of the bay. Even if such reduction effect occurred, the trophic state of the nutrient concentration is very high. If we assume that 0.05 mg/l for TP and p., 5 mg/l for TN are the maximum limits for eutrophication evolution (Tolendo Jr. A. et al. 1984), the entire Guanabara Bay area must be classified as an extensively eutrophicated ecosystem.

On the other hand, the amount of oxygen near the input of sewage is very low in the entire water column, reflecting high concentration of organic discharge. Away from the pollutant discharge area, super saturation of oxygen at the water surface is inferred to be caused by intensive photosynthetic activity. However, a very low concentration was observed at the bottom layer, except for the stretch corresponding to the entrance of the bay, and almost 100% of DO saturation levels in all water layers.

As an estuary regime was used, a significant salinity gradient of 7 to 17% of salinity at water surface was observed during the rainy season (November/92) near the Guapimirim and the Caceribu-Macacu basin, depending on the bay area. According to salinity variation, Guanabara Bay can be divided into eulitral, polihalino, meso and oligohalino regimes, from the entrance to the inner part of the bay.

Sludge composed of putrefied organic compounds hugely accumulate as a consequence of pollutant flow and eroded matters from the contribution basin, especially at the inner part of the bay. This could seriously affect water quality as well as benthos assemblage activities. The sediments found at the entrance and central areas of the bay are predominantly composed of fine sands and sands containing organic silt, respectively.

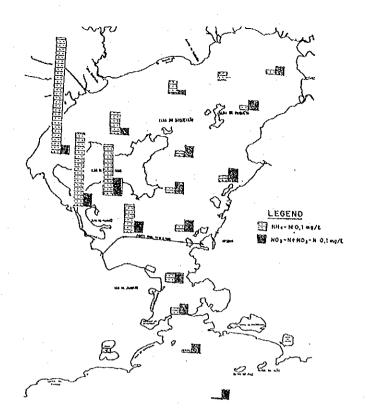


Fig. 7.1-1 Variation of NH_4-N and $NO_3 - N + NO_2 - N$ Concentrations in the Guanabara Bay

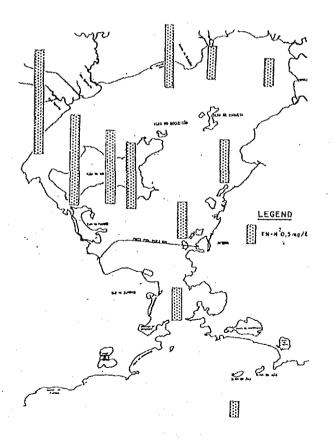


Fig. 7.1-2 Variation of TN Concentration in the Guanabara Bay

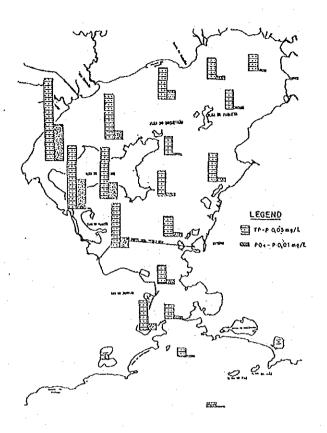


Fig. 7.1-3 Variation of TP and PO4 Concentration in the Guanabara Bay

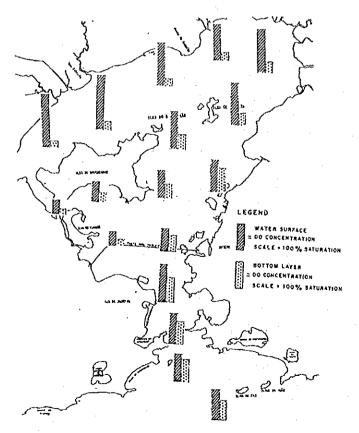


Fig. 7.1-4 Variation of DO Concentration in the Guanabara Bay

7.2 Phytoplankton Community

7.2.1 Sampling Procedures

During the three (3) simultaneous sampling surveys performed in 1992, chlorophyll and phytoplankton samples were collected at the eighteen (18) stations previously established in the Guanabara Bay.

Two (2) chlorophyll samples, one taken in the low tide and one during high tide, were collected during each survey with a Van Dorn sampler filtered immediately and preserved in the boat deck.

7.2.2 Phytoplankton Biomass Variation

The mean concentrations of phytoplankton biomass expressed as chlorophylla-a at water surface and bottom on 18 sampling stations according to tidal variations are presented in **Table 7.2-1. Fig. 7.2-1**, based on the mean value of surface layer, shows the chlorophyll-a variation pattern in the Guanabara Bay.

As shown in this figure, concentration of chlorophyll-a tends to be higher on the west side and in the inner part of the bay, lower in the central region, and the lowest concentration is observed in the mouth of the bay. This type of algae biomass variation reasonably coincides with nutrients variation in the bay, especially of phosphorous as previously presented.

Fig. 7.2-2 shows the relationship between chlorophyll-a and P, indicating an important function of this nutrient for phytoplank-ton production.

Besides the above behaviours a remarkable verifical variation of algae pigment, higher in water surface and lower at the bottom layer, was also observed at almost all of the sampling stations. This phenomenon is caused by floating mechanisms of Oscillatoria sp, the absolute predominant phytoplankton in terms of biomass in the bay which is associated with water mass stratification regime thereby contributing to the formation of algae bloom or green tide.

On the other hand, variation of algae concentration depending on tidal level was observed. Generally, a higher concentration of chlorophyll-a is verified during low tide and vice-versa as indi-

Table 7.2-1	Variation of chlorophyll-a concentration
	in the Guanabara Bay (ug/1)

STATION	1		2		3		. 4		5		6	
DEPTH	SUR.	BOT.	SUR.	BOT.	SUR.	BOT.	SUR.	BOT.	SUR.	BOT	SUR.	BOT.
High tide	1,44	1,29	3,65	5,11	6,61	6,31	4,38	8,11	4,15	2,06	20,61	9,75
Low Tide	0,46	0,80	17,77	5,13	23,11	8,74	77,34	77,34	36,40	6,61	69,75	11,05
Mean	0,95	1,05	10,71	5,12	14,86	7,53	44,36	44,36	20,28	4,34	45,18	10,4
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<u></u>			· ·		1 - E			1.1		enten Transformation			
STATION	7		8	ľ	9		10		1	1	12		
DEPTH	SUR.	BOT.	SUR.	BOT.									
High tide	45,24	12,70	42,52	32,06	49,36	10,85	17,45	8,54	87,58	16,15	30,02	14,55	
Low Tide	65,46	20,75	65,55	32,50	63,82	16,88	50,75	11,87	75,36	29,20	35,52	14,80	
Mean	55,35	16,73	54,04	32,28	56,59	13,87	34,12	10,21	81,47	22,70	32,77	14,68	

a Arta arta										•		
STATION	13		14		15		16		17		18	
DEPTH	SUR.	BOT.	SUR.	BOT.	SUR.	BOT.	SUR.	BOT.	SUR.	BOT.	SUR.	BOT.
High tide	56,14	60,14	85,09	14,68	25,17	10,69	38,41	18,71	36,98	20,91	46,78	23,73
low Tide	51,23	64,15	108,26	36,53	25,84	13,63	27,48	10,08	57,24	23,70	98,46	57,8
Mean	53,69	62,15	96,68	25,61	25,51	12,16	32,95	14,40	47,11	22,31	72,62	42,3

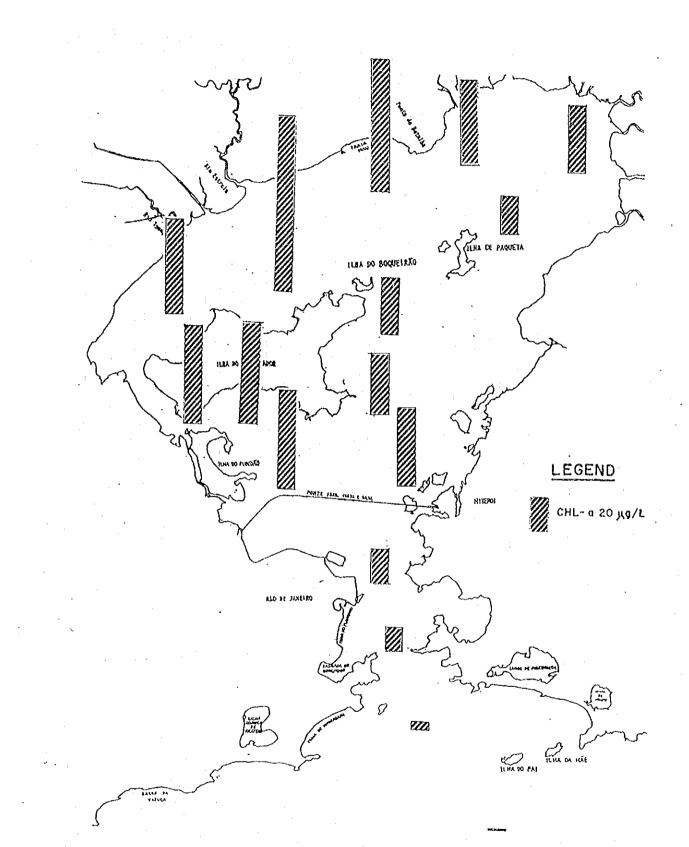
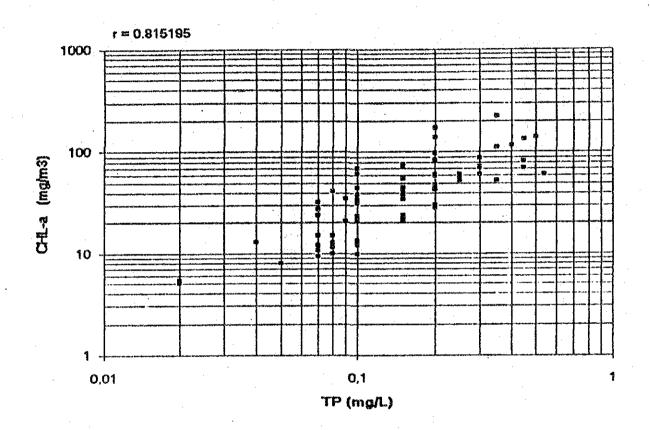


Fig. 7.2-1 Phytoplankton Biomass (chlorophy11-a) Distribution on the Guanabara Bay



. A

Fig. 7.2-2 Correlation between TP And Chlorophyll-A in the Guanabara Bay

cated in Table 7.2.-1, principally in the mouth of the bay where coastal waters of the ocean have a strong influence.

7.2.3 Phytoplankton Species

The results of classification and quantification of phytoplankton in all samples are recorded in Appendix 7.1. Fig. 7.2-3 to 7.2-6 graphically illustrate the general behaviour of the phytoplankton community obtained in two water layers and from different periods of sampling.

According to the data computed from the first study (May 1992), the phytoplankton population tends to increase as we progress toward the centre of the Guanabara Bay. On the other hand, Nostocophyceae, constituted mostly by Oscillatoria sp., absolutely predominate the phytoplankton population in all the sampling stations of the two water layers, except station 18 where Dinophyceae predominates (Pretoperidium trochoideun, one of red tide organisms), followed by Prasinophyceae (Tretraselmis sp.).

A pronounced difference in phytoplankton density was also observed between the upper and bottom layers. The population in the bottom was nearly 30 to 80% less than in the upper layer.

As for the results obtained during the high tide of June 1992, a distribution pattern very different from the first study was verified. Although the tendency of the phytoplankton population to increase in the inner part of the bay was confirmed, the algae composition drastically changed. Among the phytoplankton group belonging to the Nostocophyceae, Oscillatoria sp. population dropped, whereas Synechocystis sp. population increased in the central and inner parts of the bay.

Besides, one of the most remarkable changes was that in spite of Nostocophyceae, Bacillariophyceae mainly composed of Nitzschia sp. appeared as the predominant species in the central zone of the bay, including the east side area of the inner part of the bay (St. 15, 16, and 18). In the stations located in the west side (St. 8, 9, 13 and 14) Nostocophyceae was still predominant in the water surface. However, in the deep layers, the Bacillariophyceae predominance extended in almost all the sampling stations in the bay, except for stations 8 and 18, a phenomenon suggesting the strong influence of oceanic water invading the bay, especially the deep layers. The phytoplankton survey performed in the rainy season showed recuperation of Nostochophyceae predominance with an appreciable proliferation of Synechosystes sp., besides Oscillatoria sp.. Although the trend of phytoplankton density distribution is similar to the previously mentioned chlorophylla-a, the density index as well as similarity index were calculated statistically, and variation in a 56 species population was noted, though it is not a significant factor in the distribution characteristics in the bay. These suggests homogeneity in the phytoplankton community distribution as a consequence of a high eutrophication level which developed in the entire area of Guanabara Bay.

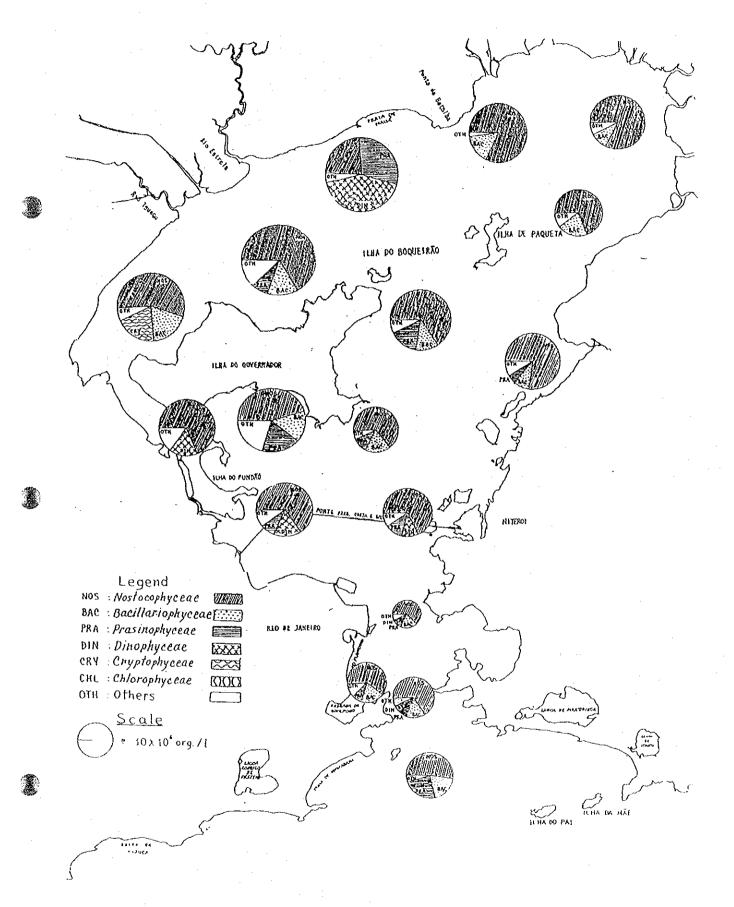


Fig. 7.2-3 Distribution of phytoplankton population - May / 1992 - surface -

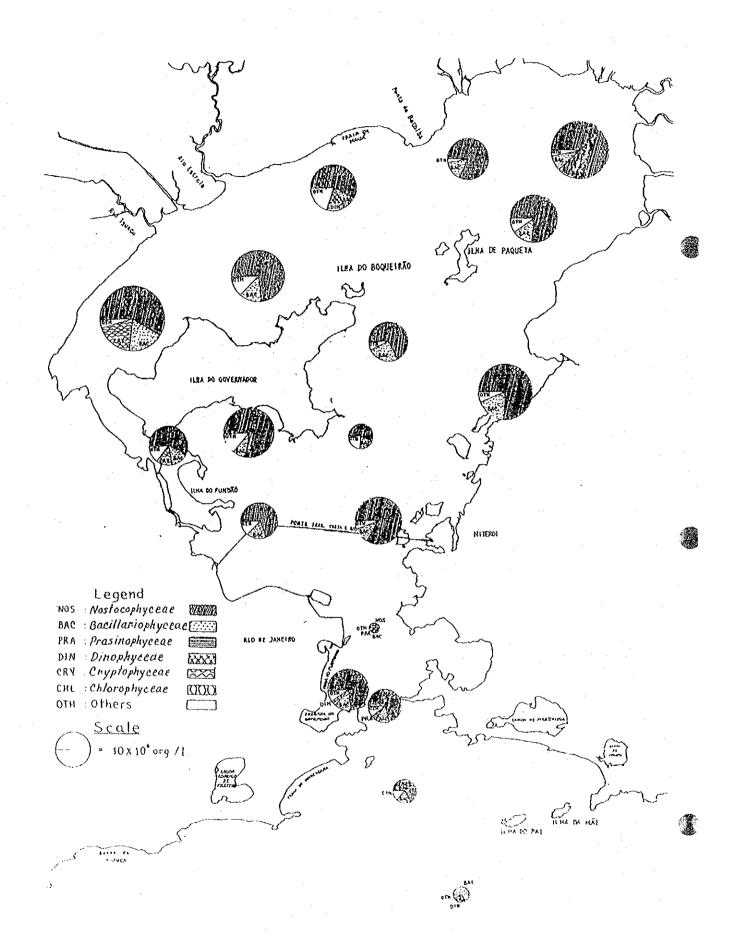


Fig. 7.2-4 Distribution of phytoplankton population - May / 1992 - bottom -

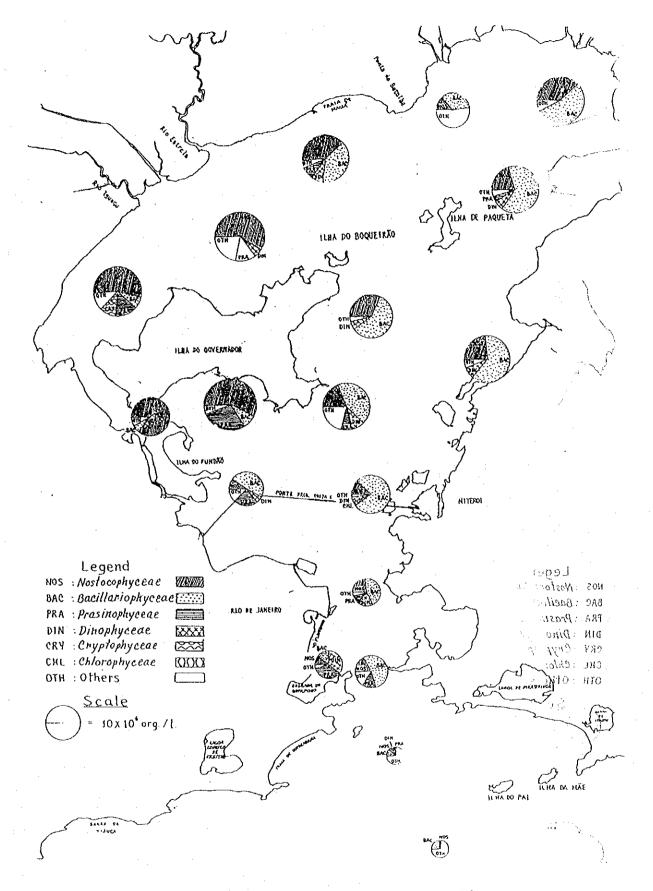
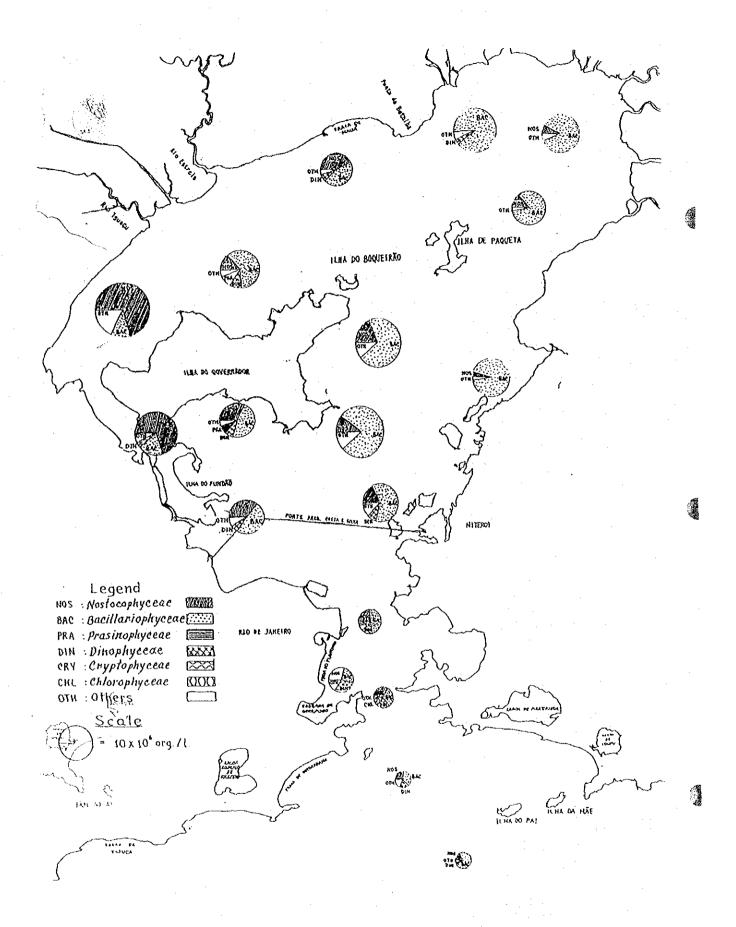
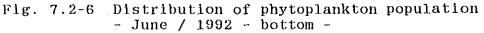


Fig. 7.2-5 Distribution of phytoplankton population - June / 1992 - surface -

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7.2.4 Limiting Factors for Phytoplankton Production

In ecosystems located in tropical regions characterized by high concentration of nutrients, like the Guanabara Bay, intense proliferation of phytoplankton may usually be expected.

The intensity of solar radiation in these regions does not normally constitute a limiting factor, at least not in the water surface, because saturation intensity for algae metabolism is much lower than that available in natural environments. At the same time, water temperature in the bay maintains almost always an optimum range for algae growth in terms of annual mean value (25°C). In these environmental conditions, the behaviour of nutrients constitutes an essential factor for the control of eutrophication evolution.

The relationship between nutrients and algae in an aquatic system from the viewpoint of physiological characteristics is very complex, since different algae species, different types and forms of nutrients interfere in this relationship.

However, a number of recent researches has demonstrated that N and P are more scarce in the natural environment, and these parameters have been introduced in the management and control planning of aquatic systems, associated with the biomass amount expressed by chlorophyll-a (7.2.1).

Since estuarine regime is different from continental aquatic systems, the dissolution of P from sediments is accelerated due to the presence of a significative amount of sulphur compounds that contribute to reduce the P retention capacity of Fe^{s} present at the sediment surface (7.2.2). Several studies performed in estuarine environment in this season laid emphasis on the tendency of N as being a limiting factor (7.2.3), even though this situation could change depending on the intensity of nutrients discharged from tributaries of the basin.

The definition of N or P as limiting factors in an aquatic system offers basic information for the planning of treatment facilities, as well as the application of simulation models.

A correlation between N and P ratio was carried out both in water and in algae biomass in the Guanabara Bay for verification.

In this correlation, N and P ratio in algae was assumed as being the same as that of the secton because algae concentration corresponds to a great part of suspended matter in water. Fig. 7.2-7 and 7.2-8 were prepared using all the data on N, P and chlorophyll-a collected at water surface through 3 sampling campaigns (2 samples collection for each campaign) at 18 stations during 1992. The correlation coefficient values computed in water and algae were, respectively, 0.77 and 0.89. N and P ratios in water considerably vary according to the concentration of nutrients while the same phenomenon does not occur in algae. The chemical composition of aquatic organisms is therefore relatively stable even if environmental conditions change. N/P ratios were obtained in ranges of 6 to 15 in water and 5 to 7.5 in algae, suggesting insufficient quantity of P for algae growth, especially in the bay area with lower concentration of nutrients, which corresponds to In this area, the sediments are essentially the mouth of the bay. composed of sand with a small portion of organic matter that can not constitute a significant source of nutrients. This fact coincides with the nutrient balance theory already mentioned.

Accordingly, it is possible to conclude that P is the most probable limiting factor for eutrophication in Guanabara Bay.

7.2.5 Eutrophication Level

Exaggerated production of algae biomass caused by water enrichment brings about a series of negative consequences, resulting in eutrophication phenomenon, for practical uses of aquatic systems. Various criteria have been elaborated to position trophic levels of water for the purpose of water resource.

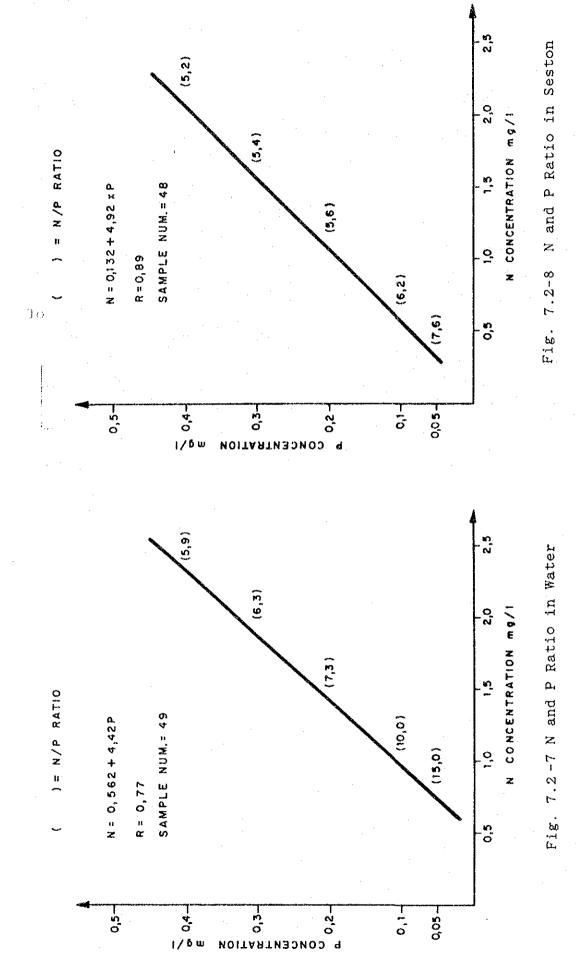
The relation between concentration of N, P and chlorophyll-a presented in Table 7.2-2 is one of the criteria used frequently to classify aquatic ecosystems in terms of eutrophication (7.2.4). Vollenweider (7.2.5) proposed ranges of chlorophyll-a according to the eutrophication level, as shown in Fig. 7.2-9.

Based on the referred criteria, most of the Guanabara Bay presents an extremely high eutrophic level, particularly the wide western area. If a mesotrophic level was adopted as water quality recuperation target (corresponding to 20 ug/l of chlorophyll-a), it would be necessary to reduce the phytoplankton biomass to approximately 70%.

Table 7.2-2	An example of trophic classification criteria of
1	tropical aquatic system by CEPIS, 1990

017.5.5

	oligotrophic	mesotrophic	eutrophic
Total P (mg/m3)	21,3	39,6	118,7
Chlorophyll-a (mg/m3)	3,6	6.7	17,4



 $7{\pm}18$

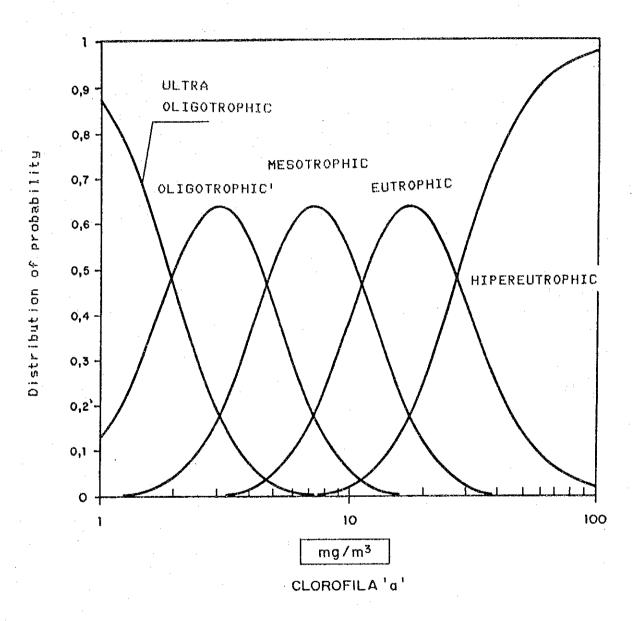


Fig. 7.2.-9. Distribution of Probability of Trophic Level (Vollenweider and Kerekes, 1981)

7.2.6 Contribution of Phytoplankton to Nutrient Balance

Phytoplankton constitutes the most important aquatic organism in the Guanabara Bay, given its presence in great quantity and its strong influence on the alternation of water quality.

These large amounts of algae produced in the bay represent nothing more than organic matter, but alive organic matter, differing from those from pollution sources. One of the most remarkable behaviour of this biomass is oxygen production as the consequence of organic matter synthesis, which greatly contributes to the water purification process.

The growth velocity of these algae is fast, the multiplication of cells occurring 1/4 to $1 \ 1/2$ times a day in optimum conditions (7.2.6). However, actually, the specific growth rate has decreased due to several limitation factors involved in the aquatic environment.

Assuming that Guanabara Bay is a great biological reactor and with application of the Mono equation, it is possible to estimate the specific growth rate of algae within a range of $0.25 \, d^{-1}$, which approximately corresponds to the 4 day turnover period of predominant algae in the bay. For this evaluation, 0.3 was used as saturation constant for Oscillatoria sp. (7.2.7), the most proliferating algae in the bay, and 0.2 mg p/l, the mean value obtained in the bay, as growth limiting substrate concentration.

Up to now, C contents in algae in Guanabara Bay was not analyzed due to operational problems with the TOC analyzer at the FEEMA laboratory. A C concentration of algae of 6.15 g/m³ could be estimated by applying the chemical composition of 41:7.2:1 for, respectively, C, N and P, proposed by Redfield (7.2.8) in marine algae group, and associating it with mean P contents analysed in seston in Guanabara Bay (0.15 g/m³).

If we admit that all algae found at a water depth of four (4) meters can carry out photosynthetic reaction through vertical circulation of algae particles promoted by water mass movement, it is possible to estimate 6,158 C/m³/d as the carbon production rate in the bay, using the specific growth rate presented above (0.25/d).

During November 1992 and April and May 1993, a primary production survey was performed using oxygen method. The mean gross production obtained was in the range of 7.1 g O_2 g $O_2/m^2/dx 5.25$ g/m²/d of net carbon production, which is slightly lower than the value computed theoretically.

This difference of C production between the theoretical computation and practical determination can be attributed to discrepancies between some assumptions applied for theoretical calculation. Anyhow, the explanation presented above indicates occurrence of accelerated growth rate and renovation of algae cells in the Guanabara Bay.

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7.3 Zooplankton Community

7.3.1 Sampling Procedures

Zooplankton sampling was performed at 17 stations on June 1992 during the 1st phase of the study, and at 12 stations on October 1992 on the 2nd phase of the study, with the participation of the staff of the Institute of Biology, Universidade Federal do Rio de Janeiro.

During the 1st phase of the study, a "Rule 1500" type water pump was used to collect samples by pumping up 150 to 200 liters from the surface layer and bottom layer of each station. Pumped water was filtered by two types of plankton nets, a 50 um mesh and a 200 um mesh, to collect simultaneously micro and macro zooplanktons. Biological analysis of zooplanktons of the 1st phase pointed out a very small population due to insufficiency in pump potential for drawing water. For this reason, a STILL type pump with higher potential (3.4 HP) was used in the 2nd phase and 500 liters of water from two water layers was pumped up.

Concomitantly, a conical net (60 cm mouth diameter and 200 um mesh net) equipped with a flowmeter was used for horizontal water surface sampling. Approximately 25 m^3 of water volume were filtered at each station. The determination of water temperature, salinity and dissolved oxygen concentration were simultaneously performed at each station on the boat deck. The classification and quantification of collected samples were carried out in the Department of Biology of UFRJ.

7.3.2 Species Variation

In the 1st phase of the study, as previously mentioned, a very low zooplankton density was observed in all sampling stations as compared to the data obtained from earlier researches. Even so, these data indicated that the Copepode group predominated numerically and presented higher density in the mouth of the bay. In the area adjacent to Ilha do Governador near the pollution flow stretch, lower zooplankton density was observed.

In the 2nd phase of the study, 23 species of microzooplankton and 70 species of macrozooplankton were identified.

Table 7.3-1, 7.3-2 and 7.3-3 present, respectively, classification results and density counting conducted for microzooplankton and macrozooplankton caught by water pump and macrozooplankton collected by surface plankton net.

Predominant species represented by Acartia lilljeborji, Paracalunus quasimodo, Paracalanus crassirostris, etc. all of which belong to Copepoda group are typically of the coast region of the ocean. p. quasimodo is, for example, neritic, termofil and epiplanktonic, being considered opportunistic hervivorous, consuming, principally, phytoplankton, protozoa, etc. In case of absence of vegetable food, they admit introduce detrits.

Table 7.3-1

Zooplankton density of the Guanabara bay collected with pump (50 um mesh)

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VFL2AG3 215.47 24.11 224.35 32.14 157.59 20.19 19.30 3.43 9.54 1.57 3 19 643.34 65.67 649.52 98.83 117.31 522.62 74.19 64.74 11.41 64.24 3.23 5 1AU101 5 12 13 15 17 16 11 <		•••••	••••••		••••				•••••	•••••			*****
179 643.34 65.67 649.52 98.83 111.31 522.62 74.19 64.74 11.81 44.24 3.23 5 TATION 9 12 13 15 17 10 ALLA 3 8 0 3 3 5 9 8 8 TEMATORA 0.48 0.59 0.11 0.20 0.89 0.52 0.56 0.85 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.86 0.85 0.86													33.5
FileTiol 5 12 13 15 17 18 FILE S B S S B S B S B FILE S B S B S B S B S FILE S B S B S B S B S FILE S B S B S B S B S B FILE S B S B S B S B S FILE S B S B S B S B S FILE S S B S B S B S B FILE S S B S B S B S B FILE S S S S S S S S B FILE S S S S S S S S S FILE S S S S S S S S S FILE S													1.1
PLLA S B S B S B S B C B FRANTODA 0.40 </td <td></td> <td>¥1.14</td> <td>. 63.67</td> <td>¥13.52</td> <td>98.83 </td> <td>111.31</td> <td>¥R,Ω</td> <td>74.19</td> <td>84.74</td> <td>11.11</td> <td>H.74</td> <td>3.23</td> <td>5.2(</td>		¥1.14	. 63.67	¥13.52	98.83 	111.31	¥R,Ω	74.19	84.74	11.11	H.74	3.23	5.2(
IBANDBA 0.40 0.50 0.10 0.20 0.40 0.42 0.40				-			•						
USLASCA LARTAR 0.28 0.08 0.20 0.00<	/ 4.11	3								¥ ••••••••			
NULTCLASTA LATTAR 0.28 0.28 0.20 0.02 0.08 0.48 0.40 0.18 NULTCLASTA LATTAR 0.48 0.49 0.49 0.44 0.22 0.02 0.08 0.48 0.49 0.14 NULTCLASTA 1.84 5.84 0.19 0.49 0.49 0.41 0.22 0.01 0.01 0.03<	ILLINI	1.41	1.6	1.11	1.21	8.89	8.82	1.61	0.85	6.81	0.02		
X1821720114 LAPTAS 1.84 5.84 0.19 0.49 0.44 0.23 38.86 2.25 6.49 1.34 Varachynaa 0.48 0.49 0.29 0.48 0.28 0.49	IOLLUSCA LANTAR	Ø.28	1.11	1.11	1.11	1.21	\$. 1 }	8.28	1.11	8.8 3 -	0.11		
Drachymax 0.00	WITCHER LENTER	8.28	. 9.11	1.14	\$.2\$	8.29	0.02	1.11	1.11	8.68	8.88		
Laizoida 0.00 2.40 7.67 1.40 0.00 3.27 0.04 0.32 0.00 0.64 L. 111jeborgi 0.20 14.60 55.33 14.60 2.44 15.07 1.60 0.52 7.45 1.81 P. grazizodo 0.80 1.80 0.80 0.60	ENTER LITTLE	1.8	5.44	8.18	1.41	0.41	8.28	11.11	2.26	6.85	1.14		
L. 1111jeborgi 0.20 14.00 55.33 14.00 2.40 15.07 1.60 0.52 7.44 1.81 P. qxxbisodo 0.60 1.83 0.00 0.60 0.40 0.60 0.40	Irachyara	4.43	\$.\$\$	1.11	4.28	1.11	1.11	• •	9.83	8,88	8.13		
1. quasimodo 0.00 1.00 0.00 <td>alanoida</td> <td></td> <td>2.40</td> <td>7.61</td> <td>1.41</td> <td>. 8.88</td> <td>3.27</td> <td>8.H</td> <td>\$.12</td> <td>1.11</td> <td></td> <td></td> <td></td>	alanoida		2.40	7.61	1.41	. 8.88	3.27	8.H	\$.12	1.11			
P. Crassirostris 0.09 0.23 1.33 0.69 0.44 1.53 2.08 0.32 1.48 0.12 C. relificatus 0.09	i. lilijedorgi												
1. relificatus 0.00<	. greatsolo	1.81	1.00	9.11	1.61	- 8.99	1.0	8.83					
7. stylifera 0.85 0.28 0.28 0.28 0.28 0.85 0.87 0.86 0.86 0.85 0.86 0.86 0.85 0.86 <td></td> <td></td> <td>ŧ.2¥</td> <td></td> <td></td> <td></td> <td>1.51</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			ŧ.2¥				1.51						
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Seccilosicaatoléa 0.88	· · · ·												
. giealizechi 0.08 </td <td>• •</td> <td></td>	• •												
arycasa ap. 0.89 9.80 0.88 0.89 0.89 0.40 0.40 0.80 0.80 0.89 0.68 acca ap. 0.40 1.84 5.33 1.80 0.80 4.59 0.40 0.80 0.80 0.80 0.40 argacticoida 0.00 0.80 0.80 0.40 0.40 0.80 0.80 0.40 0.4				· · · · · · · · ·			1.11	1.11					
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HERICRIC COPERED 8.48 1.48 9.33 0.44 0.29 0.68 9.69 0.46 0.48 0.62 aramite Copereda 0.09 0.28 0.68 0.09 0.09 0.09 0.09 0.09 0.09 0.09 arepeda Bazglii 4.49 36.68 203.33 10.20 75.08 15.09 56.44 20.67 106.00 7.20 307022 0.20 0.20 0.28 0.09 0.09 0.09 0.09 0.09 0.02 . tergestima 0.00 0.20 0.20 0.09 0.09 0.09 0.09 0.09	• •												
araalte Copepela 0.00 0.20 0.00 0.00 0.00 0.00 0.00 0.0													
apepola Bazglii 4.49 36.68 203.33 10.20 75.88 15.89 56.44 24.67 106.00 7.20 307032 0.20 4.28 0.89 0.80 0.89 4.08 0.48 0.85 0.20 0.02 . tergestina 0.88 0.20 0.02 0.86 0.09 0.89 0.89 0.89 0.00 0.00 GPAL 7.60 65.48 277.87 30.88 07.68 42.38 101.40 33.37 125.69 11.02 FRAGE 0.33 2.44 12.69 1.34 3.01 1.04 4.61 1.45 5.66 0.48													
302021 8.20 6.20 8.80 8.80 8.80 8.80 8.80 8.80 8.85 8.20 8.02 . tergestina 8.81 8.28 8.02 8.86 8.00 8.60 8.60 8.60 8.60 8.60 OPAL 7.60 65.40 277.87 38.88 87.68 42.38 101.40 33.37 125.60 11.02 TERAGE 8.33 2.44 12.69 1.34 3.81 1.84 4.61 1.45 5.66 8.45		-											
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6781 7.68 65.68 277.87 38.88 87.68 42.38 191.48 33.37 125.69 11.82 F88265 8.33 2.84 12.89 1.34 3.81 1.84 4.61 1.45 5.66 8.45	and a second												
FERASE 0.33 2.44 12.49 1.34 3.41 1.46 4.41 1.45 5.46 0.48				•• • •	*******		•.••		*******	********	****		
		-											
TB 0.34 7.73 42.35 7.53 15.45 4.23 13.50 5.02 21.52 1.32												÷	
	[]	8.94	1.13	42.35	1.11	15.45	4.13	п.я	5.02	21.52	1.12		

Table 7.3-1 Continue

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STATION	. 1	12		. 11	11		11		11		
TAXA	5	\$	1	5	8	1	1	1	\$	•••••••••	
Ruggiess kochi	9.60	8.89	1.11	6.H	0.63	1.6	6.M	1.13	1.11	8.00	
HENATODA	0.21	8.98	1.10	8.60	9.69	1.帧	1.14	1.03	. 1.8	8,89	
MOLLUSCA LARVAE	22.00	1.9	4.00	4.40	8.80	0.14	į.N	0.85		1.0	
POLYCKAETA LARVAE	1,00	5.65	8.05	8.44	9.60	1.8	4.10	1.69	1.11	8.99	
CIERTPEOLA LANYAE	19.60	.6.99	8.10	5.80	110.W		479.64	244.16	- 12.前	12.4	
Alpheidae	8.89	机的	- 1,6	0.93	\$.94 8.98	8.M 8.M	8.09 8.09	8,65 8.40	9.8 8.8	1.針 - 1.料	
Lyciferidee Brachyers	\$.68 8.80	9.99 9.85	0.00 10.00	1.M 1.M	2.80	12.60	- 1.N	2.40	1.6	4.1	
Porcellanidae	9.89	4.00	1.50	\$.90	1.61	1.14	1.9	1.10	1.10	1.60	
Pagerides	9.00	1.0	0.00	9.80	6.68	1.0	8.89	8.40	8.85	1.1	
Calasoida	8.00	2.44	25.65	2.60	2.00	66.65	2.00	18.89	4.11	8.99	
Fas. Calanidae	8.00	8.80	9.60	8.90	1.8	0.60	8.99	8.00	. I.H	9.60	
A. lilljaborgi	4.10	28.80	400.00	. 1.10	39.60	2100.60	4.44	18.89	2.94	59.60	
P. ERESIDOGO	2.00	15.00	140.00	8.00	74.99	1411.11	料.料	162.66	1.0	私.昭	
P. cressirostris	0.60	2.0	11.14	1.60	4.60	244.45	4.94	4,61	\$.\$ <u></u>	2.99	
Peracalenes sp.	1.14	1.1	211.66	1.1	34.60	2100.44	1.9	31.6	2.86) 위 위	
T. stylifera	1.64 A.64	8,86 8,60	8.80 a.ea	1.10	8.60 4.60	1.10 11.11	\$.60 6.63	、 机钟 1.約	1.14 5.5E		
P. acutus C. velificatus cop	8.89 8.99	8,89 8,89	9.60 9.40	0.68 8,88	0.43	1.11	1.6	1.14	1.14	1.05	
C. Mericast cop	1.44	1.61	0.00	8.80		1.N	1.00	9.89	6.H	8.60	
F.Pseudocalasidaa	8.00	14.00	73.34	6.85	0.00	11.11	- 1.6	2.04		. 6.62	
Cteaocalanas citer	0.00	2.01	196.65	8.80	6.8	266.66	2.00	2.04	1.00	8.00	
Rauplij	8.00	1.14	0.10	1.05	2.10	1.11	2.81	8.84	8.80	3.00	
Calocaleaus savo	4.99	1.8	8.69	8.80	8.N	8.69	1.18	1.11	8.8	8.80	
Eucelasus sp.	8.00	8 .90	8.10	6.19	4.80	8.00	4.19	1.8	I.M	1.90	
Respiri	8.00	8.99	0.89	8,85	8.80	1.11	E.N.	8.42	, I.H	6.60	
Eyclepoids	8.00	9.04	8.90	1.0	8.00	\$.\$\$	1.63	9.00	1.H	8.66	
0. pleaifera	8.69	9.60	8.80	Ø.00	0.00	8.00	0.98	8.00	0.49	8.89	
0. sisilis	1.00	0.00	11.16	0.60	0.00	8.60	0.60	8.89	8.60	8.80	
Q. seligere	8.80	1,H	1.11	8.49	1.11	1.10	1.13	1.14	1.89	9.H	
0, 14923	8.60 8.69	8.00 8.00	9.60 8.00	\$.\$0 8.\$0	6.88 6.99	8.89 6.20	8,99 8,99	8.14 8.40	1.N 1.N	8,89 8,89	
0, oculate Namplit	9.60	1.00	0.60 0.60	0.00	8.00	1.64	1.10	1.14	9.86	8.00	
Poecilostosatoida	1.00	1.10	1.19	8,80	· 1.10	8.80	1.90	1.99	1.19	1.11	
C. siesbrechti	0.00	6.99	0.44	8.00	1.0	8.10	6.36	6.69	1.19	1.00	
Qacees carte	8.60	6.80	49.69	8.69	9.85	356.66	0.89	2.00	8.96	6.66	
H. thelessies	8.00	. 8.60	\$.69	8.69	1.10	0.00	1.05	1.11	8.H	8.81	
Narpacticolda	8.80	B.99	8.69	8.00	1.11	\$.91	1.10	1.14	1.1	1.16	
E. acatifrons	8.80	8.60	8.60	1.60	4.N	9.40	0.01	8.8	0.49	2.H	
Bestesic Copepoda	8.50	2.00	1.00	8.49	6.D	9.89	2.08	1.14	1.H	8.66	
ISCPOOL	8.80	1.10	0.00	1.10	. 1.11	2.8	1.06	1.14	1.11	2.00	
ARPHIPODA	8.80	5.00	8.99	9.00	1.14	9.89	. 1.11	1.19	1.14	9.99	÷.,
CURACEA Ostracoda	0.48 <u>)</u> 8.00	1.99 9.49	4.60 8.60	8.49 8.64	1.69	8.63	. 8.91 8.99	8.05 8.09	1.96 1.96	6.60 6.64	
E. terpestiaa	8,45 8,45	9.49	8.89 8.89	8.49	1.11 1.11	9.89 6.89	8.W	0.1N	9.00	6.89	
ECHIBOOERRA LANYAE	5.00	8.89	8,10	1,55	5.14	1.11	8.14	1.15	1.14	1.94	
CHAETOGRATHA	8.00	2.14	1.49	1.14	9.00		1.54	1.0	0.99	8.00	
Oikopleure dioice	8,80	8.89	1,64	8.41	1.10	1.0	8.80	0.10	1.14	8.80	
EGG FISH	8.88	4.69	8.89	8.89	1.11	1.91	1.14	1.00	1.1	8.94	
C. edestales	9.65	4.48	2.11	8.65	1.14	1.11	1.19	1.1	2.14	1.15	
Noa identificate	9.60	8.00	2.40	1.09	8.68	8.64	4.60	8.84	2.M	2.91	
LARVAE FISH	1.10	8.65	0.81	0.50	1.11	6,6	ê.H	8.00	1.10	\$. %	
C. edentulus	8.00	0.00	8.00	9,89	. I.N	8,99		1.11	1.19	9.N	
Bioksidis 	1.14	۱. ۱۹	1.16	8.96	1.6	1.14	1.14	6.M	1.N	1.W	+++
TOTAL	18.85		1342.44	28.64		4091.34			21.80	151.54	
AVERAGE	4.76	2.11		1.17		144.11	1.13		8.55	1.4	
510	1.11	4.55	\$9.65	1.44	11.15	\$14.58	£1.4 1		1.94	11.51	

Zooplankton density of the Guanabara bay collected with pump (200 um mesch)

FTATION TATION	1	\$	5	\$	1	I	1	11	13	ß	17	11
(848 	*****					*******				A 60		 • •
, tetraphylla	15.44	5.41.		1.11	8.60 8.69	1.19 1.14	1.01 1.01	4.64 8.69	8.85 9.39	8.19 8.19	1.約 1.約	8.8 8.8
6. <u>Fa</u> icea	11.59 1.69	9.61 9.61	\$.10 4.87	1.19 1.14	0.09 0.00	1.54 1.54	1.9	8.M	8.N	8.89	1.0	0.6
mphynora gracilia 1. autrícola	. 9.00	1.94 1.69	1.00	4.54	9.0	1.00	8.N	0.00	ė.n	0.64	-1,N	6.6
aggiaes Lochi	\$4.85	0.H	8,96	4.59	1.19	1.14	8.85	1.10	1.N	8,64	1.00	- 1.1
EMATOOR	机酸	\$.N	8.朝	9.9	1.8	24.60	\$,13	1.10	1.0	1.04	0.N	1.1
olince finite	11.54	1.14	1.16	1.9	1.14	1.4	1.81 1.89	1.66 1.69	6.96 8.98	4.04 6.04	4,64 1,64	9.9 9.1
OLIVIALEDI LIKITAL	1.16 31.41	1.M - 19.19	1.44 3449.47	6.66 959.59	1.19 43.54	4.00 635.89	569.69	197.45	112.44	\$\$74.12	1519.52	114.1
leniste Leite Leniste	1.10	3,41	11.31	0.01	1.0	1.8	1.00	1.1	1.6	9.66	8.8	1.
sciferidae	38.41	1.0	4.86	0.00	3.12	8.89	9.09	1.10	3.44	6.0	9.9	ŧ.(
rechyera	200.7)	615.34	271.48	\$49.55	56.07	8J.N	116.17	8.11	87.11	126.12	11,51	11.
orcellanides	1.44	5.69	8.99	8.4	Q. N	8.00	1.13	小村	した。	8.00	1.8	9,1 - 9,1
allinentier	机	1.M	3.44	1.例	8.04	- 8.M	1.10 9.10	1.10	- 1.神 1.特	8.00 8.05	6.60 4.16	3.
tontopode	30.33 900.83	32.97 512.84	1.19 1.11	11.10 11.111	0.10 9.00	1.10 1.81	4.H	1.10	0.01	34.45	4.31	1.
alanoida . Calenidae	178.67	- 34.65	1.14	1.11	6.11	4.14	8.14	I.N	11.44	1.10	0.00	
.]i]]jeborgi		1721.59	514.44	4544.54	1111.14	4329.60	892.84	211.95	1147.28	3769.23	\$73.28	114.
. 444538060	4247.14		1443.48	675.68	571.17	12(8.M	\$99.21	31.6 2	625.57	492.31	224.14	SH5.1
eressirestris	1.10	1.N	1.19	. I.N	8.98	0.00	1.12	8.99	1.8	9.00	8.62	8.
erecejenss pervor		. 511.15	512.15	548.54	103.43	200,89	196.43	13.70	11.11	500.00 74.92	34.19 .8.47	83. 1.
. stylitera	124.67	10.0	51.29	- 6.65	51.91	制度	4.11. 新藤	17.12 1.19	、 机树 制料	9.96	. 8.92 18.95	9. 9.
, acetus , velificatus co	1.10 1.11	. 8,00 - 73,24	6,1 1,1	1.10 45.45	3.转 1.转	. 1.12 1.14	6.H	1.00	1.H	0.N	1.0	
, apericata cop	1.14	¥.H	1.11	£.10	8.M	4.8	1.1	1.00	1.0	1.0	1.0	ŧ.
, querscala coy , Pacudocalazidai		512.64	1.19	1.8	1.60	121.00	4.4	23.47	1.4	30.45	1.99	1.
tesocaleses citer		146.54	1.00	18.91	18.80	8.00	1.00	3.42	13.14	1.94	6.9	8.
scaleans pileator	1.0	1.N	1.65	1.1	8.N	8.98	1.00	8.H	11.64	0.N	6.80	i .
calant sp.	257.41	ł.N	1.10	45.45	0.0	0, M	0.90	0.01	1.8	1.0	0.00	1.
Pontelliose	11.13	34.45	8.00	0.90	8.10	0.00	1.N	1.19	8.60	6.00	8.M 1.M).).
, fieriatilis	. 9. 53	8,49	1.0	- 1.6	-1.0	1.10	1.14 1.14		- 11.神 - 11.神	\$.0 \$.0	4.3E	
naplii 	- 1544.40 - 314.71	H.H. H.H	(8,80) (8,80)	45,85 8,10	1,转 1,转	. 4.69 91.89	1.64	9.94 1.64	11.14	1.8	1.0	
rclopoida . plupifera	111.20	13.H	1.0	1.10 1.19	1.8	. er.e	4.13	LH	1.01	1.91	1.8	
. șivilis	1.14	13.74		1.60	1.44	8.69	8.93	1.14	8.94	1.14	8.04	ŧ.
setipera	6.80	1.10	8.9	1.19		1.00	6.6	8.0	8.8	1.19	6.N	₽.
bebes ·	0.C0	0.60	8.64	8.80	8.64	1.49	1.6	1.9	9.M	0.00	8.0	1.1
. oculata	1.85	8.N	1.63	1.11	1.H	1.10	9.09	1.14	6.W	1.91	1.11	I .
amplii	415.51	146.54	141.57	465.41	155.76	时.纳	35,71 \$,99	28.55	1.99 1.94	38.86 11.10	33.17 8.00	n. 1.
vecilostosatoida . giesbrechti	. 1.14 1.69	1.N 1.N	. 8.89 8.99	· 8.89 8.80	1.H 1.H	1.11 1.14	1.9t	3.42	- 1.9	0.00	1.64	
nches certa	1.#	1.8	机的	1.H	1.10	1.10	1.91	1.00	ŧ.N	1.N	8.99	6.
. Welenies	1.14	1.16	1.11	1.11	1.14	1.41	1.60	8.61	9.N	8.00	1.88	ŧ.(
erpecticolde	8.95	34.45	8.99	9.90	. 1.N	41.04	41.44	9.N	8.14	\$.M	0.92	1.
. ecutifrons	1.粉	1.10	6.H	9.90	8.58	1.0	¢.H	4.94	0.0	E.16	1.0	ŧ.
extonic Copepoda	9.14	36.65	6.99	1.14	8.8	48.66	41.44	1.96	1.00	8.96 8.99	1.91 1.91	
arasile Copepode	1.00	1.1	1.90	9.69	51.13 8.89	- 신원 - 신원	8,93 8,93	2.19 1.19	1.19 1.19	7.69	12.13	9.
SOPUSA Spilloga	· 主的 主約	1.約 1.約	1.19 8.14	- 4.51 4.81	с.ня 8.14	4.00 12.00	11.44	1.1	4.97	1.15	8,61	14.
FERER .	1.01	6.M	1.14	1.0	1.0	1.00	6.90	1.04	8.64	1.14	1.0	
raidim gracile	1.8	5.49	1.N	8,91	8.90	6.00	9.94	4.00	9.M	1.65	4.0	\$,
MAINACEA	4.99		4.H	. 8.19	9.M	8.99	17.86	8. R	8. 11	8.69	\$.95	Q. 9
TLACORA	1.64	1.99		11.53	8.98	1.19	· e.H	8.85	4.00	3.85	8.8	. İ .
nome tergesline					59.19	0.98	ŧ.Ħ	8.00	0.00	1.0	4.31	.
ailis svirestri		5.0		. 8.8	- 1.時	0.60	1.9	0.04	8.00 7.11	3.89 8.89	1.99 1.99), 1,
NETOGRATIKA Metografika	3.N		- 17.18 8.99	- 0.60 0.60	0.00 1.14	1.約 1.約	4,94 4,98	●.19 1.19	3.48 6.86	8.00	- 1.約	- f.
BINGBERRE LARTA Antionalis	21.17 3.66	8.14		1.0	1.0	1.8	1.料	1.0	1.11	1.N	6.6	9
ă fiși	1.11	1.69	B. 00	1,10	1.0	1 11.16	9.80	6.96	6.0	0.00	1,81	
meidee	1.12	1.94		4,59		92.00	197.14	8,98	33,13	7.49	142.24	В.
grealidee type i	19.31	8.98	1.16	. 8.6 0	8.8	8.99	0.00	.00	1.14		8,66	ę.
ecentulus	61.78		151.20	45.45	6.23	31.0	n.0	4.85		50.04	8.67	Ĵ.
a ideatify	8]. H			- Ø.S	6.13	4.8	215.55	6.65	41.41		23.66 8.89	Я. І.
ISH LANYAE	8,00 8,00	1.10 4 M		1,91 1,91		9.09 4.00	1,14 1.44	0.98 8.94				1
lupeidee 1674.1.]idee	9.99 9.99	0.00 5.43		1.00 1.00	. a.u		ê.M	1.H			9.00	
efestalua .efestalua	4.9			1.00	1.15	1.0	1.0	1.0	1.64		8.8	
letaidae	n.n			<u>(1.51</u>	1.00	0,10	1.11	1.14	6.8		0.00	4.
on identify	1.64	5.49	8.10	1.9		6.0	8.W	8.90	1.41	6.60	8.00	\$.
erciforne	1.91			·	6,23	1.0	6.90	,0.10	. 8.49	1.10	8.N	٩.
******										18448 51		
						7141.00 142.44				10969.23 154.76	2/41.94 39.47	11%). 원.
YERNE 18			194.33 \$48.39							795.93	201.05	- 115.

Table 7.3-3

Zooplankton density of the Guanabara bay collected with net (200 um mesh)

STATION TALA	1	*****	1						•			
TALLA		-		· •	<u></u>		9	• ·	1		1	
	\$	•	\$:		\$	1	\$	•	\$	•		•
Regiona kochi	1.14	6.10	1.11	8.10	1.N	1.10	1.N	8.19	9. \$ \$	8.91	6.14	1.2
IENATOGA	0.60	0.03	8.68	0.90	8.99	1.6	8.19	8.0	4.00	19.99	0.0	- 2. 0
IOLLUSCA LARVAE	8.M	1.11	8.00	机转	4.14	12.N	8.M	1.N	ł.W	9.N	- 0, N	, 8.8
POLYCHAETA LARYAE	9,50	2.14	8.90	0.80	8.09	8,89	1.80	1.90	- 制制	2.料	1.14	. 6. 8
CIRRIPEDIA LARVAE	4,09	76.00	161.00	222.48	154.69	446,88	- 18.66	12.斜	÷.₩	4.4	- I,H	21.1
l]pheides	8.00	0.09	8.00	.0.00	0.00	8.60	1.89	2.00	1.14	4.N	¥.\$	4.0
luciforidae	8,60	2.40	8.90	8.80	8.89	5.09	8.80	1.94	. 1. W	1.19	j J.M	1.1
Brachyura	4.00	12.44	52.80	14.00	4.45	H.H	2.88	38.64	8.89	¢.M	- 1.0	2.8
forcellenidze	9.00	8.40	6.90	1.19	1.H	2.40	8.69	1.11	1.10	\$.09	1.14	8.8
Fagur idea	0.00	9.08	0.00	1.11	1.10	8.60	8.68	2.8	8.68	1.1		9,8
Calanoida .	18.80	43,00	31.14	料.約	2.10	133.34	1.05	1.8	1.09	1.N	12.10	H.6
fan. Celanidee	4.00	8.80	4.86	I.N	1.14	4.86	6.90	621.M	6.N	1.14	8.W	4.8
A. Hilljeborgi	28.80	80.00	51.14	419.10	11.00	4110.10	38.6	4465.66	0.68	1441.00	34.H	411.1
. qrasiaodo	60.00	45,60	28.18	6.68	16.00	911.34	12.0	\$55.34	1.0	748.64	1.11	45.1
. crassirostris	1.60	0.00	8,60	13,34	4.44	6,6	.1.19	141.00	1.6	21.14	- 9.82	11.1
aracalanos so.	178.69	100,00	445.65	124.60	16.00	\$90.00	16.00	1441.55	1.14	549.89		299.8
raracaranan sp. 1. stylifora				1.15	4.89	12,34	2.約	- 41.11	6.M	14.种	1.19	1.5
	4.80	\$0.00								- 村.村	1.00	- 6 1.6
· ACULUS	1.65	1,較	- 1.0	9.41	1.0	1.00	1.0	1.6	8.00			1.1 1.1
. vetificatus cop	1.19	0,00	1.31	8,00	6.00	9.60	1.#	. 1.00	. 0. M	1.1	0.10	
. Chericana cop	1.00	0.90	8.0	1.69	8.05	0.44	2.8	1.1	1.84	\$.¥	1.10	8.8
Preudocalantére	12.00	185.00	26.65	31.34	1.的	269.09	1.11	111.6	1.0	5.转	- L Ø	1.6
tenocalanus citer	18.80	229.0D	4.44	40.00	9.00	11.11	1.10	111.111	1.10	8.H	1.19	9,9
Bauglii	8.00	6,00	24.64	0.00	0.00	9.80	4.69	: I.H	9. H	1.11	0.64	6.6
Calocalanes pavo	6 .49	49,66	Q. 40	\$.\$\$	1.00	÷ \$.\$§	1.特	1.11	U. N	\$.N	9.N	1.6
Eucaleans ap.	6.60	19.00	1.00	9.89	机铸	6.N	- 1.執	·	. I.H	1.林.	1.00	8.0
lauplii	0.ŧ	\$\$, 6 9	8.80	8.00	8,80	8.94	P. \$4	i (), ()	1.0	0.N	1.4	1.1
cyc lopo i da	1.6	\$.\$0	8.60	8.80	1.40	1.11	1.69	1.W	1.91	1.#	1.64	1.9
), pluaifera	2.40	10.60	6.H	6.45	0.00	ł. Pł	1.秋	8.98	- Ŧ.Ħ	8.W	1.6	8.8
D. similis	1.0	44.49	40.00	1.68	2.69	Q. 10	1.10	1.#	1.9	1.0	- 1.H	8,9
). setigere	6.40	48,00	13.34	13.34	0.M	8.88	1.00	. N. N	1.1	1.10	8.8	1.9
), bebes	2.10	48.60	8.00	13,34	0.00	. \$4.65	1.11	1.税	8.89	3.N	1.N	5.0
), ocalata	2.00	\$.00	. I.H	0,25	8.05	8.88	8.60	4.8	1.11	1.H	1.H	1.1
teplíi	12.44	44.00	12.24	\$.65	8.90	0.00	\$,60	8.68	8.66	1.N	1.10	1.5
eecilostonatoida	8.80	8.98	8.60	1.14	8.90	8.85	1.54	8,98	8.54	8.88	1.91	8.0
, giesbrechti	65.80	\$10.00	110.00	10.46	4.40	8.80	4,94	45.65	4.00	8,89	8.30	1.1
ACEEL COTLE	16.40	610.69	225.65	66.65	8.60	64.66	1.0	46.66	6.0	1.85	1.05	1.0
i. thelassies	8.00	0.00	11.34	6.85	1.11	9.10	1.11	1.8	1.10	8.00	8.85	1.9
iarpact icoida	.1.11	8,69	8.60	0.00	1.N	9,69	1.12	9.6	1.14	1.N	0.84	
acutifross	1.00	0,00 0,00	6.66	1.00	1.64	9.10	1.60	1.55	1.14	6.#	1.0	1.8
		1.05	-12.14	6.45	1.H	\$.69	1.11	1.00		8.8	1.0	- 1.0
HERIGRIC Copepoda SOPODA	2.8\$		2.8	8.90	· 1.H	2.49		2.49	8.40	6.99	2.00	1.8
	E. 10	8.50					8.85	1.14				4.8
XPHIP00A	\$.N	1.14	1.44	8,69	1.10	8.85			1.16	9.N	0.94	
QUACEA .	1.00	2,90	2.00	1.09	1.14	8.H	1.60	9.M	0.00	1.8	1.85	8,8
STRACODA	1.	1.10	1.10	1.14	1.11	6.64	8.9	1.10	8.99	2.94	8.N	\$.#
. tergestise		3728.08	142.00	124.80	2.19	\$.\$\$	1.94	4.64	8.M	1.14	1.96	.
CHINODERNA LANYAE	8.05	1.11		0.0	1.M	\$.09	1,00	8.10	9. 9 9	1.11	1,91	\$.\$
RAETOGRATHA	0.00	10.60	8.89	1.10	- 9.H	2.#	0.86	9.60	1.13	2.00	\$. H	
ikoplaara dioica	8.49	5.40	1.81	1.19	6.W	1.8	8.00	8.88	8. H	8,00	8,68	· 8.8
66 FISH	8.00	8.96	1.00	0.00	8.69	1.44	1.19	1.98	6.00	• • • •	1.14	. 8. 9
. edentulus	§.#	1.41	4.80	1.14	4.00	8.90	1.11	4.14	- 8.86	5.W	1.6	4.3
identificate	2, 80	1.11	8.00	2.44	1.00	8. H	- 1.H	8.90	· \$.16	8.N	し、特	4,1
ARYAE FISH	8.19	8.N	1.8	1.0	1.12	\$. \$ \$	1.8	9.N	1.N	1.10	1.9	1.1
. siesieles	8.89	4,00	8.88	9,14	0.09	1.11	i 4.0	8.66	1.11	\$.N	5.N	E. B
sables.	0.00	2.81	1.94	1.0	1.0	8.96	÷ 9.89	1.96	1.0	1.9	1.00	9.9
		****	· · · • · • · • • • • • • • • • • • • •	********	********	1745 54	A1 85	A011 48		1838.N	£1 M	\$547.9
6141	676 6M	2816 88										
OTAL VERAGE	£76.00 10.67	7836.09 130.18	1434.84 28.57	23.44	214.99 \$.44	1783.34 164.32	92.00 1,70	\$\$17.30 149.59	1,44	56.11	1.91	192.7

7.3.3 Distribution Pattern

Fig. 7.3-1 shows the distribution pattern of macrozooplankton that indicates higher values at the mouth region and lower values at the central and the inner part of the bay, specially at the area adjacent to Ilha do Governador. Microzooplankton showed the same distribution pattern and its distribution characteristics specially stand out at water surface. The population found at the western side of the bay is extremely restricted but larger at the entrance of the bay. The area corresponding to the center stretch of the bay present intermediate values.

The density at the bottom layer commonly showed higher values than those at the water surface, following, however, the same regional variation pattern observed at the surface layer.

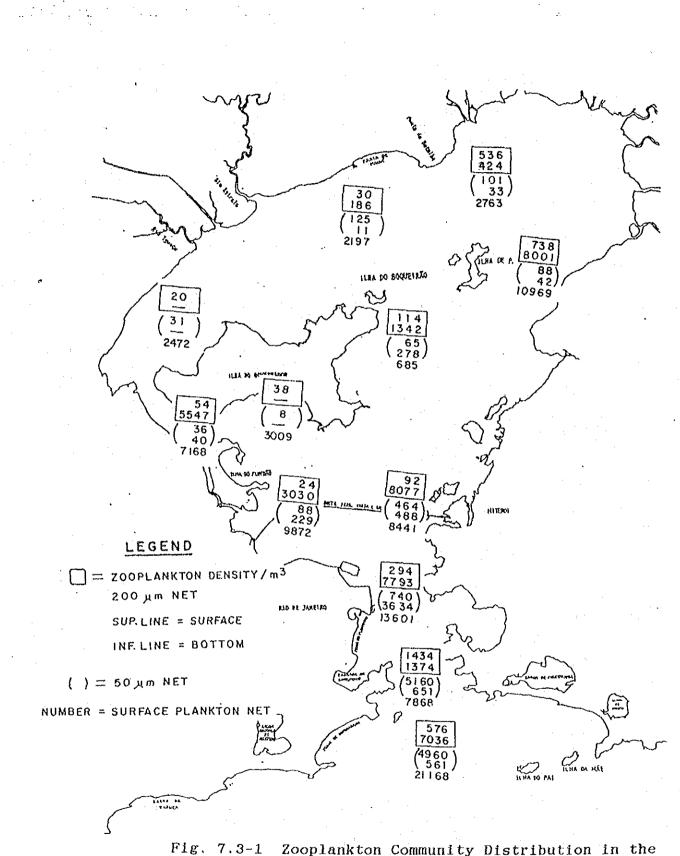
This type of zooplankton distribution could be explained, partially by complex pollution effects represented by high ammonia concentration, grease and oil contamination, heavy metals, organic toxic substances and sulfide compounds influences, etc., and by meso and oligohalino condition which occurs in the rainy season at the western side and inner part of the bay where a huge river water flow is derived from the basin.

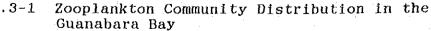
Fig. 7.3-2 shows the correlation degree between zooplankton and salinity variation measured in the Guanabara Bay. Although zooplanktons are generally observed to increase, the rise in salinity concentration shows a disperse correlation pattern and the absence of consistent interdependency, indicating interferences of some others factors that could affect zooplankton distribution in the bay. This conditioning factor could be attributed to complex pollution effects as already mentioned above.

The influence of pollution effects, however, was more moderate at the central area of the bay although salinity dilution still prevails, conditioning the generation of the Copepoda group principally at water surface layer where the influence of continental water discharge is more pronounced.

The mouth region of the bay can be considered to be almost without the toxic effects of pollution and presents, on the other hand, euhalino regime that offers favorable conditions to the predominant group of zooplankton originating from the coastal area of the ocean. Population density obtained by surface plankton net resulted in higher values than those in the pumped samples, showing, nevertheless, the same tendencies in zooplankton composition and distribution characteristics observed in other samples.

The correlation coefficient of the Person as well as the Sannon Weaver diversity index applied in 3 different types of zooplankton data demonstrated tendencies of giving higher index values at the mouth region than at the central and inner parts of the bay. A variation in the significant index value at the western side area of the bay with higher pollution level, however, was not observed.





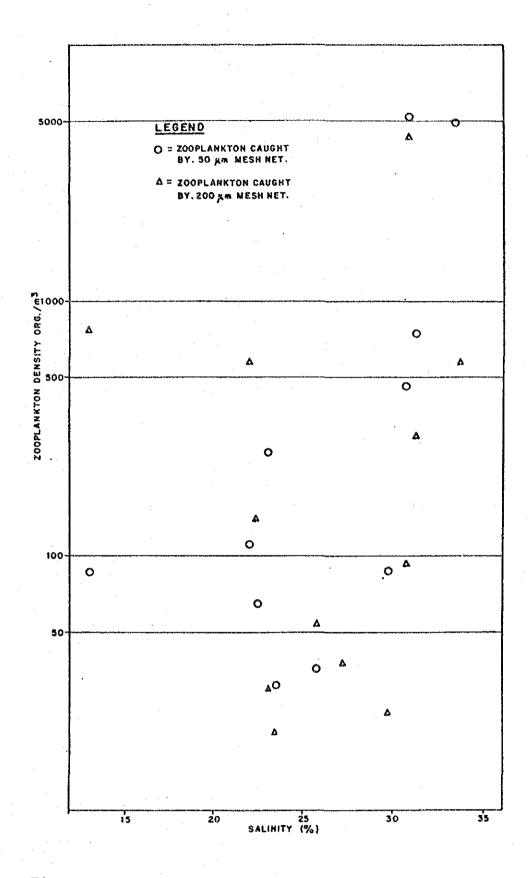


Fig. 7.3-2 Zooplankton density and salinity relationships.

7.3.4 Zooplankton Density

Concerning zooplankton density, Table 7.3-4 gives an idea about size of zooplankton biomass in the Guanabara Bay.

The biomass value of phytoplankton in this table was evaluated based on chlorophyll-a and that of zooplankton was determined in the UFRJ Department of Zoology laboratory. Percentage of zooplankton biomass in relation to phytoplankton obtained by this evaluation is considerably low, except in stations 1 and 2 located at the mouth of the bay, if compared to biomass ratio usually found in eutrophic environment where it varies normally from 1 to 10%. (7.3-1)

Table 7.3-4. Ratios of algae and zooplankton biomass in the Guanabara bay

	<u> </u>	STATION										
Biomass	1	2	3	4	- 5	6	7	8	9	10	11	12
Algae biomass	0,87	2,23	3,00	6,78	8,31	8,51	8,10	7,98	10,89	7,07	3,20	4,92
Zoo biomass	0,033	0,022	0,021	0,011	0,010	0,040	0,004	0,001	0,003	0,006	0,005	0,026
A/Z ratio (%)	4	1	0.7	0,2	0,1	0,5	0,05		0,03	0,2	0,2	0.5

This low density of zooplankton in the bay seems to enable zooplanktons to survive almost interdependently from phytoplankton proliferation that serves commonly as their food.

Fig. 7.3-3 indicated negative correlation between zoo and phytoplankton population, as an increase in zooplankton density was observed regardless of a decrease in chlorophyll-a.

Generally speaking, zooplankton must increase, accompanying algae proliferation according to the food web relation. This relation, however, tends to have low eutrophic systems because of large contents of bacteria and suspended organic matters that are another zooplankton source of food, besides phytoplankton. (7.3.2)

On the other hand, phytoplankton produced predominantly in eutrophicated ecosystems are mostly of the Cianophyceae group that presents, usually, a colony with large dimension not edible for zooplankton connsumption.

The zoo and chlorophyll relation observed in Fig. 7.3-3 could be explained satisfactorily by the behavior above mentioned, suggesting that zooplankton production in the Guanabara Bay is almost independent from phytoplankton proliferation.

The explanation presented leads to the conclusion that the present Guanabara Bay condition is not favorable for zooplankton production.

On the other hand, the lower correlation among these organisms suggests that secondary production represented by zooplankton is not an important factor for the application of the eutrophication simulation model.

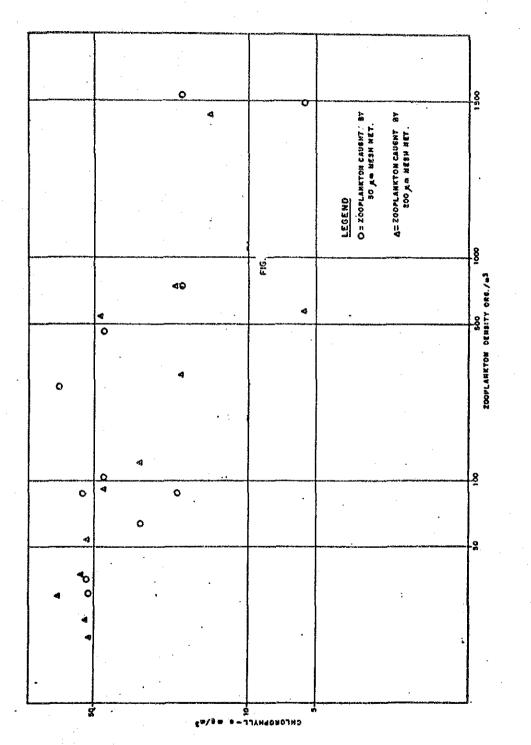


Fig. 7.3-3 Chlorophyll-a and zooplankton density relationships

REFERENCES

- 7.3.1 McCauley, E. and J. Kalff. Empirical relationships between phytoplankton and zooplankton biomass in lakes. Can. J. FISH. AQUAT. SCI. 38. pp 458-463.
- 7.3.2 WILLIANS, R. Zooplankton of the bristol channel and Seven Estuary. Maine Pollution Bulletin, Vol. 15, No. 2, pp 66-70, 1984.

7.4 Benthic Community

Data on benthos were collected at 16 stations (see Fig. 7.4-1) during the 1st phase study (June/92) and at 13 stations (except 3 stations located near the entrance of the bay) during the 2nd phase of the study (Oct/92) using the Peterson dredge samples. The exception of the 3 stations included in the 1st survey phase in the 2nd phase was made when the Peterson dredge samples were lost during the sampling operation. All collected bottom samples were properly preserved and sent to the FEEMA laboratory for classification and quantification, the results of which are shown in Appendix 7.2.

The result of the benchic community surveys performed in the two study phases indicated three distinct areas for their distribution pattern (Fig. 7.4-1 and 7.4-2). At the inner part of the bay delimited by the northern region of Ilha do Governador and Ilha de Paqueta, very few or a total absence of benchic organisms was observed, a phenomenon attributed to largely reduced oxygen concentrations at the bottom layer and, at the same time, in the sediment composed of silt with organic concentration maintained in anaerobic condition, together with reduced sulfide compounds that produce toxic effects in benchic animals.

At the area circled by the southern side of Ilha do Governador and Fundao, a great amount of Gastropoda, Littoridina australias was In this region a relatively high level of pollution is collected. observed and only 1 to 2 mg/1 of DO was measured at the bottom layer of the sampling station located near the Galeao bridge (St. The great difference in the biological distribution found 8). between the two areas above referred could be attributed to the difference in the sediments' characteristics. The predominant characteristic of the sediments in this area is sand mixed with some proportion of unnoticeable silt without H_2S production. The environment characterized by such pollution condition allows for the development of only a few kinds of organisms called opportunistic. Of the total population of 33000 org./m^2 found in the 1st phase of the study and of 44000 org./m^2 in the 2nd phase at St. 8, only 2 species consequently showed very low diversity index value, suggesting that the environment is extremely selective for few species of benthic organisms.

On the stretch which extends between the entrance and the Rio-Niteroi bridge, water quality is much better as compared to the areas already mentioned, and the sediments constitute fine sand with very little proportion of organic matter. In this condition, benthos community appeared more diversified, with the polychaeta errantia population predominating.

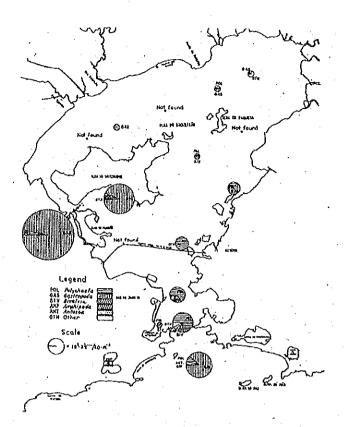


Fig. 7.4-1 Benthic Community Distribution in the Guanabara Bay

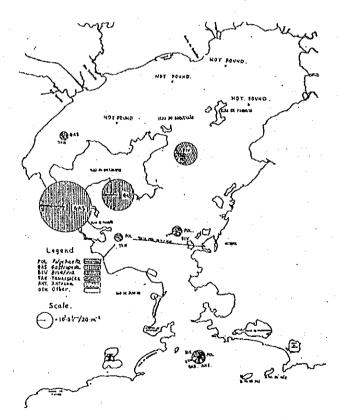


Fig. 7.4-2 Benthic Community Distribution in the Guanabara Bay in October, 1992

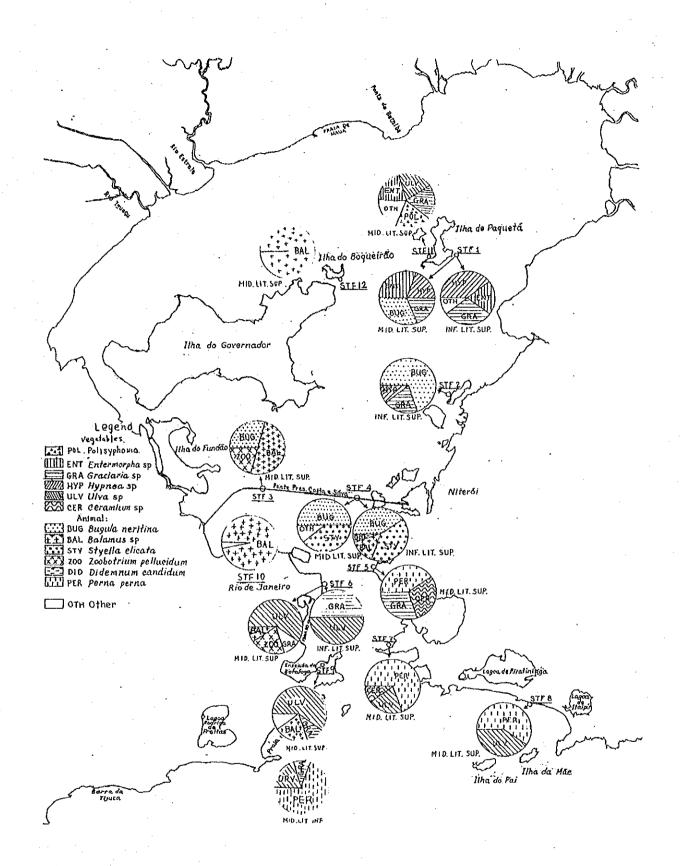


Fig. 7.5-1

Surface Distribution Ratio of Fouling Community at the Coastline of the Guanabara Bay

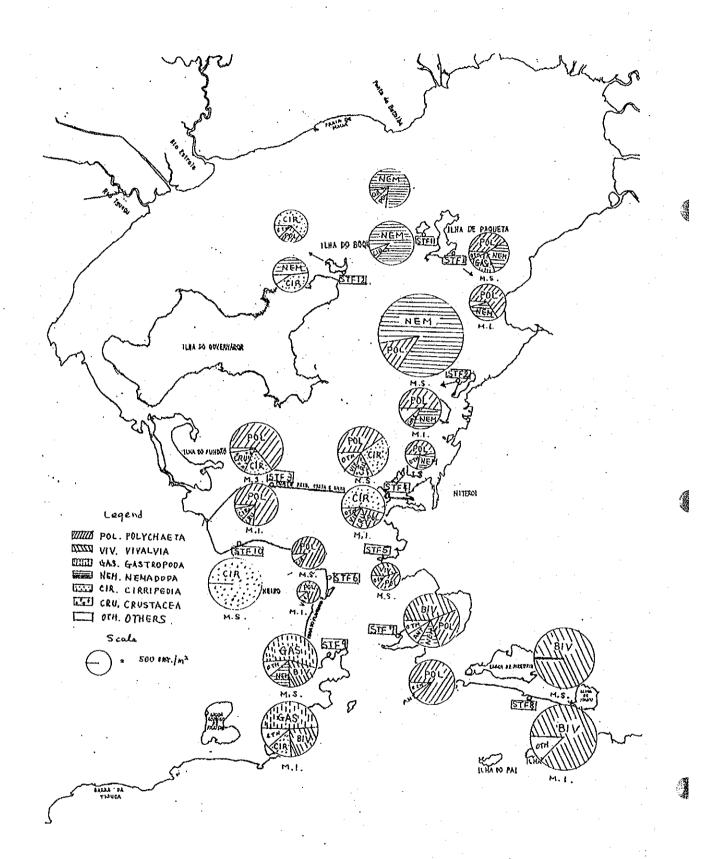


Fig. 7.5-2 Zoobenthos Community Distribution at the Coastline of the Guanabara Bay

7.5 Fouling Community

At the Guanabara Bay, the Rocky Coast that consists basic substract for the production of fouling organisms occupies a relatively small spread found mainly at the entrance region of the bay and around Ilha de Paqueta.

The coast constructed of stone and concrete, even if its area is more extensive than the Rocky Coast, is limited to the southern and central parts of the coastline where anthropic activity is more intensive.

Fouling fauna sampling were performed at 8 stations during the 1st phase of the study and 5 stations in the 2nd phase, selected strategically, taking into consideration the geological characteristics of the coastline and the water quality of Guanabara Bay.

The samples collected were in two tide levels (middle littoral superior and infra littoral superior), except at the station located on Ilha de Tavares where collection was performed besides in the two zones above mentioned, also in the middle littoral inferior, scrapping all fouling faunas adhesive inside the screen at 0.09 m². The collected samples, after preservation, were sent to the Department of Oceanography of the Universidade Estadual do Rio de Janeiro for classification and quantification. We had also the collaboration of Prof. Iva Nilce da Silva Brum of the National Museum and Universidade Federal do Rio de Janeiro for classification of zoobenthos, Cirripedia group in the observation conducted at the station established at the Rio de Janeiro harbor.

The results of the two surveys performed showed the presence of 41 species of zoobenthos and 5 species of macroalgae, thus obtaining relatively rich population of organisms at most sampling stations. Generally speaking, the middle littoral superior zone presented a higher fauna population than the infra littoral superior zone (see Appendix 7.3).

Fig.7.5-1 graphically shows the surface distribution ratio of macrofaunas estimated visually at all sampling stations. This figure presents the predominance in the Rocky surface of macroal-gae (Entermopha sp., Ulva graciraria and Hypnea sp.) that are relatively sensitive to pollution and salinity changes at the stations of Ilha de Paqueta, Santos Dumond Domestic airport, Ponta de Gragoata and Enseada de Botafogo.

Mussel Perna perna belonging to Cirripedia group is widely used commercially and was abundantly observed at the entrance of the bay. Approximately 95 of the posts of the Rio-Niteroi bridge extending to 8.5km are known as important production and commercialization sources of these mussels. However, very little amount of mussels were caught in the two phases of the sumpling surby because the frequent scrapping of fishermen has caused a decrease in this fauna. Instead, observation was carried out on zoobenthos, Bugula nentina and Styiella plicata, which cover the surfaces of the bridge posts situated at Niteroi side. General distribution pattern of the main zoobenthos can be seen in Fig.7.5-2 the Polychaeta group, found in 11 sampling stations, constitutes organisms with the large distribution area among the fouling fauna.

Balanaus sp. of Cirripedia group, specially B. amphirite and amphirite, which are considered biological pollution indicators, were observed to be predominant at the Rio de Janeiro harbor, where pollution level is high.

The Nematoda and Gastropoda groups as well as Perna perna, as explained, were each observed in limited areas.

Data presented above indicated the proliferation tendencies of each fouling fauna group in a restricted area without any general trends in their distribution pattern.

The statistical analysis that was realized using the Morita similarity index resulted in the formation of 7 groups of distribution trends with an 80% similarity ratio that could justify the observation results mentioned above.

7.6 Fish Production

During the two phases of the study, the main techniques in fishing, fish production, marketing of main commercial fish species, state of the fishermen and biological behavior of fishes were verified by viewing the bay as a-nursery ground.

Today, about 5,000 fishermen, grouped into 4 colonies, using boats and canoes are estimated to be working in the bay. The main fishing techniques used within the bay are "set nets", "trap nets", "bamboo screens", "hand lines", "sand trawls", etc.

According to the statistical data of IBAMA registered at Maua and Ramos fishermen colonies and the inventory data obtained at the Niteroi market by JICA/FEEMA study, about 6 tons/day of commercial fish production was estimated as the maximum production within the bay, in addition to about 1 ton per day of mussel Perna perna. About 80% of the catch is composed of Corvina, Bagre, Tainha, Sardinha de boca torta, Parati, Espada and Enchove. Depending on our field inventory, the minimum size of the fish captured by set nets was longer than 12cm and the biggest was 70cm. The weight varied from 100 to 3,000g. Fish captured by bamboo screens rane from 22 to 68cm long and from 570 to 790g in weight (see Appendix 7.4).

The total income by set nets and bamboo screens was estimated at about US\$ 10 to US\$ 20 per day, hence a total monthly yield of US\$ 200 to US\$ 400 can be estimated. Although their amount has decreased last year, it is still possible to catch shrimp in Guanabara Bay. Each operation can capture about 10kg of shrimp, using 15m x 15m mesh net, obtaining about US\$ 25 in gain. The extraction and cleaning of mussels are usually done as a family scale activity. About 300 pople, usually forming groups of 6, dedicate themselves exclusively to this activity which yields about US\$ 5,000 per group. The annual production of mussels meat in the coloby of Jurujuba and Boa Viagem is 300 tons, producing a profit of about US\$ 250,000.

The detailed investigation realized by the FEEMA laboratory showed that almost all of the heavy metals and PCB's found in the meat and kidney of various species of fishes and in mussels were lower in concentration than the criteria adapted.

Even though there are no historical statistical data, fish production reduction has been evident, recently causing serious anxiety among the fishermen. According to our investigation, the main reason for the fish production decadence is owed mainly to recent predatory fishing practices for maximum profits. Further, water quality deterioration might have affected also, without doubt, fish population composition and production.

According to Prof. Gustavo W. a. Nenon of the National Museum, and Universidade Federal do Rio de Janeiro, Guanabara bay plays a very important role as a fish nursery ground. Some of the fish, for instance, Tainha, Parati, Sardinha, some species of Manjuba, that are most popular in these regions enter the bay to grow up and return to the ocean after reaching maturity.

On the other hand, Enchova, some species of Linguado, Corvina and Pescadinhas enter the bay for reproduction. This fish behavior signified the close relationship between the bay and the ocean in view of fish production, as can be seen in many other cases of the estuarine system. So, if predatory fishing activities and water quality deterioration continue, it would cause the rupture of such an interdependent relationship in the near future, affecting severely fish production not only in the Guanabara Bay but also in the adjacent coastal areas of the ocean.

One of the best available solution in this situation that could meet the fishermen's requirement, and at the same time maintain fish communities according to the original function of the bay, would be the practice of artificial culture of commercial fauna, for instance mussels, oysters or other similar marine production, that can offer a renewable production without damaging the fundamental function of Guanabara Bay as a nursery ground.

7.7 Salt Marsh and Mangrove Swamps

7.7.1 General Situation of Mangrove in the Guanabara Bay

The profile of the main area of salt marsh and mangrove seamps and the general aspect of the present distribution of mangrove forest at the Guanabara Bay basin is drafted in Fig. 7.7-1. This figure was elaborated based on the information extracted by satellites images (LANDSAT) registered in 1991 and interpreted by I.E.F. (Instituto Estadual de Floresta) and the Study team in association with the field observations works perfomed during the 2nd phase of the study.

Although the Guapimirim and Cacerebu basins are preserved by the Federal Register, significant interference of human activities, principally at the southeast side of its area is already noticeable.

The mangrove forests extended in Rio Estrela and Rio Iguacu, mainly on the right side of Rio Estrela and the left side of Rio Iguacu, are seriously devastated. On the other hand, an appreciable area located at the lower side of the garbage landfill site, Jardim Gramacho, presents a mangrove forest almost non-existent. The ground of this area is completely dried and water can only be extracted at approximately 30cm below the ground.

The general distribution of mangrove forests observed in the study shows Laguncuraria sp.,normally near the river side, Avicennia sp. at the inner part and, in some cased, Rhizophora sp, on the river side. The mangrove forest existing in the Guapimirim basin is generally higher in elevation than the other areas; approximately 3-5meters for Laguncuraria sp., and 10-12meters for Avicennia sp. It is important to mention that Spartina sp., Hibiscus sp., and typha sp. are observed to largely invade the appreciable area of the mangrove forest.

7.7-2 Characteristics of Sediments

As for the characteristics of the sediments in the researched basins that consist fundamental subtracts to support all the biological and forestal evolution, as well as casual utilization for sewage disposal, the physico chemical analysis performed in the 12 stations generally showed light acid and high concentrations of organic matters (8 to 49% of volatile matter lost) (Table 7.7-1). The concentrations of N and P were also relatively high compared to normal soil composition, ranging from 1.3 to 2.0% and 0.71 to 0.26%, respectively. This fertility could be derived, mainly, from the contribution of litters originating from mangrove forests and pollution sources. On the other hand, the sediments are black in color due to reduction process and are composed almost of clay and silt (94-99%), indicating very low permeability.

It was verified that organic matter and phosphorous in the Iguacu and Estrela basins affected by pollution flow tend to have higher

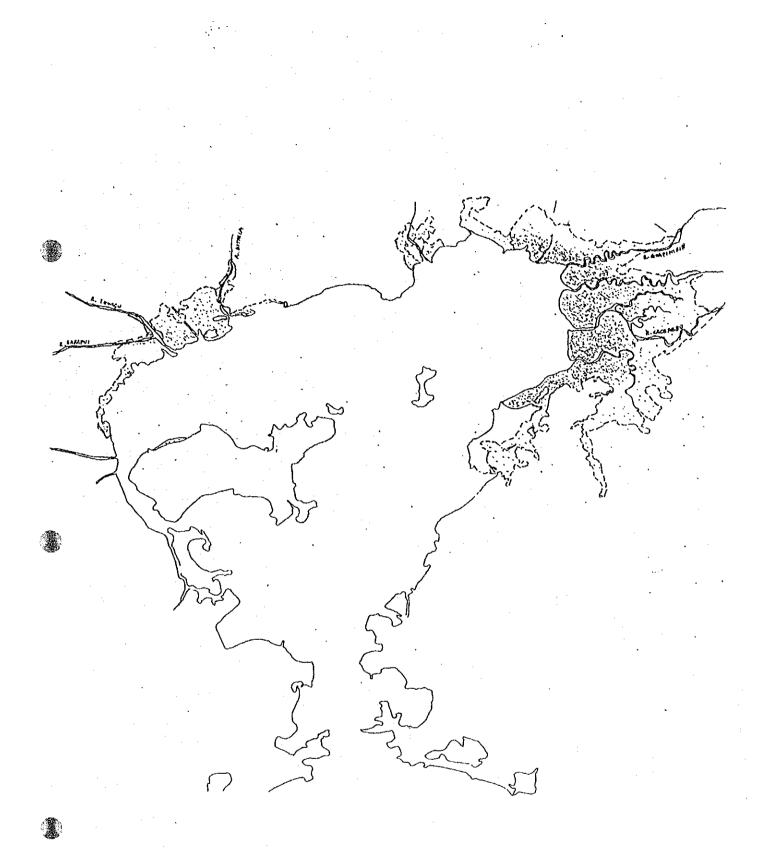


Fig. 7.7-1 Profile of Slt Marsh and Mangrove Swamps

concentrations than in Guapimirim and Cacerebu. The station located at the middle part of Estrela basin especially showed extremely high organic matter content (48%); this area is found to be highly populated by crabs.

As for heavy metals, all parameters analyzed showed very inferior values than the maximum limit for the criteria for practical agricultural use proposed by EPA/USA (Table 7.7-1). Higher Hg concentrations in Iguacu and Estrela basins located near the pollution source were obtained however as compared to the Guapimirim basin.

7.7-3 Crabs Community Inventory

Based on the investigation on the community of crabs performed in the transversal sections, the predominance of the Uca group followed by Ucides sp. and Chasmagnathus sp. was verified. The crab population ranges from 20 to 80 org./m², and the population in Estrela and Iguacu basins is observed to be higher. (Table 7.7-2)

Detailed information on to crab inventories are stated in Appendix 7.5. (May 1992 and November 1992)

Based on the data obtained, it seems that the destruction and the pollution level of the mangrove forest in researched areas has not yet reached the level where it can adversely affect the production of crabs. On the contrary, some crab groups such as Uca sp. already referred to, yield a higher population growth ratio in Estrela and Iguacu basins where more intensive environmental changes can be observed, as compared to APA-Guapimirim.

Crabs seem to be the most important consumers of organic matters in mangrove swamps, representing almost 75% of all animal biomass in this environment (Table 7.7-2). On the other hand, they essentially contribute to the oxidation of organic matter and reduction of compound contents in sediments through excavation when constructing their burrows.

As for the benthos community, the results showed predominant presence of the Polychaeta Errantia group in major sampling stations. The total population of organisms in each station ranged from 22 to 4653 org./m², generally showing a high population in the station situated near the sea-shore. Significant features of benthic distribution in the studied basins were not observed.

Station		Iguaçu Basin	sin	ы	Estrela Basin	un	ō	Guapimirin	Basin		Cacerebu Basin	asin
Parameter		2	n		R	3	Freed		3		7	3
Colour	balck	black	brown	black	black	black	prown	black	black	brown	black	black
H2S odor	ON	ON	NO	NO	NO	ON	ON	NO	ON	NO	0N	0N
He	5.2			6.7	6.2	6.5	6.6	6.5	6.6	6.6	7.1	6.6
Humidity (0/8)	67.9	59.6	54.2	53.5	59.4	661.3	63.2	67.1	76.7	49.1	66.0	67.0
Vol. Solid. 550oC (mg/l)	233	147	136	164	486	64	144	140	229	102	157	154
N-Kjeld hal (mg/l)	18.0	15.0	16.0	10.0	20.0	16.6	13.0	14.0	24.0	17.0	16.0	1.0
I.P. (mg/l)	2.5	2.4	1.3	1.5	2.6	11	<u> </u>	0.9	1.1	1.0	1.1	0.7
Clay and Silt (mg/l)	97.1	96.0	95.6	96.2	97.2	95.0	97.0	98.3	96.2	94.0	0.66	97.0
Cd (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	100'0>	<0.001	<0.00
Pb (mg/l)	0.04	0.03	0.03	0.05	0.04	0.04	0.01	0.02	10'0	0.01	0.02	0.01
Cu (mg/l)	0.045	0.035	0.025	<0.002	0.200	0,140	0.006	0.008	0.006	0.015	0.020	0,015
Cr (mg/l)	0.80	0.35	0.65	0.02	0.08	0.04	0.01	0.02	10.0	0.03	0.03	0.02
Hg (11811)	0.60	0.45	0.40	0.60	0.60	0.40	0.10	0.10	0.10	0.05	0.10	0.15
(lng/l)	0.10	0.14	0.08	0.10	0.11	0.11	0.08	0.05	0.04	0.05	0.10	0.03
Pe (mg/l)	27.0	22.0	27.0	47.0	25.0	17.0	24.0	32.0	18.0	43.0	51.0	32.0
Ni (mg/)	0.015	0.010	0.015	<0.005	0.015.	0.005	0.010	0.010	0.010	0.010	0.015	0,005
Mg (mg/l)	0.095	0.100	060.0	<00.00>	0.095	0.24	0.16	0.20	0.18	0.26	0.28	0.22

Table 7.7-1 Physical and Chemical Composition of Sediment Deposited in Mangrove Swamps around the Guanabara Bay

sited

Station Station	Rio	Rio Guapimirim	Ē	Rio C	Rio Cacerebu	
sp.	* * * * [*] * * * [*] * * * [*]	* * *	+ +]	
4 4	6 7	æ	¢	2	÷	2
, d	티지주보다 [프린프			11 11 11 11		
, d. 8	0 17.6	11,3	17,3	22,6	20,8	7,52
, ds						
	0 2,2	5,3	3,9	20,1	12,9	9,2
					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Ģ	,0 2,8	3,5	3,2	<u>.</u>	m T	м, м
7 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	· · · · · · · · · · · · · · · · · · ·			1 1 1 1 1 1		
	6		0,6			2.0
-		========	244282	# 11 K K K K K K K K K K K K K K K K K K	102E=E	142402
Total 70tal 34,0 34,0 39,0 42,6 38,5 79,8 63,6 22,6 20,1 25,0 42,8 26,8 37,9	,6 22,6	20,1	25,0	42.8	26,3	37,9

2

Table 7.7-2 Distribution of main species of crab on the marsh and mangrove.

7-46

7.7-4 Mangrove Swamps Purification Capacity and its Utilization for Waste Treatment.

The mangrove swamps and marshes form the coastline and maintain a semi-independent ecological environment of its own. The soil of these areas receives nutrient through the watershed and estuarine system and relays it to vegetal and animal biomasses. Some of the organic matter produced might be recycled in a mangrove forest, while others could be exported to the estuarine system.

There are no available data on standing stock and the productivity of mangrove trees in the Guanabara Bay basin that are essential to any nutrient balance study. It is, however possible to have a general idea through data researched in others basins. In the Panamanian Rhizophora forest (7.7-3), standing stock data showed estimates of 3,5tons/ha of leaves, 159tons/ha of stems, 116tons/ha of roots. In terms of productivity, 8ge/m² and 14ge/m² were found, respectively, in Puerto Rican and Malaya Rhizophora mangrove forests.

In relation to litter production that directly affects nutrient balance, a production of 1.26 and $2.3g/m^2$ was registered respectively at the region of Bertioga and Camboa in Brazil and this data (7.7-4) coincides with data obtained at Puerto Rico, Florida and Panama (7.7-5) whereby values ranging from 1.3 to 2.0 g/m²/d were measured.

When litters fall on humid ground, as in the case of swamps and marshes, they suffer rapid decomposition by fungals and bacterial acvtions, breaking down into detritus particles which will be consumed by various kinds of benthic animals. Crabs assemblages are the most important consumer of organic matter in mangrove forests, representing almost 75% of the animal biomass in this environment.

In the case of Guanabara Bay, assuming that each crab weighs 1g, it is possible to estimate 20g to 80g of crab biomass per square meter, basing on the 20 to 80crabs/m^2 found in 4 mangrove basins. If we assume that each of them daily eats organic matter correspondent to 3% of their own weight, the consumption of litters by crabs can be estimated in a range of 0.6 to $2,4g/\text{m}^2$, a reasonable value compared to litter production in a mangrove environment.

As for nutrient and organic matter balance between mangrove swamps and the estuarine system, there are no consensus among the published papers. Some study suggests that marshes may be important sources of organic matter for coastal ecosystem, while others suggest swamps and marshes are relatively unimportant (7.7-6). In addition, marshes have been described both as sinks and sources of inorganic nutrient (7.7-7).

In conformity to the study carried out by Golly (7.7-3) in Puerto Rico, around $2.3g/m^2$ of organic matter was registered to be exported from swamps to the estuarine. However, it seems to be the reverse in Guanabara Bay. This conclusion was reached because of

the presence of high concentration of organic matter in the sediments at the Iguacu and Estrela mangrove basins where pollution effects are presently more evident than in Guapimirim and Caceribu (Table 7.7-1). If exportation occurs more than accumulation a difference in the organic matter amount in the two referred areas will not be observed.

As for nutrient exchange, sediments in mangrove swamps normally contain large amount of sulfide compounds which accelerate the dissolution of P, therefore increasinf P concentration in the water. On the other hand, large amount of nutrients are found in Guanabara Bay, especially in the sediments in the Iguacu and Estrela swamps. In the Bay, P is observed to accumulate rather than dissolve from sediments and due to exportation.

Given the above explanation, it is reasonable to conclude that mangrove swamps and marshes in the guanabara Bay area contribute to the retention of nutrient and organic matter, thereby tlking part in the purification of the bay water.

The use of coast wetlands as natural sewage treatment plant can be considered a very interesting solution in the region where sophisticated mechanical facilities are beyond economic reach.

A mangrove forest must be supported by constant nutrient supply in order to keep the specific rate of growth, according to experiments performed in a system models of Florida, U.S.A. (7.7-8). Sediments of mangrove swamps and marshes of the Guanabara Bay present, yet, very low nutrient concentration to achieve the maximum production of trees, showing a possibility for the use of tertiary sewage treatment in the area. Walsh (7.7-9) reported that large amounts of nitrate and phosphate were removed from water running through mangrove swamps. The high proportions of fine clay found in the guanabara swamps and marshes has an efficient Premoval capacity. Ammonia ions can also be retained within the lattice structure of clay minerals and reduced for biological avctivities.

On the other hand, by denitrifying (7.7-8) bacteria, nitrogen in N² in sediments can be reduced. The disposal of sewage with large amounts of organic matter is not recommendable because it could provoke clogging of mangrove soil composed of not very permeable fine clay and silt. The heavy coating of soil as well as lenticels caused by large organic matter discharge can destroy the mangrove forest.

Therefore, sewage to be discharged in mangrove swamps should be subject to pre-treament to prevent the over accumulation of nutrients which could destroy the mangrove forest.

It is also very important to take note of the vulnerable nature of mangrove forests, where constant sediment accumlation and invasion of several grasses that could overcome the mangrove tree population through the years may occur. Global and aggressive measures should be adopted, therefore, to maintain and preserve mangroves.

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7.8 Water Area Division Based on the Aquatic Organisms

As it was evidenced through explanations on nutrient and chlorophyll-a variation feature, the division of Guanabara Bay into three areas was considered reasonable (see Fig. 7.8-1) in view of the phytoplankton biomass distribution pattern.

Table 7.8-1 indicated the main characteristics of the trophic state of each specific area, based on the mean values obtained from the 3 simultaneous surveys/92. Phytoplankton species distribution did not significantly vary in the bay area.

Zooplankton community is composed predominantly by the Copepoda group and its numerical distribution showed tendencies similar to phytoplankton suggesting the application of the same area division already presented. However, zooplankton distribution characteristics have to be considered in relation to toxic effects and salinity regime than nutrient amount variation.

Benthic community showed a clear distribution pattern according to the influence of water quality and especially of sediment characteristics allowing the division of the bay into 3 parts, into areas slightly different from those divided for the phyto and zooplankton community (Fig. 7.8-2)

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It was not possible to divide the water area of the bay according to fouling fauna distribution, because the general distribution trend of these organisms was not found. It would be reasonable to divide marshes and mangrove swamps in two regions, one constituting the Iguacu and Estrela basins where the devastation of trees, influence of pollution, others are in its advanced states, the Guapimirim and Cabecebu basins where a satisfactorily preserved condition can still be found in its central area regardless of anthropic interferences mainly at the south-east side and large scale invasions of vegetables in the forest.

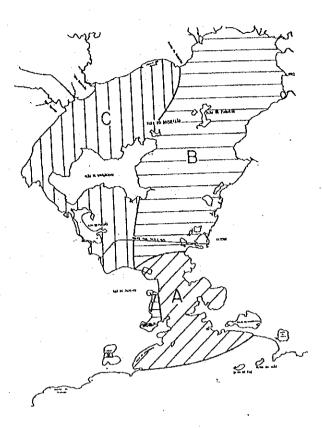


Fig. 7.8-1 Water Area Division Accordind to Phytoplankton and Zooplankton Distribution

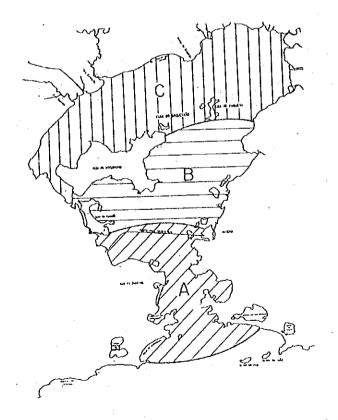


Fig. 7.8-2

Water Area Division According Benthic Community Distribution

· .	Area	of the Guanabara	bay
PARAMETER	A	B	с
TP mg/l	0,03 - 0.10	0.10 - 0.15	0.15 - 0.45
PO ₄ -P mg/l	0.01 - 0.025	0.01 - 0.020	0.05 - 0.22
TN mg/l	0.45 - 1.0	0.5 - 1.3	1.3 - 2.9
NH ₄ -N mg/l	0.02 - 0.10	0.04 - 0.10	0.15 - 1.3
CHL-a mg/l	1 - 20	20 - 50	50 - 97
Secchi Depth.	2.0 - 8.0	0.8 - 1.2	0.5 - 1.2
Trophic State	meso-eutrophic	super-eutrophic	ultra-eutrophic
Carlson Trophic State Index	50 - 60	60 ~ 70	70 - 80

Table 7.8-1 Characteristics of Trophic Levels of the Three Areas

APPENDIX

APPENDIX 1

DISTRIBUTION OF ENVIRONMENTAL FACTORS IN THE BAY

Field Record of the First Simultaneous Survey Table APP 1.2-1(3) (Spring Tide - Low Tide) Table APP 1.2-1(1)

1

Date:	Hay 18, 1992	Time: 09:05 - 10:00				
Station:	1					
Location:		22*54'58.9' S, 43*09'29.0'				
Neather or	the previous day:	Clear				
Weather or	the day:	Slightly cloudy				
Air temper	ature:	26.48 °C (09:00)				
Wind force		1 m/s				
Wind direct	ction:	Б				
Mater cold	or:	Light blue				
Secchi-dis	sk reading:	15.9 m				
Water dept	ት:	51.0 m				

Depth	Temp.	Salinity	· DO)		
(n)	(*C)	(%)	(mg/l)	(%)	pH	Sigma-t
0.0	24.28	35.02	6.0	89	7.78	23.59
2.0	24.19	35.02	5.8	86	-	23.62
4.0	24.16	35.02	5.7	85	-	23.63
5.0	24.11	35.03	6.0	89	7.63	23.65
8.0	24.10	35.04	5.7	85	-	23.66
8.0	23.91	35.12	5.8	86	-	23.78
10.0	23.80	35,28	5.8	86	-	23.93
12.0	23.74	35.23	5.8	86	-	23,91
14.0	23.68	35.27	5.0	87	-	23.96
16.0	23.59	35.39	5.9	87	-	24.08
18.0	23.46	35.55	5.9	87	-	24.24
20.0	23.25	35.66	5.9	86	-	24.38
22.0	23.38	35.53	5.9	86	· •	24.24
24.0	23.46	35.50	5.9	87	-	24.20
25.0	23.47	35,51	6.0	88	7.56	24.20
26.0	23.23	35.66	5.9	87		24.39
35.0	22.94	35.66	5.9	86		24.47
40.0	22.63	35.68	5.8	84	-	24.58
50.0	21.88	35.64	5.6	81	-	24.76

ę	APP 1.2-1	(3)	Field Rec	ord of th	e Firs	: st Simul	taneous Su	rvey
			(Spring T	ide - Low	Tide)		
	Date:		18, 1992		ime:		- 12:25	
	Station:	3	•					
	Location:			2	2*58*:	8.7° S.	43'08'23.2	2' W
	Weather o	n the pr	evious day	y: 0	lear			
	Weather o	n the da	у:		light	ly cloud	y	
	Air tempe	rature:				(11:35		
	Wind force	e:			m/s	•		
	Wind dire	ction:			SH			
	Water col	or:			ight g	treen		
	Seechi-di:	sk readi	hg:		.2 m	•		
	Water dep				1.0 m			
	Depth	Temp.	Salinity	DC				
	(m)	(°C)	(%)	(mg/l)	(%)	płł	Signa-t	
	0.0	25.94	32.60	5.9	89	7.54	21.27	
	0.5	24.60	33.35	5.8	86		22.24	
	1.0	24.58	33.40	5.8	86	-	22.28	
	2.0	24.22	33.93	5.8	85	-	22.79	
	3.0	24.53	34.01	5.6	83	· _ ;	22.76	
	4.0	24.18	33.57	5.7	84		22.53	
	5.0	24.22	33.92	5.5	82	7.60	22.78	
	6.0	24.17	34.04	5.4	80	-	22.89	
	8.0	24.14	34.05	5.3	79	-	22.90	
	9.8	24.17	34.01	5.3	78	- ¹	22.86	
	15.0	24.02	34.29	5.3	78	-	23.12	
	20.0	23.99	34.31	5.2	76	-	23.14	
	25.0	23.96	34.32	5.1	75	~	23.16	
	27.2	23.96	34.40	5.1	75	- '	23.22	
	31.8	23.75	34,52	5.1	75	-	23.37	
	35.0	23.91	34.52	5.1	75	-	23.33	
	45.0	23.78	34.92	5.2	77	-	23.67	
	49.0	23.86	34.56	5.2	77	7.7	23.37	

Table APP 1.2-1(2)	Field Record of the First Simultaneous Survey (Spring Tide - Low Tide)

vey Table APP 1.2-1(4)	ey	Table	APP	1.2-1(4)
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W

Field Record	of the First Simultaneous	Current
inclu hecolu	or the ritar anguleancous	aurvey
(Spring Tide	- Low Tida)	
Tobutu8 1100		

Date: Station: Location: Weather of Wind ford Wind dire Water col Secchi-di Water dep	2 on the pr on the da ce: ection: lor: isk readi		/: () 5 1 1 1 1 1	lear	27.8'S, lycloud	- 11:25 43°08'02.4' ly
Depth	Temp:	Salinity	DC			
(m)	(°C)	(%)	(mg/l)		pH	Signa-t
0.0	25.31	33.01	7.6	114	7.40	21.77
1.0	24,68	33.33	8.1	122	-	22.20
2.0	24.23	34.03	5.4	80	-	22.86
3.0	23.92	34.52	5.3	79	-	23.32
5.0	23.91	34.59	5.3	79	7.51	23.38
5.8	23.91	34.62	5.4	80	-	23.40
8.0	23.92	34.92	5.6	84	-	23.62
10.0	23.92	34.96	5.7		+	23.65
12.0	23.91	34.95	5.6	84		23.65
14.0	23.89	34.96	5.6	84	-	23.66
16.0	23.84	34.98	5.5	81	-	23.69
16.6	23.82	34.98	5.6	82	7.66	23.70

Date: Station:	Hay 4	18, 1992		Timė:	12:50	- 13:10	
Location	-			22*56**	25.5° °	43*10.102.	14
Weather o	on the da	v:			ly cloud		
Air tempe				-	17 01000	0	
Wind for			2	/m/s			
Wind dire	ection:			SSW			
Water col	lor:			ight b	on cerro		
Secchi-di	isk readi	ng:		.3 m	010111		
Hater der	oth:			2.5 m			
Depth	Temp.	Salinity	DC)			
(m)	(*C)	(%)	(mg/l)	(%)	płł	Signa-t	
0.0	25.16	32.68	8.0	119	7.64	21.57	
1.0	25.17	32.69	7.9	117	-	21.57	
2.0	24.66	33.12	7.7	114	-	22.05	
3.0	24.60	33.18	6.5	96	7.40	22.10	
4.0	24.61	33.18	6.0	88	-	22.11	
5.0	24.61	33.21	5.8	86	-	22.13	
	A2 AA	33 66	5.4	79	-	22.46	
6.0	24.37	33.55	0.4				
8.0	24.37 24.11	33.96	4.3		7.60		
				83	7.60	22.84	

Table APP 1.2-1(5)	Field Record of the First Simultaneous Survey
	(Spring Tide - Low Tide)

Date: May 18, 1992	Time: 13:35 - 14:00
Station: 5	
Location:	22°54'15.6' \$, 43°09'03.3' W
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	25.3 °C (13:35)
Wind force:	10 m/s
Wind direction:	SSW
Water color:	Green
Secchi-disk reading:	3.0 m
Water depth:	38.5 a

			D0	Salinity	Temp,	Depth
Signa-t	pH	(X)	(mg/1)	(X) -	(*C)	(a)
24.40	7.53	102	6.8	34.04	24.97	0.0
24.91	-	83	5.6	34.29	24.10	1.0
24.94	-	81	5.5	34.32	24.09	2.0
24.97	. ~	81	5.5	34.33	24.05	3.0
25.07	-	80	5.4	34.41	23.97	3.5
24.98	7.62	80	5.4	34.33	24.00	5.0
25.09	-	80	5.4	34.42	23.92	7.7
25.16	-	79	5.3	34.49	23.92	8.0
	7.48	· •	-	•• .	1. ¹ -	10.0
25.24	~	79	5.3	34.58	23.89	15.0
25.28	-	79	5.3	34.58	23.82	20.0
25.27	-	79	5.3	34.58	23,85	25.0
25.29	-	79	5.3	34.59	23.84	30.0
25.30	-	77	5.2	34.60	23.84	35.0
25.34	7.63	80	5.4	34.63	23.81	37.5

Field Record of the First Simultaneous Survey (Spring Tide - Low Tide) Table APP 1.2-1(6)

Date: May 18, 1992	Time: 11:50 - 12:15
Station: 6	
Location:	22*51'52.0' S, 43*09'31.0' W
Weather on the previous da	Clear
Weather on the day:	Slightly cloudy
Air temperature:	29.0 °C (11:54)
Wind force:	
Wind direction:	-
Water color:	Greenish brown
Secchi-disk reading:	1.3 m
Water depth:	20.0 m

		00	Salinity	Temp.	Depth
pll Signa-t	(%)	(mg/1)	(%)	(*C)	(m)
8.89 22.12	134	8.9	32.1	26.1	0.0
- 22.15	128	8.5	32.1	26.0	1.0
- 22.33	118	7.9	32.1	25.4	1.5
- 22.27	107	7.2	32.1	25.6	2.0
- 22.52	94	6.3	32.2	25.1	3.0
~ 22.76	76	5.2	32.5	25.3	4.0
8.38 22.95	62	4.2	32.6	25.0	5.0
8.29 23.93	45	3.1	33.4	24.4	10.0
- 24.82	54	3.6	34.2	24.1	15.0
8.31 25.08	58	3.9	34.4	23,9	19.0

Table APP 1.2-1(7)	Field Record of the First Simultaneous Survey
10010 MLL 112 1/11	Field Record of the first statistications parted
	(Spring Tide - Low Tide)
	(obting iter new iter)

Date: Hay 18, 1992	Time: 11:15 - 11:30
Station: 7	
Location:	22°51'59.1' S, 43°11.'57.8' W
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	30.0 °C (11:23)
Nind force:	Light wind
Wind direction:	• · · · · · · · · · · · · · · · · · · ·
Water color:	Greenish brown
Secchi-disk reading:	1.0 m
Water depth:	6.0 m

Depth	Temp.	Salinity	DO			
(m)	(°Č)	(%) ~	(mg/1)	(%)	pil	Sigma-t
0.0	27.1	31.5	4.5	69	8.27	21.20
0.5	26.6	31.5	4.2	63	-	21.38
1.0	25.7	31.6	4.3	64		21.74
1.5	25.1	31.9	2.8	42	-	22.22
2.0	25.3	32.7	2.7	41	-	22,98
2.5	24.7	32.8	2.0	29	-	23.24
3.0	25.0	32.8	2.1	31	8.15	23.15
4.0	24.8	33.1	2.1	31	'	23.51
5.0	24.6	33.3	2.0	29	8.13	23.77

Table APP 1.2-1(8)	Field Record of the First Simultaneous S	Survey.
	(Spring Tide - Low Tide)	

Date:	Hay 18.	1992	· 1	ine:	10:20	- 10:40	
Station:	8					1.00	
tocation:			2	2*59' 1	0.0° S	, 43*14.'1	11.9'
Weather o	n the pre	vious day	/: C	lear			
Weather o	n the day	:	S	lightl	y clou	dy	
Air tempe	rature:		2	9.5 *0	(10:3	2)	
Wind forc	e:			-			
Wind dire	ction:			-			
Water col	ог: .		0	reenis	h brew	n	
	a. a.	<i>.</i>	,	.2 🕮			
Secchi-di	sk readin	ig:	1	• 64 334			-
Secchi-di Water dep		g:		.0 n			
Water dep	th:		6			:	
Water dep Depth	th: Temp. S	alinity	E DO	.0 m		Signa-k	-
Water dep	th:		6	.0 m	pH	Signa-t	-
Water dep Depth	th: Temp. S	alinity	E DO	.0 m	pH 8,13		-
Water dep Depth (m)	Temp. S (°C)	alinity (X)	6 DO (mg/l)	.0 m (X)			-
Water dep Depth (m) 0.0	th: Temp. S (°C) 26.2	alinity (X) 28.7	6 (mg/1) 2.8	.0 m (X) 42 21	8.13	18.69	
Water dep Depth (m) 0.0 1.0	Temp. S (°C) 26.2 25.8	alinity (X) 28.7 29.9	6 DO (mg/1) 2.8 1.4	.0 m (X) 42 21 20	8.13	18.69 20.01	
Water dep Depth (@) 0.0 1.0 2.0	th: Temp. S (*C) 26.2 25.8 25.8 25.8	alinity (X) 28.7 29.9 30.3	E DO (mg/1) 2.8 1.4 1.3	(X) (X) 42 21 20	8.13	18.69 20.01 20.41	

Table APP 1.2-1(9) Field Record of the First Simultaneous Survey (Spring Tide - Low Tide)

Date: Station:	Hay 9	18, 1992	1	ine: (9:40 ~	09:55
location:	•	1. A.	. 2	2" 49" 3	3.8' S	, 43*12'28.4
Weather o	n the pr	revious day;		lear		
Weather o	n the da	лу:			ly člou	łv
Air tempe	rature:			-	•	
Wind forc	e:	1.1	L	ight i	rind	
Water col	00:				sh brom	a
Secchi-di	sk readi	ing:		.3 a		-
Water dep	th:			5.0 m		
Depth	Temp.	Salinity	00		· <u>-</u>	·
Depth (m)	Temp. (°C)	Salinity(%) -	00 (rg/1)	(\$)		Signa-t
				(X) 45	pH 8,16	
(R)	(°C)	(%)	(eg/1)			
(m) 0.0	(°C) 25.9	(%)	(rg/1) 3.0	45		19.48 19.66
(m) 0.0 1.0	(°C) 25.9 25.8	(%) 30.2 30.4	(rg/1) 3.0 1.8	45 26		19.48
(nt) 0.0 1.0 2.0	(°C) 25.9 25.8 25.5	(x) - 30.2 30.4 30.4	(mg/1) 3.0 1.6 1.3	45 26 20		19.48 19.66 19.75 21.08

APP 1-2

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Table APP 1.2-1(10) Field Record of the First Simultaneous Survey (Spring Tide - Low Tide)

Date: Nay 18, 1992	Time: 08:30 - 09:00
Station: 10	
Location:	22*50'01.0" S, 43*09'10.4' W
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	26.5 °C (09:00)
Wind force:	-
Water color:	_
Secchi-disk reading:	Greenish brown
Water depth:	1.4 a
Water depth:	24.0 m

Depth	Terp.	Salinity DO				
(m)	(°C)	(%)	(mg/l)	(%)	рH	Sigma-t
0.0	25.3	32.2	6.7	99	8.51	21.16
2.5	24.9	32.3	5.4	80		- 21.35
5.0	24.4	33.0	3.6	53	8.29	22.03
7.5	24.1	33.8	3.0	44	-	22.72
10.0	23.9	34.3	3.3	48	· _	23.15
15.0	23.8	34.2	3.6	. 53	-	23.11
20.0	23.8	34.2	3.6	56	· - ·	23.11
23.0	23.8	34.4	3.9	58	8.20	23.26

Table APP 1.2-1(11) Field Record of the First Simultaneous Survey (Spring Tide - Low Tide)

Date: Hay 18, 1992	Time: 03:05 - 09:35
Station: 11 Location: Weather on the previous day Weather on the day: Air temperature: Wind force:	22*49'01.1' S, 43*06'13.4' W Clear Slightly cloudy 26.5 °C (09:15) 0 m/s
Wind direction: Water color: Secchi-disk reading: Water depth:	Dark greenish brown 0.9 m 2.6 m
Depth Temp Salinity	DO

Depth	Temp.	Salinity	100			
(m)	(°C)	(X)	(ng/l)	(%)	B4	Sigma-t
0.0	25.5	26.5	9.1	132	8.38	16.84
0.5	25.5	26.8	8.9	129	-	17.06
1.0	25.4	26.9	8.5	123	-	17.17
1.5	25.4	27.5	6.3	91	-	17.62
2.0	25.1	27.9	5.0	73	8.26	18.00
2.2	25.1	28.1	4.7	68	-	18,15
2.5	25.0	28.3	4.6	67	-	18.33

Table Af? 1.2-1(12) Field Record of the First Simultaneous Survey (Spring Tide - Low Tide)

Date: May 18, 1992	Time: 10:30 ~ 11:15
Station: 12	
Location:	22*47'49.1' S. 43*07'56.1' W
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	29.5 °C (10:30)
Wind force:	-
Wind direction:	-
Water color:	Greenish brown
Secchi-disk reading:	0.9 m
Water depth:	16.4 m

Depth	h Temp. Salinity		DO				
(m)	(°C)	(%)	(mg/1)	(%)	PA	Signa-t	
0.0	26.1	28.3	10.7	158	8.51	18.00	
0.5	25.5	28.4	10.7	157	-	18.26	
1.0	25.3	28.5	9.4	136	~	18.39	
1.5	25.0	28.8	6.0	88	-	18.71	
2.0	25.0	29.2	5.8	84	-	19.00	
2.5	25.0	29.3	5.2	76	-	19.08	
3.0	24.8	30.0	5.5	80	-	19.66	
5.0	24.4	30,5	4.0	59	8.19	20.15	
7.0	24.4	30.6	3.7	54		20.23	
10.0	24.1	30.8	3.1	45	-	20.47	
15.0	23.9	31.1	3.0	44	-	20.75	
15.4	23.9	31.1	-	-	8.08	20.75	
16.0	23.9	31.1	~	-		20.75	

Table APP 1.2-1(13) Field Record of the First Simultaneous Survey (Spring Tide - Low Tide)

Date:	Hay 1	8, 1992	1	ime:	11:55	- 12:10	
Station:	13			÷.,			•
Location:			22*47'00.0" S, 43*15'00.0'				
Weather of	n the pr	evious day:	C	lear			
Reather o			C	lear			
Air teare		•	3	1.5 *0	(12:03	3)	
Wind forc			5	n/s			
Wind dire			Ň	W			
Water col			E	rown			
· - · · · · ·		ng:		1.4 m			
Secchi-di Water dep	sk readi	ng:	Ċ	•			
Secchi-di Water dep	sk readi th:		Ċ	1.4 m			
Secchi-di	sk readi		0)),4 ณ 5 ณ	pH	Signa-t	
Secchi-di Water dep Depth	sk readi th: Temp.	Salinity _	0 1),4 ณ 5 ณ	pH 9.17		
Secchi-di Water dep Depth (m)	sk readi th: Temp. (°C)	Salinity (%)	0) (mg/l)	.4 m .5 m (X)	9.17		
Secchi-di Water dep Depth (m) 0.0	sk readi th: Temp. (°C) 27.0	Salinity (X) 26.7	0) (mg/1) 3.8	.4 m .5 m (X) 56 46	9.17	16.53 18.06	

Table APP 1.2-1(14) Field Record of the First Simultaneous Survey (Spring Tide - Low Tide)

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	Date: Station:	Хау 18 14	1, 1992	T	ime:	11:05	- 11:30	
	Location:	•••		2	2° 49' '	13 Ar S	43*12'00	i or
		the nre	evicus day;		lear	, v, v	1 10 10 00	
	Weather or					ly close	łu	
	Air temper	•	•			C (11:0		
	Wind force				m/s	5 (1170)	· /	
	Wind direc			ม				
	Water cold		-			sh brom		
	Secchi-dis		107 1		.8 m		1	
	Water dept		18.		.7 m			
	nater dept	-11+		4	- F - M			
	Depth	Temp.	Salinity	DÖ				
	(m)	(°¢)	(%)	(mg/l)	(%)	pH	Sigma-t	
	0.0	26.0	28.2	10.7	158	9.70	17.95	
	0,5	25.9	28.2	10.5	154	-	17.98	
	1.0	25.3	28.3	9.2	134	-	18.24	
	1.5	25.3	29.3	7.6	112	· _	18.99	
	2.0	25.3	29.8	5.8	86	-	19.36	
	2.5	25.2	30.4	4.0	59	-	19.84	
	3.0	25.1	30.9	2.9	42	9.25	20.25	
	3.5	24.8	31.8	2.0	29	-	21.07	
	4.0	24.4	32.3	2.0	29	9.32	21.51	
APP 1-3	4.5	24,4	32.4	1.4	21	-	21.58	

1.2-1(15)	Field Record of the First Simultaneous Survey
	(Spring Tide - Low Tide)

Table APP

	Hay 18, 1992	Time: 11:45 ~ 12:25				
Station:		•				
Location:	1	22*46'09.1' S, 43*05'29.2' W				
Weather o	i the previous day:	Clear				
Weather o	the day:	Slightly cloudy				
Air temper	rature:					
Wind force	2:	-				
Wind direx	ction:	· _				
Water cold	Dr:	Dark greenish brown, transpare				
Secchi-di:	sk reading:	0.7 ±				
Water dep	th:	7.5 a				
Depth	Temp. Salinity	00				
(m)	(*C) (X)	(mg/l) (X) pH Sigma-t				

Date: Station:	Hay 1 18	8, 1992	Time: 10:20 - 10:40 22*44'00,0' S, 43*15'00,0'					
ocation								
leather o	on the pr	evious day:	(lear		-		
	on the da	y:	(lear				
ir tespe					C (10:2	0)		
ind fore				l m∕s				
lind dire			1	8				
ater col				rown				
ecchi-di	sk readi	nd:	C					
				.5 m				
later deç				.5 m				
Depth	Temp.	Salinity			•			
	oth:	а.	3	.5 m	 1kg	Signa-t	•	
Depth (m) 0.0	Temp.	Salinity_	BO	.5 m	 9.75	Signa-t 20.15	•	
Depth (m) 0.0 0.5	Temp. (°C) 25.9 25.9	Salinity (%)	00 (mg/1)	.5 m (X)	<u>`</u>		•	
Depth (m) 0.0 0.5 1.0	Temp. (°C) 25.9 25.9 25.6	Salinity (X) 31.1	00 (mg/l) 7.1	.5 m (X) 106	<u>`</u>	20.15	•	
Depth (m) 0.0 0.5 1.0 1.5	Temp. (°C) 25.9 25.9	Salinity (X) 31.1 31.1	3 D0 (mg/1) 7.1 4.4	.5 m (X) 106 66	<u>`</u>	20.15 20.15		
Depth (m) 0.0 0.5 1.0 1.5 2.0	Temp. (°C) 25.9 25.9 25.6 24.8 24.6	Salinity (X) 31.1 31.1 31.7	3 D0 (mg/1) 7.1 4.4 2.1	.5 m (X) 106 66 31	<u>`</u>	20.15 20.15 20.70		
Depth (m) 0.0 0.5 1.0 1.5 2.0 2.5	Temp. (°C) 25.9 25.9 25.9 25.6 24.8 24.8 24.6 24.5	Salinity (X) 31.1 31.1 31.7 31.9	00 (mg/l) 7.1 4.4 2.1 2.1	(X) 106 66 31 31	<u>`</u>	20.15 20.15 20.70 21.09	•	
(m) 0.0 0.5 1.0 1.5 2.0	Temp. (°C) 25.9 25.9 25.6 24.8 24.6	Salinity (%) 31.1 31.1 31.7 31.9 32.1	3 D0 (mg/l) 7.1 4.4 2.1 2.1 1.2	(X) 106 66 31 31 19	<u>`</u>	20.15 20.15 20.70 21.09 21.30	•	

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Table AFP 1.2-1(18)

Depth	Depth Temp. Sa		inity DO			
(m)	(°C)	(X)	(mg/l)	(%)	pfl	Sigma-t
0.0	27.3	28.1	15.4	230	8.51	17.47
0.5	25.8	28.3	12.4	181	· -	18.09
0.7	25.5	28.4	10.0	147	-	18.25
1.0	25.3	28.4	7.1	104	-	18.31
1.5	25.1	28.6	5.4	78		18.52
3.0	25.1	29.5	3.9	57	8.16	19.20
5.0	24.7	30.5	2.9	42	-	20.07
6.5	24.5	30.7	2.6	37	8.12	20.28

Field Record of the First Simultaneous Survey (Spring Tide - Low Tide) Table APP 1.2-1(16)

Date:		, 1992	1	lise:	13:05	- 13:20
Station:	16		-			
location:					3.3° S,	, 43''05' 4
		evious day:		lear		
leather o		74			y cloud	
Air tempe	rature:				(13:0	5)
find forc	e:			l - 2 m	√s	
ind dire	ction:			-		
Mater col	or:	1 - F	(Greenis	h brow	1 I
Secchi-di	sk readir	ig:	().9 m		
later dep	th:		4	1.3 m		
						·
Depth	Temp.	Salinity _	<u>D0</u>			
(m)	(°C)	· (X)	(ng/l)	(),)	, płi	Sigma-t
0.0	27.4	27.5	14.0	208	8.55	17.00
0.5	27.6	27.2	12.6	189	-	16.71
1.0	26.4	28.5	9.9	146	-	18.05
1.5	25.6	29.1	6.9	101		18.75
2.0	25.4	29.5	5.6	82	-	19.11
	25.0	29.9	4.3	63	-	19.53
2.5			2.0	44	-	20.01
2.5 3.0	24.4	30.3	3.0			
		30.3	2.9	43	8.20	20.07

Field Record of the First Simultaneous Survey (Spring Tide - Low Tide) Table APP 1.2-1(17)

Date:	Hay 18	3, 1992	т	ime:	09:25	- 09:50	
Station:	17						
Location:			2	2" 44' 0	0.0' S.	43*07.00.0*	R
		evicus dav:		Іеаг			
Weather o					y cloud	v	
Air tense		•			(09:45		
Wind forc				ight w		· ·	
Wind dire			ĸ				
Water col			-	rown .			
Secchi-di				1.9 m.			
Water dep		18.		.2 12			
nater dep	un.		v				•
Depth	Temp.	Salinity	DO			·····	
(m)	(°C)	(%)	(ag/l)	(X)	płł	Signa-L	
0.0	25.1	30.6	8.6	126	9.81	20.02	
0.5	25.1	30.6	8.3	122	-	20.02	
1.0	25.6	30.7	1.1	114		19.95	
1.5	24.9	31.6	5.6	82	~	20.83	
2.0	24.5	31.9	2.5	37	. .	21.18	
2.5	24.5	32.0	2.6	38	-	21.25	
3.0	24.3	32.2	2.3	34	-	21.46	
3.5	24.3	32.4	1.8	27	-	21.81	
4.0	24,3	32.5	1.9	28	-	21.69	
4.5	24.2	32.6	1.5	22	9.40	21.79	

APP 1-4

Table	APP 1.2-2 Date:		Field Recc (Spring Ti 18, 1992	ide - Hig	h Tide)	taneous Sur - 15:35	vey	Table	APP 1.2-2	(3)
	Station: Location: Weather of Weather of	n the pr n the da		n: C S	lear	18.7°S, ycloud	43*08' 23.2 y	2" W		Date: Station: Location: Weather c Weather c	n the
	Wind force Wind direct Water cold Secchi-dis	ction: or: sk readi	ng:	S B 7	SW SW 10e .0 m 20.0 m					Air tempe Wind ford Wind dire	ratu :e: :ctio
	Water dep Depth (m)	th: Temp. (*C)	Salinity (%)	D0 (ng/1))	pH	Signa-t			Water col Secchi-di Nater dep	sk re
	0.0	24.20	34.56 34,99	6.0 6.0	89 89	7.54	23.27 23.60			Depth (m)	Ter (*(
	1.0 2.0 3.0	24.19 24.20 24.16	34.99 35.00 35.00	5.9 6.1	88 91	-	23.60 23.61			0.0	24 24
	5.0 5.0 6.0	24.10	35.00 35.02	5.9 5.9	88 88	7.48	23.64 23.63		÷	2.0	24 24 24
	8.0 8.0 10.0	23.79 23.66	35.05	5.7 5.6	85 83	-	23.76 23.84			4.0 5.0	24 24 24
	15.0	23.65	35.11	5.5	81	· -	23.85			6.0	24

5.5

81

Clear

Cloudy

~ 14 ø√s

SW

00

(mg/1) (X)

5.7

5.7

5.6 5.7 5.7

5.6

5.6 5.6

5.6

5.5

5.5

5.5 5.6 5.5

5.2

5.1

Green 2.5 n 50.0 m

84

84

83

84

84

82

82

83

82

81

.78

75

7.30

Time: 16:00 - 16:25

₽{I}

7.48

-

-

7.48

_

_

-

-

_

7.61

22*55'39.8' S, 43*08'32.3' W

Sigma-t

23.08

23.16

23.25

23.35

23.55

23.57

23.58

23.57

23.56 23.58 23.58

23.57

23.58

23.57

23.58

23.59

23.86

		(Spring Ti	ide - Hig	h Tide	e)	
ate:	Hay	18, 1992	. 1	ime:	14:50	- 17:10
tation:	4					
ocation:			2	2°56′2	24.8 S	43°10.'01.
eather o	n the pro	evious day	<i>n</i> : (lear		
eather o	n the day	y:	0	loudy		
ir tempe	rature:			-		
ind forc	e:		8	tn√s		
ind dire	ction:		8	3 1		
ater cole	or:		(ireen		
ecchi-di:	sk readi	ng:	j	.6 m		
ater dep	th:		. 1	'.5 m		
Depth	Temp.	Salinity	DC)		
Depth (m)	Temp. (*C)	Salinity (%)	D((mg/l)		rH.	Sigma-t
					₽Ħ 7.56	Sigma-t 22.24
(m)	(*C)	())	(mg/l)	(X)		
(m) 0.0	(*C) 24.66	(%) 33.37	(mg/l) 6.2	(X) 92		22.24
(m) 0.0 1.0	(*C) 24.66 24.69	(X) 33.37 33.36	(mg/1) 6.2 6.2	(¥) 92 92		22.24 22.22
(m) 0.0 1.0 2.0	(*C) 24.66 24.69 24.70	(X) 33.37 33.36 33.39	(mg/1) 6.2 6.2 6.3	(X) 92 92 93	7.56	22.24 22.22 22.24
(m) 0.0 1.0 2.0 3.0	(*C) 24.66 24.69 24.70 24.54	(X) 33.37 33.36 33.39 33.56	(mg/1) 6.2 6.2 6.3 5.8	(X) 92 92 93 86	7.56	22.24 22.22 22.24 22.41
(m) 0.0 1.0 2.0 3.0 4.0	(*C) 24.66 24.69 24.70 24.54 24.54	(%) 33.37 33.36 33.39 33.56 33.53	(mg/1) 6.2 6.2 6.3 5.8 5.9	(X) 92 92 93 86 88	7.56	22.24 22.22 22.24 22.41 22.39

Field Record of the First Simultaneous Survey

Table APP 1.2-2(2)	Field Record of the First	Simultaneous Survey
·····	(Spring Tide - High Tide)	

23,60

19.5

Date:

Station:

Location:

Wind force:

Water depth: o, Depth

(m)

0.0

1.0

2.0

3.0

4.0

5.0

6.0

10.0

14.1

20.0

25.0

30.0

35.0

40.0

45.0

48.0

Wind direction: Water color: Secchi-disk reading:

35.11

May 18, 1992

3

Weather on the previous day:

Тепр.

24.23

24.12

24.08

24.01

23.88 23.87

23.88

23.84

23.91

23.89

23.88

23.93 23.89 23.90 23.90

23,90

(*c)

Salinity

(%)

34.32

34.38 34.48 34.59

34.80

34.83

34.84

34.82

34.83

34.85

34.85 34.85 34.85 34.85 34.85

34.85

34.87

Weather on the day: Air temperature:

Table APP 1.2-2(4) Field Record of the First Simultaneous Survey (Spring Tide - High Tide)

Date: Station:	May 18 5	1992	1	ine:	17:20	- 17:40
location			2	2°54' 3	4 5' 5	43*08' 5
	-	evious day	-	lear	M.0 0,	, 40 00 0
	on the day				y cloud	łv
	erature:				(17:28	
vind for				n/s		.,
find dir				W		
Mater co				-		
	isk readi	ng:	2	.3 m		
ater de		• ·	3	4.0 m		
Depth		alinity_	D0			
(m)	(°C)	(%)	(mg/l)	(%)	₽H	Signa-t
0.0	24.13	34.07	4.9	73	7.55	24.68
1.0	24.13	34.07	4.9	73	~	24.68
2.0	24.13	34.06	4.9	72	-	24.67
3.0	24.13	34.10	4.9	.73	-	24.71
4.0	24.13	34.09	4.9	72	-	24.70
5.0	24.14	34.12	5.1	75	7.45	24.73
6.0	24.16	34.09	5.0	74	-	24.63
7.0	24.14	34.09	5.0	74	-	24.70
10.0	24.20	34.09	5.1	75	7.50	24.68
14.1	24.17	34.17	5.3	78	-	24.77
20.0	23.92	34.64	5.3	79	-	25.31
25.0	23.90	34.68	5.4	80	. –	25.36
28.2	23.89	34,69	5.5	81		25.37
34.6	23.68	34.71	5.5	80	-	25.45
35.0	23.89	34.70	5.5	81	7.63	25.38

Table APP 1.2-2(5)	Field Record of the First Simultaneous Survey
	(Spring Tide - High Tide)

Date: Hay 18, 1992	Time: 16:50 - 17:15
Station: 6 Location: Meather on the previous day: Mint force: Wind direction: Water color: Seechi-disk reading: Mater depth:	22°51'53.1' S, 43°09'31.7' W Clear Slightly cloudy 24.5 °C (16:25) Light wind Dark green 2.0 m 22.0 m
	and the second se

Depth	Temp.	Salinity	00		- A - 1	
(a)	(*0)	(%)	(mg/1)	(%)	pH 1	Signa-t
0.0	24.4	33.5	6.5	96	8.34	24.13
1.0	24.4	33.6	6.1	90	. .	24.13
2.0	24.4	33.6	6.0	89	-	24.13
3.0	24.3	33.6	6.0	63		24.16
4.0	24.2	34.0	6.1	90	~.	24.59
5.0	24.0	34.2	6.0	89	8.33	24.85
10.0	23.7	34.5	6.1	91	8.28	25.24
15.0	23.8	34.5	6.1	91	. +-	25.21
20.0	23.9	34.6	6.3	93	-	25.28
21.0	23.9	34.6	6.2	92	8.27	25.28

. .

Date: Station:		18, 1992	ĩ	ise:	15:25	- 15:35
location	-		2	2 49 3	5.6°S	43 12 27.3
		revious day:		lear		
Neather (y cloud	iv
Air temps					(15:34	
and for				-		,
fater co		1. State 1.	G	reenis	h brow	`
Secchi-d		ind		.2 🖬	DE OIL	•
Kater dei		1118.	-	.0 0		
ater de	pun			.09		
Depth	Temp.	Salinity	DO		1.	
Depth (m)	Temp. (°C)	Salinity(%)	00 (mg/l)	(%)	рĦ	Sigma-t
(n)				(%) 85	pH 8.41	Sigma-t 20.28
(m) 0.0	(°C)	(1)	(mg/l)			
(m) 0.0 1.0	(°C) 26.2	(%)	(mg/l) 5.7	85		20.28
(m) 0.0 1.0 2.0	(°C) 26.2 26.3	(%) 31.4 31.4	(mg/l) 5.7 5.9	85 88		20.28 20.25
(m) 0.0 1.0 2.0 2.5	(°C) 26.2 26.3 26.1 25.9	(%) 31.4 31.4 31.5	(mg/l) 5.7 5.9	85 88		20.28 20.25 20.39
(m) 1.0 2.0 2.5 3.0	(*C) 26.2 26.3 26.1	(%) 31.4 31.4	(mg/1) 5.7 5.9 4.4	85 88 65		20.28 20.25 20.33 -2.86
(m) 0.0 1.0 2.0 2.5	(°C) 26.2 26.3 26.1 25.9	(X) 31.4 31.4 31.5 31.9 33.2	(mg/1) 5.7 5.9 4.4	85 88 65 - 36		20.28 20.25 20.33 -2.86 20.90

Taine APP 1.2-2(8)

Field Record of the First Simultaneous Survey (Spring Tide - High Tide)

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Table APP 1.2-2(6)	Field Record of the First Simultaneous Survey
10010 111 1.6-2(0)	FIGHT RECORD OF the First significations and vey
	(Spring Tide - High Tide)

ate: tation:		1992	1	lise:	16:25	- 16:35
cation:				2*52'0	n 7' .s	43*11.
		evious day		lear.	v	, 70 11.
	n the day				ly cloud	iv
ir tempe		· ·			(16:2	•
ind forc				light v		
ind dire	ction:			-		
ater col	06:)ark gr	een	•
ecchi-di	sk readir	ug:		.7 ธ		
ater der	the contract of the second sec		F	3.5 m		
ater dep	· · · · ·		~			
Depth	Temp. S	alinity	DO		pH	Sigma-L
		Salinity (%)			pH	Signa-L
Depth	Temp. S		DO		рН 8.32	Signa-t 22.32
Depth (m)	Temp. S (°C)	(%)	DO (mg/1)	(%)		
Depth (m) 0.0	Temp. S (°C) 25.1	(¥) 32.0	DO (mg/1) 4.3	(%) 64	8.32	22.32
Depth (m) 0.0 1.0	Temp. S (°C) 25.1 24.9	(%) - 32.0 32.9	DO (mg/1) 4.3 4.1	(%) 64 60	8.32	22.32 23.28
Depth (m) 0.0 1.0 2.0	Temp. S (*C) 25.1 24.9 24.7	(%) 32.0 32.9 33.0	DO (mg/1) 4.3 4.1 3.4	(%) 64 60 50	8.32	22.32 23.28 23.44
Depth (m) 0.0 1.0 2.0 3.0	Temp. S (*C) 25.1 24.9 24.7 24.7	(X) 32.0 32.9 33.0 33.0	00 (mg/l) 4.3 4.1 3.4 3.1	(%) 64 60 50 45	8.32	22.32 23.28 23.44 23.44

Table APP 1.2-2(9)	Field Record of the First Simultaneous Survey
	(Spring Tide - High Tide)

÷

ate:	May 18,	1992	T	ine:	14:30	- 15:00
tation:	10		9	2• 4Q' K	19' 5	43*09' 1
ocation:	- 11.0	ione dan		lear	1,0 01	
	n the prev		-		y cloud	u l
	n the day:				(14:52	
ir lenre				0.0 0	(14.00	
ind forc						
ater col					h brom	
	sk reading	11		.3 m	ar or own	L
later dep			-	.งต 6.0 ต	•	
later dep	th:			0.0 %		
Depth	Тепр. 5	Saliaity	00			
Depth (a)	Тепр. 5 (*С)	Saliaity(%)	00 (ng/1)	(X)	pH	Signa-t
(a)				(%) 87	pH 8,58	Signa-t 21.44
(a) 0.0	(*C) 25.6	(1)	(mg/1)			21.44 21.53
(m) 0.0 1.0	(*C) 25.6 25.3	(¥,) 32.7	(mg/l) 5.8	87		21.44 21.53 21.58
(a) 0.0 1.0 2.0	(*C) 25.6 25.3 25.2	(X) 32.7 32.7	(mg/1) 5.8 5.8	87 87		21.44 21.53
(m) 0.0 1.0 2.0 3.0	(*C) 25.6 25.3 25.2 25.0	(X) 32.7 32.7 32.7 32.7	(mg/1) 5.8 5.8 5.1	87 87 87 77		21.44 21.53 21.58
(m) 0.0 1.0 2.0 3.0 4.0	(*C) 25.6 25.3 25.2 25.0 25.0 25.0	(X) 32.7 32.7 32.7 32.8	(mg/1) 5.8 5.8 5.1 4.9	87 87 77 73		21.44 21.53 21.58 21.70 21.77
(n) 0.0 1.0 2.0 3.0 4.0 5.0	(*C) 25.6 25.3 25.2 25.0 25.0 25.0 24.8	(X) 32.7 32.7 32.7 32.8 32.8 32.9	(mg/1) 5.8 5.8 5.1 4.9 4.8	87 87 77 73 72	8.58	21.44 21.53 21.58 21.70 21.77 21.83
(n) 0.0 1.0 2.0 3.0 4.0 5.0 10.0	(*C) 25.6 25.3 25.2 25.0 25.0 25.0 24.8 24.4	(X) 32.7 32.7 32.7 32.8 32.8 32.9 32.9	(mg/1) 5.8 5.8 5.1 4.9 4.8 4.8 4.5	87 87 77 73 72 66	8.58	21.44 21.53 21.58 21.70 21.77
(n) 0.0 1.0 2.0 3.0 4.0 5.0	(*C) 25.6 25.3 25.2 25.0 25.0 25.0 24.8	(X) 32.7 32.7 32.7 32.8 32.9 32.9 33.8	(mg/1) 5.8 5.8 5.1 4.9 4.8 4.5 3.9	87 87 77 73 72 66 57	8.58	21.44 21.53 21.58 21.70 21.77 21.83 22.63

Table APP 1.2-2(7)	Field Record	of the	First	Simultaneous	Survey
	(Spring Tide	- Iligh	Tide)		

	a the prev	vious day:	C	lear	-	43*14.1	2 .7' . W	Table	APP 1.2-2(1	-	Field Record (Spring Tide			Similta	necus Surve
	n the day:				cloux				Datas	u	10 1000		Ŧ!	10.00	17. (0
ir tempe And forc			2	0.0 0	(15:6))			Bate: Station:	nay 11	18, 1992		Time:	17:25	- 17:40
ind fore				2					location:				90 * 46'	44 11 C	. 43°06′20.
later col			N	ark bro	1 673					the p	revious day		Clear	44.1 0	, 40 00 20.
	sk reading	,.		.4 m	JA11				Weather on				Cloudy	,	
ater dep		· .		.5 m					Nater colo		~~ *		-	sh brow	n.
acce cop	ы,		Ŭ						Secchi-dis		ing:		1.3 n	-11 01 01	
Depth	Temp. Se	linity	DO						Water dept				5.0 m		
(m)	(°C)	(%)	(eg/1)	(%)	рH	Sigma-t									
									Depth	Temp.		DO			
0.0	26.0	30.3	3.7	55	8.17	20.35			(n)	· (*C)	(X)	(sg/l)	(%)	pH	Signa-t
1.0	26.0	30.8	3.4	50	-	20.65								***	
2.0	25.8	31.3	2.6	39	8,16	21.41			0.0	25.0	30.7	5.8	85	8.22	
3.0	25.6	31.7	1.8	27	-	21.87			0.5	25.0	30.7	5.6	83	· 🗕	20.13
4.0	25.5	32.1	1.8	27	-	22.30			1.0	25.0	30.8	5.5	81	-	20.20
5.0	25.4	32.3	2.0	30	-	22.53			2.0	25.0	30.7	5.5	80	: -	20.13
6.0	25.4	32.4	2.4	36	-	22.63			3.0	25.0	30.7	5.4	79	-	20.13
7.0	25.3	32.5	2.2	32	-	22.76			4.0	24.8	30.8	5.2	76	8.21	20.28
	25.3	32.5	1.9	29	8.09	22.76			4.5	24.8	30.8	5.0	- 74	-	20.28

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APP 1-6

Table APP 1.2-2(11) Field Record of the First Simultaneous Survey (Spring Tide - High Tide)

Date: May 18, 1992	Time: 16:45 - 17:00
Station: 12	001472-10-11-0 401072-51-01-W
Location:	22'47'49.1' S, 43'07'51.9' W
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	-
Wind force:	
Wind direction:	- ·
Water color:	Greenish brown
Secchi-disk reading:	1.2 m
Water depth:	17.5 m

Depth	Tesp.	Salinity	DO			
(m)	(°C)	(%)	(mg/l)	(%)	Hq	Signa-t
0.0	25.4	30.3	8.6	127	8.52	19.71
0.5	25.5	30.3	8.8	130	-	19.68
1.0	25.5	30.2	8.7	128	<u> </u>	19.60
3.0	24.9	30.5	8.3	122	-	20.01
5.0	24.4	31.3	3.9	57	8.20	20.75
7.0	24.1	31.5	3.3	59	-	20.99
10.0	24.1	31.6	3.3	59		21.07
15.0	23.9	32.0	3.6	52	-	21.43
16.0	23.9	32.1	3.8	56	8.14	21.50
17.0	23.9	32.0	3.8	56	-	21.43

May 18, 1992 Date: Station: 15 Location: Weather on the previous day: Weather on the day: Air temperature: Wind force: Wind direction: Water color: Secchi-disk reading: Water depth:

16

Weather on the previous day:

Weather on the day:

Secchi-disk reading:

Temp. (°C)

26.2

26.2

Air temperature:

Station:

Location:

Wind force: Wind direction:

Water color:

Water depth:

Depth

(m)

0.0

0.5

Table APP 1.2-2(14)

Time: 15:30 - 15:50 22*46 17.2' S, 43*05'43.5' W Clear Slightly cloudy

5 - 6 m/s

Field Record of the First Simultaneous Survey (Spring Tide - High Tide)

Brownish dark green 1.2 m 10.0 m

Depth	Tepp,	Salinity	DO			
(m)	(*C)	(%)	(mg/1)	(1)	płł s	Signa-t
0.0	25.4	30.1	9.3	137	8.53	19.58
0.5	25.3	30.1	9.0	133	-	19,59
1.0	25.3	30.1	8.8	130	~	19.59
2.0	25.2	30.2	8.0	118	-	19.69
2.5	25.2	30.3	7.4	109	-	19.77
3.0	25.1	30.5	4.5	65	8.25	19.95
5.0	24.3	31.3	3.1	45	·	20.79
7.0	24.3	31.4	2.9	43	8.68	20.88
9.0	24.3	28.2	2.6	37	· _	16.90

Field Record of the First Simultaneous Survey (Spring Tide - High Tide)

Clear

8 m/s

4.3 m

205

SY

DO

(mg/1) (X)

13.9

12.7 187

Time: 14:15 - 14:45

Slightly cloudy 27.2 °C (14:20)

Greenish brown 0.9 m

22*48'44.1' S, 43*06'20.5' W

pH Signa-t

18.19

18.27

8.53

Field Record of the First Simultaneous Survey Table APP 1.2-2(12)

Date: Nay 18, 1992	Time: 14:30 - 14:55
Station: 13	
Location:	22*47'00.0" S, 43*15'00.0" W
Weather on the previous day	Clear
Weather on the day:	Clear
Air temperature:	29.5 °C (14:22)
Wind force:	7 m/s
Wind direction:	SW
Water color:	Brown
Secchi-disk reading:	0.5 m
Water depth:	2.0 m

Depth (a)	Temp. (°C)	Salinity (%)	D0 (mg/l)	(1)	pq	Sigma-t
0.0	26.8	26,3	11.5	169	9.61	16.30
0.5	26.7	26.2	11.0	162	-	16.25
1.0	26.7	26.2	10.6	156	-	16.25
1.5	28.6	30.5	10.4	156	9.26	19.49
2.0	25.1	31.5	2.3	35	-	20,69

Table APP 1.2-2(15) (Spring Tide - High Tide) May 18, 1992 Date:

1.0	26.1	28.8	10.7	158	-	18.37
1.3	26.1	28.9	-	-		18.45
1.5	25.0	29.9	6.6	96	-	19.53
2.0	25.1	30.1	4.6	68	-	19.65
2.5	25.0	30.5	3.6	53	-	19.98
3.0	24.8	30.7	3.2	47	-	20.19
3.3	24.8	30.7	2.9	43	8.16	20.19
4.0	24.7	30.7	2.9	42	-	20.22

Salinity

(%)

28.6

28.7

Field Record of the First Simultaneous Survey Table APP 1.2-2(13) (Spring Tide - High Tide)

Date:	Hay 18	, 1992	T	ime:	15:30	- 15:50
Station:	14		0	101 I C 0	0.01 0	10110100.0
Location:					U.U 3.	43 12 00.0
		evious day:	-	lear		
Weather of				y cloud	y	
Air tempe	rature:				15:28)	
Nind force	e:		. 6	in/s		
Wind dires	ction:		2	;		
Water col	or:		6	reenis	h brown	
Secchi-di:	sk readir	0.7 в				
Water dep	th:		e	3.0 m		
Depth	Tenp.	Salinity	DO			
(m)	(*C)	(%)	(mg/1)	(X)	pH	Signa-t
0.0	25.9	30.9	11.8	175	9.76	20.00
0.5	25.8	31.0	11.1	165	-	20.11
1.0	25.8	31.0	10.5	156	-	20.11
1.5	25.8	31.1	9.7	144	-	20.25
2.0	25.0	32.4	5.4	80	~	21.40
2.5	24.5	32.7	3.5	51	-	21.78
3.0	24.4	32.7	3.2	46	8.90	21.81
w.v			- , -			

2.7

2.5

2.5

39

31

37

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32.8

32.9

32.9

3.5

4.0

4.5

24.3

24.2

24.3

Table APP 1.2-2(16)	Field Record of the First Simultaneous Survey
	(Spring Tide - High Tide)

Date:		8, 1992	Ĩ	ime:	16:55	- 17:15	
Station:	17		9	2* 17' 1	9 10 01	43*07'00.	
Location:				lear	0.0 3	, 45 07 00.	
		evious day:	-			· ·	
Weather o		y:			y clou		
Air tempe					(16:5	o)	
Wind forc				- 6 n	√s		
Wind direction:			SM				
Water col	or:				ah brom	n	
Secchi-di	sk readi	ng:		.9 m			
Water dep	th:		5	.0 m			
Depth	Temp.	Salinity	DO	<u> </u>			
(m)	(*0)	· (X)	(mg/l)	(X)	pH	Sigma-t	
0.0	25.0	31.9	8.8	131	9.52	21.03	
0.5	25.1	31.9	7.7	114	-	21.00	
1.0	25.0	31.9	7.4	110	-	21.03	
1.5	25.0	31.9	6.9	102		21.03	
2.0	25.0	32.0	6.8	100	~	21.10	
2.5	25.0	32.0	6.9	102		21.10	
3.0	24.9	32.1	5.7	84		21.21	
3.5	24.9	32.1	5.1	75	_	21.21	
4.0	24.9	32.1	5.0	74	-	21.21	

21.91

22.02

21.99

Date:		8, 1992		Time:	16:10	- 16:30	
Station:	18						
Location:			:	22*44' (00.0' S	43*10.00.	
Weather o	m the pr	evious day:	(Clear			
Weather o	m the da	y:	(Clear			
Air tempe	erature:			(18:1	2)		
Wind ford			3 m/s		.,		
Wind dire				SN .			
Water col				-	h how	n	
Secchi-di		nd .	Greenish brown 1.0 m 4.0 m				
Water der		112 -					
nater der	:	1. A.	•	6.0 Al	;		
Depth	Temp.	Salinity	DO		· · · · ·		
(n)	(*C)	(%)	(mg/1)	(%)	pH	Sigma-t	
0.0	25.6	31.5	8.0	119	9.61	20.55	
0.5	25.6	31.5	9.2	137		20.55	
1.0	25.6	31.5	7.9	117	-	20.55	
1.5	25.0	31.5	7.6	113	9.26	20.55	
2.0	25.6	31.5	6.9	103		20.55	
2.5	25.5	31.8	6.5	97		20.65	
0.0	20.0	01.0	0.0	01	. –	20.00	

5.9

5.8

4.8

68

87

72

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20.65

20.76

20.98

Table APP 1.2-2(17) Field Record of the First Simultaneous Survey (Spring Tide - High Tide)

Table APP 1.2-3(1)	Field Record of the Second Simultaneous	Survey
	(Neap Tide - High Tide)	

31.8

31.7

32.0

3.0 3.5

4.0

25.5

25.4

25.4

24.11 24.02

23.84

23.68

23.59

23.37

23.27

23.24

23.01

22.68 22.09

21.71

35.11

35.17

35.26

35.29

35.42

35.46

35.49 35.57 35.65

35.70

5.0

6.0

8.0

10.0 15.0

20.0

25.0

30.0

35.0

40.0 45.0

49.0

Time: 11:00 - 11:22 June 8, 1992 Date: Station: 1 22'54'58.9' S, 43'09'29.0' W Location: Weather on the previous day: Clear Weather on the day: Slightly cloudy Air temperature: 28.0 *C (11:20) Wind force: 1 n/s Wind direction: R Water color: Green Garbage: No No 0i1: Secchi-disk reading: Water depth: 7.0 m 50.0 a Depth Salinity ΰÖ Tepp. (mg/1) (%) (a) (°¢) (X) pH Signa-L 8.42 19.64 0.0 24.89 34.96 9,8 144 19.62 1.0 24.95 34.96 9.4 142 9.6 19.70 2.0 24.66 34.94 143 9.3 9.2 9.5 138 136 19.79 19.83 3.0 24.37 34.93 34.94 4.0 24.22 34.98 34.98

134

115

110

104

103

97 95

85

81 ~

77

8.9 132

7.8 7.4 7.0

7.0

6.8 101

8.6

8.5 5.9

5.6

5.4

8.24

-

-

-

-

8.15

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8.11

19.87

19.89

19.94

19.99

20.02

20.08

20.11

20.12 20.18

20.27

20.44

20.54

Table APP 1.2-3(2)

¥

Field Record of the Second Similtaneous Survey (Neap Tide - High Tide)

Date:	June	8.1992	1	ime:	09:55	- 10:10	
Station:	2						
Location:			- 2	2 58 2	27.8' S	43*08'02.4"	W
Weather o	n the pr	evious day	: (lear			
Weather d	n the da	v:	5	lighti	ly cloud	ly	
Air tempe	rature:		. 2	6.5 *0	(10:10	0)	
Wind forc	e:			-		•	
Wind dire	ction:			-			
Water col	or:		(ireen			
Garbage:				lo :			
0il:			2	io `			
Secchi-di	sk readi	ng:	.7	.5 m			
Water dep	th:		1	9.0 R			
Depth	Tonp.	Salinity	DC)			
(m)	(°C)	(X)	(mg/1)	(%)	pli	Sigma-t	
0.0	23.91	34.76	7.2	107	8.13	19.92	
1.0	23 01	34 78	1 2	107		10.00	

0.0	23.91	34.76	7.2	107	8.13	19.92
1.0	23.91	34.76	7.2	107	-	19.92
2.0	23.92	34.76	7.3	108	-	19.92
3.0	23.91	34.78	7.1	105	-	19.92
4.0	23.89	34.76	7.1	105		19.93
5.0	23.88	34.76	7.0	104	8.01	19.93
6.0	23.85	34.79	7.1	105	-	19.94
8.0	23.56	35.13	7.0	103	-	20.02
10.0	23.49	35.18	7.0	103	-	20.04
12.0	23.45	35.20	6.8	100	-	20.06
14.0	23.23	35.32	6.6	97	· _	20.12
16.0	23.20	35.34	6.4	93		20.13
18.0	23.19	35.36	6.4	94	8.08	20.13

Date: Station: Location: Meather or Air temper Wind force Wind direc Water cold Garbage: Oil: Secchi-dis Water depl	3 in the pro- in the day rature: st stion: or: sk readin		2 0 2 2 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	llear Slightl 26.5 °C 2 m/s NW)	.0" ¥
Depth	Temp.	Salinity	DÓ)			
(m)	(*C)	(X)	(ng/l)	(X)	tH	Sigma-t	
0.0	24.48	33.77	6.7	. 99	8.12	19.76	
0.5	24.44	33.81	6.6	98		19.77	
1.0	24.37	33.86	6.5	96	· _	19.79	
2.0	24.20	34.10	8.6	97	-	19.84	
3.0	24.14	34.10	6.4	95	_	19.86	
4.0	24.10	34.17	6.2	92		19.87	
5.0	24.03	34.31	6.4	95	7.94	19.89	
6.0	23.87	34,59	6.4	95	-	19.93	
8.0	23.81	34.70	6.6	97	-	19.95	
10.0	23.72	34.84	6.5	96	-	19.98	
15.0	23.69	34,89	6.4	94	-	19.99	
20.0	23.68	34.90	6.4	94	-	19.99	
25.0	23.65	34.94	6.2	92	-	20.00	
31.0	23.65	34.94	6.5	95	8.07	20.00	

		eap 11de	- High Ti	de)		
Date:	June 8,	1992	Т	ime:	07:40	- 07:55
Station:	5					
Location:					5.6°S,	43°09'03
	n the previ	ous day:	-	lear		
Weather o	n the day:		\$	lightl	y cloud	y
Air temper				-,		
hind force				m∕s		
Wind dire				NW		
Water col	or: ·			rom		
Garbage:				o		
Oil:				°		
	sk reading:			.2 m		
Water dep	(h:		3	6.0 m		
Depth		Salinity	DO			
(m)	(°C)	(%)	(mg/l)	(X)	pH	Sigma-t
0.0	24.50	33.71	7.2	106	7.55	22.53
1.0	24.44	33.75	6.3	93	-	22.58
2.0	24.36	33.91	7.1	105	-	22.72
3.0	24.24	33.93	7.2	107	-	22.78
3.5	24.31	33.97	7.0	103	-	22.78
5.0	24.30	34.00	7.2	107	7.50	22.81
6.0	24.28	34.04	7.2	107		22.85
8.0	24.13	34.22	7.6	112	-	23,03
10.0	23.90	34.50	7.6	113	7.70	23.30
15.0	23.79	34.81	7.5	110	~	23.57
20.0	23.72	34.86	7.5	111	-	23.63
	23.72	34.86	7.4	109	-	23.63
25.0						
25.0 30.0 35.0	23.72	34.86 34.86	7.4 7.3	109 107	~	23.63 23.63

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Table APP 1.2-3(5)

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Table APP 1.2-3(4) Field Record of the Second Simultaneous Survey (Neap Tide - High Tide)

Date: Station: Location: Weather of Meather of Air tempe Water col Garbage: Oil: Secchi-di Water dep	4 n the pre n the day rature: or: sk readin		2 C S 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	lear lightl			.1" W
Depth	Tepp.	Salinity	DO	,			
(n)	(°C)	(X)	(mg/l)	(%)	PH	Sigma-L	
0.0	24.34	34.08	6.5	96	8.14	19.80	
1.0	24.33	34.09	6.4	95	-	19.80	
2.0	24.30	34.13	6.1	90	-	19.81	
3.0	24.12	30.00	5.1	74	8.04	19.86	
4.0	24.10	34.38	5.7	85	-	19.87	
5.0	24.07	34.41	5.6	83		19.88	
5.0	24.05	34.43	8.4	.95	-	19.88	
8.0	24.01	34.48	6.6	97	-	19.89	
10.0	23.99	34.50	6.4	94	-	19.90	
11.0	23.95	34.54	4.9	73	8.03	19.91	

Table APP 1.2-3(6) Field Record of the Second Simultaneous Survey (Neap Tide - High Tide)

Date: Station:	June 8 6	1992	. 1	îime:	07:15	- 07:50
Location:	o		,	22*52' r		. 43*09' 34.0
	n tha nra	vious day:		lear	0,0 5	, 43 09 34.0
Weather o					y clou	
Air tempe	-	•			; (07:2	
Wind force				ight w		5)
Wind dire				angine w l	and	
Hater col			•	•	h brow	
Garbage:				io een s	ar Drow	1
Oil:			•	les		
Secchi~dis	ek roodin	a.		.5 m		
		5	-	20		
Water dep			-	2.0 m		
		Salinity	-	2.0 m		<u> </u>
Water depi	th:	Salinity (X)	2		pH	Sigma-t
Water dep Depth	th: Temp.		2		pH 8.01	Sigma-t 22.04
Water dep Depth (m)	th: Temp. (°C)	(%)	2 DO (mg/1)	(%)		
Water dep Depth (m) 0.0	th: Temp. (°C) 24.6	(X) 33.1	2 00 (mg/1) 6.0	(%)		22.04
Water dep Depth (m) 0.0 1.0 2.5 5.0	th: Temp. (°C) 24.6 24.6	(X) 33.1 33.6	2 <u>DO</u> (mg/1) 6.0	(X) 88 -		22.04 22.42 23.09
Water depth (m) 0.0 1.0 2.5	th: Temp. (°C) 24.6 24.6 24.1	(%) 33.1 33.6 34.3	2 00 (mg/1) 6.0 - 5.7	(%) 88 - 84 76	8.01	22.04 22.42 23.09
Mater dep Depth (m) 0.0 1.0 2.5 5.0	th: Temp. (°C) 24.6 24.6 24.1 23.9	(%) 33.1 33.6 34.3 34.7	2 00 (mg/1) 6.0 - 5.7 5.2	(X) 88 - 84 76 75	8.01	22.04 22.42 23.09 23.48 23.53
Nater dep Depth (m) 0.0 1.0 2.5 5.0 7.5	th: Temp. (°C) 24.6 24.6 24.1 23.9 23.9	(X) 33.1 33.6 34.3 34.7 34.8	2 <u>DO</u> (mg/1) 6.0 5.7 5.2 5.4	(%) 88 - 84 76 75 75	8.01	22.04 22.42 23.09 23.48 23.53
Water dep Depth (m) 0.0 1.0 2.5 5.0 7.5 10.0	th: Temp. (*C) 24.6 24.6 24.1 23.9 23.9 23.8	(X) 33.1 33.6 34.3 34.7 34.8 35.0	2 <u>DO</u> (mg/1) 6.0 - 5.7 5.2 5.4 5.4 5.4	(%) 88 - 84 76 75 75 75 74	8.01	22.04 22.42 23.09 23.48 23.53 23.71

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Field Record of the Second Simultaneous Survey (Neap Tide - High Tide) Table APP 1.2-3(3)

APP 1-9

Date: June 8, 1992	Time: 08:10 - 08:30
Station: 7	
Location:	22*52'00.0' S, 43*12'00.0' W
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	30.0 °C (08:15)
Wind force:	Light wind
Wind direction:	N
Water color:	Brownish green
Garbage:	Yes
0il:	Yes .
Secchi-disk reading:	0.8 m
Water depth:	8.0 m

Depth	Temp.	Salinity	00			
(a)	(°C)	(%)	(vg/l)	(X)	płł	Signa-t
0.0	25.3	30.1	3.0	45	7.81	19.59
0.5	25.3	32.0	· –	-	- '	21.01
1.0	25.1	32.9	3.5	52	-	21.74
2.0	25.0	33.1	4.3	64	-	21,92
3.0	24.9	33.4	4.8	71	8.05	22.18
4.0	24.7	33.6	4.0	59		22.39
5.0	24.5	33.8	2.5	37	-	22.60
8.0	24.4	33.9	2.1	32	`	22.70
7.0	24.3	33.3	2.1	32	7.68	22.28

Table AFP 1.2-3(9) Field Record of the Second Simultaneous Survey (Neap Tide - High Tide)

Date:	June 8	, 1992	1	ime:	09:26	- 09:45	
Station: Location:	9		, 2	2 49 3	5' S, 4	3* 12' 27'	N
		evious day:		lear			
Weather c	n the da	y:	-	lear			
Air tempe	rature:		3	1.0 *0	(09:32)	•	
Wind force	e:		Ĺ	ight w	ind		
Water col	or:		B	romis	h green	1	
Garbage:			Y	es			
Oil:			K	lo			
Seconi-di	sk readi	ng:	1	.1 m			
Water der	oth:		8	i.0 m			
Depth	Temp.	Salinity	DO				
(m)	(*C)	(%)	(mg/1)	(X)	þł	Sigma-t	
0,0	25.7	31.2	6.1	91	7.98	20.29	
1.0	25.6	31.4	5.9	88	~	20.47	
2.0	25.7	32.4	5.7	88	- ·	21.19	•
3.0	25.3	33.1	5.1	76		21.83	
4.0	24.8	33.5	4.3	64	-	22.28	

3.5

52

22.39

7.93

Time: 10:05 - 10:25

Clear 26.0 °C (10:22) Light wind

Brownish green

Clear

Я

No

22'50'04' S. 43'09'08' W

33.6

24.7

June 8, 1992

Station: 10 Location: Weather on the previous day: Weather on the day:

Air temperature: Wind force: Wind direction:

Water color:

Garbage:

5.0

Date:

Table APP 1.2-3(8)

Table APP 1.2-3(7)

Field Record of the Second Simultaneous Survey (Neap Tide - High Tide)

Field Record of the Second Simultaneous Survey (Neap Tide - High Tide) Table APP 1.2-3(10)

Date: June 8, 1992	Time: 08:55 - 09:10
Station: 8	
Location:	22,50,12.0, S. 43,14,19.0, M
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	28.0 °C (09:04)
Wind force:	
Wind direction:	-
Water color:	Brownish green
Garbage:	Yes
011:	No
Secchi-disk reading:	1,4 m
Water depth:	8.0 m

Depth	oth Temp. Salinity DO					·····
(m)	(*0)	(1,)	(mg/l)	(X)	pfl	Signa-L
0.0	25.5	31.3	1.8	27	7.71	20.42
1.0	25.5	31.2	1.5	22	-	20.35
2.0	25.5	31.3	1.3	20	7.73	20.42
3.0	25.5	31.4	1.3	19	-	20.50
4.0	25.5	31.4	1.3	19	-	20.50
5.0	25.4	31.9	1.3	19		20,90
8.0	25.2	32.3	1.2	19	- '	21.26
6.5	25.3	32.2	-		-	21.18
7.0	24.9	33.3	1.6	23	7.79	22.10

22, 20, 13	or 3	5, 43	14' 19	3.0°
Clear				
Slightly	clo	ıdy		
28.0 °C	(09:0)4)		
-				
Brownish	gree	20		
Yes				
No				
1,4 m				
8.0 m				

halbage. Nil: Secchi-disk reading: Nater depth:			1	០ .2 ត 4.0 m		•	
Depth	Temp.	Salinity	DC)			DO
(n)	(°C)	(X)	(ng/1)	(%)	₽H 3	Sigma-t (r	eading.
0.0	25.4	32.9	8.3	124	8.26	21.65	10.0
1.0	-	-	-	-	-	- 1	9.
2.5	24.9	33.4	7.0	105	~	22.18	8.
4.0	- ·			-	- '	-	5.
5.0	24.4	34.1	4.5	67	8.04	22.85	5.
7.5	24.0	34.5	4.0	59	· _	23.27	4.
10.0	24.0	34.7	4.0	59	- '	23.43	4.
15.0	23.8	34.8	4.0	59		23.56	4.
20.0	23.7	35.0	4.2	62	· _	23.74	5.
23.0	23.7	35.1	4.2	62	8.07	23.82	5.

Table APP 1.2-3(11) Field Record of the Second Simultaneous Survey (Neap Tide - High Tide)

Time: 08:00 - 08:20
22°48'58.1' \$, 43°06'04.7' ¥
Clear
Clear
25.3 *C (07:10)
1 m/s
N
Brown
Yes
No
1.1 m
3.5 m

.

Depth	Temp.	Salinity	DC	ł		
(a)	(°C)	(%)	(mg/l)	(%)	pH	Sigma-t
0.0	25.5	28.6	9.3	136	8.17	18.41
0.5	25.4	28.8	8.5	124	-	18.59
1.0	25.3	29.4	7.4	108		19.08
1.5	25.2	29.5	7.1	104	-	19.17
2.0	25.1	29.9	6.5	95		19.50
2.5	24.9	30.1	6.6	96	8.09	19.71
3.0	24.9	. 30.1	5.9	86	·	19.71
3.3	24.9	30.2	5.9	86	-	19.78

Table APP 1.2-3(13)	Field Record of (Neap Tide - Hi		Simultaneous Survey
Date: Station:		8, 1992	Time:	10:09 - 10:20
Location:	13		22° 47' 0	8.4' S. 43'15'02.5' W

Location:	22°47'08.4' S. 43°15'02.5' W
Weather on the previous day:	Clear
Weather on the day:	Clear
Air temperature:	30.5 °C (10:11)
Wind force:	2 m/s
Wind direction:	NE
Water color:	Greenish brown
Garbage:	No
0i1:	No
Secchi-disk reading:	0.8 m
Water depth:	1.8 m
Depth Temp. Salinity (m) (°C) (X) (m	10 g/l) (%) p{ Signa-t
	SATA (MA) IN OIGHT-C

(R)	(*C)	(X)	(mg/1)	(1)	pl	Signa-t
0.0	26.6	27.1	7.9	120	8.04	16.95
0.5	26.4	28.0	7.0	106		17.68
1.0	25.2	32.2	2.8	42	· -	21.19
1.5	24.7	32.7	1.5	22	7.95	21.71
	0.0 0.5 1.0	0.0 28.6 0.5 26.4 1.0 25.2	0.0 28.6 27.1 0.5 26.4 28.0 1.0 25.2 32.2	0.0 28.6 27.1 7.9 0.5 26.4 28.0 7.0 1.0 25.2 32.2 2.8	0.0 28.6 27.1 7.9 120 0.5 26.4 28.0 7.0 106 1.0 25.2 32.2 2.8 42	0.0 28.6 27.1 7.9 120 8.04 0.5 26.4 28.0 7.0 106 - 1.0 25.2 32.2 2.8 42 -

Table	APP	1.	2-3(12)	Field	Reco	rd	of	th	е	Se
				(Nea)	> Tide	-	Hig	h	Ti	ide

Second Simultaneous Survey le)

Date:	June 8	1992	Time:	08:40 - 09:00
Station:	12			
Location:			22" 47" 8	56.2° S, 43°08'02.9° W
Weather o	n the pre	vious day:	Clear	
Weather o	n the day		Clear	
Air tempe	rature:		28.0 *0	: (08:50)
Wind forc	e:		1 m/s	
Wind dire	ction:		NEN	
Water col	OF:		Brown	
Garbage:			No	
011:			No	
Secchi-di	sk readir	ng:	1.9 m	
Water dep	th:		17.0 m	
Depth	Temp.	Salinity	DO	
(m)	(*c)	(¥.)	(mg/l) (X)	pH Sigma-I

Depui	L 4:4 - ,	corniry		,		
(m)	("0)	(%)	(ng/l)	(%)	pH	Sigma-L
0.0	24.7 .	30.5	7.9	115	8.12	20.07
0.5	24.7	30.6	7.5	110		20.14
1.0	24.7	30.7	7.5	110		20.22
1.5	24.6	30.7	7.8	114		20.25
2.0	24.6	30.8	7.7	112	-	20.32
4.0	-		7.3			-
5.0	24.5	31.3	6.3	92	8.05	20.72
8.0	24.2	31.6	~ `	-	-	21.04
10.0	24.0	32.0	-	-	· -	21.40
15.0	23.8	32.2	7	-	-	21.58
16.0	23.8	32.3	4.5	55	8.02	21.68

Table APP 1.2-3(14) Field Record of the Second Simultaneous Survey (Neap Tide - High Tide)

Date: Station:	June 8, 14	1992		Time:	09:35	- 09:40	
Location				(22" 4)	5' 12 Q'	S. 43°12′05	5° W
		evious da	v:	Clear		0, 10 10 00	.0 1
	on the day			clear			
Air teap					(09:27	3	
Wind for				1 m/s	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	
Wind dire				NB			
Water co				Brown			
Garbage:				No			
Oil:				NO			
Secchi-di	isk readin	ng:		D.8 m			-
Water der		0		5.6 m			
		_					
Depth	Temp.	Salinity	: D)	.		
		Salinity (X)	(mg/l)		pŧl	Sigma-t	
Depth	Temp.				pH 8.44	Sigma-t 17.87	
Depth (ສ)	Temp. (°C)	(X)	(mg/1)	(X)			
Depth (m) 0.0	Temp. (°C) 26.0	(X) 28.1	(mg/l) 11.7	(X) 171		17.87	
Depth (m) 0.0 0.5	Temp. (°C) 26.0 25.9	(X) 28.1 29.1	(mg/l) 11.7 10.3	(X) 171 153		17.87 18.65	·
Depth (m) 0.0 0.5 1.0	Temp. (°C) 26.0 25.9 25.2	(X) 28.1 29.1 32.6	(mg/1) 11.7 10.3 5.2	(X) 171 153 78		17.87 18.65 21.51	·
Depth (m) 0.0 0.5 1.0 1.5	Temp. (*C) 28.0 25.9 25.2 24.7	(X) 28.1 29.1 32.6 33.0	(mg/1) 11.7 10.3 5.2 4.2	(X) 171 153 78 63		17.87 18.65 21.51 21.96	·
Depth (m) 0.0 0.5 1.0 1.5 2.0	Temp. (°C) 26.0 25.9 25.2 24.7 24.6	(X) 28.1 29.1 32.6 33.0 33.4	(mg/1) 11.7 10.3 5.2 4.2 4.1	(X) 171 153 78 63 61	8.44	17.87 18.65 21.51 21.96 22.29	
Depth (m) 0.0 0.5 1.0 1.5 2.0 2.5	Temp. (°C) 26.0 25.9 25.2 24.7 24.6 24.5	(X) 28.1 29.1 32.6 33.0 33.4 33.5	(mg/1) 11.7 10.3 5.2 4.2 4.1 3.6	(X) 171 153 78 63 61 54	8.44	17.87 18.65 21.51 21.96 22.29 22.40	
Depth (m) 0.0 0.5 1.0 1.5 2.0 2.5 3.0	Temp. (*C) 28.0 25.9 25.2 24.7 24.6 24.5 24.5	(X) 28.1 29.1 32.6 33.0 33.4 33.5 33.6	(mg/1) 11.7 10.3 5.2 4.2 4.1 3.6 3.4	(X) 171 153 78 63 61 54 54 50	8.44	17.87 18.65 21.51 21.96 22.29 22.40 22.47	

APP 1-11

Table APP 1.2-3(15)	Field Record of the Second Simultaneous Survey
	(Neap Tide - High Tide)

Table APP 1.2-3(17)	Field Record of the Second Simultaneous Survey
	(Neap Tide - High Tide)

Daté: June 8, 1992 Station: 15	Time: 09:25 - 09:40
Location:	22"46'00.4" S. 43"05'32.4" W
Weather on the previous day	Clear
Weather on the day	Clear
Air temperature	29.5 °C (09:27)
Wind force	0.5 m/s
Wind direction	1 m/s
Water color	Greenish brown
Garbage	No
011	No
Secchi-disk reading	1.5 m
Water depth	8.0 m

ith .		8.U m				
Temp.	Salinity	DO		· .		
(°C)	(%)	(ng/l)	(%)	рH	Signa-t	
25.1	29.6	8.5	126	8.17	19.27	
25.2	29.6	8.5	124	-	19.24	
25.1	29.8	8.4	123	-	19.42	
24.9	29.9	8.3	121	-	19.56	
24.9	30.7	7.2	105	-	20.16	
24.6	31.0	6.6	96	8.11	20.48	
24.6	31.3	5.5	80		20.70	
24.4	31.3	•	-	-	20.76	
24.4	31.5	-	-	-	20.91	
24.5	31.6	4.6	62	8.01	20.96	
24.2	31.6	-	-+	-	21.05	
	25.1 25.2 25.1 24.9 24.9 24.6 24.6 24.4 24.4 24.5	Temp. Salinity (°C) (%) 25.1 29.6 25.2 29.6 25.1 29.8 24.9 29.9 24.6 31.0 24.6 31.3 24.4 31.5 24.5 31.6	Temp. Salinity DO (*C) (%) (mg/l) 25.1 29.6 8.5 25.2 29.6 8.5 25.1 29.8 8.4 24.9 29.9 8.3 24.9 30.7 7.2 24.6 31.0 6.6 24.6 31.3 5.5 24.4 31.3 - 24.4 31.5 - 24.5 31.6 4.6	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	

Date: Station:	June 8 17	, 1992		lime:	07:45	- 08:15
Location))+ 497 C	0 e e	, 43°07'01.
		revious day		lear	6.0 5	, 45 07 01.
Weather o				lear		
Air temp		~		25.0 °C	107-4	5)
Wind for				light w		v7
Wind dire				18	1171	
Water co				hown		-
Garbage				lo		
011				lo		
Secchi-di	isk read	ing		.2 m		
Water deg				5.3 m		
	· · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·				
Depth	Temp.	Selinity	DC			
(๓)	(*0)	. (%)	(eg/1)	(X)	pH	Sigma-t
0.0	24.6	31.6	7,8	114	8.50	20,93
		· · ·				00.01
0.5	24.4	31.1	7.5	108	-	20.61
0.5	24.4 24.5	31.1 31.8	7.5 7.3	108 107	:]	
					: _	20.61 21.11 21.22
1.0	24.5	31.8	7.3	107		21.11
1.0 1.5	24.5 24.4	31.8 31.9	7.3 7.1	107 103		21.11 21.22
1.0 1.5 2.0	24.5 24.4 24.4	31.8 31.9 32.1	7.3 7.1 6.9	107 103 101		21.11 21.22 21.37
1.0 1.5 2.0 2.5	24.5 24.4 24.4 24.2	31.8 31.9 32.1 32.3	7.3 7.1 6.9 6.4	107 103 101 94		21.11 21.22 21.37 21.58

Table	APP	1.2-3(16)	Field	Record

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Field Record of the Second Simultaneous Survey (Neap Tide - High Tide)

Field Record of the Second Simultaneous Survey (Neap Tide - High Tide) Table APP 1.2-3(18)

Date: Station:		, 1992		Time:	10:05	- 10:20	
Location				122"13	a' 97 a'	e 40200	(03.4° W)
Weather (on the m	revious day	J 1	Clear	5 61.5	0, 40 03	03.4 1)
Weather o	on the de	. CT 1000 (10)		lear			
Air temps		~			(10:1	•)	
Wind for		•				• •	
Wind dire				l - 2 в (В	vs		
Water col					.		
Garbage					h gree	n	
Oil				íes	1		
Secchi-di	Isk noodi	5.4	-	lo			
Water der		нқ		.4 m			
aater uer	, n		4	1.5 ភ			
Depth	Tenp,	Salinity	DX				
(m)	(°C)	(X)	(mg/l)	(*)	Bq.	Sigma-L	
0.0	25.4	29.7	7.1	104	6.23	19.26	
0.5	25.4	29.9	7.0	103	-	19.41	
1.0	25.4	30.1	7.1	105	-	19.56	
1.5	24.8	30.5	5.0	74	-	20.04	
2.0	24.8	31.0	4.3	64	-	20.42	
2.0 2.5	24.8 . 24.6	$31.0 \\ 31.0$	4.3 3.9			20.42 20.49	÷
						20.48	
2.5	24.6	31.0	3.9	58	-		·
2.5 3.0	24.6 24.6	31.0	3.9 3.4	58 50	8.01	20.48	·

ate: tation:	June 8,	1992	. 1	ime:	08:45	- 09:05
tation 1			2	2*44'0	2.7' S	43'09'5
		evious day		lear		10 00 0
	n the da			lear		
ir tempe		•			(08:50)) .
ind force	e		(n/s	-	•
ind dire	ction		Ň	8		
ater col	or		E	rom		
arbage			- F	io -		
il			ŀ	0		
	sk readi	ng	0	.9 в		
ater der	,th		. 4	.0 🖬		
Depth	Teap.	Salinity	DX			
(m)	(°C)	(X)	(mg/1)	(%)	pH	Signa-t
(m)						
0.0	25.3	30.6	9.1	134	8.49	19.97
	25.3	30.6 31.0	9.1 8.8	134 130	8.49	19.97 20,33
0.0			-		8.49 -	
0.0 0.5 1.0 1.5	25.1	31.0	8.8	130	8.49 - -	20,33
0.0 0.5 1.0 1.5 2.0	25.1 25.3	31.0 31.7	8.8 6.3	130 93	8.49 - - -	20,33 20.80
0.0 0.5 1.0 1.5 2.0 2.5	25.1 25.3 25.2	31.0 31.7 32.2	8.8 6.3 5.5	130 93 82	8.49 - - -	20,33 20.80 21.20
0.0 0.5 1.0 1.5 2.0	25.1 25.3 25.2 24.8	31.0 31.7 32.2 32.8	8.8 6.3 5.5 3.9	130 93 82 58	8.49	20,33 20.80 21.20 21.78

ļ

Date: Station: Location: Meather or Wind force Wind direc Garbage: Oil: Secchi-dis Water dep	2 i the pro- i the day sture: ction: or: sk reading		2 C S 2 G Y N 5	lear lightl: B.O °C -)
Depth	Temp.	Salinity	- IX			
(m)	(°C)	(%)	(ng/l)	(X)	١٩	Sigma-t
0.0	25.41	34.08	6.6	99	7.84	19.48
1.0	24.19	34.48	6.2	94	-	19.84
2.0	24.01	34.59	6.1	90	-	19.89
3.0	23.85	34.77	6.0	88	. ••	19.94
4.0	23.85	34.77	5.9	88		19.94
5.0	23.86	34.82	6.0	89	7.92	19.94
6.0	23.82	34.86	6.0	- 83	-	19.95
7.0	23.79	34.97	6.2	92	÷	19.96
10.0	23,66	35.08	6.1	91	-	20.00
12.0	23.45	35.21	5.7	84	-	20.06
14.0	23.35	35,26	5.8	85	-	20.08
16.0	23.24	35.33	5.2	77	-	20.12
17.0	23.14	35.33	5.2	77	7.79	20.14

Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide)

ate: Itation:	τ	ime:	14:35	- 14:45			
ocation:	4	2	22*56'24.8' S, 43*10'01.4*				
eather o	n the pro		lear	,			
eather o				lightl	y cloud	iy .	
ir tempe	rature:		3	0.5 °C	(14:35	5)	
ind force	e:			-			
ind dire	ction:						
later col	or:		D	ark br	own		
arbage:			N	0			
il:				0.			
erchi di	sk readia	ng:	0	.4 m			
later dep			1	0.0 m			
later dep	th:	Salinity	1 DC			·····	
		Salinity (%))	[4]	Sigma-t	
later dep Depth	th: Temp.		DC)	£₩ 8.55	Signa-t 19.43	
later dep Depth (m)	th: Temp. (°C)	(%)	DC (mg/l)	(%)			
later dep Depth (m) 0.0	th: Temp. (°C) 25.58	(%) 33.92	DC (mg/l) 16.5	(X) 249		19.43	
Depth (m) 0.0 1.0	th: Temp. (*C) 25.58 25.21	(%) 33.92 33.94	DC (mg/1) 16.5 10.2	(X) 249 153		19.43 19.54	
Aater dep Depth (m) 0.0 1.0 2.0	th: Temp. (°C) 25.58 25.21 24.86	(X) 33.92 33.94 34.11	00 (mg/1) 16.5 10.2 10.8	(X) 249 153 161	8.55	19.43 19.54 j \$4	
Ater dep Depth (m) 0.0 1.0 2.0 3.0	th: Temp. (°C) 25.58 25.21 24.86 24.53	(%) 33.92 33.94 34.11 34.18	DC (mg/1) 16.5 10.2 10.8 8.9	(X) 249 153 161 132	8.55 8.20	19.43 19.54	
Ater dep Depth (m) 0.0 1.0 2.0 3.0 4.0	th: Temp. (°C) 25.58 25.21 24.86 24.53 24.40	(X) 33.92 33.94 34.11 34.18 34.18	DC (mg/1) 16.5 10.2 10.8 8.9 7.4	(X) 249 153 161 132 110	8.55 8.20	19.43 19.54 56 19.54 19.54 19.87 19.87	
Depth (m) 0.0 1.0 2.0 3.0 4.0 5.0	th: Temp. (°C) 25.58 25.21 24.86 24.53 24.40 24.22	(X) 33.92 33.94 34.11 34.18 34.18 34.33	DC (mg/1) 16.5 10.2 10.8 8.9 7.4 5.3	(X) 249 153 161 132 110 78	8.55 8.20	19.43 19.54 55 1 1 1 2.83	

Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide) Table APP 1.2-4(2)

Table

W

Date: June 8, 1992	Time: 14:10 - 14:20
Station: 3	
Location:	22'55'39.8' S, 43'08'32.3' W
Weather on the previous day	y: Clear
Weather on the day:	Slightly cloudy
Air temperature:	28.0 °C (14:10)
Wind force:	-
Wind direction:	-
Water color:	Brown
Garbage:	Yes
0il:	Yes .
Secchi-disk reading:	1.6 m
Water depth:	33.5 m
Depth Temp. Salinity	
(m) (°C) (%)	(mg/l) (%) pH Sigma-t

(at)	(0)	(4)	(*******	141		
0.0	26,10	33.30	12.0	186	8.06	19.27
1.0	24,90	33.34	10.9	162	-	19.63
2.0	24.56	33.68	7.4	110	-	19.73
3.0	24.45	33.77	6.3	93	-	19.77
4.0	24.40	33.87	6.3	93		19.78
5.0	24.34	33.95	6.2	91	7.48	19.80
6.0	24.29	34.09	6.3	93	-	19.81
8.0	24.19	34.22	6.7	99	-	19.84
10.0	24.16	34.32	6.7	100	-	19.85
15.0	23.90	34.62	6.8	100	~	19.93
20.0	23.86	34.65	6.8	100	-	19.94
25.0	23.74	34.82	6.5	95		19.97
30.0	23.70	34.89	6.5	95		19.98
32.5	23.69	34.90	6.4	94	7.63	19.99

APP 1.2-4(4		ield Record Neap Tide -			Simulta	aneous Surve	₽y
Date:	June 8, 5	1992	т	ime:	15:10 -	15:20	: _
Station:	5			01 C / 1 O	A 57 C	43*08' 56.7'	ŵ.
Location:				2 04 J lear	ч.э э,	43 00 30.1	
Weather on					y cloudy		
Weather on	-	•			(15:15)		
Air temper Wind force			2		(10.10	,	
Wind direc				_			
Water colo			n	ark br	- CWD		
Garbage:	4. •		-	0 0	0011		
Oil:				es			
Secchi-dis	k pooding	.		.8 m			
Water dept		5.		5.0 m			
nater dept			v	0.0 #			
Depth	Temp.	Salinity	DO				
(m)	("0")	(X)	(mg/l)	(%)	płi S	Sigma-t	
0.0	28.70	32.79	19.8	301	8.38	21.16	
1.0	25.57	32.79	16.7	250	-	21.52	
2.0	25.40	32.92	11.8	176	~	21.67	
3.0	25.31	32.96	10.9	163	-	21.72	
4.0	24.89	33.23	8.4	125	-	22.05	
5.0	24.63	33.48	5.1	76	8.10	22.32	
6.0	24.50	33.75	6.4	95	-	22.56	
8.0	24.24	34.08	6.9	96	-	22.89	
10.0	24.11	34.33	6.7	100	8.06	23.11	
15.0	23,88	34.65	7.0	103	-	23.42	
20.0	23.79	34.78	7.4	109	-	23.55	
25.0	23.75	34.82	6.8	100	-	23.59	
30.0	23.72	34.85	7.0	103	-	23.62	
34.0	23.71	34.88	6.9	108	8.02	23.65	

APP 1-13

Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide) Table APP 1.2-4(3)

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Field Record of the Second Similtaneous Survey (Neap Tide - Low Tide) Table APP 1.2-4(5)

Date: June 8, 1992	Time: 15:30 - 15:45
Station: 6	
Location:	22 52 02.0 S. 43 09 34.0 W
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	31.5 °C (15:40)
Wind force:	**
Wind direction:	
Water color:	Brown
Garbage:	No
011:	No
Secchi-disk reading:	1.0 m
Water depth:	22.0 m

Depth Temp.		Salinity	10			
(m) .	(*C)	(%)	(mg/1)	(%)	pH	Signa-t
0.0	27.0	33.1	2.0	31	8.65	21.30
2.5	25.0	33.6	1.2	18	-	22.30
5.0	24.8	33.8	- 1.1	16	8.16	22.51
7.5	24.6	34.0	1.0	15		22.72
10.0	24.2	34.4	0.8	12	8.07	23.14
15.0	23.8	35.0	0.9	13	-	23.71
20.0	23.7	35.1	0.9	13 :	-	23.82
21.0	23.7	32.2	0.9	13	8.13	21.64

Table APP 1.2-4(6)

Table APP 1.2-4(7)

Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide)

Date:	June 8,	1992	ĩ	ime:	15:08 -	15:20	
Station:	7						
Location:		-			0.7°S,	43*11'55	.6° W
Weather on	the prev	ious day:		lear			
Weather on	the day:		S	loight	ly cloud	ly	
Air tempera	ature:		3	2.0 °C	(15:12))	
Wind force	:			-			
Wind direc	tion:			-			
Water colo			B	rown			
Garbage:	••			0			
Oil:				0			
Secchi-dis	k reading			.1 m			
Water dept		•		.0 m			
nater dept						1.1	
Depth	Temp.	Salinity	DO				
(m)	(°C)	(X)	(mg/1)	(X)	pH 3	Sigma-t	
0.0	28.8	31.8	2.1	32	8.36	20.39	
1.0	26.4	32.0	1.8	26	-	20.67	
1.5	25.0	33.2	-	-	-	22.00	
2.0	25.0	33.3	1.0	15	-	22.07	
3.0	24.6	33.7	0.8	12	8.01	22.49	
4.0	24.3	34.0	0.7	10	-	22.81	
5.0	24.3	34.1	0.6	9		22.88	
6.0	24.3	34.1	0.5	7	7.96	22.88	

Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide)

Date: June 8, 1992	Time: 14:35 - 14:50
Station: 8	
Location:	22'50'12.0' S, 43'14'19.0' W
Weather on the previous day:	Clear
Weather on the day:	Slightly cloudy
Air temperature:	32.0 °C (14:42)
Wind force:	Brownish green
Wind direction:	
Water color:	1. -
Garbage:	Yes
0il:	No
Secchi-disk reading:	1.0 m
Water depth:	7.0 m

Temp.	Salinity	DO			
(*C)	(%)	(mg/1)	(X)	pH	Signa-L
28.2	27.3	2.3	35	8.36	16.60
26.6	28.8	1.3	19	-	18.22
26.2	29.4	0.5	8	-	18.79
25.7	31.1	0.3	5	7.76	20.21
25.6	31.3	0.3	5	·	20.39
25.5	31.6	0.4	8	-	20.65
25.4	32.0	0.5	1	-	20.98
25.3	32.4	0.5	7	7.84	21.31
	(°C) 28.2 26.6 26.2 25.7 25.6 25.5 25.4	(*C) (X) 28.2 27.3 26.6 28.8 26.2 29.4 25.7 31.1 25.6 31.3 25.5 31.6 25.4 32.0	(*C) (X) (mg/1) 28.2 27.3 2.3 26.6 28.8 1.3 26.2 29.4 0.5 25.7 31.1 0.3 25.6 31.3 0.3 25.5 31.6 0.4 25.4 32.0 0.5	(*C) (X) (mg/1) (X) 28.2 27.3 2.3 35 26.6 28.8 1.3 19 26.2 29.4 0.5 8 25.7 31.1 0.3 5 25.6 31.3 0.3 5 25.5 31.6 0.4 6 25.4 32.0 0.5 7	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

Station:	9		- C	5		· · · ·
Location:			2	2' 49' 3	5.6' S	, 43 12 27.3
Meather o	n the pr	evious day:	Ċ	lear		
Neather o				lear	- 1 - L	
Air tempe			3	3.0 °C	(14:18))
Water col			·B	romis	h greer	1 ⁻ .
Garbage:			N	0	Ť.	
Oil:			N	lo .		
Secchi-di	sk readi	ng:	1	.2 m		
Water dep			e	6.0 m		
Depth	Temp.	Salinity	<u></u> DO			
(m)	(*C)	(%)	(mg/1)	(%)	pH	Signa-t
0.0	27.0	31.3	2.8	42	8.02	19.96
		2				
1.0	26.8	31.3	2.0	30	-	20.02
1.0	26.8 25.7	31.3 32.0	$\frac{2.0}{1.5}$	30 22	-	20.02
					-	1 A A A A A A A A A A A A A A A A A A A
1.0 2.0	25.7	32.0	1.5	22	- 	20.89

Table APP 1.2-4(8)

Date:

5.0

June 8, 1992

Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide)

Time: 14:13 - 14:23

Table APP 1.2-4(9)	Field Record of the Second Simultaneous	Survey
	(Neap Tide - Low Tide)	

Date: Station:	June 8 10	, 1992	1	líne:	13:35	- 13:54	
Station: Location:	• •			10° KO' 1		21001001 9	
		evious day:		lear	JA 3, 9	3.09.08. #	÷.,
	n the da			lear			
Air tempe		y .			. (19.50		
Wind ford				S.U 1 Jight 9	C (13:50	9	
Wind dire				Anglic : NE	a i na		
Water col)ark bi			
Garbage:	OI .			lo lo			
Oil:			-	lo lo			
	sk readi	nd•		.5 ຄ			•
Water der		IIR ·		เวล 31.0 ล			
warer net			4	.i.v a			
Depth	Temp.	Salinity	DC)		1.) - ^{1.}	DO
(n)	(°C)	(%)	(a.g/1)	(%)	рH	Sigma-t (r	
0.0	26.0	33.1	5.8	88	8.68	21.62	7.
0.5	-	-	-	-	~	-	4.
	-	-	-	-	-	-	
0.5	-	- -	-	-	• • •	-	3.
0.5 1.0	24.7	33.7	2.6			- 22.46	3. 2.
0.5 1.0 2.0	24.7	33.7	2.6	-	1 1 1 1	- 22.46	3. 2. 3.
0.5 1.0 2.0 2.5	24.7	33.7	2.6	- 38		22.46	3. 2. 3. 2.
0.5 1.0 2.0 2.5 3.0	24.7	- 33.7 - 34.0	- 2.6 - 2.0	- 38		22.46	3. 2. 3. 2.
0.5 1.0 2.0 2.5 3.0 4.0	-	-	-	38		- ·	3.1 2. 3. 2. 2.
0.5 1.0 2.0 2.5 3.0 4.0 5.0	24.5	34.0	- - 2.0	- 38 - 29		- - 22.75	3.1 2. 3. 2. 2. 2.
0.5 1.0 2.0 2.5 3.0 4.0 5.0 7.5	- 24.5 24.0	- 34.0 34.7	- 2.0 1.8	- 38 - 29 27		- 22.75 23.43	4.1 3.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1

Table #	PP 1.2-4	(10)	Field	Record	of	the	Second	Similt	aneous Surve	v
-	20.0	23.7		35.0		2.0	29	8.08	23.74	2.4
	15.0	23.8		35.0	1	0.5	29	-	23.71	2.4
	10.0	23.9		34.9		1.8	27	-	23.61	2.2
	1.0	0110				1.0	6.1		20.40	6.6

Date: Station:	June 8. 11	1992	1	ine:	15:15	- 15:30	
Location:			2	2"48' F	9.2' S.	43*06'08	8" W
Weather or	the pre	evious day:		lear	~		
Weather or				lear			
Water cold	-				h brown		
Garbage:				io			
0i1:				io			
Secchi-di:	k readir	12:		.0 m.			
Water dep		-5-	-	.7 m.			
Depth	Tenp.	Salinity	DC DC)	· · · ·		
(m)	(*C)	(X)	(mg/1)	(%)	гH	Signa-t	
0,0	28.1	30.2	9.0	138	8.36	18.78	
0.5	26.8	30.0	9.9	149	-	19.05	
1.0	26.3	30.1	9.8	146	-	19.28	
1.5	25.9	30.1	8.7	129	-	19.40	
2.0	25.8	30.1	8.2	121	-	19.44	
2.5	25.8	30.2	8.4	124	8.36	19.51	

APP 1-14

Table APP 1.2-4(11) Field Record of the Jecond Simultaneous Survey (Neap Tide - Low Tide)

Date: June 8, 1992	Time: 14:35 - 14:55
Station: 12	· · ·
Location:	22°47'30.0° S, 43°07'55.4° W
Meather on the previous day:	Clear
Weather on the day:	Clear
Water color:	Greenish brown
Garbage:	Ro
Oil:	No
Seechi-disk reading:	1.8 m
Water depth:	16.1 m

Depth Temp.		Temp. Salinity DO				
(a)	(*C)	(%)	(mg/l)	(X)	pH 1	Sigma-t
0.0	27.8	30.6	11.4	174	8.45	19.18
0.5	27.1	30.6	10.8	163	~	19.40
1.0	25.6	30.8	7.3	103	-	20.02
1.5	24.9	30.9	5.5	81		20.31
2.0		-	5.4	66	-	
3.0	24.9	31.3	5.4	79	-	20.61
4.0	-	-	5.2	-		
5.0	24.8	31.3	5.5	81		20.64
8.0	24.3	32.0		-	-	21.31
10.0	24.2	32.2	-	·	-	21.49
15.0	23.8	32.5	4.1	60	8.06	21.83
15.5	23.9	32.6	-	-	-	21.88

Table APP 1.2-4(12) Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide)

Date:	June 8,	1992	Ţ	ine:	13:22	- 13:37	
Date: June 8, 1992 Station: 13 Location: Weather on the previous day: Weather on the day: Air temperature: Wind force: Wind direction: Water color: Garbage: Oil: Secchi-disk reading:			22°44'10.5' S, 43°14'58.6' W Clear Clear 24.0 °C (13:25) 3 m/s NW Greenish brown No 0.7 m				
Water dep	oth:		1.6 m				
Depth	Temp.	Salinity (X)	D((ng/1)			Signa-t	DO (reading)
(m)	(°C)		(#8/17		,,,, ,		() coornay,
0.0	28.0	26.8	14.1	212	8.82	16.29	16.4
0.5	28.0	-	-	-	÷	-	14.4
1.0	25.4	-	- ·	-	8.81	-	13.2
1.5	25.4	-	-	-			3.9

 Table APP 1.2-4(13)
 Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide)

Bepth Temp. Salinity DO (m) (*C) (X) $(mg/1)$ (X) pH Sigma-t 0.0 27.7 29.0 20.1 306 8.14 18.01 0.5 27.7 29.0 16.7 252 - 18.01 1.0 26.6 30.2 12.0 180 - 19.26 1.5 25.7 31.4 6.4 95 - 20.45 2.0 25.1 32.3 4.4 65 8.07 21.31 2.5 24.7 33.0 3.4 50 - 21.96 3.0 24.6 33.3 3.1 45 - 22.22 3.5 24.5 33.5 2.8 42 - 22.40 4.0 24.5 33.6 - - 8.71 22.47	Station: Location:	n the da rature e ction or sk readi	evious day y	2 C 3 1 N 8 8 N 8 N 0 0	lear lear		- 14:09 43*12'01	.9 ⁻ ¥
$\begin{array}{cccccccccccccccccccccccccccccccccccc$						pti	Sigma-t	
4.5 24.4 26.4 ADD	0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0	27.7 26.6 25.7 25.1 24.7 24.6 24.5 24.5	29.0 30.2 31.4 32.3 33.0 33.3 33.5 33.6	16.7 12.0 6.4 4.4 3.4 3.1	252 180 95 55 50 45 42	8,07	18.01 19.26 20.45 21.31 21.96 22.22 22.40	

Table APP 1.2-4(14) Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide)

	June 8,	1992	ĩ	ime:	14:00	- 14:15		
Station:	15							
Location:			22*46'02.7' S, 43*05'32.8"					
Weather o	n the pr	evious day	C	lear				
Weather o	n the da	У		lear				
Air tempe	rature		3	4.0 *0	(14:08)	-		
Wind forc	e		0	ei∕s				
Wind dire	ction		N	E				
Water col	or		G	reenis	h brown	ι .		
Garbage			N	0				
011 -			N	0				
Secchi-di	ch nordi	nđ	1	.8 m				
occultrut	av rean	115	1	.o u				
Water dep		115		.0 m				
		Salinity		.0 m				
Water dep	th	-	8	.0 m	pH	Sigma~t		
Water dep Depth	th Temp.	Salinity	8 DO	.0 m	рН 8.30			
Water dep Depth (m)	th Temp. (°C)	Salinity (%)	8 (mg/1)	.0 m (X) 127				
Water dep Depth (m) 0.0	th Temp. (°C) 26.8	Salinity (%) 29.6	8 (mg/1) 8.5	.0 m (X) 127 111	8.30	18.75		
Water dep Depth (m) 0.0 0.5	th Temp. (°C) 26.8 26.0	Salinity (%) 29.6 29.5	8 0 (mg/1) 8.5 7.5	0 m (X) 127 111 88	8.30	18.75 18.92		
Water dep Depth (m) 0.0 0.5 1.0	th Temp. (°C) 26.8 26.0 25.4	Salinity (%) 29.6 29.5 30.1	8 <u>D0</u> (mg/1) 8.5 7.5 8.0	0 m (%) 127 111 88 71	8.30	18.75 18.92 19.56		
Water dep Depth (m) 0.0 0.5 1.0 1.5	th Temp. (°C) 26.8 26.0 25.4	Salinity (%) 29.6 29.5 30.1	8 <u>D0</u> (mg/1) 8.5 7.5 6.0 5.8	1.0 m (X) 127 111 88 71 73	8.30	18.75 18.92 19.56 		
Water dep Depth (m) 0.0 0.5 1.0 1.5 2.0	th Temp. (°C) 26.8 26.0 25.4 - 24.9	Salinity (%) 29.6 29.5 30.1 30.8	8 <u>D0</u> (mg/1) 8.5 7.5 8.0 5.8 5.0	0 m (X) 127 111 88 71 73	8.30	18.75 18.92 19.56 		
Water dep Depth (m) 0.0 0.5 1.0 1.5 2.0 3.0	th Temp. (°C) 26.8 26.0 25.4 - 24.9 24.6	Salinity (%) 29.6 29.5 30.1 30.8 31.3	8 <u>D0</u> (mg/1) 8.5 7.5 8.0 5.8 5.0 4.6	127 111 88 71 73 67	8.30 - - 8.09	18.75 18.92 19.56 20.24 20.70		

Table APP 1.2-4(15)	Field Record of the Second Simultaneous Survey
	(Neap Tide - Low Tide)

Date: June 8, 1992	Time: 13:25 - 13:40
Station: 16	
Location:	22*43'46.6' \$, 43*05'02.0' W
Weather on the previous day	Clear
Weather on the day	Clear
Air temperature	33.0 °C (13:30)
Wind force	0 m/s
Wind direction	NE
Water color	Dark brown
Garbage	No and the second
0il	No
Serchi-disk reading	1.1 m
Water depth	4.5 m
Depth Temp. Salinity	DO
(m) (°C) (X) (mg	71) (%) pH Sigma-t

0.0	27.7	28.9	8.9	134	8.30	17.93
0.5	26.6	29.4	11.7	175	-	18.66
1.0	25.7	30.2	11.5	170	-	19.54
1.5	25.1	30.5	6.3	93	-	19.95
2.0	24.6	30.9	3.7	54	-	20.40
2.5	24.7	31.0	3.4	50	-	20.45
3.0	24.6	31.1	3.3	48	-	20.55
3.5	24.5	31.1	2.9	42	8.02	20.58
4.0	24.5	31.2	2.4	35		20.68
1.0					<u></u>	

APP 1-15

Date: Station:	June 8, 17	1992	1	ine:	15:10	~ 15:20	
Location:					2.4' S.	43'07'02	0 1
		evious day	-	lear			
Weather o				lear			
Air tempe		•	3	34.0 °ċ	(15:1)	2)	
Wind forc				m/s			
Wind dire	ction		N	E			
Water col	or		8	rom			
Garbage			N	a			
0il				lo			
Secchi-di	sk readi	ng		.0 m			
Water dep	th		. 4	1.8 m			
		0-11-11-	DC		<u>.</u>		
Depth	Temp. (°C)	Salinity		(%)	胡	Sigma-t	
(ต)	(0)	VA 7,	(mg/l)		्रश	01802-C	
0.0	27.7	31.7	8.1	118	8.32	20.05	
0.5	26,6	31.8	8.7	127	-	20.47	
1.0	25.6	32.1	9.7	142	~	21.01	
1.5	25.1	32.1	5.7	84		21.16	
2.0	24.9	32.4	4.4	65	. +	21.45	
2.5	24.8	32.6	3.7	54	· _	21.63	
3.0	24.6	33.0	3.3	48		21.99	
3.5	24.4	33.3	2.5	37	-	22.27	
4.0	24.3	33.5	-	-	7.36	22.46	

Table APP 1.2-4(16) Field Record of the Second Simultaneous Survey (Neap Tide - Low Tide)

Table APP 1.2-5(1)

Field Record of the Third Simultaneous Survey (Spring Tide - Low Tide)

$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Weather of Wind ford Wind dire	l rature: on the pro on the day se: sction: lsk readir oth:	vious ':	2 2 0 2 2 8 8 4 0 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	4.5 *(09:20-09 00.0° S, 4 (09:20) and sligh	13*05'01.	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						Calinity.	F0	Cidmo-t
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			ря					STRUG-C
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	(m)	(.0)		(mg/1)	<u>(</u> U)	(4)	(05/00)	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.0	22.95	7.46	8.1	117	34.45		23.55
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			_	8.1	117	34.46	-	23.56
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			-	8.1	117		-	23,49
$\begin{array}{cccccccccccccccccccccccccccccccccccc$				8.4	122	34.37	-	23.50
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		22.85	-	8.5	123		-	23.57
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			8.09	8.6	124	34.43		23.58
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		22.77	- ·	8.6	124	34.44	-	23.60
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8.0	22.76	-	8.7	126	34.43	-	23.59
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	10.0	22.75	-	8.9	128		-	23.60
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	12.0		~	8.8	127	34.43	-	23.61
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	14.0	21.99	· -	8.8	125	34.62	-	23.95
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	15.0	21.97	-	8.7	124	34.62	· - ·	23.96
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	16.0	21.94	-	8.6	123	34.64	-	23.98
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	18.0	21.91	-	8.6	123	34.64	-	23.99
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	20.0	21.64	·	8.6	122	34.82	-	24.20
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	25.0	21.09	8.08	. 8.1	114	34.99	- 1	24.48
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	30.0	19.39	-	7.6	104	35.27		25.15
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	33.0	17.94	-	6.6	88	35.38		25.60
45.0 16.00 - 5.9 76 35.51 - 26.16	35.0	17.07	-	6.7	89	35.33	-	
	40.0	16.41	-	6.2	81	35.51		
49.0 15.20 7.95 5.7 73 35.49 - 26.33	45.0	16.00	-	5.9	76	35.51	-	
	49.0	15.20	7.95	5.7	73	35.49	-	26.33

Table APP 1.2-4(17)	Field Record of the Second	Simultaneous Survey
	(Neap Tide - Low Tide)	

4.0 ----

Date: Station:		, 1992		Time:	16:17	2 - 16:32	
Location			:	22*44*()).0° s	5, 43° 10° 00°	ų
Weather o	on the p	revious day	, (Clear		/, IV IV VV	"
Weather o				Clear			
Air tempe	erature			28.5 *0	(16:1	2)	
Wind ford	ce	•		3 m/s			
Wind dire	ection		SW Greenish brown No				
Water col	lor						
Garbage							
0i1				ŝõ			
Secchi-di	sk read	ing).6 a			
Water der				3.8 m			
Depth	Тепр.	Salinity	DX)			
(m)	(°C)	(X)	(mg/l)	())	F fl	Signa-t	
0.0			10 4				

		continue of		,		
(m)	(*C)	(%)	(mg/l)	(%)	64	Signa-L
0.0	28.1	30.6	16.4	251	9.69	19.09
0.5	28.1	30.3	14.5	222	-	18.86
1.0	28.0	30.4	15.2	232	-	18.97
1.5	26.2	31.2	7.8	115	-	20.14
2.0	25.4	31.8	3.9	58	-	20.84
2.5	25.0	32.5	3.2	47		21.49
3.0	24.5	32.9	1.7	25	-	21.94
3.5	24.4	33.2	-		8.04	22.20

Tab'e APP 1.2-5(2)	Third Simultaneous Survey
	(Spring Tide - Low Tide)

Date:	November 10, 1992	Time:	10:45~10:55	
Station:	2			
Location:		22*58' 2	29.2' S, 43'07'59.1'	ń.
Air tempera	ture:	25.94	C(10:45)	
Weather on	the previous day:	Cloudy	and slightly rain	
Weather on		Cloudy		
Wind force:		1 a/s		
Wind direct		S		
Secchi-disk	reading:	1.6 m		
Water depth		17.0 m	· · ·	
Water color			sh green	
Garbage:		Yes		
0il:		No	· · ·	
V				

Depth	Тепр.	pH	C	0	Salinity	23	Signa-t
(n)	(°C)		(mg/1)	())	(%).	(mS/cm)	÷
0.0	23.45	7.95	6.4	93	31.24		20.99
1.0	22.68	-	5.9	87	32.16	-	21.91
1.5	22.93	- '	6.1	90	32.49	-	22.08
2.0	22.52	-	8.5	95	32.90	•	22.51
3.0	22.35	-	6.4	-94	33.20	· _	22.78
4.0	22.32	-	6.5	92	33.34	-	22.89
5.0	22.31	7.99	6,5	92	33.38	· _	22.93
6.0	22.30	-	6.5	93	33.42	-	22.96
8.0	22.30	-	6,6	94	33.43	-	22.97
10.0	22,33	-	6,9	99	33.41	-	22.94
12.0	22.41		7.3	105	33.83	-	23.24
14.0	22.45		7.8	112	34.04	-	23.02
15.0	22.47	-	8.3	119	34.38	-	23.02
18.0	22.47	8.14	8.3	119	34.38	-	23.03

I

APP 1-16'

Table APP	Third Simultaneous Survey (Spring Tide - Low Tide)						
Date: Station: Location: Air temper Weather on Wind force Wind direc Secchi-dis Water dept Mater colo Garbage: Oil:	1992 Time: 11:20-11:37 22*55'53.6' S, 43*08'34.9' W 26.83 *C(11:20) day: Cloudy and slightly rain Cloudy 2-3 m/s S 1.5 m 45.0 m Brown Yes No						
Depth(m)	Temp. (*C)	Bd	(mg/l)	00 (%)	Salinity (%)	EC (mS/cm)	Signa-t
0.0	24.30	8.09	7.7	107	29.59	-	19.50
0.5	23.90	-	7.1	103	30.87	- '	20.58
1.0	23.08	· -	6.7	98	30.95		20.88
2.0	22.83	-	6.6	94	31.37		21.26
3.0	22.73		6.6	94	31.51	-	21.40
3.5	22.40	· -	6.4	91	32.28	-	22.07
4.0	22.46	-	6.4	91	32.97	-	22.58
5.0	22.39	8.00	6.5	92	32.98	-	22.60
6.0	22.40	-	6.5	92	33.01		22.62
7.0	22.37		6.6	94	33.25	. – .	22.81
8.0	22.42	-	6.6	94	33.01	-	22.62
10.0	22.40	-	6.9	98	32.98	-	22.60
12.0	22.36	~	7.1	98	33.40		22.93
14.0	22.37	-	7.0	101	33.43	-	22.95
15.0	22.39	-	7.2	100	33.35	-	22.88
16.0	22.37	-	7.3	103	33,40	-	22.93
18.0	22.36	-	7.4	104	33.46	-	22.97
20.0	22.36	-	7.4	105	33.39	-	22.92
25.0	22.37	**	7.4	105	33.40	-	22.93
30.0	22.37	~	7.4	105	33.42	-	22.94
35.0	22.33		7.4	106	33.60	-	23.09
40.0	- 22.28		7.4	108	- 33.89	-	23.17
44.0	22.31	8.06	7.4	106	33.51	÷-	23.03

Table APF		Simultaneous Survey g Tide - Low Tide)					
Date:	November 10, 1992	Time: 12:00-12:10					
Station:	4						
Location:		22°56 21.2' S, 43°09'59.3'					
Air tempe	rature:	26.8 °C(12:00)					
Weather c	n the previous day:	Cloudy and slightly rain					
Weather c	n the day:	Cloudy 2−3 rr/s					
Wind force							
Wind dire	ection:	51					
Secchi-di	sk reading:	0.8 m					
Water der		11.0 m					
Water co		Brown					
Garbage:		No					
0i1:		Yes					
	· · · · · · · · · · · · · · · · · · ·						

W

Depth(m)	Tesp.	pH	D	0	Salinity	EC	Signa-t
	(*0)	•	(rg/l)	(X)	(%)	(nS/cn)	-
0.0	25.10	8.09	8.8	128	29.70	-	19.35
0.5	23.14	-	6.4	92	31.67		21.40
1.0	22.92		6.6	94	31.87	-	21.62
2.0	22.93	-	6.4	91	31.64	-	21.44
3.0	22.98	8.02	6.6	94	31.59	-	21.39
4.0	22.80	•••`	6.3	89	31.88	-	21.68
4.5	22.74		5.9	84	31.94	-	21.72
5.0	22.26	-	5.3	75	32.83	-	22.53
6.0	22.00	-	4.9	69	33.32	_ <u>~</u> `	22.97
7.0	21.93	8.00	4.7	67	33.35	-	23.01
8.0	21.92		4.8	68	33.41	•	23.08
9.0	21.92	-	4.8	68	33,43	-	23.07
10.0	21.92	7.96	4.8	68	33.47	-	23.10

Table APP 1.2-5(5)			Third Simultaneous Survey (Spring Tide - Low Tide)					
Date: November 10, 1992 Station: 5 Location: Air temperature: Weather on the previous day: Weather on the day: Wind force: Wind direction: Secchi-disk reading: Water depth: Water color: Garbage: Oil:				22°54'07.3° S. 43°08'54.0' W 25.56 "C(12:33)				
Depth(m)	Temp. (°C)	pH	0 (mg/1)	0 (X)	Salinity (X)	EC (mS/cm)	Sigma-t	
0.0	23.44	8.03	6.6	95	30.24	-	20.24	
1.0	23.38	-	6.0	86	30.89	-	20.75	
1.5	22.81	-	5.6	80	30.97	· _	20.97	
2.0	22.82	-	5.6	80	30.98	-	20,97	
3.0	22.54	-	6.0	85	31.64		21.55	
4.0	22.51	~	6.1	86	31.98	-	21.81	
5.0	22.52	8.01	5.9	84	31.99	-	21.82	
6.0	22.52	-	5.9	84	32.09	· -	21.89	
0.8	22.47	-	6.0	85	32.17	-	21.97	
10.0	22.45	8.02	6.1	87	32.38	-	22.13	
12.0	22.22	-	6.0	85	32.68		22.42	
14.0	22.19	-	6.2	88	32.80	-	22.52	
15.0	22.14	-	6.2	88	32.97	-	22.67	
16.0	22.14	-	6.2	88	33.03	-	22.71	
18.0	22.14		6.4	92	33.13	-	22.79	
20.0	22.14	-	6.4	90	33.13	-	22.79	
25.0	22.13	-	6.8	98	33.47		23.05	
30.0	22.13		8.8	96	33.44	-	23.02	
35.0	22.18	-	6.8	98	33.57		23.11	
37.0	22.19	8.07	6.9	99	33.57	-	23.10	

	Third Simultaneous Survey (Spring Tide - Low Tide)
Date: November	10, 1992 Time: 08:20-08:45
Station: 6	
Location:	22°52'04.0' S. 43°00'05.4' W
Air temperature:	23.7 *C(08:20)
Weather on the previ	ous day: Cloudy and slightly rain
Weather on the day:	Cloudy
Wind force:	0-1 m/s
Wind direction:	SM
Secchi-disk reading:	1,0 m
Water depth:	19.5 m
Water color:	Brown
Garbage:	Ko
011:	No

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DEDRIGEL	tenp,	141	10		oarmity	50	ec signa-c	
	(°C)		(mg/1)	(%)	(%)	(mS/cm)		
0.0	24.50	-	9.5	132	22.16	34.11	13.88	
0.5	23.88	-	7.6	106	24.48	38.52	15.79	
1.0	23.65	-	7.1	100	27.18	41.39	17.88	
1.5	23.68		6.3	90	28.51	43.01	18.87	
2.0	23.52		6.1	77	28.91	43.41	19.22	
2.5	23.27	-	5.4	77	29.61	44.13	19.81	
3.0	23.15	-	5.5	79	29.97	44.14	20.12	
4.0	22.95	-	5.8	82	29.74	44.03	20.00	
5.0	22.84	-	5.6	79	30.05	44.35	20.27	
7.0	22.23		4.1	58	30.85	44.97	21.04	
9.0	21.96	-	3.8	50	31.84	45.98	21.86	
13.0	21.61	-	3.0	43	32.75	46.78	22.65	
17.0	21.80	- '	3.9	55	33.30	47.54	23.01	

Table APP 1.2-5(7)	Third Simultaneous Survey (Spring Tide - Low Tide)	
Station: 7 Location: Air temperature: Weather on the prev Weather on the day Wind force: Wind direction: Secchi-disk reading Mater depth: Water color:	Cloudy O-i m/s Str 7.1 m Brown	
Garbage: Oil:	No Yes	

Depth(m)	Temp.	pH		0	Salinity	EC	Signa-t
	(°C)		(mg/l)	(%)	(%)	(nS/cm)	
0.0	24.16	-	5.4	78	29.16	44.30	19.22
0.5	23.88	••• [*]	5.0	72	29.43	44.33	19.50
1.0	23.85	••	4.7	67	29.15	44.31	19.30
1.5	23.33	-	4.4	63	30.40	45.31	20.39
2.0	22.69	-	2.7	38	31.34	45.85	21.28
2.5	22.65	-	2.7	38	31.33	45.85	21.28
3.0	22.59	-	2.7	38	31.62	45.98	21.52
4.0	22.18		3.4	49	32.21	46.55	22.08
5.0	22.13	-	3.6	50	32.36	46.71	22.21
6.0	22.08	-	3.6	51	32.55	46.91	22.36
6.5	21.93		3.6	51	32.64	46.91	22.47

Third Simultaneous Survey (Spring Tide - Low Tide) Date: November 10, 1992 Time: 10:35-10:45 Station: 9 22*49'26.8' S, 43*14'35.4' W 27.2 *C(10:40) Location: Air temperature: Weather on the previous day: Cloudy and slightly rain Weather on the day: Cloudy Wind force: Wind direction: Secchi-disk reading: 0-1 m∕s SM ол 0.6 m 3.6 m Water depth:

Table APP 1.2-5(9)

Water color:

Table APP 1.2-5(10)

Garbage:

0il:		Ho					•	
Depth(m)	Temp. (*C)	₽Ĥ	[(rg/1)) <u>)</u> (X)	Salinity (%)	EC (nS/cn)	Signa-t	
0.0	25.09	-	6.37	91	26.47	41.38	16.93	
0.5	25.11	~	5.94	85	26.45	41.35	16.91	
1.0	24.99	· 🗕 -	5.35	77	26.49	41.35	16.98	
1.5	24.83	-	4.28	61	28.54	41.29	17.06	
2.0	24.08	-	1.88	27	28.09	42.70	18.44	
2.5	23.76	-	1.86	26	28.78	43.65	19.05	
3.0	23.48	-	2.05	23	29.98	44.81	20.03	
3.5	22.90	-	1.07	15	30.79	45.60	20.81	

Third Simultaneous Survey

Brown

Кo

Table APP			neous Survey - Low Tide)				
Date:	November 10, 1992	Time:	11:03-11:21				
Station:	8						
Location:		22*50'04.3' S. 43*14'21.9' W					
Air tempe	rature:	25.0 *C(11:05)					
Weather o	n the previous day:	Cloudy and slightly rain					
Weather o	n the day:	Cloudy					
Wind forc	e:	2-3 m/s					
Wind dire	ction:	SW					
Secchi-di	sk reading:	0.9 m					

• Water depth: Water color:

Temp. (°C)

25.75

24.52 24.45 24.37 24.33 24.06 24.03 23.92

23.72

23.08

23.04

23.04

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-

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-

-

_

Garbage:

Depth(m)

011:

0.0

0.5 1.0 1.5

2.0

2.5

3.0

4.0

5.0

6.0

7.0

8.0

9.2 m

Brown

94

32

30

31

37

26

25

22

17

18

14 12

No

No

DO (mg/l) (%)

6,58

2.26 2.10 2.16 2.58

1.82

1.76

1.63

1.22

1.18

0.96

0.87

Salinity

(X)

24.25 26.10 26.92 27.59

27.84

28.63

28.71

28.84

29.25

30.57

30.60 30.57

EC

38.72

40.48 41.52 42.50

42.61

43.54

43.62

43.69

44.05

45.14

45.25 45.21

(#S/C#)

Signa-t

15.08

16.82

17.46 17.98

18.18

18.85

18.92

19.05

19.41

20.59

20.62

20.60 _

10010 141	1.6 0(1	.,			- Low Tid			
Date: Stalion:	Novers 10	ber 10	, 1992	Time:	09:10-0	9:35		
Location:				22* 50'	00.3 S.	43*09' 10	3' 8	
Air tempei	rature:				C(09:10)			
Weather or	the pre	evious			and slig	htly rai	'n	
Weather or	i the day	<i>!</i> :		Cloudy	1			
Wind force			1	1-2 ៧	s			
Wind direc				SN				
Secchi~dis		ng:		0.7 m		:		
Water dep			1	22.5 ¤	3			
Water cold)r:			Greeni	sh brown			
Garbage:			i	No				
0i1:			i	No				
Depth(m)	Tenp. pH			00	Salinity	EC	Signa-t	
	(*0)		(mg/1)	(%)	(%)	(#S/cm)		
0.0	25.15	-	9.60	135	23.50	36.27	14.69	
0.5	24.11	-	7.71	108	25.13	39.39		
1.0	23.71	-	6.62	94	28.25	42.75	18.67	
1.5	23.32	-	5.88	83	29.39	43.97		
2.0	23.19	-	5.56	79	29.63	44.11	19.85	
2.5	22.90	-	4.75	67	30.32	44.78	20.45	
3.0	22.97	-	4.70	67	30.38	44.83	20.48	
5.0	21.71	-	3.23	46	32,98	45.79	22.79	
7.0	21.55		3.07	43	32.63	46.52	22.57	
9.0	21.43		2.80	39	32,95	46.78	22.85	
11.0	21.38		2.77	39	33.04	46.83	22.93	
13.0	21.28	-	2.67	38	33.18	46.92	23.06	
15.0	21.36	-	2.72	38	33.28	47.14	23.11	
17.0	21.40		3.03	43	33.31	47.30	23.13	
18.0	21.49	+-	3.03	43	33.34	47.28	23.12	

APP 1-18

Table APP 1	.2-5(11)		Third Sim (Spring Ti			÷ .	1	Table APP 1	.2-5(14)				ous Survey Low Tide)
Date: Station: Location:	November 11	10,):00-09:15 .9' S. 43*0	6'09 5' W			November 14	10; 1	992	Time:	10:40-11:00
Air tempera Wid force:			20 0-	6.1°C (0 1 m∕s			1	location: Air tempera Wid force:				29,5°C Non	(10:40)
Wind direct Water color			Si Bi	n no#m				find direct					
ecchi-disl			0.	8 m.	1 - F			fater color				Brown	
fater depti	ı		2 80	.6 m	:			Secchi-disk Mater depth				0.4 m 4.0 m	
Sarbage: Dil:			No				(Carbage: Dil;				No No	
Depth (m)	Temp. (°C)	Płł	 (ng/1)	(%)	Salinity (X)	Sigma-t	-	Depth		lkq	D	0	Salinity
0.0	25.3	8.51		~	14.5	7.95	-		(°C)		(mg/1)	(%)	
0.5	25.1	-	-		15.4	8.67		0.0 0.5	25.6 25.3	8.32	12.8 8.9	180 126	22.4 24.2
1.0	25.1 25.1	-	-	-	16.2 17.9	9.27 10.53		1.0	25.2	-	8.2	114	24.4
1.5 1.6	-	8.18	-	-		-		1.5	25.2	-	7.8	111	24.8
2.0	23.6	-		-	25.9	16.93		2.0 2.5	25.0 24.2	-	6.8 3.7	96 52	25.1 26.7
2.5	23.0	-		-	27.1	18.00		3.0		8.28	2.4	35	29.3
							-	3.5	22.7	-	2.3	32	30.1
						i.	-						
Table APP	1.2-5(12)		Third Sim (Spring T					Table APP	1.2-5(15)				neous Survey - Low Tide)
Date: Station:	November 12	10,	1992 T	ime: 1	0:00-10:15			Date:	November	10,	1992	Time:	10:45-1
Location:			2	2° 47' 22	.4° \$, 43°0	07'45.0' W		Station: Location:	15			22* 45	58.8' S, 4
Nid force:				-1 m/s				Weather on	the prev	ious o	lay:	Cloudy	
Nind direc Nater colo				N Nown				Weather on				Cloudy	
Secchi-disl				ຕວະຫ .9 m				Wind force				1-2 ត. SW	s
Water dept				1.5 m				Wind direc Water colo				on Dark l	rown
Garbage:				es, a l				Secchi-dis		:		0.5 m	
0il:			Y	es, a l	ittle			Water dept	h:			7.3 m	
Bepth (m)	Temp. (°C)	рH	00 (ng/l)	(%)	Salinity (%)	Signa-L		Garbage: Oil:				No No	
0.0	26.1	8.95			21.2	12.70		Depth (m)	Temp. (°C)	рH	(mg/	10 1) (X	Salinity
0.5	26.2	-	-	⊷ ·	21.2	12.67							
1.0 1.5	26.1 25.7	-	-	-	21.1 23.7	12.63 14.68		0.0	25.6	8.5		-	8.7
2.0	25.0	~	-	-	25.3	16.08		0.5 1.0	25.6 25.2	-	-	-	11.8
3.0	24.1	-	-	-	26.6	17.32		1.5	25.0	-	-	-	22.3
5.0	22.0 21.9	8:23	-	-	30.8	21.06		2.0	24.3	-	-	+-	25.5
7.0 10.0	21.3	-	-	-	31.1 31.3	21.32 21.52		3.0	22.9	8.3	; -	-	28.3
13.5	21.4	8.12	~	-	32.0	22.14		4.0 5.0	22.7 22.3	·	-	-	29.1 29.9
14.0	21.4	-	· ~		32.1	22.21		6.0	21.9	-	-	-	30.9
								6.3	21.9	8.2			30.9
	-							7-51- 100	1 9-5(16)		1bird	Cimilto	neous Surve
Table APP 1	.2-5(13)		Third Sim (Spring Ti					Table APP	1.2-0(10)	,			- Low Tide)
Date:	November	10,	1992 Ti	me: 11	1:10-11:25			Date: Station:	November 16	• 10,	1992	Time:	11:30-1
Station: Location:	13							Location:					25.8′S, 4
Air Lempera	ature:			9.2°C (1	11:10)			Weather on			day:	Cloud	•
Wid force:				n√s sek brov	m on block			Weather on Air temper				Cloud	,
Water colo Socchi-disi				ark broi .2 m	wn or black			Wind force	:			1-2 m	/s
Secchi-dis Water depti				.5 m				Wind direc	tion:			SW	
Garbage:			R	2				Water colo Secchi-dis		<i>.</i>		Вгомп 0.6 m	
Oil:			Y	23				Mater dept				3.5 m	
Depth (m)	Temp. (°C)	рH	D0 (mg/1)	(%)	Salinity (%)	Signa-t		Garbage: Oil:				No No	
0.0	25.5	7.65	0.6	9	23.0	14.22		Depth	Temp.	pH		DO	
0.5	25.2	-	1.0 1.5	15 21	23.2 23.5	14.45 14.88		(m)	(*C)		(mg/	(1) (%	, (%)
1.0 1.5	24.5 24.0	1.77		22	24.0	15.40		0.0	25.7	7.3	2 -	· -	13.3
2.0	23.4	-	1.1	16	25.0	16.31		0.5	25.3	-	-		14.9
2.5	23.3	-	0.7	10	25.7	16.87		1.0 1.5	25.4 24.6		-		22.5
								2.0	23.4		-	· ·	27.2
								2.5	22.7	8.2	4 -		28.6
						APP	1-19	3.0	22.6 22.5	-	-		29.6
						- Arr	· 1,9	0.0					

96 52 35 32 2.4 2.3 19.60 20.34 30.1 Third Simultaneous Survey (Spring Tide - Low Tide) 392 Time: 10:45-11:00 22*45'58.8' S, 43*05'32.0' Cloudy y: Cloudy 1-2 m/s S₩ Dark brown 0.5 m 7.3 m

Salinity Sigma-t (%)

13.74

15.17

15.35

15.65

15.93

17.36

17.96

19.21

19.99

19.95

no No										
Tenp.	pH			Salinity	Sigma-t					
(°C)		(mg/l)	(%)	(%)						
25.6	8.59	-	_	8.7	3.57					
25.6	-	-	-	11.8	5.86					
25.2	-	-	-	21.8	13.41					
25.0	-	-	-	22.3	13.84					
24.3	-	-	•	25.5	16.43					
22.9	8.35		-	28.3	18.93					
22.7	·	-	-	29.1	19.59					
22.3	-	-	-	29.9	20.30					
21.9	-	-	-	30.9	21.17					
21.9	8.21	-	-	30.9	21.17					
	(*C) 25.6 25.2 25.0 24.3 22.9 22.7 22.3 21.9	(*C) 25.6 8.59 25.6 - 25.2 - 25.0 - 24.3 - 22.9 8.35 22.7 - 22.3 - 21.9 -	Temp. pH D (*C) (mg/1) 25.6 8.59 - 25.6 - - 25.7 - - 25.8 - - 25.9 8.35 - 22.7 - - 22.3 - - 21.9 - -	No Temp. pH DO (*C) (mg/1) (X) 25.6 8.59 25.6 25.2 25.0 24.3 24.3 22.9 8.35 22.7 22.3 21.9	$\begin{array}{c c c c c c c c c c c c c c c c c c c $					

Third Simultaneous Survey (Spring Tide - Low Tide) **992** Time: 11:30-11:45 22*43'25.8' S, 43*04'44.9' W Cloudy ay: Cloudy 1-2 m/s SW вгомп 0.6 m 3.5 m No No Salinity DO Sigma-t (mg/1) (%) (%) 6.95 8.25 11.64 14.10 13.3 ----14.9 19.5 _ --

· .				11de -	Low Tide)	
Date:	November	10, 19	92	Time:	09:00-09	9:30
Station:	17					
location:						
Weather or		:		Cloudy		
Air temper					(09:00)	
Wind force				1-2 m/s		
Wind direc				SH		
Water colo				вгочп		
	k reading:			D.6 m		
Water dept	h:			3.5 m		
Garbage:				No		
Oil:			1	Ko		
Depth	Temp.	pli		00	Salinity	Signa-L
(m)	(°C)		(rg/l)	(X)	(%)	
0.0	25.1	8.40	9.0	126	22.7	14.11
0.5	25.2		9.6	133	21.4	13.11
1.0	24.7	••	8.3	117	23.3	14.67
1.5	24.4	-	7.2	101	25.0	16.03
2.0	24.1		8.1	86	26.0	16.87
2.5	23.4		4.4	61	27.2	17.96
3.0	22.6	8.14	3.0	43	29.3	19.77
3.5	22.4	-	2.5	35	30.2	20.50
4.0	22.2	-	2.3	32	30.4	20.71
Date: Station: Location: Weather of Weather of Air temper Wind force Wind direc Water cold	e: ction: or: sk reading	10, 19 ious da	(Spring 192 ny:	Tide - Time: Cloudy Slightl	ly cloudy C(10:03)	
Garbage: Oil:	:			No No No		
Depth	Temp. (°C)	РЙ	(mg/l)	00 (%)	Salinity (%)	Signa-

peput	1 Catt	- pu	0	J.	parmity	otkus¢
(m)	(°C)		(mg/l)	(%)	(%)	-
0.0	26.0	8.34	10.0	143	23.0	14.07
0.5	25.6	-	4.8	68	23.6	14.64
1.0	25.1	-	4.8	68	25.2	15.98
1.5	24.5	-	5.2	75	26.3	16.98
2.0	24.1	8.14	4.4	63	27.7	18.14
2.5	23.6		3.0	42	28.9	19.19
3.0	22.8	••	1.9	27	30.1	20.31

Cloudy 24.7 *C(11:38) Air temperature: 0-1 m/s SW Brown 0.7 m Wind force: Wind direction: Water color: Secchi-disk reading: Water depth: 7.7 m Garbage: No 011: No Depth DO Temp. pH Salinity ĒĊ Signa-t (52/1) (%) **(**m) (*C) (*) (mS/cm) 7.28 5.56 3.08 2.95 37.29 0.0 25:64 -103 79 44 42 27 15 23.21 14.33 25.04 25.40 24.91 24.84 24.70 24.55 23.21 23.33 24.32 24.41 24.78 25.80 37.40 38.81 38.30 38.68 0.5 14.50 15.38 -1.5 --15.46 15.78 16.59 2.0 -1.94 2.5 -1.08 39.89 3.0 24.65 ---0.95 13 24.91 38.69 15.89 27.03 27.33 27.61 3.5 24.41 -0.83 12 41.67 17.55 -14 15 14 · 4.0 24.38 0.98 41.98 17.78 5.0 42.36 24.33 1.02 18.01 6.0 24.31 ..-1.01 27.69 42.45 18.07 7.0 24.29 0.98 27.80 14 42.59 18.16

Third Simultaneous Survey

(Spring Tide - Low Tide)

Time: 11:36-11:50

22'49'38.6' S, 43'15'39.4' W Cloudy and slightly rain

Table APP 1.2-5(19)

Weather on the day:

Date:

Station: 19

Location:

November 10, 1992

Weather on the previous day:

N 1			1000		14.00.1	4.00	
Date:	Novem 2	ber 10,	1992	Time:	14:20-1	4:30	
Station: Location				00• E3i	34.5' S.	13,08,01	0" W -
Air temp					C(14:20)	10 00 01	
	on the pro	องโกมเร			and slig	htlv rain	ı
	on the day			Cloudy		1019 1011	•
Wind for				0-1 m/			
Wind dir				SSE			
	isk readi	ng:		3.5 m			
Water de		<u>.</u>		18.0 m	1		
Water co					sh brown		
Garbage:							
011:			l	No			
Depth	Temp.	PH	•	00	Salinity	EC	Sigma-t
(m)	(*C)		(mg/1)	(%)	(%)	(nS/cn)	
0.0	23.44	7.99	6.5	- 94	33.24	-	22.50
1.0	22.55	-	6.5	93	33.74	-	23.13
2.0	22.57	ч :	6.8	97	33.82	-	23.19
3.0	22.59	-	7.1	102	33.91	-	23.25
4.0	22.61	-	7.3	104	33.92	-	23.25
5.0	22.63	8.00	7.3	104	33.93	-	23.25
6.0	22.66		7.3	106	33.95	-	23.27
8.0	22.91	- 1	7.9	114	34.24	-	23.41
10.0	22.80		8.1	117	34.33	-	23.51
12.0	22.15	-	7.8	112	34.45	· -	23.78
14.0	22.04	- '	7.9	113	34.48	-	23.83
15.0	22.02		7.9	113	34.49	-	23.85
16.0	22.02		8.0	114	34.49	-	23.85
17.0	22.01	8.09	8.0	114	34.49	-	23.85

Table APP 1.2-6(1)

Field Record of the Third Simultaneous Survey

Table APP	1.2-6(3)			neous Súr - High Ti		
Date: Station:	Novem 4	ber 10,	1992	Time;	15:17-1	5:25	
Location:	9				00.01.0		
Air temper	aturat				20.8' S. C(15:17)	43 (3) 25	1.6 W
Weather or		avious	daw		and slig		_
Reather or			uay.	Cloudy		HULY LAI	n
find force				5-6 m/			
Wind direc				SNI	3		
Secchi-dis		nø:		1.5 m			
later dept				11.5 m	1		
fater colo					sh green		-
Garbage:	•••			No	SIL ALCOL		
Oil:				No			
Depth(m)	Temp.	płł		DO	Salinity	EC	Signa-
	(*0)		(mg/1)	(%)	(%)	(mS/cm)	
0.0	23.77	7.99	7.0	100	31.25	-	20.9
1.0	23.72	-	7.5	101	31.26	-	20.9
2.0	23.20	-	6.8	97	31.75	-	21.4
2.5	22.83	**	5.7	82	32.11	-	21.8
3.0	22.50	8.02	5.7	80	32.38	-	22.1
4.0	22.44	-	5.4	77	32.43	-	22.1
5.0	22.44	-	5.6	80	32.68		22.3
6.0	22.39	-	5.6	79	32.81	-	22.4
7.0	22.25	8.05	5.2	74	32.91	-	22.5
8.0	22.21	-	5.1	72	32.98	~	22.6
8.5	22.00	-	4.9	69	33.01	-	22.7
9.0	22.13	-	4.5	65	33.29	-	22.9
10.0	21.94	· –	4.5	64	33.34	-	23.0
11.0	21.92	8.03	4.5	64	33.37		23.0

		-					
Table APP		Simultaneous Survey g Tide - High Tide)					
Date:	November 10, 1992	Time: 14:50-15:07					
Station:	3						
Location:		22°55'51.8' S, 43°08'33.4' W					
Air temper	ature:	23.8 °C(14:50)					
Weather on	the previous day:	Cloudy and slightly rain					
Weather on		Cloudy					
Wind force	··· •	5-6 m/s					
Wind direc	-	SSE					
Secchi-dis		3.0 m					
Water dept	•	45.0 m					
Water colo		Brownish green					
	••						

Mater colo Sarbage: Sil:	ι Γ		· Y	rowni es o			
Depth(m)	Temp. (°C)	płł	[mg/l]	0 (%)	Salinity (%)	EC (mS/cm)	Sigma-t
0.0	22.63	7.99	6.8	97	32.29	-	22.01
1.0	22.83	-	6.5	93	33.15	-	22.61
2.0	22.74	<u> </u>	6.5	93	33.29	~	22.74
3.0	22.71	-	6.9	98	33.32	-	22.77
4.0	22.68		8.9	- 98	33.48	-	22.90
5.0	22.74	8.04	7.0	101	33.38	-	22.81
6.0	22.71	-	7.0	101	33.26	-	22.72
8.0	22.66	-	6.9	100	33.42	-	22.86
10.0	22.66	-	7.0	101	33.49	~	22.91
12.0	22.68	-	7.3	104	33.44		22.87
14.0	22.71	-	7.4	106	33.45	-	22.87
15.0	22.67	- .	7.4	106	33.55	-	22.95
16.0	22.65		7.4	107	33.54	-	22.95
18.0	22.71	-	7.4	107	33.36	-	22.80
20.0	22.74	· _	7.5	108	33.38	-	22.81
25.0	22.65		7.5	108	33.50	-	22.92
30.0	22.65	-+• ·	7.4	107	33.58		22,98
35.0	22.59	-	7.3	105	33.85	-	23.20
40.0	22.57	 `	7.4	107	33.89	-	23.24
44.0	22.57	7.70	7.3	105	33.90	-	23.25

Table APP 1.2-6(4)

.

Third Simultaneous Survey (Spring Tide - High Tide)

Date: Station:	Nover 5	ber 10	1992	Time:	15:46-1	6:03				
Location:				22*54	07.5°S.	43*08*52	2.4' W			
Air temper	rature:				*C(15:46)					
Weather or	n the pr	evious	day:	Cloudy	and slig	htly rai	n			
Weather or	n the da	y:		Cloudy						
Wind force	e:			6 m/s						
Wind direct				SW						
Secchi-dis	sk readi	ng:		1.6 m						
Water depl	th:			38.5 m						
Water cold	110			Bromi	sh green					
Garbage:				Yes						
011:				No						
Depth(m)	Temp.	рH		DO	Salinity	EC	Sigma-L			
	(°C)		(mg/l)	(X)	(%)	(mS/cm)				
0.0	23.22	7.97	6.6	96	32.11		21.71			
1.0	23.15	-	8.2	118	32.18	-	21.78			
2.0	22.78	-	7.9	113	32.65	-	22.24			
3.0	22.74	-	8.9	128	32.89	-	22 44			

1.0	23.15	-	8.2	118	32.18	-	21.78
2.0	22.78	-	1.9	113	32.65	-	22.24
3.0	22.74	-	8.9	128	32.89	_	22.44
4.0	22.71		7.0	101	32.98	_	22.51
5.0	22.65	8.02	6.5	94	32.98		22.53
6.0	22.54	-	6.6	95	33.14	-	22.68
8.0	22.41		6.3	90	33.07	-	22.67
10.0	22.42	8.05	8.4	91	33.10	-	22.68
12.0	22.43		6.5	93	33.50	_	22.98
14.0	22.45	-	6.7	96	33.56	-	23.02
15.0	22.45	-	6.7	96	33.56		23.02
16.0	22.48	-	6.7	97	33.57		23.02
18.0	22.49	-	6.9	99	33.59	-	23.04
20.0	22.49	-	7.1	102	33.60	-	23.04
25.0	22.47	-	7.2	104	33.91	· _	23.28
30.0	22.47	-	7.4	106	33.94	-	23.31
35.0	22.45	-	6.7	96	33.92	-	23.30
37.5	22.46	-	7.5	108	33.92	-	23.29
38.0	· -	8.08	-	-	-	-	~

.

4

APP 1-21

Table APP	1.2~6(5))			neous Sur - High Tic		
Date: Station:	Novemb 6	er 10	, 1992 1	lime:	14:28-14	1:45	
location:				22*52	01.6' S.	3*08' 59	6' W
Air temper	ature:				C(14:30)		
Weather or		vious			and slig	tly rain	ı
Weather or				Cloudy			
Wind force	:		· · · •	2-3 m/	s		
Wind direc	ction:		5	SM			
Secchi-dis	sk readin	g:	1	1.5 a			
Nater dept			1	19.8 m			
Water colo	ж.			lrown			
Garbage:				ło			
0il:			1	to			
Denth (-)		- 11			0.17-71.		
Depth(m)	Temp. (*C)	pH	(ing/1)	(X)	Salinity (X)	EC (mS/cm)	Signa-t
0.0	23.31		6.0	 86	30.78	45.71	20.68
0.5	23.31	_	6.1	87	30.81	45.76	20.88
1.0	23.27	-	6.0	86	30.81	45.77	20.72
1.5	23.23	_	5.9	. 85	30.86	45.76	20.77
2.0	23.16	-	5.9	84	30.85	45.76	20.78
2.5	23.11		5.7	81	30.93	45.77	20.85
3.0	23.07	-	5,8	60	30,96	45.77	20,89
4.0	22.93	· •	4.9	69	31.54	46.22	21.36
5.0	22.54	-	5.0	69	32.26	46.89	22.02
6.0	22.40		4.9	69	32.36	48.92	22.13
7.0	22.36	-	4.9	69	32.40	46.99	22.17
9.0	22.37	-	4.5	64	33.37	47.89	22.90
11.0	22.01	-	4.7	67	33.46	47.98	23.07
13.0	22.00	-	4.5	64	33.51	48.03	23.11
15.0	22.00	-	4.6	66	33.52	48.07	23.12
17.0	22.00	-	4.5	65	33.53	48.09	23.13
18.0	22.00	-	4.5	64	33.55	48.12	23.14

Table APP	1.2-6(7))			neous Sur - High Ti				
Date: Station:	Novenb 8	er 10	. 1992 1	lime:	16:12-1	6:30			
Location:			5	2*501	04.5' S,	43" 14' 19	3 1		
Air temper	ature:			3.8 *	C(16:17)				
Keather on the previous day: Cloudy and slightly rain									
Weather on				loudy			· ·		
Wind force		-		3-4 m/					
Wind direc				5₩					
Secchi-disk reading:									
Water depth: 8.8 m									
Water colo				гона	· · ·				
Garbage:	•		N	lo					
Oil:			1	lo					
,									
Depth(a)	Тепр.	рН	1	0	Salinity	23	Signa-t		
	(*0)		(rg/l)	(%)	(%)	(nS/cn)			
0.0	24.94	-	6.73	83	27.39	42.58	17.66		
0.5	24.94	- `	6.52	80	27.44	42.59	17.70		
1.0	24.92	-	6.51	80	27.41	42.59	17.68		
1.5	24.93		6.61	81	27.39	42.57	17.67		
2.0	24.91	-	6.48	80	27.46	42.61	17.73		
2.5	24.62	-	4.89	60	28.00	43.21	18.22		
3.0	24.27	-	4.35	53	29.36	43.85	19.34		
4.0	24.01	-	3.63	44	29.38	44.53	19.43		
5.0	23.98	-	3.65	44	23.55	44.83	19.56		
6.0	24.02	~	3.60	44	29.71	- 44.94	19.67		
7.0	24.04		3.58	43	29.91	45.23	19.82		
8.0	23.17	÷ .	2.25	27	30.57	45.25	20.56		
8.5	22.88	- ·	1.36	16	30.30	45.40	20.44		

Table APP 1.2-6(8)

Third Simultaneous Survey (Spring Tide - High Tide)

Date:		er 10,	1992	Time:	15:44-1	5:55	
Station: Location:	9			00*401	30.0° S.	13*10* 31	17 54
Air temper	sturat				C(15:45)	45 12 51.	1 1
Weather on		viane	davra		and slig	hely and	_
Weather on			uay.	Cloudy		iciy tan	1
Wind force		•		3-4 m/			
Wind direc	-			SM	а.		
Secchi-dis		ø-		1.0 m	·		
Water dept		6 .		5.5 m			
Water colo				Brown			
Carbage:				No			
Oil:			÷	ก้อ			
Depth(m)	Temp.	рĦ		00	Salinity	EC	Signa-t
	(*C)		(ng/l) (X)	(%)	(#S/cm)	
0.0	25.36	-	7.95	116	27.94	43,68	17.95
0.5	25.19		7.57	110	28.01	43,82	18.05
1.0	25.31	-	7.48	109	28:00	43,80	19.01
1.5	25.19	-	7.46	108	28.21	43.83	16.20
2.0	25.04	**	6.87	100	28.33	43.96	18.34
2.5	24.75	-	4.43	64	28.99	44.53	18.92
3.0	24.13	-	4.52	65	23.54	44.86	19.51
3.5	23.70	-	3.22		29.87	44.80	19.89
4.0	23.06	-	2.46	35	30.53	45.34	20.57
4.5	22.69	~	2.11	30	31.17	45.73	21.15
5.0	22.56	-	1.81	26	31.41	45.85	21.37
5.5	22.48	S —	1.35	19	31.50	45.91	21.46

APP 1-22

 Date:
 November 10, 1992
 Time:
 18:54-17:15

 Station:
 7
 22*51'59.7'S, 43*12'00.1'W

Table APP 1.2-6(6)

Air temperature:	24.5 *C(16:55)
Weather on the previous day:	Cloudy and slightly rain
Weather on the day:	Cloudy
Wind force:	0-2 m/s
Wind direction:	SM
Secchi-disk reading:	0.9 m
Water depth:	8.0 m
Water color:	Brown
Garbage:	No
oil:	Но

Third Simultaneous Survey (Spring Tide - High Tide)

Depth(m)	Temp,	pH	Ŭ	0	Salinity	EC	Signa-t
	(*C) .		(mg/1)	(%)	(%)	(mS/cm)	
0.0	24.33	-	8.9	129	29.01	44.33	19.06
0.5	24.31	_	9.1	125	29.03	44.35	19.08
1.0	24.31	-	8.6	124	29.05	44.36	19.09
1.5	24.22	-	8.2	118	29.23	44.50	19.25
2.0	24.06	~	6.5	94	29.73	45.04	19.68
2.5	24.02	-	6.1	88	29.84	45.11	19.77
3.0	23.74	•	4.7	67	30.49	45.60	20.34
4.0	23.26	· -	4.3	61	30.70	45.59	20.64
5.0	23.00		3.9	55	31.05	45.76	20.97
6.0	22.37	-	2.8	40	31.92	46,35	21.81
7.0	22,25	-	2.7	39	32.09	46.47	21.97
8.0	21.89	-	2.0	28	28.09	41.11	19.05

able APP 1	.2-6(9)				eous Surv Hìgh Tid				Table APP	1.2-6(11)				eous Survey High Tide)
ate:	Novembe	er 10,	1992	Time:	15:00-15	5:16			Date:	November	10,	1992	Time:	14:55~15:10
her on force: direcu hi-disk r depth	the pre- the day ion: readin	:	day:	24.0 *C Cloudy Cloudy 2-3 m/s SH 0.9 m 22.8 m	(15:00)	13°C3'01.4	3" W		Station: Location: Wid force: Wind direc Water cold Secchi-dis Water dept Garbage: Oil:	tion: pr k reading	, 1	-	22*47*0 1-2 m/s SW Brown 0.6 m 15.0 m No No	07.1° S. 43°(s
er color bage: :				Brown No No					Depth (m)	Temp. (°C)	рН	(mg/1	00) (%)	Salinity) (%)
epth(m)	Temp. (°C)	pH	(m#/)	DO) (X)	Salinity (X)		Sigma-t		0.0 0,5	25.3 25.2	8.8	4 – –	-	23.2 23.3
									1.0	24.8	-	-	-	25.3
	24.08 24.09	-	8.16 8.15		27.98 27.98	42.68 42.67	18.36 18.35		2.0 3.0	23.3 23.1	-	-	-	27.3 28.9
	24.09	-	7.17		27.95	42.64	18.33		5.0	22.3	8.34	1 ~	-	30.3
	24.00	-	6.98		28.13	42.85	18.49		7.0	22.0	-	-	-	31.0
.0	23.86	-	7.24		28.36	43.46	18.71		10.0	21.5		-	-	31.9
5.	23.62	-	5.75		29.15 29:57	43.51	19.37 19.72		12.0	21.4 21.4	-	-	-	32.2 32.3
.0 .0	23.48	-	5.15 4.92		29.57	44.30 44.42	20.09		13.0 14.0	21.4	8.23	, - ,	-	32.3 32.4
0	23.05 22.96	· _	4.90		30.14	44.61	20.30					-		
,)	22.76	· -	3.56		30.48	44.78	20.61							
.0	22.04	⊷.	3.35		31.83	46.04	21.83							
3.0	21.90	-	3.52		32.07 32.71	36.67 47.13	22.05 22.50		D-11 (DD	1 0 0/103			:11	
1.0 1.0	22.04 22.08	-	3.78		32.83	47.13	22.50		Table APP	1.2-6(12)				cous Survey High Tide)
.0 .	22.07	-	3.98		32.92	47.30	22.65					COLUMB	1106 -	men Hue)
.0	22.00	-	4.01		33.00	47.42	22.73		Date:	November	10,	1992	Time:	14:00-14:12
.0	21.90	~	3.91		33.10	47.51	22.83		Station:	13				
.0	21.80	-	3.81 3.94		33.30 33.34	47.61 47.64	23.01 23.04		Location:				00 0±0	(11.00)
5.0 5.0	21.80 21.80	_	3.86		33.36	47.65	23.05		Air temper Wid force:	ature:				(14:00)
.u 1.0	21.80	-	3.88		33.35	47.65			Wid force: Wind direc	tion:			Non -	
8.0	21.60	-	3.21		33.34	47.65	23.04		Water colo	r			Dark br	'OWTI
			<u> </u>					•	Secchi-dis				0.3 m	
									Water dept Garbage:	n			2.0 m No	
					•				Oil:				No	
able 100	1 2. 0/1	(0)	71. :-	السناع إن		Supro-			Depth	Temp.	рłł		0	Salinity
Table APP	1.2-0()	10)			taneous S e - High				(m)	(°C)		(mg/1		
)ate:	Novem	er 10	, 1992	Tine	e: 14:25	6-14:40			0.0 0.5	27.5 28.7	8.73	15.9 12.6	228 176	19.7 20.6
tion:	11								1.0	24.9	-	1.3	18	20.0
ocation:	natura			22*	53 16.2 1°C (14:3	S. 43*10	05.0'W		1.5	24.5	8.06		24	25.2
Air tempe Wid force					r C (14:: ∎∕s	~,			2.0	24.2	-	1.3	18	26.0
ind dire	ction:			SW	· •			•						
ater col					mish gre	en								
Secchi-di: Water depl		ing		0.5 3.3										
mater dep Garbage:	un			s.s No	CI.				Table inc	1 9-0/195		11.1.1	1	
Oil:				No					Table APP	1.2-0(13)				eous Survey High Tide)
Depth (m)	Тепр. (°С)	płł		00 vz/1)		inity Si (%)	igma-t		Date: Station:	November 14	10,	1992	Time:	14:30-14:42
*****									Location:	**				
0.0	26.2	9.	09		-	19.3	11.26		Air temper				28.5°C	(14:30)
0.5 1.0	25.7 25.5	-				19.5 19.6	11.55 11.68		Wid force:				1-2 m/s	3
1.5	25.5	-				20.7	12.62		Wind direc Water colo				SW Brownie	sh green
2.0	24.5			·· -		23.6	14.96		Secchi-dis				0.4 m	M RICCII
2.3	23.4	8.	36			24.4	15.86		Water dept				5.5 m	
3.0	22.6	-			·	25.4	16.83		Garbage:				No	
									011:				No	
. 1									Depth (m)	Temp. (°C)	рł	(mg/1	DO) (%)	Salinity (%)
									0.0	26.2	8.86		218	22.8
									0.0	60.6	0.00	ן יפי י	610	22.0

Third Simultaneous Survey (Spring Tide - High Tide) 992 Time: 14:00-14:12 29.2°C (14:00) Non Dark brown 0.3 m 2.0 m No No <u>DO</u> Salinity Signa-t

22*47'07.1' S, 43*07'43.8' W

Salinity Sigma-t

14.43

14.53

16.14

18.07

19.33 20.60 21.22

22.03

22.36

22.44

(°C)		(mg/1)	(%)	(X)	
27.5	8.73	15.9	228	19.7	11.17
26.7	-	12.6	178	20.6	12.08
24.9	-	1.3	18	23.8	14.99
24.5	8.06	1.7	24	25.2	16.15
24.2	+	1.3	18	25.0	16.84
	27.5 26.7 24.9 24.5	27.5 8.73 26.7 - 24.9 - 24.5 8.06	27.5 8.73 15.9 26.7 - 12.6 24.9 - 1.3 24.5 8.06 1.7	27.5 8.73 15.9 228 26.7 - 12.6 178 24.9 - 1.3 18 24.5 8.06 1.7 24	27.5 8.73 15.9 228 19.7 26.7 - 12.6 178 20.6 24.9 - 1.3 18 23.8 24.5 8.06 1.7 24 25.2

992 Time: 14:30-14:42 28.5°C (14:30) 1-2 m/s SW Brownish green 0.4 m 5.5 m No No Salinity Sigma-t DO (mg/1) (%) (%) 15.1 218 22.8 13.86 26.2 26.0 24.7 0.0 8.86 0.5 1.0 1.5 -13.2189 23.4 14.37 ~ 6.2 88 26.0 16.6924.2 26.8 27.7 29.4 30.7 -4.8 4.1 3.7 68 58 53 36 17.44 2.0 2.5 3.0 19.44 18.23 19.65 20.82 21.37 23.8 _ 23.3 8.19 22.8 2.5 -

2.3

2.2

32

30

31.2

31.2

21.39

APP 1-23

3.5

4.0

22.0

21.9

8.04

Table APP	1,2-6(14)				cous Survey High Tide)	
Weather o Air tempe Wind forc Wind dire Water col	e: ction: or: sk reading	vicus da	y: (Cloudy Cloudy	(15:40)	::55 *05'29.8' W
Depth (10)	Temp. (*C)	, Hq	(mg/l))) (X)	Salinity (X)	Signa-t
0.0	26.8	9.03	-	. –	17.2	9.52
0.5	26.1		-	-	18.6	10.77
1.0	25.0	-	-	-	22.0	13.62
1.5	24.0	-		-	25.2	16.29
2.0	23.2	~	-	-	28.4	18.92
3.0	22.1	8.37	-	-	30.5	20.81
5.0	21.8	-	-	·	31.5	21.65
6.0	21.5	-			31.7	21.88
7.0	21.5	8.29	-	-	31.8	21.95
7.5	21.5	~	-		31.8	21.96

able APi	P 1.2-6(16)				xus Survey ligh Tide)	
Date: Station:	November 17	10, 199	92 T	ime:	15:25-15	: 37
Location	: on the day:		Ċ	loudy		
Air temp					(15:25)	
Wind for				-2 m/s		
Wind dire			S	•		
Water co			G	reenis	n brown	
	isk reading	::	Ó	4 m		
Water de		-	5	.5 ព		
Garbage:	•		N	-		
0i1:			Я	0		÷
Depth	Temp.	pH	D		Salinity	Signa-t
(m)	(°C)		(mg/1)	(X)	(%)	
0.0	26.5	8.83	14.6	208	21.3	12.66
0.5	26.1	-	14.3	202	21.2	12.70
1.0	25.0		10.5	149	24.8	15.71
1.5	25.2	~	5.9	84	24.2	
2.0	23.8	-	4.1	58	28.4	18.75
2.5	23.2	-	3.5	49	28.9	19.30
3.0	23.1	-	3.5	49	29.0	19.40
3.5 4.0	22.6	-	2.4	33	30.0	20.30
	22.5	8.07	1.9	27	30.0	20.32

Third Simultaneous Survey (Spring Tide - High Tide) Table APP 1.2-6(15) Date: Nov Station: 16 November 10, 1992 Time: 16:20-16:35 Location: Weather on the previous day: 22'43'23.4' S, 43'05'05.7' W Cloudy Meather on the previo Weather on the day: Air temperature: Wind force: Wind direction: Water color: Secchi-disk reading: Water depth: Caphane: Cloudy ---2-3 n∕s S¥ Brown 0.8 m 5.0 m Garbage: No 0i1: No

Signa-t	Salinity	00		pH	Teap.	Depth
	(%)	(%)	(mg/1)		(*C)	(m)
6.22	13.1	-	-	8.96	27.7	0.0
11.30	19.6	~	-	-	26.8	0.5
14.17	22.7	-	-		24.9	1.0
15.94	24.8	-	-	-	24.2	1.5
18.19	27.5	-	-	-	23.4	2.0
19.08	28.5			-	22.9	3.0
20,14	29.8	· -		8.24	22.6	4.0
20.45	30.1	-	• -		22.3	4.5

Table APP 1.2-6(17)

Third Simultaneous Survey (Spring Tide - High Tide)

١.

Date:	Novembe	r 10, 19	92 T	ise:	15:00-15	:10
Station:	18					
location:						
Weather c	on the pre	vious da	y: C	loudy		
	m the day			loudy		
Air tempe	erature:		2	8.2 °C	(15:00)	
Wind ford	ce:			-2 a/s		
Wind dire	ection:		S			
Water col	lor:		B	rownis	h green	
Secchi-di	isk reading	R:		.4 m		
Nater der		•	4	.0 m		
Garbage:			N	o		
011:			N	0		
Bepth						
	Temp.	더	D		Salinity	Signa-I
(n)	(°C)		(mg/l)	(%)	(%)	
0.0	26.7	8.91	14.8	213	23.0	13.80
0.5	26.9	~	12.8	185	23.3	14.02
1.0	26.0	· _ ·	6.0	86	26.8	16.91
1.5	24.3	· -	5.2	88	26.8	17.4
2.0	24.2	· -	5.3	75	26.9	17.51
2.5	24.2	~.	3.7	52	28.0	18.3
3.0	23.2	8.07	1,9	28	30.0	20.13
3.5	22.7	~	1.8	28	30.2	20.42

Table APP			Characteri Houth of t		
	May 17, 1992 09:40		Location:	A 22*56' 02.4 43*08' 36.8	
Depth(m)	Temp.(°C) Sa	linity(%)	EC(mS/cm)	DO(mg/1)	Sigma-t
0.0	25.00	32.25	49.46	8.7	21.29
1.0	24.91	32.49	49.53	8.0 7.1	21.50 21.95
2.0	24.55 24.54	32.95 33.18	49.84 50.15	.6.6	22.13
3.0 4.0	24.54	33.42	50.26	6.5	22.31
5.0	24.26	33.58	50.37	6.4	22,51
6.0	24.29	33.73	50.49	6.6	22.62
7.0	24.20	33.66	50.45	6.6	22.59
8.0	24.19	33.71	50.46	6.9	22.63
9.0	24.14	33.75	50.51	6.9	22.68
10.0	24.13	33.74	50.49	7.0	22.67
11.0	24.12	33.78	50.52	7.0	22.71
12.0	24.11	33.81	50.52	7.8	22.73
13.0	24.10	33.81	50.54	7.9 7.7	22.73 22.76
14.0	24.09	33.84	50.57	1.7	22.70
15.0	24.08	33.90	50.60 50.76	7.6	22.93
16.0	24.01	34.04		7.6	22.97
17.0	24.00	34.08 34.13	50.84	7.7	23.01
18.0 19.0	23.98 23.98	34.13		7.8	23.10
20.0	23.90	34.37	51.09	7.9	23.22
1 ¹	V 17 1000				
Date: Time:	May 17, 1992 11:00		Station: Location:	A' 22°56'02. 43°08'36.	
Depth(m)	Temp.(°C) S	alinity(%) EC(mS/cm		Signa-
0.0 2.0	24.60 23.93	33.45 34.28			22.3 23.14
4.0	23.92	34.28			23.1
6.0	23.89	34.33	50.99		23.1
8.0	23.86	34.34			23.2
8.7	23.86	34.39			23.2
9.2	23.85	34,41	50.10	5.5	23.2
Date: Time: Station	May 17, 199 12:00 n: B	2			
Time: Station	12:00) EC(mS/cm) DO(ng/1)	Signa-t
Time: Station Depth(0.0	12:00 a: B m) Temp.(*C) S 25.10	alinity(% 32.57	49.92	9.1	21.50
Time: Station Depth(0.0 2.0	12:00 :: B m) Temp. (*C) S 25.10 24.39	alinity(% 32.57 33.32	49.92 50.20	9.1 0.0	21.50 22.27
Time: Station Depth(0.0 2.0 4.0	12:00 12:00 11: B 12:00 10: S 10: S 10	alinity(% 32.57 33.32 33.78	49.92 50.20 50.56	9.1 0.0 6.4	21.50 22.27 22.67
Time: Station Depth(0.0 2.0 4.0 6.0	12:00 1: B m) Temp. (*C) S 25.10 24.39 24.21 23.92	alinity(% 32.57 33.32 33.78 34.16	49.92 50.20 50.56 50.99	9.1 0.0 6.4 5.9	21.50 22.27 22.67 23.04
Time: Station Depth(0.0 2.0 4.0 6.0 8.0	12:00 12:00 1: B 10 10 12:00 10	alinity(% 32.57 33.32 33.78 34.16 34.39	49.92 50.20 50.56 50.99 51.01	9.1 0.0 6.4 5.9 5.7	21.50 22.27 22.67 23.04 23.24
Time: Station Depth(2.0 4.0 6.0 8.0 10.0	12:00 1: B m) Temp. (*C) S 25.10 24.39 24.21 23.92	alinity(% 32.57 33.32 33.78 34.16	49.92 50.20 50.56 50.99	9.1 0.0 6.4 5.9	21.50 22.27 22.67 23.04
Time: Station Depth(0.0 2.0 4.0 6.0 8.0	12:00 1: B m) Temp. (*C) S 25.10 24.39 24.21 23.92 23.85 23.82	alinity(% 32.57 33.32 33.78 34.16 34.39 34.44	49.92 50.20 50.56 50.99 51.01 51.10	9.1 0.0 6.4 5.9 5.7 5.6	21.50 22.27 22.67 23.04 23.24 23.28
Time: Station Depth(0.0 2.0 4.0 8.0 8.0 10.0 12.0	12:00 12:00 1: B m) Temp. (*C) S 25.10 24.39 24.21 23.92 23.85 23.82 23.81	alinity(% 32.57 33.32 33.78 34.16 34.39 34.44 34.78	49.92 50.20 50.56 50.99 51.01 51.10 51.10	9.1 0.0 6.4 5.9 5.7 5.6 5.6	21.50 22.27 22.67 23.04 23.24 23.28 23.54
Time: Station Depth(0.0 2.0 4.0 8.0 8.0 8.0 10.0 12.0 14.0	12:00 1: B m) Temp. (*C) S 25.10 24.39 24.21 23.92 23.85 23.82 23.81 23.81	alinity(% 32.57 33.32 33.78 34.16 34.39 34.44 34.78 34.45	49.92 50.20 50.56 50.99 51.01 51.10 51.10 51.12	9.1 0.0 6.4 5.9 5.7 5.6 5.6 5.6 5.7	21.50 22.27 22.67 23.04 23.24 23.28 23.54 23.29
Time: Station Depth(0.0 2.0 4.0 8.0 8.0 10.0 12.0 14.0 14.0 16.0 18.0 20.0	12:00 12:00 1: B m) Temp. (*C) S 25.10 24.39 24.21 23.92 23.85 23.82 23.81 23.81 23.81 23.85 23.85 23.85 23.85 23.85 23.85 23.85	slinity(% 32.57 33.32 33.78 34.16 34.39 34.44 34.78 34.45 34.45 34.45 34.45 34.45	49.92 50.20 50.56 50.99 51.01 51.10 51.10 51.12 51.10 51.09	9.1 0.0 6.4 5.9 5.7 5.6 5.6 5.7 5.8 5.7 5.8 5.7 5.9	21.50 22.27 22.67 23.04 23.24 23.28 23.54 23.29 23.29 23.29 23.29 23.26
Time: Station Depth(0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0	12:00 12:00 1: B (m) Temp. (*C) S 25.10 24.39 24.21 23.92 23.85 23.85 23.82 23.81 23.81 23.81 23.88 23.88 23.88 23.88 23.88	alinity(% 32.57 33.32 33.78 34.16 34.39 34.44 34.78 34.45 34.45 34.45 34.44 34.46	49.92 60.20 50.56 50.99 51.01 51.10 51.10 51.12 51.10 51.10 51.10 51.10 51.10 51.10	9.1 0.0 6.4 5.9 5.7 5.6 5.6 5.6 5.6 5.7 5.8 5.7 5.9 6.2	21.50 22.27 23.04 23.24 23.28 23.54 23.29 23.29 23.29 23.29 23.29 23.26 23.30
Time: Station Depth(0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 18.0 20.0 22.0 24.0	12:00 12:00 1: B m) Temp. (*C) S 25.10 24.39 24.21 23.92 23.85 23.81 23.81 23.81 23.81 23.85 23.88 23.80 23.80 23.81	alinity(% 32.57 33.32 33.78 34.16 34.39 34.44 34.45 34.45 34.45 34.44 34.46 34.43	49.92 60.20 50.56 50.99 51.01 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.10	9.1 0.0 6.4 5.9 5.7 5.6 5.6 5.6 5.6 5.7 5.8 5.7 5.9 6.2 5.9	21.50 22.27 23.04 23.24 23.28 23.54 23.54 23.29 23.29 23.29 23.29 23.28 23.20 23.30 23.30
Time: Station Depth(2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0	12:00 12:00 1: B (*C) S 25.10 24.39 24.21 23.92 23.85 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.81	alinity(% 32.57 33.32 33.78 34.16 34.39 34.45 34.44 34.45 34.45 34.45 34.46 34.46 34.46 34.46	49.92 60.20 50.56 50.99 51.01 51.10 51.10 51.12 51.10 51.00 51.00 51.10 51.10	9.1 0.0 6.4 5.9 5.7 5.6 5.6 5.6 5.7 5.8 5.7 5.8 5.7 5.9 6.2 5.9 5.7	21.50 22.27 22.67 23.04 23.24 23.28 23.54 23.29 23.29 23.29 23.29 23.20 23.20 23.30 23.30
Time: Station Depth(0.0 2.0 4.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 24.0 28.0	12:00 12:00 1: B (*C) S 25.10 24.39 24.21 23.92 23.85 23.82 23.81 23.81 23.81 23.81 23.85 23.85 23.85 23.81 23.83 23.85 23.85 23.85 23.85 23.85 23.85 23.85 23.85 23.85 23.85 23.81 23.85 23.85 23.85 23.81 23.85 23.85 23.81 23.85 23.85 23.85 23.81 23.85 23.85 23.85 23.81 23.85 23.85 23.81 23.81 23.85 23.85 23.85 23.81 23.81 23.81 23.81 23.81 23.81 23.81 23.85 23.85 23.82 23.85 23	alinity(% 32.57 33.32 33.78 34.16 34.39 34.44 34.45 34.45 34.44 34.46 34.46 34.46 34.46 34.46	49.92 60.20 50.56 50.99 51.01 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.10	9.1 0.0 6.4 5.9 5.7 5.6 5.6 5.6 5.7 5.7 5.8 5.7 5.9 6.2 5.9 5.7 5.7 5.6	21.50 22.27 22.67 23.24 23.24 23.28 23.54 23.29 23.29 23.29 23.28 23.29 23.20 23.30 23.30 23.30
Time: Station Depth(0.0 2.0 4.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 28.0 28.0 30.0	12:00 12:00 1: B (*C) S 25.10 24.39 24.21 23.92 23.85 23.82 23.81 23.81 23.81 23.85 23.88 23.85 23.88 23.85 23.88 23.80 23.81 23.81 23.81 23.81 23.82 23.82	slinity(% 32.57 33.32 33.78 34.44 34.78 34.45 34.45 34.45 34.45 34.45 34.46 34.46 34.46 34.46 34.46 34.46 34.46	49.92 60.20 50.56 50.99 51.01 51.10 51.10 51.12 51.10 51.09 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.10	$\begin{array}{c} 9.1\\ 0.0\\ 6.4\\ 5.9\\ 5.7\\ 5.6\\ 5.6\\ 5.7\\ 5.8\\ 5.7\\ 5.8\\ 5.7\\ 5.9\\ 6.2\\ 5.9\\ 6.2\\ 5.9\\ 5.7\\ 5.6\\ 5.7\\ 5.6\\ 5.5\end{array}$	21.50 22.27 22.67 23.04 23.24 23.28 23.29 23.28 23.29 23.28 23.29 23.26 23.30 23.30 23.30 23.30 23.30 23.30
Time: Station Depth(0.0 2.0 4.0 8.0 8.0 10.0 12.0 14.0 16.0 14.0 16.0 22.0 24.0 22.0 24.0 28.0 30.0 32.0	12:00 12:00 1: B (m) Temp. (*C) S 25.10 24.39 24.21 23.92 23.85 23.82 23.81 23.81 23.81 23.81 23.81 23.81 23.85 23.82 23.80 23.81 23.81 23.81 23.82 23.82 23.82 23.85	alinity(% 32.57 33.32 33.78 34.16 34.39 34.44 34.45 34.45 34.45 34.45 34.46 34.46 34.46 34.46 34.46 34.46 34.42 34.39	49.92 60.20 50.56 50.99 51.01 51.10 51.10 51.12 51.10 51.10 51.09 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.07 51.06	$\begin{array}{c} 9.1\\ 0.0\\ 6.4\\ 5.9\\ 5.7\\ 5.6\\ 5.6\\ 5.7\\ 5.8\\ 5.7\\ 5.8\\ 5.7\\ 5.9\\ 6.2\\ 5.9\\ 5.7\\ 5.9\\ 5.5\\ 5.6\end{array}$	21.50 22.27 23.04 23.24 23.28 23.54 23.29 23.29 23.28 23.29 23.28 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30
Time: Station Depth(0.0 2.0 4.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 28.0 28.0 30.0	12:00 12:00 1: B (*C) S 25.10 24.39 24.21 23.92 23.85 23.82 23.81 23.81 23.81 23.85 23.88 23.85 23.88 23.85 23.88 23.80 23.81 23.81 23.81 23.81 23.82 23.82	slinity(% 32.57 33.32 33.78 34.44 34.78 34.45 34.45 34.45 34.45 34.45 34.46 34.46 34.46 34.46 34.46 34.46 34.46	49.92 60.20 50.56 50.99 51.01 51.10 51.10 51.12 51.10 51.09 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.10	$\begin{array}{c} 9.1\\ 0.0\\ 6.4\\ 5.9\\ 5.7\\ 5.6\\ 5.6\\ 5.7\\ 5.8\\ 5.7\\ 5.8\\ 5.7\\ 5.9\\ 6.2\\ 5.9\\ 6.2\\ 5.9\\ 5.7\\ 5.6\\ 5.7\\ 5.6\\ 5.5\end{array}$	21.50 22.27 22.67 23.04 23.24 23.28 23.29 23.29 23.29 23.26 23.30 23.30 23.30 23.30 23.30 23.30 23.30
Time: Station Depth(0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 28.0 28.0 30.0 30.0 32.0 34.0	12:00 12:00 1: B (m) Temp. (*C) S 25.10 24.39 24.21 23.92 23.85 23.82 23.81 23.81 23.81 23.88 23.88 23.80 23.81 23.81 23.82 23.82 23.82 23.82 23.82 23.86 23.86 23.86	alinity(% 32.57 33.32 33.78 34.16 34.39 34.44 34.45 34.45 34.45 34.45 34.46 34.46 34.46 34.46 34.46 34.46 34.46 34.42 34.39 34.39	49.92 60.20 50.56 50.99 51.01 51.10 51.10 51.12 51.10 51.10 51.10 51.10 51.10 51.10 51.10 51.00 51.06 51.08	$\begin{array}{c} 9.1\\ 0.0\\ 6.4\\ 5.9\\ 5.7\\ 5.6\\ 5.6\\ 5.6\\ 5.7\\ 5.8\\ 5.7\\ 5.8\\ 5.7\\ 5.9\\ 6.2\\ 5.9\\ 5.7\\ 5.6\\ 5.5\\ 5.6\\ 5.5\\ 5.6\\ 5.5\\ 5.6\\ 5.5\end{array}$	21.50 22.27 23.04 23.24 23.28 23.54 23.29 23.29 23.29 23.29 23.29 23.20 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30

Depth(m)) Temp.(°C)	Salinity(%)	EC(mS/cm)	DO(mg/1)	Sigma-t
2	24.20	34.02	50.90	- ·	22.85
4	24.06	34.25	50.98	-	23.07
6	24.07	34.23	51.02	-	23.05
8	24.07	34.24	51.12		23.06
10	24.05	34.31	51.13	-	23.12
12	24:00	34.63	51.57	~	23.37
14	23.91	34.76	51.60	-	23.50
16	23.92	34.74	51.60	- ·	23.48
18	23.96	34.72	51.60		23.45
20	23.90	34.75	51.60		23.49
22	23.89	34.76	51.59	-	23.50
24	23.64	34.94	51.48	-	23.71

Date:	May	17.	1992
Time:	17:0	0 .	

Date: Hay 17, 1992 Time: 15:30 Station: D

.

Station: E

Depth(m)	Temp.(°C)	Salinity(%)	EC(mS/cm)	DO(mg/l)	Sigma-t
0	23.71	34.68	51.29		23.50
2	23.72	34.69	51.32	-	23.50
4	23.72	34.69	51.32	-	23,50
6	23.72	34.69	51.32	-	23.50
8	23.74	34.68	51.32	-	23.49
10	23.74	34.68	51.32	-	23.49
12	23.74	34.68	51.32	-	23.49
14	23.74	34.68	51.32	-	23.49
16	23.74	34.68	51.32		23.49
18	23.74	34.68	51.32	-	23.49

Date:	May 17,	1992
Time:	14:00	
Station:	С	

Depth(m)	Temp.(*C)	Salinity(X)	EC(mS/cm)	DO(mg/l)	Sigma-t
0.0	23.82	34.49	51.16	8.9	23.32
2.0	23.78	34.67	51.35	7.7	23.47
4.0	23.78	34.67	51.37	7.1	23.47
6.0	23.17	34.69	51.37	7.0	23.49
8.0	23.77	34.68	51.37	7.0	23.48
9.4	23.77	34.69	51.38	7.1	23.49
11.2	23.76	34.70	51.38	7.1	23.50
13.2	23.77	34.69	51.37	7.0	23.49
15.0	23.77	34.70	51.38	7.1	23.49
16.9	23.76	34.72	51.38	7.0	23.51
18.8	23.76	34.72	51.40	7.0	23.51
20.7	23.76	34.72	51.38	7.0	23.51
22.6	23.76	34.24	51.85	8.9	23.15

Table API	9 1.5-1(2)	Physical Ch near the Mo		
Date: Station: Location: Time: Water der Weather: Wind ford Air tempo	si 22 05 05 05 05 05 05 05 05 05 05 05 05 05	ovember 11, 19 t. F-1 2°56'15.2' S, 3:00-09:06 2.3 m lear -1 m/s 3.53 °C(09:30)	43°08′49	.5' W
Depth(m)	Temp.(°C) S	Salinity(%) E	C(mS/cm)	Sigma-t
0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 12.0 13.0 14.0 15.0 15.0 16.0 17.0 18.0 19.0	22.63 22.81 22.60 22.55 22.55 22.52 22.52 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50 22.50	32.37 32.88 33.22 33.34 33.53 33.53 33.63 33.64 33.64 33.64 33.63 33.65 33.66 33.66 33.66 33.67 33.66 33.67 33.67 33.67 33.67 33.67	47.95 48.06 48.21 48.40 48.45 48.59 48.57 48.71 48.71 48.71 48.71 48.70 48.73 48.73 48.73 48.73 48.73 48.74 48.74 48.74	22.07 22.46 22.72 22.82 22.88 22.97 23.06 23.06 23.06 23.06 23.06 23.08 23.08 23.08 23.08 23.09 23.09 23.09 23.09 23.09 23.09 23.09 23.09 23.09 23.09 23.09 23.09 23.09 23.09 23.12
20.0 21.0 22.0	22.47 22.49 22.44	33.73 33.74 33.78	48.79 48.79 48.84	23.14 23.14 23.19

Station: Time: Air temps		St. F-1 10:00-10:10 25.70 *C(10:00))	
Depth(m)	Temp.(°C)	Salinity(X)	SC(mS/cm)	Sigma-t
0.0	23.07	31.63	46.62	21.39
1.0	22.83	31.99	46.92	21.73
2.0	22.76	32.19	47.09	21.90
3.0	22.68	32.37	47.29	22.06
4.0	22.66	32.47	47.32	22.14
5.0	22.65	32.52	47.36	22,18
6.0	22.62	32.74	47.37	22.35
7.0	22.57	32.84	47.92	22.44
8.0	22.52	33, 33	48.26	22.82
9.0	22.51	33,50	48.56	22.95
10.0	22.51	33,50	48.54	22,95
11.0	22.51	33.56	48.62	23.00
12.0	22.51	33,58	48.65	23.01
13.0	22.50	33.59	48.70	23.03
14.0	22.50	33.63	48.68	23,06
15.0	22.49	33.68	48.74	23,10
16.0	22.49	33.68	48.74	23.10
17.0	22.49	33.68	48.74	23.10
18.0	22.49	33.68	48.74	23.10
19.0	22.49	33.68	48.74	23.10
20.0	22.49	33.68	48.74	23.10
21.0	22.48	33.69	48.74	23.11

Station:	St. F-2
Location:	22*56'12.9" S, 43*08'46.3" W
Time:	11:00-11:10
Water depth:	27.4 m
Air temperature:	27.4 °C(11:00)

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Station: Tíme:		St.F-1 09:30-09:38		
Depth(m)	Temp.(°C)	Salinity(%)	EC(mS/cm)	Sigma-t
0.0	22.75	32.71	47.76	22.29
1.0	22.66	32.92	47.89	22.48
2.0	22.51	33.51	48.54	22.96
3.0	22.50	33.52	48.54	22.97
4.0	22.50	33.51	48.56	22.97
5.0	22.50	33,51	48.56	22.97
6.0	22.49	33.57	48.60	23.01
7.0	22.49	33.58	48.62	23.02
8.0	22.49	33,58	48.60	23.02
9.0	22.49	33.57	48.62	23.01
10.0	22.50	33.57	48.62	23.01
11.0	22.50	33.58	48.65	23.02
12.0	22.49	33.61	48.67	23.04
13.0	22.49	33.64	48.71	23.07
14.0	22.49	33,65	48.71	23.07
15.0	22.46	33.67	48.73	23.10
16.0	22.46	33.67	48.73	23.10
17.0	22.47	33.66	48.71	23.09
18.0	22.47	33.65	48.71	23.08
19.0	22.47	33.67	48.71	23.09
20.0	22.47	33.67	48.73	23.09
21.0	22,46	33.67	48.71	23,10
22.0	22.45	33.71	48.79	23.13

Depth(m)	Temp.(°C)	Salinity(%)	EC(mS/cm)	Sigma-L
0.0	24.22	30.44	46.11	20.16
1.0	23.05	31,48	46.68	21.28
2.0	22.83	32.06	46.98	21.78
3.0	22.83	32.24	47.29	21.92
4.0	22.81	32.52	47.59	22.13
5.0	22.75	32.68	47.70	22.27
6.0	22.72	32.70	47.70	22.29
7.0	22,64	32.78	47.73	22.38
8.0	22.65	32.76	47.73	22.36
9.0	22.62	32.85	47.87	22.43
10.0	22.56	33.13	48.12	22.66
11.0	22.55	33.20	48.28	22.72
12.0	22.54	33.27	48.29	22.77
13.0	22.54	33.28	48.28	22.78
14.0	22.53	33.29	48.39	22.79
15.0	22.53	33.32	48.42	22.81
16.0	22.52	33.37	48.43	22.85
17.0	22.51	33.42	48.44	22.89
18.0	22.51	33.43	48.44	22.90
19.0	22.51	33.44	48.44	22.91
20.0	22.51	33.44	48.44	22.91
21.0	22.52	33.44	48.44	22.91
22.0	22.52	33.45	48.45	22.91
23.0	22.51	33.52	48.52	22.97
24.0	22,50	33.58	48.58	23.00
25.0	22.50	33.56	48.58	23.00
28.0	22.49	33.60	48.60	23.04
27.0	22.49	33.63	48.63	23.06

Table APP 1.5.1(3)

Physical Characteristics near the Houth of the Bay-2

Station: Time:		St. F-2 12:00-12:10		
Depth(m)	Temp.(*C)	Salinity(%)	EC(mS/cm)	Signa-t
0.0	23.27	32.72	47.79	22.15
0.5	22.61	33.21	43.21	22.71
1.0	22.58	33.22	43.21	22.73
2.0	22.54	33.19	43.18	22.71
3.0	22.58	33.21	43.17	22.72
4.0	22.54	33.20	43.28	22.72
5.0	22.54	33,19	49.18	22.71
6.0	22.54	33.20	43.17	22.72
7.0	22.54	33.20	48.17	22.72
8.0	22.54	33.20	48.18	22.72
9.0	22.54	33.20	49.18	22.72
10.0	22.55	33.18	48.22	22.70
11.0	22.55	33.16	48.14	22.69
12.0	22.65	33,16	48.15	22.69
13.0	22.55	33.16	48.14	22.69
14.0	22.55	33.16	+8.12	22.69
15.0	22,55	33.14	·8.14	22.67
18.0	22.54	33.18	8.18	22.71
17.0	22.52	33.34	.8.34	22.83
18.0	22.52	33.34	8.35	22.83
19.0	22.52	33.38	8.37	22.86
20.0	22.51	33.39	8.39	22.87
21.0	22.51	33.32	3.40	22.82
22.0	22,51	33.39	3.40	22.87
23.0	22.51	33.48	8.40	22.94
24.0	22.50	33.67	8.67	23.01
25.0	22.43	33.66	8.67	23.10
26.0	22.43	33.69	.8.70	23.12
27.0	22.41	33.7	8.71	23.13

Station: Time:		St. F-2 14:00-14:10		
Depth(m)	Temp.(°C)	Salinity(X)	EC(mS/cm)	Sigma-I
0.0	23.04	32.71	48.15	22.21
1.0	23.01	32.68	48.06	22.20
2.0	23.06	32.67	48.06	22.17
3.0	23.09	32.74	48.12	22.22
4.0	22.94	32.85	48.12	22.34
5.0	22.99	32.90	48.17	22.37
6.0	22.89	32.89	48.20	22.39
7.0	22.84	32.99	48.18	22.48
8.0	22.82	33.03	48.31	22.51
9.0	22.20	32.92	48.20	22.60
10.0	22.80	32.95	48.22	22.46
11.0	22.55	32.95	48.18	22.53
12.0	22.88	32.92	48.25	22.41
13.0	22.53	33.42	48,46	22.89
14.0	22.64	33.24	48.36	22.72
15.0	22.53	33.17	48.40	22.70
16.0	22.62	33.35	48.39	22.81
17.0	22.52	33.48	48.51	22.94
18.0	22.49	33.52	48.54	22.98
19.0	22.49	33.51	48.54	22.97
20.0	22.47	33.54	48.54	23.00
21.0	22.49	33.53	48.56	22.98
22.0	22.47	33.54	48.54	23.00

Station:	St. F-2	
Time:	15:00-15:10	

Station: Time:		St. F-2 13:10-13:18	:	
Depth(m)	Temp.(°C)	Salinity(%)	EC(mS/cm)	Sigma-t
0.0	25,33	29.61	46.00	19.21
1.0	24.73	29.84	45.78	19.56
2.0	22.97	31.13	45.87	21.04
3.0	22.56	31.83	46.42	21.68
4.0	22.61	31.89	46.53	21.71
5.0	22.63	32.59	47.48	22.24
6.0	. 22.62	32.60	47.48	22.25
7.0	22.62	32,61	47.50	22.25
8.0	22.56	33.10	48,18	22.64
9.0	22.54	33.27	48.28	22.77
10.0	22.54	33.30	48.23	22.80
11.0	22.53	33.33	48.35	22.82
12.0	22.52	33.42	48.43	22.89
13.0	22.51	33.52	48.57	22.97
14.0	22.50	33.54	48.57	22.99
15.0	22.50	33.57	48.62	23.01
16.0	22.49	33.58	48.64	23.02
17.0	22.50	33.59	48.64	23.03
18.0	22.47	4 33.61	48.65	23.05
19.0	22.47	33.61	48.65	23.05
20.0	22.49	33.61	48.65	23.04
21.0	22.46	33.61	48.65	23.05
22.0	22.46	33.61	48.65	23.05

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Dopth(m)	Tomp (*0)	Callation (M.)	ro(- o ()	0
		Salinity(%)	2U(@S/CD)	Sigma~t
0.0	23.16	33.17	48.74	22.52
1.0	23.12	33.18	48.76	22.54
2.0	23.12	33.20	48.74	22.55
3.0	23.11	33.19	48.74	22.55
4.0	23.07	33.24	48.76	22.60
5.0	· 23.08	33.22	48.74	22.58
6.0	23.07	33.22	48.78	22.58
7.0	23.05	33.23	48.76	22.60
8.0	23.07	33.25	48.74	22.61
9.0	23.04	32.29	48.76	21.89
10.0	23.03	32.30	48.23	21.90
11.0	23.03	32.30	48.82	21.90
12.0	23.03	32.33	48.84	21.93
13.0	23.03	33.35	48,82	22.69
14.0	23.01	33.36	48.85	22.71
15.0	22.99	33.35	48.85	22.70
16.0	22.88	33,42	48.89	22.79
17.0	22.78	33.48	48.79	22.85
18.0	22.81	33.46	48.76	22.84
19.0	22.76	33.47	48.76	22.88
20.0	22.77	33.49	48.81	22.87
21.0	22.77	33.50	48.81	22.88
22.0	22.80	33.50	48.79	22.87

43'CS' 28.0' W Date: April 23, 1392 Time: 10:50-11:08 43'CS' 28.0' W Station: P1-3 Location: 22'54'51. 1 % light intensity at 0 m: 17000 lux (no.5 fill 1 % light intensity water depth: 5.2 m A.6 m Mater color: 2.50 us Scenhish brown A.6 m Mater color: 2.5 m 5.2 m A.6 m 0.0 2.5 m 5.2 m 3.0 24.90 3.1 (rc) 2.5 m 5.2 m 8.1 122 1.0 24.90 2.1 48 11.122 2.1 48 11.122 2.1 48 11.122 2.1 48 11.122 2.1 48 11.122 2.1 48 11.122 2.1 48 11.122 2.1 49 23.94 2.1 41 7.1 2.1 41 7.1 2.1 44 51.10 2.1 44 51.24 2.1 44 51.24 2.1 44 51.24 2.1 44 51.24 2.1 44 51.24 2.1 44 51.24 2.1 44 51.24 2.1 44 51.24 <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>											
Date day: Clear Light intensity at 0 m: 24.3 °C (03:77) 24.3 °C (03:77) 2500 us an: 15000 lux (no. 5 filter), 2500 us Mater color: m: 15000 lux (no. 5 filter), 2500 us Secchi disk reading: mater depth: 4.6 m Secchi disk reading: mater depth: 4.6 m Secchi disk reading: mater depth: 0.0 25.57 33.64 2.8 m 15.5m 1.0 (*C) (*) 2.8 m 15.5m 0.0 24.80 33.94 2.8 m 1.0 24.80 33.94 51.06 3.45 50.20 4.5 67 7.16 23.48 3.45 50.21 4.5 1.0 24.90 34.34 51.08 3.45 5.0 7.45 2.3.48 51.08 51.08 51.08 3.45 5.0 7.4 2.3.48 34.12 51.24 3.45 5.0 7.45 2.3.48 34.32 51.08 3.45 5.0 7.4 2.3.48 51.36 51.36 3.45<	1 23, 1992 Time: I cati	:20-10:07 22*54'58.9' S		Date: Station:	Apri	1 23, 1992	Time:	10:50-11:0	v v v	43° 06' 57	
I % light intensity water depth: a.3 ° C (08:27) a.3 ° C (08:27) water depth: Mater color: Secchi-disk reading: water depth: Greenish brown C. (08:27) Secchi-disk reading: Mater depth: Greenish brown 2.6 m Depth Terp: Salinity EC 2.6 m (mo/1) (%) phpth Terp: Salinity EC 2.6 m (mo/1) (%) phi Signa= 1.10 33.45 S0.20 4.46 S1.48 3.45 S1.01 (*1.0 C. (*1.0 C. (*1.0 C. (*1.0 C. (*1.0 C. (*1.0 S1.05 3.45 S1.01 C. (*2.0 C. (*2.0 C. (*2.0 C. (*2.0 C. (*2.0 <th colspa="</th"><th>Clear</th><th>· · · · · · · · · · · · · · · · · · ·</th><th></th><th>Light intensit</th><th>ty at 0 m:</th><th></th><th>17000</th><th>lux (no.5 fi</th><th>lter).</th><th>2500 uE</th></th>	<th>Clear</th> <th>· · · · · · · · · · · · · · · · · · ·</th> <th></th> <th>Light intensit</th> <th>ty at 0 m:</th> <th></th> <th>17000</th> <th>lux (no.5 fi</th> <th>lter).</th> <th>2500 uE</th>	Clear	· · · · · · · · · · · · · · · · · · ·		Light intensit	ty at 0 m:		17000	lux (no.5 fi	lter).	2500 uE
X Section: 24.9 °C (06:27) Mater color: 1500 lux (no. 5 filter). 2600 us (no. 15.5 m that a creating: 2.6 m that a creating: 2.7 m				I % light inte	ensity water	r depth:	5.2 B			5.8 B	
m: 15000 lux (no. 5 filter). 260 us Secchi-disk reading: 2.5 m water depth: 4.2 m 5.2 m 5.2 m water depth: 4.2 m 5.5 m 5.2 m recentish brown 2.6 m 4.6 m 5.1 m 2.6 m 2.6 m 15.5 m 5.2 m 2.6 m 2.6 m 15.5 m 5.2 m 2.6 m 2.6 m 2.6 m 100 2.6 m 2.6 m 100 100 2.6 m 2.6 m 2.6 m 100 2.6 m 2.6 m 2.5 m 2.5 m 3.10 (m2/1) (x) pH Signa-t 2.0 2.5 Si 33.34 51.00 4.8 71 3.45 So.20 4.5 6f 7.76 22.483 3.0 24.38 3.12 51.24 4.8 71 3.45 So.50 4.4 8 Si 23.420 5.0 24.4 8 2.1 06 3.2 30 4.1 2 67 71 3.45 So.50 4.4 8 Si 23.420 5.0 24.4 8 5.0 24.4 8 5.1 24 4.8 71 3.45 So 50.5 7.4 8 50.6 8 7.1 25.2 23.4 8 2.2 3.2 8 3.1 2 51.24 4.8 71 3.47 So 50.1 74 2.0 2 24.4 34.2 5 5.3 2	24.9 °C (0	9:27)		Mater color:	•	•	Green	ish brown			
water depth: 4.2 m 4.6 m Mater depth: 5.2 m $Creenish$ brown $Creenish$ brow $Crei$	15000 lux	(no. 5 filter).	, 2600 uE	Secchi-disk re	eading:		2.5 #				
Greenish grown Creenish grown 2.6 m Creenish grown 2.6 m Creenish grown 2.6 m Creenish grown 2.6 m Creenish grown Creenish grown 2.6 m Creenish grown Creenish grown Saimity EC Creenish grown Creenish grown Creenish grown Creenish grown Saimity EC Creenish grown Cre Creenish grown	н 2,4 1 2,4	•	4.68	Water depth:			6.2 m				
2.6 m Depth Temp. Salinity EC D0 Salinity EC D0 (a) ('c') ('x') (ms/(n) ('ms/)) ('x) (a) ('col) ('ms/) ('x) (ms/) ('ms/) ('x) Salinity EC D0 (a) ('col) ('ms/) ('x) (ms/) ('ms/) ('x) (a) ('ms/) ('x) (ms/) ('ms/) ('x) (ms/) ('ms/) ('x) 33.45 50.329 4.5 51.10 5.8 8.1 122 33.45 50.329 4.5 51.00 24.38 33.34 51.10 5.8 8.7 33.45 50.329 4.5 51 24 33.12 51.03 4.5 67 33.05 51.01 5.8 - 23.450 5.3 23.46 3.7 54 34.50 51.01 5.0 74 - 23.48 3.7 54 34.50 51.01 5.0 7.4 5.3 23.46 3.7 54 34.51 5.0 7.4 5.3 5.3 5.3	Ureenish C	LOAD									
I5.5a [a] (*C) (%) (mS/cm) (mg/1) (%) $^{-1}$	2.6 B		• .	Depth			ខ្ល	8			
EC BO EC EC BO EC <t< th=""><th>15.5a</th><th></th><th></th><th>(u)</th><th>() ()</th><th></th><th>' '</th><th>(x) (x)</th><th>ጜ</th><th>Signa-t</th></t<>	15.5a			(u)	() ()		' '	(x) (x)	ጜ	Signa-t	
(ms/m) (ms/l) (x) pH Signar-t 1.0 24.80 33.94 51.41 7.1 106 50.20 4.5 67 7.76 22.483 3.0 24.34 33.96 51.10 5.8 87 50.23 4.5 67 7.76 22.483 3.0 24.34 33.95 51.10 5.8 87 50.52 4.5 85 - 22.838 3.0 24.06 34.23 51.03 4.5 67 50.52 4.5 85 - 23.016 5.0 23.408 3.7 54 4.5 54 51.07 4.8 73 7.85 23.420 5.3 23.46 3.5 2.7 54 51.08 5.0 74 - 23.484 5.3 23.46 3.5 2.7 54 51.08 5.0 74 - 23.484 5.3 23.48 5.4 54 54 54 54 54	ន្ល			0.0	25.57		1.67 8	.1 122	8.11	22.234	
50.20 4.5 67 7.76 22.483 33.96 51.10 5.8 87 50.20 4.5 67 7.76 22.483 3.0 24.38 34.12 51.24 4.8 71 50.20 4.4 85 - 22.638 3.0 24.33 34.12 51.24 4.8 71 50.52 4.4 85 - 23.016 5.3 54.05 34.73 50.33 37.75 51.07 4.9 73 7.85 23.420 5.3 23.46 34.57 - 0.2 51.07 4.9 73 7.85 23.420 5.3 23.46 34.57 - 0.2 2 51.01 5.0 74 - 23.484 5.5 53.450 5.5 2 51.31 5.0 74 - 23.484 5.5 2 2 2 51.31 5.0 74 - 23.483 5.5 2 2 2 51.31 5.0 74 - 23.583 5.0 2 2 2	(I_2(I) (II2/SII)		Signart	1.0			1.41 7	.1 106	•	22.676	
50.20 4.5 67 7.76 22.483 3.0 24.38 34.12 51.24 4.8 71 50.34 4.4 55 - 22.833 4.0 24.06 34.23 51.08 4.5 67 50.34 4.4 55 - 22.833 5.0 34.23 51.08 4.5 67 50.35 4.6 5.3 23.46 34.33 50.98 3.7 54 51.01 5.0 7.4 - 23.480 34.53 - 0.2 54 51.18 5.0 74 - 23.480 34.53 - 0.2 2 51.18 5.0 74 - 23.480 34.53 - 0.2 2 51.18 5.0 74 - 23.480 5.5 23.46 34.59 - 0.2 2 51.18 5.0 74 - 23.480 5.5 23.46 34.58 - 0.2 2 51.31 5.0 74 - 23.583 5.0 23.41 34.58 0.01 1	والمعالية المحالية والمحالية و		and the second	2.0			1.10 5	.8 87	ı	Z2.846	
50.34 4.4 55 - 22,033 4.5 67 50.52 4.6 58 - 23,016 5.0 23,80 34,34 5.7 54 50.52 4.6 58 - 23,016 5.0 23,80 34,34 57 54 51.07 4.9 73 7,85 23,420 5.3 23,46 34,57 - 0.2 2 51.18 5.0 74 - 23,484 5.5 23,46 34,59 - 0.2 2 51.31 5.0 74 - 23,589 5.0 23,41 34,58 - 0.2 2 51.31 5.0 74 - 23,589 5.0 23,41 34,58 - 0.2 2			22.469	3.0			1.24 4	11 8	1	22.941	
50.52 4.6 58 - 23.016 5.0 23.80 34.34 50.98 3.7 54 51.07 4.9 73 7.85 23.420 5.3 23.46 34.57 - 0.2 2 51.18 5.0 74 - 23.484 5.5 23.46 34.59 - 0.2 2 51.31 5.0 74 - 23.589 6.0 23.41 34.58 50.85 0.1 1		55	22.838	4.0.			1.09	.5 67	1	23.121	
51.07 4.9 73 7.85 23.420 5.3 5.3 23.46 34.57 51.18 5.0 74 - 23.484 5.5 23.46 34.58 51.31 5.0 74 - 23.589 5.0 23.41 34.58	50.52 4.		23.016	5.0			0.38	.7 54	7.82	23.282	
51.18 5.0 74 - 23.484 5.5 23.46 34.58 51.31 5.0 74 - 23.559 6.0 23.41 34.58	51.07 4.	• -	23.420	5.3		34.57		.2 2	•	23.559	
51.31 5.0 74 - 23.539 5.0 23.41 34.53	51.18	- 52	23.484	5.5		24.58	•	.2	ı	23.567	
	51.31	- 14	23.539	9'0	23.41		0.85	.1	ł	23.581	
51.51 5.0 74 7.93	51.51	74 7.93	23.572	And the second							

Preliminary Survey - 1 Table APP 1.7-1(2)

Time: 11:27-11:40 Location: 22'56'09.4° S, 43'08'11.8° भ Greenish brown

Preliminary Survey - 1

Table APP 1.7-1(4)

April 23, 1992 P1-4

Date: Ap Station: P1 Water color: Secchi-disk reading: Water depth:

Sigma-t

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(mS/cm) (mg/1) (A

Salinity (X)

C C Lead

Depth (m)

1.4 m 30.8 m

22.24 22.24 22.65 22.65 22.65 22.65 22.65 22.65 23.65 25.65 25.65 25.65 25.65 25.65 25.65 25.65 25.65 25.65 25.65 25.65 25.75

0.0 10.0 10.0 25.0 30.0 30.0

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	43° 08° 25. 3°		Signa-t	22.072	22.265	22.690	22.947	23.285	23.325	23.468	23.648	
	មិន ភូមិ ទី		5		1	ł	,	ł	÷	F :	I	
	0:20-10: 22°55°0 Jark bro	0	ર	121	32	82	8	8	ន	Z	8	
	Time: 10:20-10:35 Location: 22°55°00.1° Greenish dark brown 0.8 ш 21.9 m	8	(1/2回)	9.8 8	7.5	6.8	5.1	5.1	5.2	5.0 0.0	5.7	
		ន	(ms/cm)	50.59	50.23	50,42	50.61	50.92	50.96	51.09	51.27	
	April 23, 1992 P1-2	Selinity	રે	33.21	33.33	3.8	33.98	8.8	87.58 1	34.54	34.74	
• .	ing:	Temp.	() 	24.95	24.47	24.00	24.00	23.79	23.76	23.89	23.60	
	Date: Station: Water color: Secchi-disk read Water depth:	Depth	(H)	0.0	1.0	3.0	5.0	7.0	10.0	15.0	20.0	

APP 1-28

23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.23 23.24 23.24 23.24 23.24 23.24 23.24 23.24 23.24 23.25 23.24 23.25 23.26 23.27 23.26 23.27 23.26 23.27 23.26 23.27 25.27

0.0 5.0 7.0 10.0 10.0 10.0

Tenp.

Depth (E)

Date: April 23, 1992 Station: P1-1 Weather on the previous day: Weather on the day: Air temperature: Light intensity at 0 m: 1 % light intensity water depth: Mater color: Secchi-disk reading: Mater depth:

Table APP 1.7-1(1)

Table APP 1.7-1(5) Preliminary Survey - 1

Date: April 23, 1992 Time: 13.55-13.15 Station: P1-5 Location: 22'55'54.9' S, 43'08'34.5' W Water color: Brown (transparent) Sechi-disk readine: 1.3 m

securituiss realing Water depth:	- cou 115.		- 63	۲.۵ ۵.5 m		•	
Depth	Temp.	Salinity	ដ្ឋ	8			
(e)	<u>;</u>	(*)	(mS/cm)	(1/2u)	છ	æ	Signa-t
0.0	25.06	XI.XI	50.85	0.9	133	8.01	22.130
0.7	25.03	X.X	50.88	,	I	ı	22.121
2.0	24.83	33.36	50.82	5.4	<u> 8</u> 3	ı	22 223
2.1	24.24	23 SZ 29	50.45	ı	,	ı	22.615
2.8	23.77	33.68	51.57	4.9	12	ı	22.785
3.0.	24.11	33.90	50°.03	5.0	73	ł	22,853
3.5	24.23	33.91	50.67	,	1	7.86	22, 807
5.0	24.02	37.08 18	50.79	5.0	73	1	22.987
7.1	23.87	34.21	50.85	ŀ	1	ŧ	23.162
9.8	23.90	34.23	50.85	4.8	70	7.87	23.188
10.6	23.82	34.51	51.18	•	,	1	23.407
14.5	23,80	34.66	51.34	5.1	74		23.528
18.8	23.74	34.74	51.41	ł	ı	J	23.607
19.8	23.68	34.77	51.48	4.9	78	1	23.649
26.0	23.65	34.81	51.41	ł		,	23 600

Table APP 1.7-1(6) Preliminary Survey - 1

42.5° ¥	i .	1 ~			~	~			
43 09	Sigma-t	21.895	21.522	22.151	22.418	22.43	23 171	23.56	23 88
4:55 2:50.6°, S, 2:2 m 2.2 m 2.2 m ent)	ጜ		ı	,	1	1	ı	ł	ı
14:36-14:55 on: 22°55 50 lux, 2100 lux, 2100 (transparent)		153	154	140	18	81	3	93	72
Time: 14:38-14:55 Location: 22:53:50.5° S, 43°03'42.5° 1000 lux, 2100 uE 2.4 m 2.2 m Brown (transparent) 1.2 m 1.2 m	EC <u>00</u> mS/cm) (mg/1) (10.3	10.4	9.5	5.5	5.5	4.1	4.6	5.0
	EC (IIS/CII)	50.90	50.93	50.63	50.37	50.35	50.73	51.27	51.35
April 23, 1992 P1-6 1 m: water depth: water depth:	Salinity (X)	33.14	33.17	33.27	33.45	33.46	34.21	X. 8	67.78
	Temp. (*C)	25.34	25.34	24.84	24.41	24,33	23.84	23. B	23.61
Date: April 23, 15 Station: PJ-6 Station: PJ-6 Light intensity at 0 m: 1 % light intensity water depth Mater color: Secchi-disk reading: Mater depth:	Bepth (m)	0.0	1.0	3.0	4.0	5.0	7.0	10.0	15.0

y Survey - 1 1992 Time: 15:00-15:12 Location: 22°53'19.6' S, south Brown 1.4 m 33.0 m 33.0 m 33.0 m (mS/cm) (mg/1) (%) pH 1.4 m 33.0 m 50.74 8.0 119 7.99 50.74 8.0 119 7.99 50.74 4.3 53 50.76 4.7 88 50.76 4.3 53 50.54 4.3 53 50.55 6.7 8 115 50.55 6.7 8 7 8 50.55 6.7 8 7 8 50.55 6.7 8 7 8 50.55 7 8 7 8 50.55 7 8 7 8 50.55 7 8 7 8 7 8 50.55 8 7 8 7 8 7 8 7 8 50.55 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8		
ver - 1 Time: 15:00-15:12 Location: 22 ⁵ 5 ³ 19.5 ⁶ S, 4 m/s South Brown 1.4 m 33.0 m 3.0 m		· · ·
vey - 1 Time: 15:00-15:12 focation: 22°53'19.6° south Brown 1.4 m 33.0 m 35.0 m		Signe-t 22.020 22.550 22.556 23.7566 23.7567 23.7566 23.7567 23.75767 23.75767 23.7567 23.7567 23.7567 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.75767 23.7576777 25.7576777777777777777777777777777777777
vev 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.		田 (1) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
vev 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.	÷	4_1 1
vev 8. 8. 8. 8. 8. 8. 8. 8. 8. 8.	· +4	
11 23, 199 11 23, 199 23, 19 33, 19 23, 19 33, 19 23, 19 33, 19 23, 19 33, 19 23, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 19 33, 71 34, 26 34, 75 34, 75 34, 75 34, 75	urvey -	EC (mS/cm) (mS
	Preliminary S	Salinity (x) (x) 33.19 33.19 33.19 33.19 33.19 33.19 33.19 33.19 33.19 34.77 34.75 34.75 34.75 34.77 34.77 34.77 34.77 34.77 34.77 34.77 34.77 34.77 34.77 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 34.77 35.58 35.77 35.78 35.77 35.78 35.77 37.77 3
		Temp. (*C) (*C) (*C) (*C) (*C) (*C) (*C) (*C)
Table APP 1.7-1(7) Date: Date: Station: Wind direction: Wind direction: Water color: Mater color: Mater color: Secchi-disk reading: Mater depth: (m) (°C) 0.0 25.07 2.0 24.24 10.0 25.03 15.0 24.24 25.0 23.36 15.0 23.35 25.0 23.55 25.0 23.55	able APP 1.7-1(7)	Depth Depth (m) (m) 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0

Table APP,1.7-1(8) Preliminary Survey - 1

Station: PI- Station: PI- Aater color: Secchi-disk reading: Mater depth:	read	191-2, 1932 191-8 1915:	768T	1.00%: 10:00-10:32 Location: 22*53'16.2* Brown 1.2 m 13.0m	: 22°53' 16.1		S, 43° 10′ 05.0′
Depth (n)	Tesp.	Salinity (%)	(IIS/CII)	(1/2)	<u>10</u>	Æ	Signa-t
0.0	25.51	33.31	51.24	9.2	138	8.01	21, 931
1.0	25.48	33.32	51.15	9.3	138	1	21.948
2.0	25.23	33.32	51.06	9.3	8	1	22.025
3.0	24.33	33.58	50.45	8.7	132	1	22.478
3.5	24.24	33.71	50.51	7.8	114	ı	22.617
4.0	24.08	33.86	50. 60	6,0	88	•	22.778
5.0 2	23.93	34.03	50.67	6 C	57	ı	22.951
7.0	23.81	34.27	50.77	3.6	5	ı	23.167
10.0	23.70	ж. Ж	50.90	3.6	5	ı	23.245
12.0	23, 61	24.54	51 01	с. С.	វេ		067 26

APP 1-29

Preliminary Survey - 1 Table APP 1.7-1111)

Time: 15:40-15:50 Location: 22°53'01.6° S, 43°11'31.0° M Gravish green brown 1.6 m 8.0 m

Prelisinary Survey - 1

Table APP 1.7-1(9)

April 23, 1992 Pl-9

Date: April Station: Pl-9 Mater color: Secchi-disk reading: Water depth:

Signe-t

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3 2 (1/20)

(15) 원 /일

Salinity (x)

G g

Depth E

8.01

4 0

	<pre>S92 Time: 16:12-16:16</pre>	50 <u>10</u> (as/cm) (ag/1) (X) pi Signa-t	4.7 71 7.84	4.7 71 -	4.6 70 -	50.76 4.4 66 - 21.728	3.3 50 -	3.2 48 -	2.1 31 -	1.7 26 -
Frettannery out ver - 1	April 23, 1992 PI-11 ing:	Salinity (%)	ļ			33.01		ŝ.		
	or: isk readi	Temp.	25. ES	87.83 25.63	25.63	25.44	24.48	24.23	24.06	24.02
TINIA MEL T' LINA ANDI	Date: Station: Mater color: Secchi-disk read Water denth:	Depth (m)	0.0	1.0	2.0	3.0	4.0	5.5	5.0	7.0

21.895 21.904 221.904 221.933 22.933 22.938 22.538 22.538 22.538 22.538

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Table APP

	۶.										
	Time: 15:55-16:05 Location: 22'52'55'5' 5, 43'12'03.1' Stavish green brown 1.3 m 4.0 m		Sigma-t	21.387	21.390	21.330	21.401	21.386	21.382	21.364	21.339
	::05 53.5° S 04m		푻	7.61	•	1	•	1	ł	•	,
	15:55-16:05 : 22 ⁵ 52 ⁶ 53.1 green brown		3	B	8	B	88	8	8	ያ የ	33
ı	Time: 15:55-16:05 Location: 22 [°] 52 [°] 53 [°] 53 [°] Cravish green brown 1.3 m 4.0 m	8	(1/2m)	4.6	4.6	1.6	4.5	46	44	4.3	4.3
}		ន	(1/2世) (112/5日)	50.93	80. 88	50.98	50 38 29	50.98	50.95	50.95	50.92
	April 23, 1992 Pl-10 ing:	Selinity	ŝ	32.75	32.77	32.77	32.78	32.75	32.76	32.74	32.71
	k readii	Temp.	9	25.91	25.95	25.95	25.94	25.34	25.95	25.96	25.97
	Date: Apr Station: Pl- Mater color: Secchi-disk reading: Mater depth:	Depth	(H)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5

Time: 16:20-16:30 Location: 22"51"56.6" S, 43"11"57.7" W Greyish green brown 1.4 m 9.1 m

Preliminary Survey - 1

Table APP 1.7-1(12)

April 23, 1992 PI-12

Date: Station:

Water color: Secchi-disk reading: Water depth:

Signa-t

3 8 (1/311)

(<u>m</u>s/cm)

Salinity (X)

Depth (a)

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22.22.22.22 22.22.22 22.22.22 23.22.22 23.22.22 23.23 23.23

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7.0 8.0

0.0 3.0 3.5 3.5

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APP 1-30

Table APP 1.7-1(13) Preliminary Survey - 1

Time: 16:43-16:50 Location: 22"52"02.2" S, 43"08"35.7" W Gravish green brown 1.4 m April 23. 1992 Pl-13 Date: April 2 Station: P1-13 Water color: Secchidis: reading: Weter Anth-

Depth	Temp.	Salinity	ස	ă			
(B)	(C)	(*)	(mS/cm) ((ug/))	સ	Z	Sigma-t
0.0	24.91	33.27	50.62	6,9	105	8.01	22.085
3.0	24.88	33.29	50.62	5.0	8	1	22.109
5,0	24.00	87.83 19	50.71	3.8	55	,	22.930
0	23.92	34.10	50.71	3.7	ß	ł	23.006
8.7	23.71	34.38	50.92	4 0	8	ŀ	23.279
13.0	23,56	34,66	51.10	4.1	8	ł	23.535
15.6	23.51	34.70	51.12	4.0	33	ı	23.579

Table APP'1.7-1(14) Preliminary Survey - 1

° 55.0°		
Lime 10:07-10:30 Location: 22'58'03.5' S, 43'03'55.0' Clear Clear 27.2 °C (13:30) 3 m/s 2850 jux (no.5 filter) 15000 jux (no.5 filter) 15000 jux (no.5 filter) 13.6 m 13.6 m	Sigma-t 23.325 23.334 23.451 23.451 23.527 23.658 23.657 23.057 25.027	
Lime 10:07-10:30 Ocation: 22'58'00.5' S Clear Llear 27.2 °C (13:30) 3 m/s 3 m/s 552 15000 lux (no.5 filter) 15000 lux greenish brown 13.6 m 13.5 m 18.5 m	pH 7.95 7.96 7.96 7.93 8.02	
Time 10:07-10 Location: 22:58 Clear Clear 27.2 °C (13:30) 3 m/s 3 m/s 3 m/s 3.1 m 2550 lux (no.5 1500 lux (no.5 13.6 m 13.6 m 13.6 m	888888888888	
Time 10: Location: Clear Clear Clear Clear 3 m/s 555 25500 lux 15000 lux 3.1 m 3.1 m 3.1 m 15.5 m 13.6 m 13.6 m	D D D D D D D D D D D D D D	
92 th:	EC (mS/Cm) (ms	
ate: April 24, 1992 tation: P1-14 eather on the previous day: feather on the day: in temperature: ind force: ind direction: light intensity on the surface: light intensity on the surface: light intensity at 0 m: Ater color: Secchi disk reading: Mater depth:	Salinity (1,) (2,) (3,)) (3,) (3,)) (3,))) (3,))) (3,)))(3,)))(3,)))(3,)))(3,)))(3,))(3,)))(3,))(3,)))(3,))(3,)))(3,))(3,	•
ate: April 24. tation: P1-14 24. teather on the previous day: the temperature: find force: find force: light intensity on the surfe light intensity on the surfe ater color: Secchi disk reading: Mater depth:	76mp. 24.75 24.45 24.45 23.32 23.32 23.33 20.35 20.33	
Date: Station: Reather on the prev Meather on the darve Mart temperature: Wind force: Wind direction: Wind direction: Mater color: Secchi disk readin Mater depth:	Depth (m) (m) (m) (m) (m) (m) (m) (m) (m) (m)	

Table APP 1.7-1(15)

Time: 10:57-11:08 Preliminary Survey - 1 April 24, 1992

kater color: Secchi-dísk readi Mater depth:	r: k reading h:			Greenis 3.0 m 18.1 m	ish dar a	Location: ZZ 3/ 25.3 Greenish dark brown . 3.0 m 18.1 m	s. 44 UI 45.5	× .
Bepth	Temp.	Salinity	ដ	8				
(E)	() •	(1)	(ms/cm) (i	(ug/))	(X)	βł	Signa-t	
0.0	24.63	34.26	51.46		16	7.92	22.914	
0.1	24.47	34.42	51.41	5,9	8	•	23,082	
3.0	24.02	34.60	51,51	5.8 9	<u>8</u> 8	1	23.353	
4.0	24.01	34,66	51,59	5.7	83 25	1	23,402	
5.0	24.00	34,66	51.60	6.7	33 23	1	23,405	
10.0	23.66	34.98	51,51	5.7	84	ı	23.747	
11.0	23.43	35.03	51.40	1	ı	1	23.852	
12.0	22.61	ж. <u></u>	50.87	1	1	ı	24.331	
15.0	21.31	35.42	49.78	5.3	8	1	24.750	
18.0	21.25	35.42	49.70	6°2	84	ı	24.756	

Table APP 1.7-i(15) Preliminary Survey - 1

æ

Secchi-disk reæ Water depth:	k recong			3.5 m 16.5 m	Jark green 3.5 m 16.5 m		
Depth	Temp.	Salinity	B	8			
(B)	9	(*)	Ê	(U/Ju)	(¥)	ጜ	signa-t
0.0	24.49	34.31	51,85	5.8	86	7.92	22,994
1.0	24.57	34.36	51.71	5.8	86	F	23.008
2.0	24.05	34.50	51,45	, 1	ı	ı	23.289
3.0	23.98	34.60	51,46	5.5	9I		23, 365
0.5	23.96	34.60	51.45	ດ. ເວ	81	۱	23.371
5.0	23.95	34.67	51,48	3.5 2	81	t	23.427
1.0	23 78	34.79	51.51	5.6	8	ı	23-568
10.0	23.20	35.15	51.45	5.6	83	ı	24.010
13.0	23.14	35.35	49.73	5.9	86	1	24.178
14.0	20.22	35.47	48.70		ı	ı	25.083
15.0	20.13	35.51	48.55	5.8	81	i	25.137
10.0	FF 00	, 10 10	10 01	r u	70		06 190

APP 1-31

Table APP 1.7-1(17) Preliminary Survey - 1

Station: Mater color: Secchi-disk readi Mater depth:		PI-17 21, 1006	2	Time: Locatio Greenia 3.0 m 32.0 m	lime: 11:45-17 Location: 22*57 Greenish brown (3.0 m 3.0 m	line: 11:45-12:06 Location: 22°57'02.9° Greenish brown (trans 3.0 m 32.0 m	2:05 02.9°S, 43°03'48.0° (transperent)
Depth	Temp.	Salinity	53	8		-	
(m)	3	E	(us/su)	(1/8u)	સિ	₹	Si gaa-t
0.0	25.06	33.92	51.63	6.4	96	83.7	22.528
1.0	21.83	34.19	51.48	6.3	94	ı	22.862
3.0	24.31	34.23	51.38	5,8	87	;	22.988
4.0	24.13	34 47	51.43	5.8	83	ı	23.223
5.0	24.08	34.52	51.45	7 20	8	ı	23.275
7.0	24.00	200	51.45	5.3	62	ı	23.359
10.0	23.97	34.61	51.46	5,2	78	1	23.376
13.0	23,68	21.72	51.38	5.4	80	,	23.582
14.0	23.54	34.94	51.27	5.6	82	,	23.752
15.0	22.52	35.02	SC. SS	5.8	84	ı	24.108
20.0	21.64	35.23	86.64	5.8	3	ı	24.515
25.0	19.76	35.48	48.26	5.7	13	1	25.212
8.0	10 50	25 54	20 GY	c u	95		000 00

Preliminary Survey - 1 Table APP 1.7-1(18)

Depth (H)	nater deptil			12.0 #	. 4			
	Temp. (°C)	Salinity (%)	EC (mS/cm)	EC _ DO (mS/cm) (mg/1)	· (X)	.	signa-t	
0.0	25.43	1	52.12	6.3	1	1.88	22.489	-
1.0	25.31	33.96	51.96	6.2	3	1	22.481	
2.0	24.55	34.11	51.40	6.3	64	ı	22.826	
3.0	24.35	34.21	51.27	5.4	95	ı	22.96)	
	24.18	8.8	51.26	5.3	52	ł	23.072	
5.0	23.92	34.42	51 16	4 4	I		23.247	
7.0	23.58	87 F8	50.99	с С	23	•	23.468	
10.0	23.22	34.75	50.90	2.0	8	I	23.702	
11.0	23.14	34.81	50.87	1.7	26	,	23.771	

Table APP 1.7-1(19) Preliminary Survey - 1

Bate: Ar Bate: Ar Meather on the day: Mind direction: Wind force: Mater color: Secchi disk reading: Mater depth: (m) (°C) (°C) (m) (°C) 24.76 2.0 24.76 3.0 24.76 3.0 24.76 5.73 1.0 25.73 1.0 25.73 1.0 25.73 1.0 25.75 2.0 24.57 1.0 25.75 1.0 25.75 2.0 24.57 1.0 25.75 2.0 24.57 1.0 25.75 2.0 24.57 1.0 25.75 1.0 25.75 2.0 25.75 1.0 25.75	April 24, 1992 Time: 13:27-13:37 P1-19 Location: 22'54'10.3' S, 43'08'25.5' V: 27:2 *C (13:30) 7 n/s SSE Brown 1.5 m 26.0 m	Salinity EC DO (mS/cm) (mg/l) (X) pH Signa-t	51.21 9.7 146 8.10	51.26 9.5 145 ~	51.92 7.7 114	50,76 5.3 102 -	33.38 50.63 5.9 87 - 22.213	50.62 5.4 80 -	51.07 5.1 76 -	51.31 4.6 58 -	51.30 4.5 66 -	51.31 4.4 85
	the day: ature: tion: tion: r: k reading	6 () 1 () 1 ()	25.73	25.75	24.75	24.90	24.76	24.67	24.51	23.77	23,68	23. FG

ż Table APP 1.7-1(20)

	s' 25.53° ¥		
	Time: 13:40-13:55 Location: 22°53°01.1° S, 43°08°25.53 11500 lux Greenish brown 1.5 m	Signe-t	21.273 21.273 21.282 22.130 22.152 22.152 22.155 22.130 22.730
	13:48-13:55 :: 22°53'01] х і broнл	₹	8 8
	Time: 13:48- Location: 22°5 11500 lux Greenish brown 1.5 m 8.0 m	8	81 82 82 82 82 82 82 82 82 82 82 82 82 82
	Time: Locatio 11500 1 Greenis 1.5 m 8.0 m	00 (1/201)	10.3 10.1 5.3 5.3 3.7 2.2 3.7 2.7
y Survey -	1932	8C <u>D</u> (mS/cm) (mg/1)	51.12 50.55 50 50.55 50 50 50 50 50 50 50 50 50 50 50 50 5
Preliminary Survey -	April 24, 1992 P1-20 8:	Salinity (%)	32.71 32.28 32.28 32.55
	üp	Temp. (°C)	26.18 26.19 24.81 24.81 24.76 24.60 24.49 24.24 24.24
mre 444 1.1-1/20)	Date: Station: Water color: Secchi-disk rea Water depth: Water depth	Depth (m)	0.0 2.0 7.0 7.0 7.0 7.0 7.0 7.0
1100			ii

APP 1-32