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# 1978

## ANNUAL ENVIRONMENTAL OPERATING REPORT (NONRADIOLOGICAL)

## SALEM NUCLEAR GENERATING STATION - UNIT NO. 1

January 1 through December 31, 1978

Docket No. 50-272
Operating License No. DPR-70


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(NON-RADIOLOGICAL)

January 1 Through December 31, 1978

SALEM NUCLEAR GENERATING STATION

UNIT NO. 1

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PUBLIC SERVICE ELECTRIC AND GAS COMPANY

80 Park Place

Newark, New Jersey

March 30, 1979

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SALEM NUCLEAR GENERATING STATION
ANNUAL ENVIRONMENTAL OPERATING REPORT
(NON-RADIOLOGICAL)

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ACKNOWLEDGEMENT

This report was prepared by Public Service Electric and Gas Company, Newark, New Jersey. Data were collected at the Salem Nuclear Generating Station and in the Delaware Estuary by the staff of Salem Station, the PSE&G Research and Testing Laboratory and Ichthyological Associates (IA) of Middletown, Delaware. Data analysis and report preparation was performed by the PSE&G Licensing and Environment Department and the IA staff.

## SECTION 1.0
## GENERAL

### 1.1 INTRODUCTION

This report is required by Section 5.6.1.1.1.a of the Environmental Technical Specifications (Appendix B) to Salem Nuclear Generating Station Operating License No. DRP-70. It includes the results of analyses carried out under the non-radiological environmental monitoring requirements described in the Environmental Technical Specifications (ETS). Appendix B became effective on December 11, 1976 at 7:36 p.m. EST when Salem Nuclear Generating Station (SNGS), Unit 1, attained initial criticality.

Information from December 11 through December 31, 1976 is reported for all required monitoring programs in the 1976 Annual Environmental Operating Report (Non-radiological), April 1977. Results of the first full year of Salem Unit 1 operation were reported in the 1977 Annual Environmental Operating Report (Non-radiological), March 31, 1978. This third such report covers the same information for the period January 1, 1978 through December 31, 1978.

## 1.2 SUMMARY

Salem Unit 1 was operational during much of 1978 while Salem Unit 2 continued in the construction phase. Two (2) extended maintenance outages, one in the spring and one in the fall, did occur during the operation of Unit 1, and additional relatively short maintenance periods occurred at other times throughout the year. Daily average reactor power levels achieved during the reporting period and corresponding condenser delta temperature information are given in Figures 2.1-1 through 2.1-3.

The requirements for non-radiological environmental monitoring were divided into two general monitoring and surveillance programs: abiotic and biotic. The abiotic program covered field (estuary), and station monitoring efforts, including plant temperature information and plant and field chemical surveys. Section 2.0 of this report discusses the abiotic program. Meteorological information for 1978 are presented in two (2) 1978 Semiannual Radioactive Effluent Release Reports (RERR-4 and RERR-5) for Salem Station.

The biotic studies were divided into aquatic and terrestrial programs, and the results are presented in Section 3.0. In addition to the field studies, the aquatic effort included substantial monitoring of the intake and discharge for impingement and entrainment.

## 1.3 CONCLUSIONS

Heat dissipation through the condensers was generally related to reactor power level. The circulating water system experienced intake screen failure and condenser tube plugging at times, requiring operation with fewer than six pumps. However, no environmental impact from the operation of the circulating water system was detected in the Delaware River estuary.

Plant chemical discharges were made in accordance with the Environmental Technical Specification provisions, and chemical usage was compared with predicted waste discharge concentrations. No unusual or significant water quality impacts or chemical concentrations were noted during the period in which estuary water quality samples were taken.

The general ecological survey was conducted in accordance with the provisions of ETS Section 3.1.2.1 to determine the effect of plant operation on the ecology of the Delaware River estuary. No significant changes in the ecology of the river in the vicinity of Salem Nuclear Generating Station were observed.

Aquatic and terrestrial species compositions, densities and abundances were within expected ranges when compared to preoperational monitoring data, except for the number of juvenile weakfish (Cynoscion regalis) within the estuary. Data collected during the summer indicated that the juvenile weakfish population was larger than had been previously observed. Although relatively high impingement rates did occur, there was no indication that the operation of Salem Station had a significant impact on the 1978 year class of weakfish.

## SECTION 2.0
## ABIOTIC MONITORING AND SURVEILLANCE PROGRAMS

### 2.1 TEMPERATURE (ETS Section 2.1)

During 1978, Salem Unit 1 was in commercial operation as a baseload electric generating station, with production varying from 0 to 1113 MWe.

An extended outage for maintenance started in March and continued through mid-June. Another extended outage occurred in October and November for a period of four weeks. Several shorter ones occurred throughout the year. Average daily power level and average daily delta temperature are presented in Figures 2.1-1 through 2.1-3. These figures demonstrate the close correlation between power level and delta temperature.

There are three parts to the condenser serving the Salem Unit 1 steam turbine, and each is divided into two separate halves. As required by the ETS, condenser temperatures were monitored at the inlet to each condenser half or shell, for a total of six measurements. Similarly, discharge temperatures were measured in each of the six discharge lines.

The Salem condenser monitoring system utilizes probes called resistor temperature detectors (RTD). These RTD's are interfaced with the plant computer which records the condenser temperature readings on an hourly basis. The data are processed to produce the delta T and maximum discharge temperature information required by the ETS. When the computer monitoring system was out of service, the intake and discharge temperatures were monitored every two hours utilizing local instrumentation located on the condensers.

The results of the temperature monitoring program are summarized in Table 2.1-1. Presented are the average intake, discharge and delta temperatures for the Unit 1 condenser.

The coldest intake temperatures occurred in February [0.6°C(33.1°F)] while the highest occurred in July [34.2°C (93°F)]. The lowest and highest discharge temperatures occurred in February and August respectively [1.1°C (34°F)] and [42.8°C (109°F)]. The monthly average delta T was fairly consistent throughout the year. No data are reported for April and May because of the plant outage.

2.1.1 Condenser Delta Temperature (ETS Section 2.1.1)

Heat rejected through the condensers varied in response to plant operating conditions and power level. Problems were frequently encountered with the circulating water system, the most common being failures of the vertical traveling intake screens. Nonrepresentative locations of the RTD's and plugging of condenser tubing also contributed to indications exceeding the 16.5°F delta T limit with 6 pumps in service at times. Such corrective actions as power reductions or water box cleaning, were generally employed to reduce the delta T. In addition, the RTD's were relocated during the March outage thus rectifying the problem of erroneous readings when the station resumed operation in June.

As mentioned before, the main problems were with the circulating water vertical traveling screens. Because of a serious detritus loading problem, and also to maximize survival of fish impinged upon the screens, the circulating water traveling screens were operated continuously. This caused excessive wear of the screens and related hardware and resulted in frequent breakdowns. Since a circulating pump cannot be operated without its traveling screen, Salem Unit 1 operated much of the time with fewer than 6 pumps in service.

2.1.2 Maximum Discharge Temperature (ETS Section 2.1.2)

The circulating water intake and discharge temperatures reached their maximums in August. The intake temperature maximum was 30.0°C (96.8°F) while the maximum discharge temperature was 42.7°C (109.0°F). This occurred when fewer than six pumps were operating. ETS limits for maximum discharge temperatures were not exceeded in 1978.

2.1.3 Rate of Change of Discharge Temperature (ETS Section 2.1.3)

Section 2.1.3 of the Salem ETS requires that "The rate of change of discharge temperature shall not exceed 8°F per hour during normal plant shutdown". In 1978 Salem Unit 1, during normal power level reductions did not exceed a rate of change of greater than 15% of full power in one hour. This rate of change is substantially less than the 25% which would require additional monitoring. Correspondingly, the specified rate of change requirement was not exceeded and there was no necessity to increase the frequency of discharge temperature monitoring.

Unplanned power reductions did occur because of the need to protect plant equipment or when, for certain reactor safeguard operations, the plant decreased reactor power level rapidly. No cold shock or other environmental impact attributable to shutdown was observed.

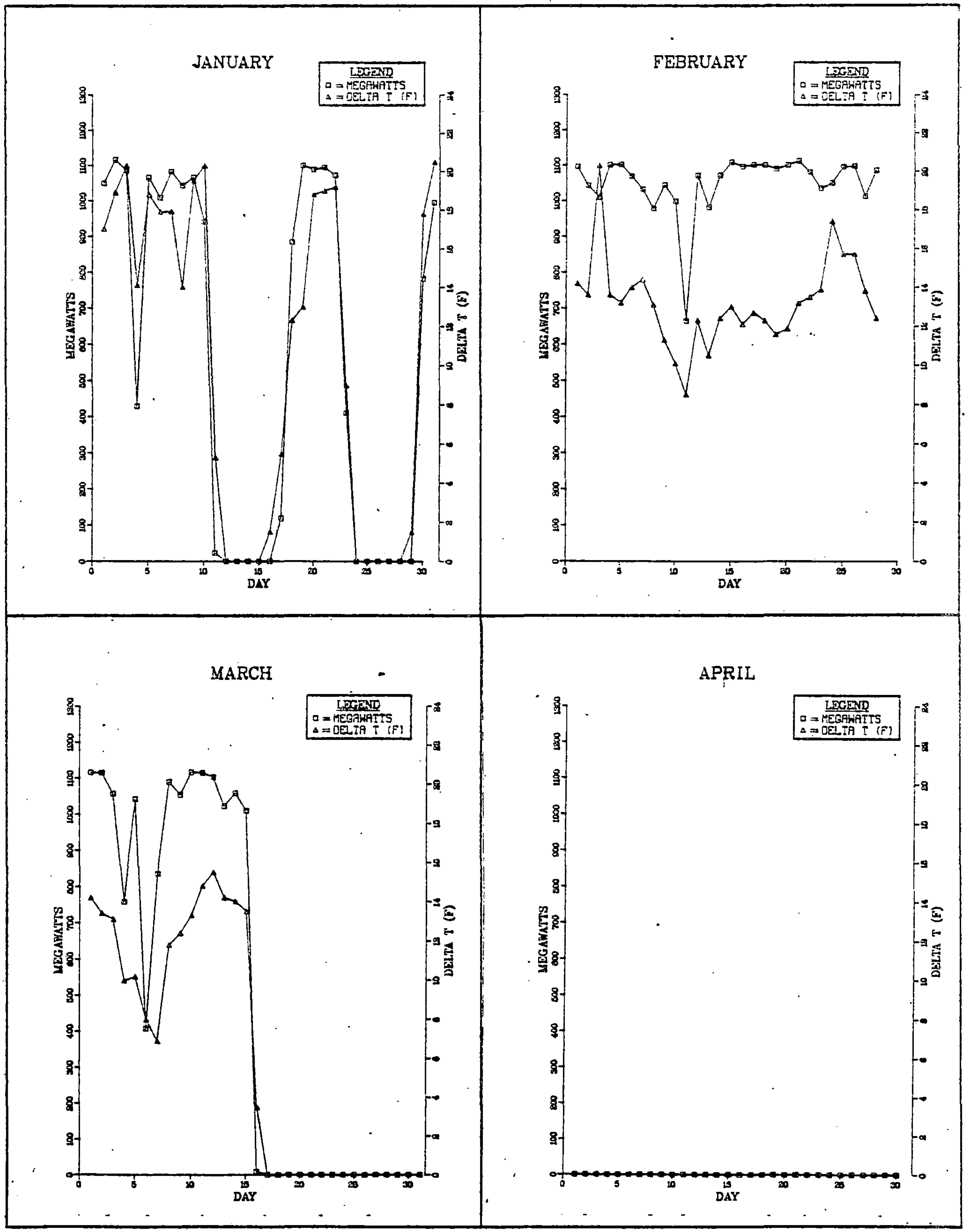
TABLE 2.1-1

AVERAGE CONDENSER TEMPERATURES - 1978

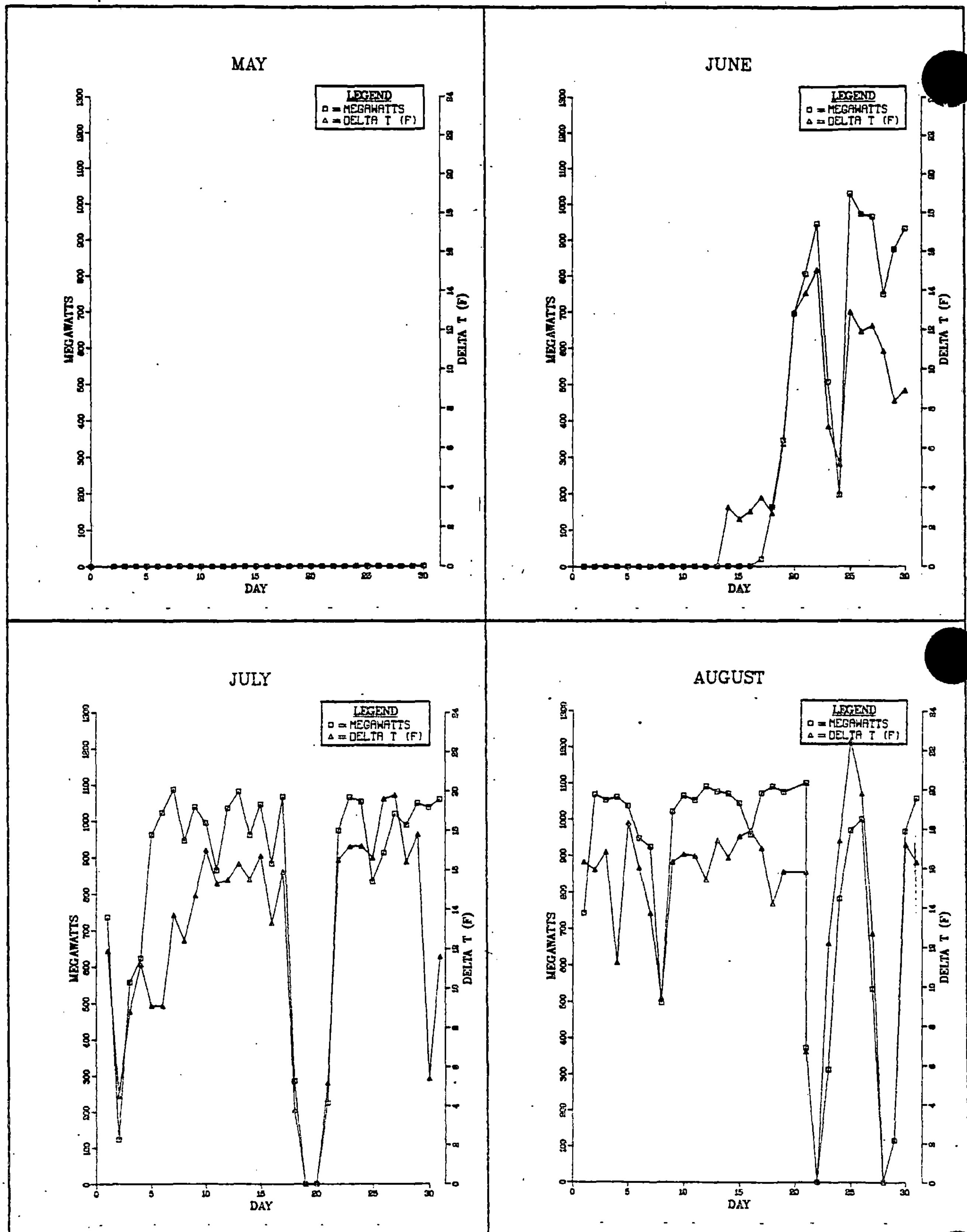
| Date | Intake Temp. Average* °C | (°F) | Discharge Temp. Average* °C | (°F) | Delta T Average* °C | (°F) |
|---|---|---|---|---|---|---|
| January | 1.3 | (34.3) | 8.9 | (48.1) | 7.7 | (13.7) |
| February | 0.6 | (33.1) | 7.9 | (46.2) | 7.3 | (13.2) |
| March | 1.8 | (35.2) | 8.6 | (47.5) | 6.8 | (12.5) |
| April** | - | | - | | - | |
| May** | - | | - | | - | |
| June | 23.8 | (74.8) | 28.7 | (83.7) | 4.9 | ( 8.9) |
| July | 25.7 | (78.3) | 32.8 | (91.0) | 7.1 | (12.7) |
| August | 27.8 | (82.0) | 36.0 | (96.8) | 8.2 | (14.8) |
| September | 24.5 | (76.1) | 32.8 | (91.0) | 8.3 | (14.9) |
| October | 18.9 | (66.0) | 23.5 | (74.3) | 4.7 | ( 8.3) |
| November | 12.3 | (54.1) | 21.4 | (70.5) | 9.1 | (16.4) |
| December | 7.0 | (44.6) | 14.6 | (58.3) | 7.6 | (13.7) |

*Average of Condenser Circuits 11, 12 and 13

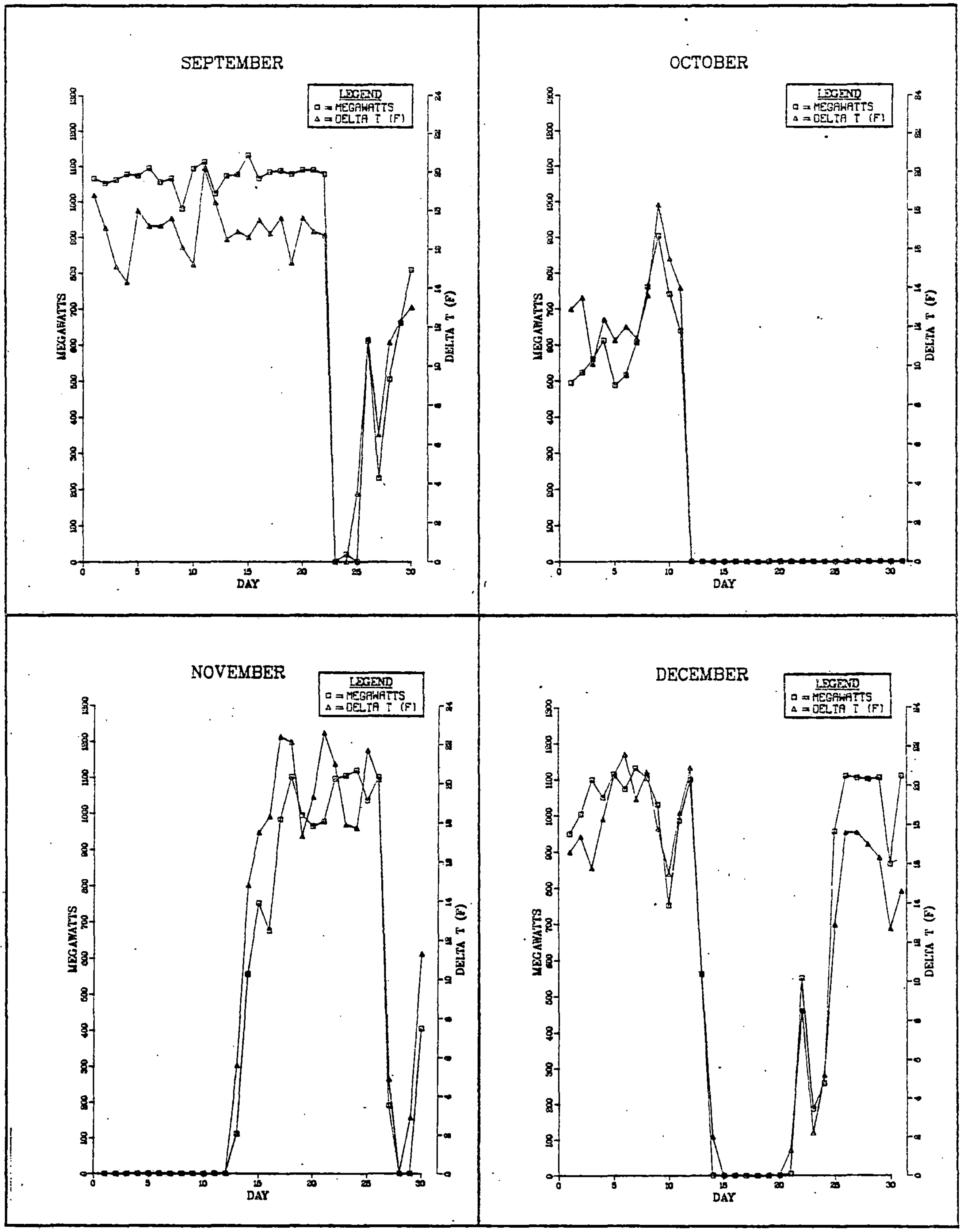
**No power generated in April and May




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Daily Average Reactor Power Level And Condenser Delta Temperature<br>Figure 2.1-1 |
| --- | --- |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Daily Average Reactor Power Level And Condenser Delta Temperature |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.1-2 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Daily Average Reactor Power Level And Condenser Delta Temperature<br>Figure 2.1-3 |
|---|---|

## 2.2 CHEMICAL

### 2.2.1 Chlorine

#### 2.2.1.1 Sodium Hypochlorite System (ETS Section 2.2.1)

The Salem Nuclear Generating Station uses sodium hypochlorite (NaOCl) solution for treatment of cooling circuits in order to maintain these circuits free from biofouling. The sodium hypochlorite solution is injected at the intakes immediately behind the vertical traveling screens. The circulating and service water systems chlorination controls are programmed to chlorinate in sequence, not in parallel. The program calls for chlorination three times per day for 30 minutes each.

The Salem Environmental Technical Specifications require that "The concentration of free chlorine in the circulating water system and service water system shall not be greater than 1.0 mg/liter at the outlet of the final heat exchanger". The ETS require a chlorine residual analyzer which is permanently located to optimize the monitoring of exchanger residuals.

Several technical problems with the sodium hypochlorite system occurred in 1978 at the Salem Nuclear Generating Station. Consequently, chlorination took place on only 19 days in 1978. The chlorination system was operated manually from July 5 until August 14 (Table 2.2.1-1).

Due to failure of the automatic control system, the free chlorine residual was determined by manual amperometric titration of grab samples taken during the chlorination cycle.

During the chlorination periods, these analyses of free chlorine residual indicated values between 0 and 0.4 mg/liter. Consequently, because of the additional dilution from other condenser circuits, the concentration at the discharge to the river was less than 0.1 mg/liter.

The weekly river biocide surveys taken during periods of chlorination (described in Section 2.2.1.2) showed a total chlorine residual of 0.03 mg/liter or less on all occasions.

Also, the ecological monitoring program conducted in the vicinity of Artificial Island revealed no effect on the aquatic community from the sodium hypochlorite system.

A mass balance comparing the total quantity of chlorine injected to the volume of circulating and service water chlorinated in 1978 is summarized in Table 2.2.1-2. It demonstrates that the amount of chlorine injected and reduced by chlorine demand, would have resulted in a free chlorine residual at the discharge below detectable levels. This is consistent with the station's analyses of free chlorine residual.

Actually, the chlorine residuals discharged to the river are further reduced because the system contact time is significantly longer than the time (5 minutes) between intake and the point at which chlorine residual monitoring occurrs.

TABLE 2.2.1-1

SODIUM HYPOCHLORITE SYSTEM
1978 OPERATING SUMMARY

| Water System | Sodium Hypochlorite System | | Chlorination | |
|---|---|---|---|---|
| | In Service | Out of Service | Days | Cycles |
| Circulating | July 5 | July 29 | 8 | 14 |
| Service | July 12 | July 31 | 11 | 26 |
| | August 1 | August 14 | 4 | 5 |



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TABLE 2.2.1-2

1978 - CHLORINE INJECTION SYSTEM

| Circulating and Service Water Volume Chlorinated(1) | CHLORINE | | | | |
|---|---|---|---|---|---|
| | | | Intake River (4) | Free Residual | |
| | Injected(2) | Injection Rate(3) | Demand | Ambient River(4) in the Vicinity of the Discharge | Calculated Discharge |
| x $10^6$ gal | lbs. | mg/liter | mg/liter | mg/liter | mg/liter |
| 506.2 | 8040 | 1.90 | 1.97 | <0.03 | 0 |

(1) Refer to Table 2.2.1-1 for operating summary.
(2) Based on soundings of tank levels in July and August.
(3) 1978 Average during periods of chlorination.
(4) July and August river water summary data (Section 2.2.5.2)

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2.2.1.2 Chlorine - River Survey (ETS Section 3.1.1.1)

As stated in Section 2.2.1.1, the circulating and service water systems are periodically injected with sodium hypochlorite to reduce biofouling in the system. During each week of biocide injection, grab samples are taken in the river to measure the free and total residual chlorine. The sampling locations are the same as the monthly river survey, being at the intake, discharge, and outside and downstream of the mixing zone (Figure 2.2.5-1).

In accordance with ETS requirements the concentration in the sample taken outside and downstream of the mixing zone shall not exceed the ambient (intake) total residual level by more than 0.1 mg/liter.

In 1978 the sampling program did not show detectable total residual chlorine increases at any location in the river during the chlorination periods. In all sampling locations the rivers total chlorine residual was less than 0.03 mg/liter.

As discussed in Section 2.2.1.1, chlorination did not begin until July 5 and continued only until August 14. During this time the river samples showed no detectable total residual chlorine and no adverse biological impact was noted in the ecological studies (Section 3.1). The biocide samples for the first two weeks in August were inadvertently omitted but station records indicate that the concentration of free residual chlorine at the final heat exchanger did not exceed 1.0 mg/l.

### 2.2.2 Suspended Solids

#### 2.2.2.1 Suspended Solids Discharge From Non-radioactive Liquid Waste Basin (ETS Section 2.2.2)

The original design of the non-radioactive liquid waste basin was based on processing approximately equal quantities of demineralizer regenerant wastes, steam generator blowdown and service water needed to quench the steam generator blowdown, permitting settling and pH neutralization before discharge to the river.

In 1978, samples for suspended solids were taken from the basin discharge pipe on days when the basin was being discharged, and were analyzed using the filtration/gravimetric method which is recognized by EPA.

This was for year-end comparison with ETS Section 2.2.2 which states that "The average suspended solids concentration in the effluent from the non-radioactive chemical liquid waste disposal system shall not exceed 25 mg/liter on an annual basis". The 1978 suspended solids concentration in the discharge from the non-radioactive waste basin was calculated to be 34.7 mg/liter. This exceeds the ETS limit. A licensee event report (LER 79-13/04L) reporting this was filed with the NRC.

The prime contributor to the high total suspended solids (TSS) concentration was the blowdown quench water, which is service water derived directly from the river. The monthly average TSS of the river water during 1978 was 135 mg/liter (intake area).

Since June 17, 1978, the station discontinued the addition of this quench water. By eliminating the quench water, the TSS concentration of the basin discharge decreased from 59.7 mg/liter in the first two quarters of 1978 to 9.6 mg/liter in the last two quarters (Table 2.2.2-1).

Another contributor to high TSS concentrations was the high number of demineralizer regenerations necessary to support water requirements of Unit 2 startup-related flushes.

To reduce the number of regeneration cycles a well water pretreatment system will become operational in 1979.

2.2.2.2 River Survey (ETS Section 3.1.1.3)

Suspended solids concentrations in the river were highly variable (Figure 2.2.2-1) throughout the year, ranging from 25 to 320 mg/liter and averaging 135 mg/liter at the intake (Figure 2.2.5-1). The preoperational data show a larger variation, 5 to 550 mg/l. The 1978 concentrations exceeded the preoperational monthly maximums on 2 occasions, both at the discharge, but the suspended solids concentrations released from the non-radioactive waste basin for the dates (May 23 and December 21) were 5.0 and 2.7 mg/liter. This indicates that the station would have no effect on river TSS concentrations. A paired T-test was performed on TSS data between the intake and discharge locations. No significant ($p<.01$) difference was detected for the 1978 data.

Such ambient conditions verify that no station-related impact resulted from TSS concentrations in the non-radioactive liquid waste basin discharge (See Table 2.2.2-2).

TABLE 2.2.2-1

SALEM NON-RADIOACTIVE LIQUID WASTE BASIN
TOTAL SUSPENDED SOLIDS (TSS) DATA SUMMARY - 1978

<table>
<tr><th>Quarter - 1978</th><th>Jan-Mar</th><th>Apr-Jun</th><th>Jul-Sep</th><th>Oct-Dec</th></tr>
<tr><td>Average (mg/liter)</td><td>49.3</td><td>70.1</td><td>10.0</td><td>9.2</td></tr>
<tr><td>Average Before Quench Water Was Curtailed (mg/liter)</td><td colspan="2">59.7</td><td colspan="2"></td></tr>
<tr><td>Average After Quench Water Was Curtailed (mg/liter)</td><td colspan="2"></td><td colspan="2">9.6</td></tr>
<tr><td>Annual Average (mg/liter)</td><td colspan="4">34.7</td></tr>
</table>

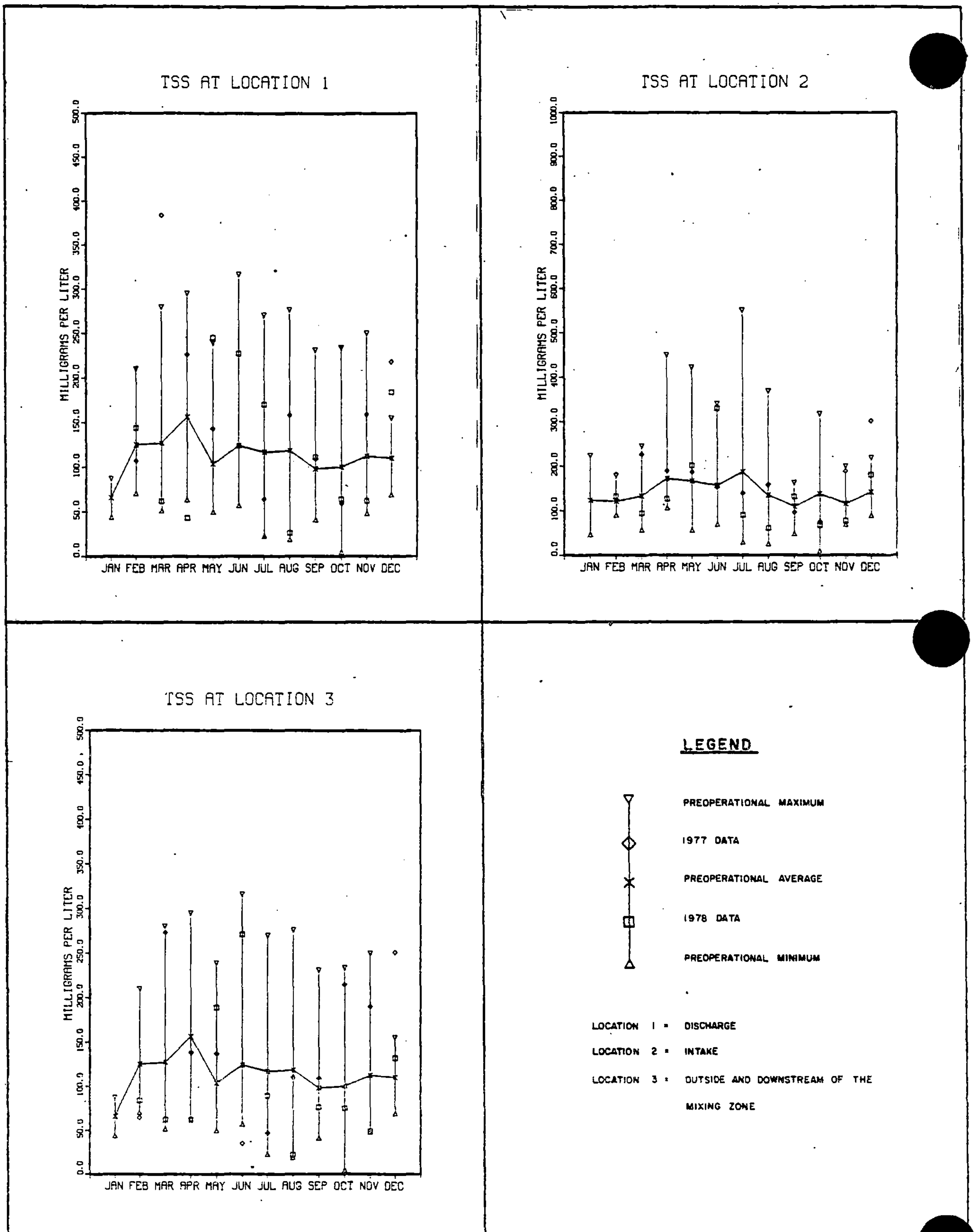
TABLE 2.2.2-2

SALEM MONTHLY RIVER WATER SURVEY
TOTAL SUSPENDED SOLIDS (TSS) DATA - 1978

| Month | Discharge Area mg/liter | Intake Area mg/liter | Outside and Downstream of the Mixing Zone mg/liter |
|---|---|---|---|
| January* | -- | -- | -- |
| February | 144 | 132 | 87 |
| March | 62 | 94 | 62 |
| April | 43 | 126 | 62 |
| May | 245 | 201 | 189 |
| June | 227 | 329 | 271 |
| July | 170 | 90 | 89 |
| August | 26 | 61 | 22 |
| September | 111 | 131 | 76 |
| October | 64 | 67 | 75 |
| November | 62 | 77 | 49 |
| December | 184 | 180 | 132 |
| Average | 122 | 135 | 101 |

1978 Annual Average of TSS in the
Delaware River = 119 mg/liter

*Samples for the month of January 1978 were not obtained due to inclement weather, ice floes and low tidal conditions.




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Suspended Solids as TSS |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.2-1 |

### 2.2.3 pH

#### 2.2.3.1 Non-radioactive Liquid Waste Basin pH (ETS Section 2.2.3)

The non-radioactive chemical liquid waste disposal system is required to treat non-radioactive liquid waste from steam generator blowdown and the make-up demineralizer system to insure that "the pH of the non-radioactive chemical waste disposal system effluent shall be within the range of 6.0 to 9.0 pH units after mixing with the circulating water discharge stream." (ETS Section 2.2.3).

A pH controller regulates the pH of the effluent by feeding acid ($H_2SO_4$) or caustic (NaOH) to the system. This assures that the waste leaving the basin is acceptable for discharge.

During 1978 the pH of the waste effluent was maintained and discharged between 6.0 and 9.0 whenever discharges were made. The basin discharges into one of the circulating water discharge pipes. The high circulating water flow compared to the small quantity of water discharged from the waste basin makes it impossible to significantly alter the pH of the circulating water regardless of the pH of the waste basin effluent.

#### 2.2.3.2 River pH (ETS Section 3.1.1.4)

The ecological and water quality monitoring programs on the Delaware River near the station indicated no influence from the operation of the non-radioactive liquid chemical waste basin (refer to Section 2.2.5.2 for a complete discussion of acidity/alkalinity relationships).

## 2.2.4 Dissolved Oxygen

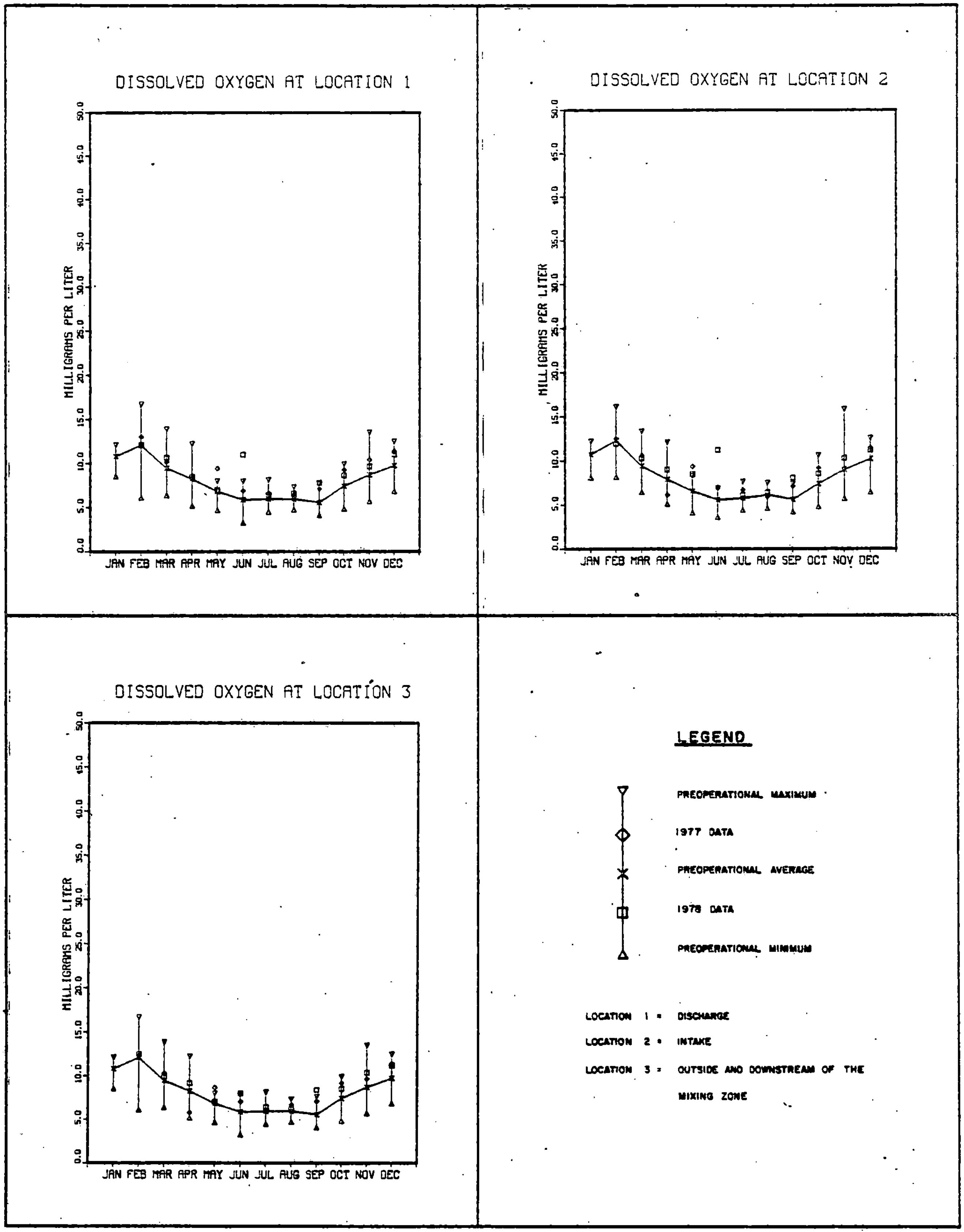
### 2.2.4.1 Station Conditions

There was no effect by station operations on dissolved oxygen (D.O.) in the river. Hydrazine was used as an oxygen scavenger in the steam side of the Unit 1 condenser system. Although minor leakage did occur in the condensers, this was in-leakage to the steam side preventing any discharge of hydrazine (refer to Section 2.2.5.1 for additional discussion on the use of hydrazine at the station).

### 2.2.4.2 River Survey (ETS Section 3.1.1.2)

In 1978, dissolved oxygen concentrations were usually higher than the averages in the preoperational data. A definite seasonal trend is present with the lowest concentrations occurring during the warmest months (Figure 2.2.4-1). The variation in D.O. among sampling locations (Figure 2.2.5-1) is very small and a T-test indicates that the station does not affect the concentrations significantly ($p<.01$).

The June samples indicate a supersaturation at locations 1 & 2 which seems unlikely. A more plausible explanation is that there were substances present in the water which caused an interference with the analytical method used, leading to the questionable results.




| | |
|---|---|
| **PUBLIC SERVICE ELECTRIC AND GAS COMPANY** | Dissolved Oxygen as $O_2$ |
| **SALEM NUCLEAR GENERATING STATION** | Figure 2.2.4-1 |

### 2.2.5 Other Chemicals

#### 2.2.5.1 Chemical Releases (ETS Section 3.1.1.5)

An inventory of chemicals used during the reporting period was made and the quantities discharged daily of each of the chemical constituents in ETS Table 3.1.-3 were estimated. Since the production wells were used to supply certain systems which ultimately discharged to the river, the well water chemical constituents were taken into account also in making the daily estimates of the other chemicals in Table 2.2.5-1. Well water consumption by Salem Unit 1 was 2.02 x $10^8$ gals. in 1978.

Based on NPDES permit monitoring reports, the Salem Nuclear Generating Station used 28.185 x $10^{10}$ gals. of water for cooling and service purposes in 1978 or an average of 7.72 x $10^8$ gal/day. This volume was the basis of calculation used to determine the magnitude of the increases over natural river concentrations produced by the chemical releases shown in Table 2.2.5-1.

TABLE 2.[illegible]3-1
CHEMICAL RELEASE ESTIMATES - 1978

| CHEMICAL CONSTITUENT | AVE.NATURAL CONC.IN WATER* (mg/liter) | PREDICTED AVE. NET AMOUNT DISCHARGED (lbs/day) | PREDICTED AVE. NET INCREASE (mg/liter) | 1978 ESTIMATED AVE.NET ACTUALLY DISCHARGED (lbs/day) | 1978 ESTIMATED AVE.NET ACTUALLY INCREASE** (mg/liter) |
|---|---|---|---|---|---|
| Chlorine as $Cl_2$ | 0 | 870 | <0.1 | 423 | <0.1 |
| Calcium as Ca | 100 | 135 | $5.1x10^{-3}$ | 198 | $3.0x10^{-2}$ |
| Magnesium as Mg | 240 | 56 | $2.1x10^{-3}$ | 83 | $1.3x10^{-2}$ |
| Sodium as Na | 2000 | 600 | $2.2x10^{-2}$ | 2747 (1,2) | $4.3x10^{-1}$ |
| Potassium as K | 70 | 55 | $2.0x10^{-3}$ | 52 | $8.0x10^{-3}$ |
| Copper as Cu | 0.082 | -- | -- | 0.1 (4) | $5.6x10^{-3}$ |
| Sulfate as $SO_4$ | 570 | 1590 | $5.8x10^{-2}$ | 6815 (1,3) | 1.05 |
| Chloride as Cl | 3700 | 138 | $5.1x10^{-3}$ | 313 | $4.8x10^{-2}$ |
| Nitrate as $NO_3$ | 5.6 | 2.4 | $9.0x10^{-5}$ | 35 (5) | $5.4x10^{-3}$ |
| Silica as $SiO_2$ | -- | 46 | $1.7x10^{-3}$ | 31 | $4.8x10^{-3}$ |
| Phosphate as $PO_4$ | 0.66 | 11 | $4.1x10^{-4}$ | 7 | $1.0x10^{-3}$ |
| Volatile-Amines | -- | 4.2 | $1.5x10^{-3}$ | 4 | $6.2x10^{-4}$ |
| Hydrazine | 0 | 0.04 | $1.5x10^{-6}$ | 44 (6) | 0 |
| Suspended Solids | 170 | <1000 | <0.04 | 117.5 | $1.8x10^{-2}$ |

* From Final Environmental Statement, April 1973.
** After dilution with circulating and service water only; no mixing with river water assumed.



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Notes

(1) An unusually high number of demineralizer regenerations necessary to support the initial flushes required for Unit 2 startup combined with normal regenerations necessary for Unit 1 the resulted in a higher use of sodium hydroxide (NaOH) and sulfuric acid ($H_2SO_4$) than anticipated.

(2) The total sodium discharged in the circulating water discharge produced an increase less than 0.5 mg/liter compared to 2000 mg/liter which is the natural concentration of sodium in water. Therefore, there was no environmental impact.

(3) Sulfate produced an increase of only 1.0 mg/liter over a natural concentration in the Delaware River of 570 mg/liter. There was no environmental impact.

(4) Attributable to average copper concentrations in the production wells. This represents a discharge concentration of 0.0056 mg/liter, much lower than 0.082 mg/liter, which is the natural copper concentration in the river. It is concluded that the station did not significantly influence the ambient copper concentration in the river.

(5) Chemical analysis of the production wells yielded a higher content of nitrate ($NO_3$) than anticipated. This resulted in higher discharges of concentrations of nitrate to the river than anticipated.

The river water survey indicates similar values for the area surrounding the intake and discharge (See Section 2.2.5.2).

No environmental impact is associated with nitrate values.

(6) Hydrazine was used for oxygen scavenging for Unit 1 and in a test program for Unit 2.

The hydrazine reacts with dissolved oxygen in the steam systems to form nitrogen and water. 44 lb/day of hydrazine were used at the Station. All the hydrazine reacts and decomposes in the system and very little or no hydrazine is discharged.

2.2.5.2 River Water Quality (ETS Section 3.1.1.4)

During 1978 PSE&G conducted a monthly ambient river water quality sampling and analysis program in accordance with Section 3.1.1 of the Environmental Technical Specifications. No samples were obtained during January because of inclement weather and ice conditions on the river.

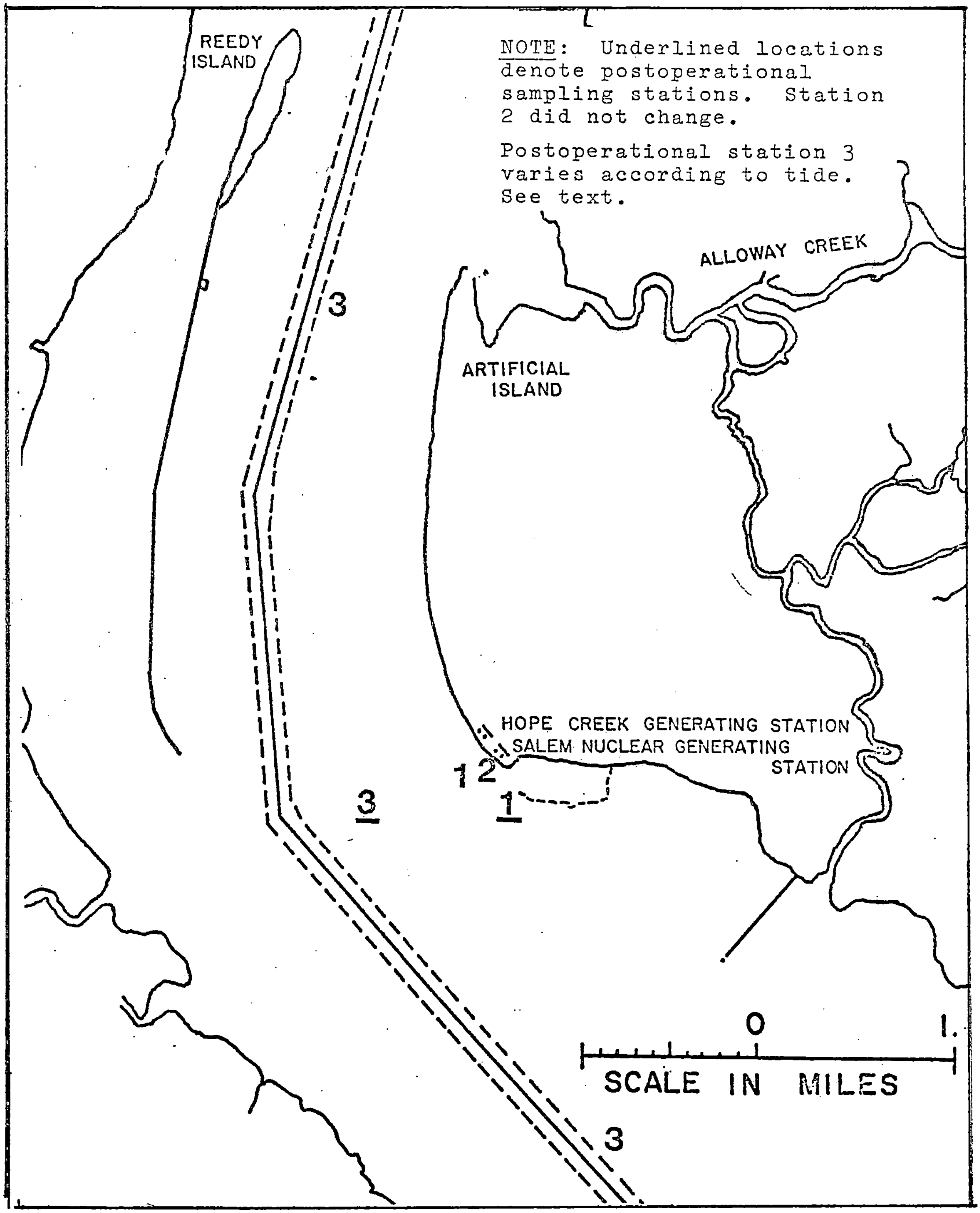
Three locations, as given in Figure 2.2.5-1, were sampled once each month. Station 1 was located near the circulating water system discharge at a depth of 10 feet. Station 2 was next to the Circulating Water System intake at a depth of 8 feet, and Station 3 was outside and downstream of the mixing zone at a depth of 18 feet. The location of Station 3 varied depending on the tidal stage and direction of flow in the vicinity of Artificial Island. On incoming and high slack tides, the sampling point was adjacent to buoy N4R, approximately 2.5 miles north of the discharge. On outgoing and low slack tides, the sampling point was next to buoy R8L, about 2 miles south of the discharge.

Preoperational data were available from three sampling locations: one near the present intake, one opposite the Station in the river channel, and one near Sunken Ship Cove (Figure 2.2.5-1). Depending on the availability of preoperational data, appropriate comparisons with operational data have been made.

Since the start of the River Water Quality Monitoring Program many changes have occurred with a number of parameters added to the monthly surveys. Some of the parameters are useful indicators of the effect of Salem Station on river water quality while others are not directly related to power plant operation. The following parameters have been shown to be not significantly affected by Station operation and will be recommended for deletion in a forthcoming ETS change request.

1. Methyl Orange Alkalinity
2. Phenolphthalein Alkalinity
3. Free Carbon Dioxide
4. Total Volatile Solids
5. Silica
6. Total Organic Carbon
7. Reducing Substances
8. Sulfides
9. Zinc
10. Chromium
11. Manganese
12. Phenols

It is recommended that reporting levels for the remaining parameters be deferred for at least one more year while a broader post-operational data base is developed.




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Sampling Stations<br>Figure 2.2.5-1 |
|---|---|

## SALINE/FRESH WATER RELATIONSHIPS

The Delaware River near Artificial Island exhibits substantial tidal mixing. This leads to limited vertical stratification of salinity and a spectrum of salinity related chemical concentrations depending on season, fresh water flow, and tidal stage. A typically wide range of values for the following salinity-related chemical parameters was observed in 1978.

Chloride concentrations, expressed as calcium carbonate, varied from 300 mg/liter to 9,000 mg/liter (Figure 2.2.5-2). The monthly preoperational maximums were exceeded only twice. The highest concentrations occurred during the fall when low rainfall led to reduced river flows, thereby causing the saline waters to penetrate further upstream. Concentrations for 1978 tended to be lower than the 1977 data. In most cases the intake and discharge concentrations were very close with neither location having a consistently higher concentration.

Note - For chloride as NaCl, multiply values given by 1.17.

Conductivity followed chloride in its seasonal pattern (Figure 2.2.5-3). Values for 1978 ranged from 500 umhos to 13,000 umhos. The highest values were during the low rainfall period in the summer and autumn months. Preoperational data was only exceeded once by a small amount. Intake and discharge values were very close for all of 1978, indicating no plant related effects.

Sulfate values were between 10 and 1,000 mg/liter as $CaCO_3$ with the highest recordings in the autumn (Figure 2.2.5-4). Four of the 1978 values were greater than the preoperational maximums and three were less than the preoperational minimums. Discharge values were equal to the intake except for November and December when they were greater at the discharge, even though the November and December values were within the preoperational range.

A T-test was performed between the intake and discharge to determine if there was any effect from station operation. No significant difference ($p<.01$) was detected for the 1978 data, despite the use of sulfuric acid ($H_2SO_4$) in the Salem non-radioactive liquid waste basin.

Calcium levels were low in 1978 (Figure 2.2.5-5). The range was 30 to 350 mg/liter as $CaCO_3$ with the highest values occurring in the autumn. Compared to the preoperational range of 30 to 750 mg/liter it is not surprising that more than half of the 1978 data was below the preoperational average. In May all three locations were below the preoperational minimums.

The intake and discharge values were almost identical. Consequently, the Station's effect on the river's calcium levels appears to be negligible.

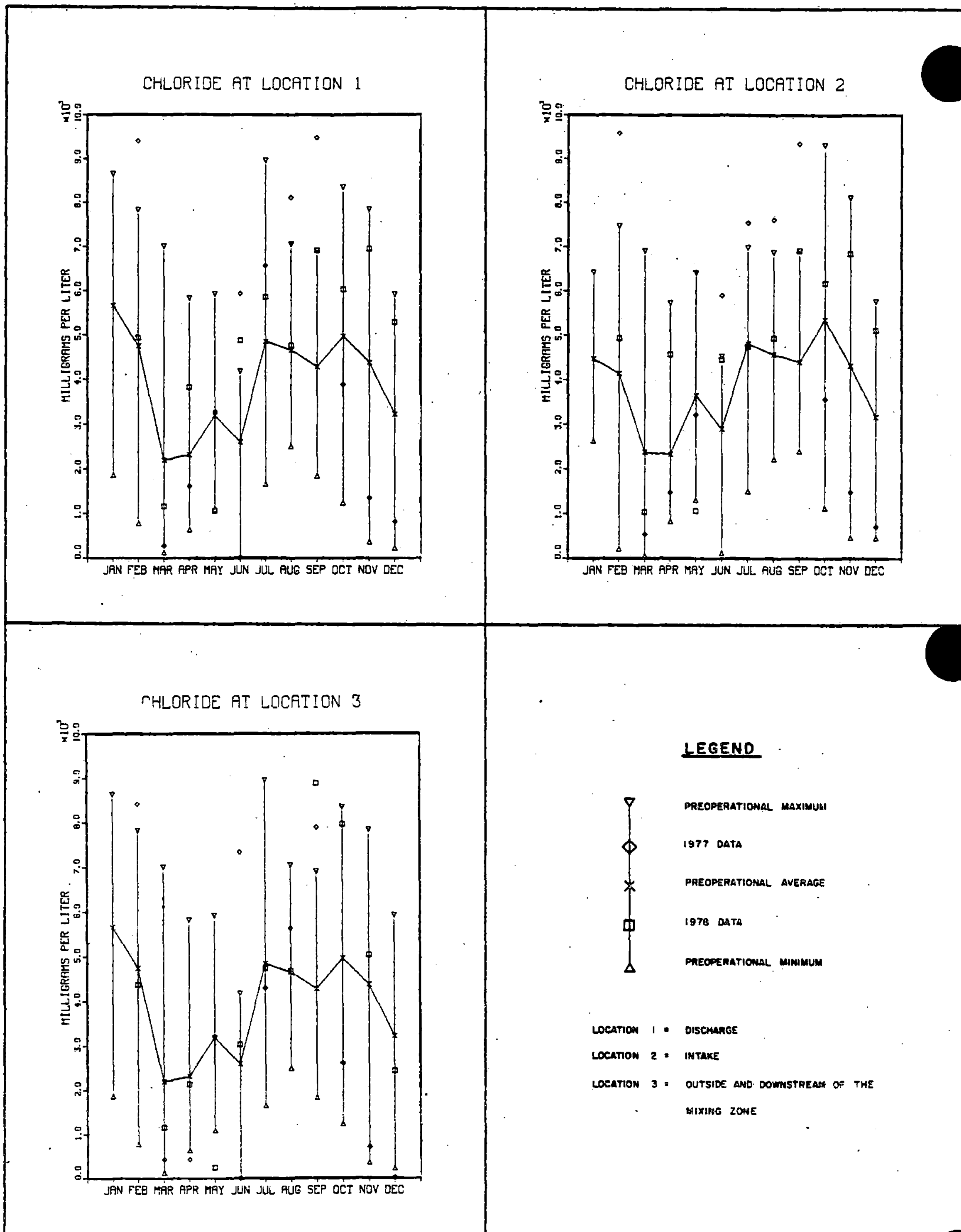
Magnesium values, measured as $CaCO_3$ ranged from 100 to 1,500 mg/liter (Figure 2.2.5-6). The variation is much less than 1977 which ranged from 20 to 2,045 mg/liter. No values were greater than the preoperational maximum values and 2 values were less than the preoperational minimums.

Again the highest values were during the summer and autumn months. Station location 3 had the largest variation. The intake and discharge values were similar for all months except April when the intake concentration was higher. Therefore, it seems that the Station has little or no effect on the river's magnesium levels.

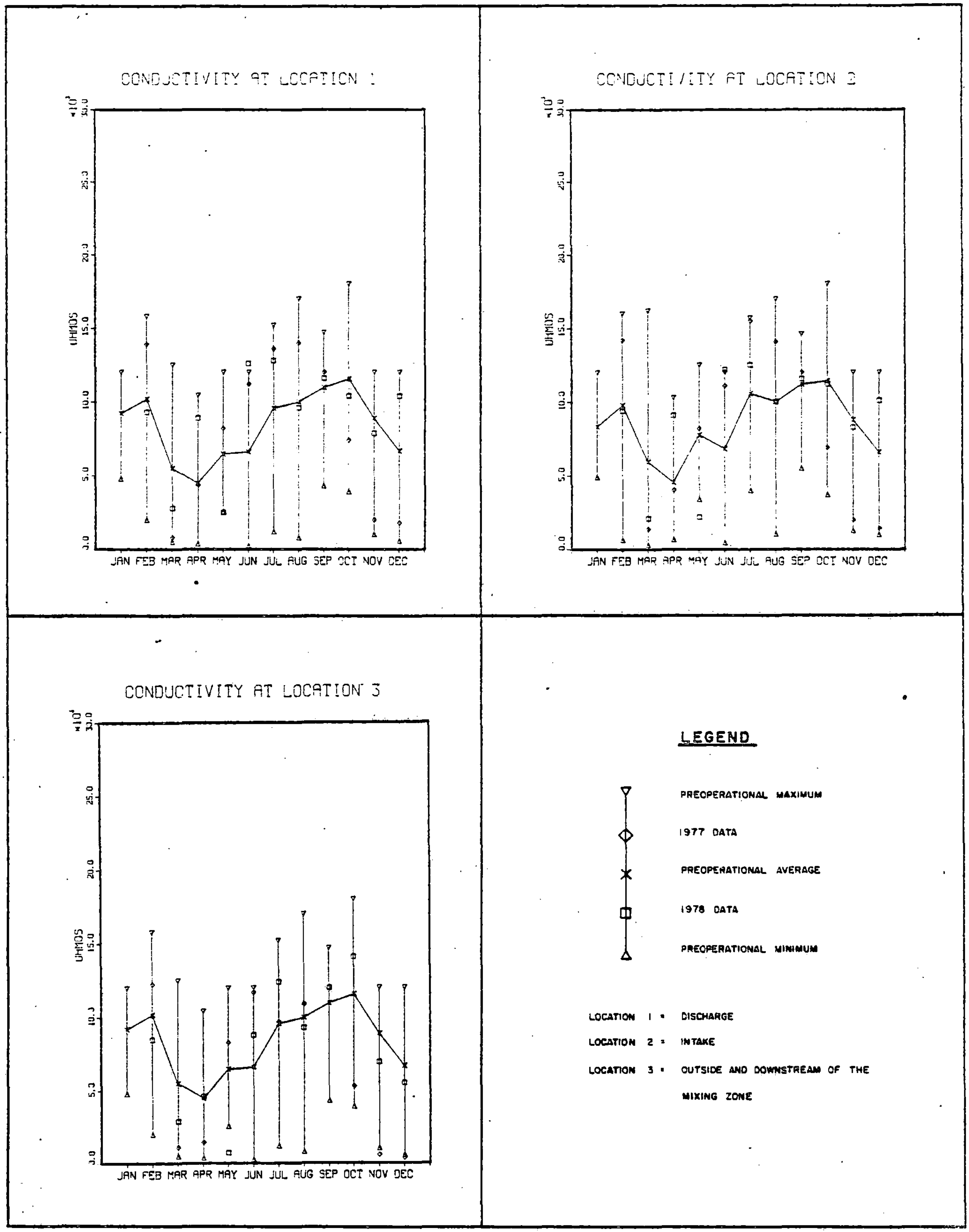
Sodium and Potassium concentrations as $CaCO_3$ were measured since October 1972 only at one station, near Sunken Ship Cove, during the preoperational program. During 1978 both of the parameters were measured at all three locations (Figures 2.2.5-7 and 2.2.5-8).

Even with the limited preoperational data maximum sodium levels were only exceeded once and potassium twice. As with the previous chemicals the highest values were recorded during summer and autumn.

A T-test was used to check the intake and discharge concentrations of sodium and no significant difference ($p<.01$) was noted despite the Station's use of sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl).




| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Chloride As $CaCO_3$ |
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-2 |



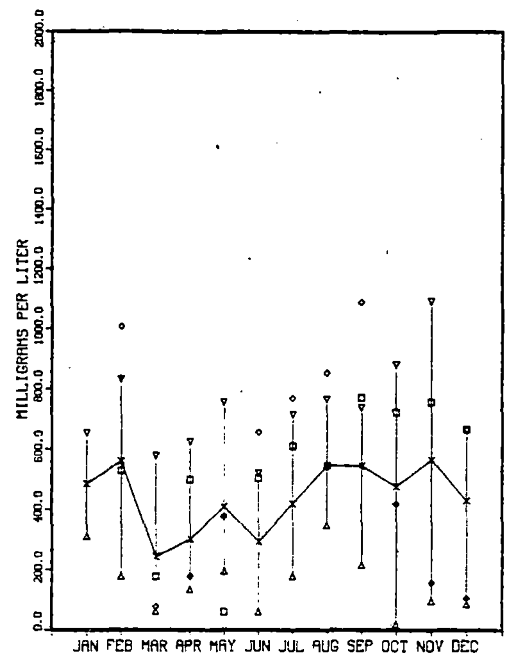

**PUBLIC SERVICE ELECTRIC AND GAS COMPANY**

**SALEM NUCLEAR GENERATING STATION**

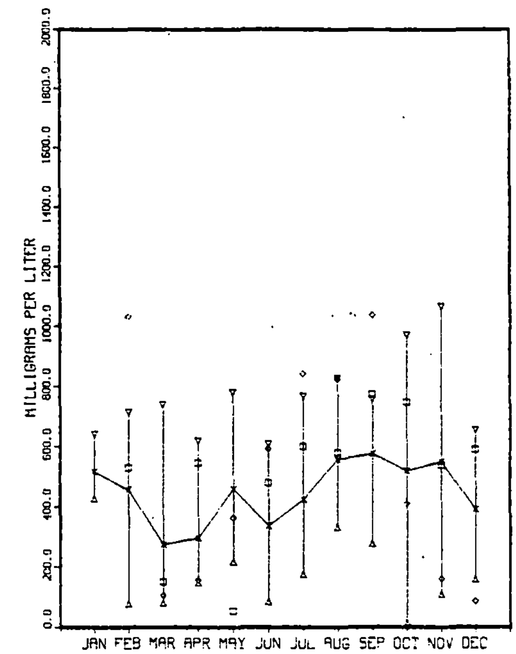
Conductivity As UMHOS

Figure 2.2.5-3

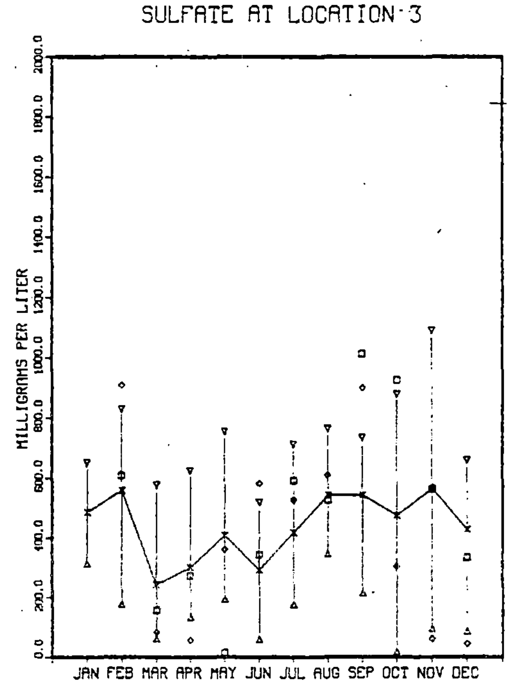
SULFATE AT LOCATION 1




SULFATE AT LOCATION 2




SULFATE AT LOCATION 3

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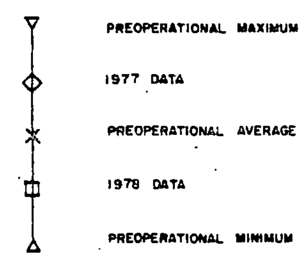
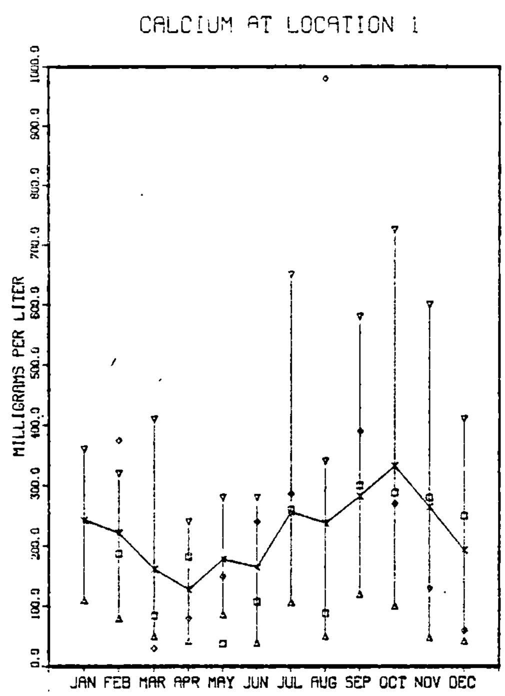


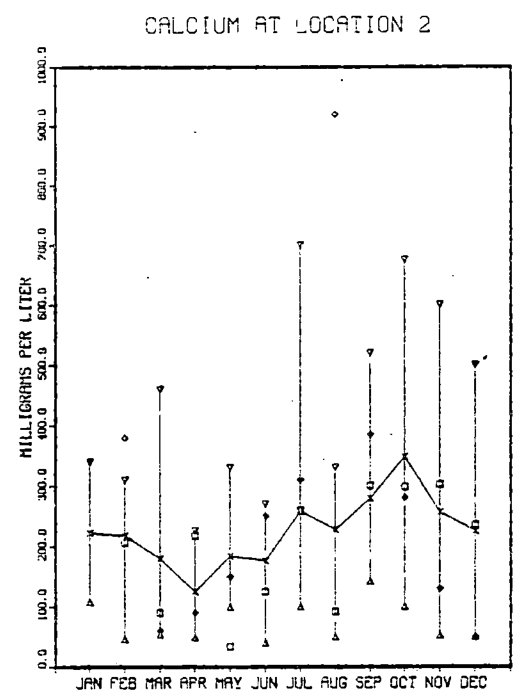

LOCATION 1 = DISCHARGE

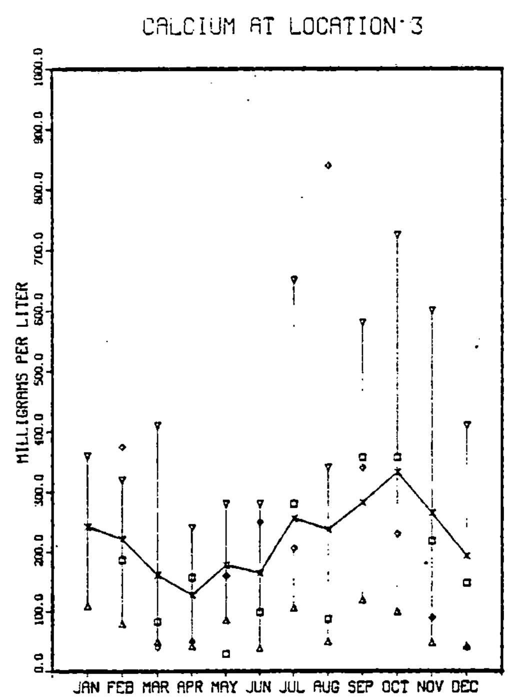
LOCATION 2 = INTAKE

LOCATION 3 = OUTSIDE AND DOWNSTREAM OF THE MIXING ZONE

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Sulfate As $CaCO_3$ |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-4 |




**LEGEND**

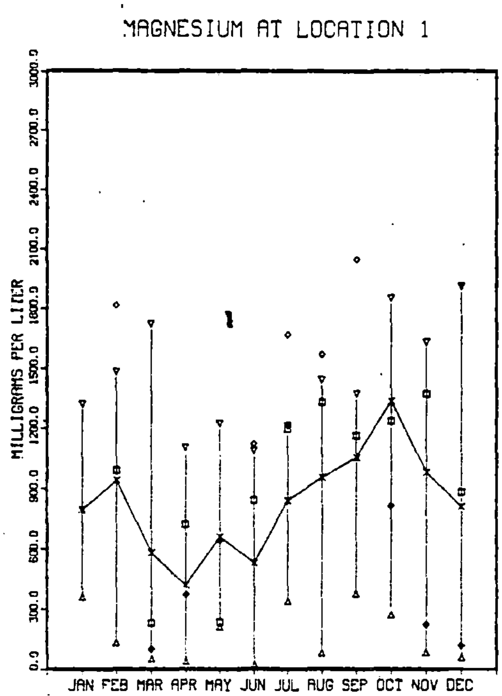
- ▽ PREOPERATIONAL MAXIMUM
- ◇ 1977 DATA
- × PREOPERATIONAL AVERAGE
- □ 1978 DATA
- △ PREOPERATIONAL MINIMUM

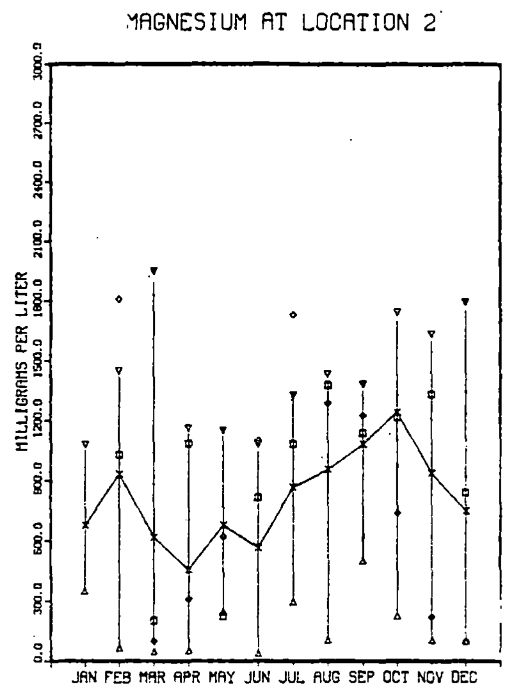
LOCATION 1 = DISCHARGE

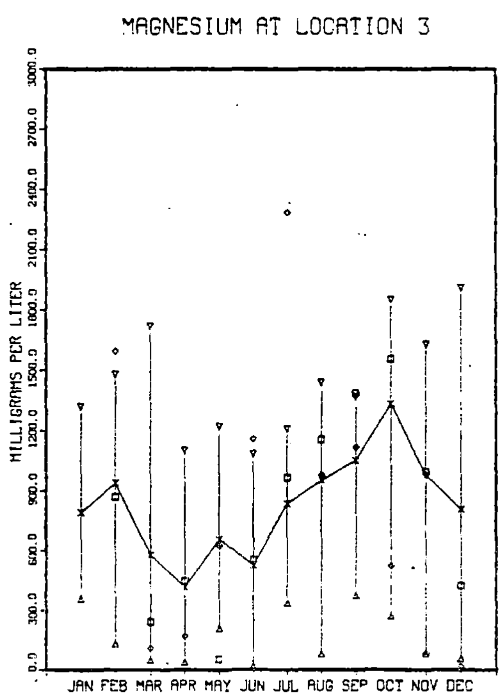
LOCATION 2 = INTAKE

LOCATION 3 = OUTSIDE AND DOWNSTREAM OF THE MIXING ZONE

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Calcium As $CaCO_3$ |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-5 |




**LEGEND**

▽ PREOPERATIONAL MAXIMUM

◇ 1977 DATA

✕ PREOPERATIONAL AVERAGE

□ 1978 DATA

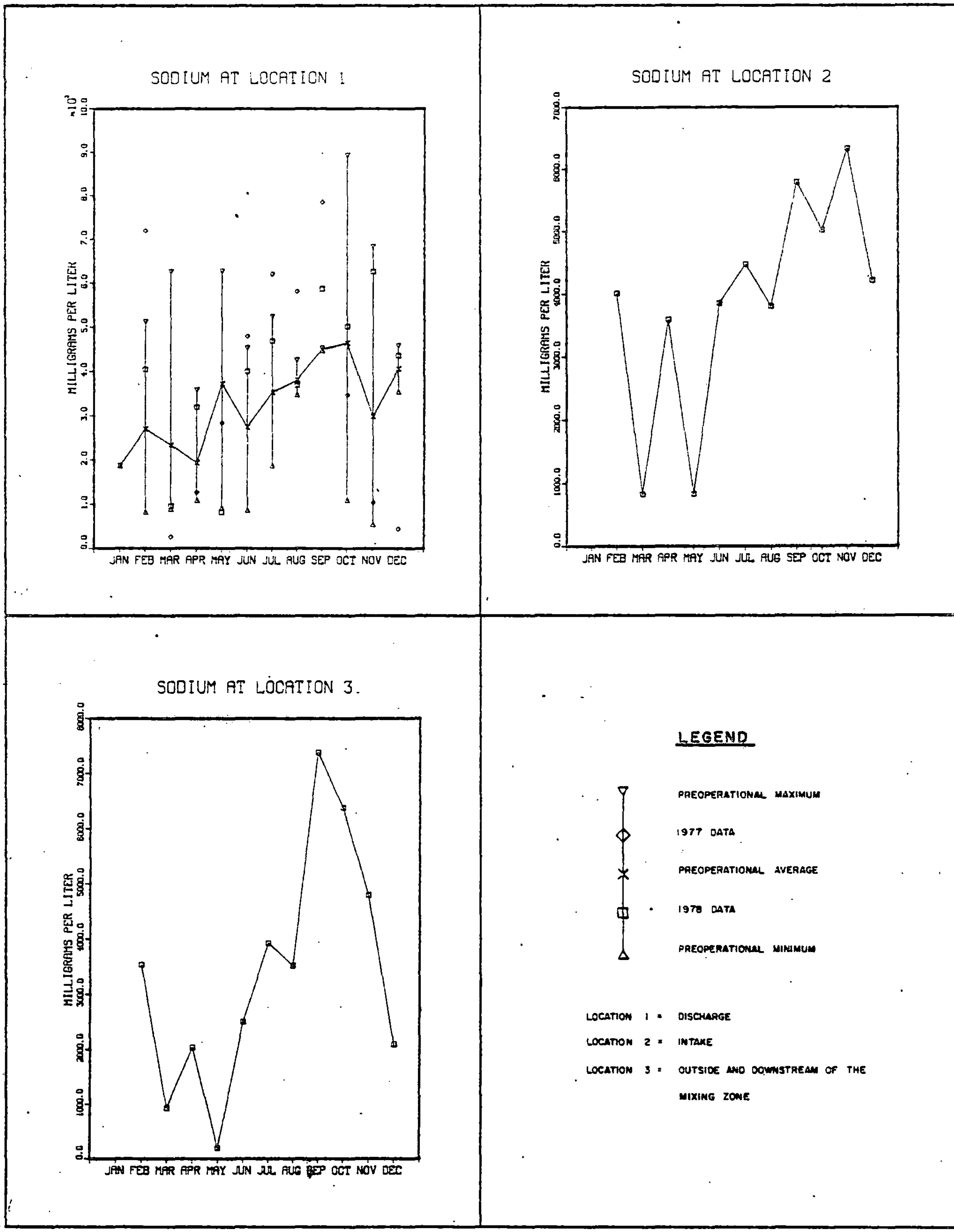
△ PREOPERATIONAL MINIMUM

LOCATION 1 = DISCHARGE

LOCATION 2 = INTAKE

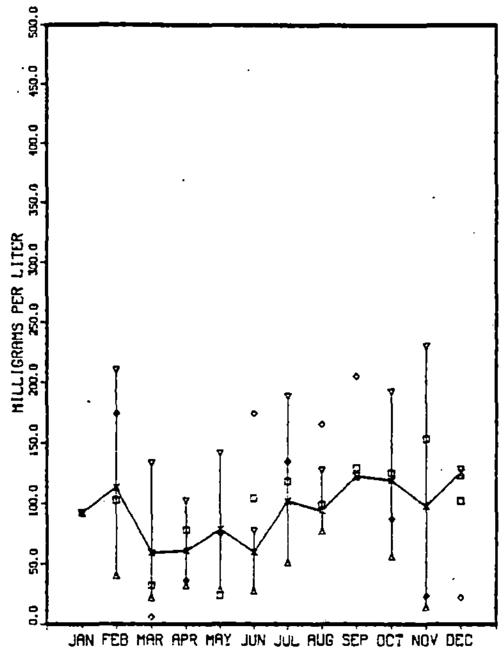
LOCATION 3 = OUTSIDE AND DOWNSTREAM OF THE MIXING ZONE

| | |
|---|---|
| **PUBLIC SERVICE ELECTRIC AND GAS COMPANY** | Magnesium As $CaCO_3$ |
| **SALEM NUCLEAR GENERATING STATION** | Figure 2.2.5-6 |

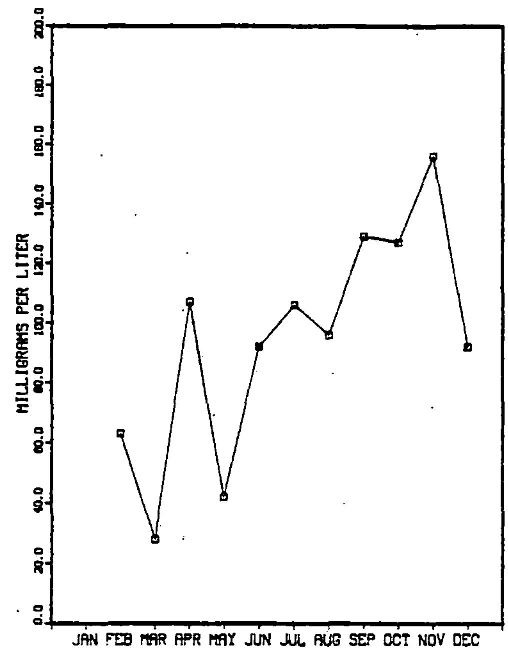



| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Sodium As $CaCO_3$ |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-7 |

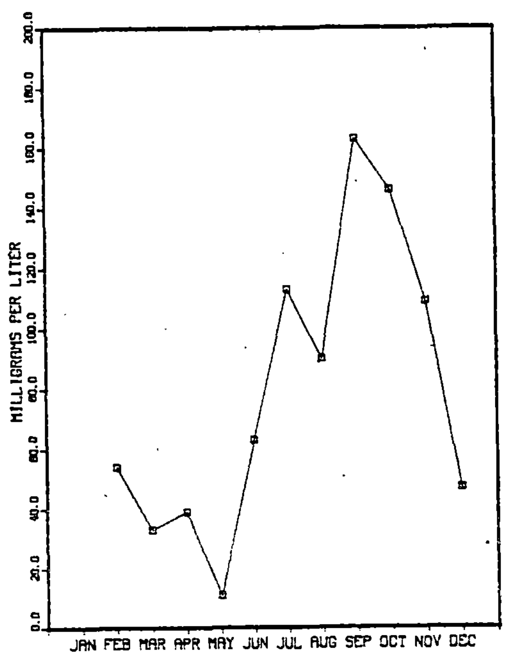
POTASSIUM AT LOCATION 1

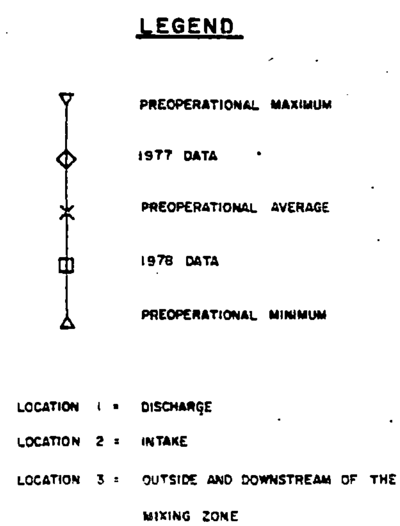



POTASSIUM AT LOCATION 2




POTASSIUM AT LOCATION 3




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Potassium As $CaCO_3$<br>Figure 2.2.5-8 |
| --- | --- |

## RIVER ACIDITY/ALKALINITY RELATIONSHIPS

The Delaware River in the vicinity of Artificial Island is well buffered as a result of the influence of seawater in the estuary. The pH as a result has always been between 6.0 and 9.0 for all of the monitoring years. The acidity/alkalinity relationships are discussed below.

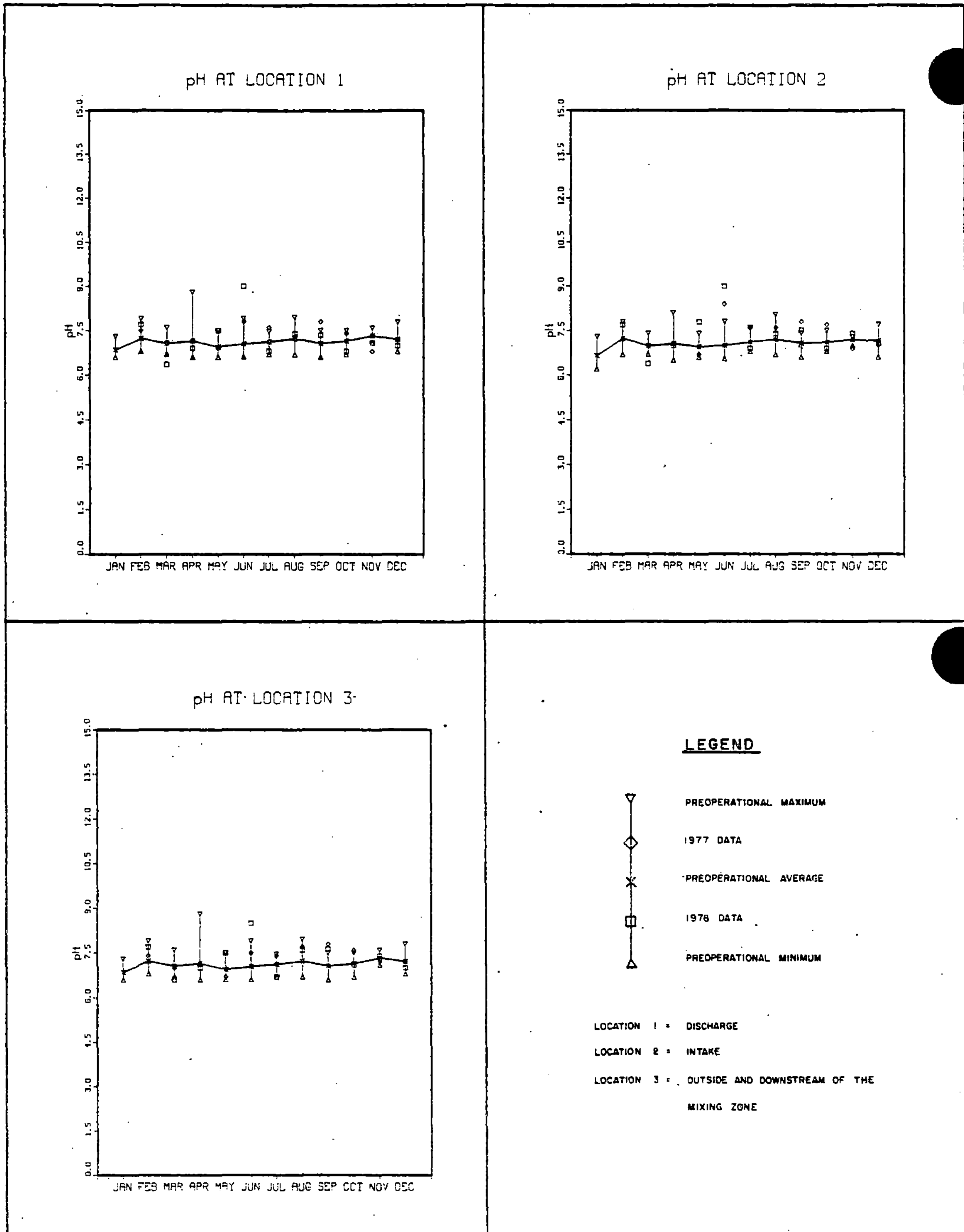
pH varied from 6.2 to 9.0 in 1978 (Figure 2.2.5-9). The preoperational maximums and minimums were exceeded 8 times. This large variation does not seem to be linked to station operation because the intake and discharge value varied together.

The high June value appears to be linked with the high dissolved oxygen values recorded for the same date. Possibly, a large amount of caustic material was present in the river in the vicinity of Artificial Island and led to high pH values and erroneous dissolved oxygen values.

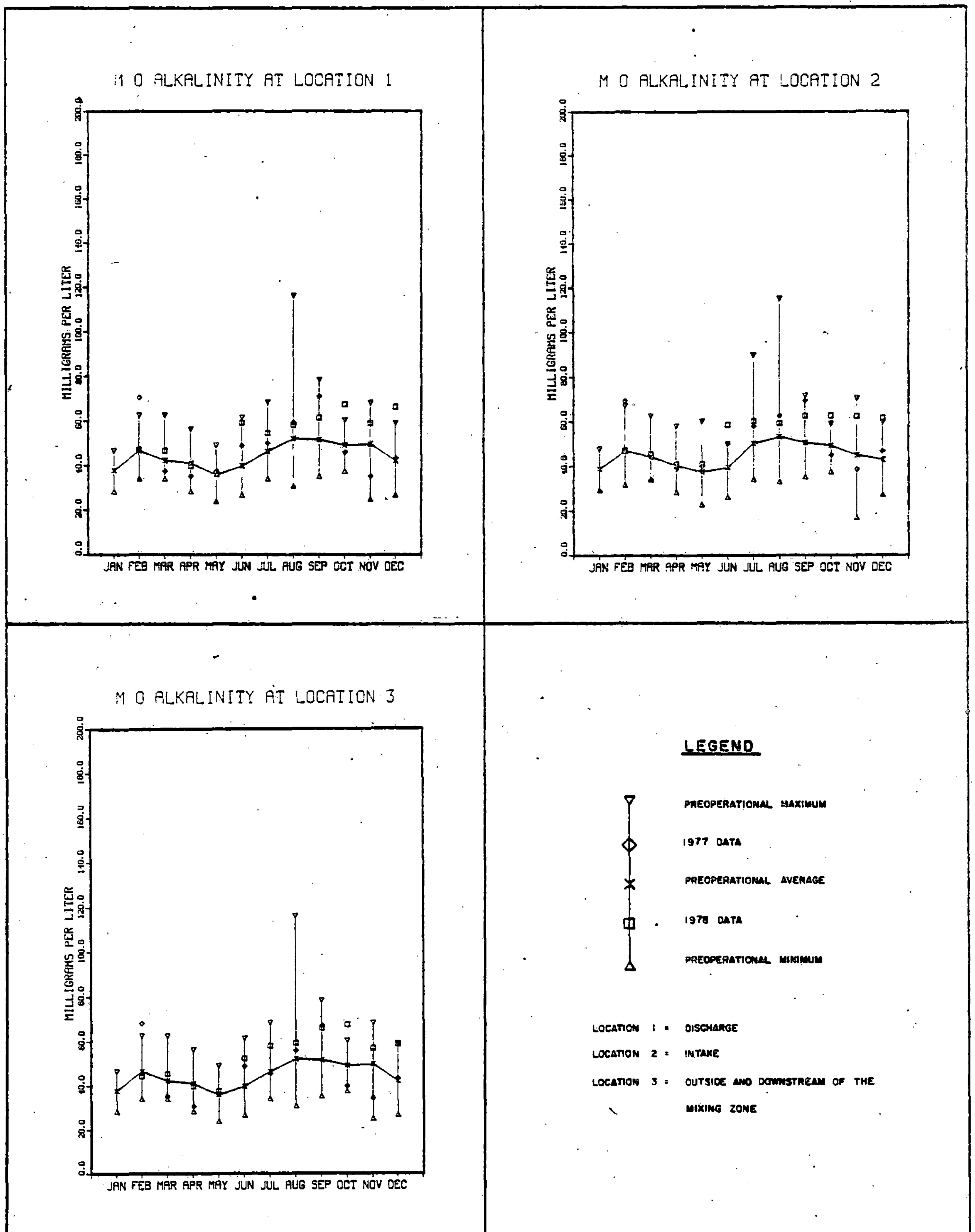
Methyl Orange Alkalinity for 1978 followed the preoperational seasonal trend (Figure 2.2.5-10). The highest values were during summer and autumn seasons. Six times the maximum values were exceeded but little difference was apparent between the intake and discharge. The June sample showed a higher value than the preoperational maximum at the intake but not at the discharge. This indicates that the June sample also was affected by the caustic in the water.

Phenolphthalein Alkalinity has been zero in all samples taken at Salem under this program and continued to be zero throughout 1978. This is reasonable since the pH has always bracketed the neutral range.

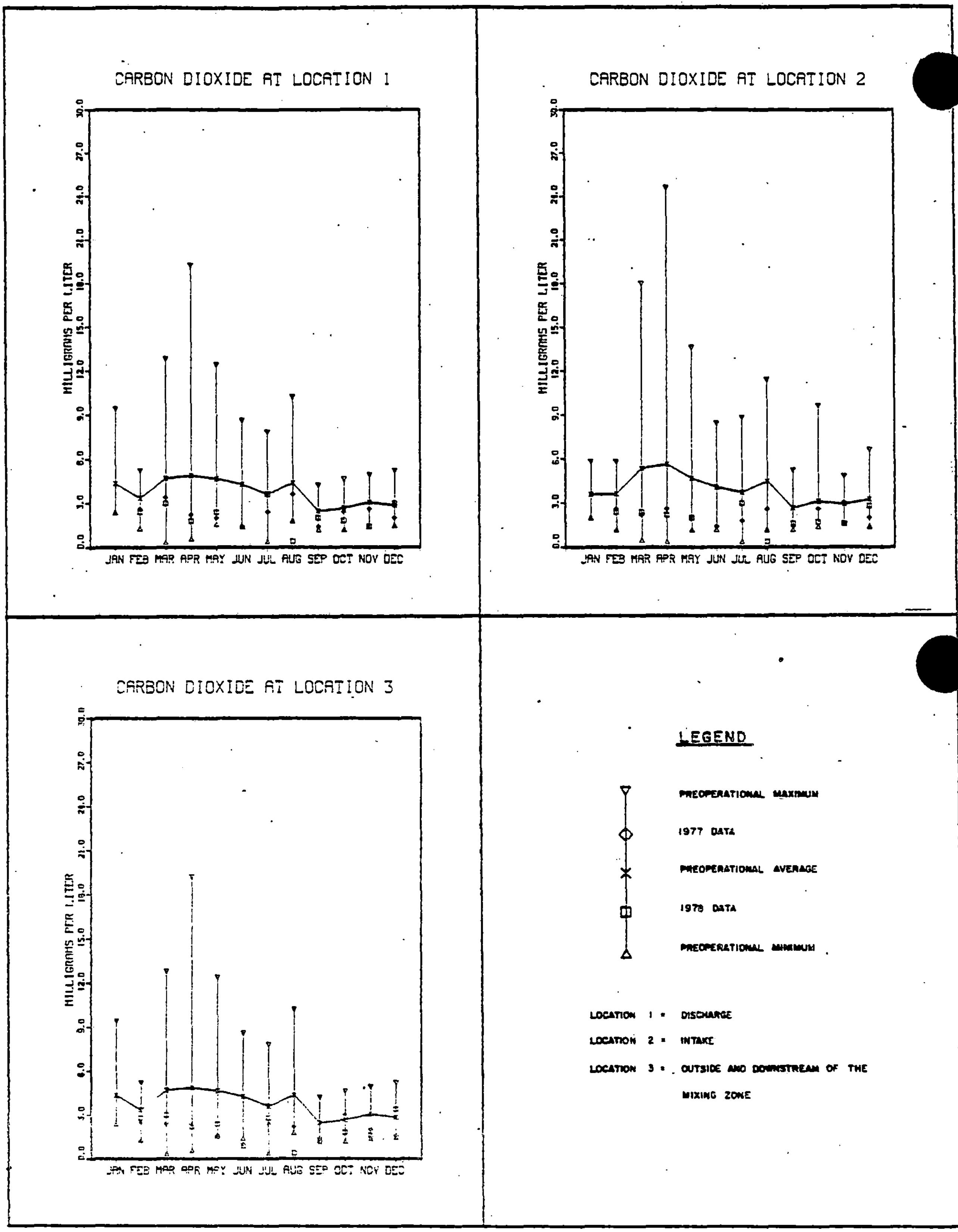
Free Carbon Dioxide for 1978 was consistently lower than the preoperational averages at all three locations (Figure 2.2.5-11). The preoperational range was 0.3 to 24.0 mg/liter while the 1978 data ranged from 0.0 to 3.5 mg/liter. The 1977 data also showed a reduced range. Since all three locations for 1977 and 1978 have shown low carbon dioxide levels, it is concluded that the station has not affected free carbon dioxide levels.




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | pH As pH<br>Figure 2.2.5-9 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Methyl Orange Alkalinity As $CaCO_3$ |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-10 |




| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Carbon Dioxide As $CaCO_3$ |
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-11 |

## SOLIDS RELATIONSHIPS

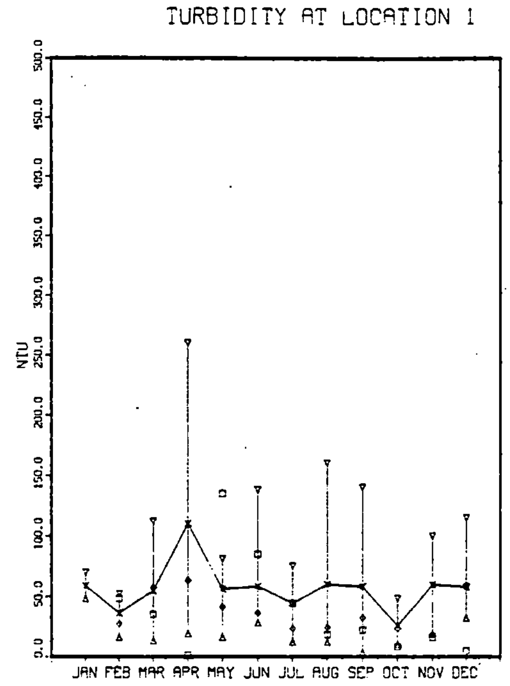
This section describes the behavior of parameters related to suspended matter in the water. Total suspended solids were discussed earlier in Section 2.2.2.2 and should be referred to when examining this section.

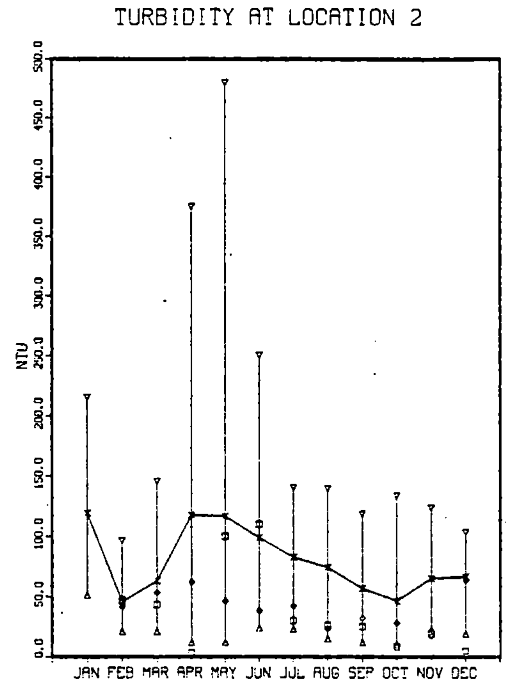
Turbidity is measured at Salem as nephelometric turbidity units (NTU) which "are considered comparable to the previously reported...Jackson turbidity units (JTU)" (USEPA, Methods for Chemical Analysis of Water and Wastes, 1974), since the traditional Jackson Candle turbidimeter is difficult to use at low turbidity levels.

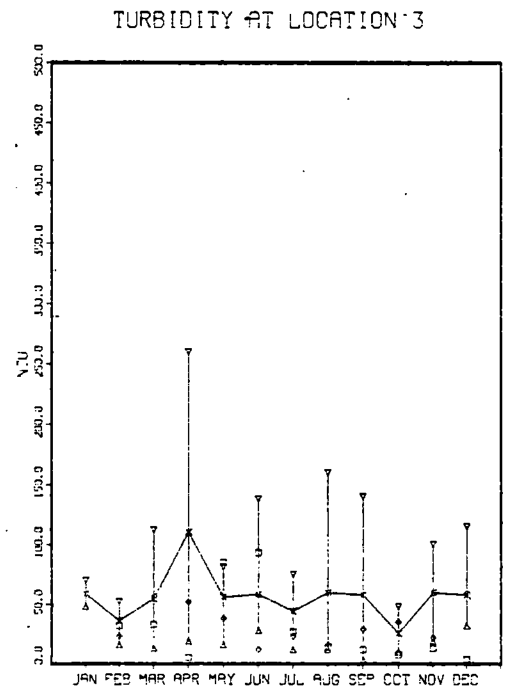
The highest turbidity ranges were observed at the discharge area for preoperational data, 10 to 480 NTU (Figure 2.2.5-12). The 1978 data for all three locations varied from 1 to 130 NTU. Twice the 1978 data exceeded the preoperational maximums but seven times new minimum values were established. Turbidity, as expected, is highly dependent on the total suspended solids load so like total suspended solids most of the 1978 data was below the preoperational average.

Total Volatile Solids were taken regularly in 1977 and 1978 but only one year of preoperational data is available. The range of the preoperational data was from 50 to 1,700 mg/liter (Figure 2.2.5-13). Using this range as a comparison to the 1978 data, only twice was the maximum range exceeded, both occurred in September when the values were high for all 3 locations. The highest value was at location 3 (outside and downstream of the mixing zone), not location 1 (discharge), so apparently the Station had no discernible affect on total volatile solids.

Silica values ranged from 0.15 to 7.1 mg/liter (Figure 2.2.5-14). As with total volatile solids there was only one year of preoperational data. Using the range of values over that entire year to compare the 1978 data, no 1978 data exceed the preoperational maximum. The intake and discharge values were similar in all months except May when the intake concentration was much higher than the discharge concentration. It, therefore, is likely that the station had no significant effect on the silica concentrations in the river.

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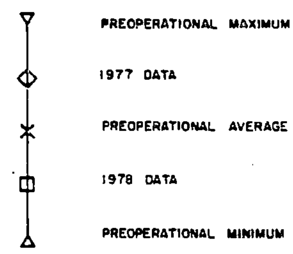
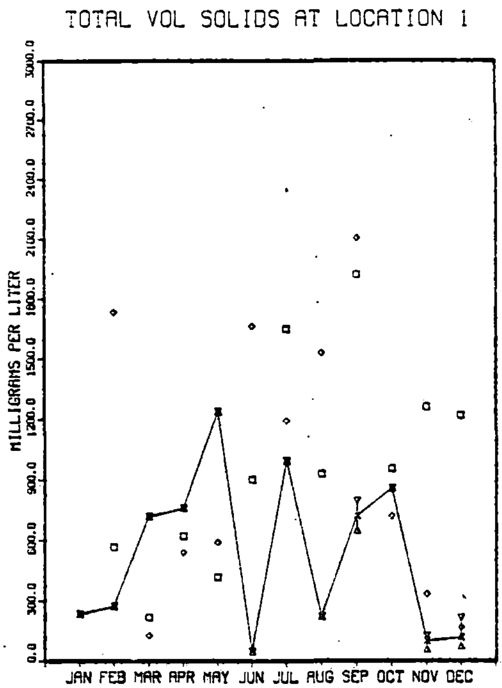
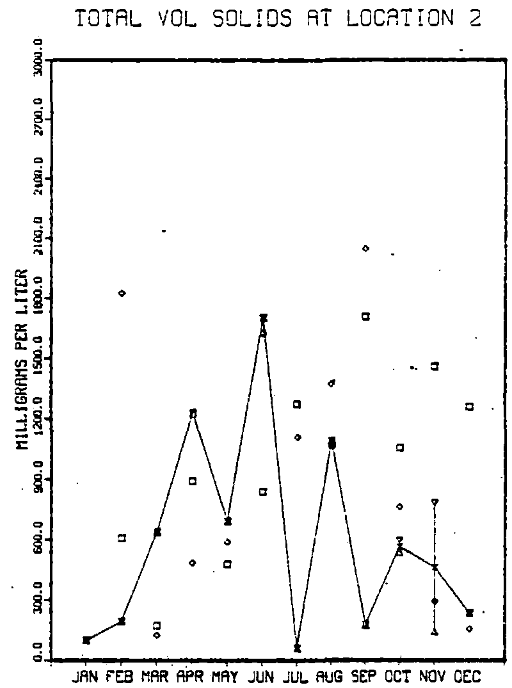
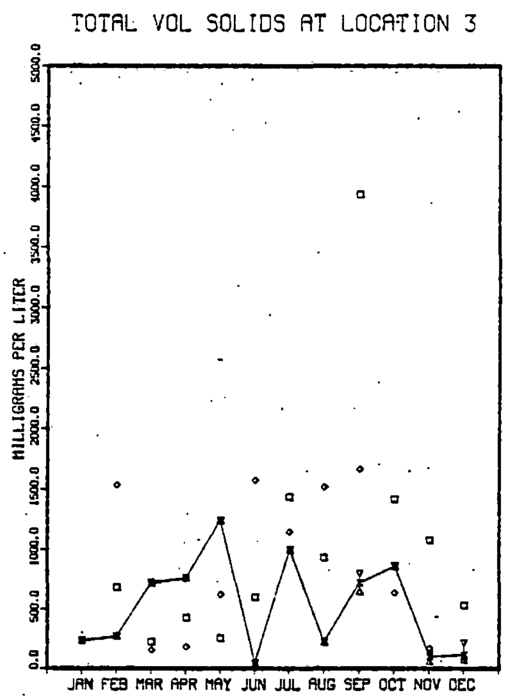


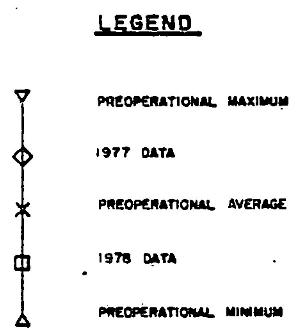

LOCATION 1 = DISCHARGE
LOCATION 2 = INTAKE
LOCATION 3 = OUTSIDE AND DOWNSTREAM OF THE MIXING ZONE

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Turbidity As NTU<br>Figure 2.2.5-12 |
|---|---|



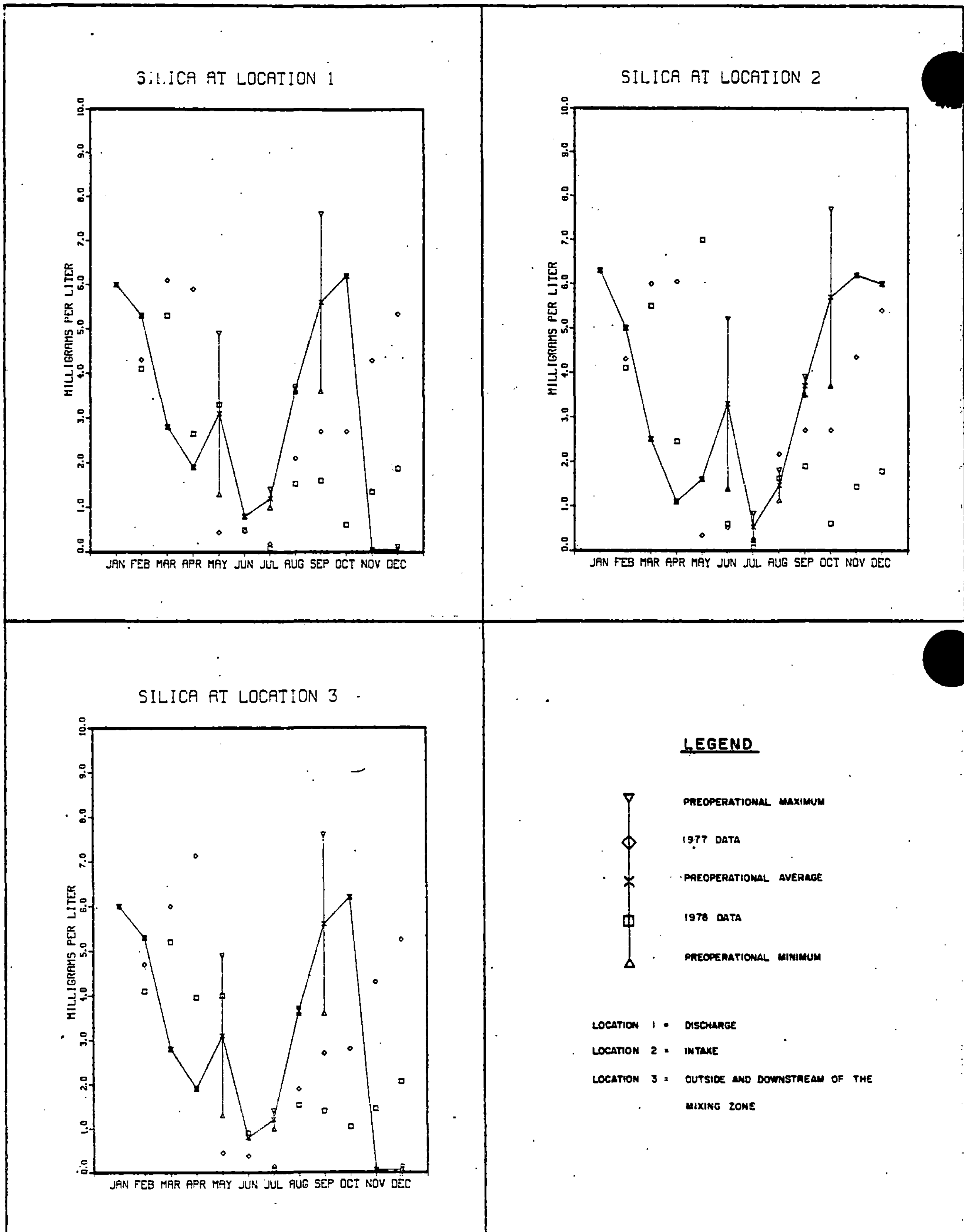




LOCATION 1 = DISCHARGE
LOCATION 2 = INTAKE
LOCATION 3 = OUTSIDE AND DOWNSTREAM OF THE MIXING ZONE

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Total Volatile Solids As TVS<br>Figure 2.2.5-13 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Silica As $SiO_2$ |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-14 |

## OXYGEN/ORGANIC RELATIONSHIPS

The dissolved oxygen levels were discussed in Section 2.2.4 and should be referred to before proceeding in this section.

Biochemical Oxygen Demand (BOD) data were recorded prior to 1977 only at a sampling station near Sunken Ship Cove.

In 1978 BOD was measured at all three locations (Figure 2.2.5-15). Location 1 shows that the 1978 data was below the 1977 data and was below the preoperational average for all months except May. A comparison of all three locations shows that no one location is consistently greater than the others. The levels encountered are low and are reasonable for unpolluted water such as the lower reach of the Delaware River.

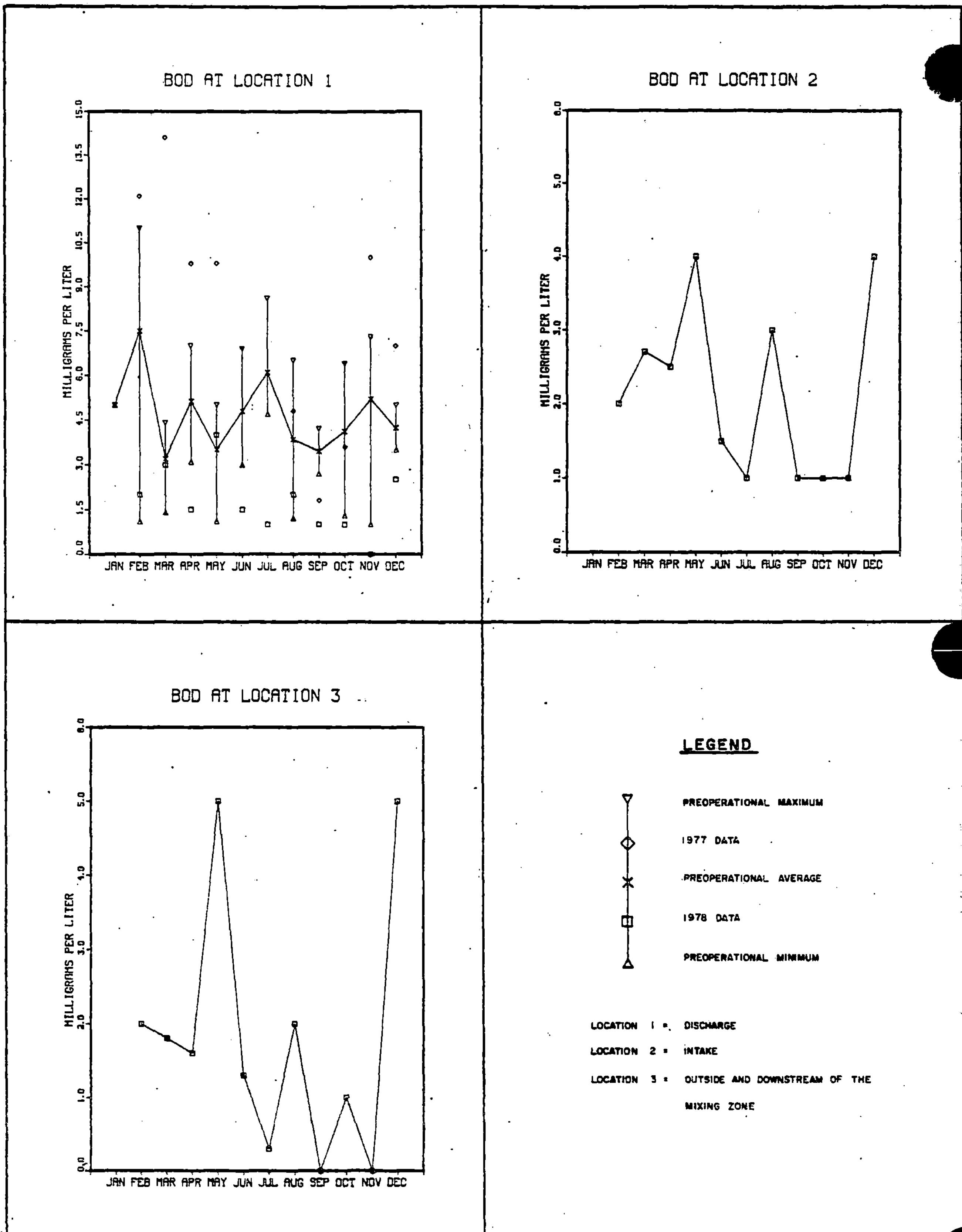
Chemical Oxygen Demand (COD) for preoperational data ranged from 0 to 650 mg/liter (Figure 2.2.5-16). The 1978 data ranged from 10 to 250 mg/liter and only exceeded a preoperational monthly maximum once. The discharge values were not consistently greater than the intake values so it can be concluded that the station had no detrimental effect on COD levels.

It should be noted that in saline waters with chloride (Cl) concentrations above 1000 mg/liter (1410 mg/liter as $CaCO_3$) any COD values below 250 mg/liter are highly questionable because of the high chloride interference. Since most of the 1978 and preoperational data fall into this range, COD data have little meaning.

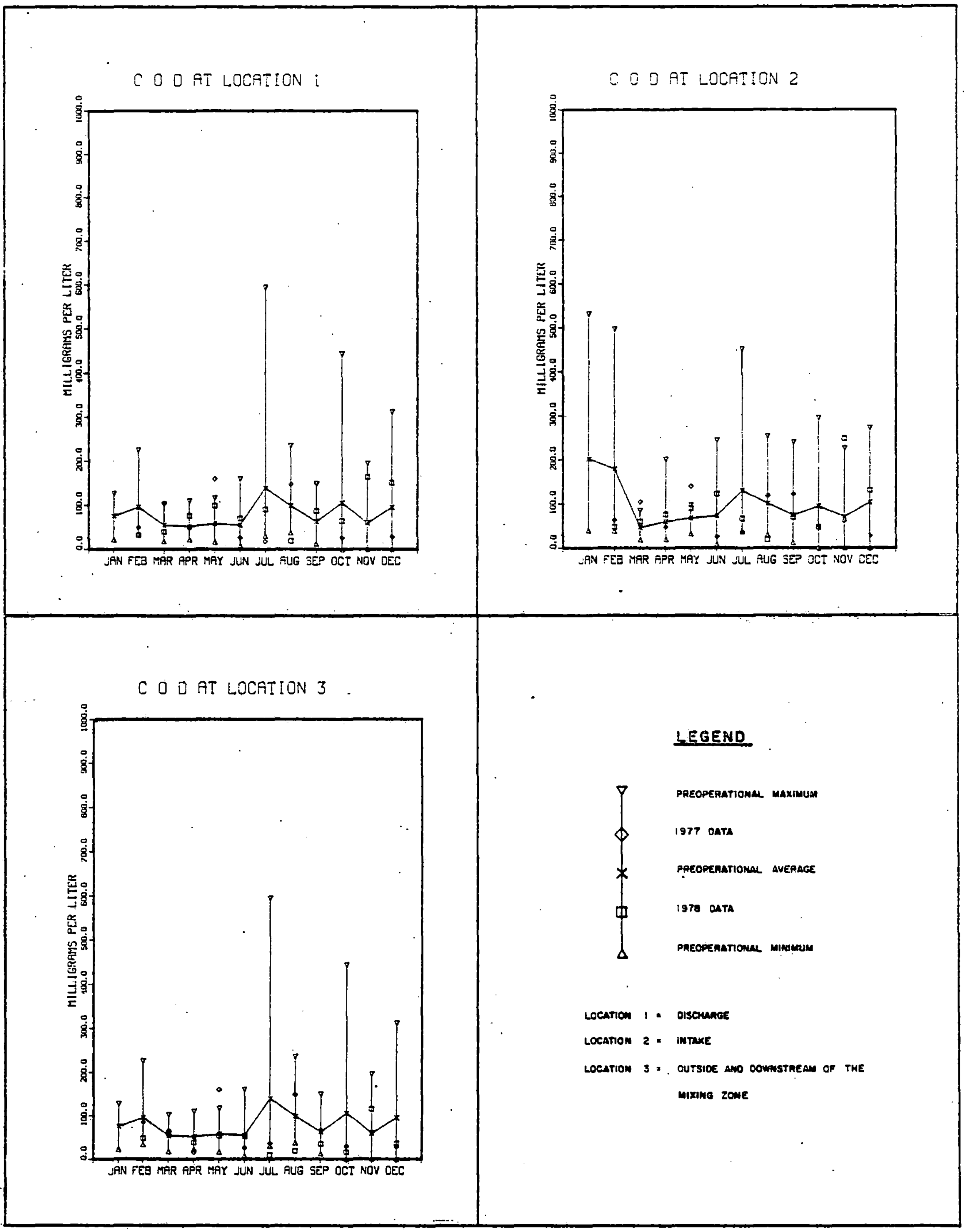
Total Organic Carbon (TOC) in 1978 was always below the preoperational maximums. There was no discernable difference between the three sampling locations (Figure 2.2.5-17).

Since the Station discharges very little organic matter, it is expected that the Station would have no impact on the TOC levels.

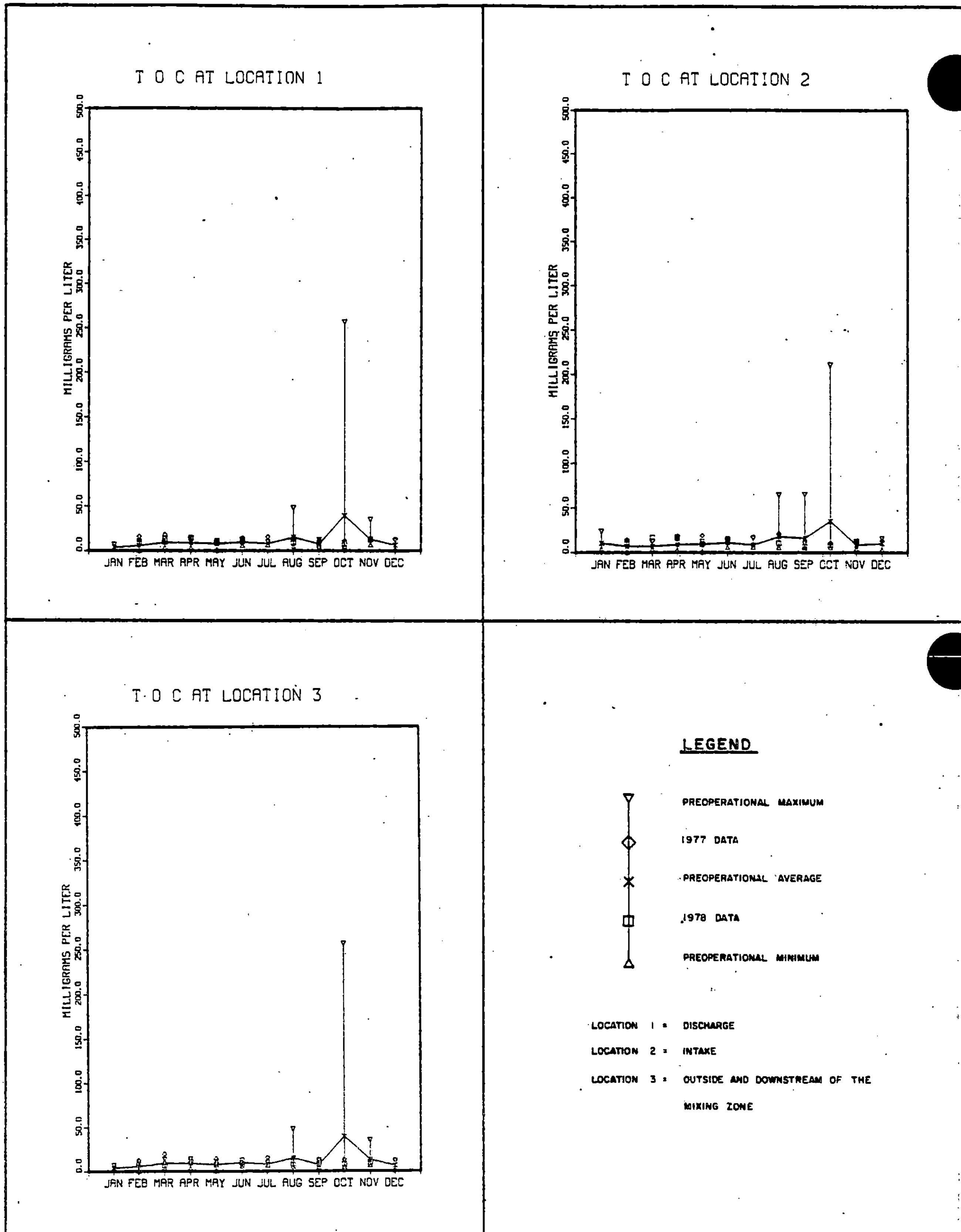
Reducing Substances as $H_2S$ was measured to assess the oxidation-reduction potential of the Delaware River water near Salem. The preoperational monthly maximums were only exceeded once by the 1978 data. This occurred at the intake (Figure 2.2.5-18).



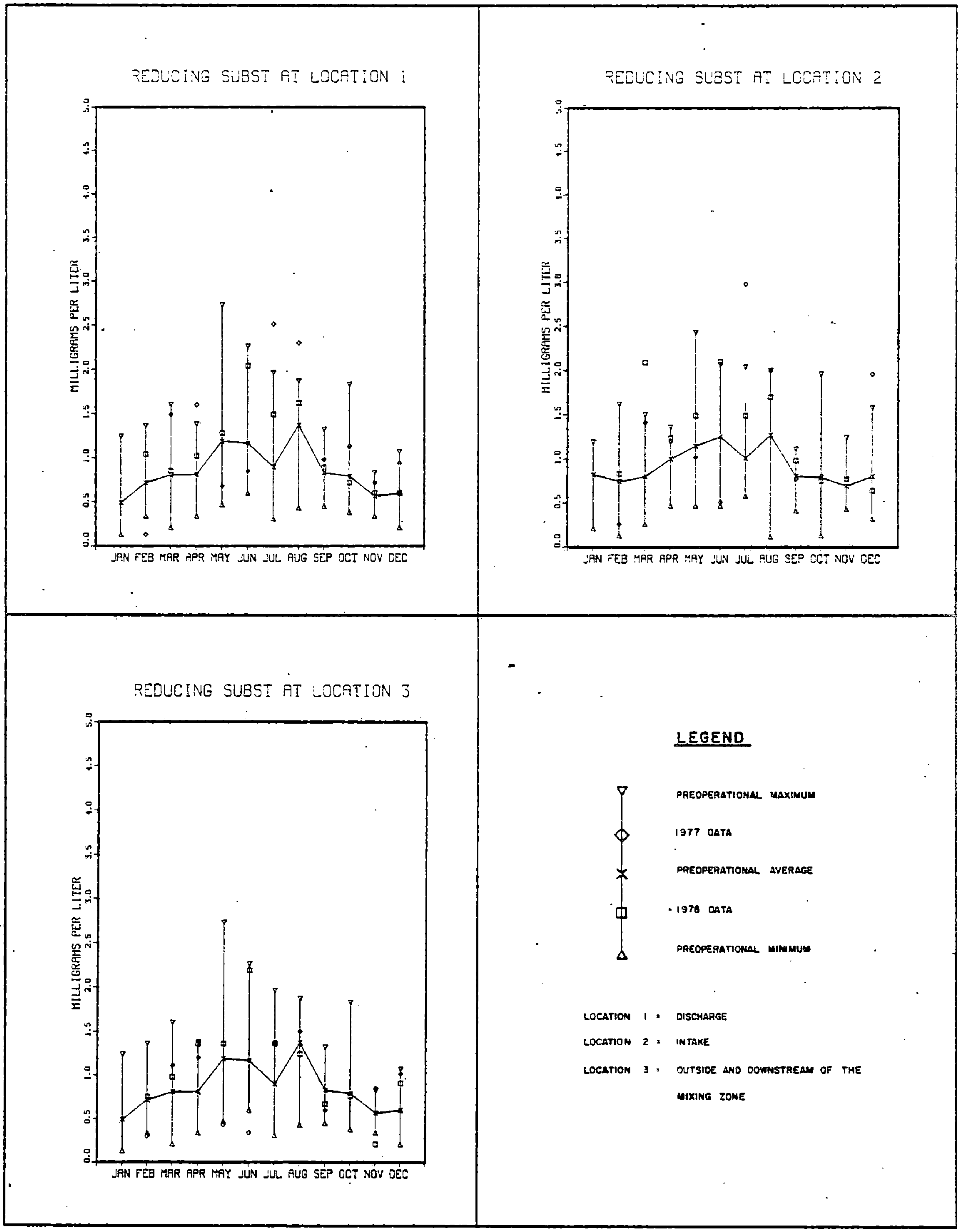

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Biological Oxygen Demand As BOD |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-15 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Chemical Oxygen Demand As COD |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-16 |




| | |
|---|---|
| **PUBLIC SERVICE ELECTRIC AND GAS COMPANY** | Total Organic Carbon As TOC |
| **SALEM NUCLEAR GENERATING STATION** | Figure 2.2.5-17 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Reducing Substances As $H_2S$ |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-18 |

The intake values were usually equal to or slightly less than the discharge. This is to be expected since the station does not release any chemicals which would lead to significant reducing substances levels.

Sulfides are an indicator of a highly polluted or anerobic environment. The Delaware River in the Station area has been shown to be well oxygenated, high in dissolved oxygen usually near saturation, and not highly polluted, with low BOD and COD levels. The preoperational data ranged from 0 to 0.1 mg/liter (Figure 2.2.5-19). The minimum accurately detectable level is 0.05 mg/liter. The 1978 data frequently exceeded the preoperational maximums but these values are very close to the minimum detectable levels. Only during June 1978 did a significantly higher value occur and this seems to be related to the interference found in many parameters for the June sample (see dissolved oxygen and pH). The station therefore does not appear to be affecting the sulfide levels in the river.

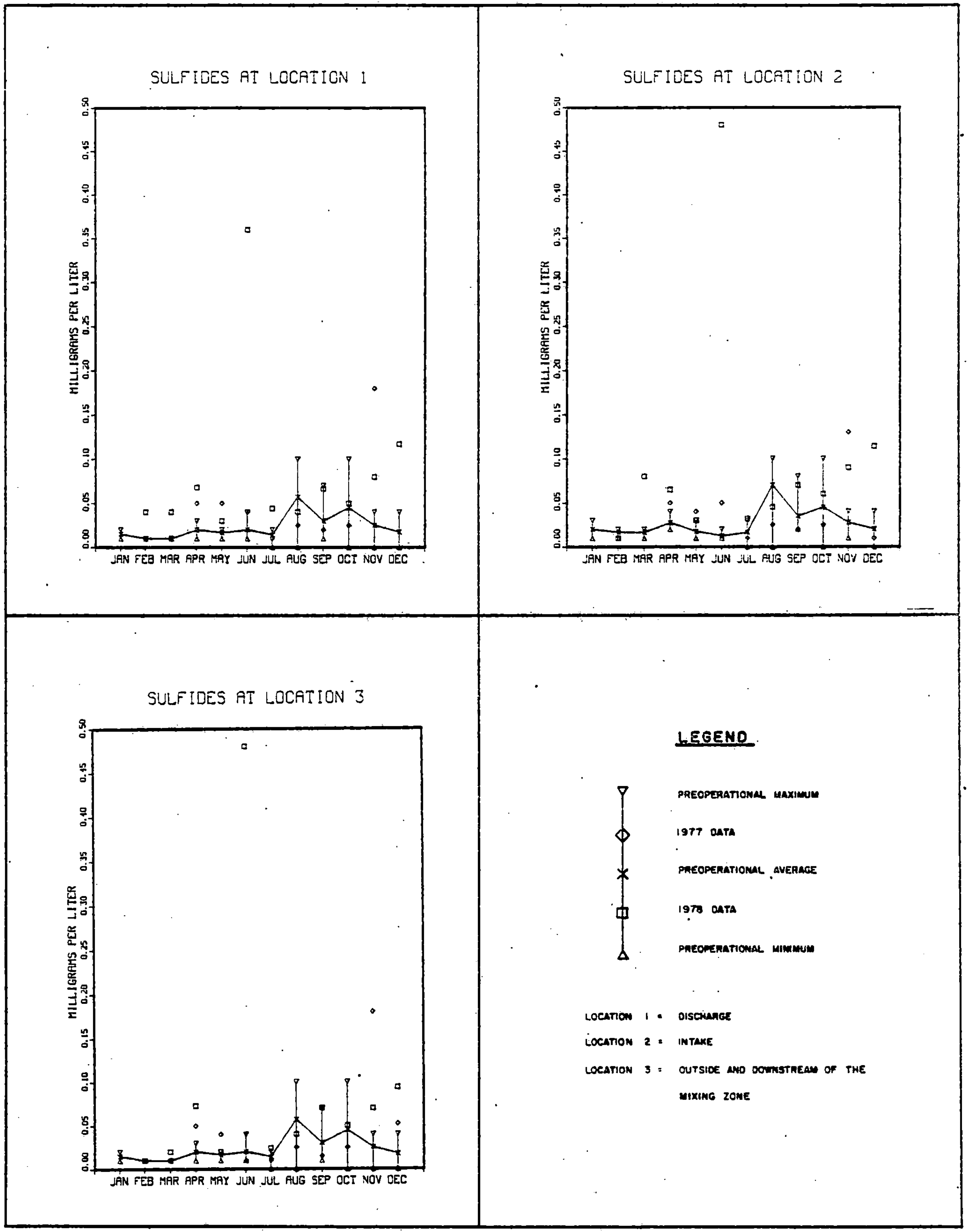
## NITROGEN/PHOSPHORUS RELATIONSHIPS

The nitrogen and phosphorus relationships may be strongly influenced by runoff, agricultural practices, and domestic sewage disposal. By comparison, the operation of Salem Station will normally have an insignificant effect on the Nitrogen/Phosphorus relationship in the Delaware River.

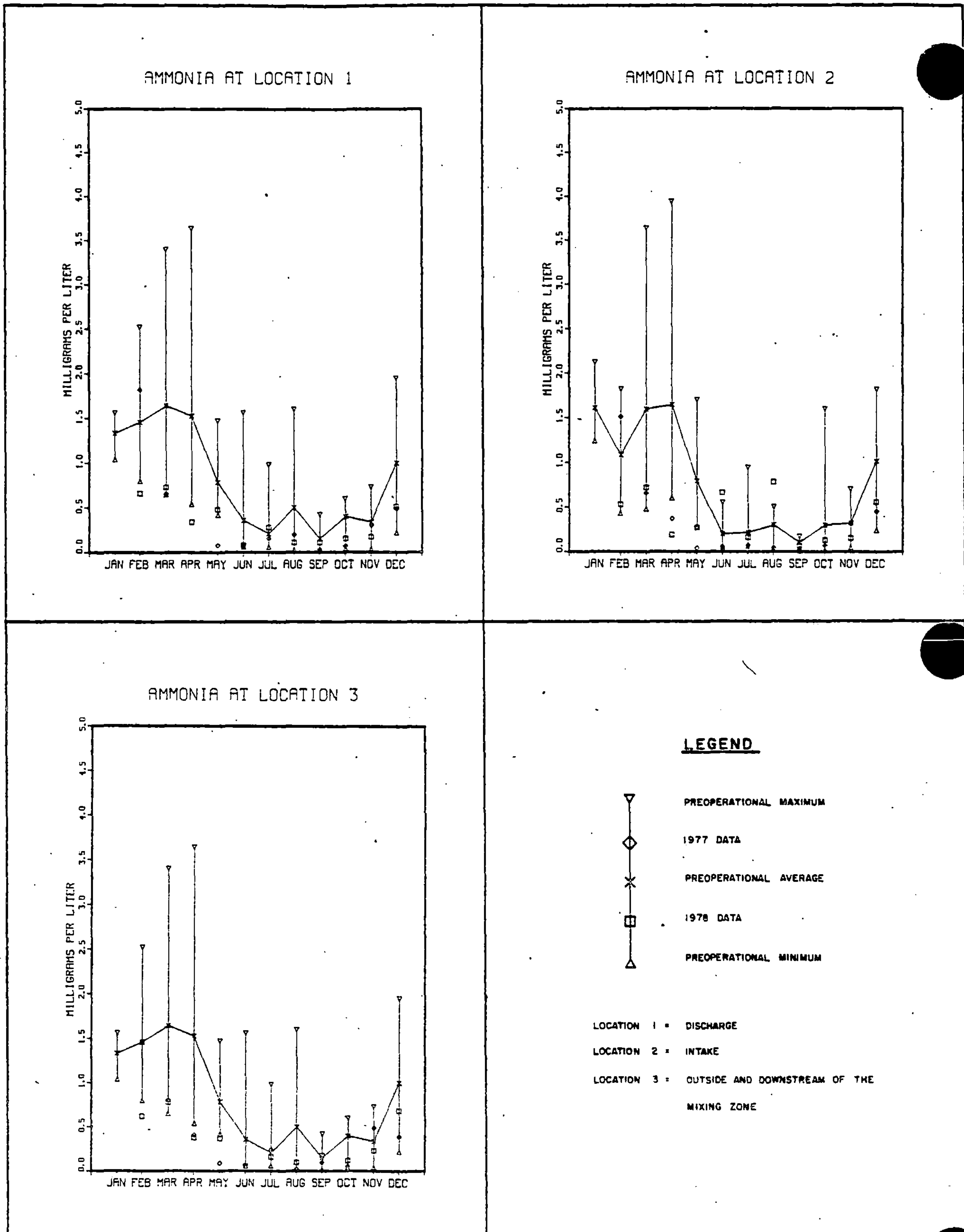
Ammonia as $NH_3$ was very low in 1978. The preoperational range was from 0.0 to 3.8 mg/liter while the 1978 data only ranged from 0.01 to 0.7 mg/liter (Figure 2.2.5-20). The preoperational data has a late winter/early spring peak while the minimum concentrations are found during the summer/autumn period.

Preoperational maximums were exceeded twice, both times at the intake, and new minimums were established six times.

The intake and discharge concentrations were similar with neither locations being predominantly greater. Therefore, the Station does not appear to affect the ammonia levels in the river.




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Sulfides As S<br>Figure 2.2.5-19 |
|---|---|

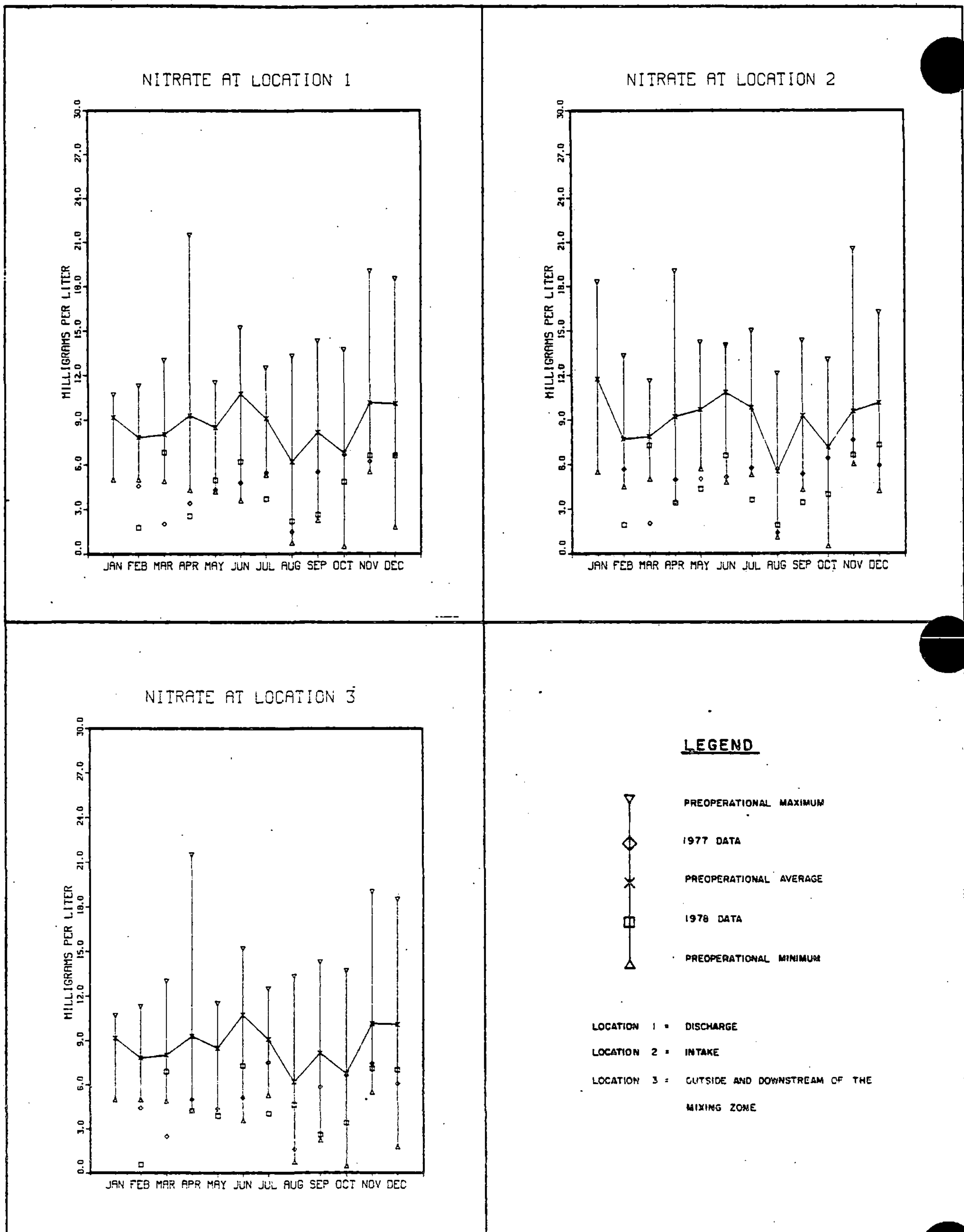



| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Ammonia As $NH_3$ |
|---|---|
| | Figure 2.2.5-20 |

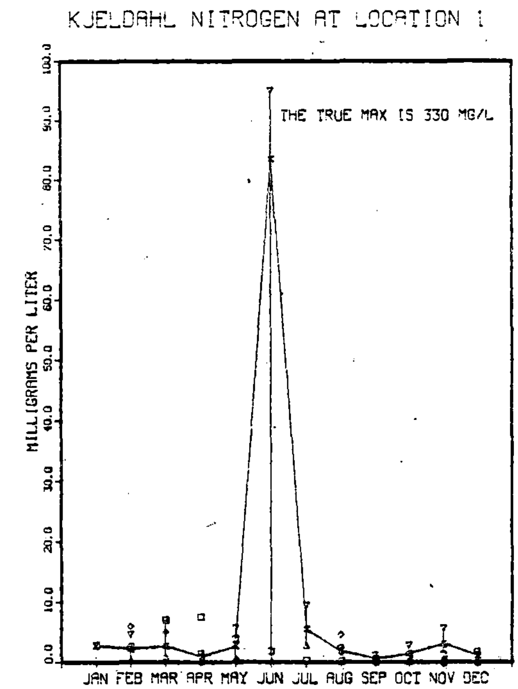
Nitrate measured as $NO_3$ for 1978 was always lower than the preoperational average (Figure 2.2.5-21). The preoperational values ranged from 0.05 to 22.0 mg/liter, while the 1978 data ranged from 1.0 to 7.0 mg/liter. Nine times the 1978 data was below the preoperational minimums. The intake and discharge values were similar and indicate that the Station did not change the $NO_3$ content of the river in any appreciable manner.

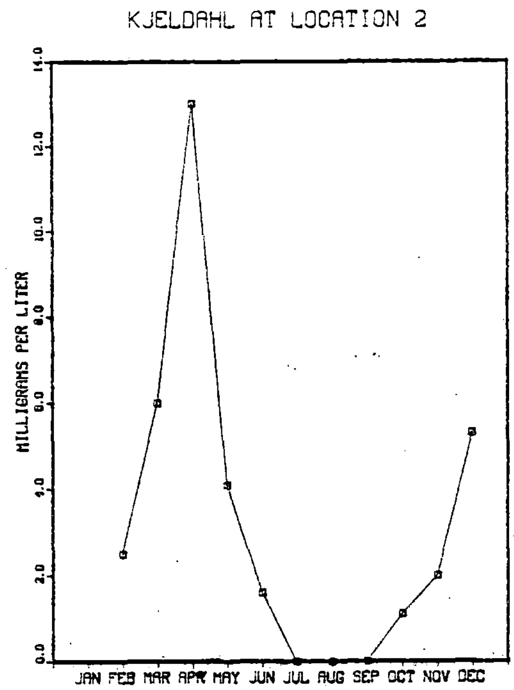
Kjeldahl Nitrogen is a measure of free ammonia and most organic nitrogen compounds. The preoperational data is limited to a location near Sunken Ship Cove. The high preoperational data during June seems exceptional and should be ignored (Figure 2.2.5-22). Normally, the range is between 0 and 10 mg/liter, the 1978 data all fall within this range except for the April intake sample. Since the discharge concentration is no greater than the intake values, and agricultural practices greatly influence the Kjeldahl nitrogen in the river, the Station did not signicantly affect the Kjeldahl nitrogen levels in the river.

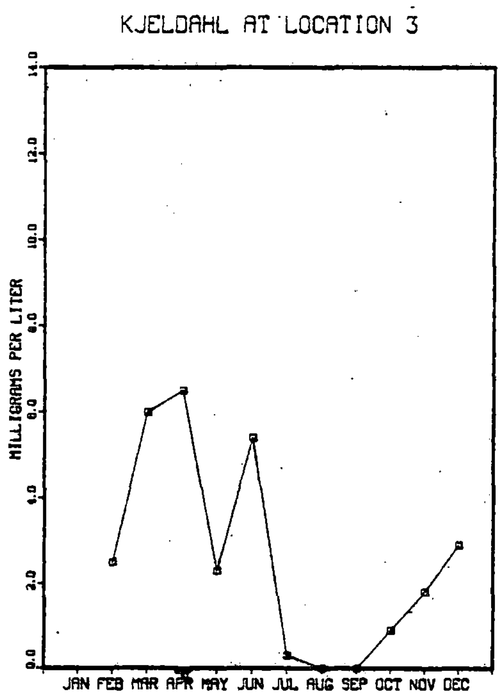
Total Phosphorus as $PO_4$ (Phosphate) in 1978 was high, ranging from 0.2 to 14.5 mg/liter while the preoperational data only ranged from 0.0 to 4.0 mg/liter (Figure 2.2.5-23). The large variation in the 1978 data is caused by the very high concentrations found during April. April is a month of heavy rains leading to large amounts of runoff. Since all three locations are very high and the station does not discharge significant quantities of phosphorus containing chemicals, it seems likely that the high values originated upstream of the station. An additional point is that the high values are above the accurate range of the method used so that a comparison between the intake and discharge is not viable. It seems logical that the station did not affect the phosphorus concentrations, the ambient variations resulting from runoff to the river.




| | |
|---|---|
| **PUBLIC SERVICE ELECTRIC AND GAS COMPANY** | Nitrate As $NO_3$ |
| **SALEM NUCLEAR GENERATING STATION** | Figure 2.2.5-21 |




**LEGEND**

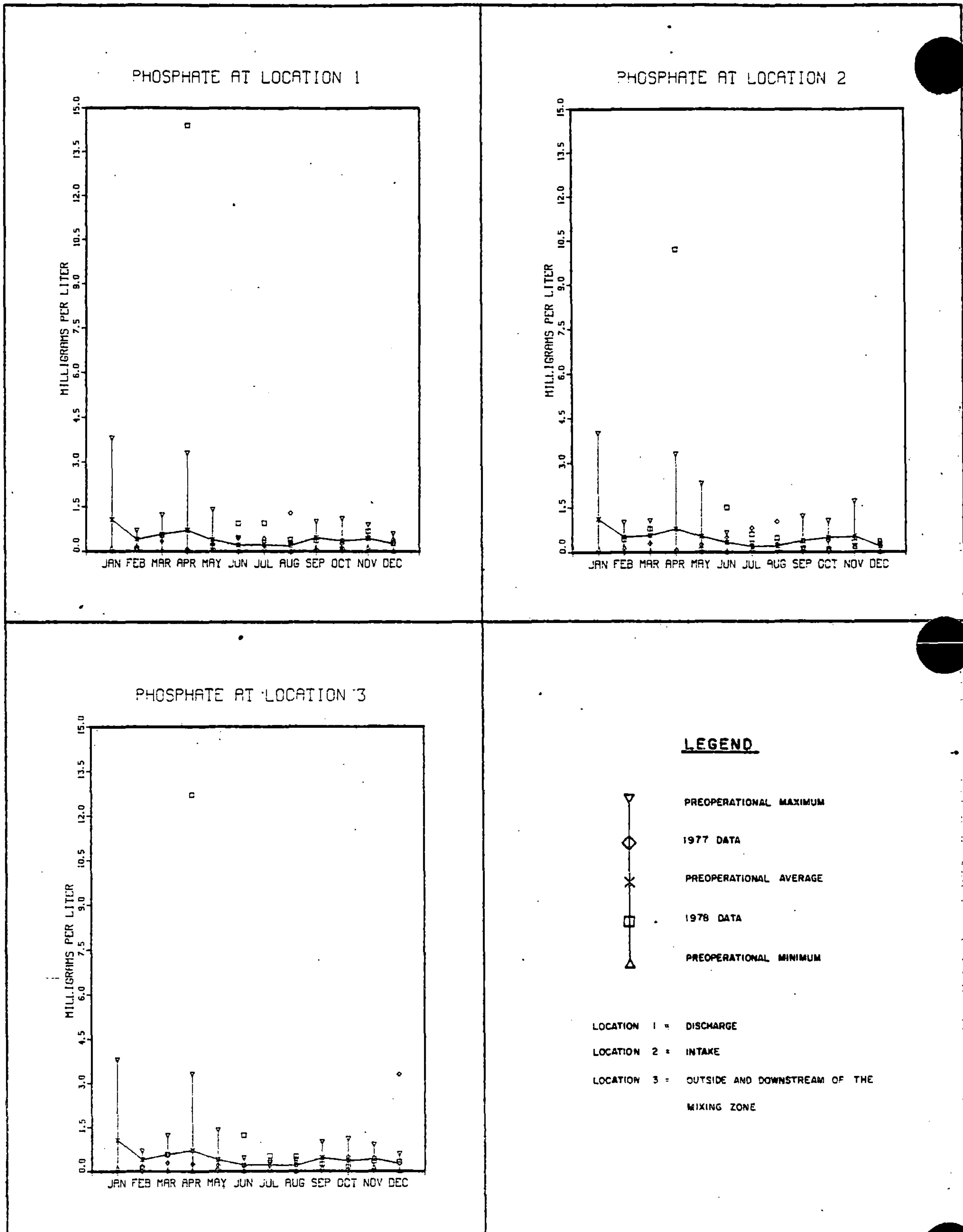
- ▽ PREOPERATIONAL MAXIMUM
- ◇ 1977 DATA
- ✕ PREOPERATIONAL AVERAGE
- □ 1978 DATA
- △ PREOPERATIONAL MINIMUM

LOCATION 1 = DISCHARGE

LOCATION 2 = INTAKE

LOCATION 3 = OUTSIDE AND DOWNSTREAM OF THE MIXING ZONE

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Kjeldahl Nitrogen As N<br>Figure 2.2.5-22 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Phosphate As $PO_4$ |
| --- | --- |
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-23 |

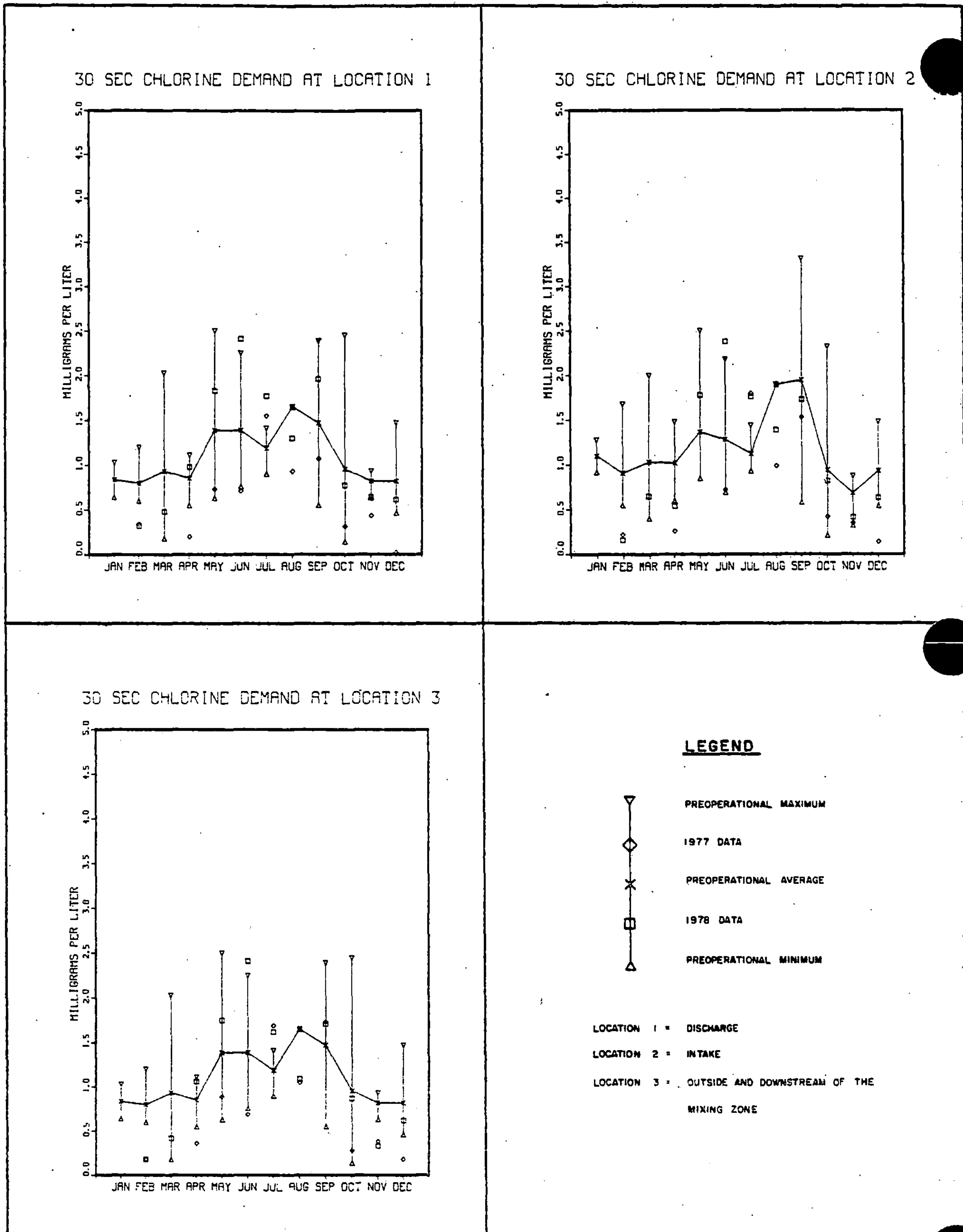
CHLORINE DEMAND

Thirty (30) second and three (3) minute chlorine demand were determined as part of the river monitoring program.

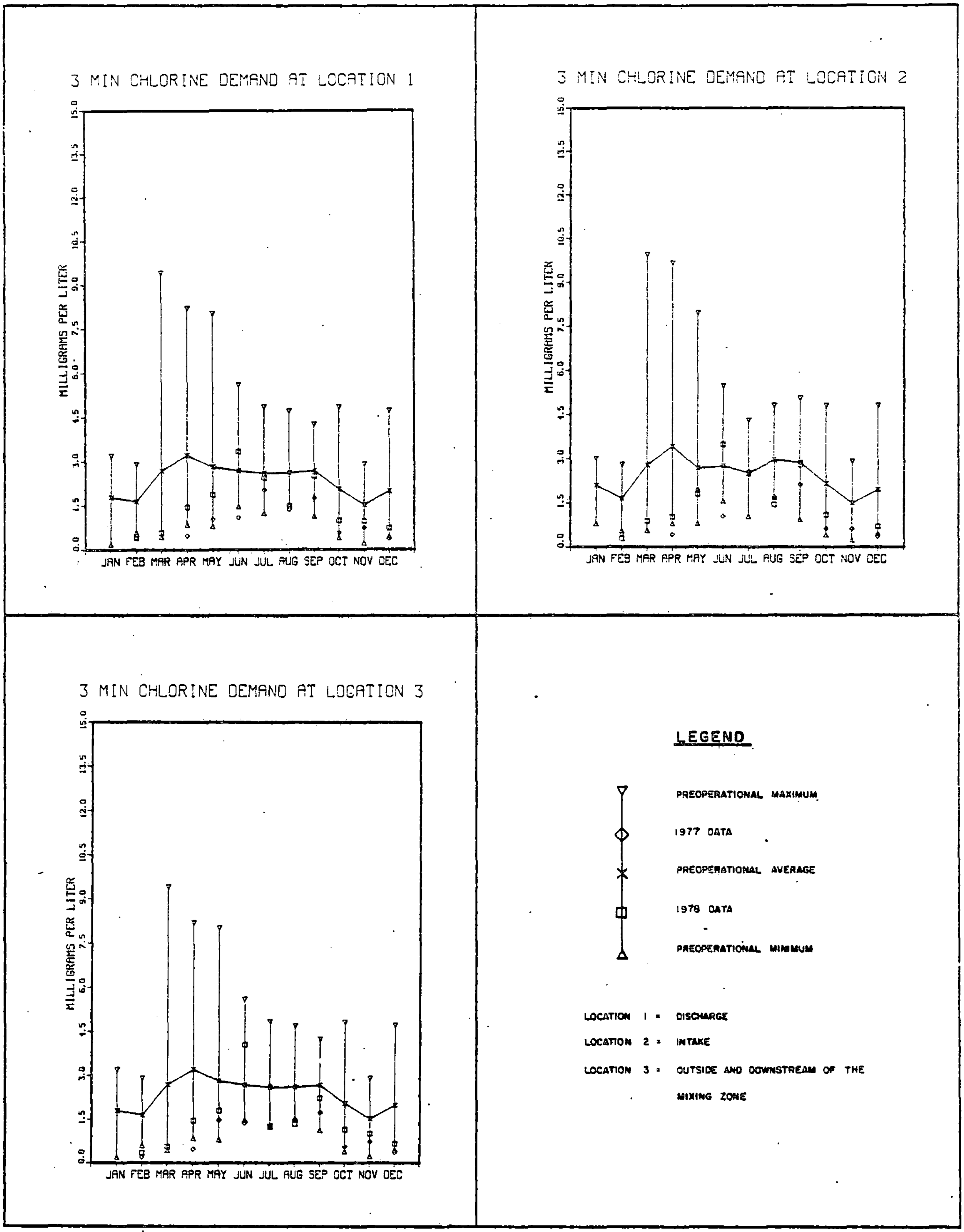
The 30 second chlorine demand for 1978 ranged from 0.2 to 2.4 mg/liter (Figure 2.2.5-24). Six times the 1978 demand was greater than the preoperational maximums and 7 times the 1978 values were below the minimums. The intake and discharge demands were similar with neither location having a consistently greater value.

The 3 minute chlorine demand is usually greater than the 30 second demand for preoperational data. In 1978 the 3 minute demand ranged from 0.2 to 3.8 mg/liter, while the preoperational data ranged from 0.1 to 10.0 mg/liter (Figure 2.2.5-25). Only during the June sample did the demand exceed the preoperational average. The reduction in demand at all stations appears to be linked to the reduced ammonia levels present in the river in 1978.

A comparison of the intake and discharge indicate that neither location had consistently higher or lower demands.




| | |
|---|---|
| **PUBLIC SERVICE ELECTRIC AND GAS COMPANY** | 30 Second Chlorine Demand As $Cl_2$ |
| **SALEM NUCLEAR GENERATING STATION** | Figure 2.2.5-24 |




| | |
|---|---|
| **PUBLIC SERVICE ELECTRIC AND GAS COMPANY** | 3 Minute Chlorine Demand As $Cl_2$ |
| **SALEM NUCLEAR GENERATING STATION** | Figure 2.2.5-25 |

METALS

Iron concentrations vary from 0.0 to 11.0 mg/liter for preoperational data. The 1978 data varied from 0.5 to 13.5 mg/liter (Figure 2.2.5-26). The increased variation during 1978 appears to be due to large natural variations or discharges from sites upstream of the Station. The highest 1978 value of 13.5 mg/liter was outside and downstream of the mixing zone during June. The concentration at the intake was also high, 9.0 mg/liter, but the value at the discharge was only 5.5 mg/liter. April showed a high concentration at the intake, but low concentrations were present at the discharge and downstream of the discharge. These wide fluctuations between locations indicate that "slugs" of iron rich water may be passing downstream. The station does release some iron containing compounds but the releases are small and relatively constant over the year. Therefore, it is concluded that the station did not significantly alter the river's iron concentrations.

Copper levels for preoperational data varied from near 0.0 to 6.5 mg/liter. The 1978 data ranged only from near 0.0 to 0.6 mg/liter (Figure 2.2.5-27). Only during November did the discharge value exceed the intake value by an appreciable amount, but this high concentration was still within the preoperational range forthe month. Since the only Station source of copper is small amounts arising from corrosion and only the November sample shows any indication of a higher copper concentration at the discharge, no Station impact is noted.

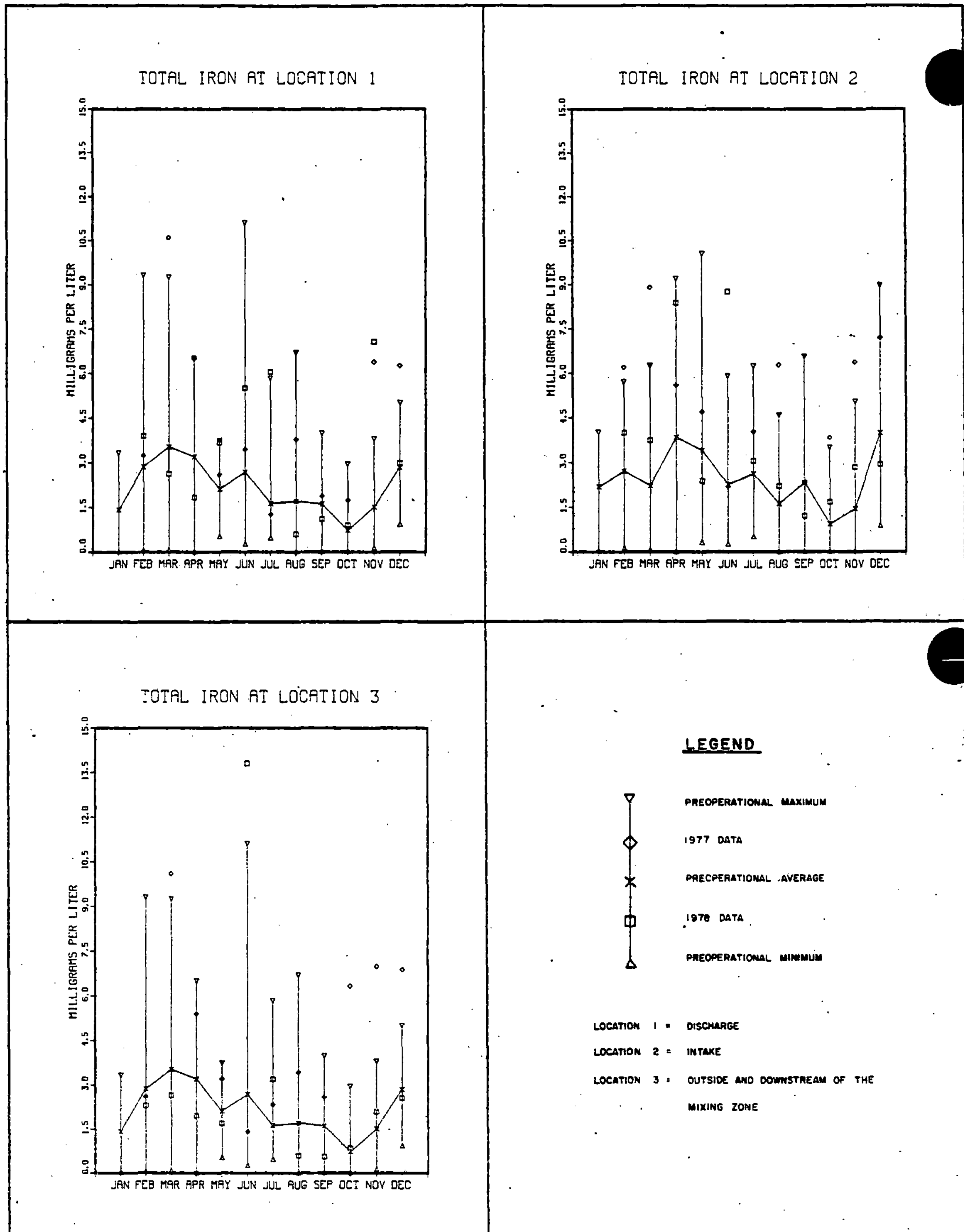
Chromium levels near the station are very low and near the limit of detection. The preoperational range, excluding the extremely high March data, is between 0.0 and 0.8 mg/liter. The 1978 data is between 0.0 and 0.2 mg/liter (Figure 2.2.5-28). Since the station does not discharge any significant quantities of chromium, and all of the 1978 data is close to the limit of detection, it is reasonable to conclude that the station did not affect the chromium levels in the river.

Manganese concentrations ranged from 0.0 to 0.64 mg/liter in the preoperational data. The 1978 data ranged from 0.02 to almost 1.0 mg/liter with the preoperational maximums being exceeded seven times (Figure 2.2.5-29). Extreme variation was present between locations for most sampling dates. Since the station does not discharge a significant amount of manganese and the variation in the river is generally high, a Station impact on the manganese levels in the river is unlikely.

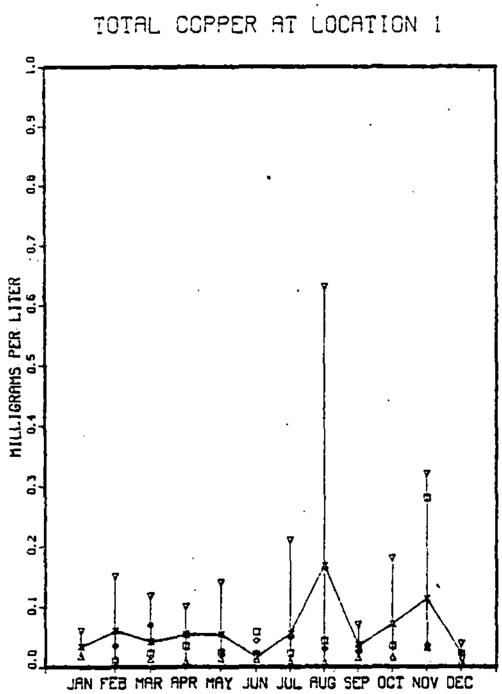
Zinc concentrations ranged from 0.0 to near 0.19 mg/liter (Figure 2.2.5-30 - Note the scale change for location 2). The 1978 data had a smaller range of 0.05 to 0.4 mg/liter. The preoperational maximums were exceeded six times. The discharge and intake locations were similar indicating no significant plant discharge. The high values encountered in 1977 were not seen in 1978. The river's concentration is not affected by the plant since no zinc compounds are discharged into the circulating water system.

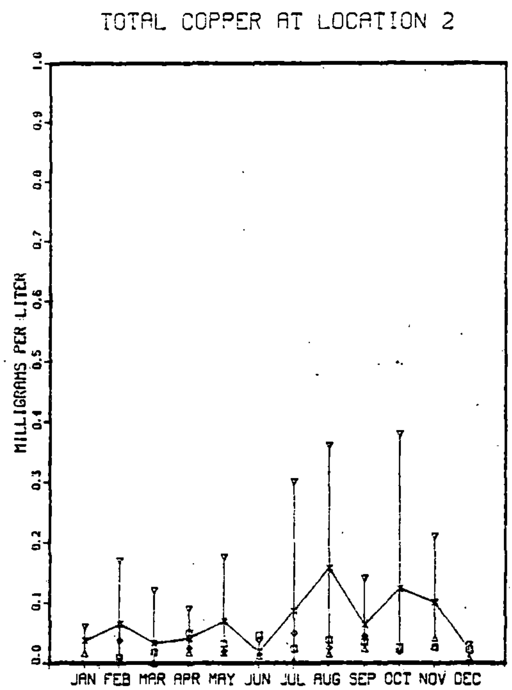
PHENOLS

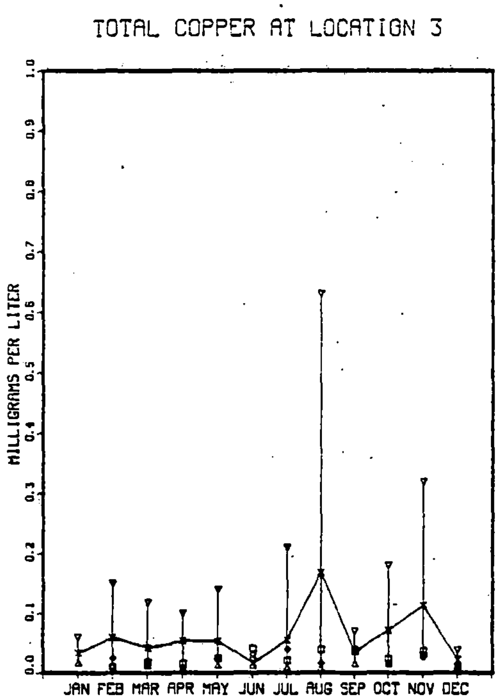
There are no phenol results presented in graphical form because the concentrations were usually below detectable levels. The preoperational data ranged from 0.001 to 0.130 mg/liter, while the 1978 data ranged from below detectable levels to 0.025 mg/liter. The low levels for 1978 are to be expected since the Station does not discharge any chemical in large quantity which contains phenols. Any phenols in the river would result from other sources.

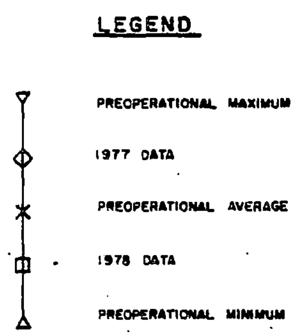



| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Total Iron As Fe |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-26 |



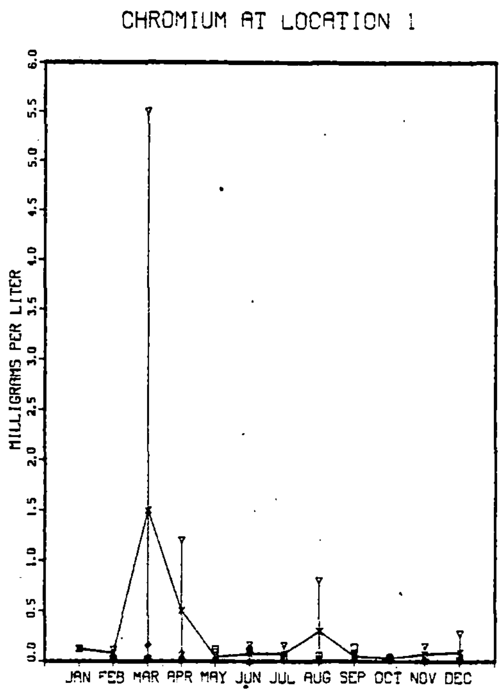



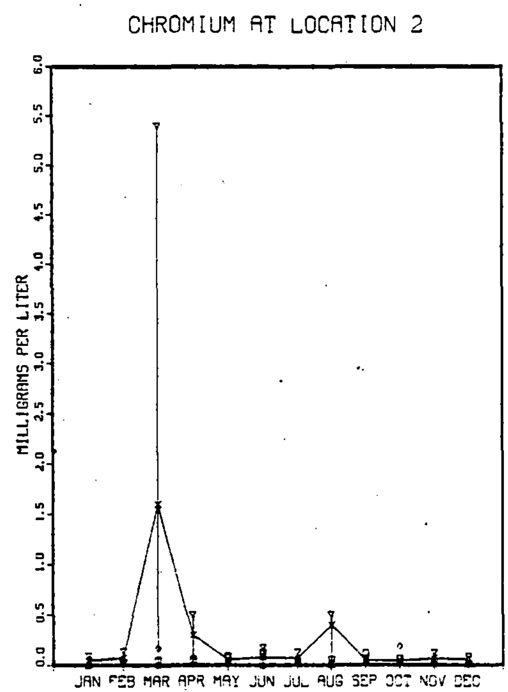

LOCATION 1 = DISCHARGE

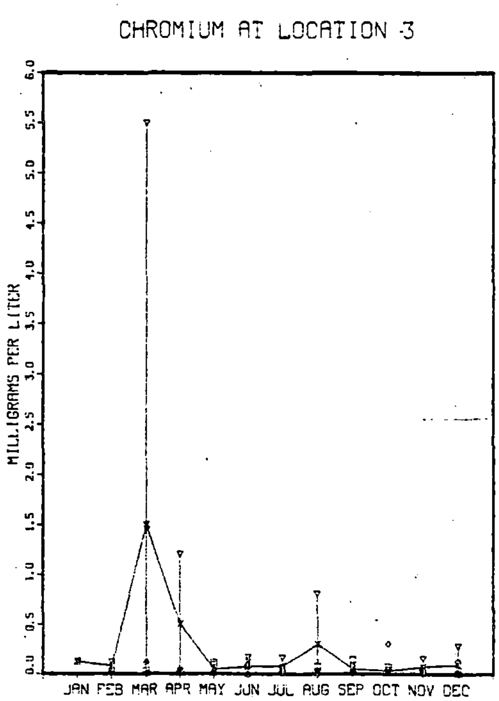
LOCATION 2 = INTAKE

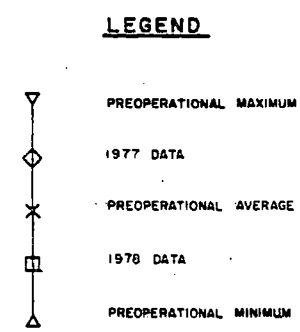
LOCATION 3 = OUTSIDE AND DOWNSTREAM OF THE MIXING ZONE

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Total Copper As Cu |
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-27 |



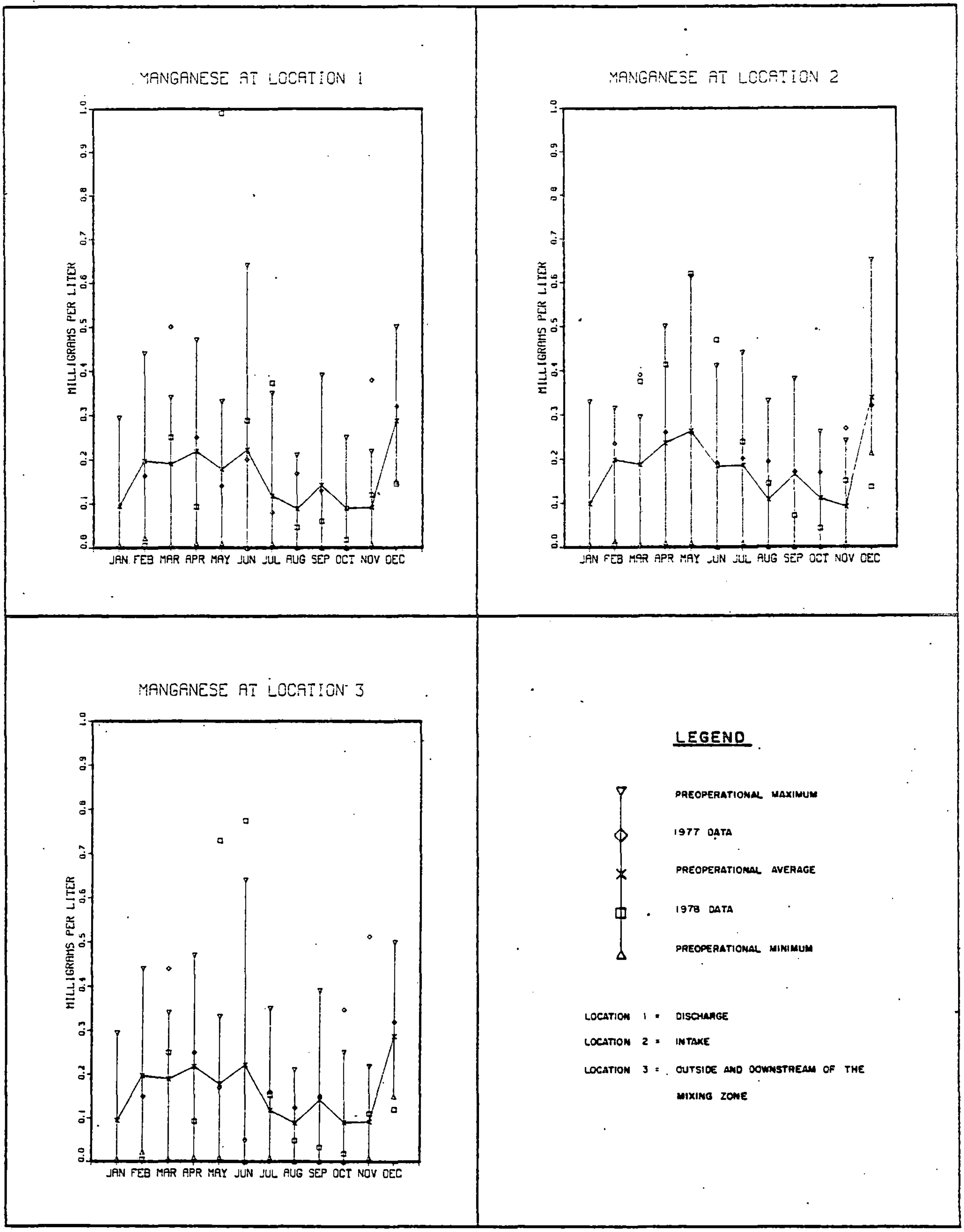



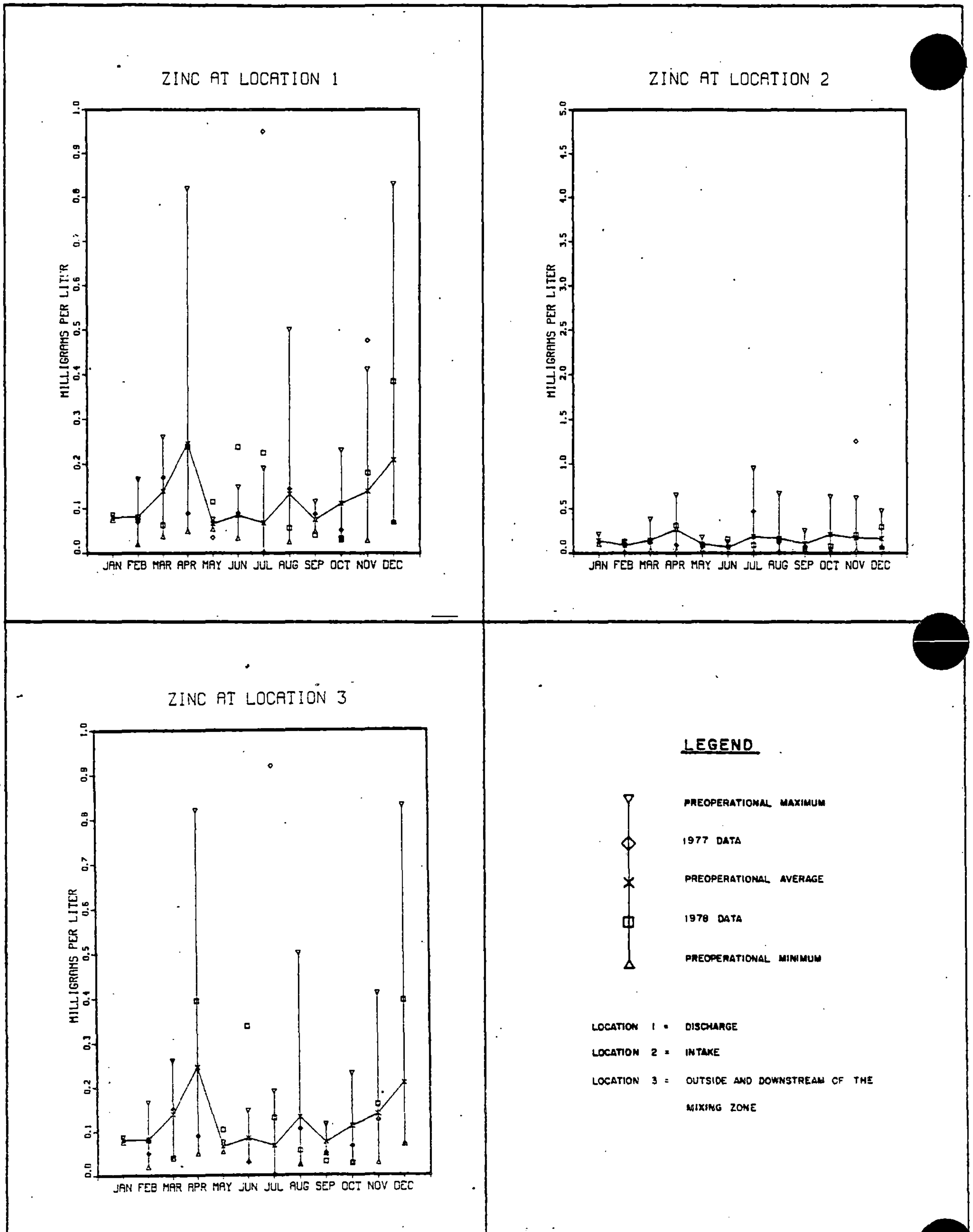




LOCATION 1 = DISCHARGE
LOCATION 2 = INTAKE
LOCATION 3 = OUTSIDE AND DOWNSTREAM OF THE MIXING ZONE

| | |
|---|---|
| **PUBLIC SERVICE ELECTRIC AND GAS COMPANY** | Chromium As Cr |
| **SALEM NUCLEAR GENERATING STATION** | Figure 2.2.5-28 |




| | |
|---|---|
| **PUBLIC SERVICE ELECTRIC AND GAS COMPANY** | Manganese As Mn |
| **SALEM NUCLEAR GENERATING STATION** | Figure 2.2.5-29 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY | Zinc As Zn |
|---|---|
| SALEM NUCLEAR GENERATING STATION | Figure 2.2.5-30 |

## SECTION 3.0
## BIOTIC MONITORING AND SURVEILLANCE PROGRAMS

The results of the General Ecological Survey (ETS Section 3.1.2.1) from January through December 1978 are presented in this section. In addition to the required data, additional non-required study data are presented as these data contribute to an understanding of local ecological schedules and relationships. The objective of the studies is to identify significant changes in population characteristics relative to pre-operational levels, and to evaluate these relative to Salem operation.

### 3.1 AQUATIC (ETS Section 3.1.2.1.1)

The study area is located in the lower Delaware River. It extends approximately 8 km north and 10 km south of the station's location which is on the southern portion of Artificial Island in Salem County, New Jersey about 80 km from the mouth of Delaware Bay and 1.6 km upriver from the head of the bay. Primary emphasis has been directed at the area which is affected by the Salem thermal plume, although sampling is done throughout the region.

The Delaware River in this Region is estuarine and is bordered by extensive marshland and occasional small sandy beaches. There is little industrial development on this portion of the river. Width varies from 3 km at Artificial Island over 8 km in the southern portion of the study area.

Limited sampling is also done in three of the four tidal creeks entering the Delaware River in this region: Alloway and Hope creeks in Salem County, New Jersey and Appoquinimink Creek in New Castle County, Delaware. For further information on the character of the area see Volume 2 of the 1977 Annual Environmental Operating Report.

## 3.1.1 Phytoplankton (ETS Section 3.1.2.1.1a)

A study of phytoplankton which occur in the Delaware River near Artificial Island was initiated in March 1973 and continued in 1978. Objectives are to determine seasonal trends in size, photosynthetic rate, and composition of the standing crop.

### 3.1.1.1 Summary

Phytoplankton are microscopic plants which live suspended in water, with little or no mobility, and whose distributions are determined largely by local water movements. They are the primary producers which, along with water-born detritus, form the basis of the local estuarine food web.

In 1978 the phytoplankton standing crop was dominated by diatoms. Skeletonema costatum, a diatom that inhabits brackish and marine waters, was the most abundant species. Phyto-flagellates, green algae, blue-green algae, euglenoids and dinoflagellates were present seasonally or throughout the year, but were generally not dominant.

The standing crop, as indicated by mean chlorophyll *a* level, varied seasonally, being highest from late May through June. Chlorophyll *a* levels were somewhat lower from July through August and decreased further from September through December.

Phytoplankton production (photosynthesis) was highest in July and lowest in November and March. Productivity was highest near the surface where light penetration was greatest; it decreased with depth and was negligible at 1 or 2 m. This abrupt drop in carbon production from the surface to the 2-m depth suggests that local phytoplankton production, which is seasonal and restricted to a relatively shallow euphotic zone, is probably not sufficient to supply the total local primary food base.

Plant detritus also contributes to the local food base. The phaeo-pigments (decomposition products of chlorophyll *a*) are indicative of the detrital load which fluctuates seasonally. Mean concentrations of phaeo-pigments were highest from late May through early August; low concentrations occurred from March to early May and from late August through December.

Two years (1977 and 1978) of operational studies of phytoplankton have been completed and objectives have been met. The data generated forms an adequate base for assessing the impact of Salem on the study area. Review and analysis of the data presented in this and in Volume 2 of 1977 Annual Environmental Operating Report, show that seasonal levels of phytoplankton standing crop and surface net productivity were similar to pre-operational (1974-1976) norms. Additionally, there has been no discernible impact on community structure. This was indicated by the annual appearance of similar dominant taxa, particularly the diatoms, which are best represented by *Skeletonema costatum*.

### 3.1.1.2 Materials and Methods

FIELD AND LABORATORY

The requirements of the Phytoplankton ETS were satisfied. Two replicate samples for pigment studies were collected near the surface and bottom at 10 stations (Table 3.1.1-1, Fig. 3.1.1-1) semimonthly from April through October and monthly in March, November, and December; single 125 ml aliquots from each replicate sample at stations PP05, PP06, and PP07 were combined and used for taxonomic enumeration. Samples for productivity studies were taken at depths of 0.0, 0.5, 1.0, and 2.0 meters at stations PP05 and PP07 bimonthly from March through November. No samples were collected in January and February because of severe icing conditions. All samples were taken with an 8.1-liter Van Dorn bottle. For a complete description of gear, gear deployment, collection of physicochemical data, and laboratory procedures refer to Volume 2 of the 1977 Annual Environmental Operating Report.

On March 7 a quality control sample containing known pigment concentrations was obtained from the Environmental Protection Agency. This sample was analyzed to test accuracy and precision of methods used. Measured concentrations were within the limits of reference values provided (Table 3.1.1-2). Additionally, units used in counting algae genera are given in Table 3.1.1-3.

DATA REDUCTION

Principal components analysis (BMDP4M Factor Analysis; Dixon, 1975) was used to calculate and display similarities in pigment concentration among stations or groups of stations. This method is described by Marriott (1974) and Pielou (1977). Sampling times were taken as variables and stations as observations. A sampling time x sampling time (R-mode) product moment correlation matrix was calculated from log (X + 1) transformed chlorophyll a and phaeo-pigment data. The factor scores for each station along only the first three principal component axes were then plotted.

### 3.1.1.3 Results and Discussion

CHLOROPHYLL A AND PHAEO-PIGMENTS

A total of 680 samples for standing crop studies was taken near Artificial Island on 17 sampling dates from March 23 through December 19, 1978 and analyzed for pigments.

Chlorophyll a and phaeo-pigment concentrations varied seasonally. The lowest chlorophyll a levels measured were on April 7 (mean 3.5 $mg/m^3$ $\pm$ 2.1); the highest measured were on June 7 (30.8, $\pm$ 10.1) (Fig. 3.1.1-2). Mean standing crop was typically low in March and April (range 3.5-7.6 $mg/m^3$). It increased in May (range 6.4-23.0 $mg/m^3$) and peaked on June 7. Mean chlorophyll a concentration decreased rapidly from late June through August (range 10.0-25.8 $mg/m^3$) and decreased further from September through December (range 5.3-8.7).

The lowest phaeo-pigment levels measured were on November 6 (mean 4.9 $mg/m^3$ $\pm$ 2.1); the highest measured were on June 19 (27.0, $\pm$ 14.6) (Fig. 3.1.1-3). Mean concentrations were high from late May through early August (13.4-27.0 $mg/m^3$); low concentrations occurred from March to early May (5.0-8.4) and from late August to December (4.9-8.7).

Similarity among stations was examined using principal component analysis. The first three principal components axes explained 74.2 percent of the total variance (Factor I = 42.7 percent; Factor II = 17.9; Factor III = 13.6) for chlorophyll a concentration and 67.5 percent of the total variance (Factor I = 32.1 percent; Factor II = 19.9; Factor III = 15.5) for phaeo-pigment concentration. No stations appeared to be distinctly different from the overall group.

However, a north-south trend in the pattern of seasonal change of pigment concentrations is indicated (Fig. 3.1.1-4, 3.1.1-5). This trend may be related to the effects of fresh water input in the northern and marine or saltwater imput in the southern part of the study area.

Examination of the data indicated that the vertical distribution of mean chlorophyll a concentration was not consistent among stations or from date to date; mean phaeo-pigment levels were more consistent, being higher near the bottom in 64 percent of the comparisons. The annual mean chlorophyll a concentration was 11.5 $mg/m^3$ at the surface and 11.6 near the bottom. The annual mean phaeo-pigment concentration was 9.4 $mg/m^3$ at the surface and 12.7 near the bottom.

The pattern of seasonal change in phytoplankton standing crop was similar to that of previous years (1974-1977). Annual mean chlorophyll a levels in 1977 and 1978 (8.3, 11.5 $mg/m^3$) were similar to pre-operational norms (range 8.3-11.4).

PHYTOPLANKTON PRODUCTIVITY

Data on photosynthetic rate (gross production, net production, and respiration), chlorophyll a concentration, water temperature, and Secchi disc reading at stations PP05 and PP07 are included in Tables 3.1.1-4 and 3.1.1-5.

High levels of turbidity (Secchi disc readings of 8-16 inches) indicated low light penetration. Gross and net productivity levels were highest near the surface where light penetration was greatest. Levels decreased with depth and were negligible at 1.0 and 2.0 meters. In March and November surface levels were also negligible. Surface net photosynthetic rate at Station PP05 and Station PP07 was similar except in May when values were higher at Station PP05 (47 $mgC/m^3/hr$) than at Station PP07 (0) (Fig. 3.1.1-6). The production rate was highest (112 $mgC/m^3/hr$) in July and lowest (-28 to 28) in March and November.

A rapid decrease with depth of gross and net productivity levels was also typical in previous years (1974-1977). Maximum levels of net productivity have always occurred near the surface in the summer. In 1977 and 1978 these levels (range 112-164 $mgC/m^3/hr$) were within pre-operational norms (range 110-246); winter levels were negligible in all years.

## PHYTOPLANKTON COMPOSITION AND DENSITY

Sixty-five genera representing five divisions were identified in 102 samples taken from March through December at stations PP05, PP06, and PP07 on the transect immediately west of Salem (Table 3.1.1-6). These included 31 genera of diatoms (Bacillariophyta), 23 genera of green algae (Chlorophyta), 5 genera of blue-green algae (Cyanophyta), 3 genera of euglenoids (Euglenophyta), and 3 genera of dinoflagellates (Pyrrophyta).

Phytoplankton fluctuated seasonally in abundance and composition. The lowest densities measured were on April 7 (mean 1,648 cells/ml; range 1,394-1,856); common taxa included the diatoms (86.6 percent of the phytoplankton community), particularly Skeletonema costatum, phytoflagelates (7.3 percent) and green algae (4.7 percent) (Tables 3.1.1-7, 3.1.1-8). The highest densities measured were on May 25 (mean 13,953 cells/ml; range 11,722-17,050); common taxa included the diatoms (84.1 percent of the phytoplankton community), particularly S. costatum and the genus Melosira, phyto-flagellates (6.7 percent), and green algae (7.9 percent).

The diatoms were most abundant; they comprised 30.1 to 87.7 percent of the phytoplankton community, with a mean annual density of 6,060 cells/ml. Seasonal distribution of diatoms was similar to that of total abundance (Fig. 3.1.1-7). Mean diatom density decreased sharply from late March (8,939 cells/ml) to early April (1,427), increased in late April (5,994), and was highest in late May (11,738). Mean density from June through November fluctuated between 3,836 and 9,522 cells/ml and was lowest in December (800).

S. costatum, a diatom that inhabits brackish and marine waters, was the most abundant phytoplankton species. It comprised 3.8 to 82.7 percent of the phytoplankton community (Table 3.1.1-8, Fig. 3.1.1-8), with a mean annual density of 5,442 cells/ml. A number of genera, particularly Melosira, Cyclotella, Navicula, Nitzschia, Synedra, and Coscinodiscus, also occurred throughout the year (Table 3.1.1-6). They were less numerous than S. costatum, except in December when Melosira, Chaetoceros, and Asterionella formosa, were each more abundant (6.7, 5.7, and 4.4 percent of the phytoplankton community, respectively). Genera such as Asterionella and Chaetoceros, occurred seasonally.

Phyto-flagellates comprised 6.7 to 46.8 percent of the phytoplankton community with a mean annual density of 799 cells/ml. They were most abundant in late March, September, October, and December.

The green algae comprised 1.5 to 16.4 percent of the phytoplankton community with a mean annual density of 431 cells/ml. Abundance was high in May, June, and late October. Ankistrodesmus falcatus was generally the most abundant species from May through December. Other taxa, particularly the genera Chlamydomonas, Chlorella, Crucigenia, and Scenedesmus, were present throughout the year.

The blue-green algae comprised 0.1 to 3.4 percent of the phytoplankton community with a mean annual density of 65 cells/ml. Oscillatoria and Anacystis were the most common genera.

Euglenoids and dinoflagellates comprised only 0.0 to 3.3 percent of the phytoplankton community. For the two divisions combined the mean annual density was 33 cells/ml.

The pattern of seasonal change in phytoplankton composition and abundance was similar to that of previous years (1974-1977). Mean annual density in 1978 was higher (ca. 7,400 cells/ml) than in the pre-operational years (ca. range 3,500-6,400; peak seasonal density (mean 14,000 cells/ml) was within pre-operational norms (ca. range 7,300-14,700). Diatoms, particularly S. costatum, were most abundant in all years.

TABLE 3.1.1-1
**PHYTOPLANKTON SAMPLING STATIONS.**

| Station | Description |
|---|---|
| PP01 | Between the mouth of the Chesapeake and Delaware Canal and bell buoy "RB" (ca. 0.1 km west of the mouth of the Chesapeake and Delaware Canal). |
| PP02 | Between buoy N "B" and the northern tip of Artificial Island (ca. 0.5 km north of Artificial Island). |
| PP03 | Approximately 15 m west of buoy N "A" (ca. 1.0 km west of Artificial Island). |
| PP04 | Between buoy C "IR" and Reedy Island Dike. |
| PP05 | Approximately 15 m west of Salem and the mouth of Sunken Ship Cove. |
| PP06 | Between buoys R "2B" and R "4B" (ca. 1.3 km west of Artificial Island). |
| PP07 | Between Appoquinimink light and buoy "1B" (ca. 0.3 km from the Delaware shore). |
| PP08 | 15 m west of Hope Creek Jetty. |
| PP10 | 1.0 km NE of Liston Point. |
| PP11 | Approximately 1.3 km west of the New Jersey shore from a point just north of the mouth of Mad Horse Creek. |

IA SALEM PP 1978

TABLE 3.1.1-2
QUALITY CONTROL SAMPLE
CHLOROPHYLL A AND PHAEO-PIGMENTS

| Aliquot No. | Chlorophyll a ($mg/m^3$) | Phaeo-pigments ($mg/m^3$) |
|---|---|---|
| 1 | 5.31 | 3.77 |
| 2 | 6.09 | 2.83 |
| 3 | 5.69 | 3.13 |
| 4 | 5.98 | 3.97 |
| Reference values: | 6.09 ± 1.1 | 4.17 ± 1.4 |

TABLE 3.1.1-3
UNITS USED IN COUNTING ALGAL GENERA

| Genus | Unit |
|---|---|
| CHLOROPHYTA | |
| Actinastrum | Colony |
| Ankistrodesmus | Colony or cell |
| Botryococcus | Colony |
| Crucigenia | Colony |
| Dictyosphaerium | Colony |
| Franceia | Colony or cell |
| Gonium | Colony |
| Kirchneriella | Colony |
| Lagerheimia | Colony or cell |
| Micractinium | Colony |
| Pediastrum | Colony |
| Quadrigula | Colony |
| Scenedesmus | Colony |
| Selenastrum | Colony |
| Ulothrix | 100 u filament |
| CYANOPHYTA | |
| Agmenellum | Colony |
| Anabaena | 100 u filament |
| Anacystis | Colony |
| Gomphosphaeria | Colony |
| Oscillatoria | 100 u filament |

TABLE 3.1.1-4

SUMMARY BY MONTH OF PRIMARY PRODUCTION AND CHLOROPHYLL A - STATION PP05.

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE | | 03/15/78 | 05/11/78 | 07/18/78 | 09/21/78 | 11/14/78 |
| TIDE | | EBB 2 | EBB 2 | EBB SLACK | EBB 2 | FLOOD 2 |
| SAL. (PPT) | SURFACE | 4.0 | 6.0 | 8.0 | 6.0 | 10.0 |
| | BOTTOM | | | | | |
| TEMP.(C) | SURFACE | 3.1 | 13.4 | 24.2 | 24.5 | 9.0 |
| | BOTTOM | | | | | |
| | AIR | 8.0 | 14.0 | 26.5 | 22.0 | 16.0 |
| OXYGEN (PPM) | SURFACE | 12.4 | 9.0 | 5.7 | 7.2 | 10.6 |
| | BOTTOM | | | | | |
| SECCHI (INCHES) | | 10 | 10 | 14 | 14 | 13 |
| | | | SURFACE | | | |
| GROSS PHOTOSYNTHESIS | (MG/M3/HR) | 9.3 | 75.0 | 159.3 | 79.6 | 9.3- |
| NET PHOTOSYNTHESIS | (MG/M3/HR) | 2.8 | 46.8 | 112.5 | 75.0 | 28.1- |
| RESPIRATION | (MG/M3/HR) | 6.5 | 28.1 | 46.8 | 4.6 | 18.7 |
| CHLOROPHYLL-A | (MG/M3) | 7.0 | 10.3 | 11.5 | 5.8 | 5.7 |
| | | | 1/2-METER | | | |
| GROSS PHOTOSYNTHESIS | (MG/M3/HR) | 4.6 | 18.7 | 56.2 | 51.5 | 23.4 |
| NET PHOTOSYNTHESIS | (MG/M3/HR) | 4.6 | 32.8 | 9.3 | 51.5 | 4.6 |
| RESPIRATION | (MG/M3/HR) | .0 | 14.0- | 46.8 | .0 | 18.7 |
| CHLOROPHYLL-A | (MG/M3) | 6.1 | 9.9 | 9.4 | 5.6 | 5.3 |
| | | | 1-METER | | | |
| GROSS PHOTOSYNTHESIS | (MG/M3/HR) | .0 | 4.6 | 51.5 | 9.3 | 32.8- |
| NET PHOTOSYNTHESIS | (MG/M3/HR) | 4.6- | 14.0 | 4.6- | 9.3 | 23.4- |
| RESPIRATION | (MG/M3/HR) | 4.6 | 9.3- | 56.2 | .0 | 9.3- |
| CHLOROPHYLL-A | (MG/M3) | 5.7 | 16.5 | 12.3 | 3.8 | 6.1 |
| | | | 2-METER | | | |
| GROSS PHOTOSYNTHESIS | (MG/M3/HR) | 9.3 | 4.6 | 60.9 | 4.6 | 4.6- |
| NET PHOTOSYNTHESIS | (MG/M3/HR) | 14.0 | 9.3 | 4.6- | 4.6 | 14.0- |
| RESPIRATION | (MG/M3/HR) | 4.6- | 4.6- | 65.6 | .0 | 9.3 |
| CHLOROPHYLL-A | (MG/M3) | 6.1 | 18.1 | 12.7 | 3.5 | 5.7 |

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TABLE 3.1.1-5

SUMMARY BY MONTH OF PRIMARY PRODUCTION AND CHLOROPHYLL A - STATION PP07.

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE | | 03/15/78 | 05/11/78 | 07/18/78 | 09/21/78 | 11/14/78 |
| TIDE | | EBB 2 | EBB 2 | EBB SLACK | EBB 2 | FLOOD 2 |
| SAL. (PPT) | SURFACE | 4.0 | 7.0 | 6.0 | 6.0 | 9.0 |
| | BOTTOM | | | | | |
| TEMP.(C) | SURFACE | 3.2 | 12.9 | 24.4 | 24.1 | 9.2 |
| | BOTTOM | | | | | |
| | AIR | 9.0 | 14.5 | 27.0 | 23.0 | 17.0 |
| OXYGEN (PPM) | SURFACE | 12.8 | 9.0 | 6.1 | 7.3 | 10.4 |
| | BOTTOM | | | | | |
| SECCHI (INCHES) | | 8 | 10 | 16 | 10 | 14 |
| | | | SURFACE | | | |
| GROSS PHOTOSYNTHESIS | (MG/M3/HR) | 7.5 | 4.6 | 107.8 | 65.6 | 37.5 |
| NET PHOTOSYNTHESIS | (MG/M3/HR) | 9.3 | .0 | 103.1 | 65.6 | 28.1 |
| RESPIRATION | (MG/M3/HR) | 1.8- | 4.6 | 4.6 | .0 | 9.3 |
| CHLOROPHYLL-A | (MG/M3) | 5.7 | 11.9 | 9.9 | 5.8 | 8.6 |
| | | | 1/2-METER | | | |
| GROSS PHOTOSYNTHESIS | (MG/M3/HR) | 11.2- | 4.6 | 56.2 | 51.5 | 9.3 |
| NET PHOTOSYNTHESIS | (MG/M3/HR) | 9.3- | 18.7 | 42.1 | 51.5 | 9.3 |
| RESPIRATION | (MG/M3/HR) | 1.8- | 14.0- | 14.0 | .0 | .0 |
| CHLOROPHYLL-A | (MG/M3) | 4.9 | 14.4 | 5.3 | 6.1 | 9.9 |
| | | | 1-METER | | | |
| GROSS PHOTOSYNTHESIS | (MG/M3/HR) | 6.5 | 18.7 | 18.7 | 4.6 | 28.1- |
| NET PHOTOSYNTHESIS | (MG/M3/HR) | 6.5 | 37.5 | 9.3 | 4.6 | .0 |
| RESPIRATION | (MG/M3/HR) | .0 | 18.7- | 9.3 | .0 | 28.1- |
| CHLOROPHYLL-A | (MG/M3) | 4.9 | 13.2 | 10.7 | 5.8 | 9.4 |
| | | | 2-METER | | | |
| GROSS PHOTOSYNTHESIS | (MG/M3/HR) | 14.0 | 4.6- | .0 | 4.6 | 9.3- |
| NET PHOTOSYNTHESIS | (MG/M3/HR) | 7.5 | 9.3 | 18.7- | .0 | 4.6- |
| RESPIRATION | (MG/M3/HR) | 6.5 | 14.0- | 18.7 | 4.6 | 4.6- |
| CHLOROPHYLL-A | (MG/M3) | 5.3 | 15.6 | 9.9 | 7.3 | 10.3 |

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TABLE 3.1.1-6
PHYTOPLANKTON TAXA AND THEIR OCCURRENCE-
STATIONS PP05, PP06, and PP07.

| Month | March | April | | May | | June | | July | | August | | September | | October | | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day | 23 | 7 | 21 | 10 | 25 | 7 | 19 | 7 | 25 | 11 | 22 | 12 | 26 | 10 | 24 | 6 | 19 |
| CHLOROPHYTA | | | | | | | | | | | | | | | | | |
| Actinastrum hantzschia | - | X | X | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ankistrodesmus falcatus | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Botryococcus | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X | - | - |
| Chlamydomonas | X | X | X | X | X | X | X | X | X | X | X | X | - | - | X | - | - |
| Chlorella | - | X | X | X | X | X | X | X | X | X | - | X | X | X | - | - | X |
| Crucigenia | - | X | X | - | X | - | X | X | - | X | - | X | X | X | X | - | X |
| Dictyosphaerium pulchellum | - | - | - | - | X | - | - | X | - | X | - | X | - | - | - | - | X |
| Franceia | - | - | - | - | - | - | - | - | - | - | X | - | X | - | - | X | - |
| Golenkinia | - | X | - | - | X | - | - | - | X | - | - | - | - | - | - | - | - |
| G. radiata | - | - | - | - | - | - | - | - | - | X | X | - | - | - | - | - | - |
| Gonium | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X |
| Kirchneriella | - | - | - | - | - | - | - | - | X | - | - | - | - | - | - | - | - |
| Lagerheimia | - | - | - | - | - | - | - | - | - | - | - | X | - | - | X | X | X |
| Micractinium | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X |
| M. pusillum | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | - | X |
| Oocystis | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X | - |
| Pediastrum | X | - | X | - | - | - | - | X | - | X | - | - | - | - | - | - | X |
| P. boryanum | - | X | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| P. duplex | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | - | - |
| Quadrigula lacustris | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | - | - |
| Scenedesmus | X | - | X | X | - | - | X | - | - | - | X | X | - | X | X | X | X |
| S. abundans | - | - | - | X | X | X | X | X | X | - | X | - | - | - | - | - | - |
| S. acuminatus | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | - | - |
| S. bijuga | - | - | - | - | - | - | - | - | - | X | X | - | - | - | - | - | - |
| S. dimorphus | - | - | - | - | X | - | - | - | - | - | X | - | - | - | - | - | X |
| S. quadricauda | - | X | X | X | X | X | X | X | X | X | X | - | X | X | X | X | X |
| Schroederia | - | - | - | - | - | - | - | - | - | X | - | - | - | - | - | - | - |
| Selenastrum | - | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | - |
| Tetraedron | - | X | - | - | - | X | - | X | - | - | X | - | - | - | - | - | - |
| Tetrastrum elegans | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X | - | X |
| Treubaria setigerum | - | - | - | - | - | - | - | - | - | X | - | - | - | - | - | - | - |
| Ulothrix | - | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | - |
| Unidentified colonies | - | X | - | X | - | - | X | - | - | X | X | - | X | - | X | - | X |
| Unidentified filaments | - | X | X | - | X | - | - | X | - | X | - | - | - | - | - | X | - |
| EUGLENOPHYTA | | | | | | | | | | | | | | | | | |
| Euglena | X | X | X | X | X | X | - | X | X | X | X | X | X | X | - | - | - |
| Phacus | X | X | - | X | X | X | - | X | X | - | X | - | - | - | - | - | - |
| Trachelomonas | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X | - |
| BACILLARIOPHYTA | | | | | | | | | | | | | | | | | |
| Centric | | | | | | | | | | | | | | | | | |
| Biddulphia | - | - | X | - | X | X | - | - | - | - | - | - | - | - | X | X | - |
| Chaetoceros | - | - | - | - | - | - | X | - | X | X | X | X | X | X | X | X | X |
| Corethron | - | - | - | - | - | - | - | - | - | - | - | - | X | - | - | - | - |
| Coscinodiscus | X | X | X | X | X | X | X | X | X | X | X | X | X | X | - | X | X |
| Cyclotella | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Melosira | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| M. granulata | - | X | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Rhizosolenia | - | - | - | - | - | - | - | X | X | - | X | - | - | - | - | - | X |
| Skeletonema costatum | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Stephanodiscus | - | - | - | X | - | - | - | - | - | - | - | - | - | - | X | - | X |
| Thalassiosira | X | X | - | - | - | - | - | - | - | - | - | - | - | X | X | X | - |

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TABLE 3.1.1-6
CONTINUED

| Month / Day | March 23 | April 7 | April 21 | May 10 | May 25 | June 7 | June 19 | July 7 | July 25 | August 11 | August 22 | September 12 | September 26 | October 10 | October 24 | November 6 | December 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pennate | | | | | | | | | | | | | | | | | |
| Amphiprora | - | - | - | - | - | - | - | - | X | - | - | - | - | - | - | - | - |
| Amphora | - | - | - | - | - | - | X | - | X | - | - | - | - | - | - | - | - |
| Asterionella formosa | X | X | - | X | X | X | - | - | X | - | - | - | - | - | - | - | X |
| A. japonica | X | X | X | - | - | - | - | - | - | - | - | - | - | - | - | X | - |
| Cocconeis | - | - | - | X | - | - | - | - | X | - | - | - | - | - | X | - | - |
| Cymbella | X | X | - | - | - | - | - | - | X | - | - | - | - | - | - | - | X |
| Diatoma | - | - | X | - | - | X | - | - | - | - | - | X | - | - | - | - | - |
| Diploneis | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X |
| Fragilaria | X | - | X | - | X | - | - | - | - | - | X | - | - | - | - | - | - |
| Frustulia | X | - | - | X | - | - | - | - | - | X | X | X | - | X | X | - | X |
| Gyrosigma | X | X | X | - | - | - | - | - | - | - | - | - | X | X | X | X | X |
| Hantzschia | - | X | - | X | X | - | - | - | - | - | - | - | - | - | X | X | - |
| Meridion | - | X | - | - | - | X | - | - | - | X | - | - | - | - | - | - | - |
| Navicula | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Nitzschia | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Pinnularia | - | - | - | X | - | X | X | X | X | - | - | - | - | - | - | - | - |
| Pleurosigma | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | - | - |
| Rhaphoneis | X | - | - | X | X | X | X | X | X | - | X | - | - | - | - | - | - |
| Rhoicosphenia | X | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | X |
| R. curvata | - | - | - | - | - | - | - | - | - | - | X | - | X | - | - | - | - |
| Surirella | - | X | X | X | X | X | - | - | X | - | - | - | - | - | - | - | - |
| Synedra | - | - | X | X | X | X | X | X | X | - | X | X | X | - | X | X | X |
| Thalassionema | X | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PYRROPHYTA | | | | | | | | | | | | | | | | | |
| Gymnodinium | - | - | - | - | - | X | - | - | X | X | X | - | X | X | X | X | X |
| Gyrodinium | - | - | - | - | X | - | - | - | - | - | - | X | - | - | - | X | X |
| Peridinium | - | - | - | - | - | - | - | X | - | - | - | - | - | X | X | - | - |
| CYANOPHYTA | | | | | | | | | | | | | | | | | |
| Agmenellum | - | - | - | X | - | - | X | - | - | - | - | - | - | - | - | - | - |
| Anabaena | - | - | - | - | - | - | - | X | - | - | - | - | - | - | - | - | - |
| Anacystis | - | - | - | - | - | - | - | - | - | X | X | X | X | X | X | X | X |
| Gomphosphaeria | - | - | - | - | - | - | X | X | X | - | - | - | - | - | - | - | - |
| Oscillatoria | - | - | - | X | X | X | X | - | - | X | X | X | - | - | X | X | X |
| Unidentified colonies | - | X | - | - | - | X | X | - | X | - | - | X | - | - | X | X | X |
| Unidentified filaments | X | X | X | X | X | X | X | X | X | X | X | X | X | X | - | X | X |

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TABLE 3.1.1-7

MEAN DENSITY AND PERCENT COMPOSITION OF PHYTOPLANKTON BY DIVISION - STATIONS PP05, PP06, AND PP07.

(NUMBERS / ML)

| DATE | 03/23/78 | | 04/07/78 | | 04/21/78 | | 05/10/78 | | 05/25/78 | |
|---|---|---|---|---|---|---|---|---|---|---|
| TAXONOMIC GROUP | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. |
| CYANOPHYTA | 72.0 | .7 | 14.9 | .9 | 10.1 | .1 | 23.1 | .4 | 87.7 | .6 |
| CHLOROPHYTA | 156.0 | 1.5 | 77.1 | 4.7 | 210.8 | 3.1 | 625.6 | 10.2 | 1,097.9 | 7.9 |
| EUGLENOPHYTA | 32.0 | .3 | 9.6 | .6 | 11.5 | .2 | 20.5 | .3 | 68.3 | .5 |
| BACILLARIOPHYTA | 8,938.7 | 85.8 | 1,426.7 | 86.6 | 5,993.6 | 86.9 | 4,903.2 | 80.2 | 11,738.4 | 84.1 |
| PYRROPHYTA | | | | | | | | | 19.7 | .1 |
| PHYTO-FLAGELLATES | 1,217.3 | 11.7 | 120.0 | 7.3 | 674.9 | 9.8 | 544.8 | 8.9 | 941.1 | 6.7 |
| TOTAL ABUNDANCE | 10,416.0 | | 1,648.3 | | 6,900.9 | | 6,117.2 | | 13,953.1 | |

| DATE | 06/07/78 | | 06/19/78 | | 07/07/78 | | 07/25/78 | | 08/11/78 | |
|---|---|---|---|---|---|---|---|---|---|---|
| TAXONOMIC GROUP | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. |
| CYANOPHYTA | 89.7 | .8 | 72.1 | .9 | 116.3 | 2.3 | 97.6 | 1.0 | 92.9 | 1.5 |
| CHLOROPHYTA | 593.3 | 5.4 | 681.5 | 8.6 | 400.9 | 8.0 | 307.9 | 3.2 | 427.9 | 7.0 |
| EUGLENOPHYTA | 18.9 | .2 | | | 32.3 | .6 | 17.7 | .2 | 3.6 | .1 |
| BACILLARIOPHYTA | 9,522.1 | 86.7 | 6,464.9 | 81.4 | 3,953.3 | 78.9 | 8,469.3 | 87.0 | 4,795.5 | 79.0 |
| PYRROPHYTA | 5.3 | | | | 6.9 | .1 | 4.8 | | 18.8 | .3 |
| PHYTO-FLAGELLATES | 759.1 | 6.9 | 725.2 | 9.1 | 498.9 | 10.0 | 841.1 | 8.6 | 735.1 | 12.1 |
| TOTAL ABUNDANCE | 10,988.4 | | 7,943.7 | | 5,008.6 | | 9,738.4 | | 6,071.8 | |

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TABLE 3.1.1-7
CONTINUED

| DATE | 08/22/78 | | 09/12/78 | | 09/26/78 | | 10/10/78 | | 10/24/78 | |
|---|---|---|---|---|---|---|---|---|---|---|
| TAXONOMIC GROUP | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. |
| CYANOPHYTA | 81.1 | .9 | 53.5 | 1.2 | 68.1 | .8 | 26.7 | .3 | 31.0 | .5 |
| CHLOROPHYTA | 374.5 | 4.1 | 259.0 | 5.6 | 288.3 | 3.5 | 378.0 | 3.6 | 680.1 | 10.8 |
| EUGLENOPHYTA | 9.3 | .1 | 5.6 | .1 | 29.2 | .4 | 5.6 | .1 | | |
| BACILLARIOPHYTA | 7,863.7 | 85.5 | 3,835.9 | 82.5 | 6,645.5 | 81.5 | 9,259.9 | 87.7 | 4,405.9 | 69.8 |
| PYRROPHYTA | 9.7 | .1 | 5.6 | .1 | 11.1 | .1 | 17.1 | .2 | 78.7 | 1.2 |
| PHYTO-FLAGELLATES | 858.9 | 9.3 | 490.9 | 10.6 | 1,106.9 | 13.6 | 877.2 | 8.3 | 1,118.6 | 17.7 |
| TOTAL ABUNDANCE | 9,197.2 | | 4,650.5 | | 8,149.1 | | 10,564.5 | | 6,314.3 | |

| DATE | 11/06/78 | | 12/19/78 | | Annual | |
|---|---|---|---|---|---|---|
| TAXONOMIC GROUP | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. | MEAN DENSITY | PERCENT COMP. |
| CYANOPHYTA | 78.7 | 1.5 | 90.5 | 3.4 | 65.1 | 0.9 |
| CHLOROPHYTA | 324.5 | 6.2 | 435.0 | 16.4 | 430.5 | 5.9 |
| EUGLENOPHYTA | 9.3 | .2 | | | 16.1 | 0.2 |
| BACILLARIOPHYTA | 4,004.9 | 76.2 | 800.2 | 30.1 | 6060.0 | 82.0 |
| PYRROPHYTA | 14.7 | .3 | 88.5 | 3.3 | 16.4 | 0.2 |
| PHYTO-FLAGELLATES | 825.6 | 15.7 | 1,245.4 | 46.8 | 798.9 | 10.8 |
| TOTAL ABUNDANCE | 5,257.7 | | 2,659.6 | | 7387.0 | |

TABLE 3.1.1-8
PERCENT COMPOSITION OF PHYTOPLANKTON TAXA WHICH COMPRISED MORE THAN ONE PERCENT
OF THE MEAN DENSITY - STATIONS PP05, PP06, AND PP07

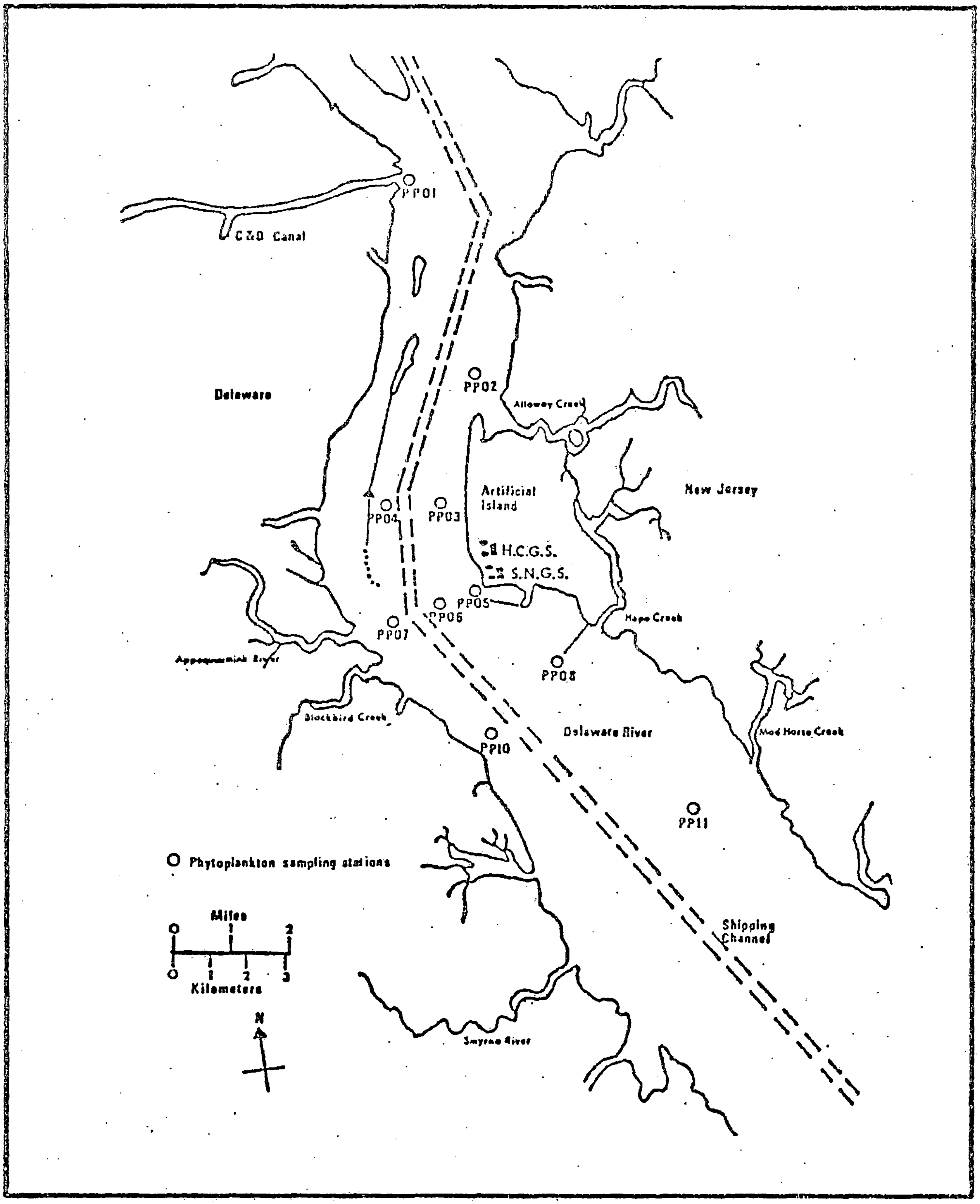
| DATE / TAXONOMIC GROUP | 03/23/78 | 04/07/78 | 04/21/78 | 05/10/78 | 05/25/78 | 06/07/78 | 06/19/78 | 07/07/78 |
|---|---|---|---|---|---|---|---|---|
| *CYANOPHYTA | | | | | | | | |
| UNID. FILAMENTS | | | | | | | | 1.9 |
| *CHLOROPHYTA | | | | | | | | |
| UNID. FILAMENTS | | | | | 2.2 | | | |
| ULOTHRIX | | | | | | 1.8 | | |
| CHLORELLA | | | | | | | 1.1 | |
| A. FALCATUS | | | | 7.8 | 3.1 | 1.8 | 4.6 | 2.6 |
| S. QUADRICAUDA | | 1.0 | | | | | | 1.8 |
| CHLAMYDOMONAS | | 1.2 | | 1.0 | | | | 1.1 |
| *EUGLENOPHYTA | | | | | | | | |
| *BACILLARIOPHYTA | | | | | | | | |
| COSCINODISCUS | | | | | | | | 1.1 |
| CYCLOTELLA | 1.0 | 1.9 | | 1.4 | | | 1.0 | 2.2 |
| MELOSIRA | 1.7 | 1.0 | 1.3 | 1.4 | 5.0 | 1.0 | | |
| S. COSTATUM | 69.8 | 72.7 | 82.0 | 74.0 | 73.3 | 82.0 | 77.1 | 72.5 |
| THALASSIOSIRA | 4.5 | 1.7 | | | | | | |
| A. FORMOSA | 1.0 | 2.2 | | | | | | |
| A. JAPONICA | 4.9 | 2.3 | | | | | | |
| NAVICULA | | 1.6 | | 1.1 | 1.1 | | | 1.3 |

TABLE 3.1.1-8
CONTINUED

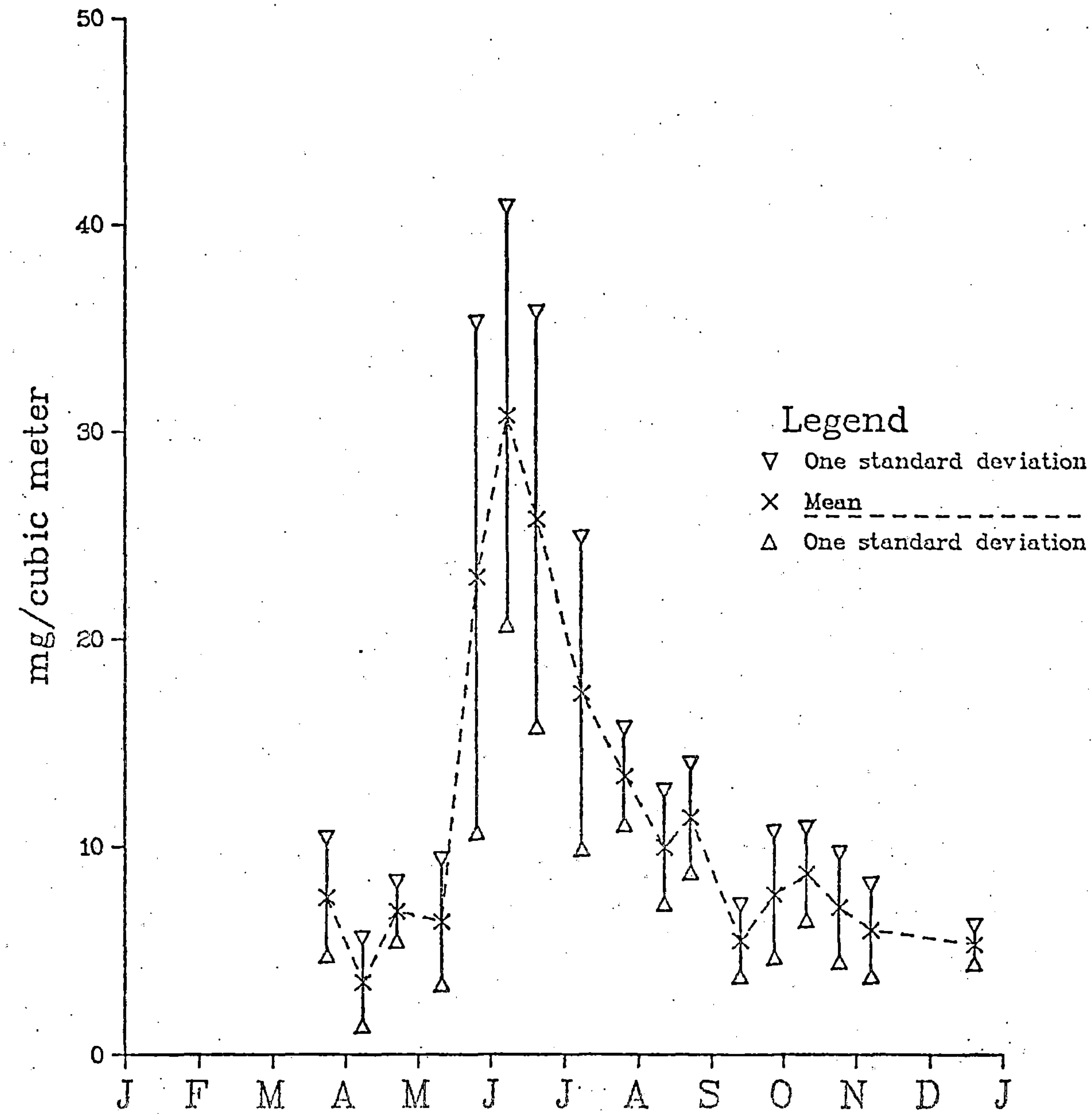
| DATE | 07/25/78 | 08/11/78 | 08/22/78 | 09/12/78 | 09/26/78 | 10/10/78 | 10/24/78 | 11/06/78 |
|---|---|---|---|---|---|---|---|---|
| TAXONOMIC GROUP | | | | | | | | |
| *CYANOPHYTA | | | | | | | | |
| *CHLOROPHYTA | | | | | | | | |
| A. FALCATUS | 2.5 | 4.4 | 2.5 | 4.4 | 2.9 | 3.2 | 9.3 | 5.0 |
| S. QUADRICAUDA | | 1.3 | | | | | | |
| *EUGLENOPHYTA | | | | | | | | |
| *BACILLARIOPHYTA | | | | | | | | |
| CYCLOTELLA | | | | 2.0 | | | | 1.3 |
| MELOSIRA | 1.5 | | | | | | 2.3 | 1.4 |
| S. COSTATUM | 81.2 | 69.4 | 79.0 | 74.8 | 76.8 | 82.7 | 57.9 | 59.2 |
| CHAETOCEROS | 1.0 | 5.8 | 3.5 | 2.7 | 2.1 | 1.2 | 3.9 | 9.3 |
| NITZSCHIA | | 1.4 | | 1.0 | | 2.1 | 2.8 | 2.8 |
| *PYRROPHYTA | | | | | | | | |
| GYMNODINIUM | | | | | | | 1.2 | |

| DATE | 12/19/78 |
|---|---|
| TAXONOMIC GROUP | |
| *CYANOPHYTA | |
| OSCILLATORIA | 2.1 |
| *CHLOROPHYTA | |
| A. FALCATUS | 8.6 |
| S. QUADRICAUDA | 2.9 |
| D. PULCHELLUM | 1.3 |
| *BACILLARIOPHYTA | |
| COSCINODISCUS | 1.6 |
| CYCLOTELLA | 2.9 |
| MELOSIRA | 6.7 |
| S. COSTATUM | 3.8 |
| CHAETOCEROS | 5.7 |
| A. FORMOSA | 4.4 |
| NITZSCHIA | 2.1 |
| *PYRROPHYTA | |
| GYRODINIUM | 3.0 |

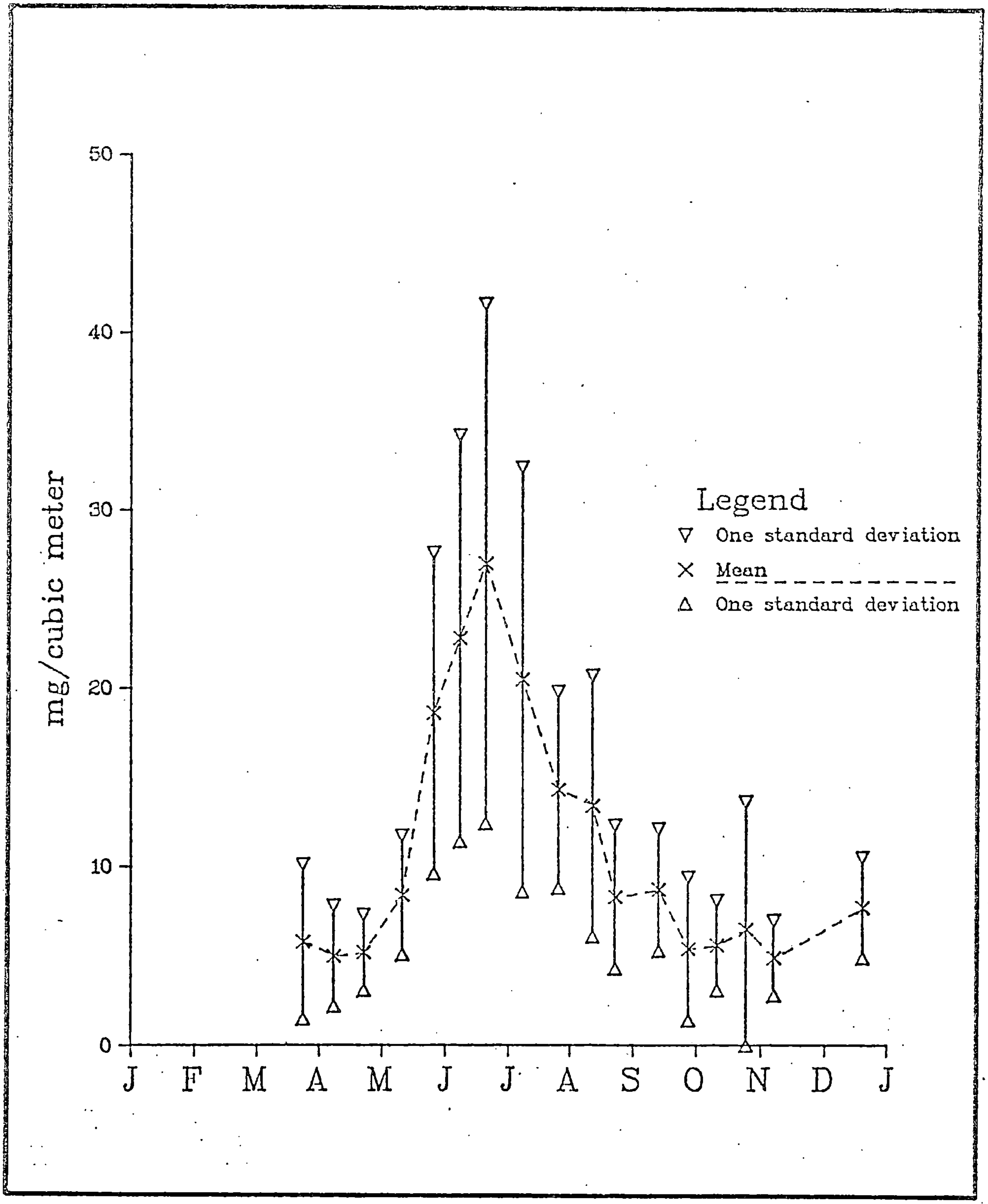
IA SALEM PP 1978



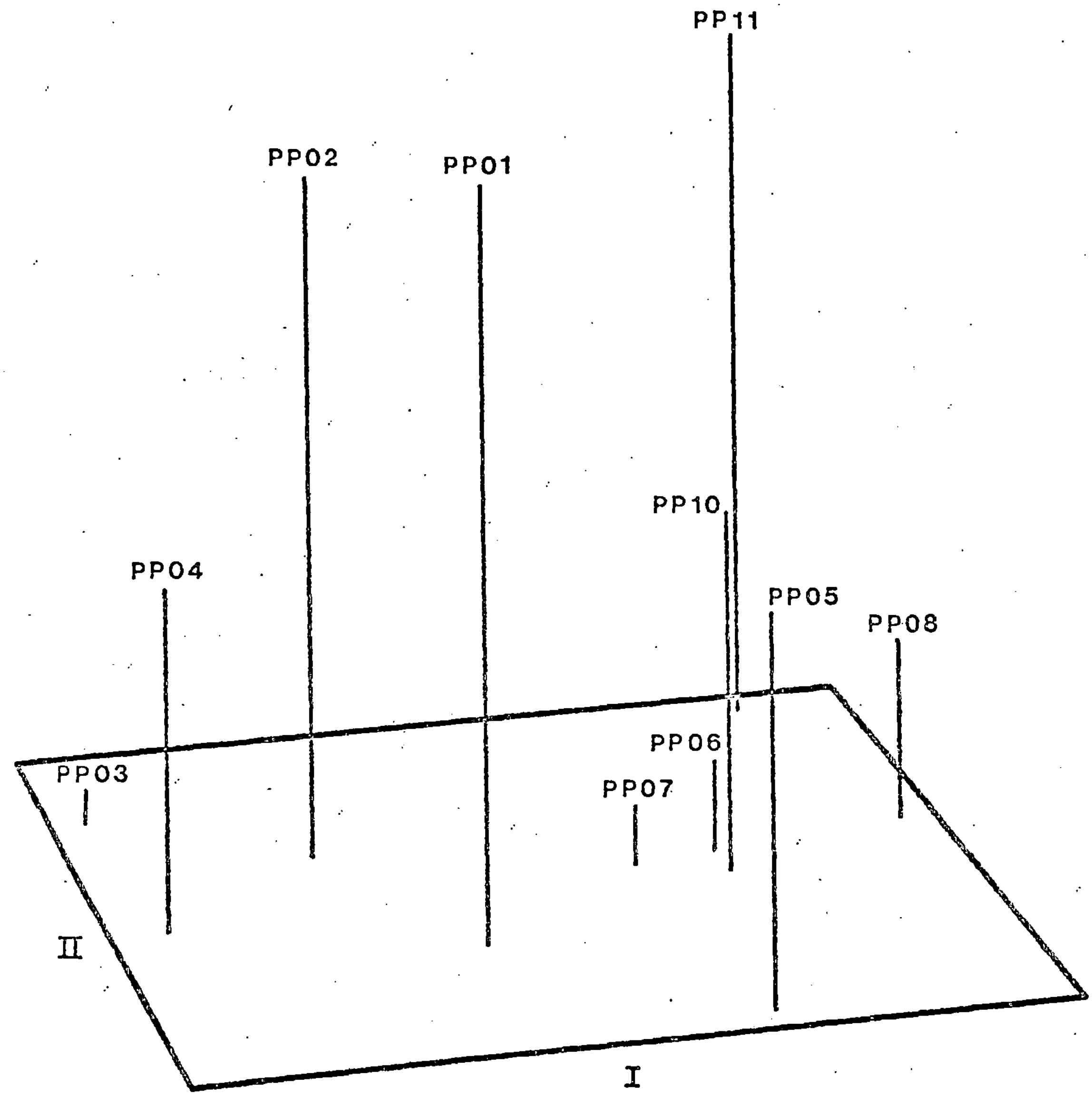

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Phytoplankton sampling stations-1978 |
| --- | --- |
| | Figure 3.1.1-1 |



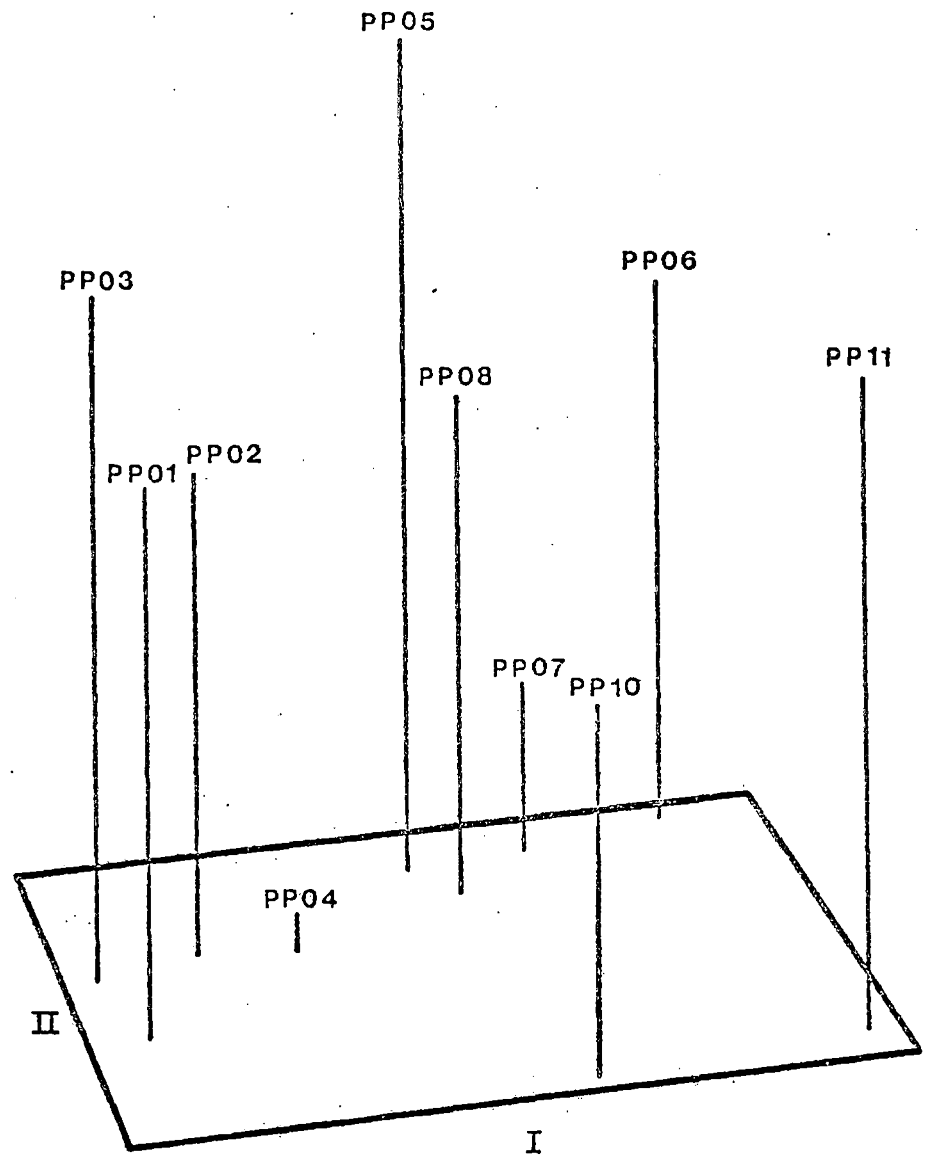

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Mean and standard deviation of chlorophyll a concentration-1978 |
|---|---|
| | Figure 3.1.1-2 |



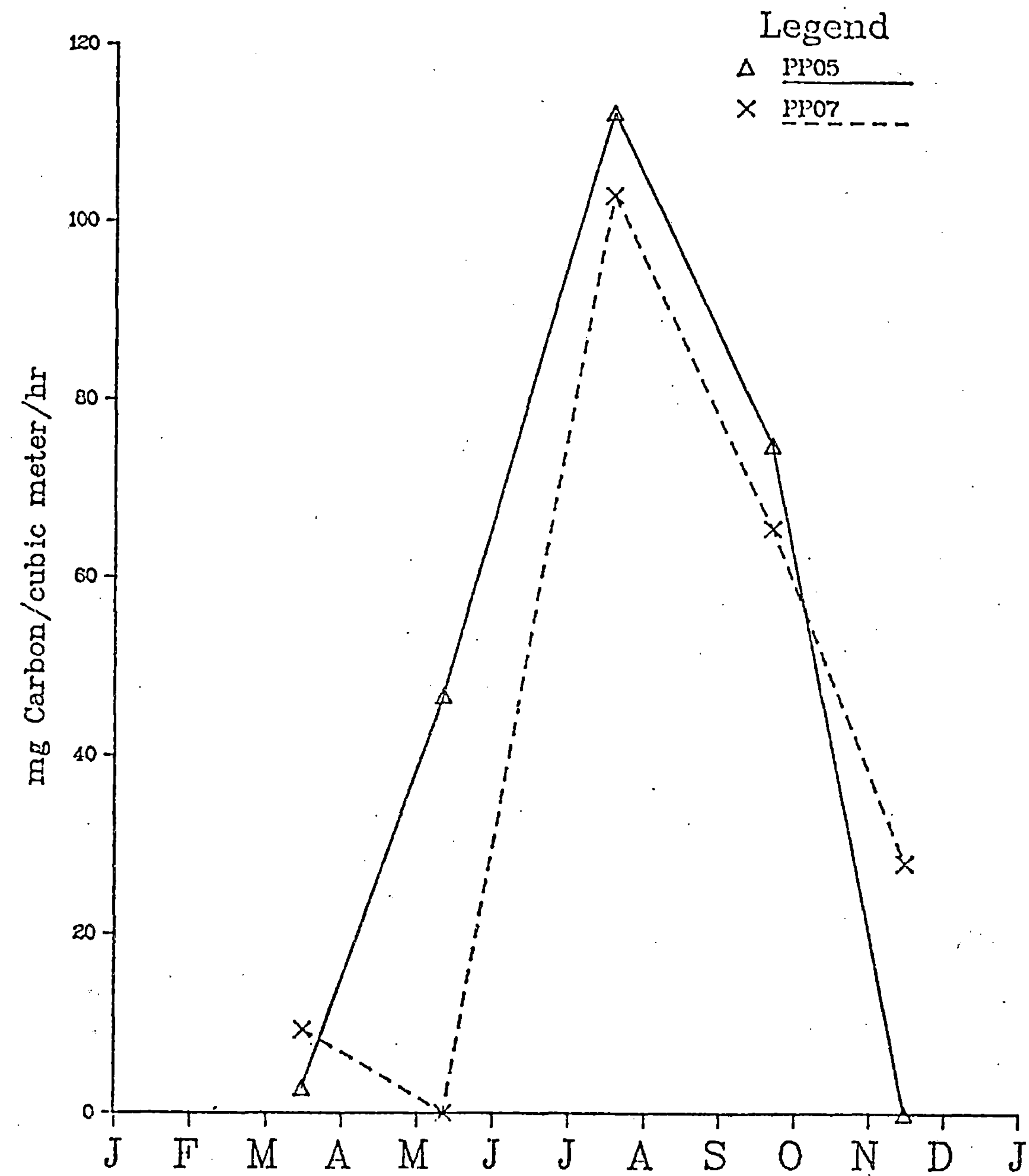

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Mean and standard deviation of phaeo-pigment concentration-1978 |
|---|---|
| | Figure 3.1.1-3 |



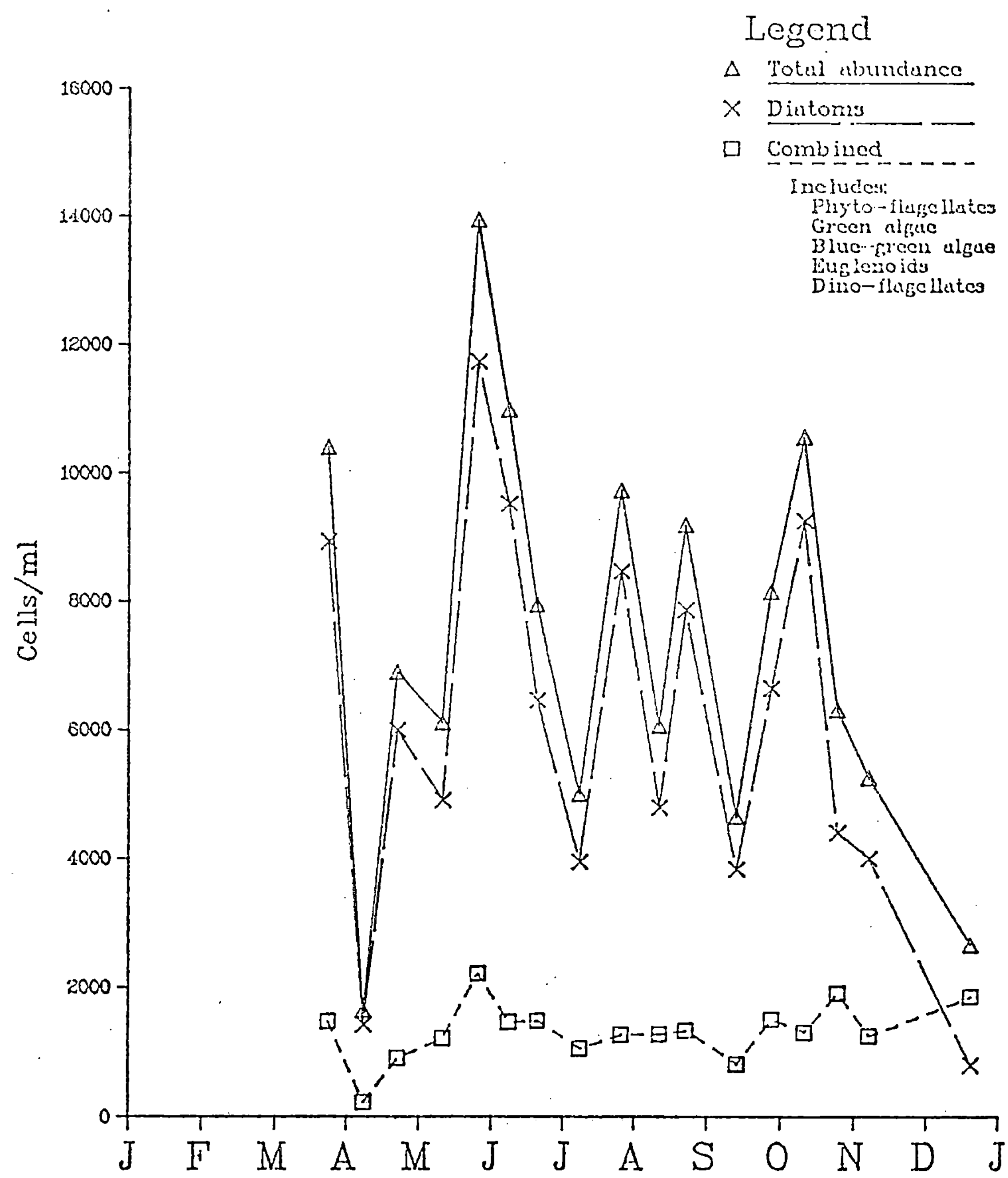

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Similarity on first three component axes based on chlorophyll a concentration-1978 |
|---|---|
| | Figure 3.1.1-4 |



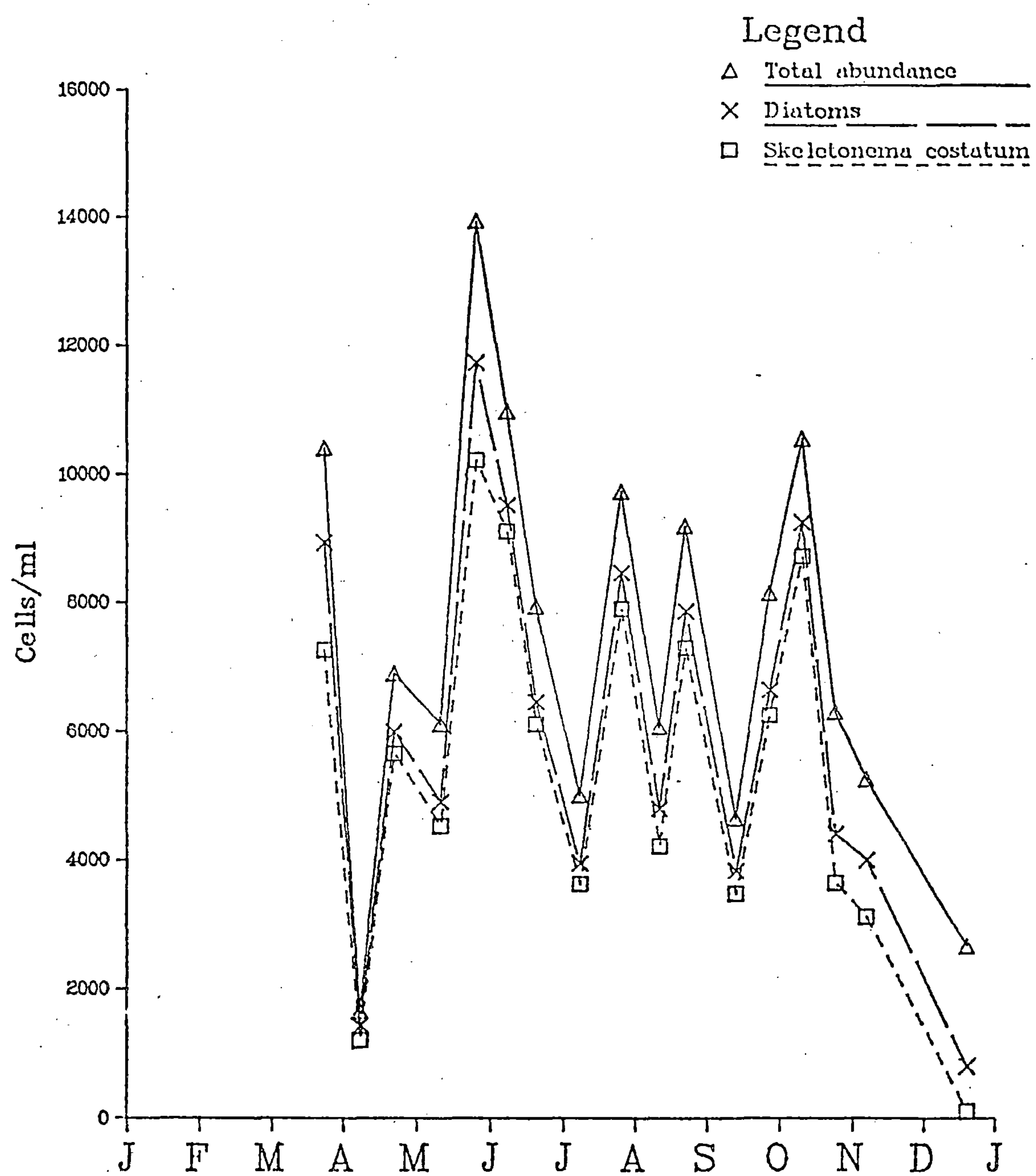

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Similarity on first three component axes based on phaeo-pigment concentration-1978 |
|---|---|
| | Figure 3.1.1-5 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Net production by phytoplankton measured in surface samples-1978 |
| --- | --- |
| | Figure 3.1.1-6 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Mean density of phytoplankton by division-stations PP05,PP06, and PP07- 1978<br>Figure 3.1.1-7 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Mean density of the diatom, Skeletonema costatum - stations PP05, PP06, and PP07-1978 |
|---|---|
| | Figure 3.1.1-8 |

### 3.1.2 Ichthyoplankton (ETS Section 3.1.2.1.lb)

Ichthyoplankton collections have been taken in the Delaware River near Artificial Island since 1971. The continuing objectives are to identify and enumerate fish eggs, larvae, and age 0+ young in the Artificial Island area and to determine seasonal and spatial distributions in the region.

#### 3.1.2.1 Summary

In 1978, 383 ichthyoplankton samples contained a total of 13,664 eggs, 48,907 larvae, and 322 young of 22 taxa. Bay anchovy (Anchoa mitchilli), weakfish (Cynoscion regalis), naked goby (Gobiosoma bosci), and silversides (Membras sp./Menidia spp.) were the most abundant species. General life history information is presented under Temporal Distribution.

Bay anchovy comprised 87.8 percent of the total catch. Eggs, larvae, or young were collected from May through November. Eggs were most abundant in late June and mid-July, larvae in mid-July, and young in late July. Density of eggs and larvae was greatest at stations south of Salem; of young it was greatest north of Salem.

Weakfish comprised 7.6 percent of the total catch. Eggs, larvae, or young occurred from mid-June through August. Eggs were collected only in mid-July, but were not abundant. Larval abundance characteristically peaked twice; once in mid-June and once in mid-July. Young were most abundant from late June through mid-July. Density of larvae was greatest at stations south of Salem; of young it was greatest north of Salem.

Naked goby comprised 3.6 percent of the total catch. Larvae or young were collected from mid-June through mid-September. Larvae were most abundant in mid-July; young were collected in mid-July and early August, but were never abundant. Density of larvae was greatest at stations south of Salem.

Silversides comprised 0.3 percent of the total catch. Eggs, larvae, or young occurred from mid-June through early August. Eggs and young were collected in mid- and late June and in late July, but were never abundant; larvae were most abundant in late July.

Catch composition and predominant taxa were similar to previous years. Annual mean density was similar to that in 1976, lower than that in 1973, 1974, and 1977, but greater than that in 1975. In 1978 atypically low salinities from May through August probably contributed to a decrease in annual mean density.

### 3.1.2.2 Materials and Methods

#### FIELD AND LABORATORY

The requirements of the Ichthyoplankton ETS were satisfied. During daylight, samples were taken at 11 stations (Table 3.1.2-1, Fig. 3.1.2-1), monthly in March through May and September through November, and semimonthly from June through August. River icing and inclement weather prevented sampling in January, February, and December. Replicate samples were taken at stations IP05 through IP07.

Samples were collected with 1/2-meter (0.5-mm mesh) plankton nets (fitted with General Oceanics digital flowmeters, Model 2030) fished simultaneously near surface and near bottom; middepth samples were taken at stations IP03, IP06, and IP09 where depth (MLW) exceeds 9.0 m (20 ft). For a complete description of gear, gear deployment, collection of physicochemical data, and laboratory procedures refer to Volume 2 of the 1977 Annual Environmental Operating Report.

#### DATA REDUCTION

For purposes of data tabulation and discussion, stations were grouped geographically as eastern (IP03, IP05, and IP08), mid-river (IP06 and IP09), and western (IP04, IP07, and IP10); and north of Salem (IP01-IP04), on the transect west of Salem (IP05-IP07), and south of Salem (IP08-IP11).

### 3.1.2.3 Results

#### GENERAL SAMPLE COMPOSITION

In 1978, 383 ichthyoplankton collections were processed including 168 surface, 47 middepth, and 168 bottom samples

(Table 3.1.2-2). A total of 29,567.0 $m^3$ of water was filtered and 13,664 eggs, 48,907 larvae, and 322 young of 22 taxa were collected. Taxa represented by more than 100 specimens, in order of decreasing abundance are: the bay anchovy, weakfish, naked goby, and the silversides. These are discussed below.

SPECIES DISCUSSION

1. Bay anchovy comprised 87.8 percent of the total catch and was represented by 55,230 specimens including 13,624 eggs, 41,414 larvae, and 192 young (Table 3.1.2-2). The annual mean density of eggs, larvae, and young was 0.461, 1.401, and 0.006/$m^3$, respectively.

Bay anchovy eggs were taken from May 17 through September 13 at water temperature of 14.7 to 28.0 C and salinity of 1.0 to 10.5 ppt. Mean density increased from less than 0.001/$m^3$ on May 17 to 2.090/$m^3$ on June 28 and 2.510/$m^3$ on July 12, then steadily decreased through the remainder of the period (Table 3.1.2-3, Fig. 3.1.2-2). Over 85 percent of the total catch of eggs was taken on June 28 and July 12. The mean density per station on June 28 and July 12 ranged to 18.196/$m^3$ at Station IP09 and to 12.862/$m^3$ at Station IP11, respectively. Maximum density per collection was 62.410/$m^3$ (June 28, Station IP09, near bottom).

Annual mean density at stations north of, on the transect west of, and south of Salem was 0.072, 0.226, and 1.091/$m^3$, respectively (Table 3.1.2-4). For eastern, mid-river, and western stations it was 0.190, 0.696, and 0.223/$m^3$, respectively (Table 3.1.2-5). Annual mean density was greatest at stations IP09 (1.810/$m^3$) and IP11 (1.568) (Table 3.1.2-6). Mean density per date for stations south of Salem and on the transect west of Salem was greater than for stations north of Salem (Table 3.1.2-3).

Annual mean density for surface, middepth, and bottom was 0.171, 0.365, and 0.845/$m^3$, respectively (Table 3.1.2-2). Over 72 percent of the total catch of eggs was taken in bottom samples.

Of the 13,624 bay anchovy eggs collected 14.0 percent were viable (Table 3.1.2-8). Viable eggs were taken from June 15 to August 31; the highest mean percent viable (33.7) occurred on June 15. At stations north of, on the transect west of, and south of Salem mean percent viable was 19.4, 15.3, and 13.2. Mean percent viable for eastern, mid-river, and western stations was 16.0, 15.0, and 9.6 percent, respectively. On June 28 and July 12, when over 76 percent of the viable eggs were collected, mean percent viable was highest (13.4 percent) at stations south of Salem. The annual mean percent viable (33.6 percent per station) was highest at Station IP06.

In surface, middepth, and bottom collections mean percent viable was 9.9, 8.6, and 15.7 percent, respectively.

Bay anchovy larvae were taken from June 15 through October 27 at water temperature of 13.8 to 28.0 C and salinity to 12.0 ppt. Mean density per date increased from 1.220/$m^3$ on June 15 to 8.331/$m^3$ on July 12 and decreased to 0.005/$m^3$ on October 26 (Table 3.1.2-3, Fig. 3.1.2-2). Over 56 percent of the total larval catch was taken on July 12. Mean density per station on this date ranged from 0.777/$m^3$ at Station IP02 to 28.818/$m^3$ at Station IP09. Maximum density per collection was 42.549/$m^3$ (July 12, Station IP09, near surface).

Annual mean density for stations north of, on the transect west of, and south of Salem was 0.438, 0.998, and 2.753/$m^3$, respectively (Table 3.1.2-4). For eastern, mid-river, and western stations it was 0.749, 1.406, and 1.886, respectively (Table 3.1.2-5). Annual mean density per station was greatest at stations IP09 (3.525/$m^3$) and IP10 (3.075) where over 43 percent of the total larval catch was taken (Table 3.1.2-6). From June 15 to July 12 mean density per date was greatest south of Salem and at mid-river stations. Subsequently, catch decreased with no discernible pattern (Tables 3.1.2-3, 3.1.2-7).

Annual mean density for surface, middepth, and bottom collections was 1.747, 0.971, and 1.107/$m^3$, respectively (Table 3.1.2-2).

Bay anchovy young were taken from June 28 through November 22 at water temperatures of 9.8 to 28.0 C and salinity of 1.0 to 11.0 ppt. Mean density per date increased from 0.002/$m^3$ on June 28 to 0.041/$m^3$ on July 27, and fluctuated at low levels through the remainder of the period (Table 3.1.2-3, Fig. 3.1.2-2). Over 42 percent of the total catch of young occurred on July 27. The mean density per station on this date ranged to 0.388/$m^3$ (Station IP01) with a maximum density per collection of 0.588/$m^3$ at Station IP01, near the surface.

Annual mean density for stations north of, on the transect west of, and south of Salem was 0.019, 0.001, and 0.001/$m^3$, respectively (Table 3.1.2-4). For eastern, mid-river, and western stations it was 0.003, 0.001, and 0.002/$m^3$, respectively (Table 3.1.2-5). The highest annual mean density per station (0.067/$m^3$) occurred at Station IP01 (Table 3.1.2-6).

Annual mean density for surface, middepth, and bottom collections was 0.011, 0.001, and 0.002/$m^3$, respectively (Table 3.1.2-2). Over 85 percent of the total catch of young was collected in surface samples.

2. Weakfish comprised 7.6 percent of the total catch and was represented by 4,796 specimens including 2 eggs, 4,709 larvae, and 85 young (Table 3.1.2-2). The annual mean density of eggs, larvae, and young was less than 0.001, 0.159, and 0.003/$m^3$, respectively.

Two eggs were collected on July 12 at Station IP11 (one near surface and one near bottom) at water temperature of 22.0 to 23.7 C and salinity of 7.0 ppt. Mean density on this date was 0.001/$m^3$ (Tables 3.1.2-3). Only one of two eggs collected was viable (Table 3.1.2-8).

Larvae were collected from June 15 through August 10 at water temperature of 20.0 to 28.0 C and salinity to 10.0 ppt. Maximum mean density per date occurred on June 15 (0.907/$m^3$); a secondary peak occurred on July 12 (0.689) (Table 3.1.2-3, Fig. 3.1.2-3). Values ranged from 0.005/$m^3$ on August 10 to 0.107/$m^3$ on June 28. Maximum density per collection was 16.216/$m^3$ (June 15, Station IP08, near bottom). This single collection represented 35 percent of the total larval catch (1,654 of 4,709 specimens).

Annual mean density at stations north of, on the transect, west of, and south of Salem was 0.013, 0.080, and 0.386/$m^3$, respectively (Table 3.1.2-4). For eastern, mid-river, and western stations it was 0.399, 0.184, and 0.063/$m^3$, respectively (Table 3.1.2-5). From June 15 through July 27 mean density per date was greatest south of Salem. Subsequently, catch decreased with no discernible pattern (Table 3.1.2-3). From June 15 through July 12 mean density per date was greatest at eastern and mid-river stations with no discernible pattern after this period (Table 3.1.2-7).

Annual mean density in for surface, middepth and bottom collections was 0.050, 0.240, and 0.268/$m^3$, respectively (Table 3.1.2-2).

Weakfish young were collected from June 15 through July 12 and from August 10 through August 31 at water temperature of 21.0 to 28.0 C and salinity to 10.0 ppt. Maximum mean density per date occurred on June 28 (0.024/$m^3$) and July 12

(0.010/$m^3$). Other levels were equal to or less than 0.001/$m^3$ (Table 3.1.2-3, Fig. 3.1.2-3). On June 28 mean density per station ranged to 0.131/$m^3$ at Station IP03. Maximum density per collection was 0.359/$m^3$ (June 28, Station IP03, middepth).

Annual mean density for north of, on the transect west of, and south of Salem was 0.005, 0.003, and 0.001/$m^3$, respectively (Table 3.1.2-4). For eastern, midriver, and western stations it was 0.008, 0.002, and 0.003/$m^3$, respectively (Table 3.1.2-5). From June 15 to July 12 mean density per date was greatest either north of, or on the transect west of, Salem. Subsequently, catch decreased with no discernible pattern (Table 3.1.2-3).

Annual mean density for surface, middepth, and bottom collections was 0.001, 0.008, and 0.004/$m^3$, respectively (Table 3.1.2-2).

3. Naked goby comprised 3.6 percent of the total catch and was represented by 2,241 specimens including 2,238 larvae and 3 young. The annual mean density of larvae and young was 0.076 and less than 0.001/$m^3$, respectively (Table 3.1.2-2).

Larvae were collected from June 15 through September 13 at water temperature of 20.0 to 28.0 C and salinity of 1.0 to 10.0 ppt. Mean density per date increased from 0.003/$m^3$ on June 15 to 0.396/$m^3$ on July 12; density steadily decreased through the remainder of the period (Table 3.1.2-3, Fig. 3.1.2-4). Mean density per station on July 12 ranged from 0.023/$m^3$ at Station IP02 to 1.873/$m^3$ at Station IP09. Maximum density per collection was 2.218/$m^3$ (July 12, Station IP09, near surface).

Annual mean density for stations north of, on the transect west of, and south of Salem was 0.029, 0.059, and 0.142/$m^3$, respectively (Table 3.1.2-4). For eastern, mid-river, and western stations it was 0.073, 0.104, and 0.036, respectively (Table 3.1.2-5). Annual mean density was greatest (0.198/$m^3$) at Station IP09; at other stations it ranged from 0.017 (Station IP02) to 0.184/$m^3$ (Station IP11) (Table 3.1.2-6). From June 15 through July 27 mean density per date was greatest south of Salem. Subsequently, catch decreased with no discernible pattern. For eastern, mid-river, and western stations mean density per date followed no discernible pattern (Table 3.1.2-7).

Annual mean density for surface, middepth, and bottom collections was 0.060, 0.112, and 0.084/$m^3$, respectively.

A total of three naked goby young was collected on July 12, and August 10 at water temperature of 26.6 to 27.6 C and salinity of 1.0 to 5.0 ppt. Mean density per date was less than 0.001/$m^3$ on July 12 and 0.001/$m^3$ on August 10. One specimen per station was taken near bottom at stations IP02, and IP07 on August 10 and at Station IP09 on July 12.

4. Silversides taken in the Salem study area are potentially one of three species. Although current taxonomic literature indicates subtle morphological and meristic differences, the high degree of local and individual specimen variation made identification of eggs and larvae to genus or species tenuous and impracticable. However, young were identified to species and are discussed separately.

Silversides comprised 0.3 percent of the total catch and were represented by 191 specimens including 8 eggs, 182 larvae, and 1 young (Table 3.1.2-2). Annual mean density of eggs, larvae, and young was less than 0.001, 0.006, and less than 0.001/$m^3$, respectively.

Eggs of the silversides were collected on June 15, June 28, an July 27 at water temperature of 21.0 to 27.0 C and salinity of 0.5 to 6.0 ppt. Mean density on these dates was 0.001, 0.001, and 0.002/$m^3$, respectively (Table 3.1.2-3). Seven of the eight eggs collected were taken in bottom collections (Table 3.1.2-2). All eggs collected were viable (Table 3.1.2-8).

Larvae were collected from June 15 through August 10 at water temperature of 20.0 to 27.5 C and salinity to 10.0 ppt. Mean density per date increased from 0.008/$m^3$ on June 15 to 0.037/$m^3$ on July 27, then decreased to 0.013/$m^3$ on August 10 (Table 3.1.2-3, Fig. 3.1.2-5).

Annual mean density for stations north of, on the transect west of, and south of Salem was 0.007, 0.008, and 0.003/$m^3$, respectively (Table 3.1.2-4). For eastern, mid-river, and western stations it was 0.002, 0.002, and 0.013/$m^3$, respectively (Table 3.1.2-5). Annual mean density was greatest (0.021/$m^3$) at Station IP07; at other stations it ranged from 0.001 to 0.018/$m^3$ (Table 3.1.2-6).

Annual mean density for surface, middepth, and bottom collections was 0.004, 0.001, and 0.010/$m^3$ (Table 3.1.2-2). Bottom samples contained over 64 percent of the larval catch.

One young Atlantic silverside (Menidia menidia) was collected on June 28 at Station IP10 near bottom at water temperature of 25.9 C and salinity of 4.5 ppt. Mean density on this date was less than $0.001/m^3$ (Tables 3.1.2-3).

COMPARISON OF YEARS

Since 1971 from 19 to 26 taxa of ichthyoplankton have been collected annually. Fishes taken each year were bay anchovy, naked goby, river herrings (*Alosa* spp.), weakfish, Atlantic silverside, silversides, northern pipefish (*Syngnathus fuscus*), white perch (*Morone americana*), striped bass (*Morone saxatilis*), American eel (*Anguilla rostrata*), and spot (*Leiostomus xanthurus*). Species taken for the first time in 1978 were the goldfish/carp (*Carassius* sp./*Cyprinus* sp.) and white sucker (*Catostomus commersoni*) (Table 3.1.2-9).

The total abundance of ichthyoplankton increased from 1971 through 1974. In 1975 annual mean density decreased by 60 percent, from $3.836/m^3$ in 1974 to $1.556/m^3$. In 1976 and 1977 it increased to 5.347 and $25.215/m^3$, respectively. Annual mean density decreased to $2.128/m^3$ in 1978.

The bay anchovy has dominated annual catch since 1971. Percent of the total catch has ranged from 77.3 to 97.7. In 1978 it comprised 87.8 percent of the total catch. Eggs of the bay anchovy have comprised from 96.0 to 99.9 percent of each annual egg catch. The percent egg catch (99.4 percent) was similar in 1978. Annual mean density was highest ($13.728/m^3$) in 1977, increasing 400 percent from the 1976 level. In 1978 annual mean density of eggs was over 29 times less than that in 1977. Annual mean percent viable was 14.0 in 1978, but has ranged from 11.6 in 1975 to 25.2 in 1977. Since 1971 bay anchovy larvae have comprised from 68.7 to 98.2 percent of the annual larval catch. Annual mean density was highest in 1977 ($10.885/m^3$), similar in 1976 (1.685) and 1978 (1.401), and low in 1973, 1974, and 1975 (0.197, 0.725, and 0.479, respectively).

Weakfish density increased from 1971 through 1975 ($0.021/m^3$), decreased in 1976 (0.008) and peaked in 1977. Annual mean density in 1977 ($0.413/m^3$) was more than 19 times greater than in 1975, 51 times greater than in 1976, and 2 times greater than in 1978. From 1974 through 1978 annual mean density of young weakfish remained low ($\leq 0.001$ to $0.003/m^3$).

Mean density of naked goby increased from 1971 through 1976 ($0.446/m^3$); it decreased in 1977 (0.121) and again in 1978 (0.076).

In 1978 the annual mean density ($2.128/m^3$) of ichthyoplankton was similar to most other years (range 0.931 to 4.046), but was less than 12.5 percent ($17.921/m^3$) of 1977 densities. During May through August of 1977 and 1978 mean salinity ranged from 3.0 to 15.0 ppt and 1.4 to 4.2 ppt, respectively; in previous years (1972-1977) it ranged from 1.7-9.0 ppt. Lower salinities in 1978 probably contributed to the slight decrease in ichthyoplankton density.

TEMPORAL DISTRIBUTION

During March through May at least seven species were taken. They were the marine spawned American eel and sand lance (Ammodytes spp.); the freshwater spawned white perch, striped bass, river herrings, and white sucker; and the estuarine spawned bay anchovy (Fig. 3.1.2-6). These species were taken in relatively low density per date (not exceeding $0.008/m^3$) (Table 3.1.2-3). The occurrence of marine spawned ichthyoplankton was the result of migration or transport to low salinity nursery grounds. The occurrence of freshwater spawned ichthyoplankton was largely the result of transport from upriver or from local tidal tributaries. The first occurrence of an estuarine spawned species during this period was on May 17.

During June through September, the period of maximum ichthyoplankton density, at least 13 species were collected. They were the marine spawned spot and windowpane (Scophthalmus aquosus); the freshwater spawned striped bass, white perch, river herrings, and minnows (Cyprinidae); and the estuarine spawned bay anchovy, weakfish, naked goby, hogchoker (Trinectes maculatus), black drum (Pogonias cromis), silversides, and northern pipefish. Bay anchovy, weakfish, and naked goby, the most abundant taxa during this period, were the product of local and downbay spawning. The occurrence in the study area of ichthyoplankton spawned downbay was the result of upstream estuarine transport. Bay anchovy spawns in early evening (Hildebrand and Cable, 1930) and eggs have a relatively short incubation period (Kuntz, 1914). Peak density in June and July indicate that spawning occurred near the study area. Weakfish eggs have a longer incubation period (Harmic, 1958), and were in late stages of development (tail-bud and tail-free) when collected, suggesting a downbay origin. Naked goby eggs have not been taken in the area. The naked goby attaches its eggs to oyster and clam shells during spawning (Nelson, 1928). The adhesive nature of the egg and the historic lack of suitable substrate preclude its occurrence in samples taken near Artificial

Island. Larvae and young of these three species occur in the area throughout the period and use it as a nursery.

During October through December three species were taken. They were the marine spawned Atlantic croaker (Micropogon undulatus) and the estuarine spawned bay anchovy and northern pipefish. The specimen of bay anchovy and northern pipefish which occurred during this period were products of earlier spawns. Although Atlantic croaker were taken in extremely low mean density per date (equal to or less than 0.001), this period typically represents their period of maximum abundance. The Atlantic croaker spawns offshore from September through January (Hildebrand and Cable, 1930). Larvae and young are subsequently transported up the estuary and occur in the area throughout the period.

TABLE 3.1.2-1
ICHTHYOPLANKTON SAMPLING STATIONS

| Station | Location |
|---|---|
| IP01 | Between buoys "3" and C "27" and approximately 23 m east of the mouth of Chesapeake and Delaware Canal. |
| IP02 | Between buoy N "B" and the northern tip of Artificial Island. |
| IP03 | Between buoys N "8R" and R "4B" and equidistant from the shipping channel and New Jersey shore. |
| IP04 | Between buoys C "3R" and C "3B" and equidistant from the shipping channel and Reedy Island Dike. |
| IP05 | Between buoys R "4B" and N "10L" and 92 m west of Artificial Island. |
| IP06 | Between buoys R "4B" and N "10L" and 46 m east of the shipping channel. |
| IP07 | Between buoys R "2" and N "10L" and equidistant from the shipping channel and the Delaware shore. |
| IP08 | Between buoys R "8L" and R "6L" and 46 m southwest of the Hope Creek Jetty. |
| IP09 | Between buoys R "8L" and R "6L" and 46 m northeast of the shipping channel. |
| IP10 | Between buoys R "8L" and R "6L" and equidistant from the shipping channel and the Delaware shore. |
| IP11 | Between buoys R "6L" and R "4L" and equidistant from the shipping channel and the New Jersey shore. |

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TABLE 3.1.2-2
TOTAL NUMBER AND ANNUAL MEAN DENSITY OF ICHTHYOPLANKTON

| DEPTH SAMPLED | SURFACE | | MIDDEPTH | | BOTTOM | | TOTAL | |
|---|---|---|---|---|---|---|---|---|
| NO. OF SAMPLES | 168 | | 47 | | 168 | | 383 | |
| VOL. FILTERED (M3) | 14,312.2 | | 3,519.8 | | 11,735.0 | | 29,567.0 | |
| | NUMBER | DENSITY | NUMBER | DENSITY | NUMBER | DENSITY | NUMBER | DENSITY |
| TOTAL EGGS | 2,464 | .172 | 1,286 | .365 | 9,914 | .845 | 13,664 | .462 |
| TOTAL LARVAE | 26,852 | 1.876 | 4,677 | 1.329 | 17,378 | 1.481 | 48,907 | 1.654 |
| TOTAL YOUNG | 183 | .013 | 42 | .012 | 97 | .008 | 322 | .011 |
| EGGS: | | | | | | | | |
| UNIDENTIFIABLE FISH | 4 | * | | | | | 4 | * |
| ALOSA SPP. | | | | | 1 | * | 1 | * |
| A. MITCHILLI | 2,443 | .171 | 1,284 | .365 | 9,897 | .843 | 13,624 | .461 |
| CARASSIUS/CYPRINUS | | | | | 1 | * | 1 | * |
| MEMBRAS/MENIDIA SPP. | 1 | * | | | 7 | .001 | 8 | * |
| M. AMERICANA | 4 | * | | | 2 | * | 6 | * |
| M. SAXATILIS | 10 | .001 | 2 | .001 | 5 | * | 17 | .001 |
| C. REGALIS | 1 | * | | | 1 | * | 2 | * |
| T. MACULATUS | 1 | * | | | | | 1 | * |
| LARVAE: | | | | | | | | |
| UNIDENTIFIABLE FISH | 67 | .005 | | | 2 | * | 69 | .003 |
| ALOSA SPP. | 21 | .001 | 1 | * | 8 | .001 | 30 | .001 |
| A. MITCHILLI | 25,001 | 1.747 | 3,417 | .971 | 12,996 | 1.107 | 41,414 | 1.401 |
| CYPRINIDAE | 15 | .001 | 1 | * | 16 | .001 | 32 | .001 |
| CARASSIUS/CYPRINUS | 3 | * | | | | | 3 | * |
| C. COMMERSONI | 1 | * | | | | | 1 | * |
| MEMBRAS/MENIDIA SPP. | 62 | .004 | 2 | .001 | 118 | .010 | 182 | .006 |
| MORONE SPP. | 3 | * | 1 | * | 6 | .001 | 10 | * |
| M. AMERICANA | 52 | .004 | 1 | * | 35 | .003 | 88 | .003 |
| M. SAXATILIS | 15 | .001 | 2 | .001 | 11 | .001 | 28 | .001 |
| SCIAENIDAE | | | | | 1 | * | 1 | * |
| C. REGALIS | 718 | .050 | 846 | .240 | 3,145 | .268 | 4,709 | .159 |
| M. UNDULATUS | | | | | 1 | * | 1 | * |
| P. CROMIS | 1 | * | | | 2 | * | 3 | * |
| AMMODYTES SP. | 4 | * | | | | | 4 | * |
| G. BOSCI | 861 | .060 | 395 | .112 | 982 | .084 | 2,238 | .076 |
| S. AQUOSUS | | | | | 1 | * | 1 | * |
| T. MACULATUS | 28 | .002 | 11 | .003 | 54 | .005 | 93 | .003 |

* = BELOW REPORTABLE LEVEL

TABLE 3.1.2-2
CONTINUED

| DEPTH SAMPLED | SURFACE | | MIDDEPTH | | BOTTOM | | TOTAL | |
|---|---|---|---|---|---|---|---|---|
| | NUMBER | DENSITY | NUMBER | DENSITY | NUMBER | DENSITY | NUMBER | DENSITY |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | 7 | * | | | 11 | .001 | 18 | .001 |
| A. MITCHILLI | 164 | .011 | 4 | .001 | 24 | .002 | 192 | .006 |
| M. MENIDIA | | | | | 1 | * | 1 | * |
| S. FUSCUS | 2 | * | 9 | .003 | 9 | .001 | 20 | .001 |
| C. REGALIS | 10 | .001 | 29 | .008 | 46 | .004 | 85 | .003 |
| L. XANTHURUS | | | | | 1 | * | 1 | * |
| M. UNDULATUS | | | | | 1 | * | 1 | * |
| G. BOSCI | | | | | 3 | * | 3 | * |
| S. AQUOSUS | | | | | 1 | * | 1 | * |

* = BELOW REPORTABLE LEVEL

TABLE 3.1.2-3
MEAN DENSITY PER DATE OF ICHTHYOPLANKTON TAKEN AT STATIONS
NORTH OF, ON THE TRANSECT WEST OF, AND SOUTH OF SALEM

| DATE | 03/22/78 | | | | 04/20/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | NORTH | WEST | SOUTH | TOTAL | NORTH | WEST | SOUTH | TOTAL |
| NO. OF SAMPLES | 9 | 14 | 9 | 32 | 9 | 14 | 9 | 32 |
| SAL. RANGE (PPT) | 0.0- 0.0 | 1.0- 3.0 | 3.0- 6.0 | 0.0- 6.0 | 2.0- 9.0 | 4.0- 6.0 | 7.5- 9.0 | 2.0- 9.0 |
| TEMP. RANGE (C) | 5.1- 6.0 | 4.3- 5.2 | 4.0- 4.9 | 4.0- 6.0 | 10.8-11.2 | 11.0-11.3 | 10.8-11.0 | 10.8-11.3 |
| VOL. FILTERED (M3) | 369.6 | 829.4 | 651.6 | 1,850.6 | 871.8 | 1,201.4 | 911.0 | 2,984.2 |
| TOTAL EGGS | | | | | .014 | .004 | .002 | .006 |
| TOTAL LARVAE | | | .002 | .001 | .011 | .003 | | .005 |
| TOTAL YOUNG | .005 | .005 | .012 | .008 | .001 | .001 | | .001 |
| EGGS: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | | | .002 | | | .001 |
| M. SAXATILIS | | | | | .011 | .004 | .002 | .006 |
| LARVAE: | | | | | | | | |
| M. AMERICANA | | | | | .008 | | | .002 |
| M. SAXATILIS | | | | | .002 | .002 | | .001 |
| AMMODYTES SP. | | | .002 | .001 | .001 | .002 | | .001 |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | .005 | .005 | .012 | .008 | .001 | .001 | | .001 |

* = BELOW REPORTABLE LEVEL

TABLE 3.1.2-3
CONTINUED

| DATE | | 05/17/78 | | | | 06/15/78 | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | NORTH | WEST | SOUTH | TOTAL | NORTH | WEST | SOUTH | TOTAL |
| NO. OF SAMPLES | 9 | 14 | 9 | 32 | 9 | 13 | 9 | 31 |
| SAL. RANGE (PPT) | 1.0- 2.0 | 3.0- 3.0 | 3.0- 6.0 | 1.0- 6.0 | 0.0- 3.0 | 0.0- 1.5 | 1.0- 6.0 | 0.0- 6.0 |
| TEMP. RANGE (C) | 14.7-15.1 | 14.5-14.8 | 14.5-15.4 | 14.5-15.4 | 19.8-22.0 | 20.8-21.4 | 20.0-20.8 | 19.8-22.0 |
| VOL. FILTERED (M3) | 860.0 | 1,101.2 | 808.5 | 2,769.7 | 866.1 | 861.6 | 950.9 | 2,678.6 |
| TOTAL EGGS | .005 | .005 | .001 | .004 | | .009 | .203 | .075 |
| TOTAL LARVAE | .051 | .011 | .006 | .022 | .150 | 1.016 | 5.165 | 2.209 |
| TOTAL YOUNG | .001 | | | * | .002 | | .002 | .001 |
| EGGS: | | | | | | | | |
| UNIDENTIFIABLE FISH | .001 | | .001 | .001 | | | | |
| ALOSA SPP. | | .001 | | * | | | | |
| A. MITCHILLI | .001 | | | * | | .007 | .203 | .074 |
| CARASSIUS/CYPRINUS | | .001 | | * | | | | |
| MEMBRAS/MENIDIA SPP. | | | | | | .002 | | .001 |
| M. AMERICANA | .002 | .004 | | .002 | | | | |
| LARVAE: | | | | | | | | |
| UNIDENTIFIABLE FISH | .006 | | | .002 | .002 | .070 | | .023 |
| ALOSA SPP. | .009 | .001 | | .003 | .020 | .003 | | .007 |
| A. MITCHILLI | | | | | .021 | .534 | 2.934 | 1.220 |
| CYPRINIDAE | | | | | .029 | .008 | | .012 |
| CARASSIUS/CYPRINUS | | | | | | .003 | | .001 |
| C. COMMERSONI | .001 | | | * | | | | |
| MEMBRAS/MENIDIA SPP. | | | | | .016 | .007 | .002 | .008 |
| MORONE SPP. | .002 | | .002 | .001 | .007 | | | .002 |
| M. AMERICANA | .015 | .007 | .002 | .008 | .045 | .022 | | .022 |
| M. SAXATILIS | .017 | .003 | .001 | .007 | .005 | .001 | | .002 |
| C. REGALIS | | | | | .006 | .363 | 2.220 | .907 |
| P. CROMIS | | | | | | .001 | .001 | .001 |
| G. BOSCI | | | | | | .002 | .006 | .003 |
| S. AQUOSUS | | | | | | | .001 | * |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | .001 | | | * | .001 | | | * |
| S. FUSCUS | | | | | | | .001 | * |
| C. REGALIS | | | | | .001 | | | * |
| S. AQUOSUS | | | | | | | .001 | * |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-3

CONTINUED

| DATE | 06/28/78 | | | | 07/12/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | NORTH | WEST | SOUTH | TOTAL | NORTH | WEST | SOUTH | TOTAL |
| NO. OF SAMPLES | 9 | 14 | 9 | 32 | 9 | 14 | 9 | 32 |
| SAL. RANGE (PPT) | 1.0- 2.5 | 3.0- 4.0 | 3.0- 5.5 | 1.0- 5.5 | 2.0- 7.0 | 4.0- 5.0 | 4.0- 6.0 | 2.0- 7.0 |
| TEMP. RANGE (C) | 24.0-26.1 | 25.1-25.5 | 24.2-27.0 | 24.0-27.0 | 22.0-26.0 | 24.0-24.9 | 23.2-24.5 | 22.0-26.0 |
| VOL. FILTERED (M3) | 613.4 | 861.2 | 746.6 | 2,221.2 | 859.8 | 1,045.7 | 895.4 | 2,800.9 |
| TOTAL EGGS | .057 | .565 | 5.522 | 2.091 | .102 | 1.356 | 6.172 | 2.511 |
| TOTAL LARVAE | .546 | 1.060 | 7.089 | 2.945 | 2.438 | 5.363 | 20.931 | 9.442 |
| TOTAL YOUNG | .068 | .020 | .005 | .028 | .010 | .022 | .008 | .014 |
| EGGS: | | | | | | | | |
| A. MITCHILLI | .057 | .562 | 5.522 | 2.090 | .102 | 1.355 | 6.169 | 2.510 |
| MEMBRAS/MENIDIA SPP. | | .003 | | .001 | | | | |
| C. REGALIS | | | | | | | .002 | .001 |
| T. MACULATUS | | | | | | .001 | | * |
| LARVAE: | | | | | | | | |
| UNIDENTIFIABLE FISH | .002 | .001 | | .001 | | | | |
| ALOSA SPP. | .002 | | | * | | | | |
| A. MITCHILLI | .447 | .758 | 6.480 | 2.595 | 2.294 | 4.638 | 18.442 | 8.331 |
| MEMBRAS/MENIDIA SPP. | .011 | .003 | .016 | .010 | .030 | .006 | .001 | .012 |
| C. REGALIS | .051 | .069 | .197 | .107 | .060 | .457 | 1.565 | .689 |
| P. CROMIS | | .001 | | * | | | | |
| G. BOSCI | .034 | .228 | .394 | .230 | .048 | .249 | .902 | .396 |
| T. MACULATUS | | | .003 | .001 | .006 | .013 | .021 | .014 |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | .008 | | | .002 | | .006 | .002 | .003 |
| M. MENIDIA | | | .001 | * | | | | |
| S. FUSCUS | | .001 | .003 | .001 | | .002 | .001 | .001 |
| C. REGALIS | .060 | .017 | .001 | .024 | .010 | .014 | .003 | .010 |
| L. XANTHURUS | | .001 | | * | | | | |
| G. BOSCI | | | | | | | .001 | * |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-3
CONTINUED

| DATE | 07/27/78 | | | | 08/10/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | NORTH | WEST | SOUTH | TOTAL | NORTH | WEST | SOUTH | TOTAL |
| NO. OF SAMPLES | 9 | 14 | 9 | 32 | 9 | 14 | 9 | 32 |
| SAL. RANGE (PPT) | 5.0- 7.0 | 5.5- 7.5 | 5.0-10.0 | 5.0-10.0 | 3.0- 7.0 | 4.5- 5.0 | 5.0- 6.0 | 3.0- 7.0 |
| TEMP. RANGE (C) | 27.0-27.5 | 26.5-28.0 | 25.5-27.0 | 25.5-28.0 | 25.4-27.6 | 26.2-27.6 | 26.6-27.0 | 25.4-27.6 |
| VOL. FILTERED (M3) | 634.9 | 838.8 | 512.8 | 1,986.5 | 716.4 | 967.6 | 798.7 | 2,482.7 |
| TOTAL EGGS | .797 | .377 | .950 | .659 | .001 | .284 | .146 | .158 |
| TOTAL LARVAE | 1.706 | 5.533 | 3.064 | 3.672 | .842 | .911 | 1.159 | .971 |
| TOTAL YOUNG | .123 | | .006 | .041 | .050 | .003 | .001 | .016 |
| EGGS: | | | | | | | | |
| A. MITCHILLI | .794 | .377 | .948 | .657 | .001 | .284 | .146 | .158 |
| MEMBRAS/MENIDIA SPP. | .003 | | .002 | .002 | | | | |
| LARVAE: | | | | | | | | |
| A. MITCHILLI | 1.556 | 5.236 | 2.638 | 3.389 | .677 | .816 | 1.039 | .848 |
| MEMBRAS/MENIDIA SPP. | .003 | .072 | .021 | .037 | .014 | .018 | .006 | .013 |
| C. REGALIS | .036 | .043 | .078 | .050 | .007 | .007 | .001 | .005 |
| G. BOSCI | .093 | .166 | .322 | .183 | .124 | .059 | .110 | .094 |
| T. MACULATUS | .017 | .017 | .004 | .014 | .020 | .010 | .003 | .010 |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | .123 | | .006 | .041 | .046 | .001 | .001 | .014 |
| S. FUSCUS | | | | | .003 | | | .001 |
| C. REGALIS | | | | | | .001 | | * |
| G. BOSCI | | | | | .001 | .001 | | .001 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-3
CONTINUED

| DATE | 08/31/78 | | | | 09/13/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | NORTH | WEST | SOUTH | TOTAL | NORTH | WEST | SOUTH | TOTAL |
| NO. OF SAMPLES | 9 | 14 | 9 | 32 | 9 | 14 | 9 | 32 |
| SAL. RANGE (PPT) | 4.0- 6.5 | 6.5- 9.0 | 7.5-10.0 | 4.0-10.0 | 3.0-10.5 | 5.0- 5.5 | 7.0- 9.0 | 3.0-10.5 |
| TEMP. RANGE (C) | 27.1-28.0 | 26.2-27.1 | 26.1-26.5 | 26.1-28.0 | 23.0-25.8 | 24.2-26.4 | 23.0-24.3 | 23.0-26.4 |
| VOL. FILTERED (M3) | 810.3 | 918.1 | 733.1 | 2,461.5 | 810.3 | 846.7 | 848.0 | 2,505.0 |
| TOTAL EGGS | .002 | .039 | .014 | .020 | .001 | .002 | .004 | .002 |
| TOTAL LARVAE | .094 | .015 | .057 | .054 | .037 | .038 | .018 | .031 |
| TOTAL YOUNG | .009 | .001 | .004 | .004 | .035 | .008 | .001 | .014 |
| EGGS: | | | | | | | | |
| A. MITCHILLI | .002 | .039 | .014 | .020 | .001 | .002 | .004 | .002 |
| LARVAE: | | | | | | | | |
| A. MITCHILLI | .091 | .009 | .055 | .050 | .035 | .035 | .018 | .029 |
| SCIAENIDAE | | | | | | .001 | | * |
| G. BOSCI | .002 | .007 | .003 | .004 | .002 | .001 | | .001 |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | .007 | | | .002 | .032 | .004 | | .012 |
| S. FUSCUS | | | .003 | .001 | .002 | .005 | .001 | .003 |
| C. REGALIS | .001 | .001 | .001 | .001 | | | | |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-3
CONTINUED

| DATE | | 10/26/78 | | | | 10/27/78 | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | NORTH | WEST | SOUTH | TOTAL | NORTH | WEST | SOUTH | TOTAL |
| NO. OF SAMPLES | 7 | 14 | 9 | 30 | 2 | | | 2 |
| SAL. RANGE (PPT) | 5.5- 6.0 | 8.0-10.0 | 9.5-12.0 | 5.5-12.0 | 2.0- 2.0 | .-. | .-. | 2.0- 2.0 |
| TEMP. RANGE (C) | 14.0-14.1 | 14.0-14.0 | 13.5-14.0 | 13.5-14.1 | 14.0-14.8 | -.-. | -.-. | 14.0-14.8 |
| VOL. FILTERED (M3) | 602.1 | 981.4 | 879.2 | 2,462.7 | 125.1 | 0.0 | 0.0 | 125.1 |
| TOTAL EGGS | | | | | | | | |
| TOTAL LARVAE | .005 | | .011 | .005 | .008 | | | .008 |
| TOTAL YOUNG | .022 | .001 | | .006 | .024 | | | .024 |
| LARVAE: | | | | | | | | |
| A. MITCHILLI | .003 | | .011 | .005 | .008 | | | .008 |
| M. UNDULATUS | .002 | | | * | | | | |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | .022 | | | .005 | .024 | | | .024 |
| S. FUSCUS | | .001 | | * | | | | |

| DATE | | 11/21/78 | | | | 11/22/78 | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | NORTH | WEST | SOUTH | TOTAL | NORTH | WEST | SOUTH | TOTAL |
| NO. OF SAMPLES | 9 | 14 | 5 | 28 | | | 4 | 4 |
| SAL. RANGE (PPT) | 5.0- 6.0 | 6.0- 8.0 | 7.0- 9.0 | 5.0- 9.0 | .-. | .-. | 9.0-11.0 | .-11.0 |
| TEMP. RANGE (C) | 9.5-10.5 | 10.2-11.8 | 10.5-11.0 | 9.5-11.8 | -.-. | -.-. | 11.0-11.5 | -.-11.5 |
| VOL. FILTERED (M3) | 640.9 | 748.0 | 430.3 | 1,819.2 | 0.0 | 0.0 | 419.1 | 419.1 |
| TOTAL EGGS | | | | | | | | |
| TOTAL LARVAE | | | | | | | | |
| TOTAL YOUNG | .009 | .007 | .005 | .007 | | | .002 | .002 |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | .009 | .004 | .005 | .006 | | | .002 | .002 |
| S. FUSCUS | | .001 | | .001 | | | | |
| M. UNDULATUS | | .001 | | .001 | | | | |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-4
ANNUAL MEAN DENSITY OF ICHTHYOPLANKTON TAKEN AT STATIONS
NORTH OF, ON THE TRANSECT WEST OF, AND SOUTH OF SALEM

| LOCATION | NORTH | WEST | SOUTH | TOTAL |
|---|---|---|---|---|
| NO. OF SAMPLES | 108 | 167 | 108 | 383 |
| SAL. RANGE (PPT) | 0.0- 6.5 | 0.0- 9.5 | 1.0-11.5 | 0.0-11.5 |
| TEMP. RANGE (C) | 5.1-28.0 | 4.3-28.0 | 4.0-27.0 | 4.0-28.0 |
| VOL. FILTERED (M3) | 8,780.7 | 11,201.1 | 9,585.2 | 29,567.0 |
| TOTAL EGGS | .074 | .228 | 1.091 | .462 |
| TOTAL LARVAE | .502 | 1.159 | 3.288 | 1.654 |
| TOTAL YOUNG | .026 | .006 | .003 | .011 |
| EGGS: | | | | |
| UNIDENTIFIABLE FISH | * | | * | * |
| ALOSA SPP. | | * | | * |
| A. MITCHILLI | .072 | .226 | 1.091 | .461 |
| CARASSIUS/CYPRINUS | | * | | * |
| MEMBRAS/MENIDIA SPP. | * | * | * | * |
| M. AMERICANA | * | * | | * |
| M. SAXATILIS | .001 | * | * | .001 |
| C. REGALIS | | | * | * |
| T. MACULATUS | | * | | * |
| LARVAE: | | | | |
| UNIDENTIFIABLE FISH | .001 | .005 | | .002 |
| ALOSA SPP. | .003 | * | | .001 |
| A. MITCHILLI | .438 | .998 | 2.753 | 1.401 |
| CYPRINIDAE | .003 | .001 | | .001 |
| CARASSIUS/CYPRINUS | | * | | * |
| C. CHAMBERSONI | * | | | * |
| MEMBRAS/MENIDIA SPP. | .007 | .008 | .003 | .006 |
| MORONE SPP. | .001 | | * | * |
| M. AMERICANA | .007 | .002 | * | .003 |
| M. SAXATILIS | .002 | .001 | * | .001 |
| SCIAENIDAE | | * | | * |
| C. REGALIS | .013 | .080 | .386 | .159 |
| M. UNDULATUS | * | | | * |
| P. CROMIS | | * | * | * |
| AMMODYTES SP. | * | * | * | * |
| G. BOSCI | .024 | .059 | .142 | .076 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-4
CONTINUED

| LOCATION | NORTH | WEST | SOUTH | TOTAL |
|---|---|---|---|---|
| LARVAE: | | | | |
| S. AQUOSUS | | | * | * |
| T. MACULATUS | .003 | .003 | .003 | .003 |
| YOUNG: | | | | |
| A. ROSTRATA | .001 | * | .001 | .001 |
| A. MITCHILLI | .019 | .001 | .001 | .006 |
| M. MENIDIA | | | * | * |
| S. FUSCUS | * | .001 | .001 | .001 |
| C. REGALIS | .005 | .003 | .001 | .003 |
| L. XANTHURUS | | * | | * |
| M. UNDULATUS | | * | | * |
| G. BOSCI | * | * | * | * |
| S. AQUOSUS | | | * | * |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-5
ANNUAL MEAN DENSITY OF ICHTHYOPLANKTON TAKEN AT
EASTERN, MID-RIVER, AND WESTERN STATIONS

| LOCATION | EAST | MID-RIVER | WEST | TOTAL |
|---|---|---|---|---|
| NO. OF SAMPLES | 60 | 155 | 96 | 311 |
| SAL. RANGE (PPT) | 0.0-11.0 | 0.0-11.0 | 0.0- 9.5 | 0.0-11.0 |
| TEMP. RANGE (C) | 4.3-27.6 | 4.0-28.0 | 4.6-27.9 | 4.0-28.0 |
| VOL. FILTERED (M3) | 4,931.3 | 10,688.9 | 7,767.7 | 23,387.9 |
| TOTAL EGGS | .190 | .697 | .224 | .433 |
| TOTAL LARVAE | 1.230 | 1.710 | 2.007 | 1.707 |
| TOTAL YOUNG | .013 | .004 | .006 | .007 |
| EGGS: | | | | |
| UNIDENTIFIABLE FISH | * | | * | * |
| ALOSA SPP. | | * | | * |
| A. MITCHILLI | .190 | .696 | .223 | .432 |
| CARASSIUS/CYPRINUS | | * | | * |
| MEMBRAS/MENIDIA SPP. | | * | * | * |
| M. AMERICANA | | * | * | * |
| M. SAXATILIS | * | * | .001 | * |
| T. MACULATUS | | * | | * |
| LARVAE: | | | | |
| UNIDENTIFIABLE FISH | | .006 | * | .003 |
| ALOSA SPP. | * | * | * | * |
| A. MITCHILLI | .749 | 1.406 | 1.886 | 1.427 |
| CYPRINIDAE | * | .001 | * | .001 |
| CARASSIUS/CYPRINUS | | * | | * |
| MEMBRAS/MENIDIA SPP. | .002 | .002 | .013 | .006 |
| MORONE SPP. | * | | .001 | * |
| M. AMERICANA | .001 | .002 | .003 | .002 |
| M. SAXATILIS | .001 | * | .001 | .001 |
| SCIAENIDAE | | * | | * |
| C. REGALIS | .399 | .184 | .063 | .189 |
| P. CROMIS | | * | * | * |
| AMMODYTES SP. | * | * | * | * |
| G. BOSCI | .073 | .104 | .036 | .075 |
| S. AQUOSUS | | | * | * |
| T. MACULATUS | .003 | .004 | .003 | .003 |

* = BELOW REPORTABLE LEVEL

IA SALEM IP 1978

TABLE 3.1.2-5
CONTINUED

| LOCATION | EAST | MID-RIVER | WEST | TOTAL |
|---|---|---|---|---|
| YOUNG: | | | | |
| A. ROSTRATA | .001 | * | .001 | .001 |
| A. MITCHILLI | .003 | .001 | .002 | .002 |
| M. MENIDIA | | | * | * |
| S. FUSCUS | .001 | .001 | * | .001 |
| C. REGALIS | .008 | .002 | .003 | .003 |
| L. XANTHURUS | | * | | * |
| M. UNDULATUS | | * | | * |
| G. BOSCI | | * | * | * |
| S. AQUOSUS | * | | | * |

* = BELOW REPORTABLE LEVEL

IA SALEM IP 1978

TABLE 3.1.2-6
ANNUAL MEAN DENSITY PER STATION OF ICHTHYOPLANKTON

| STATION | IP01 | | | | IP02 | | | |
|---|---|---|---|---|---|---|---|---|
| DEPTH SAMPLED | SURFACE | MID | BOTTOM | TOTAL | SURFACE | MID | BOTTOM | TOTAL |
| NO. OF SAMPLES | 12 | 0 | 12 | 24 | 12 | 0 | 12 | 24 |
| VOL. FILTERED (M3) | 1,137.8 | | 732.8 | 1,870.6 | 1,150.2 | | 972.7 | 2,122.9 |
| TOTAL EGGS | .024 | | .057 | .037 | .017 | | .021 | .018 |
| TOTAL LARVAE | 1.089 | | .753 | .957 | .299 | | .209 | .258 |
| TOTAL YOUNG | .111 | | .001 | .068 | .007 | | .016 | .011 |
| EGGS: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | | | .002 | | | .001 |
| A. MITCHILLI | .020 | | .056 | .034 | .013 | | .017 | .015 |
| MEMBRAS/MENIDIA SPP. | | | | | | | .002 | .001 |
| M. AMERICANA | .001 | | | .001 | | | | |
| M. SAXATILIS | .003 | | .001 | .002 | .002 | | .001 | .001 |
| LARVAE: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | .001 | .001 | .003 | | | .002 |
| ALOSA SPP. | .011 | | .004 | .008 | .006 | | .001 | .004 |
| A. MITCHILLI | 1.011 | | .685 | .883 | .263 | | .118 | .196 |
| CYPRINIDAE | .002 | | | .001 | .006 | | .011 | .008 |
| C. COMMERSONI | | | | | .001 | | | * |
| MEMBRAS/MENIDIA SPP. | .018 | | .019 | .018 | .003 | | .005 | .004 |
| MORONE SPP. | | | .001 | .001 | | | .003 | .001 |
| M. AMERICANA | .010 | | .007 | .009 | .009 | | .011 | .010 |
| M. SAXATILIS | .002 | | .003 | .002 | .003 | | .003 | .003 |
| C. REGALIS | .003 | | .015 | .007 | .001 | | .017 | .008 |
| M. UNDULATUS | | | | | | | .001 | * |
| AMMODYTES SP. | | | | | .001 | | | * |
| G. BOSCI | .033 | | .018 | .027 | .003 | | .035 | .017 |
| T. MACULATUS | .002 | | | .001 | .001 | | .002 | .001 |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | | | .001 | .001 | | | | |
| A. MITCHILLI | .111 | | | .067 | .007 | | .011 | .009 |
| S. FUSCUS | | | | | | | .001 | * |
| C. REGALIS | | | | | | | .003 | .001 |
| G. BOSCI | | | | | | | .001 | * |

* = BELOW REPORTABLE LEVEL

IA SALEM IP 1978

TABLE 3.1.2-6
CONTINUED

| STATION | IP03 | | | | IP04 | | | |
|---|---|---|---|---|---|---|---|---|
| DEPTH SAMPLED | SURFACE | MID | BOTTOM | TOTAL * | SURFACE | MID | BOTTOM | TOTAL |
| NO. OF SAMPLES | 12 | 12 | 12 | 36 | 12 | 0 | 12 | 24 |
| VOL. FILTERED (M3) | 1,033.7 | 878.1 | 997.4 | 2,909.2 | 1,107.3 | | 770.7 | 1,878.0 |
| TOTAL EGGS | .144 | .253 | .086 | .157 | .006 | | .100 | .045 |
| TOTAL LARVAE | .651 | .436 | .335 | .478 | .456 | | .231 | .364 |
| TOTAL YOUNG | .011 | .031 | .018 | .019 | .016 | | .004 | .011 |
| EGGS: | | | | | | | | |
| UNIDENTIFIABLE FISH | .001 | | | * | | | | |
| A. MITCHILLI | .142 | .253 | .086 | .156 | .005 | | .099 | .043 |
| M. AMERICANA | | | | | .001 | | | .001 |
| M. SAXATILIS | .001 | | | * | .001 | | .001 | .001 |
| LARVAE: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | | | .003 | | | .002 |
| ALOSA SPP. | .001 | | .001 | .001 | | | .001 | .001 |
| A. MITCHILLI | .621 | .334 | .269 | .414 | .421 | | .135 | .304 |
| CYPRINIDAE | .001 | | .001 | .001 | .001 | | .003 | .002 |
| MEMBRAS/MENIDIA SPP. | .002 | | .007 | .003 | .003 | | .005 | .004 |
| MORONE SPP. | | .001 | .001 | .001 | .001 | | .001 | .001 |
| M. AMERICANA | .002 | | .003 | .002 | .010 | | .008 | .009 |
| M. SAXATILIS | .004 | .002 | | .002 | .002 | | .004 | .003 |
| C. REGALIS | | .038 | .024 | .020 | .002 | | .032 | .014 |
| G. BOSCI | .018 | .058 | .023 | .032 | .008 | | .032 | .018 |
| T. MACULATUS | .002 | .003 | .006 | .004 | .006 | | .009 | .007 |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | | | .001 | * | .002 | | .001 | .002 |
| A. MITCHILLI | .011 | | .004 | .005 | .008 | | .001 | .005 |
| S. FUSCUS | | .002 | | .001 | | | .001 | .001 |
| C. REGALIS | | .028 | .013 | .013 | .006 | | | .004 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-6
CONTINUED

| STATION | IP05 | | | | IP06 | | | |
|---|---|---|---|---|---|---|---|---|
| DEPTH SAMPLED | SURFACE | MID | BOTTOM | TOTAL | SURFACE | MID | BOTTOM | TOTAL |
| NO. OF SAMPLES | 24 | 0 | 24 | 48 | 24 | 23 | 24 | 71 |
| VOL. FILTERED (M3) | 1,495.2 | | 1,126.4 | 2,621.6 | 1,807.5 | 1,668.2 | 1,494.1 | 4,969.8 |
| TOTAL EGGS | .337 | | .841 | .553 | .001 | .020 | .240 | .079 |
| TOTAL LARVAE | .976 | | .601 | .815 | .581 | .671 | .733 | .657 |
| TOTAL YOUNG | .005 | | .010 | .007 | .001 | .007 | .004 | .004 |
| EGGS: | | | | | | | | |
| ALOSA SPP. | | | .001 | * | | | | |
| A. MITCHILLI | .334 | | .834 | .549 | | .019 | .240 | .078 |
| CARASSIUS/CYPRINUS | | | .001 | * | | | | |
| MEMBRAS/MENIDIA SPP. | .001 | | .004 | .002 | | | | |
| M. AMERICANA | .001 | | .002 | .002 | | | | |
| M. SAXATILIS | | | | | .001 | .001 | | * |
| T. MACULATUS | .001 | | | * | | | | |
| LARVAE: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | | | .033 | | .001 | .012 |
| ALOSA SPP. | .001 | | .001 | .001 | | .001 | .001 | * |
| A. MITCHILLI | .815 | | .471 | .667 | .429 | .428 | .536 | .476 |
| CYPRINIDAE | .003 | | .002 | .002 | | .001 | | * |
| CARASSIUS/CYPRINUS | .002 | | | .001 | | | | |
| MEMBRAS/MENIDIA SPP. | .001 | | .004 | .003 | .003 | .001 | .003 | .002 |
| M. AMERICANA | .008 | | .004 | .006 | .001 | .001 | .003 | .001 |
| M. SAXATILIS | .001 | | .001 | .001 | | | .001 | * |
| SCIAENIDAE | | | .001 | * | | | | |
| C. REGALIS | .023 | | .030 | .026 | .050 | .193 | .106 | .115 |
| P. CROMIS | .001 | | | * | | | | |
| AMMODYTES SP. | .001 | | | * | | | | |
| G. BOSCI | .120 | | .080 | .103 | .060 | .046 | .027 | .045 |
| T. MACULATUS | .001 | | .007 | .003 | .004 | .002 | .007 | .004 |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | .001 | | .002 | .001 | | | | |
| A. MITCHILLI | .003 | | .002 | .002 | | .002 | .001 | .001 |
| S. FUSCUS | .001 | | .001 | .001 | | .003 | | .001 |
| C. REGALIS | .001 | | .004 | .003 | .001 | .002 | .003 | .002 |
| L. XANTHURUS | | | .001 | * | | | | |
| M. UNDULATUS | | | | | | | .001 | * |

* = BELOW REPORTABLE LEVEL

TABLE 3.1.2-6
CONTINUED

| STATION | IP07 | | | | IP08 | | | |
|---|---|---|---|---|---|---|---|---|
| DEPTH SAMPLED | SURFACE | MID | BOTTOM | TOTAL | SURFACE | MID | BOTTOM | TOTAL |
| NO. OF SAMPLES | 24 | 0 | 24 | 48 | 12 | 0 | 12 | 24 |
| VOL. FILTERED (M3) | 1,994.2 | | 1,615.5 | 3,609.7 | 1,073.1 | | 949.0 | 2,022.1 |
| TOTAL EGGS | .092 | | .326 | .197 | .212 | | .267 | .237 |
| TOTAL LARVAE | 2.684 | | 1.379 | 2.100 | 1.815 | | 2.874 | 2.312 |
| TOTAL YOUNG | .002 | | .013 | .007 | .003 | | .007 | .005 |
| EGGS: | | | | | | | | |
| A. MITCHILLI | .091 | | .325 | .196 | .212 | | .267 | .237 |
| M. SAXATILIS | .001 | | .001 | .001 | | | | |
| LARVAE: | | | | | | | | |
| A. MITCHILLI | 2.561 | | 1.214 | 1.958 | 1.633 | | .778 | 1.231 |
| MEMBRAS/MENIDIA SPP. | .004 | | .041 | .021 | .001 | | .001 | .001 |
| M. AMERICANA | .002 | | .001 | .001 | | | | |
| M. SAXATILIS | .001 | | .001 | .001 | | | | |
| C. REGALIS | .056 | | .089 | .070 | .117 | | 1.880 | .945 |
| P. CROMIS | | | .001 | * | | | | |
| AMMODYTES SP. | .001 | | | * | .001 | | | * |
| G. BOSCI | .058 | | .032 | .046 | .063 | | .211 | .133 |
| T. MACULATUS | .003 | | .002 | .002 | | | .004 | .002 |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | | | .001 | .001 | .002 | | .002 | .002 |
| A. MITCHILLI | .001 | | .001 | .001 | .001 | | .001 | .001 |
| S. FUSCUS | .001 | | .001 | .001 | | | .003 | .001 |
| C. REGALIS | | | .010 | .004 | | | | |
| G. BOSCI | | | .001 | * | | | | |
| S. AQUOSUS | | | | | | | .001 | * |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-6
CONTINUED

| STATION | IP09 | | | | IP10 | | | |
|---|---|---|---|---|---|---|---|---|
| DEPTH SAMPLED | SURFACE | MID | BOTTOM | TOTAL | SURFACE | MID | BOTTOM | TOTAL |
| NO. OF SAMPLES | 12 | 12 | 12 | 36 | 12 | 0 | 12 | 24 |
| VOL. FILTERED (M3) | 1,098.6 | 973.5 | 1,025.4 | 3,097.5 | 1,269.2 | | 1,010.8 | 2,280.0 |
| TOTAL EGGS | .095 | 1.059 | 4.362 | 1.810 | .115 | | .790 | .414 |
| TOTAL LARVAE | 4.752 | 3.261 | 4.368 | 4.156 | 4.719 | | 1.325 | 3.214 |
| TOTAL YOUNG | | .003 | .005 | .003 | .002 | | .003 | .002 |
| EGGS: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | | | .001 | | | * |
| A. MITCHILLI | .094 | 1.058 | 4.362 | 1.810 | .114 | | .789 | .414 |
| MEMBRAS/MENIDIA SPP. | | | | | | | .001 | * |
| M. SAXATILIS | .001 | .001 | | .001 | | | | |
| LARVAE: | | | | | | | | |
| A. MITCHILLI | 4.352 | 2.476 | 3.636 | 3.525 | 4.596 | | 1.164 | 3.075 |
| MEMBRAS/MENIDIA SPP. | | .001 | .002 | .001 | .013 | | .035 | .009 |
| MORONE SPP. | | | | | .002 | | | .001 |
| M. AMERICANA | | | | | .002 | | | .001 |
| M. SAXATILIS | | | | | .001 | | | * |
| C. REGALIS | .221 | .504 | .580 | .429 | .055 | | .136 | .091 |
| P. CROMIS | | | .001 | * | | | | |
| G. BOSCI | .178 | .275 | .144 | .198 | .050 | | .017 | .035 |
| S. AGUOSUS | | | | | | | .001 | * |
| T. MACULATUS | | .005 | .005 | .003 | .002 | | .002 | .002 |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | | .001 | | * | .002 | | .002 | .002 |
| M. MENIDIA | | | | | | | .001 | * |
| S. FUSCUS | | .002 | .001 | .001 | | | | |
| C. REGALIS | | | .003 | .001 | | | | |
| G. BOSCI | | | .001 | * | | | | |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-6
CONTINUED

| STATION | IP11 | | | |
|---|---|---|---|---|
| DEPTH SAMPLED | SURFACE | MID | BOTTOM | TOTAL |
| NO. OF SAMPLES | 12 | 0 | 12 | 24 |
| VOL. FILTERED (M3) | 1,145.4 | | 1,040.2 | 2,185.6 |
| TOTAL EGGS | .958 | | 2.242 | 1.569 |
| TOTAL LARVAE | 2.682 | | 3.429 | 3.038 |
| TOTAL YOUNG | .003 | | .006 | .004 |
| EGGS: | | | | |
| A. MITCHILLI | .957 | | 2.241 | 1.568 |
| MEMBRAS/MENIDIA SPP. | | | | |
| C. REGALIS | .001 | | .001 | .001 |
| LARVAE: | | | | |
| A. MITCHILLI | 2.595 | | 2.882 | 2.732 |
| F. HETEROCLITUS | | | | |
| MEMBRAS/MENIDIA SPP. | | | .005 | .002 |
| M. AMERICANA | | | | |
| C. REGALIS | .032 | | .209 | .116 |
| G. BOSCI | .055 | | .327 | .184 |
| T. MACULATUS | | | .007 | .003 |
| YOUNG: | | | | |
| A. ROSTRATA | .002 | | .002 | .002 |
| B. TYRANNUS | | | | |
| A. MITCHILLI | .001 | | .001 | .001 |
| S. FUSCUS | | | .001 | * |
| C. REGALIS | | | .002 | .001 |

* = BELOW REPORTABLE LEVEL

TABLE 3.1.2-7
MEAN DENSITY PER DATE OF ICHTHYOPLANKTON TAKEN AT
EASTERN, MID-RIVER, AND WESTERN STATIONS

| DATE | 03/22/78 | | | | 04/20/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | EAST | MIDRIVER | WEST | TOTAL | EAST | MIDRIVER | WEST | TOTAL |
| NO. OF SAMPLES | 9 | 9 | 8 | 26 | 9 | 9 | 8 | 26 |
| SAL. RANGE (PPT) | 0.0- 4.0 | 2.0- 4.0 | 0.0- 4.0 | 0.0- 4.0 | 3.5- 9.0 | 5.0- 8.0 | 3.5- 4.5 | 3.5- 9.0 |
| TEMP. RANGE (C) | 4.3- 5.5 | 4.0- 4.6 | 4.6- 5.6 | 4.0- 5.6 | 10.8-11.1 | 10.9-11.0 | 11.0-11.3 | 10.8-11.3 |
| VOL. FILTERED (M3) | 552.8 | 538.7 | 471.8 | 1,563.3 | 656.8 | 890.0 | 738.1 | 2,284.9 |
| TOTAL EGGS | | | | | .003 | .004 | .007 | .005 |
| TOTAL LARVAE | .002 | | | .001 | .005 | .001 | .003 | .003 |
| TOTAL YOUNG | .011 | | .008 | .006 | .003 | | | .001 |
| EGGS: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | | | .002 | | | * |
| M. SAXATILIS | | | | | .002 | .004 | .007 | .004 |
| LARVAE: | | | | | | | | |
| M. AMERICANA | | | | | | | .001 | * |
| M. SAXATILIS | | | | | .003 | .001 | | .001 |
| AMMODYTES SP. | .002 | | | .001 | .002 | | .001 | .001 |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | .011 | | .008 | .006 | .003 | | | .001 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.2-7
CONTINUED

| DATE | 05/17/78 | | | | 06/15/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | EAST | MIDRIVER | WEST | TOTAL | EAST | MIDRIVER | WEST | TOTAL |
| NO. OF SAMPLES | 9 | 9 | 8 | 26 | 9 | 8 | 8 | 25 |
| SAL. RANGE (PPT) | 2.0- 4.0 | 3.0- 5.5 | 1.0- 4.0 | 1.0- 5.5 | 0.0- 0.5 | 1.0- 6.0 | 0.0- 3.5 | 0.0- 6.0 |
| TEMP. RANGE (C) | 14.5-14.8 | 14.5-14.7 | 14.5-14.8 | 14.5-14.8 | 21.0-21.4 | 20.0-21.4 | 20.2-21.4 | 20.0-21.4 |
| VOL. FILTERED (M3) | 796.6 | 754.0 | 582.5 | 2,133.1 | 646.1 | 736.5, | 707.9 | 2,090.5 |
| TOTAL EGGS | .008 | | .005 | .004 | .005 | .255 | .014 | .096 |
| TOTAL LARVAE | .009 | .005 | .045 | .017 | 3.360 | 2.934 | 1.530 | 2.590 |
| TOTAL YOUNG | | | | | .003 | .001 | .001 | .002 |
| EGGS: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | .002 | * | | | | |
| ALOSA SPP. | .001 | | | * | | | | |
| A. MITCHILLI | | | .002 | * | .002 | .255 | .014 | .095 |
| CARASSIUS/CYPRINUS | .001 | | | * | | | | |
| MEMBRAS/MENIDIA SPP. | | | | | .003 | | | .001 |
| M. AMERICANA | .005 | | .002 | .002 | | | | |
| LARVAE: | | | | | | | | |
| UNIDENTIFIABLE FISH | | | .005 | .001 | | .081 | | .029 |
| ALOSA SPP. | | .001 | .002 | .001 | .006 | .001 | | .002 |
| A. MITCHILLI | | | | | .687 | 2.178 | 1.168 | 1.375 |
| CYPRINIDAE | | | | | .012 | .001 | .004 | .006 |
| CARASSIUS/CYPRINUS | | | | | .005 | | | .001 |
| MEMBRAS/MENIDIA SPP. | | | | | .009 | .005 | .001 | .005 |
| MORONE SPP. | | | .005 | .001 | .003 | | .001 | .001 |
| M. AMERICANA | .004 | .004 | .019 | .008 | .029 | .004 | .016 | .016 |
| M. SAXATILIS | .005 | | .014 | .006 | .003 | | .001 | .001 |
| C. REGALIS | | | | | 2.603 | .659 | .331 | 1.149 |
| P. CROMIS | | | | | .002 | .001 | | .001 |
| G. BOSCI | | | | | | .003 | .006 | .003 |
| S. AQUOSUS | | | | | | | .001 | * |
| YOUNG: | | | | | | | | |
| A. ROSTRATA | | | | | | | .001 | * |
| S. FUSCUS | | | | | | .001 | | * |
| C. REGALIS | | | | | .002 | | | * |
| S. AQUOSUS | | | | | .002 | | | * |

* = BELOW REPORTABLE LEVEL

IA SALEM IP 1978

TABLE 3.1.2-7
CONTINUED

| DATE | 06/28/78 | | | | 07/12/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | EAST | MIDRIVER | WEST | TOTAL | EAST | MIDRIVER | WEST | TOTAL |
| NO. OF SAMPLES | 9 | 9 | 8 | 26 | 9 | 9 | 8 | 26 |
| SAL. RANGE (PPT) | 2.0- 5.0 | 3.0- 5.0 | 2.0- 4.5 | 2.0- 5.0 | 3.0- 5.0 | 4.0- 5.0 | 2.5- 6.0 | 2.5- 6.0 |
| TEMP. RANGE (C) | 24.0-25.9 | 25.1-27.0 | 25.0-26.0 | 24.0-27.0 | 24.8-26.0 | 23.2-24.5 | 23.4-26.0 | 23.2-26.0 |
| VOL. FILTERED (M3) | 609.3 | 571.8 | 560.4 | 1,741.5 | 660.4 | 786.1 | 732.6 | 2,179.1 |
| TOTAL EGGS | .235 | 6.852 | .728 | 2.566 | 2.229 | 1.395 | 1.603 | 1.718 |
| TOTAL LARVAE | 2.857 | 3.655 | 2.161 | 2.895 | 3.493 | 14.127 | 10.693 | 9.817 |
| TOTAL YOUNG | .061 | .012 | .023 | .033 | .023 | .011 | .015 | .016 |
| EGGS: | | | | | | | | |
| A. MITCHILLI | .230 | 6.852 | .728 | 2.564 | 2.227 | 1.395 | 1.603 | 1.717 |
| MEMBRAS/MENIDIA SPP. | .005 | | | .002 | | | | |
| T. MACULATUS | | | | | .002 | | | * |
| LARVAE: | | | | | | | | |
| UNIDENTIFIABLE FISH | | .002 | | .001 | | | | |
| A. MITCHILLI | 2.378 | 3.300 | 1.913 | 2.531 | 2.848 | 11.651 | 10.534 | 8.606 |
| MEMBRAS/MENIDIA SPP. | .002 | .003 | .020 | .008 | .002 | .009 | .004 | .005 |
| C. REGALIS | .199 | .103 | .064 | .124 | .312 | 1.679 | .248 | .764 |
| P. CROMIS | | | .002 | .001 | | | | |
| G. BOSCI | .279 | .247 | .162 | .231 | .321 | .767 | .093 | .405 |
| T. MACULATUS | | | | | .011 | .020 | .014 | .015 |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | | | | | .006 | .005 | | .004 |
| M. MENIDIA | | | .002 | .001 | | | | |
| S. FUSCUS | .005 | | | .002 | .003 | .001 | | .001 |
| C. REGALIS | .054 | .012 | .021 | .030 | .014 | .004 | .015 | .011 |
| L. XANTHURUS | .002 | | | .001 | | | | |
| G. BOSCI | | | | | | .001 | | * |

* = BELOW REPORTABLE LEVEL

IA SALEM IP' 1978

TABLE 3.1.2-7
CONTINUED

| DATE | 07/27/78 | | | | 08/10/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | EAST | MIDRIVER | WEST | TOTAL | EAST | MIDRIVER | WEST | TOTAL |
| NO. OF SAMPLES | 9 | 9 | 8 | 26 | 9 | 9 | 8 | 26 |
| SAL. RANGE (PPT) | 6.5- 7.5 | 5.0- 8.0 | 5.0- 7.0 | 5.0- 8.0 | 3.0- 5.0 | 5.0- 6.0 | 3.0- 6.0 | 3.0- 6.0 |
| TEMP. RANGE (C) | 27.0-28.0 | 26.7-27.0 | 26.4-27.5 | 26.4-28.0 | 27.0-27.6 | 26.2-26.7 | 26.3-27.0 | 26.2-27.6 |
| VOL. FILTERED (M3) | 434.6 | 482.2 | 591.4 | 1,508.2 | 648.7 | 690.2 | 768.1 | 2,107.0 |
| TOTAL EGGS | 1.102 | 1.348 | .210 | .831 | .432 | .155 | .005 | .186 |
| TOTAL LARVAE | 2.358 | .543 | 7.689 | 3.868 | 1.417 | .714 | .893 | .996 |
| TOTAL YOUNG | .021 | | .003 | .007 | .002 | .001 | .004 | .002 |
| EGGS: | | | | | | | | |
| A. MITCHILLI | 1.102 | 1.348 | .208 | .830 | .432 | .155 | .005 | .186 |
| MEMBRAS/MENIDIA SPP. | | | .002 | .001 | | | | |
| LARVAE: | | | | | | | | |
| A. MITCHILLI | 1.914 | .340 | 7.369 | 3.550 | 1.255 | .653 | .811 | .896 |
| MEMBRAS/MENIDIA SPP. | .007 | .002 | .110 | .046 | .011 | | .029 | .014 |
| C. REGALIS | .055 | .058 | .059 | .058 | .005 | .010 | .001 | .005 |
| G. BOSCI | .368 | .129 | .134 | .200 | .129 | .039 | .044 | .069 |
| T. MACULATUS | .014 | .015 | .017 | .015 | .017 | .012 | .008 | .012 |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | .021 | | .003 | .007 | | | .001 | * |
| S. FUSCUS | | | | | .002 | | .001 | .001 |
| C. REGALIS | | | | | | .001 | | * |
| G. BOSCI | | | | | | | .001 | * |

* = BELOW REPORTABLE LEVEL

IA SALEM IP 1978

TABLE 3.1.2-7
CONTINUED

| DATE | 08/31/78 | | | | 09/13/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | EAST | MIDRIVER | WEST | TOTAL | EAST | MIDRIVER | WEST | TOTAL |
| NO. OF SAMPLES | 9 | 9 | 8 | 26 | 9 | 9 | 8 | 26 |
| SAL. RANGE (PPT) | 6.0- 9.5 | 6.5-10.0 | 5.0- 9.5 | 5.0-10.0 | 4.5- 5.5 | 5.5- 9.0 | 4.5- 8.0 | 4.5- 9.0 |
| TEMP. RANGE (C) | 26.1-27.2 | 26.3-26.8 | 26.1-27.9 | 26.1-27.9 | 24.0-26.4 | 24.0-24.5 | 23.0-25.0 | 23.0-26.4 |
| VOL. FILTERED (M3) | 686.6 | 661.7 | 669.4 | 2,017.7 | 587.3 | 713.0 | 636.8 | 1,937.1 |
| TOTAL EGGS | .004 | .048 | .015 | .022 | | .006 | .002 | .003 |
| TOTAL LARVAE | .026 | .006 | .034 | .022 | .014 | .024 | .039 | .026 |
| TOTAL YOUNG | .003 | .003 | .001 | .002 | .010 | .006 | .019 | .011 |
| EGGS: | | | | | | | | |
| A. MITCHILLI | .004 | .048 | .015 | .022 | | .006 | .002 | .003 |
| LARVAE: | | | | | | | | |
| A. MITCHILLI | .023 | .002 | .028 | .018 | .009 | .024 | .039 | .024 |
| SCIAENIDAE | | | | | .002 | | | .001 |
| G. BOSCI | .003 | .005 | .006 | .004 | .003 | | | .001 |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | | | .001 | * | .009 | | .017 | .008 |
| S. FUSCUS | | .002 | | * | .002 | .006 | .002 | .003 |
| C. REGALIS | .003 | .002 | | .001 | | | | |

* = BELOW REPORTABLE LEVEL

IA SALEM IP 1978

TABLE 3.1.2-7

CONTINUED

| DATE | 10/26/78 | | | | 11/21/78 | | | |
|---|---|---|---|---|---|---|---|---|
| LOCATION | EAST | MIDRIVER | WEST | TOTAL | EAST | MIDRIVER | WEST | TOTAL |
| NO. OF SAMPLES | 9 | 9 | 8 | 26 | 7 | 9 | 8 | 24 |
| SAL. RANGE (PPT) | 6.0-11.0 | 9.5-12.0 | 5.5-12.0 | 5.5-12.0 | 6.0- 8.0 | 7.0- 9.0 | 5.5- 8.0 | 5.5- 9.0 |
| TEMP. RANGE (C) | 13.8-14.0 | 14.0-14.0 | 13.9-14.1 | 13.8-14.1 | 9.5-11.8 | 11.0-11.1 | 9.8-10.6 | 9.5-11.8 |
| VOL. FILTERED (M3) | 717.5 | 672.8 | 683.3 | 2,073.6 | 341.1 | 570.3 | 625.4 | 1,536.8 |
| TOTAL EGGS | | | | | | | | |
| TOTAL LARVAE | .001 | .001 | .012 | .005 | | | | |
| TOTAL YOUNG | | | .001 | * | .015 | .005 | .003 | .007 |
| LARVAE: | | | | | | | | |
| A. MITCHILLI | .001 | .001 | .012 | .005 | | | | |
| YOUNG: | | | | | | | | |
| A. MITCHILLI | | | | | .015 | .002 | .003 | .005 |
| S. FUSCUS | | | .001 | * | | .002 | | .001 |
| M. UNDULATUS | | | | | | .002 | | .001 |

| DATE | 11/22/78 | | | |
|---|---|---|---|---|
| LOCATION | EAST | MIDRIVER | WEST | TOTAL |
| NO. OF SAMPLES | 2 | | | 2 |
| SAL. RANGE (PPT) | 9.0-10.0 | - - - | - - - | 9.0-10.0 |
| TEMP. RANGE (C) | 11.0-11.1 | - - - | - - - | 11.0-11.1 |
| VOL. FILTERED (M3) | 215.1 | 0.0 | 0.0 | 215.1 |
| TOTAL EGGS | | | | |
| TOTAL LARVAE | | | | |
| TOTAL YOUNG | | | | |

* = BELOW REPORTABLE LEVEL

IA SALEM IP 1978

TABLE 3.1.2-8
NUMBERS AND PERCENT VIABLE OF
FISH EGGS SUMMARIZED BY SPECIES, 1978

| | SURFACE | | | MIDDEPTH | | BOTTOM | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | No. of Eggs | Percent Viable | Mean Salinity (ppt) | No. of Eggs | Percent Viable | No. of Eggs | Percent Viable | Mean Salinity (ppt) | No. of Eggs | Percent Viable | Mean Salinity (ppt) |
| | | | | Bay anchovy, *Anchoa mitchilli* | | | | | | | |
| May 17 | | | 1.0 | | | 1 | 0.0 | 2.0 | 1 | 0.0 | 1.5 |
| June 15 | 1 | 0.0 | 1.8 | | | 198 | 32.8 | 2.9 | 199 | 33.7 | 2.4 |
| June 28 | 250 | 2.8 | 3.6 | 424 | 6.4 | 3,968 | 15.9 | 3.7 | 4,642 | 14.2 | 3.5 |
| July 12 | 1,771 | 7.9 | 4.3 | 430 | 5.1 | 4,828 | 13.2 | 4.6 | 7,029 | 11.4 | 4.5 |
| July 27 | 293 | 22.9 | 6.4 | 421 | 16.6 | 592 | 32.6 | 7.00 | 1,306 | 25.2 | 6.7 |
| August 10 | 127 | 22.0 | 5.1 | 6 | 0.0 | 260 | 9.2 | 5.4 | 393 | 13.2 | 5.3 |
| August 31 | | | 7.2 | 2 | 0.0 | 46 | 2.2 | 8.5 | 48 | 2.1 | 7.9 |
| September 13 | 1 | 0.0 | 7.0 | 1 | 0.0 | 4 | 0.0 | 7.4 | 6 | 0.0 | 7.2 |
| Total | 2,443 | 9.9 | 4.6 | 1,284 | 8.6 | 9,897 | 15.7 | 5.2 | 13,624 | 14.0 | 4.9 |
| | | | | Silversides, *Membras* sp./*Menidia* spp. | | | | | | | |
| June 15 | | | 0.0 | | | 2 | 100.0 | 0.5 | 2 | 100.0 | 0.3 |
| June 28 | 1 | 100.0 | 3.0 | | | 2 | 100.0 | 3.0 | 3 | 100.0 | 3.0 |
| July 27 | | | 6.5 | | | 3 | 100.0 | 6.3 | 3 | 100.0 | 6.4 |
| Total | 1 | 100.0 | 3.2 | | | 7 | 100.0 | 3.3 | 8 | 100.0 | 3.2 |
| | | | | White perch, *Morone americana* | | | | | | | |
| May 17 | 4 | 16.7 | 1.7 | | | 2 | 0.0 | 2.0 | 6 | 8.3 | 1.8 |
| | | | | Striped bass, *Morone saxatilis* | | | | | | | |
| April 20 | 10 | 0.0 | 4.3 | 2 | 0.0 | 5 | 0.0 | 4.6 | 17 | 0.0 | 4.4 |
| | | | | Weakfish, *Cynoscion regalis* | | | | | | | |
| July 12 | 1 | 0.0 | 5.0 | | | 1 | 100.0 | 7.0 | 2 | 50.0 | 7.0 |
| | | | | Hogchoker, *Trinectes maculatus* | | | | | | | |
| July 12 | 1 | 100.0 | 5.0 | | | | | 5.0 | 1 | 100.0 | 5.0 |

TABLE 3.1.2-9
COMPARISON OF COMBINED CATCH OF ICHTHYOPLANKTON TAKEN FROM 1971 THROUGH 1978

| SPECIES | 1971 N | 1971 RANK | 1971 PERCENT OF TOTAL | 1971 N/C | 1972 N | 1972 RANK | 1972 PERCENT OF TOTAL | 1972 N/C |
|---|---|---|---|---|---|---|---|---|
| A. MITCHILLI | 7,741 | 1 | 82.3 | 11.4 | 23,705 | 1 | 87.0 | 26.9 |
| G. BOSCI | 632 | 2 | 6.7 | 0.9 | 1,444 | 2 | 5.3 | 1.6 |
| ALOSA SPP. | 268 | 3 | 2.8 | 0.4 | 188 | 8 | 0.7 | 0.2 |
| B. TYRANNUS | 186 | 4 | 2.0 | 0.3 | 329 | 4 | 1.2 | 0.4 |
| C. REGALIS | 168 | 5 | 1.8 | 0.2 | 317 | 5 | 1.2 | 0.3 |
| M. MENIDIA | 95 | 6 | 1.0 | 0.1 | 9 | | <0.1 | <0.1 |
| S. FUSCUS | 78 | 7 | 0.8 | 0.1 | 34 | | 0.1 | <0.1 |
| MEMBRAS/MENIDIA SPP. | 39 | 8 | 0.4 | <0.1 | 26 | | <0.1 | <0.1 |
| A. AESTIVALIS | 35 | 9 | 0.4 | <0.1 | 64 | | 0.2 | <0.1 |
| T. MACULATUS | 31 | 10 | 0.3 | <0.1 | 0 | | 0 | 0 |
| M. AMERICANA | 29 | | 0.3 | <0.1 | 155 | 9 | 0.5 | 0.2 |
| A. PSEUDOHARENGUS | 25 | | 0.2 | <0.1 | 20 | | <0.1 | <0.1 |
| B. CHRYSURA | 19 | | 0.2 | <0.1 | 0 | | 0 | 0 |
| M. UNDULATUS | 15 | | 0.1 | <0.1 | 0 | | 0 | 0 |
| M. SAXATILIS | 12 | | 0.1 | <0.1 | 210 | 6 | 0.8 | 0.2 |
| FUNDULUS SPP. | 6 | | <0.1 | <0.1 | 346 | 3 | 1.3 | 0.4 |
| MORONE SPP. | 5 | | <0.1 | <0.1 | 202 | 7 | 0.7 | 0.2 |
| M. BERYLLINA | 4 | | <0.1 | <0.1 | 3 | | <0.1 | <0.1 |
| A. ROSTRATA | 4 | | <0.1 | <0.1 | 110 | 10 | 0.4 | 0.1 |
| L. XANTHURUS | 2 | | <0.1 | <0.1 | 24 | | <0.1 | <0.1 |
| F. HETEROCLITUS | 1 | | <0.1 | <0.1 | 0 | | 0 | 0 |
| C. HIPPOS | 1 | | <0.1 | <0.1 | 0 | | 0 | 0 |
| P. SALTATRIX | 1 | | <0.1 | <0.1 | 4 | | <0.1 | <0.1 |
| P. EVOLANS | 1 | | <0.1 | <0.1 | 0 | | 0 | 0 |
| P. TRIACANTHUS | 1 | | <0.1 | <0.1 | 0 | | 0 | 0 |
| H. NUCHALIS | 0 | | 0 | 0 | 25 | | <0.1 | <0.1 |
| M. MARTINICA | 0 | | 0 | 0 | 8 | | <0.1 | <0.1 |
| P. AMERICANUS | 0 | | 0 | 0 | 5 | | <0.1 | <0.1 |
| I. NEBULOSUS | 0 | | 0 | 0 | 1 | | <0.1 | <0.1 |
| S. AQUOSUS | 0 | | 0 | 0 | 1 | | <0.1 | <0.1 |
| P. FLAVESCENS | 0 | | 0 | 0 | 0 | | 0 | 0 |
| G. ACULEATUS | 0 | | 0 | 0 | 0 | | 0 | 0 |
| D. CEPEDIANUM | 0 | | 0 | 0 | 0 | | 0 | 0 |
| O. TAU | 0 | | 0 | 0 | 0 | | 0 | 0 |
| P. DENTATUS | 0 | | 0 | 0 | 0 | | 0 | 0 |
| E. MICROSTOMUS | 0 | | 0 | 0 | 0 | | 0 | 0 |
| P. MARINUS | 0 | | 0 | 0 | 0 | | 0 | 0 |
| CLUPEIDAE | 0 | | 0 | 0 | 0 | | 0 | 0 |
| CYPRINIDAE | 0 | | 0 | 0 | 0 | | 0 | 0 |
| TOTAL | 9,398 | | 100.0 | 13.9 | 27,230 | | 100.0 | 30.9 |

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TABLE 3.1.2-9
CONTINUED

| SPECIES | 1973 N | 1973 RANK | 1973 PERCENT OF TOTAL | 1973 N/M3 | 1973 N/C | 1974 N | 1974 RANK | 1974 PERCENT OF TOTAL | 1974 N/M3 | 1974 N/C |
|---|---|---|---|---|---|---|---|---|---|---|
| A. MITCHILLI | 19,623 | 1 | 82.9 | 0.253 | 40.5 | 348,084 | 1 | 95.4 | 3.661 | 407.1 |
| G. BOSCI | 1,776 | 2 | 7.5 | 0.023 | 3.7 | 14,094 | 2 | 3.9 | 0.148 | 16.5 |
| ALOSA SPP. | 17 | | <0.1 | <0.001 | <0.1 | 34 | | <0.1 | <0.001 | <0.1 |
| B. TYRANNUS | 11 | | <0.1 | <0.001 | <0.1 | 158 | 9 | <0.1 | 0.002 | 0.2 |
| C. REGALIS | 146 | 6 | 0.6 | 0.002 | 0.3 | 835 | 3 | 0.2 | 0.009 | 1.0 |
| M. MENIDIA | 48 | | 0.2 | <0.001 | 0.1 | 13 | | <0.1 | <0.001 | <0.1 |
| S. FUSCUS | 70 | 9 | 0.3 | <0.001 | 0.1 | 177 | 8 | <0.1 | 0.002 | 0.2 |
| MEMBRAS/MENIDIA SPP. | 96 | 7 | 0.4 | 0.001 | 0.2 | 9 | | <0.1 | <0.001 | <0.1 |
| A. AESTIVALIS | 3 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| T. MACULATUS | 10 | | <0.1 | <0.001 | <0.1 | 73 | | <0.1 | 0.001 | 0.1 |
| M. AMERICANA | 83 | 8 | 0.3 | 0.001 | 0.2 | 333 | 4 | 0.1 | 0.004 | 0.4 |
| A. PSEUDOHARENGUS | 3 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| B. CHRYSURA | 2 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| M. UNDULATUS | 326 | 4 | 1.4 | 0.004 | 0.7 | 180 | 7 | 0.1 | 0.002 | 0.2 |
| M. SAXATILIS | 52 | | 0.2 | <0.001 | 0.1 | 196 | 6 | 0.1 | 0.002 | 0.2 |
| FUNDULUS SPP. | 1,148 | 3 | 4.8 | 0.015 | 2.4 | 4 | | <0.1 | <0.001 | <0.1 |
| MORONE SPP. | 168 | 5 | 0.7 | 0.002 | 0.3 | 2 | | <0.1 | <0.001 | <0.1 |
| M. BERYLLINA | 0 | | 0 | 0 | 0 | 3 | | <0.1 | <0.001 | <0.1 |
| A. ROSTRATA | 62 | 10 | 0.3 | <0.001 | 0.1 | 313 | 5 | 0.1 | 0.003 | 0.4 |
| L. XANTHURUS | 26 | | 0.1 | <0.001 | <0.1 | 27 | | <0.1 | <0.001 | <0.1 |
| F. HETEROCLITUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| C. HIPPOS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. SALTATRIX | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| P. EVOLANS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. TRIACANTHUS | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| H. NUCHALIS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| M. MARTINICA | 0 | | 0 | 0 | 0 | 97 | 10 | <0.1 | 0.001 | 0.1 |
| P. AMERICANUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| I. NEBULOSUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| S. AQUOSUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. FLAVESCENS | 2 | | <0.1 | <0.001 | <0.1 | 9 | | <0.1 | <0.001 | <0.1 |
| G. ACULEATUS | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| D. CEPEDIANUM | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| O. TAU | 0 | | 0 | 0 | 0 | 7 | | <0.1 | <0.001 | <0.1 |
| P. DENTATUS | 0 | | 0 | 0 | 0 | 5 | | <0.1 | <0.001 | <0.1 |
| E. MICROSTOMUS | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| P. MARINUS | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| CLUPEIDAE | 0 | | 0 | 0 | 0 | 9 | | <0.1 | <0.001 | <0.1 |
| CYPRINIDAE | 0 | | 0 | 0 | 0 | 23 | | <0.1 | <0.001 | <0.1 |
| TOTAL | 23,674 | | 100.0 | 0.306 | 48.9 | 364,689 | | 100.0 | 3.836 | 426.5 |

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TABLE 3.1.2-9
CONTINUED

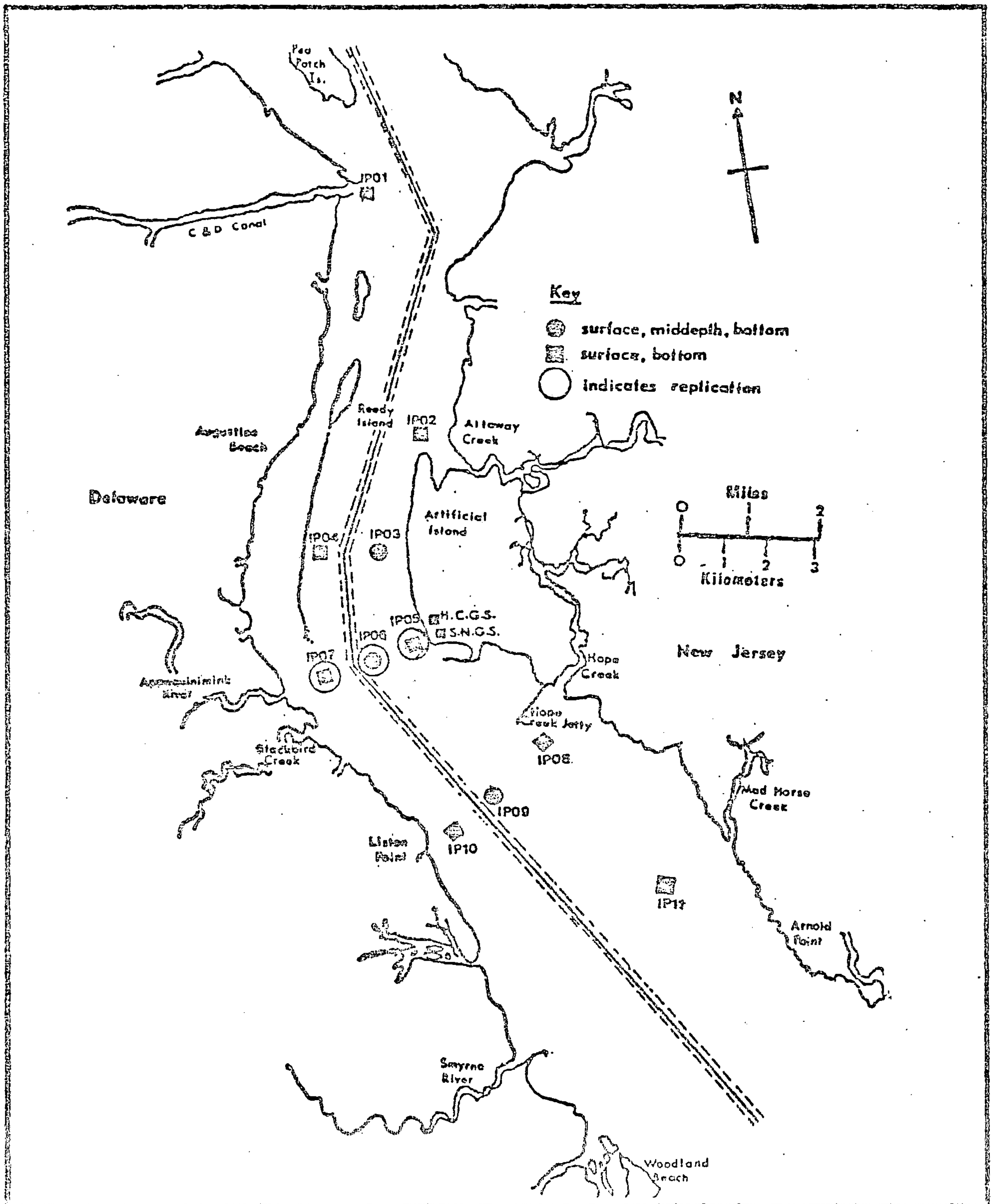
| SPECIES | 1975 N | 1975 RANK | 1975 PERCENT OF TOTAL | 1975 N/M3 | 1975 N/C | 1976 N | 1976 RANK | 1976 PERCENT OF TOTAL | 1976 N/M3 | 1976 N/C |
|---|---|---|---|---|---|---|---|---|---|---|
| A. MITCHILLI | 94,920 | 1 | 77.3 | 1.202 | 97.7 | 191,672 | 1 | 90.9 | 4.860 | 334.5 |
| G. BOSCI | 24,462 | 2 | 19.9 | 0.310 | 25.2 | 17,588 | 2 | 8.3 | 0.446 | 30.7 |
| ALOSA SPP. | 52 | 9 | <0.1 | 0.001 | 0.1 | 66 | 9 | <0.1 | 0.002 | 0.1 |
| B. TYRANNUS | 49 | 10 | <0.1 | 0.001 | 0.1 | 144 | 5 | 0.1 | 0.004 | 0.2 |
| C. REGALIS | 1,640 | 3 | 1.3 | 0.021 | 1.7 | 302 | 4 | 0.1 | 0.008 | 0.5 |
| M. MENIDIA | 25 | | <0.1 | <0.001 | <0.1 | 5 | | <0.1 | <0.001 | <0.1 |
| S. FUSCUS | 90 | 8 | 0.1 | 0.001 | 0.1 | 36 | | <0.1 | 0.001 | 0.1 |
| MEMBRAS/MENIDIA SPP. | 116 | 7 | 0.1 | 0.001 | 0.1 | 68 | 8 | <0.1 | 0.002 | 0.1 |
| A. AESTIVALIS | 12 | | <0.1 | <0.001 | <0.1 | 9 | | <0.1 | <0.001 | <0.1 |
| T. MACULATUS | 7 | | <0.1 | <0.001 | <0.1 | 6 | | <0.1 | <0.001 | <0.1 |
| M. AMERICANA | 15 | | <0.1 | <0.001 | <0.1 | 24 | | <0.1 | 0.001 | <0.1 |
| A. PSEUDOHARENGUS | 2 | | <0.1 | <0.001 | <0.1 | 1 | | <0.1 | <0.001 | <0.1 |
| B. CHRYSURA | 4 | | <0.1 | <0.001 | <0.1 | 5 | | <0.1 | <0.001 | <0.1 |
| M. UNDULATUS | 501 | 5 | 0.4 | 0.006 | 0.5 | 624 | 3 | 0.3 | 0.016 | 1.1 |
| M. SAXATILIS | 44 | | <0.1 | 0.001 | <0.1 | 27 | | <0.1 | <0.001 | <0.1 |
| FUNDULUS SPP. | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| MORONE SPP. | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| M. BERYLLINA | 160 | 6 | 0.1 | 0.002 | 0.2 | 91 | 7 | <0.1 | 0.002 | 0.2 |
| A. ROSTRATA | 614 | 4 | 0.5 | 0.008 | 0.6 | 51 | | <0.1 | 0.001 | 0.1 |
| L. XANTHURUS | 40 | | <0.1 | 0.001 | <0.1 | 53 | 10 | <0.1 | 0.001 | 0.1 |
| F. HETEROCLITUS | 0 | | 0 | 0 | 0 | 4 | | <0.1 | <0.001 | <0.1 |
| C. HIPPOS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. SALTATRIX | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. EVOLANS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. TRIACANTHUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| H. NUCHALIS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| M. MARTINICA | 71 | | 0.1 | 0.001 | 0.1 | 107 | 6 | <0.1 | 0.003 | 0.2 |
| P. AMERICANUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| I. NEBULOSUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| S. AQUOSUS | 3 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| P. FLAVESCENS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| G. ACULEATUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| D. CEPEDIANUM | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| O. TAU | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. DENTATUS | 3 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| E. MICROSTOMUS | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| P. MARINUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| CLUPEIDAE | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| CYPRINIDAE | 21 | | <0.1 | <0.001 | <0.1 | 4 | | <0.1 | <0.001 | <0.1 |
| LEPOMIS SP. | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| P. CROMIS | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| AMMODYTES SP. | 5 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| R. MARGINATA | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| SCIAENIDAE | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| TOTAL | 122,861 | | 100.0 | 1.556 | 126.4 | 210,890 | | 100.0 | 5.347 | 368.0 |

IA SALEM IP 1978

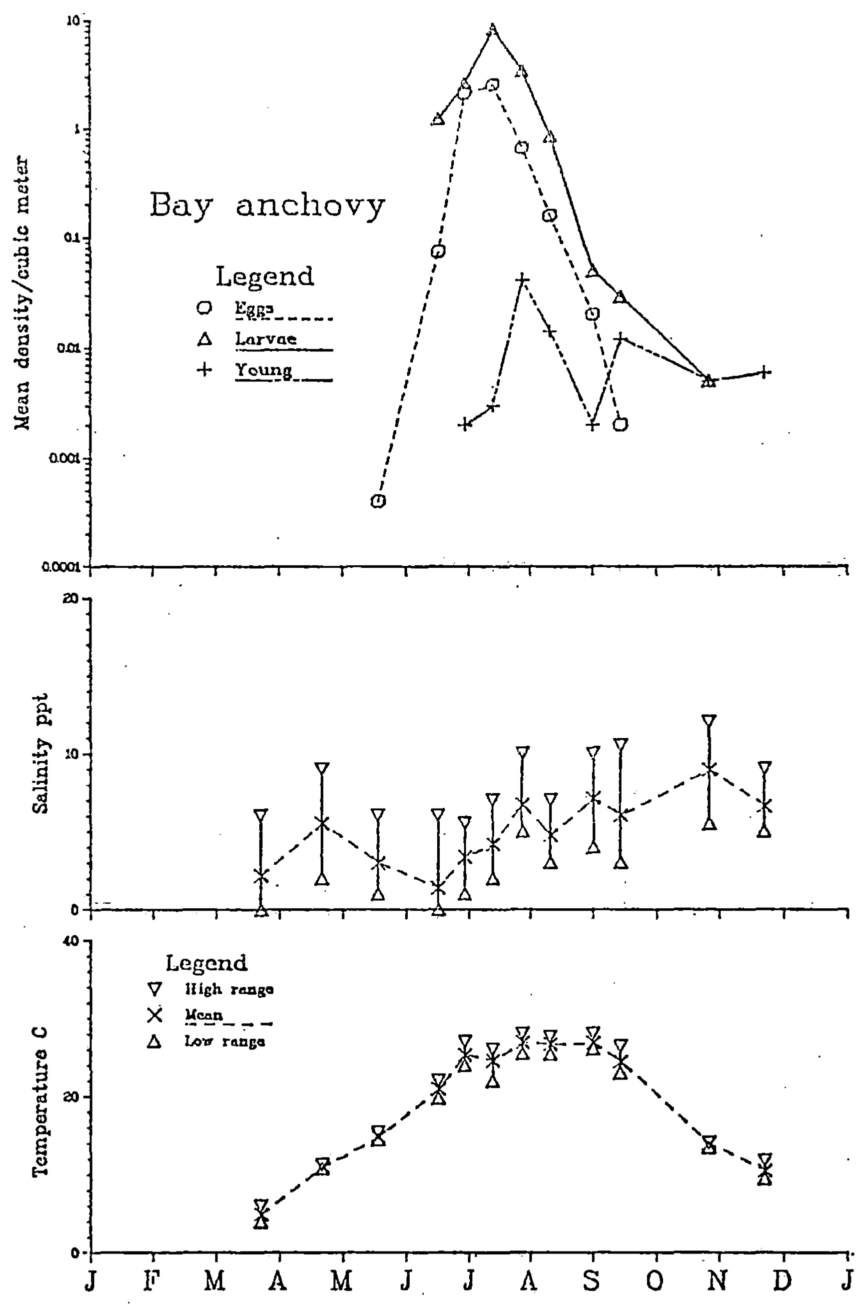
TABLE 3.1[illegible]
CONTINUED

| SPECIES | 1977 (OPERATIONAL) N | RANK | PERCENT OF TOTAL | N/M3 | N/C | 1978 (OPERATIONAL) N | RANK | PERCENT OF TOTAL | N/M3 | N/C |
|---|---|---|---|---|---|---|---|---|---|---|
| A. MITCHILLI | 884,228 | 1 | 97.7 | 24.626 | 1,761.4 | 55,230 | 1 | 87.9 | 1.868 | 144.2 |
| G. BOSCI | 4,340 | 3 | 0.5 | 0.121 | 8.6 | 2,241 | 3 | 3.6 | 0.076 | 5.9 |
| ALOSA SPP. | 1 | | <0.1 | <0.001 | <0.1 | 31 | 9 | <0.1 | 0.001 | 0.1 |
| B. TYRANNUS | 224 | 6 | <0.1 | 0.006 | 0.4 | 0 | | 0 | 0 | 0 |
| C. REGALIS | 14,844 | 2 | 1.6 | 0.413 | 29.6 | 4,796 | 2 | 7.6 | 0.162 | 12.5 |
| M. MENIDIA | 10 | | <0.1 | <0.001 | <0.1 | 1 | | <0.1 | <0.001 | <0.1 |
| S. FUSCUS | 129 | 7 | <0.1 | 0.004 | 0.3 | 20 | 10 | <0.1 | <0.001 | <0.1 |
| MEMBRAS/MENIDIA SPP. | 884 | 4 | 0.1 | 0.025 | 1.8 | 190 | 4 | 0.30 | 0.006 | 0.50 |
| A. AESTIVALIS | 3 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| T. MACULATUS | 394 | 5 | <0.1 | 0.011 | 0.8 | 94 | 5.5 | 0.15 | 0.003 | 0.24 |
| M. AMERICANA | 6 | | <0.1 | <0.001 | <0.1 | 94 | 5.5 | 0.15 | 0.003 | 0.24 |
| A. PSEUDOHARENGUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| B. CHRYSURA | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| M. UNDULATUS | 91 | 9 | <0.1 | 0.003 | 0.2 | 2 | | <0.1 | <0.001 | <0.1 |
| M. SAXATILIS | 67 | 10 | <0.1 | 0.001 | 0.1 | 45 | 7 | <0.1 | 0.002 | 0.12 |
| FUNDULUS SPP. | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| MORONE SPP. | 6 | | <0.1 | <0.001 | <0.1 | 10 | | <0.1 | <0.001 | <0.1 |
| M. BERYLLINA | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| A. ROSTRATA | 100 | 8 | <0.1 | 0.003 | 0.2 | 18 | | <0.1 | <0.001 | <0.1 |
| L. XANTHURUS | 27 | | <0.1 | 0.001 | <0.1 | 1 | | <0.1 | <0.001 | <0.1 |
| F. HETEROCLITUS | 3 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| C. HIPPOS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. SALTATRIX | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. EVOLANS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. TRIACANTHUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| M. MARTINICA | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. AMERICANUS | 2 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| I. NEBULOSUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| S. AQUOSUS | 11 | | <0.1 | <0.001 | <0.1 | 2 | | <0.1 | <0.001 | <0.1 |
| P. FLAVESCENS | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| G. ACULEATUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| D. CEPEDIANUM | 3 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| O. TAU | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. DENTATUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| E. MICROSTOMUS | 1 | | <0.1 | <0.001 | <0.1 | 0 | | 0 | 0 | 0 |
| P. MARINUS | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| CLUPEIDAE | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| CYPRINIDAE | 0 | | 0 | 0 | 0 | 32 | 8 | 0.05 | 0.001 | <0.1 |
| LEPOMIS SP. | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| P. CROMIS | 1 | | <0.1 | <0.001 | <0.1 | 3 | | <0.1 | <0.001 | <0.1 |
| AMMODYTES SP. | 0 | | 0 | 0 | 0 | 4 | | <0.1 | <0.001 | <0.1 |
| R. MARGINATA | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| SCIAENIDAE | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| CARASSIUS SP./CYPRINUS SP. | 0 | | 0 | 0 | 0 | 4 | | <0.1 | <0.001 | <0.1 |
| C. COMMERSONI | 0 | | 0 | 0 | 0 | 1 | | <0.1 | <0.001 | <0.1 |
| TOTAL | 905,376 | | 100.0 | 25.215 | 1803.5 | 62,820 | | 100.0 | 2.125 | 164.0 |

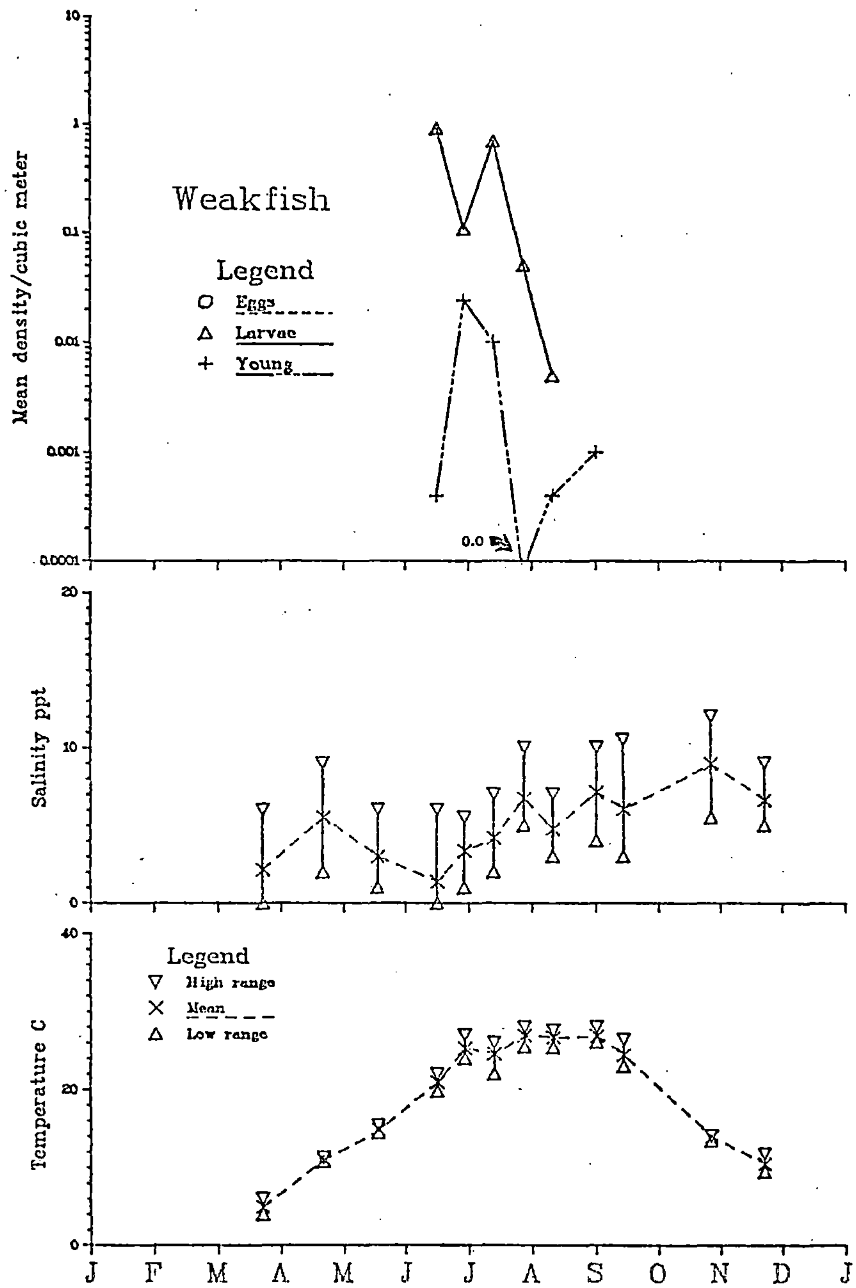
IA SALEM IP 1978



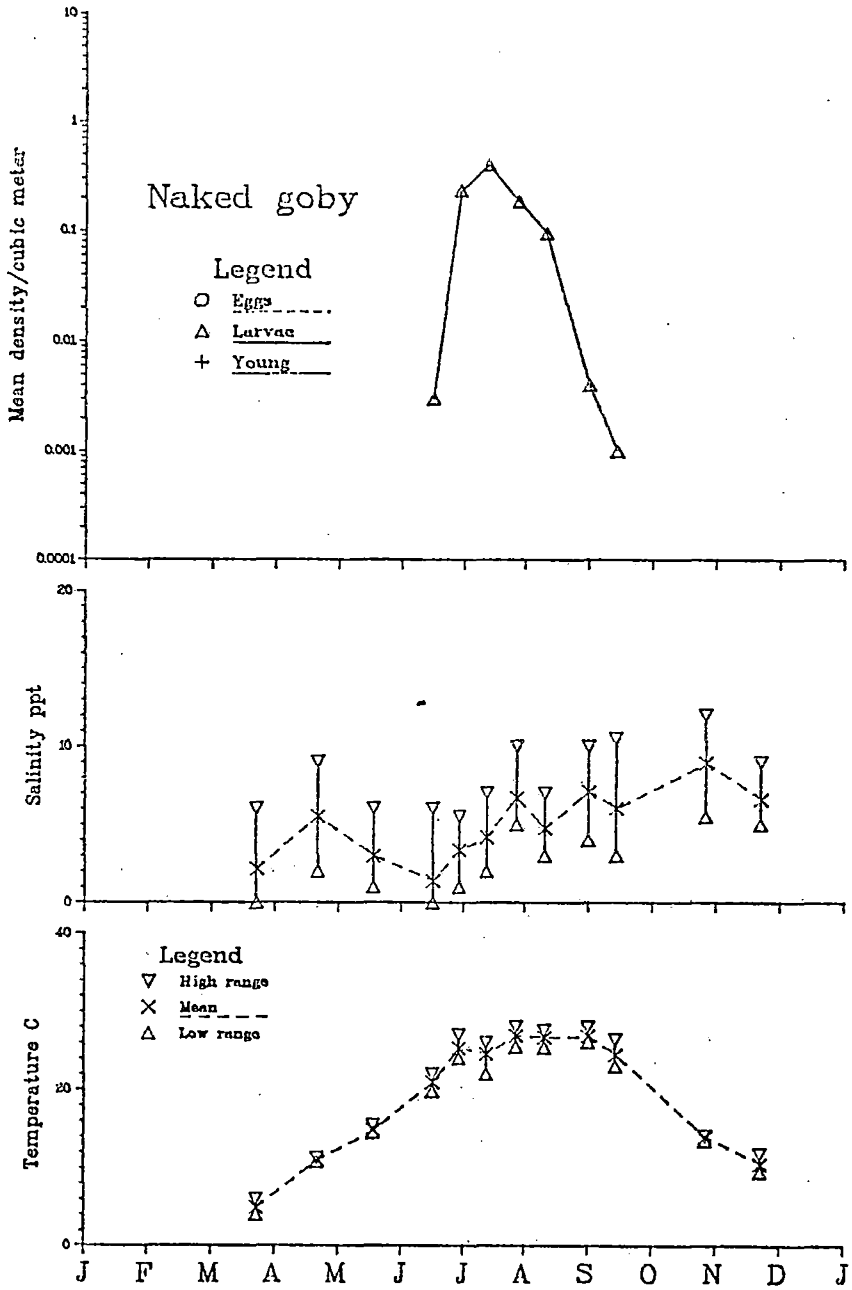

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Ichthyoplankton sampling stations - 1978 |
| | Figure 3.1.2-1 |



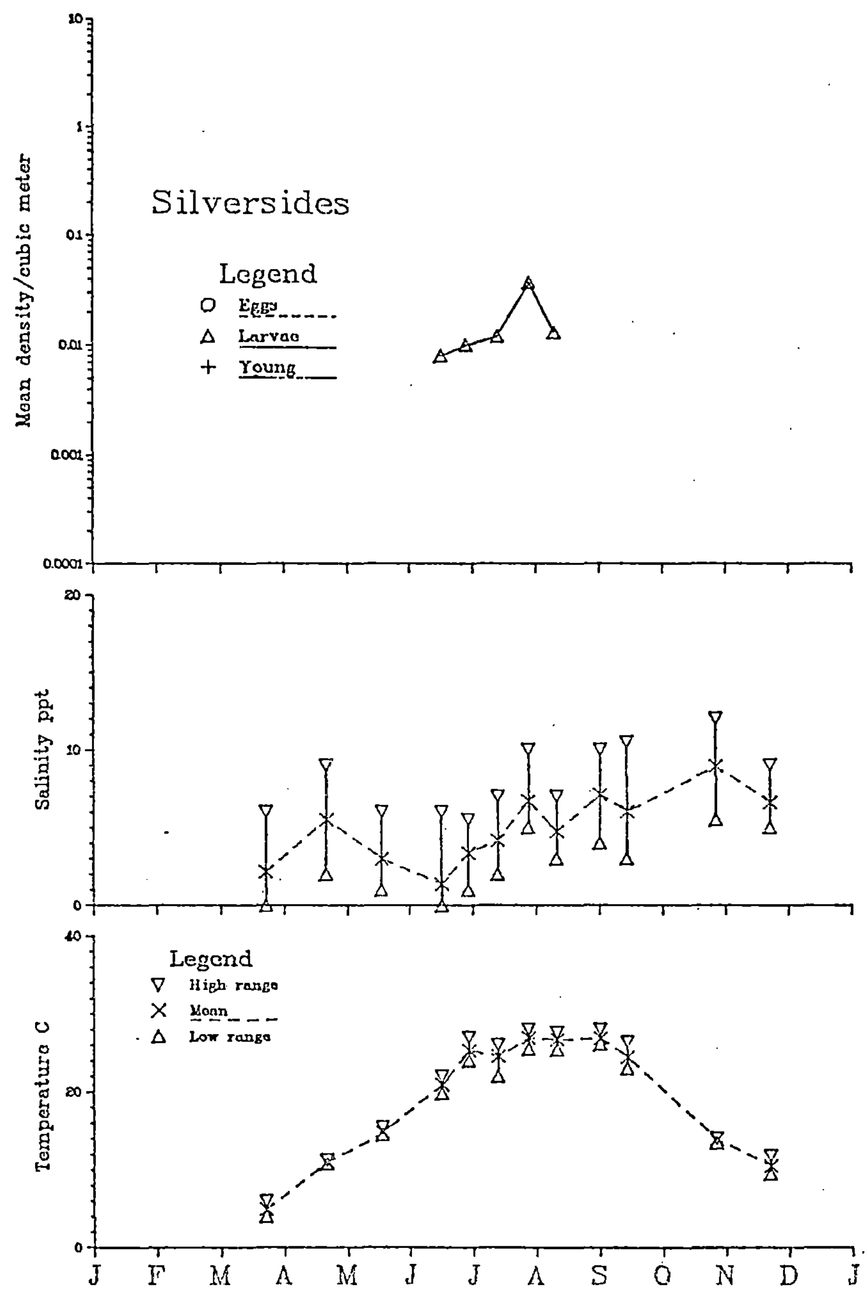

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of bay anchovy ichthyoplankton - 1978<br>Figure 3.1.2-2 |
|---|---|



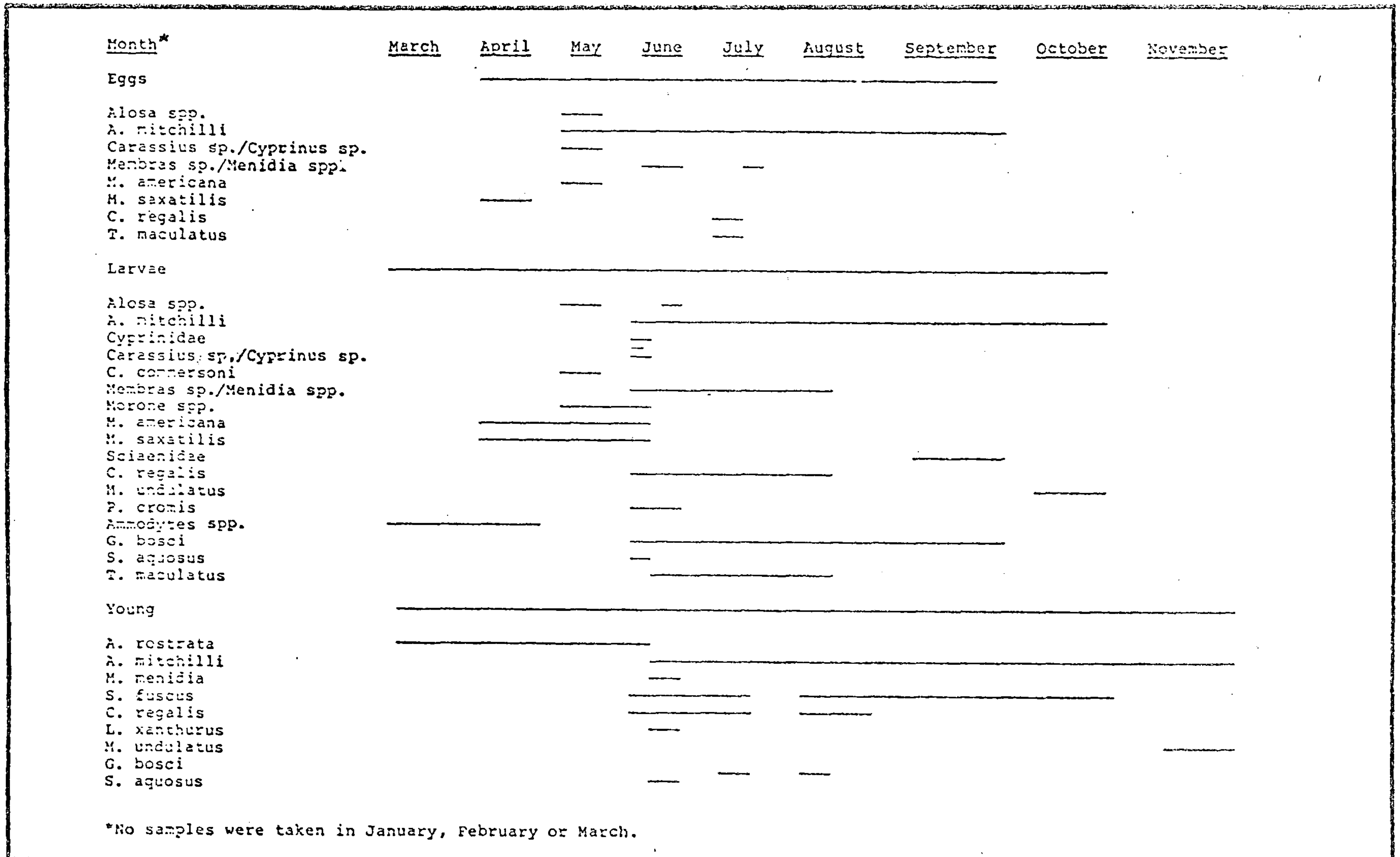

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of weakfish ichthyoplankton - 1978<br>Figure 3.1.2-3 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of naked goby ichthyoplankton - 1978<br><br>Figure 3.1.2-4 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY SALEM NUCLEAR GENERATING STATION | Temporal abundance of silversides ichthyoplankton - 1978 |
|---|---|
| | Figure 3.1.2-5 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal occurrence of ichthyoplankton-1978

Figure 3.1.2-6

## 3.1.3 Zooplankton (ETS Section 3.1.2.1.1c and d)

Quantitative zooplankton collections were made in the Delaware River near Salem on 32 sampling dates from March 22 through December 13, 1978. Objectives were to determine seasonal and spatial variation in microzooplankton and macroinvertebrate plankton composition and abundance immediately offshore of Artificial Island, in the region of the Salem Unit I thermal plume, and in regions to the north and south.

### 3.1.3.1 Summary

Microzooplankton are invertebrates not retained by a 0.5-mm mesh conical net but retained by a 0.08-mm mesh net; macroinvertebrates are retained on the 0.5-mm mesh net. One hundred fourteen invertebrate species were identified in the 681 microzooplankton and 335 macroinvertebrate plankton samples analyzed. Annual mean microzooplankton and macroinvertebrate plankton densities were approximately 66,000/m$^3$ and 10,000/100m$^3$, respectively. Monthly mean microzooplankton density was high from March through May (ca. 115,000/m$^3$) and then decreased through September (ca. 19,000/m$^3$). It remained low in October and November and then increased in December (ca. 71,000/m$^3$). Copepods, rotifers, and polychaetes were the most abundant taxonomic groups and accounted for 58, 29, and 6 percent, respectively, of the total microzooplankton sample. Acartia tonsa, Eurytemora affinis, Ectinosoma spp., Notholca spp., and Branchionus spp. were predominant. Two distinct communities of microzooplankters occurred seasonally during 1978. A tidal river community consisting of limnetic and oligohaline organisms such as rotifers, cyclopoid copepods, and cladocerans occurred during periods of lowest salinity (winter and spring). An estuarine community predominated by euryhaline calanoid copepods and meroplanktonic larvae of benthic invertebrates occurred during periods of higher salinities (late spring through fall). The pattern of seasonal change in microzooplankton abundance was similar to that of recent years (1973-1977).

Macroinvertebrate monthly mean density was low from March through May (ca. 1,000/100m$^3$), increased to a peak during June (ca. 64and decreased through November (ca. 5,023/100m$^3$). Neomysis americana and Rhithropanopeus harrisii were most abundant, comprising 94.2 percent of the total annual sample. Other predominant taxa included:

*Gammarus* spp., *Uca minax*, *Blackfordia virginica*, *Palaemonetes pugio*, *Edotea triloba*, *Corophium* spp., Brachyura, and *Crangon septemspinosa*.

### 3.1.3.2 Materials and Methods

All zooplankton samples required by ETS were collected.

Microzooplankton samples were collected from March through December during daylight at 12 stations and over 12-hr periods at three stations extending west of Salem (Table 3.1.3-1, Fig. 3.1.3-1). All microzooplankton samples were collected with a filter pump plankton sampler (Fig. 3.1.3-2) fitted with a number 20 net (0.08 mm mesh). For a more detailed description of sampling gear, gear deployment, collection of physicochemical data and laboratory procedures see Volume 2 of the 1977 Annual Environmental Operating Report.

Macroinvertebrates were collected from March through November in the ichthyoplankton program from just below surface and just above bottom with 1/2-meter plankton nets of 0.5-mm mesh. Detailed descriptions of sampling and laboratory materials and methods are described in Section 3.1.2.1.1b and Section 3.1.2.1.1c and d, respectively, of the 1977 Annual Environmental Operating Report. In 1978 samples from stations IP01, IP02, IP03, IP04, IP05, IP06, IP07, IP08, IP09, IP10, IP11, IP21, and IP22 were processed; samples from stations IP05, IP06, IP07, IP21, and IP22 were replicated. Also in 1978, the taxon Brachyura represented megalops of *Uca minax* and *Rhithropanopeus harrisii* (after August 31 megalops were identified to species).

### 3.1.3.3 Results and Discussion

GENERAL SAMPLE COMPOSITION

One hundred fourteen invertebrate taxa were identified in the 681 microzooplankton and 334 macroinvertebrate samples collected and analyzed (Tables 3.1.3-2 through 3.1.3-6). Annual mean microzooplankton and macroinvertebrate plankton density was approximately 66,000/$m^3$ and 10,000/100$m^3$, respectively.

Monthly mean microzooplankton density during 1978 was high from March through May (ca. 115,000/$m^3$) after which it decreased through September to approximately 19,000/$m^3$. Monthly mean density remained low in October and November and then increased in December to 71,000/$m^3$ (Fig. 3.1.3-3). Extremely high density of copepod nauplii (60,614/$m^3$) accounted for the December increase. The peak monthly microzooplankton density of 126,572/$m^3$ occurred during March.

Microzooplankton density during March through December, 1978 (66,388/$m^3$) was greater than observed in previous years (1973-1977). Mean density during these years ranged from 31,433 to 46,340/$m^3$. The pattern of seasonal change in microzooplankton abundance was similar to that of recent years (1973-1977).

Copepods, rotifers, and polychaetes were the three most abundant taxonomic groups, comprising 58, 29, and 6 percent, respectively, of the total microzooplankton sample (Table 3.1.3-7). Common organisms were Acartia tonsa, Eurytemora affinis, Ectinosoma spp., Notholca spp., Branchionus spp., and Gastropoda (veligers). Microzooplankton community structure, i.e., species composition, during 1978 was similar to that of recent years (1973-1977).

Macroinvertebrate monthly mean density was low from March through May (ca. 1,000/100$m^3$), increased to a peak during June (ca. 37,000/100$m^3$) and decreased through November (ca. 5,000/100$m^3$) (Fig. 3.1.3-3). Neomysis americana and Rhithropanopeus harrisii were most abundant comprising 94.2 percent of the total annual sample (Table 3.1.3-8). Other common taxa included: Gammarus spp., Uca minax, Blackfordia virginica, Palaemonetes pugio, Edotea triloba, Corophium spp., Brachyura and Crangon septemspinosa.

## MICROZOOPLANKTON COMPOSITION

An overview of each major taxonomic group is presented together with detailed discussion on predominant species in each group.

### Aschelminthes

Fifteen genera of Rotifera were represented by more than 25 species. Rotifers were typically associated with low salinity waters. Seasonally, they were most abundant from March through mid-June comprising over 52 percent of the microzooplankton sample (Table 3.1.3-4). Rotifer spp., an "artificial" taxon including illoricate rotifers that contract upon preservation making specific identification impossible without the addition of a relaxing agent or close examination of trophi, was the most abundant rotifer and second most abundant microzooplankton taxon collected. It had an annual density of $13,477/m^3$ and it comprised over 20 percent of the annual sample (Table 3.1.3-7). Density was greatest from March through May (Fig. 3.1.3-4). Peak density ($209,545/m^3$) occurred on March 22 (Table 3.1.3-2). It was collected at water temperature of 5.9 to 38.0 C and salinity of 0.0 to 11.0 ppt. Examination of trophi of randomly selected illoricate individuals indicated that most were Synchaeta spp. which tolerate brackish waters.

Notholca sp. was the second most abundant rotifer ($3,360/m^3$) and sixth ranking microzooplankter (Table 3.1.3-7). Density was greatest from April through June (Fig. 3.1.3-4). Peak density occurred on May 17 ($44,867/m^3$) (Table 3.1.3-2). It was collected at water temperature of 6.0 to 27.2 C and salinity of 0.0 to 8.0 ppt.

Keratella quadrata was the third most abundant rotifer ($1,309/m^3$) and ninth ranking microzooplankter (Table 3.1.3-7). Density was greatest during May with a peak density on May 17 ($17,014/m^3$) (Table 3.1.3-2; Fig. 3.1.3-4). It was collected at water temperature of 7.0 to 22.0 C and salinity of 0.0 to 7.0 ppt.

The genus Branchionus ranked third and was represented by at least eight species. Of these, B. angularis was predominant. It ranked tenth among all microzooplankters and comprised 1.4 percent of the annual sample ($945/m^3$) (Table 3.1.3-7). Density was greatest from May to July (Fig. 3.1.3-4). Greatest density occurred on May 17 ($6,968/m^3$) and May 25 (6,326) (Table 3.1.3-2). It was collected at water temperature of 7.0 to 29.0 C and salinity of 0.0 to 10.0 ppt.

The nematode worms collected were either free-living benthic or terrestrial forms washed into the water from local soils. The annual mean density was $97/m^3$. Density was greatest from March through June. Peak density ($488/m^3$) occurred on March 22 (Tables 3.1.3-2). Nematodes were collected at water temperature of 6.0 to 28.0 C and salinity of 0.0 to 14.0 ppt.

Annelida

Polychaete eggs and larvae had an annual density of 4,043/$m^3$ and were the fifth most abundant microzooplankter (Table 3.1.3-7). Density was greatest during October through December (Fig. 3.1.3-5). Monthly peak density (40,381/$m^3$) occurred on October 26 (Table 3.1.3-2). Eggs and larvae were collected at water temperature of 5.9 to 29.0 C and salinity of 0.0 to 15.0 ppt.

Mollusca

Larval gastropods (veligers) had an annual mean of 1,432/$m^3$ and were the eighth most abundant microzooplankter (Table 3.1.3-7). They were most abundant during June through September (Fig. 3.1.3-5). Peak density (12,254/$m^3$) was on July 27 (Table 3.1.3-2). It was collected at water temperature of 6.5 to 29.0 C and salinity of 0.0 to 14.0 ppt. Larvae are believed to be young of gastropods occurring in local tidal marshes or further south in Delaware Bay (Lindsay and Morrisson, 1974).

Larval pelecypods (mostly free-swimming veliger larvae) were collected intermittently throughout the year. The annual density was 134/$m^3$. Density was greatest during October with a peak (2,476/$m^3$) occurring on October 26 (Tables 3.1.3-2). Larvae were collected at water temperature of 6.0 to 28.0 C and salinity of 5.0 to 14.0 ppt. *Macoma balthica* has consistently been one of the most abundant adult pelecypods collected near Artificial Island (Connelly *et al*., 1976) and is probably the source of many of the larvae collected.

Arthropoda

Six genera of Cladocera were collected: *Bosmina*, *Moina*, *Ceriodaphnia*, *Chydorus*, *Leydigia*, and *Alona*. Cladoceran density was greatest during May and June (Table 3.1.3-2). *Bosmina* spp., which was the most abundant cladoceran and fourteenth most abundant microzooplankter, had an annual mean density of 336/$m^3$ (Table 3.1.3-7). Density was greatest during May and June. A peak density of 5,864/$m^3$ was collected on May 25 (Table 3.1.3-2). *Bosmina* spp. occurred at water temperature of 7.0 to 27.2 C and salinity of 0.0 to 7.0 ppt.

Copepoda

Adults and copepodids of at least 15 species of copepods were collected during 1978. Nauplii (early developmental stages) plus juveniles and adults of the three most abundant copepods comprised over 40 percent of the total microzooplankton sample. Nauplii were collected on every sampling date and were the most abundant microzooplankton taxon ($27,014/m^3$) (Table 3.1.3-7). Taxonomic subtleties made species identification impracticable. The presence of several species in this category may have masked specific density differences. Copepod nauplii mean densities were highest during April through June and December (Fig. 3.1.3-6). Peak density ($116,909/m^3$) occurred on December 6 (Table 3.1.3-2). Two species of calanoid copepods, Eurytemora affinis and Acartia tonsa, were dominant members of the microzooplankton community accounting for 7.0 and 6.6 percent, respectively, of the annual sample (Table 3.1.3-7). E. affinis predominated from March through mid-June and A. tonsa predominated for the remainder of the year (Table 3.1.3-2, Fig. 3.1.3-6).

Acartia tonsa, the most abundant species of copepod ($4,680/m^3$) and third ranking microzooplankter, reached maximum density of $20,425/m^3$ on July 12 (Tables 3.1.3-7, 3.1.3-2; Fig. 3.1.3-6). Described as a euryhaline species by Cronin et al. (1962), A. tonsa was collected in the study area at water temperature of 6.0 to 29.0 C and salinity of 0.0 to 15.0 ppt.

Eurytemora affinis was the second most abundant copepod species ($4,349/m^3$) and fourth most abundant microzooplankter (Table 3.1.3-7). Densities were greatest from March through June with a maximum density of $24,723/m^3$ collected on April 25 (Table 3.1.3-2, Fig. 3.1.3-6). E. affinis was collected at water temperature of 5.9 to 29.0 C and salinity of 0.0 to 11.0 ppt.

The harpacticoid copepod, Ectinosoma spp., was the third most abundant copepod and seventh ranking microzooplankter with an annual density of $2,278/m^3$ (Table 3.1.3-7). It was abundant every month except March (Table 3.1.3-2). A peak density of $8,607/m^3$ was collected on July 27 (Table 3.1.3-2). It was collected at water temperature of 5.9 to 29.0 C and salinity of 0.0 to 14.0 ppt.

Cirripedia nauplii and cypris, which together had an annual density of $625/m^3$ were the eleventh most abundant microzooplankters. They were most abundant during May through September and reached peak density of $4,891/m^3$ on

June 28 (Table 3.1.3-2). They were collected at water temperature of 6.0 to 29.0 C and salinity of 0.0 to 14.0 ppt. Most were probably larvae of *Balanus improvisus*, the only adult barnacle which sets near Artificial Island (see Section 3.1.4).

Tardigrades were collected during April, May, and June and had an annual density of 4.0/$m^3$. Greatest density (58/$m^3$) was collected on May 17 (Table 3.1.3-2). Tardigrades were collected at water temperature of 12.5 to 27.8 C and salinity of 2.0 to 5.0 ppt.

MACROINVERTEBRATE PLANKTON COMPOSITION

The 10 predominant macroinvertebrate plankters, which comprised 99.5 percent of the macroinvertebrate sample during 1978 (Table 3.1.3-8), are discussed in order of decreasing abundance.

*Neomysis americana*, the opossum shrimp, was the most abundant macroinvertebrate collected. Annual mean density was 7,520/100$m^3$. It comprised approximately 75 percent of the total sample and was collected throughout the year (Tables 3.1.3-8, 3.1.3-3). Greatest density occurred from June through November (Fig. 3.1.3-7). Peak density (40,839/100$m^3$) occurred on June 15 (Table 3.1.3-3). It was collected at water temperature of 4.0 to 28.0 C and salinity of 0.0 to 12.0 ppt. The seasonality of juveniles indicated that most reproduction occurred from May through November (Fig. 3.1.3-8). Mean density was greater near bottom than near surface on all sampling dates (Table 3.1.9-9). *N. americana* apparently congregates on or near the bottom during daylight (Hulburt, 1957; Hopkins, 1965; and Browne *et al.*, 1976).

*Rhithropanopeus harrisii* larvae, including zoeae and megalops of this brackish water mud crab, were the second most abundant macroinvertebrate collected. Annual mean density was 1,926/100$m^3$ (Table 3.1.3-8). It was abundant from June through September (Fig. 3.1.3-9). Peak density (11,140/100$m^3$) occurred on July 27 (Table 3.1.3-3). It was collected at water temperature of 4.3 to 28.0 C and salinity of 0.0 to 11.0 ppt.

*Gammarus* spp. (probably including *G. fasciatus*, *G. tigrinus*, and *G. daiberi*) was the third most abundant macroinvertebrate collected. Annual mean density was 215/100$m^3$ (Table 3.1.3-8). It was collected throughout the year, with highest densities occurring during June through September (Fig. 3.1.3-10). Peak density ($846/100m^3$) occurred on August 10 (Table 3.1.3-3). It was taken at water temperature of 4.0 to 28.0 C and salinity of 0.0 to 11.5 ppt. The seasonality of juveniles indicated that most reproduction occurred during May through October (Fig. 3.1.3-11). Greater density occurred near bottom than near surface on all sampling dates (Table 3.1.3-9). It occurred in higher densities at northern stations than at southern stations (Table 3.1.3-10). Gammarus spp. is essentially a freshwater organism; therefore, this north-south distribution probably corresponds to the salinity gradient.

Uca minax, including zoeae and megalops of the red-jointed fiddler crab, were the fourth most abundant macroinvertebrate collected. Annual mean density was $124/100m^3$ (Table 3.1.3-8). It was collected during June through September (Fig. 3.1.3-9). Peak density ($1,869/100m^3$) occurred on June 28 (Table 3.1.3-3). It was collected at water temperature 19.8 to 27.5 C and salinity 0.0 to 10.0 ppt. Densities were greatest at stations IP03, IP05, IP08, and IP10 (Table 3.1.3-10). Since U. minax adults inhabit the intertidal zone along banks of tidal streams and river, the greater densities of U. minax larvae at these stations may be due to the proximity of these stations to shore (Fig. 3.1.3-1).

Blackfordia virginica, a hydromedusa, was the fifth most abundant macroinvertebrate plankter. Annual mean density was $92/100m^3$ (Table 3.1.3-8). It occurred from July through September (Fig. 3.1.3-7). Peak density ($1,105/100m^3$) occurred on August 31 (Table 3.1.3-3). It was collected at temperature of 23.0 to 28.0 C and salinity of 3.0 to 10.5 ppt. The seasonality of juveniles indicated that most reproduction occurred from July through August (Fig. 3.1.3-12). Greater density of B. virginica occured near bottom than near surface (Table 3.1.3-9). Generally it occurred in greater densities at southern stations than at northern stations (Table 3.1.3-10). This observation corroborates findings of Cronin, Daiber, and Hulburt (1962) that B. virginica is typically found in waters with salinities exceeding 7.5 ppt.

Palaemonetes pugio, the grass shrimp, was the sixth most abundant macroinvertebrate collected. Annual mean density was $26/100m^3$ (Table 3.1.3-8). It was collected from April through November (Table 3.1.3-3). Greatest densities occurred from June through August (Fig. 3.1.3-13). Peak density ($169/100m^3$) occurred on July 27 (Table 3.1.3-3). P. pugio was collected at water temperature of 10.2 to 28.0 C and salinity of 0.0 to 11.0 ppt. It occurred mostly as juveniles 2 to 7 mm long. The seasonality of juveniles indicated that most reproduction occurred during June through September (Fig. 3.1.3-14). It is rarely collected in benthic samples in the study area (see Section 3.1.4) probably because it typically inhabits shallow water grass habitats (Welsh, 1975).

The isopod, Edotea triloba, was the most abundant isopod and seventh most abundant macroinvertebrate. Annual mean density was 22/100m$^3$ (Table 3.1.3-8). It was collected throughout the year and was most abundant during July through September (Table 3.1.3-3, Fig. 3.1.3-7). Peak density (96/100m$^3$) occurred on September 13 (Table 3.1.3-3). It was collected at water temperature 4.3 to 28.0 C and salinity of 0.0 to 11.0 ppt. The seasonality of juveniles indicated that most reproduction occurred from June through October (Fig. 3.1.3-15). Mean density was greater near bottom than surface on all sampling dates (Table 3.1.3-9). Generally, E. triloba occurred in greater densities at southern stations than northern stations (Table 3.1.3-10).

Corophium spp. was the second most abundant amphipod and eighth most abundant macroinvertebrate collected. Annual mean density was 19/100m$^3$ (Table 3.1.3-8). It was collected throughout the year, with highest densities occurring from July through November (Table 3.1.3-3, Fig. 3.1.3-10). Peak density (59/100m$^3$) occurred on August 10 (Table 3.1.3-3). It was collected at water temperature of 4.3 to 28.0 C and salinity of 2.0 to 10.0 ppt. The seasonality of juveniles indicated that most reproduction occurred from June through November (Fig. 3.1.3-16). Mean density was greater near bottom than near surface on all sampling dates (Table 3.1.3-9). Corophium spp. typically occurred in greater densities at northern stations than southern stations (Table 3.1.3-10).

Brachyura ranked ninth among macroinvertebrates collected. Annual mean density was 16/100m$^3$ (Table 3.1.3-8). It was collected from July through August (Fig. 3.1.3-9). Peak density (114/100m$^3$) occurred on August 10 (Table 3.1.3-3). It was collected at water temperature of 22.0 to 28.0 C and salinity of 2.0 to 10.0 ppt.

Crangon septemspinosa, the sand shrimp, ranked tenth among macroinvertebrates collected. Annual mean density was 14/100m$^3$ (Table 3.1.3-8). It was collected on all sampling dates. Greatest densities occurred from June through September (Fig. 3.1.3-13). Peak density (127/100m$^3$) occurred on June 15 (Table 3.1.3-3). It was collected at water temperature of 4.0 to 28.0 C and salinity of 0.0 to 10.0 ppt. The seasonality of juveniles indicated that most reproduction occurred from May through September (Fig. 3.1.3-17).

Mean density was greater near bottom than surface on all sampling dates (Table 3.1.3-10).

TABLE 3.1.3-1
MICROZOOPLANKTON SAMPLING STATIONS - 1978

| Station | Description |
|---|---|
| ZP01 | Between the mouth of the Chesapeake and Delaware Canal and bell buoy "RB" (ca. 0.2 km east of the mouth of the Chesapeake and Delaware Canal. |
| ZP03 | Approximately 15 m west of buoy N"A" (ca. 1 km west of Artificial Island). |
| ZP04 | Between buoy C"1R" and Reedy Island Dike. |
| ZP05 | Approximately 15 m west of Salem and the mouth of Sunken Ship Cove. |
| ZP06 | Between buoys R: 2B" and R"4B" (ca. 1.2 km west of Artificial Island). |
| ZP07 | Between Appoquinimink Light and buoy "1B" (ca. 0.4 km off Delaware shore). |
| ZP08 | 15 m west of Hope Creek Jetty. |
| ZP10 | 1 km NE of Liston Point |
| ZP11 | Approximately 1.2 km west of New Jersey shore from a point just north of the mouth of Mad Horse Creek. |
| ZP12 | Approximately 1.6 km NE of Delaware Point. |
| ZP21 | In Hope Creek, approximately 3.2 km from its mouth. |
| ZP22 | In Hope Creek, approximately 1.4 km from its mouth. |

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TABLE 3.1.3-2
MICROZOOPLANKTON MEAN DENSITY PER SAMPLING PERIOD
(NUMBERS/CUBIC METER)

| DATE | 03/22/78 | 03/29/78 | 04/20/78 | 04/25/78 | 05/17/78 | 05/25/78 | 06/15/78 | 06/28/78 | 07/12/78 |
|---|---|---|---|---|---|---|---|---|---|
| DAY OR NIGHT | 12 HOUR | DAY | 12 HOUR | DAY | 12 HOUR | DAY | 12 HOUR | DAY | DAY |
| PERIDINIUM | | | 214 | 29 | | | | | |
| N. SCINTILLANS | | | | | | | | 17 | |
| ROTIFER SPP. | 209,545 | 15,200 | 360 | 566 | 8,727 | 29,094 | 2,004 | 230 | 203 |
| ROTIFERA A | | | | | | | 449 | 510 | 56 |
| NOTHOLCA | 158 | 467 | 556 | 2,673 | 44,867 | 13,657 | 4,659 | 16 | 6 |
| KERATELLA | | 2 | 9 | 14 | 422 | 1,321 | 74 | | |
| K. QUADRATA | 10 | 19 | | 63 | 17,014 | 9,029 | 36 | | |
| B. CALYCIFLORUS | 4 | 38 | 214 | 509 | 1,995 | 4,644 | 1,365 | 48 | |
| B. ANGULARIS | 9 | 5 | 39 | 58 | 6,968 | 6,326 | 2,878 | 627 | 1,071 |
| B. VARIABILIS | | | | | | 122 | 20 | | |
| B. CAUDATUS | | | | | | 26 | 2,410 | 185 | 39 |
| B. URCEOLARIS | | 1 | | | 18 | 44 | 60 | | |
| B. DIVERSICORNIS | | | | | | | 45 | | |
| B. PLICATILIS | | | | | | | | | 6 |
| B. QUADRIDENTATUS | | | | | 27 | 66 | 68 | 7 | 2 |
| K. BOSTONIENSIS | | * | 3 | | 372 | 654 | 74 | | |
| K. LONGISPINA | | | | | | 34 | | | |
| P. PATULUS | | * | | | 6 | | | | |
| POLYARTHRA | | 16 | | | 45 | 151 | 55 | | |
| PLOESOMA | | | | | | 7 | 56 | | |
| ASPLANCHNA | | | | 7 | 424 | 2,192 | 57 | 47 | |
| F. LONGISETA | | 17 | | 29 | 1,195 | 1,491 | 281 | | |
| NEMATODA | 488 | 143 | 53 | 132 | 159 | 355 | 228 | 171 | 3 |
| POLYCHAETA | 1,832 | 16 | 27 | 22 | | | 109 | 312 | 551 |
| OLIGOCHAETA | | 5 | | | 9 | 29 | 18 | | |
| GASTROPODA | | 5 | | | | | 119 | 2,790 | 4,114 |
| PELECYPODA | | | 4 | | | | | | |
| BOSMINA | | 26 | 2 | 9 | 231 | 5,864 | 553 | 7 | 25 |
| DAPHNIA | | | | | 3 | 36 | 84 | 14 | |
| MOINA | | | | | | | 58 | 166 | |
| CERIODAPHNIA | | | | | | | 9 | | |
| CHYDORUS | | 2 | | | 18 | 44 | | | |
| ALONA | | | | | 9 | | | | |
| LEYDIGIA SP. | | * | | | | | | | |
| COPEPOD NAUPLII | 6,954 | 12,442 | 94,264 | 64,511 | 39,756 | 25,580 | 20,459 | 66,659 | 17,971 |
| E. AFFINIS | 889 | 3,301 | 12,662 | 24,723 | 9,548 | 6,351 | 19,454 | 3,524 | 4,484 |
| DIAPTOMUS | 15 | 31 | 4 | | 18 | 36 | 4 | | |
| P. CORONATUS | | | 3 | | | | 683 | 3,415 | 1,672 |
| A. TONSA | | | | 7 | | 14 | 7,014 | 12,333 | 20,425 |
| HARPACTICOIDA | 99 | 67 | 33 | 103 | 273 | 394 | 86 | 86 | 1 |
| SCOTTOLANA | | 11 | | | 54 | 129 | 385 | 510 | 180 |
| ECTINOSOMA | 640 | 237 | 346 | 2,418 | 3,002 | 2,339 | 1,852 | 4,619 | 1,337 |
| E. CURTICORNE | | | | | 18 | | | | |
| O. COLCARVA | 15 | | 18 | | | | | | |
| H. FOSTERI | | 26 | 9 | | 9 | 44 | 67 | 260 | 286 |
| CYCLOPS | 83 | 156 | 399 | 448 | 1,118 | 3,041 | 434 | 22 | 35 |

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TABLE 3.1.3-2
CONTINUED

| DATE | 03/22/78 | 03/29/78 | 04/20/78 | 04/25/78 | 05/17/78 | 05/25/78 | 06/15/78 | 06/28/78 | 07/12/78 |
|---|---|---|---|---|---|---|---|---|---|
| DAY OR NIGHT | 12 HOUR | DAY | 12 HOUR | DAY | 12 HOUR | DAY | 12 HOUR | DAY | DAY |
| C. VERNALIS | 12 | 7 | 57 | 25 | 80 | 767 | 143 | 161 | |
| C. BICUSPIDATUS | 20 | 110 | 97 | 149 | 154 | 325 | 9 | 22 | 1 |
| E. AGILIS | | | | | 9 | | 4 | | |
| T. PRASINUS | | | 4 | | | | | | |
| ERGASILUS | | | | | | | 2 | | |
| CIRRIPEDIA | | | | | 551 | 1,118 | 304 | 4,891 | 1,318 |
| CRYPTONISCUS LARVAE | | | | | | | 18 | | |
| TARDIGRADA | | | | 7 | 58 | | | 14 | |
| TOTAL | 220,783 | 32,368 | 109,387 | 96,513 | 137,171 | 115,342 | 66,708 | 101,677 | 53,799 |
| NO. SAMPLES | 39 | 24 | 39 | 24 | 39 | 24 | 39 | 24 | 24 |

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TABLE 3.1.3-2
CONTINUED

| DATE | 07/27/78 | 08/10/78 | 08/31/78 | 09/13/78 | 09/27/78 | 10/18/78 | 10/26/78 | 11/15/78 | 11/21/78 |
|---|---|---|---|---|---|---|---|---|---|
| DAY OR NIGHT | 12 HOUR | 12 HOUR | DAY | 12 HOUR | DAY | 12 HOUR | DAY | DAY | 12 HOUR |
| INVERT. EGG | | * | 26 | 9 | 4 | 5 | | | |
| TURBELLARIA | | 7 | 33 | 6 | 7 | | 5 | | |
| ROTIFER SPP. | 64 | 13 | 23 | 1 | 5 | 19 | 4 | 70 | 190 |
| ROTIFERA A | 9 | * | 44 | 4 | 13 | | 18 | 1 | 1 |
| BDELLOIDEA | | | 41 | 6 | | | 1 | 5 | |
| NOTHOLCA | 8 | * | | | 2 | | | | * |
| KERATELLA | 11 | | | | | | | | |
| B. CALYCIFLORUS | | 2 | | 2 | | | 128 | | * |
| B. ANGULARIS | 80 | 549 | 92 | 175 | 7 | | 11 | | |
| B. CAUDATUS | 1 | 5 | * | | | | | | |
| B. DIVERSICORNIS | | | | * | | | | | |
| B. HAVANAENSIS | | 5 | | | | | | | |
| B. PLICATILIS | 1 | 1 | | | | | | | |
| B. QUADRIDENTATUS | | | | | | | 4 | | |
| SYNCHAETA | | | | | 1 | 1 | | 12 | |
| LECANE | | | | | | 2 | | | |
| ASPLANCHNA | 10 | 3 | 1 | | | | | | |
| NEMATODA | 19 | 5 | 4 | 18 | 11 | 12 | 8 | 27 | 6 |
| POLYCHAETA | 1,233 | 555 | 138 | 53 | 95 | 5,895 | 40,381 | 14,448 | 3,726 |
| OLIGOCHAETA | | * | 2 | 1 | 4 | 1 | | 10 | |
| GASTROPODA | 12,254 | 4,549 | 2,496 | 1,596 | 668 | 41 | 4 | 7 | |
| PELECYPODA | 16 | 1 | 5 | | | 4 | 2,476 | 57 | 51 |
| ACARINA | | | | | 5 | | | | |
| CRUSTACEA | | | 17 | | | | | | |
| BOSMINA | | * | | | | | 1 | | |
| MOINA | | 13 | 2 | 10 | | | | | |
| OSTRACODA | | | | 1 | 15 | 9 | 1 | | |
| COPEPOD NAUPLII | 10,349 | 11,642 | 5,066 | 6,966 | 7,717 | 6,279 | 3,572 | 13,371 | 5,503 |
| P. CRASSIROSTRIS | | | | | 32 | 2 | 8 | | |
| P. PARVUS | | | | | 1 | | | | |
| E. AFFINIS | 13 | 197 | 7 | 6 | 2 | 2 | 18 | 8 | 80 |
| P. CORONATUS | 520 | 351 | 291 | 247 | 626 | 103 | 261 | 264 | 665 |
| A. TONSA | 10,342 | 9,037 | 5,632 | 7,040 | 8,253 | 3,760 | 3,290 | 3,229 | 2,529 |
| HARPACTICOIDA | 33 | 31 | 44 | 52 | 48 | 63 | 60 | 59 | 8 |
| SCOTTOLANA | 121 | 162 | 62 | 27 | 12 | 6 | 20 | 39 | |
| ECTINOSOMA | 8,607 | 4,990 | 327 | 2,028 | 783 | 1,857 | 769 | 5,750 | 1,539 |
| E. CURTICORNE | | | | 1 | | | | | |
| O. COLCARVA | 16 | 13 | 84 | 24 | 381 | 4 | 13 | | 1 |
| H. FOSTERI | 5 | 116 | 52 | 7 | | * | | | 1 |
| CYCLOPS | 6 | 4 | 32 | 2 | | 1 | 3 | 5 | * |
| C. VERNALIS | 3 | 3 | | | | | | | |
| C. BICUSPIDATUS | | * | 4 | | 1 | | | | |
| ERGASILUS | 32 | 2 | 91 | 7 | 11 | | 5 | | |
| ARGULUS SPP. | | 2 | | | * | | | | |
| CIRRIPEDIA | 1,060 | 632 | 955 | 511 | 406 | 267 | 190 | 170 | 50 |
| CRYPTONISCUS LARVAE | 1 | 27 | 13 | 13 | 24 | 5 | 20 | | |
| TOTAL | 44,826 | 32,936 | 15,598 | 18,826 | 19,148 | 18,350 | 51,282 | 37,543 | 14,356 |
| NO. SAMPLES | 39 | 48 | 24 | 48 | 24 | 55 | 24 | 24 | 57 |

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TABLE 3.1.3-2
CONTINUED

| DATE | 12/06/78 | 12/13/78 |
|---|---|---|
| DAY OR NIGHT | DAY | 12 HOUR |
| TURBELLARIA | 24 | |
| ROTIFER SPP. | 284 | 2,941 |
| NOTHOLCA | | 117 |
| K. QUADRATA | | 2 |
| B. CALYCIFLORUS | * | 1 |
| B. VARIABILIS | * | |
| B. CAUDATUS | 1 | |
| B. HAVANAENSIS | | 2 |
| K. BOSTONIENSIS | | 20 |
| SYNCHAETA | * | 2 |
| NEMATODA | 68 | 25 |
| POLYCHAETA | 10,854 | 608 |
| GASTROPODA | * | 1 |
| PELECYPODA | 41 | 13 |
| MOINA | | 2 |
| COPEPODA | | 3 |
| COPEPOD NAUPLII | 116,909 | 4,318 |
| E. AFFINIS | 488 | 1,217 |
| DIAPTOMUS | | * |
| P. CORONATUS | 212 | 89 |
| A. TONSA | 340 | 362 |
| HARPACTICOIDA | 40 | 25 |
| SCOTTOLANA | * | |
| ECTINOSOMA | 1,117 | 978 |
| O. COLCARVA | * | 1 |
| H. FOSTERI | 3 | 11 |
| CYCLOPS | * | 2 |
| C. VERNALIS | | 3 |
| C. BICUSPIDATUS | | 1 |
| E. AGILIS | 1 | |
| CIRRIPEDIA | 62 | 20 |
| TOTAL | 130,457 | 10,778 |
| NO. SAMPLES | 23 | 39 |

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TABLE 3.1.3-3
MACROINVERTEBRATES MEAN DENSITY PER SAMPLING PERIOD
(NUMBERS/100 CUBIC METERS)

| DATE | 03/22/78 | 04/20/78 | 05/17/78 | 06/15/78 | 06/28/78 | 07/12/78 | 07/27/78 | 08/10/78 | 08/31/78 |
|---|---|---|---|---|---|---|---|---|---|
| DAY OR NIGHT | DAY | DAY | DAY | DAY | DAY | DAY | DAY | DAY | DAY |
| M. PROLIFERA | * | | | | | | | | |
| HYDROZOA | | * | 3 | 1 | * | | * | | |
| HYDROZOA (MEDUSAE) | | | | | | * | * | | 11 |
| HYDROZOA #1 (MEDUSAE) | | | | | | | | | * |
| BOUGAINVILLIA SPP. | | | | * | | * | * | | 1 |
| N. BACHEI | | | | * | | * | 9 | * | 5 |
| OBELIA SPP. | | 1 | | | | | | | |
| PHIALIDIUM SPP. | | | | | * | | * | 1 | 7 |
| B. VIRGINICA | | | | | | * | 163 | 149 | 1,105 |
| M. LEIDYI | | | | | | | * | | |
| B. OVATA | | | | | | | | | * |
| TURBELLARIA | | | | | | | | | * |
| POLYCHAETA | 14 | 1 | 1 | * | 1 | | * | * | * |
| OLIGOCHAETA | 5 | 1 | 16 | 28 | 1 | * | | * | |
| HIRUDINEA | 2 | 1 | * | * | | | | | |
| GASTROPODA | | | | * | * | | | | |
| NUDIBRANCHIA | | | | * | 1 | 2 | 5 | * | |
| MACOMA SPP. | | | 28 | * | | * | * | | |
| L. POLYPHEMUS | | | | | | * | | | |
| L. KINDTII | | | | 126 | * | 2 | | * | |
| L. AESTIVA | | | | 2 | * | 13 | 1 | * | |
| L. MAJOR | | | * | | | | | | |
| ERGASILIDAE | | | * | | | | | | |
| ARGULUS SPP. | | | | 1 | 1 | 5 | 29 | 7 | 1 |
| CIRRIPEDIA | * | * | | | * | | | | |
| N. AMERICANA | 203 | 831 | 397 | 40,839 | 27,132 | 6,703 | 4,197 | 4,862 | 4,181 |
| L. AMERICANUS | | | 1 | 3 | 24 | 19 | 40 | 2 | 3 |
| ISOPODA | | | * | | | | | | |
| CHIRIDOTEA SPP. | | | 18 | | | | | | |
| C. ALMYRA | 15 | 1 | 12 | 7 | 7 | * | * | * | * |
| E. TRILOBA | * | * | * | 1 | 19 | 24 | 78 | 13 | 36 |
| C. POLITA | * | | * | 1 | 4 | * | 1 | * | * |
| C. LUNIFRONS | | | * | | * | * | * | * | |
| A. MEDIALIS | | | * | * | 1 | 1 | 4 | 2 | 1 |
| AMPHIPODA | | | | | | | * | * | |
| L. PLUMULOSUS | * | * | * | | | | | | |
| COROPHIUM SPP. | 1 | 1 | 4 | 6 | 6 | 54 | 48 | 59 | 4 |
| GAMMARUS SPP. | 47 | 10 | 151 | 537 | 560 | 105 | 244 | 846 | 506 |
| M. NITIDA | | | * | * | * | * | * | 1 | * |
| HAUSTORIIDAE | | * | * | | | | | * | |
| MONOCULODES SPP. | | | * | 1 | * | * | * | 1 | * |
| M. EDWARDSI | 2 | * | * | 2 | 2 | 1 | 5 | 8 | 2 |
| PARAPLEUSTES SPP. | | | | * | * | * | * | * | |
| ORCHESTIA SPP. | | | | | | | | * | * |
| P. PUGIO | | * | | 19 | 56 | 62 | 169 | 71 | 55 |
| C. SEPTEMSPINOSA | 2 | 2 | 9 | 127 | 37 | 6 | 11 | 4 | * |

TABLE 3.1.3-3
CONTINUED

| DATE | 03/22/78 | 04/20/78 | 05/17/78 | 06/15/78 | 06/28/78 | 07/12/78 | 07/27/78 | 08/10/78 | 08/31/78 |
|---|---|---|---|---|---|---|---|---|---|
| DAY OR NIGHT | DAY | DAY | DAY | DAY | DAY | DAY | DAY | DAY | DAY |
| BRACHYURA | | | | | * | 2 | 66 | 114 | 5 |
| C. SAPIDUS | | | | | | | | | 1 |
| R. HARRISII | * | | * | 144 | 2,776 | 8,081 | 11,140 | 9,823 | 866 |
| U. MINAX | | | | 7 | 1,869 | 148 | 205 | 8 | |
| INSECTA | | | | * | * | | | | |
| DIPTERA | | * | | | | | | | |
| CYLICIDAE | | | * | | | | | | |
| CHIRONOMIDAE | * | | * | * | * | | | | |
| CHAETOGNATHA | | * | | | | | | | |
| TOTAL | 298 | 856 | 649 | 41,862 | 32,510 | 15,242 | 16,431 | 15,983 | 6,802 |
| NO. SAMPLES | 28 | 28 | 27 | 28 | 28 | 28 | 28 | 28 | 28 |

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TABLE 3.1.3-3
CONTINUED

| DATE | 09/13/78 | 10/26/78 | 10/27/78 | 11/21/78 | 11/22/78 |
|---|---|---|---|---|---|
| DAY OR NIGHT | DAY | DAY | DAY | DAY | DAY |
| HYDROZOA (MEDUSAE) | 12 | 7 | | 25 | 88 |
| HYDROZOA #1 (MEDUSAE | 2 | | | | |
| BOUGAINVILLIA SPP. | 2 | * | | | |
| N. BACHEI | 9 | * | | * | |
| PHIALIDIUM SPP. | 1 | | | | |
| B. VIRGINICA | 118 | | | | |
| ACTINIARIA | | * | | | |
| CTENOPHORA | | * | | 3 | 7 |
| B. OVATA | | * | | | |
| RHYNCHOCOELA | | * | | | |
| POLYCHAETA | 1 | | | | |
| OLIGOCHAETA | 2 | * | | * | * |
| HIRUDINEA | | | | 5 | |
| NUDIBRANCHIA | * | * | | | |
| MACOMA SPP. | * | | | | |
| L. AESTIVA | * | | | 4 | * |
| ARGULUS SPP. | 1 | * | * | * | |
| N. AMERICANA | 12,765 | 5,314 | 2,705 | 5,120 | 89 |
| L. AMERICANUS | 18 | 5 | | 7 | 2 |
| C. ALMYRA | 1 | 1 | 2 | 1 | |
| E. TRILOBA | 96 | 13 | 4 | 1 | 3 |
| C. POLITA | * | * | | | |
| C. LUNIFRONS | | * | | | |
| A. MEDIALIS | * | * | | * | |
| COROPHIUM SPP. | 13 | 15 | 8 | 51 | 6 |
| GAMMARUS SPP. | 281 | 35 | 61 | 12 | |
| M. NITIDA | 15 | * | | * | |
| M. EDWARDSI | 15 | * | 4 | * | |
| PARAPLEUSTES SPP. | 2 | * | | * | |
| ORCHESTIA SPP. | | * | | | |
| P. PUGIO | 16 | * | | * | |
| C. SEPTEMSPINOSA | 8 | 6 | | 4 | |
| C. SAPIDUS | 1 | * | * | | |
| R. HARRISII | 921 | * | 2 | * | |
| U. MINAX | 1 | | | | |
| TOTAL | 14,316 | 5,406 | 2,791 | 5,241 | 198 |
| NO. SAMPLES | 28 | 26 | 2 | 24 | 4 |

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TABLE 3.1.3-4
MICROZOOPLANKTON SEASONAL MEAN DENSITY (NUMBERS/CUBIC METER) -1978.

| SEASON | | 01/01 - 02/29 | | 03/01 - 06/15 | | 06/16 - 09/15 | | 09/16 - 11/30 | | 12/01 - 12/31 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| TEMP. (C) | RANGE | 0.0 - 0.0 | | 5.9 - 22.0 | | 22.0 - 29.0 | | 8.2 - 20.8 | | 6.0 - 10.1 | |
| | MEAN | 0.0 | | 13.1 | | 25.9 | | 14.3 | | 7.7 | |
| SAL. (PPT) | RANGE | 0.0 - 0.0 | | 0.0 - 10.0 | | 2.0 - 11.0 | | 4.0 - 15.0 | | 3.0 - 10.0 | |
| | MEAN | 0.0 | | 2.8 | | 5.9 | | 9.3 | | 6.3 | |
| TAXONOMIC GROUP | | MEAN NO. | MEAN % | MEAN NO. | MEAN % | MEAN NO. | MEAN % | MEAN NO. | MEAN % | MEAN NO. | MEAN % |
| SUCTORIA | | | | 39 | 0.03 | 1 | * | | | | |
| TURBELLARIA | | | | | | 7 | 0.01 | 1 | * | 9 | 0.01 |
| ROTIFER SPP. | | | | 42,539 | 36.34 | 142 | 0.35 | 80 | 0.33 | 1,955 | 3.54 |
| BDELLOIDEA | | | | | | 6 | 0.01 | 1 | * | | |
| MONOGONONTA | | | | 19,397 | 16.57 | 444 | 1.10 | 23 | 0.09 | 94 | 0.17 |
| NEMATODA | | | | 225 | 0.19 | 29 | 0.07 | 11 | 0.04 | 41 | 0.07 |
| POLYCHAETA | | | | 340 | 0.29 | 489 | 1.21 | 10,080 | 41.99 | 4,409 | 7.99 |
| OLIGOCHAETA | | | | 8 | * | * | * | 2 | * | | |
| GASTROPODA | | | | 20 | 0.01 | 4,824 | 11.98 | 101 | 0.42 | * | * |
| PELECYPODA | | | | * | * | 4 | * | 347 | 1.44 | 24 | 0.04 |
| ACARINA | | | | | | | | * | * | | |
| CRUSTACEA | | | | | | 2 | * | | | | |
| BRANCHIOPODA | | | | 795 | 0.67 | 30 | 0.07 | * | * | 1 | * |
| OSTRACODA | | | | | | * | * | 4 | 0.01 | | |
| COPEPODA | | | | 38,407 | 32.81 | 16,664 | 41.38 | 6,798 | 28.32 | 46,088 | 83.54 |
| CALANOIDA | | | | 12,232 | 10.45 | 11,968 | 29.72 | 4,257 | 17.73 | 1,436 | 2.60 |
| HARPACTICOIDA | | | | 1,762 | 1.50 | 4,173 | 10.36 | 2,039 | 8.49 | 1,061 | 1.92 |
| CYCLOPOIDA | | | | 1,008 | 0.86 | 177 | 0.43 | 58 | 0.24 | 15 | 0.02 |
| BRANCHIURA | | | | | | * | * | * | * | | |
| CIRRIPEDIA | | | | 264 | 0.22 | 1,295 | 3.21 | 195 | 0.81 | 35 | 0.06 |
| ISOPODA | | | | 3 | * | 11 | 0.02 | 7 | 0.02 | | |
| TARDIGRADA | | | | 10 | * | 1 | * | | | | |
| TOTAL | | | | 117,049 | 99.94 | 40,267 | 99.92 | 24,004 | 99.93 | 55,168 | 99.96 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.3-5
MACROINVERTEBRATE PLANKTON SEASONAL MEAN DENSITY (NUMBERS/100 CUBIC METERS) -1978.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SEASON | 01/01 - 02/29 | | 03/01 - 06/15 | | 06/16 - 09/15 | | 09/16 - 11/30 | | 12/01 - 12/31 | |
| TEMP. (C) RANGE | 0.0 - 0.0 | | 4.0 - 22.0 | | 22.0 - 28.0 | | 9.5 - 14.8 | | 0.0 - 0.0 | |
| MEAN | 0.0 | | 12.9 | | 25.7 | | 12.2 | | 0.0 | |
| SAL. (PPT) RANGE | 0.0 - 0.0 | | 0.0 - 9.0 | | 1.0 - 10.0 | | 2.0 - 12.0 | | 0.0 - 0.0 | |
| MEAN | 0.0 | | 2.9 | | 5.2 | | 7.6 | | 0.0 | |
| TAXONOMIC GROUP | MEAN NO. | MEAN % | MEAN NO. | MEAN % | MEAN NO. | MEAN % | MEAN NO. | MEAN % | MEAN NO. | MEAN % |
| DEMOSPONGIAE | | | * | * | | | | | | |
| HYDROZOA | | | 1 | * | 267 | 1.58 | 21 | 0.42 | | |
| ANTHOZOA | | | | | | | * | * | | |
| CTENOPHORA | | | | | | | 2 | 0.04 | | |
| TENTACULATA | | | | | * | * | | | | |
| NUDA | | | | | * | * | * | * | | |
| TURBELLARIA | | | | | * | * | | | | |
| RHYNCHOCOELA | | | | | | | * | * | | |
| POLYCHAETA | | | 5 | 0.04 | * | * | | | | |
| OLIGOCHAETA | | | 13 | 0.11 | * | * | * | * | | |
| HIRUDINEA | | | 1 | * | | | 2 | 0.04 | | |
| GASTROPODA | | | * | * | * | * | | | | |
| NUDIBRANCHIA | | | * | * | 1 | * | * | * | | |
| PELECYPODA | | | 7 | 0.06 | * | * | | | | |
| XIPHOSURA | | | | | * | * | | | | |
| BRANCHIOPODA | | | 33 | 0.28 | * | * | | | | |
| CALANOIDA | | | * | * | 2 | 0.01 | 2 | 0.04 | | |
| CYCLOPOIDA | | | * | * | | | | | | |
| BRANCHIURA | | | * | * | 7 | 0.04 | * | * | | |
| CIRRIPEDIA | | | * | * | * | * | | | | |
| MYSIDACEA | | | 11,162 | 96.87 | 9,973 | 59.10 | 4,851 | 97.94 | | |
| CUMACEA | | | 1 | * | 18 | 0.10 | 5 | 0.10 | | |
| ISOPODA | | | 15 | 0.13 | 50 | 0.29 | 9 | 0.18 | | |
| AMPHIPODA | | | 202 | 1.75 | 466 | 2.76 | 56 | 1.13 | | |
| DECAPODA | | | 82 | 0.71 | 6,089 | 36.08 | 5 | 0.10 | | |
| INSECTA | | | * | * | * | * | | | | |
| DIPTERA | | | * | * | * | * | | | | |
| CHAETOGNATHA | | | * | * | | | | | | |
| TOTAL | | | 11,522 | 99.95 | 16,873 | 99.96 | 4,953 | 99.99 | | |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.3-6
INVERTEBRATES COLLECTED IN ASSOCIATION WITH
THE PLANKTON COMMUNITY-1978.

KEY: F = FRESHWATER; B = BRACKISH; M = MARINE;
T = TERRESTRIAL

| COMMON NAME | SCIENTIFIC NAME | ORIGIN |
|---|---|---|
| | *** HOLOPLANKTON *** | |
| COMB JELLIES | CTENOPHORA SPECIES | B,M |
| | BEROE OVATA | B,M |
| | MNEMIOPSIS LEIDYI | B,M |
| ROTIFERS | ROTIFER SPECIES | F,B |
| | BDELLOIDEA SPECIES | F |
| | ASPLANCHNA SPP. | F |
| | BRANCHIONUS ANGULARIS | F,B |
| | B. CALYCIFLORUS | F,B |
| | B. CAUDATUS | F |
| | B. DIVERSICORNIS | F |
| | B. HAVANAENSIS | F,B |
| | B. PLICATILIS | B |
| | B. QUADRIDENTATUS | F,B |
| | B. URCEOLARIS | F |
| | B. VARIABILIS | F |
| | FILINIA LONGISETA | F |
| | KELLICOTTIA BOSTONIENSIS | F |
| | K. LONGISPINA | F |
| | KERATELLA SPP. | F |
| | K. QUADRATA | F |
| | LECANE SP. | F |
| | NOTHOLCA SPP. | F,B,M |
| | PLATYIAS PATULUS | F |
| | PLOESOMA SPP. | F |
| | POLYARTHRA SPP. | F |
| | ROTIFER A | F,B |
| | SYNCHAETA SPP. | F,B,M |
| CLADOCERAN ( WATERFLEAS ) | ALONA SP. | F |
| | BRANCHIOPODA SPECIES | F |
| | BOSMINA SPP. | F |
| | CERIODAPHNIA | F |
| | CHYDORUS SPP. | F |
| | DAPHNIA SPP. | F |
| | LEPTODORA KINDTII | F,B |
| | LEYDIGIA SP. | F |
| | MOINA SPP. | F |

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TABLE 3.1.3-6
CONTINUED

| COMMON NAME | SCIENTIFIC NAME | ORIGIN |
|---|---|---|
| | *** HOLOPLANKTON *** CONTINUED | |
| COPEPOD | COPEPOD NAUPLII | F,B,M |
| CALANOID | ACARTIA TONSA | B,M |
| | DIAPTOMUS SPP. | F |
| | EURYTEMORA AFFINIS | F,B |
| | LABIDOCERA AESTIVA | B,M |
| | PARACALANUS CRASSIROSTRIS | B,M |
| | P. PARVUS | B,M |
| | PSEUDODIAPTOMUS CORONATUS | B,M |
| CYCLOPOID | CYCLOPOIDA SPECIES | F,B,M |
| | CYCLOPS SPP. | F |
| | C. BICUSPIDATUS THOMASI | F |
| | C. VERNALIS | F |
| | HALICYCLOPS FOSTERI | F,B |
| | OITHONA COLCARVA | B,M |
| | TROPOCYCLOPS PRASINUS | B,M |
| | LEPTINOGASTER MAJOR | B,M |
| | *** MEROPLANKTON *** | |
| HYDROMEDUSAE | HYDROZOA (MEDUSAE) | B,M |
| (JELLYFISH) | HYDROZOA #1 (MEDUSAE) | B,M |
| | BOUGAINVILLIA SPP. | B,M |
| | NEMOPSIS BACHEI | B,M |
| | OBELIA SP. | B,M |
| | PHIALIDIUM SPP. | B |
| | B. VIRGINICA | B,M |
| WORM | POLYCHAETE EGGS | F,B,M |
| | POLYCHAETE LARVAE | F,B,M |
| SNAIL | GASTROPOD LARVAE | F,B,M |
| CLAM | PELECYPOD LARVAE | B,M |
| BARNACLE | CIRRIPEDIA NAUPLII, CYPRIS | B |
| PARASITIC ISOPOD | AEGATHOA MEDIALIS | B,M |
| TRUE CRABS | BRANCHYURA MEGALOPS | B |
| BLUE CRAB | CALLINECTES SAPIDUS MEGALOPS | B |
| FIDDLER CRAB | UCA MINAX ZOEA,MEGALOPS | B |
| MUD CRAB | RHITHROPANOPEUS HARRISII ZOEA MEGALOPS | B |

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TABLE 3.1.3-6
CONTINUED

| COMMON NAME | SCIENTIFIC NAME | ORIGIN |
|---|---|---|
| | *** TYCHOPLANKTON *** | |
| SPONGE | MICROCIONA PROLIFERA | B,M |
| ANEMONE | ACTINIARIA SPECIES | B,M |
| FLATWORM | TURBELLARIA SPECIES | F,B,M |
| ROUNDWORM | NEMATODA SPECIES | F,B,M,T |
| SEGMENTED WORM | POLYCHAETE SPECIES | F,B,M |
| | OLIGOCHAETE SPECIES | F,B |
| LEECH | HIRUDINEA SPECIES | B,M |
| | RHYNCOCOELA SPECIES | B,M |
| SNAIL | NUDIBRANCHIA | B,M |
| HORSESHOE CRAB | LIMULUS POLYPHEMUS TRILOBITE LARVAE | B,M |
| WATER MITE | ACARINA SPECIES | F |
| SEED SHRIMP | OSTRACODA SPECIES | F,B |
| WATER BEAR | TARDIGRADA SPECIES | F,T |
| COPEPOD | | |
| CYCLOPOID | EUCYCLOPS AGILIS | F |
| | ERGASILIDAE | F,B,M |
| | ERGASILUS SP. | F,B,M |
| HARPACTICOID | ECTINOSOMA SPP. | B,M |
| | ECTINOSOMA CURTICONE | B,M |
| | SCOTTOLANA SPP. | B |
| | LAOPHONTE SPP. | B |
| | HARPACTICOIDA SPECIES | B,M |
| FISH LOUSE | ARGULUS SPP. | F,B,M |
| CUMACEAN | LEUCON AMERICANUS | B |
| TANAID | LEPTOCHELIA SAVIGNYI | B,M |

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TABLE 3.1.3-6
CONTINUED

| COMMON NAME | SCIENTIFIC NAME | ORIGIN |
|---|---|---|
| | *** TYCHOPLANKTON *** CONTINUED | |
| ISOPODA | ISOPODA | F,B,M |
| | CASSIDINIDEA LUNIFRONS | B |
| | CHIRIDOTEA SPP. | B |
| | CHIRIDOTEA ALMYRA | B |
| | CYATHURA POLITA | F,B |
| | EDOTEA TRILOBA | B,M |
| | MICRONISCUS LARVAE | B,M |
| | CRYPTONISCUS LARVAE | B,M |
| | BOPYRIDAE | B,M |
| AMPHIPODA | COROPHIUM SPP. | F,B |
| | GAMMARUS SPP. | F,B |
| | LEPTOCHEIRUS PLUMULOSUS | B |
| | MONOCULODES SPP. | B |
| | MONOCULODES EDWARDSI | B |
| | MELITA NITIDA | B |
| | ORCHESTIA SPP. | B |
| | HAUSTORIDAE SPECIES | B |
| | PARAPLEUSTES SPP. | B |
| | PARAMETABELLA CYPRIS | B,M |
| MYSID SHRIMP - OPOSSUM SHRIMP | NEOMYSIS AMERICANA | B,M |
| GRASS SHRIMP | PALAEMONETES PUGIO | B |
| SAND SHRIMP | CRANGON SEPTEMSPINOSA | B |
| BLUE CRAB | CALLINECTES SAPIDUS POST MEGALOPS | B,M |
| MUD CRAB | RHITHROPANOPEUS HARRISII POST MEGALOPS | B |
| INSECT | INSECTA | F,B,T |
| | DIPTERA LARVAE | F,B,T |
| | CULICIDAE LARVAE | F,B,T |
| | CHIRONOMIDAE LARVAE | F |
| ARROW WORM | CHAETOGNATHA SPP. | B,M |

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TABLE 3.1.3-7
MEAN DENSITY (numbers/cubic meter), TOTAL DENSITY, AND
CUMULATIVE PERCENT OF 10 PREDOMINANT MICROZOOPLANKTERS - 1978

| Rank | Taxon | Major Taxonomic Group | Annual Mean Density | Total Annual Density | % of Total | Cumulative % of Total |
|---|---|---|---|---|---|---|
| 1 | Copepod nauplii | Copepoda | 27,014 | 540,290 | 40.7 | 40.7 |
| 2 | Rotifer spp. | Rotifera | 13,477 | 269,548 | 20.3 | 61.0 |
| 3 | Acartia tonsa | Copepoda | 4,680 | 93,602 | 7.0 | 68.0 |
| 4 | Eurytemora affinis | Copepoda | 4,349 | 86,977 | 6.6 | 74.6 |
| 5 | Polychaeta eggs and larvae | Annelida | 4,043 | 80,856 | 6.1 | 80.7 |
| 6 | Notholca spp. | Rotifera | 3,360 | 67,192 | 5.0 | 85.7 |
| 7 | Ectinosoma spp. | Copepoda | 2,278 | 45,557 | 3.5 | 89.2 |
| 8 | Gastropoda veliger larvae | Gastropoda | 1,432 | 28,645 | 2.1 | 91.3 |
| 9 | Keratella quadrata | Rotifera | 1,309 | 26,176 | 2.0 | 93.3 |
| 10 | Branchionus angularis | Rotifera | 945 | 18,899 | 1.4 | 94.7 |

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TABLE 3.1.3-8
MEAN DENSITY (numbers/100 cubic meters) AND CUMULATIVE PERCENT OF 10 PREDOMINANT MACROINVERTEBRATE PLANKTERS-1978

| Rank | Taxon | Major Taxonomic Group | Annual Mean Density | % of Total | Cumulative % of Total |
|---|---|---|---|---|---|
| 1 | Neomysis americana | Mysidacea | 7,520 | 74.98 | 74.98 |
| 2 | Rhithropanopeus harrisii | Decapoda | 1,926 | 19.20 | 94.18 |
| 3 | Gammarus spp. | Amphipoda | 215 | 2.14 | 96.32 |
| 4 | Uca minax | Decapoda | 124 | 1.24 | 97.56 |
| 5 | Blackfordia virginica | Hydrozoa | 92 | 0.92 | 98.48 |
| 6 | Palaemonetes pugio | Decapoda | 26 | 0.26 | 98.74 |
| 7 | Edotea triloba | Isopoda | 22 | 0.22 | 98.96 |
| 8 | Corophium spp. | Amphipoda | 19 | 0.19 | 99.15 |
| 9 | Brachyura | Decapoda | 16 | 0.16 | 99.31 |
| 10 | Crangon septemspinosa | Decapoda | 14 | 0.14 | 99.45 |

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TABLE 3.1.3-9
MEAN SAMPLING DENSITIES (numbers/100 cubic meter) BY
DATE AND DEPTH OF THE 10 PREDOMINANT MACROINVERTEBRATES IN 1978

| | | 3/22 | 4/20 | 5/17 | 6/15 | 6/28 | 7/12 | 7/27 | 8/10 | 8/31 | 9/13 | 10/26-27 | 11/21-22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N. americana | S | 27 | 5 | 69 | 1,085 | 6,396 | 2,073 | 67 | 441 | 127 | 163 | 91 | 318 |
| | B | 430 | 1,421 | 591 | 66,999 | 46,499 | 9,376 | 8,925 | 8,514 | 8,287 | 25,118 | 6,749 | 6,917 |
| R. harrisii | S | 0 | 0 | * | 28 | 3,096 | 8,577 | 6,580 | 6,750 | 853 | 1,153 | * | 1 |
| | B | * | 0 | * | 169 | 2,427 | 7,276 | 15,522 | 13,935 | 909 | 512 | 1 | * |
| Gammarus spp. | S | 21 | 1 | 40 | 15 | 79 | 84 | 31 | 71 | 86 | 9 | 13 | 2 |
| | B | 66 | 19 | 250 | 766 | 954 | 117 | 534 | 1,418 | 1,200 | 612 | 65 | 18 |
| U. minax | S | 0 | 0 | 0 | 8 | 2,183 | 204 | 166 | 11 | 0 | 1 | 0 | 0 |
| | B | 0 | 0 | 0 | 4 | 1,961 | 72 | 291 | 4 | 0 | * | 0 | 0 |
| B. virginica | S | 0 | 0 | 0 | 0 | 0 | 0 | 94 | 142 | 630 | 33 | 0 | 0 |
| | B | 0 | 0 | 0 | 0 | 0 | * | 220 | 201 | 1,237 | 256 | 0 | 0 |
| P. pugio | S | 0 | * | 0 | 24 | 71 | 41 | 76 | 47 | 49 | 19 | * | * |
| | B | 0 | 0 | 0 | 8 | 47 | 80 | 271 | 107 | 60 | 11 | 0 | * |
| E. triloba | S | * | 0 | * | * | 2 | 4 | 5 | 2 | 3 | 19 | 5 | 1 |
| | B | 0 | * | 1 | 3 | 47 | 44 | 161 | 17 | 60 | 144 | 22 | 4 |
| Corophium spp. | S | 1 | 1 | 3 | 3 | 4 | 34 | 21 | 17 | 1 | 2 | 14 | 11 |
| | B | 4 | 2 | 4 | 6 | 7 | 45 | 60 | 77 | 8 | 24 | 20 | 77 |
| Brachyura | S | 0 | 0 | 0 | 0 | * | 1 | 25 | 13 | 2 | † | † | † |
| | B | 0 | 0 | 0 | 0 | * | 4 | 95 | 157 | 10 | † | † | † |
| C. septemspinosa | S | 0 | 0 | 1 | 0 | 1 | * | * | * | 0 | 0 | 0 | 0 |
| | B | 5 | 4 | 15 | 212 | 72 | 15 | 24 | 9 | * | 18 | 9 | 5 |

† = All Brachyura identified to species after 8/31/78
* = Less than 1
S = surface, B = bottom

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TABLE 3.1.3-10
MEAN SAMPLING DENSITIES (numbers/100 cubic meters) BY
STATION AND DEPTH OF THE 10 PREDOMINANT MACROINVERTEBRATES, 1978

| | | IP01 | IP02 | IP03 | IP04 | IP05 | IP06 | IP07 | IP08 | IP09 | IP10 | IP11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N. americana | S | 890 | 109 | 232 | 4,369 | 3,308 | 236 | 654 | 105 | 2 | 48 | 4 |
| | B | 8,963 | 8,889 | 22,433 | 13,614 | 20,088 | 39,202 | 11,414 | 27,574 | 13,325 | 6,874 | 2,711 |
| R. harrisii | S | 2,356 | 2,708 | 3,168 | 1,724 | 3,750 | 3,048 | 1,776 | 2,428 | 1,122 | 1,415 | 1,348 |
| | B | 2,923 | 3,393 | 6,876 | 3,052 | 1,848 | 3,026 | 3,152 | 6,803 | 2,984 | 1,737 | 2,323 |
| Gammarus spp. | S | 186 | 20 | 30 | 62 | 98 | * | 6 | 4 | * | 5 | 2 |
| | B | 1,921 | 524 | 456 | 755 | 417 | 993 | 342 | 65 | 29 | 76 | 15 |
| U. minax | S | 16 | 142 | 145 | 0 | 468 | 1 | 111 | 1,098 | 42 | 324 | 12 |
| | B | 4 | 60 | 115 | 16 | 73 | 30 | 49 | 1,564 | 9 | 12 | 206 |
| B. virginica | S | * | 3 | 7 | 4 | 97 | 36 | 12 | 91 | 16 | 17 | 542 |
| | B | * | 11 | 94 | 13 | 79 | 29 | 704 | 190 | 207 | 64 | 313 |
| P. pugio | S | 24 | 21 | 30 | 9 | 51 | 27 | 33 | 34 | 10 | 25 | 35 |
| | B | 36 | 30 | 68 | 22 | 36 | 22 | 57 | 67 | 87 | 43 | 66 |
| E. triloba | S | 1 | 2 | 5 | * | 18 | * | 1 | 8 | * | 1 | 2 |
| | B | 2 | 3 | 24 | 19 | 73 | 57 | 20 | 87 | 74 | 50 | 50 |
| Corophium spp. | S | 9 | 16 | 5 | 3 | 71 | * | * | * | 0 | * | * |
| | B | 26 | 75 | 35 | 33 | 106 | 13 | 6 | 3 | 3 | 2 | 4 |
| Brachyura | S | 5 | 1 | 1 | 0 | 39 | 0 | 1 | 1 | 0 | * | 1 |
| | B | 26 | 24 | 48 | 5 | 98 | 73 | 5 | 35 | 4 | 3 | 5 |
| C. septemspinosa | S | 0 | 0 | * | * | * | 0 | * | 0 | 0 | 1 | 0 |
| | B | 4 | 22 | 68 | 6 | 56 | 69 | 30 | 50 | 31 | 17 | 1 |

* = Less than 1

S = surface, B = bottom

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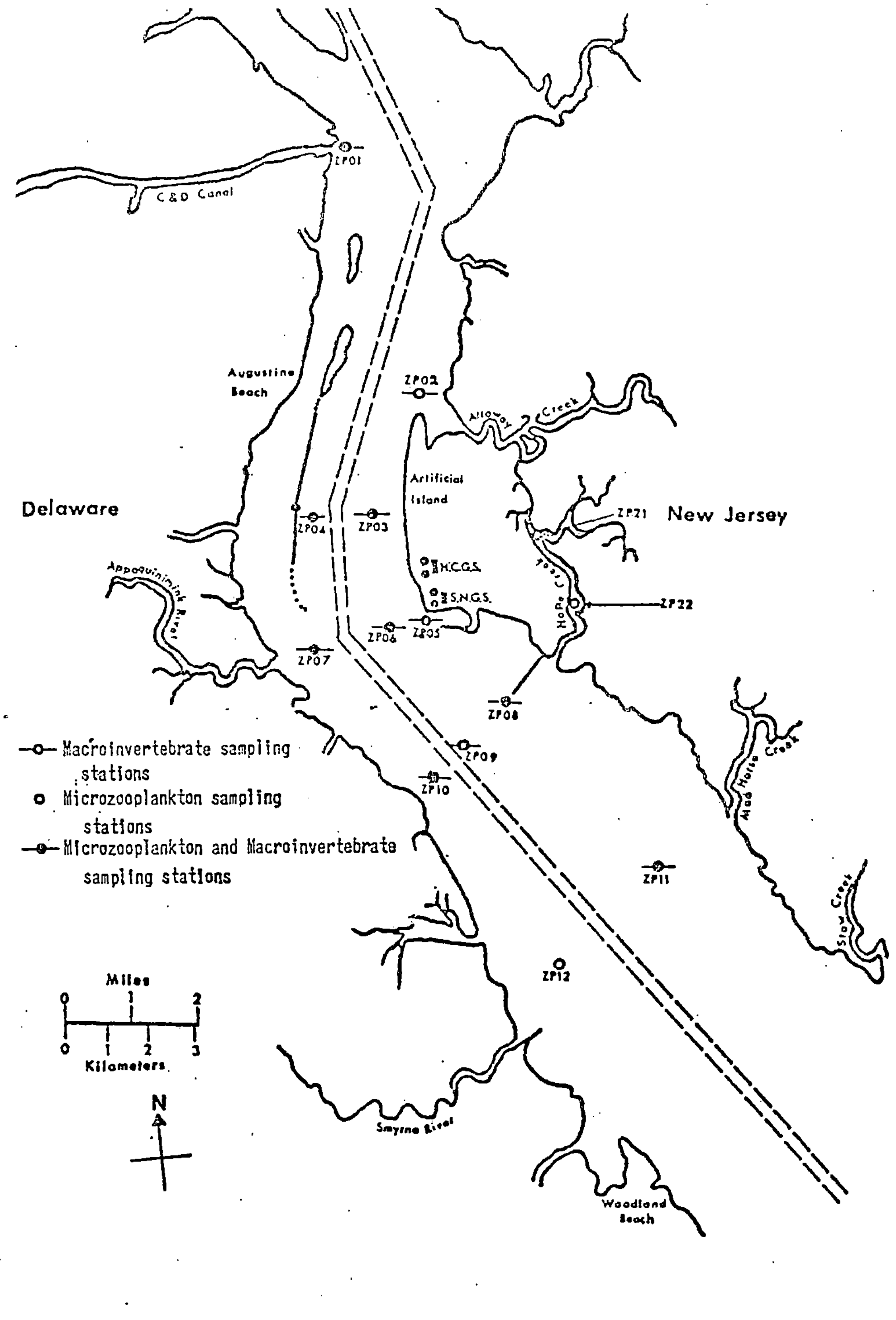
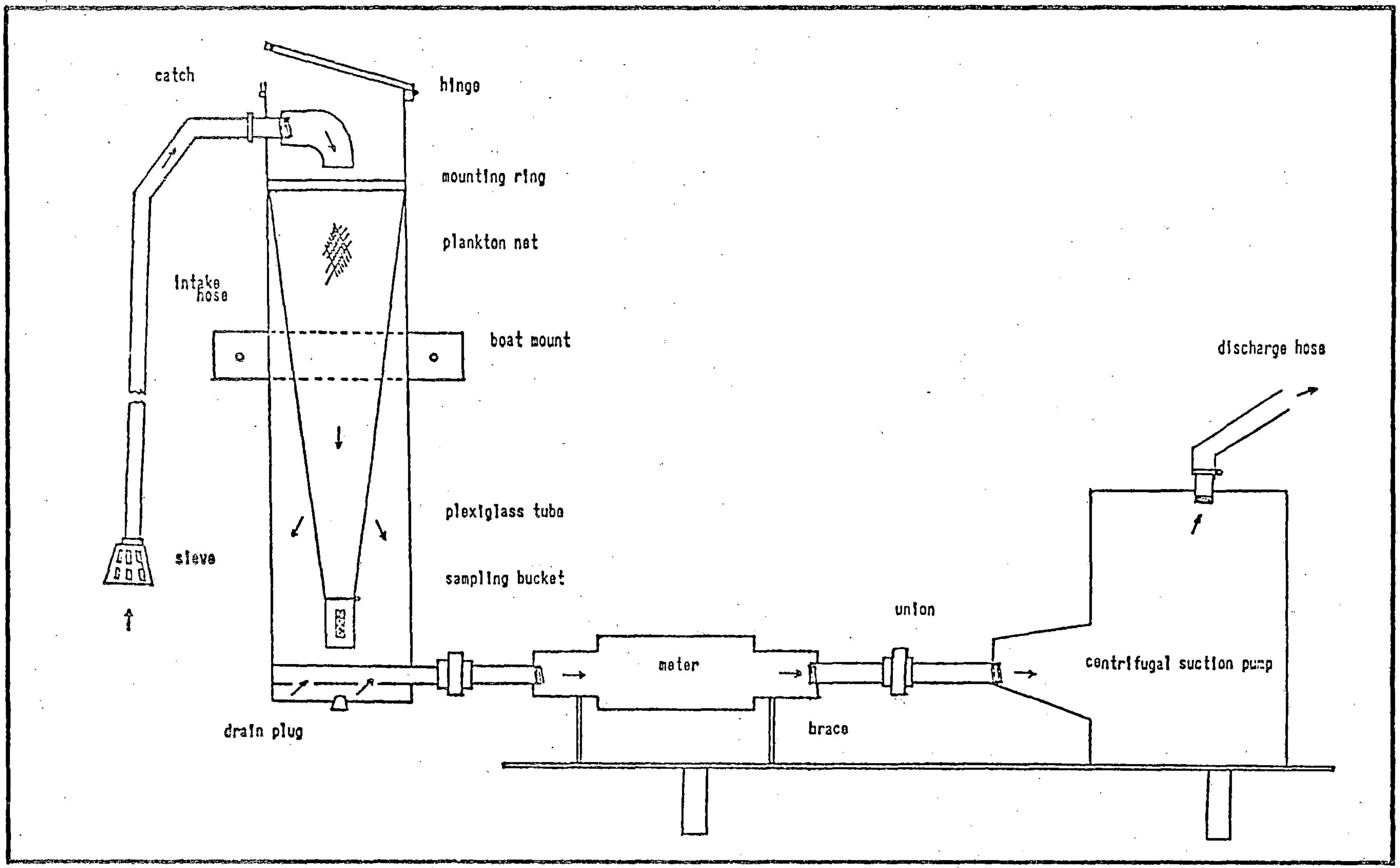


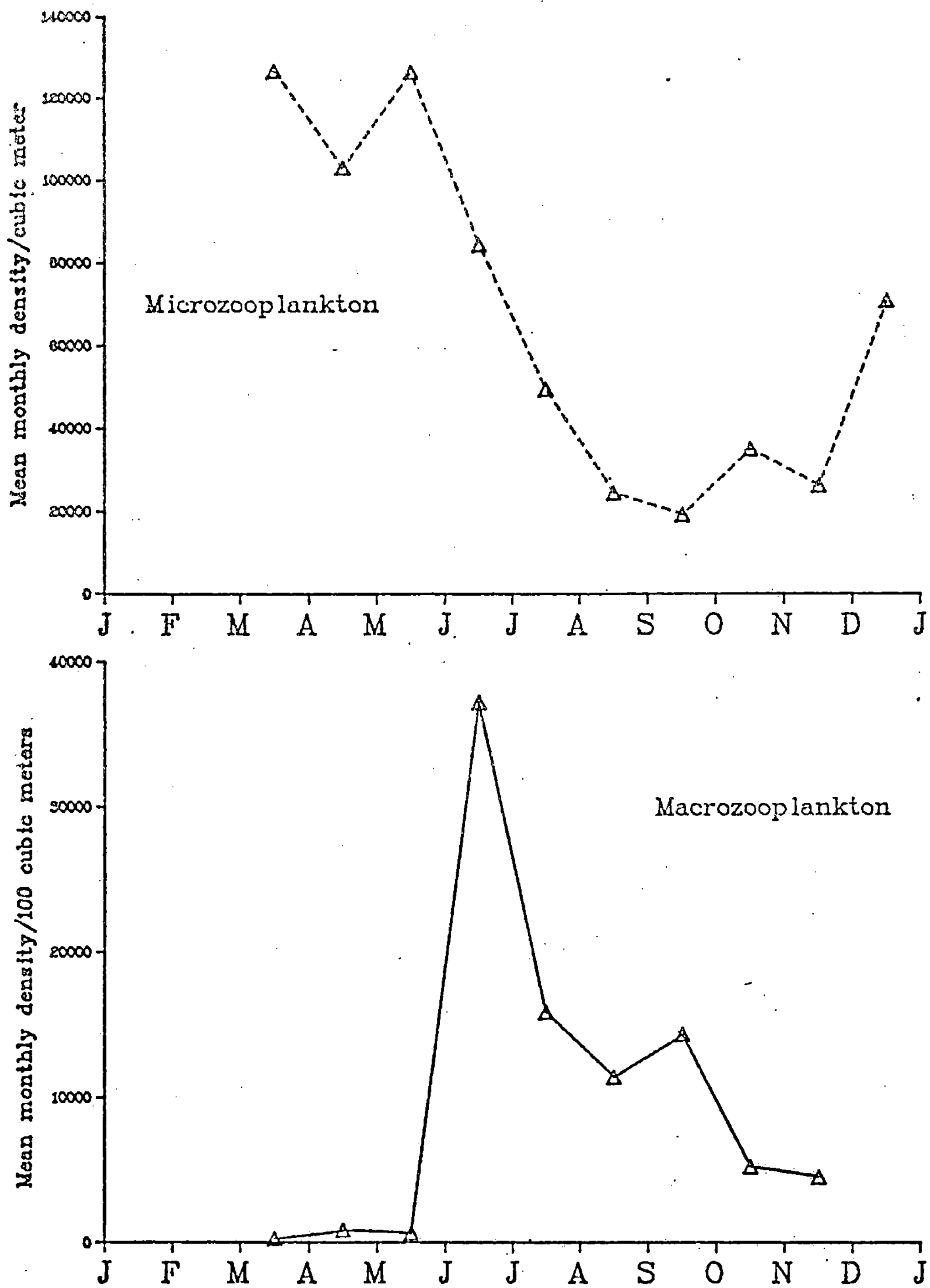

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Zooplankton sampling stations-1978 |
| --- | --- |
| | Figure 3.1.3-1 |



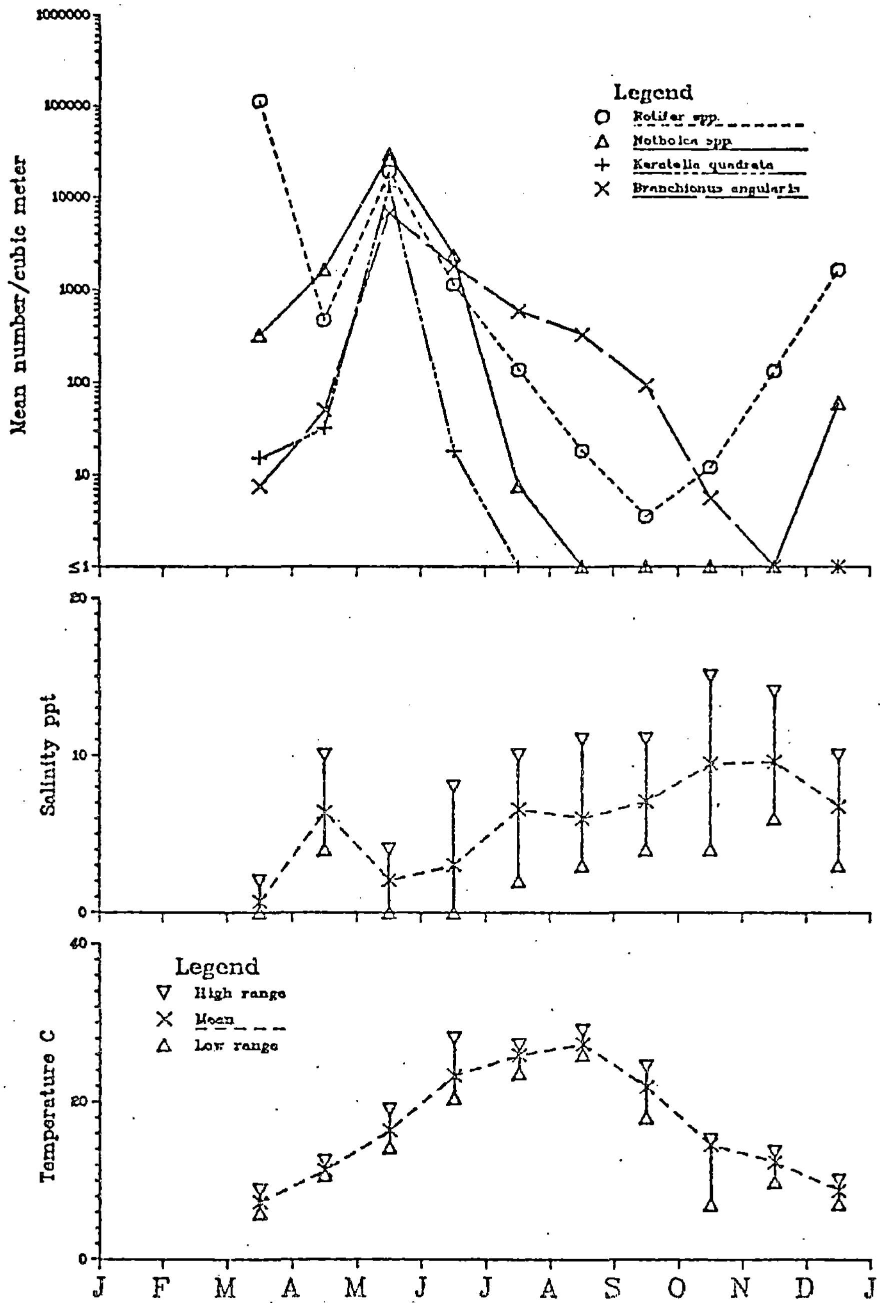

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Filter pump plankton sampler

Figure 3.1.3-2



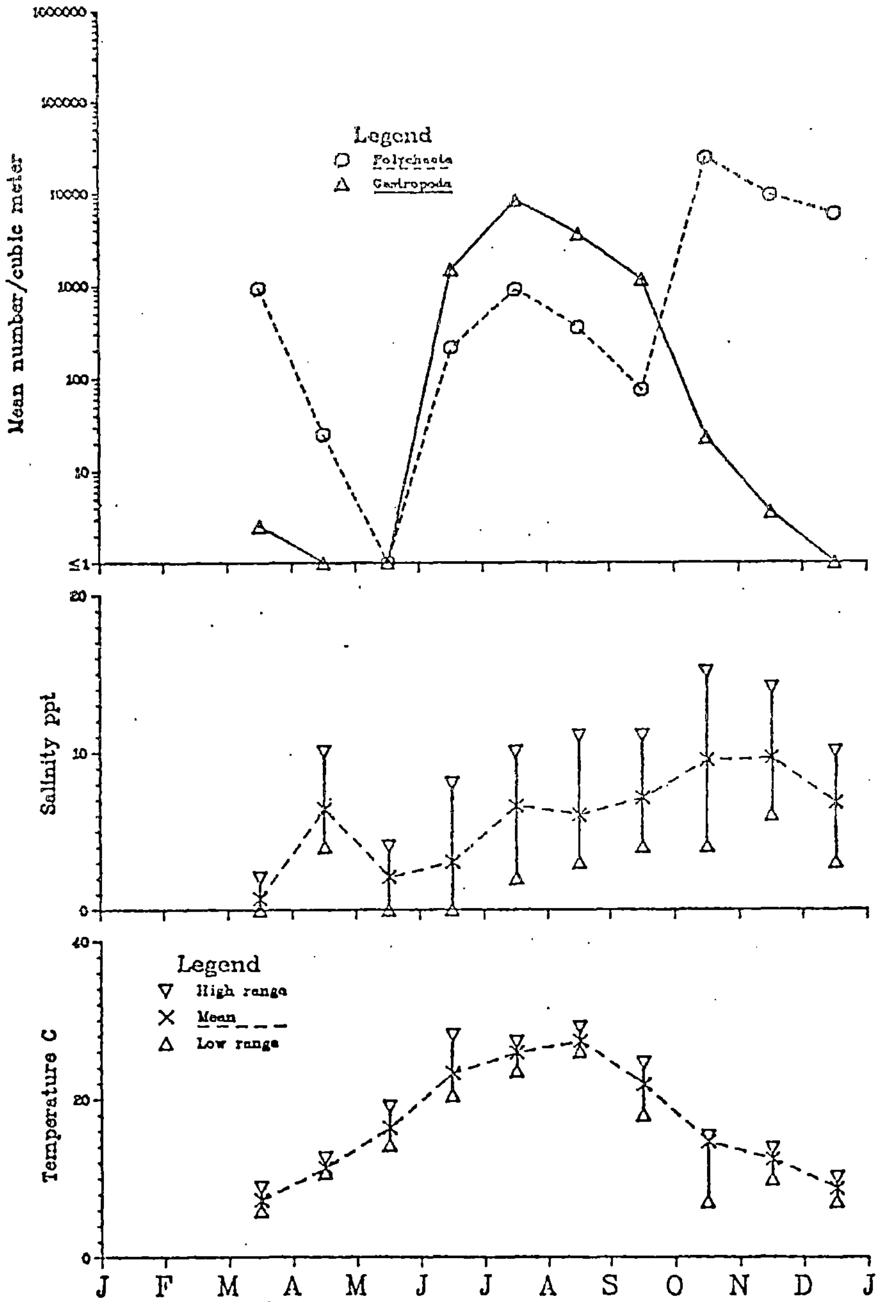

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of Microzooplankton and Macroinvertebrate plankton-1978 |
|---|---|
| | Figure 3.1.3-3 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of Rotifer spp., Notholca spp., K. quadrata, and B. angularis-1978

Figure 3.1.3-4




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of Polychaeta and Gastropoda-1978<br>Figure 3.1.3-5 |
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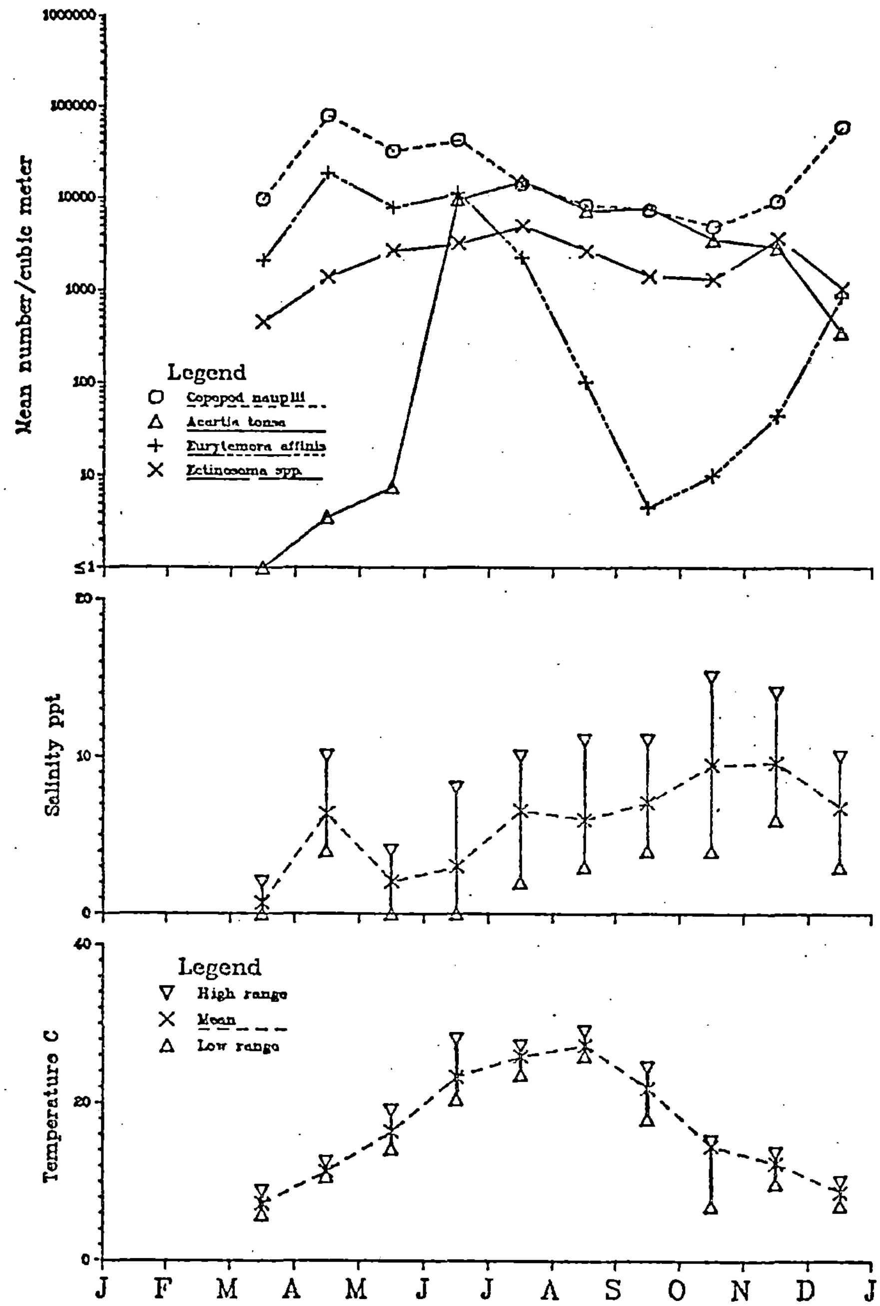


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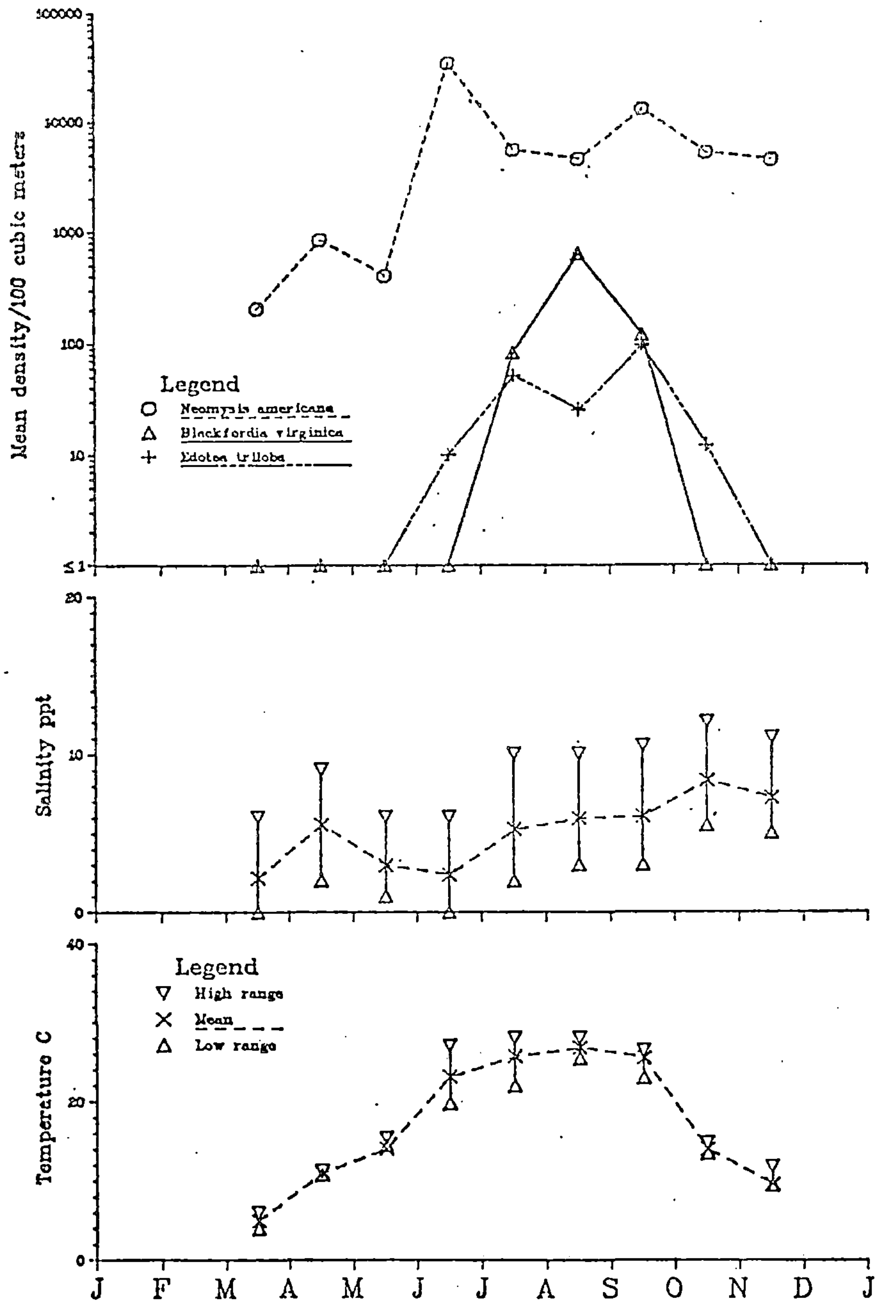
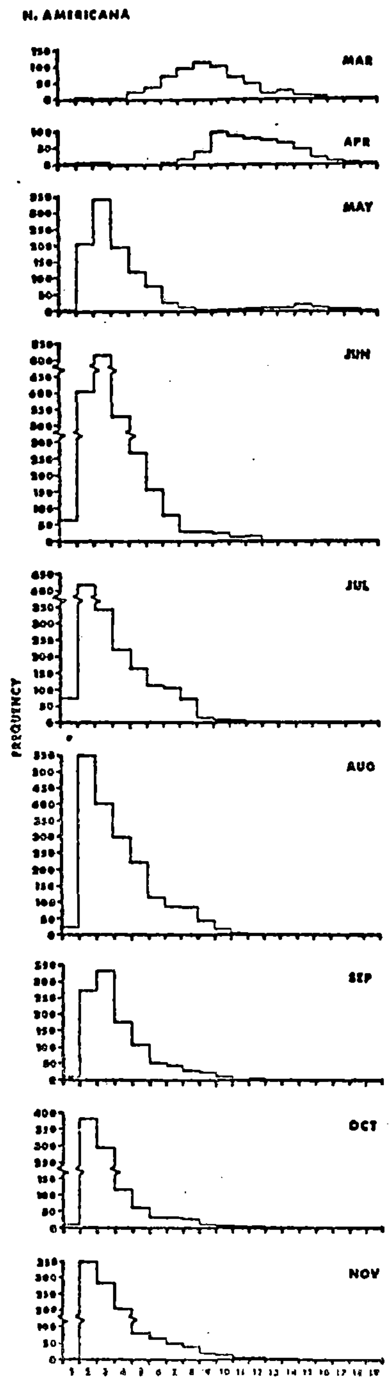
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of copepod nauplii, A. tonsa, E. affinis, and Ectinosoma spp.-1978 |
| | Figure 3.1.3-6 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of N. americana B. virginica, and E. triloba-1978

Figure 3.1.3-7

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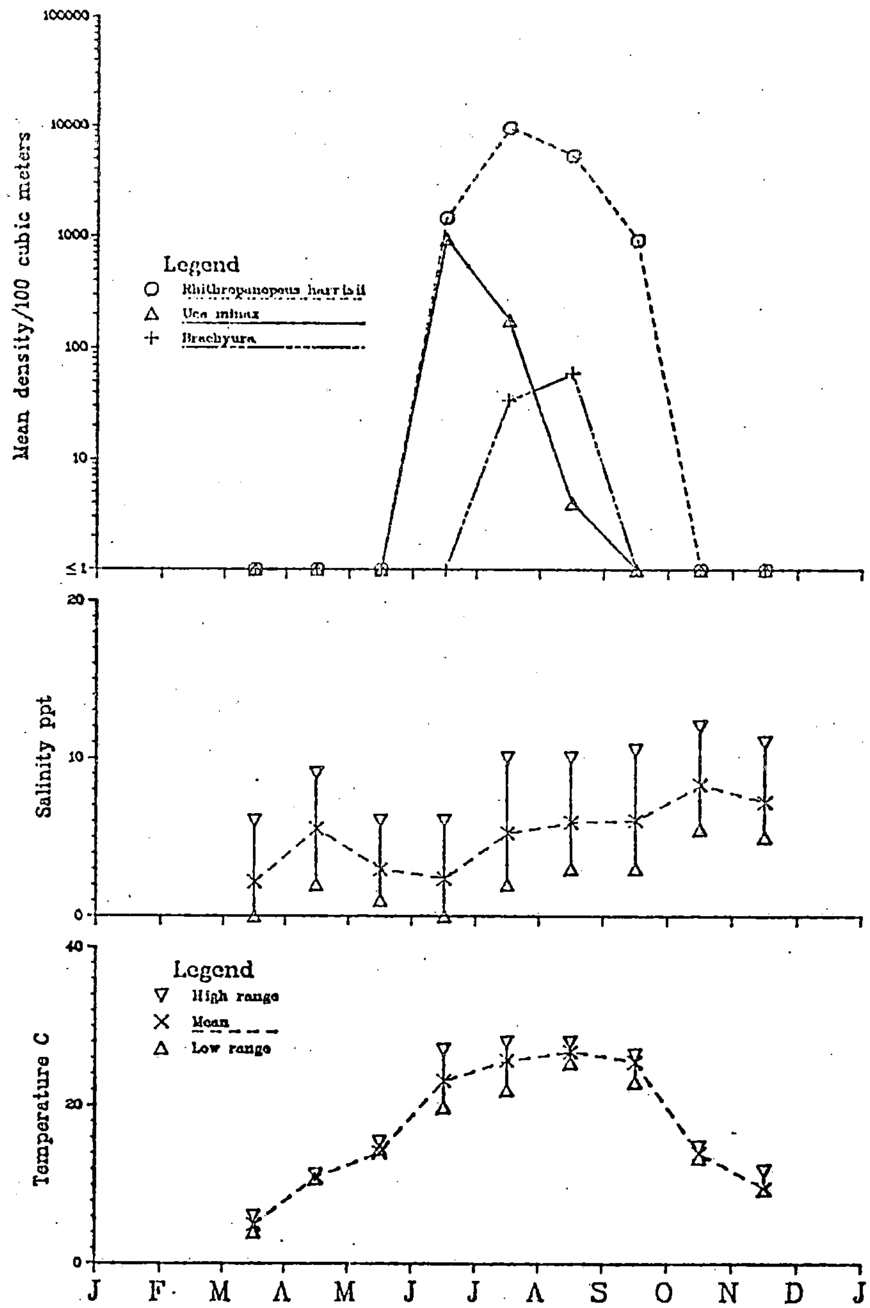
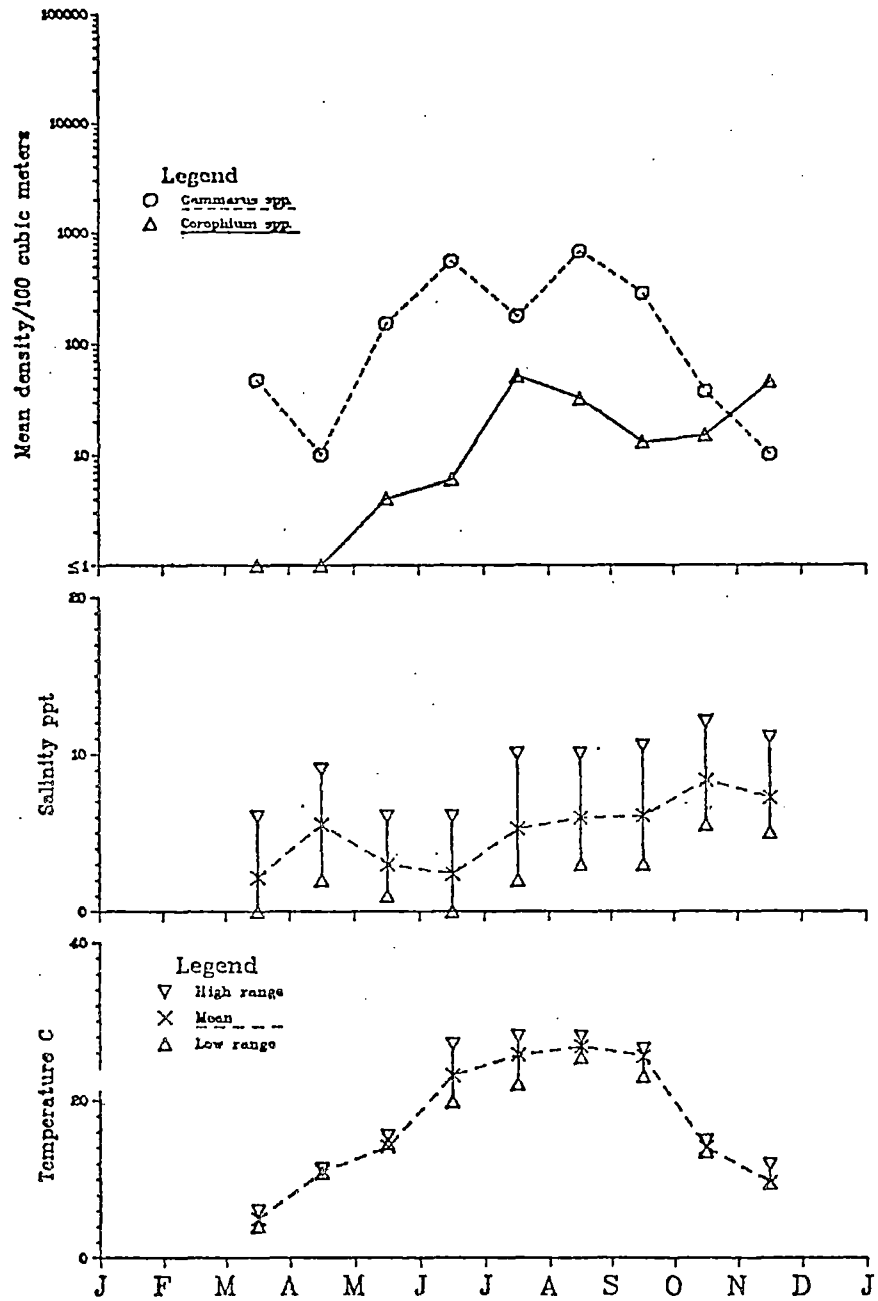
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Length frequency distributions for N. americana - 1978 |
| | Figure 3.1.3-8 |



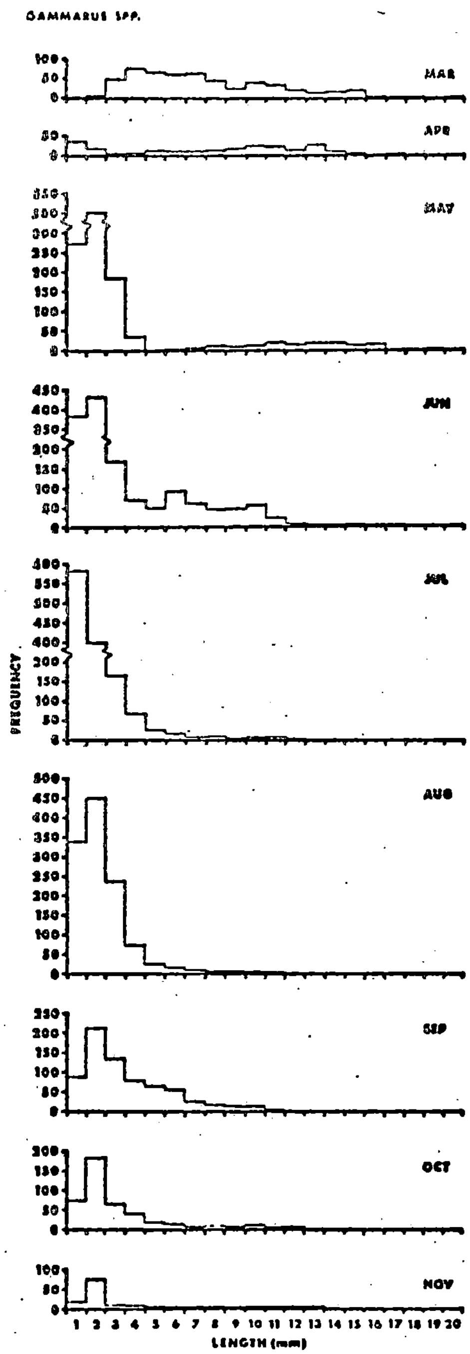

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of R. harrisii, U. minax, and Brachyura-1978

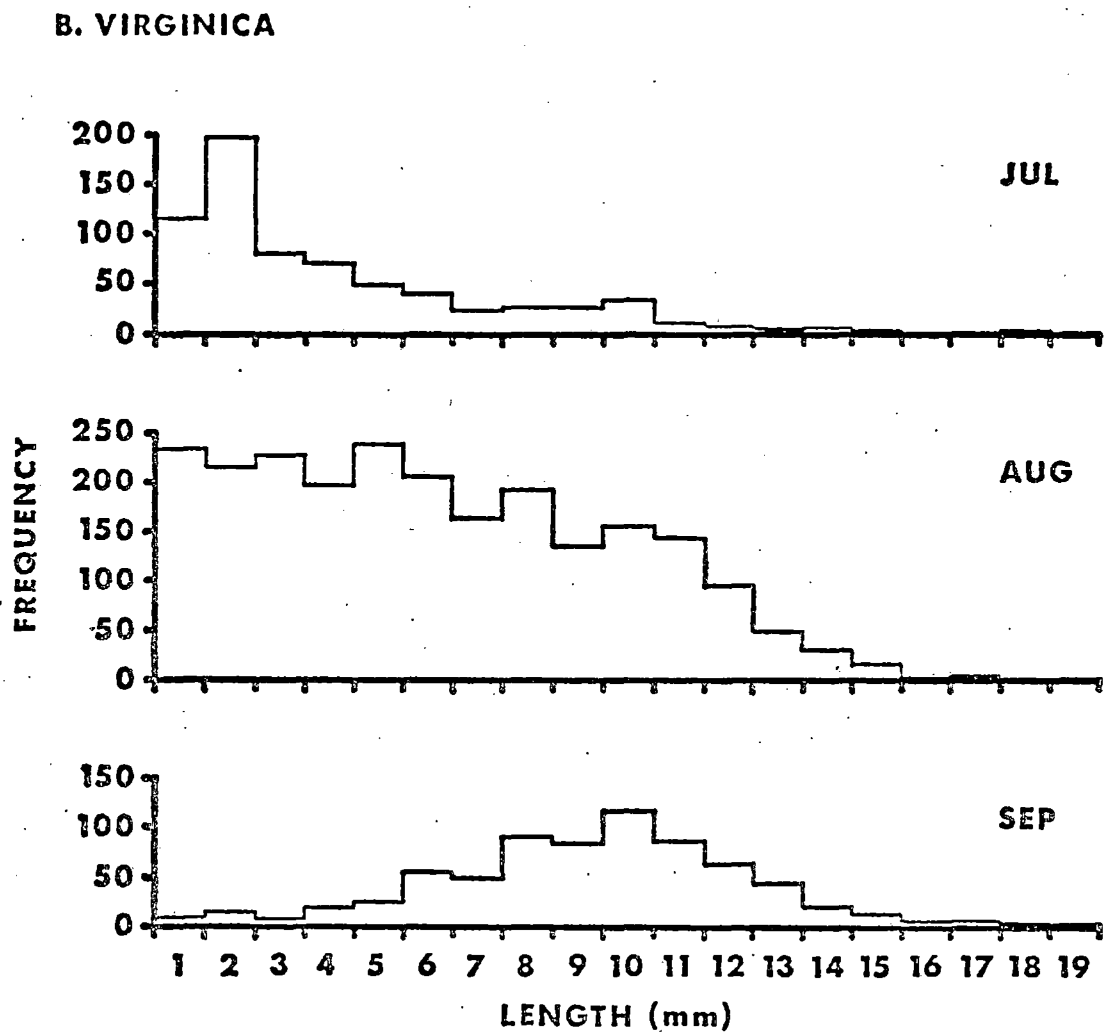
Figure 3.1.3-9



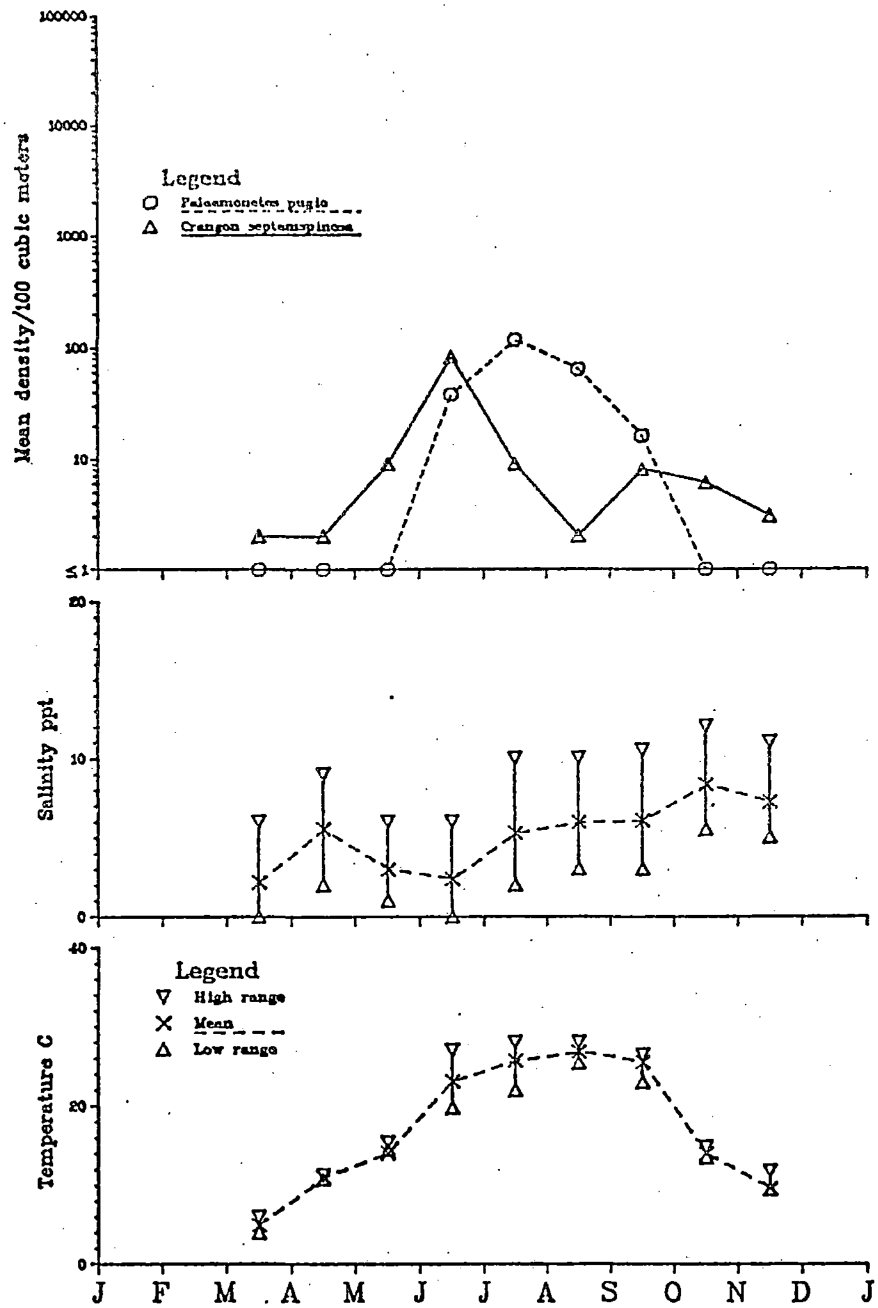

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of Gammarus spp. and Corophium spp. - 1978 |
|---|---|
| | Figure 3.1.3-10 |



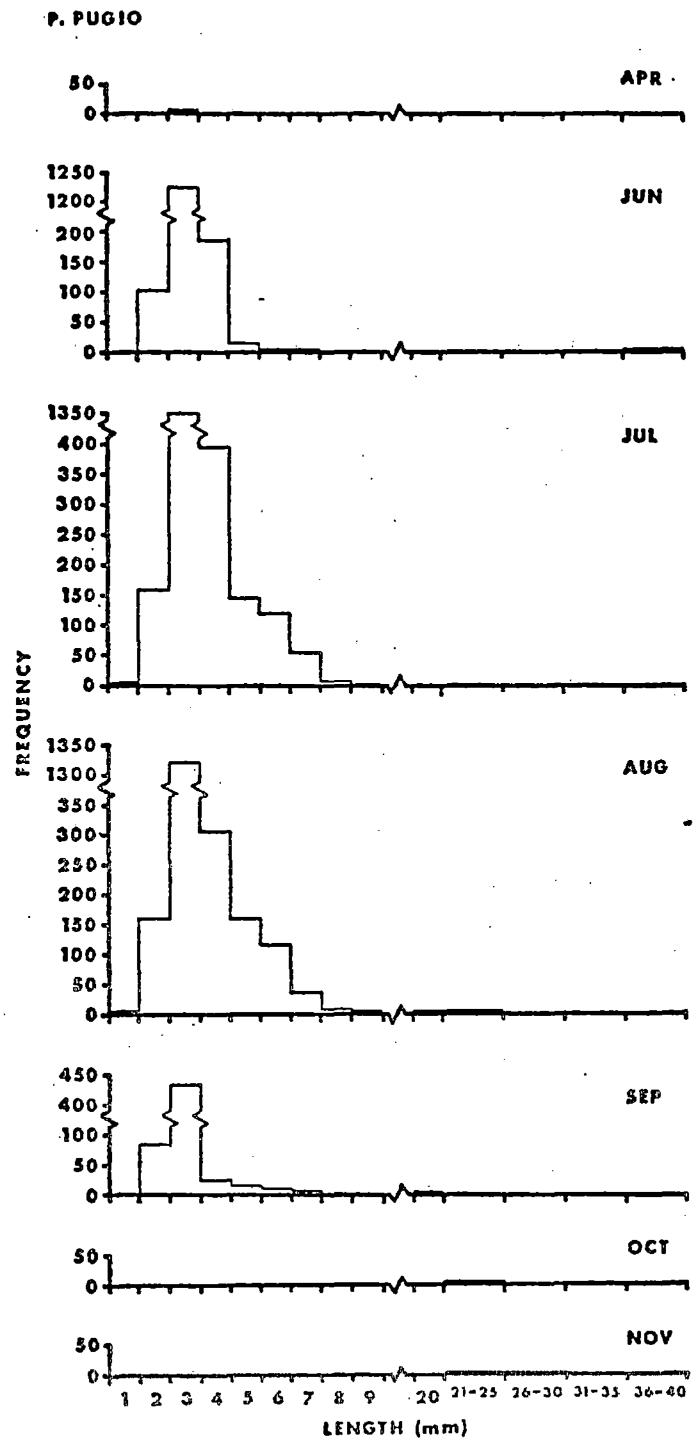

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Length frequency distributions for *Gammarus* spp. - 1978 |
| --- | --- |
| | Figure 3.1.3-11 |



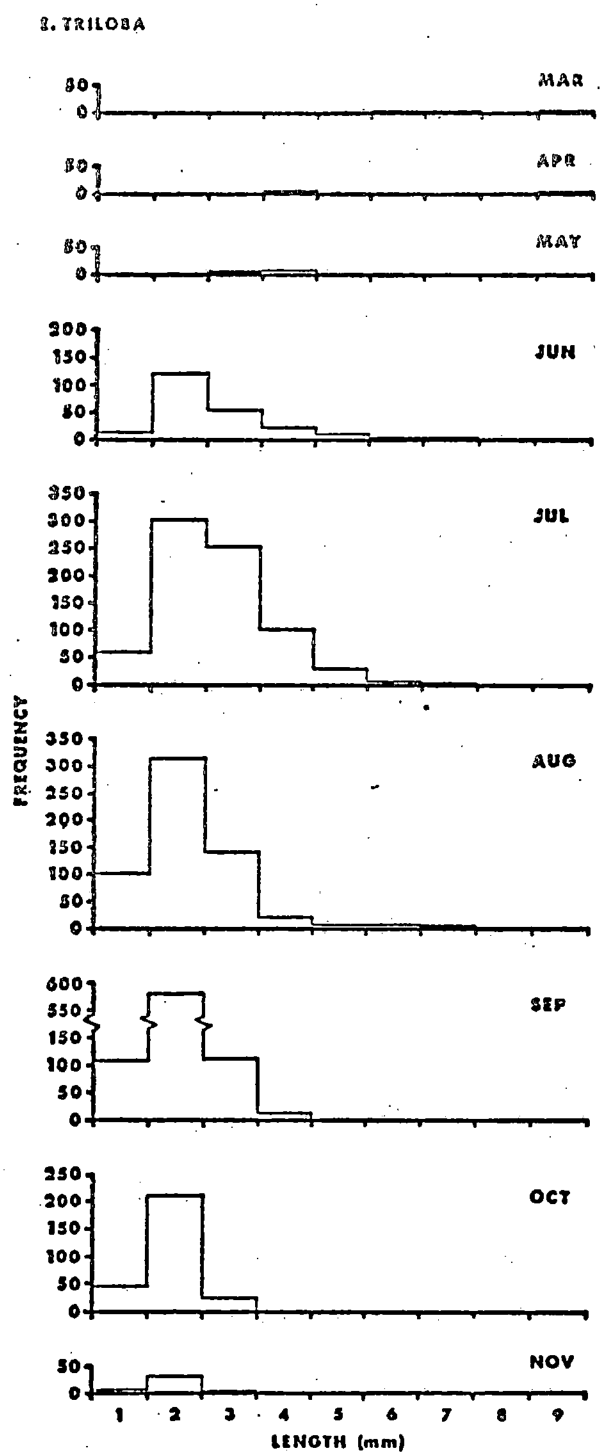

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Length frequency distributions for B. *virginica* - 1978 |
|---|---|
| | Figure 3.1.3-12 |



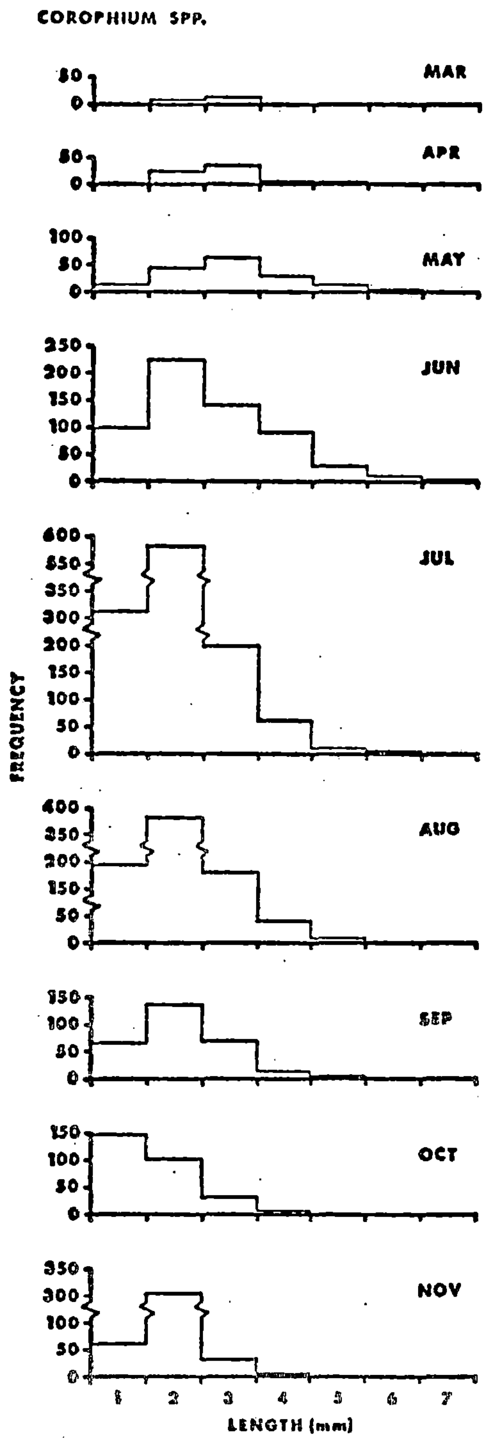

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of P. pugio and C. septemspinosa - 1978 |
|---|---|
| | Figure 3.1.3-13 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY SALEM NUCLEAR GENERATING STATION | Length frequency distributions for P. pugio - 1978 |
|---|---|
| | Figure 3.1.3-14 |



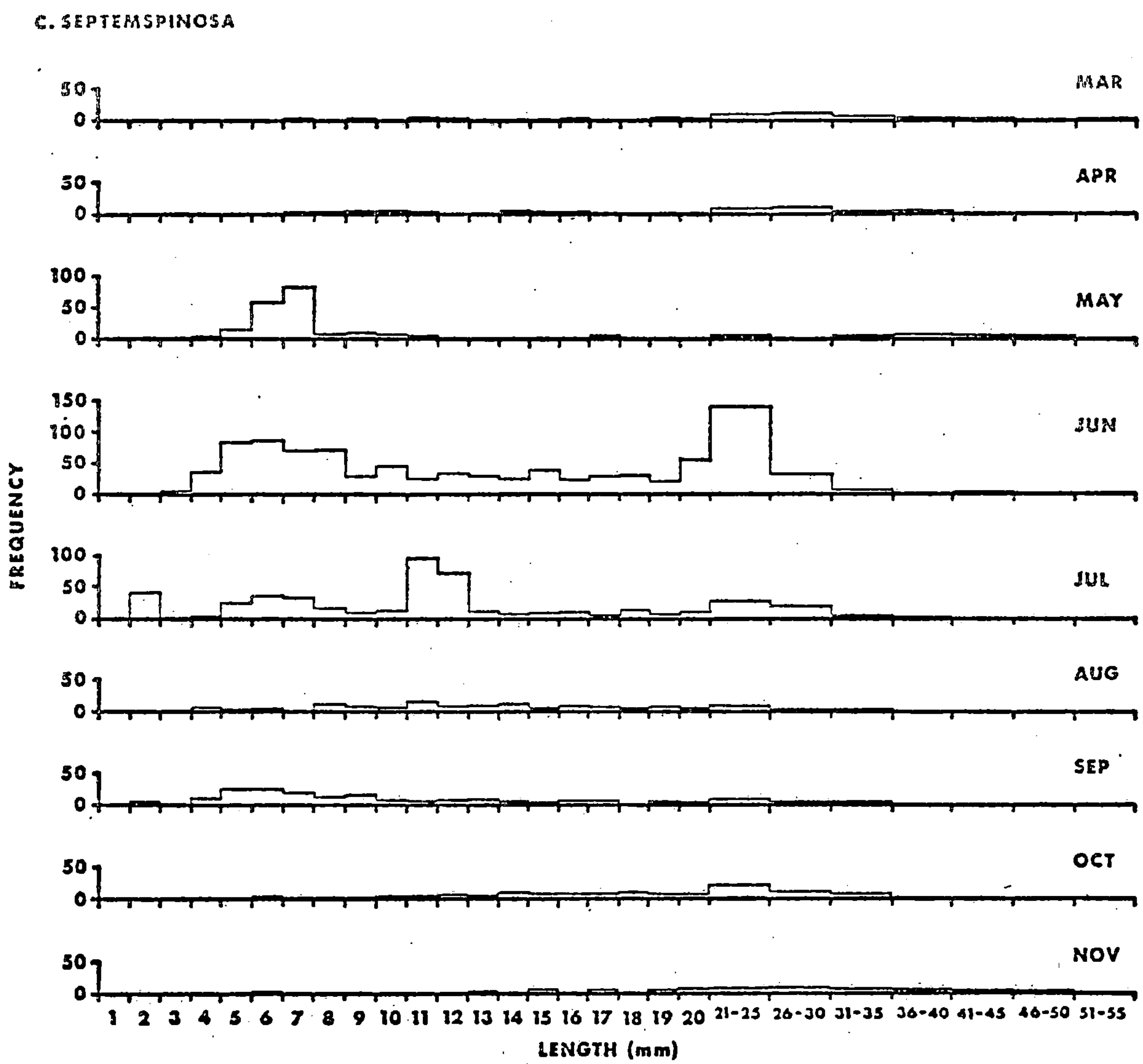

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Length frequency distributions for *E. triloba* - 1978 |
| | Figure 3.1.3-15 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Length frequency distributions for *Corophium* spp. - 1978

Figure 3.1.3-16




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Length frequency distributions for *C. septemspinosa* - 1978 |
|---|---|
| | Figure 3.1.3-17 |

## 3.1.4 Benthos (ETS Section 3.1.2.1.le)

Benthos of the Delaware Estuary has been studied since 1971. Objectives are to estimate and monitor changes in species diversity, distribution, density, and biomass.

### 3.1.4.1 Summary

The same eight taxa were taken at all stations in 1977 and 1978. Balanus improvisus, Scolecolepides viridis, and Cyathura polita ranked within the top six in both density and biomass in 1975-1978. Simple diversity (number of species) and the index of diversity were higher at the southern stations in 1978. Both measures of diversity were higher during the high salinity summer and fall months. The annual mean diversity index was highest at Station T5S1, 7.6 km southeast of Salem. Station T4S2, just south of Salem, had the highest annual mean simple diversity and the highest annual mean density and biomass of all stations in 1977 and 1978. Seasonally, mean density was greatest during July and August and mean biomass was greatest during March through June in 1978.

The benthos community has not changed in the two operational years (1977 and 1978) from the pre-operational years (1971-1976). Review of the data on species composition and distribution, diversity, density, and biomass indicate no discernible impact on the benthos by Salem 1.

### 3.1.4.2 Materials and Methods

FIELD AND LABORATORY

The requirements of the Benthos ETS were satisfied. Triplicate samples were taken at 14 stations on six transects (Table 3.1.4-1, Fig. 3.1.4-1) monthly during March through November. Water depth and substrate description, based on visual inspection, at each station is reported in Table 3.1.4-2. All samples were taken during daylight with a Ponar grab sampler which samples an area 0.05 $m^2$ to a depth of approximately 15 cm. In 1978, 126 collections (378 individual grabs) were taken and analyzed. For a more detailed description of sampling gear, gear deployment, collection of physicochemical data and laboratory procedures see Volume 2 of the 1977 Annual Environmental Operating Report.

## TAXONOMIC CONSIDERATIONS

In 1978 a continuing effort was made to identify all benthic invertebrates to the lowest taxonomic level. Wherever taxonomic changes relative to previous IA reports are made, the previously cited name is referenced. An organism referred to as Annelida in 1975-77 was re-identified to the class Turbellaria in 1978.

### 3.1.4.3 Results and Discussion

## GENERAL SAMPLE COMPOSITION

A total of 79 taxa has been collected since 1971 (Table 3.1.4-3). In 1978, 60 taxa were collected. Organisms collected in 1978 but not in 1971-1977 include a flatworm, Turbellaria #1; the snail *Hydrobia* sp.; and an insect larvae in the family Ceratopogonidae.

Twenty-three taxa were taken at from one to three stations (Table 3.1.4-4). *Euplana gracilis*, *Eteone heteropoda*, Diptera, Ceratopogonidae, *Culicoides* sp., and *Bowerbankia gracilis* were each represented by single specimens. *Stylochus ellipticus*, *Doridella obscura*, and *Modiolus demissus* were taken only at T4S2 (gravel-shell substrate) in 22, 11, and 33 percent, respectively, of the total grabs taken (Table 3.1.4-4). *Parahaustorius* sp. was collected at T3S1 (30 percent of total grabs), T3S2 (33 percent), and T7S1 (15 percent), (all with sand substrate). The remaining 13 taxa were taken infrequently. Many of these are at the northern limits of their range in the estuary.

Organisms taken at all stations in the Salem study area in 1978 were *Garveia franciscana*, *Sertularia argentea*, Rhynchocoela, *Scolecolepides viridis*, *Paranais litoralis*, *Neomysis americana*, *Chiridotea almyra*, *Cyathura polita*, *Corophium lacustre*, and *Crangon septemspinosa*. These, except for *C. almyra* and *C. septemspinosa*, had been taken at all stations also in 1977. *S. viridis*, a polychaete, and *C. polita*, an isopod, had a high percent occurrence at almost every station, indicating their importance in the study area. G. franciscana, a hydroid, had its highest percent occurrence at T2S2 (100 percent), T4S2 (100 percent), T2S1 (96 percent), T4S1 (96 percent), and T8S2 (96 percent). S. argentea, a hydroid, had its highest percent occurrence at T4S3 (96 percent) and T4S2 (93 percent). Rhynchocoela, a nemertean worm, had its highest percent occurrence at T4S2 (93 percent) and T5S2 (85 percent). P. litoralis, an oligochaete, had its highest percent occurrence (100 percent) at T2S1, T4S1, T4S2, and T8S2. It had a very low percent occurrence (4-41 percent) at T3S1, T3S2, T7S1 (sand substrate), and T7S2 (hard clay substrate). C. almyra, an isopod, had its highest percent occurrence at three sand stations, T3S2 (81 percent), T3S1 (74 percent), and T7S1 (67 percent), thus demonstrating a sand substrate preference. N. americana and C. septemspinosa had a low percent occurrence at almost every station.

Edotea triloba, Gammarus spp., and Monoculodes edwardsi were taken at 13 of 14 stations in 1978 with a low percent occurrence at all stations. Other taxa widely distributed in the study area were Hartlaubella gelatinosa, Turbellaria, Tricladida, Nereis succinea, Polydora sp., Oligochaeta #1, Macoma balthica, and Leucon americanus.

## SPECIES DISCUSSION

Balanus improvisus, Scolecolepides viridis, and Cyathura polita ranked within the top six species in both density and biomass in 1975-78. Paranais litoralis and Polydora sp. also ranked within the top six species in density for all four years and Turbellaria ranked in the top six in density in 1977 and 1978. The high ranking of these organisms in density and biomass indicates their importance in the community structure. These six species, which comprised 76.3 percent and 53.9 percent, respectively, of the annual mean density and biomass, are discussed below.

P. litoralis, an oligochaete, ranked first in density and 17th in biomass (Table 3.1.4-5). Annual mean density of this species was greatest at T4S1. It occurred at every station during the year with a percent occurrence $\geq$ 89 percent at 9 of the 14 stations (Table 3.1.4-4). It had a lower percent occurrence at stations with predominantly sand substrates (T3S1, T3S2, T7S1) and clay substrates (T3S3, T7S2). P. litoralis occurred in 266 grabs or 70.4 percent of the annual sample (Table 3.1.4-5).

B. improvisus, a barnacle, ranked second in density and first in biomass (Table 3.1.4-5). Annual mean density and biomass at Station T4S2 were higher than all other stations. The occurrence and abundance of this species is directly related to availability of substrate, e.g., gravel and shell, which is suitable for setting of larvae. It occurred at 10 of the 14 stations sampled during 1978 but its percent occurrence was high at only T4S2 (93 percent) (Table 3.1.4-4). The amount of suitable substrate in the study area is reflected in the occurrence of B. improvisus in only 17.2 percent (65 grabs) of the total grabs (Table 3.1.4-5). Despite the apparent lack of suitable substrate, this species ranks high in the annual sample due to its extremely high density and biomass at T4S2.

S. viridis, a polychaete, ranked third in density and second in biomass (1976-78) (Table 3.1.4-5). Annual mean density and biomass of this species were highest at T2S2 and also were high at most other stations except T7S2. S. viridis had the highest number of occurrences (319) of any taxa and was found at every station (Tables 3.1.4-5, 3.1.4-4). The only relatively low percent occurrence (30 percent) of this polychaete was at T7S2 which is dominated by another spionid polychaete, Polydora sp. The high ranking of S. viridis in density and biomass and its high percent occurrence at every station indicates the importance of this resident species.

Turbellaria, a flatworm, ranked fourth in density and 22nd in biomass (Table 3.1.4-5). Annual mean density and biomass of this species was highest at T3S2 (sand substrate) and high only at T2S2, T3S1, and T7S1 (all with sand substrate). It occurred at 11 of the 14 stations sampled during 1978 but its percent occurrence was relatively high at only T2S2 (67 percent), T3S2 (63 percent), T3S1 (44 percent), and T7S1 (37 percent) (Table 3.1.4-4). Turbellaria occurred in 18.8 percent (71 grabs) of the total grabs (Table 3.1.4-5).

Polydora sp., a polychaete, ranked fifth in density and 18th in biomass (Table 3.1.4-5). Annual mean density and biomass of this species were highest at T7S2. This species occurred at 11 stations but had a relatively high percent occurrence at only T7S2 (96 percent), T3S3 (52 percent), and T5S1 (52 percent) (Table 3.1.4-4). This polychaete occurred in 25.4 percent (96 grabs) of the total grabs (Table 3.1.4-5).

C. polita, an isopod, ranked sixth in density and biomass and was taken at all stations (Tables 3.1.4-5, 3.1.4-4). Annual mean density of this species was highest at T5S1. C. polita had the second highest number of occurrences (303) and was taken in 80.2 percent of the total annual grabs (Table 3.1.4-5). This isopod had its lowest percent occurrence (30 percent) at T3S2, a station with a sand substrate (Table 3.1.4-4). It had a relatively high percent occurrence (≥46 percent) at all other stations. Its high ranking for density and biomass and its high number of occurrences throughout the study area indicates the importance of this species.

STATION DISCUSSION

Station T2S1

This inshore station with a substrate of fine sand, clay, and some detritus (Table 3.1.4-2) is on the northernmost transect (Fig. 3.1.4-1). It ranked eighth in density ($2,460.0/m^2$) and 13th in biomass ($613.6\ mg/m^2$) in 1978 (Table 3.1.4-6). The top three ranking taxa, P. litoralis, S. viridis, and C. polita, comprised 84.3 and 77.9 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T2S2

This station has a substrate of sand interspersed with clay and detritus (Table 3.1.4-2). It ranked sixth in density ($2,815.6/m^2$) and fifth in biomass ($1,694.9\ mg/m^2$) (Table 3.1.4-6). The top three ranking taxa, Turbellaria, C. lacustre, and S. viridis, comprised 88.5 and 75.5 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T3S1

This station had a substrate of fine sand with small amounts of mud and detritus (Table 3.1.4-2). It ranked 12th in density ($1,511.1/m^2$) and third in biomass ($3,025.4\ mg/m^2$) (Table 3.1.4-6). The high ranking in biomass is due mainly to the very high occurrence of Gammarus spp. in May. The top three ranking taxa, Gammarus spp., S. viridis, and Turbellaria, comprised 77.0 and 73.8 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T3S2

The substrate at this station consists of black sand with very little mud and detritus (Table 3.1.4-2). It ranked third in density (3,157.0/$m^2$) and 11th in biomass (752.6 mg/$m^2$) (Table 3.1.4-6). The top three ranking taxa, Turbellaria, C. almyra, and S. viridis, comprised 92.6 and 70.4 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5). Turbellaria accounted for 80.1 percent of the annual mean density but only 2.5 percent of the biomass.

Station T3S3

The substrate at this station consists of clay and organic mud, some sand, and detritus (Table 3.1.4-2). It ranked 11th in density (1,795.6/$m^2$) and 12th in biomass (674.4 mg/$m^2$) (Table 3.1.4-6). The top three ranking taxa, Polydora sp., S. viridis, and P. litoralis, comprised 69.1 and 25.9 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T4S1

The substrate at this station consists of organic mud, clay, and detritus (Table 3.1.4-2). This station ranked second in density (3,169.6/$m^2$) and fourth in biomass (1,727.5 mg/$m^2$) (Table 3.1.4-6). The top three ranking taxa, P. litoralis, S. viridis, and E. triloba, comprised 85.6 and 38.0 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5). P. litoralis accounted for 73.3 percent of the annual mean density but only 2.0 percent of the biomass.

Station T4S2

The substrate at this station consists of sand, gravel, shell, mud, and detritus (Table 3.1.4-2). This station ranked first in density (7,831.1/$m^2$) and biomass (12,315.9 mg/$m^2$) (Table 3.1.4-6). The top three ranking taxa, B.

*improvisus*, *P. litoralis*, and *N. succinea*, comprised 79.7 and 72.7 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T4S3

The substrate at this station consists of clay and detritus (Table 3.1.4-2). It ranked last of 14 stations in density ($667.4/m^2$) and 10th in biomass ($1,096.3\ mg/m^2$) (Table 3.1.4-6). The top three ranking taxa, *P. litoralis*, *S. viridis*, and *N. americana*, comprised 68.5 and 24.0 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T5S1

The substrate at this station consists of sandy clay and detritus (Table 3.1.4-2). It ranked fourth in density ($2,880.0/m^2$) and seventh in biomass ($1,666.4\ mg/m^2$) (Table 3.1.4-6). The top three ranking taxa, *P. litoralis*, *C. polita*, and *Polydora* sp., comprised 46.6 and 14.4 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T5S2

The substrate at this station consists of sand, gravel, shell, organic mud, and some detritus (Table 3.1.4-2). This station ranked seventh in density ($2,506.7/m^2$) and second in biomass ($3,095.9\ mg/m^2$) (Table 3.1.4-6). The top three ranking taxa, *P. litoralis*, *S. viridis*, and *C. polita*, comprised 73.5 and 20.6 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T7S1

The substrate at this station is composed mainly of fine black sand with some clay and detritus (Table 3.1.4-2). This station ranked 13th in density ($1,093.3/m^2$) and eighth in biomass (1,313.6 mg/$m^2$) (Table 3.1.4-6). The top three ranking taxa, S. viridis, Turbellaria, and Gammarus spp., comprised 73.7 and 58.6 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T7S2

The substrate at this station is composed mainly of hard clay (Table 3.1.4-2). This station ranked 10th in density (1,991.9/$m^2$) and 14th in biomass (562.7 mg/$m^2$) (Table 3.1.4-6). The top three ranking taxa, Polydora sp., C. polita, and Gammarus spp., comprised 93.3 and 56.9 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5). Polydora sp. accounted for 82.2 percent of the annual mean density and 14.0 percent of the biomass at this station.

Station T8S1

This station has a substrate of organic mud with detritus and sand (Table 3.1.4-2). It ranked fifth in density (2,829.6/$m^2$) and ninth in biomass (1,189.3 mg/$m^2$) (Table 3.1.4-6). The top three ranking taxa, P. litoralis, N. americana, and C. polita, comprised 54.1 and 22.9 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

Station T8S2

The substrate at this station is composed of organic mud, sand, and some detritus (Table 3.1.4-2). It ranked ninth in density (2,151.9/$m^2$) and sixth in biomass (1,671.2 mg/$m^2$) (Table 3.1.4-6). The top three ranking taxa, P. litoralis, S. viridis, and C. polita, comprised 88.1 and 50.9 percent, respectively, of the annual mean density and biomass at this station (Table 3.1.4-5).

## SPECIES DIVERSITY

Analysis of species diversity provides a means of detecting changes in community structure. Two components of species diversity are species richness (number of species) and the numbers of individuals in each species. The mean number of species at each station in 1978 ranged from 9 at T3S2 and T7S2 to 22 at T4S2 (Table 3.1.4-7). In 1977, the range was from 9 at T3S2 to 24 at T4S2.

Salinity and sediment type are two principle parameters controlling species composition and abundance. Mean simple diversity (number of species) per region was higher at the southern stations ($\overline{X}$ = 17) than at the northern stations ($\overline{X}$ = 11). Mean simple diversity ranged from 9 to 13 in the northern transects (2, 3, 7) and from 13 to 22 in the southern transects (4, 5, 8).

Maximum mean simple diversity per month occurred in November ($\overline{X}$ = 16) (Table 3.1.4-7). Other months with high diversities were August and October ($\overline{X}$ = 15). This correlated with high salinity during August through November. The minimum mean simple diversity occurred in April and June ($\overline{X}$ = 12).

The maximum monthly number of species per station was 28 at T4S2 in July and November (Table 3.1.4-7). The minimum number was five at T7S2 in April and May. This low diversity is probably due to the hard clay substrate and the low salinity.

Maximum annual mean simple diversity per station occurred at station T4S2 ($\overline{X}$ = 22) which has a gravel and shell type substrate (Table 3.1.4-7). Minimum simple diversity occurred at stations with sand or clay substrates. Annual mean simple diversity was lowest ($\overline{X}$ = 9) at T3S2 (sand substrate) and T7S2 (clay substrate), ranking just behind T2S2 (sand substrate) and T3S3 (clay substrate) ($\overline{X}$ = 10).

Another measure of diversity is a diversity index. One common index which accounts for both components of species diversity is the Shannon-Weaver index (Shannon and Weaver, 1963). This function is recommended by that U.S. Environmental Protection Agency (Weber, 1973) for calculating mean diversity. The yearly mean diversity index per station ranged from 0.857 at T7S2 to 1.993 at T5S1 (Table 3.1.4-7). In 1977, the range was from 1.028 at T3S1 to 1.974 at T5S1.

The mean diversity index per region was higher at the southern stations (D = 1.601) than at the northern stations (D = 1.167). It ranged from 0.857 to 1.337 in the northern transects (2, 3, 7) and from 1.048 to 1.993 in the southern transects (4, 5, 8) (Table 3.1.4-7). This trend correlates with salinity.

The maximum mean diversity index per month occurred in October (D = 1.637) and the minimum occurred in July (D = 1.138) (Table 3.1.4-7). The low diversity in July was due to the numerical dominance of Polydora sp., Paranais litoralis, and Balanus improvisus, which represented 71.7 percent of the monthly sample.

The maximum monthly diversity indices per station occurred at T5S1 (D = 2.395) and T7S1 (D = 2.385) in September as a result of the high salinities. The minimum indices occurred at T7S2 in August (D = 0.112) and at T3S2 in May (D = 0.289). These resulted from the numerical dominance of Polydora sp. at T7S2 and Turbellaria at T3S2.

The maximum annual mean diversity indices per station occurred at T5S1 (D = 1.993) which has a sandy clay substrate, and at T8S1 (D = 1.846) which has an organic mud and detritus substrate. Station T4S2, which has a gravel and shell substrate, and ranked first in simple diversity, did not have a high index of diversity due to the numerical dominance of Balanus improvisus. The minimum mean diversity indices occurred at T7S2 (D = 0.857) which has a hard clay substrate and, at T3S2 (D = 1.031) which has a black sand substrate. Station T7S2 was dominated numerically by Polydora sp. and T3S2 was dominated by Turbellaria.

DENSITY

In 1978, the annual mean density per station ranged from 667.4/$m^2$ at T4S3, just southwest of Salem, to 7,831.1/$m^2$, at T4S2, just south of Salem (Table 3.1.4-6). In 1977, it ranged from 944.7/$m^2$ at T3S1, just west of Salem, to 12,471.3/$m^2$ at T4S2. Balanus improvisus was the most abundant organism at T4S2 in 1978, comprising 60 percent of the annual total. Organisms at this station comprised 21.2 percent of the 1978 sample. Total density at Station T4S2 was higher than all other stations for 5 of the 9 months sampled. Total density was highest at T4S2 in July due to the very high density of B. improvisus (11,687/$m^2$) which comprised 82.9 percent of the monthly total.

*Paranais litoralis* ($\bar{X}$ density = 674.2/$m^2$), *Balanus improvisus* (370.8/$m^2$), and *Scolecolepides viridis* (309.4/$m^2$) comprised 25.6, 14.1, and 11.7 percent, respectively, of the 1978 sample (Table 3.1.4-5). In 1977, *P. litoralis* ($\bar{X}$ = 728.4/$m^2$), *B. improvisus* (626.1/$m^2$), and *S. viridis* (520.3/$m^2$) comprised 26.2, 22.5, and 18.7 percent, respectively, of the annual mean density. Other numerically important organisms in 1978 were Turbellaria, *Polydora* sp., *Cyathura polita*, and *Corophium lacustre*. These seven taxa comprised 80.7 percent of the annual mean density.

*P. litoralis* was the numerically dominant taxon in March, May, September, and October (Fig.3.1.4-2). Other taxa which ranked first were *Polydora* sp. in July and August, *B. improvisus* in June, *C. lacustre* in November, and Turbellaria in April (Figs. 3.1.4-3, 3.1.4-2). Also ranking among the first three on a monthly basis were *S. viridis*, *Neomysis americana*, and *C. polita*.

## BIOMASS

Estimated mean biomass per station ranged from 562.7 mg/$m^2$ at T7S2, 3.7 km northwest of Salem, to 12,315.9 mg/$m^2$ at T4S2, just south of Salem (Table 3.1.4-6). In 1977, it ranged from 558.3 mg/$m^2$ at T3S3, 3.0 km west of Salem, to 15,988.4 mg/$m^2$ at T4S2. *Balanus improvisus* comprised 65.9 percent of the biomass at T4S2 in 1978. Total biomass at Station T4S2 was higher than all other stations for 7 of the 9 months sampled.

*Balanus improvisus* (646.3 mg/$m^2$) comprised 28.8 percent of the biomass of all taxa taken in 1978 (Table 3.1.4-5). *Scolecolepides viridis* ranked second (406.8 mg/$m^2$) with 18.1 percent, and *Macoma balthica* ranked third (243.7 mg/$m^2$) with 10.9 percent. In 1977, *B. improvisus* (810.3 mg/$m^2$) comprised 33.2 percent of the biomass of all taxa. *S. viridis* ranked second (504.1 mg/$m^2$) with 20.6 percent, and *M. balthica* ranked third (309.9 mg/$m^2$) with 12.7 percent. In June, July, August, and November 1978 *B. improvisus* comprised the highest monthly biomass (Fig.3.1.4-4). *S. viridis* ranked first in March, April, and September, *Gammarus* spp. ranked first in May, and *M. balthica* ranked first in October. Other taxa ranking among the first three on a monthly basis in 1978 were *Microciona prolifera*, *Crassostrea virginica*, *Cyathura polita*, and *Crangon septemspinosa* (Fig. 3.1.4-5).

3.1.4.4 Seasonal Summary

Seasonal mean abundance of the predominant benthic taxa is reported in Table 3.1.4-8. Mean density was greatest during July and August due to the abundance of Polychaeta (32.1 percent), *Balanus improvisus* (23.5 percent), and Oligochaeta (22.7 percent) (Fig.3.1.4-6). Mean density was lowest during September through November. Oligochaeta ranked first in density during March through June and September through November. Polychaeta ranked first during July and August and ranked second during March through June and September through November. *B. improvisus* ranked second during July and August.

Mean biomass was greatest during March through June due to the abundance of *B. improvisus* (32.5 percent) and Polychaeta (22.6 percent) (Fig.3.1.4-7). Mean biomass was lowest during July and August. *B. improvisus* ranked first in biomass during March through August. Pelecypoda ranked first during September through November and ranked second during July and August. Polychaeta ranked second during March through June and September through November.

TABLE 3.1.4-1
LOCATION OF BENTHOS STATIONS AND PERIOD OF SAMPLING - 1978

| Location | Description | Years Sampled |
|---|---|---|
| Transect 2 | | |
| Station 1: | Two hundred meters west of New Jersey shore (Eagle Island). On a line between white buoy "B" and cable tower which is directly east (90 degrees). | 1971 to Present |
| Station 2: | Fifty meters west of white buoy "B". | 1971 to Present |
| Transect 7 | | |
| Station 1: | About 50 meters from shore of Artificial Island on a line from Bayview lighthouse and red buoy "2R". | 1972 to Present |
| Station 2: | Midway between Reedy Island Dike and Delaware River channel on a line between Bayview lighthouse and red buoy "2R". | 1972 to Present |
| Transect 3 | | |
| Station 1: | About 50 meters offshore Artificial Island, from a point 300 meters upstream from site of plant discharge. | 1971 to Present |
| Station 2: | About 200 meters from red buoy R"4B" on a line with this buoy and Bayview lighthouse. | 1971 to Present |
| Station 3: | About 200 meters downriver from bell buoy R"2" on a line with light buoy and smoke stacks at Getty Petroleum. | 1971 to Present |
| Transect 4 | | |
| Station 1: | Sample in cove by Sunken ships about 100 meters from north bank and 200 meters from east end of cove. | 1971 to Present |
| Station 2: | On a line between Taylors Bridge Light and Stony Point 250 meters from the New Jersey shore. | 1971 to Present |
| Station 3: | On a line between Taylors Bridge Light and Stony Point 400 meters from the New Jersey shore. | 1971 to Present |
| Transect 8 | | |
| Station 1: | Halfway between Hope Creek Jetty and Mad Horse Creek and 100 meters offshore. | 1972 to Present |
| Station 2: | Midway between Alder Cove and black buoy "7L". | 1972 to Present |
| Transect 5 | | |
| Station 1: | 150 meters off small sandy beach in front of Mad Horse Creek Tower. | 1971 to Present |
| Station 2: | Midway between Mad Horse Creek Tower and channel buoy "6L". | 1971 to Present |

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TABLE 3.1.4-2
LOCATION, DEPTH, SUBSTRATE, AND NUMBER OF GRABS - 1978

| Location | Fish Survey Trawl Zone | Approximate Depth (Mean Low Water) Meters | Feet | Substrate | No. of Grabs 1978 |
|---|---|---|---|---|---|
| Transect 2 | | | | | |
| Station 1 | E-5 | 1.0 | 3.5 | Very fine sand, clay, and some detritus | 27 |
| Station 2 | E-5 | 7.0 | 24.0 | Sand interspersed with clay and detritus | 27 |
| Transect 3 | | | | | |
| Station 1 | E-2 | 4.0 | 13.0 | Fine black sand, some mud, and detritus | 27 |
| Station 2 | E-2 | 6.0 | 20.0 | Coarse black sand, very little mud, and detritus | 27 |
| Station 3 | W-1 | 3.0 | 10.0 | Clay and organic mud, some sand, and detritus | 27 |
| Transect 4 | | | | | |
| Station 1 | E-1 | 1.0 | 3.0 | Organic mud, clay, and detritus | 27 |
| Station 2 | E-1 | 5.0 | 16.5 | Sand, gravel, shell, some mud, and detritus | 27 |
| Station 3 | E-1 | 9.0 | 30.0 | Clay and detritus | 27 |
| Transect 5 | | | | | |
| Station 1 | SE-3 | 1.5 | 5.0 | Hard sandy clay and detritus | 27 |
| Station 2 | SE-3 | 5.0 | 16.5 | Sand, gravel, shell, organic mud, and some detritus | 27 |
| Transect 7 | | | | | |
| Station 1 | E-4 | 4.0 | 13.0 | Fine black sand, some clay, and detritus | 27 |
| Station 2 | RIE-2 | 6.5 | 22.0 | Hard clay, very little detritus | 27 |
| Transect 8 | | | | | |
| Station 1 | SE-3 | 1.5 | 5.0 | Organic mud, detritus and some sand | 27 |
| Station 2 | SE-3 | 4.5 | 15.0 | Organic mud, sand, and some detritus | 27 |

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TABLE 3.1.4-3
PHYLOGENETIC LIST OF BENTHIC INVERTEBRATES - 1978

| Phylum | Order | Family | Genus | Species | Year of Capture |
|---|---|---|---|---|---|
| Porifera | Poecilosclerida | Microcionidae | Microciona | prolifera (Ellis and Solander 1786) | 1972-78 |
| Cnidaria | Hydrozoa | | | | 1976-78 |
| | Athecata | Clavidae | Cordylophora | caspia (Pallas 1771) | 1971-73, 1975-77 |
| | | Bougainvilliidae | Garveia | franciscana (Torrey 1902) | 1971-78 |
| | Thecata | Campanularidae | | | 1977-78 |
| | | | Hartlaubella | gelatinosa (Pallas 1766) | 1971-78 |
| | | Campanulinidae | | | 1977-78 |
| | | Sertularidae | Sertularia | argentea Linne 1758 | 1971-78 |
| | Actiniaria | Diadumenidae | Diadumene | leucolena (Verrill 1866) | 1973-78 |
| Platyhelminthes | Class Turbellaria | | | | 1975-78 |
| | | ** | *Turbellaria #1 | | 1978 |
| | Tricladida | | | | 1977-78 |
| | Polycladia | Stylochidae | Stylochus | ellipticus (Girard 1850) | 1972-78 |
| | | Leptoplanidae | Euplana | gracilis (Girard 1850) | 1976-78 |
| Rhynchocoela | | | | | 1973-78 |
| Annelida | Class Polychaeta | | | | |
| | Phyllodocida | Phyllodocidae | Eteone | heteropoda Hartman 1951 | 1973-74, 1976-78 |
| | | Nereidae | Laeonereis | culveri (Webster 1879) | 1973-78 |
| | | | Nereis | succinea (Frey and Leuckart 1847) | 1971-78 |
| | | Glyceridae | Glycera | dibranchiata Ehlers 1868 | 1973-77 |
| | | Goniadidae | Glycinde | solitaria Webster 1879 | 1974, 1976-78 |
| | Spionida | Spionidae | Polydora | sp. | 1973-78 |
| | | | Polydora | ligni Webster 1879 | 1977 |
| | | | Scolecolepides | viridis (Verrill 1873) | 1973-78 |
| | | | Streblospio | benedicti Webster 1879 | 1973-78 |
| | | Sabellariidae | Sabellaria | vulgaris Verrill 1873 | 1976-77 |
| | Terebellida | Pectinariidae | Pectinaria | gouldii (Verrill 1873) | 1977 |
| | | Ampharetidae | Hypaniola | grayi Pettibone 1953 | 1975-78 |
| | Class Oligochaeta | | | | 1971-78 |
| | | ** | *Oligochaeta #1 | | 1973-78 |
| | | Naididae | Paranais | litoralis (Muller 1784) | 1971-78 |
| | Class Hirudinea | | | | 1971-75, 1977-78 |
| Mollusca | Class Gastropoda | | | | 1975-78 |
| | Mesogastropoda | Hydrobiidae | Hydrobia | sp. | 1978 |
| | Cephalaspidea | Pyramidellidae | | | 1975-77 |
| | | | Turbonilla | sp. | 1975-76 |
| | Nudibranchia | | | | 1974-75, 1977-78 |
| | | Corambidae | Doridella | obscura (Verrill 1870) | 1976-78 |
| | Class Pelecypoda | | | | |
| | Pteroconchida | Mytilidae | Modiolus | demissus (Dillyn 1817) | 1971-78 |
| | | Ostreidae | Crassostrea | virginica (Gmelin 1792) | 1971-78 |
| | Heterodontida | Dreissenidae | Congeria | leucophaeta (Conrad 1831) | 1972-74, 1976 |
| | | Tellinidae | Macoma | balthica (Linne 1758) | 1971-78 |
| | | | Macoma | tenta (Say 1834) | 1975-77 |
| | | Solenidae | | | 1977 |
| | | Mactridae | Mulinia | lateralis (Say 1822) | 1974, 1976-78 |
| | | | Rangia | cuneata (Gray 1831) | 1971-76 |
| | | Myacidae | Mya | arenaria (Linne 1758) | 1975-78 |

TABLE 3.1.4-3
CONTINUED

| Phylum | Order | Family | Genus | Species | Year of Capture |
|---|---|---|---|---|---|
| Arthropoda | Xiphosurida | Limulidae | Limulus | polyphemus (Linne 1758) | 1977 |
| | Acarina | | | | 1971 |
| | Thoracica | Balanidae | Balanus | improvisus Darwin 1854 | 1971-78 |
| | Mysidacea | Mysidae | Neomysis | americana (Smith 1873) | 1971-78 |
| | Cumacea | Leuconidae | Leucon | americanus Zimmer 1943 | 1972-78 |
| | Isopoda | Idoteidae | Chiridotea | almyra Bowman 1955 | 1971-78 |
| | | | Edotea | triloba (Say 1818) | 1971-78 |
| | | Anthuridae | Cyathura | polita (Stimpson 1855) | 1971-78 |
| | | Sphaeromidae | Cassidinidea | lunifrons (Richardson) | 1972-73, 1976-78 |
| | Amphipoda | Photidae | Leptocheirus | plumulosus (Shoemaker 1932) | 1971-78 |
| | | Corophiidae | Corophium | lacustre Vanhoffen 1911 | 1971-78 |
| | | Gammaridae | Gammarus | spp. | 1971-78 |
| | | | Melita | nitida Smith 1873 | 1972-78 |
| | | Haustoriidae | Parahaustorius | sp. | 1973-78 |
| | | Oedicerotidae | Monoculodes | edwardsi Holmes 1905 | 1973-78 |
| | | Pleustidae | Parapleustes | sp. | 1976-78 |
| | | Caprellidae | | | 1972, 1977 |
| | Decapoda | Palaemonidae | Palaemonetes | pugio (Holthius 1949) | 1971-75, 1978 |
| | | Crangonidae | Crangon | septemspinosa (Say 1818) | 1971-78 |
| | | Portunidae | Callinectes | sapidus Rathbun 1896 | 1974-76 |
| | | Xanthidae | Panopeus | herbstii Milne-Edwards 1834 | 1971 |
| | | | Rhithropanopeus | harrisii (Gould 1841) | 1971-78 |
| | Diptera | | | | 1972-73, 1978 |
| | | Tipulidae | | | 1972, 1976 |
| | | Ceratopogonidae | | | 1978 |
| | | | Culicoides | sp. | 1975, 1978 |
| | | Chironomidae | | | 1971-78 |
| Ectoprocta | Ctenostomata | | | | 1975-78 |
| | | Vesicularidae | Amathia | vidovici (Heller 1867) | 1971-78 |
| | | | Bowerbankia | gracilis Leidy 1855 | 1977-78 |
| | | Walkeriidae | Aeverrillia | armata (Verrill 1874 | 1975, 1977 |
| | Cheilostomata | Membraniporidae | | | 1975-78 |
| Chordata | Pleurogona | Molgulidae | Molgula | manhattensis (DeKay 1843) | 1972, 1976-77 |

* Descriptive name
** Undetermined

TABLE 3.1.4-4
PROPORTION EACH TAXON OCCURRED IN TOTAL SAMPLES - 1978

| Transect | 2 | | 3 | | | 4 | | | 5 | | 7 | | 8 | | Taken |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station | 1 | 2 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 2 | at n/14 stations |
| H. prolifera | - | .04 | .22 | .11 | - | .04 | .04 | .19 | - | .37 | .04 | .07 | - | .37 | 10/14 |
| Hydrozoa | - | - | - | - | - | - | - | - | .11 | - | - | - | .04 | - | 2/14 |
| G. franciscana | .96 | 1.00 | .74 | .70 | .70 | .96 | 1.00 | .93 | .48 | .89 | .74 | .41 | .48 | .96 | 14/14 |
| Campanularidae | - | - | .04 | - | - | .04 | - | - | - | .07 | - | - | - | .04 | 4/14 |
| H. gelatinosa | .04 | .04 | .04 | - | - | .04 | .11 | .15 | .04 | .22 | .07 | - | .04 | .04 | 11/14 |
| Campanulinidae | .04 | - | .07 | - | .04 | - | .22 | - | .22 | .07 | .07 | - | .07 | - | 8/14 |
| S. argentea | .78 | .19 | .63 | .44 | .67 | .59 | .93 | .96 | .04 | .78 | .52 | .67 | .15 | .89 | 14/14 |
| D. leucolena | - | - | - | - | - | - | .04 | - | .04 | - | - | - | - | - | 2/14 |
| Turbellaria | .04 | .67 | .44 | .63 | .04 | - | .04 | .07 | .19 | - | .37 | - | .07 | .07 | 11/14 |
| Turbellaria #1 | - | - | - | - | - | .07 | - | - | - | - | - | - | .07 | - | 2/14 |
| Tricladida | .37 | .07 | .04 | - | .07 | .44 | .19 | .07 | .22 | .19 | .04 | - | .30 | .04 | 12/14 |
| S. ellipticus | - | - | - | - | - | - | .22 | - | - | - | - | - | - | - | 1/14 |
| E. gracilis | - | - | - | - | - | .04 | - | - | - | - | - | - | - | - | 1/14 |
| Rhynchocoela | .41 | .41 | .37 | .22 | .26 | .74 | .93 | .33 | .70 | .85 | .48 | .26 | .81 | .81 | 14/14 |
| E. heteropoda | - | - | - | - | - | - | - | - | - | .04 | - | - | - | - | 1/14 |
| L. culveri | - | - | - | - | - | .11 | - | - | - | - | - | - | - | - | 1/14 |
| N. succinea | .04 | .04 | - | - | .22 | .44 | .89 | - | .78 | .33 | .07 | .26 | .81 | .11 | 11/14 |
| G. solitaria | - | - | - | - | - | - | - | - | .11 | - | - | .04 | .11 | .04 | 4/14 |
| Polydora sp. | - | - | .04 | .04 | .52 | .11 | .48 | .19 | .52 | .11 | .15 | .96 | .44 | - | 11/14 |
| S. viridis | 1.00 | 1.00 | .89 | .81 | .59 | .63 | .81 | .93 | .96 | .93 | .96 | .30 | 1.00 | 1.00 | 14/14 |
| S. benedicti | - | - | - | - | - | .07 | .15 | .04 | .44 | .33 | - | - | .26 | .04 | 7/14 |
| H. grayi | .04 | - | - | - | - | - | - | - | .07 | - | - | - | - | - | 2/14 |
| Oligochaeta | .07 | - | - | .04 | - | .11 | .11 | .04 | .22 | - | - | .04 | .11 | .04 | 9/14 |
| Oligochaeta #1 | .04 | .04 | .11 | - | - | .63 | .89 | .19 | .96 | 1.00 | .11 | .04 | 1.00 | .37 | 12/14 |
| P. litoralis | 1.00 | .89 | .26 | .04 | .48 | 1.00 | 1.00 | .89 | .96 | .93 | .41 | .04 | .96 | 1.00 | 14/14 |
| Hirudinea | - | - | - | - | - | .04 | - | - | - | .04 | - | - | - | - | 2/14 |
| Gastropoda | - | - | - | - | - | - | .19 | - | .07 | .07 | - | - | - | .04 | 4/14 |
| Hydrobia sp. | - | - | - | - | - | .07 | .11 | - | .26 | - | - | - | .11 | .04 | 5/14 |
| Nudibranchia | .04 | - | - | - | - | - | .04 | - | - | - | - | - | - | - | 2/14 |
| D. obscura | - | - | - | - | - | - | .11 | - | - | - | - | - | - | - | 1/14 |
| M. demissus | - | - | - | - | - | - | .33 | - | - | - | - | - | - | - | 1/14 |
| C. virginica | - | - | .04 | - | - | - | .63 | - | .04 | - | - | - | - | - | 3/14 |
| M. balthica | .15 | .04 | .04 | - | .11 | .59 | .59 | .59 | .37 | .81 | .04 | - | .78 | .67 | 12/14 |
| M. lateralis | - | - | - | - | - | - | - | .07 | - | .11 | - | - | .04 | .11 | 4/14 |
| M. arenaria | - | - | - | - | - | - | .04 | - | .19 | - | - | - | .07 | - | 3/14 |
| B. improvisus | - | .04 | .04 | - | .19 | - | .93 | .11 | .37 | .22 | - | .04 | .30 | .19 | 10/14 |
| N. americana | .26 | .37 | .44 | .56 | .48 | .44 | .52 | .44 | .52 | .48 | .44 | .33 | .48 | .48 | 14/14 |
| L. americanus | .19 | - | .04 | .07 | .19 | .33 | .04 | .11 | - | .37 | .04 | .04 | .19 | .19 | 12/14 |
| C. almyra | .22 | .67 | .74 | .81 | .11 | .15 | .04 | .04 | .19 | .07 | .67 | .07 | .07 | .11 | 14/14 |
| E. triloba | .33 | - | .04 | .04 | .37 | .56 | .30 | .07 | .26 | .26 | .11 | .26 | .48 | .15 | 13/14 |
| C. polita | .96 | .44 | .56 | .30 | .85 | .96 | 1.00 | .89 | .96 | .89 | .63 | .93 | 1.00 | .85 | 14/14 |
| C. lunifrons | - | - | - | - | .04 | - | .04 | - | - | - | - | - | - | - | 2/14 |
| L. plumulosus | .74 | - | - | - | - | .19 | .04 | - | .78 | .04 | - | - | .78 | - | 6/14 |
| C. lacustre | .33 | .26 | .22 | .04 | .15 | .30 | .78 | .07 | .56 | .11 | .19 | .22 | .41 | .04 | 14/14 |
| Gammarus spp. | .33 | .41 | .33 | .26 | .48 | .37 | .44 | .30 | .33 | .07 | .26 | .41 | .22 | - | 13/14 |
| M. nitida | - | - | - | .04 | .04 | .07 | .33 | .04 | - | .07 | - | .07 | .04 | .07 | 9/14 |
| Parahaustorius sp. | - | - | .30 | .33 | - | - | - | - | - | - | .15 | - | - | - | 3/14 |
| M. edwardsi | .37 | .19 | .15 | .07 | .07 | .19 | - | .11 | .26 | .19 | .26 | .04 | .26 | .22 | 13/14 |
| Parapleustes sp. | - | - | - | - | - | - | .11 | - | .04 | - | - | - | - | - | 2/14 |
| P. pugio | - | - | - | - | .04 | - | - | - | - | - | - | - | - | - | 1/14 |
| C. septemspinosa | .22 | .07 | .19 | .07 | .11 | .15 | .41 | .15 | .33 | .07 | .15 | .15 | .30 | .19 | 14/14 |
| R. harrisii | - | - | - | - | .07 | .04 | .52 | - | .11 | .11 | .04 | .30 | .15 | - | 8/14 |
| Diptera | - | .04 | - | - | - | - | - | - | - | - | - | - | - | - | 1/14 |
| Ceratopogonidae | - | - | - | - | - | - | - | - | - | - | - | - | .04 | - | 1/14 |
| Culicoides sp. | - | - | - | - | - | - | - | .04 | - | - | - | - | - | - | 1/14 |
| Chironomidae | .26 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1/14 |
| Ctenostomata | - | - | - | - | .07 | - | .89 | .04 | .26 | .30 | - | - | .26 | - | 6/14 |
| A. vidovici | .04 | - | .07 | .04 | - | .07 | .04 | .26 | - | .11 | .04 | - | - | .04 | 9/14 |
| B. gracilis | - | - | .04 | - | - | - | - | - | - | - | - | - | - | - | 1/14 |
| Membraniporidae | - | - | .11 | - | - | .04 | .78 | .07 | .26 | .30 | - | - | .15 | .19 | 8/14 |

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TABLE 3.1.4-5
ANNUAL RANK OF BENTHIC TAXA NEAR ARTIFICIAL ISLAND IN THE DELAWARE RIVER, 1978.

SUMMARY OF ALL STATIONS

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | P. LITORALIS | 674.2 | 25.602 | 25.602 | 266 | 15.6 | .696 | 17 |
| 2 | B. IMPROVISUS | 370.8 | 14.081 | 39.683 | 65 | 646.3 | 28.818 | 1 |
| 3 | S. VIRIDIS | 309.4 | 11.749 | 51.432 | 319 | 406.8 | 18.139 | 2 |
| 4 | TURBELLARIA | 279.5 | 10.614 | 62.046 | 71 | 5.1 | .227 | 22 |
| 5 | POLYDORA SP. | 245.3 | 9.315 | 71.361 | 96 | 14.4 | .642 | 18 |
| 6 | C. POLITA | 130.8 | 4.967 | 76.328 | 303 | 120.3 | 5.364 | 6 |
| 7 | C. LACUSTRE | 115.6 | 4.390 | 80.718 | 99 | 8.5 | .379 | 19 |
| 8 | N. AMERICANA | 76.6 | 2.909 | 83.627 | 169 | 21.5 | .959 | 15 |
| 9 | GAMMARUS SP. | 69.5 | 2.639 | 86.266 | 114 | 148.9 | 6.639 | 5 |
| 10 | N. SUCCINEA | 56.5 | 2.146 | 88.412 | 108 | 75.3 | 3.358 | 7 |
| 11 | OLIGOCHAETA 1 | 54.9 | 2.085 | 90.497 | 145 | 37.6 | 1.677 | 11 |
| 12 | RHYNCHOCOELA | 40.4 | 1.534 | 92.031 | 205 | 16.1 | .718 | 16 |
| 13 | C. ALMYRA | 37.0 | 1.405 | 93.436 | 107 | 33.6 | 1.498 | 14 |
| 14 | M. BALTHICA | 25.8 | .960 | 94.416 | 129 | 243.7 | 10.866 | 3 |
| 15 | L. PLUMULOSUS | 20.2 | .767 | 95.183 | 69 | 4.3 | .192 | 23 |
| 16 | E. TRILOBA | 18.6 | .706 | 95.889 | 87 | 1.8 | .080 | 24 |
| 17 | G. FRANCISCANA | 15.7 | .596 | 96.485 | 296 | 54.1 | 2.412 | 10 |
| 18 | TRICLADIDA | 12.9 | .490 | 96.975 | 55 | .3 | .013 | 30 |
| 19 | S. ARGENTEA | 11.7 | .444 | 97.419 | 222 | 36.5 | 1.628 | 13 |
| 20 | M. NITIDA | 8.4 | .319 | 97.738 | 21 | 1.5 | .067 | 25 |
| 21 | C. SEPTEMSPINOSA | 6.7 | .254 | 97.992 | 69 | 70.5 | 3.144 | 8 |
| 21 | L. AMERICANUS | 6.7 | .254 | 98.246 | 48 | .4 | .018 | 29 |
| 23 | M. EDWARDSI | 5.4 | .205 | 98.451 | 64 | .9 | .040 | 27 |
| 24 | S. BENEDICTI | 4.5 | .171 | 98.622 | 36 | .3 | .013 | 30 |
| 25 | CHIRONOMIDAE | 4.3 | .163 | 98.785 | 7 | .2 | .009 | 35 |
| 26 | R. HARRISII | 3.5 | .133 | 98.918 | 36 | 37.6 | 1.677 | 11 |
| 27 | MEMBRANIPORIDAE | 2.7 | .103 | 99.021 | [illegible] | | | 60 |
| 28 | CTENOSTOMATA | 2.6 | .099 | 99.120 | | | | 60 |
| 29 | OLIGOCHAETA | 2.5 | .095 | 99.215 | [illegible] | .3 | .013 | 30 |
| 30 | C. VIRGINICA | 2.4 | .091 | 99.306 | 19 | 161.0 | 7.179 | 4 |
| 31 | HYDROBIA | 2.2 | .084 | 99.390 | 16 | .2 | .009 | 35 |
| 32 | M. PROLIFERA | 2.1 | .080 | 99.470 | 40 | 62.5 | 2.787 | 9 |
| 33 | PARAHAUSTORIUS SP. | 2.0 | .076 | 99.546 | 21 | 7.2 | .321 | 20 |
| 34 | S. ELLIPTICUS | 1.5 | .057 | 99.603 | 6 | .3 | .013 | 30 |
| 35 | H. GELATINOSA | 1.2 | .046 | 99.649 | 22 | 1.4 | .062 | 26 |
| 35 | CAMPANULINIDAE | 1.2 | .046 | 99.695 | 22 | .2 | .009 | 35 |
| 37 | A. VIDOVICI | 1.0 | .038 | 99.733 | 19 | .2 | .009 | 35 |
| 37 | M. DEMISSUS | 1.0 | .038 | 99.771 | 9 | 5.8 | .259 | 21 |
| 39 | GASTROPODA | .7 | .027 | 99.798 | 10 | .3 | .013 | 30 |
| 40 | M. LATERALIS | .6 | .023 | 99.821 | 9 | .6 | .027 | 28 |
| 40 | PARAPLEUSTES SP. | .6 | .023 | 99.844 | 4 | .1 | .004 | 40 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

SUMMARY OF ALL STATIONS

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 40 | D. OBSCURA | .6 | .023 | 99.867 | 3 | .1 | .004 | 40 |
| 43 | TURBELLARIA #1 | .5 | .019 | 99.886 | 4 | * | * | 60 |
| 43 | G. SOLITARIA | .5 | .019 | 99.905 | 8 | * | * | 60 |
| 43 | M. ARENARIA | .5 | .019 | 99.924 | 8 | .1 | .004 | 40 |
| 46 | CAMPANULARIDAE | .3 | .011 | 99.935 | 5 | * | * | 60 |
| 47 | HYDROZOA | .2 | .008 | 99.943 | 4 | | | 60 |
| 47 | H. GRAYI | .2 | .008 | 99.951 | 3 | * | * | 60 |
| 47 | P. PUGIO | .2 | .008 | 99.959 | 1 | * | * | 60 |
| 47 | L. CULVERI | .2 | .008 | 99.967 | 3 | .2 | .009 | 35 |
| 51 | HIRUDINEA | .1 | .004 | 99.971 | 2 | * | * | 60 |
| 51 | DIPTERA | .1 | .004 | 99.975 | 1 | * | * | 60 |
| 51 | CULICOIDES | .1 | .004 | 99.979 | 1 | | | 60 |
| 51 | CERATOPOGONIDAE | .1 | .004 | 99.983 | 1 | | | 60 |
| 51 | NUDIBRANCHIA | .1 | .004 | 99.987 | 2 | * | * | 60 |
| 51 | E. GRACILIS | .1 | .004 | 99.991 | 1 | | | 60 |
| 51 | C. LUNIFRONS | .1 | .004 | 99.995 | 2 | * | * | 60 |
| 51 | B. GRACILIS | .1 | .004 | 99.999 | 1 | * | * | 60 |
| 51 | E. HETEROPODA | .1 | .004 | 100.003 | 1 | | | 60 |
| 51 | D. LEUCOLENA | .1 | .004 | 100.007 | 2 | .1 | .004 | 40 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: T2S1

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | P. LITORALIS | 1,676.3 | 68.148 | 68.148 | 27 | 41.5 | 6.763 | 2 |
| 2 | S. VIRIDIS | 336.3 | 13.672 | 81.820 | 27 | 398.6 | 64.961 | 1 |
| 3 | C. POLITA | 62.2 | 2.529 | 84.349 | 26 | 38.1 | 6.209 | 3 |
| 4 | CHIRONOMIDAE | 60.7 | 2.468 | 86.817 | 7 | 3.2 | .522 | 12 |
| 5 | TRICLADIDA | 58.5 | 2.378 | 89.195 | 10 | 1.2 | .196 | 15 |
| 6 | L. PLUMULOSUS | 45.2 | 1.838 | 91.033 | 20 | 7.5 | 1.222 | 8 |
| 7 | RHYNCHOCOELA | 43.7 | 1.777 | 92.810 | 11 | 4.0 | .652 | 10 |
| 8 | C. ALMYRA | 27.4 | 1.114 | 93.924 | 6 | 6.2 | 1.010 | 9 |
| 9 | M. EDWARDSI | 21.5 | .874 | 94.798 | 10 | 3.2 | .522 | 12 |
| 10 | G. FRANCISCANA | 19.3 | .785 | 95.583 | 26 | 37.9 | 6.177 | 4 |
| 10 | N. AMERICANA | 19.3 | .785 | 96.368 | 7 | 3.6 | .587 | 11 |
| 12 | M. BALTHICA | 16.3 | .663 | 97.031 | 4 | .7 | .114 | 19 |
| 12 | GAMMARUS SP. | 16.3 | .663 | 97.694 | 9 | 12.7 | 2.070 | 7 |
| 14 | S. ARGENTEA | 15.6 | .634 | 98.328 | 21 | 19.0 | 3.096 | 6 |
| 15 | E. TRILOBA | 9.6 | .390 | 98.718 | 9 | 2.4 | .391 | 14 |
| 16 | C. LACUSTRE | 8.9 | .362 | 99.080 | 9 | .8 | .130 | 18 |
| 17 | C. SEPTEMSPINOSA | 6.7 | .272 | 99.352 | 6 | 29.9 | 4.873 | 5 |
| 18 | L. AMERICANUS | 5.9 | .240 | 99.592 | 5 | .9 | .147 | 17 |
| 19 | OLIGOCHAETA | 3.7 | .150 | 99.742 | 2 | .1 | .016 | 23 |
| 20 | OLIGOCHAETA 1 | 1.5 | .061 | 99.803 | 1 | | | 27 |
| 21 | A. VIDOVICI | .7 | .028 | 99.831 | 1 | .1 | .016 | 23 |
| 21 | TURBELLARIA | .7 | .028 | 99.859 | 1 | .3 | .049 | 20 |
| 21 | H. GELATINOSA | .7 | .028 | 99.887 | 1 | .3 | .049 | 20 |
| 21 | H. GRAYI | .7 | .028 | 99.915 | 1 | .2 | .033 | 22 |
| 21 | NUDIBRANCHIA | .7 | .028 | 99.943 | 1 | .1 | .016 | 23 |
| 21 | CAMPANULINIDAE | .7 | .028 | 99.971 | 1 | | | 27 |
| 21 | N. SUCCINEA | .7 | .028 | 99.999 | 1 | 1.1 | .179 | 16 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: T2S2

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | TURBELLARIA | 875.6 | 31.099 | 31.099 | 18 | 13.7 | .808 | 9 |
| 2 | C. LACUSTRE | 848.9 | 30.151 | 61.250 | 7 | 67.9 | 4.006 | 4 |
| 3 | S. VIRIDIS | 766.7 | 27.231 | 88.481 | 27 | 1,198.4 | 70.702 | 1 |
| 4 | P. LITORALIS | 143.7 | 5.104 | 93.585 | 24 | 5.5 | .324 | 10 |
| 5 | C. ALMYRA | 65.2 | 2.316 | 95.901 | 18 | 40.4 | 2.383 | 6 |
| 6 | GAMMARUS SP. | 25.2 | .895 | 96.796 | 11 | 21.2 | 1.251 | 8 |
| 7 | G. FRANCISCANA | 20.0 | .710 | 97.506 | 27 | 106.6 | 6.289 | 3 |
| 8 | RHYNCHOCCELA | 19.3 | .685 | 98.191 | 11 | .6 | .035 | 16 |
| 9 | C. POLITA | 15.6 | .554 | 98.745 | 12 | 32.1 | 1.894 | 7 |
| 10 | N. AMERICANA | 11.1 | .394 | 99.139 | 10 | 3.5 | .206 | 11 |
| 11 | B. IMPROVISUS | 7.4 | .263 | 99.402 | 1 | 132.7 | 7.829 | 2 |
| 12 | M. EDWARDSI | 3.7 | .131 | 99.533 | 5 | 1.2 | .071 | 14 |
| 12 | S. ARGENTEA | 3.7 | .131 | 99.664 | 5 | 3.2 | .189 | 12 |
| 14 | OLIGOCHAETA 1 | 2.2 | .078 | 99.742 | 1 | .7 | .041 | 15 |
| 14 | TRICLADIDA | 2.2 | .078 | 99.820 | 2 | | | 19 |
| 16 | C. SEPTEMSPINOSA | 1.5 | .053 | 99.873 | 2 | 64.3 | 3.794 | 5 |
| 17 | M. BALTHICA | .7 | .025 | 99.898 | 1 | .6 | .035 | 16 |
| 17 | N. SUCCINEA | .7 | .025 | 99.923 | 1 | | | 19 |
| 17 | DIPTERA | .7 | .025 | 99.948 | 1 | .1 | .006 | 18 |
| 17 | M. PROLIFERA | .7 | .025 | 99.973 | 1 | 2.3 | .136 | 13 |
| 17 | H. GELATINOSA | .7 | .025 | 99.998 | 1 | | | 19 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: T3S1

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | GAMMARUS SP. | 632.6 | 41.864 | 41.864 | 9 | 1,789.8 | 59.159 | 1 |
| 2 | S. VIRIDIS | 297.8 | 19.707 | 61.571 | 24 | 432.7 | 14.302 | 2 |
| 3 | TURBELLARIA | 232.6 | 15.393 | 76.964 | 12 | 10.8 | .357 | 14 |
| 4 | N. AMERICANA | 103.7 | 6.863 | 83.827 | 12 | 18.3 | .605 | 12 |
| 5 | C. ALMYRA | 86.7 | 5.738 | 89.565 | 20 | 85.8 | 2.836 | 4 |
| 6 | C. POLITA | 39.3 | 2.601 | 92.166 | 15 | 59.2 | 1.957 | 7 |
| 7 | RHYNCHOCOELA | 28.1 | 1.860 | 94.026 | 10 | 43.5 | 1.438 | 8 |
| 8 | G. FRANCISCANA | 14.8 | .979 | 95.005 | 20 | 65.6 | 2.168 | 6 |
| 9 | PARAHAUSTORIUS SP. | 13.3 | .880 | 95.885 | 8 | 40.4 | 1.335 | 9 |
| 10 | S. ARGENTEA | 12.6 | .834 | 96.719 | 17 | 73.9 | 2.443 | 5 |
| 11 | C. LACUSTRE | 6.7 | .443 | 97.162 | 6 | .8 | .026 | 17 |
| 11 | P. LITORALIS | 6.7 | .443 | 97.605 | 7 | .2 | .007 | 20 |
| 11 | POLYDORA SP. | 6.7 | .443 | 98.048 | 1 | .2 | .007 | 20 |
| 14 | M. PROLIFERA | 4.4 | .291 | 98.339 | 6 | 333.3 | 11.017 | 3 |
| 15 | C. SEPTEMSPINOSA | 3.7 | .245 | 98.584 | 5 | 12.1 | .400 | 13 |
| 16 | M. BALTHICA | 3.0 | .199 | 98.783 | 1 | 32.1 | 1.061 | 10 |
| 16 | M. EDWARDSI | 3.0 | .199 | 98.982 | 4 | .4 | .013 | 18 |
| 18 | MEMBRANIPORIDAE | 2.2 | .146 | 99.128 | 3 | | | 29 |
| 18 | OLIGOCHAETA 1 | 2.2 | .146 | 99.274 | 3 | 4.2 | .139 | 15 |
| 20 | C. VIRGINICA | 1.5 | .099 | 99.373 | 1 | 18.4 | .608 | 11 |
| 20 | CAMPANULINIDAE | 1.5 | .099 | 99.472 | 2 | | | 29 |
| 20 | TRICLADIDA | 1.5 | .099 | 99.571 | 1 | .1 | .003 | 23 |
| 20 | L. AMERICANUS | 1.5 | .099 | 99.670 | 1 | | | 29 |
| 20 | A. VIDOVICI | 1.5 | .099 | 99.769 | 2 | .1 | .003 | 23 |
| 25 | E. TRILOBA | .7 | .046 | 99.815 | 1 | | | 29 |
| 25 | B. GRACILIS | .7 | .046 | 99.861 | 1 | .2 | .007 | 20 |
| 25 | H. GELATINOSA | .7 | .046 | 99.907 | 1 | 3.0 | .099 | 16 |
| 25 | CAMPANULARIDAE | .7 | .046 | 99.953 | 1 | | | 29 |
| 25 | B. IMPROVISUS | .7 | .046 | 99.999 | 1 | .3 | .010 | 19 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: T3S2

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | TURBELLARIA | 2,528.9 | 80.110 | 80.110 | 17 | 39.1 | 5.197 | 5 |
| 2 | C. ALMYRA | 244.4 | 7.742 | 87.852 | 22 | 256.0 | 34.024 | 1 |
| 3 | S. VIRIDIS | 150.4 | 4.764 | 92.616 | 22 | 234.3 | 31.140 | 2 |
| 4 | N. AMERICANA | 137.0 | 4.340 | 96.956 | 15 | 85.3 | 11.337 | 3 |
| 5 | RHYNCHOCOELA | 25.2 | .798 | 97.754 | 6 | 3.3 | .439 | 11 |
| 6 | G. FRANCISCANA | 14.1 | .447 | 98.201 | 19 | 9.6 | 1.276 | 9 |
| 7 | C. POLITA | 12.6 | .399 | 98.600 | 8 | 6.3 | .837 | 10 |
| 8 | S. ARGENTEA | 8.9 | .282 | 98.882 | 12 | 31.2 | 4.147 | 6 |
| 8 | PARAHAUSTORIUS SP. | 8.9 | .282 | 99.164 | 9 | 52.4 | 6.964 | 4 |
| 10 | GAMMARUS SP. | 8.1 | .257 | 99.421 | 7 | 13.5 | 1.794 | 8 |
| 11 | POLYDORA SP. | 6.7 | .212 | 99.633 | 1 | .7 | .093 | 13 |
| 12 | M. PROLIFERA | 2.2 | .070 | 99.703 | 3 | 17.9 | 2.379 | 7 |
| 12 | L. AMERICANUS | 2.2 | .070 | 99.773 | 2 | .1 | .013 | 16 |
| 14 | M. EDWARDSI | 1.5 | .048 | 99.821 | 2 | .1 | .013 | 16 |
| 14 | C. SEPTEMSPINOSA | 1.5 | .048 | 99.869 | 2 | 1.6 | .213 | 12 |
| 16 | M. NITIDA | .7 | .022 | 99.891 | 1 | .1 | .013 | 16 |
| 16 | A. VIDOVICI | .7 | .022 | 99.913 | 1 | .4 | .053 | 14 |
| 16 | OLIGOCHAETA | .7 | .022 | 99.935 | 1 | .3 | .040 | 15 |
| 16 | P. LITORALIS | .7 | .022 | 99.957 | 1 | .1 | .013 | 16 |
| 16 | E. TRILOBA | .7 | .022 | 99.979 | 1 | .1 | .013 | 16 |
| 16 | C. LACUSTRE | .7 | .022 | 100.001 | 1 | | | 21 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: T3S3

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | POLYDORA SP. | 852.6 | 47.485 | 47.485 | 14 | 44.2 | 6.555 | 4 |
| 2 | S. VIRIDIS | 203.0 | 11.306 | 58.791 | 16 | 113.6 | 16.847 | 2 |
| 3 | P. LITURALIS | 185.9 | 10.354 | 69.145 | 13 | 16.9 | 2.506 | 10 |
| 4 | B. IMPROVISUS | 149.6 | 8.332 | 77.477 | 5 | 267.7 | 39.700 | 1 |
| 5 | C. POLITA | 128.1 | 7.135 | 84.612 | 23 | 59.9 | 8.883 | 3 |
| 6 | N. AMERICANA | 126.7 | 7.057 | 91.669 | 13 | 25.0 | 3.708 | 8 |
| 7 | GAMMARUS SP. | 22.2 | 1.236 | 92.905 | 13 | 26.4 | 3.915 | 6 |
| 8 | M. BALTHICA | 19.3 | 1.075 | 93.980 | 3 | 22.4 | 3.322 | 9 |
| 9 | E. TRILOBA | 18.5 | 1.030 | 95.010 | 10 | 1.0 | .148 | 16 |
| 10 | L. AMERICANUS | 17.0 | .947 | 95.957 | 5 | .8 | .119 | 17 |
| 11 | G. FRANCISCANA | 14.1 | .785 | 96.742 | 19 | 41.0 | 6.080 | 5 |
| 12 | S. ARGENTEA | 13.3 | .741 | 97.483 | 18 | 8.2 | 1.216 | 12 |
| 13 | RHYNCHOCOELA | 11.9 | .663 | 98.146 | 7 | 1.9 | .282 | 15 |
| 14 | N. SUCCINEA | 8.9 | .496 | 98.642 | 6 | 4.4 | .653 | 13 |
| 15 | C. LACUSTRE | 6.7 | .373 | 99.015 | 4 | .6 | .089 | 18 |
| 16 | C. ALMYRA | 3.7 | .206 | 99.221 | 3 | 3.0 | .445 | 14 |
| 17 | C. SEPTEMSPINOSA | 3.0 | .167 | 99.388 | 3 | 11.4 | 1.691 | 11 |
| 18 | P. PUGIO | 2.2 | .123 | 99.511 | 1 | .1 | .015 | 19 |
| 19 | M. EDWARDSI | 1.5 | .084 | 99.595 | 2 | | | 26 |
| 19 | CTENOSTOMATA | 1.5 | .084 | 99.679 | 2 | | | 26 |
| 19 | R. HARRISII | 1.5 | .084 | 99.763 | 2 | 25.5 | 3.782 | 7 |
| 19 | TRICLADIDA | 1.5 | .084 | 99.847 | 2 | | | 26 |
| 23 | M. NITIDA | .7 | .039 | 99.886 | 1 | .1 | .015 | 19 |
| 23 | TURBELLARIA | .7 | .039 | 99.925 | 1 | .1 | .015 | 19 |
| 23 | CAMPANULINIDAE | .7 | .039 | 99.964 | 1 | .1 | .015 | 19 |
| 23 | C. LUNIFRONS | .7 | .039 | 100.003 | 1 | | | 26 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: T4S1

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | P. LITORALIS | 2,322.2 | 73.267 | 73.267 | 27 | 34.8 | 2.015 | 5 |
| 2 | S. VIRIDIS | 260.0 | 8.203 | 81.470 | 17 | 608.1 | 35.209 | 2 |
| 3 | E. TRILOBA | 129.6 | 4.089 | 85.559 | 15 | 12.8 | .741 | 8 |
| 4 | M. BALTHICA | 60.0 | 1.893 | 87.452 | 16 | 821.6 | 47.571 | 1 |
| 5 | TRICLADIDA | 59.3 | 1.871 | 89.323 | 12 | 1.1 | .064 | 19 |
| 6 | RHYNCHOCOELA | 58.5 | 1.846 | 91.169 | 20 | 24.1 | 1.395 | 7 |
| 7 | OLIGOCHAETA 1 | 46.7 | 1.473 | 92.642 | 17 | 10.4 | .602 | 9 |
| 8 | C. POLITA | 45.2 | 1.426 | 94.068 | 26 | 66.1 | 3.827 | 4 |
| 9 | GAMMARUS SP. | 32.6 | 1.029 | 95.097 | 10 | 5.3 | .307 | 13 |
| 10 | N. AMERICANA | 26.7 | .842 | 95.939 | 12 | 5.9 | .342 | 11 |
| 11 | L. AMERICANUS | 21.5 | .678 | 96.617 | 9 | .7 | .041 | 21 |
| 12 | G. FRANCISCANA | 19.3 | .609 | 97.226 | 26 | 69.0 | 3.995 | 3 |
| 13 | N. SUCCINEA | 13.3 | .420 | 97.646 | 12 | 8.0 | .463 | 10 |
| 14 | POLYDORA SP. | 12.6 | .398 | 98.044 | 3 | .3 | .017 | 26 |
| 15 | S. ARGENTEA | 11.9 | .375 | 98.419 | 16 | 34.2 | 1.980 | 6 |
| 16 | OLIGOCHAETA | 7.4 | .233 | 98.652 | 3 | .4 | .023 | 25 |
| 17 | C. LACUSTRE | 5.9 | .186 | 98.838 | 8 | .2 | .012 | 27 |
| 17 | M. EDWARDSI | 5.9 | .186 | 99.024 | 5 | 1.0 | .058 | 20 |
| 19 | C. ALMYRA | 5.2 | .164 | 99.188 | 4 | 2.7 | .156 | 16 |
| 19 | M. NITIDA | 5.2 | .164 | 99.352 | 2 | .7 | .041 | 21 |
| 21 | L. PLUMULOSUS | 3.7 | .117 | 99.469 | 5 | 3.6 | .208 | 15 |
| 22 | C. SEPTEMSPINOSA | 3.0 | .095 | 99.564 | 4 | 2.4 | .139 | 17 |
| 23 | L. CULVERI | 2.2 | .069 | 99.633 | 3 | 2.4 | .139 | 17 |
| 23 | TURBELLARIA #1 | 2.2 | .069 | 99.702 | 2 | | | 34 |
| 25 | S. BENEDICTI | 1.5 | .047 | 99.749 | 2 | | | 34 |
| 25 | HYDROBIA | 1.5 | .047 | 99.796 | 2 | .5 | .029 | 24 |
| 25 | A. VIDOVICI | 1.5 | .047 | 99.843 | 2 | .7 | .041 | 21 |
| 28 | H. GELATINOSA | .7 | .022 | 99.865 | 1 | .1 | .006 | 28 |
| 28 | E. GRACILIS | .7 | .022 | 99.887 | 1 | | | 34 |
| 28 | M. PROLIFERA | .7 | .022 | 99.909 | 1 | 5.8 | .336 | 12 |
| 28 | CAMPANULARIDAE | .7 | .022 | 99.931 | 1 | | | 34 |
| 28 | MEMBRANIPORIDAE | .7 | .022 | 99.953 | 1 | | | 34 |
| 28 | HIRUDINEA | .7 | .022 | 99.975 | 1 | .1 | .006 | 28 |
| 28 | R. HARRISII | .7 | .022 | 99.997 | 1 | 4.1 | .237 | 14 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: T4S2

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | B. IMPROVISUS | 4,703.7 | 60.067 | 60.067 | 25 | 8,111.4 | 65.861 | 1 |
| 2 | P. LITORALIS | 1,030.4 | 13.158 | 73.225 | 27 | 21.7 | .176 | 15 |
| 3 | N. SUCCINEA | 506.7 | 6.471 | 79.696 | 24 | 825.1 | 6.699 | 3 |
| 4 | C. LACUSTRE | 484.4 | 6.186 | 85.882 | 21 | 31.0 | .252 | 13 |
| 5 | S. VIRIDIS | 211.1 | 2.696 | 88.578 | 22 | 228.1 | 1.852 | 5 |
| 6 | C. POLITA | 177.8 | 2.271 | 90.849 | 27 | 206.0 | 1.673 | 6 |
| 7 | OLIGOCHAETA 1 | 118.5 | 1.513 | 92.362 | 24 | 117.9 | .957 | 8 |
| 8 | M. NITIDA | 100.0 | 1.277 | 93.639 | 9 | 18.4 | .149 | 16 |
| 9 | POLYDORA SP. | 65.9 | .842 | 94.481 | 13 | 6.4 | .052 | 19 |
| 10 | RHYNCHOCOELA | 62.2 | .794 | 95.275 | 25 | 9.5 | .077 | 18 |
| 11 | N. AMERICANA | 61.5 | .785 | 96.060 | 14 | 37.9 | .308 | 11 |
| 12 | C. VIRGINICA | 31.1 | .397 | 96.457 | 17 | 2,004.2 | 16.273 | 2 |
| 13 | M. BALTHICA | 29.6 | .378 | 96.835 | 16 | 195.6 | 1.588 | 7 |
| 14 | R. HARRISII | 26.7 | .341 | 97.176 | 14 | 269.8 | 2.191 | 4 |
| 15 | E. TRILOBA | 23.7 | .303 | 97.479 | 8 | 1.6 | .013 | 23 |
| 16 | S. ELLIPTICUS | 20.7 | .264 | 97.743 | 6 | 4.7 | .038 | 20 |
| 17 | G. FRANCISCANA | 20.0 | .255 | 97.998 | 27 | 31.9 | .259 | 12 |
| 18 | S. ARGENTEA | 18.5 | .236 | 98.234 | 25 | 26.5 | .215 | 14 |
| 19 | CTENOSTOMATA | 17.8 | .227 | 98.461 | 24 | | | 36 |
| 20 | GAMMARUS SP. | 17.0 | .217 | 98.678 | 12 | 13.3 | .108 | 17 |
| 21 | MEMBRANIPORIDAE | 15.6 | .199 | 98.877 | 21 | | | 36 |
| 22 | C. SEPTEMSPINOSA | 14.8 | .189 | 99.066 | 11 | 63.6 | .516 | 10 |
| 23 | M. DEMISSUS | 14.1 | .180 | 99.246 | 9 | 80.7 | .655 | 9 |
| 24 | TRICLADIDA | 11.9 | .152 | 99.398 | 5 | | | 36 |
| 25 | D. OBSCURA | 8.9 | .114 | 99.512 | 3 | .9 | .007 | 25 |
| 26 | PARAPLEUSTES SP. | 7.4 | .094 | 99.606 | 3 | .9 | .007 | 25 |
| 27 | GASTROPODA | 5.2 | .066 | 99.672 | 5 | 1.3 | .011 | 24 |
| 28 | CAMPANULINIDAE | 4.4 | .056 | 99.728 | 6 | .6 | .005 | 27 |
| 29 | S. BENEDICTI | 3.7 | .047 | 99.775 | 4 | .4 | .003 | 30 |
| 29 | HYDROBIA | 3.7 | .047 | 99.822 | 3 | | | 36 |
| 31 | H. GELATINOSA | 2.2 | .028 | 99.850 | 3 | .6 | .005 | 27 |
| 31 | C. ALMYRA | 2.2 | .028 | 99.878 | 1 | 2.1 | .017 | 22 |
| 31 | OLIGOCHAETA | 2.2 | .028 | 99.906 | 3 | .6 | .005 | 27 |
| 34 | M. ARENARIA | 1.5 | .019 | 99.925 | 1 | .2 | .002 | 32 |
| 35 | D. LEUCOLENA | .7 | .009 | 99.934 | 1 | | | 36 |
| 35 | L. PLUMULOSUS | .7 | .009 | 99.943 | 1 | .4 | .003 | 30 |
| 35 | C. LUNIFRONS | .7 | .009 | 99.952 | 1 | .1 | .001 | 33 |
| 35 | M. PROLIFERA | .7 | .009 | 99.961 | 1 | 2.3 | .019 | 21 |
| 35 | A. VIDOVICI | .7 | .009 | 99.970 | 1 | | | 36 |
| 35 | NUDIBRANCHIA | .7 | .009 | 99.979 | 1 | .1 | .001 | 33 |
| 35 | TURBELLARIA | .7 | .009 | 99.988 | 1 | .1 | .001 | 33 |
| 35 | L. AMERICANUS | .7 | .009 | 99.997 | 1 | | | 36 |

* = BELOW REPORTABLE LEVEL

TABLE 3.1.4-5
CONTINUED

STATION: T4S3

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | P. LITORALIS | 239.3 | 35.866 | 35.866 | 24 | 9.2 | .839 | 11 |
| 2 | S. VIRIDIS | 161.5 | 24.206 | 60.072 | 25 | 235.8 | 21.511 | 2 |
| 3 | N. AMERICANA | 56.3 | 8.438 | 68.510 | 12 | 18.1 | 1.651 | 8 |
| 4 | C. POLITA | 51.9 | 7.779 | 76.289 | 24 | 87.9 | 8.019 | 6 |
| 5 | M. BALTHICA | 30.4 | 4.556 | 80.845 | 16 | 205.0 | 18.701 | 3 |
| 6 | S. ARGENTEA | 19.3 | 2.893 | 83.738 | 26 | 91.9 | 8.384 | 5 |
| 7 | G. FRANCISCANA | 18.5 | 2.773 | 86.511 | 25 | 254.9 | 23.253 | 1 |
| 8 | RHYNCHOCOELA | 14.8 | 2.218 | 88.729 | 9 | 6.5 | .593 | 12 |
| 9 | B. IMPROVISUS | 12.6 | 1.888 | 90.617 | 3 | 52.7 | 4.808 | 7 |
| 10 | GAMMARUS SP. | 11.1 | 1.664 | 92.281 | 8 | 17.1 | 1.560 | 9 |
| 11 | POLYDORA SP. | 8.1 | 1.214 | 93.495 | 5 | 1.8 | .164 | 14 |
| 12 | A. VIDOVICI | 5.2 | .779 | 94.274 | 7 | .7 | .064 | 17 |
| 13 | TRICLADIDA | 4.4 | .659 | 94.933 | 2 | .1 | .009 | 22 |
| 13 | C. SEPTEMSPINOSA | 4.4 | .659 | 95.592 | 4 | 94.6 | 8.630 | 4 |
| 15 | M. PROLIFERA | 3.7 | .555 | 96.147 | 5 | 12.0 | 1.095 | 10 |
| 15 | OLIGOCHAETA 1 | 3.7 | .555 | 96.702 | 5 | 4.1 | .374 | 13 |
| 17 | H. GELATINOSA | 3.0 | .450 | 97.152 | 4 | .8 | .073 | 16 |
| 18 | C. ALMYRA | 2.2 | .330 | 97.482 | 1 | .1 | .009 | 22 |
| 18 | M. EDWARDSI | 2.2 | .330 | 97.812 | 3 | .1 | .009 | 22 |
| 18 | H. LATERALIS | 2.2 | .330 | 98.142 | 2 | 1.2 | .109 | 15 |
| 18 | L. AMERICANUS | 2.2 | .330 | 98.472 | 3 | .5 | .046 | 18 |
| 18 | C. LACUSTRE | 2.2 | .330 | 98.802 | 2 | | | 26 |
| 23 | MEMBRANIPORIDAE | 1.5 | .225 | 99.027 | 2 | | | 26 |
| 23 | E. TRILOBA | 1.5 | .225 | 99.252 | 2 | .2 | .018 | 21 |
| 23 | TURBELLARIA | 1.5 | .225 | 99.477 | 2 | .4 | .036 | 19 |
| 26 | CULICOIDES | .7 | .105 | 99.582 | 1 | | | 26 |
| 26 | OLIGOCHAETA | .7 | .105 | 99.687 | 1 | | | 26 |
| 26 | S. BENEDICTI | .7 | .105 | 99.792 | 1 | .1 | .009 | 22 |
| 26 | M. NITIDA | .7 | .105 | 99.897 | 1 | .4 | .036 | 19 |
| 26 | CTENOSTOMATA | .7 | .105 | 100.002 | 1 | | | 26 |

* = BELOW REPORTABLE LEVEL

IA SALEM B 1978

TABLE 3.1.4-5
CONTINUED

STATION: T5S1

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | P. LITORALIS | 656.3 | 22.789 | 22.789 | 26 | 16.7 | 1.002 | 13 |
| 2 | C. POLITA | 369.6 | 12.834 | 35.623 | 26 | 192.0 | 11.520 | 4 |
| 3 | POLYDORA SP. | 317.0 | 11.007 | 46.630 | 14 | 31.9 | 1.914 | 11 |
| 4 | B. IMPROVISUS | 257.8 | 8.952 | 55.582 | 10 | 295.9 | 17.755 | 1 |
| 5 | OLIGOCHAETA 1 | 234.1 | 8.129 | 63.711 | 26 | 149.6 | 8.976 | 5 |
| 6 | S. VIRIDIS | 220.7 | 7.663 | 71.374 | 26 | 295.6 | 17.737 | 2 |
| 7 | L. PLUMULOSUS | 187.4 | 6.507 | 77.881 | 21 | 39.6 | 2.376 | 10 |
| 8 | C. LACUSTRE | 152.6 | 5.299 | 83.180 | 15 | 11.1 | .666 | 16 |
| 9 | N. SUCCINEA | 143.0 | 4.965 | 88.145 | 21 | 91.9 | 5.514 | 7 |
| 10 | RHYNCHOCOELA | 85.2 | 2.958 | 91.103 | 19 | 12.7 | .762 | 14 |
| 11 | N. AMERICANA | 52.6 | 1.826 | 92.929 | 14 | 5.3 | .318 | 18 |
| 12 | S. BENEDICTI | 29.6 | 1.028 | 93.957 | 12 | 1.3 | .078 | 24 |
| 13 | GAMMARUS SP. | 23.7 | .823 | 94.780 | 9 | 21.0 | 1.260 | 12 |
| 14 | M. BALTHICA | 23.0 | .799 | 95.579 | 10 | 49.0 | 2.940 | 8 |
| 15 | HYDROBIA | 22.2 | .771 | 96.350 | 7 | 1.7 | .102 | 22 |
| 16 | OLIGOCHAETA | 13.3 | .462 | 96.812 | 6 | 1.9 | .114 | 20 |
| 17 | C. SEPTEMSPINOSA | 10.4 | .361 | 97.173 | 9 | 144.4 | 8.664 | 6 |
| 18 | G. FRANCISCANA | 9.6 | .333 | 97.506 | 13 | 5.1 | .306 | 19 |
| 19 | E. TRILOBA | 8.9 | .309 | 97.815 | 7 | .6 | .036 | 27 |
| 19 | TRICLADIDA | 8.9 | .309 | 98.124 | 6 | .5 | .030 | 28 |
| 21 | M. EDWARDSI | 7.4 | .257 | 98.381 | 7 | 1.6 | .096 | 23 |
| 22 | TURBELLARIA | 6.7 | .233 | 98.614 | 5 | 1.1 | .066 | 26 |
| 22 | C. ALMYRA | 6.7 | .233 | 98.847 | 5 | 9.2 | .552 | 17 |
| 24 | CTENOSTOMATA | 5.2 | .181 | 99.028 | 7 | | | 37 |
| 24 | MEMBRANIPORIDAE | 5.2 | .181 | 99.209 | 7 | | | 37 |
| 26 | CAMPANULINIDAE | 4.4 | .153 | 99.362 | 6 | 1.8 | .108 | 21 |
| 27 | M. ARENARIA | 3.7 | .128 | 99.490 | 5 | .2 | .012 | 29 |
| 28 | R. HARRISII | 3.0 | .104 | 99.594 | 3 | 40.0 | 2.400 | 9 |
| 29 | G. SOLITARIA | 2.2 | .076 | 99.670 | 3 | .1 | .006 | 30 |
| 29 | HYDROZOA | 2.2 | .076 | 99.746 | 3 | | | 37 |
| 31 | H. GRAYI | 1.5 | .052 | 99.798 | 2 | | | 37 |
| 31 | C. VIRGINICA | 1.5 | .052 | 99.850 | 1 | 231.2 | 13.873 | 3 |
| 31 | GASTROPODA | 1.5 | .052 | 99.902 | 2 | | | 37 |
| 34 | H. GELATINOSA | .7 | .024 | 99.926 | 1 | 12.4 | .744 | 15 |
| 34 | D. LEUCOLENA | .7 | .024 | 99.950 | 1 | 1.2 | .072 | 25 |
| 34 | S. ARGENTEA | .7 | .024 | 99.974 | 1 | | | 37 |
| 34 | PARAPLEUSTES SP. | .7 | .024 | 99.998 | 1 | | | 37 |

* = BELOW REPORTABLE LEVEL

TABLE 3.1.4-5
CONTINUED

STATION: T5S2

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | P. LITORALIS | 1,231.9 | 49.142 | 49.142 | 25 | 27.1 | .875 | 11 |
| 2 | S. VIRIDIS | 355.6 | 14.185 | 63.327 | 25 | 298.3 | 9.635 | 4 |
| 3 | C. POLITA | 254.1 | 10.136 | 73.463* | 24 | 311.0 | 10.046 | 3 |
| 4 | POLYDORA SP. | 155.6 | 6.207 | 79.670 | 3 | 12.0 | .388 | 14 |
| 5 | M. BALTHICA | 117.8 | 4.699 | 84.369 | 22 | 1,509.4 | 48.755 | 1 |
| 6 | OLIGOCHAETA 1 | 95.6 | 3.814 | 88.183 | 27 | 126.0 | 4.070 | 5 |
| 7 | RHYNCHOCOELA | 55.6 | 2.218 | 90.401 | 23 | 47.9 | 1.547 | 8 |
| 8 | N. AMERICANA | 36.3 | 1.448 | 91.849 | 13 | 23.5 | .759 | 13 |
| 9 | L. AMERICANUS | 29.6 | 1.181 | 93.030 | 10 | 1.4 | .045 | 21 |
| 10 | N. SUCCINEA | 20.7 | .826 | 93.856 | 9 | 12.0 | .388 | 14 |
| 10 | E. TRILOBA | 20.7 | .826 | 94.682 | 7 | 1.2 | .039 | 23 |
| 12 | G. FRANCISCANA | 17.8 | .710 | 95.392 | 24 | 40.1 | 1.295 | 9 |
| 13 | S. BENEDICTI | 17.0 | .678 | 96.070 | 9 | 1.6 | .052 | 20 |
| 14 | S. ARGENTEA | 15.6 | .622 | 96.692 | 21 | 99.9 | 3.227 | 6 |
| 15 | B. IMPROVISUS | 13.3 | .531 | 97.223 | 6 | 88.1 | 2.846 | 7 |
| 16 | TRICLADIDA | 11.9 | .475 | 97.698 | 5 | .3 | .010 | 27 |
| 17 | M. PROLIFERA | 7.4 | .295 | 97.993 | 10 | 423.3 | 13.673 | 2 |
| 18 | CTENOSTOMATA | 5.9 | .235 | 98.228 | 8 | | | 31 |
| 18 | MEMBRANIPORIDAE | 5.9 | .235 | 98.463 | 8 | | | 31 |
| 20 | C. LACUSTRE | 5.2 | .207 | 98.670 | 3 | .4 | .013 | 25 |
| 20 | M. EDWARDSI | 5.2 | .207 | 98.877 | 5 | 1.3 | .042 | 22 |
| 22 | H. GELATINOSA | 4.4 | .176 | 99.053 | 6 | 2.0 | .065 | 17 |
| 23 | C. ALMYRA | 3.0 | .120 | 99.173 | 2 | .4 | .013 | 25 |
| 23 | M. NITIDA | 3.0 | .120 | 99.293 | 2 | .3 | .010 | 27 |
| 23 | GASTROPODA | 3.0 | .120 | 99.413 | 2 | 1.9 | .061 | 18 |
| 26 | A. VIDOVICI | 2.2 | .088 | 99.501 | 3 | .6 | .019 | 24 |
| 26 | R. HARRISII | 2.2 | .088 | 99.589 | 3 | 35.3 | 1.140 | 10 |
| 26 | M. LATERALIS | 2.2 | .088 | 99.677 | 3 | 2.1 | .068 | 16 |
| 29 | GAMMARUS SP. | 1.5 | .060 | 99.737 | 2 | 1.8 | .058 | 19 |
| 29 | CAMPANULARIDAE | 1.5 | .060 | 99.797 | 2 | .1 | .003 | 30 |
| 29 | CAMPANULINIDAE | 1.5 | .060 | 99.857 | 2 | | | 31 |
| 29 | C. SEPTEMSPINOSA | 1.5 | .060 | 99.917 | 2 | 26.4 | .853 | 12 |
| 33 | L. PLUMULOSUS | .7 | .028 | 99.945 | 1 | .2 | .006 | 29 |
| 33 | E. HETEROPODA | .7 | .028 | 99.973 | 1 | | | 31 |
| 33 | HIRUDINEA | .7 | .028 | 100.001 | 1 | | | 31 |

* = BELOW REPORTABLE LEVEL

IA SALEM B 1978

TABLE 3.1.4-5
CONTINUED

STATION: I751

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | S. VIRIDIS | 465.9 | 42.614 | 42.614 | 26 | 678.3 | 51.629 | 1 |
| 2 | TURBELLARIA | 258.5 | 23.644 | 66.258 | 10 | 4.8 | .365 | 12 |
| 3 | GAMMARUS SP. | 81.5 | 7.454 | 73.712 | 7 | 86.4 | 6.576 | 3 |
| 4 | C. ALMYRA | 61.5 | 5.625 | 79.337 | 18 | 57.0 | 4.339 | 4 |
| 5 | C. POLITA | 52.6 | 4.811 | 84.148 | 17 | 46.5 | 3.539 | 5 |
| 6 | N. AMERICANA | 28.9 | 2.643 | 86.791 | 12 | 6.5 | .495 | 11 |
| 7 | RHYNCHOCOELA | 25.9 | 2.369 | 89.160 | 13 | 7.9 | .601 | 10 |
| 8 | POLYDORA SP. | 23.0 | 2.104 | 91.264 | 4 | 1.2 | .091 | 16 |
| 9 | G. FRANCISCANA | 14.8 | 1.354 | 92.618 | 20 | 39.6 | 3.014 | 6 |
| 10 | P. LITORALIS | 13.3 | 1.217 | 93.835 | 11 | .4 | .030 | 20 |
| 10 | C. LACUSTRE | 13.3 | 1.217 | 95.052 | 5 | .5 | .038 | 19 |
| 12 | S. ARGENTEA | 10.4 | .951 | 96.003 | 14 | 25.0 | 1.903 | 8 |
| 13 | M. EDWARDSI | 7.4 | .677 | 96.680 | 7 | 1.1 | .084 | 17 |
| 14 | E. TRILOBA | 6.7 | .613 | 97.293 | 3 | .4 | .030 | 20 |
| 14 | TRICLADIDA | 6.7 | .613 | 97.906 | 1 | | | 26 |
| 16 | PARAHAUSTORIUS SP. | 5.2 | .476 | 98.382 | 4 | 8.0 | .609 | 9 |
| 16 | C. SEPTEMSPINOSA | 5.2 | .476 | 98.858 | 4 | 307.0 | 23.367 | 2 |
| 18 | N. SUCCINEA | 2.2 | .201 | 99.059 | 2 | 3.2 | .244 | 13 |
| 18 | OLIGOCHAETA 1 | 2.2 | .201 | 99.260 | 3 | 2.1 | .160 | 15 |
| 20 | H. GELATINOSA | 1.5 | .137 | 99.397 | 2 | .8 | .061 | 18 |
| 20 | R. HARRISII | 1.5 | .137 | 99.534 | 1 | 2.7 | .206 | 14 |
| 20 | CAMPANULINIDAE | 1.5 | .137 | 99.671 | 2 | .1 | .008 | 22 |
| 20 | L. AMERICANUS | 1.5 | .137 | 99.808 | 1 | | | 26 |
| 24 | H. BALTHICA | .7 | .064 | 99.872 | 1 | .1 | .008 | 22 |
| 24 | M. PROLIFERA | .7 | .064 | 99.936 | 1 | 34.1 | 2.596 | 7 |
| 24 | A. VIDOVICI | .7 | .064 | 100.000 | 1 | .1 | .008 | 22 |

* = BELOW REPORTABLE LEVEL

IA SALEM B 1978

TABLE 3.1.4-5
CONTINUED

STATION: T7S2

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | POLYDORA SP. | 1,637.0 | 82.199 | 82.199 | 26 | 78.6 | 13.966 | 3 |
| 2 | C. POLITA | 136.5 | 6.955 | 89.154 | 25 | 174.4 | 30.988 | 1 |
| 3 | GAMMARUS SP. | 83.0 | 4.168 | 93.322 | 11 | 67.0 | 11.905 | 4 |
| 4 | N. AMERICANA | 28.9 | 1.451 | 94.773 | 9 | 6.9 | 1.226 | 9 |
| 5 | S. VIRIDIS | 27.4 | 1.376 | 96.149 | 8 | 21.9 | 3.891 | 6 |
| 6 | S. ARGENTEA | 13.3 | .668 | 96.817 | 18 | 21.7 | 3.856 | 7 |
| 7 | E. TRILOBA | 9.6 | .482 | 97.299 | 7 | 1.0 | .178 | 15 |
| 8 | R. HARRISII | 8.9 | .447 | 97.746 | 8 | 144.8 | 25.729 | 2 |
| 8 | RHYNCHOCOELA | 8.9 | .447 | 98.193 | 7 | 4.4 | .782 | 11 |
| 10 | G. FRANCISCANA | 8.1 | .407 | 98.600 | 11 | 24.3 | 4.318 | 5 |
| 11 | N. SUCCINEA | 7.4 | .372 | 98.972 | 7 | 1.2 | .213 | 14 |
| 12 | C. LACUSTRE | 5.9 | .296 | 99.268 | 6 | 1.6 | .284 | 13 |
| 13 | C. SEPTEMSPINOSA | 3.7 | .186 | 99.454 | 4 | 7.6 | 1.350 | 8 |
| 14 | C. ALMYRA | 3.0 | .151 | 99.605 | 2 | 2.0 | .355 | 12 |
| 15 | M. PROLIFERA | 1.5 | .075 | 99.680 | 2 | 5.2 | .924 | 10 |
| 15 | M. NITIDA | 1.5 | .075 | 99.755 | 2 | .1 | .018 | 16 |
| 17 | OLIGOCHAETA 1 | .7 | .035 | 99.790 | 1 | | | 23 |
| 17 | G. SOLITARIA | .7 | .035 | 99.825 | 1 | | | 23 |
| 17 | OLIGOCHAETA | .7 | .035 | 99.860 | 1 | | | 23 |
| 17 | P. LITORALIS | .7 | .035 | 99.895 | 1 | | | 23 |
| 17 | B. IMPROVISUS | .7 | .035 | 99.930 | 1 | | | 23 |
| 17 | M. EDWARDSI | .7 | .035 | 99.965 | 1 | | | 23 |
| 17 | L. AMERICANUS | .7 | .035 | 100.000 | 1 | .1 | .018 | 16 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: T8S1

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | P. LITORALIS | 823.7 | 29.110 | 29.110 | 26 | 15.4 | 1.295 | 11 |
| 2 | N. AMERICANA | 354.1 | 12.514 | 41.624 | 13 | 42.9 | 3.607 | 8 |
| 3 | C. POLITA | 352.6 | 12.461 | 54.085 | 27 | 213.7 | 17.967 | 2 |
| 4 | POLYDORA SP. | 348.9 | 12.330 | 66.415 | 12 | 24.0 | 2.018 | 9 |
| 5 | OLIGOCHAETA 1 | 226.7 | 8.012 | 74.427 | 27 | 87.2 | 7.331 | 5 |
| 6 | S. VIRIDIS | 217.8 | 7.697 | 82.124 | 27 | 319.7 | 26.879 | 1 |
| 7 | N. SUCCINEA | 85.2 | 3.011 | 85.135 | 22 | 107.1 | 9.005 | 4 |
| 8 | C. LACUSTRE | 75.6 | 2.672 | 87.807 | 11 | 4.7 | .395 | 14 |
| 9 | RHYNCHOCOELA | 66.7 | 2.357 | 90.164 | 22 | 23.9 | 2.009 | 10 |
| 10 | L. PLUMULOSUS | 45.2 | 1.597 | 91.761 | 21 | 8.4 | .706 | 13 |
| 11 | B. IMPROVISUS | 39.3 | 1.389 | 93.150 | 8 | 82.8 | 6.961 | 6 |
| 12 | M. BALTHICA | 32.6 | 1.152 | 94.302 | 21 | 169.2 | 14.226 | 3 |
| 13 | C. SEPTEMSPINOSA | 25.9 | .915 | 95.217 | 8 | 57.2 | 4.809 | 7 |
| 14 | E. TRILOBA | 22.2 | .785 | 96.002 | 13 | 1.9 | .160 | 18 |
| 15 | GAMMARUS SP. | 17.8 | .629 | 96.631 | 6 | 9.3 | .782 | 12 |
| 16 | TRICLADIDA | 13.3 | .470 | 97.101 | 8 | 1.0 | .084 | 22 |
| 17 | G. FRANCISCANA | 9.6 | .339 | 97.440 | 13 | 4.0 | .336 | 16 |
| 17 | S. BENEDICTI | 9.6 | .339 | 97.779 | 7 | 1.0 | .084 | 22 |
| 19 | M. EDWARDSI | 8.9 | .315 | 98.094 | 7 | 1.6 | .135 | 19 |
| 20 | OLIGOCHAETA | 5.9 | .209 | 98.303 | 3 | .4 | .034 | 30 |
| 20 | L. AMERICANUS | 5.9 | .209 | 98.512 | 5 | .7 | .059 | 26 |
| 22 | CTENOSTOMATA | 5.2 | .184 | 98.696 | 7 | | | 34 |
| 23 | M. NITIDA | 4.4 | .155 | 98.851 | 1 | .4 | .034 | 30 |
| 23 | R. HARRISII | 4.4 | .155 | 99.006 | 4 | 4.3 | .362 | 15 |
| 23 | TURBELLARIA #1 | 4.4 | .155 | 99.161 | 2 | .1 | .008 | 33 |
| 26 | G. SOLITARIA | 3.7 | .131 | 99.292 | 3 | .5 | .042 | 28 |
| 26 | TURBELLARIA | 3.7 | .131 | 99.423 | 2 | .9 | .076 | 24 |
| 28 | MEMBRANIPORIDAE | 3.0 | .106 | 99.529 | 4 | | | 34 |
| 28 | S. ARGENTEA | 3.0 | .106 | 99.635 | 4 | 3.0 | .252 | 17 |
| 30 | HYDROBIA | 2.2 | .078 | 99.713 | 3 | .5 | .042 | 28 |
| 31 | M. LATERALIS | 1.5 | .053 | 99.766 | 1 | .3 | .025 | 32 |
| 31 | C. ALMYRA | 1.5 | .053 | 99.819 | 2 | 1.4 | .118 | 20 |
| 31 | M. ARENARIA | 1.5 | .053 | 99.872 | 2 | 1.2 | .101 | 21 |
| 31 | CAMPANULINIDAE | 1.5 | .053 | 99.925 | 2 | .7 | .059 | 26 |
| 35 | HYDROZOA | .7 | .025 | 99.950 | 1 | | | 34 |
| 35 | CERATOPOGONIDAE | .7 | .025 | 99.975 | 1 | | | 34 |
| 35 | H. GELATINOSA | .7 | .025 | 100.000 | 1 | | | 34 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-5
CONTINUED

STATION: IBS2

| RANK BY NUMBER | TAXA | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | NUMBER OF OCCURRENCES | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|---|
| 1 | P. LITORALIS | 1,107.4 | 51.471 | 51.471 | 27 | 28.7 | 1.717 | 8 |
| 2 | S. VIRIDIS | 657.8 | 30.574 | 82.045 | 27 | 631.0 | 37.760 | 1 |
| 3 | C. POLITA | 131.1 | 6.093 | 88.138 | 23 | 191.6 | 11.466 | 3 |
| 4 | RHYNCHOCOELA | 60.0 | 2.789 | 90.927 | 22 | 35.6 | 2.130 | 7 |
| 5 | OLIGOCHAETA 1 | 34.1 | 1.585 | 92.512 | 10 | 24.0 | 1.436 | 10 |
| 6 | N. AMERICANA | 29.6 | 1.376 | 93.888 | 13 | 17.9 | 1.071 | 11 |
| 7 | M. BALTHICA | 27.4 | 1.274 | 95.162 | 18 | 406.4 | 24.319 | 2 |
| 8 | G. FRANCISCANA | 19.3 | .897 | 96.059 | 26 | 28.5 | 1.705 | 9 |
| 9 | S. ARGENTEA | 17.8 | .827 | 96.886 | 24 | 73.6 | 4.404 | 5 |
| 10 | C. SEPTEMSPINOSA | 8.9 | .414 | 97.300 | 5 | 164.2 | 9.826 | 4 |
| 11 | M. PROLIFERA | 7.4 | .344 | 97.644 | 10 | 38.4 | 2.298 | 6 |
| 11 | E. TRILOBA | 7.4 | .344 | 97.988 | 4 | 1.6 | .096 | 15 |
| 13 | M. EDWARDSI | 6.7 | .311 | 98.299 | 6 | .6 | .036 | 19 |
| 14 | B. IMPROVISUS | 5.9 | .274 | 98.573 | 5 | 16.1 | .963 | 12 |
| 15 | C. ALMYRA | 5.2 | .242 | 98.815 | 3 | 3.6 | .215 | 14 |
| 16 | L. AMERICANUS | 4.4 | .205 | 99.020 | 5 | 1.0 | .060 | 16 |
| 17 | MEMBRANIPORIDAE | 3.7 | .172 | 99.192 | 5 | | | 30 |
| 17 | TURBELLARIA | 3.7 | .172 | 99.364 | 2 | .7 | .042 | 18 |
| 19 | M. LATERALIS | 3.0 | .139 | 99.503 | 3 | 4.7 | .281 | 13 |
| 20 | N. SUCCINEA | 2.2 | .102 | 99.605 | 3 | .3 | .018 | 22 |
| 21 | M. NITIDA | 1.5 | .070 | 99.675 | 2 | .4 | .024 | 20 |
| 22 | TRICLADIDA | .7 | .033 | 99.708 | 1 | .1 | .006 | 25 |
| 22 | G. SOLITARIA | .7 | .033 | 99.741 | 1 | | | 30 |
| 22 | A. VIDOVICI | .7 | .033 | 99.774 | 1 | .3 | .018 | 22 |
| 22 | C. LACUSTRE | .7 | .033 | 99.807 | 1 | .1 | .006 | 25 |
| 22 | S. BENEDICTI | .7 | .033 | 99.840 | 1 | .2 | .012 | 24 |
| 22 | CAMPANULARIDAE | .7 | .033 | 99.873 | 1 | .1 | .006 | 25 |
| 22 | H. GELATINOSA | .7 | .033 | 99.906 | 1 | .1 | .006 | 25 |
| 22 | GASTROPODA | .7 | .033 | 99.939 | 1 | .8 | .048 | 17 |
| 22 | OLIGOCHAETA | .7 | .033 | 99.972 | 1 | .4 | .024 | 20 |
| 22 | HYDROBIA | .7 | .033 | 100.005 | 1 | .1 | .006 | 25 |

* = BELOW REPORTABLE LEVEL

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TABLE 3.1.4-6

ANNUAL RANK BY LOCATION OF BENTHIC TAXA NEAR ARTIFICIAL ISLAND IN THE DELAWARE RIVER, 1978.

| RANK BY NUMBER | SAMPLING LOCATION | MEAN DENSITY (NO/SQ M) | % FAUNA BY NUMBER | CUMED % BY NUMBER | DRY WEIGHT (MG/SQ M) | % BY WEIGHT | RANK BY WEIGHT |
|---|---|---|---|---|---|---|---|
| 1 | T4S2 | 7,831.1 | 21.245 | 21.245 | 12,315.9 | 39.223 | 1 |
| 2 | T4S1 | 3,169.6 | 8.599 | 29.844 | 1,727.5 | 5.502 | 4 |
| 3 | T3S2 | 3,157.0 | 8.565 | 38.409 | 752.6 | 2.397 | 11 |
| 4 | T5S1 | 2,880.0 | 7.813 | 46.222 | 1,666.4 | 5.307 | 7 |
| 5 | T8S1 | 2,829.6 | 7.676 | 53.898 | 1,189.3 | 3.788 | 9 |
| 6 | T2S2 | 2,815.6 | 7.638 | 61.536 | 1,694.9 | 5.398 | 5 |
| 7 | T5S2 | 2,506.7 | 6.800 | 68.336 | 3,095.9 | 9.860 | 2 |
| 8 | T2S1 | 2,460.0 | 6.674 | 75.010 | 613.6 | 1.954 | 13 |
| 9 | T8S2 | 2,151.9 | 5.838 | 80.848 | 1,671.2 | 5.322 | 6 |
| 10 | T7S2 | 1,991.9 | 5.404 | 86.252 | 562.7 | 1.792 | 14 |
| 11 | T3S3 | 1,795.6 | 4.871 | 91.123 | 674.4 | 2.148 | 12 |
| 12 | T3S1 | 1,511.1 | 4.099 | 95.222 | 3,025.4 | 9.635 | 3 |
| 13 | T7S1 | 1,093.3 | 2.966 | 98.188 | 1,313.6 | 4.183 | 8 |
| 14 | T4S3 | 667.4 | 1.811 | 99.999 | 1,096.3 | 3.491 | 10 |

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TABLE 3.1.4-7
COMPARISON OF THE SHANNON-WEAVER DIVERSITY
INDEX (D), SIMPLE DIVERSITY (s), AND TOTAL SPECIMENS (N)- 1978

| | | March | April | May | June | July | August | September | October | November | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T2S1 | s | 13 | 10 | 12 | 12 | 14 | 11 | 12 | 13 | 16 | 13 |
| | N | 1,894 | 2,587 | 1,961 | 4,067 | 3,988 | 414 | 1,120 | 2,120 | 3,994 | 2,461 |
| | D | 1.102 | 0.913 | 1.301 | 1.024 | 1.003 | 1.957 | 1.625 | 1.141 | 1.050 | 1.235 |
| T2S2 | s | 12 | 6 | 9 | 11 | 6 | 12 | 11 | 10 | 12 | 10 |
| | N | 1,542 | 9,087 | 2,040 | 1,600 | 447 | 521 | 953 | 421 | 8,735 | 2,816 |
| | D | 0.932 | 0.632 | 1.186 | 1.337 | 1.399 | 1.856 | 1.772 | 1.748 | 0.694 | 1.284 |
| T3S1 | s | 10 | 15 | 11 | 11 | 9 | 13 | 6 | 14 | 16 | 12 |
| | N | 994 | 887 | 6,154 | 2,260 | 594 | 480 | 481 | 773 | 981 | 1,512 |
| | D | 1.272 | 1.601 | 0.404 | 1.207 | 1.330 | 1.871 | 0.677 | 1.423 | 1.365 | 1.239 |
| T3S2 | s | 7 | 7 | 9 | 9 | 11 | 12 | 6 | 10 | 10 | 9 |
| | N | 573 | 7,174 | 12,753 | 4,160 | 846 | 688 | 267 | 736 | 1,220 | 3,157 |
| | D | 1.083 | 0.472 | 0.289 | 0.741 | 1.441 | 1.428 | 1.245 | 1.299 | 1.277 | 1.031 |
| T3S3 | s | 7 | 7 | 11 | 8 | 13 | 9 | 15 | 12 | 9 | 10 |
| | N | 167 | 841 | 2,321 | 1,086 | 5,561 | 1,794 | 2,475 | 766 | 1,154 | 1,796 |
| | D | 1.735 | 0.652 | 1.244 | 1.646 | 0.433 | 0.596 | 1.528 | 1.876 | 0.939 | 1.183 |
| T4S1 | s | 19 | 17 | 13 | 14 | 15 | 14 | 14 | 18 | 18 | 16 |
| | N | 4,322 | 3,534 | 3,581 | 2,080 | 2,820 | 2,401 | 3,075 | 4,147 | 2,572 | 3,170 |
| | D | 0.927 | 1.067 | 1.335 | 1.269 | 0.696 | 0.990 | 0.974 | 0.940 | 1.237 | 1.048 |
| T4S2 | s | 22 | 17 | 18 | 19 | 28 | 27 | 17 | 23 | 28 | 22 |
| | N | 4,036 | 4,005 | 4,374 | 13,693 | 14,094 | 11,824 | 1,955 | 5,152 | 11,351 | 7,832 |
| | D | 1.951 | 1.515 | 1.741 | 0.831 | 0.867 | 1.475 | 1.752 | 1.889 | 1.695 | 1.524 |
| T4S3 | s | 12 | 10 | 19 | 7 | 9 | 17 | 14 | 14 | 16 | 13 |
| | N | 774 | 214 | 1,469 | 154 | 267 | 700 | 648 | 861 | 929 | 668 |
| | D | 1.745 | 1.915 | 1.608 | 1.669 | 1.768 | 1.968 | 1.991 | 1.786 | 1.528 | 1.775 |
| T5S1 | s | 20 | 17 | 15 | 15 | 13 | 22 | 23 | 24 | 20 | 19 |
| | N | 1,541 | 1,421 | 2,427 | 3,508 | 4,333 | 3,320 | 4,515 | 3,695 | 1,168 | 2,881 |
| | D | 2.383 | 1.915 | 1.496 | 1.772 | 1.190 | 2.239 | 2.395 | 2.204 | 2.343 | 1.993 |
| T5S2 | s | 22 | 16 | 19 | 11 | 13 | 17 | 12 | 19 | 23 | 17 |
| | N | 4,936 | 1,552 | 4,374 | 213 | 2,568 | 2,940 | 266 | 2,923 | 2,797 | 2,508 |
| | D | 1.626 | 1.616 | 1.349 | 2.152 | 1.431 | 1.719 | 2.101 | 1.559 | 1.946 | 1.722 |
| T7S1 | s | 8 | 12 | 8 | 14 | 10 | 12 | 19 | 6 | 8 | 11 |
| | N | 2,160 | 1,141 | 1,121 | 1,748 | 1,313 | 362 | 747 | 835 | 419 | 1,094 |
| | D | 0.655 | 0.897 | 0.839 | 1.521 | 0.843 | 1.845 | 2.385 | 1.373 | 1.674 | 1.337 |
| T7S2 | s | 6 | 5 | 5 | 8 | 11 | 8 | 12 | 14 | 13 | 9 |
| | N | 1,281 | 1,713 | 247 | 1,015 | 1,901 | 6,320 | 3,107 | 761 | 1,587 | 1,992 |
| | D | 0.404 | 0.501 | 0.905 | 1.306 | 0.939 | 0.112 | 0.786 | 1.959 | 0.804 | 0.857 |
| T8S1 | s | 15 | 15 | 19 | 14 | 17 | 20 | 22 | 23 | 18 | 18 |
| | N | 1,715 | 1,515 | 2,283 | 4,681 | 4,847 | 1,794 | 4,820 | 2,647 | 1,174 | 2,831 |
| | D | 1.980 | 1.767 | 2.023 | 1.286 | 1.538 | 2.215 | 1.491 | 2.083 | 2.229 | 1.846 |
| T8S2 | s | 8 | 10 | 16 | 14 | 12 | 15 | 14 | 16 | 13 | 13 |
| | N | 1,700 | 2,479 | 3,295 | 2,327 | 2,820 | 2,707 | 1,615 | 1,647 | 780 | 2,152 |
| | D | 0.704 | 1.387 | 1.120 | 1.333 | 1.051 | 1.331 | 1.362 | 1.636 | 1.745 | 1.299 |
| Mean | s | 13 | 12 | 13 | 12 | 13 | 15 | 14 | 15 | 16 | |
| | N | 1,974 | 2,725 | 3,457 | 3,042 | 3,314 | 2,590 | 1,860 | 1,963 | 2,776 | |
| | D | 1.321 | 1.204 | 1.203 | 1.364 | 1.138 | 1.543 | 1.579 | 1.637 | 1.466 | |

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TABLE 3.1.4-8

SEASONAL MEAN DENSITY AND BIOMASS OF BENTHOS TAKEN NEAR ARTIFICIAL ISLAND IN THE DELAWARE RIVER, 1978.

| SEASON | 01/01 - 02/29 | | | | 03/01 - 06/15 | | | |
|---|---|---|---|---|---|---|---|---|
| TEMP. (C) RANGE | | | | | 2.9 - 21.6 | | | |
| MEAN | | | | | 12.6 | | | |
| SAL. (PPT) RANGE | | | | | 0.0 - 10.0 | | | |
| MEAN | | | | | 4.1 | | | |
| | DENSITY (NO/SQ M) | | BIOMASS (MG/SQ M) | | DENSITY (NO/SQ M) | | BIOMASS (MG/SQ M) | |
| TAXONOMIC GROUP | MEAN | MEAN % | MEAN | MEAN % | MEAN | MEAN % | MEAN | MEAN % |
| MICROCIONA | | | | | 1 | 0.03 | 12 | 0.48 |
| CNIDARIA | | | | | 29 | 1.03 | 121 | 4.91 |
| RHYNCHOCOELA | | | | | 21 | 0.75 | 17 | 0.68 |
| POLYCHAETA | | | | | 636 | 22.73 | 556 | 22.56 |
| OLIGOCHAETA | | | | | 734 | 26.23 | 51 | 2.06 |
| PELECYPODA | | | | | 36 | 1.28 | 287 | 11.64 |
| BALANUS | | | | | 341 | 12.18 | 801 | 32.50 |
| NEOMYSIS | | | | | 97 | 3.46 | 28 | 1.13 |
| LEUCON | | | | | 1 | 0.03 | * | * |
| ISOPODA | | | | | 98 | 3.50 | 170 | 6.89 |
| AMPHIPODA | | | | | 168 | 6.00 | 346 | 14.04 |
| DECAPODA | | | | | 9 | 0.32 | 63 | 2.55 |
| OTHER | | | | | 627 | 22.40 | 12 | 0.48 |
| TOTAL | | | | | 2,798 | | 2,464 | |

* = BELOW REPORTABLE LEVEL

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TABLE 2.1.4-8
CONTINUED

| SEASON | 06/16 - 09/15 | | | | 09/16 - 11/30 | | | |
|---|---|---|---|---|---|---|---|---|
| TEMP. (C) RANGE | 23.0 - 29.0 | | | | 11.2 - 25.1 | | | |
| MEAN | 26.2 | | | | 16.8 | | | |
| SAL. (PPT) RANGE | 2.0 - 10.0 | | | | 5.0 - 12.0 | | | |
| MEAN | 6.7 | | | | 8.9 | | | |
| | DENSITY (NO/SQ M) | | BIOMASS (MG/SQ M) | | DENSITY (NO/SQ M) | | BIOMASS (MG/SQ M) | |
| TAXONOMIC GROUP | MEAN | MEAN % | MEAN | MEAN % | MEAN | MEAN % | MEAN | MEAN % |
| MICROCIONA | 3 | 0.10 | 136 | 6.87 | 3 | 0.13 | 80 | 3.76 |
| CNIDARIA | 29 | 0.98 | 72 | 3.63 | 33 | 1.50 | 68 | 3.20 |
| RHYNCHOCOELA | 23 | 0.77 | 10 | 0.50 | 78 | 3.54 | 20 | 0.94 |
| POLYCHAETA | 947 | 32.09 | 416 | 21.02 | 371 | 16.87 | 472 | 22.22 |
| OLIGOCHAETA | 670 | 22.70 | 51 | 2.57 | 769 | 34.98 | 59 | 2.77 |
| PELECYPODA | 21 | 0.71 | 421 | 21.27 | 28 | 1.27 | 570 | 26.83 |
| BALANUS | 693 | 23.48 | 635 | 32.08 | 196 | 8.91 | 447 | 21.04 |
| NEOMYSIS | 13 | 0.44 | 3 | 0.15 | 92 | 4.18 | 26 | 1.22 |
| LEUCON | 10 | 0.33 | * | * | 11 | 0.50 | 1 | 0.04 |
| ISOPODA | 290 | 9.82 | 119 | 6.01 | 235 | 10.69 | 161 | 7.58 |
| AMPHIPODA | 197 | 6.67 | 28 | 1.41 | 309 | 14.05 | 34 | 1.60 |
| DECAPODA | 14 | 0.47 | 85 | 4.29 | 10 | 0.45 | 184 | 8.66 |
| OTHER | 41 | 1.38 | 3 | 0.15 | 63 | 2.86 | 2 | 0.09 |
| TOTAL | 2,951 | | 1,979 | | 2,198 | | 2,124 | |

* = BELOW REPORTABLE LEVEL

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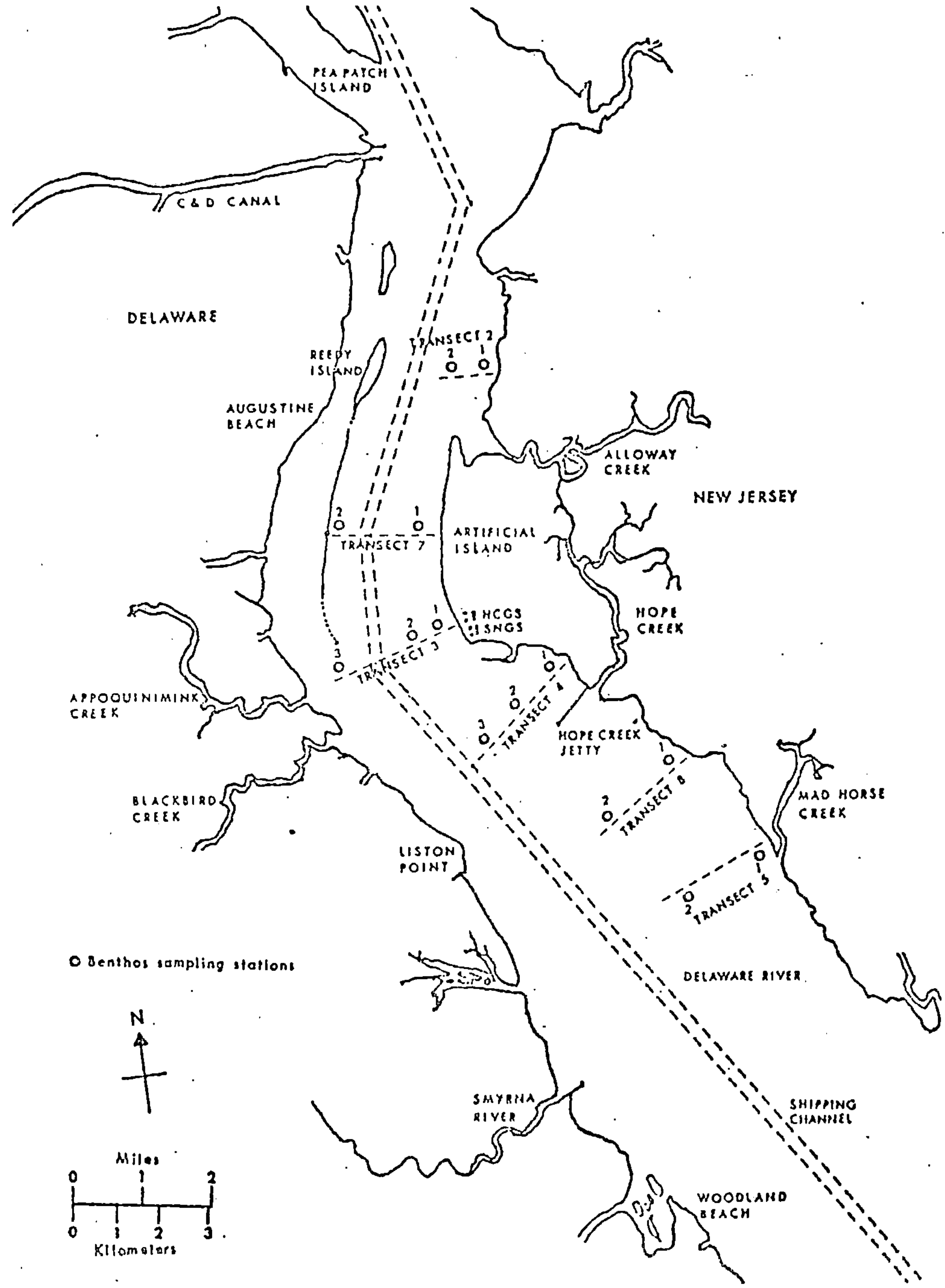
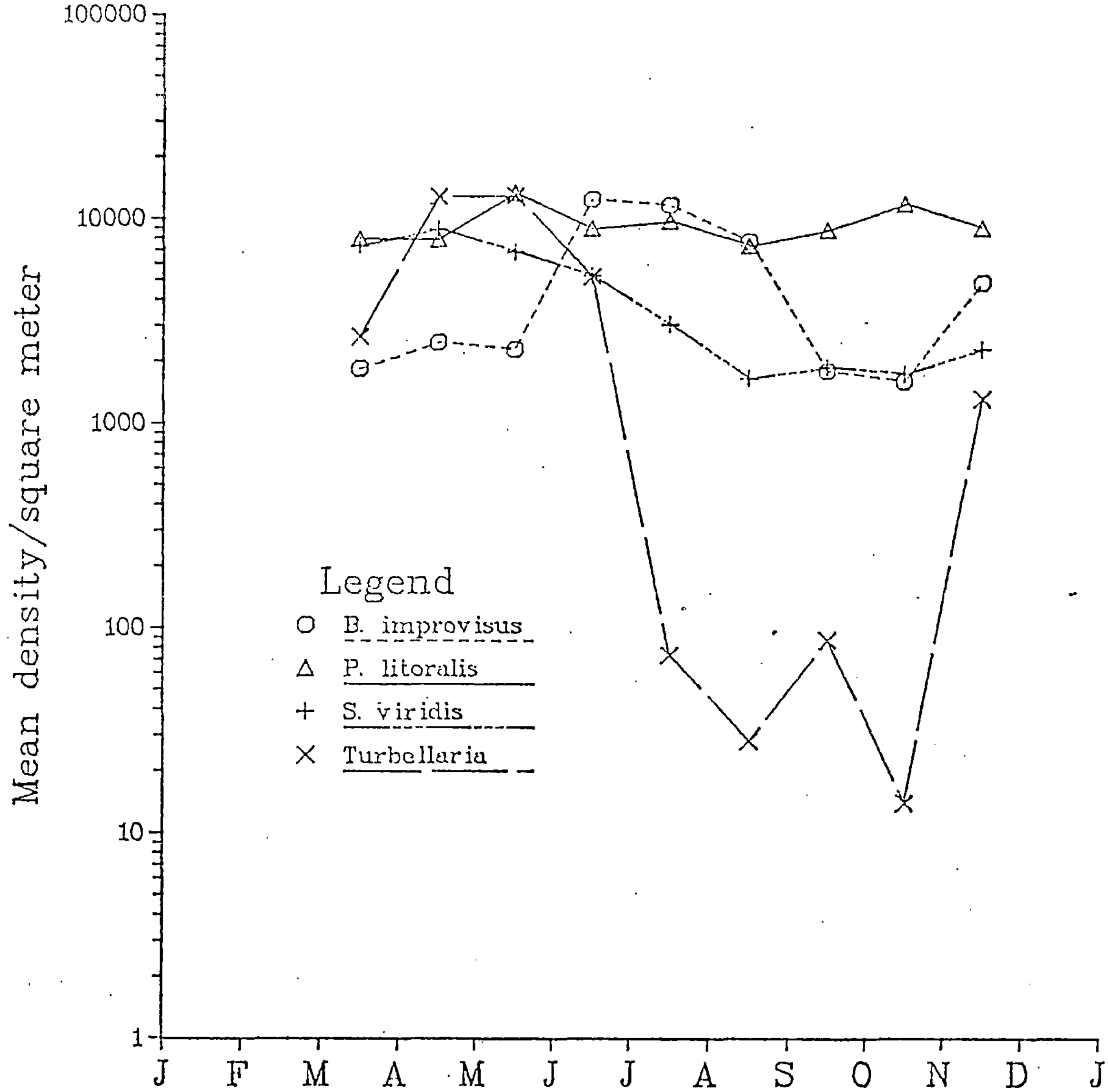
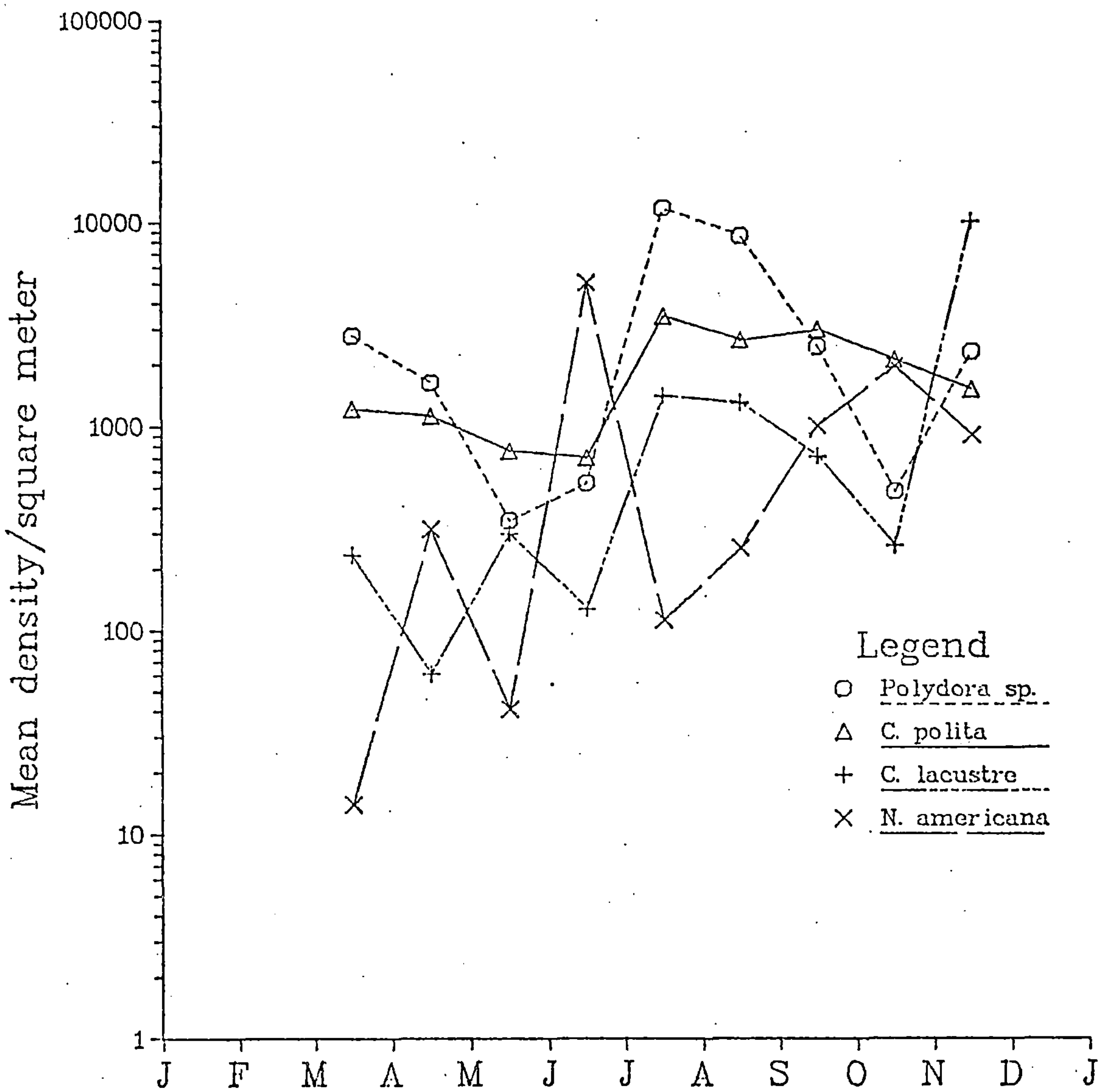


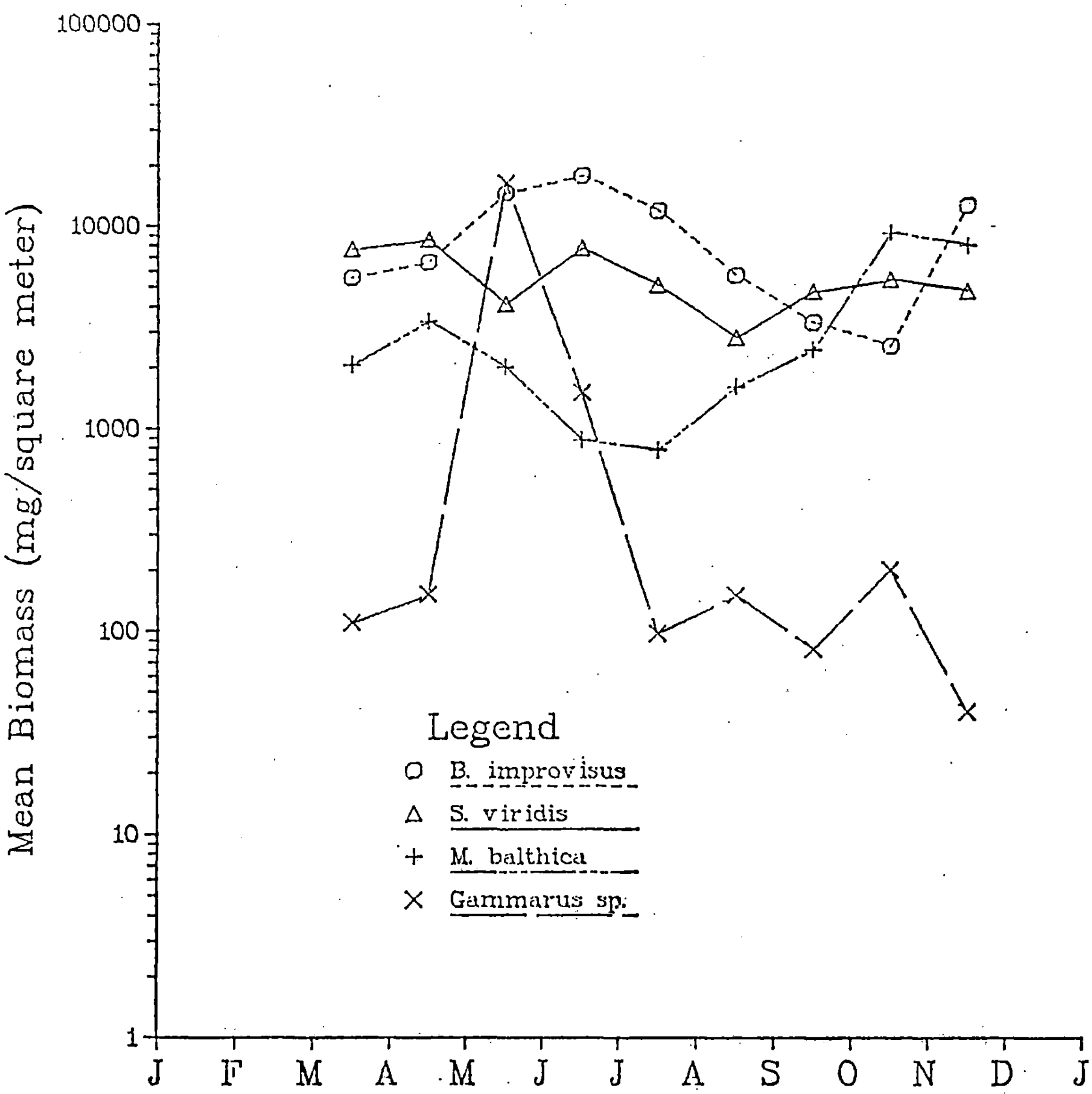

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Benthos sampling stations - 1978 |
|---|---|
| | Figure 3.1.4-1 |



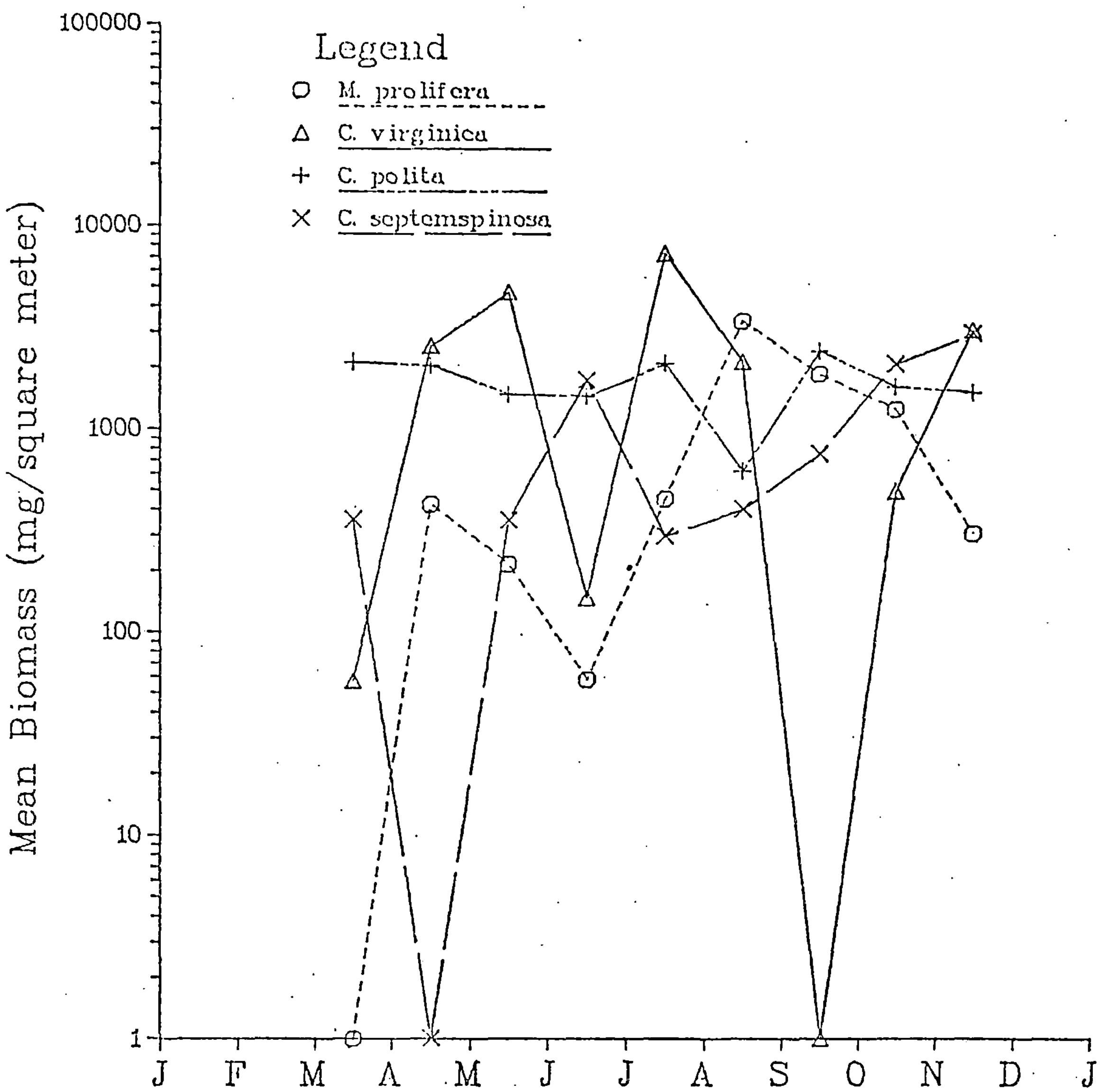

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Monthly mean density of the top ranking benthic taxa - 1978 |
|---|---|
| | Figure 3.1.4-2 |



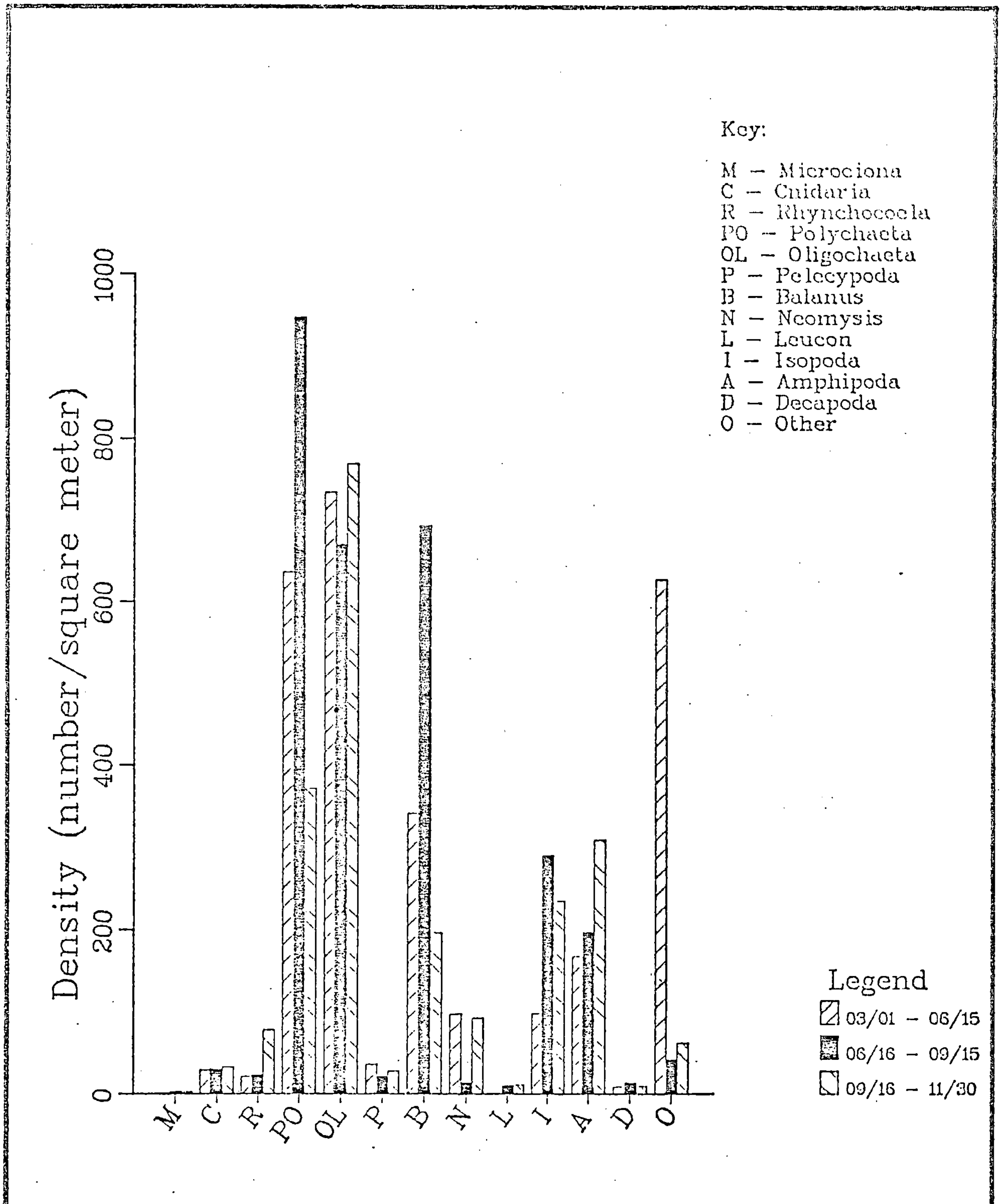

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Monthly mean density of the top ranking benthic taxa - 1978 |
|---|---|
| | Figure 3.1.4-3 |



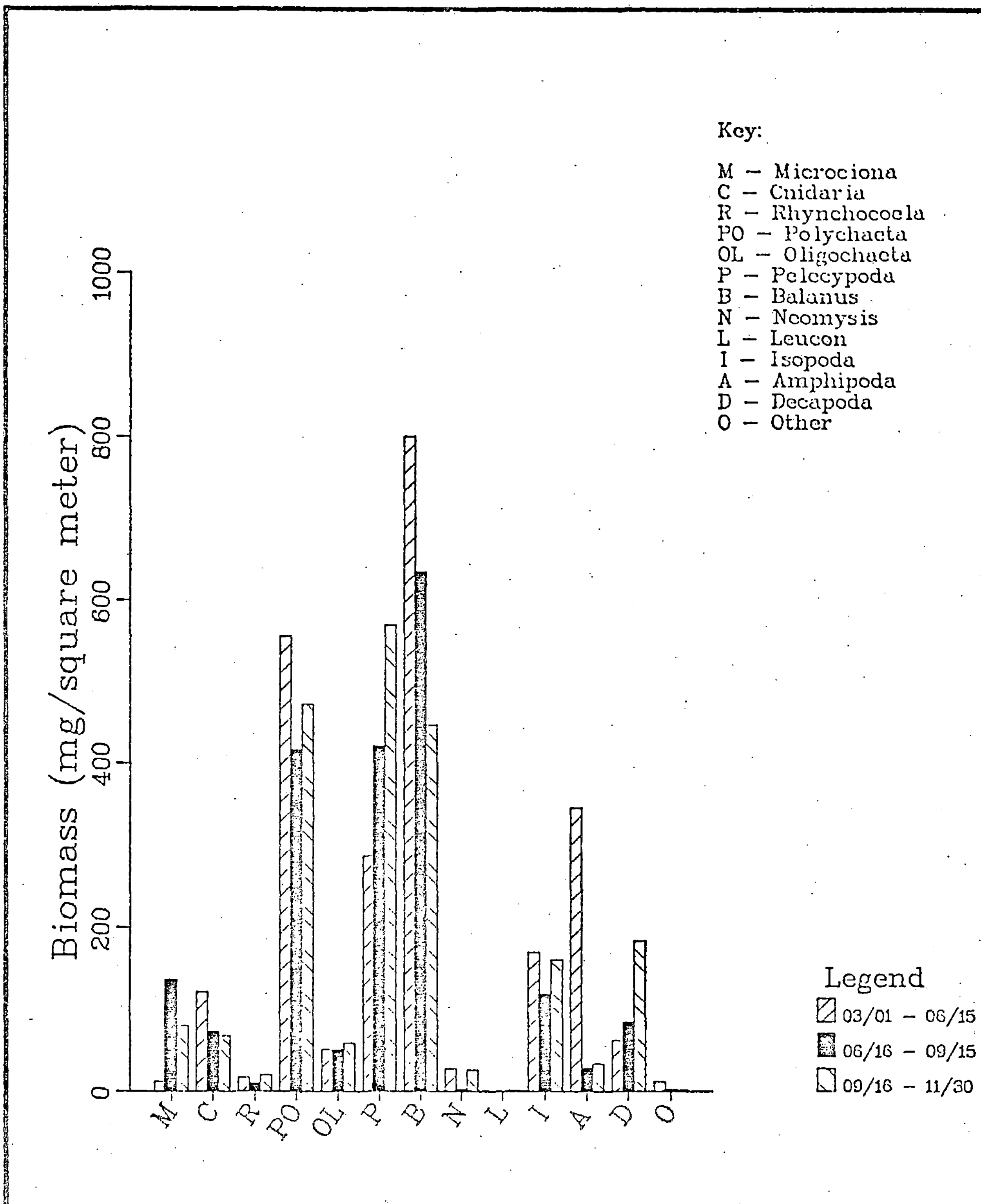

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Monthly mean biomass of the top ranking benthic taxa - 1978 |
| --- | --- |
| | Figure 3.1.4-4 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Monthly mean biomass of the top ranking benthic taxa - 1978 |
|---|---|
| | Figure 3.1.4-5 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean density of benthos<br>1978 |
|---|---|
| | Figure 3.1.4-6 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean biomass of benthos<br>1978 |
| --- | --- |
| | Figure 3.1.4-7 |

## 3.1.5 Blue Crab (ETS Section 3.1.2.1.1f)

The blue crab, Callinectes sapidus, is the most commercially valued aquatic organism in the Delaware estuary; it also supports an active sport fishery. This report discusses economics, abundance, distribution, and life stage of blue crab in the 1978 commercial pot fishery and in trawl and seine samples. The pot fishery generally captures crab larger than 76 mm (carapace width), while trawls and seines, which sample all sizes, are more effective in taking small crab.

### 3.1.5.1 Summary

The blue crab was abundant and well distributed throughout the study area in all but winter months. Crab utilized the area for growth, mating, and nursery; spawning occurs farther south near the mouth of Delaware Bay.

Data on commercial aspects of the fishery were obtained by census and interview of selected crabbers who operate in the study area. Biological data were obtained from commercial crab pot catches, and in trawl and seine samples.

In 1978, there were 36 licensed commercial crabbers (18 each in New Jersey and Delaware) who were known to operate in this area.

The 1978 hard crab catch in the study area for Delaware and New Jersey combined was conservatively estimated at 12,000 bushels; 1,500,000 individual crab, or 219,360 kg of whole crab. The New Jersey portion of this catch was 99 percent of the state's entire reported landings of hard blue crab. The Delaware portion comprised 72 percent of that state's landings.

The 1978 catch of peeler crab in the study area was estimated at 110,000 individuals. The New Jersey estimated portion comprised more than 100 percent of that state's entire reported landings, which indicates an underestimate by the state; the Delaware portion accounted for 66 percent of that state's entire catch.

Economically, the dockside value of the 12,000 bushels of hard crab was $192,000 ($16/bushel), and of the 110,000 individual peeler crab was $50,600 ($0.46/individual).

Mature male crab comprised 52.5 percent of the commercial catch in the study area.

Over 94 percent of the crab taken in seine and trawl samples occurred from May through November. In daylight trawl samples, crab were more abundant in the southern portion of the study area. Typically, more crab were taken at night than during daylight.

Peaks in trawl and seine catch were in June and October. Crab taken in June were generally older than one year; the October crab catch was mostly individuals spawned in 1978. The decrease in catch of older, marketable adults after June reflected their removal from the population by commercial crabbers.

The mean size-class distribution of crab in trawl and seine samples reflected growth from January through August; its subsequent decrease reflected recruitment into the sample of the 1978 year-class.

Numerous observations of crab matings were noted throughout the southern study area, while sporadic sightings of egg-bearing female crab were only reported from the extreme southern reaches.

### 3.1.5.2 Materials and Methods

#### COMMERCIAL CATCH

All samples required by this ETS section were taken. Commercial catch data were obtained by census, interview, and accompanying crabbers who usually operate in the study area from May through October. The commercial season legally extends from March through November. A sub-sample of crabbers known to operate in the study area were censused by means of monthly questionnaires which ask for daily catch statistics. For a detailed description of catch landing estimation and catch sub-sampling and sample processing procedures see Volume 2 of the 1977 Annual Environmental Operating Report. Briefly, licensed crabbers fish baited pots and sort their catch into two groups: hard crab and peeler crab. The hard crabs are further sorted into categories of graded value (based on size, sex, condition, and market demands).

The categories may vary, but are generally No. 1 (large mature male), No. 2 (small mature male), and No. 3 (mature female). Hard crab which are damaged or less than 5 inches (127 mm) in width, and peeler crab of less than 3 inches (76 mm) must, by law, be released.

TRAWL AND SEINE SAMPLE

All samples required by this ETS were taken. Samples were taken in all months except January and February when severe icing conditions precluded operations. For details of trawl and seine sampling procedures see Volume 2 of the 1977 Annual Environmental Operating Report.

Briefly, otter trawls were hauled on the bottom in river and creek trawl zones and seines were hauled at river and creek seine stations on a semimonthly schedule (Figs. 3.1.5-1, 3.1.5-2, 3.1.5-3). The trawl and seine crab sample was processed in the same manner as the commercial catch.

DATA REDUCTION

Data are discussed on the basis of the following statistics: bu/pd = number of bushels (bu) of crab captured in a pot (p) during one day (d); n/pd = number of individual crab (n) captured in a crab pot (p) fished for one day (d); n/T = number of crab (n) taken per trawl haul (T); and n/Coll. = number of crab (n) per seine collection (Coll.).

3.1.5.3 Results

Following a second consecutive winter (1977-1978) of unusually low temperature, crab catch levels remained severely reduced in the study area as compared to catches prior to 1977. This continued reduction was reflected in the commercial and trawl and seine catch.

## COMMERCIAL CATCH

Of the 36 licensed commercial crabbers who operated in the study area for most of the 1978 season, 18 were based in New Jersey and docked primarily in upper Mad Horse Creek, at Hancocks Bridge on Alloway Creek, and at the mouth of Stow Creek. The remaining 18 were based in Delaware and docked primarily at Flemings Landing on the Smyrna River, Collins Beach on the Delaware River, and at Delaware City. Most were family operations, and 65 persons ranging in age from their midteens to late 50's were involved in crabbing. Data on the commercial crab pot catch was collected from June through November.

### Hard Crab

Data supplied by nine crabbers (five based in New Jersey, four in Delaware) for 1978 indicate that their combined total catch of hard crab was over 4,304 bushels (Table 3.1.5-1). Of these, 3,221 bushels were taken in New Jersey. Twenty-seven crabbers who did not participate in the program are estimated to have taken over 7,700 bushels. The total catch of hard crab from the study area in 1978 probably exceeded 12,000 bushels. The annual estimated hard crab catch in previous years ranged from 7,000 bushels in 1977 to 45,000 bushels in 1975.

The total take of hard crab from the study area in 1978 was approximately 1,500,000 individuals (based on mean number of 125 crab per bushel in 1971 and 1976). By weight, the catch in 12,000 bushels was about 219,360 kg (based on mean weight of 18.3 kg per bushel in 1978). These estimates are conservative. Catch by small scale operations, the frequent reporting of smaller than realized catch, raiding of pots, and illegal crabbing all account for an unknown component of the actual harvest.

The largest catch (unadjusted for effort) in New Jersey and Delaware waters combined was 2,091 bushels in July (Table 3.1.5-1). The August catch ranked second; September, third; October, fourth; followed by June and November.

Monthly catch data adjusted to a per unit effort basis (bu/pd) are presented in Table 3.1.5-2. Based on the combined effort in New Jersey and Delaware, the largest catch was in July (0.0612); the smallest was in June (0.0117). The New Jersey catch was largest in July (0.0736) and smallest in September (0.0366); the Delaware catch was largest in July (0.0457) and smallest in June (0.0117). The adjusted catch was higher in New Jersey in all months sampled. In 36 of 39 months sampled over the past seven years adjusted catch was higher in Delaware.

Data on the 1978 New Jersey commercial catch, most of which comes from the Delaware Estuary (including the study area), indicate that 71 crabbers licensed to fish 9,138 pots took some 7,080 bushels of hard crab (1978 pers. comm. with L. Albertson Huber, New Jersey Division of Fish, Game, and Shell Fisheries). Study program data indicate that the 18 crabbers operating near Artificial Island took 99 percent of this total.

Data on the 1978 Delaware commercial crab catch, most of which comes from the same area, indicate that 40 crabbers took a reported total of 6,948 bushels of hard crab (1978 pers. comm. with Richard W. Coles, Delaware State Department of Natural Resources and Environmental Control). Study program data indicate that the 18 crabbers who operated near Artificial Island took 72 percent of this reported total.

Peeler Crab

All nine crabbers who regularly completed questionnaires also submitted data on their catch of peeler crab (Table 3.1.5-3). These nine took 36,346 peeler crab (75 percent by the five New Jersey crabbers) from June through November 1978. The catch by 27 crabbers who did not participate in the program is estimated at 73,654 peeler crab (41,032 by 14 Delaware fishermen). The total peeler crab catch in the study area in 1978 is conservatively estimated at 110,000 individuals. Annual estimated peeler crab catch in the study area in previous years ranged from 39,700 individuals in 1973 to 233,870 individuals in 1976.

The largest monthly catch, based on combined data from nine crabbers in New Jersey and Delaware, was 22,326 crab in July (Table 3.1.5-3). The monthly n/pd of peeler crab was highest in July in New Jersey (0.8501) and Delaware (0.5154), and lowest in October (0.0112 and 0.0094, respectively) (Table 3.1.5-4).

On the average, New Jersey crabbers took more peeler crab than did Delaware crabbers. In each of the previous seven years, adjusted catch had been higher in Delaware.

Records on the New Jersey 1978 commercial catch from the Delaware Estuary indicate that 71 crabbers took a reported 56,000 peeler crab (1978 pers. comm. with L. Albertson Huber). Study program data indicate that the 18 New Jersey crabbers who operated near Artificial Island took 107 percent of this total.

Records on the 1978 Delaware commercial catch from the Delaware Estuary indicate that 40 crabbers took a reported 75,900 peeler crab (1978 pers. comm. with Richard W. Coles). Study program data indicate that the 18 Delaware crabbers operating near Artificial Island took 66 percent of this total.

## Economic Aspects

The wholesale price per bushel of hard crab in 1978 averaged $26 for No. 1, $16 for No. 2, and $11 for No. 3. A reasonable average price in 1978 was $16 per bushel. The 12,000 bushels taken from the study area in 1978 had an estimated dockside value of $192,000.

The peeler crab catch is usually sold to buyers at dockside who hold them until they molt and are soft. The price to crabbers averaged 46 cents per peeler crab. At this price, the 110,000 peeler crab taken by commercial crabbers in 1978 had an estimated value of $50,600.

A more lucrative but much smaller market for peeler crab is to local sport fishermen who consider them preferred bait for fishes such as weakfish. The retail price per dozen ranged from $8 to $12 and averaged $9.

## Composition of Catch by Sex, Size, and Stage of Development

A total of 1,352 blue crab taken in 149 individual crab pot samples was examined (Tables 3.1.5-5, 3.1.5-6). These were taken in zones SW1 through NW1, RI2, and SE1 through SE3 on seven dates from July 12 to October 20 (Fig. 3.1.5-1). Catch data adjusted for effort (individuals/pd) are presented in Table 3.1.5-5. Mean monthly catch was highest in July (17.0 crab/pot) and lowest in September (5.9). The mean catch per pot in 1978 was 9.1 crab. Prior to 1978, mean pot catch ranged from 5.5 crab in 1977 to 21.6 crab in 1976.

Data on catch composition (percent catch) are presented in Table 3.1.5-6. Mature male crab comprised 52.5 percent of the 1978 catch. Percent catch was highest in October (72.9) and lowest in September (32.1).

Immature male crab comprised the smallest percent of the annual catch (1.4). Percent catch was highest in October (2.6) and lowest in August and September (0.4).

Mature female crab comprised 32.2 percent of the annual catch. Percent catch was highest in September (61.0) and lowest in October (9.4).

Immature female crab comprised 13.9 percent of the annual catch. Percent catch was highest in July (17.2) and lowest in September (6.4).

Of 28 peeler crab (2.1 percent of the total catch) (Table 3.1.5-7) taken in 149 samples, 3.6 percent was mature male, 3.6 percent was immature male, and 92.8 percent was immature female.

Monthly mean width of crab, by sex and developmental stage, are presented in Tables 3.1.5-8 through 3.1.5-11 and summarized in Table 3.1.5-12. The mean size of mature male crab was 127.4 mm in July; it increased to 150.3 mm in September (Table 3.1.5-8). At the end of monitoring in October mean size had decreased to 141.2 mm.

The monthly mean size of immature male ranged from 103.2 mm in July to 110 mm (1 specimen) in August (Table 3.1.5-9).

The mean size of mature female ranged from 152.0 mm in July to 167.5 mm in October (Table 3.1.5-10).

The monthly mean size of immature female ranged from 114.6 mm in September to 125.2 mm in August (Table 3.1.5-11).

## TRAWL AND SEINE SAMPLE

### Trawl Catch

A total of 873 crab was taken in 863 bottom trawl collections in the Delaware Estuary. Over 94 percent (828) was captured from May through November in 662 collections. Of the total, 822 were taken in 849 collections during daylight and 51 were taken in 14 collections at night.

During daylight 775 were taken in 762 collections in the west sector (which includes zones NW2-SW1), and the east sector (which includes zones NE2-SE0, RI1, and RI2) combined, and 47 were taken in 87 collections in the shipping channel. An additional 10 crab were taken in 111 collections in the local tidal creeks (Fig. 3.1.5-2). The mean catch per trawl in the Delaware Estuary in 1978 was 1.0 crab; it had ranged from 0.6 in 1977 to 5.0 in 1975.

In combined river trawl samples during daylight in the west sector, 286 crab were taken in 260 collections (Table 3.1.5-13). In the east sector, 489 crab were taken in 502 collections (Table 3.1.5-14).

No crab were taken in March and only one crab was taken in April (zone SE1). From May through August crab remained sparsely distributed (n/T range over the period; 0.2-0.8, west sector; 0.1-0.5, east sector) (Figure 3.1.5-4).

Catch increased markedly in September (1.7, west sector; 1.5 east sector), and peaked in October (4.2, west sector; 4.3, east sector). Catch decreased in November (2.3, west sector; 1.6, east sector) and December (0.6, west sector; 1.0, east sector).

In west and east sectors, annual catch per zone increased from north to south (Fig. 3.1.5-5). Within the west sector, annual catch was greater in zones SW1 through W3 (n/T range: 0.9-1.8) than in zones NW1 and NW2 (n/T range: 0.2-0.4). Within the east sector, annual catch was greater in zones SE0 through SSC (n/T range: 1.1-2.7) than in zones E2 through NE2 (n/T range: 0.2-0.6).

The annual n/T was similar in the west sector (1.1 crab) and in the east sector (1.0).

A total of 47 crab was taken in 87 hauls (n/T = 0.5) made in the shipping channel from March through December (Table 3.1.5-15).

In night samples from March through October in Zone W3, 3 crab (n/T = 0.4) were taken in 7 hauls (Table 3.1.5-16); in Zone SSC 48 crab (n/T = 6.9) were taken in 7 hauls (Table 3.1.5-17). The greatest catch occurred in Zone SSC in September (n/T = 18.0). More crab were taken at night (n/T = 3.6) than during daylight (1.0).

Seven crab (n/T = 0.2) were taken in Appoquinimink Creek and three (0.1) were taken in Alloway Creek from March through December. No crab were taken in 28 collections in Hope Creek. All crab taken in Appoquinimink Creek occurred in

October (n/T = 1.2), while crab occurred in Alloway Creek in July (n/T = 0.3), September (0.3), and October (0.2).

## Seine Catch

A 68.6 m, 1.3 cm mesh bag seine was fished during daylight and at night semimonthly from March through October at Augustine Beach and at Sunken Ship Cove (stations AUB3 and SSC6, Fig. 3.1.5-1). During daylight, crab were taken in June and August through October samples (Tables 3.1.5-18, 3.1.5-19). At night crab were taken in May, June, and August through October (Table 3.1.5-20, 3.1.5-21). During daylight, 27 crab were taken in 7 collections at Station AUB3, and 25 crab were taken in 7 collections at Station SSC6. At night, 115 crab were taken in 7 collections at Station AUB3, and 54 crab were taken in 7 collections at Station SSC6. Annual mean catch for combined stations at night (n/Coll. = 12.1) was greater than during daylight (3.7).

Ten seine stations on the Delaware Estuary were sampled semimonthly during daylight from March through December with 3.0 m, 0.3 cm mesh and 7.6 m, 0.6 cm mesh seines (stations PHD1-MHC8, Fig. 3.1.5-1). A total of 74 crab were taken in 170 collections all of which occurred from May through November (Table 3.1.5-22). Annual mean catch per station was highest (1.4 specimens) at Station AUB3. Highest monthly mean catch was in September (2.4 specimens).

From March through December, 4 crab were taken in 42 collections (n/Coll. = 0.1) in Appoquinimink Creek and 5 crab were taken in 37 collections (0.1) in Alloway Creek (Fig. 3.1.5-3). Monthly mean catch per sample was highest in September in both Appoquinimink (n/Coll. = 1.0) and Alloway creeks (1.7).

## Size-Class Distribution

Size-class distribution of crab taken in trawl and seine catches from April through December is given in Tables 3.1.5-23 through 3.1.5-32.

Monthly mean width of crab taken in the river by trawl during daylight increased from 48 mm (1 specimen) in April to 128.3 mm in July (west sector) and 139.0 mm in August (east sector) (Tables 3.1.5-23, 3.1.5-24; Fig. 3.1.5-6). The appearance in the population of smaller individuals of the 1978 year-class in July and August contributed, along with removal of larger specimens by crabbers, to a decrease in monthly mean width in August (108.5 mm, west sector) and September (75.9 mm, east sector) and subsequent months. The mean width of crab decreased steadily through December (36.0 mm, west sector; 35.9 mm, east sector). Mean size of crab taken in combined west and east sectors in 1978 was 59.0 mm. It had ranged from 49.6 mm in 1973 to 87.6 mm in 1971.

Crab taken in the shipping channel during daylight were largest (130.5 mm) in July (Table 3.1.5-25). Crab taken at night were largest in August (one 160 mm specimen, W3) and June (94.7 mm, SSC) (Tables 3.1.5-26, 3.1.5-27).

Specimen size in creek trawls (70.7 mm, Appoquinimink; 57.7 mm, Alloway) was similar to that in river trawls.

Crab taken by 68.6 m seine during daylight were largest in June at AUB3 (76.0 mm) and August at SSC6 (124.5 mm) (Tables 3.1.5-28, 3.1.5-29). At night, maximum size occurred in June at AUB3 (95.5 mm) and in September at SSC6 (39.5 mm) (Tables 3.1.5-30, 3.1.5-31).

The mean width of crab taken by 3.0 m and 7.6 m seines in the river during daylight was greatest in July (59 mm, 1 specimen) (Table 3.1.5-32).

Mean width of crab taken by 3.0 m seine in Appoquinimink and Alloway creeks was greatest in August (31.0 mm) and September (36.6) respectively.

OBSERVATIONS ON MATING AND EGG-BEARING CRAB

During 1978 a total of 203 observations of mating was reported in July and August by four commercial crabbers who operate in the southern part of the study area. In 1978, two commercial crabbers reported 2 captures of egg-bearing female crab in August and September, in zones SE3 and SW1.

TABLE 3.1.5-1
BUSHELS OF MARKETABLE HARD BLUE CRAB,
CALLINECTES SAPIDUS, LANDED COMMERCIALLY IN 1978

| Crabber | June | July | Aug | Sept | Oct | Nov | Total per Crabber |
|---|---|---|---|---|---|---|---|
| | | | NEW JERSEY | | | | |
| A-1 | | 518 | 332 | 77 | | | 927 |
| B-2 | | 429 | 239 | 141 | 114 | | 923 |
| C | | 307 | 283 | 52 | * | | 642 |
| I-1 | | 372 | * | * | * | | 372 |
| J | | 120 | 86 | 80 | 71 | | 357 |
| Totals | | 1,746 | 940 | 350 | 185 | | 3,221 |
| | | | DELAWARE | | | | |
| J-3 | | 173 | 111 | | | | 284 |
| J-4 | 16 | 103 | 90 | 42 | | | 251 |
| K | | 27 | 123 | 33 | | | 183 |
| M-1 | | 42 | 110 | 110 | 101 | 2 | 365 |
| Totals | 16 | 345 | 434 | 185 | 101 | 2 | 1,083 |
| Totals for All Crabbers and Grand Total | 16 | 2,091 | 1,374 | 535 | 286 | 2 | 4,304 |

TABLE 3.1.5-2
MEAN NUMBER OF BUSHELS OF MARKETABLE HARD
BLUE CRAB, CALLINECTES SAPIDUS, LANDED COMMERCIALLY IN 1978

| Crabber | June | July | Aug | Sept | Oct | Nov | Weighted Total Mean per Crabber |
|---|---|---|---|---|---|---|---|
| | | | NEW JERSEY | | | | |
| A-1 | | 0.0834 | 0.0656 | 0.0407 | | | 0.0704 |
| B-2 | | 0.0909 | 0.0618 | 0.0386 | 0.0465 | | 0.0628 |
| C | | 0.0555 | 0.0425 | 0.0267 | * | | 0.0454 |
| I-1 | | 0.0897 | * | * | * | | 0.0897 |
| J | | 0.0487 | 0.0402 | 0.0405 | 0.0518 | | 0.0450 |
| Monthly Means | | 0.0736 | 0.0525 | 0.0366 | 0.0492 | | |
| | | | DELAWARE | | | | |
| J-3 | | 0.0573 | 0.0360 | | | | 0.0465 |
| J-4 | 0.0117 | 0.0481 | 0.0409 | 0.0284 | | | 0.0349 |
| K | | 0.0358 | 0.0461 | 0.0337 | | | 0.0416 |
| M-1 | | 0.0415 | 0.0275 | 0.0342 | 0.0353 | 0.0328 | 0.0327 |
| Monthly Means | 0.0117 | 0.0457 | 0.0376 | 0.0321 | 0.0353 | 0.0328 | |
| Monthly Means for All Crabbers | 0.0117 | 0.0612 | 0.0451 | 0.0347 | 0.0445 | 0.0328 | |

* Data not supplied

TABLE 3.1.5-3
NUMBER OF INDIVIDUAL MARKETABLE PEELER
BLUE CRAB, CALLINECTES SAPIDUS, LANDED COMMERCIALLY IN 1978

| Crabber | June | July | Aug | Sept | Oct | Nov | Total per Crabber |
|---|---|---|---|---|---|---|---|
| | | | NEW JERSEY | | | | |
| A-1 | | 9,820 | 4,785 | 125 | | | 14,430 |
| B-2 | | 2,068 | 1,387 | 140 | 55 | | 3,650 |
| C | | 2,044 | * | * | * | | 2,044 |
| I-1 | | 2,609 | * | * | * | | 2,609 |
| J | | 3,158 | 1,478 | 9 | 0 | | 4,645 |
| Totals | | 19,399 | 7,650 | 274 | 55 | | 27,378 |
| | | | DELAWARE | | | | |
| J-3 | | 881 | 1,616 | | | | 2,497 |
| J-4 | 689 | 779 | 182 | 4 | | | 1,654 |
| K | | 426 | 1,249 | 123 | | | 1,798 |
| M-1 | | 841 | 2,092 | 58 | 27 | 1 | 3,019 |
| Totals | 689 | 2,927 | 5,139 | 185 | 27 | 1 | 8,968 |
| Totals for All Crabbers and Grand Total | 689 | 22,326 | 12,789 | 459 | 82 | 1 | 36,346 |

TABLE 3.1.5-4
MEAN NUMBER OF INDIVIDUAL MARKETABLE PEELER
BLUE CRAB, CALLINECTES SAPIDUS, LANDED COMMERCIALLY IN 1978

| Crabber | June | July | Aug | Sept | Oct | Nov | Weighted Total Mean per Crabber |
|---|---|---|---|---|---|---|---|
| | | | NEW JERSEY | | | | |
| A-1 | | 1.5330 | 0.9457 | 0.0661 | | | 1.0965 |
| B-2 | | 0.4381 | 0.3584 | 0.0384 | 0.0224 | | 0.2447 |
| C | | 0.3698 | * | * | * | | 0.3698 |
| I-1 | | 0.6287 | * | * | * | | 0.6287 |
| J | | 1.2811 | 0.6907 | 0.0046 | 0 | | 0.5850 |
| Monthly Means | | 0.8501 | 0.6649 | 0.0364 | 0.0112 | | |
| | | | DELAWARE | | | | |
| J-3 | | 0.2917 | 0.5247 | | | | 0.4093 |
| J-4 | 0.5029 | 0.3640 | 0.0827 | 0.0027 | | | 0.2300 |
| K | | 0.5757 | 0.4678 | 0.1255 | | | 0.4096 |
| M-1 | | 0.8302 | 0.5233 | 0.0181 | 0.0094 | 0.0164 | 0.2711 |
| Monthly Means | 0.5029 | 0.5154 | 0.3996 | 0.0488 | 0.0094 | 0.0164 | |
| Monthly Means for All Crabbers | 0.5029 | 0.7014 | 0.5133 | 0.0426 | 0.0106 | 0.0164 | |

* Data not supplied

TABLE 3.1.5-5
MEAN NUMBER OF BLUE CRAB, *CALLINECTES SAPIDUS*, TAKEN
PER SAMPLED CRAB POT IN 1978. NUMBER OF POTS SAMPLED ARE IN PARENTHESES

| Zones | June | July | August | September | October | Mean |
|---|---|---|---|---|---|---|
| SE-3 | | 18.0 (20) | | 5.1 (23) | | 11.1 (43) |
| SE-2 | | | 8.5 (8) | | | 8.5 (8) |
| SE-1 | | | 5.2 (17) | | | 5.2 (17) |
| Mean (East Zone) | | 18.0 (20) | 6.28 (25) | 5.1 (23) | | 9.3 (68) |
| NW-1 | | | 6.6 (5) | | | 6.6 (5) |
| RI-2 | | | 8.3 (3) | | | 8.3 (3) |
| W-3 | | | 4.7 (3) | | | 4.7 (3) |
| W-2 | | | 4.3 (8) | | | 4.3 (8) |
| W-1 | | 18.0 (5) | 5.0 (4) | | | 12.2 (9) |
| SW-2 | | 8.1 (12) | | | | 8.1 (12) |
| SW-1 | | | | 6.9 (19) | 8.7 (22) | 7.9 (41) |
| Mean (West Zone) | | 15.8 (17) | 5.5 (23) | 6.9 (19) | 8.7 (22) | 8.9 (81) |
| Mean (Combined Zones) | | 17.0 (37) | 6.7 (48) | 5.9 (42) | 8.7 (22) | 9.1 (149) |

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TABLE 3.1.5-6
CATCH AND PERCENT OF BLUE CRAB, CALLINECTES SAPIDUS, IN CRAB POT SAMPLES
BY SEX AND DEVELOPMENTAL STAGE IN 1978

| Zone | Mature Male Catch | Mature Male % | Immature Male Catch | Immature Male % | Mature Female Catch | Mature Female % | Immature Female Catch | Immature Female % | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | | | July | | | | | |
| SE3 | 163 | 45.4 | 11 | 3.1 | 118 | 32.9 | 67 | 10.7 | 359 |
| W1 | 50 | 55.6 | 1 | 1.1 | 20 | 22.2 | 19 | 21.1 | 90 |
| SW2 | 104 | 58.1 | | | 53 | 29.6 | 22 | 12.3 | 179 |
| Total | 317 | 50.5 | 12 | 1.9 | 191 | 30.4 | 108 | 17.2 | 628 |
| | | | | August | | | | | |
| SE2 | 41 | 60.3 | 1 | 1.5 | 21 | 30.9 | 5 | 7.4 | 68 |
| SE1 | 68 | 76.4 | | | 13 | 14.6 | 8 | 9.0 | 89 |
| NW1 | 24 | 72.7 | | | 5 | 15.2 | 4 | 12.1 | 33 |
| RI2 | 15 | 60.0 | | | 9 | 36.0 | 1 | 4.0 | 25 |
| W3 | 8 | 57.1 | | | 4 | 28.6 | 2 | 14.3 | 14 |
| W2 | 12 | 35.3 | | | 15 | 44.1 | 7 | 20.6 | 34 |
| W1 | 5 | 25.0 | | | 7 | 35.0 | 8 | 40.0 | 20 |
| Total | 173 | 61.1 | 1 | 0.4 | 74 | 26.2 | 35 | 12.4 | 283 |
| | | | | September | | | | | |
| SE3 | 31 | 26.3 | 1 | 0.9 | 76 | 64.4 | 10 | 8.5 | 118 |
| SW1 | 49 | 37.4 | | | 76 | 58.0 | 6 | 4.6 | 131 |
| Total | 80 | 32.1 | 1 | 0.4 | 152 | 61.0 | 16 | 6.4 | 249 |
| | | | | October | | | | | |
| SW1 | 140 | 72.9 | 5 | 2.6 | 18 | 9.4 | 29 | 15.1 | 192 |
| Total | 140 | 72.9 | 5 | 2.6 | 18 | 9.4 | 29 | 15.1 | 192 |
| Grand Total | 710 | 52.5 | 19 | 1.4 | 435 | 32.2 | 188 | 13.9 | 1,352 |

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TABLE 3.1.5-7
NUMBER AND PERCENTAGE OF PEELER BLUE CRAB, CALLINECTES SAPIDUS, TAKEN BY CRAB POT IN 1978

| Zone | July n | July Percent | August n | August Percent | September n | September Percent | October n | October Percent | All months Combined n | All months Combined Percent |
|---|---|---|---|---|---|---|---|---|---|---|
| SE-3 | 19 | 5.0 | | | 0 | 0.0 | | | 19 | 4.0 |
| SE-2 | | | 1 | 1.5 | | | | | 1 | 1.5 |
| SE-1 | | | 1 | 1.1 | | | | | 1 | 1.1 |
| Total and Percentage | 19 | 5.0 | 2 | 1.3 | 0 | 0.0 | | | 21 | 3.3 |
| NW-1 | | | 1 | 3.0 | | | | | 1 | 3.0 |
| RI-2 | | | 0 | 0.0 | | | | | 0 | 0.0 |
| W-3 | | | 0 | 0.0 | | | | | 0 | 0.0 |
| W-2 | | | 1 | 2.9 | | | | | 1 | 2.9 |
| W-1 | 2 | 2.0 | 0 | 0.0 | | | | | 2 | 1.8 |
| SW-2 | 2 | 1.0 | | | | | | | 2 | 1.0 |
| SW-1 | | | | | 0 | 0.0 | 1 | 0.5 | 1 | 0.3 |
| Total and Percentage | 4 | 1.5 | 2 | 1.6 | 0 | 0.0 | 1 | 0.5 | 7 | 1.0 |
| Total and Percentage for All Zones Combined | 23 | 3.7 | 4 | 1.4 | 0 | 0.0 | 1 | 0.5 | 28 | 2.1 |

TABLE 3.1.5-8
MEAN CARAPACE WIDTH (in mm) OF MATURE MALE BLUE CRAB, CALLINECTES SAPIDUS, TAKEN BY CRAB POT IN 1978. NUMBER OF CRABS MEASURED, IN PARENTHESES

| Zone | July | August | September | October | Mean of Means |
|---|---|---|---|---|---|
| SE-3 | 124.7(163) | | 148.7(31) | | 136.7(194) |
| SE-2 | | 143.0(41) | | | 143.0(41) |
| SE-1 | | 142.7(68) | | | 142.7(68) |
| Mean of Means | 124.7(163) | 142.8(109) | 148.7(31) | | |
| NW-1 | | 137.3(24) | | | 137.3(24) |
| RI-2 | | 135.5(15) | | | 135.5(15) |
| W-3 | | 150.8(8) | | | 150.8(8) |
| W-2 | | 134.8(12) | | | 134.8(12) |
| W-1 | 128.7(50) | 128.8(5) | | | 128.8(55) |
| SW-2 | 128.8(104) | | | | 128.8(104) |
| SW-1 | | | 151.9(49) | 141.2(140) | 146.6(189) |
| Mean of Means | 128.8(154) | 137.4(64) | 151.9(49) | 141.2(140) | |
| Mean of Means (All Zones) | 127.4(317) | 139.0(173) | 150.3(80) | 141.2(140) | |

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TABLE 3.1.5-9
MEAN CARAPACE WIDTH (in mm) OF IMMATURE MALE BLUE CRAB, CALLINECTES SAPIDUS, TAKEN BY CRAB POT IN 1978. NUMBER OF CRABS MEASURED, IN PARENTHESES

| Zone | July | August | September | October | Mean of Means |
|---|---|---|---|---|---|
| SE-3 | 102.3(11) | | 105(1) | | 103.6(12) |
| SE-2 | | 110(1) | | | 110(1) |
| SE-1 | | | | | |
| Mean of Means | 102.3(11) | 110(1) | 110(1) | | |
| RI-2 | | | | | |
| W-3 | | | | | |
| W-2 | | | | | |
| W-1 | 104(1) | | | | 104(1) |
| SW-2 | | | | | |
| SW-1 | | | | 107.0(5) | 107.0(5) |
| Mean of Means | 104(1) | | | 107.0(5) | |
| Mean of Means (All Zones) | 103.2(12) | 110(1) | 105(1) | 107.0(5) | |

TABLE 3.1.5-10
MEAN CARAPACE WIDTH (in mm) OF MATURE FEMALE BLUE CRAB, CALLINECTES SAPIDUS, TAKEN BY CRAB POT IN 1978. NUMBER OF CRABS MEASURED, IN PARENTHESES

| Zone | July | August | September | October | Mean of Means |
|---|---|---|---|---|---|
| SE-3 | 151.0(118) | | 161.5(76) | | 156.2(194) |
| SE-2 | | 164.8(21) | | | 164.8(21) |
| SE-1 | | 162.2(13) | | | 162.2(13) |
| Mean of Means | 151.0(118) | 163.5(34) | 161.5(76) | | |
| NW-1 | | 168.4(5) | | | 168.4(5) |
| RI-2 | | 172.3(9) | | | 172.3(9) |
| W-3 | | 158.5(4) | | | 158.5(4) |
| W-2 | | 170.9(15) | | | 170.9(15) |
| W-1 | 151.6(20) | 170.9(7) | | | 161.2(27) |
| SW-2 | 153.5(53) | | | | 153.5(53) |
| SW-1 | | | 168.5(76) | 167.5(18) | 168.0(94) |
| Mean of Means | 152.6(73) | 168.2(40) | 168.5(76) | 167.5(18) | |
| Mean of Means (All Zones) | 152.0(191) | 166.8(74) | 165.0(152) | 167.5(18) | |

TABLE 3.1.5-11
MEAN CARAPACE WIDTH (in mm) OF IMMATURE FEMALE BLUE CRAB, *CALLINECTES SAPIDUS*, TAKEN BY CRAB POT IN 1978. NUMBER OF CRABS MEASURED, IN PARENTHESES

| Zone | July | August | September | October | Mean of Means |
|---|---|---|---|---|---|
| SE-3 | 119.2(67) | | 107.3(10) | | 113.2(77) |
| SE-2 | | 125.0(5) | | | 125.0(5) |
| SE-1 | | 125.9(8) | | | 125.9(8) |
| Mean of Means | 119.2(67) | 125.4(13) | 107.3(10) | | |
| NW-1 | | 119.5(4) | | | 119.5(4) |
| RI-2 | | 117(1) | | | 117(1) |
| W-3 | | 134.5(2) | | | 134.5(2) |
| W-2 | | 122.9(7) | | | 122.9(7) |
| W-1 | 118.3(19) | 131.3(8) | | | 124.8(27) |
| SW-2 | 119.0(22) | | | | 119.0(22) |
| SW-1 | | | 122.0(6) | 124.1(29) | 123.0(35) |
| Mean of Means | 118.6(41) | 125.0(22) | 122.0(6) | 124.1(29) | |
| Mean of Means (All Zones) | 118.8(108) | 125.2(35) | 114.6(16) | 124.1(29) | |

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TABLE 3.1.5-12
SIZE-CLASS (carapace width in mm) DISTRIBUTION OF
BLUE CRAB, CALLINECTES SAPIDUS, TAKEN BY CRAB POT IN 1978

| Carapace Width (mm) | July | | | | August | | | | September | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mature Male | Immature Male | Mature Female | Immature Female | Mature Male | Immature Male | Mature Female | Immature Female | Mature Male | Immature Male | Mature Female | Immature Female |
| 70-74 | | | | | | | | | | | | 1 |
| 75-79 | | | | | | | | | | | | |
| 80-84 | | | | | | | | | | | | |
| 85-89 | | | | | | | | | | | | |
| 90-94 | | 1 | | (1) | | | | | | | | 1 |
| 95-99 | 1 | 2 | | 1 (1) | | | | | | | | |
| 100-104 | 8 | 3 (1) | | 4 (3) | 2 | | | | 1 | | | 1 |
| 105-109 | 20 | 5 | | 5 (5) | 2 | | | 1 | 3 | 1 | | 3 |
| 110-114 | 39 | | 1 | 14 (5) | 2 | 1 | | 2 | 2 | | 1 | 2 |
| 115-119 | 41 | | | 21 (5) | 8 | | | 6 (1) | 1 | | 1 | 3 |
| 120-124 | 41 | | 1 | 24 (1) | 17 | | | 3 (2) | 7 | | 1 | 1 |
| 125-129 | 34 | | 1 | 8 (1) | 11 | | | 8 | | | | 1 |
| 130-134 | 36 | | 4 | 6 | 19 | | | 6 | | | | 1 |
| 135-139 | 35 | | 11 | 3 | 24 | | | 4 | 8 | | 2 | 2 |
| 140-144 | 29 | | 21 | | 22 | | | 1 | 5 | | 1 | |
| 145-149 | 16 | | 30 | | 16 | | 5 | (1) | 7 | | 1 | |
| 150-154 | 8 | | 39 | | 18 | | 4 | | 4 | | 11 | |
| 155-159 | 6 | | 37 | | 12 | | 7 | | 5 | | 14 | |
| 160-164 | 3 | | 26 | | 13 | | 11 | | 6 | | 28 | |
| 165-169 | | | 14 | | 1 | | 15 | | 9 | | 24 | |
| 170-174 | | | 5 | | 6 | | 16 | | 7 | | 28 | |
| 175-179 | | | 1 | | | | 6 | | 8 | | 16 | |
| 180-184 | | | | | | | 8 | | 5 | | 18 | |
| 185-189 | | | | | | | 2 | | 1 | | 5 | |
| 190-194 | | | | | | | | | 1 | | 1 | |
| 195-199 | | | | | | | | | | | | |
| 200-204 | | | | | | | | | | | | |
| 205-209 | | | | | | | | | | | | |
| n | 317 | 11 (1) | 191 | 86 (22) | 173 | 1 | 74 | 31 (4) | 80 | 1 | 152 | 16 |
| $\bar{x}$ | 126.7 | 102.4 | 151.7 | 119.0 | 140.8 | 110 | 167.0 | 125.9 | 150.7 | 105 | 165.0 | 112.8 |

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TABLE 3.1.5-12
CONTINUED

| Carapace Width (mm) | October Mature Male | October Immature Male | October Mature Female | October Immature Female | Total Mature Male | Total Immature Male | Total Mature Female | Total Immature Female |
|---|---|---|---|---|---|---|---|---|
| 70-74 | | | | | | | | 1 |
| 75-79 | | | | | | | | |
| 80-84 | | | | | | | | |
| 85-89 | | (1) | | | | (1) | | |
| 90-94 | | | | | | 1 | | 1 (1) |
| 95-99 | | | | | 1 | 2 | | 1 (1) |
| 100-104 | | 1 | | | 11 | 4 (1) | | 5 (3) |
| 105-109 | 4 | | | 3 | 29 | 6 | | 12 (5) |
| 110-114 | 2 | 1 | | 3 | 45 | 2 | 2 | 21 (5) |
| 115-119 | 8 | 2 | | 5 | 58 | 2 | 1 | 35 (6) |
| 120-124 | 13 | | | 5 | 78 | | 2 | 33 (3) |
| 125-129 | 11 | | | 4 | 56 | | 1 | 21 (1) |
| 130-134 | 13 | | 1 | 3 | 68 | | 5 | 16 |
| 135-139 | 18 | | | 3 | 85 | | 13 | 12 |
| 140-144 | 17 | | | 2 | 73 | | 22 | 3 |
| 145-149 | 10 | | 1 | 1 | 49 | | 37 | 1 (1) |
| 150-154 | 13 | | | | 43 | | 54 | |
| 155-159 | 10 | | | | 33 | | 58 | |
| 160-164 | 6 | | 3 | | 28 | | 68 | |
| 165-169 | 4 | | 5 | | 14 | | 58 | |
| 170-174 | 5 | | 3 | | 18 | | 52 | |
| 175-179 | 2 | | 3 | | 10 | | 26 | |
| 180-184 | 3 | | 2 | | 8 | | 28 | |
| 185-189 | | | | | 1 | | 7 | |
| 190-194 | 1 | | | | 2 | | 1 | |
| 195-199 | | | | | | | | |
| 200-204 | | | | | | | | |
| 205-209 | | | | | | | | |
| n | 140 | 4 (1) | 18 | 29 | 710 | 17 (2) | 435 | 162 (26) |
| $\bar{x}$ | 141.2 | 107.0 | 167.5 | 124.1 | 135.7 | 104.3 | 159.6 | 120.8 |

TABLE 3.1.5-13
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 4.9 METER TRAWL IN WEST RIVER ZONES, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T |
| NW2 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.3 | 4.0 | 0.3 | 4.0 |
| NW1 | - | - | - | - | 0.0 | 2.0 | 0.0 | 5.0 | 0.0 | 4.0 | 0.0 | 6.0 | 0.5 | 4.0 |
| W-3 | - | - | - | - | 0.0 | 3.0 | 0.0 | 5.0 | 0.0 | 5.0 | 0.8 | 6.0 | 0.3 | 4.0 |
| W-2 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.3 | 4.0 | 0.5 | 4.0 | 0.0 | 4.0 |
| W-1 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.3 | 4.0 | 0.3 | 4.0 |
| SW2 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.5 | 6.0 | 1.8 | 5.0 | 1.0 | 4.0 |
| SW1 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.3 | 4.0 | 1.8 | 4.0 | 0.0 | 4.0 |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 5.0 | | 25.0 | | 9.0 | |
| NO. COLL. | | - | | - | | 15.0 | | 30.0 | | 31.0 | | 33.0 | | 28.0 |
| N/T | - | | - | | 0.0 | | 0.0 | | 0.2 | | 0.8 | | 0.3 | |

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | CATCH / UNIT EFFORT | NO. COLL. | CRAB TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | | | |
| NW2 | 0.5 | 2.0 | 0.5 | 2.0 | 2.5 | 4.0 | 0.0 | 4.0 | 0.0 | 2.0 | 0.4 | 32.0 | 14.0 |
| NW1 | 0.0 | 4.0 | 0.0 | 2.0 | 1.3 | 4.0 | 0.3 | 4.0 | 0.0 | 2.0 | 0.2 | 37.0 | 8.0 |
| W-3 | 0.0 | 5.0 | 0.4 | 5.0 | 5.0 | 5.0 | 1.3 | 4.0 | 0.0 | 2.0 | 0.9 | 44.0 | 38.0 |
| W-2 | 0.5 | 4.0 | 1.3 | 4.0 | 5.0 | 4.0 | 8.0 | 4.0 | 2.0 | 2.0 | 1.8 | 36.0 | 66.0 |
| W-1 | 0.5 | 4.0 | 1.3 | 4.0 | 3.5 | 4.0 | 2.8 | 4.0 | 0.0 | 2.0 | 0.9 | 36.0 | 34.0 |
| SW2 | 0.3 | 4.0 | 6.0 | 4.0 | 4.5 | 4.0 | 0.0 | 4.0 | 0.5 | 2.0 | 1.5 | 39.0 | 60.0 |
| SW1 | 1.0 | 4.0 | 1.3 | 4.0 | 7.8 | 4.0 | 3.5 | 4.0 | 2.0 | 2.0 | 1.8 | 36.0 | 66.0 |
| CRAB TOTALS | 10.0 | | 42.0 | | 123.0 | | 63.0 | | 9.0 | | | | 286.0 |
| NO. COLL. | | 27.0 | | 25.0 | | 29.0 | | 28.0 | | 14.0 | | 260.0 | |
| N/T | 0.4 | | 1.7 | | 4.2 | | 2.3 | | 0.6 | | 1.1 | | |

N/T = NUMBER PER 10 MINUTE COLLECTION.

IA SALEM CR 1978

TABLE 3.1.5-14
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 4.9 METER TRAWL IN EAST AND REEDY ISLAND ZONES, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T |
| NE2 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.3 | 4.0 | 0.0 | 2.0 |
| NE1 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.0 | 4.0 |
| E-6 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.0 | 4.0 |
| E-5 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.3 | 4.0 | 0.5 | 4.0 |
| E-4 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.3 | 4.0 | 0.0 | 4.0 | 0.3 | 4.0 |
| RI2 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.3 | 6.0 | 0.8 | 4.0 |
| RI1 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.0 | 5.0 | 0.5 | 4.0 |
| E-3 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.5 | 4.0 |
| E-2 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.3 | 4.0 | 0.0 | 4.0 | 0.5 | 4.0 |
| SSC | - | - | - | - | 0.0 | 2.0 | 0.0 | 3.0 | 0.3 | 3.0 | 2.3 | 3.0 | 1.0 | 2.0 |
| E-1 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.5 | 4.0 | 0.3 | 4.0 | 0.5 | 4.0 |
| SE3 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.0 | 4.0 |
| SE2 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.0 | 4.0 | 0.8 | 4.0 | 0.8 | 4.0 |
| SE1 | - | - | - | - | 0.0 | 2.0 | 0.3 | 4.0 | 0.0 | 4.0 | 0.5 | 4.0 | 2.0 | 4.0 |
| SE0 | - | - | - | - | 0.0 | 2.0 | 0.0 | 4.0 | 0.3 | 4.0 | 0.8 | 4.0 | 0.5 | 4.0 |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 1.0 | | 6.0 | | 20.0 | | 29.0 | |
| NO. COLL. | | - | | - | | 30.0 | | 59.0 | | 59.0 | | 62.0 | | 56.0 |
| N/T | - | | - | | 0.0 | | 0.0 | | 0.1 | | 0.3 | | 0.5 | |

N/T = NUMBER PER 10 MINUTE COLLECTION.

IA SALEM CR 1978

TABLE 3.1.5-14
CONTINUED

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | CATCH / UNIT EFFORT | NO. COLL. | CRAB TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | | | |
| NE2 | 0.0 | 2.0 | 0.0 | 2.0 | 2.5 | 2.0 | 0.0 | 4.0 | 0.0 | 2.0 | 0.2 | 28.0 | 6.0 |
| NE1 | 0.5 | 2.0 | 0.5 | 2.0 | 2.5 | 4.0 | 0.5 | 4.0 | 0.5 | 2.0 | 0.5 | 32.0 | 15.0 |
| E-6 | 0.0 | 4.0 | 0.0 | 4.0 | 3.8 | 4.0 | 0.0 | 4.0 | 0.0 | 2.0 | 0.4 | 36.0 | 15.0 |
| E-5 | 0.3 | 4.0 | 0.3 | 4.0 | 0.5 | 4.0 | 0.5 | 4.0 | 1.5 | 2.0 | 0.3 | 36.0 | 12.0 |
| E-4 | 0.0 | 4.0 | 0.3 | 4.0 | 0.8 | 4.0 | 0.0 | 4.0 | 0.5 | 2.0 | 0.2 | 36.0 | 7.0 |
| RI2 | 0.0 | 2.0 | 1.5 | 2.0 | 4.5 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.6 | 30.0 | 17.0 |
| RI1 | 0.0 | 2.0 | 0.5 | 2.0 | 3.0 | 2.0 | 0.0 | 2.0 | 0.5 | 2.0 | 0.3 | 29.0 | 10.0 |
| E-3 | 0.3 | 4.0 | 0.0 | 4.0 | 2.0 | 4.0 | 0.8 | 4.0 | 0.0 | 2.0 | 0.4 | 36.0 | 14.0 |
| E-2 | 0.3 | 4.0 | 1.0 | 4.0 | 2.3 | 4.0 | 0.0 | 4.0 | 0.0 | 2.0 | 0.5 | 36.0 | 17.0 |
| SSC | 0.5 | 2.0 | 4.0 | 2.0 | 7.0 | 3.0 | 1.0 | 2.0 | 0.0 | 1.0 | 1.8 | 23.0 | 42.0 |
| E-1 | 0.5 | 4.0 | 2.0 | 4.0 | 5.3 | 4.0 | 1.0 | 4.0 | 0.0 | 2.0 | 1.1 | 36.0 | 40.0 |
| SE3 | 0.0 | 4.0 | 5.5 | 4.0 | 5.3 | 4.0 | 1.8 | 4.0 | 0.5 | 2.0 | 1.4 | 36.0 | 51.0 |
| SE2 | 0.5 | 4.0 | 0.5 | 4.0 | 9.0 | 4.0 | 4.3 | 4.0 | 0.5 | 2.0 | 1.8 | 36.0 | 64.0 |
| SE1 | 0.3 | 4.0 | 2.3 | 4.0 | 2.8 | 4.0 | 11.5 | 4.0 | 2.5 | 2.0 | 2.3 | 36.0 | 83.0 |
| SE0 | 0.8 | 4.0 | 3.5 | 4.0 | 13.0 | 4.0 | 1.0 | 4.0 | 8.5 | 2.0 | 2.7 | 36.0 | 96.0 |
| CRAB TOTALS | 13.0 | | 74.0 | | 229.0 | | 87.0 | | 30.0 | | | | 489.0 |
| NO. COLL. | | 50.0 | | 50.0 | | 53.0 | | 54.0 | | 29.0 | | 502.0 | |
| N/T | 0.3 | | 1.5 | | 4.3 | | 1.6 | | 1.0 | | 1.0 | | |

N/T = NUMBER PER 10 MINUTE COLLECTION.

IA SALEM CR 1978

TABLE 3.1.5-15
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 4.9 METER TRAWL IN CHANNEL ZONES, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | T | N | T | N | T | N | T | N | T | N | T | N | T |
| CHA1 | - | - | - | - | 0 | 1.0 | 0 | 2.0 | 0 | 1.0 | 0 | 2.0 | 4 | 2.0 |
| CHA2 | - | - | - | - | 0 | 1.0 | 0 | 2.0 | 0 | 2.0 | 0 | 2.0 | 0 | 2.0 |
| CHA3 | - | - | - | - | 0 | 1.0 | 0 | 2.0 | 0 | 2.0 | 0 | 2.0 | 2 | 2.0 |
| CHA4 | - | - | - | - | 0 | 1.0 | 0 | 2.0 | 0 | 2.0 | 0 | 2.0 | 5 | 2.0 |
| CHA5 | - | - | - | - | 0 | 1.0 | 0 | 2.0 | 0 | 2.0 | 0 | 2.0 | 0 | 2.0 |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 11.0 | |
| NO. COLL. | | - | | - | | 5.0 | | 10.0 | | 9.0 | | 10.0 | | 10.0 |
| N/T | - | | - | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 1.1 | |

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | CATCH / UNIT EFFORT | NO. COLL. | CRAB TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | T | N | T | N | T | N | T | N | T | | | |
| CHA1 | 0 | 2.0 | 11 | 2.0 | 1 | 2.0 | 2 | 2.0 | 4 | 1.0 | 1.3 | 17.0 | 22.0 |
| CHA2 | 0 | 2.0 | 6 | 2.0 | 4 | 2.0 | 0 | 2.0 | 0 | 1.0 | 0.6 | 18.0 | 10.0 |
| CHA3 | 0 | 2.0 | 1 | 2.0 | 2 | 2.0 | 1 | 2.0 | 0 | 1.0 | 0.3 | 18.0 | 6.0 |
| CHA4 | 0 | 2.0 | 1 | 1.0 | 2 | 2.0 | 0 | 2.0 | 0 | 1.0 | 0.5 | 17.0 | 8.0 |
| CHA5 | 0 | 2.0 | 0 | 1.0 | 0 | 2.0 | 0 | 2.0 | 1 | 1.0 | 0.1 | 17.0 | 1.0 |
| CRAB TOTALS | 0.0 | | 19.0 | | 9.0 | | 3.0 | | 5.0 | | | | 47.0 |
| NO. COLL. | | 10.0 | | 8.0 | | 10.0 | | 10.0 | | 5.0 | | 87.0 | |
| N/T | 0.0 | | 2.4 | | 0.9 | | 0.3 | | 1.0 | | 0.5 | | |

N/T = NUMBER PER 20 MINUTE COLLECTION.

IA SALEM CR 1978

TABLE 3.1.5-16
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN AT NIGHT
BY 4.9 METER TRAWL IN ZONE W-3, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T |
| W-3 | - | - | - | - | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 1.0 | - | - |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 1.0 | | 0.0 | |
| NO. COLL. | | - | | - | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | - |
| N/T | - | | - | | 0.0 | | 0.0 | | 0.0 | | 1.0 | | - | |

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | CATCH / UNIT EFFORT | NO. COLL. | CRAB TOTALS |
| W-3 | 1.0 | 1.0 | 1.0 | 1.0 | 0.0 | 1.0 | - | - | - | - | 0.4 | 7.0 | 3.0 |
| CRAB TOTALS | 1.0 | | 1.0 | | 0.0 | | 0.0 | | 0.0 | | | | 3.0 |
| NO. COLL. | | 1.0 | | 1.0 | | 1.0 | | | | | | 7.0 | |
| N/T | 1.0 | | 1.0 | | 0.0 | | - | | - | | 0.4 | | |

N/T = NUMBER PER 10 MINUTE COLLECTION.

TABLE 3.1.5-17
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN AT NIGHT
BY 4.9 METER TRAWL IN ZONE SSC, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T |
| SSC | - | - | - | - | 0.0 | 1.0 | 0.0 | 1.0 | 6.0 | 1.0 | 3.0 | 1.0 | - | - |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 6.0 | | 3.0 | | 0.0 | |
| NO. COLL. | | - | | - | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | - |
| N/T | - | | - | | 0.0 | | 0.0 | | 6.0 | | 3.0 | | - | |

N/T = NUMBER PER 10 MINUTE COLLECTION.

TABLE 3.1.5-17
CONTINUED

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/T | T | N/T | T | N/T | T | N/T | T | N/T | T | CATCH / UNIT EFFORT | NO. COLL. | CRAB TOTALS |
| SSC | 6.0 | 1.0 | 18.0 | 1.0 | 15.0 | 1.0 | - | - | - | - | 6.9 | 7.0 | 48.0 |
| CRAB TOTALS | 6.0 | | 18.0 | | 15.0 | | 0.0 | | 0.0 | | | | 48.0 |
| NO. COLL. | | 1.0 | | 1.0 | | 1.0 | | | | | | 7.0 | |
| N/T | 6.0 | | 18.0 | | 15.0 | | - | | - | | 6.9 | | |

N/T = NUMBER PER 10 MINUTE COLLECTION.

TABLE 3.1.5-18
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 68.6 METER SEINE AT AUGUSTINE BEACH, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL |
| AUB3 | - | - | - | - | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 8.0 | 1.0 | - | - |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 8.0 | | 0.0 | |
| NO. COLL. | | - | | - | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | - |
| N/COLL | - | | - | | 0.0 | | 0.0 | | 0.0 | | 8.0 | | - | |

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | CATCH / COLL-ECTION | NO. COLL. | CRAB TOTALS |
| AUB3 | 6.0 | 1.0 | 7.0 | 1.0 | 6.0 | 1.0 | - | - | - | - | 3.9 | 7.0 | 27.0 |
| CRAB TOTALS | 6.0 | | 7.0 | | 6.0 | | 0.0 | | 0.0 | | | | 27.0 |
| NO. COLL. | | 1.0 | | 1.0 | | 1.0 | | | | | | 7.0 | |
| N/COLL | 6.0 | | 7.0 | | 6.0 | | - | | - | | 3.9 | | |

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TABLE 3.1.5-19
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 68.6 METER SEINE AT SUNKEN SHIP COVE BEACH, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL |
| SSC6 | - | - | - | - | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | 0.0 | 1.0 | - | - |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 0.0 | |
| NO. COLL. | | - | | - | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | - |
| N/COLL | - | | - | | 0.0 | | 0.0 | | 0.0 | | 0.0 | | - | |

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | CATCH / COLL-ECTION | NO. COLL. | CRAB TOTALS |
| SSC6 | 2.0 | 1.0 | 23.0 | 1.0 | 0.0 | 1.0 | - | - | - | - | 3.6 | 7.0 | 25.0 |
| CRAB TOTALS | 2.0 | | 23.0 | | 0.0 | | 0.0 | | 0.0 | | | | 25.0 |
| NO. COLL. | | 1.0 | | 1.0 | | 1.0 | | | | | | 7.0 | |
| N/COLL | 2.0 | | 23.0 | | 0.0 | | - | | - | | 3.6 | | |

TABLE 3.1.5-20
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN AT NIGHT
BY 68.6 METER SEINE AT AUGUSTINE BEACH, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL |
| AUB3 | - | - | - | - | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 1.0 | 4.0 | 1.0 | - | - |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 1.0 | | 4.0 | | 0.0 | |
| NO. COLL. | | - | | - | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | - |
| N/COLL | - | | - | | 0.0 | | 0.0 | | 1.0 | | 4.0 | | - | |

TABLE 3.1.5-20
CONTINUED

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | CATCH / COLL- ECTION | NO. COLL. | CRAB TOTALS |
| AUB3 | 3.0 | 1.0 | 21.0 | 1.0 | 86.0 | 1.0 | - | - | - | - | 16.4 | 7.0 | 115.0 |
| CRAB TOTALS | 3.0 | | 21.0 | | 86.0 | | 0.0 | | 0.0 | | | | 115.0 |
| NO. COLL. | | 1.0 | | 1.0 | | 1.0 | | | | | | 7.0 | |
| N/COLL | 3.0 | | 21.0 | | 86.0 | | - | | - | | 16.4 | | |

TABLE 3.1.5-21
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN AT NIGHT
BY 68.6 METER SEINE AT SUNKEN SHIP COVE BEACH, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL |
| SSC6 | - | - | - | - | 0.0 | 1.0 | 0.0 | 1.0 | 1.0 | 1.0 | 0.0 | 1.0 | - | - |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 1.0 | | 0.0 | | 0.0 | |
| NO. COLL. | | - | | - | | 1.0 | | 1.0 | | 1.0 | | 1.0 | | - |
| N/COLL | - | | - | | 0.0 | | 0.0 | | 1.0 | | 0.0 | | - | |

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | CATCH / COLL- ECTION | NO. COLL. | CRAB TOTALS |
| SSC6 | 0.0 | 1.0 | 53.0 | 1.0 | 0.0 | 1.0 | - | - | - | - | 7.7 | 7.0 | 54.0 |
| CRAB TOTALS | 0.0 | | 53.0 | | 0.0 | | 0.0 | | 0.0 | | | | 54.0 |
| NO. COLL. | | 1.0 | | 1.0 | | 1.0 | | | | | | 7.0 | |
| N/COLL | 0.0 | | 53.0 | | 0.0 | | - | | - | | 7.7 | | |

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TABLE 3.1.5-22
MONTHLY MEAN NUMBER OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT BY 3.0 AND 7.6 METER SEINE AT RIVER SEINE STATIONS, 1978.

| LOCATION | JAN | | FEB | | MAR | | APR | | MAY | | JUN | | JUL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL |
| PHD1 | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 |
| SGB2 | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 |
| AUB3 | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 2.0 | 1.5 | 2.0 | 0.0 | 1.0 |
| ST3A | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.5 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 |
| RE14 | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 2.0 | 1.5 | 2.0 | 0.0 | 2.0 |
| ELP5 | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 |
| OB5A | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.5 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 |
| SSC6 | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 | 1.0 | 1.0 |
| HOP7 | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 |
| MHC8 | - | - | - | - | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 |
| CRAB TOTALS | 0.0 | | 0.0 | | 0.0 | | 0.0 | | 2.0 | | 6.0 | | 1.0 | |
| NO. COLL. | | - | | - | | 10.0 | | 20.0 | | 20.0 | | 20.0 | | 18.0 |
| N/COLL | - | | - | | 0.0 | | 0.0 | | 0.1 | | 0.3 | | 0.1 | |

| LOCATION | AUG | | SEP | | OCT | | NOV | | DEC | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | N/COLL | COLL | CATCH / COLL- ECTION | NO. COLL. | CRAB TOTALS |
| PHD1 | 0.0 | 2.0 | 0.5 | 2.0 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.1 | 17.0 | 1.0 |
| SGB2 | 0.5 | 2.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.1 | 17.0 | 1.0 |
| AUB3 | 0.5 | 2.0 | 5.0 | 2.0 | 0.0 | 2.0 | 5.0 | 2.0 | 0.0 | 1.0 | 1.4 | 17.0 | 24.0 |
| ST3A | 0.5 | 2.0 | 6.5 | 2.0 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.9 | 17.0 | 15.0 |
| RE14 | 0.5 | 2.0 | 8.5 | 2.0 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 1.0 | 1.2 | 17.0 | 21.0 |
| ELP5 | 0.0 | 2.0 | 0.5 | 2.0 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.1 | 17.0 | 1.0 |
| OB5A | 0.0 | 2.0 | 0.5 | 2.0 | 0.0 | 1.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.1 | 17.0 | 2.0 |
| SSC6 | 0.0 | 2.0 | 0.5 | 2.0 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.1 | 17.0 | 2.0 |
| HOP7 | 0.0 | 2.0 | 0.0 | 2.0 | 0.0 | 1.0 | 0.5 | 2.0 | 0.0 | 1.0 | 0.1 | 17.0 | 1.0 |
| MHC8 | 0.0 | 2.0 | 1.5 | 2.0 | 0.0 | 1.0 | 1.5 | 2.0 | 0.0 | 1.0 | 0.4 | 17.0 | 6.0 |
| CRAB TOTALS | 4.0 | | 47.0 | | 0.0 | | 14.0 | | 0.0 | | | | 74.0 |
| NO. COLL. | | 20.0 | | 20.0 | | 12.0 | | 20.0 | | 10.0 | | 170.0 | |
| N/COLL | 0.2 | | 2.4 | | 0.0 | | 0.7 | | 0.0 | | 0.4 | | |

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TABLE 3.1.5-23
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 4.9 METER TRAWL IN WEST RIVER ZONES, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 4 | 3 | 2 | - |
| 016-020 | - | - | - | - | - | - | - | 2 | 5 | 2 | 3 | 1 |
| 021-025 | - | - | - | - | - | - | - | - | 7 | 16 | 21 | - |
| 026-030 | - | - | - | - | - | 1 | - | 1 | 1 | 19 | 8 | 2 |
| 031-035 | - | - | - | - | - | - | - | - | 3 | 14 | 6 | 1 |
| 036-040 | - | - | - | - | - | - | - | - | - | 9 | 4 | 1 |
| 041-045 | - | - | - | - | - | - | - | - | 1 | 5 | 3 | 3 |
| 046-050 | - | - | - | - | 1 | 1 | - | - | 1 | 2 | 2 | - |
| 051-055 | - | - | - | - | 1 | - | - | - | 1 | 5 | 2 | 1 |
| 056-060 | - | - | - | - | - | - | - | - | 1 | 4 | 2 | - |
| 061-065 | - | - | - | - | 1 | 1 | - | - | 3 | 7 | 2 | - |
| 066-070 | - | - | - | - | - | 1 | - | - | 2 | 9 | - | - |
| 071-075 | - | - | - | - | - | 1 | - | - | - | 9 | - | - |
| 076-080 | - | - | - | - | - | 2 | - | - | 1 | - | 1 | - |
| 081-085 | - | - | - | - | - | 1 | - | - | - | 5 | 1 | - |
| 086-090 | - | - | - | - | 1 | - | - | - | - | 1 | 2 | - |
| 091-095 | - | - | - | - | 1 | 3 | - | - | 1 | 4 | - | - |
| 096-100 | - | - | - | - | - | 2 | 1 | - | 1 | 1 | 1 | - |
| 101-105 | - | - | - | - | - | 5 | - | - | - | 3 | - | - |
| 106-110 | - | - | - | - | - | 1 | - | 1 | 2 | - | 1 | - |
| 111-115 | - | - | - | - | - | 1 | 1 | - | - | - | - | - |
| 116-120 | - | - | - | - | - | 2 | - | 1 | 1 | - | - | - |
| 121-125 | - | - | - | - | - | 2 | 2 | - | - | - | - | - |
| 126-130 | - | - | - | - | - | - | 1 | - | - | 1 | 1 | - |
| 131-135 | - | - | - | - | - | - | 1 | - | - | - | 1 | - |
| 136-140 | - | - | - | - | - | - | 1 | - | - | 1 | - | - |
| 141-145 | - | - | - | - | - | - | - | 1 | - | 1 | - | - |
| 146-150 | - | - | - | - | - | 1 | 2 | 1 | - | - | - | - |
| 151-155 | - | - | - | - | - | - | - | - | - | - | - | - |
| 156-160 | - | - | - | - | - | - | - | - | - | - | - | - |
| 161-165 | - | - | - | - | - | - | - | 1 | 1 | - | - | - |
| 166-170 | - | - | - | - | - | - | - | 1 | - | - | - | - |
| 171-175 | - | - | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 176-180 | - | - | - | - | - | - | - | - | - | - | - | - |
| 181-185 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| TOTAL MEAS. | - | - | - | - | 5 | 25 | 9 | 10 | 39 | 122 | 63 | 9 |
| TOTAL TAKEN | - | - | - | - | 5 | 25 | 9 | 10 | 42 | 123 | 63 | 9 |
| MEAN | - | - | - | - | 69.0 | 94.1 | 128.3 | 108.5 | 54.0 | 50.4 | 39.8 | 36.0 |

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TABLE 3.1.5-24
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 4.9 METER TRAWL IN EAST AND REEDY ISLAND ZONES, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | - | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 1 | 1 | 3 | 2 |
| 016-020 | - | - | - | - | 1 | - | - | - | 4 | 14 | 7 | 8 |
| 021-025 | - | - | - | - | - | - | - | - | 2 | 41 | 19 | 5 |
| 026-030 | - | - | - | - | 1 | - | - | - | 4 | 31 | 16 | 3 |
| 031-035 | - | - | - | - | - | 1 | - | - | 4 | 25 | 12 | 6 |
| 036-040 | - | - | - | - | - | - | - | - | 4 | 12 | 8 | - |
| 041-045 | - | - | - | - | 1 | 2 | - | - | 3 | 9 | 5 | 1 |
| 046-050 | - | - | - | 1 | - | - | - | - | 7 | 10 | 4 | - |
| 051-055 | - | - | - | - | 2 | 1 | - | - | 14 | 7 | 2 | - |
| 056-060 | - | - | - | - | - | - | - | - | 4 | 9 | 2 | 1 |
| 061-065 | - | - | - | - | - | 2 | - | - | 3 | 6 | - | 1 |
| 066-070 | - | - | - | - | - | 1 | - | - | - | 6 | - | - |
| 071-075 | - | - | - | - | - | 1 | - | - | 2 | 6 | 1 | 1 |
| 076-080 | - | - | - | - | - | 1 | 1 | - | - | 6 | 1 | - |
| 081-085 | - | - | - | - | - | 2 | - | - | 2 | 5 | 1 | - |
| 086-090 | - | - | - | - | 1 | - | - | - | 1 | 8 | 2 | - |
| 091-095 | - | - | - | - | - | 2 | - | 1 | 1 | 4 | - | - |
| 096-100 | - | - | - | - | - | 1 | 2 | - | - | 2 | 2 | - |
| 101-105 | - | - | - | - | - | 1 | 3 | - | - | 4 | - | - |
| 106-110 | - | - | - | - | - | 2 | 1 | - | - | 1 | - | 1 |
| 111-115 | - | - | - | - | - | 1 | - | 1 | - | 4 | - | - |
| 116-120 | - | - | - | - | - | - | 3 | - | - | 1 | - | - |
| 121-125 | - | - | - | - | - | 1 | 3 | - | 1 | 4 | - | - |
| 126-130 | - | - | - | - | - | - | 4 | 2 | - | - | - | - |
| 131-135 | - | - | - | - | - | 1 | 1 | - | 2 | 1 | - | - |
| 136-140 | - | - | - | - | - | - | 1 | 3 | - | 1 | - | - |
| 141-145 | - | - | - | - | - | - | - | 2 | - | - | - | - |
| 146-150 | - | - | - | - | - | - | 3 | - | 3 | 2 | - | - |
| 151-155 | - | - | - | - | - | - | 1 | - | - | 2 | - | - |
| 156-160 | - | - | - | - | - | - | 3 | 1 | 1 | - | - | - |
| 161-165 | - | - | - | - | - | - | 2 | - | 1 | 2 | - | 1 |
| 166-170 | - | - | - | - | - | - | - | 1 | 3 | 2 | - | - |
| 171-175 | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| 176-180 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| 181-185 | - | - | - | - | - | - | 1 | 1 | 3 | - | - | - |
| 186-190 | - | - | - | - | - | - | - | - | - | - | - | - |
| 191-195 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 196-200 | - | - | - | - | - | - | - | - | - | - | - | - |
| 201-205 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| TOTAL MEAS. | - | - | - | 1 | 6 | 20 | 29 | 12 | 74 | 229 | 85 | 30 |
| TOTAL TAKEN | - | - | - | 1 | 6 | 20 | 29 | 13 | 74 | 229 | 87 | 30 |
| MEAN | - | - | - | 48.0 | 47.0 | 82.6 | 130.5 | 139.0 | 75.9 | 53.1 | 34.9 | 35.9 |

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TABLE 3.1.5-25
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 4.9 METER TRAWL IN CHANNEL ZONES, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | - | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 016-020 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| 021-025 | - | - | - | - | - | - | - | - | - | - | - | 1 |
| 026-030 | - | - | - | - | - | - | - | - | 1 | - | - | 2 |
| 031-035 | - | - | - | - | - | - | - | - | - | - | 2 | - |
| 036-040 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| 041-045 | - | - | - | - | - | - | - | - | 2 | - | 1 | - |
| 046-050 | - | - | - | - | - | - | - | - | 2 | - | - | 1 |
| 051-055 | - | - | - | - | - | - | - | - | 2 | - | - | - |
| 056-060 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 061-065 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 066-070 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 071-075 | - | - | - | - | - | - | - | - | - | - | - | - |
| 076-080 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 081-085 | - | - | - | - | - | - | - | - | 1 | 1 | - | - |
| 086-090 | - | - | - | - | - | - | - | - | - | - | - | - |
| 091-095 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| 096-100 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 101-105 | - | - | - | - | - | - | - | - | - | - | - | - |
| 106-110 | - | - | - | - | - | - | 2 | - | - | - | - | 1 |
| 111-115 | - | - | - | - | - | - | 1 | - | - | - | - | - |
| 116-120 | - | - | - | - | - | - | 3 | - | - | - | - | - |
| 121-125 | - | - | - | - | - | - | 1 | - | - | - | - | - |
| 126-130 | - | - | - | - | - | - | - | - | - | - | - | - |
| 131-135 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| 136-140 | - | - | - | - | - | - | 1 | - | - | - | - | - |
| 141-145 | - | - | - | - | - | - | 1 | - | - | - | - | - |
| 146-150 | - | - | - | - | - | - | - | - | - | - | - | - |
| 151-155 | - | - | - | - | - | - | - | - | - | - | - | - |
| 156-160 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 161-165 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 166-170 | - | - | - | - | - | - | 1 | - | - | - | - | - |
| 171-175 | - | - | - | - | - | - | 1 | - | - | - | - | - |
| TOTAL MEAS. | - | - | - | - | - | - | 11 | - | 19 | 9 | 3 | 5 |
| TOTAL TAKEN | - | - | - | - | - | - | 11 | - | 19 | 9 | 3 | 5 |
| MEAN | - | - | - | - | - | - | 130.5 | - | 57.8 | 88.2 | 34.7 | 47.6 |

IA SALEM CR 1978

TABLE 3.1.5-26
SIZE-CLASS DISTRIBUTION OF BLUF CRAB, CALLINECTES SAPIDUS, TAKEN AT NIGHT
BY 4.9 METER TRAWL IN ZONE W-3, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | - | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 016-020 | - | - | - | - | - | - | - | - | - | - | - | - |
| 021-025 | - | - | - | - | - | - | - | - | - | - | - | - |
| 026-030 | - | - | - | - | - | - | - | - | - | - | - | - |
| 031-035 | - | - | - | - | - | - | - | - | - | - | - | - |
| 036-040 | - | - | - | - | - | - | - | - | - | - | - | - |
| 041-045 | - | - | - | - | - | - | - | - | - | - | - | - |
| 046-050 | - | - | - | - | - | - | - | - | - | - | - | - |
| 051-055 | - | - | - | - | - | - | - | - | - | - | - | - |
| 056-060 | - | - | - | - | - | - | - | - | - | - | - | - |
| 061-065 | - | - | - | - | - | - | - | - | - | - | - | - |
| 066-070 | - | - | - | - | - | - | - | - | - | - | - | - |
| 071-075 | - | - | - | - | - | - | - | - | - | - | - | - |
| 076-080 | - | - | - | - | - | - | - | - | - | - | - | - |
| 081-085 | - | - | - | - | - | 1 | - | - | - | - | - | - |
| 086-090 | - | - | - | - | - | - | - | - | - | - | - | - |
| 091-095 | - | - | - | - | - | - | - | - | - | - | - | - |
| 096-100 | - | - | - | - | - | - | - | - | - | - | - | - |
| 101-105 | - | - | - | - | - | - | - | - | - | - | - | - |
| 106-110 | - | - | - | - | - | - | - | - | - | - | - | - |
| 111-115 | - | - | - | - | - | - | - | - | - | - | - | - |
| 116-120 | - | - | - | - | - | - | - | - | - | - | - | - |
| 121-125 | - | - | - | - | - | - | - | - | - | - | - | - |
| 126-130 | - | - | - | - | - | - | - | - | - | - | - | - |
| 131-135 | - | - | - | - | - | - | - | - | - | - | - | - |
| 136-140 | - | - | - | - | - | - | - | - | - | - | - | - |
| 141-145 | - | - | - | - | - | - | - | - | - | - | - | - |
| 146-150 | - | - | - | - | - | - | - | - | - | - | - | - |
| 151-155 | - | - | - | - | - | - | - | - | - | - | - | - |
| 156-160 | - | - | - | - | - | - | - | 1 | - | - | - | - |
| TOTAL MEAS. | - | - | - | - | - | 1 | - | 1 | 1 | - | - | - |
| TOTAL TAKEN | - | - | - | - | - | 1 | - | 1 | 1 | - | - | - |
| MEAN | - | - | - | - | - | 82.0 | - | 160.0 | 14.0 | - | - | - |

IA SALEM CR 1978

TABLE 3.1.5-27
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN AT NIGHT
BY 4.9 METER TRAWL IN ZONE SSC, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | - | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| 016-020 | - | - | - | - | - | - | - | 1 | 3 | - | - | - |
| 021-025 | - | - | - | - | - | - | - | 1 | 3 | - | - | - |
| 026-030 | - | - | - | - | 1 | - | - | 4 | 1 | 1 | - | - |
| 031-035 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| 036-040 | - | - | - | - | 3 | - | - | - | - | 1 | - | - |
| 041-045 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 046-050 | - | - | - | - | - | - | - | - | 1 | 4 | - | - |
| 051-055 | - | - | - | - | - | - | - | - | 3 | 2 | - | - |
| 056-060 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 061-065 | - | - | - | - | 1 | - | - | - | - | - | - | - |
| 066-070 | - | - | - | - | - | - | - | - | - | - | - | - |
| 071-075 | - | - | - | - | - | 1 | - | - | - | 2 | - | - |
| 076-080 | - | - | - | - | - | - | - | - | - | - | - | - |
| 081-085 | - | - | - | - | - | - | - | - | - | - | - | - |
| 086-090 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 091-095 | - | - | - | - | - | - | - | - | - | 1 | - | - |
| 096-100 | - | - | - | - | 1 | 1 | - | - | - | 2 | - | - |
| 101-105 | - | - | - | - | - | - | - | - | - | - | - | - |
| 106-110 | - | - | - | - | - | - | - | - | - | - | - | - |
| 111-115 | - | - | - | - | - | 1 | - | - | - | - | - | - |
| 116-120 | - | - | - | - | - | - | - | - | - | - | - | - |
| TOTAL MEAS. | - | - | - | - | 6 | 3 | - | 6 | 18 | 15 | - | - |
| TOTAL TAKEN | - | - | - | - | 6 | 3 | - | 6 | 18 | 15 | - | - |
| MEAN | - | - | - | - | 50.5 | 94.7 | - | 26.5 | 30.9 | 61.7 | - | - |

IA SALEM CR 1978

TABLE 3.1.5-28
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 68.6 METER SEINE AT AUGUSTINE BEACH, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | - | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | - | - | - | - |
| 016-020 | - | - | - | - | - | - | - | 1 | - | - | - | - |
| 021-025 | - | - | - | - | - | - | - | 2 | 1 | 1 | - | - |
| 026-030 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| 031-035 | - | - | - | - | - | - | - | 2 | - | 2 | - | - |
| 036-040 | - | - | - | - | - | - | - | - | - | - | - | - |
| 041-045 | - | - | - | - | - | - | - | - | - | - | - | - |
| 046-050 | - | - | - | - | - | - | - | - | - | - | - | - |
| 051-055 | - | - | - | - | - | 2 | - | 1 | 1 | 1 | - | - |
| 056-060 | - | - | - | - | - | 1 | - | - | - | - | - | - |
| 061-065 | - | - | - | - | - | - | - | - | - | - | - | - |
| 066-070 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 071-075 | - | - | - | - | - | 2 | - | - | 2 | - | - | - |
| 076-080 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 081-085 | - | - | - | - | - | - | - | - | - | - | - | - |
| 086-090 | - | - | - | - | - | - | - | - | - | - | - | - |
| 091-095 | - | - | - | - | - | 1 | - | - | - | - | - | - |
| 096-100 | - | - | - | - | - | 1 | - | - | 1 | - | - | - |
| 101-105 | - | - | - | - | - | 1 | - | - | - | - | - | - |
| 106-110 | - | - | - | - | - | - | - | - | - | - | - | - |
| TOTAL MEAS. | - | - | - | - | - | 8 | - | 6 | 7 | 6 | - | - |
| TOTAL TAKEN | - | - | - | - | - | 8 | - | 6 | 7 | 6 | - | - |
| MEAN | - | - | - | - | - | 76.0 | - | 31.2 | 67.0. | 33.5 | - | - |

IA SALEM CR 1978

TABLE 3.1.5-29
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 68.6 METER SEINE AT SUNKEN SHIP COVE BEACH, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 4 | - | - | - |
| 016-020 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| 021-025 | - | - | - | - | - | - | - | - | 2 | - | - | - |
| 026-030 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| 031-035 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| 036-040 | - | - | - | - | - | - | - | - | - | - | - | - |
| 041-045 | - | - | - | - | - | - | - | - | - | - | - | - |
| 046-050 | - | - | - | - | - | - | - | - | - | - | - | - |
| 051-055 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 056-060 | - | - | - | - | - | - | - | - | 2 | - | - | - |
| 061-065 | - | - | - | - | - | - | - | - | 2 | - | - | - |
| 066-070 | - | - | - | - | - | - | - | - | - | - | - | - |
| 071-075 | - | - | - | - | - | - | - | - | - | - | - | - |
| 076-080 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 081-085 | - | - | - | - | - | - | - | - | - | - | - | - |
| 086-090 | - | - | - | - | - | - | - | - | - | - | - | - |
| 091-095 | - | - | - | - | - | - | - | - | - | - | - | - |
| 096-100 | - | - | - | - | - | - | - | - | - | - | - | - |
| 101-105 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 106-110 | - | - | - | - | - | - | - | 1 | - | - | - | - |
| 111-115 | - | - | - | - | - | - | - | - | - | - | - | - |
| 116-120 | - | - | - | - | - | - | - | - | - | - | - | - |
| 121-125 | - | - | - | - | - | - | - | - | - | - | - | - |
| 126-130 | - | - | - | - | - | - | - | - | - | - | - | - |
| 131-135 | - | - | - | - | - | - | - | - | - | - | - | - |
| 136-140 | - | - | - | - | - | - | - | - | - | - | - | - |
| 141-145 | - | - | - | - | - | - | - | 1 | - | - | - | - |
| TOTAL MEAS. | - | - | - | - | - | - | - | 2 | 23 | - | - | - |
| TOTAL TAKEN | - | - | - | - | - | - | - | 2 | 23 | - | - | - |
| MEAN | - | - | - | - | - | - | - | 124.5 | 35.7 | - | - | - |

IA SALEM CR 1978

TABLE 3.1.5-30
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN AT NIGHT
BY 68.6 METER SEINE AT AUGUSTINE BEACH, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | - | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 4 | 3 | - | - |
| 016-020 | - | - | - | - | - | - | - | - | 4 | 10 | - | - |
| 021-025 | - | - | - | - | - | - | - | - | 1 | 27 | - | - |
| 026-030 | - | - | - | - | - | - | - | - | 1 | 12 | - | - |
| 031-035 | - | - | - | - | - | - | - | - | - | 20 | - | - |
| 036-040 | - | - | - | - | - | - | - | 2 | - | 6 | - | - |
| 041-045 | - | - | - | - | - | - | - | 1 | - | 3 | - | - |
| 046-050 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 051-055 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 056-060 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| 061-065 | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| 066-070 | - | - | - | - | 1 | - | - | - | 1 | 1 | - | - |
| 071-075 | - | - | - | - | - | - | - | - | 2 | - | - | - |
| 076-080 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 081-085 | - | - | - | - | - | 1 | - | - | 1 | - | - | - |
| 086-090 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 091-095 | - | - | - | - | - | - | - | - | - | - | - | - |
| 096-100 | - | - | - | - | - | 1 | - | - | - | - | - | - |
| 101-105 | - | - | - | - | - | 2 | - | - | - | - | - | - |
| TOTAL MEAS. | - | - | - | - | 1 | 4 | - | 3 | 20 | 86 | - | - |
| TOTAL TAKEN | - | - | - | - | 1 | 4 | - | 3 | 21 | 86 | - | - |
| MEAN | - | - | - | - | 67.0 | 95.5 | - | 38.3 | 43.5 | 28.8 | - | - |

IA SALEM CR 1978

TABLE 3.1.5-31
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN AT NIGHT
BY 68.6 METER SEINE AT SUNKEN SHIP COVE BEACH, 1978.

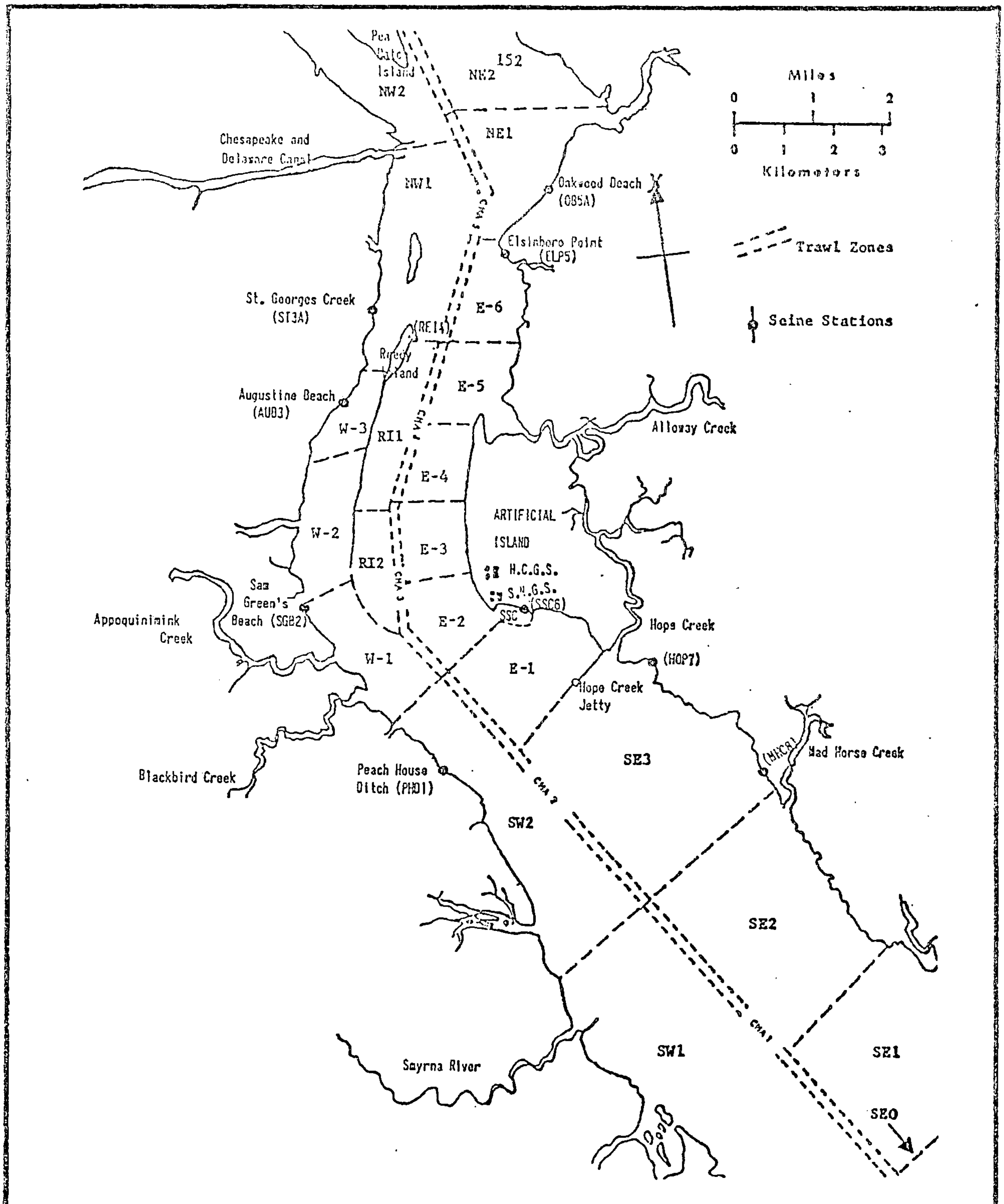
| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | - | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | - | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 2 | - | - | - |
| 016-020 | - | - | - | - | - | - | - | - | 3 | - | - | - |
| 021-025 | - | - | - | - | - | - | - | - | 5 | - | - | - |
| 026-030 | - | - | - | - | - | - | - | - | 6 | - | - | - |
| 031-035 | - | - | - | - | 1 | - | - | - | 4 | - | - | - |
| 036-040 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 041-045 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 046-050 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 051-055 | - | - | - | - | - | - | - | - | 4 | - | - | - |
| 056-060 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 061-065 | - | - | - | - | - | - | - | - | 4 | - | - | - |
| 066-070 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 071-075 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 076-080 | - | - | - | - | - | - | - | - | - | - | - | - |
| 081-085 | - | - | - | - | - | - | - | - | - | - | - | - |
| 086-090 | - | - | - | - | - | - | - | - | - | - | - | - |
| 091-095 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 096-100 | - | - | - | - | - | - | - | - | - | - | - | - |
| TOTAL MEAS. | - | - | - | - | 1 | - | - | - | 35 | - | - | - |
| TOTAL TAKEN | - | - | - | - | 1 | - | - | - | 53 | - | - | - |
| MEAN | - | - | - | - | 33.0 | - | - | - | 39.5 | - | - | - |

IA SALEM CR 1978

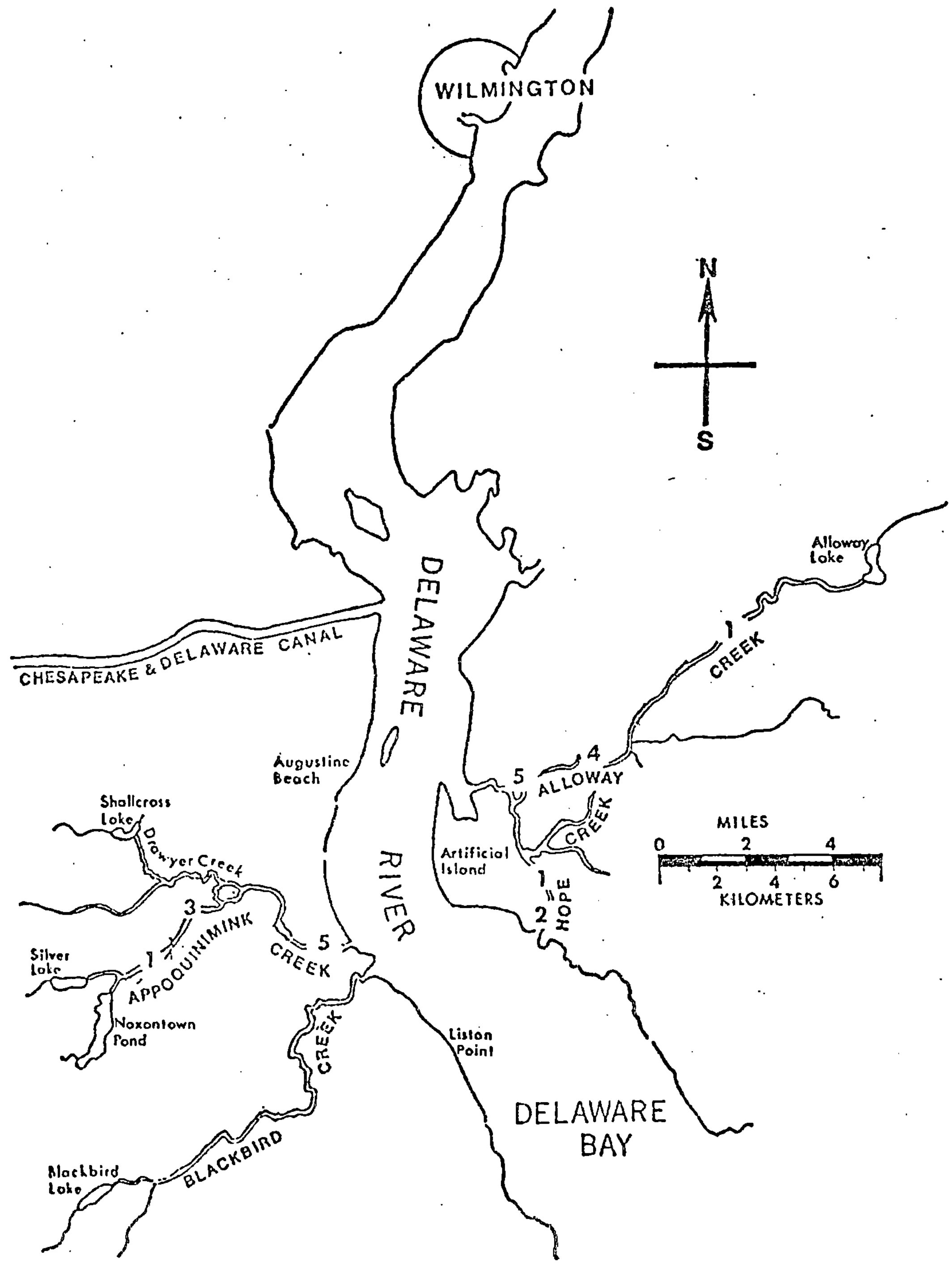
TABLE 3.1.5-32
SIZE-CLASS DISTRIBUTION OF BLUE CRAB, CALLINECTES SAPIDUS, TAKEN DURING DAYLIGHT
BY 3.0 AND 7.6 METER SEINES AT RIVER SEINE STATIONS, 1978.

| CARAPACE WIDTH (MM) | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 001-005 | - | - | - | - | - | - | - | - | 6 | - | - | - |
| 006-010 | - | - | - | - | - | - | - | - | 14 | - | - | - |
| 011-015 | - | - | - | - | - | - | - | - | 10 | - | 4 | - |
| 016-020 | - | - | - | - | - | - | - | - | 7 | - | 2 | - |
| 021-025 | - | - | - | - | 1 | - | - | 2 | 2 | - | 5 | - |
| 026-030 | - | - | - | - | - | - | - | 1 | - | - | 1 | - |
| 031-035 | - | - | - | - | - | 1 | - | - | 1 | - | - | - |
| 036-040 | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| 041-045 | - | - | - | - | - | - | - | 1 | - | - | 1 | - |
| 046-050 | - | - | - | - | 1 | 2 | - | - | 3 | - | - | - |
| 051-055 | - | - | - | - | - | 1 | - | - | 1 | - | - | - |
| 056-060 | - | - | - | - | - | - | 1 | - | 1 | - | - | - |
| 061-065 | - | - | - | - | - | - | - | - | 1 | - | - | - |
| 066-070 | - | - | - | - | - | 1 | - | - | - | - | - | - |
| 071-075 | - | - | - | - | - | - | - | - | - | - | - | - |
| 076-080 | - | - | - | - | - | - | - | - | - | - | - | - |
| 081-085 | - | - | - | - | - | - | - | - | - | - | - | - |
| 086-090 | - | - | - | - | - | - | - | - | - | - | - | - |
| 091-095 | - | - | - | - | - | 1 | - | - | - | - | - | - |
| 096-100 | - | - | - | - | - | - | - | - | - | - | - | - |
| TOTAL MEAS. | - | - | - | - | 2 | 6 | 1 | 4 | 47 | - | 14 | - |
| TOTAL TAKEN | - | - | - | - | 2 | 6 | 1 | 4 | 47 | - | 14 | - |
| MEAN | - | - | - | - | 34.5 | 57.2 | 59.0 | 28.3 | 17.5 | - | 21.4 | - |

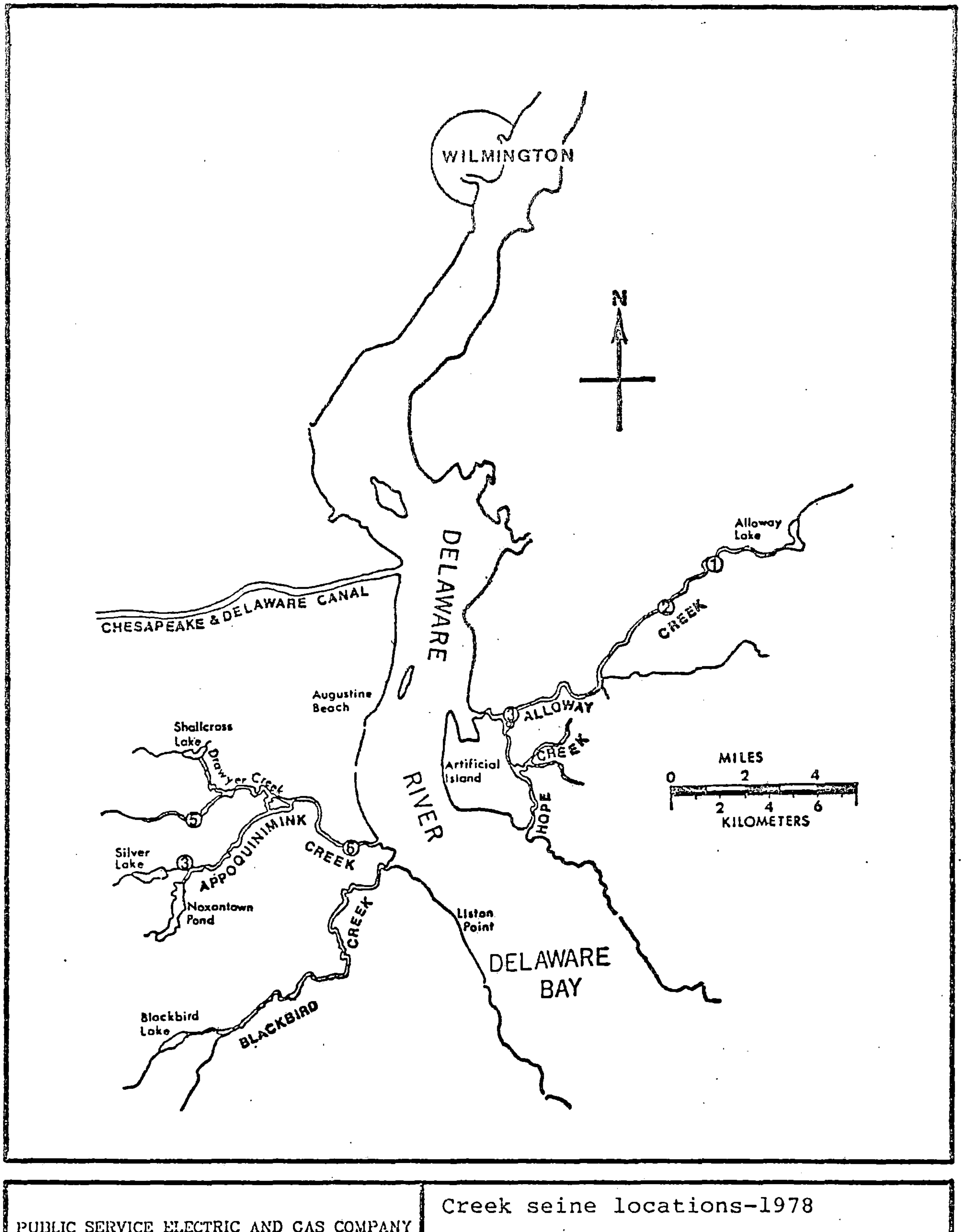
IA SALEM CR 1978



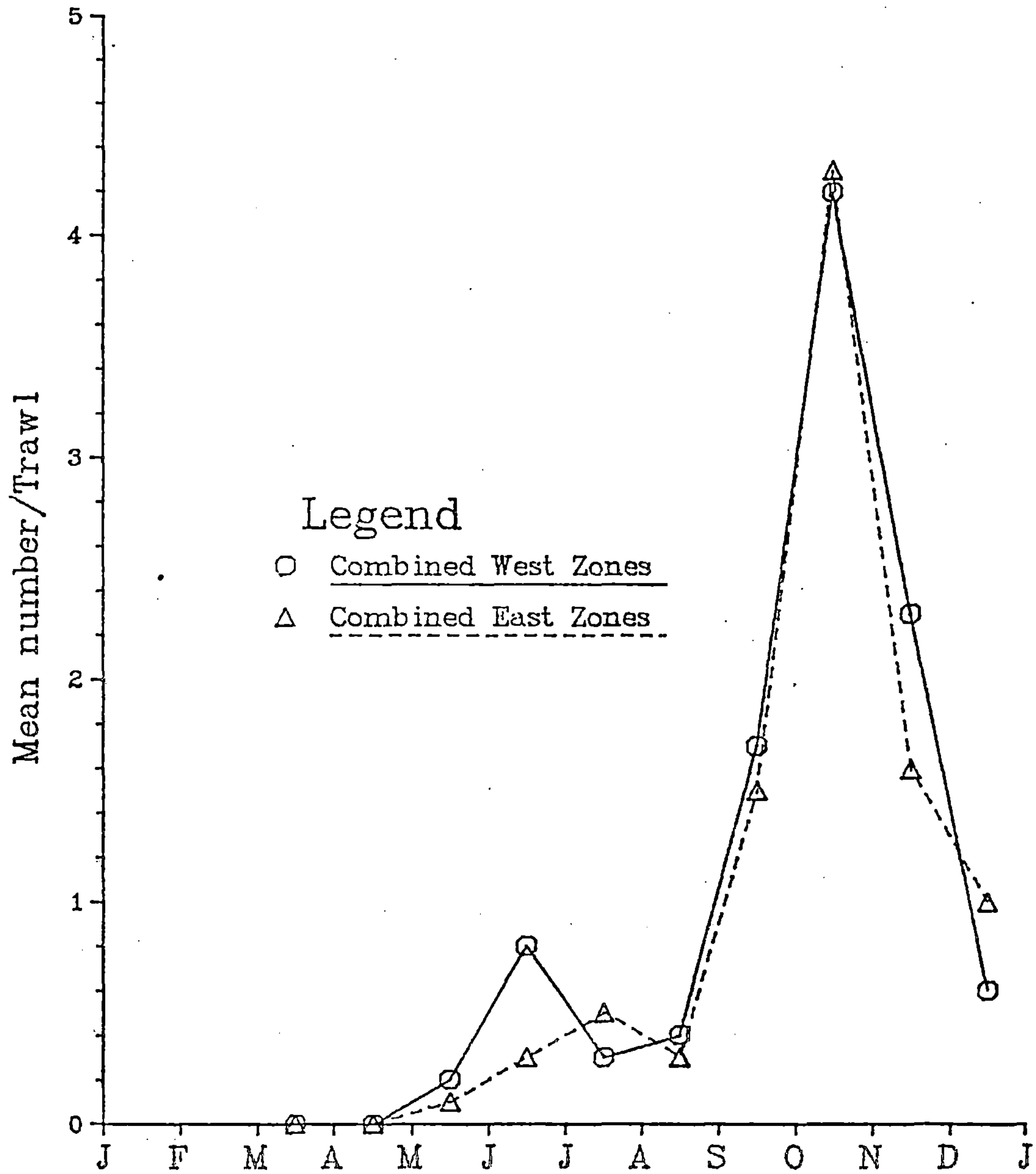

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | River trawl and seine locations-1978<br><br>Figure 3.1.5-1 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Creek trawl locations-1978<br><br>Figure 3.1.5-2 |
|---|---|



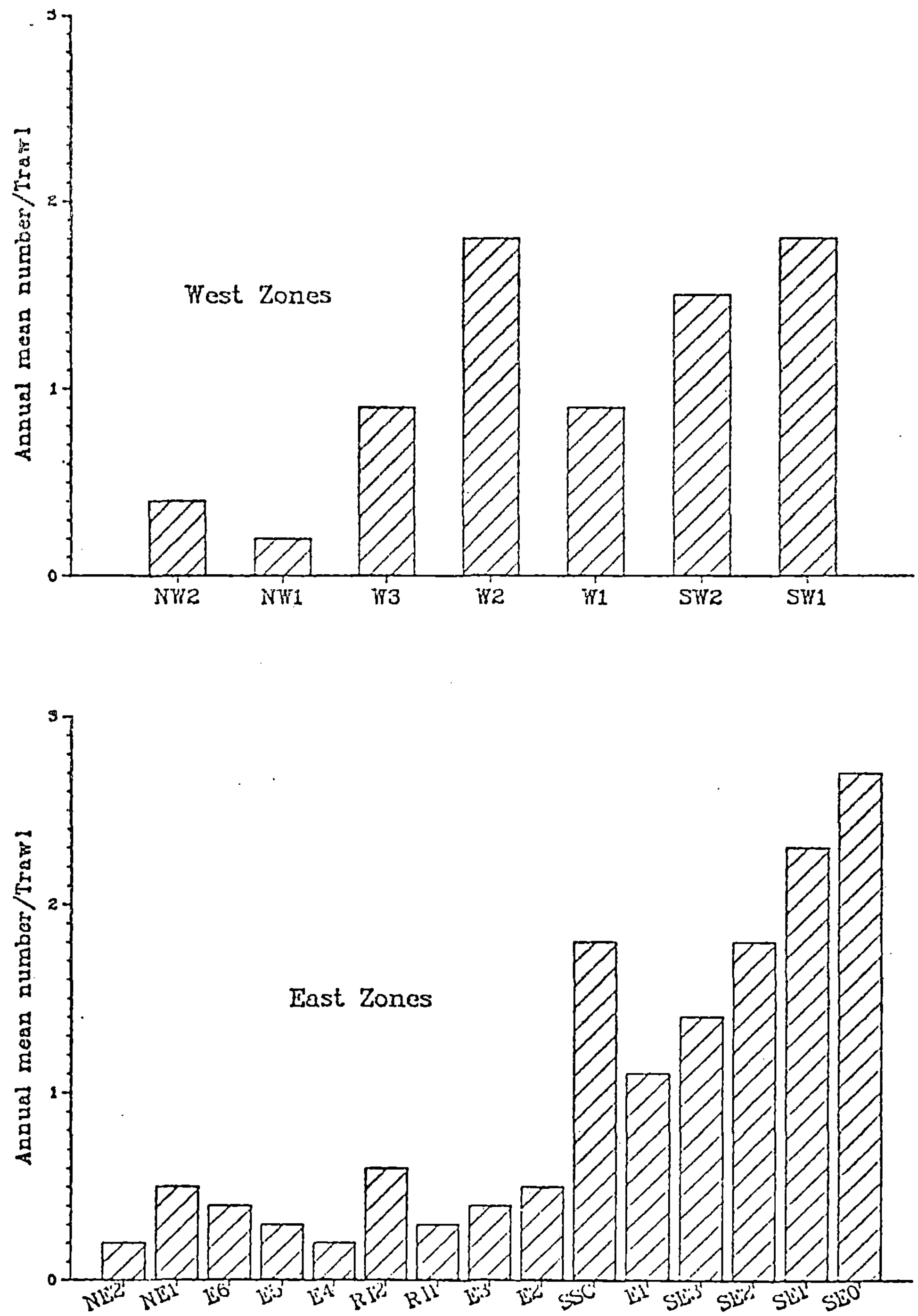

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Creek seine locations-1978 |
|---|---|
| | Figure 3.1.5-3 |



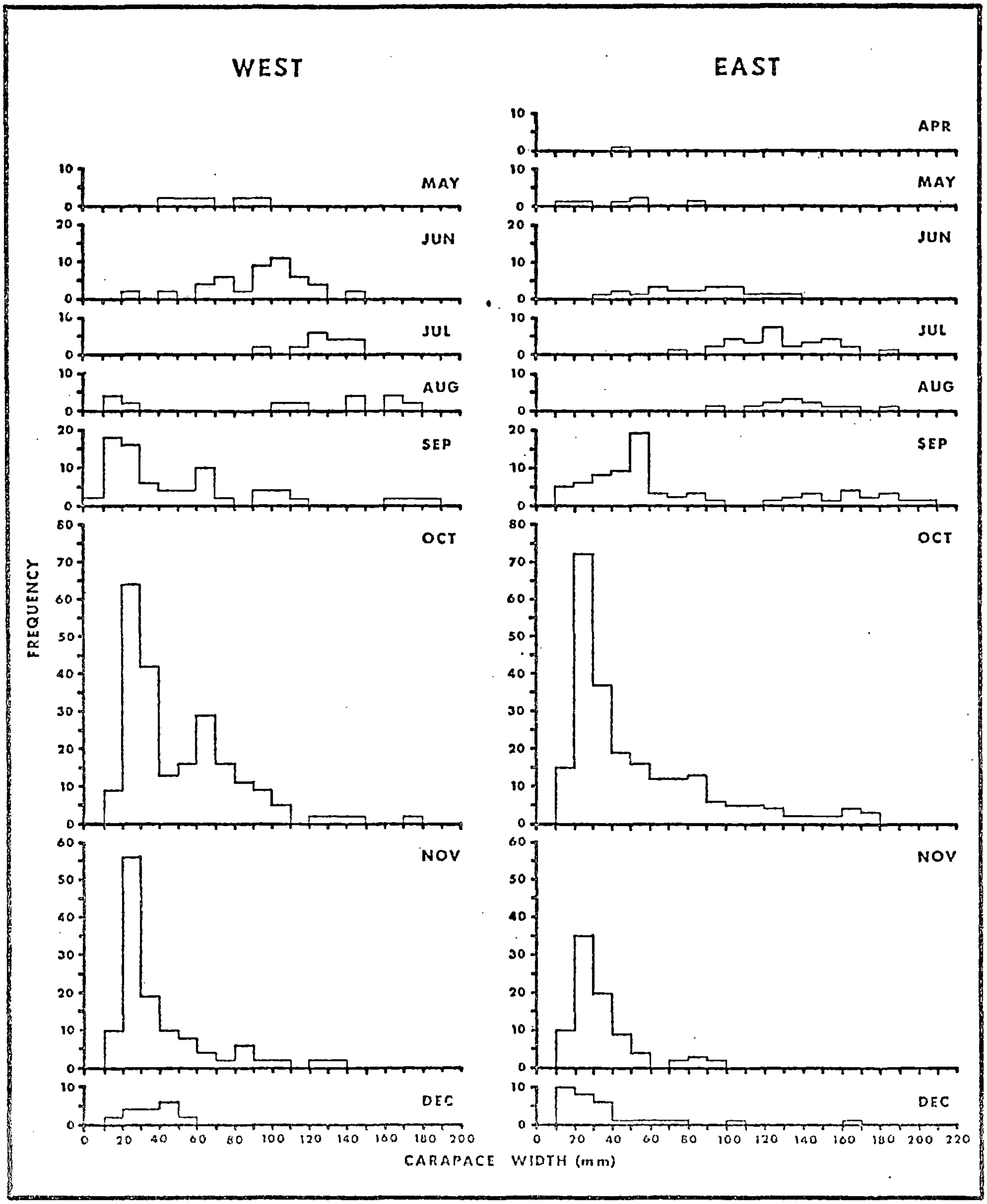

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Seasonal abundance of blue crab in river trawl collections-1978

Figure 3.1.5-4




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Spatial distribution of blue crab in river trawl collections-1978 |
| --- | --- |
| | Figure 3.1.5-5 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal size distribution standardized for effort of blue crab in river trawl collections-1978<br>Figure 3.1.5-6 |
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## 3.1.6a Juvenile And Adult Fishes - River (ETS Section 3.1.2.1.1g)

The fishes of the Delaware River near Artificial Island were sampled in 1978 by seine, trawl, and gill net within the area illustrated in Figure 3.1.6a-1. Objectives of the daylight seine and trawl programs were to determine 1) species composition, 2) spatial and temporal distribution, and 3) relative abundance of fishes. The objective of the night seine and trawl program was to identify diel differences in species abundance. The objective of the gill net program was to determine the period of occurrence and distribution of alosids during migratory movements through the study area.

### 3.1.6a.1 Summary

Some 111 species of 51 families have been taken from the study area and contiguous regions since the study began in mid 1968 (Table 3.1.6a-1). In 1978, 148,538 specimens of 54 species of 31 families were taken in combined daylight seine, trawl, and gill net collections. All but the rainbow trout and harvest fish had been collected in previous years. The catch included freshwater, estuarine, and marine species which utilized the region primarily as a nursery or feeding area.

Weakfish (49,615 specimens), bay anchovy (36,861), hogchoker (33,919), white perch (2,909), spot (1,067), Atlantic croaker (994), American eel (814), and blueback herring (594) were most abundant in the trawl catch and comprised nearly ninety-nine percent of the annual catch. Atlantic silverside (5,022), bay anchovy (4,400), Atlantic menhaden (658), and mummichog (484) were the most abundant species taken by seine and comprised about ninety percent of the annual catch. Atlantic menhaden (6,776), blueback herring (1,478), alewife (370), bluefish (121), and American shad (30) comprised nearly ninety-nine percent of the gill net catch.

Catch composition correlated strongly with seasonal variations in salinity and water temperature. Fewest species and specimens were taken in March, a period of low water temperature and salinity. The catch in deeper waters comprised primarily white perch. No fish were taken in abundance in the shore zone.

Species variety and specimen counts increased during April through June, a period of rising water temperature and salinity. Many summer residents including bay anchovy, Atlantic menhaden, bluefish, and summer flounder were taken during this period. Juvenile weakfish appeared in very large numbers in late June. Adult alosids (American shad, blueback herring, alewife) were taken during pre-spawning migrations.

Bay anchovy, hogchoker, and white perch were predominant in the trawl catch during April and May. Weakfish replaced white perch as one of the predominant species in June. In the shore zone bay anchovy, Atlantic menhaden, Atlantic silverside, and mummichog were most abundant.

Species number and abundance remained high through September as the summer ichthyofaunal community became established. Several marine strays including inshore lizardfish, Atlantic needlefish, and harvestfish appeared in the catch during this period. Weakfish, bay anchovy, and hogchoker were predominant in the offshore catch; in the shore zone, Atlantic silverside and bay anchovy were predominant.

As temperature declined during October through December, summer residents began emigration from the study area and were gradually replaced by winter species. Juvenile herrings and American shad were taken as they migrated through the region from upriver nursery areas.

Weakfish numbers dropped drastically during this period. However, bay anchovy and hogchoker continued to be taken in large numbers offshore during October and November. In the shore zone only Atlantic silverside was abundant.

By December only hogchoker and white perch were taken in abundance offshore. No fish were taken in abundance in the shore zone during this period.

### 3.1.6a.2 Seine

Seines were hauled during daylight to determine species composition and the spatial and temporal distribution of fishes in the shore zone. Night collections were also made to identify diel differences in species abundance.

#### MATERIALS AND METHODS

#### Field

All seine samples required under this ETS were collected. Biweekly seine collections were taken during daylight at ten stations from March 17 through December 12 (Table 3.1.6a-2,

Fig. 3.1.6a-1). Inclement weather and river icing precluded sampling during January, February, early March, and late December. Corresponding night and day collections were taken monthly from March through October except during July, at stations SSC6 and AUB3. Collections were taken about 12 hr apart on two consecutive days.

Two types of seine were employed: a 7.6-m x 1.2-m (25.0- x 4.0-ft) bag seine with 6.4-mm (1/4-in) stretch mesh and a 3.0-m x 1.2-m (10.0- x 4.0-ft) flat seine with 3.2-mm (1/8-in) stretch mesh.

Gear deployment, sample processing, and collection of physicochemical data were as in 1977; for a complete description see the 1977 Annual Environmental Operating Report.

## Data Reduction

Data are discussed on the following statistics: s = species variety, n = number of specimens, and n/coll = number of specimens per collection.

To show the temporal abundance of the more abundant species, catch data (n/coll) were transformed by the log (x + 1) and the mean plus and minus one standard deviation and the range for each month were plotted.

To show the spatial distribution of these species the above listed parameters plus the 95 percent confidence interval of the mean were calculated and plotted for each station for spring (March 16 through June 15), summer (June 16 through September 15), and fall (September 16 through December 15).

Catch composition between combined east and west stations was compared using Spearman's coefficient of rank correlation.

Principal components analysis (BMDP4M Factor Analysis; Dixon, 1975) was used to calculate and display similarities in the catch composition among stations. This method is described by Marriott (1974) and Pielou (1977). The 13 more abundant species were included as variables and stations as observations. A species by species (R-mode) product moment correlation matrix was calculated from log (x + 1) transformed catch data. The factor scores for each station along only the first three component axes were plotted.

## RESULTS

### Temporal Catch Composition

A total of 11,661 specimens of 31 species were taken in 170 seine collections (Table 3.1.6a-3). Atlantic silverside (n = 5,022), bay anchovy (4,400), Atlantic menhaden (658), and mummichog (484) were most abundant and comprised 90.1 percent of the total catch.

Seasonal catch patterns were evident. March and April were characterized by low species variety (s = 3 and 5) and abundance (n/coll = 1.8 and 3.3). Mummichog and Atlantic silverside were predominant (85.7 percent of the catch). Species variety and abundance increased through June (s = 16; n/coll = 164.7) as large numbers of adult bay anchovy and young Atlantic menhaden, along with several less abundant summer residents, including spot, weakfish, and hogchoker moved into the study area. Atlantic silverside and mummichog were also taken in abundance. During July through September species variety (monthly s = 16-17) and abundance (monthly n/coll = 72.6-159.0) remained high.

Several marine strays including inshore lizardfish, and Atlantic needlefish were taken during the period. The catch was predominated by young of the Atlantic silverside and bay anchovy. In October species variety (3 = 8) decreased as the marine strays and several summer residents emigrated from the area. However, the catch remained high (n/coll = 74.1) because of the abundance of Atlantic silverside (n/coll = 63.2). Species variety increased in November (s = 12) but decreased in December (4) as lingering estuarine species migrated downbay. Abundance decreased in both months (n/coll = 12.8 and 4.3, respectively).

### Spatial Catch Composition

The annual n/coll was 85.6 for east stations and 51.6 for west stations. The five west stations yielded 29 species; the five east stations yielded 18. Sixteen species were common to east and west stations. Spearman's rank correlation coefficient ($r_s = .798$, $p \leq 0.0001$) indicates a high degree of correlation between the catches of the two groups.

Between-station similarity based on catch composition was plotted along the first three component axes in Figure 3.1.6a-2. These components explain 71.1 percent of the total variance (Factor I = 30.9 percent; Factor II = 25.2; Factor III = 15.0).

Two groups of stations can be identified. One closely associated group is SSC6, HOP7, and MHC8. These stations are located on the east shore south of Salem and may experience similar physicochemical conditions. A second group, less closely associated, consists of the five stations on the west side of the river plus Station ELP5. Station OB5A is not closely associated with any other station and is most distant from the first group both on the figure and geographically. The general north-south trend along axis I suggests that a factor such as salinity has a strong influence on catch composition.

Species Accounts

The following discussion traces the abundance and distribution of the four more abundant species. They are presented in order of decreasing abundance and based on summary data in Table 3.1.6a-3 and Figures 3.1.6a-3 through 17. Additional data have been included which are not presented in tables but are contained in the PSE&G aquatic data base.

1. Atlantic silverside (n = 5,022, young and adult) comprised 43.1 percent of the total catch (Table 3.1.6a-3). Length range was 12-120 mm.

It was collected from March through December (Fig. 3.1.6a-3). During spring Atlantic silverside was collected in low numbers at all four stations south of Salem but was most abundant at HOP7 (Fig. 3.1.6a-4). It was taken at only two of six statons north of Salem. Most captures were adult. Abundance increased through July as age 0+ fish were recruited into the catch. After June the catch was almost entirely age 0+. The catch declined in August but increased in September. Abundance during summer was greater than during spring at all stations. There was a general increase in abundance from north to south but the catch was greatest at MHC8 and AUB3 (Fig. 3.1.6a-5). The species remained abundant through October but the catch declined sharply in November and remained low in December (Fig. 3.1.6a-3). The catch during fall was less than during summer at all stations. The greatest abundance during fall was at SSC6 (Fig. 3.1.6a-6).

Atlantic silverside comprised 85.3 percent of the catch in October; from May through September it comprised 24.2 to 59.7 percent of the monthly catch.

It was collected at all stations but the catch was greatest at MHC8 (n = 1,302) where 25.9 percent of the annual catch was taken (Table 3.1.6a-3). The annual n/coll was 33.8 for east stations and 25.2 for west stations. The n/coll for night collections was 20.3; for comparable day collections it was 53.1.

2. Bay anchovy (n = 4,400, young and adult) comprised 37.7 percent of the total catch (Table 3.1.6a-3). Length range was 16-91 mm.

It was collected from May through November (Fig. 3.1.6a-7). During spring bay anchovy was taken at eight stations and in low numbers (Fig. 3.1.6a-8). All were age 1+ or older. Abundance during summer was greater than during spring at all stations as age 0+ fish were recruited into the catch (Fig. 3.1.6a-9). When abundance peaked in July they predominated the catch. Abundance decreased in August but increased to July levels in September (Fig. 3.1.6a-7). Station OB5A had the greatest catch during the period. During fall abundance decreased steadily. Bay anchovy was taken at all stations except SSC6 but abundance at each station was less than during summer (Fig. 3.1.6a-10). Greatest abundance was at ST3A.

Bay anchovy comprised 64.8, 62.2, and 47.3 percent of the catch in May, September, and August, respectively. During other months the percentage ranged from 13.6 to 32.0.

It was collected at all stations but the catch was greatest at Station OB5A (n = 1,146) where 26.0 percent of the annual catch was taken (Table 3.1.6a-3). The annual n/coll was 35.4 for east stations and 16.3 for west stations. The n/coll for night collections was 14.0; for comparable day collections it was 13.4.

3. Atlantic menhaden (n = 658, age 0+ and 1+ young) comprised 5.6 percent of the total catch (Table 3.1.6a-3). Length range was 22-160 mm.

It was collected from May through September (Fig. 3.1.6a-11). During spring it was taken at eight stations and in low numbers. During this period there was a slight increase in abundance from north to south (Fig. 3.1.6a-12). The catch (predominantly age 0+) peaked in June and declined in July and August. During summer Atlantic menhaden was taken at all stations (Fig. 3.1.6a-13). Abundance was greater than during spring at seven stations. It was no longer most abundant at southern stations; it was most abundant at OB5A and AUB3. Only one specimen was taken during fall.

Atlantic menhaden comprised 17.1 percent of the July catch. During other months it comprised less than 3.1 percent.

It was taken at all stations but the catch was greatest at OB5A (n = 207) where 31.5 percent of annual catch was taken (Table 3.1.6a-3). The annual n/coll was 5.8 for east stations and 1.9 for west stations. On June 19-20, 146 specimens were taken in two night collections while 49 were taken in two day collections. None were taken in other day-night collections.

4. Mummichog (n = 484, young and adult) comprised 4.2 percent of the total catch. Length range was 22-111 mm.

It was taken from March through September and in November and December (Fig. 3.1.6a-14). The catch was low from March through May but peaked in June. Abundance subsequently decreased through September. During spring mummichog were taken at all stations except HOP7 (Fig. 3.1.6a-15). It was most abundant at ST3A and AUB3. During summer it was taken at the same stations and at about the same abundance as during spring (Fig. 3.1.6a-16). Abundance during fall was less than during summer at eight stations. None were taken in October and few were taken in November (n/coll = 0.6) and December (0.5). It was most abundant at AUB3 (Fig. 3.1.6a-17). None were taken at HOP7, OB5A, or SGB2.

Mummichog comprised 88.9 and 40.9 percent of the monthly catch in March and April, respectively. During other months it comprised from 1.1 to 11.6 percent of the monthly catch.

It was taken at all stations except HOP7. The catch was greatest at ST3A (n = 158) where 32.6 percent of the annual catch was taken (Table 3.1.6a-3). The annual n/coll was 4.7 for west stations and 1.0 for east stations. The n/coll for night collections was 8.1; for comparable day collections it was 5.6.

## Preoperational Comparison

Annual rank and percent of catch of the four more abundant species in 1978 were within or above the range for the preoperational period 1970 through 1976 (Table 3.1.6a-4). Annual abundance (n/coll) for three of the species equaled or exceeded the abundance in 1975 or 1976 (Table 3.1.6a-5). The Atlantic menhaden was less abundant in 1978 than in 1975 or 1976. Other species that were less abundant include the tidewater silverside and bluefish. The weakfish was more abundant.

### 3.1.6a.3 TRAWL

Trawling during daylight was conducted to determine 1) species composition, 2) relative abundance, and 3) spatial and temporal distribution of the fishes which frequent the deeper waters of the river. In addition night trawling was conducted to identify diel differences in species abundance.

#### MATERIALS AND METHODS

##### Field

All trawl samples required under this ETS were collected. Biweekly bottom trawl samples were taken during daylight from March 13 through December 18 in 19 of 22 river zones and 5 channel zones (Table 3.1.6a-6, Fig. 3.1.6a-1). Zones NE2, RI1, and RI2 were sampled biweekly to monthly. Inclement weather and river icing precluded sampling in January, February, early March, and late December. Corresponding night and daylight collections were taken monthly from March through October except for July at zones W-3 and SSC. Collections were taken about 12 hr apart on two consecutive days.

A standard river collection was a 10-min tow (5-min in Zone SSC) of a 4.9-m (16-ft) semiballoon otter trawl[1]. A standard channel collection was a 20-min tow. Night collections were of 5-min duration.

Sample processing and collection of physicochemical data were as in 1977; for a complete description see the 1977 Annual Environmental Operating Report.

##### Data Reduction

Data are discussed on the following statistics: s = species variety, n = number of specimens, T = number of standard hauls, T* = number of hauls in which a species appeared, n/T = number of specimens per 10 min of sampling time, and n/T* = number of specimens per haul (10-min effort) in which a species was taken.

Monthly mean and standard deviation were calculated from log (x + 1) transformed catch per effort values of pooled semimonthly collections. Seasonal mean, standard deviation,

[1]=3.8-cm stretched mesh No. 9 thread body, 3.2-cm stretched mesh No. 15 thread cod end, innterliner of 1.3-cm No. 63 knotless nylon netting inserted and hogtied in cod end.

and 95 percent confidence interval were calculated from log (x + 1) transformed regional catch per effort values for spring (March 16 through June 15), summer (June 16 through September 15), and fall (September 16 through December 15). Regions were defined as follows: the northwest region contained zones NW1 and NW2; the central-west region contained zones W-1, W-2, and W-3; the southwest region contained zones SW1 and SW2; the north channel region contained zones CHA3, CHA4, and CHA5; the south channel region contained zones CHA1 and CHA2; the northeast region contained zones NE1, NE2, and E-6; the central-east region contained zones E-1, E-2, E-3, E-4, E-5, RI1, and RI2; the southeast region contained zones SE0, SE1, SE2, and SE3.

Catch composition among the combined west, east, and channel zones was compared using Spearman's coefficient of rank correlation. Figure 3.1.6a-1 depicts the zones east and west of the shipping channel as well as those within the channel. Zones RI1 and RI2, although west of the channel, were grouped with east zones.

Principal components analysis (BMPD4M Factor Analysis: Dixon, 1975) was used to calculate and display similarities in the catch composition among zones. This method is described by Marriott (1974) and Pielou (1977). The thirteen most abundant species were included as variables and zones as observations. A species by species (R-mode) product moment correlation matrix was calculated from log (x + 1) transformed catch data. The factor scores for each zone along only the first three component axes were plotted.

## RESULTS

### Temporal Catch Commposition

A total of 128,093 specimens of 45 species were taken in 848 trawl collections from west, east, and channel zones (Table 3.1.6a-7). Weakfish (n = 49,615), bay anchovy (36,861), hogchoker (33,919), white perch (2,909), spot (1,067), Atlantic croaker (884), American eel (814), and blueback herring (594) were most abundant and comprised nearly ninety-nine percent of the total annual catch.

As in previous years, strong seasonal patterns in catch were evident. Species variety (s = 5) and fish abundance (n/T = 2.7) were lowest in March. Although not abundant, white perch comprised most of the catch. Both catch statistics increased through May (s = 20; n/T = 68.7). Many summer residents, including bay anchovy, Atlantic menhaden, bluefish, and summer flounder appeared in the catch during this period as did yearling shad and herrings. Bay anchovy, hogchoker, and white perch were predominant. These three species, along with blueback herring, were taken most often.

Species variety remained high (monthly $s \geq 20$) through August as the summer ichthyofaunal community became established. Catch per effort peaked during summer, with June and July n/T values of 266.6 and 265.2, respectively. Juvenile weakfish appeared in very large numbers during this period and along with bay anchovy and hogchoker comprised more than ninety-eight percent of the summer catch. The preceding three species, along with American eel, spot, and Atlantic menhaden, were taken most often.

The number of species taken increased during fall (monthly $s \geq 26$) as summer species were gradually replaced by winter species. However, relative abundance declined (monthly $n/T < 164.0$), largely because of the emigration of weakfish. Bay anchovy and hogchoker again were the most abundant species taken, although spot, American eel, Atlantic croaker, white perch, and blueback herring appeared in moderate numbers. These seven species, along with black drum, were taken most often. During December, only hogchoker and white perch were taken in abundance as catch continued to decline ($n/T = 84.7$).

## Spatial Catch Composition

Spearman's coefficient of rank correlation based on annual species catch per effort data among combined west, east, and channel zones were significant. The strongest correlation ($r_s = .810$, $p \leq 0.0001$) exists between the channel and east groups. This is probably explained by the similarity of water depth in these areas as well as common circulation and tidal patterns along the channel and eastern portion of the study area. The weakest correlation ($r_s = .637$, $p \leq 0.0001$) occurs between the channel and west groups.

Principal components analysis of annual species catch per effort data by zone revealed similar results (Fig. 3.1.6a-18). The first three component axes explain 64.1 percent of the total variance (Factor I = 32.2 percent; Factor II = 19.4; Factor III = 12.5. Three major groups are indicated in this analysis. The five channel zones, two Reedy Island zones, and Zone SEO form one group. The central and southern east zones are grouped together along with zones E-6, NW1, and SW2. The third group includes most west zones as well as zones NE1 and NE2. Zones SSC, W-3, and E-5 appear as unique areas. The position of the three major groups indicates degree of similarity; the channel and east groups being most proximate thus most similar, and conversely, the west and channel groups being furthest apart and least similar.

Species Accounts

The eight most abundant species, each represented by more than 500 specimens, are discussed in order of decreasing abundance. The following accounts of these species are based primarily on annual summary data presented in Table 3.1.6a-7, and monthly and seasonal data presented in Figures 3.1.6a-19 through 45. Additional data have been included that are not presented in tabular form but are contained in the PSE&G aquatic data base.

1. Weakfish [1] (n = 49,615, almost all age 0+ young) comprised 38.7 percent of the total catch. Catch frequency was 426 (of 848). The annual n/T was 54.1; the n/T* was 106.6 (Table 3.1.6a-7). Length range was 12-756 mm.

The abundance of age 0+ weakfish in 1978 was of unprecedented magnitude. In fact, the catch in the last two weeks of June was greater than the combined annual catches from 1973 through 1977. It was taken from June through November (Fig. 3.1.6a-19). Although a few were taken earlier, peak abundance occurred during the last two weeks of June as young-of-year fish immigrated into the study area from down bay spawning grounds. Catches in the central and southern zones were greater than in the northern zones. Abundance remained high during the summer and as the season progressed weakfish became more uniformly distributed (Figs. 3.1.6a-19 and 20). The catch of weakfish decreased sharply in September and continued to decline through November, as these fish began their annual migration out of the estuary (Fig. 3.1.6a-19). Although catch levels during fall were lower in all regions from those of summer, relative abundance among regions remained uniform (Fig. 3.1.6a-21).

Weakfish comprised 79.8, 61.2, and 35.7 percent of the catch in June, July, and August, respectively.

It was taken in all zones but was most abundant, based on annual n/T values, in zones RI2, W-3, RI1, and CHA4. It was least abundant in zones E-6 and SE3 (Table 3.1.6a-7). The annual n/T* value west of the shipping channel was 111.3; to the east it was 106.5. The n/T for night collections was 27.6; for comparable day collections it was 74.4.

2. Bay anchovy (n = 36,861, young and adult) comprised 28.8 percent of the total catch. Catch frequency was 560. The annual n/T was 40.2; the n/T* was 60.7 (Table 3.1.6a-7). Length range was 12-105 mm.

It was taken from April through December (Fig. 3.1.6a-22). Large numbers were first taken in May as the upbay migration of adult fish into the area heightened. Although it was taken throughout the study area during spring, abundance increased from north to south (Fig. 3.1.6a-23). Catch

[1] This discussion of weakfish is based only on samples taken under ETS. Additional information can be found in "Summary Assessment of Weakfish Impingement: Summer 1978, (PSE&G 1978b)

decreased in June as fish moved downbay to spawn but increased in July as these fish returned and young-of-year began to appear in the catch. The catch of bay anchovy declined slightly in August (Fig. 3.1.6a-22). Although it was taken in all regions during summer the greatest catch occurred in the central-west region, the lowest was in the channel regions (Fig. 3.1.6a-24). Catch was greater than spring levels in the three east regions and the central-west and northwest regions. Catch increased through November as young-of-year fish continued to be recruited into the local population and adults seeking warmer waters moved downriver into this area (Fig. 3.1.6a-22). Catch dropped sharply in December as these fish continued their movements to more suitable environs downbay. The distribution during fall was similar to that of summer although the catch was greater in all but the central-west and southwest regions (Fig. 3.1.6a-25).

Bay anchovy comprised 82.4 percent of the catch in May and from 24.7 to 51.2 percent of the monthly catch from July through November.

It was taken in all zones but was most abundant, based on annual n/T values, in zones SSC, W-2, E-1, and W-3. It was least abundant in zones E-3, RI-2, E-4, and in the channel zones (Table 3.1.6a-7). The annual n/T* value west of the channel was 90.3; to the east it was 66.4. The n/T for night collections was 10.4; for comparable day collections it was 109.0.

3. Hogchoker (n = 33,919, young and adult) comprised 26.5 percent of the total catch. Catch frequency was 584, the greatest of all species. The annual n/T was 37.0; the n/T* was 55.4 (Table 3.1.6a-7). Length range was 22-192 mm.

It was taken from March through December (Fig. 3.1.6a-26). Few were taken in March. Catch increased through May as yearlings and subsequently, older fish immigrated into the study area from wintering grounds downbay. During spring it was taken in all regions. Catch levels were similar in regions of abundance but were very low in the channel regions (Fig. 3.1.6a-27). The abundance of hogchoker continued to increase through August (Fig. 3.1.6a-26). This was evidenced by the greater catch in all regions during summer. The distribution was similar to that of spring. (Fig. 3.1.6a-28). The catch during this period was predominated by yearlings. Abundance remained high through October as young-of-year fish began to appear in the catch. However, it dropped in November and continued to decline in December, as larger fish and then smaller specimens migrated downbay (Fig. 3.1.6a-26). It continued to be taken in all regions during fall. Abundance was greatest in the two central regions and the northeast region. Catch was lower than summer levels in three regions, most notably in the southwest region. It was greater than summer levels in the northwest, central-west, and central-east regions.

Hogchoker comprised 60.5 percent of the catch in December and from 32.6 to 51.0 percent of the monthly catch from August through November.

It was taken in all zones but was most abundant, based on annual n/T values, in zones W-3, E-5, W-1, SW1, and E-6. It was least abundant in RI2, RI1, and in the channel zones (Table 3.1.6a-7). The annual n/T* value west of the channel was 73.5; to the east it was 57.1. The n/T for night collections was 86.8, for comparable day collections it was 37.5.

4. White perch (n = 2,909, young and adult) comprised 2.3 percent of the total catch. Catch frequency was 273. The annual n/T was 3.2; the n/T* was 10.3 (Table 3.1.6a-7). Length range was 32-287 mm.

It was taken from March through December (Fig. 3.1.6a-30). Catch was moderate in March and increased in April as yearlings and then older fish were taken. However, catch declined in May as many of these fish migrated upriver or into local tributaries. Although it was taken in all regions during spring, it was most abundant in the northeast, central-west, and southwest regions (Fig. 3.1.6a-31). Catch increased slightly in June but few were taken through the remainder of summer (Fig. 3.1.6a-30). During summer it was taken in abundance only in the northwest and northeast regions and was absent from the catch in the south channel and southeast regions (Fig. 3.1.6a-32). It was again common in October and November. Abundance peaked in December as fish of several age groups were taken as they migrated through the study area enroute to wintering grounds downbay (Fig. 3.1.6a-30). During fall, it was taken in all regions. Catch was greatest in the central and northern regions west and east of the channel (Fig. 3.1.6a-33).

White perch comprised 83.3, 45.2, and 30.2 percent of the catch in March, April, and December, respectively.

It was taken in all zones but was most abundant, based on annual n/T values, in zones SW-1, E-5, SSC, and NE2. It was least abundant in the central and southern east zones and the channel zones (Table 3.1.6a-7). The annual n/T* value west of the channel was 13.7; to the east it was 9.8. The n/T for night collections was 4.7, for comparable day collections it was 3.8.

5. Spot (n = 1,067, almost all age 0+ young) comprised 0.8 percent of the total catch. Catch frequency was 203. The annual n/T was 1.2; the n/T* was 5.3 (Table 3.1.6a-7). Length range was 22-233 mm.

It was taken from June through December (Fig. 3.1.6a-34). Few were taken in June. Catch increased through August as larger young-of-year immigrated into this area from downbay (Fig. 3.1.6a-34). Although it was taken in all regions during summer its abundance was greater in the northern and central regions (Fig. 3.1.6a-35). Catch dropped slightly in September but increased again in October (Fig. 3.1.6a-34). This increase probably resulted from movements of spot into the study area from upriver nursery areas with the approach of winter. Abundance decreased through December as larger and subsequently, smaller fish continued their downbay migration. Catch was greater than summer levels in five regions, most notably in the southwest and southeast regions (Fig. 3.1.6a-36). However, the distribution during fall was generally similar to that in summer.

Spot comprised less than 2.4 percent of any monthly catch.

It was taken in all zones except RI1. It was most abundant, based on annual n/T values, in zones SSC, NE2, W-2, NE1, and NW2 and least abundant among the central and southern east zones and the channel zones (Table 3.1.6a-7). The annual n/T* value west of the channel was 6.1; to the east it was 5.6. The n/T for night collections was 3.8; for comparable day collections it was 8.0.

6. Atlantic croaker (n = 884, all but one age 0+ young) comprised 0.7 percent of the total catch. Catch frequency was 100. The annual n/T was 1.0; the n/T* was 7.9 (Table 3.1.6a-7). Length range was 16-90 mm.

It was taken from September through December (Fig. 3.1.6a-37). Few were taken in September. Catch increased in October, peaked in November, and decreased in December. Croaker was well distributed among regions during this period although the catch was greatest among west regions (Fig. 3.1.6a-38).

Atlantic croaker comprised 5.7 percent of the November catch but less than 2.5 percent of any other monthly catch.

It was taken in all zones except E-2. It was most abundant, based on annual n/T values, in zones SW2, NW2, and RI1 and least abundant among the central east zones (Table 3.1.6a-7). The annual n/T* value west of the channel was 14.9; to the east it was 3.5. The small number of Atlantic croaker taken in day-night collections precludes any comparison.

7. American eel (n = 814, several age groups) comprised 0.6 percent of the total catch. Catch frequency was 219. The annual n/T was 0.9; the n/T* was 3.4 (Table 3.1.6a-7). Length range was 35-566 mm.

It was taken from April through December (Fig. 3.1.6a-39). Few were taken from April through June. During this period it was taken in all regions except the south channel and northeast regions (Fig. 3.1.6a-40). Numbers increased in July and August but decreased in September (Fig. 3.1.6a-39). Catch during summer was greater than spring in all regions.

It was taken in greatest abundance in the central-east and northeast regions (Fig. 3.1.6a-41). Catch decreased gradually through December (Fig. 3.1.6a-39). It was again taken in all regions during fall although catch in all but one region decreased from summer levels (Fig. 3.1.6a-42).

American eel comprised less than 1.7 percent in any monthly catch.

It was taken in all zones but was most abundant, based on annual n/T values, in zones RI1, RI2, and W-1. It was least abundant in zones CHA1, CHA2, SE0, and SE3 (Table 3.1.6a-7). The annual n/T* values west of the channel was 3.1; to the east it was 4.4. The n/T for night collections was 2.8; for comparable day collections it was 0.4.

8. Blueback herring (n = 594, mostly age 0+ and 1+ young) comprised 0.5 percent of the total catch. Catch frequency was 125. The annual n/T was 0.6; the n/T* was 4.4 (Table 3.1.6a-7). Length range was 53-235 mm.

It was taken from April through August and during November and December (Fig. 3.1.6a-43). Relatively large numbers were taken during April. The catch comprised exclusively age 1+ specimens. Numbers decreased in May. It was taken in relatively uniform abundance in all regions during spring (Fig. 3.1.6a-44). Few were taken from June through August (Fig. 3.1.6a-43). It was again taken in abundance in November and December as age 0+ fish passed through the area from upriver nursery grounds (Fig. 3.1.6a-43). Yearlings also appeared in the catch but in low numbers. It was taken in nearly equal abundance in all regions (Fig. 3.1.6a-45).

Blueback herring comprised about 17.7 of the April catch but less than 2.5 percent of any other monthly catch.

It was taken in all zones but was most abundant, based on annual n/T values, in zones SSC, NE1, E-1, and E-2. It was least abundant in zones E-5, SE0, W-2, W-3, and NW1 (Table 3.1.6a-7). The annual n/T* value west of the channel was 3.3; to the east it was 5.3. The n/T for night collections was 1.7; for comparable day collections it was 25.0. However, these results are biased by one large catch (125 specimens) taken during one day collection. The night catch was greater in all other day-night collections.

Preoperational Comparison

Monthly and annual trawl catch per effort values (n/T*, based on samples in which the species was taken) of weakfish, bay anchovy, hogchoker, spot, and Atlantic croaker during 1978 were within or exceeded the range recorded during the preoperational years 1970-1976 (Table 3.1.6a-8).

The zero catch of blueback herring in March was below the preoperational range. However, unusually low water temperature that month may have inhibited the immigration of these fish into the study area. The catch of blueback herring in April was well within the preoperational range. The catch of American eel in May was below the preoperational range. However, in other months the catch was well within this range. The monthly catch of white perch in April, May, July, and November were below the respective monthly preoperational range. However, the reduced catch in 1978 appears to follow an observed decline in the local abundance of white perch since 1972.

### 3.1.6a.5 Gill Net

Gill nets were fished in the spring and fall to monitor the period of occurrence and distribution of alosids during migratory movements through the study area.

#### MATERIAL AND METHODS

##### Field

All samples required under this ETS were collected. Collections were taken during daylight at four zones from March 23 through November 24 (Fig. 3.1.6a-46). Monthly effort was 31.5 drift hours in March, 33.0 in April, 31.5 in May, 19.5 in June, 5.0 in September, 35.0 in October, and 16.0 in November.

Samples were taken with 91.4-m floating gill nets constructed of nylon monofilament in stretched mesh sizes of 2.5 (1 in), 3.8 (1 1/2 in), 7.9 (3 1/8 in), and 14.0 (5 1/2 in) cm.

Gear deployment, sample processing, and collection of physicochemical data were as in 1977, for complete description see the 1977 Annual Environmental Operating Report.

##### Data Reduction

Data are discussed with the following statistics: n = number of specimens, n/drift hr = number of specimens per drift hour, and n/drift hr* = number of specimens per drift hour in which the species was taken.

RESULTS

A total of 8,884 specimens of 20 species were taken in 171.5 drift hours (76.5 west of the shipping channel, 95.0 in the east) (Tables 3.1.6a-9 and 10). The following accunits are of the three alosid species taken, Atlantic menhaden, and bluefish. Together these fishes comprised 98.8 percent of the total catch. Summary catch data are presented in Tables 3.1.6a-9 through 11.

SPECIES ACCOUNTS

1. Atlantic menhaden (n = 6,776, young and adult) comprised 76.3 percent of the total catch. Length range was 67-298 mm.

It was collected from April through November (Table 3.1.6a-9). The n/drift·hr* was high (Table 3.1.6a-10) and indicative of the schooling behavior of this species. Catch was greatest in May (n/drift hr = 92.5), October (72.3), and November (48.0). In the spring the catch comprised yearlings and older age groups. Length range was 96-298 mm.

In the fall most fish taken were young-of-year and ranged in length from 67-150 mm. The remainder were of older age groups (length range 151-274 mm).

It was taken both east and west of the channel during all months. However, in May abundance was greater east of the shipping channel (n/drift hr = 114.1 east vs. 59.8 west). From June through November the n/drift hr was greater in the west.

2. Blueback herring (n = 1,478, young and adult) comprised 16.6 percent of the total catch. Length range was 79-315 mm.

It was collected in all months except September (Table 3.1.6a-9).

Adults (n = 51), enroute to spawning areas, were taken from March through May, with the greatest weekly n/drift in late April (Table 3.1.6a-11). There were 1,140 yearlings taken in the spring; most were caught in May (Table 3.1.6a-9).

Young-of-year (n = 287) were taken during October and November as they emigrated from nursery areas. Weekly n/drift hr during the fall was greatest during the first two weeks of November (Table 3.1.6a-11).

It was taken both east and west of the channel during all months except March. The annual n/drift hr was greater in the east (12.7) than west (3.6).

3. Alewife (n = 370, young and adult) comprised 4.2 percent of the total catch. Length range was 71-310 mm.

It was collected from March through June and in October and November. The alewife was the first of the alosid species to be taken in large numbers during the spring season, indicating its relatively early spawning habit. Adults (n = 300), enroute to spawning areas, were taken from March through mid-May. Weekly n/drift hr during the spring was greatest from late March through mid-April (Table 3.1.6a-11). Five yearlings were taken in the spring.

Young-of-year (n = 65), emigrating from nursery areas, were taken during October and November. During this period weekly n/drift hr was greatest from mid-October through mid-November (Table 3.1.6a-11).

It was taken east and west of the channel in all months. The n/drift hr was greater in the west during March, April, and October but greater in the east during June and November.

4. Bluefish (n = 121, young and adult) comprised 1.4 percent of the total catch. Length range was 86-544 mm.

It was collected from May through November (Table 3.1.6a-9). Catch was greatest during June (n/drift hr = 1.3), September (5.4), and October (1.7).

Older fish comprised most of the catch in May and June. Length range was 350-466 mm. The remainder were yearlings.

From September through November young-of-year (length range 90-200 mm) predominated the catch.

The species was taken east and west of the channel during all months. The n/drift hr was greater in the west during May, September, and October. It was greater in the east during June and November.

5. American shad (n = 30, young and adult), comprised 0.3 percent of the total catch. Length range was 110-505 mm.

It was collected from March through June and in November (Table 3.1.6a-9). Adults (n = 21) enroute to spawning areas were taken from March through May. The weekly n/drift hr in the spring was greatest during mid-April (Table

3.1.6a-11). Seven yearlings were taken from late May through June. Two young-of-year were taken in mid-November.

The n/drift hr was greater in the east for all months except April.

### 3.1.6b Juvenile and Adult Fishes - Tidal Tributaries (ETS Section 3.1.2.1.1g)

The fishes of three tidal tributaries of the Delaware River near Artificial Island, Appoquinimink Creek, Delaware and Alloway and Hope creeks, New Jersey, were sampled in 1978 by seine and trawl (Figs. 3.1.6b-1 and 2). Objectives were to 1) identify species and life stages that utilize the tributaries and 2) describe seasonal changes in species composition and distribution.

#### 3.1.6b.1 Summary

A total of 4,299 specimens of 33 species were taken in combined seine and trawl collections. The catch comprised freshwater, brackish water, and estuarine species. Mummichog (n = 915), Atlantic silverside (811), banded killifish (374), silvery minnow (259), and tessellated darter (252) were the most abundant species taken by seine. Together these fish comprised some 82 percent of the annual catch. Hogchoker (n = 302), white perch (205), spot (150), weakfish (106), and brown bullhead (92) were the most abundant species taken by trawl and comprised nearly 76 percent of the annual catch.

Several species including mummichog, white perch, brown bullhead, and hogchoker were taken in nearly all months of sampling. However, for most species the period of occurrence was seasonal and strongly related to water temperature and salinity.

During spring, the catch was predominated by fresh and brackish water species, eg. mummichog and banded killifish in the shore zone and white perch in the deeper waters. Hogchoker was taken in abundance in the deeper waters. Peak catch in the shore zone occurred during summer as large numbers of fresh and brackish water species (e.g. tessellated darter and silvery minnow) and estuarine fishes (e.g. Atlantic silverside and bay anchovy) were taken. Catch in deeper waters increased slightly over spring levels. Weakfish and hogchoker were the only species taken in abundance. White perch and bay anchovy were common.

The catch in the shore zone decreased sharply during fall. Only Atlantic silverside and mummichog were taken in abundance. However, peak catch in deeper waters occurred during this period as the numbers of several fresh and brackish water species increased. Spot, hogchoker, white perch, and brown bullhead were most abundant.

By December only mummichog remained in abundance in the shore zone. Silvery minnow and white perch were common in the deeper waters.

### 3.1.6b.2 Materials and Methods

FIELD

All samples required under this ETS were collected. Biweekly to monthly seine and trawl samples were taken during daylight from March 27 through December 21. Seines were hauled at three stations each in Alloway and Appoquinimink creeks (Table 3.1.6b-1, Fig. 3.1.6b-1). Trawls were hauled in three zones each in Appoquinimink and Alloway creeks and two zones in Hope Creek (Table 3.1.6b-2, Fig. 3.1.6b-2).

Gear included a 3.0-m x 1.2-m (10.0-ft x 4.0-ft) flat seine with 3.2-mm (1/8-in) stretched mesh and a 2.7-m (9.0-ft) semi-balloon otter trawl.

Gear deployment, sample processing, and collection of physicochemical data were as in 1977; for a complete description see the 1977 Annual Environmental Operating Report.

DATA REDUCTION

Data are discussed on the following statistics: s = species variety, n = number of specimens, T = number of trawl hauls, n/T = number of specimens per trawl haul, and n/coll = number of specimens per seine collection.

Monthly mean and standard deviation for the more abundant species were calculated from log (x + 1) transformed catch per effort values of pooled semimonthly or monthly collections. Seasonal means by station or zone were calculated from log (x + 1) transformed catch per effort values for spring (March 16 through June 15), summer (June 16 through September 15), and fall (September 16 through December 15).

Principal components analysis (BMPD4M Factor Analysis; Dixon, 1975) was used to calculate and display similarities in the catch composition among zones and stations. This method is described by Marriott (1974) and Pielou (1977). The twelve more abundant species taken by seine and the nine taken by trawl were included as variables and stations or zones as observations. A species by species (R-mode) product moment correlation matrix was calculated from log (x + 1) transformed catch data. The factor scores for each zone along only the first three component axes were plotted.

3.1.6b.3 Results

TEMPORAL CATCH COMPOSITION

A total of 3,173 specimens of 26 species were collected in 79 seine collections; 1,126 specimens of 20 species were taken in 111 trawl collections (Tables 3.1.6b-3 and 4). Thirty-three species were taken in all; 13 were taken by both gear types. The most abundant species taken by seine were mummichog (n = 915), Atlantic silverside (811), banded killifish (374), silvery minnow (259), and tessellated darter (252). Together these comprised 82.3 percent of the annual catch. Hogchoker (n = 302), white perch (205), spot (150), weakfish (106), and brown bullhead (92) were the most abundant species taken by trawl and comprised 75.9 percent of the annual catch.

Several species, including mummichog, white perch, brown bullhead, and hogchoker were taken in nearly all months of sampling. However, the period of occurrence of other species was seasonal and correlated strongly to variations in salinity and water temperature.

From March through May species variety and fish abundance were low. The catch comprised fresh or brackish water species and the estuarine hogchoker, bay anchovy, and Atlantic silverside. During this period mummichog and banded killifish predominated the shore zone catch; hogchoker, white perch, and brown bullhead were most abundant in deeper waters.

The number of species taken, particularly in the shore zone, increased in June as both adult and young-of-year of many freshwater species and alosids appeared as spawning activities of these fishes peaked. Several estuarine species, including Atlantic menhaden, spot, and weakfish were first taken. Fewer species were taken during July and August. Catch levels in the shore zone peaked during the summer season as large numbers of Atlantic silverside, mummichog, silvery minnow, and tessellated darter appeared in the catch. Bay anchovy, white perch, and Atlantic menhaden were taken in moderate numbers. In the deeper waters catch increased slightly over spring levels; weakfish and hogchoker were most abundant.

Species variety and catch levels decreased in the shore zone during fall. The catch of nearly all species was lower than during summer, particularly those that were abundant during the summer. Although abundance decreased, Atlantic silverside and mummichog remained the most abundant species in the shore zone. Conversely, species variety and catch levels increased in the deeper waters. Spot, hogchoker, white perch, and brown bullhead were most abundant. By December, few species were taken in the shore zone and only mummichog was abundant. In the deeper waters, ten species were taken but their catch was low. Silvery minnow and white perch were common.

## SPATIAL CATCH COMPOSITION

A total of 2,036 specimens of 19 species were taken by seine in Alloway Creek and 1,137 specimens of 22 species were taken in Appoquinimink Creek (Table 3.1.6b-3). Fifteen species were common to both tributaries. The more abundant species in one tributary were also abundant in the other. Abundant in both tributaries were mummichog, Atlantic silverside, banded killifish, silvery minnow, tessellated darter, bay anchovy, and white perch. Bluegill, pumpkinseed, alewife, and white crappie were among the fishes taken only in Appoquinimink Creek; spot, bluefish, largemouth bass, and black crappie were taken only in Alloway Creek.

The trawl catch was 692 specimens of 19 species in Appoquinimink Creek, 381 specimens of 16 species in Alloway Creek, and 53 specimens of 10 species in Hope Creek (Table 3.1.6b-4). Catch composition in Appoquinimink and Alloway creeks was similar. Most species abundant in one tributary were also abundant in the other; white perch and brown bullhead were abundant only in Appoquinimink Creek and bay anchovy only in Alloway Creek. The more abundant species common to both tributaries included hogchoker, spot, and weakfish. Species taken only in Appoquinimink Creek were gizzard shad, mummichog, striped bass, and yellow perch. Winter flounder was taken only in Alloway Creek. Species variety and abundance were low in Hope Creek and species taken were also taken in the other tributaries.

Similarity in catch among seine stations and trawl zones was calculated through the principal component analysis (Figs. 3.1.6b-3 and 4). The first three components of the station comparison explain 90.0 percent of the total variance (Factor I = 37.4 percent; Factor II = 29.7; Factor III = 22.9). From the analysis, stations ALL1, ALL2, and APP3 are grouped, as are ALL3 and APP6 (Fig. 3.1.6b-3). Station APP5 appears unique. The first three components of the zone comparison explain 87.1 percent of the total variance (Factor I = 65.4 percent; Factor II = 12.3; Factor III =

9.4). The analysis indicates that zones HOP1, HOP2, and ALL4 are similar and form one group (Fig. 3.1.6b-4). In addition, zones APP3 and ALL1 are grouped with Zone APP1. Zones APP5 and ALL5 appear dissimilar from other zones.

The grouping of the zones and stations in relation to tributary mileage (distance from mouth) suggests that a factor such as salinity has a strong influence on catch composition.

SPECIES ACCOUNTS

The eight most abundant species, each represented by more than 200 specimens in the combined seine and trawl catch,dare discussed in order of decreasing abundance. The following species accounts are based on annual summary data presented in Tables 3.1.6b-3 and 4 and monthly and seasonal data presented in Figures 3.1.6b-5 through 22. Additional data have been included that are not presented in tabular form but are contained in the PSE&G aquatic data base.

1. Mummichog (n = 916, young and adult) comprised 21.3 percent of the total seine and trawl catch. All but one were taken by seine. The annual n/coll was 11.5 (Table 3.1.6b-3). Length range was 13-108 mm.

It was taken from March through December (Fig. 3.1.6b-5). Large numbers were taken from March through July, except in May. After July the catch declined through November and increased to peak levels in December.

Distribution of mummichog in Alloway and Appoquinimink creeks was dissimilar (Fig. 3.1.6b-6). In Alloway Creek the catch was greatest during all seasons at the station furthest downstream (ALL3). The catch at ALL1 was greater than ALL2 during spring and fall but was less than ALL2 during summer. In Appoquinimink Creek most of the spring catch was collected at APP3 followed in order by APP6 and APP5. During summer the catches at APP3 and APP6 were nearly equal; none were collected at APP5. Few were taken during fall.

2. Atlantic silverside (n = 811, young and adult) comprised 18.8 percent of the total seine and trawl catch. All were collected by seine. The annual n/coll was 10.3 (Table 3.1.6b-3). Length range was 18-97 mm.

It was taken in April and June through November (Fig. 3.1.6b-7). Abundance peaked in July and declined steadily through November except in October when the catch increased slightly.

Abundance during summer and fall was greatest at stations nearest the mouths (ALL3, APP6) of both tributaries (Fig. 3.1.6b-8). In Alloway Creek the catch at ALL2 was greater than ALL1 during summer and fall. In Appoquinimink Creek none were taken at APP5 during summer and few were taken at APP3 and APP5 during fall.

3. Banded killifish (n = 374, young and adult) comprised 8.7 percent of the total seine and trawl catch. All were taken by seine. The annual n/coll was 4.7 (Table 3.1.6b-3). Length range was 18-91 mm.

It was taken from April through December except during August and November (Fig. 3.1.6b-9). Peak abundance occurred in April and the catch declined steadily thereafter. Few were taken in September, October, and December.

In both tributaries abundance during spring was greatest at the stations furthest upstream and decreased progressively downstream (Fig. 3.1.6b-10). The distribution was similar in Alloway Creek during summer. Few were taken during summer in Appoquinimink Creek or during fall in either tributary.

4. White perch (n = 324, several age groups) comprised 7.5 percent of the total seine and trawl catch. Some 63 percent were taken by trawl. The annual n/T and n/coll were 1.8 and 1.5, respectively (Tables 3.1.6b-3 and 4). Length range was 13-208 mm.

It was taken by trawl from March through November (Fig. 3.1.6b-11). Large numbers were taken in April and October. Catch declined from April through August and increased through October.

It was taken by seine from June through October (Fig. 3.1.6b-12). Peak abundance was in June and the catch declined steadily thereafter.

During spring, white perch were most abundant in the trawl zones furthest upstream (Fig. 3.1.6b-13). In the summer the catch was similar in all zones although lowest in the zones closest to the mouths of the tributaries. During fall, the distribution in Appoquinimink Creek was similar to that in spring. Few were taken in Alloway Creek during fall.

Seine catch distributions were similar to trawl in that abundance was greatest at stations furthest upstream (Fig. 3.1.6b-14).

5. Hogchoker (n = 307, mostly age 0+ young) comprised 7.1 percent of the total seine and trawl catch. All but five were collected by trawl. The annual n/T was 2.8 (Table 3.1.6b-4). Length range was 30-156 mm.

It was collected from March through November (Fig. 3.1.6b-15). Large numbers were first taken in April. Catch decreased in May but increased to peak numbers in September. Abundance steadily declined through November.

During spring, distribution in Alloway and Appoquinimink creeks was similar; abundance increased in an upstream progression (Fig. 3.1.6b-16). During summer, the catch in Alloway Creek was greatest at ALL4; in Appoquinimink Creek abundance remained greatest upstream. During fall, as fish migrated down both tributaries, abundance decreased in the upstream zones.

6. Silvery minnow (n = 304, young and adult) comprised 7.1 percent of the total seine and trawl catch. Some 85 percent were collected by seine. The annual n/coll was 3.3 (Table 3.1.6b-3). Length range was 14-124 mm.

It was taken in April and June through October (Fig. 3.1.6b-17). Few were taken in April. Abundance peaked in June and decreased steadily through October.

Distribution during summer was similar in both tributaries with greatest abundance occurring at upstream stations (Fig. 3.1.6b-18). This pattern continued during fall in Appoquinimink Creek; few were taken during fall in Alloway Creek.

7. Tessellated darter (n = 252, young and adult) comprised 5.9 percent of the total seine and trawl catch. All were taken by seine. The annual n/coll was 3.2 (Table 3.1.6b-3). Length range was 15-86 mm.

It was taken from June through October except in August (Fig. 3.1.6b-19). Peak abundance occurred in June after which the catch declined steadily.

Distribution was restricted to upstream stations of both tributaries during all seasons (Fig. 3.1.6b-20).

8. Bay anchovy (n = 218, young and adult) comprised 5.1 percent of the total seine and trawl catch. Some 65 percent were collected by seine. The annual n/coll was 1.8 (Table 3.1.6b-3). Length range was 14-81 mm.

It was collected by seine from June through October (Fig. 3.1.6b-21). Abundance was low in June, increased to peak level in August, and subsequently decreased.

Distribution in the two tributaries was dissimilar (Fig. 3.1.6b-22). In Alloway Creek it was taken in abundance only during summer when it occurred more abundantly at stations ALL2 and ALL3. In Appoquinimink Creek it was taken in low numbers during all seasons and was taken only at APP6 during spring and summer and APP3 during fall.

TABLE 3.1.6a-1
FISHES COLLECTED FROM THE DELAWARE RIVER AND FOUR TIDAL TRIBUTARIES NEAR ARTIFICIAL ISLAND
FROM JUNE 1968 TO DECEMBER 1978.

THOSE SPECIES TAKEN OUTSIDE OF, BUT ADJACENT TO, THE STUDY AREA HAVE THE LOCALITY NOTED IN PARENTHESES AFTER THE COMMON NAME. HABITAT: M = MARINE; B = BRACKISH ( SALINITY 1-10 PPT ); F = FRESH. PRIMARY ACTIVITY IN AREA: M = MIGRANT; SP = SPAWNING IN AREA; SF = SUMMER FEEDING; WF = WINTER FEEDING; N = NURSERY; R = RESIDENT SPECIES; ST = STRAY. TYPE OF GEAR: T = TRAWL, S = SEINE, G = GILL NET. SPECIES OBSERVED BUT NOT COLLECTED ARE MARKED WITH AN ASTERISK.

| SPECIES | HABITAT | PRIMARY ACTIVITY IN AREA | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PETROMYZONTIDAE - LAMPREYS | | | | | | | | | | | | | |
| PETROMYZON MARINUS-SEA LAMPREY | M,B,F | M | * | * | T | T | T | G,T | S,T,G | T | G | T | T,G |
| CARCHARHINIDAE - REQUIEM SHARKS | | | | | | | | | | | | | |
| CARCHARHINUS OBSCURUS-DUSTY SHARK | M | ST | - | - | G | - | - | - | - | - | - | - | - |
| MUSTELUS CANIS-SMOOTH DOGFISH | M | ST | - | G | S | - | - | * | - | - | - | - | - |
| DASYATIDAE - STINGRAYS | | | | | | | | | | | | | |
| DASYATIS SABINA-ATLANTIC STINGRAY ( BOWERS BEACH ) | M | ST | - | G | - | - | - | - | - | - | - | - | - |
| MYLIOBATIDAE - EAGLE RAYS | | | | | | | | | | | | | |
| RHINOPTERA BONASUS-COWNOSE RAY | M | ST | - | - | T | - | - | - | - | - | - | - | T |
| ACIPENSERIDAE - STURGEONS | | | | | | | | | | | | | |
| ACIPENSER OXYRHNCHUS-ATLANTIC STURGEON | M,B,F | M | G | G | G | T | T | - | T | G | G | T,G | T |
| ANGUILLIDAE - FRESHWATER EELS | | | | | | | | | | | | | |
| ANGUILLA ROSTRATA-AMERICAN EEL | M,B,F | M,SF, N,R | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T |
| CONGRIDAE - CONGER EELS | | | | | | | | | | | | | |
| CONGER OCEANICUS-CONGER EEL | M | ST | - | - | - | - | - | - | S | - | - | - | - |
| CLUPEIDAE - HERRINGS | | | | | | | | | | | | | |
| ALOSA AESTIVALIS-BLUEBACK HERRING | M,B,F | SP,N | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | T,G | S,T,G | S,T,G | S,T,G |
| ALOSA MEDIOCRIS-HICKORY SHAD | M,B,F | M,SF | - | S,T | S,T | S,T,G | S,T,G | S,T,G | - | G | G,T | - | - |
| ALOSA PSEUDOHARENGUS-ALEWIFE | M,B,F | SP,N | T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | T,G |
| ALOSA SAPIDISSIMA-AMERICAN SHAD | M,B,F | M | G | G,T | G | S,T,G | G,T | S,G | G,T | S,T,G | S,T,G | S,T,G | T,G |
| BREVOORTIA TYRANNUS-ATLANTIC MENHADEN | M,B,F | N,SF | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G |
| CLUPEA HARENGUS-ATLANTIC HERRING | M | ST | - | - | - | S,T | - | G,T | G,T | T,G | G | - | - |
| DOROSOMA CEPEDIANUM-GIZZARD SHAD | F,B | R,SP | T | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | S,T | S,T,G | T |
| ENGRAULIDAE - ANCHOVIES | | | | | | | | | | | | | |
| ANCHOA HEPSETUS-STRIPED ANCHOVY | M,B | ST | S,T | T | S | S | S | S,T | S | - | - | S,T,G | G |
| ANCHOA MITCHILLI-BAY ANCHOVY | M,B,F | SP,N, SF | S,T | S,T | S,T | S,T | S,T | S,T,G | S,T | S,T,G | S,T,G | S,T,G | S,T,G |

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TABLE 3.1.6a-1
CONTINUED

| SPECIES | HABITAT | PRIMARY ACTIVITY IN AREA | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SALMONIDAE - TROUTS | | | | | | | | | | | | | |
| SALMO GAIRDNERI-RAINBOW TROUT | F | ST | - | - | - | - | - | - | - | - | - | - | G |
| UMBRIDAE - MUDMINNOWS | | | | | | | | | | | | | |
| UMBRA PYGMAEA-EASTERN MUDMINNOW | F | ST | - | - | S | - | - | - | - | S | - | S | - |
| ESOCIDAE - PIKES | | | | | | | | | | | | | |
| ESOX AMERICANUS-REDFIN PICKERAL | F,B | R,SP | - | S | S | S | S | S | - | - | - | - | - |
| ESOX NIGER-CHAIN PICKERAL | F,B | R,SP | - | S | S | - | S | - | - | - | - | - | - |
| SYNODONTIDAE - LIZARDFISHES | | | | | | | | | | | | | |
| SYNODUS FOETENS-INSHORE LIZARDFISH | M | ST | - | - | - | - | - | T | S,T | S | S | - | S,T |
| CYPRINIDAE - MINNOWS AND CARPS | | | | | | | | | | | | | |
| CARASSIUS AURATUS-GOLDFISH | F,B | R,SP | - | S,T | S,T | S | - | - | S,T | S,T | S | T | S |
| CYPRINUS CARPIO-CARP | F,B | R,SP | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G |
| HYBOGNATHUS NUCHALIS-SILVERY MINNOW | F,B | R,SP | - | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T |
| NOTEMIGONUS CRYSOLEUCAS-GOLDEN SHINER | F,B | R,SP | - | S | S | S,T | S,T | S | S | S | S | - | - |
| NOTROPIS ANALOSTANUS-SATINFIN SHINER | F | R,SP | - | S | S | S | S | S | S | S | S | - | - |
| NOTROPIS HUDSONIUS-SPOTTAIL SHINER | F,B | R,SP | - | S,T | S | S,T | S | S,T | S | S | S | S | - |
| RHINICHTHYS ATRATULUS-BLACKNOSE DACE | F | ST | - | S | S | - | - | - | - | - | - | - | - |
| SEMOTILUS ATROMACULATUS-CREEK CHUB | F | ST | - | - | - | S | - | - | - | - | - | - | - |
| CATOSTOMIDAE - SUCKERS | | | | | | | | | | | | | |
| CARPIODES CYPRINUS-QUILLBACK | F | ST | - | S | - | - | - | - | - | - | - | - | - |
| CATOSTOMUS COMMERSONI-WHITE SUCKER ( UPPER CREEKS ) | F | R,SP | - | S | S | - | - | - | - | S | S | - | - |
| ERIMYZON OBLONGUS-CREEK CHUBSUCKER ( UPPER CREEKS ) | F | R,SP | - | S | S | S | - | - | - | - | - | - | - |
| ICTALURIDAE - FRESHWATER CATFISHES | | | | | | | | | | | | | |
| ICTALURUS CATUS-WHITE CATFISH | F,B | R,SP | T | S,T | S,T | S,T | S,T,G | T | S,T | T,G | S,T,G | S,T,G | T,G |
| ICTALURUS NEBULOSUS-BROWN BULLHEAD | F,B | R,SP | T | S,T | S,T | S,T | S,T,G | S,T | S,T | T | S,T | S,T | S,T,G |
| ICTALURUS NATALIS-YELLOW BULLHEAD | F | R | - | - | - | - | - | - | S | - | - | - | - |
| ICTALURUS PUNCTATUS-CHANNEL CATFISH | F | R,SP | T | S,T | S,T | T | T | S,T | S,T | T,G | S,T,G | S,T | T |
| NOTURUS GYRINUS-TADPOLE MADTOM ( UPPER CREEKS ) | F | R,SP | - | S | S | - | - | - | - | - | - | - | - |
| BATRACHOIDIDAE - TOADFISHES | | | | | | | | | | | | | |
| OPSANUS TAU-OYSTER TOADFISH | M,B | SF | T | T | T | S,T | T | T | T | T | T | T | T |
| LOPHIIDAE - GOOSEFISH | | | | | | | | | | | | | |
| LOPHIUS AMERICANUS-GOOSEFISH | M,B | ST | - | - | * | - | - | * | - | - | - | - | - |
| GADIDAE - CODFISHES | | | | | | | | | | | | | |
| MERLUCCIUS BILINEARIS-SILVER HAKE | M | ST | - | - | - | T | - | - | T | T | - | - | - |
| POLLACHIUS VIRENS-POLLOCK (LEWES) | M | ST | - | - | - | S | - | - | - | - | - | - | - |
| UROPHYCIS CHUSS-RED HAKE | M | ST | - | - | - | T | T | T | T | T | - | T | T |

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TABLE 3.1.6a-1
CONTINUED

| SPECIES | HABITAT | PRIMARY ACTIVITY IN AREA | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UROPHYCIS REGIUS-SPOTTED HAKE | M,B | SF | T | T | S,T | S,T | T | T | T | S,T | S,T | S,T | T |
| OPHIDIIDAE - CUSK-EELS AND BROTULAS | | | | | | | | | | | | | |
| RISSOLA MARGINATA-STRIPED CUSK-EEL | M,B | ST | T | T | S,T | S,T | - | S,T | T | T | S,T | T | T |
| EXOCOETIDAE - FLYING FISHES AND HALFBEAKS | | | | | | | | | | | | | |
| HYPORHAMPHUS UNIFASCIATUS-HALFBEAK | M | ST | - | - | S | S | - | - | - | S | S | S | - |
| BELONIDAE - NEEDLEFISHES | | | | | | | | | | | | | |
| STRONGYLURA MARINA-ATLANTIC NEEDLEFISH | M,B,F | N,SF | S | S,T | S | S,T | S | S | S,T | S | S,T | - | S,G |
| CYPRINODONTIDAE - KILLIFISHES | | | | | | | | | | | | | |
| CYPRINODON VARIEGATUS-SHEEPSHEAD MINNOW | M,B,F | SF | - | S | S | S | S | S | S | S | S | - | S |
| FUNDULUS DIAPHANUS-BANDED KILLIFISH | F,B,M | R,SP | - | S | S | S | S | S | S | S | ST | S | S |
| FUNDULUS HETEROCLITUS-MUMMICHOG | B,F,M | R,SP | S,T | S,T | S | S,T | S,T | S | S | S | S | S | S |
| FUNDULUS LUCIAE-SPOTFIN KILLIFISH | M,B | SF | S | S | S | S | S | - | - | - | - | - | - |
| FUNDULUS MAJALIS-STRIPED KILLIFISH | M,B | SF | S | S | S | S | S | S,T | S | S | S | S | S |
| LUCANIA PARVA-RAINWATER KILLIFISH | M,B | SF | - | - | S | - | - | S | - | - | - | - | - |
| POECILLIDAE - LIVEBEARER | | | | | | | | | | | | | |
| GAMBUSIA AFFINIS-MOSQUITOFISH | M,B,F | R,SP | - | S | S | S | S | - | - | - | - | - | - |
| ATHERINIDAE - SILVERSIDES | | | | | | | | | | | | | |
| MEMBRAS MARTINICA-ROUGH SILVERSIDE | M,B,F | SF,SP | S,T | S | S | S | S | S,T | S | S | S | S | - |
| MENIDIA BERYLLINA-TIDEWATER SILVERSIDE | B,F,M | R,SP | S,T | S | S | S,T | S,T | S | S | S | S | S | S |
| MENIDIA MENIDIA-ATLANTIC SILVERSIDE | M,B,F | R,SP | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T |
| GASTEROSTEIDAE - STICKLEBACKS | | | | | | | | | | | | | |
| APELTES QUADRACUS-FOURSPINE STICKLEBACK | M,B,F | WF | - | S,T | S | S | - | - | S,T | - | - | - | - |
| GASTEROSTEUS ACULEATUS-THREESPINE STICKLEBACK | M,B,F | WF | - | S,T | S | S,T | - | T | S,T | S | S | - | - |
| SYNGNATHIDAE - PIPEFISHES AND SEAHORSES | | | | | | | | | | | | | |
| HIPPOCAMPUS ERECTUS-LINED SEAHORSE | M,B | ST | - | T | - | S,T | - | - | - | - | - | - | - |
| SYNGNATHUS FUSCUS-NORTHERN PIPEFISH | M,B,F | N,SF | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T |
| PERCICHTHYIDAE - TEMPERATE BASSES | | | | | | | | | | | | | |
| MORONE AMERICANA-WHITE PERCH | B,F,M | R,SP | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G |
| MORONE SAXATILIS-STRIPED BASS | M,B,F | M,R, N,SF | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G |
| SERRANIDAE - SEA BASSES | | | | | | | | | | | | | |
| CENTROPRISTIS STRIATA-BLACK SEA BASS | M | ST | - | - | - | - | - | - | T | T | T | T | - |

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TABLE 3.1.6a-1
CONTINUED

| SPECIES | HABITAT | PRIMARY ACTIVITY IN AREA | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CENTRARCHIDAE - SUNFISHES | | | | | | | | | | | | | |
| ENNEACANTHUS CHAETODON-BLACKBANDED SUNFISH | F | ST | - | - | S | - | - | - | - | - | - | - | - |
| ENNEACANTHUS GLORIOSUS-BLUESPOTTED SUNFISH | F | ST | - | - | - | - | S | - | S,T | - | - | - | - |
| LEPOMIS AURITUS-REDBREAST SUNFISH ( UPPER CREEKS ) | F | R,SP | - | S | S | S | S | - | - | - | - | - | - |
| LEPOMIS GIBBOSUS-PUMPKINSEED | F,B | R,SP | - | S,T | S | S,T | S,T | S,T | S | S,T | S | S | - |
| LEPOMIS MACROCHIRUS-BLUEGILL | F,B | R,SP | T | S,T | S | S,T | S | S,T | S,T | S,T | S,T | S,T | S,T |
| MICROPTERUS DOLOMIEUI-SMALLMOUTH BASS | F,B | ST | - | - | - | - | - | - | S | - | - | - | - |
| MICROPTERUS SALMOIDES-LARGEMOUTH BASS | F,B | R,SP | - | S | S | S,T | S | S | S,T | S | S | S | - |
| POMOXIS ANNULARIS-WHITE CRAPPIE | F,B | R,SP | - | S | S | S,T | S,T | S | S | S | S | S | S,T |
| POMOXIS NIGROMACULATUS-BLACK CRAPPIE | F,B | R,SP | - | S,T | S,T | S,T | S | S,T | S,T | S | S | S | S,T |
| PERCIDAE - PERCHES | | | | | | | | | | | | | |
| ETHEOSTOMA OLMSTEDI-TESSELLATED DARTER | F,B | R,SP | - | S,T | S,T | S,T | S,T | S | S,T | S,T | S,T | S,T | - |
| PERCA FLAVESCENS-YELLOW PERCH | F,B | R,SP | S,T | S,T | S | S,T | S,T,G | S,T | S,T | S,T | S,T | S | S,T |
| POMATOMIDAE - BLUEFISHES | | | | | | | | | | | | | |
| POMATOMUS SALTATRIX-BLUEFISH | M,B,F | N,SF | S,T | S,T | S,T | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G |
| CARANGIDAE - JACKS AND POMPANOS | | | | | | | | | | | | | |
| CARANX HIPPOS-CREVALLE JACK | M,B,F | N,SF | S,T | S,T | S | S,T | S,T | S,T | S,T | S,T | S,T | - | S,T |
| SELENE VOMER-LOOKDOWN | M,B | ST | S | - | S | S | - | * | S,T | T | - | S | - |
| TRACHINOTUS CAROLINUS-FLORIDA POMPANO ( SLAUGHTER BEACH, LEWES ) | M | - | - | - | S | - | - | - | - | - | - | - | - |
| TRACHINOTUS FALCATUS-PERMIT ( SLAUGHTER BEACH, LEWES ) | M | - | - | - | S | S | - | - | - | - | - | - | - |
| VOMER SETAPINNIS-ATLANTIC MOONFISH | M | ST | - | T | S | - | - | - | - | - | - | - | - |
| LUTJANIDAE - SNAPPERS | | | | | | | | | | | | | |
| LUTJANUS GRISEUS-GREY SNAPPER | M,B,F | ST | - | S | S | S | - | - | - | - | - | - | - |
| SPARIDAE - PORGIES | | | | | | | | | | | | | |
| LAGODON RHOMBOIDES-PINFISH | M,B | ST | - | S | - | S | - | - | S | - | - | - | - |
| SCIAENIDAE - DRUMS | | | | | | | | | | | | | |
| BAIRDIELLA CHRYSURA-SILVER PERCH | M,B,F | N,SF | S,T | S,T | S,T | S,T | S,T | T | S,T | T | T | - | - |
| CYNOSCION REGALIS-WEAKFISH | M,B,F | N,SF | S,T | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G | S,T,G |
| LEIOSTOMUS XANTHURUS-SPOT | M,B,F | N,SF | S,T | S,T | T | S,T | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G | S,T,G |
| MENTICIRRHUS SAXATILIS-NORTHERN KINGFISH | M,B | ST | S,T | S | S | - | - | - | S,T | S | - | - | - |
| MICROPOGON UNDULATUS-ATLANTIC CROAKER | M,B,F | N,WF | - | T | T | S,T | S,T | T | S,T | S,T | S,T | T | S,T |
| POGONIAS CROMIS-BLACK DRUM | M,B,F | N,SF | S,T | S,T | S,T | S,T | S,T | T | S,T | S,T | - | S,T | S,T |

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TABLE3.1.6a-1
CONTINUED

| SPECIES | HABITAT | PRIMARY ACTIVITY IN AREA | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHAETODONTIDAE - BUTTERFLYFISHES | | | | | | | | | | | | | |
| CHAETODON OCELLATUS-SPOTFIN BUTTERFLYFISH | M | ST | - | - | - | - | - | - | T | - | - | - | - |
| MUGILIDAE - MULLETS | | | | | | | | | | | | | |
| MUGIL CEPHALUS-STRIPED MULLET | M,B,F | SF | - | S | S | - | - | S | S | - | S | S | - |
| MUGIL CUREMA-WHITE MULLET | M,B,F | ST | - | - | S | S | - | - | - | - | - | - | - |
| SPHYRAENIDAE -BARRACUDAS | | | | | | | | | | | | | |
| SPHYRAENA BOREALIS-NORTHERN SENNET ( LEWES ) | M | - | - | - | S | - | - | - | - | - | - | - | - |
| URANOSCOPIDAE - STARGAZERS | | | | | | | | | | | | | |
| ASTROSCOPUS GUTTATUS-NORTHERN STARGAZER | M,B | ST | T | - | T | S | T | - | S,T | T | T | T | T |
| GOBIIDAE - GOBIES | | | | | | | | | | | | | |
| GOBIOSOMA BOSCI-NAKED GOBY | M,B,F | N,SF | T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | T | T |
| GOBIOSOMA GINSBURGI-SEABOARD GOBY ( WOODLAND BEACH ) | M,B | SF | T | T | T | T | T | - | - | - | - | - | - |
| SCOMBRIDAE - MACKERELS AND TUNAS | | | | | | | | | | | | | |
| SCOMBER SCOMBRUS-ATLANTIC MACKERAL | M | ST | - | - | - | T | - | - | - | - | - | - | - |
| SCOMBEROMORUS MACULATUS-SPANISH MACKERAL | M | ST | - | - | - | - | - | - | - | - | G | - | - |
| STROMATEIDAE - BUTTERFISHES | | | | | | | | | | | | | |
| PEPRILUS TRIACANTHUS-BUTTERFISH | M,B | SF | T | T | T | T | - | T | T | T,G | T | T,G | T,G |
| PEPRILUS ALEPIDOTUS-HARVESTFISH | M | ST | - | - | - | - | - | - | - | - | - | - | T |
| TRIGLIDAE - SEAROBINS | | | | | | | | | | | | | |
| PRIONOTUS CAROLINUS-NORTHERN SEAROBIN ( BOWERS BEACH ) | M | ST | - | - | T | S,T | T | - | T | - | T | T | T |
| PRIONOTUS EVOLANS-STRIPED SEAROBIN | M,B | ST | T | T | - | T | T | - | S,T | T | S,T | - | T |
| COTTIDAE - SCULPINS | | | | | | | | | | | | | |
| MYOXOCEPHALUS AENAEUS-GRUBBY (LEWES) | M | - | - | - | - | S | - | - | - | - | - | - | - |
| BOTHIDAE - LEFTEYE FLOUNDER | | | | | | | | | | | | | |
| ETROPUS MICROSTOMUS-SMALLMOUTH FLOUNDER | M,B | ST | - | - | S | S | T | - | - | T | - | T | - |
| PARALICHTHYS DENTATUS-SUMMER FLOUNDER | M,B | ST | T | T | S,T | S,T | S,T,G | S,T | S,T,G | S,T | S,T | S,T | T,G |
| PARALICHTHYS OBLONGUS-FOURSPOT FLOUNDER | M,B | ST | - | - | - | - | - | - | - | T | - | - | - |
| SCOPHTHALMUS AQUOSUS-WINDOWPANE | M,B | ST | - | T | S,T | S,T | - | T | S,T | T | T | S,T | T |

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TABLE 3.1.6a-1
CONTINUED

| SPECIES | HABITAT | PRIMARY ACTIVITY IN AREA | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PLEURONECTIDAE - RIGHTEYE FLOUNDER | | | | | | | | | | | | | |
| PSEUDOPLEURONECTES AMERICANUS-WINTER FLOUNDER | M,B,F | N,SF | S,T | S,T | S,T | S,T | - | - | S,T | S,T | - | S,T | S,T |
| SOLEIDAE - SOLES | | | | | | | | | | | | | |
| TRINECTES MACULATUS-HOGCHOKER | M,B,F | N,SF | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T | S,T,G | S,T,G | S,T,G |
| CYNOGLOSSIDAE - TONGUEFISHES | | | | | | | | | | | | | |
| SYMPHURUS PLAGIUSA-BLACKCHEEK TONGUEFISH | M,B | - | - | - | - | - | - | - | - | T | S,T | - | - |
| BALISTIDAE - FILEFISHES | | | | | | | | | | | | | |
| ALUTERA SCHOEPFI-ORANGE FILEFISH | M | - | - | - | - | - | - | - | - | - | * | - | - |
| OSTRACIIDAE - BOXFISHES | | | | | | | | | | | | | |
| LACTOPHRYS TRIQUETER-SMOOTH TRUNKFISH | M | - | - | - | - | - | - | - | - | T | - | - | - |
| TETRAODONTIDAE - PUFFERS | | | | | | | | | | | | | |
| SPHAEROIDES MACULATUS-NORTHERN PUFFER | M,B | ST | - | S,T | S,T | S,T | S | - | T | - | - | S,T | - |

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TABLE 3.1.6a-2
DESCRIPTION OF SEINE STATIONS - 1978

PHD1

| | |
|---|---|
| LOCATION: | West shore of Delaware River at mouth of Peach House Ditch. |
| DESCRIPTION: | Station consists of a ditch ca. 70 yds long and a beach ca. 50 yds long. A small submerged sand bar extends across the mouth of the ditch. |
| BOTTOM COMPOSITION: | Sand and mud. |
| SLOPE OF BEACH: | Ten to 15 degrees at high tide; 3 to 5 degrees at low tide. |
| VEGETATION: | Little vegetation immediately adjacent to beach or ditch. Area north and south of ditch vegetated with marsh grass. |

SGB2

| | |
|---|---|
| LOCATION: | West shore of Delaware River at "Sam Green's Beach" located 1/4 mile north of the mouth of Appoquinimink Creek. |
| DESCRIPTION: | Station consists of 1/2-mile long beach. A small sand cliff about 8 ft high parallels the beach and slopes to beach level toward the northern end of the area. |
| BOTTOM COMPOSITION: | Sand at high tide; sand-mud-rubble at low tide. |
| SLOPE OF BEACH: | Ten degrees at high tide; 5 degrees at low tide. |
| VEGETATION: | No aquatic vegetation present. |

AUB3

| | |
|---|---|
| LOCATION: | West shore of Delaware River along Augustine Beach. |
| DESCRIPTION: | Station consists of 3/4-mile long beach interrupted by two launching ramps and two wooden breakwaters. Sunken barge borders north end. Most sampling done in 110-yard area between the two breakwaters. |
| BOTTOM COMPOSITION: | Sand at high tide; soft mud at low tide. |
| SLOPE OF BEACH: | Ten to 15 degrees at high tide; 5 degrees at low tide. |
| VEGETATION: | Little vegetation immediately adjacent to station. |

ST3A

| | |
|---|---|
| LOCATION: | West shore of Delaware River, 3/4 mile north of Canadas Beach. |
| DESCRIPTION: | Station consists of 1/4-mile long beach interrupted by clumps of peat and beach grass. Thousand Acre marsh spillpool and a shallow ditch located at southern end of station. |
| BOTTOM COMPOSITION: | Sand and mud at high tide; mud at low tide. |
| SLOPE OF BEACH: | Fifteen to 20 degrees at high tide; 5 to 10 degrees at low tide. |
| VEGETATION: | Little aquatic vegetation present. Beach bordered by high marsh grass. |

REI4

| | |
|---|---|
| LOCATION: | Delaware River east side of Reedy Island. |
| DESCRIPTION: | Station consists of 1/2-mile long beach at northern end of island. |
| BOTTOM COMPOSITION: | Sand and mud. |
| SLOPE OF BEACH: | Ten to 15 degrees at all tidal phases. |
| VEGETATION: | No aquatic vegetation. Beach bordered by high marsh grass. |

TABLE 3.1.6a-2

CONTINUED

ELP5

| | |
|---|---|
| LOCATION: | East shore of Delaware River, Elsinboro Point. |
| DESCRIPTION: | Station located on 80-yard beach interrupted with occasional grassy areas. Beach protected from direct tidal flow by a sand bar located about 1/4 mile offshore. |
| BOTTOM COMPOSITION: | Sand and gravel with some silt. |
| SLOPE OF BEACH: | Ten to 20 degrees at all tidal phases. |
| VEGETATION: | Beach bordered by high marsh grass. |

OB5A

| | |
|---|---|
| LOCATION: | East shore of Delaware River at Oakwood Beach. |
| DESCRIPTION: | Station consists of 1-mile section of beach located 3/4 mile north of Elsinboro Point. |
| BOTTOM COMPOSITION: | Sand and gravel. |
| SLOPE OF BEACH: | Ten to 20 degrees at high tide; 5 to 10 degrees at low tide. |
| VEGETATION: | No aquatic vegetation present. |

SSC6

| | |
|---|---|
| LOCATION: | East shore of Delaware River, in Sunken Ship Cove, on the southern end of Artificial Island. |
| DESCRIPTION: | Station consists of an 80-yard beach at the east end of Sunken Ship Cove. A sunken ship's hull forms a wall at east end. |
| BOTTOM COMPOSITION: | Soft sand at high tide and mud at low tide. |
| SLOPE OF BEACH: | Twenty degrees at high tide; 5 degrees at low tide. |
| VEGETATION: | No aquatic vegetation present. High marsh grass present about 30 yds inshore. |

HOP7

| | |
|---|---|
| LOCATION: | East shore of Delaware River; wedge-shaped beach south of Hope Creek between tower and bay marker. |
| DESCRIPTION: | Station consists of 70-yard section of beach flanked by steep peat banks and interrupted by clumps of peat and beach grass. |
| BOTTOM DESCRIPTION: | Sand and gravel with some hard mud. |
| SLOPE OF BEACH: | Five to 10 degrees at all tidal phases. |
| VEGETATION: | No aquatic vegetation present. |

MHC8

| | |
|---|---|
| LOCATION: | East shore of Delaware River north of Mad Horse Creek. |
| DESCRIPTION: | Station consists of beach about 70 yds long. |
| BOTTOM COMPOSITION: | Sand and mud. |
| SLOPE OF BEACH: | Ten to 12 degrees at high tide; 5 to 10 degrees at low tide. |
| VEGETATION: | Shoreline bordered by high marsh grass. |

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3.1-237

TABLE 3.1.6a-3
TOTAL NUMBER, RANK, AND PERCENT OF
TOTAL DAYLIGHT SEINE CATCH - 1978

| STATION | PHD1 | SGB2 | AUB3 | ST3A | REI4 | OB5A | ELP5 | SSC6 | HOP7 | MHC8 | TOTAL | RANK | PCT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLS. (10) | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 170 | | |
| NO. OF COLLS. (13) | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 17 | 170 | | |
| NO. OF COLLS. (15) | | | | | | | | | | | | | |
| NO. OF SPECIES | 18 | 15 | 16 | 20 | 14 | 14 | 13 | 13 | 8 | 8 | 32 | | |
| NO. OF SPECIMENS | 924 | 669 | 1,273 | 1,071 | 451 | 2,063 | 850 | 1,149 | 1,059 | 2,152 | 11,661 | | |
| SPECIES | | | | | | | | | | | | | |
| M. MENIDIA | 504 | 316 | 773 | 352 | 200 | 131 | 236 | 557 | 651 | 1,302 | 5,022 | 1 | 43.1 |
| A. MITCHILLI | 265 | 269 | 262 | 440 | 153 | 1,146 | 473 | 367 | 308 | 717 | 4,400 | 2 | 37.7 |
| CYPRINIDAE | | 38 | 13 | 39 | 7 | 537 | 40 | 4 | | | 678 | 3 | 5.8 |
| B. TYRANNUS | 42 | 5 | 60 | 24 | 34 | 207 | 52 | 59 | 72 | 103 | 658 | 4 | 5.6 |
| F. HETEROCLITUS | 68 | 8 | 125 | 158 | 38 | 8 | 27 | 41 | | 11 | 484 | 5 | 4.2 |
| L. XANTHURUS | 3 | 9 | 11 | 6 | 8 | 1 | 1 | 100 | | 3 | 142 | 6 | 1.2 |
| F. MAJALIS | 9 | | 9 | 1 | 1 | | 3 | 13 | 22 | 14 | 72 | 7 | .6 |
| C. REGALIS | 18 | 11 | 3 | 9 | | 5 | 8 | 1 | | | 55 | 8 | .5 |
| M. AMERICANA | 2 | 1 | 4 | 15 | 2 | 8 | | 1 | | | 33 | 9 | .3 |
| M. SAXATILIS | 1 | 1 | 3 | 2 | 1 | 6 | 5 | | | | 19 | 10 | .2 |
| P. CROMIS | 1 | 1 | 1 | 6 | 2 | | 1 | 1 | 1 | | 14 | 11 | .1 |
| A. ROSTRATA | | 3 | 2 | | | 7 | | | 1 | | 13 | 12 | .1 |
| P. SALTATRIX | 2 | | | 1 | 2 | 3 | 2 | | 1 | | 11 | 13 | .1 |
| H. NUCHALIS | 1 | 1 | | 4 | 1 | 1 | 1 | | | 1 | 10 | 14 | .1 |
| T. MACULATUS | | 4 | 2 | | | | | 3 | | | 9 | 15 | .1 |
| P. AMERICANUS | | | | 4 | 1 | | | 1 | | | 6 | 16 | .1 |
| S. FUSCUS | 1 | | 2 | 2 | | | | | | | 5 | 17 | .0 |
| S. FOETENS | | | | | | | | 1 | 3 | 1 | 5 | 17 | .0 |
| A. AESTIVALIS | | | | | 1 | 2 | 1 | | | | 4 | 19 | .0 |
| F. DIAPHANUS | 3 | 1 | | | | | | | | | 4 | 19 | .0 |
| C. CARPIO | | | | 3 | | | | | | | 3 | 21 | .0 |
| C. AURATUS | | | 1 | 1 | | | | | | | 2 | 22 | .0 |
| M. UNDULATUS | | | 2 | | | | | | | | 2 | 22 | .0 |
| I. NEBULOSUS | | | | 2 | | | | | | | 2 | 22 | .0 |
| S. MARINA | | | | | | 1 | | | | | 1 | 25 | .0 |
| C. VARIEGATUS | 1 | | | | | | | | | | 1 | 25 | .0 |
| M. BERYLLINA | 1 | | | | | | | | | | 1 | 25 | .0 |
| P. FLAVESCENS | 1 | | | | | | | | | | 1 | 25 | .0 |
| C. HIPPOS | 1 | | | | | | | | | | 1 | 25 | .0 |
| L. MACROCHIRUS | | 1 | | | | | | | | | 1 | 25 | .0 |
| P. ANNULARIS | | | | 1 | | | | | | | 1 | 25 | .0 |
| P. NIGROMACULATUS | | | | 1 | | | | | | | 1 | 25 | .0 |

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TABLE 3.1.6a-4
ANNUAL RANK AND PERCENT OF SEINE CATCH DURING 1970-1978

| | 1970 | | 1971 | | 1972 | | 1973 | |
|---|---|---|---|---|---|---|---|---|
| | Rank | percent of catch | Rank | percent of catch | Rank | percent of catch | Rank | percent of catch |
| M. menidia | 1 | 47.4 | 1 | 39.9 | 1 | 39.5 | 1 | 46.0 |
| A. mitchilli | 2 | 40.0 | 4 | 12.7 | 2 | 36.2 | 2 | 30.5 |
| B. tyrannus | 5 | 1.5 | 2 | 31.0 | 3 | 14.6 | 7 | 1.5 |
| F. heteroclitus | 4 | 1.6 | 7 | 1.1 | 5 | 1.4 | 5 | 1.8 |

| | 1974 | | 1975 | | 1976 | | 1977 | |
|---|---|---|---|---|---|---|---|---|
| | Rank | percent of catch | Rank | percent of catch | Rank | percent of catch | Rank | percent of catch |
| M. menidia | 2 | 28.7 | 1 | 34.5 | 2 | 33.6 | 2 | 33.0 |
| A. mitchilli | 1 | 43.2 | 2 | 34.4 | 1 | 34.0 | 1 | 50.8 |
| B. tyrannus | 3 | 13.0 | 3 | 17.6 | 3 | 22.7 | 3 | 6.7 |
| F. heteroclitus | 6 | 1.8 | 5 | 3.1 | 5 | 1.9 | 5 | 2.9 |

| | 1978 | |
|---|---|---|
| | Rank | percent of catch |
| M. menidia | 1 | 43.1 |
| A. mitchilli | 2 | 37.7 |
| B. tyrannus | 3 | 5.6 |
| F. heteroclitus | 4 | 4.2 |

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TABLE 3.1.6a-5
SEINE CATCH PER EFFORT (N/COLL) DURING 1975-1978 OF THE MOST ABUNDANT SPECIES
TAKEN IN 1978. A DASH INDICATES NO COLLECTIONS

| Date | Jan. n/coll | Feb. n/coll | Mar. n/coll | Apr. n/coll | May n/coll | June n/coll | July n/coll | Aug. n/coll | Sept. n/coll | Oct. n/coll | Nov. n/coll | Dec. n/coll | Annual n/coll |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *M. menidia* | | | | | | | |
| 1975 | 1.0 | 0.6 | 1.0 | 2.0 | 17.0 | 8.8 | 32.8 | 89.2 | 46.4 | 31.0 | 19.0 | 7.6 | 25.2 |
| 1976 | 0 | * | * | 10.4 | 4.0 | 8.2 | 31.4 | 41.4 | 77.2 | 24.2 | 10.4 | * | 26.0 |
| 1977 | - | - | 0 | 3.6 | 10.8 | 7.0 | 34.2 | 33.2 | 37.2 | 63.8 | 11.8 | 0.8 | 21.2 |
| 1978 | - | - | 0 | * | 8.2 | 39.8 | 95.0 | 31.8 | 37.6 | 63.2 | 10.7 | 3.8 | 29.5 |
| | | | | | | *A. mitchilli* | | | | | | | |
| 1975 | 0 | 0 | 0 | * | 34.0 | 18.6 | 26.2 | 59.8 | 28.0 | 58.1 | 19.0 | 0.2 | 25.2 |
| 1976 | 0 | 0 | 0 | 34.0 | 57.0 | 46.2 | 31.6 | 45.8 | 36.8 | 7.0 | 2.0 | 0 | 26.4 |
| 1977 | - | - | 0 | 8.0 | 35.0 | 6.0 | 44.0 | 78.4 | 125.2 | 8.2 | 5.8 | 0 | 32.8 |
| 1978 | - | - | 0 | 0 | 20.3 | 43.6 | 50.9 | 34.4 | 67.2 | 10.1 | 2.8 | 0 | 25.9 |
| | | | | | | *B. tyrannus* | | | | | | | |
| 1975 | 0 | 0 | 0 | 1.6 | 60.6 | 37.0 | 11.2 | 0.6 | 0 | * | 0.4 | 0.2 | 13.0 |
| 1976 | 0 | 0 | 0 | 4.2 | 131.2 | 65.6 | 18.8 | 11.0 | 2.4 | 0.8 | 0.4 | 0 | 17.6 |
| 1977 | - | - | 0 | 2.2 | 11.6 | 23.8 | 0.4 | 1.8 | 0.8 | 0 | * | 0 | 4.2 |
| 1978 | - | - | 0 | 0 | * | 32.9 | 28.1 | 0.3 | * | 0 | 0 | 0 | 3.9 |
| | | | | | | *F. heteroclitus* | | | | | | | |
| 1975 | 2.0 | 0 | 0.2 | 1.2 | 2.0 | 6.2 | 0.2 | 1.8 | 1.0 | 5.0 | 1.0 | 0.6 | 2.2 |
| 1976 | 0.4 | 1.0 | 3.0 | 1.4 | 2.2 | 0.8 | 1.0 | 0.8 | 1.0 | 1.2 | 2.8 | 2.4 | 1.4 |
| 1977 | - | - | 0.8 | 1.2 | 4.4 | 0.6 | 0.4 | 0.8 | 5.4 | 3.4 | 0.4 | 0.4 | 1.8 |
| 1978 | - | - | 1.6 | 1.4 | 1.9 | 12.5 | 2.4 | 3.4 | 1.2 | 0 | 0.6 | 0.5 | 2.8 |

* = Less than 0.1

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TABLE 3.1.6a-6
DESCRIPTION OF RIVER TRAWL ZONES - 1978

| Zone | Border Limits | | Shore | Depth at Mean Low Water (ft) | Bottom Type |
|---|---|---|---|---|---|
| NW2 | Southern: | Line from the entrance to the Chesapeake and Delaware Canal to the western boundary of the shipping channel. | East: Marsh (Pea Patch Island) and surmerged dike. | Range: 1/2 ft to 40 ft | Hard and soft mud |
| | Western: | Delaware shore. | West: Marsh and Delaware City bulkhead. | Mode: 10 ft | |
| | Eastern: | Pea Patch Island and the western boundary of the shipping channel. | | | |
| | Northern: | Line from New Castle to Buoy 50. | | | |
| NW1 | Southern: | Cable area on east side of Reedy Island; and line from northern tip of Reedy Island to a point on the western boundary of the shipping channel 700 yards above Buoy 5R. | East: Marsh interrupted by sand beach (Reedy Island). | Range: 1/2 ft to 40 ft | Soft mud |
| | Western: | Delaware shore. | West: Marsh interrupted by sand beach. | Mode: 11 ft | |
| | Eastern: | Reedy Island and western boundary of the shipping channel. | | | |
| | Northern: | Line from the entrance to the Chesapeake and Delaware Canal to the western boundary of the shipping channel. | | | |
| NE2 | Southern: | Line from the southern tip of Hickory Island (at mouth of Salem River) to eastern boundary of shipping channel (across from Buoy 5N). | East: Marsh interrupted by sand beach. | Range: 1/2 ft to 40 ft | Hard and soft mud |
| | Western: | Eastern boundary of shipping channel. | West: none | Mode: 10 ft | |
| | Eastern: | New Jersey shore. | | | |
| | Northern: | Line from Pennsville to Buoy 6D. | | | |
| NE1 | Southern: | Line from Elsinboro Point to a point on the eastern boundary of the shipping channel 1,500 yards below Buoy N2N. | East: Marsh interrupted by sand beach. | Range: 1 ft to 43 ft | Hard and soft mud |
| | Western: | Eastern boundary of shipping channel. | West: none | Mode: 9 ft | |
| | Eastern: | New Jersey shore. | | | |
| | Northern: | Line from southern tip of Hickory Island (mouth of Salem River) to eastern boundary of shipping channel (across channel from Buoy 5N). | | | |
| SW2 | Southern: | Line from Delaware Point to a point on the western boundary of the shipping channel 400 yards below Buoy R6L. | East: none | Range: 1/2 ft to 34 ft | Hard and soft mud |
| | Western: | Delaware shore. | West: Marsh interrupted by sand beach. | Mode: 13 ft | |
| | Eastern: | Western boundary of shipping channel. | | | |
| | Northern: | Line from mouth of Ray's Ditch to point on the western boundary of the shipping channel 1,000 yards below Buoy 1B. | | | |
| SW1 | Southern: | Line from Bakeoven Point to Buoy 42 (39° 21' N latitude). | East: none | Range: 1 ft to 38 ft | Hard and soft mud |
| | Western: | Delaware shore | West: Marsh interrupted by sand beach. | Mode: 13 ft | |
| | Eastern: | Western boundary of shipping channel. | | | |
| | Northern: | Line from Delaware Point to a point on the western boundary of the shipping channel 400 yards below Buoy R6L. | | | |

TABLE 3.1.6a-6

CONTINUED

| Zone | Border Limits | Shore | Depth at Mean Low Water (ft) | Bottom Type |
|---|---|---|---|---|
| SE3 | Southern: Line from 500 yards above mouth of Mad Horse Creek to a point on the eastern boundary of the shipping channel 400 yards below Buoy R6L.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore.<br>Northern: Line from Hope Creek Jetty to Buoy R8L. | East: Marsh interrupted by sand beach.<br>West: none | Range: 1/2 ft to 35 ft<br>Mode: 13 ft | Hard and soft mud |
| SE2 | Southern: Line from Arnold Point to a point on the eastern boundary of the shipping channel 1 mile below Buoy R4L.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore.<br>Northern: Line from 500 yards above mouth of Mad Horse Creek to a point on the eastern boundary of the shipping channel 400 yards below Buoy R6L. | East: Marsh interrupted by sand beach.<br>West: none | Range: 1 ft to 30 ft<br>Mode: 13 ft | Hard and soft mud |
| SE1 | Southern: Line from Dunks Point tower to Buoy 42.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore.<br>Northern: Line from Arnold Point to a point on the eastern boundary of the shipping channel 1 mile below Buoy R4L. | East: Marsh interrupted by sand beach.<br>West: none | Range: 3 ft to 31 ft<br>Mode: 13 ft | Hard and soft mud |
| SE0 | Southern: Line from Sea Breeze to Ship John Shoal.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore.<br>Northern: Line from Dunks Point tower to Buoy 42. | East: Marsh interrupted by sand beach.<br>West: none | Range: 1 ft to 44 ft<br>Mode: 10 ft | Hard and soft mud |
| W-1 | Southern: Line for Ray's Ditch to Hope Creek Jetty.<br>Western: Delaware shore.<br>Eastern: Western boundary of shipping channel to Buoy 1B, to southern tip of Reedy Island Dike.<br>Northern: Line from lower break to light at southern tip of Reedy Island Dike. | East: Rocky along Reedy Island Dike.<br>West: Marsh interrupted by sand beach. | Range: 1 ft to 32 ft<br>Mode: 3 ft | Hard mud sand; rock near dike, rocky |
| W-2 | Southern: Line from lower break to light at southern tip of Reedy Island Dike.<br>Western: Delaware shore.<br>Eastern: Reedy Island Dike.<br>Northern: Line from mouth of Augustine Creek to point on Reedy Island Dike, 1,000 yards below light below break in Reedy Island Dike. | East: Rocky<br>West: Marsh interrupted by sand beach. | Range: 1 ft to 19 ft<br>Mode: 4 ft | Soft mud sand; rocky near dike |
| W-3 | Southern: Line from mouth of Augustine Creek to point on Reedy Island Dike, 1,000 yards below light below break in Reedy Island Dike.<br>Western: Delaware shore.<br>Eastern: Reedy Island Dike.<br>Northern: Cable area east of Reedy Island. | East: Rocky<br>West: Marsh interrupted by sand beach. | Range: 1/2 ft to 22 ft<br>Mode: 8 ft | Soft mud sand; rocky near dike |

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TABLE 3.1.6a-6

CONTINUED

| Zone | Border Limits | Shore | Depth at Mean Low Water (ft) | Bottom Type |
|---|---|---|---|---|
| E-1 | Southern: Line from Hope Creek Jetty to Buoy R8L.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore.<br>Northern: Line from western tip of Sunken Ships to a point on the eastern boundary of the shipping channel 1,500 yards below Buoy R2B. | East: Marsh interrupted by sand beach.<br>West: none | Range: 1 ft to 40 ft<br>Mode: 17 ft | Hard sand and mud |
| E-2 | Southern: Line from western tip of Sunken Ships to a point on the eastern boundary of the shipping channel 1,500 yards below Buoy R2B.<br>Eastern: New Jersey shore (Artificial Island).<br>Western: Eastern boundary of shipping channel.<br>Northern: Line from a point 1,500 yards north of the southern tip of Artificial Island to a point on the eastern boundary of the shipping channel 100 yards above Buoy R2R. | East: Rock wall<br>West: none | Range: 11 ft to 41 ft<br>Mode: 26 ft | Hard sand and mud |
| E-3 | Southern: Line from a point 1,500 yards north of the southern tip of Artificial Island to a point on the eastern boundary of the shipping channel 100 yards below Buoy R4B.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore<br>Northern: Line from a point 2,000 yards south of northern tip of Artificial Island to a point on the eastern boundary of the shipping channel 100 yards above Buoy R2R. | East: Rock wall<br>West: none | Range: 7 ft to 33 ft<br>Mode: 23 ft | Hard sand and mud |
| E-4 | Southern: Line from a point 2,000 yards south of the northern tip of Artificial Island to a point on the eastern boundary of the shipping channel 100 yards above Buoy R2R.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore.<br>Northern: Line from north tip of Artificial Island to a point on the eastern boundary of the shipping channel 1,000 yards above Buoy N4R. | East: Rock wall<br>West: none | Range: 10-ft to 35 ft<br>Mode: 26 ft | Hard sand and mud |
| E-5 | Southern: Line from northern tip of Artificial Island to a point on the eastern boundary of the shipping channel 100 yards above Buoy N4R.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore.<br>Northern: Line from a point 400 yards south of Straight Ditch to a point on the eastern boundary of the shipping channel 100 yards above Buoy N6R. | East: Marsh interrupted by sand beach.<br>West: none | Range: 1 ft to 41 ft<br>Mode: 16 ft | Hard and soft mud |

TABLE 3.1.6a-6

CONTINUED

| Zone | Border Limits | Shore | Depth at Mean Low Water (ft) | Bottom Type |
|---|---|---|---|---|
| E-5 | Southern: Line from a point 400 yards south of Straight Ditch to a point on the eastern boundary of the shipping channel 1,000 yards above Buoy N6R.<br>Western: Eastern boundary of shipping channel.<br>Eastern: New Jersey shore.<br>Northern: Line from Elsinboro Point to a point on eastern boundary of shipping channel 1,500 yards below Buoy N2N. | East: Marsh interrupted by sand beach.<br>West: none | Range: 1 ft to 43 ft<br>Mode: 16 ft | Hard and soft sand and mud |
| R11 | Southern: Line from southern tip of Reedy Island Dike to Buoy 1B.<br>Western: Reedy Island Dike.<br>Eastern: Western boundary of shipping channel.<br>Northern: Line south of flashing green 2½-second light on Reedy Island Dike to a point on the western boundary of the shipping channel 100 yards south of Buoy C1R. | East: none<br>West: Rocky (Reedy Island Dike); marsh, sand beach (Reedy Island). | Range: 14 ft to 32 ft<br>Mode: 22 ft | Rocky (near dike); soft mud |
| R12 | Southern: Line south of flashing green 2½-second light on Reedy Island Dike to a point on the western boundary of the shipping channel approximately 100 yards south of Buoy C1R.<br>Western: Reedy Island Dike.<br>Eastern: Western boundary of shipping channel.<br>Northern: Line from northern tip of Reedy Island to a point on the western boundary of the shipping channel 1,000 yards above Buoy 5R. | East: none<br>West: Rocky (Reedy Island Dike); marsh, sand beach (Reedy Island). | Range: 2 ft to 38 ft<br>Mode: 22 ft | Rocky (near dike); soft mud |
| SSC | Southern: Ring of Sunken Ships.<br>Western: Line from western tip of Sunken Ships to southern tip of Artificial Island.<br>Eastern: Ring of Sunken Ships.<br>Northern: New Jersey shore (Artificial Island). | East: Wood Wall<br>West: none<br>North: Sand beach, rock wall<br>South: Wood Wall | Range: 1 ft to 17 ft<br>Mode: 9 ft | Soft mud and sand |

TABLE 3.1.6a-7

ANNUAL TRAWL CATCH STATISTICS - 1978

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ZONE | CHA1 | | | | CHA2 | | | | CHA3 | | | |
| NO. OF COLLECTIONS | 18 | | | | 18 | | | | 18 | | | |
| NO. OF SPECIES | 19 | | | | 15 | | | | 18 | | | |
| NO. OF SPECIMENS | 1,360 | | | | 1,390 | | | | 2,881 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 37.8 | | | | 38.6 | | | | 80.0 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| A. OXYRHYNCHUS | | | | | | | | | 2 | .1 | 2 | .5 |
| A. ROSTRATA | 3 | .1 | 3 | .5 | 4 | .1 | 2 | 1.0 | 26 | .7 | 6 | 2.2 |
| A. AESTIVALIS | 11 | .3 | 2 | 2.8 | 21 | .6 | 3 | 3.5 | 10 | .3 | 1. | 5.0 |
| A. PSEUDOHARENGUS | 5 | .1 | 2 | 1.3 | 4 | .1 | 2 | 1.0 | 3 | .1 | 2 | .8 |
| A. SAPIDISSIMA | 1 | | 1 | .5 | | | | | | | | |
| B. TYRANNUS | | | | | 8 | .2 | 2 | 2.0 | 5 | .1 | 2 | 1.3 |
| A. MITCHILLI | 269 | 7.5 | 12 | 11.2 | 281 | 7.8 | 14 | 10.0 | 113 | 3.1 | 15 | 3.8 |
| I. PUNCTATUS | | | | | | | | | 1 | | 1 | .5 |
| S. FOETENS | 1 | | 1 | .5 | | | | | | | | |
| O. TAU | 6 | .2 | 3 | 1.0 | | | | | | | | |
| R. MARGINATA | 3 | .1 | 2 | .8 | 5 | .1 | 4 | .6 | 1 | | 1 | .5 |
| M. MENIDIA | | | | | 1 | | 1 | .5 | | | | |
| P. EVOLANS | | | | | | | | | 1 | | 1 | .5 |
| M. AMERICANA | 2 | .1 | 1 | 1.0 | 4 | .1 | 2 | 1.0 | 11 | .3 | 3 | 1.5 |
| M. SAXATILIS | | | | | 1 | | 1 | .5 | 2 | .1 | 1 | 1.0 |
| P. SALTATRIX | 1 | | 1 | .5 | | | | | 2 | .1 | 1 | 1.0 |
| C. REGALIS | 866 | 24.1 | 11 | 39.4 | 1,010 | 28.1 | 10 | 50.5 | 2,261 | 62.8 | 10 | 113.1 |
| L. XANTHURUS | 3 | .1 | 2 | .8 | 3 | .1 | 2 | .8 | 11 | .3 | 3 | 1.8 |
| M. UNDULATUS | 45 | 1.3 | 3 | 7.5 | 27 | .8 | 3 | 4.5 | 49 | 1.4 | 2 | 12.3 |
| P. CROMIS | 3 | .1 | 2 | .8 | 3 | .1 | 2 | .8 | 11 | .3 | 4 | 1.4 |
| A. GUTTATUS | 1 | | 1 | .5 | | | | | | | | |
| P. TRIACANTHUS | 3 | .1 | 1 | 1.5 | 5 | .1 | 4 | .6 | 7 | .2 | 3 | 1.2 |
| P. ALEPIDOTUS | 1 | | 1 | .5 | | | | | | | | |
| S. AQUOSUS | 4 | .1 | 3 | .7 | | | | | | | | |
| T. MACULATUS | 132 | 3.7 | 8 | 8.3 | 13 | .4 | 8 | .8 | 365 | 10.1 | 10 | 18.3 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

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TABLE 3.1.6a-7
CONTINUED

| ZONE | CHA4 | CHA5 |
|---|---|---|
| NO. OF COLLECTIONS | 17 | 17 |
| NO. OF SPECIES | 16 | 18 |
| NO. OF SPECIMENS | 3,602 | 2,793 |
| SPECIMENS/10 MIN TRAWL (N/T) | 105.9 | 82.1 |

| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. ROSTRATA | 15 | .4 | 5 | 1.5 | 16 | .5 | 5 | 1.6 | | | | |
| A. AESTIVALIS | 24 | .7 | 4 | 3.0 | 20 | .6 | 4 | 2.5 | | | | |
| A. PSEUDOHARENGUS | 2 | .1 | 1 | 1.0 | 3 | .1 | 1 | 1.5 | | | | |
| A. SAPIDISSIMA | 4 | .1 | 1 | 2.0 | 1 | | 1 | .5 | | | | |
| B. TYRANNUS | 8 | .2 | 7 | .6 | 5 | .1 | 3 | .8 | | | | |
| A. MITCHILLI | 80 | 2.4 | 12 | 3.3 | 54 | 1.6 | 10 | 2.7 | | | | |
| I. PUNCTATUS | 1 | | 1 | .5 | 2 | .1 | 1 | 1.0 | | | | |
| R. MARGINATA | 1 | | 1 | .5 | | | | | | | | |
| M. AMERICANA | 22 | .6 | 8 | 1.4 | 20 | .6 | 4 | 2.5 | | | | |
| M. SAXATILIS | | | | | 1 | | 1 | .5 | | | | |
| P. SALTATRIX | 1 | | 1 | .5 | 1 | | 1 | .5 | | | | |
| C. REGALIS | 3,268 | 96.1 | 9 | 181.6 | 2,476 | 72.8 | 9 | 137.6 | | | | |
| L. XANTHURUS | 5 | .1 | 2 | 1.3 | 2 | .1 | 2 | .5 | | | | |
| M. UNDULATUS | 11 | .3 | 3 | 1.8 | 14 | .4 | 2 | 3.5 | | | | |
| P. CROMIS | 3 | .1 | 2 | .8 | 1 | | 1 | .5 | | | | |
| A. GUTTATUS | | | | | 1 | | 1 | .5 | | | | |
| P. TRIACANTHUS | 4 | .1 | 3 | .7 | 1 | | 1 | .5 | | | | |
| S. AQUOSUS | | | | | 1 | | 1 | .5 | | | | |
| T. MACULATUS | 153 | 4.5 | 10 | 7.7 | 174 | 5.1 | 9 | 9.7 | | | | |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FF 1978

TABLE 3.1.6a-7
CONTINUED

| ZONE | E-1 | | | | E-2 | | | | E-3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 36 | | | | 36 | | | | 36 | | | |
| NO. OF SPECIES | 22 | | | | 16 | | | | 14 | | | |
| NO. OF SPECIMENS | 5,546 | | | | 3,433 | | | | 2,855 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 154.1 | | | | 95.4 | | | | 79.3 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| A. OXYRHYNCHUS | | | | | | | | | 2 | .1 | 2 | 1.0 |
| A. ROSTRATA | 39 | 1.1 | 9 | 4.3 | 45 | 1.3 | 9 | 5.0 | 23 | .6 | 8 | 2.9 |
| A. AESTIVALIS | 39 | 1.1 | 3 | 13.0 | 35 | 1.0 | 9 | 3.9 | 28 | .8 | 5 | 5.6 |
| A. PSEUDOHARENGUS | 4 | .1 | 4 | 1.0 | 2 | .1 | 1 | 2.0 | | | | |
| A. SAPIDISSIMA | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 | | | | |
| B. TYRANNUS | 1 | | 1 | 1.0 | 2 | .1 | 2 | 1.0 | 1 | | 1 | 1.0 |
| A. MITCHILLI | 2,814 | 78.2 | 28 | 100.5 | 565 | 15.7 | 22 | 25.7 | 356 | 9.9 | 22 | 16.2 |
| I. PUNCTATUS | | | | | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 |
| O. TAU | 1 | | 1 | 1.0 | | | | | | | | |
| R. MARGINATA | 6 | .2 | 4 | 1.5 | 5 | .1 | 3 | 1.7 | 6 | .2 | 3 | 2.0 |
| M. MENIDIA | 2 | .1 | 2 | 1.0 | | | | | | | | |
| S. FUSCUS | 1 | | 1 | 1.0 | | | | | | | | |
| M. AMERICANA | 24 | .7 | 7 | 3.4 | 29 | .8 | 8 | 3.6 | 121 | 3.4 | 8 | 15.1 |
| M. SAXATILIS | 2 | .1 | 1 | 2.0 | | | | | 2 | .1 | 2 | 1.0 |
| P. SALTATRIX | | | | | 2 | .1 | 2 | 1.0 | | | | |
| C. HIPPOS | 9 | .3 | 1 | 9.0 | | | | | | | | |
| C. REGALIS | 1,494 | 41.5 | 16 | 93.4 | 1,467 | 40.8 | 20 | 73.4 | 1,294 | 35.9 | 17 | 76.1 |
| L. XANTHURUS | 72 | 2.0 | 8 | 9.0 | 11 | .3 | 7 | 1.6 | 5 | .1 | 4 | 1.3 |
| M. UNDULATUS | 3 | .1 | 3 | 1.0 | | | | | 4 | .1 | 3 | 1.3 |
| P. CROMIS | 6 | .2 | 4 | 1.5 | 11 | .3 | 7 | 1.6 | 2 | .1 | 1 | 2.0 |
| P. TRIACANTHUS | 5 | .1 | 1 | 5.0 | 1 | | 1 | 1.0 | | | | |
| P. ALEPIDOTUS | 1 | | 1 | 1.0 | | | | | | | | |
| P. DENTATUS | 5 | .1 | 3 | 1.7 | 1 | | 1 | 1.0 | | | | |
| P. AMERICANUS | 1 | | 1 | 1.0 | | | | | | | | |
| T. MACULATUS | 1,016 | 28.2 | 21 | 48.4 | 1,255 | 34.9 | 22 | 57.0 | 1,010 | 28.1 | 21 | 48.1 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FF 1978

TABLE 3.1.6a-7
CONTINUED

| ZONE | E-4 | | | | E-5 | | | | E-6 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 36 | | | | 36 | | | | 36 | | | |
| NO. OF SPECIES | 19 | | | | 20 | | | | 20 | | | |
| NO. OF SPECIMENS | 3,618 | | | | 7,569 | | | | 4,260 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 100.5 | | | | 210.3 | | | | 118.3 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| A. OXYRHYNCHUS | | | | | | | | | 1 | | 1 | 1.0 |
| A. ROSTRATA | 13 | .4 | 9 | 1.4 | 21 | .6 | 11 | 1.9 | 63 | 1.8 | 11 | 5.7 |
| A. AESTIVALIS | 17 | .5 | 7 | 2.4 | 9 | .3 | 4 | 2.3 | 10 | .3 | 6 | 1.7 |
| A. PSEUDOHARENGUS | 1 | | 1 | 1.0 | 5 | .1 | 5 | 1.0 | 2 | .1 | 2 | 1.0 |
| A. SAPIDISSIMA | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 | | | | |
| B. TYRANNUS | 2 | .1 | 2 | 1.0 | 4 | .1 | 3 | 1.3 | 10 | .3 | 6 | 1.7 |
| D. CEPEDIANUM | | | | | 1 | | 1 | 1.0 | | | | |
| A. MITCHILLI | 213 | 5.9 | 20 | 10.7 | 1,643 | 45.6 | 19 | 86.5 | 1,168 | 32.4 | 20 | 58.4 |
| C. CARPIO | | | | | 1 | | 1 | 1.0 | 2 | .1 | 2 | 1.0 |
| I. CATUS | | | | | | | | | 3 | .1 | 3 | 1.0 |
| I. NEBULOSUS | 2 | .1 | 1 | 2.0 | | | | | 4 | .1 | 2 | 2.0 |
| I. PUNCTATUS | 3 | .1 | 2 | 1.5 | 6 | .2 | 4 | 1.5 | 13 | .4 | 8 | 1.6 |
| R. MARGINATA | 4 | .1 | 3 | 1.3 | 1 | | 1 | 1.0 | | | | |
| S. FUSCUS | 1 | | 1 | 1.0 | | | | | | | | |
| M. AMERICANA | 98 | 2.7 | 10 | 9.8 | 340 | 9.4 | 10 | 34.0 | 76 | 2.1 | 13 | 5.8 |
| M. SAXATILIS | 2 | .1 | 1 | 2.0 | 15 | .4 | 2 | 7.5 | | | | |
| P. SALTATRIX | | | | | 2 | .1 | 2 | 1.0 | 3 | .1 | 3 | 1.0 |
| C. REGALIS | 1,909 | 53.0 | 18 | 106.1 | 1,205 | 33.5 | 20 | 60.3 | 598 | 16.6 | 17 | 35.2 |
| L. XANTHURUS | 8 | .2 | 5 | 1.6 | 37 | 1.0 | 11 | 3.4 | 37 | 1.0 | 10 | 3.7 |
| M. UNDULATUS | 6 | .2 | 3 | 2.0 | 10 | .3 | 4 | 2.5 | 8 | .2 | 4 | 2.0 |
| P. CROMIS | 3 | .1 | 3 | 1.0 | 9 | .3 | 7 | 1.3 | 6 | .2 | 4 | 1.5 |
| P. TRIACANTHUS | 1 | | 1 | 1.0 | 8 | .2 | 4 | 2.0 | 3 | .1 | 2 | 1.5 |
| P. DENTATUS | | | | | 4 | .1 | 2 | 2.0 | 3 | .1 | 3 | 1.0 |
| S. AQUOSUS | 1 | | 1 | 1.0 | | | | | 1 | | 1 | 1.0 |
| T. MACULATUS | 1,333 | 37.0 | 23 | 58.0 | 4,247 | 118.0 | 26 | 163.3 | 2,249 | 62.5 | 25 | 90.0 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FF 1978

TABLE 3.1.6a-7
CONTINUED

| ZONE | NE1 | | | | NE2 | | | | RI1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 32 | | | | 28 | | | | 28 | | | |
| NO. OF SPECIES | 19 | | | | 20 | | | | 15 | | | |
| NO. OF SPECIMENS | 4,398 | | | | 5,495 | | | | 3,553 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 137.4 | | | | 196.3 | | | | 126.9 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| A. ROSTRATA | 6 | .2 | 5 | 1.2 | 16 | .6 | 8 | 2.0 | 114 | 4.1 | 7 | 16.3 |
| A. AESTIVALIS | 74 | 2.3 | 6 | 12.3 | 24 | .9 | 5 | 4.8 | 10 | .4 | 4 | 2.5 |
| A. PSEUDOHARENGUS | 5 | .2 | 3 | 1.7 | 7 | .3 | 3 | 2.3 | 9 | .3 | 4 | 2.3 |
| B. TYRANNUS | 7 | .2 | 5 | 1.4 | 6 | .2 | 6 | 1.0 | 19 | .7 | 6 | 3.2 |
| D. CEPEDIANUM | | | | | 1 | | 1 | 1.0 | | | | |
| A. MITCHILLI | 865 | 27.0 | 20 | 43.3 | 1,470 | 52.5 | 14 | 105.0 | 231 | 8.3 | 19 | 12.2 |
| C. CARPIO | 2 | .1 | 1 | 2.0 | 1 | | 1 | 1.0 | | | | |
| H. NUCHALIS | 9 | .3 | 2 | 4.5 | 6 | .2 | 4 | 1.5 | | | | |
| I. CATUS | 1 | | 1 | 1.0 | 2 | .1 | 2 | 1.0 | | | | |
| I. NEBULOSUS | 2 | .1 | 2 | 1.0 | 18 | .6 | 7 | 2.6 | | | | |
| I. PUNCTATUS | 4 | .1 | 4 | 1.0 | 3 | .1 | 2 | 1.5 | | | | |
| O. TAU | | | | | | | | | 1 | | 1 | 1.0 |
| S. FUSCUS | | | | | | | | | 1 | | 1 | 1.0 |
| M. AMERICANA | 125 | 3.9 | 15 | 8.3 | 224 | 8.0 | 16 | 14.0 | 20 | .7 | 11 | 1.8 |
| M. SAXATILIS | 1 | | 1 | 1.0 | 5 | .2 | 5 | 1.0 | | | | |
| P. FLAVESCENS | | | | | 1 | | 1 | 1.0 | | | | |
| P. SALTATRIX | 1 | | 1 | 1.0 | 2 | .1 | 2 | 1.0 | 3 | .1 | 3 | 1.0 |
| C. REGALIS | 1,329 | 41.5 | 13 | 102.2 | 2,100 | 75.0 | 11 | 190.9 | 2,987 | 106.7 | 13 | 229.8 |
| L. XANTHURUS | 90 | 2.8 | 12 | 7.5 | 90 | 3.2 | 8 | 11.3 | | | | |
| M. UNDULATUS | 4 | .1 | 3 | 1.3 | 15 | .5 | 5 | 3.0 | 66 | 2.4 | 6 | 11.0 |
| P. CROMIS | 12 | .4 | 6 | 2.0 | 12 | .4 | 3 | 4.0 | 4 | .1 | 3 | 1.3 |
| P. TRIACANTHUS | | | | | | | | | 1 | | 1 | 1.0 |
| P. DENTATUS | 2 | .1 | 1 | 2.0 | | | | | | | | |
| S. AQUOSUS | | | | | | | | | 2 | .1 | 1 | 2.0 |
| T. MACULATUS | 1,859 | 58.1 | 24 | 77.5 | 1,492 | 53.3 | 21 | 71.0 | 85 | 3.0 | 13 | 6.5 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

TABLE 3.1.6a-7
CONTINUED

| ZONE | RI2 | | | | SE0 | | | | SE1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 28 | | | | 36 | | | | 36 | | | |
| NO. OF SPECIES | 15 | | | | 26 | | | | 19 | | | |
| NO. OF SPECIMENS | 5,401 | | | | 4,548 | | | | 3,815 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 192.9 | | | | 126.3 | | | | 106.0 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| P. MARINUS | 1 | | 1 | 1.0 | | | | | | | | |
| R. BONASUS | | | | | 1 | | 1 | 1.0 | | | | |
| A. OXYRHYNCHUS | | | | | 1 | | 1 | 1.0 | | | | |
| A. ROSTRATA | 85 | 3.0 | 8 | 10.6 | 4 | .1 | 4 | 1.0 | 18 | .5 | 7 | 2.6 |
| A. AESTIVALIS | 12 | .4 | 5 | 2.4 | 6 | .2 | 3 | 2.0 | 30 | .8 | 4 | 7.5 |
| A. PSEUDOHARENGUS | 3 | .1 | 1 | 3.0 | | | | | 8 | .2 | 2 | 4.0 |
| B. TYRANNUS | 23 | .8 | 9 | 2.6 | 1 | | 1 | 1.0 | 6 | .2 | 3 | 2.0 |
| A. MITCHILLI | 428 | 15.3 | 16 | 26.8 | 1,917 | 53.3 | 25 | 76.7 | 892 | 24.8 | 23 | 38.8 |
| S. FOETENS | | | | | 1 | | 1 | 1.0 | | | | |
| O. TAU | | | | | 38 | 1.1 | 12 | 3.2 | 14 | .4 | 7 | 2.0 |
| U. CHUSS | | | | | 2 | .1 | 1 | 2.0 | 6 | .2 | 1 | 6.0 |
| R. MARGINATA | | | | | 13 | .4 | 7 | 1.9 | 21 | .6 | 8 | 2.6 |
| M. MENIDIA | 3 | .1 | 2 | 1.5 | | | | | 1 | | 1 | 1.0 |
| S. FUSCUS | | | | | 2 | .1 | 1 | 2.0 | 2 | .1 | 2 | 1.0 |
| M. AMERICANA | 31 | 1.1 | 11 | 2.8 | 29 | .8 | 5 | 5.8 | 42 | 1.2 | 5 | 8.4 |
| M. SAXATILIS | | | | | 1 | | 1 | 1.0 | | | | |
| C. STRIATA | | | | | 2 | .1 | 1 | 2.0 | | | | |
| P. SALTATRIX | 2 | .1 | 2 | 1.0 | 3 | .1 | 2 | 1.5 | 1 | | 1 | 1.0 |
| C. REGALIS | 4,612 | 164.7 | 11 | 419.3 | 2,226 | 61.8 | 19 | 117.2 | 1,750 | 48.6 | 21 | 83.3 |
| L. XANTHURUS | 7 | .3 | 2 | 3.5 | 5 | .1 | 4 | 1.3 | 9 | .3 | 5 | 1.8 |
| M. UNDULATUS | 23 | .8 | 6 | 3.8 | 7 | .2 | 2 | 3:5 | 15 | .4 | 5 | 3.0 |
| P. CROMIS | 6 | .2 | 5 | 1.2 | 4 | .1 | 3 | 1.3 | 9 | .3 | 3 | 3.0 |
| A. GUTTATUS | | | | | 7 | .2 | 3 | 2.3 | | | | |
| G. BOSCI | | | | | 2 | .1 | 2 | 1.0 | | | | |
| P. TRIACANTHUS | | | | | 4 | .1 | 3 | 1.3 | | | | |
| P. ALEPIDOTUS | | | | | 2 | .1 | 1 | 2.0 | | | | |
| P. DENTATUS | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 | 3 | .1 | 2 | 1.5 |
| S. AQUOSUS | | | | | 3 | .1 | 3 | 1.0 | 13 | .4 | 5 | 2.6 |
| T. MACULATUS | 164 | 5.9 | 16 | 10.3 | 266 | 7.4 | 24 | 11.1 | 975 | 27.1 | 24 | 40.6 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FF 1978

TABLE 3.1.6a-7
CONTINUED

| ZONE | SE2 | | | | SE3 | | | | SSC | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 36 | | | | 36 | | | | 38 | | | |
| NO. OF SPECIES | 21 | | | | 24 | | | | 25 | | | |
| NO. OF SPECIMENS | 4,073 | | | | 3,710 | | | | 7,135 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 113.1 | | | | 103.1 | | | | 375.5 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| A. ROSTRATA | 28 | .8 | 8 | 3.5 | 5 | .1 | 4 | 1.3 | 7 | .4 | 6 | 2.3 |
| A. AESTIVALIS | 33 | .9 | 7 | 4.7 | 22 | .6 | 6 | 3.7 | 55 | 2.9 | 5 | 22.0 |
| A. PSEUDOHARENGUS | 6 | .2 | 2 | 3.0 | 8 | .2 | 4 | 2.0 | 4 | .2 | 4 | 2.0 |
| A. SAPIDISSIMA | | | | | 1 | | 1 | 1.0 | 4 | .2 | 3 | 2.7 |
| B. TYRANNUS | | | | | 5 | .1 | 2 | 2.5 | 1 | .1 | 1 | 2.0 |
| D. CEPEDIANUM | | | | | | | | | 1 | .1 | 1 | 2.0 |
| A. MITCHILLI | 1,439 | 40.0 | 22 | 65.4 | 1,318 | 36.6 | 27 | 48.8 | 5,424 | 285.5 | 31 | 349.9 |
| I. CATUS | | | | | | | | | 2 | .1 | 1 | 4.0 |
| I. NEBULOSUS | | | | | | | | | 4 | .2 | 2 | 4.0 |
| S. FOETENS | | | | | 1 | | 1 | 1.0 | | | | |
| O. TAU | 11 | .3 | 4 | 2.8 | 7 | .2 | 5 | 1.4 | | | | |
| U. CHUSS | 2 | .1 | 2 | 1.0 | 11 | .3 | 3 | 3.7 | 6 | .3 | 4 | 3.0 |
| R. MARGINATA | 10 | .3 | 6 | 1.7 | 1 | | 1 | 1.0 | 1 | .1 | 1 | 2.0 |
| M. MENIDIA | | | | | 18 | .5 | 1 | 18.0 | 5 | .3 | 2 | 5.0 |
| S. FUSCUS | 4 | .1 | 3 | 1.3 | 6 | .2 | 6 | 1.0 | 6 | .3 | 5 | 2.4 |
| P. EVOLANS | 1 | | 1 | 1.0 | 2 | .1 | 1 | 2.0 | | | | |
| M. AMERICANA | 32 | .9 | 6 | 5.3 | 27 | .8 | 8 | 3.4 | 165 | 8.7 | 15 | 22.0 |
| M. SAXATILIS | 4 | .1 | 2 | 2.0 | | | | | 1 | .1 | 1 | 2.0 |
| P. SALTATRIX | | | | | 1 | | 1 | 1.0 | 1 | .1 | 1 | 2.0 |
| C. HIPPOS | | | | | | | | | 5 | .3 | 3 | 3.3 |
| C. REGALIS | 1,467 | 40.8 | 20 | 73.4 | 585 | 16.3 | 17 | 34.4 | 802 | 42.2 | 19 | 84.4 |
| L. XANTHURUS | 13 | .4 | 6 | 2.2 | 54 | 1.5 | 8 | 6.8 | 127 | 6.7 | 23 | 11.0 |
| M. UNDULATUS | 7 | .2 | 2 | 3.5 | 3 | .1 | 2 | 1.5 | 1 | .1 | 1 | 2.0 |
| P. CROMIS | 15 | .4 | 6 | 2.5 | 7 | .2 | 7 | 1.0 | 10 | .5 | 5 | 4.0 |
| A. GUTTATUS | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 | | | | |
| G. BOSCI | 1 | | 1 | 1.0 | | | | | | | | |
| P. TRIACANTHUS | 4 | .1 | 2 | 2.0 | 7 | .2 | 3 | 2.3 | 1 | .1 | 1 | 2.0 |
| P. ALEPIDOTUS | 1 | | 1 | 1.0 | | | | | | | | |
| P. DENTATUS | 3 | .1 | 2 | 1.5 | 4 | .1 | 2 | 2.0 | 12 | .6 | 8 | 3.0 |
| S. AQUOSUS | | | | | 3 | .1 | 2 | 1.5 | 2 | .1 | 2 | 2.0 |
| T. MACULATUS | 991 | 27.5 | 29 | 34.2 | 1,613 | 44.8 | 26 | 62.0 | 488 | 25.7 | 33 | 29.6 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FF 1978

TABLE 3.1.6a-7
CONTINUED

| ZONE | NW1 | | | | NW2 | | | | SW1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 34 | | | | 32 | | | | 36 | | | |
| NO. OF SPECIES | 19 | | | | 21 | | | | 22 | | | |
| NO. OF SPECIMENS | 4,099 | | | | 4,010 | | | | 6,105 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 120.6 | | | | 125.3 | | | | 169.6 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| A. ROSTRATA | 22 | .6 | 11 | 2.0 | 21 | .7 | 12 | 1.8 | 21 | .6 | 10 | 2.1 |
| A. AESTIVALIS | 4 | .1 | 3 | 1.3 | 29 | .9 | 6 | 4.8 | 15 | .4 | 5 | 3.0 |
| A. PSEUDOHARENGUS | 4 | .1 | 3 | 1.3 | 4 | .1 | 3 | 1.3 | 12 | .3 | 5 | 2.4 |
| B. TYRANNUS | 11 | .3 | 6 | 1.8 | 23 | .7 | 12 | 1.9 | 2 | .1 | 2 | 1.0 |
| D. CEPEDIANUM | | | | | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 |
| A. MITCHILLI | 1,358 | 39.9 | 21 | 64.7 | 1,007 | 31.5 | 20 | 50.4 | 1,942 | 53.9 | 22 | 88.3 |
| I. CATUS | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 | | | | |
| I. NEBULOSUS | 3 | .1 | 3 | 1.0 | 4 | .1 | 4 | 1.0 | 1 | | 1 | 1.0 |
| I. PUNCTATUS | 5 | .1 | 4 | 1.3 | 8 | .3 | 6 | 1.3 | | | | |
| O. TAU | | | | | | | | | 4 | .1 | 2 | 2.0 |
| U. CHUSS | | | | | | | | | 9 | .3 | 3 | 3.0 |
| R. MARGINATA | | | | | | | | | 4 | .1 | 2 | 2.0 |
| S. FUSCUS | 2 | .1 | 1 | 2.0 | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 |
| P. CAROLINUS | | | | | | | | | 1 | | 1 | 1.0 |
| M. AMERICANA | 144 | 4.2 | 14 | 10.3 | 241 | 7.5 | 17 | 14.2 | 378 | 10.5 | 15 | 25.2 |
| M. SAXATILIS | 4 | .1 | 3 | 1.3 | 10 | .3 | 5 | 2.0 | 3 | .1 | 2 | 1.5 |
| L. MACROCHIRUS | 1 | | 1 | 1.0 | | | | | | | | |
| P. ANNULARIS | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 | | | | |
| P. FLAVESCENS | | | | | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 |
| P. SALTATRIX | | | | | 2 | .1 | 2 | 1.0 | | | | |
| C. REGALIS | 1,805 | 53.1 | 16 | 112.8 | 1,803 | 56.3 | 14 | 128.8 | 1,164 | 32.3 | 19 | 61.3 |
| L. XANTHURUS | 31 | .9 | 8 | 3.9 | 83 | 2.6 | 11 | 7.5 | 68 | 1.9 | 7 | 9.7 |
| M. UNDULATUS | 12 | .4 | 4 | 3.0 | 199 | 6.2 | 3 | 66.3 | 23 | .6 | 7 | 3.3 |
| P. CROMIS | 3 | .1 | 3 | 1.0 | 22 | .7 | 3 | 7.3 | 14 | .4 | 8 | 1.8 |
| G. BOSCI | | | | | 1 | | 1 | 1.0 | | | | |
| P. DENTATUS | 2 | .1 | 2 | 1.0 | | | | | 1 | | 1 | 1.0 |
| S. AQUOSUS | | | | | | | | | 3 | .1 | 3 | 1.0 |
| T. MACULATUS | 686 | 20.2 | 20 | 34.3 | 548 | 17.1 | 23 | 23.8 | 2,437 | 67.7 | 31 | 78.6 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FP 1978

TABLE 3.1.6a-7
CONTINUED

| ZONE | SW2 | | | | W-1 | | | | W-2 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 36 | | | | 36 | | | | 36 | | | |
| NO. OF SPECIES | 23 | | | | 21 | | | | 20 | | | |
| NO. OF SPECIMENS | 5,867 | | | | 5,721 | | | | 7,842 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 163.0 | | | | 158.9 | | | | 217.8 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| A. ROSTRATA | 39 | 1.1 | 16 | 2.4 | 100 | 2.8 | 13 | 7.7 | 40 | 1.1 | 9 | 4.4 |
| A. AESTIVALIS | 14 | .4 | 4 | 3.5 | 28 | .8 | 8 | 3.5 | 6 | .2 | 3 | 2.0 |
| A. PSEUDOHARENGUS | 16 | .4 | 5 | 3.2 | 3 | .1 | 2 | 1.5 | 2 | .1 | 1 | 2.0 |
| A. SAPIDISSIMA | 1 | | 1 | 1.0 | 4 | .1 | 1 | 4.0 | | | | |
| B. TYRANNUS | 15 | .4 | 6 | 2.5 | 10 | .3 | 7 | 1.4 | 9 | .3 | 5 | 1.8 |
| D. CEPEDIANUM | 3 | .1 | 1 | 3.0 | 1 | | 1 | 1.0 | | | | |
| A. MITCHILLI | 1,503 | 41.8 | 26 | 57.8 | 1,813 | 50.4 | 29 | 62.5 | 5,112 | 142.0 | 27 | 189.3 |
| C. CARPIO | | | | | 6 | .2 | 2 | 3.0 | 2 | .1 | 2 | 1.0 |
| I. CATUS | | | | | 2 | .1 | 2 | 1.0 | | | | |
| I. NEBULOSUS | 2 | .1 | 2 | 1.0 | 1 | | 1 | 1.0 | 4 | .1 | 3 | 1.3 |
| O. TAU | 1 | | 1 | 1.0 | | | | | | | | |
| U. CHUSS | | | | | 1 | | 1 | 1.0 | | | | |
| U. REGIUS | 1 | | 1 | 1.0 | | | | | | | | |
| R. MARGINATA | 1 | | 1 | 1.0 | | | | | | | | |
| M. MENIDIA | | | | | | | | | 1 | | 1 | 1.0 |
| S. FUSCUS | 5 | .1 | 2 | 2.5 | 9 | .3 | 8 | 1.1 | 6 | .2 | 4 | 1.5 |
| M. AMERICANA | 102 | 2.8 | 14 | 7.3 | 160 | 4.4 | 15 | 10.7 | 234 | 6.5 | 16 | 14.6 |
| M. SAXATILIS | | | | | 1 | | 1 | 1.0 | 8 | .2 | 6 | 1.3 |
| P. NIGROMACULATUS | | | | | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 |
| P. SALTATRIX | | | | | | | | | 1 | | 1 | 1.0 |
| C. REGALIS | 2,297 | 63.8 | 19 | 120.9 | 979 | 27.2 | 18 | 54.4 | 921 | 25.6 | 19 | 48.5 |
| L. XANTHURUS | 35 | 1.0 | 9 | 3.9 | 81 | 2.3 | 14 | 5.8 | 103 | 2.9 | 15 | 6.9 |
| M. UNDULATUS | 229 | 6.4 | 5 | 45.8 | 26 | .7 | 4 | 6.5 | 25 | .7 | 7 | 3.6 |
| P. CROMIS | 14 | .4 | 9 | 1.6 | 28 | .8 | 11 | 2.5 | 6 | .2 | 4 | 1.5 |
| G. BOSCI | 2 | .1 | 2 | 1.0 | | | | | 2 | .1 | 2 | 1.0 |
| P. TRIACANTHUS | 1 | | 1 | 1.0 | | | | | | | | |
| P. ALEPIDOTUS | 1 | | 1 | 1.0 | | | | | | | | |
| P. DENTATUS | 1 | | 1 | 1.0 | 3 | .1 | 3 | 1.0 | 6 | .2 | 4 | 1.5 |
| S. AQUOSUS | 2 | .1 | 2 | 1.0 | | | | | | | | |
| T. MACULATUS | 1,582 | 43.9 | 24 | 65.9 | 2,464 | 68.4 | 30 | 82.1 | 1,353 | 37.6 | 34 | 39.8 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FF 1978

TABLE 3.1.6a-7
CONTINUED

| | |
|---|---|
| ZONE | W-3 |
| NO. OF COLLECTIONS | 36 |
| NO. OF SPECIES | 22 |
| NO. OF SPECIMENS | 13,014 |
| SPECIMENS/10 MIN TRAWL (N/T) | 361.5 |

| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. ROSTRATA | 20 | .6 | 13 | 1.5 | | | | | | | | |
| A. AESTIVALIS | 8 | .2 | 3 | 2.7 | | | | | | | | |
| A. PSEUDOHARENGUS | 4 | .1 | 3 | 1.3 | | | | | | | | |
| B. TYRANNUS | 74 | 2.1 | 11 | 6.7 | | | | | | | | |
| D. CEPEDIANUM | 6 | .2 | 1 | 6.0 | | | | | | | | |
| A. MITCHILLI | 2,586 | 71.8 | 24 | 107.8 | | | | | | | | |
| C. CARPIO | 11 | .3 | 5 | 2.2 | | | | | | | | |
| I. CATUS | 1 | | 1 | 1.0 | | | | | | | | |
| I. NEBULOSUS | 21 | .6 | 7 | 3.0 | | | | | | | | |
| I. PUNCTATUS | 5 | .1 | 3 | 1.7 | | | | | | | | |
| M. MENIDIA | 1 | | 1 | 1.0 | | | | | | | | |
| S. FUSCUS | 1 | | 1 | 1.0 | | | | | | | | |
| M. AMERICANA | 208 | 5.8 | 16 | 13.0 | | | | | | | | |
| M. SAXATILIS | 11 | .3 | 4 | 2.8 | | | | | | | | |
| P. SALTATRIX | 1 | | 1 | 1.0 | | | | | | | | |
| C. REGALIS | 4,940 | 137.2 | 20 | 247.0 | | | | | | | | |
| L. XANTHURUS | 77 | 2.1 | 15 | 5.1 | | | | | | | | |
| M. UNDULATUS | 52 | 1.4 | 8 | 6.5 | | | | | | | | |
| P. CROMIS | 7 | .2 | 4 | 1.8 | | | | | | | | |
| P. DENTATUS | 10 | .3 | 6 | 1.7 | | | | | | | | |
| S. AQUOSUS | 1 | | 1 | 1.0 | | | | | | | | |
| T. MACULATUS | 4,969 | 138.0 | 29 | 171.3 | | | | | | | | |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM PF 1978

TABLE 3.1.6a-7
CONTINUED

| ZONE | WEST | | | | CHANNEL | | | | EAST | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 246 | | | | 88 | | | | 514 | | | |
| NO. OF SPECIES | 35 | | | | 25 | | | | 40 | | | |
| NO. OF SPECIMENS | 46,658 | | | | 12,026 | | | | 69,409 | | | |
| SPECIMENS/10 MIN TRAWL (N/T) | 189.7 | | | | 68.3 | | | | 140.2 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| P. MARINUS | | | | | | | | | 1 | | 1 | 1.0 |
| R. BONASUS | | | | | | | | | 1 | | 1 | 1.0 |
| A. OXYRHYNCHUS | | | | | 2 | | 2 | .5 | 4 | | 4 | 1.0 |
| A. ROSTRATA | 263 | 1.1 | 84 | 3.1 | 64 | .4 | 21 | 1.5 | 487 | 1.0 | 114 | 4.4 |
| A. AESTIVALIS | 104 | .4 | 32 | 3.3 | 86 | .5 | 14 | 3.1 | 404 | .8 | 79 | 5.3 |
| A. PSEUDOHARENGUS | 45 | .2 | 22 | 2.0 | 17 | .1 | 8 | 1.1 | 64 | .1 | 36 | 1.9 |
| A. SAPIDISSIMA | 5 | | 2 | 2.5 | 6 | | 3 | 1.0 | 9 | | 8 | 1.4 |
| B. TYRANNUS | 144 | .6 | 49 | 2.9 | 26 | .1 | 14 | .9 | 88 | .2 | 48 | 1.9 |
| D. CEPEDIANUM | 12 | | 5 | 2.4 | | | | | 3 | | 3 | 1.2 |
| A. MITCHILLI | 15,321 | 62.3 | 169 | 90.7 | 797 | 4.5 | 63 | 6.3 | 20,743 | 41.9 | 328 | 66.4 |
| C. CARPIO | 19 | .1 | 9 | 2.1 | | | | | 6 | | 5 | 1.2 |
| H. NUCHALIS | | | | | | | | | 15 | | 6 | 2.5 |
| I. CATUS | 5 | | 5 | 1.0 | | | | | 8 | | 7 | 1.2 |
| I. NEBULOSUS | 36 | .1 | 21 | 1.7 | | | | | 30 | .1 | 14 | 2.3 |
| I. PUNCTATUS | 18 | .1 | 13 | 1.4 | 4 | | 3 | .7 | 31 | .1 | 22 | 1.4 |
| S. FOETENS | | | | | 1 | | 1 | .5 | 2 | | 2 | 1.0 |
| O. TAU | 5 | | 3 | 1.7 | 6 | | 3 | 1.0 | 72 | .1 | 30 | 2.4 |
| U. CHUSS | 10 | | 4 | 2.5 | | | | | 27 | .1 | 11 | 3.0 |
| U. REGIUS | 1 | | 1 | 1.0 | | | | | | | | |
| R. MARGINATA | 5 | | 3 | 1.7 | 10 | .1 | 8 | .6 | 68 | .1 | 37 | 1.9 |
| M. MENIDIA | 2 | | 2 | 1.0 | 1 | | 1 | .5 | 29 | .1 | 8 | 4.1 |
| S. FUSCUS | 25 | .1 | 18 | 1.4 | | | | | 23 | | 20 | 1.3 |
| P. CAROLINUS | 1 | | 1 | 1.0 | | | | | | | | |
| P. EVOLANS | | | | | 1 | | 1 | .5 | 3 | | 2 | 1.5 |
| M. AMERICANA | 1,467 | 6.0 | 107 | 13.7 | 59 | .3 | 18 | 1.6 | 1,383 | 2.8 | 148 | 9.8 |
| M. SAXATILIS | 37 | .2 | 21 | 1.8 | 4 | | 3 | .7 | 33 | .1 | 16 | 2.1 |
| C. STRIATA | | | | | | | | | 2 | | 1 | 2.0 |
| L. MACROCHIRUS | 1 | | 1 | 1.0 | | | | | | | | |
| P. ANNULARIS | 2 | | 2 | 1.0 | | | | | | | | |
| P. NIGROMACULATUS | 2 | | 2 | 1.0 | | | | | | | | |
| P. FLAVESCENS | 2 | | 2 | 1.0 | | | | | 1 | | 1 | 1.0 |
| P. SALTATRIX | 4 | | 4 | 1.0 | 5 | | 4 | .6 | 21 | | 20 | 1.1 |
| C. HIPPOS | | | | | | | | | 14 | | 4 | 5.6 |
| C. REGALIS | 13,909 | 56.5 | 125 | 111.3 | 9,881 | 56.1 | 49 | 100.8 | 25,825 | 52.2 | 252 | 106.5 |
| L. XANTHURUS | 478 | 1.9 | 79 | 6.1 | 24 | .1 | 11 | 1.1 | 565 | 1.1 | 113 | 5.6 |
| M. UNDULATUS | 566 | 2.3 | 38 | 14.9 | 146 | .8 | 13 | 5.6 | 172 | .3 | 49 | 3.5 |
| P. CROMIS | 94 | .4 | 42 | 2.2 | 21 | .1 | 11 | 1.0 | 116 | .2 | 67 | 1.8 |
| A. GUTTATUS | | | | | 2 | | 2 | .5 | 9 | | 5 | 1.8 |
| G. BOSCI | 5 | | 5 | 1.0 | | | | | 3 | | 3 | 1.0 |
| P. TRIACANTHUS | 1 | | 1 | 1.0 | 20 | .1 | 12 | .8 | 35 | .1 | 19 | 1.9 |
| P. ALEPIDOTUS | 1 | | 1 | 1.0 | 1 | | 1 | .5 | 4 | | 3 | 1.3 |
| P. DENTATUS | 23 | .1 | 17 | 1.4 | | | | | 39 | .1 | 26 | 1.8 |
| S. AQUOSUS | 6 | | 6 | 1.0 | 5 | | 4 | .6 | 25 | .1 | 15 | 1.8 |
| P. AMERICANUS | | | | | | | | | 1 | | 1 | 1.0 |
| T. MACULATUS | 14,039 | 57.1 | 191 | 73.5 | 837 | 4.8 | 45 | 9.3 | 19,043 | 38.5 | 348 | 57.4 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FF 1978

TABLE 3.1.6a-7
CONTINUED

| ZONE | TOTAL |
|---|---|
| NO. OF COLLECTIONS | 848 |
| NO. OF SPECIES | 45 |
| NO. OF SPECIMENS | 128,093 |
| SPECIMENS/10 MIN TRAWL (N/T) | 139.7 |

| SPECIES | NUMBER | N/T | T* | N/T* |
|---|---|---|---|---|
| P. MARINUS | 1 | | 1 | 1.0 |
| R. BONASUS | 1 | | 1 | 1.0 |
| A. OXYRHYNCHUS | 6 | | 6 | .8 |
| A. ROSTRATA | 814 | .9 | 219 | 3.4 |
| A. AESTIVALIS | 594 | .6 | 125 | 4.4 |
| A. PSEUDOHARENGUS | 126 | .1 | 66 | 1.8 |
| A. SAPIDISSIMA | 20 | | 13 | 1.4 |
| B. TYRANNUS | 258 | .3 | 111 | 2.1 |
| D. CEPEDIANUM | 15 | | 8 | 2.0 |
| A. MITCHILLI | 36,861 | 40.2 | 560 | 60.7 |
| C. CARPIO | 25 | | 14 | 1.8 |
| H. NUCHALIS | 15 | | 6 | 2.5 |
| I. CATUS | 13 | | 12 | 1.1 |
| I. NEBULOSUS | 66 | .1 | 35 | 1.9 |
| I. PUNCTATUS | 53 | .1 | 38 | 1.3 |
| S. FOETENS | 3 | | 3 | .8 |
| O. TAU | 83 | .1 | 36 | 2.1 |
| U. CHUSS | 37 | | 15 | 2.8 |
| U. REGIUS | 1 | | 1 | 1.0 |
| R. MARGINATA | 83 | .1 | 48 | 1.5 |
| M. MENIDIA | 32 | | 11 | 2.9 |
| S. FUSCUS | 48 | .1 | 38 | 1.4 |
| P. CAROLINUS | 1 | | 1 | 1.0 |
| P. EVOLANS | 4 | | 3 | 1.0 |
| M. AMERICANA | 2,909 | 3.2 | 273 | 10.3 |
| M. SAXATILIS | 74 | .1 | 40 | 1.7 |
| C. STRIATA | 2 | | 1 | 2.0 |
| L. MACROCHIRUS | 1 | | 1 | 1.0 |
| P. ANNULARIS | 2 | | 2 | 1.0 |
| P. NIGROMACULATUS | 2 | | 2 | 1.0 |
| P. FLAVESCENS | 3 | | 3 | 1.0 |
| P. SALTATRIX | 30 | | 28 | 1.0 |
| C. HIPPOS | 14 | | 4 | 5.6 |
| C. REGALIS | 49,615 | 54.1 | 426 | 106.6 |
| L. XANTHURUS | 1,067 | 1.2 | 203 | 5.3 |
| M. UNDULATUS | 884 | 1.0 | 100 | 7.9 |
| P. CROMIS | 231 | .3 | 120 | 1.8 |
| A. GUTTATUS | 11 | | 7 | 1.2 |
| G. BOSCI | 8 | | 8 | 1.0 |
| P. TRIACANTHUS | 56 | .1 | 32 | 1.3 |
| P. ALEPIDOTUS | 6 | | 5 | 1.0 |
| P. DENTATUS | 62 | .1 | 43 | 1.6 |
| S. AQUOSUS | 36 | | 25 | 1.3 |
| P. AMERICANUS | 1 | | 1 | 1.0 |
| T. MACULATUS | 33,919 | 37.0 | 584 | 55.4 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/10 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM FF 1978

TABLE 3.1.6a-8
TRAWL CATCH PER UNIT EFFORT (n/T*) DURING 1970-1978 OF THE MOST ABUNDANT SPECIES TAKEN IN 1978. A DASH INDICATES NO COLLECTIONS.

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Weakfish, *C. regalis* | | | | | | | |
| 1970 | - | - | | | | 29.9 | 95.2 | 16.5 | 4.8 | 6.2 | | | 44.6 |
| 1971 | - | | | | 0.5 | 55.9 | 49.8 | 29.0 | 9.7 | 6.4 | 2.1 | | 29.2 |
| 1972 | | | | | 1.0 | 1.8 | 17.1 | 27.4 | 19.6 | 3.8 | 2.7 | | 18.9 |
| 1973 | - | - | | | | 16.5 | 12.4 | 11.1 | 6.4 | 5.2 | 1.7 | | 10.3 |
| 1974 | | | | | 1.0 | 1.5 | 14.1 | 9.2 | 6.9 | 3.7 | 1.7 | | 8.5 |
| 1975 | | | | 2.0 | 1.0 | 77.6 | 33.0 | 16.0 | 8.9 | 3.8 | 1.0 | | 28.0 |
| 1976 | | | | 1.0 | 1.3 | | 14.9 | 10.6 | 5.0 | 4.5 | 1.0 | | 9.9 |
| 1977 | - | | | | 1.0 | 9.0 | 28.5 | 14.0 | 9.1 | 3.1 | 1.0 | | 15.9 |
| 1978 | - | - | | | | 410.3 | 172.3 | 68.2 | 26.7 | 12.5 | 3.9 | | 106.6 |
| | | | | | | Bay anchovy, *A. mitchilli* | | | | | | | |
| 1970 | - | - | | | 13.4 | 32.0 | 92.2 | 29.7 | 46.5 | 35.7 | 12.8 | 5.7 | 49.3 |
| 1971 | - | | 1.3 | 5.4 | 20.3 | 13.9 | 31.8 | 96.8 | 66.7 | 35.6 | 58.7 | | 45.1 |
| 1972 | | 1.0 | 2.0 | 48.4 | 51.8 | 22.4 | 16.3 | 46.8 | 65.8 | 92.8 | 28.4 | | 53.5 |
| 1973 | - | - | | 1.6 | 47.5 | 10.9 | 25.8 | 37.2 | 297.8 | 49.6 | 25.1 | 1.0 | 52.4 |
| 1974 | | 1.3 | 54.7 | 62.7 | 39.9 | 59.6 | 283.9 | 91.3 | 68.8 | 67.5 | 36.8 | 1.3 | 102.9 |
| 1975 | | 1.0 | 1.7 | 37.4 | 151.7 | 52.8 | 43.4 | 93.0 | 76.3 | 52.3 | 34.2 | 5.4 | 64.3 |
| 1976 | 1.0 | - | 99.4 | 250.6 | 36.8 | 61.5 | 69.3 | 84.1 | 167.1 | 74.5 | 5.2 | | 102.1 |
| 1977 | - | | 0.7 | 112.2 | 36.4 | 65.3 | 69.6 | 138.1 | 187.4 | 108.0 | 32.7 | | 92.0 |
| 1978 | - | - | | 6.3 | 67.4 | 27.9 | 85.0 | 65.2 | 65.6 | 107.1 | 39.2 | 2.1 | 60.7 |
| | | | | | | Hogchoker, *T. maculatus* | | | | | | | |
| 1970 | - | - | | 20.4 | 35.5 | 17.9 | 27.8 | 19.4 | 7.4 | 5.9 | 5.5 | 200.0 | 21.2 |
| 1971 | - | | 5.8 | 8.9 | 17.7 | 15.6 | 15.7 | 15.7 | 17.9 | 13.5 | 16.1 | 6.5 | 15.2 |
| 1972 | 9.3 | | 2.0 | 2.6 | 15.9 | 7.1 | 10.3 | 10.7 | 3.6 | 5.4 | 11.4 | 5.8 | 6.6 |
| 1973 | - | - | | 1.8 | 13.5 | 6.2 | 3.7 | 6.9 | 3.4 | 3.4 | 14.6 | 4.6 | 7.1 |
| 1974 | 5.6 | 1.3 | 4.7 | 7.4 | 19.3 | 7.9 | 12.6 | 6.8 | 7.8 | 14.3 | 10.8 | 3.0 | 10.7 |
| 1975 | 1.5 | 2.4 | 2.6 | 5.1 | 18.8 | 17.4 | 16.7 | 8.0 | 23.9 | 23.7 | 17.8 | 9.4 | 15.8 |
| 1976 | | 2.8 | 5.6 | 16.3 | 29.1 | 14.4 | 12.5 | 10.5 | 8.9 | 7.8 | 7.9 | 1.3 | 13.1 |
| 1977 | - | | 1.7 | 2.5 | 8.9 | 2.0 | 8.6 | 7.5 | 18.6 | 37.1 | 59.5 | | 27.2 |
| 1978 | - | - | 2.4 | 6.6 | 19.3 | 51.3 | 50.5 | 69.1 | 67.5 | 64.7 | 68.9 | 66.2 | 54.0 |
| | | | | | | White perch, *M. americana* | | | | | | | |
| 1970 | - | - | 3.3 | 14.5 | 10.4 | 27.1 | 31.4 | 5.6 | 1.8 | 34.3 | 38.0 | 31.0 | 24.0 |
| 1971 | - | 5.5 | 11.1 | 17.8 | 19.1 | 36.4 | 15.6 | 23.1 | 45.7 | 27.5 | 46.5 | 15.4 | 27.4 |
| 1972 | 8.6 | 16.5 | 8.9 | 26.2 | 27.2 | 30.0 | 50.8 | 13.5 | 4.4 | 17.1 | 11.9 | 3.9 | 26.3 |
| 1973 | - | - | 18.4 | 12.8 | 11.9 | 22.6 | 18.6 | 2.0 | 1.8 | 3.0 | 15.8 | 11.2 | 15.3 |
| 1974 | 14.0 | 18.3 | 14.4 | 10.5 | 7.3 | 4.1 | 2.6 | 1.0 | 1.8 | 7.6 | 13.1 | 7.4 | 9.4 |
| 1975 | 2.8 | 3.8 | 13.1 | 13.6 | 20.5 | 2.9 | 3.8 | 1.5 | 2.3 | 11.2 | 31.3 | 30.1 | 13.4 |
| 1976 | 5.8 | 12.6 | 22.0 | 12.2 | 10.0 | 22.3 | 1.9 | 1.2 | 1.0 | 7.3 | 14.9 | 5.3 | 13.0 |
| 1977 | - | 2.9 | 3.6 | 6.3 | 8.4 | 2.8 | 1.0 | | 1.0 | 7.4 | 11.9 | 4.9 | 7.5 |
| 1978 | - | - | 4.1 | 8.7 | 6.4 | 9.4 | 1.8 | 1.7 | 1.0 | 3.1 | 7.3 | 32.3 | 10.3 |

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TABLE 3.1.6a-8

CONTINUED

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Spot, *L. xanthurus*** | | | | | | | | | | | | | |
| 1970 | - | - | | | | | | 2.0 | | | | | 2.0 |
| 1971 | - | | | | | 10.0 | 9.8 | 14.9 | 16.6 | 9.9 | 20.9 | 1.0 | 13.7 |
| 1972 | | | | | 0.7 | 33.4 | 46.7 | 19.2 | 7.5 | 15.5 | 5.9 | | 29.5 |
| 1973 | - | - | | | | 44.2 | 25.5 | 16.6 | 5.1 | 4.9 | 22.7 | 54.5 | 27.2 |
| 1974 | | | 2.0 | | 11.3 | 21.6 | 28.0 | 8.4 | 12.4 | 10.4 | 14.7 | | 15.9 |
| 1975 | | | | 1.0 | 1.1 | 27.2 | 16.6 | 15.0 | 8.0 | 24.2 | 27.3 | 8.5 | 20.1 |
| 1976 | | | | 3.9 | 27.9 | 120.0 | 70.3 | 9.2 | 7.5 | 14.1 | 15.6 | | 42.4 |
| 1977 | - | | | | 46.9 | 28.9 | 15.2 | 14.4 | 6.6 | 22.0 | 15.8 | | 22.9 |
| 1978 | - | - | | | | 1.8 | 5.4 | 4.5 | 2.4 | 8.5 | 4.7 | 8.9 | 5.3 |
| **Atlantic croaker, *M. undulatus*** | | | | | | | | | | | | | |
| 1970 | - | - | | | | | | | | | 1.0 | 7.0 | 4.0 |
| 1971 | - | | | | | | | | | 3.2 | 7.6 | 5.7 | 6.3 |
| 1972 | 1.0 | | | 1.0 | | 1.8 | 3.4 | 1.0 | | | 1.0 | | 2.2 |
| 1973 | - | - | | | | | | | 1.0 | 2.4 | 5.1 | 4.9 | 4.7 |
| 1974 | 1.0 | 1.0 | 1.4 | 2.0 | 2.2 | 2.2 | 4.7 | 2.1 | 1.7 | 2.0 | 3.9 | 3.0 | 2.7 |
| 1975 | 4.0 | | 1.0 | 0.7 | 1.7 | 7.5 | 12.4 | 5.4 | 7.9 | 8.9 | 92.0 | 105.7 | 31.4 |
| 1976 | 2.0 | | 1.0 | 1.0 | | 1.0 | 1.3 | 2.0 | 1.2 | 41.8 | 141.4 | 27.0 | 92.4 |
| 1977 | - | | | | | | | - | 1.3 | 10.2 | 37.9 | 2.9 | 26.4 |
| 1978 | - | - | | | | | | | 1.5 | 4.5 | 12.3 | 4.6 | 7.9 |
| **American eel, *A. rostrata*** | | | | | | | | | | | | | |
| 1970 | - | - | | 2.0 | 6.1 | 4.9 | 5.5 | 10.3 | 1.0 | 1.0 | 2.0 | | 5.1 |
| 1971 | - | 2.0 | 1.0 | 2.4 | 2.7 | 5.6 | 2.9 | 7.9 | 4.9 | 3.5 | 1.8 | 1.3 | 4.0 |
| 1972 | 2.0 | | 1.0 | 1.5 | 2.6 | 3.6 | 2.8 | 1.8 | 1.0 | 5.2 | 1.8 | 1.0 | 2.5 |
| 1973 | - | - | 1.5 | 1.3 | 2.7 | 4.9 | 2.0 | 1.0 | 1.1 | 1.3 | 1.0 | 1.0 | 2.7 |
| 1974 | 1.0 | 1.6 | | 1.5 | 2.3 | 2.4 | 1.3 | 1.2 | 1.4 | 1.7 | 2.4 | 1.0 | 1.7 |
| 1975 | 1.2 | 1.2 | 1.0 | 2.3 | 3.0 | 1.6 | 2.0 | 2.2 | 2.4 | 2.0 | 1.8 | 1.1 | 2.0 |
| 1976 | | 1.2 | 2.0 | 2.4 | 2.5 | 2.7 | 1.4 | 1.4 | 1.5 | 1.2 | 1.3 | | 1.8 |
| 1977 | - | | | 1.8 | 2.4 | 1.6 | 1.7 | 1.1 | 1.8 | 2.0 | 1.5 | 1.0 | 1.7 |
| 1978 | - | - | 1.0 | 1.5 | 1.1 | 2.7 | 4.2 | 6.5 | 3.1 | 4.9 | 1.7 | 1.8 | 3.4 |
| **Blueback herring, *A. aestivalis*** | | | | | | | | | | | | | |
| 1970 | - | - | 1.0 | 1.2 | 2.0 | 23.6 | 3.0 | 2.0 | 1.0 | 1.0 | 32.9 | 2.6 | 11.1 |
| 1971 | - | | 6.0 | 5.9 | 1.5 | 9.1 | 1.7 | 1.5 | 1.3 | 1.0 | 5.3 | 1.8 | 5.2 |
| 1972 | 2.0 | 1.0 | 12.3 | 7.5 | 1.0 | 2.6 | 1.5 | | 1.0 | | 1.2 | | 4.8 |
| 1973 | - | - | 1.3 | 1.5 | 1.4 | | 5.0 | | | | 5.0 | 5.0 | 3.4 |
| 1974 | 1.0 | 1.3 | 4.1 | 5.6 | 1.0 | | | | | 1.6 | 26.6 | 1.0 | 7.6 |
| 1975 | 1.0 | | 5.1 | 4.4 | 1.1 | 1.5 | 2.0 | | | 1.3 | 3.7 | 1.5 | 4.0 |
| 1976 | | 2.6 | 5.8 | 1.4 | 1.0 | | 2.0 | | | 2.3 | 6.2 | | 4.6 |
| 1977 | - | | 4.4 | 4.9 | 1.0 | 1.0 | | | | 2.6 | 2.8 | | 3.7 |
| 1978 | - | - | | 5.1 | 1.8 | 1.0 | 0.7 | 0.5 | | | 4.7 | 3.8 | 4.4 |

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TABLE 3.1.6a-9

MONTHLY GILL NET CATCH, WEST AND EAST OF THE SHIPPING CHANNEL - 1978

| | March | | April | | May | | June | | September | | October | | November | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | West | East | West | East | West | East | West | East | West | East | West | East | West | East |
| Total No.Drifts | 24 | 22 | 15 | 18 | 14 | 19 | 10 | 11 | 2 | 8 | 35 | 35 | 11 | 21 |
| Total No. Drift Hours | 16.5 | 15 | 15 | 18 | 12.5 | 19 | 8.5 | 11 | 1 | 4 | 17.5 | 17.5 | 5.5 | 10.5 |
| No. of 2.5 and 3.8cm Drifts | | | | | 4 | 6 | 7 | 8 | 2 | 8 | 35 | 33 | 11 | 21 |
| No. of Drift Hours | | | | | 4 | 6 | 5.5 | 8 | 1 | 4 | 17.5 | 16.5 | 5.5 | 10.5 |
| No. of 7.9cm Drifts | 12 | 12 | 10 | 10 | 9 | 10 | 3 | 3 | | | | 2 | | |
| No. of Drift Hours | 8 | 8 | 10 | 10 | 7.5 | 10 | 3 | 3 | | | | 1 | | |
| No. of 14.0cm Drifts | 12 | 10 | 5 | 8 | 1 | 3 | | | | | | | | |
| No. of Drift Hours | 8.5 | 7 | 5 | 8 | 1 | 3 | | | | | | | | |
| P. marinus | 1 | | | | | | | | | | | | | |
| Alosa spp. | | | 1 | | | | | | | | | | | |
| A. aestivalis | 1 | | 27 | 19 | 82 | 735 | 72 | 255 | | | 56 | 67 | 34 | 130 |
| A. pseudoharengus | 122 | 18 | 106 | 52 | 1 | 2 | 1 | 3 | | | 27 | 14 | 2 | 22 |
| A. sapidissima | | 6 | 7 | 7 | | 3 | 1 | 4 | | | | | | 2 |
| B. tyrannus | | | 4 | 5 | 747 | 2167 | 300 | 140 | 45 | 69 | 1532 | 999 | 327 | 441 |
| A. hepsetus | | | | | | | | | 1 | | | | | |
| A. mitchilli | | | | | | | 4 | 4 | | | | 1 | | 1 |
| S. gairdneri | | | | | 1 | | | | | | | | | |
| C. carpio | | 1 | | 1 | 2 | | | | | | | | | |
| I. catus | | | 3 | | | | | | | | | | | |
| I. nebulosus | | | | | | | 1 | | | | | | | |
| S. marina | | | | | | | | | | 1 | | | | |
| M. americana | 2 | 1 | 7 | 2 | | 1 | | | | | | | | |
| M. saxatilis | | | 4 | | | | | | | | | | | |
| P. saltatrix | | | | | 2 | 2 | 3 | 22 | 10 | 17 | 32 | 26 | 2 | 5 |
| C. regalis | | | | | | | 1 | | | | 27 | 2 | 1 | |
| L. xanthurus | | | | | | | | | | | 7 | | 1 | |
| P. triacanthus | | | | | | | | | 5 | 6 | 1 | 12 | 1 | 2 |
| P. dentatus | | | | | | 1 | | | | | | | | |
| T. maculatus | | | | | | | | | | | 2 | | | |

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TABLE 3.1.6a-10
ANNUAL GILL NET CATCH - 1978

| Mesh size (cm) | 2.5,3.8 | | | 7.9 | | | 14.0 | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Total No. Drifts | 135 | | | 71 | | | 39 | | | 245 |
| No. Drift Hours | 78.5 | | | 60.5 | | | 32.5 | | | 171.5 |
| Species | n | n per drift hour | n per drift hour* | n | n per drift hour | n per drift hour* | n | n per drift hour | n per drift hour* | |
| P. marinus | | | | 1 | + | 1.0 | | | | 1 |
| Alosa spp. | | | | 1 | + | 1.0 | | | | 1 |
| A. aestivalis | 1,427 | 18.2 | 28.5 | 51 | 0.8 | 3.9 | | | | 1,478 |
| A. pseudoharengus | 70 | 0.9 | 3.7 | 299 | 4.9 | 12.5 | 1 | + | 1.0 | 370 |
| A. sapidissima | 9 | 0.1 | 1.3 | 2 | + | 4.0 | 19 | 0.6 | 2.4 | 30 |
| B. tyrannus | 5,526 | 70.4 | 71.8 | 1,175 | 19.4 | 46.1 | 75 | 2.3 | 15.0 | 6,776 |
| A. hepsetus | 1 | + | 2.0 | | | | | | | 1 |
| A. mitchilli | 10 | 0.1 | 2.2 | | | | | | | 10 |
| S. gairdneri | 1 | + | 1.0 | | | | | | | 1 |
| C. carpio | | | | 1 | + | 1.0 | 3 | 0.1 | 1.0 | 4 |
| I. catus | | | | 3 | + | 1.5 | | | | 3 |
| I. nebulosus | | | | 1 | + | 1.0 | | | | 1 |
| S. marina | 1 | + | 2.0 | | | | | | | 1 |
| M. americana | | | | 11 | 0.2 | 1.7 | 2 | 0.1 | 1.0 | 13 |
| M. saxatilis | | | | 1 | + | 0.5 | 3 | 0.1 | 1.5 | 4 |
| P. saltatrix | 97 | 1.2 | 3.2 | 24 | 0.4 | 3.4 | | | | 121 |
| C. regalis | 31 | 0.4 | 4.1 | | | | | | | 31 |
| L. xanthurus | 8 | 0.1 | 2.3 | | | | | | | 8 |
| P. triacanthus | 27 | 0.3 | 3.9 | | | | | | | 27 |
| P. dentatus | | | | | | | 1 | + | 1.0 | 1 |
| T. maculatus | 2 | + | 2.0 | | | | | | | 2 |
| | | | | | | | | | | 8,884 |

* = number of specimens per drift hour in which the species was taken.
+ = n per drift hour less than 0.05.

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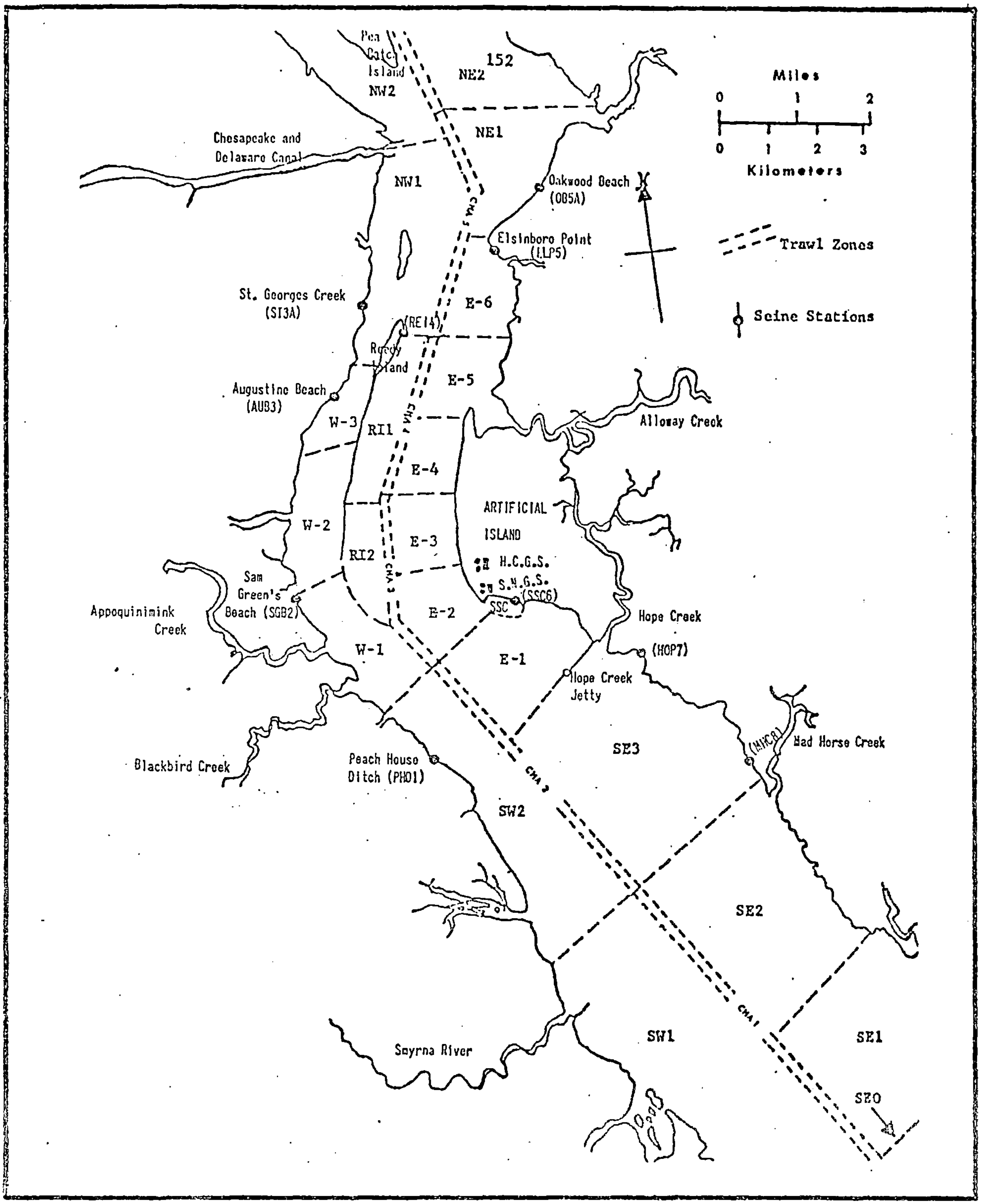
TABLE 3.1.6a-11
WEEKLY NUMBER PER DRIFT HOUR (n/DRIFT hr), OF ALOSID SPECIES
TAKEN BY GILL NETS - 1978

| Mesh Size (cm) | 7.9 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Month | March | | April | | | May | | | June | October |
| Week | 19-25 | 26-31 | 2-8 | 9-15 | 16-22 | 7-13 | 21-27 | 28-31 | 4-10 | 8-14 |
| No. of Drifts | 8 | 16 | 8 | 8 | 4 | 3 | 8 | 8 | 6 | 2 |
| No. of Drift Hours | 4 | 12 | 8 | 8 | 4 | 3 | 7.5 | 7 | 6 | 1 |
| Alosa spp. | | | | | 0.3 | | | | | |
| A. aestivalis | | 0.1 | 0.3 | 1.1 | 8.8 | 0.7 | | 0.3 | | |
| A. pseudoharengus | 0.5 | 11.5 | 9.0 | 9.6 | 2.0 | 0.7 | | | | |
| A. sapidissima | | | 0.1 | | | 0.3 | | | | |

| Mesh Size (cm) | 14.0 | | | | | | |
|---|---|---|---|---|---|---|---|
| Month | March | | April | | | May | |
| Week | 19-25 | 26-31 | 2-8 | 9-15 | 16-22 | 7-13 | 21-27 |
| No. of Drifts | 4 | 18 | 7 | 4 | 2 | 2 | 2 |
| No. of Drift Hours | 2 | 13.5 | 7 | 4 | 2 | 2 | 2 |
| A. aestivalis | | | | | | | |
| A. pseudoharengus | | | | 0.3 | | | |
| A. sapidissima | | 0.4 | 0.3 | 1.3 | 3.0 | | |

| Mesh Size (cm) | 2.5 and 3.8 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | May | | June | | | October | | | | November | | | |
| Week | 21-27 | 28-31 | 4-10 | 11-17 | 25-30 | 8-14 | 15-21 | 22-28 | 29-31 | 1-4 | 5-11 | 12-18 | 19-25 |
| No. of Drifts | 4 | 6 | 8 | 3 | 4 | 18 | 31 | 17 | 2 | 6 | 14 | 6 | 6 |
| No. of Drift Hours | 4 | 6 | 7.5 | 3 | 3 | 9 | 15.5 | 8.5 | 1 | 3 | 7 | 3 | 3 |
| A. aestivalis | 185.8 | 11.7 | 38.4 | 13.0 | | 0.1 | 1.5 | 11.3 | 2.0 | 13.7 | 13.7 | 7.0 | 2.0 |
| A. pseudoharengus | | 0.2 | 0.1 | 1.0 | | 0.6 | 1.2 | 2.0 | | 0.7 | 2.6 | 0.8 | |
| A. sapidissima | | 0.3 | 0.3 | 0.7 | 0.3 | | | | | | 0.3 | | |

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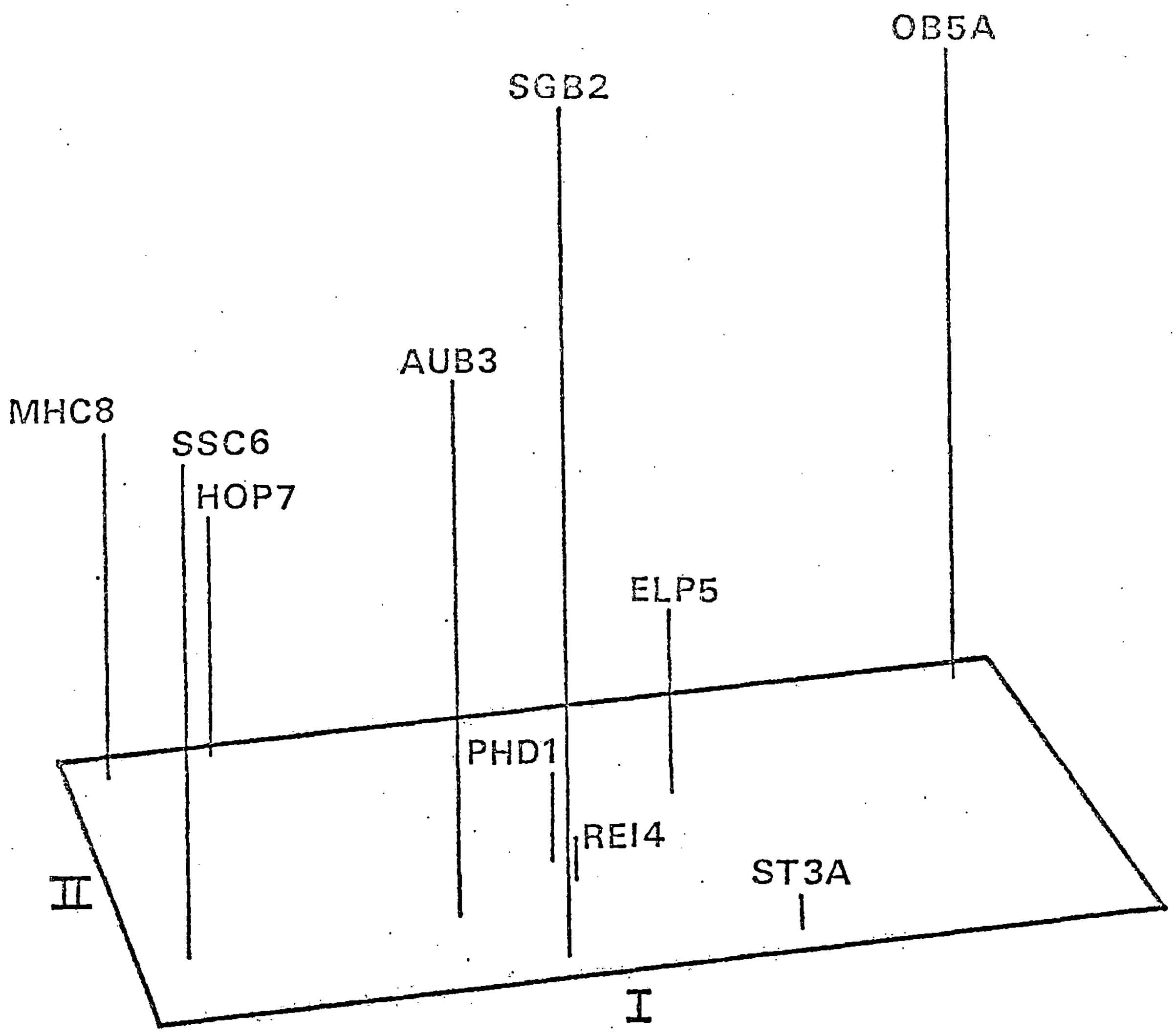
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | River trawl and seine locations-1978 |
| | Figure 3.1.6a-1 |

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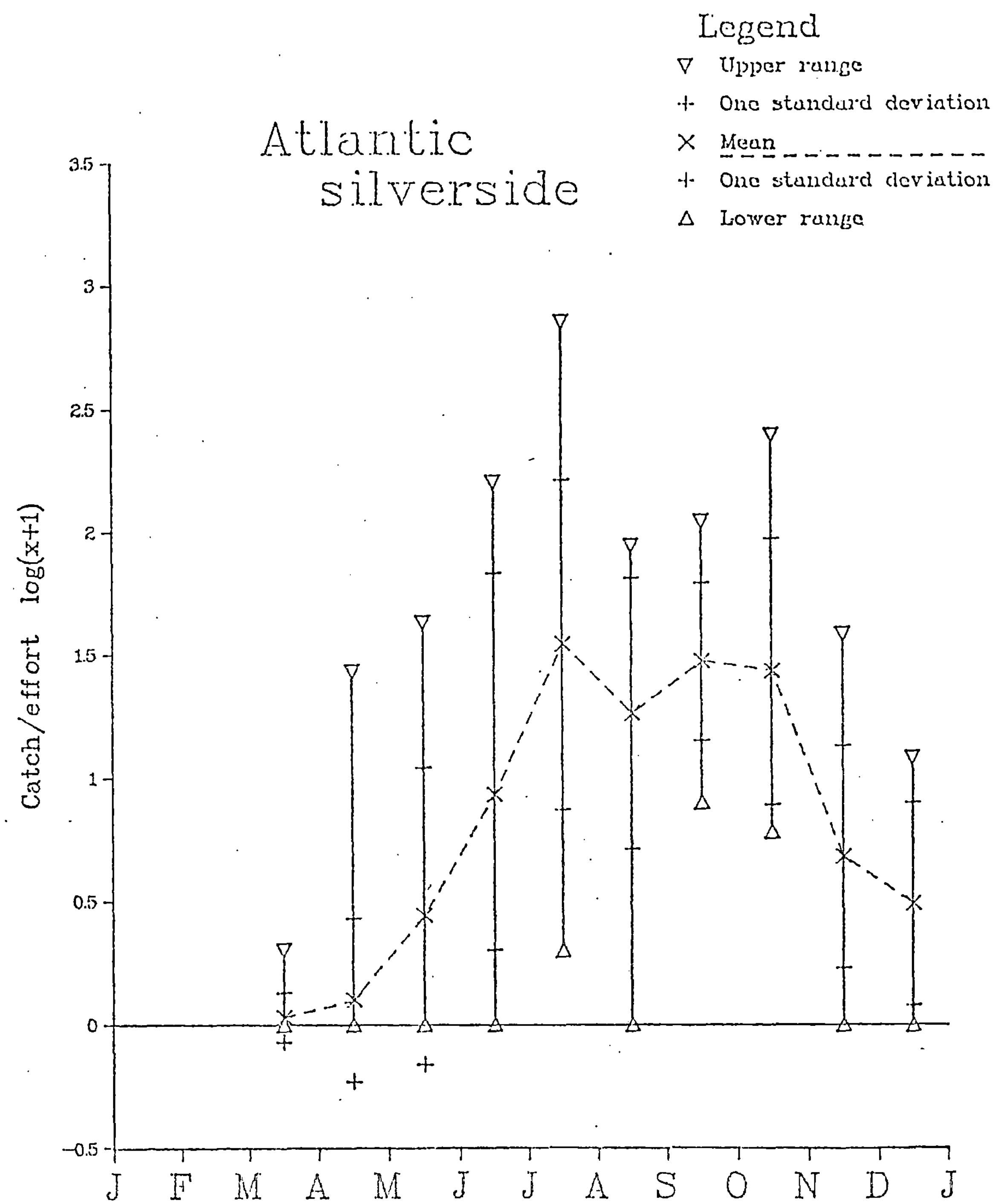
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Similarity of seine catch on first three component axes based on species composition - 1978 |
| | Figure 3.1.6a-2 |

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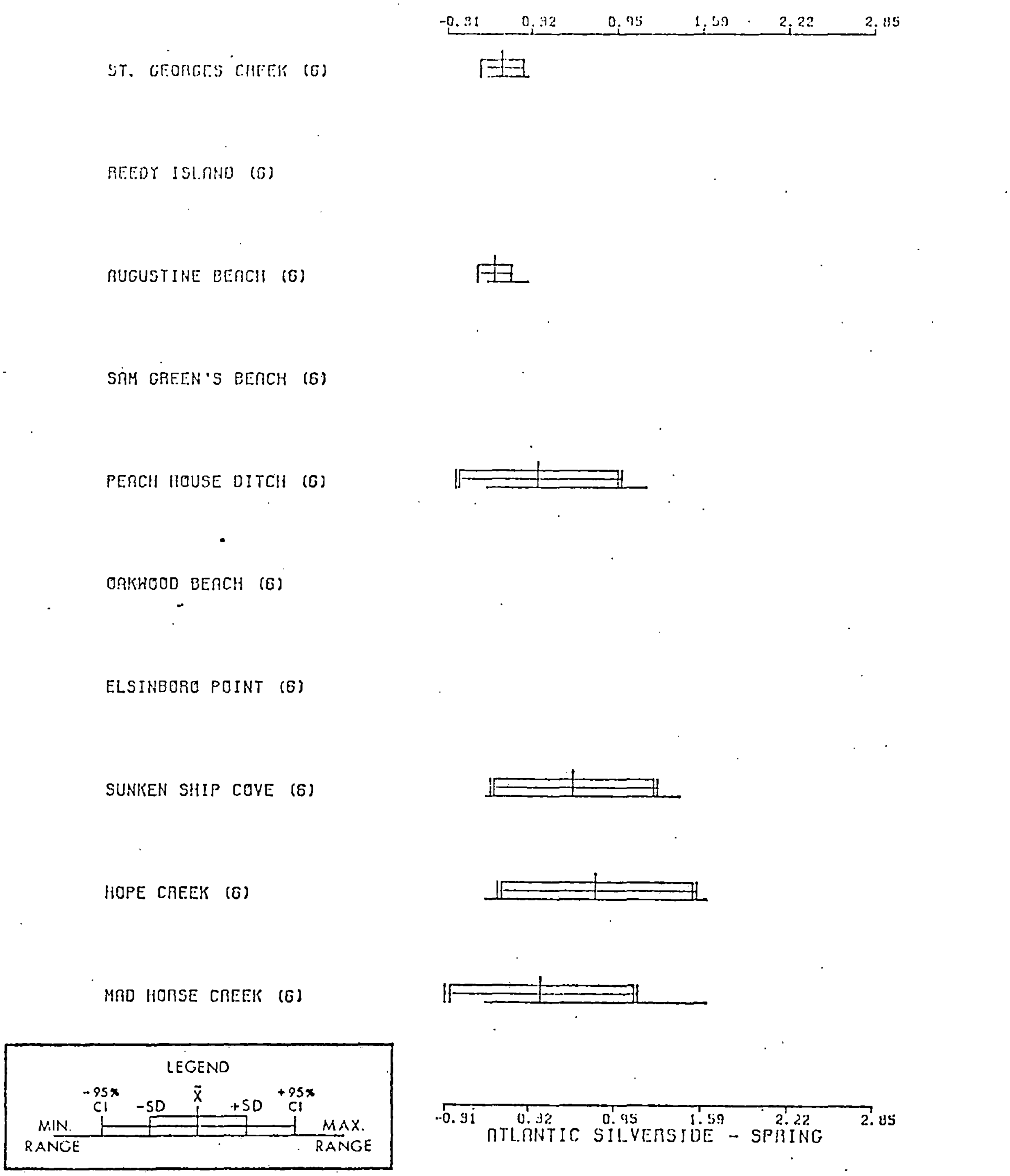
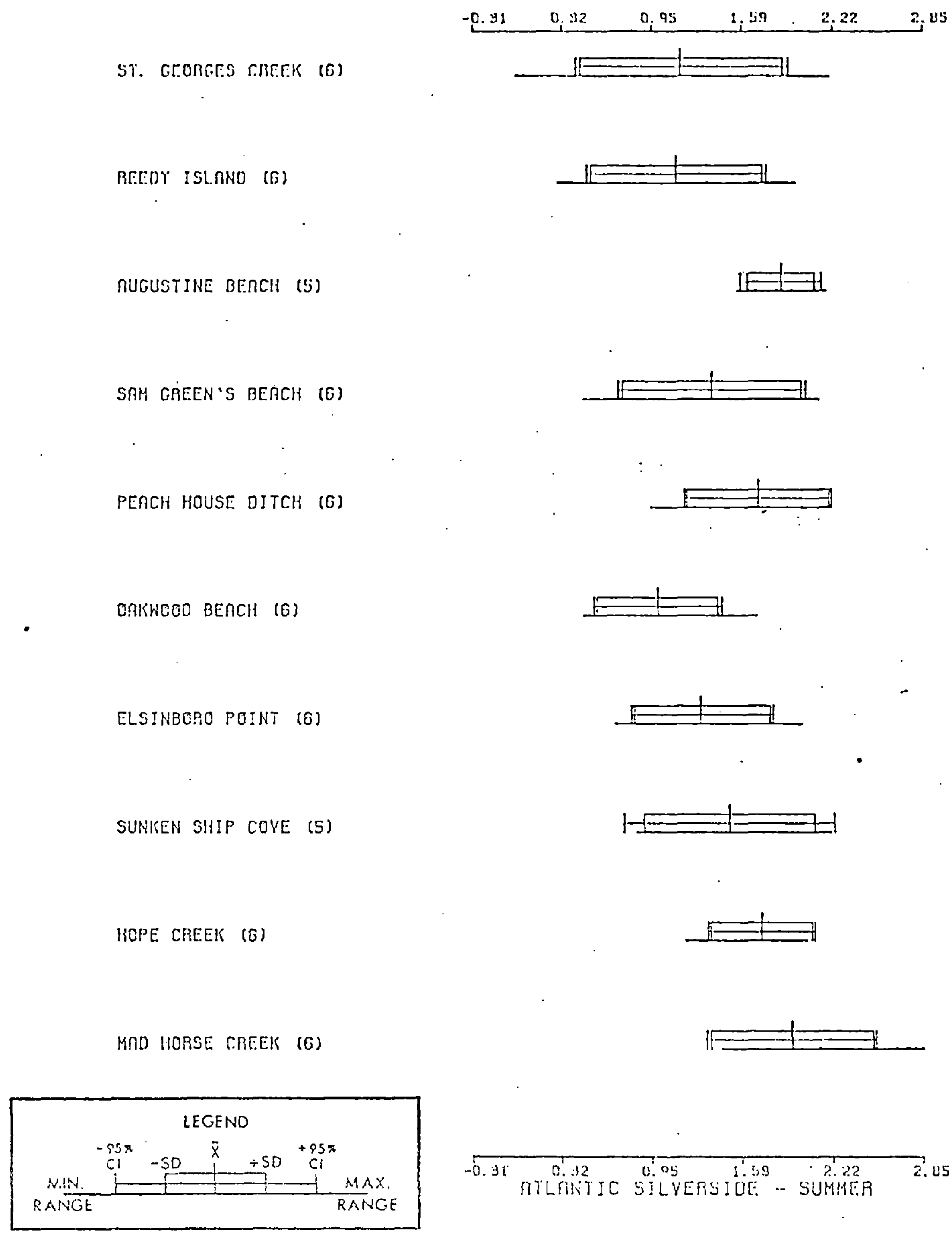
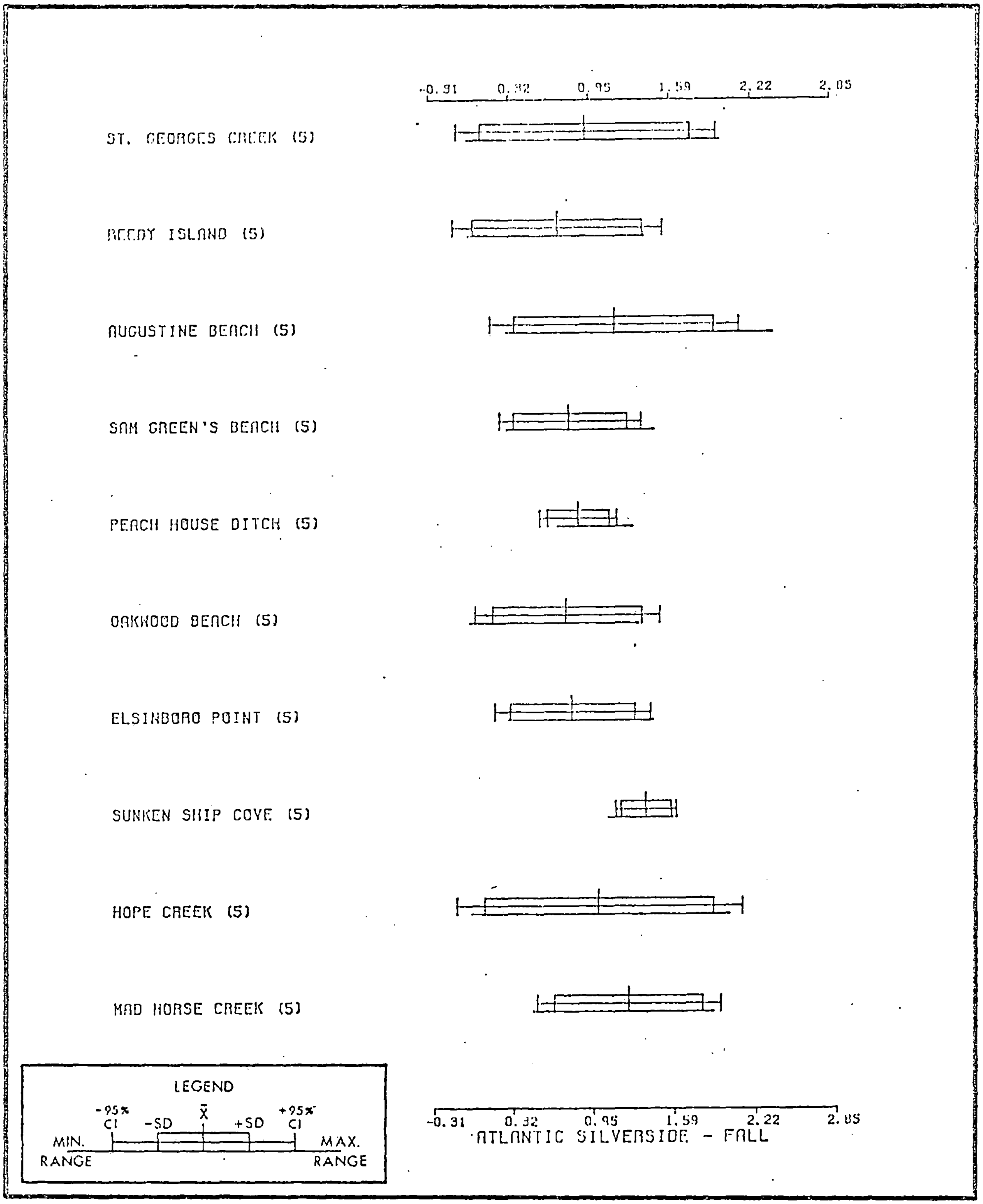
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of Atlantic silverside by seines - 1978 |
| | Figure 3.1.6a-3 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of Atlantic silverside in spring-1978 |
|---|---|
| | Figure 3.1.6a-4 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of Atlantic silverside in summer-1978<br>Figure 3.1.6a-5 |
|---|---|

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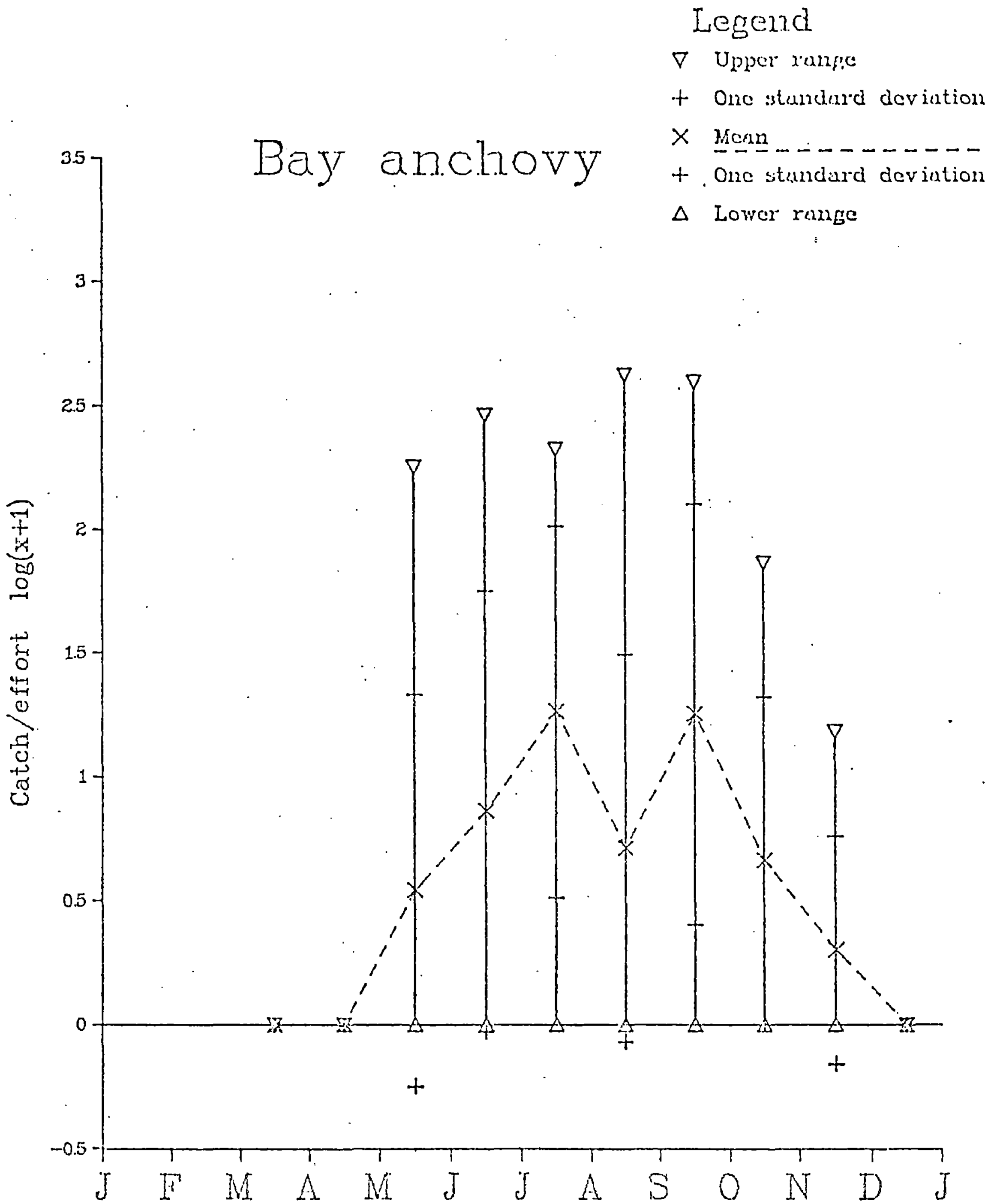
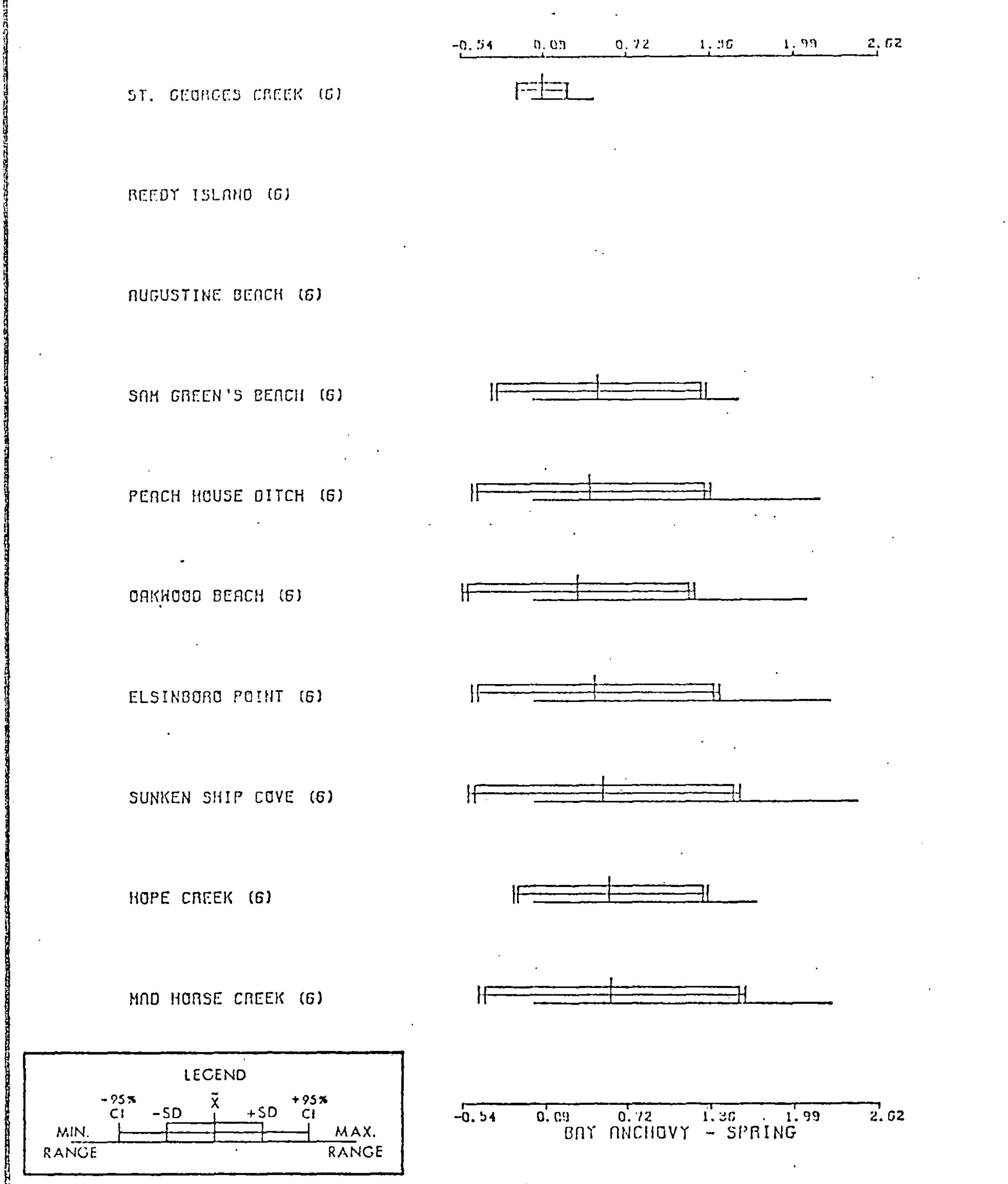
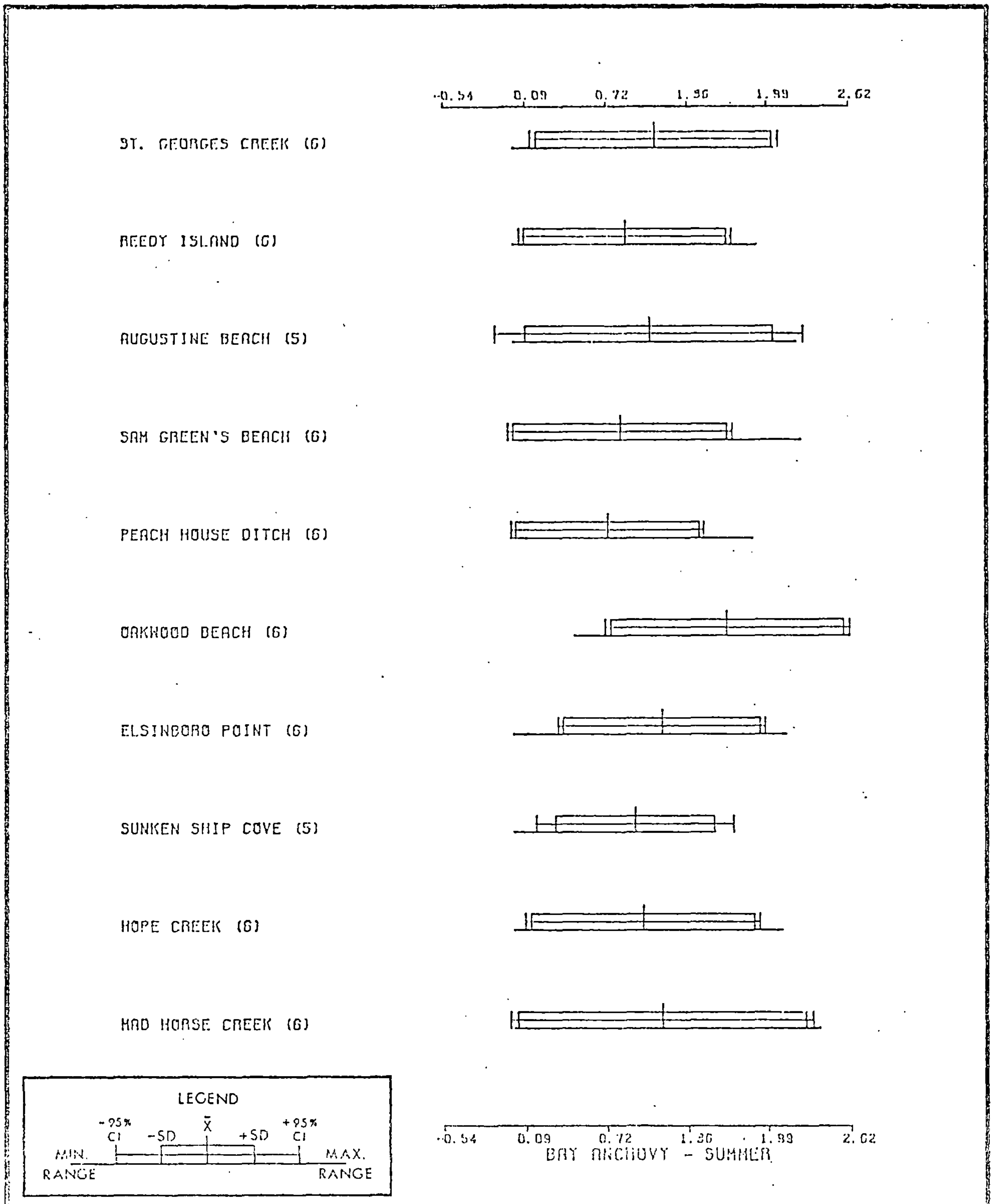
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of Atlantic silverside in fall-1978 |
| | Figure 3.1.6a-6 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of bay anchovy by seines - 1978 |
|---|---|
| | Figure 3.1.6a-7 |



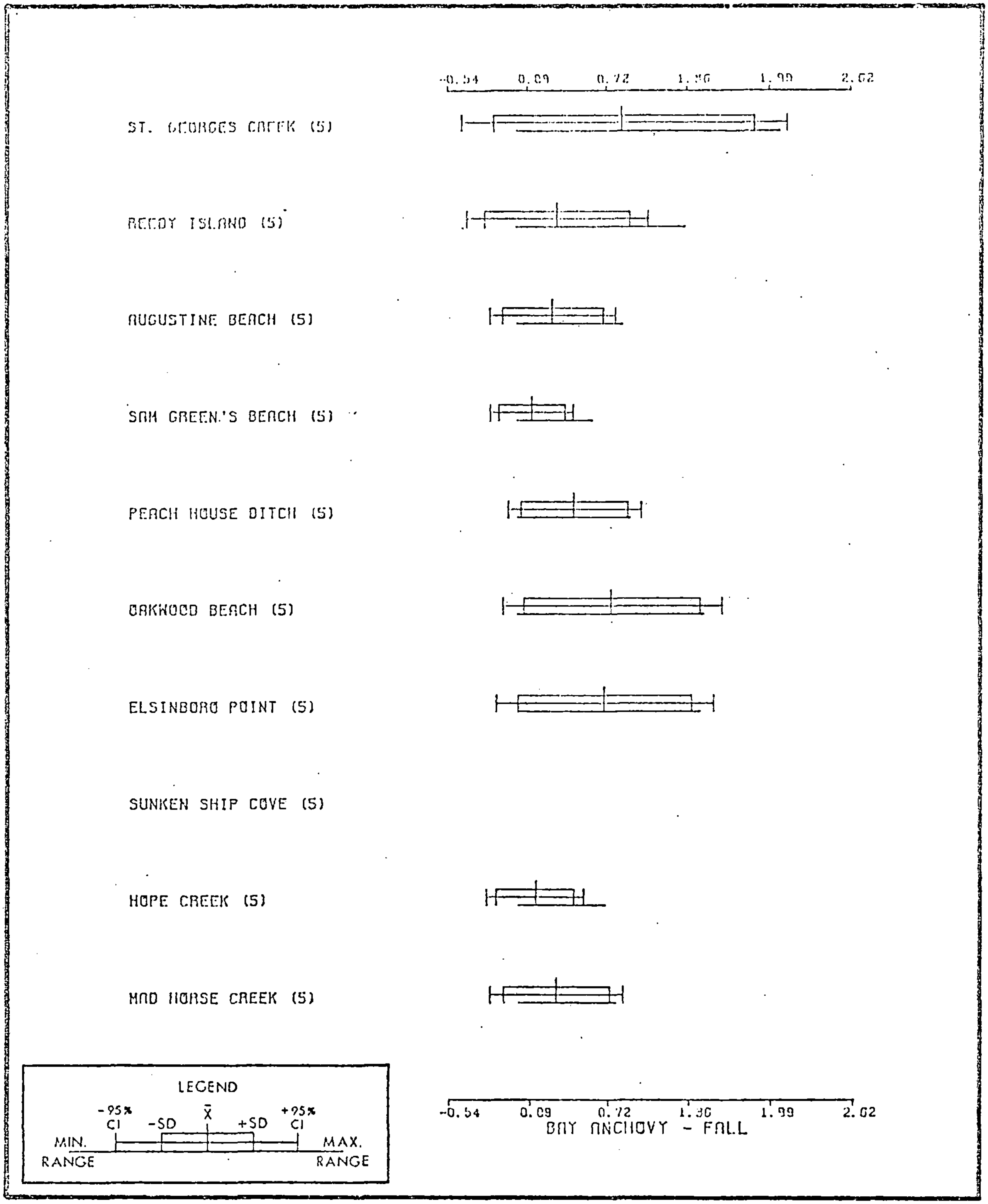

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of bay anchovy in spring-1978<br>Figure 3.1.6a-8 |
|---|---|




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Seine catch statistics of bay anchovy in summer-1978

Figure 3.1.6a-9

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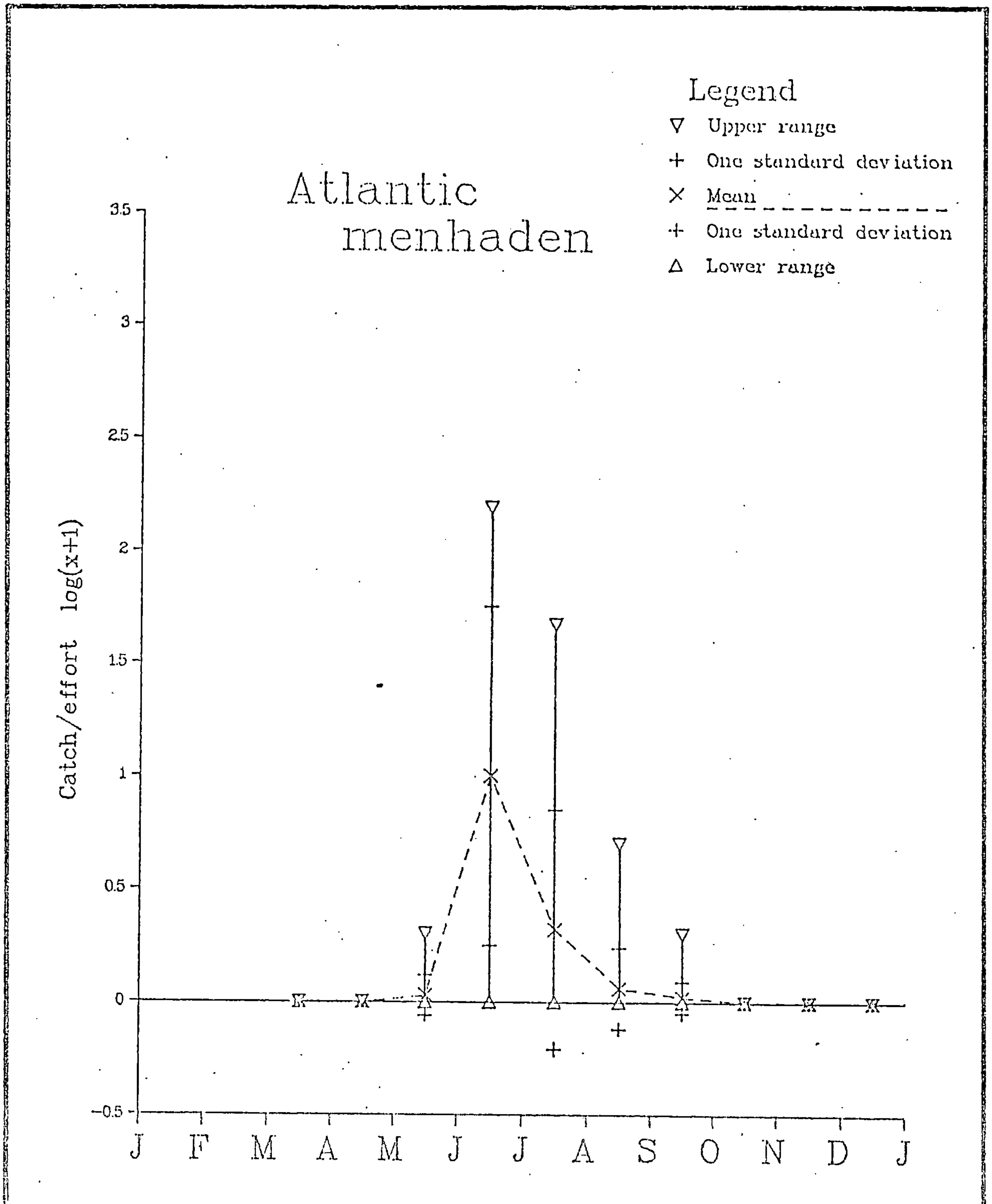
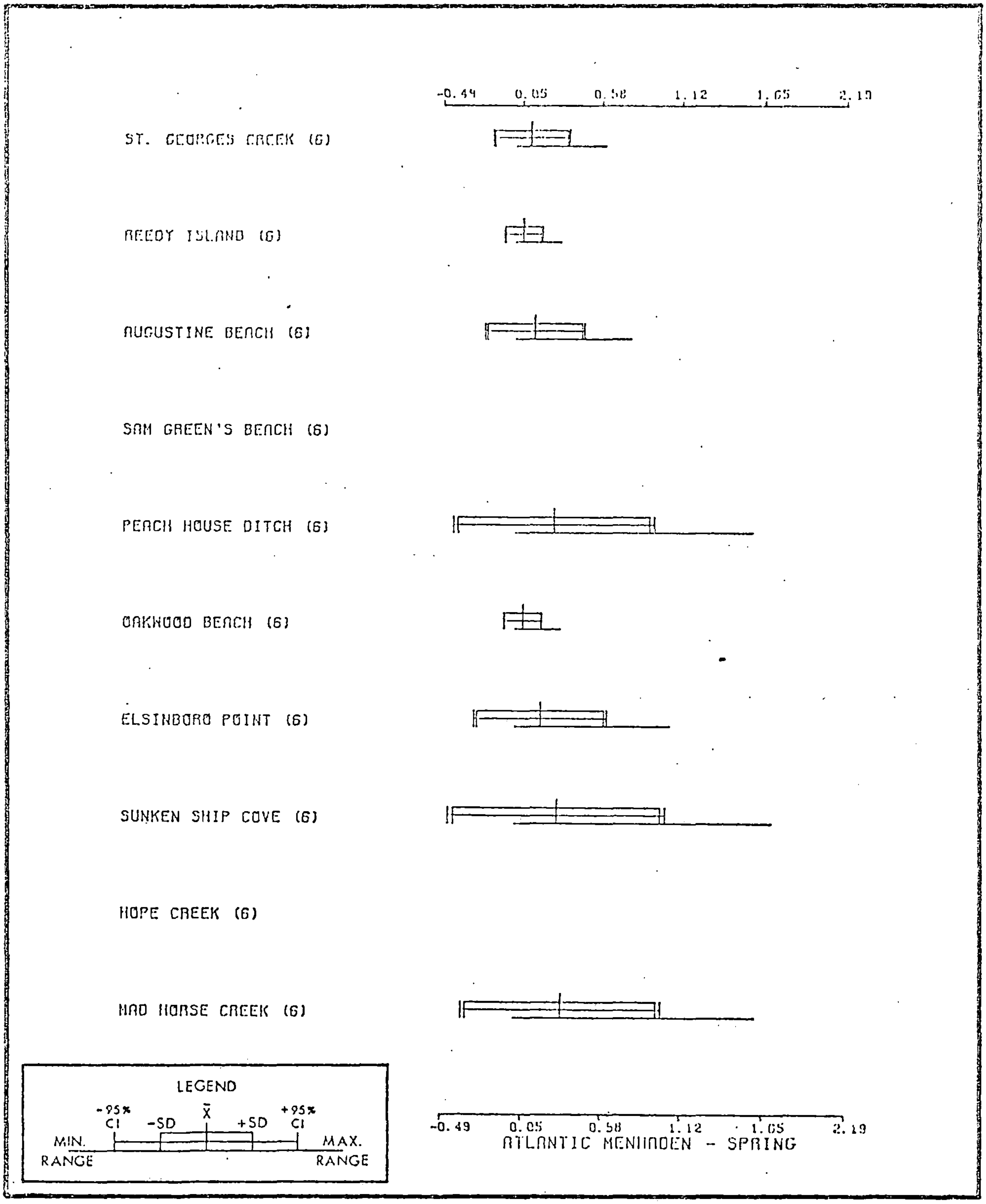
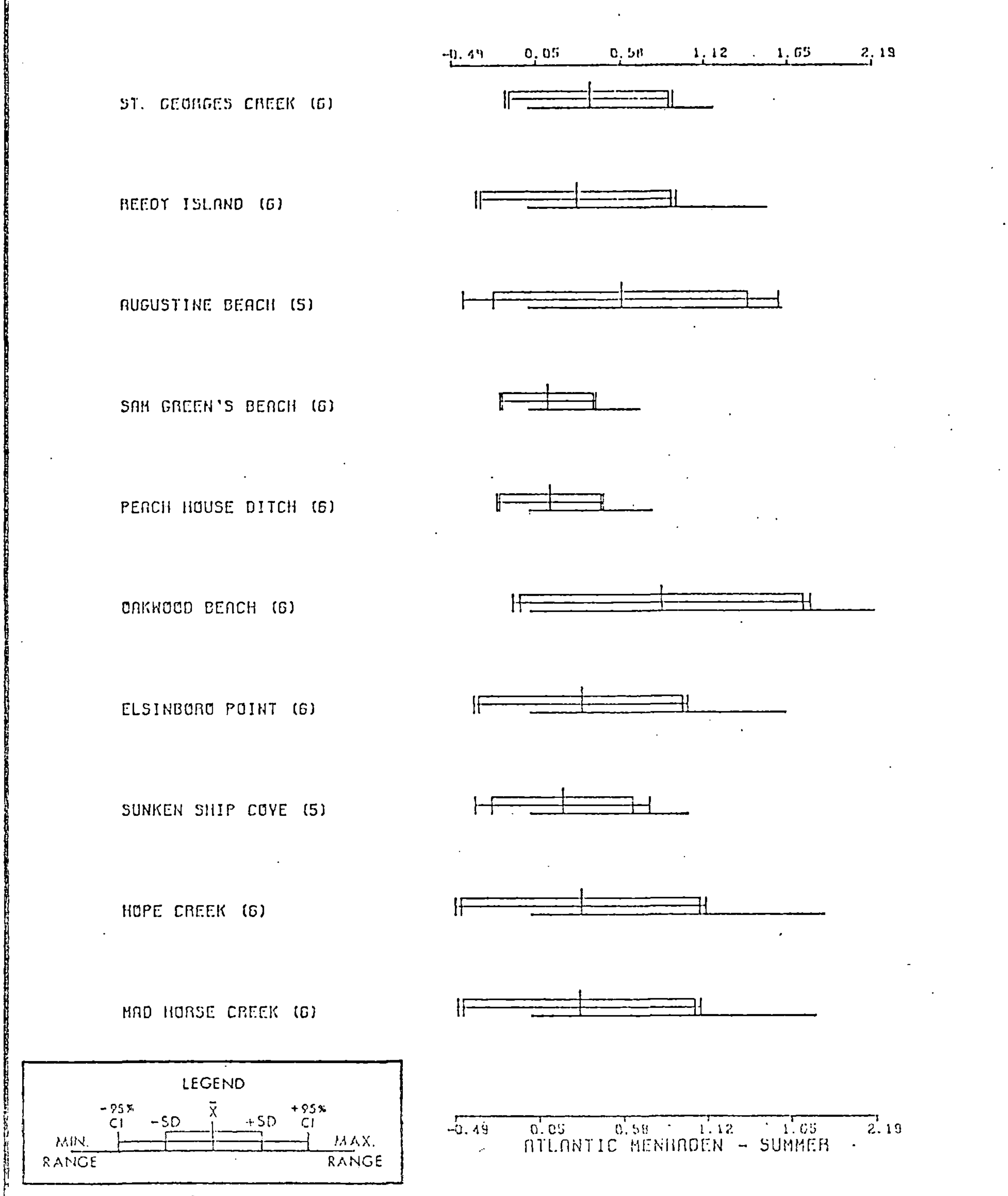
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of bay anchovy in fall-1978 |
| | Figure 3.1.6a-10 |



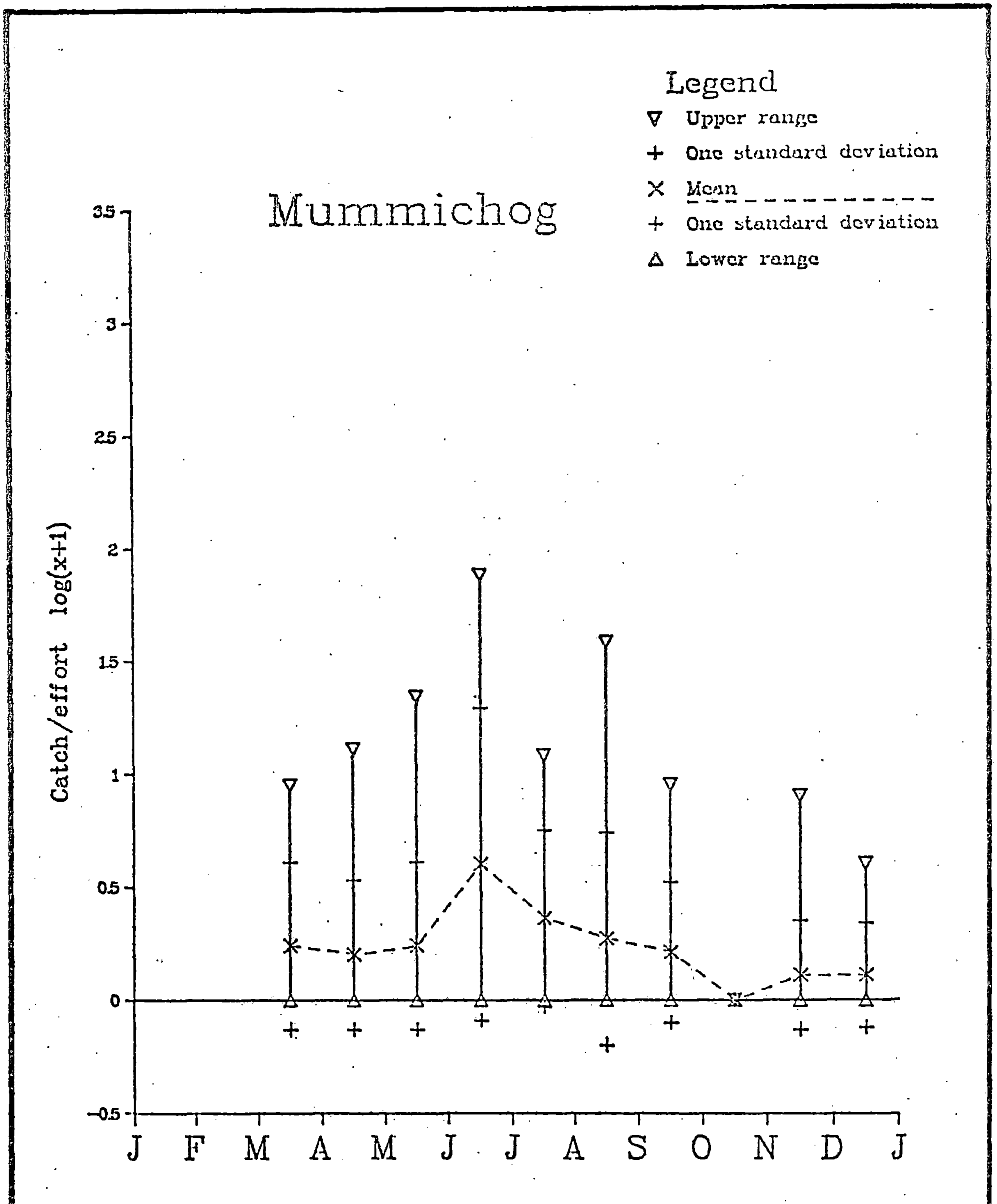

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of Atlantic menhaden by seines - 1978 |
|---|---|
| | Figure 3.1.6a-11 |



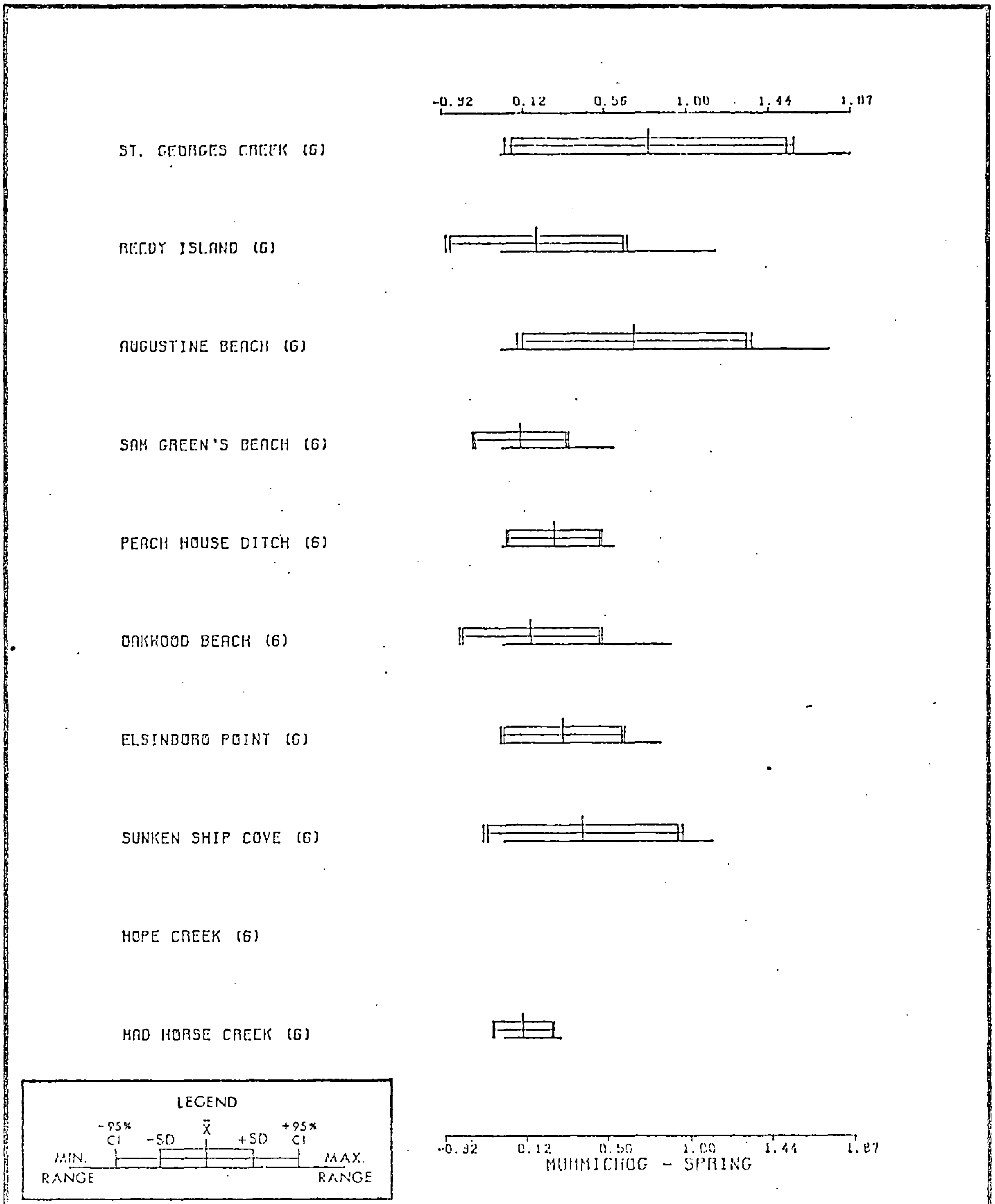

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of Atlantic menhaden in spring-1978 |
|---|---|
| | Figure 3.1.6a-12 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of Atlantic menhaden in summer-1978<br>Figure 3.1.6a-13 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of mummichog by seines - 1978 |
| --- | --- |
| | Figure 3.1.6a-14 |

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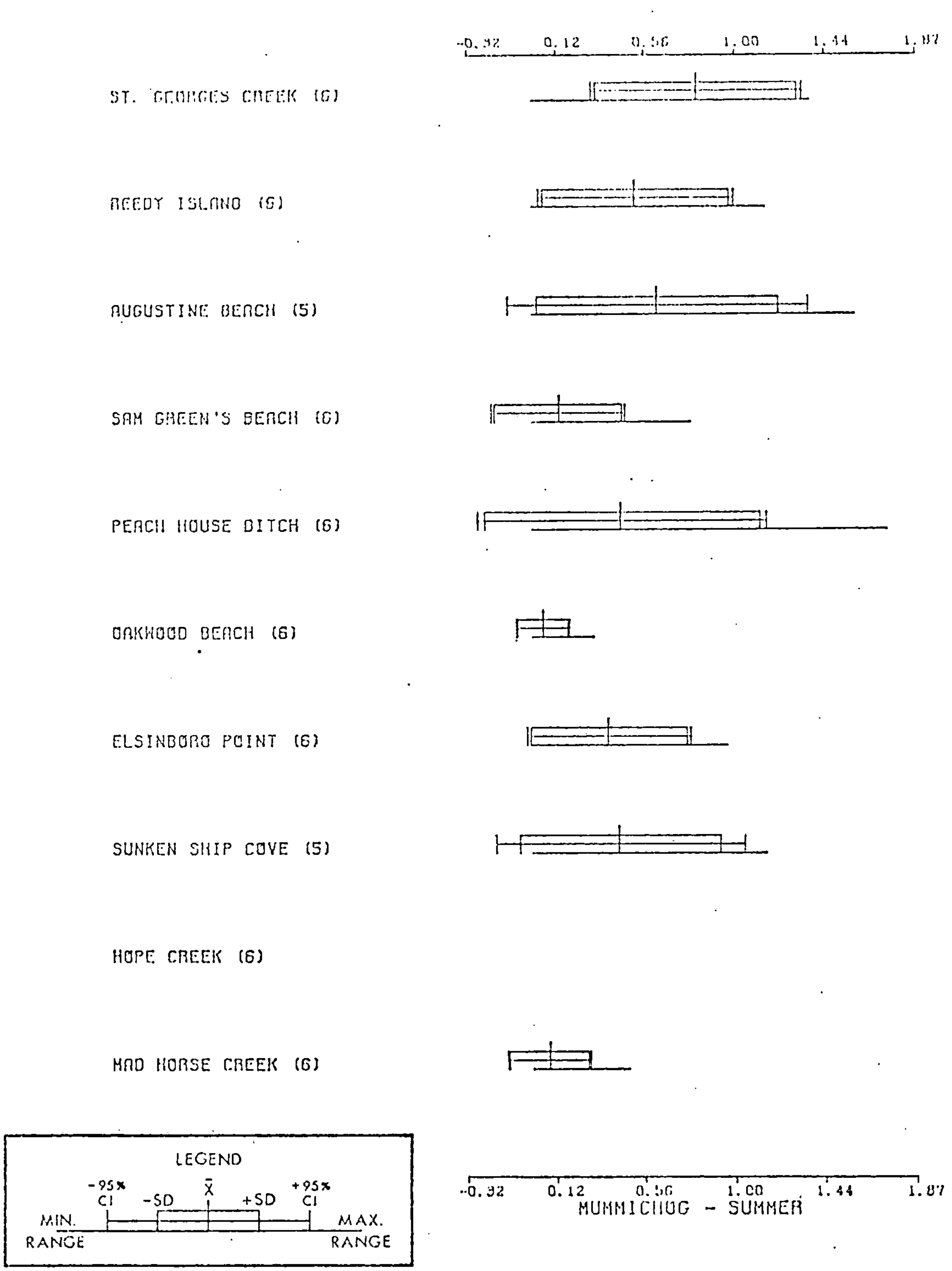
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of mummichog in spring-1978 |
| | Figure 3.1.6a-15 |

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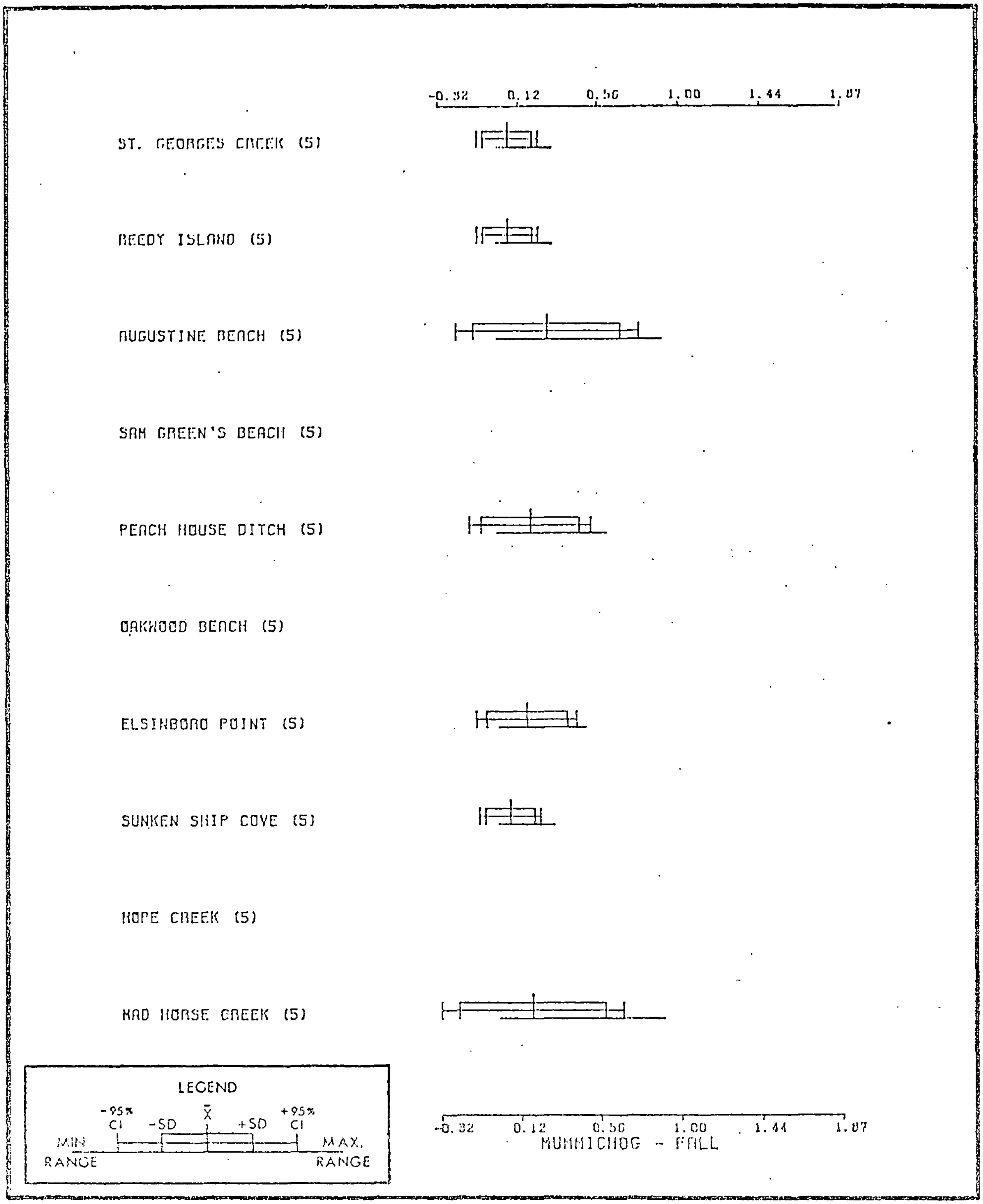
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of mummichog in summer-1978 |
| | Figure 3.1.6a-16 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seine catch statistics of mummichog in fall-1978<br>Figure 3.1.6a-17 |
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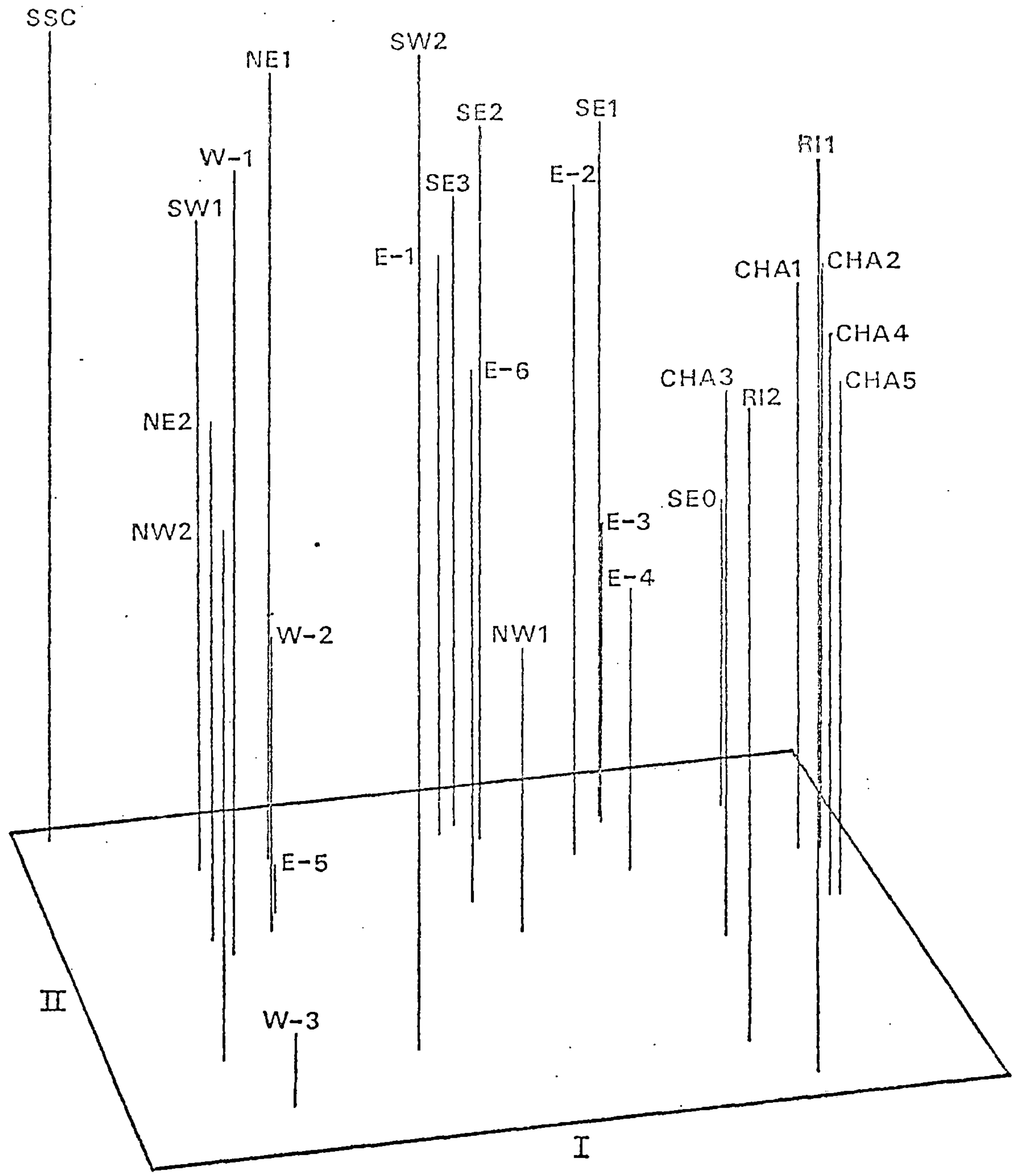
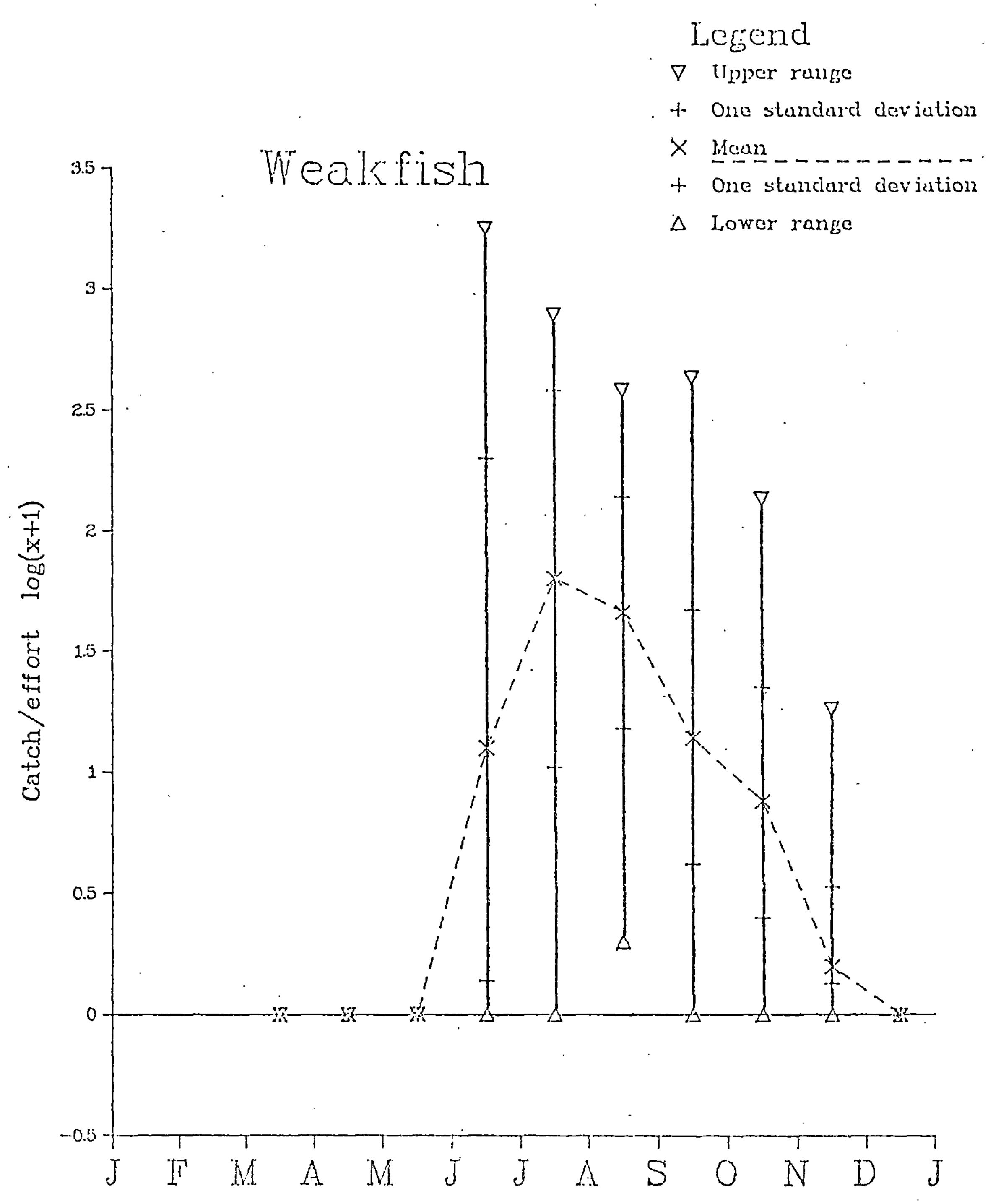
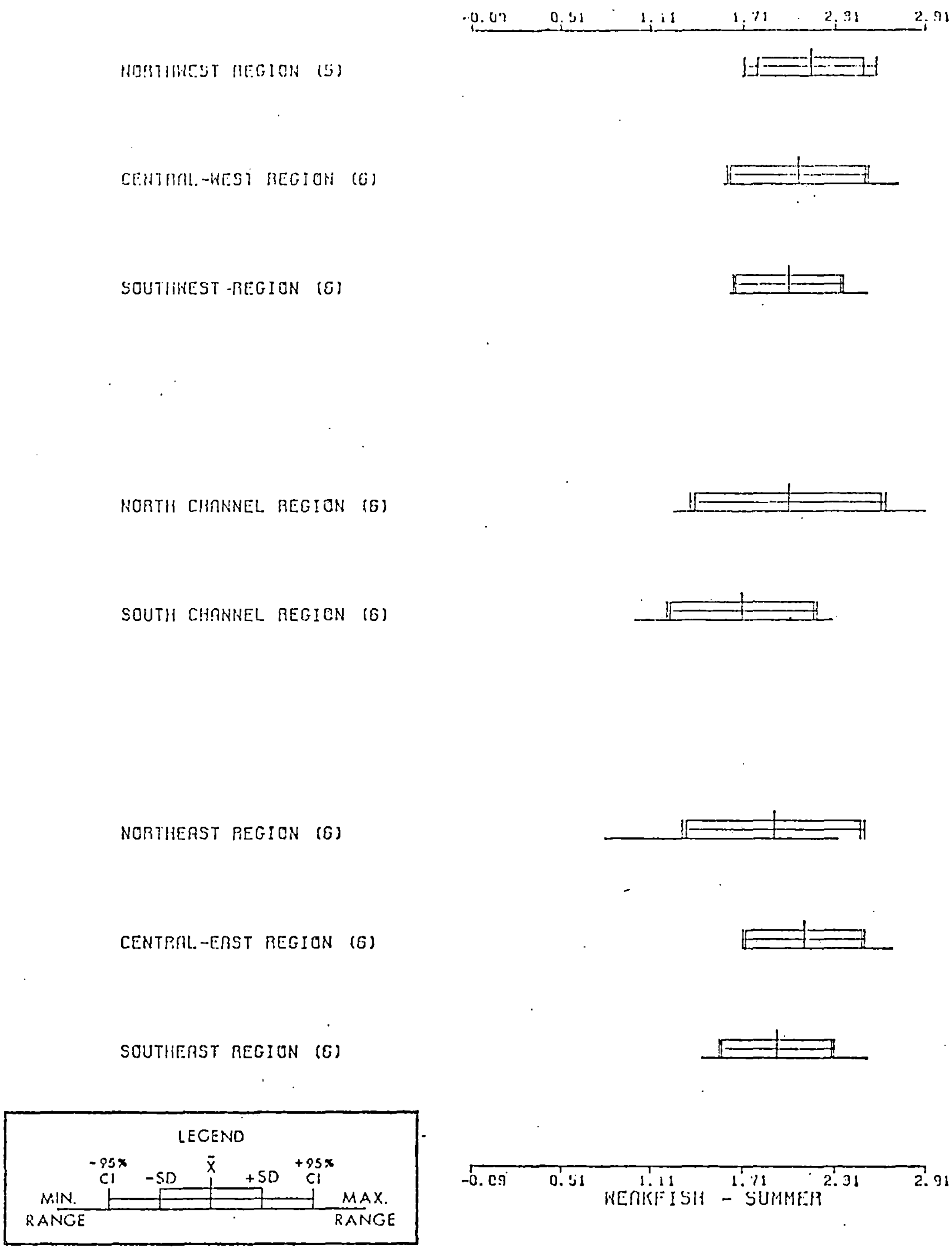


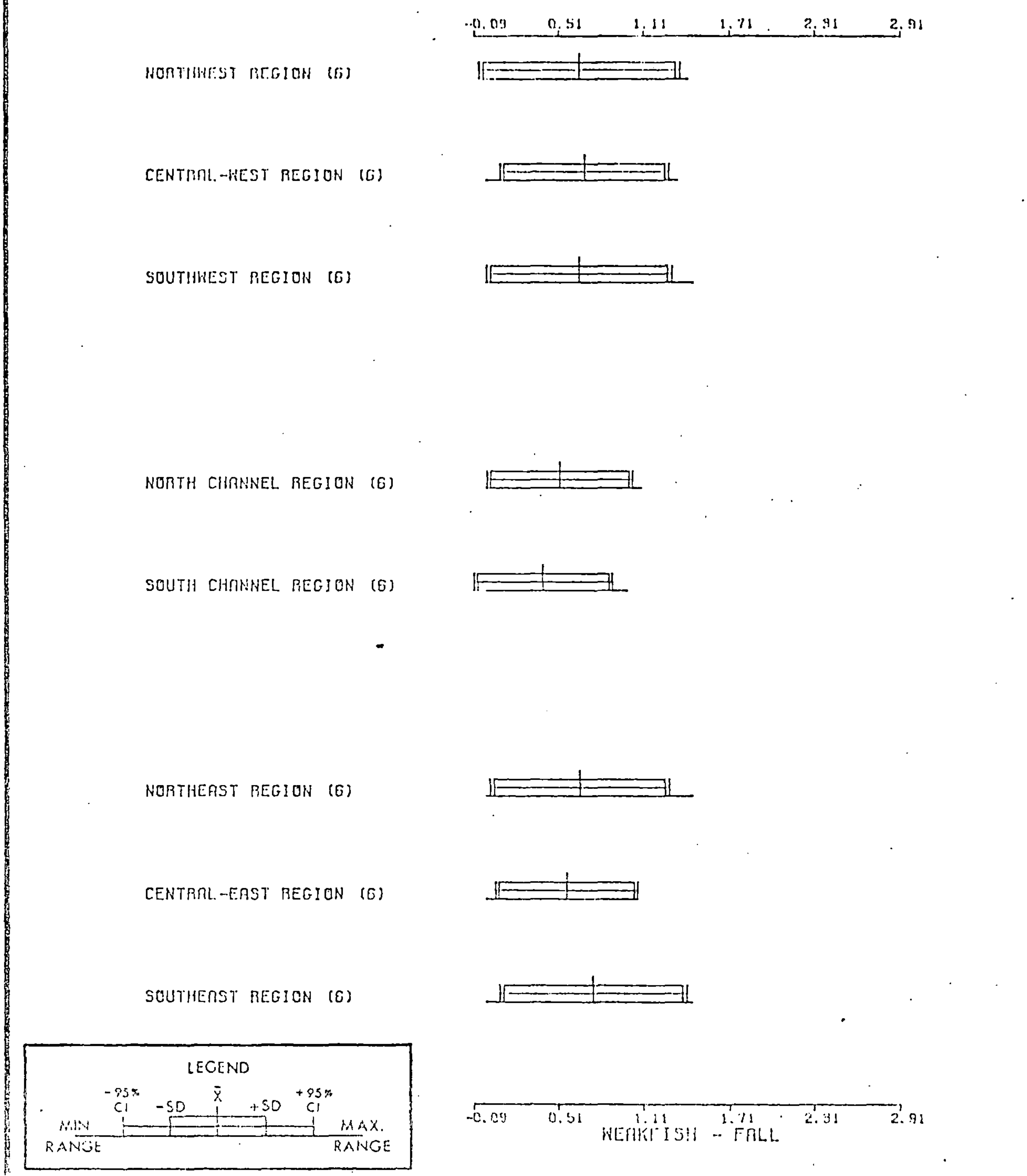

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Similarity of trawl catch on first three component axes based on species composition -1978 |
|---|---|
| | Figure 3.1.6a-18 |



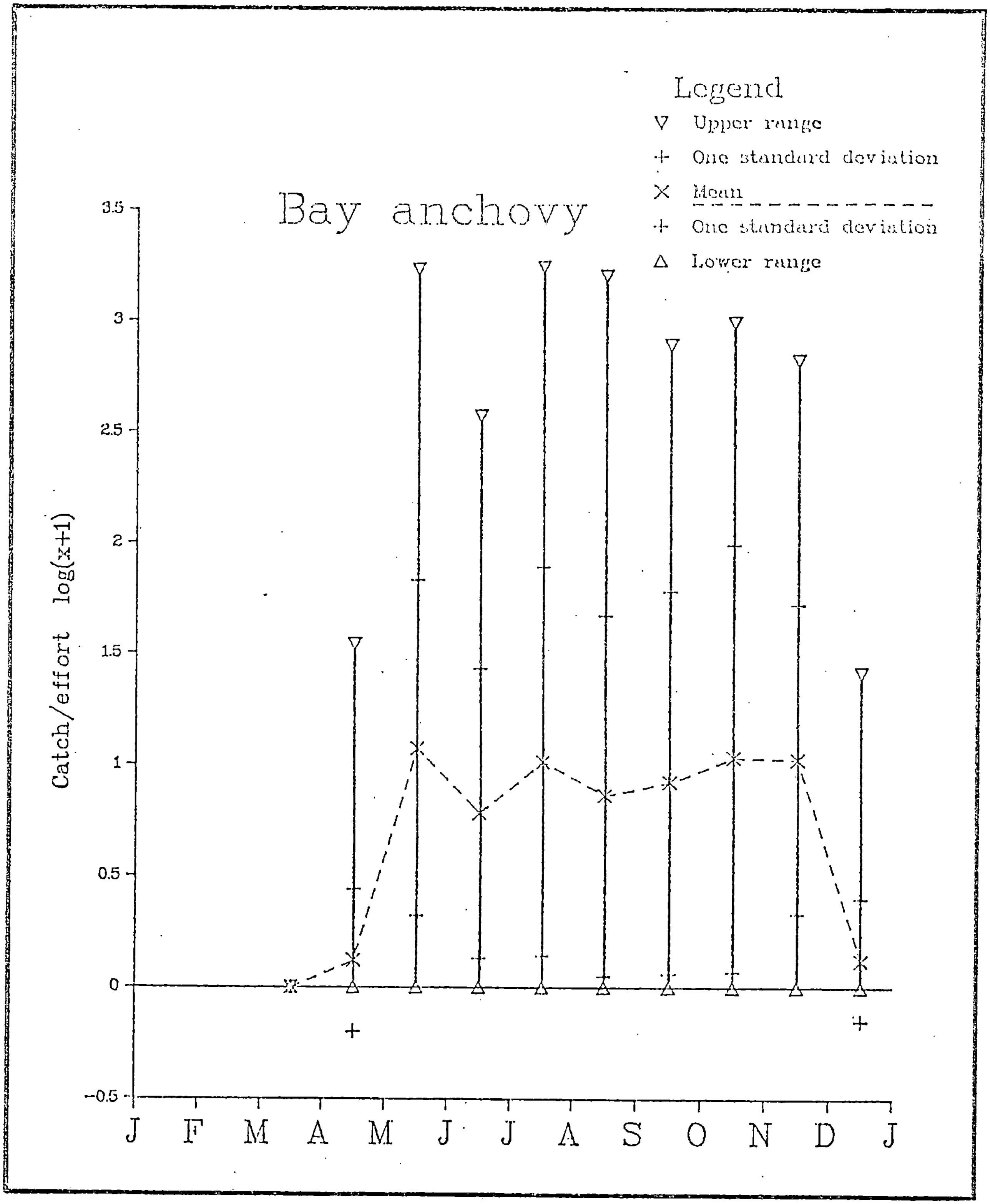

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of weakfish by trawl-1978<br>Figure 3.1.6a-19 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of weakfish in summer-1978 |
|---|---|
| | Figure 3.1.6a-20 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of weakfish in fall-1978 |
|---|---|
| | Figure 3.1.6a-21 |

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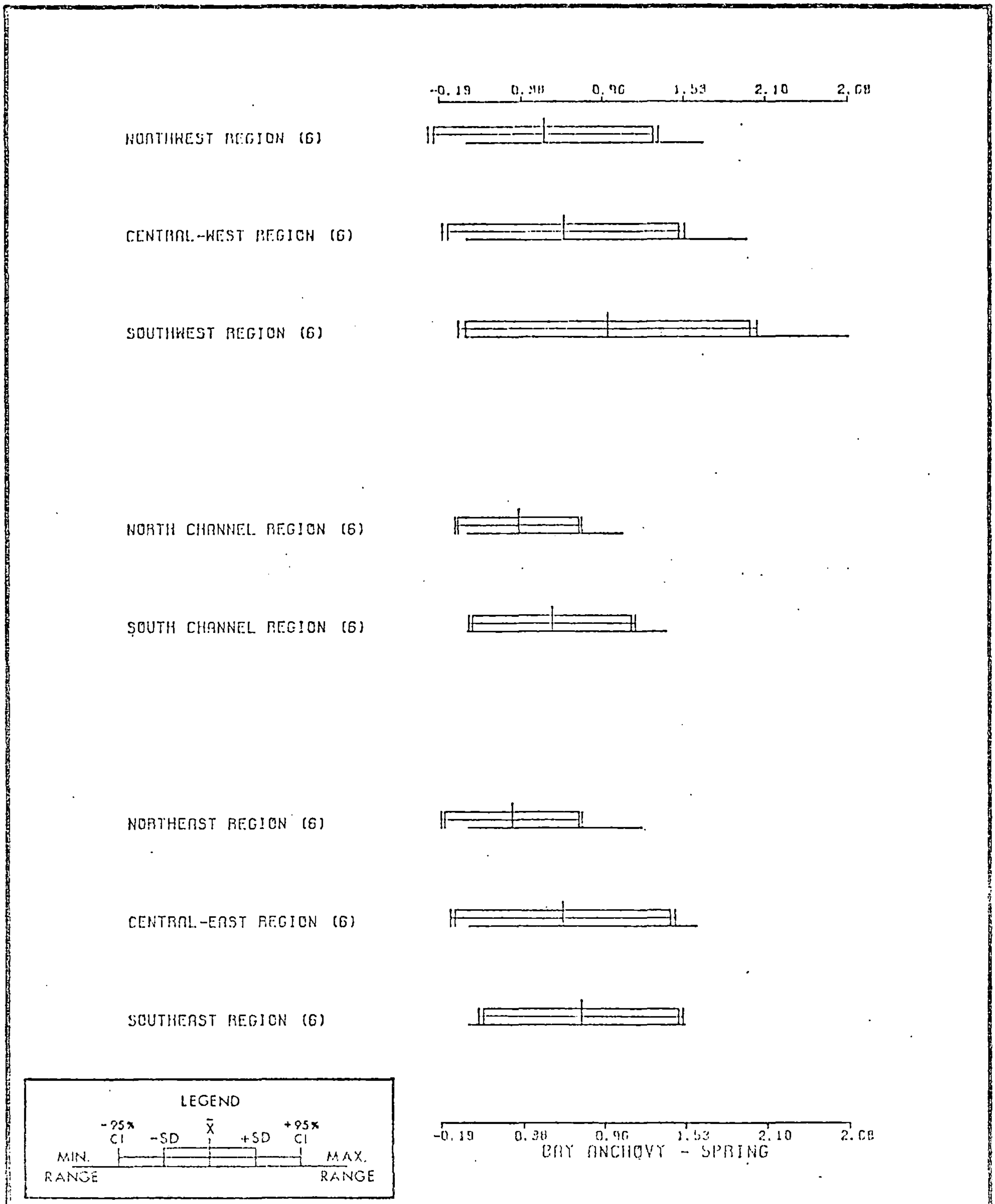
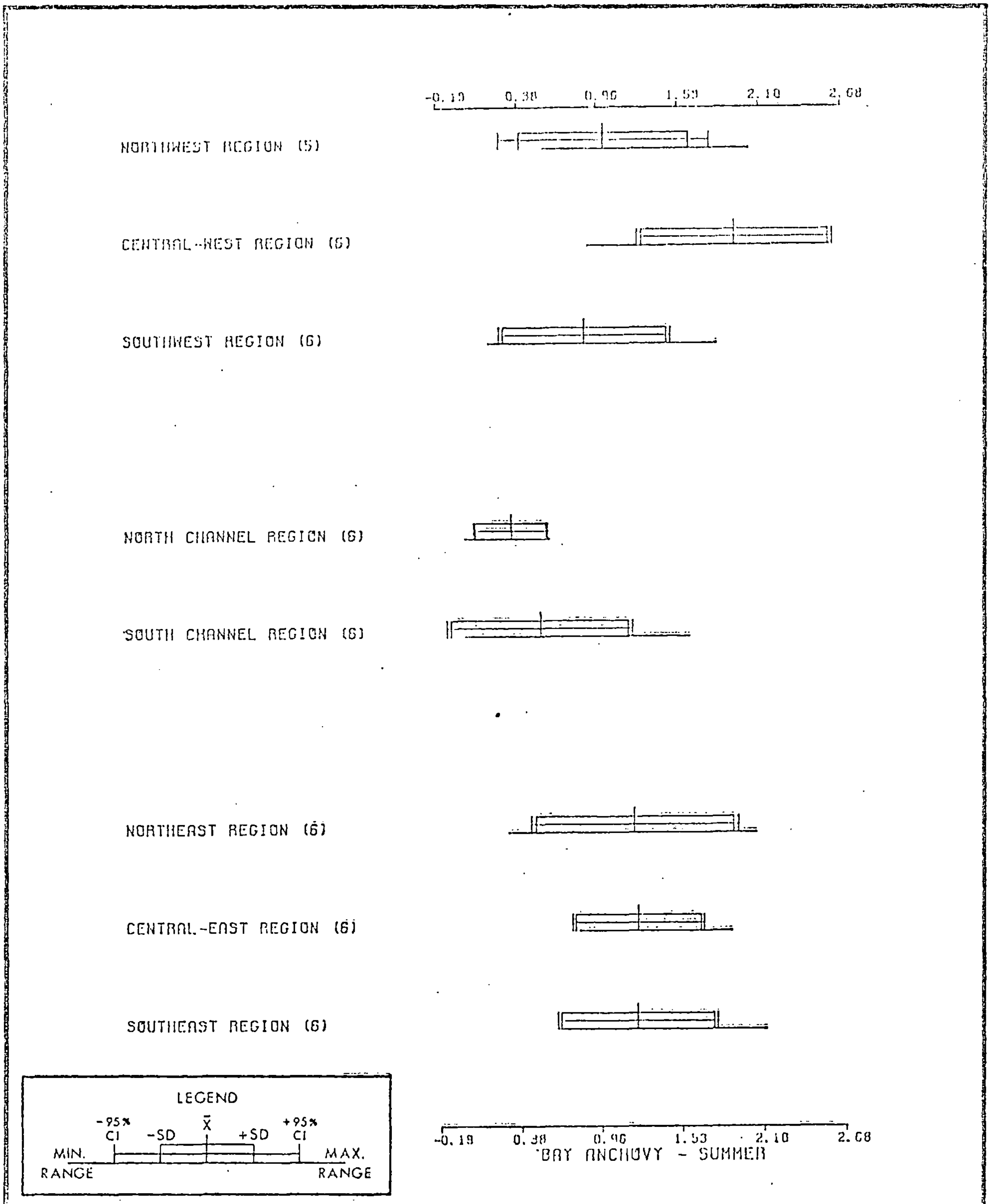
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of bay anchovy by trawl-1978 |
| | Figure 3.1.6a-22 |



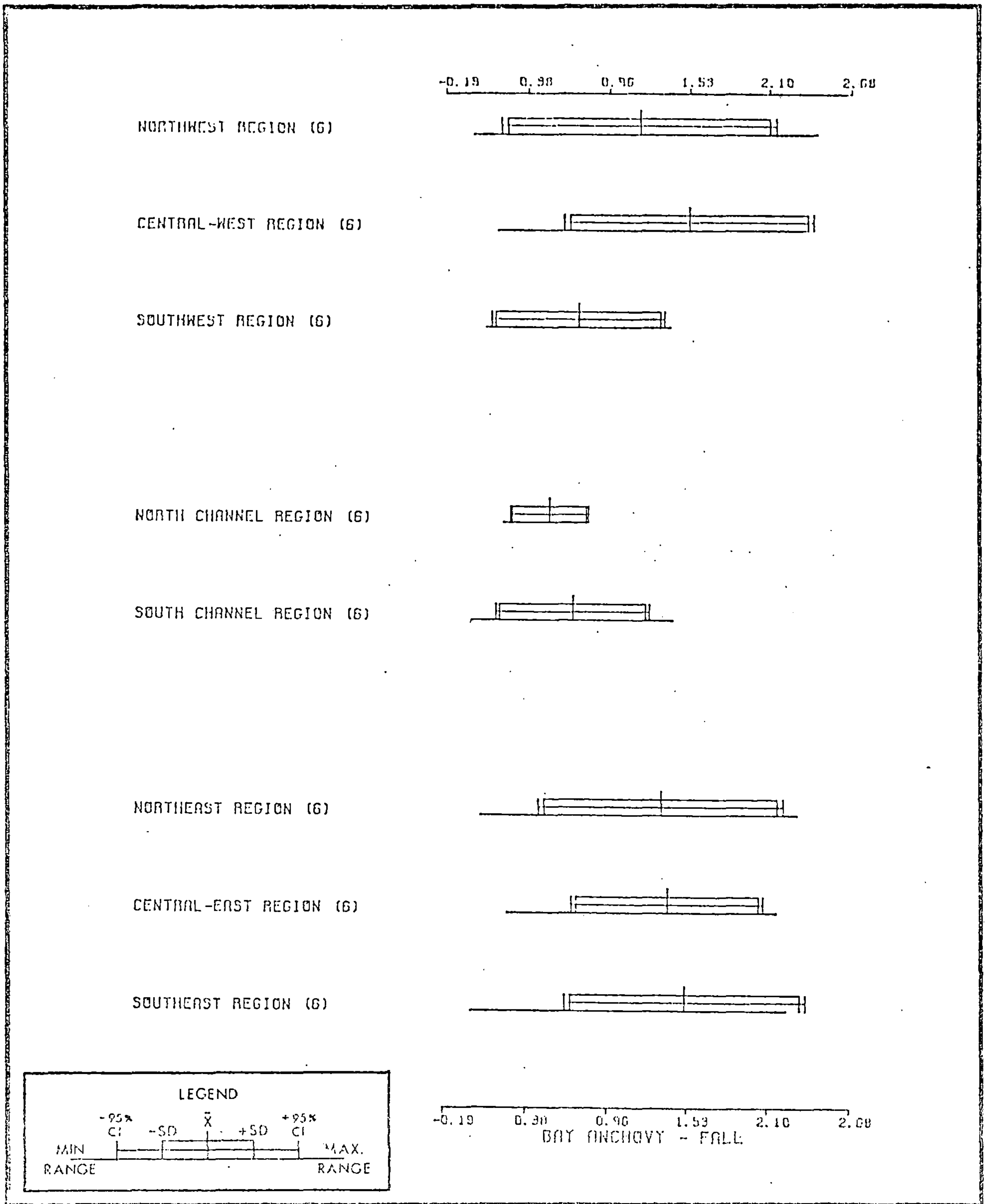

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of bay anchovy in spring-1978 |
| | Figure 3.1.6a-23 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Trawl catch statistics of bay anchovy in summer-1978

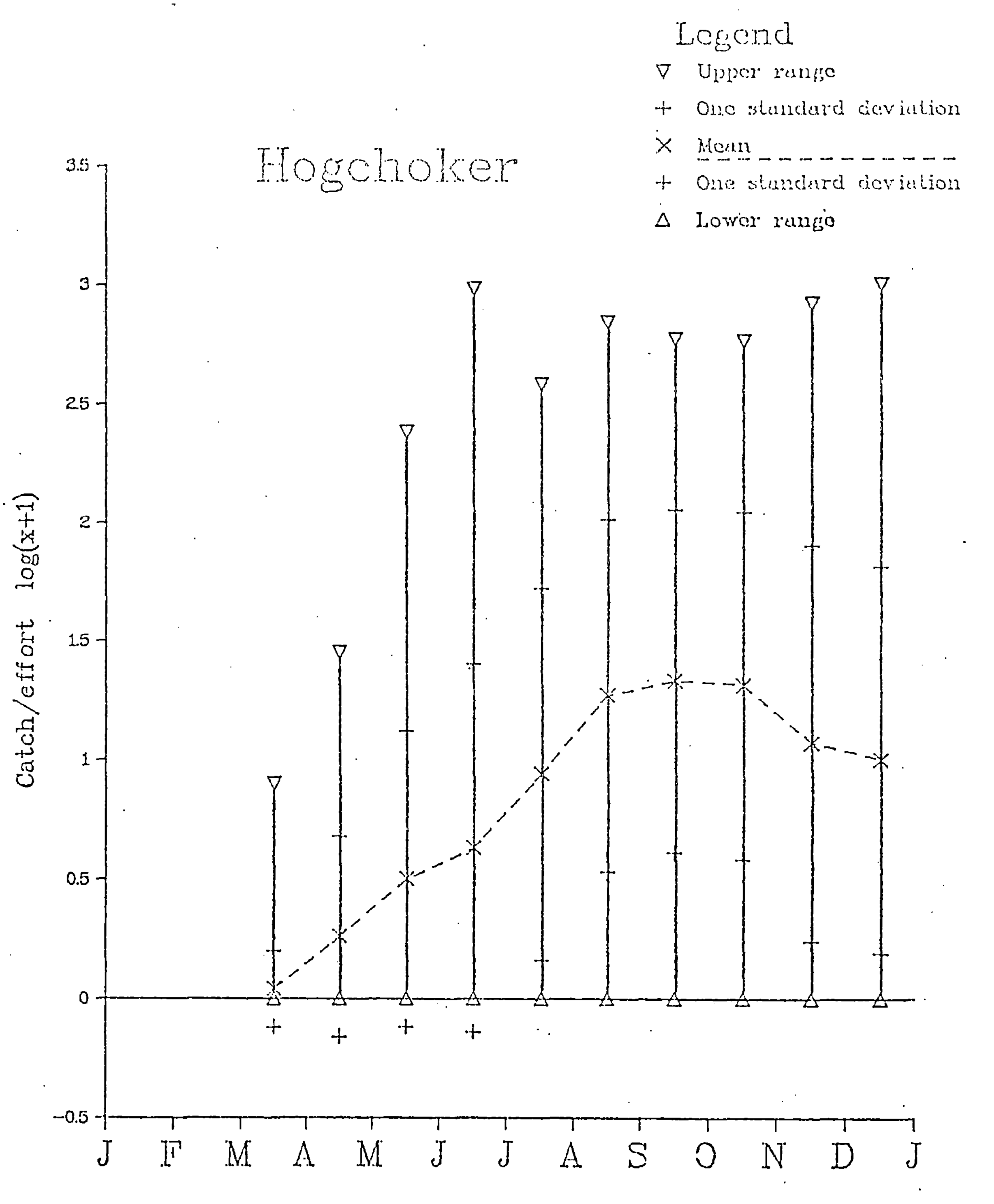
Figure 3.1.6a-24



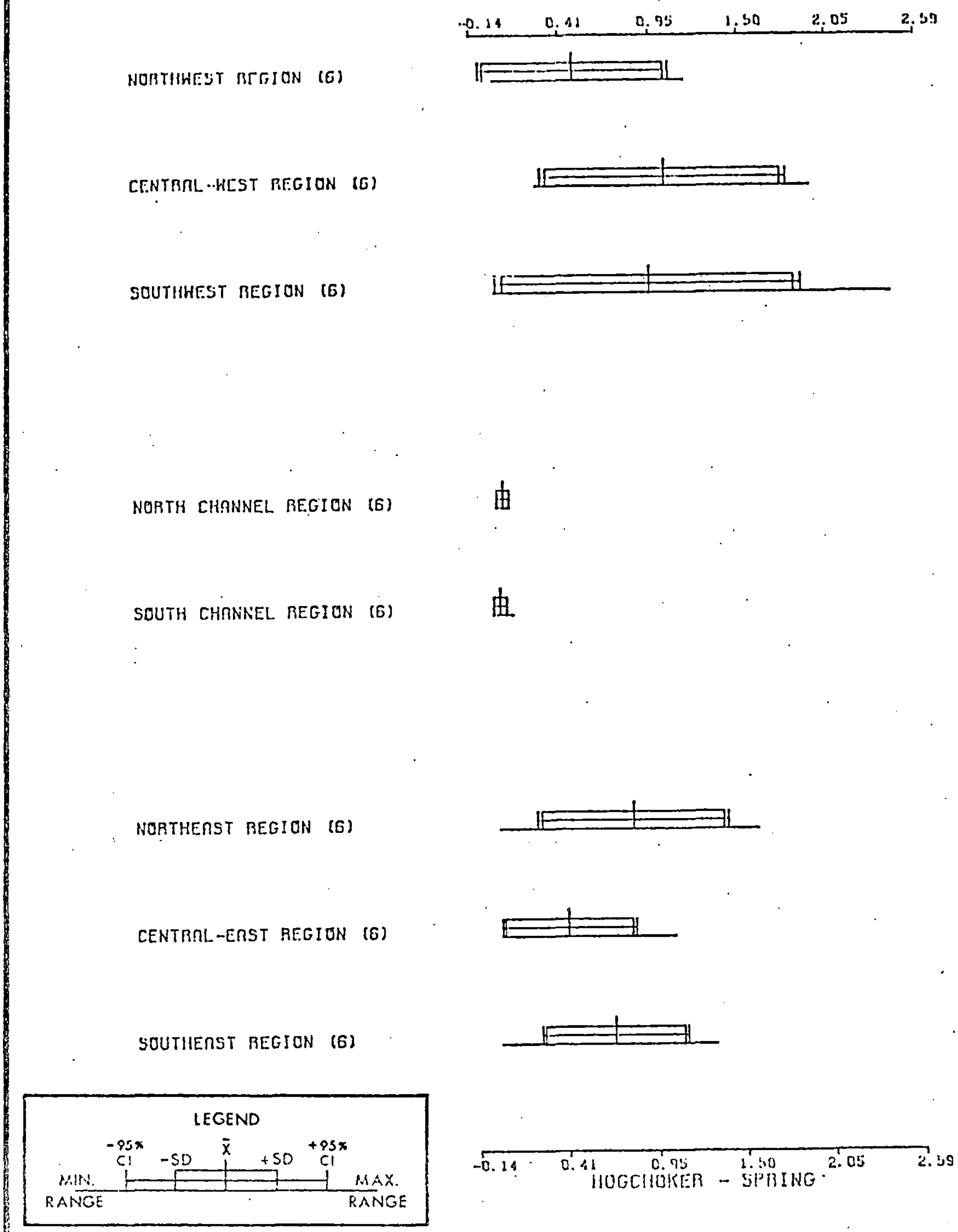

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Trawl catch statistics of bay anchovy in fall-1978

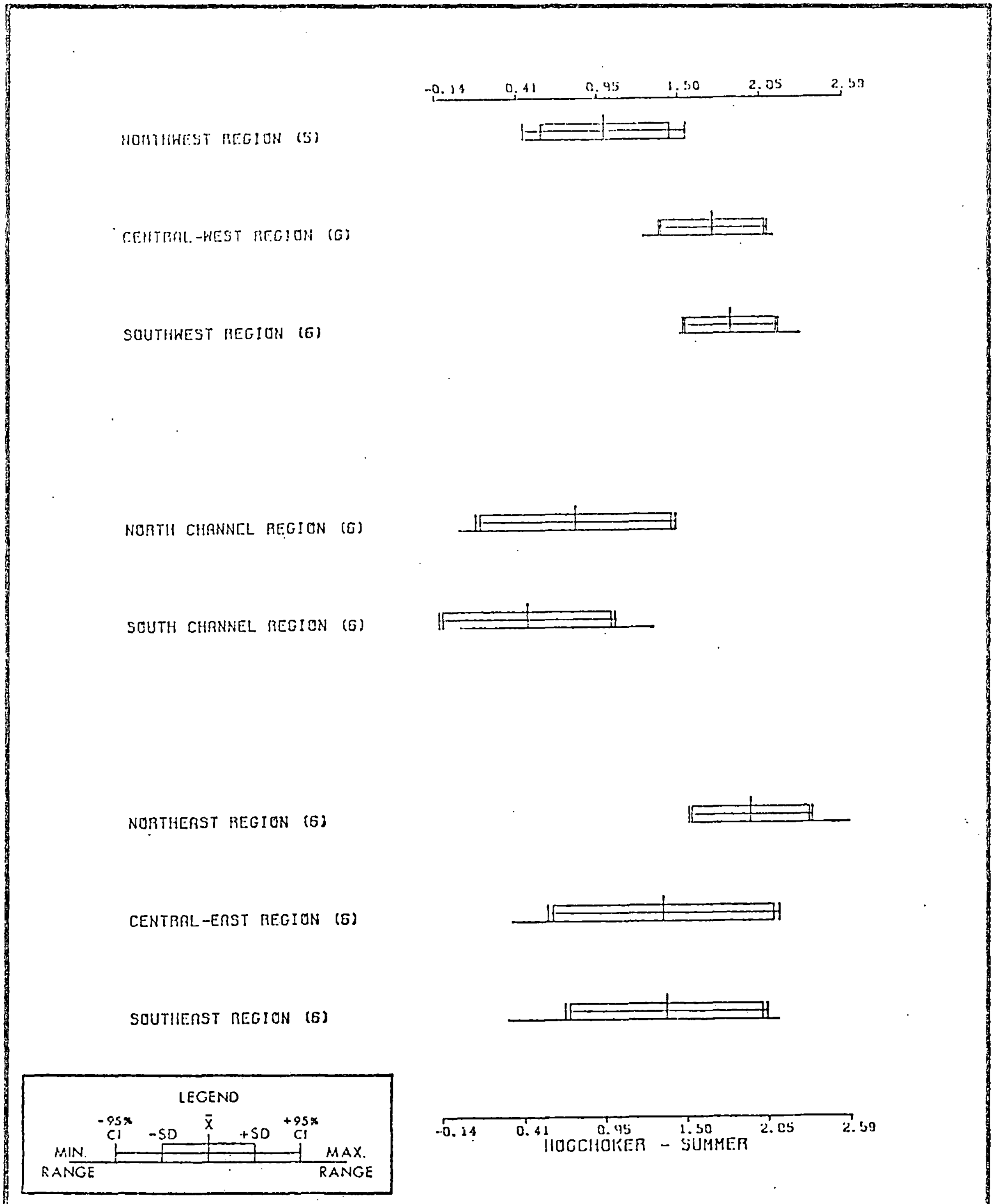
Figure 3.1.6a-25




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of hogchoker by trawl-1978 |
|---|---|
| | Figure 3.1.6a-26 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of hogchoker in spring-1978 |
| --- | --- |
| | Figure 3.1.6a-27 |

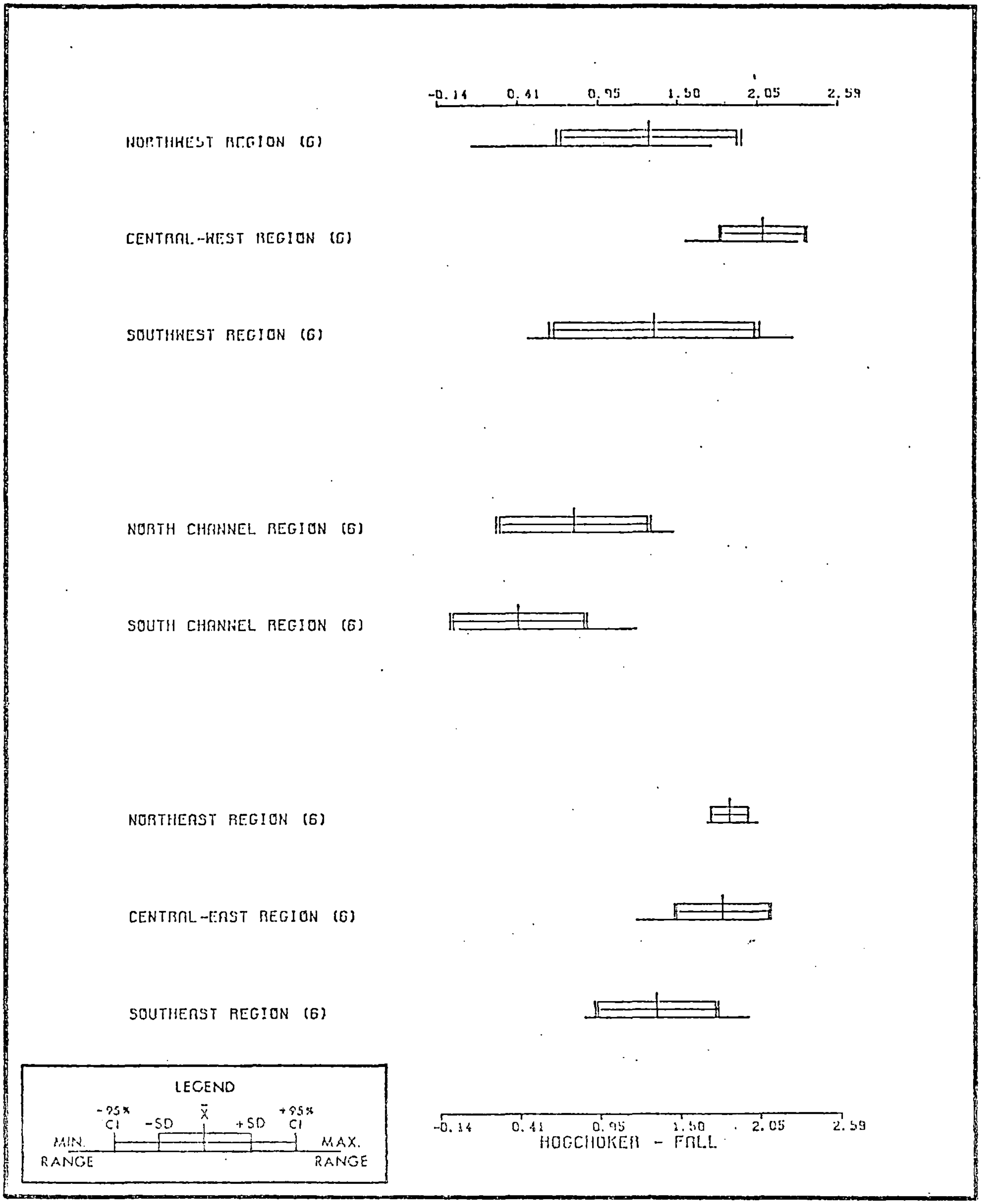



PUBLIC SERVICE ELECTRIC AND GAS COMPANY

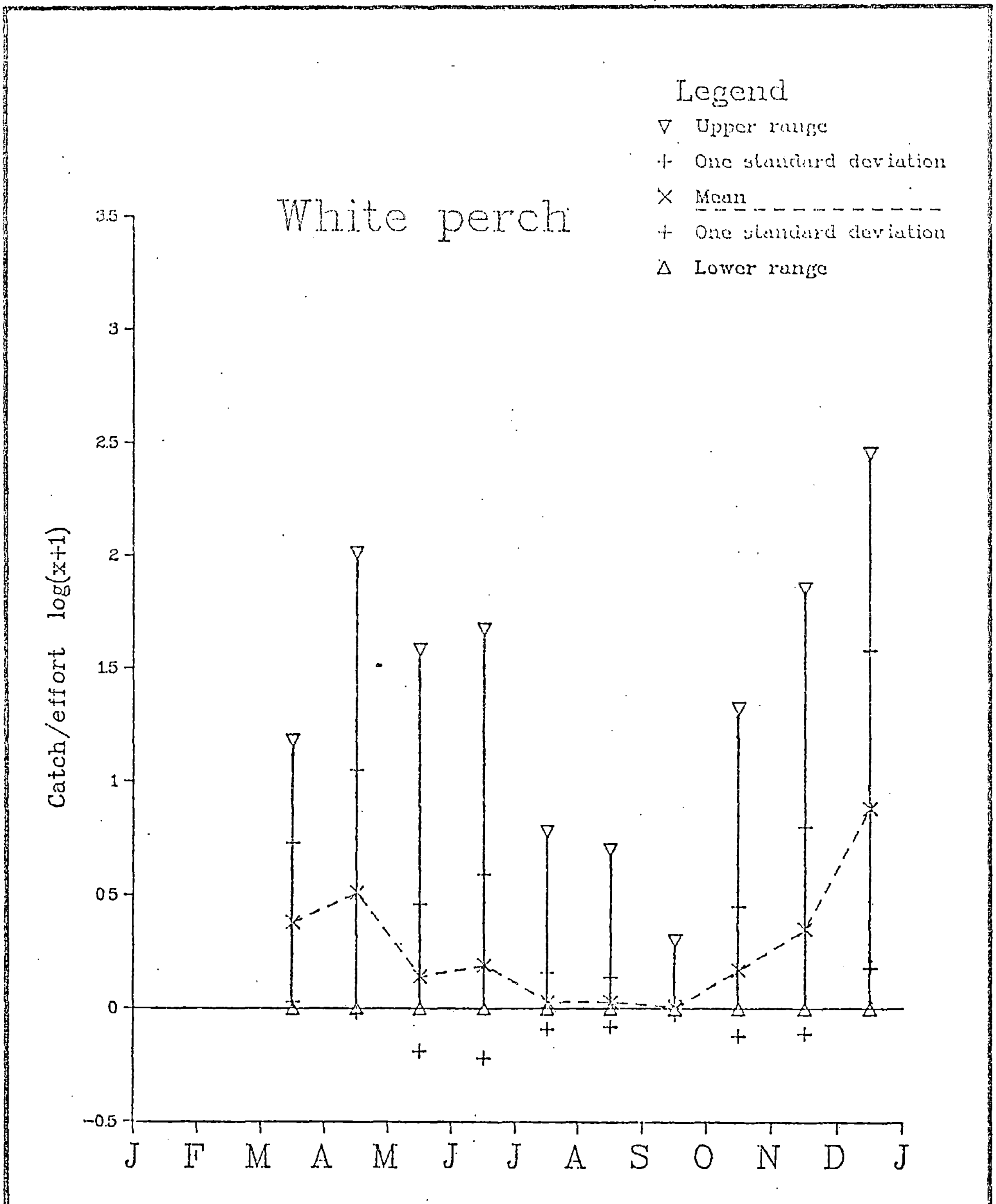
SALEM NUCLEAR GENERATING STATION

Trawl catch statistics of hogchoker in summer-1978

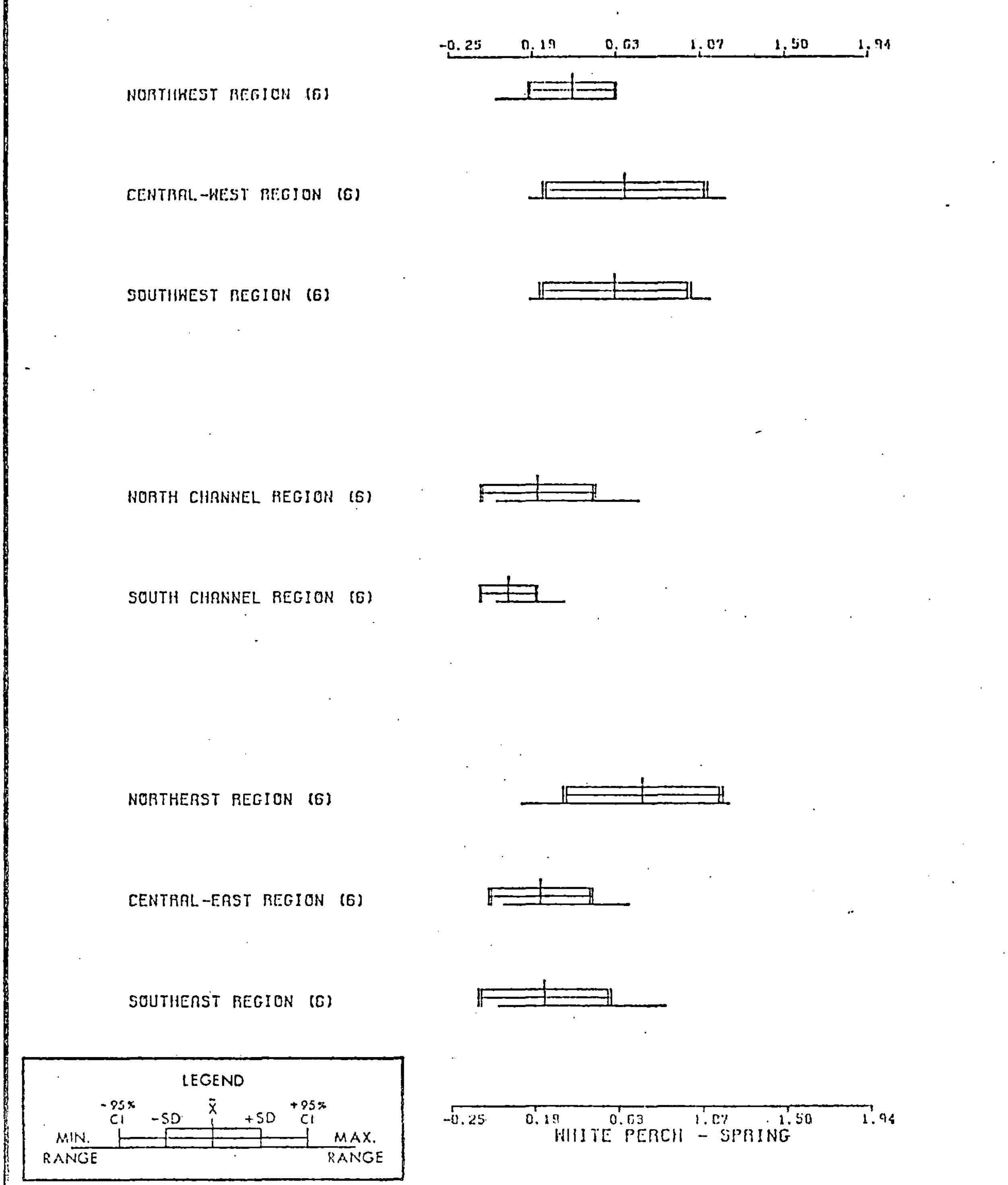
Figure 3.1.6a-28



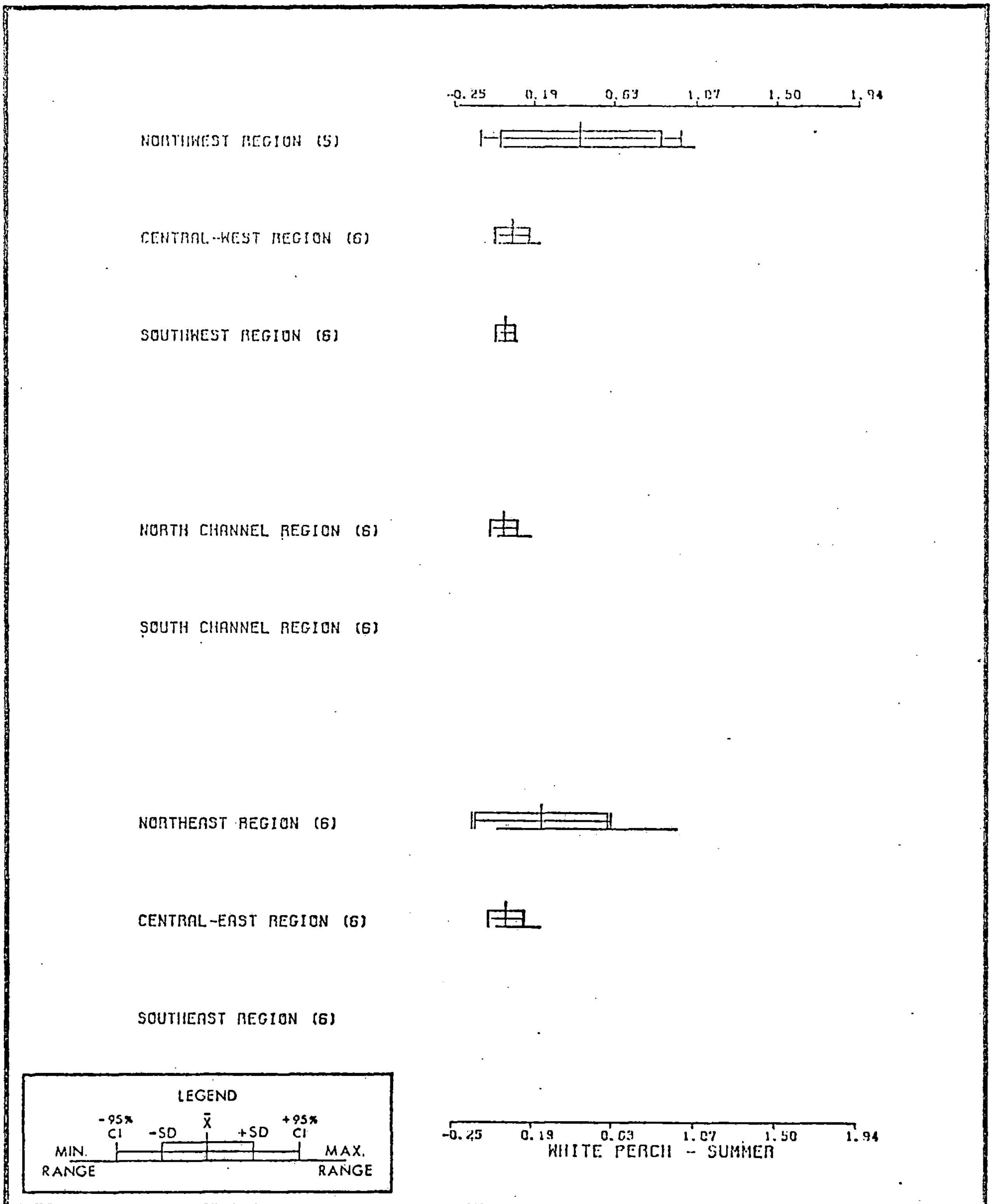

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of hogchoker in fall-1978<br>Figure 3.1.6a-29 |



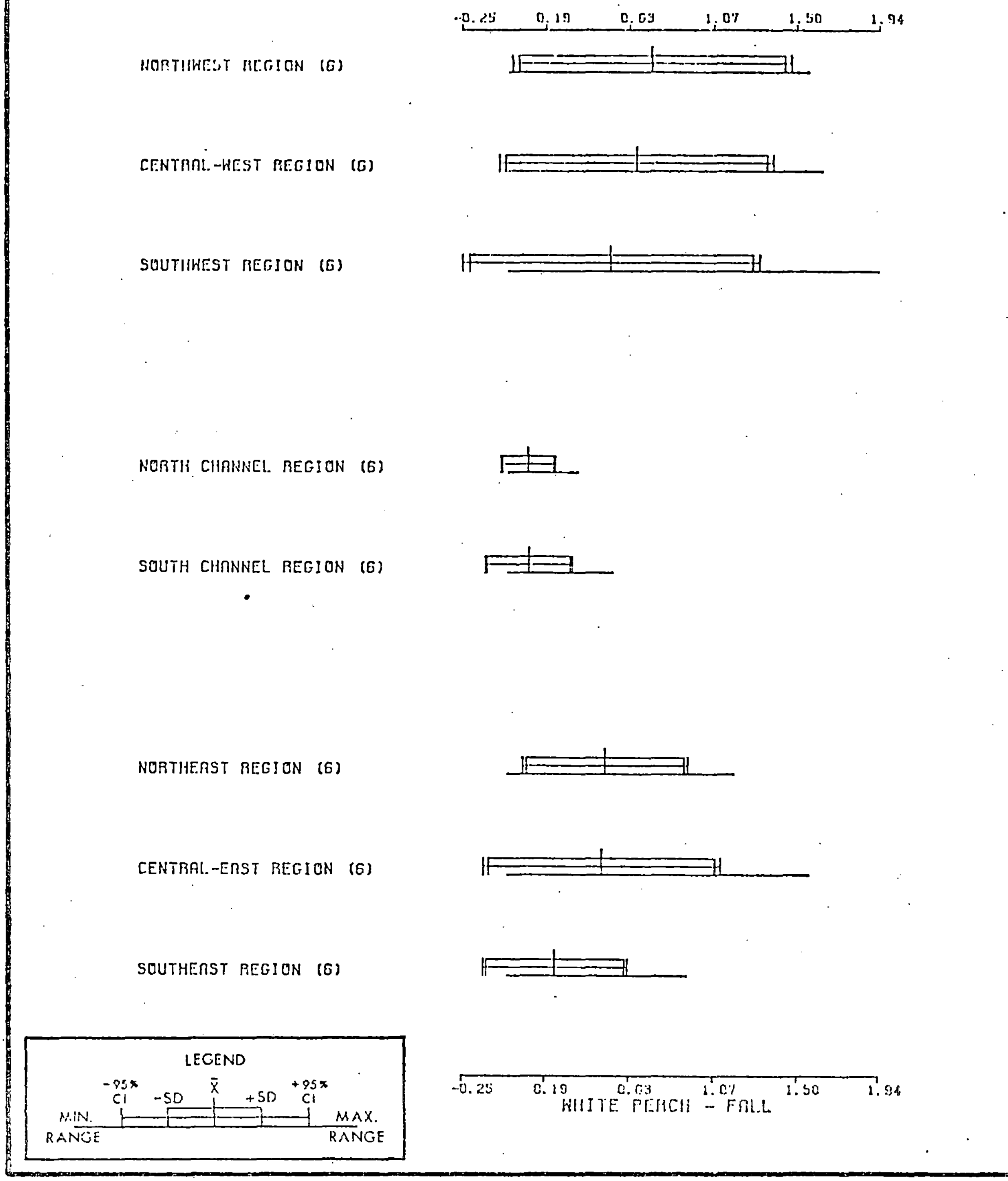

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of white perch by trawl - 1978 |
| | Figure 3.1.6a-30 |



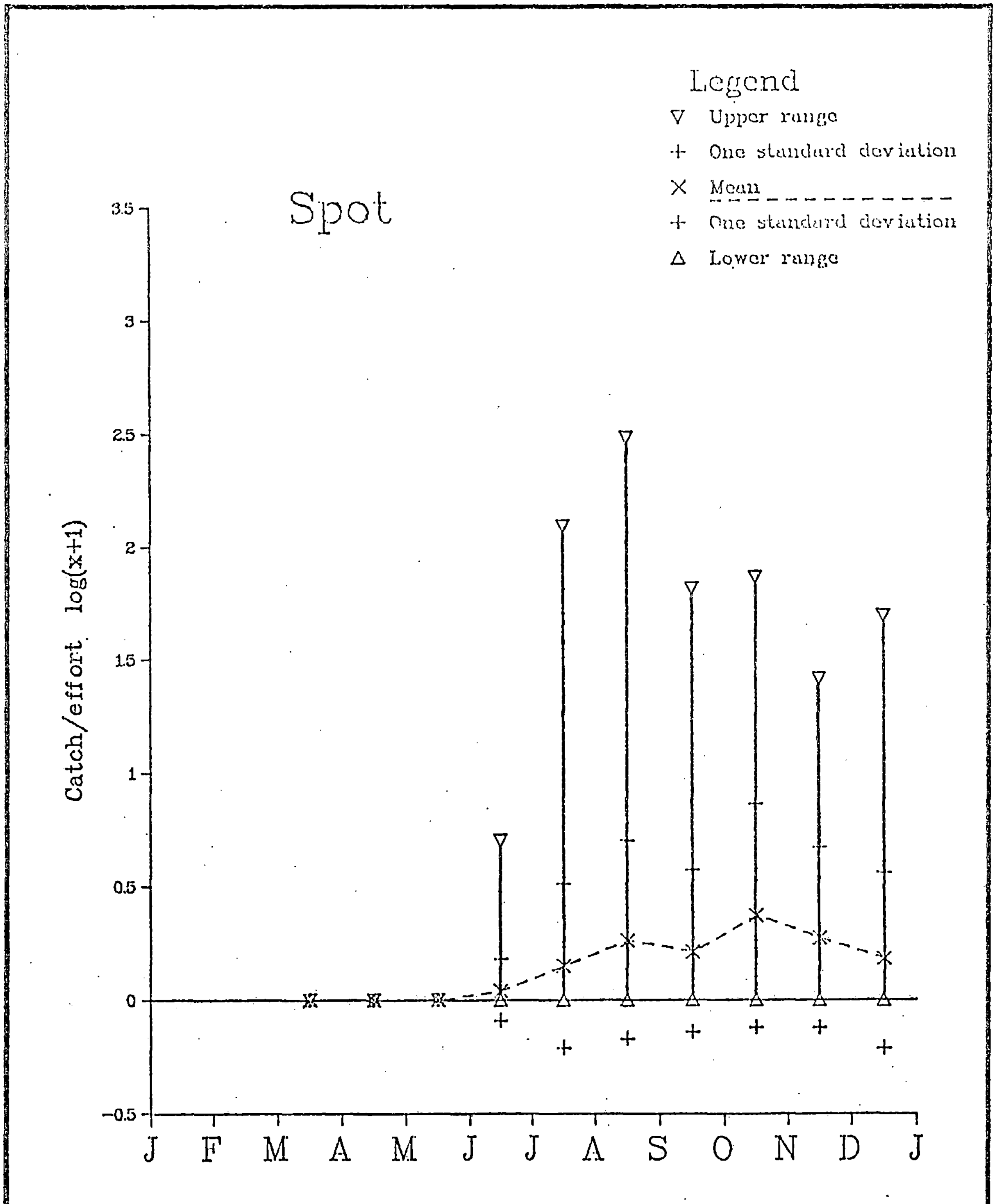

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of white perch in spring-1978<br>Figure 3.1.6a-31 |
|---|---|




| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of white perch in summer-1978<br>Figure 3.1.6a-32 |



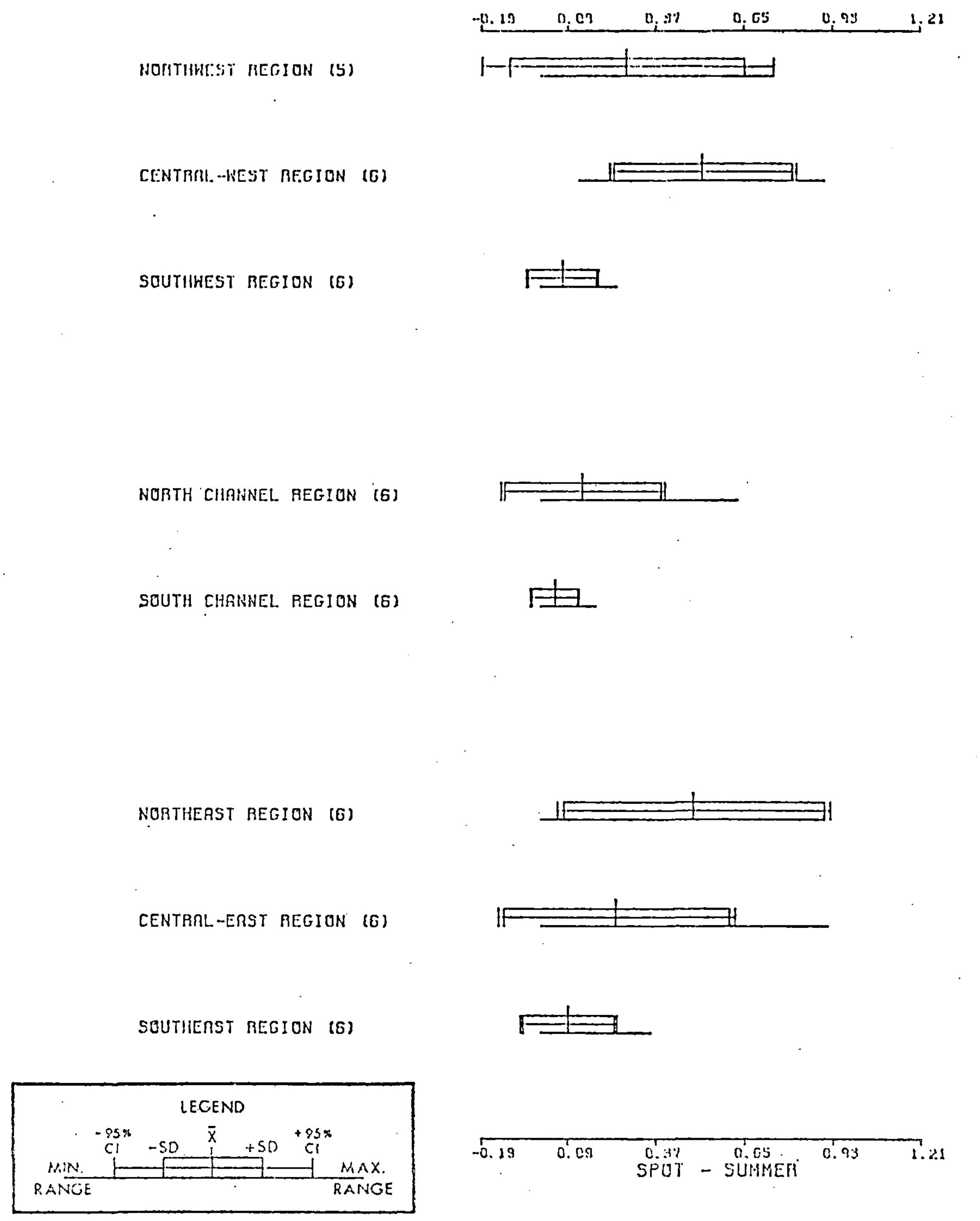

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of white perch in fall-1978 |
|---|---|
| | Figure 3.1.6a-33 |



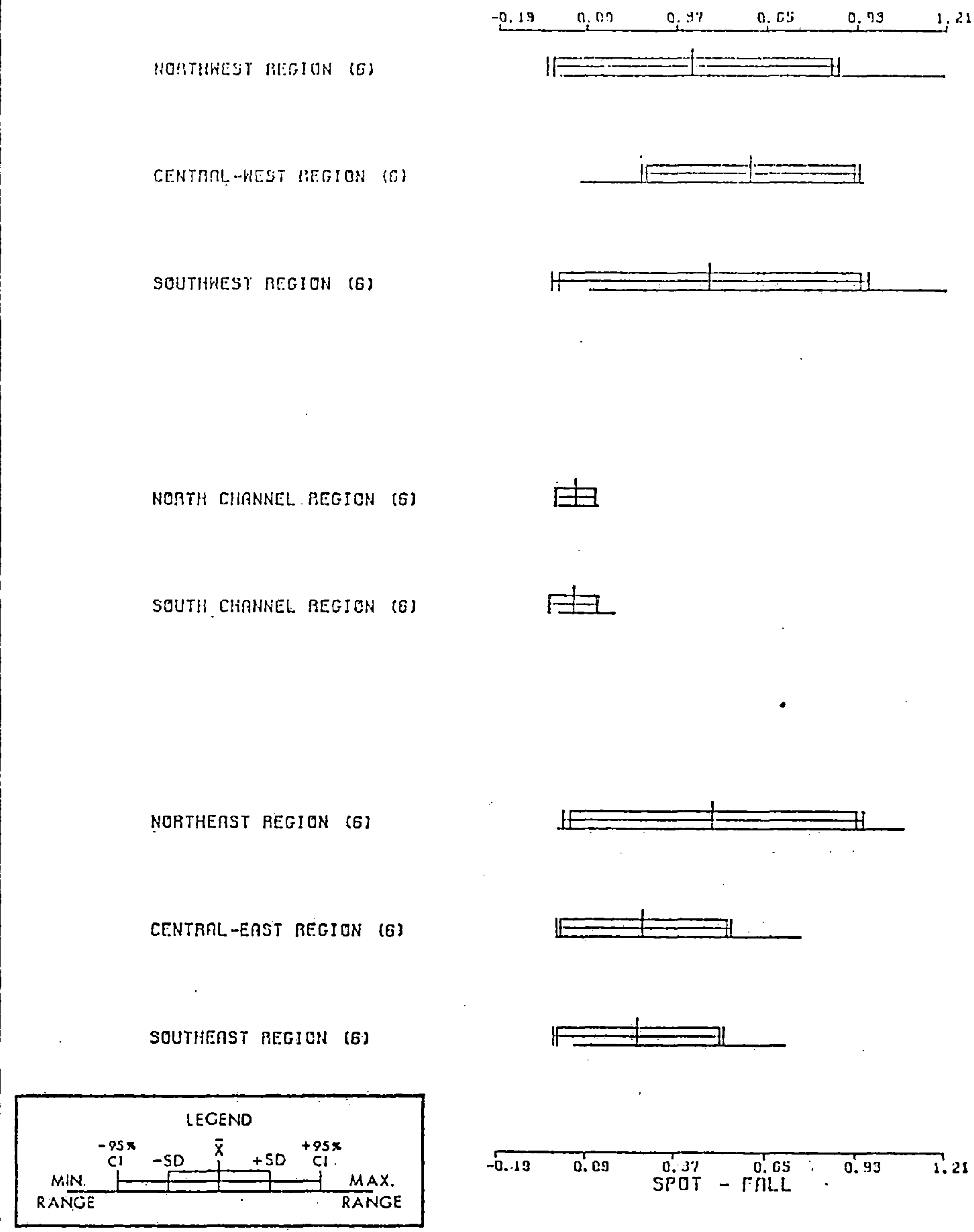

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of spot by trawl-1978

Figure 3.1.6a-34



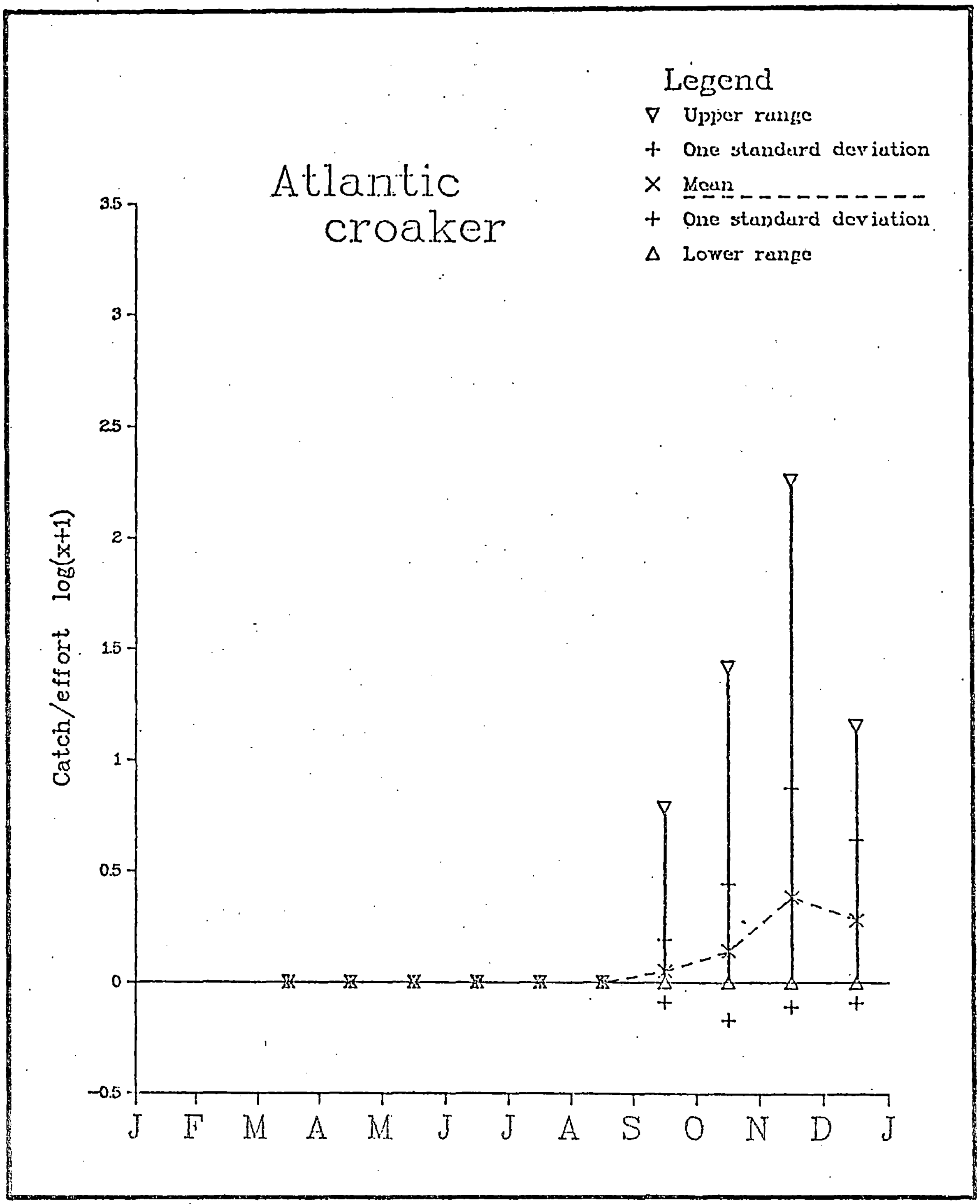

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of spot in summer-1978 |
| --- | --- |
| | Figure 3.1.6a-35 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Trawl catch statistics of spot in fall-1978

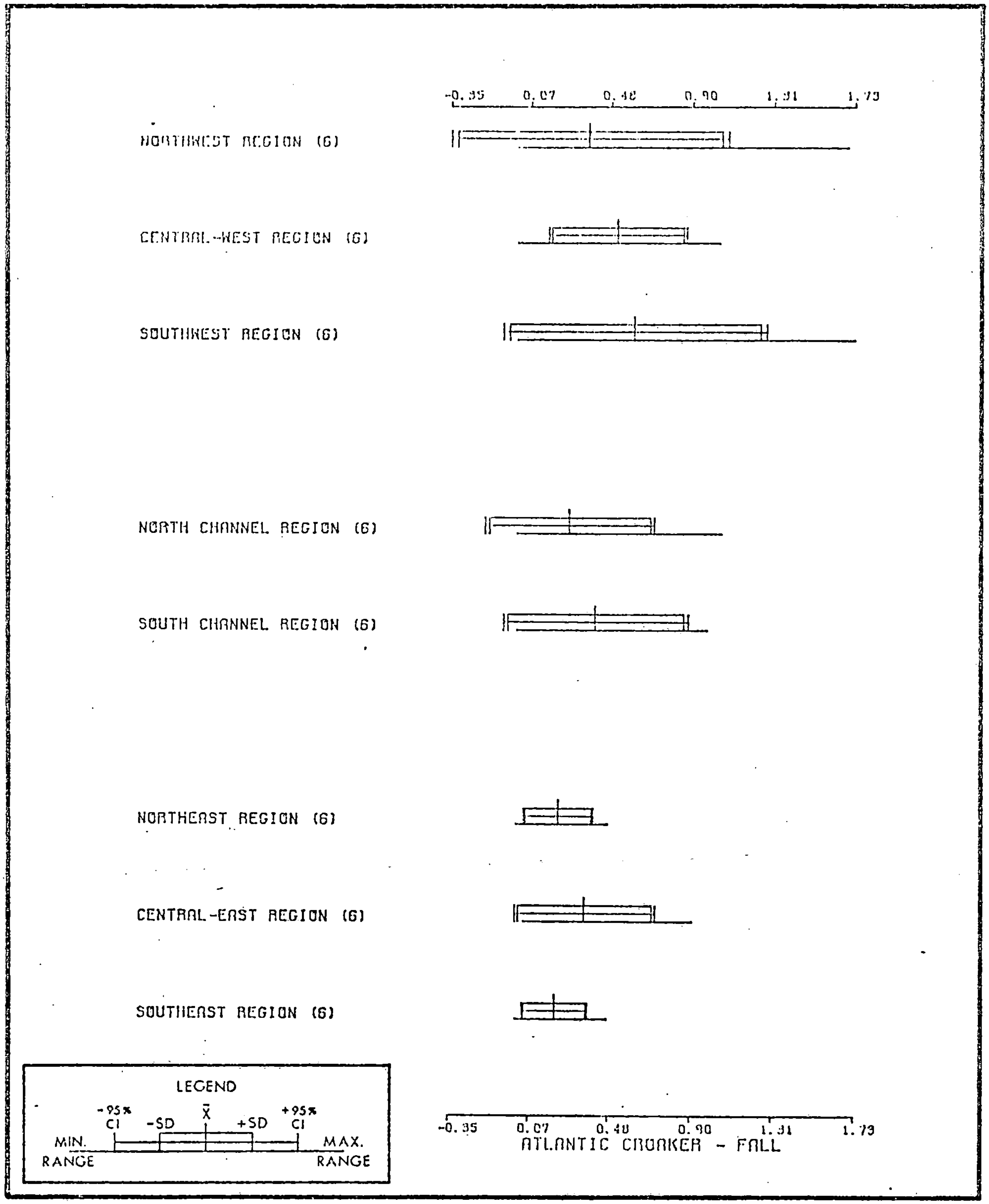
Figure 3.1.6a-36




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of Atlantic croaker by trawl-1978

Figure 3.1.6a-37

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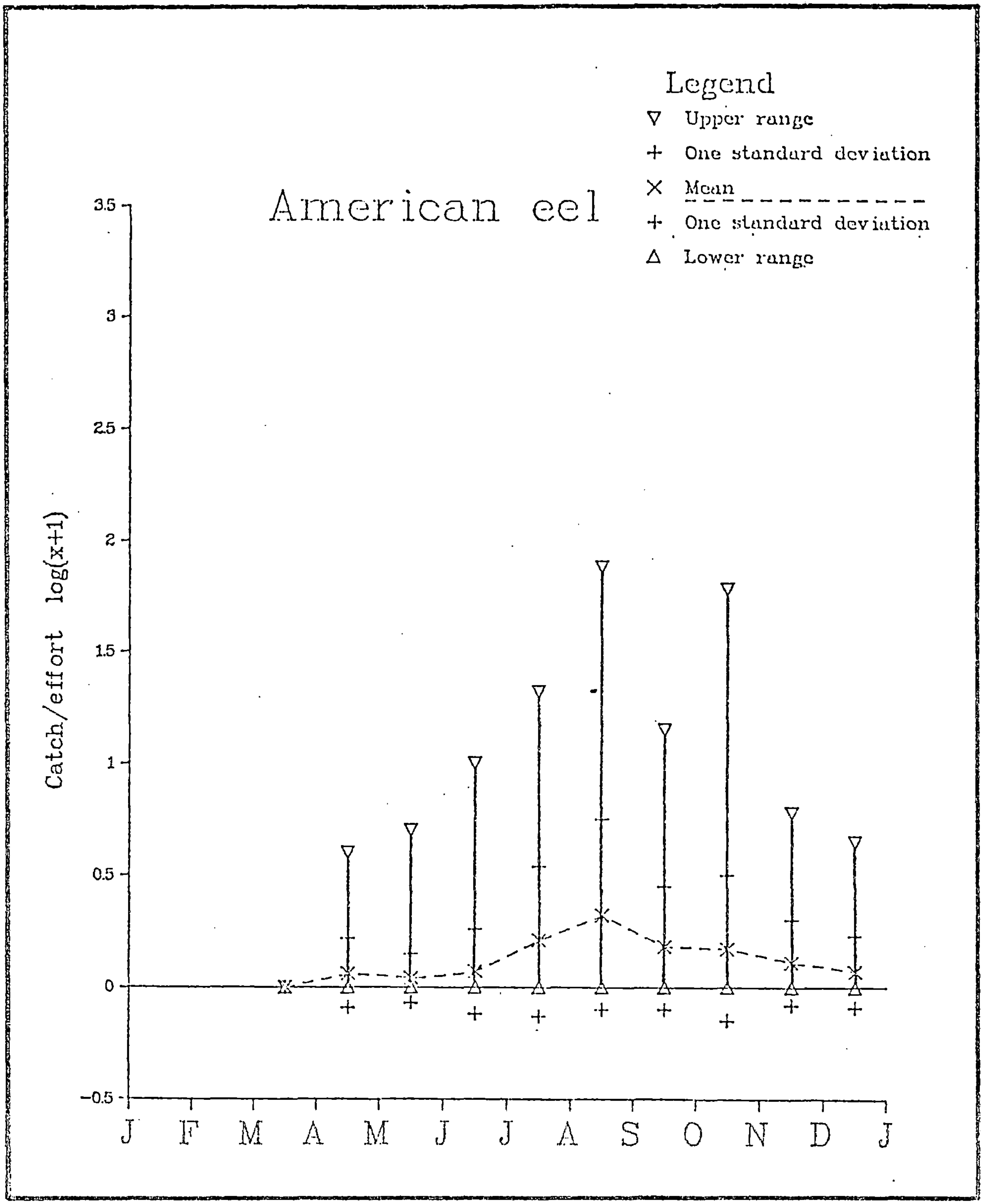
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of Atlantic croaker in fall-1978 |
| | Figure 3.1.6a-38 |

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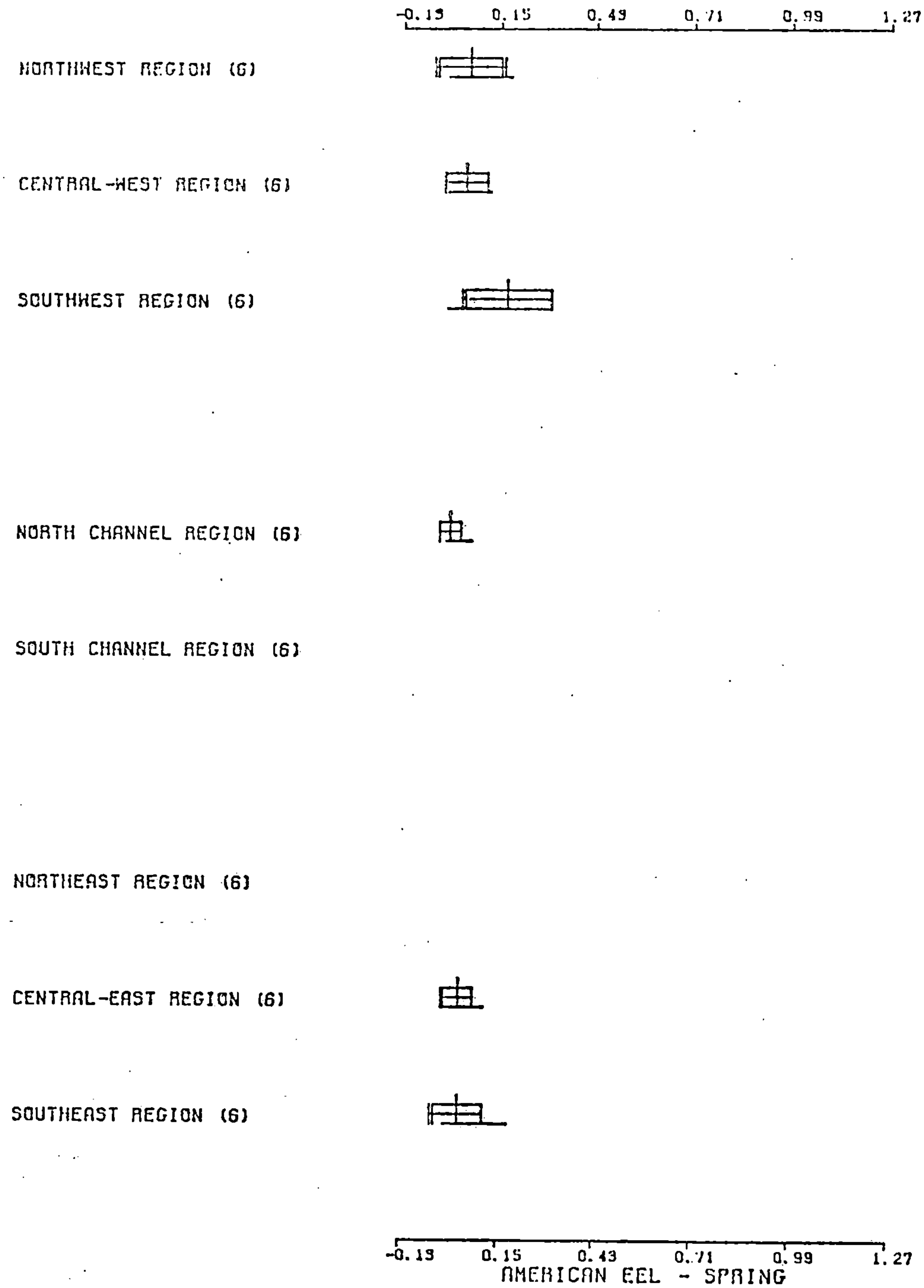
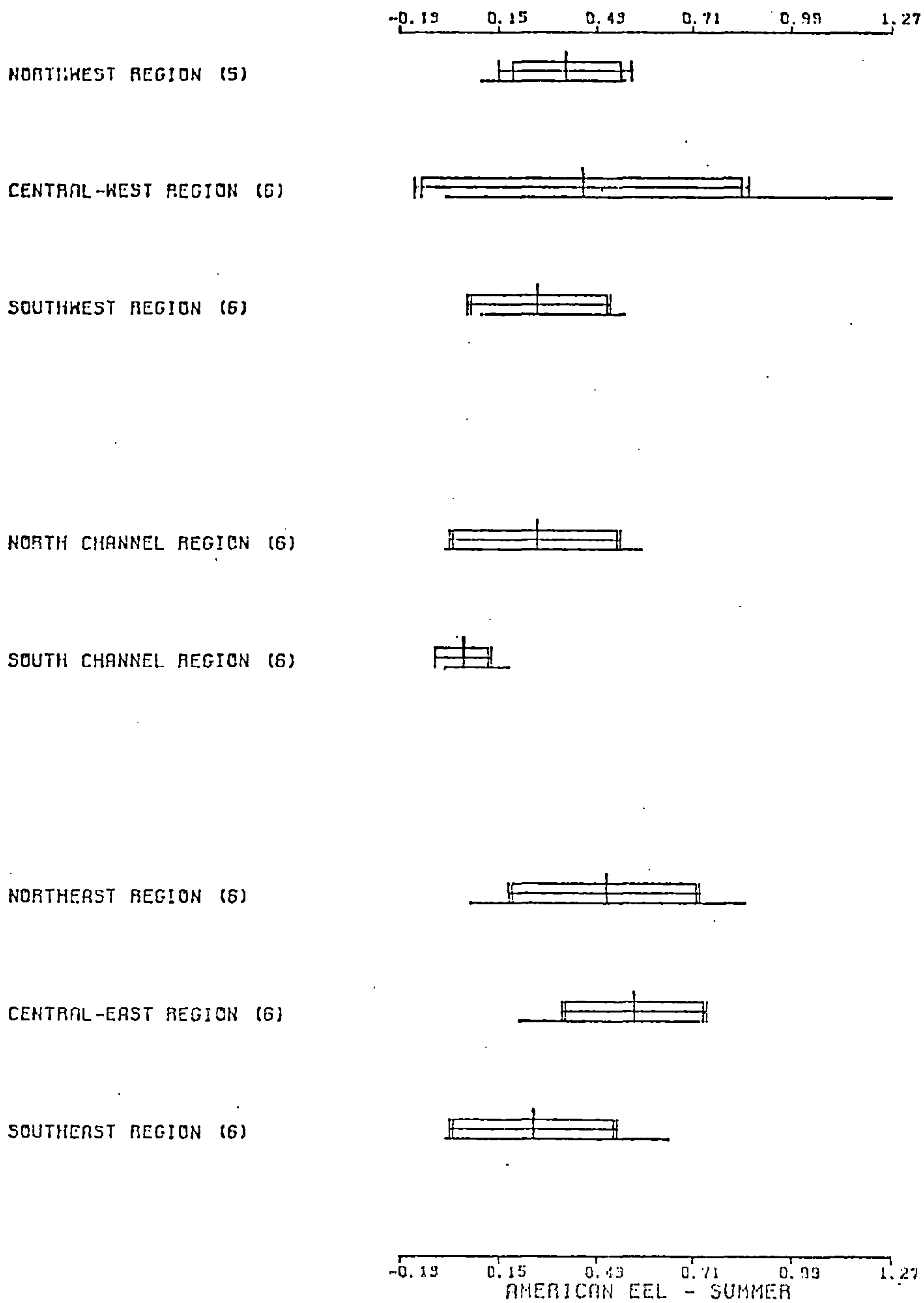
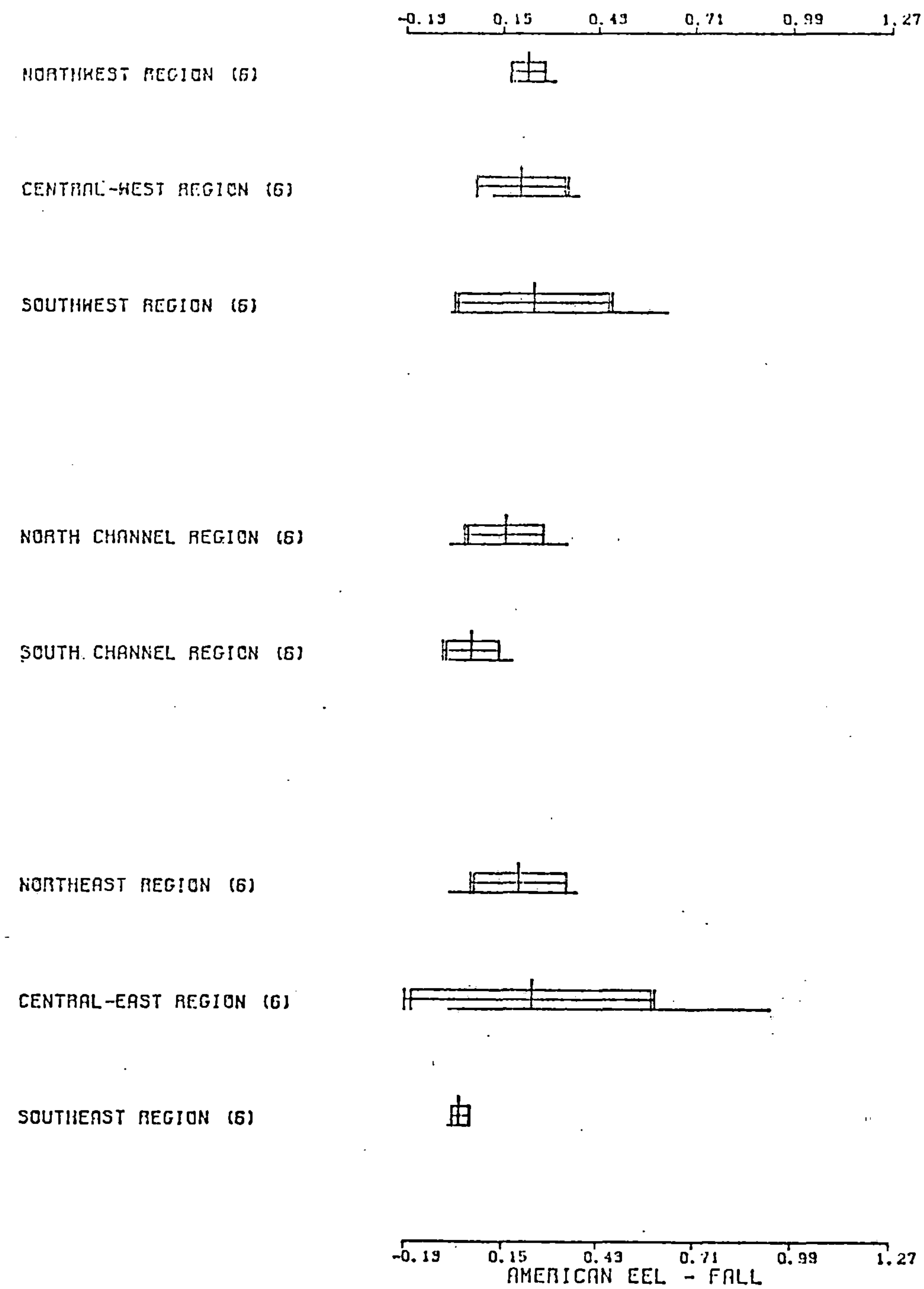
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of American eel by trawl-1978 |
| | Figure 3.1.6a-39 |



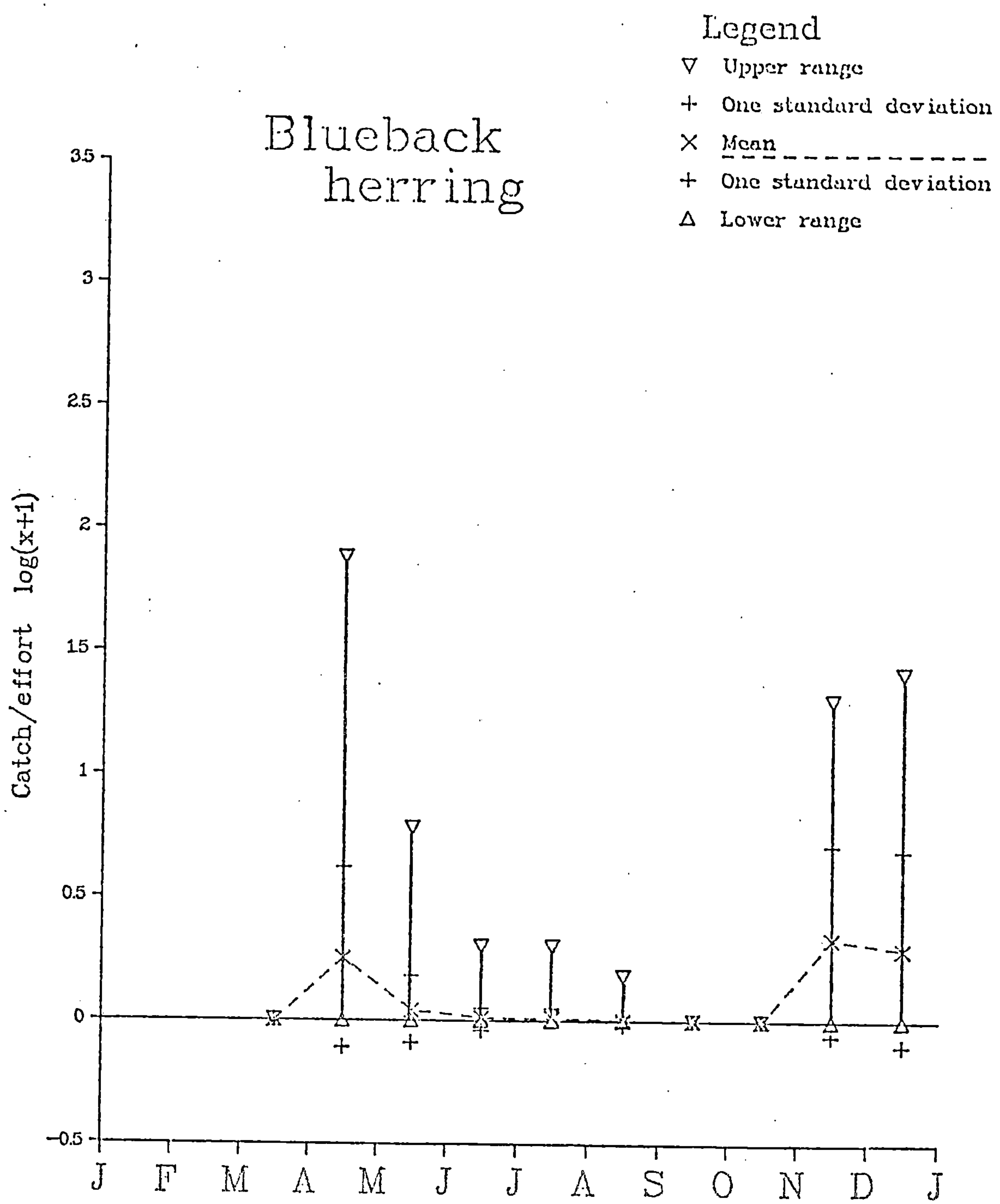

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of American eel in spring-1978 |
| | Figure 3.1.6a-40 |



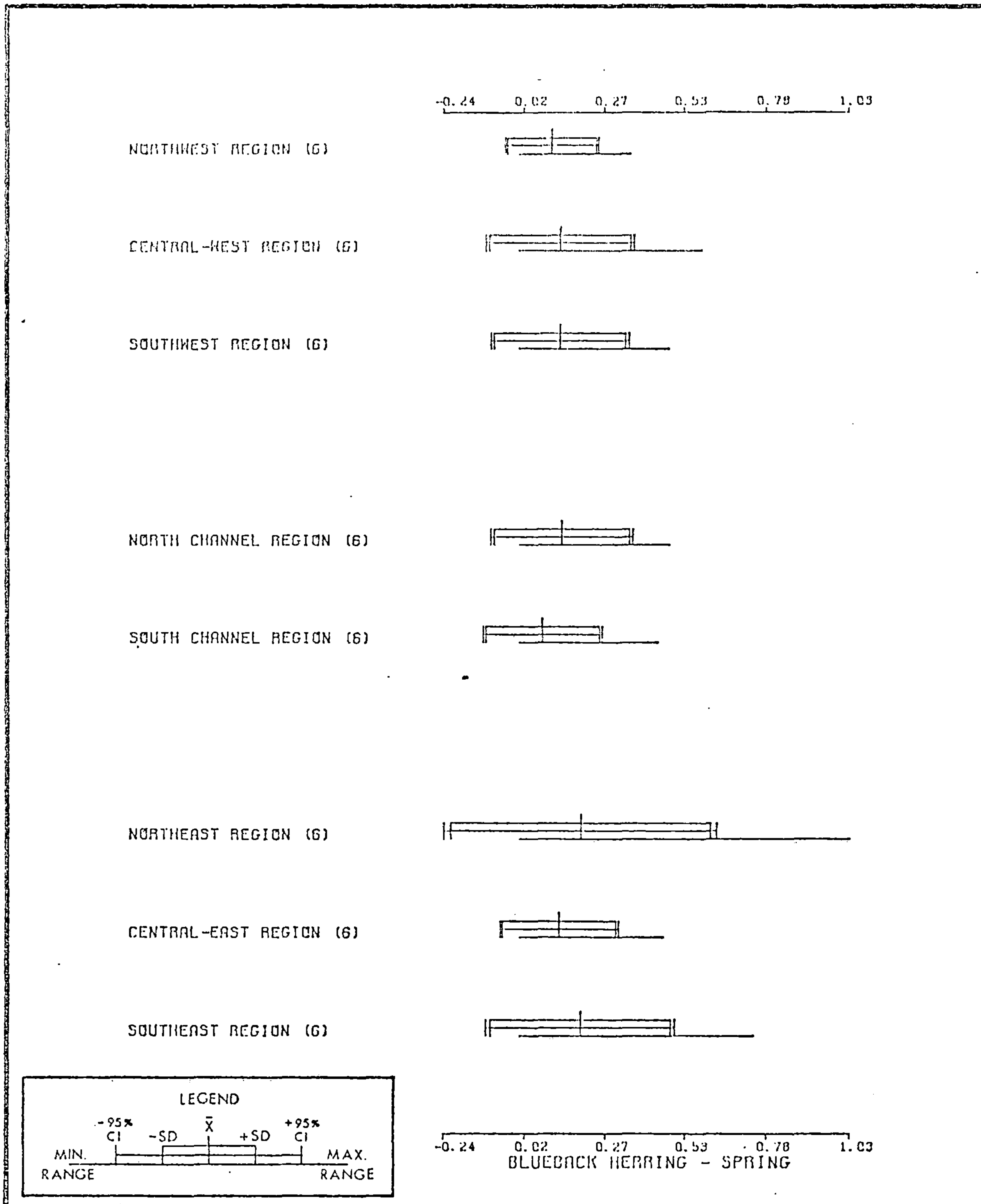

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of American eel in summer-1978 |
| | Figure 3.1.6a-41 |



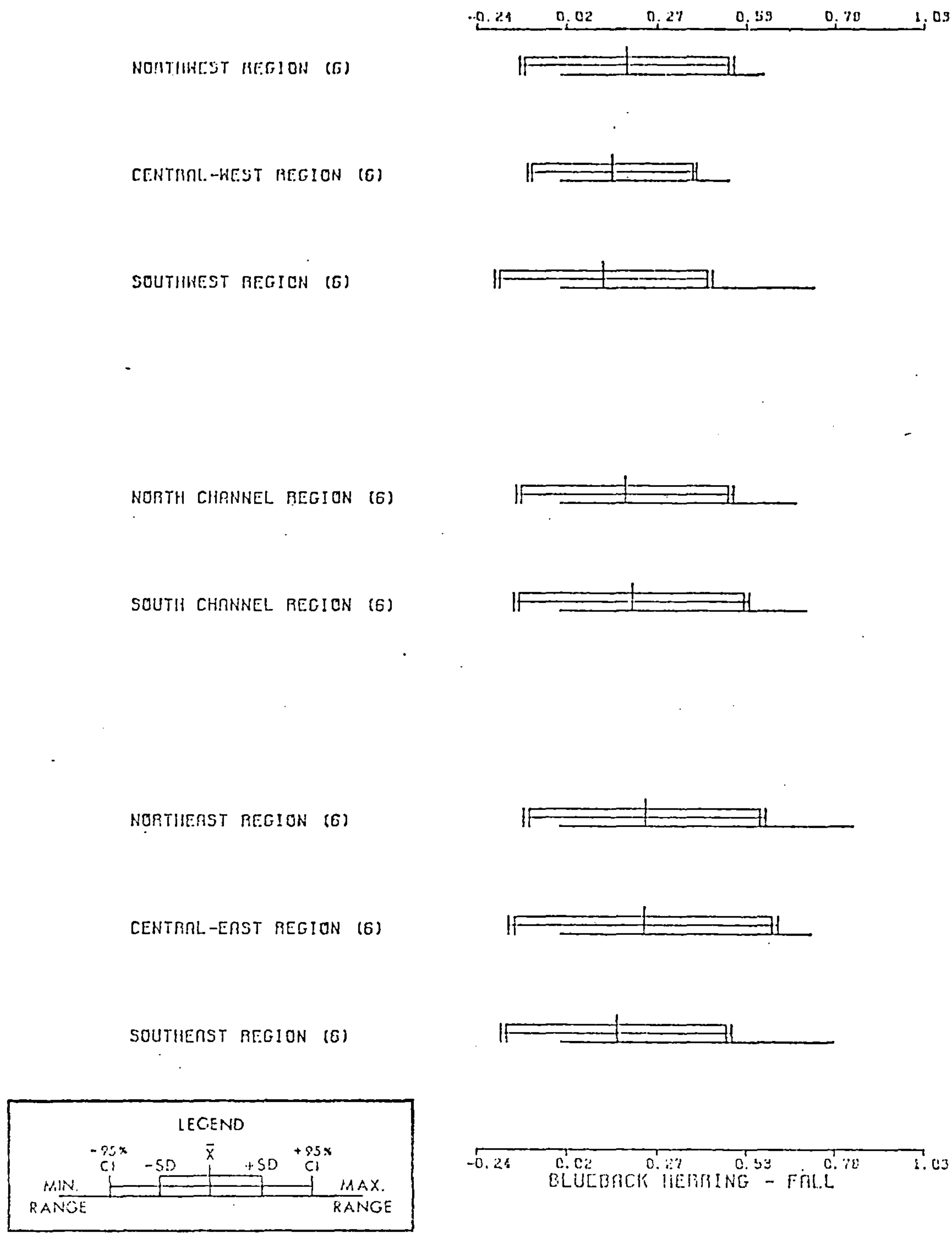

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of American eel in fall-1978 |
|---|---|
| | Figure 3.1.6a-42 |



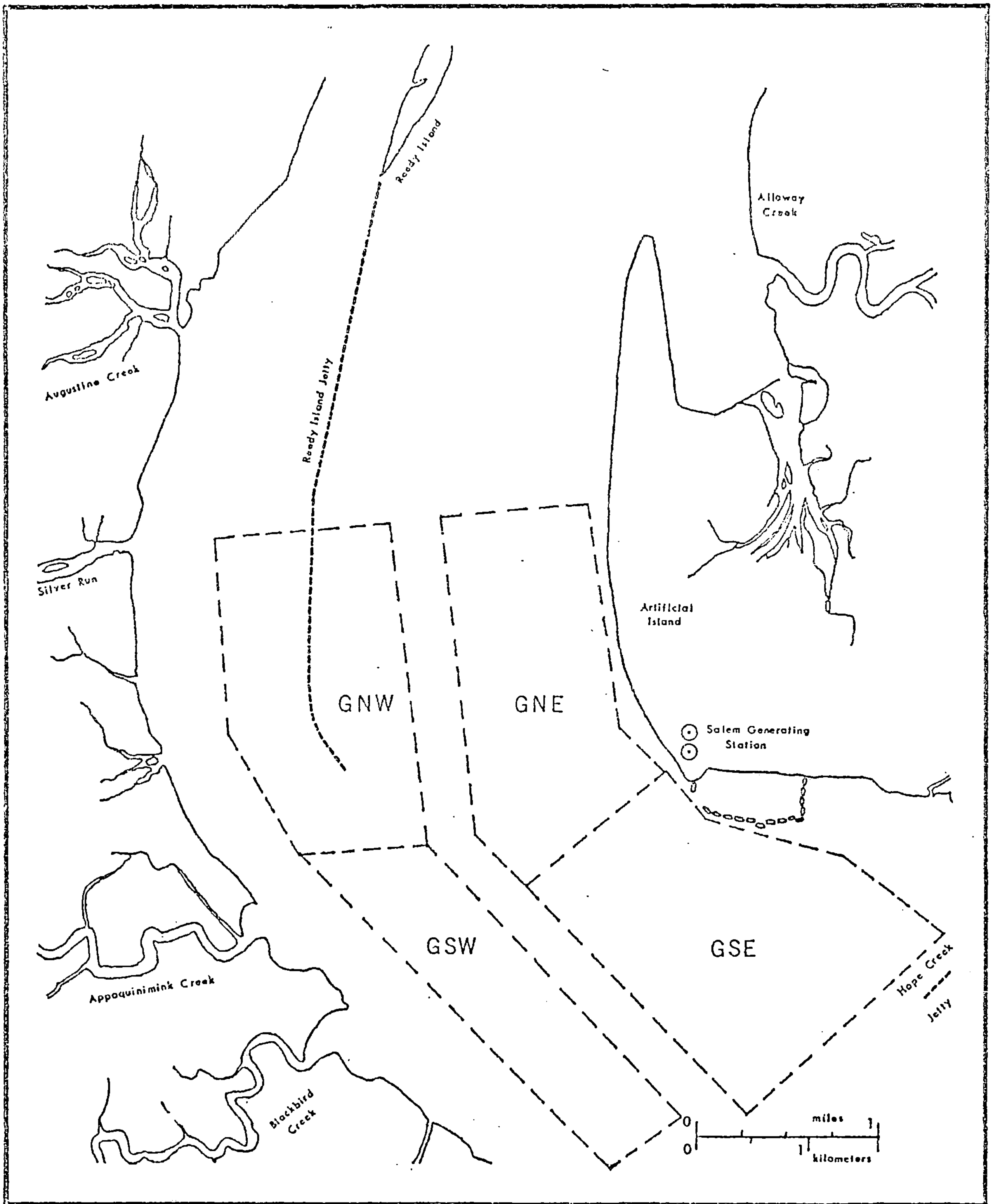

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of blueback herring by trawl-1978 |
| | Figure 3.1.6a-43 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of blueback herring in spring-1978<br>Figure 3.1.6a-44 |
|---|---|




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Trawl catch statistics of blueback herring in fall-1978 |
|---|---|
| | Figure 3.1.6a-45 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Gill net zone locations - 1978 |
| --- | --- |
| | Figure 3.1.6a-46 |

TABLE 3.1.6b-1
DESCRIPTION OF SEINE STATIONS - 1978

| STATION | LOCATION | SHORE | BOTTOM COMPOSITION | BOTTOM SLOPE |
|---|---|---|---|---|
| Appoquinimink | | | | |
| 3 | Small gravel beach 0.75 mile below Silver Lake dam, 9.75 miles upstream from mouth. | 50% marsh; 30% pasture; 20% wooded | 70% soft mud; 30% gravel | 10-30 degrees |
| 5 | Base of wooded bank bordering south branch of Drawyer Creek 0.5 mile upstream from Road 429 bridge, 9 miles upstream from mouth. | 50% wooded bank; 50% marsh | 60% mud-detritus; 40% sand-gravel | 20-35 degrees |
| 6 | Beach at Fennimore Landing, 1 mile upstream from mouth. | Sand-bank, meadow, some trees | 90% sand-gravel, 10% mud-clay | 5-15 degrees |
| Alloway | | | | |
| 1 | Base of wooded bank, 2 miles upstream from Quinton (Route 49) bridge, 11.5 miles upstream from mouth. | Wooded | 80% gravel-sand; 20% clay, some silt | 20-30 degrees |
| 2 | Gravel beach 0.5 mile below Quinton (Route 49) bridge, 9 miles upstream from mouth. | 90% pasture; 10% marsh, some trees | 80% gravel-sand; 20% mud | 15-25 degrees |
| 3 | Sand bar at mouth of second ditch off south side of creek (upper end of Elsinboro Creek tributary), 1 mile upstream from mouth. | Sand bar, marsh | 80% sand; 20% soft mud, detritus | 30-40 degrees |

## TABLE 3.1.6b-2
## DESCRIPTION OF TRAWL ZONES - 1978

| ZONE | LOCATION | SHORE | DEPTH | BOTTOM TYPE |
|---|---|---|---|---|
| Appoquinimink | | | | |
| 1 | Creek channel 7.75 to 8.75 miles upstream from mouth (Rte. 13 bridges delimit lower end of trawl zone). | 75% marsh; 20% wooded; 5% residential (lawns), a few docks | 5-15 ft | Gravel, sand, mud |
| 3 | Creek channel 5.25 to 6.5 miles upstream from mouth (Rte. 299 bridge at Odessa delimits end of trawl zone). | 80% marsh; 15% residential (lawns), a few docks; 5% wooded | 5-25 ft | Gravel, sand, mud |
| 5 | Creek channel from mouth to 1.75 miles upstream. | 90% marsh; 10% meadow | 3-25 ft | Gravel, sand, mud |
| Alloway | | | | |
| 1 | Creek channel 8.0 to 9.5 miles upstream from mouth (Quinton-Rte. 49 bridge delimits upper end of trawl zone). | 80% marsh; 15% wooded; 5% residential (lawns) | 3-15 ft | Gravel, sand, mud |
| 4 | Creek channel 2.5 to 4.75 miles upstream from mouth (Hancocks Bridge delimits upper end of trawl zone). | 70% marsh; 30% residential (cottages, lawns, marina), several docks | 5-20 ft | Gravel, sand, mud |
| 5 | Creek channel from mouth to 2.5 miles upstream. | Marsh | 10-25 ft | Gravel, sand, mud |
| Hope | | | | |
| 1 | Creek channel of Halfway Creek from the intersection at Hope Creek to a point midway to Alloway Creek. | Marsh, a few cabins and docks | 8-20 ft | Gravel, sand, mud |
| 2 | Creek channel from S.N.G.S. bridge upstream to a point midway to the intersection with Halfway Creek. | Marsh | 8-30 ft | Gravel, sand, mud |

TABLE 3.1.6b-3
CREEK SEINE CATCH STATISTICS-1978

| | APPOQUINIMINK CREEK | | | ALLOWAY CREEK | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| STATION | 3 | 5 | 6 | 1 | 2 | 3 | TOTAL | | |
| NO. OF COLLECTIONS | 14 | 14 | 14 | 11 | 13 | 13 | 79 | | |
| NO. OF SPECIES | 17 | 12 | 11 | 14 | 14 | 7 | 31 | | |
| NO. OF SPECIMENS | 578 | 85 | 474 | 921 | 775 | 340 | 3,173 | | |
| SPECIES | | | | | | | | RANK | PCT |
| F. HETEROCLITUS | 157 | 12 | 40 | 278 | 374 | 54 | 915 | 1 | 28.8 |
| M. MENIDIA | 203 | 1 | 367 | 5 | 30 | 205 | 811 | 2 | 25.6 |
| F. DIAPHANUS | 23 | 14 | | 315 | 22 | | 374 | 3 | 11.8 |
| H. NUCHALIS | 21 | 1 | | 89 | 118 | 30 | 259 | 4 | 8.2 |
| E. OLMSTEDI | | 31 | | 153 | 68 | | 252 | 5 | 7.9 |
| A. MITCHILLI | 10 | | 7 | 5 | 75 | 45 | 142 | 6 | 4.5 |
| M. AMERICANA | 56 | | 2 | 29 | 32 | | 119 | 7 | 3.8 |
| B. TYRANNUS | | | 45 | | 37 | | 82 | 8 | 2.6 |
| A. ROSTRATA | 25 | 14 | 7 | 1 | | | 47 | 9 | 1.5 |
| CYPRINIDAE | | | | 36 | | | 36 | 10 | 1.1 |
| N. HUDSONIUS | 26 | | | 3 | 4 | | 33 | 11 | 1.0 |
| M. BERYLLINA | 17 | | | 2 | | | 19 | 12 | .6 |
| L. MACROCHIRUS | 12 | 3 | 1 | | | | 16 | 13 | .5 |
| ALOSA SPP. | 13 | | | | | | 13 | 14 | .4 |
| A. AESTIVALIS | 4 | | | 3 | 5 | | 12 | 15 | .4 |
| L. XANTHURUS | | | | | 5 | 2 | 7 | 16 | .2 |
| F. MAJALIS | 5 | 1 | | | | | 6 | 17 | .2 |
| M. SAXATILIS | | | 1 | | 1 | 3 | 5 | 18 | .2 |
| T. MACULATUS | 1 | 2 | | | 2 | | 5 | 18 | .2 |
| C. REGALIS | | | 2 | | 2 | | 4 | 20 | .1 |
| L. GIBBOSUS | | 3 | | | | | 3 | 21 | .1 |
| A. PSEUDOHARENGUS | 3 | | | | | | 3 | 21 | .1 |
| CYPRINODONTOIDEI | | 2 | | | | | 2 | 23 | .1 |
| P. ANNULARIS | | 1 | | | | | 1 | 24 | .0 |
| NOTROPIS | | | 1 | | | | 1 | 24 | .0 |
| N. ANALOSTANUS | | | 1 | | | | 1 | 24 | .0 |
| CENTRARCHIDAE | 1 | | | | | | 1 | 24 | .0 |
| P. FLAVESCENS | 1 | | | | | | 1 | 24 | .0 |
| P. SALTATRIX | | | | | | 1 | 1 | 24 | .0 |
| M. SALMOIDES | | | | 1 | | | 1 | 24 | .0 |
| P. NIGROMACULATUS | | | | 1 | | | 1 | 24 | .0 |

IA SALEM FF 1978

TABLE 3.1.6b-4
CREEK TRAWL CATCH STATISTICS-1978

| | APPOQUINIMINK CREEK | | | | ALLOWAY CREEK | | | | HOPE CREEK | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NO. OF COLLECTIONS | 42 | | | | 41 | | | | 28 | | | |
| NO. OF SPECIES | 19 | | | | 16 | | | | 10 | | | |
| NO. OF SPECIMENS | 692 | | | | 381 | | | | 53 | | | |
| SPECIMENS / 5 MIN TRAWL (N/T) | 16.5 | | | | 9.3 | | | | 1.9 | | | |
| SPECIES | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* | NUMBER | N/T | T* | N/T* |
| A. ROSTRATA | 34 | .8 | 17 | 2.0 | 18 | .4 | 7 | 2.6 | 2 | .1 | 2 | 1.0 |
| A. AESTIVALIS | 9 | .2 | 3 | 3.0 | 1 | | 1 | 1.0 | 4 | .1 | 3 | 1.3 |
| A. PSEUDOHARENGUS | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 | | | | |
| B. TYRANNUS | 3 | .1 | 2 | 1.5 | 3 | .1 | 3 | 1.0 | | | | |
| D. CEPEDIANUM | 1 | | 1 | 1.0 | | | | | | | | |
| A. MITCHILLI | 18 | .4 | 6 | 3.0 | 52 | 1.3 | 11 | 4.7 | 6 | .2 | 4 | 1.5 |
| C. CARPIO | 7 | .2 | 4 | 1.8 | 8 | .2 | 4 | 2.0 | | | | |
| H. NUCHALIS | 32 | .8 | 7 | 4.6 | 13 | .3 | 5 | 2.6 | | | | |
| I. CATUS | 3 | .1 | 3 | 1.0 | 3 | .1 | 3 | 1.0 | 2 | .1 | 2 | 1.0 |
| I. NEBULOSUS | 77 | 1.8 | 12 | 6.4 | 13 | .3 | 5 | 2.6 | 2 | .1 | 1 | 2.0 |
| I. PUNCTATUS | 29 | .7 | 12 | 2.4 | 6 | .1 | 4 | 1.5 | | | | |
| F. HETEROCLITUS | 1 | | 1 | 1.0 | | | | | | | | |
| M. AMERICANA | 171 | 4.1 | 29 | 5.9 | 30 | .7 | 13 | 2.3 | 4 | .1 | 4 | 1.0 |
| M. SAXATILIS | 2 | | 2 | 1.0 | | | | | | | | |
| P. FLAVESCENS | 4 | .1 | 2 | 2.0 | | | | | | | | |
| C. REGALIS | 36 | .9 | 5 | 7.2 | 53 | 1.3 | 10 | 5.3 | 17 | .6 | 4 | 4.3 |
| L. XANTHURUS | 60 | 1.4 | 5 | 12.0 | 89 | 2.2 | 7 | 12.7 | 1 | | 1 | 1.0 |
| P. CROMIS | 2 | | 2 | 1.0 | 1 | | 1 | 1.0 | 1 | | 1 | 1.0 |
| P. AMERICANUS | | | | | 4 | .1 | 2 | 2.0 | | | | |
| T. MACULATUS | 202 | 4.8 | 25 | 8.1 | 86 | 2.1 | 17 | 5.1 | 14 | .5 | 6 | 2.3 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/5 MIN TRAWL IN WHICH SPECIES WAS TAKEN

IA SALEM PF 1978

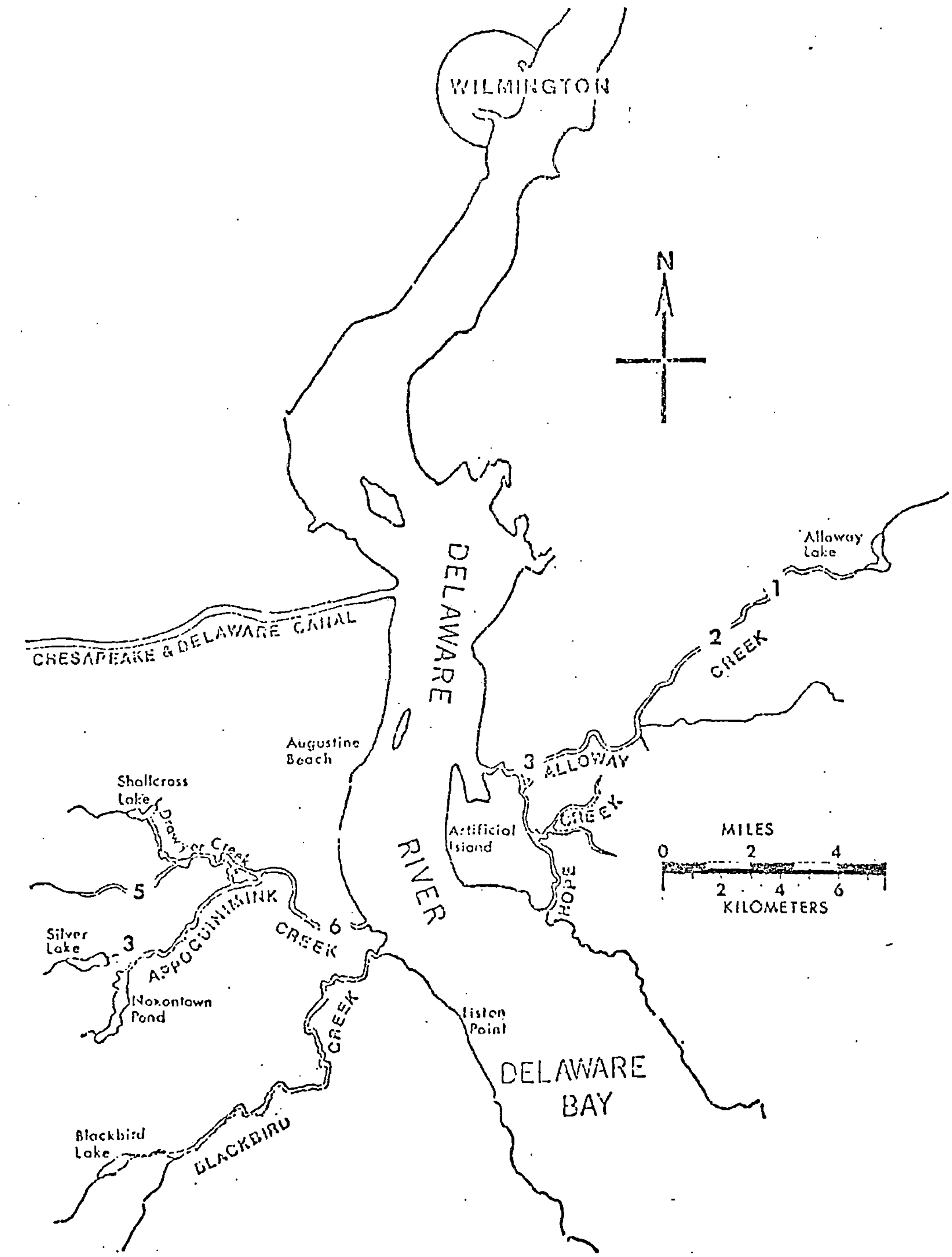
TABLE 3.1.6b-4
CONTINUED

| | TOTAL |
|---|---|
| NO. OF COLLECTIONS | 111 |
| NO. OF SPECIES | 20 |
| NO. OF SPECIMENS | 1,126 |
| SPECIMENS / 5 MIN TRAWL (N/T) | 10.1 |

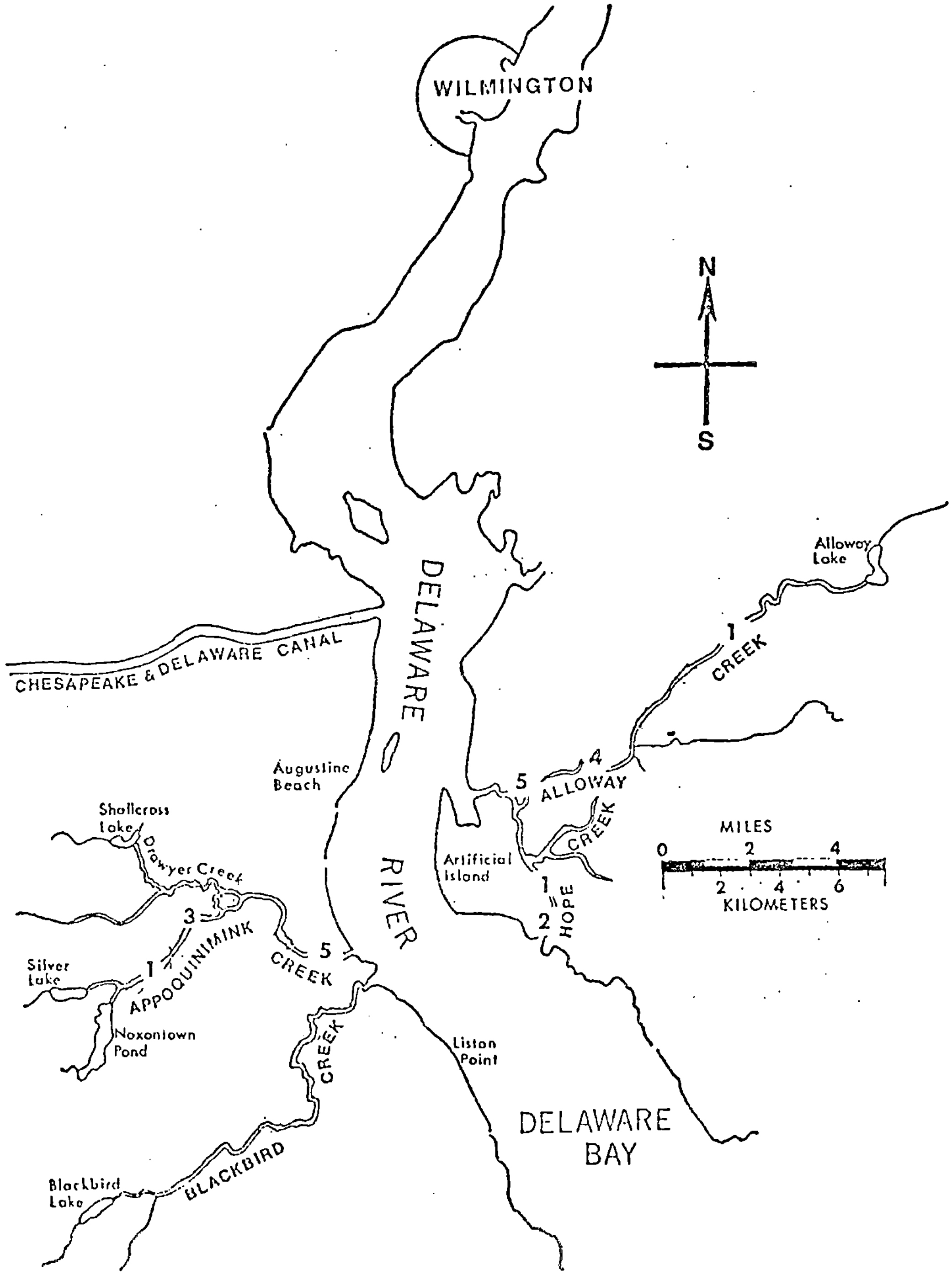
| SPECIES | NUMBER | N/T | T* | N/T* |
|---|---|---|---|---|
| A. ROSTRATA | 54 | .5 | 26 | 2.1 |
| A. AESTIVALIS | 14 | .1 | 7 | 2.0 |
| A. PSEUDOHARENGUS | 2 | | 2 | 1.0 |
| B. TYRANNUS | 6 | .1 | 5 | 1.2 |
| D. CEPEDIANUM | 1 | | 1 | 1.0 |
| A. MITCHILLI | 76 | .7 | 21 | 3.6 |
| C. CARPIO | 15 | .1 | 8 | 1.9 |
| H. NUCHALIS | 45 | .4 | 12 | 3.8 |
| I. CATUS | 8 | .1 | 8 | 1.0 |
| I. NEBULOSUS | 92 | .8 | 18 | 5.1 |
| I. PUNCTATUS | 35 | .3 | 16 | 2.2 |
| F. HETEROCLITUS | 1 | | 1 | 1.0 |
| M. AMERICANA | 205 | 1.8 | 46 | 4.5 |
| M. SAXATILIS | 2 | | 2 | 1.0 |
| P. FLAVESCENS | 4 | | 2 | 2.0 |
| C. REGALIS | 106 | 1.0 | 19 | 5.6 |
| L. XANTHURUS | 150 | 1.4 | 13 | 11.5 |
| P. CROMIS | 4 | | 4 | 1.0 |
| P. AMERICANUS | 4 | | 2 | 2.0 |
| T. MACULATUS | 302 | 2.7 | 48 | 6.3 |

T* NUMBER OF TRAWL HAULS WITH SPECIES
N/T* SPECIMENS/5 MIN TRAWL IN WHICH SPECIES WAS TAKEN

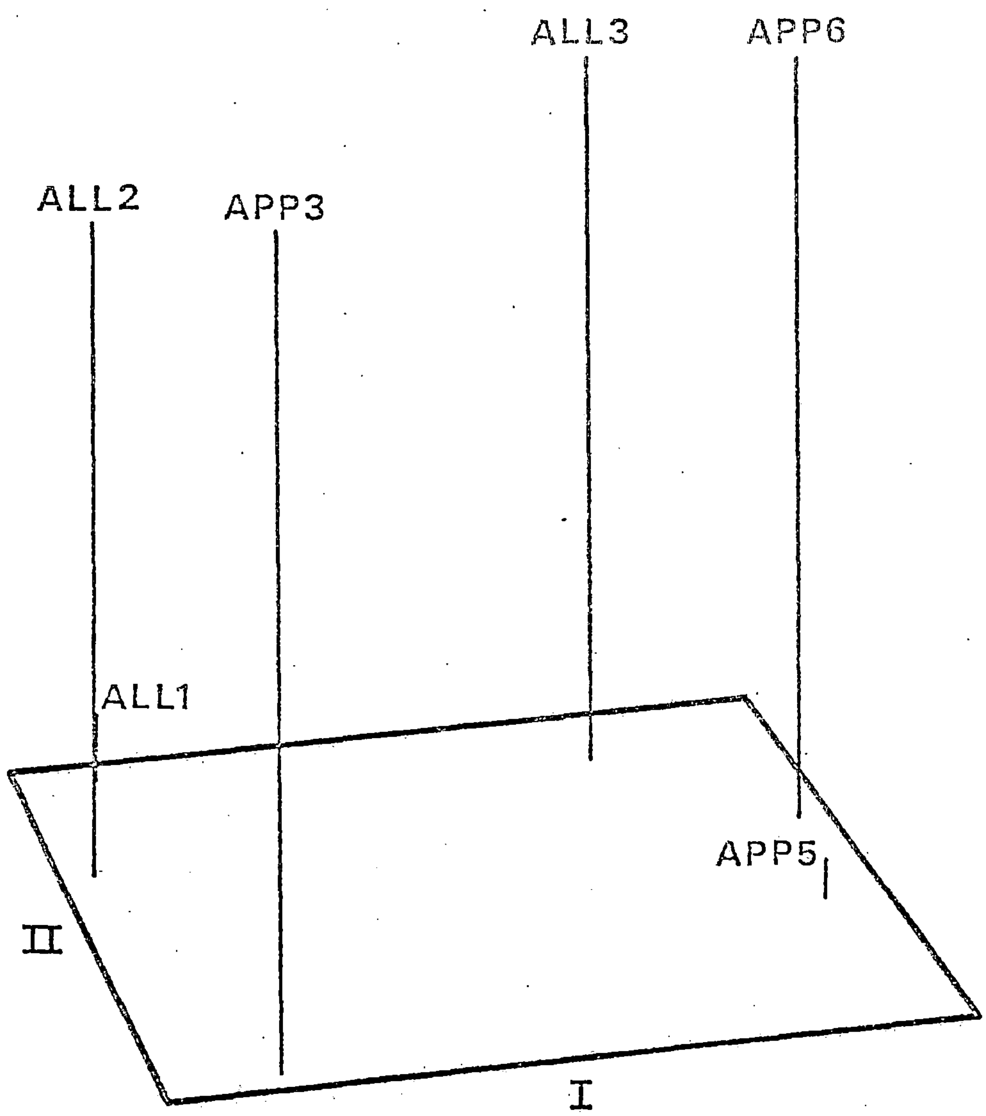
IA SALEM FF 1978




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Creek seine locations-1978 |
| --- | --- |
| | Figure 3.1.6b-1 |



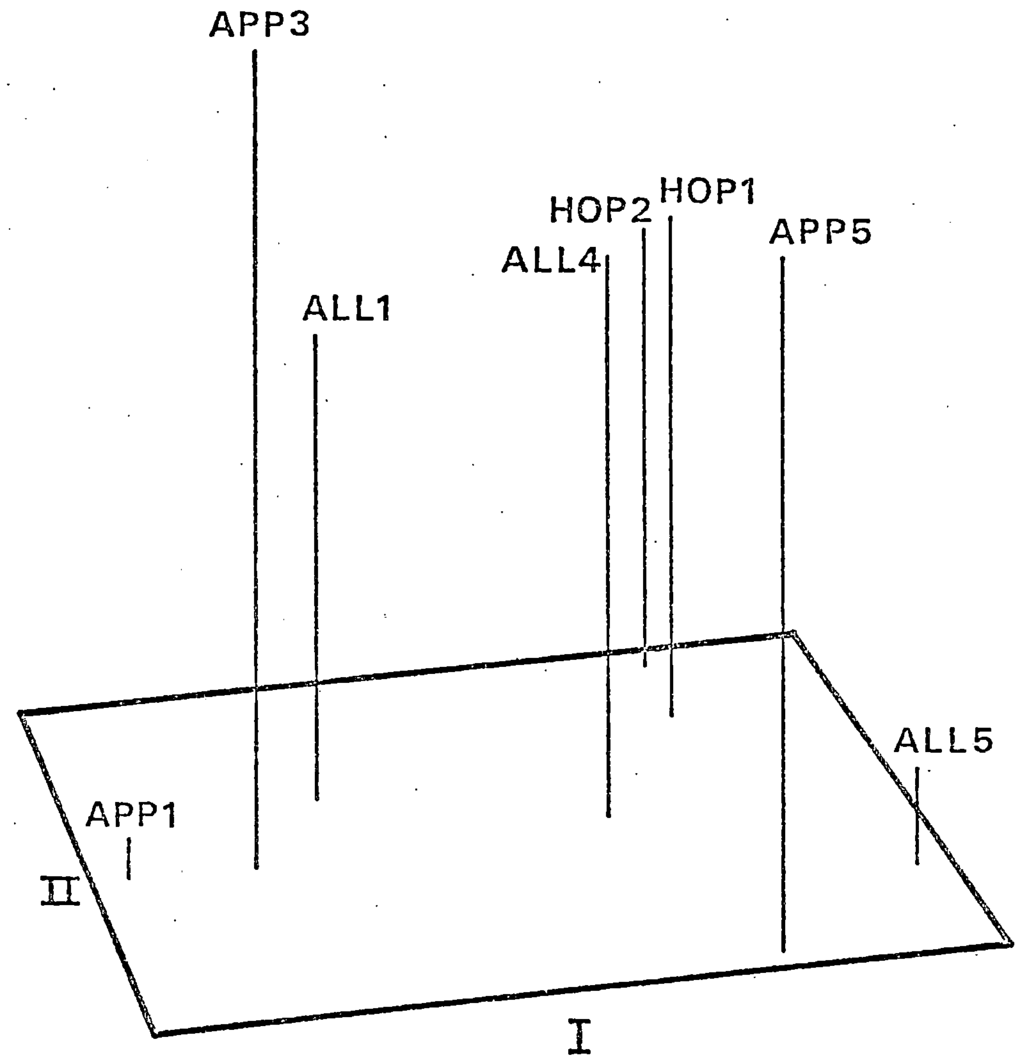

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Creek trawl locations-1978 |
| | Figure 3.1.6b-2 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Similarity of seine catch on first three component axes based on species composition-1978

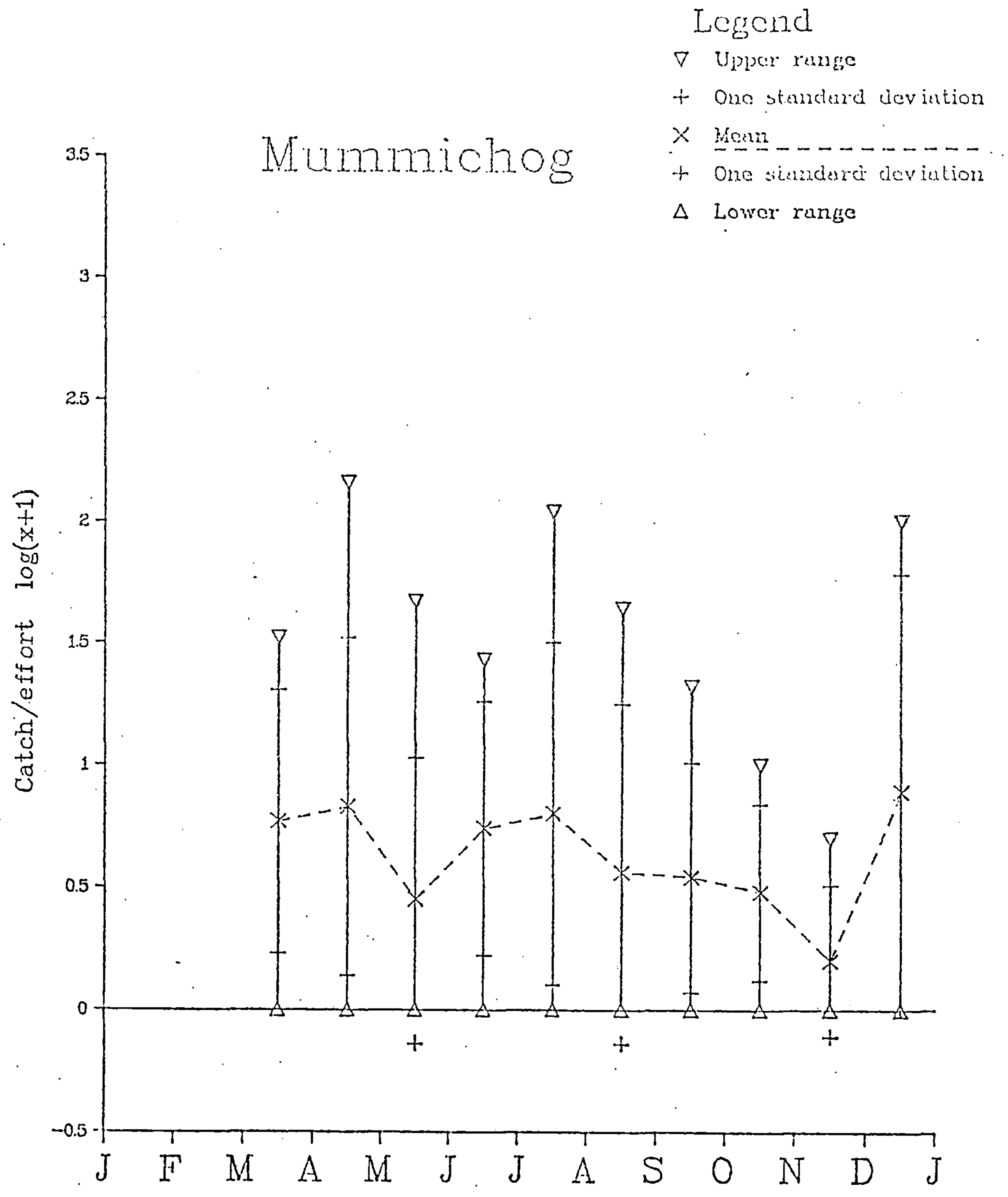
Figure 3.1.6b-3




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Similarity of trawl catch on first three component axes based on species composition-1978

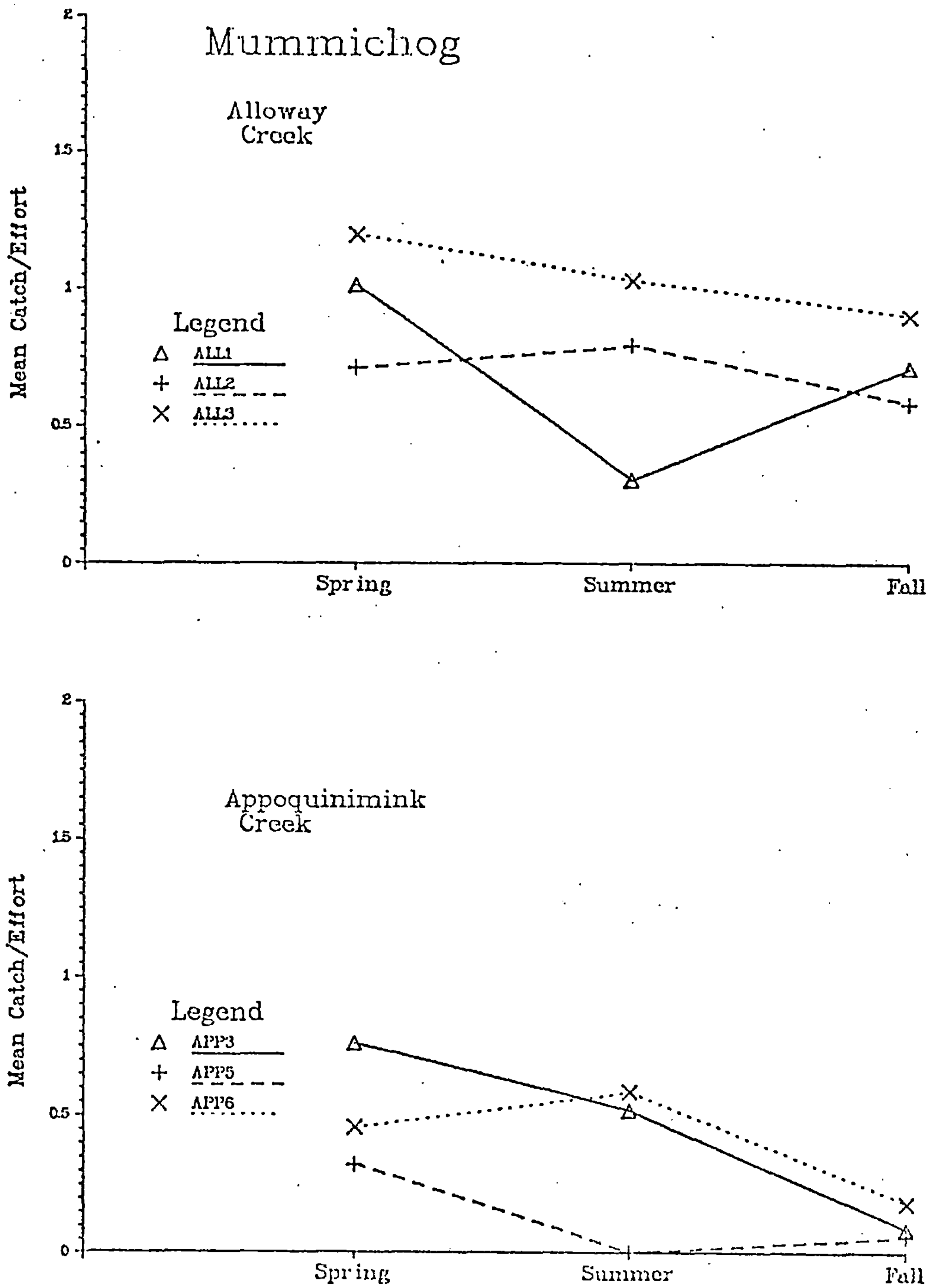
Figure 3.1.6b-4




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of mummichog by seine-1978

Figure 3.1.6b-5

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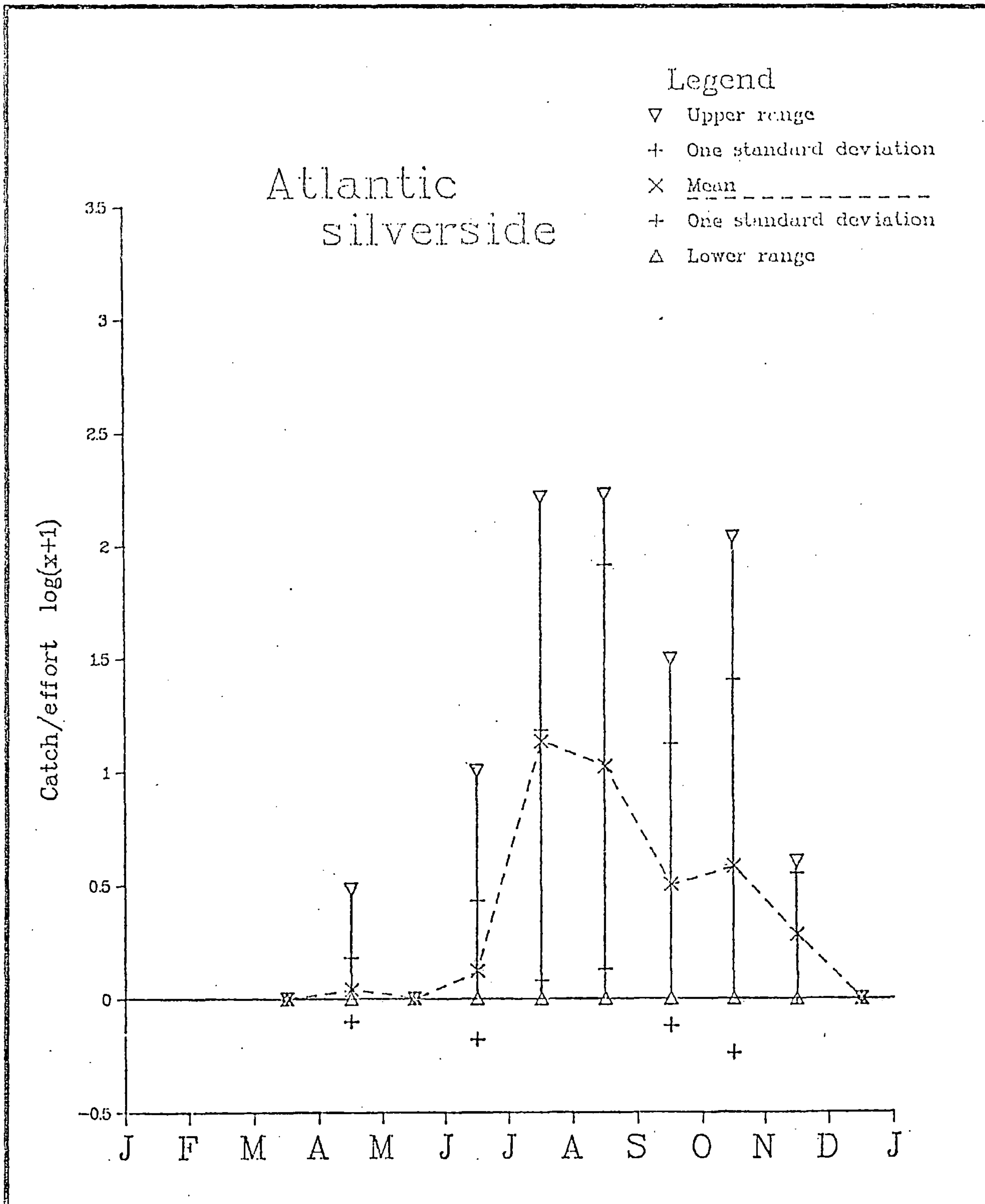
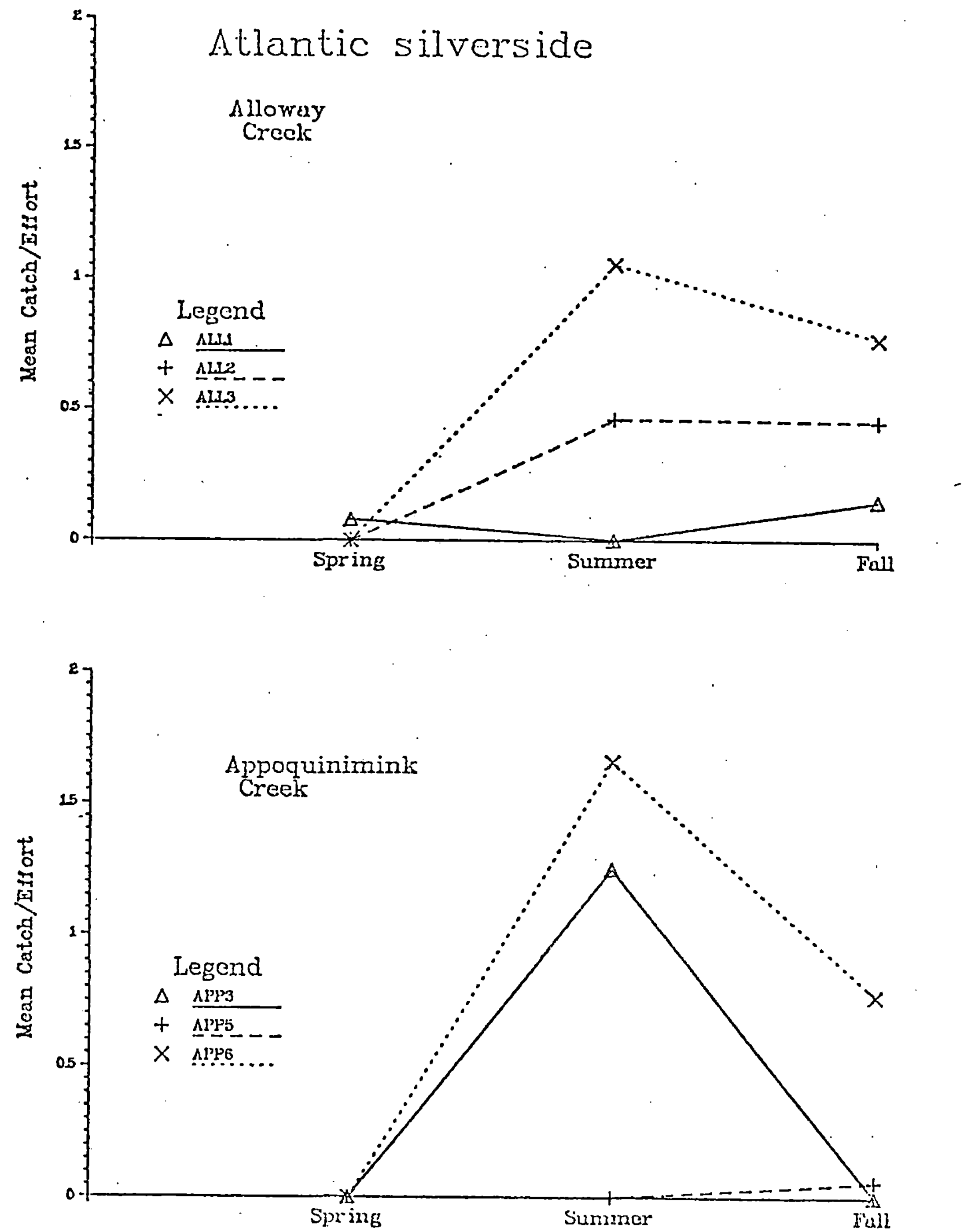
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean seine catch of mummichog-1978 |
| | Figure 3.1.6b-6 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of Atlantic silverside by seine-1978

Figure 3.1.6b-7




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean seine catch of Atlantic silverside-1978<br>Figure 3.1.6b-8 |
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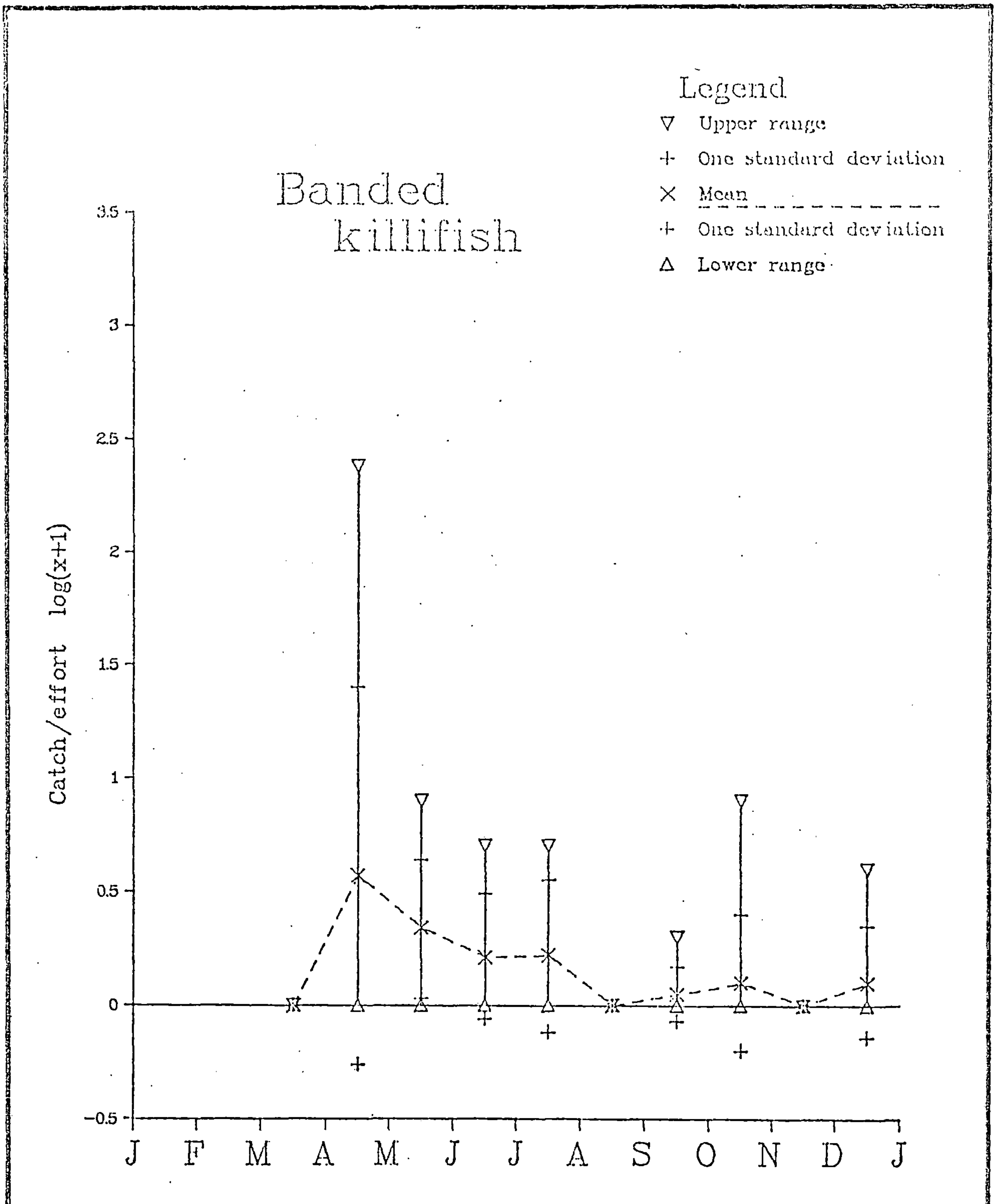
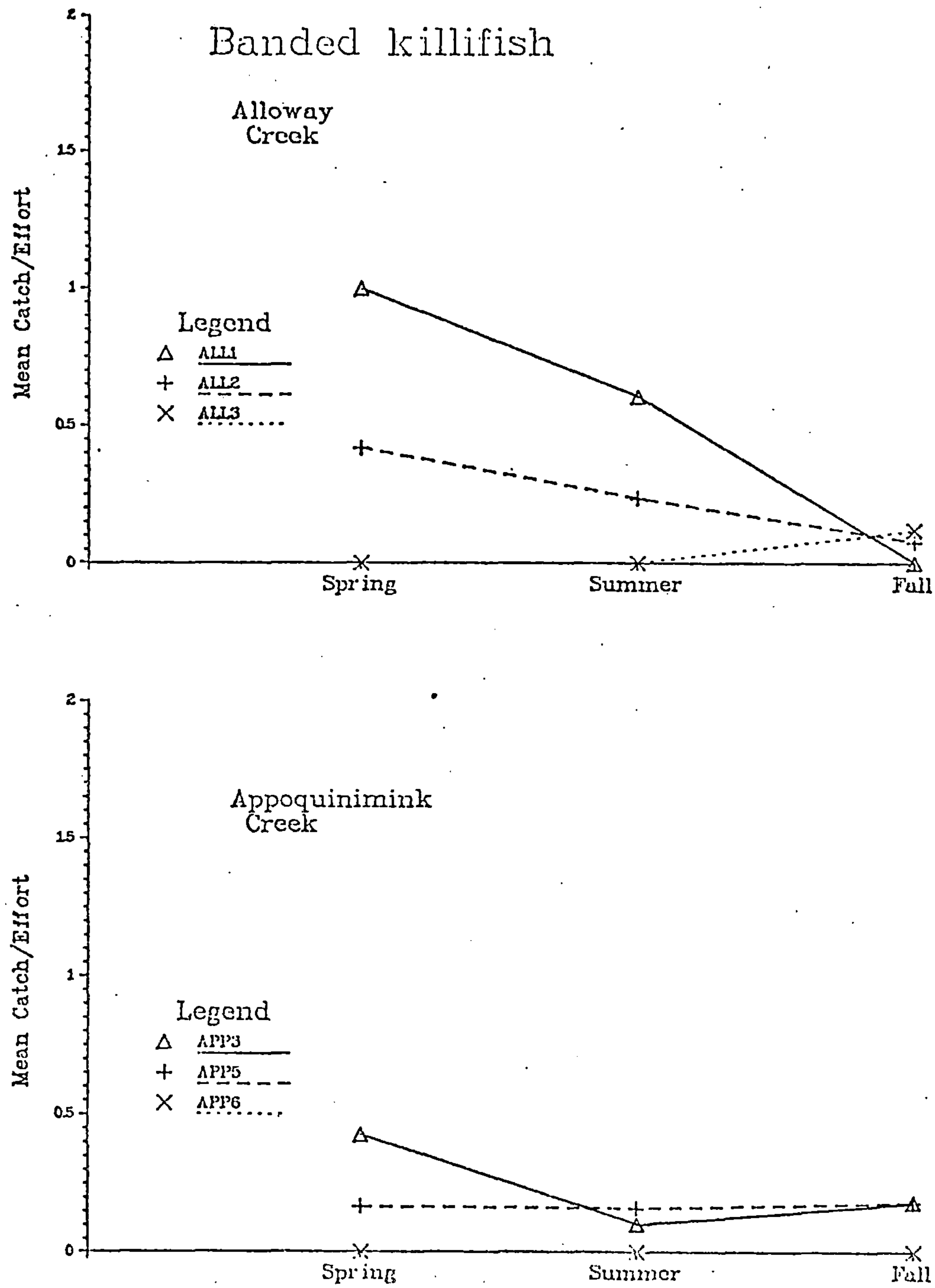



PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of banded killifish by seine-1978

Figure 3.1.6b-9

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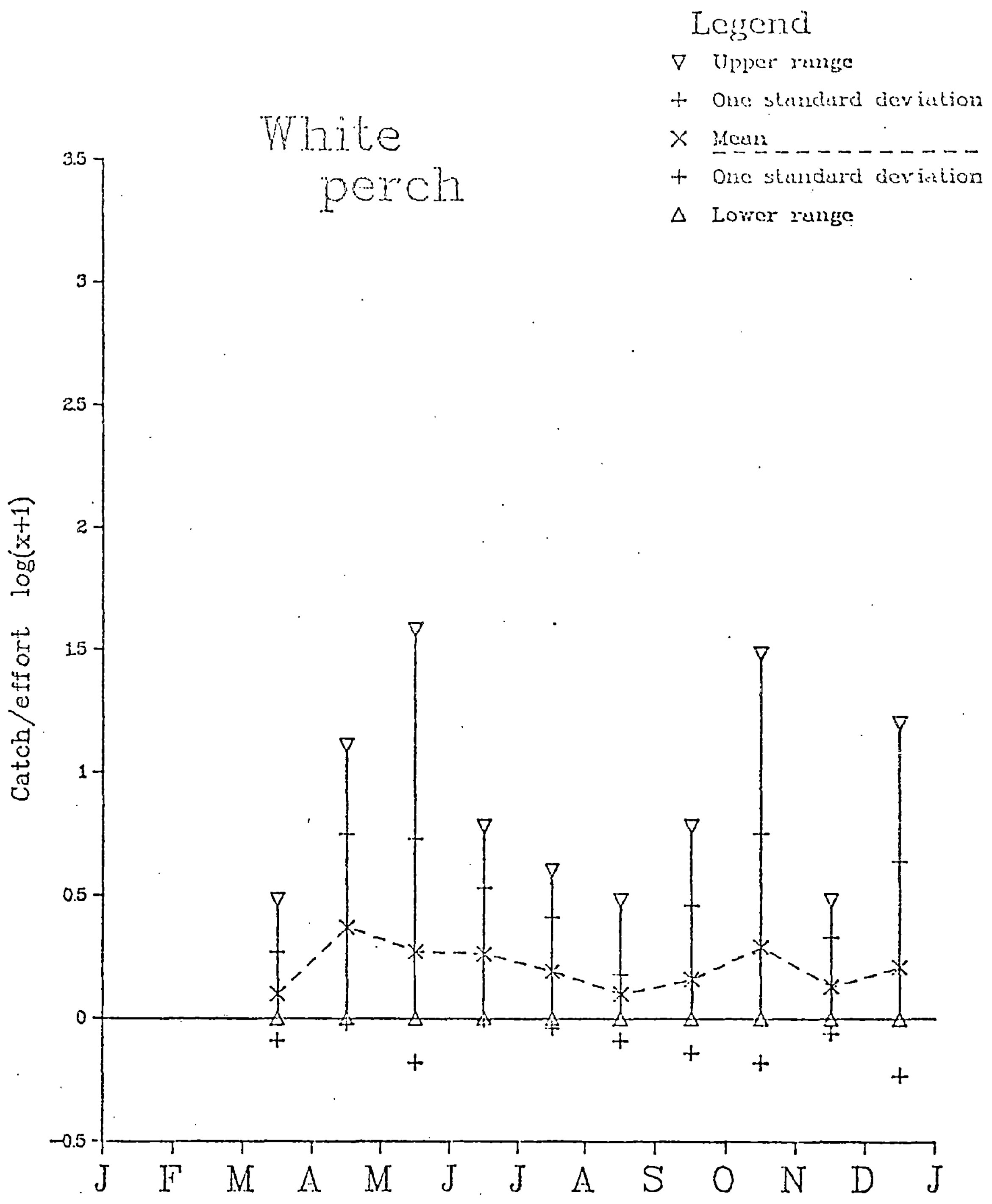
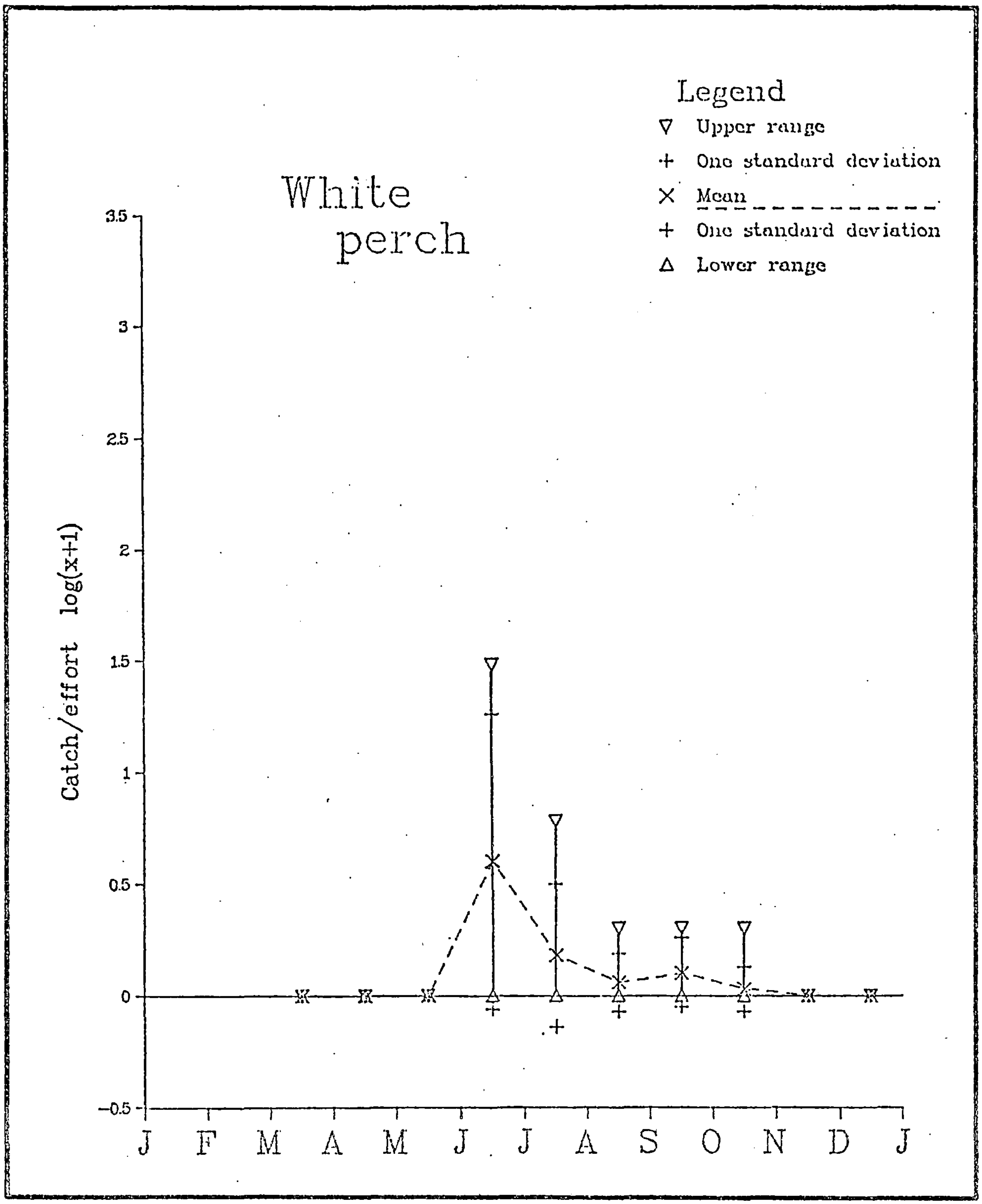
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean seine catch of banded killifish-1978 |
| | Figure 3.1.6b-10 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Temporal abundance of white perch by trawl-1978

Figure 3.1.6b-11




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of white perch by seine-1978<br>Figure 3.1.6b-12 |
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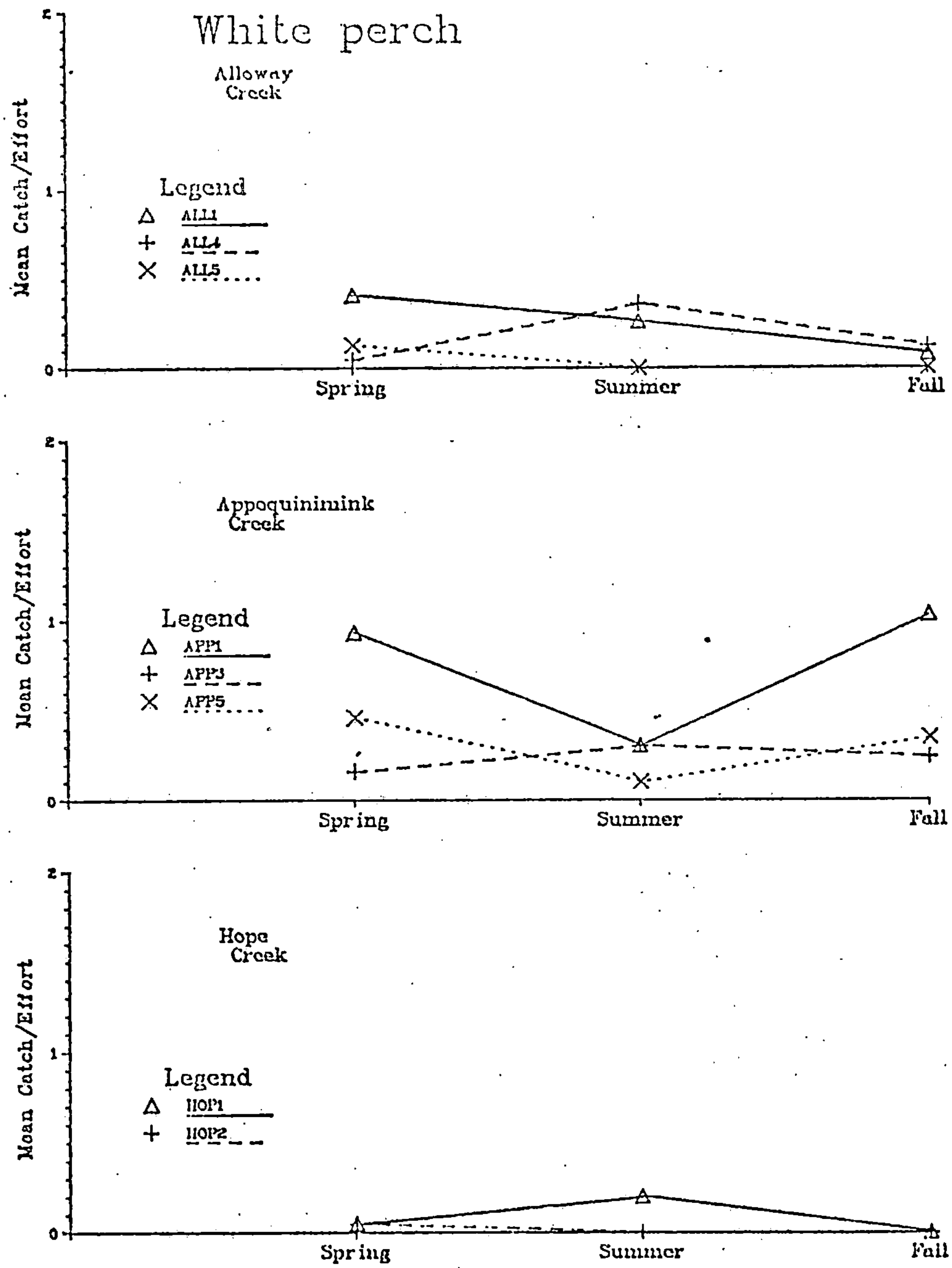


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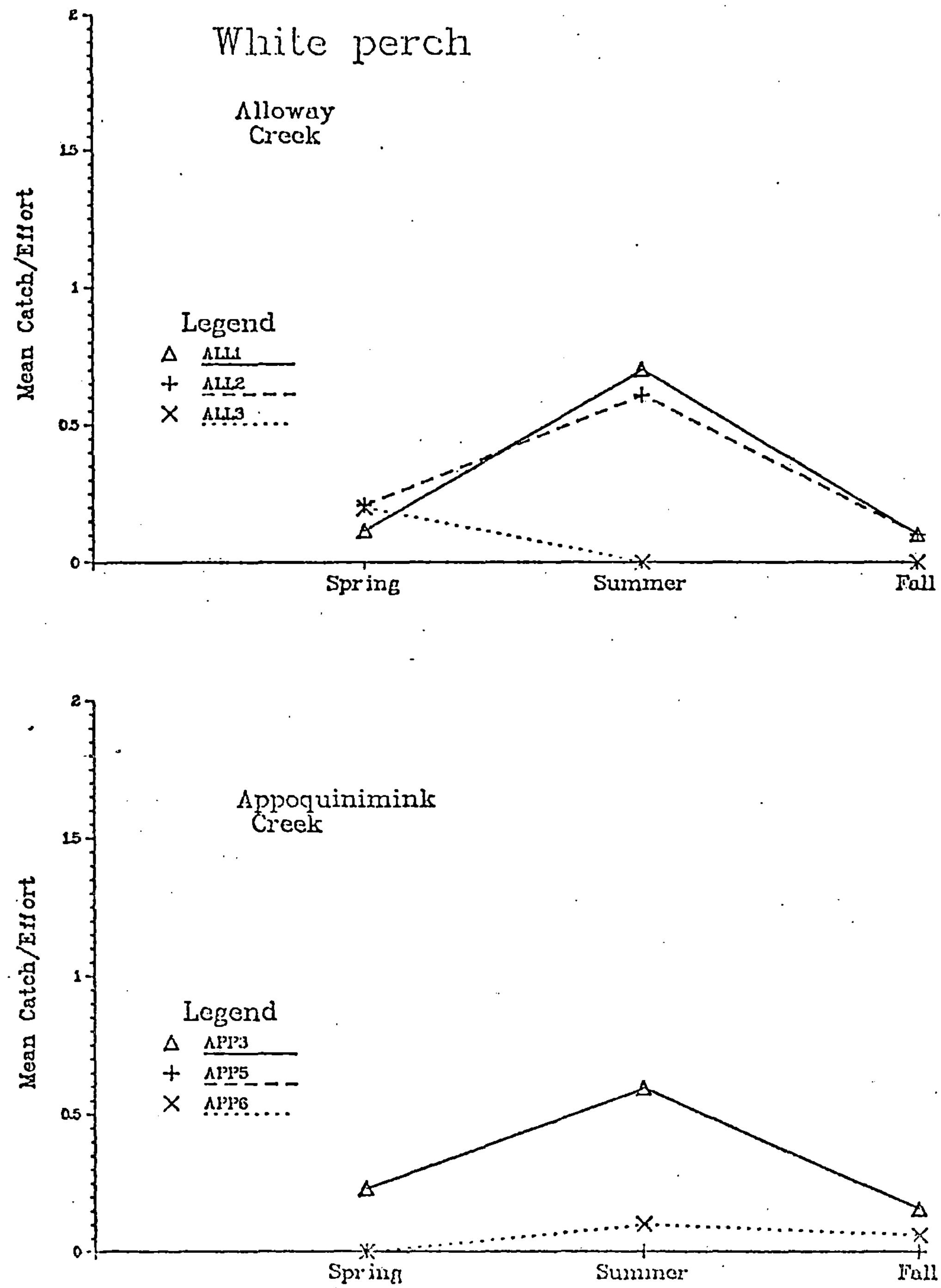
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean trawl catch of white perch-1978 |
| | Figure 3.1.6b-13 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean seine catch of white perch-1978 |
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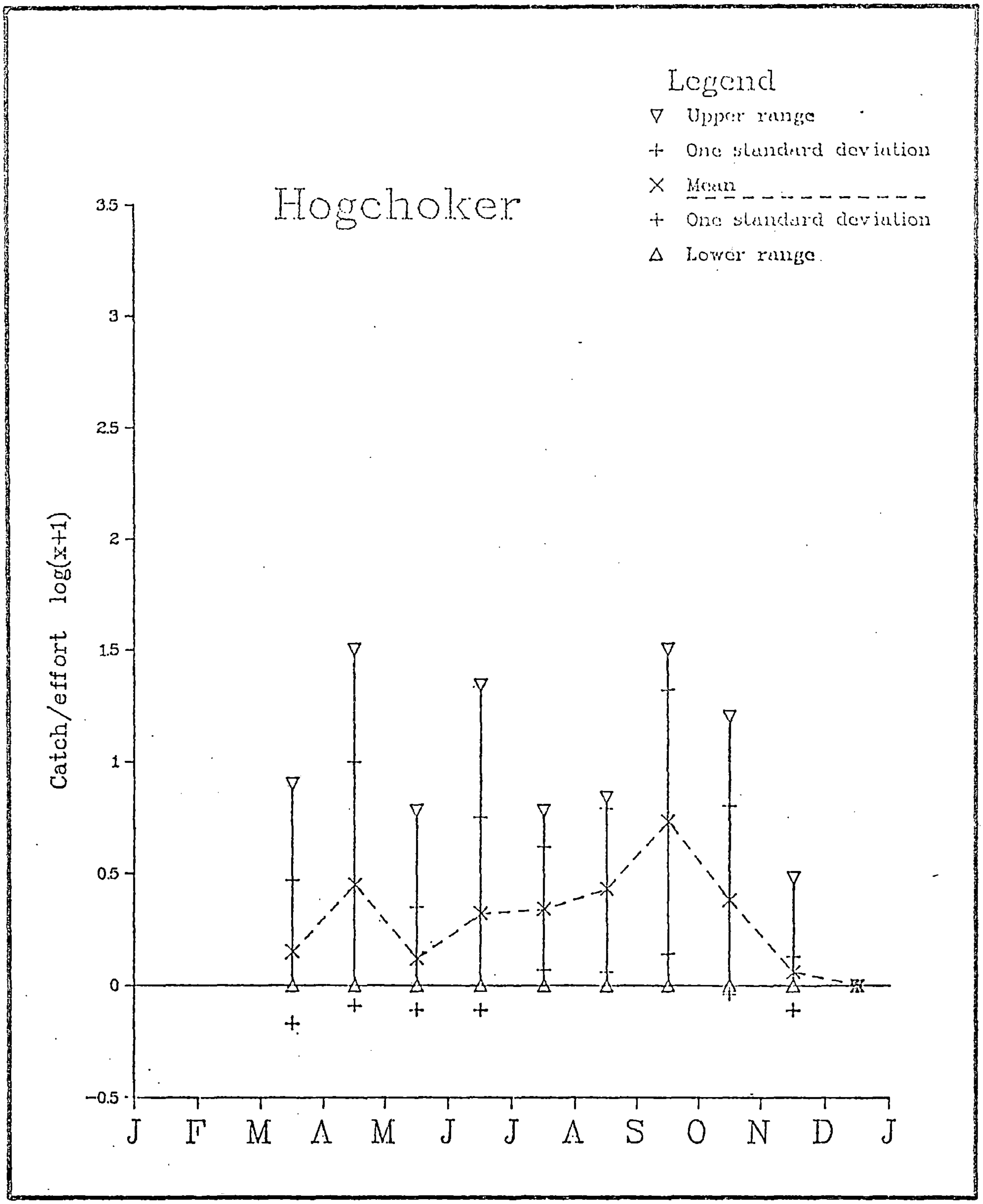
| | Figure 3.1.6b-14 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of hogchoker by trawl-1978 |
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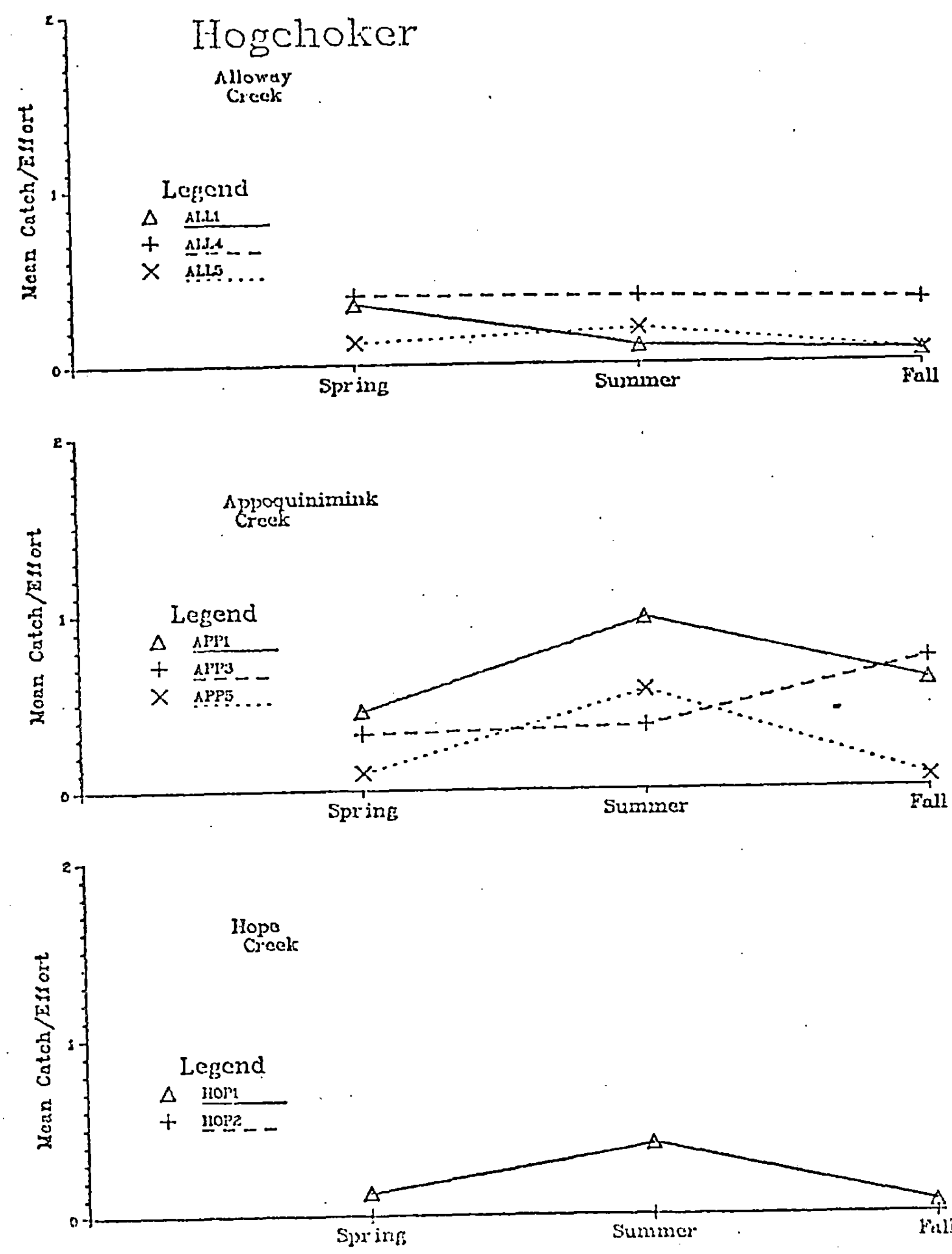
| | Figure 3.1.6b-15 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean trawl catch of hogchoker-1978<br>Figure 3.1.6b-16 |
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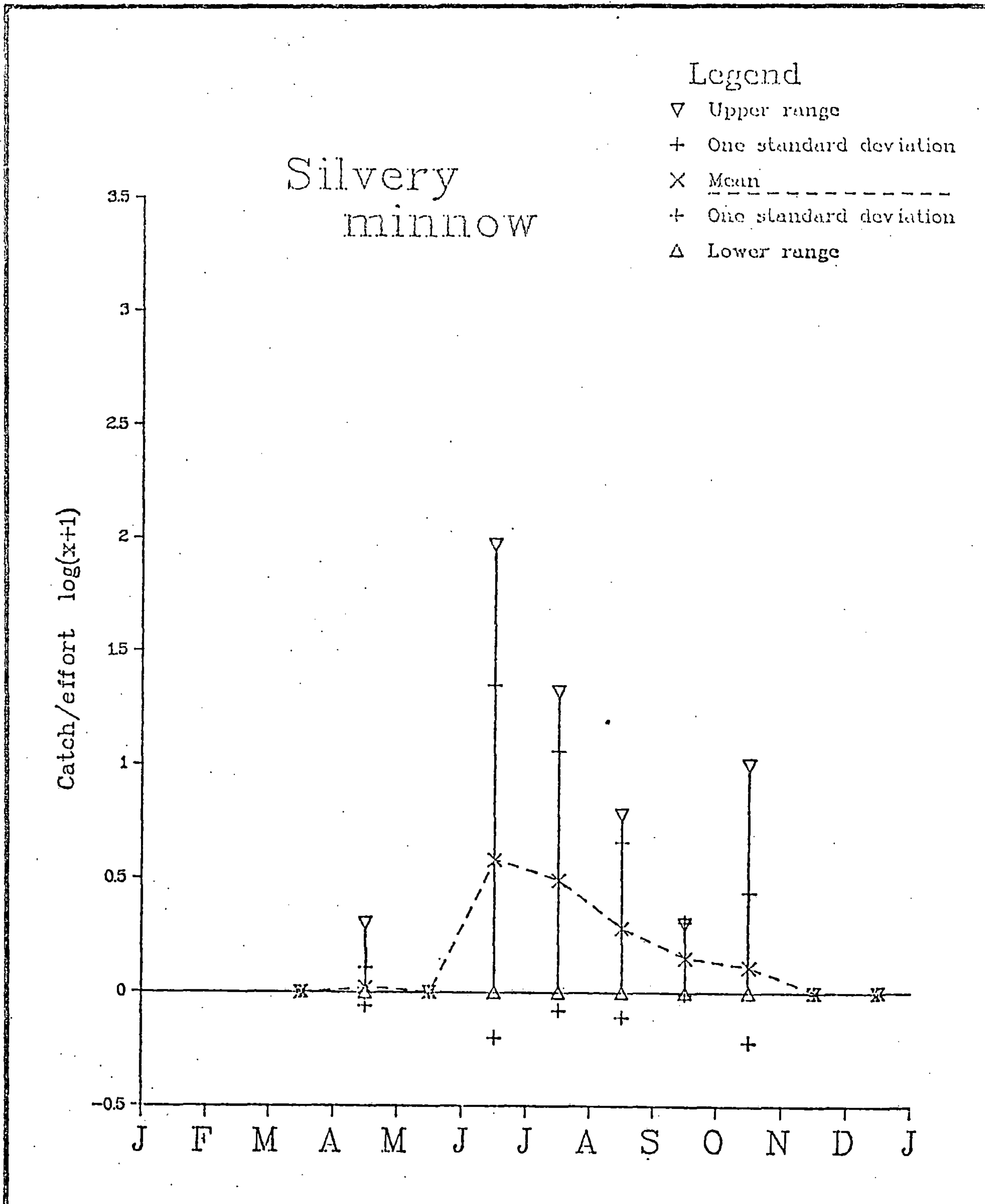


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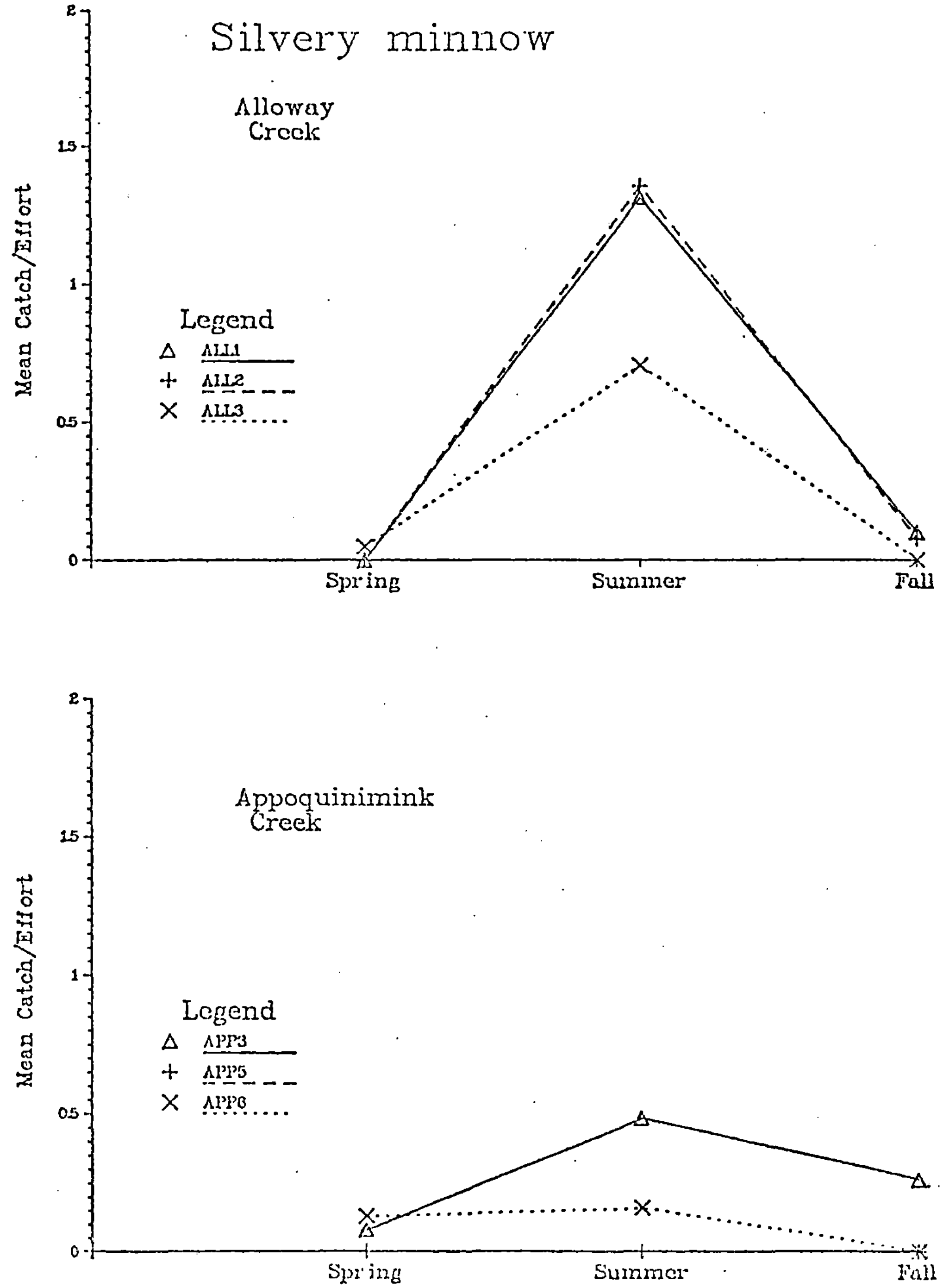
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of silvery minnow by seine-1978 |
| | Figure 3.1.6b-17 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean seine catch of silvery minnow-1978<br>Figure 3.1.6b-18 |
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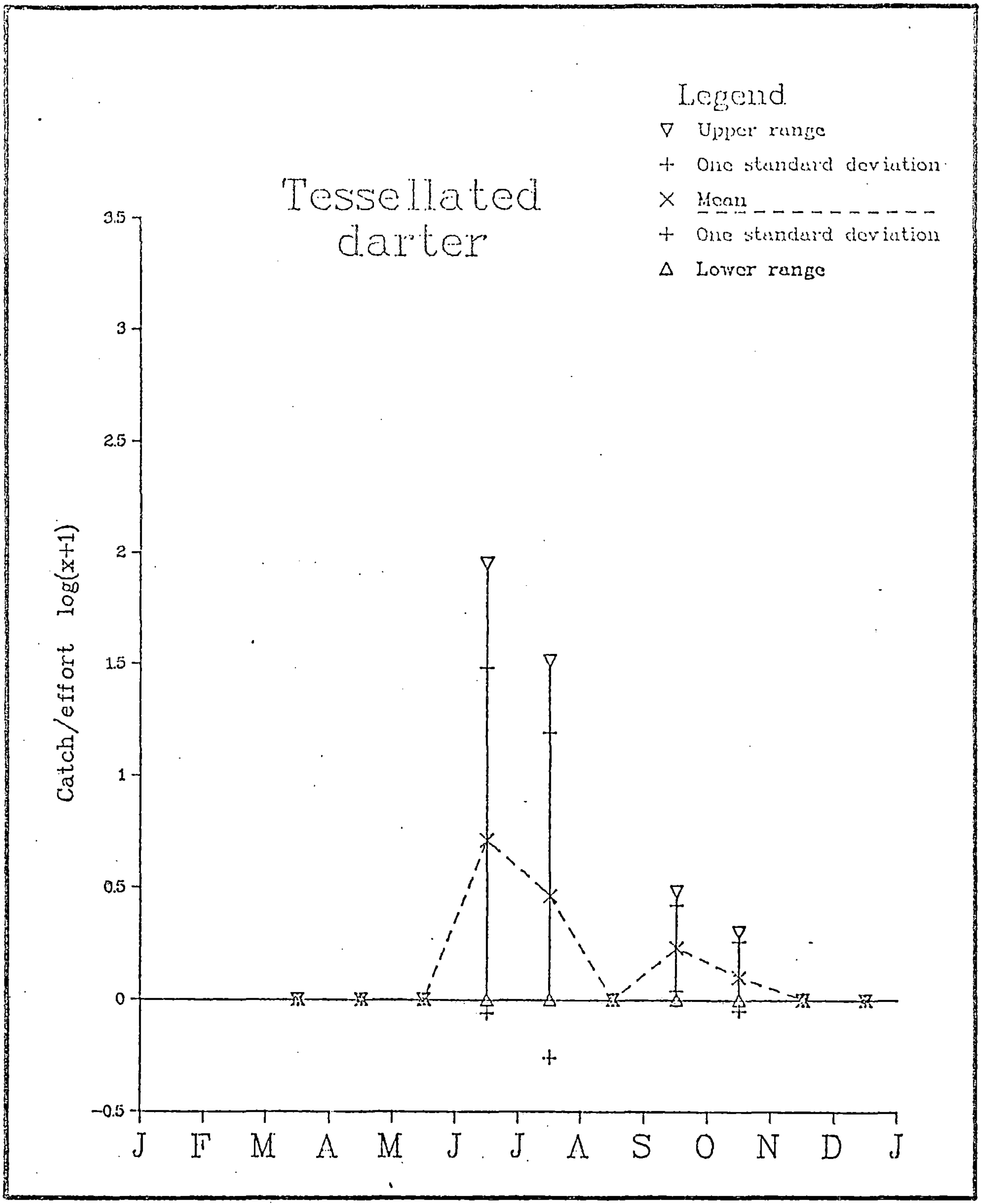


| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of tessellated darter by seine-1978<br>Figure 3.1.6b-19 |
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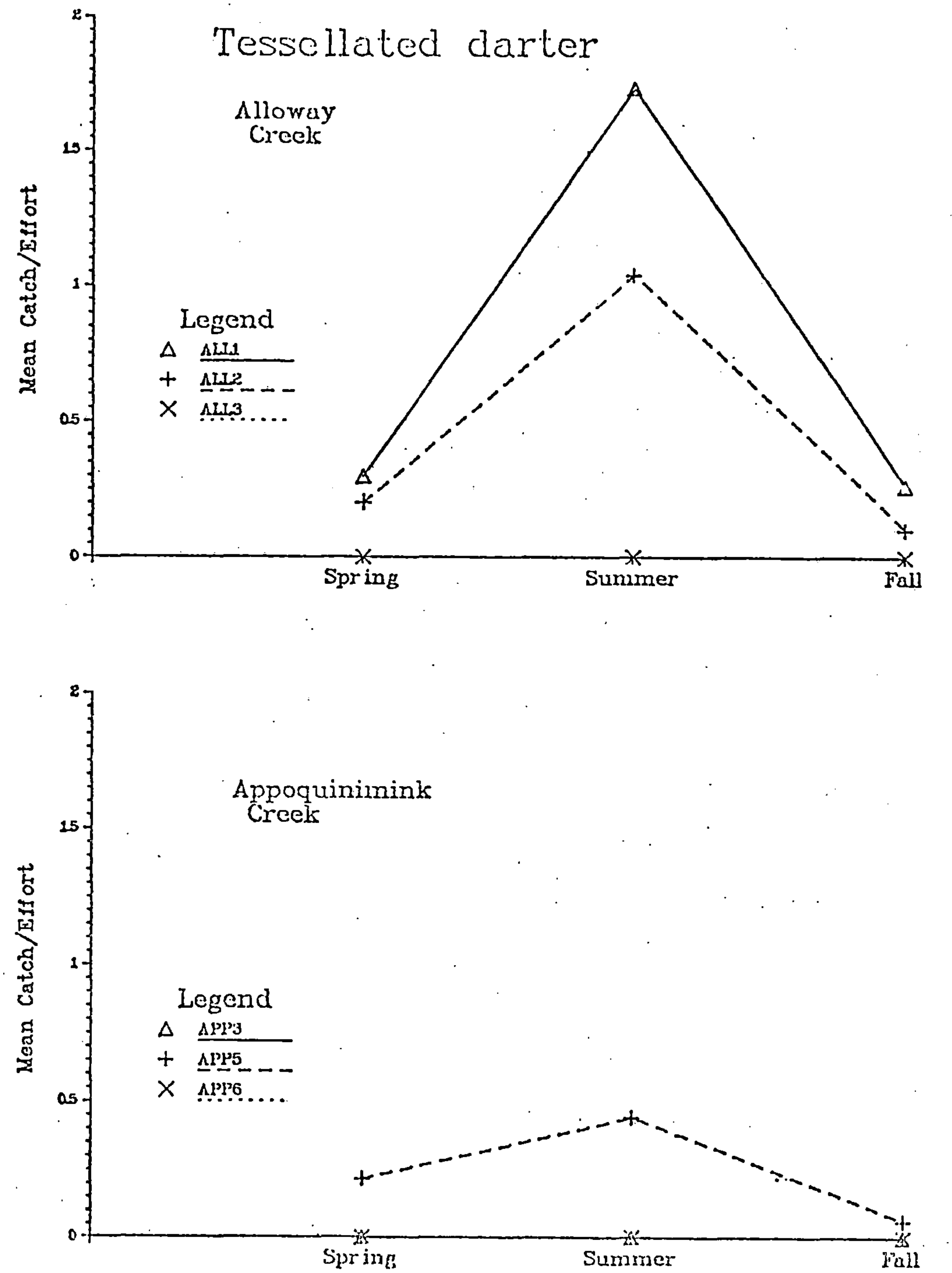


| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Seasonal mean seine catch of tessellated darter-1978 |
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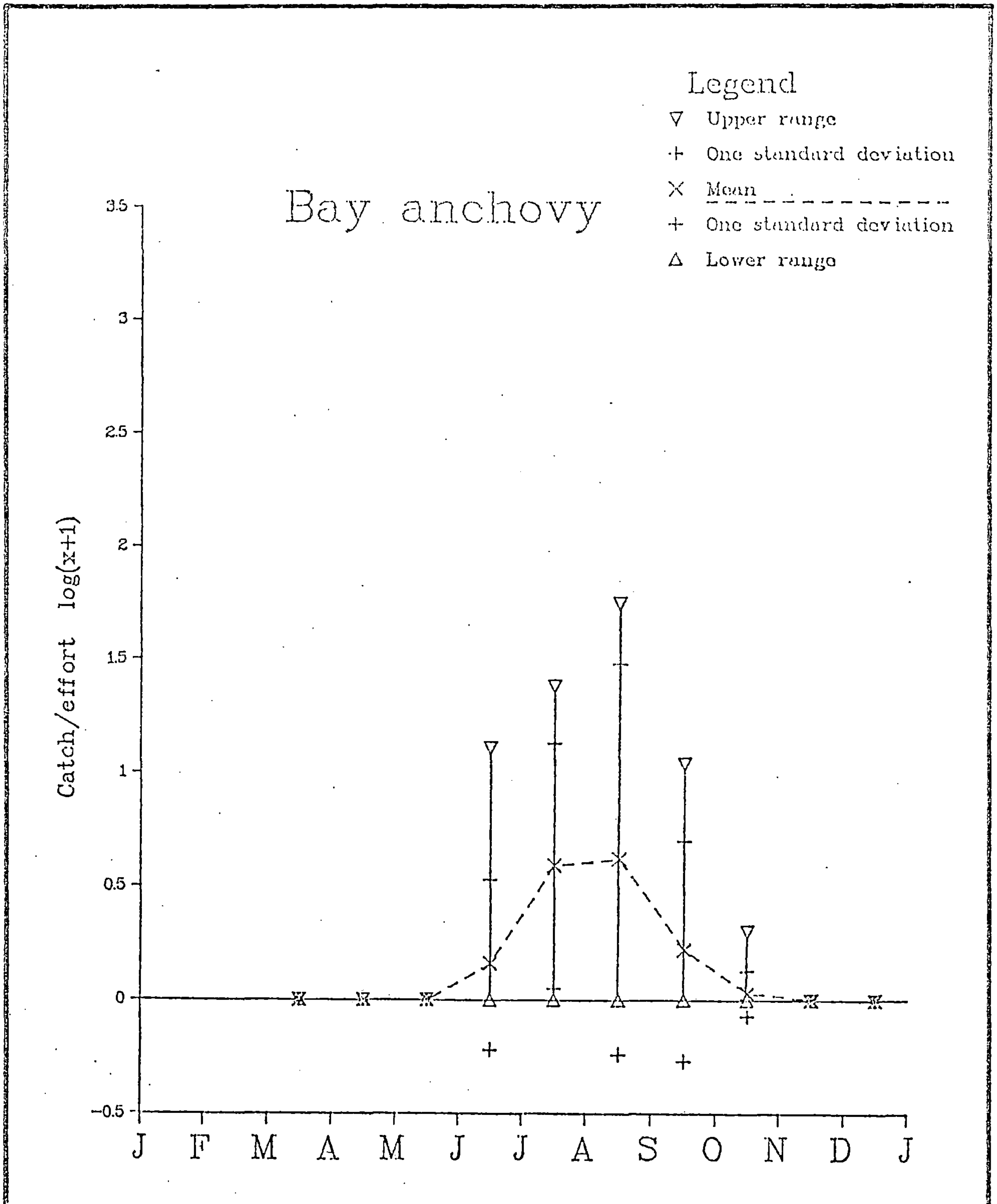
| | Figure 3.1.6b-20 |

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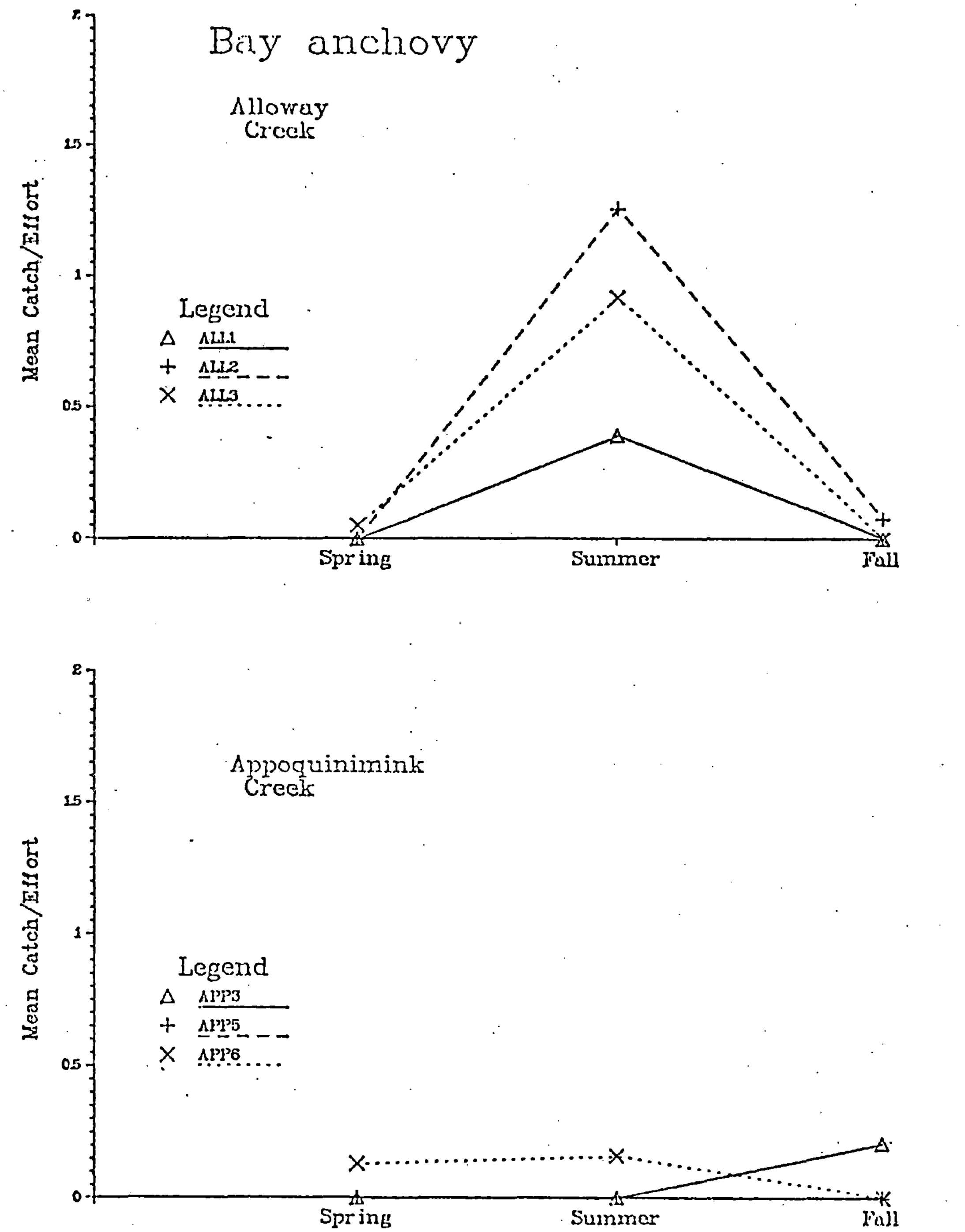
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Temporal abundance of bay anchovy by seine-1978 |
| | Figure 3.1.6b-21 |




PUBLIC SERVICE ELECTRIC AND GAS COMPANY
SALEM NUCLEAR GENERATING STATION

Seasonal mean seine catch of bay anchovy-1978

Figure 3.1.6b-22

## 3.1.7 Impingement of Organisms (ETS Section 3.1.2.2)

In accordance with Section 3.1.2.2 of the ETS studies of impingement at Salem were conducted in 1978. Principal objectives are to determine species composition and to quantify number of fishes and blue crab impinged on the circulating (CWS) and service water (SWS) intake screens and to determine survival rates of organisms impinged at the circulating water intake.

This section presents a summary of results during January through December 1978 as reported in Monthly Progress Reports, numbers 10 through 21, to NRC.

### 3.1.7.1 Summary

At the CWS intake a total 93,853 specimens of 59 fishes and 2,988 blue crab were taken in 2,195 samples (3,791 min sampled). From these samples it is estimated that total impingement was 14,362,829 fish (44,310.3 kg) and 363,268 blue crab (9,367.4 kg).

The most numerous fishes were weakfish (60.8 percent of the estimated total number), bay anchovy (14.3 percent), hogchoker (10.2 percent), white perch (5.1 percent) and blueback herring (2.1 percent). The most important fishes by weight were weakfish (23.5 percent), white perch (22.0 percent), hogchoker (11.1 percent), bay anchovy (10.4 percent), and silvery minnow (5.3 percent).

Estimated monthly impingement was greatest during July. Weakfish and bay anchovy comprised most (90.6 percent) of the July estimate. Impingement was also high in June, August, and December.

Some 61 percent of all fish collected were live, 28 percent were dead, and 11 percent were damaged. Of blue crab, 94 percent were live, 5 percent were dead, and 1 percent were damaged.

At the SWS intake a total of 10,829 specimens of 49 fishes and 369 blue crab were taken in 154, 24-hr samples. Estimated total impingement was 25,423 fish (137.01 kg) and 857 blue crab (16.93 kg).

The most numerous fishes were weakfish (59.1 percent of the estimated total number), white perch (10.1 percent), bay anchovy (6.3 percent), hogchoker (4.0 percent), and gizzard shad (3.6 percent). The most important fishes by weight were white perch (15.1 percent), gizzard shad (15.0

percent), weakfish (14.9 percent), silvery minnow (6.0 percent), and spot (5.0 percent).

Estimated monthly impingement was greatest during July. Weakfish comprised 84.5 percent of the July estimate. Impingement was also high in June; weakfish comprised 80.0 percent of the fish impinged.

### 3.1.7.2 Circulating Water System (CWS)

#### INTAKE AND FISH RESCUE SYSTEM DESCRIPTION

The circulating water system intake and the fish rescue system were described in detail in Volume 2 of the 1977 Annual Environmental Operating Report.

In brief, the principal components of the fish rescue system are vertical traveling water screens fitted with fish buckets, a low pressure fish removal system, a high pressure trash removal system, troughs to return impinged organisms to the river, and counting pools for sampling purposes.

Prior to July 14, 1978, the combined flow of the fish trough and the trash trough were discharged through a common outfall located at the north end of the intake structure. To reduce recirculation of discharged material during ebb tide a south discharge was put into operation. This permitted screen-wash flow to be discharged in the direction of tide.

For sampling, both troughs can be diverted to two counting pools, located at the north and south ends of the intake, which have been designed to minimize collection stress. Prior to July 14, only the north counting pool was operational. Thereafter both pools were used depending on the direction of screen wash discharge.

#### MATERIALS AND METHODS

##### Sampling Schedule

All samples required by the Impingement ETS were taken. Prior to June 29, fishes and blue crab impinged on the CWS screens were sampled during three, 24-hr periods per week. A minimum of four 3-min samples for survival and abundance were taken at approximately 6-hr intervals (1200, 1800, 0000, 0600).

On June 29 it was determined that during periods of heavy detrital loading long periods in the counting pool were negatively biasing survival estimates. The procedure during periods of heavy detritus was modified to sample 1 min of flow for survival and abundance and a subsequent 2 min of flow for abundance only.

On July 11, the sampling schedule was changed to increase the number of sampling days per week to seven and to increase the sampling frequency within each day. On three days per week the schedule became four 3-min samples per day for survival and abundance taken at approximately 6-hr intervals plus as many 1-min abundance samples as practicable taken throughout the balance of the day. On the remaining four days as many 1-min abundance samples as practicable were taken. On September 15, the sampling schedule was reduced to six days per week due to the reduction in the number of fish impinged.

## Sampling Procedure

Before each survival sample was taken, the appropriate pool was filled to a depth of about 25 cm with water filtered through a nylon mesh filter bag. Sampling was initiated by rapidly removing the filter bag. After 1 or 3 min flow of total screen wash water had entered the pool sampling was terminated by re-inserting the filter bag.

Organisms were allowed a 5-min acclimation period after which the pool was drained. During draining impinged organisms were collected with dip nets and their condition determined according to the following criteria.

Live: Swimming vigorously, no apparent orientation problems, behavior normal.

Dead: No vital signs, no body or opercular movement, no response to gentle probing.

Damaged: Struggling or swimming on side, indication of abrasion or laceration.

All specimens in each category were sorted by species, and the total number and weight of each was determined. All specimens or a representative subsample (at least 100 specimens) of each species, drawn equally from each condition category if possible, were measured to the nearest 5 mm. Length and weight range per species and per condition category was also determined. Individuals and small numbers per species (as a group) were weighed to the nearest

0.1 g with an Ohaus 1600 Series triple beam balance. Large numbers per species were mass weighed to the nearest gram with a Salter suspended scale.

Abundance samples were taken by diverting a 1-to 3-min flow of screen wash water to a counting pool. After sampling, the pool was drained immediately, all organisms were removed and sorted by species, and the total number of each was determined. The largest and the smallest specimen of each species was measured to the nearest 5 mm.

With all samples the numbers of pumps and screens in operation, screen speed, tidal stage and elevation, air temperature (C), sky condition, wind direction, and wave height at the time of each sample were recorded. Measurements of water temperature (C) in the pool were taken with a mercury thermometer or a Yellow Springs Instrument Company Model 51 A oxygen analyzer, and of salinity (ppt) with an American Optical Corporation salinity refractometer, Model 10419. Detritus taken with the sample was weighed to the nearest 0.1 kg with a Dillon dynomometer or a Salter suspended scale. All data were recorded on a computer compatible field sheet.

## Data Reduction

An estimate of the total number (est. n) and weight of each species impinged per day was calculated by first multiplying the mean impingement rate per minute for the interval between each two consecutive samples times the number of minutes in the interval and summing the interval estimates. The sum of the interval estimates was then scaled to 24 hr by multiplying by 1440 (the number of minutes in 24 hr) divided by the sum of the time intervals between all samples. The general computational formula is given by:

(1) $$E_d = \left[\sum\left(T \cdot \frac{R_1 + R_2}{2}\right)\right] \cdot \frac{1440}{\Sigma T}$$

where:

$E_d$ = daily estimated number (or weight)

T = number of minutes in interval between consecutive samples

$R_1$ = rate/min at start of interval

$R_2$ = rate/min at end of interval

If samples were taken over less than a 12-hr period the sum of the interval estimates was scaled only over the period between the first and last samples.

This method of estimation eliminates the bias inherent in computing a straight mean estimated number per 24 hr by taking into account non-uniform sampling intervals and the variability of impingement rate caused by the patchy appearance of fish schools and daily activity cycles. The estimate is also valid for equally spaced samples.

An estimate of the number of each species returned to the river alive per day was calculated by the same method as total number except that the rate of live specimens per minute was entered into equation 1 instead of rate of all specimens per species impinged per minute. The estimated number of live specimens was divided by the estimated total number impinged and multiplied by 100 to give percent live.

Estimates of the total number and weight of each species impinged per week were calculated by summing the daily estimates and multiplying by 168 (the number of hours in a week) divided by the number of hours included in the daily estimates. The computational formula is given by:

$$(2) \qquad E_w = \left(\sum E_d\right) \cdot \frac{168}{\sum H}$$

where:

$E_w$ = weekly estimated number (or weight)

$E_d$ = daily estimated number (or weight)

H = number of hours included in daily estimates

Weekly estimates were summed to yield a monthly estimate.

RESULTS

The CWS was fully operational (5-6 circulators in service) during most of January 1 through March 16, June 14 through October 9, and November 14 through December 31. From March 17 through June 13 a planned maintenance outage was in progress. During the outage samples were taken from April 11 through April 27 during which time one circulator was in operation. All circulators were shut down during the remainder of the outage. There was also an outage from

October 10 through November 13 during which only 1 - 2 circulators were operated.

A total of 93,853 specimens of 59 fishes and 2,9888 blue crab were taken in 2,195 samples (3,791 min sampled) at the CWS intake (Table 3.1.7-1). From these samples, it is estimated that total impingement in 1978 was 14,362,829 fish (44,810.3 kg) and 363,268 blue crab (9367.4 kg) (Table 3.1.7-2).

The most numerous species were weakfish, bay anchovy, hogchoker, white perch, and blueback herring.

Estimated impingement was greatest during July (est. n = 7,387,809)(Fig. 3.1.7-1). Weakfish (76.9 percent) and bay anchovy (13.7 percent) comprised 90.6 percent of the July estimate (Table 3.1.7-3). Impingement was also high in June (est. n = 3,482,551), August (est. n = 944,912), and December (est. n = 720,100). Weakfish comprised 64.6 percent of the June total and 61.1 percent of that in August. In December white perch and blueback herring comprised 30.4 percent and 28.2 percent of the total, respectively (Table 3.1.7-3).

Species variety was greatest (33) in December and least (12) in March.

Some 61 percent of all fish collected were live, 28 percent were dead, and 11 percent were damaged (Table 3.1.7-1). Of blue crab, 94 percent were live, 5 percent were dead, and 1 percent were damaged. Survival was high for winter flounder (100 percent live), hogchoker (98 percent), northern pipefish (96 percent), windowpane (93 percent), striped cusk-eel (87 percent), summer flounder (86 percent), and butterfish (84 percent). Survival was low for gizzard shad (19 percent live), carp (25 percent), Atlantic croaker (32 percent), and channel catfish (33 percent). Most (63 percent) gizzard shad were damaged (Table 3.1.7-1).

## Species Discussion

Thirteen fishes were each represented in the sample by more than 300 specimens and together comprised 98.4 percent of the total impingement. These species and blue crab are discussed below.

1. Weakfish, n = 51,006; est. n = 8,729,959 (Table 3.1.7-2), comprised 60.8 percent of the estimated total number and 23.5 percent (ranked first) of the estimated total weight. It was taken during June through December. Most (66.2

percent) of the estimated number was impinged during July (Table 3.1.7-3).

A detailed discussion of weakfish impingement during June through September was presented in Section III of the report, Summary Assessment of Weakfish Impingement: Summer 1978 (PSE&G 1978b).

Annual survival was 60 percent; 35 percent were dead, and 5 percent damaged (Table 3.1.7-1). Percent live ranged from 33 in December to 85 in October. During months of abundance (June-September) percent live ranged from 44 to 81 (Table 3.1.7-3).

Fork length ranged from 18 to 253 mm. Weight ranged from 0.1 to 250.6 g.

2. Bay anchovy, n = 14,525; est. n = 2,049,169 (Table 3.1.7-2), comprised 14.3 percent of the estimated total number and 10.4 percent (ranked fourth) of the estimated total weight. It was taken during January, April, and June through December. Most (90.1 percent) of the estimated number was impinged during June through September (Table 3.1.7-3).

Annual survival was 44 percent; 49 percent were dead and 7 percent damaged (Table 3.1.7-1). Percent live ranged from 25 in January to 69 in November. During months of abundance (June-September) percent live ranged from 33 to 52 (Table 3.1.7-3).

Fork length ranged from 13 to 98 mm. Weight ranged from 0.1 to 9.4 g.

3. Hogchoker, n = 9,873; est. n = 1,462,562 (Table 3.1.7-2), comprised 10.2 percent of the estimated total number and 11.1 percent (ranked third) of the estimated total weight. It was taken during January, April, and June through December. Most (81.3 percent) of the estimated number was impinged during June and July (Table 3.1.7-3).

Annual survival was 98 percent; 1 percent were dead and 1 percent damaged (Table 3.1.7-1). Percent live ranged from 67 in January to 100 in April. During months of abundance (June-December) percent live ranged from 90 to 99 (Table 3.1.7-3).

Fork length ranged from 13 to 186 mm. Weight ranged from 0.1 to 111.7 g.

4. White perch, n = 5,743; est. n = 726,480 (Table 3.1.7-2), comprised 5.1 percent of the estimated total number and 22.0 percent (ranked second) of the estimated total weight. It was taken during all months. Most (77.1

percent) of the estimated number was impinged during February and December (Table 3.1.7-3).

Annual survival was 44 percent; 8 percent were dead and 48 percent damaged (Table 3.1.7-1). Percent live ranged from zero in September to 77 in April. During months of abundance (January-March, November, December) percent live ranged from 3 to 72 (Table 3.1.7-3).

Fork length ranged from 38 to 293 mm. Weight ranged from 1.1 to 427.6 g.

5. Blueback herring, n = 3,458; est. n = 308,395 (Table 3.1.7-2), comprised 2.1 percent of the estimated total number and 2.2 percent (ranked eighth) of the estimated total weight. It was taken during all months except March. Most (97.0 percent) of the estimated number was impinged during November and December (Table 3.1.7-3).

Annual survival was 70 percent; 18 percent were dead and 12 percent damaged (Table 3.1.7-1). During months of abundance (November, December) percent live ranged from 69 to 75 (Table 3.1.7-3).

Fork length ranged from 38 to 278 mm. Weight ranged from 0.1 to 134.3 g.

6. Atlantic silverside, n = 1,908; est. n = 170,490 (Table 3.1.7-2), comprised 1.2 percent of the estimated total number and 1.1 percent (ranked eleventh) of the estimated total weight. It was taken during January through March and June through December. Most (70.4 percent) of the estimated number was impinged during August, October, and December (Table 3.1.7-3).

Annual survival was 76 percent; 18 percent were dead and 6 percent damaged (Table 3.1.7-1). Percent live ranged from zero in January to 85 in November. During months of abundance (July-December) percent live ranged from 69 to 85 (Table 3.1.7-3).

Fork length ranged from 23 to 193 mm. Weight ranged from 0.1 to 13.5 g.

7. Silvery minnow, n = 1,350; est. n = 203,655 (Table 3.1.7-2), comprised 1.4 percent of the estimated total number and 5.3 percent (ranked fifth) of the estimated total weight. It was taken during January through March, June and December. Most (86.7 percent) of the estimated number was impinged during January and February (Table 3.1.7-3).

Annual survival was 55 percent; 7 percent were dead and 3 percent damaged (Table 3.1.7-1). Percent live ranged from

25 in March to 100 in June. During months of abundance (January, February, December) percent live ranged from 39 to 69 (Table 3.1.7-3).

Fork length ranged from 33 to 143 mm. Weight ranged from 0.1 to 32.4 g.

8. Spot, n = 1,183; est. n = 128,341 (Table 3.1.7-2), comprised 0.9 percent of the estimated total number and 4.2 percent (ranked sixth) of the estimated total weight. It was taken during June through December. Most (69.5 percent) of the estimated number was impinged during July, August, and November (Table 3.1.7-3).

Annual survival was 71 percent; 14 percent were dead and 15 percent damaged (Table 3.1.7-1). Percent live ranged from 26 in October to 85 in November. During months of abundance (June-August, November, December) percent live ranged from 68 to 85 (Table 3.1.7-3).

Fork length ranged from 23 to 198 mm. Weight ranged from 0.1 to 89.8 g.

9. Atlantic menhaden, n = 1,120; est. n = 126,030 (Table 3.1.7-2), comprised 0.9 percent of the estimated total number and 1.8 percent (ranked ninth) of the estimated total weight. It was taken during June through December. Most (81.7 percent) of the estimated number was impinged during June through August (Table 3.1.7-3).

Annual survival was 63 percent; 22 percent were dead and 15 percent damaged (Table 3.1.7-1). Percent live ranged from 53 in June to 84 in October. During months of abundance (June-August) percent live ranged from 53 to 66 (Table 3.1.7-3).

Fork length ranged from 33 to 238 mm. Weight ranged from 0.2 to 194.7 g.

10. Atlantic croaker, n = 689; est. n = 59,086 (Table 3.1.7-2), comprised 0.4 percent of the estimated total number and 0.1 percent (ranked thirteenth) of the estimated total weight. It was taken during January, and September through December. Most (86.4 percent) of the estimated number was impinged during December (Table 3.1.7-3).

Annual survival was 32 percent; 28 percent were dead and 40 percent damaged (Table 3.1.7-1). Percent live ranged from 8 in January to 88 in September. During December 27 percent were live (Table 3.1.7-3).

Fork length ranged from 23 to 88 mm. Weight ranged from 0.1 to 7.6 g.

11. Butterfish, n = 671; est. n = 54,419 (Table 3.1.7-2), comprised 0.4 percent of the estimated total number and 0.3 percent (ranked twelfth) of the estimated total weight. It was taken during August through October and December. Most (90.7 percent) of the estimated number was impinged during September (Table 3.1.7-3).

Annual survival was 84 percent; 8 percent were dead and 8 percent damaged (Table 3.1.7-1). Percent live ranged from 78 in August to 100 in December. During September 84 percent were live (Table 3.1.7-3).

Fork length ranged from 33 to 158 mm. Weight ranged from 0.8 to 66.3 g.

12. Gizzard shad, n = 454; est. n = 65,333 (Table 3.1.7-2), comprised 0.5 percent of the estimated total number and 3.5 percent (ranked seventh) of the estimated total weight. It was taken during January, February, and December. Most (98.6 percent) of the estimated number was impinged during January and December (Table 3.1.7-3).

Annual survival was 19 percent; 18 percent were dead and 63 percent damaged (Table 3.1.7-1). Percent live ranged from zero in February to 44 in December. During months of abundance (January, December) percent live ranged from 9 to 67 (Table 3.1.7-3).

Fork length ranged from 68 to 333 mm. Weight ranged from 3.2 to 626.5 g.

13. Striped cusk-eel, n = 343; est. n = 38,062 (Table 3.1.7-2), comprised 0.3 percent of the estimated total number and 1.5 percent (ranked tenth) of the estimated total weight. It was taken during April and June through November. Most (92.3 percent) of the estimated number was impinged during July, September, and October (Table 3.1.7-3).

Annual survival was 87 percent; 2 percent were dead and 11 percent damaged (Table 3.1.7-1). Percent live ranged from 79 in July to 100 in April. During months of abundance (July-October) percent live ranged from 79 to 90 (Table 3.1.7-3).

Fork length ranged from 73 to 258 mm. Weight ranged from 6.7 to 58.2 g.

Blue crab, n = 2,988; est. n = 363,268; estimated total weight = 9367.4 kg (Table 3.1.7-2), was taken during June through December. Most (76.0 percent) of the estimated number was impinged during June, July, and October (Table 3.1.7-3)(Fig. 3.1.7-2). Estimated monthly impingement ranged from 8,573 in December to 136,706 in October.

Annual survival was 94 percent; 5 percent were dead and 1 percent damaged (Table 3.1.7-1). Percent live ranged from 88 in June to 98 in November. During months of abundance (June-October) percent live ranged from 88 to 97 (Table 3.1.7-3).

Carapace width ranged from 8 to 208 mm. Weight ranged from 0.1 to 323.0 g.

3.1.7.3 Service Water System (SWS)

INTAKE DESCRIPTION

Service water is withdrawn from the river through an intake located about 122 m north of the CWS intake by six 0.69 $m^3/s$ pumps per unit. The SWS supplies water for essential internal plant usage. The pumps for each unit are mounted in two wells with three pumps per well. Each well is equipped with three conventional vertical traveling screens. Under normal operating conditions four pumps per unit are operated. Traveling water screen operation is intermittent and is activated by differential pressure. Impinged organisms were washed into troughs leading to removable trash baskets at each end of the intake structure.

MATERIALS AND METHODS

Sampling Schedule and Procedure

All fishes and blue crab impinged on the SWS screens were collected during three 24-hr periods per week. Normally, during each 24-hr period two 12-hr collections were taken. From March 17 through June 16, total 24-hr collections were generally taken. All collections required by the ETS, except one 24-hr sample and one 12-hr sample in December, were taken. These collections were not taken as a result of operational problems and icing conditions at the intake.

Impinged organisms were collected with sampling nets set in the trash baskets. Fishes and blue crab were sorted by species, and the total number and weight of each was determined. All specimens or a representative subsample (at least 100 specimens) of each species were measured to the nearest 5 mm. The length and weight range per species was determined. Weight of detritus taken with the sample was recorded. All data were recorded on a computer compatable field sheet.

## Data Reduction

Weekly impingement estimates for each species were calculated by multiplying the number (or weight) taken during each 24-hr sampling period by seven, summing the results, and dividing by the number of 24-hr periods sampled. Weekly estimates were summed to yield a monthly estimate.

## RESULTS

A total of 10,829 specimens of 49 fishes and 369 blue crab were taken in 154, 24-hr samples at the SWS intake (Table 3.1.7-5). Estimated total impingement in 1978 was 25,423 fish (137.01 kg) and 857 blue crab (16.93 kg) (Table 3.1.7-6).

The most numerous species were weakfish, white perch, bay anchovy, hogchoker, and gizzard shad.

Estimated monthly impingement was greatest during July (est. n = 11,097). Weakfish comprised 84.4 percent of the July estimate (Table 3.1.7-7). Impingement was also high in June (est. n = 6,294); weakfish comprised 80.9 percent of fish impinged. Species variety was greatest (23) in January and least (11) in February and September (Table 3.1.7-5).

Although weakfish ranked first in estimated annual number impinged (est. n = 6,439) it ranked only third in estimated weight (20.40 kg), being exceeded by white perch (20.66 kg) and gizzard shad (20.59 kg) (Table 3.1.7-6). Most impinged weakfish were young (age 0+) whereas impinged white perch and gizzard shad included young and adults.

## Species Discussion

Eight fishes were each represented in the sample by more than 200 specimens and together comprised 90.9 percent of the total impingement. These species, two less abundant fishes which are considered important, and blue crab are discussed below.

1. Weakfish, n = 6,439; est. n = 15,024 (Table 3.1.7-6), comprised 59.1 percent of the estimated total number and 14.9 percent (ranked third) of the estimated total weight. It was taken during June through December. Most (98 percent) was impinged during June through August (Table 3.1.7-7). Only single specimens were taken in November and December. Fork length ranged from 23 to 233 mm. Weight ranged from 0.1 to 115.0 g (Table 3.1.7-7).

2. White perch, n = 1,091; est. n = 2,580 (Table 3.1.7-6), comprised 10.1 percent of the estimated total number and 15.1 percent (ranked first) of the estimated total weight. It was taken during all months except August. Most (94 percent) was impinged during January through March and December (Table 3.1.7-7). In September only one specimen was taken. Fork length ranged from 43 to 253 mm. Weight ranged from 1.3 to 223.0 g (Table 3.1.7-7).

3. Bay anchovy, n = 681; est. n = 1,592 (Table 3.1.7-6), comprised 6.3 percent of the estimated total number and 3.4 percent (ranked eighth) of the estimated total weight. It was taken during April through December. Most (94 percent) was impinged during May through August (Table 3.1.7-7). During December only one specimen was taken. Fork length ranged from 33 to 98 mm. Weight ranged from 0.2 to 10.0 g (Table 3.1.7-7).

4. Hogchoker, n = 434; est. n = 1,015 (Table 3.1.7-6), comprised 4.0 percent of the estimated total number and 4.1 percent (ranked sixth) of the estimated total weight. It was taken during March through December. Most (71 percent) was impinged during June and July (Table 3.1.7-7). In March only one specimen was taken. Fork length ranged from 28 to 183 mm. Weight ranged from 0.1 to 127.5 g (Table 3.1.7-7).

5. Gizzard shad, n = 384; est. n = 915 (Table 3.1.7-6), comprised 3.6 percent of the estimated total number and 15.0 percent (ranked second) of the estimated total weight. It was taken during January through March and December. Most (93 percent) was impinged during January (Table 3.1.7-7). It was also common during December (n = 20). Only single specimens were taken in February and March. Fork length ranged from 73 to 218 mm. Weight ranged from 3.7 to 161.5 g (Table 3.1.7-7).

6. Silvery minnow, n = 327; est. n = 709 (Table 3.1.7-6), comprised 2.8 percent of the estimated total number and 6.0 percent (ranked fourth) of the estimated total weight. It

was taken during January through April, June, and December. Most (92 percent) was impinged during January and February (Table 3.1.7-7). Only single specimens were taken during April and June. Fork length ranged from 48 to 163 mm. Weight ranged from 1.1 to 31.6 g (Table 3.1.7-7).

7. Blueback herring, n = 287; est. n = 668 (Table 3.1.7-6), comprised 2.6 percent of the estimated total number and 3.1 percent (ranked ninth) of the estimated total weight. It was taken during January, March through July, November and December. Most (90 percent) was impinged during March, April, and December (Table 3.1.7-7). Few were taken during January (n = 3), May (3), July (2), or July (1). Fork length ranged from 38 to 263 mm. Weight ranged from 1.5 to 222.4 g (Table 3.1.7-7).

8. Atlantic menhaden, n = 206; est. n = 496 (Table 3.1.7-6), comprised 2.0 percent of the estimated total number and 3.9 percent (ranked seventh) of the estimated total weight. It was taken during April through December. Most (81 percent) was impinged during June and July (Table 3.1.7-7). Few (n = 1-9) were taken during the remaining months of occurrence. Fork length ranged from 33 to 223 mm. Weight ranged from 0.2 to 148.0 g (Table 3.1.7-7).

9. Atlantic croaker, n = 130; est. n = 315 (Table 3.1.7-6), comprised 1.2 percent of the estimated total number and 0.2 percent (ranked tenth) of the estimated total weight. It was taken during January, October, and December. Most (98 percent) was impinged during December (Table 3.1.7-7). Two were taken during January and one was taken in October. Fork length ranged from 28 to 73. Weight ranged from 0.1 to 3.8 g (Table 3.1.7-7).

10. Spot, n = 105; est. n = 250 (Table 3.1.7-6), comprised 1.0 percent of the estimated total number and 5.0 percent (ranked fifth) of the estimated total weight. It was taken during January and June through December. Most (68 percent) was impinged during August, September, and November (Table 3.1.7-7). Impingement was low during January (n = 1) and June (3). Fork length ranged from 28 to 168 mm. Weight ranged from 0.1 to 88.9 g (Table 3.1.7-7).

Blue crab, n = 369; est. n = 857; estimated total weight = 16.93 kg (Table 3.1.7-6), was taken during April through December. Most (70 percent) was impinged during October (Table 3.1.7-7). It was also common during November (n = 41). Only one specimen was taken during April. Carapace width ranged from 13 to 193 mm. Weight ranged from 0.2 to 146.5 g (Table 3.1.7-7).

TABLE 3.1.7-1
ACTUAL NUMBER AND SURVIVAL OF SPECIMENS TAKEN
IN IMPINGEMENT SAMPLES AT THE SALEM CWS IN 1978

| Species | Actual No. | % Survival Live | Dead | Damaged |
|---|---|---|---|---|
| A. rostrata | 216 | 65 | 6 | 29 |
| C. oceanicus | 3 | 50 | 50 | 0 |
| A. aestivalis | 3,458 | 70 | 18 | 12 |
| A. pseudoharengus | 44 | 59 | 7 | 34 |
| A. sapidissima | 15 | 87 | 13 | 0 |
| B. tyrannus | 1,120 | 63 | 22 | 15 |
| D. cepedianum | 454 | 19 | 18 | 63 |
| A. hepsetus | 1 | 100 | 0 | 0 |
| A. mitchilli | 14,525 | 44 | 49 | 7 |
| U. pygmaea | 2 | 100 | 0 | 0 |
| E. americanus | 1 | 100 | 0 | 0 |
| C. auratus | 1 | 0 | 0 | 100 |
| C. carpio | 8 | 25 | 0 | 75 |
| H. nuchalis | 1,350 | 55 | 7 | 38 |
| N. crysoleucas | 1 | 0 | 0 | 100 |
| I. catus | 13 | 30 | 8 | 62 |
| I. nebulosus | 15 | 69 | 0 | 31 |
| I. punctatus | 9 | 33 | 0 | 67 |
| O. tau | 8 | 100 | 0 | 0 |
| M. bilinearis | 2 | 50 | 50 | 0 |
| U. chuss | 46 | 46 | 20 | 35 |
| U. regius | 1 | 100 | 0 | 0 |
| R. marginata | 343 | 87 | 2 | 11 |
| S. marina | 9 | 100 | 0 | 0 |
| F. diaphanus | 5 | 100 | 0 | 0 |
| F. heteroclitus | 35 | 77 | 3 | 20 |
| F. majalis | 12 | 67 | 0 | 33 |
| M. martinica | 39 | 64 | 32 | 4 |
| Menidia sp. | 1 | 0 | 100 | 0 |
| M. beryllina | 5 | 0 | 100 | 0 |
| M. menidia | 1,908 | 76 | 18 | 6 |
| G. aculeatus | 31 | 87 | 3 | 10 |
| S. fuscus | 48 | 96 | 2 | 2 |
| M. americana | 5,743 | 44 | 8 | 48 |
| M. saxatilis | 221 | 43 | 5 | 52 |
| L. macrochirus | 18 | 94 | 0 | 6 |
| M. salmoides | 1 | 100 | 0 | 0 |
| P. annularis | 4 | 75 | 0 | 25 |
| P. flavescens | 46 | 72 | 12 | 16 |
| P. saltatrix | 114 | 51 | 30 | 19 |
| C. hippos | 14 | 100 | 0 | 0 |
| B. chrysura | 3 | 100 | 0 | 0 |
| C. regalis | 51,006 | 60 | 35 | 5 |
| L. xanthurus | 1,183 | 71 | 14 | 15 |
| M. undulatus | 689 | 32 | 28 | 40 |
| P. cromis | 238 | 67 | 4 | 29 |
| C. ocellatus | 2 | 100 | 0 | 0 |
| M. cephalus | 2 | 100 | 0 | 0 |
| A. gutattus | 1 | 100 | 0 | 0 |
| G. bosci | 2 | 100 | 0 | 0 |
| P. triacanthus | 671 | 84 | 8 | 8 |
| P. alepidotus | 12 | 75 | 8 | 17 |
| P. carolinus | 9 | 88 | 12 | 0 |
| P. evolans | 21 | 85 | 10 | 5 |
| P. dentatus | 43 | 86 | 4 | 10 |
| S. aquosus | 193 | 83 | 14 | 3 |
| P. americanus | 14 | 100 | 0 | 0 |
| T. maculatus | 9,873 | 98 | 1 | 1 |
| A. schoepfi | 1 | 100 | 0 | 0 |
| Fish Total | 93,853 | 61 | 28 | 11 |
| C. sapidus | 2,988 | 94 | 5 | 1 |

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TABLE 3.1.7-2
ANNUAL TOTALS FOR THE MORE
COMMONLY IMPINGED ORGANISMS, SALEM CWS

| Species | Actual No. | Estimated No. | Estimated Wt. (kg) |
|---|---|---|---|
| A. aestivalis | 3,458 | 308,395 | 989.4 |
| B. tyrannus | 1,120 | 126,030 | 800.8 |
| D. cepedianum | 454 | 65,333 | 1,569.3 |
| A. mitchilli | 14,525 | 2,049,169 | 4,638.2 |
| H. nuchalis | 1,350 | 203,655 | 2,357.3 |
| R. marginata | 343 | 38,062 | 678.2 |
| M. menidia | 1,908 | 170,490 | 479.6 |
| M. americana | 5,743 | 726,480 | 9,835.9 |
| C. regalis | 51,006 | 8,729,959 | 10,524.5 |
| L. xanthurus | 1,183 | 128,341 | 1,908.2 |
| M. undulatus | 689 | 59,086 | 66.2 |
| P. triacanthus | 671 | 54,419 | 140.1 |
| T. maculatus | 9,873 | 1,462,562 | 4,958.5 |
| Total of common fish species | 92,323 | 14,121,981 | 38,946.2 |
| Total of all fish species | 93,853 | 14,362,829 | 44,810.3 |
| C. sapidus | 2,988 | 363,268 | 9,367.4 |

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TABLE 3.1.7-3
MONTHLY IMPINGEMENT DATA ON THE MORE COMMON SPECIES, SALEM CWS

| Species | CF | % Survival L | % Survival D | % Survival D* | Actual No. | Estimated No. | Estimated Wt. | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **January (81 samples, 243 min sampled)** | | | | | | | | | | | |
| A. aestivalis | 3 | 0 | 67 | 33 | 3 | 147 | 0.8 | 3.7 | 4.7 | 73 | 83 |
| D. cepedianum | 47 | 9 | 23 | 68 | 320 | 54,761 | 1,280.8 | 8.3 | 626.5 | 78 | 333 |
| A. mitchilli | 3 | 25 | 75 | 0 | 4 | 515 | + | 0.2 | 1.0 | 43 | 48 |
| H. nuchalis | 64 | 60 | 5 | 34 | 756 | 106,923 | 1,272.3 | 2.2 | 30.4 | 63 | 138 |
| M. menidia | 3 | 0 | 67 | 33 | 3 | 490 | 1.0 | 0.7 | 5.2 | 58 | 93 |
| M. americana | 50 | 18 | 22 | 60 | 200 | 46,144 | 369.8 | 1.7 | 108.5 | 53 | 178 |
| M. undulatus | 7 | 8 | 69 | 23 | 13 | 2,005 | 0.6 | 0.2 | 1.8 | 33 | 58 |
| T. maculatus | 2 | 67 | 33 | 0 | 3 | 1,128 | 0.6 | 0.2 | 1.1 | 38 | 48 |
| Total of common fish species | | | | | 1,302 | 212,113 | 2,925.9 | | | | |
| Total of all fish species | | | | | 1,408 | 229,209 | 3,831.1 | | | | |
| **February (79 samples, 237 min sampled)** | | | | | | | | | | | |
| A. aestivalis | 1 | 0 | 100 | 0 | 1 | 210 | 0.9 | 2.7 | 2.7 | 63 | 63 |
| D. cepedianum | 8 | 0 | 13 | 87 | 8 | 906 | 47.1 | 14.5 | 80.2 | 103 | 178 |
| H. nuchalis | 56 | 39 | 11 | 50 | 379 | 69,681 | 820.7 | 1.6 | 32.4 | 63 | 143 |
| M. menidia | 2 | 50 | 50 | 0 | 2 | 218 | 0.7 | 6.3 | 8.3 | 103 | 113 |
| M. americana | 77 | 3 | 12 | 85 | 1,778 | 341,710 | 3,079.9 | 1.6 | 427.6 | 48 | 268 |
| Total of common fish species | | | | | 2,168 | 412,725 | 3,949.3 | | | | |
| Total of all fish species | | | | | 2,303 | 433,359 | 5,299.0 | | | | |

CF = catch frequency (number of samples in which the species appeared)
+ = less than 0.1 kg

% survival: L = live; D = dead; D* = damaged

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TABLE 3.1.7-3
CONTINUED

| Species | CF | % Survival L | D | D* | Actual No. | Estimated No. | Estimated Wt. | Weight (g) Min | Max | Length (mm) Min | Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March (51 samples, 153 min sampled) | | | | | | |
| H. nuchalis | 15 | 25 | 13 | 62 | 24 | 4,132 | 49.5 | 5.0 | 25.4 | 78 | 128 |
| M. menidia | 7 | 57 | 43 | 0 | 7 | 961 | 3.9 | 2.0 | 9.4 | 73 | 118 |
| M. americana | 46 | 21 | 9 | 70 | 276 | 47,589 | 784.0 | 2.2 | 217.3 | 53 | 268 |
| Total of common fish species | | | | | 307 | 52,682 | 837.4 | | | | |
| Total of all fish species | | | | | 379 | 65,352 | 954.5 | | | | |
| | | | | | April (77 samples, 231 min sampled) | | | | | | |
| A. aestivalis | 25 | 65 | 20 | 15 | 65 | 5,742 | 21.9 | 1.2 | 11.0 | 63 | 93 |
| A. mitchilli | 8 | 44 | 44 | 12 | 16 | 4,315 | 13.0 | 1.9 | 6.3 | 58 | 88 |
| R. marginata | 2 | 100 | 0 | 0 | 3 | 454 | 6.1 | 10.3 | 24.0 | 128 | 168 |
| M. americana | 33 | 77 | 7 | 16 | 71 | 7,186 | 67.7 | 2.4 | 87.4 | 63 | 213 |
| T. maculatus | 27 | 100 | 0 | 0 | 61 | 8,207 | 32.7 | 0.3 | 64.5 | 23 | 143 |
| Total of common fish species | | | | | 216 | 25,904 | 141.4 | | | | |
| Total of all fish species | | | | | 264 | 31,232 | 293.3 | | | | |

CF = catch frequency (number of samples in which the species appeared)
% survival: L = live; D = dead; D* = damaged

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TABLE 3.1.7-3
CONTINUED

| Species | CF | % Survival L | % Survival D | % Survival D* | Actual No. | Estimated No. | Estimated Wt. | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **June (66 samples, 196 min sampled)** | | | | | | | | | | | |
| A. aestivalis | 7 | 27 | 64 | 9 | 11 | 1,682 | 32.9 | 0.1 | 134.3 | 38 | 278 |
| B. tyrannus | 43 | 53 | 37 | 10 | 251 | 34,034 | 160.4 | 0.2 | 98.3 | 33 | 188 |
| A. mitchilli | 55 | 33 | 59 | 8 | 3,148 | 487,389 | 1,593.1 | 0.1 | 8.1 | 13 | 93 |
| H. nuchalis | 1 | 100 | 0 | 0 | 2 | 280 | + | 0.1 | 0.1 | 33 | 33 |
| R. marginata | 5 | 86 | 0 | 14 | 12 | 914 | 24.5 | 16.0 | 48.3 | 143 | 203 |
| M. menidia | 5 | 60 | 40 | 0 | 5 | 669 | 1.3 | 0.1 | 6.3 | 23 | 88 |
| M. americana | 16 | 60 | 20 | 20 | 20 | 3,213 | 125.8 | 1.8 | 219.0 | 48 | 243 |
| C. regalis | 42 | 44 | 53 | 3 | 14,087 | 2,250,587 | 2,283.1 | 0.1 | 250.6 | 18 | 253 |
| L. xanthurus | 27 | 68 | 30 | 2 | 81 | 10,336 | 3.0 | 0.1 | 2.3 | 23 | 63 |
| T. maculatus | 65 | 98 | 1 | 1 | 4,280 | 637,610 | 1,804.5 | 0.2 | 66.2 | 28 | 148 |
| Total of common fish species | | | | | 21,897 | 3,426,714 | 6,028.6 | | | | |
| Total of all fish species | | | | | 22,011 | 3,482,551 | 6,515.2 | | | | |
| C. sapidus | 54 | 88 | 11 | 1 | 558 | 87,422 | 3,838.6 | 0.7 | 323.0 | 13 | 193 |
| **July (202 samples, 347 min sampled)** | | | | | | | | | | | |
| A. aestivalis | 2 | 100 | 0 | 0 | 2 | 501 | 0.8 | 8.3 | 8.3 | 98 | 98 |
| B. tyrannus | 92 | 66 | 21 | 13 | 310 | 43,498 | 219.8 | 0.4 | 138.9 | 43 | 218 |
| A. mitchilli | 171 | 40 | 52 | 7 | 5,393 | 1,010,475 | 2,269.2 | 0.1 | 9.4 | 28 | 93 |
| R. marginata | 33 | 79 | 4 | 17 | 94 | 14,642 | 356.4 | 6.7 | 58.2 | 73 | 223 |
| M. menidia | 35 | 69 | 31 | 0 | 113 | 11,055 | 8.7 | 0.2 | 6.0 | 28 | 93 |
| M. americana | 15 | 38 | 12 | 50 | 16 | 1,761 | 88.7 | 1.1 | 163.0 | 38 | 218 |
| C. regalis | 197 | 68 | 26 | 6 | 28,108 | 5,682,599 | 7,235.7 | 0.1 | 166.4 | 28 | 197 |
| L. xanthurus | 55 | 70 | 26 | 5 | 137 | 24,401 | 67.0 | 0.4 | 34.1 | 33 | 128 |
| T. maculatus | 186 | 98 | 1 | 1 | 2,803 | 554,593 | 1,714.0 | 0.8 | 111.7 | 33 | 186 |
| Total of common fish species | | | | | 36,976 | 7,343,525 | 11,960.3 | | | | |
| Total of all fish species | | | | | 37,245 | 7,387,809 | 14,251.9 | | | | |
| C. sapidus | 124 | 92 | 6 | 2 | 375 | 51,992 | 3,247.6 | 4.0 | 244.7 | 38 | 183 |

CF = catch frequency (number of samples in which the species appeared)
+ = less than 0.1 kg
% survival: L = live; D = dead; D* = damaged

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TABLE 3.1.7-3
CONTINUED

| Species | CF | % Survival L | % Survival D | % Survival D* | Actual No. | Estimated No. | Estimated Wt. | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **August (400 samples, 522 min sampled)** | | | | | | | | | | | |
| A. aestivalis | 4 | 20 | 60 | 20 | 5 | 214 | 4.0 | 1.1 | 15.5 | 53 | 123 |
| B. tyrannus | 147 | 63 | 17 | 20 | 304 | 25,378 | 109.3 | 1.2 | 103.2 | 43 | 188 |
| A. mitchilli | 297 | 35 | 59 | 6 | 1,999 | 183,207 | 233.7 | 0.1 | 7.0 | 23 | 93 |
| R. marginata | 13 | 89 | 0 | 11 | 15 | 1,110 | 3.3 | 8.4 | 19.2 | 113 | 153 |
| M. menidia | 83 | 70 | 27 | 3 | 215 | 18,317 | 19.5 | 0.6 | 6.1 | 33 | 93 |
| M. americana | 11 | 33 | 33 | 33 | 11 | 643 | 25.1 | 63.0 | 135.8 | 113 | 293 |
| C. regalis | 357 | 72 | 20 | 8 | 6,050 | 577,135 | 621.0 | 0.2 | 19.2 | 23 | 253 |
| L. xanthurus | 182 | 69 | 22 | 9 | 361 | 31,172 | 254.3 | 2.5 | 59.8 | 38 | 198 |
| P. triacanthus | 15 | 78 | 11 | 11 | 28 | 1,645 | 2.8 | 1.2 | 7.6 | 38 | 83 |
| T. maculatus | 227 | 90 | 9 | 1 | 873 | 81,516 | 485.6 | 0.7 | 87.6 | 28 | 163 |
| Total of common fish species | | | | | 9,861 | 920,337 | 1,758.6 | | | | |
| Total of all fish species | | | | | 9,977 | 944,912 | 1,786.5 | | | | |
| C. sapidus | 139 | 95 | 2 | 3 | 223 | 19,587 | 1,309.3 | 0.6 | 236.3 | 18 | 183 |
| **September (337 samples, 467 min sampled)** | | | | | | | | | | | |
| A. aestivalis | 2 | 100 | 0 | 0 | 2 | 384 | + | | | 63 | 113 |
| B. tyrannus | 58 | 73 | 12 | 15 | 97 | 8,097 | 27.4 | 3.6 | 15.2 | 58 | 203 |
| A. mitchilli | 230 | 52 | 42 | 6 | 1,878 | 164,871 | 164.1 | 0.1 | 9.3 | 18 | 98 |
| R. marginata | 49 | 86 | 2 | 12 | 88 | 8,105 | 93.1 | 8.7 | 32.5 | 113 | 198 |
| M. menidia | 74 | 73 | 24 | 3 | 145 | 12,024 | 11.0 | 0.4 | 6.3 | 28 | 98 |
| M. americana | 2 | 0 | 50 | 50 | 2 | 134 | 15.1 | 77.6 | 86.0 | 183 | 193 |
| C. regalis | 260 | 81 | 11 | 8 | 2,639 | 207,843 | 298.4 | 0.1 | 41.4 | 33 | 163 |
| L. xanthurus | 79 | 51 | 27 | 22 | 105 | 9,124 | 91.2 | 4.2 | 89.8 | 58 | 168 |
| M. undulatus | 10 | 88 | 0 | 12 | 14 | 1,314 | 0.2 | 0.1 | 1.8 | 23 | 63 |
| P. triacanthus | 73 | 84 | 8 | 8 | 612 | 49,355 | 124.5 | 0.8 | 66.3 | 33 | 158 |
| T. maculatus | 164 | 99 | 0 | 1 | 404 | 37,876 | 213.0 | 0.4 | 87.0 | 23 | 178 |
| Total of common fish species | | | | | 5,986 | 499,127 | 1,308.0 | | | | |
| Total of all fish species | | | | | 6,077 | 506,617 | 1,053.1 | | | | |
| C. sapidus | 153 | 97 | 1 | 2 | 428 | 43,230 | 355.2 | 0.1 | 215.8 | 8 | 208 |

CF = catch frequency (number of samples in which the species appeared)
+ = less than 0.1 kg
% survival: L = live; D = dead; D* = damaged

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TABLE 3.1.7-3
CONTINUED

| Species | CF | % survival L | D | D* | Actual No. | Estimated No. | Estimated No. | Weight (g) Min | Max | Length (mm) Min | Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | October (297 samples, 419 min sampled) | | | | | | |
| A. aestivalis | 2 | 100 | 0 | 0 | 2 | 305 | 0.4 | 3.1 | 3.5 | 73 | 78 |
| B. tyrannus | 17 | 84 | 8 | 8 | 24 | 2,685 | 28.6 | 3.6 | 36.7 | 63 | 148 |
| A. mitchilli | 129 | 64 | 28 | 8 | 737 | 82,137 | 133.8 | 0.1 | 8.4 | 23 | 88 |
| R. marginata | 60 | 90 | 2 | 8 | 125 | 12,393 | 187.7 | 10.1 | 52.3 | 123 | 258 |
| M. menidia | 47 | 74 | 20 | 6 | 241 | 22,501 | 30.2 | 0.5 | 13.5 | 33 | 88 |
| M. americana | 3 | 33 | 0 | 67 | 3 | 324 | 24.4 | 112.5 | 128.5 | 153 | 213 |
| C. regalis | 50 | 85 | 6 | 9 | 107 | 10,843 | 72.5 | 0.8 | 28.0 | 43 | 188 |
| L. xanthurus | 22 | 26 | 15 | 59 | 27 | 2,601 | 76.3 | 16.3 | 70.2 | 108 | 153 |
| M. undulatus | 25 | 80 | 10 | 10 | 31 | 2,137 | 2.2 | 0.5 | 3.5 | 43 | 73 |
| P. triacanthus | 14 | 83 | 10 | 7 | 30 | 3,141 | 12.6 | 1.5 | 17.7 | 38 | 98 |
| T. maculatus | 100 | 99 | 0 | 1 | 295 | 33,753 | 238.8 | 0.3 | 46.2 | 23 | 143 |
| Total of common fish species | | | | | 1,622 | 172,820 | 807.5 | | | | |
| Total of all fish species | | | | | 1,683 | 180,294 | 831.2 | | | | |
| C. sapidus | 200 | 96 | 3 | 1 | 1,144 | 136,706 | 454.0 | 0.1 | 222.8 | 13 | 173 |
| | | | | | November (330 samples, 446 min sampled) | | | | | | |
| A. aestivalis | 134 | 75 | 15 | 10 | 768 | 96,042 | 287.4 | 0.8 | 22.3 | 38 | 138 |
| B. tyrannus | 22 | 72 | 7 | 21 | 29 | 2,561 | 53.9 | 7.0 | 76.7 | 83 | 183 |
| A. mitchilli | 148 | 69 | 23 | 8 | 1,331 | 114,109 | 224.8 | 0.3 | 7.0 | 33 | 98 |
| R. marginata | 6 | 80 | 0 | 20 | 6 | 444 | 7.1 | 14.1 | 30.1 | 138 | 188 |
| M. menidia | 58 | 85 | 8 | 7 | 183 | 25,131 | 96.7 | 0.9 | 6.7 | 53 | 168 |
| M. americana | 69 | 45 | 1 | 54 | 546 | 59,060 | 1,715.0 | 2.6 | 184.8 | 53 | 228 |
| C. regalis | 5 | 80 | 0 | 20 | 6 | 623 | 9.1 | 18.7 | 35.6 | 123 | 158 |
| L. xanthurus | 74 | 85 | 2 | 13 | 294 | 33,678 | 996.2 | 3.9 | 81.3 | 98 | 168 |
| M. undulatus | 16 | 82 | 9 | 9 | 23 | 2,606 | 5.5 | 0.3 | 7.6 | 33 | 88 |
| T. maculatus | 143 | 98 | 0 | 2 | 371 | 39,906 | 221.2 | 0.4 | 64.9 | 13 | 153 |
| Total of common fish species | | | | | 3,557 | 374,160 | 3,616.9 | | | | |
| Total of all fish species | | | | | 3,622 | 381,394 | 4,000.5 | | | | |
| C. sapidus | 88 | 98 | 0 | 2 | 176 | 15,758 | 106.1 | 0.1 | 88.0 | 8 | 128 |

CF = catch frequency (number of samples in which the species appeared)
% survival: L = live; D = dead; D* = damaged

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TABLE 3.1.7-3
CONTINUED

| Species | CF | % Survival L | D | D* | Actual No. | Estimated No. | Estimated Wt. | Weight (g) Min | Max | Length (mm) Min | Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | December (275 samples, 530 min sampled) | | | | | | |
| A. aestivalis | 137 | 69 | 19 | 12 | 2,599 | 203,168 | 640.3 | 0.7 | 34.5 | 53 | 148 |
| B. tyrannus | 50 | 67 | 10 | 23 | 105 | 9,777 | 201.4 | 3.2 | 194.7 | 68 | 238 |
| D. cepedianum | 58 | 44 | 8 | 48 | 126 | 9,666 | 241.4 | 3.2 | 138.3 | 68 | 218 |
| A. mitchilli | 17 | 26 | 21 | 53 | 19 | 2,151 | 6.5 | 1.0 | 5.0 | 43 | 83 |
| H. nuchalis | 57 | 69 | 2 | 29 | 189 | 22,639 | 214.8 | 2.0 | 28.5 | 63 | 138 |
| M. menidia | 155 | 78 | 16 | 7 | 994 | 79,124 | 306.6 | 0.7 | 10.5 | 48 | 193 |
| M. americana | 217 | 72 | 6 | 22 | 2,820 | 218,716 | 3,540.4 | 0.6 | 263.2 | 48 | 238 |
| C. regalis | 9 | 33 | 11 | 56 | 9 | 329 | 4.7 | 3.2 | 27.6 | 68 | 143 |
| L. xanthurus | 71 | 68 | 4 | 28 | 178 | 17,029 | 420.2 | 6.8 | 68.4 | 83 | 173 |
| M. undulatus | 116 | 27 | 29 | 44 | 608 | 51,024 | 57.7 | 0.1 | 5.7 | 28 | 88 |
| P. triacanthus | 1 | 100 | 0 | 0 | 1 | 278 | 0.2 | 1.3 | 1.3 | 38 | 38 |
| T. maculatus | 159 | 98 | 1 | 1 | 783 | 67,973 | 248.1 | 0.1 | 45.4 | 13 | 123 |
| Total of common fish species | | | | | 8,431 | 681,874 | 5,882.3 | | | | |
| Total of all fish species | | | | | 8,884 | 720,100 | 5,994.0 | | | | |
| C. sapidus | 50 | 96 | 2 | 2 | 84 | 8,573 | 56.6 | 0.1 | 50.7 | 13 | 98 |

CF = catch frequency (number of samples in which the species appeared)
% survival: L = live; D = dead; D* = damaged

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TABLE 3.1.7-4
ACTUAL NUMBER OF SPECIMENS TAKEN IN
IMPINGEMENT SAMPLES AT THE SALEM CWS IN 1978

| Species | J | F | M | A | M | J |
|---|---|---|---|---|---|---|
| A. rostrata | 21 | 5 | 2 | 25 | | 9 |
| C. oceanicus | | | | | | |
| A. aestivalis | 3 | 1 | | 65 | | 11 |
| A. pseudoharengus | | 3 | | 1 | | |
| A. sapidissima | | | | | | |
| B. tyrannus | | | | | | 251 |
| D. cepedianum | 320 | 8 | | | | |
| A. hepsetus | | | | | | |
| A. mitchilli | 4 | | | 16 | | 3,148 |
| U. pygmaea | 1 | | | | | |
| E. americanus | | | 1 | | | |
| C. auratus | | | | | | |
| C. carpio | 1 | 5 | | 1 | | |
| N. nuchalis | 756 | 379 | 24 | | | 2 |
| N. crysoleucas | 1 | | | | | |
| I. catus | 4 | 8 | | | | |
| I. nebulosus | 4 | 2 | | | | |
| I. punctatus | 6 | 1 | | | | |
| O. tau | | | | | | |
| M. bilinearis | | 2 | | | | |
| U. chuss | 26 | 2 | 9 | 6 | | |
| U. regius | | | | | | |
| R. marginata | | | | 3 | | 12 |
| S. marina | | | | | | |
| F. diaphanus | | | 1 | | | |
| F. heteroclitus | 8 | 4 | 2 | 3 | | 3 |
| F. majalis | 1 | | 10 | | | |
| M. martinica | | | | | | 3 |
| Menidia sp. | | | | | | 1 |
| M. beryllina | | | | | | 1 |
| M. menidia | 3 | 2 | 7 | | | 5 |
| G. aculaetus | | 5 | 25 | | | 1 |
| S. fuscus | | | | 2 | | 2 |
| M. americana | 200 | 1,778 | 276 | 71 | | 20 |
| M. saxatilis | 18 | 88 | 21 | 1 | | |
| L. macrochirus | | | | 3 | | 1 |
| M. salmoides | | | | | | |
| P. annularis | | | | 4 | | |
| P. flavescens | 15 | 10 | 1 | 2 | | 3 |
| P. saltatrix | | | | | | 30 |
| C. hippos | | | | | | |
| B. chrysura | | | | | | |
| C. regalis | | | | | | 14,087 |
| L. xanthurus | | | | | | 81 |
| M. undulatus | 13 | | | | | |
| P. cromis | | | | | | |
| C. ocellatus | | | | | | |
| M. cephalus | | | | | | |
| A. gutattus | | | | | | |
| G. bosci | | | | | | |
| P. triacanthus | | | | | | |
| P. alepidotus | | | | | | |
| P. carolinus | | | | | | |
| P. evolans | | | | | | |
| P. dentatus | | | | | | 8 |
| S. aquosus | | | | | | 52 |
| P. americanus | | | | | | |
| T. maculatus | 3 | | | 61 | | 4,280 |
| A. schoepfi | | | | | | |
| Fish Total | 1,408 | 2,303 | 379 | 264 | | 22,011 |
| No. of species | 20 | 17 | 12 | 15 | | 22 |
| C. sapidus | | | | | | 558 |

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TABLE 3.1.7-4
CONTINUED

| Species | J | A | S | O | N | D | Total |
|---|---|---|---|---|---|---|---|
| A. rostrata | 5 | 18 | 8 | 7 | 83 | 83 | 216 |
| C. oceanicus | | 1 | | | | 2 | 3 |
| A. aestivalis | 2 | 5 | 2 | 2 | 768 | 2,599 | 3,458 |
| A. pseudoharengus | 1 | 2 | | | 5 | 32 | 44 |
| A. sapidissima | | 1 | | | 1 | 13 | 15 |
| B. tyrannus | 310 | 304 | 97 | 24 | 29 | 105 | 1,120 |
| D. cepedianum | | | | | | 126 | 454 |
| A. hepsetus | | | 1 | | | | 1 |
| A. mitchilli | 5,393 | 1,999 | 1,878 | 737 | 1,331 | 19 | 14,525 |
| U. pygmaea | | | | | | 1 | 2 |
| E. americanus | | | | | | | 1 |
| C. auratus | | | | | | 1 | 1 |
| C. carpio | 1 | | | | | | 8 |
| H. nuchalis | | | | | | 189 | 1,350 |
| N. crysoleucas | | | | | | | 1 |
| I. catus | 1 | | | | | | 13 |
| I. nebulosus | 4 | 2 | | | | 3 | 15 |
| I. punctatus | | | | | | 2 | 9 |
| O. tau | | | 6 | 1 | 1 | | 8 |
| M. bilinearis | | | | | | | 2 |
| U. chuss | | | | 1 | | 2 | 46 |
| U. regius | | | | | 1 | | 1 |
| R. marginata | 94 | 15 | 88 | 125 | 6 | | 343 |
| S. marina | 3 | 6 | | | | | 9 |
| F. diaphanus | | | 2 | | 1 | 1 | 5 |
| F. heteroclitus | | 1 | 3 | | | 11 | 35 |
| F. majalis | | | | | | 1 | 12 |
| M. martinica | 22 | 11 | | 2 | 1 | | 39 |
| Menidia sp. | | | | | | | 1 |
| M. beryllina | 1 | 2 | 1 | | | | 5 |
| M. menidia | 113 | 215 | 145 | 241 | 183 | 994 | 1,908 |
| G. aculaetus | | | | | | | 31 |
| S. fuscus | 1 | 3 | 15 | 18 | 7 | | 48 |
| M. americana | 16 | 11 | 2 | 3 | 546 | 2,820 | 5,743 |
| M. saxatilis | | | | 1 | 2 | 90 | 221 |
| L. macrochirus | | | | | 2 | 12 | 18 |
| M. salmoides | | | | | | 1 | 1 |
| P. annularis | | | | | | | 4 |
| P. flavescens | 2 | 1 | | | | 12 | 46 |
| P. saltatrix | 48 | 27 | 8 | 1 | | | 114 |
| C. hippos | | 8 | 3 | 3 | | | 14 |
| B. chrysura | | | 1 | 1 | | 1 | 3 |
| C. regalis | 28,108 | 6,050 | 2,639 | 107 | 6 | 9 | 51,006 |
| L. xanthurus | 137 | 361 | 105 | 27 | 294 | 178 | 1,183 |
| M. undulatus | | | 14 | 31 | 23 | 608 | 689 |
| P. cromis | 7 | 27 | 10 | 2 | 11 | 181 | 238 |
| C. ocellatus | | | 1 | 1 | | | 2 |
| M. cephalus | | | | | | 2 | 2 |
| A. gutattus | | | | 1 | | | 1 |
| G. bosci | | 1 | | 1 | | | 2 |
| P. triacanthus | | 28 | 612 | 30 | | 1 | 671 |
| P. alepidotus | | 3 | 9 | | | | 12 |
| P. carolinus | | | 2 | 7 | | | 9 |
| P. evolans | 2 | | 7 | 12 | | | 21 |
| P. dentatus | 32 | 1 | 1 | | | 1 | 43 |
| S. aquosus | 139 | | | 1 | | 1 | 193 |
| P. americanus | | 1 | 12 | 1 | | | 14 |
| T. maculatus | 2,803 | 873 | 404 | 295 | 371 | 783 | 9,873 |
| A. schoepfi | | | 1 | | | | 1 |
| Fish Total | 37,245 | 9,977 | 6,077 | 1,683 | 3,622 | 8,884 | 93,853 |
| No. of species | 24 | 28 | 29 | 28 | 21 | 33 | 59 |
| C. sapidus | 375 | 223 | 428 | 1,144 | 176 | 84 | 2,988 |

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TABLE 3.1.7-5
ACTUAL NUMBER OF SPECIMENS TAKEN IN
IMPINGEMENT SAMPLES AT THE SALEM SWS IN 1978

| Species | J | F | M | A | M | J |
|---|---|---|---|---|---|---|
| A. rostrata | 10 | | 6 | 5 | 13 | 11 |
| A. aestivalis | 3 | | 67 | 89 | 3 | 2 |
| A. pseudoharengus | | | 3 | 1 | | 2 |
| B. tyrannus | | | | 1 | 9 | 95 |
| C. cepedianum | 362 | 1 | 1 | | | |
| A. mitchilli | | | | 5 | 41 | 229 |
| U. pygmaea | 2 | | 2 | | | |
| E. americanus | 1 | | 1 | | | |
| C. carpio | 2 | 3 | | 2 | | 1 |
| H. nuchalis | 208 | 93 | 8 | 1 | | 1 |
| I. catus | | | | | | 1 |
| I. nebulosus | 4 | 2 | 1 | | | |
| I. punctatus | 2 | 1 | 2 | | | |
| O. tau | | | | | | 3 |
| M. bilinearis | 1 | | | 1 | | |
| U. chuss | 12 | | 50 | 6 | 5 | |
| R. marginata | | | | 8 | 13 | 2 |
| S. marina | | | | | | |
| F. heteroclitus | 10 | 5 | 7 | | | |
| F. majalis | 1 | | 48 | | | |
| M. martinica | | | | | | |
| M. menicia | 1 | 1 | 8 | | | |
| G. aculeatus | | 1 | 4 | 1 | | |
| S. fuscus | | | | | | |
| M. americana | 154 | 415 | 183 | 26 | 6 | 14 |
| M. saxatilis | 3 | 25 | 7 | | | 1 |
| C. striata | | | | 2 | 5 | |
| L. gibbosus | 1 | | | | | |
| L. macrochirus | 4 | | | 2 | 2 | |
| P. annularis | 2 | | 2 | 2 | 1 | 4 |
| P. nigromaculatus | 2 | | | | 1 | |
| P. flavescens | 28 | 8 | 8 | 6 | | |
| P. saltatrix | | | | | | 4 |
| B. chrysura | | | | | | |
| C. regalis | | | | | | 2,543 |
| L. xanthurus | 1 | | | | | 3 |
| M. undulatus | 2 | | | | | |
| P. cromis | | | | | | |
| A. gutattus | | | | | | |
| G. bosci | | | | | | |
| P. triacanthus | | | | | | |
| P. carolinus | | | | | 1 | |
| P. evolans | | | | | | |
| E. microstomus | | | | | 1 | |
| P. dentatus | | | | 2 | 5 | 1 |
| P. oblongus | | | | | | |
| S. aquosus | | | | | | 20 |
| P. americanus | | | | | | |
| T. maculatus | | | 1 | 22 | 31 | 165 |
| Fish Total | 816 | 555 | 409 | 182 | 137 | 3,102 |
| No. of species | 23 | 11 | 19 | 18 | 15 | 19 |
| C. sapidus | | | | 1 | 12 | 13 |

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TABLE 3.1.7-5
CONTINUED

| Species | J | A | S | O | N | D | Total |
|---|---|---|---|---|---|---|---|
| A. rostrata | 2 | 7 | | 3 | 7 | 14 | 78 |
| A. aestivalis | 1 | | | | 23 | 99 | 287 |
| A. pseudoharengus | | 1 | | | | 2 | 9 |
| B. tyrannus | 78 | 5 | 5 | 4 | 3 | 6 | 206 |
| C. cepedianum | | | | | | 20 | 384 |
| A. mitchilli | 332 | 36 | 15 | 12 | 10 | 1 | 681 |
| U. pygmaea | | | | | | | 4 |
| E. americanus | | | | | | | 2 |
| C. carpio | | 1 | | | | | 9 |
| H. nuchalis | | | | | | 16 | 327 |
| I. catus | | | | | | | 1 |
| I. nebulosus | 2 | 2 | | 1 | | 1 | 13 |
| I. punctatus | | | | | | | 5 |
| O. tau | | | | | | | 3 |
| M. bilinearis | | | | | | | 2 |
| U. chuss | | | | | | | 73 |
| R. marginata | 11 | 2 | 1 | 5 | | | 42 |
| S. marina | | 1 | | | | | 1 |
| F. heteroclitus | | | | | 1 | 1 | 24 |
| F. majalis | | | | | | 1 | 50 |
| M. martinica | 2 | | | | | | 2 |
| M. menidia | 23 | 2 | | 2 | 1 | 67 | 105 |
| G. aculeatus | | | | | | | 6 |
| S. fuscus | 1 | 2 | 2 | 10 | | | 15 |
| M. americana | 4 | | 1 | 2 | 12 | 274 | 1,091 |
| M. saxatilis | | 1 | | | | 5 | 42 |
| C. striata | | | | | | | 7 |
| L. gibbosus | | | | | | | 1 |
| L. macrochirus | | | | | | | 8 |
| P. annularis | | | | | | | 11 |
| P. nigromaculatus | 2 | | | | | | 5 |
| P. flavescens | | | | | | | 50 |
| P. saltatrix | 9 | 2 | | | | | 15 |
| B. chrysura | | | | 1 | 1 | | 2 |
| C. regalis | 3,751 | 128 | 12 | 3 | 1 | 1 | 6,439 |
| L. xanthurus | 10 | 28 | 23 | 12 | 20 | 8 | 105 |
| M. undulatus | | | | 1 | | 127 | 130 |
| P. cromis | | | | | 1 | 23 | 24 |
| A. gutattus | | | 1 | | | | 1 |
| G. bosci | | | | 2 | | 1 | 3 |
| P. triacanthus | | 1 | 4 | 2 | | | 7 |
| P. carolinus | | | | 1 | | | 2 |
| P. evolans | | | | 1 | | | 1 |
| E. microstomus | | | | 1 | | | 2 |
| P. dentatus | 3 | 1 | | 1 | | | 13 |
| P. oblongus | | | | 2 | | | 2 |
| S. aquosus | 77 | | | 1 | | | 98 |
| P. americanus | | | 7 | | | | 7 |
| T. maculatus | 141 | 27 | 10 | 17 | 5 | 15 | 434 |
| Fish Total | 4,449 | 247 | 81 | 84 | 85 | 682 | 10,829 |
| No. of species | 17 | 17 | 11 | 21 | 13 | 19 | 49 |
| C. sapidus | 13 | 9 | 17 | 257 | 41 | 6 | 369 |

TABLE 3.1.7-6
ANNUAL TOTALS FOR THE MORE COMMONLY IMPINGED ORGANISMS, SALEM SWS.

| Species | Actual No. | Estimated No. | Estimated Wt. (Kg) |
|---|---|---|---|
| A. aestivalis | 287 | 668 | 4.27 |
| B. tyrannus | 206 | 496 | 5.29 |
| D. cepedianum | 384 | 915 | 20.59 |
| A. mitchilli | 681 | 1,592 | 4.66 |
| H. nuchalis | 327 | 709 | 8.22 |
| M. americana | 1,091 | 2,580 | 20.66 |
| C. regalis | 6,439 | 15,024 | 20.40 |
| L. xanthurus | 105 | 250 | 6.85 |
| M. undulatus | 130 | 315 | 0.32 |
| T. maculatus | 434 | 1,015 | 5.64 |
| Total of more common fishes | 10,084 | 23,564 | 96.90 |
| Total of all fish species | 10,829 | 25,423 | 137.01 |
| C. sapidus | 369 | 857 | 16.93 |

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TABLE 3.1.7-7
IMPINGEMENT DATA ON THE MORE COMMON SPECIES, SALEM SWS

| Species | CF | Actual No. | Estimated No. | Estimated Wt. (Kg) | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|
| January (13, 24-hr samples) | | | | | | | | |
| A. aestivalis | 2 | 3 | 7 | 0.02 | 1.7 | 4.5 | 63 | 88 |
| D. cepedianum | 12 | 362 | 845 | 19.30 | 8.4 | 161.5 | 83 | 208 |
| H. nuchalis | 12 | 208 | 422 | 5.15 | 1.5 | 27.1 | 48 | 133 |
| M. americana | 13 | 154 | 368 | 2.39 | 2.3 | 78.2 | 58 | 163 |
| L. xanthurus | 1 | 1 | 2 | 0.02 | 9.9 | 9.9 | 83 | 83 |
| M. undulatus | 1 | 2 | 5 | + | 1.4 | 1.6 | 43 | 43 |
| Total of more common fishes | | 730 | 1,649 | 26.88 | | | | |
| Total of all fish species | | 816 | 1,907 | 31.69 | | | | |
| February (12, 24-hr samples) | | | | | | | | |
| D. cepedianum | 1 | 1 | 2 | 0.11 | 46.1 | 46.1 | 158 | 158 |
| H. nuchalis | 12 | 93 | 228 | 2.44 | 1.1 | 27.6 | 63 | 163 |
| M. americana | 12 | 415 | 973 | 6.76 | 1.1 | 121.8 | 53 | 198 |
| Total of more common fishes | | 509 | 1,203 | 9.31 | | | | |
| Total of all fish species | | 555 | 1,312 | 11.18 | | | | |

CF = catch frequency (number of 24-hr samples in which the species appeared)
+ = less than 0.01 Kg

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TABLE 3.1.7-7
CONTINUED

| Species | CF | Actual No. | Estimated No. | Estimated Wt. (Kg) | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|
| **March (14, 24-hr samples)** | | | | | | | | |
| A. aestivalis | 3 | 67 | 134 | 0.53 | 2.4 | 9.2 | 53 | 108 |
| D. cepedianum | 1 | 1 | 2 | 0.11 | 44.0 | 44.0 | 158 | 158 |
| H. nuchalis | 5 | 8 | 17 | 0.20 | 3.4 | 20.1 | 83 | 128 |
| M. americana | 14 | 183 | 406 | 4.16 | 1.9 | 198.6 | 53 | 223 |
| T. maculatus | 1 | 1 | 2 | + | 1.4 | 1.4 | 43 | 43 |
| Total of more common fishes | | 260 | 561 | 5.00 | | | | |
| Total of all fish species | | 409 | 896 | 8.43 | | | | |
| **April (12, 24-hr samples)** | | | | | | | | |
| A. aestivalis | 5 | 89 | 230 | 1.81 | 1.7 | 222.4 | 38 | 258 |
| B. tyrannus | 1 | 1 | 2 | 0.23 | 99.0 | 99.0 | 188 | 188 |
| A. mitchilli | 2 | 5 | 12 | 0.03 | 1.0 | 2.8 | 58 | 73 |
| H. nuchalis | 1 | 1 | 2 | 0.04 | 16.5 | 16.5 | 113 | 113 |
| M. americana | 7 | 26 | 69 | 0.40 | 3.0 | 13.4 | 53 | 98 |
| T. maculatus | 11 | 22 | 53 | 0.46 | 0.3 | 51.2 | 33 | 133 |
| Total of more common fishes | | 144 | 368 | 2.97 | | | | |
| Total of all fish species | | 182 | 474 | 6.01 | | | | |
| C. sapidus | 1 | 1 | 2 | + | 2.0 | 2.0 | 33 | 33 |

CF = catch frequency (number of 24-hr samples in which the species appeared)
+ = less than 0.01 Kg

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TABLE 3.1.7-7
CONTINUED

| Species | CF | Actual No. | Estimated No. | Estimated Wt (Kg) | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|
| | | | | May (14, 24-hr samples) | | | | |
| A aestivalis | 3 | 3 | 6 | 0.89 | 62.5 | 194.0 | 188 | 263 |
| B. tyrannus | 3 | 9 | 17 | 0.91 | 14.3 | 114.4 | 108 | 193 |
| A. mitchilli | 11 | 41 | 95 | 0.25 | 0.9 | 6.8 | 43 | 88 |
| M. 'americana | 4 | 6 | 13 | 0.31 | 3.5 | 95.6 | 73 | 188 |
| T. maculatus | 10 | 31 | 66 | 0.53 | 0.1 | 127.5 | 28 | 158 |
| Total of more common fishes | | 90 | 197 | 2.89 | | | | |
| Total of all fish species | | 137 | 301 | 8.39 | | | | |
| C, sapidus | 7 | 12 | 27 | 0.14 | 0.3 | 13.7 | 23 | 58 |
| | | | | June (12, 24-hr samples) | | | | |
| A. aestivalis | 2 | 2 | 5 | 0.07 | 12.0 | 17.7 | 98 | 108 |
| B. tyrannus | 11 | 95 | 198 | 1.02 | 0.2 | 72.7 | 33 | 173 |
| A. mitchilli | 11 | 229 | 484 | 1.63 | 0.2 | 6.7 | 53 | 88 |
| H. nuchalis | 1 | 1 | 2 | 0.07 | 31.6 | 31.6 | 103 | 103 |
| M. americana | 9 | 14 | 32 | 1.71 | 9.1 | 113.1 | 43 | 183 |
| C. regalis | 5 | 2,543 | 5,091 | 5.28 | 0.1 | 115.0 | 23 | 233 |
| L. xanthurus | 2 | 3 | 7 | + | 0.1 | 0.3 | 28 | 38 |
| T. maculatus | 11 | 165 | 374 | 1.04 | 0.4 | 44.6 | 33 | 128 |
| Total of more common fishes | | 3,052 | 6,193 | 10.82 | | | | |
| Total of all fish species | | 3,102 | 6,294 | 17.00 | | | | |
| C. sapidus | 6 | 13 | 30 | 1.04 | 6.4 | 88.5 | 43 | 188 |

CF = catch frequency (number of 24-hr samples in which the species appeared)
+ = less than 0.01 Kg

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TABLE 3.1.7-7
CONTINUED

| Species | CF | Actual No. | Estimated No. | Estimated Wt (Kg) | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|
| July (13, 24-hr samples) | | | | | | | | |
| A. aestivalis | 1 | 1 | 2 | 0.03 | 11.5 | 11.5 | 93 | 93 |
| B. tyrannus | 12 | 78 | 205 | 1.19 | 1.1 | 33.5 | 43 | 143 |
| A. mitchilli | 13 | 332 | 828 | 2.22 | 1.2 | 5.2 | 53 | 88 |
| M. americana | 4 | 4 | 10 | 0.25 | 27.1 | 78.0 | 43 | 178 |
| C. regalis | 13 | 3,751 | 9,363 | 13.86 | 0.4 | 7.6 | 33 | 98 |
| L. xanthurus | 6 | 10 | 23 | 0.15 | 0.5 | 22.4 | 43 | 113 |
| T. maculatus | 12 | 141 | 346 | 1.16 | 0.7 | 16.1 | 38 | 93 |
| Total of more common fishes | | 4,317 | 10,777 | 18.86 | | | | |
| Total of all fish species | | 4,449 | 11,097 | 21.29 | | | | |
| C. sapidus | 4 | 13 | 30 | 1.31 | 9.2 | 125.0 | 53 | 158 |
| August (14, 24-hr samples) | | | | | | | | |
| B. tyrannus | 5 | 5 | 12 | 0.26 | 1.9 | 13.3 | 58 | 118 |
| A. mitchilli | 11 | 36 | 81 | 0.19 | 0.4 | 4.5 | 33 | 78 |
| C. regalis | 13 | 128 | 527 | 1.14 | 0.3 | 6.2 | 33 | 93 |
| L. xanthurus | 11 | 28 | 60 | 1.52 | 8.5 | 59.1 | 83 | 153 |
| T. maculatus | 7 | 27 | 63 | 0.88 | 2.6 | 80.1 | 58 | 163 |
| Total of more common fishes | | 224 | 743 | 3.99 | | | | |
| Total of all fish species | | 247 | 805 | 6.03 | | | | |
| C. sapidus | 6 | 9 | 20 | 1.71 | 23.6 | 146.5 | 78 | 193 |

CF = catch frequency (number of 24-hr samples in which the species appeared)
+ = less than 0.01 kg

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TABLE 3.1.7-7
CONTINUED

| Species | CF | Actual No. | Estimated No. | Estimated Wt. (Kg) | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|
| | | | | September (12, 24-hr samples) | | | | |
| B. tyrannus | 3 | 5 | 12 | 0.45 | 8.7 | 105.6 | 93 | 208 |
| A. mitchilli | 8 | 15 | 39 | 0.07 | 0.3 | 4.9 | 33 | 83 |
| M. americana | 1 | 1 | 2 | 0.52 | 223.0 | 223.0 | 253 | 253 |
| C. regalis | 6 | 12 | 33 | 0.11 | 1.2 | 3.3 | 53 | 83 |
| L. xanthurus | 10 | 23 | 59 | 1.88 | 10.6 | 73.4 | 93 | 158 |
| T. maculatus | 6 | 10 | 23 | 0.62 | 0.6 | 97.5 | 38 | 183 |
| Total of more common fishes | | 66 | 168 | 3.65 | | | | |
| Total of all fish species | | 81 | 204 | 3.76 | | | | |
| C. sapidus | 8 | 17 | 39 | 0.51 | 1.1 | 17.2 | 18 | 93 |
| | | | | October (14, 24-hr samples) | | | | |
| B. tyrannus | 2 | 4 | 10 | 0.11 | 5.2 | 15.1 | 73 | 98 |
| A. mitchilli | 7 | 12 | 28 | 0.07 | 0.8 | 10.0 | 48 | 98 |
| M. americana | 2 | 2 | 5 | 0.32 | 55.2 | 84.0 | 163 | 183 |
| C. regalis | 3 | 3 | 6 | 0.01 | 3.0 | 4.3 | 73 | 98 |
| L. xanthurus | 8 | 12 | 28 | 1.45 | 14.1 | 88.9 | 113 | 168 |
| M. undulatus | 1 | 1 | 2 | + | 1.6 | 1.6 | 58 | 58 |
| T. maculatus | 8 | 17 | 40 | 0.57 | 0.6 | 62.2 | 33 | 153 |
| Total of more common fishes | | 51 | 119 | 2.53 | | | | |
| Total of all fish species | | 84 | 193 | 5.28 | | | | |
| C. sapidus | 14 | 257 | 601 | 1.04 | 0.2 | 51.4 | 13 | 113 |

CF = catch frequency (number of 24-hr samples in which the species appeared)
+ = less than 0.01 Kg

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TABLE 3.1.7-7
CONTINUED

| Species | CF | Actual No. | Estimated No. | Estimated Wt. (Kg) | Weight (g) Min | Weight (g) Max | Length (mm) Min | Length (mm) Max |
|---|---|---|---|---|---|---|---|---|
| | | | | November (13, 24-hr samples) | | | | |
| A. aestivalis | 8 | 23 | 46 | 0.18 | 1.6 | 24.6 | 63 | 138 |
| B. tyrannus | 2 | 3 | 7 | 0.19 | 11.7 | 52.4 | 93 | 158 |
| A. mitchilli | 8 | 10 | 23 | 0.20 | 1.2 | 3.6 | 58 | 78 |
| M. americana | 3 | 12 | 20 | 0.72 | 19.1 | 84.8 | 118 | 163 |
| C. regalis | 1 | 1 | 2 | + | 2.9 | 2.9 | 63 | 63 |
| L. xanthurus | 9 | 20 | 41 | 1.07 | 16.6 | 47.4 | 98 | 143 |
| T. maculatus | 5 | 5 | 11 | 0.11 | 0.8 | 32.4 | 38 | 123 |
| Total of more common fishes | | 74 | 150 | 2.47 | | | | |
| Total of all fish species | | 85 | 169 | 4.15 | | | | |
| C. sapidus | 9 | 41 | 94 | 11.17 | 0.4 | 28.2 | 18 | 58 |
| | | | | December (10.5, 24-hr samples) | | | | |
| A. aestivalis | 7 | 99 | 238 | 0.74 | 1.5 | 5.2 | 58 | 88 |
| B. tyrannus | 5 | 6 | 33 | 0.93 | 3.7 | 148.0 | 93 | 223 |
| D. cepedianum | 6.5 | 20 | 66 | 1.07 | 3.7 | 117.8 | 73 | 218 |
| A. mitchilli | 3 | 1 | 2 | + | 3.0 | 3.0 | 73 | 73 |
| H. nuchalis | 5 | 16 | 38 | 0.30 | 1.6 | 20.2 | 63 | 133 |
| M. americana | 9.5 | 274 | 682 | 3.12 | 1.3 | 38.1 | 43 | 158 |
| C. regalis | 1 | 1 | 2 | + | 3.3 | 3.3 | 68 | 68 |
| L. xanthurus | 4 | 8 | 30 | 0.76 | 5.5 | 50.1 | 78 | 153 |
| M. undulatus | 4.5 | 127 | 308 | 0.32 | 0.1 | 3.8 | 28 | 73 |
| T. maculatus | 8 | 15 | 37 | 0.27 | 1.2 | 14.3 | 33 | 93 |
| Total of more common fishes | | 567 | 1,436 | 7.51 | | | | |
| Total of all fish species | | 682 | 1,771 | 13.80 | | | | |
| C. sapidus | 3 | 6 | 14 | 0.01 | 0.5 | 2.7 | 18 | 33 |

CF = catch frequency (number of 24-hr samples in which the species appeared)
+ = less than 0.01 Kg

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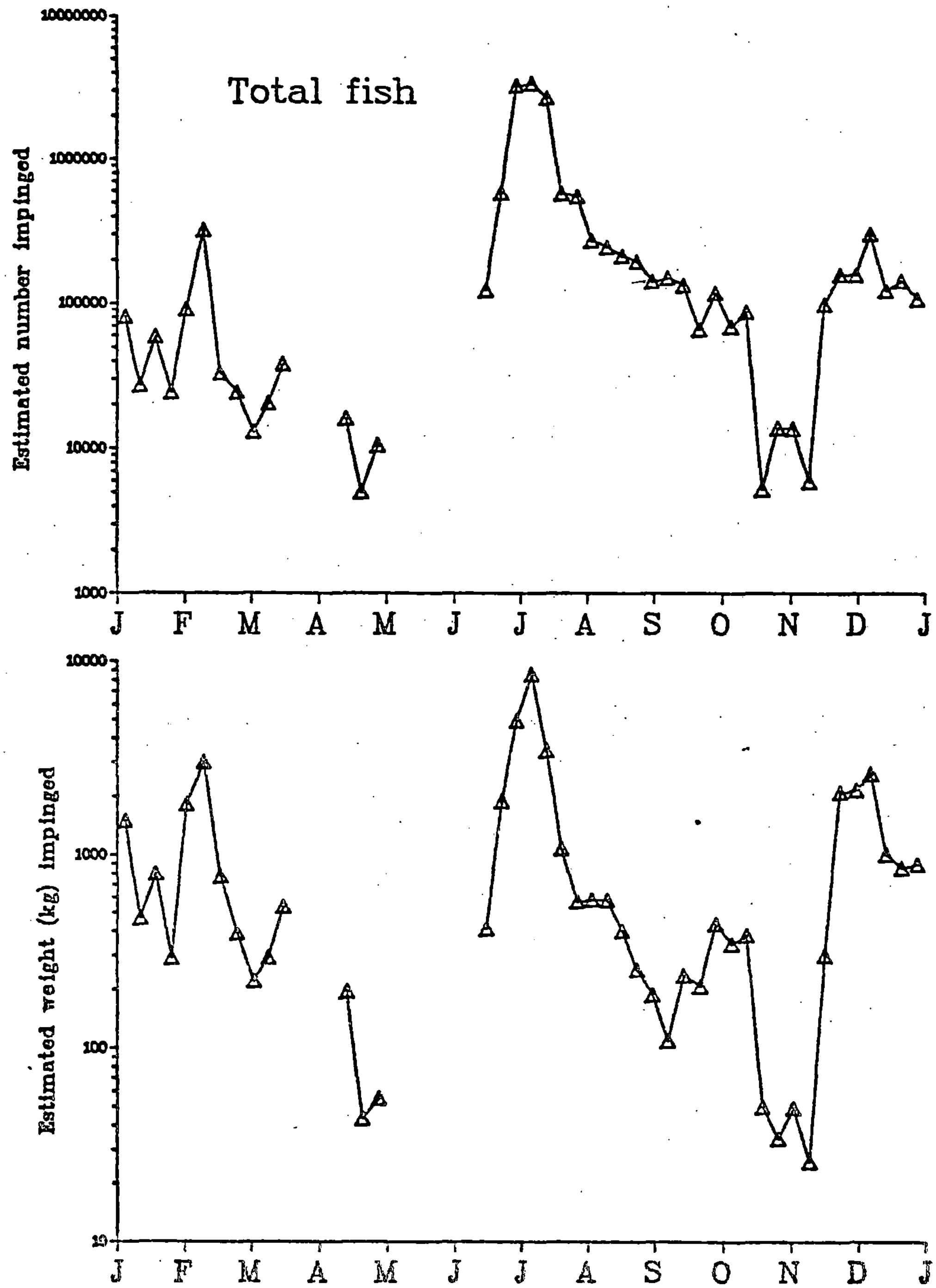
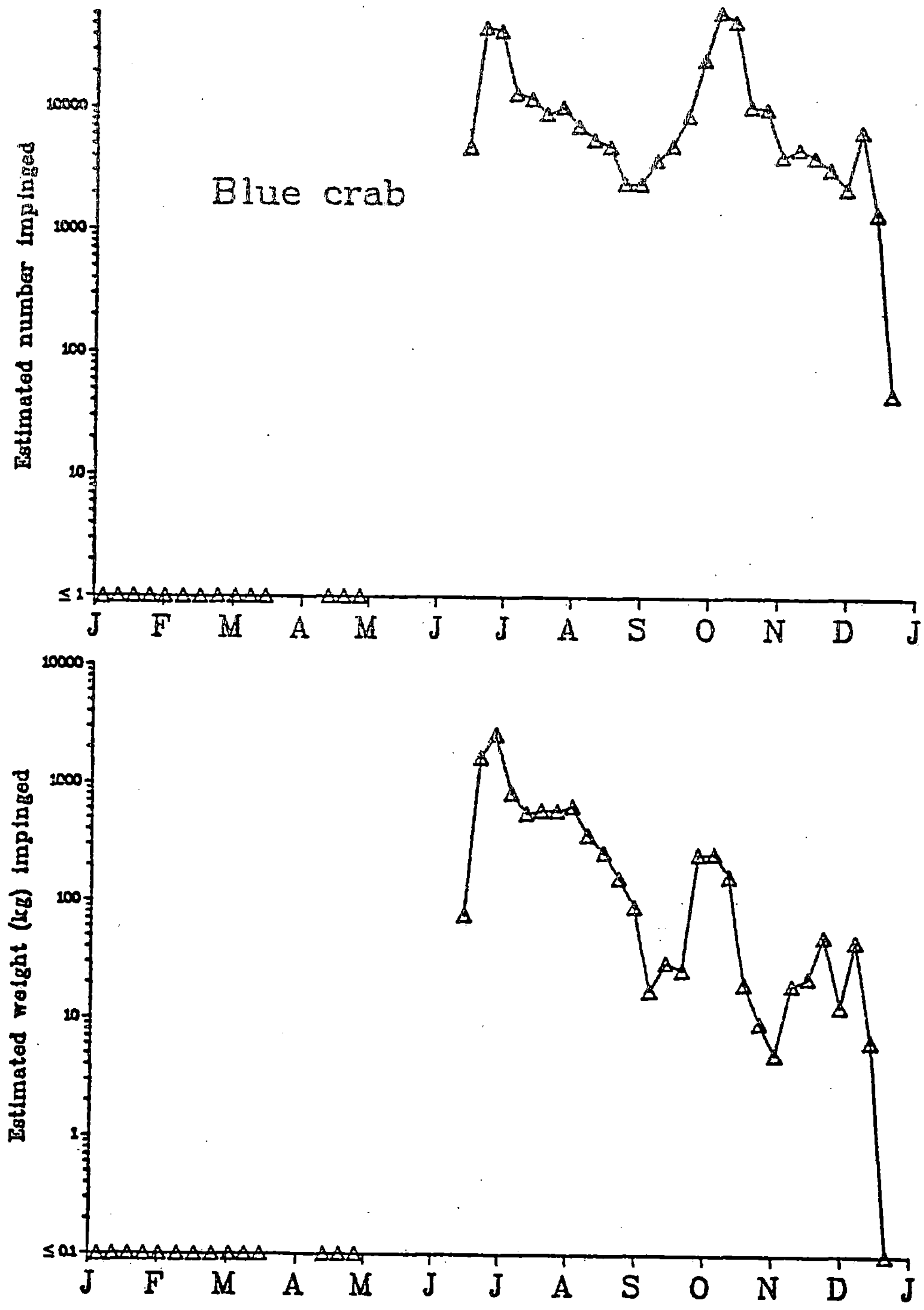



| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Weekly estimated number and weight of all impinged fishes, Salem CWS - 1978 |
|---|---|
| | Figure 3.1.7-1 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Weekly estimated number and weight of impinged blue crab, Salem CWS - 1978 |
|---|---|
| | Figure 3.1.7-2 |

## 3.1.8 Entrainment of Planktonic Organisms

## (ETS Section 3.1.2.3)

In accordance with Section 3.1.2.3 of the ETS, entrainment studies were conducted in 1978. The continuing objective is to estimate the number and percent survival of planktonic organisms which pass through the Salem Unit 1 circulating water system (CWS). Planktonic organisms included are fish eggs and larvae, microzooplankton, and macroinvertebrates.

### 3.1.8.1 Summary

MICROZOOPLANKTON

Abundance Studies

A total of 141 microzooplankton samples was collected in 1978. Mean abundance per sampling date ranged from 3,978/$m^3$ on November 21-22 to a peak density (105,057/$m^3$) on July 12-13. Mean density was generally lower from mid-September through mid-December (3,978 to 30,680/$m^3$) than previous months. The most abundant taxa which comprised 76.7 percent of the total catch were Rotifer spp., copepod nauplii, *Acartia tonsa*, Gastropoda (veliger), and *Pseudodiaptomus coronatus*.

Rotifer spp. comprised 28.6 percent of the total catch. It occurred from February through mid-August and mid-October through mid-December with peak density (74,378/$m^3$ $\pm$ 31,248) on March 16-17.

Copepod nauplii comprised 17.9 percent of the total catch. It was most abundant from mid-March through early September with peak density (29,713/$m^3$ $\pm$ 16,616) on April 19-20.

*A. tonsa* comprised 11.8 percent of the total catch. It was collected from late June through mid-December with peak density (15,711/$m^3$ $\pm$ 7,711) on July 12-13.

Gastropoda (veliger) comprised 10.1 percent of the total catch. It was collected from June through October with peak density (15,266/$m^3$ $\pm$ 4,733) on August 31-September 1.

*P. coronatus* comprised 8.3 percent of the total catch. It occurred in March and from late June through mid-December with peak density (26,952/$m^3$ $\pm$ 21,890) on July 12-13.

Other abundant taxa, which together comprised 21.2 percent of the total catch, were: *Ectinosoma* spp., Polychaeta (eggs and larvae), *Eurytemora affinis*, Cirripedia (nauplii and cypris larvae) and Nematoda.

## Survival Studies

Thirty-four paired intake and discharge microzooplankton samples were collected during three 24-hr sampling periods in 1978. A total of 2,754 microzooplankters representing 39 taxa were collected in 14.5 $m^3$ of water filtered. Abundant taxa were copepod nauplii, *Eurytemora affinis*, *Acartia tonsa*, Gastropoda, and *Ectinosoma* spp.

Copepod nauplii were collected on all sampling dates. During April 19-20, mean percent live at 0 hr was 81 in intake samples and 92 in discharge samples; at +12 hr it was 80 and 81, respectively. During June 28-29, the mean percent live at 0 hr was 71 in intake samples and 72 in discharge samples; at +12 hr it was 90 and 75, respectively. During September 13-14, the mean percent live at 0 hr was 91 in intake samples and 81 in discharge samples; at +12 hr it was 33 and 55, respectively.

*E. affinis* (copepodid) was collected during April 19-20 and June 28-29. During April 19-20 the mean percent live at 0 hr was 87 in intake samples at +12 hr it was 77. The mean percent live at 0 hr was 83 in discharge samples; at +12 hr it was 100. During June 28-29, mean percent live at 0 hr was 85 in intake samples and 82 in discharge samples; at +12 hr it was 61 and 81, respectively.

*A.* tonsa (copepodid) was collected on June 28-29 and September 13-14. During June 28-29, the mean percent live at 0 hr was 50 in intake samples and 69 in discharge samples; at +12 hr it was 60 and 87, respectively. During September 13-14, the mean percent live at 0 hr was 76 in intake samples and 83 in discharge samples; at +12 hr it was 50 and 62, respectively. Mean percent live during both dates was lower in intake samples than in discharge samples.

Gastropoda (veliger) was collected only during the September 13-14 sampling date. Mean percent live at 0 hr was 71 in intake samples and 88 in discharge samples; at +12 hr it was 64 and 66, respectively.

Ectinosoma spp. was collected only during September 13-14. Mean percent live at 0 hr was 81 in intake samples and 88 in discharge samples; at +12 hr it was 87 in intake and discharge samples.

## MACROINVERTEBRATE PLANKTON

### Abundance Studies

A total of 1,793,350 macroplankters representing 58 taxa were collected in 128 macroinvertebrate plankton samples in 1978. Mean density per sampling date ranged from 176/100m$^3$ on March 2-3 to peak density (85,137/100m$^3$) on September 13-14. Mean density was greatest from April to September (7,283 to 85,137/100m$^3$) and November 21-22 through mid-December (9,591 to 10,865/100m$^3$). The most abundant taxa, which comprised 92.8 percent of the total catch were: Neomysis americana and Rhithropanopeus harrisii.

N. americana comprised 81.6 percent of the total catch. Density was low in March (ca. 40/100m$^3$), it increased through June 28-29 (43,076/100m$^3$ ± 27,662) and peaked on September 13-14 (77,695/100m$^3$ ± 36,101).

R. harrisii comprised 11.2 percent of the total catch. Greatest density occurred from June through mid-August. Peak density (14,299/100m$^3$ ± 15,258) occurred on July 12-13.

Other abundant taxa which comprised 6.6 percent of the total catch were: Gammarus spp., Edotea triloba, Corophium spp., Brachyura, Leucon americanus, Palaemonetes pugio, Crangon septemspinosa, and Hydrozoa (medusae).

### Survival Studies

Twenty-three paired intake and discharge macrozooplankton survival samples were collected during three 24-hr sampling periods in 1978: 5 pairs during April 19-20, 7 pairs during June 28-29, and 11 pairs during September 13-14. A total of 46,931 macroplankters representing 28 taxa was collected in 105 m$^3$ of water filtered. The most abundant taxa were: Neomysis americana, Gammarus spp., and Rhithropanopeus harrisii.

N. americana was collected on all three sampling dates. During April 19-20 the mean percent live at 0 hr was 71 in intake samples and 70 in discharge samples; at +12 hr it was 33 and 43, respectively. During June 28-29, mean percent live at 0 hr was 81 in intake samples and 95 in discharge samples; at +12 hr it was 71 and 84, respectively. During September 13-14 the mean percent live for juveniles at 0 hr was 98 in intake samples and 96 in discharge samples; at +12 hr it was 94 and 51, respectively. The mean percent live for adults at 0 hr was 99 in intake samples and 83 in discharge samples; at +12 hr it was 92 and 74, respectively.

Gammarus spp. was collected during all three sampling dates. During April 19-20, the mean percent live at 0 hr was 87 in intake samples; at +12 hr it was 91. Mean percent live (90) in the discharge samples remained unchanged throughout the latent period. During June 28-29 the mean percent live for juveniles at 0 hr was 88 in intake samples; at +12 hr it was 87. Mean percent live at 0 hr was 86 in discharge samples; at +12 hr it was 89. During September 13-14, the mean percent live for juveniles at 0 hr was 97 in intake samples and 99 in discharge samples; at +12 hr it was 96 and 98, respectively.

R. harrisii (zoea) was collected during the June 28-29 and September 13-14 sampling dates. Initial and +12 hr survival was high in all samples. During June, the initial mean percent live in the intake (98) samples was unchanged at +12 hr. Mean percent live at 0 hr was 96 in the discharge samples; at +12 hr it was 95. During September 13-14, the mean percent live at 0 hr in intake samples was 97; at +12 hr it was 93. Mean percent live at 0 hr was 100 in discharge samples; at +12 hr it was unchanged.

## ICHTHYOPLANKTON

### Abundance Studies

A total of 135 ichthyoplankton abundance samples was collected in 1978. Of the 29,984 specimens of 19 taxa collected, bay anchovy (Anchoa mitchilli), naked goby (Gobiosoma bosci), weakfish (Cynoscion regalis), and silversides (Membras sp./Menidia spp.) were most abundant.

Bay anchovy comprised 90.2 percent of the total catch. Eggs, larvae, young, or adults were collected from late June through late November. Eggs and larvae were most abundant in mid-July (mean density per date = 24.924 ± 17.842 and 6.146/$m^3$ ± 2.119, respectively), young in late August-early September (1.127 ± 1.045), and adults in mid-September (0.085 ± 0.065).

Naked goby comprised 3.7 percent of the total catch. Larvae or young were collected from late June through September and in late November. Larvae were most abundant in mid-July (mean density per date = 0.574/$m^3$ ± 0.233) and young in late August-early September (0.043 ± 0.040).

Weakfish comprised 3.7 percent of the total catch. Larvae or young were collected from late June through mid-September and in early November. A single egg was collected in mid-July. Larvae and young were most abundant in late June (mean density per date = 0.613 ± 0.398 and 0.636/$m^3$ ± 0.513, respectively).

Silversides comprised 1.5 percent of the total catch. Eggs or larvae were collected from late June through late August-early September. Eggs were most abundant in mid-July (mean density per date = 0.007/$m^3$ ± 0.008) and larvae in mid-August (0.465/$m^3$ ± 0.758).

## Survival Studies

Twenty-three paired intake and discharge ichthyoplankton survival samples were collected during three 24-hr sampling periods in 1978. Of the 319 specimens of nine species collected, young bay anchovy and larval and young weakfish were most abundant. The mean percent live for bay anchovy young collected on September 13-14 at the intake and discharge was similar both initially (75.0 and 76.0, respectively) and after the 12-hr latent mortality period (20.0 and 20.0, respectively). The initial mean percent live for weakfish larvae and young collected on June 28-29 at the intake (30.2 and 58.8, respectively) was lower than at the discharge (89.5 and 79.6, respectively). This relationship continued through the 12-hr latent period with only slight decreases in mean percent live at either location. The reasons for the relatively low percent live for weakfish larvae and young in the intake samples are not known.

### 3.1.8.2 METHODS AND MATERIALS

Equipment and procedures used to collect and process entrainment samples in 1978 were the same as those employed in 1977. For a detailed description see Volume 2 of the 1977 Annual Environmental Operating Report. Briefly, entrainment samples were collected at intake and discharge locations using a high capacity centrifugal pump in combination with an abundance chamber and a larval table (Figs. 3.1.8-1 through 3.1.8-4). Microzooplankton and ichthyoplankton-macroinvertebrate abundance samples were processed at the Delaware laboratory in the same manner as the riverine collections (see Sections 3.1.2 and 3.1.3). Survival samples were processed on site at the field laboratory, and all percentages were calculated on the basis of initial total sample size. High concentrations of detritus and large numbers of macroinvertebrates in survival samples occassionally required extra processing time and subsequent deviation from the prescribed schedule of latent mortality observations.

Conditions permitting, the entrainment monitoring program is scheduled monthly September through May and semimonthly June through August. Replicate samples are to be taken every 4 hr during a 24-hr period. Intake and discharge collections are synchronized with CWS passage time to ensure sampling the same water mass. Intake samples for abundance and survival determinations are integrated with depth and taken inboard of the vertical traveling screens. Discharge samples (for survival only) are collected from a standpipe on the CWS discharge pipe at a point approximately 152 m upstream of the effluence into the river.

Entrainment studies in 1978 were limited in number and scope because of weather, station operating schedule and mechanical problems. Extreme cold and icing during January and February precluded survival sampling. Abundance samples were not collected in January because of traveling screen failures. Salem Unit 1 was not in commercial operation from March 17 through June 13 and from October 10 through November 13. Scheduling of sampling during these periods was hampered by intermittent circulating pump operation and other maintenance related problems.

Microzooplankton, macroinvertebrate, and ichthyoplankton abundance samples were collected as per the ETS schedule during February-April and late June through December. However the number of collections per date during March, April, late June, October and December were fewer than specified because of mechanical problems with CWS components or sampling equipment.

Microzooplankton, macroinvertebrate and ichthyoplankton survival samples were collected in April, late June and September. High concentrations of macroinvertebrates and/or detritus increased the initial processing time and limited the number of samples collected during scheduled sampling periods. Survival sampling was restricted to circulating pump 12B and discharge standpipe 12. Mechanical difficulties with sampling equipment and various components of #12 CWS limited the number of survival sampling periods attempted.

Latent survival samples had, at times, higher survival estimates than samples analyzed immediately. This was due to stunned organisms recovery during holding and the precision of the analytical technique in subsample for survival estimation.

Intake sample integration with depth was not attempted in 1978. Point samples were taken at between 4.6 and 6.1 m below surface. Design and mechanical problems with the integration apparatus have been rectified. However delays in equipment delivery precluded implementation in 1978.

### 3.1.8.3 Results

MICROZOOPLANKTON

Abundance Studies

One hundred forty-one microzooplankton samples were collected during 14 sampling experiences from February 27 through December 13, 1978 (Tables 3.1.8-1, 3.1.8-2). A total of 60 $m^3$ of water was filtered and 51 taxa were collected. Total annual mean density was 38,676/$m^3$. Water temperature and salinity ranged from 0.6 to 28.7 C and 1.0 to 12.0 ppt, respectively.

Mean density per sampling date ranged from 3,978/$m^3$ on November 21-22 to 105,057/$m^3$ on July 12-13 (Table 3.1.8-1). Mean density was generally lower from mid-September through mid-December (3,978 to 30,680/$m^3$) than previous months. The 10 predominant taxa, which comprised 97.9 percent of the total annual sample, are discussed below in order of decreasing abundance (Table 3.1.8-2).

Rotifer spp. comprised 28.6 percent of the annual sample and was the most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was 11,051/$m^3$. It occurred from February through mid-August and mid-October through mid-December (Table 3.1.8-1). Peak density (74,378/$m^3$ $\pm$ 31,248) occurred on March 16-17. It was collected at water temperature 0.6 to 28.7 C and salinity 1.0 to 12.0 ppt.

Copepod nauplii comprised 17.9 percent of the annual sample and was the second most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was 6,915/$m^3$. It was collected on all sampling dates and was most abundant from mid-March through early September (Table 3.1.8-1). Peak density (29,713/$m^3$ ± 16,616) occurred on April 19-20. It was collected at water temperature 0.6 to 28.7 C and salinity 1.0 to 12.0 ppt.

Acartia tonsa comprised 11.8 percent of the annual sample and was the third most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was 4,574/$m^3$. Females were more abundant (2,017/$m^3$) than copepodids (1,955) or males (582). It was collected from late June through mid-December with peak density (15,711/$m^3$ ± 7,711) on July 12-13 (Table 3.1.8-1). It was collected at water temperature 5.0 to 28.7 C and salinity 4.0 to 12.0 ppt.

Gastropoda (veliger) comprised 10.1 percent of the annual sample and was the fourth most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was 3,900/$m^3$. It was collected from June through October with peak density (15,266/$m^3$ ± 4,733) on August 31-September 1 (Table 3.1.8-1). It was collected at water temperature 17.3 to 28.7 C and salinity 4.0 to 10.0 ppt.

Pseudodiaptomus coronatus comprised 8.3 percent of the annual sample and was the fifth most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was 3,238/$m^3$. Females were more abundant (1,551/$m^3$) than males (1,095) or copepodids (592). It occurred in March and from late June through mid-December with peak density (26,952/$m^3$ ± 21,890) on July 12-13 (Table 3.1.8-1). It was collected at water temperature 0.6 to 28.7 C and salinity of 3.0 to 12.0 ppt.

Ectinosoma spp. comprised 7.8 percent of the annual sample and was the sixth most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was 3,009/$m^3$. Adults were more abundant (2,892/$m^3$) than copepodids (117). It was predominant on every sampling date with peak density (6,972/$m^3$ ± 3,166) on July 12-13 (Table 3.1.8-1). It was collected at water temperature 0.6 to 28.7 C and salinity 1.0 to 12.0 ppt.

Polychaeta (eggs and larvae) comprised 7.7 percent of the annual sample and was the seventh most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was 2,978/$m^3$. Eggs were more abundant (2,394/$m^3$) than larvae (584). It was collected on all sampling dates and was most abundant from February through March and November (Table 3.1.8-1). Peak density ($24,280/m^3 \pm 15,856$) occurred on November 1-2. It was collected at water temperature 0.6 to 28.7 C and salinity 1.0 to 12.0 ppt.

<u>Euytemora affinis</u> comprised 3.5 percent of the annual sample and was the eighth most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was $1,342/m^3$. Copepodids were more abundant ($809/m^3$) than males (304) or females (225). It was collected on all sampling dates (Table 3.1.8-1). Greatest density occurred from February through July and in December. Peak density ($6,663/m^3 \pm 4,746$) occurred on July 12-13. It was collected at water temperature 0.6 to 28.7 C and salinity 1.0 to 12.0 ppt.

Cirripedia (nauplii and cypris larvae) comprised 1.6 percent of the annual sample and was the ninth most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was $638/m^3$. Nauplii were more abundant ($633/m^3$) than cypris larvae (5). It was collected from June through mid-December and was most abundant from June through August (Table 3.1.8-1). Peak density ($2,684/m^3 \pm 1,779$) occurred on July 12-13. It was collected at water temperature 5.0 to 28.7 C and salinity 4.0 to 12.0 ppt.

Nematoda comprised 0.6 percent of the annual sample and was the tenth most abundant microzooplankter collected (Table 3.1.8-2). Annual mean density was $224/m^3$. Greatest density occurred from February through July and in September (Table 3.1.8-1). Peak density ($719/m^3 \pm 1,206$) occurred on April 19-20. It was collected at water temperature 0.6 to 28.7 C and salinity 1.0 to 12.0 ppt.

## Survival Studies

Thirty-four paired intake and discharge samples were collected in 1978; 12 pairs during April 19-20, 10 pairs during June 28-29, and 12 pairs during September 13-14. A total of 2,754 microzooplankters comprising 39 taxa were collected in 14.5 $m^3$ of water filtered (Table 3.1.8-3).

### April 19-20

Nineteen taxa were collected; copepod nauplii and <u>Eurytemora affinis</u> copepodids were most abundant (Table 3.1.8-3).

Ambient water temperature ranged from 10.2 to 11.5 C and salinity ranged from 5.5 to 8.0 ppt.

Initial mean percent live for copepod nauplii in intake and discharge samples was 81 and 92, respectively (Table 3.1.8-3). Mean percent live in the intake and discharge samples was 80 and 81, respectively, at +12 hr.

Initial mean percent for _E. affinis_ (copepodids) in intake and discharge samples was 87 and 83, respectively (Table 3.1.8-3). Mean percent live in the intake and discharge samples was 77 and 100, respectively, at +12 hr.

June 28-29

Twenty-seven taxa were collected; copepod nauplii, _Acartia tonsa_, and _Eurytemora affinis_ were most abundant (Table 3.1.8-3). Ambient water temperature ranged from 21.0 to 26.8 C and condenser delta T ranged from 3.8 to 6.1 C. Salinity ranged from 4.0 to 6.0 ppt.

Initial mean percent live for copepod nauplii in intake and discharge samples was 71 and 72, respectively (Table 3.1.8-3). Mean percent live in intake and discharge samples was 90 and 75, respectively, at +12 hr.

Initial mean percent live for _A. tonsa_ females in intake and discharge samples was 85 and 55, respectively (Table 3.1.8-3). Mean percent live in the intake samples decreased through all observations. Mean percent live in the intake and discharge samples was 60 and 71, respectively, at +12 hr.

Initial mean percent live for _A tonsa_ copepodids in intake and discharge samples was 50 and 69, respectively, at the intake and discharge (Table 3.1.8-3). Mean percent live in the intake and discharge samples was 60 and 87, respectively, at +12 hr.

Initial mean percent live for _E. affinis_ copepodids in intake and discharge samples was 85 and 82, respectively (Table 3.1.8-3). Mean percent live in the intake and discharge samples was 61 and 81, respectively, at +12 hr.

September 13-14

Twenty-one taxa were collected; Gastropoda (veliger), copepod nauplii, Acartia tonsa, and Ectinosoma spp. were most abundant (Table 3.1.8-3). Ambient water temperature ranged from 21.2 to 31.7 C and condenser delta T ranged from 8.2 to 11.1 C. Salinity ranged from 5.0 to 10.0 ppt.

Initial mean percent live for Gastropoda (veliger) in intake and discharge samples was 71 and 88, respectively (Table 3.1.8-3). Mean percent live in the intake and discharge samples was 64 and 66, respectively, at +12 hr.

Initial mean percent live for copepod nauplii in intake and discharge samples was 91 and 81, respectively (Table 3.1.8-3). Mean percent live in the intake and discharge samples was 33 and 55, respectively, at +12 hr.

Initial mean percent live for A. tonsa copepodids in intake and discharge samples was 76 and 83, respectively (Table 3.1.8-3). Mean percent live in the intake and discharge samples was 50 and 62, respectively, at +12 hr.

Initial mean percent live for Ectinosoma spp. in intake and discharge samples was 81 and 88, respectively (Table 3.1.8-3). Mean percent live in intake and discharge samples was 87 at +12 hr.

## MACROINVERTEBRATE PLANKTON

### Abundance Studies

One hundred twenty-eight macroinvertebrate plankton samples were collected on 13 sampling dates from March 2 through December 13, 1978 (Tables 3.1.8-4, 3.1.8-5). A total of 6,857.2 cubic meters of water were filtered and 58 taxa were collected. Total annual mean density was $26,153/100m^3$. Water temperature and salinity ranged from 0.6 to 28.7 C and 1.0 to 15.0 ppt, respectively.

Mean density per sampling date ranged from $176/100m^3$ on March 2-3 to $85,137/100m^3$ on September 13-14 (Table 3.1.8-4). Mean density was greatest from April through September ($7,283$ to $85,137/100m^3$), and November 21-22 through mid-December ($9,591$ to $10,865/100m^3$). The 10 predominant taxa which comprised 99.4 percent of the total annual sample are discussed below in order of decreasing abundance (Table 3.1.8-5).

Neomysis americana, the opposum shrimp, comprised 81.6 percent of the annual sample and was the most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 21,657/100m$^3$. It occurred from March through mid-December (Table 3.1.8-4). Density was low in March (ca. 39/100m$^3$); it increased through June 28-29 (43,076/100m$^3$ ± 27,662) and peaked on September 13-14 (77,695/100m$^3$ ± 36,101). It was collected at water temperature 0.6 to 28.7 C and salinity 3.0 to 15.0 ppt.

Rhithropanopeus harrisii, the mud crab, comprised 11.2 percent of the annual sample and was the second most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 2,960/100m$^3$. It occurred from April through mid-December (Table 3.1.8-4). Greatest density occurred from June through mid-August. Peak density (14,299/100m$^3$ ± 15,258) occurred on July 12-13. It was collected at water temperature 5.0 to 28.7 C and salinity 4.0 to 10.0 ppt.

Gammarus spp., the scud, comprised 2.2 percent of the annual sample and was the third most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 573/100m$^3$. It occurred from March through December (Table 3.1.8-4). Generally, density was greatest during June through September; it peaked (1,615/100m$^3$ ± 697) on June 28-29. It was collected at water temperature 0.6 to 28.7 C and salinity 1.0 to 15.0 ppt.

Edotea triloba, an isopod, comprised 1.7 percent of the annual sample and was the fourth most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 439/100m$^3$. It occurred from March through mid-December (Table 3.1.8-4). Density was greatest during June through early November; it peaked (3,736/100m$^3$ ± 3,595) on September 13-14. It was collected at water temperature 1.0 to 28.7 C and salinity 3.0 to 10.0 ppt.

Corophium spp., the scud, comprised 0.7 percent of the annual sample. It was the second most abundant amphipod and the fifth most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 197/100m$^3$. It occurred on all sampling dates from March through December (Table 3.1.8-4). Greatest density occurred from July through August and in December. Peak density (704/100m$^3$ ± 253) occurred on August 10-11. It was collected at water temperature 0.6 to 28.7 C and salinity 4.0 to 12.0 ppt.

Brachyura comprised 0.7 percent of the annual sample and was the sixth most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 180/100m$^3$. It occurred from June through mid-August, with peak density (1,642/100m$^3$ $\pm$ 977) on August 10-11 (Table 3.1.8-4). It was collected at water temperature 23.7 to 28.7 C and salinity 6.0 to 8.0 ppt.

Leucon americanus, a cumacean shrimp, comprised 0.4 percent of the annual sample and was the seventh most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 113/100m$^3$. It occurred from June through December, with greatest density during late August through November (Table 3.1.8-4). Peak density (763/100m$^3$ $\pm$ 592) occurred on September 13-14. It was collected at water temperature 5.0 to 28.7 C and salinity 4.5 to 15.0 ppt.

Palaemonetes pugio, the grass shrimp, comprised 0.4 percent of the annual sample and was the eighth most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 109/100m$^3$. It occurred from April through December, with greatest density in July and August (Table 3.1.8-4). Peak density (344/100m$^3$ $\pm$ 150) occurred on August 10-11. It was collected at water temperature 5.0 to 28.7 C and salinity 4.0 to 15.0 ppt.

Crangon septemspinosa, the sand shrimp, comprised 0.3 percent of the annual sample and was the ninth most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 77/100m$^3$. It occurred on all sampling dates from March through December with peak densities on June 28-29 (391/100m$^3$ $\pm$ 517) and September 13-14 (360/100m$^3$ $\pm$ 366) (Table 3.1.8-4). It was collected at water temperature 0.6 to 28.7 C and salinity 4.0 to 15.0 ppt.

Hydrozoa (medusae) comprised 0.2 percent of the annual sample. It was the most abundant hydromedusae and tenth most abundant macroinvertebrate plankter collected (Table 3.1.8-5). Annual mean density was 55/100m$^3$. It was collected from August through November (Table 3.1.8-4). Peak density (391/100m$^3$ $\pm$ 262) occurred on September 13-14. It was collected at water temperature 8.5 to 28.7 C and salinity 6.0 to 15.0 ppt.

## Survival Studies

Twenty-three paired intake and discharge macrozooplankton survival samples were collected; 5 pairs during April 19-20, 7 during June 28-29, and 11 during September 13-14. During the September 13-14 sampling period heavy detritus and specimen holding problems prevented the processing of some samples. A total of 46,931 macroinvertebrates representing 28 taxa was collected in 105 $m^3$ of water filtered (Table 3.1.8-6).

April 19-20

A total of 13 taxa were collected. Neomysis americana, Gammarus spp., Hirudinea, Crangon septemspinosa, and Polychaeta were most abundant (Table 3.1.8-6). Ambient water temperature ranged from 10.2 to 11.0 C and salinity 5.5 to 8.0 ppt. There was no delta T across the condensers on this date; therefore, any plant-induced mortality must be attributed to pressure and/or mechanical effects.

Initial mean percent live for N. americana in intake and discharge samples was 71 and 70, respectively (Table 3.1.8-6). Mean percent live in the intake samples decreased to 33 percent at +12 hr. Survival in discharge samples decreased to 43 percent at +12 hr.

Initial mean percent live for Gammarus spp. in intake and discharge samples was 87 and 90, respectively (Table 3.1.8-6). Mean percent live in the intake samples was 91 at +12 hr. This increase in percent live was the result of the recovery of previously stunned specimens. Mean percent live in discharge samples was unchanged at +12 hr.

Initial mean percent live for Hirudinea was 94 and 100 in the intake and discharge samples, respectively (Table 3.1.8-6). Mean percent live in intake and discharge samples at +12 hr remained unchanged.

Initial mean percent live for C. septemspinosa in both intake and discharge samples was 66 (Table 3.1.8-6). Mean percent live in intake samples increased to 85 at +4 hr and 86 at +12 hr. This increase resulted from the recovery of previously stunned specimens. Mean percent live in discharge samples increased to 71 at +12 hr.

Initial mean percent live for Polychaeta was 100 at both the intake and discharge (Table 3.1.8-6). This percentage remained unchanged for both intake and discharge samples throughout the 12 hr latent period.

June 28-29

A total of 18 taxa were collected. Neomysis americana, Gammarus spp., Rhithropanopeus harrisii, Crangon septemspinosa, and Edotea triloba were most abundant (Table 3.1.8-6). Ambient water temperature ranged from 21.0 to 26.8 C and delta T across condenser 12 ranged from 3.8 to 6.1 C. Salinity ranged from 4.0 to 6.0 ppt.

Initial mean percent live for N. americana in intake and discharge samples was 81 and 95, respectively (Table 3.1.8-6). Mean percent live decreased to 71 in intake samples and 84 in discharge samples at +12 hr.

Initial mean percent live for Gammarus spp. (adult) was 73 in intake samples (Table 3.1.8-6). No adults were taken at the discharge. Mean percent live in intake samples decreased to 62 at +12 hr. Initial mean percent live for Gammarus spp. (juveniles) at the intake and discharge samples was 88 and 86, respectively (Table 3.1.8-6). Mean percent live in intake samples decreased to 87 at +12 hr. Mean percent live in discharge samples increased to 89 at +12 hr.

Initial mean percent live for R. harrisii was 98 at the intake and 96 at the discharge. Mean percent live in intake samples remained unchanged at +12 hr; discharge samples remained virtually unchanged.

Initial mean percent live for C. septemspinosa was 29 at the intake and 73 at the discharge. Mean percent live in intake samples decreased to 27 at +12 hr. Mean percent live in discharge samples decreased to 66 at +4 hr and 56 at +12 hr.

Initial mean percent live for E. triloba was 94 at the intake and 100 at the discharge (Table 3.1.8-6). Mean percent live in intake samples decreased to 88 percent at +12 hr. Mean percent live in discharge samples remained unchanged through the 12 hr latent period.

September 13-14

A total of 20 taxa were collected. Neomysis americana Gammarus spp., Edotea triloba, Rhithropanopeus harrisii, and Leucon americanus were most abundant (Table 3.1.8-6). Ambient water temperature ranged from 22.2 to 23.5 C and salinity 6.0 to 9.0 ppt. Delta T across condenser 12 ranged from 7.5 to 11.4 C.

Initial mean percent live for N. americana (adult) in intake and discharge samples was 99 and 83, respectively (Table 3.1.8-6). Mean percent live in intake samples decreased to 92 at +12 hr. Mean percent live in discharge samples decreased to 74 at +12 hr. Initial mean percent live for juveniles in intake and discharge samples was 98 and 96, respectively. Mean percent live in intake samples decreased to 94 at +2 hr and then remained unchanged for the remainder of the 12 hr latent period. Mean percent live in discharge samples decreased to 87 at +2 hr, 64 at +4 hr, and 51 at +12 hr.

Initial mean percent live for Gammarus spp. (juveniles) was 97 in intake samples and 99 in discharge samples (Table 3.1.8-6). Mean percent live in intake and discharge samples was 96 and 98, respectively, at +12 hr.

Initial mean percent live for E. triloba (juveniles) was 99 in both the intake and discharge samples (Table 3.1.8-6). Mean percent live in intake samples remained unchanged at +12 hr. Mean percent live in discharge samples decreased to 97 at +12 hr.

Initial mean percent live for R. harrisii (zoea) in intake and discharge samples was 97 and 100, respectively (Table 3.1.8-6). Mean percent live in intake samples decreased to 93 at +12 hr; discharge samples remained unchanged.

Initial mean percent live for L. americanus (adult)was 100 in intake samples and 98 in discharge samples (Table 3.1.8-6). Mean percent live in intake and discharge samples decreased to 92 and 94, respectively, at +12 hr.

## ICHTHYOPLANKTON

### Abundance Studies

A total of 135 ichthyoplankton abundance samples was collected during 14 sampling experiences from February 27 through December 13, 1978 (Table 3.1.8-7). Ichthyoplankton of 19 taxa including 17,549 eggs, 10,437 larvae, 1,877 young, and 121 adults were taken in 7,203.4 $m^3$ of water filtered; total annual mean density was 4.163/$m^3$. Annual mean density for eggs, larvae, young, and adults was 2.436, 1.449, 0.261, and 0.017/$m^3$, respectively. Taxa of which more than 100 specimens were taken are, in order of decreasing abundance; bay anchovy, naked goby, weakfish, and silversides. These comprised over 99 percent of the total catch and are discussed below.

Bay anchovy comprised 90.2 percent of the total catch and was represented by 27,055 specimens including 17,520 eggs, 8,152 larvae, 1,272 young, and 111 adults (Table 3.1.8-7). The annual mean density of eggs, larvae, young, and adults was 2.432, 1.132, 0.177, and 0.015/$m^3$, respectively.

Bay anchovy eggs ranked first in and comprised 99.8 percent of the total egg catch (Table 3.1.8-7). Eggs were collected from June 28-29 through August 10-11 at water temperature 21.0 to 28.7 C and salinity 4.0 to 10.0 ppt. Mean density per date ranged from 0.153/$m^3$ $\pm$ 0.135 on July 27-28 to 24.924/$m^3$ $\pm$ 17.842 on July 12-13 (Table 3.1.8-8). Density per collection on July 12-13 ranged from 5.100 to 107.320/$m^3$.

Viable eggs were taken on all dates during the period of occurrence. Annual mean percent viable was 6.8 and mean percent viable per date ranged from 2.0 on August 10-11 to 12.0 on July 27-28 (Table 3.1.8-9). On July 12-13, when over 86 percent of the egg catch was collected, mean percent viable was 7.4.

Bay anchovy larvae ranked first in and comprised 78.1 percent of the total larval catch (Table 3.1.8-7). Larvae were collected from June 28-29 through October 11 at water temperature 17.3 to 28.7 C and salinity 4.0 to 10.0 ppt. Mean density per date ranged from 0.011/$m^3$ $\pm$ 0.022 on October 11 to 6.146/$m^3$ $\pm$ 2.119 on July 12-13 (Table 3.1.8-8). Density per collection on July 12-13 ranged from 2.480 to 12.960/$m^3$.

Bay anchovy young ranked first in and comprised 67.8 percent of total young catch (Table 3.1.8-7). Young were collected from July 12 through November 21-22 at water temperature 8.5 to 28.7 C and salinity 5.0 to 12.0 ppt. Mean density per date ranged from 0.002/$m^3$ $\pm$ 0.005 on June 28-29 to 1.127 $\pm$ 1.045 on August 31-September 1 (Table 3.1.8-8). Density per collection on August 31-September 1 ranged from 0.010 to 5.620/$m^3$.

Bay anchovy adults ranked first in and comprised 91.7 percent of the total adult catch (Table 3.1.8-7). Adults were collected from June 28-29 through October 11 at water temperature 17.8 to 28.7 C and salinity 4.0 to 10.0 ppt. Mean density per date ranged from 0.002/$m^3$ $\pm$ 0.004 on August 31-September 1 to 0.085/$m^3$ $\pm$ 0.065 on September 13-14 (Table 3.1.8-8). Density per collection on September 13-14 ranged to 0.260/$m^3$.

Naked goby comprised 3.7 percent of the total catch and was represented by 1,119 specimens including 1,085 larvae and 34 young (Table 3.1.8-7). The annual mean density of larvae and young was 0.151 and 0.005/$m^3$, respectively.

Naked goby larvae ranked second in and comprised 10.4 percent of the total larval catch (Table 3.1.8-7). Larvae were collected from June 28-29 through September 13-14 and on November 1-2 at water temperature 14.5 to 28.7 C and salinity 4.0 to 10.0 ppt. Mean density per date ranged from 0.003 on September 13-14 and November 1-2 to 0.574/$m^3$ $\pm$ 0.233 on July 12-13 (Table 3.1.8-8). Density per collection on July 12-13 ranged from 0.020 to 1.260/$m^3$.

Naked goby young ranked fourth in and comprised 1.8 percent of the total young catch (Table 3.1.8-7). Young were collected on July 12-13, July 27-28, August 31-September 1 and November 21-22 at water temperature 12.0 to 27.0 C and salinity 5.0 to 12.0 ppt. Mean density per date was 0.002/$m^3$ $\pm$ 0.004 on July 27-28, August 31-September 1, and November 21-22 and 0.043/$m^3$ $\pm$ 0.040 on August 31-September 1 (Table 3.1.8-8). Density per collection on August 31-September 1 ranged to 0.180/$m^3$.

Weakfish comprised 3.7 percent of the total catch and was represented by 1,096 specimens including 1 egg, 660 larvae, and 435 young (Table 3.1.8-7). The annual mean density of eggs, larvae, and young was less than 0.001, 0.092, and 0.060/$m^3$, respectively.

A single weakfish egg was collected on July 12 at water temperature 24.5 C and salinity 7.0 ppt. Density in the collection was 0.020/$m^3$. The egg was not viable.

Weakfish larvae ranked third in and comprised 6.3 percent of the total larval catch (Table 3.1.8-7). Larvae were collected from June 28-29 through August 31-September 1 at water temperature 21.0 to 28.7 C and salinity 4.0 to 10.0 ppt. Mean density per date ranged from 0.006/$m^3$ $\pm$ 0.008 on August 31-September 1 to 0.613/$m^3$ $\pm$ 0.398 on June 28-29 (Table 3.1.8-8). Density per collection on June 28-29 ranged from 0.040 to 1.740/$m^3$.

Weakfish young ranked second in and comprised 23.2 percent of the total young catch (Table 3.1.8-7). Young were collected from June 28-29 through September 13-14 and on November 1 at water temperature 14.5 to 27.7 C and salinity 4.0 to 10.0 ppt. Mean density per date ranged from 0.002/$m^3$ $\pm$ 0.005 on November 1-2 to 0.636/$m^3$ $\pm$ 0.513 on June 28-29 (Table 3.1.8-8). Density per collection on June 28-29 ranged from 0.060 to 2.160/$m^3$.

Silversides taken in entrainment samples at Salem Unit 1 are potentially *Menbras martinica*, *Menidia beryllina*, and *Menidia menidia*. Although current taxonomic literature indicates subtle morphological and meristic differences, the high degree of local and individual specimen variation made identification of eggs and larvae to genus or species tenuous and impracticable. However, young were identified to species and are discussed separately.

Silversides comprised 1.5 percent of the total catch and were represented by 454 specimens including 6 eggs and 448 larvae (Table 3.1.8-7). The annual mean density of eggs and larvae was 0.001 and 0.062/$m^3$, respectively.

Silverside eggs ranked third in and comprised less than 0.1 percent of the total egg catch (Table 3.1.8-7). Eggs were collected on July 12-13 and on July 27-28 at water temperature 24.5 to 26.6 C and salinity 7.0 to 10.0 ppt. Mean density per date was 0.007/$m^3$ $\pm$ 0.008 on July 12-13 and 0.003/$m^3$ $\pm$ 0.005 on July 27-28 (Table 3.1.8-8). Annual mean percent viable was 83.3 (Table 3.1.8-9).

Silverside larvae ranked fourth in and comprised 4.3 percent of the total larval catch (Table 3.1.8-7). Larvae were collected from June 28-29 through August 31-September 1 at water temperature 21.0 to 28.7 C and salinity 5.0 to 8.0 ppt. Mean density per date ranged from 0.033 on June 28-29 and July 12-13 to 0.470/$m^3$ on August 10-11 (Table 3.1.8-8). Density per collection on August 10-11 ranged from 0.060 to 4.260/$m^3$.

Young rough silversides (*Membras martinica*) were taken on July 12-13, August 10-11, and September 13-14 (1 specimen per date); mean density per date was 0.002/$m^3$ $\pm$ 0.004 on each occasion (Table 3.1.8-8). A total of 30 specimens of Atlantic silverside (*Menidia menidia*) young were taken from June 28-29 through October 11 and on November 21-22 and December 13. Mean density per date was highest (0.025/$m^3$ $\pm$ 0.033) on August 10-11.

A total of four adult Atlantic silversides were taken on July 12-13, August 10-11, and August 31-September 1. Mean density per date ranged from 0.001 $\pm$ 0.002 to 0.003/$m^3$ $\pm$ 0.004 (Table 3.1.8-8).

## Survival Studies

Twenty-three paired intake and discharge ichthyoplankton survival samples were collected; 5 pairs during April 19-20, 7 during June 28-29, and 11 during September 13-14. A total of 143 larvae, 162 young, and 14 adults of 9 species were collected in 148 $m^3$ of water filtered (Table 3.1.8-10). Although described below, collections containing less than 10 specimens should not be evaluated singularly nor quantitatively.

April 19-20

The American eel, Anguilla rostrata, was the only species taken; 1 glass eel and 5 elvers were collected at ambient water temperature of 10.2-11.0 C and salinity of 5.5 to 8.0 ppt (Table 3.1.8-10). To conform to the established conventions of data tabulation these specimens were categorized as young and adult, respectively. Initial mean percent live was 100 in intake and discharge samples; mean percent live remained at 100 through the 12 hr latent effects period. There was no delta T across the condensers on this date, therefore, the absence of plant-induced mortality can be evaluated with respect to only pressure and/or mechanical effects.

June 28-29

Seven species were taken: bay anchovy (Anchoa mitchilli), satin fin shiner (Notropis analostanus), rough silverside (Membras martinica), northern pipefish (Syngnathus fuscus), weakfish (Cynoscion regalis, spot (Leiostomus xanthurus), and naked goby (Gobiosoma bosci) (Table 3.1.8-10). Bay anchovy and weakfish were most abundant; the other species were represented by single specimens and are not discussed. Ambient water temperature ranged from 21.0 to 26.8 C and delta T across condenser 12 ranged from 3.8 to 6.1 C. Salinity and DO ranged from 4.0 to 6.0 ppt and from 6.6 to 8.4 mg/l, respectively.

Bay anchovy larvae were taken at the intake (n = 9) and discharge (n = 2); initial mean percent live was 55.6 and 50.0, respectively (Table 3.1.8-10). Mean percent live at the intake was 33.3 at +2 hr and 11.1 at +4 hr. It remained 11.1 for the remaining 8 hr of the latent period. Mean percent live in the discharge samples (50.0) remained unchanged through the 12 hr latent period.

Weakfish larvae were taken at the intake (n = 63) and discharge (n = 57); initial mean percent live was 30.2 and 89.5, respectively (Table 3.1.8-10). Mean percent live in the intake samples remained virtually unchanged through the latent period, ranging from 30.2 to 31.7; in the discharge samples it was 87.7 at +2 hr and again at +4 hr; it was 63.2 from +8 hr through +12 hr. Initial mean percent live weakfish young taken at the intake (n = 34) and discharge (n = 49) was 58.8 and 79.6, respectively. Percent live was 52.9 at the intake and 73.5 at the discharge at +12 hr.

September 13-14

Four species were taken: bay anchovy, northern pipefish, Atlantic croaker (Micropogon undulatus), and naked goby (Table 3.1.8-10). Ambient water temperature ranged from 21.2 to 23.5 C and delta T across condenser 12 ranged from 7.5 to 11.4 C. Salinity and DO ranged from 6.0 to 9.0 ppt and 6.4 to 7.9 mg/l, respectively.

Bay anchovy larvae were taken at the intake (n = 3) and discharge (n = 4); initial mean percent live was 100.0 and 0.0, respectively (Table 3.1.8-10). Mean percent live at the intake was 66.7 at +8 hr; at +12 hr all specimens were dead. Initial mean percent live for bay anchovy young taken at the intake (n = 40) and discharge (n = 25) was 75.0 and 76.0, respectively. Percent live was similar in intake and discharge samples through the latent period and at +12 hr it was 20.0 at both locations. Initial mean percent live for bay anchovy adults taken at the intake (n = 7) and discharge (n = 2) was 57.1 and 50.0, respectively. Mean percent live at the intake was 71.4 at +2 hr because of the temporary recovery of a previously stunned specimen. It was 28.6 at +12 hr. Mean percent live in the discharge sample remained at 50.0 through +4 hr. By +8 hr the previously live specimen became stunned and remained in that condition through the remainder of the latent period.

Northern pipefish young were taken at the intake (n = 4) and discharge (n = 3); initial mean percent live was 75.0 and 66.7, respectively (Table 3.1.8-10). Mean percent live in the intake samples remained at 75.0 through +8 hr. At +12 hr it was 50.0. Mean percent live in the discharge sample was 33.3 at +4 hr. It returned to 66.7 at +8 hr and remained there through +12 hr.

Single specimens of Atlantic croaker larvae and naked goby young were taken at the intake and discharge, respectively. Initial mean percent live was 100.0 for both specimens and remained at 100.0 through the 12 hr latent period.

TABLE 3.1.8-1
MEAN DENSITY (NUMBERS/CUBIC METER), BY DATE, OF MICROZOOPLANKTON - 1978.

| | |
|---|---|
| DATE | 02/27/78-02/28/78 |
| NO. OF SAMPLES | 4 |
| WATER TEMPERATURE (C) | 1.6- 2.0 |
| DISSOLVED OXYGEN (MG/L) | 12.9-13.0 |
| PH | 6.5- 6.6 |
| SALINITY (PPT) | 5.0- 9.0 |
| PUMPS OPERATING | 6 |
| TOTAL VOLUME FILTERED (M3) | 2.0 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 65290 | 37858 |
| NEMATODA | A | A | 310 | 436 |
| POLYCHAETA | A | E | 2205 | 1845 |
| COPEPOD NAUPLII | A | N | 1340 | 1154 |
| E. AFFINIS | A | C | 430 | 553 |
| HARPACTICOIDA | A | A | 410 | 387 |
| ECTINOSOMA | A | A | 1240 | 1471 |
| ECTINOSOMA | A | C | 420 | 960 |
| O. COLCARVA | M | A | 50 | 159 |

IA SALEM EN 1978

TABLE 3.1.8-1
CONTINUED

DATE 03/02/78-03/03/78
NO. OF SAMPLES 12
WATER TEMPERATURE (C) 0.6- 1.9
DISSOLVED OXYGEN (MG/L) 12.6-14.9
PH 7.0
SALINITY (PPT) 3.0- 6.0
PUMPS OPERATING 6
TOTAL VOLUME FILTERED (M3) 6.0

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 25989 | 11086 |
| NOTHOLCA | A | A | 37 | 55 |
| K. QUADRATA | A | A | 31 | 49 |
| B. CALYCIFLORUS | A | A | 20 | 44 |
| NEMATODA | A | A | 591 | 214 |
| POLYCHAETA | A | E | 2471 | 793 |
| ACARINA | A | A | 20 | 44 |
| COPEPOD NAUPLII | A | N | 1362 | 460 |
| P. CRASSIROSTRIS | A | A | 10 | 22 |
| P. CRASSIROSTRIS | F | A | 17 | 37 |
| E. AFFINIS | A | C | 277 | 126 |
| E. AFFINIS | F | A | 23 | 35 |
| E. AFFINIS | M | A | 98 | 68 |
| P. CORONATUS | A | C | 10 | 22 |
| HARPACTICOIDA | A | A | 281 | 177 |
| ECTINOSOMA | A | A | 1935 | 1162 |
| ECTINOSOMA | A | C | 601 | 307 |
| O. COLCARVA | F | A | 50 | 110 |
| TARDIGRADA | A | A | 21 | 46 |

TABLE 3.1.8-1
CONTINUED

| | |
|---|---|
| DATE | 03/16/78-03/17/78 |
| NO. OF SAMPLES | 10 |
| WATER TEMPERATURE (C) | 2.5- 4.6 |
| DISSOLVED OXYGEN (MG/L) | 11.6-13.8 |
| PH | |
| SALINITY (PPT) | 1.0- 4.0 |
| PUMPS OPERATING | 2-3 |
| TOTAL VOLUME FILTERED (M3) | 5.0 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 74378 | 31248 |
| NOTHOLCA | A | A | 148 | 141 |
| B. CALYCIFLORUS | A | A | 15 | 34 |
| NEMATODA | A | A | 291 | 270 |
| POLYCHAETA | A | E | 6708 | 1169 |
| POLYCHAETA | A | L | 30 | 68 |
| COPEPODA | A | C | 15 | 34 |
| COPEPOD NAUPLII | A | N | 6629 | 1399 |
| E. AFFINIS | A | C | 230 | 167 |
| E. AFFINIS | F | A | 221 | 180 |
| E. AFFINIS | M | A | 117 | 92 |
| DIAPTOMUS | A | C | 16 | 36 |
| HARPACTICOIDA | A | A | 121 | 133 |
| ECTINOSOMA | A | A | 2113 | 971 |
| ECTINOSOMA | A | C | 395 | 357 |
| O. COLCARVA | A | C | 20 | 45 |
| C. BICUSPIDATUS | A | C | 72 | 87 |

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TABLE 3.1.8-1
CONTINUED

| | |
|---|---|
| DATE | 04/19/78-04/20/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 10.2-11.0 |
| DISSOLVED OXYGEN (MG/L) | 8.8-11.0 |
| PH | 7.0- 7.6 |
| SALINITY (PPT) | 5.5- 8.0 |
| PUMPS OPERATING | 1 |
| TOTAL VOLUME FILTERED (M3) | 3.6 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | ± 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 180 | 225 |
| ROTARIA | A | A | 67 | 147 |
| NOTHOLCA | A | A | 1487 | 899 |
| KERATELLA | A | A | 363 | 333 |
| BRANCHIONUS | A | A | 15 | 32 |
| B. CALYCIFLORUS | A | A | 67 | 147 |
| NEMATODA | A | A | 719 | 1206 |
| POLYCHAETA | A | E | 83 | 183 |
| PELECYPODA | A | L | 83 | 183 |
| BOSMINA | A | A | 67 | 147 |
| COPEPOD NAUPLII | A | N | 29713 | 16616 |
| T. LONGICORNIS | A | A | 15 | 32 |
| E. AFFINIS | A | C | 3816 | 2583 |
| E. AFFINIS | F | A | 457 | 386 |
| E. AFFINIS | M | A | 901 | 410 |
| DIAPTOMUS | M | A | 30 | 66 |
| HARPACTICOIDA | A | A | 430 | 731 |
| HARPACTICOIDA | A | C | 67 | 147 |
| ECTINOSOMA | A | A | 456 | 469 |
| ECTINOSOMA | A | C | 200 | 440 |
| H. FOSTERI | F | A | 111 | 245 |
| CYCLOPS | A | C | 67 | 147 |
| TARDIGRADA | A | A | 97 | 155 |

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TABLE 3.1.8-1
CONTINUED

| | |
|---|---|
| DATE | 06/28/78-06/29/78 |
| NO. OF SAMPLES | 10 |
| WATER TEMPERATURE (C) | 21.0-26.8 |
| DISSOLVED OXYGEN (MG/L) | 6.7- 8.4 |
| PH | 6.5- 7.1 |
| SALINITY (PPT) | 4.0- 6.0 |
| PUMPS OPERATING | 6 |
| TOTAL VOLUME FILTERED (M3) | 4.0 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 80 | 181 |
| ROTIFERA A | A | A | 25 | 57 |
| B. ANGULARIS | A | A | 25 | 57 |
| B. CAUDATUS | A | A | 90 | 137 |
| NEMATODA | A | A | 675 | 1079 |
| POLYCHAETA | A | L | 35 | 79 |
| GASTROPODA | A | L | 2175 | 905 |
| MOINA | A | A | 95 | 149 |
| COPEPOD NAUPLII | A | N | 7950 | 6261 |
| E. AFFINIS | A | C | 3240 | 1998 |
| E. AFFINIS | F | A | 1455 | 791 |
| E. AFFINIS | M | A | 1305 | 854 |
| P. CORONATUS | A | C | 3020 | 1369 |
| P. CORONATUS | F | A | 5485 | 2946 |
| P. CORONATUS | M | A | 1310 | 1110 |
| A. TONSA | A | C | 1345 | 1144 |
| A. TONSA | F | A | 5715 | 2406 |
| A. TONSA | M | A | 1135 | 637 |
| HARPACTICOIDA | A | A | 185 | 235 |
| SCOTTOLANA | A | A | 400 | 385 |
| SCOTTOLANA | A | C | 195 | 295 |
| ECTINOSOMA | A | A | 1360 | 1115 |
| C. VERNALIS | A | A | 25 | 57 |
| C. VERNALIS | A | C | 50 | 113 |
| C. VERNALIS | F | A | 25 | 57 |
| C. VERNALIS | M | A | 40 | 90 |
| CIRRIPEDIA | A | N | 765 | 896 |
| CRYPTONISCUS LARVAE | A | L | 40 | 90 |

TABLE 3.1.8-1
CONTINUED

| | |
|---|---|
| DATE | 07/12/78-07/13/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 24.0-25.0 |
| DISSOLVED OXYGEN (MG/L) | 6.2- 8.0 |
| PH | |
| SALINITY (PPT) | 5.0-10.0 |
| PUMPS OPERATING | 5-6 |
| TOTAL VOLUME FILTERED (M3) | 4.8 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| INVERT. EGG | A | E | 156 | 247 |
| ROTIFER SPP. | A | A | 212 | 209 |
| ROTIFERA A | A | A | 576 | 256 |
| K. VALGA | A | A | 21 | 46 |
| B. CALYCIFLORUS | A | A | 21 | 46 |
| B. ANGULARIS | A | A | 1160 | 790 |
| B. CAUDATUS | A | A | 21 | 46 |
| B. URCEOLARIS | A | A | 167 | 228 |
| PARADICRANOPHORUS | A | A | 21 | 46 |
| NEMATODA | A | A | 212 | 159 |
| POLYCHAETA | A | L | 1122 | 647 |
| GASTROPODA | A | L | 12851 | 5173 |
| COPEPOD NAUPLII | A | N | 28729 | 9514 |
| E. AFFINIS | A | A | 52 | 115 |
| E. AFFINIS | A | C | 4035 | 2385 |
| E. AFFINIS | F | A | 951 | 909 |
| E. AFFINIS | M | A | 1625 | 1337 |
| P. CORONATUS | A | C | 3622 | 1602 |
| P. CORONATUS | F | A | 11986 | 10734 |
| P. CORONATUS | M | A | 11344 | 9554 |
| A. TONSA | A | C | 5076 | 3777 |
| A. TONSA | F | A | 8288 | 2885 |
| A. TONSA | M | A | 2347 | 1049 |
| HARPACTICOIDA | A | A | 365 | 294 |
| HARPACTICOIDA | A | C | 42 | 92 |
| SCOTTOLANA | A | A | 253 | 166 |
| SCOTTOLANA | A | C | 104 | 158 |
| ECTINOSOMA | A | A | 6951 | 3120 |
| ECTINOSOMA | A | C | 21 | 46 |
| H. FOSTERI | F | A | 21 | 46 |
| CIRRIPEDIA | A | N | 2684 | 1779 |
| CRYPTONISCUS LARVAE | A | L | 21 | 46 |

TABLE 3.1.8-1
CONTINUED

| | |
|---|---|
| DATE | 07/27/78-07/28/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 26.3-27.4 |
| DISSOLVED OXYGEN (MG/L) | 5.4- 6.7 |
| PH | 6.9- 7.4 |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 5 |
| TOTAL VOLUME FILTERED (M3) | 4.8 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| INVERT. EGG | A | E | 8 | 18 |
| TURBELLARIA | A | A | 27 | 41 |
| TURBELLARIA | A | L | 17 | 37 |
| ROTIFER SPP. | A | A | 128 | 98 |
| ROTIFERA A | A | A | 13 | 28 |
| B. ANGULARIS | A | A | 212 | 241 |
| B. URCEOLARIS | A | A | 17 | 37 |
| ASPLANCHNA | A | A | 33 | 73 |
| NEMATODA | A | A | 50 | 64 |
| POLYCHAETA | A | E | 17 | 37 |
| POLYCHAETA | A | L | 2030 | 903 |
| GASTROPODA | A | L | 10833 | 6736 |
| COPEPOD NAUPLII | A | N | 14250 | 4283 |
| E. AFFINIS | A | C | 117 | 101 |
| E. AFFINIS | M | A | 31 | 46 |
| P. CORONATUS | A | C | 194 | 224 |
| P. CORONATUS | F | A | 233 | 170 |
| P. CORONATUS | M | A | 106 | 132 |
| A. TONSA | A | C | 6815 | 2601 |
| A. TONSA | F | A | 1535 | 358 |
| A. TONSA | M | A | 1182 | 529 |
| HARPACTICOIDA | A | A | 8 | 18 |
| HARPACTICOIDA | A | C | 77 | 92 |
| SCOTTOLANA | A | C | 150 | 194 |
| SCOTTOLANA | F | A | 38 | 45 |
| ECTINOSOMA | A | A | 5967 | 3270 |
| O. COLCARVA | F | A | 8 | 18 |
| O. COLCARVA | M | A | 8 | 18 |
| H. FOSTERI | A | C | 17 | 25 |
| C. VERNALIS | A | C | 50 | 110 |
| ERGASILUS | A | C | 25 | 55 |
| CIRRIPEDIA | A | N | 1988 | 843 |
| CRYPTONISCUS LARVAE | A | L | 131 | 91 |
| TARDIGRADA | A | A | 31 | 69 |

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TABLE 3.1.8-1
CONTINUED

| | |
|---|---|
| DATE | 08/10/78-08/11/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 26.7-28.7 |
| DISSOLVED OXYGEN (MG/L) | 6.0- 9.8 |
| PH | 7.2- 7.4 |
| SALINITY (PPT) | 6.0 |
| PUMPS OPERATING | 4-5 |
| TOTAL VOLUME FILTERED (M3) | 4.8 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| INVERT. EGG | A | E | 3 | 6 |
| TURBELLARIA | A | A | 3 | 6 |
| TURBELLARIA | A | L | 31 | 69 |
| ROTIFER SPP. | A | A | 8 | 18 |
| ROTIFERA A | A | A | 10 | 23 |
| B. ANGULARIS | A | A | 191 | 272 |
| NEMATODA | A | A | 62 | 64 |
| POLYCHAETA | A | E | 3 | 6 |
| POLYCHAETA | A | L | 397 | 363 |
| GASTROPODA | A | L | 5344 | 5552 |
| MOINA | A | A | 9 | 14 |
| COPEPOD NAUPLII | A | N | 4153 | 2215 |
| E. AFFINIS | A | C | 129 | 243 |
| E. AFFINIS | F | A | 75 | 93 |
| E. AFFINIS | M | A | 58 | 46 |
| P. CORONATUS | A | C | 711 | 403 |
| P. CORONATUS | F | A | 876 | 628 |
| P. CORONATUS | M | A | 256 | 133 |
| A. TONSA | A | C | 5003 | 3724 |
| A. TONSA | F | A | 4316 | 3064 |
| A. TONSA | M | A | 1698 | 976 |
| SCOTTOLANA | F | A | 10 | 23 |
| S. CANADENSIS | A | A | 109 | 161 |
| S. CANADENSIS | A | C | 78 | 66 |
| S. CANADENSIS | F | A | 46 | 68 |
| ECTINOSOMA | A | A | 3594 | 2989 |
| O. COLCARVA | F | A | 10 | 23 |
| H. FOSTERI | A | C | 15 | 24 |
| H. FOSTERI | F | A | 144 | 184 |
| H. FOSTERI | M | A | 21 | 46 |
| CIRRIPEDIA | A | N | 344 | 248 |
| CRYPTONISCUS LARVAE | A | L | 57 | 78 |

TABLE 3.1.8-1
CONTINUED

DATE 08/31/78-09/01/78
NO. OF SAMPLES 12
WATER TEMPERATURE (C) 26.5-27.0
DISSOLVED OXYGEN (MG/L) 5.1- 6.2
PH 7.0- 7.3
SALINITY (PPT) 6.0- 8.0
PUMPS OPERATING 5-6
TOTAL VOLUME FILTERED (M3) 4.8

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| INVERT. EGG | A | E | 19 | 30 |
| TURBELLARIA | A | A | 10 | 23 |
| TURBELLARIA | A | L | 135 | 76 |
| ROTIFERA A | A | A | 108 | 80 |
| BDELLOIDEA | A | A | 36 | 69 |
| K. VALGA | A | A | 7 | 15 |
| B. ANGULARIS | A | A | 118 | 138 |
| B. QUADRIDENTATUS | A | A | 10 | 23 |
| NEMATODA | A | A | 14 | 31 |
| POLYCHAETA | A | L | 477 | 291 |
| GASTROPODA | A | L | 15266 | 4733 |
| PELECYPODA | A | L | 21 | 46 |
| MOINA | A | A | 6 | 14 |
| COPEPOD NAUPLII | A | N | 3465 | 1509 |
| E. AFFINIS | A | C | 14 | 31 |
| P. CORONATUS | A | C | 166 | 87 |
| P. CORONATUS | F | A | 260 | 104 |
| P. CORONATUS | M | A | 74 | 65 |
| A. TONSA | A | C | 4053 | 1283 |
| A. TONSA | F | A | 4181 | 2523 |
| A. TONSA | M | A | 633 | 210 |
| HARPACTICOIDA | A | A | 42 | 52 |
| HARPACTICOIDA | A | C | 56 | 56 |
| HARPACTICOIDA | F | A | 24 | 37 |
| HARPACTICOIDA | M | A | 10 | 23 |
| SCOTTOLANA | A | A | 76 | 87 |
| SCOTTOLANA | A | C | 47 | 51 |
| SCOTTOLANA | F | A | 24 | 37 |
| ECTINOSOMA | A | A | 5156 | 3067 |
| H. FOSTERI | F | A | 45 | 50 |
| ERGASILUS | M | A | 141 | 65 |
| CIRRIPEDIA | A | N | 2057 | 596 |
| CIRRIPEDIA | A | Y | 57 | 49 |
| CRYPTONISCUS LARVAE | A | A | 10 | 23 |
| CRYPTONISCUS LARVAE | A | L | 97 | 76 |

TABLE 3.1.8-1
CONTINUED

DATE 09/13/78-09/14/78
NO. OF SAMPLES 12
WATER TEMPERATURE (C) 21.2-23.5
DISSOLVED OXYGEN (MG/L) 6.5- 8.3
PH 6.8- 6.9
SALINITY (PPT) 6.0- 9.0
PUMPS OPERATING 5-6
TOTAL VOLUME FILTERED (M3) 6.6

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 47 | 103 |
| NEMATODA | A | A | 262 | 280 |
| POLYCHAETA | A | L | 104 | 128 |
| OLIGOCHAETA | A | A | 113 | 168 |
| GASTROPODA | A | L | 1926 | 1088 |
| COPEPOD NAUPLII | A | N | 1111 | 950 |
| E. AFFINIS | M | A | 19 | 42 |
| P. CORONATUS | A | C | 19 | 42 |
| P. CORONATUS | F | A | 327 | 198 |
| P. CORONATUS | M | A | 52 | 81 |
| A. TONSA | A | C | 1461 | 738 |
| A. TONSA | F | A | 771 | 583 |
| A. TONSA | M | A | 85 | 127 |
| ECTINOSOMA | A | A | 1168 | 643 |
| O. COLCARVA | A | A | 57 | 90 |
| O. COLCARVA | A | C | 33 | 73 |
| CIRRIPEDIA | A | N | 19 | 42 |

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TABLE 3.1.8-1
CONTINUED

| | |
|---|---|
| DATE | 10/11/78 |
| NO. OF SAMPLES | 6 |
| WATER TEMPERATURE (C) | 17.3-18.0 |
| DISSOLVED OXYGEN (MG/L) | 6.9- 7.3 |
| PH | 6.9- 7.2 |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 3 |
| TOTAL VOLUME FILTERED (M3) | 2.4 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| TURBELLARIA | A | A | 8 | 21 |
| ROTIFER SPP. | A | A | 42 | 52 |
| NEMATODA | A | A | 8 | 21 |
| POLYCHAETA | A | E | 1297 | 843 |
| POLYCHAETA | A | L | 179 | 166 |
| GASTROPODA | A | L | 151 | 115 |
| OSTRACODA | A | A | 8 | 21 |
| COPEPOD NAUPLII | A | N | 892 | 355 |
| E. AFFINIS | M | A | 8 | 21 |
| P. CORONATUS | A | C | 163 | 115 |
| P. CORONATUS | F | A | 209 | 205 |
| P. CORONATUS | M | A | 97 | 139 |
| A. TONSA | A | C | 344 | 244 |
| A. TONSA | F | A | 1411 | 1012 |
| A. TONSA | M | A | 402 | 427 |
| HARPACTICOIDA | A | A | 8 | 21 |
| HARPACTICOIDA | A | C | 122 | 164 |
| SCOTTOLANA | A | C | 5 | 13 |
| ECTINOSOMA | A | A | 2335 | 902 |
| CIRRIPEDIA | A | N | 200 | 172 |
| CRYPTONISCUS LARVAE | A | L | 25 | 44 |

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TABLE 3.1.8-1
CONTINUED

| | |
|---|---|
| DATE | 11/01/78-11/02/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 13.0-14.5 |
| DISSOLVED OXYGEN (MG/L) | 8.4- 9.5 |
| PH | |
| SALINITY (PPT) | 6.0- 9.0 |
| PUMPS OPERATING | 1-2 |
| TOTAL VOLUME FILTERED (M3) | 4.6 |

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 44 | 68 |
| NEMATODA | A | A | 2 | 5 |
| POLYCHAETA | A | E | 21320 | 14330 |
| POLYCHAETA | A | L | 2960 | 1526 |
| OLIGOCHAETA | A | A | 8 | 18 |
| COPEPOD NAUPLII | A | N | 1314 | 1092 |
| E. AFFINIS | A | C | 21 | 31 |
| E. AFFINIS | F | A | 28 | 61 |
| P. CORONATUS | A | C | 35 | 43 |
| P. CORONATUS | F | A | 140 | 111 |
| P. CORONATUS | M | A | 154 | 112 |
| A. TONSA | A | C | 205 | 130 |
| A. TONSA | F | A | 225 | 132 |
| A. TONSA | M | A | 119 | 115 |
| HARPACTICOIDA | A | A | 41 | 43 |
| HARPACTICOIDA | F | A | 2 | 5 |
| S. CANADENSIS | A | A | 21 | 31 |
| ECTINOSOMA | A | A | 4010 | 2145 |
| CIRRIPEDIA | A | N | 31 | 47 |

TABLE 3.1.8-1
CONTINUED

DATE 11/21/78-11/22/78
NO. OF SAMPLES 12
WATER TEMPERATURE (C) 8.5-12.5
DISSOLVED OXYGEN (MG/L) 5.9- 8.9
PH 6.8- 7.1
SALINITY (PPT) 10.0-12.0
PUMPS OPERATING 5
TOTAL VOLUME FILTERED (M3) 4.8

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 8 | 18 |
| NEMATODA | A | A | 35 | 49 |
| POLYCHAETA | A | E | 175 | 115 |
| POLYCHAETA | A | L | 302 | 171 |
| OLIGOCHAETA | A | L | 4 | 9 |
| PELECYPODA | A | L | 19 | 37 |
| ACARINA | A | A | 6 | 14 |
| COPEPOD NAUPLII | A | N | 627 | 497 |
| E. AFFINIS | A | C | 85 | 91 |
| E. AFFINIS | M | A | 6 | 14 |
| P. CORONATUS | A | C | 25 | 32 |
| P. CORONATUS | F | A | 769 | 602 |
| P. CORONATUS | M | A | 556 | 468 |
| A. TONSA | A | C | 140 | 92 |
| A. TONSA | F | A | 196 | 72 |
| A. TONSA | M | A | 48 | 44 |
| HARPACTICOIDA | A | A | 6 | 10 |
| HARPACTICOIDA | M | A | 17 | 37 |
| ECTINOSOMA | A | A | 927 | 493 |
| CIRRIPEDIA | A | N | 27 | 37 |

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TABLE 3.1.8-1
CONTINUED

DATE 12/13/78
NO. OF SAMPLES 3
WATER TEMPERATURE (C) 5.0- 5.8
DISSOLVED OXYGEN (MG/L) 10.1-11.0
PH 7.1- 7.4
SALINITY (PPT) 5.0- 6.0
PUMPS OPERATING 2-3
TOTAL VOLUME FILTERED (M3) 1.8

| TAXON | SEX | LIFE STAGE | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|---|---|
| ROTIFER SPP. | A | A | 889 | 912 |
| NOTHOLCA | A | A | 178 | 382 |
| K. QUADRATA | A | A | 22 | 96 |
| K. BOSTONIENSIS | A | A | 22 | 96 |
| SYNCHAETA | A | A | 44 | 96 |
| F. LONGISETA | A | A | 22 | 96 |
| P. HUDSONI | A | A | 22 | 96 |
| POLYCHAETA | A | E | 533 | 287 |
| POLYCHAETA | A | L | 111 | 191 |
| GASTROPODA | A | L | 22 | 96 |
| PELECYPODA | A | L | 22 | 96 |
| COPEPOD NAUPLII | A | N | 2156 | 1659 |
| E. AFFINIS | A | C | 333 | 1159 |
| E. AFFINIS | F | A | 44 | 96 |
| E. AFFINIS | M | A | 200 | 438 |
| P. CORONATUS | A | C | 44 | 191 |
| P. CORONATUS | M | A | 22 | 96 |
| HARPACTICOIDA | A | C | 44 | 96 |
| ECTINOSOMA | A | A | 1222 | 1127 |
| H. FOSTERI | A | C | 22 | 96 |
| C. BICUSPIDATUS | A | A | 22 | 96 |
| CIRRIPEDIA | A | N | 22 | 96 |

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TABLE 3.1.8-2

RANK, TOTAL NUMBER, ANNUAL MEAN DENSITY AND PERCENT TOTAL CATCH OF MICROZOOPLANKTON - 1978.

| | |
|---|---|
| DATE | 01/01/78-12/31/78 |
| NO. OF SAMPLES | 141 |
| WATER TEMPERATURE (C) | 0.6-28.7 |
| DISSOLVED OXYGEN (MG/L) | 5.1-14.9 |
| PH | 6.5- 7.6 |
| SALINITY (PPT) | 1.0-12.0 |
| PUMPS OPERATING | 1-6 |
| TOTAL VOLUME FILTERED (M3) | 60.0 |

| TAXON | LIFE STAGE | SEX | RANK | NUMBER | NUMBERS/CUBIC METER | PERCENT |
|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 1 | 663047 | 11051 | 28.6 |
| COPEPOD NAUPLII | N | A | 2 | 414919 | 6915 | 17.9 |
| GASTROPODA | L | A | 3 | 234007 | 3900 | 10.1 |
| ECTINOSOMA | A | A | 4 | 173538 | 2892 | 7.5 |
| POLYCHAETA | E | A | 5 | 143653 | 2394 | 6.2 |
| A. TONSA | A | F | 6 | 121002 | 2017 | 5.2 |
| A. TONSA | C | A | 7 | 117307 | 1955 | 5.1 |
| P. CORONATUS | A | F | 8 | 93062 | 1551 | 4.0 |
| P. CORONATUS | A | M | 9 | 65720 | 1095 | 2.8 |
| E. AFFINIS | C | A | 10 | 48516 | 809 | 2.1 |
| CIRRIPEDIA | N | A | 11 | 37974 | 633 | 1.6 |
| P. CORONATUS | C | A | 12 | 35510 | 592 | 1.5 |
| POLYCHAETA | L | A | 13 | 35069 | 584 | 1.5 |
| A. TONSA | A | M | 14 | 34916 | 582 | 1.5 |
| E. AFFINIS | A | M | 15 | 18250 | 304 | 0.8 |
| E. AFFINIS | A | F | 16 | 13502 | 225 | 0.6 |
| NEMATODA | A | A | 17 | 13440 | 224 | 0.6 |
| B. ANGULARIS | A | A | 18 | 8172 | 136 | 0.4 |
| HARPACTICOIDA | A | A | 19 | 7225 | 120 | 0.3 |
| ECTINOSOMA | C | A | 20 | 7000 | 117 | 0.3 |
| NOTHOLCA | A | A | 21 | 6238 | 104 | 0.3 |
| ROTIFERA A | A | A | 22 | 3395 | 57 | 0.1 |
| SCOTTOLANA | A | A | 23 | 3183 | 53 | 0.1 |
| SCOTTOLANA | C | A | 24 | 2236 | 37 | 0.1 |
| CRYPTONISCUS LARVAE | L | A | 25 | 1689 | 28 | 0.1 |
| HARPACTICOIDA | C | A | 26 | 1373 | 23 | 0.1 |
| H. FOSTERI | A | F | 27 | 1273 | 21 | 0.1 |
| KERATELLA | A | A | 28 | 980 | 16 | * |
| INVERT. EGG | E | A | 29 | 893 | 15 | * |
| B. URCEOLARIS | A | A | 30 | 880 | 15 | * |
| TURBELLARIA | L | A | 31 | 879 | 15 | * |
| ERGASILUS | A | M | 32 | 674 | 11 | * |
| S. CANADENSIS | A | A | 33 | 623 | 10 | * |
| TARDIGRADA | A | A | 34 | 615 | 10 | * |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-2
CONTINUED

| TAXON | LIFE STAGE | SEX | RANK | NUMBER | NUMBERS/CUBIC METER | PERCENT |
|---|---|---|---|---|---|---|
| OLIGOCHAETA | A | A | 35 | 580 | 10 | * |
| O. COLCARVA | A | A | 36 | 480 | 8 | * |
| R. CAUDATUS | A | A | 37 | 460 | 8 | * |
| MOINA | A | A | 38 | 455 | 8 | * |
| B. CALYCIFLORUS | A | A | 38 | 455 | 8 | * |
| C. VERNALIS | C | A | 40 | 440 | 7 | * |
| PELECYPODA | L | A | 41 | 430 | 7 | * |
| O. COLCARVA | A | F | 42 | 390 | 7 | * |
| S. CANADENSIS | C | A | 43 | 375 | 6 | * |
| C. BICUSPIDATUS | C | A | 44 | 358 | 6 | * |
| SCOTTOLANA | A | F | 45 | 347 | 6 | * |
| CIRRIPEDIA | Y | A | 46 | 273 | 5 | * |
| O. COLCARVA | C | A | 47 | 260 | 4 | * |
| E. AFFINIS | A | A | 48 | 250 | 4 | * |
| K. QUADRATA | A | A | 49 | 225 | 4 | * |
| S. CANADENSIS | A | F | 50 | 221 | 4 | * |
| TURBELLARIA | A | A | 51 | 213 | 4 | * |
| H. FOSTERI | C | A | 52 | 190 | 3 | * |
| DIAPTOMUS | A | M | 53 | 180 | 3 | * |
| BDELLOIDEA | A | A | 54 | 175 | 3 | * |
| ASPLANCHNA | A | A | 55 | 160 | 3 | * |
| BOSMINA | A | A | 55 | 160 | 3 | * |
| ROTARIA | A | A | 55 | 160 | 3 | * |
| CYCLOPS | C | A | 55 | 160 | 3 | * |
| C. VERNALIS | A | M | 55 | 160 | 3 | * |
| ACARINA | A | A | 60 | 150 | 3 | * |
| O. COLCARVA | A | M | 61 | 140 | 2 | * |
| K. VALGA | A | A | 62 | 133 | 2 | * |
| HARPACTICOIDA | A | M | 63 | 130 | 2 | * |
| HARPACTICOIDA | A | F | 64 | 127 | 2 | * |
| ERGASILUS | C | A | 65 | 120 | 2 | * |
| PARADICRANOPHORUS | A | A | 66 | 100 | 2 | * |
| C. VERNALIS | A | F | 66 | 100 | 2 | * |
| C. VERNALIS | A | A | 66 | 100 | 2 | * |
| H. FOSTERI | A | M | 66 | 100 | 2 | * |
| P. CRASSIROSTRIS | A | F | 66 | 100 | 2 | * |
| BRANCHIONUS | A | A | 71 | 88 | 1 | * |
| T. LONGICORNIS | A | A | 71 | 88 | 1 | * |
| DIAPTOMUS | C | A | 73 | 80 | 1 | * |
| SYNCHAETA | A | A | 73 | 80 | 1 | * |
| COPEPODA | C | A | 75 | 75 | 1 | * |
| P. CRASSIROSTRIS | A | A | 76 | 60 | 1 | * |
| CRYPTONISCUS LARVAE | A | A | 77 | 50 | 1 | * |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-2
CONTINUED

| TAXON | LIFE STAGE | SEX | RANK | NUMBER | NUMBERS/CUBIC METER | PERCENT |
|---|---|---|---|---|---|---|
| B. QUADRIDENTATUS | A | A | 77 | 50 | 1 | * |
| K. BOSTONIENSIS | A | A | 79 | 40 | 1 | * |
| P. HUDSONI | A | A | 79 | 40 | 1 | * |
| F. LONGISETA | A | A | 79 | 40 | 1 | * |
| C. BICUSPIDATUS | A | A | 79 | 40 | 1 | * |
| OLIGOCHAETA | L | A | 83 | 20 | * | * |
| OSTRACODA | A | A | 83 | 20 | * | * |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-3
SUMMARY BY DATE OF INITIAL AND LATENT MEAN PERCENT SURVIVAL,
MICROZOOPLANKTON -1978.

| | | | |
|---|---|---|---|
| DATE | 04/19/78 - 04/20/78 | | |
| LOCATION | INTAKE | | |
| COLLECTION TIME | 1042 | - | 0459 |
| WATER TEMP. (C) | 10.2 | - | 11.0 |
| COND. DELTA T (C) | . | - | |
| DISS. OXYGEN (MG/L) | 8.8 | - | 11.0 |
| SALINITY (PPT) | 5.5 | - | 8.0 |
| VOLUME FILTERED (M3) | 3.6 | | |

LIFESTAGE KEY: A = ADULT
C = COPEPODID
L = LARVAE
N = NAUPLII
Y = CYPRIS LARVAE

| TAXON | SEX | LIFE STAGE | 0000 TOTAL NUMBER | 0000 PERCENT LIVE | 0000 PERCENT STUNNED | 0000 PERCENT DEAD | 0200 TOTAL NUMBER | 0200 PERCENT LIVE | 0200 PERCENT STUNNED | 0200 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROTARIA | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| NOTHOLCA | A | A | 10 | 100 | 0 | 0 | 7 | 85 | 0 | 14 |
| KERATELLA | A | A | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 100 |
| BRANCHIONUS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. CALYCIFLORUS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| POLYCHAETA | A | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PELECYPODA | A | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOSMINA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 91 | 81 | 8 | 9 | 85 | 89 | 3 | 7 |
| T. LONGICORNIS | F | A | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| E. AFFINIS | A | C | 8 | 87 | 12 | 0 | 7 | 85 | 0 | 14 |
| E. AFFINIS | F | A | 3 | 33 | 66 | 0 | 3 | 100 | 0 | 0 |
| E. AFFINIS | M | A | 9 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| DIAPTOMUS | M | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 1 | 100 | 0 | 0 | 2 | 50 | 0 | 50 |
| ECTINOSOMA | A | C | 3 | 33 | 0 | 66 | 0 | 0 | 0 | 0 |
| H. FOSTERI | F | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CYCLOPS | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TARDIGRADA | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-3
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 2 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| ROTARIA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NOTHOLCA | A | A | 10 | 50 | 30 | 20 | 5 | 40 | 20 | 40 |
| KERATELLA | A | A | 1 | 0 | 0 | 100 | 1 | 0 | 0 | 100 |
| BRANCHIONUS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. CALYCIFLORUS | A | A | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 2 | 50 | 0 | 50 | 1 | 0 | 0 | 100 |
| POLYCHAETA | A | E | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| PELECYPODA | A | L | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| BOSMINA | A | A | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 100 |
| COPEPOD NAUPLII | A | N | 113 | 92 | 0 | 7 | 83 | 90 | 3 | 6 |
| T. LONGICORNIS | F | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E. AFFINIS | A | C | 21 | 76 | 0 | 23 | 14 | 85 | 7 | 7 |
| E. AFFINIS | F | A | 4 | 50 | 25 | 25 | 0 | 0 | 0 | 0 |
| E. AFFINIS | M | A | 5 | 80 | 0 | 20 | 0 | 0 | 0 | 0 |
| DIAPTOMUS | M | A | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | A | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 100 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 100 |
| ECTINOSOMA | A | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H. FOSTERI | F | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| CYCLOPS | A | C | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| TARDIGRADA | A | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-3
CONTINUED

1200

| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 1 | 100 | 0 | 0 |
| ROTARIA | A | A | 0 | 0 | 0 | 0 |
| NOTHOLCA | A | A | 1 | 0 | 0 | 100 |
| KERATELLA | A | A | 2 | 50 | 50 | 0 |
| BRANCHIONUS | A | A | 1 | 100 | 0 | 0 |
| B. CALYCIFLORUS | A | A | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 4 | 25 | 25 | 50 |
| POLYCHAETA | A | E | 0 | 0 | 0 | 0 |
| PELECYPODA | A | L | 0 | 0 | 0 | 0 |
| BOSMINA | A | A | 0 | 0 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 93 | 80 | 7 | 11 |
| T. LONGICORNIS | F | A | 0 | 0 | 0 | 0 |
| E. AFFINIS | A | C | 18 | 77 | 11 | 11 |
| E. AFFINIS | F | A | 1 | 0 | 0 | 100 |
| E. AFFINIS | M | A | 7 | 100 | 0 | 0 |
| DIAPTOMUS | M | A | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | A | 3 | 0 | 0 | 100 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | C | 1 | 0 | 0 | 100 |
| H. FOSTERI | F | A | 0 | 0 | 0 | 0 |
| CYCLOPS | A | C | 0 | 0 | 0 | 0 |
| TARDIGRADA | A | A | 0 | 0 | 0 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-3
CONTINUED

DATE 04/19/78 - 04/20/78
LOCATION DISCHARGE
COLLECTION TIME 1044 - 0505
WATER TEMP. (C) 10.9 - 11.5
COND. DELTA T (C) -
DISS. OXYGEN (MG/L) 8.4 - 10.2
SALINITY (PPT) 5.5 - 8.0
VOLUME FILTERED (M3) 2.8

LIFESTAGE KEY: A = ADULT
C = COPEPODID
L = LARVAE
N = NAUPLII
Y = CYPRIS LARVAE

| TAXON | SEX | LIFE STAGE | 0000 TOTAL NUMBER | 0000 PERCENT LIVE | 0000 PERCENT STUNNED | 0000 PERCENT DEAD | 0200 TOTAL NUMBER | 0200 PERCENT LIVE | 0200 PERCENT STUNNED | 0200 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| TURBELLARIA | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROTIFER SPP. | A | A | 1 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| NOTHOLCA | A | A | 12 | 75 | 16 | 8 | 6 | 83 | 0 | 16 |
| KERATELLA | A | A | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 100 |
| B. CALYCIFLORUS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 2 | 100 | 0 | 0 | 3 | 33 | 33 | 33 |
| POLYCHAETA | A | E | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| BOSMINA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OSTRACODA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 154 | 92 | 4 | 2 | 134 | 88 | 2 | 8 |
| E. AFFINIS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E. AFFINIS | A | C | 12 | 83 | 0 | 16 | 18 | 83 | 11 | 5 |
| E. AFFINIS | F | A | 5 | 80 | 20 | 0 | 4 | 100 | 0 | 0 |
| E. AFFINIS | M | A | 6 | 100 | 0 | 0 | 4 | 100 | 0 | 0 |
| HARPACTICOIDA | A | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 2 | 50 | 0 | 50 | 6 | 33 | 66 | 0 |
| ECTINOSOMA | A | C | 1 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| C. BICUSPIDATUS | F | A | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-3
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| TURBELLARIA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NOTHOLCA | A | A | 6 | 83 | 16 | 0 | 4 | 100 | 0 | 0 |
| KERATELLA | A | A | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 100 |
| B. CALYCIFLORUS | A | A | 1 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| POLYCHAETA | A | E | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| BOSMINA | A | A | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| OSTRACODA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 202 | 94 | 3 | 1 | 129 | 87 | 8 | 3 |
| E. AFFINIS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| E. AFFINIS | A | C | 30 | 90 | 0 | 10 | 8 | 87 | 0 | 12 |
| E. AFFINIS | F | A | 3 | 100 | 0 | 0 | 6 | 83 | 16 | 0 |
| E. AFFINIS | M | A | 0 | 0 | 0 | 0 | 5 | 100 | 0 | 0 |
| HARPACTICOIDA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 5 | 80 | 0 | 20 | 3 | 33 | 0 | 66 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| C. BICUSPIDATUS | F | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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TABLE 3.1.8-3
CONTINUED

1200

| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| TURBELLARIA | A | A | 0 | 0 | 0 | 0 |
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 |
| NOTHOLCA | A | A | 8 | 62 | 12 | 25 |
| KERATELLA | A | A | 0 | 0 | 0 | 0 |
| B. CALYCIFLORUS | A | A | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 0 | 0 | 0 | 0 |
| POLYCHAETA | A | E | 0 | 0 | 0 | 0 |
| BOSMINA | A | A | 0 | 0 | 0 | 0 |
| OSTRACODA | A | A | 2 | 100 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 147 | 81 | 8 | 10 |
| E. AFFINIS | A | A | 1 | 0 | 0 | 100 |
| E. AFFINIS | A | C | 8 | 100 | 0 | 0 |
| E. AFFINIS | F | A | 4 | 100 | 0 | 0 |
| E. AFFINIS | M | A | 5 | 60 | 0 | 40 |
| HARPACTICOIDA | A | A | 1 | 100 | 0 | 0 |
| HARPACTICOIDA | A | C | 1 | 100 | 0 | 0 |
| ECTINOSOMA | A | A | 2 | 0 | 0 | 100 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 |
| C. BICUSPIDATUS | F | A | 1 | 100 | 0 | 0 |

IA SALEM EN 1978

3.1-414

TABLE 3.1.8-3
CONTINUED

DATE 06/28/78 - 06/29/78
LOCATION INTAKE
COLLECTION TIME 1530 - 0647
WATER TEMP. (C) 21.0 - 26.8
COND. DELTA T (C) 3.8 - 6.1
DISS. OXYGEN (MG/L) 6.7 - 8.4
SALINITY (PPT) 4.0 - 6.0
VOLUME FILTERED (M3) 4.0

LIFESTAGE KEY: A = ADULT
C = COPEPODID
L = LARVAE
N = NAUPLII
Y = CYPRIS LARVAE

| | | | 0000 | | | | 0200 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
| ROTIFER SPP. | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. ANGULARIS | A | A | 1 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| B. CAUDATUS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ASPLANCHNA | A | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| NEMATODA | A | A | 1 | 100 | 0 | 0 | 3 | 100 | 0 | 0 |
| GASTROPODA | A | A | 0 | 0 | 0 | 0 | 3 | 66 | 0 | 33 |
| GASTROPODA | A | L | 5 | 40 | 20 | 40 | 6 | 83 | 0 | 16 |
| MOINA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 113 | 71 | 15 | 13 | 77 | 71 | 6 | 22 |
| E. AFFINIS | A | C | 28 | 85 | 10 | 3 | 13 | 61 | 7 | 30 |
| E. AFFINIS | F | A | 6 | 66 | 16 | 16 | 8 | 75 | 12 | 12 |
| E. AFFINIS | M | A | 7 | 71 | 0 | 28 | 2 | 50 | 0 | 50 |
| P. CORONATUS | A | C | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. CORONATUS | F | A | 7 | 85 | 0 | 14 | 3 | 66 | 0 | 33 |
| P. CORONATUS | M | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| A. TONSA | A | C | 2 | 50 | 0 | 50 | 7 | 42 | 28 | 28 |
| A. TONSA | F | A | 21 | 85 | 14 | 0 | 17 | 64 | 11 | 23 |
| A. TONSA | M | A | 5 | 60 | 0 | 40 | 6 | 50 | 33 | 16 |
| HARPACTICOIDA | A | A | 2 | 50 | 50 | 0 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SCOTTOLANA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SCOTTOLANA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 3 | 33 | 33 | 33 | 5 | 40 | 40 | 20 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H. FOSTERI | F | A | 1 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| H. FOSTERI | M | A | 1 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| C. VERNALIS | F | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C. VERNALIS | M | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 5 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |

TABLE 3.1.8-3
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. ANGULARIS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. CAUDATUS | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| ASPLANCHNA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| GASTROPODA | A | A | 1 | 100 | 0 | 0 | 4 | 75 | 0 | 25 |
| GASTROPODA | A | L | 7 | 42 | 0 | 57 | 5 | 80 | 0 | 20 |
| MOINA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 107 | 64 | 2 | 32 | 68 | 54 | 4 | 41 |
| E. AFFINIS | A | C | 29 | 65 | 3 | 31 | 11 | 63 | 0 | 36 |
| E. AFFINIS | F | A | 3 | 66 | 0 | 33 | 2 | 100 | 0 | 0 |
| E. AFFINIS | M | A | 12 | 83 | 0 | 16 | 5 | 100 | 0 | 0 |
| P. CORONATUS | A | C | 0 | 0 | 0 | 0 | 3 | 100 | 0 | 0 |
| P. CORONATUS | F | A | 6 | 100 | 0 | 0 | 7 | 57 | 0 | 42 |
| P. CORONATUS | M | A | 1 | 100 | 0 | 0 | 4 | 100 | 0 | 0 |
| A. TONSA | A | C | 10 | 50 | 20 | 30 | 11 | 72 | 0 | 27 |
| A. TONSA | F | A | 26 | 65 | 11 | 23 | 25 | 56 | 12 | 32 |
| A. TONSA | M | A | 10 | 40 | 20 | 40 | 10 | 60 | 10 | 30 |
| HARPACTICOIDA | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | C | 1 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| SCOTTOLANA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SCOTTOLANA | A | C | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 1 | 100 | 0 | 0 | 1 | 0 | 100 | 0 |
| ECTINOSOMA | A | C | 5 | 60 | 20 | 20 | 0 | 0 | 0 | 0 |
| H. FOSTERI | F | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H. FOSTERI | M | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C. VERNALIS | F | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| C. VERNALIS | M | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 5 | 80 | 0 | 20 | 3 | 100 | 0 | 0 |

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TABLE 3.1.8-3
CONTINUED

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| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 |
| B. ANGULARIS | A | A | 1 | 100 | 0 | 0 |
| B. CAUDATUS | A | A | 0 | 0 | 0 | 0 |
| ASPLANCHNA | A | A | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 2 | 100 | 0 | 0 |
| GASTROPODA | A | A | 2 | 50 | 0 | 50 |
| GASTROPODA | A | L | 5 | 80 | 0 | 20 |
| MOINA | A | A | 1 | 100 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 33 | 90 | 0 | 9 |
| E. AFFINIS | A | C | 18 | 61 | 5 | 33 |
| E. AFFINIS | F | A | 5 | 100 | 0 | 0 |
| E. AFFINIS | M | A | 4 | 25 | 25 | 50 |
| P. CORONATUS | A | C | 2 | 100 | 0 | 0 |
| P. CORONATUS | F | A | 6 | 83 | 0 | 16 |
| P. CORONATUS | M | A | 0 | 0 | 0 | 0 |
| A. TONSA | A | C | 5 | 60 | 0 | 40 |
| A. TONSA | F | A | 41 | 60 | 2 | 36 |
| A. TONSA | M | A | 4 | 50 | 0 | 50 |
| HARPACTICOIDA | A | A | 4 | 25 | 25 | 50 |
| HARPACTICOIDA | A | C | 1 | 0 | 0 | 100 |
| SCOTTOLANA | A | A | 1 | 100 | 0 | 0 |
| SCOTTOLANA | A | C | 3 | 100 | 0 | 0 |
| ECTINOSOMA | A | A | 5 | 80 | 0 | 20 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 |
| H. FOSTERI | F | A | 1 | 100 | 0 | 0 |
| H. FOSTERI | M | A | 0 | 0 | 0 | 0 |
| C. VERNALIS | F | A | 0 | 0 | 0 | 0 |
| C. VERNALIS | M | A | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 7 | 71 | 0 | 28 |

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TABLE 3.1.8-3
CONTINUED

| | |
|---|---|
| DATE | 06/28/78 - 06/29/78 |
| LOCATION | DISCHARGE |
| COLLECTION TIME | 1534 - 0651 |
| WATER TEMP. (C) | 29.0 - 30.2 |
| COND. DELTA T (C) | 3.8 - 6.1 |
| DISS. OXYGEN (MG/L) | 5.2 - 6.9 |
| SALINITY (PPT) | 4.0 - 6.0 |
| VOLUME FILTERED (M3) | 3.6 |

LIFESTAGE KEY: A = ADULT
C = COPEPODID
L = LARVAE
N = NAUPLII
Y = CYPRIS LARVAE

| | | | 0000 | | | | 0200 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| B. CALYCIFLORUS | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. ANGULARIS | A | A | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| B. CAUDATUS | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 2 | 50 | 0 | 50 | 1 | 100 | 0 | 0 |
| POLYCHAETA | A | L | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| GASTROPODA | A | L | 11 | 63 | 0 | 36 | 7 | 100 | 0 | 0 |
| ACARINA | A | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| OSTRACODA | A | A | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 90 | 72 | 13 | 14 | 64 | 59 | 10 | 29 |
| E. AFFINIS | A | C | 17 | 82 | 0 | 17 | 13 | 92 | 0 | 7 |
| E. AFFINIS | F | A | 5 | 60 | 20 | 20 | 3 | 100 | 0 | 0 |
| E. AFFINIS | M | A | 1 | 100 | 0 | 0 | 3 | 100 | 0 | 0 |
| DIAPTOMUS | A | C | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| P. CORONATUS | A | C | 2 | 50 | 0 | 50 | 0 | 0 | 0 | 0 |
| P. CORONATUS | F | A | 7 | 71 | 0 | 28 | 9 | 77 | 0 | 22 |
| P. CORONATUS | M | A | 5 | 80 | 20 | 0 | 2 | 100 | 0 | 0 |
| A. TONSA | A | C | 13 | 69 | 0 | 30 | 15 | 73 | 0 | 26 |
| A. TONSA | F | A | 9 | 55 | 0 | 44 | 8 | 87 | 0 | 12 |
| A. TONSA | M | A | 4 | 25 | 25 | 50 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SCOTTOLANA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SCOTTOLANA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 5 | 40 | 20 | 40 | 1 | 0 | 100 | 0 |
| ECTINOSOMA | A | C | 2 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| CYCLOPS | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 6 | 83 | 16 | 0 | 1 | 100 | 0 | 0 |
| CRYPTONISCUS LARVAE | A | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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TABLE 3.1.8-3
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. CALYCIFLORUS | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. ANGULARIS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. CAUDATUS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| POLYCHAETA | A | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GASTROPODA | A | L | 8 | 87 | 0 | 12 | 6 | 83 | 0 | 16 |
| ACARINA | A | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| OSTRACODA | A | A | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 100 |
| COPEPOD NAUPLII | A | N | 96 | 68 | 9 | 21 | 59 | 62 | 0 | 37 |
| E. AFFINIS | A | C | 26 | 88 | 3 | 7 | 15 | 53 | 6 | 40 |
| E. AFFINIS | F | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| E. AFFINIS | M | A | 6 | 83 | 16 | 0 | 1 | 100 | 0 | 0 |
| DIAPTOMUS | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. CORONATUS | A | C | 3 | 100 | 0 | 0 | 3 | 0 | 0 | 100 |
| P. CORONATUS | F | A | 17 | 76 | 0 | 23 | 13 | 53 | 0 | 46 |
| P. CORONATUS | M | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| A. TONSA | A | C | 18 | 55 | 5 | 38 | 8 | 37 | 0 | 62 |
| A. TONSA | F | A | 14 | 71 | 0 | 28 | 24 | 50 | 0 | 50 |
| A. TONSA | M | A | 10 | 70 | 10 | 20 | 10 | 50 | 0 | 50 |
| HARPACTICOIDA | A | A | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 100 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| SCOTTOLANA | A | A | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| SCOTTOLANA | A | C | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| ECTINOSOMA | A | A | 5 | 20 | 40 | 40 | 8 | 37 | 0 | 62 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 | 3 | 100 | 0 | 0 |
| CYCLOPS | A | C | 1 | 100 | 0 | 0 | 0. | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 2 | 100 | 0 | 0 | 4 | 100 | 0 | 0 |
| CRYPTONISCUS LARVAE | A | L | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |

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TABLE 3.1.8-3
CONTINUED

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| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 |
| B. CALYCIFLORUS | A | A | 1 | 100 | 0 | 0 |
| B. ANGULARIS | A | A | 0 | 0 | 0 | 0 |
| B. CAUDATUS | A | A | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 0 | 0 | 0 | 0 |
| POLYCHAETA | A | L | 1 | 100 | 0 | 0 |
| GASTROPODA | A | L | 7 | 100 | 0 | 0 |
| ACARINA | A | A | 0 | 0 | 0 | 0 |
| OSTRACODA | A | A | 1 | 0 | 0 | 100 |
| COPEPOD NAUPLII | A | N | 32 | 75 | 0 | 25 |
| E. AFFINIS | A | C | 11 | 81 | 9 | 9 |
| E. AFFINIS | F | A | 4 | 75 | 0 | 25 |
| E. AFFINIS | M | A | 5 | 100 | 0 | 0 |
| DIAPTOMUS | A | C | 0 | 0 | 0 | 0 |
| P. CORONATUS | A | C | 0 | 0 | 0 | 0 |
| P. CORONATUS | F | A | 12 | 100 | 0 | 0 |
| P. CORONATUS | M | A | 3 | 66 | 0 | 33 |
| A. TONSA | A | C | 8 | 87 | 0 | 12 |
| A. TONSA | F | A | 14 | 71 | 0 | 28 |
| A. TONSA | M | A | 2 | 50 | 0 | 50 |
| HARPACTICOIDA | A | A | 0 | 0 | 0 | 0 |
| HARPACTICOIDA | A | C | 0 | 0 | 0 | 0 |
| SCOTTOLANA | A | A | 1 | 0 | 0 | 100 |
| SCOTTOLANA | A | C | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 13 | 46 | 0 | 53 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 |
| CYCLOPS | A | C | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 1 | 0 | 0 | 100 |
| CRYPTONISCUS LARVAE | A | L | 0 | 0 | 0 | 0 |

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TABLE 3.1.8-3
CONTINUED

DATE 09/13/78 - 09/14/78
LOCATION INTAKE
COLLECTION TIME 0953 - 0502
WATER TEMP. (C) 21.2 - 23.5
COND. DELTA T (C) 8.2 - 11.1
DISS. OXYGEN (MG/L) 6.5 - 8.3
SALINITY (PPT) 6.0 - 9.0
VOLUME FILTERED (M3) 6.6

LIFESTAGE KEY: A = ADULT
C = COPEPODID
L = LARVAE
N = NAUPLII
Y = CYPRIS LARVAE

| | | | 0000 | | | | 0200 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 3 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| POLYCHAETA | A | L | 2 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| OLIGOCHAETA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GASTROPODA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GASTROPODA | A | L | 7 | 71 | 14 | 14 | 14 | 50 | 28 | 21 |
| COPEPOD NAUPLII | A | N | 12 | 91 | 0 | 8 | 6 | 100 | 0 | 0 |
| E. AFFINIS | M | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. CORONATUS | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. CORONATUS | F | A | 2 | 100 | 0 | 0 | 3 | 100 | 0 | 0 |
| P. CORONATUS | M | A | 0 | 0 | 0 | 0 | 1 | 0 | 100 | 0 |
| A. TONSA | A | C | 17 | 76 | 5 | 17 | 12 | 58 | 8 | 33 |
| A. TONSA | F | A | 12 | 66 | 8 | 25 | 1 | 100 | 0 | 0 |
| A. TONSA | M | A | 1 | 100 | 0 | 0 | 1 | 0 | 0 | 100 |
| ECTINOSOMA | A | A | 11 | 81 | 9 | 9 | 10 | 80 | 10 | 10 |
| O. COLCARVA | A | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| O. COLCARVA | A | C | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| CIRRIPEDIA | A | N | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |

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TABLE 3.1.8-3
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 3 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| POLYCHAETA | A | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| OLIGOCHAETA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GASTROPODA | A | A | 0 | 0 | 0 | 0 | 5 | 100 | 0 | 0 |
| GASTROPODA | A | L | 12 | 83 | 16 | 0 | 11 | 72 | 0 | 27 |
| COPEPOD NAUPLII | A | N | 7 | 71 | 0 | 28 | 4 | 75 | 0 | 25 |
| E. AFFINIS | M | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| P. CORONATUS | A | C | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| P. CORONATUS | F | A | 3 | 66 | 33 | 0 | 2 | 100 | 0 | 0 |
| P. CORONATUS | M | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| A. TONSA | A | C | 15 | 80 | 0 | 20 | 10 | 40 | 0 | 60 |
| A. TONSA | F | A | 4 | 75 | 0 | 25 | 8 | 75 | 0 | 25 |
| A. TONSA | M | A | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 8 | 75 | 0 | 25 | 8 | 75 | 12 | 12 |
| O. COLCARVA | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| O. COLCARVA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 1 | 0 | 0 | 100 |
| NEMATODA | A | A | 0 | 0 | 0 | 0 |
| POLYCHAETA | A | L | 1 | 0 | 0 | 100 |
| OLIGOCHAETA | A | A | 2 | 50 | 0 | 50 |
| GASTROPODA | A | A | 0 | 0 | 0 | 0 |
| GASTROPODA | A | L | 17 | 64 | 35 | 0 |
| COPEPOD NAUPLII | A | N | 6 | 33 | 0 | 66 |
| E. AFFINIS | M | A | 0 | 0 | 0 | 0 |
| P. CORONATUS | A | C | 0 | 0 | 0 | 0 |
| P. CORONATUS | F | A | 3 | 100 | 0 | 0 |
| P. CORONATUS | M | A | 1 | 100 | 0 | 0 |
| A. TONSA | A | C | 4 | 50 | 0 | 50 |
| A. TONSA | F | A | 6 | 66 | 0 | 33 |
| A. TONSA | M | A | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 8 | 87 | 0 | 12 |
| O. COLCARVA | A | A | 0 | 0 | 0 | 0 |
| O. COLCARVA | A | C | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 0 | 0 | 0 | 0 |

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TABLE 3.1.8-3
CONTINUED

DATE 09/13/78 - 09/14/78
LOCATION DISCHARGE
COLLECTION TIME 0957 - 0506
WATER TEMP. (C) 27.0 - 31.7
COND. DELTA T (C) 8.2 - 11.1
DISS. OXYGEN (MG/L) 4.4 - 6.0
SALINITY (PPT) 5.0 - 10.0
VOLUME FILTERED (M3) 6.6

LIFESTAGE KEY: A = ADULT
C = COPEPODID
L = LARVAE
N = NAUPLII
Y = CYPRIS LARVAE

| TAXON | SEX | LIFE STAGE | 0000 TOTAL NUMBER | 0000 PERCENT LIVE | 0000 PERCENT STUNNED | 0000 PERCENT DEAD | 0200 TOTAL NUMBER | 0200 PERCENT LIVE | 0200 PERCENT STUNNED | 0200 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROTIFERA A | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| NOTHOLCA | A | A | 2 | 50 | 0 | 50 | 0 | 0 | 0 | 0 |
| B. ANGULARIS | A | A | 2 | 50 | 0 | 50 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 5 | 0 | 0 | 100 | 13 | 23 | 0 | 76 |
| POLYCHAETA | A | E | 3 | 33 | 0 | 66 | 0 | 0 | 0 | 0 |
| POLYCHAETA | A | L | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| GASTROPODA | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| GASTROPODA | A | L | 9 | 88 | 11 | 0 | 18 | 100 | 0 | 0 |
| COPEPOD NAUPLII | A | N | 32 | 81 | 3 | 15 | 27 | 77 | 11 | 11 |
| COPEPOD NAUPLII | F | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. CORONATUS | A | C | 1 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| P. CORONATUS | F | A | 5 | 100 | 0 | 0 | 3 | 33 | 0 | 66 |
| A. TONSA | A | C | 6 | 83 | 16 | 0 | 21 | 71 | 9 | 19 |
| A. TONSA | F | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| A. TONSA | M | A | 3 | 100 | 0 | 0 | 2 | 50 | 0 | 50 |
| HARPACTICOIDA | A | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| ECTINOSOMA | A | A | 9 | 88 | 11 | 0 | 10 | 80 | 20 | 0 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| C. VERNALIS | F | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ERGASILUS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 4 | 50 | 50 | 0 | 2 | 0 | 50 | 50 |
| CRYPTONISCUS LARVAE | A | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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TABLE 3.1.8-3
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 2 | 50 | 0 | 50 | 0 | 0 | 0 | 0 |
| ROTIFERA A | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| NOTHOLCA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. ANGULARIS | A | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 11 | 0 | 0 | 100 | 1 | 0 | 0 | 100 |
| POLYCHAETA | A | E | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| POLYCHAETA | A | L | 2 | 50 | 0 | 50 | 1 | 100 | 0 | 0 |
| GASTROPODA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GASTROPODA | A | L | 7 | 85 | 14 | 0 | 15 | 73 | 0 | 26 |
| COPEPOD NAUPLII | A | N | 15 | 33 | 6 | 60 | 9 | 66 | 0 | 33 |
| COPEPOD NAUPLII | F | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| P. CORONATUS | A | C | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| P. CORONATUS | F | A | 0 | 0 | 0 | 0 | 3 | 66 | 0 | 33 |
| A. TONSA | A | C | 11 | 36 | 9 | 54 | 4 | 75 | 0 | 25 |
| A. TONSA | F | A | 1 | 100 | 0 | 0 | 3 | 33 | 0 | 66 |
| A. TONSA | M | A | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| HARPACTICOIDA | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ECTINOSOMA | A | A | 5 | 40 | 40 | 20 | 10 | 80 | 10 | 10 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C. VERNALIS | F | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| ERGASILUS | A | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | L | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| CIRRIPEDIA | A | N | 5 | 80 | 20 | 0 | 1 | 0 | 0 | 100 |
| CRYPTONISCUS LARVAE | A | L | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| ROTIFER SPP. | A | A | 0 | 0 | 0 | 0 |
| ROTIFERA A | A | A | 0 | 0 | 0 | 0 |
| NOTHOLCA | A | A | 0 | 0 | 0 | 0 |
| B. ANGULARIS | A | A | 0 | 0 | 0 | 0 |
| NEMATODA | A | A | 1 | 100 | 0 | 0 |
| POLYCHAETA | A | E | 0 | 0 | 0 | 0 |
| POLYCHAETA | A | L | 0 | 0 | 0 | 0 |
| GASTROPODA | A | A | 0 | 0 | 0 | 0 |
| GASTROPODA | A | L | 18 | 66 | 0 | 33 |
| COPEPOD NAUPLII | A | N | 9 | 55 | 11 | 33 |
| COPEPOD NAUPLII | F | A | 0 | 0 | 0 | 0 |
| P. CORONATUS | A | C | 2 | 50 | 0 | 50 |
| P. CORONATUS | F | A | 2 | 100 | 0 | 0 |
| A. TONSA | A | C | 8 | 62 | 0 | 37 |
| A. TONSA | F | A | 3 | 33 | 0 | 66 |
| A. TONSA | M | A | 1 | 0 | 0 | 100 |
| HARPACTICOIDA | A | A | 1 | 100 | 0 | 0 |
| ECTINOSOMA | A | A | 8 | 87 | 0 | 12 |
| ECTINOSOMA | A | C | 0 | 0 | 0 | 0 |
| C. VERNALIS | F | A | 0 | 0 | 0 | 0 |
| ERGASILUS | A | A | 1 | 100 | 0 | 0 |
| CIRRIPEDIA | A | L | 0 | 0 | 0 | 0 |
| CIRRIPEDIA | A | N | 1 | 0 | 0 | 100 |
| CRYPTONISCUS LARVAE | A | L | 1 | 0 | 100 | 0 |

TABLE 3.1-8-4
MEAN DENSITY (NUMBERS/100 CUBIC METERS), BY DATE, OF MACROINVERTEBRATE PLANKTON - 1978.

| | |
|---|---|
| DATE | 03/02/78-03/03/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 0.6- 2.1 |
| DISSOLVED OXYGEN (MG/L) | 12.1-14.2 |
| PH | 7.0 |
| SALINITY (PPT) | 3.0- 6.0 |
| PUMPS OPERATING | 6 |
| TOTAL VOLUME FILTERED (M3) | 600.0 |

| TAXON | NUMBERS/100 CUBIC METERS | ± 95% CONFIDENCE LIMIT |
|---|---|---|
| POLYCHAETA | 6.333 | 3.002 |
| OLIGOCHAETA | 0.708 | 0.903 |
| HIRUDINEA | 0.333 | 0.734 |
| N. AMERICANA | 18.108 | 10.356 |
| C. ALMYRA | 1.875 | 2.876 |
| E. TRILOBA | 0.183 | 0.404 |
| C. POLITA | 0.167 | 0.367 |
| C. LUNIFRONS | 0.667 | 1.467 |
| COROPHIUM SPP. | 24.717 | 21.330 |
| GAMMARUS SPP. | 104.592 | 39.886 |
| M. NITIDA | 0.442 | 0.972 |
| M. EDWARDSI | 12.967 | 8.856 |
| CAPRELLIDAE | 0.167 | 0.367 |
| C. SEPTEMSPINOSA | 4.425 | 3.432 |
| INSECTA | 0.217 | 0.477 |
| CHIRONOMIDAE | 0.217 | 0.477 |

TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 03/16/78-03/17/78 |
| NO. OF SAMPLES | 8 |
| WATER TEMPERATURE (C) | 2.5- 3.6 |
| DISSOLVED OXYGEN (MG/L) | 11.6-13.6 |
| PH | 7.2- 7.3 |
| SALINITY (PPT) | 1.0- 4.0 |
| PUMPS OPERATING | 2-4 |
| TOTAL VOLUME FILTERED (M3) | 400.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| POLYCHAETA | 1.250 | 1.532 |
| OLIGOCHAETA | 2.500 | 4.072 |
| N. AMERICANA | 59.000 | 49.326 |
| C. ALMYRA | 6.500 | 6.177 |
| L. PLUMULOSUS | 0.500 | 0.774 |
| COROPHIUM SPP. | 8.250 | 15.076 |
| GAMMARUS SPP. | 95.000 | 37.169 |
| M. EDWARDSI | 22.000 | 15.353 |
| C. SEPTEMSPINOSA | 2.500 | 4.623 |

TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 04/19/78-04/20/78 |
| NO. OF SAMPLES | 9 |
| WATER TEMPERATURE (C) | 10.2-11.0 |
| DISSOLVED OXYGEN (MG/L) | 8.8-11.0 |
| PH | 7.0- 7.6 |
| SALINITY (PPT) | 5.5- 8.0 |
| PUMPS OPERATING | 1 |
| TOTAL VOLUME FILTERED (M3) | 315.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| N. BACHEI | 0.311 | 0.717 |
| POLYCHAETA | 39.644 | 37.401 |
| OLIGOCHAETA | 0.633 | 1.460 |
| HIRUDINEA | 20.922 | 22.509 |
| N. AMERICANA | 6620.289 | 4757.352 |
| C. ALMYRA | 1.556 | 1.134 |
| E. TRILOBA | 1.889 | 1.894 |
| L. PLUMULOSUS | 2.522 | 2.988 |
| COROPHIUM SPP. | 16.144 | 9.384 |
| GAMMARUS SPP. | 515.200 | 176.295 |
| M. EDWARDSI | 25.678 | 19.553 |
| P. PUGIO | 0.933 | 1.076 |
| C. SEPTEMSPINOSA | 36.456 | 28.618 |
| R. HARRISII | 0.633 | 1.460 |

TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 06/28/78-06/29/78 |
| NO. OF SAMPLES | 9 |
| WATER TEMPERATURE (C) | 21.0-26.8 |
| DISSOLVED OXYGEN (MG/L) | 6.6- 8.4 |
| PH | 6.4- 7.1 |
| SALINITY (PPT) | 4.0- 6.0 |
| PUMPS OPERATING | 6 |
| TOTAL VOLUME FILTERED (M3) | 450.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| HYDROZOA | 0.222 | 0.512 |
| B. VIRGINICA | 0.222 | 0.512 |
| POLYCHAETA | 1.556 | 2.144 |
| OLIGOCHAETA | 0.889 | 1.356 |
| NUDIBRANCHIA | 44.222 | 32.643 |
| L. AESTIVA | 0.222 | 0.512 |
| ARGULUS SPP. | 1.333 | 1.719 |
| N. AMERICANA | 43075.522 | 27661.684 |
| L. AMERICANUS | 12.222 | 21.990 |
| CHIRIDOTEA SPP. | 3.333 | 2.977 |
| C. ALMYRA | 7.778 | 9.827 |
| E. TRILOBA | 103.556 | 162.073 |
| C. POLITA | 12.667 | 10.022 |
| A. MEDIALIS | 3.111 | 2.675 |
| COROPHIUM SPP. | 47.778 | 18.741 |
| GAMMARUS SPP. | 1615.333 | 697.446 |
| M. NITIDA | 0.222 | 0.512 |
| M. EDWARDSI | 1.556 | 2.144 |
| P. PUGIO | 67.778 | 50.851 |
| C. SEPTEMSPINOSA | 390.889 | 516.655 |
| BRACHYURA | 3.111 | 2.444 |
| R. HARRISII | 5149.778 | 5421.909 |
| U. MINAX | 142.222 | 230.791 |
| DIPTERA | 0.222 | 0.512 |

TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 07/12/78-07/13/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 24.0-25.0 |
| DISSOLVED OXYGEN (MG/L) | 6.2- 8.0 |
| PH | |
| SALINITY (PPT) | 5.0-10.0 |
| PUMPS OPERATING | 5-6 |
| TOTAL VOLUME FILTERED (M3) | 625.2 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| BOUGAINVILLIA SPP. | 0.167 | 0.367 |
| N. BACHEI | 2.442 | 2.379 |
| PLATYHELMINTHES | 0.333 | 0.734 |
| OLIGOCHAETA | 0.167 | 0.367 |
| HIRUDINEA | 0.167 | 0.367 |
| GASTROPODA | 0.500 | 0.790 |
| NUDIBRANCHIA | 26.275 | 9.392 |
| MACOMA SPP. | 1.000 | 1.014 |
| L. POLYPHEMUS | 0.167 | 0.367 |
| L. AESTIVA | 28.500 | 27.153 |
| ARGULUS SPP. | 3.992 | 2.027 |
| CIRRIPEDIA | 0.333 | 0.495 |
| N. AMERICANA | 18567.767 | 11662.938 |
| L. AMERICANUS | 64.658 | 62.971 |
| CHIRIDOTEA SPP. | 1.167 | 1.266 |
| C. ALMYRA | 4.167 | 3.039 |
| E. TRILOBA | 414.558 | 341.809 |
| C. POLITA | 12.167 | 15.596 |
| C. LUNIFRONS | 0.833 | 0.654 |
| A. MEDIALIS | 22.883 | 24.017 |
| COROPHIUM SPP. | 315.975 | 215.939 |
| GAMMARUS SPP. | 1573.283 | 665.528 |
| M. NITIDA | 3.108 | 2.281 |
| MONOCULODES SPP. | 0.833 | 1.008 |
| M. EDWARDSI | 5.667 | 4.750 |
| PARAPLEUSTES SPP. | 1.608 | 1.864 |
| P. PUGIO | 129.875 | 85.655 |
| C. SEPTEMSPINOSA | 89.100 | 59.264 |
| BRACHYURA | 24.050 | 21.841 |
| R. HARRISII | 14299.000 | 15258.005 |
| U. MINAX | 0.333 | 0.734 |
| CHIRONOMIDAE | 0.167 | 0.367 |

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TABLE 3.1.8-4
CONTINUED

DATE 07/27/78-07/28/78
NO. OF SAMPLES 12
WATER TEMPERATURE (C) 26.3-27.4
DISSOLVED OXYGEN (MG/L) 5.4- 6.7
PH 6.9- 7.4
SALINITY (PPT) 6.0- 8.0
PUMPS OPERATING 5
TOTAL VOLUME FILTERED (M3) 600.0

| TAXON | NUMBERS/100 CUBIC METERS | ± 95% CONFIDENCE LIMIT |
|---|---|---|
| N. BACHEI | 3.000 | 2.453 |
| PHIALIDIUM SPP. | 1.333 | 1.903 |
| B. VIRGINICA | 68.333 | 31.524 |
| D. LEUCOLENA | 0.167 | 0.367 |
| PLATYHELMINTHES | 0.167 | 0.367 |
| TURBELLARIA | 1.833 | 1.834 |
| NEMATODA | 0.167 | 0.367 |
| POLYCHAETA | 2.500 | 1.545 |
| OLIGOCHAETA | 0.500 | 0.790 |
| NUDIBRANCHIA | 76.833 | 35.164 |
| MACOMA SPP. | 0.833 | 1.008 |
| L. POLYPHEMUS | 0.333 | 0.495 |
| L. AESTIVA | 3.167 | 2.060 |
| ARGULUS SPP. | 19.833 | 9.009 |
| N. AMERICANA | 1657.833 | 1041.202 |
| L. AMERICANUS | 44.500 | 37.596 |
| C. ALMYRA | 2.500 | 2.490 |
| E. TRILOBA | 171.167 | 119.687 |
| C. POLITA | 5.167 | 4.248 |
| CIROLANA | 0.167 | 0.367 |
| C. LUNIFRONS | 2.500 | 1.637 |
| A. MEDIALIS | 6.333 | 3.786 |
| L. PLUMULOSUS | 2.833 | 2.680 |
| COROPHIUM SPP. | 305.833 | 115.641 |
| GAMMARUS SPP. | 321.667 | 189.153 |
| M. NITIDA | 11.667 | 7.144 |
| HAUSTORIIDAE | 0.167 | 0.367 |
| MONOCULODES SPP. | 1.500 | 1.545 |
| M. EDWARDSI | 7.667 | 5.548 |
| PARAPLEUSTES SPP. | 0.333 | 0.495 |
| ORCHESTIA SPP. | 0.167 | 0.367 |
| P. PUGIO | 303.167 | 104.205 |
| C. SEPTEMSPINOSA | 39.000 | 31.082 |
| BRACHYURA | 353.167 | 247.203 |
| R. HARRISII | 12945.833 | 6651.140 |
| U. MINAX | 25.833 | 26.459 |

TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 08/10/78-08/11/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 26.7-28.7 |
| DISSOLVED OXYGEN (MG/L) | 6.0- 9.8 |
| PH | 7.2- 7.4 |
| SALINITY (PPT) | 6.0 |
| PUMPS OPERATING | 4-5 |
| TOTAL VOLUME FILTERED (M3) | 600.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| HYDROZOA (MEDUSAE) | 55.833 | 50.539 |
| N. BACHEI | 1.000 | 1.484 |
| PHIALIDIUM SPP. | 3.833 | 2.787 |
| B. VIRGINICA | 29.833 | 30.010 |
| TURBELLARIA | 1.333 | 1.467 |
| S. ELLIPTICUS | 0.167 | 0.367 |
| RHYNCHOCOELA | 1.333 | 2.256 |
| ANNELIDA | 0.167 | 0.367 |
| POLYCHAETA | 3.833 | 2.198 |
| OLIGOCHAETA | 0.333 | 0.495 |
| NUDIBRANCHIA | 3.500 | 2.307 |
| MACOMA SPP. | 0.167 | 0.367 |
| L. POLYPHEMUS | 0.167 | 0.367 |
| L. AESTIVA | 2.000 | 1.533 |
| ARGULUS SPP. | 22.167 | 9.835 |
| N. AMERICANA | 6057.333 | 6121.981 |
| L. AMERICANUS | 43.333 | 50.027 |
| L. SAVIGNYI | 0.167 | 0.367 |
| C. ALMYRA | 1.667 | 1.783 |
| E. TRILOBA | 58.500 | 39.659 |
| C. POLITA | 31.833 | 24.851 |
| C. LUNIFRONS | 4.500 | 2.431 |
| A. MEDIALIS | 55.333 | 26.586 |
| AMPHIPODA | 0.167 | 0.367 |
| COROPHIUM SPP. | 703.500 | 252.872 |
| GAMMARUS SPP. | 604.167 | 422.450 |
| M. NITIDA | 24.000 | 9.131 |
| HAUSTORIIDAE | 0.333 | 0.734 |
| MONOCULODES SPP. | 4.167 | 4.107 |
| M. EDWARDSI | 23.167 | 17.164 |
| PARAPLEUSTES SPP. | 3.000 | 2.201 |
| ORCHESTIA SPP. | 0.167 | 0.367 |
| P. PUGIO | 343.667 | 149.549 |
| C. SEPTEMSPINOSA | 13.167 | 12.456 |
| BRACHYURA | 1642.167 | 976.645 |
| C. SAPIDUS | 0.167 | 0.367 |
| R. HARRISII | 1604.667 | 2792.654 |
| CHIRONOMIDAE | 0.167 | 0.367 |

TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 08/31/78-09/01/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 26.5-27.0 |
| DISSOLVED OXYGEN (MG/L) | 5.1- 6.2 |
| PH | 7.0- 7.3 |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 5-6 |
| TOTAL VOLUME FILTERED (M3) | 725.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| HYDROZOA (MEDUSAE) | 202.200 | 105.584 |
| HYDROZOA #1(MEDUSAE) | 12.775 | 9.115 |
| BOUGAINVILLIA SPP. | 0.167 | 0.367 |
| N. BACHEI | 3.992 | 4.068 |
| B. VIRGINICA | 292.208 | 228.112 |
| RHYNCHOCOELA | 0.167 | 0.367 |
| POLYCHAETA | 2.433 | 1.660 |
| HIRUDINEA | 0.167 | 0.367 |
| NUDIBRANCHIA | 1.275 | 1.244 |
| ARGULUS SPP. | 10.592 | 5.344 |
| N. AMERICANA | 10952.208 | 7370.207 |
| L. AMERICANUS | 101.658 | 100.605 |
| C. ALMYRA | 1.158 | 1.155 |
| E. TRILOBA | 589.542 | 353.184 |
| C. POLITA | 34.550 | 31.065 |
| C. LUNIFRONS | 1.983 | 1.412 |
| A. MEDIALIS | 5.758 | 3.801 |
| BOPYRIDAE | 0.333 | 0.734 |
| L. PLUMULOSUS | 0.167 | 0.367 |
| COROPHIUM SPP. | 138.592 | 59.460 |
| GAMMARUS SPP. | 737.600 | 708.238 |
| M. NITIDA | 7.600 | 7.113 |
| M. EDWARDSI | 53.258 | 44.522 |
| PARAPLEUSTES SPP. | 0.275 | 0.419 |
| ORCHESTIA SPP. | 0.333 | 0.495 |
| P. PUGIO | 274.375 | 135.465 |
| C. SEPTEMSPINOSA | 54.433 | 65.542 |
| C. SAPIDUS | 3.550 | 2.628 |
| R. HARRISII | 28.883 | 30.995 |
| U. MINAX | 148.100 | 105.926 |

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TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 09/13/78-09/14/78 |
| NO. OF SAMPLES | 10 |
| WATER TEMPERATURE (C) | 21.2-23.9 |
| DISSOLVED OXYGEN (MG/L) | 6.3- 7.9 |
| PH | 6.6- 7.4 |
| SALINITY (PPT) | 6.0- 9.0 |
| PUMPS OPERATING | 5-6 |
| TOTAL VOLUME FILTERED (M3) | 600.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| HYDROZOA (MEDUSAE) | 391.400 | 261.895 |
| HYDROZOA #1(MEDUSAE) | 18.000 | 10.811 |
| N. BACHEI | 2.800 | 3.827 |
| B. VIRGINICA | 216.800 | 168.798 |
| ACTINIARIA | 1.000 | 1.216 |
| POLYCHAETA | 3.400 | 4.105 |
| HIRUDINEA | 0.200 | 0.452 |
| NUDIBRANCHIA | 1.600 | 2.111 |
| MACOMA SPP. | 0.800 | 1.000 |
| L. AESTIVA | 2.600 | 3.238 |
| ARGULUS SPP. | 5.600 | 3.358 |
| N. AMERICANA | 77695.000 | 36101.191 |
| L. AMERICANUS | 763.000 | 591.878 |
| C. ALMYRA | 5.000 | 3.830 |
| E. TRILOBA | 3736.200 | 3595.399 |
| C. POLITA | 22.000 | 20.622 |
| C. LUNIFRONS | 1.400 | 0.966 |
| A. MEDIALIS | 23.000 | 18.632 |
| L. PLUMULOSUS | 0.600 | 1.357 |
| COROPHIUM SPP. | 51.600 | 13.552 |
| GAMMARUS SPP. | 1070.800 | 626.412 |
| M. NITIDA | 9.200 | 7.636 |
| M. EDWARDSI | 100.600 | 91.084 |
| PARAPLEUSTES SPP. | 2.000 | 1.168 |
| P. CYPRIS | 0.200 | 0.452 |
| P. PUGIO | 46.600 | 36.274 |
| C. SEPTEMSPINOSA | 360.400 | 335.983 |
| C. SAPIDUS | 15.600 | 9.930 |
| R. HARRISII | 588.000 | 672.796 |
| U. MINAX | 1.800 | 2.473 |
| CHIRONOMIDAE | 0.200 | 0.452 |

TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 10/11/78 |
| NO. OF SAMPLES | 6 |
| WATER TEMPERATURE (C) | 17.3-18.0 |
| DISSOLVED OXYGEN (MG/L) | 6.9- 7.3 |
| PH | 6.9- 7.2 |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 3-4 |
| TOTAL VOLUME FILTERED (M3) | 450.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| HYDROZOA (MEDUSAE) | 1.083 | 1.342 |
| ACTINIARIA | 0.217 | 0.557 |
| POLYCHAETA | 0.867 | 1.114 |
| NUDIBRANCHIA | 1.083 | 1.027 |
| L. AESTIVA | 5.767 | 4.747 |
| ARGULUS SPP. | 1.300 | 1.220 |
| N. AMERICANA | 2402.183 | 1397.818 |
| L. AMERICANUS | 72.850 | 45.997 |
| C. ALMYRA | 2.617 | 2.155 |
| E. TRILOBA | 386.650 | 276.620 |
| C. POLITA | 1.100 | 2.228 |
| A. MEDIALIS | 7.317 | 9.719 |
| BOPYRIDAE | 2.650 | 4.654 |
| COROPHIUM SPP. | 153.983 | 210.894 |
| GAMMARUS SPP. | 288.183 | 400.533 |
| M. NITIDA | 1.100 | 1.848 |
| M. EDWARDSI | 2.217 | 3.392 |
| PARAPLEUSTES SPP. | 62.850 | 156.195 |
| ORCHESTIA SPP. | 0.433 | 0.705 |
| P. PUGIO | 35.967 | 51.448 |
| C. SEPTEMSPINOSA | 7.067 | 9.416 |
| C. SAPIDUS | 1.967 | 1.919 |
| R. HARRISII | 7.733 | 5.021 |

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TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 11/01/78-11/02/78 |
| NO. OF SAMPLES | 8 |
| WATER TEMPERATURE (C) | 13.5-14.5 |
| DISSOLVED OXYGEN (MG/L) | 7.9- 9.5 |
| PH | |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 2 |
| TOTAL VOLUME FILTERED (M3) | 485.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| HYDROZOA (MEDUSAE) | 9.488 | 20.229 |
| ACTINIARIA | 0.250 | 0.591 |
| RHYNCHOCOELA | 0.200 | 0.473 |
| POLYCHAETA | 0.663 | 1.190 |
| HIRUDINEA | 0.750 | 0.866 |
| NUDIBRANCHIA | 0.163 | 0.384 |
| MACOMA SPP. | 0.500 | 1.182 |
| L. AESTIVA | 0.250 | 0.591 |
| N. AMERICANA | 1705.738 | 1535.008 |
| LEUCONIDAE | 0.825 | 1.951 |
| L. AMERICANUS | 171.688 | 114.442 |
| C. ALMYRA | 14.950 | 11.281 |
| E. TRILOBA | 113.650 | 87.966 |
| C. POLITA | 0.413 | 0.658 |
| A. MEDIALIS | 2.000 | 1.999 |
| BOPYRIDAE | 0.500 | 1.182 |
| COROPHIUM SPP. | 83.275 | 45.489 |
| GAMMARUS SPP. | 224.650 | 129.781 |
| M. NITIDA | 1.325 | 1.936 |
| M. EDWARDSI | 2.875 | 2.425 |
| PARAPLEUSTES SPP. | 5.225 | 2.549 |
| ORCHESTIA SPP. | 0.200 | 0.473 |
| P. CYPRIS | 0.163 | 0.384 |
| P. PUGIO | 12.225 | 15.852 |
| C. SEPTEMSPINOSA | 7.400 | 8.602 |
| C. SAPIDUS | 0.200 | 0.473 |
| R. HARRISII | 0.500 | 0.774 |

TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 11/21/78-11/22/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 8.5-12.5 |
| DISSOLVED OXYGEN (MG/L) | 5.9- 8.9 |
| PH | 6.8- 7.1 |
| SALINITY (PPT) | 10.0-15.0 |
| PUMPS OPERATING | 5 |
| TOTAL VOLUME FILTERED (M3) | 807.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| HYDROZOA (MEDUSAE) | 1.642 | 1.527 |
| POLYCHAETA | 0.275 | 0.419 |
| HIRUDINEA | 2.875 | 2.893 |
| NUDIBRANCHIA | 0.108 | 0.238 |
| L. AESTIVA | 2.250 | 1.305 |
| N. AMERICANA | 10495.042 | 4750.099 |
| L. AMERICANUS | 135.342 | 115.428 |
| C. ALMYRA | 3.325 | 2.804 |
| E. TRILOBA | 15.933 | 16.913 |
| BOPYRIDAE | 0.883 | 1.039 |
| COROPHIUM SPP. | 121.225 | 85.274 |
| GAMMARUS SPP. | 49.175 | 29.298 |
| M. NITIDA | 1.150 | 1.139 |
| M. EDWARDSI | 2.950 | 2.851 |
| PARAPLEUSTES SPP. | 4.442 | 1.679 |
| P. PUGIO | 12.017 | 13.057 |
| C. SEPTEMSPINOSA | 17.600 | 15.442 |
| C. SAPIDUS | 0.167 | 0.367 |
| R. HARRISII | 0.333 | 0.734 |

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TABLE 3.1.8-4
CONTINUED

| | |
|---|---|
| DATE | 12/13/78 |
| NO. OF SAMPLES | 6 |
| WATER TEMPERATURE (C) | 5.0- 6.0 |
| DISSOLVED OXYGEN (MG/L) | 9.9-11.0 |
| PH | 7.1- 7.4 |
| SALINITY (PPT) | 5.0- 6.0 |
| PUMPS OPERATING | 3-5 |
| TOTAL VOLUME FILTERED (M3) | 300.0 |

| TAXON | NUMBERS/100 CUBIC METERS | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| RHYNCHOCOELA | 0.667 | 1.084 |
| POLYCHAETA | 1.333 | 1.714 |
| HIRUDINEA | 3.333 | 2.168 |
| N. AMERICANA | 8475.667 | 7781.627 |
| LEUCONIDAE | 0.333 | 0.857 |
| L. AMERICANUS | 60.667 | 64.425 |
| C. ALMYRA | 9.667 | 8.121 |
| E. TRILOBA | 24.000 | 23.935 |
| COROPHIUM SPP. | 558.667 | 266.220 |
| GAMMARUS SPP. | 324.000 | 128.420 |
| M. NITIDA | 40.667 | 25.699 |
| M. EDWARDSI | 42.000 | 11.344 |
| PARAPLEUSTES SPP. | 9.333 | 9.070 |
| P. PUGIO | 3.333 | 2.542 |
| C. SEPTEMSPINOSA | 36.667 | 16.829 |
| R. HARRISII | 0.333 | 0.857 |

TABLE 3.1.8-5

RANK, TOTAL NUMBER, ANNUAL MEAN DENSITY AND PERCENT TOTAL CATCH OF MACROINVERTEBRATE PLANKTON - 1978.

| | |
|---|---|
| DATE | 03/01/78-12/31/78 |
| NO. OF SAMPLES | 128 |
| WATER TEMPERATURE (C) | 0.6-28.7 |
| DISSOLVED OXYGEN (MG/L) | 5.1-14.2 |
| PH | 6.4- 7.6 |
| SALINITY (PPT) | 1.0-15.0 |
| PUMPS OPERATING | 1-6 |
| TOTAL VOLUME FILTERED (M3) | 6857.2 |

| TAXON | RANK | NUMBER | NUMBERS/100 CUBIC METERS | PERCENT |
|---|---|---|---|---|
| N. AMERICANA | 1 | 1463423 | 21657.240 | 81.6 |
| R. HARRISII | 2 | 200004 | 2959.865 | 11.2 |
| GAMMARUS SPP. | 3 | 38731 | 573.181 | 2.2 |
| E. TRILOBA | 4 | 29681 | 439.250 | 1.7 |
| COROPHIUM SPP. | 5 | 13336 | 197.360 | 0.7 |
| BRACHYURA | 6 | 12131 | 179.527 | 0.7 |
| L. AMERICANUS | 7 | 7663 | 113.405 | 0.4 |
| P. PUGIO | 8 | 7363 | 108.965 | 0.4 |
| C. SEPTEMSPINOSA | 9 | 5197 | 76.911 | 0.3 |
| HYDROZOA (MEDUSAE) | 10 | 3689 | 54.594 | 0.2 |
| B. VIRGINICA | 11 | 3661 | 54.179 | 0.2 |
| U. MINAX | 12 | 1804 | 26.697 | 0.1 |
| N. EDWARDSI | 13 | 1486 | 21.991 | 0.1 |
| NUDIBRANCHIA | 14 | 864 | 12.786 | * |
| A. MEDIALIS | 15 | 720 | 10.655 | * |
| C. POLITA | 16 | 681 | 10.078 | * |
| M. NITIDA | 17 | 475 | 7.030 | * |
| PARAPLEUSTES SPP. | 18 | 414 | 6.127 | * |
| ARGULUS SPP. | 19 | 394 | 5.831 | * |
| C. ALMYRA | 20 | 292 | 4.321 | * |
| L. AESTIVA | 21 | 261 | 3.863 | * |
| POLYCHAETA | 22 | 258 | 3.818 | * |
| HYDROZOA #1(MEDUSAE) | 23 | 180 | 2.664 | * |
| C. SAPIDUS | 24 | 112 | 1.657 | * |
| HIRUDINEA | 25 | 103 | 1.524 | * |
| N. BACHEI | 26 | 81 | 1.199 | * |
| C. LUNIFRONS | 27 | 72 | 1.066 | * |
| MONOCULODES SPP. | 28 | 39 | 0.577 | * |
| PHIALIDIUM SPP. | 29 | 31 | 0.459 | * |
| L. PLUMULOSUS | 29 | 31 | 0.459 | * |
| OLIGOCHAETA | 31 | 26 | 0.385 | * |
| CHIRIDOTEA SPP. | 32 | 22 | 0.326 | * |
| BOPYRIDAE | 32 | 22 | 0.326 | * |
| TURBELLARIA | 34 | 19 | 0.281 | * |
| MACOMA SPP. | 34 | 19 | 0.281 | * |

* - INDICATES BELOW REPORTABLE

TABLE 3.1.8-5
CONTINUED

| TAXON | RANK | NUMBER | NUMBERS/100 CUBIC METERS | PERCENT |
|---|---|---|---|---|
| RHYNCHOCOELA | 36 | 12 | 0.178 | * |
| ORCHESTIA SPP. | 37 | 7 | 0.104 | * |
| ACTINIARIA | 37 | 7 | 0.104 | * |
| LEUCONIDAE | 39 | 5 | 0.074 | * |
| L. POLYPHEMUS | 40 | 4 | 0.059 | * |
| CHIRONOMIDAE | 40 | 4 | 0.059 | * |
| PLATYHELMINTHES | 42 | 3 | 0.044 | * |
| GASTROPODA | 42 | 3 | 0.044 | * |
| HAUSTORIIDAE | 42 | 3 | 0.044 | * |
| BOUGAINVILLIA SPP. | 45 | 2 | 0.030 | * |
| CIRRIPEDIA | 45 | 2 | 0.030 | * |
| P. CYPRIS | 45 | 2 | 0.030 | * |
| S. ELLIPTICUS | 48 | 1 | 0.015 | * |
| AMPHIPODA | 48 | 1 | 0.015 | * |
| ANNELIDA | 48 | 1 | 0.015 | * |
| L. SAVIGNYI | 48 | 1 | 0.015 | * |
| DIPTERA | 48 | 1 | 0.015 | * |
| D. LEUCOLENA | 48 | 1 | 0.015 | * |
| CIROLANA | 48 | 1 | 0.015 | * |
| NEMATODA | 48 | 1 | 0.015 | * |
| CAPRELLIDAE | 48 | 1 | 0.015 | * |
| HYDROZOA | 48 | 1 | 0.015 | * |
| INSECTA | 48 | 1 | 0.015 | * |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-6
SUMMARY BY DATE OF INITIAL AND LATENT MEAN PERCENT SURVIVAL,
MACROINVERTEBRATE PLANKTON -1978

| | | | | |
|---|---|---|---|---|
| DATE | 04/19/78 | - | 04/20/78 | |
| LOCATION | INTAKE | | | |
| COLLECTION TIME | 1127 | - | 0510 | |
| WATER TEMP. (C) | 10.2 | - | 11.0 | |
| COND. DELTA T (C) | | - | | |
| DISS. OXYGEN (MG/L) | 8.8 | - | 9.7 | |
| SALINITY (PPT) | 5.5 | - | 8.0 | |
| VOLUME FILTERED (M3) | 13.0 | | | |

LIFESTAGE KEY: A = ADULT
J = JUVENILE
M = MEGALOPS
Z = ZOEA

| TAXON | SEX | LIFE STAGE | 0000 TOTAL NUMBER | 0000 PERCENT LIVE | 0000 PERCENT STUNNED | 0000 PERCENT DEAD | 0200 TOTAL NUMBER | 0200 PERCENT LIVE | 0200 PERCENT STUNNED | 0200 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| POLYCHAETA | | A | 11 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| OLIGOCHAETA | | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| HIRUDINEA | | A | 17 | 94 | 0 | 5 | 0 | 0 | 0 | 0 |
| N. AMERICANA | | A | 3210 | 71 | 4 | 24 | 0 | 0 | 0 | 0 |
| C. POLITA | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| L. PLUMULOSUS | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| COROPHIUM SPP. | | A | 5 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| GAMMARUS SPP. | | A | 122 | 87 | 9 | 3 | 0 | 0 | 0 | 0 |
| HAUSTORIIDAE | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| M. EDWARDSI | | A | 6 | 83 | 0 | 16 | 0 | 0 | 0 | 0 |
| P. PUGIO | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| C. SEPTEMSPINOSA | | A | 15 | 66 | 26 | 6 | 0 | 0 | 0 | 0 |
| R. HARRISII | | J | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| POLYCHAETA | | A | 6 | 100 | 0 | 0 | 5 | 100 | 0 | 0 |
| OLIGOCHAETA | | A | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| HIRUDINEA | | A | 16 | 93 | 0 | 6 | 2 | 100 | 0 | 0 |
| N. AMERICANA | | A | 2841 | 39 | 1 | 58 | 647 | 36 | 2 | 61 |
| C. POLITA | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| L. PLUMULOSUS | | A | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| COROPHIUM SPP. | | A | 3 | 100 | 0 | 0 | 4 | 100 | 0 | 0 |
| GAMMARUS SPP. | | A | 70 | 91 | 1 | 7 | 101 | 97 | 0 | 1 |
| HAUSTORIIDAE | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| M. EDWARDSI | | A | 3 | 100 | 0 | 0 | 3 | 33 | 0 | 66 |
| P. PUGIO | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| C. SEPTEMSPINOSA | | A | 7 | 85 | 0 | 14 | 9 | 88 | 0 | 11 |
| R. HARRISII | | J | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |

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TABLE 3.1.8-6
CONTINUED

| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| | | | 1200 | | | |
| POLYCHAETA | | A | 11 | 100 | 0 | 0 |
| OLIGOCHAETA | | A | 2 | 100 | 0 | 0 |
| HIRUDINEA | | A | 17 | 94 | 0 | 5 |
| N. AMERICANA | | A | 3210 | 33 | 1 | 65 |
| C. POLITA | | A | 1 | 100 | 0 | 0 |
| L. PLUMULOSUS | | A | 1 | 100 | 0 | 0 |
| COROPHIUM SPP. | | A | 5 | 100 | 0 | 0 |
| GAMMARUS SPP. | | A | 122 | 91 | 2 | 5 |
| HAUSTORIIDAE | | A | 1 | 100 | 0 | 0 |
| M. EDWARDSI | | A | 6 | 66 | 0 | 33 |
| P. PUGIO | | A | 1 | 100 | 0 | 0 |
| C. SEPTEMSPINOSA | | A | 15 | 86 | 0 | 13 |
| R. HARRISII | | J | 1 | 100 | 0 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-6
CONTINUED

| | | | |
|---|---|---|---|
| DATE | 04/19/78 - 04/20/78 | | |
| LOCATION | DISCHARGE | | |
| COLLECTION TIME | 1133 | - | 0516 |
| WATER TEMP. (C) | 10.9 | - | 11.5 |
| COND. DELTA T (C) | | - | |
| DISS. OXYGEN (MG/L) | 8.1 | - | 9.9 |
| SALINITY (PPT) | 5.5 | - | 8.0 |
| VOLUME FILTERED (M3) | 13.0 | | |

LIFESTAGE KEY: A = ADULT
J = JUVENILE
M = MEGALOPS
Z = ZOEA

| TAXON | SEX | LIFE STAGE | 0000 TOTAL NUMBER | 0000 PERCENT LIVE | 0000 PERCENT STUNNED | 0000 PERCENT DEAD | 0200 TOTAL NUMBER | 0200 PERCENT LIVE | 0200 PERCENT STUNNED | 0200 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| POLYCHAETA | | A | 8 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| OLIGOCHAETA | | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| HIRUDINEA | | A | 11 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| N. AMERICANA | | A | 4593 | 70 | 5 | 24 | 933 | 63 | 0 | 36 |
| COROPHIUM SPP. | | A | 7 | 71 | 0 | 28 | 0 | 0 | 0 | 0 |
| COROPHIUM SPP. | | J | 3 | 100 | 0 | 0 | U | 0 | 0 | 0 |
| GAMMARUS SPP. | | A | 131 | 90 | 7 | 1 | 41 | 82 | 14 | 2 |
| M. EDWARDSI | | A | 7 | 85 | 0 | 14 | 1 | 100 | 0 | 0 |
| C. SEPTEMSPINOSA | | A | 6 | 66 | 16 | 16 | 0 | 0 | 0 | 0 |
| C. SEPTEMSPINOSA | | J | 6 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| POLYCHAETA | | A | 2 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| OLIGOCHAETA | | A | 1 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| HIRUDINEA | | A | 1 | 100 | 0 | 0 | 6 | 100 | 0 | 0 |
| N. AMERICANA | | A | 1063 | 59 | 0 | 39 | 2699 | 40 | 0 | 58 |
| COROPHIUM SPP. | | A | 2 | 100 | 0 | 0 | 6 | 66 | 0 | 33 |
| COROPHIUM SPP. | | J | 0 | 0 | 0 | 0 | 3 | 100 | 0 | 0 |
| GAMMARUS SPP. | | A | 54 | 83 | 12 | 3 | 125 | 89 | 5 | 4 |
| M. EDWARDSI | | A | 2 | 50 | 0 | 50 | 7 | 85 | 0 | 14 |
| C. SEPTEMSPINOSA | | A | 1 | 100 | 0 | 0 | 3 | 66 | 0 | 33 |
| C. SEPTEMSPINOSA | | J | 0 | 0 | 0 | 0 | 6 | 100 | 0 | 0 |

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TABLE 3.1.8-6
CONTINUED

| TAXON | SEX | LIFE STAGE | 1200<br>TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| POLYCHAETA | | A | 8 | 100 | 0 | 0 |
| OLIGOCHAETA | | A | 2 | 100 | 0 | 0 |
| HIRUDINEA | | A | 11 | 100 | 0 | 0 |
| N. AMERICANA | | A | 4593 | 43 | 0 | 56 |
| COROPHIUM SPP. | | A | 7 | 71 | 0 | 28 |
| COROPHIUM SPP. | | J | 3 | 100 | 0 | 0 |
| GAMMARUS SPP. | | A | 131 | 90 | 5 | 4 |
| M. EDWARDSI | | A | 7 | 85 | 0 | 14 |
| C. SEPTEMSPINOSA | | A | 7 | 71 | 14 | 14 |
| C. SEPTEMSPINOSA | | J | 6 | 100 | 0 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-6
CONTINUED

| | | | |
|---|---|---|---|
| DATE | 06/28/78 | - | 06/29/78 |
| LOCATION | INTAKE | | |
| COLLECTION TIME | 1548 | - | 0610 |
| WATER TEMP. (C) | 21.0 | - | 26.8 |
| COND. DELTA T (C) | 3.8 | - | 6.1 |
| DISS. OXYGEN (MG/L) | 6.6 | - | 8.4 |
| SALINITY (PPT) | 4.0 | - | 6.0 |
| VOLUME FILTERED (M3) | 21.0 | | |

LIFESTAGE KEY: A = ADULT
J = JUVENILE
M = MEGALOPS
Z = ZOEA

| TAXON | SEX | LIFE STAGE | 0000 TOTAL NUMBER | 0000 PERCENT LIVE | 0000 PERCENT STUNNED | 0000 PERCENT DEAD | 0200 TOTAL NUMBER | 0200 PERCENT LIVE | 0200 PERCENT STUNNED | 0200 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| GASTROPODA | | J | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| NUDIBRANCHIA | | A | 18 | 100 | 0 | 0 | 17 | 100 | 0 | 0 |
| ARGULUS SPP. | | J | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| N. AMERICANA | | J | 7522 | 81 | 0 | 17 | 5448 | 79 | 0 | 19 |
| L. AMERICANUS | | A | 9 | 88 | 0 | 11 | 4 | 100 | 0 | 0 |
| C. ALMYRA | | J | 9 | 88 | 0 | 11 | 4 | 100 | 0 | 0 |
| E. TRILOBA | | J | 77 | 94 | 1 | 3 | 46 | 89 | 2 | 8 |
| C. POLITA | | J | 8 | 87 | 0 | 12 | 8 | 87 | 0 | 12 |
| A. MEDIALIS | | J | 1 | 0 | 0 | 100 | 1 | 0 | 0 | 100 |
| COROPHIUM SPP. | | J | 28 | 92 | 0 | 7 | 14 | 85 | 0 | 14 |
| GAMMARUS SPP. | | A | 115 | 73 | 16 | 9 | 0 | 0 | 0 | 0 |
| GAMMARUS SPP. | | J | 751 | 88 | 2 | 8 | 678 | 87 | 2 | 9 |
| M. EDWARDSI | | J | 5 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. PUGIO | | J | 6 | 83 | 16 | 0 | 6 | 83 | 16 | 0 |
| C. SEPTEMSPINOSA | | J | 148 | 29 | 3 | 67 | 96 | 13 | 0 | 66 |
| R. HARRISII | | J | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| R. HARRISII | | Z | 516 | 98 | 1 | 0 | 456 | 98 | 1 | 0 |
| U. MINAX | | Z | 14 | 92 | 7 | 0 | 13 | 92 | 7 | 0 |

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TABLE 3.1.8-6
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| GASTROPODA | | J | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| NUDIBRANCHIA | | A | 6 | 100 | 0 | 0 | 29 | 100 | 0 | 0 |
| ARGULUS SPP. | | J | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| N. AMERICANA | | J | 3281 | 75 | 0 | 23 | 9769 | 76 | 2 | 21 |
| L. AMERICANUS | | A | 6 | 83 | 0 | 16 | 11 | 90 | 0 | 9 |
| C. ALMYRA | | J | 5 | 80 | 0 | 20 | 10 | 90 | 0 | 10 |
| E. TRILOBA | | J | 31 | 96 | 0 | 3 | 99 | 86 | 2 | 11 |
| C. POLITA | | J | 2 | 100 | 0 | 0 | 9 | 88 | 0 | 11 |
| A. MEDIALIS | | J | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 100 |
| COROPHIUM SPP. | | J | 19 | 89 | 0 | 10 | 33 | 90 | 0 | 9 |
| GAMMARUS SPP. | | A | 115 | 71 | 16 | 12 | 115 | 71 | 16 | 12 |
| GAMMARUS SPP. | | J | 220 | 98 | 0 | 1 | 1018 | 88 | 2 | 8 |
| M. EDWARDSI | | J | 5 | 100 | 0 | 0 | 5 | 100 | 0 | 0 |
| P. PUGIO | | J | 0 | 0 | 0 | 0 | 11 | 81 | 18 | 0 |
| C. SEPTEMSPINOSA | | J | 55 | 54 | 1 | 43 | 164 | 26 | 0 | 73 |
| R. HARRISII | | J | 1 | 0 | 0 | 100 | 1 | 0 | 0 | 100 |
| R. HARRISII | | Z | 85 | 100 | 0 | 0 | 673 | 97 | 1 | 0 |
| U. MINAX | | Z | 1 | 100 | 0 | 0 | 27 | 92 | 7 | 0 |

1200

| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| GASTROPODA | | J | 1 | 100 | 0 | 0 |
| NUDIBRANCHIA | | A | 18 | 100 | 0 | 0 |
| ARGULUS SPP. | | J | 1 | 100 | 0 | 0 |
| N. AMERICANA | | J | 7547 | 71 | 2 | 25 |
| L. AMERICANUS | | A | 9 | 77 | 0 | 22 |
| C. ALMYRA | | J | 9 | 77 | 0 | 22 |
| E. TRILOBA | | J | 77 | 88 | 1 | 10 |
| C. POLITA | | J | 8 | 87 | 0 | 12 |
| A. MEDIALIS | | J | 1 | 0 | 0 | 100 |
| COROPHIUM SPP. | | J | 28 | 85 | 0 | 14 |
| GAMMARUS SPP. | | A | 115 | 62 | 24 | 13 |
| GAMMARUS SPP. | | J | 749 | 87 | 2 | 9 |
| M. EDWARDSI | | J | 5 | 100 | 0 | 0 |
| P. PUGIO | | J | 6 | 83 | 16 | 0 |
| C. SEPTEMSPINOSA | | J | 148 | 27 | 0 | 72 |
| R. HARRISII | | J | 1 | 0 | 0 | 100 |
| R. HARRISII | | Z | 516 | 98 | 1 | 0 |
| U. MINAX | | Z | 14 | 92 | 7 | 0 |

TABLE 3.1.8-6
CONTINUED

DATE 06/28/78 - 06/29/78
LOCATION DISCHARGE
COLLECTION TIME 1552 - 0614
WATER TEMP. (C) 29.0 - 30.2
COND. DELTA T (C) 3.8 - 6.1
DISS. OXYGEN (MG/L) 5.1 - 7.1
SALINITY (PPT) 4.5 - 6.0
VOLUME FILTERED (M3) 21.0

LIFESTAGE KEY: A = ADULT
J = JUVENILE
M = MEGALOPS
Z = ZOEA

| | | | 0000 | | | | 0200 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
| POLYCHAETA | | A | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| OLIGOCHAETA | | A | 3 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| NUDIBRANCHIA | | A | 13 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| N. AMERICANA | | J | 7529 | 95 | 0 | 3 | 2358 | 90 | 1 | 8 |
| L. AMERICANUS | | A | 14 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| C. ALMYRA | | A | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| C. ALMYRA | | J | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| E. TRILOBA | | J | 27 | 100 | 0 | 0 | 4 | 100 | 0 | 0 |
| C. POLITA | | J | 7 | 100 | 0 | 0 | 6 | 100 | 0 | 0 |
| COROPHIUM SPP. | | J | 10 | 90 | 0 | 10 | 5 | 80 | 0 | 20 |
| GAMMARUS SPP. | | J | 744 | 86 | 12 | 0 | 123 | 95 | 4 | 0 |
| P. PUGIO | | J | 10 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| C. SEPTEMSPINOSA | | J | 46 | 73 | 4 | 21 | 3 | 33 | 0 | 66 |
| R. HARRISII | | Z | 331 | 96 | 2 | 1 | 99 | 94 | 3 | 2 |
| U. MINAX | | Z | 4 | 75 | 25 | 0 | 2 | 100 | 0 | 0 |

| | | | 0400 | | | | 0800 | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
| POLYCHAETA | | A | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| OLIGOCHAETA | | A | 4 | 100 | 0 | 0 | 4 | 100 | 0 | 0 |
| NUDIBRANCHIA | | A | 5 | 100 | 0 | 0 | 14 | 100 | 0 | 0 |
| N. AMERICANA | | J | 6111 | 88 | 0 | 10 | 5496 | 85 | 1 | 12 |
| L. AMERICANUS | | A | 12 | 100 | 0 | 0 | 8 | 100 | 0 | 0 |
| C. ALMYRA | | A | 0 | 0 | 0 | 0 | 2 | 0 | 100 | 0 |
| C. ALMYRA | | J | 2 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| E. TRILOBA | | J | 17 | 100 | 0 | 0 | 13 | 100 | 0 | 0 |
| C. POLITA | | J | 1 | 100 | 0 | 0 | 11 | 100 | 0 | 0 |
| COROPHIUM SPP. | | J | 7 | 85 | 0 | 14 | 10 | 90 | 0 | 10 |
| GAMMARUS SPP. | | J | 683 | 92 | 6 | 0 | 586 | 97 | 1 | 0 |
| P. PUGIO | | J | 3 | 100 | 0 | 0 | 14 | 100 | 0 | 0 |
| C. SEPTEMSPINOSA | | J | 27 | 66 | 0 | 33 | 14 | 35 | 0 | 64 |
| R. HARRISII | | Z | 247 | 96 | 1 | 2 | 379 | 95 | 2 | 2 |
| U. MINAX | | Z | 2 | 50 | 50 | 0 | 6 | 83 | 16 | 0 |

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TABLE 3.1.8-6
CONTINUED

1200

| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| POLYCHAETA | | A | 2 | 0 | 100 | 0 |
| OLIGOCHAETA | | A | 3 | 100 | 0 | 0 |
| NUDIBRANCHIA | | A | 16 | 100 | 0 | 0 |
| N. AMERICANA | | J | 6893 | 84 | 1 | 13 |
| L. AMERICANUS | | A | 10 | 100 | 0 | 0 |
| C. ALMYRA | | A | 1 | 0 | 100 | 0 |
| C. ALMYRA | | J | 2 | 100 | 0 | 0 |
| E. TRILOBA | | J | 21 | 100 | 0 | 0 |
| C. POLITA | | J | 9 | 100 | 0 | 0 |
| COROPHIUM SPP. | | J | 11 | 90 | 0 | 9 |
| GAMMARUS SPP. | | J | 707 | 89 | 9 | 1 |
| P. PUGIO | | J | 13 | 84 | 0 | 15 |
| C. SEPTEMSPINOSA | | J | 30 | 56 | 0 | 43 |
| R. HARRISII | | Z | 371 | 95 | 2 | 1 |
| U. MINAX | | Z | 4 | 75 | 25 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-6
CONTINUED

| | | | |
|---|---|---|---|
| DATE | 09/13/78 - 09/13/78 | LIFESTAGE KEY: | A = ADULT |
| LOCATION | INTAKE | | J = JUVENILE |
| COLLECTION TIME | 1015 - 2200 | | M = MEGALOPS |
| WATER TEMP. (C) | 22.2 - 23.5 | | Z = ZOEA |
| COND. DELTA T (C) | 8.0 - 9.9 | | |
| DISS. OXYGEN (MG/L) | 6.4 - 7.8 | | |
| SALINITY (PPT) | 6.0 - 9.0 | | |
| VOLUME FILTERED (M3) | 20.0 | | |

| TAXON | SEX | LIFE STAGE | 0000 TOTAL NUMBER | 0000 PERCENT LIVE | 0000 PERCENT STUNNED | 0000 PERCENT DEAD | 0200 TOTAL NUMBER | 0200 PERCENT LIVE | 0200 PERCENT STUNNED | 0200 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| HYDROZOA (MEDUSAE) | | A | 26 | 80 | 0 | 19 | 20 | 45 | 0 | 55 |
| PHIALIDIUM SPP. | | A | 6 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. VIRGINICA | | A | 39 | 35 | 5 | 58 | 12 | 0 | 8 | 91 |
| POLYCHAETA | | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| N. AMERICANA | | A | 14334 | 99 | 0 | 0 | 7739 | 96 | 0 | 3 |
| N. AMERICANA | | J | 1756 | 98 | 0 | 1 | 1756 | 94 | 1 | 3 |
| L. AMERICANUS | | A | 43 | 100 | 0 | 0 | 11 | 100 | 0 | 0 |
| E. TRILOBA | | A | 18 | 94 | 0 | 5 | 0 | 0 | 0 | 0 |
| E. TRILOBA | | J | 116 | 99 | 0 | 0 | 52 | 98 | 0 | 1 |
| A. MEDIALIS | | J | 8 | 100 | 0 | 0 | 4 | 50 | 50 | 0 |
| COROPHIUM SPP. | | A | 3 | 33 | 0 | 66 | 0 | 0 | 0 | 0 |
| COROPHIUM SPP. | | J | 33 | 100 | 0 | 0 | 15 | 100 | 0 | 0 |
| GAMMARUS SPP. | | A | 20 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| GAMMARUS SPP. | | J | 144 | 97 | 0 | 2 | 85 | 97 | 0 | 2 |
| M. EDWARDSI | | A | 4 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| M. EDWARDSI | | J | 3 | 100 | 0 | 0 | 3 | 100 | 0 | 0 |
| P. PUGIO | | J | 2 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| C. SEPTEMSPINOSA | | J | 13 | 100 | 0 | 0 | 3 | 100 | 0 | 0 |
| C. SAPIDUS | | J | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| C. SAPIDUS | | M | 2 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| R. HARRISII | | M | 2 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| R. HARRISII | | Z | 38 | 97 | 0 | 2 | 25 | 100 | 0 | 0 |

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TABLE 3.1.8-6
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| HYDROZOA (MEDUSAE) | | A | 20 | 40 | 0 | 60 | 10 | 60 | 0 | 40 |
| PHIALIDIUM SPP. | | A | 4 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| B. VIRGINICA | | A | 32 | 15 | 6 | 78 | 9 | 22 | 0 | 77 |
| POLYCHAETA | | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| N. AMERICANA | | A | 20031 | 95 | 0 | 4 | 465 | 97 | 0 | 2 |
| N. AMERICANA | | J | 0 | 0 | 0 | 0 | 1756 | 94 | 0 | 5 |
| L. AMERICANUS | | A | 31 | 93 | 0 | 6 | 9 | 100 | 0 | 0 |
| E. TRILOBA | | A | 18 | 94 | 0 | 5 | 0 | 0 | 0 | 0 |
| E. TRILOBA | | J | 71 | 97 | 0 | 2 | 40 | 100 | 0 | 0 |
| A. MEDIALIS | | J | 7 | 85 | 14 | 0 | 2 | 50 | 0 | 50 |
| COROPHIUM SPP. | | A | 3 | 33 | 0 | 66 | 0 | 0 | 0 | 0 |
| COROPHIUM SPP. | | J | 12 | 100 | 0 | 0 | 15 | 100 | 0 | 0 |
| GAMMARUS SPP. | | A | 20 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| GAMMARUS SPP. | | J | 55 | 92 | 0 | 7 | 78 | 98 | 0 | 1 |
| M. EDWARDSI | | A | 4 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| M. EDWARDSI | | J | 2 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| P. PUGIO | | J | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| C. SEPTEMSPINOSA | | J | 13 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| C. SAPIDUS | | J | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| C. SAPIDUS | | M | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| R. HARRISII | | M | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| R. HARRISII | | Z | 20 | 95 | 0 | 5 | 18 | 100 | 0 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-6
CONTINUED

| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | 1200 PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| HYDROZOA (MEDUSAE) | | A | 32 | 62 | 0 | 37 |
| PHIALIDIUM SPP. | | A | 8 | 100 | 0 | 0 |
| B. VIRGINICA | | A | 40 | 20 | 2 | 77 |
| POLYCHAETA | | A | 2 | 100 | 0 | 0 |
| N. AMERICANA | | A | 14971 | 92 | 0 | 7 |
| N. AMERICANA | | J | 1756 | 94 | 0 | 5 |
| L. AMERICANUS | | A | 39 | 92 | 0 | 7 |
| E. TRILOBA | | A | 18 | 88 | 0 | 11 |
| E. TRILOBA | | J | 120 | 99 | 0 | 0 |
| A. MEDIALIS | | J | 10 | 90 | 0 | 10 |
| COROPHIUM SPP. | | A | 3 | 0 | 0 | 100 |
| COROPHIUM SPP. | | J | 27 | 100 | 0 | 0 |
| GAMMARUS SPP. | | A | 0 | 0 | 0 | 0 |
| GAMMARUS SPP. | | J | 155 | 96 | 0 | 3 |
| M. EDWARDSI | | A | 4 | 100 | 0 | 0 |
| M. EDWARDSI | | J | 3 | 100 | 0 | 0 |
| P. PUGIO | | J | 2 | 100 | 0 | 0 |
| C. SEPTEMSPINOSA | | J | 13 | 100 | 0 | 0 |
| C. SAPIDUS | | J | 1 | 100 | 0 | 0 |
| C. SAPIDUS | | M | 2 | 50 | 0 | 50 |
| R. HARRISII | | M | 2 | 100 | 0 | 0 |
| R. HARRISII | | Z | 31 | 93 | 0 | 6 |

IA SALEM EN 1978

TABLE 3.1.8-6
CONTINUED

| | | | |
|---|---|---|---|
| DATE | 09/13/78 - 09/14/78 | | LIFESTAGE KEY: A = ADULT |
| LOCATION | DISCHARGE | | J = JUVENILE |
| COLLECTION TIME | 1631 - 0514 | | M = MEGALOPS |
| WATER TEMP. (C) | 29.1 - 31.7 | | Z = ZOEA |
| COND. DELTA T (C) | 7.5 - 11.4 | | |
| DISS. OXYGEN (MG/L) | 5.5 - 6.9 | | |
| SALINITY (PPT) | 8.0 - 8.0 | | |
| VOLUME FILTERED (M3) | 17.0 | | |

| TAXON | SEX | LIFE STAGE | 0000 TOTAL NUMBER | 0000 PERCENT LIVE | 0000 PERCENT STUNNED | 0000 PERCENT DEAD | 0200 TOTAL NUMBER | 0200 PERCENT LIVE | 0200 PERCENT STUNNED | 0200 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| HYDROZOA (MEDUSAE) | | A | 27 | 74 | 0 | 25 | 9 | 77 | 0 | 22 |
| N. BACHEI | | A | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| PHIALIDIUM SPP. | | A | 1 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| B. VIRGINICA | | A | 38 | 76 | 0 | 23 | 4 | 50 | 0 | 50 |
| POLYCHAETA | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| NUDIBRANCHIA | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| ACARINA | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| N. AMERICANA | | A | 2130 | 83 | 0 | 16 | 0 | 0 | 0 | 0 |
| N. AMERICANA | | J | 3249 | 96 | 0 | 3 | 2229 | 87 | 0 | 11 |
| L. AMERICANUS | | A | 58 | 98 | 0 | 1 | 6 | 100 | 0 | 0 |
| L. AMERICANUS | | J | 10 | 100 | 0 | 0 | 10 | 100 | 0 | 0 |
| E. TRILOBA | | J | 295 | 99 | 0 | 0 | 68 | 100 | 0 | 0 |
| C. POLITA | | J | 2 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| A. MEDIALIS | | J | 2 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| COROPHIUM SPP. | | J | 24 | 100 | 0 | 0 | 12 | 100 | 0 | 0 |
| GAMMARUS SPP. | | J | 140 | 99 | 0 | 0 | 66 | 98 | 0 | 1 |
| M. NITIDA | | J | 2 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| M. EDWARDSI | | A | 2 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| M. EDWARDSI | | J | 7 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. PUGIO | | J | 4 | 50 | 0 | 50 | 1 | 0 | 0 | 100 |
| C. SEPTEMSPINOSA | | J | 14 | 50 | 0 | 50 | 4 | 25 | 0 | 75 |
| C. SAPIDUS | | J | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| C. SAPIDUS | | M | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| R. HARRISII | | M | 4 | 100 | 0 | 0 | 2 | 100 | 0 | 0 |
| R. HARRISII | | Z | 65 | 100 | 0 | 0 | 9 | 100 | 0 | 0 |

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TABLE 3.1.8-6
CONTINUED

| TAXON | SEX | LIFE STAGE | 0400 TOTAL NUMBER | 0400 PERCENT LIVE | 0400 PERCENT STUNNED | 0400 PERCENT DEAD | 0800 TOTAL NUMBER | 0800 PERCENT LIVE | 0800 PERCENT STUNNED | 0800 PERCENT DEAD |
|---|---|---|---|---|---|---|---|---|---|---|
| HYDROZOA (MEDUSAE) | | A | 15 | 73 | 0 | 26 | 5 | 40 | 0 | 60 |
| N. BACHEI | | A | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| PHIALIDIUM SPP. | | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| B. VIRGINICA | | A | 7 | 85 | 0 | 14 | 3 | 33 | 0 | 66 |
| POLYCHAETA | | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| NUDIBRANCHIA | | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ACARINA | | A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N. AMERICANA | | A | 814 | 53 | 0 | 46 | 1316 | 88 | 0 | 11 |
| N. AMERICANA | | J | 1659 | 64 | 0 | 35 | 0 | 0 | 0 | 0 |
| L. AMERICANUS | | A | 15 | 93 | 0 | 6 | 19 | 94 | 0 | 5 |
| L. AMERICANUS | | J | 10 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| E. TRILOBA | | J | 76 | 98 | 0 | 1 | 64 | 100 | 0 | 0 |
| C. POLITA | | J | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| A. MEDIALIS | | J | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| COROPHIUM SPP. | | J | 8 | 100 | 0 | 0 | 3 | 100 | 0 | 0 |
| GAMMARUS SPP. | | J | 79 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| M. NITIDA | | J | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| M. EDWARDSI | | A | 0 | 0 | 0 | 0 | 2 | 100 | 0 | 0 |
| M. EDWARDSI | | J | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. PUGIO | | J | 1 | 0 | 0 | 100 | 0 | 0 | 0 | 0 |
| C. SEPTEMSPINOSA | | J | 1 | 0 | 0 | 100 | 4 | 75 | 0 | 25 |
| C. SAPIDUS | | J | 0 | 0 | 0 | 0 | 1 | 100 | 0 | 0 |
| C. SAPIDUS | | M | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R. HARRISII | | M | 2 | 100 | 0 | 0 | 1 | 100 | 0 | 0 |
| R. HARRISII | | Z | 9 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |

IA SALEM EN 1978

TABLE 3.1.8-6
CONTINUED

1200

| TAXON | SEX | LIFE STAGE | TOTAL NUMBER | PERCENT LIVE | PERCENT STUNNED | PERCENT DEAD |
|---|---|---|---|---|---|---|
| HYDROZOA (MEDUSAE) | | A | 34 | 61 | 0 | 38 |
| N. BACHEI | | A | 1 | 100 | 0 | 0 |
| PHIALIDIUM SPP. | | A | 1 | 100 | 0 | 0 |
| B. VIRGINICA | | A | 60 | 50 | 0 | 50 |
| POLYCHAETA | | A | 2 | 100 | 0 | 0 |
| NUDIBRANCHIA | | A | 2 | 100 | 0 | 0 |
| ACARINA | | A | 2 | 100 | 0 | 0 |
| N. AMERICANA | | A | 2130 | 74 | 0 | 25 |
| N. AMERICANA | | J | 4269 | 51 | 0 | 48 |
| L. AMERICANUS | | A | 76 | 94 | 0 | 5 |
| L. AMERICANUS | | J | 10 | 100 | 0 | 0 |
| E. TRILOBA | | J | 415 | 97 | 0 | 2 |
| C. POLITA | | J | 2 | 100 | 0 | 0 |
| A. MEDIALIS | | J | 3 | 100 | 0 | 0 |
| COROPHIUM SPP. | | J | 31 | 100 | 0 | 0 |
| GAMMARUS SPP. | | J | 188 | 98 | 0 | 1 |
| M. NITIDA | | J | 2 | 100 | 0 | 0 |
| M. EDWARDSI | | A | 2 | 100 | 0 | 0 |
| M. EDWARDSI | | J | 14 | 78 | 0 | 21 |
| P. PUGIO | | J | 7 | 0 | 0 | 100 |
| C. SEPTEMSPINOSA | | J | 19 | 42 | 0 | 57 |
| C. SAPIDUS | | J | 1 | 100 | 0 | 0 |
| C. SAPIDUS | | M | 2 | 100 | 0 | 0 |
| R. HARRISII | | M | 5 | 100 | 0 | 0 |
| R. HARRISII | | Z | 119 | 100 | 0 | 0 |

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TABLE 3.1.8-7

RANK, TOTAL NUMBER, ANNUAL MEAN DENSITY AND PERCENT TOTAL CATCH OF ICHTHYOPLANKTON - 1978.

| | |
|---|---|
| DATE | 01/01/78-12/31/78 |
| NO. OF SAMPLES | 135 |
| WATER TEMPERATURE (C) | 0.6-28.7 |
| DISSOLVED OXYGEN (MG/L) | 5.1-14.2 |
| PH | 6.4- 7.6 |
| SALINITY (PPT) | 1.0-15.0 |
| PUMPS OPERATING | 1-6 |
| TOTAL VOLUME FILTERED (M3) | 7203.4 |

| | RANK | NUMBER | NUMBERS/CUBIC METER | PERCENT |
|---|---|---|---|---|
| TOTAL EGGS | | 17549 | 2.436 | 58.5 |
| TOTAL LARVAE | | 10437 | 1.449 | 34.8 |
| TOTAL YOUNG | | 1877 | 0.261 | 6.3 |
| TOTAL ADULT | | 121 | 0.017 | 0.4 |
| EGGS: | | | | |
| A. MITCHILLI | 1 | 17520 | 2.432 | 99.8 |
| UNID. FISH | 2 | 18 | 0.002 | 0.1 |
| MEMBRAS/MENIDIA SPP. | 3 | 6 | 0.001 | * |
| T. MACULATUS | 4 | 2 | * | * |
| M. SAXATILIS | 4 | 2 | * | * |
| C. REGALIS | 6 | 1 | * | * |
| LARVAE: | | | | |
| A. MITCHILLI | 1 | 8152 | 1.132 | 78.1 |
| G. BOSCI | 2 | 1085 | 0.151 | 10.4 |
| C. REGALIS | 3 | 660 | 0.092 | 6.3 |
| MEMBRAS/MENIDIA SPP. | 4 | 448 | 0.062 | 4.3 |
| T. MACULATUS | 5 | 73 | 0.010 | 0.7 |
| M. UNDULATUS | 6 | 7 | 0.001 | 0.1 |
| S. FUSCUS | 7 | 3 | * | * |
| AMMODYTES SP. | 7 | 3 | * | * |
| F. HETEROCLITUS | 9 | 2 | * | * |
| L. XANTHURUS | 10 | 1 | * | * |
| S. MARINA | 10 | 1 | * | * |
| BOTHIDAE | 10 | 1 | * | * |
| UNIDENTIFIABLE FISH | 10 | 1 | * | * |
| YOUNG: | | | | |
| A. MITCHILLI | 1 | 1272 | 0.177 | 67.8 |
| C. REGALIS | 2 | 435 | 0.060 | 23.2 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-7
CONTINUED

| | RANK | NUMBER | NUMBERS/CUBIC METER | PERCENT |
|---|---|---|---|---|
| YOUNG: | | | | |
| S. FUSCUS | 3 | 57 | 0.008 | 3.0 |
| G. BOSCI | 4 | 34 | 0.005 | 1.8 |
| M. MENIDIA | 5 | 30 | 0.004 | 1.6 |
| A. ROSTRATA | 5 | 30 | 0.004 | 1.6 |
| T. MACULATUS | 7 | 5 | 0.001 | 0.3 |
| A. AESTIVALIS | 7 | 5 | 0.001 | 0.3 |
| M. MARTINICA | 9 | 3 | * | 0.2 |
| L. XANTHURUS | 9 | 3 | * | 0.2 |
| F. HETEROCLITUS | 11 | 1 | * | 0.1 |
| P. TRIACANTHUS | 11 | 1 | * | 0.1 |
| M. UNDULATUS | 11 | 1 | * | 0.1 |
| ADULT: | | | | |
| A. MITCHILLI | 1 | 111 | 0.015 | 91.7 |
| M. MENIDIA | 2 | 4 | 0.001 | 3.3 |
| S. FUSCUS | 3 | 2 | * | 1.7 |
| T. MACULATUS | 3 | 2 | * | 1.7 |
| A. ROSTRATA | 3 | 2 | * | 1.7 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
MEAN DENSITY (NUMBERS/CUBIC METER), BY DATE, OF ICHTHYOPLANKTON - 1978.

| | |
|---|---|
| DATE | 02/27/78-02/28/78 |
| NO. OF SAMPLES | 5 |
| WATER TEMPERATURE (C) | 1.1- 2.0 |
| DISSOLVED OXYGEN (MG/L) | 12.9-13.7 |
| PH | 6.4- 6.8 |
| SALINITY (PPT) | 5.0- 9.0 |
| PUMPS OPERATING | 5-6 |
| TOTAL VOLUME FILTERED (M3) | 246.2 |

| | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | | |
| TOTAL YOUNG | 0.008 | 0.014 |
| TOTAL ADULT | | |
| EGGS: | | |
| LARVAE: | | |
| YOUNG: | | |
| A. ROSTRATA | 0.008 | 0.014 |
| ADULT: | | |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 03/02/78-03/03/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 0.6- 2.1 |
| DISSOLVED OXYGEN (MG/L) | 12.1-14.2 |
| PH | 7.0 |
| SALINITY (PPT) | 3.0- 6.0 |
| PUMPS OPERATING | 6 |
| TOTAL VOLUME FILTERED (M3) | 600.0 |

| | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | 0.005 | 0.006 |
| TOTAL YOUNG | 0.025 | 0.014 |
| TOTAL ADULT | | |
| EGGS: | | |
| LARVAE: | | |
| UNIDENTIFIABLE FISH | 0.002 | 0.004 |
| AMMODYTES SP. | 0.003 | 0.005 |
| YOUNG: | | |
| A. ROSTRATA | 0.025 | 0.014 |
| ADULT: | | |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 03/16/78-03/17/78 |
| NO. OF SAMPLES | 8 |
| WATER TEMPERATURE (C) | 2.5- 3.6 |
| DISSOLVED OXYGEN (MG/L) | 11.6-13.6 |
| PH | 7.2- 7.3 |
| SALINITY (PPT) | 1.0- 4.0 |
| PUMPS OPERATING | 2-4 |
| TOTAL VOLUME FILTERED (M3) | 400.0 |

| | NUMBERS/CUBIC METER | ± 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | | |
| TOTAL YOUNG | 0.013 | 0.012 |
| TOTAL ADULT | | |
| EGGS: | | |
| LARVAE: | | |
| YOUNG: | | |
| A. ROSTRATA | 0.013 | 0.012 |
| ADULT: | | |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 04/19/78-04/20/78 |
| NO. OF SAMPLES | 9 |
| WATER TEMPERATURE (C) | 10.2-11.0 |
| DISSOLVED OXYGEN (MG/L) | 8.8-11.0 |
| PH | 7.0- 7.6 |
| SALINITY (PPT) | 5.5- 8.0 |
| PUMPS OPERATING | 1 |
| TOTAL VOLUME FILTERED (M3) | 315.0 |

| | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | 0.063 | 0.038 |
| TOTAL LARVAE | 0.003 | 0.007 |
| TOTAL YOUNG | 0.019 | 0.015 |
| TOTAL ADULT | 0.003 | 0.007 |
| EGGS: | | |
| UNID. FISH | 0.057 | 0.041 |
| M. SAXATILIS | 0.006 | 0.015 |
| LARVAE: | | |
| AMMODYTES SP. | 0.003 | 0.007 |
| YOUNG: | | |
| A. ROSTRATA | 0.019 | 0.015 |
| ADULT: | | |
| A. ROSTRATA | 0.003 | 0.007 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 06/28/78-06/29/78 |
| NO. OF SAMPLES | 9 |
| WATER TEMPERATURE (C) | 21.0-26.8 |
| DISSOLVED OXYGEN (MG/L) | 6.6- 8.4 |
| PH | 6.4- 7.1 |
| SALINITY (PPT) | 4.0- 6.0 |
| PUMPS OPERATING | 6 |
| TOTAL VOLUME FILTERED (M3) | 450.0 |

| | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | 1.162 | 0.745 |
| TOTAL LARVAE | 3.131 | 2.309 |
| TOTAL YOUNG | 0.660 | 0.532 |
| TOTAL ADULT | 0.020 | 0.017 |
| EGGS: | | |
| A. MITCHILLI | 1.162 | 0.745 |
| LARVAE: | | |
| A. MITCHILLI | 2.104 | 2.227 |
| MEMBRAS/MENIDIA SPP. | 0.033 | 0.043 |
| C. REGALIS | 0.613 | 0.398 |
| L. XANTHURUS | 0.002 | 0.005 |
| G. BOSCI | 0.364 | 0.205 |
| T. MACULATUS | 0.013 | 0.015 |
| YOUNG: | | |
| A. MITCHILLI | 0.002 | 0.005 |
| M. MENIDIA | 0.002 | 0.005 |
| S. FUSCUS | 0.013 | 0.015 |
| C. REGALIS | 0.636 | 0.513 |
| L. XANTHURUS | 0.007 | 0.011 |
| ADULT: | | |
| A. MITCHILLI | 0.018 | 0.016 |
| T. MACULATUS | 0.002 | 0.005 |

* - INDICATES BELOW REPORTABLE

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 07/12/78-07/13/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 24.0-25.0 |
| DISSOLVED OXYGEN (MG/L) | 6.2- 8.0 |
| PH | 99.9- |
| SALINITY (PPT) | 5.0-10.0 |
| PUMPS OPERATING | 5-6 |
| TOTAL VOLUME FILTERED (M3) | 625.2 |

| | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | 24.936 | 17.855 |
| TOTAL LARVAE | 7.385 | 2.368 |
| TOTAL YOUNG | 0.264 | 0.195 |
| TOTAL ADULT | 0.043 | 0.027 |
| EGGS: | | |
| A. MITCHILLI | 24.924 | 17.842 |
| MEMBRAS/MENIDIA SPP. | 0.007 | 0.008 |
| C. REGALIS | 0.002 | 0.004 |
| T. MACULATUS | 0.003 | 0.007 |
| LARVAE: | | |
| A. MITCHILLI | 6.146 | 2.119 |
| F. HETEROCLITUS | 0.002 | 0.004 |
| MEMBRAS/MENIDIA SPP. | 0.033 | 0.029 |
| C. REGALIS | 0.587 | 0.267 |
| G. BOSCI | 0.574 | 0.233 |
| T. MACULATUS | 0.043 | 0.031 |
| YOUNG: | | |
| A. MITCHILLI | 0.032 | 0.026 |
| F. HETEROCLITUS | 0.002 | 0.004 |
| M. MARTINICA | 0.002 | 0.004 |
| M. MENIDIA | 0.003 | 0.007 |
| S. FUSCUS | 0.007 | 0.008 |
| C. REGALIS | 0.209 | 0.197 |
| G. BOSCI | 0.010 | 0.015 |
| ADULT: | | |
| A. ROSTRATA | 0.002 | 0.004 |
| A. MITCHILLI | 0.038 | 0.026 |
| M. MENIDIA | 0.003 | 0.004 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 07/27/78-07/28/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 26.3-27.4 |
| DISSOLVED OXYGEN (MG/L) | 5.4- 6.7 |
| PH | 6.9- 7.4 |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 5 |
| TOTAL VOLUME FILTERED (M3) | 600.0 |

| | NUMBERS/CUBIC METER | ± 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | 0.157 | 0.134 |
| TOTAL LARVAE | 4.973 | 1.954 |
| TOTAL YOUNG | 0.190 | 0.098 |
| TOTAL ADULT | 0.012 | 0.010 |
| EGGS: | | |
| A. MITCHILLI | 0.153 | 0.135 |
| MEMBRAS/MENIDIA SPP. | 0.003 | 0.005 |
| LARVAE: | | |
| A. MITCHILLI | 4.197 | 1.792 |
| S. MARINA | 0.002 | 0.004 |
| MEMBRAS/MENIDIA SPP. | 0.198 | 0.132 |
| C. REGALIS | 0.022 | 0.018 |
| G. BOSCI | 0.528 | 0.238 |
| T. MACULATUS | 0.027 | 0.020 |
| YOUNG: | | |
| A. MITCHILLI | 0.172 | 0.097 |
| M. MENIDIA | 0.007 | 0.006 |
| S. FUSCUS | 0.007 | 0.006 |
| C. REGALIS | 0.003 | 0.005 |
| G. BOSCI | 0.002 | 0.004 |
| ADULT: | | |
| A. MITCHILLI | 0.012 | 0.010 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 08/10/78-08/11/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 26.7-28.7 |
| DISSOLVED OXYGEN (MG/L) | 6.0- 9.8 |
| PH | 7.2- 7.4 |
| SALINITY (PPT) | 6.0 |
| PUMPS OPERATING | 4-5 |
| TOTAL VOLUME FILTERED (M3) | 600.0 |

| | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | 3.037 | 4.297 |
| TOTAL LARVAE | 1.978 | 1.068 |
| TOTAL YOUNG | 0.170 | 0.083 |
| TOTAL ADULT | 0.035 | 0.038 |
| EGGS: | | |
| A. MITCHILLI | 3.037 | 4.297 |
| LARVAE: | | |
| A. MITCHILLI | 1.080 | 0.485 |
| F. HETEROCLITUS | 0.002 | 0.004 |
| MEMBRAS/MENIDIA SPP. | 0.470 | 0.769 |
| S. FUSCUS | 0.002 | 0.004 |
| C. REGALIS | 0.023 | 0.025 |
| G. BOSCI | 0.365 | 0.158 |
| T. MACULATUS | 0.037 | 0.034 |
| YOUNG: | | |
| A. MITCHILLI | 0.132 | 0.052 |
| M. MARTINICA | 0.002 | 0.004 |
| M. MENIDIA | 0.025 | 0.033 |
| S. FUSCUS | 0.002 | 0.004 |
| C. REGALIS | 0.010 | 0.009 |
| ADULT: | | |
| A. MITCHILLI | 0.032 | 0.037 |
| M. MENIDIA | 0.002 | 0.004 |
| S. FUSCUS | 0.002 | 0.004 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 08/31/78-09/01/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 26.5-27.0 |
| DISSOLVED OXYGEN (MG/L) | 5.1- 6.2 |
| PH | 7.0- 7.3 |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 5-6 |
| TOTAL VOLUME FILTERED (M3) | 725.0 |

| | NUMBERS/CUBIC METER | + 95% - CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | 0.385 | 0.148 |
| TOTAL YOUNG | 1.191 | 1.087 |
| TOTAL ADULT | 0.004 | 0.006 |
| EGGS: | | |
| LARVAE: | | |
| A. MITCHILLI | 0.343 | 0.149 |
| MEMBRAS/MENIDIA SPP. | 0.018 | 0.016 |
| S. FUSCUS | 0.002 | 0.004 |
| M. UNDULATUS | 0.007 | 0.011 |
| G. BOSCI | 0.016 | 0.012 |
| YOUNG: | | |
| A. MITCHILLI | 1.127 | 1.045 |
| M. MENIDIA | 0.002 | 0.004 |
| S. FUSCUS | 0.010 | 0.013 |
| C. REGALIS | 0.006 | 0.008 |
| G. BOSCI | 0.043 | 0.040 |
| P. TRIACANTHUS | 0.002 | 0.004 |
| T. MACULATUS | 0.002 | 0.004 |
| ADULT: | | |
| A. MITCHILLI | 0.002 | 0.004 |
| M. MENIDIA | 0.001 | 0.002 |
| S. FUSCUS | 0.001 | 0.002 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 09/13/78-09/14/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 21.2-23.9 |
| DISSOLVED OXYGEN (MG/L) | 6.3- 7.9 |
| PH | 6.6- 7.4 |
| SALINITY (PPT) | 6.0- 9.0 |
| PUMPS OPERATING | 5-6 |
| TOTAL VOLUME FILTERED (M3) | 600.0 |

| | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | 0.055 | 0.034 |
| TOTAL YOUNG | 0.492 | 0.359 |
| TOTAL ADULT | 0.085 | 0.065 |
| EGGS: | | |
| LARVAE: | | |
| A. MITCHILLI | 0.042 | 0.033 |
| S. FUSCUS | 0.002 | 0.004 |
| M. UNDULATUS | 0.003 | 0.005 |
| G. BOSCI | 0.003 | 0.005 |
| T. MACULATUS | 0.005 | 0.006 |
| YOUNG: | | |
| A. MITCHILLI | 0.438 | 0.340 |
| M. MARTINICA | 0.002 | 0.004 |
| M. MENIDIA | 0.002 | 0.004 |
| S. FUSCUS | 0.040 | 0.027 |
| C. REGALIS | 0.007 | 0.015 |
| M. UNDULATUS | 0.002 | 0.004 |
| T. MACULATUS | 0.002 | 0.004 |
| ADULT: | | |
| A. MITCHILLI | 0.085 | 0.065 |

* - INDICATES BELOW REPORTABLE

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 10/11/78 |
| NO. OF SAMPLES | 6 |
| WATER TEMPERATURE (C) | 17.3-18.0 |
| DISSOLVED OXYGEN (MG/L) | 6.9- 7.3 |
| PH | 6.9- 7.2 |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 3-4 |
| TOTAL VOLUME FILTERED (M3) | 450.0 |

| | NUMBERS/CUBIC METER | + - 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | 0.011 | 0.022 |
| TOTAL YOUNG | 0.095 | 0.061 |
| TOTAL ADULT | 0.004 | 0.007 |
| EGGS: | | |
| LARVAE: | | |
| A. MITCHILLI | 0.011 | 0.022 |
| YOUNG: | | |
| A. MITCHILLI | 0.060 | 0.048 |
| M. MENIDIA | 0.009 | 0.023 |
| S. FUSCUS | 0.027 | 0.035 |
| ADULT: | | |
| A. MITCHILLI | 0.004 | 0.007 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 11/01/78-11/02/78 |
| NO. OF SAMPLES | 8 |
| WATER TEMPERATURE (C) | 13.5-14.5 |
| DISSOLVED OXYGEN (MG/L) | 7.9- 9.5 |
| PH | 99.9- |
| SALINITY (PPT) | 6.0- 8.0 |
| PUMPS OPERATING | 2 |
| TOTAL VOLUME FILTERED (M3) | 485.0 |

| | NUMBERS/CUBIC METER | + 95% − CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | 0.003 | 0.006 |
| TOTAL YOUNG | 0.075 | 0.083 |
| TOTAL ADULT | 0.002 | 0.005 |
| EGGS: | | |
| LARVAE: | | |
| G. BOSCI | 0.003 | 0.006 |
| YOUNG: | | |
| A. AESTIVALIS | 0.003 | 0.006 |
| A. MITCHILLI | 0.068 | 0.082 |
| C. REGALIS | 0.002 | 0.005 |
| T. MACULATUS | 0.003 | 0.006 |
| ADULT: | | |
| T. MACULATUS | 0.002 | 0.005 |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 11/21/78-11/22/78 |
| NO. OF SAMPLES | 12 |
| WATER TEMPERATURE (C) | 8.5-12.5 |
| DISSOLVED OXYGEN (MG/L) | 5.9- 8.9 |
| PH | 6.8- 7.1 |
| SALINITY (PPT) | 10.0-15.0 |
| PUMPS OPERATING | 5 |
| TOTAL VOLUME FILTERED (M3) | 807.0 |

| | NUMBERS/CUBIC METER | ± 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | 0.002 | 0.003 |
| TOTAL YOUNG | 0.045 | 0.022 |
| TOTAL ADULT | | |
| EGGS: | | |
| LARVAE: | | |
| M. UNDULATUS | 0.001 | 0.002 |
| BOTHIDAE | 0.001 | 0.002 |
| YOUNG: | | |
| A. ROSTRATA | 0.003 | 0.005 |
| A. AESTIVALIS | 0.005 | 0.006 |
| A. MITCHILLI | 0.033 | 0.023 |
| M. MENIDIA | 0.002 | 0.004 |
| G. BOSCI | 0.002 | 0.004 |
| ADULT: | | |

* - INDICATES BELOW REPORTABLE

1A SALEM EN 1978

TABLE 3.1.8-8
CONTINUED

| | |
|---|---|
| DATE | 12/13/78 |
| NO. OF SAMPLES | 5 |
| WATER TEMPERATURE (C) | 5.0- 6.0 |
| DISSOLVED OXYGEN (MG/L) | 9.9-11.0 |
| PH | 7.1- 7.4 |
| SALINITY (PPT) | 5.0- 6.0 |
| PUMPS OPERATING | 3-5 |
| TOTAL VOLUME FILTERED (M3) | 250.0 |

| | NUMBERS/CUBIC METER | ± 95% CONFIDENCE LIMIT |
|---|---|---|
| TOTAL EGGS | | |
| TOTAL LARVAE | | |
| TOTAL YOUNG | 0.008 | 0.014 |
| TOTAL ADULT | | |
| EGGS: | | |
| LARVAE: | | |
| YOUNG: | | |
| M. MENIDIA | 0.004 | 0.011 |
| T. MACULATUS | 0.004 | 0.011 |
| ADULT: | | |

* - INDICATES BELOW REPORTABLE

IA SALEM EN 1978

TABLE 3.1.8-9
NUMBER AND PERCENT VIABLE OF FISH EGGS
SUMMARIZED BY SPECIES AND DATE - 1978

| Date | No. of eggs | Percent viable | Mean salinity |
|---|---|---|---|
| | Bay anchovy, *Anchoa mitchilli* | | |
| June 28-29 | 523 | 7.3 | 5.9 |
| July 12-13 | 15,083 | 7.4 | 7.7 |
| July 27-28 | 92 | 12.0 | 7.7 |
| August 10-11 | 1,822 | 2.0 | 7.0 |
| Total | 17,520 | 6.8 | 7.0 |
| | Silversides, *Membras* sp./*Menidia* spp. | | |
| July 12-13 | 4 | 75.0 | 7.7 |
| July 27-28 | 2 | 100.0 | 7.7 |
| Total | 6 | 83.3 | 7.7 |

IA SALEM EN 1978

TABLE 3.1.8-10
SUMMARY BY DATE OF INITIAL AND LATENT MEAN PERCENT SURVIVAL OF ICHTHYOPLANKTON-1978

| | |
|---|---|
| Month/day/year | 04/19-20/78 |
| No. of intake-discharge samples | 5 |
| Range in ambient water temperature (C) | 10.2-11.0 |
| Range in ambient D.O.(mg/l) | 8.8-9.7 |
| Range in ambient salinity (ppt) | 5.5-8.0 |
| Range in ambient pH | 7.2-7.6 |
| Range in condenser delta T (C) | 0.0 |
| Total volume ($m^3$) | 24.0 |

| | | Hours After Collection | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | | | 2 | | | 4 | | | 8 | | | 12 | | |
| Species | Total No. | % Live | % Stunned | % Dead | %Live | % Stunned | % Dead | % Live | % Stunned | % Dead | % Live | % Stunned | %Dead | % Live | % Stunned | % Dead |
| Intake | | | | | | | | | | | | | | | | |
| Adult: | | | | | | | | | | | | | | | | |
| *A. rostrata* | 3 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| Discharge | | | | | | | | | | | | | | | | |
| Young: | | | | | | | | | | | | | | | | |
| *A. rostrata* | 1 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| Adult: | | | | | | | | | | | | | | | | |
| *A. rostrata* | 2 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |

IA SALEM EN 1978

TABLE 3.1.8-10
CONTINUED

| | |
|---|---|
| Month/day/year | 06/28-29/78 |
| No. of intake-discharge samples | 7 |
| Range in ambient water temperatures (C) | 21.0-26.8 |
| Range in ambient D.O. | 6.6-8.4 |
| Range in ambient salinity | 4.0-6.0 |
| Range in ambient pH | 6.5-7.1 |
| Range in condenser delta T (C) | 3.8-6.1 |
| Total volume filtered ($m^3$) | 42.0 |

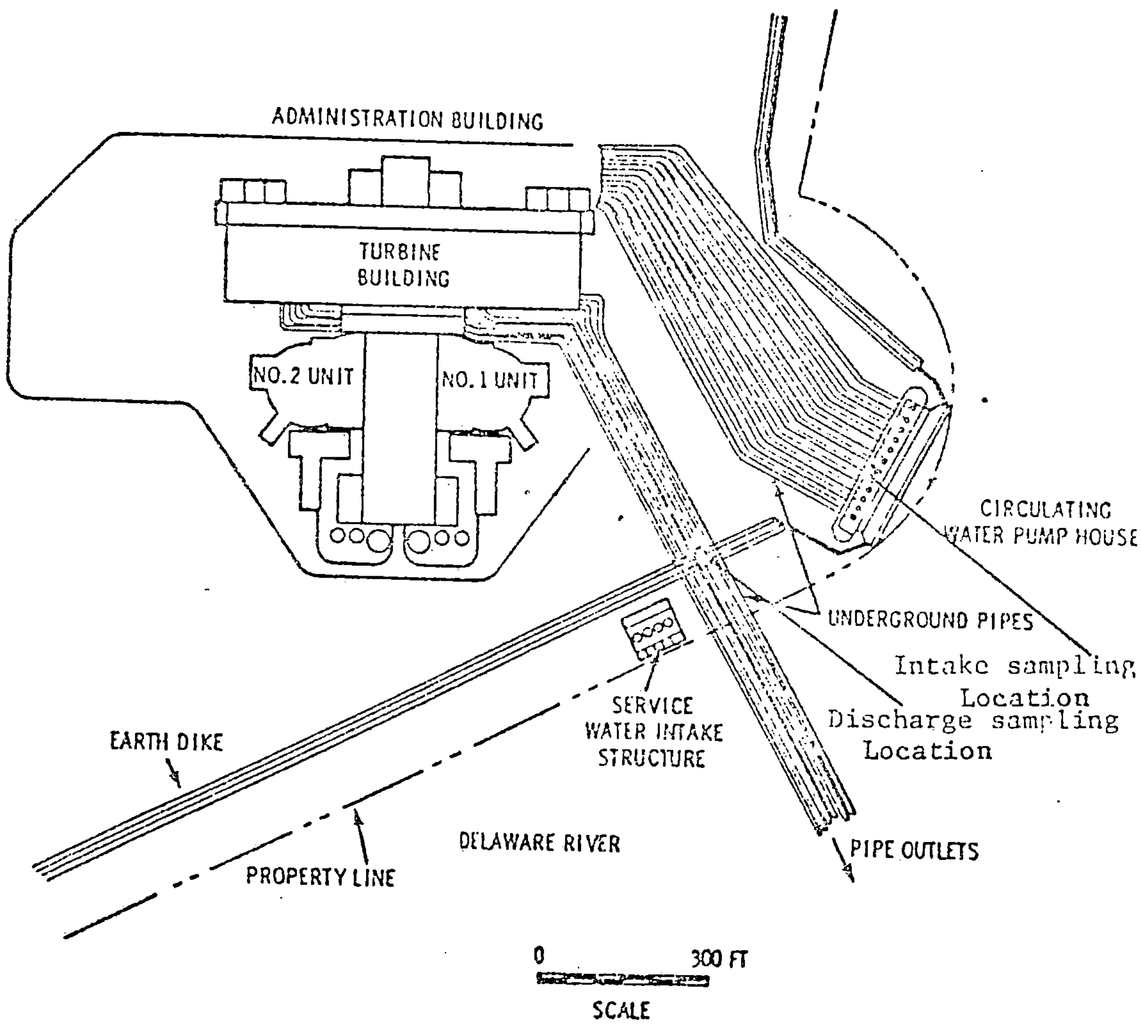
| | | Hours After Collection | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | | | 2 | | | 4 | | | 8 | | | 12 | | |
| Species | Total No. | % Live | % Stunned | % Dead | % Live | % Stunned | % Dead | % Live | % Stunned | % Dead | % Live | % Stunned | % Dead | % Live | % Stunned | % Dead |
| Intake | | | | | | | | | | | | | | | | |
| Larvae: | | | | | | | | | | | | | | | | |
| *A. mitchilli* | 9 | 55.6 | 0.0 | 44.4 | 33.3 | 0.0 | 66.7 | 11.1 | 0.0 | 88.9 | 11.1 | 0.0 | 88.9 | 11.1 | 0.0 | 88.9 |
| *M. martinica* | 1 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| *C. regalis* | 63 | 30.2 | 1.6 | 68.3 | 30.2 | 1.6 | 68.3 | 31.7 | 0.0 | 68.3 | 31.7 | 0.0 | 68.3 | 30.2 | 1.6 | 68.3 |
| *L. xanthurus* | 1 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| *G. bosci* | 1 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 |
| Young: | | | | | | | | | | | | | | | | |
| *S. fuscus* | 3 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 |
| *C. regalis* | 34 | 58.8 | 0.0 | 41.2 | 55.9 | 0.0 | 44.1 | 55.9 | 0.0 | 44.1 | 55.9 | 0.0 | 44.1 | 52.9 | 0.0 | 47.1 |
| Discharge | | | | | | | | | | | | | | | | |
| Larvae: | | | | | | | | | | | | | | | | |
| *A. mitchilli* | 2 | 50.0 | 0.0 | 50.0 | 50.0 | 0.0 | 50.0 | 50.0 | 0.0 | 50.0 | 50.0 | 0.0 | 50.0 | 50.0 | 0.0 | 50.0 |
| *C. regalis* | 57 | 89.5 | 0.0 | 10.5 | 87.7 | 0.0 | 12.3 | 87.7 | 0.0 | 12.3 | 63.2 | 0.0 | 36.8 | 63.2 | 0.0 | 36.8 |
| *G. bosci* | 1 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 |
| Young: | | | | | | | | | | | | | | | | |
| *N. analostanus* | 1 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| *C. regalis* | 49 | 79.6 | 16.3 | 4.1 | 81.6 | 14.3 | 4.1 | 83.7 | 10.2 | 4.1 | 73.5 | 10.2 | 16.3 | 73.5 | 10.2 | 16.3 |
| *L. xanthurus* | 1 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |

TABLE 3.1.8-10
CONTINUED

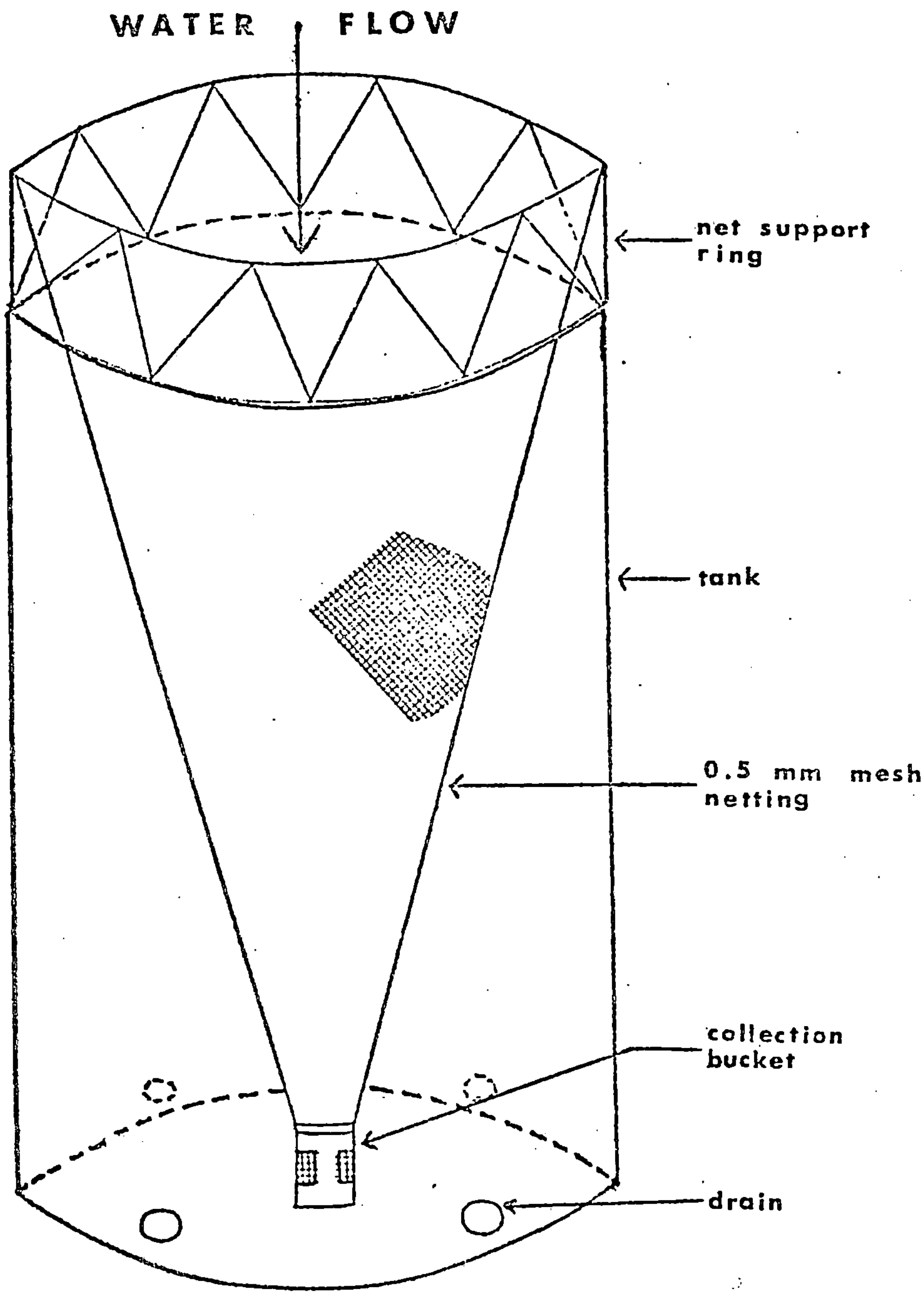
| | |
|---|---|
| Month/day/year | 09/13-14/78 |
| No. of intake-discharge samples ; | 11 |
| Range in ambient water temperature (C) | 21.2-23.5 |
| Range in ambient D.O. (mg/l) | 6.4-7.9 |
| Range in ambient salinity (ppt) | 6.0-9.0 |
| Range in ambient pH | 6.8-7.0 |
| Range in condenser delta T (C) | 7.5-11.4 |
| Total volume filtered ($m^3$) | 82.0 |

Hours After Collection

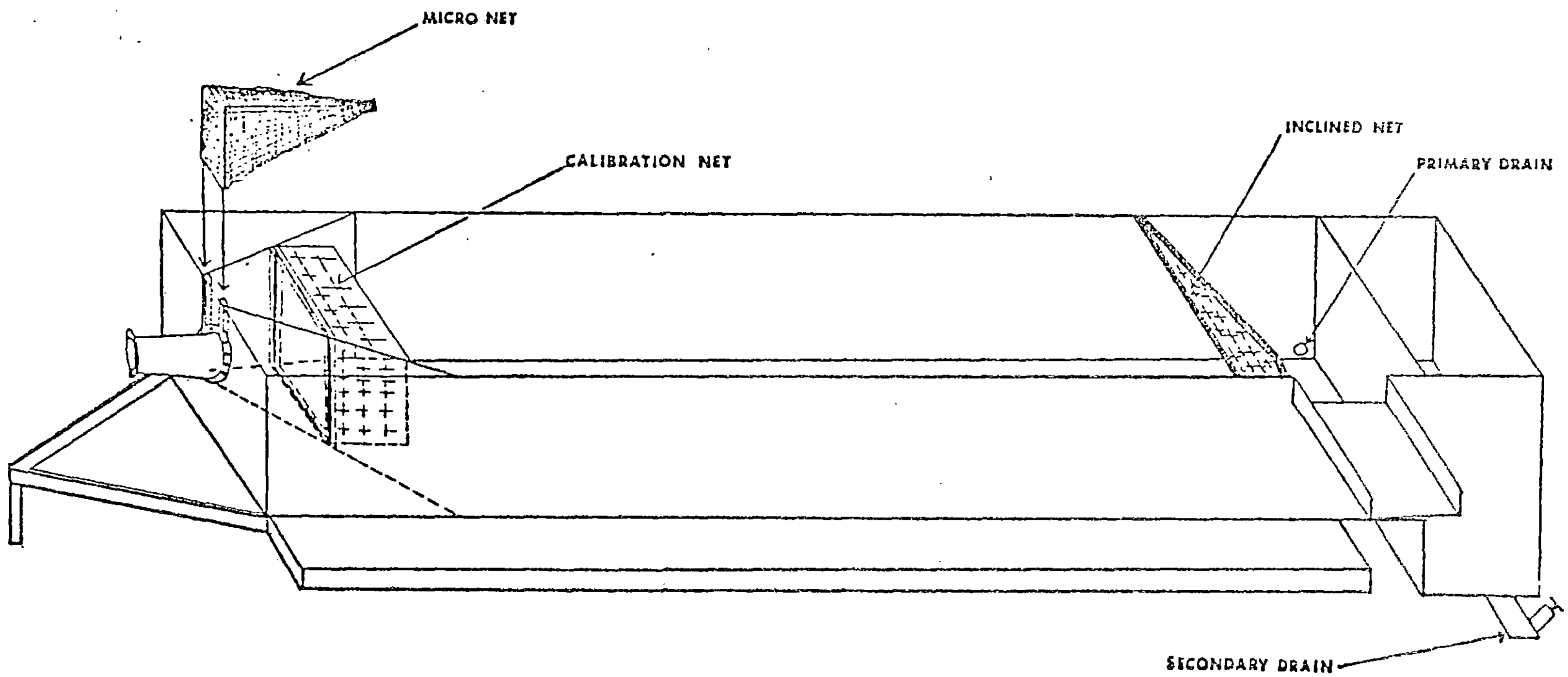
| | | 0 | | | 2 | | | 4 | | | 8 | | | 12 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Total No. | % Live | % Stunned | % Dead | % Live | % Stunned | % Dead | % Live | % Stunned | % Dead | % Live | % Stunned | % Dead | % Live | % Stunned | % Dead |
| Intake | | | | | | | | | | | | | | | | |
| Larvae: | | | | | | | | | | | | | | | | |
| *A. mitchilli* | 3 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 66.7 | 33.3 | 0.0 | 0.0 | 0.0 | 100.0 |
| *M. undulatus* | 1 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| Young: | | | | | | | | | | | | | | | | |
| *A. mitchilli* | 40 | 75.0 | 10.0 | 15.0 | 77.5 | 7.5 | 15.0 | 72.5 | 12.5 | 15.0 | 50.0 | 27.5 | 22.5 | 20.0 | 27.5 | 52.5 |
| *S. fuscus* | 4 | 75.0 | 0.0 | 25.0 | 75.0 | 0.0 | 25.0 | 75.0 | 0.0 | 25.0 | 75.0 | 0.0 | 25.0 | 50.0 | 25.0 | 25.0 |
| Adult: | | | | | | | | | | | | | | | | |
| *A. mitchilli* | 7 | 57.1 | 28.6 | 14.3 | 71.4 | 14.3 | 14.3 | 57.1 | 28.6 | 14.3 | 42.9 | 14.3 | 42.9 | 28.6 | 28.6 | 42.6 |
| Discharge | | | | | | | | | | | | | | | | |
| Larvae: | | | | | | | | | | | | | | | | |
| *A. mitchilli* | 4 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 |
| Young: | | | | | | | | | | | | | | | | |
| *A. mitchilli* | 25 | 76.0 | 8.0 | 16.0 | 76.0 | 8.0 | 16.0 | 68.0 | 16.0 | 16.0 | 48.0 | 36.0 | 16.0 | 20.0 | 4.0 | 76.0 |
| *S. fuscus* | 3 | 66.7 | 0.0 | 33.3 | 66.7 | 0.0 | 33.3 | 33.3 | 33.3 | 33.3 | 66.7 | 0.0 | 33.3 | 66.7 | 0.0 | 33.3 |
| *G. bosci* | 1 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 | 100.0 | 0.0 | 0.0 |
| Adult: | | | | | | | | | | | | | | | | |
| *A. mitchilli* | 2 | 50.0 | 0.0 | 50.0 | 50.0 | 0.0 | 50.0 | 50.0 | 0.0 | 50.0 | 0.0 | 50.0 | 50.0 | 0.0 | 50.0 | 50.0 |



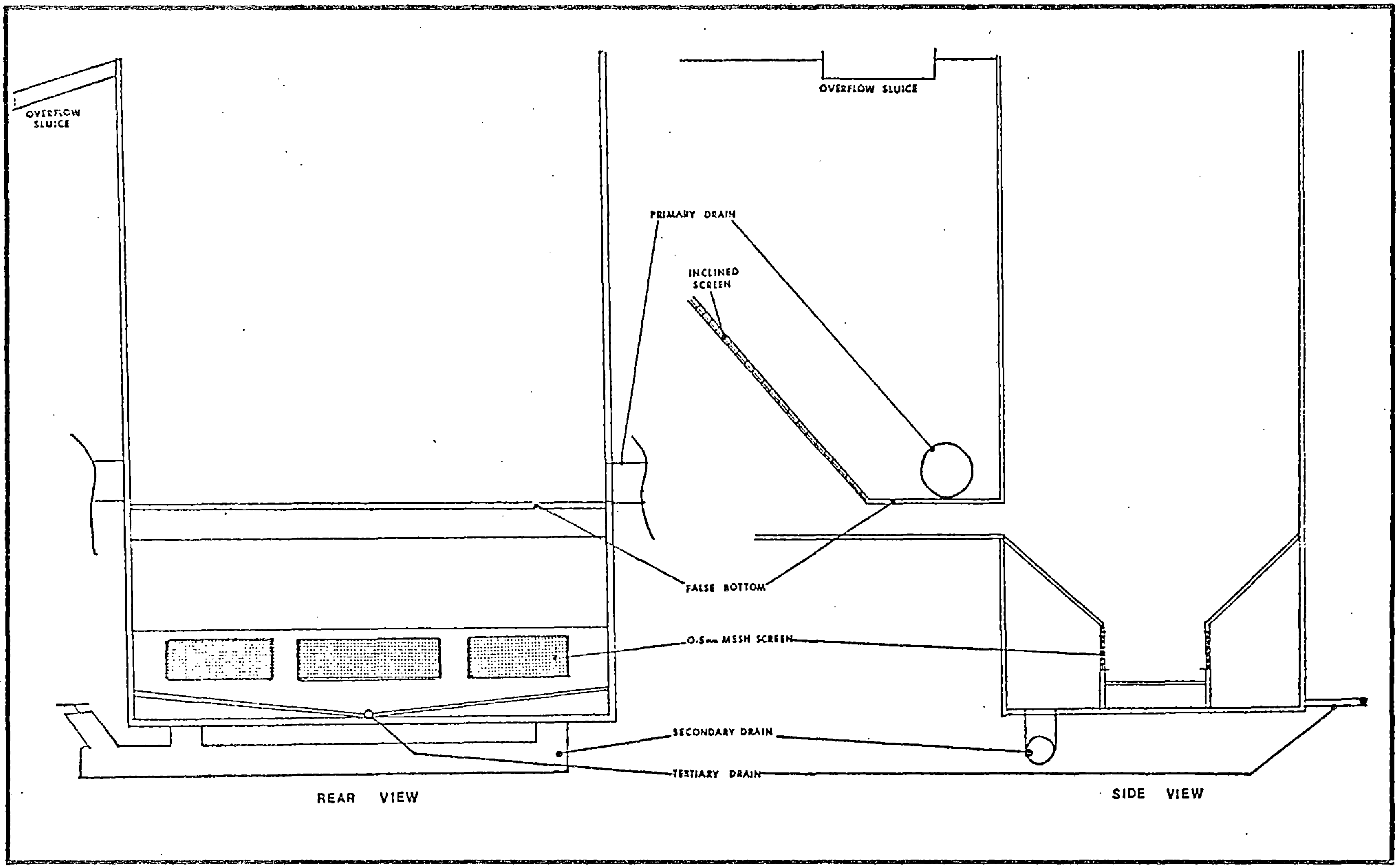

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Entrainment sampling sites - 1978 |
|---|---|
| | Figure 3.1.8-1 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY SALEM NUCLEAR GENERATING STATION | Abundance chamber - 1978 |
|---|---|
| | Figure 3.1.8-2 |




| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Larval table - 1978 |
| | Figure 3.1.8-3 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Larval table collection box- 1978<br>Figure 3.1.8-4 |
|---|---|

## 3.2 TERRESTRIAL (ETS Section 3.1.2.1.2)

This program studies the abundance and distribution of vascular plants and nonfish vertebrates on and near Artificial Island. Emphasis is on species of economic or ecological importance or species classified as rare or endangered (U.S.D.I., 1973).

Research in 1978 included bird surveys, and surveys of bald eagle occurrence, and osprey nesting, and study of diamondback terrapin nesting.

### 3.2.1 Diamondback Terrapin Nesting Study (ETS Section 3.1.2.1.2.1)

The objectives are to monitor nesting activity and success of the northern diamondback terrapin, *Malaclemys terrapin terrapin*. Northern diamondback terrapin inhabit brackish water along the Atlantic coast from Cape Cod to Cape Hatteras. Burger and Monteveechi (1975) stated that most nests were found above the high tide level in flat areas on sand dunes or beaches that have about 20 percent vegetative cover. Generally, it takes the female less than an hour to select a site, dig a flask shaped hole, lay and cover her eggs, and return to the water. Nesting begins in mid-June. Hatching usually begins from mid to late August and may continue into November. Cold weather may cause the young to hibernate in or near the nest and emerge the following spring (Carr, 1952; Lawler and Musick, 1972).

#### 3.2.1.1 Summary

Diamondback terrapin nesting was monitored at three beaches on the Delaware River within 4.8 km of Salem. Nesting was recorded from June 10 through late July, with three activity peaks observed. Degree of activity varied greatly between sites. A total of 127 females was tagged during 1978, with eight recaptures. Estimated number of females utilizing a beach ranged from 30 to 682. Carapace length ranged from 15.3 to 20.6 cm, and age ranged from 12 to 22+ years. Major nest predators were mink, Norway rats, and crows. Black-backed gulls and great blue herons may have preyed on hatched young both in and out of the nest. Hatching was observed from late August through mid-September. Evidence indicated a total of only 88 young, but this number is highly convervative. Cool spring and summer weather delayed nesting by many females and subsequent hatching of eggs.

3.2.1.2 Study Area

Observations were made from June 10 through November 9, 1978 at suitable nesting beaches at Sunken Ship Cove and near the mouth of Hope Creek, New Jersey, and Liston Point, Delaware (Fig. 3.2.1-1). For description and discussion of these three locations see Volume 2 of the 1977 Annual Environmental Operating Report.

3.2.1.3 Materials and Methods

The three sites were searched during daylight from June into November as required by the ETS. Weekly searches for evidence of nesting were conducted in early June. After first evidence of nesting (June 10), the beaches were monitored three to five times a week through July. Searches for depredated nests and emerging hatchlings were made one to three times a week from August through September. Two searches were conducted during October, and one in November. Each visit consisted of walking the beach and counting turtles, crawl tracks, depredated nests, and eggs. For further description of the study methods see Volume 2 of the 1977 Annual Environmental Operating Report.

In 1978, nests containing unbroken eggs were marked with a numbered stake, and the number of eggs and date recorded. These nests were located by following tracks, finding females on the nest, and random searching. Located nests were monitored for predation. If depredated, the date and number of eggs predated were recorded.

3.2.1.4 Data Reduction

The following formula was developed to provide a rough relative estimate of the number of nesting females utilizing each study area

$$N = \left( \sum \frac{T_s + T_r}{\frac{V}{3}} \right) D$$

where $T_s$ is the number of turtles sighted, $T_r$ is the number of tracks counted, V is the number of times the study area was visited over the study period, D is the known number of days of nesting activity, and 3 is the estimated mean number of nests laid per female during the nesting season.

### 3.2.1.5 Results and Discussion

NESTING ACTIVITY AND EFFORT

Nesting in 1978 began on June 10 and continued through late July. The last dates of observed nesting activity were July 14, 20, and 27 for Sunken Ship Cove, Hope Creek beach, and Liston Point, respectively. Nesting activity varied between sites (Fig. 3.2.1-2, 3.2.1-3). Activity appeared to have three peaks at Liston Point, with the first on June 19 and the second, and highest, on July 6. The third peak occurred four days later on July 10. It is probable the second and third peaks reflected many renesting females. Hildebrand (1932) reported that cultured terrapin may lay from one to five nests per year, but that most lay from one to three nests. Hope Creek also appeared to have three peaks of activity, with the highest observed on June 20. Activity at Sunken Ship Cove slight, but appeared to have two peaks. Nesting activity at this site was greatly affected by heavy usage of the beach by fisherman throughout the summer. Fishermen were present on 23 (85 percent) of the 27 visits made during the active nesting period.

The activity peaks in 1978 did not exhibit the strong cyclic pattern of nesting observed in 1977. In order for cyclic nesting to occur, two criteria must be met (Worth and Smith, 1976). First, there must be no significant immigrant increase in the rookery once seasonal nesting has begun. Second, hormonal synchrony within the nesting population is implied. All three sites had some activity peaks occurring within one day of each other indicating these three nesting populations may belong to one large population. However, many females were probably still immigrating into the rookery areas after nesting had begun. Terrapin appeared to be several weeks behind in their normal seasonal cycle due to the cold spring weather. Terrapin are generally first observed in the spring from early to mid-April, but in 1978 were not observed until mid-May. Therefore, most females were probably not physiologically ready for nesting until late June or early July.

Liston Point had the most nesting activity followed by Hope Creek and Sunken Ship Cove (Table 3.2.1-1). The mean number of combined individuals and tracks observed during nesting was 42.6 at Liston Point, 15.4 at Hope Creek, and 2.6 at Sunken Ship Cove. The estimated number of females utilizing each beach was 30 for Sunken Ship Cove, 211 for Hope Creek, 682 for Liston Point.

Nesting activity on a daily basis appears related to tide and weather. The highest mean number of sightings was during late flood tide under a clear cloud cover (Table 3.2.1-2). More turtles were generally seen during periods of high tide and clear to partly cloudy skies. Burger and Montevecchi (1975) reported a high positive correlation between activity and tidal stage.

A total of 5,653 eggs from 776 nests were recorded during 1978. Most nests were found at Liston Point (505 nests, 4,071 eggs). Hope Creek had 266 nests (1,546 eggs), while only five nests (36 eggs) were located at Sunken Ship Cove. Most of the recorded nests were depredated; 88.3 percent at Liston Point, 87.9 percent at Hope Creek, and 60.0 percent at Sunken Ship Cove.

PREDATION

Marked nests were monitored over the season to determine predation pressure. A total of 63 non-depredated nests were located; 43 at Liston Point, 18 at Hope Creek, and 2 at Sunken Ship Cove. The two nests at Sunken Ship Cove were lost when fishermen removed the stakes. A total of 37 (61.1 percent) of the marked nests were depredated by the end of September; 31 (72.1 percent) at Liston Point and 6 (33 percent) at Hope Creek. Burger (1976) reported that 60 percent of the marked nests in her study were destroyed by raccoons, Procyon lotor, and foxes.

The only predator tracks observed at Sunken Ship Cove were of the norway rat, Rattus norvegicus. Tracks of mink, Mustela vision; norway rat; and crow, Corvus brachyrhynchos, were observed at depredated nests on Hope Creek beach. Mink and rat tracks were commonly observed at Liston Point. Raccoon tracks were also occasionally sighted. Track evidence indicated that mink, raccoon, norway rats, crows, great black-backed gulls; Larus marinus, and occasionally great blue heron, *Ardea herodias*, preyed on hatchlings both in and out of the nest.

## TAGGED FEMALES

A total of 127 terrapin was tagged during 1978; 56 at Liston Point and 71 at Hope Creek beach. No terrapin were captured at Sunken Ship Cove. Eight tagged terrapin were recaptured in 1978. Six of these were recaptured where originally tagged: three at Liston Point and three at Hope Creek beach. The remaining two had lost their tags.

Mean plastron length and width of the tagged specimens was 16.9 cm (range: 14.9-18.6) and 9.1 cm (8.2-9.1), respectively, at Liston Point and 16.1 cm (14.1-18.4) and 9.0 cm (7.9-9.8) at Hope Creek. Mean carapace length and width was 18.3 cm (range: 16.1-20.6) and 14.0 cm (12.2-15.6), respectively, at Liston Point and 17.3 (15.3-19.2) and 13.3 cm (12.2-14.7) at Hope Creek.

Age of nesting females ranged from 12 to 22+ years. Some of the females captured had completely smooth shells which may indicate they were up to 40+ years (Hildebrand 1932). Mean age at Liston Point was 15.9 years (range: 12-22+), and 16.4 years (13-22+) at Hope Creek.

## HATCHLING ABUNDANCE AND ACTIVITY

Hatchlings were first observed August 23, with observations continuing into September. Tracks of 25 young were found at Liston Point, and 19 hatched nests containing 150 eggs were located. Twenty-nine young were observed. No hatchlings were found at Hope Creek and only one track was sighted. Ten hatched nests containing remnants of 45 eggs were found. At Sunken Ship Cove only 33 tracks of young were recorded.

Hatchling activity was greatest during the first two weeks of hatching (Fig. 3.2.1-4). Activity dropped off quickly in September, with the last evidence of hatching observed on September 21. The apparent decrease in hatchling numbers observed in 1978 compared to previous years is felt to be really only a decrease in the number of emerged young. The delay in nesting by many females, coupled with a cooler, wetter incubation period than normal (NOAA, 1978), appeared to delay most hatching to the point where hatchlings did not emerge from the nest but immediately went into hibernation. Carr (1952) reported that overwintering in the nest is common for turtles both by unhatched eggs and by hatchlings.

TABLE 3.2.1-1
SUMMARY OF NESTING AND HATCHING
DATA FOR DIAMONDBACK TERRAPIN - 1978

| Area | Period | No. of Visits | No. of Non-depredated Nests | No. of Depredated Nests | No. of Non-depredated Eggs | No. of Depredated Eggs | No. of Turtles In Area | No. of Tracks Observed |
|---|---|---|---|---|---|---|---|---|
| Sunken Ship Cove | 10-15 June | 4 | | | | | | |
| | 16-30 June | 12 | 1 | | 10 | | 2 | 24 |
| | June | 16 | 1 | | 10 | | 2 | 24 |
| | 1-15 July | 8 | 1 | | 10 | | 10 | 14 |
| | 16-31 July | 4 | | | | | | |
| | July | 12 | 1 | | 10 | | 10 | 14 |
| Subtotal (Adults) | | 28 | 2 | | 20 | | 12 | 38 |
| | 1-15 Aug. | 1 | | 2 | | 10 | | |
| | 16-31 Aug. | 5 | | 1 | | 6 | | 20 |
| | August | 6 | | 3 | | 16 | | 20 |
| | 1-15 Sept. | 3 | | | | | | 13 |
| | 16-30 Sept. | 2 | | | | | | |
| | September | 5 | | | | | | 13 |
| | October | 2 | | | | | | |
| | November | 1 | | | | | | |
| Subtotal (Young) | | 14 | | 3 | | 16 | | 33 |
| Total | | 42 | 2 | 3 | 20 | 16 | 12 | 71 |

IA SALEM T 1978

TABLE 3.2.1-1
CONTINUED

| Area | Period | No. of Visits | No. of Non-depredated Nests | No. of Depredated Nests | No. of Non-depredated Eggs | No. of Depredated Eggs | No. of Turtles In Area | No. of Tracks Observed |
|---|---|---|---|---|---|---|---|---|
| Hope Creek Beach | 10-15 June | 5 | 2 | 3 | 26 | 24 | 8 | 8 |
| | 16-30 June | 13 | 12 | 66 | 67 | 364 | 44 | 178 |
| | June | 18 | 14 | 69 | 93 | 388 | 52 | 186 |
| | 1-15 July | 9 | 7 | 52 | 54 | 322 | 31 | 84 |
| | 16-31 July | 4 | | 31 | | 184 | 6 | 10 |
| | July | 13 | 7 | 83 | 54 | 506 | 37 | 94 |
| Subtotal (Adults) | | 31 | 21 | 152 | 147 | 894 | 89 | 280 |
| | 1-15 Aug. | 1 | | 23 | | 162 | | |
| | 16-31 Aug. | 4 | 5 | 30 | 17 | 133 | | 1 |
| | August | 5 | 5 | 53 | 17 | 295 | | 1 |
| | 1-15 Sept. | 3 | | 25 | | 136 | | |
| | 16-30 Sept. | 2 | 5 | 5 | 28 | 29 | | |
| | September | 5 | 5 | 30 | 28 | 165 | | |
| | October | 2 | | | | | | |
| | November | 1 | | | | | | |
| Subtotal (Young) | | 13 | 10 | 83 | 45 | 460 | | 1 |
| Total | | 44 | 31 | 235 | 192 | 1,354 | 89 | 281 |

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TABLE 3.2.1-1
CONTINUED

| Area | Period | No. of Visits | No. of Non-depredated Nests | No. of Depredated Nests | No. of Non-depredated Eggs | No. of Depredated Eggs | No. of Turtles In Area | No. of Tracks Observed |
|---|---|---|---|---|---|---|---|---|
| Liston Point | 10-15 June | 5 | 12 | 5 | 121 | 55 | 5 | 23 |
| | 16-30 June | 13 | 17 | 65 | 190 | 492 | 35 | 488 |
| | June | 18 | 29 | 70 | 311 | 547 | 40 | 511 |
| | 1-15 July | 10 | 12 | 209 | 145 | 1,637 | 40 | 499 |
| | 16-31 July | 4 | 1 | 57 | 10 | 436 | 2 | 58 |
| | July | 14 | 13 | 266 | 155 | 2,073 | 42 | 557 |
| Subtotal (Adults) | | 32 | 42 | 336 | 466 | 2,620 | 82 | 1,068 |
| | 1-15 Aug. | 1 | | 8 | | 66 | | |
| | 16-31 Aug. | 5 | 8 | 54 | 71 | 424 | 29 | 22 |
| | August | 6 | 8 | 62 | 71 | 490 | 29 | 22 |
| | 1-15 Sept. | 3 | 7 | 43 | 51 | 319 | | 2 |
| | 16-30 Sept. | 2 | 4 | 3 | 28 | 26 | | 1 |
| | September | 5 | 11 | 46 | 79 | 345 | | 3 |
| | October | 2 | | | | | | |
| | November | 1 | | | | | | |
| Subtotal (Young) | | 14 | 19 | 108 | 150 | 835 | 29 | 25 |
| Total | | 46 | 61 | 444 | 616 | 3,455 | 111 | 1,093 |

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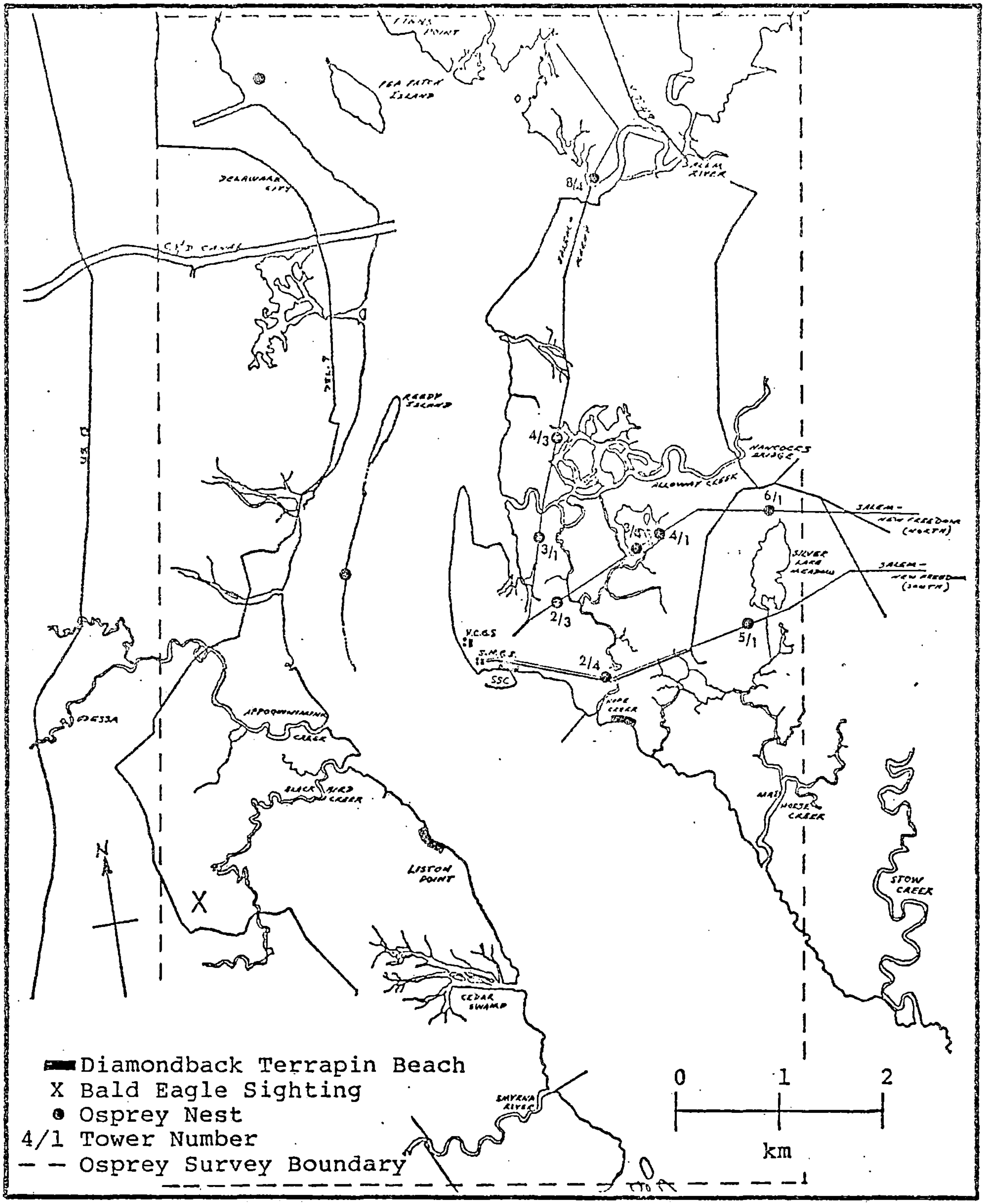
TABLE 3.2.1-2
DIAMONDBACK TERRAPIN SIGHTINGS
RELATED TO TIDE AND CLOUD COVER* - 1978

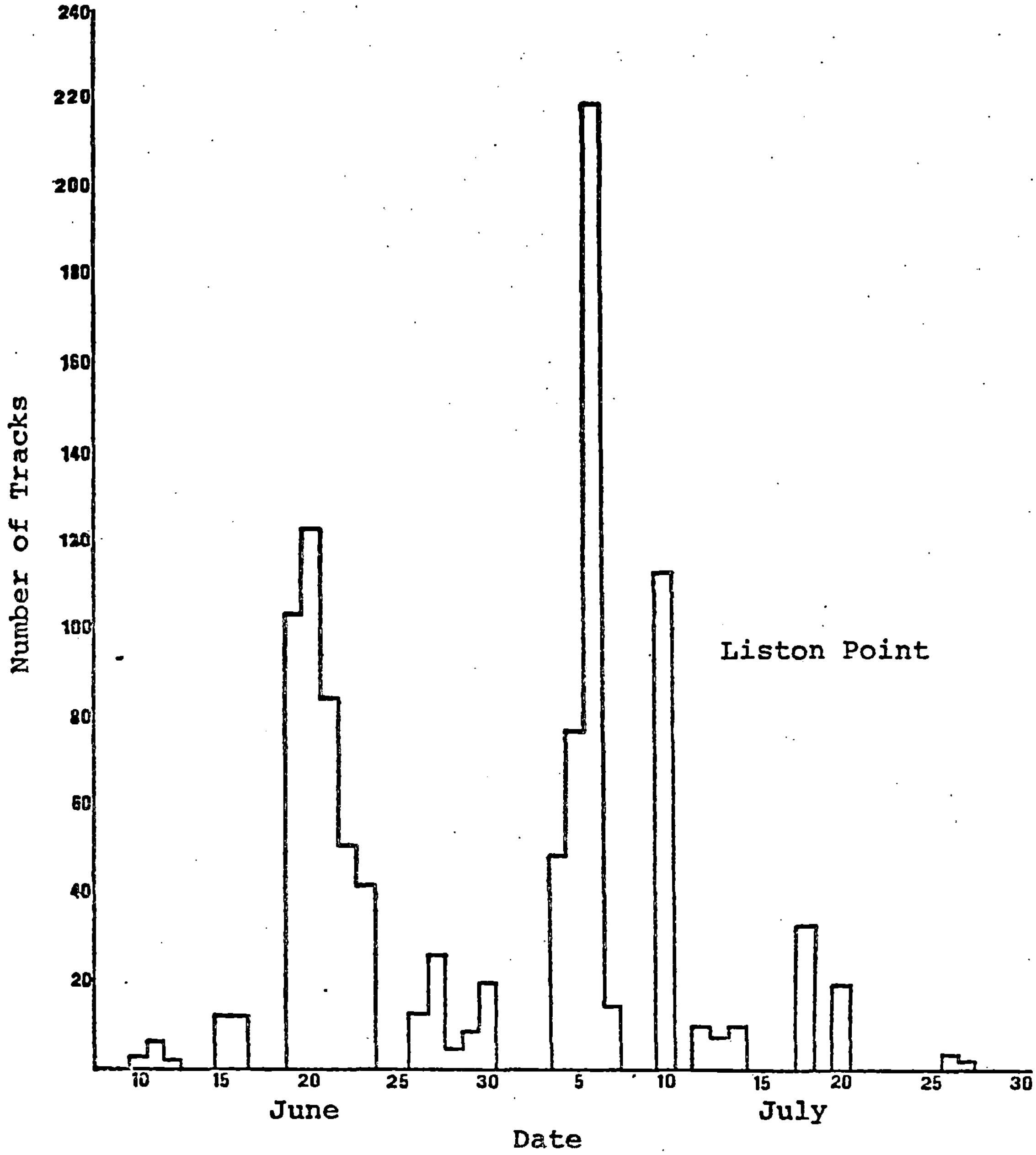
| Tide | Cloud Cover (0-10) Clear (0-3) | Partly Cloudy (4-6) | Overcast (7-10) | Total |
|---|---|---|---|---|
| Flood 1 | 1.6 | 2.8 | 0.0 | 4.4 |
| Flood 2 | 7.0 | 2.4 | 4.2 | 13.6 |
| Ebb 1 | 3.3 | 5.0 | 5.0 | 13.3 |
| Ebb 2 | 0.2 | 2.7 | 0.1 | 3.0 |
| Total | 12.1 | 12.9 | 9.3 | |

* Information for tide and cloud cover is from NOAA (1977) and NOAA (1978), respectively.

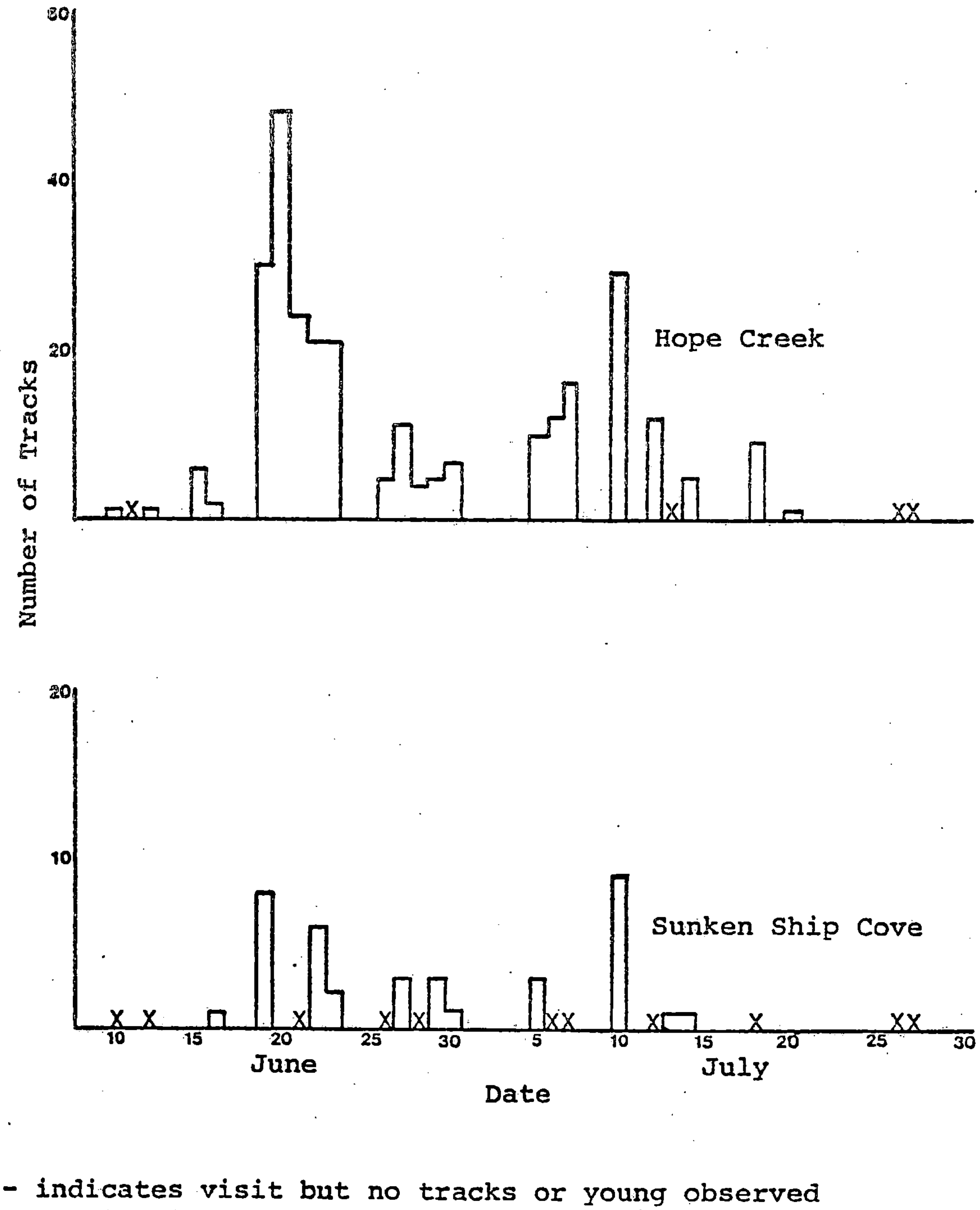
IA SALEM T 1978



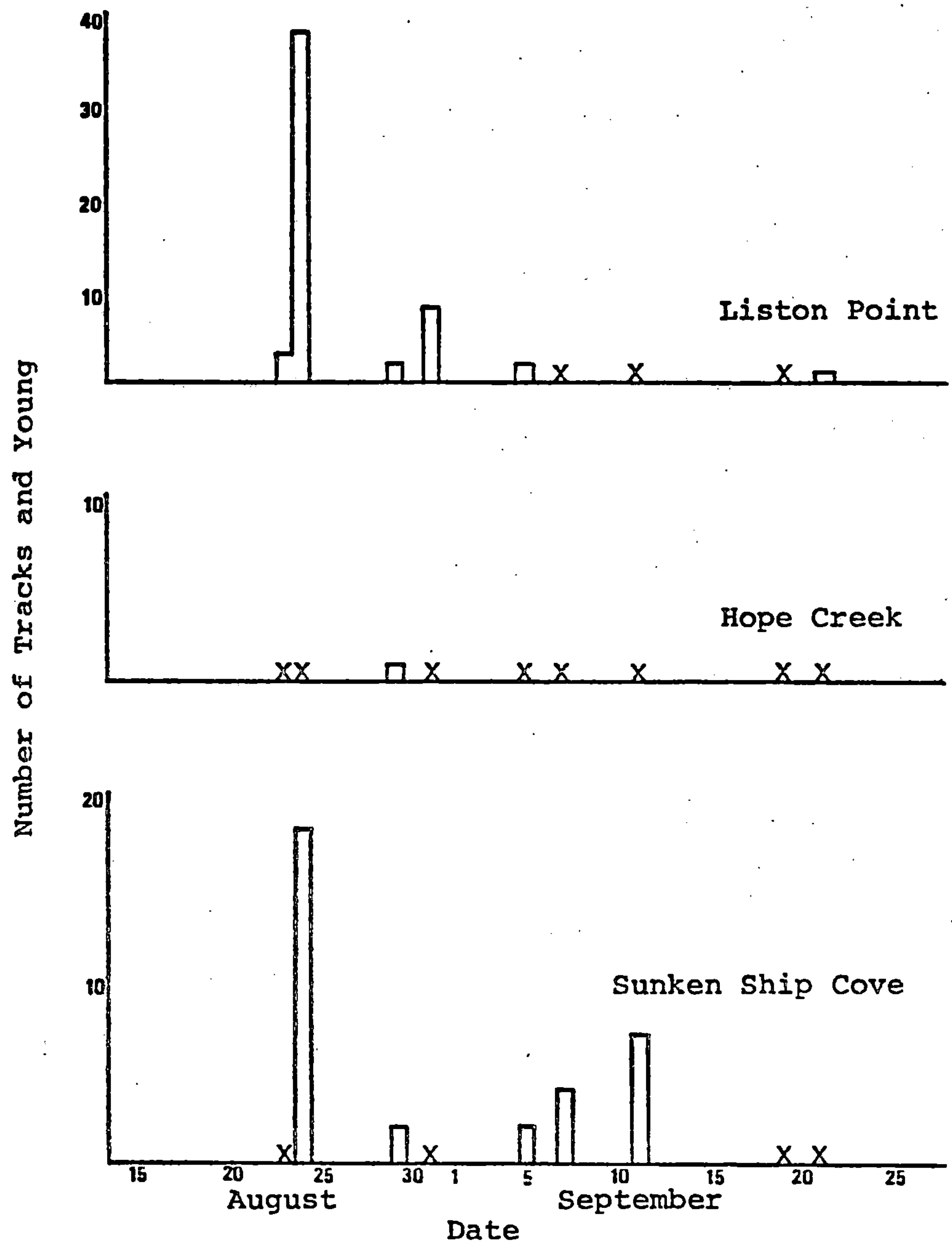

| | |
|---|---|
| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Diamondback terrapin study sites, osprey nests, and bald eagle sightings - 1978 |
| | Figure 3.2.1-1 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Nesting activity of diamondback terrapin at Liston Point - 1978 |
|---|---|
| | Figure 3.2.1-2 |




| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Nesting activity of diamondback terrapin at Hope Creek and Sunken Ship Cove - 1978 |
|---|---|
| | Figure 3.2.1-3 |




x - indicates visit but no tracks or young observed

| PUBLIC SERVICE ELECTRIC AND GAS COMPANY<br>SALEM NUCLEAR GENERATING STATION | Hatching activity of diamondback terrapin - 1978 |
|---|---|
| | Figure 3.2.1-4 |

### 3.2.2 Bird Population Studies (ETS Section 3.1.2.1.2.2)

Bird surveys were conducted during March through December to provide a quantitative assessment of species composition, seasonal abundance, and local distribution within 4.8 to 8.0 km of Salem. Surveys were not conducted during January and February due to weather conditions.

#### 3.2.2.1 Summary

The greatest numbers of individuals and species were sighted during migrations. The abundant species sighted on the river were the Canada goose, laughing gull, great black-backed gull, Bonaparte's gull, and herring gull. Herons were common from late spring through mid-summer. Abundant waterfowl were the Canada goose, green-winged teal, black duck, and mallard. Black ducks and mallards were the only confirmed year-round residents. Green-winged teal, and Canada geese were commonly observed migrants; Canada geese also wintered in the area.

#### 3.2.2.2 Study Area

The study area was described in Clark (1976). The bird survey covered approximately 11 km of the river and 43 km of tidal creeks. This was divided into six zones to enable correlation of sightings with community type (Fig. 3.2.1-1).

Zone 1 (864 ha or 2,136 acres) includes all of Artificial Island and is composed of pasture, freshwater potholes, tidal marsh, sandy beach, disturbed area, and open water communities.

Zone 2 (1,219 ha or 3,013 acres) is predominantly saltmarsh cordgrass and includes tidal marsh and tidal mud flats on both sides of Alloway Creek. Reed, trees, and shrubs occur along the creek banks.

Zone 3 (226 ha or 558 acres) includes the town of Hancocks Bridge, a part of Alloway Creek west of Salem-Hancocks Bridge Road, and an impounded freshwater marsh vegetated primarily by reed.

Zone 4 (1,193 ha or 2,949 acres) includes the tidal marsh surrounding Halfway Creek and Hope Creek downstream from Solters Creek. Reed marsh and low cordgrass marsh are the predominant associations, with reed occupying most of the tidal marsh adjacent to Halfway Creek and lining the banks of most of Hope Creek.

Zone 5 (1,097 ha or 2,710) includes low tidal marsh, tidal mud flats, and farmland surrounding the uppermost region of Hope Creek and all of Solters Creek. Saltmarsh cordgrass is the predominant species.

Zone 6 (497 ha or 1,227 acres) is predominantly low tidal marsh adjacent to Fishing Creek. Saltmarsh cordgrass is the predominant species, but reed occupies much of the creek banks.

### 3.2.2.3 Materials and Methods

All ETS required samples were collected in 1978. Surveys were made weekly to monthly (weather permitting) throughout the year in areas regularly accessible by boat or foot.

The data are presented as two separate surveys: the river bird survey, including all bird species observed on the survey route on the Delaware River; and the waterfowl survey, including only waterfowl and osprey observed on the river and creeks. Detailed description of the survey methods and route can be found in Volume 2 of the 1977 Annual Environmental Operating Report.

The American coot, Fulica americana, was recorded as a waterfowl species due to similarity of habits and habitat.

### 3.2.2.4 Results and Discussion

RIVER SURVEY

Approximately 80 percent of the species observed on the river were summer or winter residents, the rest occurred only during migration. About half are known to breed in the general region.

The most sightings were during April ($\overline{X}$ = 1,169 individuals), probably the peak month of spring migration (Table 3.2.2-1). March ($\overline{X}$ = 1,020 individuals) also had high migratory activity. The fewest sightings were in June ($\overline{X}$ = 136 individuals).

The most species (26) occurred during April and the fewest (10) in October (Table 3.2.2-1). A total of 58 species was recorded on the river in 1978.

Abundant species on the river in 1978 were the Canada goose, Branta canadensis; laughing gull, Larus atricilla; great black-backed gull, Larus marinus; and herring gull, Larus argentatus. Gulls were usually common but were most abundant during May, July, and August. The laughing gull was the common gull from August through November. Waterfowl, especially Canada geese, were most abundant during March through April. Herons and egrets (Ardeidae) were common during May through July.

Distribution correlated with habitat requirements. Gulls were often sighted where perching was available, e.g., Hope Creek Jetty, Sunken Ship Cove, and the pilings along the west shore of Artificial Island. Dabbling ducks were most often sighted in Sunken Ship Cove, along the west shore of Artificial Island, and in the region of the cove off the northeast side of the island. A flock of 200 to 900 Canada geese was common in this cove during late winter and early spring. These areas offer some shelter from wind and waves. Diving ducks were generally found offshore although small groups were often observed in Sunken Ship Cove. Herons and egrets were usually in quiet, shallow waters along the shore, e.g., the beach at Sunken Ship Cove and behind the pilings on the west shore of Artificial Island.

## WATERFOWL SURVEY

Most species occur as winter residents or during migration; only a few breed in the area. Sightings were highest in March ($\overline{X}$ = 1,385 individuals) and April (1,133) (Table 3.2.2-2). This reflected the many Canada geese in the area. Sightings were lowest in July ($\overline{X}$ = 10 individuals). The most species occurred in March (13) and the fewest in July (2). Migration was most active from March through April and September through December.

The most abundant waterfowl were Canada geese; green-winged teal, Anas carolinensis; black ducks, Anas rubripes; and mallards, Anas platyrhynchos. Canada geese occurred from March through June and October through December. Black ducks and mallards were the only annual residents regularly observed. Green-winged teal were observed March through May and August through December

Most sightings were in Zones 1, 5, and 6 (Table 3.2.2-3). The most sightings were recorded on the river (Zone 1). Canada geese, black ducks, and mallards were common. Most sightings were of Canada geese.

Zone 5 contains a large area which is mostly open water at high tide and mud flat at low tide. Large numbers of Canada geese; black ducks; pintails, Anas acuta; mallards; and green-winged teal used this area, especially during migration. This zone also contains many narrow streams and ditches lined primarily with saltmarsh cordgrass and very little reed. Saltmarsh cordgrass is an important food and cover plant for waterfowl in this region (Clark, 1976), while reed is of relatively little value for either food or cover. Black ducks and occasionally mallards were flushed from these streams and ditches, especially at high tide.

Zone 6 is predominantly low marsh with many small streams and ditches. Birds often use this area for shelter during high winds. Most sightings were of green-winged teal during migration. Black ducks and mallards were also common.

Table 3.2.2-1
MONTHLY MEAN NUMBER OF BIRD OBSERVATIONS - 1978

| | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Surveys | 0 | 0 | 3 | 3 | 3 | 5 | 3 | 2 | 2 | 4 | 3 | 1 | 29 |
| Mean Number of Individual Sightings | | | 1020.0 | 1168.7 | 312.7 | 136.2 | 266.0 | 268.5 | 186.5 | 176.3 | 216.0 | 293.0 | 4043.9 |
| Percent by Month | | | 25.2 | 28.9 | 7.7 | 3.4 | 6.6 | 6.6 | 4.6 | 4.4 | 5.3 | 7.3 | |
| Species | | | | | | | | | | | | | |
| Red-throated loon | | | | | | | | | | | 0.7 | 1.0 | 0.1 |
| Double-crested cormorant | | | 0.3 | 24.0 | 26.7 | 1.4 | 1.7 | 3.5 | 4.0 | 1.8 | 1.3 | | 6.6 |
| Canada goose | | | 542.3 | 994.7 | 6.0 | | | | | 2.7 | | 82.0 | 162.8 |
| Snow goose | | | 10.0 | 2.0 | | | | | | | | | 1.2 |
| Mallard | | | 113.7 | 5.3 | 4.0 | | | | | 0.2 | | | 12.7 |
| Black duck | | | 47.3 | 6.7 | 1.7 | 0.2 | | | 0.5 | 0.8 | 1.3 | 39.0 | 7.4 |
| Black or mallard | | | 0.3 | | | | | | | | | | <0.1 |
| Pintail | | | 53.3 | 1.3 | | | | | | | | | 5.7 |
| Blue-winged teal | | | | 1.3 | | | | | | | | | 0.1 |
| Green-winged teal | | | 20.0 | 3.3 | | | | | | 1.0 | | | 2.6 |
| Canvasback | | | 5.7 | | | | | | | | | 4.0 | 0.7 |
| Greater scaup | | | 73.0 | | | | | | | | | | 7.6 |
| Common goldeneye | | | 10.7 | | | | | | | | | | 1.1 |
| Bufflehead | | | 0.7 | 0.3 | | | | | | | 1.3 | | 0.2 |
| Red-breasted merganser | | | | | | | | | | | | 3.0 | 0.1 |
| Unidentified duck | | | 6.7 | | | | | | | | | | 0.7 |
| Sharp-shinned hawk | | | | | | | | | | 0.3 | | | <0.1 |
| Marsh hawk | | | 2.3 | 0.3 | 0.3 | 0.2 | | | | | 1.0 | 1.0 | 0.5 |
| Red-tailed hawk | | | | 1.3 | | | | | | | | | 0.1 |
| Eastern merlin | | | | 0.3 | | | | | | | | | <0.1 |
| American kestrel | | | 0.3 | | | | | | | 0.2 | | | 0.1 |
| Ring-necked pheasant | | | 1.0 | 0.7 | | | | | | | | | 0.2 |
| Great egret | | | | | 0.3 | 2.0 | 2.0 | | | 0.5 | | | 0.6 |
| Snowy egret | | | | 0.3 | 0.7 | 2.2 | 4.3 | | | | | | 0.9 |
| Cattle egret | | | 1.3 | | | | | 2.5 | | | | | 0.3 |
| Great-blue heron | | | | 0.7 | 1.7 | 3.6 | 1.7 | 0.5 | | | | | 1.1 |
| Black-crowned night heron | | | | | 3.0 | 9.4 | 3.7 | | | | | | 2.3 |
| Glossy ibis | | | | | 3.0 | | | | | | | | 0.3 |
| American coot | | | | | | | | | | | 0.6 | | 0.1 |
| Black-bellied plover | | | | 2.7 | | | | | | | | | 0.3 |
| Killdeer | | | | 0.3 | | 0.4 | | | | | | | 0.1 |
| Spotted sandpiper | | | | | | | | | 0.5 | | | | <0.1 |
| Greater yellowlegs | | | | 0.7 | 0.3 | | | | | | | | 0.1 |
| Least sandpiper | | | | | | | | | | | 6.3 | | 0.7 |
| Semipalmated sandpiper | | | | | 1.0 | 0.2 | | 1.0 | | | | | 0.2 |
| Common snipe | | | 0.7 | 0.3 | | | | | | | | | 0.1 |
| Great black-backed gull | | | 5.0 | 8.0 | 105.0 | 75.8 | 153.7 | 60.0 | 38.5 | 9.0 | 7.7 | 23.0 | 50.8 |
| Herring gull | | | 5.7 | 11.7 | 129.3 | 21.0 | 11.7 | 12.0 | 20.5 | 18.0 | 25.7 | 87.0 | 30.4 |
| Ring-billed gull | | | 1.3 | 6.3 | | 3.6 | 4.0 | 3.5 | | | 23.7 | 2.0 | 4.6 |
| Laughing gull | | | | | 5.3 | 14.0 | 74.7 | 179.0 | 115.0 | 87.3 | 125.7 | 51.0 | 57.8 |
| Bonaparte's gull | | | | | | | | | | | 12.3 | | 1.3 |
| Least tern | | | | | | | 0.3 | 3.5 | 4.0 | | 5.0 | | 1.1 |
| Common tern | | | | | | | 1.3 | | | | | | 0.1 |
| Mourning dove | | | | 1.3 | 0.3 | | | 2.0 | | | | | 0.3 |
| Belted kingfisher | | | | | | | | 0.5 | 1.0 | 1.0 | | | 0.2 |

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Table 3.2.2-1
CONTINUED

| | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Surveys | 0 | 0 | 3 | 3 | 3 | 5 | 3 | 2 | 2 | 4 | 3 | 1 | 29 |
| Mean Number of Individual Sightings | | | 1020.0 | 1168.7 | 312.7 | 136.2 | 266.0 | 268.5 | 186.5 | 176.3 | 216.0 | 293.0 | 4043.9 |
| Percent by Month | | | 25.2 | 28.9 | 7.7 | 3.4 | 6.6 | 6.6 | 4.6 | 4.4 | 5.3 | 7.3 | |
| **Species** | | | | | | | | | | | | | |
| Yellow-shafted flicker | | | | 0.3 | | | | | | | | | <0.1 |
| Kingbird | | | | | 0.3 | | | | | | | | <0.1 |
| Barn swallow | | | | | 2.0 | 1.4 | 2.7 | 0.5 | | | | | 0.8 |
| Tree swallow | | | | | 1.3 | | 0.3 | | | 14.8 | | | 2.2 |
| Rough-winged swallow | | | | | | | | | 2.0 | 0.2 | | | 0.2 |
| Common Crow | | | 0.3 | 1.0 | 2.0 | 0.2 | 2.7 | | | | | | 0.7 |
| Fish crow | | | | | | | | | | 0.5 | | | 0.1 |
| Starling | | | | | | | | | | 4.0 | | | 0.6 |
| Meadowlark | | | 1.3 | | | | | | | | | | 0.1 |
| Red-winged blackbird | | | 100.0 | 93.3 | 18.3 | | 1.3 | | | 20.5 | | | 24.9 |
| Cowbird | | | 16.7 | | | | | | 0.5 | | | | 1.8 |
| Common grackle | | | | | | 0.6 | | | | | 3.3 | | 0.4 |
| Unidentified blackbirds | | | | | | | | | | 12.5 | | | 1.7 |
| Song sparrow | | | | | | | | | | 1.0 | | | 0.1 |

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TABLE 3.2.2-2
MONTHLY MEAN NUMBER OF SIGHTINGS
OF WATERFOWL AND OSPREY - 1978

| | Mar | Apr | May | June | July | Aug. | Sept | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of Surveys | 3 | 3 | 3 | 5 | 2 | 2 | 2 | 4 | 3 | 1 | 28 |
| Mean Number of Individual Sightings | 1385.0 | 1133.0 | 35.7 | 16.8 | 9.5 | 25.0 | 187.5 | 168.8 | 204.3 | 144.0 | 3309.6 |
| Percent by Month | 41.8 | 34.2 | 1.1 | 0.5 | 0.3 | 0.8 | 5.7 | 5.1 | 6.2 | 4.3 | |
| **Species** | | | | | | | | | | | |
| Canada goose | 833.0 | 1024.7 | 8.3 | 2.8 | | | | 6.0 | 24.3 | 82.0 | 206.8 |
| Snow goose | 10.0 | 2.0 | | | | | | | | | 1.3 |
| Mallard | 115.3 | 20.0 | 10.7 | 2.4 | 0.5 | 1.0 | 26.0 | 36.8 | 31.0 | | 26.6 |
| Black duck | 137.7 | 26.3 | 9.7 | 4.0 | | 4.0 | 25.5 | 24.8 | 24.3 | 40.0 | 29.0 |
| Black or mallard | 0.3 | 11.3 | | | | | | | | 14.0 | 1.8 |
| Pintail | 134.3 | 1.3 | | | | | 5.5 | | 3.3 | | 15.3 |
| Gadwall | 1.3 | 0.3 | | | | | | | | | 0.2 |
| Blue-winged teal | | 1.3 | | | | | 3.5 | 0.8 | | | 0.5 |
| Green-winged teal | 51.0 | 38.7 | 0.7 | | | 19.0 | 126.0 | 99.8 | 119.3 | 1.0 | 47.1 |
| Wood duck | 2.0 | 1.3 | | | | | | 0.5 | | | 0.4 |
| Canvasback | 5.7 | | | | | | | | | 4.0 | 0.8 |
| Greater scaup | 73.0 | | | | | | | | | | 7.8 |
| Common goldeneye | 10.7 | | | | | | | | | | 1.1 |
| Bufflehead | 0.7 | 0.3 | | | | | | | 1.3 | | 0.3 |
| Red-breasted merganser | | | | | | | | | | 3.0 | 0.1 |
| American coot | | | | | | | | | 0.7 | | 0.8 |
| Osprey | 1.3 | 5.3 | 6.3 | 7.6 | 9.0 | 1.0 | 1.0 | 0.3 | | | 0.2 |

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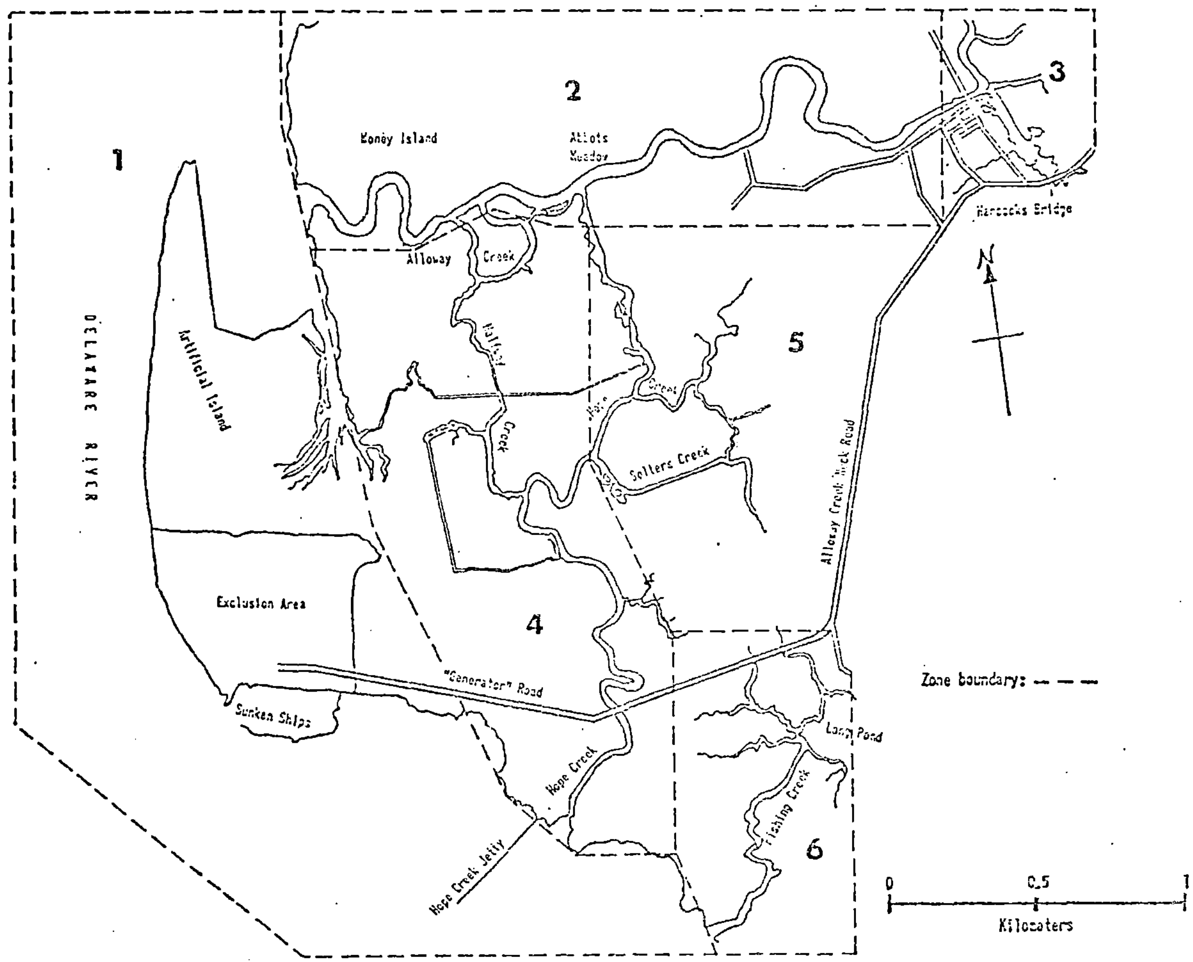
TABLE 3.2.2-3
SUMMARY BY ZONE OF WATERFOWL SIGHTINGS - 1978

| Zone | 1 | 2 | 3 | 4 | 5 | 6 | Total |
|---|---|---|---|---|---|---|---|
| Number of Species | 15 | 6 | 8 | 5 | 9 | 6 | 16 |
| Number of Individual Sightings | 5123 | 284 | 769 | 58 | 2186 | 1101 | 9521 |
| Percent by Zone | 53.8 | 3.0 | 8.1 | 0.6 | 22.9 | 11.6 | |
| Species | | | | | | | |
| Canada goose | 4545 | 13 | 131 | | 1102 | | 5791 |
| Snow goose | 36 | | | | | | 36 |
| Mallard | 130 | 91 | 194 | 10 | 220 | 100 | 745 |
| Black duck | 85 | 72 | 119 | 38 | 291 | 207 | 812 |
| Black or mallard | 1 | 1 | | 2 | | 45 | 49 |
| Pintail | 4 | 46 | 77 | 5 | 287 | 9 | 428 |
| Gadwall | | | 4 | | 1 | | 5 |
| Blue-winged teal | 4 | | | | 7 | 3 | 14 |
| Green-winged teal | 14 | 60 | 238 | 1 | 273 | 733 | 1319 |
| Wood duck | | | 4 | | 4 | 4 | 12 |
| Canvasback | 21 | | | | | | 21 |
| Greater scaup | 219 | | | | | | 219 |
| Common goldeneye | 32 | | | | | | 32 |
| Bufflehead | 7 | | | | | | 7 |
| Red-breasted merganser | 3 | | | | | | 3 |
| Unidentified duck | 20 | | | 2 | | | 22 |
| American coot | 2 | 1 | 2 | | 1 | | 6 |

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The bird survey study area and the six waterfowl survey zones - 1978

Figure 3.2.2-1

### 3.2.3 BALD EAGLE AND OSPREY MONITORING STUDY (ETS Section 3.1.2.1.2.3)

The study objectives are to record the occurrence of osprey and bald eagle and to monitor nesting of osprey in the vicinity of Artificial Island. The southern bald eagle, Haliaeetus l. leucocephalus, is classified as "endangered" (U.S.D.I., 1974); and the North American osprey, Pandion haliaetus carolinensis, as "status undetermined" (U.S.D.I., 1973).

#### 3.2.3.1 Summary

Osprey were observed in the study area from March 15 through October 6. Eleven osprey nests were monitored by helicopter in 1978. Nine nests were located on transmission towers, 1 on pilings, and 1 on a nesting platform. Seven nests contained eggs and were considered active. These nests produced 10 fledged birds for a nesting success of 67 percent, with a mean of 1.11 young/active nest.

Bald eagle were observed once in the study area during 1978. Two birds were sighted May 28 near Taylors Bridge, Delaware.

#### 3.2.3.2 Study Area

The study area extends 16.1 km north, 12.9 km south, and 8.0 km east and west from Salem. The northern boundary is near Finns Point, New Jersey and the southern boundary is just north of Woodland Beach, Delaware (Fig. 3.2.1-1).

The area features riverine, bay, upland field, and wooded habitats. Pilings, range towers, and powerline towers are common.

#### 3.2.3.3 Materials and Methods

Known osprey nests were checked by helicopter about every two weeks during April through August. During flights the region was searched for additional osprey nests and for bald eagle. The number of adults, eggs, nestlings, and fledglings in each nest were recorded. Bald eagle sighted by IA personnel were recorded to location, activity, and age (adult or immature).

### 3.2.3.4 Results and Discussion

Adult osprey were sighted from March 15 through October 6. Most sightings were made during the bird survey. The most sightings were in July (Table 3.2.2-2). Sightings were of possibly eight adults.

Eleven nests were located and monitored in 1978 (Table 3.2.3-1). Nine nests were located on transmission towers, 1 on pilings, and 1 on a nesting platform. Four nests were known to be inactive or were destroyed early in the season. Seven nests contained a total of 10 young, all of which fledged. The number of eggs and newly hatched young was not recorded for all nests. Most females at the active nests remained on the nest while the helicopter was near. Considering only the seven possible active nests, nesting success in 1978 was 67 percent. The mean number of young fledged per active nest was 1.11. This is well within the 0.95 to 1.30 immatures per adult female that Henny and Wight (1969) estimated is needed each year to ensure population stability.

Two adult bald eagles were sighted flying north over Delaware Route 9 east of Taylors Bridge on May 28 by IA personnel.

## TABLE 3.2.3-1
## OSPREY NESTING AND SUCCESS - 1978

| Location of Nests | No. of Eggs Observed | No. of Young Observed | No. of Fledglings Observed |
|---|---|---|---|
| River piling east of Getty Oil Refinery, Delaware City | ** | 0 | 0 |
| Nesting platform, Reedy Island Jetty* | 2 | | |
| Nests on Transmission Line Towers | | | |
| Salem - Keeny 3/1* | 0 | | |
| Salem - Keeny 4/3 | 1 | 1 | 1 |
| Salem - Keeny 8/4 | ** | 0 | 0 |
| Salem - North 2/3 | ** | 1 | 1 |
| Salem - North 3/4 | ** | 3 | 3 |
| Salem - North 4/1 | ** | 1 | 1 |
| Salem - North 6/1 | 2 | 0 | 0 |
| Salem - South 2/4 | 1 | 1 | 1 |
| Salem - South 5/1 | ** | 3 | 3 |
| Total | | 10 | 10 |

* = Disappearance of nest.
** = Unable to determine.

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