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ENVIRONMENTAL PROTECTION BRANCH  
ENVIRONMENTAL PROTECTION SERVICE  
PACIFIC REGION

MARINE ENVIRONMENTAL SURVEILLANCE OF  
MUCHALAT INLET, B.C.,  
1976-1977

Regional Program Report: 79-10

by

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February 1979

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## ABSTRACT

During 1976-1977, the Environmental Protection Service conducted four environmental surveys in Muchalat Inlet in order to assess the condition of the marine receiving area and the possible influences of effluent originating from the Tahsis Company Limited pulp mill. Parameters examined in the surveys included water column temperature, salinity, dissolved oxygen, nutrients and phytoplankton productivity; intertidal and deep benthic macrofauna composition. In addition, the Pisces IV submersible was employed to observe and record environmental conditions in the vicinity of the pulp mill diffuser outfall, an ocean dump site and a control area.

The results of this work indicated that the subsurface discharge of the Tahsis mill effluent did not appear to have appreciable impacts on surface water quality, phytoplankton productivity levels or the intertidal macrofauna community. This has been tentatively attributed to the effective surface flushing action of the Gold River and the submarine diffusion of the mill effluent. The dissolved oxygen concentrations in the deep bottom waters of Muchalat Inlet were extremely low, often below 1 mg/l; however, this feature has been reported previously by other workers and appears to be a natural feature. The benthic environment near the mill was altered by pulp mill wastes due to a build up of fibrous material settling on the bottom.

RÉSUMÉ

Durant les années 1976 et 1977, le Service de la protection de l'environnement a étudié à quatre reprises les eaux de l'inlet Muchalat, aux abords de l'île Vancouver. Le but de ces études était de prévoir les incidences mésologiques possibles des effluents de l'usine de pâte de la Tahsis Company Limited. Les facteurs étudiés étaient la température de l'eau, la salinité, la teneur en oxygène dissous et en matière nutritives, la prolifération du phytoplancton et la composition de la macrofaune benthique des eaux intertidales et profondes. On a, de plus, utilisé le submersible Pisces IV à proximité du diffuseur de l'effluent de l'usine, ainsi que dans des zones d'immersion de déchets et de contrôle.

Les déchets de l'usine ne semblent pas avoir d'incidences appréciables sur la qualité des eaux en surface, la prolifération du phytoplancton et la macrofaune intertidale. On attribue cette situation à la dispersion des eaux en surface par le courant de la rivière Gold et à la diffusion sous-marine des effluents. La teneur en oxygène dissous des eaux profondes l'inlet Muchalat est extrêmement faible et souvent inférieure à 1 mg/l; toutefois, cette caractéristique avait déjà été notée par d'autres chercheurs et semble naturelle. Aux alentours de l'usine, l'environnement benthique a été perturbé par une accumulation de matières fibreuses sur le fond.

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	i
RESUME	ii
TABLE OF CONTENTS	iii
List of Figures	v
List of Tables	vi
List of Plates	vii
SUMMARY	viii
1       INTRODUCTION	1
1.1   Study Area	1
1.2   Rationale for Surveys	1
2       METHODS AND MATERIALS	3
2.1   Biological	3
2.1.1 Primary Productivity	3
2.1.2 Chlorophyll and Phaeophytin	3
2.1.3 Phytoplankton Standing Crop	4
2.1.4 Seston	4
2.2   Chemical	4
2.2.1 Dissolved Oxygen	4
2.2.2 Salinity	5
2.2.3 Inorganic Carbon and pH	5
2.2.4 Nutrients	5
2.3   Physical Measurements	5
2.3.1 Temperature	5
2.3.2 Light	5
2.4   Benthic Communities	6
2.4.1 Pisces IV Submersible Observations	6
2.4.2 Benthic Trawls	6
2.5   Station Locations	6

	<u>Page</u>
3           RESULTS AND DISCUSSION	12
3.1       Temperature	12
3.2       Salinities	12
3.3       Dissolved Oxygen	12
3.4       Light	13
3.5       pH and Total Carbonate Carbon	13
3.6       Seston	13
3.7       Nutrients	14
3.7.1    Nitrate and Phosphate	14
3.7.2    Silicate	14
3.8       Phytoplankton Productivity	14
3.9       Phytoplankton Standing Crop	15
3.10      Chlorophyll	15
3.11      Intertidal Communities	16
3.12      Benthic Communities	16
 REFERENCES	19
ACKNOWLEDGEMENTS	21
FIGURES	22
TABLES	36
APPENDIX I     MUCHALAT INLET WATER QUALITY SURVEYS	45
APPENDIX II    MUCHALAT INLET PHYTOPLANKTON STANDING CROP	66
APPENDIX III   SUBMERSIBLE DIVING OBSERVATIONS - PISCES IV	99
APPENDIX IV    MUCHALAT INLET TRAWL SURVEY	105

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	LOCATION MAP	2
2	WATER QUALITY STATIONS	7
3	PHYTOPLANKTON PRODUCTIVITY STATIONS	8
4	INTERTIDAL STATIONS	9
5	PISCES IV DIVE LOCATIONS	10
6	BENTHIC TRAWL STATIONS	11
7	DISSOLVED OXYGEN PROFILES STATIONS M1 TO M8 - November 16, 1976	23
8	DISSOLVED OXYGEN PROFILES STATIONS M1 TO M8 - March 12, 1977	24
9	DISSOLVED OXYGEN PROFILES STATIONS M1 TO M8 - May 26, 1977	25
10	DISSOLVED OXYGEN PROFILES STATIONS M1 TO M8 - August 17, 1977	26
11	DISSOLVED OXYGEN PROFILES STATIONS M1 TO M8 - September 28, 1977	27
12	PHYTOPLANKTON PRODUCTION PROFILES, STATIONS C-1 AND C-2, 18 November, 1976	28
13	PHYTOPLANKTON PRODUCTION PROFILES, STATIONS C-3 AND C-4, 17 November, 1976	29
14	PHYTOPLANKTON PRODUCTION PROFILES, STATIONS C-1 AND C-2, 25 May, 1977	30
15	PHYTOPLANKTON PRODUCTION PROFILES, STATIONS C-3 AND C-4, 27 May, 1977	31
16	PHYTOPLANKTON PRODUCTION PROFILES, STATIONS C-1 AND C-2, 17 August, 1977	32
17	PHYTOPLANKTON PRODUCTION PROFILES, STATIONS C-3 AND C-4, 18 August, 1977	33
18	PHYTOPLANKTON PRODUCTION PROFILES, STATIONS C-1 AND C-2, 30 September, 1977	34
19	PHYTOPLANKTON PRODUCTION PROFILES, STATIONS C-3 AND C-4, 29 September , 1977	35

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	SEASONAL VARIATION IN TEMPERATURE (°C) - STATIONS C-1 TO C-4, MUCHALAT INLET	37
2	SEASONAL VARIATION IN SALINITY (°/oo) - STATIONS C-1 TO C-4, MUCHALAT INLET	37
3	DISSOLVED OXYGEN (ppm) - STATIONS C-1 TO C-4, MUCHALAT INLET	38
4	PERCENT SATURATION OF DISSOLVED OXYGEN - STATIONS C-1 TO C-4, MUCHALAT INLET	38
5	MEAN EXTINCTION COEFFICIENTS (k) AND SECCHI DEPTH (m) STATIONS C-1 TO C-4, MUCHALAT INLET	39
6	pH MEASUREMENTS - STATIONS C-1 TO C-4, MUCHALAT INLET	39
7	SEASONAL VARIATION IN TOTAL CARBONATE CARBON (mgC/litre) STATIONS C-1 TO C-4, MUCHALAT INLET	40
8	PERCENT ORGANIC CONTENT OF DRY SESTON - STATIONS C-1 TO C-4, MUCHALAT INLET	40
9	SEASONAL VARIATION IN SESTON (mg/litre) - STATIONS C-1 TO C-4, MUCHALAT INLET	41
10	NITRATE MEASUREMENTS ( $\text{NO}_3^-$ ) (mgN/litre) - STATIONS C-1 TO C-4, MUCHALAT INLET	41
11	TOTAL PHOSPHATE MEASUREMENTS ( $\text{PO}_4^{3-}$ ) (mgP/litre) - STATIONS C-1 TO C-4, MUCHALAT INLET	42
12	SILICATE MEASUREMENTS ( $\text{SiO}_4^{2-}$ ) (mgSi/litre) - STATIONS C-1 TO C-4, MUCHALAT INLET	42
13	DAILY AREAL PRODUCTION (mgC/m <sup>2</sup> /day) - STATIONS C-1 TO C-4, MUCHALAT INLET	43
14	CHLOROPHYLL 'A' AND PHAEOPIGMENTS (mg/m <sup>3</sup> ) - STATIONS C-1 TO C-4, MUCHALAT INLET	43
15	HEAVY METAL LEVELS IN <u>Mytilus edulis</u> - STATIONS 1, 4, 5 AND 6 ( $\mu\text{g/g}$ )	44
16	HEAVY METAL LEVELS IN <u>Fucus</u> sp. - STATIONS 1, 4, 5 AND 6 ( $\mu\text{g/g}$ )	44

LIST OF PLATES

<u>Plate</u>		<u>Page</u>
1	CLUMPS OF FIBRE ON ROCK FACE BELOW EFFLUENT DIFFUSER, MUCHALAT INLET (595)	18
2	CLEAN ROCK FACE WITH COVERING OF BRACHIOPODS, GLASS SPONGES (Hexactinellida) AND TUBE WORMS (Polychaeta), MUCHALAT INLET (596)	18
3	GORGONIAN CORAL, <u>Paragorgia arborea</u> , AT 135 METRES, MUCHALAT INLET (596)	18

## SUMMARY

During 1976-1977, the Environmental Protection Service conducted a series of surveys in Muchalat Inlet in order to obtain biological and chemical data with which to assess the receiving water environment near the Tahsis Co. Ltd. pulp mill. On four separate surveys from November 1976 to September 1977, tests to determine phytoplankton productivity, water quality and intertidal community condition were completed. In March 1977, the Pisces IV submersible was used to examine the benthic environment. Further information on benthic communities was obtained by a series of bottom trawls conducted in August 1977.

During the sampling periods, the pulp mill effluent discharges did not appear to have a noticeable effect on center channel water column dissolved oxygen values in the top 30 metres. Fluctuations in dissolved oxygen levels appeared to be related primarily to the influence of freshwater inflow and natural seasonal change. Dissolved oxygen values below 5 mg/l in the shallow zone were limited to the late fall surveys. The effluent is discharged at depth (>20 m) through a submarine diffuser; however, it was observed "boiling" to the surface during all surveys. Once at the surface, the effluent appeared to remain near the shoreline. As the sampling sites are located mid-channel, this probably accounts for no noticeable depression of DO at the stations near the discharge. Extremely low levels of DO were measured in the deep (>100 m) bottom waters. However, this feature has persisted for sometime in Muchalat Inlet (Waldichuk, 1968), and may be a natural feature.

Productivity levels recorded during 1977, did not indicate a significant impact attributable to the presence of pulp mill effluent. During each survey, results between stations were reasonably comparable, even at the stations nearest the outfall. As previously mentioned, the effluent in the surface waters was not widespread and effects on phytoplankton populations might therefore be localized. Factors which could effect the growth of phytoplankton such as nutrients, carbonate carbon, light and standing crop were not considered abnormal.

Stockner et al (1975), concluded in their report that flushing was one of the most important physical factors in reducing the effects of KME discharge into receiving waters. The proximity of the Gold River to the pulp mill would appear to create such a situation.

The impact of the pulp mill discharges upon the intertidal communities of Muchalat Inlet appeared to be minimal. The sparsity of intertidal organisms at the stations examined appears to be a natural feature of the inlet. Heavy metal levels in Fucus sp. and Mytilus edulis were not considered to be elevated.

Observations from the Pisces IV submersible of the deep benthic conditions at the head of Muchalat Inlet indicated a substantial build up of fibrous material, primarily pulp mill wastes, on the seabed. The material is generally restricted to the deep portion (>300 metres). The low DO near the bottom, enhanced by the decomposition of fibrous material, result in an environment unsuited to most forms of benthic life.

## 1 INTRODUCTION

### 1.1 Study Area

Muchalat Inlet is a narrow fjord approximately 29 kilometers long which empties into Nootka Sound (Figure 1). The main basin reaches a maximum depth of 360 meters. Water exchange due to tidal action and the outflow of freshwater is generally restricted to the level of the sill at Gore Island (Tully, 1937). The Gold River is the major contributor of freshwater, although there are a number of small creeks draining into the inlet.

The Tahsis Company Limited kraft mill is located on the north shore of Muchalat Inlet on the Gold River delta. The pulp mill was opened in June 1967, with a design production potential of 750 tons/day of bleached kraft pulp. Estimated effluent flow over the 1974-77 period averaged approximately 131.6 million litres per day. Because of the considerable depth of the inlet, a decision was made to discharge the effluent through a submarine diffuser at a depth of 20 meters below the low tide level. The pulp mill draws its process water from approximately 5 kilometers up the Gold River.

To assist the reader, the large number of tables and figures referred to in the RESULTS AND DISCUSSION section can be found following the main body of the report.

### 1.2 Rationale for Surveys

The Environmental Protection Service is responsible for conducting surveillance and compliance monitoring programs at the coastal mills. Prior to 1976, biological monitoring programs in Muchalat Inlet were being conducted by an independent monitoring agency and the Tahsis Company personnel. It was felt that additional surveys were required to complete a biological assessment of the receiving water environment near the Tahsis Co. Ltd. pulp mill.

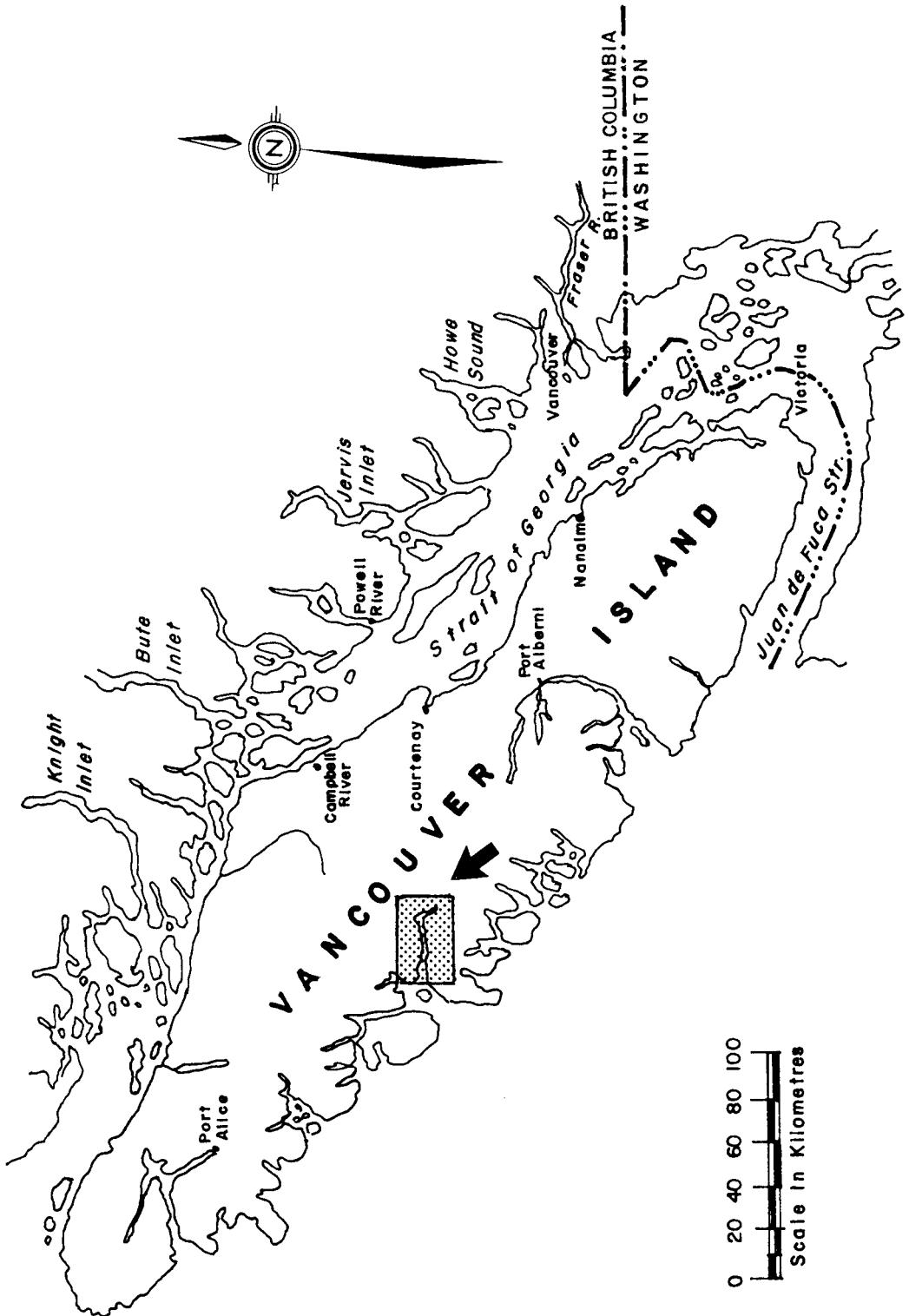


FIGURE I MUCHALAT INLET

2 METHODS AND MATERIALS

2.1 Biological

2.1.1 Primary Productivity. The standard C<sup>14</sup> method proposed by Steeman-Nielsen (1952) was used with minor modifications incorporated. Water was collected from eight depths (0, 1, 2, 3, 5, 10, 20 and 30 metres) at four stations, with a plastic 6-litre Van Dorn bottle. Duplicate 125 ml light bottles were filled from each depth and inoculated with 1 ml NaH<sup>14</sup>CO<sub>3</sub> radioisotope (1 c) diluted in filtered seawater. At 1, 3, 5 and 20 metres, a 125-ml dark bottle was filled and inoculated with the same amount of isotope, to account for assimilation of isotope by processes other than photosynthesis. All work was completed in subdued light situations to avoid chlorophyll degradation during the inoculation procedure. Three scintillation vials containing scintillation fluor (Liquid Scintillation Fluor, Aquasol<sup>1</sup>) were inoculated with 1 ml of the premixed radioactive solution to obtain an average disintegrations per minute (DPM) estimate.

Duplicate light and dark bottles were incubated in situ with clear plexiglass holders for four to seven hours. After the specified incubation period, the bottles were recovered, transported in dark boxes, and filtered immediately onto 45μ cellulose nitrate filters. Filters were placed in 10 ml of scintillation fluor and stored in a cooler. Activity measurements were determined on a Packard Tri-Carb Liquid Scintillation Spectrometer (Model 3375). The equation of Strickland and Parsons (1972) was used to convert counts per minute to mgC/m<sup>3</sup>/day. Areal production rates (mgC/m<sup>2</sup>/day) were integrated on a Hewlett Packard Calculator Plotter (Model 9830).

2.1.2 Chlorophyll and Phaeophytin. Samples collected from 1, 3, 5 and 20 meters were removed to 1 litre polyethylene bottles, filtered onto glass fibre filters, placed in dessicant chambers, and frozen. In the

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<sup>1</sup>Aquasol, New England Nuclear xylene-based fluor

laboratory, they were dissolved in 90% acetone, placed in a tissue grinder and analyzed on a spectrophotometer for chlorophyll 'a' and phaeophytin.

2.1.3 Phytoplankton Standing Crop. Samples for phytoplankton standing crop were collected at each depth and placed in 100 ml amber glass jars and preserved with Lugol's Solution. Identification and enumeration were completed using Utermohl's sedimentation method (1958). Results are expressed as cells and total numbers.

2.1.4 Seston. Samples for seston analysis were collected in 1-litre polyethylene bottles from 1, 3, 5 and 20-metre depths and frozen immediately. Samples were returned to the laboratory, filtered onto pre-weighed glass fibre filters, and dried to a constant weight at 105°C. Samples were reweighed and ashed in a muffle oven at 550°C for approximately four hours. The loss of material on ignition (LOI) is a measure of particulate organic matter.

## 2.2 Chemical

2.2.1 Dissolved Oxygen. Samples were collected from 1, 3, 5 and 20 metre depths to accompany the phytoplankton productivity study and from 0, 2, 4, 6, 10, 20, 30 and 50 metre depths for the dissolved oxygen survey. Dissolved oxygen was measured by the standard Winkler titration method as outlined in Strickland and Parsons (1972). The percent saturation of oxygen in the water column was calculated from the salinity, temperature and dissolved oxygen values measured at each depth using the equation of Gameson and Robertson (1955):

$$C = \frac{475}{33.5 + T} = (2.65 \times S)$$

$$\% \text{ saturation} = \frac{A}{C} \times 100$$

where: C = saturation of oxygen in the sample water  
S = salinity of the sample water

T = temperature of sample water

A = observed dissolved oxygen concentration in the sample

2.2.2 Salinity. Water samples were taken from each depth and analyzed with a Guildline Autosal (Model 8400).

2.2.3 Inorganic Carbon and pH. Samples were collected from 1, 3, 5 and 20 metre depths for inorganic carbon and pH, stored in 180 ml polyethylene bottles, frozen and analyzed later on an Accumet 420 pH meter. Inorganic carbon was calculated according to the procedure outlined in Strickland and Parsons (1968).

2.2.4 Nutrients. Samples for nutrients were collected from 1, 3, 5 and 20 metre depths, removed to 250 ml polyethylene bottles and frozen. Analysis of nitrate, nitrite, ammonia, ortho-phosphate, total phosphate and silicate were completed by the method outlined in the Fisheries and Marine Service - Environmental Protection Service Laboratory Manual (1974).

### 2.3 Physical Measurements

2.3.1 Temperature. Water temperature was measured with a standard centigrade thermometer immediately after retrieval of the Van Dorn samplers.

2.3.2 Light. Total incident solar radiation in gram-calories/cm<sup>2</sup> was measured on a Belfort Pyrheliograph during the production studies. Percent extinction of light with depth in the water column was measured by a Montedoro-Whitney Solar Illuminance Meter (LMT-8B). These data were regressed to calculate the mean extinction coefficient 'k' according to the procedure outlined in Platt and Irwin (1968). Water transparency was estimated at each station using a standard 30 cm white secchi disc.

2.4        Benthic Communities

2.4.1      Pisces IV Submersible Observations. Two dives were conducted in the Pisces IV submersible during the March 1977 survey. During each dive, two observers recorded visual observations of bottom conditions and types of marine life encountered. A photographic record of each dive was made using a Bolex 16 mm movie camera and a Hasselblad 70 mm still camera.

2.4.2      Benthic Trawls. Benthic trawls were conducted at five locations in Muchalat Inlet and Hanna Channel. The trawling gear consisted of an otter trawl with 3.8 cm mesh, 1.27 cm mesh cod end liner, and a 5.8 m throat. The trawl was lowered to the bottom with a 3:1 scope and towed for an estimated 0.8 km. At each station, macrofauna in the trawls were sorted, photographed, counted, weighed and where possible identified.

2.5        Station Locations (Figures 2 to 6)

Water quality was measured at eight (8) locations four of which had previously been monitored by T.W. Beak Consultants Ltd. (1975; 1977) during their biological monitoring program (Figure 2). Phytoplankton productivity stations were located in relation to the effluent discharge. Station C-1, east of the mill site; C-2, near the diffuser site; C-3, west of Victor Island; C-4, a control site, removed from mill influence (Figure 3). Intertidal stations were located on both shores at varying distances from the point of effluent discharge (Figure 4). Pisces IV submersible dive locations were selected in order to examine the diffuser and a designated ocean dump site (Dive 595), and a control area removed from these operations (Dive 596) (Figure 5). Trawl sites were located near the mill and in control areas several kilometres from the mill (Figure 6).

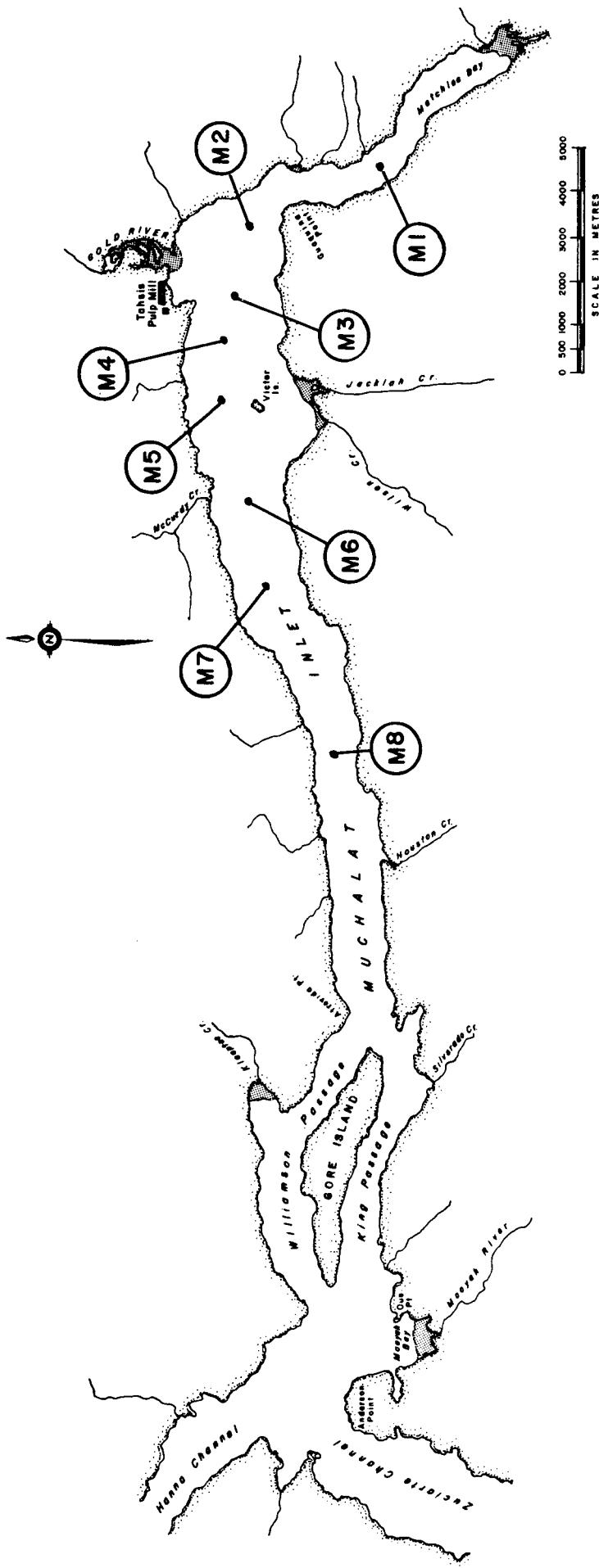


FIGURE 2 WATER QUALITY STATIONS

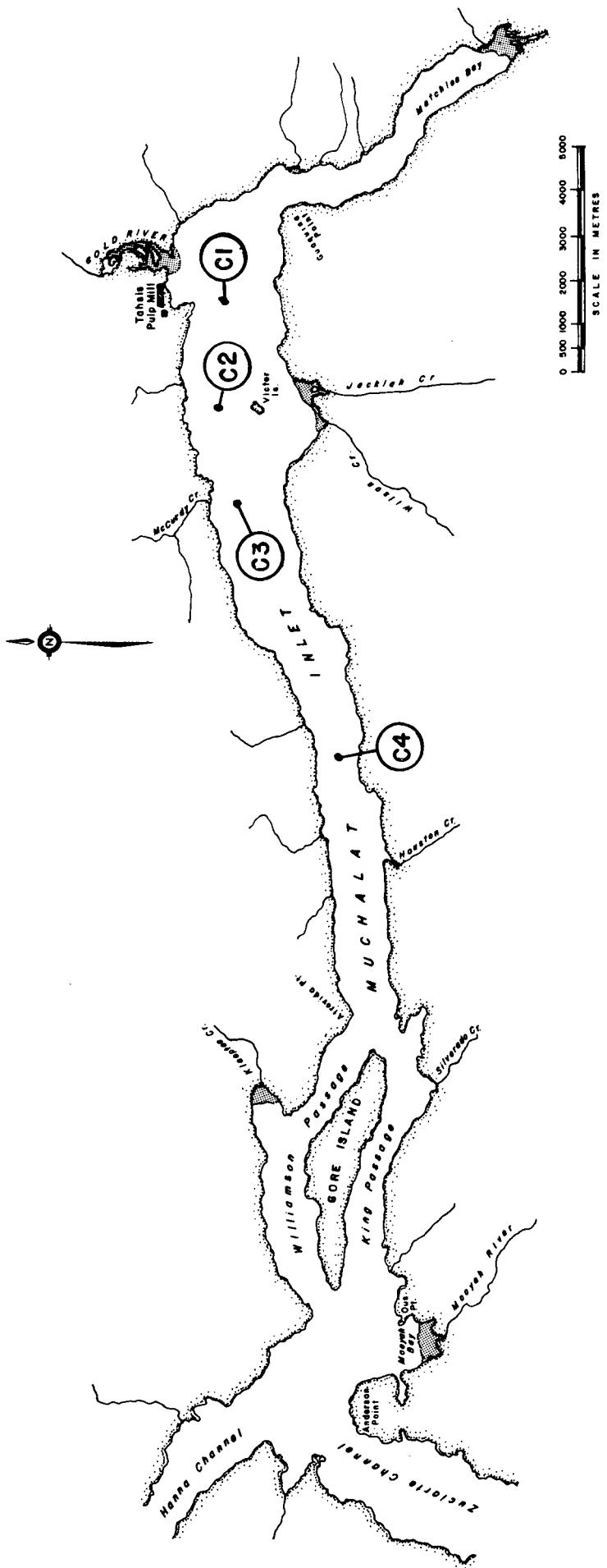


FIGURE 3 PHYTOPLANKTON PRODUCTIVITY STATIONS

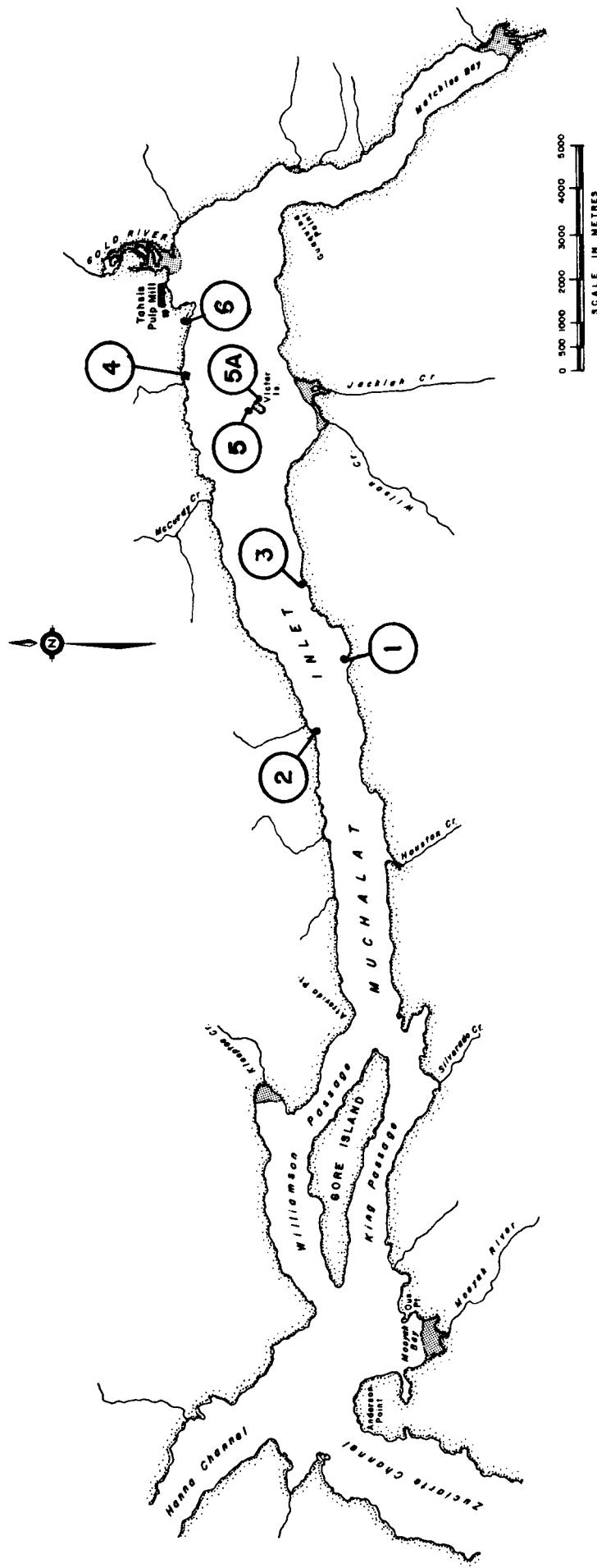


FIGURE 4 INTERTIDAL STATIONS

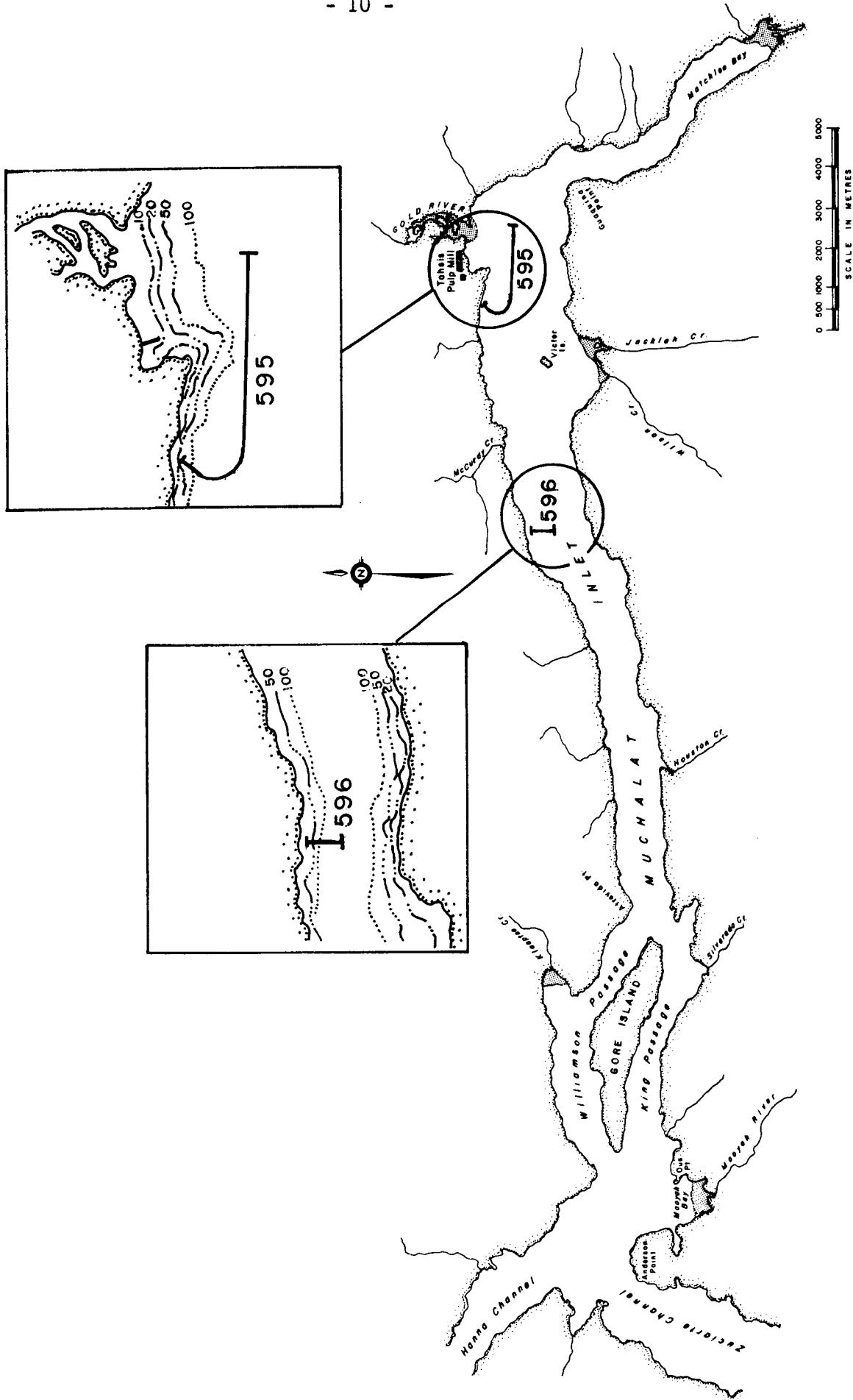


FIGURE 5 PISCES IV DIVE LOCATIONS

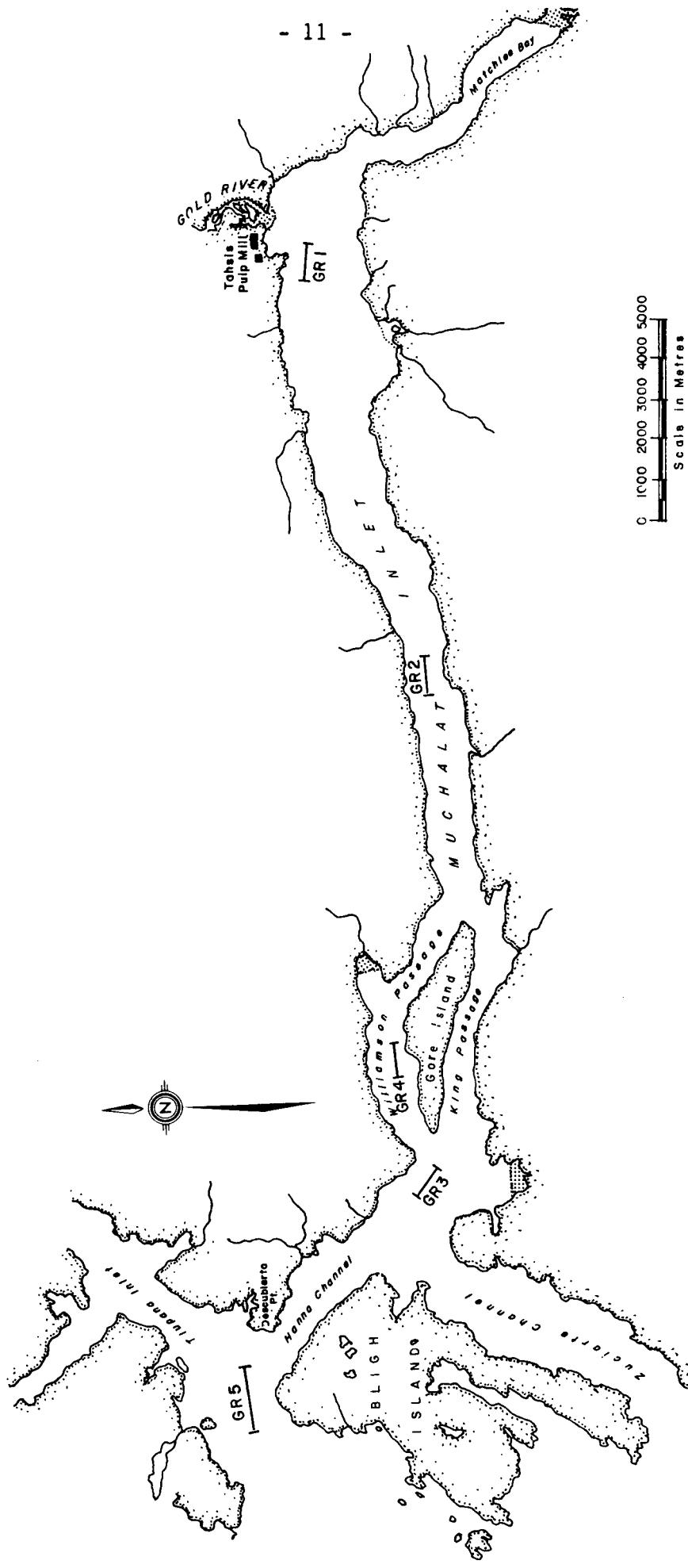


FIGURE 6 BENTHIC TRAWL STATIONS

### 3 RESULTS AND DISCUSSION

#### 3.1 Temperature (Table 1 and Appendix I)

During both the November 1976 and March 1977 surveys, a negative temperature gradient was recorded at all stations. This is normal for coastal waters in winter months. Temperatures were lowest in March varying from 4.6 to 9.4°C, with temperature differences between zero and two metres as much as 3.5°C. During the May survey, increases in the surface water temperatures reversed the gradient and resulted in generally uniform temperatures 8.0-11.0°C at all depths. High surface temperatures, 19.0-22.0°C were recorded in August with the thermocline depth averaging 10 metres. In September, the measured surface temperatures were lower, 14.0-15.5°C, and varied from 12-14°C between 2 to 30 metres.

#### 3.2 Salinities (Table 2 and Appendix I)

Surface salinities were noticeably affected by the input of freshwater, particularly the Gold River, during all surveys. Salinities were lower in the surface water, 2.9 to 12.6<sup>0</sup>/oo at all stations in March and May 1977. Over a three day period of heavy rainfall in November 1976, salinities decreased up to 15<sup>0</sup>/oo in the upper layers (0-3 metres). Below an average depth of three metres, values were higher, 28.6 to 32.8<sup>0</sup>/oo, and generally uniform. During the August and September 1977 surveys, the salinity differences between surface and depth were less, with average surface salinities from 19.0-30.0<sup>0</sup>/oo. The halocline, although not well defined, appeared to fluctuate from four to six metres.

#### 3.3 Dissolved Oxygen (Tables 3 and 4 and Appendix I)

The profiles of dissolved oxygen indicate there were slight differences between stations (Figures 7 to 11). Dissolved oxygen levels were generally lowest near the head of the inlet, at Stations M-1 and M-2 and highest closer to the mouth at Station M-8. Differences were also evident in dissolved oxygen levels from surface to bottom. In 1977, the

DO levels below 20 metres shifted from averages of 4-6 ppm in March to 2-4 ppm in May, August and September. Values in the top four metres varied from 10-12 ppm in March to 4-10 ppm in May, August and September. The August profiles are typical of more constant summer surface water conditions. Measured DO's at or near the bottom revealed extremely low oxygen levels (Appendix I). This appears to be typical of bottom conditions in Muchalat Inlet as similar levels were recorded by Waldichuk et al (1968) in studies conducted from 1959-1966.

During the course of the present surveys, the discharge of pulpmill effluent did not appear to have had any measurable impact on temperature, salinity or dissolved oxygen at the stations sampled.

#### 3.4 Light (Table 5)

The effect of the Gold River inflow on light transmission through the water column was observed in November 1976. Three days of heavy rainfall resulted in extremely turbid surface waters. The mean extinction coefficients were very high at all stations (2.1-2.7) and water transparency, measured with a standard Secchi disc was between one and two metres. Under more normal conditions, mean extinction coefficients were reasonably high (1.1-1.8) and Secchi determinations varied from 4.5 to 6 metres.

#### 3.5 pH and Total Carbonate Carbon (Tables 6 and 7)

pH measurements were very uniform throughout the year and with depth (7.20-8.01). Changes in total carbonate carbon were generally a reflection of variations in salinity. Values at the surface were substantially lower than those at depth. As salinities in the upper layers increased, total carbonate carbon values increased accordingly.

#### 3.6 Seston (Tables 8 and 9)

Seston values did not follow any seasonal pattern. The percent organic content increased during the August survey when high productivity was recorded. In November, the turbidity which resulted from heavy rainfall, was recorded in the seston weights. At this time, percent organic content of the samples was low.

### 3.7        Nutrients

3.7.1      Nitrate and Phosphate (Tables 10 and 11). Lowest nitrate was measured in August 1977, which corresponds to a period of high productivity. At this time, levels of nitrate were below the limit of detection ( $0.010 \text{ mgN/l}$ ) at several depths at Stations C-2 and C-3, possibly the result of increased productivity. Nitrate levels peaked at 20 metre depths at all stations throughout the year. The data collected did not indicate that there was a problem of nitrate deficiency in the water column.

Phosphate levels appeared to increase in the water column through the year (from averages of  $0.01 \text{ mgP/l}$  to  $0.03 \text{ mgP/l}$ ) and were generally higher at 20 metres than at the surface. The phosphate measured was above levels which would limit the growth of phytoplankton.

3.7.2      Silicate (Table 12). Silicate measurements appeared to fluctuate in a manner similar to the results for nitrate and phosphate. Unfortunately, most levels recorded during the 1977 surveys were below the limit of detection ( $0.5 \text{ mgSi/l}$ ). It would be natural for decreases in silicate concentrations to occur during the growing season, and as silicate is normally present to excess in seawater, it probably would not significantly limit phytoplankton growth.

### 3.8        Phytoplankton Productivity (Table 13)

In November, zero production was recorded at all stations (Figures 11 and 12). Productivity is normally lower at this time of year and the heavy overcast conditions during the two day testing period could have caused further decreases in production. Typical seasonal increases were recorded in May. At Station C-1, the lack of significant production at the surface (Figure 13) was believed to be due largely to the freshwater influence, although surface light inhibition may also have been a contributing factor. At the remaining stations (Figure 14), production profiles showed that most production occurred in the top two metres. Surface inhibition was apparent in August, although the level of production was increased. The depth of the euphotic zone was also increased in August from average depths of 3-5 metres to 10-20 metres

(Figures 15 and 16). At Station C-2, productivity was approximately 50% higher than at either Station C-1 or Station C-4.

It was noted by Stockner et al (1975), that in certain situations, given sufficient light, the nutrients in KME (nitrogen, phosphorous and carbon) can enhance phytoplankton productivity adjacent to a pulp mill. This may have occurred at Station C-2.

In September (Figures 17 and 18), production had decreased and was recorded at shallower depths than in August.

### 3.9 Phytoplankton Standing Crop (Appendix II)

With the exception of the November survey, the dominant species at each station was Skeletonema costatum. Total numbers of phytoplankters were low during the November survey. At this time, production values were zero. There were general increases in populations in May, and increases in productivity levels. In August, the diversity as well as total numbers of diatoms rose dramatically. This corresponds to the period of highest production recorded during this study. In September, there was a noticeable increase in the numbers of Dinophyceae present at each station and the diversity of diatoms was slightly lower than in August. Total numbers were generally greater in the upper 10 metres and there did not appear to be any great differences in standing crop between stations.

### 3.10 Chlorophyll (Table 14)

The levels of chlorophyll 'a' and phaeopigments during the November survey were below the limit of detection. For the remaining surveys, the amount of chlorophyll generally corresponded to the amount of productivity. In August, chlorophyll 'a' levels were high in the surface layers when production was high ( $1.2$  to  $4.9 \text{ mg/m}^3$ ). In September, the phaeopigment values were considerably higher than the chlorophyll levels, which is indicative of the end of a growth period. Values recorded at 20 metre depths were below the limit of detection for all surveys.

### 3.11 Intertidal Communities

The predominantly steep sides of Muchalat Inlet limited the choice of intertidal stations; however, beaches with similar populations were selected (Figure 4). In general, beaches were dominated by Fucus sp. and Mytilus edulis. Barnacles were also common. Hemigrapsus nudus and H. oregonensis were observed at most stations as well as Pentidotea wosnesenski and Gnorimisphaeroma oregonensis. There was no obvious impact of effluent on the intertidal communities of the areas examined.

The analyses for heavy metals in mussel tissue and Fucus sp. did not indicate any increases attributable to the pulp mill with the possible exception of Pb levels in Fucus sp. at Station 6 (Tables 15 and 16). The metal levels were not considered high and in the case of copper in mussel tissue, the concentrations were considerably lower than those found in the vicinity of groundwood pulp mills in the province (Nelson and Goyette, 1976).

### 3.12 Benthic Communities

Benthic communities were observed from the Pisces IV submersible (Appendix III) and a series of bottom trawls were taken to collect organisms for identification (Appendix IV).

The bottom at Dive site 595 was notably devoid of life, with the exception of amphipods. The extremely low dissolved oxygen conditions (<1 mg/l) recorded in this area have persisted for sometime (Waldichuk, 1968) and certainly contributes to the marked absence of life. A fibre mat covers the bottom, and the decomposition of this organic material undoubtedly adds to the anoxia. The dive continued to the vicinity of the effluent diffuser pipe, which was observed to be missing the blind end phlange.

The absence of life on the steep rock face below the diffuser pipe may indicate the direct environmental impact of the effluent discharge (Plate 1); however, Metridium sp. were observed growing on the pipe and schools of rock fish were attracted to the area.

Marine life on the bottom at Dive site 596 was considerably more abundant than was observed near the pulp mill. The rock faces

examined were covered with a variety of organisms including Munida quadrispina (Squat lobster), brachiopods, Spirontocaris sp., anemones, spider crab, sponges, Pandalus platyceros (prawns), and Gorgonian corals (Plates 2, and 3). Unlike Dive site 595, natural sediment covered flat areas of the bottom. Dissolved oxygen in the bottom waters at this site was also very low (0.8 mg/l).

No benthic organisms were recovered from the trawls conducted at sites GR-1 and Gr-2. The remainder of the trawls were conducted in the sill area (GR-3, GR-4) and an additional site at the north end of Hanna Passage (GR-5). The trawl yields were predominantly shrimp, most commonly Spirontocaris spp. Although the quantity of animals collected by the trawls were small, a considerable variety of species were collected on the sill and at Hanna Channel.

The results of the Pisces IV dives and the trawls conducted near the pulp mill point to a greatly modified deep benthic environment which appears to have been caused by a combination of natural and anthropogenic factors.



PLATE 1

CLUMPS OF FIBRE ON ROCK  
FACE BELOW EFFLUENT DIFFUSER,  
MUCHALAT INLET. (595)



PLATE 2

CLEAN ROCK FACE WITH COVERING  
OF BRACHIOPODS, GLASS SPONGES  
(HEXACTINELLIDA) AND TUBE  
WORMS (POLYCHAETA), MUCHALAT  
INLET. (596)

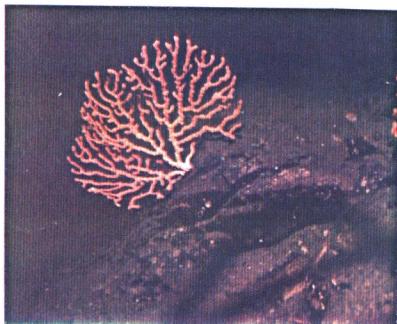


PLATE 3

GORGONIAN CORAL, Paragorgia  
arborea, AT 135 METRES,  
MUCHALAT INLET. (596)

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#### ACKNOWLEDGEMENTS

The author would like to thank D. Goyette (Senior Project Biologist) for his part in the direction of the project and to D. Brothers and H. Nelson for their assistance in the field portion of the work.

Thanks to Dr. J. Stockner, D. Buchanan and D.D. Cliff for their time, advice and generous loan of equipment, without which the project would not have been impossible.

Thanks also to Ms. R. Woods for phytoplankton enumeration and identification from 1976-1977.

FIGURES

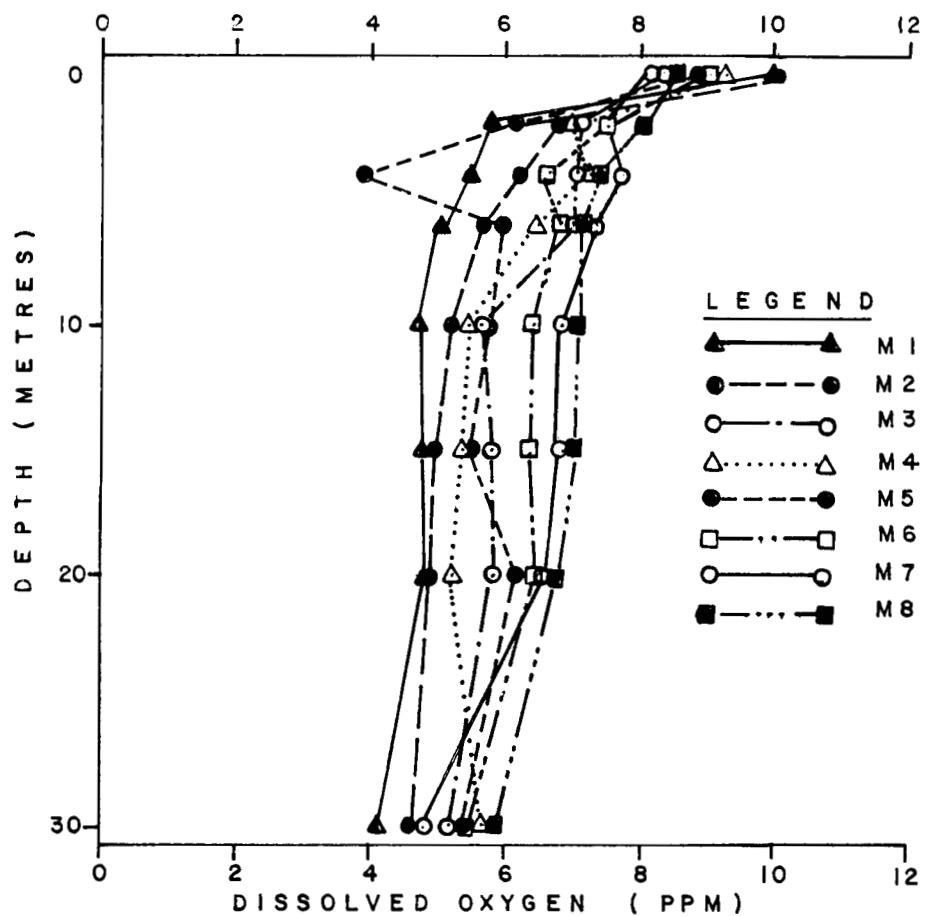


FIGURE 7 DISSOLVED OXYGEN PROFILES  
STATIONS M1 TO M8 - November 16, 1976

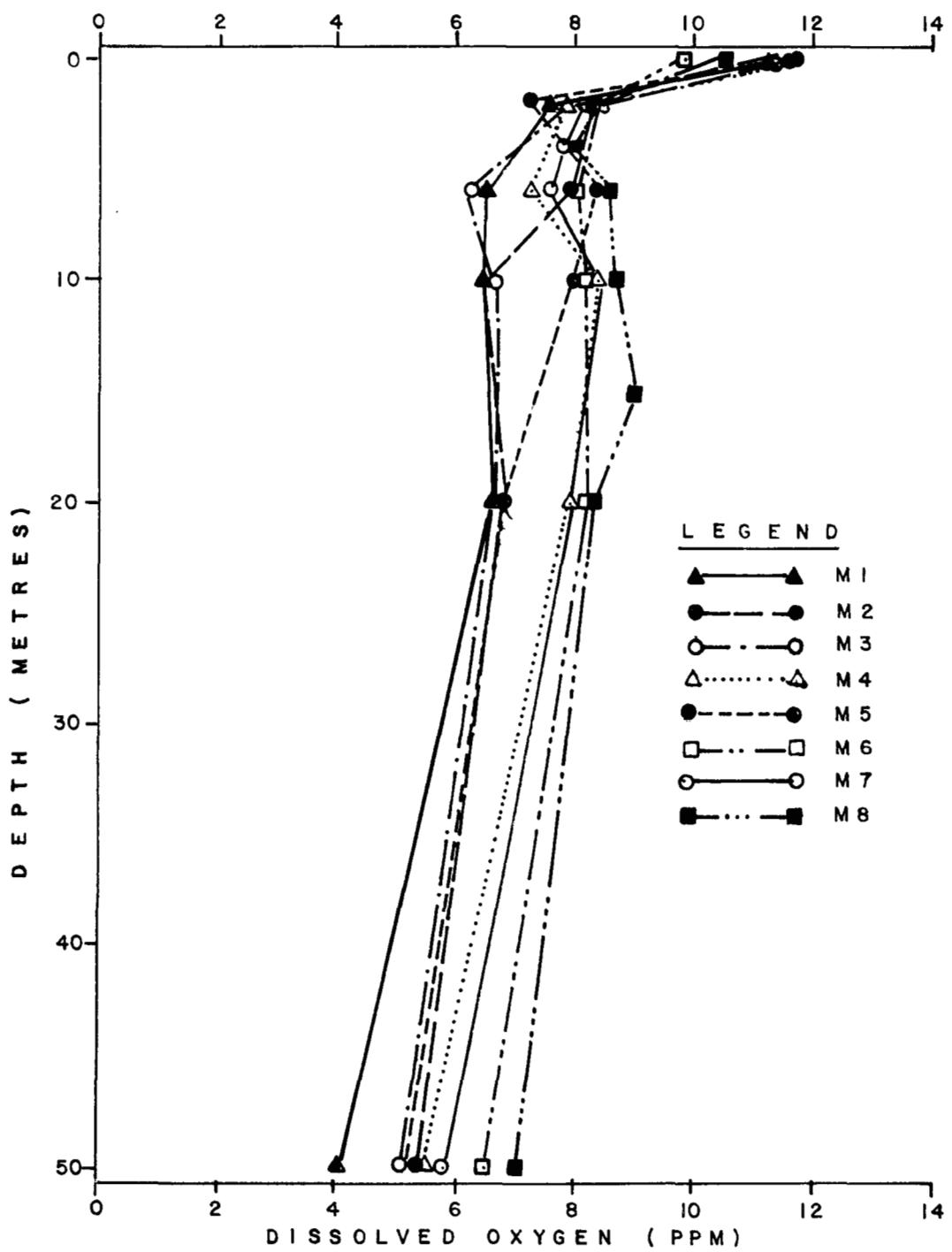


FIGURE 8 DISSOLVED OXYGEN PROFILES  
STATIONS M1 TO M8 - March 12, 1977

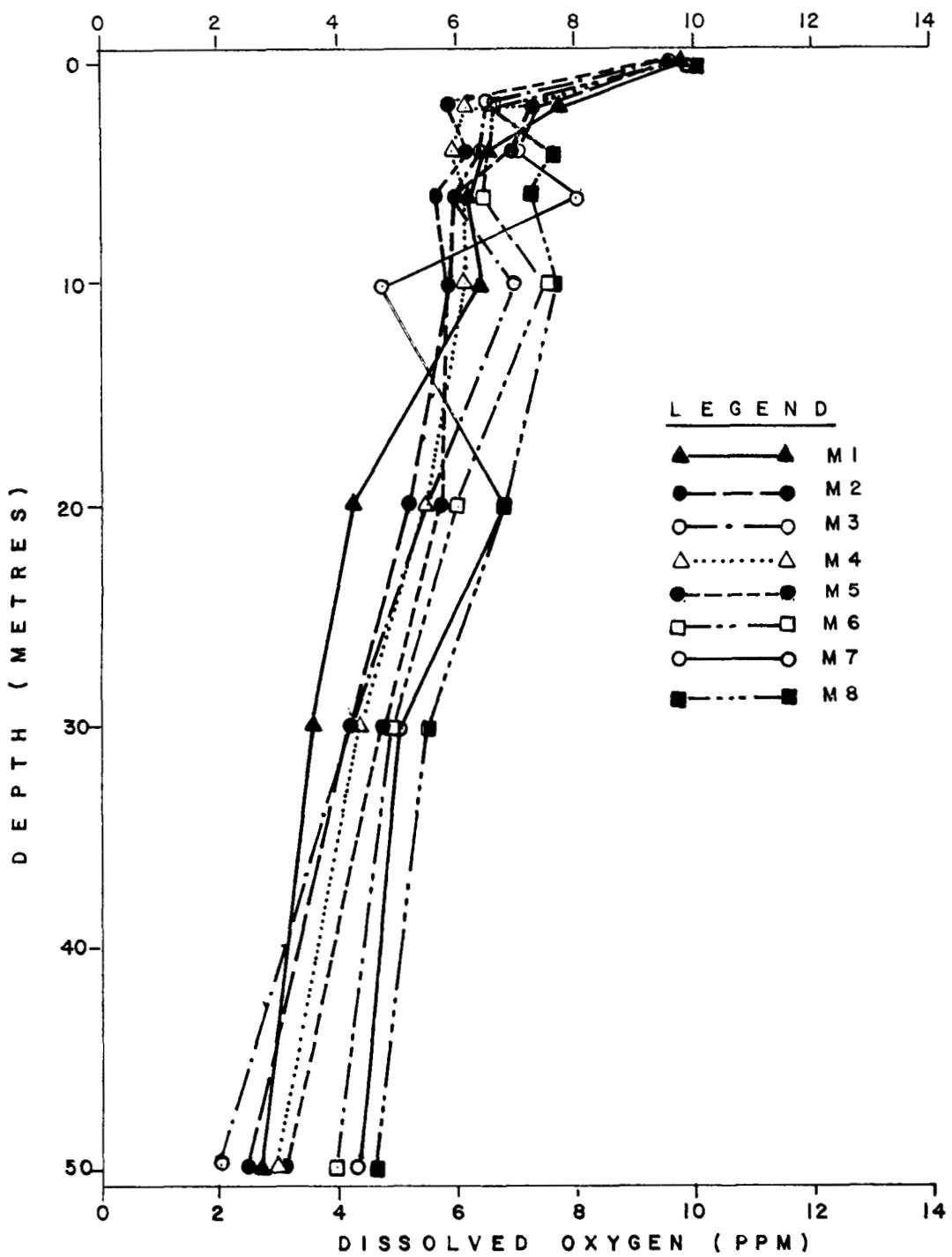


FIGURE 9 DISSOLVED OXYGEN PROFILES -  
STATIONS M1 TO M8 - May 26, 1977

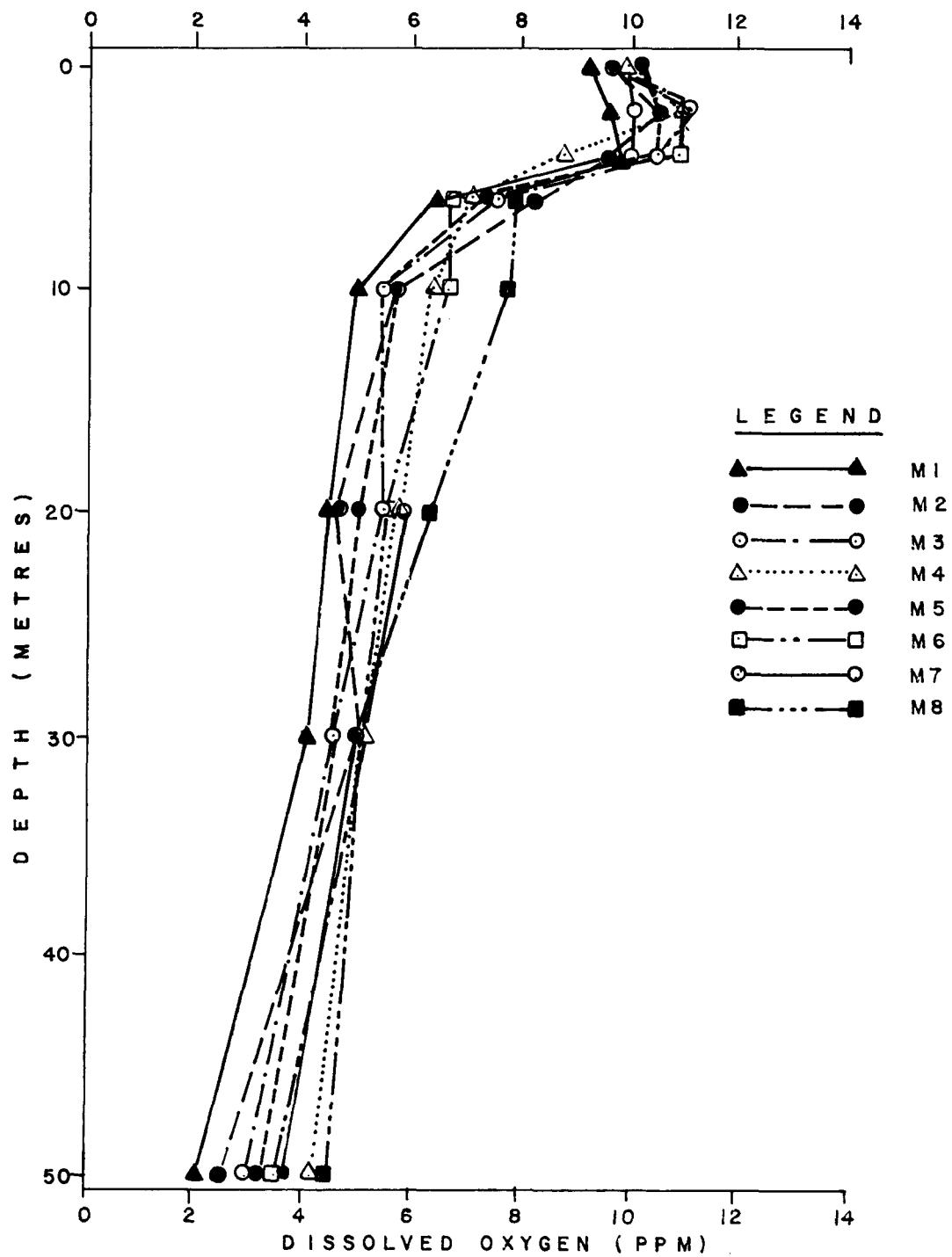


FIGURE 10 DISSOLVED OXYGEN PROFILES -  
STATIONS M1 TO M8 - August 17, 1977

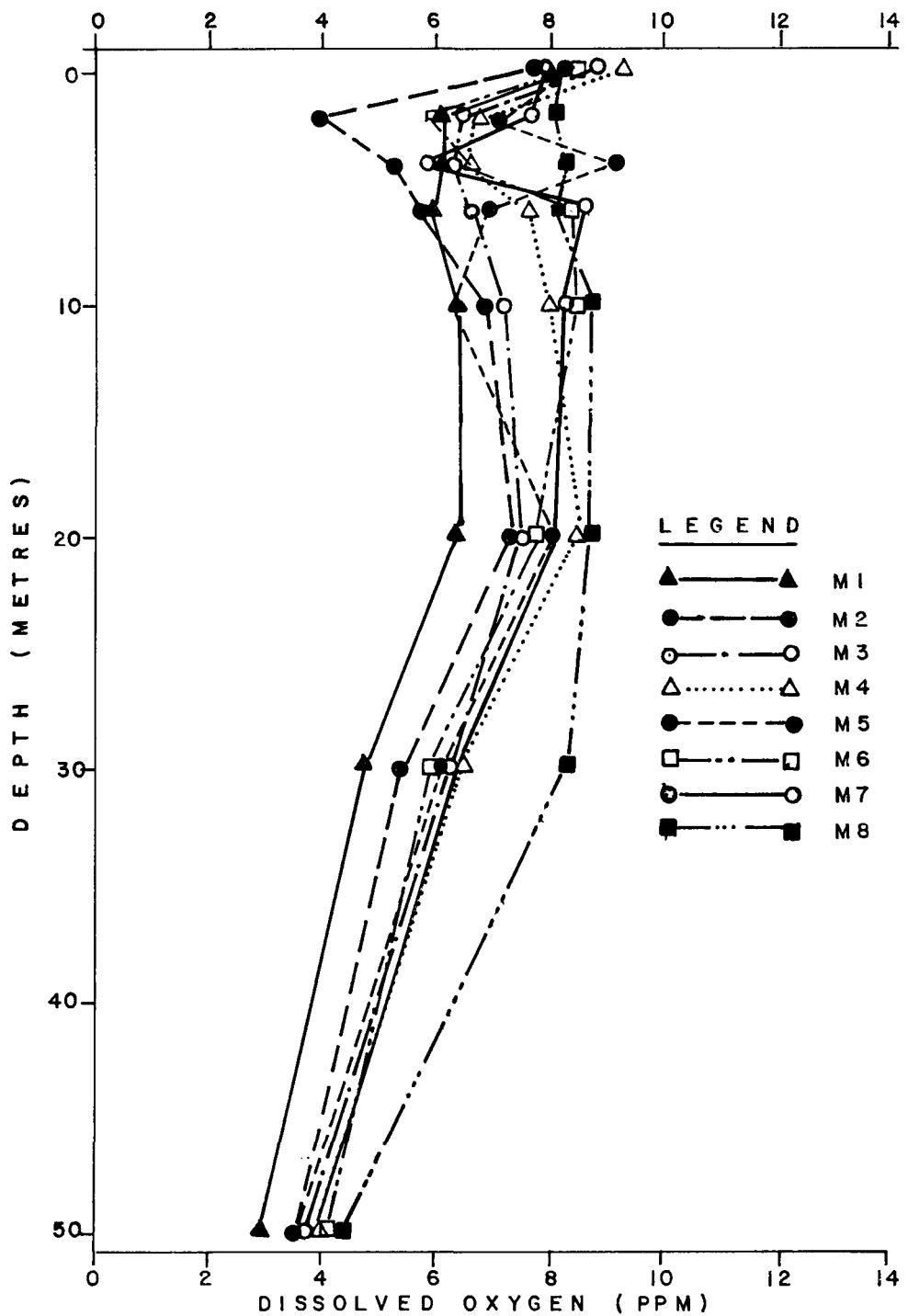


FIGURE II DISSOLVED OXYGEN PROFILES  
STATIONS M1 TO M8 - September 28, 1977

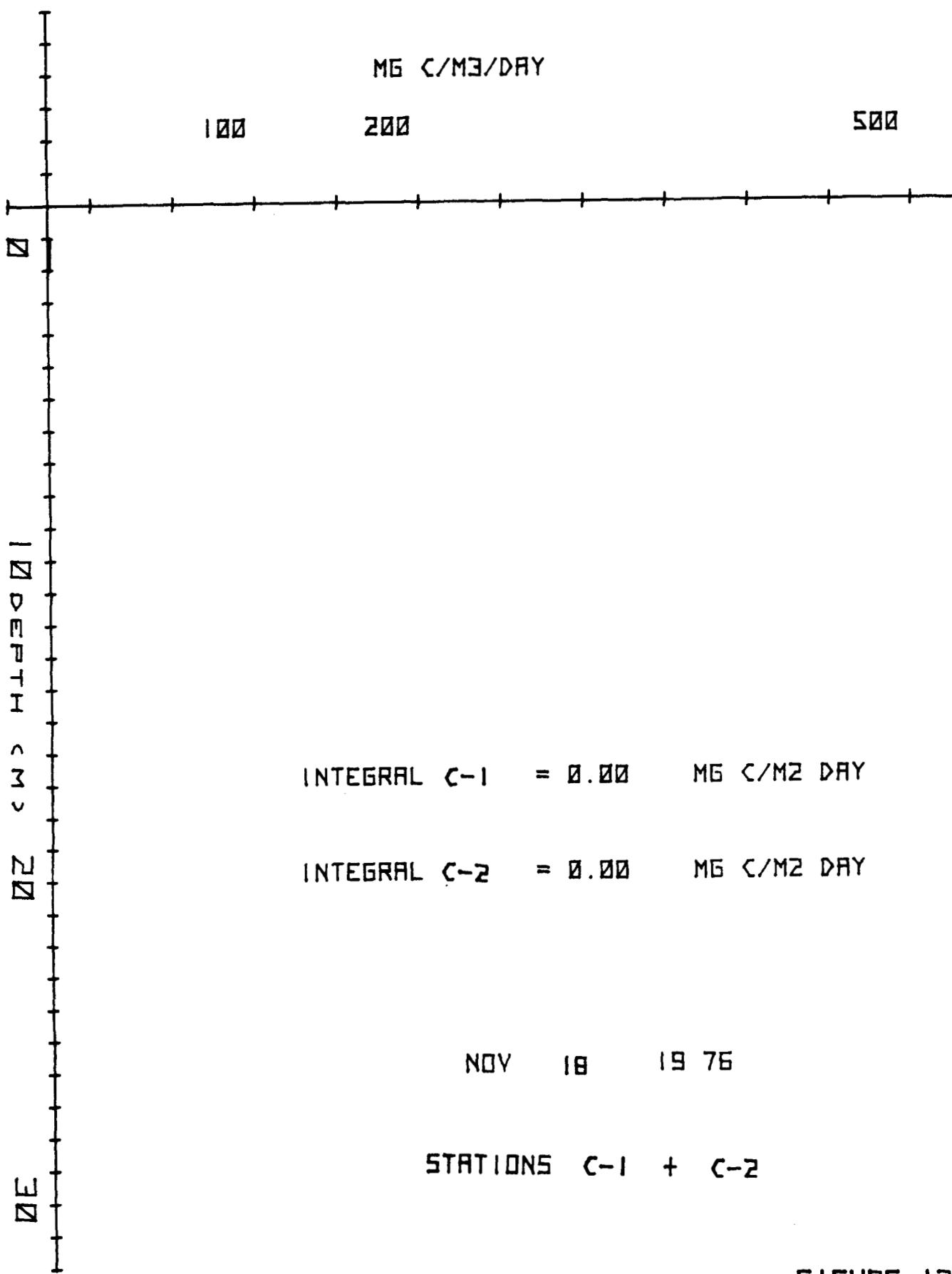


FIGURE 12

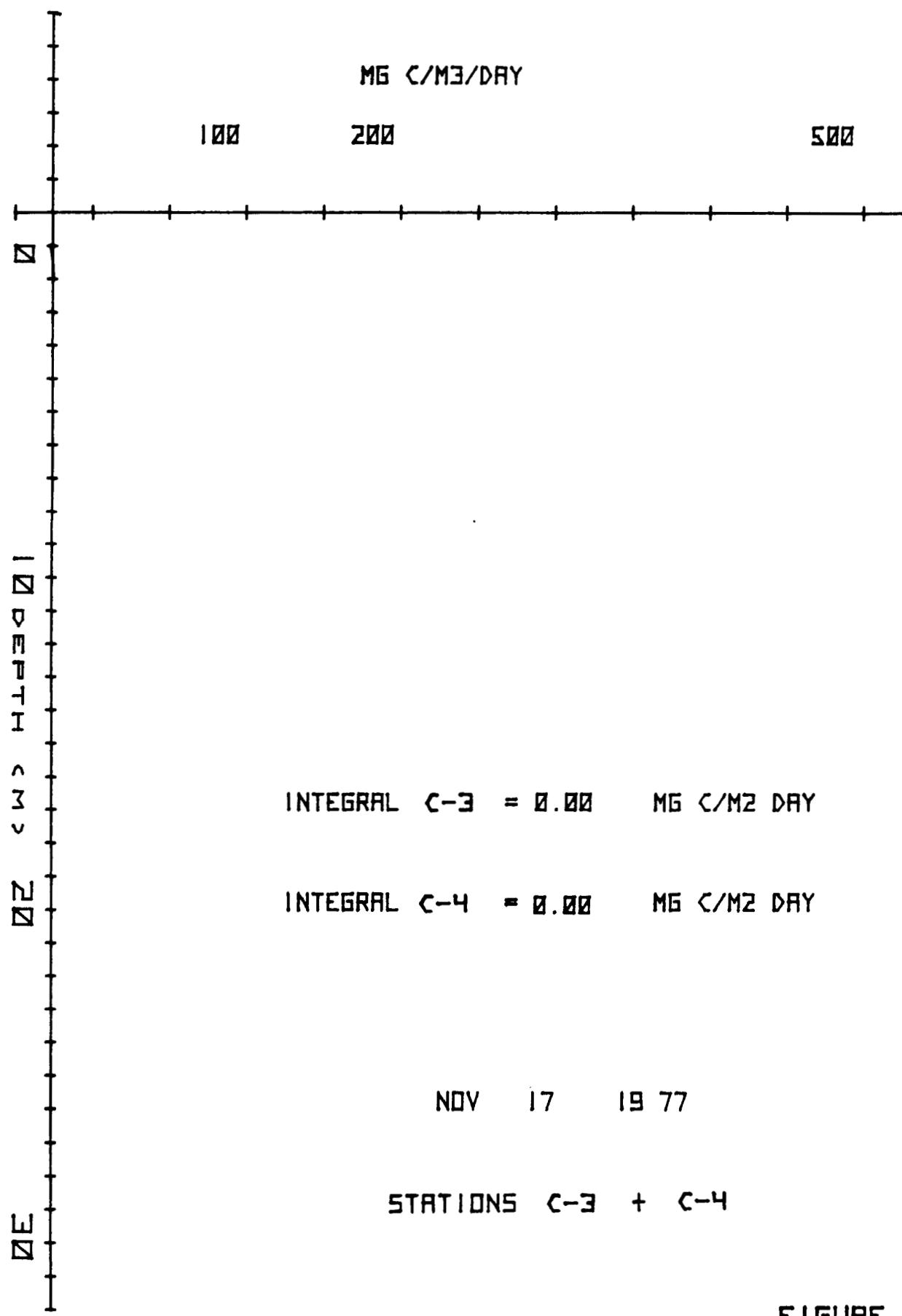


FIGURE 13

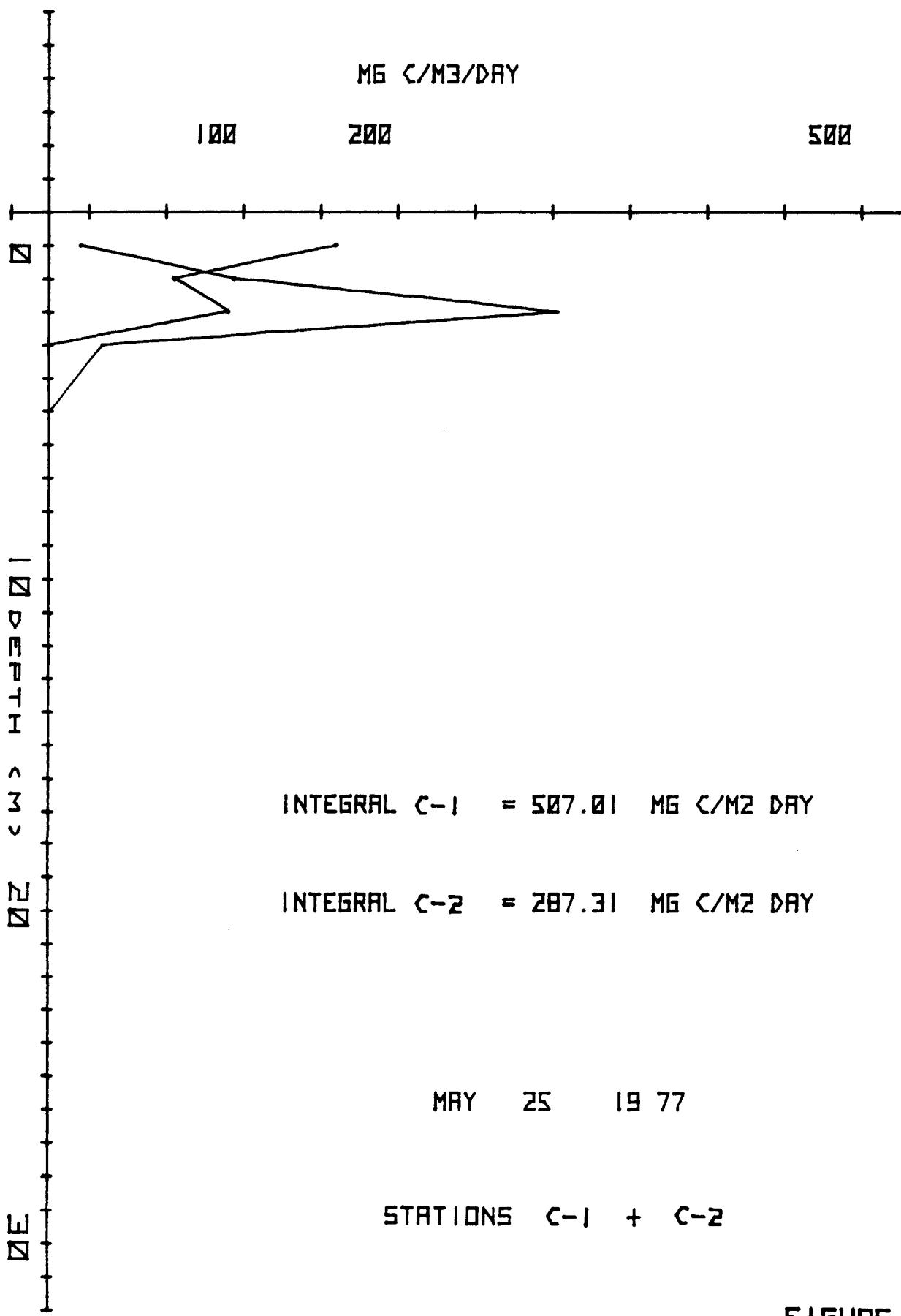


FIGURE 14

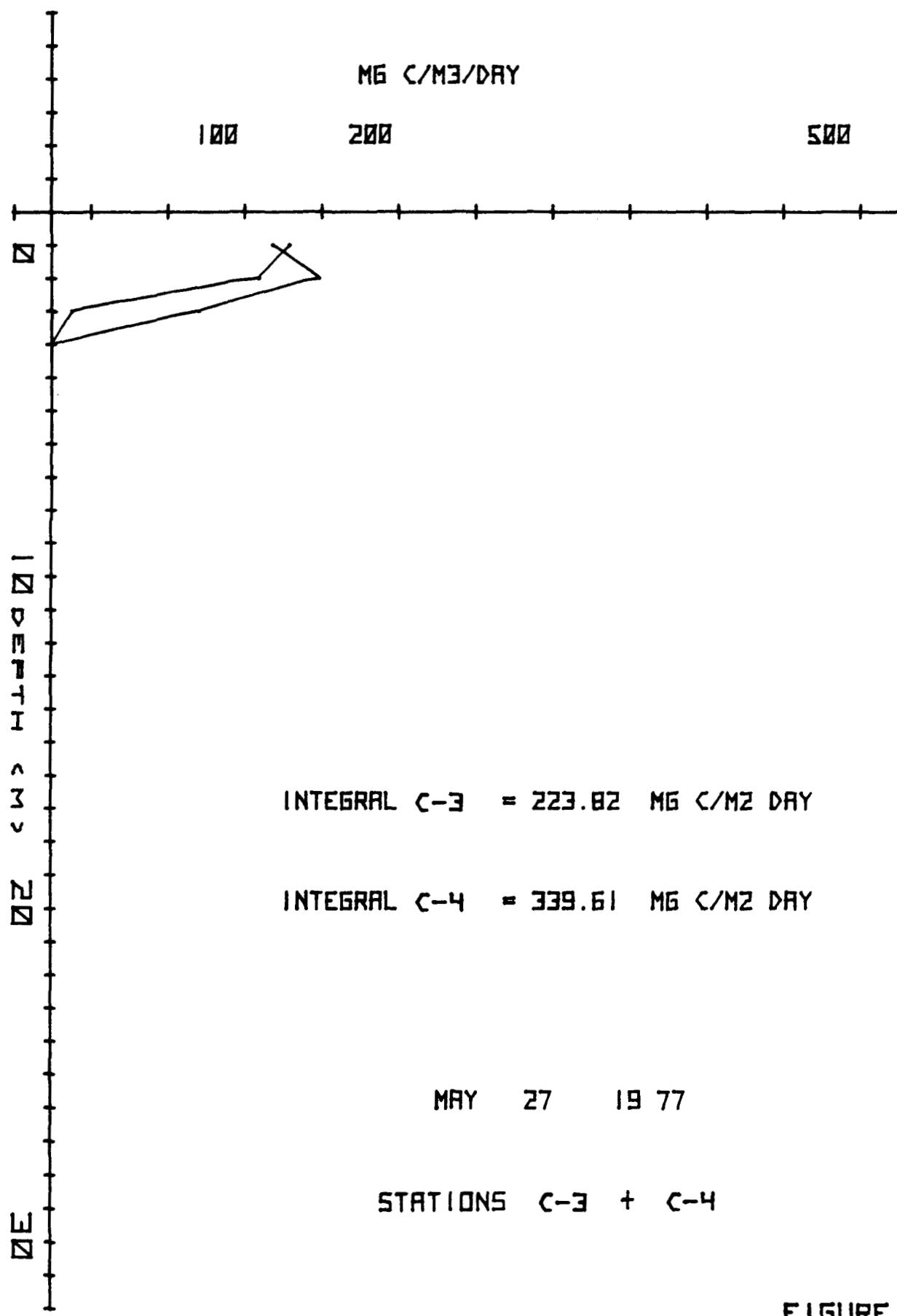


FIGURE 15

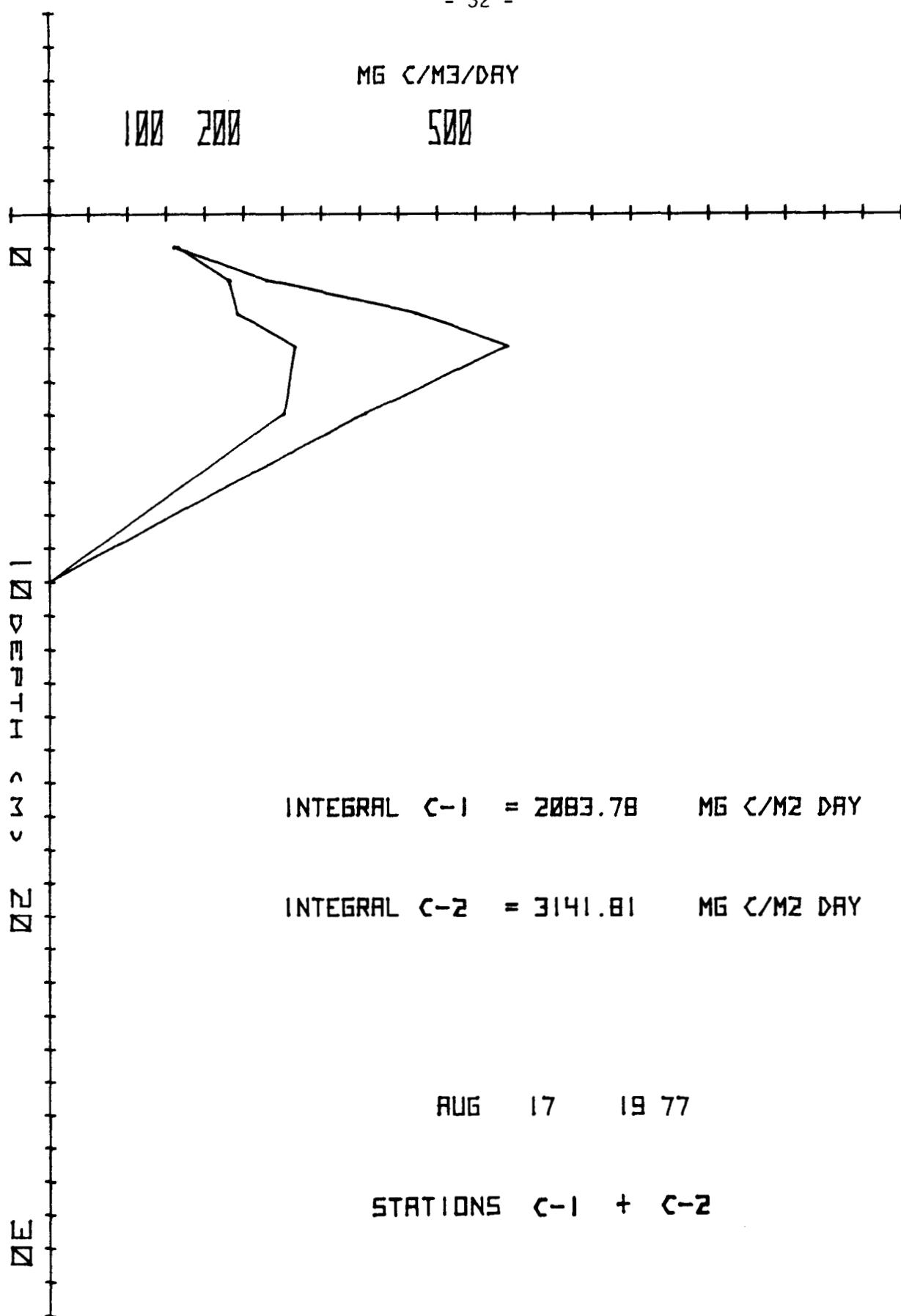
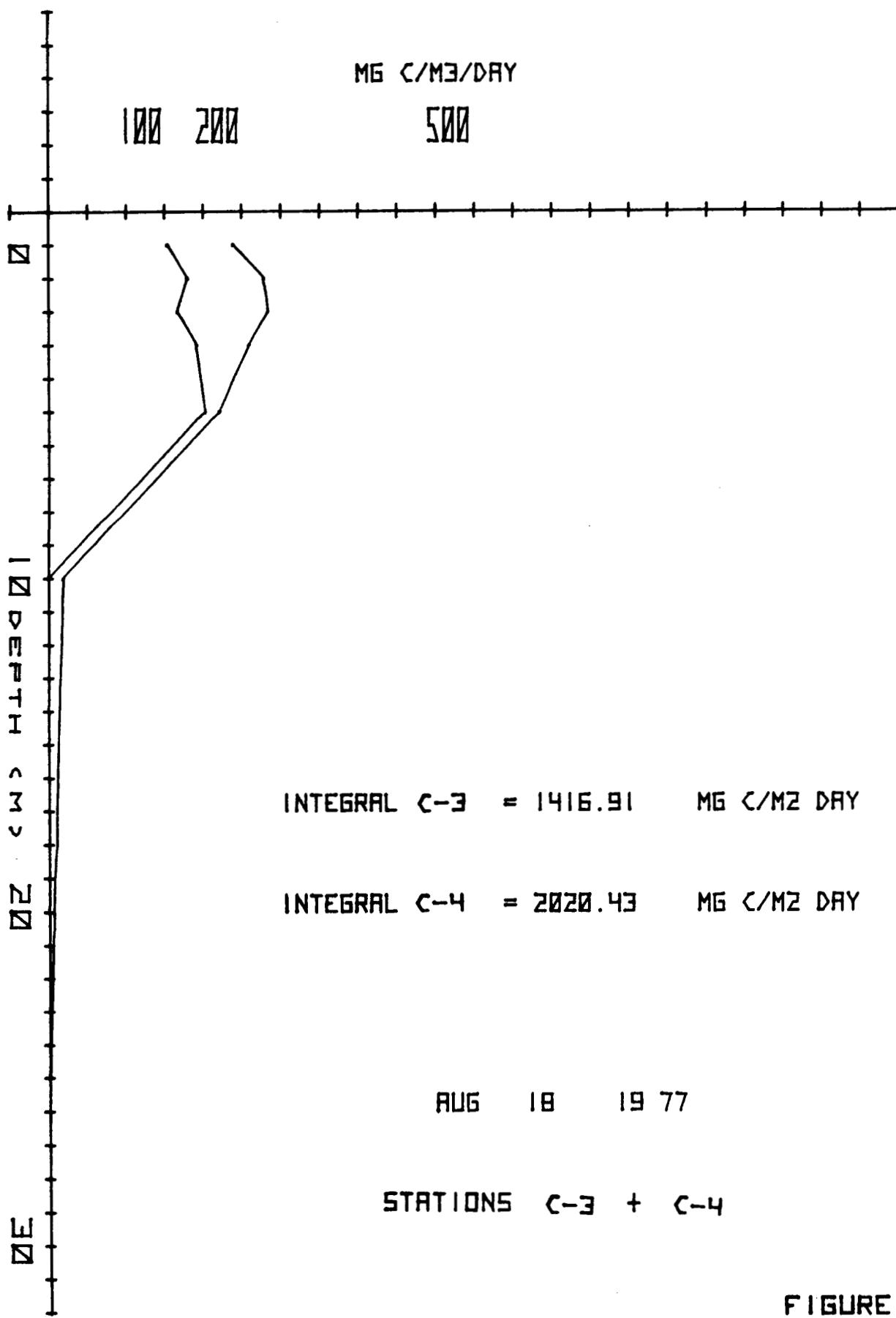


FIGURE 16



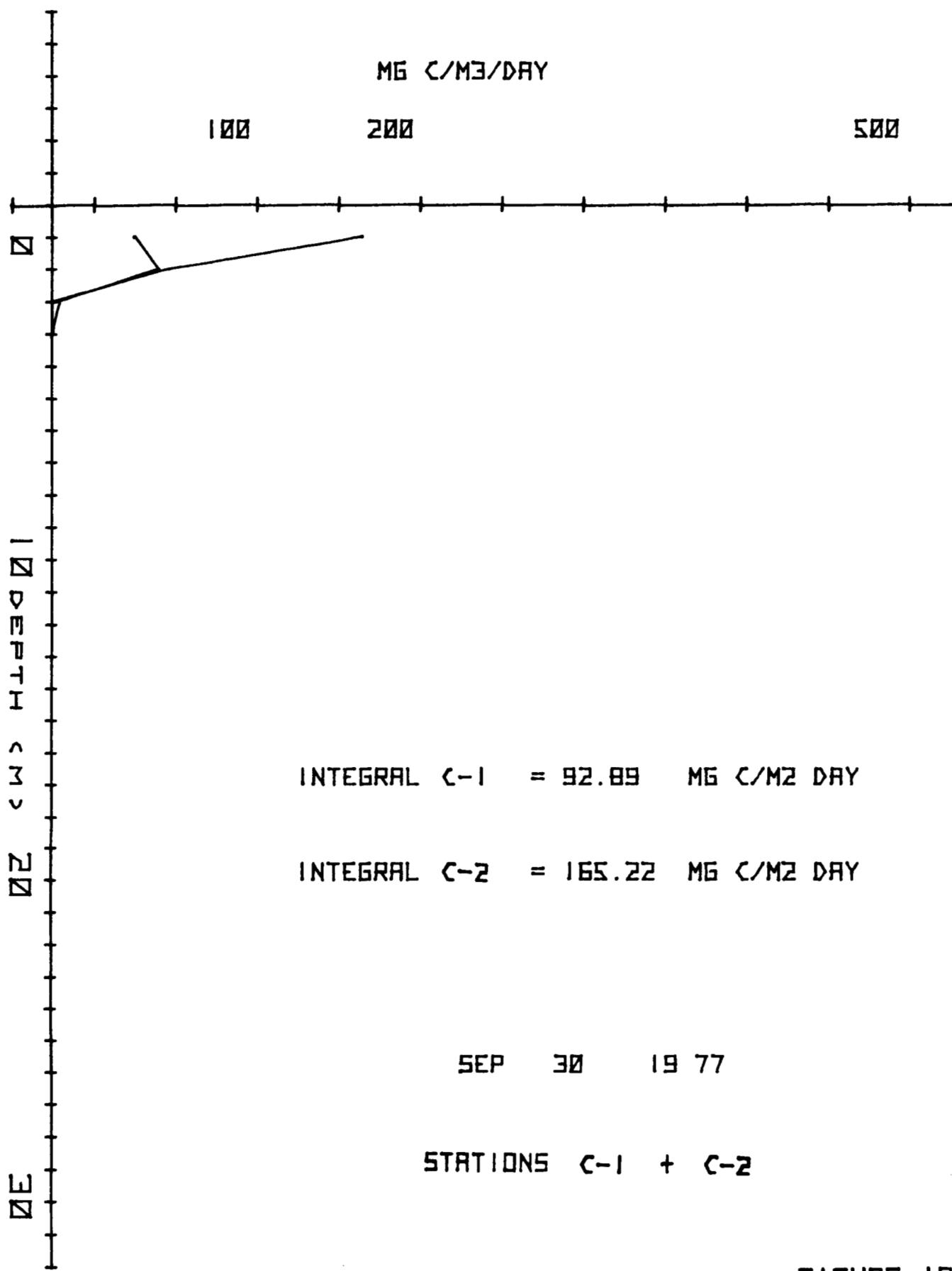
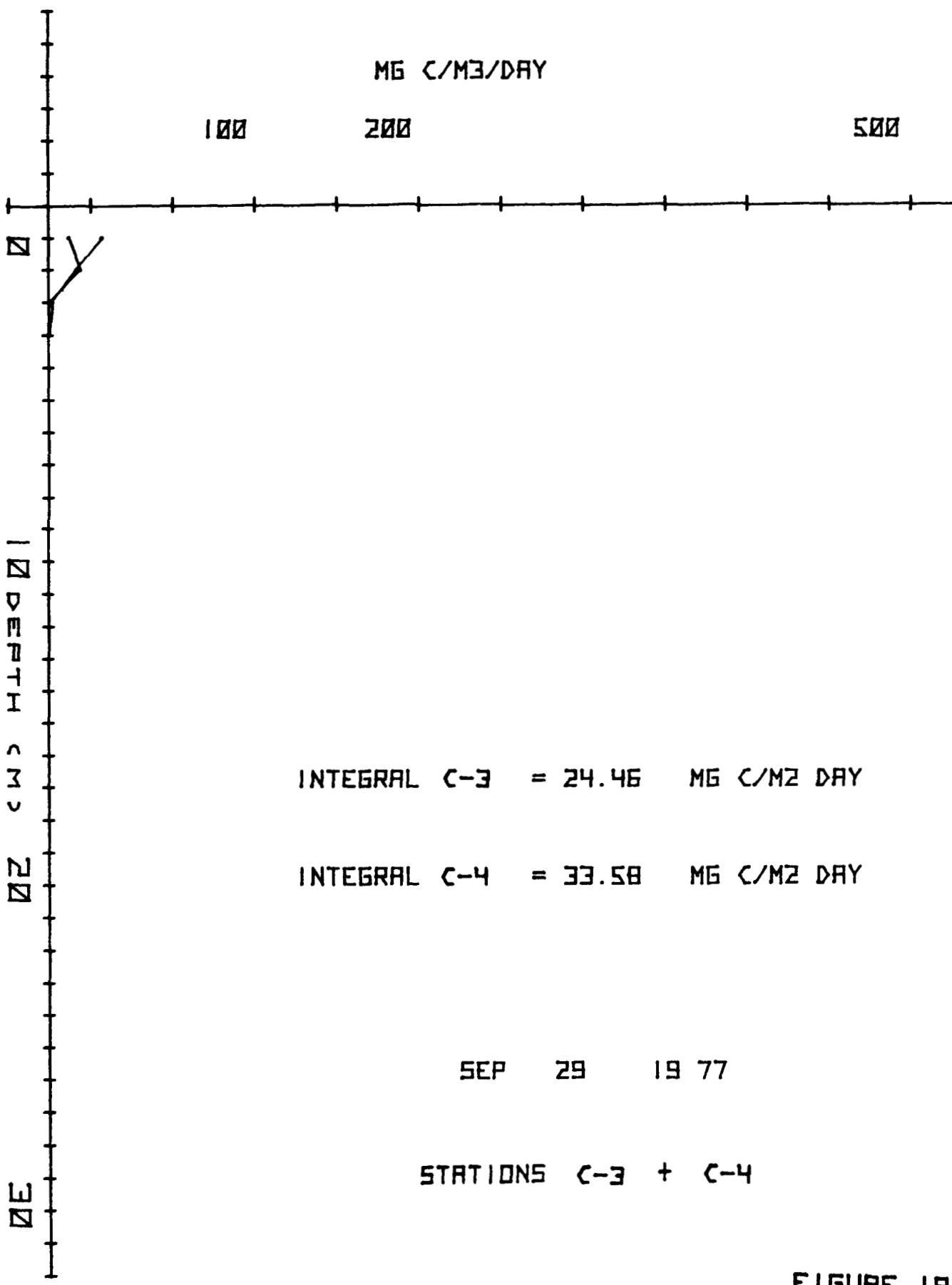


FIGURE 18



TABLES

TABLE 1 SEASONAL VARIATION IN TEMPERATURE (°C) - STATIONS C-1  
TO C-4, MUCHALAT INLET

Date	Station C-1				Station C-2			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 18/76	8.0	9.0	11.0	11.0	8.0	10.0	10.5	11.0
May 25/77	12.0	11.0	10.5	10.0	12.5	10.0	10.5	9.5
August 17/77	19.5	17.0	14.0	10.0	18.0	15.5	13.5	10.0
September 30/77	13.5	14.0	13.0	13.0	13.5	13.5	13.5	13.0

	Station C-3				Station C-4			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 17/76	9.5	10.0	10.5	11.0	9.5	10.0	10.0	11.0
May 27/77	10.0	10.5	10.5	9.0	10.5	10.5	10.5	9.5
August 18/77	18.0	17.5	14.0	10.5	16.0	16.0	14.5	10.5
September 29/77	13.5	13.5	13.0	12.5	13.5	13.5	13.5	12.5

TABLE 2 SEASONAL VARIATION IN SALINITY (‰) - STATIONS C-1  
TO C-4, MUCHALAT INLET

	Station C-1				Station C-2			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 18/76	4.96	12.92	28.79	30.78	3.22	22.80	29.41	30.77
May 25/77	9.09	28.19	30.26	31.22	12.57	30.22	30.26	30.00
August 17/77	24.57	24.62	28.96	31.45	25.65	28.28	29.17	31.83
September 30/77	22.55	29.07	30.37	31.17	23.63	29.21	30.54	31.21

	Station C-3				Station C-4			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 17/76	9.95	16.80	24.95	30.88	13.70	17.07	26.10	30.71
May 27/77	13.35	28.02	29.52	30.00	15.00	29.12	29.97	31.12
August 18/77	26.61	26.91	29.15	31.89	28.15	28.41	29.17	31.91
September 29/77	23.85	29.85	30.65	31.32	26.27	28.86	30.50	31.19

TABLE 3 DISSOLVED OXYGEN (ppm) - STATIONS C-1 TO C-4, MUCHALAT INLET

Date		Station C-1				Station C-2			
		1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November	18/76	11.1	9.4	6.4	5.1	10.9	8.2	7.0	5.5
May	25/77	9.6	6.3	6.9	7.7	9.7	5.8	7.5	7.3
August	17/77	9.5	10.5	8.6	5.4	10.8	10.3	8.1	5.0
September	30/77	7.6	5.8	6.3	7.0	7.6	6.2	6.4	7.7

		Station C-3				Station C-4			
		1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November	17/76	10.0	9.0	7.7	6.5	9.5	9.2	8.1	6.9
May	27/77	4.6	6.7	7.2	6.7	9.3	8.3	8.3	7.7
August	18/77	9.6	9.6	9.6	6.1	9.9	10.3	9.4	6.2
September	29/77	7.8	6.2	5.5	7.5	8.1	9.0	8.0	8.3

TABLE 4 PERCENT SATURATION OF DISSOLVED OXYGEN - STATIONS C-1 TO C-4, MUCHALAT INLET

		Station C-1				Station C-2			
		1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November	18/76	99.7	90.6	71.4	57.7	97.0	86.0	77.6	62.2
May	25/77	96.9	70.4	76.9	83.7	101.0	63.9	83.6	79.4
August	17/77	122.8	132.0	102.6	60.0	136.6	126.2	95.7	55.7
September	30/77	86.0	69.2	74.3	83.0	86.6	73.3	76.3	91.3

		Station C-3				Station C-4			
		1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November	17/76	95.8	90.9	82.9	73.6	93.1	93.1	86.8	78.0
May	27/77	45.5	73.6	79.8	72.0	94.0	91.8	92.3	84.3
August	18/77	122.2	121.3	114.6	68.7	122.4	127.6	113.5	69.9
September	29/77	89.0	73.6	64.9	88.0	93.9	106.1	95.4	97.3

TABLE 5 MEAN EXTINCTION COEFFICIENTS (k) AND SECCHI DEPTH (m)  
STATIONS C-1 TO C-4, MUCHALAT INLET

Date	Station C-1		Station C-2	
	Extinction Coefficient	Secchi Disc	Extinction Coefficient	Secchi Disc
November 18/76	2.7501	1.3	2.6428	1.0
May 25/77	1.7110	4.5	1.3436	4.5
August 17/77	1.2337	6.5	1.1309	6.5
September 30/77	1.8150	6.0	1.7142	4.0

	Station C-3		Station C-4	
	Extinction Coefficient	Secchi Disc	Extinction Coefficient	Secchi Disc
November 17/76	2.6625	2.0	2.1451	2.0
May 27/77	1.4277	5.0	1.4277	6.0
August 18/77	1.7110	5.5	1.1212	6.0
September 29/77	1.8341	6.0	2.4792	6.0

TABLE 6 pH MEASUREMENTS - STATIONS C-1 TO C-4, MUCHALAT INLET

	Station C-1				Station C-2			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 18/76	7.30	7.70	7.70	7.70	7.20	7.80	7.80	7.80
May 25/77	7.41	7.56	7.68	7.78	7.59	7.61	7.72	7.79
August 17/77	7.94	7.99	7.76	7.64	7.95	7.90	7.61	7.69
September 30/77	7.71	7.73	7.73	7.86	7.76	7.66	7.70	7.92

	Station C-3				Station C-4			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 17/76	7.50	7.70	7.80	7.80	7.60	7.50	7.70	7.80
May 27/77	7.56	7.73	7.80	7.80	7.67	7.89	7.90	7.86
August 18/77	8.01	7.93	7.76	7.66	7.86	7.82	7.78	7.46
September 29/77	7.75	7.74	7.68	7.82	7.76	7.79	7.86	7.82

TABLE 7 SEASONAL VARIATION IN TOTAL CARBONATE CARBON (mgC/litre)  
STATIONS C-1 TO C-4, MUCHALAT INLET

Date	Station C-1				Station C-2			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 18/76	5244	10944	22572	24852	4332	18354	22458	24738
May 25/77	9758	22303	23733	24304	11283	23073	23193	24122
August 17/77	18799	21191	22587	24236	19691	21794	22952	23932
September 30/77	16899	22164	22959	23516	18698	21876	23077	24008

	Station C-3				Station C-4			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 17/76	9006	13680	19494	24738	11400	14022	20520	24738
May 27/77	12048	22022	22838	24214	13812	22344	23079	24278
August 18/77	20416	20701	22325	22959	21648	21762	22714	24675
September 29/77	18592	22952	23417	23932	20583	22050	23410	24028

TABLE 8 PERCENT ORGANIC CONTENT OF DRY SESTON - STATIONS C-1 TO C-4, MUCHALAT INLET

	Station C-1				Station C-2			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 18/76	25.4	25.4	44.0	57.1	35.6	41.0	65.4	66.7
May 25/77	0.0	0.0	50.0	0.0	50.0	0.0	0.0	0.0
August 17/77	48.8	34.3	45.9	55.3	47.2	45.1	48.9	67.6
September 30/77	25.0	0.0	100.0	0.0	0.0	100.0	33.3	50.0

	Station C-3				Station C-4			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 17/76	26.2	28.2	35.9	76.9	36.7	62.5	55.6	0.0
May 27/77	0.0	0.0	0.0	0.0	100.0	100.0	50.0	100.0
August 18/77	42.9	42.3	39.7	37.5	62.9	28.0	45.2	82.9
September 29/77	50.0	33.3	25.0	*	15.4	50.0	50.0	50.0

\* ANALYTICAL RESULT DOUBTFUL

TABLE 9 SEASONAL VARIATION IN SESTON (mg/litre) - STATIONS C-1 TO C-4, MUCHALAT INLET

Date	Station C-1				Station C-2			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 18/76	6.3	5.9	2.5	2.1	4.5	3.9	2.6	1.5
May 25/77	<1.0	<1.0	2.0	<1.0	2.0	<1.0	<1.0	<1.0
August 17/77	4.3	7.0	6.1	4.7	5.3	7.1	9.0	3.4
September 30/77	4.0	<1.0	<1.0	<1.0	<1.0	2.0	6.0	2.0

	Station C-3				Station C-4			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 17/76	6.5	3.9	3.9	1.3	3.0	1.6	1.8	<1.0
May 27/77	<1.0	<1.0	<1.0	<1.0	1.0	1.0	2.0	1.0
August 18/77	7.0	7.1	7.8	7.2	5.4	10.7	8.4	4.1
September 29/77	2.0	3.0	4.0	*	13.0	2.0	2.0	4.0

\* ANALYTICAL RESULT DOUTBFUL

TABLE 10 NITRATE MEASUREMENTS ( $\text{NO}_3^-$ ) (mgN/litre) - STATIONS C-1 TO C-4, MUCHALAT INLET

	Station C-1				Station C-2			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 18/76	0.05	0.09	0.15	0.21	0.05	0.16	0.22	0.22
May 25/77	0.014	0.034	0.046	0.082	0.018	0.075	0.078	0.086
August 17/77	0.026	0.025	0.008	0.29	<0.010	<0.010	0.078	0.29
September 30/77	0.059	0.056	0.055	0.10	0.025	0.058	0.083	0.086

	Station C-3				Station C-4			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 17/76	0.08	0.11	0.18	0.23	0.10	0.12	0.19	0.27
May 27/77	0.019	0.018	0.049	0.10	0.011	0.033	0.039	0.072
August 18/77	0.006	<0.010	<0.010	0.230	0.19	0.015	0.015	0.27
September 29/77	0.035	0.045	0.062	0.064	0.049	0.052	0.045	0.060

TABLE 11 TOTAL PHOSPHATE MEASUREMENTS ( $\text{TPO}_4$ ) (mgP/litre) -  
STATIONS C-1 TO C-4, MUCHALAT INLET

Date	Station C-1				Station C-2			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 18/76	0.018	0.031	0.057	0.068	< 0.010	0.044	0.062	0.062
May 25/77	0.014	0.037	0.040	0.045	0.015	0.047	0.041	0.047
August 17/77	0.026	0.030	0.050	0.070	0.030	0.041	0.057	0.071
September 30/77	0.038	0.049	0.048	0.045	0.037	0.053	0.052	0.042

	Station C-3				Station C-4			
	1 m	3 m	5 m	20 m	1 m	3 m	5 m	20 m
November 17/76	0.019	0.031	0.013	0.043	0.045	0.032	0.033	0.060
May 27/77	0.018	0.037	0.039	0.049	0.017	0.029	0.033	0.041
August 18/77	0.026	0.026	0.037	0.066	0.031	0.034	0.042	0.065
September 29/77	0.033	0.049	0.043	0.040	0.036	0.041	0.035	0.038

TABLE 12 SILICATE MEASUREMENTS ( $\text{SiO}_2$ ) (mgSi/litre) - STATIONS  
C-1 TO C-4, MUCHALAT INLET

TABLE 13 DAILY AREAL PRODUCTION ( $\text{mgC/m}^2/\text{day}$ ) - STATIONS C-1 TO C-4, MUCHALAT INLET

Date	Station C-1	Station C-2	Station C-3	Station C-4
November 1976	0.00	0.00	0.00	0.00
May 1977	507.01	287.31	223.82	339.61
August 1977	2083.78	3141.81	1416.91	2020.43
September 1977	92.89	165.22	24.46	33.58

TABLE 14 CHLOROPHYLL 'A' AND PHAEOPIGMENTS ( $\text{mg/m}^3$ ) - STATIONS C-1 TO C-4, MUCHALAT INLET

Date	Station C-1 Chlorophyll/phaeopigment			
	1 m	3 m	5 m	20 m
November 18/76	<.53/.53	<.53/.53	<.53/.53	<.53/.53
May 25/77	.88/.8	1.6 /1.37	<.8 /<.8	<.8 /<.8
August 17/77	1.3 /1.2	1.2 /1.8	4.5 /4.9	<.8 /<.8
September 30/77	2.0 /<.8	<1.6/<1.6	<.8 /1.8	-
Date	Station C-2 Chlorophyll/phaeopigment			
	1 m	3 m	5 m	20 m
November 18/76	<.53/.53	<.53/.53	<.53/.53	<.53/.53
May 25/77	<.8 /1.03	<.8 /<.8	<.8 /<.8	<.8 /<.8
August 17/77	<.8 /.85	3.2 /3.0	4.9 /5.9	<.8 /<.8
September 30/77	-	.96/<.8	<.8 /<.8	<.8 /<.8
Date	Station C-3 Chlorophyll/phaeopigment			
	1 m	3 m	5 m	20 m
November 17/76	<.53/.53	<.53/.53	<.53/.53	<.53/.53
May 27/77	<.8 /1.02	1.45/1.18	.8 /<.8	<.8 /<.8
August 18/77	3.3 /<.8	2.0 /1.4	4.9 /1.4	<.8 /1.0
September 29/77	<.8 /6.0	<.8 /1.4	<.8 /9.0	<.8 /2.8
Date	Station C-4 Chlorophyll/phaeopigment			
	1 m	3 m	5 m	20 m
November 17/76	<.53/.53	<.53/.53	<.53/.53	<.53/.53
May 27/77	<.8 /2.33	<.8 /1.39	<.8 /1.08	<.8 /<.8
August 18/77	3.8 /2.5	4.3 /3.1	3.4 /2.5	<.8 /1.0
September 29/77	<.8 /7.5	<.8 /3.3	<.9 /3.2	<.8 /2.1

TABLE 15 HEAVY METAL LEVELS IN *MYTILUS EDULIS* - STATIONS 1, 4, 5 AND 6 ( $\mu\text{g/g}$ )

	Cu		Fe		Zn		Pb		Cd		Mo		Hg	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Station 1	13.0	1.8	190	28	59.0	8.5	<1.0	<0.2	2.7	0.39	<15.0	<3.0	0.18	0.03
Station 4	11.0	1.4	140	17	61.0	7.7	<1.0	<0.2	2.6	0.32	<15.0	<3.0	-	-
Station 5	10.0	1.2	210	25	58.0	6.8	1.2	0.14	2.0	0.24	<15.0	<3.0	-	-
Station 6	21.0	5.6	280	74	98.0	26.0	2.2	0.59	3.9	1.0	<15.0	<3.0	-	-

TABLE 16 HEAVY METAL LEVELS IN *FUCUS* sp. - STATIONS 1, 4, 5 AND 6 ( $\mu\text{g/g}$ )

	Cu		Fe		Zn		Pb		Cd		Mo		Hg	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Station 1	7.2	1.6	84	19	42.0	9.5	1.4	0.33	2.1	0.48	<15.0	<3.0	-	-
	4.9	1.3	76	19	47.0	12.0	<1.0	<0.20	2.2	0.57	<15.0	<3.0	-	-
Station 4	7.2	1.6	90	19	50.0	11.0	<1.0	<0.20	1.6	0.35	<15.0	<3.0	-	-
	7.7	1.4	72	13	54.0	10.0	<1.0	<0.20	1.8	0.34	<15.0	<3.0	-	-
Station 5	5.6	1.5	81	21	59.0	15.0	<1.0	<0.20	2.2	0.58	<15.0	<3.0	0.10	0.03
Station 6	6.1	1.4	84	19	59.0	13.0	31.0	6.9	1.6	0.35	<15.0	<3.0	0.10	0.02

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEYS

- (a) 16 November, 1976
- (b) 12 March, 1977
- (c) 26 May, 1977
- (d) 17 August, 1977
- (e) 28 September, 1977

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(a) 16 November, 1976

Station : M-1

Date : 16 November, 1976

Time : 1427

Depth (m)	Temperature (°C)	Salinity °/oo	Dissolved oxygen (mg/l)	(% sat.)
0	9.0	7.02	10.2	94.9
2	11.0	29.19	5.8	64.9
4	11.0	30.06	5.6	63.1
6	11.0	30.25	5.1	57.9
10	11.0	30.53	4.7	53.3
15	11.0	30.78	4.9	55.4
20	11.0	30.80	5.0	56.6
30	10.5	31.07	4.2	47.2

Station : M-2

Date : 16 November, 1976

Time : 1340

Depth (m)	Temperature (°C)	Salinity °/oo	Dissolved oxygen (mg/l)	(% sat.)
0	8.5	7.19	10.1	92.9
2	10.5	29.49	6.8	75.6
4	11.0	29.95	6.3	70.9
6	11.0	30.29	5.7	64.4
10	11.0	30.61	5.4	61.1
15	11.0	30.78	4.8	54.4
20	11.0	31.01	4.9	55.6
30	10.5	31.53	4.7	52.9

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(a) 16 November, 1976

Station : M-3

Date : 16 November, 1976

Time : 1320

Depth (m)	Temperature (°C)	Salinity °/oo	Dissolved oxygen (mg/l)	(% sat.)
0	9.0	17.77	8.4	80.0
2	10.5	29.00	7.0	75.3
4	11.0	29.98	7.1	80.0
6	11.0	30.37	7.0	79.1
10	11.0	30.56	5.6	63.3
15	11.0	30.65	5.8	65.7
20	11.0	30.90	5.8	65.8
30	10.5	31.26	5.2	58.4

Station : M-4

Date : 16 November, 1976

Time : 1240

Depth (m)	Temperature (°C)	Salinity °/oo	Dissolved oxygen (mg/l)	(% sat.)
0	8.5	11.82	9.3	93.5
2	-	29.22	7.0	-
4	11.0	29.89	7.2	81.1
6	11.0	30.44	6.5	73.4
10	11.0	30.56	5.5	62.1
15	11.0	30.77	5.4	61.2
20	11.0	31.01	5.2	59.1
30	10.5	-	5.6	-

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(a) 16 November, 1976

Station : M-5

Date : 16 November, 1976

Time : 1220

Depth (m)	Temperature (°C)	Salinity (^o/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	9.0	17.87	9.0	89.6
2	10.5	29.00	6.1	67.6
4	11.0	30.02	3.9	43.9
6	11.0	30.27	6.0	67.8
10	11.0	30.56	5.8	65.5
15	11.0	30.80	5.5	62.3
20	11.0	31.01	6.2	70.3
30	11.0	31.34	5.5	62.5

Station : M-6

Date : 16 November, 1976

Time : 1120

Depth (m)	Temperature (°C)	Salinity (^o/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	9.0	18.48	8.9	88.8
2	10.5	28.52	7.5	78.1
4	11.0	30.25	6.6	74.6
6	11.0	30.38	6.9	77.9
10	11.0	30.65	6.4	72.5
15	11.0	30.80	6.4	72.5
20	11.0	30.90	6.5	73.7
30	11.0	31.24	5.3	60.2

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(a) 16 November, 1976

Station : M-7

Date : 16 November, 1976

Time : 1120

Depth (m)	Temperature (°C)	Salinity (^0/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	9.5	23.00	8.2	83.2
2	10.0	27.79	7.6	82.4
4	10.5	29.79	7.7	85.6
6	10.5	30.29	7.4	82.7
10	11.0	30.61	6.9	78.1
15	11.0	30.82	6.9	78.0
20	11.0	30.99	6.6	74.9
30	10.5	31.38	4.8	53.9

Station : M-8

Date : 16 November, 1976

Time : 1000

Depth (m)	Temperature (°C)	Salinity (^0/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	9.5	23.26	8.5	88.5
2	10.0	26.00	8.0	85.8
4	10.5	30.02	7.5	83.6
6	10.5	30.14	7.3	81.5
10	10.5	30.59	7.1	79.3
15	10.5	30.77	7.0	78.4
20	11.0	30.98	6.8	77.1
30	10.0	31.28	5.8	65.9

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(b) 12 March, 1977

Station : M-1

Date : 12 March, 1977

Time : 1830

Depth (m)	Temperature (°C)	Salinity (^o/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	5.0	2.9	12.0	98.9
2	7.6	25.9	7.6	76.9
6	6.5	29.3	6.5	65.5
10	8.9	29.5	6.5	69.5
20	9.4	30.1	6.7	72.7
50	9.3	31.4	4.1	44.8

Station : M-2

Date : 12 March, 1977

Time : 1900

Depth (m)	Temperature (°C)	Salinity (^o/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	4.6	4.8	11.5	94.8
2	8.1	25.8	8.3	84.9
6	8.5	29.0	7.9	83.4
10	8.3	29.5	6.4	67.5
20	8.9	29.9	6.8	72.8
50	9.1	31.3	5.4	58.7
180 (bottom)	7.8	32.6	1.2	12.7

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(b) 12 March, 1977

Station : M-3

Date : 12 March, 1977

Time : 1930

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	5.5	4.1	11.8	98.9
2	8.3	24.6	8.0	81.6
6	8.8	28.9	6.2	65.8
10	8.9	29.2	6.7	71.4
20	8.9	29.8	6.7	71.7
50	9.0	31.2	5.1	55.3

Station : M-4

Date : 12 March, 1977

Time : 2015

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	5.3	4.1	11.6	97.1
2	8.0	27.0	7.8	80.3
6	8.6	28.7	7.3	77.1
10	8.6	29.3	8.4	89.0
20	8.7	29.7	8.0	85.2
50	9.0	31.2	5.5	59.6
350 (Bottom)	7.7	32.8	0.1	1.1

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(b) 12 March, 1977

Station : M-5

Date : 12 March, 1977

Time : 2100

Depth (m)	Temperature (°C)	Salinity °/oo	Dissolved oxygen (mg/l)	(% sat.)
0	5.3	4.1	11.8	98.7
2	8.5	27.4	7.2	75.2
6	8.3	29.1	8.3	87.2
10	8.6	29.5	8.0	84.9
20	8.9	30.0	6.8	72.9
50	9.0	31.3	5.1	55.3
350 (Bottom)	7.6	32.9	0.2	2.1

Station : M-6

Date : 12 March, 1977

Time : 2130

Depth (m)	Temperature (°C)	Salinity °/oo	Dissolved oxygen (mg/l)	(% sat.)
0	6.2	7.6	9.9	86.4
2	8.1	25.6	8.3	84.8
6	8.5	29.0	8.0	84.4
10	5.3	29.2	8.2	80.1
20	5.9	29.8	8.2	81.6
50	6.0	31.2	6.5	65.4

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(b) 12 March, 1977

Station : M-7

Date : 12 March, 1977

Time : 2200

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	5.7	5.8	11.3	96.4
2	8.3	26.8	8.1	82.8
6	7.8	28.7	7.5	77.6
10	8.6	29.6	8.4	89.1
20	8.8	30.0	8.0	85.6
50	8.9	31.4	5.8	62.7

Station : M-8

Date : 12 March, 1977

Time : 1600

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	6.4	10.5	10.5	93.6
2	7.9	20.2	8.4	82.4
4	8.5	26.6	7.9	82.0
6	8.5	28.6	8.6	90.4
10	8.5	29.3	8.7	92.0
15	8.5	29.6	9.0	95.4
20	6.9	29.8	8.3	84.6
50	8.9	31.1	7.0	75.7
300 (Bottom)	7.3	32.8	0.8	8.4

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(c) 26 May, 1977

Station : M-1

Date : 26 May, 1977

Time : 1540

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	10.0	12.64	9.7	95.5
2	10.5	24.81	7.7	82.7
4	10.0	30.07	6.6	72.9
6	10.0	30.83	6.2	68.6
10	9.5	30.83	6.5	69.9
20	9.0	31.49	4.3	46.8
30	9.0	31.49	3.6	39.2
50	8.5	32.27	2.7	29.1

Station : M-2

Date : 26 May, 1977

Time : 1500

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	11.0	9.43	9.8	97.0
2	10.5	26.83	7.3	79.7
4	10.0	30.57	6.9	76.2
6	10.0	30.70	6.0	66.2
10	9.5	31.01	5.9	64.8
20	9.0	31.58	5.4	58.6
30	9.0	31.93	4.2	45.9
50	8.5	32.26	2.5	27.0
265 (off mill)	8.0	33.03	0.9	0.1

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(c) 26 May, 1977

Station : M-3

Date : 26 May, 1977

Time : 1460

Depth (m)	Temperature (°C)	Salinity (^o/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	10.0	9.39	10.0	96.6
2	10.5	29.25	6.5	72.2
4	10.0	30.53	6.4	70.7
6	9.5	30.74	6.0	65.5
10	9.5	31.02	7.0	76.9
20	9.0	31.52	5.5	59.9
30	8.5	31.97	4.2	45.4
50	8.5	32.24	2.0	21.6

Station : M-4

Date : 26 May, 1977

Time : 1400

Depth (m)	Temperature (°C)	Salinity (^o/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	10.0	9.21	9.7	93.7
2	10.0	29.29	6.2	68.1
4	10.0	30.57	5.9	65.1
6	9.5	30.78	6.2	67.7
10	9.5	30.99	6.2	67.7
20	9.0	31.54	5.5	59.7
30	8.5	31.95	4.3	46.4
50	8.5	32.26	3.0	32.4

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(c) 26 May, 1977

Station : M-5

Date : 26 May, 1977

Time : 1345

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	10.5	8.13	10.0	97.0
2	10.0	28.66	5.9	64.4
4	10.0	30.97	6.2	68.8
6	9.5	30.76	5.7	62.2
10	9.5	30.99	5.8	63.7
20	9.0	31.77	5.8	63.0
30	9.0	31.77	4.8	52.1
50	8.5	32.27	3.1	33.5

Station : M-6

Date : 26 May, 1977

Time : 1315

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	11.0	8.46	9.7	106.0
2	10.5	27.72	6.6	72.5
4	10.0	30.35	6.6	72.9
6	10.0	30.62	6.4	70.7
10	9.5	30.95	7.5	82.4
20	9.0	31.58	6.0	65.2
30	8.5	32.04	4.9	52.9
50	8.5	32.27	4.0	43.2

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(c) 26 May, 1977

Station : M-7

Date : 26 May, 1977

Time : 1240

Depth (m)	Temperature (°C)	Salinity (‰)	Dissolved oxygen (mg/l)	(% sat.)
0	11.0	8.07	-	-
2	10.0	27.38	7.4	80.0
4	10.0	30.30	7.1	78.4
6	10.0	30.70	8.1	89.5
10	9.5	30.93	4.7	52.2
20	9.0	31.37	6.8	73.9
30	9.0	31.93	5.0	54.6
50	8.5	32.70	4.3	46.7

Station : M-8

Date : 26 May, 1977

Time : 1200

Depth (m)	Temperature (°C)	Salinity (‰)	Dissolved oxygen (mg/l)	(% sat.)
0	10.5	8.50	10.0	97.5
2	11.0	23.10	7.0	75.2
4	10.0	30.43	7.6	83.9
6	10.0	30.79	7.3	81.1
10	9.5	30.98	7.7	84.6
20	9.0	31.47	6.8	73.9
30	8.5	31.87	5.5	59.1
50	9.5	32.20	4.6	50.8
280	8.0	32.27	0.8	0.1

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(d) 17 August, 1977

Station : M-1

Date : 17 August, 1977

Time : 0800

Depth (m)	Temperature (°C)	Salinity (‰)	Dissolved oxygen (mg/l)	(% sat.)
0	20.0	19.30	9.2	115.7
2	17.5	27.07	9.6	121.5
4	16.0	27.72	9.8	121.0
6	12.5	29.95	6.4	74.4
10	10.0	31.31	5.0	55.6
20	9.5	31.68	4.5	49.5
30	9.0	34.00	4.1	45.6
50	8.5	32.43	2.1	22.7
150	8.5	-	2.7	-

Station : M-2

Date : 17 August, 1977

Time : 0900

Depth (m)	Temperature (°C)	Salinity (‰)	Dissolved oxygen (mg/l)	(% sat.)
0	20.0	21.33	9.6	122.3
2	18.0	28.00	10.5	134.6
4	16.0	-	9.6	-
6	14.0	29.08	8.2	97.6
10	11.0	31.37	5.7	64.8
20	10.0	31.50	4.6	51.4
30	10.0	30.97	5.0	55.2
50	9.0	32.20	2.5	27.8
300	8.5	32.78	1.2	13.1

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(d) 17 August, 1977

Station : M-3

Date : 17 August, 1977

Time : 1020

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	20.5	22.23	9.4	122.1
2	18.0	26.30	11.0	140.1
4	16.0	28.13	10.4	128.4
6	13.0	30.14	7.5	88.2
10	10.5	31.33	5.4	60.7
20	10.0	31.45	5.4	60.0
30	9.5	32.00	4.5	49.7
50	9.0	32.33	2.9	31.7
330	8.5	32.62	0.8	8.6

Station : M-4

Date : 17 August, 1977

Time : 1100

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	22.0	21.77	9.8	129.8
2	17.0	26.87	11.0	137.5
4	14.5	-	8.7	-
6	11.0	30.79	7.0	79.1
10	10.5	31.47	6.3	70.8
20	9.5	31.81	5.7	62.6
30	9.0	32.10	5.0	54.6
50	8.5	32.37	4.1	44.3
348	8.5	32.97	1.1	12.0

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(d) 17 August, 1977

Station : M-5

Date : 17 August, 1977

Time : 1135

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	21.0	20.79	10.2	131.6
2	17.0	27.19	10.5	131.3
4	15.0	28.30	10.5	127.3
6	12.5	29.74	7.2	83.7
10	10.5	31.47	5.6	62.9
20	10.0	31.83	5.0	55.9
30	9.5	32.18	4.6	50.8
50	8.5	32.16	3.2	34.6
360	8.0	32.76	0.6	6.5

Station : M-6

Date : 17 August, 1977

Time : 1300

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	21.0	23.66	9.8	128.9
2	16.0	28.11	10.9	134.6
4	14.5	29.12	10.9	131.3
6	11.5	31.31	6.7	77.0
10	11.0	-	6.7	-
20	10.0	31.81	5.5	61.5
30	9.5	32.06	5.2	57.5
50	9.0	32.33	3.5	38.3
340	8.5	32.87	1.9	20.7

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(d) 17 August, 1977

Station : M-7

Date : 17 August, 1977

Time : 1340

Depth (m)	Temperature (°C)	Salinity (‰)	Dissolved oxygen (mg/l)	(% sat.)
0	20.0	25.00	10.0	130.7
2	18.0	-	10.1	-
4	15.0	29.23	10.0	122.0
6	12.5	-	7.6	-
10	11.5	31.45	-	-
20	10.0	31.93	5.9	65.9
30	9.5	32.10	5.1	56.4
50	9.0	32.37	3.6	39.6
360	8.5	32.83	1.1	12.0

Station : M-8

Date : 17 August, 1977

Time : 1425

Depth (m)	Temperature (°C)	Salinity (‰)	Dissolved oxygen (mg/l)	(% sat.)
0	19.0	26.21	10.0	129.0
2	17.0	27.56	10.5	131.3
4	14.5	-	9.5	-
6	12.0	31.14	7.9	91.9
10	12.0	31.66	7.8	90.7
20	11.0	31.91	6.4	73.1
30	9.0	32.20	5.0	54.6
50	8.5	32.39	4.5	48.6
320	8.0	32.95	1.5	16.1

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(e) 28 September, 1977

Station : M-1

Date : 28 September, 1977

Time : 1605

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	15.0	20.03	8.2	94.3
2	14.0	28.49	6.1	72.5
4	13.5	30.25	6.1	72.6
6	13.0	30.31	5.9	69.5
10	13.0	30.98	6.4	75.7
20	12.5	31.95	6.4	75.4
30	12.0	31.26	4.8	55.7
50	9.0	31.92	3.0	32.7
152	9.0	32.63	2.2	24.1

Station : M-2

Date : 28 September, 1977

Time : 1520

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	14.5	22.49	7.8	90.1
2	14.5	28.18	4.0	48.0
4	13.5	30.42	5.3	63.2
6	13.5	30.71	5.8	69.3
10	13.0	31.17	6.9	81.8
20	13.0	31.19	7.3	86.5
30	12.5	31.28	5.4	63.3
50	9.5	33.69	3.6	40.1
280	9.0	32.71	0.9	9.9

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(e) 28 September, 1977

Station : M-3

Date : 28 September, 1977

Time : 1505

Depth (m)	Temperature (°C)	Salinity (‰)	Dissolved oxygen (mg/l)	(% sat.)
0	14.0	8.75	9.4	98.8
2	14.0	29.22	6.8	81.2
4	13.0	30.61	6.6	77.9
6	13.0	30.77	6.6	78.0
10	13.0	30.98	7.2	85.2
20	13.0	31.17	7.5	88.9
30	12.5	31.32	6.3	73.9
50	9.5	31.99	3.6	39.7

Station : M-4

Date : 28 September, 1977

Time : 1445

Depth (m)	Temperature (°C)	Salinity (‰)	Dissolved oxygen (mg/l)	(% sat.)
0	15.5	20.54	8.9	103.7
2	13.5	29.41	6.5	76.9
4	13.5	31.55	6.4	76.9
6	13.5	30.73	7.6	90.8
10	13.0	31.01	8.0	94.7
20	13.0	31.19	8.5	100.7
30	12.5	31.32	6.4	75.1
50	9.0	32.01	3.7	40.3

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(e) 28 September, 1977

Station : M-5

Date : 28 September, 1977

Time : 1425

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	14.5	21.12	8.3	95.1
2	13.5	30.16	6.9	82.1
4	13.5	30.42	9.2	109.6
6	13.0	30.73	6.9	81.5
10	13.0	30.92	6.3	74.5
20	13.0	31.21	8.0	94.8
30	12.5	31.32	6.1	71.6
50	10.0	31.99	3.5	39.0

Station : M-6

Date : 28 September, 1977

Time : 1335

Depth (m)	Temperature (°C)	Salinity (°/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	15.0	20.96	8.4	97.1
2	14.0	28.96	6.0	71.6
4	13.5	30.75	6.5	77.6
6	13.5	30.92	8.3	99.2
10	13.0	31.01	8.5	100.6
20	13.0	31.22	7.8	92.5
30	12.0	31.36	6.0	69.7
50	9.5	31.90	4.0	44.1
270	9.0	32.68	2.3	25.1

APPENDIX I

MUCHALAT INLET WATER QUALITY SURVEY

(e) 28 September, 1977

Station : M-7

Date : 28 September, 1977

Time : 1255

Depth (m)	Temperature (°C)	Salinity (^o/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	14.5	23.37	7.9	91.8
2	14.0	29.24	7.7	92.0
4	13.5	30.44	5.8	69.1
6	13.5	30.80	8.5	101.6
10	13.5	31.00	8.3	99.3
20	13.0	31.28	8.1	96.1
30	12.5	31.45	6.4	75.2
50	10.0	31.92	3.9	43.5

Station : M-8

Date : 28 September, 1977

Time : 1220

Depth (m)	Temperature (°C)	Salinity (^o/oo)	Dissolved oxygen (mg/l)	(% sat.)
0	14.0	22.84	8.3	95.1
2	14.0	27.34	8.0	94.4
4	13.5	30.48	8.3	99.0
6	13.5	30.75	8.2	98.0
10	13.0	30.92	8.6	101.7
20	13.0	31.15	8.6	101.9
30	13.0	31.28	8.3	98.4
50	10.5	31.88	4.4	49.6

## APPENDIX II

### MUCHALAT INLET PHYTOPLANKTON STANDING CROP

- (a) 17-18 November, 1976
- (b) 25-27 May, 1977
- (c) 17-18 August, 1977
- (d) 20-30 September, 1977

## MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-1

November 1976

Data Expressed as Total Count/100 ml

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-1

November 1976

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	-	-	-	40	10	40	-	-
<i>Platycola</i> sp.	10	10	-	20	-	-	-	-
<i>Strombidium</i> spp.	10	-	-	-	10	130	20	-
<i>S. conicum</i>	50	50	40	110	20	-	30	-
<u>Tintinnidae</u>								
<i>Tintinnopsis</i> sp.	-	-	-	-	-	10	-	-
<u>Suctorria</u>								
<i>Trochiscia</i> sp.	-	-	-	-	-	-	10	-
<u>Miscellaneous</u>								
<i>Amphipod</i>	-	-	-	-	10	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-2

November 1976

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Achnanthes</i> sp.	-	-	30	-	-	-	-	-
<i>Amphora</i> sp.	10	-	-	-	10	-	-	-
<i>Cocconeis</i> sp.	-	-	-	-	-	-	-	10
<i>Cosinodiscus</i> spp.	-	-	10	-	10	10	-	10
<i>Grammatophora</i> sp.	-	10	-	-	-	-	-	-
<i>Leptocylindrus danicus</i>	-	-	80	-	-	-	-	-
<i>Licmophora</i> sp.	-	-	-	10	-	-	-	-
<i>Melosira</i> sp.	-	-	-	-	-	-	-	10
<i>Navicula distans</i>	-	-	-	-	-	-	10	-
<i>Nitzschia</i> spp.	40	70	40	30	40	-	-	-
<i>N. closterium</i>	-	10	-	20	30	-	10	20
<i>N. sigmoides</i>	20	20	-	10	-	-	-	10
<i>Skeletonema costatum</i>	-	-	-	170	-	-	-	-
<i>Striatella</i> spp.	20	-	-	-	-	-	10	-
<i>Synedra</i> sp.	-	-	10	-	-	-	-	-
<i>Thalassionema nitzschoides</i>	-	-	40	10	-	-	-	10
<i>Thalassiosira</i> spp.	-	-	10	10	20	-	10	10
Chrysophyceae	8900	14240	12460	8900	10680	3560	7120	7120
<u>Dinophyceae</u>								
<i>Ceratium fusus</i>	-	-	-	-	10	-	-	-
<i>Glenodinium</i> spp.	30	10	30	10	-	-	30	10
<i>Gymnodinium</i> spp.	-	10	-	-	10	-	20	30
<i>Peridinium</i> sp.	-	-	-	20	-	-	-	-
Cryptophyceae	1780	3560	1780	5340	10680	3560	3560	3560
<i>Rhodomonas</i> spp.	-	-	-	1780	16020	1780	1780	-
<u>Chlorophyta</u>								
Chlorophyceae								
<i>Ulothrix</i> sp.	-	-	120	-	-	-	-	-
<u>Cyanophyta</u>								
Cyanophyceae								
<i>Anabaena</i> sp.	20	-	-	-	-	-	-	-
<i>Dactylococcopsis</i> sp.	-	-	-	-	-	10	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-2

November 1976

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Silicoflagellata</u>								
<i>Ebria</i> sp.	-	-	-	-	-	-	-	10
<u>Radiolaria</u>								
Unidentified radiolarian	-	-	-	-	-	-	10	-
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	-	-	-	10	40	-	-	-
<i>Platycola</i> sp.	-	10	-	-	-	-	-	-
<i>Strombidium</i> spp.	-	-	-	10	-	-	20	10
<i>S. conicum</i>	30	10	40	60	40	10	30	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-3

November 1976

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Achnanthes</i> sp.	20	-	-	-	-	-	-	-
<i>Amphora</i> spp.	-	-	10	-	10	-	-	-
<i>Cocconeis</i> spp.	30	-	-	10	-	-	10	-
<i>Coscinodiscus</i> sp.	-	-	-	-	-	10	-	-
<i>Melosira</i> spp.	-	-	-	-	20	20	-	-
<i>Navicula</i> spp.	10	-	10	-	10	-	-	20
<i>N. distans</i>	10	-	-	-	-	-	-	-
<i>Nitzschia</i> spp.	90	50	10	30	10	10	10	30
<i>N. closterium</i>	-	-	-	10	20	10	10	10
<i>N. pacifica</i>	-	-	-	-	-	-	-	20
<i>N. sigmoides</i>	10	10	20	-	10	-	-	10
<i>Pinnularia</i> spp.	10	-	-	-	10	-	-	-
<i>Skeletonema costatum</i>	180	-	280	560	110	30	-	-
<i>Striatella</i> spp.	20	-	-	-	-	-	-	-
<i>Synedra</i> sp.	-	-	-	10	-	-	-	-
<i>Thalassionema nitzschoides</i>	-	-	-	-	-	-	20	10
<i>Thalassiosira</i> sp.	-	20	20	-	10	20	-	-
Chrysophyceae	7120	7120	14240	5340	16020	7120	5340	3560
Loricate chrysophycean	-	-	-	-	-	3560	1780	1780
<u>Dinophyceae</u>								
<i>Ceratium fusus</i>	-	-	-	-	-	-	10	-
<i>Glenodinium</i> spp.	40	50	10	10	10	50	50	30
<i>Gymnodinium</i> spp.	-	-	-	-	-	-	10	10
<i>Peridinium</i> spp.	-	-	10	-	10	10	-	-
Cryptophyceae	3560	1780	7120	1780	10680	3560	7120	-
<i>Rhodomonas</i> spp.	1780	5340	7120	3560	5340	7120	-	-
<u>Chlorophyta</u>								
Euglenophyceae								
<i>Euglena</i> spp.	-	-	10	10	-	10	-	-
<u>Cyanophyta</u>								
<i>Anabaena</i> spp.	70	-	-	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-3

November 1976

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<b>Ciliata</b>								
<i>Mesodinium rubrum</i>	10	-	20	10	20	-	-	-
<i>Strombidium spp.</i>	-	30	10	-	-	10	30	20
<i>S. conicum</i>	50	40	60	40	20	20	-	-
<b>Tintinnidae</b>								
<i>Tintinnopsis sp.</i>	10	-	10	-	-	-	-	-
<b>Miscellaneous</b>								
<i>Bacteria</i>	Present	-	-	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

November 1976

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Amphora</i> spp.	10	-	-	-	10	-	-	-
<i>Ceratoneis arcus</i>	10	-	-	-	-	-	-	-
<i>Cocconeis</i> spp.	10	-	10	20	20	-	20	-
<i>Coscinodiscus</i> sp.	-	-	-	-	-	-	10	-
<i>Fragilaria</i> sp.	-	-	-	-	-	-	-	10
<i>Melosira</i> spp.	10	-	10	-	-	-	-	-
<i>Navicula distans</i>	-	-	-	-	10	-	-	-
<i>Nitzschia</i> sp.	90	70	90	90	50	30	40	20
<i>N. closterium</i>	10	-	10	-	30	40	10	20
<i>N. sigmoides</i>	20	-	10	-	-	-	-	-
<i>Pleurosigma</i> sp.	-	-	-	-	-	10	-	-
<i>Skeletonema costatum</i>	40	210		620	440	-	-	-
<i>Stauroneis</i> sp.	10	-	-	-	-	-	-	-
<i>Synedra</i> spp.	-	-	-	10	10	-	-	-
<i>Thalassionema nitzschoides</i>	20	-	-	-	10	-	40	-
<i>Thalassiosira</i> spp.	20	-	20	20	10	-	-	20
Chrysophyceae	21360	10680	5340	7120	14240	7120	1780	7120
Loricate chrysophycean	-	-	-	-	1780	5340	-	-
<u>Dinophyceae</u>								
<i>Ceratium fusus</i>	-	-	-	-	-	-	10	-
<i>Dinophysoid dinoflagellate</i>	-	-	-	-	-	-	10	-
<i>Glenodinium</i> spp.	50	20	-	10	40	70	50	30
<i>Gymnodinium</i> spp.	-	-	-	-	10	-	10	20
<i>Oxytoxum</i> sp.	-	-	-	-	-	-	-	10
<i>Peridinium</i> spp.	-	-	10	20	10	-	-	-
Cryptophyceae	1780	7120	5340	1780	12460	7120	1780	3560
<i>Rhodomonas</i> spp.	12460	23140	14240	3560	12460	1780	1780	-
<u>Chlorophyta</u>								
Euglenophyceae								
<i>Euglena</i> spp.	10	50	-	-	10	-	-	-
<u>Cyanophyta</u>								
Cyanophyceae								
<i>Anabaena</i> spp.	-	-	-	60	-	-	-	-
<i>Oscillatoria</i> spp.	-	-	-	170	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

November 1976

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Silicoflagellata</u>								
<i>Distephanus</i> sp.	-	-	10	-	-	-	-	-
<i>Ebria</i> sp.	-	-	-	10	-	-	-	10
<u>Radiolaria</u>								
<i>Lithomelissa</i> sp.	-	-	-	-	10	-	-	-
Unidentified radiolarian	-	-	-	-	10	-	-	-
<u>Ciliata</u>								
<i>Colpidium</i> sp.	-	10	-	-	-	-	-	-
<i>Mesodinium rubrum</i>	60	60	90	90	50	20	-	-
<i>Strombidium</i> spp.	10	-	10	-	30	10	-	-
<i>S. conicum</i>	30	40	-	60	110	80	10	10
<u>Suctorria</u>								
<i>Trochiscis</i> sp.	-	-	10	-	-	-	-	10
<u>Miscellaneous</u>								
<i>Amphipod</i>	-	-	-	-	10	-	-	-
Bacteria	Present	Present	Present	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-1

May 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Ceratoneis arcus</i>	10	30	-	-	-	-	-	-
<i>Chaetoceros spp.</i>	330	70	40	80	-	-	10	-
<i>Cocconeis sp.</i>	-	-	-	-	-	-	10	-
<i>Coscinodiscus sp.</i>	-	-	-	-	-	-	10	-
<i>Grammatophora sp.</i>	10	-	-	-	-	-	-	-
<i>Leptocylindrus danicus</i>	-	-	-	-	-	20	-	-
<i>Melosira sp.</i>	-	-	-	-	-	-	-	10
<i>Navicula spp.</i>	90	50	-	40	20	-	-	-
<i>Nitzschia spp.</i>	430	290	930	840	330	210	50	60
<i>N. closterium</i>	20	40	300	430	190	80	-	50
<i>N. pacifica</i>	-	-	160	200	-	10	-	-
<i>N. sigmoides</i>	40	40	10	-	-	10	-	-
<i>Pleurosigma sp.</i>	-	-	-	-	-	-	-	10
<i>Rhizosolenia delicatula</i>	-	-	-	-	10	-	-	-
<i>Skeletonema cosatum</i>	7220	18020	8930	4600	910	1280	590	580
<i>Synedra spp.</i>	10	10	20	-	-	-	-	-
<i>Thalassionema nitzschoides</i>	90	-	10	-	-	10	-	-
<i>Thalassiosira sp.</i>	40	50	360	420	90	170	140	30
Unidentified filament	1210	60	360	50	170	30	60	10
Chrysophyceae	17800	99680	402280	105020	505520	58740	8900	3560
Loricate chrysophycean	-	1780	3560	-	-	-	-	-
<u>Dinophyceae</u>								
<i>Amphidinium spp.</i>	-	10	120	10	10	-	-	-
<i>Dinophysis spp.</i>	-	-	30	20	-	-	-	-
<i>Glenodinium sp</i>	860	460	1870	1300	660	900	100	60
<i>Gymnodinium spp.</i>	10	10	-	-	-	-	10	-
<i>Peridinium spp.</i>	-	80	10	10	-	-	-	-
Cryptophyceae	1780	10680	24920	8900	17800	8900	1780	3560
<i>Rhodomonas spp.</i>	-	-	17800	-	1780	1780	-	-
<u>Chlorophyta</u>								
Chlorophyceae								
<i>Geminella sp.</i>	-	-	-	-	-	-	2650	-
<u>Euglenophyceae</u>								
<i>Euglena spp.</i>	-	100	20	20	10	20	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-1

May 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Cyanophyta</u>								
Cyanophyceae								
<i>Dactylococcopsis</i> sp.	-	-	-	-	-	10	10	-
<u>Silicoflagellata</u>								
<i>Distephanus</i> sp.	10	-	-	10	-	-	-	-
<u>Radiolaria</u>								
Unidentified radiolarian	-	-	-	-	-	-	-	10
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	-	-	50	-	-	10	-	-
<i>Strombidium</i> spp.	40	100	10	-	-	20	-	-
<i>S. conicum</i>	-	420	1230	260	300	130	-	30
<i>Wisteria</i> spp.	-	10	-	-	-	-	-	-
<u>Tintinnidae</u>								
<i>Tintinnopsis</i> sp.	-	-	-	-	-	10	-	20
<u>Suctorria</u>								
<i>Trochiscia</i> sp.	10	-	-	-	10	-	-	-
<i>T. ovata</i>	-	-	10	-	-	-	-	-
<u>Miscellaneous</u>								
Amphipod	-	-	10	-	10	-	-	-
Copepod	-	-	10	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-2

May 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Amphora</i> sp.	-	-	-	-	10	-	-	-
<i>Bacteriastrum</i> sp.	-	-	-	-	10	-	-	-
<i>Ceratoneis arcus</i>	-	10	-	-	-	-	-	-
<i>Chaetoceros</i> spp.	650	400	1600	40	20	-	-	-
<i>Cocconeis</i> spp.	30	-	-	10	-	-	-	10
<i>Cosinodiscus</i> sp.	-	-	-	-	-	-	-	20
<i>Melosira</i> spp.	40	-	20	-	-	-	-	30
<i>Navicula</i> spp.	30	10	-	20	-	-	-	-
<i>Nitzschia</i> spp.	250	240	760	370	310	240	260	80
<i>N. closterium</i>	-	10	140	150	30	20	10	20
<i>N. sigmoides</i>	-	30	10	-	10	-	-	10
<i>Pinnularia</i> spp.	-	20	10	-	-	-	-	-
<i>Rhizosolenia delicatula</i>	-	-	-	-	10	-	10	-
<i>Skeletonema costatum</i>	32310	15890	12070	1480	1370	580	420	460
<i>Thalassionema nitzschoides</i>	30	20	-	-	-	10	-	-
<i>Thalassiosira</i> spp.	10	30	70	300	200	110	70	20
<i>T. subtilis</i>	-	-	20	-	10	-	-	-
Unidentified filament	-	260	240	60	110	-	20	-
Chrysophyceae	32040	49840	254540	1847640	218160	72980	10680	10680
<u>Dinophyceae</u>								
<i>Amphidinium</i> spp.	-	40	120	-	20	10	-	-
<i>Cochlodinium</i> sp.	-	-	-	-	-	-	-	10
<i>Dinophysis</i> sp.	-	-	-	10	-	-	-	-
<i>Glenodinium</i> spp.	2960	1720	1400	500	290	240	80	80
<i>Gymnodinium</i> spp.	-	-	10	10	-	10	40	10
<i>Peridinium</i> spp.	-	50	10	-	10	-	-	-
Cryptophyceae	1780	14240	12460	19580	19580	7120	3560	1780
<i>Rhodomonas</i> sp.	-	1780	1780	1780	3560	1780	1790	-
<u>Chlorophyta</u>								
Chlorophyceae								
<i>Ulothrix</i> sp.	-	40	30	-	-	-	-	-
Unidentified biflagellate	-	3860	3200	240	50	10	-	-
Unidentified quadriflagellate	140	170	10	50	20	-	-	-
Euglenophyceae								
<i>Euglena</i> spp.	30	-	-	50	40	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-2

May 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Cyanophyta</u>								
Cyanophyceae								
<i>Dactylococcopsis</i> sp.	-	-	-	10	10	-	-	-
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	-	-	60	30	10	-	-	-
<i>Strombidium</i> spp.	10	100	60	-	270	60	-	-
<i>S. conicum</i>	60	400	1060	230	-	240	40	20
<i>S. strobilis</i>	40	10	-	-	-	-	-	-
<u>Tintinnidae</u>								
<i>Tintinnopsis</i> sp.	-	-	-	60	20	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-3

May 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Amphora</i> sp.	10	-	-	-	-	-	-	-
<i>Biddulphia</i> sp.	-	-	-	-	-	-	-	10
<i>Ceratoneis arcus</i>	10	10	-	-	-	-	-	-
<i>Chaetoceros</i> spp.	410	420	170	100	20	20	-	-
<i>Cocconeis</i> sp.	10	-	-	-	-	-	-	10
<i>Coscinodiscus</i> spp.	-	-	-	10	10	-	-	-
<i>Eunotia</i> sp.	-	-	-	10	-	-	-	-
<i>Grammatophora</i> sp.	20	-	-	-	-	-	-	-
<i>Leptocylindrus danicus</i>	40	-	-	-	10	-	-	-
<i>Navicula</i> spp.	10	50	10	10	10	-	-	-
<i>Nitzschia</i> spp.	290	400	570	680	1010	80	130	90
<i>N. closterium</i>	50	20	30	260	170	50	70	10
<i>N. pacifica</i>	60	-	40	40	40	-	-	-
<i>N. sigmoides</i>	10	-	-	-	-	-	-	-
<i>Rhizosolenia delicatula</i>	-	-	-	-	-	-	10	-
<i>Skeletonema costatum</i>	17340	19630	7120	720	800	640	160	440
<i>Synedra</i> spp.	30	40	70	20	20	10	10	-
<i>Thalassionema nitzschoides</i>	40	10	10	-	10	-	-	-
<i>Thalassiosira</i> spp.	30	40	70	260	450	70	70	60
Unidentified filament	60	30	310	140	40	340	-	-
Chrysophyceae	24920	53400	206480	156640	80100	16020	8900	3560
Lorate chrysophycean	1780	-	-	-	-	-	-	-
Dinophyceae								
<i>Amphidinium</i> spp.	20	90	70	20	60	-	-	-
<i>Cochlodinium</i> spp.	-	10	-	-	10	20	-	-
<i>Dinophysis</i> sp	-	-	-	30	-	-	-	-
<i>Glenodinium</i> spp.	1060	3950	5150	620	760	240	70	110
<i>Gymnodinium</i> spp.	30	60	-	10	10	10	-	-
<i>G. splendens</i>	-	-	-	-	-	-	-	10
<i>Peridinium</i> spp.	40	130	20	10	50	10	-	-
Cryptophyceae	21360	23140	78320	40940	49840	3560	7120	-
<i>Rhodomonas</i> spp.	8900	12460	72980	44500	39160	3560	1780	-
<u>Chlorophyta</u>								
Euglenophyceae								
<i>Euglena</i> sp.	130	90	360	130	80	-	10	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-3

May 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Silicoflagellata</u>								
<i>Distephanus</i> sp.	-	-	120	-	10	-	-	-
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	30	20	60	40	10	20	-	-
<i>Strombidium</i> spp.	30	150	-	-	-	10	30	-
<i>S. conicum</i>	440	1180	1590	470	510	250	60	30
Unidentified ciliate	10	10	10	-	50	-	-	-
<u>Tintinnidae</u>								
<i>Tintinnopsis</i> sp.	-	-	-	10	10	-	-	-
<u>Miscellaneous</u>								
<i>Amphipod</i>	-	-	10	10	20	-	-	-

## MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

May 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3*	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Achnanthes</i> sp.	-	10	-	-	-	-	-	-
<i>Asterionella</i> sp.	120	-	-	-	-	-	-	-
<i>Chaetoceros</i> spp.	1420	790	110	-	20	-	-	-
<i>Cocconeis</i> sp.	-	10	-	-	-	-	-	-
<i>Coscinodiscus</i> sp.	-	-	-	-	-	-	10	-
<i>Eunotia</i> sp.	-	-	10	-	-	-	-	-
<i>Melosira</i> sp.	-	10	-	-	-	-	-	-
<i>Navicula</i> spp.	40	50	-	-	-	-	-	-
<i>Nitzschia</i> spp.	110	120	30	20	90	30	70	20
<i>N. closterium</i>	30	-	-	-	20	10	20	-
<i>N. pacifica</i>	-	10	10	-	10	10	10	-
<i>Pleurosigma</i> sp.	-	-	-	-	-	-	-	10
<i>Skeletonema costatum</i>	9860	10370	250	20	570	50	180	140
<i>Striatella</i> sp.	10	-	10	-	-	-	-	-
<i>Synedra</i> sp.	10	10	-	-	-	-	-	-
<i>Thalassionema nitzschoides</i>	-	-	-	-	10	-	10	-
<i>Thalassiosira</i> spp.	40	20	10	10	50	50	40	30
Unidentified filament	1170	990	170	-	-	280	90	30
Chrysophyceae	19580	51620	33820	10680	37380	8900	5340	7120
Dinophyceae								
<i>Amphidinium</i> sp.	-	10	-	-	-	-	-	-
<i>Cochlodinium</i> sp.	-	10	-	-	-	-	-	-
<i>Glenodinium</i> spp.	520	1160	60	20	110	40	20	50
<i>Gymnodinium</i> sp.	-	10	-	-	-	-	-	-
<i>Peridinium</i> sp.	60	100	-	-	10	-	-	-
Cryptophyceae	3560	19580	24920	5340	16020	8900	1780	3560
<i>Rhodomonas</i> spp.	3560	21360	32040	-	14240	5340	-	-
<u>Chlorophyta</u>								
Euglenophyceae								
<i>Euglena</i> spp.	-	20	20	20	-	-	-	-
<u>Silicoflagellata</u>								
<i>Ebria</i> sp.	10	10	10	-	10	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

May 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3 *	5	10	20	30
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	10	10	-	-	-	-	-	-
<i>Strombidium spp.</i>	40	10	-	-	10	-	-	-
<i>S. conicum</i>	350	390	50	-	110	60	10	20
<u>Suctorria</u>								
<i>Trochiscia spp.</i>	20	30	-	-	-	-	10	-
<u>Miscellaneous</u>								
<i>Amphipod</i>	-	-	-	10	-	-	-	-
<i>Copepod</i>	-	-	10	10	10	-	-	-

\* 3 Metre Sample

Considerable amount of granular material; particles of various sizes.

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-1

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Amphiprora</i> sp.	-	-	-	-	10	-	-	-
<i>Amphora</i> sp.	-	-	10	-	-	-	-	-
<i>Asterionella</i> sp.	-	-	-	10	-	-	-	-
<i>Asteromphalus</i> spp.	-	-	10	30	30	30	-	-
<i>Biddulphia alterans</i>	10	-	-	20	30	-	-	-
<i>B. longicurvis</i>	10	-	-	20	630	-	-	-
<i>Chaetoceros</i> spp.	-	40	130	590	1060	290	120	150
Resting spore of <i>C.</i> spp.	-	10	10	60	90	50	10	20
<i>Coccconeis</i> sp.	10	-	-	-	-	-	-	-
<i>Coscinodiscus</i> spp.	-	20	20	40	220	50	-	-
<i>Ditylum</i> sp.	80	740	1170	1080	980	520	130	10
<i>Leptocylindrus danicus</i>	-	-	-	210	5110	140	-	-
<i>Melosira</i> sp.	20	-	-	-	-	-	-	-
<i>Navicula</i> spp.	30	30	20	10	-	10	50	-
<i>Nitzschia</i> spp.	40	40	160	390	320	140	60	20
<i>N. closterium</i>	-	-	-	-	60	160	20	10
<i>N. pacifica</i>	10	20	70	110	4720	1910	1000	80
<i>N. sigmoides</i>	10	30	10	-	-	-	-	-
<i>Pleurosigma</i> sp.	-	-	-	-	10	-	-	-
<i>Rhizosolenia</i> spp.	-	-	20	30	140	170	90	60
<i>Skeletonema costatum</i>	1990	3730	4200	8070	5520	10800	4920	1180
<i>Stephanopyxis</i> sp.	-	-	-	-	20	-	-	-
<i>Synedra</i> spp.	-	-	-	10	50	20	-	-
<i>Thalassionema nitzschoides</i>	-	-	-	-	90	140	70	10
<i>Thalassiosira</i> spp.	20	100	160	490	2630	150	130	80
<i>T. subtilis</i>	-	40	10	-	30	-	-	-
Unidentified filament	90	610	700	380	30	160	40	-
Chrysophyceae	23140	19580	30260	17800	72980	8900	12460	5340
<u>Dinophyceae</u>								
<i>Dinophysis</i> spp.	-	-	-	50	-	-	-	-
<i>D. parva</i>	10	-	-	-	-	-	-	-
<i>Glenodinium</i> spp.	50	90	60	70	90	-	-	-
<i>Peridinium</i> spp.	-	80	-	350	-	10	-	-
<i>Prorocentrum</i> spp.	120	10	30	70	80	-	-	-
Cryptophyceae	135280	151300	133500	126380	30260	19580	19580	3560
<i>Rhodomonas</i> spp.	1780	-	-	-	1780	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-1

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Cyanophyta</u>								
Cyanophyceae								
<i>Dactylococcopsis sp.</i>	20	10	-	-	-	-	-	-
<u>Silicoflagellata</u>								
<i>Ebria sp.</i>	-	10	-	-	-	-	-	-
<u>Radiolaria</u>								
Unidentified radiolarian	-	-	-	-	-	-	10	-
<u>Ciliata</u>								
<i>Strombidium spp.</i>	20	-	20	30	40	-	-	-
<i>S. conicum</i>	10	40	40	10	-	60	20	30
<u>Suctorria</u>								
<i>Trochiscia spp.</i>	-	50	50	-	10	-	-	10
<u>Miscellaneous</u>								
<i>Amphipod</i>	-	-	-	10	-	-	-	-
<i>Copepod</i>	-	-	-	-	-	10	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-2

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
<u>Bacillariophyceae</u>								
<i>Amphiprora</i> sp.	-	-	-	-	10	-	10	-
<i>Amphora</i> spp.	30	-	-	-	-	10	-	-
<i>Asterionella</i> spp.	-	10	-	10	10	-	-	-
<i>Asteromphalus</i> spp.	-	-	10	-	-	20	-	-
<i>Biddulphia</i> sp.	-	-	-	-	-	10	-	-
<i>Biddulphia longicurvis</i>	-	20	170	70	330	-	-	-
<i>Ceratoneis arcus</i>	-	10	-	10	-	-	-	-
<i>Chaetoceros</i> sp.	470	330	110	130	250	570	20	50
Resting spore of <i>Chaetoceros</i> sp.	10	10	90	230	110	20	-	-
<i>Coscinodiscus</i> spp.	-	90	330	160	320	10	50	10
<i>Ditylum</i> spp.	470	890	810	850	1180	530	180	40
<i>Eucampia</i> sp.	-	-	-	-	-	10	-	-
<i>Leptocylindrus danicus</i>	70	290	210	480	1750	80	-	10
<i>Melosira</i> spp.	40	-	-	-	40	-	-	-
<i>Navicula</i> spp.	-	40	10	30	-	20	10	-
<i>Nitzschia</i> spp.	70	270	580	250	260	350	150	20
<i>N. closterium</i>	-	10	20	30	100	40	30	-
<i>N. pacifica</i>	10	430	720	950	2230	1490	550	60
<i>N. sigmaoides</i>	-	-	10	-	-	-	-	-
<i>Rhizosolenia</i> spp.	10	200	190	420	450	220	220	70
<i>R. setigera</i>	-	-	10	-	10	-	-	-
<i>Skeletonema costatum</i>	7020	1560	7230	27350	12520	5530	980	410
<i>Stephanopyxis</i> sp.	-	-	-	20	-	-	-	-
<i>Synedra</i> spp.	30	60	50	80	90	30	30	-
<i>Thalassionema nitzschoides</i>	-	110	-	220	110	-	40	-
<i>Thalassiosira</i> spp.	30	300	200	600	1480	110	10	40
Unidentified filament	6940	3430	3240	1920	2280	260	160	80
Chrysophyceae	238520	199360	258100	316840	866860	80100	83660	56960
<u>Dinophyceae</u>								
<i>Dinophysis</i> spp.	-	10	-	40	110	20	-	-
<i>Glenodinium</i> spp.	180	900	610	1580	1370	170	70	10
onyaulacoid dinoflagellate	-	-	10	-	-	-	-	-
<i>Gymnodinium</i> spp.	-	-	-	40	-	-	-	-
<i>Oxytoxum</i> spp.	-	-	40	10	120	40	-	-
<i>Peridinium</i> spp.	10	240	20	260	180	-	-	-
<i>Prorocentrum</i> spp.	70	100	60	100	120	-	-	-
Cryptophyceae	85440	140620	199360	256320	322180	33820	7120	19580
<i>Rhodomonas</i> spp.	23140	10680	5340	10680	16020	1780	-	1780

## MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-2

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chlorophyta</u>								
Chlorophyceae								
<i>Cosmarium sp.</i>	10	-	-	-	-	-	-	-
Euglenophyceae								
<i>Euglena sp.</i>	-	-	10	-	-	-	-	-
Prasinophyceae								
Unidentified quadriflagellate	-	80	-	150	30	-	-	-
<u>Silicoflagellata</u>								
<i>Distephanus sp.</i>	-	-	-	-	10	-	-	-
<u>Radiolaria</u>								
Unidentified radiolarian	-	-	-	-	-	-	10	10
<u>Ciliata</u>								
<i>Strombidium spp.</i>	60	60	10	-	-	-	-	-
<i>S. conicum</i>	150	750	150	800	610	-	-	-
Tintinnidae								
<i>Salpingella sp.</i>	-	-	-	10	10	-	-	-
<u>Suctorria</u>								
<i>Trochiscia spp.</i>	-	40	-	10	-	-	-	-
<u>Miscellaneous</u>								
<i>Copepod</i>	-	-	10	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-3

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Actinoptychus</i> sp.	-	-	-	-	-	10	-	-
<i>Amphiprora</i> sp.	-	10	-	-	-	-	-	-
<i>Amphora</i> sp.	-	-	-	10	-	-	-	-
<i>Asterionella</i> spp.	70	20	-	60	10	-	-	-
<i>Asteromphalus</i> spp.	-	20	-	10	-	10	10	-
<i>Biddulphia aurita</i>	-	-	30	-	-	-	-	-
<i>B. longicruris</i>	10	10	20	140	10	-	-	-
<i>B. pulchella</i>	20	-	20	-	30	-	-	-
<i>Chaetoceros</i> spp.	330	500	130	460	400	310	230	90
Resting spore of <i>Chaetoceros</i> sp.	80	10	20	60	140	40	-	-
<i>Coscindiscus</i> spp.	90	120	10	50	350	-	90	-
<i>Ditylum</i> spp.	460	600	310	750	250	880	170	130
<i>Eucampia</i> spp.	-	-	40	-	-	60	2800	-
<i>Leptocylindrus danicus</i>	2180	1310	3020	1790	3860	350	110	20
<i>Melosira</i> sp.	-	-	-	-	-	-	20	-
<i>Navicula</i> spp.	20	30	-	-	10	-	30	10
<i>Nitzschia</i> spp.	150	130	60	270	240	180	110	20
<i>N. closterium</i>	30	230	160	130	90	220	200	10
<i>N. pacifica</i>	530	700	740	580	1260	1490	440	170
<i>N. sigmoides</i>	-	20	10	10	10	-	-	-
<i>Pleurosigma</i> sp.	-	-	-	-	10	-	-	-
<i>Rhizosolenia</i> spp.	230	280	250	340	260	230	30	90
<i>R. delicatula</i>	100	-	-	-	-	-	140	10
<i>R. setigera</i>	20	50	50	10	-	50	40	-
<i>Skeletonema costatum</i>	18190	20060	16650	13170	18020	10120	3080	2550
<i>Stephanopyxis</i> sp.	-	-	-	20	-	-	60	-
<i>Synedra</i> spp.	40	110	50	20	110	30	60	10
<i>Thalassionema nitzschoides</i>	60	30	10	60	120	100	120	10
<i>Thalassiosira</i> spp.	80	580	120	590	1210	360	90	160
Unidentified filament	3090	1620	14290	600	1700	1740	640	170
Chrysophyceae	151300	411180	78320	174120	316840	243540	124600	17800
Lorate chrysophycean	-	8900	-	7120	-	12460	12460	-
<u>Dinophyceae</u>								
<i>Amphidinium</i> spp.	10	-	-	70	40	-	-	-
<i>Ceratium</i> sp.	-	-	-	-	10	-	-	-
<i>Dinophysis</i> spp.	-	10	10	-	10	-	-	-
<i>Glenodinium</i> spp.	350	1030	260	1070	3480	260	70	-
<i>Gymnodinium</i> spp.	-	10	-	-	-	-	-	-
<i>Noctiluca</i> spp.	10	-	10	30	70	-	-	-
<i>Oxytoxum</i> spp.	-	10	-	10	60	-	-	-
<i>Peridinium</i> spp.	20	220	-	320	580	60	10	10
<i>Prorocentrum</i> spp.	-	130	10	180	150	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-3

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta (cont.)</u>								
Cryptophyceae	35600	51620	17800	46280	28480	32040	17800	5340
<i>Rhodomonas</i> sp	3560	3560	1780	10680	7120	1780	3560	-
<u>Chlorophyta</u>								
Euglenophyceae								
<i>Euglena</i> sp.	-	-	-	10	-	-	10	-
<u>Cyanophyta</u>								
Cyanophyceae								
<i>Anabaena</i> spp.	-	-	80	-	-	-	-	-
<i>Dactylococcopsis</i> spp.	-	30	-	20	-	-	-	-
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	-	-	-	-	-	-	10	-
<i>Strombidium</i> spp.	-	100	-	70	70	30	-	-
<i>S. conicum</i>	210	490	80	760	180	10	20	30
<i>S. Strobilis</i>	-	30	-	-	-	-	-	-
<i>Tiarina</i> sp.	-	-	-	-	-	20	20	-
<u>Tintinnidae</u>								
<i>Salpingella</i> sp.	-	-	-	10	-	-	-	-
<u>Suctorria</u>								
<i>Trochiscia</i> spp.	-	-	-	-	70	-	10	-
<u>Miscellaneous</u>								
Amphipod	-	-	-	10	-	-	10	-

## MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
<u>Bacillariophyceae</u>								
<i>Amphiprora</i> spp.	-	-	-	-	20	-	10	-
<i>Asterionella</i> spp.	60	140	10	150	80	-	-	-
<i>Asteromphalus</i> spp.	-	40	30	20	40	-	10	-
<i>Bacteriastrum</i> sp.	10	-	-	-	-	-	-	-
<i>Biddulphia alterans</i>	30	50	50	100	120	40	10	-
<i>B. longicruris</i>	950	410	630	560	1760	20	50	-
<i>Chaetoceros</i> spp.	540	220	120	940	210	360	20	20
Resting spore of <i>Chaetoceros</i> sp.	100	110	260	70	120	10	-	-
<i>Coscinodiscus</i> spp.	340	260	170	220	240	30	20	-
<i>Ditylum</i> spp.	760	490	510	530	560	800	210	70
<i>Eucampia</i> spp.	-	10	-	-	-	310	550	-
<i>Leptocylindrus danicus</i>	8460	590	1850	2720	1920	820	30	.80
<i>Melosira</i> sp.	-	40	-	-	-	-	-	-
<i>Navicula</i> spp.	100	70	40	130	100	60	10	20
<i>Nitzchia</i> spp.	230	240	110	230	190	200	260	40
<i>N. closterium</i>	190	250	160	210	210	230	220	30
<i>N. pacifica</i>	2100	2210	2760	3320	1410	2230	560	140
<i>N. sigmoides</i>	-	20	-	30	-	-	-	-
<i>Pleurosiama</i> spp.	-	-	-	-	10	20	-	-
<i>Rhizosolenia</i> spp.	650	620	700	550	200	180	160	80
<i>R. delicatula</i>	50	-	20	-	10	140	70	-
<i>R. setigera</i>	20	10	20	-	-	60	-	-
<i>R. stolterfothii</i>	-	-	-	-	40	-	-	-
<i>Skeletonema costatum</i>	23290	21590	21860	40380	37990	12440	2250	360
<i>Stephanopyxis</i> spp.	30	-	1-	-	70	250	260	-
<i>Synedra</i> spp.	160	90	180	120	220	140	30	10
<i>Thalassionema nitzschoides</i>	150	60	140	40	180	130	40	20
<i>Thalassiosira</i> sp.	790	1860	940	1510	2190	490	170	100
Unidentified filament	770	200	2980	510	1280	770	420	60
<i>Chrysophyceae</i>	138840	128160	135380	112140	259880	94340	94340	10680
<i>Loricate chrysophycean</i>	3560	-	1780	1780	-	7120	14240	-
<i>Loricate chrysophycean</i>	-	-	-	-	-	-	5340	-
<u>Dinophyceae</u>								
<i>Amphidinium</i> spp.	50	30	10	30	10	-	-	-
<i>Dinophysis</i> spp.	20	40	50	40	10	-	-	-
<i>Glenodinium</i> spp.	630	1520	650	1580	2120	980	10	170
<i>Gymnodinium</i> sp.	10	-	-	-	-	-	-	-
<i>Noctiluca</i> spp.	20	10	30	30	130	-	-	-
<i>Oxytoxum</i> spp.	40	110	160	100	280	-	-	-
<i>Peridinium</i> spp.	100	120	180	160	270	30	-	-
<i>Prorocentrum</i> spp.	240	360	60	90	100	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta (cont.)</u>								
Cryptophyceae	23140	26700	37380	40940	49840	33820	14240	1780
Rhodomonas spp.	3560	7120	5340	1780	8900	3560	1780	-
<u>Chlorophyta</u>								
Euglenophyceae								
Euglena sp.	-	20	-	-	-	-	-	-
<u>Ciliata</u>								
Mesodinium rubrum	-	-	-	-	10	-	-	-
Strombidium spp.	100	-	50	60	150	30	10	10
S. conicum	230	70	40	210	320	20	-	-
<u>Suctorria</u>								
Trochiscis spp.	80	30	40	50	10	-	-	-
<u>Miscellaneous</u>								
Amphipod	-	-	10	10	-	-	-	-
Copepod	10	-	-	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-1

September 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Achnanthes</i> spp.	20	-	10	-	-	-	-	-
<i>Amphora</i> spp.	60	-	10	-	-	-	-	-
<i>Chaetoceros</i> spp.	9500	10460	1980	550	290	60	50	10
<i>Coccconeis</i> sp	20	-	10	-	-	-	10	-
<i>Coscinodiscus</i> spp.	-	-	-	10	30	10	-	-
<i>Ditylum</i> spp.	80	40	30	-	-	-	-	-
<i>Grammatophora</i> sp.	-	-	-	10	-	-	-	-
<i>Leptocylindrus</i> danicus	-	-	-	-	30	-	10	-
<i>Melosira</i> spp.	-	40	50	60	10	-	-	-
<i>Navicula</i> spp.	130	30	60	30	20	-	30	30
<i>Nitzschia</i> spp.	250	70	70	70	120	30	120	20
<i>N. closterium</i>	500	960	710	720	100	60	40	-
<i>N. pacifica</i>	-	-	-	-	-	30	-	20
<i>Rhizosolenia</i> sp.	-	-	-	-	-	10	-	-
<i>R. delicatula</i>	40	10	-	-	-	-	20	10
<i>Skeletonema costatum</i>	13780	23270	10320	5420	1670	360	30	130
<i>Synedra</i> spp.	30	20	20	10	-	-	-	-
<i>Thalassionema nitzschoides</i>	340	50	10	-	-	10	-	20
<i>Thalassiosira</i> spp.	-	20	50	20	50	30	160	280
Unidentified filament	510	1090	620	540	-	-	10	20
Chrysophyceae	23140	30260	55180	21360	21360	21360	10680	28480
Dinophyceae								
<i>Amphidinium</i> spp.	10	30	80	50	90	30	-	-
<i>Ceratium</i> sp.	-	10	-	-	-	-	-	-
<i>C. fusus</i>	-	-	20	10	-	-	-	-
<i>Cochlodinium</i> spp.	-	20	30	-	30	-	10	20
<i>Dinophysis</i> spp.	10	-	10	-	-	40	-	-
<i>Glenodinium</i> spp.	30	390	380	220	410	470	190	200
<i>Gymnodinium</i> spp.	-	60	70	40	-	10	-	40
<i>Oxytoxum</i> spp.	-	30	40	-	-	30	-	10
<i>Peridinium</i> sp	10	40	20	-	70	90	30	20
Unidentified dinoflagellate ( <i>Pouchetia</i> , c.f.)	10	30	60	40	100	10	-	-
<i>Encysted Gymnodinium</i>	-	-	-	10	-	-	-	-
Cryptophyceae	5340	1780	23140	3560	7120	5340	3560	7120
<i>Rhodomonas</i> spp.	-	8900	10680	1780	3560	3560	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-1

September 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chlorophyta</u>								
Chlorophyceae								
<i>Euglena spp.</i>	250	70	10	10	10	10	-	-
Desmideaceae								
<i>Cosmarium sp.</i>	60	-	-	10	-	-	-	-
<u>Silicoflagellata</u>								
<i>Distephanus spp.</i>	20	40	40	30	20	-	-	-
<i>Ebria sp.</i>	10	-	-	-	-	-	-	-
<u>Radiolaria</u>								
Unidentified radiolarian	-	-	-	-	-	10	40	-
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	30	260	200	90	90	-	20	-
<i>Strombidium spp.</i>	30	130	360	380	300	260	110	90
<i>S. conicum</i>	610	2560	4030	690	830	430	320	80
<i>S. strobilis</i>	-	20	20	-	10	-	-	-
<u>Tintinnidae</u>								
<i>Parundella sp.</i>	10	-	-	10	-	-	-	-
<i>Tintinnopsis spp.</i>	-	20	-	-	30	110	40	20
<i>Tintinnus sp.</i>	-	10	10	-	-	-	-	-
<u>Suctorria</u>								
<i>Trochiscis spp.</i>	20	40	-	10	30	-	20	-
<u>Miscellaneous</u>								
<i>Copepod</i>	-	-	-	20	-	10	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-2

August 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Amphora</i> sp.	10	-	-	-	-	-	-	-
<i>Biddulphia longicurvis</i>	-	40	-	-	-	-	-	-
<i>Chaetoceros</i> spp.	9960	13090	7510	300	10	-	10	90
<i>Coscinodiscus</i> sp.	-	-	10	-	-	-	-	-
<i>Ditylum</i> spp.	-	80	20	-	-	-	-	-
<i>Eucampia cornuta</i>	-	40	-	-	-	-	-	-
<i>Leptocylindrus danicus</i>	-	-	-	-	-	-	50	-
<i>Melosira</i> spp.	-	70	60	-	-	-	-	-
<i>Navicula</i> spp.	20	-	-	20	20	-	20	10
<i>Nitzschia</i> spp.	200	40	170	60	20	-	60	100
<i>N. closterium</i>	170	1220	1120	330	30	-	20	70
<i>N. pacifica</i>	-	60	-	-	-	-	-	-
<i>Rhizosolenia delicatula</i>	-	10	-	10	-	10	20	40
<i>Skeletonema costatum</i>	9270	20490	17640	5200	470	30	60	110
<i>Striatella</i> sp.	-	-	10	-	-	-	-	-
<i>Synedra</i> spp.	20	10	10	-	-	-	-	10
<i>Thalassionema nitzschoides</i>	-	10	30	10	10	-	-	-
<i>Thalassiosira</i> spp.	-	60	-	40	60	10	50	510
Unidentified filament	340	920	510	350	40	-	-	-
Chrysophyceae	10680	7120	14240	30260	51620	14240	1780	8900
<i>Loricate chrysophycean</i>	-	1780	1780	:	-	-	-	-
<i>Dinobryon</i> sp.	-	-	-	-	-	-	10	-
Dinophyceae								
<i>Amphidinium</i> spp.	-	-	-	-	20	20	-	-
<i>Ceratium</i> sp.	-	-	10	-	-	-	-	-
<i>Ceratium fusus</i>	-	-	30	20	10	-	-	-
<i>Cochlodinium</i> spp.	-	10	-	20	-	40	-	-
<i>Dinophysis</i> spp.	10	-	20	20	20	-	-	10
<i>Glenodinium</i> spp.	50	110	150	190	270	430	-	100
<i>Gymnodinium</i> spp.	-	30	30	10	30	20	20	-
<i>G. splendens</i>	-	-	-	10	10	20	160	-
<i>Cyst of Gymnodinium</i> sp.	-	-	10	-	-	-	-	-
<i>Oxytoxum</i> spp.	-	10	-	30	10	10	-	-
<i>Peridinium</i> spp.	-	10	30	20	30	10	10	10
Unidentified dinoflagellate ( <i>Pouchetia</i> , c.f.)	-	30	10	-	20	-	-	-
Cryptophyceae	5340	5340	3560	8900	10680	5340	-	1780
<i>Rhodomonas</i> spp.	5340	12460	3560	10680	26700	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-2

September 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chlorophyta</u>								
Chlorophyceae								
<i>Scenedesmus</i> sp.	40	-	-	-	-	-	-	-
Euglenophyceae								
<i>Euglena</i> spp.	-	30	20	-	-	-	-	-
<u>Silicoflagellata</u>								
<i>Dictyocha</i> spp.	-	60	20	40	-	-	-	-
<i>Dictyophorus</i> spp.	10	60	30	30	-	-	-	-
<i>Ebria</i> sp.	-	-	-	-	10	-	-	-
<u>Radiolaria</u>								
<i>Lithomelissa</i> sp.	-	-	-	-	-	10	10	-
Unidentified radiolarian	-	-	10	10	-	10	-	20
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	20	170	400	40	30	-	-	20
<i>Strombidium</i> spp.	20	200	210	190	230	130	20	120
<i>S. conicum</i>	-	5260	3000	1010	780	400	180	210
<i>S. strobilis</i>	-	10	-	-	-	-	-	-
<u>Tintinnidae</u>								
<i>Parundella</i> spp.	-	-	-	30	-	10	-	-
<i>Tintinnopsis</i> spp.	-	10	-	-	60	40	80	50
<i>Tintinnus</i> sp.	-	10	-	-	-	-	-	-
<u>Suctorria</u>								
<i>Trochiscia</i> sp.	10	-	30	-	-	-	-	-
<u>Miscellaneous</u>								
Bacteria	-	-	-	Present	-	-	-	-
Copepod	-	20	10	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

September 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chrysophyta</u>								
Bacillariophyceae								
<i>Biddulphia longicurvis</i>	-	-	-	-	-	-	-	10
<i>Chaetoceros spp.</i>	5540	3400	1190	420	170	30	-	-
<i>Coscinodiscus spp.</i>	10	-	-	10	10	-	-	-
<i>Ditylum spp.</i>	70	10	-	-	-	-	-	-
<i>Leptocylindrus danicus</i>	-	-	-	-	-	-	-	60
<i>Licmophora sp.</i>	10	-	-	-	-	-	-	-
<i>Melosira spp.</i>	10	-	10	20	-	-	-	-
<i>Navicula spp.</i>	20	30	10	-	-	30	20	20
<i>Nitzschia spp.</i>	240	140	60	80	50	90	90	240
<i>N. closterium</i>	1200	900	440	120	-	20	40	10
<i>Rhizosolenia sp.</i>	-	-	-	-	-	-	-	10
<i>Skeletonema costatum</i>	28470	9440	4590	1120	210	-	30	120
<i>Thalassinema nitzschoides</i>	40	80	60	-	10	10	-	-
<i>Thalassiosira spp.</i>	80	30	20	20	20	10	140	510
Unidentified filament	490	860	360	100	-	-	10	-
Chrysophyceae	33820	28420	24920	21360	28420	14240	14240	16020
<i>Lorate chrysophycean</i>	-	-	1780	-	-	-	1780	-
<u>Dinophyceae</u>								
<i>Amphidinium spp.</i>	-	10	-	60	-	10	-	10
<i>Ceratium fusus</i>	-	10	40	10	-	-	-	-
<i>Cochlodinium sp.</i>	-	-	-	-	-	-	-	10
<i>Dinophysis spp.</i>	-	10	10	10	20	-	-	-
<i>Glenodinium spp.</i>	320	510	150	270	320	390	200	190
<i>Gymnodinium spp.</i>	10	20	-	-	10	20	-	-
<i>Oxytoxum spp.</i>	-	10	10	20	-	-	-	-
<i>Peridinium spp.</i>	20	20	40	20	30	10	30	10
Cryptophyceae	5340	8900	7120	7120	12460	5340	5340	7120
<i>Rhodomonas spp.</i>	8900	10680	1780	3560	1780	-	-	-
<u>Chlorophyta</u>								
Euglenophyceae								
<i>Euglena spp.</i>	20	10	-	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

September 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Silicoflagellata</u>								
<i>Dictyocha spp.</i>	-	10	10	10	-	-	-	-
<i>Distephanus spp.</i>	10	20	-	-	10	-	-	-
<u>Radiolaria</u>								
<i>Lithomelissa spp.</i>	-	-	-	-	10	-	20	-
Unidentified radiolarian	-	-	20	20	10	20	30	-
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	60	860	570	120	90	20	-	20
<i>Strombidium spp.</i>	60	140	110	60	80	100	80	70
<i>S. conicum</i>	410	1100	240	830	540	380	250	60
<i>S. strobilis</i>	-	-	-	-	10	10	-	-
<u>Tintinnidae</u>								
<i>Parundella spp.</i>	10	10	-	10	10	-	-	-
<i>Salpingella spp.</i>	-	-	-	10	-	-	10	-
<i>Tintinnopsis spp.</i>	-	-	60	80	100	20	10	-
<u>Miscellaneous</u>								
<i>Copepod</i>	-	-	-	10	10	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

September 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<b>Chrysophyta</b>								
<b>Bacillariophyceae</b>								
<i>Chaetoceros spp.</i>	8490	5070	5430	1470	110	30	10	40
<i>Coscinodiscus spp.</i>	-	-	-	20	-	-	10	10
<i>Ditylum spp.</i>	90	10	30	-	-	-	-	-
<i>Leptocylindrus danicus</i>	-	-	40	-	-	-	-	-
<i>Licmophora sp</i>	10	-	-	-	-	-	-	-
<i>Naricula spp.</i>	20	20	20	-	30	-	20	70
<i>Nitzschia spp.</i>	220	80	120	130	30	10	80	100
<i>N. closterium</i>	640	360	370	110	20	30	20	40
<i>N. pacifica</i>	30	-	-	-	-	-	-	-
<i>Rhizosolenia sp.</i>	-	-	-	-	-	-	10	-
<i>R. delicatula</i>	-	-	-	10	-	10	-	20
<i>Skeletonema costatum</i>	17180	14620	12350	2920	120	70	-	60
<i>Thalassionema nitzschoides</i>	10	-	10	-	-	-	-	-
<i>Thalassiosira spp.</i>	50	50	10	30	70	50	120	150
Unidentified filament	590	220	470	50	-	-	50	30
<b>Chrysophyceae</b>	17800	39160	28480	26700	17800	14240	3560	8900
<i>Dinobryon sp.</i>	-	-	-	-	-	1780	-	-
<i>Lorate chrysophycean</i>	3560	-	-	3560	-	-	-	-
<b>Dinophyceae</b>								
<i>Amphidinium spp.</i>	-	10	-	-	10	-	-	-
<i>Ceratium fusus</i>	10	10	10	10	-	-	-	10
<i>Cochlodinium spp.</i>	10	-	10	-	10	-	-	-
<i>Dinophysis sp.</i>	-	20	-	-	-	-	-	-
<i>Glenodinium spp.</i>	420	600	760	480	70	220	170	220
<i>Gymnodinium spp.</i>	10	30	30	30	10	30	10	10
<i>G. splendens</i>	-	10	-	-	-	-	-	-
<i>Oxytoxum spp.</i>	-	60	20	10	-	-	-	-
<i>Peridinium spp.</i>	20	40	50	20	10	10	-	20
Unidentified dinoflagellate <i>(Pouchetia, c.f.)</i>	-	-	10	-	20	20	-	-
<b>Cryptophyceae</b>	10680	12460	10680	12460	8900	8900	3560	1780
<i>Rhodomonas spp.</i>	7120	21360	19580	3560	5340	-	-	-
<b>Chlorophyta</b>								
<b>Chlorophyceae</b>								
<i>Scenedesmus sp.</i>	-	-	40	-	-	-	-	-

MUCHALAT INLET PHYTOPLANKTON SAMPLES

STATION C-4

September 1977

Data Expressed as Total Count/100 ml

	Depth in Metres							
	0	1	2	3	5	10	20	30
<u>Chlorophyta (cont.)</u>								
<u>Euglenophyceae</u>								
<i>Euglena spp.</i>	20	-	40	-	-	10	-	-
<u>Radiolaria</u>								
<i>Lithomelissa spp.</i>	-	-	-	10	-	10	10	10
<i>Unidentified radiolarian</i>	-	20	10	20	10	20	10	40
<u>Silicoflagellata</u>								
<i>Dictyocha spp.</i>	-	-	10	10	-	-	-	-
<i>Distephanus spp.</i>	10	40	10	10	10	-	-	-
<u>Ciliata</u>								
<i>Mesodinium rubrum</i>	210	830	330	110	20	20	20	-
<i>Strombidium spp.</i>	50	170	60	50	60	140	90	50
<i>S. conicum</i>	490	800	660	460	540	350	20	120
<i>S. cornucopiae</i>	-	20	-	-	-	-	-	-
<i>S. strobilis</i>	-	-	10	-	-	10	-	-
<u>Tintinnidae</u>								
<i>Parundella sp.</i>	-	-	10	-	-	-	-	-
<i>Salpingella sp.</i>	-	10	-	-	-	-	-	-
<i>Tintinnopsis sp.</i>	-	-	-	-	-	-	30	10
<u>Miscellaneous</u>								
<i>Copepod</i>	-	-	-	-	-	10	-	-

APPENDIX III

SUBMERSIBLE DIVING OBSERVATIONS - PISCES IV

- (a) Muchalat Inlet - 12 March, 1977
- (b) Muchalat Inlet - 12 March, 1977

APPENDIX III

SUBMERSIBLE DIVING OBSERVATIONS - PISECES IV

(a) Muchalat Inlet - 12 March, 1977

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DIVE : 595

LOCATION : Off Gold River pulp mill to effluent diffuser

OBSERVER : H. Nelson

G. Packman

PILOT : D. Grant

POSITION : Submerge      Surface

49° 40.25 N      49° 40.60 N

126° 06.70 W      126° 80.31 W

DURATION : 5 hours

TIME : 0945 hours

DEPTH : 360 m

---

OBSERVATIONS:

Descending - much detritus, white particles in strands in suspension.  
- pelagic amphipods, ctenophores

50 m - decrease in suspended matter  
- siphonophores, euphausiids

175 m - many pelagic amphipods  
- Pasiphaea pacifica  
- milky turbid water layer just off bottom

Bottom

310 m - visibility approximately 6 feet  
- flat bottom, substrate dark fine sediment, fine wood particles.  
- bottom epibenthic area inhabited by many amphipods  
course 270°, gradually sloping bottom  
- little or no current  
- several logs and branches buried to varying degrees with  
fine sediment. No benthic life except amphipods (white  
in colour)

- 325 m
  - after covering approximately one-quarter mile of bottom, no life observed other than amphipods.
  - no obvious signs of dumping activity
  - heading 325°, towards diffuser
  - often pass clumps of amphipods (10 to 50) presumably feeding on pieces of detritus.
  - heading 020° towards diffuser.
- 360 m
  - no change
  - large clumps of light coloured suspended matter just off bottom.
- 340 m
  - base of steep rock cliff with clumps of fine fibres accumulating in the crevices.
  - rock face devoid of life
  - water becoming murky, visibility decreased, fibre suspended in water column.
- 265 m
  - observed first Munida quadrispina
  - white slime (bacterial) in pockets or crevices
  - clumps of fibre rolling down rock face
- 250 m
  - anemone
  - tube polychaetes, squat lobster.
- 225 m
  - many zooplankters, amphipods and copepods
  - small shrimp
  - amphipods very abundant in fibre mat and water column
- 125 m
  - many polychaete tubes
- 100 m
  - visibility improved to approximately 35 feet
- 95 m
  - several Metridium sp., nudibranch, cup coral
- 85 m
  - Pandalus platyceros (prawn), Hydrolagus colliei (rat fish).
- 50 m
  - rat fish
- 45 m
  - visibility decreasing
  - large pieces of fibre on shelves of cliff
- 40 m
  - rat fish, Metridium sp., tube polychaetes
- 35 m
  - visibility poor

- schools of rock fish around diffuser pipe.
  - pipe open ended, covered with Metridium sp., as are supporting cables
  - visibility above the pipe quite good
  - 20 m      - begin ascent from end of pipe
  - surfaced approximately 150 feet south of shore sewer box
- 

SUMMARY: A marked lack of benthic life in this area, with the exception of amphipods which seem to thrive. Since the bottom is covered by a mat of fibre the natural decomposition of this organic matter may have contributed to the anoxic bottom environment. This anoxia was revealed by results of the dissolved oxygen survey done in the area after completion of the dive. The unusual absence of life on the steep rock face below the diffuser pipe may indicate the direct environment impact of the effluent discharge. During the dive, stressed rock fish, Sebastes entomelas were collected from the diffuser area by crew off the ship.

APPENDIX III

SUBMERSIBLE DIVING OBSERVATIONS - PISECES IV

(b) Muchalat Inlet - 12 March, 1977

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DIVE : 596, E.P.S.

LOCATION : Seven miles west of Gold River pulp mill

OBSERVER : H. Nelson

D. Sullivan

PILOT : D. Grant

POSITION : Submerge      Surface

49° 38.9 N      49° 39.1 N

126° 16.2 W      126° 16.2 W

DURATION : 2 hours

TIME : 1543 hours

DEPTH : 225 m

---

OBSERVATIONS:

Descending - small white particles in suspension

75 m - few plankters, some pelagic amphipods and siphonophores

115 m - white suspension still present, few plankters, one  
Pasiphaea pacifica (pelagic shrimp)

175 m - several copepods, P. pacifica (less plankton than noted  
on previous dive near pulp mill (#595). Also the strands  
of particles and fine fibres (wood) not seen in this  
dive.)

200 m - squid

Bottom

225 m - rock face with many Munida quadrispina (squat lobster),  
many brachipods

- Spirontocaris sp., rockfish, squid, sole, sponge,  
Lophaster sp. (spiny starfish), anemone, spider crab

200 m - Pandalus platyceros (prawn), hairy triton, tube  
polychaetes (considerably more life than noted on Dive #  
595).

- 135 m      - many Gorgonian corals, prawns, one box crab, hermit crabs, tunicates, rockfish.
  - 100 m      - tunicates, brachiopods, cloud sponges, urichins, many tube polychaetes.  
              - shelves on rock face have substrate of sand and shell fragments
  - 75 m        - Pachycerianthus sp. (burrowing anemone)  
              - abundant brachiopods and tube polychaetes covering rock faces
  - 50 m        - several burrowing anemones
  - 20 m        - begin ascent
- 

SUMMARY:      Differences noted from dive (595) off the Gold River pulp mill include less fibre and fewer strands of particulate matter in water column. Plankton in water column less abundant however benthic life significantly more abundant. Of particular interest, the large gorgonian corals at 135 meters.

APPENDIX IV

MUCHALAT INLET TRAWL SURVEY

- (a) Trawl Locations
- (b) Station GR-3 - 19 August, 1977
- (c) Station GR-4 - 19 August, 1977
- (d) Station GR-5 - 19 August, 1977

APPENDIX IV

MUCHALAT INLET TRAWL SURVEY

(a) Trawl Locations

Trawl : GR-1\*

Date : 18-19 August, 1977

Area : Muchalat Inlet, B.C.

	Time (PDT)	Depth (m)	Position
Tow 1 - Begin Fishing	1504	356.5	49° 40.3 N 126° 08.0 W
- Stop Fishing	1511	329.4	49° 40.55 N 126° 07.6 W
Tow 2 - Begin Fishing	0743	360.5	49° 40.35 N 126° 80.2 W
- Stop Fishing	0753	342.2	49° 40.2 N 126° 07.8 W

Trawl : GR-2\*

Date : 18 August, 1977

Area : Muchalat Inlet, B.C.

	Time (PDT)	Depth (m)	Position
Tow 1 - Begin Fishing	1309	340.4	49° 38.88 N 126° 16.1 W
- Stop Fishing	1324	322.1	49° 38.78 N 126° 16.75 W

\* No animals collected in either GR-1 or GR-2 trawls.

APPENDIX IV

MUCHALAT INLET TRAWL SURVEY

(a) Trawl Locations

Trawl : GR-3

Date : 19 August, 1977

Area : Williamson Passage

	Time (PDT)	Depth (m)	Position
Tow 1 - Begin Fishing	1006	197.6	49° 39.1 N 126° 27.0 W
- Stop Fishing	1013		49° 39.0 N 126° 26.65 W

Trawl : GR-4

Date : 19 August, 1977

Area : Williamson Passage

	Time (PDT)	Depth (m)	Position
Tow 1 - Begin Fishing	1050	159.2	49° 34.47 N 126° 24.2 W
- Stop Fishing	1057		49° 39.47 N 126° 23.82 W

Trawl : GR-5

Date : 19 August, 1977

Area : Hanna Channel

	Time (PDT)	Depth (m)	Position
Tow 1 - Begin Fishing	1223	248.9	49° 41.54 N 126° 31.85 W
- Stop Fishing	1230	245.2	49° 41.59 N 126° 30.50 W

APPENDIX IV

MUCHALAT INLET TRAWL SURVEY

(b) Station GR-3

19 August, 1977

200 meters

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Species	Count	Wet Weight (gms)
<u>Yoldia</u> sp.	1	1
<u>Cylichna</u> <u>attonsa</u>	1	1
<u>Chorilia</u> <u>longipes</u>	1	30
<u>Pandalus</u> <u>jordani</u>	1	6
<u>Pandalus</u> <u>platyceros</u>	3	66
<u>Pandalopsis</u> <u>dispar</u>	68	590
<u>Spirontocaris</u> ssp.	671	470
<u>Pasiphaea</u> <u>pacifica</u>	28	19
<u>Munida</u> <u>quadrispina</u>	12	60
<u>Crangon</u> sp.	5	5
<u>Rocinela</u> sp.	1	1
<u>Brisaster</u> <u>latifrons</u>	6	84
Holothuroidea sp.	1	
Ophiuroidea	2	
<u>Lycodopsis</u> <u>pacifica</u>	3	52
<u>Bathygonus</u> <u>nigripinnis</u>	2	21
<u>Microstomus</u> <u>pacificus</u>	1	197

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APPENDIX IV

MUCHALAT INLET TRAWL SURVEY

(c) Station GR-4

19 August, 1977

160 meters

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Species	Count	Wet Weight (gms)
<u>Macoma</u> sp.	2	2
<u>Acila castrensis</u>	3	3
<u>Pandalus jordani</u>	137	650
<u>Pandalus platyceros</u>	4	183
<u>Pandalopsis dispar</u>	104	1000
<u>Spirontocaris</u> ssp.	536	375
<u>Pasiphaea pacifica</u>	59	30
<u>Munida quadrispina</u>	8	32
<u>Crangon</u> sp.	14	40
<u>Brisaster latifrons</u>	2	4
<u>Lycodopsis pacifica</u>	2	80
<u>Bathygonus nigripinnis</u>	1	17
<u>Lyopsetta exilis</u>	2	20
<u>Pisces</u> unid.	2	5

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APPENDIX IV

MUCHALAT INLET TRAWL SURVEY

(d) Station GR-5

19 August, 1977

245 meters

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Species	Count	Wet Weight (gms)
<u>Cardiomya</u> sp.	1	1
<u>Nuculana</u> sp.	3	1
<u>Macoma</u> sp.	4	4
<u>Acila castrensis</u>	8	9
<u>Chorila longipes</u>	1	6
<u>Pandalopsis</u> <u>dispar</u>	80	470
<u>Spirontocaris</u> ssp.	480	334
<u>Munida quadrispina</u>	12	44
<u>Crangon</u> sp.	4	4
<u>Brisaster latifrons</u>	36	445
<u>Holothuroidea</u> sp.	2	2
<u>Brachiopoda</u>	2	3
<u>Bathygonus nigripinnis</u>	2	19
<u>Microstomus pacificus</u>	1	61

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