inch rectangular vertical bars on 12 inch centers across each 22 foot by 8 foot intake opening, a total of 88 bars. The design water velocity through the bar rack at the remote intake is 1.2 feet per second with all three circulating water pumps operating (fps; TI 1979).

In its simplest form, the largest general circulation of Lake Ontario is counterclockwise with flow to the east along the south shore in a relatively narrow band.

At the 19 ft. depth contour, the measured current speed of six-hour duration exceeded with comparable frequency is about 0.2 feet per second (USNRC 1985). Lake currents were measured at selected locations in the vicinity of the Oswego Steam Station (about 6 miles west of Nine Mile Point) for 5 days between 12 October and 19 November 1970. These surface current velocities were mostly alongshore, with speeds ranging from less than 0.08 feet per second (2.5 cm/sec.) to 0.50 feet per second (15 cm/sec.).

Please call me with any additional questions.

Regards,

Vernon Thompson

**ATTACHMENT C – DESIGN INPUT EMAIL #3**

I don't have an average inlet water temperature per se, but the following may give you some idea of the outer bounds.

Intake water temperature recorded at JAFNPP in 2004 ranged from a minimum of 0.6 °C (33.0°F) in early January to a maximum of 23.7 °C (74.6°F) in early October. Intake water temperatures begin to rise in mid-March and peak from mid-July through September.

This thermal stratification in Lake Ontario, generally extends from late June to October of each year, when the epilimnion averages nearly 70°F (21 °C) and the hypolimnion averages approximately 39 °F (3.9 °C). The timing of the overturn is closely related to the time when the surface water temperatures fluctuate through the temperature of maximum density of fresh water (i.e. 4°C).

Let me know if you have any other questions.

Thanks

Vernon

Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 1

Reference for RAI E-1-i-1

POWER AUTHORITY OF THE STATE OF NEW YORK
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

316(a) DEMONSTRATION SUBMISSION

PERMIT NO. NY0020109

LMSE-76/0301&260/002

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## LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

## SUMMARY OF FINDINGS

The major findings of this document in regard to the effect of thermal discharge from the James A. FitzPatrick Nuclear Power Plant (JAF) on the aquatic community in the vicinity of Nine Mile Point are summarized below. Discharge effects on major trophic levels and representative important species were assessed. The demonstration follows the procedures provided in the draft document "316(a) Technical Guidance - Thermal Discharges," dated September 30, 1974 and is a Type III Demonstration.

1. The James A. FitzPatrick Plant Nuclear Power Plant (JAF) has a flow of 22.23 $m^3$/sec (785 cfs) and a maximum plant temperature rise of 17.5°C (31.5°F). The heated water is discharged through a multiport, high velocity diffuser at a depth of 8 m (25 ft) directly offshore from the plant.

2. JAF operated at a 50% power level or greater from July through October 1975 and was placed in commercial operation on July 28, 1975. The power levels sustained throughout the summer of 1975 combined with the operation of Nine Mile Point Nuclear Station Unit 1 (NMP-1) were sufficient to produce observable effects on the trophic levels being studied had any occurred.

3. The JAF diffuser was designed to produce rapid dilution of the thermal effluent and to minimize the surface area which experiences significant temperature increases. Mathematical analysis of the near-field plume (before plume surfacing) indicates a decrease in temperature above intake temperatures from 31.5 to 13.5°F (17.5 to 7.5°C) in one second and a further decrease to 9°F (5°C) four seconds after discharge.

4. Hydrothermal field surveys confirmed the rapid dilution of the thermal effluent and indicated a maximum surface area extent of the 3°F (1.7°C) isotherm of 1,196 x $10^3$ $ft^2$ when the isotherm was present. Most of the year the areal extent of the surface 3°F isotherm will be reduced (at times to zero) because of natural temperature differences between the surface and bottom near the outfall. Interaction of the JAF plume with that of NMP-1 was documented. Under conditions causing near field plume interaction, JAF's discharge was found to reduce surface temperatures due to the NMP-1 discharge.

5. An analysis of the abundance of major phytoplankton groups in 1975 yielded no evidence of plant-induced depression or enhancement of total phytoplankton, diatoms, green algae, or blue-green algae. Analysis of primary production and chlorophyll _a_ concentrations from entrainment samples indicated that primary production was

increased somewhat in the plume during the period of study and that it was not possible to detect trends in chlorophyll a concentrations. The lack of trends in chlorophyll a indicates that plant operation is not affecting phytoplankton standing crop and mortality due to plume entrainment is not indicated in the data.

6. Comparisons of abundances of microzooplankton between plant and control transects in 1975 indicated neither statistical nor observable differences in abundances. The mortality data for microzooplankton collected at the plant intake, from the plume, and from exposure to simulated plume conditions did not show an increase in mortality attributable to temperature increases encountered during plume entrainment.

7. The abundances of the macrozooplankters Leptodora kindtii and Gammarus fasciatus were compared for plant and control transects in 1975. No differences in abundance attributable to plant operation were found.

8. Ichthyoplankton in the study area was low in abundance with the exception of alewife larvae. This low abundance of larvae of most species suggests that the area around JAF's discharge is not a major spawning ground.

9. Local scouring and deposition due to the action of the high velocity diffuser has been observed in the discharge area. The area of scour and deposition was estimated to be $44.9 \times 10^3\ m^2$. Benthic habitat has been lost in the area of scour, while in the area of deposition, recolonization and benthic production will resume. The loss of benthic habitat is small and unimportant in relation to benthic production in the Nine Mile Point vicinity.

10. The fish community at Nine Mile Point has a species composition typical of Lake Ontario and a seasonal pattern of distribution and abundance that is not influenced by the presence of the thermal discharge.

11. Voluntary exposure to the thermal plume by representative important species of fish will not cause mortalities because the velocity field of the plume will not permit species to maintain themselves in an area of elevated temperature above their upper incipient lethal temperature. Avoidance responses to unsuitable temperatures by representative species of fish will insure that mortalities will not occur.

12. Exposure to the thermal plume due to entrainment could result in mortality of the juveniles and adults of some representative species if it is assumed that individuals do not avoid the plume

and that they are entrained into the plume at the point of discharge. It was demonstrated that representative important species entrained at the point of discharge would be in safe temperature increases in less than one second which makes the possibility of plume entrained mortality for all life history stages very remote.

13. The velocity field of the JAF diffuser will preclude acclimation to temperatures above ambient which could produce a cold shock situation.

14. The lethal thresholds for Gammarus spp. are well above any time/temperature regimes they will experience if entrained into the JAF plume, therefore, no mortalities will occur.

15. The effects of shear forces, reduced dissolved oxygen levels, pressure changes, and temperature/chemical interactions in the plume were analyzed and found to have no effect on organisms.

16. The analyses in this document demonstrate that the current mode of discharge at JAF, which is the alternative thermal effluent limitation previously requested, will not harm the biological community in the vicinity of Nine Mile Point.

# I. INTRODUCTION

On May 22, 1974, the staff for Region II of the U.S. Environmental Protection Agency (EPA) issued a draft National Pollutant Discharge Elimination System (NPDES) permit for the James A. FitzPatrick Nuclear Power Plant (JAF). On June 30, 1974 the Power Authority of the State of New York (PASNY), pursuant to Section 316(a) of the Federal Water Pollution Control Act (FWPCA), requested the Regional Administrator impose alternative thermal effluent limitations to those designated in the draft permit. On February 27, 1975, EPA issued a final NPDES Permit for the FitzPatrick Plant which did not contain the requested alternative thermal effluent limitations.

In the memorandum transmitted with the Final Permit, EPA deferred a decision on PASNY's request for alternative thermal effluent limitations until a demonstration is made pursuant to 316(a) of FWPCA that those alternative thermal effluent limitations are sufficient to protect the balanced indigenous community. In meetings and correspondence between PASNY and EPA subsequent to issuance of the Final Permit, the scope for a 316(a) Demonstration was discussed and a Type III Demonstration was confirmed in a letter dated November 9, 1976 from Mr. Gerald Hansler (EPA) to Mr. Scott Lilly (PASNY). The Representative Important Species for JAF were indicated in a letter dated August 11, 1975 from Mr. Gerald Hansler (EPA) to Mr. George Berry (PASNY).

This document follows the procedures presented in the draft document entitled "316(a) Technical Guidance Thermal Discharges," dated September 30, 1974 and addressed specific points discussed at meetings between PASNY and EPA. Extensive references are made to study results previously submitted to EPA. This document includes descriptions of the plant and the site baseline hydrography. The baseline biological community description summarizes available data from the site and includes biological data for the various trophic levels while the plant was in operation. More specific impact evaluations based on both site data and published literature are provided for the designated representative important species to support conclusions made in this document.

Appended to this document are the temperature data available for the representative important species and a description of the thermal bioassay conducted for this demonstration. Also included in the Appendix are the relevant water quality communications.

# II. PLANT DESCRIPTION

## A. LOCATION AND GENERAL FEATURES

The James A. FitzPatrick Nuclear Power Plant (JAF) is located in the Town of Scriba, New York on the south shore of Lake Ontario (Figures II-1 and II-2). The plant is a single generating unit with a boiling water reactor producing 821 MWe (net output). It is located approximately 3000 ft east of the Nine Mile Point Nuclear Power Station and approximately 7 mi east of the Oswego Steam Station.

## B. CIRCULATING WATER SYSTEM

JAF uses once-through cooling to dissipate waste heat from the main condensers and auxiliary cooling systems. Circulating water is withdrawn from Lake Ontario through a submerged inlet, circulated through the main condensers and auxiliary systems, and returned to the lake through a submerged jet diffuser (Figure II-3).

When operating to maximum power output, the plant requires a total flow of 23.36 $m^3$/sec (825 cfs). Of the total flow, 22.23 $m^3$/sec (785 cfs) are for the main condensers which raise the temperature 18.0°C (32.4°F), and 1.13 $m^3$/sec (40 cfs) are for service water requirements which produce a 7.5°C (13.5°F) rise in temperature. The combined condenser and service water discharge flow has a temperature rise of 17.5°C (31.5°F). These cooling water characteristics remain essentially the same throughout the year. The seasonal temperature variation of the cooling water flow at the intake is approximately 0°C (32°F) to 25°C (77°F).

The total heat rejected to the lake is a function of electrical load; heat rejection increases with an increase in electrical load. With the exception of NRC imposed limitations, the Power Authority expects to operate the plant at full load except when maintenance or refueling is required. The heat rejection rate at 100% load is calculated to be $5.714 \times 10^9$ Btu/hr.

### 1. Intake Structure

The intake structure is located on the lake bottom 274.3 m (900 ft) offshore of the plant in 7.9 m (26 ft) of water at the average controlled lake surface level of 75 m (246 ft). The structure is 20.9 m (68.5 ft) across at its widest point and 4.3 m (14 ft) high (Figure II-4). There are four intake openings on the south side of the structure and a solid wall on the north side. This configuration was designed to prevent any recirculation of heated water from the discharge structure located 82.3 m (270 ft) farther out in the lake.

GENERAL LOCATION MAP

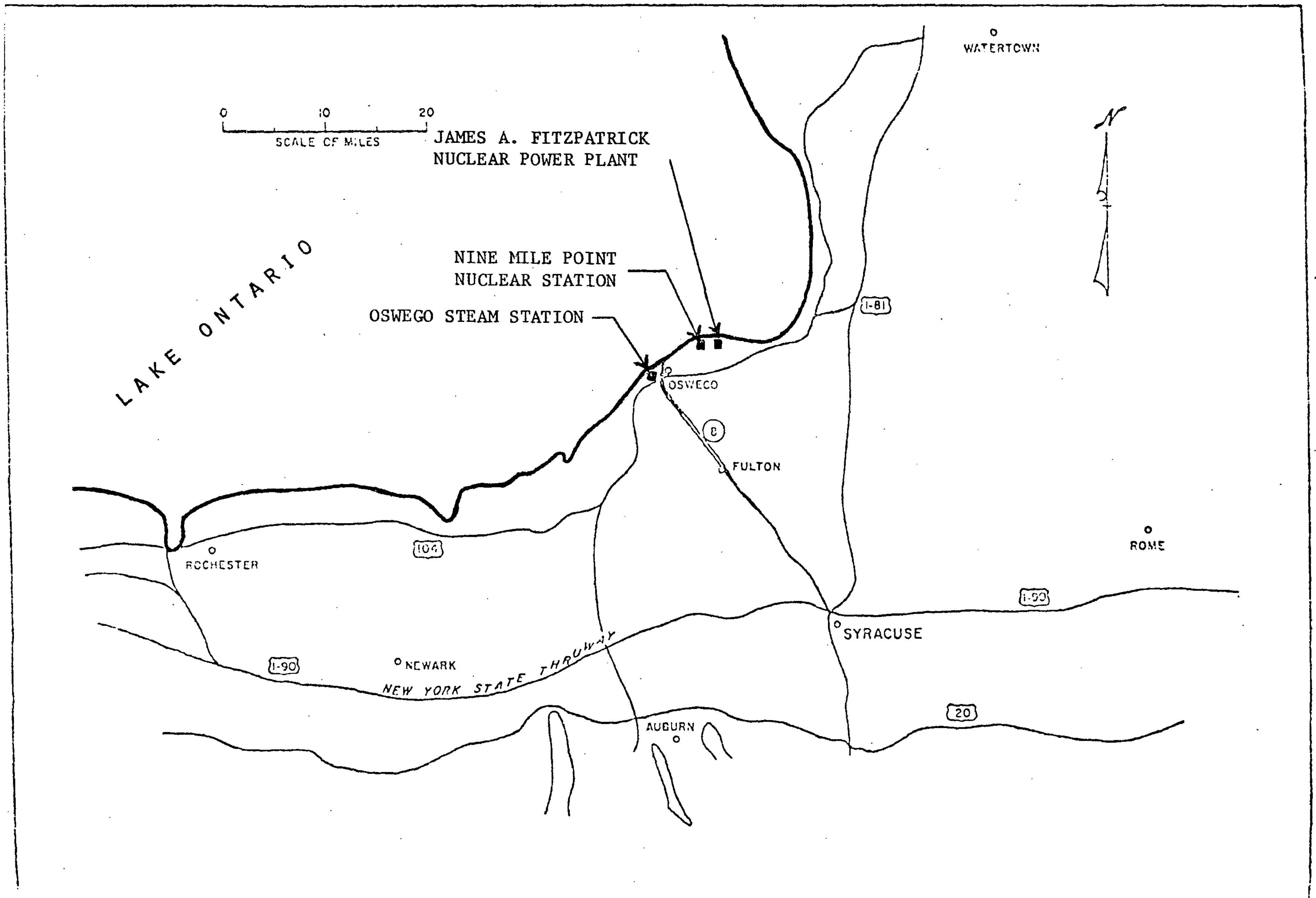



FIGURE II-1

PLOT PLAN

JAMES A. FITZPATRICK
NUCLEAR POWER PLANT

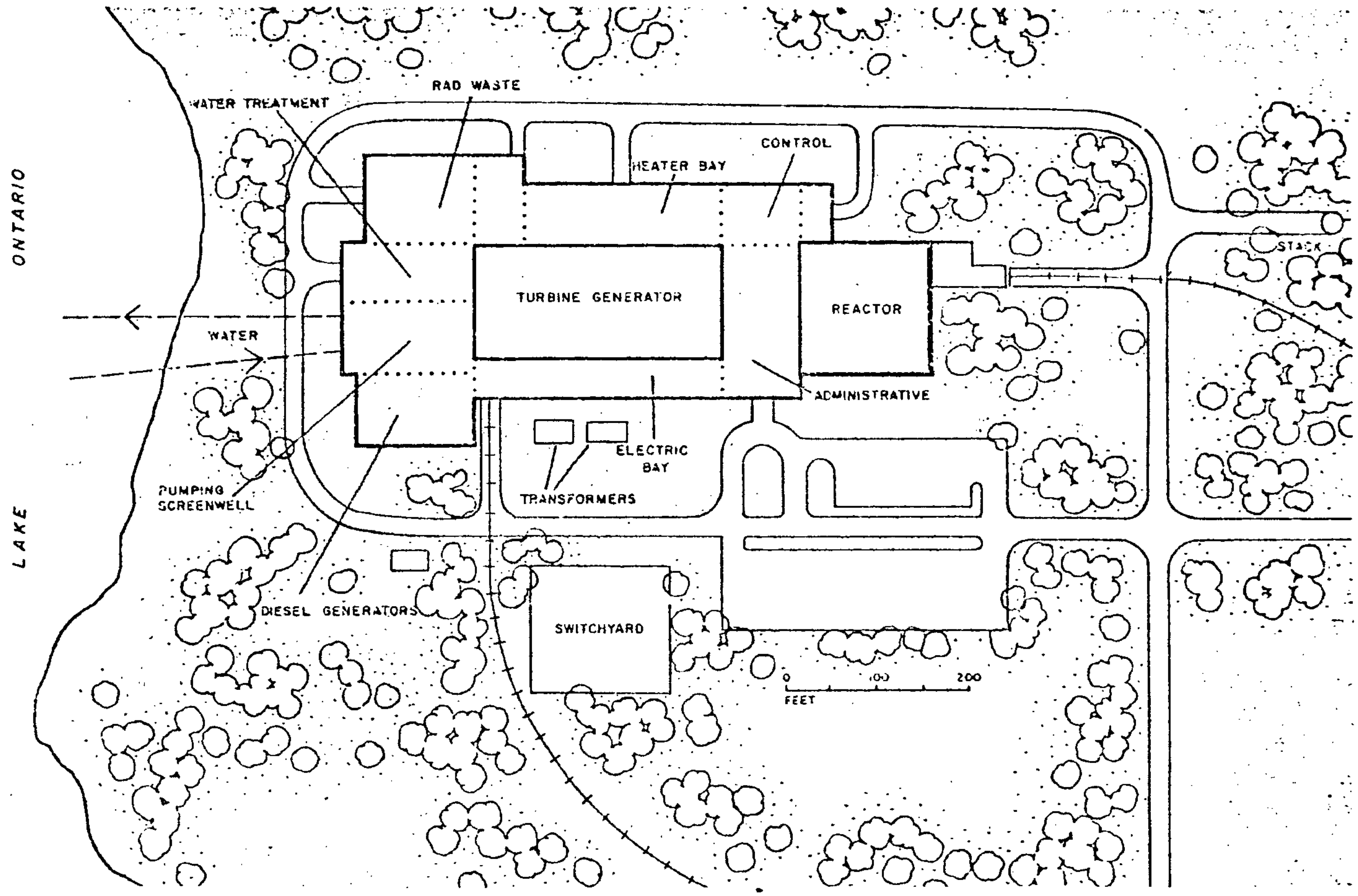



FIGURE II-2

WATER INTAKE AND DISCHARGE ARRANGEMENT

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

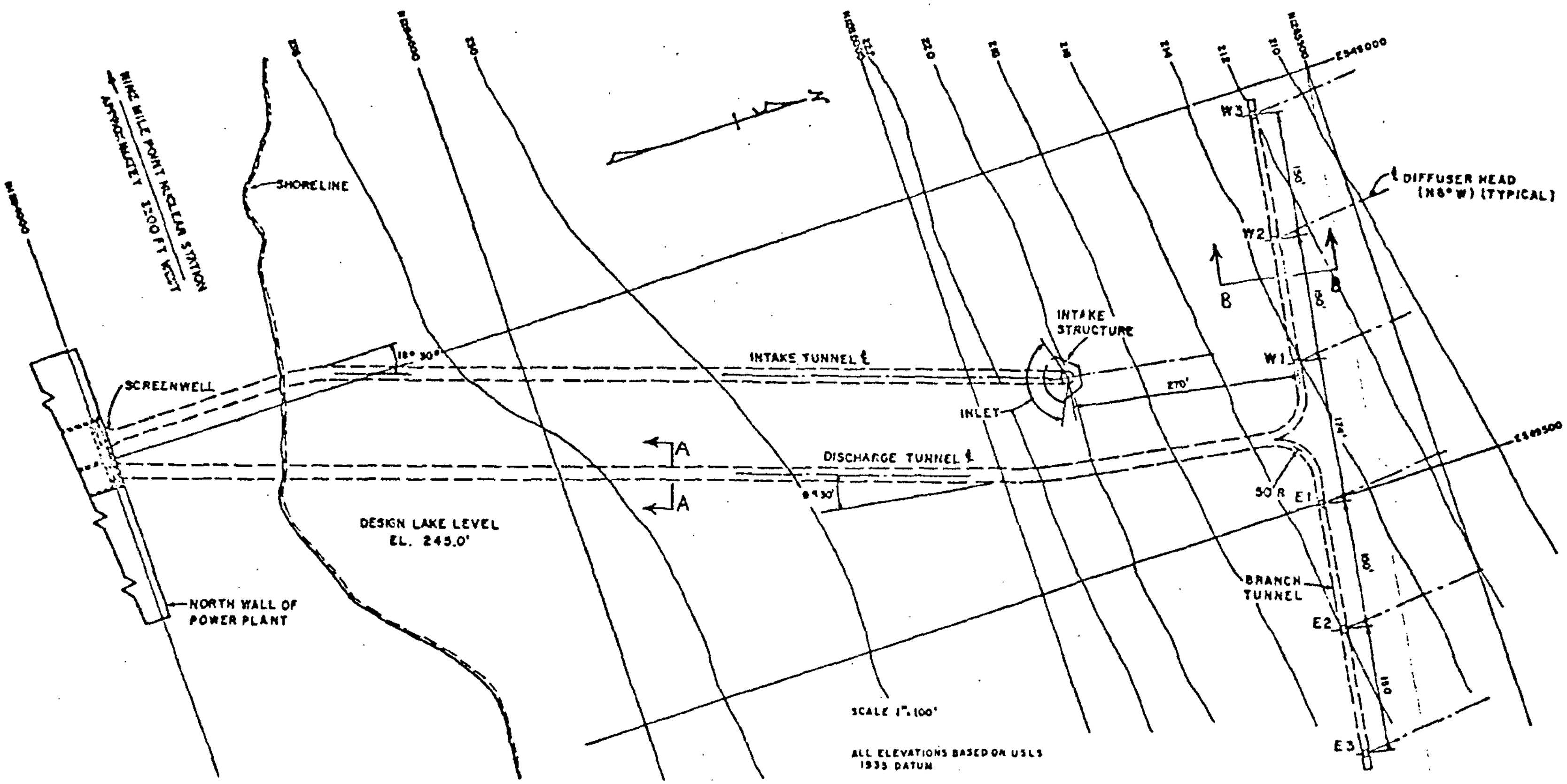



FIGURE II-3

INTAKE STRUCTURE

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

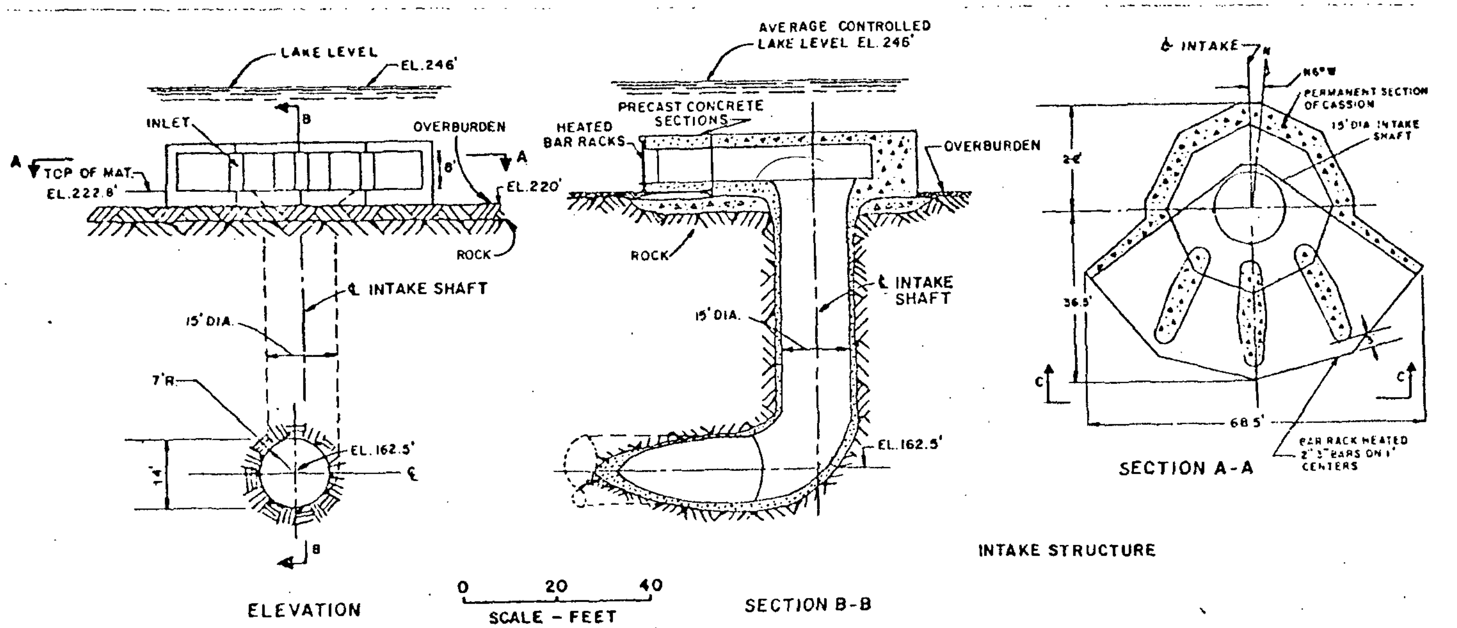



FIGURE II-4

The four intake openings are 2.4 m (8 ft) high with a maximum width of 6.7 m (22 ft) at the bar racks. There is a total horizontal clear opening of 21.3 m (70 ft). The intake openings are 0.9 m (2.8 ft) above the lake bottom and the entire structure is covered by a solid roof. The intake cover restricts flow to a primarily horizontal direction. A bar rack system covers the entire open area of the intake structure to prevent the entry of large debris. In addition, the bar racks are heated to prevent ice formation. The calculated intake velocity through the bar racks is 0.43 m/sec (1.4 ft/sec).

After passing through the intake openings the water flows down a 4.6 m (15 ft) diameter vertical shaft to a horizontal tunnel 18.3 m (60 ft) below the lake bottom (Figure II-5). The water passes through the tunnel at 1.4 m/sec (4.7 ft/sec) and then rises in a vertical shaft to the onshore screenwell forebay. In the forebay the water passes through three separate bays, each equipped with bar racks and vertical traveling screens. The vertical traveling screens have 0.95 cm (0.375 in) square wire mesh. Behind the traveling screens is a well from which the main circulating pumps withdraw water.

2. <u>Discharge Structure</u>

The multiport discharge structure is located 356.6 m (1170 ft) offshore of the plant (Figure II-5). The discharge tunnel extends from the onshore screenwell to two branch tunnels positioned approximately parallel to the shoreline. Each branch tunnel has three diffuser heads spaced 45.7 m (150 ft) apart, with two discharge nozzles at each head, directed away from the shoreline. The submergence of the diffuser heads varies from 7.0-8.5 m (23-28 ft); depth of submergence increasing from east to west along the branch tunnels. The nozzles of each pair are separated by a horizontal angle of 42° and each nozzle has a 0.76 m (2.5 ft) diameter opening (Figure II-6). The circulating water system is designed to produce a 4.3 m/sec (14 ft/sec) exit velocity.

The NPDES permit for JAF places the following limitations on the discharge effluent:

(1) The discharge temperature shall not exceed 44.5°C (112°F).

(2) The discharge-intake temperature* difference shall not exceed 17.8°C (32.4°F).

*During those periods when intake water tempering occurs, the intake temperature shall be considered that temperature existing after tempering.

## INTAKE AND DISCHARGE TUNNELS

## JAMES A. FITZPATRICK NUCLEAR POWER PLANT

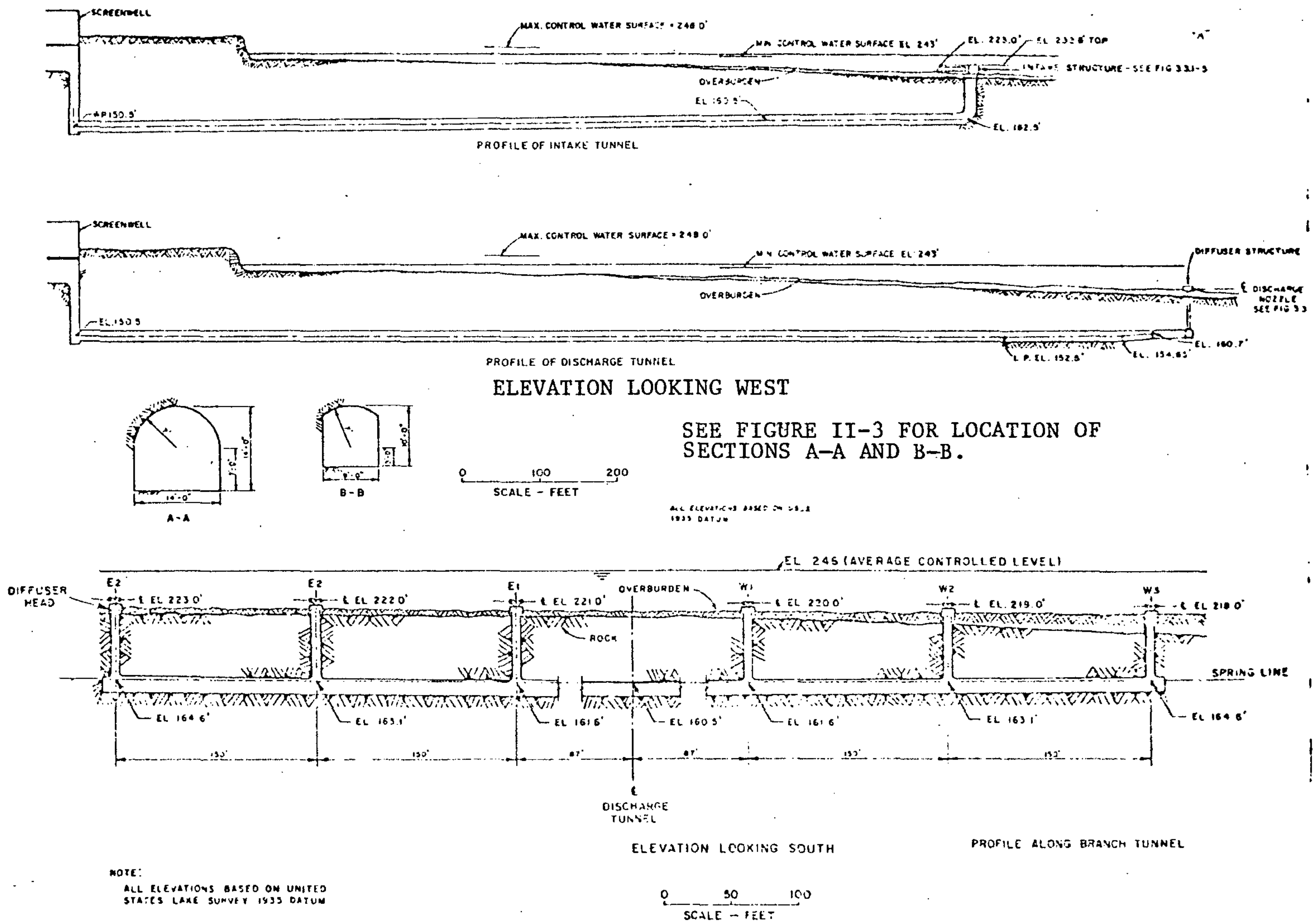
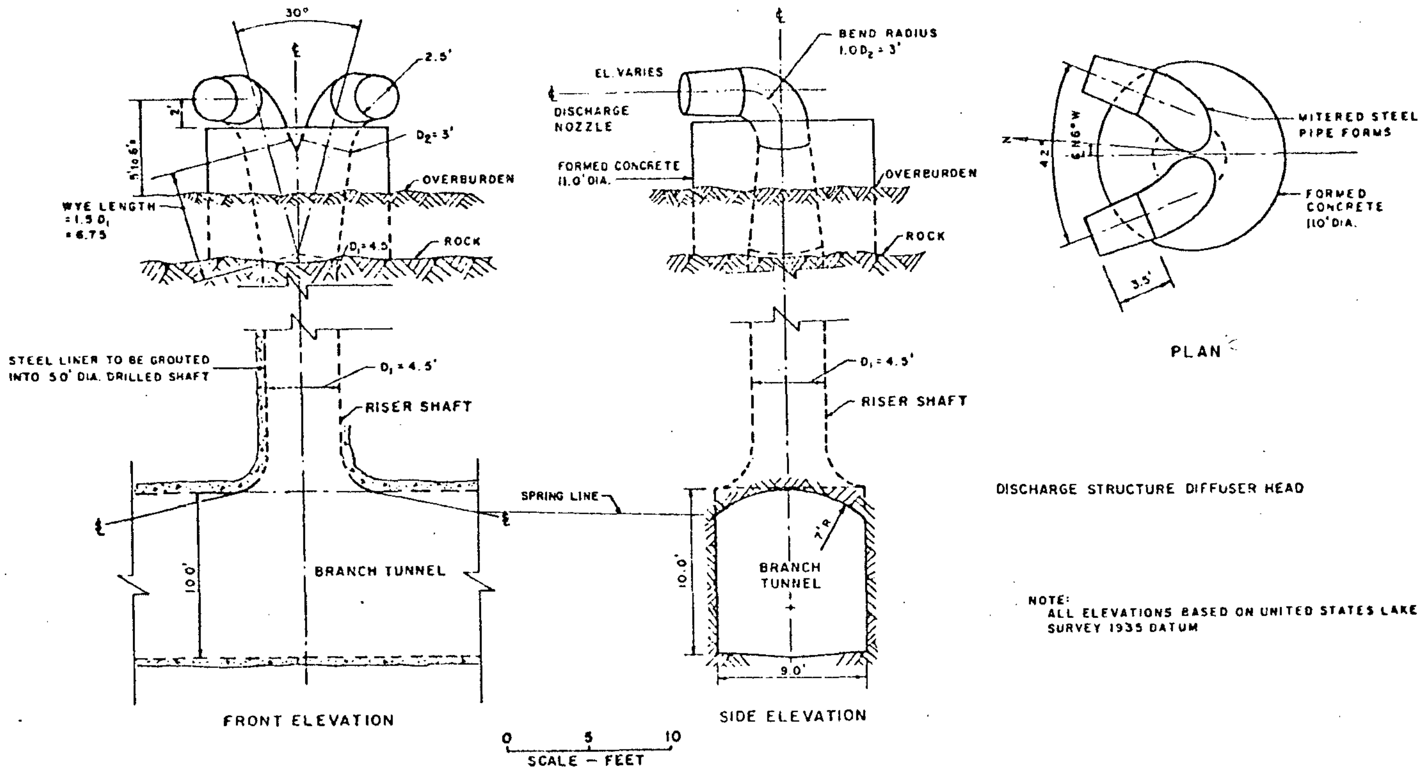



FIGURE II-5

DISCHARGE STRUCTURE TYPICAL DIFFUSER HEAD

JAMES A. FITZPATRICK NUCLEAR POWER PLANT




DISCHARGE STRUCTURE DIFFUSER HEAD

NOTE:
ALL ELEVATIONS BASED ON UNITED STATES LAKE SURVEY 1935 DATUM

FIGURE II-6

(3) The net rate of addition of heat to the receiving water shall not exceed 1.44 billion Kcal/hr. (5.72 billion BTU/hr.).

(4) The pH shall not be less than 6.5 nor greater than 8.5 at any time.*

(5) No algicides shall be added to the condenser and auxiliary cooling water.

## C. OPERATING HISTORY

JAF achieved criticality in November, 1974 and began commercial operation on July 28, 1975. Between these dates the plant went through a period of start-up testing during which there was intermittent operation at increasingly higher power levels.

Table II-1 summarizes the plant electrical output (gross MWe) from July 1, 1975 to September 30, 1976. During this interval the plant was consistently above 500 MWe gross output when the unit was on line. Figure II-7 provides a frequency histogram of daily average discharge temperatures for the fall of 1975 and the spring and summer of 1976. There were a total of 18 outages with durations ranging from less than 24 hrs to all or part of 68 days (Table II-2). During two outages there was a brief resumption of generation. However, each outage was counted as a single event because the plant did not reach a high power level for a sustained period. The circulating water systems were in operation during outages, and except for 7 days during the outage in December 1975, the average flow was at least 8.7 $m^3$/sec (307.5 cfs) averaged over one day periods.

*The pH of the discharge shall not exceed 8.5 unless the pH of the intake water is greater than this value; in this case, the pH of the discharge shall not exceed the pH of the intake by more than 0.1 pH unit.

TABLE II-1

PLANT ELECTRICAL OUTPUT*

JAMES A. FITZPATRICK NUCLEAR POWER PLANT - JULY 1, 1975-SEPTEMBER 30, 1976

| | 1975 | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JULY | | | AUGUST | | | SEPTEMBER | | | OCTOBER | | | NOVEMBER | | | DECEMBER | | |
| DATE | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG |
| 1 | | | 126 | | | 638 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 675 | 749 | 718 |
| 2 | | | 191 | | | 645 | | | 0 | 0 | 498 | 180 | 0 | 0 | 0 | 757 | 780 | 773 |
| 3 | | | 194 | | | 572 | | | 0 | 496 | 632 | 541 | 0 | 0 | 0 | 770 | 776 | 773 |
| 4 | | | 201 | | | 0 | | | 0 | 596 | 633 | 622 | 0 | 492 | 303 | 771 | 801 | 779 |
| 5 | | | 201 | | | 163 | | | 0 | 624 | 631 | 625 | 504 | 590 | 543 | 799 | 814 | 805 |
| 6 | | | 254 | | | 402 | | | 0 | 625 | 633 | 625 | 595 | 700 | 658 | 796 | 801 | 797 |
| 7 | | | 322 | | | 480 | | | 157 | 624 | 628 | 624 | 705 | 780 | 744 | 800 | 802 | 688 |
| 8 | | | 6 | | | 548 | | | 363 | 625 | 627 | 626 | 771 | 779 | 774 | 0 | 0 | 0 |
| 9 | | | 8 | | | 622 | | | 525 | 626 | 632 | 628 | 772 | 778 | 775 | 0 | 0 | 0 |
| 10 | | | 326 | | | 672 | | | 524 | 629 | 633 | 631 | 775 | 780 | 776 | 0 | 0 | 0 |
| 11 | | | 467 | | | 665 | | | 161 | 266 | 636 | 512 | 0 | 779 | 350 | 0 | 0 | 0 |
| 12 | | | 542 | | | 674 | | | 0 | 480 | 521 | 483 | 0 | 382 | 102 | 0 | 0 | 0 |
| 13 | | | 607 | | | 686 | | | 0 | 528 | 538 | 535 | 0 | 0 | 0 | 0 | 348 | 237 |
| 14 | | | 635 | | | 693 | | | 0 | 549 | 629 | 612 | 0 | 0 | 0 | 0 | 451 | 314 |
| 15 | | | 592 | | | 696 | | | 0 | 611 | 628 | 620 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | | | 460 | | | 175 | | | 28 | 626 | 639 | 633 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | | | 0 | | | 471 | | | 387 | 623 | 641 | 633 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | | | 21 | | | 492 | | | 541 | 636 | 641 | 635 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19 | | | 361 | | | 607 | | | 628 | 639 | 661 | 638 | 0 | 295 | 65 | 0 | 0 | 0 |
| 20 | | | 462 | | | 680 | | | 702 | 653 | 755 | 702 | 295 | 561 | 443 | 0 | 0 | 0 |
| 21 | | | 565 | | | 701 | | | 742 | 682 | 794 | 773 | 534 | 584 | 555 | 0 | 0 | 0 |
| 22 | | | 622 | | | 498 | | | 743 | 0 | 795 | 457 | 557 | 563 | 560 | 0 | 0 | 0 |
| 23 | | | 617 | | | 517 | | | 739 | 0 | 168 | 24 | 560 | 562 | 561 | 0 | 0 | 0 |
| 24 | | | 616 | | | 520 | | | 748 | 175 | 590 | 446 | 560 | 563 | 563 | 20 | 290 | 115 |
| 25 | | | 607 | | | 521 | | | 750 | 594 | 706 | 658 | 554 | 567 | 562 | 60 | 370 | 278 |
| 26 | | | 611 | | | 515 | | | 749 | 705 | 796 | 770 | 556 | 559 | 558 | 10 | 330 | 103 |
| 27 | | | 614 | | | 511 | | | 609 | 384 | 792 | 761 | 553 | 559 | 554 | 330 | 780 | 398 |
| 28 | | | 616 | | | 509 | | | 719 | 562 | 794 | 765 | 554 | 557 | 555 | 510 | 620 | 547 |
| 29 | | | 624 | | | 515 | | | 748 | 0 | 793 | 692 | 550 | 583 | 558 | 620 | 690 | 660 |
| 30 | | | 633 | | | 553 | | | 418 | 0 | 0 | 0 | 613 | 692 | 670 | 680 | 690 | 687 |
| 31 | | | 634 | | | 434 | | | | 0 | 0 | 0 | | | | 540 | 690 | 598 |

*Gross MWe

TABLE II-1 (Continued)

PLANT ELECTRICAL OUTPUT*

| | 1976 | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JANUARY | | | FEBRUARY | | | MARCH | | | APRIL | | | MAY | | | JUNE | | |
| DATE | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG |
| 1 | 548 | 560 | 550 | 0 | 0 | 0 | 0 | 0 | 0 | 410 | 590 | 509 | 530 | 690 | 665 | 770 | 780 | 775 |
| 2 | 440 | 570 | 498 | 0 | 0 | 0 | 0 | 0 | 0 | 520 | 620 | 582 | 690 | 750 | 722 | 770 | 780 | 771 |
| 3 | 480 | 530 | 514 | 0 | 0 | 0 | 0 | 0 | 0 | 500 | 630 | 553 | 730 | 750 | 743 | 770 | 780 | 771 |
| 4 | 510 | 520 | 514 | 0 | 0 | 0 | 0 | 0 | 0 | 200 | 600 | 361 | 670 | 750 | 728 | 0 | 770 | 351 |
| 5 | 510 | 610 | 560 | 0 | 0 | 0 | 0 | 0 | 0 | 200 | 570 | 459 | 730 | 750 | 741 | 0 | 0 | 0 |
| 6 | 580 | 600 | 585 | 0 | 0 | 0 | 0 | 0 | 0 | 590 | 620 | 604 | 740 | 760 | 747 | 30 | 430 | 295 |
| 7 | 570 | 590 | 580 | 0 | 0 | 0 | 0 | 0 | 0 | 590 | 610 | 601 | 740 | 760 | 751 | 430 | 500 | 480 |
| 8 | 570 | 590 | 580 | 0 | 0 | 0 | 0 | 0 | 0 | 590 | 660 | 614 | 740 | 760 | 750 | 490 | 600 | 516 |
| 9 | 579 | 657 | 618 | 0 | 0 | 0 | 0 | 0 | 0 | 640 | 700 | 671 | 730 | 750 | 747 | 640 | 750 | 693 |
| 10 | 654 | 726 | 687 | 0 | 0 | 0 | 0 | 0 | 0 | 680 | 720 | 706 | 730 | 750 | 743 | 740 | 780 | 764 |
| 11 | 730 | 783 | 755 | 0 | 0 | 0 | 0 | 0 | 0 | 700 | 730 | 716 | 730 | 750 | 739 | 750 | 780 | 767 |
| 12 | 788 | 805 | 799 | 0 | 0 | 0 | 0 | 0 | 0 | 710 | 720 | 715 | 730 | 740 | 737 | 770 | 780 | 776 |
| 13 | 797 | 805 | 801 | 0 | 0 | 0 | 0 | 0 | 0 | 690 | 720 | 712 | 0 | 750 | 315 | 780 | 780 | 780 |
| 14 | 798 | 803 | 801 | 0 | 0 | 0 | 0 | 0 | 0 | 690 | 710 | 700 | 0 | 0 | 0 | 770 | 790 | 778 |
| 15 | 799 | 803 | 800 | 0 | 0 | 0 | 0 | 0 | 0 | 560 | 710 | 684 | 30 | 160 | 13 | 780 | 800 | 785 |
| 16 | 0 | 803 | 473 | 0 | 0 | 0 | 0 | 0 | 0 | 640 | 700 | 671 | 240 | 420 | 353 | 770 | 790 | 782 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 680 | 700 | 690 | 420 | 580 | 513 | 770 | 790 | 775 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 680 | 690 | 688 | 590 | 680 | 631 | 0 | 780 | 139 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 680 | 700 | 687 | 680 | 740 | 719 | 0 | 460 | 198 |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 680 | 700 | 697 | 730 | 750 | 741 | 460 | 630 | 554 |
| 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 500 | 710 | 676 | 730 | 760 | 746 | 640 | 760 | 710 |
| 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 490 | 600 | 558 | 600 | 770 | 727 | 760 | 780 | 773 |
| 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 580 | 690 | 648 | 680 | 740 | 704 | 0 | 783 | 446 |
| 24 | 0 | 0 | 0 | 0 | 0 | 0 | 101 | 180 | 29 | 700 | 720 | 707 | 740 | 790 | 770 | 0 | 681 | 505 |
| 25 | 0 | 0 | 0 | 0 | 0 | 0 | 90 | 310 | 184 | 700 | 720 | 712 | 780 | 790 | 781 | 670 | 760 | 714 |
| 26 | 0 | 0 | 0 | 0 | 0 | 0 | 310 | 360 | 331 | 710 | 730 | 718 | 780 | 790 | 781 | 770 | 780 | 774 |
| 27 | 0 | 0 | 0 | 0 | 0 | 0 | 350 | 450 | 408 | 710 | 730 | 723 | 770 | 790 | 782 | 750 | 760 | 753 |
| 28 | 0 | 0 | 0 | 0 | 0 | 0 | 450 | 510 | 466 | 720 | 740 | 733 | 770 | 790 | 778 | 740 | 760 | 751 |
| 29 | 0 | 0 | 0 | 0 | 0 | 0 | 510 | 540 | 430 | 720 | 740 | 726 | 770 | 780 | 776 | 740 | 760 | 755 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 | 220 | 580 | 507 | 520 | 730 | 692 | 770 | 780 | 776 | 0 | 500 | 215 |
| 31 | 0 | 0 | 0 | 0 | 0 | 0 | 280 | 550 | 501 | | | | 770 | 780 | 778 | | | |

*Gross MWe

TABLE II-1 (Continued)

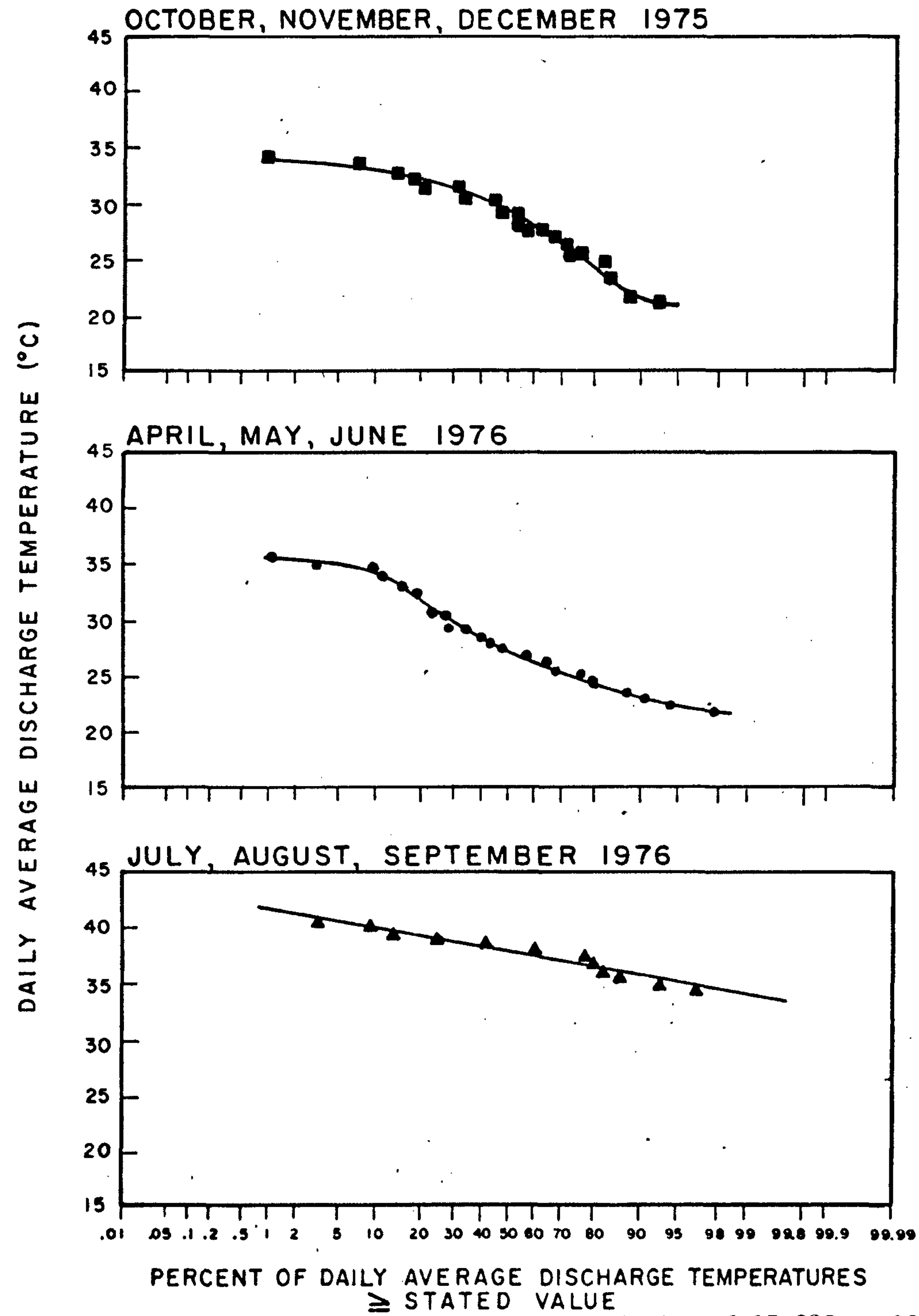
PLANT ELECTRICAL OUTPUT*

| DATE | 1976 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | JULY | | | AUGUST | | | SEPTEMBER | | |
| | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX | AVG |
| 1 | 150 | 580 | 248 | 740 | 760 | 750 | 470 | 680 | 603 |
| 2 | 580 | 690 | 633 | 740 | 760 | 751 | 680 | 760 | 723 |
| 3 | 700 | 770 | 743 | 740 | 760 | 748 | 760 | 780 | 772 |
| 4 | 750 | 770 | 762 | 740 | 750 | 747 | 780 | 790 | 780 |
| 5 | 760 | 770 | 767 | 740 | 750 | 747 | 770 | 790 | 779 |
| 6 | 760 | 780 | 771 | 560 | 750 | 725 | 770 | 790 | 782 |
| 7 | 760 | 780 | 773 | 560 | 680 | 632 | 780 | 790 | 786 |
| 8 | 740 | 780 | 769 | 670 | 750 | 718 | 780 | 790 | 785 |
| 9 | 770 | 600 | 750 | 750 | 780 | 769 | 770 | 790 | 782 |
| 10 | 690 | 770 | 751 | 760 | 780 | 771 | 590 | 790 | 723 |
| 11 | 760 | 780 | 765 | 760 | 780 | 771 | 710 | 740 | 735 |
| 12 | 750 | 780 | 765 | 770 | 790 | 783 | 720 | 740 | 735 |
| 13 | 0 | 780 | 715 | 620 | 800 | 777 | 730 | 740 | 735 |
| 14 | 0 | 0 | 0 | 760 | 790 | 785 | 730 | 740 | 731 |
| 15 | 0 | 0 | 0 | 780 | 790 | 788 | 720 | 740 | 733 |
| 16 | 0 | 0 | 0 | 780 | 790 | 788 | 720 | 740 | 731 |
| 17 | 0 | 330 | 113 | 780 | 790 | 788 | 620 | 740 | 724 |
| 18 | 350 | 600 | 503 | 780 | 800 | 792 | 720 | 740 | 733 |
| 19 | 596 | 672 | 637 | 780 | 800 | 791 | 720 | 740 | 729 |
| 20 | 678 | 759 | 721 | 690 | 800 | 785 | 730 | 740 | 730 |
| 21 | 0 | 780 | 462 | 770 | 800 | 788 | 730 | 740 | 732 |
| 22 | 0 | 0 | 0 | 780 | 800 | 786 | 730 | 740 | 730 |
| 23 | 0 | 0 | 0 | 780 | 800 | 786 | 730 | 740 | 735 |
| 24 | 0 | 0 | 0 | 780 | 800 | 792 | 650 | 740 | 730 |
| 25 | 0 | 0 | 0 | 780 | 800 | 789 | 720 | 740 | 733 |
| 26 | 0 | 0 | 0 | 780 | 790 | 786 | 720 | 740 | 733 |
| 27 | 0 | 0 | 0 | 600 | 790 | 763 | 730 | 740 | 733 |
| 28 | 0 | 400 | 73 | 600 | 730 | 622 | 730 | 740 | 733 |
| 29 | 420 | 620 | 543 | 730 | 790 | 775 | 730 | 740 | 730 |
| 30 | 610 | 660 | 635 | 0 | 790 | 650 | 730 | 740 | 730 |
| 31 | | | | 670 | 730 | 695 | 0 | 430 | 157 |

*Gross MWe

# FREQUENCY HISTOGRAM OF DAILY AVERAGE DISCHARGE TEMPERATURES UNDER CONSTANT FULL FLOW OPERATION*

## JAMES A. FITZPATRICK NUCLEAR POWER PLANT —1975-1976




* Discharge Temperatures Calculated by Addition of 17.8°C to 1975-76

TABLE II-2

OUTAGES BETWEEN JULY 1, 1975 AND SEPTEMBER 30, 1976

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

| NUMBER | START DATE | END DATE | DURATION IN DAYS* |
|---|---|---|---|
| 1 | 17 JUL | 17 JUL | < 1 |
| 2 | 4 AUG | 4 AUG | < 1 |
| 3 | 1 SEP | 6 SEP | 6 |
| 4 | 12 | 15 | 4 |
| 5 | 1 OCT | 2 OCT | < 2 |
| 6 | 22 | 23 | < 2 |
| 7 | 29 | 4 NOV | < 7 |
| 8 | 11 NOV | 19 | < 9 |
| 9 | 8 DEC | 23 DEC | 16 |
| 10 | 16 JAN | 23 MAR | <68 |
| 11 | 13 MAY | 14 MAY | < 2 |
| 12 | 4 JUN | 5 JUN | < 2 |
| 13 | 18 | 19 | < 2 |
| 14 | 23 | 24 | < 2 |
| 15 | 30 | 30 | < 1 |
| 16 | 13 JUL | 17 JUL | < 5 |
| 17 | 21 | 28 | < 8 |
| 18 | 30 AUG | 31 AUG | < 2 |

*Dates are inclusive in the outage. An outage could span two consecutive dates but have a total duration ranging from less than three hours to more than 45 hours. Incident number 8, for example, could be a little more than 7 days but could not exceed 9 days.

# III. BASELINE HYDROGRAPHIC CHARACTERISTICS

## A. INTRODUCTION

The discharge of JAF is designed to minimize the impact of the plant's thermal discharge on the biological and thermal characteristics of Lake Ontario in the vicinity of Nine Mile Point. Lake Ontario temperature characteristics, general circulation and local current patterns, lake bed topography, and existing water uses were the important design criteria used in the development of the circulating water system. The selection of a water body segment for multiplant impact analysis was based on hydrographic characteristics of the southeast section of Lake Ontario. The baseline hydrographic characteristics of Lake Ontario relevant to the assessment of the thermal discharge from the FitzPatrick Plant are discussed in the following sections.

## B. GENERAL FEATURES OF LAKE ONTARIO

### 1. Seasonal Temperature Structure

#### a. Spring Warming and the Thermal Bar

Lake Ontario is a large temperate lake which experiences seasonal changes in its thermal structure. Natural warming of the lake begins in mid-March and continues until mid-September. At the onset of warming the surface water temperature in the shallow littoral zone rises more rapidly than in regions just offshore. By May this difference has created a sharp horizontal temperature gradient with inshore water temperatures above 4°C (39°F) and the offshore water below 4°C (39°F). There is a convergence zone where water from the relatively warm inshore region mixes with the cold offshore water (Rodgers, 1966). As a consequence of the nonlinear temperature/density relationship of fresh water, the mixed water produced in this transition zone is heavier than the water on either side and sinks, setting up a bar that may reduce free exchange of water between the shallow littoral zone and the deeper part of the lake. The thermal bar moves gradually and steadily offshore with spring warming of the lake until it dissipates in late June. It is estimated that the spring thermal bar may exist for as long as 8 weeks (Sweers, 1969).

As the thermal bar moves offshore, the inshore water continues to warm and a thermocline develops which separates the warm surface water from the cold deep water. The thermocline restricts vertical mixing to the epilimnion, but in mid-lake on the offshore side of the thermal bar mixing extends from surface to bottom. About four weeks after emergence of the bar the inshore area constitutes approximately half the area of the lake (Sweers, 1969).

b. Summer Stratification

The disappearance of an offshore surface temperature of 4°C (39.2°F) in late June defines the start of the summer season in the lake. In general, vertical stratification is established over the entire basin by the combined effects of lake warming and the advection of the warmer, nearshore water. The sporadic appearance of surface temperature minima during summer are related to upwellings. As warming continues, stratification intensifies and the thermocline is more sharply defined, with vertical temperature gradients in excess of 1°C/m (0.6°F/ft). As a consequence of stratification, heat transfer and mixing are confined largely to the epilimnion. The lake's mean surface temperature reaches 21°C (69.8°F), and the hypolimnion temperature varies with depth, ranging between 3.8 and 4.0°C (38.0° and 39.2°F) (Sweers, 1969). The thermocline forms near the surface in early summer but descends due to continued warming and reaches a characteristic depth of approximately 21 m (70 ft) (Casey et al., 1965).

c. Fall Cooling

In late September the warming process ends, the lake's mean surface temperature rapidly drops below 17°C (62.6°F) and the rate of descent of the thermocline increases. The vertical temperature gradient decreases as the surface layer and deeper water effectively mix. Mixing is the consequence of convection caused by cooling at the surface and is enhanced by the weakening of the thermocline which permits wind-induced turbulence to extend to greater depths.

The fall cooling process resembles spring warming. When nearshore water cools below the temperature of maximum density, a "reverse" thermal bar develops separating colder inshore water from warmer offshore water. The fall thermal bar has a weaker thermal gradient than the spring thermal bar.

d. Winter Cooling

The breakdown of stratification throughout the lake marks the onset of the winter season. The offshore water mass is well mixed, attaining a nearly isothermal condition. The date of overturn differs from year to year depending on the occurrence of storms. The lake surface is cooled below 4°C(39°F) and surface isotherms tend to be parallel to shore. As cooling continues and surface temperatures drop below 4°C (39°F), vertical stratification is again produced with colder buoyant water above the warmer 4°C (39°F) water at depth. Vertical circulation at times extends as deep as 100 m (328 ft) (Sweers, 1969). With continued cooling ice forms in the nearshore region. Under normal climatic conditions the greatest extent of ice cover is found in the east end of the lake in mid-March, while in a severe winter ice covers about 25% of the lake surface (U.S. Army Corps of Engineers, 1975).

## 2. Lake Circulation

The large scale circulation of Lake Ontario is counter-clockwise (cyclonic flow) with flow to the east along the south shore in a relatively narrow band and a somewhat less pronounced flow to the west along the north shore. The conceptual model that explains this general circulation is presented here as follows.

A cool mound of water extends from surface to bottom in spring and from below the thermocline to the bottom in summer and fall (Sweers, 1969). The baroclinic flow resulting from the horizontal temperature differences is initially directed outward from mid-lake towards the shore. Although the Coriolis effect is acting to turn the flow to the right (clockwise), its effect is diminished due to bottom friction. This outward flow brings water to the inshore area where it begins to pile up. A surface slope, higher inshore than in mid-lake, develops into a barotropic current initially directed lakeward. The barotropic current tends to the right because of the Coriolis effect. The result is that Coriolis effect and the barrier effect of the coastline trap the flow against the shoreline. The flow continues along the shoreline in a counter-clockwise direction as long as the surface slope is maintained.

Inflow from the Niagara River causes the western end of the lake surface to be higher than the eastern end (on the average). The resulting flow down the gradient is held against the lake's south shore by the Coriolis effect, thereby enhancing the already existing barotropic flow along the south shore. Wind stress averaged over the year tends further to accelerate the flow to the east and decelerate the flow to the west.

The general circulation in winter is less well documented. In late fall after overturn has occurred, the lake is essentially isothermal, thereby permitting a free exchange of water from surface to bottom. Wind direction in winter is primarily from the west-northwest. The net surface flow that results is eastward with westward return flow developing below the surface. The surface layer in the western end is advected to the east and is replaced by subsurface water (Sweers, 1969). This large scale upwelling at the upwind end of the lake and downwelling at the downwind end mixes the surface and subsurface water on a scale that is not likely to occur during the rest of the year.

### 3. Perturbations of the General Circulation Pattern

The general circulation described above is documented by observations collected over long periods (months). The circulation patterns that are observed at any given time, however, are more complex as a result of the lake's response to the shifting winds. At times a major wind shift can alter the currents in a matter of hours, while at other times some features of the current pattern have continued even with an opposing wind (Csanady, 1972). The response time of the currents to a shift in wind distribution is partially related to the scale of the current; large offshore longshore currents respond sluggishly and with longshore currents nearer to shore the response is more rapid, six hours or less. In addition, the deeper the current, the more slowly it responds.

Two important examples of wind-induced changes in the general circulation are upwelling and internal oscillations. Upwelling occurs when a water mass is forced from depth to the surface, and is observed to some degree in all lakes during all seasons (Mortimer, 1971); however it is more conspicuous during seasons of stratification when the upwelled water is much colder than the surface water that it displaces. Wind stress and associated currents depress the thermocline to below equilibrium level at the downwind end of the basin, while at the upwind end the thermocline is displaced upward and may intersect the surface. Upwelling motions are strongly influenced by the Coriolis force. Depression of the thermocline is greatest to the right of the downwind end of a basin and upwelling is strongest to the left of the upwind end (Mortimer, 1971). For example, in Lake Ontario, a west wind causes upwelling along the northwest shore, and the thermocline is deepest along the southeast shore.

A variety of mechanisms have been proposed to account for the observed periodic displacement of the thermocline. The most direct explanation is that an upwelling event displaces the thermocline from equilibrium by converting kinetic energy of the wind to potential energy of the thermocline position. When the wind stress is removed, internal waves are set in motion and contribute to the dissipation of this energy. Internal waves incease in amplitude after storms, and in Lake Ontario the oscillations have a period near 17.5 hours, roughly three complete oscillations every two days. These oscillation events are a common feature of lake temperature records and are prominent in the intake temperature records at many power plants.

## C. SITE FEATURES

### 1. Bottom Sediments

A number of observations of the bottom sediments have been made along the south shore of Lake Ontario. Sutton et al. (1970) made observations of nearshore bottom sediments (0-33 m, 0-108.3 ft) in 1968 and 1969 between Rochester and Stony Point. Among their conclusions the following are relevant to the FitzPatrick site:

a. There is generally a west-to-east transport of sediment.

b. Sites of sediment accumulation occur in nearshore shallow areas where the shoreline is irregular and where there are local deviations from the above transport pattern.

c. In general, the coarser sands, boulders, pebbles, and cobbles lie in the beach or nearshore area, and finer sediments are found lakeward.

d. Several small patches of sand occur offshore between Oswego and Mexico Bay, and it is hypothesized that these originate from the Oswego River.

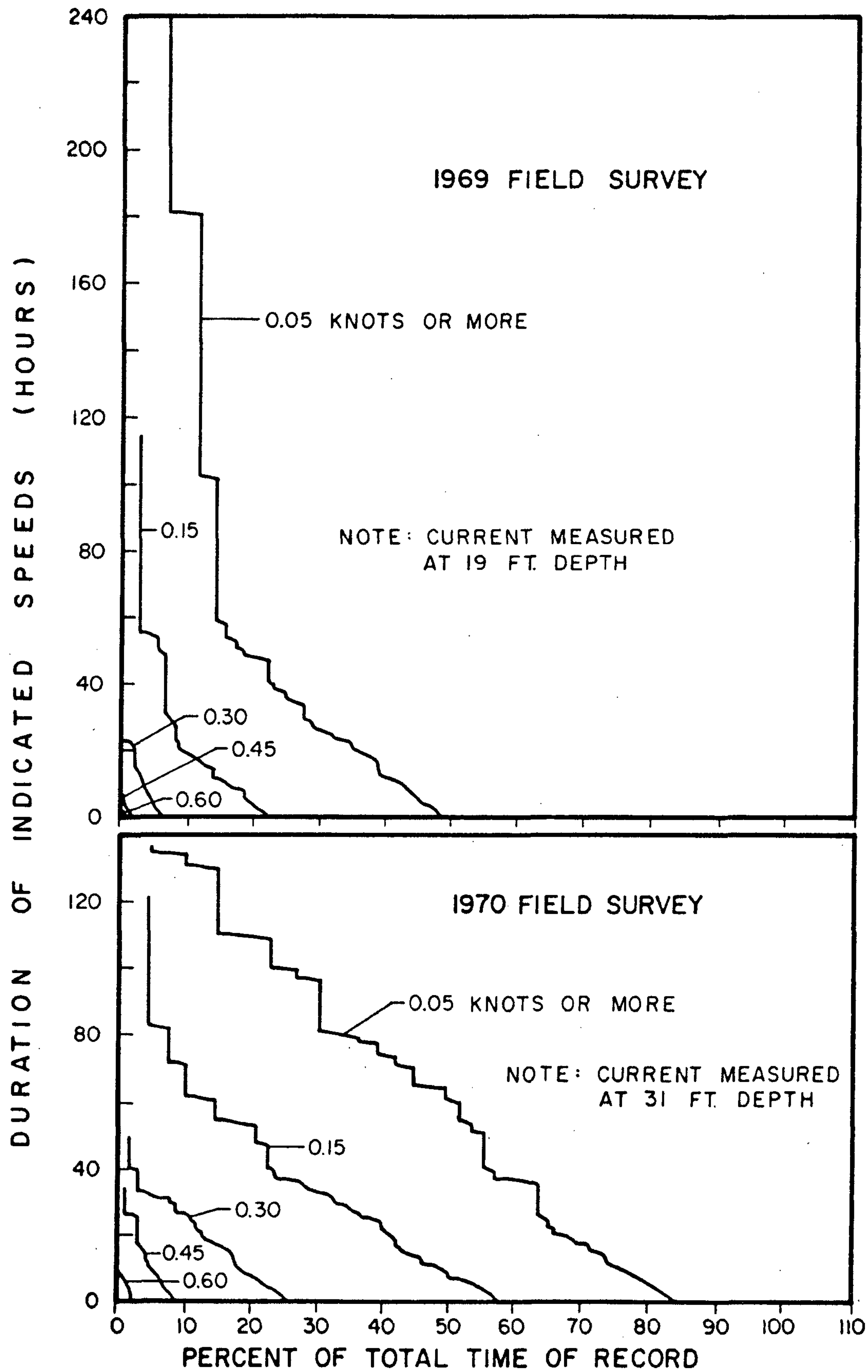
Visual observations made in the Nine Mile Point vicinity during the 1974 sampling period corroborate some of the earlier observations of Sutton et al. (1970). The two western transects, NMPW and NMPP, are dominated by more bedrock and rubble than sand and silt, whereas the FITZ and NMPE transects have bedrock and rubble near shore with sand and silt prevalent beyond the 6.1 m (20 ft) depth contour. The presence of a finer grained sediment to the east probably corresponds to the dominance of patchy sand deposits in Mexico Bay. The irregularity of the shoreline at Nine Mile Point could possibly be the cause of minor sand and silt deposition at that point and eastward. In general, finer grained sediments are more dominant farther offshore.

2. Local Currents

In the course of preoperational studies for JAF, current measurements were made off the Nine Mile Point promontory from May to October 1969, and from July to October 1970. Two fixed underwater towers were placed in the lake, one in 7.3 m (24 ft) of water, and one in 14.0 m (46 ft) of water, and provided average hourly current speed and direction. In addition, two drogue surveys were conducted in 1969 to obtain the overall current pattern at the site. These studies were reported by Gunwaldson et al. (1970) and the Power Authority of the State of New York (PASNY) (1971). Figure III-1 presents frequency-duration data derived from these studies. The data obtained are consistent with wind-induced current frequencies reported by Palmer and Izatt (1970) for a similar water depth near Toronto.

The field data clearly illustrate a correlation between summer currents

# DURATION OF LAKE ONTARIO CURRENT



and wind speed. The correlation is an accepted principle of hydrodynamics as theorized by Ekman (1928) and subsequently verified by numerous oceanographers (Neumann and Pierson, 1966). Measurements of wind currents at lightships (Haight, 1942) have been analyzed to determine the ratio of current speed to wind speed. Reported values of this ratio, commonly called the "wind factor," range between .005 and .030.

The wind speed frequency data indicate that over the year a speed in excess of 32 km/hr (20 mph) occurs 21.6% of the time, based on readings averaged over a 6-hour period. For the summer months, June through September, winds in excess of 32 km/hr (20 mph) occur 13.9% of the time. The current speed of 6 hour duration exceeded with comparable frequency in 14 m (46 ft) of water is about 15 cm/sec (0.5 fps) (see Figure III-2). For a persistence of 24 hours, the current speed exceeded 13.9% of the time is 13.7 cm/sec (0.45 fps).

The predominant direction of currents in the studies described above is alongshore, as dictated by continuity. On those occasions when onshore or offshore currents were observed, their magnitudes were substantially less than those for alongshore currents. The reported frequencies of various current directions during the summer are presented in Figure III-2. This figure indicates that currents alongshore from the west or east are equally frequent at 35% of the time for each. Onshore and offshore currents each account for 5% of the observations. The remaining 30% of the observations were below the meter threshold, 0.05 knots (2.5 cm/sec, 0.09 fps). At the 6.4 m (21 ft) depth in 14.0 m (46 ft) of water, the mean onshore current speed was 3.0 cm/sec (0.09 fps) and the mean offshore current speed was 6.0 cm/sec (0.2 fps). On the other hand, alongshore currents from the west and east averaged 9 cm/sec (0.3 fps).

Vertical profiles of currents have been recorded in several lake studies. Current profiles with depth, however, are sensitive to the turbulent momentum exchange coefficient and ambient stratification. A theoretical profile was computed for the homogeneous shallow waters found near the Nine Mile Point site and indicates the absence of any significant Ekman spiral.

Lake currents were measured at selected locations in the immediate vicinity of the Oswego Steam Station on five days between 12 October and 19 November 1970. These surface current velocities were mostly alongshore with speeds that ranged from very low (less than 2.5 cm/sec, 0.08 fps) up to 15 cm/sec (0.50 fps). This is in general agreement with the measurements at Nine Mile Point.

### 3. Local Lake Thermal Structure

Data on the thermal structure of the lake in the vicinity of Nine Mile

# LAKE ONTARIO CURRENT DIRECTIONS

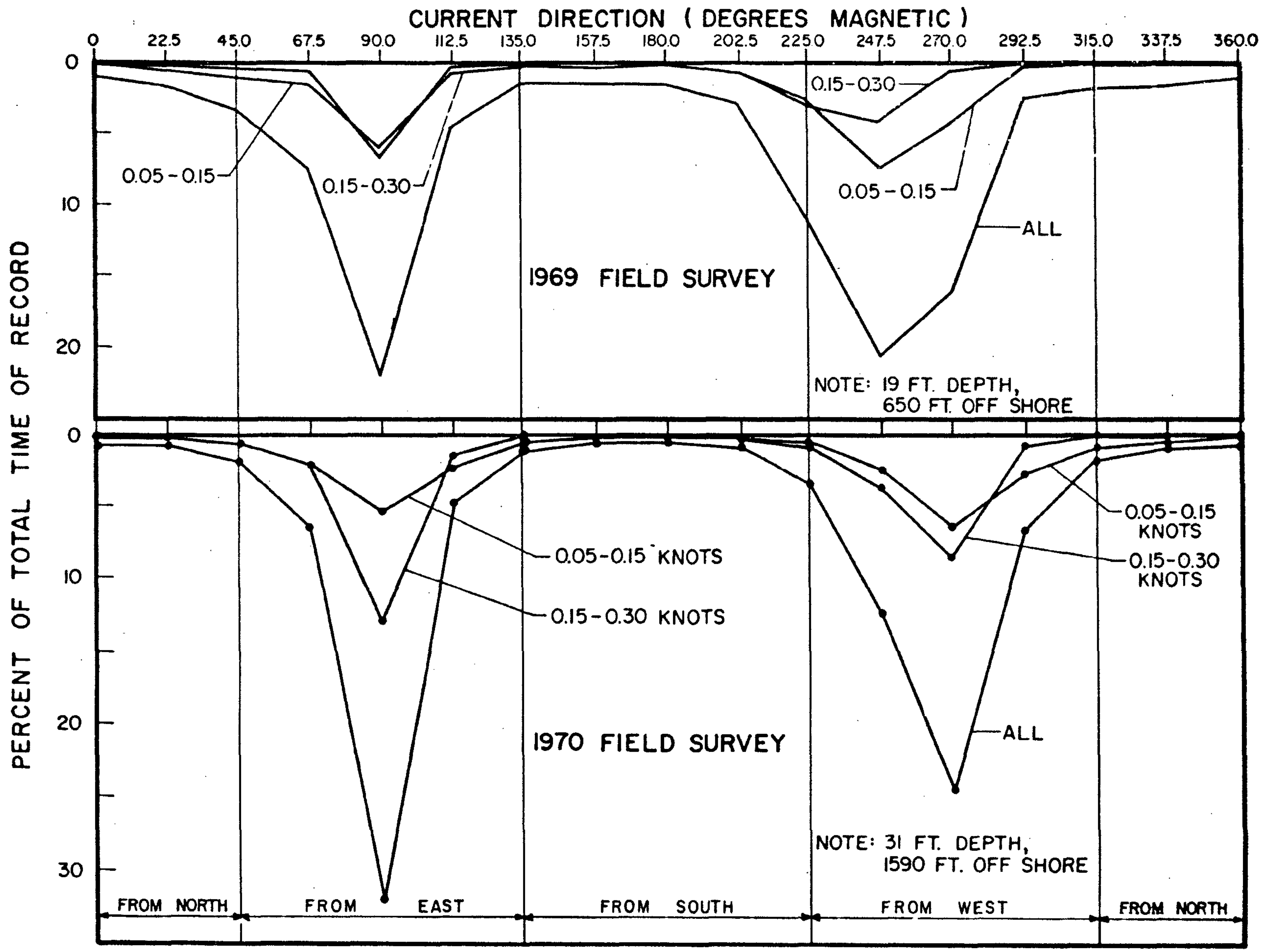



FIGURE III-2

Point are available from studies conducted offshore of JAF 1969 and 1970, from temperature data recorded in the existing intake for Oswego Units 1-4 (see Figure III-5 for location) from 1968 through 1972, and from studies conducted offshore of the Oswego-Nine Mile Point area during 1973. A short description of each of these studies is presented in subsequent paragraphs. These data were used to determine the vertical temperature variations and the surface temperatures in the vicinity of JAF.

In conjunction with the lake current studies carried out in 1969 and 1970 as part of the preoperational surveys for JAF (PASNY, 1971), water temperatures were also recorded. Three types of temperature measurements were made:

a. intermittent vertical profiles obtained in 18.3 and 30.5 m (60 and 100 ft) of water,

b. continuous temperature recordings, using seven self-contained underwater instruments mounted on the two underwater towers, obtained at various depths,

c. surface temperatures measured by airborne infrared radiometry.

The 1970 studies offshore of Oswego consisted of the collection of weekly temperature data at four locations near the discharge of Oswego Unit 6. Temperatures were measured at 1-meter increments from surface to lake bottom for seventeen consecutive weeks from July through November 1970 (QLM, 1972).

Temperature data in the Oswego-Nine Mile Point area were obtained during 1973 from west of Oswego to east of Nine Mile Point. Vertical temperature profiles were obtained weekly from June through mid-December 1973 along five transects (QLM, 1974).

Data from these studies were used to evaluate the vertical temperature structure and to determine whether or not persistent stratification exists in this area. Vertical temperature profiles revealed the existence of transient thermal gradients equal to or greater than 1°C per meter (1.6°F per 3.2 ft) throughout the study area. The gradients appeared to be seasonal since they existed primarily in the summertime. They were not "seasonally stable," since they were generated and destroyed by surface heating and cooling and mixing within the water column over periods dependent upon meteorological conditions. Although gradients were observed on sequential weeks for up to a three week period, the gradients observed were at different temperatures and at different depths from week to week and, therefore, were not persistent. In addition, when the gradients were observed, they appeared to be uniform from station to station. A more complete discussion is presented in the documents previously submitted to the EPA (LMS, 1976).

These data were also used to determine the surface temperature in the area. During 1970 the maximum surface temperature recorded was 25.5°C (77.9°C). The temperature data recorded in the existing intake of the Oswego Steam Station were statistically analyzed and are shown in Figure III-3. Since the lake is generally isothermal in the top 6 m (20 ft), the temperature obtained at the intake depth of 4.9 m (16 ft) can be considered to be representative of the surface water teperatures. The analysis shows that temperatures in excess of 23.3°C (74°F) occurred only 10% of the time during the summer months and less than 1% of the time on an annual basis.

Figure III-4 shows the average surface temperature throughout the 1973 survey period for the stations in water depths of 6 and 30.5 m (20 and 100 ft.). As shown in this figure, temperatures at both stations were approximately 12°C (54°F) on 4 June, rose to a maximum temperature of approximately 24°C (75.2°F) on 13 August, and then declined to approximately 6°C (43°F) on December. A drop in the average surface temperatures of between 3 and 5°C (5.4 and 9°F) seems to have occurred during the week between 11 and 18 June. This drop in temperature can be attributed to "upwelling" generated by wind from the south.

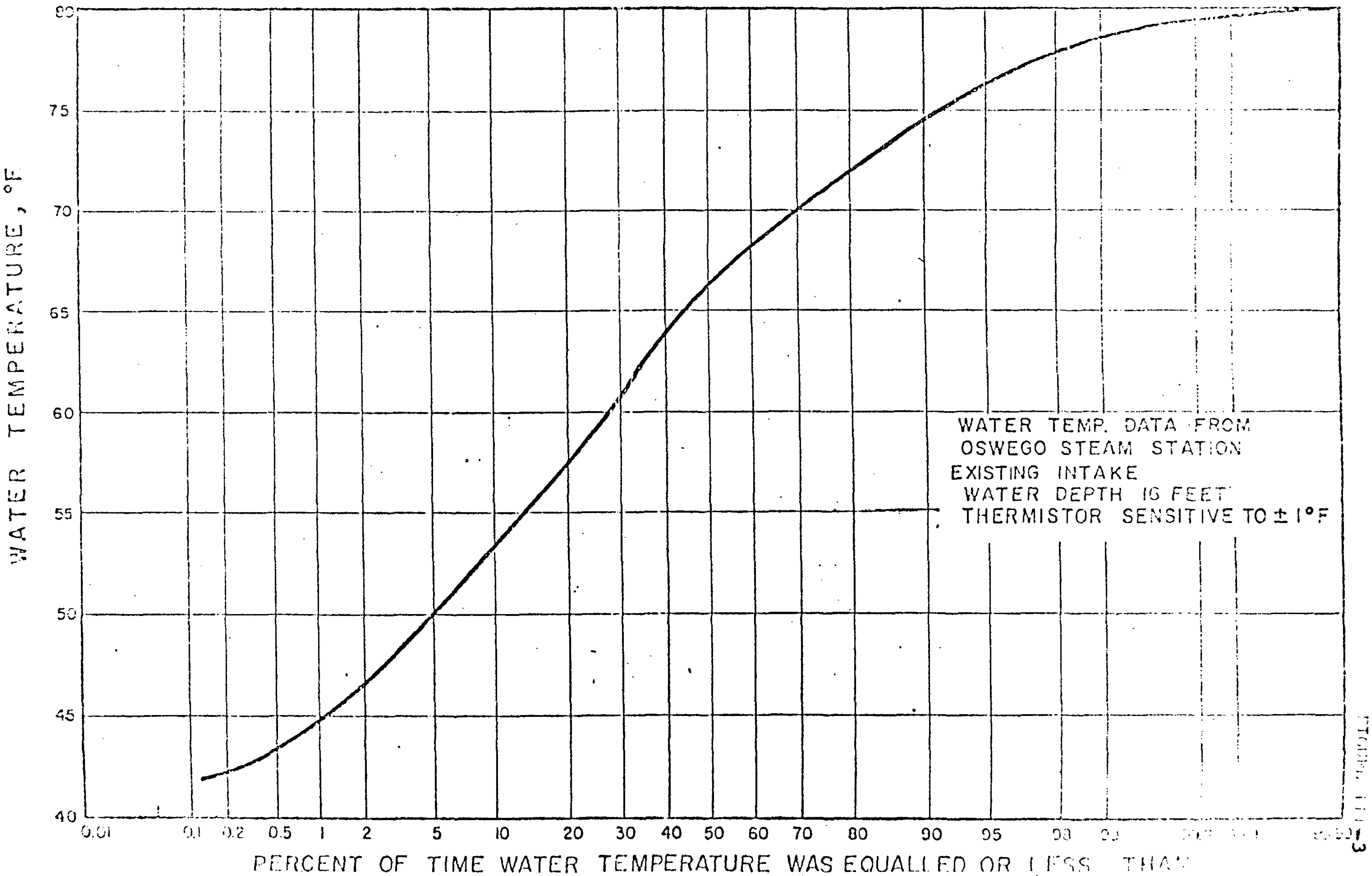
## D. EXISTING THERMAL DISCHARGES IN THE FITZPATRICK VICINITY

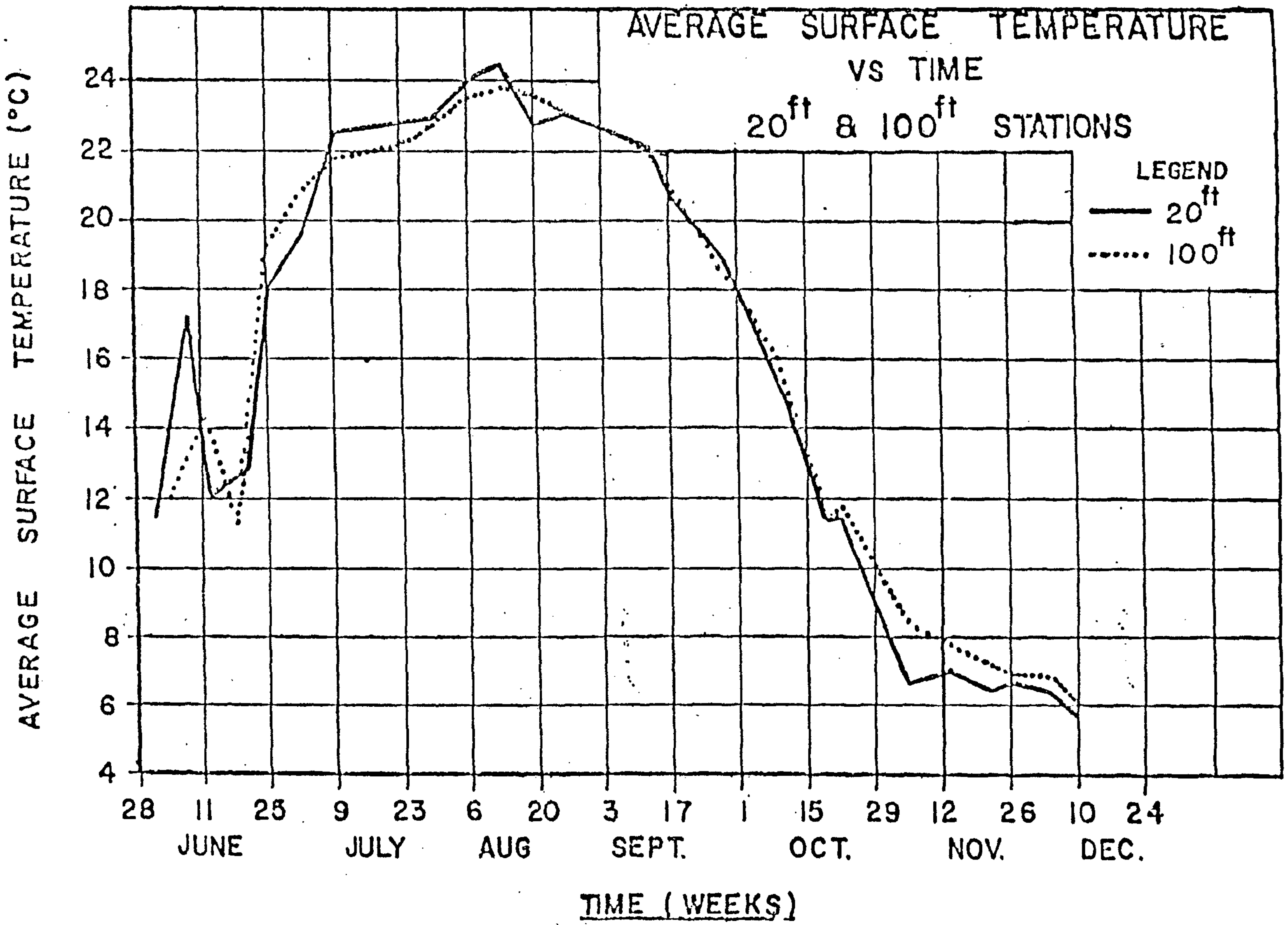
### 1. Oswego Steam Station Units 1-4, 5 and 6

The Oswego Steam Station's Units 1-4, which were constructed during the period 1938 to 1959, have a maximum generating capacity of 407 megawatts. The combined cooling water flow for these units is 21.58 $m^3$/sec (762 cfs) when they are operating at maximum capacity. The common intake of the circulating water systems is located 76.2 m (250 ft) north of the northwestern tip of the Oswego Harbor breakwater (see Figure III-5 for location of intake and discharge structures at Oswego). The cooling water flow for Units 1-4 is discharged to the "western leg" or turning basin of Oswego Harbor at a maximum temperature of 6.8°C (12.4°F) above intake temperature.

The circulating water systems for Oswego Units 5 and 6 are independent of the Units 1-4 systems, each having submerged intake and discharge structures in the lake offshore of the station (See Figure III-5 for location of intake and discharge structures at Oswego). Oswego Unit 5 began operation in 1975 and has a maximum net output of 850 MWe. Its maximum cooling water flow of 17.98 $m^3$/sec (635 cfs) is taken from the lake approximately 414.5 m (1360 ft) offshore of the site. The flow

FREQUENCY DISTRIBUTION FOR LAKE ONTARIO WATER TEMPERATURE
MEASURED AT OSWEGO FOR SUMMER (JUNE, JULY, AUG., SEPT.) 1968 – 1972






1 9 7 3.

FIGURE III-4

# LOCATION OF INTAKE AND DISCHARGE STRUCTURES
## OSWEGO STEAM STATION-UNIT 6

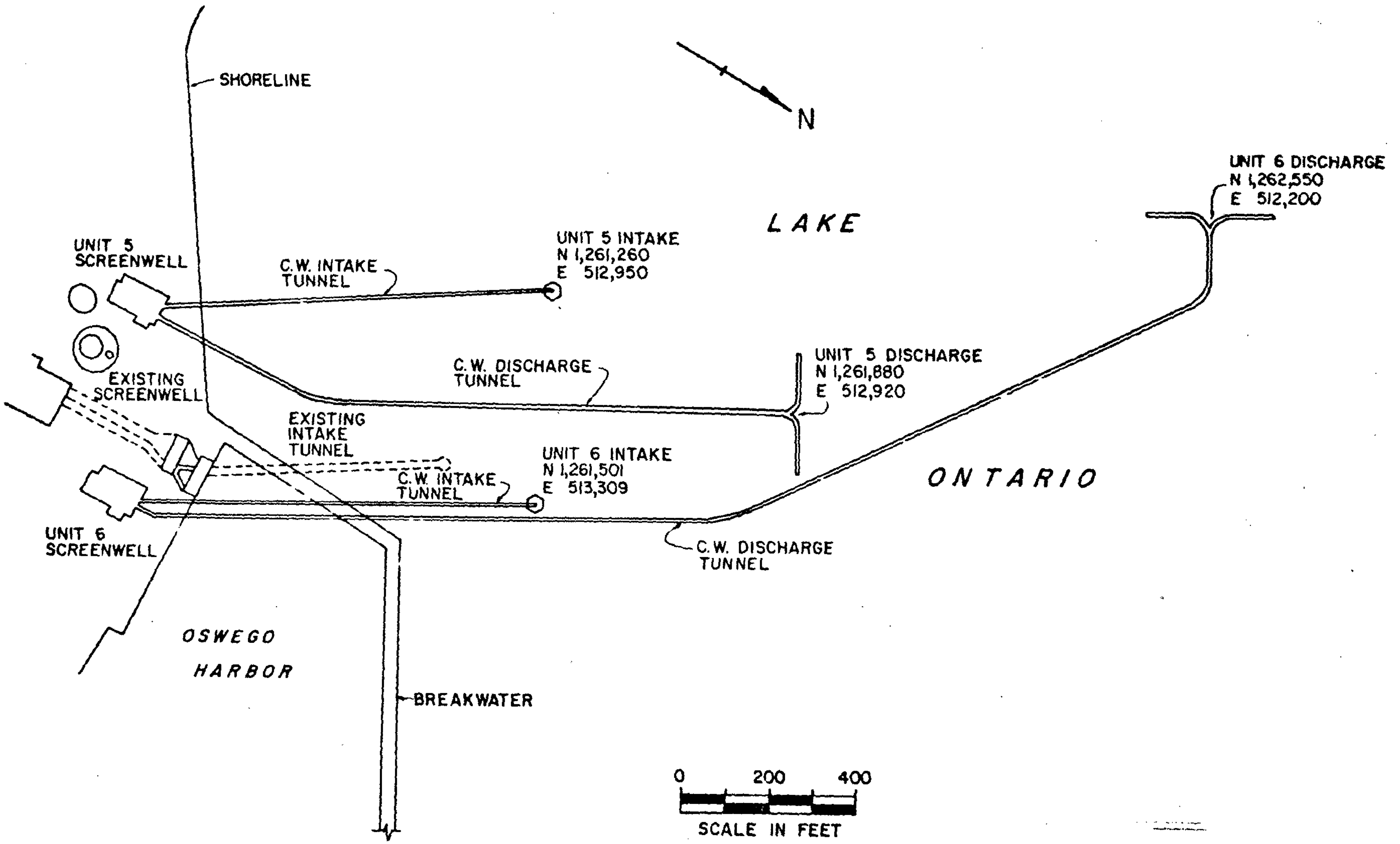



FIGURE III-5

is returned to the lake at a temperature increase up to 15.9°C (28.6°F) above intake temperature through a high-speed, submerged difuser designed to achieve rapid dilution.

Oswego Unit 6, presently under construction, will have a maximum net output of 850 MWe, a maximum cooling water flow of 17.98 $m^3$/sec (635 cfs) and a maximum temperature increase over intake temperature of 15.9°C (28.6°F). Table III-1 indicates the hydraulic and thermal characteristics of generating units in the vicinity of the FitzPatrick plant.

The plant flows and temperature rises presented for the units at Oswego are maximum conditions for full generating capacity, however, these units will operate at less than full capacity much of the time. Therefore, an assessment of impact should be based on an estimate of actual plant loads. Seasonal plant operating loads have been estimated for Oswego Units 5 and 6 and are presented in Table III-2. A similar estimate is not available for Oswego Units 1-4, but because these are relatively old units, it is anticipated that they will operate at substantially less than maximum rated capacity.

2. Nine Mile Point Nuclear Station Unit 1

Nine Mile Point Nuclear Station Unit 1 (NMP-1) has been in operation since 1969 and has a maximum net capacity of 610 MWe. The maximum cooling water flow of 16.94 $m^3$/sec (597 cfs) for this unit is taken from the lake approximately 259.1 m (850 ft) offshore of the site. This flow is returned to the lake at temperatures up to 17.3°C (31.2°F) higher than intake temperature through a submerged discharge in the lake. The discharge is located approximately 11.3 km (7 mi) east of the Oswego Steam Station and approximately 914.4 m (3000 ft) west of JAF discharge. Monthly capacity factors for Nine Mile Unit 1 are presented in Table III-3.

3. Oswego River

The Oswego River discharges an annual average flow of 174.2 $m^3$/sec (6137 cfs) (based on the 33-year period, 1933-1967) into Oswego Harbor from the south, where the river flow mixes with the Oswego Units 1-4 discharge and waste treatment plant discharges, and enters Lake Ontario at the harbor mouth.

The maximum flow on record was 1064.2 $m^3$/sec (37,500 cfs), which occurred on 28 March 1936. The minimum daily flow of 10.02 $m^3$/sec (353 cfs) was recorded on 14 August 1949, but the minimum average seven-consecutive-day flow, having a once-in-ten-year frequency (MA7CD/10) is 20.43 $m^3$ (720 cfs).

TABLE III-1

DISCHARGE CHARACTERISTICS FOR OSWEGO UNITS 1-6
NINE MILE UNIT 1, AND FITZPATRICK UNIT

| | OSWEGO UNITS 1-4 | OSWEGO UNIT 5 | OSWEGO UNIT 6 | NINE MILE UNIT 1 | FITZPATRICK UNIT |
|---|---|---|---|---|---|
| Length of main tunnel from existing shoreline | - | 414.5 m<br>1360 ft | 688.8 m<br>2260 ft | 160.9 m<br>528 ft | 384 m<br>1260 ft |
| Tunnel velocity | - | - | - | 8 fps<br>2.44 m/sec | 4.7 fps<br>1.43 m/sec |
| Length of diffuser | - | 79.3 m<br>260 ft | 81.4 m<br>267 ft | - | 235.9 m<br>774 ft |
| Number of duffuser ports | - | 12 | 12 | - | 12 |
| Number of diffuser ports/riser | | 2 | 2 | - | 2 |
| Inside diameter of diffuser ports | - | 0.61 m<br>2 ft | 0.61 m<br>2.0 ft | - | 0.76 m<br>2.5 ft |
| Port spacing | - | 12.2 m<br>40 ft | 12.2 m<br>40 ft | - | 45.7 m<br>150 ft |
| Initial discharge velocity | - | 5.12 m/sec<br>16.8 fps | 16.8 fps<br>5.12 m/sec | 1.22 m/sec<br>4 fps | 4.27 m/sec<br>14 fps |
| Angle between ports | - | 20° | 20° | - | 42° |
| Total diffuser flow | 21.58 $m^3$/sec<br>762 cfs | 17.98 $m^3$/sec<br>635 cfs | 17.98 $m^3$/sec<br>635 cfs | 16.94 $m^3$/sec<br>597 cfs | 23.36 $m^3$/se<br>825 cfs |
| Average depth of port centerline below mean low water | - | 6.4 m<br>21 ft | 10.4 m<br>34 ft | 4.9 m<br>16 ft | 7.62 m<br>25 ft |
| Average depth of lake bottom below mean low water at discharge | - | 7.92 m<br>26 ft | 11.9 m<br>39 ft | 5.5 m<br>18 ft | 9.14 m<br>30 ft |
| Maximum Port temperature rise above lake ambient | 6.9°C<br>12.4°F | 15.9°C<br>28.6°F | 15.9°C<br>28.6°F | 17.3°C<br>31.2°F | 17.5°C<br>31.5°F |

- Does not apply

TABLE III-2

ANTICIPATED MAXIMUM SEASONAL LOADS

OSWEGO STEAM STATION UNITS 5 AND 6 - 1981*

| SEASON | PERCENTAGE MAX. LOAD | UNIT OUTPUT (MWe) | HEAT DISCHARGE (BBtu/hr) | CONDENSER $\Delta T$ (°F) | DISCHARGE $\Delta T$ (°F) |
|---|---|---|---|---|---|
| UNIT 5 | | | | | |
| SUMMER | 53.4 | 453.9 | 2.244 | 18.3 | 16.4 |
| FALL | 70.2 | 596.7 | 2.765 | 22.5 | 20.0 |
| WINTER | 48.7 | 414.9 | 2.052 | 17.4 | 15.7 |
| SPRING | 30.0 | 255.0 | 1.443 | 11.8 | 10.8 |
| UNIT 6 | | | | | |
| SUMMER | 53.4 | 453.9 | 2.244 | 18.3 | 16.4 |
| FALL | 70.2 | 596.7 | 2.765 | 22.5 | 20.0 |
| WINTER | 48.7 | 414.9 | 2.052 | 17.4 | 15.7 |
| SPRING | 30.0 | 255.0 | 1.443 | 11.8 | 10.8 |

*Anticipated year of maximum usage.

TABLE III-3

RECORD OF MONTHLY CAPACITY FACTORS*

NINE MILE POINT NUCLEAR STATION UNIT 1

| MONTH | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | MEAN |
|---|---|---|---|---|---|---|---|
| JAN | - | 79.3 | 77.9 | 94.8 | 94.9 | 70.3 | 83.4 |
| FEB | - | 98.4 | 89.0 | 60.8 | 93.9 | 56.8 | 79.8 |
| MAR | - | 100.0 | 82.6 | 94.6 | 77.2 | 79.2 | 86.7 |
| APR | - | 6.4 | 0.8 | 30.8 | 0.0 | 83.7 | 24.3 |
| MAY | - | 1.9 | 0.0 | 0.0 | 0.0 | 88.5 | 18.1 |
| JUN | - | 51.3 | 22.5 | 27.9 | 0.0 | 86.9 | 37.7 |
| JUL | 45.8 | 75.7 | 75.2 | 81.9 | 69.8 | - | 69.7 |
| AUG | 86.1 | 88.0 | 80.1 | 83.6 | 91.1 | - | 85.8 |
| SEP | 87.0 | 52.6 | 54.6 | 84.4 | 94.1 | - | 74.5 |
| OCT | 64.8 | 12.7 | 68.9 | 66.6 | 78.8 | - | 58.4 |
| NOV | 89.4 | 93.3 | 77.2 | 68.0 | 90.4 | - | 83.7 |
| DEC | 44.8 | 94.6 | 95.2 | 89.0 | 47.1 | - | 74.1 |
| MEAN | | 62.8 | 60.3 | 65.2 | 61.4 | | 64.7 |

*Based on 500 MWe prior to July 1971 and 610 MWe after July 1971.

Previous investigations have shown that temperatures in the Oswego River are normally higher than those at the surface of the lake. The 1970 survey data indicate that the river warms more rapidly than the lake and is warmer throughout the summer months. The National Field Investigations Center (Anonymous, 1975) report of a thermal survey conducted by infrared radiometry demonstrates a plume in the lake that results from the river discharge.

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## IV. JAMES A. FITZPATRICK THERMAL DISCHARGE CHARACTERISTICS

### A. INTRODUCTION

This chapter describes the characteristics of the thermal plume resulting from the JAF plant discharge which are pertinent to the evaluation of biological impact. Information on the characteristics of the plume resulting from the thermal discharge is available from three sources: 1) hydraulic model results; 2) analytical model results; and 3) the results of three hydrothermal field surveys conducted during the summer and fall of 1976.

The hydraulic model tests were conducted primarily to evaluate, prior to construction, the performance of the diffuser system in the near-field vicinity of the discharge. A combination of the hydraulic model results and an analytical far-field model was used to predict temperature distributions outside the near-field area. The hydrothermal field surveys were designed to measure the three-dimensional temperature distributions resulting from the joint operation of NMP-1 and the JAF plants and to evaluate the performance of JAF diffuser based on the dilution of dye released into the discharge.

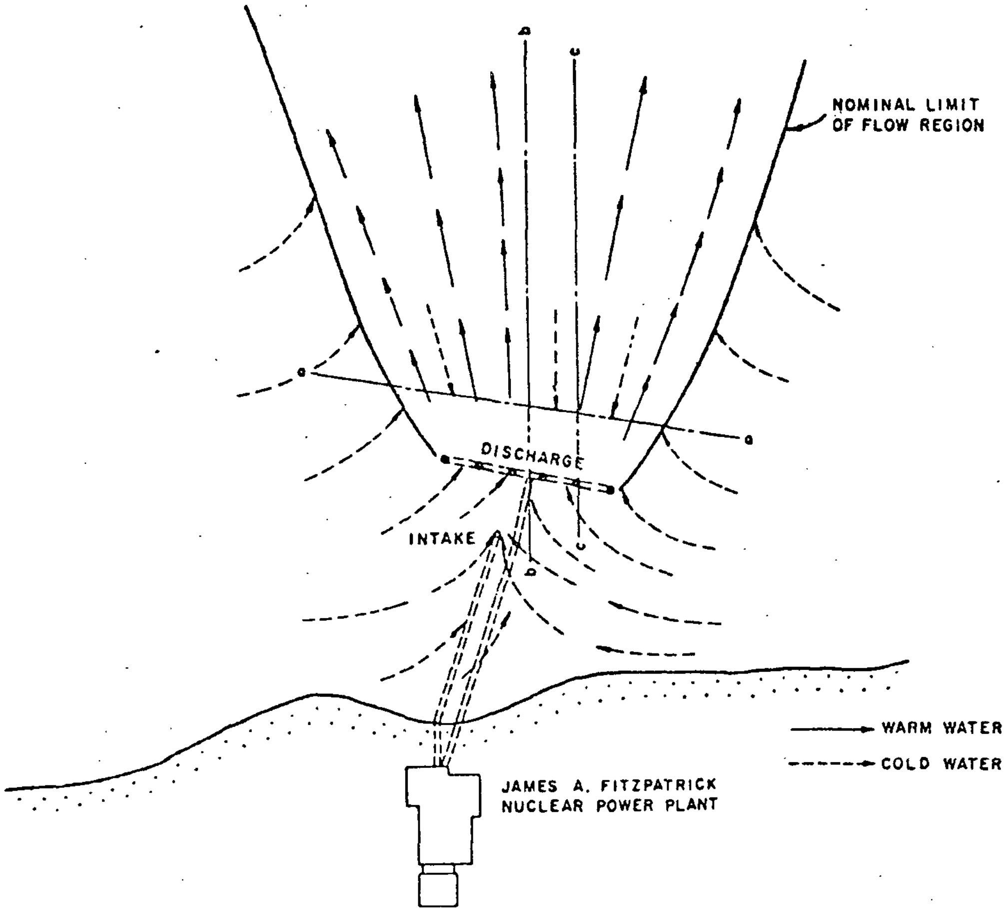
### B. REVIEW OF PHYSICAL AND MATHEMATICAL MODELS

A total of five different hydraulic models were constructed and tested in order to select the final diffuser configuration and evaluate its performance (PASNY, 1971). Models 1 and 2 were used primarily to select the optimum diffuser configuration and orientation. Models 3 and 4 were undistorted models of the diffuser structure at scales of 1/50 and 1/81, respectively, and were used to evaluate the diffuser performance under various ambient lake conditions. Model 5 was constructed to assist in determining the thermal effects produced by NMP-1 at the site of JAF discharge.

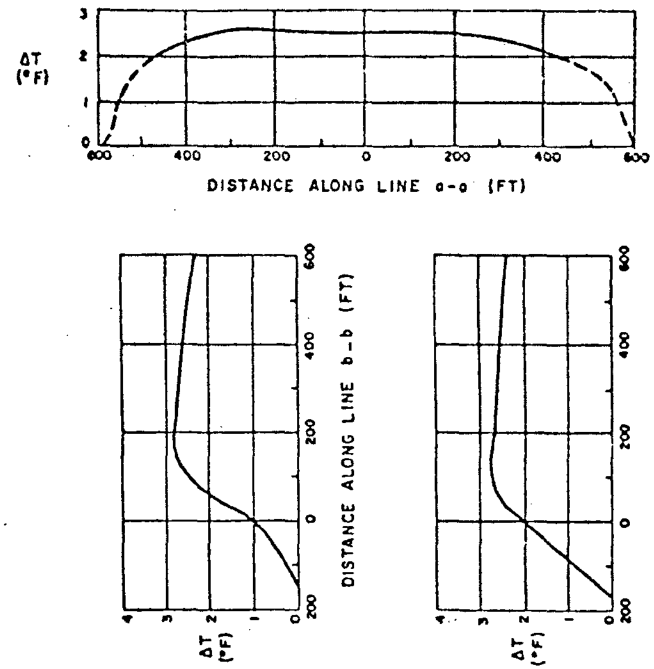
Figures IV-1, IV-2, and IV-3 show surface flow patterns and excess temperature contours in the vicinity of the discharge resulting from hydraulic model tests with no lake current, 0.8 fps eastward lake current, and 0.7 fps westward lake current, respectively. The maximum excess surface temperatures measured during the three test conditions were 2.8°F with no lake current, and 4.0 and 4.4°F for the eastward and westward current conditions, respectively. These temperature rises correspond to dilutions of the discharge flow by ambient water of 11.6:1, 8.1:1, and 7.4:1. The near-field hydraulic model results indicated that the dilution of the discharge achieved at the lake surface decreased with increasing ambient cross currents. It should be noted, however, that the lake current conditions simulated in the above model tests (0.8 and 0.7 fps) have both a low probability of occurrence

## SURFACE FLOW PATTERN AND TEMPERATURE PROFILES WITH NO NATURAL LAKE CURRENT – MODEL TESTS*

JAMES A. FITZPATRICK NUCLEAR POWER PLANT




FLOW PATTERN




SURFACE TEMPERATURE PROFILES

NOTES:

DISTANCE IS MEASURED FROM THE CENTER OF DISCHARGE STRUCTURE.
DASHED LINES ARE EXTRAPOLATED FROM MODEL DATA.

FIGURE IV-1

*PASNY, 1971

## FLOW PATTERN AND TEMPERATURE PROFILES WITH WESTWARD LAKE CURRENT - MODEL TESTS*

### JAMES A. FITZPATRICK NUCLEAR POWER PLANT

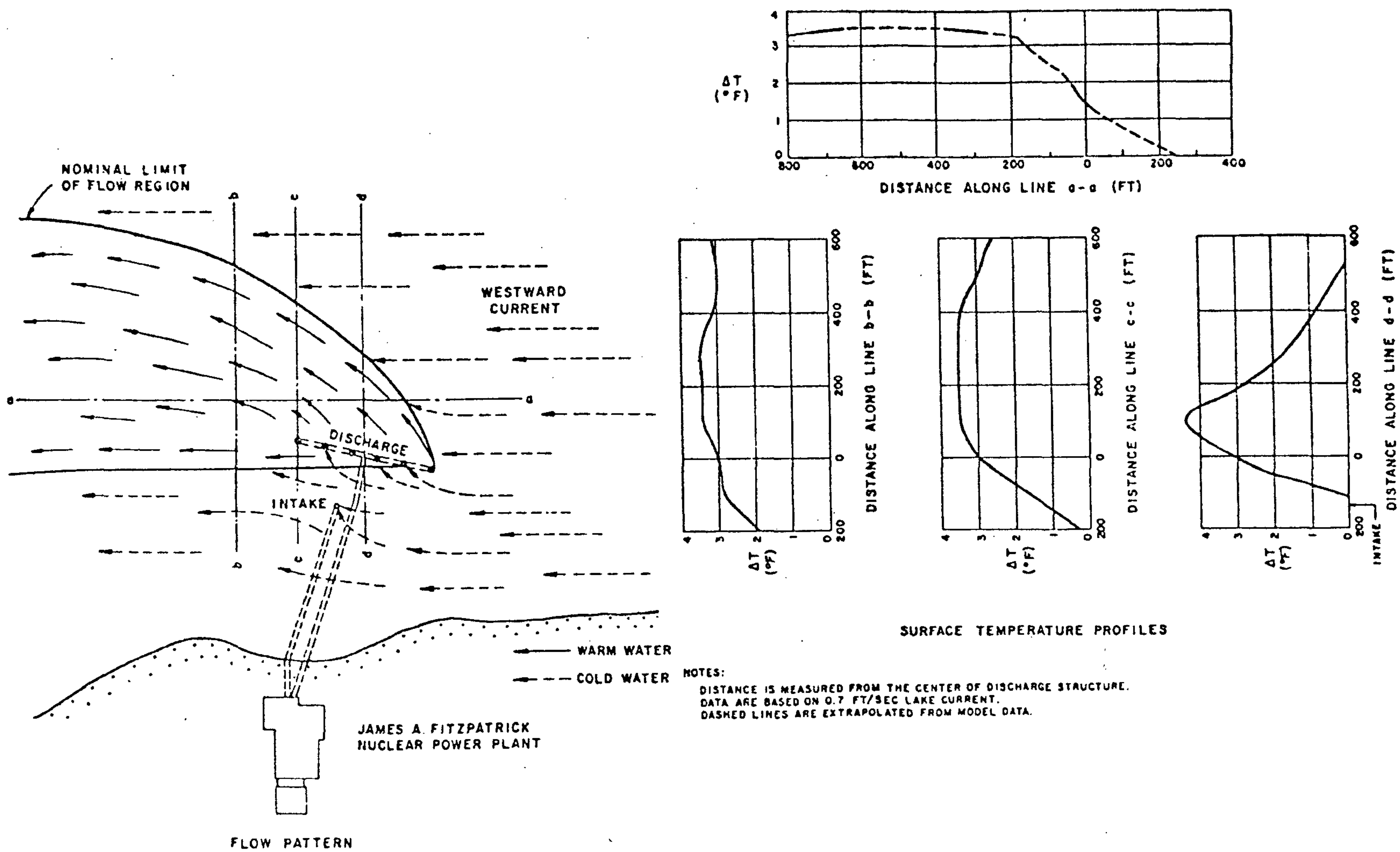



FIGURE IV-3

*BASNY ... 197-

FLOW PATTERN AND TEMPERATURE PROFILES WITH EASTWARD LAKE CURRENT - MODEL TESTS*

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

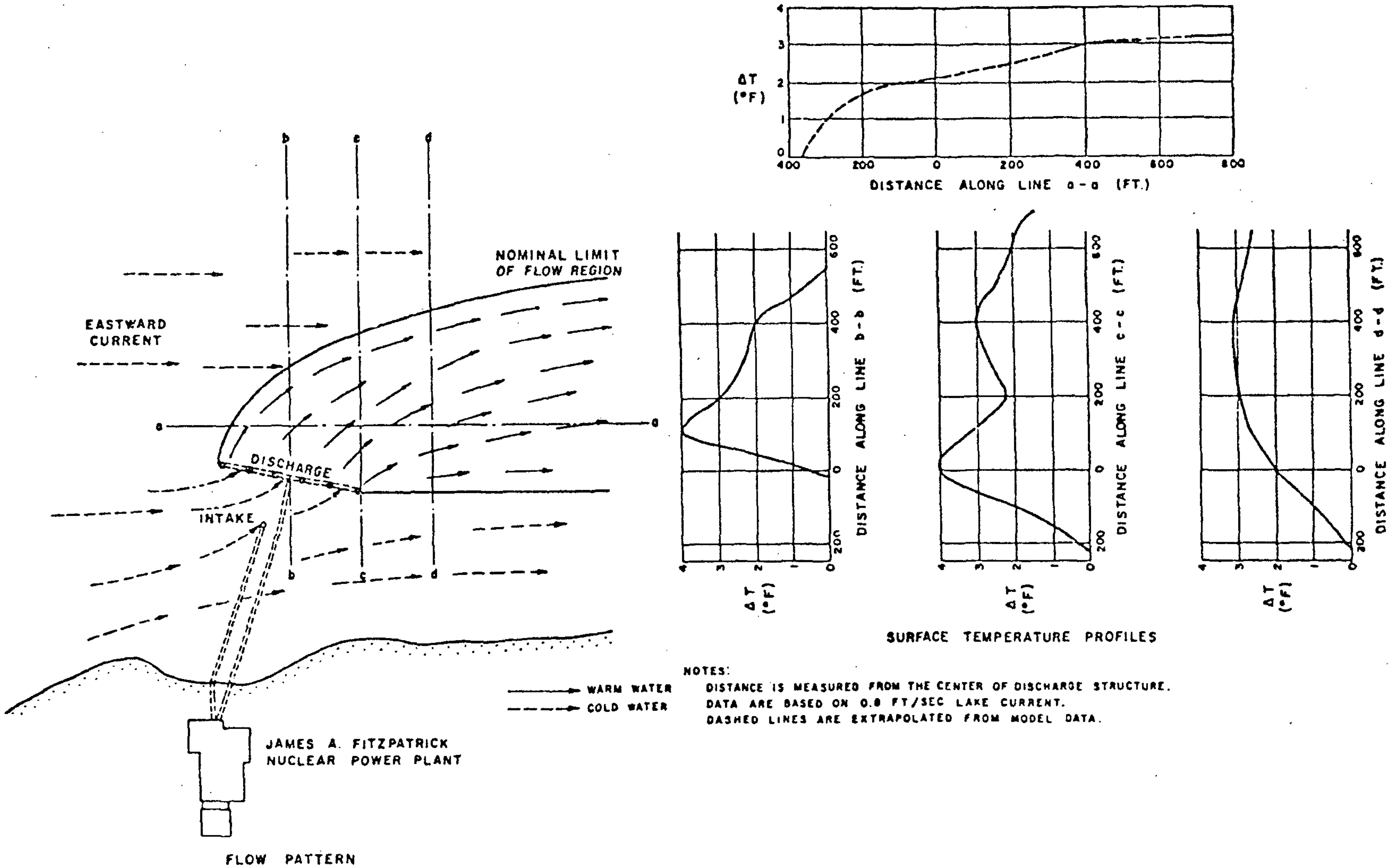



FIGURE IV-2

*PASNY 1971

and short duration time in the lake (Figures III-1 and III-2). The 0.8 fps speed has a frequency of occurrence of less than 5% at 12 hours duration. Figures IV-2 and IV-3, which illustrate the maximum excess temperatures of 4.0 and 4.4°F, respectively, show that those temperature rises decrease rapidly within approximately 200 ft of the discharge, indicating the occurrence of additional rapid dilution of the discharge waters in that region.

Temperature distributions outside the near-field area were predicted by an analytical model which used the near-field hydraulic model results to define a line source for the intermediate and far-field plume. Surface temperature distributions were predicted for ambient currents ranging from no lake current to 0.8 fps eastward current and 0.7 fps westward current. The results obtained from the analytical model studies indicated that as the ambient lake current increased, dilution along the plume centerline occurred less rapidly, and the surface area bounded by a given isotherm increased. Geometrically, the plumes became increasingly elongated in the direction of the simulated current as the velocity increased, with the far-field plume centerline approximately paralleling the shoreline at the higher along shore velocities. Plumes resulting from easterly currents were found to be similar to plumes resulting from westerly currents, outside of the near-field zone.

It should be noted that all of the above hydraulic and analytical modeling was done under conditions that would be expected to render the results conservative. The hydraulic model tests did not simulate certain field conditions usually associated with lake currents, such as the presence of winds and waves, which would induce some additional heat dissipation and mixing in the prototype. The model tests used an earlier estimated plant temperature rise of 32.4°F, which is 0.9°F above the design value. In addition, the model tests did not evaluate the effect of ambient lake stratification on the temperature rises produced by the diffuser in the near field. The initial colder dilution waters entrained into the jets from the lower depths under stratified ambient conditions would reduce the excess surface temperatures relative to surface ambient. Hence, since the nearshore waters of Lake Ontario are stratified during most of the spring, summer and early fall months, the effect of the JAF discharge on surface temperatures during these seasons would be reduced from those predicted under isothermal conditions.

## C. REVIEW OF HYDROTHERMAL FIELD SURVEYS TO DATE AND INTERACTION OF THE NINE MILE POINT AND JAMES A. FITZPATRICK NUCLEAR PLANT THERMAL PLUMES

Triaxial hydrothermal field surveys of JAF thermal plume were conducted during June, August and October of 1976 (Stone and Webster, 1976a, 1976b, 1976c). Briefly, the surveys included simultaneous triaxial measurements of temperature and dye concentration along fixed transects in the vicinity of the JAF and NMP-1 plants. Lake currents at three depths, lake level, and wind speed and direction were also continuously monitored before and during each survey. The following represents a summary of the triaxial surveys.

Table IV-1 contains a summary of the pertinent plant operating data and prevailing lake conditions during each of the 13 triaxial surveys, along with measurements of the observed surface plumes. The surveys were conducted under plant generating loads ranging between 725 and 793 MWe (88 and 97% of capacity), with a mean of 773 MWe (94% of capacity). Lake currents during the surveys were predominantly westward, with only the two 7 October surveys conducted during eastward currents. Current velocities were generally low, as evidenced by the fact that currents exceeded 0.5 fps during only one of the 13 surveys.

The presence of natural thermal gradients (both horizontal and vertical) in the vicinity of the discharge, as well as possible interaction with NMP-1 plume, complicate the determination of an ambient temperature from which plume temperature rises can be calculated. The vertical stratification observed at the JAF intake (Table IV-1) during each of the surveys is an example of such a complicating factor. In those cases where an ambient temperature was determined, it was obtained by averaging temperatures in the vicinity of the diffuser along transects outside the dye plume. The degree of natural temperature variation and the presence of NMP-1 plume in the vicinity of JAF discharge prevented the determination of ambient temperature by this method for all but one of the August surveys (Table IV-1).

The ambient temperature determined for the single 4 June survey was 53.3°F while ambient on the 13th of June decreased during the day from 51.7 to 47.3°F. The maximum surface temperature rise observed during the June surveys was 2.3°F, and thus no 3°F temperature rise isotherm was present. The minimum dilution of the dye observed at the surface during the June surveys (Table IV-1) would yield maximum surface temperature rises between 3.4 and 4.2°F if applied to the plant T under isothermal lake conditions. However, the vertical stratification in the vicinity of the discharge reduces the observed surface temperature rise since the dilution water entrained by the jet is from the lower depth, which is cooler than surface water. The degree to which surface temperature rises are affected by vertical stratification is dependent on both the magnitude and the distribution of vertical temperature differences.

The sizes of the observed dye plumes during the June surveys increased with increasing current velocity, the largest areal extent of the 10:1 dilution being observed on 4 June when lake currents were approximately 0.25 fps. Substantial reductions of the areal extent of the same dilution contour were observed on 13 June, under low (< 0.1 fps) lake currents.

TABLE IV-1

SUMMARY OF HYDROTHERMAL FIELD SURVEY DATA

JAMES A. FITZPATRICK NUCLEAR POWER PLANT - 1976

| DATE OF SURVEY | TIME | PLANT LOAD (MWe) | PLANT ΔT (°F) | DISCHARGE TEMP (°F) | LAKE CURRENT[a] VELOCITY (fps) | LAKE CURRENT[a] DIRECTION | VERTICAL ΔT AT INTAKE[b] (°F) | MAXIMUM OBSERVED ΔT AT SURFACE (°F) | MAXIMUM OBSERVED DILUTION FACTOR AT SURFACE[c] | SURFACE AREA OF 3°F ISOTHERM ($ft^2 x 10^3$) | SURFACE AREA OF 10 TO 1 DILUTION FACTOR[c] ($ft^2 x 10^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 JUN | 0657-0818 | 779 | 29.0 | 81.0 | 0.25 | SW | 3.0 | 2.3 | 7.1 | NO | 1398 |
| 13 JUN | 0638-0801 | 782 | 29.0 | 78.5 | <0.05 | W | 3.0 | 0.8 | 8.6 | NO | 44 |
| | 1032-1152 | 782 | 28.8 | 75.5 | <0.05 | W | 2.1 | 1.7 | 6.9 | NO | 164 |
| | 1446-1623 | 780 | 28.5 | 74.0 | 0.08 | SW | 1.7 | 2.2 | 7.4 | NO | 312 |
| 19 AUG | 0856-0949 | 788 | 29.5 | 99.0 | 0.46 | WSW | 1.1 | 2.6 | 8.5 | NO | 28 |
| | 1229-1338 | 793 | 29.5 | 100.0 | 0.33 | W | 5.1 | ND | 7.5 | ND | 226 |
| | 1603-1743 | 791 | 28.5 | 101.3 | 0.26 | SW | 5.4 | ND | 9.6 | ND | 27 |
| 20 AUG | 0818-0949 | 793 | 29.5 | 100.0 | 0.17 | SW | 4.2 | ND | 8.9 | ND | 6 |
| | 1231-1344 | 792 | 27.5 | 100.0 | 0.24 | W | 2.5 | ND | 8.2 | ND | 888 |
| | 1610-1722 | 791 | 29.0 | 101.0 | 0.25 | W | 2.9 | ND | 8.4 | ND | 15 |
| 7 OCT | 0828-1004 | 726 | 26.5 | 89.0 | 0.74 | E | 2.1 | 4.3 | 5.5 | 139 | 818 |
| | 1502-1615 | 726 | 26.0 | 89.0 | <0.10 | E | 4.0 | 4.2 | NA | 1196 | NA |
| 8 OCT | 1642-1759 | 725 | 26.0 | 87.5 | 0.50 | W | 0.0 | 3.6 | 5.9 | 232 | 989 |

[a] Lake current at 10 ft depth
[b] Difference between top 2 ft and bottom 2 ft of water column
[c] Based on dye concentration measurements

NO - Not observed
ND - Ambient temperature not determined
NA - Not available

The ambient temperature determined for the first 19 August survey was 68.9°F, and the corresponding maximum surface temperature rise was 2.6°F. The degree of thermal stratification in the discharge area was low during the first survey period, as indicated by the 1.1°F difference between surface and bottom temperatures (Table IV-1). It is of interest to note that the minimum observed dye dilution of 8.5 at the surface would produce a 3.5°F temperature rise under isothermal conditions, and that the maximum observed temperature rise (2.6°F) plus the observed vertical $\Delta$T (1.1°F) yields a similar temperature rise of 3.7°F. This indicates that the main portion of the entrained dilution water originated in the cooler bottom waters. No 3°F surface isotherm was observed during the first August survey.

The influence of the NMP-1 plume in the vicinity of the JAF discharge (note the increase in vertical $\Delta$T) prevented the determination of an ambient temperature for the remainder of the August surveys. The minimum dye dilution values applied to the existing plant T's would yield maximum surface temperature rises between 3.0 and 3.9°F under isothermal conditions. The calculated maximum temperature rises based on the dye data were less than the observed vertical T at the intake in three of the five August surveys for which ambient temperature could not be determined in the near field. This would indicate that the JAF discharge actually had a cooling effect on the surface waters in the vicinity of the discharge during the three surveys. The plume chartings (Stone and Webster, 1976b) also showed this effect. Thus, the interaction of the NMP-1 plume with the JAF plume under these conditions resulted in a reduction of the temperature in the NMP-1 plume through dilution with the cooler JAF plume. The maximum temperature rise attributable to the JAF discharge during the last two August surveys (Table IV-1) would be 3.4°F based on dye dilution, but the temperature rise relative to the surface waters in the vicinity would be reduced by the observed vertical stratification during these surveys.

The surface areal extents of the 10:1 dilution factor contours observed during the August surveys are given in Table IV-1. These would correspond to the approximate extents of the 3°F isotherm under capacity operation (plant $\Delta$T equal to 31.5°F) and isothermal lake conditions.

The survey results listed in Table IV-1 show that both the highest maximum surface temperature (4.3°F) and lowest minimum dilution factor (5.5) for all 1976 surveys occurred during the October surveys. Both of these values were recorded during the first 7 October survey which had the highest observed current velocity of all surveys and was also the only survey during which significant easterly currents were observed. A low minimum dilution (5.9) was also observed during the 8 October survey at a current velocity of 0.5 fps to the west.

In summary, the field survey results show maximum surface temperature rises of 4.3°F based on recorded temperature data and 4.8°F based on dye dilution and assuming isothermal lake conditions. During periods of vertical stratification in the vicinity of the discharge resulting from either natural causes or the influence of the NMP-1 discharge, the surface temperature rises attributable to the JAF discharge are reduced and it may, under conditions of NMP-1 plume interaction, actually reduce temperatures in the NMP-1 plume. The survey data do indicate that increasing lake velocities can decrease the dilution achieved by the diffuser, and can increase the areal extent of the intermediate field isotherms.

## D. PLUME TIME-TEMPERATURE HISTORY AND VELOCITY PROFILES

In order to determine the time-temperature history of plume waters it is necessary to know the spatial distribution of velocities and temperatures in the plume. The time of travel through the temperature distribution can then be determined by integrating the velocity distribution over distance. The high velocities and high levels of turbulence in the near-field jet region of a submerged discharge preclude the measurement of these distributions in the submerged jet region, thus necessitating a theoretical determination using the known discharge velocity and temperature ($u_o$ and $T_o$, respectively) and measured values from field data at the point of jet surfacing. Abramovich ([1963]) has shown that the dissipation of velocity is related to the dilution of temperature. A variety of expressions are available to describe this relationship, but one that is in common usage is,

$$\frac{u_o}{u} = \left(\frac{T_o}{T}\right)^b \qquad \text{(IV-1)}$$

If b = 1, the temperature and velocity are diluted equally. However, usually b>1, as evidenced by plume deflection in an ambient current, until the plume no longer shows the effect of discharge momentum, although noticeable temperature elevations remain. This is explained by the fact that the discharge momentum has gone to increase the level of turbulent motion in the plume, while the decay of heat is primarily a result of exchange to the atmosphere; that is, the decay of heat and momentum are distinctly different processes.

It remains then to describe the temperature dilution distribution. Previous studies (LMS, 1975) have indicated that the dilution of temperature along the centerline of the plume is proportional to the centerline distance raised to same power or,

$$\frac{T(s)}{T_o} = \frac{1}{S^a} \qquad \text{(IV-2)}$$

By substitution of Equation IV-2 into Equation IV-1 and integration of the resulting expression for velocity over centerline distance, a time/temperature relationship can be determined. Substitution of the initial discharge conditions and conditions at some centerline distance downstream yields values of a and b of 0.41 and 1.12 respectively. The substitution values selected for this determination were the initial discharge velocity of 14.0 fps, the initial $\Delta T$ of 31.5°F, and the velocity and temperature at a centerline distance of 300 ft of 1.0 fps and 3.0°F, respectively. The resulting time/temperature distribution for travel along the plume centerline is shown in Figure IV-4. Figure IV-4 applies only to the near-field portion of the plume where discharge momentum dominates the hydrodynamics of the plume. Figure IV-4 illustrates the rapid dilution of the discharge temperature achieved by the diffuser in the near field, with the initial temperature rise of 31.5°F being reduced to less than a 7°F temperature rise within ten seconds of discharge to the lake. It should be noted that since the time/temperature relationship shown in Figure IV-4 is along the centerline of the plume, it represents the maximum exposure. Waters flowing in the plume but not at the centerline would be diluted more quickly and therefore would be subjected to smaller temperature rises.

The velocity (u) versus distance (s) can be derived from the temperature distribution using Equation IV-1. The resulting estimated centerline velocity is described by Figure IV-5 for the near-field region.

In the far-field plume, velocities are dominated by lake currents; thus the centerline time of travel can be computed by dividing the centerline distance to a specified isotherm by the magnitude of lake current. The far-field model results for lake currents between 0.2 and 0.8 fps indicate that the maximum travel time to the 2°F isotherm would be 2.5 hours and would occur at lake currents of 0.5 fps. Lake currents less than 0.5 fps would yield lower travel times since dilution along the centerline occurs more rapidly. The use of lake current to compute far-field travel time is conservative in that the average velocities along the centerline would be higher than the lake currents due to convective spreading and discharge momentum.

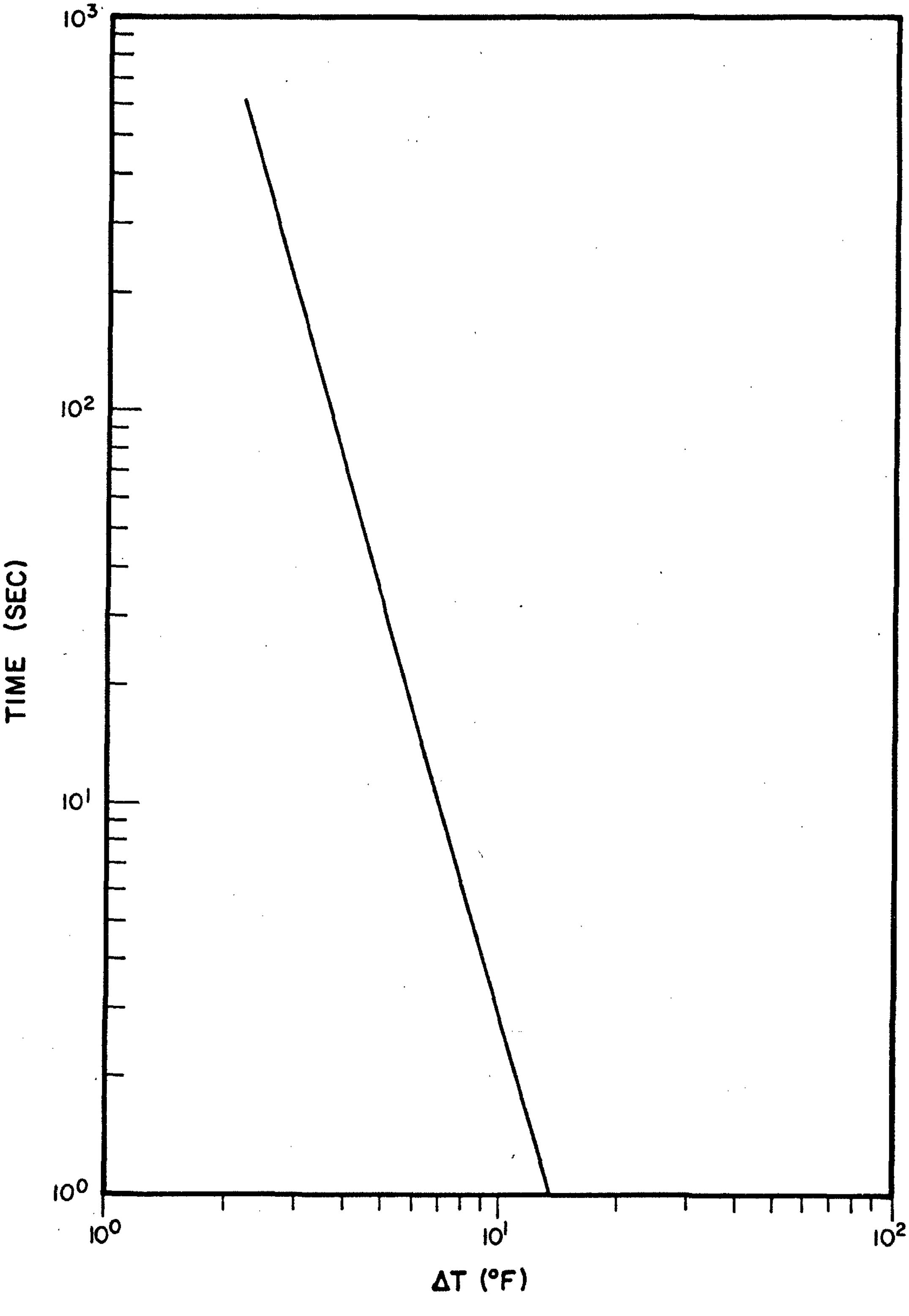
It should be pointed out that a distribution of possible time/temperature exposures exists which could be experienced by an entrained organism; these exposures range from a low temperature rise for a short time period to the maximum exposures given above. Only a small percentage of the organisms would experience either the maximum or minimum exposures.

## E. WATER BODY SEGMENT FOR MULTI-PLANT EFFECTS

A water body segment encompassing the discharges of Oswego Units 1-6, Nine Mile Point Unit 1, the James A. FitzPatrick Plant and the Oswego

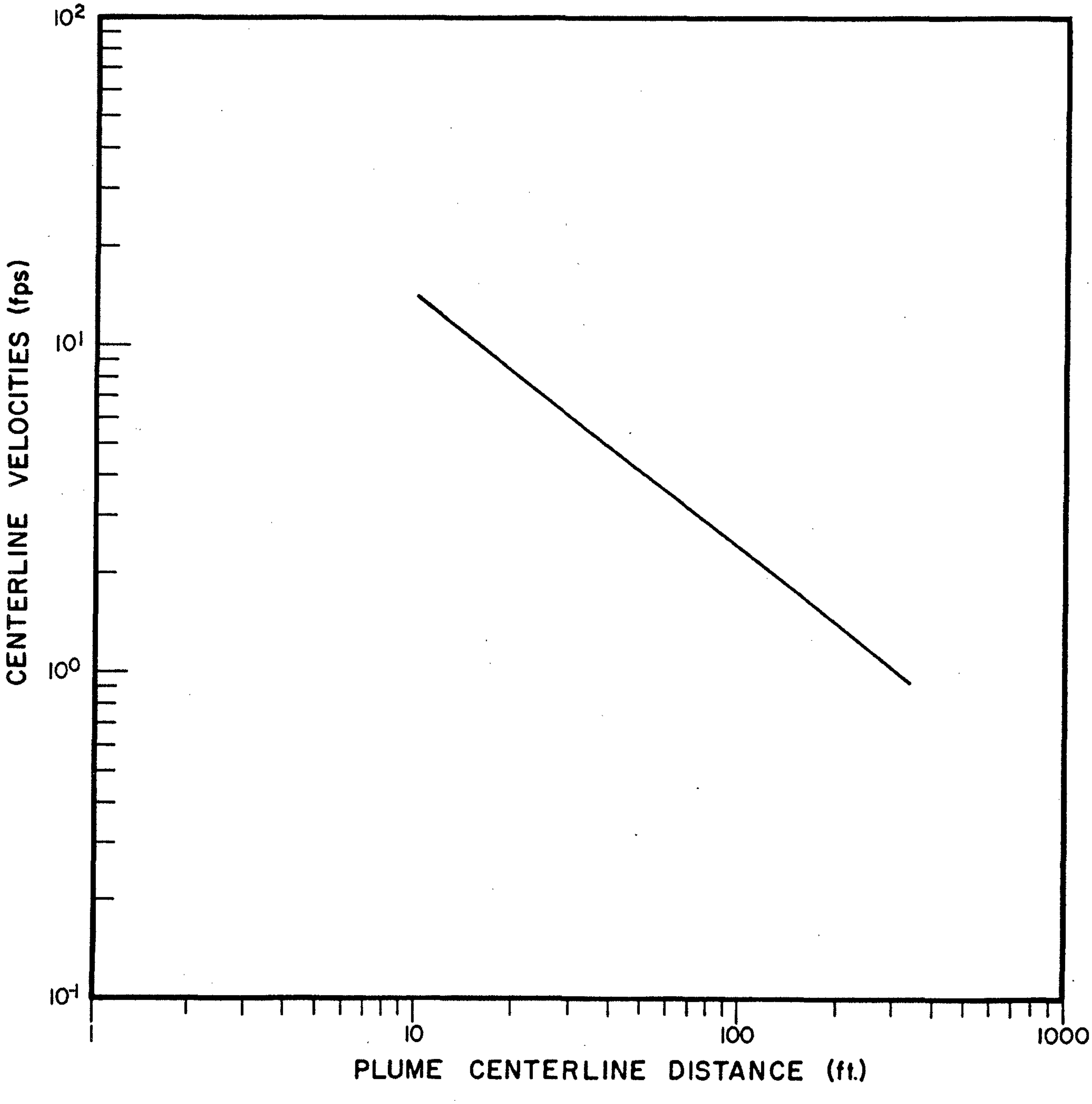
# TIME-TEMPERATURE HISTORY FOR THE NEAR FIELD PLUME

## JAMES A. FITZPATRICK NUCLEAR POWER PLANT AND VICINITY



# VELOCITY AT PLUME CENTERLINE VS. DISTANCE FROM DIFFUSER

## JAMES A. FITZPATRICK NUCLEAR POWER PLANT



River was chosen for consideration of multi-plant effects. Based on an analysis of ambient lake current persistences, it is expected that 95% of the currents of 0.1 knots will have an excursion distance shorter than half the water body segment length. That is, for the characteristic speed, a persistence in excess of 96 hours would be required before a floating organism would leave the water body segment, which extends approximately 10.6 km (6.6 mi) offshore and stretches along the shore for a distance of 36 km (22.5 mi). The volume of water contained in this segment is $9.6 \times 10^9$ $m^3$ ($3.4 \times 10^{11}$ $ft^3$). The cross-sectional area normal to the longshore flow is approximately $2.7 \times 10^5$ $m^2$ ($2.9 \times 10^6$ $ft^2$) (see Table IV- 2 ). The selected segment includes 0.59% of the volume of Lake Ontario.

## F. PLUME ENTRAINMENT VOLUME RATIOS

In order to evaluate the effect of the thermal discharge on the water body segment, it is desirable to quantify the fraction of the total flow through the water body that is entrained into the plume at selected temperature rises.

It has been shown by many investigators that a Gaussian distribution is a good approximation of the horizontal and vertical temperature variations for submerged and surface jets. Therefore, it can be assumed that temperature in a cross section, normal to the plume centerline, decreases exponentially with the square of the horizontal distance, r, and vertical distance, z, from the centerline. This temperature, T(s,r,z) is described by:

$$T(s,r,z) = T^* (s) \operatorname{Exp} - \left[ \left( \frac{z^2}{2\sigma_z^2} + \frac{r^2}{2\sigma_r^2} \right) \right] \qquad \text{(IV-3)}$$

Where $\sigma_z$ and $\sigma_r$ are the standard deviations of the temperature distributions and $T^*(s)$ is the centerline temperature. If $\sigma_r$ is assumed to be different for both the left and right side of the plume cross section, plume asymmetry is also accounted for.

Equation IV-3 describes a full elliptical cross section for each isotherm in the submerged portion of the jet and a half elliptical section for the plume after jet surfacing ($z \geq 0$). The cross-sectional area within any isotherm of value T after jet surfacing can be shown to be:

$$A = \pi \sigma_r \sigma_z \ln \frac{T^*(s)}{T} \qquad \text{(IV-4)}$$

TABLE IV-2

CHARACTERISTICS OF THE WATER BODY SEGMENT

| Water Body Segment | | |
|---|---|---|
| Distance to offshore boundary | 10.6 km | 6.6 mi |
| Depth at offshore boundary | ~140 m | ~450 ft |
| Distance along shore | 36 km | 22.5 mi |
| Surface area | 382 $km^2$ | 147.5 $mi^2$ |
| Volume within bounds | $9.6 \times 10^9$ $m^3$ | $3.4 \times 10^{11}$ $ft^3$ |
| Cross sectional area | $2.7 \times 10^5$ $m^2$ | $2.9 \times 10^6$ $ft^2$ |

Solving Equation IV-4 for temperature as a function of area enclosed yields:

$$T = T^*(s)\ \mathrm{Exp} - \left[\frac{A}{\pi \sigma_r \sigma_z}\right] \tag{IV-5}$$

and by substitution from Equation IV-1:

$$u = u_o \left(\frac{T^*(s)}{T_o}\right)^b \mathrm{Exp} - \left[\frac{bA}{\pi \sigma_r \sigma_z}\right] \tag{IV-6}$$

The principle of heat conservation dictates that under steady-state conditions the heat flux at any plume cross section be equal to the total flux at the diffuser ports or:

$$H = \int_o^\infty \rho C_p T_u\, dA = H_o = \rho C_p n \pi r^2 u_o T_o \tag{IV-7}$$

Where: H = heat flux at any plume cross section
$H_o$ = heat at diffuser ports input
$\rho$ = density of water
$C_p$ = heat capacity of water
n = number of diffuser ports
r = radius of diffuser ports

Substitution for T and u from Equations IV-5 and IV-6 and evaluation of the integral in Equation IV-7 yields:

$$\sigma_r \sigma_z = n r_o^2 (b + 1) \left(\frac{T_o}{T^*(s)}\right)^{b+1} \tag{IV-8}$$

as a necessary condition for heat conservation at any cross section after jet surfacing. A similar analysis for the submerged portion of the jet yields the necessary condition:

$$\sigma_r \sigma_z = r_o^2 \left(\frac{b + 1}{2}\right)\left(\frac{T_o}{T^*(s)}\right)^{b+1} \tag{IV-9}$$

The total flow through an isotherm T with area A(T) is defined by:

$$Q = \int_o^{A(T)} u(A)\, dA \tag{IV-10}$$

which after substitution for (A) from Equation IV-6 and evaluation of the integral yields:

$$Q(T) = u_o \left(\frac{T^*(s)}{T_o}\right)^b \frac{\pi \sigma_r \sigma_z}{b} \left[1 - \left(\frac{T}{T^*(s)}\right)^b\right] \tag{IV-11}$$

where the $\sigma_r \sigma_z$ product is specified by equation IV-8.

Substitution for $\sigma_r \sigma_z$ from Equation IV-11 yields:

$$Q = \frac{Q_o T_o}{T^*(s)} \left(\frac{b + 1}{b}\right) \left[1 - \left(\frac{T}{T^*(s)}\right)^b\right] \tag{IV-12}$$

for the flow through the cross section bounded by isotherm T, after jet surfacing. Similar analysis for the submerged portion of the jet also leads to Equation IV-12. Differentiating equation IV-12 with respect to T*(s), solving for T*(s) when Q is maximum, and back substitution into Equation IV-12 yields:

$$Q_{MAX}\ (T) = \frac{Q_o T_o}{T(b + 1)^{1/b}} \tag{IV-13}$$

for the maximum flow through the isotherm T.

The beauty of equation IV-13 is that it allows the maximum flow to be computed without requiring prior determination of where in the plume it occurs. It should be noted that the $Q_{MAX}$ resulting from equation IV-13 is a conservative estimate of the entrained flow since it is the sum of some portion of the discharged flow and the entrained flow contained within the particular isotherm. Thus, the actual maximum flow entrained through the particular isotherm would be less than $Q_{MAX}$ by the portion of the original discharge flow still inside the isotherm at the location where $Q_{MAX}$ occurs.

Equation IV-13 was used to calculate the maximum flows within the 2°F and 3°F isotherm for the JAF plume and for the other generating stations in the selected water body segment. The results of the analysis and a comparison of the entrained flows with the total flow in the water body segment are given in Table IV-3. All flow rates shown in Table IV-3 are based on capacity operation of all stations. If seasonal load factors were applied in the analysis the given isotherm flows would be substantially reduced.

TABLE IV-3

MAXIMUM HEATED WATER FLOW WITHIN 3 AND 2°F ISOTHERMS

JAMES A. FITZPATRICK NUCLEAR POWER PLANT AND VICINITY

| PLANT | ISOTHERM (°F) | $Q_{MAX}$ (cfs) | RATIO OF $Q_{MAX}$ TO Q IN WATER BODY SEGMENT[a] |
|---|---|---|---|
| FITZPATRICK | 3 | 5001 | 0.0103 |
| | 2 | 7502 | 0.0154 |
| ALL PLANTS[b] | 3 | 15576 | 0.0320 |
| | 2 | 23365 | 0.0479 |

[a] Q in water body segment equals 13800 $m^3$/sec
[b] Includes Oswego Units 5 and 6, Nine Mile Point Unit 1, FitzPatrick

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