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ECOLOGICAL STUDY
OF THE TIDAL SEGMENT OF THE
JAMES RIVER ENCOMPASSING HOG POINT
1977 Final Technical Report*

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Special Scientific Report No. 87
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

February 1978

*Study Sponsored by the Virginia Electric and Power Company

Section I

RIVER BIOTA STUDIES AT THE VEPCO SURRY NUCLEAR POWER STATION

by

Robert A. Jordan
Patricia A. Goodwin
Richard K. Carpenter
and
Charles E. Sutton

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Introduction

The Surry Power Station, operated by the Virginia Electric and Power Company, is located on a peninsula that extends into the James River on its south shore. The tip of the peninsula is known as Hog Point, and it is approximately 30 miles (48 km) upstream from Chesapeake Bay and 50 miles (80 km) downstream from Richmond (Fig. 1). The section of the river bordering this peninsula is the transition zone between fresh water and saline water, where the salinities encountered are near the tolerance minima for most estuarine and marine species and near the tolerance maxima for freshwater species. Therefore, the biological community consists of a few resident species that can tolerate the entire range of conditions, and of visitors from upstream that can survive until their tolerance limits are exceeded. The region is biologically significant mainly as a nursery ground and migration corridor for fish species that are harvested elsewhere. The fish populations in the vicinity of the power station have been monitored by VEPCO personnel. VIMS was engaged by VEPCO to monitor the lower trophic levels, including the phytoplankton, zooplankton, benthic macro-invertebrates and fouling organisms. The monitoring study has been in progress since May, 1969, and intensified sampling programs for phytoplankton and zooplankton were conducted in the years 1975 through 1977. The present report covers the study period January through

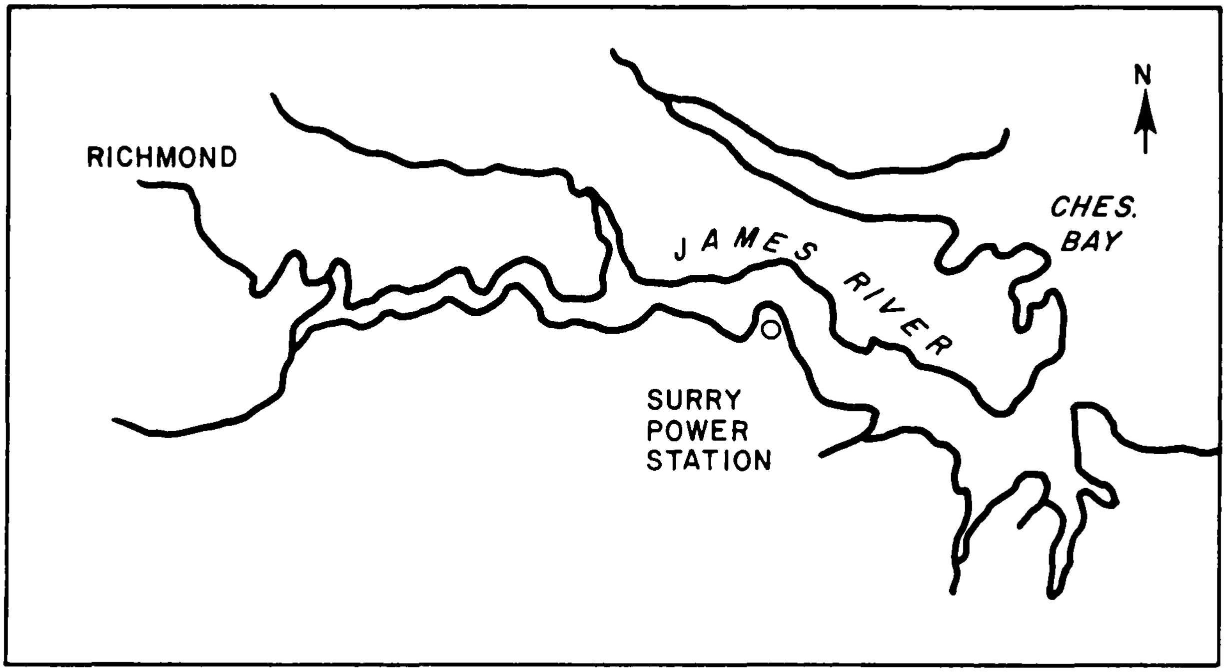

Figure 1. Location of the Surry Power Station.

December 1977.

The first of the two units of the power plant began commercial operation in December 1972, the second in May 1973. Together they require a cooling water flow of $106 m^3 sec^{-1}$, which is pumped from the river on the downstream side of the peninsula into a 2.74 km long elevated intake canal in which it flows by gravity for approximately 33 minutes to the power plant (Fig. 2). The water then flows by gravity through the condensers, where its temperature is raised a maximum of 8.3°C, into a 1 km long sea level discharge canal which has a time of passage of approximately 28 minutes. The cooling water encounters a constriction at the discharge canal mouth, which boosts its velocity to $1.8 m.sec^{-1}$, causing turbulent mixing of the cooling water with the river water. On ebbing tides the plume hugs the shore downstream from the discharge and elongates, while on flooding tides it is oriented upstream and remains more compact.

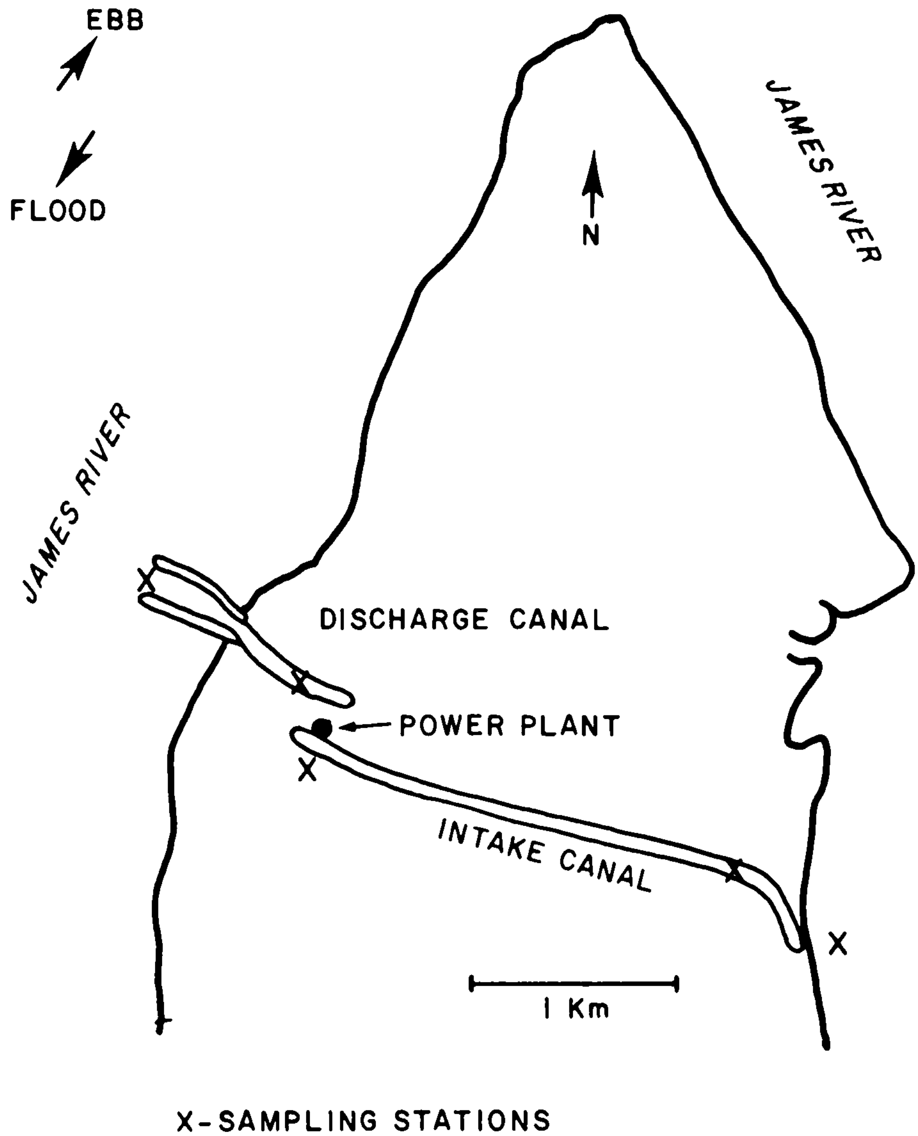

Figure 2. Surry Power Station cooling water canal system showing in-plant sampling stations.

Methods

Station Locations

Table 1 and Figure 3 show the locations of the phytoplankton and zooplankton sampling stations used in the river study. The intake canal was sampled at its upstream and downstream ends, while the discharge canal was sampled near the highway bridge about 0.8 km upstream from the canal mouth (Fig. 2). The benthos and fouling plate stations are shown in Table 2 and Figure 4.

Sampling and Sample Analysis Methods

Phytoplankton samples were accompanied by samples for determinations of chlorophyll *a* concentration, salinity, and dissolved oxygen concentration. Water temperature and Secchi Disk transparency were measured at each station. A non-metallic 2-liter Van Dorn bottle was used for sampling of phytoplankton and related parameters. Phytoplankton samples were preserved with Lugol's iodine solution, and cell counts and identifications were performed using the inverted microscope method. Chlorophyll *a* samples were preserved with mercuric chloride (40 mg/l), and stored in opaque bottles on ice until return to the laboratory. They were then filtered through glass fiber filters, which were subsequently ground in 90% acetone to extract the chlorophyll *a*. The chlorophyll concentration in the extract was determined using a Turner Fluorometer, model 111.

Table 1

Plankton Sampling Station Locations

Station	Depth (m)	Location
DWS	2	Adjacent to tower (QK Fl Lt "A")
Intake	1 8	Outside intake forebay - zooplankton sampling Inside intake forebay - phytoplankton sampling
HPS	5	Adjacent to tower (QK Fl Lt "C")
HPW3	2.5	Adjacent to tower (QK Fl Lt "D")
HPW2	3	Adjacent to tower (QK Fl Lt "E")
HPW1	1	Off west shore of Hog Point, midway between HPS and discharge
Discharge	2.5	Discharge canal mouth
CBE	1	Off west shore of Gravel Neck, south of discharge
CBC	3	Midway between discharge and range markers near Cobham Wharf
JI	8	Adjacent to tower (QK Fl Lt "G")
Intake Canal Uptake and Downstream		Within Surry power plant intake canal (sampled by VEPCO personnel)
Discharge Canal		Within Surry power plant discharge canal (sampled by VEPCO personnel)

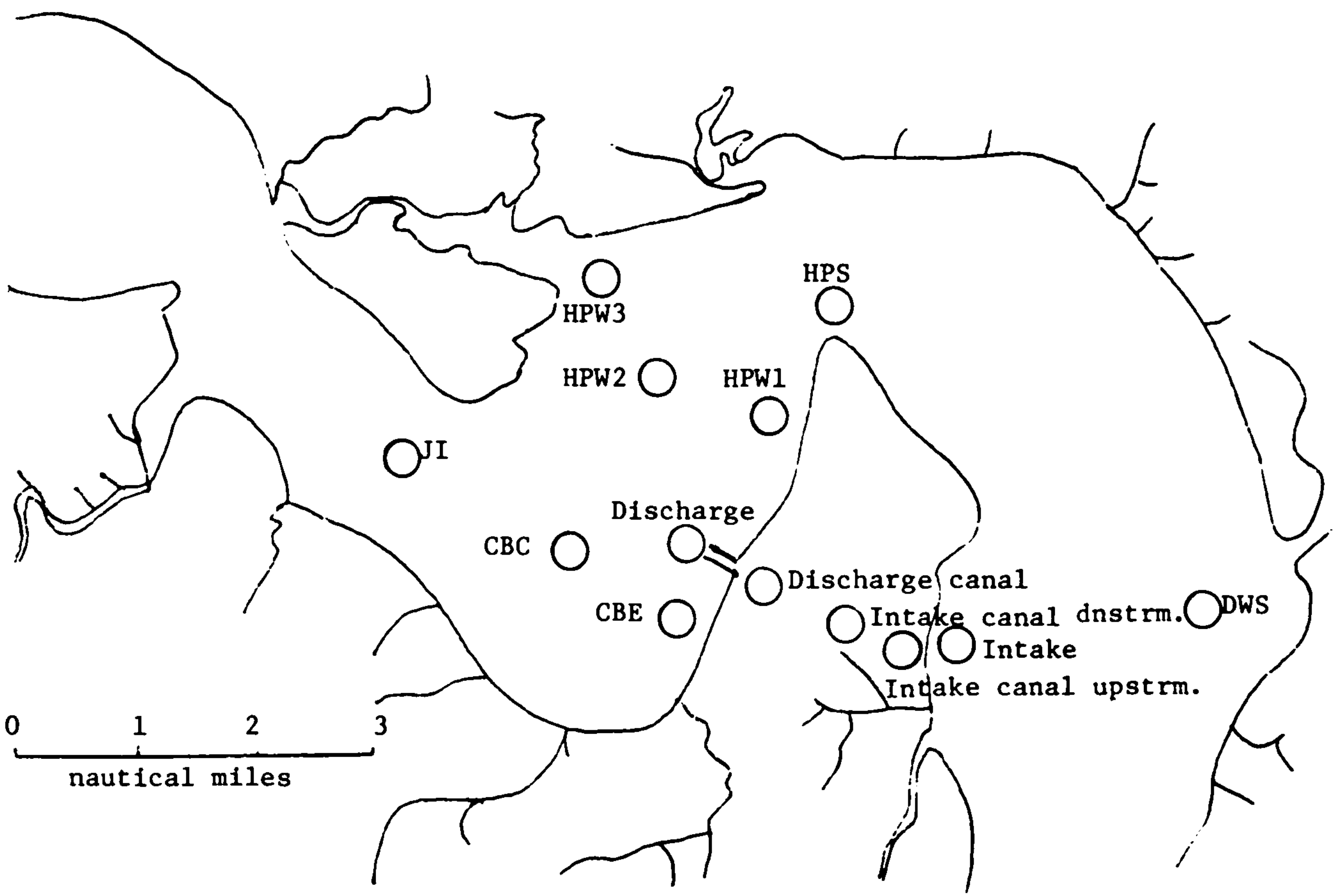

Figure 3. Plankton sampling stations

Table 2

Benthos and Fouling Plate Station Locations

Station	Depth (m)	Location
1	1.5	Off tower (QK Fl 38 ft.) near Cobham Wharf
2	2.5	Cobham Bay, off Chestnut Bluffs
3	1	Cobham Bay, between mouths of College Run and Lower Chippokes Creek
4	3	Center of Cobham Bay
5	3	Tower (QK Fl Lt "E")
6	1	In Thorofare off marker tower R "4"
7	1	Cobham Bay, off Gravel Neck
8	4	Tower (QK Fl Lt "F")
9	1	West of Hog Point
10	4	Between station 9 and black buoy "45"
11	5	Tower (QK Fl Lt "C")
12	.5	Off mouth of College Creek
13	1	East of Hog Point, on line with black and white buoy "J29"
14	6	Black and white buoy "J35"
15	1	Off power plant intake
16	2	Tower (QK Fl Lt "A")
DWS	2	Tower (QK Fl Lt "A")
CBN	2.5	Tower (QK Fl Lt "D")
CBS	3	Tower (QK Fl Lt "F")

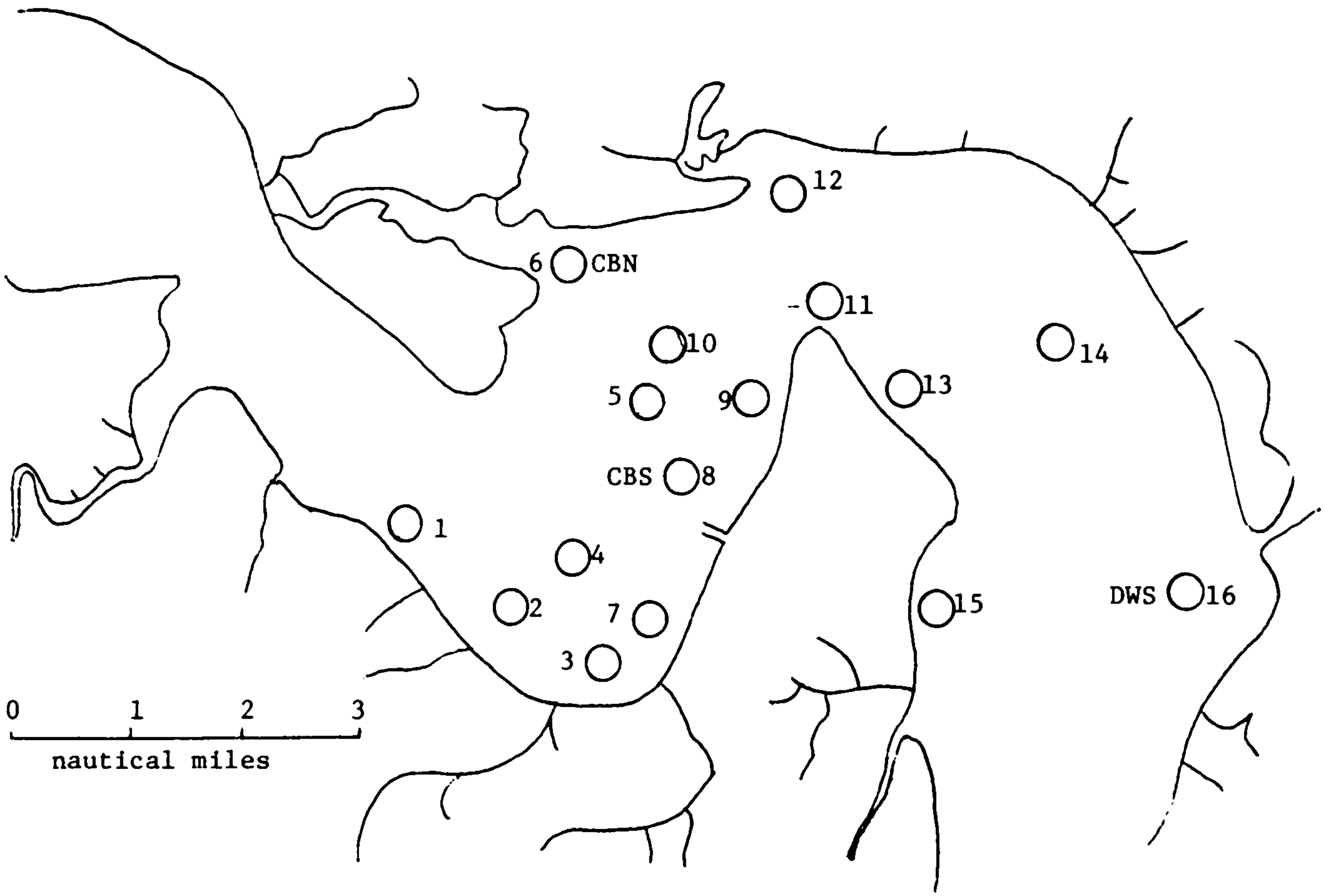

Figure 4. Benthos and fouling plate stations.

Zooplankton samples were taken with a 12.5 cm diameter Clarke-Bumpus quantitative sampler, equipped with a No. 20 (76μ pore size) net. Tow duration ranged from one minute to five minutes, depending on the turbidity conditions encountered. Samples were preserved with 5% buffered formalin, and counts and identifications were made using an Olympus dissecting microscope. Measurements of water temperature, salinity, dissolved oxygen, Secchi Disk transparency, and water depth accompanied each zooplankton tow.

Benthos was sampled with a .05 m^2 Ponar grab. The samples were sieved through 1.0 mm and 0.5 mm mesh screens, and the organisms were preserved in a formalin solution containing the stain Phloxine B. Counts and identifications were made under a dissecting microscope.

Fouling organisms were collected on 125 x 75 mm asbestos boards suspended in the river. Two pairs of horizontal and vertical fouling plates were suspended from a VEPCO instrument tower located at each station, one pair being replaced bi-monthly, the other pair yearly. The attached organisms were preserved by freezing, and were counted and identified under a dissecting microscope.

Temperature measurements were performed using a Hydrolab model RT-125 research thermometer equipped with a model L5 A50 thermistor probe. Salinity was measured on a Beckman model RS-7B salinometer. Dissolved oxygen concentrations were determined by the azide modification of the Winkler technique.

Sampling Design

The sampling dates, stations, and biological parameters sampled are shown in Table 3. Phytoplankton and zooplankton samples for investigation of entrainment effects were taken in the intake and discharge canals by Surry Power Plant personnel. In all months except May and July these samples were obtained on the same day as the river samples. In May the canal samples were taken one day later than the river samples. In July the canal samples were taken nine days late, so additional sets of samples were taken in the river at the plant intake and discharge to provide a complete entrainment series. In January only phytoplankton samples were taken at the upstream end of the intake canal. In all, eight complete plankton runs, including replicated sampling of surface phytoplankton, chlorophyll a, and zooplankton at ten river stations and of phytoplankton and zooplankton at at least two canal stations, were performed during the study year.

Benthos sampling was performed quarterly during the winter, spring, and fall, and monthly during the summer. The winter sampling run was originally scheduled for January, but could not be performed until March 8 due to ice cover at some of the inshore stations. Two samples were taken per station per sampling run.

All of the fouling plates were destroyed by river ice

Table 3

Summary of Biological Sampling Effort; sampling dates, stations sampled, and types of samples taken (Ph = phytoplankton, C = chlorophyll *a*, Z = zooplankton, B = benthos, F = fouling organisms)

	Date (1977)								
Plankton Stations	2 - 23	4 - 13	5 - 12	6 - 13	7 - 12	7 - 21	8 - 16	9 - 6	11 - 9
DWS	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z		Ph,C,Z	Ph,C,Z	Ph,C,Z
Intake	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z
HPS	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z		Ph,C,Z	Ph,C,Z	Ph,C,Z
HPW3	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z		Ph,C,Z	Ph,C,Z	Ph,C,Z
HPW2	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z		Ph,C,Z	Ph,C,Z	Ph,C,Z
HPW1	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z		Ph,C,Z	Ph,C,Z	Ph,C,Z
Discharge	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z
CBE	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z		Ph,C,Z	Ph,C,Z	Ph,C,Z
CBC	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z		Ph,C,Z	Ph,C,Z	Ph,C,Z
JI	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z	Ph,C,Z		Ph,C,Z	Ph,C,Z	Ph,C,Z
Intake Canal Upstrm.	Ph	Ph,Z	Ph,Z	Ph,Z		Ph,Z	Ph,Z	Ph,Z	Ph,Z
Intake Canal Dnstrm.	Ph,Z	Ph,Z	Ph,Z	Ph,Z		Ph,Z	Ph,Z	Ph,Z	Ph,Z
Discharge canal	Ph,Z	Ph,Z	Ph,Z	Ph,Z		Ph,Z	Ph,Z	Ph,Z	Ph,Z

Table 3 (continued)

Benthos Stations	Date (1977) 3 - 8	4 - 25	6 - 20	7 - 14	8 - 18	10 - 20
1	B	B	B	B	B	B
2	B	B	B	B	B	B
3	B	B	B	B	B	B
4	B	B	B	B	B	B
5	B	B	B	B	B	B
6	B	B	B	B	B	B
7	B	B	B	B	B	B
8	B	B	B	B	B	B
9	B	B	B	B	B	B
10	B	B	B	B	B	B
11	B	B	B	B	B	B
12	B	B	B	B	B	B
13	B	B	B	B	B	B
14	B	B	B	B	B	B
15	B	B	B	B	B	B
16	B	B	B	B	B	B

Fouling Plate Stations	Date (1977) 4 - 25	6 - 20	8 - 16	10 - 31	12 - 30
DWS	F	F		F	F
CBN	F	F	F	F	F
CBS	F	F		F	F

in January. New sets of plates were installed at the three stations on March 8, and the spring bimonthly plates were taken from these sets on April 25. Complete sets of samples were recovered from each station on June 20, and included horizontal and vertical bimonthly plates, incubated since April 25, and horizontal and vertical "annual" plates, incubated since March 8. In August the plates at stations DWS and CBS were found to have separated from the instrument towers, and they could not be located by dragging the river bottom with a grappling hook or by diving in the vicinities of the towers. New sets of plates were installed at these stations on September 12.

Data Presentation and Analysis

The raw data for each section of the study are presented in an appendix. Most of the plankton data have been subjected to an analysis of variance, followed by Student-Newman-Keuls' test (Steel and Torrie, 1960) to identify significant differences among sampling stations. Log or square root transformations were performed when necessary to normalize the data prior to analysis. Within the body of the report, data summaries are presented, which include parameter means and which depict differences that are significant at at least the .05 level.

The benthos data presented in this report include only the organisms recovered on the 1.0 mm mesh screen, which is the sieving device that was used in all preceding years of the study. The data for the 0.5 mm sieve organisms will be included in a subsequent report.

Results - Plankton Studies

Data Presentation

The hydrographic data for the plankton sampling runs are presented in Appendix Table A1. The raw biological data are in appendix B, Table B1 (chlorophyll *a*), Table B2 (total phytoplankton cell counts), Tables B3-B11 (phytoplankton species cell counts), and Tables B12-B20 (zooplankton counts). The river tidal and water temperature conditions on the plankton sampling dates are summarized in Table 4, while the phytoplankton and zooplankton analysis of variance results are presented in Tables 5-22.

Phytoplankton Distribution Patterns

On the phytoplankton ANOVA summary tables (Tables 5-13) station means for chlorophyll *a*, total cell counts, and individual species cell counts are listed in ascending order. Means not sharing an underline are significantly different at the .05 level according to Student-Newman-Keuls' test.

Examination of the phytoplankton ANOVA results reveals eight distinct spatial distribution patterns. The first of these is an apparent uniform distribution throughout the study area, with no evident power plant effect (for example, 8μ *Chroomonas* sp. in February).

Distribution patterns involving the study area as a whole include a general increase in abundance from the

Table 4

Environmental Conditions During Plankton Sampling Runs, 1977

Date	Tide	Discharge Temp. minus Intake Temp. (°C)	Discharge Surface Temp. (°C)	No. of Power Plant Units Operating	Stations Affected by Plume
Feb. 23	Flood	7.8	13.20	1	CBE,HPW1,HPS
Apr. 13	HWS - Ebb	5.1	22.10	1	CBE,HPW1
May 12	Ebb	5.2	23.10	1	CBE,HPW1,HPS
June 13	HWS - Ebb	7.9	30.80	2	CBE,HPW1
July 12	Ebb	5.2	33.80	1	CBE,HPW1
July 21	LWS - Flood	4.9	34.90	1	
Aug. 16	Flood	7.9	37.30	2	CBE,HPW1
Sept. 6	Ebb	5.4	36.20	1	CBE,HPW1,HPS
Nov. 9	Ebb	7.5	26.90	2	CBE,HPW1,HPS

upstream to the downstream stations (chlorophyll a, total cells, Chaetoceros sp., Skeletonema costatum, and Asterionella japonica in February), and the opposite pattern, a decrease with progression from upstream to downstream (Nitzschia vermicularis, Amphiprora sp., Asterionella formosa in February; total cells, Melosira subsalsa, Nitzschia Kutzingiana in May; 8u Chroomonas sp., 16µ Chroomonas sp., Katodinium rotundatum in June; Skeletonema costatum in July; 8µ Chroomonas sp., 16µ Chroomonas sp., 3µ flagellate in September; Skeletonema costatum in November). The months in which the upstream-downstream zonation of phytoplankton abundance was observed were those in which upstream-downstream salinity ranges of at least 5 ppt were present (Table A1). In April, when the entire study area was occupied by essentially fresh water and in August, when the salinity range was approximately 3 ppt, there were significant differences in phytoplankton populations among the river stations but there were no distinct upstream-downstream trends.

A number of the spatial distributions indicated essentially uniform abundance throughout the study area, with the exception of one or two stations where population levels were significantly higher than at most of the remaining stations. The exceptional stations included HPW3 (chlorophyll a, total cells, Melosira subsalsa, Melosira ambigua in April; Katodinium rotundatum, Pyramimonas sp. in June), CBE (8µ Chroomonas sp., Cryptomonas sp. in April; 8 µ Chroomonas sp., Ankistrodesmus sp., Rhizosolenia minima in June), DWS (8μ Chroomonas sp. in April, Leptocylindrus minimus in July), HPW2 (16μ Chroomonas sp., Katodinium rotundatum in July), and CBC (8μ Chroomonas sp., Rhizosolenia minima in September). Of these stations, HPW3, CBE, and DWS are near creek mouths, where relatively high productivity and population levels have been observed in previous study years (Jordan et al. 1976, 1977). The fact that the exceptionally high populations were found at these stations for sampling runs that were performed during ebbing tides (Table 4) supports the hypothesis that the creek drainage contributed organisms or nutrients to the plankton populations at these stations.

The remaining four distribution patterns relate to the Surry Power Station and its influence on the phytoplankton community in the vicinity of Hog Point. The first of these patterns involves the loss of phytoplankton from the river water passed through the power plant cooling water canals and condensers. This was observed in June (Katodinium rotundatum, total cells, chlorophyll a), July (16μ Chroomonas sp.), August (8μ Chroomonas sp., 16μ Chroomonas sp., Katodinium rotundatum), and September (8μ Chroomonas sp., Katodinium rotundatum). The species affected were flagellates, removal was detected only for sampling runs conducted when discharge water temperatures exceeded 30°C (Table 4), and reduced population levels of the affected species were not observed in the river beyond the immediate vicinity of the discharge canal mouth.

The power plant occasionally contributed phytoplankton to the upstream side of Hog Point (Skeletonema costatum, Asterionella japonica in February; Nitzschia vermicularis in April; Gyrosigma beaufortianum in August and September; Amphiprora sp. in November). Nitzschia vermicularis and Gyrosigma beaufortianum are large pennate diatoms that were probably swept up from the river bottom in the shallow area adjacent to the power plant intake and transported in suspension through the intake and discharge canals.

In several cases the transport process resulted in reduced population levels of certain species on the upstream side of Hog Point, when the cooling water taken in was poorer in phytoplankton than was the upstream receiving water. This pattern was observed for Amphiprora sp. and Asterionella formosa in February; Melosira ambigua and Synedra ulna in April; and total cells, Melosira subsalsa, and Nitzschia kützingiana in May.

Finally, there was one species, Nitzschia longissima, that was exceptionally abundant in the power plant canals during three of the sampling runs (July 21, August, and September).

Zooplankton Distribution Patterns

The zooplankton ANOVA results (Tables 14-22) are presented according to the same format as were the phytoplankton results, with population density means in ascending order and underlines joining means that are not significantly different (.05 level). Five patterns, in addition to uniform distribution throughout the study area, are apparent.

A general decrease in abundance from upstream to downstream was observed for copepod nauplii, Eurytemora sp., and cyclopoid copepods in February; rotifers in May and June; and Eurytemora sp. in November. Stations with exceptionally high population densities of one or more zooplankton organisms included HPW3 (polychaete larvae and pelecypod larvae in May), HPS (barnacle nauplii in June), CBE (polychaete larvae and pelecypod larvae in July), and CBC (Eurytemora sp. and Acartia sp. in July). On one sampling date (September 6) the stations on the upstream side of Hog Point exhibited denser populations of pelecypod larvae than did the stations further upstream or downstream.

The power plant effects that appeared in the zooplankton spatial distributions included release of meroplankton into the river water passing through the cooling water canals (barnacle nauplii in April and September) and transport of organisms from the downstream side to the upstream side of Hog Point (polychaete larvae in April; barnacle nauplii in May, August, and November; and polychaete larvae in August).

Table 5

James River Phytoplankton ANOVA Summary 2-23-77

Parameters — Stations and Means
(Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Chl a ($\mu g \cdot l^{-1}$)

CBE	JI	CBC	HPW3	HPW2	HPW1	DWS	Dis.	Int.	HPS
3.2	5.2	5.2	5.6	5.6	6.0	6.4	7.6	9.6	10.2

Total cells ($cells \cdot ml^{-1}$)

JI	CBC	HPW2	HPW3	CBE	HPW1	HPS	DWS	Dis.	ICD	DC	Int.	ICU
1050	2250	2400	2625	2700	2950	3525	4400	4800	5750	5850	5850	7050

8μ Chroomonas sp. ($cells \cdot ml^{-1}$)

Int.	ICD	CBE	HPW3	HPW1	ICU	CBC	DWS	HPW2	Dis.	DC	JI	HPS
13	13	20	26	26	26	26	26	32	32	39	46	65

16μ Chroomonas sp. ($cells \cdot ml^{-1}$)

DWS	CBC	CBE	HPS	HPW3	HPW1	HPW2	ICD	Dis.	JI	Int.	ICU	DC
0	0	6	13	13	13	20	20	20	20	32	39	64

Cryptomonas sp. ($cells \cdot ml^{-1}$)

JI	HPW3	HPW2	HPS	DWS	HPW1	ICD	DC	Dis.	CBC	ICU	CBE	Int.
6	13	20	39	39	64	64	64	64	71	90	97	122

Chaetoceros sp. ($cells \cdot ml^{-1}$)

JI	CBC	HPW2	CBE	HPW3	HPS	HPW1	Dis.	DC	DWS	ICD	Int.	ICU
607	1590	1939	2055	2152	2268	2333	2462	2592	2818	3134	3218	3761

Skeletonema costatum ($cells \cdot ml^{-1}$)

JI	CBE	CBC	HPW3	HPW2	HPW1	HPS	DWS	Dis.	Int.	ICD	DC	ICU
52	122	169	191	192	377	756	1288	2016	2256	2378	2843	2844

Nitzschia vermicularis ($cells \cdot ml^{-1}$)

DC	ICD	ICU	Int.	Dis.	CBE	HPW1	DWS	JI	HPW2	HPS	CBC	HPW3
2	2	2	3	4	9	15	18	36	40	42	42	43

Table 5 (continued)

<u>Amphiprora</u> sp. (cells·ml^{-1})

DWS	ICU	ICD	HPW1	DC	Dis.	CBE	Int.	HPS	HPW3	CBC	JI	HPW2
1	1	1	2	2	2	2	2	7	9	9	10	11

<u>Asterionella japonica</u> (cells·ml^{-1})

HPW3	HPW2	CBE	CBC	JI	HPW1	DWS	HPS	Dis.	ICD	Int.	ICU	DC
0	0	0	0	0	6	6	10	24	42	44	46	51

<u>Asterionella formosa</u> (cells·ml^{-1})

DWS	Int.	ICU	ICD	DC	Dis.	HPW2	HPS	HPW1	CBC	JI	CBE	HPW3
0	0	0	0	0	0	2	4	4	4	4	6	7

Table 6

James River Phytoplankton ANOVA Summary 4-13-77

Parameters — Stations and Means
(Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Chl a ($\mu g\ l^{-1}$)

HPW1	CBC	CBE	Int.	Dis.	HPS	JI	HPW2	DWS	HPW3
4.0	4.1	4.4	6.4	6.6	6.8	7.8	8.4	9.5	12.2

Total cells ($cells \cdot ml^{-1}$)

HPW1	HPS	Dis.	Int.	DC	ICU	ICD	HPW2	CBC	CBE	JI	DWS	HPW3
1875	1925	2025	2100	2400	2725	2750	2950	3850	4075	5150	7750	8075

8μ Chroomonas sp. ($cells \cdot ml^{-1}$)

HPS	Dis.	Int.	JI	HPW2	DC	HPW1	ICD	ICU	HPW3	CBC	DWS	CBE
271	310	349	349	375	401	542	543	634	672	762	1215	2714

Cryptomonas sp. ($cells \cdot ml^{-1}$)

ICD	DC	HPS	HPW1	Int.	ICU	CBC	Dis.	JI	HPW3	HPW2	DWS	CBE
39	39	52	52	64	78	78	90	116	142	168	246	297

Melosira subsalsa ($cells \cdot ml^{-1}$)

HPW1	CBE	Int.	Dis.	DC	HPS	HPW2	ICD	ICU	CBC	JI	DWS	HPW3
287	298	445	474	562	573	644	691	873	1939	2999	4537	5480

Melosira ambigua ($cells \cdot ml^{-1}$)

CBE	HPW1	Dis.	ICD	Int.	DC	HPS	ICU	CBC	DWS	HPW2	JI	HPW3
8	9	15	22	26	26	42	58	117	124	224	280	295

Cyclotella meneghiniana ($cells \cdot ml^{-1}$)

DC	Dis.	HPW2	CBE	HPW1	ICD	Int.	HPS	HPW3	ICU	CBC	JI	DWS
0	39	52	64	64	90	129	142	142	155	181	220	310

Nitzschia kützingiana ($cells \cdot ml^{-1}$)

CBE	HPW2	CBC	HPS	ICU	ICD	JI	HPW1	Int.	DC	DWS	Dis.	HPW3
78	194	207	233	246	246	258	284	284	310	349	426	478

Nitzschia vermicularis ($cells \cdot ml^{-1}$)

HPW3	CBE	JI	CBC	HPW2	HPS	DWS	HPW1	ICU	Int.	DC	ICD	Dis.
0	0	1	2	2	4	6	8	12	14	15	16	17

Table 6 (continued)

Synedra ulna (cells·ml^{-1})	Int.	Dis.	ICD	ICU	DC	HPW1	CBE	HPS	DWS	CBC	JI	HPW3	HPW2
	0	0	1	2	2	2	3	4	12	14	18	22	24

Table 7

James River Phytoplankton ANOVA Summary 5-12-77

Parameters — Stations and Means
(Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Chl a ($\mu g \cdot l^{-1}$)

HPW1	CBC	Dis.	CBE	HPS	Int.	DWS	JI	HPW3	HPW2
3.6	4.8	5.4	6.0	6.3	6.7	7.2	9.0	10.8	11.8

Total cells ($cells \cdot ml^{-1}$)

Dis.	ICU	ICD	Int.	DWS	DC	HPW1	HPS	CBC	HPW3	HPW2	CBE	JI
850	1300	1350	1700	1725	1725	2000	3675	3675	4075	4150	4875	5925

8 μ Chroomonas sp. ($cells \cdot ml^{-1}$)

HPW1	HPW3	JI	Dis.	CBC	CBE	ICU	DWS	HPS	ICD	HPW2	Int.	DC
13	26	26	39	78	90	90	116	116	130	232	272	284

Melosira subsalsa ($cells \cdot ml^{-1}$)

ICD	Int.	Dis.	DC	DWS	ICU	HPW1	HPW2	CBC	HPS	HPW3	CBE	JI
52	78	78	181	182	414	569	698	802	1047	1460	1952	4098

Skeletonema costatum ($cells \cdot ml^{-1}$)

CBE	CBC	JI	HPW1	ICU	DC	Dis.	ICD	Int.	HPS	DWS	HPW3	HPW2
0	0	26	26	52	52	65	104	155	168	310	452	698

Cyclotella meneghiniana ($cells \cdot ml^{-1}$)

ICD	CBC	ICU	DC	Dis.	JI	DWS	HPW3	HPW2	CBE	HPW1	Int.	HPS
13	64	90	129	181	181	329	336	349	426	466	466	504

Nitzschia kützingiana ($cells \cdot ml^{-1}$)

Dis.	Int.	ICU	DC	ICD	DWS	HPW1	HPW2	HPS	JI	HPW3	CBE	CBC
142	233	272	323	336	362	582	750	1280	1318	1500	1771	2004

Table 8

James River Phytoplankton ANOVA Summary 6-13-77

Stations and Means
(Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Parameters													
Chl *a* ($\mu g \cdot l^{-1}$)				HPW1	HPS	DWS	Dis.	CBE	CBC	JI	HPW3	HPW2	Int.
				2.9	3.1	3.2	3.6	4.1	4.4	4.8	5.0	5.2	5.8
Total cells ($cells \cdot ml^{-1}$)	Dis.	HPS	HPW1	Int.	DC	ICD	CBC	ICU	JI	HPW2	HPW3	DWS	CBE
	650	850	1025	1175	1200	1300	1375	1675	1850	2050	2125	2250	3275
8μ *Chroomonas* sp. ($cells \cdot ml^{-1}$)	DWS	HPW1	HPS	Dis.	Int.	DC	ICU	CBC	HPW3	ICD	HPW2	JI	CBE
	194	194	265	336	362	375	466	478	510	517	834	834	1448
16μ *Chroomonas* sp. ($cells \cdot ml^{-1}$)	DWS	ICD	DC	HPW1	Int.	HPW3	Dis.	JI	HPS	CBC	CBE	ICU	HPW2
	39	52	52	78	103	116	116	116	129	148	180	207	297
Katodinium rotundatum ($cells \cdot ml^{-1}$)	DWS	HPW1	DC	Dis.	ICU	HPS	Int.	CBC	ICD	JI	HPW2	CBE	HPW3
	0	0	0	0	26	32	39	52	65	97	142	162	233
Melosira subsalsa ($cells \cdot ml^{-1}$)	ICD	DC	Dis.	HPW2	ICU	JI	CBC	HPW3	Int.	HPS	HPW1	CBE	DWS
	0	0	0	39	52	90	110	129	129	142	187	232	264
Rhizosolenia minima ($cells \cdot ml^{-1}$)	ICU	DC	Dis.	HPS	Int.	ICD	JI	CBC	DWS	HPW2	HPW3	CBE	HPW1
	0	0	13	13	26	26	32	39	58	58	72	148	155
Nitzschia kützingiana ($cells \cdot ml^{-1}$)	DWS	DC	HPW2	CBC	HPW1	Dis.	ICD	ICU	HPW3	HPS	Int.	CBE	JI
	13	26	39	39	46	52	64	65	71	84	129	162	181
Pyramimonas sp. ($cells \cdot ml^{-1}$)	HPS	ICD	DC	Int.	Dis.	HPW1	CBE	ICU	JI	CBC	HPW2	DWS	HPW3
	39	52	52	64	78	90	110	155	162	181	214	226	407

Table 8 (continued)

Ankistrodesmus sp. (cells·ml^{-1})	Dis.	Int.	ICU	DC	HPS	ICD	HPW1	HPW2	DWS	CBC	HPW3	JI	CBE
	0	13	13	13	26	26	32	52	96	110	162	188	252
3μ Flagellate (cells·ml^{-1})	HPS	JI	Dis.	HPW1	HPW2	CBC	Int.	HPW3	DWS	CBE	ICD	ICU	DC
	13	20	26	58	78	90	103	110	122	188	388	440	492

Table 9

James River Phytoplankton ANOVA Summary 7-12-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, $\alpha \leq .05$)									
Chl a ($\mu g \cdot l^{-1}$)	CBC	DWS	HPS	Dis.	JI	HPW2	HPW1	Int.	CBE	HPW3
	4.5	5.6	6.0	6.2	7.2	7.6	8.2	8.5	8.7	9.2
Total cells ($cells \cdot ml^{-1}$)	Dis.	CBC	HPS	HPW1	Int.	HPW3	DWS	CBE	HPW2	JI
	925	1025	1150	1325	1475	2025	2450	2750	3500	3850
8μ Chroomonas sp. ($cells \cdot ml^{-1}$)	CBC	Dis.	Int.	HPS	HPW1	DWS	HPW3	CBE	HPW2	JI
	362	374	466	543	569	795	828	1190	1280	1854
16μ Chroomonas sp. ($cells \cdot ml^{-1}$)	CBC	Dis.	HPS	HPW1	Int.	CBE	DWS	JI	HPW3	HPW2
	32	78	103	214	220	232	239	304	362	660
Katodinium rotundatum ($cells \cdot ml^{-1}$)	CBC	DWS	HPS	Dis.	CBE	Int.	HPW1	HPW3	JI	HPW2
	13	52	52	78	84	90	116	465	620	808
Leptocylindrus minimus ($cells \cdot ml^{-1}$)	HPW1	JI	CBC	HPW3	HPS	Dis.	HPW2	CBE	Int.	DWS
	0	24	26	39	71	90	155	162	207	750
Chaetoceros sp. ($cells \cdot ml^{-1}$)	HPW1	JI	HPW3	HPW2	Dis.	Int.	CBE	CBC	HPS	DWS
	32	46	60	84	90	90	96	155	194	258
Skeletonema costatum ($cells \cdot ml^{-1}$)	DWS	Int.	Dis.	HPW2	HPS	HPW3	HPW1	CBC	CBE	JI
	6	12	15	24	61	102	118	135	143	271

Table 10

James River Phytoplankton ANOVA Summary 7-21-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, $\alpha \leq .05$)				
Total cells (cells·ml^{-1})	Dis. 1150	ICU 1400	ICD 1600	Int. 1600	DC 1650
8μ *Chroomonas* sp. (cells·ml^{-1})	ICD 246	DC 271	Dis. 284	ICU 310	Int. 440
Katodinium rotundatum (cells·ml^{-1})	ICD 78	DC 116	Dis. 130	ICU 168	Int. 232
Chaetoceros sp. (cells·ml^{-1})	Dis. 52	DC 142	Int. 298	ICU 323	ICD 375
Skeletonema costatum (cells·ml^{-1})	Int. 87	DC 87	ICD 89	Dis. 92	ICU 139
Nitzschia longissima (cells·ml^{-1})	ICU 207	Int. 220	Dis. 220	ICD 530	DC 530
Gyrosigma sp. (cells·ml^{-1})	Dis. 6	Int. 11	ICD 11	DC 12	ICU 13

Table 11

James River Phytoplankton ANOVA Summary 8-16-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, $\alpha \leq .05$)												
Chl *a* ($\mu g \cdot l^{-1}$)	DWS	CBE	JI	CBC	HPS	Dis.	HPW1	HPW3	Int.	HPW2			
	4.3	7.6	7.9	9.5	9.6	10.0	10.2	10.4	10.8	11.5			
Total cells ($cells \cdot ml^{-1}$)	Dis.	DC	HPS	CBC	DWS	CBE	HPW2	HPW1	ICD	Int.	ICU	JI	HPW3
	1300	1350	1550	1750	1750	1850	2100	2300	2450	2450	2500	2750	2800
8μ *Chroomonas* sp. ($cells.ml^{-1}$)	Dis.	DC	HPS	CBE	CBC	HPW1	ICD	ICU	Int.	HPW2	DWS	JI	HPW3
	26	233	426	568	569	736	750	776	866	866	930	1266	1512
16μ *Chroomonas* sp. ($cells \cdot ml^{-1}$)	Dis.	DC	ICD	ICU	DWS	CBC	HPS	HPW3	HPW2	Int.	HPW1	CBE	JI
	0	0	26	26	65	65	90	90	90	103	104	142	258
Katodinium rotundatum ($cells \cdot ml^{-1}$)	Dis.	DC	HPS	CBC	Int.	DWS	ICD	ICU	HPW3	CBE	HPW2	JI	HPW1
	0	0	78	104	142	149	155	194	258	271	272	466	542
Skeletonema costatum ($cells.ml^{-1}$)	DWS	HPW2	HPS	HPW1	CBE	HPW3	ICD	Dis.	Int.	CBC	ICU	DC	JI
	12	38	48	48	55	57	64	71	78	92	92	100	121
Cyclotella meneghiniana ($cells \cdot ml^{-1}$)	ICD	Int.	DWS	JI	ICU	HPW1	HPW3	HPW2	CBC	HPS	CBE	DC	Dis.
	13	26	32	52	52	52	52	64	65	78	90	130	142
Chaetoceros sp. ($cells \cdot ml^{-1}$)	HPW1	Dis.	HPS	Int.	HPW3	DWS	ICU	ICD	DC	CBC	CBE	HPW2	JI
	12	12	14	16	17	19	20	24	26	27	28	30	51
Leptocylindrus minimus ($cells \cdot ml^{-1}$)	HPS	HPW2	CBE	DC	ICU	DWS	CBC	HPW1	JI	Int.	Dis.	ICD	HPW3
	0	0	0	26	26	52	52	64	78	90	90	104	168

Table 11 (continued)

Rhizosolenia minima ($cells \cdot ml^{-1}$)	HPW3	HPW2	ICD	DC	ICU	Int.	Dis.	DWS	HPS	HPW1	CBC	JI	CBE
	26	26	39	52	64	65	104	104	116	142	142	142	232
Gyrosigma beaufortianum ($cells \cdot ml^{-1}$)	DWS	JI	CBE	HPW2	HPW3	HPS	HPW1	DC	ICD	CBC	ICU	Dis.	Int.
	62	80	116	213	222	224	225	240	256	266	302	347	465
Nitzschia longissima ($cells \cdot ml^{-1}$)	DWS	HPW2	HPS	HPW3	JI	Int.	CBE	CBC	HPW1	Dis.	ICD	ICU	DC
	6	13	17	18	19	24	26	30	36	57	64	65	74
Pyramimonas sp. ($cells \cdot ml^{-1}$)	HPW1	ICD	DC	CBC	DWS	Int.	Dis.	CBE	HPS	HPW2	JI	HPW3	ICU
	39	52	65	78	97	104	104	104	116	129	142	181	246
3μ Flagellate ($cells \cdot ml^{-1}$)	HPW2	HPW1	ICU	DC	CBC	JI	Dis.	HPW3	HPS	Int.	CBE	DWS	ICD
	13	39	39	39	39	52	52	52	52	52	65	136	634

Table 12

James River Phytoplankton ANOVA Summary 9-6-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, α ≤.05)												
Total cells (cells·ml^{-1})	Dis.	DWS	DC	HPS	CBE	HPW1	ICD	Int.	ICU	JI	HPW3	HPW2	CBC
	1850	2100	2350	2600	2700	2900	3050	3050	3400	3450	3750	3900	4150
8µ Chroomonas sp. (cells·ml^{-1})	Dis.	DC	DWS	CBE	HPW1	HPS	ICU	ICD	Int.	JI	HPW3	HPW2	CBC
	233	426	491	543	620	646	685	698	776	1202	1241	1279	1629
16µ Chroomonas sp. (cells·ml^{-1})	DWS	Dis.	DC	Int.	ICD	HPS	HPW3	HPW1	ICU	CBE	JI	HPW2	CBC
	0	13	39	52	65	78	78	78	90	194	232	246	258
Cryptomonas sp. (cells·ml^{-1})	ICU	ICD	DC	JI	Int.	Dis.	HPS	HPW2	DWS	HPW1	CBC	HPW3	CBE
	0	0	0	13	52	52	64	90	103	155	155	168	284
Katodinium rotundatum (cells·ml^{-1})	DC	Dis.	ICD	DWS	HPW1	HPS	CBE	ICU	Int.	HPW3	JI	HPW2	CBC
	0	13	78	136	155	194	258	258	259	414	440	582	633
Leptocylindrus minimus (cells·ml^{-1})	CBE	DC	JI	Int.	CBC	HPW3	ICD	HPW2	Dis.	ICU	HPW1	DWS	HPS
	90	90	129	168	181	194	220	220	258	272	284	362	388
Rhizosolenia minima (cells·ml^{-1})	ICD	DC	Dis.	ICU	Int.	DWS	CBE	JI	HPS	HPW3	HPW1	HPW2	CBC
	13	26	39	52	52	181	207	310	323	323	374	374	556
Cyclotella meneghiniana (cells·ml^{-1})	HPW3	CBE	CBC	HPW2	HPW1	DC	DWS	HPS	ICU	JI	Dis.	Int.	ICD
	13	26	39	77	90	104	110	116	130	181	181	207	284
Skeletonema costatum (cells·ml^{-1})	Dis.	HPS	CBE	CBC	HPW3	DC	DWS	HPW1	ICD	Int.	HPW2	ICU	JI
	0	15	20	20	22	24	42	44	48	50	50	53	128

Table 12 (continued)

Nitzschia longissima (cells·ml^{-1})	CBC	JI	DWS	HPW2	HPW1	CBE	Int.	HPW3	HPS	Dis.	ICU	ICD	DC
	13	26	130	142	168	181	220	220	246	349	400	491	646
Gyrosigma beaufortianum (cells·ml^{-1})	CBE	JI	CBC	HPW1	DWS	HPW2	HPS	Dis.	HPW3	DC	ICD	Int.	ICU
	4	16	74	102	106	297	384	403	405	670	863	890	1066
Gyrosigma sp. (cells·ml^{-1})	DWS	CBE	CBC	Dis.	JI	HPW1	ICU	Int.	ICD	DC	HPW2	HPS	HPW3
	0	0	2	3	4	5	5	6	6	7	8	18	48
Pyramimonas sp. (cells·ml^{-1})	ICD	Int.	HPS	ICU	DC	Dis.	HPW2	HPW3	CBC	DWS	JI	HPW1	CBE
	39	90	90	90	90	130	194	349	362	375	478	608	633
3μ Flagellate (cells·ml^{-1})	DC	ICD	CBE	HPS	Dis.	ICU	DWS	HPW1	Int.	CBC	HPW2	HPW3	JI
	0	26	39	39	52	52	52	78	104	142	207	246	298

Table 13

James River Phytoplankton ANOVA Summary 11-9-77

Parameters — Stations and Means (Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Parameters													
Chl *a* ($\mu g \cdot l^{-1}$)	HPW1	DWS	CBC	CBE	Dis.	HPW2	HPS	Int.	JI	HPW3			
	1.6	2.0	2.0	2.2	2.2	2.2	2.4	2.6	2.8	3.0			
Total cells ($cells \cdot ml^{-1}$)	Dis.	HPW2	HPW1	ICD	DC	HPW3	JI	DWS	HPS	CBE	ICU	CBC	Int.
	400	400	400	550	550	550	600	700	700	750	750	800	850
8 µ *Chroomonas* sp. ($cells \cdot ml^{-1}$)	HPW1	HPW2	HPW3	JI	ICD	Dis.	DC	CBC	ICU	CBE	HPS	Int.	DWS
	90	174	188	214	214	226	246	252	278	278	284	298	398
16 µ *Chroomonas* sp. ($cells \cdot ml^{-1}$)	Dis.	HPW2	HPW1	DC	ICD	JI	HPS	ICU	CBC	CBE	DWS	HPW3	Int.
	39	58	58	78	84	84	96	116	136	142	142	155	181
Katodinium rotundatum ($cells \cdot ml^{-1}$)	DWS	HPW1	Dis.	JI	HPW2	HPW3	ICD	CBE	DC	Int.	HPS	ICU	CBC
	10	20	26	26	32	64	65	72	78	78	90	129	142
Skeletonema costatum ($cells \cdot ml^{-1}$)	Dis.	ICD	DWS	ICU	DC	HPS	HPW2	Int.	HPW3	CBE	HPW1	JI	CBC
	0	8	8	15	18	32	33	34	35	37	44	93	100
Nitzschia longissima ($cells \cdot ml^{-1}$)	DWS	CBC	HPW3	HPW2	JI	DC	CBE	ICU	ICD	Dis.	HPW1	HPS	Int.
	6	6	20	20	20	26	26	32	39	39	52	58	78
3 µ Flagellate ($cells.ml^{-1}$)	JI	Dis.	HPW3	HPW2	HPW1	CBC	DC	Int.	DWS	HPS	ICD	CBE	ICU
	13	13	26	26	39	39	39	52	55	84	90	97	110
Amphiprora sp. ($cells \cdot ml^{-1}$)	HPW2	CBE	JI	CBC	HPW3	HPS	HPW1	DC	DWS	ICD	ICU	Dis.	Int.
	0	0	1	1	1	4	4	4	6	7	10	10	15

Table 14

James River Zooplankton ANOVA Summary 2-23-77

Parameters — Stations and Means
(Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Parameters												
Copepod nauplii (No./100 l)	IC	DC	DWS	Int.	Dis.	HPS	CBE	HPW2	CBC	HPW1	HPW3	JI
	13	21	25	32	50	61	83	116	123	168	404	676
Barnacle nauplii (No./100 l)	HPW3	HPW2	DWS	CBE	Int.	JI	CBC	HPS	IC	DC	Dis.	HPW1
	0	0	1	1	1	1	2	2	3	5	9	13
Polychaete larvae (No./100 l)	JI	HPW3	IC	CBE	CBC	DC	HPW2	HPS	DWS	HPW1	Int.	Dis.
	4	13	16	27	31	46	49	60	74	77	145	176
Eurytemora sp. (No./100 l)	IC	Int.	DWS	Dis.	DC	HPS	HPW2	HPW1	CBC	CBE	HPW3	JI
	1	2	3	6	8	16	51	52	65	84	150	267
Harpacticoid copepods (No./100 l)	HPW2	DWS	HPW3	JI	CBC	DC	CBE	HPW1	HPS	Int.	IC	Dis.
	1	1	2	2	2	4	4	6	9	10	18	21
Cyclopoid copepods (No./100 l)	DWS	Int.	IC	Dis.	CBE	DC	HPS	HPW3	HPW2	HPW1	CBC	JI
	3	4	4	5	7	7	8	8	10	21	23	34
Rotifers (No./100 l)	IC	DC	HPW3	DWS	HPS	HPW2	Dis.	CBE	CBC	HPW1	Int.	JI
	1	1	13	21	24	29	36	37	37	65	87	105

Table 15

James River Zooplankton ANOVA Summary 4-13-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, α ≤.05)												
Copepod nauplii (No./100 l)	DWS	HPW3	CBC	JI	ICD	Dis.	HPS	CBE	DC	HPW2	ICU	HPW1	Int.
	139	224	234	259	276	341	342	350	364	404	412	698	1252
Barnacle nauplii (No. /100 l)	DWS	Int.	HPS	HPW3	HPW2	HPW1	CBE	CBC	JI	ICU	ICD	DC	Dis.
	0	0	0	0	0	0	0	0	0	13	25	58	233
Eurytemora sp. (No./100 l)	CBE	Dis.	ICD	DC	HPW1	ICU	HPW3	Int.	JI	HPS	HPW2	DWS	CBC
	0	6	7	9	15	18	18	20	21	25	30	34	43
Harpacticoid copepods (No./100 l)	CBC	CBE	DWS	ICU	HPW3	HPW1	JI	HPW2	DC	Int.	Dis.	ICD	HPS
	3	4	4	9	10	13	14	15	17	22	26	26	66
Cyclopoid copepods (No./100 l)	DC	ICD	CBE	ICU	DWS	Dis.	CBC	JI	HPW3	HPS	HPW1	Int.	HPW2
	4	6	8	9	14	15	20	25	28	39	60	66	74
Rotifers (No./100 l)	CBE	DWS	HPS	HPW1	ICU	DC	HPW2	CBC	JI	ICD	Dis.	HPW3	Int.
	2	11	14	17	18	28	38	38	41	45	54	56	255
Bosmina sp. (No./100 l)	DC	HPW1	CBE	JI	HPW3	ICD	ICU	Dis.	DWS	CBC	HPS	HPW2	Int.
	1	5	10	11	14	14	14	15	17	19	29	47	56
Polychaete larvae (No./100 l)	DWS	HPS	HPW3	CBE	CBC	JI	HPW1	Int.	ICU	ICD	DC	HPW2	Dis.
	0	0	0	0	0	0	1	2	3	4	5	6	8

Table 16

James River Zooplankton ANOVA Summary 5-12-77

Parameters — Stations and Means
(Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Parameters													
Copepod nauplii (No./100 l)	DC	Dis.	ICD	CBE	HPS	ICU	HPW2	Int.	CBC	DWS	JI	HPW1	HPW3
	118	182	192	223	407	502	528	565	619	668	802	1161	1602
Barnacle nauplii (No./100 l)	JI	CBC	HPW3	CBE	HPW2	HPS	ICD	DC	DWS	ICU	HPW1	Int.	Dis.
	9	12	23	54	71	277	293	452	554	555	790	811	1125
Polychaete larvae (No./100 l)	CBE	CBC	JI	HPS	HPW2	ICD	DWS	DC	HPW1	Dis.	ICU	Int.	HPW3
	2	3	5	9	13	18	19	25	25	28	39	82	186
Pelecypod larvae (No./100 l)	CBE	ICD	DC	ICU	HPS	CBC	HPW1	Dis.	DWS	HPW2	JI	Int.	HPW3
	0	0	7	20	35	44	54	58	60	76	87	225	348
Eurytemora sp. (No./100 l)	DC	ICD	ICU	Dis.	CBC	CBE	HPS	HPW2	JI	DWS	HPW1	Int.	HPW3
	11	11	15	44	52	57	136	149	151	154	180	219	303
Acartia sp. (No./100 l)	JI	CBE	CBC	HPW1	HPW2	HPS	DC	HPW3	DWS	Dis.	ICU	Int.	ICD
	2	2	3	7	19	26	34	37	49	112	240	483	859
Harpacticoid copepods (No./100 l)	DWS	ICU	Int.	ICD	DC	HPW3	CBC	Dis.	HPW2	HPW1	HPS	CBC	JI
	9	17	20	21	23	29	41	45	56	70	75	86	166
Rotifers (No./100 l)	Dis.	DC	ICD	Int.	ICU	DWS	HPS	CBC	HPW1	HPW2	HPW3	CBE	JI
	0	0	0	3	4	9	14	20	29	40	42	73	286

Table 17

James River Zooplankton ANOVA Summary 6-13-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, $\alpha \leq .05$)												
Copepod nauplii	DC	ICU	ICD	Dis.	HPS	JI	HPW3	CBE	Int.	DWS	HPW2	CBC	HPW1
	69	211	242	266	462	515	574	750	966	1001	1060	1316	1325
Barnacle nauplii (No./100 1)	JI	HPW2	ICD	ICU	DWS	HPW3	CBC	DC	CBE	Int.	Dis.	HPW1	HPS
	0	14	32	56	60	69	72	130	143	148	175	186	300
Polychaete larvae (No./100 1)	ICU	DC	ICD	HPS	Int.	JI	HPW3	CBC	DWS	Dis.	HPW2	HPW1	CBE
	1	3	4	4	4	5	13	16	18	20	24	29	31
Pelecypod larvae (No./100 1)	DWS	ICD	ICU	Dis.	DC	Int.	HPW2	HPS	JI	CBE	CBC	HPW1	HPW3
	0	0	0	2	4	7	12	20	30	40	40	60	62
Eurytemora sp. (No./100 1)	DC	HPW2	HPW3	ICU	DWS	Int.	Dis.	HPS	ICD	JI	CBE	CBC	HPW1
	1	4	4	5	5	11	13	16	17	23	25	30	67
Acartia sp. (No./100 1)	CBC	HPW2	DC	Int.	HPS	Dis.	HPW3	JI	ICU	CBE	HPW1	ICD	DWS
	3	9	11	13	16	16	17	22	34	57	58	62	177
Harpacticoid copepods (No./100 1)	HPW2	JI	ICD	DC	DWS	CBC	Int.	HPW3	HPS	CBE	Dis.	ICU	HPW1
	0	0	2	2	2	3	3	4	4	5	6	9	9
Rotifers (No./100 1)	DWS	Int.	HPS	ICD	ICU	DC	Dis.	HPW3	HPW1	JI	CBC	CBE	HPW2
	0	0	0	0	0	0	6	16	18	28	130	141	195

Table 18

James River Zooplankton ANOVA Summary 7-12-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, $\alpha \leq .05$)									
Copepod nauplii (No./100 l)	DWS	HPW2	Dis.	HPS	CBE	HPW1	HPW3	INT	CBC	JI
	177	1116	1340	1806	2135	2227	2788	2838	3589	3639
Barnacle nauplii (No./100 l)	DWS	HPW2	CBC	Int.	JI	Dis.	HPW1	HPW3	CBE	HPS
	7	8	17	24	70	72	94	125	183	238
Polychaete larvae (No./100 l)	DWS	JI	HPW2	Int.	CBC	Dis.	HPS	HPW1	HPW3	CBE
	7	13	30	37	64	68	83	131	140	325
Pelecypod larvae (No./100 l)	DWS	HPW2	Dis.	Int.	JI	HPS	HPW3	HPW1	CBC	CBE
	7	94	158	170	408	932	1409	1509	2725	9430
Eurytemora sp. (No./100 l)	Dis.	CBE	DWS	HPW2	Int.	HPW3	HPS	HPW1	JI	CBC
	0	0	1	2	9	9	11	29	63	662
Acartia sp. (No./100 l)	DWS	JI	HPW2	Dis.	HPS	HPW1	HPW3	Int.	CBE	CBC
	51	82	151	272	348	421	435	477	614	1214
Harpacticoid copepods (No./100 l)	Dis.	JI	HPW2	DWS	CBC	HPW3	CBE	HPS	Int.	HPW1
	0	0	2	3	11	29	33	39	51	72

Table 19

James River Zooplankton ANOVA Summary 7-21-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, α ≤ .05)				
Copepod nauplii (No./100 l)	DC	Dis.	Int.	ICU	ICD
	177	655	1262	1332	2304
Barnacle nauplii (No./100 l)	DC	ICD	Int.	ICU	Dis.
	65	85	152	184	235
Polychaete larvae (No./100 l)	DC	ICD	Int.	Dis.	ICU
	28	44	53	72	120
Pelecypod larvae (No./100 l)	DC	ICU	ICD	Dis.	Int.
	1	5	7	12	178
Eurytemora sp. (No./100 l)	Int.	ICD	DC	ICU	Dis.
	9	18	21	26	37
Acartia sp. (No./100 l)	Dis.	DC	ICU	ICD	Int.
	115	161	321	410	479
Harpacticoid copepods (No./100 l)	ICU	ICD	Int.	DC	Dis.
	10	11	18	18	34
Rotifers (No./100 l)	DC	ICD	ICU	Dis.	Int.
	1	1	2	8	26

Table 20

James River Zooplankton ANOVA Summary 8-16-77

Stations and Means
(Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Parameters													
Copepod nauplii (No./100 l)	DC	CBC	Dis.	HPS	DWS	HPW3	HPW1	HPW2	CBE	ICU	Int.	JI	ICD
	345	349	541	547	597	726	936	981	1142	1671	1694	1935	2776
Barnacle nauplii (No./100 l)	HPS	JI	CBC	HPW2	HPW3	HPW1	DWS	CBE	ICU	Dis.	DC	Int.	ICD
	33	40	50	50	93	125	129	237	306	360	372	402	574
Polychaete larvae (No./100 l)	HPW2	DWS	HPW3	HPW1	Dis.	DC	HPS	JI	CBE	Int.	CBC	ICD	ICU
	8	8	12	18	22	22	29	30	32	39	47	58	93
Pelecypod larvae (No./100 l)	HPS	DWS	DC	HPW2	HPW1	ICU	CBC	ICD	CBE	JI	HPW3	Dis.	Int.
	0	2	4	11	14	17	18	19	23	26	42	52	78
Eurytemora sp. (No./100 l)	DWS	CBC	ICD	HPW1	ICU	HPW3	DC	Dis.	HPS	JI	HPW2	Int.	CBE
	0	0	4	6	7	8	8	9	10	19	22	24	31
Acartia sp. (No./100 l)	DC	CBE	ICU	ICD	CBC	Dis.	HPW3	HPW1	DWS	HPS	Int.	JI	HPW2
	57	70	80	84	114	130	138	166	182	238	253	317	314
Harpacticoid copepods (No./100 l)	DWS	JI	CBE	HPW1	HPW3	Int.	CBC	DC	HPS	Dis.	ICD	HPW2	ICU
	0	0	4	4	4	4	4	5	13	14	14	16	18
Rotifers (No./100 l)	DWS	Dis.	HPW1	DC	HPS	ICD	HPW2	CBE	Int.	HPW3	CBC	JI	ICU
	0	0	2	3	5	6	8	10	12	19	20	26	27

Table 21

James River Zooplankton ANOVA Summary 9-6-77

Parameters	Stations and Means (Stations not sharing an underline are significantly different, $\alpha \leq .05$)												
Copepod nauplii (No./100 l)	Dis.	DC	DWS	Int.	CBE	JI	HPS	HPW3	HPW1	ICD	ICU	CBC	HPW2
	272	375	449	495	561	651	797	1017	1160	1177	2978	3972	4249
Barnacle nauplii (No./100 l)	DWS	Int.	HPW3	JI	CBC	CBE	Dis.	HPW2	HPS	HPW1	ICD	ICU	DC
	23	30	44	60	63	76	93	93	106	121	224	267	324
Polychaete larvae (No./100 l)	HPW3	DWS	CBE	CBC	Int.	Dis.	HPS	JI	HPW2	HPW1	DC	ICU	ICD
	2	4	15	16	16	17	20	23	28	44	65	78	92
Pelecypod larvae (No./100 l)	DWS	Dis.	Int.	ICD	DC	JI	ICU	HPW3	HPW1	HPS	CBC	HPW2	CBE
	6	67	70	214	252	378	497	1374	1703	2660	3628	3690	5228
Acartia sp. (No./100 l)	Int.	CBE	Dis.	JI	HPS	DWS	HPW1	HPW3	ICU	ICD	HPW2	CBC	DC
	77	89	127	128	132	148	224	231	262	334	361	572	606
Rotifers (No./100 l)	DWS	Dis.	DC	JI	HPS	HPW1	CBE	CBC	HPW3	HPW2	Int.	ICD	ICU
	2	3	11	28	37	58	63	71	72	87	140	354	2430

Table 22

James River Zooplankton ANOVA Summary 11-9-77

Parameter — Stations and Means

(Stations not sharing an underline are significantly different, $\alpha \leq .05$)

Parameter													
Copepod nauplii (No./100 l)	HPW3	Dis.	JI	CBE	DC	HPW1	Int.	CBC	ICD	DWS	HPW2	ICU	HPS
	84	141	172	184	225	273	316	402	536	550	700	715	1717
Barnacle nauplii (No./100 l)	HPW2	HPW3	JI	CBC	HPW1	ICU	DWS	CBE	HPS	Int.	ICD	Dis.	DC
	1	3	3	4	5	11	12	12	18	21	32	42	56
Polychaete larvae (No./100 l)	DWS	Dis.	JI	CBC	HPW3	HPW2	Int.	DC	HPS	ICD	ICU	CBE	HPW1
	10	17	19	23	32	35	37	53	77	96	106	125	200
Acartia sp. (No./100 l)	HPW3	DC	CBE	Dis.	CBC	HPW1	ICD	DWS	JI	ICU	Int.	HPS	HPW2
	7	12	18	22	25	31	46	57	66	74	77	179	180
Rotifers (No./100 l)	HPW2	HPW1	CBE	CBC	Dis.	HPS	HPW3	DWS	JI	DC	Int.	ICD	ICU
	0	3	6	12	16	24	28	31	43	57	58	64	66
Eurytemora sp. (No./100 l)	DWS	Int.	HPS	HPW1	Dis.	ICU	DC	CBE	ICD	CBC	HPW3	HPW2	JI
	0	0	0	0	0	0	0	2	3	3	12	24	43

Results - Benthos Studies

Data Presentation

The hydrographic data associated with the 1977 benthos sampling runs appear in Appendix Table A2. The benthos biological data are in Appendix C, Tables C1-C6 (species counts) and C7-C12 (diversity indices). One mollusk, which has been designated as Brachidontes recurvus in previous reports, was determined to be Modiolus demissus instead, so this name appears instead of B. recurvus in Tables C1-C6.

Benthos Distribution Patterns

The 1977 spatial distributions for the major benthic organisms of the study area are presented in Table 23. Most of these organisms showed an apparent preference for either the sandy or the silty clay substrate. Those that seemed to be most abundant at the sandy stations were Corbicula manilensis (Table 23E), Nereis succinea (Table 23H), Corophium lacustre (Table 23L), and Lepidactylus dytiscus (Table 23M). Organisms that apparently preferred the silty clay substrate were Rangia cuneata, Congeria leucophaeta, Scolecolepides viridis, Heteromastus filiformis, Gammarus sp., Leptocheirus plumulosus, and Cyathura polita (Tables 23A, C, G, I, K, N, and O, respectively). Macoma mitchelli (Table 23D), Hydrobia sp. (Table 23F), oligochaetes (Table 23J), and dipteran larvae (Table 23P) were not distinctly associated with one or the other of the substrate types. Dipteran larvae, however, were found in the 1.0 mm fractions of samples taken only from stations upstream from Hog Point.

Four species exhibited distribution patterns that suggested possible responses to the power plant plume. Congeria leucophaeta and Heteromastus filiformis yielded the highest numbers of individuals in samples from plume station 11, while for Corophium lacustre the largest numbers obtained within the silty clay substrate were from plume stations 8 and 11. Although the numbers of these organisms that were collected were so small that statistical testing could not be performed there is at least some suggestion of a positive power plant effect on these species. This pattern has been observed in previous study years for Congeria leucophaeta (Jordan et al. 1977).

The only species showing a possible negative power plant effect was Leptocheirus plumulosus, which seemed to be less abundant at plume stations 8 and 11 than at the other silty clay stations. This pattern had been observed previously in 1974 and 1975 (Jordan et al. 1974). Analysis of variance, however, indicated that the apparent differences within the 1977 data were not significant at the .05 level.

Severely cold weather during the winter of 1976 - 77 apparently killed large numbers of Rangia cuneata. Most of the individuals of this species collected on March 8 (Table C1) were decomposing, indicating that they had recently died. The total number of R. cuneata collected in the study area on April 25 (Table 23A) was 51, lower than the total collected on any other sampling date since the Surry Power Station study began in 1969 (Figure 5). Recovery was rapid, however, and population levels determined during the succeeding four sampling runs in the 1977 study year were within the range of the 1975 and 1976 population levels.

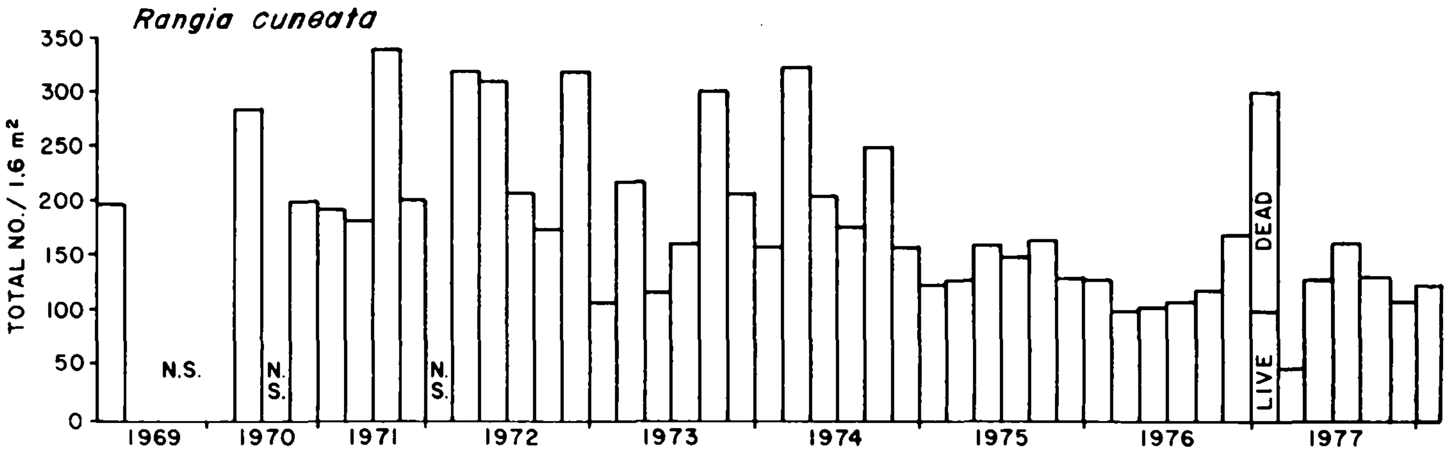

Figure 5. Temporal distribution of Rangia cuneata in the study area, May 1969 - Jan. 1978.

N.S. = Not sampled

Table 23

Seasonal and Spatial Distributions of Major Benthic Animals - 1977

A. <u>Rangia</u> <u>cuneata</u> (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt Sand Clay	
	Control			Plume			Control			Plume							
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8	1	6		1		3	3	1	7	7	5	11	18	7	19		89
Apr. 25		4		7		2	2		7	2	1	4	17	5			51
June 20	1		17	5	2	1	6	13	5	10	4	21	10	17	15		127
July 14	2	8	2	10	2	5	24	14	4	15	2	12	34	3	13	4	154
Aug. 18	2	2	5	5	11	19	9	9	7	11		10	6	17	11	4	128
Oct. 10	7		11	6	3	2	10	5	6	8	1	27	8	2	11	2	109
Σ	13	20	35	34	18	32	54	42	36	53	13	85	93	51	69	10	658

B. <u>Rangia</u> <u>cuneata</u> (g per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt Sand Clay	
	Control			Plume			Control			Plume							
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8	.41	.98		.44		1.46	.42		1.69	1.08	.50	1.60	2.55	1.14	12.52		24.79
Apr. 25		1.42		5.28		1.32	.50		4.56	.79	.12	1.15	2.70	.80			18.64
June 20			15.20	2.21	.52	1.31	.14	.26	4.97	4.10		5.49	4.64	.83	3.46		43.13
July 14	.83	1.54		.67	.74	.62	.52	.01	2.77	2.01		2.59	15.13	.62	4.76		32.81
Aug. 18	1.08	2.36		.92	2.17	.80	.01	1.00	5.06	4.19		3.72	1.55	1.65	3.83		28.34
Oct. 10	3.72		8.33	3.95			.01	.74	2.78	2.89		6.73	3.63	.88	3.48	1.42	38.56
Σ	6.04	6.30	23.53	13.47	3.43	5.51	1.60	2.01	21.83	15.06	.62	21.28	30.20	5.92	28.05	1.42	186.27

Table 23 (continued)

Seasonal and Spatial Distributions of Major Benthic Animals - 1977

C. Congeria leucophaeta (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt	
	Control			Plume			Control				Plume					Sand Clay	
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8											1				1		2
Apr. 25								1						1	1		3
June 20							1								30		31
July 14							1										1
Aug. 18														2			2
Oct. 10																	0
Σ	0	0	0	0	0	0	2	1	0	0	1	0	0	3	32	0	39

D. Macoma mitchelli (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt	
	Control			Plume			Control				Plume					Sand Clay	
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8																	0
Apr. 25																6	6
June 20													1				1
July 14							3	4			1		4	1	1		14
Aug. 18							1	2			1	1					5
Oct. 10	11	2	3	2		3	4	4	7	10		4	4		2	1	57
Σ	11	2	3	2	0	3	8	10	7	10	2	5	9	1	3	7	83

Table 23 (continued)

Seasonal and Spatial Distributions of Major Benthic Animals - 1977

E. Corbicula manilensis (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt	
	Control			Plume			Control			Plume						Sand Clay	
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8			4	1	1					1							7
Apr. 25		1					1										2
June 20		1	2												1		4
July 14					2												2
Aug. 18				1													1
Oct. 10																	0
Σ	0	2	6	2	3	0	1	0	0	1	0	0	0	0	1	0	16

F. Hydrobia sp. (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt	
	Control			Plume			Control			Plume						Sand Clay	
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8	3			1		1	1			23	21	5					55
Apr. 25	1					1					9	3	1			1	16
June 20	8	2	2				1		4								17
July 14										1			4		3		8
Aug. 18					2					1	3	2	3	1			12
Oct. 10			2	1		1				1		1	1				7
Σ	12	2	4	2	2	3	2	0	4	26	33	11	9	1	3	1	115

Table 23 (continued)

Seasonal and Spatial Distributions of Major Benthic Animals - 1977

G. Scolecolepides viridis (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt	
	Control			Plume			Control				Plume					Sand Clay	
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8		1			2	2			1	1			2	1	5		15
Apr. 25		2				1	5						1	1		5	15
June 20							6	2				1	9	2	4		24
July 14							3	5		1	5	1	2	6	7		30
Aug. 18	4					4	4	6	1	3	2		2		1		27
Oct. 10			4			6	6	1			2		1		4		24
Σ	4	3	4	0	2	13	24	14	2	5	9	2	17	10	21	5	135

H. Nereis succinea (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt	
	Control			Plume			Control				Plume					Sand Clay	
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8					1					1	3			2	2		9
Apr. 25	1	1			1					1	1			1	2		8
June 20			1			1					2	1			2	2	9
July 14	1			2								2				1	6
Aug. 18	7	1	1	1	1	3					1			1		1	17
Oct. 10	14	2	9		5	9		2		3	4	1		1	2	8	60
Σ	23	4	11	3	8	13	0	2	0	5	11	4	0	5	8	12	109

Table 23 (continued)

Seasonal and Spatial Distributions of Major Benthic Animals - 1977

I. <u>Heteromastus filiformis</u> (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt Sand Clay	
	Control			Plume			Control			Plume							
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8																	0
Apr. 25																1	1
June 20															2		2
July 14							1	1							15	1	18
Aug. 18			1	1		2	2								4		10
Oct. 10	1					1	4								7		13
Σ	1	0	1	1	0	3	7	1	0	0	0	0	0	0	28	2	44

J. Oligochaetes (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt Sand Clay	
	Control			Plume			Control			Plume							
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8	1									3			1				5
Apr. 25				2						2					1		5
June 20									1			1			1		3
July 14	1								1	1							3
Aug. 18														1			1
Oct. 10														1	1		2
Σ	2	0	0	2	0	0	0	0	2	6	0	1	1	2	3	0	19

Table 23 (continued)

Seasonal and Spatial Distributions of Major Benthic Animals - 1977

K. *Gammarus* sp. (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt	
	Control			Plume			Control		Plume							Sand Clay	
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8			2				8	4		4		2			9		29
Apr. 25		2		1					5		10	2			1		21
June 20			2				4						1		2		9
July 14	1						1	1									3
Aug. 18																	0
Oct. 10																	0
Σ	1	2	4	1	0	0	13	5	5	4	10	4	1	0	12	0	62

L. *Corophium lacustre* (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt	
	Control			Plume			Control		Plume							Sand Clay	
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8																	0
Apr. 25		3	1	3		1					1	1			7		17
June 20	2	10	14	5	2		3		1		1	2		6	47		93
July 14	378		1						1	1					3		384
Aug. 18	16						1				3			6			26
Oct. 10	1																1
Σ	397	13	16	8	2	1	4	0	2	1	5	3	0	12	57	0	521

Table 23 (continued)

Seasonal and Spatial Distributions of Major Benthic Animals - 1977

M. Lepidactylus dytiscus (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt Sand Clay	
	Control			Plume			Control		Plume								
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8			11		1												12
Apr. 25			3		1												4
June 20					13			1									14
July 14			2		2												4
Aug. 18			3		5							1					9
Oct. 10		2		1													3
Σ	0	2	19	1	22	0	0	1	0	0	0	1	0	0	0	0	46

N. Leptocheirus plumulosus (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt Sand Clay	
	Control			Plume			Control		Plume								
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8		3									2	3	2			7	17
Apr. 25																	0
June 20			1	4		9		3		12		13	8	2	1	10	63
July 14	4		2				3	15	2	10	13	11	1	7		8	76
Aug. 18	1		3				10	12	10	8	4	19	3	1	1	8	80
Oct. 10	4		3			7			2	4	1		3		1		25
Σ	9	3	9	4	0	16	13	30	14	34	20	46	17	10	3	33	261

Table 23 (continued)

Seasonal and Spatial Distributions of Major Benthic Animals - 1977

O. Cyathura polita (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt Sand Clay	
	Control			Plume			Control			Plume							
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8						1	1				3				2		7
Apr. 25												1	1		6		8
June 20											1	3		1	3		8
July 14							1	1		1	1	3	1	1		1	10
Aug. 18								1	1	1	3			1			7
Oct. 10					1		1	1	1	1				1	1		7
Σ	0	0	0	0	1	1	3	3	2	3	8	7	2	4	12	1	47

P. Dipteran larvae (No. per 0.1 m^2)

Substrates and Station Numbers

	Sand						Silty Clay									Silt Sand Clay	
	Control			Plume			Control			Plume							
Date	1	3	12	7	9	13	5	10	2	6	14	16	4	8	11	15	Σ
Mar. 8										1							1
Apr. 25		3							1	3							7
June 20			1	1													2
July 14	3																3
Aug. 18										1							1
Oct. 10																	0
Σ	3	3	1	1	0	0	0	0	1	5	0	0	0	0	0	0	14

Results - Fouling Organisms Study

The 1977 fouling organism data appear in Tables 24 - 26. The name Modiolus demissus has replaced the name Brachidontes recurvus on these tables, as a result of the correction of a previous error in identification.

As mentioned in the methods section the February plates at all three stations were destroyed by river ice, and the August plates at stations DWS and CBS had separated from the towers and could not be found.

As in previous study years (Jordan et al. 1976, 1977) barnacles and the tube dwelling amphipod, Corophium lacustre, were the most numerous of the organisms collected on the summer and annual fouling plates. The October plates from station DWS, located the farthest downstream, yielded tunicates of the genus Molgula along with three species of marine algae that were not found at the two upstream stations. The August plates recovered from station CBN and the October plates recovered from all three stations were almost completely covered by ectoprocts and hydroids. This probably accounts for the lower numbers of barnacles and C. lacustre on these plates, relative to the numbers present on the June and annual plates. The hydroid - ectoproct covering was apparently favorable for colonization by polychaetes (Nereis succinea) and epibenthic amphipods (Gammarus sp.) which were most abundant on the October plates at each station.

There was no obvious characteristic unique to the fouling organism community at station CBS, near the power plant discharge, that could be interpreted as a power plant effect in this area.

Table 24

Fouling Organisms
1977
Station DWS

Horizontal Plate		No. Organisms/dm² Jan-Feb	Mar.-Apr	May-Jun	Annual*
Barnacles	*Balanus* sp.	Lost		777	996
Bivalves	*Modiolus demissus*			1	6
	Congeria leucophaeta				
Amphipods	*Corophium lacustre*		1	1076	1099
	Gammarus sp.		1		5
Polychaetes	*Nereis succinea*				
	Scolecolepides viridis				
Decapods	*Rhithropanopeus harrissi*				
Ectoprocts	*Bowerbankia* sp.				
	Membranipora tenuis				X
Hydroids					X
Dipteran Larvae					
Total No. of Genera (not including Hydroids and Dipteran Larvae)			2	3	5
Total No. of Organisms (not including Bryozoans and Hydroids)			2	1854	2106

Vertical Plate		Jan-Feb	Mar.-Apr	May-Jun	Annual*
Barnacles	*Balanus* sp.	Lost		576	1099
Bivalves	*Modiolus demissus*			1	
	Congeria leucophaeta				
Amphipods	*Corophium lacustre*			154	1039
	Gammarus sp.		1	7	
Polychaetes	*Nereis succinea*				
	Scolecolepides viridis				
Decapods	*Rhithropanopeus harrissi*				
Ectoprocts	*Bowerbankia* sp.				
	Membranipora tenuis				X
Hydroids					X
Dipteran Larvae					
Total No. of Genera (not including Hydroids and Dipteran Larvae)			1	4	3
Total No. of Organisms (not including Bryozoans and Hydroids)			1	738	2138

*Incubated from 3-8-77 to 6-20-77

Table 24 (continued)

Fouling Organisms
1977
Station DWS

Horizontal Plate		Jul-Aug	Sep-Oct*	Nov-Dec
		No. Organisms/dm^2		
Barnacles	*Balanus* sp.	Lost	169	
Bivalves	*Modiolus demissus*			
	Congeria leucophaeta			
Amphipods	*Corophium lacustre*		31	
	Gammarus sp.		177	3
	Leptocheirus plumulosus		3	
Polychaetes	*Nereis succinea*			
	Scolecolepides viridis			
Decapods	*Rhithropanopeus harrissi*			
Ectoprocts	*Bowerbankia* sp.			
	Membranipora tenuis		X	
Hydroids			X	
Dipteran Larvae				
Tunicates	*Molgula* sp.		9	
Algae	*Polysiphonia harveyi*		X	
	Ceramium rubrum		X	
	Enteromorpha sp.		X	
Total No. of Genera (not including Algae, Hydroids, and Dipteran Larvae)			6	1
Total No. of Organisms (not including Algae, Bryozoans, and Hydroids)			389	3

Vertical Plate		Jul-Aug	Sep-Oct*	Nov-Dec
Barnacles	*Balanus* sp.	Lost	136	
Bivalves	*Modiolus demissus*			
	Congeria leucophaeta			
Amphipods	*Corophium lacustre*		5	3
	Gammarus sp.		363	2
Polychaetes	*Nereis succinea*		6	
	Scolecolepides viridis			
Decapods	*Rhithropanopeus harrissi*			
Ectoprocts	*Bowerbankia* sp.			
	Membranipora tenuis		X	
Hydroids			X	
Dipteran Larvae				
Tunicates	*Molgula* sp.		8	
Algae	*Enteromorpha* sp.		X	
Total No. of Genera (not including Algae, Hydroids, and Dipteran Larvae)			6	2
Total No. of Organisms (not including Algae, Bryozoans, and Hydroids)			518	5

*Incubated from 9-12-77 to 10-31-77

Table 25

Fouling Organisms
1977
Station CBN

Horizontal Plate		No. Organisms/dm² Jan-Feb	Mar-Apr	May-Jun	Annual*
Barnacles	*Balanus* sp.	Lost		1249	748
Bivalves	*Modiolus demissus*				
	Congeria leucophaeta			7	2
Amphipods	*Corophium lacustre*		1	1366	1333
	Gammarus sp.		1	10	1
Polychaetes	*Nereis succinea*				
	Scolecolepides viridis				
Decapods	*Rhithropanopeus harrissi*				
Ectoprocts	*Bowerbankia* sp.				
	Membranipora tenuis				
Hydroids			X	X	X
Dipteran Larvae			3		
Total No. of Genera (not including Hydroids and Dipteran Larvae)			2	4	4
Total No. of Organisms (not including Bryozoans and Hydroids)			5	2632	2084

Vertical Plate		Jan-Feb	Mar-Apr	May-Jun	Annual*
Barnacles	*Balanus* sp.	Lost		1414	1590
Bivalves	*Modiolus demissus*				
	Congeria leucophaeta			1	
Amphipods	*Corophium lacustre*			549	1502
	Gammarus sp.		2	1	1
	Leptocheirus plumulosus		1		
Polychaetes	*Nereis succinea*				
	Scolecolepides viridis				
Decapods	*Rhithropanopeus harrissi*				
Ectoprocts	*Bowerbankia* sp.				
	Membranipora tenuis				
Hydroids				X	X
Dipteran Larvae			1		
Total No. of Genera (not including Hydroids and Dipteran Larvae)			2	4	3
Total No. of Organisms (not including Bryozoans and Hydroids)			4	1965	3093

*Incubated from 3-8-77 to 6-20-77

Table 25 (continued)

Fouling Organisms
1977
Station CBN

Horizontal Plate		No. Organisms/dm^2 Jul-Aug	Sep-Oct	Nov-Dec
Barnacles	*Balanus* sp.	80	14	
Bivalves	*Modiolus demissus*		4	
	Macoma mitchelli		2	
	Congeria leucophaeta	1	1	
Amphipods	*Corophium lacustre*	20	20	1
	Gammarus sp.		25	5
Polychaetes	*Nereis succinea*	12	20	
	Scolecolepides viridis			
Decapods	*Rhithropanopeus harrissi*	6		
	Palaemonetes vulgaris		1	
Ectoprocts	*Bowerbankia* sp.			
	Membranipora tenuis	X	X	
Hydroids		X	X	
Dipteran Larvae				
Total No. of Genera (not including Hydroids and Dipteran Larvae)		6	9	2
Total No. of Organisms (not including Bryozoans and Hydroids)		119	87	6

Vertical Plate		Jul-Aug	Sep-Oct	Nov-Dec
Barnacles	*Balanus* sp.	65	34	
Bivalves	*Modiolus demissus*		2	
	Congeria leucophaeta		1	
Amphipods	*Corophium lacustre*	5	9	1
	Gammarus sp.		12	1
Polychaetes	*Nereis succinea*	8	13	
	Scolecolepides viridis			
Decapods	*Rhithropanopeus harrissi*	7	5	
Ectoprocts	*Bowerbankia* sp.			
	Membranipora tenuis	X	X	X
Hydroids		X	X	
Dipteran Larvae				
Nudibranch			1	
Total No. of Genera (not including Hydroids and Dipteran Larvae)		5	9	2
Total No. of Organisms (not including Bryozoans and Hydroids)		85	77	2

Table 26

Fouling Organisms
1977
Station CBS

Horizontal Plate		No. Organisms/dm^2 Jan-Feb	Mar-Apr	May-Jun	Annual*
Barnacles	Balanus sp.	Lost		551	329
Bivalves	Modiolus demissus			3	
	Congeria leucophaeta			7	4
Amphipods	Corophium lacustre		1	1410	1323
	Gammarus sp.		5	1	1
	Leptocheirus plumulosus		1	1	
Polychaetes	Nereis succinea				
	Scolecolepides viridis				
Decapods	Rhithropanopeus harrissi				
Ectoprocts	Bowerbankia sp.				
	Membranipora tenuis			X	X
Hydroids				X	X
Dipteran Larvae					
Total No. of Genera (not including Hydroids and Dipteran Larvae)			3	7	5
Total No. of Organisms (not including Bryozoans and Hydroids)			7	1973	1657

Vertical Plate		Jan-Feb	Mar-Apr	May-Jun	Annual*
Barnacles	Balanus sp.	Lost		348	186
Bivalves	Modiolus demissus				1
	Congeria leucophaeta			1	1
Amphipods	Corophium lacustre			1126	1124
	Gammarus sp.		4	8	30
	Leptocheirus plumulosus		3		2
Polychaetes	Nereis succinea				
	Scolecolepides viridis				
Decapods	Rhithropanopeus harrissi				
Ectoprocts	Bowerbankia sp.				
	Membranipora tenuis			X	X
Hydroids				X	X
Dipteran Larvae					1
Total No. of Genera (not including Hydroids and Dipteran Larvae)			2	5	7
Total No. of Genera (not including Bryozoans and Hydroids)			7	1483	1345

*Incubated from 3-8-77 to 6-20-77

Table 26 (continued)

Fouling Organisms
1977
Station CBS

Horizontal Plate		No. Organisms/dm² Jul-Aug	Sep-Oct*	Nov-Dec
Barnacles	*Balanus* sp.	Lost	36	
Bivalves	*Modiolus demissus*		3	
	Congeria leucophaeta			
Amphipods	*Corophium lacustre*		41	6
	Gammarus sp.		65	11
Polychaetes	*Nereis succinea*		19	
	Scolecolepides viridis			
Decapods	*Rhithropanopeus harrissi*			
Ectoprocts	*Bowerbankia* sp.			
	Membranipora tenuis		X	X
Hydroids			X	
Dipteran Larvae				
Total No. of Genera (not including Hydroids and Dipteran Larvae)			6	3
Total No. of Organisms (not including Bryozoans and Hydroids)			164	17

Vertical Plate		Jul-Aug	Sep-Oct*	Nov-Dec
Barnacles	*Balanus* sp.	Lost	53	
Bivalves	*Modiolus demissus*		1	
	Congeria leucophaeta			
Amphipods	*Corophium lacustre*		23	6
	Gammarus sp.		77	6
	Leptocheirus plumulosus		3	
Polychaetes	*Nereis succinea*		17	
	Scolecolepides viridis			
Decapods	*Rhithropanopeus harrissi*			
Ectoprocts	*Bowerbankia* sp.			
	Membranipora tenuis		X	X
Hydroids			X	X
Dipteran Larvae				
Total No. of Genera (not including Hydroids and Dipteran Larvae)			6	3
Total No. of Organisms (not including Bryozoans and Hydroids)			174	12

*Incubated from 9-12-77 to 10-31-77

Conclusions

Analysis of the 1977 plankton and benthos data from the vicinity of the Surry Power Station yielded results that are consistent with the findings in previous study years (Jordan *et al*. 1976, 1977). The effects of the power plant on the river phytoplankton community on the upstream side of Hog Point mainly resulted from the introduction of water pumped from the downstream side, that was either richer or poorer in certain species than the upstream receiving water. Destruction of plant entrained phytoplankton occurred in the summer months, but reduced population densities were not detected in the river itself beyond the immediate vicinity of the discharge canal mouth. Modification of the discharge area zooplankton community by the introduction of organisms pumped from the intake side of Hog Point or released into the cooling water by species residing within the intake and discharge canals was observed, but destruction of entrained organisms was not detected in the 1977 study. The power plant discharge plume may have affected four benthos species, but the only indisputable damage to an invertebrate population observed during the 1977 study was the winter kill of *Rangia cuneata*, from which rapid recovery was achieved.

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Appendix A

Hydrographic Data Tables

Table A1

James River Hydrographic Data 1977

Plankton Sampling Runs

Date	Parameter	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	DISCHARGE	CBE	CBC	JI
		Station									
2-23	Time (EST)	1040	1106	1147	1215	1236	1300	1325	1347	1408	1441
	Secchi Depth (cm)	89	57	65	75	67	87	55	95	62	39
	Sample Depth (m)	0	0	0	0	0	0	0	0	0	0
	Temp. (°C)	5.25	5.40	6.10	5.05	5.15	6.65	13.20	6.35	5.10	4.00
	Sal. (‰)	4.73	7.01	3.85	2.16	2.17	3.46	6.53	2.51	2.15	1.19
	D.O. (mg/1)	11.68	12.79	11.17	12.44	11.73	12.42	11.52	12.10		12.12
	Sample Depth (m)	.75	3.5	2	1	1.5	1	1	1	1	4
	Temp. (°C)	4.80	5.40	6.00	5.10	5.00	6.60	13.20	6.40	5.15	4.20
	Sal. (‰)	4.90	7.08	3.84	2.25	2.29	3.45	6.54	2.57	2.15	1.74
	D.O. (mg/1)	11.60	12.30	12.07	11.70	11.68	12.18	10.49	13.10		12.54
	Sample Depth (m)	1.5	7	4	2	3		2		2	8
	Temp. (°C)	4.45	6.30	6.15	4.70	5.00		13.35		5.85	4.35
	Sal. (‰)	5.91	7.36	3.90	2.44	2.78		6.58		2.94	1.75
	D.O. (mg/1)	11.83	12.69	11.95	11.97	12.94		12.10			12.01
4-13	Time (EST)	1040	1111	1141	1203	1224	1245	1303	1345	1405	1426
	Secchi Depth (cm)	55	35	35	63	38	49	31	63	62	52
	Sample Depth (m)	0	0	0	0	0	.25	0	0	0	0
	Temp. (°C)	16.40	17.80	17.80	16.95	16.90	21.60	22.10	24.60	17.00	15.40
	Sal. (‰)	0.12	0.21	0.16	0.10	0.13	0.19	0.24	0.14	0.09	0.10
	D.O. (mg/1)	11.11	9.53	9.45	10.03	9.00	9.49	8.96	10.88	9.87	9.45
	Sample Depth (m)	1	4	2.25	1	1.25		1	.5	.75	2.5
	Temp. (°C)	16.40	17.15	17.50	16.90	16.95		22.20	24.20	17.20	15.40
	Sal. (‰)	0.12	0.19	0.16	0.10	0.14		0.24	0.14	0.09	-
	D.O. (mg/1)	10.28	9.36	9.04	10.24	9.87		8.59	-	9.32	9.08
	Sample Depth (m)	2	8	4.5	2	2.5		2		1.5	5
	Temp. (°C)	16.75	17.15	17.65	16.85	17.10		22.50		17.40	15.55
	Sal. (‰)	0.12	0.19	0.16	0.10	0.13		0.24		0.09	0.09
	D.O. (mg/1)	9.94	9.40	9.26	10.79	8.91		8.91		9.62	10.09

Table A1 (continued)

Date	Parameter	Station DWS	INTAKE	HPS	HPW3	HPW2	HPW1	DISCHARGE	CBE	CBC	JI
5-12	Time (EDT)	1008	1057	1130	1155	1210	1228	1255	1353	1410	1440
	Secchi Depth (cm)	55	36	46	40	47	54	46	44	52	46
	Sample Depth (m)	0	0	0	0	0	0	0	0	0	0
	Temp. (°C)	18.00	18.10	19.35	18.70	18.65	19.45	23.10	19.50	18.75	18.80
	Sal. (‰)	4.78	6.24	2.28	2.29	2.42	1.91	6.26	1.08	1.05	0.86
	D.O. (mg/1)	8.42	7.50	8.10	8.12	8.54	8.68	7.40	9.34	8.30	8.76
	Sample Depth (m)	1	3.75	2.5	1	1.5	1	1	1	1	3
	Temp. (°C)	18.10	18.15	19.10	18.70	18.60	19.45	23.50	19.20	18.80	18.75
	Sal. (‰)	4.78	6.24	2.89	2.30	2.44	2.66	6.27	1.11	1.04	0.87
	D.O. (mg/1)	7.78	7.54	8.98	7.92	8.34	8.40	7.14	8.50	8.08	8.62
	Sample Depth (m)	2	7.5	5	2	3		2		2	6
	Temp. (°C)	18.30	18.25	19.20	18.70	18.75		23.40		19.00	18.80
	Sal. (‰)	4.87	6.32	3.06	2.38	2.48		6.21		1.04	1.37
	D.O. (mg/1)	8.10	7.40	7.82	8.00	8.46		7.24		8.06	8.04
6-13	Time (EDT)	1103	1138	1212	1240	1308	1334	1400	1440	1511	1542
	Secchi Depth (cm)	91	42	67	82	73	74	45	82	74	60
	Sample Depth (m)	0	0	0	0	0	0	0	0	0	0
	Temp. (°C)	22.95	22.90	24.10	23.70	23.40	25.30	30.80	25.50	24.30	22.70
	Sal. (‰)	7.26	8.03	6.01	4.68	5.86	5.27	8.23	3.74	4.21	2.87
	D.O. (mg/1)	6.89	6.48	6.35	8.01	6.40	6.99	6.62	7.50	7.50	6.35
	Sample Depth (m)	1	4	2.5	1	1.5	1	1	1	1.5	2
	Temp. (°C)	22.55	23.00	23.40	23.70	23.40	25.05	30.80	25.30	24.20	22.70
	Sal. (‰)	7.82	8.04	6.22	4.70	5.88	5.55	8.23	4.37	4.44	2.88
	D.O. (mg/1)	7.27	-	6.74	6.74	7.01	5.13	4.56	7.46	7.07	6.78
	Sample Depth (m)	2	8	5	2	3		2		3	4
	Temp. (°C)	22.25	22.70	22.70	23.40	23.10		30.80		24.60	22.90
	Sal. (‰)	8.93	8.28	7.88	4.76	6.08		8.17		4.59	3.09
	D.O. (mg/1)	7.03	6.72	6.82	7.17	7.27		5.01		6.27	4.64

Table A1 (continued)

Date	Parameter	Station DWS	INTAKE	HPS	HPW3	HPW2	HPW1	DISCHARGE	CBE	CBC	JI
7-12	Time (EDT)	1040	1115	1140	1204	1238	1257	1317	1403	1437	1517
	Secchi Depth (cm)	74	29	53	43	58	51	40	77	-	75
	Sample Depth (m)	0	0	0	0	0	0	0	0	0	0
	Temp. (°C)	28.50	28.60	30.30	29.65	31.10	30.85	33.80	30.50	29.80	29.80
	Sal. (‰)	9.87	10.07	8.20	6.58	7.37	7.12	10.09	6.55	5.71	4.63
	D.O. (mg/1)	6.62	6.76	6.78	7.10	7.38	6.64	5.86	7.92	6.14	7.26
	Sample Depth (m)	1	3.5	2.5	1	1.5	1	1	.75	1.5	3.5
	Temp. (°C)	28.50	28.60	29.80	29.80	30.00	30.85	33.80	30.50	29.75	29.60
	Sal. (‰)	6.53	10.20	8.64	6.63	7.43	7.12	10.12	6.44	6.02	5.16
	D.O. (mg/1)	6.42	7.04	6.32	6.38	7.06	6.48	5.96	7.22	6.24	5.98
	Sample Depth (m)	2	7	5	2	3		2	1.5	3	7
	Temp. (°C)	28.50	28.70	29.60	29.80	29.65		33.70	30.70	30.00	29.60
	Sal. (‰)	10.09	10.21	9.07	6.65	7.66		10.09	6.53	6.70	5.19
	D.O. (mg/1)	6.96	6.46	6.10	6.14	5.76		6.10	7.08	5.74	6.20
7-21	Time (EDT)		1042					1248			
	Secchi Depth (cm)		38					43			
	Sample Depth (m)		0					0			
	Temp. (°C)		30.10					34.90			
	Sal. (‰)		9.30					9.42			
	D.O. (mg/1)		5.76					5.94			
	Sample Depth (m)		3.75					1			
	Temp. (°C)		29.95					34.85			
	Sal. (‰)		9.43					9.42			
	D.O. (mg/1)		5.94					4.71			
	Sample Depth (m)		7.5					2			
	Temp. (°C)		29.90					34.90			
	Sal. (‰)		9.54					9.41			
	D.O. (mg/1)		5.88					5.80			

Table A1 (continued)

Date	Parameter	Station DWS	INTAKE	HPS	HPW3	HPW2	HPW1	DISCHARGE	CBE	CBC	JI
8-16	Time (EDT)	1050	1123	1148	1212	1236	1257	1320	1430	1455	1515
	Secchi Depth (cm)	110	54	34	64	60	70	50	82	68	72
	Sample Depth (m)	0	0	0	0	0	0	0	0	0	0
	Temp. (°C)	29.15	29.35	29.60	29.70	29.75	31.10	37.30	32.20	29.80	30.05
	Sal. (‰)	10.73	11.55	10.75	8.60	9.18	10.26	11.79	9.64	10.82	7.92
	D.O. (mg/l)	6.80	6.44	6.30	6.24	6.18	6.30	6.40	6.92	6.92	7.63
	Sample Depth (m)	1	4	2	1.25	1.5	1	1	1	1.5	3.5
	Temp. (°C)	29.00	29.30	29.55	29.75	29.80	31.00	37.20	32.00	29.75	29.70
	Sal. (‰)	10.84	11.57	10.74	8.60	9.69	10.26	11.79	9.66	10.01	9.11
	D.O. (mg/l)	6.44	6.78	6.08	7.00	6.48	6.52	5.99	6.52	6.78	6.48
	Sample Depth (m)	2	8	4	2.5	3	3	2		3	7
	Temp. (°C)	28.60	29.40	29.50	29.75	29.90	31.05	37.20		29.85	29.40
	Sal. (‰)	12.19	11.58	10.75	8.65	9.64	10.29	11.75		10.13	9.18
	D.O. (mg/l)	6.12	6.88	6.40	6.12	6.56	6.64	6.50		5.17	6.58
9-6	Time (EDT)	1040	1115	1149	1219	1244	1311	1339	1422	1447	1516
	Secchi Depth (cm)	110	70	70	95	90	85	67	65	112	97
	Sample Depth (m)	0	0	0	0	0	0	0	0	0	0
	Temp. (°C)	28.20	28.00	30.80	29.55	29.20	31.15	36.20	30.30	29.45	29.40
	Sal. (‰)	11.28	12.85	10.85	8.50	8.94	10.28	12.71	8.40	8.04	6.65
	D.O. (mg/l)	8.78	7.34	7.08	7.92	7.66	7.72	7.28	8.86	8.00	8.98
	Sample Depth (m)	1	3.5	2.25	1	1.5	1	1	.5	1.5	4
	Temp. (°C)	28.20	27.95	30.55	29.50	29.25	32.00	35.90	30.40	29.40	28.70
	Sal. (‰)	11.33	12.92	10.60	8.61	8.95	10.66	12.71	8.49	8.08	7.78
	D.O. (mg/l)	7.76	7.48	8.74	7.62	7.72	7.12	7.34	9.04	8.08	7.20
	Sample Depth (m)	2	7	4.5	2	3		2		3	8
	Temp. (°C)	28.30	27.95	30.90	29.45	29.40		35.60		29.40	28.85
	Sal. (‰)	12.72	13.00	10.86	9.17	8.94		12.70		8.23	8.50
	D.O. (mg/l)	7.42	7.66	7.16	7.32	7.46		6.94		8.18	7.10

Table A1 (continued)

Date	Parameter	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	DISCHARGE	CBE	CBC	JI
		Station									
11-9	Time (EST)	1050	1120	1153	1447	1424	1220	1244	1334	1358	1528
	Secchi Depth (cm)	107	71	66	45	49	64	58	79	69	42
	Sample Depth (m)	0	0	0	0	0	0	0	0	0	0
	Temp. (°C)	18.60	19.00	19.40	18.20	18.50	19.70	26.90	19.00	18.50	18.00
	Sal. (‰)	8.24	8.42	6.86	3.65	4.50	5.81	8.63	4.24	3.32	2.39
	D.O. (mg/1)	8.21	7.99	8.03	7.74	8.41	8.37	7.58	9.04	8.84	7.50
	Sample Depth (m)	1.25	4	2.5	1.25	1.5	1	1	1	1.75	4
	Temp. (°C)	18.50	18.80	19.40	18.20	18.50	19.70	26.80	19.20	18.40	18.00
	Sal. (‰)	8.50	8.50	6.89	3.79	4.54	5.82	8.63	4.37	3.88	2.62
	D.O. (mg/1)	8.56	7.88	7.95	8.49	8.11	7.60	7.68	8.25	8.05	7.99
	Sample Depth (m)	2.5	8	5	2.5	3		2		3.5	8
	Temp. (°C)	18.40	18.60	19.40	18.30	18.60		26.60		18.60	18.00
	Sal. (‰)	9.20	8.70	6.93	4.03	4.56		8.60		4.32	2.74
	D.O. (mg/1)	7.76	7.99	8.05	8.25	8.68		7.74		8.01	7.74

Table A2

James River Hydrographic Data 1977

Benthos Sampling Runs

Date	Station	6	12	14	16	15	13	11	10
3-8	Time (EST)	1302	1253	1226	1156	1209	1235	1243	1311
	Secchi Depth (cm)	53	71	86	88	90	110	38	61
	Sample Depth (m)	0	0	0	0	0	0	0	0
	Temp. (°C)	10.25	10.20	10.20	9.80	9.80	10.50	10.15	10.20
	Sal. (‰)	1.85	2.66	3.79	4.87	5.99	4.51	3.80	2.27
	D.O. (mg/l)	11.25	11.55	11.84	12.30	12.74	12.66	11.52	11.38
	Sample Depth (m)	1.5	1	6	2	1	1	5	4.5
	Temp. (°C)	10.15	10.20	9.70	9.25	9.70	10.30	10.15	9.90
	Sal. (‰)	1.87	2.67	4.62	6.33	5.79	4.55	3.81	3.06
	D.O. (mg/l)	11.00	11.65	11.38	11.80	12.41	12.36	11.92	11.59

Station	5	9	8	7	4	3	2	1
Time (EST)	1318	1327	1337	1428	1439	1449	1457	1504
Secchi Depth (cm)	65	92	72	74	72	120	97	89
Sample Depth (m)	0	0	0	0	0	0	0	0
Temp. (°C)	10.10	11.60	11.60	10.90	10.40	10.25	10.10	10.40
Sal. (‰)	2.96	3.49	3.26	2.08	2.51	1.84	1.69	1.54
D.O. (mg/l)	11.61	12.55	11.31	12.49	11.59	12.74	12.93	13.58
Sample Depth (m)	3.5	1	4	1	3	2	2	1
Temp. (°C)	9.90	11.40	11.45	11.00	10.20	10.10	9.80	10.30
Sal. (‰)	3.04	3.47	3.38	2.12	2.46	1.85	1.72	1.52
D.O. (mg/l)	11.82	12.05	12.05	13.90	12.22	11.94	12.05	13.52

Table A2 (continued)

James River Hydrographic Data 1977

Benthos Sampling Runs

Date	Station	6	12	14	16	15	13	11	10
4-25	Time (EDT)	1050	1113	1126	1150	1200	1214	1219	1228
	Secchi Depth (cm)	35	55	65	48	43	44	46	49
	Sample Depth (m)	0	0	0	0	0	.5	0	0
	Temp. (°C)	19.40	20.35	20.70	20.80	19.60	20.40	20.60	20.95
	Sal. (‰)	0.12	0.14	0.34	0.91	0.99	0.65	0.55	0.36
	D.O. (mg/l)	9.74	11.21	10.84	8.90	9.26	8.96	8.01	9.30
	Sample Depth (m)	1.5		7	2	.75		4	4.5
	Temp. (°C)	19.20		20.10	20.05	19.30		20.30	20.15
	Sal. (‰)	0.11		1.62	1.68	0.94		0.59	0.33
	D.O. (mg/l)	9.85		7.97	8.85	9.95		9.09	9.74

Station	5	9	8	7	4	3	2	1
Time (EDT)	1236	1245	1254	1313	1320	1332	1340	1347
Secchi Depth (cm)	45	52	55	54	53	77	58	54
Sample Depth (m)	0	0	0	.5	0	0	0	0
Temp. (°C)	20.85	22.20	21.70	22.00	21.05	21.10	20.90	20.60
Sal. (‰)	0.44	0.73	0.43	0.34	0.19	0.10	0.13	0.08
D.O. (mg/l)	9.07	8.35	8.25	9.72	10.08	10.75	10.60	11.01
Sample Depth (m)	4	1	4		2	1.5	1.5	1
Temp. (°C)	20.45	22.20	20.40		20.60	20.10	19.50	20.40
Sal. (‰)	0.43	0.75	0.31		0.20	0.10	0.30	0.08
D.O. (mg/l)	7.81	8.76	8.31		10.02	10.43	10.02	10.91

Table A2 (continued)

James River Hydrographic Data 1977

Benthos Sampling Runs

Date	Station	6	12	14	16	15	13	11	10
6-20	Time (EDT)	1009	1043	1059	1126	1148	1203	1213	1226
	Secchi Depth (cm)	55	69	70	67	38	46	52	71
	Sample Depth (m)	0	0	0	0	0	0	0	0
	Temp. (°C)	26.80	26.60	26.00	25.80	25.90	26.60	27.70	27.20
	Sal. (‰)	4.05	5.11	6.10	7.32	8.76	7.77	6.50	4.59
	D.O. (mg/l)	8.67	7.74	7.18	6.98	7.42	6.96	6.49	7.46
	Sample Depth (m)	1	.5	7.5	2	.5	.5	4.5	4
	Temp. (°C)	26.20	25.80	25.60	25.40	26.00	26.60	27.40	26.60
	Sal. (‰)	4.58	5.50	6.55	7.82	8.74	7.78	6.88	5.12
	D.O. (mg/l)	7.40	6.91	6.87	6.85	7.00	6.65	6.35	6.47

Date	Station	5	9	8	7	4	3	2	1
	Time (EDT)	1234	1243	1254	1355	1404	1414	1424	1432
	Secchi Depth (cm)	60	70	69	80	69	91	78	82
	Sample Depth (m)	0	0	0	0	0	0	0	0
	Temp. (°C)	27.00	29.60	27.40	27.95	27.20	28.75	27.80	27.90
	Sal. (‰)	4.54	6.54	4.22	4.64	5.22	4.41	4.44	3.96
	D.O. (mg/l)	8.13	7.56	7.92	9.68	7.28	9.64	8.63	9.24
	Sample Depth (m)	3	1	4	1	3	1	2	1
	Temp. (°C)	26.30	28.90	27.60	27.85	28.30	28.40	27.30	27.60
	Sal. (‰)	4.92	6.47	5.66	4.66	5.90	4.43	4.41	3.96
	D.O. (mg/l)	6.77	7.30	7.04	8.79	6.55	9.90	8.59	8.91

Table A2 (continued)

James River Hydrographic Data 1977

Benthos Sampling Runs

Date	Station	6	12	14	16	15	13	11	10
7-14	Time (EDT)	1025	1037	1048	1105	1117	1130	1142	1153
	Secchi Depth (cm)	39	44	54	52	40	46	50	53
	Sample Depth (m)	0	.5	0	0	.5	.5	0	0
	Temp. (°C)	29.60	29.80	29.80	29.60	29.60	29.90	30.00	30.50
	Sal. (‰)	5.89	6.33	7.44	8.39	9.01	9.06	7.97	7.68
	D.O. (mg/l)	6.38	7.09	7.42	6.99	6.91	7.72	7.11	6.35
	Sample Depth (m)	1.5		6.5	2			4.5	4.5
	Temp. (°C)	29.80		29.60	29.35			29.65	30.20
	Sal. (‰)	6.19		7.97	8.25			8.06	7.75
	D.O. (mg/l)	6.42		5.93	6.95			7.01	6.33

Station	5	9	8	7	4	3	2	1
Time (EDT)	1201	1213	1219	1234	1228	1242	1250	1302
Secchi Depth (cm)	45	69	56	60	55	61	46	63
Sample Depth (m)	0	.5	0	.5	0	.5	0	.75
Temp. (°C)	29.90	31.05	30.70	31.30	30.80	30.80	30.10	30.20
Sal. (‰)	6.89	7.02	6.52	6.45	6.38	5.77	5.32	5.30
D.O. (mg/l)	7.03	8.85	7.62	8.31	7.56	8.40	7.62	7.76
Sample Depth (m)	3		4		2		2	
Temp. (°C)	29.80		30.35		30.40		29.70	
Sal. (‰)	6.92		7.41		6.51		5.46	
D.O. (mg/l)	6.58		6.78		6.62		6.29	

Table A2 (continued)

James River Hydrographic Data 1977

Benthos Sampling Runs

Date	Station	6	12	14	16	15	13	11	10
8-18	Time (EDT)	0740	0750	0805	0818	0832	0844	0855	0907
	Secchi Depth (cm)	39	60	75	93	30	51	62	55
	Sample Depth (m)	0	.5	0	0	.5	.5	0	0
	Temp. (°C)	27.20	27.00	28.40	27.30	26.30	28.90	29.00	28.40
	Sal. (‰)	7.17	8.34	9.72	11.05	11.72	10.07	9.59	8.30
	D.O. (mg/l)	5.74	5.62	6.60	6.36	6.00	5.62	6.22	6.22
	Sample Depth (m)	1		7	1.5			4	3
	Temp. (°C)	26.80		28.70	27.80			28.90	28.50
	Sal. (‰)	7.47		10.64	11.96			9.84	8.48
	D.O. (mg/l)	6.32		6.28	5.70			5.44	6.12

Station	5	9	8	7	4	3	2	1
Time (EDT)	0915	0923	1001	1023	1013	1034	1044	1055
Secchi Depth (cm)	52	59	57	57	51	46	58	65
Sample Depth (m)	0	.5	0	.5	0	.5	0	.5
Temp. (°C)	28.40	30.80	28.40	27.10	28.00	26.90	27.80	27.40
Sal. (‰)	7.47	10.66	7.68	7.66	6.98	7.48	7.82	6.80
D.O. (mg/l)	5.72	5.92	6.28	6.26	6.46	6.26	5.96	5.84
Sample Depth (m)	3		4		2.5		2	
Temp. (°C)	28.15		28.20		27.90		27.50	
Sal. (‰)	7.50		8.76		7.00		7.80	
D.O. (mg/l)	6.14		6.06		5.76		6.44	

Table A2 (continued)

James River Hydrographic Data 1977

Benthos Sampling Runs

Date	Station	6	12	14	16	15	13	11	10
10-20	Time (EDT)	0804	0820	0830	0844	0856	0912	0920	0940
	Secchi Depth (cm)	72	87	80	99	54	23	58	49
	Sample Depth (m)	0	.75	0	0	.75	.75	0	0
	Temp. (°C)	13.30	13.20	13.20	12.90	13.20	13.20	15.00	14.20
	Sal. (‰)	9.27	9.84	12.17	11.82	13.20	12.82	10.68	11.07
	D.O. (mg/l)	8.72	8.78	8.44	8.36	8.56	9.00	9.04	8.76
	Sample Depth (m)	1.5		7.5	2			4	5
	Temp. (°C)	13.20		13.60	12.80			14.40	13.50
	Sal. (‰)	9.18		14.01	11.97			10.90	10.84
	D.O. (mg/l)	8.42		8.56	8.62			8.40	8.82

Station	5	9	8	7	4	3	2	1
Time (EDT)	0948	0955	1009	1035	1020	1045	1055	1105
Secchi Depth (cm)	60	60	70	54	63	52	101	84
Sample Depth (m)	0	.75	0	.75	0	.75	0	.75
Temp. (°C)	14.00	14.80	16.00	13.00	14.10	13.50	13.50	13.60
Sal. (‰)	10.65	10.32	10.50	8.39	8.65	9.08	8.61	8.20
D.O. (mg/l)	8.24	8.86	8.24	9.02	9.57	9.75	8.86	9.77
Sample Depth (m)	3		3.5		2		2	
Temp. (°C)	13.80		17.20		14.00		13.50	
Sal. (‰)	10.68		11.25		9.58		8.60	
D.O. (mg/l)	9.02		7.85		8.42		9.19	

Appendix B

Biological Data Tables for the Plankton Studies

Table B1

James River Chlorophyll Concentrations, 1977
(μg Chl a per liter, surface samples, two samples per station)

Station	Feb. 23	Apr. 13	May 12	June 13	July 12	Aug. 16	Sept. 6*	Nov. 9
DWS	7.0	8.1	7.5	3.2	5.5	4.3	5.5	2.4
	5.6	10.9	6.8	3.2	5.7	4.3	7.1	1.7
Intake	10.0	7.1	6.7	6.3	8.8	11.3	12.2	2.5
	9.1	5.8	6.7	5.4	8.2	10.3	9.6	2.7
HPS	10.3	7.4	5.7	3.2	5.3	8.8	7.8	2.2
	10.1	6.3	6.9	3.0	6.7	10.3	9.2	2.6
HPW3	5.9	13.1	10.6	5.0	10.5	10.3		2.8
	5.2	11.4	10.9	5.0	7.9	10.6		3.2
HPW2	4.7	8.4	12.0	5.6	7.0	11.2		2.3
	6.5	8.3	11.6	4.8	8.1	11.8		2.2
HPW1	4.9	3.2	3.9	3.0	7.5	11.0		1.6
	7.0	4.7	3.2	2.8	8.8	9.5		1.7
Discharge	9.4	6.4	5.7	3.4	6.7	10.6		2.1
	5.8	6.7	5.0	3.8	5.8	9.4		2.2
CBE	3.7	4.7	6.3	3.2	8.8	8.2		2.3
	2.7	4.2	5.8	5.0	8.6	7.0		2.0
CBC	5.0	4.1	4.9	4.5	4.5	9.5		2.1
	5.4	4.1	4.6	4.2	4.5	9.5		2.0
JI	4.5	8.5	8.8	4.6	7.2	7.8		2.9
	5.8	7.1	9.1	5.1	7.2	8.0		2.7

* Reliable results obtained for only three stations.

Table B2

James River Phytoplankton Cell Counts, 1977
(Total cells per ml, surface samples, two samples per station)

Station	Feb. 23	Apr. 13	May 12*	June 13	July 12**	July 21	Aug. 16	Sept. 6	Nov. 9
DWS	4700	7750	1600	2150	2800		1400	2050	600
	4100	7750	1850	2350	2100		2050	2150	750
Intake	5900	2000	1850	1200	1500	1900	2700	2700	800
	5800	2200	1550	1150	1450	1300	2250	3450	900
HPS	3150	1900	3400	850	1200		1600	2700	650
	3900	1950	3950	850	1100		1500	2500	750
HPW3	2450	8850	4250	2100	2000		2650	3650	450
	2800	7300	3900	2150	2050		2950	3900	650
HPW2	2250	2500	4300	2200	3550		2250	3900	400
	2550	3400	4000	1900	3450		1950	3900	400
HPW1	3350	1900	2000	1050	1350		2100	3000	450
	2550	1850	2000	1000	1300		2500	2800	400
Intake Canal	7500	2850	1000	1650		1050	2450	3350	750
(Upstream)	6600	2600	1600	1700		1750	2550	3400	750
Intake Canal	6850	2900	1500	1350		1900	2600	3250	500
(Downstream)	4650	2600	1200	1250		1300	2250	2850	600
Discharge Canal	5850	2800	1650	1300		1400	1300	2550	550
	5850	2000	1800	1100		1900	1400	2150	500
Discharge	4800	1700	850	600	750	1200	1150	2050	350
	4800	2350	850	700	1100	1100	1400	1650	400
CBE	2550	4700	4100	3150	2600		1850	2800	800
	2850	3450	5650	3400	2900		1800	2550	750
CBC	2300	4000	3650	1550	1150		1700	3750	750
	2200	3700	3700	1200	900		1750	4550	850
JI	1100	4400	5600	1700	3850		2800	3550	700
	1000	5900	6250	2000	3850		2750	3350	500

* Canal samples taken May 13
** Canal sampling missed, run on July 21

Table B3

James River Phytoplankton 2-23-77

Dominant Organisms (cells per ml, 2 samples per station)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
Cryptophyta													
8µ Chroomonas sp.		13	78	26	39	52	26	13	26	13	26	13	65
	52	13	52	26	26		26	13	52	52	13	39	26
16µ Chroomonas sp.		26	13		13		39	26	103	26			39
		39	13	26	26	26	39	13	26	13	13		
Cryptomonas sp.	65	142	39	26	13	90	65	39	39	116	52	90	13
	13	103	39		26	39	116	90	90	13	142	52	
15µ Cryptophyte	26	90	13		52	39	26				26	13	
	26	26	13		39	39	13				52	26	
Bacillariophyta													
Chaetoceros sp.	2934	2908	1965	2081	1810	2585	4304	3878	2495	2443	2133	1487	658
	2702	3529	2572	2223	2068	2081	3219	2391	2689	2482	1978	1693	530
Skeletonema	1450	2546	672	205	203	418	2689	2792	2908	1939	118	176	40
costatum	1125	1965	840	177	180	336	2999	1965	2779	2094	126	162	64
Rhizosolenia		8	1				4	6	6	2			
delicatulum	1	4					7	5	5	2			
Cyclotella	39	13		26	52							13	13
meneghiniana			13	26	52	13			26		13		
Nitzschia	13	13									13		
kützinginana					26					13			

Table B3 (continued)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
Nitzschia	16	4	36	48	29	16	2	2	2	4	10	44	35
vermicularis	20	2	48	38	50	14	2	1	2	4	8	40	36
Asterionella	8	47	10			8	66	55	55	22			
japonica	4	42	10			3	27	30	47	26			
Asterionella			4	10	2	6					3	6	2
formosa			3	4	2	2					10	3	7
Amphiprora sp.	1	2	6	4	14	2		1	1	2	1	8	11
		2	8	14	8	1	1	1	2	1	2	10	8

Table B4

James River Phytoplankton 4-13-77

Dominant Organisms (cells per ml, 2 samples per station)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
Cryptophyta													
8 μ Chroomonas sp.	1112	414	284	724	336	465	362	543	414	336	3102	801	336
	1318	284	258	620	414	620	905	543	388	284	2327	724	362
Cryptomonas sp.	207	103	52	207	103	78		26	78	103	310	129	52
	284	26	52	78	233	26	155	52		78	284	26	181
Bacillariophyta													
Melosira subsalsa	4782	448	540	6256	621	267	924	766	641	556	328	1913	2663
	4292	442	606	4705	666	307	822	616	484	392	269	1965	3335
Melosira ambigua	164	40	33	313	252	14	84	20	14	5		149	269
	83	12	52	277	196	4	32	24	39	25	16	85	290
Cyclotella meneghiniana	388	103	103	155	26	78	181	52				207	233
	233	155	181	129	78	52	129	129		78	129	155	207
Nitzschia kützingiana	233	336	78	388	207	310	284	259	284	258	78	181	207
	465	233	388	569	181	259	207	233	336	595	78	233	310
Nitzschia vermicularis	8	14	2		2	6	13	20	12	17		3	
	3	15	7		2	10	12	13	18	17			1
Synedra ulna	9		7	33	26	2	4		2		5	13	18
	16		1	12	21	1		1	1		1	16	19
Nitzschia longissima	3		1	14	8	1	3	1	1		1	4	11
	7		5	21	4		1			2		3	5
Asterionella formosa	8			38								9	6
	7			16	23							2	31

Table B5

James River Phytoplankton 5-12-77

Dominant Organisms (cells per ml, 2 samples per station)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE* CANAL UP	INTAKE* CANAL DOWN	DISCHARGE* CANAL	DISCHARGE	CBE	CBC	JI
Cryptophyta													
8µ _Chroomonas_ sp.	129	362	155	26	207	26	26	78	362	26	103	78	
	103	181	78	26	258		155	181	207	52	78	78	52
16µ _Chroomonas_ sp.	13	26	103		103	26		78	78	26	26		
	13		155		26		78	103	52				
15µ Cryptophyte			103	26	879	129			26	26	284	181	
	78		155	52	1034		78				284	52	26
Pyrrophyta													
Katodinium	26	103	26		52		52			78	26		
rotundatum	26	207		26	155		52	52	78	52			
Bacillariophyta													
Melosira	155	103	879	1396	750	336	388		129	52	1344	698	3904
subsalsa	209	52	1215	1525	646	801	439	103	233	103	2559	905	4292
Skeletonema	323	207	155	724	905	52		155		52			
costatum	297	103	181	181	491		103	52	103	78			52
Cyclotella	362	414	595	414	362	517	52	26	129	207	388		155
meneghiniana	297	517	414	259	336	414	129		129	155	465	129	207
Rhizosolenia	13				52	129	26	26	26		26		
minima	52		26	26	26	26		26		26	26	52	78
Nitzschia	336	233	1086	1474	698	569	284	491	310	155	1732	1706	1344
kützingiana	388	233	1474	1525	801	595	259	181	336	129	1810	2301	1293

* Canal samples taken 5-13-77

Table B6

James River Phytoplankton 6-13-77

Dominant Organisms (cells per ml, 2 samples per station)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
Cryptophyta													
8µ *Chroomonas* sp.	168	491	297	569	879	207	569	620	336	336	1435	517	711
	220	233	233	452	789	181	362	414	414	336	1461	439	957
16µ *Chroomonas* sp.	39	103	103	129	323	13	181	78	26	129	90	155	78
	39	103	155	103	271	142	233	26	78	103	271	142	155
15µ Cryptophyte				52		13					116		13
				65	13						116	13	52
Pyrrophyta													
Katodinium		52	65	233	142		26	78			207	65	39
rotundatum		26		233	142		26	52			116	39	155
Bacillariophyta													
Melosira	284	103	155	103	26	271	52				181	194	52
subsalsa	245	155	129	155	52	103	52				284	26	129
Skeletonema				65	52		52	52		52	13		52
costatum	39						52	78	52				
Cyclotella	362	52	13		13			26	26			13	26
meneghiniana	207	78	26	52	39				26				
Rhizosolenia	65			78	78	168		26		26	142	13	39
minima	52	52	26	65	39	142		26			155	65	26
Nitzschia	13	129	103	52	39	39	78	26	52	52	155	52	220
kützingiana	13	129	65	90	39	52	52	103		52	168	26	142

Table B6 (continued)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
Chlorophyta													
Pyraminonas sp.	233	26		336	259	129	155	52	78	26	78	220	207
	220	103	78	478	168	52	155	52	26	129	142	142	116
Ankistrodesmus sp.	103	26	26	194	78	13		52			271	116	233
	90		26	129	26	52	26		26		233	103	142
Microflagellates	103	103		103	142	13	284	362	569	26	155	78	13
3μFlagellate	142	103	26	116	13	103	595	414	414	26	220	103	26

Table B7

James River Phytoplankton 7-12-77

Dominant Organisms (cells per ml, 2 samples per station)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	DISCHARGE	CBE	CBC	JI
Cryptophyta										
8μ <u>Chroomonas</u> sp.	957	595	543	879	1357	595	284	1293	375	1926
	633	336	543	776	1202	543	465	1086	349	1783
16μ <u>Chroomonas</u> sp.	271	207	90	310	711	207	103	181	13	310
	207	233	116	414	608	220	52	284	52	297
Pyrrophyta										
<u>Katodinium</u>	65	129	78	491	776	129	78	129	13	517
<u>rotundatum</u>	39	52	26	439	840	103	78	39	13	724
Bacillariophyta										
<u>Leptocylindrus</u>	801	155	52	26	168		26	103	39	39
<u>minimus</u>	698	259	90	52	142		155	220	13	8
<u>Chaetoceros</u> sp.	284	129	258	71	52	39		90	271	65
	233	52	129	49	116	26	181	103	39	26
<u>Skeletonema</u>	5	23	82	88	26	100		134	138	235
<u>costatum</u>	7		40	117	22	137	30	152	132	307
<u>Cyclotella</u>	13	26	26	26		39		65	26	13
<u>meneghiniana</u>	26	78	78			52		78	52	
<u>Rhizosolenia</u>	78	26			103	26		39	26	39
<u>minima</u>	13		13		90	26		103	65	13
<u>Nitzschia</u>	65	26	13							
<u>kützingiana</u>	26	26					26		13	39

Table B7 (continued)

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	DISCHARGE	CBE	CBC	JI
					Stations					
Nitzschia	1	9	1	1	2	2	7	1	3	2
longissima	2	6	2	2	3	1	1	2	2	1
Gyrosigma sp.		11	1	1	1	2	4		2	
		3	3			1	4		1	1
Microflagellates										
3 µ flagellate	116	52			52			26		
	116				13			13		

Table B8

James River Phytoplankton 7-21-77

Dominant Organisms (cells per ml, 2 samples per station)

Organisms	Intake	Stations Intake Canal Up	Intake Canal Down	Discharge Canal	Discharge
Cryptophyta					
8 µ *Chroomonas* sp.	465	284	181	258	336
	414	336	310	284	233
16 µ *Chroomonas* sp.			78	26	26
	52	78		103	103
Pyrrophyta					
Katodinium	181	181	129	129	207
rotundatum	284	155	26	103	52
Bacillariophyta					
Leptocylindrus		26	129	52	78
minimus	52		129		129
Chaetoceros sp.	517	155	595	258	52
	78	491	155	26	52
Skeletonema	78	115	98	64	92
costatum	96	163	80	110	91
Cyclotella		78	52		52
meneghiniana		26			103
Rhizosolenia		26			
minima					78
Nitzschia	181	259	517	465	181
longissima	258	155	543	595	259
Gyrosigma sp.	11	13	14	12	7
	11	13	8	13	6

Table B9

James River Phytoplankton 8-16-77

Dominant Organisms (cells per ml, 2 samples per station)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
Cryptophyta													
8 µ *Chroomonas* sp.	840	1008	491	1396	905	646	931	776	233	26	517	569	1318
	1021	724	362	1629	827	827	620	724	233	26	620	569	1215
16 µ *Chroomonas* sp.	78	103	78	103	103	78	52	52			103	78	284
	52	103	103	78	78	129					181	52	233
Pyrrophyta													
Katodinium	52	129	78	233	388	620	181	207			258	78	388
rotundatum	246	155	78	284	155	465	207	103			284	129	543
Bacillariophyta													
Skeletonema		83	84	19	16	51	90	86	96	41	64	129	113
costatum	23	73	12	96	59	46	95	42	105	101	46	56	130
Cyclotella	26		78	52	26	26	26	26	78	207	103	78	52
meneghiniana	39	52	78	52	103	78	78		181	78	78	52	52
Chaetoceros sp.	31	13	14	17	18	15	7	9	24	8	11	14	40
	7	18	15	17	41	8	33	40	27	17	46	40	62
Leptocylindrus	39	129		103		103		78		52		52	103
minimus	65	52		233		26	52	129	52	129		52	52
Rhizosolenia	78	78	103		52	103	103	78	52		284	181	129
minima	129	52	129	52		181	26		52	207	181	103	155
Gyrosigma	58	460	228	227	213	233	298	248	245	345	118	249	90
beaufortianum	65	470	221	218	213	217	305	264	236	349	114	283	69

Table B9 (continued)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
<u>Nitzschia</u>	4	24	20	15	13	32	61	79	88	56	33	29	19
<u>longissima</u>	8	24	14	22	13	39	69	49	59	58	20	30	19
Chlorophyta													
<u>Pyramimonas</u> sp.	65	155	207	181	155		259	52	52	129	129	26	155
	129	52	26	181	103	78	233	52	78	78	78	129	129
Microflagellates													
3 µ Flagellate	78	78	52	26				569	52	26	78	52	78
	194	26	52	78	26	78	78	698	26	78	52	26	26

Table B10

James River Phytoplankton 9-6-77

Dominant Organisms (cells per ml, 2 samples per station)

Stations

Organisms	DWS	INTAKE	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
Cryptophyta													
8 μ *Chroomonas* sp.	452	595	620	1189	1370	595	698	698	439	233	491	1448	1189
	530	957	672	1293	1189	646	672	698	414	233	595	1810	1215
16 μ *Chroomonas* sp.		52	78	78	233	78	103	78	52	26	233	233	284
		52	78	78	259	78	78	52	26		155	284	181
Cryptomonas sp.	103	103	26	155	155	207				78	388	181	
	103		103	181	26	103				26	181	129	26
Pyrrophyta													
Katodinium	129	259	103	336	517	129	284	103		26	362	465	491
rotundatum	142	259	284	491	646	181	233	52			155	801	388
Bacillariophyta													
Leptocylindrus	427	129	491	155	207	233	233	284	103	233	129	155	129
minimus	297	207	284	233	233	336	310	155	78	284	52	207	129
Rhizosolenia	220	52	336	310	362	465	78		52	52	207	543	336
minima	142	52	310	336	388	284	26	26		26	207	569	284
Cyclotella	129	233	129		26	103	78	414	155	207	52	52	207
meneghiniana	90	181	103	26	129	78	181	155	52	155		26	155
Skeletonema	36	55	30	14	43	33	24	22	33		20	27	146
costatum	48	44		29	58	55	82	73	15		20	14	110
Nitzschia	26	181	336	259	155	155	439	439	776	414	181		52
longissima	233	259	155	181	129	181	362	543	517	284	181	26	

Table B10 (continued)

Stations

Organisms	DWS	Intake	HPS	HPW3	HPW2	HPW1	INTAKE CANAL UP	INTAKE CANAL DOWN	DISCHARGE CANAL	DISCHARGE	CBE	CBC	JI
Gyrosigma beaufortianum	111	834	363	448	317	101	1057	940	738	411	2	78	10
	102	946	405	362	277	102	1075	786	602	395	6	69	21
Gyrosigma sp.		9	17	52	11	6	3	8	4	6		1	4
		3	20	44	4	4	7	5	10			2	4
Microflagellates													
3μFlagellates	78	78	26	233	181	52	52	26		52	52	155	362
	26	129	52	259	233	103	52	26		52	26	129	233
Chlorophyta													
Pyramimonas sp.	323	26	103	414	259	698	26	26	26	181	620	310	336
	427	155	78	284	129	517	155	52	155	78	646	414	620

Table B11

James River Phytoplankton 11-9-77

Dominant Organisms (cells per ml, 2 samples per station)

Stations

Organisms	DWS	Intake	HPS	HPW3	HPW2	HPW1	Intake Canal Up	Intake Canal Down	Discharge Canal	Discharge	CBE	CBC	JI
Cryptophyta													
8 μ *Chroomonas* sp.	381	259	220	142	246	78	246	246	246	181	246	259	259
	414	336	349	233	103	103	310	181	246	271	310	246	168
16 μ *Chroomonas* sp.	110	207	103	90	52	39	78	65	103	52	181	155	116
	175	155	90	220	65	78	155	103	52	26	103	116	52
Pyrrophyta													
Katodinium		78	90	26	39	13	168	65	103	26	78	90	26
rotundatum	19	78	90	103	26	26	90	65	52	26	65	194	26
Bacillariophyta													
Skeletonema	3	42	36	55	21	65	26		11		56	102	90
costatum	14	25	27	15	45	22	4	15	24		18	97	96
Nitzschia	6	65	65	13		52	39	39	39	26	39	13	13
longissima	6	90	52	26	39	52	26	39	13	52	13		26
Gyrosigma sp.	2	2	1	2		2	4			2	1	5	2
	1	1		1	3	2	1	1		2		2	1
Amphiprora sp.	6	15	2			4	9	8	5	11		1	
	6	15	5	1		3	11	6	4	9			1
Chlorophyta													
Pyramimonas sp.	19	13		26				26	26	13		52	13
	32			26	13				26	13	13	65	13
Microflagellates													
3 μ flagellate	52	13	116	13		65	116	26	39	13	65	39	13
	58	90	52	39	52	13	103	155	39	13	129	39	13

Table B12

James River Zooplankton; February 23, 1977
(Numbers of organisms per 100 liters, surface samples, two samples per station)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
Copepod nauplii	1	33.1	30.3	56.3	449.6	95.3	164.0
	2	16.9	33.4	65.7	357.8	137.7	171.9
	$\bar{x}$	25.0	31.9	61.0	403.7	116.5	167.9
	s	11.5	2.2	6.6	64.9	30.0	5.5
	$s_{\bar{x}}$	8.1	1.6	4.7	45.9	21.2	3.9
Polychaete larvae	1	91.1	112.2	59.2	15.0	47.1	99.5
	2	57.1	178.3	59.8	11.7	51.0	55.3
	$\bar{x}$	74.1	145.3	59.5	13.3	49.0	77.4
	s	24.0	46.7	0.4	2.3	2.8	31.2
	$s_{\bar{x}}$	17.0	33.0	0.3	1.6	2.0	22.1
Harpacticoid copepods	1	1.2	1.8	7.9	2.2	0.0	8.1
	2	1.1	18.6	10.3	1.5	1.7	2.9
	$\bar{x}$	1.1	10.2	9.1	1.8	0.8	5.5
	s	0.1	11.9	1.7	0.5	1.2	3.6
	$s_{\bar{x}}$	0.1	8.4	1.2	0.4	0.8	2.6
Eurytemora sp.	1	2.4	3.6	13.0	172.0	38.8	44.4
	2	4.2	0.0	19.9	128.5	62.9	59.7
	$\bar{x}$	3.3	1.8	16.5	150.3	50.9	52.0
	s	1.3	2.5	4.9	30.8	17.0	10.8
	$s_{\bar{x}}$	0.9	1.8	3.5	21.8	12.0	7.7
Rotifers	1	26.0	92.6	26.7	13.5	35.3	53.8
	2	15.9	81.7	20.7	13.1	22.1	75.7
	$\bar{x}$	21.0	87.2	23.7	13.3	28.7	64.8
	s	7.2	7.7	4.3	0.2	9.3	15.5
	$s_{\bar{x}}$	5.1	5.4	3.0	0.2	6.6	11.0
Bosmina sp.	1	2.4	-	1.4	-	-	0.0
	2	0.0	-	0.0	-	-	2.9
	$\bar{x}$	1.2	-	0.7	-	-	1.5
	s	1.7	-	1.0	-	-	2.1
	$s_{\bar{x}}$	1.2	-	0.7	-	-	1.5
Cyclopoid copepods	1	1.2	3.6	6.5	9.0	9.4	13.4
	2	5.3	3.7	9.6	7.3	10.2	29.1
	$\bar{x}$	3.2	3.6	8.0	8.1	9.8	21.3
	s	2.9	0.1	2.2	1.2	0.6	11.1
	$s_{\bar{x}}$	2.0	0.1	1.5	0.8	0.4	7.8

Table B12 (continued)

Organisms		Stations DWS	Intake	HPS	HPW3	HPW2	HPW1
Barnacle nauplii	1	0.0	1.8	2.2	-	-	6.7
	2	1.1	0.0	2.2	-	-	18.9
	$\bar{x}$	0.5	0.9	2.2	-	-	12.8
	s	0.7	1.3	0.0	-	-	8.6
	$s_{\bar{x}}$	0.5	0.9	0.0	-	-	6.1
Acartia sp.	1	-	-	3.6	-	1.2	2.7
	2	-	-	2.2	-	0.0	1.5
	$\bar{x}$	-	-	2.9	-	0.6	2.1
	s	-	-	1.0	-	0.8	0.9
	$s_{\bar{x}}$	-	-	0.7	-	0.6	0.6

Table B12 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	D.C.
Copepod nauplii	1	45.1	51.6	141.2	778.6	21.1	14.1
	2	55.5	113.6	104.3	573.7	5.3	28.2
	$\bar{x}$	50.3	82.6	122.8	676.1	13.2	21.1
	s	7.3	43.8	26.2	144.9	11.2	10.0
	$s_{\bar{x}}$	5.2	31.0	18.5	102.4	7.9	7.0
Polychaete larvae	1	119.2	15.9	35.7	4.6	22.9	31.7
	2	233.2	38.3	25.7	4.1	8.8	59.9
	$\bar{x}$	176.2	27.1	30.7	4.3	15.8	45.8
	s	80.6	15.9	7.1	0.4	10.0	19.9
	$s_{\bar{x}}$	57.0	11.2	5.0	0.3	7.0	14.1
Harpacticoid copepods	1	19.3	4.0	4.9	3.1	28.2	3.5
	2	22.2	4.4	0.0	1.3	8.8	3.5
	$\bar{x}$	20.8	4.2	2.4	2.2	18.5	3.5
	s	2.0	0.3	3.4	1.2	13.7	0.0
	$s_{\bar{x}}$	1.4	0.2	2.4	0.9	9.7	0.0
Eurytemora sp.	1	0.0	67.5	68.2	293.5	0.0	5.3
	2	11.1	100.3	62.6	240.8	1.8	10.6
	$\bar{x}$	5.5	83.9	65.4	267.2	0.9	7.9
	s	7.8	23.2	4.0	37.2	1.2	3.7
	$s_{\bar{x}}$	5.5	16.4	2.8	26.3	0.9	2.6
Rotifers	1	35.4	18.5	45.5	109.7	1.8	0.0
	2	37.0	54.6	28.9	100.1	0.0	1.8
	$\bar{x}$	36.2	36.5	37.2	104.9	0.9	0.9
	s	1.1	25.5	11.7	6.7	1.2	1.2
	$s_{\bar{x}}$	0.8	18.0	8.3	4.8	0.9	0.9
Bosmina sp.	1	-	1.3	3.2	1.5	-	-
	2	-	0.0	0.0	1.3	-	-
	$\bar{x}$	-	0.7	1.6	1.4	-	-
	s	-	0.9	2.3	0.1	-	-
	$s_{\bar{x}}$	-	0.7	1.6	0.1	-	-
Cyclopoid copepods	1	3.2	7.9	32.5	41.7	7.0	12.3
	2	7.4	5.9	14.4	27.1	1.8	1.8
	$\bar{x}$	5.3	6.9	23.5	34.4	4.4	7.0
	s	3.0	1.4	12.7	10.4	3.7	7.5
	$s_{\bar{x}}$	2.1	1.0	9.0	7.3	2.6	5.3

Stations: Discharge, CBE, CBC, J.I., I.C.D., D.C.

Table B12 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	D.C.
		Stations					
Barnacle nauplii	1	9.7	1.3	3.2	0.0	3.5	3.5
	2	7.4	0.0	0.0	2.7	1.8	7.0
	$\bar{x}$	8.5	0.7	1.6	1.4	2.6	5.3
	s	1.6	0.9	2.3	1.9	1.2	2.5
	$s_{\bar{x}}$	1.1	0.7	1.6	1.3	0.9	1.8
Acartia sp.	1	-	1.3	0.0	4.6	-	-
	2	-	1.5	1.6	1.3	-	-
	$\bar{x}$	-	1.4	0.8	3.0	-	-
	s	-	0.1	1.3	2.3	-	-
	$s_{\bar{x}}$	-	0.1	0.8	1.6	-	-

Table B13

James River Zooplankton April 13, 1977
(Numbers of organisms per 100 liters, surface samples, two samples per station

Organisms		Stations DWS	Intake	HPS	HPW3	HPW2	HPW1
Copepod nauplii	1	156.9	1031.5	416.9	156.6	267.7	763.5
	2	121.8	1471.7	267.8	292.2	541.2	631.8
	$\bar{x}$	139.3	1251.6	342.4	224.4	404.4	697.6
	s	24.8	311.3	105.5	95.8	193.4	93.1
	$s_{\bar{x}}$	17.5	220.1	74.6	67.8	136.8	65.9
Bosmina sp.	1	14.9	47.8	30.5	22.4	23.8	8.3
	2	19.1	63.6	27.1	5.5	70.6	2.3
	$\bar{x}$	17.0	55.7	28.8	13.9	47.2	5.3
	s	3.0	11.2	2.4	11.9	33.1	4.3
	$s_{\bar{x}}$	2.1	7.9	1.7	8.4	23.4	3.0
Harpacticoid copepods	1	6.0	35.8	57.6	4.5	5.9	8.3
	2	1.7	8.5	74.6	16.5	23.5	17.3
	$\bar{x}$	3.9	22.2	66.1	10.5	14.7	12.8
	s	3.0	19.3	12.0	8.5	12.4	6.3
	$s_{\bar{x}}$	2.1	13.7	8.5	6.0	8.8	4.5
Eurytemora sp.	1	37.3	23.9	27.1	13.4	29.7	8.3
	2	31.3	17.0	23.7	22.0	29.4	21.6
	$\bar{x}$	34.3	20.4	25.4	17.7	29.6	15.0
	s	4.3	4.9	2.4	6.1	0.2	9.4
	$s_{\bar{x}}$	3.0	3.5	1.7	4.3	0.2	6.6
Rotifers	1	16.4	55.8	13.6	44.8	23.8	25.0
	2	5.2	453.8	13.6	66.1	52.9	8.6
	$\bar{x}$	10.8	254.8	13.6	55.5	38.4	16.8
	s	7.9	281.5	0.0	15.1	20.6	11.6
	$s_{\bar{x}}$	5.6	199.0	0.0	10.7	14.6	8.2
Cyclopoid copepods	1	11.9	31.9	27.1	22.4	65.4	33.4
	2	17.4	101.8	50.8	33.1	82.3	86.5
	$\bar{x}$	14.7	66.8	39.0	27.7	73.9	60.0
	s	3.8	49.4	16.8	7.6	12.0	37.6
	$s_{\bar{x}}$	2.7	35.0	11.9	5.3	8.5	26.6
Polychaete larvae	1	-	4.0	-	-	5.9	0.0
	2	-	0.0	-	-	5.8	2.3
	$\bar{x}$	-	2.0	-	-	5.9	1.1
	s	-	2.8	-	-	0.1	1.6
	$s_{\bar{x}}$	-	2.0	-	-	0.0	1.1

Table B13 (continued)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
		Stations					
Barnacle nauplii	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-

Table B13 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
		Stations						
Copepod nauplii	1	423.1	393.7	238.1	210.7	327.6	581.2	361.0
	2	258.7	306.9	230.9	307.5	225.4	243.0	366.3
	$\bar{x}$	340.9	350.3	234.5	259.1	276.5	412.1	363.7
	s	116.3	61.4	5.1	68.5	72.2	239.1	3.7
	$s_{\bar{x}}$	82.2	43.4	3.6	48.4	51.1	169.1	2.6
Bosmina sp.	1	17.7	4.2	11.9	6.6	24.7	15.8	1.8
	2	12.3	16.4	26.8	14.6	3.5	12.3	0.0
	$\bar{x}$	15.0	10.3	19.4	10.6	14.1	14.1	0.9
	s	3.8	8.6	10.6	5.7	14.9	2.5	1.2
	$s_{\bar{x}}$	2.7	6.1	7.5	4.0	10.6	1.8	0.9
Harpacticoid copepods	1	35.5	8.4	0.0	6.6	21.1	7.0	24.7
	2	15.4	0.0	5.4	22.0	29.9	10.6	8.8
	$\bar{x}$	25.5	4.2	2.7	14.3	25.5	8.8	16.7
	s	14.2	5.9	3.8	10.9	6.2	2.5	11.2
	$s_{\bar{x}}$	10.0	4.2	2.7	7.7	4.4	1.8	7.9
Eurytemora sp.	1	8.9	-	47.6	13.2	3.5	8.8	8.8
	2	3.1	-	37.6	29.3	10.6	26.4	8.8
	$\bar{x}$	6.0	-	42.6	21.2	7.0	17.6	8.8
	s	4.1	-	7.1	11.4	5.0	12.4	0.0
	$s_{\bar{x}}$	2.9	-	5.0	8.1	3.5	8.8	0.0
Rotifers	1	82.8	4.2	23.8	59.3	42.3	15.8	54.6
	2	24.6	0.0	53.7	22.0	47.5	19.4	1.8
	$\bar{x}$	53.7	2.1	38.7	40.6	44.9	17.6	28.2
	s	41.2	3.0	21.1	26.4	3.7	2.5	37.4
	$s_{\bar{x}}$	29.1	2.1	14.9	18.6	2.6	1.8	26.4
Cyclopoid copepods	1	14.8	12.6	35.7	6.6	8.8	15.8	5.3
	2	15.4	4.1	5.4	43.9	3.5	1.8	3.5
	$\bar{x}$	15.1	8.3	20.5	25.3	6.2	8.8	4.4
	s	0.4	6.0	21.5	26.4	3.7	10.0	1.2
	$s_{\bar{x}}$	0.3	4.2	15.2	18.7	2.6	7.0	0.9
Polychaete larvae	1	8.9	-	-	-	3.5	3.5	1.8
	2	6.2	-	-	-	5.3	1.8	8.8
	$\bar{x}$	7.5	-	-	-	4.4	2.6	5.3
	s	1.9	-	-	-	1.2	1.2	5.0
	$s_{\bar{x}}$	1.4	-	-	-	0.9	0.9	3.5

Table B13 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
			Stations					
Barnacle	1	298.8	-	-	-	19.4	19.4	59.9
nauplii	2	166.3	-	-	-	29.9	7.0	56.4
	x	232.6	-	-	-	24.7	13.2	58.1
	s	93.7	-	-	-	7.5	8.7	2.5
	s-	66.3	-	-	-	5.3	6.2	1.8

Table B14

James River Zooplankton; May 12, 1977
(Numbers of organisms per 100 liters, surface samples, two samples per station)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
Copepod nauplii	1	608.1	655.9	477.0	2095.1	607.3	1658.8
	2	728.1	474.5	336.8	1108.8	447.6	663.7
	$\bar{x}$	668.1	565.2	406.9	1601.9	527.5	1161.2
	s	84.8	128.3	99.1	697.4	113.0	703.6
	$s_{\bar{x}}$	60.0	90.7	70.1	493.2	79.9	497.5
Polychaete larvae	1	10.4	81.2	11.8	257.2	16.2	26.9
	2	27.1	82.2	6.7	114.0	9.1	23.2
	$\bar{x}$	18.8	81.7	9.2	185.6	12.7	25.0
	s	11.8	0.7	3.6	101.3	5.0	2.6
	$s_{\bar{x}}$	8.3	0.5	2.6	71.6	3.5	1.8
Barnacle nauplii	1	651.7	999.0	279.9	27.9	86.4	1181.9
	2	457.2	623.2	273.5	18.5	54.8	397.9
	$\bar{x}$	554.5	811.1	276.7	23.2	70.6	789.9
	s	137.5	265.7	4.5	6.6	22.3	554.4
	$s_{\bar{x}}$	97.2	187.9	3.2	4.7	15.8	392.0
Harpacticoid copepods	1	1.7	27.1	106.4	52.7	56.7	107.4
	2	16.1	12.6	43.4	6.2	54.8	32.1
	$\bar{x}$	8.9	19.9	74.9	29.4	55.7	69.8
	s	10.1	10.2	44.6	32.9	1.3	53.3
	$s_{\bar{x}}$	7.2	7.2	31.5	23.3	0.9	37.7
Eurytemora sp.	1	94.1	201.6	118.3	371.9	170.0	221.6
	2	213.2	237.3	153.4	234.1	127.9	137.4
	$\bar{x}$	153.6	219.4	135.8	303.0	149.0	179.5
	s	84.2	25.2	24.8	97.5	29.8	59.6
	$s_{\bar{x}}$	59.6	17.8	17.6	68.9	21.1	42.1
Pelecypod larvae	1	90.6	240.7	19.7	371.9	56.7	73.9
	2	29.5	208.8	50.0	323.4	94.4	33.9
	$\bar{x}$	60.1	224.8	34.9	347.6	75.5	53.9
	s	43.2	22.6	21.4	34.3	26.7	28.3
	$s_{\bar{x}}$	30.6	15.9	15.2	24.3	18.9	20.0
Acartia sp.	1	38.3	652.9	25.0	52.7	35.1	13.4
	2	59.0	313.2	26.7	21.6	3.0	0.0
	$\bar{x}$	48.7	483.1	25.8	37.1	19.1	6.7
	s	14.6	240.2	1.2	22.0	22.7	9.5
	$s_{\bar{x}}$	10.3	169.9	0.8	15.6	16.0	6.7

Table B14 (continued)

Organisms		Stations DWS	Intake	HPS	HPW3	HPW2	HPW1
Rotifers	1	17.4	0.0	17.1	27.9	21.6	47.0
	2	0.0	6.3	10.0	55.4	57.8	10.7
	$\bar{x}$	8.7	3.2	13.5	41.7	39.7	28.9
	s	12.3	4.5	5.0	19.5	25.6	25.7
	$s_{\bar{x}}$	8.7	3.2	3.5	13.8	18.1	18.1
Cyclopoid copepods	1	0.0	3.0	-	-	-	6.7
	2	1.3	0.0	-	-	-	1.8
	$\bar{x}$	0.7	1.5	-	-	-	4.2
	s	0.9	2.1	-	-	-	3.5
	$s_{\bar{x}}$	0.7	1.5	-	-	-	2.5
Bosmina sp.	1	-	-	21.0	-	18.9	6.7
	2	-	-	10.0	-	15.2	7.1
	$\bar{x}$	-	-	15.5	-	17.1	6.9
	s	-	-	7.8	-	2.6	0.3
	$s_{\bar{x}}$	-	-	5.5	-	1.8	0.2
Amphipods	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-

Table B14 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
Copepod nauplii	1	160.6	154.1	483.5	894.2	297.6	598.8	195.5
	2	204.3	291.4	753.8	710.8	86.3	405.1	40.5
	$\bar{x}$	182.4	222.7	618.6	802.5	192.0	501.9	118.0
	s	30.9	97.1	191.1	129.7	149.4	137.0	109.6
	$s_{\bar{x}}$	21.9	68.6	135.1	91.7	105.7	96.9	77.5
Polychaete larvae	1	27.2	3.1	3.1	9.2	29.9	52.8	40.5
	2	28.4	0.0	2.8	0.0	7.0	24.7	8.8
	$\bar{x}$	27.8	1.6	3.0	4.6	18.5	38.7	24.7
	s	0.9	2.2	0.2	6.5	16.2	19.9	22.4
	$s_{\bar{x}}$	0.6	1.6	0.1	4.6	11.4	14.1	15.8
Barnacle nauplii	1	926.3	25.2	6.2	15.3	269.5	618.2	623.5
	2	1324.0	83.2	16.9	2.9	317.0	491.4	280.0
	$\bar{x}$	1125.1	54.2	11.6	9.1	293.2	554.8	451.7
	s	281.2	41.1	7.6	8.8	33.6	89.7	242.8
	$s_{\bar{x}}$	198.8	29.0	5.4	6.2	23.8	63.4	171.7
Harpacticoid copepods	1	46.9	53.5	40.3	165.4	15.8	15.8	24.7
	2	44.0	117.9	42.3	166.9	26.4	17.6	21.1
	$\bar{x}$	45.4	85.7	41.3	166.1	21.1	16.7	22.9
	s	2.1	45.6	1.5	1.1	7.5	1.2	2.5
	$s_{\bar{x}}$	1.5	32.2	1.0	0.8	5.3	0.9	1.8
Eurytemora sp.	1	56.8	37.7	58.9	174.5	8.8	10.6	14.1
	2	31.0	76.3	45.2	126.6	14.1	19.4	7.0
	$\bar{x}$	43.9	57.0	52.0	150.6	11.4	15.0	10.6
	s	18.2	27.3	9.7	33.9	3.7	6.2	5.0
	$s_{\bar{x}}$	12.9	19.3	6.9	24.0	2.6	4.4	3.5
Pelecypod larvae	1	46.9	-	43.4	110.2	-	14.1	10.6
	2	69.8	-	45.2	63.3	-	26.4	3.5
	$\bar{x}$	58.4	-	44.3	86.8	-	20.3	7.0
	s	16.2	-	1.3	33.2	-	8.7	5.0
	$s_{\bar{x}}$	11.4	-	0.9	23.5	-	6.2	3.5
Acartia sp.	1	121.0	3.1	6.2	3.1	826.0	149.7	51.1
	2	103.4	0.0	0.0	0.0	891.2	329.3	15.8
	$\bar{x}$	112.2	1.6	3.1	1.5	858.6	239.5	33.5
	s	12.4	2.2	4.4	2.2	46.1	127.0	24.9
	$s_{\bar{x}}$	8.8	1.6	3.1	1.5	32.6	89.8	17.6
Rotifers	1	-	56.6	31.0	315.4	-	1.8	-
	2	-	90.2	8.5	256.1	-	7.0	-
	$\bar{x}$	-	73.4	19.7	285.8	-	4.4	-
	s	-	23.7	15.9	41.9	-	3.7	-
	$s_{\bar{x}}$	-	16.8	11.3	29.6	-	2.6	-

Table B14 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
			Stations					
Cyclopoid Copepods	1	-	6.3	3.1	0.0	-	-	-
	2	-	17.3	2.8	5.8	-	-	-
	$\bar{x}$	-	11.8	3.0	2.9	-	-	-
	s	-	7.8	0.2	4.1	-	-	-
	$s_{\bar{x}}$	-	5.5	0.1	2.9	-	-	-
<u>Bosmina</u> sp.	1	0.0	9.4	24.8	49.0	-	-	-
	2	5.2	24.3	28.2	51.8	-	-	-
	$\bar{x}$	2.6	16.9	26.5	50.4	-	-	-
	s	3.7	10.5	2.4	2.0	-	-	-
	$s_{\bar{x}}$	2.6	7.4	1.7	1.4	-	-	-
Amphipods	1	-	-	-	-	5.3	-	-
	2	-	-	-	-	3.5	-	-
	$\bar{x}$	-	-	-	-	4.4	-	-
	s	-	-	-	-	1.2	-	-
	$s_{\bar{x}}$	-	-	-	-	0.9	-	-

Table B15

James River Zooplankton June 13, 1977
(Numbers of organisms per 100 liters, surface samples, two samples per station)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
Copepod nauplii	1	1220.5	673.2	393.7	531.9	1093.4	824.0
	2	782.0	1258.4	531.2	616.3	1025.7	1827.7
	$\bar{x}$	1001.2	965.8	462.5	574.1	1059.6	1325.4
	s	310.0	413.7	97.2	59.6	47.8	710.4
	$s_{\bar{x}}$	219.2	292.6	68.7	42.2	33.8	502.4
Acartia sp.	1	187.3	16.6	4.3	22.3	4.9	6.2
	2	166.7	8.6	27.7	11.6	12.4	109.8
	$\bar{x}$	177.0	12.6	16.0	16.9	8.6	58.0
	s	14.5	5.7	16.6	7.6	5.3	73.2
	$s_{\bar{x}}$	10.3	4.0	11.7	5.4	3.8	51.8
Barnacle nauplii	1	68.0	138.5	325.6	80.8	14.6	224.4
	2	53.0	157.9	274.4	57.9	12.4	148.3
	$\bar{x}$	60.5	148.2	300.0	69.3	13.5	186.4
	s	10.6	13.7	36.2	16.2	1.5	53.8
	$s_{\bar{x}}$	7.5	9.7	25.6	11.4	1.1	38.0
Harpacticoid copepods	1	1.2	4.2	6.4	2.8	-	0.0
	2	3.0	1.7	2.5	5.8	-	17.8
	$\bar{x}$	2.1	2.9	4.4	4.3	-	8.9
	s	1.3	1.7	2.7	2.1	-	12.6
	$s_{\bar{x}}$	0.9	1.2	1.9	1.5	-	8.9
Eurytemora sp.	1	6.0	13.8	14.9	5.6	4.9	56.1
	2	4.5	8.6	17.6	2.9	3.1	77.1
	$\bar{x}$	5.3	11.2	16.3	4.2	4.0	66.6
	s	1.0	3.7	1.9	1.9	1.2	14.9
	$s_{\bar{x}}$	0.7	2.6	1.4	1.3	0.9	10.5
Polychaete larvae	1	13.1	5.5	2.1	8.3	9.7	15.6
	2	22.7	3.4	5.0	17.4	37.3	41.5
	$\bar{x}$	17.9	4.5	3.6	12.9	23.5	28.6
	s	6.8	1.5	2.0	6.4	19.5	18.3
	$s_{\bar{x}}$	4.8	1.0	1.4	4.5	13.8	13.0
Pelecypod larvae	1	-	0.0	4.3	66.8	12.1	34.3
	2	-	13.7	35.2	57.9	12.4	86.0
	$\bar{x}$	-	6.9	19.8	62.4	12.3	60.2
	s	-	9.7	21.9	6.3	0.2	36.6
	$s_{\bar{x}}$	-	6.9	15.5	4.5	0.1	25.9
Rotifers	1	-	-	-	11.1	106.9	24.9
	2	-	-	-	20.2	282.9	11.9
	$\bar{x}$	-	-	-	15.7	194.9	18.4
	s	-	-	-	6.4	124.4	9.2
	$s_{\bar{x}}$	-	-	-	4.6	88.0	6.5

Table B15 (continued)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
		Stations					
Gastropod larvae	1	-	5.1	-	-	-	24.9
	2	-	0.0	-	-	-	47.5
	$\bar{x}$	-	2.6	-	-	-	36.2
	s	-	3.6	-	-	-	15.9
	$s_{\bar{x}}$	-	2.6	-	-	-	11.3
Cyclopoid copepods	1	-	-	-	-	-	0.0
	2	-	-	-	-	-	3.0
	$\bar{x}$	-	-	-	-	-	1.5
	s	-	-	-	-	-	2.1
	$s_{\bar{x}}$	-	-	-	-	-	1.5
Bosmina sp.	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-
Amphipods	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-

Table B15 (continued)

James River Zooplankton June 13, 1977
(Numbers of organisms per 100 liters, surface samples, two samples per station)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
		Stations						
Copepod nauplii	1	328.1	652.4	1893.8	540.7	153.2	109.2	68.7
	2	204.1	848.1	739.0	488.6	331.2	313.5	68.7
	$\bar{x}$	266.1	750.3	1316.4	514.6	242.2	211.4	68.7
	s	87.6	138.4	816.5	36.8	125.8	144.5	0.0
	$s_{\bar{x}}$	62.0	97.9	577.4	26.1	88.9	102.2	0.0
Acartia sp.	1	9.0	41.3	5.6	39.3	77.5	29.9	14.1
	2	22.7	73.6	0.0	5.4	45.8	38.7	7.0
	$\bar{x}$	15.8	57.4	2.8	22.3	61.6	34.3	10.6
	s	9.7	22.8	3.9	24.0	22.4	6.2	5.0
	$s_{\bar{x}}$	6.8	16.1	2.8	17.0	15.8	4.4	3.5
Barnacle nauplii	1	229.2	153.3	128.1	-	22.9	15.8	135.6
	2	121.0	132.0	15.4	-	40.5	95.1	123.3
	$\bar{x}$	175.1	142.6	71.8	-	31.7	55.5	129.5
	s	76.5	15.0	79.7	-	12.4	56.0	8.7
	$s_{\bar{x}}$	54.1	10.6	59.4	-	8.8	39.6	6.2
Harpacticoid copepods	1	4.5	2.0	5.6	-	0.0	8.8	3.5
	2	7.6	8.6	0.0	-	3.5	8.8	0.0
	$\bar{x}$	6.0	5.3	2.8	-	1.8	8.8	1.8
	s	2.2	4.7	3.9	-	2.5	0.0	2.5
	$s_{\bar{x}}$	1.5	3.3	2.8	-	1.8	0.0	1.8
Eurytemora sp.	1	22.5	15.7	44.6	34.4	15.8	3.5	1.8
	2	3.8	34.6	15.4	10.7	17.6	7.0	0.0
	$\bar{x}$	13.1	25.2	30.0	22.6	16.7	5.3	0.9
	s	13.2	13.4	20.6	16.7	1.2	2.5	1.2
	$s_{\bar{x}}$	9.3	9.4	14.6	11.8	0.9	1.8	0.9
Polychaete larvae	1	13.5	13.8	22.3	4.9	1.8	1.8	3.5
	2	26.5	47.6	10.3	5.4	5.3	0.0	1.8
	$\bar{x}$	20.0	30.7	16.3	5.1	3.5	0.9	2.6
	s	9.2	23.9	8.5	0.3	2.5	1.2	1.2
	$s_{\bar{x}}$	6.5	16.9	6.0	0.2	1.8	0.9	0.9
Pelecypod larvae	1	0.0	49.1	39.0	39.3	-	-	3.5
	2	3.8	30.3	41.1	21.5	-	-	3.5
	$\bar{x}$	1.9	39.7	40.0	30.4	-	-	3.5
	s	2.7	13.3	1.5	12.6	-	-	0.0
	$s_{\bar{x}}$	1.9	9.4	1.0	8.9	-	-	0.0
Rotifers	1	9.0	129.7	167.1	29.5	-	-	-
	2	3.8	151.4	92.4	26.8	-	-	-
	$\bar{x}$	6.4	140.6	129.7	28.2	-	-	-
	s	3.7	15.4	52.8	1.9	-	-	-
	$s_{\bar{x}}$	2.6	10.9	37.4	1.3	-	-	-

Table B15 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
		Stations						
Gastropod larvae	1	-	5.9	5.6	-	-	-	-
	2	-	10.8	0.0	-	-	-	-
	$\bar{x}$	-	8.4	2.8	-	-	-	-
	s	-	3.5	3.9	-	-	-	-
	$s_{\bar{x}}$	-	2.5	2.8	-	-	-	-
Cyclopoid copepods	1	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-	-
	s	-	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-	-
Bosmina sp.	1	-	15.7	-	-	-	-	-
	2	-	8.6	-	-	-	-	-
	$\bar{x}$	-	12.2	-	-	-	-	-
	s	-	5.0	-	-	-	-	-
	$s_{\bar{x}}$	-	3.5	-	-	-	-	-
Amphipods	1	-	-	-	-	0.0	-	1.8
	2	-	-	-	-	3.5	-	3.5
	$\bar{x}$	-	-	-	-	1.8	-	2.6
	s	-	-	-	-	2.5	-	1.2
	$s_{\bar{x}}$	-	-	-	-	1.8	-	0.9

Table B16

James River Zooplankton July 12, 1977
(Numbers of organisms per 100 liters, surface samples, two samples per station)

Organisms		Stations DWS	Intake	HPS	HPW3	HPW2	HPW1
Copepod nauplii	1	208.9	1277.4	1623.0	2676.2	582.2	1235.7
	2	145.2	4398.5	1989.2	2900.3	1649.9	3219.0
	$\bar{x}$	177.1	2838.0	1806.1	2788.2	1116.1	2227.4
	s	45.1	2207.0	259.0	158.5	755.0	1402.4
	$s_{\bar{x}}$	31.9	1560.6	183.1	112.1	533.8	991.7
Pelecypod larvae	1	9.3	256.0	545.1	866.7	37.6	604.4
	2	3.8	83.0	1319.7	1951.8	150.7	2412.7
	$\bar{x}$	6.6	169.5	932.4	1409.2	94.1	1508.6
	s	3.9	122.3	547.8	767.3	80.0	1278.6
	$s_{\bar{x}}$	2.7	86.5	387.3	542.6	56.6	904.1
Acartia sp.	1	67.9	686.5	379.7	400.0	75.1	308.9
	2	33.4	268.3	317.1	469.8	226.0	533.3
	$\bar{x}$	50.6	477.4	348.4	434.9	150.6	421.1
	s	24.4	295.8	44.3	49.4	106.7	158.7
	$s_{\bar{x}}$	17.2	209.1	31.3	34.9	75.4	112.2
Barnacle nauplii	1	12.0	34.9	159.2	133.3	4.7	53.7
	2	2.6	12.8	317.1	116.4	11.3	133.3
	$\bar{x}$	7.3	23.8	238.2	124.8	8.0	93.5
	s	6.6	15.7	111.6	12.0	4.7	56.3
	$s_{\bar{x}}$	4.7	11.1	78.9	8.5	3.3	39.8
Polychaete larvae	1	10.6	34.9	85.7	171.4	32.9	147.7
	2	3.8	38.3	80.1	107.6	26.4	114.3
	$\bar{x}$	7.2	36.6	82.9	139.5	29.6	131.0
	s	4.8	2.4	4.0	45.2	4.6	23.6
	$s_{\bar{x}}$	3.4	1.7	2.8	31.9	3.2	16.7
Eurytemora sp.	1	0.0	11.6	12.2	9.5	4.7	0.0
	2	2.6	6.4	9.6	8.8	0.0	57.1
	$\bar{x}$	1.3	9.0	10.9	9.2	2.4	28.6
	s	1.8	3.7	1.9	0.5	3.3	40.4
	$s_{\bar{x}}$	1.3	2.6	1.3	0.4	2.4	28.6
Harpacticoid copepods	1	0.0	69.8	36.8	19.0	4.7	80.6
	2	5.1	31.9	41.6	39.5	0.0	63.5
	$\bar{x}$	2.6	50.9	39.2	29.3	2.4	72.0
	s	3.6	26.8	3.5	14.5	3.3	12.1
	$s_{\bar{x}}$	2.6	18.9	2.4	10.2	2.4	8.6
Rotifers	1	0.0	-	18.4	14.3	9.4	-
	2	2.6	-	16.0	0.0	0.0	-
	$\bar{x}$	1.3	-	17.2	7.2	4.7	-
	s	1.8	-	1.7	10.1	6.6	-
	$s_{\bar{x}}$	1.3	-	1.2	7.1	4.7	-

Table B16 (continued)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
		Stations					
Gastropod larvae	1	-	-	-	0.0	-	-
	2	-	-	-	6.6	-	-
	$\bar{x}$	-	-	-	3.3	-	-
	s	-	-	-	4.7	-	-
	$s_{\bar{x}}$	-	-	-	3.3	-	-
Decapod larvae	1	-	-	0.0	-	-	-
	2	-	-	6.4	-	-	-
	$\bar{x}$	-	-	3.2	-	-	-
	s	-	-	4.5	-	-	-
	$s_{\bar{x}}$	-	-	3.2	-	-	-
Bosmina sp.	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-

Table B16 (continued)

Organisms		Discharge	CBE	CBC	J.I.
				Stations	
Copepod nauplii	1	986.5	1508.1	2670.5	3919.4
	2	1692.6	2762.6	4506.6	3359.3
	$\bar{x}$	1339.5	2135.4	3588.6	3639.3
	s	499.3	887.0	1298.3	396.0
	$s_{\bar{x}}$	353.0	627.2	918.0	280.0
Pelecypod larvae	1	156.4	5576.2	1978.2	391.4
	2	158.7	13283.4	3472.7	424.7
	$\bar{x}$	157.5	9429.8	2725.4	408.1
	s	1.6	5449.8	1056.8	23.6
	$s_{\bar{x}}$	1.1	3853.6	747.2	16.7
Acartia sp.	1	216.5	646.3	797.1	121.3
	2	327.9	581.3	1631.6	43.4
	$\bar{x}$	272.2	613.8	1214.4	82.4
	s	78.8	46.0	590.1	55.0
	$s_{\bar{x}}$	55.7	32.5	417.3	38.9
Barnacle nauplii	1	60.2	67.6	0.0	82.7
	2	84.6	299.3	34.9	57.9
	$\bar{x}$	72.4	183.4	17.4	70.3
	s	17.3	163.8	24.7	17.5
	$s_{\bar{x}}$	12.2	115.8	17.4	12.4
Polychaete larvae	1	72.2	380.2	58.2	11.0
	2	63.5	270.5	69.8	14.5
	$\bar{x}$	67.8	325.4	64.0	12.8
	s	6.2	77.6	8.2	2.4
	$s_{\bar{x}}$	4.4	54.8	5.8	1.7
Eurytemora sp.	1	-	-	564.4	88.2
	2	-	-	759.1	38.6
	$\bar{x}$	-	-	661.7	63.4
	s	-	-	137.7	37.1
	$s_{\bar{x}}$	-	-	97.4	24.8
Harpacticoid copepods	1	-	25.4	17.4	-
	2	-	40.3	4.4	-
	$\bar{x}$	-	32.8	10.9	-
	s	-	10.6	9.3	-
	$s_{\bar{x}}$	-	7.5	6.6	-
Rotifers	1	12.0	4.2	5.8	5.5
	2	10.6	23.0	0.0	9.6
	$\bar{x}$	11.3	13.6	2.9	7.6
	s	1.0	13.3	4.1	2.9
	$s_{\bar{x}}$	0.7	9.4	2.9	2.1

Table B16 (continued)

Organisms		Discharge	CBE	CBC	J.I.
		Stations			
Gastropod larvae	1	-	52.9	-	-
	2	-	0.0	-	-
	$\bar{x}$	-	26.4	-	-
	s	-	37.4	-	-
	$s_{\bar{x}}$	-	26.4	-	-
Decapod larvae	1	-	-	5.8	-
	2	-	-	0.0	-
	$\bar{x}$	-	-	2.9	-
	s	-	-	4.1	-
	$s_{\bar{x}}$	-	-	2.9	-
Bosmina sp.	1	-	71.8	0.0	-
	2	-	0.0	4.4	-
	$\bar{x}$	-	35.9	2.2	-
	s	-	50.8	3.1	-
	$s_{\bar{x}}$	-	35.9	2.2	-

Table B17

Surry Zooplankton Entrainment 7-21-77

(Numbers of organisms per 100 liters, surface samples, two samples per station

Organisms		INT	DIS	ICD	ICU	DC
Copepod nauplii	1	736.7	686.7	2569.8	1241.7	197.3
	2	1788.2	622.5	2037.9	1421.4	156.8
	$\bar{x}$	1262.5	654.6	2303.8	1331.6	177.0
	s	743.6	45.4	376.1	127.0	28.6
	$s_{\bar{x}}$	525.8	32.1	266.0	89.8	20.2
Pelecypod larvae	1	115.1	16.9	12.3	8.8	1.8
	2	241.2	7.6	1.8	1.8	0.0
	$\bar{x}$	178.2	12.2	7.0	5.3	0.9
	s	89.1	6.6	7.5	5.0	1.2
	$s_{\bar{x}}$	63.0	4.6	5.3	3.5	0.9
Acartia sp.	1	270.5	123.8	450.9	258.9	156.8
	2	688.2	106.3	368.1	382.2	165.6
	$\bar{x}$	479.4	115.1	409.5	320.6	161.2
	s	295.4	12.4	58.5	87.2	6.2
	$s_{\bar{x}}$	208.9	8.8	41.4	61.6	4.4
Barnacle nauplii	1	109.4	287.1	103.9	197.3	89.8
	2	194.1	182.2	66.9	170.8	40.5
	$\bar{x}$	151.7	234.6	85.4	184.1	65.2
	s	59.9	74.2	26.2	18.7	34.9
	$s_{\bar{x}}$	42.4	52.4	18.5	13.2	24.7
Polychaete larvae	1	34.5	107.0	37.0	72.2	14.1
	2	70.6	38.0	51.1	167.3	42.3
	$\bar{x}$	52.6	72.5	44.0	119.8	28.2
	s	25.5	48.8	10.0	67.3	19.9
	$s_{\bar{x}}$	18.0	34.5	7.0	47.6	14.1
Eurytemora sp.	1	0.0	73.2	26.4	10.6	31.7
	2	17.6	0.0	8.8	40.5	10.6
	$\bar{x}$	8.8	36.6	17.6	25.5	21.1
	s	12.5	51.7	12.4	21.2	14.9
	$s_{\bar{x}}$	8.8	36.6	8.8	15.0	10.6
Harpacticoid copepods	1	11.5	45.0	21.1	8.8	31.7
	2	23.5	22.8	1.8	10.6	3.5
	$\bar{x}$	17.5	33.9	11.4	9.7	17.6
	s	8.5	15.7	13.7	1.2	19.9
	$s_{\bar{x}}$	6.0	11.1	9.7	0.9	14.1
Rotifers	1	34.5	0.0	1.8	1.8	1.8
	2	17.6	15.2	0.0	1.8	0.0
	$\bar{x}$	26.1	7.6	0.9	1.8	0.9
	s	11.9	10.7	1.2	0.0	1.2
	$s_{\bar{x}}$	8.4	7.6	0.9	0.0	0.9

Stations: INT, DIS, ICD, ICU, DC

Table B17 (continued)

Organisms		INT	DIS	ICD	ICU	DC
		Stations				
Gastropod larvae	1	-	5.6	0.0	1.8	1.8
	2	-	0.0	1.8	1.8	0.0
	$\bar{x}$	-	2.8	0.9	1.8	0.9
	s	-	4.0	1.2	0.0	1.2
	$s_{\bar{x}}$	-	2.8	0.9	0.0	0.9
Decapod larvae	1	-	-	-	1.8	1.8
	2	-	-	-	3.5	1.8
	x	-	-	-	2.6	1.8
	s	-	-	-	1.2	0.0
	$s_{\bar{x}}$	-	-	-	0.9	0.0
Bosmina sp.	1	-	-	3.5	1.8	-
	2	-	-	0.0	0.0	-
	$\bar{x}$	-	-	1.8	0.9	-
	s	-	-	2.5	1.2	-
	$s_{\bar{x}}$	-	-	1.8	0.9	-
Amphipods	1	-	-	-	1.8	1.8
	2	-	-	-	1.8	3.5
	$\bar{x}$	-	-	-	1.8	2.6
	s	-	-	-	0.0	1.2
	$s_{\bar{x}}$	-	-	-	0.0	0.9

Table B18

James River Zooplankton August 16, 1977

(Numbers of organisms per 100 liters, surface samples, two samples per station)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
Copepod nauplii	1	521.9	2448.2	538.1	921.2	611.4	937.8
	2	671.3	940.5	555.9	529.9	1350.9	934.9
	$\bar{x}$	596.6	1694.4	547.0	725.6	981.2	936.4
	s	105.7	1066.1	12.6	276.7	522.9	2.0
	$s_{\bar{x}}$	74.7	753.9	8.9	195.6	369.8	1.4
Acartia sp.	1	128.2	354.2	221.0	150.3	180.4	241.8
	2	235.7	152.9	256.6	125.4	506.6	90.7
	$\bar{x}$	181.9	253.6	238.8	137.9	343.5	166.3
	s	76.0	142.4	25.1	17.6	230.6	106.8
	$s_{\bar{x}}$	53.8	100.6	17.8	12.4	163.1	75.5
Barnacle nauplii	1	95.8	598.3	38.4	106.7	50.1	108.2
	2	162.6	206.4	28.5	78.4	50.7	141.5
	$\bar{x}$	129.2	402.4	33.5	92.5	50.4	124.8
	s	47.2	277.1	7.0	20.0	0.4	23.5
	$s_{\bar{x}}$	33.4	195.9	5.0	14.1	0.3	16.6
Polychaete larvae	1	10.4	39.4	28.8	24.2	15.0	24.0
	2	6.0	38.2	28.5	0.0	0.0	12.3
	$\bar{x}$	8.2	38.8	28.7	12.1	7.5	18.2
	s	3.1	0.8	0.2	17.1	10.6	8.3
	$s_{\bar{x}}$	2.2	0.6	0.2	12.1	7.5	5.9
Pelecypod larvae	1	0.0	70.8	-	43.6	5.0	4.0
	2	3.0	84.1	-	40.8	16.9	23.1
	$\bar{x}$	1.5	77.5	-	42.2	11.0	13.5
	s	2.1	9.4	-	2.0	8.4	13.5
	$s_{\bar{x}}$	1.5	6.6	-	1.4	5.9	9.5
Rotifers	1	-	15.7	9.6	29.1	15.0	1.3
	2	-	7.6	0.0	9.4	0.0	3.1
	$\bar{x}$	-	11.7	4.8	19.2	7.5	2.2
	s	-	5.7	6.8	13.9	10.6	1.2
	$s_{\bar{x}}$	-	4.0	4.8	9.8	7.5	0.9
Harpacticoid copepods	1	-	7.9	19.2	4.8	15.0	2.7
	2	-	0.0	7.1	3.1	16.9	4.6
	$\bar{x}$	-	3.9	13.2	4.0	16.0	3.6
	s	-	5.6	8.6	1.2	1.3	1.4
	$s_{\bar{x}}$	-	3.9	6.0	0.8	0.9	1.0
Eurytemora sp.	1	-	47.2	19.2	0.0	10.0	0.0
	2	-	0.0	0.0	15.7	33.8	12.3
	$\bar{x}$	-	23.6	9.6	7.8	21.9	6.2
	s	-	33.4	13.6	11.1	16.8	8.7
	$s_{\bar{x}}$	-	23.6	9.6	7.8	11.9	6.2

Table B18 (continued)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
		Stations					
Bosmina sp.	1	-	-	-	-	5.0	2.7
	2	-	-	-	-	0.0	0.0
	$\bar{x}$	-	-	-	-	2.5	1.3
	s	-	-	-	-	3.5	1.9
	$s_{\bar{x}}$	-	-	-	-	2.5	1.3
Gastropod larvae	1	-	-	-	-	0.0	2.7
	2	-	-	-	-	16.9	1.5
	$\bar{x}$	-	-	-	-	8.4	2.1
	s	-	-	-	-	11.9	0.8
	$s_{\bar{x}}$	-	-	-	-	8.4	0.6
Decapod larvae	1	-	-	-	4.8	-	1.3
	2	-	-	-	0.0	-	1.5
	$\bar{x}$	-	-	-	2.4	-	1.4
	s	-	-	-	3.4	-	0.1
	$s_{\bar{x}}$	-	-	-	2.4	-	0.1
Amphipods	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-

Table B18 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
		Stations						
Copepod nauplii	1	558.8	642.1	515.2	891.1	2057.2	1655.7	199.0
	2	523.6	1641.6	183.3	2979.2	3494.5	1685.6	491.4
	$\bar{x}$	541.2	1141.8	349.3	1935.1	2775.9	1670.6	345.2
	s	24.9	706.7	234.7	1476.5	1016.3	21.2	206.7
	$s_{\bar{x}}$	17.6	499.7	166.0	1044.1	718.6	15.0	146.2
Acartia sp.	1	192.1	80.6	170.3	260.2	70.4	65.2	26.4
	2	67.9	60.1	57.6	374.3	98.6	95.1	88.1
	$\bar{x}$	130.0	70.4	114.0	317.2	84.5	80.1	57.2
	s	87.8	14.4	79.7	80.7	19.9	21.2	43.6
	$s_{\bar{x}}$	62.1	10.2	56.4	57.1	14.1	15.0	30.8
Barnacle nauplii	1	419.1	106.6	63.9	58.5	576.0	310.0	220.2
	2	300.6	367.9	36.7	22.5	572.4	303.0	523.1
	$\bar{x}$	359.9	237.3	50.3	40.5	574.2	306.5	371.6
	s	83.8	184.8	19.2	25.5	2.5	5.0	214.2
	$s_{\bar{x}}$	59.2	130.7	13.6	18.0	1.8	3.5	151.5
Polychaete larvae	1	43.7	21.3	25.6	13.0	38.8	72.2	10.6
	2	0.0	42.4	68.1	44.9	77.5	114.5	33.5
	$\bar{x}$	21.8	31.9	46.8	29.0	58.1	93.4	22.0
	s	30.9	14.9	30.1	22.6	27.4	29.9	16.2
	$s_{\bar{x}}$	21.8	10.6	21.3	16.0	19.4	21.1	11.4
Pelecypod larvae	1	26.2	0.0	29.8	6.5	35.2	15.8	5.3
	2	77.6	46.0	5.2	44.9	3.5	17.6	3.5
	$\bar{x}$	51.9	23.0	17.5	25.7	19.4	16.7	4.4
	s	36.3	32.5	17.4	27.2	22.4	1.2	1.2
	$s_{\bar{x}}$	25.7	23.0	12.3	19.2	15.9	0.9	0.9
Rotifers	1	-	2.4	8.5	6.5	8.8	24.7	0.0
	2	-	17.7	31.4	44.9	3.5	29.9	5.3
	$\bar{x}$	-	10.0	20.0	25.7	6.2	27.3	2.6
	s	-	10.8	16.2	27.2	3.7	3.7	3.7
	$s_{\bar{x}}$	-	7.7	11.4	19.2	2.6	2.6	2.6
Harpacticoid copepods	1	8.7	0.0	8.5	-	12.3	12.3	3.5
	2	19.4	7.1	0.0	-	15.8	24.7	7.0
	$\bar{x}$	14.1	3.5	4.3	-	14.1	18.5	5.3
	s	7.5	5.0	6.0	-	2.5	8.7	2.5
	$s_{\bar{x}}$	5.3	3.5	4.3	-	1.8	6.2	1.8
Eurytemora sp.	1	17.5	33.2	-	0.0	1.8	12.3	3.5
	2	0.0	28.3	-	37.4	5.3	1.8	12.3
	$\bar{x}$	8.7	30.7	-	18.7	3.5	7.0	7.9
	s	12.4	3.4	-	26.5	2.5	7.5	6.2
	$s_{\bar{x}}$	8.7	2.4	-	18.7	1.8	5.3	4.4

Table B18 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C
Bosmina sp.	1	-	2.4	-	-	5.3	7.0	1.8
	2	-	0.0	-	-	0.0	0.0	0.0
	$\bar{x}$	-	1.2	-	-	2.6	3.5	0.9
	s	-	1.7	-	-	3.7	5.0	1.2
	$s_{\bar{x}}$	-	1.2	-	-	2.6	3.5	0.9
Gastropod larvae	1	8.7	-	-	-	3.5	0.0	-
	2	29.1	-	-	-	3.5	1.8	-
	$\bar{x}$	18.9	-	-	-	3.5	0.9	-
	s	14.4	-	-	-	0.0	1.2	-
	$s_{\bar{x}}$	10.2	-	-	-	0.0	0.9	-
Decapod larvae	1	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-	-
	s	-	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-	-
Amphipods	1	-	-	-	-	-	-	24.7
	2	-	-	-	-	-	-	24.7
	$\bar{x}$	-	-	-	-	-	-	24.7
	s	-	-	-	-	-	-	0.0
	$s_{\bar{x}}$	-	-	-	-	-	-	0.0

Table B19

James River Zooplankton September 6, 1977
(Numbers of organisms per 100 liters, surface samples, two samples per station

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
		Stations					
Copepod nauplii	1	300.9	108.6	826.3	947.4	3075.7	966.9
	2	596.4	881.4	768.1	1086.0	5421.9	1354.1
	$\bar{x}$	448.6	495.0	797.2	1016.7	4248.8	1160.5
	s	209.0	546.5	41.2	98.0	1659.0	273.8
	$s_{\bar{x}}$	147.8	386.4	29.1	69.3	1173.1	193.6
Pelecypod larvae	1	3.2	12.8	2528.0	1011.0	3289.5	1576.6
	2	9.3	127.7	2792.8	1736.4	4090.6	1829.4
	$\bar{x}$	6.3	70.3	2660.5	1373.7	3690.0	1703.0
	s	4.3	81.3	187.2	513.0	566.4	178.7
	$s_{\bar{x}}$	3.0	57.5	132.4	362.7	400.5	126.4
Acartia sp.	1	128.5	51.1	143.9	195.4	390.2	239.9
	2	167.7	102.2	120.6	267.4	332.1	207.2
	$\bar{x}$	148.1	76.6	132.2	231.4	361.1	223.6
	s	27.8	36.1	16.4	50.9	41.1	23.1
	$s_{\bar{x}}$	19.6	25.6	11.6	36.0	29.0	16.3
Barnacle nauplii	1	17.9	19.2	131.6	22.7	53.4	45.8
	2	28.0	38.3	80.4	66.2	132.8	196.2
	$\bar{x}$	22.9	28.7	106.0	44.4	93.1	121.0
	s	7.1	13.6	36.2	30.7	56.1	106.4
	$s_{\bar{x}}$	5.0	9.6	25.6	21.7	39.7	75.2
Rotifers	1	1.6	0.0	45.6	104.5	72.2	38.4
	2	1.9	281.0	28.2	38.6	102.6	77.4
	$\bar{x}$	1.8	140.5	36.9	71.6	87.4	57.9
	s	0.2	198.7	12.4	46.6	21.6	27.5
	$s_{\bar{x}}$	0.1	140.5	8.7	33.0	15.2	19.5
Polychaete larvae	1	1.6	6.4	19.3	4.5	32.1	65.9
	2	5.6	25.6	20.1	0.0	24.2	22.1
	$\bar{x}$	3.6	16.0	19.7	2.3	28.1	44.0
	s	2.8	13.6	0.6	3.2	5.6	31.0
	$s_{\bar{x}}$	2.0	9.6	0.4	2.3	4.0	21.9
Eurytemora sp.	1	0.0	-	7.0	27.3	8.0	16.5
	2	11.2	-	16.1	8.3	6.0	0.0
	$\bar{x}$	5.6	-	11.6	17.8	7.0	8.2
	s	7.9	-	6.4	13.4	1.4	11.6
	$s_{\bar{x}}$	5.6	-	4.5	9.5	1.0	8.2
Harpacticoid copepods	1	-	-	5.3	2.3	0.0	1.8
	2	-	-	2.0	0.0	3.0	8.3
	$\bar{x}$	-	-	3.6	1.1	1.5	5.1
	s	-	-	2.3	1.6	2.1	4.6
	$s_{\bar{x}}$	-	-	1.6	1.1	1.5	3.2

Table B19 (continued)
Stations

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
Gastropod larvae	1	1.6	-	1.8	-	-	0.0
	2	0.0	-	0.0	-	-	2.8
	$\bar{x}$	0.8	-	0.9	-	-	1.4
	s	1.2	-	1.2	-	-	2.0
	$s_{\bar{x}}$	0.8	-	0.9	-	-	1.4
Bosmina sp.	1	-	-	5.3	-	0.0	-
	2	-	-	0.0	-	12.1	-
	$\bar{x}$	-	-	2.6	-	6.0	-
	s	-	-	3.7	-	8.5	-
	$s_{\bar{x}}$	-	-	2.6	-	6.0	-
Cyclopoid copepods	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-
Decapod larvae	1	-	-	-	-	-	0.0
	2	-	-	-	-	-	2.8
	$\bar{x}$	-	-	-	-	-	1.4
	s	-	-	-	-	-	2.0
	$s_{\bar{x}}$	-	-	-	-	-	1.4
Amphipods	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-

Table B19 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
Copepod nauplii	1	247.6	706.2	4826.6	762.8	1004.0	1278.7	369.9
	2	295.4	415.7	3118.0	539.3	1349.2	4678.1	380.4
	$\bar{x}$	271.5	560.9	3972.3	651.1	1176.6	2978.4	375.2
	s	33.8	205.4	1208.2	158.0	244.1	2403.7	7.5
	$s_{\bar{x}}$	23.9	145.3	854.4	111.8	172.6	1699.7	5.3
Pelecypod larvae	1	26.8	5458.9	3270.2	536.4	283.6	376.9	137.4
	2	107.4	4997.9	3985.1	220.2	144.4	616.5	366.4
	$\bar{x}$	67.1	5228.4	3627.6	378.3	214.0	496.7	251.9
	s	57.0	325.9	505.5	223.5	98.4	169.4	161.9
	$s_{\bar{x}}$	40.3	230.5	357.4	158.1	69.6	119.8	114.5
Acartia sp.	1	147.2	142.3	697.0	154.0	361.1	334.6	838.4
	2	107.4	36.3	447.7	101.1	306.5	190.2	373.4
	$\bar{x}$	127.3	89.3	572.4	127.6	333.8	262.4	605.9
	s	28.1	75.0	176.3	37.4	38.6	102.1	328.8
	$s_{\bar{x}}$	19.9	53.0	124.6	26.5	27.3	72.2	232.5
Barnacle nauplii	1	60.2	96.7	45.7	58.0	267.7	213.1	373.4
	2	125.3	56.1	81.0	62.9	179.7	320.6	274.8
	$\bar{x}$	92.8	76.4	63.4	60.4	223.7	266.8	324.1
	s	46.0	28.7	25.0	3.5	62.3	76.0	69.7
	$s_{\bar{x}}$	32.6	20.3	17.7	2.5	44.0	53.7	49.3
Rotifers	1	6.7	56.4	74.4	38.0	0.0	1086.8	0.0
	2	0.0	69.3	66.9	18.0	708.1	3772.8	21.1
	$\bar{x}$	3.4	62.8	70.6	28.0	354.0	2429.8	10.6
	s	4.7	9.1	5.4	14.2	500.7	1899.3	15.0
	$s_{\bar{x}}$	3.4	6.4	3.8	10.0	354.0	1343.0	10.6
Polychaete larvae	1	20.1	10.7	15.2	19.9	70.4	47.6	70.4
	2	13.4	19.8	16.2	27.0	112.7	109.2	59.9
	$\bar{x}$	16.8	15.3	15.7	23.4	91.6	78.4	65.2
	s	4.7	6.4	0.7	5.0	29.9	43.6	7.5
	$s_{\bar{x}}$	3.3	4.5	0.5	3.5	21.1	30.8	5.3
Eurytemora sp.	1	3.4	-	-	-	1.8	1.8	-
	2	0.0	-	-	-	0.0	3.5	-
	$\bar{x}$	1.7	-	-	-	0.9	2.6	-
	s	2.4	-	-	-	1.2	1.2	-
	$s_{\bar{x}}$	1.7	-	-	-	0.9	0.9	-
Harpacticoid copepods	1	13.4	-	0.0	-	7.0	15.8	7.0
	2	4.5	-	2.0	-	21.1	28.2	7.0
	$\bar{x}$	8.9	-	1.0	-	14.1	22.0	7.0
	s	6.3	-	1.4	-	10.0	8.7	0.0
	$s_{\bar{x}}$	4.4	-	1.0	-	7.0	6.2	0.0

Table B19 (continued)

Organisms		Stations Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
Gastropod larvae	1	0.0	-	-	-	14.09	8.8	3.5
	2	4.5	-	-	-	14.09	10.6	7.0
	$\bar{x}$	2.2	-	-	-	14.09	9.7	5.3
	s	3.2	-	-	-	0.0	1.2	2.5
	$s_{\bar{x}}$	2.2	-	-	-	0.0	0.9	1.8
Bosmina sp.	1	-	10.7	0.0	-	8.8	-	-
	2	-	19.8	2.0	-	0.0	-	-
	$\bar{x}$	-	15.3	1.0	-	4.4	-	-
	s	-	6.4	1.4	-	6.2	-	-
	$s_{\bar{x}}$	-	4.5	1.0	-	4.4	-	-
Cyclopoid copepods	1	-	-	0.0	-	7.0	0.0	-
	2	-	-	2.0	-	3.5	10.6	-
	$\bar{x}$	-	-	1.0	-	5.3	5.3	-
	s	-	-	1.4	-	2.5	7.5	-
	$s_{\bar{x}}$	-	-	1.0	-	1.8	5.3	-
Decapod larvae	1	0.0	10.7	-	-	-	-	-
	2	13.4	3.3	-	-	-	-	-
	$\bar{x}$	6.7	7.0	-	-	-	-	-
	s	9.5	5.3	-	-	-	-	-
	$s_{\bar{x}}$	6.7	3.7	-	-	-	-	-
Amphipods	1	-	-	-	-	1.8	0.0	3.5
	2	-	-	-	-	3.5	10.6	0.0
	$\bar{x}$	-	-	-	-	2.6	5.3	1.8
	s	-	-	-	-	1.2	7.5	2.5
	$s_{\bar{x}}$	-	-	-	-	0.9	5.3	1.8

Table B20

James River Zooplankton November 9, 1977
(Numbers of organisms per 100 liters, surface samples, two samples per station

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
		Stations					
Copepod nauplii	1	451.2	276.4	1958.8	80.4	684.0	208.5
	2	649.1	355.3	1475.8	86.6	716.0	338.0
	$\bar{x}$	550.1	315.8	1717.3	83.5	700.0	273.3
	s	139.9	55.8	341.5	4.4	22.6	91.6
	$s_{\bar{x}}$	99.0	39.5	241.5	3.1	16.0	64.8
Polychaete larvae	1	2.3	28.5	80.4	31.9	31.2	136.9
	2	17.6	46.4	73.2	31.1	39.0	262.5
	$\bar{x}$	10.0	37.4	76.8	31.5	35.1	199.7
	s	10.8	12.7	5.0	0.5	5.5	88.8
	$s_{\bar{x}}$	7.7	9.0	3.6	0.4	3.9	62.8
Barnacle nauplii	1	9.3	10.7	12.5	3.8	2.8	4.9
	2	15.1	30.5	24.4	1.4	0.0	5.3
	$\bar{x}$	12.2	20.6	18.4	2.6	1.4	5.1
	s	4.1	14.0	8.4	1.8	2.0	0.3
	$s_{\bar{x}}$	2.9	9.9	6.0	1.2	1.4	0.2
Acartia sp.	1	32.5	71.2	220.3	8.9	178.8	29.6
	2	81.9	82.2	136.7	5.4	180.2	31.8
	$\bar{x}$	57.2	76.7	178.5	7.2	179.5	30.7
	s	35.0	7.8	59.1	2.5	1.0	1.6
	$s_{\bar{x}}$	24.7	5.5	41.8	1.8	0.7	1.1
Rotifers	1	31.3	42.7	20.8	30.6	-	6.2
	2	31.5	72.9	26.8	24.4	-	0.0
	$\bar{x}$	31.4	57.8	23.8	27.5	-	3.1
	s	0.1	21.4	4.3	4.4	-	4.4
	$s_{\bar{x}}$	0.1	15.1	3.0	3.1	-	3.1
Pelecypod larvae	1	0.0	7.1	0.0	1.3	-	2.5
	2	7.6	8.0	1.2	5.4	-	6.6
	$\bar{x}$	3.8	7.5	0.6	3.4	-	4.6
	s	5.4	0.6	0.9	2.9	-	2.9
	$s_{\bar{x}}$	3.8	0.4	0.6	2.1	-	2.1
Eurytemora sp.	1	-	-	-	12.8	14.2	-
	2	-	-	-	10.8	34.1	-
	$\bar{x}$	-	-	-	11.8	24.1	-
	s	-	-	-	1.4	14.1	-
	$s_{\bar{x}}$	-	-	-	1.0	10.0	-

Table B20 (continued)

Organisms		DWS	Intake	HPS	HPW3	HPW2	HPW1
Harpacticoid copepods	1	-	-	2.8	10.2	22.7	0.0
	2	-	-	7.3	6.8	39.0	1.3
	$\bar{x}$	-	-	5.0	8.5	30.8	0.7
	s	-	-	3.2	2.4	11.5	0.9
	$s_{\bar{x}}$	-	-	2.3	1.7	8.1	0.7
Cyclopoid copepods	1	-	-	0.0	-	2.8	1.2
	2	-	-	2.4	-	0.0	0.0
	$\bar{x}$	-	-	1.2	-	1.4	0.6
	s	-	-	1.7	-	2.0	0.9
	$s_{\bar{x}}$	-	-	1.2	-	1.4	0.6
Gastropod larvae	1	0.0	0.0	2.8	-	-	0.0
	2	1.3	6.6	1.2	-	-	2.6
	$\bar{x}$	0.6	3.3	2.0	-	-	1.3
	s	0.9	4.7	1.1	-	-	1.9
	$s_{\bar{x}}$	0.6	3.3	0.8	-	-	1.3
Amphipods	1	-	-	-	-	-	-
	2	-	-	-	-	-	-
	$\bar{x}$	-	-	-	-	-	-
	s	-	-	-	-	-	-
	$s_{\bar{x}}$	-	-	-	-	-	-

Stations spans the columns DWS through HPW1.

Table B20 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C.
			Stations					
Copepod nauplii	1	143.2	137.2	336.0	170.5	514.3	720.4	244.8
	2	139.1	231.2	469.0	173.4	558.3	709.8	204.3
	$\bar{x}$	141.2	184.2	402.5	172.0	536.3	715.1	224.6
	s	3.0	66.5	94.1	2.1	31.1	7.5	28.6
	$s_{\bar{x}}$	2.1	47.0	66.6	1.5	22.0	5.3	20.3
Polychaete larvae	1	22.2	116.5	25.3	14.9	105.7	88.1	33.5
	2	11.6	133.3	20.0	23.0	86.3	123.3	72.2
	$\bar{x}$	16.9	124.9	22.6	19.0	96.0	105.7	52.8
	s	7.5	11.9	3.8	5.8	13.7	24.9	27.4
	$s_{\bar{x}}$	5.3	8.4	2.7	4.1	9.7	17.6	19.4
Barnacle nauplii	1	44.5	15.5	1.4	2.71	22.9	10.6	49.3
	2	39.1	9.5	6.7	2.71	40.5	10.6	61.6
	$\bar{x}$	41.8	12.5	4.0	2.71	31.7	10.6	55.5
	s	3.8	4.2	3.7	0.0	12.4	0.0	8.7
	$s_{\bar{x}}$	2.7	3.0	2.6	0.0	8.8	0.0	6.2
<u>Acartia</u> sp.	1	18.1	23.3	23.9	65.0	52.8	66.9	10.6
	2	26.1	13.6	26.6	66.4	38.8	81.0	14.1
	$\bar{x}$	22.1	18.4	25.3	65.7	45.8	74.0	12.3
	s	5.6	6.9	1.9	1.0	10.0	10.0	2.5
	$s_{\bar{x}}$	4.0	4.8	1.4	0.7	7.0	7.0	1.8
Rotifers	1	19.5	6.5	11.2	67.6	84.5	49.3	63.4
	2	11.6	5.4	13.3	17.6	44.0	82.8	51.1
	$\bar{x}$	15.5	6.0	12.3	42.6	64.3	66.0	57.2
	s	5.6	0.7	1.5	35.4	28.6	23.7	8.7
	$s_{\bar{x}}$	3.9	0.5	1.0	25.0	20.2	16.7	6.2
Pelecypod larvae	1	0.0	3.9	-	-	1.8	10.6	-
	2	2.9	1.4	-	-	1.8	8.8	-
	$\bar{x}$	1.4	2.6	-	-	1.8	9.7	-
	s	2.0	1.8	-	-	0.0	1.2	-
	$s_{\bar{x}}$	1.4	1.3	-	-	0.0	0.9	-
<u>Eurytemora</u> sp.	1	-	3.9	2.8	46.0	0.0	-	-
	2	-	0.0	4.0	39.3	5.3	-	-
	$\bar{x}$	-	1.9	3.4	42.6	2.6	-	-
	s	-	2.7	0.8	4.7	3.7	-	-
	$s_{\bar{x}}$	-	1.9	0.6	3.4	2.6	-	-

Table B20 (continued)

Organisms		Discharge	CBE	CBC	J.I.	I.C.D.	I.C.U.	D.C
		Stations						
Harpacticoid copepods	1	-	-	-	20.3	0.0	5.3	-
	2	-	-	-	13.6	1.8	1.8	-
	$\bar{x}$	-	-	-	16.9	0.9	3.5	-
	s	-	-	-	4.8	1.2	2.5	-
	$s_{\bar{x}}$	-	-	-	3.4	0.9	1.8	-
Cyclopoid copepods	1	2.8	1.3	-	2.7	-	-	-
	2	0.0	0.0	-	2.7	-	-	-
	$\bar{x}$	1.4	0.6	-	2.7	-	-	-
	s	2.0	0.9	-	0.0	-	-	-
	$s_{\bar{x}}$	1.4	0.6	-	0.0	-	-	-
Gastropod larvae	1	-	1.3	-	-	-	-	-
	2	-	0.0	-	-	-	-	-
	$\bar{x}$	-	0.6	-	-	-	-	-
	s	-	0.9	-	-	-	-	-
	$s_{\bar{x}}$	-	0.6	-	-	-	-	-
Amphipods	1	0.0	-	-	-	-	1.8	-
	2	2.9	-	-	-	-	1.8	-
	$\bar{x}$	1.4	-	-	-	-	1.8	-
	s	2.0	-	-	-	-	0.0	-
	$s_{\bar{x}}$	1.4	-	-	-	-	0.0	-

Appendix C

Biological Data Tables for

the Benthos Study

Table C1

James River Benthos; March 8, 1977

Species, Number of Individuals and Total Wet Weight (Without Clam Shell) in Grams per 0.1 m^2 at Each Station

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mollusks																
Rangia cuneata (dead)	8	13	3	20		109	1				12		1	18	3	11
Rangia cuneata (live)	1	7	6	18	3	7	1	7		1	19		3	5		11
Congeria leucophaeta											1			1		
Macoma mitchelli																
Macoma balthica														2		
Corbicula manilensis						1	1		1			4				
Hydrobia sp.	3				1	23	1						1	21		5
Modiolus demissus																
Annelids																
Polychaetes																
Scolecolepides viridis		1	1	2		1		1	2		5		2			
Nereis succinea						1		2	1		2			3		
Lysipiddes grayi						1				4						
Polydora ligni																
Laeonereis culveri																
Heteromastus filiformis																
Oligochaetes	1			1		3										
Amphipods																
Gammarus sp.					8	4				4	9	2				2
Corophium lacustre																
Lepidactylus dytiscus									1			11				
Leptocheirus plumulosus			3	2										2	7	3

Table C1 (cont'd.)

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Isopods																
Unidentified (Suborder Flabellifera)								1								
Cyathura polita					1						2		1	3		
Edotea triloba																
Chiridotea almyra												1				
Dipteran larvae						1										
Hydroids	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Balanus sp.			4			1		6						60	42	
Ectoprocts														X	X	
Biomass (grams)	.41	1.7	.99	2.6	.43	1.1	.54	1.2	.01	.01	12.6	.21	1.47	.55	.02	1.61

Table C2

James River Benthos; April 25, 1977

Species, Number of Individuals and Total Wet Weight
(Without Clam Shell) in Grams per 0.1 m^2 at Each Station

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mollusks																
Rangia cuneata		7	4	17	2	2	7	5					2	1		4
Congeria leucophaeta								1		1	1					
Macoma mitchelli															6	
Macoma balthica																
Corbicula manilensis			1		1											
Hydrobia sp.	1			1									1	9	1	3
Modiolus demissus										1						
Annelids																
Polychaetes																
Scolecolepides viridis			2	1	5			1					1		5	
Nereis succinea	1		1			1		1	1		2			1		
Lysipiddes grayi						1						1	1			
Polydora ligni											3					
Laeonereis culveri													7		2	
Heteromastus filiformis															1	
Oligochaetes						2	2				1					
Amphipods																
Gammarus sp.		5	2				1				1			10		2
Corophium lacustre			3				3				7	1	1	1		1
Lepidactylus dytiscus									1			3				
Leptocheirus plumulosus																

Table C2 (cont'd.)

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Isopods																
Cyathura polita				1							6					1
Edotea triloba																
Chiridotea almyra																
Dipteran larvae		1	3			3										
Hydroids	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Balanus sp.											42			14		3
Ectoprocts														X		
Biomass (grams)	.004	4.6	1.44	2.72	.52	.09	5.3	.81	.005	.002	.04	.005	1.34	.14	.04	1.16

Table C3

James River Benthos; June 20, 1977

Species, Number of Individuals and Total Wet Weight (Without Clam Shell) in Grams per 0.1 m^2 at Each Station

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mollusks																
Rangia cuneata	1	5		10	6	10	5	17	2	13	15	17	1	4		21
Congeria leucophaeta					1						30					
Macoma mitchelli				1												
Macoma balthica											1		1			
Corbicula manilensis			1								1	2				
Hydrobia sp.	8	4	2		1							2				
Modiolus demissus								1			4					
Annelids																
Polychaetes																
Scolecolepides viridis				9	6			2		2	4					1
Nereis succinea											2	1	1	2	2	1
Lysipiddes grayi												1				
Polydora ligni																
Laeonereis culveri																
Heteromastus filiformis											2					
Oligochaetes		1									1					1
Decapods																
Rhithropanopeus harrissi											1					
Crangon septemspinosus													1			

Table C3 (cont'd.)

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Amphipods																
Gammarus sp.				1	4						2	2				
Corophium lacustre	2	1	10		3		5	6	2		47	14		1		2
Lepidactylus dytiscus									13	1						
Leptocheirus plumulosus				8		12	4	2		3	1	1	9		10	13
Isopods																
Cyathura polita								1			3			1		3
Edotea triloba																
Chiridotea almyra																
Dipteran larvae							1					1				
Hydroids			X	X	X	X	X	X		X	X		X	X		
Balanus sp.					180			29		1	403	141		4		1
Ectoprocts								X			X					
Biomass (grams)	.006	4.98	.11	4.7	.25	4.12	2.22	.87	.53	.28	4.03	15.3	1.6	.02	.02	5.51

Table C4

James River Benthos; July 14, 1977

Species, Number of Individuals and Total Wet Weight
(Without Clam Shell) in Grams per 0.1 m^2 at Each Station

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mollusks																
Rangia cuneata	2	4	8	34	24	15	10	3	2	14	13	2	5	2	4	12
Congeria leucophaeta					1											
Macoma mitchelli				4	3			1		4	1			1		
Macoma balthica											1				1	
Corbicula manilensis									2							
Hydrobia sp.				4		1					3					
Modiolus demissus								1			2					
Annelids																
Polychaetes																
Scolecolepides viridis				2	3	1		6		5	7			5		1
Nereis succinea	1						2								1	2
Lysipiddes grayi																
Polydora ligni																
Laeonereis culveri																
Heteromastus filiformis					1					1	15				1	
Oligochaetes	1	1				1										
Decapods																
Rhithropanopeus harrissi	1															
Amphipods																
Gammarus sp.	1				1					1						
Corophium lacustre	378	1				1					3	1				
Lepidactylus dytiscus									2			2				
Leptocheirus plumulosus	4	2		1	3	10		7		15		2		13	8	11

Table C4 (cont'.d)

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Isopods																
Cyathura polita				1	1	1		1		1				1	1	3
Edotea triloba											1					
Chiridotea almyra																
Dipteran larvae	3															
Hydroids		X		X	X	X	X	X		X	X	X	X	X		X
Balanus sp.	11				9	3					20				18	38
Ectoprocts								X								
Biomass (grams)	1.45	2.77	1.6	15.2	.57	2.04	.68	.65	.84	.05	4.84	.01	.62	.03	.02	2.63

Table C5

James River Benthos; August 18, 1977

Species, Number of Individuals and Total Wet Weight (Without Clam Shell) in Grams per 0.1 m^2 at Each Station

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mollusks																
Rangia cuneata	2	7	2	6	9	11	5	17	11	9	11	5	19		4	10
Congeria leucophaeta								2								
Macoma mitchelli					1					2				1		1
Macoma balthica																
Corbicula manilensis							1									
Hydrobia sp.				3		1		1	2					3		2
Modiolus demissus								4								
Annelids																
Polychaetes																
Scolecolepides viridis	4	1		2	4	3				6	1		4	2		
Nereis succinea	7		1				1	1	1			1	3	1	1	
Lysipiddes grayi																
Polydora ligni								3								
Laeonereis culveri																
Heteromastus filiformis					2		1				4	1	2			
Oligochaetes								1								
Decapods																
Rhithropanopeus harrissi								1								
Crangon septemspinosus															1	

Table C5 (cont'd.)

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Amphipods																
Gammarus sp.																
Corophium lacustre	16				1			6						3		
Lepidactylus dytiscus									5			3				1
Leptocheirus plumulosus	1	10		3	10	8		1		12	1	3	12	4	8	19
Isopods																
Cyathura polita		1				1		1		1				3		
Edotea triloba																
Chiridotea almyra											1					
Dipteran larvae						1										
Hydroids				X	X	X				X		X		X		
Balanus sp.	2	1						23		2	5			5		13
Ectoprocts								X	X		X			X		X
Biomass (grams)	1.14	5.07	2.36	1.56	.04	4.22	.93	1.69	2.18	1.04	3,85	.02	.86	.02	.31	3.75

Table C6

James River Benthos; October 20, 1977

Species, Number of Individuals and Total Wet Weight
(Without Clam Shell) in Grams per 0.1 m^2 at Each Station

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mollusks																
Rangia cuneata	7	6		8	10	8	6	2	3	5	11	11	2	1	2	27
Congeria leucophaeta																
Macoma mitchelli	11	7	2	4	4	10	2			4	2	3	3		1	4
Macoma balthica										1						
Corbicula manilensis																
Hydrobia sp.				1		1	1					2	1			1
Modiolus demissus						1	1	2						2	1	6
Annelids																
Polychaetes																
Scolecolepides viridis				1	6					1	4	4	6	2		
Nereis succinea	14		2			3		1	5	2	2	9	9	4	8	1
Lysipiddes grayi																
Polydora ligni																
Laeonereis culveri																
Heteromastus filiformis	1				4						7		1			
Oligochaetes								1			1					
Decapods																
Rhithropanopeus harrissi						1										

Table C6 (cont'd.)

Species	Station 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Amphipods																
Gammarus sp.																
Corophium lacustre	1															
Lepidactylus dytiscus			2				1									
Leptocheirus plumulosus	4	2		3		4					1	3	7	1		
Isopods																
Cyathura polita		1			1	1		1	1	1	1					
Edotea triloba					1					1						
Chiridotea almyra																
Dipteran larvae																
Hydroids				X	X	X		X		X	X		X	X	X	X
Balanus sp.								10		1	4	14		18	38	5
Ectoprocts	X				X		X			X	X			X	X	X
Biomass (grams)	3.8	2.8	.01	3.64	.05	3.2	3.96	.89	.02	.76	3.52	8.40	.07	.04	1.47	6.75

Table C7

Diversity and Related Parameters for Benthic Samples

March 8, 1977

Station Number	Number of Individuals	Number of SPECIES	SHANNON Formula H-PRIME	RICHNESS S-1/LN N
1	4	2	0.8113	0.7213
2	8	2	0.5436	0.4809
3	14	4	1.7884	1.1368
4	23	4	1.0862	0.9568
5	13	4	1.4885	1.1696
6	43	10	2.2530	2.3928
7	3	3	1.5850	1.8205
8	17	5	1.9015	1.4118
9	5	4	1.9219	1.8640
10	9	3	1.3921	0.9102
11	38	6	1.9624	1.3745
12	18	4	1.5003	1.0379
13	7	4	1.8424	1.5417
14	97	8	1.7363	1.5302
15	49	2	0.5917	0.2569
16	21	4	1.7057	0.9854
All Stations Combined	370	17	2.9313	2.7057

Table C8

Diversity and Related Parameters for Benthic Samples

April 25, 1977

Station Number	Number of Individuals	Number of SPECIES	SHANNON Formula H-PRIME	RICHNESS S-1/LN N
1	2	2	1.0000	1.4427
2	13	3	1.2957	0.7797
3	16	7	2.6556	2.1640
4	20	4	0.8476	1.001
5	8	3	1.2988	0.9618
6	9	5	2.1972	1.8205
7	13	4	1.6692	1.1696
8	8	4	1.5488	1.4427
9	2	2	1.0000	1.4427
10	2	2	1.0000	1.4427
11	63	8	1.7171	1.6895
12	5	3	1.3710	1.2427
13	13	6	2.0349	1.9494
14	36	6	1.9740	1.3953
15	15	5	1.9656	1.4771
16	14	6	2.4138	1.8946
All Stations Combined	239	19	3.4311	3.2868

Table C9

Diversity and Related Parameters for Benthic Samples

June 20, 1977

Station Number	Number of Individuals	Number of SPECIES	SHANNON Formula H-PRIME	RICHNESS S-1/LN N
1	11	3	1.0958	0.8341
2	11	4	1.6767	1.2511
3	13	3	0.9913	0.7797
4	29	5	1.9011	1.1879
5	201	7	0.7241	1.1314
6	22	2	0.9940	0.3235
7	15	4	1.8256	1.1078
8	58	7	1.8946	1.4777
9	17	3	1.0224	0.7059
10	20	5	1.5789	1.3352
11	517	15	1.3130	2.2407
12	182	10	1.2690	1.7294
13	13	5	1.5059	1.5595
14	12	5	2.0850	1.6097
15	12	2	0.6500	0.4024
16	43	8	2.0054	1.8611
All Stations Combined	1176	21	2.0090	2.8289

Table C10

Diversity and Related Parameters for Benthic Samples

July 14, 1977

Station Number	Number of Individuals	Number of SPECIES	SHANNON Formula H-PRIME	RICHNESS S-1/LN N
1	402	9	0.4686	1.3341
2	8	4	1.7500	1.4427
3	8	1	0.0000	0.0000
4	46	6	1.3719	1.3059
5	46	9	2.2011	2.0895
6	33	8	2.1178	2.0020
7	12	2	0.6500	0.4024
8	19	6	2.1471	1.6981
9	6	3	1.5850	1.1162
10	41	7	2.1498	1.6157
11	66	10	2.6458	2.1481
12	7	4	1.9502	1.5417
13	5	1	0.0000	0.0000
14	22	5	1.6542	1.2941
15	34	7	1.9388	1.7015
16	67	6	1.7788	1.1891
All Stations Combined	822	20	2.4735	2.8309

Table C11

Diversity and Related Parameters for Benthic Samples

August 18, 1977

Station Number	Number of Individuals	Number of SPECIES	SHANNON Formula H-PRIME	RICHNESS S-1/LN N
1	32	6	2.0109	1.4427
2	20	5	1.6784	1.3352
3	3	2	0.9183	0.9124
4	14	4	1.8774	1.1368
5	25	6	1.8539	1.5533
6	25	6	1.9715	1.5533
7	7	4	1.1488	1.5417
8	61	12	2.5899	2.6758
9	19	4	1.5288	1.0189
10	26	6	1.7947	1.5346
11	23	6	2.0165	1.5946
12	10	5	1.6855	1.7372
13	40	5	1.8598	1.0843
14	19	8	2.6101	2.3774
15	14	4	1.5216	1.1368
16	46	6	1.9576	1.3059
All Stations Combined	399	20	2.9853	3.1725

Table C12

Diversity and Related Parameters for Benthic Samples

October 20, 1977

Station Number	Number of Individuals	Number of SPECIES	SHANNON Formula H-PRIME	RICHNESS S-1/LN N
1	38	6	2.1161	1.3745
2	14	4	1.2958	1.1368
3	6	3	1.5850	1.1162
4	17	5	1.9254	1.4118
5	26	6	2.2109	1.5346
6	29	8	2.4451	2.0788
7	11	5	1.8676	1.6681
8	17	6	1.8981	1.7648
9	9	3	1.3516	0.9102
10	16	8	2.6494	2.5247
11	32	8	2.5717	2.0198
12	46	7	2.4932	1.5671
13	29	7	2.4288	1.7818
14	28	6	1.6981	1.5005
15	50	5	1.1354	1.0225
16	44	6	1.7435	1.3213
All Stations Combined	415	16	2.9637	2.4883

Section II a.

PLANT ENTRAINMENT OF ICHTHYOPLANKTON AT THE VEPCO NUCLEAR POWER PLANT

by

John V. Merriner

A. Deane Estes

and

Robert K. Dias

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We express our gratitude to Mr. Frank Wojcik who set up and ran the computer programs for several tables in this report. We thank Mr. John White of VEPCO who kindly reduced our oversized tables to standard size. We express our thanks to our typists, Mrs. Julia Millen, Ms. Barbara Gardner, and Mrs. Carolyn Orselli for their patience in typing this report. We thank our technical staff who spent many long hours at Surry collecting the data and we thank the VEPCO biologists and technicians for their assistance in the field. We also thank Mary Ann Vaden who prepared the figures included in this report and Marguerite Shackelford who proofread the final copy.

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INTRODUCTION

Ichthyoplankton entrainment sampling at VEPCO Surry Nuclear Power Plant was initiated by the Ichthyology Department of Virginia Institute of Marine Science in April 1975. Objectives of this study were assessment of the kinds and amounts of ichthyoplankton being entrained from the James River near Hog Island and passed through the Surry facility.

VEPCO Surry is located near the fresh-saltwater transition zone of the James River. Depending upon river flow and salinity patterns in the area, ichthyofauna can range from strictly freshwater species to marine strays. This reach of the estuary serves as spawning grounds (engraulids, gobiids), fish nursery grounds (sciaenids, Brevoortia), and migration route (Anguilla, Morone and Alosa). White (1976) reported 84 species representing 38 families in the vicinity of Hog Island and VEPCO Surry Nuclear Power Plant. Most of these species do not spawn in the vicinity of Hog Island but are found there as juvenile through adult life stages. They are not subject to entrainment.

Many eggs, prolarval, and larval fishes are pelagic, and therefore are transported by water currents. Pelagic fish eggs and larvae are potentially subject to entrainment when present in the waters surrounding the intake structure at VEPCO Surry. Intake pumps have a combined capacity to withdraw 1.68 million gallons of water per minute from the James River. Water velocity at the intake structure trash bars is approximately 1 foot/second (Applicants Environmental Report), but velocity fields have not been thoroughly mapped at distances away from the trash bars (J. White, personal communication).

Samples through December 1977 have been sorted, identified, enumerated, and stored in vials. Data from these samples have been punched and are stored on ADP cards.

Species lists and abundance of fish eggs, larvae, juveniles, and adults taken in samples from January through December 1977 are presented. Ranges of salinity, dissolved oxygen, and temperature for each 24-hour sampling station are also presented. Species composition, trends of abundance, statistical analyses of the data set (1977), and entrainment impact upon the ichthyofauna near Hog Island are discussed.

Sampling visits for plant and thermal plume ichthyoplankton entrainment during 1977 are presented in Table 1. Sampling intensity reflects anticipated periods of greatest spawning activity (April, May).

METHODS AND MATERIALS

Ichthyoplankton entrainment studies at VEPCO Surry Nuclear Power Plant from January through December 1977 employed a 0.5 meter paired net apparatus (Figure 1) equipped with conical Nitex nets (505 μ mesh) and General Oceanics Digital Flowmeters (Model 2030). Flowmeters were periodically calibrated in the VIMS flume.

Sampling sites for the 24-hour stations were: (1) intake structure forebay directly in front of the trash bars, and (2) mid-channel in the discharge canal at the roadway bridge. Samples were made at surface, midwater, and bottom depths at sample times of 1000, 1400, 1800, 2200, 0200, and 0600 hours. Tow time at the intake was 10 minutes and at the discharge was 5 minutes. Temperature, salinity, and dissolved oxygen data were recorded for each sample at each sample time.

Tow times at the intake and discharge reflect a compromise between sampling equal water volumes and sampling the same water mass at each site. Time of passage through the facility (intake to discharge) is approximately one hour (J. White, personal communication). Transportation time between sites was approximately 15 minutes and occasionally, sampling in the discharge was delayed.

Dissolved oxygen samples were fixed on station for laboratory analysis by Winkler Titration Method. Salinity samples were returned to VIMS for analysis with a Beckman RS-7 induction salinometer. Water temperature was measured with a stem thermometer (-35 to 50 C, 1 C interval) and recorded in the field sample log. Sea state, weather, tidal stage, turbidity, air temperature, and wind were recorded on the log sheet at the time of sampling.

Samples were preserved in approximately 5% formalin in the field and returned to the lab for sorting, enumeration, and identification. Data are stored on ADP cards. Specimens are retained in vials with 5% buffered formalin for further study or reference.

The manual by Lippson and Moran (1974) has been most useful in identification of specimens. Myomere counts of small larvae were facilitated by clearing and staining (Mook and Wilcox, 1974).

The site visit scheduled for January 1977 was cancelled as severe ice conditions existed in the James River during the entire month.

Vessels and operators for 24-hour stations were provided by VEPCO. Two VIMS project personnel were required on each of two 12-hour shifts.

All calculations and conclusions presented in this report are based on number of organisms per 100 cubic meters of water strained unless otherwise stated.

Statistical methods

Catch data were subjected to statistical analysis (a) to determine the significant spatial and temporal trends in the ichthyoplanktonic community, (b) to develop regression models which identify the major environmental factors of importance to community structure, and (c) to assess significant patterns in two dominant fish populations (Anchoa mitchilli and Gobiosoma bosci).

Six dependent or response variables (Y_i) which reflect overall community structure were included in the analysis; these were total abundance of fish, abundance of fish species, fish species diversity (Shannon index), total abundance of eggs, abundance of egg species, and egg species diversity. The abundance of A. mitchilli fish, A. mitchilli eggs, and G. bosci fish were also included as dependent variables. [NOTE: For simplicity throughout this report, the species abundance and species diversity of the egg stage are referred to as egg species abundance and egg species diversity, respectively.]

Measures of abundance were computed as $Y_i = \log_e (C_i + 1)$, where Y_i is abundance and C_i is standardized catch of collection i (i.e. number captured per 100 cubic meters of water strained per collection). Logarithmic transformation of the catch data was necessary to convert discrete variables to continuous form and to remove heterogeneity and non-normality from the data. Measures of species diversity were not log-transformed, but were analyzed in their original scale.

Ten independent variables (X_j) were chosen for analysis: sample depth, water temperature, salinity, dissolved oxygen, tide and dummy variables for sampling location, period and seasons (fall, winter and spring). Table 2 summarizes notation and defines the dependent and independent variables.

Multiple regression was selected as the major method to analyze trends in the response variables for the following reasons:

(a) Complex multivariate relationships exist between the abundance of fish and eggs and environmental variables; as a descriptive tool, multiple regression can give a concise summary of these relationships.

(b) Field survey data are confounded by numerous factors since such surveys are observational in nature rather than controlled; multiple regression allows for control of some of these confounding factors by the use of "dummy" (categorical) variables. Also, each partial regression coefficient is computed as if the other variables in the equation are held constant, thereby removing their confounding effects.

(c) The ability to accurately predict the effects of environmental change or modification upon living resources is an ultimate goal; multiple regression techniques can be used to develop empirical models with predictive capabilities.

Stepwise regression techniques (Draper and Smith, 1966) were used to develop the "best" regression equation for each Y_i in the following manner:

(a) The dependent variables were plotted against environmental (independent) variables and the data were transformed where necessary.

(b) Matrices of simple correlation coefficients of dependent and independent variables and selected transformations were computed.

(c) Using the multiple regression model

$$Y_i = B_0 + B_1X_1 + B_2X_2 + \ldots + B_pX_p + \varepsilon,$$

where Y_i is abundance or species diversity, X_j is some function of one of the selected environmental variables, and B_j is a partial regression coefficient, a stepwise regression was performed to identify those parameters which explain a significant portion of the variation in the model.

(d) For each final regression equation residuals were analyzed to detect possible violations of the basic assumptions that the errors were independent, had zero mean, constant variance and followed a normal distribution.

Computations were made using SPSS version 6.02 (Nie, et al., 1975). Independent variables were retained in the equations if their partial regression coefficients (b_j) could be declared significantly different from zero at $P<0.10$. Equations for the community structure variables (Y_1 through Y_6, Table 2) were based upon data from February through December 1977; severe ice conditions in January did not permit sampling in this month. Equations for *A. mitchilli* and *G. bosci* (Y_7 through Y_9) were based on data from May through October 1977, the time period in which eggs and larvae of these species are known to occur.

RESULTS AND DISCUSSION

Seasonal Trends in Species Composition and Abundance

Number of species (fish) increased from February to May, then remained stable through July, except on 10-11 May when a large number of species were captured at the discharge (Fig. 2; Table 3). Number of species declined slightly in August, then remained stable through October, declined in November and increased slightly in December. Number of species was not consistently greater at either the intake or discharge. Lowest number of species was recorded on 17-18 February; highest number was recorded on 10-11 May.

Fish eggs were captured from March-September (Fig. 3; Table 3). Number of species increased from early March to late March, then remained stable through late June. Number of species decreased in late June, increased in July, decreased again in September, and none were captured in October. Fish eggs were captured only in the discharge during March and discharge samples had consistently more species than the intake, indicating spawning activity in either the high level intake canal or the discharge canal.

Calculated number of fish ($100m^3$) captured in 24-hour samples increased from February-March, then declined from March to mid-May (Fig. 4). Abundance of fish increased from mid-May through July when the greatest abundance was recorded. Abundance declined sharply in August and September, then remained stable through November, and increased slightly in December.

Increased fish abundance during March (Fig. 4) was due to large catches of adult bay anchovy, Anchoa mitchilli and postlarval Atlantic menhaden, Brevoortia tyrannus (Table 4). VIMS trawl surveys indicate that anchovy spend winter months farther downriver (Hoagman and Kriete, 1976) and begin moving upriver again as water temperatures rise. The high abundance recorded from June-August reflect the peak spawning activity of naked goby, Gobiosoma bosci and bay anchovy (Table 4).

Abundance of fish was generally higher at the intake during warmer months and higher at the discharge during cooler months (Fig. 4) though this cannot be considered a hard and fast rule. During cooler months, fish are present predominately in juvenile and adult life stages. These fish might effectively avoid our nets at the intake where low water velocities exist and yet be captured in the turbulent, faster water at the discharge.

Abundance of fish eggs was low (<3/sample) until 17-18 May, except in the discharge on 12-13 and 19-20 April (Fig. 5). Spawning in the high level intake canal or discharge canal presumably caused these increases. An increase in abundance was recorded on 17-18 May and a sharp increase was noted on 23-24 May as bay anchovy spawning activity increased. Abundance of eggs fluctuated from late May-July, but remained high relative to other months. Abundance declined in August and September and no eggs were captured past September. Highest abundance of eggs was recorded on 21-22 June.

Average catch of fish per sample (100m^3; all stations combined) decreased at all depths between or when comparing intake to discharge (Table 5). Average catch per sample was stratified with depth (greatest catch at bottom) at both the intake and discharge.

Average catch of fish eggs per sample (100m^3; all stations; comparing intake to discharge) increased in surface samples, remained constant at midwater, and decreased in bottom samples (Table 5). Eggs were stratified with depth at the intake (greatest catch at the bottom) but little stratification was found at the discharge.

Bay anchovy and naked goby were the dominant species captured during 1977 as had been shown in 1975 and 1976 (Tables 5, 6, and 7). All life stages of bay anchovy were captured; gobies were primarily in the larval and post-larval stages. Eggs, larvae, and postlarvae of both species were taken from April through September. Juvenile and adult anchovy were taken all year. These two species comprised 91.7% of the total yearly calculated catch for both fish and eggs [bay anchovy = 68.5% (fish = 10.6%; eggs = 57.9%); naked goby = 23.2%]. From April-September, the period of larval goby and anchovy abundance, bay anchovy = 67.8% (fish = 4.9%; eggs = 62.9%) and naked goby = 25.2% of the total calculated catch. Naked goby was the most abundant fish captured reaching concentrations of 37/m^3 on 21 July (Table 7). Bay anchovy concentrations also peaked on 21 July when $2/m^3$ were recorded. Bay anchovy eggs were the most abundant organism with concentrations reaching $42/m^3$ on 21 June (Table 9).

Total yearly calculated catch ($100m^3$) of bay anchovy (fish and eggs) rose slightly over 1976 (approximately 143,000 versus 139,000). Percentage of total catch also rose over 1976 (65.5% versus 59%) while total catch of all fish and eggs decreased (209,000 versus 236,000)(Jordan et al, 1977). The number of samples taken decreased in 1977 (1,339 versus 1,407), however the average catch per sample (yearly) of anchovy increased from 99/sample to 107/sample.

Total yearly calculated catch of naked goby decreased sharply from 1976 (49,000 versus 78,000). Percentage of total catch also decreased from 1976 (23% versus 33%)(Jordan et al, 1977) and average catch per sample decreased from 55/sample to 36/sample.

Atlantic silversides (Menidia menidia), Tidewater silversides (Menidia beryllina), and rough silversides (Membras martinica) were captured in all life stages (Tables 7 and 9). Eggs, larvae, and juveniles were occasionally numerous ($>3/m^3$) during spring and summer; only juveniles and adults (in low numbers) were captured in fall and winter. The rough silversides was the most abundant species of the silversides group. Silversides eggs, normally demersal and attached to submerged objects, presumably had been dislodged by wave action and water currents.

Striped bass (Morone saxatilis) were captured on only three occasions (Tables 7 and 9); one egg, one larva, and one juvenile were taken. Larval white perch (Morone americana) were not captured in 1977 (Table 7). White perch eggs were captured from April 19-May 10 in concentrations less than $1/m^3$ (Table 9). During late April, white perch eggs were common occurrences; most were captured in discharge samples indicating some spawning in the high level intake canal or the discharge canal. Resident populations of white perch, catfish, etc. are found in the high level intake canal (J. White, personal communication).

Striped bass larvae were less abundant and white perch (eggs) were more abundant in 1977 samples than in 1976 or 1975 (Jordan et al., 1977, 1976).

Postlarval and juvenile Atlantic croaker (Micropogon undulatus) and spot (Leiostomus xanthurus) were captured seasonally (Table 7). Spot were captured in concentrations $<1/m^3$ during the springtime. Croaker were captured in fall and early-winter samples in concentrations of $<2/m^3$.

Sciaenids are hatched offshore and soon thereafter move into estuaries which serve as nursery areas for postlarvae and juveniles. The area encompassing Hog Point is a portion of their James River nursery area. Upon entering the nursery, the fish re-distribute in search of food, etc. Haven (1957) and Chao (1976) found juvenile croaker in salinities from $0\text{-}18^0/_{00}$ with smallest fish in lowest salinities. Croaker remain in the estuary for almost a year before returning to sea (Chao, 1976) and may occupy the entire saline portion of the estuary.

Carp (Cyprinus carpio) eggs were taken in low numbers during early April. Carp eggs were taken primarily in the discharge canal (Table 9). Several carp larvae were also taken (Table 7).

Other species were captured only in lower numbers (Tables 7 and 9).

Hydrographic Data

Ranges of salinity, water temperature and dissolved oxygen data taken during 24-hour stations are presented in Tables 10, 11, and 12 and intake data are shown in Figures 6, 7, and 8.

Several periods of extreme meteorological conditions occurred during 1977 causing hydrological data patterns to deviate from the norm. A prolonged period of sub-freezing temperatures in January produced severe ice conditions near VEPCO which prevented January sampling and led to low water temperatures and elevated salinities during February sampling (Figs. 6 and 7; Tables 10 and 11). March and April samples produced data that were near normal for early springtime samples. Dry conditions in late April caused salinities to rise slightly. Prolonged drought conditions throughout the spring and summer produced salinities consistently above normal until November (Fig. 6).

Water temperature at the intake reached a maximum of 32°C on 21-22 July (Fig. 7, Table 11). Water temperatures at the discharge usually exceeded intake temperatures by

4-9°C unless one or both of the units were inoperative (Table 11).

Dissolved oxygen data showed no oxygen deficiences at either the intake or the discharge canal (Fig. 8, Table 12).

Statistical Results

An examination of simple correlation matrices of potential regression variables in original and log-transformed scale was made to identify the final form of variables. In general, correlations were higher between transformed dependent variables (Y_i) and independent variables (X_j) in their original scale, except for fish and egg species diversities. Little or no improvement in correlations were found by transforming either species diversity or the independent variables.

Although many simple correlation coefficients (r) between the dependent and independent variables were declared highly significant ($P<0.001$), most correlations were not high (maximum $r = 0.593$). All independent variables, except depth and tide, were significantly correlated ($P<0.05$ or better) with five or more of the dependent variables.

Table 13 presents descriptive statistics of the dependent and independent variables, and Table 14 summarizes the results of the regression analysis. Each final regression equation is discussed separately, then overall patterns are summarized.

In the following discussion it is important to remember that the regression coefficients are partial coefficients which estimate the effects of a particular variable while holding constant or controlling for other variables in the equation. Evaluation of the contribution of a particular independent variable is facilitated by controlling the influence of other variables which, otherwise, could confound or mask significant relationships.

Total Abundance of Fish (Y_1):

All independent variables except tide were retained in the final regression equation as significant predictors of total abundance of fish. Although the equation for Y_1 was highly significant ($P<0.001$), less than one-third of the variation in total abundance of fish was explained by the regression ($R^2 = 0.29$). Since the primary objective of the analysis was to assess the effects of the independent variables and not to predict abundance, a low R^2 does not hinder the analysis.

Depth, temperature, period, fall and winter had positive partial regression coefficients (b_j's); i.e., their partial effects on Y_1 (fish abundance) were positive. The remaining variables had negative b_j's.

Within the ranges of values observed, the equation predicts an increasing total abundance of fish (Y_1) with an increasing depth or temperature, or with a decreasing salinity or dissolved oxygen, holding other variables constant. Y_1 was significantly higher ($P<0.10$) at the mouth of the intake canal than in the discharge canal (recall location was coded as 0 = intake, 1 = discharge). A significantly higher ($P<0.001$) fish abundance was found at night than day (period was coded as 0 = day, 1 = night).

Dummy seasons were included in the analysis to mathematically reduce the unexplained variation in the model and to remove factors which could confound the analysis. After allowing for the effects of other variables in the equation, spring had a significantly lower total abundance of fish than the reference season summer; for fall and winter, the converse was true. This does not mean that, overall, spring had a lower and fall and winter had a higher fish abundance than summer. Rather, other seasonal effects (in addition to those accounted for by variables in the equation) tend to decrease fish abundance in spring and increase it in fall and winter. Factors which may be reflected in the season dummy variables include time and duration of migrations of parent populations, recruitment, wind direction, currents, fishing efficiency of gear, and other unmeasured factors which vary seasonally. For example, the high abundance of ctenophores during the summer would decrease the gear efficiency by clogging nets and would lead to lower abundance estimates in this season. The overall effects of these factors can be masked by other factors and may not be evident when examining data summaries.

Abundance of Fish Species (Y_2):

All independent variables, except tide, fall and spring, were retained in the equation for Y_2. The highly significant equation explained 28 percent of the variation in fish species abundance. The partial regression coefficients for depth, temperature, location, period and winter were positive; those for salinity and dissolved oxygen were negative. Holding other variables constant, a significantly higher ($P<0.01$) fish species abundance was found in the discharge canal than at the mouth of the intake canal. Two plausible explanations for this unusual pattern are (a) additional species (not present in samples from the intake mouth) inhabited the intake canal, and (b) the efficiency and selectivity of the sampling gear differed between the two locations. Night samples had a higher abundance of fish species than day samples, and unmeasured seasonal factors represented by the dummy season winter tended to increase fish species abundance in this season.

Fish Species Diversity (Y_3):

The equation for Y_3, significant at $P<0.001$, explained 19 percent of the variation in fish species diversity. Temperature, location, period and spring were the only independent variables retained in the equation for Y_3 where their partial regression coefficients were positive. Fish species diversity will increase as these variables increase, holding other variables constant.

Total Abundance of Eggs (Y_4):

The regression of Y_4 on all independent variables, except salinity, location and tide, was highly significant and explained 42 percent of the variation in egg abundance. The partial effects of depth and temperature were positive, while the partial effect of dissolved oxygen was negative. All else being equal, the equation predicts a higher egg abundance during the day than at night. Unmeasured seasonal factors in fall, winter and spring tend to increase egg abundance during these seasons compared to summer. After allowing for other variables, no differences in egg abundance were found between intake and discharge samples.

Abundance of Egg Species (Y_5):

The highly significant regression equation for Y_5 explained 39 percent of the variation in egg species abundance. Depth, temperature, tide, winter and spring had positive partial regression coefficients (b_j's); period had a negative b_j. The remaining independent variables were not selected as significant predictors of egg species abundance. No significant differences in egg species abundance were detected between the two sampling locations.

Egg Species Diversity (Y_6):

Although the final equation for Y_6 was highly significant, less than 10 percent of the variation in egg diversity was explained by the regression. Temperature had a positive effect on egg diversity, and salinity had a negative effect. Holding temperature and salinity constant, a higher egg diversity was found in the discharge canal than at the mouth of the intake canal. Other independent variables were not retained in the equation.

Abundance of Anchoa mitchilli Fish (Y_7):

Fifty percent of the variation in Y_7 was explained by the highly significant regression of anchovy abundance on all independent variables except location. Depth and temperature had a positive relationship with anchovy abundance, and salinity and dissolved oxygen had a negative one. A higher anchovy abundance is predicted at night, at high slack water, or in the fall with all else being equal. The partial effect of spring on Y_7 was negative. No differences in anchovy abundance were found between the two sampling locations.

Abundance of Gobiosoma bosci Fish (Y_8):

The highly significant equation for goby abundance explained 60 percent of the variation in Y_8 and retained all independent variables except salinity. Depth, temperature, period, tide, fall and spring had positive partial regression coefficients, and dissolved oxygen and location had negative coefficients. A significantly higher goby abundance was found at the mouth of the intake canal, during the night, at high slack water, or in fall and spring after allowing for the effects of other variables in the equation.

Abundance of Anchoa mitchilli Eggs (Y_9):

The highly significant equation for anchovy egg abundance explained 56 percent of the variation in Y_9. All independent variables except tide were retained as significant predictors of anchovy egg abundance. Independent variables with significant positive partial regression coefficients were depth, temperature, salinity, fall and spring. Dissolved oxygen, location and period had negative partial regression coefficients. Intake collections and day collections exhibited a higher anchovy egg abundance.

Summary of Regression Analysis:

A nonparametric ranking procedure was developed to assess the relative importance of the independent variables. Direct comparisons of partial regression coefficients (b_j's) are not useful since the independent variables were measured in different units. However, comparisons between standardized coefficients (the dependent and independent variables were standardized to have unit variance) can be used to determine the relative effect of each independent variable on the dependent variables. The procedure consisted of ranking the absolute values of the standardized b_j's in each equation, summing the individual ranks for each variable across all equations, and ranking these sums to give an overall measure of relative importance. Ties were assigned average ranks, and dummy seasons were not included in the analysis. Table 15 summarizes these data.

Overall, temperature ranked first in relative importance and was retained in all nine regression equations as a highly significant ($P<0.01$ or better) predictor of fish and egg abundances and diversities. In all equations the relationship between temperature and the dependent variables was positive; within the range of temperatures encountered during the study, abundance and diversity will increase as temperature increases.

Dissolved oxygen was the second most important independent variable and was retained in all but three equations. Dissolved oxygen did not have a significant effect on fish and egg species diversities or egg species abundance; in the other equations it was highly significant and had a negative relationship with abundance. Apparently, levels of dissolved oxygen were never low enough to result in a decreased abundance.

Period was third in relative importance and was retained in all but one regression equation as a highly significant independent variable. The relationship between period and all fish abundance and diversity variables was positive; fish abundance and fish species diversity were significantly higher at night than during the day. If net avoidance was greater during the day because of increased visibility, this pattern could result from diurnal differences in the fishing efficiency of the sampling gear. The opposite pattern was observed for egg abundances which were significantly higher during the day. No explanation for this pattern can be offered at this time.

Salinity, fourth in relative importance, was a significant variable in five regression equations. Fish abundnace, fish species abundance, egg diversity and anchovy abundance increased as salinity decreased, holding other variables constant. The converse was true for anchovy egg abundance. Salinity did not have a significant effect upon the other dependent variables.

Location, next in overall importance, was retained as a significant variable in six equations, but the pattern of its effect was mixed. For three dependent variables (total fish, goby, and anchovy egg abundances), significantly higher catches were made at the mouth of the intake canal than in the discharge canal. For others (fish species abundance, fish diversity, and egg diversity), the reverse was true. The presence of resident populations of fishes within the intake canal proper is probably a complicating factor. The location dummy variable is a measure of the net mechanical removal of fish and eggs as the water passes through the plant. Additional fishes inhabiting the intake canal could account for the unexpected gain in fish and egg species diversities. Also, the stresses of passage through the plant could make some species more susceptible to capture in the discharge canal and would result in inflated estimates of diversity.

Depth was significant in seven regression equations. Depth had no significant effect on fish and egg species diversities but was significant for all other dependent variables. Fish, egg and species abundance increased significantly as depth increased. A majority of negatively buoyant eggs and larvae would explain this pattern. Also, surface effects (e.g. wind, currents, turbulence, and velocity) may have resulted in a decreased gear efficiency for surface samples.

Tide was the least important independent variable and was retained in only three equations. Tide had little or no effect upon the overall community structure. It was a significant factor, however, in the abundance of anchovies and gobies; their abundance increased as tide increased (i.e., abundance was greater at late flood, high slack and early ebb than at other tide stages).

CONCLUSIONS

VEPCO Surry Nuclear Power Plant does entrain and remove some as yet, undeterminable portion of the ichthyofaunal populations present in that 10 mile section of the James River encompassing Hog Point. The ecological impact of this removal has not been determined and it is unlikely that any impact can be determined in the immediate future. Pre-operational ichthyoplankton data are absent and current studies at VEPCO Surry have only been in progress since April, 1975. Therefore long term trends have not become evident and studies to determine ichthyoplankton abundance in the river proper have not been undertaken.

Natural fluctuations in fish populations are considerable at times and reflect changes in natural mortality. Natural mortality from the egg to juvenile stage is 99% or more (Pearcy, 1962; Ahlstrom, 1954). Success of a given yearclass is correlated with natural mortality and conditions on the spawning and nursery grounds. Thus from year to year there may be natural fluctuations of one or more orders of magnitude.

Adult fish population trends have been monitored from the pre-operational period to present. VEPCO data (screen impingement, seine and trawl) and VIMS trawl data reveal large increases and decreases in relative abundance of some fishes in the vicinity of Hog Point (J. White, personal communication and Bender et al., 1974).

Variability in our ichthyoplankton data set is also considerable and parallel in magnitude to that found in seine and trawl catches near VEPCO Surry. In addition to variability due to biological attributes of the organisms themselves, ichthyoplankton data are influenced by variability from the gear used, sampling techniques, environmental factors, etc.

Bay anchovy and naked goby are the most abundant species entrained by VEPCO Surry Nuclear Power Plant. Although not commercially important, they are forage species for commercially important species such as weakfish (<u>Cynoscion regalis</u>), striped bass (<u>Morone saxatilis</u>), bluefish (<u>Pomatomus saltatrix</u>), catfish (<u>Ictalurus</u> sp.), etc. (Hildebrand and Schroeder, 1928). They are abundant (relative to other species captured) in our samples; however it is unlikely that their centers of abundance are located at VEPCO Surry as both species prefer slightly more saline waters when spawning; abundance could fluctuate with salinity patterns.

Sharp changes in abundance of adult anchovy may occur from year to year. These are natural fluctuations that are a part of the biological atributes of any fish population. VIMS winter trawl data (Hoagman and Kriete, 1975) and VEPCO data (White, 1976) indicate relatively stable bay anchovy populations over the long term.

Naked goby are seldom captured in trawl or seine surveys. They inhabit oyster communities and other areas where crevices, etc. afford shelter. It is impossible to obtain a realistic estimate of adult population levels and no effect of the plant on population levels can be determined.

Species of direct economic or recreational value did not constitute a significant portion of total fish captured (comparing relative abundance of all species) during 1977.

The James River has been subjected to numerous stresses in recent years, i.e. organic and inorganic pollutants, siltation, flooding, etc. To extract any one stress (e.g. VEPCO Surry) from such a combination is extremely difficult, especially when the effects of other stresses have not been analyzed. Coupled with sampling variability, natural population fluctuations, biological attributes of ichthyoplankton, environmental factors, and other sources of variability inherent in any sampling program, any changes other than those of catastrophic proportions are difficult to assess.

Multiple regression techniques were useful in explaining some of the complex relationships between environmental factors and the abundance and diversity of fish and eggs, and in isolating factors which tend to confound the analysis of data from general field surveys. These techniques were successful in identifying the dominant environmental factors and assessing their relative importance. Also, this approach identified methods to improve the sampling design and suggested areas for future research. Although the percentage of explained variation was low in some cases, the predictability of the models could be increased with improvements in sampling design and incorporation of other factors into the equations. Other factors of importance are estimates of gear efficiency, clogging, avoidance and the effects of wind and currents. We can estimate the quantity of ichthyoplankton affected by the plant, but the biological significance of this impact cannot be assessed until the abundance of eggs, larvae, juveniles and adults in the region are determined and their interelationships are understood.

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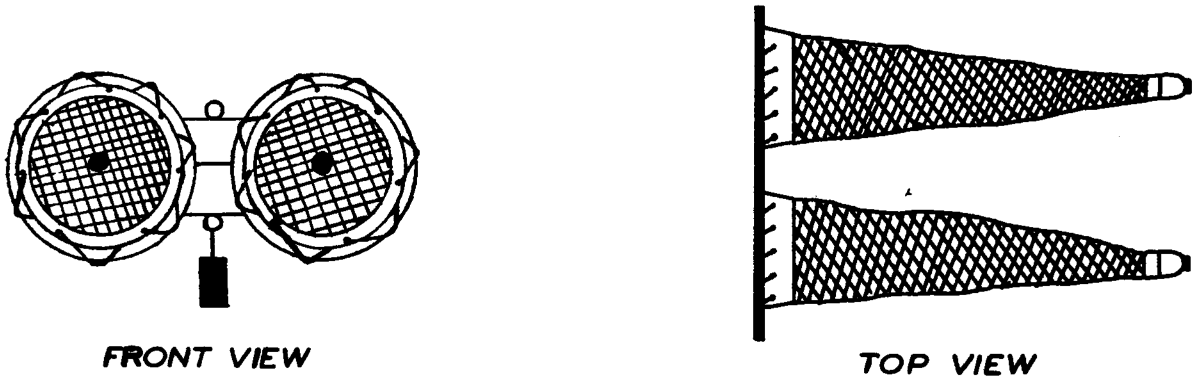

Figure 1. Paired net apparatus used at VEPCO Surry Nuclear Power Plant for ichthyoplankton collections.

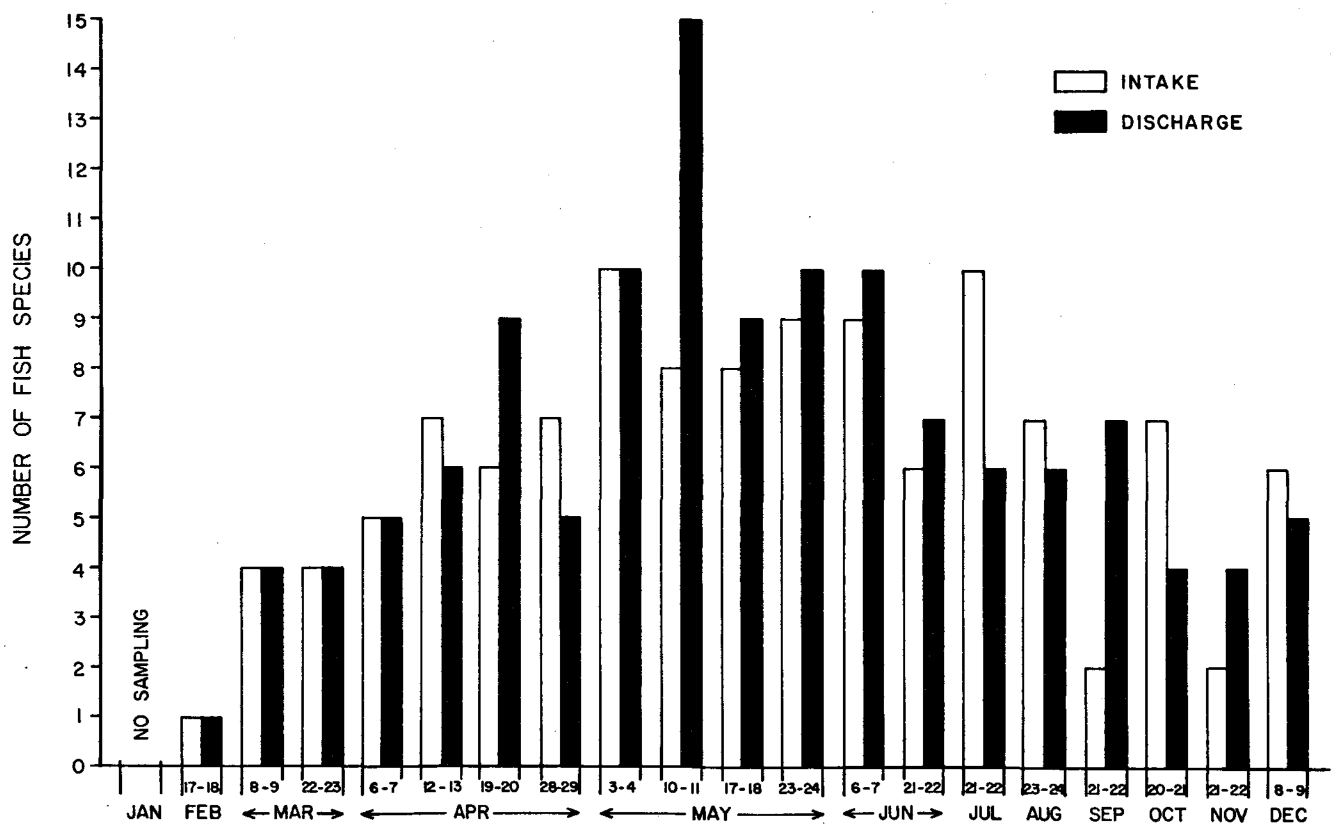

Figure 2. Number of fish species captured during plant entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

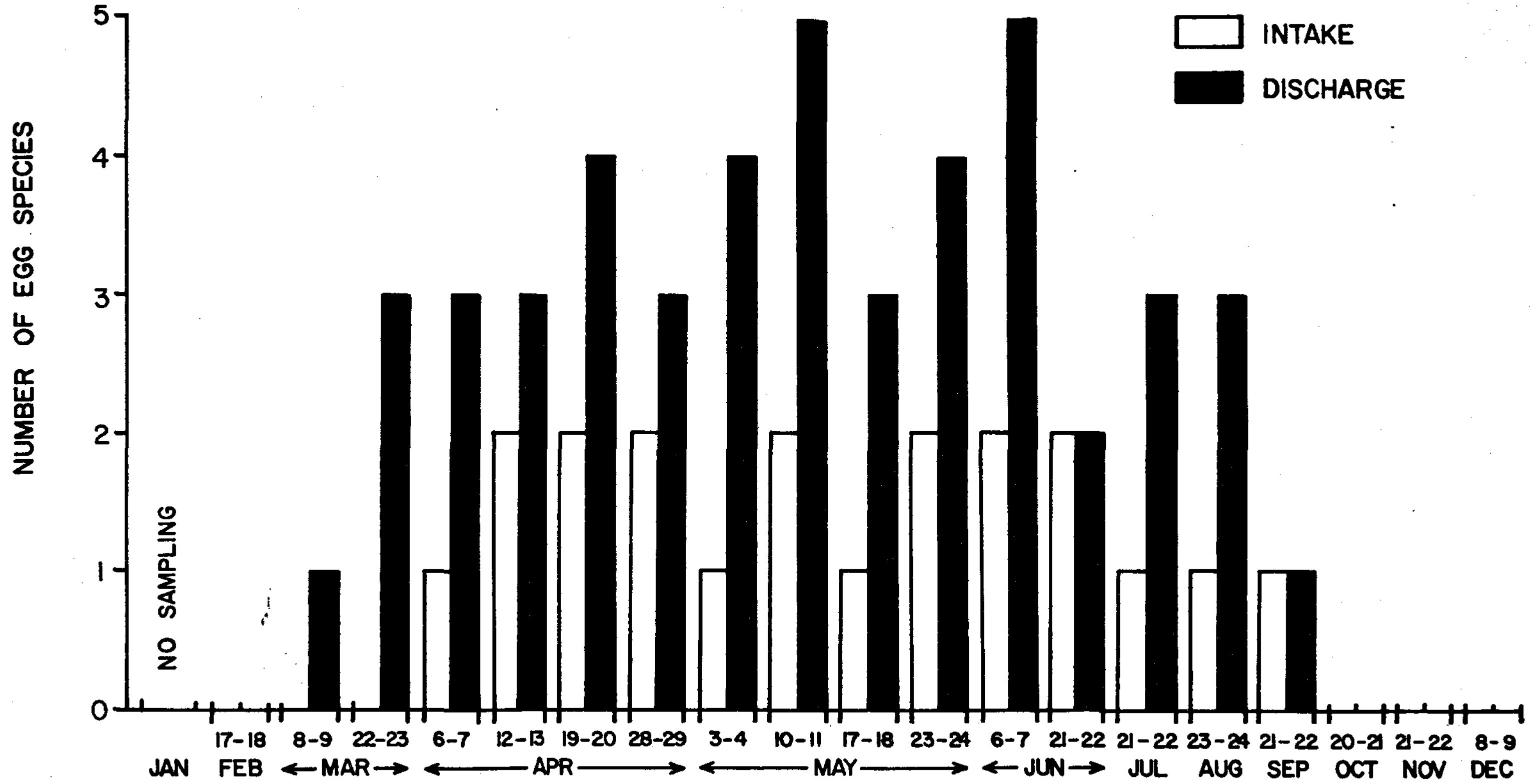

Figure 3. Number of egg species captured during plant entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

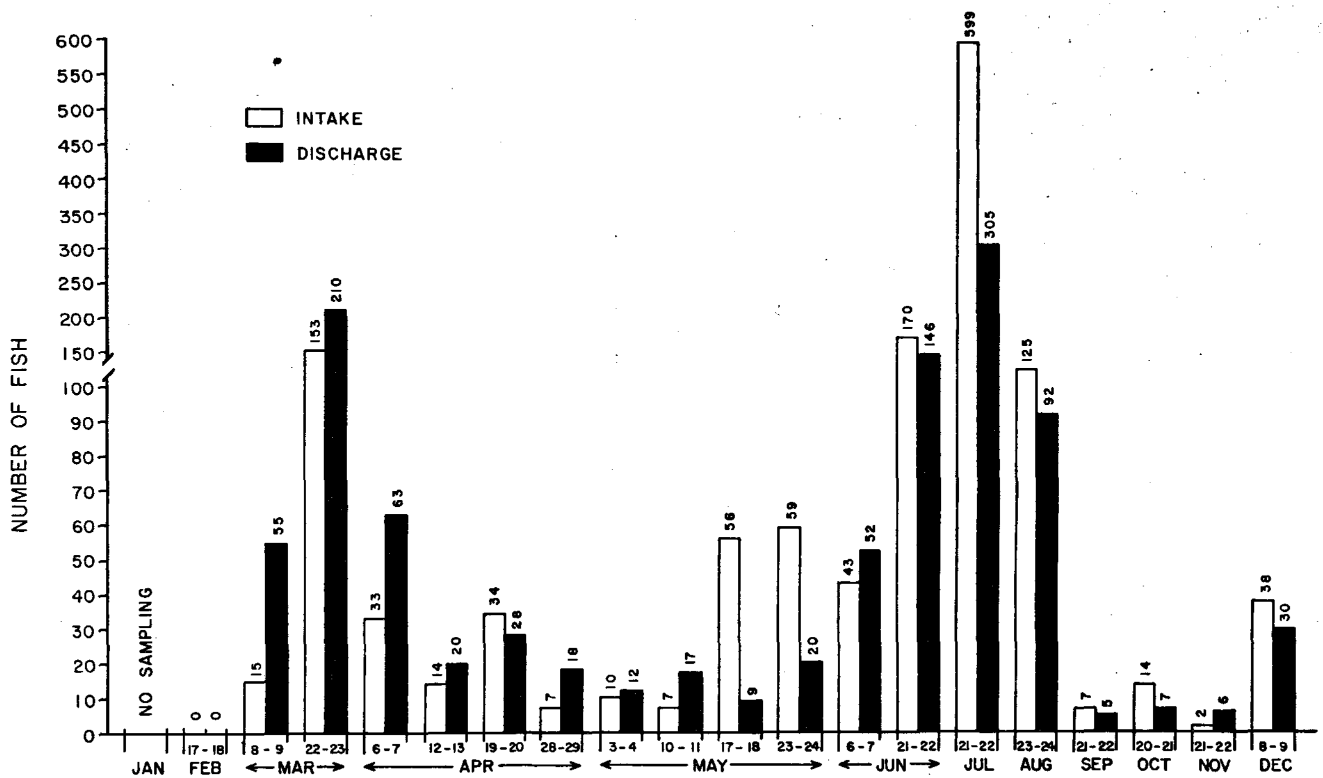

Figure 4. Average number of fish per sample ($100m^3$) captured during plant entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

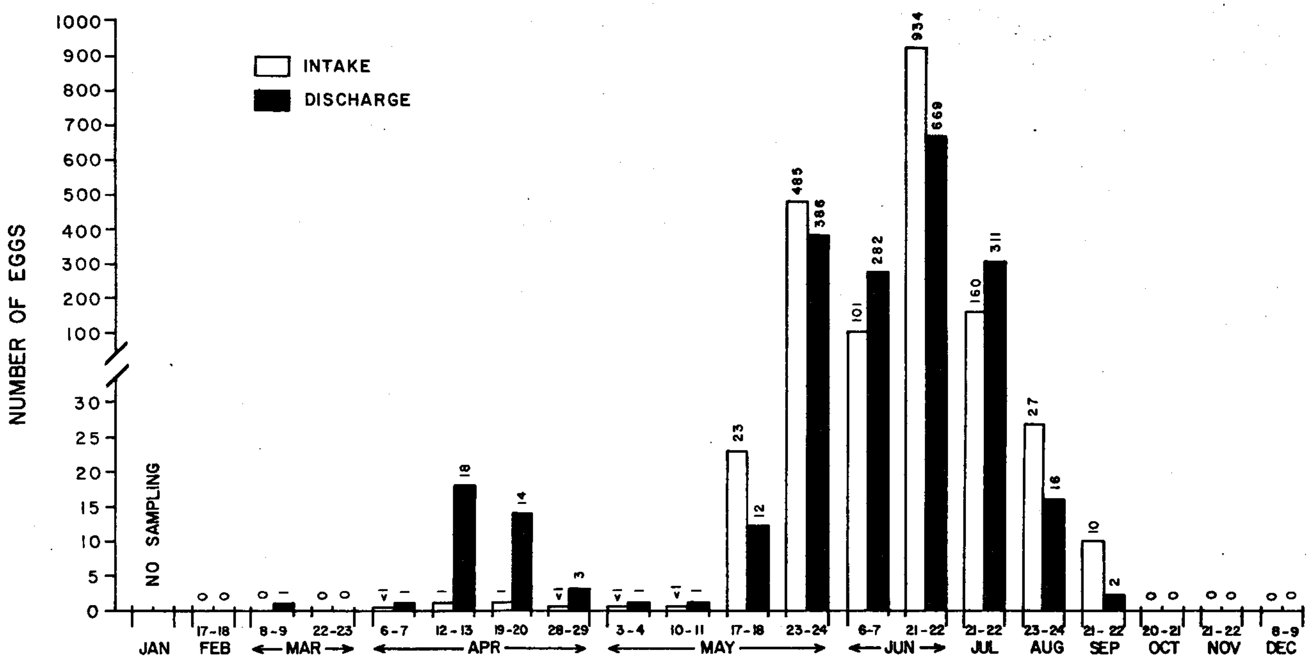

Figure 5. Average number of eggs per sample ($100m^3$) captured during plant entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

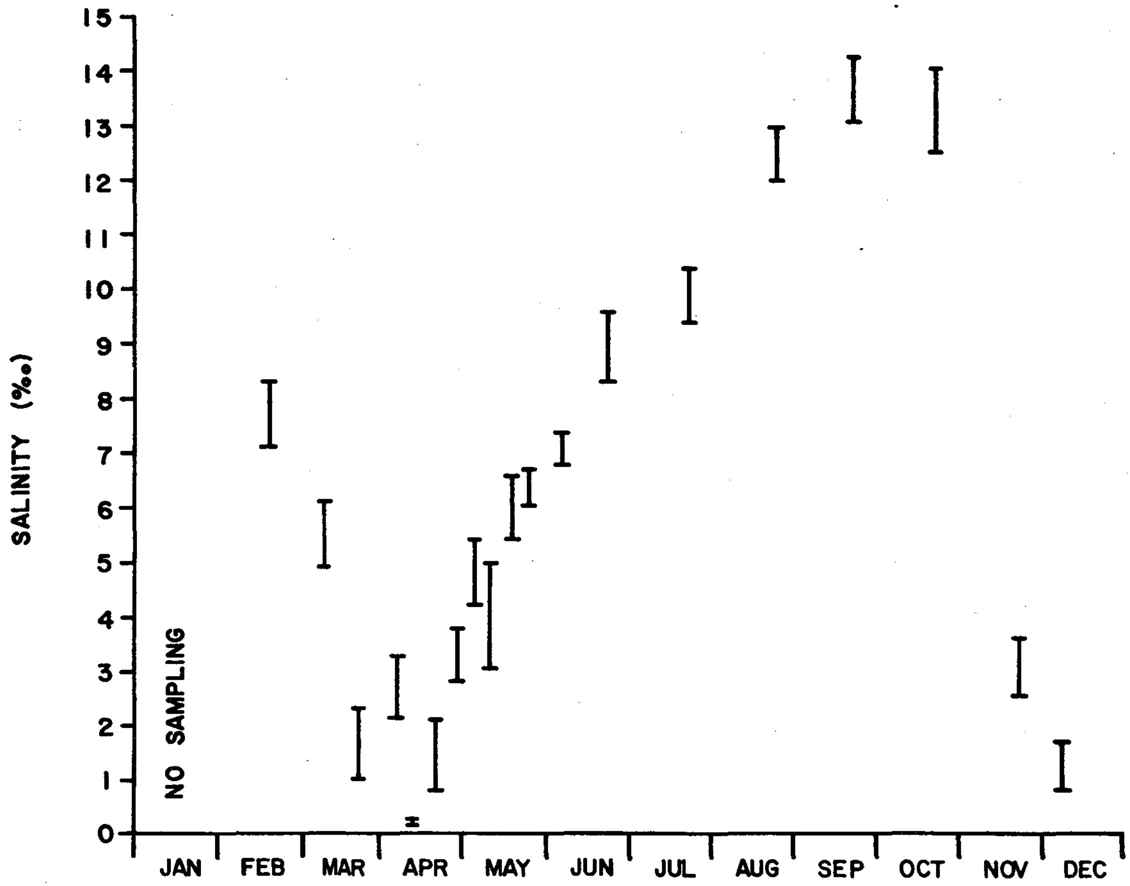

Figure 6. Ranges of salinity ($^0/_{00}$) at the intake during plant entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

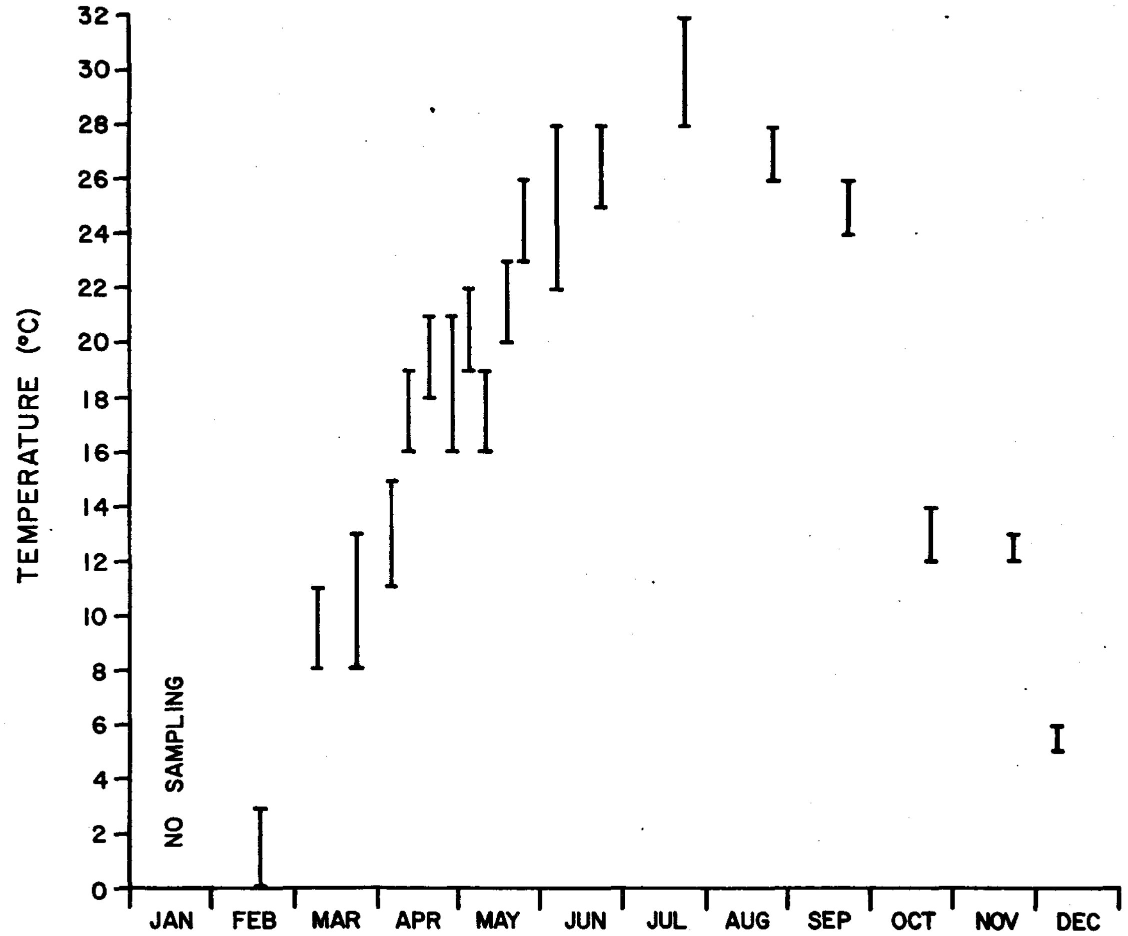

Figure 7. Ranges of water temperature (C) at the intake during plant entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

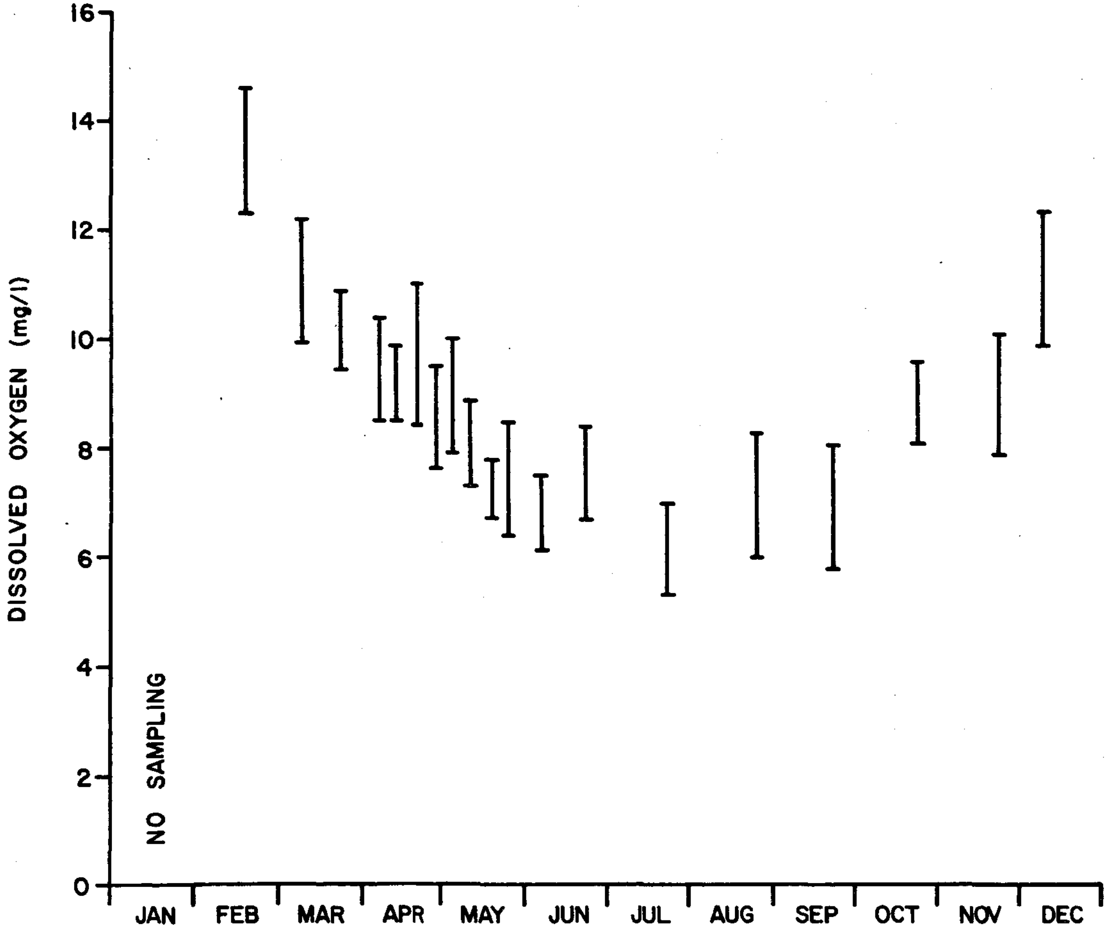

Figure 8. Ranges of dissolved oxygen (mg/l) at the intake during plant entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

Table 1. Ichthyoplankton sampling schedule for plant and plume entrainment studies at VEPCO Surry Nuclear Power Plant (January through December 1977).

Study	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Plant Entrainment	X*	X	XX	XXXX	XXXX	XX	X	X	X	X	X	X
Plume Entrainment	X*	X	XX	XXXX	XXXX	XX	XX	XXXX	XX	X	XX	XX

*No samples - severe ice conditions

Table 2. Dependent (Y_i) and independent (X_j) variables for statistical analysis (standardized catch is number collected per 100 cubic meters of water strained per collection).

Variable	Definition
Y_1, Total abundance of fish	$Y_1 = \log_e (C_1 + 1)$, where C_1 = standardized catch of fish
Y_2, Abundance of fish species	$Y_2 = \log_e (C_2 + 1)$, where C_2 = number of fish species
Y_3, Fish species diversity	$Y_3 = -\Sigma p_k \log_e p_k$, where $p_k = \frac{n_k}{N}$, n_k = number of fish of the k^{th} species, and N = total number of fish
Y_4, Total abundance of eggs	$Y_4 = \log_e (C_4 + 1)$, where C_4 = standardized catch of eggs
Y_5, Abundance of egg species	$Y_5 = \log_e (C_5 + 1)$, where C_5 = number of egg species
Y_6, Egg species diversity	$Y_6 = -\Sigma p_k \log_e p_k$, where $p_k = \frac{n_k}{N}$, n_k = number of eggs of the k^{th} species, and N = total number of eggs
Y_7, Abundance of *A. mitchilli* fish	$Y_7 = \log_e (C_7 + 1)$, where C_7 = standardized catch of *A. mitchilli* fish
Y_8, Abundance of *G. bosci* fish	$Y_8 = \log_e (C_8 + 1)$, where C_8 = standardized catch of *G. bosci* fish
Y_9, Abundance of *A. mitchilli* eggs	$Y_9 = \log_e (C_9 + 1)$, where C_9 = standardized catch of *A. mitchilli* eggs
X_1, Collection depth	Meters
X_2, Water temperature	°C
X_3, Salinity	ppt
X_4, Dissolved oxygen	mg/l
X_5, Location dummy variable	0 = intake, 1 = discharge

Table 2. Continued

Variable	Definition			
X_6, Period dummy variable	0 = day (5 to 16.9 h EST), 1 = night (17.0 to 4.9 h EST)			
X_7, Tide	Represented by a cosine function: +1.0 = slack before ebb; -1.0 = slack before flood			
X_8, X_9, X_{10}, Season dummy variables	Season	X_8, Fall =	X_9, Winter =	X_{10}, Spring =
	Summer (July, Aug., Sept.)	0	0	0
	Fall (Oct., Nov., Dec.)	1	0	0
	Winter (Jan., Feb., March)	0	1	0
	Spring (April, May, June)	0	0	1

Table 3. Number of species captured in plant entrainment samples at VEPCO Surry Nuclear Power Plant from January through December 1977.

DATE		INTAKE Number of Species Fish	Eggs	Both*	DISCHARGE Number of Species Fish	Eggs	Both*	Species Occurring at Both Intake and Discharge Fish	Eggs
Jan.		No Sample							
Feb.	17-18	1	0	0	1	0	0	1	0
Mar.	08-09	4	0	0	4	1	0	3	0
Mar.	22-23	4	0	0	4	3	0	4	0
Apr.	06-07	5	1	0	5	3	0	4	1
Apr.	12-13	7	2	0	6	3	0	4	2
Apr.	19-20	6	2	0	9	4	1	6	2
Apr.	28-29	7	2	1	5	3	1	4	1
May	03-04	10	1	0	10	4	2	8	1
May	10-11	8	2	1	15	5	2	8	2
May	17-18	8	1	1	9	3	2	8	1
May	23-24	9	2	1	10	4	2	8	1
June	06-07	9	2	2	10	5	4	6	2
June	21-22	6	2	2	7	2	1	4	1
July	21-22	10	1	1	6	3	3	5	1
Aug.	23-24	7	1	1	6	3	2	6	1
Sept.	21-22	2	1	1	7	1	1	2	1
Oct.	20-21	7	0	0	4	0	0	3	0
Nov.	21-22	2	0	0	4	0	0	2	0
Dec.	08-09	6	0	0	5	0	0	4	0

*Number of species that occur as both fish and eggs within the same sample.

Table 4. Average abundance (number per sample) of dominant species of fish and one species of fish/eggs captured during 24-hour sampling stations at VEPCO Surry Nuclear Power Plant from January through December 1977 (taken from numbers/100 m^3).

	Intake					Discharge				
	Anchoa mitchilli	Anchoa mitchilli eggs	Gobiosoma bosci	Micropogon undulatus	Brevoortia tyrannus	Anchoa mitchilli	Anchoa mitchilli eggs	Gobiosoma bosci	Micropogon undulatus	Brevoortia tyrannus
February 17-18	0	0	0	0	0	0	0	0	0	0
March 08-09	13	0	0	0	0	50	0	0	0	0
March 22-23	143	0	0	0	5	198	0	0	0	6
April 06-07	20	0	0	0	6	53	0	0	0	3
April 12-13	1	0	0	0	8	3	0	0	0	7
April 19-20	<1	0	0	0	28	4	0	0	0	11
April 28-29	<1	0	0	0	4	1	<1	0	0	3
May 03-04	0	<1	0	0	6	<1	<1	<1	0	5
May 10-11	0	<1	<1	0	1	<1	<1	<1	<1	7
May 17-18	1	23	<1	0	2	<1	12	<1	0	2
May 23-24	<1	483	10	0	1	1	386	6	<1	4
June 06-07	1	100	39	0	0	2	282	43	0	1
June 21-22	8	934	157	0	0	7	669	137	0	1
July 21-22	44	160	549	0	0	54	311	247	0	0
August 23-24	22	27	99	0	0	25	16	65	0	0
September 21-22	6	9	1	0	0	4	2	1	<1	0
October 20-21	1	0	<1	11	0	4	0	0	2	<1
November 21-22	1	0	0	1	0	4	0	0	2	0
December 08-09	3	0	0	35	0	3	0	0	26	0

Table 5. Average (yearly) number of fish and fish eggs captured per sample (by depth) during 24-hour entrainment stations at VEPCO Surry Nuclear Power Station from January through December 1977.

	Intake Surface	Discharge Surface	Intake Midwater	Discharge Midwater	Intake Bottom	Discharge Bottom
Fish	38	30	83	52	100	83
% Change	-21%		-37%		-17%	
Eggs	43	79	89	89	145	103
% Change	84%		0%		-29%	

Table 6. Species and number of fish captured during 24-hour stations at VEPCO Surry Nuclear Power Plant in 1977.

FEBRUARY 17 - FEBRUARY 18, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
NO CATCH MADE AT THIS TIME													
	14:00												
NO CATCH MADE AT THIS TIME													
	18:00												
ANGUILLA ROSTRATA													1
	22:00												
ANGUILLA ROSTRATA						1		1					
	2:00												
ANGUILLA ROSTRATA							1				1		
	6:00												

Table 6. (continued).

MARCH 8 - MARCH 9, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI						1	1				3	2	2
LEIOSTOMUS XANTHURUS								1	1			2	1
	14:00												
ANCHOA MITCHILLI		1				1				2	1	2	6
LEIOSTOMUS XANTHURUS			1						1				
SPECIMEN MANGLED								1					
	18:00												
ANCHOA MITCHILLI				1		1		1	1	32	36	45	49
ANGUILLA ROSTRATA										1			
LEIOSTOMUS XANTHURUS								1		1			
	22:00												
ANCHOA MITCHILLI		2		1		4	3			11	12	21	21
LEIOSTOMUS XANTHURUS										1	4	5	4
	2:00												
ANCHOA MITCHILLI					2	36	32		1	17	20	97	60
LEIOSTOMUS XANTHURUS		2	1			1	1			2	1	4	1
MENIDIA MENIDIA										1			
PARALICHTHYS DENTATUS							1						

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI		3	1	6	4	12	4	1		6	3	5	10
ANGUILLA ROSTRATA						1							
LEIOSTOMUS XANTHURUS				1	1			1		2	1	1	2

Table 6. (continued).

MARCH 22 - MARCH 23, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI	1	6	27	18	26	29	36	36	42	62	68	77
ANGUILLA ROSTRATA								1	1			1
BREVOORTIA TYRANNUS	1	2		1			3	2	1	6	5	8
LEIOSTOMUS XANTHURUS			1		1				1		9	1
14:00												
ANCHOA MITCHILLI	1	2	2	2	65	42	14	22	16	18	45	42
BREVOORTIA TYRANNUS	1	3		1	1			1		1		
18:00												
ANCHOA MITCHILLI	73	71	90	71	78	62	14	26	34	28	63	65
ANGUILLA ROSTRATA					1			1				
BREVOORTIA TYRANNUS	3	7	1									
LEIOSTOMUS XANTHURUS			4	2	1	2	1		1			2
22:00												
ANCHOA MITCHILLI	4	2	32	23	35	25						
ANGUILLA ROSTRATA	1				1							
LEIOSTOMUS XANTHURUS			2		3	4						
2:00												
ANCHOA MITCHILLI	2	1	35	51	24	32						
LEIOSTOMUS XANTHURUS		1		1	2	1						

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI		31	72	58	47	49	35	60	102	57	53	66	64
ANGUILLA ROSTRATA													2
BREVOORTIA TYRANNUS		11	7	4	1	1		3	1		1		1
LEIOSTOMUS XANTHURUS		1	1	4	5					6	5	9	4

Table 6. (continued).

APRIL 6 - APRIL 7, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		1			1	15	18	1	3	13	17	11	22
ANGUILLA ROSTRATA									1				
BREVOORTIA TYRANNUS		5	2						1	1		1	3
LEIOSTOMUS XANTHURUS			4	3	2	1	4		1			4	1
	14:00												
ANCHOA MITCHILLI		1				6	4	9	1	8	10	12	10
ANGUILLA ROSTRATA													1
BREVOORTIA TYRANNUS										1		1	2
LEIOSTOMUS XANTHURUS				2									
MENIDIA BERYLLINA			1										
	18:00												
ANCHOA MITCHILLI				11	11	8	5	9	22	48	49	44	44
BREVOORTIA TYRANNUS				1	1		1	1	1	2	1	5	
LEIOSTOMUS XANTHURUS												1	
SPECIMEN MANGLED											1		
	22:00												
ANCHOA MITCHILLI		6	3	8	8	5		7	3	22	19	49	29
ANGUILLA ROSTRATA								1					
BREVOORTIA TYRANNUS		2	3	5	8					2	3	2	3
LEIOSTOMUS XANTHURUS		1	1	7	6	2	12			10	15	11	5

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ANCHOA MITCHILLI		3	1	9	7	2		3	4	21	23	21	20
ANGUILLA ROSTRATA								1	1				
BREVOORTIA TYRANNUS				1			2				1		
LEIOSTOMUS XANTHURUS		1	1	3	1	5	4				4	1	
MENIDIA BERYLLINA								1					
TRINECTES MACULATUS							1						
	6:00												
ANCHOA MITCHILLI		5	3	7	4			5	4	12	14	7	6
BREVOORTIA TYRANNUS		5	13							1	1	3	
LEIOSTOMUS XANTHURUS								1		6	3	1	4
SPECIMEN MANGLED						1							

Table 6. (continued).

APRIL 12 - APRIL 13, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI									1	2			
BREVOORTIA TYRANNUS		16	14							1		1	1
LEIOSTOMUS XANTHURUS		1	2			1							
TRINECTES MACULATUS								1					
SPECIMEN MANGLED		1											
	14:00												
ANCHOA MITCHILLI										2	2		2
BREVOORTIA TYRANNUS				1						2	1	2	1
	18:00												
ANCHOA MITCHILLI				1		1	2		1	1		3	4
ATHERINIDAE												1	
BREVOORTIA TYRANNUS						5	3	1	1	7	6	2	5
LEIOSTOMUS XANTHURUS				1		1	1			1	3	1	1
MENIDIA BERYLLINA					1	2							
MENIDIA MENIDIA				1									
PERCA FLAVESCENS					1								
SPECIMEN MANGLED							1						

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	22:00												
ANCHOA MITCHILLI					1		1	1		1	4	2	4
ANGUILLA ROSTRATA					1				1	1			
BREVOORTIA TYRANNUS				6	1	7	11	1	3	4	6	7	10
LEIOSTOMUS XANTHURUS				1	2	12	5	1		14	12	9	11
	2:00												
ANCHOA MITCHILLI		1								1	1	5	
ANGUILLA ROSTRATA								1					
BREVOORTIA TYRANNUS								1	2	5	5	4	
LEIOSTOMUS XANTHURUS		2							1	20	18	9	9
SPECIMEN MANGLED								1					
	6:00												
ANCHOA MITCHILLI			1						1		1		
BREVOORTIA TYRANNUS		2	5	1			1			1			
LEIOSTOMUS XANTHURUS		1		2	2	2	2			2		2	4
SPECIMEN MANGLED													1

Table 6. (continued).

APRIL 19 – APRIL 20, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI										1			1
BREVOORTIA TYRANNUS		2							1			1	
MEMBRAS MARTINICA							1	1		1			
MENIDIA BERYLLINA								1			1		
MENIDIA MENIDIA		2											
	14:00												
ANCHOA MITCHILLI								1					
BREVOORTIA TYRANNUS						7	7					1	
MEMBRAS MARTINICA		1											
MENIDIA BERYLLINA							1						
	18:00												
ANCHOA MITCHILLI								5	2	1	3	2	2
BREVOORTIA TYRANNUS		3		11	20	12	17	4	3	6	8	2	5
CYPRINUS CARPIO												2	
LEIOSTOMUS XANTHURUS				1				4	8	1	1	1	
MENIDIA MENIDIA									1				

Table 6. (continued).

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
22:00												
ANCHOA MITCHILLI			1				1		1	2	1	1
ANGUILLA ROSTRATA							1	3				
BREVOORTIA TYRANNUS	21	4	26	32	18	11		2	6	3	7	1
CYPRINUS CARPIO										1		
LEIOSTOMUS XANTHURUS			5	2	7	9	2	1	12	17	3	1
MEMBRAS MARTINICA			1									
MENIDIA BERYLLINA								1				
MENIDIA MENIDIA							2					
2:00												
ANCHOA MITCHILLI					1		1	2	4	2	1	
ATHERINIDAE										1		
BREVOORTIA TYRANNUS					12	7	1	2	9	3	7	12
CYPRINUS CARPIO								1		1		
LEIOSTOMUS XANTHURUS					6	9			22	19	3	1
MENIDIA BERYLLINA			1			1			1			1
MENIDIA MENIDIA						1			1			
PARALICHTHYS DENTATUS												1
SPECIMEN MANGLED				1								
6:00												
ANCHOA MITCHILLI					1	1						
BREVOORTIA TYRANNUS	4	2		2	5	5	1	1		1	1	7
CYPRINUS CARPIO											1	
LEIOSTOMUS XANTHURUS	1			1								3
SPECIMEN MANGLED	1											

Table 6. (continued).

APRIL 28 - APRIL 29, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ALOSA AESTIVALIS					1	1							
BREVOORTIA TYRANNUS						1							
MENIDIA MENIDIA				1	1								
SPECIMEN MANGLED								1					
	14:00												
	18:00												
BREVOORTIA TYRANNUS									1				
LEIOSTOMUS XANTHURUS												2	
	22:00												
ANCHOA MITCHILLI											1		4
BREVOORTIA TYRANNUS		3	1										2
LEIOSTOMUS XANTHURUS						2						1	4
MENIDIA MENIDIA		1											1
SPECIMEN MANGLED						1							
	2:00												
ANCHOA MITCHILLI					1			1	1		2		
BREVOORTIA TYRANNUS		2	2	4	2	2	2	1	6	5	5	2	1
LEIOSTOMUS XANTHURUS					1	4	2	19	46	16	6	1	1
MEMBRAS MARTINICA						1							
PARALICHTHYS DENTATUS													1

Table 6. (continued)

		INTAKE						DISCHARGE					
SPECIES	STATION TIME	SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	6:00												
BREVOORTIA TYRANNUS		2	1			1	1		1	1	1	1	1
CYPRINUS CARPIO		1											
LEIOSTOMUS XANTHURUS						3	3	1	2	4	10	4	3

Table 6. (continued).

MAY 3 - MAY 4, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ALOSA AESTIVALIS											1		
ALOSA PSEUDOHARENGUS			1										
BREVOORTIA TYRANNUS						1					1		
LEIOSTOMUS XANTHURUS											1	1	
MEMBRAS MARTINICA									1				
MENIDIA BERYLLINA		2						1					
	14:00												
	18:00												
ALOSA AESTIVALIS								1					
ALOSA PSEUDOHARENGUS				1					1				
ANCHOA MITCHILLI											1		
ANGUILLA ROSTRATA													1
ATHERINIDAE			1										
BREVOORTIA TYRANNUS		1		2		1		1	2	1	1	3	
LEIOSTOMUS XANTHURUS								2		1	2	4	
MENIDIA BERYLLINA									1				
MENIDIA MENIDIA			1										
	22:00												
ALOSA PSEUDOHARENGUS											1		
ANCHOA MITCHILLI												1	
ANGUILLA ROSTRATA			1										
BREVOORTIA TYRANNUS		15	10		2			5	3	4	4	5	1
GOBIOSOMA BOSCI										1			
ICTALURUS PUNCTATUS						1							
LEIOSTOMUS XANTHURUS									1	4	11	3	4
MEMBRAS MARTINICA			1			3							
MENIDIA BERYLLINA			1			1							
MENIDIA MENIDIA					1								
SYNGNATHUS FUSCUS											1		

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ANCHOA MITCHILLI										1	1		
BREVOORTIA TYRANNUS		1			2						1		4
LEIOSTOMUS XANTHURUS				2				1	1	1		1	2
MEMBRAS MARTINICA			2										
MENIDIA BERYLLINA												1	3
MENIDIA MENIDIA					1	1							
	6:00												
ALOSA AESTIVALIS		1	1				1						1
ALOSA PSEUDOHARENGUS		1								1			
ANGUILLA ROSTRATA											1		
BREVOORTIA TYRANNUS						3	1	3	2	3	1		
LEIOSTOMUS XANTHURUS								1		1			1
MEMBRAS MARTINICA			1										
MENIDIA BERYLLINA												1	
SYNGNATHUS FUSCUS							1						

Table 6. (continued).

MAY 10 - MAY 11, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ATHERINIDAE												1	
GOBIOSOMA BOSCI													1
LEIOSTOMUS XANTHURUS								1	1				
MEMBRAS MARTINICA					1								
MENIDIA BERYLLINA		1											
	14:00												
ALOSA AESTIVALIS										1			
ICTALURUS PUNCTATUS										1			
LEIOSTOMUS XANTHURUS				1						1			1
MEMBRAS MARTINICA					1		4			1			
MENIDIA MENIDIA							1					1	
MORONE SAXATILIS										1			
	18:00												
ANCHOA MITCHILLI										1			
LEIOSTOMUS XANTHURUS												1	
SYNGNATHUS FUSCUS										1			
	22:00												
ANCHOA MITCHILLI												1	
ATHERINIDAE													1
BREVOORTIA TYRANNUS					1	5	1	6	10	2	5	28	19
LEIOSTOMUS XANTHURUS					2	6	5			4	1	16	17
MENIDIA MENIDIA												1	
SPECIMEN MANGLED		1											

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ALOSA PSEUDOHARENGUS										1	1		
ANCHOA MITCHILLI											1	1	
ANGUILLA ROSTRATA		1									1		1
BREVOORTIA TYRANNUS		1	1					1		1	1		3
DOROSOMA CEPEDIANUM		1	1					1					
LEIOSTOMUS XANTHURUS						1		2	2	4	3	3	2
MEMBRAS MARTINICA			1										
MENIDIA BERYLLINA					1	1			1				
MENIDIA MENIDIA			1			1				1			1
	6:00												
GOBIOSOMA BOSCI				1									
LEIOSTOMUS XANTHURUS									1			1	7
MEMBRAS MARTINICA								1			1		
MENIDIA BERYLLINA								1					
MICROPOGON UNDULATUS													1

Table 6. (continued).

MAY 17 - MAY 18, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ATHERINIDAE											1		
LEIOSTOMUS XANTHURUS						1							
MEMBRAS MARTINICA		7	3	4		1							
MENIDIA BERYLLINA		2		2							1		
MENIDIA MENIDIA					1						1		1
	14:00												
ANCHOA MITCHILLI					5	2	2	1					
ATHERINIDAE		17		4									
GOBIOSOMA BOSCI						3							
MEMBRAS MARTINICA		118	21	23	5	10	3	1				1	
MENIDIA BERYLLINA		30	10	8	2	5	2		1				
MENIDIA MENIDIA		54	14	15	4	10	6					1	1
	18:00												
ANCHOA MITCHILLI		2										1	
BREVOORTIA TYRANNUS		1										2	
GOBIOSOMA BOSCI											1	1	
MEMBRAS MARTINICA										1		3	1
MENIDIA BERYLLINA													2
MENIDIA MENIDIA									1			2	1
SPECIMEN MANGLED												1	
	22:00												
ANCHOA MITCHILLI											1		
ANGUILLA ROSTRATA			1	1					1			1	
ATHERINIDAE								1					
BREVOORTIA TYRANNUS						1	1	3	3	4	4	2	2
GOBIOSOMA BOSCI								1					
LEIOSTOMUS XANTHURUS				1			1	2	2	1	2	1	
MEMBRAS MARTINICA		5	6	2	3	1	1	2	2	2	1	4	2
MENIDIA BERYLLINA		2	8	3	3	2	3		1	2			4
MENIDIA MENIDIA		5	10	3	4	1		2	3			2	1

Table 6. (continued).

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	2:00												
ANCHOA MITCHILLI				1		1							
BREVOORTIA TYRANNUS				1		5	6	2	2			1	3
GOBIOSOMA BOSCI					1	1				1			1
LEIOSTOMUS XANTHURUS							3			1		2	2
MEMBRAS MARTINICA		7	3	1	1	1	1	1	1			2	
MENIDIA BERYLLINA		10	10		1	1	1	1					
MENIDIA MENIDIA		13	7	1	3			1		2	6	1	
	6:00												
ALOSA AESTIVALIS												1	1
ANCHOA MITCHILLI		1									1		
BREVOORTIA TYRANNUS					1							1	
GOBIOSOMA BOSCI												1	
LEIOSTOMUS XANTHURUS											1	1	
MEMBRAS MARTINICA		5	1	1		1	1		1			1	1
MENIDIA BERYLLINA		2											
MENIDIA MENIDIA		1											

Table 6. (continued).

MAY 23 - MAY 24, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ATHERINIDAE						1							
GOBIOSOMA BOSCI				2			1	2		3		1	2
LEIOSTOMUS XANTHURUS								1		1			
MEMBRAS MARTINICA		15	5		1	1	1	2	1			5	1
MENIDIA BERYLLINA			1					1					
MENIDIA MENIDIA						1					1		
	14:00												
ATHERINIDAE		2	2										
GOBIOSOMA BOSCI					1	1		1				1	
MEMBRAS MARTINICA		100	29	24	6	6	4	1				1	
MENIDIA BERYLLINA		20	4	5	2			2	1	2		4	
MENIDIA MENIDIA		30	10		5	2						1	
SPECIMEN MANGLED				1									
	18:00												
ANCHOA MITCHILLI		1											
ATHERINIDAE		1											
BREVOORTIA TYRANNUS						1							
GOBIOSOMA BOSCI				1	1	1	1	1		1			2
LEIOSTOMUS XANTHURUS												1	
MEMBRAS MARTINICA		6		1		3	4	2				1	2
MENIDIA BERYLLINA		1		1			3				2	1	2
MENIDIA MENIDIA		2	1	2	2	4	4					3	3
MICROPOGON UNDULATUS												1	
SYNGNATHUS FUSCUS		1											

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	22:00												
ANCHOA MITCHILLI								1	1	1	2	2	1
ATHERINIDAE				1			1						
BREVOORTIA TYRANNUS					2			18	20	10	3		1
GOBIOSOMA BOSCI				5	5	5	2		1	1	5	4	8
LEIOSTOMUS XANTHURUS								7	12	12	4	5	2
MEMBRAS MARTINICA				1		2				1			
MENIDIA BERYLLINA				1	2	2		1	1		2	2	
MENIDIA MENIDIA			2		1				3	2			
MICROPOGON UNDULATUS											1		
	2:00												
ANCHOA MITCHILLI							1		1				
ANGUILLA ROSTRATA		1	2		3				2				
BREVOORTIA TYRANNUS				1		1							
GOBIOSOMA BOSCI		1		8	13	9	14	2	2	8	6	17	13
MEMBRAS MARTINICA		2	2		2		5			3			
MENIDIA BERYLLINA		1	1	4	3	1	3				1	1	
MENIDIA MENIDIA			8	1	2	1	5			1	1	1	1
SYNGNATHUS FUSCUS				1						1			
	6:00												
ANCHOA MITCHILLI												1	
ATHERINIDAE							1						
BREVOORTIA TYRANNUS											1		
GOBIOSOMA BOSCI				6	5		3			3	1	6	1
HYPSOBLENNIUS HENTZI			1										
MEMBRAS MARTINICA			22	1	4		7	2	1			1	2
MENIDIA BERYLLINA		3	7		5		1		1			1	
MENIDIA MENIDIA			9		1	1		1	1	1		2	1

Table 6. (continued).

JUNE 6 - JUNE 7, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI									1			
GOBIOSOMA BOSCI	1		2			1			4	3	20	18
MEMBRAS MARTINICA	2	1				1		1				1
MENIDIA MENIDIA	1	1										
14:00												
GOBIOSOMA BOSCI			9	12	14	10						
SYNGNATHUS FUSCUS			1									
18:00												
ANCHOA MITCHILLI							1	2	1			3
GOBIOSOMA BOSCI	4	3	16	4	3	12	17	4	15	21	33	29
MEMBRAS MARTINICA									2			
MENIDIA BERYLLINA										1		
22:00												
ANCHOA MITCHILLI							1					1
BREVOORTIA TYRANNUS							3	6	1	1		
CYNOSCION REGALIS				1								
DOROSOMA CEPEDIANUM		1										
GOBIOSOMA BOSCI	44	82	12	24	6	5	1	3	12	9	9	14
LEIOSTOMUS XANTHURUS							7	2	5	7	4	4
MEMBRAS MARTINICA	1		1	1		1	1	2				
MENIDIA BERYLLINA	2							1	1			
MENIDIA MENIDIA							2	1				
MORONE SAXATILIS										1		
TRINECTES MACULATUS					2	1						

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ANCHOA MITCHILLI			1		1			1	1				1
ANGUILLA ROSTRATA									1				
CYNOSCION REGALIS			1										
GOBIOSOMA BOSCI			19	1	10	10	15	6	9		7	23	22
LEIOSTOMUS XANTHURUS											3		
MEMBRAS MARTINICA		1	1		1			1					1
MENIDIA BERYLLINA					1	1							
TRINECTES MACULATUS							1						
	6:00												
ANCHOA MITCHILLI					1		3	1	2	1	1	2	2
CYNOSCION REGALIS													1
GOBIOSOMA BOSCI			2	7	22	3	13	3	5	17	18	37	38
LEIOSTOMUS XANTHURUS								1					
MEMBRAS MARTINICA			2									1	
MENIDIA MENIDIA									1	1			

Table 6. (continued).

JUNE 21 - JUNE 22, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI					1				1			2
GOBIOSOMA BOSCI			23	28	32	34	12	9	19	7	50	60
MEMBRAS MARTINICA	1	1										
14:00												
ANCHOA MITCHILLI			3				1	3	4	1	3	10
GOBIOSOMA BOSCI		1	49	51	63	63	32	51	81	81	85	114
MEMBRAS MARTINICA	11	11										
MENIDIA BERYLLINA		1										
18:00												
ANCHOA MITCHILLI			5	1	3	3	2	2	2	2	9	5
BREVOORTIA TYRANNUS												1
GOBIOSOMA BOSCI	155	158	47	115	93	81	72	196	88	116	138	110
MEMBRAS MARTINICA	2									2	1	
MENIDIA MENIDIA	1											
SYNGNATHUS FUSCUS								2			1	1
22:00												
ANCHOA MITCHILLI	2	1	6	27		2	5	1	4	2	3	1
FUNDULUS HETEROCLITUS							1					
GOBIOSOMA BOSCI	57	15	74	27	8	5	18	18	37	30	56	34
MEMBRAS MARTINICA	1		3	3	1		1		1		5	2
MENIDIA BERYLLINA		1										
SYNGNATHUS FUSCUS							1					

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ANCHOA MITCHILLI		2		1	2	2	2	1	1	4	1	6	3
ANGUILLA ROSTRATA												1	
GOBIOSOMA BOSCI		9	11	26	36	25	31	5	3	22	17	42	33
MEMBRAS MARTINICA		1		1						2	3	5	2
SYNGNATHUS FUSCUS			1										
	6:00												
ANCHOA MITCHILLI			1	3	3	1	1		1	1	1	1	6
GOBIOSOMA BOSCI		30	43	40	37	16	5	5	15	41	39	74	66
MEMBRAS MARTINICA			1										

Table 6. (continued).

JULY 21 – JULY 22, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI	2	3	2	1		2	1	2	5	13	12	11
ATHERINIDAE		1										
GOBIOSOMA BOSCI	3	1	19	24	10	6	3	2	22	26	27	28
HYPSOBLENNIUS HENTZI		1										
MEMBRAS MARTINICA		2								1		1
MENIDIA BERYLLINA	1			1								
14:00												
ANCHOA MITCHILLI			11				3	1	5	14	14	15
CHASMODES BOSQUIANUS		1										
GOBIOSOMA BOSCI				19	39	65	6	7	26	23	60	37
MEMBRAS MARTINICA	1		2			2			1		1	
MENIDIA BERYLLINA			1									1
SYNGNATHUS FUSCUS				1								
18:00												
ANCHOA MITCHILLI		1	5	12	11	30	18	10	19	24	26	43
GOBIOSOMA BOSCI	14	21	92	270	187	304	78	21	104	114	189	185
MEMBRAS MARTINICA												1
SYNGNATHUS FUSCUS	1	1										
22:00												
ANCHOA MITCHILLI	2	1	15	20	21	23	18	11	16	20	19	20
CYNOSCION NEBULOSUS						1						
FUNDULUS DIAPHANUS								1				
GOBIOSOMA BOSCI	3	6	33	30	33	18	4	7	53	72	46	52
MEMBRAS MARTINICA	3					1	1	2	2		2	4
MENIDIA BERYLLINA					1					1		
MENIDIA MENIDIA				4								
TRINECTES MACULATUS									1			

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ANCHOA MITCHILLI		1	2	11	10		5	12	2	4	4	7	14
GOBIOSOMA BOSCI		11	29	205	232	395	436	69	14	53	73	120	108
MEMBRAS MARTINICA				1					1		1	2	1
MENIDIA BERYLLINA				1									
TRINECTES MACULATUS				1		2							
	6:00												
ANCHOA MITCHILLI				11	15	15	13	3	6	14	12	30	22
GOBIOSOMA BOSCI		5	1	129	187	72	55	10	11	50	78	222	218
MEMBRAS MARTINICA												1	
MENIDIA BERYLLINA							1						1
TRINECTES MACULATUS												1	

Table 6. (continued).

AUGUST 23 - AUGUST 24, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI			2	2	1	2	2	3	3	2	3	4
GOBIOSOMA BOSCI			6	3	3	3	10	9	29	19	39	38
14:00												
ANCHOA MITCHILLI					1		1	1	3	1	3	2
GOBIOSOMA BOSCI					2	6	3	3	2	4	6	1
MEMBRAS MARTINICA		2				1						
18:00												
ANCHOA MITCHILLI							2		5	3	3	5
GOBIOSOMA BOSCI					5	3	1		5	2	4	2
MEMBRAS MARTINICA		4										
22:00												
ANCHOA MITCHILLI			6	6	6	6	14	14	11	10	19	7
ATHERINIDAE	1											
CYNOSCION REGALIS						1			1			
GOBIOSOMA BOSCI	1	7	43	42	10	8	3	5	11	17	23	24
MEMBRAS MARTINICA	2	1				4		1	2	1	1	4
MENIDIA BERYLLINA					1	1	1			1		
MENIDIA MENIDIA		1						1				
SYNGNATHUS FUSCUS			1									
2:00												
ANCHOA MITCHILLI			14	18	3		11	8	17	15	21	18
GOBIOSOMA BOSCI	1	1	210	231	20	12	5	1	15	16	57	61
MEMBRAS MARTINICA	3	1									1	1
MENIDIA BERYLLINA		1	1					1				
SPECIMEN MANGLED		1										

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI		2		30	24	23	23	4	7	8	8	43	37
GOBIOSOMA BOSCI		2	2	66	62	37	42		6	4	1	193	159

Table 6. (continued).

SEPTEMBER 21 – SEPTEMBER 22, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI											1		
GOBIOSOMA BOSCI					1								
	14:00												
	18:00												
ANCHOA MITCHILLI												4	2
GOBIOSOMA BOSCI											1		
SYMPHURUS PLAGIUSA										1			
	22:00												
ANCHOA MITCHILLI				7	8		1	3	1	5	1	8	9
GOBIOSOMA BOSCI				2	1							2	
MEMBRAS MARTINICA											1		
MICROPOGON UNDULATUS													1
PRIONOTUS CAROLINUS												1	
	2:00												
ANCHOA MITCHILLI				2		2					1	2	
GOBIOSOMA BOSCI					1							1	1
SYMPHURUS PLAGIUSA												1	
	6:00												
ANCHOA MITCHILLI							2			1		1	
GOBIOSOMA BOSCI												1	
SYNGNATHUS FUSCUS										1			

Table 6. (continued)

OCTOBER 20 - 21, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI				1						1	1		1
MENIDIA BERYLLINA													1
MICROPOGON UNDULATUS							1				1		
	14:00												
ANCHOA MITCHILLI									1	1	2		1
MENIDIA BERYLLINA								1					
MICROPOGON UNDULATUS						1					1		
SYNGNATHUS FUSCUS					1	1							
	18:00												
ANCHOA MITCHILLI						1	2	3		2	2	6	6
MENIDIA BERYLLINA									2			1	1
MICROPOGON UNDULATUS													1
	22:00												
ANCHOA MITCHILLI			1					1	1	3	3	1	2
BREVOORTIA TYRANNUS									1				
GOBIOSOMA BOSCI						1							
MENIDIA BERYLLINA			1							1			
MICROPOGON UNDULATUS			1	1		4	4	1		1		1	1
SYNGNATHUS FUSCUS							1						
	2:00												
ANCHOA MITCHILLI			1					3	1	1	2	1	2
MENIDIA BERYLLINA								2	1				
MICROPOGON UNDULATUS		1	2	2		22	18		2	2	1	3	2
SYMPHURUS PLAGIUSA							1						

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI						1					1	2	4
DOROSOMA PETENENSE		2											
MENIDIA BERYLLINA		2											
MICROPOGON UNDULATUS					2		1					1	6
SYMPHURUS PLAGIUSA		1											

Table 6. (continued).

NOVEMBER 21 - 22, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI								1	1	1			
	14:00												
ANCHOA MITCHILLI												1	
MICROPOGON UNDULATUS												1	
	18:00												
ANCHOA MITCHILLI						5	3			2	1	4	4
MENIDIA BERYLLINA								1					
MICROPOGON UNDULATUS						1				1	1	1	1
	22:00												
ANCHOA MITCHILLI										3		9	7
FUNDULUS HETEROCLITUS									1				
MENIDIA BERYLLINA									1				
MICROPOGON UNDULATUS						2						2	4
	2:00												
ANCHOA MITCHILLI										3	3	2	3
MENIDIA BERYLLINA								1	3				
MICROPOGON UNDULATUS						2	1				1		
	6:00												
ANCHOA MITCHILLI										1			1
MICROPOGON UNDULATUS						2						2	2

Table 6. (continued).

DECEMBER 8 - 9, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		1	1					2	3	5	6	2	7
MICROPOGON UNDULATUS				2		2	1			2	2	3	3
	14:00												
ANCHOA MITCHILLI		2	2	6		1	2				1		
MENIDIA BERYLLINA								1					
MICROPOGON UNDULATUS		26	20	14	13	2		2	1	8	5	7	1
	18:00												
ANCHOA MITCHILLI					2				2	2	2	2	
FUNDULUS HETEROCLITUS									1				
MENIDIA BERYLLINA										1	1		
MICROPOGON UNDULATUS		6	5	38	36	10	4	22	14	33	28	55	45
	22:00												
ANCHOA MITCHILLI		1		1	2	2			1	2	1	1	
ANGUILLA ROSTRATA		1											
MENIDIA BERYLLINA								2	2				
MICROPOGON UNDULATUS				2	2	14	11	3	1	4	5		6
	2:00												
ANCHOA MITCHILLI			1	2			2					1	
ANGUILLA ROSTRATA								1					
DOROSOMA CEPEDIANUM		1											
MENIDIA BERYLLINA			2						1			1	
MICROPOGON UNDULATUS		35	14	72		52	47	6	7	8	9	18	7
MORONE AMERICANA							1						

Table 6. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI								1	1			1	
ANGUILLA ROSTRATA									1				
MENIDIA BERYLLINA								1	2				
MICROPOGON UNDULATUS		2		9	5	3	7	1	1	16	16	13	18

Table 7. Species and calculated number of fish per $100m^3$ captured during 24-hour stations at VEPCO Surry Nuclear Power Plant in 1977.

FEBRUARY 17 – FEBRUARY 18, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
NO CATCH MADE AT THIS TIME													
	14:00												
NO CATCH MADE AT THIS TIME													
	18:00												
ANGUILLA ROSTRATA													6
	22:00												
ANGUILLA ROSTRATA						14		8					
	2:00												
ANGUILLA ROSTRATA							5				5		
	6:00												

Table 7. (continued).

MARCH 8 - MARCH 9, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI						5	4				12	10	9
LEIOSTOMUS XANTHURUS								5	4			10	5
	14:00												
ANCHOA MITCHILLI		28				5				7	4	9	26
LEIOSTOMUS XANTHURUS			11						5				
SPECIMEN MANGLED								8					
	18:00												
ANCHOA MITCHILLI				4		4		3	3	89	107	150	168
ANGUILLA ROSTRATA										3			
LEIOSTOMUS XANTHURUS								3		3			
	22:00												
ANCHOA MITCHILLI		27		5		23	14			44	48	92	96
LEIOSTOMUS XANTHURUS										4	16	22	18
	2:00												
ANCHOA MITCHILLI					10	102	116		4	73	89	406	267
LEIOSTOMUS XANTHURUS		19	8			3	4			9	4	17	4
MENIDIA MENIDIA										4			
PARALICHTHYS DENTATUS							4						

Table 7. (continued).

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	6:00												
ANCHOA MITCHILLI		11	4	25	16	49	16	4		21	11	14	29
ANGUILLA ROSTRATA						4							
LEIOSTOMUS XANTHURUS				4	4			4		7	4	3	6

Table 7. (continued).

MARCH 22 – MARCH 23, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI		9	57	132	90	116	141	148	162	183	276	227	262
ANGUILLA ROSTRATA									5	4			3
BREVOORTIA TYRANNUS		9	19		5			12	9	4	27	17	27
LEIOSTOMUS XANTHURUS				5		4				4		30	3
	14:00												
ANCHOA MITCHILLI		4	8	7	8	195	133	66	105	82	91	197	171
BREVOORTIA TYRANNUS		4	12		4	3			5		5		
	18:00												
ANCHOA MITCHILLI		223	232	269	243	253	225	96	152	160	157	213	242
ANGUILLA ROSTRATA						3			6				
BREVOORTIA TYRANNUS		9	23	3									
LEIOSTOMUS XANTHURUS				12	7	3	7	7		5			7
	22:00												
ANCHOA MITCHILLI		15	8	148	120	142	112						
ANGUILLA ROSTRATA		4				4							
LEIOSTOMUS XANTHURUS				9		12	18						
	2:00												
ANCHOA MITCHILLI		13	6	152	242	136	171						
LEIOSTOMUS XANTHURUS			6		5	11	5						

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI		128	298	294	240	340	245	300	557	207	215	231	243
ANGUILLA ROSTRATA													8
BREVOORTIA TYRANNUS		45	29	20	5	7		15	5		4		4
LEIOSTOMUS XANTHURUS		4	4	20	26					22	20	31	15

Table 7. (continued).

APRIL 6 — APRIL 7, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI		4			5	45	52	4	11	46	62	34	72
ANGUILLA ROSTRATA									4				
BREVOORTIA TYRANNUS		22	9						4	4		3	10
LEIOSTOMUS XANTHURUS			18	13	9	3	12		4			13	3
	14:00												
ANCHOA MITCHILLI		5				26	18	36	4	25	32	36	31
ANGUILLA ROSTRATA													3
BREVOORTIA TYRANNUS										3		3	6
LEIOSTOMUS XANTHURUS				8									
MENIDIA BERYLLINA			5										
	18:00												
ANCHOA MITCHILLI				69	82	54	38	31	81	157	179	120	128
BREVOORTIA TYRANNUS				6	7		8	3	4	7	4	14	
LEIOSTOMUS XANTHURUS												3	
SPECIMEN MANGLED											4		
	22:00												
ANCHOA MITCHILLI		29	15	32	33	21		26	11	75	65	113	69
ANGUILLA ROSTRATA								4					
BREVOORTIA TYRANNUS		10	15	20	33					7	10	5	7
LEIOSTOMUS XANTHURUS		5	5	28	25	8	50			34	51	25	12

Table 7. (continued).

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	2:00												
ANCHOA MITCHILLI		16	5	38	31	8		10	14	65	73	70	69
ANGUILLA ROSTRATA								3	4				
BREVOORTIA TYRANNUS				4			8				3		
LEIOSTOMUS XANTHURUS		5	5	13	4	19	16				13	3	
MENIDIA BERYLLINA								3					
TRINECTES MACULATUS							4						
	6:00												
ANCHOA MITCHILLI		21	13	39	22			16	13	38	47	23	21
BREVOORTIA TYRANNUS		21	55							3	3	10	
LEIOSTOMUS XANTHURUS								3		19	10	3	14
SPECIMEN MANGLED						6							

Table 7. (continued).

APRIL 12 - APRIL 13, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI									3	6			
BREVOORTIA TYRANNUS		45	41							3		3	3
LEIOSTOMUS XANTHURUS		3	6			3							
TRINECTES MACULATUS								3					
SPECIMEN MANGLED		3											
	14:00												
ANCHOA MITCHILLI										5	5		6
BREVOORTIA TYRANNUS				5						5	3	6	3
	18:00												
ANCHOA MITCHILLI				5		4	8		3	3		9	12
ATHERINIDAE												3	
BREVOORTIA TYRANNUS						18	12	3	3	21	19	6	15
LEIOSTOMUS XANTHURUS				5		4	4			3	9	3	3
MENIDIA BERYLLINA					5	7							
MENIDIA MENIDIA				5									
PERCA FLAVESCENS					5								
SPECIMEN MANGLED							4						

Table 7. (continued).

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
22:00												
ANCHOA MITCHILLI				3		3	3		3	12	5	11
ANGUILLA ROSTRATA				3				3	3			
BREVOORTIA TYRANNUS			16	3	18	30	3	10	11	17	19	28
LEIOSTOMUS XANTHURUS			3	6	30	14	3		39	35	25	31
2:00												
ANCHOA MITCHILLI	4								3	3	13	
ANGUILLA ROSTRATA							3					
BREVOORTIA TYRANNUS							3	6	13	14	10	
LEICSTOMUS XANTHURUS	9							3	54	51	23	23
SPECIMEN MANGLED							3					
6:00												
ANCHOA MITCHILLI		7						4		3		
BREVOORTIA TYRANNUS	9	33	5			9			3			
LEIOSTOMUS XANTHURUS	4		9	14	17	17			6		6	13
SPECIMEN MANGLED												3

Table 7. (continued).

APRIL 19 - APRIL 20, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI										4			6
BREVOORTIA TYRANNUS		8							4			5	
MEMBRAS MARTINICA							4	4		4			
MENIDIA BERYLLINA								4			4		
MENIDIA MENIDIA		8											
	14:00												
ANCHOA MITCHILLI								3					
BREVOORTIA TYRANNUS						20	22					5	
MEMBRAS MARTINICA		5											
MENIDIA BERYLLINA							3						
	18:00												
ANCHOA MITCHILLI								17	7	4	13	10	10
BREVOORTIA TYRANNUS		17		36	74	55	104	14	11	24	33	10	26
CYPRINUS CARPIO												10	
LEIOSTOMUS XANTHURUS				3				14	28	4	4	5	
MENIDIA MENIDIA									4				

Table 7. (continued).

SPECIES	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
STATION TIME 22:00												
ANCHOA MITCHILLI			5				3		4	7	5	6
ANGUILLA ROSTRATA							3	10				
BREVOORTIA TYRANNUS	100	20	119	164	85	58		7	22	11	37	6
CYPRINUS CARPIO										4		
LEIOSTOMUS XANTHURUS			23	10	33	47	7	3	43	63	16	6
MEMBRAS MARTINICA			5									
MENIDIA BERYLLINA								3				
MENIDIA MENIDIA							7					
STATION TIME 2:00												
ANCHOA MITCHILLI					3		4	8	15	8	4	
ATHERINIDAE										4		
BREVOORTIA TYRANNUS					40	25	4	8	33	11	30	48
CYPRINUS CARPIO								4		4		
LEIOSTOMUS XANTHURUS					20	32			81	72	13	4
MENIDIA BERYLLINA			4			4			4			4
MENIDIA MENIDIA						4			4			
PARALICHTHYS DENTATUS												4
SPECIMEN MANGLED				4								
STATION TIME 6:00												
ANCHOA MITCHILLI					3	3						
BREVOORTIA TYRANNUS	14	7		8	15	17	3	4		4	4	32
CYPRINUS CARPIO											4	
LEIOSTOMUS XANTHURUS	3			4								14
SPECIMEN MANGLED	3											

Table 7. (continued).

APRIL 28 – APRIL 29, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ALOSA AESTIVALIS					4	3							
BREVOORTIA TYRANNUS						3							
MENIDIA MENIDIA				4	4								
SPECIMEN MANGLED								3					
	14:00												
	18:00												
BREVOORTIA TYRANNUS									3				
LEIOSTOMUS XANTHURUS												9	
	22:00												
ANCHOA MITCHILLI											4		17
BREVOORTIA TYRANNUS		18	7										8
LEIOSTOMUS XANTHURUS						8						4	17
MENIDIA MENIDIA		6											4
SPECIMEN MANGLED						4							
	2:00												
ANCHOA MITCHILLI					5			4	4		8		
BREVOORTIA TYRANNUS		11	11	20	11	9	9	4	22	19	20	10	5
LEIOSTOMUS XANTHURUS					5	18	9	78	170	61	24	5	5
MEMBRAS MARTINICA						4							
PARALICHTHYS DENTATUS													5

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
BREVOORTIA TYRANNUS		18	6			5	5		4	4	4	4	4
CYPRINUS CARPIO		9											
LEIOSTOMUS XANTHURUS						15	15	4	8	16	41	16	13

Table 7. (continued).

MAY 3 – MAY 4, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ALOSA AESTIVALIS											4		
ALOSA PSEUDOHARENGUS			10										
BREVOORTIA TYRANNUS						6					4		
LEIOSTOMUS XANTHURUS											4	4	
MEMBRAS MARTINICA									4				
MENIDIA BERYLLINA		30						4					
	14:00												
	18:00												
ALOSA AESTIVALIS								3					
ALOSA PSEUDOHARENGUS				4					3				
ANCHOA MITCHILLI											4		
ANGUILLA ROSTRATA													4
ATHERINIDAE			5										
BREVOORTIA TYRANNUS		4		7		3		3	7	4	4	11	
LEIOSTOMUS XANTHURUS								6		4	8	15	
MENIDIA BERYLLINA									3				
MENIDIA MENIDIA			5										
	22:00												
ALOSA PSEUDOHARENGUS											4		
ANCHOA MITCHILLI												4	
ANGUILLA ROSTRATA			6										
BREVOORTIA TYRANNUS		87	63		14			18	11	16	17	22	5
GOBIOSOMA BOSCI										4			
ICTALURUS PUNCTATUS						6							
LEIOSTOMUS XANTHURUS									4	16	46	13	18
MEMBRAS MARTINICA			6			17							
MENIDIA BERYLLINA			6			6							
MENIDIA MENIDIA					7								
SYNGNATHUS FUSCUS											4		

Table 7. (continued).

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	2:00												
ANCHOA MITCHILLI										3	4		
BREVOORTIA TYRANNUS		7			11						4		17
LEIOSTOMUS XANTHURUS				9				3	3	3		4	8
MEMBRAS MARTINICA			13										
MENIDIA BERYLLINA												4	12
MENIDIA MENIDIA					5	4							
	6:00												
ALOSA AESTIVALIS		3	4				4						4
ALOSA PSEUDOHARENGUS		3								3			
ANGUILLA ROSTRATA											3		
BREVOORTIA TYRANNUS						10	4	10	7	10	3		
LEIOSTOMUS XANTHURUS								3		3			4
MEMBRAS MARTINICA			4										
MENIDIA BERYLLINA												4	
SYNGNATHUS FUSCUS							4						

Table 7. (continued).

MAY 10 – MAY 11, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ATHERINIDAE												4	
GOBIOSOMA BOSCI													5
LEIOSTOMUS XANTHURUS								4	4				
MEMBRAS MARTINICA					5								
MENIDIA BERYLLINA		5											
	14:00												
ALOSA AESTIVALIS										4			
ICTALURUS PUNCTATUS										4			
LEIOSTOMUS XANTHURUS				4						4			5
MEMBRAS MARTINICA					4		25			4			
MENIDIA MENIDIA							6					5	
MORONE SAXATILIS										4			
	18:00												
ANCHOA MITCHILLI										4			
LEIOSTOMUS XANTHURUS												5	
SYNGNATHUS FUSCUS										4			
	22:00												
ANCHOA MITCHILLI												3	
ATHERINIDAE													3
BREVOORTIA TYRANNUS					5	22	5	22	38	8	20	94	65
LEIOSTOMUS XANTHURUS					9	26	23			15	4	54	58
MENIDIA MENIDIA												3	

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ALOSA PSEUDOHARENGUS										3	3		
ANCHOA MITCHILLI											3	3	
ANGUILLA ROSTRATA		7									3		4
BREVOORTIA TYRANNUS		7	9					4		3	3		11
DOROSOMA CEPEDIANUM		7	9					4					
LEIOSTOMUS XANTHURUS						8		7	7	13	10	10	7
MEMBRAS MARTINICA			9										
MENIDIA BERYLLINA					9	8			4				
MENIDIA MENIDIA			9			8				3			4
	6:00												
GOBIOSOMA BOSCI				7									
LEIOSTOMUS XANTHURUS									4			4	27
MEMBRAS MARTINICA								4			4		
MENIDIA BERYLLINA								4					
MICROPOGON UNDULATUS													4

Table 7. (continued).

MAY 17 – MAY 18, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ATHERINIDAE											3		
LEIOSTOMUS XANTHURUS						4							
MEMBRAS MARTINICA		43	24	17		4							
MENIDIA BERYLLINA		12		9							3		
MENIDIA MENIDIA					4						3		2
	14:00												
ANCHOA MITCHILLI					15	5	5	3					
ATHERINIDAE		52		13									
GOBIOSOMA BOSCI						8							
MEMBRAS MARTINICA		360	84	73	15	25	8	3				2	
MENIDIA BERYLLINA		91	40	26	6	13	5		3				
MENIDIA MENIDIA		165	56	48	12	25	15					2	2
	18:00												
ANCHOA MITCHILLI		11										2	
BREVOORTIA TYRANNUS		5										5	
GOBIOSOMA BOSCI											3	2	
MEMBRAS MARTINICA										2		7	3
MENIDIA BERYLLINA													5
MENIDIA MENIDIA									3			5	3
SPECIMEN MANGLED												2	
	22:00												
ANCHOA MITCHILLI											3		
ANGUILLA ROSTRATA			4	5					3			3	
ATHERINIDAE								3					
BREVOORTIA TYRANNUS						5	5	9	9	11	11	5	5
GOBIOSOMA BOSCI								3					
LEIOSTOMUS XANTHURUS				5			5	6	6	3	6	3	
MEMBRAS MARTINICA		19	25	9	14	5	5	6	6	5	3	10	5
MENIDIA BERYLLINA		8	34	14	14	9	15		3	5			10
MENIDIA MENIDIA		19	42	14	19	5		6	9			5	3

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ANCHOA MITCHILLI				4		3							
BREVOORTIA TYRANNUS				4		13	17	5	6			2	7
GOBIOSOMA BOSCI					4	3				2			2
LEIOSTOMUS XANTHURUS							9			2		4	5
MEMBRAS MARTINICA		32	16	4	4	3	3	3	3			4	
MENIDIA BERYLLINA		46	53		4	3	3	3					
MENIDIA MENIDIA		60	37	4	13			3		5	15	2	
	6:00												
ALOSA AESTIVALIS												2	2
ANCHOA MITCHILLI		4									2		
BREVOORTIA TYRANNUS					5							2	
GOBIOSOMA BOSCI												2	
LEIOSTOMUS XANTHURUS											2	2	
MEMBRAS MARTINICA		20	6	4		10	12		3			2	2
MENIDIA BERYLLINA		8											
MENIDIA MENIDIA		4											

Table 7. (continued).

MAY 23 - MAY 24, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ATHERINIDAE					5							
GOBIOSOMA BOSCI			10			6	5		7		3	6
LEIOSTOMUS XANTHURUS							3		2			
MEMBRAS MARTINICA	79	32		6	5	6	5	3			14	3
MENIDIA BERYLLINA		6					3					
MENIDIA MENIDIA					5					2		
14:00												
ATHERINIDAE	7	8										
GOBIOSOMA BOSCI				4	5		3				3	
MEMBRAS MARTINICA	368	112	98	24	27	18	3				3	
MENIDIA BERYLLINA	74	16	20	8			6	3	5		10	
MENIDIA MENICIA	110	39		20	9						3	
SPECIMEN MANGLED			4									
18:00												
ANCHOA MITCHILLI	4											
ATHERINIDAE	4											
BREVOORTIA TYRANNUS					3							
GOBIOSCMA BOSCI			3	3	3	3	2		2			5
LEIOSTOMUS XANTHURUS											2	
MEMBRAS MARTINICA	22		3		8	11	5				2	5
MENIDIA BERYLLINA	4		3			8				5	2	5
MENIDIA MENIDIA	7	4	7	6	10	11					7	8
MICROPCGON UNDULATUS											2	
SYNGNATHUS FUSCUS	4											

Table 7. (continued).

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
22:00												
ANCHOA MITCHILLI							3	3	2	5	4	2
ATHERINIDAE			4			6						
BREVOORTIA TYRANNUS				8			47	54	25	8		2
GOBIOSOMA BOSCI			19	21	28	12		3	2	13	9	18
LEIOSTOMUS XANTHURUS							18	33	30	10	11	5
MEMBRAS MARTINICA			4		11				2			
MENIDIA BERYLLINA			4	8	11		3	3		5	4	
MENIDIA MENIDIA		13		4				8	5			
MICROPOGON UNDULATUS										3		
2:00												
ANCHOA MITCHILLI						5		3				
ANGUILLA ROSTRATA	4	8		13				6				
BREVOORTIA TYRANNUS			4		5							
GOBIOSOMA BOSCI	4		36	57	43	71	6	6	21	16	41	32
MEMBRAS MARTINICA	8	8		9		25			8			
MENIDIA BERYLLINA	4	4	18	13	5	15				3	2	
MENIDIA MENIDIA		33	4	9	5	25			3	3	2	2
SYNGNATHUS FUSCUS			4						3			
6:00												
ANCHOA MITCHILLI											2	
ATHERINIDAE						5						
BREVOORTIA TYRANNUS										2		
GOBIOSOMA BOSCI			17	15		15			7	2	14	2
HYPSOBLENNIUS HENTZI		3										
MEMBRAS MARTINICA		72	3	12		36	6	3			2	5
MENIDIA BERYLLINA	9	23		15		5		3			2	
MENIDIA MENIDIA		30		3	5		3	3	2		5	2

Table 7. (continued).

JUNE 6 – JUNE 7, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI									3			
GOBIOSOMA BOSCI	5		5			4			11	8	99	81
MEMBRAS MARTINICA	9	5				4		3				5
MENIDIA MENIDIA	5	5										
14:00												
GOBIOSOMA BOSCI			38	59	53	46						
SYNGNATHUS FUSCUS			4									
18:00												
ANCHOA MITCHILLI							3	5	3			10
GOBIOSOMA BOSCI	14	11	47	13	10	43	44	11	41	57	132	101
MEMBRAS MARTINICA									5			
MENIDIA BERYLLINA										3		
22:00												
ANCHOA MITCHILLI							3					4
BREVOORTIA TYRANNUS							8	16	3	3		
CYNOSCION REGALIS				3								
DOROSOMA CEPEDIANUM		4										
GOBIOSOMA BOSCI	140	295	33	78	45	45	3	8	39	28	34	50
LEIOSTOMUS XANTHURUS							18	5	16	22	15	14
MEMBRAS MARTINICA	3		3	3		9	3	5				
MENIDIA BERYLLINA	6							3	3			
MENIDIA MENIDIA							5	3				
MORONE SAXATILIS										3		
TRINECTES MACULATUS					15	9						

Table 7. (continued).

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	2:00												
ANCHOA MITCHILLI			4		5			3	3				3
ANGUILLA ROSTRATA									3				
CYNOSCION REGALIS			4										
GOBIOSOMA BOSCI			84	4	45	46	86	18	28		21	62	60
LEIOSTOMUS XANTHURUS											9		
MEMBRAS MARTINICA		4	4		5			3					3
MENIDIA BERYLLINA					5	5							
TRINECTES MACULATUS							6						
	6:00												
ANCHOA MITCHILLI					3		9	3	6	3	3	5	5
CYNOSCION REGALIS													2
GOBIOSOMA BOSCI			7	22	77	9	41	9	15	50	53	88	92
LEIOSTOMUS XANTHURUS								3					
MEMBRAS MARTINICA			7									2	
MENIDIA MENIDIA									3	3			

Table 7. (continued).

JUNE 21 – JUNE 22, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI						4				2			5
GOBIOSOMA BOSCI				69	100	118	137	33	27	47	18	127	156
MEMBRAS MARTINICA		3	3										
	14:00												
ANCHOA MITCHILLI				13				3	9	10	3	8	26
GOBIOSOMA BOSCI			5	205	236	205	222	93	146	211	214	219	298
MEMBRAS MARTINICA		48	51										
MENIDIA BERYLLINA			5										
	18:00												
ANCHOA MITCHILLI				14	3	9	9	5	5	5	5	22	13
BREVOORTIA TYRANNUS													3
GOBIOSOMA BOSCI		527	568	129	334	284	251	182	503	234	316	334	277
MEMBRAS MARTINICA		7									5	2	
MENIDIA MENIDIA		3											
SYNGNATHUS FUSCUS									5			2	3
	22:00												
ANCHOA MITCHILLI		7	4	22	110		13	15	3	11	6	8	3
FUNDULUS HETEROCLITUS								3					
GOBIOSOMA BOSCI		198	58	266	110	55	33	55	55	104	86	148	93
MEMBRAS MARTINICA		3		11	12	7		3		3		13	5
MENIDIA BERYLLINA			4										
SYNGNATHUS FUSCUS								3					

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ANCHOA MITCHILLI		11		5	12	13	14	3	3	12	3	17	9
ANGUILLA ROSTRATA												3	
GOBIOSOMA BOSCI		49	72	130	209	164	215	17	10	64	49	119	95
MEMBRAS MARTINICA		5		5						6	9	14	6
SYNGNATHUS FUSCUS			7										
	6:00												
ANCHOA MITCHILLI			4	9	10	8	11		3	3	3	2	14
GOBIOSOMA BOSCI		108	157	126	119	128	56	14	43	106	101	174	156
MEMBRAS MARTINICA			4										

Table 7. (continued).

JULY 21 - JULY 22, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		10	19	11	6		14	5	11	25	65	62	57
ATHERINIDAE			6										
GOBIOSOMA BOSCI		15	6	105	156	65	43	15	11	111	129	138	144
HYPSOBLENNIUS HENTZI			6										
MEMBRAS MARTINICA			13								5		5
MENIDIA BERYLLINA		5			6								
	14:00												
ANCHOA MITCHILLI				65				11	3	20	51	61	60
CHASMODES BOSQUIANUS			6										
GOBIOSOMA BOSCI					102	236	380	21	24	103	84	263	149
MEMBRAS MARTINICA		5		12			12			4		4	
MENIDIA BERYLLINA				6									4
SYNGNATHUS FUSCUS					5								
	18:00												
ANCHOA MITCHILLI			7	26	60	62	171	77	40	81	95	124	181
GOBIOSOMA BOSCI		96	142	469	1343	1056	1737	332	85	444	451	900	777
MEMBRAS MARTINICA													4
SYNGNATHUS FUSCUS		7	7										
	22:00												
ANCHOA MITCHILLI		11	6	106	192	142	204	82	54	66	87	83	85
CYNOSCION NEBULOSUS							9						
FUNDULUS DIAPHANUS									5				
GOBIOSOMA BOSCI		17	34	232	288	223	159	18	35	219	312	200	221
MEMBRAS MARTINICA		17					9	5	10	8		9	17
MENIDIA BERYLLINA						7					4		
MENIDIA MENIDIA					38								
TRINECTES MACULATUS										4			

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	2:00												
ANCHOA MITCHILLI		7	13	79	68		43	48	8	16	16	28	57
GOBIOSOMA BOSCI		73	195	1464	1589	3624	3759	277	58	215	300	486	441
MEMBRAS MARTINICA				7					4		4	8	4
MENIDIA BERYLLINA				7									
TRINECTES MACULATUS				7		18							
	6:00												
ANCHOA MITCHILLI				51	74	70	63	14	25	51	45	91	70
GOBIOSOMA BOSCI		33	7	603	917	338	266	45	46	183	290	675	696
MEMBRAS MARTINICA												3	
MENIDIA BERYLLINA							5						3
TRINECTES MACULATUS												3	

Table 7. (continued).

AUGUST 23 - AUGUST 24, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI			9	9	5	11	7	11	11	8	10	15
GOBIOSOMA BOSCI			26	13	14	17	35	33	105	77	127	138
14:00												
ANCHOA MITCHILLI					7		4	4	10	4	9	6
GOBIOSOMA BOSCI					13	50	12	11	7	15	19	3
MEMBRAS MARTINICA		14				8						
18:00												
ANCHOA MITCHILLI							7		17	10	9	15
GOBIOSOMA BOSCI					31	21	4		17	6	12	6
MEMBRAS MARTINICA		28										
22:00												
ANCHOA MITCHILLI			18	19	17	20	37	38	29	27	45	17
ATHERINIDAE	4											
CYNOSCION REGALIS						3			3			
GOBIOSOMA BOSCI	4	27	126	132	28	26	8	14	29	46	54	57
MEMBRAS MARTINICA	7	4				13		3	5	3	2	10
MENIDIA BERYLLINA					3	3	3			3		
MENIDIA MENIDIA		4						3				
SYNGNATHUS FUSCUS			3									
2:00												
ANCHOA MITCHILLI			46	66	25		26	20	41	37	52	48
GOBIOSOMA BOSCI	3	3	684	846	168	207	12	3	36	40	142	162
MEMBRAS MARTINICA	9	3									2	3
MENIDIA BERYLLINA		3	3					3				
SPECIMEN MANGLED		3										

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI		10		137	122	129	156	11	20	25	26	130	117
GOBIOSOMA BOSCI		10	13	301	316	208	286		17	13	3	581	505

Table 7. (continued).

SEPTEMBER 21 - SEPTEMBER 22, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI											4		
GOBIOSOMA BOSCI					5								
	14:00												
	18:00												
ANCHOA MITCHILLI												17	9
GOBIOSOMA BOSCI											5		
SYMPHURUS PLAGIUSA										5			
	22:00												
ANCHOA MITCHILLI				29	37		6	10	4	20	4	24	27
GOBIOSOMA BOSCI				8	5							6	
MEMBRAS MARTINICA											4		
MICROPOGON UNDULATUS													3
PRIONOTUS CAROLINUS												3	
	2:00												
ANCHOA MITCHILLI				11		20					3	7	
GOBIOSOMA BOSCI					7							3	4
SYMPHURUS PLAGIUSA												3	
	6:00												
ANCHOA MITCHILLI							100			5		4	
GOBIOSOMA BOSCI												4	
SYNGNATHUS FUSCUS										5			

Table 7. (continued).

OCTOBER 20 - 21, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI				3						2	3		3
MENIDIA BERYLLINA													3
MICROPOGON UNDULATUS							4				3		
	14:00												
ANCHOA MITCHILLI									3	3	5		3
MENIDIA BERYLLINA								3					
MICROPOGON UNDULATUS						6					3		
SYNGNATHUS FUSCUS					7	6							
	18:00												
ANCHOA MITCHILLI						4	10	9		8	7	18	18
MENIDIA BERYLLINA									6			3	3
MICROPOGON UNDULATUS													3
	22:00												
ANCHOA MITCHILLI			3					3	3	8	7	2	5
BREVOORTIA TYRANNUS									3				
GOBIOSOMA BOSCI						5							
MENIDIA BERYLLINA			3							3			
MICROPOGON UNDULATUS			3	3		20	23	3		3		2	2
SYNGNATHUS FUSCUS							6						
	2:00												
ANCHOA MITCHILLI			4					8	3	2	5	2	5
MENIDIA BERYLLINA								6	3				
MICROPOGON UNDULATUS		4	8	7		145	168		6	4	2	7	5
SYMPHURUS PLAGIUSA							9						

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI						7					3	6	12
DOROSOMA PETENENSE		10											
MENIDIA BERYLLINA		10											
MICROPOGON UNDULATUS					11		10					3	18
SYMPHURUS PLAGIUSA		5											

Table 7. (continued).

NOVEMBER 21 - 22, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI							4	4	3			
14:00												
ANCHOA MITCHILLI											4	
MICROPOGON UNDULATUS											4	
18:00												
ANCHOA MITCHILLI					22	13			8	4	16	15
MENIDIA BERYLLINA							4					
MICROPOGON UNDULATUS					4				4	4	4	4
22:00												
ANCHOA MITCHILLI									9		16	12
FUNDULUS HETEROCLITUS								3				
MENIDIA BERYLLINA								3				
MICROPOGON UNDULATUS					7						3	7
2:00												
ANCHOA MITCHILLI									10	10	7	10
MENIDIA BERYLLINA							3	9				
MICROPOGON UNDULATUS					6	3				3		
6:00												
ANCHOA MITCHILLI									4			3
MICROPOGON UNDULATUS					10						7	7

Table 7. (continued).

DECEMBER 8 - 9, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
ANCHOA MITCHILLI	5	4					6	8	13	15	5	19
MICROPOGON UNDULATUS			6		6	3			5	5	8	8
14:00												
ANCHOA MITCHILLI	5	6	11		9	13				2		
MENIDIA BERYLLINA							3					
MICROPOGON UNDULATUS	70	55	27	23	19		5	3	20	12	20	3
18:00												
ANCHOA MITCHILLI				6				5	5	5	5	
FUNDULUS HETEROCLITUS								3				
MENIDIA BERYLLINA									2	2		
MICROPOGON UNDULATUS	27	21	129	114	54	19	60	37	80	68	140	111
22:00												
ANCHOA MITCHILLI	5		4	8	7			2	5	3	2	
ANGUILLA ROSTRATA	5											
MENIDIA BERYLLINA							5	5				
MICROPOGON UNDULATUS			8	8	51	38	8	2	10	13		14
2:00												
ANCHOA MITCHILLI		3	4			3					2	
ANGUILLA ROSTRATA							3					
DOROSOMA CEPEDIANUM	2											
MENIDIA BERYLLINA		6						3			2	
MICROPOGON UNDULATUS	78	39	131		88	75	16	18	20	22	40	15
MORONE AMERICANA						2						

Table 7. (continued).

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	6:00												
ANCHOA MITCHILLI								3	3			3	
ANGUILLA ROSTRATA									3				
MENIDIA BERYLLINA								3	6				
MICROPOGON UNDULATUS		18		41	20	13	34	3	3	44	43	34	48

Table 8. Species and number of fish eggs captured in 24-hour stations at VEPCO Surry Nuclear Power Plant in 1977.

MARCH 8 - MARCH 9, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
UNIDENTIFIED									1	2	1		
	14:00												
UNIDENTIFIED												1	1
	18:00												
UNIDENTIFIED													6
	2:00												
UNIDENTIFIED												7	7

Table 8. (continued).

MARCH 22 - MARCH 23, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ALOSA SAPIDISSIMA												1	
MORONE SAXATILIS												1	
UNIDENTIFIED												6	

Table 8. (continued).

APRIL 6 - APRIL 7, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
SPECIMEN MANGLED												1	
	14:00												
CYPRINUS CARPIO													2
	18:00												
CYPRINUS CARPIO													1
DOROSOMA CEPEDIANUM											1		
	22:00												
DOROSOMA CEPEDIANUM													1
UNIDENTIFIED								1					
	2:00												
UNIDENTIFIED									2				1
	6:00												
UNIDENTIFIED			1								1		

Table 8. (continued).

APRIL 12 - APRIL 13, 1977

SPECIES / STATION TIME	INTAKE						DISCHARGE					
	SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
10:00												
CYPRINUS CARPIO	1											
MORONE AMERICANA							2	6	1		7	4
UNIDENTIFIED								2	1		1	1
14:00												
CYPRINUS CARPIO											1	
MORONE AMERICANA							1	3	4	1	2	2
UNIDENTIFIED											1	1
18:00												
CYPRINUS CARPIO										1		
MORONE AMERICANA							1	2	1	3		3
UNIDENTIFIED				3				1		2	2	2
22:00												
CYPRINUS CARPIO										2		
MORONE AMERICANA									3	4	4	1
UNIDENTIFIED									3		4	1
2:00												
CYPRINUS CARPIO									5	1	7	7
MORONE AMERICANA							1	4		6	2	4
6:00												
CYPRINUS CARPIO	1	1	1			1	1		5	11	20	21
MORONE AMERICANA							1	2		3	8	9
UNIDENTIFIED											4	5

Table 8. (continued).

APRIL 19 - APRIL 20, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
CYPRINUS CARPIO												2	2
MORONE AMERICANA					1					5	1	2	4
	14:00												
CYPRINUS CARPIO		1										2	2
DOROSOMA CEPEDIANUM												1	
MORONE AMERICANA							1				4	5	5
UNIDENTIFIED												1	
	18:00												
CYPRINUS CARPIO				1									
MORONE AMERICANA								1					1
	22:00												
MORONE AMERICANA								1	1			4	2
	2:00												
CYPRINUS CARPIO										1		2	
MORONE AMERICANA			1						1	3	1	7	3
UNIDENTIFIED											1		
	6:00												
CYPRINUS CARPIO								1		2	6	5	4
DOROSOMA CEPEDIANUM									1				
MORONE AMERICANA				1		1	2		2	2	8	18	4

Table 8. (continued).

APRIL 28 - APRIL 29, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI												1	
MEMBRAS MARTINICA					1								
MORONE AMERICANA								1	1				1
	14:00												
MORONE AMERICANA											1	1	3
	18:00												
MORONE AMERICANA									1	3		1	
	22:00												
UNIDENTIFIED												1	
	2:00												
MORONE AMERICANA									2		2		
UNIDENTIFIED										1			
	6:00												
MORONE AMERICANA		1						1		1		1	1

Table 8. (continued).

MAY 3 - MAY 4, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI										1			
UNIDENTIFIED										1	1		2
	14:00												
MORONE AMERICANA										1			
	2:00												
ANCHOA MITCHILLI						1							
MORONE AMERICANA												1	
	6:00												
ANCHOA MITCHILLI								1				1	2
MEMBRAS MARTINICA													1

Table 8. (continued).

MAY 10 - MAY 11, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
MEMBRAS MARTINICA					1						1		
	14:00												
MEMBRAS MARTINICA													1
	18:00												
ANCHOA MITCHILLI						1	1						
CYPRINUS CARPIO								1					
MORONE AMERICANA									1				
	22:00												
MEMBRAS MARTINICA							1						
	6:00												
ANCHOA MITCHILLI												1	
DOROSOMA PETENENSE											1		

Table 8. (continued).

MAY 17 - MAY 18, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI				19	11	27	41	11	10	15	24	16	5
MENIDIA MENIDIA													1
	14:00												
ANCHOA MITCHILLI		1		3		5	3	1	6	2	6	2	2
	18:00												
ANCHOA MITCHILLI								1	1			2	
MENIDIA MENIDIA											1		
	22:00												
ANCHOA MITCHILLI			1	6	5		5	2					1
MENIDIA MENIDIA												1	
	2:00												
ANCHOA MITCHILLI		1	1	6	1	1		4	8	6	6	4	5
	6:00												
ANCHOA MITCHILLI		2	15	9	13	4	6	1	2	3	5	10	2
DOROSOMA CEPEDIANUM												1	
MENIDIA MENIDIA									1				

Table 8. (continued).

MAY 23 - MAY 24, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		68	50	160	136	128	170	92	148	152	115	156	102
	14:00												
ANCHOA MITCHILLI		3	3	43	34	45	47	12	44	17	47	49	20
	18:00												
ANCHOA MITCHILLI		8	3	5	6	2	13	6	9	7	8	8	18
DOROSOMA CEPEDIANUM												1	
DOROSOMA PETENENSE		18				1							
	22:00												
ANCHOA MITCHILLI		20	9	30	34	86	61	25	75	103	70	141	118
DOROSOMA CEPEDIANUM												1	
	2:00												
ANCHOA MITCHILLI		13	11	222	313	598	670	350	294	372	433	514	452
MEMBRAS MARTINICA									1				
	6:00												
ANCHOA MITCHILLI		77	51		157	166	157	141	222	214	224	319	316
FUNDULUS HETEROCLITUS													1

Table 8. (continued).

JUNE 6 - JUNE 7, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		33	1				146	160	124	146	92	67	86
	18:00												
ANCHOA MITCHILLI							3	14	9	9	16	8	3
	22:00												
ANCHOA MITCHILLI					2	7	3	10	3	6	2	1	11
MEMBRAS MARTINICA						1							
MENIDIA BERYLLINA											1		
	2:00												
ANCHOA MITCHILLI				1	20	127	202	67	90		78	203	225
MEMBRAS MARTINICA											1		
	6:00												
ANCHOA MITCHILLI		52	129	28	5	38	8	128	215	236	233	264	375
GOBIOSOMA BOSCI										1			
UNIDENTIFIED												1	

Table 8. (continued).

JUNE 21 - JUNE 22, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		116					1	202	138	242	171	134	240
	14:00												
ANCHOA MITCHILLI		86	84	34		84		99	107	107	111	98	89
MENIDIA BERYLLINA										1			
	18:00												
ANCHOA MITCHILLI					2	60	27	63	30	68	33	79	77
	22:00												
ANCHOA MITCHILLI				21		24	19	39	24	10	9	49	31
MENIDIA MENIDIA		1											
	2:00												
ANCHOA MITCHILLI		43	71	355	441	471	479	217	235	305	385	523	466
MENIDIA BERYLLINA												1	
	6:00												
ANCHOA MITCHILLI		465	716	1234	1292	531	304	706	694	687	839	877	775

Table 8. (continued).

JULY 21 - JULY 22, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		1	40	80	47	84	12	72	78	168	119	152	144
MEMBRAS MARTINICA													1
	14:00												
ANCHOA MITCHILLI		24	30		20	59	60	57	99	109	97	101	70
	18:00												
ANCHOA MITCHILLI		40	43	2			14	34	20	23	33	39	12
	2:00												
ANCHOA MITCHILLI			1					15	11	24	26	33	28
	6:00												
ANCHOA MITCHILLI		1	14	51	6	183	229	179	153	198	215	224	152
GOBIOSOMA BOSCI										2			

Table 8. (continued).

AUGUST 23 - AUGUST 24, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		2		1	5	6	3	2	9	3	3	8	3
	14:00												
ANCHOA MITCHILLI				4		3	2		1	1	1		
GOBIOSOMA BOSCI									1				
	18:00												
ANCHOA MITCHILLI		1		1	1					1			
	22:00												
ANCHOA MITCHILLI						1		1		1			1
	2:00												
ANCHOA MITCHILLI				2	4	2		1			1	1	2
	6:00												
ANCHOA MITCHILLI		2		54	47	17	25	18	47	5	28	30	16
FUNDULUS DIAPHANUS												1	

Table 8. (continued).

SEPTEMBER 21 - SEPTEMBER 22, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	14:00												
ANCHOA MITCHILLI						1							
	18:00												
ANCHOA MITCHILLI		1	1	1									
	22:00												
ANCHOA MITCHILLI					1			1					
	6:00												
ANCHOA MITCHILLI		4	5			3	4	1	2	4	2	2	

Table 9. Species and number of fish eggs per $100m^3$ captured in 24-hour stations at VEPCO Surry Nuclear Power Plant in 1977.

MARCH 8 - MARCH 9, 1977

		INTAKE						DISCHARGE					
	STATION	SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
SPECIES	TIME	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
UNIDENTIFIED									4	8	4		
	14:00												
UNIDENTIFIED												4	4
	18:00												
UNIDENTIFIED													21
	2:00												
UNIDENTIFIED												29	31

Table 9. (continued).

MARCH 22 – MARCH 23, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ALOSA SAPIDISSIMA												3	
MORONE SAXATILIS												3	
UNIDENTIFIED												20	

Table 9. (continued).

APRIL 6 – APRIL 7, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
SPECIMEN MANGLED												3	
	14:00												
CYPRINUS CARPIO													6
	18:00												
CYPRINUS CARPIO													3
DOROSOMA CEPEDIANUM											4		
	22:00												
DOROSOMA CEPEDIANUM													2
UNIDENTIFIED								4					
	2:00												
UNIDENTIFIED									7				3
	6:00												
UNIDENTIFIED			4								3		

Table 9. (continued).

APRIL 12 – APRIL 13, 1977

SPECIES / STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
10:00												
CYPRINUS CARPIO	3											
MORONE AMERICANA							6	18	3		19	11
UNIDENTIFIED								6	3		3	3
14:00												
CYPRINUS CARPIO											3	
MORONE AMERICANA							3	10	10	3	6	6
UNIDENTIFIED											3	3
18:00												
CYPRINUS CARPIO										3		
MORONE AMERICANA							3	6	3	9		9
UNIDENTIFIED				14				3		6	6	6
22:00												
CYPRINUS CARPIO										6		
MORONE AMERICANA									8	12	11	3
UNIDENTIFIED									8		11	3
2:00												
CYPRINUS CARPIO									13	3	18	18
MORONE AMERICANA							3	12		17	5	10
6:00												
CYPRINUS CARPIO	4	7	5			9	4		15	35	59	67
MORONE AMERICANA							4	7		9	24	29
UNIDENTIFIED											12	16

Table 9. (continued).

APRIL 19 – APRIL 20, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
CYPRINUS CARPIO												10	11
MORONE AMERICANA					4					21	4	10	22
	14:00												
CYPRINUS CARPIO		5										11	11
DOROSOMA CEPEDIANUM												5	
MORONE AMERICANA							3				15	27	27
UNIDENTIFIED												5	
	18:00												
CYPRINUS CARPIO				3									
MORONE AMERICANA								3					5
	22:00												
MORONE AMERICANA								3	3			21	11
	2:00												
CYPRINUS CARPIO										4		8	
MORONE AMERICANA			5						4	11	4	30	12
UNIDENTIFIED											4		
	6:00												
CYPRINUS CARPIO								3		7	22	22	18
DOROSOMA CEPEDIANUM									4				
MORONE AMERICANA				3		3	7		7	7	30	78	18

Table 9. (continued).

APRIL 28 – APRIL 29, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI												4	
MEMBRAS MARTINICA					4								
MORONE AMERICANA								3	3				5
	14:00												
MORONE AMERICANA											4	4	14
	18:00												
MORONE AMERICANA									3	11		5	
	22:00												
UNIDENTIFIED												4	
	2:00												
MORONE AMERICANA									7		8		
UNIDENTIFIED										4			
	6:00												
MORONE AMERICANA		9						4		4		4	4

Table 9. (continued).

MAY 3 – MAY 4, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI										4			
UNIDENTIFIED										4	4		9
	14:00												
MORONE AMERICANA										4			
	2:00												
ANCHOA MITCHILLI						4							
MORONE AMERICANA												4	
	6:00												
ANCHOA MITCHILLI								3				4	7
MEMBRAS MARTINICA													4

Table 9. (continued).

MAY 10 – MAY 11, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
MEMBRAS MARTINICA					5						4		
	14:00												
MEMBRAS MARTINICA													5
	18:00												
ANCHOA MITCHILLI						4	4						
CYPRINUS CARPIO								4					
MORONE AMERICANA									5				
	22:00												
MEMBRAS MARTINICA							5						
	6:00												
ANCHOA MITCHILLI												4	
DOROSOMA PETENENSE											4		

Table 9. (continued).

MAY 17 - MAY 18, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI				83	48	104	152	30	28	37	61	38	12
MENIDIA MENIDIA													2
	14:00												
ANCHOA MITCHILLI		3		10		13	8	3	17	5	16	4	5
	18:00												
ANCHOA MITCHILLI								3	3			5	
MENIDIA MENIDIA											3		
	22:00												
ANCHOA MITCHILLI			4	27	23		25	6					3
MENIDIA MENIDIA												3	
	2:00												
ANCHOA MITCHILLI		5	5	23	4	3		11	23	15	15	9	12
	6:00												
ANCHOA MITCHILLI		8	85	32	60	39	71	3	5	7	11	22	5
DOROSOMA CEPEDIANUM												2	
MENIDIA MENIDIA									3				

Table 9. (continued).

MAY 23 – MAY 24, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI		360	323	784	850	699	1049	251	423	357	282	433	283
	14:00												
ANCHOA MITCHILLI		11	12	175	135	205	210	33	125	46	132	127	53
	18:00												
ANCHOA MITCHILLI		29	11	17	19	5	36	14	22	17	20	20	46
DOROSOMA CEPEDIANUM												2	
DOROSOMA PETENENSE		65				3							
	22:00												
ANCHOA MITCHILLI		154	58	112	144	489	353	66	204	256	179	305	266
DOROSOMA CEPEDIANUM												2	
	2:00												
ANCHOA MITCHILLI		55	46	991	1379	2848	3401	978	845	987	1170	1236	1105
MEMBRAS MARTINICA									3				
	6:00												
ANCHOA MITCHILLI		244	167		459	758	797	392	590	510	550	771	786
FUNDULUS HETEROCLITUS													2

Table 9. (continued).

JUNE 6 – JUNE 7, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		152	5				638	415	313	418	252	330	387
	18:00												
ANCHOA MITCHILLI							11	36	24	25	43	32	10
	22:00												
ANCHOA MITCHILLI					6	53	27	25	8	20	6	4	39
MEMBRAS MARTINICA						8							
MENIDIA BERYLLINA											3		
	2:00												
ANCHOA MITCHILLI				4	90	580	1154	201	278		230	546	615
MEMBRAS MARTINICA											3		
	6:00												
ANCHOA MITCHILLI		177	469	88	17	119	25	365	632	690	687	627	908
GOBIOSOMA BOSCI										3			
UNIDENTIFIED												2	

Table 9. (continued).

JUNE 21 – JUNE 22, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI		342					4	550	409	602	433	340	623
	14:00												
ANCHOA MITCHILLI		372	387	142		273		288	307	279	294	253	233
MENIDIA BERYLLINA										3			
	18:00												
ANCHOA MITCHILLI					6	183	84	159	77	181	90	191	194
	22:00												
ANCHOA MITCHILLI				76		166	125	119	73	28	26	129	84
MENIDIA MENIDIA		3											
	2:00												
ANCHOA MITCHILLI		234	467	1775	2564	3099	3326	738	799	887	1113	1482	1339
MENIDIA BERYLLINA												3	
	6:00												
ANCHOA MITCHILLI		1667	2613	3893	4154	4248	3416	1956	1972	1771	2179	2059	1836

Table 9. (continued).

JULY 21 – JULY 22, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	10:00												
ANCHOA MITCHILLI		5	252	442	305	545	86	360	446	848	592	779	742
MEMBRAS MARTINICA													5
	14:00												
ANCHOA MITCHILLI		121	178		107	358	351	204	333	431	354	443	282
	18:00												
ANCHOA MITCHILLI		274	291	10			80	145	81	98	130	186	50
	2:00												
ANCHOA MITCHILLI			7					60	46	98	107	134	114
	6:00												
ANCHOA MITCHILLI		7	97	238	29	859	1106	806	638	725	799	681	486
GOBIOSOMA BOSCI										7			

Table 9. (continued).

AUGUST 23 - AUGUST 24, 1977

SPECIES	STATION TIME	INTAKE SURFACE LEFT	INTAKE SURFACE RIGHT	INTAKE MIDWATER LEFT	INTAKE MIDWATER RIGHT	INTAKE BOTTOM LEFT	INTAKE BOTTOM RIGHT	DISCHARGE SURFACE LEFT	DISCHARGE SURFACE RIGHT	DISCHARGE MIDWATER LEFT	DISCHARGE MIDWATER RIGHT	DISCHARGE BOTTOM LEFT	DISCHARGE BOTTOM RIGHT
	10:00												
ANCHOA MITCHILLI		8		4	22	28	17	7	33	11	12	26	11
	14:00												
ANCHOA MITCHILLI				25		20	17		4	3	4		
GOBIOSOMA BOSCI									4				
	18:00												
ANCHOA MITCHILLI		6		7	7					3			
	22:00												
ANCHOA MITCHILLI						3		3		3			2
	2:00												
ANCHOA MITCHILLI				7	15	17		2			2	2	5
	6:00												
ANCHOA MITCHILLI		10		247	240	96	170	51	137	16	91	90	51
FUNDULUS DIAPHANUS												3	

Table 9. (continued).

SEPTEMBER 21 - SEPTEMBER 22, 1977

SPECIES	STATION TIME	INTAKE						DISCHARGE					
		SURFACE		MIDWATER		BOTTOM		SURFACE		MIDWATER		BOTTOM	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
	14:00												
ANCHOA MITCHILLI						14							
	18:00												
ANCHOA MITCHILLI		10	19	8									
	22:00												
ANCHOA MITCHILLI					5			3					
	6:00												
ANCHOA MITCHILLI		22	30			32	200	5	10	19	9	8	

Table 10. Ranges of salinity (PPT) at VEPCO Surry Nuclear Power Plant during 24-hour plant entrainment stations from January through December 1977.

DATE			INTAKE Surface	INTAKE Midwater	INTAKE Bottom	DISCHARGE Surface	DISCHARGE Midwater	DISCHARGE Bottom
Feb.	17-18	High	8.1	8.1	8.3	8.7	8.7	8.7
		Low	7.1	7.6	7.8	7.6	7.8	7.8
Mar.	08-09	High	5.9	6.0	6.1	6.2	6.0	5.9
		Low	4.9	5.0	5.1	5.2	5.1	5.1
Mar.	22-23	High	2.3	2.1	2.0	2.1	2.1	2.1
		Low	1.1	1.0	1.4	1.5	1.5	1.5
Apr.	06-07	High	3.3	3.1	3.1	3.1	3.1	3.1
		Low	2.1	2.2	2.2	2.0	2.0	2.0
Apr.	12-13	High	0.3	0.3	0.2	0.4	0.2	0.3
		Low	0.2	0.2	0.2	0.2	0.2	0.2
Apr.	19-20	High	1.2	2.1	1.2	1.1	1.1	1.1
		Low	0.8	0.8	0.8	0.8	0.8	0.8
Apr.	28-29	High	3.8	3.5	3.8	4.2	4.2	4.2
		Low	2.8	2.8	2.8	2.9	2.9	2.9
May	03-04	High	5.1	5.2	5.4	5.1	5.1	5.1
		Low	4.2	4.2	4.2	4.4	4.3	4.3
May	10-11	High	4.4	4.9	5.0	4.7	4.7	4.7
		Low	3.0	3.1	3.2	3.1	3.1	3.1
May	17-18	High	6.3	6.3	6.6	6.2	6.2	6.2
		Low	5.5	5.4	5.4	5.7	5.5	5.5

Table 10. (Continued)

DATE			INTAKE Surface	Midwater	Bottom	DISCHARGE Surface	Midwater	Bottom
May	23-24	High	6.7	6.6	6.6	6.6	6.6	6.6
		Low	6.0	6.0	6.0	6.0	6.0	6.0
June	06-07	High	7.4	7.4	7.4	7.3	7.3	7.3
		Low	6.8	6.8	6.8	6.8	6.7	6.7
June	21-22	High	9.6	9.2	9.2	9.3	9.2	9.2
		Low	8.3	8.3	8.5	8.6	8.5	8.4
July	21-22	High	10.1	10.1	10.4	10.1	10.8	10.1
		Low	9.7	9.4	9.4	9.6	9.6	9.6
Aug.	23-24	High	12.7	13.0	13.0	13.0	12.9	12.9
		Low	12.0	12.0	12.0	12.1	12.1	12.1
Sept.	21-22	High	14.2	14.3	14.3	14.2	14.2	14.2
		Low	13.2	13.3	13.1	13.3	13.4	13.3
Oct.	20-21	High	14.1	14.1	14.0	14.0	14.0	14.0
		Low	12.5	12.5	12.5	12.5	12.6	12.6
Nov.	21-22	High	3.4	3.5	3.6	3.4	3.4	3.4
		Low	2.5	2.7	2.8	2.7	2.7	2.7
Dec.	08-09	High	1.4	1.5	1.7	1.9	1.4	1.4
		Low	0.8	1.0	1.0	1.0	1.0	1.0

Table 11. Ranges of water temperature (C) at VEPCO Surry Nuclear Power Plant during 24-hour plant entrainment stations from January through December 1977.

DATE			INTAKE Surface	Midwater	Bottom	DISCHARGE Surface	Midwater	Bottom
Feb.	17-18	High	3	3	3	3	3	3
		Low	0	1	1	2	2	2
Mar.	08-09	High	11	11	11	16	16	16
		Low	8	8	9	14	14	14
Mar.	22-23	High	13	13	13	19	18	18
		Low	9	9	8	15	15	16
Apr.	06-07	High	15	15	15	20	19	19
		Low	11	11	12	16	16	16
Apr.	12-13	High	19	19	18	23	22	22
		Low	16	16	16	20	20	20
Apr.	19-20	High	21	20	20	26	25	25
		Low	18	18	18	24	23	23
Apr.	28-29	High	21	20	20	27	25	25
		Low	17	16	17	24	22	22
May	03-04	High	22	22	22	28	27	26
		Low	20	19	19	25	24	24
May	10-11	High	19	18	18	25	24	23
		Low	16	16	16	22	20	20
May	17-18	High	23	23	22	31	30	30
		Low	21	20	20	28	27	27

Table 11. (Continued)

DATE			INTAKE Surface	Midwater	Bottom	DISCHARGE Surface	Midwater	Bottom
May	23-24	High	26	26	26	33	32	32
		Low	24	23	23	31	29	30
June	06-07	High	28	26	26	32	32	32
		Low	23	22	22	30	28	28
June	21-22	High	28	27	27	35	34	34
		Low	25	25	25	33	31	32
July	21-22	High	32	32	32	36	35	35
		Low	29	28	28	34	32	32
Aug.	23-24	High	28	28	28	36	36	36
		Low	26	26	26	29	28	29
Sept.	21-22	High	26	26	25	31	30	30
		Low	24	24	24	28	28	28
Oct.	20-21	High	14	14	14	22	22	22
		Low	13	12	12	20	20	20
Nov.	21-22	High	13	13	13	13	13	14
		Low	12	12	12	12	13	12
Dec.	08-09	High	6	6	6	15	15	14
		Low	5	5	5	14	13	13

Table 12. Ranges of dissolved oxygen (mg/l) at VEPCO Surry Nuclear Power Plant during 24-hour plant entrainment stations from January through December 1977.

DATE			INTAKE Surface	INTAKE Midwater	INTAKE Bottom	DISCHARGE Surface	DISCHARGE Midwater	DISCHARGE Bottom
Feb.	17-18	High	14.1	14.6	13.3	14.6	14.2	14.3
		Low	12.3	12.4	12.7	10.7	10.6	11.6
Mar.	08-09	High	12.1	11.9	12.2	11.9	10.9	11.4
		Low	10.2	9.9	10.1	10.0	10.1	10.1
Mar.	22-23	High	10.9	10.9	10.9	10.5	10.6	10.6
		Low	9.4	9.4	10.2	9.0	9.7	9.7
Apr.	06-07	High	10.0	10.0	10.4	9.8	10.9	10.8
		Low	8.5	8.7	8.7	9.2	8.1	9.7
Apr.	12-13	High	9.7	9.6	9.9	9.3	9.2	9.7
		Low	8.5	8.9	8.7	8.6	8.6	8.6
Apr.	19-20	High	11.0	10.8	10.5	9.6	10.3	10.5
		Low	8.6	8.4	8.7	8.1	8.4	8.5
Apr.	28-29	High	8.6	9.1	9.5	8.4	8.7	8.6
		Low	8.1	7.6	8.0	7.7	7.5	7.4
May	03-04	High	10.0	9.5	9.6	9.2	8.6	8.7
		Low	8.0	7.9	8.0	7.8	7.4	7.4
May	10-11	High	8.9	8.5	8.5	8.8	8.7	8.8
		Low	7.9	7.8	7.3	7.3	7.6	7.2
May	17-18	High	7.7	7.8	7.7	7.8	7.5	7.6
		Low	7.0	6.8	6.7	6.6	6.8	6.9

Table 12. (Continued)

DATE			INTAKE Surface	INTAKE Midwater	INTAKE Bottom	DISCHARGE Surface	DISCHARGE Midwater	DISCHARGE Bottom
May	23-24	High	8.4	8.2	8.5	8.1	7.4	7.8
		Low	6.8	6.8	6.4	6.7	6.4	6.7
June	06-07	High	7.5	7.3	6.9	6.8	6.8	6.9
		Low	6.3	6.2	6.1	6.1	6.5	6.4
June	21-22	High	8.4	7.8	8.0	7.5	7.2	7.7
		Low	6.7	6.8	6.9	6.5	6.3	6.6
July	21-22	High	7.0	6.6	6.5	6.4	6.3	6.5
		Low	5.8	5.3	5.8	5.5	5.5	5.5
Aug.	23-24	High	8.1	7.7	8.3	7.7	7.6	7.2
		Low	6.3	6.2	6.0	5.6	6.0	6.2
Sept.	21-22	High	8.1	7.7	7.6	7.4	7.5	7.4
		Low	6.6	7.0	5.8	5.8	4.8	6.1
Oct.	20-21	High	9.4	9.2	9.6	9.1	9.1	9.2
		Low	8.5	8.3	8.1	8.3	8.1	7.7
Nov.	21-22	High	9.6	9.8	10.1	10.0	10.1	10.2
		Low	8.7	8.4	7.9	9.1	9.4	9.1
Dec.	08-09	High	11.6	12.4	12.4	11.8	11.9	11.7
		Low	9.9	11.2	10.5	9.5	10.2	8.3

Table 13. Descriptive statistics of dependent (Y_i) and independent (X_j) variables.

Variable	February-December 1977 (N = 660) Mean	Standard Deviation	Minimum	Maximum	May-October 1977 (N = 352) Mean	Standard Deviation	Minimum	Maximum
Y_1, Total abundance of fish	3.102	2.051	0.0	8.915	-	-	-	-
Y_2, Abundance of fish species	0.947	0.574	0.0	2.197	-	-	-	-
Y_3, Fish species diversity	0.417	0.446	0.0	1.836	-	-	-	-
Y_4, Total abundance of eggs	1.619	2.395	0.0	8.993	-	-	-	-
Y_5, Abundance of egg species	0.298	0.381	0.0	1.386	-	-	-	-
Y_6, Egg species diversity	0.025	0.120	0.0	1.039	-	-	-	-
Y_7, Abundance of *A. mitchilli* fish	-	-	-	-	1.302	1.652	0.0	5.848
Y_8, Abundance of *G. bosci* fish	-	-	-	-	2.062	2.435	0.0	8.907
Y_9, Abundance of *A. mitchilli* eggs	-	-	-	-	2.553	2.794	0.0	8.993
X_1, Depth	3.2	2.121	1.0	7.0	3.2	2.122	1.0	7.0
X_2, Temperature	20.5	8.273	0.0	36.0	25.8	5.538	12.0	36.0
X_3, Salinity	6.0	4.167	0.0	14.0	8.7	3.501	3.0	14.0
X_4, Dissolved oxygen	8.6	1.831	4.8	14.6	7.4	0.943	4.8	10.0
X_5, Location	0.49	0.500	0	1	0.49	0.501	0	1
X_6, Period	0.48	0.500	0	1	0.49	0.501	0	1

Table 13. Continued

Variable	February-December 1977 (N = 660) Mean	Standard Deviation	Minimum	Maximum	May-October 1977 (N = 352) Mean	Standard Deviation	Minimum	Maximum
X_7, Tide	0.03	0.688	-1	1	-0.02	0.686	-1	1
X_8, Fall	0.16	0.370	0	1	0.10	0.303	0	1
X_9, Winter	0.15	0.354	0	1	-	-	-	-
X_{10}, Spring	0.53	0.500	0	1	0.59	0.492	0	1

Table 14. Summary statistics for final stepwise regression equations.

Y_i	Final Equation R^2	F_s	DF	Sig.	b_1 Depth	b_2 Temp.	b_3 Salinity	b_4 Dissolved Oxygen	b_5 Location	b_6 Period	b_7 Tide	b_8 Fall	b_9 Winter	b_{10} Spring	b_0 Constant
Y_1, Total abundance of fish	0.29	29.9	9,650	0.001	0.192***	0.155***	-0.190***	-0.276**	-0.297	0.936***	ns	0.825*	2.149***	-0.671*	2.442
Y_2, Abundance of fish species	0.28	36.9	7,652	0.001	0.032**	0.018**	-0.037***	-0.094***	0.129**	0.318***	ns	ns	0.190**	ns	1.277
Y_3, Fish species diversity	0.19	38.0	4,655	0.001	ns	0.012***	ns	ns	0.074*	0.177***	ns	ns	ns	0.194***	-0.049
Y_4, Total abundance of eggs	0.42	67.0	7,652	0.001	0.114**	0.157***	ns	-0.369***	ns	-0.658***	ns	1.253***	2.504***	1.409***	0.227
Y_5, Abundance of egg species	0.39	68.5	6,653	0.001	0.011*	0.027***	ns	ns	ns	-0.074**	0.031	ns	0.116**	0.172***	-0.354
Y_6, Egg species diversity	0.07	15.8	3,656	0.001	ns	0.002**	-0.006***	ns	0.034***	ns	ns	ns	ns	ns	0.006
Y_7, Abundance of _A. mitchilli_ fish	0.50	43.3	8,343	0.001	0.159***	0.124***	-0.114**	-0.500***	ns	0.639***	0.269**	1.381***	NA	-1.683***	2.813
Y_8, Abundance of _G. bosci_ fish	0.60	63.1	8.343	0.001	0.254***	0.372***	ns	-0.980***	-2.045***	0.539**	0.377**	3.585***	NA	1.045***	-1.370
Y_9, Abundance of _A. mitchilli_ eggs	0.56	55.4	8,343	0.001	0.154**	0.338***	0.120	-1.399***	-1.647***	-1.026**	ns	4.526***	NA	3.915***	1.106

R^2, Coefficient of multiple determination
F_s, F-statistic for test of significance of regression
DF, Degrees of freedom
Sig., Significance of regression
b_j, Partial regression coefficient
*, Significant, P<0.05
**, Highly significant, P<0.01
***, Very highly significant, P<0.001
ns, Not significant, P>0.10
NA, Not applicable

Table 15. Standardized partial regression coefficients with ranks of relative importance in parentheses.

Y_i	Depth	Temperature	Salinity	Dissolved Oxygen	Location	Period	Tide
Y_1	0.199 (5)	0.625 (1)	-0.386 (2)	-0.247 (3)	-0.073 (6)	0.228 (4)	ns (7)
Y_2	0.117 (5)	0.253 (4)	-0.271 (3)	-0.300 (1)	0.112 (6)	0.277 (2)	ns (7)
Y_3	ns (5.5)	0.219 (1)	ns (5.5)	ns (5.5)	0.083 (3)	0.198 (2)	ns (5.5)
Y_4	0.101 (4)	0.543 (1)	ns (6)	-0.282 (2)	ns (6)	-0.137 (3)	ns (6)
Y_5	0.062 (3)	0.577 (1)	ns (6)	ns (6)	ns (6)	-0.097 (2)	0.056 (4)
Y_6	ns (5.5)	0.123 (3)	-0.203 (1)	ns (5.5)	0.142 (2)	ns (5.5)	ns (5.5)
Y_7	0.204 (4)	0.416 (1)	-0.242 (3)	-0.285 (2)	ns (7)	0.194 (5)	0.112 (6)
Y_8	0.221 (4)	0.845 (1)	ns (7)	-0.379 (3)	-0.420 (2)	0.111 (5)	0.106 (6)
Y_9	0.117 (6)	0.617 (1)	0.150 (5)	-0.472 (2)	-0.295 (3)	-0.184 (4)	ns (7)
Sum of Ranks	42	14	38.5	30	41	32.5	54
Overall Rank of Relative Importance	6	1	4	2	5	3	7

Section II b.

THERMAL PLUME ENTRAINMENT OF ICHTHYOPLANKTON AT VEPCO NUCLEAR POWER STATION

by

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3.5.2 ICHTHYOPLANKTON ENTRAINMENT STUDY

Please refer to the following report by the Virginia Institute of Marine Science for preliminary results and conclusions.

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INTRODUCTION

Thermal plume ichthyoplankton sampling was initiated at VEPCO Surry Nuclear Power Plant in August 1975 by the Ichthyology Department of Virginia Institute of Marine Science. Objectives of this study were to assess the kinds and amounts of ichthyoplankton being entrained from the waters of Cobham Bay, James River by the thermal effluent from the facility.

Heated effluent from the Surry facility travels through the discharge canal where some cooling occurs. The canal is constricted at the discharge point to increase water velocity as it enters the river. In achieving this, considerable turbulence is created, promoting faster mixing, thus reducing the area of thermal impact to the immediate vicinity of the discharge point. Most ichthyoplankters are pelagic and unable to effectively negotiate water currents. As Cobham Bay water mixes with the thermal effluent, ichthyofauna therein are entrained and carried along with the thermal plume.

VEPCO Surry is located near the freshwater to marine transition zone of the James River, thus the ichthyofauna varies considerably as salinity fluctuates with seasonal and short-term weather patterns affecting the James River discharge. Eighty-four fish species representing 38 families have been reported from the vicinity of Hog Island (White, 1976); species reported ranged from strictly freshwater to polyhaline forms.

Many species are represented only as juvenile and adult life stages. As such, they are capable of negotiating the currents in the thermal plume and are not subject to entrainment. Other species utilize the area as spawning areas (engraulids, gobiids), nursery areas (sciaenids, Brevoortia), and as migration route (Alosa, Morone, Anguilla). Many freshwater and several anadromous species spawn upriver from Hog Island; however, in years that salinities are depressed during spawning times, spawning may occur near Hog Island. Larvae and postlarvae of these species might then occur near VEPCO Surry and be subject to entrainment.

Species lists and abundance of ichthyoplankton captured in and near the thermal plume from VEPCO Surry are presented along with ranges of salinity, dissolved oxygen, and temperature during sampling visits. Species composition, trends of abundance, statistical analyses of the data set (1977), and entrainment impact upon the ichthyofauna near Hog Island are discussed.

Sampling visits for plant and thermal plume ichthyoplankton entrainment from January through December 1977 are presented in Table 1. Sampling intensity for plume entrainment reflects anticipated periods of greatest spawning activity (April, May) and periods of critical water temperature elevations (ΔT) i.e., August.

MATERIALS AND METHODS

Thermal plume ichthyoplankton sampling employed the use of a 0.5 meter paired net apparatus (Figure 1) equipped with conical Nitex nets (505 μ mesh) and General Oceanics Digital Flowmeters (Model 2030). The unit was selected as the best sampling gear for the plume study after reviewing gear evaluation studies conducted for the plant entrainment sampling program (Merriner and Estes, 1975). Flowmeters were periodically calibrated in the VIMS flume. For towing, lead weights and a bridle of 0.25 inch braided nylon rope were added to the net apparatus.

Sampling sites (Figure 2) were: (1) mid-channel in the discharge canal at the roadway bridge; (2) plume area where water temperatures exceed ambient water temperatures by 5 C; and (3) that area of Cobham Bay where ambient water temperatures exist. Two tows each were made in the plume area and ambient river water; one tow was made in the discharge canal. Stepped oblique tows of 5-minute duration were made with bottom, midwater, and surface steps per tow. The nets fished at each depth for approximately 1 minute and 40 seconds. The boat's engine was operated at 900 RPM, except in the discharge canal where the boat was tied to the roadway bridge.

Water temperature, dissolved oxygen, and salinity were taken in the discharge canal, at the end of tow 1, and at the end of tow 3. Data were taken at surface, midwater, and bottom depths except where water was less than 4 meters deep. For the latter, only surface and bottom data were obtained. Salinity samples were returned to VIMS for analysis with a Beckman RS-7 induction salinometer. Dissolved oxygen samples were fixed in the field for laboratory analysis by the Winkler Titration Method. Water temperature was measured to the nearest degree with a stem thermometer (-35 C to 50 C, 1 C interval). Sea state, weather, turbidity, etc. were recorded at the time of sampling.

Sampling at low slack tide would theoretically locate the plume in the same relative position during sampling visits, except for minor deviations due to meterological conditions (wind, rain, etc.) that influenced river flow during any given sampling period. This reduced total sampling time and provided relatively constant water depths for sampling. At low slack tide, the plume generally flowed straight out from the discharge canal and then bent slightly upriver (Figure 2).

Ichthyoplankton samples were preserved with approximately 5% formalin, and returned to VIMS for sorting, enumeration, and identification. Data were tabulated and punched on ADP cards for analysis.

The most useful key for the identification of fish eggs and larvae has been a manual by Lippson and Moran (1974). Where identification of larvae was dependent upon accurate myomere counts, larvae were cleared and stained (Mook and Wilcox, 1974).

The site scheduled for January 1977 was cancelled as severe ice conditions existed in the James River during the entire month.

Vessels and operators for sampling stations were provided by VEPCO. Two VIMS project personnel were required to conduct each shift (day; night) of plume sampling.

All calculations and conclusions presented in this report are based on number of organisms per 100 cubic meters of water strained unless otherwise stated.

Statistical Methods

Catch data were subjected to statistical analysis (a) to determine the significant spatial and temporal trends in the ichthyoplanktonic community, (b) to develop regression models which identify the major environmental factors of importance to community structure, and (c) to assess significant patterns in two dominant fish populations (*Anchoa mitchilli* and *Gobiosoma bosci*).

Six dependent or response variables (Y_i) which reflect overall community structure were included in the analysis; these were total abundance of fish, abundance of fish species, fish species diversity (Shannon index), total abundance of eggs, abundance of egg species, and egg species diversity. The abundance of *A. mitchilli* fish, *A. mitchilli* eggs, and *G. bosci* fish were also included as dependent variables. [NOTE: For simplicity throughout this report, the species abundance and species diversity of the egg stage are referred to as egg species abundance and egg species diversity, respectively.]

Measures of abundance were computed as $Y_i = \log_e (C_i + 1)$, where Y_i is abundance and C_i is standardized catch of collection i (i.e. number captured per 100 cubic meters of water strained per collection). Logarithmic transformation of the catch data was necessary to convert discrete variables to continuous form and to remove heterogeneity and non-normality from the data. Measures of species diversity were not log-transformed, but were analyzed in their original scale.

Nine independent variables (X_j) were chosen for analysis: water temperature, salinity, dissolved oxygen and dummy variables for sampling locations (plume and ambient), period and seasons (fall winter and spring). Table 2 summarizes notation and defines the dependent and independent variables.

Multiple regression was selected as the major method to analyze trends in the response variables for the following reasons:

(a) Complex multivariate relationships exist between the abundance of fish and eggs and environmental variables; as a descriptive tool, multiple regression can give a concise summary of these relationships.

(b) Field survey data are confounded by numerous factors since such surveys are observational in nature rather than controlled; multiple regression allows for control of some of these confounding factors by the use of "dummy" (categorical) variables. Also, each partial regression coefficient is computed as if the other variables in the equation are held constant, thereby removing their confounding effects.

(c) The ability to accurately predict the effects of environmental change or modification upon living resources is an ultimate goal; multiple regression techniques can be used to develop empirical models with predictive capabilities.

Stepwise regression techniques (Draper and Smith, 1966) were used to develop the "best" regression equation for each Y in the following manner:

(a) The dependent variables were plotted against environmental (independent) variables and the data were transformed where necessary.

(b) Matrices of simple correlation coefficients of dependent and independent variables and selected transformations were computed.

(c) Using the multiple regression model

$$Y_i = B_0 + B_1X_1 + B_2X_2 + \ldots + B_pX_p + \varepsilon,$$

where Y_i is abundance or species diversity, X_j is some function of one of the selected environmental variables, and B_j is a partial regression coefficient, a stepwise regression was performed to identify those parameters which explain a significant portion of the variation in the model.

(d) For each final regression equation residuals were analyzed to detect possible violations of the basic assumptions that the errors were independent, had zero mean, constant variance and followed a normal distribution.

Computations were made using SPSS version 6.02 (Nie, et. al., 1975). Independent variables were retained in the equations if their partial regression coefficients (b_j) could be declared significantly different from zero at $P<0.10$. Equations for the community structure variables (Y_1 through Y_6, Table 2) were based upon data from February through December 1977; severe ice conditions in January did not permit sampling in this month. Equations for *A. mitchilli* and *G. bosci* (Y_7 through Y_9) were based on data from May through October 1977, the time period in which eggs and larvae of these species are known to occur.

RESULTS AND DISCUSSION

Seasonal Trends in Species Composition and Abundance

Number of species (fish) increased from February (lowest) through April (Fig. 3; Table 3). Number of species fluctuated from May through July but total number of species remained high. Species count declined during August, increased during September and October, and fluctuated during November and December, although moderate species counts were recorded. Highest number of species was recorded on 23-24 May. Nighttime species counts exceeded daytime count on all but two sampling visits.

Daytime species counts in the thermal plume exceeded counts in the discharge on all but four sampling visits (Fig. 4). Of those four visits, one (15 December) contained a species in the thermal plume that was not taken in the discharge canal.

Nighttime species counts in the thermal plume exceeded counts in the discharge canal on all but eight sampling visits (Fig. 5). Of those eight visits, four (24 March, 24 May, 3 August, and 22 September) contained one or more species in the thermal plume that were not taken in the discharge canal.

Fish eggs were captured from February through August (Fig. 6; Table 3). February and March catches were made only in the discharge canal and contained primarily an egg that remains unidentified. Species counts of eggs increased during April, declined during the first half of May, and increased to the highest counts in late May. Species counts fluctuated from June through August but counts remained relatively low.

Daytime species counts of fish eggs in the plume were higher than counts in the discharge canal during 50% of the sampling visits (Fig. 7). Nighttime species counts of eggs in the plume were higher during less than 50% of the sampling visits (Fig. 8). In all cases where species counts were the same or lower in the plume, the species captured were the same as those captured in the discharge canal.

Species counts of fish and fish eggs between the thermal plume and discharge canal indicate some ichthyoplankton entrainment by the thermal plume. However, variability within these data limit impact assessment.

Abundance (average number of fish per sample; $100m^3$) of fish increased from February (lowest) through March (Fig. 9). Abundance of fish decreased in early April and fluctuated through May although moderate numbers were recorded. Increased abundance was recorded in early June and sharp increases were recorded each sampling visit thereafter until 3 August when maximum abundance was recorded. Abundance decreased slightly through mid and late August though numbers remained relatively high. A sharp decrease was recorded during September and slight decreases continued through December.

Nighttime catch (average catch per sample) exceeded daytime catch on all but one sampling visit (Fig. 9). During one visit, nighttime catches exceeded daytime catches over fifty-fold (23-24 August; 281 vs 5). Threefold to fivefold increases were common.

Data depicting average catch per sample (by site) for both daytime and nighttime sampling revealed no consistent trends in catch at any sampling site (Figs. 10 and 11; Table 4). However, during August, sampling in the discharge canal consistently yielded higher catches than the plume area or ambient river area.

Abundance of fish eggs was low until 23-24 May though some spawning activity was recorded during April and early May (Fig. 12). A sharp increase in catch was recorded on 23-24 May and abundance remained relatively high through 8-9 August sampling. Late August sampling captured low numbers of eggs and no eggs were captured after August. Daytime samples tended to capture more fish eggs but this was not always the case.

Highest catch of eggs was not consistent at any sampling site during daytime or nighttime samples until 23-24 May (Fig. 12 and 14; Table 4). With the onset of spawning activity of bay anchovy (Anchoa mitchilli) in mid-May, discharge canal samples consistently contained higher numbers of eggs than the plume or ambient river areas. Bay anchovy prefer higher salinities for spawning (Mansuetti and Hardy, 1967) and eggs being entrained at the intake [(higher salinity), (Table 9)] would pass through the plant with the cooling water and be captured in the discharge canal. Also it is probable that spawning takes place in the high level intake canal.

Bay anchovy and naked goby (Gobiosoma bosci) were the dominant species captured in 1977 plume entrainment samples

(Tables 6 and 8). Gobies were captured from May through October, usually as larvae and postlarvae. Bay anchovy eggs, larvae, and postlarvae were abundant from late spring through early fall. Juveniles and adults were taken all year, but were captured in higher numbers in winter and early spring samples. Naked goby was the most abundant fish captured. Concentrations reached $12/m^3$ on 3 August; however, concentrations were usually less than $7/m^3$. Larval bay anchovy were taken from May through October in concentrations generally less than $3/m^3$. Bay anchovy eggs were taken from May through August with concentrations reaching $14/m^3$ in early August; however, concentrations generally were less than $5/m^3$.

Two sciaenids, spot (*Leiostomus xanthurus*) and Atlantic croaker (*Micropogon undulatus*) were captured seasonally (Table 6). Spot were captured during the spring months and croaker were captured during fall months. Both were usually captured in concentrations less than $1/m^3$.

Sciaenids are hatched offshore and thereafter migrate into Atlantic coast estuaries which serve as nursery areas for postlarvae and juveniles. The area encompassing Hog Point is near the center of the James River nursery area. Once in the nursery area, they re-distribute in search of food, etc. Juvenile croaker have been found to occupy almost the entire saline portion of the estuary with smallest fish being found in the lowest salinities (Haven, 1957; Markle, 1976) and they remain in the estuary for nearly a year before migrating back to sea (Chao, 1976). As these fish re-distribute, they are repeatedly subject to entrainment by the heated water plume until they reach a size that they can effectively overcome the turbulence created in the mixing zone.

Atlantic menhaden (*Brevoortia tyrannus*) were taken in early spring when they enter the estuarine nursery grounds as postlarvae (Table 6). However, numbers were generally insignificant.

One striped bass (*Morone saxatilis*), a juvenile, was taken in June (Table 6). No striped bass eggs were taken. White perch (*Morone americana*) eggs and larvae were taken in low numbers during April (Tables 6 and 8).

Atlantic silverside (*Menidia menidia*), Tidewater silverside (*Menidia beryllina*) and rough silverside (*Membras martinica*) were captured throughout the year. Eggs, larvae, and juveniles were captured during spring and summer; juveniles and adults were captured in fall and winter (Tables 6 and 8).

Several species of alosine fish were captured occasionally during springtime samples but concentrations remained low (Tables 6 and 8).

Carp (*Cyprinus carpio*) eggs were taken in the discharge canal in April (Table 8).

Other species were occasionally taken but numbers remained low.

Hydrographic Data

Salinity, water temperature and dissolved oxygen data from 1977 plume entrainment samples are presented in Figures 15, 16 and 17 and Tables 9, 10 and 11.

Salinities (Fig. 15, Table 9) remained less than $1^0/_{00}$ during late March and April. Accordingly, several freshwater and anadromous species were taken occasionally as eggs and larvae; carp and white perch were the dominant eggs captured (Tables 6 and 8). Salinities rose during May ($1.5-4.3^0/_{00}$) resulting in reduced catches of freshwater and anadromous species while estuarine spawners became more abundant. Drought conditions during the summer and early fall produced rising salinities through October ($14.2^0/_{00}$). Salinities fell to more normal levels after October.

Water temperature (Fig. 16; Table 10) peaked during July and August when plume temperatures were consistently above 30 C. Plume temperatures did not always exceed ambient readings by 5 C as data for the plume area are taken at the end of Tow 1 (Fig. 2) and some mixing has occurred at this point. Also, the thermal plume sometimes travels out into the river and "dives" making exact location of the 5 C ΔT difficult.

Dissolved oxygen data are presented in Figure 17 and Table 11. No oxygen deficiencies were recorded during 1977 sampling visits though water temperatures were high at times. Presumably wind action and turbulence in the mixing zone prevented dissolved oxygen deficiencies.

Statistical Results

An examination of simple correlation matrices of potential regression variables in original and log-transformed scale was made to identify the final form of variables. In general, correlations were higher between transformed dependent variables (Y_i) and independent variables (X_j) in their original scale, except for fish and egg species diversities. Little or no improvement in correlations were found by transforming either species diversity or the independent variables.

Although many simple correlation coefficients (r) between the dependent and independent variables were declared highly significant ($P<0.001$), most correlations were not high (maximum $r = 0.683$). All independent variables, except plume and ambient, were significantly correlated ($P<0.05$ or better) with six or more of the dependent variables.

Table 12 presents descriptive statistics of the dependent and independent variables, and Table 13 summarizes the results of the regression analysis. Each final regression equation is discussed separately, then overall patterns are summarized.

In the following discussion it is important to remember that the regression coefficients are partial coefficients which estimate the effects of a particular variable while holding constant or controlling for other variables in the equation. Evaluation of the contribution of a particular independent variable is facilitated by controlling the influence of other variables which, otherwise, could confound or mask significant relationships.

Total Abundance of Fish (Y_1):

Temperature, salinity, period and spring were retained in the final regression equation as significant predictors of fish abundance. The equation for Y_1 was highly significant ($P<0.001$) and explained almost half of the variation in fish abundance ($R^2 = 0.47$).

Temperature and period had positive partial regression coefficients (b_j's); i.e. their partial effects on Y_1 (fish abundance) were positive. Salinity and spring had negative b_j's. Within the ranges of values observed, the equation predicts an increasing total abundance of fish with an increasing temperature or decreasing salinity, holding other variables constant. A significantly higher ($P<0.001$) fish abundance was found at night than during the day. (recall period was coded as 0 = day, 1 = night).

Dummy seasons were included in the analysis to mathematically reduce the unexplained variation in the model and to remove factors which could confound the analysis. After allowing for the effects of other variables in the equation, spring had a significantly lower fish abundance than the reference season summer; fall and winter did not differ significantly from summer. This does not mean that, overall, spring had a lower and fall, winter and summer had an equal fish abundance. Rather, other seasonal effects (in addition to those accounted for by variables in the equation) tend to decrease fish abundance in the spring. Factors which may be reflected in the season dummy variables include time and duration of migrations of parent populations, recruitment, wind direction, currents, fishing efficiency of gear, and other unmeasured factors which vary seasonally. The overall effects of these factors can be masked by other factors and may not be evident when examining data summaries.

The location dummy variables (plume and ambient) were included in the analysis to estimate the partial effects of location on fish abundance. Because neither were retained in the equation, no significant differences in fish abundance were found between plume and ambient river samples and samples from the discharge canal (the reference location). In other words, there was no evidence of significant plume entrainment after removing the effects of other variables in the equation.

Abundance of Fish Species (Y_2):

The equation for Y_2, although highly significant, explained only one-third of the variation in fish species abundance (R^2 = 0.36). Since the primary objective of the analysis was to assess the effects of the independent variables and not to predict abundance, a low R^2 does not hinder the analysis. The partial regression coefficients for temperature and period were positive; those for salinity and winter were negative. Other independent variables were not retained in the equation for fish species abundance. Holding other variables constant, an increase in temperature or a decrease in salinity will increase the fish species abundance. A significantly higher fish species abundance was found at night. Unmeasured seasonal factors represented by the dummy season winter tended to decrease fish species abundance in this season. Here also, there was no evidence of significant plume entrainment holding other variables constant.

Fish Species Diversity (Y_3):

The highly significant equation for Y_3 explained 30 percent of the variation in fish species diversity and retained plume, ambient, period winter and spring as significant independent variables. Night samples had a significantly higher fish diversity than day samples. Seasonal factors (in addition to those reflected in other variables in the equation) decreased the fish diversity in winter and increased it in spring; no significant differences in fish diversity were found between fall and summer. Plume and ambient river samples had a significantly higher fish species diversity than discharge canal samples.

Total Abundance of Eggs (Y_4):

Thirty-nine percent of the variation in egg abundance was explained by the equation for Y_4. The partial effects of temperature, winter and spring were positive; those of salinity, ambient and period were negative. Ambient river samples and night samples had a significantly lower egg abundance than did plume, discharge or day samples. Unmeasured seasonal factors in winter and spring tended to increase egg abundance in these seasons compared to summer and fall.

Abundance of Egg Species (Y_5):

Thirty-seven percent of the variation in egg species abundance was explained by the equation for Y_5. Temperature and spring had significant positive partial regression coefficiets; salinity, ambient and fall had significant negative coefficients. The abundance of egg species will increase as temperature and spring increase or as salinity, ambient and fall decrease, all else being held constant.

Egg Species Diveristy (Y_6):

Although the equation for Y_6 was highly significant, only 12 percent of the variation in egg diversity was explained by the regression. The partial effects of temperature, plume and spring were positive, and that of salinity was negative. An increase in temperature or a decrease in salinity will lead to an increase in egg species diversity. Egg diversity was significantly higher in spring than in the other seasons, holding other variables constant. Plume samples had a significantly higher egg species diversity than did discharge or ambient river samples.

Abundance of Anchoa mitchilli Fish (Y_7):

Sixty-eight percent of the variation in anchovy abundance was explained by the final equation for Y_7. All independent variables, except the location dummy variables, were retained as significant independent variables. Temperature, period and fall had positive partial effects on anchovy abundance, and salinity, dissolved oxygen and spring had negative effects.

Abundance of Gobiosoma bosci Fish (Y_8):

Over half of the variation in goby abundance was explained by the final equation for Y_8. The partial regression coefficients for temperature, ambient, and period were positive, and the coefficient for dissolved oxygen was negative. Other independent variables were not retained as significant predictors of goby abundance.

Abundance of Anchoa mitchilli Eggs (Y_9):

Almost 50 percent of the variation in anchovy egg abundance was explained by the regression equation. The partial effects of temperature, fall and spring were positive, and the effects of dissolved oxygen and period were negative. No differences in anchovy egg abundance were found between the three sampling locations.

Summary of Regression Analysis:

A nonparametric ranking procedure was developed to assess the relative importance of the independent variables. Direct comparisons of partial regression coefficients (b_j's) are not useful since the independent variables were measured in different units. However, comparisons between standardized coefficients (the dependent and independent variables were standardized to have unit variance) can be used to determine the relative effect of each independent variable on the dependent variables. The procedure consisted of ranking the absolute values of the standardized b_j's in each equation, summing the individual ranks for each variable across all equations, and ranking these sums to give an overall measure of relative importance. Ties were assigned average ranks, and dummy seasons were not included in the analysis. Table 14 summarizes these data.

Overall, temperature ranked first in relative importance of the independent variables and was retained in eight of the nine regression equations. In these equations the relationship between temperature and the dependent variables was positive. Within the ranges of temperatures encountered during the study, abundance of fish and eggs increased as temperature increased. Fish and egg species diversities, however, were little affected by temperature, after removing the effects of other independent variables.

Period was second in importance of the independent variables and was retained in seven equations. The relationship between period and all fish abundance and diversity variables (Y_1, Y_2, Y_3, Y_7 and Y_8) was positive; fish abundance and fish species diversity were significantly higher at night than during the day. If net avoidance was greater during the day because of increased visibility, this pattern could result from diurnal differences in the fishing efficiency of the sampling gear. The opposite pattern was observed for total abundance of eggs and anchovy egg abundance which were significantly higher during the day. No explanation for this pattern can be offered at this time.

Salinity was next in relative importance and was retained in six regression equations as a significant independent variable. In these equations, the partial effect of salinity was negative.

Dissolved oxygen did not have a significant effect upon the variables which reflected overall community structure (Y_1 through Y_6). The abundance of anchovy, goby and anchovy eggs, however, was negatively related to dissolved oxygen. As dissolved oxygen decreased, these variables tended to increase. Apparently, levels of dissolved oxygen were never low enough to result in a decreased abundance.

Only in one equation (egg species diversity) were the plume samples found to be significantly higher than both the discharge and ambient river samples. Thus, there was no significant evidence of plume entrainment of ichthyoplankton after removing the effects of other variables.

CONCLUSIONS

The ichthyoplankton data set collected in and around the thermal plume from VEPCO Surry Nuclear Power Plant during 1977 revealed no statistically significant thermal plume entrainment of the Cobham Bay ichthyofauna. Some entrainment is evidently occurring, as samples from the plume (Figs. 4, 5, 7, and 8) often show higher number of species, but variability between sites is also quite high. This high variability between sites limits ichthyoplankton assessment by species occurrence and abundance. Also, size of the individuals present should be considered when comparing species capture, as larger fish can overcome turbulence in the mixing zone and may select the warmer water in the plume area during colder months.

We can now define the species and quantity of ichthyoplankton in and around the thermal plume from VEPCO Surry Nuclear Power Plant, however our data are not sufficient to overcome sources of variability. Natural fluctuations in abundance (which may be one or more orders of magnitude from year to year), sampling variability and biological attributes of the ichthyofauna interact in such a way as to confound interpretation of the data set. Other sources of stress (i.e. organic and inorganic pollutants, siltation, flooding, etc.) also interact to add difficulty to impact assessment. Impact assessment must contain an examination of all available data sets (trawl, seine, impingement, and entrainment) and take into consideration all factors affecting the estuarine ecosystem.

Adult fish population trends have been monitored since the pre-operational period. VEPCO data (screen impingement, trawl, and seine) and VIMS trawl data reveal large increases and decreases in relative abundance of some fishes in the vicinity of Hog Point (J. White, personal communication and Bender et al., 1975). However, ichthyoplankton studies have only been in progress since August, 1975 and no pre-operational data is available, thus long term trends in ichthyoplankton abundances have not become readily evident though some short term trends indicate relatively stable ichthyoplankton abundances.

Bay anchovy and naked goby were the dominant forms captured in 1977 plume entrainment samples. Both prefer slightly higher salinities for spawning (Lippson and Moran, 1974) than those normally recorded in and around the thermal plume from VEPCO Surry. Their salinity preferences for spawning make it unlikely that their centers of abundances are near the Cobham Bay area of the James River, but larval abundances could fluctuate with salinity patterns.

Bay anchovy egg and larval concentrations have been relatively stable during the two years of this study. Slightly higher concentrations of anchovy eggs were recorded in 1977, probably due to higher salinities brought about by drought conditions. Adult bay anchovy concentrations have also remained within the bounds of natural fluctuations over the long term [VIMS trawl surveys (Hoagman and Kriete, 1975) and VEPCO data (White, 1976)].

Adult naked goby inhabit oyster communities and other areas where crevices etc. afford them shelter and are seldom captured in trawl or seine surveys. It is impossible to obtain a realistic estimate of population levels to monitor trends in abundance. Therefore no attempt is made to assess the impact of the thermal plume on naked goby.

Fishes of commercial importance did not constitute a significant portion (relative to other species captured) of the catch in our samples. Several species (Atlantic croaker, spot, and Atlantic menhaden) utilize the area as nursery grounds while in the postlarval and juvenile stages, but entrainment for these species is applicable only until they reach a size when they can effectively negotiate turbulence created in the mixing zone.

Multiple regression techniques were useful in explaining some of the complex relationships between environmental factors and the abundance and diversity of fish and eggs, and in isolating factors which tend to confound the analysis of data from general field surveys. These techniques were successful in identifying the dominant envionmental factors and assessing their relative importance. Although the percentage of explained variation was low in some cases, the predictability of the models could be increased with improvements in sampling design and incorporation of other factors into the equations. Other factors of importance are estimates of gear efficiency, clogging, avoidance and the effects of wind and currents.

Although there was little statistical evidence of significant plume entrainment of ichthyoplankton, the long term impact of the thermal discharge upon the fishery resources of the region cannot be determined because the relationships between egg production, recruitment and adult stocks are poorly known. We can estimate the quantity of ichthyoplankton affected by the discharge, but the biological significance of this impact cannot be assessed until the abundance of eggs, larvae, juveniles and adults in the region are determined and their interrelationships are understood.

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Figure 1. 0.5 paired net apparatus with rope bridle and lead weight.

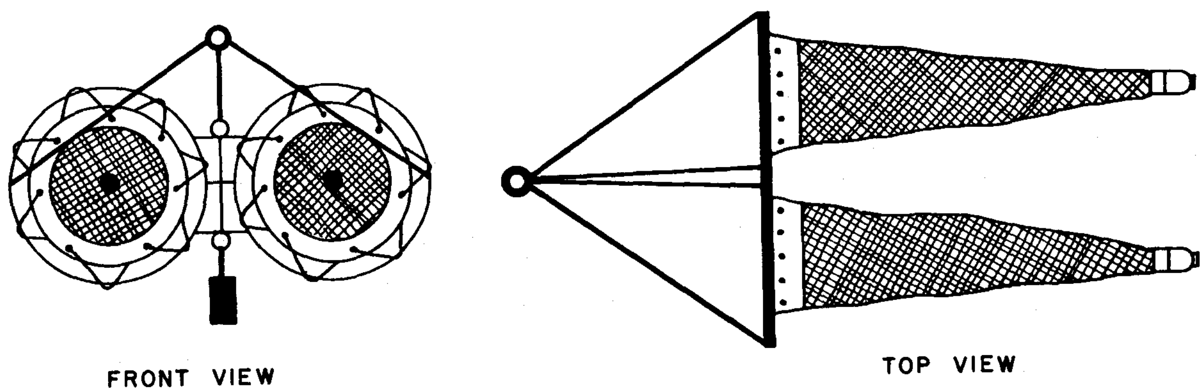
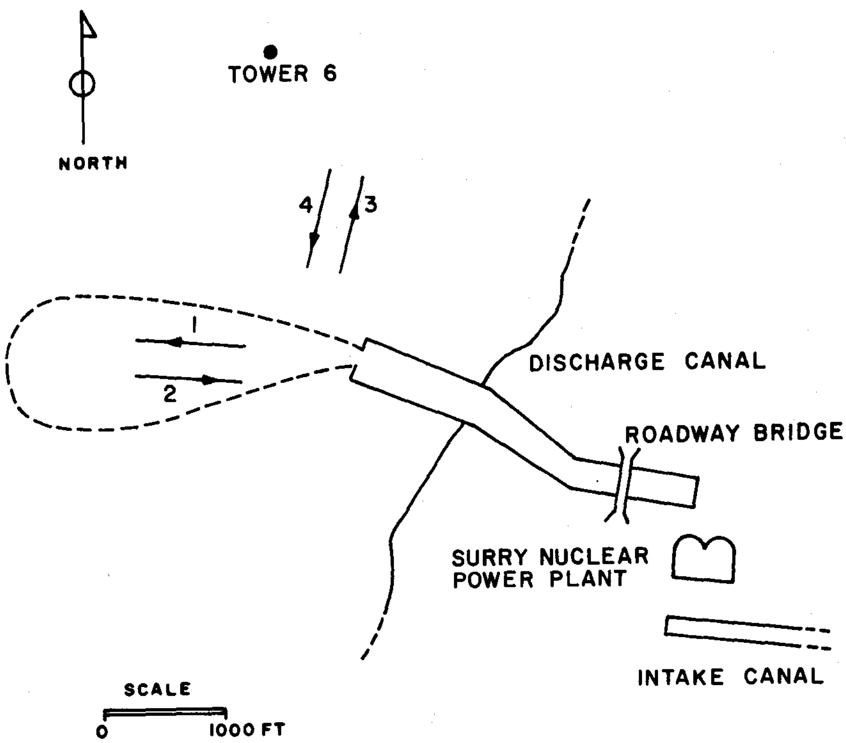


Figure 2. James River in vicinity of Surry Nuclear Power Station showing plume entrainment sampling locations.



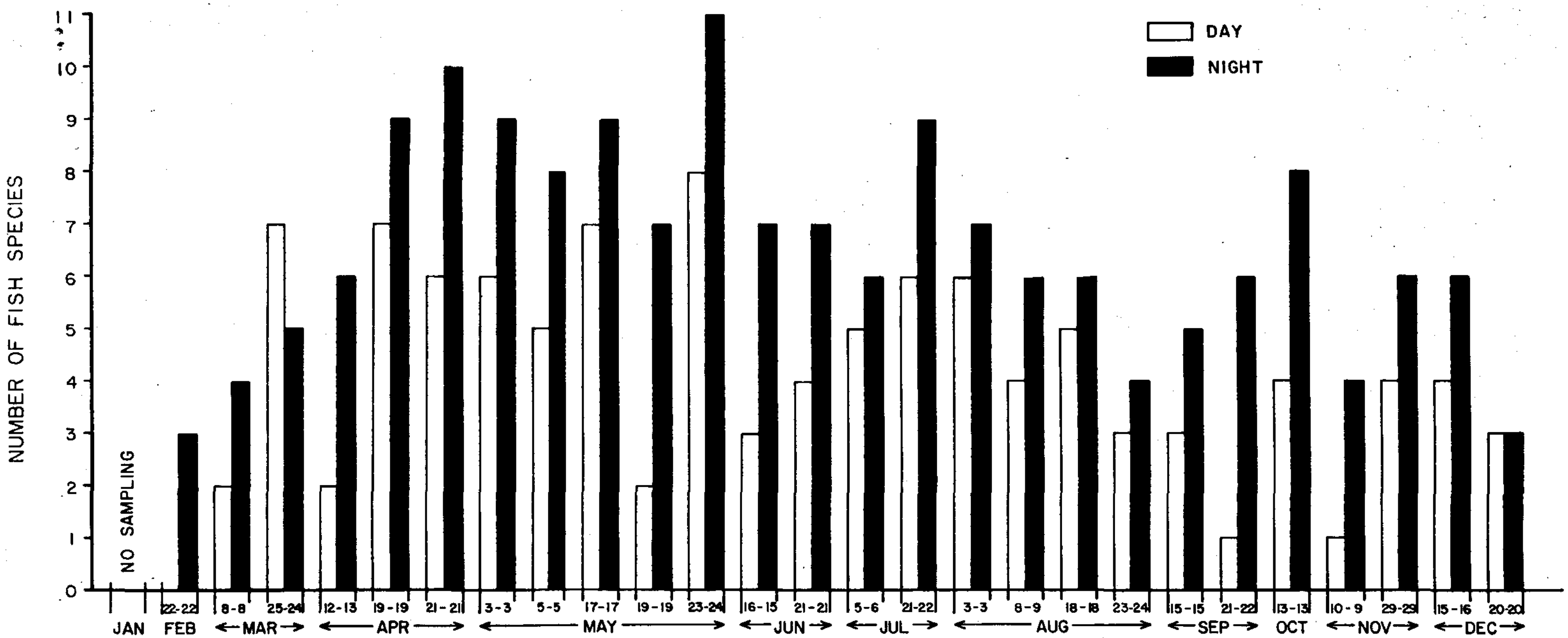


Figure 3. Number of fish species captured during plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

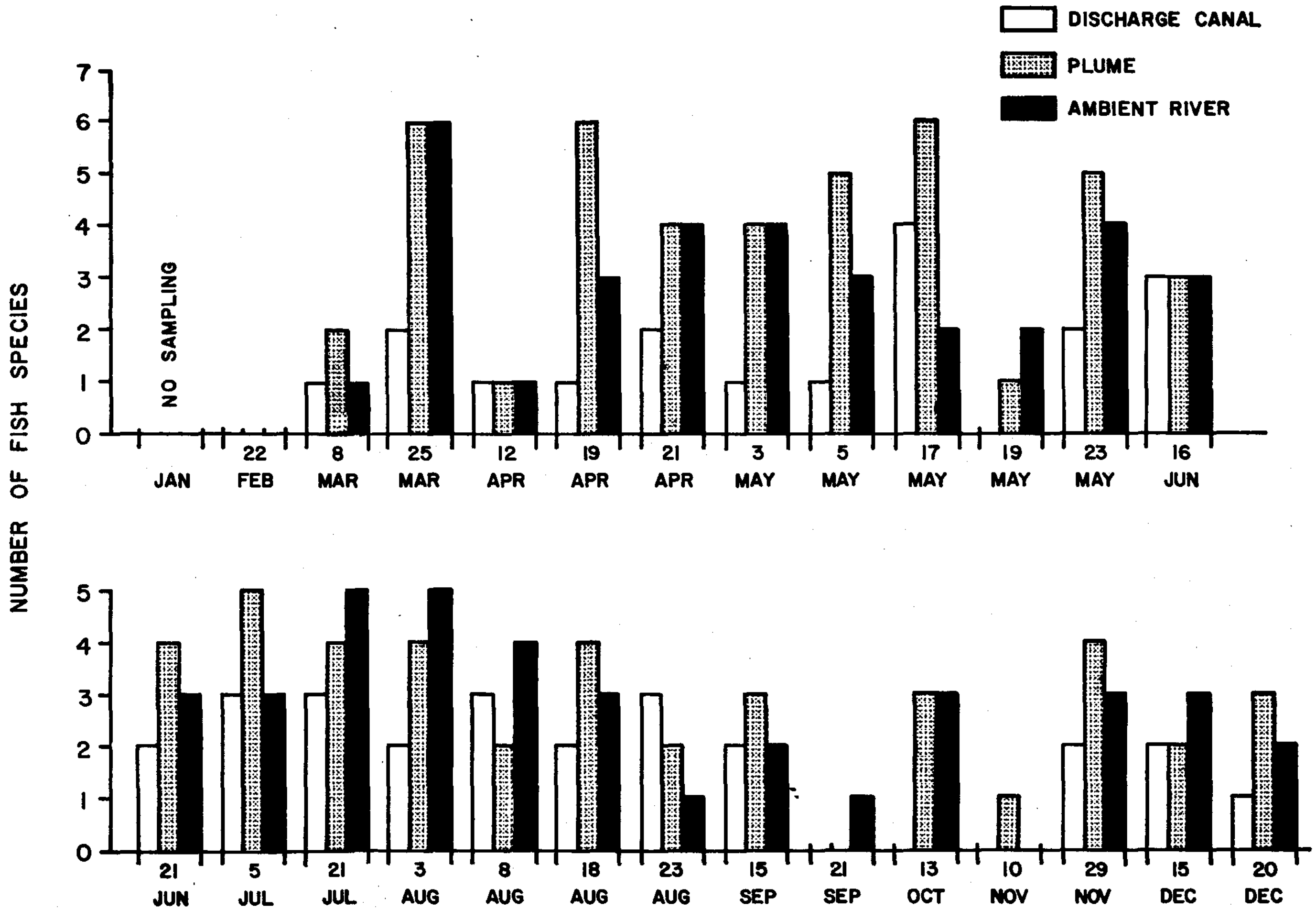


Figure 4. Number of fish species captured during day plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

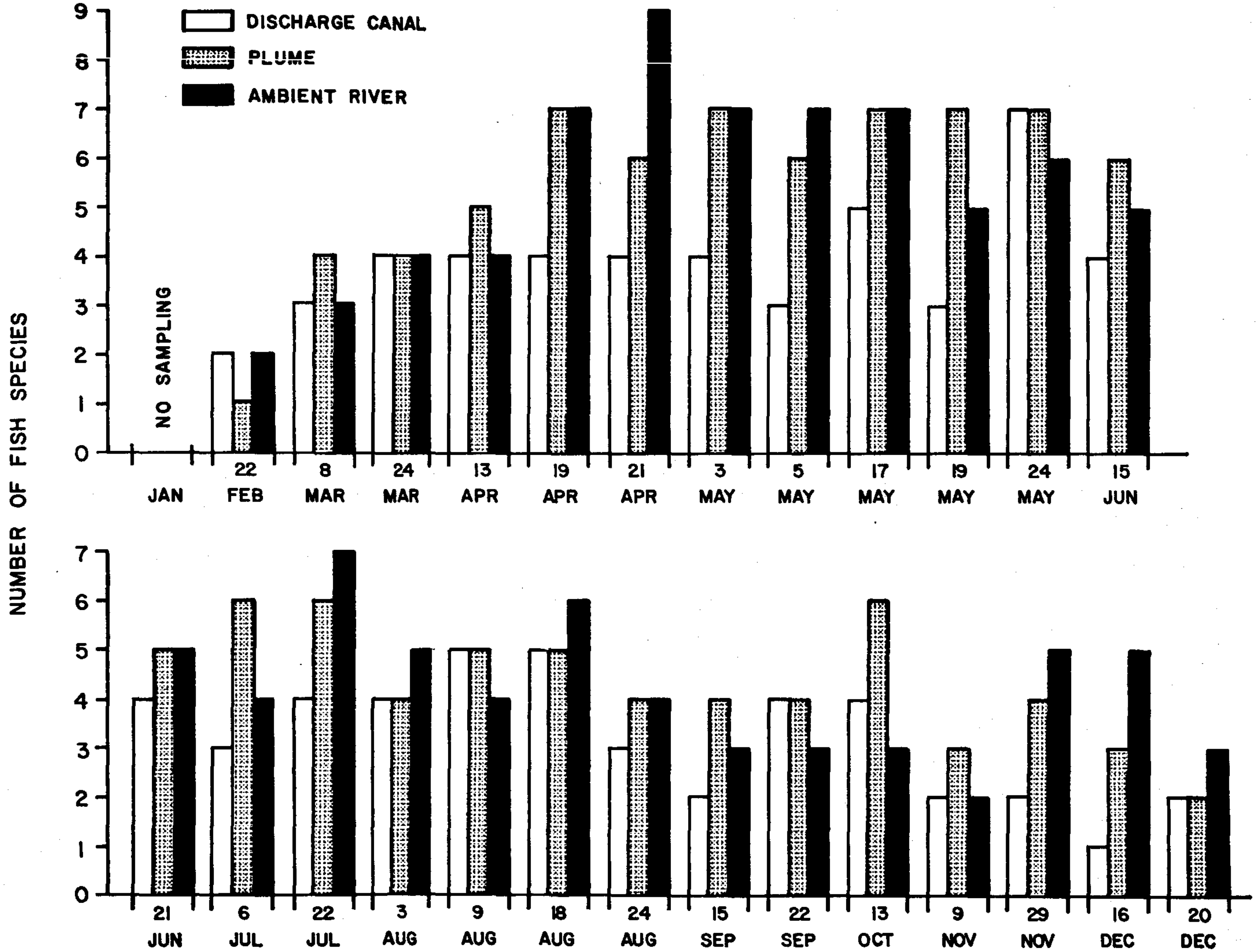


Figure 5. Number of fish species captured during night plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

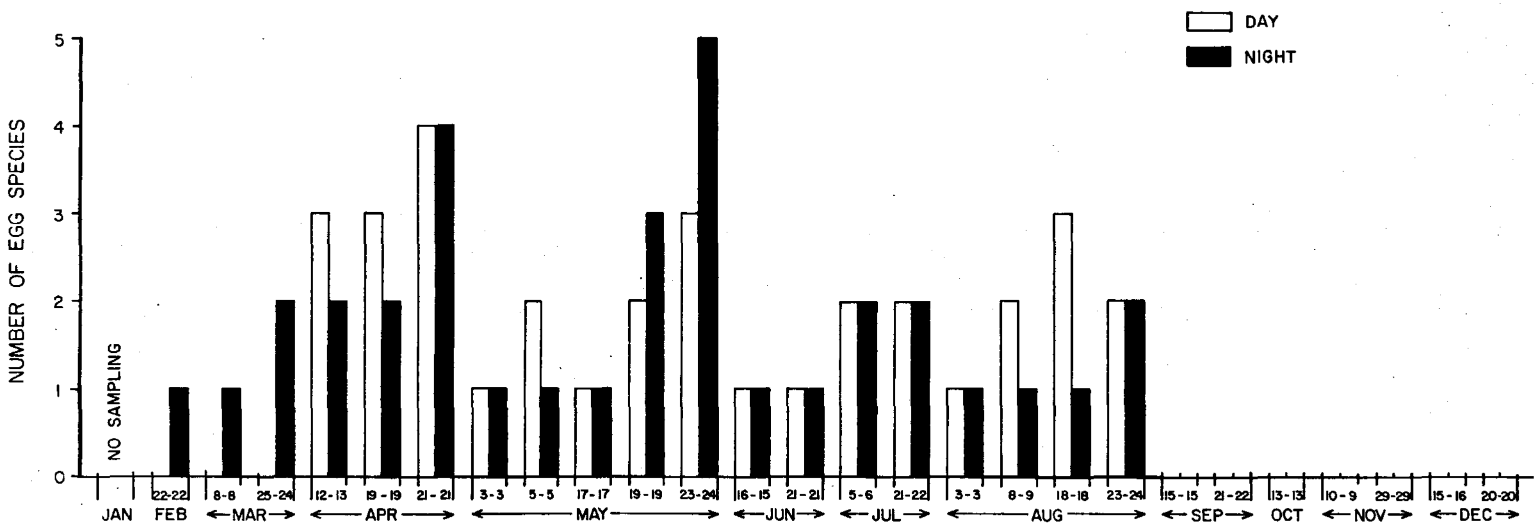


Figure 6. Number of egg species captured during plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

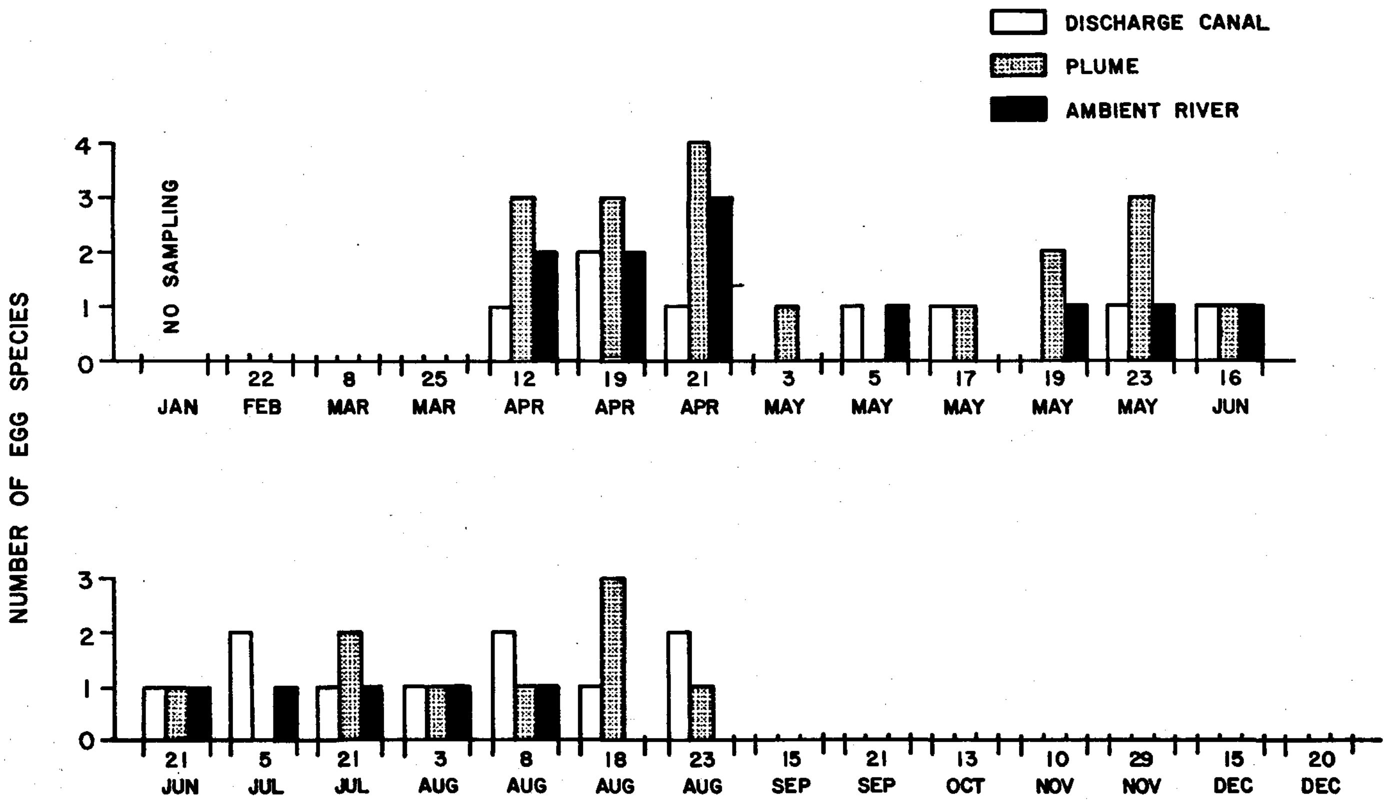


Figure 7. Number of egg species captured during day plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

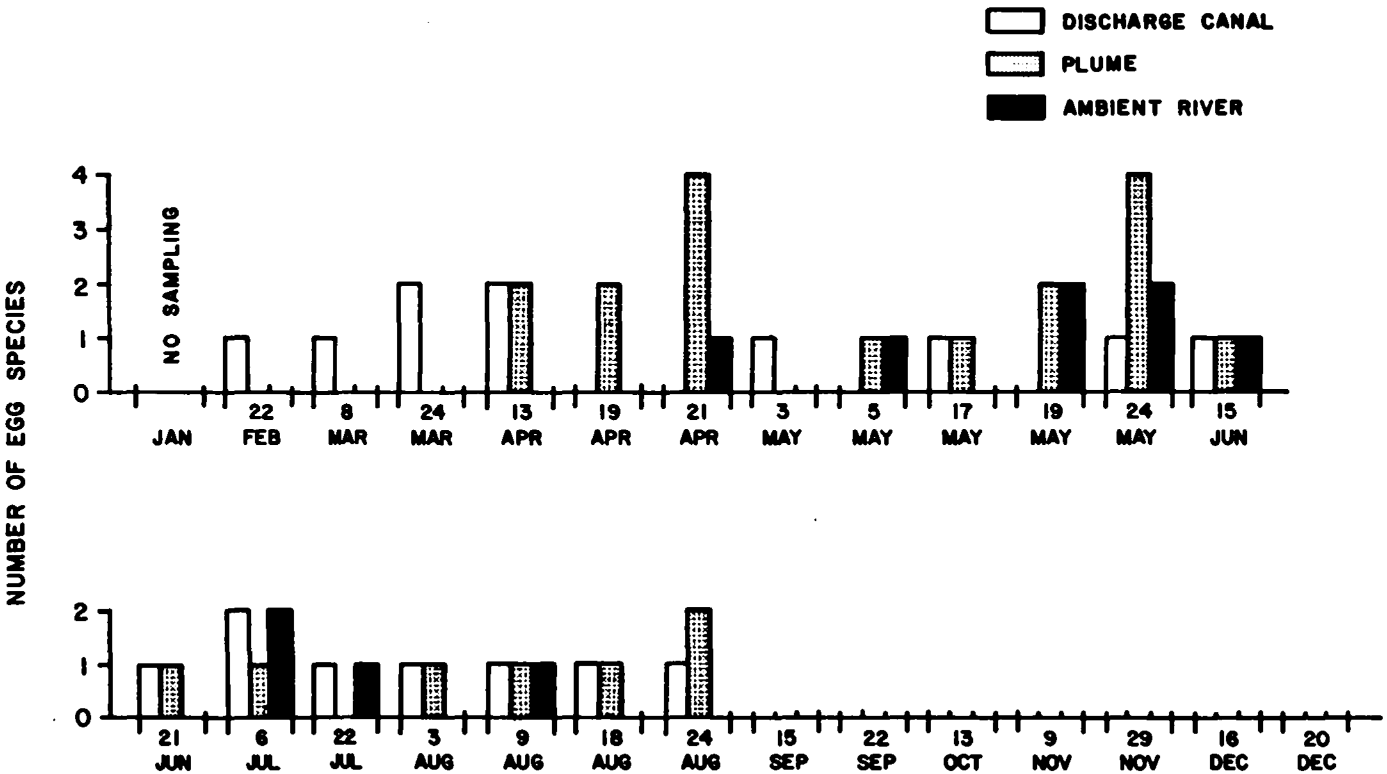


Figure 8. Number of egg species captured during night plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

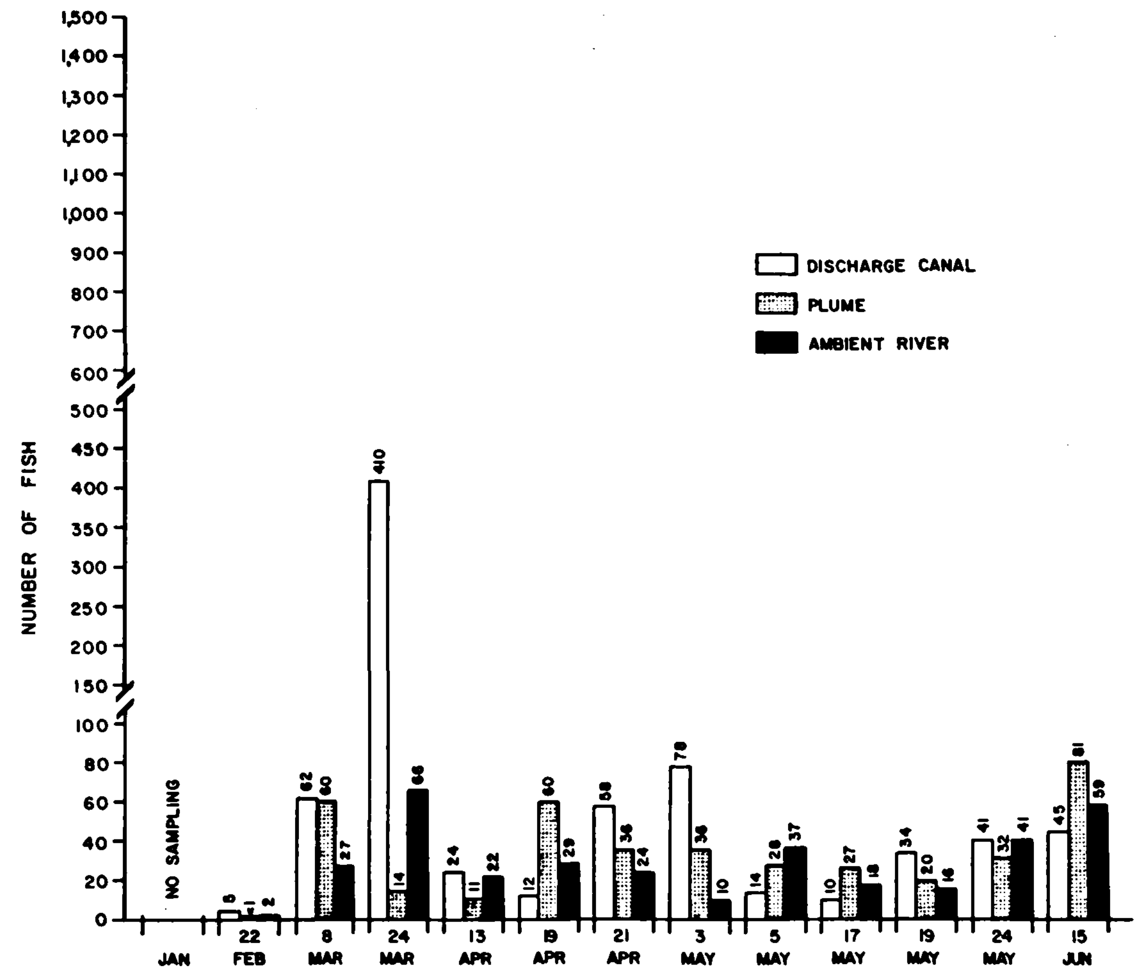
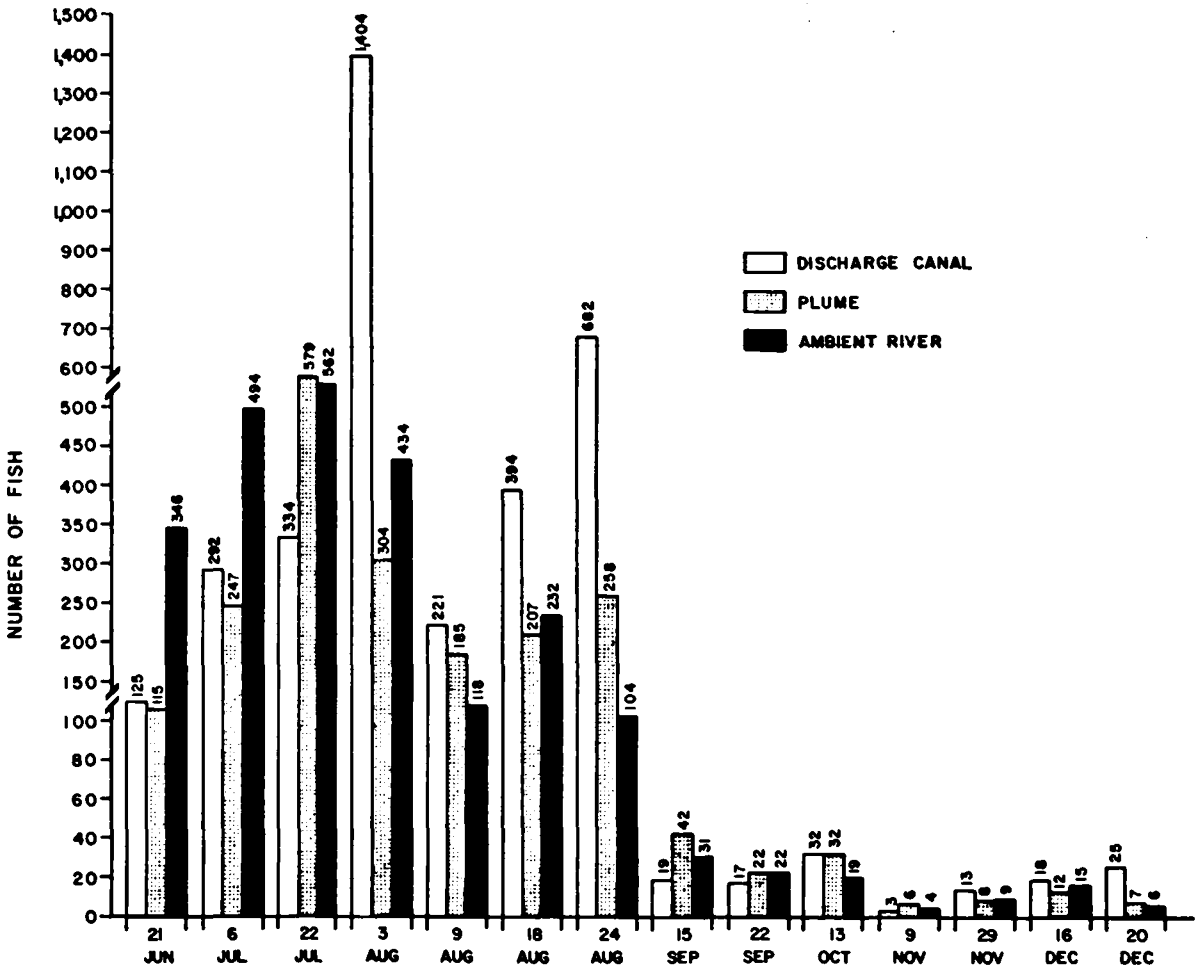


Figure 9. Average number of fish per sample ($100m^3$) captured during plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.



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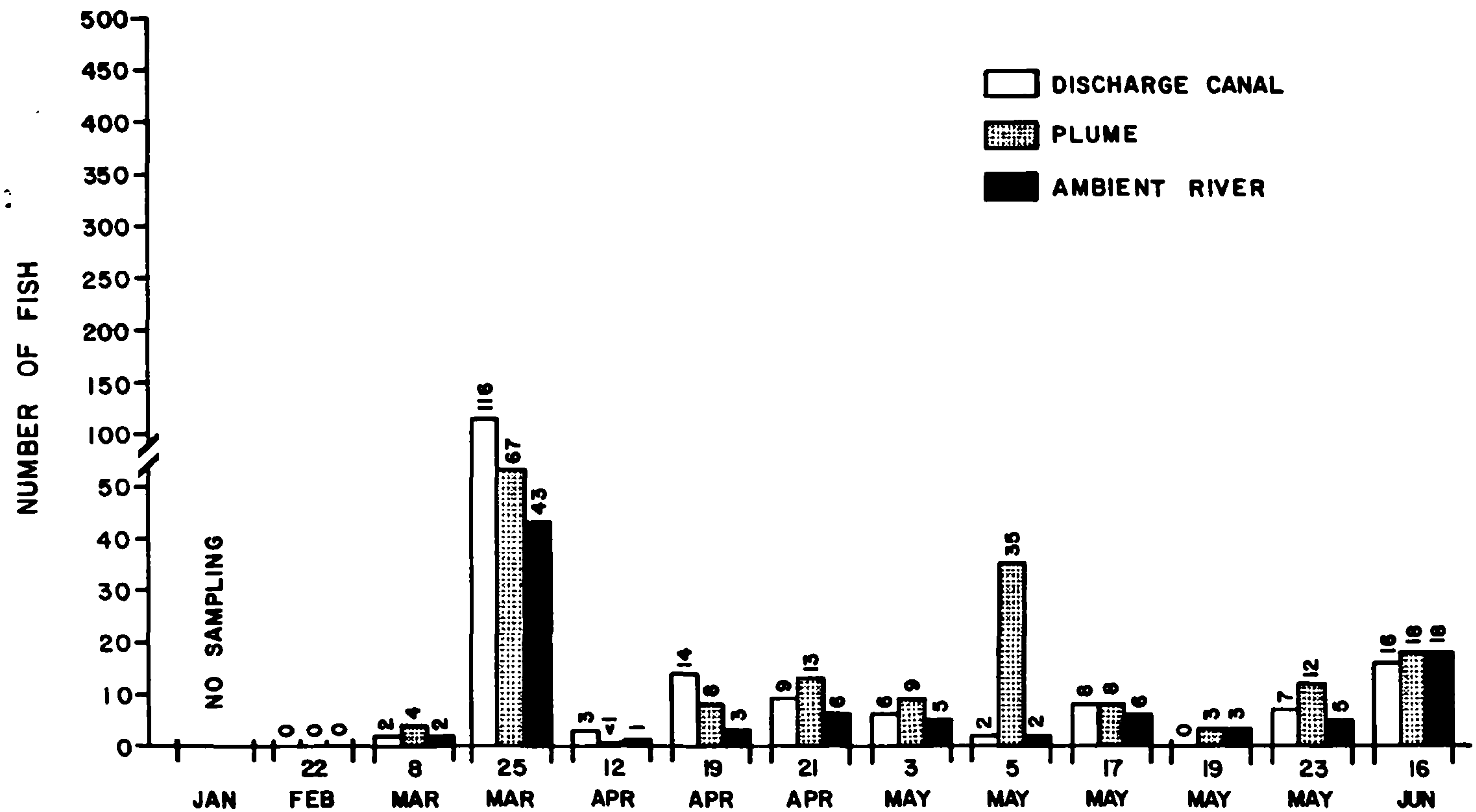
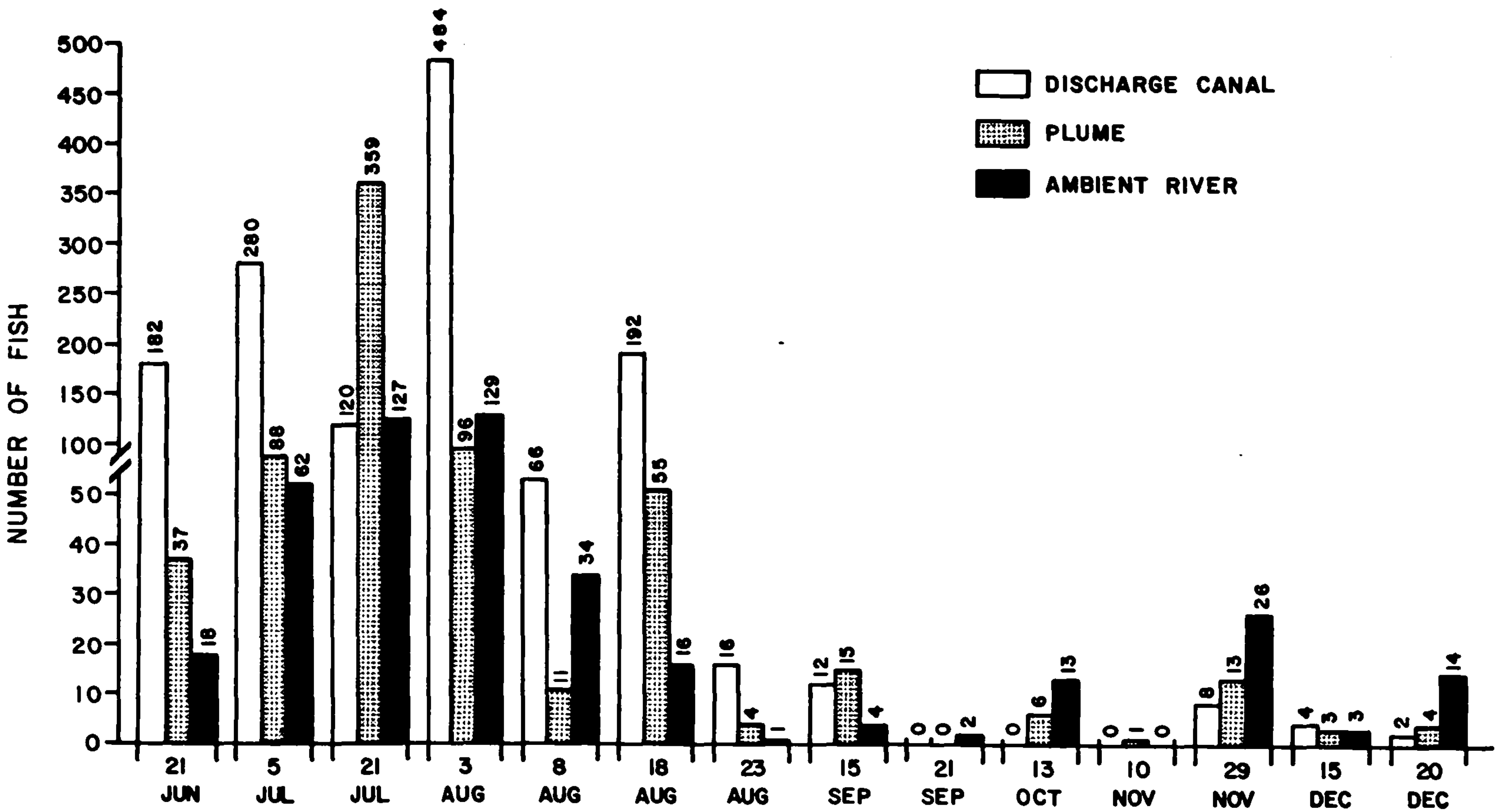


Figure 10. Average number of fish per sample (100m^3) captured during day plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.



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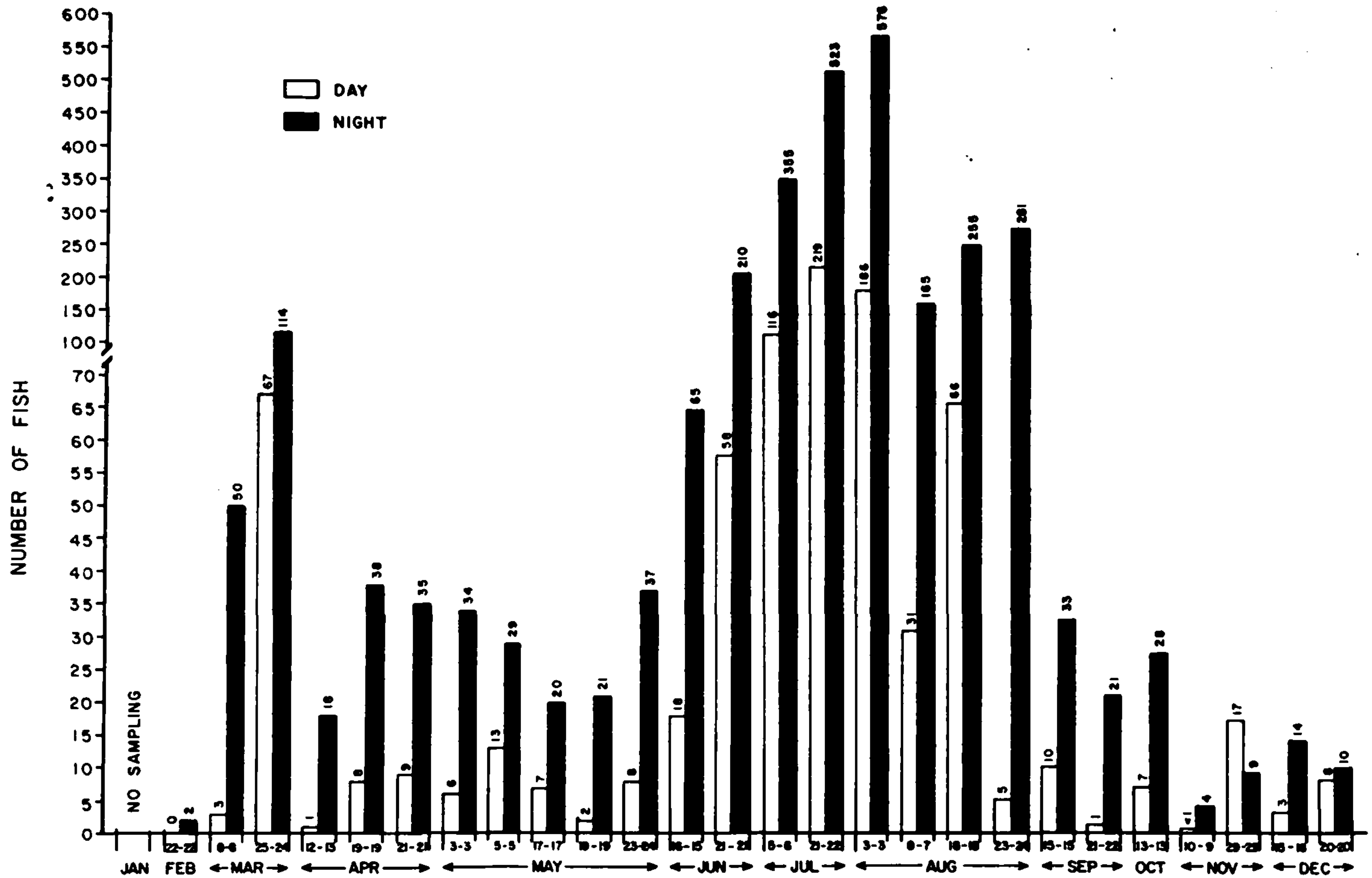


Figure 11. Average number of fish per sample ($100m^3$) captured during night plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

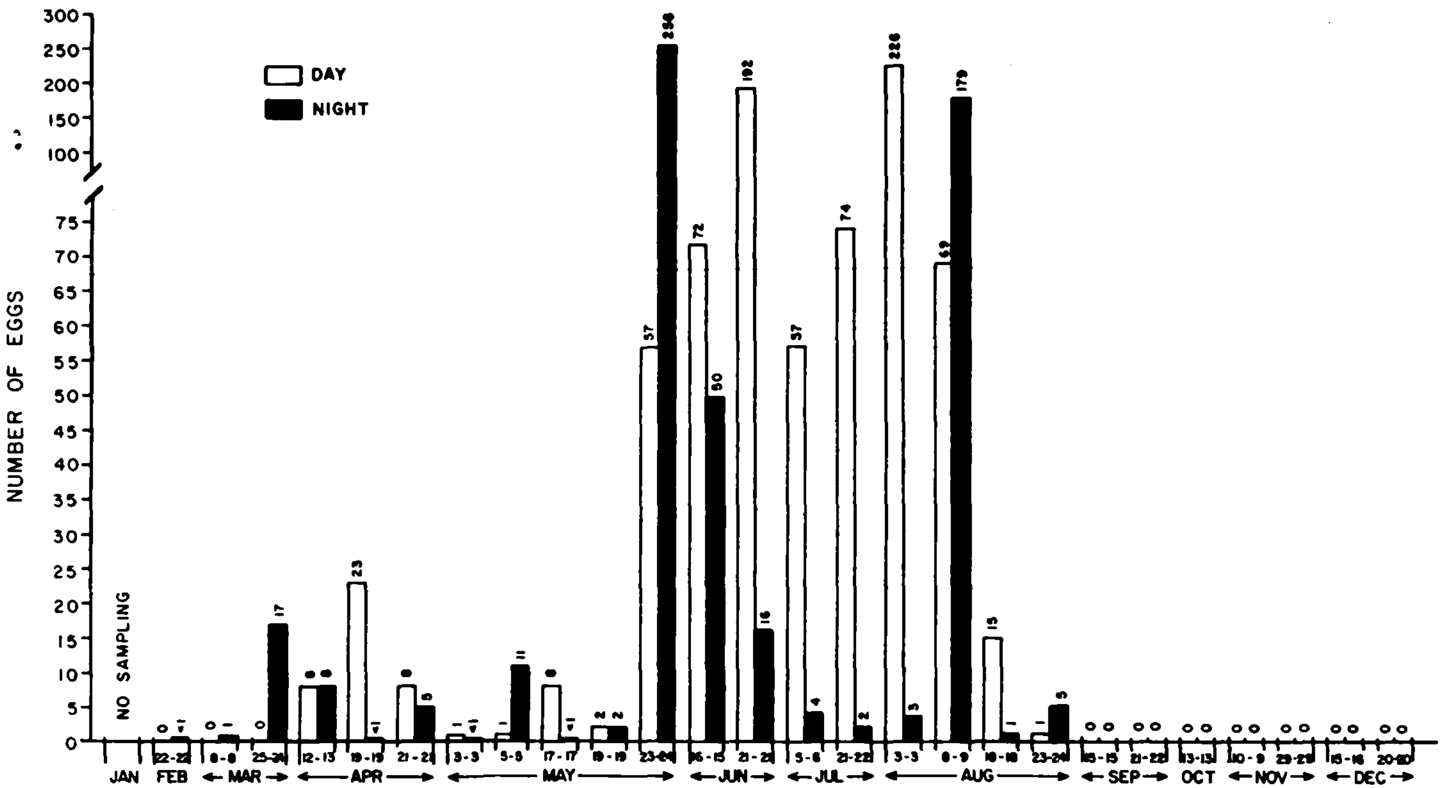


Figure 12. Average number of eggs per sample (100m^3) captured during plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

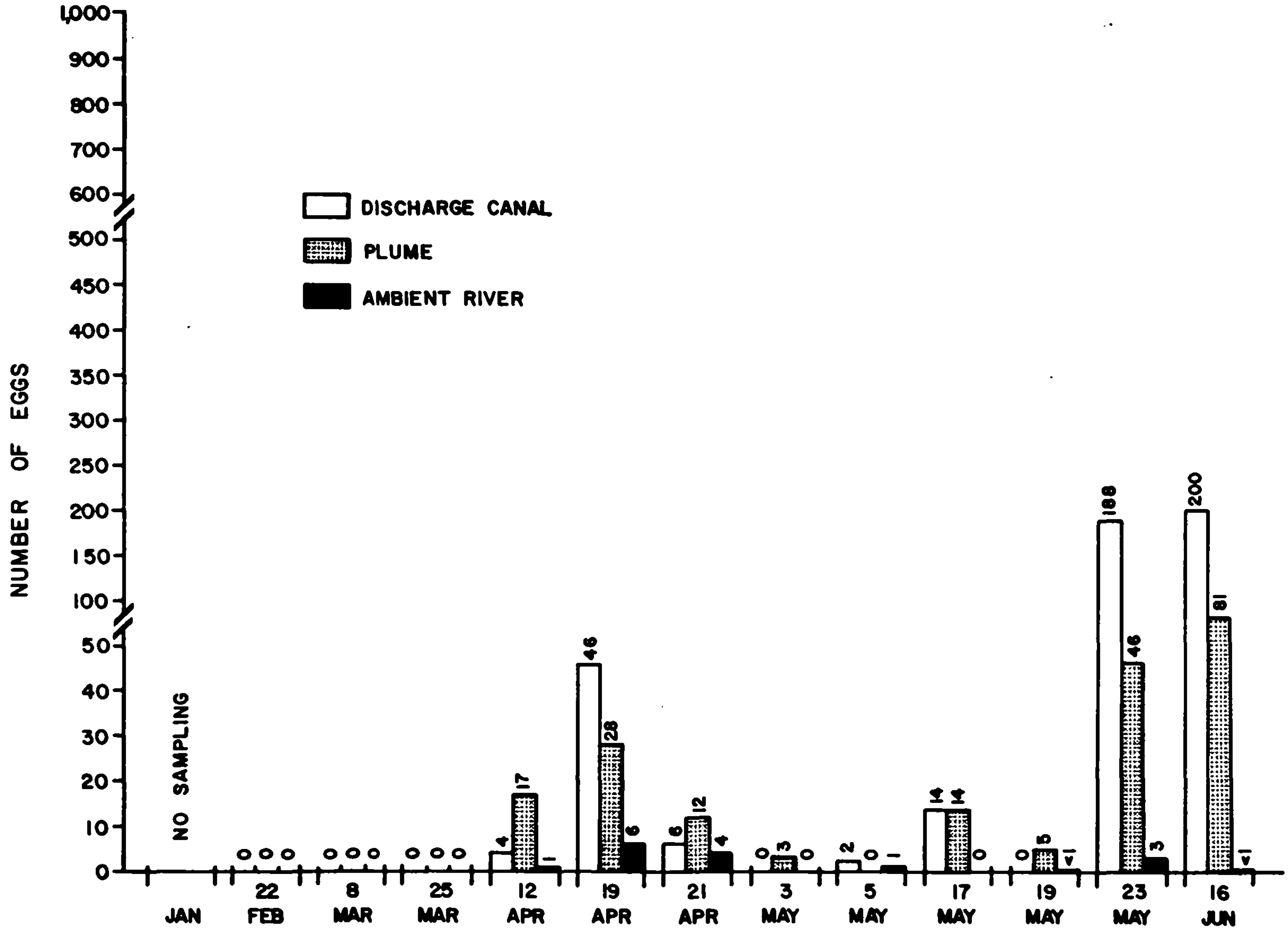
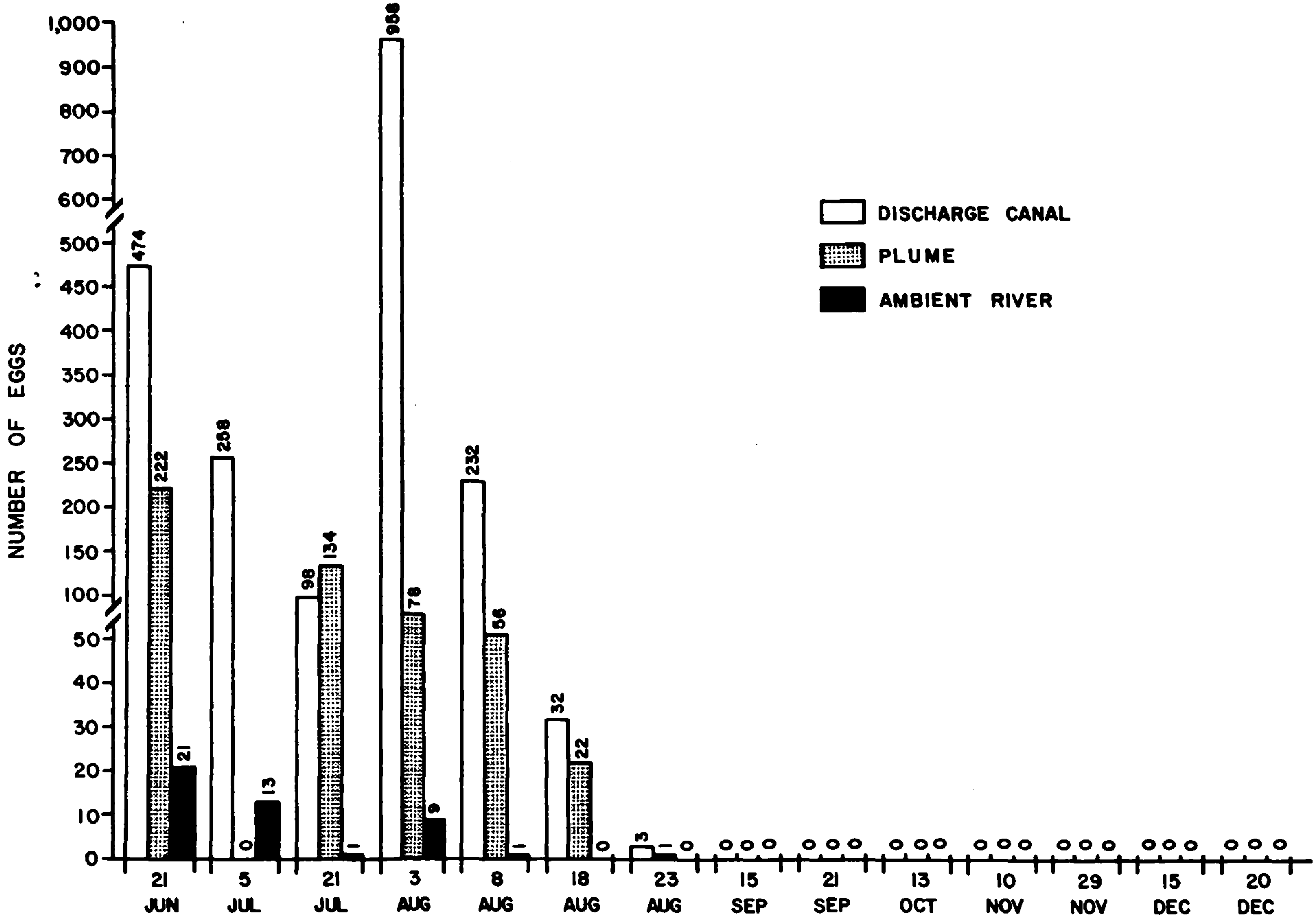


Figure 13. Average number of eggs per sample ($100m^3$) captured during day plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.



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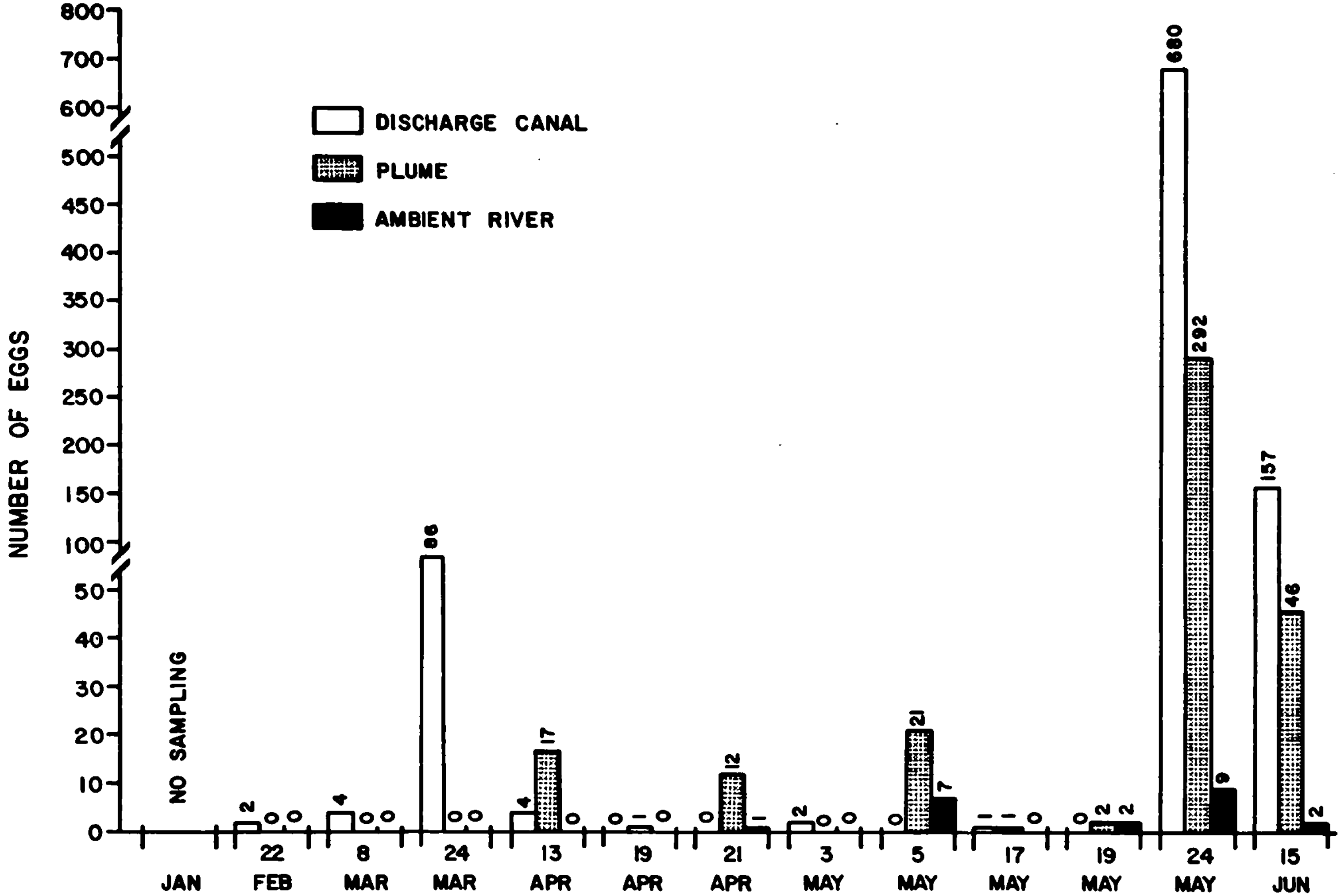

Figure 14. Average number of eggs per sample (100m^3) captured during night plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

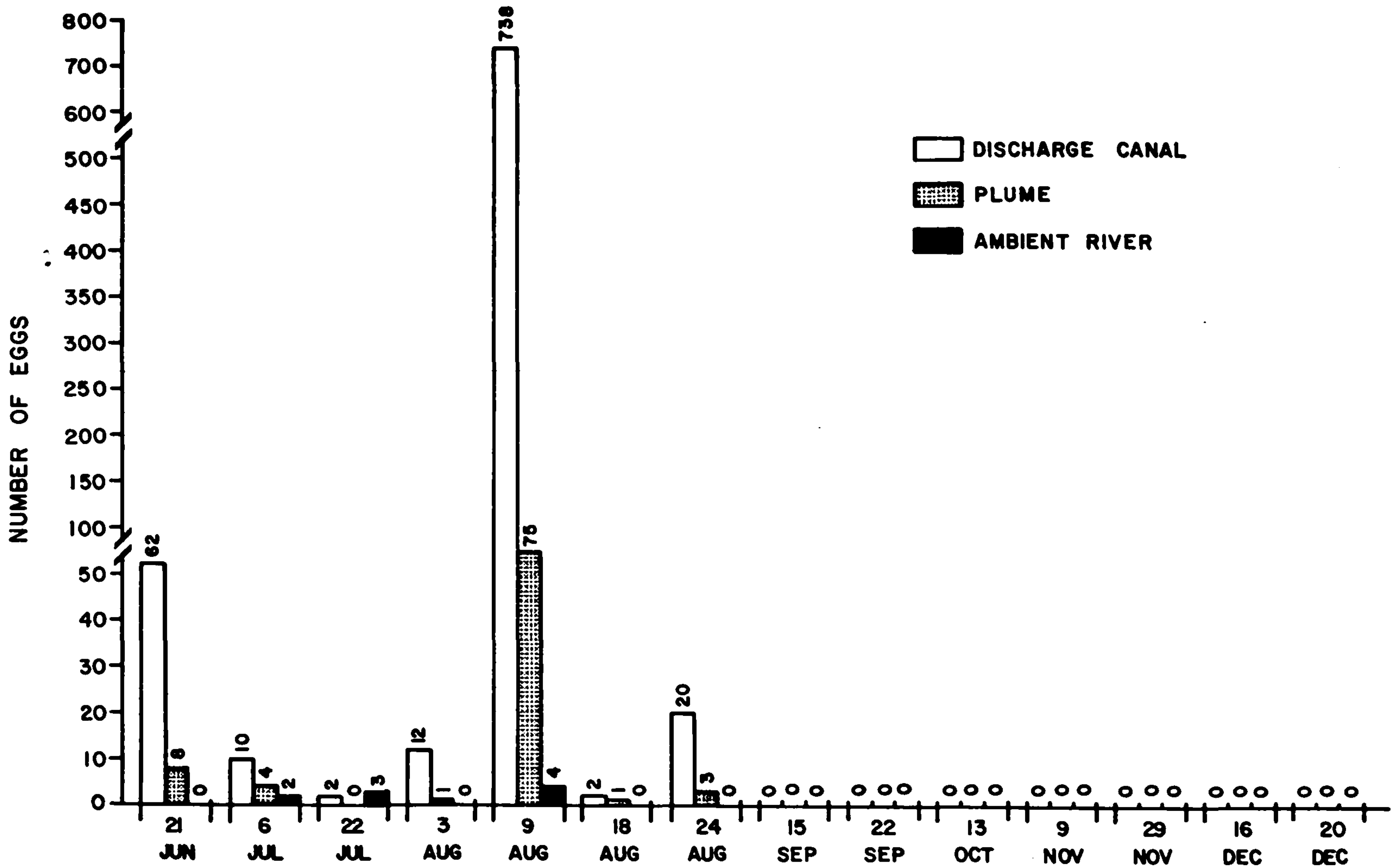

Figure 14. (continued).

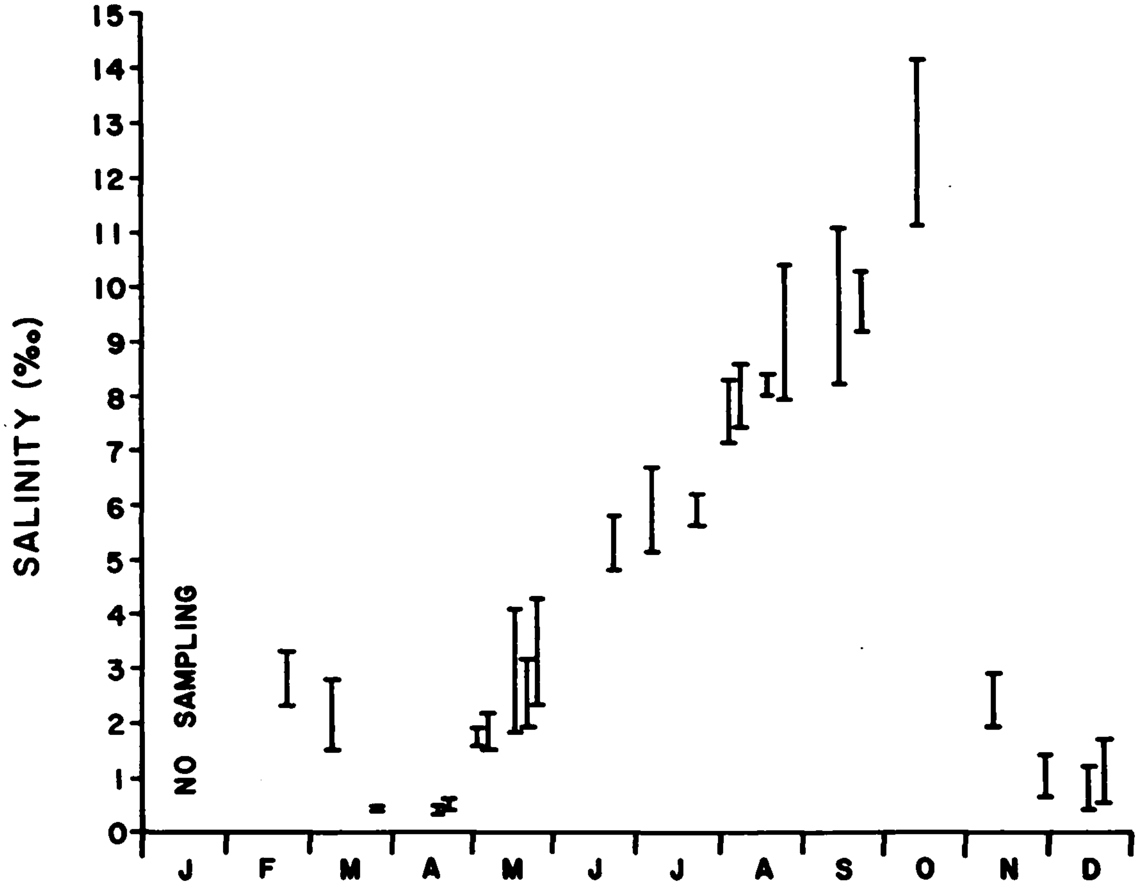

Figure 15. Ranges of salinity ($^0/_{00}$) in ambient river water during plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

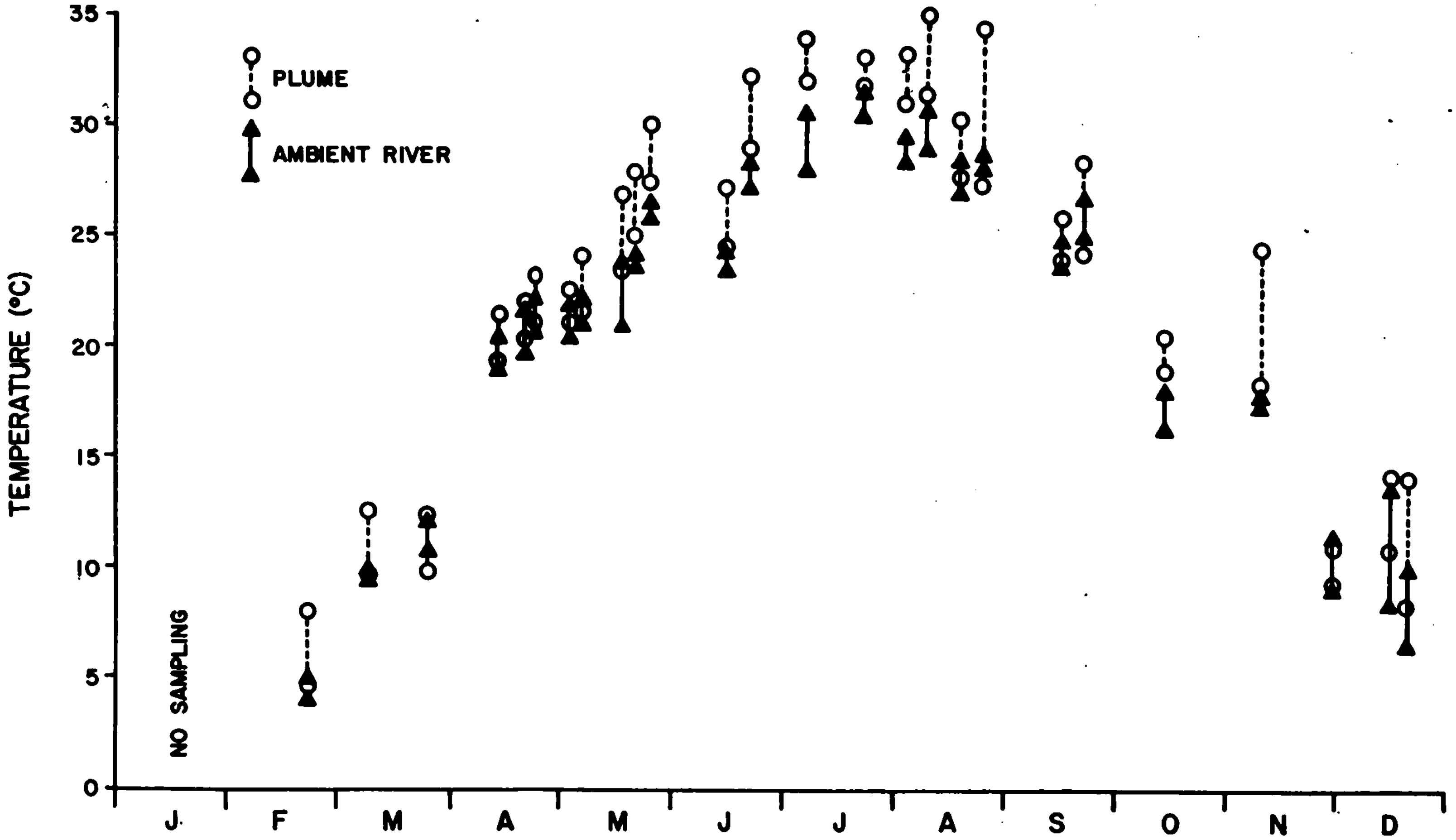

Figure 16. Ranges of water temperature during plume entrainment stations at VEPCO Surry Nuclear Power Plant in 1977.

Table 1. Ichthyoplankton sampling schedule for plant and plume entrainment studies at VEPCO Surry Nuclear Power Plant (January through December 1977).

Study	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Plant Entrainment	X*	X	XX	XXXX	XXXX	XX	X	X	X	X	X	X
Plume Entrainment	X*	X	XX	XXXX	XXXX	XX	XX	XXXX	XX	X	XX	XX

*No samples - severe ice conditions

Table 2. Dependent (Y_i) and independent (X_j) variables for statistical analysis (standardized catch is number collected per 100 cubic meters of water strained per collection).

Variable	Definition
Y_1, Total abundance of fish	$Y_1 = \log_e (C_1 + 1)$, where C_1 = standardized catch of fish
Y_2, Abundance of fish species	$Y_2 = \log_e (C_2 + 1)$, where C_2 = number of fish species
Y_3, Fish species diversity	$Y_3 = -\Sigma p_k \log_e p_k$, where $p_k = \frac{n_k}{N}$, n_k = number of fish of the k^{th} species, and N = total number of fish
Y_4, Total abundance of eggs	$Y_4 = \log_e (C_4 + 1)$, where C_4 = standardized catch of eggs
Y_5, Abundance of egg species	$Y_5 = \log_e (C_5 + 1)$, where C_5 = number of egg species
Y_6, Egg species diversity	$Y_6 = -\Sigma p_k \log_e p_k$, where $p_k = \frac{n_k}{N}$, n_k = number of eggs of the k^{th} species, and N = total number of eggs
Y_7, Abundance of _A. mitchilli_ fish	$Y_7 = \log_e (C_7 + 1)$, where C_7 = standardized catch of _A. mitchilli_ fish
Y_8, Abundance of _G. bosci_ fish	$Y_8 = \log_e (C_8 + 1)$, where C_8 = standardized catch of _G. bosci_ fish
Y_9, Abundance of _A. mitchilli_ eggs	$Y_9 = \log_e (C_9 + 1)$, where C_9 = standardized catch of _A. mitchilli_ eggs
X_1, Water temperature	°C
X_2, Salinity	ppt
X_3, Dissolved oxygen	mg/l
X_4, X_5, Location dummy variables	see below

Location	X_4, Plume =	X_5, Ambient =
Discharge	0	0
Plume	1	0
Ambient	0	1

Table 2. Continued

Variable	Definition			
X_6, Period dummy variable	0 = day (5 to 16.9 h EST), 1 = night (17.0 to 4.9 h EST)			
X_7, X_8, X_9, Season dummy variables	Season	X_7, Fall =	X_8, Winter =	X_9, Spring =
	Summer (July, Aug., Sept.)	0	0	0
	Fall (Oct., Nov., Dec.)	1	0	0
	Winter (Jan., Feb., March)	0	1	0
	Spring (April, May, June)	0	0	1

Table 3. Number of species captured in plume entrainment samples at VEPCO Surry Nuclear Power Plant from January through December 1977.

DATE	DAY Number of Species Fish	Eggs	Both*	NIGHT Number of Species Fish	Eggs	Both*	Species Occurring in Both Day and Night Samples Fish	Eggs
Feb. 22-22	0	0	0	3	1	0	0	0
Mar. 08-08	2	0	0	4	1	0	2	0
Mar. 24-25	7	0	0	5	2	1	4	0
Apr. 12-13	2	3	0	6	2	1	2	2
Apr. 19-19	7	3	3	9	2	2	5	1
Apr. 21-21	6	4	2	10	4	3	4	3
May 03-03	6	1	0	9	1	0	4	0
May 05-05	5	2	1	8	1	1	3	1
May 17-17	7	1	1	9	1	1	6	1
May 19-19	2	2	1	7	3	3	2	2
May 23-24	8	3	3	11	5	4	8	2
June 15-16	3	1	1	7	1	1	3	1
June 21-21	4	1	1	7	1	1	4	1
July 05-06	5	2	2	6	2	1	4	1
July 21-22	6	2	2	9	2	1	5	1
Aug. 03-03	6	1	1	7	1	1	4	1
Aug. 08-09	4	2	2	6	1	1	3	1
Aug. 18-18	5	3	2	6	1	1	4	1
Aug. 23-24	3	2	2	4	2	2	2	1
Sept. 15-15	3	0	0	5	0	0	2	0
Sept. 21-22	1	0	0	6	0	0	1	0
Oct. 13-13	4	0	0	8	0	0	3	0

Table 3. (Continued)

DATE	DAY Number of Species Fish	Eggs	Both*	NIGHT Number of Species Fish	Eggs	Both*	Species Occurring in Both Day and Night Samples Fish	Eggs
Nov. 09-10	1	0	0	4	0	0	1	0
Nov. 29-29	4	0	0	6	0	0	4	0
Dec. 15-16	4	0	0	6	0	0	2	0
Dec. 20-20	3	0	0	3	0	0	3	0

*Number of species that occur as both fish and eggs within the same sample.

Table 4. Average calculated number (per 100 m^3) of fish and fish eggs per sample captured in plume entrainment samples at VEPCO Surry Nuclear Power Plant from January through December 1977.

DATE	DISCHARGE CANAL Larvae	DISCHARGE CANAL Eggs	PLUME Larvae	PLUME Eggs	AMBIENT RIVER Larvae	AMBIENT RIVER Eggs
Feb. 22 (D)	0	0	0	0	0	0
Feb. 22 (N)	5	2	<1	0	2	0
Mar. 08 (D)	2	0	4	0	2	0
Mar. 08 (N)	62	4	60	0	27	0
Mar. 24 (N)	410	86	14	0	66	0
Mar. 25 (D)	116	0	67	0	43	0
Apr. 12 (D)	3	4	<1	17	1	1
Apr. 13 (N)	24	4	11	17	22	0
Apr. 19 (D)	14	46	8	28	3	6
Apr. 19 (N)	12	0	60	1	29	0
Apr. 21 (D)	9	6	13	12	6	4
Apr. 21 (N)	58	0	36	12	24	1
May 03 (D)	6	0	9	3	5	0
May 03 (N)	78	2	36	0	10	0
May 05 (D)	2	2	35	0	2	1
May 05 (N)	14	0	28	21	37	7
May 17 (D)	8	14	8	14	6	0
May 17 (N)	10	1	27	1	18	0
May 19 (D)	0	0	3	5	3	<1
May 19 (N)	34	0	20	2	16	2
May 23 (D)	7	188	12	46	5	3
May 24 (N)	41	680	32	292	41	9

Table 4. (Continued)

DATE	DISCHARGE CANAL Larvae	DISCHARGE CANAL Eggs	PLUME Larvae	PLUME Eggs	AMBIENT RIVER Larvae	AMBIENT RIVER Eggs
June 15 (N)	45	157	81	46	59	2
June 16 (D)	16	200	18	81	18	<1
June 21 (D)	182	474	37	222	18	21
June 21 (N)	125	62	115	8	346	0
July 05 (D)	280	258	88	0	62	13
July 06 (N)	292	10	247	4	494	2
July 21 (D)	120	98	359	134	127	1
July 22 (N)	334	2	579	0	562	3
Aug. 03 (D)	484	958	96	78	129	9
Aug. 03 (N)	1404	12	304	1	434	0
Aug. 08 (D)	66	232	11	56	34	1
Aug. 09 (N)	221	738	185	75	118	4
Aug. 18 (D)	192	32	55	22	16	0
Aug. 18 (N)	394	2	207	1	232	0
Aug. 23 (D)	16	3	4	1	1	0
Aug. 24 (N)	682	20	258	3	104	0
Sept. 15 (D)	12	0	15	0	4	0
Sept. 15 (N)	19	0	42	0	31	0
Sept. 21 (D)	0	0	0	0	2	0
Sept. 22 (N)	17	0	22	0	22	0
Oct. 13 (D)	0	0	6	0	13	0
Oct. 13 (N)	32	0	32	0	19	0
Nov. 09 (N)	3	0	6	0	4	0

Table 4. (Continued)

DATE	DISCHARGE CANAL Larvae	DISCHARGE CANAL Eggs	PLUME Larvae	PLUME Eggs	AMBIENT RIVER Larvae	AMBIENT RIVER Eggs
Nov. 10 (D)	0	0	1	0	0	0
Nov. 29 (D)	8	0	13	0	26	0
Nov. 29 (N)	13	0	8	0	9	0
Dec. 15 (D)	4	0	3	0	3	0
Dec. 16 (N)	18	0	12	0	15	0
Dec. 20 (N)	25	0	7	0	6	0
Dec. 20 (D)	2	0	4	0	14	0

Table 5. Species and number of fish captured in plume entrainment samples at VEPCO Surry Nuclear Power Plant in 1977.

FEBRUARY 22 - 22, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME	NO CATCH AT THIS TIME									

SPECIES	LEFT	RIGHT	TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
NIGHT PLUME										
ANGUILLA ROSTRATA	1			1			1	1		1
MENIDIA MENIDIA	1									
TRINECTES MACULATUS									1	

Table 5. (continued).

MARCH 8 - 8, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	2		2	2	1	1				3
LEIOSTOMUS XANTHURUS			1							

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	14	11			36	38			32	
ANGUILLA ROSTRATA	1				2					
LEIOSTOMUS XANTHURUS	3	2			1	2			1	
PARALICHTHYS DENTATUS						1			1	

Table 5. (continued).

MARCH 24 - 25, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	78	107	6	7			28	21	8	12
ANGUILLA ROSTRATA		1								
BREVOORTIA TYRANNUS	1	1	1						1	
LEIOSTOMUS XANTHURUS	7	3	2	2			8	10	11	6
MORONE AMERICANA				1				1		

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI	24	29	11	22	6	15	9	12	5	7
ANGUILLA ROSTRATA				1				2		
BREVOORTIA TYRANNUS					1			1	1	
ICTALURUS PUNCTATUS										1
LEIOSTOMUS XANTHURUS		1	3	4	4	10	4	5	2	2
PARALICHTHYS DENTATUS			1							
TRINECTES MACULATUS			3	7	3	10	4	7		5

Table 5. (continued).

APRIL 12 - 13, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
BREVOORTIA TYRANNUS		1							1	
PERCA FLAVESCENS				1						
SPECIMEN MANGLED		1							1	

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	1	1	1		1		3		1	1
ANGUILLA ROSTRATA						2				
BREVOORTIA TYRANNUS	4	2	1	1		2	1	1	1	1
LEIOSTOMUS XANTHURUS	5	3	3	1		3	7	8	6	5
MORONE AMERICANA						1			1	
PERCA FLAVESCENS		1								

Table 5. (continued).

APRIL 19 - 19, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ALOSA SAPIDISSIMA								1		
BREVOORTIA TYRANNUS	1	6	3	1	1			3		
CYPRINUS CARPIO			1	1						
DOROSOMA CEPEDIANUM			1	1	1					
LEIOSTOMUS XANTHURUS					2					
MENIDIA MENIDIA					1					
MORONE AMERICANA				1					1	

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ALOSA PSEUDOHARENGUS									1	
ALOSA SAPIDISSIMA							1			
ANCHOA MITCHILLI		1	1	3	2	8		2	1	2
ANGUILLA ROSTRATA	1			1		2		1	1	
BREVOORTIA TYRANNUS	2	1		8	16	23	3	5	7	2
CYPRINUS CARPIO			1		3	1				
LEIOSTOMUS XANTHURUS		1	5	5	16	18	12	5	5	3
MENIDIA BERYLLINA			2							
MORONE AMERICANA					2		2			1

Table 5. (continued).

APRIL 21 - 21, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ALOSA AESTIVALIS									1	
ALOSA SAPIDISSIMA							1			
BREVOORTIA TYRANNUS		2	1		1		2	2		
CYPRINUS CARPIO				1						
LEIOSTOMUS XANTHURUS		1			5	7	2			
TRINECTES MACULATUS					1					
SPECIMEN MANGLED	1									

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ALOSA AESTIVALIS							1			
ALOSA PSEUDOHARENGUS										1
ANCHOA MITCHILLI	1			1	3	2			1	1
BREVOORTIA TYRANNUS	4	1			2	6	2	1		1
CYPRINUS CARPIO			1							1
DOROSOMA CEPEDIANUM								1		
LEIOSTOMUS XANTHURUS	13	9	13	10	7	8	1	1	11	6
MEMBRAS MARTINICA			1	1			1	1		
MENIDIA MENIDIA		1								
MORONE AMERICANA					3	1	2	1	1	1

Table 5. (continued).

MAY 3 - 3, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
DAY PLUME										
ALOSA AESTIVALIS			1				1		1	1
ALOSA PSEUDOHARENGUS				2	1		2			1
ATHERINIDAE						1				
GOBIOSOMA BOSCI			3	1	1	2				1
LEIOSTOMUS XANTHURUS	3									
MENIDIA BERYLLINA									1	
SPECIMEN MANGLED										1

SPECIES	LEFT	RIGHT	TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
NIGHT PLUME										
ALOSA AESTIVALIS				1			1			
ALOSA PSEUDOHARENGUS	1			1	1		1			1
ALOSA SP.							2			
ANGUILLA ROSTRATA	1	2								
BREVOORTIA TYRANNUS	13	8	3	1						1
GOBIOSOMA BOSCI							2			
ICTALURUS PUNCTATUS			9	11	1	2	2			
LEIOSTOMUS XANTHURUS	8	6	3	4	1		1	2	1	
MEMBRAS MARTINICA			1			2	1			
TRINECTES MACULATUS						1				

Table 5. (continued).

MAY 5 - 5, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ALOSA AESTIVALIS		1		1	1			1		
GOBIOSOMA BOSCI				1	1			1		
LEIOSTOMUS XANTHURUS			15	16	1					
MEMBRAS MARTINICA					1				1	
MENIDIA BERYLLINA					1					

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ALOSA AESTIVALIS						1	1	3		1
ANCHOA MITCHILLI					1			1		
ANGUILLA ROSTRATA		1								
BREVOORTIA TYRANNUS	1	2	6	7	2			1	2	2
ICTALURUS PUNCTATUS			1	1	3	1	2		1	3
LEIOSTOMUS XANTHURUS	1	1	4	5	3	7	5	10	3	9
MEMBRAS MARTINICA						2	1		2	3
TRINECTES MACULATUS									1	

Table 5. (continued).

MAY 17 - 17, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	1		2							
BREVOORTIA TYRANNUS		1								
GOBIOSOMA BOSCI	3		3				2	2	3	2
MEMBRAS MARTINICA			3	1	1					
MENIDIA BERYLLINA			2							
MENIDIA MENIDIA			1							
MORONE AMERICANA	1				1					1

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	1		1							
BREVOORTIA TYRANNUS		3			1	2	1	2		
GOBIOSOMA BOSCI				1	1	1				
LEIOSTOMUS XANTHURUS		1	1		2	4			2	2
MEMBRAS MARTINICA			2		7	6	3	3		2
MENIDIA BERYLLINA		1	1		3	3	2	1	2	
MENIDIA MENIDIA	2	1	2			3	1	1		
SYNGNATHUS FUSCUS							1			
TRINECTES MACULATUS								1		

Table 5. (continued).

MAY 19 - 19, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
GOBIOSOMA BOSCI										1
MEMBRAS MARTINICA			1	1	2		1		3	

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI	3	1	1	1						
ATHERINIDAE					1					
BREVOORTIA TYRANNUS	7	10	3	1		1		1		
GOBIOSOMA BOSCI			1		1	2	1	2	5	6
LEIOSTOMUS XANTHURUS	1	5	2	5	1	2	2			1
MEMBRAS MARTINICA				1		2		1	1	1
MENIDIA BERYLLINA			2		1	2	1		2	1
MENIDIA MENIDIA						1				
SPECIMEN MANGLED						1				

Table 5. (continued).

MAY 23 - 24, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ALOSA AESTIVALIS							1			
ANCHOA MITCHILLI	1									
BREVOORTIA TYRANNUS				1						
GOBIOSOMA BOSCI	1	3	3	2	1		4	1		
LEIOSTOMUS XANTHURUS					1	10				
MEMBRAS MARTINICA						1	1			
MENIDIA BERYLLINA							1		1	
MENIDIA MENIDIA			1							

NIGHT PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ALOSA AESTIVALIS									1	4
ANCHOA MITCHILLI	1	1								
ANGUILLA ROSTRATA						1				
BREVOORTIA TYRANNUS	3	2	3							
GOBIOSOMA BOSCI	5	8	5	5	7	4	6	7	12	14
LEIOSTOMUS XANTHURUS	4		3	3	1	1		1	1	1
MEMBRAS MARTINICA			2		1	1	2		6	3
MENIDIA BERYLLINA	1	1	3				1	3		
MENIDIA MENIDIA		1								
MICROPOGON UNDULATUS	1									
TRINECTES MACULATUS					2	2		1		

Table 5. (continued).

JUNE 15 - 16, 1977

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	3	3	4	2	8	5	3	3	4	4
BREVOORTIA TYRANNUS		1				1				
GOBIOSOMA BOSCI	10	11	25	19	19	14	8	14	4	9
MEMBRAS MARTINICA	1	5	4	2	4	3	7	2	5	2
MENIDIA BERYLLINA								1	2	
MENIDIA MENIDIA				2	1					1
MORONE SAXATILIS				1						

DAY PLUME

SPECIES	LEFT	RIGHT	TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI	1	1	2	2	3	1	6	9	2	1
GOBIOSOMA BOSCI	6	4	2	4	2	4	2	8	1	
MEMBRAS MARTINICA		1	3	4	3	2			1	

Table 5. (continued).

JUNE 21 - 21, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	4	1	1	4	1	4	2	4		4
GOBIOSOMA BOSCI	50	64	20	16	4	9	5	7		4
MEMBRAS MARTINICA				1			2	1		
MENIDIA MENIDIA			1							
SPECIMEN MANGLED							1			

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	1	3	5	8	15	11	12	14	13	7
BREVOORTIA TYRANNUS	1									
DOROSOMA PETENENSE			1							
GOBIOSOMA BOSCI	42	43	29	29	24	24	87	123	109	101
MEMBRAS MARTINICA	2	4	5	5	3	2	5		6	4
MENIDIA BERYLLINA			1	4	8	3	1	1		5
MENIDIA MENIDIA								1		

Table 5. (continued).

JULY 5 - 6, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	12	16	5	12	2	3	12	13		6
ATHERINIDAE						1				
GOBIOSOMA BOSCI	53	91	14	21	26	29	16	16		1
MEMBRAS MARTINICA	3			2	1		1	3		
MENIDIA BERYLLINA			2							

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	9	4	5	4	13	11	4	6	9	18
FUNDULUS HETEROCLITUS			1							
GOBIOSOMA BOSCI	127	89	57	87	63	47	79	130	94	137
MEMBRAS MARTINICA	3		1	2	2	3				1
MENIDIA BERYLLINA			1			1	1		1	
MENIDIA MENIDIA			1							
SPECIMEN MANGLED										1

Table 5. (continued).

JULY 21 - 22, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI	5	7	37	54	175	198	42	42	49	58
ATHERINIDAE								1		
GOBIOSOMA BOSCI	22	31	6	12	25	23	3	1		4
MEMBRAS MARTINICA		1	1		10	9	3	2		1
MENIDIA BERYLLINA								1		
TRINECTES MACULATUS					1					

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI	9	13	100	68	86	18	112	145	121	120
FUNDULUS HETEROCLITUS					1					
GOBIOSOMA BOSCI	39	66	148	122	129	16	64	74	76	89
LEIOSTOMUS XANTHURUS								1		
MEMBRAS MARTINICA	2		3	6	6		5	4	11	2
MENIDIA BERYLLINA			1		2			1		1
MENIDIA MENIDIA							1			
SYNGNATHUS FUSCUS	1									
TRINECTES MACULATUS			1	2				2		4

Table 5. (continued).

AUGUST 3 - 3, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANCHOA MITCHILLI	37	28	22	20	18	37	27	14	15	13
ATHERINIDAE								8		2
GOBIOSOMA BOSCI	83	83	21	20	12	34	48	42	26	13
HYPSOBLENNIUS HENTZI								2		
MEMBRAS MARTINICA			3	1			1	3		
MENIDIA MENIDIA					4					

NIGHT PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANCHOA MITCHILLI	45	33	14	15	10	15	35	26	11	16
ATHERINIDAE								2		
GOBIOSOMA BOSCI	383	366	111	131	64	67	83	121	65	64
MEMBRAS MARTINICA	2		1	1						
MENIDIA BERYLLINA		1								
SYNGNATHUS FUSCUS									1	
TRINECTES MACULATUS					1	1	1		2	

Table 5. (continued).

AUGUST 8 - 9, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	3	4	3	4			6	3	3	5
GOBIOSOMA BOSCI	25	22	7	2				1		
MEMBRAS MARTINICA		1					1	1	8	7
MENIDIA MENIDIA									1	3

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	23	27	22	26	27	31	19	16	6	11
ATHERINIDAE				1						
GOBIOSOMA BOSCI	55	48	26	42	38	48	37	31	14	17
MEMBRAS MARTINICA	1		1	1		4	2	3	1	1
MENIDIA BERYLLINA	1	1	3	2	1	1				3
TRINECTES MACULATUS		2								

Table 5. (continued).

AUGUST 18 - 18, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	10	9	3	3	1	5	2		7	
GOBIOSOMA BOSCI	52	52	12	23	8	15		1	1	2
MEMBRAS MARTINICA									4	3
SYNGNATHUS FUSCUS						1				
TRINECTES MACULATUS						1				

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	37	28	10	15	20	34	16	12	16	14
ATHERINIDAE	1					2				
GOBIOSOMA BOSCI	121	66	47	45	48	46	31	47	49	54
MEMBRAS MARTINICA	3	2	2	2	2	1			3	3
MENIDIA BERYLLINA	1					1	1	2	1	
MENIDIA MENIDIA					3					1
TRINECTES MACULATUS										1

Table 5. (continued).

AUGUST 23 - 24, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	2	3	1			1		1		
GOBIOSOMA BOSCI	3	1	2	1						
TRINECTES MACULATUS	1									

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	25	23	37	47	21	14	11	15	12	14
GOBIOSOMA BOSCI	216	180	58	40	75	68	11	19	22	17
MEMBRAS MARTINICA	1	1		3	1	1	4	4	5	
MENIDIA BERYLLINA			1		1					2

Table 5. (continued).

SEPTEMBER 15 - 15, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANCHOA MITCHILLI	1	2	7	4	6	3			1	5
FUNDULUS HETEROCLITUS				1						
GOBIOSOMA BOSCI	1	2	3	4		1		1		

NIGHT PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANCHOA MITCHILLI	3	4	4	11	3	7	1	5	5	8
CYNOSCION REGALIS								1		
GOBIOSOMA BOSCI	2	1	7	7	4	6	7	5	3	1
MEMBRAS MARTINICA					2					
TRINECTES MACULATUS			1			1				

Table 5. (continued).

SEPTEMBER 21 - 22, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI								1	1	

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	3	1	5	4	3	6	4	1	6	8
GOBIOSOMA BOSCI	1		4	2	2	1	2	2	3	
MICROGOBIUS THALASSINUS			1							
MEMBRAS MARTINICA				1	1	1				
MICROPOGON UNDULATUS	2									
SYMPHURUS PLAGIUSA		1						1		

Table 5. (continued).

OCTOBER 13 - 13, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI			1		4	2	8	5	1	6
GOBIOSOMA BOSCI								1		
MICROPOGON UNDULATUS				1			1	1	1	1
SYNGNATHUS FUSCUS			1							

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	3	3	10	7	13	7	8	9		1
ATHERINIDAE										1
GOBIIDAE				1						
GOBIOSOMA BOSCI	1									
MICROPOGON UNDULATUS	4	9	7	3	1	7	1	4		1
STRONGYLURA MARINA					1					
SYMPHURUS PLAGIUSA	1	1		1						
TRINECTES MACULATUS				1						

Table 5. (continued).

NOVEMBER 9 - 10, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI		1	1		6	3		5	1	1
FUNDULUS HETEROCLITUS						1				
MEMBRAS MARTINICA										1
MICROPOGON UNDULATUS		1				1				

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI					1	1				

Table 5. (continued).

NOVEMBER 28 - 29, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANCHOA MITCHILLI	2	2		2	12	15	2	18	21	10
LEIOSTOMUS XANTHURUS			2							2
MENIDIA BERYLLINA				1						
MICROPOGON UNDULATUS	1				2	2	3	4	1	4

NIGHT PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANCHOA MITCHILLI	2			2	1	1	1	1	1	3
GOBIIDAE								1		
LEIOSTOMUS XANTHURUS						1				1
MENIDIA BERYLLINA							2			
MICROPOGON UNDULATUS	2	5	4		2	4		1	3	6
MORONE AMERICANA					1					

Table 5. (continued).

DECEMBER 15 - 16, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI		1					2	2		
ANGUILLA ROSTRATA				1						
MICROPOGON UNDULATUS		2	2	2		1	1			1
MORONE AMERICANA										1

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ALOSA AESTIVALIS								1		
ANCHOA MITCHILLI			1	1			1		2	
DOROSOMA PETENENSE						1				
MENIDIA BERYLLINA							1			
MICROPOGON UNDULATUS	5	7	4	4	5	6	3	2	6	5
TRINECTES MACULATUS										2

Table 5. (continued).

DECEMBER 20 - 20, 1977

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	2	1			2	2	2	1		2
MICROPOGON UNDULATUS	10	3	2	4	3	1	1	1		2
TRINECTES MACULATUS							3			

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	1				1	2	2			1
MICROPOGON UNDULATUS			1			1		7	8	7
TRINECTES MACULATUS					1	1				

Table 6. Species and calculated number of fish per $100m^3$ captured in plume entrainment samples at VEPCO Surry Nuclear Power Plant in 1977.

FEBRUARY 22 - 22, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME	NO CATCH AT THIS TIME									

NIGHT PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANGUILLA ROSTRATA	5			2			2	2		3
MENIDIA MENIDIA	5									
TRINECTES MACULATUS									3	

Table 6. (continued).

MARCH 8 - 8, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	8		4	4	2	2				8
LEIOSTCMUS XANTHURUS			2							

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	56	45			107	116			78	
ANGUILLA ROSTRATA	4				6					
LEIOSTOMUS XANTHURUS	12	8			3	6			2	
PARALICHTHYS DENTATUS						3			2	

Table 6. (continued).

MARCH 24 - 25, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	315	451	17	19			65	51	20	34
ANGUILLA ROSTRATA		4								
BREVOORTIA TYRANNUS	4	4	3						3	
LEIOSTOMUS XANTHURUS	28	13	6	6			18	24	28	17
MORONE AMERICANA				3				2		

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	104	124	27	57	16	43	24	32	12	17
ANGUILLA ROSTRATA				3				5		
BREVOORTIA TYRANNUS					3			3	2	
ICTALURUS PUNCTATUS										2
LEIOSTOMUS XANTHURUS		4	7	10	10	29	11	13	5	5
PARALICHTHYS DENTATUS			2							
TRINECTES MACULATUS			7	18	8	29	11	19		12

Table 6. (continued).

APRIL 12 - 13, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
BREVOORTIA TYRANNUS		3							2	
PERCA FLAVESCENS				2						
SPECIMEN MANGLED		3							2	

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	3	3	2		3		7		2	3
ANGUILLA ROSTRATA						7				
BREVCORTIA TYRANNUS	11	6	2	2		7	2	3	2	3
LEICSTCMUS XANTHURUS	14	9	6	2		10	15	22	14	13
MORCNE AMERICANA						3			2	
PERCA FLAVESCENS		3								

Table 6. (continued).

APRIL 19 - 19, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ALOSA SAPIDISSIMA								2		
BREVOORTIA TYRANNUS	4	25	6	2	3			7		
CYPRINUS CARPIO			2	2						
DOROSOMA CEPEDIANUM			2	2	3					
LEIOSTOMUS XANTHURUS					7					
MENIDIA MENIDIA					3					
MORONE AMERICANA				2					3	

NIGHT PLUME

SPECIES	LEFT	RIGHT	TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ALOSA PSEUDOHARENGUS									2	
ALOSA SAPIDISSIMA							2			
ANCHOA MITCHILLI		4	2	7	4	17		5	2	5
ANGUILLA ROSTRATA	4			2		4		2	2	
BREVOORTIA TYRANNUS	8	4		18	32	49	6	12	13	5
CYPRINUS CARPIO			2		6	2				
LEIOSTOMUS XANTHURUS		4	10	11	32	38	26	12	9	7
MENIDIA BERYLLINA			4							
MORONE AMERICANA					4		4			2

Table 6. (continued).

APRIL 21 - 21, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ALOSA AESTIVALIS									2	
ALOSA SAPIDISSIMA							3			
BREVOORTIA TYRANNUS		9	3		3		6	6		
CYPRINUS CARPIO				3						
LEIOSTOMUS XANTHURUS		5			15	24	6			
TRINECTES MACULATUS					3					
SPECIMEN MANGLED	4									

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ALOSA AESTIVALIS							2			
ALOSA PSEUDOHARENGUS										3
ANCHOA MITCHILLI	4			3	7	5			3	3
BREVOORTIA TYRANNUS	16	4			5	14	4	2		3
CYPRINUS CARPIO			2							3
DOROSOMA CEPEDIANUM								2		
LEIOSTOMUS XANTHURUS	51	36	32	25	17	19	2	2	32	19
MEMBRAS MARTINICA			2	3			2	2		
MENIDIA MENIDIA		4								
MORONE AMERICANA					7	2	4	2	3	3

Table 6. (continued).

MAY 3 - 3, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ALOSA AESTIVALIS			3				2		2	2
ALOSA PSEUDOHARENGUS				6	3		5			2
ATHERINIDAE						3				
GOBIOSCMA BOSCI			8	3	3	6				2
LEICSTOMUS XANTHURUS	11									
MENIDIA BERYLLINA									2	
SPECIMEN MANGLED										2

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
ALCSA AESTIVALIS				3			3			
ALOSA PSEUDOHARENGUS	4			3	5		3			3
ALCSA SP.							5			
ANGUILLA ROSTRATA	4	8								
BREVOORTIA TYRANNUS	52	32	10	3						3
GOBIOSOMA BOSCI							5			
ICTALURUS PUNCTATUS			29	33	5	10	5			
LEIOSTCMUS XANTHURUS	32	24	10	12	5		3	5	3	
MEMBRAS MARTINICA			3			10	3			
TRINECTES MACULATUS						5				

Table 6. (continued).

MAY 5 - 5, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ALOSA AESTIVALIS		4		3	3			3		
GOBIOSCMA BCSCI				3	3			3		
LEIOSTOMUS XANTHURUS			39	44	3					
MEMBRAS MARTINICA					3				3	
MENIDIA BERYLLINA					3					

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ALOSA AESTIVALIS						2	2	8		3
ANCHOA MITCHILLI					2			3		
ANGUILLA ROSTRATA		5								
BREVOORTIA TYRANNUS	4	9	17	19	4			3	6	7
ICTALURUS PUNCTATUS			3	3	7	2	5		3	10
LEIOSTCMUS XANTHURUS	4	5	11	14	7	15	12	26	9	31
MEMBRAS MARTINICA						4	2		6	10
TRINECTES MACULATUS									3	

Table 6. (continued).

MAY 17 - 17, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	3		4							
BREVOORTIA TYRANNUS		3								
GOBIOSOMA BOSCI	8		6				4	5	8	6
MEMBRAS MARTINICA			6	2	3					
MENIDIA BERYLLINA			4							
MENIDIA MENIDIA			2							
MORONE AMERICANA	3				3					3

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	2		3							
BREVOORTIA TYRANNUS		7			3	5	3	6		
GOBIOSOMA BOSCI				3	3	3				
LEIOSTOMUS XANTHURUS		2	3		5	10			5	6
MEMBRAS MARTINICA			5		18	16	9	9		6
MENIDIA BERYLLINA		2	3		8	8	6	3	5	
MENIDIA MENIDIA	5	2	5			8	3	3		
SYNGNATHUS FUSCUS							3			
TRINECTES MACULATUS								3		

Table 6. (continued).

MAY 19 - 19, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
GOBIOSOMA BOSCI										2
MEMBRAS MARTINICA			3	3	4		2		7	

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	7	3	3	3						
ATHERINIDAE					2					
BREVOORTIA TYRANNUS	17	25	8	3		2		3		
GOBIOSOMA BOSCI			3		2	5	3	6	11	15
LEIOSTOMUS XANTHURUS	2	13	5	14	2	5	5			3
MEMBRAS MARTINICA				3		5		3	2	3
MENIDIA BERYLLINA			5		2	5	3		5	3
MENIDIA MENIDIA						2				
SPECIMEN MANGLED						2				

Table 6. (continued).

MAY 23 - 24, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ALOSA AESTIVALIS							2			
ANCHOA MITCHILLI	3									
BREVOORTIA TYRANNUS				2						
GOBIOSOMA BOSCI	3	8	5	4	2		9	2		
LEIOSTOMUS XANTHURUS					2	28				
MEMBRAS MARTINICA						3	2			
MENIDIA BERYLLINA							2		2	
MENIDIA MENIDIA			2							

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ALOSA AESTIVALIS									2	10
ANCHOA MITCHILLI	3	3								
ANGUILLA ROSTRATA						3				
BREVOORTIA TYRANNUS	9	6	8							
GOBIOSOMA BOSCI	14	24	13	15	21	13	16	20	29	36
LEIOSTOMUS XANTHURUS	11		8	9	3	3		3	2	3
MEMBRAS MARTINICA			5		3	3	5		15	8
MENIDIA BERYLLINA	3	3	8				3	9		
MENIDIA MENIDIA		3								
MICROPOGON UNDULATUS	3									
TRINECTES MACULATUS					6	6		3		

Table 6. (continued).

JUNE 15 - 16, 1977

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	8	8	13	7	18	13	10	11	12	15
BREVOORTIA TYRANNUS		3				3				
GOBIOSOMA BOSCI	26	29	79	63	43	37	27	50	12	33
MEMBRAS MARTINICA	3	13	13	7	9	8	24	7	15	7
MENIDIA BERYLLINA								4	6	
MENIDIA MENIDIA				7	2					4
MORONE SAXATILIS				3						

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	2	2	5	5	6	2	13	22	5	3
GOBIOSOMA BOSCI	15	10	5	10	4	9	4	20	3	
MEMBRAS MARTINICA		2	7	10	6	5			3	

Table 6. (continued).

JUNE 21 - 21, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI	12	3	3	10	2	8	4	10		9
GOBIOSOMA BOSCI	152	198	51	42	7	18	11	18		9
MEMBRAS MARTINICA				3			4	3		
MENIDIA MENIDIA			3							
SPECIMEN MANGLED							2			

SPECIES	LEFT	RIGHT	TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
NIGHT PLUME										
ANCHCA MITCHILLI	3	8	13	22	36	29	28	38	40	22
BREVOORTIA TYRANNUS	3									
DORCSOMA PETENENSE			3							
GOBIOSOMA BOSCI	108	113	74	81	58	64	200	335	333	323
MEMBRAS MARTINICA	5	10	13	14	7	5	12		18	13
MENIDIA BERYLLINA			3	11	19	8	2	3		16
MENIDIA MENICIA								3		

Table 6. (continued).

JULY 5 - 6, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI	38	52	15	36	6	9	42	50		20
ATHERINIDAE						3				
GOBIOSOMA BOSCI	166	295	41	62	73	90	57	61		3
MEMBRAS MARTINICA	9			6	3		4	11		
MENIDIA BERYLLINA			6							

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI	22	10	13	12	52	43	13	22	40	85
FUNDULUS HETEROCLITUS			2							
GOBIOSOMA BOSCI	310	234	142	252	251	186	255	478	418	649
MEMBRAS MARTINICA	7		2	6	8	12				5
MENIDIA BERYLLINA			2			4	3		4	
MENIDIA MENIDIA			2							
SPECIMEN MANGLED										5

Table 6. (continued).

JULY 21 - 22, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI	20	24	122	165	426	496	104	107	120	138
ATHERINIDAE								3		
GOBIOSOMA BOSCI	88	105	20	37	61	58	7	3		10
MEMBRAS MARTINICA		3	3		24	23	7	5		2
MENIDIA BERYLLINA								3		
TRINECTES MACULATUS					2					
NIGHT PLUME										
ANCHOA MITCHILLI	45	68	307	230	261	101	311	424	297	316
FUNDULUS HETEROCLITUS					3					
GOBIOSOMA BOSCI	197	344	454	412	392	89	178	216	187	234
LEIOSTOMUS XANTHURUS								3		
MEMBRAS MARTINICA	10		9	20	18		14	12	27	5
MENIDIA BERYLLINA			3		6			3		3
MENIDIA MENIDIA							3			
SYNGNATHUS FUSCUS	5									
TRINECTES MACULATUS			3	7				6		11

Table 6. (continued).

AUGUST 3 - 3, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI	98	164	48	32	34	79	59	34	39	36
ATHERINIDAE								19		5
GOBIOSOMA BOSCI	220	485	46	32	23	72	105	101	67	36
HYPSOBLENNIUS HENTZI								5		
MEMBRAS MARTINICA			7	2			2	7		
MENIDIA MENIDIA					8					

SPECIES	LEFT	RIGHT	TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	150	114	35	37	33	52	105	91	55	92
ATHERINIDAE								7		
GOBIOSOMA BOSCI	1272	1262	277	327	211	232	249	423	327	368
MEMBRAS MARTINICA	7		2	2						
MENIDIA BERYLLINA		3								
SYNGNATHUS FUSCUS									5	
TRINECTES MACULATUS					3	3	3		10	

Table 6. (continued).

AUGUST 8 - 9, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	7	10	8	11			17	10	11	19
GOBIOSOMA BOSCI	59	55	18	6				3		
MEMBRAS MARTINICA		2					3	3	28	26
MENIDIA MENIDIA									4	11

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	63	77	59	74	58	86	49	48	19	37
ATHERINIDAE				3						
GOBIOSOMA BOSCI	151	136	69	120	100	133	96	92	43	58
MEMBRAS MARTINICA	3		3	3		11	5	9	3	3
MENIDIA BERYLLINA	3	3	8	6	3	3				10
TRINECTES MACULATUS		6								

Table 6. (continued).

AUGUST 18 - 18, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	31	28	8	9	3	17	7		20	
GOBIOSOMA BOSCI	160	164	33	68	24	52		4	3	7
MEMBRAS MARTINICA									11	10
SYNGNATHUS FUSCUS						3				
TRINECTES MACULATUS						3				

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	110	88	26	47	56	112	48	48	58	56
ATHERINIDAE	3					7				
GOBIOSOMA BOSCI	360	208	121	142	135	152	93	187	179	215
MEMBRAS MARTINICA	9	6	5	6	6	3			11	12
MENIDIA BERYLLINA	3					3	3	8	4	
MENIDIA MENIDIA					8					4
TRINECTES MACULATUS										4

Table 6. (continued).

AUGUST 23 - 24, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	6	9	3			4		4		
GOBIOSOMA BOSCI	10	3	7	3						
TRINECTES MACULATUS	3									

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	76	71	97	135	56	43	28	47	36	47
GOBIOSOMA BOSCI	653	559	153	115	202	209	28	60	66	57
MEMBRAS MARTINICA	3	3		9	3	3	10	13	15	
MENIDIA BERYLLINA			3		3					7

Table 6. (continued).

SEPTEMBER 15 – 15, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	4	8	15	9	11	7			2	13
FUNDULUS HETEROCLITUS				2						
GOBIOSOMA BOSCI	4	8	6	9		2		3		

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	11	16	11	34	10	25	3	18	16	28
CYNOSCION REGALIS								4		
GOBIOSOMA BOSCI	7	4	19	21	13	21	24	18	10	4
MEMBRAS MARTINICA					7					
TRINECTES MACULATUS			3			4				

Table 6. (continued).

SEPTEMBER 21 - 22, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI								3	3	

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	13	4	15	12	7	17	12	5	17	24
GOBIOSOMA BOSCI	4		12	6	5	3	6	9	8	
MICROGOBIUS THALASSINUS			3							
MEMBRAS MARTINICA				3	2	3				
MICROPOGON UNDULATUS	9									
SYMPHURUS PLAGIUSA		4						5		

Table 6. (continued).

OCTOBER 13 - 13, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI			2		10	5	14	9	2	16
GOBIOSOMA BOSCI								2		
MICROPOGON UNDULATUS				3			2	2	2	3
SYNGNATHUS FUSCUS			2							

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	7	10	25	18	22	13	18	22		2
ATHERINIDAE										2
GOBIIDAE				3						
GOBIOSOMA BOSCI	2									
MICROPOGON UNDULATUS	10	31	17	8	2	13	2	10		2
STRONGYLURA MARINA					2					
SYMPHURUS PLAGIUSA	2	3		3						
TRINECTES MACULATUS				3						

Table 6. (continued).

NOVEMBER 9 - 10, 1977

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI		3	2		11	5		9	2	2
FUNDULUS HETEROCLITUS						2				
MEMBRAS MARTINICA										2
MICROPOGON UNDULATUS		3				2				

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ANCHOA MITCHILLI					2	2				

Table 6. (continued).

NOVEMBER 29 - 29, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	6	6		2	18	23	3	30	33	15
LEIOSTOMUS XANTHURUS			2							3
MENIDIA BERYLLINA				1						
MICROPOGON UNDULATUS	3				3	3	5	7	2	6

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	6			4	2	2	2	2	2	5
GOBIIDAE								2		
LEIOSTOMUS XANTHURUS						2				2
MENIDIA BERYLLINA							3			
MICROPOGON UNDULATUS	6	14	7		4	7		2	5	11
MORONE AMERICANA					2					

Table 6. (continued).

DECEMBER 15 - 16, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI		3					3	3		
ANGUILLA ROSTRATA				2						
MICROPOGON UNDULATUS		6	4	4		2	1			2
MORONE AMERICANA										2

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ALOSA AESTIVALIS								2		
ANCHOA MITCHILLI			3	2			3		5	
DOROSOMA PETENENSE						2				
MENIDIA BERYLLINA							3			
MICROPOGON UNDULATUS	15	21	10	9	9	12	8	5	16	13
TRINECTES MACULATUS										5

Table 6. (continued).

DECEMBER 20 - 20, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	6	3			4	4	5	2		4
MICROPOGON UNDULATUS	32	9	4	8	7	2	2	2		4
TRINECTES MACULATUS							7			

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	3				2	4	4			3
MICROPOGON UNDULATUS			2			2		14	19	18
TRINECTES MACULATUS					2	2				

Table 7. Species and number of fish eggs captured in plume entrainment samples at VEPCO Surry Nuclear Power Plant in 1977.

FEBRUARY 22 - 22, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME	NO CATCH AT THIS TIME									

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
UNIDENTIFIED	1									

Table 7. (continued).

MARCH 8 - 8, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME	NO CATCH AT THIS TIME									

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
UNIDENTIFIED	2									

Table 7. (continued).

MARCH 24 - 25, 1977

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
MORONE AMERICANA	1									
UNIDENTIFIED	22	19								

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT

DAY PLUME NO CATCH AT THIS TIME

Table 7. (continued).

APRIL 12 - 13, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
CYPRINUS CARPIO			1						1	
MORONE AMERICANA	1	2	5	16	1	4				1
UNIDENTIFIED				1		2				

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
CYPRINUS CARPIO	1		1	1	1	1				
MORONE AMERICANA	2		1	3	5	10				

Table 7. (continued).

APRIL 19 - 19, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ALOSA SAPIDISSIMA			1	3	1					
CYPRINUS CARPIO	3	7	3	4		3	1			3
MORONE AMERICANA	4	9	7	11	7	3	3	3		
NIGHT PLUME										
ANCHOA MITCHILLI			1							
MORONE AMERICANA			1							

Table 7. (continued).

APRIL 21 - 21, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ALOSA SAPIDISSIMA					2					
CYPRINUS CARPIO	3		1	1		1		2	1	
MEMBRAS MARTINICA				1				1		
MORONE AMERICANA			3	4		3		1		

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
CYPRINUS CARPIO				1						
MEMBRAS MARTINICA			9	2	6	1				1
MORONE AMERICANA					1					
UNIDENTIFIED			1							

Table 7. (continued).

MAY 3 - 3, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
MEMBRAS MARTINICA					2	2				

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
DOROSOMA CEPEDIANUM	1									

Table 7. (continued).

MAY 5 - 5, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI		1								
MEMBRAS MARTINICA								1		

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
MEMBRAS MARTINICA			8	16	3	5	2	8		1

Table 7. (continued).

MAY 17 - 17, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	8	3	15	9		3				

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	1			1						

Table 7. (continued).

MAY 19 - 19, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI			2	2	1	1		1		
MEMBRAS MARTINICA					1	1				

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI					1					
MEMBRAS MARTINICA					2					2
MENIDIA BERYLLINA							1			

Table 7. (continued).

MAY 23 - 24, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	78	63	46	19	20	6	1	2	3	
MEMBRAS MARTINICA					1	1				
MENIDIA MENIDIA				1						

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	235	232	124	90	66	56	3	4	4	2
DOROSOMA CEPEDIANUM					3	1				
GOBIOSOMA BOSCI				60						
MEMBRAS MARTINICA			2							
MENIDIA BERYLLINA								1		

Table 7. (continued).

JUNE 15 - 16, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	64	56	25	25	10			2		

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	81	80	33	47	29	27	1			

Table 7. (continued).

JUNE 21 - 21, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	223	88	85	109	86	120	24	5	2	6

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	22	25	4	8						

Table 7. (continued).

JULY 5 - 6, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	64	96					4	10		
MEMBRAS MARTINICA		1								

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	5	2	1		3			1		
DOROSOMA CEPEDIANUM		1						1		

Table 7. (continued).

JULY 21 - 22, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI		58	44	29	68	54		1		1
MEMBRAS MARTINICA			1							

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI							2	2		
CYPRINODON VARIEGATUS		1								

Table 7. (continued).

AUGUST 3 - 3, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	163	254	3	21	117	22	13	2	1	

SPECIES	DISCHARGE CANAL		TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	1	6	1	1						

Table 7. (continued).

AUGUST 8 - 9, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI	88	97	24	17	56	4	1			
GOBIOSOMA BOSCI		5								

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	293	236	28	9	39	35		4		1

Table 7. (continued).

AUGUST 18 - 18, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	17	4	1	14	9	3				
GOBIOSOMA BOSCI				1						
MENIDIA BERYLLINA				1						

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	1		1							

Table 7. (continued).

AUGUST 23 - 24, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	1					1				
GOBIOSOMA BOSCI	1									

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	8	5	1			2				
MENIDIA BERYLLINA						1				

Table 8. Species and calculated number of fish eggs per $100m^3$ captured in plume entrainment samples at VEPCO Surry Nuclear Power Plant in 1977.

FEBRUARY 22 - 22, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME	NO CATCH AT THIS TIME									

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
UNIDENTIFIED	5									

Table 8. (continued).

MARCH 8 - 8, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME	NO CATCH AT THIS TIME									

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
UNIDENTIFIED	8									

Table 8. (continued).

MARCH 24 – 25, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
MORONE AMERICANA	4									
UNIDENTIFIED	89	80								

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT

DAY PLUME NO CATCH AT THIS TIME

Table 8. (continued).

APRIL 12 – 13, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
CYPRINUS CARPIO			2						2	
MORONE AMERICANA	3	6	11	36	2	9				2
UNIDENTIFIED				2		5				
NIGHT PLUME										
CYPRINUS CARPIO	3		2	2	3	3				
MORONE AMERICANA	5		2	7	15	34				

Table 8. (continued).

APRIL 19 - 19, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ALOSA SAPIDISSIMA			2	6	3					
CYPRINUS CARPIO	11	29	6	9		11	2			8
MORONE AMERICANA	15	38	14	24	24	11	7	7		

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI			2							
MORONE AMERICANA			2							

Table 8. (continued).

APRIL 21 - 21, 1977

CAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
ALCSA SAPIDISSIMA					6					
CYPRINLS CARPIO	13		3	3		3		6	2	
MEMBRAS MARTINICA				3				3		
MORCNE AMERICANA			8	12		10		3		

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	TOW NO. 1 RIGHT	TOW NO. 2 LEFT	TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	TOW NO. 3 RIGHT	TOW NO. 4 LEFT	TOW NO. 4 RIGHT
CYPRINUS CARPIO				3						
MEMBRAS MARTINICA			22	5	14	2				3
MORONE AMERICANA					2					
UNICENTIFIED			2							

Table 8. (continued).

MAY 3 - 3, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
MEMBRAS MARTINICA					6	6				

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
DOROSOMA CEPEDIANUM	4									

Table 8. (continued).

MAY 5 - 5, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI		4								
MEMBRAS MARTINICA								3		

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
MEMBRAS MARTINICA			22	44	7	11	5	21		3

Table 8. (continued).

MAY 17 - 17, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	20	8	28	18		8				

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	2			3						

Table 8. (continued).

MAY 19 – 19, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANCHOA MITCHILLI			6	7	2	2		2		
MEMBRAS MARTINICA					2	2				

NIGHT PLUME

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ANCHOA MITCHILLI					2					
MEMBRAS MARTINICA					5					5
MENIDIA BERYLLINA							3			

Table 8. (continued).

MAY 23 – 24, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	204	171	78	34	46	17	2	5	6	
MEMBRAS MARTINICA					2	3				
MENIDIA MENIDIA				2						

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	675	684	329	268	198	178	8	11	10	5
DCRCSOMA CEPEDIANUM					9	3				
GCBIOSOMA BOSCI				179						
MEMBRAS MARTINICA			5							
MENIDIA BERYLLINA								3		

Table 8. (continued).

JUNE 15 - 16, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	165	149	79	83	22			7		

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	199	200	76	122	61	64	2			

Table 8. (continued).

JUNE 21 - 21, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	676	272	216	286	153	235	52	13	4	14

SPECIES			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	57	66	10	22						

Table 8. (continued).

JULY 5 - 6, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	200	312					14	38		
MEMBRAS MARTINICA		3								

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	12	5	2		12			4		
DOROSOMA CEPEDIANUM		3						4		

Table 8. (continued).

JULY 21 – 22, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI		197	145	89	165	135		3		2
MEMBRAS MARTINICA			3							

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI							6	6		
CYPRINODON VARIEGATUS		5								

Table 8. (continued).

AUGUST 3 - 3, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	432	1485	7	33	223	47	29	5	3	

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	3	21	2	2						

Table 8. (continued).

AUGUST 8 – 9, 1977

DAY PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	209	242	63	48	103	8	3			
GOBIOSOMA BOSCI		12								

NIGHT PLUME

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
ANCHOA MITCHILLI	805	670	75	26	103	97		12		3

Table 8. (continued).

AUGUST 18 - 18, 1977

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
DAY PLUME										
ANCHOA MITCHILLI	52	13	3	42	27	10				
GOBIOSCMA BOSCI				3						
MENIDIA BERYLLINA				3						

SPECIES	DISCHARGE CANAL		THERMAL PLUME				AMBIENT RIVER			
			TOW NO. 1		TOW NO. 2		TOW NO. 3		TOW NO. 4	
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	3		3							

Table 8. (continued).

AUGUST 23 - 24, 1977

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
DAY PLUME										
ANCHOA MITCHILLI	3					4				
GOBIOSOMA BOSCI	3									

SPECIES	DISCHARGE CANAL LEFT	DISCHARGE CANAL RIGHT	THERMAL PLUME TOW NO. 1 LEFT	THERMAL PLUME TOW NO. 1 RIGHT	THERMAL PLUME TOW NO. 2 LEFT	THERMAL PLUME TOW NO. 2 RIGHT	AMBIENT RIVER TOW NO. 3 LEFT	AMBIENT RIVER TOW NO. 3 RIGHT	AMBIENT RIVER TOW NO. 4 LEFT	AMBIENT RIVER TOW NO. 4 RIGHT
NIGHT PLUME										
ANCHOA MITCHILLI	24	16	3			6				
MENIDIA BERYLLINA						3				

Table 9. Salinity (PPT) at VEPCO Surry Nuclear Power Plant during plume entrainment stations from January through December 1977 (D = Day; N = Night).

DATE	DISCHARGE CANAL			PLUME			AMBIENT RIVER WATER	
	Surface	Midwater	Bottom	Surface	Midwater	Bottom	Surface	Bottom
Feb. 22 (D)	7.5	7.5	7.5	3.2	a	5.7	3.3	3.3
Feb. 22 (N)	8.0	7.9	7.9	2.6	a	5.5	2.5	2.3
Mar. 08 (D)	5.6	5.0	5.0	2.0	3.0	4.0	2.5	2.8
Mar. 08 (N)	5.0	5.0	5.0	1.5	3.0	3.7	1.5	1.7
Mar. 24 (D)	1.1	0.6	0.6	0.2	0.2	0.1	0.5	0.5
Mar. 25 (N)	0.5	0.4	0.4	0.3	0.2	0.2	0.4	0.4
Apr. 12 (D)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Apr. 13 (N)	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2
Apr. 19 (D)	1.0	0.8	0.8	0.6	0.5	0.4	0.5	0.3
Apr. 19 (N)	0.8	0.8	0.8	0.5	0.4	0.3	0.3	0.3
Apr. 21 (D)	1.4	0.9	0.9	0.7	0.4	0.4	0.5	0.6
Apr. 21 (N)	0.9	0.9	0.9	0.4	0.3	0.2	0.4	0.4
May 03 (D)	5.0	4.9	4.9	3.1	3.0	3.5	1.6	1.6
May 03 (N)	4.4	4.4	4.4	1.5	2.0	2.4	1.9	1.9
May 05 (D)	5.1	4.6	4.6	3.5	4.0	3.7	1.5	1.5

Table 9. (Continued)

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
May 05 (N)	4.8	4.8	4.8	1.5	1.7	2.1	1.9	2.2
May 17 (D)	5.8	5.9	5.9	5.1	5.0	4.6	1.8	4.1
May 17 (N)	5.6	5.7	5.7	3.4	3.7	4.1	2.0	2.9
May 19 (D)	6.4	5.8	5.9	4.5	4.5	4.5	1.9	2.5
May 19 (N)	5.8	5.8	5.8	2.7	3.0	3.1	3.2	3.1
May 23 (D)	6.1	6.1	6.1	4.6	4.7	5.1	2.3	3.1
May 24 (N)	6.2	6.2	6.2	5.3	5.1	5.1	3.5	4.3
June 15 (N)	b	b	b	b	b	b	b	b
June 16 (D)	b	b	b	b	b	b	b	b
June 21 (D)	8.9	8.8	8.8	7.5	8.3	8.1	4.8	5.5
June 22 (N)	8.7	8.7	8.7	6.6	6.7	6.7	5.1	5.8
July 05 (D)	9.0	8.5	8.5	7.8	7.8	7.8	5.1	6.5
July 06 (N)	8.7	8.8	8.7	7.6	7.7	7.9	5.5	6.7
July 21 (D)	9.6	9.6	9.6	7.1	8.0	8.4	5.6	6.1
July 22 (N)	9.6	9.6	9.6	7.9	8.2	8.3	5.9	6.2

Table 9. (Continued)

DATE	DISCHARGE CANAL Surface	DISCHARGE CANAL Midwater	DISCHARGE CANAL Bottom	PLUME Surface	PLUME Midwater	PLUME Bottom	AMBIENT RIVER WATER Surface	AMBIENT RIVER WATER Bottom
Aug. 03 (D)	11.4	10.9	10.9	9.7	9.9	10.2	7.1	8.3
Aug. 03 (N)	11.0	11.1	11.1	9.4	9.3	9.8	7.7	8.1
Aug. 08 (D)	11.8	11.3	11.3	9.7	9.4	9.4	7.4	7.8
Aug. 09 (N)	11.3	11.4	11.5	9.3	9.4	9.6	8.5	8.6
Aug. 18 (D)	11.4	11.2	11.2	10.8	10.6	10.6	8.1	8.1
Aug. 18 (N)	11.3	11.3	11.4	7.7	9.3	9.8	8.4	8.0
Aug. 23 (D)	12.2	12.2	12.4	10.7	10.3	10.4	7.9	8.7
Aug. 24 (N)	12.5	12.5	12.5	8.8	10.9	11.8	9.5	10.4
Sept. 15 (D)	12.6	12.2	12.2	9.2	9.8	10.2	9.0	10.2
Sept. 15 (N)	12.3	12.3	12.3	10.3	10.5	11.4	8.2	11.1
Sept. 21 (D)	13.3	13.4	13.3	10.4	11.1	11.8	9.4	9.2
Sept. 22 (N)	13.5	13.9	14.0	9.7	11.6	9.9	9.5	10.3
Oct. 13 (D)	13.8	13.7	13.7	11.6	12.0	12.1	11.1	11.2
Oct. 13 (N)	13.5	13.3	13.3	11.5	11.5	14.1	14.2	14.1
Nov. 09 (N)	7.5	7.5	7.5	2.7	2.6	5.5	2.9	2.9

Table 9. (Continued)

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
Nov. 10 (D)	6.3	6.3	6.3	6.1	5.9	a	1.9	a
Nov. 29 (D)	2.3	1.7	1.7	0.9	0.8	0.9	1.1	1.4
Nov. 29 (N)	1.8	1.9	1.9	1.3	1.3	1.4	0.6	1.1
Dec. 15 (D)	2.6	2.1	2.0	1.6	1.6	1.7	0.4	0.7
Dec. 16 (N)	2.3	2.3	2.3	1.4	1.5	1.9	0.8	1.2
Dec. 20 (N)	2.5	2.6	2.5	2.4	2.4	2.5	0.5	0.6
Dec. 20 (D)	2.9	2.9	3.0	0.9	1.9	2.1	1.6	1.7

a - data not taken and/or not recorded.

b - data misplaced at chemistry laboratory.

Table 10. Water temperature (C) at VEPCO Surry Nuclear Power Plant during plume entrainment stations from January through December 1977 (D = Day; N = Night).

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
Feb. 22 (D)	10.8	9.8	10.0	4.5	a	6.8	4.2	4.4
Feb. 22 (N)	13.2	12.2	12.2	6.0	a	8.0	5.0	5.0
Mar. 08 (D)	14.7	13.8	13.8	9.5	10.0	10.3	9.8	9.5
Mar. 08 (N)	16.2	15.0	15.5	10.0	11.8	12.5	9.8	9.8
Mar. 24 (N)	15.5	15.0	15.2	11.2	11.0	10.5	12.1	10.8
Mar. 25 (D)	14.9	14.1	13.8	12.2	11.2	9.7	11.8	11.2
Apr. 12 (D)	23.0	22.5	22.5	21.3	21.0	21.2	20.4	19.2
Apr. 13 (N)	20.8	20.8	20.5	20.8	19.5	19.2	a	a
Apr. 19 (D)	23.8	23.0	23.0	21.8	21.5	20.2	21.8	19.8
Apr. 19 (N)	26.0	25.5	24.8	22.0	21.4	21.0	20.5	20.0
Apr. 21 (D)	24.1	24.0	23.8	23.1	21.5	21.5	22.1	21.8
Apr. 21 (N)	24.2	25.0	24.8	22.0	21.0	21.0	21.0	20.5
May 03 (D)	26.0	24.7	24.0	22.0	22.0	22.5	20.5	20.3
May 03 (N)	27.1	25.9	25.7	21.2	21.6	22.0	21.8	21.5
May 05 (D)	26.2	25.2	25.0	24.0	24.0	23.5	21.0	21.0

Table 10. (Continued)

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
May 05 (N)	27.0	26.0	26.0	23.0	21.5	22.0	22.0	22.0
May 17 (D)	27.0	26.5	26.5	25.0	25.0	23.5	21.0	23.0
May 17 (N)	30.0	29.5	29.5	25.5	25.6	26.8	22.0	23.8
May 19 (D)	29.3	28.9	29.0	27.8	27.5	27.4	23.5	24.3
May 19 (N)	30.0	29.0	29.0	25.0	25.0	25.0	24.0	24.0
May 23 (D)	32.0	31.8	31.6	29.0	30.2	30.0	25.8	26.0
May 24 (N)	31.1	29.9	30.0	29.0	27.5	27.5	25.7	26.4
June 15 (N)	31.0	30.0	30.0	24.5	25.5	25.5	23.5	24.0
June 16 (D)	30.5	30.0	30.0	27.0	27.0	27.2	24.2	24.5
June 21 (D)	33.5	33.1	32.9	31.9	32.2	31.9	27.8	28.5
June 22 (N)	33.8	33.0	33.0	29.8	29.0	29.2	27.2	28.0
July 05 (D)	36.5	36.2	36.2	33.5	34.0	34.0	30.0	30.5
July 06 (N)	35.2	34.2	34.0	33.0	32.0	32.0	28.2	28.0
July 21 (D)	35.3	34.7	34.8	32.8	32.8	33.2	31.8	31.8
July 22 (N)	35.0	34.5	33.5	32.0	32.5	33.0	31.0	30.5

Table 10. (Continued)

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
Aug. 03 (D)	35.4	34.2	34.6	32.5	32.0	32.8	28.5	29.5
Aug. 03 (N)	36.0	35.2	35.1	33.3	31.2	31.2	28.9	28.7
Aug. 08 (D)	38.8	37.9	37.5	35.2	33.7	34.1	31.0	30.9
Aug. 09 (N)	36.0	35.0	35.0	33.0	32.5	31.5	29.5	29.0
Aug. 18 (D)	31.5	31.0	31.0	30.5	29.5	29.5	27.8	27.2
Aug. 18 (N)	35.1	33.5	33.5	27.8	28.9	29.3	28.5	27.0
Aug. 23 (D)	37.0	36.2	35.2	34.5	34.0	33.2	28.2	28.8
Aug. 24 (N)	33.3	32.4	32.4	27.4	29.2	30.5	28.4	28.7
Sept. 15 (D)	28.2	27.0	27.2	24.2	23.8	24.6	24.0	23.8
Sept. 15 (N)	28.3	27.5	27.4	25.0	25.2	26.0	24.0	24.8
Sept. 21 (D)	30.8	30.0	30.1	27.5	27.0	28.5	26.7	26.3
Sept. 22 (N)	29.2	28.0	28.0	25.5	26.5	24.3	25.0	25.0
Oct. 13 (D)	23.8	23.0	23.0	19.0	19.0	19.0	18.0	16.5
Oct. 13 (N)	23.8	23.2	23.2	20.5	19.5	19.0	16.8	16.2
Nov. 09 (D)	27.2	26.3	26.1	19.5	18.3	20.8	17.7	17.8

Table 10. (Continued)

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
Nov. 10 (D)	26.0	26.5	26.5	24.5	23.0	a	17.3	a
Nov. 29 (D)	14.5	13.9	14.0	9.7	9.3	9.5	10.8	11.3
Nov. 30 (N)	14.5	13.2	13.5	10.8	10.5	11.0	8.8	9.2
Dec. 15 (D)	14.7	14.5	14.9	13.9	13.8	14.1	13.0	13.6
Dec. 16 (N)	14.0	13.5	14.0	10.8	11.5	12.6	8.3	9.8
Dec. 20 (N)	15.0	14.5	14.5	14.0	13.5	13.8	6.5	7.0
Dec. 20 (D)	15.2	15.0	15.0	8.2	11.0	11.8	9.9	9.9

a - data not taken and/or not recorded.

Table 11. Dissolved oxygen (mg/l) at VEPCO Surry Nuclear Power Plant during plume entrainment stations from January through December 1977 (D = Day; N = Night).

DATE	DISCHARGE CANAL Surface	DISCHARGE CANAL Midwater	DISCHARGE CANAL Bottom	PLUME Surface	PLUME Midwater	PLUME Bottom	AMBIENT RIVER WATER Surface	AMBIENT RIVER WATER Bottom
Feb. 22 (D)	11.4	11.6	12.5	12.5	a	12.4	12.0	13.4
Feb. 22 (N)	10.8	11.0	10.8	11.4	a	11.0	11.6	11.8
Mar. 08 (D)	10.0	10.3	10.2	10.5	10.4	10.9	11.2	10.0
Mar. 08 (N)	10.9	10.0	10.4	10.5	11.8	11.0	9.9	10.8
Mar. 24 (N)	10.6	10.5	10.4	11.0	10.9	10.6	10.6	11.2
Mar. 25 (D)	11.1	10.6	11.0	11.0	12.0	12.0	11.2	11.2
Apr. 12 (D)	9.0	9.2	9.3	9.2	9.2	9.0	9.8	9.5
Apr. 13 (N)	8.8	8.8	9.0	9.9	8.7	9.8	8.5	9.4
Apr. 19 (D)	8.7	8.6	8.0	8.9	9.4	8.8	9.7	9.9
Apr. 19 (N)	9.4	9.4	9.2	9.2	10.0	9.6	9.6	10.3
Apr. 21 (D)	9.2	8.5	9.1	8.9	9.2	9.3	8.8	9.3
Apr. 21 (N)	8.9	8.9	8.9	9.6	9.8	10.4	9.1	8.9
May 03 (D)	7.3	7.5	7.9	8.0	8.1	8.1	7.6	8.1
May 03 (N)	9.1	9.2	9.2	8.8	8.4	7.5	8.8	9.4
May 05 (D)	7.6	8.3	8.1	8.6	7.9	7.6	8.4	7.9

Table 11. (Continued)

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
May 05 (N)	7.4	7.6	7.6	8.9	8.0	8.0	7.9	5.6
May 17 (D)	7.2	7.5	7.1	6.9	6.7	7.0	7.2	7.1
May 17 (N)	7.1	7.4	7.2	8.1	8.0	8.1	7.8	8.4
May 19 (D)	6.7	6.6	6.5	7.0	7.1	7.3	7.2	6.6
May 19 (N)	3.4	5.5	6.4	7.1	6.0	5.2	7.6	7.6
May 23 (D)	6.8	7.4	6.6	6.9	6.4	b	8.0	7.5
May 24 (N)	7.1	6.8	7.0	6.8	7.1	6.8	7.5	6.8
June 15 (N)	b	b	b	b	b	b	b	b
June 16 (D)	b	b	b	b	b	b	b	b
June 21 (D)	6.6	6.3	6.6	7.0	6.8	6.8	7.6	7.7
June 22 (N)	7.2	8.4	7.0	7.4	6.9	7.8	7.5	7.4
July 05 (D)	6.3	6.1	6.1	6.8	7.2	6.5	7.2	7.3
July 06 (N)	6.2	6.3	5.9	6.1	6.5	6.5	6.3	6.4
July 21 (D)	6.5	5.9	5.7	6.3	6.1	6.0	6.4	6.2
July 22 (N)	6.2	6.0	5.8	6.0	5.8	7.0	6.5	6.3

Table 11. (Continued)

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
Aug. 03 (D)	4.7	5.9	5.9	6.1	5.9	6.0	6.5	6.2
Aug. 03 (N)	6.5	6.2	6.1	6.9	6.9	6.9	6.5	6.6
Aug. 08 (D)	7.0	6.4	6.5	6.8	6.9	8.6	7.7	6.0
Aug. 09 (N)	5.5	6.4	6.0	6.2	6.3	6.2	6.2	6.1
Aug. 18 (D)	6.6	6.5	7.0	6.9	5.9	6.3	6.2	6.5
Aug. 18 (N)	6.3	6.1	6.5	6.6	5.3	5.7	6.5	6.3
Aug. 23 (D)	6.6	7.1	7.1	6.8	7.4	7.2	7.0	7.1
Aug. 24 (N)	6.5	6.0	6.9	6.3	6.2	6.5	4.5	6.0
Sept. 15 (D)	7.2	7.3	7.2	7.7	7.4	6.9	7.9	6.8
Sept. 15 (N)	6.4	7.0	6.6	6.8	6.7	6.8	6.9	6.6
Sept. 21 (D)	7.1	7.4	7.2	7.5	7.5	7.0	7.2	6.9
Sept. 22 (N)	6.8	5.9	6.0	6.2	6.3	5.9	6.1	6.1
Oct. 13 (D)	8.4	8.2	7.7	7.9	8.0	8.4	8.2	7.9
Oct. 13 (N)	7.9	6.1	7.2	9.0	8.6	8.1	6.9	8.0
Nov. 09 (N)	7.7	8.4	8.7	8.1	8.4	7.6	7.4	8.5

Table 11. (Continued)

DATE	DISCHARGE CANAL Surface	Midwater	Bottom	PLUME Surface	Midwater	Bottom	AMBIENT RIVER WATER Surface	Bottom
Nov. 10 (D)	7.3	8.2	7.9	8.1	7.9	a	8.0	a
Nov. 29 (D)	10.0	10.6	10.0	10.0	10.6	9.8	10.6	10.2
Nov. 29 (N)	10.5	11.9	9.7	9.4	10.4	9.9	9.7	9.4
Dec. 15 (D)	10.3	10.6	10.2	10.5	10.6	10.5	10.9	10.8
Dec. 16 (N)	10.2	10.3	10.6	10.8	10.5	11.4	10.9	11.2
Dec. 20 (N)	10.0	10.0	9.9	9.9	10.1	10.2	10.5	10.5
Dec. 20 (D)	10.1	9.9	10.2	10.2	10.0	10.1	10.6	10.6

a - data not taken and/or not recorded.

b - data misplaced at chemistry laboratory.

Table 12. Descriptive statistics of dependent (Y_i) and independent (X_j) variables.

Variable	February-December 1977 (N = 248) Mean	Standard Deviation	Minimum	Maximum	May-October 1977 (N = 150) Mean	Standard Deviation	Minimum	Maximum
Y_1, Total abundance of fish	3.489	1.908	0.0	7.941	-	-	-	-
Y_2, Abundance of fish species	1.233	0.539	0.0	2.079	-	-	-	-
Y_3, Fish species diversity	0.641	0.476	0.0	1.863	-	-	-	-
Y_4, Total abundance of eggs	1.270	1.905	0.0	7.560	-	-	-	-
Y_5, Abundance of egg species	0.328	0.435	0.0	1.386	-	-	-	-
Y_6, Egg species diversity	0.062	0.193	0.0	1.040	-	-	-	-
Y_7, Abundance of *A. mitchilli* fish	-	-	-	-	2.468	2.027	0.0	6.828
Y_8, Abundance of *G. bosci* fish	-	-	-	-	2.842	2.373	0.0	7.838
Y_9, Abundance of *A. mitchilli* eggs	-	-	-	-	1.520	2.145	0.0	7.560
X_1, Temperature	22.5	8.035	4.0	38.0	27.5	4.571	16.0	38.0
X_2, Salinity	5.2	3.937	0.0	14.0	7.4	3.336	1.0	14.0
X_3, Dissolved oxygen	8.2	1.775	5.1	12.7	7.0	0.793	5.1	9.2
X_4, Plume	0.40	0.492	0	1	0.40	0.492	0	1
X_5, Ambient	0.40	0.490	0	1	0.40	0.492	0	1
X_6, Period	0.48	0.501	0	1	0.50	0.502	0	1

Table 12. Continued

Variable	February-December 1977 (N = 248) Mean	Standard Deviation	Minimum	Maximum	May-October 1977 (N = 150) Mean	Standard Deviation	Minimum	Maximum
X_7, Fall	0.20	0.402	0	1	0.07	0.250	0	1
X_8, Winter	0.12	0.327	0	1	-	-	-	-
X_9, Spring	0.36	0.479	0	1	0.40	0.492	0	1

Table 13. Summary statistics for final stepwise regression equations.

Y_i	Final Equation R^2	F_s	DF	Sig.	b_1 Temperature	b_2 Salinity	b_3 Dissolved Oxygen	b_4 Plume	b_5 Ambient	b_6 Period	b_7 Fall	b_8 Winter	b_9 Spring	b_0 Constant
Y_1, Total abundance of fish	0.47	53.0	4,243	0.001	0.170***	-0.146***	ns	ns	ns	1.608***	ns	ns	-1.370***	0.128
Y_2, Abundance of fish species	0.36	34.2	4,243	0.001	0.026***	-0.036***	ns	ns	ns	0.502***	ns	-0.190	ns	0.613
Y_3, Fish species diversity	0.30	21.0	5,242	0.001	ns	ns	ns	0.163*	0.128	0.374***	ns	-0.223**	0.288***	0.269
Y_4, Total abundance of eggs	0.39	25.3	6,241	0.001	0.148***	-0.073	ns	ns	-0.766***	-0.486*	ns	0.804*	0.686*	-1.480
Y_5, Abundance of egg species	0.37	29.0	5,242	0.001	0.029***	-0.034***	ns	ns	-0.141**	ns	-0.114	ns	0.137*	-0.112
Y_6, Egg species diversity	0.12	8.6	4,243	0.001	0.004	-0.010	ns	0.056*	ns	ns	ns	ns	0.073*	-0.025
Y_7, Abundance of <u>A. mitchilli</u> fish	0.68	49.8	6,143	0.001	0.159***	-0.140*	-0.656***	ns	ns	1.013***	1.957**	NA	-2.374***	4.010
Y_8, Abundance of <u>G. bosci</u> fish	0.56	46.5	4,145	0.001	0.286***	ns	-0.643**	ns	0.529	1.568***	ns	NA	ns	-1.520
Y_9, Abundance of <u>A. mitchilli</u> eggs	0.49	27.9	5,144	0.001	0.370***	ns	-0.544*	ns	ns	-0.664*	3.242***	NA	2.141***	-5.608

R^2, Coefficient of multiple determination
F_s, F-statistic for test of significance of regression
DF, Degrees of freedom
Sig., Significance of regression
b_j, Partial regression coefficient
*, Significant, $P<0.05$
**, Highly significant, $P<0.01$
***, Very highly significant, $P<0.001$
ns, Not significant, $P>0.10$
NA, Not applicable

Table 14. Standardized partial regression coefficients with ranks of relative importance in parentheses.

Y_i	Temperature	Salinity	Dissolved Oxygen	Plume	Ambient	Period
Y_1	0.715 (1)	-0.301 (3)	ns (5)	ns (5)	ns (5)	0.422 (2)
Y_2	0.387 (2)	-0.259 (3)	ns (5)	ns (5)	ns (5)	0.466 (1)
Y_3	ns (5)	ns (5)	ns (5)	0.168 (2)	0.132 (3)	0.394 (1)
Y_4	0.622 (1)	-0.151 (3)	ns (5.5)	ns (5.5)	-0.197 (2)	-0.128 (4)
Y_5	0.529 (1)	-0.305 (2)	ns (5)	ns (5)	-0.159 (3)	ns (5)
Y_6	0.166 (2)	-0.201 (1)	ns (5)	0.144 (3)	ns (5)	ns (5)
Y_7	0.359 (1)	-0.230 (4)	-0.257 (2)	ns (5.5)	ns (5.5)	0.251 (3)
Y_8	0.550 (1)	ns (5.5)	-0.215 (3)	ns (5.5)	0.110 (4)	0.332 (2)
Y_9	0.789 (1)	ns (5)	-0.201 (2)	ns (5)	ns (5)	-0.155 (3)
Sum of Ranks	15	31.5	37.5	41.5	37.5	26
Overall Rank of Relative Importance	1	3	4.5	6	4.5	2