Task 2.9

Florida Department of Environmental Regulation

Longterm Effects of Dredging and Open-water Disposal on the Apalachicola Bay System

(Final Report)

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Summary of Conclusions

Using field data (physical, chemical, biological) taken in the Apalachicola Bay system from March, 1972, to the present time, a review was made concerning the impact of dredging and the deposition of spoils on the Apalachicola estuary. For the most part, data analysis was conducted on fixed (i.e. permanent) stations, which has the advantage of identifying long-term effects in specific areas of the bay. However, the use of information that was not necessarily directly related to the dredging program in the Apalachicola system disallowed a precise evaluation of certain aspects of the dredging. Such effects include immediate (short-term) area- and event-specific responses of various portions of the estuary to individual dredging events.

The main dredging effort occurred within the Intracoastal Waterway although the opening of the two-mile channel (in 1976) and the continued dredging of Sike's Cut were considered to be important focal points of the overall analysis (from 1973 to the present). All dredging ceased in 1978, which, together with the two-mile channel opening or extension, constituted important events (or interventions) in the time-series analysis of the data. Seasonal cycles of important commercial species were reviewed in detail because of potential problems of dredging activities that could affect natural successions of estuarine productivity. Salinity effects were analyzed in some detail because of the central role of salinity in affecting biological productivity.

All evaluations had to be carried out within seasonal and annual cycles of river flooding and drought. A complete review of background ecological conditions at most stations over the study period revealed habitat changes that were generally consistent with short- and long-term trends of climatological conditions. Several station-specific changes in the physical, chemical, and biological features of the estuary were related, directly or indirectly, with dredging activities:

1. Salinity at Sike's Cut was spatially and temporally related to dredging activities in the area. Prior to the 1978 cessation of dredging, there was considerable salinity stratification and generally high (stable) salinities at depth. From 1978 to the present, bottom salinities were generally lower despite periodic drought conditions, and various factors (salinity, dissolved oxygen) indicated less stratification of the water column as the cut filled in and cut off the movement of high-salinity water from the gulf into the estuary. Such salinity effects were translated into a local increase in species richness and diversity (as stenohaline gulf species penetrated the estuary) and a reduction of those organisms, many of the commercially valuable species, that usually utilize the estuary as a nursery (i.e., penaeid shrimp, blue crabs, finfishes). Such effects were supported by observed shifts in the biological (community) structure at Sike's Cut following the cessation of dredging in 1978. Preliminary surveys indicate that the area of impact is greater than that indicated in previous studies. This part of the study is continuing with an analysis of the distribution of salinity in Apalachicola Bay before and after the dredging of Sike's Cut in 1984.

2. No short-term effects of dredging were noted on various water quality factors and biological indices as a result of dredging operations in the Intracoastal Waterway and two-mile extension during winter months.

3. No significant long-term changes in habitat features were evident at stations that could have been affected by the opening of the two-mile extension in 1976. However, subtle (and statistically non-significant) changes in the biological response indicated altered conditions off Green Point relative to changes in the main (intracoastal) channel. The interpretation of increased freshwater input to the St. Vincent Sound area was thus not substantiated by statistically significant shifts in water quality (i.e., salinity) factors. However, long-term shifts in the biota indicate a diversion of fresh water to western sections of the Apalachicola estuary subsequent to the opening of the two-mile extension.

4. The dredged channels along the Intracoastal Waterway, the two-mile channel, and the East Point Channel created conditions for the concentration of silt-laden sediment fractions and loading of specific (associated) contaminants such as heavy metals and organic matter. However, the propensity of such channels to act as sinks for such materials was dependent on various factors such as proximity to urban runoff, circulation conditions, and other seasonally adjusted variables. Infaunal benthic macroinvertebrate communities reflected such conditions and were adversely affected in certain portions of the East Point Channel and the two-mile channel. However, various areas along the Intracoastal Waterway and Sike's Cut were generally unaffected in terms of accumulations of contaminated sediments. Thus, only those dredged areas that were proximal to contaminated storm-water runoff were characterized by contaminated sediments and biological degradation. Location relative to land runoff and current structure are determinants of the impact of dredged channels in the Apalachicola estuary.

5. Overall analysis of dredging activities in the Apalachicola estuary indicated that such operations can affect the salinity regime and biological productivity of the system. However, such effects are complex and depend on natural, long-term changes in the bay system and the exact nature of the dredging activity in terms of timing, location, and effort. Because the dredged channels of the intracoastal waterway serve as a nursery area for developing young of commercially important species such as penaeid shrimp during spring, summer, and fall months, dredging of the bay should be restricted to winter-early spring months (December-March), when habitat disturbance due to dredging is minimal.

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Preface and Acknowledgements

This project was funded by the Florida Department of Environmental Regulation (Project Officer, Stephen Leitman) through a contract awarded by the department to the Florida State University (Robert J. Livingston, Principal Investigator, and the Aquatic Study Group). The objective of the study was to review existing field data concerning the Apalachicola Bay System taken continuously by the F.S.U. Aquatic Study Group from March, 1972 to the present. A general review of the scope of the project, with appropriate scientific references, is given by Livingston (1983 a, b).

Field work has been carried out by numerous workers over the years (Livingston 1983 a). Data processing was carried out by the principal investigator with help from Glenn C. Woodsum, Loretta E. Wolfe, and Duane A. Meeter. Data transmission was accomplished by Shelley J. Roberts while J. Michael Kuperberg handled the administration of the grant. Additional information on dredging activities in the study area was provided by the U.S. Army Corps of Engineers (Mobile, Alabama) and Mr. Stephen Leitman (Florida State Department of Environmental Regulation; Tallahassee, Florida). Data analysis was carried out using software systems developed by the Aquatic Study Group in conjunction with the Florida State University Computer Center.

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I. Introduction

A. Environmental Setting

Livingston (1983, 1983a, b, c) has given a general review of the ecological background and socioeconomic character of the lower Apalachicola basin. The aquatic productivity of the estuary depends on three primary factors: (1) The Apalachicola River system which delivers dissolved and particulate organic matter and inorganic nutrients to the estuary while maintaining seasonally variable control of the salinity regime of major portions of the Apalachicola Bay system (East Bay, Apalachicola Bay, St. Vincent Sound, western St. George Sound; Figure 1). (2) Local rainfall and overland runoff from surrounding marshes, swamps, and wetlands. (3) The physiographic features of the system which include the shallow basin and enclosure by a barrier island system (mainly St. George Island and St. Vincent Island; Figure 1) which profoundly affect the current structure and salinity regime of the bay system.

Depths in the Apalachicola Bay System average 2-3 meters. Tidal ranges are relatively small, approximating 0.3-0.4 m at the highest tides. Such tides are unsymmetrical and semi-diurnal except during periods of high winds which tend to disrupt the usual tidal pattern and have a strong influence on the current structure of the system. Current velocities in the estuary average 1.5-2 feet per second although velocities near the passes (i.e. Indian Pass, West Pass, Sike's Cut; Figure 1) may reach 3 feet per second. Net flows tend to move to the west from St. George Sound into Apalachicola Bay where they merge with water moving out of East Bay (Figure 2). There is a net westward flow through St. Vincent Sound; however, movement through Indian Pass may be retarded by the Picoline Bar. The major outlet for low salinity water out of the estuary is West Pass although wind and tides have a major influence on net outflows at any given time (Figure 3).

B. Effects of Dredging and Spoil Placement

The impact of dredging and spoil placement on the physical/chemical environment and biological structure of estuaries has been reviewed by various authors (Marshall, 1968; Odum, 1970; Lee and Plumb, 1974). Such potential general effects have been summarized by Darnell (1976) (Table 1A). Specific categories of impact include alteration of bottom topography, modification of natural patterns of water circulation, altered water quality, and siltation effects because of the accumulation of fine-grained particles. Odum (1970) and others have alluded to the fact that sediments control various ecological factors in estuaries in terms of destabilization of the benthic habitat and the tendancy of fines to be associated with high organic concentrations, oxygen depletion due to high biochemical oxygen demand (B.O.D.) and high chemical oxygen demand (C.O.D.), and the concentration of toxic pollutants (i.e. oil and grease, organic materials, metals) due to absorption of such materials to the sediments (Fines). These trends are evident in bays and estuaries (Table 1B) where sedimentation rates from overland runoff can be particularly high. Areas where marshes are effected can also suffer impacts due to dredging and spoiling (Table 2). Darnell (1976) has given a detailed synopsis of the combined effects of dredge/spoil activities in bay systems (Figure 4) which illustrates potential problems to be examined when analyzing the impact in any given area.

Since the early review of the problem, considerable research has been carried out to address specific effects of dredge/spoil activities in areas outside and within the Apalachicola estuary. The location of the dredging activity is important to the overall impact. Water from highly contaminated disposal sites can be toxic to larval organisms when compared to the dredge site proper or areas removed from the dredge site (DeCoursey and Vernberg, 1975). However, Hoss et al. (1974) showed that such effects from contaminated sediments are species-specific, and Sissenwine and Saila (1974) demonstrated that dredge and spoil effects may have no demonstrable effect on finfish fisheries in the general area of operations.

On the other hand, dredging in upland areas to form isolated canals can have profound adverse effects on water quality, sediment quality, and the natural (biological) productivity of an estuary (Kaplan et al., 1974; Lindall et al., 1975; Adkins and Bowman, 1976). Likewise, dredging and filling can have a direct, adverse impact on grassbeds (Briggs and O'Connor, 1971) and shellfish (Mackin, 1961; Rose, 1973) in the immediate vicinity of the dredging operation. Such effects may be localized (Ingle, 1952) and specific to a given environmental situation and may depend to a considerable degree on the timing and form of the dredging operations (Mackin, 1961). Field observations in some estuaries indicate that sediment resuspension due to dredging may be similar to that due to natural changes induced by storms (Bohlen et al., 1979) so that an impact analysis should be carefully designed to include the natural background variation of environmental factors in the specific estuary in question.

Various studies have been carried out in the general region (i.e., the northeast Gulf of Mexico and surrounding areas). Subrahmanyam and

Kruczynski found that man-made islands (from dredge spoil) in Dickerson Bay (north Florida) were rapidly colonized by polychaete worms due primarily to immigration from surrounding areas. Lee and Jones (1982) showed that contaminants such as heavy metals, organochlorine pesticides, and nutrients attached to sediments generally were not released to an appreciable degree to the associated water column. Conclusions were drawn from elutriate tests that open water disposal of contaminated sediments from a Texas estuary would not cause a significant adverse impact on water quality in the Gulf of Mexico. According to a study for the U.S. Army Corps of Engineers (Water and Air Research, Inc., 1975), maintenance dredging in Apalachicola Bay in 1974 had no significant effects on water quality, plankton, coliform bacteria, or benthic invertebrates. According to this study, natural disturbances (weather, wind, floods) had greater affects on levels of suspended solids and turbidities than dredging and no metals or coliform bacteria were released to the water column. Benthic invertebrates suffered only localized, short-term effects in the channel and on spoil banks; elsewhere, the bay was unaffected by maintenance dredging during the winter or early spring. This study was based on short-term data ("before dredging . . . after dredging"; February-July). General reviews of dredging activities in the region are given by the U.S. Army Corps of Engineers, Mobile District (1976, 1981).

Taylor (1978) evaluated the effects of dredging and open water disposal on 28 sites along the Gulf Intracoastal Waterway from Apalachicola Bay to Lake Borgne, Florida. Four sites along the Intracoastal Waterway in Apalachicola Bay were analyzed. Taylor (1978) dismissed the accumulation of silt and clay in disposal areas as not significant. It is somewhat difficult to make a detailed comparison of data taken only once at different times (i.e., November, 1977-February, 1978) at the various sites along a relatively broad area of study. Benthic infauna were comparatively rich at 2 of the Apalachicola sites. However, according to the overall totals, channel stations were relatively depauperate (2,251 individuals) relative to spoil stations (8,057) and undredged areas (9.357 individuals). The most depauperate macroinvertebrate fauna were usually noted in channels at sites 1, 2, and 3 in Apalachicola Bay relative to spoil sites and undredged areas. All four sites in Apalachicola Bay were considered "environmental sensitive due to the proximity of oysters and seagrass beds."

This study was carried out during winter periods when stress from high temperature and low dissolved oxygen is minimal. Taylor (1978) indicated that, although channel maintenance dredging operations are in most instances disruptive, such alterations are "localized" and "largely temporary." However, because of the relatively limited sampling effort in any given area, such conclusions may not be applicable to all the portions of the survey area. In addition, impact based on system-wide alterations (i.e. current structure, salinity) due to dredging could escape detection because of the limited scope of the sampling. The relatively limited scope of the Taylor study in any given area simply disallows broad conclusions concerning the impact on dredging and spoil deposit operations on the aquatic areas in question. A review of the scope of the problems associated with dredging activities has been given by Darnell (1976).

Zeh (1979) and Mehta and Zeh (1980) have studied the impact of Sike's Cut on Apalachicola Bay. The authors concluded that the maximum influence of the inlet on the bay may be expected to occur during spring tides. Such influence was considered to be "fairly localized" and existing oyster reefs in the bay to be well away from the influence of the inlet on the bay.

II. Methods and Materials

A. Station Placement

General descriptions of the various methods of field analysis of physical, chemical, and biological features of the Apalachicola estuary are given by Livingston (1978, 1980, 1983) and Livingston et al. (1976). Station locations for detailed spatial relationships (Figure 1; Livingston, 1983b) and long-term studies (Figure 5; Livingston, 1978) allowed various forms of analysis of the multidisciplinary data base. Such data have been used for this report.

A series of 55 stations were established in the lower Apalachicola River system (including various tributaries and creeks), East Bay, Apalachicola Bay, St. Vincent Sound, and western St. George Sound (Figure 1). Stations were designated in the following way:

1. All Apalachicola River system stations were marked with the prefix "R."
2. All stations that were permanent collection areas in the long-term analysis (12 years) of the Apalachicola system by the FSU research group were given their established numbers (1, 1A, 1B, 1C, 1X, 1E, 2, 3, 4, 4A, 5, 5A, 5B, 6).
3. New East Bay stations were marked with the prefix "E."
4. New St. Vincent Sound stations were marked with the prefix "V."
5. New Apalachicola Bay stations were marked with the prefix "A."
6. New St. George Sound stations were marked with the prefix "G."

A detailed breakdown of exact station locations is given in Table 3.

B. Chemical Methodology (water, sediments)

Specific scientific methods used over the long-term research effort in the Apalachicola Bay system (Figure 1) have been given in a series of publications (Livingston et al., 1974, 1976, 1977, 1978; Livingston, 1975a, 1976a, b, c, d, 1979a, 1981; Livingston and Duncan, 1979; Livingston and Loucks, 1979; Meeter et al., 1979; White et al., 1979), and such details will not be reviewed here. A parallel group of publications has outlined various management approaches used in conjunction with the scientific effort (Livingston, 1975b, 1976b-e, 1978, 1979a, b, 1980, 1981, 1982a, b, 1983; Livingston and Joyce, 1977; Livingston and Loucks, 1979; Livingston et al., 1974, 1976, 1977, 1978, 1982). Livingston et al. (1974) outlined the key features of the tri-river drainage system (Figure 2) and listed various potential and real problems of development with suggestions for management initiatives to protect the resources associated with the Apalachicola valley. Livingston (1975b) listed the various state and federal laws and regulations pertaining to environmental problems in aquatic areas with application to the Apalachicola situation. The methods of analysis that relate salinity to various biological processes in the Apalachicola estuary is given by Livingston (1979a).

1. Water Quality

Water samples (surface and bottom) were taken at all fixed stations with a 1-liter Kemmerer bottle. Temperature and dissolved oxygen were measured with Y.S.I. dissolved oxygen meters. Salinity was determined with a temperature-compensated refractometer calibrated periodically with standard sea-water. Turbidity was taken with a Hach model 2100-A turbidi-meter. Apparent color was analyzed with an American Public

Health Association platinum-cobalt standard test. Light penetration was estimated with a standard Secchi disk, and water depth was routinely monitored at each sampling site. The pH was measured with portable pH meters. The date and time, along with appropriate field notes, were recorded at each sampling station.

To collect other samples for water quality analysis, a sterile plastic bag was used. Each collection included at least 100 ml of sample. Sample containers were not filled completely; an air space of at least one-fourth the total volume was maintained. According to established procedures, samples that were not analyzed immediately were placed on ice or refrigerated (1-4^{o}C) and analyzed within six hours or less. Sterile sample containers were filled below the surface of the water; a sweeping motion was used and the open end of the container was kept in the direction of the sweep. Chemical oxygen demand (Hach system, EPA-approved), biochemical oxygen demand (Standard Methods, 15th edition), oils and greases (Standard Methods, 15th edition, partition-gravimetric method), fecal coliforms (Hach multiple-tube fermentation technique, EPA approved), NO_3-N (Standard Methods, 14th edition, Brucini method), and PO_4-P (Standard Methods, 15th edition, ascorbic acid method) were analyzed using standard laboratory techniques. A Bausch and Lomb Spectronic 2000 spectrophotometer (double beam, 2 nm slit width) was used for all measurements.

2. Sediments

Sediment analyses were carried out at all 55 station locations (Figure 1). Granulometric analyses were run on a well mixed 10-cm core sample from each station. Corer dimensions are 76 mm diameter and 45 cm^2 cross-sectional area. Unpreserved sediments were divided into a coarse (> 62 micrometers) and a silt-clay (< 62 micrometers) fraction. The coarse fraction was analyzed by wet sieving using 1/2-phi-unit intervals. The silt-clay fraction was analyzed using a pipette method in 1/2-phi-unit intervals from 4 phi to 6 phi and in 1-phi intervals for finer fractions (6 phi to 10 phi). Percent organics were determined by ashing in a muffle furnace for 1 hour or more at temperatures approximating 500-550^{o}C.

For chemical analyses, all core samples were taken and transferred to clear plastic containers. Only 6 g dry weight of sample were needed for PIXE (proton-induced X-ray emission) analysis. We collected enough sediment for 10 g dry weight. Samples were taken to the F.S.U. Marine Laboratory for drying, which was accomplished in clear plastic Petri dishes covered with kim-wipes after removal of water by means of a press. Dry samples were then delivered to Element Analysis Corporation (Tallahassee, Florida). The PIXE methodology was used as a rough scanning approach (accuracy, $\pm$ 10%; precision, $\pm$ 5%; H C. Kaufmann, personal communication). With sediment samples, certain metals such as cadmium, barium, arsenic, tin, and mercury were listed as "less than" a certain value. Such figures can only be considered as tentative and cannot be taken as absolute values without more detailed analysis. Again, this method was used as a broad, range-finding approach, which should be followed up with more intensive chemical (analytical) methodology. Shallow sediment temperature and salinity did not differ substantially from our bottom water measurements and were not listed separately.

Apalachicola River flow data (Blountstown, Florida) were provided by the U. S. Army Corps of Engineers (Mobile, Alabama). Rainfall data were provided by the National Oceanic and Atmospheric Administration (Apalachicola, Florida) and the East Bay tower station of the Florida

Department of Agriculture, Division of Forestry (Tate's Hell Swamp, near the Sumatra road in Franklin County).

C. Biological Methodology

Previous analyses (Livingston, unpublished data) indicated that 10 core samples (76 mm diameter, 45 cm^2 cross sectional area, 10 cm depth) are adequate for a representative sample of benthic infaunal macroinvertebrates at each station. All samples were sieved through a 0.5-mm sieve. Each sieve fraction was preserved with 10% formalin and stained with Rose Bengal to facilitate picking. The samples were elutriated where necessary (if there was any heavy sand or shell residue) and all individuals removed for counting and identification to species under a dissecting microscope. Preliminary analyses of the data indicated that the following biological indices of the data would be used:

1. Number of individuals per m^2 (density)
2. Total number of individuals (per sample)
3. Species richness (total number of species per sample)
4. Brillouin species diversity
5. Brillouin evenness (equitability)
6. Hurlbert's diversity

River/marsh areas were sampled for fishes with seines during the first four years of study. Offshore stations were sampled at night with gill and trammel nets (2.5-cm mesh) and during the day and at night with 5-m otter trawls (1.9 cm mesh wing and body; 0.6 cm mesh liner). Two to seven repetitive 2-minute trawl tows were taken at various stations at speeds approximating 2-2.5 knots on a monthly basis from 1972 to present. The number of samples necessary for species accumulation curves exceeding 90% were determined by methods similar to those described by Livingston et al. (1976). All animals were preserved immediately in 10% buffered formalin, sorted, identified to species, counted, and measured (standard length). Larger predators and game fishes were also taken with hook and line and by examination of catches made by sports fishermen at a local fish camp.

D. Statistical/Computational Methods

All calculations involving fishes and invertebrates were based on numbers of individuals. Matrices of all variables were developed according to system, date, and station. Storage, retrieval, and analysis were performed with an interactive computer program (SPECS, MATRIX; Woodsum and Wolfe, 1983). Where necessary, skewness and kurtosis were estimated to assess the reasonableness of the assumption of normality. Log and square root transformations of the data were made as indicated. A detailed review of the use of such techniques is given by Livingston (1975), Livingston et al. (1978), and Meeter and Livingston (1978). All cluster analyses were run using various similarity coefficients.

The Bray-Curtis index of similarity, which has been shown to be an effective device for discriminating clusters of animal groups, has been applied here to identify groups of locations based on similar characteristics across a number of variables. The index is defined as

$$1 - \frac{\sum_{i=1}^{n} |x_i - y_i|}{\sum_{i=1}^{n} (x_i - y_i)} \qquad (1)$$

where

x_i = value of i^{th} variable at location one, and

y_i = value of i^{th} variable at location two.

The index is designed to range between zero and one, and for this to be true, the relationship

$$0 \leq \frac{|x_i - y_i|}{(x_i + y_i)} \leq 1 \qquad (2)$$

must hold for each variable.

It is apparent from (1) that the scales upon which the variables are measured have an important influence on the relative contribution each variable makes to the overall index. Looking at the denominator of the second term above, it is apparent that a variable whose values range from 100-280 will contribute at least 200 to this sum while a variable whose values range from 0-0.85 can contribute at most 1.70. Thus the effect of this second variable, relative to the first, is practically non-existent.

To overcome this scaling difficulty prior to the application of (1), a different line of analyses was developed. A commonly used method of rescaling a variable is the "normalization" procedure, was used to transform the value set into a new set with mean zero and standard deviation one:

$$x_i' = \frac{(x_i - \bar{x})}{s} \qquad (3)$$

where

$\bar{x}$ is the mean of the value set, and

s is the standard deviation.

This transformation cannot be used in conjunction with the Bray-Curtis index, however, because the restriction imposed by inequality (2) above may not be satisfied. To solve this problem, we considered the case where, for variable 1, the value at one location was one standard deviation above the mean ($x_i = +1$) and at another location the value was one standard deviation below the mean ($y_i = -1$). Here

$$\frac{|x_i - y_i|}{(x_i + y_i)} = \frac{|1 - (-1)|}{1 + (-1)} = \frac{2}{0}$$

which is undefined.

Another approach was used to transform each variable so that its values range between zero and one (Spä̈th, 1980). This is accomplished as follows:

$$x_i'' = \frac{x_i - x_{min}}{x_{max} - x_{min}} \quad (4)$$

where

x_{min} = minimum value found for this variable, and

x_{max} = maximum value found for the variable.

Thus the transformed value (x_i'') becomes zero for the smallest observation ($x_i = x_{min}$) and one for the largest observation ($x_i = x_{max}$), and intermediate values occupy the same relative positions within the new range as they did in the original range.

This method of rescaling imposes a common scale to all variables and ensures equal consideration of all variables in the calculation of the similarity index. However, truly equal consideration of all variables may not be desirable if one of the measured variables is a quantity that varies little from one location to another, its coefficient of variation (C) is

$$C = s/\overline{x} \quad (5)$$

where s is the sample standard deviation and $\overline{x}$ the mean, and may be quite low. If a second variable differs more from site to site and has a relatively high coefficient of variation, the following data set is possible:

Location	Variable 1	Variable 2	Rescaled V_1 V_1''	Rescaled V_2 V_2''
1	6	6	.5	.5
2	7	8	1	.75
3	5	10	0	1
4	6	2	.5	0
5	6	4	.5	.25
6	5	6	0	.5
7	7	6	1	.5
	$\bar{x}_1 = 6$	$\bar{x}_2 = 6$	$\bar{x}_1'' = .5$	$\bar{x}_2'' = .5$
	$s_1 = 0.816$	$s_2 = 2.582$	$s_1'' = 0.408$	$s_2'' = 0.323$
	$C_1 = 0.136$	$C_2 = 0.43$	$C_1'' = 0.816$	$C_2'' = 0.646$

Thus, the greater initial variability of the second variable ($C_2 > C_1$) has been lost following data transformation ($C_1 > C_2$) while the relatively higher variability of V_1 will mean that V_1 becomes the more "important' variable in discriminating clusters of locations. This means that there is an artificial exaggeration of the importance of V_1. Based on the actual values above it seems likely that V_2 would be the more "useful" variable in attempting to distinguish clusters of locations. We have developed an adjustment to this rescaling procedure that minimizes the above difficulty.

We therefore would define the "relative coefficient of variation" for variable $_k$ as

$$C_{rk} = C_k/C_{max} \tag{6}$$

where C_k is the coefficient of variation (5) and C_{max} is the largest coefficient of variation found for all variables used. We would then adjust the rescaled values computed according to (4) by

$$x_{ik}'' = (C_{Rk} \bullet x_{ik}'') + (1 - C_{Rk})/2 \tag{7}$$

The first term of (7) permits a transformed variable to range only in proportion to its original coefficient of variation. Thus the only variable allowed the full 0 to 1 range in its transformed state is that variable with the highest original coefficient ($C_k = C_{max}$). The second term of (7) adjusts the range of each rescaled variable so that its mid-range point is 0.5. If we apply (6) and (7) to the data values of the sample data set above we find that $C_{r1} = 0.316$, $C_{r2} = 1$, and that the adjusted rescaled values are

V_1	V_2
0.5	.5
0.66	.75
0.34	1
0.5	0
0.5	.25
0.34	.5
0.66	.5

The values of V_1 have still been placed in a scale compatible with that of V_2, but they have been placed in a better perspective when considering the original amounts of variation.

This adjustment is sensitive to outliers because they can increase the coefficient of variation for a variable, thereby increasing the likelihood that it will be selected as C_{max} in equation (6). One must examine the data prior to the application of this method, therefore, and possibly make other data transformations (e.g. logarithms) prior to its use. One might also perform initial transformations if a linear relationship is found to exist between the mean and standard deviation of the variables to be used in the analysis.

The ANOVA results will be analyzed later in this report (see Results and Discussion). When analyzing salinity at each station, it is important to consider the effects of riverflow and rainfall. A significant difference between the during and after dredging mean salinities may reflect the influence of a flood more than a true dredging effect. Analysis of covariance (ANCOVA) is helpful in eliminating this problem. ANCOVA assumes there is a linear relationship between the dependent variable and each covariate. Using a combination of regression and analysis of variance techniques, the effects of the covariate(s) (riverflow and rainfall) are removed and the residuals analyzed for the effect of the treatments on salinity.

III. Questions Asked

The salinity regime of the Apalachicola estuary is critical to the form and processes concerned with the productivity of the system (Livingston, 1983). Relatively little information is available concerning the long-term effects of dredging on estuarine salinity and, consequently, the biological organization of the system. Accordingly, the established data base was used to address the following questions:

1. Has there been a change in the salinity regime in the estuary related to cessation of dredging activities in 1978?

2. Has there been a change in the salinity regime related to creation of 2-mile extension channel in 1976?

3. Is the salinity at Sike's Cut different from that of the rest of the bay? If it is different, to what extent has the bay been affected by the opening of Sike's Cut?

4. Are animal populations and communities at Sike's Cut different from those in the rest of the bay?

5. Have there been changes in animal populations or communities related to cessation of dredging or the 2-mile extension work?

6. Do specific dredge/disposal events cause any observable short-term changes in turbidity, color, or dissolved oxygen?

7. Do specific dredge/disposal events cause any observable short-term changes in animal populations or communities?

Specific events will be evaluated such as the pattern of maintenance dredging at Sike's Cut and the Intracoastal Waterway from the mouth of the Apalachicola River to the boundary between Apalachicola Bay and St. George Sound (Figure 1). The opening of the two-mile extension in 1976 will also be analyzed in terms of possible changes in salinity and other factors such as biological response to potential shifts in the movement of fresh water within the estuary.

IV. Results and Discussion

A. Dredging Activities

A detailed chart of dredge spoil sites along the two-mile channel, the Intracoastal Waterway, Sike's Cut, and the East Point Channel is given in Figure 6. Daily disposal volumes (in cubic yards) by site from 1970 to present are given in Table 4 and Figures 7-11. Monthly totals of the dredging effort in Apalachicola Bay from 1970 to present is given in Table 5 and Figure 12.

Most of the dredging, almost 4 million cubic yards, occurred within the Intracoastal Waterway. The two-mile channel and extension were second and third, respectively, in spoil volumes followed by Sike's Cut and the East Point Channel (Table 5). Most of the dredging activity in the bay took place from November through March with certain notable exceptions. Sike's Cut was dredged during late spring or summer months in 1971, 1975, and 1978. The Intracoastal Waterway was dredged in April 1977 and from April to June in 1978; activity in April 1978 was concentrated at sites 9 to 11 (our station 1C) (Table 4). During May, 1978, most of the dredging occurred at disposal sites 1-4. In June, 1978, such dredging took place at site 1A (near our Station 2). Dredging in the two-mile channel was performed in April, 1978 with disposal at sites 1-4 and 8. The two-mile extension was dredged during March and April, 1976 (Table 4). No dredging occurred during 1973 and the most active dredging periods took place during 1970, 1976, and 1978 (Figure 12). No dredging in Apalachicola Bay has taken place since 1978.

Specific interventions, to be used in statistical tests, occurred as follows:

1. Sike's Cut Site; dredging ceased in 1978 (up to this point in time, Sike's Cut had been routinely dredged from year to year).
2. Intracoastal Waterway; spring-summer dredging, 1978.
3. Two-mile extension; spring, 1976.
3. Overall cessation of dredging; 1978.

The above interventions were chosen for either of two reasons: landmarks of dredging activity (newly dredged area, two mile extension, 1976; cessation of dredging, baywide, 1978), and deviations from the usual winter dredging (summer dredging in the Intracoastal Waterway, 1978).

B. Climatological Factors

Since the distribution of salinity in space and time is considered as a major ecological variable (Livingston, 1983), specific climatological features which influence salinity (i.e., Apalachicola River flow and local rainfall) have been analyzed.

1. River Flow

In terms of calendar year totals for river flow (Table 6), the highest annual river flows occurred in 1973 and 1975, with secondary high levels in 1976 and 1979. The lowest river flow was noted in 1981. A cluster analysis of these data (Figure 13) indicates that 1981 (an extremely dry year) was differentiated from a cluster of the years 1973, 1975, 1976 and 1979, the so-called wet years. Monthly variation within a given year was highest in 1973 and 1980 which indicates strong differences between the winter-early spring flooding and the rest of the year. These generalizations are graphically displayed in Figure 14. Winter and/or spring peaks are particularly noticeable during 1973 and 1980. Such peaks follow patterns which are quite similar (Figure 13), which is in line with long-term analyses indicating 6-7 year cycles of peak river flow (Meeter et al., 1979). The period from late 1980 through 1981 represents a major drought in the region (Table 7) which adds to the observation that 1981 was an unusual water year. Low flows were also observed during the fall of 1972 and 1974 (preceding the winter-spring floods) while the peak flow of 1980 was followed by the major drought of 1980-81.

2. Rainfall

Local rainfall depends, in part, on prevailing wind conditions in the region. According to long-term trends (National Oceanic and Atmospheric Adminstration, Apalachicola, 1982), about 75% of the annual number of thunderstorms occur during the summer months, and September is the wettest month of the year, on average, over the period on record (1943-present). Prevailing winds usually come from the northeast or north from September through February and from the southeast, southwest, or west from March through August.

Listings of local rainfall (East Bay, Apalachicola) are given in Table 7, and graphical representations of the data are given in Figures 15 and 16. Although the general pattern of long-term rainfall was similar in East Bay (i.e., Tate's Hell Swamp) and Apalachicola, higher rainfall totals occurred generally at the Tate's Hell site. The highest summer peaks were noted in 1974-1975 and 1979, following an approximate five year periodicity of local rainfall as noted by Meeter et al. (1979). Drought periods were noted in 1972, from 1976 to 1979, and from 1980 to 1981. Local rainfall was generally low during the major river flooding of 1973 which indicates that local rainfall is not only seasonally different from river flow patterns but differs on a multi-year basis as well (see Meeter et al., 1979, and Livingston and Loucks, 1979, for a more complete discussion of the relationships between temporal patterns of Apalachicola river flow and local rainfall).

Cluster analyses of local, annual trends (by year) are given in Figure 17. The general trends, as described above, are shown in both dendograms; drought years (1972, 1976; 1977, 1981) were clustered together as were periods of high rainfall (1974, 1979). The overall patterns of rainfall in the respective study areas were similar.

C. Physical/Chemical Environment

The raw data for physical/chemical factors are given in Table 8 and Figure 18. Certain general trends were evident throughout the estuary. The major river flooding during the winter of 1973-74 was associated with high turbidity and color. The relatively low temperatures during the winter of 1976-1978 were generally associated with high dissolved oxygen levels throughout the bay. While some station to station variability is evident, such trends tend to be consistent in most portions of the study area, based on well recognized physical-chemical relationships (Livingston, 1983).

1. Temperature

There was relatively little temperature stratification at stations 1, 2, 3, 5, 1A, 1B, and 1C (Figure 18). Seasonal ranges approximated 20-30°C depending on the year. Spatial temperature distribution during any given time period was relatively uniform throughout the bay. When temperature stratification was noted, bottom temperatures tended to be lower than those at the surface, although this was not always the case at stations 1A and 1B. At Sike's Cut (1B), bottom temperature was usually higher than surface temperature from 1972 to 1977. After 1977, bottom temperatures tended to be cooler than surface temperatures.

2. Dissolved Oxygen

Generally, bottom dissolved oxygen was lower during warm months; stratification of dissolved oxygen (lower at depth) was observed at stations 1, 2, 3, 5, 1A, 1B, and 1C. The grassbed areas (1X) showed generally higher levels of dissolved oxygen at depth (especially from 1974 to 1978). However, at Sike's Cut, dissolved oxygen was more stratified vertically from 1972 to 1978 than after 1978; from 1978 to 1982, surface dissolved oxygen tended to be lower and bottom dissolved oxygen tended to be higher, a situation which indicated increased vertical mixing after 1978.

3. Color

Color levels tended to reflect peaks of river flow at those stations influenced by river input. Color levels were highest in East Bay (Station 5) and lowest at stations along St. George Island in Apalachicola Bay (1A, 1B, 1C, 1X).

4. Turbidity

Turbidity also followed river flow conditions seasonally and among years. Bottom turbidity was usually higher than surface turbidity. Following the high turbidities observed during the major flooding of 1973, there were bay-wide reductions of this factor from 1974 to 1976. Turbidity at most stations increased from 1976 to 1979-80 and was quite low during the drought of 1981. Turbidity was a good indication of river flow throughout the Apalachicola estuary.

5. Depth/Secchi Depth

Secchi readings represent a simple though direct integration of the effects of color and turbidity on light penetration in a body of water. Secchi depth estimates were highest at those stations that were farthest from the influence of the river. There was a tendancy for Secchi depths to be deeper during periods of drought.

Depth readings at some stations tended to be somewhat more uniform during certain years than might be reasonably expected. Consequently, this factor can only be considered as a general indication of station depth. The deeper areas include stations 2, 1B and 1C. The change in depth at station 1X between 1977 and 1978 could indicate an inadvertent shift in station location during that period. A careful review of this possibility indicated that, except for station 1X, station locations remained relatively stable over the period of study.

6. Salinity

Salinity in the Apalachicola estuary (Table 9, Figure 19) is influenced by various factors such as depth, wind, tidal currents, physiography of the basin, river flow, and local rainfall (Livingston, 1983, unpublished data). Certain generalizations are apparent from a cursory review of the data. Salinity was higher at depth at most stations and all of the study areas showed at least some salinity stratification at various times. There was considerable spatial and temporal variability of salinity throughout the estuary. Stations receiving direct river input (2, 3) followed the overall seasonal and long-term patterns of Apalachicola river flow.

The trend at Sike's Cut (1B) showed a basic shift in surface and bottom salinity with time. After 1978, bottom salinities were generally lower while surface salinities were higher. These observations will be analyzed in more detail later in this report. Because of the importance of salinity as a determinant of the biological organization of the estuary and because of the complexity of contributing factors which determine the distribution of salinity in space and time, an expanded analysis of this factor was carried out relative to known patterns of dredging in the bay.

a. Long-term Trends: Seasonal Averages

To present a less cluttered view of long-term salinity trends, seasonal averages of salinity (surface and bottom) were computed at the various permanent stations in the Apalachicola estuary (Figure 20) and compared with seasonal trends of river flow and rainfall (Table 10). While the general trends (as observed above) were apparent (i.e., high salinity in 1972, reduced salinity from 1973-1975, increased salinity from 1976 through 1981, and reduced salinity from 1982 to the present), certain station-specific trends were apparent. Bottom salinity at station 2 was generally lower from 1978 to 1983 than the previous 6 years. Bottom salinity at station 1B was relatively stable from 1972 to 1978; such salinities at depth tended to be lower after 1978. Surface salinities, however, were generally low from 1972 to 1978 after which time, there was a decided trend to higher salinities. The considerable stratification during the earlier period was not evident at Sike's Cut subsequent to 1977-78. At West Pass (1A), this pattern was not evident and bottom salinities were, within the usual seasonal ranges, relatively stable over the sampling period.

Monthly determinations of salinity (surface, bottom) were run through a Pearson Correlation analysis with rainfall and river flow values to see if there was a linear relationship for analysis of covariance (Table 11). A significant ($p < 0.01$) negative correlation was made between salinity and river flow at each of the bay stations indicating that only river flow and salinity have a linear relationship.

Another analysis was made to determine the relative influence of river flow and rainfall on salinity at the various stations. A significant difference between observations before and after cessation of dredging in 1978 could reflect river flow trends rather than the pattern of dredging in the bay. Analysis of covariance (ANCOVA) is helpful in eliminating this problem since use of ANCOVA includes the assumption that there is a linear relationship between the dependent variable and each covariate (Bryant and Paulson, 1976).

Using a combination of regression and analysis of variance (ANOVA) techniques, the effects of the covariates (i.e. river flow, rainfall) are removed and the residuals can then be analyzed for the effect of the treatment (i.e. cessation of dredging) on salinity trends at the various stations. When scatterplots of the dependent variable (salinity) are run on each covariate (transformed to achieve normality), an evaluation of the linear relationships is possible. If a random scatter of points is found (as was the case with rainfall), the covariate is dropped from analysis and the ANCOVA is run with the remaining covariate (i.e. river flow) (Table 12). If the p-value is less than or equal to a selected level of significance (0.05), the slope of the line relating salinity and the covariate can be considerably different than zero. The F-tests for the factors and interactions are adjusted for the covariates so that, if a treatment effect is significant, it is not due to the covariate (i.e., the river flow).

The results (Table 12) indicate significant month by year interactions at all stations. However, surface/bottom salinity by month interactions were significant at stations 1B and 2 and surface/bottom salinity by year interactions were significant at stations 1B, 1C, and 2. Thus, some factor other than river flow is influencing the salinity at dredged stations (1C, 2) and an area near a dredge operation (1B).

D. Short-term Responses to Specific Dredging Events

An analysis was made concerning short-term response of physical, chemical, and biological (i.e., epibenthic fishes and invertebrates) factors to specific dredging and storm events in the Apalachicola system. Livingston and Wolfe (1983) found that specific storm events do have a short-term (days to weeks) effect on benthic infaunal macroinvertebrates. Such effects are part of the natural response of shallow bodies of water such as the Apalachicola estuary to the effects of short-term increases in wind velocity in the region. A complete history of dredging events in the vicinity of our sampling stations is given in Table 13. Wind speed factors from 1975 to 1978 are given in Table 14.

1. Two-mile Extension (station 1)

Primary dredging events near station 1 occurred from 3/7/75 to 3/31/75 and from 4/1/76 to 4/31/76 (Table 13). Wind speeds were high on 3/18/75 (Table 14). Surface and bottom physical-chemical data for station 1 from 1975 through 1978 are given in Figures 21 and 22. As noted previously, the salinity at station 1, subsequent to the opening of the two-mile extension in 1976, did not go up as it did at most stations in the Apalachicola estuary as a response to less overland runoff to the estuary during the latter 1970's. No overt changes (at the surface or bottom) of temperature, salinity, turbidity, color, or dissolved oxygen were apparent at station 1 during or after the dredging in 1976 or the storm in 1975. No short-term effects of dredging were noted for any of the biological indices for fishes (Figure 23) or invertebrates (Figure 24) at station 1. Dominant populations of fishes and invertebrates (Figure 25) did not appear to respond to the dredging activities over the period of sampling. There were increases in the numbers of spot (*Leiostomus xanthurus*), anchovies (*Anchoa mitchilli*), and possibly blue crabs (*Callinectes sapidus*) subsequent to 1976, but such changes could not be related to the dredging activities around station 1. Wind effects (Table 14) over the short-term were noted in terms of color and turbidity in the estuary (Table 15). Depending on the direction and velocity, wind appears to have immediate and substantial effects on color and turbidity in the Apalachicola estuary.

2. Intracoastal Waterway (Station 2)

Changes in the physical, chemical, and biological factors (described above) at station 2 (1975-1978) are given in Figures 26-27. No immediate effects of dredging on physical, chemical, or biological factors were apparent at station 2 over the study period (Figures 28-29). The usual seasonal fluctuations were relatively stable from year to year, although salinity was elevated in 1977 relative to previous years. The storm could not be associated with any alterations in seasonal and annual trends of the data. Numbers of spot (Figure 30) were higher during 1978. Penaeid shrimp (Penaeus setiferus) were higher during 1976 than during subsequent years, and blue crab numbers were generally higher in 1975 and 1976 than in 1977-78, which was consistent with the changes in salinity of the period and the possible effects of diversion of fresh water by the construction of the two-mile channel in 1976.

3. Sike's Cut (stations 1A and 1B)

Physical, chemical, and biological factors at station 1A (Figures 31-35) and station 1B (Figures 36-40) indicate no observable, short-term changes at either station that could be associated with dredging at station 1B. Numbers of spot and anchovies were generally higher in the vicinity of West Pass during 1978. At Sike's Cut, no short-term effects of dredging were obvious in terms of physical, chemical, or biological factors. Turbidity was higher during 1978 after dredging, but this trend was not apparent in 1976. Salinity at depth was generally lower in 1978, which could have been associated with increased numbers of fishes (notably spot) at this time. Penaeid shrimp were most numerous at Sike's Cut during 1978.

Overall, no short-term (measured over several months) effects of dredging and spoiling on water quality and biological response (as measured by epibenthic fishes and invertebrates) in the Apalachicola estuary were noticeable within the context of the existing sampling regime for 1975 through 1978 (the last year of dredging in the Apalachicola Bay system).

Such observations do not preclude an impact of a shorter duration (measured over days or weeks), although such an impact, if it exists, is probably negligible in terms of an immediate response of the system as a whole. Wind and storm effects on turbidity and color are noticeable on a scale of days. Such effects are short-lived and cannot be noticed within weeks or months of the event. Such observations, within the scope of our sampling effort, would indicate that, in the highly (seasonally) turbid and colored Apalachicola estuary, the impact of dredging on water quality and epibenthic organisms is not observable in terms of "short-term" (weeks to months) response relative to natural changes in the system such as storms.

E. Impact of Dredging: Sike's Cut

1. Habitat Features

The long-term physical/chemical data for the four outer bay stations (1A, 1B, 1C, 1X) were analyzed to determine the effect of the cessation of dredging at Sike's Cut in June 1978. The *a priori* hypothesis was that the surface and bottom salinities at station 1B were stratified when dredging occurred but became mixed as the channel filled in. To test this hypothesis, an analysis of variance was designed with a factor for surface/bottom and a factor for during/after dredging. Since the data were taken over a period of time, the residuals violate the independence assumption of ANOVA (i.e., they would be serially correlated). To remove this time dependency, a factor was entered in the table for month number as was a factor for year nested within during/after dredging (nested because a given year does not occur both during and after dredging). In order to have as balanced a design as possible, an equal number of data points for both during and after dredging were used.

Stations 1A, 1B, 1C 7/73 - 6/83

Station 1X 7/74 - 6/82

The ANOVA results are summarized in Table 16. The top/bottom by during/after interaction for salinity at station 1B had a p-value of .0039. This interaction means that the surface and bottom acted differently after dredging than they did during dredging. The same interaction for station 1A had a p-value of .2677 and for station 1X a p-value of .4376. The scatterplot of salinity at station 1B showed that the top and bottom salinities came closer together after June 1978.

2. Salinity Changes and Biological Response

a. Comparison with Other Estuarine Stations

Livingston (1979a) compared the salinity regime and epibenthic biota (fishes, invertebrates) at Sike's Cut (station 1B) with other areas of the Apalachicola Bay system. A comparison with historic salinity levels in the region (Table 17) before and after the opening of Sike's Cut indicates that areas of the estuary contiguous with the new pass had higher salinities after the channel was dredged open. The salinity at Sike's Cut during the years of dredging was relatively high and more stable than that in other portions of the estuary (Figure 41). The Sike's Cut region during the period of maintenance was also associated with high levels of species richness and diversity of fishes (Figure 42) and invertebrates (Figure 43) relative to other regions of the bay system. Sike's Cut was characterized by low dominance and low numerical abundance (per unit sampling effort) compared to other areas of lower and more unstable conditions of salinity. Nurserying species such as blue crabs and penaeid shrimp were low in numbers, and the nursery function of the low salinity waters was impaired by the increased salinity as water from the open Gulf of Mexico was introduced into Apalachicola Bay. The continued high salinity was inversely proportional to the nursery potential and productivity of the estuarine fishery. High species richness and diversity was not necessarily viewed as desirable within the context of the impaired fishery potential of the Apalachicola Bay system.

The exact area of Apalachicola Bay affected by Sike's Cut was considered to be relatively small according to Mehta and Zeh (1981). While Livingston (1979a) showed a biological impact due to the higher salinity, the areal extent of such increases remains relatively undetermined in terms of empirical evidence. A salinity survey (detailed surface and bottom salinities during a flooding tide along 7 transects drawn through Sike's Cut; Livingston, unpublished data) was made just prior to the dredging of the Cut in 1984. The preliminary results indicate that the area affected by high bottom salinities from Sike's Cut was greater than that predicted by Mehta and Zeh (1980). Another survey is planned to analyze such salinity changes after the Cut is dredged. These surveys should be able to estimate the area of the bay affected by the dredging operations around Sike's Cut.

b. Temporal Changes

Bottom and surface salinity (Figure 44) at West Pass (station 1A) tended to decrease from 1972 to 1980, after which time there was a general increase from 1980 to 1981 followed by a leveling off of salinity. The pattern at station 1B was different. Surface and bottom salinities did not follow the same pattern at Sike's Cut. Bottom salinity was uniformly high from 1972 to 1977, after which time the salinity remained uniformly lower

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through 1983. Surface salinity, within high seasonal variability, tended to decrease from 1972 through 1977, after which there was a general increase peaking in 1980-81. Such patterns tended to follow that observed at West Pass. Following the stratification noted from 1972-1977, surface and bottom salinities came together largely because of the simultaneously lowered bottom salinities and increased surface salinities. While there are too few good data to evaluate the actual sill depth at Sike's Cut over this period, the dredging events appear to be related to the bottom salinity regime.

Dredging occurred with regularity from 1972 through 1976. The precipitous drop in bottom salinity coincided with the period of no dredging from March, 1976, to June, 1978, which would indicate a decrease of sill depth at this time. Bottom salinities went up at station 1B following the dredging of 1978 at the same time that bottom salinities at West Pass were still decreasing. After the 1978 dredging event, bottom salinities followed a bay-wide cycle of moderate increases, but the consistently high salinities never returned over the period from 1978 to 1983. This result would indicate a rapid filling of the sill depth at Sike's Cut and a reduction in the amount of high-salinity water from 1977 to the present time. Thus, a combination of natural long-term salinity cycles and the pattern of dredging at Sike's Cut appear to have defined the general level of bottom salinity in this region of Apalachicola Bay.

The primary question is whether or not a general decrease in salinity, from about 30 ppt to somewhere between 20 and 25 ppt, would have an effect on the epibenthic fishes and invertebrates taken at Sike's Cut. If so, there would be a break in the faunal distributions at some time between 1977 and 1978. A related question (see above) concerning the areal extent of such impact is also of importance to a comprehensive review of the Sike's Cut issue.

A complete community analysis was made of epibenthic fishes and invertebrates taken at each of the permanent stations in the Apalachicola estuary from 1972 through 1983. For the sake of simplification, the major comparison was made between the dredged outer station 1B (Sike's Cut) and the undredged outer station 1A (West Pass), although other stations were included where necessary. The comparison of the natural (West) pass with the man-made Sike's Cut is not entirely satisfactory. It should be noted that such a comparison is not meant to be a decisive test of the hypothesis that Sike's Cut has affected the productivity of the Apalahcicola Bay. However, a review of both passes, in a comparative sense, allows the possibility of determining biological response along natural gradients of salinity and the changes at West Pass (and other areas of the bay) relative to temporal variability of river flow and local rainfall. Gradient analysis (along sets of permanent stations in the estuary) thus represents a first-cut evaluation of the biological response of spatial/temporal habitat factors such as salinity.

Analyses of the total numbers of fishes in the Apalachicola estuary (Figure 45) show that fish abundance increased at station 1 after 1976-77 whereas the major abundance at station 2 occurred from 1975-1977, 1981, and 1982. Fish abundance was substantially lower at stations 1A and 1B. Fish abundance was highest at West Pass during 1978, a period of relatively low overall salinity. Peaks of high numbers of fishes at station 1B occurred during periods of low salinity in 1978 and 1981. There was a generally inverse relationship between numbers of fishes and salinity. These patterns of generally higher numbers of fishes at station 1B subsequent to 1977-78 were due largely to the population fluctuations of the spot (Leiostomus xanthurus), a euryhaline estuarine species (Figure 46).

The trends of species richness (total number of fish species) and fish species diversity at stations 1A and 1B from 1972 through 1983 are given in Figure 47. Fish species richness and diversity peaked at West Pass during 1976-1977. There was a generally increasing trend following the low levels during 1978-1979 (period of reduced salinity). At Sike's Cut, the trend was downward for both indices over the study period, which was generally in synchrony with the reduced bottom salinity in the area after 1978.

Analysis of numerical invertebrate abundance (Figure 48) indicates a decline at station 2 after 1976. The generally low numbers of epibenthic invertebrates at stations 1A and 1B (Figure 48) make it difficult to see any particular trend in the data over time. However, euryhaline species such as the white shrimp declined at station 2 (Figure 49) after 1976, whereas blue crabs (Figure 50) increased at station 1 and declined at station 2 subsequent to 1976. Blue crab numbers were uniformly low at stations 1A and 1B over the study period. Animals that indicate higher salinity such as pink shrimp (Penaeus duorarum) (Figure 51) declined at station 1 after 1976, while they tended to increase at station 2 after 1977. Pink shrimp were in lower abundance at Sike's Cut after 1975. Another species that prefers higher salinities, the brief squid (Loliguncula brevis) (Figure 52), showed similar declines at Sike's Cut after 1976. These distributions are consonant with the long-term salinity observations as indicated above, and indicate a biological response to the opening of the two-mile extension.

Long-term trends of species richness and diversity at West Pass and Sike's Cut (Figure 53) indicate patterns similar to those observed for fishes. Both indices followed general salinity trends with periodic increases at West Pass and a more or less steady decline at Sike's Cut over the study period.

An integration of changes in the fish communities at West Pass and Sike's Cut is given in Figure 43. At West Pass, periods of low salinity (1972-73, 1974-75) (1977-79, 1981-82) were grouped together. Overall, the various annual groupings were mixed according to trends observed above. At station 1B, however, there were 3 main groupings: the high-salinity years (1972-1976) were associated; subsequent to 1976, two primary groupings were observed, which tended to follow the periods of low bottom salinity (1979-80, 1981-82) (1976-79, 1980-81). This analysis is further evidence that the observed shift in bottom salinities at Sike's Cut between 1977 and 1978 had an effect on the biological organization in this area.

As part of the process of reduction of variables, correlation matrices were run for the chief fish and invertebrate indices for all stations over the entire study period (1972-1983, Table 18). Relatively high correlations were noted for fish Hurlbert diversity and Brillouin evenness, fish Hurlbert diversity and Brillouin diversity, invertebrate Hurlbert diversity and Brillouin evenness, invertebrate number of species and Brillouin diversity, invertebrate Briollouin diversity and Hurlbert diversity, and invertebrate Brillouin diversity and Brillouin evenness. Factors were reduced accordingly (where necessary) for subsequent statistical analyses. The fish correlations indicate that numbers of individuals and species richness were possitively correlated. Likewise, species richness and the various diversity indices were correlated. Similar patterns of correlation were noted among the invertebrate indices although some correlation existed here between the log of numbers of individuals nad Brillouin diversity. A study of these indices allows some understanding concerning the community structure of estuarine organisms in the Apalachicola Bay system. In general, high dominance is generally associated with low species diversity and evenness.

An analysis of variance for various epibenthic fish and invertebrate indices at stations 1A and 1B was carried out comparing those years before (1975-77) and after (1979-81) the cessation of dredging at Sike's Cut (Table 19). A graphical representation is given for this analysis (Figure 54), which used only 6 years of data for the balanced statistical (ANOVA) model. The general increase in numbers of fishes at station 1B after 1978 is evident. Fish species richness and diversity declined at both stations during the period 1979-81 relative to the figures during 1975-77, with the most precipitous declines evident at Sike's Cut during 1981. Such trends were consistent with the general increase in the numbers of spot (Leiostomus xanthurus) taken at Sike's Cut during this period. Croaker were generally more abundant at West Pass. The invertebrate data (Figure 34) were somewhat different, with numbers of individuals and species higher at station 1B and a general decline of richness and diversity indices at both stations over the study period. White shrimp and blue crabs, however, were higher at station 1A than at 1B before the cessation of dredging in 1978; after 1978, these station positions were reversed, which is consistent with the observed, long-term salinity regimes. The statistical results (Table 19) indicate that there was a significant ($p < 0.05$)

difference between stations 1A and 1B in terms of invertebrate (log) numerical abundance, invertebrate number of species, and invertebrate species diversity (Brillouin, Hurlbert). There was a significant difference between two or more months of the year for fish numerical abundance, fish numbers of species, and fish Brillouin diversity. There was a significant difference between the before-dredging and after-dredging means for fish number of species (averaged over stations).

F. Impact of Dredging: The Two-Mile Extension

1. Habitat Features

A factorial design ANOVA was run with factors for year, top or bottom, and month. If there was a change in the surface/bottom relationship, we would expect a significant surface/bottom by before/after dredging interaction. There were not equal data sets before and after dredging, so a term for it was not included in the ANOVA. A second ANOVA was run with factors for before/after, surface/bottom and month. The results of the two ANOVA's were combined to calculate the surface/bottom by before/after interaction. The first such ANOVA results provided a year by surface/bottom interaction sum of squares[A]. The second ANOVA provided the before/after by surface/bottom interaction sum of squares[B] which was treated as a 1 degree of freedom contrast. By subtracting (B) from (A) we calculated the correct error sum of squares for testing the contrast (p-values summarized in table 20).

None of the interactions were statistically significant. The only significant effect was at station 3 where the mean salinity before dredging was different than that after dredging; however, there were only 2 years of data at that station before dredging with 7 years after. It is not possible to say that this difference was caused by dredging.

In summary, this analysis showed no differences in habitat features at the subject stations due to the opening of the two-mile extension.

G. Impact of Dredging: The Intracoastal Waterway

1. Water Quality, Sediment Quality and Infauna

In a recent regional analysis of pollution sources in the Apalachicola River-Bay system (Livingston, 1983b), specific stations were located in the Intracoastal Waterway (Figure 1, Table 3). These included stations 2, A7, and 1C. Water quality and biological (benthic infaunal macroinvertebrates) analyses (Table 21) in these areas indicated that the Intracoastal Waterway at the mouth of the Apalachicola River (station 2) was not polluted with organic matter, heavy metals, or other forms of pollution, although it was biologically stressed (low species richness, diversity, evenness), possibly as a result of natural conditions.

Farther out in the bay (stations A7, 1C), despite high concentrations of organic matter and silty conditions, the water and sediment quality and biological indices were close to background conditions. This observation is qualified by relatively high sediment burdens of lead, cadmium, and chromium (Livingston, 1983a). However, the biological community was relatively productive and high in species richness and diversity. This survey was conducted approximately 5½ years after cessation of dredging in the Intracoastal Waterway of Apalachicola Bay.

This analysis indicates that, while the Intracoastal Waterway is contaminated with heavy metals in certain areas (Livingston, 1983a) (possibly as a result of the increased boat traffic and concentration of silt fractions of the sediments with associated metal burdens), the biological organization of the benthic infaunal macroinvertebrates at various stations (distant from urban runoff) was not adversely affected by previous dredging activities. The fact that such studies were carried out more than 5 years after cessation of dredging would qualify the above results. However, these data tend to confirm the results of other studies in the region (Water and Air Research, 1975; Taylor, 1978).

H. East Point Channel

1. Water Quality, Sediment Quality, and Infauna

No long-term data were taken in the vicinity of the East Point Channel. However, a short-term analysis was made of the proposed dredging and construction associated with the East Point Breakwater (Livingston, 1983a). A synopsis of the findings of this study is given in Appendix A. The dredged channel was polluted with heavy metals, oils and greases because of runoff from East Point. Channel sediments were higher in the silt/clay fractions than other stations in the area, and such sediments were also high in nutrients. The channel areas were characterized by high Biochemical Oxygen Demand and seasonally low dissolved oxygen. Such conditions were associated with depauperate faunal (i.e. benthic infaunal macroinvertebrate) assemblages. The dredged areas along the East Point Channel were biologically stressed by a combination of dredging, urban runoff, and local boat traffic.

The dredged channels were viewed as repositories for fine sediments along with attached pollutants (oils and greases, metals) and organic material (high B.O.D., low dissolved oxygen). These observations were consistent with regional analyses of the distribution of pollutants and the biological organization of the Apalachicola River-Bay system (Livingston, 1983b). Such effects were dependent on two major factors: the dredged channel and the presence of urban runoff in the immediate vicinity. Thus, areas such as the St. George Island (Sike's Cut) dredge site were relatively free of pollution, while areas such as the two-mile channel and East Point Channel were polluted (Appendix A).

I. Comparison of Results to Other Findings

Most of the previous studies of the impact of dredging and associated activities on the Apalachicola Bay sytem (Ingle, 1952; Water and Air Research, 1975; Taylor, 1978) have concentrated on localized, short-term effects on a relatively limited set of physical and biological variables. The benthic macroinvertebrates have been used as indicators (and rightly so) as such organisms reflect specific forms of environmental influence. However, such organisms, when located in the Apalachicola estuary, represent a relatively adaptable group of species that often have relatively short life histories and high levels of recruitment. The possibility of long-term changes in the system (due to accumulation of contaminated sediments from urban runoff and altered current patterns and salinity distributions) have been largely ignored. The results of this survey indicate that dredging activities have affected various portions of the system because of the above-mentioned, long-term processes. Altered current and salinity structure of the estuary are partaicularly important in the determination of the distribution of species that form the basis of important sport and commercial fisheries in the region. Although such changes may be either detrimental or fortuitous, depending on the action and the point of view of different sets of users of the estuarine productivity, more care should be taken in the analysis of effects before the dredging is undertaken. For instance, spring and summer dredging in the intracoastal waterway can have adverse impacts on developing forms of penaeid shrimp and other species that use the estuary as a nursery (see Livingston, 1983, 1983c, for details of the spatial/temporal distribution of such species). In this way, serious mistakes can be avoided, and the dredging activities can be undertaken in a way that has minimal negative impacts on the bay sytem as a whole.

The results of this review indicate that dredging activities in the Apalachicola estuary can have effects on the physical, chemical, and biological structure of the system, but that such effects cannot be easily predicted *a priori*. More empirical work is needed if the productivity of the system is to be maintained and preserved in the future.

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Table 1: A. Effects of dredging and placement of dredge spoil: General and immediate effects (from Darnell, 1976).

Modification of wetland bottom topography
Creation of persistent dredge holes (sometimes becoming anoxic)
Creation of channels
Creation of canals
Modification of water circulation patterns
Increased turbidity of water
Increased oxygen demand
Reduced light penetration
Reduced photosynthetic oxygen production
Release of toxic organic compounds
Release of pesticides, heavy metals, and hydrogen sulfide
Increased temperature
Bottom siltation with very fine sediments

B. Effects of dredging and placement of spoil: effects of dredging in bays and estuaries (from Darnell, 1976).

Modification of bottom topography
Creation of bottom holes and channels
Segmentation and shoaling
Modification of current patterns (directions and velocities)
Modification of flushing patterns
Altered patterns of tidal exchange and mixing
Acceleration of passage of freshwater through the estuary
Increased penetration of saline water into the estuary
Sharpening of estuarine salinity gradients
Increase in turbidity
Reduction in particle size of surface sediments
Reduction in oxygen concentration, especially of near-bottom water

Table 2: Effects of dredging and placement of dredge spoil: effects of canalization and spoil placement in marshlands (from Darnell, 1976).

Interference with surface drainage patterns
Acceleration of surface drainage by canals
Damming of surface drainage by spoil banks
General acceleration of freshwater runoff
Loss of marshland habitat
Loss due to canalization
Loss due to water table lowering
Loss due to erosion and widening of canals
Loss due to spoil coverage
Loss due to acceleration of marsh subsidence
Acceleration of saltwater penetration
Conversion of sulfates (of saltwater) to sulfides in the canals and precipitation of iron sulfide in the canals
Erosion of spoil banks and distribution of chemically reduced sediment into canals and open marsh

Table 3: Station descriptions of areas used for water and sediment quality analyses in the Apalachicola River Bay system during the summer and fall of 1983 (see Figure 1; Livingston, 1983b for placement of stations).

Station	Location
1	Apalachicola Bay (dredge site)
1A	Apalachicola Bay, West Pass
1B	Apalachicola Bay, Sike's Cut
1C	Apalachicola Bay (dredge site)
1E	Apalachicola Bay, Nick's Hole
1X	Apalachicola Bay, St. George Island
2	Apalachicola Bay (dredge site)
3	East Bay
4	East Bay
4A	East Bay, Round (or Blount's) Bayou
5	mid East Bay
5A	upper East Bay
5B	West Pass
6	Alligator Bayou
A1	Apalachicola boat basin
A10	St. George dredged canal
A11	Little St. George Island
A2	Apalachicola Bay, between Hut restaurant and Apalachicola boat basin
A3	Apalachicola Bay, off Hut restaurant
A4	Apalachicola Bay, Carl's Creek
A5	Apalachicola Bay, Green Point
A6	Apalachicola Bay, St. Vincent Point

Table 3 (continued).

Station	Location
A7	Apalachicola Bay (dredge site)
A8	Apalachicola Bay, Cat Point
A9	St. George boat basin
E1	East Bay, Gorrie bridge fill
E2	East Bay, mouth of Eagle Creek
E3	upper Eagle Creek
E4	mid East Bay, shore
E5	East Bay, creek south of East Bayou
G1	St. George Sound, nearshore East Point
G2	St. George Sound, East Point channel
G3	St. George Sound, Porter's Creek mouth
G4	St. George Sound, Bulkhead Shoal
G5	St. George Sound, East Hole
G6	St. George Sound, near shore
G7	St. George Sound, Shell Point
G8	St. George Sound, Gorrie 300 construction site
G9	St. George Sound, Goose Island
R1	Apalachicola River mouth off Standard Oil dock
R2	Scipio Creek boat basin
R3	north Scipio Creek
R4	Apalachicola River, railroad trestle
R5	Apalachicola River, pinhook
R6	Murphy Creek
R7	Huckleberry Creek

Table 3 (continued).

Station	Location
R8	Clark's Creek
R9	Apalachicola River, St. Mark's Island
R10	Brother's River below Howard's Creek
V1	St. Vincent Sound, east
V2	St. Vincent Sound, between 9-mile and Tilton
V3	St. Vincent Sound, 11-mile
V4	St. Vincent Sound, mouth, Big Bayou
V5	St. Vincent Sound, 13-mile
V6	St. Vincent Sound, Gulf-Franklin County line

Table 4: Daily disposal volumes (cubic yards) at specific spoil sites (Figure 6) at Sike's Cut (St. George Island), the Intracoastal Waterway, the two-mile channel and extension and the East Point Channel from 1970 to present.

ST. GEORGE ISLAND DISPOSAL SITES

VOLUME DISPOSED IN CUBIC YARDS

	001	002	003	004	TOTAL
700223	0.	0.	0.	9444.	9444.
700224	0.	0.	0.	12341.	12341.
710525	0.	0.	575.	0.	575.
710526	0.	0.	7375.	0.	7375.
710527	2844.	0.	2844.	0.	5688.
710528	7000.	0.	0.	0.	7000.
710529	0.	0.	8593.	0.	8593.
710530	0.	0.	10250.	0.	10250.
710531	0.	12444.	0.	0.	12444.
710601	0.	5786.	0.	5786.	11572.
710602	0.	0.	0.	7120.	7120.
721219	0.	0.	9574.	0.	9574.
721220	0.	0.	15641.	0.	15641.
721221	0.	0.	3138.	0.	3138.
740212	0.	9747.	0.	0.	9747.
740214	0.	10360.	0.	0.	10360.
740215	0.	3022.	0.	0.	3022.
750720	0.	4178.	0.	0.	4178.
750721	0.	17733.	0.	0.	17733.
750722	5333.	10880.	0.	0.	16213.
750723	7333.	0.	0.	2467.	9800.
750724	0.	0.	0.	7071.	7071.
760324	0.	0.	0.	3293.	3293.
760325	0.	0.	0.	10413.	10413.
760326	0.	0.	0.	9873.	9873.
760327	0.	0.	0.	4067.	4067.
780607	0.	0.	288.	0.	288.
780608	0.	0.	1525.	0.	1525.
780609	0.	0.	8750.	0.	8750.
780610	0.	0.	8402.	0.	8402.
780611	0.	0.	8500.	0.	8500.
780613	0.	0.	1400.	0.	1400.
780614	0.	0.	12500.	0.	12500.
780615	0.	0.	6200.	6200.	12400.
780616	0.	0.	0.	1650.	1650.
780621	0.	0.	0.	1800.	1800.
780622	0.	0.	0.	12300.	12300.
780623	0.	0.	0.	16900.	16900.
780624	0.	0.	0.	2600.	2600.
780627	0.	0.	5100.	0.	5100.
780628	0.	0.	9600.	0.	9600.
780711	0.	0.	6028.	0.	6028.
780712	0.	0.	10962.	0.	10962.
TOTAL	22510.	74150.	137245.	113325.	

GRAND TOTAL 347230.

GULF INTRACOASTAL WATERWAY DISPOSAL SITES

VOLUME DISPOSED IN CUBIC YARDS

	001	002	003	004	005	006	007	008	009	010	011	01A	TOTAL
700120	0.	10545.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10545.
700121	0.	17940.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	17940.
700122	17835.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	17835.
700123	13233.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	13233.
700124	18900.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18900.
700125	18383.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18383.
700126	18900.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18900.
700127	17842.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	17842.
700128	18700.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18700.
700129	6500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	6500.
700203	0.	12760.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12760.
700204	0.	20740.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20740.
700205	0.	20440.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20440.
700206	0.	21600.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21600.
700207	0.	0.	21450.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21450.
700208	0.	0.	18050.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18050.
700209	0.	0.	21000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21000.
700210	0.	0.	22100.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22100.
700211	0.	0.	22100.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22100.
700212	0.	0.	19000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19000.
700217	0.	0.	21840.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21840.
700218	0.	0.	20500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20500.
700219	0.	0.	19250.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19250.
700220	0.	0.	18000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18000.
700221	0.	0.	0.	16245.	0.	0.	0.	0.	0.	0.	0.	0.	16245.
710204	0.	0.	1593.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1593.
710205	0.	0.	22910.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22910.
710206	0.	0.	23925.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23925.
710207	0.	0.	21780.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21780.
710208	0.	0.	20650.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20650.
710209	0.	23120.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23120.
710210	0.	16740.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16740.
710216	0.	0.	21750.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21750.
710217	0.	0.	22500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22500.
710218	0.	0.	22500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22500.
710219	0.	0.	24500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	24500.
710220	0.	0.	22015.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22015.
710221	0.	0.	0.	24390.	0.	0.	0.	0.	0.	0.	0.	0.	24390.
710222	0.	0.	0.	18962.	0.	0.	0.	0.	0.	0.	0.	0.	18962.
710223	0.	21945.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21945.
710224	22275.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22275.
710225	18760.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18760.
710302	19320.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19320.
710303	10850.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10850.
710304	14400.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14400.
710305	21580.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21580.
710306	19890.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19890.
710307	20250.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20250.
710308	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10710.	10710.
710309	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	15660.	15660.
710310	0.	0.	0.	17980.	0.	0.	0.	0.	0.	0.	0.	0.	17980.
710311	0.	0.	0.	14040.	0.	0.	0.	0.	0.	0.	0.	0.	14040.
711123	0.	7260.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7260.
711124	0.	19900.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19900.

GULF INTRACOASTAL WATERWAY DISPOSAL SITES

	001	002	003	004	005	006	007	008	009	010	011	01A	TOTAL
711126	0.	19920.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19920.
711127	0.	18720.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18720.
711128	0.	0.	22770.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22770.
711129	0.	0.	23760.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23760.
711130	0.	0.	25760.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25760.
711201	0.	0.	23100.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23100.
711207	0.	0.	0.	14560.	0.	0.	0.	0.	0.	0.	0.	0.	14560.
711208	0.	0.	0.	24360.	0.	0.	0.	0.	0.	0.	0.	0.	24360.
711209	0.	0.	0.	24750.	0.	0.	0.	0.	0.	0.	0.	0.	24750.
711210	0.	0.	0.	0.	24720.	0.	0.	0.	0.	0.	0.	0.	24720.
711211	0.	0.	0.	0.	24250.	0.	0.	0.	0.	0.	0.	0.	24250.
711212	0.	0.	0.	0.	22320.	0.	0.	0.	0.	0.	0.	0.	22320.
711213	0.	0.	0.	0.	0.	19650.	0.	0.	0.	0.	0.	0.	19650.
711214	0.	0.	0.	0.	0.	12750.	0.	0.	0.	0.	0.	0.	12750.
721120	12306.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12306.
721121	18407.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18407.
721122	18109.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18109.
721123	18999.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18999.
721124	7277.	7277.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14554.
721125	0.	9304.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9304.
721127	0.	24545.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	24545.
721128	0.	1307.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1307.
721206	0.	2726.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2726.
721207	0.	20500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20500.
721208	0.	0.	23113.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23113.
721209	0.	0.	25981.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25981.
721210	0.	0.	25939.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25939.
721211	0.	0.	33633.	0.	0.	0.	0.	0.	0.	0.	0.	0.	33633.
721212	0.	0.	33104.	0.	0.	0.	0.	0.	0.	0.	0.	0.	33104.
721213	0.	0.	14860.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14860.
721218	0.	0.	15656.	0.	0.	0.	0.	0.	0.	0.	0.	0.	15656.
721219	0.	0.	13506.	0.	0.	0.	0.	0.	0.	0.	0.	0.	13506.
740305	0.	0.	3011.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3011.
740306	0.	0.	23466.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23466.
740307	0.	0.	23419.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23419.
740312	0.	0.	19686.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19686.
740313	0.	0.	29587.	0.	0.	0.	0.	0.	0.	0.	0.	0.	29587.
740314	0.	28992.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	28992.
740315	0.	30390.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	30390.
740316	0.	25779.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25779.
740317	0.	7373.	5184.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12557.
740318	0.	0.	23294.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23294.
740319	0.	0.	31520.	0.	0.	0.	0.	0.	0.	0.	0.	0.	31520.
740320	0.	0.	8246.	13517.	0.	0.	0.	0.	0.	0.	0.	0.	21763.
740321	0.	0.	0.	38618.	0.	0.	0.	0.	0.	0.	0.	0.	38618.
740322	0.	0.	0.	28070.	0.	0.	0.	0.	0.	0.	0.	0.	28070.
740323	0.	0.	0.	9931.	0.	0.	0.	0.	0.	0.	0.	0.	9931.
751120	4000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4000.
751121	23000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23000.
751122	22080.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22080.
751123	21780.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21780.
751124	20210.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20210.
751125	0.	21465.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21465.
751126	0.	11000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	11000.
751202	0.	16250.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16250.
751203	0.	24380.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	24380.

GULF INTRACOASTAL WATERWAY DISPOSAL SITES

	001	002	003	004	005	006	007	008	009	010	011	01A	TOTAL
751204	0.	0.	20213.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20213.
751205	0.	0.	11250.	0.	0.	0.	0.	0.	0.	0.	0.	0.	11250.
751206	0.	0.	20915.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20915.
751207	0.	0.	24205.	0.	0.	0.	0.	0.	0.	0.	0.	0.	24205.
751208	0.	0.	25520.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25520.
751209	0.	0.	27500.	0.	0.	0.	0.	0.	0.	0.	0.	0.	27500.
751210	0.	0.	14658.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14658.
760113	0.	0.	926.	0.	0.	0.	0.	0.	0.	0.	0.	0.	926.
760114	0.	0.	20160.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20160.
760115	0.	0.	9012.	11521.	0.	0.	0.	0.	0.	0.	0.	0.	20533.
760116	0.	0.	0.	26670.	0.	0.	0.	0.	0.	0.	0.	0.	26670.
760117	0.	0.	0.	20330.	0.	0.	0.	0.	0.	0.	0.	0.	20330.
760118	0.	0.	0.	22680.	0.	0.	0.	0.	0.	0.	0.	0.	22680.
760119	0.	0.	0.	24840.	0.	0.	0.	0.	0.	0.	0.	0.	24840.
760120	0.	0.	0.	7680.	0.	0.	0.	0.	0.	0.	0.	640.	8320.
760121	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	17835.	17835.
760122	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	17425.	17425.
760127	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20140.	20140.
760128	0.	0.	0.	11340.	0.	0.	0.	0.	0.	0.	0.	3600.	14940.
760129	0.	0.	0.	34010.	0.	0.	0.	0.	0.	0.	0.	0.	34010.
760130	0.	0.	0.	34020.	0.	0.	0.	0.	0.	0.	0.	0.	34020.
760131	0.	0.	0.	32040.	0.	0.	0.	0.	0.	0.	0.	0.	32040.
760201	0.	0.	0.	0.	0.	20200.	0.	0.	0.	0.	0.	0.	20200.
760203	0.	0.	0.	0.	0.	0.	30870.	0.	0.	0.	0.	0.	30870.
760204	0.	0.	0.	0.	0.	0.	0.	19600.	0.	0.	0.	0.	19600.
770329	5347.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5347.
770330	14236.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14236.
770331	13384.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	13384.
770405	0.	0.	0.	0.	5729.	0.	0.	0.	0.	0.	0.	0.	5729.
770406	0.	0.	0.	0.	22894.	0.	0.	0.	0.	0.	0.	0.	22894.
770407	0.	0.	0.	0.	24792.	0.	0.	0.	0.	0.	0.	0.	24792.
770408	0.	0.	0.	22917.	0.	0.	0.	0.	0.	0.	0.	0.	22917.
770409	0.	0.	0.	23639.	0.	0.	0.	0.	0.	0.	0.	0.	23639.
770411	0.	0.	4084.	19833.	0.	0.	0.	0.	0.	0.	0.	0.	23917.
770412	0.	0.	19667.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19667.
770413	0.	0.	14167.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14167.
770414	0.	0.	10792.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10792.
770419	0.	0.	10653.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10653.
770420	0.	0.	15329.	0.	0.	0.	0.	0.	0.	0.	0.	0.	15329.
770421	0.	0.	16042.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16042.
770422	0.	20833.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20833.
770423	0.	19231.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19231.
770424	0.	16097.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16097.
770425	0.	10833.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10833.
780421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5970.	0.	5970.
780422	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	20400.	0.	20400.
780423	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23104.	0.	23104.
780424	0.	0.	0.	0.	0.	0.	0.	0.	0.	20823.	0.	0.	20823.
780425	0.	0.	0.	0.	0.	0.	0.	0.	0.	14500.	0.	0.	14500.
780426	0.	0.	0.	0.	0.	0.	0.	0.	0.	1740.	0.	0.	1740.
780427	0.	0.	0.	0.	0.	0.	0.	0.	0.	2848.	0.	0.	2848.
780428	0.	0.	0.	0.	0.	0.	0.	0.	0.	22100.	0.	0.	22100.
780429	0.	0.	0.	0.	0.	0.	0.	0.	18500.	0.	0.	0.	18500.
780430	0.	0.	0.	0.	0.	0.	0.	0.	19600.	0.	0.	0.	19600.
780501	0.	0.	0.	0.	0.	0.	0.	0.	32600.	0.	0.	0.	32600.
780502	0.	0.	0.	0.	0.	0.	0.	23200.	0.	0.	0.	0.	23200.

GULF INTRACOASTAL WATERWAY DISPOSAL SITES

	001	002	003	004	005	006	007	008	009	010	011	01A	TOTAL
780503	0.	0.	0.	0.	0.	0.	0.	10300.	0.	0.	0.	0.	10300.
780508	0.	1160.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1160.
780509	0.	4640.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4640.
780510	0.	16800.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16800.
780511	0.	13200.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	13200.
780512	0.	22100.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22100.
780513	0.	17800.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	17800.
780514	0.	12000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12000.
780515	0.	28300.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	28300.
780516	0.	24800.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	24800.
780517	0.	28120.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	28120.
780518	0.	0.	26854.	0.	0.	0.	0.	0.	0.	0.	0.	0.	26854.
780519	0.	0.	32612.	0.	0.	0.	0.	0.	0.	0.	0.	0.	32612.
780520	0.	0.	30663.	0.	0.	0.	0.	0.	0.	0.	0.	0.	30663.
780521	0.	0.	43098.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43098.
780522	0.	0.	33669.	0.	0.	0.	0.	0.	0.	0.	0.	0.	33669.
780523	0.	0.	31300.	0.	0.	0.	0.	0.	0.	0.	0.	0.	31300.
780524	0.	0.	35400.	0.	0.	0.	0.	0.	0.	0.	0.	0.	35400.
780525	0.	0.	33000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	33000.
780526	0.	0.	21300.	0.	0.	0.	0.	0.	0.	0.	0.	0.	21300.
780527	0.	0.	25900.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25900.
780528	0.	0.	0.	21000.	0.	0.	0.	0.	0.	0.	0.	0.	21000.
780529	0.	0.	0.	13100.	0.	0.	0.	0.	0.	0.	0.	0.	13100.
780530	9300.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9300.
780531	8100.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	8100.
780601	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7600.	7600.
780602	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	13400.	13400.
780603	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	6200.	6200.
TOTAL	494153.	698832.	1434897.	571043.	124705.	52600.	30870.	53100.	70700.	62011.	49474.	113210.	

GRAND TOTAL 3755595.

TWO MILE CHANNEL DISPOSAL SITES

VOLUME DISPOSED IN CUBIC YARDS

	001	002	003	004	005	006	008	TOTAL
700225	7777.	0.	0.	0.	0.	0.	0.	7777.
700226	14833.	0.	0.	0.	0.	0.	0.	14833.
700303	0.	19782.	0.	0.	0.	0.	0.	19782.
700304	0.	0.	22776.	0.	0.	0.	0.	22776.
700305	0.	0.	22089.	0.	0.	0.	0.	22089.
700306	0.	0.	0.	22100.	0.	0.	0.	22100.
700307	0.	0.	0.	21533.	0.	0.	0.	21533.
700308	0.	0.	0.	19763.	0.	0.	0.	19763.
700309	0.	0.	0.	0.	13096.	0.	0.	13096.
700310	0.	0.	0.	0.	10400.	0.	0.	10400.
700311	0.	0.	0.	0.	7326.	0.	0.	7326.
740215	0.	11005.	0.	0.	0.	0.	0.	11005.
740216	0.	0.	22277.	0.	0.	0.	0.	22277.
740217	0.	0.	23384.	0.	0.	0.	0.	23384.
740219	0.	0.	13022.	13022.	0.	0.	0.	26044.
740220	0.	0.	0.	20040.	0.	0.	0.	20040.
740221	0.	0.	0.	16639.	0.	0.	0.	16639.
740226	0.	0.	0.	0.	0.	13176.	0.	13176.
740227	0.	0.	0.	0.	604.	10581.	0.	11185.
740228	0.	0.	0.	0.	15251.	0.	0.	15251.
740301	0.	0.	0.	0.	24285.	0.	0.	24285.
740302	0.	0.	0.	0.	31127.	0.	0.	31127.
740303	0.	0.	0.	0.	0.	24720.	0.	24720.
740304	0.	0.	0.	0.	0.	22017.	0.	22017.
761207	0.	0.	0.	0.	0.	0.	8269.	8269.
761208	0.	0.	0.	0.	0.	0.	3222.	3222.
761209	0.	0.	0.	0.	0.	0.	7116.	7116.
761214	0.	0.	0.	0.	0.	0.	21644.	21644.
761215	0.	0.	0.	0.	0.	0.	15458.	15458.
761216	0.	0.	0.	0.	0.	0.	17912.	17912.
761217	0.	0.	0.	0.	0.	0.	8565.	8565.
780402	0.	0.	0.	18048.	0.	0.	0.	18048.
780403	0.	0.	22157.	0.	0.	0.	0.	22157.
780404	0.	0.	29543.	0.	0.	0.	0.	29543.
780405	0.	24700.	0.	0.	0.	0.	0.	24700.
780406	0.	23327.	0.	0.	0.	0.	0.	23327.
780407	28311.	0.	0.	0.	0.	0.	0.	28311.
780408	11796.	0.	0.	0.	0.	0.	0.	11796.
780409	0.	0.	0.	0.	0.	0.	987.	987.
780410	0.	0.	0.	0.	0.	0.	16250.	16250.
780411	0.	0.	0.	0.	0.	0.	6162.	6162.
780415	0.	0.	0.	0.	0.	0.	12133.	12133.
780416	0.	0.	0.	0.	0.	0.	11016.	11016.
780417	0.	0.	0.	0.	0.	0.	18989.	18989.
780418	0.	0.	0.	0.	0.	0.	4389.	4389.
TOTAL	62717.	78814.	155248.	131145.	102089.	70494.	152112.	

GRAND TOTAL 752619.

TWO MILE EXTENSION DISPOSAL SITES

VOLUME DISPOSED IN CUBIC YARDS

	007	008	TOTAL
760307	2333.	0.	2333.
760308	6779.	0.	6779.
760309	9588.	0.	9588.
760310	9588.	0.	9588.
760311	9509.	0.	9509.
760312	8489.	0.	8489.
760313	9391.	0.	9391.
760314	9201.	0.	9201.
760315	4263.	0.	4263.
760316	2889.	0.	2889.
760317	10751.	0.	10751.
760318	6057.	0.	6057.
760319	5741.	0.	5741.
760320	6637.	0.	6637.
760321	6825.	0.	6825.
760322	7227.	0.	7227.
760323	8580.	0.	8580.
760324	4935.	0.	4935.
760325	9191.	0.	9191.
760326	5190.	0.	5190.
760327	9555.	0.	9555.
760328	10400.	0.	10400.
760329	9945.	0.	9945.
760330	3159.	0.	3159.
760331	0.	4044.	4044.
760401	0.	4796.	4796.
760402	0.	10068.	10068.
760403	0.	12124.	12124.
760404	0.	13894.	13894.
760405	0.	3640.	3640.
760406	0.	10328.	10328.
760407	0.	8883.	8883.
760412	0.	8123.	8123.
760413	0.	7993.	7993.
760414	0.	8667.	8667.
760415	0.	8965.	8965.
760416	0.	8799.	8799.
760417	0.	4071.	4071.
760418	0.	8390.	8390.
760419	0.	4285.	4285.
760420	0.	10516.	10516.
760421	0.	11589.	11589.
760422	0.	6847.	6847.
760423	0.	8898.	8898.
760425	0.	1141.	1141.
760426	0.	4500.	4500.
760427	0.	8711.	8711.
760428	0.	14933.	14933.
760429	0.	8000.	8000.
760430	0.	9653.	9653.
TOTAL	176223.	211858.	

GRAND TOTAL 388081.

EAST POINT DREDGE DISPOSAL SITES

VOLUME DISPOSED IN CUBIC YARDS

	001	002	TOTAL
711215	0.	6160.	6160.
711216	0.	5800.	5800.
711221	0.	6240.	6240.
711222	0.	5787.	5787.
711223	0.	6380.	6380.
711224	4200.	0.	4200.
711226	5950.	0.	5950.
711227	5289.	0.	5289.
711228	3667.	0.	3667.
760327	0.	228.	228.
760328	0.	16871.	16871.
760329	0.	11071.	11071.
760330	0.	11342.	11342.
760331	5950.	2800.	8750.
760401	6667.	0.	6667.
770426	0.	7023.	7023.
770427	0.	10796.	10796.
770428	0.	4694.	4694.
780310	0.	2889.	2889.
780311	0.	9093.	9093.
780312	0.	11183.	11183.
780313	0.	2512.	2512.
780314	0.	8025.	8025.
780315	0.	7242.	7242.
780316	0.	12644.	12644.
780317	0.	13265.	13265.
780318	3675.	3675.	7350.
780319	3555.	0.	3555.
780320	8957.	0.	8957.
780321	8037.	0.	8037.
780322	7348.	0.	7348.
780323	9000.	0.	9000.
780324	12055.	0.	12055.
780325	17694.	0.	17694.
780326	12436.	0.	12436.
780327	4925.	0.	4925.
780328	3177.	3178.	6355.
780329	0.	14430.	14430.
780330	0.	15000.	15000.
780331	0.	6865.	6865.
780401	0.	1179.	1179.
TOTAL	122582.	206372.	

GRAND TOTAL 328954.

Table 5: Monthly totals (cubic yards) of dredging baywide and at the various disposal sites (lumped by site) in the Apalachicola estuary from 1970 to the present time.

ST. GEORGE ISLAND DISPOSAL SITES - MONTHLY TOTALS

VOLUME DISPOSED IN CUBIC YARDS

	001	002	003	004	TOTAL
7002	0.	0.	0.	21785.	21785.
7105	9844.	12444.	29637.	0.	51925.
7106	0.	5786.	0.	12906.	18692.
7212	0.	0.	28353.	0.	28353.
7402	0.	23129.	0.	0.	23129.
7507	12666.	32791.	0.	9538.	54995.
7603	0.	0.	0.	27646.	27646.
7806	0.	0.	62265.	41450.	103715.
7807	0.	0.	16990.	0.	16990.
TOTAL	22510.	74150.	137245.	113325.	

GRAND TOTAL 347230.

GULF INTRACOASTAL WATERWAY DISPOSAL SITES - MONTHLY TOTALS

VOLUME DISPOSED IN CUBIC YARDS

	001	002	003	004	005	006	007	008	009	010	011	01A
7001	130293.	28485.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7002	0.	75540.	203290.	16245.	0.	0.	0.	0.	0.	0.	0.	0.
7102	41035.	61805.	204123.	43352.	0.	0.	0.	0.	0.	0.	0.	0.
7103	106290.	0.	0.	32020.	0.	0.	0.	0.	0.	0.	0.	26370.
7111	0.	65800.	72290.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7112	0.	0.	23100.	63670.	71290.	32400.	0.	0.	0.	0.	0.	0.
7211	75098.	42433.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7212	0.	23226.	185792.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7403	0.	92534.	167413.	90136.	0.	0.	0.	0.	0.	0.	0.	0.
7511	91070.	32465.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7512	0.	40630.	144261.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7601	0.	0.	30098.	225131.	0.	0.	0.	0.	0.	0.	0.	59640.
7602	0.	0.	0.	0.	0.	20200.	30870.	19600.	0.	0.	0.	0.
7703	32967.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7704	0.	66994.	90734.	66389.	53415.	0.	0.	0.	0.	0.	0.	0.
7804	0.	0.	0.	0.	0.	0.	0.	0.	38100.	62011.	49474.	0.
7605	17400.	168920.	313796.	34100.	0.	0.	0.	33500.	32600.	0.	0.	0.
7806	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	27200.
TOTAL	494153.	698832.	1434897.	571043.	124705.	52600.	30870.	53100.	70700.	62011.	49474.	113210.

	TOTAL
7001	158778.
7002	295075.
7102	350315.
7103	164680.
7111	138090.
7112	190460.
7211	117531.
7212	209018.
7403	350083.
7511	123535.
7512	184891.
7601	314869.
7602	70670.
7703	32967.
7704	277532.
7804	149585.
7805	600316.
7806	27200.

TOTAL

GRAND TOTAL 3755595.

TWO MILE CHANNEL DISPOSAL SITES - MONTHLY TOTALS

VOLUME DISPOSED IN CUBIC YARDS

	001	002	003	004	005	006	008	TOTAL
7002	22610.	0.	0.	0.	0.	0.	0.	22610
7003	0.	19782.	44865.	63396.	30822.	0.	0.	158865
7402	0.	11005.	58683.	49701.	15855.	23757.	0.	159001
7403	0.	0.	0.	0.	55412.	46737.	0.	102149
7612	0.	0.	0.	0.	0.	0.	82186.	82186
7804	40107.	48027.	51700.	18048.	0.	0.	69926.	227808
TOTAL	62717.	78814.	155248.	131145.	102089.	70494.	152112.	

GRAND TOTAL 752619.

TWO MILE EXTENSION DISPOSAL SITES - MONTHLY TOTALS

VOLUME DISPOSED IN CUBIC YARDS

	007	008	TOTAL
7603	176223.	4044.	180267.
7604	0.	207814.	207814.
TOTAL	176223.	211858.	

GRAND TOTAL 388081.

EAST POINT DISPOSAL SITES - MONTHLY TOTALS

VOLUME DISPOSED IN CUBIC YARDS

	001	002	TOTAL
7112	19106.	30367.	49473.
7603	5950.	42312.	48262.
7604	6667.	0.	6667.
7704	0.	22513.	22513.
7803	90859.	110001.	200860.
7804	0.	1179.	1179.
TOTAL	122582.	206372.	

GRAND TOTAL 328954.

Table 6: Calendar year (January-December) totals for river flow (total; m^3/sec), Apalachicola rainfall (total; cm) and East Bay rainfall (total; cm) from 1972 through 1982.

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PLANE 1 RIVER FLOW

COLUMN STATISTICS

		SUM	MEAN	STD DEV	NBR OF POINTS	NBR MISSING	NBR NOT ZERO
COL 1	72	8015.00000	667.91667	368.19324	12.00000	0.00000	12.00000
COL 2	73	11581.00000	965.08333	588.32527	12.00000	0.00000	12.00000
COL 3	74	7999.00000	666.58333	410.28936	12.00000	0.00000	12.00000
COL 4	75	10659.00000	888.25000	353.38033	12.00000	0.00000	12.00000
COL 5	76	8893.00000	741.08333	256.86164	12.00000	0.00000	12.00000
COL 6	77	7466.00000	622.16667	336.10546	12.00000	0.00000	12.00000
COL 7	78	8519.00000	709.91667	428.41939	12.00000	0.00000	12.00000
COL 8	79	8657.00000	721.41667	395.13184	12.00000	0.00000	12.00000
COL 9	80	8543.00000	711.91667	591.94724	12.00000	0.00000	12.00000
COL 10	81	4246.00000	353.83333	201.25688	12.00000	0.00000	12.00000
COL 11	82	5937.00000	659.66667	306.83465	9.00000	3.00000	9.00000

PLANE SUMMARY

SUM	MEAN	STD DEV	NBR OF POINTS	NBR MISSING	NBR NOT ZERO
90515.00000	701.66667	415.79890	129.00000	3.00000	129.00000

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PLANE 2 EB RAIN

COLUMN STATISTICS

		SUM	MEAN	STD DEV	NBR OF POINTS	NBR MISSING	NBR NOT ZERO
COL 1	72	203.90000	16.99167	12.90944	12.00000	0.00000	12.00000
COL 2	73	216.30000	18.02500	8.26956	12.00000	0.00000	12.00000
COL 3	74	197.80000	16.48333	14.86771	12.00000	0.00000	11.00000
COL 4	75	214.90000	17.90833	15.22716	12.00000	0.00000	12.00000
COL 5	76	156.60000	13.05000	8.14689	12.00000	0.00000	12.00000
COL 6	77	116.10000	9.67500	6.98533	12.00000	0.00000	12.00000
COL 7	78	153.70000	12.80833	10.00495	12.00000	0.00000	12.00000
COL 8	79	244.10000	20.34167	21.17561	12.00000	0.00000	12.00000
COL 9	80	163.80000	13.65000	7.43255	12.00000	0.00000	12.00000
COL 10	81	135.30000	11.27500	8.48444	12.00000	0.00000	12.00000
COL 11	82	188.70000	15.72500	7.92466	12.00000	0.00000	12.00000

PLANE SUMMARY

SUM	MEAN	STD DEV	NBR OF POINTS	NBR MISSING	NBR NOT ZERO
1991.20000	15.08485	11.79442	132.00000	0.00000	131.00000

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PLANE 3 APAL RAIN

COLUMN STATISTICS

		SUM	MEAN	STD DEV	NBR OF POINTS	NBR MISSING	NBR NOT ZERO
COL 1	72	121.50000	10.12500	6.40428	12.00000	0.00000	12.00000
COL 2	73	132.60000	11.05000	6.20154	12.00000	0.00000	12.00000
COL 3	74	147.10000	12.25833	13.27639	12.00000	0.00000	12.00000
COL 4	75	176.40000	14.70000	10.24553	12.00000	0.00000	12.00000
COL 5	76	121.60000	10.13333	6.30834	12.00000	0.00000	12.00000
COL 6	77	97.70000	8.14167	5.39317	12.00000	0.00000	12.00000
COL 7	78	112.90000	9.40833	4.28495	12.00000	0.00000	12.00000
COL 8	79	143.40000	11.95000	11.96066	12.00000	0.00000	12.00000
COL 9	80	117.50000	9.79167	4.27625	12.00000	0.00000	12.00000
COL 10	81	102.90000	8.57500	9.28588	12.00000	0.00000	12.00000
COL 11	82	182.40000	15.20000	10.07788	12.00000	0.00000	12.00000

PLANE SUMMARY

SUM	MEAN	STD DEV	NBR OF POINTS	NBR MISSING	NBR NOT ZERO
1456.00000	11.03030	8.47464	132.00000	0.00000	132.00000

Table 7: Monthly totals by year of river flow (m^3/sec), Apalachicola rainfall (cm per month) and East Bay rainfall (cm per month) from 1972 through 1982.

THIS REPORT IS FOR RIVER FLOW

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82
01	1267.000	1312.000	1118.000	905.000	854.000	1088.000	1353.000	612.000	581.000	263.000	843.000
02	1286.000	1793.000	1593.000	1100.000	914.000	641.000	1299.000	1147.000	693.000	796.000	1370.000
03	997.000	1280.000	745.000	1413.000	931.000	1298.000	1292.000	1353.000	1855.000	478.000	642.000
04	634.000	2093.000	1159.000	1706.000	1015.000	995.000	753.000	1515.000	1936.000	711.000	708.000
05	472.000	1125.000	523.000	798.000	931.000	457.000	1069.000	812.000	993.000	293.000	563.000
06	529.000	1200.000	468.000	759.000	798.000	387.000	550.000	479.000	531.000	290.000	399.000
07	544.000	555.000	362.000	704.000	583.000	321.000	369.000	435.000	434.000	274.000	433.000
08	410.000	554.000	443.000	814.000	441.000	336.000	573.000	402.000	390.000	274.000	603.000
09	324.000	425.000	448.000	500.000	403.000	361.000	373.000	436.000	318.000	258.000	376.000
10	283.000	366.000	305.000	704.000	419.000	316.000	310.000	468.000	274.000	204.000	-1.000
11	303.000	375.000	284.000	628.000	492.000	711.000	274.000	498.000	268.000	182.000	-1.000
12	946.000	503.000	551.000	628.000	1112.000	555.000	304.000	500.000	270.000	223.000	-1.000
TOTAL	8015.000	11581.000	7999.000	10659.000	8893.000	7466.000	8519.000	8657.000	8543.000	4246.000	5937.000

	TOTAL
01	10216.000
02	12632.000
03	12284.000
04	13225.000
05	8036.000
06	6390.000
07	5014.000
08	5240.000
09	4222.000
10	3649.000
11	4015.000
12	5592.000

TOTAL

GRAND TOTAL 90515.000

THIS REPORT IS FOR APAL RAIN

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82
01	20.300	12.200	2.500	17.300	11.700	9.900	10.700	17.500	11.400	3.600	6.600
02	11.200	9.700	4.800	8.600	1.300	8.900	9.800	5.300	4.800	7.900	15.700
03	16.300	15.200	6.100	7.400	12.400	9.100	10.900	3.900	8.900	7.600	20.300
04	1.300	20.100	5.100	12.400	1.000	1.500	5.200	8.400	14.700	.500	8.400
05	4.300	6.600	22.100	8.900	11.900	1.800	11.900	10.800	7.600	2.800	3.800
06	13.200	5.100	8.600	11.400	20.300	.800	15.000	3.000	12.700	2.000	14.200
07	4.100	16.000	12.700	45.700	2.000	14.500	17.200	22.600	16.300	32.000	27.400
08	17.800	8.600	25.700	12.200	9.700	17.500	6.700	9.700	12.200	19.800	11.400
09	1.500	22.600	46.500	13.200	11.200	10.400	6.600	44.700	8.900	6.400	39.100
10	7.400	3.300	.300	15.500	19.300	2.500	4.800	1.000	12.700	1.000	17.500
11	13.200	5.600	3.000	8.600	8.100	11.400	11.200	7.400	4.800	5.100	5.600
12	10.900	7.600	9.700	15.200	12.700	9.400	2.900	9.100	2.500	14.200	12.400
TOTAL	121.500	132.600	147.100	176.400	121.600	97.700	112.900	143.400	117.500	102.900	182.400

	TOTAL
01	123.700
02	88.000
03	118.100
04	78.600
05	92.500
06	106.300
07	210.500
08	151.300
09	211.100
10	85.300
11	84.000
12	106.600
TOTAL	

GRAND TOTAL 1456.000

THIS REPORT IS FOR EB RAIN

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82
01	32.500	19.600	4.800	20.600	8.600	13.200	4.600	26.400	14.700	3.300	8.600
02	16.000	14.700	12.200	9.700	2.300	8.600	11.400	11.900	4.800	8.900	17.500
03	23.600	25.100	12.700	12.200	17.500	8.400	14.700	6.600	16.500	9.900	21.600
04	3.300	23.600	10.400	16.300	1.000	2.300	6.400	20.100	23.400	3.000	21.300
05	9.400	14.700	26.700	4.600	18.300	3.000	15.000	15.200	11.900	3.600	7.100
06	48.300	6.600	8.900	14.000	17.300	2.300	24.600	2.500	24.400	12.200	26.900
07	7.100	27.200	38.600	63.000	4.100	13.000	37.100	35.300	24.400	22.600	21.800
08	10.400	31.000	27.900	15.200	25.900	24.400	11.700	17.300	8.100	25.900	6.400
09	5.300	24.900	46.200	19.600	11.400	15.700	7.900	79.800	7.900	21.800	25.700
10	11.200	9.100	0.000	17.800	24.100	.800	1.000	1.500	15.000	3.300	14.500
11	20.300	8.400	2.300	3.600	10.400	14.700	15.500	7.400	9.400	4.300	3.800
12	16.500	11.400	7.100	18.300	15.700	9.700	3.800	20.100	3.300	16.500	13.500
TOTAL	203.900	216.300	197.800	214.900	156.600	116.100	153.700	244.100	163.800	135.300	188.700

	TOTAL
01	156.900
02	118.000
03	168.800
04	131.100
05	129.500
06	188.000
07	294.200
08	204.200
09	266.200
10	98.300
11	100.100
12	135.900

TOTAL .

GRAND TOTAL 1991.200

Table 8: Dissolved oxygen (ppm), color (Platinum-Cobalt units), turbidity (Jackson turbidity units), and temperature (^{o}C) taken monthly at permanent stations in the Apalahcicola estuary from March, 1972 through August, 1983.

STATION 1 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	6.7	30.0	0.0	21.0	10.5
7204	8.5	40.0	78.0	25.5	18.0
7205	8.7	30.0	20.0	24.3	18.5
7206	7.7	0.0	0.0	28.0	33.7
7207	7.0	15.0	5.0	29.0	15.0
7208	6.8	45.0	25.0	30.0	5.0
7209	7.4	20.0	7.0	30.0	22.4
7210	8.2	5.0	12.0	19.0	10.6
7211	9.1	5.0	7.0	21.5	29.0
7212	9.4	10.0	5.0	15.5	20.1
7301	10.2	70.0	21.0	10.0	10.0
7302	10.5	180.0	205.0	12.0	0.0
7303	9.2	450.0	25.0	18.4	5.4
7304	8.7	140.0	96.0	21.5	10.0
7305	8.5	17.0	10.0	24.4	11.2
7306	8.6	50.0	30.0	28.4	1.8
7307	8.6	20.0	30.0	32.3	8.9
7308	8.8	25.0	15.0	28.5	12.6
7309	8.8	3.0	2.0	29.0	24.1
7310	8.8	0.0	0.0	20.0	16.6
7311	7.2	8.0	12.0	20.0	12.6
7312	6.4	15.0	5.0	15.7	5.2
7401	7.8	10.0	16.0	18.0	2.9
7402	9.4	10.0	14.0	18.0	5.7
7403	8.5	20.0	17.0	21.0	10.3
7404	10.0	20.0	12.0	20.5	2.9
7405	7.5	50.0	7.0	27.8	0.0
7406	9.0	10.0	3.0	27.5	10.9
7407	8.0	15.0	2.0	27.8	21.0
7408	9.0	25.0	2.0	27.2	9.2
7409	9.9	30.0	3.0	28.0	12.3
7410	9.2	20.0	1.0	20.0	23.0

STATION 1 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7411	9.0	0.0	1.0	18.0	25.2
7412	9.4	10.0	2.0	13.0	5.3
7501	10.6	30.0	8.0	13.4	2.1
7502	9.3	75.0	3.0	15.2	5.2
7503	10.1	150.0	27.0	16.0	0.0
7504	8.7	170.0	33.0	17.0	3.0
7505	8.5	50.0	4.0	24.5	5.2
7506	8.2	30.0	3.0	25.0	8.5
7507	7.6	30.0	3.0	25.6	8.5
7508	5.9	25.0	3.0	29.0	3.0
7509	7.1	20.0	6.0	24.0	7.3
7510	6.9	25.0	3.0	21.0	3.6
7511	9.6	10.0	2.0	13.5	12.6
7512	9.7	20.0	2.0	16.6	5.2
7601	11.6	20.0	5.0	10.0	3.1
7602	11.4	10.0	3.0	17.0	6.2
7603	8.9	20.0	5.0	17.7	3.6
7604	9.4	45.0	3.0	24.7	5.2
7605	6.9	60.0	7.0	23.5	6.1
7606	7.2	15.0	3.0	27.0	2.1
7607	6.0	30.0	6.0	30.9	16.0
7608	9.0	0.0	5.0	28.2	16.6
7609	8.3	0.0	5.0	25.0	15.5
7610	8.9	0.0	6.0	19.0	6.2
7611	11.3	0.0	4.0	11.8	11.7
7612	9.5	50.0	16.0	9.8	0.0
7701	12.0	60.0	17.0	5.0	0.0
7702	9.3	20.0	9.0	16.2	2.9
7703	8.6	45.0	25.0	21.9	4.5
7704	8.5	0.0	10.0	24.0	6.7
7705	8.4	5.0	9.0	27.3	13.5
7706	7.8	0.0	6.0	30.5	34.0
7707	7.9	15.0	4.0	32.2	21.1
7708	6.8	15.0	12.0	28.1	9.0
7709	6.5	60.0	12.0	29.5	11.2
7710	7.9	45.0	9.0	20.0	15.8
7711	7.7	0.0	5.0	21.6	12.8
7712	9.1	55.0	10.0	15.7	3.6
7801	11.8	40.0	12.0	7.6	2.9
7802	12.2	60.0	10.0	10.8	3.6
7803	9.4	95.0	36.0	21.1	5.9
7804	9.1	10.0	7.0	25.0	4.4
7805	7.6	25.0	33.0	28.1	4.4
7806	7.7	40.0	25.0	32.0	12.0
7807	6.6	20.0	22.0	29.1	15.0
7808	6.7	80.0	25.0	28.1	2.9
7809	6.7	20.0	11.0	30.8	10.0
7810	6.7	15.0	39.0	23.2	21.0
7811	9.0	30.0	8.0	22.6	10.9
7812	8.9	2.0	8.0	21.0	14.8
7901	10.8	10.0	10.0	9.0	8.6
7902	10.0	30.0	25.0	10.2	1.6
7903	9.3	100.0	45.0	15.1	0.0

STATION 1 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7904	7.7	10.0	17.0	21.9	11.7
7905	7.5	65.0	56.0	25.1	0.0
7906	7.1	5.0	9.0	29.4	17.9
7907	6.4	10.0	62.0	28.3	10.9
7908	7.5	10.0	18.0	30.1	12.4
7909	6.9	120.0	25.0	23.7	5.0
7910	8.3	15.0	19.0	21.8	8.0
7911	9.4	25.0	16.0	17.1	18.0
7912	10.8	20.0	14.0	12.5	8.0
8001	10.8	25.0	12.0	18.0	10.0
8002	10.3	20.0	10.0	14.0	5.0
8003	8.4	10.0	11.0	18.2	6.0
8004	8.3	30.0	32.0	19.1	6.0
8005	7.1	20.0	23.0	26.0	6.0
8006	8.5	15.0	25.0	28.7	29.0
8007	7.9	5.0	24.0	29.0	12.0
8008	6.1	20.0	16.0	30.4	12.0
8009	6.6	10.0	16.0	29.9	12.0
8010	7.6	5.0	16.0	22.3	19.0
8011	8.1	10.0	42.0	18.8	22.0
8012	9.6	10.0	18.0	14.8	6.0
8101	11.0	15.0	17.0	12.1	6.0
8102	9.3	25.0	35.0	16.9	6.0
8103	9.0	45.0	90.0	13.5	30.0
8104	7.5	60.0	31.0	23.6	12.0
8105	8.1	40.0	25.0	22.7	25.0
8106	7.8	5.0	32.0	31.6	17.0
8107	6.8	5.0	33.0	29.2	20.0
8108	7.6	15.0	27.0	28.0	20.0
8109	6.6	0.0	4.0	26.0	10.0
8110	8.0	0.0	1.0	19.8	15.0
8111	8.2	20.0	2.0	15.2	22.0
8112	8.7	50.0	3.0	12.5	15.0
8201	9.6	150.0	3.0	11.2	0.0
8202	9.4	60.0	18.0	13.8	10.0
8203	4.0	80.0	20.0	21.6	0.0
8204	7.7	55.0	8.0	20.9	11.0
8205	8.0	30.0	7.0	26.0	3.0
8206	7.8	75.0	13.0	27.2	5.0
8207	7.5	20.0	5.0	30.0	19.0
8208	7.0	30.0	14.0	28.3	5.0
8209	7.8	70.0	10.0	26.9	14.0
8210	7.6	30.0	6.0	23.7	15.0
8211	7.6	20.0	8.0	17.9	15.0
8212	8.5	25.0	10.0	14.3	15.0
8301	10.6	25.0	10.0	10.7	6.0
8302	8.7	40.0	19.0	16.2	9.0
8303	8.4	125.0	34.0	14.6	4.0
8304	8.6	130.0	29.0	16.8	0.0
8305	7.4	15.0	12.0	27.4	22.0
8306	6.8	20.0	23.0	27.3	16.0
8307	7.4	45.0	7.0	29.8	21.0
8308	7.2	25.0	7.0	30.2	16.0

STATION 1 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	2.4	1.2	7.1	50.0	0.0	20.0	10.5
7204	2.6	.5	8.0	95.0	78.0	25.0	18.0
7205	2.7	1.3	7.4	45.0	25.0	25.0	24.0
7206	3.0	.7	6.3	0.0	0.0	28.0	33.7
7207	3.0	.9	5.0	7.0	3.0	28.0	29.0
7208	3.0	.9	4.9	50.0	68.0	30.0	8.5
7209	2.1	1.2	6.8	45.0	38.0	29.0	24.0
7210	2.4	.3	6.8	10.0	25.0	19.2	10.7
7211	2.4	1.8	9.4	5.0	20.0	21.0	29.0
7212	1.8	1.2	9.6	5.0	15.0	15.0	19.8
7301	1.8	.6	10.3	50.0	23.0	10.0	10.0
7302	2.5	.2	11.3	360.0	240.0	11.5	0.0
7303	2.0	.2	8.4	450.0	34.3	18.3	9.4
7304	1.3	.3	8.8	140.0	145.0	21.0	18.0
7305	2.1	.7	8.4	17.0	40.0	23.0	20.8
7306	2.3	.5	8.4	53.7	30.0	28.1	15.5
7307	2.3	1.2	8.4	35.0	30.0	30.2	19.1
7308	2.5	.5	8.6	30.0	55.0	28.4	12.6
7309	2.1	1.4	8.8	15.0	12.0	29.0	19.5
7310	1.4	1.1	8.2	20.0	0.0	20.2	17.2
7311	1.5	.9	7.0	12.0	23.0	20.0	14.9
7312	2.5	1.1	6.3	8.0	3.0	15.8	24.1
7401	1.7	.5	7.6	15.0	36.0	18.0	10.9
7402	1.5	.3	9.1	15.0	22.0	18.0	13.8
7403	2.0	.8	8.0	40.0	42.0	20.5	12.6
7404	2.5	.9	10.0	25.0	8.0	20.0	2.9
7405	2.1	.6	7.5	11.9	14.7	27.2	24.6
7406	1.5	1.1	8.2	5.0	1.0	27.4	22.3
7407	2.0	.8	6.5	20.0	4.0	26.5	28.0
7408	1.7	.7	7.0	30.0	2.0	27.1	11.4
7409	2.0	.9	7.9	30.0	7.0	27.0	17.6
7410	2.0	1.6	8.9	25.0	2.0	20.5	24.2
7411	2.0	.8	9.1	0.0	2.0	18.3	29.5
7412	2.0	1.2	8.8	30.0	2.0	14.5	15.5
7501	1.5	.6	7.4	0.0	4.0	14.5	6.9
7502	1.7	.9	9.4	70.0	3.0	16.5	7.4
7503	1.8	.4	10.0	150.0	26.0	16.0	1.5
7504	2.0	.3	7.2	145.0	31.0	17.9	4.1
7505	2.0	.4	7.0	55.0	5.0	25.0	5.8
7506	2.0	.6	6.4	30.0	4.0	25.0	26.3
7507	2.0	.7	6.4	30.0	3.0	25.1	18.1
7508	1.9	.9	5.9	10.0	2.0	29.7	11.7
7509	2.1	1.0	4.7	20.0	6.0	26.3	11.0
7510	2.0	1.0	6.1	20.0	2.0	22.5	11.0
7511	2.0	1.2	9.8	5.0	2.0	15.0	18.4
7512	2.0	1.1	9.5	15.0	2.0	16.0	10.5
7601	2.0	1.0	11.6	20.0	4.0	10.0	4.1
7602	1.8	1.2	12.6	25.0	4.0	17.0	12.6
7603	1.3	.3	8.8	30.0	6.0	17.1	3.6
7604	2.0	.7	8.8	45.0	2.0	23.8	11.5
7605	2.2	.6	6.9	40.0	4.0	23.0	5.1
7606	2.0	1.0	4.6	0.0	3.0	27.8	19.8
7607	2.0	1.1	5.5	20.0	5.0	31.0	29.7
7608	2.5	1.0	6.4	2.0	21.0	28.2	22.6
7609	2.2	1.4	5.3	0.0	10.0	25.7	18.8
7610	2.0	1.1	7.2	0.0	8.0	19.5	21.0

STATION 1 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	2.0	1.3	9.0	0.0	12.0	11.9	15.0
7612	2.5	1.1	9.9	40.0	13.0	8.8	.8
7701	2.0	.5	11.0	10.0	25.0	5.0	12.4
7702	2.0	.7	8.7	0.0	9.0	14.3	20.4
7703	2.0	.5	8.5	40.0	28.0	21.9	4.5
7704	2.0	1.2	7.4	20.0	15.0	23.0	20.2
7705	2.0	1.1	7.8	0.0	14.0	27.8	18.8
7706	2.0	1.2	7.7	0.0	14.0	29.9	34.0
7707	2.0	1.2	7.9	15.0	34.0	33.0	27.2
7708	2.0	1.2	6.4	0.0	18.0	28.4	24.2
7709	2.3	.8	6.0	35.0	12.0	30.0	21.1
7710	2.0	.9	7.7	50.0	15.0	20.0	15.8
7711	2.3	1.1	7.1	0.0	17.0	22.1	27.2
7712	2.1	1.4	9.0	50.0	20.0	15.8	16.6
7801	2.0	1.0	11.2	40.0	16.0	7.6	4.4
7802	2.0	1.0	10.8	30.0	43.0	11.0	12.0
7803	2.1	.3	9.7	75.0	34.0	20.0	7.4
7804	2.0	1.1	9.0	20.0	10.0	25.0	5.9
7805	2.0	.5	7.5	30.0	27.0	28.0	4.4
7806	2.2	.8	7.0	45.0	22.0	31.0	15.8
7807	1.8	1.1	5.6	30.0	50.0	30.0	20.4
7808	3.2	.6	6.4	50.0	22.0	28.1	10.5
7809	2.2	.5	6.5	40.0	24.0	30.4	11.0
7810	2.4	.3	6.6	10.0	44.0	23.2	21.8
7811	2.3	1.2	8.4	20.0	11.0	22.2	15.8
7812	1.8	.6	8.0	10.0	13.0	20.9	20.2
7901	2.0	.7	10.6	70.0	20.0	8.9	11.7
7902	1.7	.4	9.6	30.0	34.0	9.8	4.7
7903	1.2	.3	9.5	70.0	35.0	14.7	.8
7904	2.4	.6	7.1	15.0	45.0	21.9	24.1
7905	2.5	.4	7.5	70.0	52.0	25.0	0.0
7906	2.2	.9	5.6	10.0	20.0	28.4	25.7
7907	3.5	.4	6.1	10.0	91.0	28.1	14.8
7908	3.2	.5	3.4	10.0	20.0	29.8	15.6
7909	2.4	.5	6.2	90.0	54.0	23.6	18.0
7910	2.6	.8	8.1	20.0	21.0	21.8	10.0
7911	2.1	.4	9.1	20.0	17.0	16.8	21.0
7912	2.0	.5	11.2	20.0	15.0	12.2	10.0
8001	2.1	1.0	10.4	30.0	13.0	17.4	14.0
8002	2.0	1.0	10.8	20.0	12.0	13.8	5.0
8003	2.5	.6	8.0	15.0	13.0	18.1	6.0
8004	2.2	.6	8.4	30.0	28.0	18.3	14.0
8005	2.7	.5	5.3	30.0	30.0	25.9	11.0
8006	2.5	.8	8.0	20.0	28.0	28.7	31.0
8007	3.0	.7	6.5	0.0	33.0	28.8	20.0
8008	2.5	.9	5.0	50.0	23.0	30.7	19.0
8009	2.5	.9	4.6	15.0	21.0	29.9	17.0
8010	2.4	1.4	7.0	5.0	17.0	22.9	21.0
8011	2.5	.3	7.8	10.0	45.0	18.4	24.0
8012	2.7	1.8	9.9	10.0	18.0	15.0	19.0
8101	2.5	1.5	13.1	10.0	16.0	12.4	18.0
8102	2.3	.4	9.5	20.0	30.0	16.3	15.0
8103	1.9	.3	9.0	45.0	90.0	13.1	31.0
8104	2.6	.8	7.2	50.0	34.0	23.6	16.0
8105	2.5	1.0	6.5	45.0	30.0	22.5	25.0
8106	2.6	1.2	7.6	5.0	33.0	30.9	21.0

STATION 1 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	2.4	.9	6.5	5.0	40.0	28.9	23.0
8108	2.8	.7	7.5	10.0	32.0	28.0	20.0
8109	2.5	1.4	4.9	0.0	16.0	25.9	18.0
8110	2.2	1.4	8.0	0.0	3.0	20.2	15.0
8111	2.1	1.5	9.0	20.0	8.0	15.5	18.0
8112	1.9	1.5	11.4	55.0	5.0	13.1	15.0
8201	2.0	.4	9.2	50.0	2.0	10.6	6.0
8202	1.8	.8	6.7	20.0	15.0	14.3	18.0
8203	2.0	.5	8.4	20.0	18.0	20.9	10.0
8204	2.1	.7	7.6	20.0	5.0	21.1	22.0
8205	2.1	.7	7.3	20.0	9.0	26.0	19.0
8206	2.2	.6	6.1	80.0	17.0	27.0	25.0
8207	2.2	1.0	6.1	50.0	15.0	30.3	24.0
8208	2.2	.8	6.1	60.0	8.0	29.2	15.0
8209	1.9	.9	7.8	75.0	10.0	26.7	14.0
8210	1.9	1.2	7.4	25.0	7.0	22.6	22.0
8211	1.9	1.7	8.4	15.0	8.0	16.8	26.0
8212	1.8	.8	7.2	25.0	10.0	14.9	22.0
8301	1.9	1.4	10.1	20.0	25.0	10.7	14.0
8302	1.9	1.1	8.2	40.0	40.0	16.2	18.0
8303	2.1	.5	8.1	95.0	35.0	14.4	9.0
8304	2.2	.4	8.2	100.0	29.0	16.7	1.0
8305	2.2	1.1	7.3	15.0	12.0	26.8	22.0
8306	2.8	.8	6.4	45.0	26.0	27.1	21.0
8307	2.3	.9	6.8	30.0	14.0	30.0	29.0
8308	2.3	1.0	6.3	30.0	8.0	30.1	19.0

STATION 2 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	7.3	75.0	0.0	20.0	4.3
7204	7.3	95.0	30.0	25.5	5.5
7205	7.6	95.0	45.0	25.0	2.0
7206	7.3	15.0	1.0	30.5	6.8
7207	7.1	35.0	9.0	30.0	3.0
7208	6.7	55.0	45.0	30.0	7.0
7209	6.3	35.0	10.0	31.0	6.0
7210	7.1	10.0	5.0	24.0	2.5
7211	7.8	22.2	14.0	19.0	21.5
7212	7.8	55.0	23.0	13.5	.4
7301	9.4	83.5	35.0	13.1	.5
7302	8.6	105.0	48.0	11.5	0.0
7303	8.5	90.0	45.0	21.0	0.0
7304	8.4	90.0	53.0	20.5	0.0
7305	7.0	45.0	35.0	24.8	0.0
7306	7.1	55.0	23.0	29.4	0.0
7307	7.2	40.0	35.0	30.0	1.1
7308	8.0	30.0	10.0	31.0	12.6
7309	6.8	0.0	2.0	29.0	0.0
7310	8.4	0.0	0.0	20.5	12.0
7311	7.4	10.0	20.0	20.7	4.5
7312	7.2	15.0	30.0	18.0	3.9
7401	7.0	20.0	40.0	17.0	0.0
7402	8.6	100.0	34.0	16.0	0.0
7403	8.0	30.0	8.0	21.0	0.0
7404	8.0	60.0	24.0	22.3	5.1
7405	6.8	65.0	6.5	27.1	0.0
7406	7.8	10.0	2.0	27.8	5.7
7407	6.0	20.0	4.0	29.0	0.0
7408	8.6	75.0	6.0	27.1	0.0
7409	6.1	40.0	5.0	27.0	2.6
7410	8.0	20.0	2.0	19.4	10.1
7411	7.6	0.0	2.0	17.0	6.9
7412	8.3	30.0	5.0	12.0	0.0
7501	8.3	65.0	19.0	12.7	0.0
7502	8.2	100.0	10.0	14.8	2.0
7503	9.6	155.0	27.0	15.8	0.0
7504	7.9	250.0	51.0	17.0	0.0
7505	7.9	120.0	14.0	24.0	3.0
7506	7.8	130.0	18.0	24.5	3.0
7507	6.7	51.5	19.9	25.6	3.0
7508	6.6	50.0	4.0	28.4	2.5
7509	6.2	60.0	9.0	24.0	1.5
7510	6.3	45.0	6.0	20.5	0.0
7511	8.3	60.0	14.0	15.0	0.0
7512	8.1	50.0	5.0	14.0	3.1
7601	10.6	35.0	8.0	9.0	2.0
7602	8.3	55.0	15.0	15.0	0.0
7603	8.7	70.0	14.0	17.0	0.0
7604	6.7	90.0	7.0	23.0	3.1
7605	6.4	110.0	20.0	22.0	.5
7606	5.4	40.0	7.0	26.0	0.0
7607	5.4	10.0	4.0	29.1	.8
7608	5.5	2.0	13.0	28.5	4.0
7609	6.4	0.0	6.0	25.2	3.5
7610	7.9	25.0	9.0	18.5	.8

STATION 2 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	9.7	20.0	10.0	10.7	1.3
7612	9.1	70.0	15.0	9.5	.8
7701	12.0	65.0	19.0	6.0	0.0
7702	11.0	50.0	12.0	12.1	0.0
7703	8.0	60.0	15.0	20.9	2.9
7704	7.6	85.0	16.0	22.5	0.0
7705	7.9	0.0	12.0	26.7	5.9
7706	8.0	15.0	7.0	31.6	13.5
7707	8.0	15.0	6.0	32.0	16.6
7708	6.4	80.0	19.0	27.0	2.9
7709	5.4	70.0	15.0	27.2	1.4
7710	8.0	50.0	18.0	20.8	5.2
7711	7.5	0.0	5.0	22.6	10.5
7712	7.8	90.0	16.0	14.8	0.0
7801	10.6	70.0	16.0	7.4	0.0
7802	10.3	130.0	26.0	9.8	0.0
7803	9.4	80.0	26.0	18.3	1.4
7804	7.8	75.0	18.0	22.9	0.0
7805	7.2	90.0	37.0	27.3	1.4
7806	6.0	60.0	31.0	31.1	1.4
7807	5.9	25.0	26.0	30.0	1.4
7808	6.0	70.0	24.0	27.6	2.1
7809	6.3	30.0	13.0	30.0	2.0
7810	8.3	20.0	13.0	23.8	17.9
7811	8.8	0.0	8.0	23.7	12.6
7812	7.8	30.0	14.0	19.9	0.0
7901	10.6	30.0	21.0	9.3	0.0
7902	9.3	60.0	23.0	9.7	0.0
7903	8.1	85.0	65.0	14.4	0.0
7904	6.6	40.0	29.0	20.4	0.0
7905	6.0	70.0	24.0	24.1	0.0
7906	6.4	50.0	20.0	27.7	0.0
7907	6.3	15.0	30.0	28.0	2.3
7908	5.7	15.0	26.0	30.1	0.0
7909	7.4	120.0	24.0	23.1	1.0
7910	6.8	25.0	24.0	21.8	0.0
7911	8.4	40.0	23.1	18.3	0.0
7912	9.1	20.0	17.9	12.0	0.0
8001	9.8	25.0	17.0	15.2	0.0
8002	10.7	30.0	17.0	12.2	0.0
8003	8.3	35.0	19.0	18.4	0.0
8004	8.2	90.0	40.0	18.2	0.0
8005	6.5	35.0	30.0	24.9	0.0
8006	7.1	30.0	24.0	28.4	2.0
8007	6.0	0.0	27.0	29.3	0.0
8008	5.4	25.0	17.0	30.0	3.0
8009	5.6	15.0	17.0	29.3	2.0
8010	7.0	5.0	18.0	23.0	5.0
8011	7.8	5.0	18.0	18.4	6.0
8012	9.8	10.0	17.0	14.3	9.0
8101	11.8	20.0	21.0	10.4	4.0
8102	8.6	85.0	47.0	15.2	0.0
8103	7.3	80.0	36.0	17.1	1.0
8104	6.8	50.0	32.0	23.2	5.0
8105	6.6	50.0	33.0	24.0	5.0
8106	6.8	5.0	35.0	31.2	4.0

STATION 2 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	7.7	5.0	33.0	30.5	12.0
8108	7.8	15.0	30.0	28.0	20.0
8109	5.9	0.0	5.0	26.4	5.0
8110	6.1	0.0	1.0	21.0	5.0
8111	7.5	20.0	6.0	15.8	5.0
8112	9.0	50.0	5.0	12.8	3.0
8201	8.8	150.0	3.0	9.3	8.0
8202	8.2	200.0	56.0	12.7	0.0
8203	6.6	100.0	16.0	20.2	0.0
8204	7.6	80.0	10.0	20.3	1.0
8205	6.9	55.0	8.0	24.0	0.0
8206	6.0	130.0	16.0	29.9	2.0
8207	5.3	75.0	14.0	28.9	2.0
8208	5.4	60.0	13.0	28.0	0.0
8209	4.6	80.0	11.0	27.7	0.0
8210	7.0	40.0	7.0	23.3	4.0
8211	8.4	25.0	9.0	17.1	7.0
8212	7.0	120.0	21.0	14.5	0.0
8301	9.9	100.0	25.0	9.4	0.0
8302	8.5	200.0	43.0	14.1	0.0
8303	7.9	205.0	43.0	14.1	0.0
8304	8.0	150.0	35.0	16.5	0.0
8305	5.8	50.0	16.0	26.1	4.0
8306	5.8	25.0	19.0	26.9	5.0
8307	5.5	40.0	9.0	29.9	10.0
8308	6.0	35.0	9.0	29.2	2.0

STATION 2 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	5.1	1.2	5.7	40.0	0.0	20.0	19.0
7204	6.0	.6	7.2	80.0	31.1	25.0	18.0
7205	6.0	.6	6.7	80.0	45.0	25.0	23.5
7206	6.0	.9	6.2	12.0	0.0	31.0	10.0
7207	3.9	.6	5.7	22.0	11.0	28.0	26.0
7208	4.5	.9	4.1	145.0	75.0	30.5	23.0
7209	4.5	1.2	5.3	35.0	12.0	28.0	27.0
7210	2.4	.9	6.3	15.0	8.0	23.7	5.0
7211	4.2	1.1	7.5	15.4	22.0	19.0	21.5
7212	5.4	1.4	7.6	90.0	37.0	14.0	10.6
7301	3.8	.6	9.0	73.1	55.0	13.1	6.5
7302	3.5	.6	9.4	75.0	74.0	10.0	0.0
7303	3.2	.6	8.5	70.0	30.0	20.0	0.0
7304	1.8	.4	8.4	95.0	55.0	20.0	0.0
7305	3.0	.6	7.4	5.0	40.0	23.5	9.8
7306	7.0	.5	7.1	25.0	25.0	29.1	11.5
7307	2.5	.8	6.6	35.0	105.0	29.5	15.1
7308	3.5	.9	7.3	30.0	18.9	31.0	16.6
7309	3.5	.9	6.9	60.0	70.0	28.5	11.5
7310	1.5	.9	8.2	10.0	0.0	20.0	13.2
7311	2.0	.9	6.8	20.0	24.0	20.7	4.5
7312	2.0	.9	7.2	30.0	36.0	18.0	3.9
7401	2.5	.4	6.8	40.0	48.0	16.5	0.0
7402	3.0	.3	7.7	0.0	83.0	15.7	16.6
7403	4.0	.6	6.9	20.0	10.0	20.0	19.5
7404	1.5	.6	7.3	57.3	28.5	22.2	5.3
7405	5.0	.6	7.4	32.1	10.3	27.8	21.8
7406	4.0	.9	7.5	2.0	1.0	27.0	23.1
7407	5.0	.9	6.0	10.0	3.0	29.0	17.2
7408	4.8	.8	8.0	25.0	3.5	28.0	20.4
7409	4.0	1.1	3.5	25.0	6.0	27.0	19.8
7410	4.0	1.6	8.4	10.0	1.0	20.8	27.3
7411	4.0	1.0	8.1	0.0	2.0	18.0	23.0
7412	3.5	.5	8.1	10.0	1.0	14.0	20.3
7501	4.0	.4	8.2	110.0	26.0	12.3	0.0
7502	4.0	.8	8.0	40.0	2.0	14.5	18.2
7503	4.0	.4	9.4	150.0	27.0	15.9	0.0
7504	4.5	.3	7.8	250.0	53.0	17.0	0.0
7505	3.7	.7	6.1	110.0	15.0	24.0	3.0
7506	3.0	.6	3.4	30.0	5.0	26.0	19.3
7507	3.7	.7	3.5	30.0	4.0	25.9	14.4
7508	4.0	.9	3.6	5.0	1.0	28.7	13.9
7509	3.5	.9	6.2	2.0	1.0	24.0	10.0
7510	3.0	.8	5.4	0.0	2.0	21.0	7.3
7511	3.5	.5	7.9	60.0	14.0	15.2	0.0
7512	3.5	.9	8.8	60.0	7.0	16.0	3.1
7601	3.5	.8	9.4	35.0	8.0	10.5	2.0
7602	3.0	.4	8.4	55.0	15.0	16.0	0.0
7603	3.0	.3	8.6	35.0	8.0	16.8	4.1
7604	3.0	.7	7.1	45.0	2.0	23.0	16.8
7605	4.0	.4	6.3	40.0	2.0	22.0	9.3
7606	3.5	.8	4.0	5.0	2.0	27.0	17.2
7607	3.5	.9	6.9	10.0	4.0	29.0	27.0
7608	3.0	.6	4.9	2.0	30.0	28.1	17.1
7609	4.0	1.0	6.2	0.0	45.0	25.3	17.1
7610	3.0	.6	8.4	5.0	9.0	19.2	3.0

STATION 2 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	3.0	.7	9.3	0.0	14.0	10.2	12.8
7612	3.5	.7	8.7	5.0	15.0	9.1	7.3
7701	3.5	.6	11.0	65.0	17.0	6.0	0.0
7702	3.0	.5	11.0	45.0	16.0	12.1	.5
7703	3.0	.6	7.9	65.0	20.0	20.9	2.9
7704	3.0	.8	7.2	30.0	32.0	23.0	19.2
7705	3.0	.9	7.2	0.0	23.0	27.2	20.4
7706	3.8	.6	6.8	0.0	11.0	30.0	28.7
7707	3.0	.9	6.8	20.0	28.0	32.5	28.0
7708	3.0	.5	6.5	70.0	20.0	27.2	11.2
7709	3.0	.9	4.9	50.0	15.0	28.8	11.2
7710	3.5	.8	7.8	60.0	9.0	20.5	21.1
7711	3.0	.9	6.5	0.0	18.0	22.4	21.1
7712	3.0	.8	7.7	65.0	18.0	15.1	9.0
7801	2.5	.7	10.6	60.0	17.0	7.2	0.0
7802	3.5	.4	10.4	140.0	32.0	9.3	0.0
7803	3.0	.5	9.4	100.0	30.0	18.3	1.4
7804	3.0	.6	7.7	70.0	19.0	22.5	0.0
7805	3.2	.5	6.8	95.0	40.0	27.0	.6
7806	2.8	.8	6.1	55.0	31.0	30.8	4.4
7807	2.9	.8	5.2	25.0	62.0	30.1	9.0
7808	3.0	.6	5.5	35.0	33.0	28.0	18.1
7809	2.7	.6	5.8	30.0	14.0	29.9	2.0
7810	4.3	.5	7.9	15.0	16.0	23.5	23.3
7811	2.9	1.1	8.7	10.0	9.0	22.9	12.6
7812	3.3	.4	7.8	40.0	41.0	19.8	0.0
7901	3.1	.4	10.6	35.0	39.0	9.3	0.0
7902	4.5	.5	9.3	70.0	20.0	9.6	0.0
7903	3.2	.1	8.0	95.0	61.0	14.4	0.0
7904	2.4	.4	6.5	60.0	30.0	20.3	0.0
7905	4.5	.7	5.8	55.0	24.0	24.0	0.0
7906	3.0	.5	5.3	25.0	15.0	27.6	.8
7907	3.0	.5	6.0	15.0	32.0	27.8	5.4
7908	3.0	.6	5.6	15.0	27.0	29.7	.8
7909	3.7	.4	7.3	90.0	42.0	23.0	12.0
7910	3.5	.8	6.5	30.0	24.0	21.7	0.0
7911	4.0	.7	8.1	30.0	23.0	17.9	3.0
7912	1.3	.5	9.1	25.0	17.0	12.0	1.0
8001	2.8	.5	10.4	30.0	17.0	16.0	10.0
8002	1.7	.5	11.0	50.0	22.0	12.2	0.0
8003	2.8	.7	8.2	40.0	22.0	18.4	0.0
8004	3.6	.5	8.1	110.0	42.0	18.1	0.0
8005	3.5	.4	6.4	45.0	50.0	24.7	0.0
8006	2.8	.7	6.3	40.0	24.0	28.4	6.0
8007	4.2	.8	5.4	0.0	50.0	29.0	24.0
8008	4.5	.8	5.4	40.0	22.0	30.2	11.0
8009	2.9	.7	5.4	10.0	20.0	29.3	4.0
8010	4.5	1.4	6.4	5.0	19.0	23.0	8.0
8011	4.5	1.1	7.6	5.0	20.0	18.4	10.0
8012	1.8	1.8	9.5	10.0	19.0	14.3	15.0
8101	4.3	1.0	13.2	10.0	19.0	11.6	11.0
8102	4.1	.4	8.1	80.0	45.0	15.1	0.0
8103	3.8	.8	8.1	85.0	40.0	17.1	1.0
8104	4.5	.6	6.3	60.0	33.0	23.0	6.0
8105	4.5	.9	6.2	60.0	35.0	23.6	9.0
8106	4.3	1.1	6.7	10.0	40.0	30.3	17.0

STATION 2 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	2.9	.9	5.9	5.0	46.0	29.9	18.0
8108	4.6	.8	7.8	10.0	31.0	27.9	20.0
8109	4.0	1.2	5.6	0.0	5.0	26.2	14.0
8110	3.8	1.4	5.3	0.0	4.0	20.8	15.0
8111	3.9	1.6	7.3	45.0	3.0	15.5	4.0
8112	3.5	1.4	8.4	60.0	7.0	13.0	14.0
8201	3.0	.6	8.8	150.0	4.0	9.9	0.0
8202	3.0	.4	7.6	275.0	63.0	12.5	0.0
8203	3.1	.8	5.2	90.0	17.0	20.3	0.0
8204	4.0	.8	6.8	60.0	12.0	20.3	19.0
8205	3.1	.7	6.9	10.0	16.0	24.5	2.0
8206	3.0	.7	5.2	120.0	20.0	29.1	6.0
8207	2.3	.5	4.2	70.0	12.0	29.3	20.0
8208	3.3	.8	4.6	50.0	14.0	28.1	6.0
8209	3.7	.9	4.6	145.0	22.0	27.4	4.0
8210	3.3	.9	6.1	40.0	10.0	22.5	28.0
8211	1.9	1.3	7.9	20.0	9.0	17.0	15.0
8212	3.0	.3	6.2	125.0	55.0	14.4	0.0
8301	2.5	.6	9.9	100.0	22.0	9.2	0.0
8302	2.5	.4	8.4	160.0	40.0	14.0	0.0
8303	3.2	.5	7.8	175.0	44.0	14.0	0.0
8304	3.0	.4	7.9	140.0	33.0	16.5	0.0
8305	2.5	1.8	5.4	40.0	15.0	24.8	12.0
8306	3.0	.9	5.4	40.0	21.0	26.5	5.0
8307	2.9	1.0	3.8	30.0	12.0	29.7	24.0
8308	3.5	.7	5.7	30.0	8.0	30.0	14.0

STATION 3 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	7.8	100.0	0.0	20.0	-1.0
7204	-1.0	85.0	45.0	25.0	.4
7205	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	30.0	2.0	28.0	5.5
7207	6.8	41.0	10.0	30.5	2.5
7208	-1.0	-1.0	-1.0	30.0	-1.0
7209	-1.0	30.0	10.0	31.0	14.0
7210	-1.0	17.0	5.0	22.0	12.0
7211	-1.0	-1.0	-1.0	-1.0	.4
7212	-1.0	10.0	10.0	14.0	12.2
7301	-1.0	-1.0	-1.0	-1.0	-1.0
7302	-1.0	130.0	60.0	12.5	-1.0
7303	8.5	110.0	25.0	23.0	0.0
7304	-1.0	-1.0	-1.0	-1.0	-1.0
7305	-1.0	-1.0	-1.0	-1.0	-1.0
7306	-1.0	-1.0	-1.0	-1.0	-1.0
7307	-1.0	-1.0	-1.0	-1.0	-1.0
7308	-1.0	-1.0	-1.0	-1.0	-1.0
7309	-1.0	-1.0	-1.0	-1.0	-1.0
7310	-1.0	3.0	0.0	19.0	13.8
7311	-1.0	-1.0	-1.0	-1.0	-1.0
7312	-1.0	-1.0	-1.0	-1.0	-1.0
7401	7.1	45.0	47.0	17.0	0.0
7402	-1.0	-1.0	-1.0	-1.0	-1.0
7403	-1.0	-1.0	-1.0	-1.0	-1.0
7404	8.5	70.0	27.0	22.3	4.5
7405	7.5	40.0	2.0	25.2	0.0
7406	7.7	10.0	5.0	27.0	4.6
7407	6.4	22.5	5.5	30.6	0.0
7408	6.7	20.0	4.0	27.6	0.0
7409	6.8	45.0	6.0	25.5	.5
7410	9.7	15.0	2.0	22.0	11.8
7411	8.8	20.0	4.0	20.5	10.1
7412	10.0	60.0	7.0	14.5	0.0
7501	9.0	60.0	20.0	14.0	.5
7502	8.6	110.0	16.0	17.0	2.5
7503	10.3	150.0	26.0	17.5	0.0
7504	8.1	140.0	22.0	18.0	0.0
7505	6.2	50.0	14.0	27.0	2.5
7506	7.9	110.0	16.0	25.0	0.0
7507	6.8	50.0	6.0	27.5	7.9
7508	8.2	65.0	6.0	30.2	3.0
7509	8.6	25.0	4.0	24.2	3.6
7510	6.8	95.0	12.0	23.0	1.5
7511	9.0	50.0	9.0	18.0	0.0
7512	9.4	85.0	13.0	10.5	0.0
7601	12.5	60.0	9.0	10.0	0.0
7602	8.8	90.0	20.0	19.5	0.0
7603	8.7	50.0	13.0	17.8	0.0
7604	8.7	65.0	6.0	28.0	0.0
7605	7.2	125.0	18.0	25.0	1.3
7606	6.6	40.0	13.0	28.0	.5
7607	6.3	30.0	3.0	30.1	0.0
7608	7.1	20.0	15.0	29.0	12.2
7609	6.1	5.0	16.0	25.0	3.0
7610	7.8	45.0	18.8	20.2	.5

STATION 3 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	12.6	62.5	17.0	8.2	.8
7612	9.5	55.0	29.0	9.3	0.0
7701	11.0	70.0	20.0	7.5	0.0
7702	11.2	50.0	20.0	13.0	0.0
7703	9.8	65.0	18.0	21.3	2.1
7704	7.9	80.0	16.0	21.5	0.0
7705	8.5	60.0	27.0	24.8	.6
7706	9.7	10.0	6.0	31.8	9.0
7707	8.5	30.0	7.0	32.0	12.0
7708	7.1	100.0	24.0	27.1	2.9
7709	5.3	60.0	17.0	30.0	4.4
7710	7.8	70.0	13.0	19.0	2.1
7711	7.3	5.0	10.0	22.2	8.2
7712	8.0	105.0	15.0	16.0	1.4
7801	10.8	70.0	16.0	7.0	0.0
7802	10.8	90.0	16.0	10.5	0.0
7803	9.5	100.0	24.0	17.8	0.0
7804	8.4	70.0	18.0	23.0	0.0
7805	7.5	105.0	41.0	27.1	0.0
7806	6.5	50.0	28.0	31.5	2.1
7807	6.4	35.0	24.0	29.9	5.9
7808	7.1	80.0	34.0	27.1	.6
7809	7.2	30.0	12.0	29.0	4.0
7810	8.4	15.0	15.0	23.8	7.0
7811	8.1	10.0	13.0	21.0	0.0
7812	8.6	18.0	9.0	20.1	0.0
7901	11.5	30.0	11.0	10.0	0.0
7902	10.6	45.0	23.0	9.7	0.0
7903	8.2	100.0	59.0	15.2	0.0
7904	8.5	45.0	26.0	23.1	0.0
7905	7.1	70.0	26.0	23.0	0.0
7906	6.7	25.0	21.0	28.9	.8
7907	7.1	15.0	12.0	29.3	.8
7908	6.2	30.0	25.0	30.1	3.1
7909	8.1	150.0	59.0	22.4	1.0
7910	8.0	50.0	31.0	20.5	0.0
7911	8.8	15.0	11.2	17.0	0.0
7912	11.2	30.0	13.1	13.2	0.0
8001	11.6	45.0	14.6	15.0	1.0
8002	10.0	50.0	15.0	13.7	0.0
8003	9.4	35.0	16.0	18.3	0.0
8004	8.0	35.0	26.3	19.7	1.2
8005	7.8	35.0	20.2	25.3	1.8
8006	7.7	20.0	17.2	27.8	3.7
8007	10.7	0.0	25.0	31.0	2.0
8008	5.3	30.0	16.0	29.2	2.0
8009	5.6	10.0	15.0	29.0	4.0
8010	6.8	10.0	20.0	22.6	4.0
8011	9.1	10.0	20.0	18.4	4.0
8012	9.3	25.0	18.0	15.2	8.0
8101	11.2	10.0	19.0	12.0	5.0
8102	9.0	75.0	40.0	14.8	0.0
8103	7.4	85.0	35.0	17.3	1.0
8104	7.2	80.0	31.0	22.7	5.0
8105	10.6	50.0	22.0	25.3	9.0
8106	9.1	5.0	34.0	30.0	10.0

STATION 3 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	6.3	10.0	31.0	29.1	5.0
8108	9.0	20.0	25.0	28.6	11.0
8109	6.3	0.0	3.0	25.2	5.0
8110	8.0	0.0	7.0	21.2	6.0
8111	8.9	25.0	11.0	17.3	8.0
8112	8.3	45.0	8.0	11.8	2.0
8201	9.0	140.0	3.0	10.4	0.0
8202	7.6	250.0	55.0	14.0	0.0
8203	6.2	110.0	25.0	20.8	0.0
8204	7.7	90.0	13.0	22.0	1.0
8205	8.3	55.0	17.0	26.8	5.0
8206	7.4	60.0	15.0	26.0	7.0
8207	5.8	20.0	11.0	30.0	4.0
8208	6.4	90.0	18.0	27.5	0.0
8209	6.0	60.0	14.0	29.3	2.0
8210	6.4	60.0	13.0	22.8	0.0
8211	8.5	25.0	9.0	16.5	4.0
8212	7.3	55.0	18.0	14.0	0.0
8301	10.1	240.0	36.0	12.2	0.0
8302	8.6	150.0	37.0	15.2	0.0
8303	8.6	125.0	47.0	15.7	0.0
8304	8.1	140.0	35.0	17.6	0.0
8305	5.7	55.0	26.0	24.8	2.0
8306	7.3	60.0	5.0	27.8	10.0
8307	7.2	35.0	13.0	32.1	7.0
8308	5.5	45.0	13.0	29.0	1.0

STATION 3 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	2.1	.6	7.7	-1.0	-1.0	20.0	-1.0
7204	.9	.3	-1.0	90.0	45.0	25.0	.4
7205	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7206	2.4	-1.0	-1.0	5.0	0.0	27.0	22.0
7207	1.2	.9	7.5	33.0	8.0	30.0	4.0
7208	.6	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7209	1.2	1.1	-1.0	60.0	28.0	-1.0	16.9
7210	.9	.3	-1.0	22.0	5.0	22.0	12.0
7211	1.5	1.1	-1.0	-1.0	-1.0	-1.0	.9
7212	1.2	.6	-1.0	20.0	12.0	14.0	16.2
7301	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7302	2.5	.3	-1.0	140.0	49.0	12.5	-1.0
7303	2.0	.4	8.6	115.0	25.0	22.5	0.0
7304	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7305	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7306	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7307	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7308	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7309	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7310	1.6	-1.0	-1.0	25.0	40.0	20.0	17.2
7311	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7312	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7401	1.0	-1.0	7.1	25.0	140.0	17.0	0.0
7402	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7403	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7404	1.9	.6	8.3	70.0	31.0	22.3	5.1
7405	1.0	.6	5.5	43.1	4.0	27.0	15.5
7406	1.0	.9	8.3	40.0	4.0	26.2	4.6
7407	1.0	1.0	5.4	15.0	3.0	29.1	0.0
7408	1.5	.6	6.2	35.0	7.0	27.5	0.0
7409	1.5	.8	3.5	30.0	6.0	27.0	2.6
7410	1.1	1.1	10.8	10.0	2.0	22.0	11.8
7411	1.5	.6	9.0	20.0	3.0	20.0	13.4
7412	1.5	.9	10.0	90.0	29.0	14.5	0.0
7501	1.0	.3	8.7	65.0	21.0	13.2	.5
7502	2.0	.5	8.5	115.0	19.0	16.5	2.5
7503	1.1	.4	10.3	160.0	27.0	17.0	0.0
7504	1.1	.5	7.9	145.0	25.0	18.0	0.0
7505	1.1	.5	6.4	65.0	13.0	25.7	3.0
7506	1.0	.4	7.4	120.0	16.0	25.0	.9
7507	1.6	.7	7.1	90.0	20.0	27.5	13.9
7508	1.2	.6	7.6	80.0	7.0	29.6	3.0
7509	1.2	.8	7.8	77.0	10.0	24.0	5.1
7510	1.0	.6	6.8	75.0	13.0	22.5	1.5
7511	1.5	.8	9.3	40.0	14.0	18.0	0.0
7512	.6	.3	9.4	85.0	13.0	10.5	0.0
7601	.8	.8	12.5	60.0	10.0	10.0	0.0
7602	1.0	.3	8.4	90.0	21.0	19.5	0.0
7603	1.5	.3	8.5	50.0	16.0	17.5	0.0
7604	1.0	.8	12.3	60.0	6.0	26.0	0.0
7605	1.5	.5	7.3	130.0	20.0	25.9	2.1
7606	1.0	.5	6.5	70.0	17.0	28.0	.5
7607	1.2	.8	6.0	60.0	12.0	30.1	0.0
7608	1.5	.7	7.9	20.0	16.0	29.4	5.5
7609	1.0	.6	5.8	10.0	16.0	24.6	4.0
7610	1.0	.4	7.6	40.0	21.3	19.8	1.6

STATION 3 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	.9	.5	11.8	55.0	15.0	8.5	3.2
7612	.8	.4	9.5	55.0	42.0	9.1	0.0
7701	1.0	.4	11.0	80.0	25.0	7.5	0.0
7702	1.0	.4	11.3	40.0	21.0	13.0	.5
7703	1.0	.5	9.8	60.0	21.0	21.2	2.1
7704	.7	.6	8.7	80.0	18.0	22.0	0.0
7705	1.4	.5	7.6	55.0	30.0	24.5	1.4
7706	1.6	.8	8.2	5.0	11.0	30.6	25.7
7707	1.1	1.0	8.5	10.0	10.0	33.0	12.0
7708	1.2	.3	7.1	95.0	18.0	27.2	2.9
7709	1.8	.9	5.7	55.0	17.0	30.0	13.5
7710	1.2	.7	7.5	70.0	13.0	19.1	2.1
7711	1.4	.8	7.2	0.0	9.0	22.0	13.5
7712	1.0	.9	8.5	50.0	12.0	16.5	9.0
7801	.8	.7	10.8	70.0	21.0	7.0	0.0
7802	1.2	.7	11.0	85.0	16.0	10.4	0.0
7803	.7	.4	9.4	100.0	28.0	17.8	0.0
7804	1.0	.3	8.4	70.0	30.0	23.0	0.0
7805	1.1	.6	7.2	110.0	42.0	27.2	0.0
7806	1.2	.7	7.2	35.0	27.0	31.8	16.6
7807	1.5	.8	6.2	25.0	50.0	30.2	7.4
7808	1.1	.4	7.0	70.0	34.0	27.1	1.4
7809	1.3	.5	7.0	40.0	9.0	28.8	4.0
7810	1.3	.6	8.1	10.0	16.0	23.6	14.8
7811	1.4	1.2	7.5	5.0	27.0	21.1	0.0
7812	1.5	.7	8.5	20.0	10.0	20.0	0.0
7901	.7	.6	11.5	30.0	11.0	10.0	0.0
7902	1.1	.4	10.3	30.0	55.0	9.7	.8
7903	1.6	.2	8.1	90.0	64.0	15.1	0.0
7904	1.6	.4	8.4	50.0	26.0	22.9	0.0
7905	1.5	.4	7.0	70.0	52.0	23.0	0.0
7906	1.8	.4	6.5	20.0	19.0	28.9	9.3
7907	1.5	.7	7.5	15.0	14.0	29.2	4.7
7908	1.7	.9	5.3	30.0	27.0	30.0	4.7
7909	1.1	.2	7.9	95.0	64.0	22.3	3.0
7910	1.1	.3	8.0	50.0	30.0	20.5	0.0
7911	.9	.7	8.8	15.0	14.3	17.0	0.0
7912	.6	.5	11.2	30.0	16.1	13.2	0.0
8001	.8	.6	11.6	45.0	17.4	15.0	1.0
8002	1.3	1.0	10.0	50.0	15.0	13.7	0.0
8003	1.8	.6	7.7	20.0	18.0	17.2	15.0
8004	1.3	.6	8.0	35.0	35.5	19.5	1.3
8005	1.3	.6	7.8	35.0	24.7	25.0	3.8
8006	1.3	.6	7.7	20.0	25.4	27.3	5.7
8007	1.3	.6	10.1	5.0	38.0	30.9	2.0
8008	1.3	1.1	5.3	30.0	16.0	29.2	2.0
8009	1.1	.6	5.6	10.0	15.0	29.0	4.0
8010	1.0	.8	6.8	10.0	20.0	22.6	4.0
8011	1.0	.9	9.1	10.0	20.0	18.4	4.0
8012	1.2	1.2	9.2	25.0	18.0	15.2	8.0
8101	1.9	1.4	11.2	15.0	16.0	12.8	12.0
8102	1.9	.5	8.9	80.0	43.0	15.0	0.0
8103	1.0	.4	7.0	85.0	35.0	17.3	1.0
8104	2.0	.6	7.6	80.0	31.0	22.6	5.0
8105	1.3	.9	9.6	50.0	24.0	24.7	11.0
8106	1.3	.9	9.3	5.0	39.0	30.0	10.0

STATION 3 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	1.3	.8	5.9	5.0	29.0	28.8	6.0
8108	1.3	.8	8.9	20.0	25.0	28.5	14.0
8109	1.4	1.0	5.9	0.0	4.0	25.3	5.0
8110	.9	.9	8.0	0.0	7.0	21.2	6.0
8111	1.1	1.1	9.5	15.0	22.0	17.8	5.0
8112	.6	.6	8.3	45.0	8.0	11.8	2.0
8201	.6	.5	9.0	140.0	3.0	10.4	0.0
8202	.8	.3	7.6	250.0	55.0	14.0	0.0
8203	.8	.6	6.2	110.0	25.0	20.8	0.0
8204	.7	.4	7.7	90.0	13.0	22.0	1.0
8205	1.4	.7	8.2	55.0	22.0	26.1	8.0
8206	1.6	.5	5.8	100.0	25.0	26.2	10.0
8207	1.3	.7	4.2	10.0	14.0	30.2	20.0
8208	1.3	.4	6.2	100.0	21.0	27.3	0.0
8209	1.0	.5	6.0	55.0	13.0	29.2	4.0
8210	.9	.6	6.4	60.0	13.0	22.8	0.0
8211	.8	.8	8.5	25.0	9.0	16.5	4.0
8212	1.2	.7	6.6	80.0	21.0	14.0	0.0
8301	1.3	.2	10.1	140.0	27.0	12.1	0.0
8302	.9	.4	8.6	150.0	37.0	15.2	0.0
8303	1.3	.4	8.5	260.0	55.0	15.7	0.0
8304	1.5	.4	8.0	120.0	35.0	17.5	0.0
8305	1.3	.6	5.7	80.0	34.0	24.5	2.0
8306	1.3	.6	6.9	50.0	5.0	27.5	11.0
8307	1.3	.8	8.1	40.0	14.0	31.9	7.0
8308	.9	.9	5.3	45.0	13.0	28.8	1.0

STATION 5 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	8.7	87.5	28.8	17.6	3.0
7204	8.5	62.6	16.8	25.0	.4
7205	8.6	75.0	30.0	25.5	10.6
7206	8.5	2.0	6.0	26.0	11.2
7207	9.5	41.0	11.0	30.5	7.0
7208	7.7	70.0	58.0	31.5	7.5
7209	7.2	20.0	9.0	31.0	17.3
7210	8.1	30.0	5.0	20.8	18.8
7211	9.4	27.5	12.5	20.0	2.9
7212	9.5	5.0	20.0	14.0	15.9
7301	8.4	150.0	37.6	11.0	0.0
7302	9.3	160.0	90.0	12.0	0.0
7303	8.8	100.0	91.0	18.9	0.0
7304	8.4	90.0	92.0	21.9	.4
7305	7.2	45.0	35.0	22.3	0.0
7306	5.8	60.0	32.0	27.7	0.0
7307	6.3	50.0	60.0	29.7	1.0
7308	7.5	30.0	10.0	29.5	1.1
7309	8.4	30.0	10.0	29.1	13.5
7310	8.9	25.0	0.0	22.8	16.1
7311	8.1	25.0	13.5	20.8	8.0
7312	6.6	25.0	10.0	16.2	0.0
7401	7.8	55.0	50.0	19.0	0.0
7402	9.5	110.0	52.0	16.2	0.0
7403	8.3	40.0	22.0	20.0	2.3
7404	8.3	80.0	26.0	19.0	0.0
7405	7.7	30.0	2.0	25.7	0.0
7406	8.3	20.0	7.0	27.0	8.0
7407	7.6	114.5	7.0	28.7	.4
7408	8.2	95.0	3.0	29.2	4.3
7409	6.4	180.0	2.5	27.6	6.1
7410	7.4	25.0	3.0	24.6	10.1
7411	8.3	30.0	3.0	22.0	12.3
7412	10.8	40.0	5.0	14.5	2.1
7501	9.0	50.0	19.0	13.1	0.0
7502	9.0	100.0	16.0	17.0	3.0
7503	10.4	175.0	28.0	15.0	2.5
7504	8.1	180.0	15.0	18.5	0.0
7505	7.6	140.0	14.0	24.5	2.0
7506	7.1	130.0	15.0	25.0	3.0
7507	7.2	110.0	12.0	28.0	12.3
7508	7.4	130.0	4.0	30.2	3.0
7509	8.9	65.0	7.0	24.2	7.3
7510	8.7	60.0	8.0	25.7	2.0
7511	9.5	5.0	3.0	18.5	8.4
7512	11.2	40.0	5.0	8.0	0.0
7601	12.0	90.0	14.0	10.0	2.0
7602	8.8	100.0	18.0	20.0	1.5
7603	9.3	60.0	15.0	17.0	1.5
7604	8.6	80.0	9.0	26.5	0.0
7605	7.1	100.0	14.0	25.2	2.1
7606	8.9	60.0	14.0	29.2	0.0
7607	7.7	60.0	5.0	32.0	2.4
7608	6.8	20.0	11.0	28.5	15.0
7609	8.8	15.0	20.0	26.8	5.1
7610	8.3	81.3	14.3	19.0	3.1

STATION 5 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	12.4	122.5	37.0	8.4	6.0
7612	10.2	95.0	9.0	13.0	1.3
7701	11.8	80.0	19.0	6.8	0.0
7702	10.6	95.0	53.0	14.0	0.0
7703	10.3	50.0	27.0	19.5	4.5
7704	8.6	60.0	21.0	23.0	.6
7705	7.2	20.0	12.0	25.0	17.3
7706	7.1	5.0	4.0	30.5	9.0
7707	7.1	23.0	8.0	27.9	7.4
7708	7.9	80.0	8.0	29.0	14.3
7709	7.2	30.0	15.0	28.8	4.0
7710	7.9	70.0	7.0	21.4	9.0
7711	9.5	0.0	9.0	22.0	7.4
7712	8.9	90.0	16.0	13.1	0.0
7801	14.2	75.0	12.0	6.1	0.0
7802	14.0	380.0	87.0	5.6	0.0
7803	10.2	150.0	50.0	19.9	4.4
7804	8.4	70.0	20.0	22.6	2.1
7805	7.9	85.0	36.0	28.8	2.9
7806	10.0	80.0	23.0	33.0	2.9
7807	7.5	30.0	25.0	31.4	2.1
7808	6.7	170.0	18.0	29.9	5.2
7809	7.5	30.0	9.0	30.9	15.0
7810	7.5	15.0	12.0	24.3	20.2
7811	7.8	5.0	10.0	22.9	17.1
7812	7.7	9.0	8.0	21.9	12.4
7901	9.2	110.0	8.0	8.0	6.2
7902	10.4	75.0	65.0	10.8	0.0
7903	9.0	115.0	39.0	15.0	0.0
7904	8.6	50.0	30.0	22.3	0.0
7905	8.2	80.0	26.0	23.7	0.0
7906	8.9	30.0	19.0	29.0	0.0
7907	6.0	10.0	11.0	28.9	8.6
7908	5.8	25.0	25.0	29.2	9.3
7909	6.8	175.0	21.0	22.8	2.0
7910	7.9	85.0	18.0	20.6	7.0
7911	9.3	30.0	10.5	15.2	12.0
7912	11.2	70.0	10.1	9.1	5.0
8001	9.0	40.0	13.9	12.9	2.0
8002	11.2	40.0	19.0	16.8	1.0
8003	7.5	130.0	33.0	18.8	0.0
8004	7.1	95.0	38.0	18.8	0.0
8005	7.6	70.0	31.0	26.7	0.0
8006	8.9	50.0	34.0	27.4	2.0
8007	7.8	20.0	23.0	30.8	10.0
8008	5.4	30.0	17.0	30.1	16.0
8009	7.1	10.0	12.0	30.2	12.0
8010	8.5	5.0	15.0	22.3	12.0
8011	9.4	15.0	21.0	15.4	13.0
8012	10.1	10.0	17.0	15.7	9.0
8101	11.8	10.0	16.0	12.9	6.0
8102	9.0	85.0	45.0	16.0	0.0
8103	8.4	90.0	58.0	16.3	1.0
8104	7.2	70.0	35.0	23.2	5.0
8105	8.2	50.0	26.0	22.1	8.0
8106	7.3	5.0	33.0	31.7	9.0

STATION 5 - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	7.3	5.0	28.0	28.7	6.0
8108	6.8	25.0	22.0	27.4	21.0
8109	8.2	40.0	3.0	26.5	8.0
8110	7.8	0.0	1.0	20.0	15.0
8111	7.9	25.0	7.0	17.1	10.0
8112	9.4	60.0	5.0	12.0	9.0
8201	9.6	150.0	30.0	12.4	0.0
8202	9.0	260.0	44.0	16.4	0.0
8203	7.3	130.0	22.0	23.0	0.0
8204	7.8	225.0	17.0	25.0	2.0
8205	8.1	45.0	13.0	27.1	5.0
8206	7.7	125.0	29.0	26.1	0.0
8207	6.2	75.0	7.0	29.3	8.0
8208	6.4	55.0	13.0	28.0	5.0
8209	6.4	75.0	13.0	26.7	4.0
8210	8.2	90.0	10.0	23.0	11.0
8211	9.1	30.0	9.0	16.9	15.0
8212	7.4	10.0	8.0	13.9	18.0
8301	10.3	50.0	13.0	11.5	4.0
8302	8.8	230.0	41.0	16.0	0.0
8303	8.9	160.0	41.0	14.0	0.0
8304	8.7	190.0	33.0	18.3	0.0
8305	8.0	55.0	29.0	27.0	3.0
8306	6.8	15.0	19.0	27.1	7.0
8307	8.3	70.0	11.0	31.5	8.0
8308	7.1	25.0	10.0	30.7	11.0

STATION 5 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	1.8	.5	8.4	83.7	36.1	17.6	4.6
7204	1.5	.9	7.5	74.0	22.4	25.0	1.5
7205	2.0	.8	6.8	68.0	37.2	25.2	18.0
7206	2.7	.9	6.3	4.0	5.0	26.0	11.2
7207	2.4	.7	5.6	32.0	7.0	29.5	28.0
7208	1.5	.6	4.5	85.0	60.0	30.0	22.0
7209	2.1	.6	5.4	110.0	15.0	30.0	18.0
7210	1.8	.8	6.7	32.0	5.0	21.3	20.1
7211	1.8	1.4	8.7	19.9	17.5	21.0	3.5
7212	2.1	.6	8.4	40.0	30.0	14.0	16.9
7301	1.5	.3	7.7	148.2	46.5	11.0	0.0
7302	2.0	.2	10.6	220.0	153.0	11.5	0.0
7303	2.0	.3	8.1	121.2	110.0	18.8	0.0
7304	1.8	.5	8.4	110.0	101.3	21.2	.4
7305	1.9	.6	7.0	60.0	90.0	21.6	0.0
7306	2.5	.5	5.6	150.0	70.0	27.0	0.0
7307	2.0	.9	6.0	45.0	71.6	29.2	4.2
7308	2.5	.9	4.4	30.0	30.0	30.5	11.5
7309	2.3	.8	7.8	44.7	19.8	29.1	5.3
7310	1.4	1.6	8.2	25.0	0.0	22.0	16.1
7311	1.9	.8	7.4	25.0	19.7	20.6	10.8
7312	2.0	.8	8.7	25.0	10.0	16.3	5.9
7401	1.5	.6	8.0	60.0	125.0	19.0	0.0
7402	1.4	.3	9.5	150.0	58.0	16.0	0.0
7403	2.0	.7	6.6	40.0	14.0	19.5	5.7
7404	2.0	.5	8.2	70.0	31.0	18.5	0.0
7405	2.0	.5	6.5	30.0	10.7	26.8	8.0
7406	2.0	.9	7.3	10.0	1.0	28.0	19.5
7407	1.1	.7	6.9	57.5	84.5	28.4	4.8
7408	2.5	.7	2.6	75.0	10.0	27.3	10.3
7409	1.3	.8	5.0	57.5	4.5	26.6	20.9
7410	1.1	1.0	6.3	45.0	3.0	24.3	11.8
7411	1.3	.9	8.1	29.9	3.0	21.4	15.1
7412	1.5	.9	10.8	30.0	6.0	14.5	3.7
7501	1.8	.6	8.9	49.3	30.6	13.1	1.7
7502	2.0	.6	7.5	110.0	16.0	15.5	5.2
7503	1.5	.2	9.8	185.0	29.0	15.0	2.0
7504	1.7	.5	8.0	180.0	15.0	18.5	0.0
7505	2.0	.4	6.6	160.0	17.0	24.8	2.0
7506	2.0	.7	6.9	130.0	17.0	24.5	2.0
7507	2.0	.9	7.4	50.0	12.0	28.0	10.1
7508	2.0	.9	6.2	30.0	2.0	30.6	14.4
7509	2.0	1.0	6.4	46.8	6.0	23.5	12.0
7510	2.0	.8	7.6	65.0	7.0	23.5	3.1
7511	2.0	1.1	8.9	0.0	2.0	18.5	17.9
7512	1.5	1.0	11.6	20.0	5.0	9.0	0.0
7601	1.5	.5	11.9	105.0	17.0	10.0	2.0
7602	2.0	.4	8.8	100.0	19.0	19.0	1.5
7603	2.0	.4	9.1	70.0	15.0	17.0	1.5
7604	2.0	.4	8.4	90.0	9.0	26.0	0.0
7605	2.0	.6	7.1	110.0	17.0	24.2	2.1
7606	1.8	.7	8.1	60.0	14.0	28.0	.5
7607	2.5	.8	5.2	25.0	3.0	31.2	14.4
7608	1.8	.6	6.4	10.0	25.0	29.8	12.0
7609	2.0	.6	7.7	35.0	35.0	25.8	6.2
7610	1.5	.5	7.9	76.3	15.0	18.9	3.2

STATION 5 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	1.2	.3	12.2	120.0	41.5	8.8	5.0
7612	1.7	.8	9.4	35.0	25.0	12.9	19.3
7701	1.5	.5	12.0	80.0	20.0	6.8	0.0
7702	2.5	.4	10.6	95.0	49.0	14.0	0.0
7703	2.0	.4	10.4	120.0	64.0	19.2	4.5
7704	2.0	.4	8.5	130.0	16.0	22.8	8.2
7705	2.0	.7	7.3	5.0	29.0	24.5	24.2
7706	2.0	.8	5.8	10.0	23.0	30.7	21.1
7707	2.0	.7	6.8	30.0	22.0	27.4	12.8
7708	1.8	.6	7.5	70.0	17.0	28.7	15.0
7709	1.8	.8	6.3	30.0	19.3	29.4	8.7
7710	2.0	.6	7.9	70.0	15.0	21.0	9.0
7711	2.0	.9	6.2	0.0	20.0	22.3	18.8
7712	2.0	.6	8.5	105.0	17.0	12.8	1.4
7801	1.0	.6	13.2	45.0	19.0	7.0	5.9
7802	.9	.1	13.0	380.0	80.0	6.4	0.0
7803	2.0	.2	9.9	165.0	64.0	19.9	4.4
7804	2.0	.7	8.1	25.0	22.0	22.0	9.0
7805	1.9	.4	6.2	100.0	42.0	26.9	2.9
7806	2.0	.7	10.2	45.0	25.0	31.2	12.0
7807	2.2	.6	7.6	35.0	50.0	30.6	2.9
7808	1.9	.4	4.5	50.0	20.0	29.6	15.0
7809	2.0	.4	6.1	30.0	12.0	30.8	15.0
7810	2.3	.4	6.6	15.0	16.0	23.3	24.9
7811	2.0	1.1	8.0	0.0	13.0	22.8	19.4
7812	1.9	.6	6.9	12.0	9.0	21.8	12.4
7901	1.3	.6	9.0	100.0	10.0	8.0	7.0
7902	2.0	.4	10.4	100.0	80.0	10.8	0.0
7903	2.1	.2	9.0	75.0	41.0	14.9	0.0
7904	1.8	.3	8.5	60.0	53.0	22.0	0.0
7905	2.5	.5	8.1	75.0	29.0	23.6	0.0
7906	2.5	.5	8.6	25.0	31.0	28.9	.8
7907	2.2	.7	4.6	10.0	11.0	28.7	13.2
7908	2.1	.7	5.3	30.0	25.0	29.1	10.1
7909	2.1	.2	6.2	65.0	31.0	22.6	5.0
7910	2.1	.6	7.1	80.0	20.0	20.5	12.0
7911	1.8	.8	8.9	20.0	19.5	15.0	12.0
7912	1.5	.8	10.9	35.0	21.3	9.4	7.0
8001	1.8	.6	9.2	35.0	22.6	12.7	2.0
8002	2.0	.8	10.6	40.0	23.0	15.2	2.0
8003	1.2	.3	7.4	130.0	34.0	18.7	0.0
8004	2.2	.4	6.8	105.0	40.0	18.1	0.0
8005	2.4	.5	7.3	35.0	31.0	26.3	4.0
8006	2.5	.6	8.4	55.0	33.0	27.4	2.0
8007	2.7	.9	6.4	5.0	26.0	29.8	20.0
8008	2.3	.9	4.4	60.0	16.0	31.4	11.0
8009	2.6	1.0	5.2	10.0	16.0	30.1	14.0
8010	2.5	1.4	8.3	5.0	18.0	23.3	15.0
8011	2.0	1.2	8.9	25.0	25.0	15.0	16.0
8012	2.3	1.3	9.8	20.0	21.0	15.8	12.0
8101	2.3	1.4	11.9	10.0	17.0	13.1	11.0
8102	2.3	.3	6.0	85.0	49.0	15.8	0.0
8103	2.1	.4	8.4	95.0	60.0	16.3	1.0
8104	2.4	.5	6.0	75.0	36.0	23.1	9.0
8105	2.1	.9	6.6	50.0	38.0	22.0	9.0
8106	2.2	.9	7.4	10.0	35.0	31.1	15.0

STATION 5 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	2.7	.8	6.9	5.0	36.0	28.8	18.0
8108	2.7	.9	5.9	15.0	34.0	28.0	25.0
8109	2.3	.9	6.2	5.0	9.0	25.6	15.0
8110	2.0	.8	5.0	0.0	7.0	20.2	10.0
8111	2.9	1.4	8.8	25.0	35.0	17.3	12.0
8112	1.7	1.3	9.5	75.0	9.0	12.2	10.0
8201	2.1	.5	9.4	160.0	26.0	12.0	2.0
8202	2.0	.4	9.4	220.0	40.0	16.8	0.0
8203	1.2	.5	7.3	120.0	23.0	22.5	0.0
8204	1.8	.4	7.4	210.0	17.0	24.6	2.0
8205	2.2	.7	6.2	45.0	15.0	26.2	7.0
8206	2.1	.3	7.6	170.0	34.0	25.9	2.0
8207	2.0	.8	4.2	55.0	8.0	29.6	15.0
8208	2.1	.7	4.2	30.0	14.0	29.0	14.0
8209	1.6	.6	6.1	95.0	13.0	26.4	5.0
8210	2.1	.7	8.3	70.0	10.0	22.5	18.0
8211	1.8	1.2	7.8	30.0	11.0	16.7	30.0
8212	1.9	1.3	6.5	10.0	8.0	14.0	23.0
8301	2.2	.6	10.2	40.0	13.0	11.0	8.0
8302	2.0	.3	8.8	220.0	41.0	16.0	0.0
8303	1.8	.4	8.6	175.0	44.0	13.9	0.0
8304	1.6	.3	8.7	310.0	34.0	16.5	[illegible]
8305	2.3	.5	7.9	60.0	29.0	27.0	3.0
8306	2.2	.8	4.2	5.0	35.0	27.6	15.0
8307	2.1	1.2	7.5	75.0	12.0	31.0	9.0
8308	2.1	.7	7.1	70.0	16.0	30.7	17.0

STATION 1A - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	-1.0	-1.0	-1.0	-1.0	-1.0
7204	-1.0	-1.0	-1.0	-1.0	-1.0
7205	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	-1.0	-1.0	-1.0	-1.0
7207	5.4	-1.0	-1.0	29.8	18.7
7208	4.7	-1.0	5.0	30.0	27.9
7209	5.7	-1.0	-1.0	-1.0	22.6
7210	5.4	-1.0	-1.0	25.0	21.4
7211	-1.0	-1.0	-1.0	-1.0	-1.0
7212	6.1	5.0	14.0	14.3	22.4
7301	9.2	105.0	15.0	13.7	12.7
7302	10.8	0.0	40.0	11.1	5.1
7303	9.4	17.0	40.0	19.0	27.7
7304	8.8	26.0	22.0	22.8	13.0
7305	9.8	15.0	15.0	23.8	18.3
7306	9.4	5.0	35.0	28.5	15.3
7307	9.0	50.0	30.0	29.4	24.2
7308	9.0	25.0	10.0	28.8	17.7
7309	8.8	10.0	2.0	28.8	27.7
7310	8.4	0.0	20.0	20.2	28.0
7311	8.0	0.0	5.0	19.0	28.7
7312	7.8	9.0	5.0	15.4	21.8
7401	8.4	20.0	5.0	18.0	9.2
7402	9.5	0.0	14.0	17.8	19.5
7403	9.1	20.0	8.5	20.2	16.3
7404	8.7	30.0	8.5	22.1	5.3
7405	8.9	30.0	4.0	28.7	29.2
7406	9.5	10.0	1.0	27.5	18.3
7407	8.0	15.0	2.0	27.6	23.0
7408	12.2	20.0	1.5	28.7	13.2
7409	10.0	15.4	1.5	27.2	20.5
7410	9.1	0.0	1.0	20.1	25.7
7411	8.9	0.0	1.0	18.0	25.7
7412	9.0	25.0	1.0	13.0	9.1
7501	9.8	25.0	6.0	13.1	3.7
7502	9.4	60.0	2.0	15.9	7.9
7503	9.2	95.0	17.0	16.8	3.6
7504	8.8	65.0	17.0	19.7	4.1
7505	8.6	50.0	3.0	26.0	12.3
7506	8.4	35.0	2.0	25.8	31.2
7507	8.2	25.0	1.5	26.1	18.3
7508	7.6	20.0	1.0	31.0	15.0
7509	8.4	20.0	2.0	24.7	16.3
7510	8.4	20.0	1.0	22.8	6.2
7511	9.9	10.0	3.0	14.2	16.8
7512	9.6	0.0	1.0	17.5	22.1
7601	12.0	10.0	3.0	10.5	10.5
7602	10.9	15.0	3.0	17.5	10.5
7603	9.9	0.0	1.0	18.0	9.4
7604	8.7	35.0	2.0	26.2	16.8
7605	7.6	40.0	7.0	24.0	10.8
7606	6.4	5.0	2.0	28.0	17.2
7607	6.6	10.0	3.0	30.1	17.1
7608	7.7	0.0	9.0	29.6	18.0
7609	7.8	0.0	8.0	24.6	21.0
7610	9.2	0.0	6.0	19.5	16.0

STATION 1A - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	9.3	0.0	8.0	13.0	24.8
7612	10.2	20.0	14.0	10.2	.8
7701	10.2	15.0	11.5	15.0	11.1
7702	9.6	0.0	6.0	17.1	14.0
7703	7.9	0.0	9.0	22.1	9.3
7704	7.9	0.0	6.0	24.0	27.5
7705	7.9	0.0	7.0	27.5	18.8
7706	7.9	0.0	3.0	28.4	34.0
7707	8.3	10.0	5.0	31.0	16.6
7708	7.1	0.0	15.0	29.5	16.1
7709	6.3	20.0	10.0	29.0	18.9
7710	8.1	13.3	10.0	22.6	20.0
7711	8.6	19.5	12.6	18.5	16.2
7712	9.2	17.0	15.0	14.2	16.4
7801	11.8	70.0	17.0	7.5	0.0
7802	11.5	30.0	12.0	11.0	15.0
7803	10.2	15.0	13.0	21.1	13.5
7804	8.9	10.0	6.0	25.0	11.2
7805	8.0	15.0	20.0	28.8	9.7
7806	7.9	35.0	25.0	32.0	18.8
7807	6.6	25.0	21.0	30.8	20.4
7808	7.2	50.0	20.0	29.0	6.7
7809	7.0	20.0	14.0	30.1	15.0
7810	8.0	15.0	15.0	23.2	18.7
7811	7.9	10.0	10.0	22.7	21.2
7812	8.3	0.0	8.0	20.9	17.1
7901	10.7	15.0	10.0	8.9	14.0
7902	11.6	25.0	21.0	11.1	10.1
7903	9.7	15.0	26.0	16.3	7.0
7904	9.1	10.0	19.0	22.2	11.7
7905	7.8	20.0	16.0	26.1	6.2
7906	7.6	5.0	11.0	27.1	31.1
7907	7.1	5.0	28.0	29.1	24.1
7908	7.5	5.0	15.0	31.0	17.1
7909	7.6	65.0	25.0	23.7	10.0
7910	8.4	10.0	20.0	22.7	13.0
7911	7.9	85.0	13.2	18.0	19.0
7912	11.0	20.0	13.3	12.0	11.0
8001	10.4	15.0	17.4	17.4	16.0
8002	9.4	15.0	5.0	18.8	8.0
8003	8.3	10.0	29.0	18.2	26.0
8004	8.2	25.0	24.0	19.2	10.0
8005	8.7	20.0	11.0	27.2	12.0
8006	8.3	18.0	35.0	28.1	33.0
8007	7.9	5.0	33.0	29.2	12.0
8008	6.9	5.0	16.0	30.9	19.0
8009	6.7	5.0	17.0	30.6	14.0
8010	7.6	10.0	18.0	23.0	24.0
8011	8.0	5.0	33.0	18.8	28.0
8012	9.7	10.0	16.0	15.1	22.0
8101	11.7	5.0	16.0	11.6	21.0
8102	9.2	25.0	24.0	15.8	11.0
8103	8.4	45.0	65.0	15.6	35.0
8104	7.6	60.0	24.0	23.9	20.0
8105	7.8	30.0	27.0	23.4	34.0
8106	7.2	5.0	30.0	31.1	21.0

STATION 1A - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	6.4	5.0	33.0	29.4	34.0
8108	8.0	5.0	25.0	28.0	24.0
8109	7.4	0.0	3.0	24.8	15.0
8110	7.4	0.0	2.0	20.1	16.0
8111	8.8	2.0	8.0	15.6	22.0
8112	8.9	30.0	5.0	12.5	20.0
8201	9.4	50.0	2.0	13.0	6.0
8202	8.1	50.0	16.0	15.0	12.0
8203	7.2	25.0	7.0	22.0	20.0
8204	7.7	30.0	6.0	21.8	24.0
8205	7.6	15.0	5.0	27.0	12.0
8206	6.7	25.0	7.0	30.6	26.0
8207	5.4	5.0	8.0	31.5	33.0
8208	7.0	30.0	5.0	30.1	15.0
8209	7.9	40.0	16.0	25.9	16.0
8210	8.7	20.0	5.0	24.1	15.0
8211	7.6	0.0	6.0	17.1	20.0
8212	9.2	20.0	10.0	14.7	15.0
8301	9.5	20.0	9.0	14.1	15.0
8302	8.0	30.0	27.0	16.9	26.0
8303	9.5	70.0	27.0	14.8	9.0
8304	8.7	90.0	34.0	18.2	9.0
8305	6.3	40.0	9.0	27.2	30.0
8306	6.0	5.0	25.0	28.1	28.0
8307	7.6	60.0	11.0	30.2	32.0
8308	6.2	5.0	6.0	30.1	17.0

STATION 1A - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7204	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7205	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7207	-1.0	-1.0	4.9	-1.0	-1.0	29.3	29.2
7208	-1.0	-1.0	4.7	-1.0	18.0	29.7	33.8
7209	-1.0	-1.0	5.1	-1.0	-1.0	-1.0	24.6
7210	-1.0	-1.0	6.3	-1.0	-1.0	24.5	29.6
7211	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7212	2.4	1.1	5.7	20.0	9.0	14.6	24.3
7301	3.0	.4	9.4	30.0	10.0	13.6	23.0
7302	3.0	.7	11.4	0.0	42.0	11.3	10.7
7303	2.6	.8	10.4	11.7	42.7	18.1	32.6
7304	2.0	.8	9.2	21.0	150.0	21.8	13.9
7305	2.0	1.0	9.7	3.0	25.0	23.3	20.7
7306	2.6	.6	9.4	0.0	28.0	28.4	25.1
7307	2.5	1.8	9.0	50.0	35.0	27.9	30.6
7308	2.3	1.4	9.0	25.0	16.8	28.7	19.4
7309	3.0	1.8	8.8	11.7	6.2	28.9	26.9
7310	2.3	1.1	8.3	35.0	35.0	21.0	27.7
7311	3.0	.8	8.0	12.0	7.0	19.0	28.7
7312	4.3	1.3	6.6	9.0	5.0	15.6	28.1
7401	2.5	1.3	8.6	0.0	10.0	18.0	8.0
7402	2.5	1.4	9.4	10.0	40.0	17.8	25.3
7403	2.5	1.4	8.8	17.7	16.9	20.1	20.8
7404	2.0	1.3	7.5	26.3	10.5	22.1	5.4
7405	2.0	1.3	8.2	25.5	9.5	27.5	29.2
7406	1.5	1.5	9.4	10.0	1.0	27.0	21.8
7407	1.5	1.0	7.1	15.0	3.0	27.5	28.7
7408	2.8	1.1	10.2	35.0	3.5	28.8	21.0
7409	2.6	1.2	9.0	17.7	1.5	26.7	25.0
7410	2.5	1.7	8.4	10.0	1.0	20.9	28.4
7411	2.0	1.2	8.9	0.0	2.0	18.0	33.2
7412	2.5	1.7	8.7	15.0	1.0	14.5	21.9
7501	2.5	.6	10.0	0.0	4.0	13.2	5.9
7502	2.5	1.1	8.9	60.0	2.0	15.8	7.9
7503	3.0	.5	9.0	115.0	20.0	16.8	5.8
7504	3.5	.4	8.8	60.0	16.0	18.0	8.5
7505	2.5	.9	8.6	45.0	4.0	25.5	25.2
7506	2.2	1.1	7.7	20.0	2.0	24.8	35.5
7507	2.7	1.1	7.1	15.0	3.0	25.6	33.0
7508	3.0	2.3	6.9	0.0	4.0	30.0	32.2
7509	2.0	1.3	8.6	20.1	6.0	24.7	19.7
7510	2.3	1.1	8.4	10.0	1.0	22.2	8.4
7511	2.5	1.4	9.7	0.0	2.0	15.0	18.4
7512	2.0	1.4	9.0	20.0	1.0	17.5	23.2
7601	2.0	1.2	11.9	5.0	4.0	11.2	19.5
7602	1.9	1.7	9.8	10.0	3.0	17.5	14.2
7603	2.5	.9	8.3	0.0	1.0	17.5	10.5
7604	3.0	1.0	7.6	35.0	2.0	24.0	27.4
7605	3.0	1.0	7.7	30.0	2.0	24.0	10.8
7606	2.5	1.5	6.7	0.0	2.0	27.5	25.0
7607	2.5	1.6	7.1	10.0	4.0	31.9	32.4
7608	2.5	1.3	7.3	5.0	16.0	29.0	24.0
7609	2.5	1.3	7.8	0.0	11.0	24.6	21.0
7610	2.5	1.2	8.3	0.0	9.0	19.7	23.7

STATION 1A - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	2.8	.7	7.4	0.0	14.0	12.9	25.3
7612	2.5	.8	9.5	0.0	15.0	10.0	3.0
7701	2.5	.8	9.4	0.0	15.0	12.0	15.1
7702	2.2	1.7	9.1	0.0	30.0	15.4	31.6
7703	2.5	.9	7.8	10.0	12.0	22.1	9.3
7704	2.5	1.3	7.1	10.0	30.0	23.0	33.7
7705	2.5	1.5	7.5	0.0	30.0	27.1	20.4
7706	2.4	1.4	7.7	0.0	20.0	25.7	34.0
7707	1.7	1.5	7.5	8.0	20.0	30.0	31.0
7708	2.5	.7	6.4	0.0	21.0	29.5	24.0
7709	2.5	.8	5.9	10.0	33.0	30.0	20.0
7710	2.6	1.2	7.9	17.7	33.0	22.2	23.4
7711	2.7	1.1	8.1	17.7	22.9	18.3	20.3
7712	2.6	1.1	8.7	17.7	35.0	14.0	19.7
7801	3.0	.4	11.8	70.0	45.0	7.3	0.0
7802	2.5	.8	11.2	30.0	42.0	11.0	16.6
7803	3.0	.5	9.1	5.0	50.0	18.3	25.7
7804	2.5	1.5	9.6	10.0	8.0	25.0	15.0
7805	3.0	1.0	7.8	15.0	41.0	27.0	24.9
7806	3.1	.6	7.9	30.0	21.0	30.8	22.6
7807	2.5	1.4	6.2	20.0	25.0	30.3	28.0
7808	2.9	.8	7.0	45.0	23.0	29.0	8.2
7809	3.3	.4	6.9	10.0	16.0	30.0	18.0
7810	3.2	.5	7.9	20.0	35.0	23.2	21.8
7811	2.6	1.0	7.5	5.0	15.0	22.1	22.8
7812	2.2	.8	7.9	7.0	8.0	20.0	19.4
7901	2.6	.7	10.4	15.0	24.0	8.9	16.3
7902	3.9	.5	10.4	10.0	80.0	10.4	19.4
7903	2.5	.6	8.3	5.0	14.0	15.7	17.9
7904	2.6	.8	8.0	20.0	29.0	21.5	25.4
7905	2.7	.6	7.5	30.0	40.0	26.1	9.3
7906	2.8	.8	7.5	5.0	14.0	27.1	31.1
7907	2.9	.4	6.5	10.0	38.0	28.9	27.2
7908	2.9	.5	7.2	5.0	17.0	30.6	19.4
7909	3.0	.5	6.9	65.0	61.0	23.3	21.0
7910	2.2	.6	7.3	10.0	59.0	22.5	15.0
7911	2.2	.7	7.3	80.0	22.6	17.9	22.0
7912	3.0	.9	10.9	15.0	20.0	13.0	20.0
8001	2.5	.6	10.6	15.0	26.5	17.3	17.0
8002	2.8	1.5	9.4	15.0	12.0	18.4	10.0
8003	2.7	.4	8.0	10.0	31.0	18.1	25.0
8004	2.5	.7	8.0	15.0	26.0	18.1	15.0
8005	2.7	.8	9.0	15.0	20.0	26.9	17.8
8006	2.6	.4	7.9	22.0	57.0	28.0	34.0
8007	3.1	.5	7.7	0.0	56.0	29.1	13.0
8008	2.7	1.2	8.0	10.0	22.0	30.4	19.0
8009	3.1	.7	6.1	15.0	19.0	30.4	28.0
8010	2.9	1.6	7.1	5.0	26.0	22.9	24.0
8011	2.7	.5	7.6	5.0	35.0	18.4	29.0
8012	3.3	2.2	9.2	20.0	17.0	15.6	29.0
8101	3.2	2.7	11.5	10.0	19.0	11.4	22.0
8102	2.3	.7	8.9	20.0	28.0	16.1	11.0
8103	2.5	.4	8.3	50.0	70.0	15.6	35.0
8104	3.1	.9	7.3	60.0	24.0	23.8	20.0
8105	2.7	.8	7.4	40.0	40.0	22.9	35.0
8106	3.2	1.4	7.1	5.0	32.0	31.0	21.0

STATION 1A - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	3.1	1.2	6.1	0.0	35.0	29.3	34.0
8108	3.9	1.4	7.8	5.0	25.0	27.9	24.0
8109	4.1	2.0	7.3	0.0	4.0	24.7	20.0
8110	2.4	.9	7.6	2.0	11.0	20.1	10.0
8111	1.2	.8	10.3	10.0	18.0	15.8	22.0
8112	2.5	2.5	8.5	50.0	5.0	13.5	18.0
8201	2.6	.9	9.0	10.0	3.0	12.2	20.0
8202	2.5	.6	8.0	40.0	16.0	14.8	10.0
8203	2.8	1.2	5.3	40.0	19.0	21.8	8.0
8204	2.8	.9	7.4	145.0	37.0	21.2	32.0
8205	2.2	.9	6.8	10.0	27.0	26.1	29.0
8206	2.8	1.7	6.1	40.0	17.0	29.7	34.0
8207	3.0	1.0	4.8	25.0	19.0	31.0	35.0
8208	3.0	1.0	4.8	15.0	17.0	31.1	28.0
8209	2.8	.7	8.6	50.0	18.0	25.4	20.0
8210	2.5	1.5	7.9	20.0	9.0	23.0	22.0
8211	2.3	1.9	7.4	5.0	10.0	16.6	24.0
8212	2.3	.9	8.6	20.0	11.0	14.7	18.0
8301	2.6	1.0	8.7	40.0	62.0	14.8	28.0
8302	1.5	.6	7.3	50.0	29.0	16.1	32.0
8303	2.8	.7	9.0	80.0	35.0	15.1	23.0
8304	1.6	.6	7.5	80.0	34.0	18.1	9.0
8305	3.2	1.1	6.0	45.0	16.0	25.4	31.0
8306	2.9	.6	5.2	10.0	23.0	27.5	28.0
8307	2.0	.9	7.4	45.0	7.0	30.1	35.0
8308	1.9	1.5	6.8	10.0	6.0	30.2	19.0

STATION 1B - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	-1.0	-1.0	-1.0	-1.0	-1.0
7204	-1.0	-1.0	-1.0	-1.0	-1.0
7205	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	-1.0	-1.0	-1.0	-1.0
7207	5.4	-1.0	-1.0	29.5	19.5
7208	5.1	-1.0	2.0	29.5	23.0
7209	5.5	-1.0	-1.0	-1.0	26.6
7210	5.7	38.0	0.0	22.5	25.6
7211	6.0	15.0	10.0	21.0	30.9
7212	7.1	10.0	18.0	13.9	19.2
7301	9.6	75.0	41.0	13.9	4.8
7302	11.0	75.0	61.0	10.7	2.2
7303	9.3	21.3	30.0	20.0	14.4
7304	8.8	17.0	13.0	23.2	20.0
7305	9.8	3.0	10.0	23.7	14.3
7306	7.8	24.8	11.1	28.0	2.9
7307	8.8	40.0	20.0	30.4	18.1
7308	8.3	20.0	5.0	29.9	17.9
7309	8.4	12.0	6.0	28.8	30.9
7310	8.4	0.0	15.0	20.3	29.0
7311	7.8	0.0	5.0	20.0	26.4
7312	7.7	10.0	5.0	16.5	20.1
7401	9.3	30.0	11.2	17.6	10.3
7402	9.4	30.0	17.0	17.0	12.6
7403	9.4	20.0	4.0	21.0	11.5
7404	9.4	25.9	5.0	22.9	7.1
7405	9.3	55.0	6.0	29.0	11.4
7406	9.0	12.0	10.0	28.0	18.3
7407	7.2	15.0	2.0	27.2	26.4
7408	12.8	30.0	2.0	29.0	15.5
7409	9.3	20.0	2.0	30.0	15.0
7410	9.2	20.0	1.0	19.9	25.2
7411	9.0	0.0	1.0	18.0	24.2
7412	9.2	0.0	1.0	14.2	20.5
7501	10.4	0.0	2.0	14.0	12.3
7502	9.9	60.0	1.0	16.5	9.6
7503	9.8	45.0	3.0	17.0	8.5
7504	9.1	70.0	18.0	19.8	6.3
7505	9.0	25.0	2.0	26.5	24.7
7506	8.3	10.0	2.0	25.9	32.2
7507	7.4	20.0	5.0	29.0	26.8
7508	8.1	5.0	1.0	31.5	8.5
7509	8.2	15.0	5.0	24.9	12.1
7510	8.5	20.0	2.0	25.0	9.4
7511	9.6	0.0	3.0	15.0	16.8
7512	9.3	10.0	1.0	18.5	24.3
7601	11.9	20.0	4.0	10.5	6.2
7602	11.5	5.0	3.0	18.4	10.5
7603	9.5	0.0	0.0	18.0	9.4
7604	9.0	45.0	3.0	25.5	13.7
7605	7.6	20.0	2.0	24.0	15.6
7606	7.4	0.0	2.0	27.0	10.8
7607	6.5	25.0	4.0	31.1	11.7
7608	6.7	0.0	4.0	28.0	30.8
7609	7.7	0.0	7.0	24.3	21.5
7610	8.4	0.0	9.0	19.8	21.5

STATION 1B - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	9.5	5.0	5.0	12.6	9.0
7612	10.3	0.0	9.0	10.2	4.0
7701	11.8	40.0	17.0	3.8	0.0
7702	9.6	10.0	4.0	17.5	10.8
7703	7.9	0.0	5.0	22.0	17.2
7704	8.6	20.0	10.0	24.5	9.8
7705	7.8	0.0	12.0	27.1	24.2
7706	7.3	0.0	5.0	30.8	25.7
7707	7.0	0.0	5.0	30.0	27.0
7708	6.7	0.0	4.0	30.0	28.0
7709	7.5	7.0	7.0	28.0	21.8
7710	8.4	9.2	10.1	21.4	21.7
7711	8.2	13.8	12.9	18.7	16.7
7712	9.1	10.3	15.0	13.9	17.0
7801	12.0	100.0	27.0	7.8	0.0
7802	11.0	35.0	22.0	9.5	6.7
7803	10.1	60.0	24.0	18.3	4.4
7804	8.9	5.0	7.0	22.1	18.1
7805	8.7	15.0	25.0	28.1	5.9
7806	6.6	25.0	21.0	31.4	15.0
7807	6.8	5.0	21.0	30.6	15.8
7808	6.7	25.0	17.0	28.8	26.4
7809	6.5	15.0	9.0	30.0	27.5
7810	7.2	10.0	10.0	23.4	28.8
7811	8.4	0.0	8.0	22.0	19.5
7812	7.1	10.0	12.0	20.9	27.2
7901	10.3	5.0	9.0	9.7	21.8
7902	11.1	30.0	14.0	11.8	1.6
7903	10.4	60.0	41.0	15.5	0.0
7904	7.9	10.0	13.0	23.3	20.2
7905	7.5	10.0	14.0	25.5	16.3
7906	8.1	5.0	10.0	29.3	21.8
7907	6.7	5.0	12.0	28.8	24.1
7908	7.2	5.0	18.0	30.8	17.9
7909	7.0	35.0	21.0	23.8	26.0
7910	8.2	15.0	17.0	23.0	18.0
7911	8.7	25.0	24.2	16.8	19.0
7912	10.5	40.0	14.3	11.0	24.0
8001	10.4	10.0	11.3	17.4	24.0
8002	10.0	20.0	5.0	13.4	12.0
8003	8.5	10.0	7.0	18.4	20.0
8004	8.7	15.0	17.0	19.0	13.0
8005	7.5	15.0	14.0	27.2	12.0
8006	8.1	10.0	15.0	28.5	32.0
8007	8.4	0.0	21.0	29.9	28.0
8008	7.2	20.0	17.0	32.2	20.0
8009	7.0	0.0	14.0	30.4	24.0
8010	7.8	5.0	15.0	22.9	23.0
8011	8.4	15.0	58.0	18.7	31.0
8012	9.6	15.0	18.0	15.2	19.0
8101	10.2	5.0	17.0	11.9	20.0
8102	9.3	30.0	20.0	17.1	12.0
8103	8.5	50.0	65.0	14.7	35.0
8104	7.3	40.0	19.0	24.2	21.0
8105	8.5	45.0	17.0	24.0	24.0
8106	7.1	5.0	29.0	30.7	22.0

STATION 1B - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	5.3	5.0	37.0	29.3	34.0
8108	7.3	5.0	32.0	28.1	32.0
8109	7.8	0.0	4.0	23.5	18.0
8110	7.0	0.0	5.0	20.3	20.0
8111	8.5	15.0	4.0	16.0	20.0
8112	8.9	45.0	4.0	13.0	27.0
8201	8.6	15.0	7.0	12.8	10.0
8202	8.4	50.0	14.0	15.6	10.0
8203	7.4	60.0	9.0	23.2	2.0
8204	8.1	25.0	7.0	21.7	20.0
8205	7.4	10.0	4.0	27.5	15.0
8206	6.6	10.0	5.0	30.0	30.0
8207	6.8	10.0	6.0	30.1	25.0
8208	7.1	25.0	6.0	29.9	20.0
8209	8.2	40.0	10.0	25.9	18.0
8210	8.2	20.0	5.0	24.5	24.0
8211	7.9	0.0	6.0	17.9	30.0
8212	8.0	15.0	10.0	15.0	18.0
8301	9.0	20.0	18.0	13.5	25.0
8302	9.4	30.0	22.0	16.9	9.0
8303	9.3	80.0	26.0	15.0	6.0
8304	8.6	80.0	25.0	17.8	5.0
8305	6.8	30.0	9.0	26.5	20.0
8306	7.4	15.0	19.0	28.6	26.0
8307	8.2	30.0	5.0	31.1	25.0
8308	6.2	15.0	6.0	30.8	14.0

STATION 18 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7204	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7205	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7207	-1.0	-1.0	4.8	-1.0	-1.0	28.8	33.9
7208	-1.0	-1.0	4.0	-1.0	10.0	29.9	32.8
7209	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	29.9
7210	1.8	.3	4.6	30.0	0.0	23.0	30.5
7211	3.3	1.5	5.0	14.8	10.0	22.0	34.8
7212	2.4	1.8	5.8	15.0	15.0	15.1	27.2
7301	3.0	.6	8.9	30.0	18.0	13.4	30.2
7302	4.0	.3	11.2	0.0	50.0	12.3	24.5
7303	3.4	1.2	9.3	12.4	30.0	17.9	32.0
7304	2.8	1.4	8.8	15.0	12.0	22.0	22.0
7305	3.0	1.5	9.9	4.0	260.0	23.4	30.0
7306	3.0	1.1	7.6	18.8	21.5	27.1	30.4
7307	3.5	1.8	7.0	40.0	25.3	28.2	33.6
7308	3.5	2.0	6.8	15.0	50.0	29.9	22.1
7309	3.2	1.9	7.8	60.0	45.0	28.4	28.1
7310	3.1	1.5	8.3	0.0	0.0	21.0	31.6
7311	4.5	1.5	7.0	10.0	12.0	20.0	31.0
7312	6.0	1.5	5.7	8.0	5.0	15.5	32.7
7401	3.5	1.2	9.4	17.4	18.6	18.2	25.3
7402	2.8	.7	9.2	20.0	24.0	16.8	13.7
7403	5.0	.9	9.1	15.0	3.0	19.5	13.8
7404	2.5	1.2	9.0	14.9	5.0	21.8	28.7
7405	3.3	1.3	8.7	37.5	13.2	27.5	25.6
7406	4.0	1.2	8.5	8.0	8.0	27.0	29.2
7407	3.5	1.0	6.1	20.0	3.0	27.0	31.0
7408	4.0	1.3	9.3	10.0	2.5	27.2	27.3
7409	3.5	1.5	5.1	10.0	5.0	28.0	27.3
7410	4.0	2.2	8.3	25.0	2.0	21.0	32.6
7411	3.5	1.8	9.1	0.0	1.0	17.0	28.4
7412	3.5	2.0	7.9	0.0	1.0	15.4	30.5
7501	4.0	1.4	8.2	0.0	3.0	14.2	32.6
7502	3.5	1.4	9.0	35.0	1.0	16.5	30.1
7503	3.5	1.2	9.2	40.0	5.0	17.0	27.9
7504	3.5	.6	7.8	40.0	13.0	19.0	10.6
7505	3.5	1.4	7.2	15.0	3.0	26.1	31.7
7506	4.0	1.7	7.0	20.0	4.0	24.0	34.9
7507	3.8	1.1	7.1	60.0	20.0	29.0	30.1
7508	3.5	1.2	7.4	0.0	5.0	29.2	33.3
7509	3.0	1.2	7.1	14.6	6.0	26.2	25.2
7510	3.0	1.5	6.3	15.0	2.0	24.1	23.2
7511	3.5	1.8	8.8	0.0	2.0	20.0	33.8
7512	3.0	2.0	9.2	30.0	2.0	18.0	28.5
7601	3.0	1.6	11.1	0.0	3.0	11.0	25.3
7602	4.0	1.9	9.5	0.0	2.0	16.8	31.7
7603	3.0	1.6	7.7	0.0	1.0	18.0	28.5
7604	3.0	1.0	7.4	30.0	2.0	24.0	31.7
7605	4.0	2.0	6.2	15.0	2.0	23.8	30.0
7606	3.0	1.3	4.8	0.0	2.0	27.3	27.6
7607	3.5	1.4	7.2	135.0	20.0	29.6	31.3
7608	3.0	2.0	5.8	5.0	29.0	28.0	32.4
7609	4.0	1.8	5.7	0.0	22.0	24.7	25.3
7610	3.0	1.5	8.3	0.0	5.0	20.0	23.7

STATION 18 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	3.0	1.7	8.3	0.0	24.0	13.0	29.1
7612	3.5	1.0	8.9	0.0	9.0	9.0	27.0
7701	3.0	.5	11.3	0.0	20.0	3.5	25.8
7702	3.0	1.3	7.4	0.0	19.0	14.8	31.6
7703	3.0	1.7	7.5	0.0	5.0	19.2	30.0
7704	3.0	1.6	8.2	0.0	18.0	24.0	27.5
7705	3.8	1.7	7.6	0.0	22.0	26.2	32.5
7706	4.2	1.4	7.2	0.0	6.0	27.8	34.0
7707	2.5	1.8	8.0	3.0	10.0	29.5	31.8
7708	3.5	1.3	6.6	0.0	5.0	29.5	26.5
7709	3.0	1.7	7.4	7.0	7.0	26.0	26.5
7710	3.0	1.5	8.5	16.3	11.0	21.5	28.8
7711	3.0	1.3	8.3	16.3	13.0	18.9	26.4
7712	3.0	1.4	9.2	16.3	16.0	14.3	27.3
7801	3.0	.2	11.9	50.0	23.0	8.0	4.4
7802	2.1	.6	11.0	50.0	22.0	9.0	7.4
7803	3.0	.5	9.9	0.0	60.0	17.2	21.1
7804	3.0	1.9	7.9	0.0	7.0	21.4	27.2
7805	3.5	1.1	7.6	5.0	23.0	26.3	19.6
7806	3.0	1.2	6.9	20.0	41.0	29.4	26.4
7807	3.0	1.7	6.9	5.0	23.0	29.9	27.2
7808	3.1	1.2	6.8	25.0	15.0	29.0	27.2
7809	4.5	.7	6.9	10.0	9.0	29.8	28.0
7810	3.8	1.0	7.2	5.0	10.0	23.1	29.6
7811	4.4	1.0	7.5	0.0	19.0	22.1	26.6
7812	4.6	.6	6.7	20.0	18.0	20.2	27.2
7901	4.2	1.1	10.2	5.0	10.0	9.6	24.1
7902	3.6	.8	9.7	25.0	25.0	11.1	22.6
7903	4.0	.3	10.2	70.0	44.0	15.5	2.3
7904	4.5	1.3	7.6	10.0	17.0	21.6	25.4
7905	4.2	1.0	6.5	10.0	19.0	25.0	23.3
7906	3.2	2.1	7.9	5.0	10.0	29.1	24.1
7907	4.4	.7	6.1	5.0	13.0	27.9	23.4
7908	4.0	.8	6.8	5.0	21.0	30.2	20.2
7909	4.0	.7	6.6	35.0	29.0	23.7	25.0
7910	4.4	1.2	7.9	15.0	18.0	22.8	18.0
7911	4.0	.4	8.3	20.0	28.1	17.0	15.0
7912	3.7	1.6	9.5	45.0	15.8	14.0	25.0
8001	4.2	1.9	10.6	10.0	12.7	16.3	30.0
8002	4.5	1.7	9.1	10.0	11.0	13.1	28.0
8003	3.2	1.7	8.3	10.0	7.0	18.3	22.0
8004	4.1	.7	8.2	20.0	34.0	18.3	22.0
8005	4.2	.8	6.5	10.0	26.0	27.0	24.0
8006	4.2	1.7	7.6	10.0	15.0	28.5	33.0
8007	5.2	1.0	8.7	0.0	31.0	28.9	31.0
8008	4.3	1.4	3.4	45.0	23.0	30.8	18.0
8009	4.8	1.8	6.6	0.0	15.0	30.1	24.0
8010	4.7	2.5	6.6	10.0	18.0	22.8	26.0
8011	5.0	.3	8.0	10.0	58.0	18.4	32.0
8012	4.5	2.7	8.6	20.0	17.0	15.2	20.0
8101	4.5	1.9	9.5	5.0	15.0	11.5	28.0
8102	4.3	1.3	8.8	20.0	16.0	16.3	28.0
8103	4.0	.3	8.3	50.0	68.0	14.8	35.0
8104	4.6	1.2	5.8	45.0	22.0	23.9	24.0
8105	3.9	1.6	8.2	50.0	19.0	23.4	29.0
8106	4.5	1.6	7.0	5.0	29.0	30.2	24.0

STATION 18 - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	4.2	.9	5.3	5.0	41.0	29.2	34.0
8108	4.9	.9	7.2	5.0	34.0	28.0	32.0
8109	4.6	2.1	7.6	0.0	5.0	23.4	18.0
8110	4.5	1.8	6.2	0.0	3.0	20.4	25.0
8111	4.2	1.8	6.5	5.0	6.0	16.3	25.0
8112	3.0	1.7	8.5	50.0	5.0	14.0	29.0
8201	3.9	1.8	8.8	10.0	18.0	12.0	30.0
8202	4.0	.8	7.8	40.0	27.0	14.6	26.0
8203	3.8	1.4	7.1	25.0	5.0	22.0	15.0
8204	4.3	1.4	7.9	20.0	7.0	21.2	22.0
8205	4.4	1.9	6.7	10.0	7.0	27.0	31.0
8206	4.1	1.3	6.2	10.0	5.0	29.0	31.0
8207	4.2	1.2	6.3	10.0	8.0	30.3	27.0
8208	4.2	1.1	6.5	20.0	8.0	30.1	25.0
8209	3.6	1.0	8.0	50.0	10.0	26.0	18.0
8210	3.6	1.7	7.9	15.0	5.0	22.8	28.0
8211	3.7	2.7	7.2	0.0	9.0	17.2	32.0
8212	3.4	1.0	6.3	10.0	12.0	15.0	20.0
8301	3.8	.6	8.5	25.0	39.0	13.5	30.0
8302	4.0	.9	9.0	30.0	23.0	16.7	20.0
8303	4.1	1.4	9.2	70.0	25.0	14.7	8.0
8304	4.0	.7	8.4	70.0	24.0	17.6	8.0
8305	4.2	2.3	7.0	25.0	12.0	26.1	25.0
8306	4.0	2.0	7.4	20.0	22.0	28.3	29.0
8307	3.8	1.4	8.2	30.0	6.0	30.9	27.0
8308	4.0	1.5	6.8	10.0	6.0	30.2	18.0

STATION 1C - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	-1.0	-1.0	-1.0	-1.0	-1.0
7204	-1.0	-1.0	-1.0	-1.0	-1.0
7205	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	-1.0	-1.0	-1.0	-1.0
7207	5.1	-1.0	-1.0	29.7	22.5
7208	5.0	-1.0	1.0	30.1	18.2
7209	4.8	-1.0	-1.0	-1.0	28.3
7210	5.3	32.0	35.0	23.0	29.3
7211	6.0	25.0	20.0	21.0	33.7
7212	6.7	15.0	9.0	13.2	19.3
7301	8.8	88.0	32.0	6.7	1.4
7302	10.8	0.0	1.0	10.4	7.6
7303	9.6	5.0	4.0	20.6	5.7
7304	8.7	8.0	6.0	22.5	26.4
7305	8.5	0.0	0.0	23.7	13.9
7306	6.8	10.0	18.0	27.7	4.8
7307	8.4	45.0	25.0	31.0	10.1
7308	8.1	25.0	10.0	29.8	13.9
7309	8.6	10.0	8.0	29.3	19.8
7310	8.4	0.0	0.0	20.0	20.7
7311	8.0	0.0	2.0	20.0	19.5
7312	7.7	12.0	8.0	16.9	18.4
7401	7.5	0.0	0.0	18.5	12.1
7402	9.7	20.0	27.0	16.7	2.3
7403	8.3	20.0	7.0	21.0	2.3
7404	8.3	31.3	5.0	22.1	10.1
7405	8.2	40.0	2.0	26.5	12.0
7406	8.5	10.0	2.0	28.0	21.8
7407	8.7	15.0	1.0	28.3	19.5
7408	12.1	32.5	2.0	30.7	17.8
7409	9.0	50.0	2.0	28.0	14.4
7410	8.5	10.0	1.0	20.8	33.7
7411	9.8	0.0	1.0	17.5	18.2
7412	8.9	15.0	1.0	14.7	18.7
7501	8.8	35.0	17.0	14.4	1.6
7502	9.4	40.0	2.0	17.0	10.6
7503	9.5	40.0	4.0	17.0	11.7
7504	8.6	150.0	33.0	19.0	5.2
7505	8.6	60.0	5.0	26.2	8.5
7506	8.6	70.0	3.0	27.5	14.4
7507	8.6	10.0	15.0	28.4	16.7
7508	8.7	0.0	3.0	30.7	8.5
7509	9.0	35.0	5.0	25.5	12.6
7510	7.9	50.0	6.0	25.0	5.2
7511	9.3	5.0	2.0	16.5	15.8
7512	10.0	15.0	2.0	19.0	16.8
7601	11.1	5.0	4.0	12.0	7.3
7602	10.4	0.0	3.0	18.5	13.1
7603	9.1	0.0	1.0	18.8	14.7
7604	9.8	35.0	3.0	26.0	8.4
7605	6.3	25.0	3.0	24.0	18.0
7606	7.6	5.0	4.0	28.8	4.5
7607	6.6	10.0	2.0	31.1	12.8
7608	7.4	0.0	11.0	29.5	32.5
7609	7.2	0.0	4.0	25.1	21.5
7610	7.9	0.0	6.0	19.5	22.6

STATION 1C - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	8.6	0.0	6.0	11.9	15.0
7612	9.8	0.0	9.0	9.8	6.2
7701	13.4	60.0	21.0	3.5	0.0
7702	9.9	10.0	8.0	16.9	11.6
7703	9.2	30.0	17.0	21.2	6.1
7704	8.9	0.0	3.0	24.5	13.4
7705	7.0	0.0	9.0	27.2	20.4
7706	7.6	0.0	4.0	30.0	24.9
7707	7.0	10.0	6.0	30.9	18.1
7708	6.4	2.0	9.0	30.0	28.5
7709	5.7	5.0	8.0	27.0	29.0
7710	8.3	13.1	10.7	22.3	21.5
7711	8.1	21.9	13.4	18.5	18.1
7712	9.1	18.5	12.3	13.9	20.3
7801	11.8	70.0	28.0	7.5	2.1
7802	12.0	75.0	28.0	9.5	1.4
7803	15.3	70.0	20.0	18.9	3.6
7804	8.9	10.0	8.0	22.2	13.5
7805	7.6	25.0	26.0	26.9	7.4
7806	6.0	25.0	23.0	30.1	12.8
7807	6.5	15.0	21.0	29.4	10.5
7808	5.8	25.0	23.0	28.6	25.7
7809	5.5	15.0	12.0	28.9	29.0
7810	6.3	10.0	10.0	22.9	31.9
7811	7.3	0.0	10.0	21.5	14.9
7812	7.9	5.0	10.0	19.8	16.3
7901	10.5	5.0	6.0	9.0	22.6
7902	12.4	30.0	15.0	11.0	0.0
7903	9.4	65.0	49.0	15.9	0.0
7904	7.6	15.0	13.0	22.7	16.3
7905	8.3	30.0	17.0	27.6	4.7
7906	9.3	10.0	8.0	30.4	6.2
7907	6.8	10.0	20.0	28.8	21.0
7908	8.0	10.0	17.0	32.0	14.0
7909	7.6	30.0	20.0	24.6	25.0
7910	8.4	15.0	19.0	23.5	27.0
7911	8.8	20.0	24.8	16.3	15.0
7912	10.0	15.0	14.8	10.4	13.0
8001	8.8	10.0	17.4	16.8	26.0
8002	9.8	15.0	11.0	12.8	11.0
8003	7.8	10.0	9.0	18.7	15.0
8004	8.8	30.0	41.0	20.1	2.0
8005	7.1	15.0	12.0	28.0	16.0
8006	7.8	14.0	20.0	29.2	20.0
8007	7.1	0.0	26.0	30.0	30.0
8008	8.3	20.0	16.0	32.8	21.0
8009	6.1	5.0	17.0	30.2	25.0
8010	7.7	10.0	17.0	23.2	24.0
8011	8.1	15.0	45.0	18.7	32.0
8012	9.8	10.0	16.0	16.0	18.0
8101	10.4	10.0	16.0	11.4	15.0
8102	8.0	5.0	34.0	16.0	11.0
8103	9.2	50.0	26.0	15.8	25.0
8104	7.4	20.0	23.0	25.0	15.0
8105	8.4	40.0	17.0	23.8	19.0
8106	6.4	5.0	26.0	30.5	20.0

STATION 1C - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	6.8	5.0	31.0	29.2	23.0
8108	7.8	5.0	26.0	27.8	30.0
8109	7.3	0.0	4.0	23.4	16.0
8110	7.6	0.0	5.0	20.5	12.0
8111	8.5	20.0	3.0	16.8	26.0
8112	8.8	40.0	5.0	12.8	24.0
8201	9.6	60.0	16.0	13.0	8.0
8202	8.8	110.0	24.0	15.0	10.0
8203	7.3	70.0	13.0	24.0	1.0
8204	7.9	35.0	8.0	22.9	14.0
8205	7.3	20.0	5.0	28.1	15.0
8206	8.2	10.0	7.0	31.0	16.0
8207	7.3	25.0	7.0	31.0	20.0
8208	5.8	20.0	16.0	29.5	26.0
8209	5.4	30.0	18.0	25.8	16.0
8210	8.5	25.0	5.0	26.3	20.0
8211	7.3	0.0	7.0	18.3	32.0
8212	8.6	50.0	14.0	15.3	14.0
8301	9.6	40.0	16.0	12.3	22.0
8302	8.8	80.0	29.0	16.3	5.0
8303	8.6	125.0	34.0	15.0	2.0
8304	8.1	100.0	28.0	18.8	4.0
8305	7.3	25.0	10.0	27.1	15.0
8306	7.7	40.0	20.0	29.8	15.0
8307	8.3	50.0	8.0	31.8	20.0
8308	8.1	5.0	6.0	31.0	22.0

STATION 1C - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7204	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7205	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7207	-1.0	-1.0	4.6	-1.0	-1.0	29.7	24.7
7208	-1.0	-1.0	4.5	-1.0	-1.0	29.7	20.3
7209	-1.0	-1.0	5.0	-1.0	-1.0	-1.0	28.6
7210	2.4	.4	4.8	120.0	55.0	23.1	31.7
7211	3.3	1.6	9.3	25.0	30.0	21.0	33.7
7212	2.7	1.7	6.5	15.0	11.0	13.7	17.5
7301	3.0	.4	8.2	40.0	20.0	12.8	1.4
7302	3.5	1.3	12.2	0.0	45.0	10.5	8.6
7303	2.9	.8	9.8	10.0	13.2	17.5	10.2
7304	2.3	.8	8.9	18.0	18.0	22.1	26.8
7305	2.8	1.1	8.5	0.0	45.0	22.9	17.8
7306	2.7	.9	6.4	11.0	26.2	27.3	5.5
7307	2.5	1.2	8.4	55.0	30.0	29.9	16.6
7308	3.5	1.7	6.8	25.0	15.8	29.6	16.3
7309	3.1	1.6	9.0	12.1	15.8	29.0	24.7
7310	3.4	1.5	8.5	0.0	0.0	21.5	25.1
7311	3.2	1.1	8.0	0.0	7.0	20.0	25.3
7312	2.5	1.4	7.7	10.0	5.0	15.5	26.4
7401	2.5	1.1	7.4	0.0	0.0	18.5	13.2
7402	2.0	.4	9.0	20.0	40.0	16.8	5.2
7403	4.0	.9	7.7	10.0	11.0	20.0	24.1
7404	2.8	.8	7.7	25.1	7.0	22.0	12.1
7405	3.5	1.0	7.8	28.3	3.9	26.5	17.2
7406	3.3	1.0	7.8	10.0	2.0	27.1	28.7
7407	4.0	.8	7.8	15.0	5.0	28.0	19.5
7408	3.5	1.0	10.1	10.0	2.5	28.5	26.7
7409	3.0	1.5	6.0	40.0	4.0	29.0	21.9
7410	4.0	1.9	8.4	10.0	2.0	20.5	32.6
7411	3.0	1.5	9.2	0.0	2.0	17.5	23.0
7412	3.5	2.4	9.5	10.0	1.0	15.0	25.7
7501	2.5	.4	9.8	0.0	10.0	13.9	18.7
7502	3.5	1.1	7.4	50.0	2.0	16.2	22.5
7503	3.0	1.1	9.0	70.0	9.0	17.0	12.8
7504	2.5	.3	5.3	55.0	16.0	18.5	11.7
7505	3.5	.4	6.8	40.0	6.0	25.9	13.2
7506	3.5	1.1	7.8	55.0	5.0	25.5	27.4
7507	3.5	1.1	6.7	80.0	25.0	28.3	21.2
7508	4.0	1.1	5.0	0.0	8.0	30.0	24.7
7509	3.0	.9	7.6	2.0	7.2	23.1	20.0
7510	3.0	.9	5.9	5.0	1.0	23.8	21.1
7511	3.0	1.5	8.5	0.0	2.0	18.2	23.2
7512	3.5	1.9	9.1	30.0	4.0	18.0	21.1
7601	3.0	1.3	12.4	0.0	4.0	10.5	7.3
7602	3.0	1.4	11.2	0.0	4.0	17.0	20.0
7603	3.0	1.0	8.7	0.0	1.0	18.5	14.7
7604	3.0	.9	7.9	30.0	1.0	24.0	15.8
7605	3.0	.8	5.9	25.0	4.0	24.0	24.4
7606	3.0	.9	5.7	0.0	3.0	27.5	20.4
7607	3.0	1.6	6.3	20.0	4.0	31.0	32.4
7608	3.5	1.2	6.2	0.0	8.0	29.0	31.2
7609	4.0	1.7	6.7	0.0	4.0	24.9	22.6
7610	3.0	1.6	7.3	0.0	11.0	19.6	25.3

STATION 1C - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	4.0	1.1	9.3	0.0	27.0	12.6	21.5
7612	2.5	.9	9.1	0.0	12.0	9.0	16.0
7701	3.0	.5	11.8	0.0	12.0	4.5	18.0
7702	3.0	1.0	9.8	15.0	30.0	15.2	25.8
7703	2.5	.5	8.8	0.0	20.0	20.8	16.4
7704	3.0	1.7	9.2	10.0	15.0	24.0	18.1
7705	3.0	1.5	7.8	0.0	20.0	26.9	24.2
7706	4.0	1.3	6.1	0.0	13.0	29.0	31.8
7707	5.0	1.4	6.5	7.0	8.0	31.0	20.4
7708	3.5	1.4	6.3	1.0	20.0	31.2	23.7
7709	2.5	1.7	5.4	0.0	23.0	27.0	30.0
7710	2.7	1.3	8.0	15.3	16.6	21.8	25.3
7711	3.0	1.1	7.5	19.3	16.5	18.2	21.8
7712	3.0	1.2	8.9	17.7	16.5	13.5	23.8
7801	3.0	.3	11.0	15.0	5.0	8.7	12.8
7802	3.5	.4	12.5	70.0	25.0	9.0	3.6
7803	3.0	.5	9.9	90.0	22.0	18.9	5.2
7804	3.0	2.1	8.6	10.0	11.0	21.4	19.6
7805	3.0	.9	6.9	20.0	29.0	26.9	9.0
7806	3.1	.8	5.6	20.0	28.0	30.2	16.6
7807	2.7	1.5	5.8	20.0	29.0	29.8	15.8
7808	3.0	.8	5.7	30.0	32.0	28.1	27.2
7809	3.0	.4	6.0	15.0	14.0	28.7	29.5
7810	3.2	1.1	6.3	10.0	11.0	22.8	31.9
7811	4.0	1.1	7.1	5.0	21.0	21.3	23.5
7812	4.6	.6	7.4	0.0	9.0	19.7	21.8
7901	3.4	1.5	10.5	5.0	7.0	8.9	23.3
7902	3.5	.5	11.9	20.0	12.0	10.0	7.0
7903	1.9	.2	9.3	80.0	47.0	15.3	0.0
7904	4.0	1.0	7.4	15.0	11.0	22.4	15.3
7905	3.2	.6	7.4	15.0	16.0	27.0	15.6
7906	3.2	1.0	8.8	20.0	9.0	30.1	9.3
7907	2.9	.5	6.0	10.0	24.0	28.3	23.5
7908	3.0	.6	5.7	10.0	19.0	31.6	14.8
7909	2.7	.7	7.3	35.0	22.0	24.5	25.0
7910	3.1	1.0	8.3	15.0	33.0	23.3	28.0
7911	3.0	.4	6.4	25.0	26.6	16.0	15.0
7912	3.0	1.5	9.5	20.0	14.2	11.3	20.0
8001	3.2	1.1	8.6	10.0	19.4	16.6	26.0
8002	3.1	1.2	9.4	10.0	16.0	12.8	18.0
8003	2.4	1.1	7.5	15.0	9.0	18.5	15.0
8004	3.2	.5	8.2	15.0	32.0	18.4	8.0
8005	3.7	1.5	6.9	20.0	13.0	27.5	19.0
8006	2.3	1.1	7.0	18.0	22.0	29.0	22.0
8007	2.7	.9	6.9	0.0	26.0	29.7	30.0
8008	3.1	1.2	6.8	75.0	31.0	31.7	23.0
8009	4.5	.6	5.9	0.0	33.0	30.0	25.0
8010	3.3	1.8	7.4	10.0	18.0	23.0	24.0
8011	2.0	.3	7.9	15.0	40.0	18.4	32.0
8012	2.3	2.3	10.6	15.0	17.0	15.6	20.0
8101	2.5	1.9	11.0	10.0	22.0	11.9	21.0
8102	3.5	.9	7.1	5.0	28.0	15.8	12.0
8103	2.2	.9	9.0	50.0	30.0	15.8	29.0
8104	3.1	.8	6.6	30.0	26.0	24.7	15.0
8105	3.1	1.9	8.6	45.0	24.0	23.3	20.0
8106	3.7	1.8	3.1	5.0	36.0	30.4	26.0

STATION 1C - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	3.9	1.1	5.8	5.0	35.0	29.2	27.0
8108	4.2	1.1	6.9	5.0	28.0	27.8	31.0
8109	3.8	1.8	7.2	0.0	4.0	23.3	13.0
8110	3.8	1.3	5.7	0.0	3.0	21.0	22.0
8111	3.7	1.9	8.4	10.0	5.0	16.1	21.0
8112	2.8	2.0	8.6	45.0	5.0	13.0	25.0
8201	3.2	.8	10.1	30.0	12.0	11.9	12.0
8202	3.0	.6	8.4	50.0	16.0	15.5	15.0
8203	3.0	.8	6.9	20.0	5.0	21.0	20.0
8204	3.0	1.2	7.4	30.0	11.0	22.0	18.0
8205	3.1	1.5	6.8	30.0	14.0	26.9	21.0
8206	3.1	.7	6.1	25.0	15.0	29.0	25.0
8207	3.2	.8	7.1	35.0	13.0	30.3	25.0
8208	3.6	.7	5.8	15.0	16.0	29.9	27.0
8209	3.0	.6	6.2	30.0	17.0	25.4	16.0
8210	2.0	1.4	8.0	40.0	18.0	23.5	30.0
8211	3.1	2.5	7.9	5.0	9.0	17.3	34.0
8212	2.9	.7	7.9	20.0	11.0	15.0	22.0
8301	3.2	.5	9.6	80.0	38.0	12.0	24.0
8302	3.8	.6	8.6	50.0	30.0	16.2	10.0
8303	3.3	.6	8.3	105.0	32.0	15.0	2.0
8304	3.4	.7	7.9	70.0	27.0	18.7	21.0
8305	3.2	1.1	7.2	45.0	13.0	26.7	15.0
8306	3.2	.9	7.5	10.0	24.0	29.4	30.0
8307	3.0	1.1	8.5	50.0	12.0	31.4	22.0
8308	3.3	1.2	7.0	55.0	13.0	31.9	25.0

STATION 1X - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	-1.0	-1.0	-1.0	-1.0	-1.0
7204	-1.0	-1.0	-1.0	-1.0	-1.0
7205	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	-1.0	-1.0	-1.0	-1.0
7207	-1.0	-1.0	-1.0	-1.0	-1.0
7208	-1.0	-1.0	-1.0	-1.0	-1.0
7209	-1.0	-1.0	-1.0	-1.0	-1.0
7210	-1.0	-1.0	-1.0	-1.0	-1.0
7211	-1.0	-1.0	-1.0	-1.0	-1.0
7212	-1.0	-1.0	-1.0	-1.0	-1.0
7301	-1.0	-1.0	-1.0	-1.0	-1.0
7302	-1.0	-1.0	-1.0	-1.0	-1.0
7303	-1.0	-1.0	-1.0	-1.0	-1.0
7304	-1.0	-1.0	-1.0	-1.0	-1.0
7305	-1.0	-1.0	-1.0	-1.0	-1.0
7306	-1.0	-1.0	-1.0	-1.0	-1.0
7307	-1.0	-1.0	-1.0	-1.0	-1.0
7308	-1.0	-1.0	-1.0	-1.0	-1.0
7309	-1.0	-1.0	-1.0	-1.0	-1.0
7310	-1.0	-1.0	-1.0	-1.0	-1.0
7311	-1.0	-1.0	-1.0	-1.0	-1.0
7312	-1.0	-1.0	-1.0	-1.0	-1.0
7401	-1.0	-1.0	-1.0	-1.0	-1.0
7402	-1.0	-1.0	-1.0	-1.0	-1.0
7403	-1.0	-1.0	-1.0	-1.0	-1.0
7404	-1.0	-1.0	-1.0	-1.0	-1.0
7405	-1.0	-1.0	-1.0	-1.0	-1.0
7406	10.3	27.0	4.0	27.2	20.6
7407	4.5	25.0	2.0	26.6	14.9
7408	8.1	20.0	1.0	28.6	20.1
7409	9.4	10.0	2.0	29.2	24.2
7410	9.8	20.0	1.0	21.0	28.4
7411	8.9	0.0	1.0	18.0	23.0
7412	10.1	0.0	1.0	15.4	25.7
7501	10.2	0.0	2.0	14.9	14.4
7502	10.4	30.0	2.0	17.5	12.8
7503	8.9	40.0	3.0	17.0	15.0
7504	10.0	60.0	14.0	21.0	5.2
7505	7.9	15.0	1.0	27.5	19.3
7506	8.6	20.0	2.0	27.0	18.7
7507	8.3	15.0	4.0	28.5	16.0
7508	8.2	5.0	1.0	32.5	8.5
7509	10.5	15.0	4.0	24.0	14.2
7510	10.4	5.0	2.0	25.3	9.4
7511	11.3	5.0	2.0	18.0	17.9
7512	12.9	5.0	1.0	18.0	23.2
7601	12.0	0.0	3.0	12.0	10.5
7602	10.4	0.0	2.0	20.0	12.6
7603	9.5	0.0	1.0	19.2	21.1
7604	9.9	30.0	2.0	25.5	11.5
7605	7.5	20.0	2.0	24.5	15.6
7606	7.0	0.0	3.0	28.2	6.1
7607	8.1	30.0	3.0	32.0	13.9
7608	8.0	0.0	10.0	30.5	31.6
7609	8.2	0.0	3.0	25.0	24.2
7610	8.6	0.0	6.0	20.0	23.7

STATION 1X - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	11.6	0.0	4.0	13.1	15.0
7612	9.9	0.0	9.0	11.2	1.9
7701	13.0	40.0	14.0	4.0	0.0
7702	9.8	0.0	9.0	18.0	12.4
7703	8.4	0.0	7.0	21.5	18.8
7704	9.5	10.0	6.0	24.5	14.0
7705	9.5	0.0	9.0	28.1	25.7
7706	7.5	0.0	4.0	30.3	26.4
7707	7.5	10.0	4.0	31.0	27.2
7708	7.4	0.0	5.0	27.5	14.3
7709	7.1	49.0	13.0	29.0	12.8
7710	8.2	40.0	6.0	20.5	18.1
7711	7.2	0.0	1.0	22.2	28.0
7712	8.9	60.0	9.0	15.2	12.0
7801	12.0	20.0	10.0	8.0	12.8
7802	12.0	75.0	37.0	8.5	3.6
7803	14.8	90.0	32.0	20.0	2.9
7804	9.6	5.0	6.0	20.6	18.8
7805	8.6	20.0	26.0	28.1	4.4
7806	6.2	25.0	22.0	30.7	11.2
7807	7.0	20.0	21.0	30.2	15.0
7808	6.5	25.0	17.0	28.7	26.4
7809	6.7	5.0	11.0	29.1	26.0
7810	7.1	10.0	17.0	23.0	28.8
7811	8.0	0.0	10.0	21.9	21.8
7812	7.1	10.0	14.0	19.8	26.4
7901	10.5	0.0	7.0	9.3	17.9
7902	12.8	15.0	13.0	11.6	1.6
7903	10.4	35.0	40.0	16.3	1.6
7904	7.4	10.0	10.0	22.7	24.1
7905	7.8	20.0	11.0	27.0	15.6
7906	10.0	10.0	10.0	29.2	7.8
7907	6.8	10.0	10.0	28.4	24.1
7908	7.5	10.0	12.0	32.1	12.4
7909	6.9	30.0	21.0	24.1	26.0
7910	8.1	10.0	18.0	23.8	24.0
7911	9.2	20.0	19.9	16.7	18.0
7912	10.5	35.0	17.6	10.9	25.0
8001	9.5	10.0	15.5	17.4	25.0
8002	10.3	15.0	14.0	18.5	14.0
8003	8.0	10.0	7.0	18.1	26.0
8004	8.8	20.0	15.8	21.5	7.6
8005	8.1	10.0	15.8	26.1	16.5
8006	7.3	10.0	15.8	27.9	20.3
8007	7.5	0.0	20.0	30.6	28.0
8008	6.8	20.0	15.0	32.4	21.0
8009	8.2	0.0	14.0	31.0	26.0
8010	8.2	5.0	14.0	22.5	24.0
8011	8.6	15.0	39.0	18.7	32.0
8012	9.5	15.0	17.0	15.9	19.0
8101	10.4	5.0	15.0	12.0	19.0
8102	9.5	20.0	22.0	16.4	10.0
8103	8.9	50.0	30.0	13.2	32.0
8104	7.3	35.0	20.0	24.1	19.0
8105	10.0	40.0	18.0	24.0	24.0
8106	7.2	5.0	30.0	29.9	22.0

STATION 1X - SURFACE VALUES

	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	7.8	5.0	31.0	29.2	33.0
8108	7.6	10.0	22.0	27.2	30.0
8109	7.6	0.0	7.0	23.0	15.0
8110	7.3	0.0	4.0	20.2	10.0
8111	8.5	10.0	5.0	16.1	22.0
8112	9.6	45.0	4.0	13.0	26.0
8201	9.2	20.0	7.0	13.8	12.0
8202	8.4	60.0	15.0	16.2	16.0
8203	7.5	75.0	13.0	22.8	1.0
8204	7.9	30.0	6.0	21.8	18.0
8205	7.4	15.0	9.0	28.0	14.0
8206	6.8	20.0	5.0	30.2	30.0
8207	7.4	15.0	6.0	30.3	22.0
8208	6.9	30.0	6.0	30.0	22.0
8209	7.4	55.0	19.0	23.7	16.0
8210	8.0	35.0	9.0	23.9	25.0
8211	7.9	0.0	6.0	17.8	34.0
8212	8.7	30.0	11.0	15.1	18.0
8301	9.2	50.0	18.0	13.0	24.0
8302	9.5	60.0	27.0	17.3	5.0
8303	9.0	105.0	31.0	15.0	4.0
8304	8.5	80.0	25.0	18.3	5.0
8305	7.8	35.0	10.0	27.2	16.0
8306	8.6	0.0	18.0	29.0	30.0
8307	7.7	25.0	8.0	31.5	22.0
8308	6.9	40.0	7.0	32.1	16.0

STATION 1X - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7203	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7204	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7205	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7206	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7207	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7208	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7209	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7210	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7211	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7212	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7301	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7302	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7303	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7304	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7305	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7306	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7307	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7308	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7309	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7310	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7311	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7312	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7401	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7402	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7403	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7404	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7405	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7406	1.5	1.2	10.2	21.0	4.0	27.0	22.9
7407	.5	.5	4.5	23.1	2.0	26.0	14.9
7408	.5	.5	9.3	21.8	1.0	28.1	22.1
7409	1.1	1.1	9.8	10.0	2.0	29.2	24.2
7410	1.5	1.5	9.1	30.0	2.0	20.8	30.5
7411	.5	.5	8.9	0.0	1.0	18.0	23.0
7412	1.2	1.2	9.2	0.0	1.0	15.6	28.4
7501	.5	.5	12.4	0.0	3.0	15.0	14.4
7502	1.1	1.1	10.4	40.0	2.0	17.0	15.0
7503	.6	.6	8.5	50.0	4.0	16.8	16.0
7504	.7	.6	14.4	50.0	13.0	20.0	6.3
7505	.7	.7	14.2	25.0	2.0	27.5	19.3
7506	1.2	1.1	9.3	20.0	2.0	26.0	26.8
7507	2.8	1.1	6.8	35.0	7.0	28.3	13.2
7508	1.3	1.2	11.1	10.0	1.0	30.5	19.3
7509	1.0	.9	13.8	15.6	25.0	23.3	14.2
7510	1.0	1.0	13.4	20.0	2.0	25.1	14.2
7511	.9	.9	11.8	5.0	2.0	18.0	19.0
7512	1.4	1.4	12.9	0.0	1.0	18.0	23.2
7601	1.0	1.0	13.0	0.0	3.0	11.5	10.5
7602	.9	.9	12.3	0.0	2.0	20.0	20.0
7603	1.0	1.0	11.8	0.0	1.0	19.5	21.1
7604	1.0	.8	12.0	30.0	2.0	26.0	13.7
7605	1.2	1.2	8.1	15.0	2.0	24.5	15.6
7606	1.2	.9	9.6	10.0	3.0	27.8	9.3
7607	1.1	1.1	8.3	10.0	2.0	31.0	24.8
7608	1.4	1.3	8.3	0.0	9.0	29.9	32.0
7609	1.3	1.3	8.2	0.0	3.0	25.0	24.2
7610	1.6	1.2	9.0	0.0	6.0	20.5	24.8

STATION 1X - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
7611	1.0	1.0	11.2	0.0	4.0	12.0	15.0
7612	1.2	.8	11.2	0.0	9.0	10.5	7.3
7701	1.5	.6	13.0	45.0	18.0	4.0	0.0
7702	1.4	1.2	11.8	0.0	9.0	17.0	18.0
7703	1.1	1.1	8.6	0.0	7.0	21.5	18.8
7704	1.2	1.0	9.8	10.0	21.0	24.0	18.1
7705	1.5	1.5	9.8	0.0	9.0	28.0	25.7
7706	1.2	1.2	8.8	0.0	5.0	29.6	31.8
7707	1.2	1.2	8.5	0.0	9.0	32.0	28.7
7708	1.5	1.3	6.2	5.0	6.0	27.5	16.6
7709	1.2	1.2	5.0	50.0	13.0	29.0	18.1
7710	1.2	1.2	8.0	40.0	7.0	21.0	21.1
7711	1.2	1.2	8.1	0.0	1.0	22.4	28.7
7712	1.2	1.2	9.0	50.0	8.0	15.0	13.5
7801	.8	.8	12.6	30.0	13.0	8.0	12.8
7802	1.1	.4	12.0	75.0	42.0	8.2	5.9
7803	1.6	.5	19.7	95.0	26.0	20.0	2.9
7804	1.5	.9	10.2	10.0	8.0	20.0	19.6
7805	2.0	.8	10.9	20.0	25.0	27.2	9.0
7806	2.0	.8	6.6	30.0	32.0	30.3	18.1
7807	1.5	1.5	8.2	25.0	21.0	30.0	15.8
7808	1.5	.8	6.5	15.0	16.0	28.3	27.2
7809	1.4	.7	7.2	20.0	13.0	29.0	27.5
7810	1.6	.7	7.0	10.0	16.0	22.9	29.6
7811	2.8	.8	8.0	0.0	11.0	21.9	23.3
7812	.9	.4	7.1	10.0	14.0	19.8	26.4
7901	1.7	1.5	10.5	0.0	7.0	9.3	17.9
7902	2.4	.7	11.7	15.0	13.0	10.6	11.7
7903	3.2	.4	10.2	40.0	31.0	16.0	2.3
7904	3.3	1.8	7.2	10.0	15.0	22.0	28.0
7905	1.5	.8	7.4	10.0	14.0	26.1	18.7
7906	3.2	.7	9.4	20.0	10.0	29.1	9.3
7907	3.5	.7	6.5	11.9	13.4	27.5	25.2
7908	3.3	.7	6.6	10.0	13.0	31.8	14.0
7909	3.3	.7	6.6	35.0	28.0	24.0	25.0
7910	3.8	.9	7.8	10.0	25.0	23.5	26.0
7911	2.0	.3	8.9	20.0	22.1	16.2	18.0
7912	2.9	1.4	9.5	40.0	18.6	13.7	25.0
8001	3.1	1.5	9.0	15.0	15.7	17.2	23.0
8002	1.5	1.5	9.8	15.0	10.0	18.4	15.0
8003	2.2	1.5	7.7	10.0	7.0	18.0	27.0
8004	2.5	1.0	8.9	20.0	16.8	21.2	10.7
8005	2.5	1.2	7.5	10.0	16.8	25.6	19.1
8006	2.2	1.3	7.3	10.0	16.9	27.2	22.7
8007	1.4	.9	8.1	0.0	20.0	30.0	29.0
8008	2.0	1.3	8.1	5.0	15.0	31.8	22.0
8009	4.1	1.4	7.8	5.0	13.0	30.8	25.0
8010	1.7	1.7	8.1	10.0	15.0	22.4	24.0
8011	1.5	.2	8.2	15.0	41.0	18.5	32.0
8012	2.7	2.0	8.3	20.0	20.0	15.9	20.0
8101	3.0	2.5	10.6	10.0	16.0	11.8	28.0
8102	3.3	1.2	9.7	10.0	16.0	16.1	29.0
8103	3.2	.6	8.8	50.0	31.0	13.4	31.0
8104	3.9	1.4	5.9	40.0	23.0	24.0	25.0
8105	3.7	1.3	7.7	45.0	23.0	23.8	25.0
8106	1.9	1.4	6.2	5.0	30.0	30.5	28.0

STATION 1X - BOTTOM VALUES

	DEPTH	SECCHI	DO	COLOR	TURBIDITY	TEMP	SALINITY
8107	4.0	1.3	6.3	0.0	30.0	29.1	34.0
8108	2.5	1.4	7.9	5.0	26.0	27.2	30.0
8109	1.7	1.7	7.6	0.0	4.0	23.0	20.0
8110	3.1	1.8	6.4	0.0	4.0	20.0	10.0
8111	3.0	1.7	9.4	5.0	4.0	16.2	15.0
8112	3.0	2.0	9.2	50.0	5.0	13.0	29.0
8201	3.0	3.0	10.4	15.0	7.0	12.3	12.0
8202	3.0	.8	8.0	45.0	20.0	15.4	22.0
8203	3.3	.8	7.3	10.0	5.0	21.9	25.0
8204	3.4	1.0	7.7	35.0	11.0	21.0	28.0
8205	3.2	1.4	7.4	10.0	6.0	26.1	27.0
8206	2.5	1.1	7.2	10.0	6.0	29.2	32.0
8207	1.8	.9	7.2	15.0	7.0	30.1	25.0
8208	2.5	1.1	7.0	35.0	7.0	30.0	22.0
8209	1.9	.6	6.9	70.0	34.0	25.0	18.0
8210	2.2	1.6	7.9	30.0	13.0	23.1	30.0
8211	2.3	2.3	8.2	5.0	6.0	17.0	34.0
8212	2.3	.8	7.9	20.0	11.0	14.8	20.0
8301	1.7	1.1	9.2	30.0	15.0	12.8	24.0
8302	1.7	.7	9.5	60.0	27.0	17.3	5.0
8303	1.3	.6	8.7	95.0	28.0	14.9	7.0
8304	1.4	.7	8.5	60.0	22.0	17.6	11.0
8305	2.5	1.4	8.2	25.0	11.0	26.4	18.0
8306	2.0	1.0	8.4	5.0	25.0	28.5	30.0
8307	2.0	.8	7.9	50.0	12.0	31.0	22.0
8308	2.6	1.0	7.0	25.0	7.0	30.9	20.0

Table 9: Salinity ($^o/_{oo}$) taken monthly at permanent stations in the Apalachicola estuary from March, 1972 through August, 1983.

THIS REPORT IS FOR ST 1, SURFACE SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	10.0	2.9	2.1	3.1	0.0	2.9	8.6	10.0	6.0	0.0	6.0
02	-1.0	0.0	5.7	5.2	6.2	2.9	3.6	1.6	5.0	6.0	10.0	9.0
03	10.5	5.4	10.3	0.0	3.6	4.5	5.9	0.0	6.0	30.0	0.0	4.0
04	18.0	10.0	2.9	3.0	5.2	6.7	4.4	11.7	6.0	12.0	11.0	0.0
05	18.5	11.2	0.0	5.2	6.1	13.5	4.4	0.0	6.0	25.0	3.0	22.0
06	33.7	1.8	10.9	8.5	2.1	34.0	12.0	17.9	29.0	17.0	5.0	16.0
07	15.0	8.9	21.0	8.5	16.0	21.1	15.0	10.9	12.0	20.0	19.0	21.0
08	5.0	12.6	9.2	3.0	16.6	9.0	2.9	12.4	12.0	20.6	5.0	16.0
09	22.4	24.1	12.3	7.3	15.5	11.2	10.0	5.0	12.0	10.0	14.0	-1.0
10	10.6	16.6	23.0	3.6	6.2	15.8	21.0	8.0	19.0	15.0	15.0	-1.0
11	29.0	12.6	25.2	12.6	11.7	12.8	10.9	18.0	22.0	22.0	15.0	-1.0
12	20.1	5.2	5.3	5.2	0.0	3.6	14.8	8.0	6.0	15.0	15.0	-1.0

THIS REPORT IS FOR ST 1, BOTTOM SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	10.0	10.9	6.9	4.1	12.4	4.4	11.7	14.0	18.0	6.0	14.0
02	-1.0	0.0	13.8	7.4	12.6	20.4	12.0	4.7	5.0	15.0	18.0	13.0
03	10.5	9.4	12.6	1.5	3.6	4.5	7.4	.8	6.0	31.0	10.0	9.0
04	18.0	18.0	2.9	4.1	11.5	20.2	5.9	24.1	14.0	16.0	22.0	1.0
05	24.0	20.8	24.6	5.8	6.1	13.8	4.4	0.0	11.0	26.0	19.0	22.0
06	33.7	15.5	22.3	26.3	18.8	34.0	15.8	25.7	31.0	21.0	25.0	21.0
07	29.0	19.1	28.0	18.1	29.7	27.2	20.4	14.8	20.0	28.0	24.0	29.0
08	8.5	12.6	11.4	11.7	22.6	24.2	10.5	15.6	19.0	20.0	15.0	19.0
09	24.0	19.5	17.6	11.0	18.8	21.1	11.0	18.0	17.0	18.0	14.0	-1.0
10	10.7	17.2	24.2	11.0	21.0	15.8	21.8	10.0	21.0	15.0	22.0	-1.0
11	29.0	14.9	29.5	18.4	16.0	27.2	15.8	21.0	24.0	18.0	26.0	-1.0
12	19.8	24.1	15.5	10.5	.8	16.6	20.2	10.0	19.0	15.0	22.0	-1.0

THIS REPORT IS FOR ST 2, SURFACE SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	.5	0.0	0.0	2.0	0.0	0.0	0.0	0.0	4.0	8.0	0.0
02	-1.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
03	4.3	0.0	0.0	0.0	0.0	2.9	1.4	0.0	0.0	1.0	0.0	0.0
04	5.5	0.0	5.1	0.0	3.1	0.0	0.0	0.0	0.0	5.0	1.0	0.0
05	2.0	0.0	0.0	3.0	.5	5.9	1.4	0.0	0.0	5.0	0.0	4.0
06	6.8	0.0	5.7	3.0	0.0	13.5	1.4	0.0	2.0	4.0	2.0	5.0
07	3.0	1.1	0.0	3.0	.8	16.6	1.4	2.3	0.0	12.0	2.0	10.0
08	7.0	12.6	0.0	2.5	4.0	2.9	2.1	0.0	3.0	20.0	0.0	2.0
09	6.0	0.0	2.6	1.5	3.5	1.4	2.0	1.0	2.0	5.0	0.0	-1.0
10	2.5	12.0	10.1	0.0	.8	5.2	17.9	0.0	5.0	5.0	4.0	-1.0
11	21.5	4.5	6.9	0.0	1.3	10.5	12.6	0.0	6.0	5.0	7.0	-1.0
12	.4	3.9	0.0	3.1	.8	0.0	0.0	0.0	9.0	3.0	0.0	-1.0

THIS REPORT IS FOR ST 2, BOTTOM SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	6.5	0.0	0.0	2.0	0.0	0.0	0.0	10.0	11.0	0.0	0.0
02	-1.0	0.0	16.6	18.2	0.0	.5	0.0	0.0	0.0	0.0	0.0	0.0
03	19.0	0.0	19.5	0.0	4.1	2.9	1.4	0.0	0.0	1.0	0.0	0.0
04	18.0	0.0	5.3	0.0	16.8	19.2	0.0	0.0	0.0	6.0	19.0	0.0
05	23.5	9.8	21.8	3.0	9.3	20.4	.6	0.0	0.0	9.0	2.0	12.0
06	10.0	11.5	28.1	19.3	17.2	28.7	4.4	.8	6.0	17.0	6.0	5.0
07	26.0	16.1	17.2	14.4	27.0	28.0	9.0	5.4	24.0	18.0	20.0	24.0
08	23.0	16.6	20.4	13.9	17.1	11.2	18.1	.8	11.0	20.0	6.0	14.0
09	27.0	11.5	19.8	10.0	17.1	11.2	2.0	12.0	4.0	14.0	4.0	-1.0
10	5.0	13.2	27.3	7.3	3.0	21.1	23.3	0.0	8.0	15.0	28.0	-1.0
11	21.5	4.5	23.0	0.0	12.8	21.1	12.6	3.0	10.0	4.0	15.0	-1.0
12	10.6	3.9	20.3	3.1	7.3	9.0	0.0	1.0	15.0	14.0	0.0	-1.0

THIS REPORT IS FOR ST 3, SURFACE SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	-1.0	0.0	.5	0.0	0.0	0.0	0.0	1.0	5.0	0.0	0.0
02	-1.0	-1.0	-1.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
03	-1.0	0.0	-1.0	0.0	0.0	2.1	0.0	0.0	0.0	1.0	0.0	0.0
04	.4	-1.0	4.5	0.0	0.0	0.0	0.0	0.0	1.2	5.0	1.0	0.0
05	-1.0	-1.0	0.0	2.5	1.3	.6	0.0	0.0	1.8	9.0	5.0	2.0
06	5.5	-1.0	4.6	0.0	.5	9.0	2.1	.8	3.7	10.0	7.0	10.0
07	2.5	-1.0	0.0	7.9	0.0	12.0	5.9	.8	2.0	5.0	4.0	7.0
08	-1.0	-1.0	0.0	3.0	12.2	2.9	.6	3.1	2.0	11.0	0.0	1.0
09	14.0	-1.0	.5	3.6	3.0	4.4	4.0	1.0	4.0	5.0	2.0	-1.0
10	12.0	13.8	11.8	1.5	.5	2.1	7.0	0.0	4.0	6.0	0.0	-1.0
11	.4	-1.0	10.1	0.0	.8	8.2	0.0	0.0	4.0	8.0	4.0	-1.0
12	12.2	-1.0	0.0	0.0	0.0	1.4	0.0	0.0	8.0	2.0	0.0	-1.0

THIS REPORT IS FOR ST 3, BOTTOM SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	-1.0	0.0	.5	0.0	0.0	0.0	0.0	1.0	12.0	0.0	0.0
02	-1.0	-1.0	-1.0	2.5	0.0	.5	0.0	.8	0.0	0.0	0.0	0.0
03	-1.0	0.0	-1.0	0.0	0.0	2.1	0.0	0.0	15.0	1.0	0.0	0.0
04	.4	-1.0	5.1	0.0	0.0	0.0	0.0	0.0	1.3	5.0	1.0	0.0
05	-1.0	-1.0	15.5	3.0	2.1	1.4	0.0	0.0	3.8	11.0	8.0	2.0
06	22.0	-1.0	4.6	.9	.5	25.7	16.6	9.3	5.7	10.0	10.0	11.0
07	4.0	-1.0	0.0	13.9	0.0	12.0	7.4	4.7	2.0	6.0	20.0	7.0
08	-1.0	-1.0	0.0	3.0	6.5	2.9	1.4	4.7	2.0	14.0	0.0	1.0
09	16.9	-1.0	2.6	5.1	4.0	13.5	4.0	3.0	4.0	5.0	4.0	-1.0
10	12.0	17.2	11.8	1.5	1.6	2.1	14.8	0.0	4.0	6.0	0.0	-1.0
11	.9	-1.0	13.4	0.0	3.2	13.5	0.0	0.0	4.0	5.0	4.0	-1.0
12	16.2	-1.0	0.0	0.0	0.0	9.0	0.0	0.0	8.0	2.0	0.0	-1.0

THIS REPORT IS FOR ST 5, SURFACE SALINITY

CER PRCJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	0.0	0.0	0.0	2.0	0.0	0.0	6.2	2.0	6.0	0.0	4.0
02	-1.0	0.0	0.0	3.0	1.5	0.0	0.0	0.0	1.0	0.0	0.0	0.0
03	3.0	0.0	2.3	2.5	1.5	4.5	4.4	0.0	0.0	1.0	0.0	0.0
04	.4	.4	0.0	0.0	0.0	.6	2.1	0.0	0.0	5.0	2.0	0.0
05	10.6	0.0	0.0	2.0	2.1	17.3	2.9	0.0	0.0	8.0	5.0	3.0
06	11.2	0.0	8.0	3.0	0.0	9.0	2.9	0.0	2.0	9.0	0.0	7.0
07	7.0	1.0	.4	12.3	2.4	7.4	2.1	8.6	10.0	6.0	8.0	8.0
08	7.5	1.1	4.3	3.0	15.0	14.3	5.2	9.3	16.0	21.0	5.0	11.0
09	17.3	13.5	6.1	7.3	5.1	4.0	15.0	2.0	12.0	8.0	4.0	-1.0
10	18.8	16.1	10.1	2.0	3.1	9.0	20.2	7.0	12.0	15.0	11.0	-1.0
11	2.9	8.0	12.3	8.4	6.0	7.4	17.1	12.0	13.0	10.0	15.0	-1.0
12	15.9	0.0	2.1	0.0	1.3	0.0	12.4	5.0	9.0	9.0	18.0	-1.0

THIS REPORT IS FOR ST 5, BOTTOM SALINITY

DER PRCJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	0.0	0.0	1.7	2.0	0.0	5.9	7.0	2.0	11.0	2.0	8.0
02	-1.0	0.0	0.0	5.2	1.5	0.0	0.0	0.0	2.0	0.0	0.0	0.0
03	4.6	0.0	5.7	2.0	1.5	4.5	4.4	0.0	0.0	1.0	0.0	0.0
04	1.5	.4	0.0	0.0	0.0	8.2	9.0	0.0	0.0	9.0	2.0	0.0
05	18.0	0.0	8.0	2.0	2.1	24.2	2.9	0.0	4.0	9.0	7.0	3.0
06	11.2	0.0	19.5	2.0	.5	21.1	12.0	.8	2.0	15.0	2.0	15.0
07	28.0	4.2	4.8	10.1	14.4	12.8	2.9	13.2	20.0	18.0	15.0	9.0
08	22.0	11.5	10.3	14.4	12.0	15.0	15.0	10.1	11.0	25.0	14.0	17.0
09	18.0	5.3	20.9	12.0	6.2	8.7	15.0	5.0	14.0	15.0	5.0	-1.0
10	20.1	16.1	11.8	3.1	3.2	9.0	24.9	12.0	16.0	10.0	18.0	-1.0
11	3.5	10.8	15.1	17.9	6.0	18.8	19.4	12.0	16.0	12.0	30.0	-1.0
12	16.9	6.9	3.7	0.0	19.3	1.4	12.4	7.0	12.0	10.0	23.0	-1.0

THIS REPORT IS FOR ST 1A SURFACE SALINITY,

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	12.7	9.2	3.7	10.5	11.1	0.0	14.0	16.0	21.0	6.0	15.0
02	-1.0	5.1	19.5	7.9	10.5	14.0	15.0	10.1	8.0	11.0	12.0	25.0
03	-1.0	27.7	16.3	3.6	9.4	9.3	13.5	7.0	26.0	35.0	20.0	9.0
04	-1.0	13.0	5.3	4.1	16.8	27.5	11.2	11.7	10.0	20.0	24.0	9.0
05	-1.0	18.3	29.2	12.3	10.8	18.8	9.7	6.2	12.0	34.0	12.0	30.0
06	-1.0	15.3	18.3	31.2	17.2	34.0	18.8	31.1	33.0	21.0	26.0	28.0
07	18.7	24.2	23.0	18.3	17.1	16.6	20.4	24.1	12.0	34.0	33.0	32.0
08	27.9	17.7	13.2	15.0	18.0	16.1	6.7	17.1	19.0	24.0	15.0	17.0
09	22.6	27.7	20.5	16.3	21.0	18.9	15.0	10.0	14.0	15.0	16.0	-1.0
10	21.4	28.0	25.7	6.2	16.0	20.0	18.7	13.0	24.0	16.0	15.0	-1.0
11	-1.0	28.7	25.7	16.8	24.8	16.2	21.2	19.0	29.0	22.0	20.0	-1.0
12	22.4	21.8	9.1	22.1	.8	16.4	17.1	11.0	22.0	20.0	15.0	-1.0

THIS REPORT IS FOR ST 1A BOTTOM SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	23.0	8.0	5.9	19.5	15.1	0.0	16.3	17.0	22.0	20.0	28.0
02	-1.0	10.7	25.3	7.9	14.2	31.6	16.6	19.4	10.0	11.0	10.0	32.0
03	-1.0	32.6	20.8	5.8	10.5	9.3	25.7	17.9	26.0	35.0	8.0	23.0
04	-1.0	18.9	5.4	8.5	27.4	33.7	15.0	26.4	15.0	20.0	32.0	9.0
05	-1.0	20.7	29.2	25.2	10.8	20.4	24.9	9.3	17.8	35.0	29.0	31.0
06	-1.0	26.1	21.8	35.5	26.0	34.0	22.6	31.1	34.0	21.0	34.0	28.0
07	29.2	30.6	28.7	33.0	32.4	31.0	28.0	27.2	13.0	34.0	35.0	35.0
08	33.8	19.4	21.0	32.2	24.0	24.0	8.2	19.4	19.0	24.0	28.0	19.0
09	24.6	26.9	25.0	19.7	21.0	20.0	18.0	21.0	28.0	20.0	20.0	-1.0
10	29.6	27.7	28.4	8.4	23.7	23.4	21.8	16.0	24.0	10.0	22.0	-1.0
11	-1.0	28.7	33.2	18.4	25.3	20.3	22.8	22.0	29.0	22.0	24.0	-1.0
12	24.3	26.1	21.9	23.2	3.0	19.7	19.4	20.0	29.0	18.0	18.0	-1.0

THIS REPORT IS FOR ST 1B SURFACE SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	4.8	10.3	12.3	6.2	0.0	0.0	21.8	24.0	20.0	10.0	25.0
02	-1.0	2.2	12.6	9.6	10.5	10.8	6.7	1.6	12.0	12.0	10.0	9.0
03	-1.0	14.4	11.5	8.5	9.4	17.2	4.4	0.0	20.0	35.0	2.0	6.0
04	-1.0	20.0	7.1	6.3	13.7	9.8	18.1	20.2	13.0	21.0	20.0	5.0
05	-1.0	14.3	11.4	24.7	15.6	24.2	5.9	16.3	12.0	24.0	15.0	20.0
06	-1.0	2.9	18.3	32.2	10.8	25.7	15.0	21.8	32.0	22.0	30.0	26.0
07	19.5	18.1	26.4	26.8	11.7	27.0	15.8	24.1	28.0	34.0	25.0	25.0
08	23.0	17.9	15.5	8.5	30.8	23.0	26.4	17.9	20.0	32.0	20.0	14.0
09	26.6	30.9	15.0	12.1	21.5	21.8	27.5	26.0	24.0	18.0	18.0	-1.0
10	25.6	29.0	25.2	9.4	21.5	21.7	28.8	13.0	23.0	20.0	24.0	-1.0
11	30.9	26.4	24.2	16.8	9.0	16.7	19.5	19.0	31.0	20.0	30.0	-1.0
12	19.2	20.1	20.5	24.3	4.0	17.0	27.2	24.0	19.0	27.0	18.0	-1.0

THIS REPORT IS FOR ST 1B BOTTOM SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	30.2	25.3	32.6	25.3	26.8	4.4	24.1	30.0	28.0	30.0	30.0
02	-1.0	24.5	13.7	30.1	31.7	31.6	7.4	22.6	28.0	28.0	26.0	20.0
03	-1.0	32.0	13.8	27.9	28.5	30.0	21.1	2.3	22.0	35.0	15.0	8.0
04	-1.0	22.0	28.7	10.6	31.7	27.5	27.2	26.4	22.0	24.0	22.0	8.0
05	-1.0	30.0	25.6	31.7	30.0	32.5	19.6	23.3	24.0	29.0	31.0	25.0
06	-1.0	30.4	29.2	34.9	27.6	34.0	26.4	24.1	33.0	24.0	31.0	29.0
07	33.9	33.6	31.0	30.1	31.3	31.8	27.2	28.4	31.0	34.0	27.0	27.0
08	32.8	22.1	27.3	33.3	32.4	26.5	27.2	20.2	18.0	32.0	25.0	18.0
09	29.9	28.1	27.3	26.2	25.3	26.5	28.0	26.0	24.0	18.0	18.0	-1.0
10	30.5	31.6	32.6	23.2	23.7	28.8	29.6	18.0	26.0	25.0	28.0	-1.0
11	34.8	31.0	28.4	33.8	29.1	26.4	26.6	15.0	32.0	25.0	32.0	-1.0
12	27.2	32.7	30.5	28.5	27.0	27.3	27.2	25.0	20.0	29.0	20.0	-1.0

THIS REPORT IS FOR ST 1C SURFACE SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	1.4	12.1	1.6	7.3	0.0	2.1	22.6	26.0	15.0	8.0	22.0
02	-1.0	7.6	2.3	10.6	13.1	11.6	1.4	0.0	11.0	11.0	10.0	5.0
03	-1.0	5.7	2.3	11.7	14.7	6.1	3.6	0.0	15.0	25.0	1.0	2.0
04	-1.0	26.4	10.1	5.2	8.4	13.4	13.5	16.3	2.0	15.0	14.0	4.0
05	-1.0	13.9	12.0	8.5	18.0	20.4	7.4	4.7	16.0	19.0	15.0	15.0
06	-1.0	4.8	21.8	14.4	4.5	24.9	12.8	6.2	20.0	20.0	16.0	15.0
07	22.5	10.1	19.5	16.7	12.8	18.1	10.5	21.0	30.0	23.0	20.0	20.0
08	18.2	13.9	17.8	8.5	32.5	28.5	25.7	14.0	21.0	30.0	26.0	22.0
09	28.3	19.8	14.4	12.6	21.5	29.0	29.0	25.0	25.0	16.0	16.0	-1.0
10	29.3	20.7	33.7	5.2	22.6	21.5	31.9	27.0	24.0	12.0	20.0	-1.0
11	33.7	19.5	18.2	15.8	15.0	18.1	14.9	15.0	32.0	26.0	32.0	-1.0
12	19.3	18.4	18.7	16.8	6.2	20.3	16.3	13.0	18.0	24.0	14.0	-1.0

THIS REPORT IS FOR ST 1C BOTTOM SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	1.4	13.2	18.7	7.3	18.0	12.8	23.3	26.0	21.0	12.0	24.0
02	-1.0	8.6	5.2	22.5	20.0	25.8	3.6	7.0	18.0	12.0	15.0	10.0
03	-1.0	10.2	24.1	12.8	14.7	16.4	5.2	0.0	15.0	29.0	20.0	2.0
04	-1.0	26.8	12.1	11.7	15.8	18.1	19.6	16.3	8.0	15.0	18.0	21.0
05	-1.0	17.8	17.2	18.2	24.4	24.2	9.0	15.6	19.0	20.0	21.0	15.0
06	-1.0	5.5	28.7	27.4	20.4	31.8	16.6	9.3	22.0	26.0	25.0	30.0
07	24.7	16.6	19.5	21.2	32.4	20.4	15.8	23.5	30.0	27.0	25.0	22.0
08	20.3	16.3	26.7	24.7	31.2	28.7	27.2	14.8	23.0	31.0	27.0	26.0
09	28.6	24.7	21.9	20.0	22.6	30.0	29.5	26.0	25.0	18.0	16.0	-1.0
10	31.7	25.1	32.6	21.1	25.3	25.3	31.9	28.0	24.0	22.0	30.0	-1.0
11	33.7	25.3	23.0	23.2	21.5	21.8	23.5	15.0	32.0	21.0	34.0	-1.0
12	17.5	26.4	25.7	21.1	16.0	23.8	21.8	20.0	20.0	25.0	22.0	-1.0

THIS REPORT IS FOR ST 1X SURFACE SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	-1.0	-1.0	14.4	10.5	0.0	12.8	17.9	25.0	19.0	12.0	24.0
02	-1.0	-1.0	-1.0	12.8	12.6	12.4	3.6	1.6	14.0	10.0	16.0	5.0
03	-1.0	-1.0	-1.0	15.0	21.1	18.8	2.9	1.6	26.0	32.0	1.0	4.0
04	-1.0	-1.0	-1.0	5.2	11.5	14.0	18.8	24.1	7.6	19.0	18.0	5.0
05	-1.0	-1.0	-1.0	19.3	15.6	25.7	4.4	15.6	16.5	24.0	14.0	16.0
06	-1.0	-1.0	20.6	18.7	6.1	26.4	11.2	7.8	20.3	22.0	30.0	30.0
07	-1.0	-1.0	14.9	16.0	13.9	27.2	15.0	24.1	28.0	33.0	22.0	22.0
08	-1.0	-1.0	20.1	8.5	31.6	14.3	26.4	12.4	21.0	30.0	22.0	16.0
09	-1.0	-1.0	24.2	14.2	24.2	12.8	26.0	26.0	26.0	15.0	16.0	-1.0
10	-1.0	-1.0	28.4	9.4	23.7	18.1	28.8	24.0	24.0	10.0	25.0	-1.0
11	-1.0	-1.0	23.0	17.9	15.0	23.0	21.8	18.0	32.0	22.0	34.0	-1.0
12	-1.0	-1.0	25.7	23.2	1.9	12.0	26.4	25.0	19.0	26.0	18.0	-1.0

THIS REPORT IS FOR ST 1X BOTTOM SALINITY

DER PROJECT

	72	73	74	75	76	77	78	79	80	81	82	83
01	-1.0	-1.0	-1.0	14.4	10.5	0.0	12.8	17.9	28.0	28.0	12.0	24.0
02	-1.0	-1.0	-1.0	15.0	20.0	18.0	5.9	11.7	16.0	29.0	22.0	5.0
03	-1.0	-1.0	-1.0	16.0	21.1	18.8	2.9	2.3	27.0	31.0	25.0	7.0
04	-1.0	-1.0	-1.0	6.3	13.7	18.1	19.6	28.0	10.7	25.0	28.0	11.0
05	-1.0	-1.0	-1.0	19.3	15.6	25.7	9.0	18.7	19.1	25.0	27.0	18.0
06	-1.0	-1.0	22.9	26.8	9.3	31.8	18.1	9.3	22.7	28.0	32.0	30.0
07	-1.0	-1.0	14.9	18.2	24.8	23.7	15.8	25.2	29.0	34.0	25.0	22.0
08	-1.0	-1.0	22.1	19.3	32.0	16.6	27.2	14.0	22.0	30.0	22.0	23.0
09	-1.0	-1.0	24.2	14.2	24.2	18.1	27.5	26.0	26.0	20.0	18.0	-1.0
10	-1.0	-1.0	30.5	14.2	24.8	21.1	29.6	26.0	24.0	10.0	30.0	-1.0
11	-1.0	-1.0	23.0	19.0	15.0	23.7	23.3	18.0	32.0	15.0	34.0	-1.0
12	-1.0	-1.0	29.4	23.2	7.3	13.5	26.4	25.0	20.0	29.0	20.0	-1.0

Table 10: Seasonal averages of Apalachicola River Flow, local rainfall (Apalachicola, East Bay) and salinity in the Apalahcicola estuary (3/72 - 6/83). Winter, spring, summer, and fall (3 month) averages were used for the trend analysis.

THIS REPORT IS FOR STATION 1

DER PROJECT
SEASONAL AVERAGES

	RIVERFLOW	APAL RAIN	EB RAIN	SALINITY,T	SALINITY,B
7201	1286.5	15.8	24.3	-1.0	-1.0
7203	701.0	7.3	12.1	15.7	17.5
7206	494.3	11.7	21.9	17.9	23.7
7209	303.3	7.4	12.3	20.7	21.2
7212	1350.3	10.9	16.9	10.0	9.9
7303	1499.3	14.0	21.1	8.9	16.1
7306	769.7	9.9	21.6	7.8	15.7
7309	368.7	10.5	14.1	17.8	17.2
7312	1071.3	5.0	9.5	4.6	16.3
7403	809.0	11.1	16.6	4.4	13.4
7406	424.3	15.7	25.1	13.7	20.6
7409	345.7	16.6	16.2	20.2	23.8
7412	852.0	11.9	12.5	4.2	9.9
7503	1305.7	9.6	11.0	2.7	3.8
7506	759.0	23.1	30.7	6.7	18.7
7509	610.7	12.4	13.7	7.8	13.5
7512	798.7	9.4	9.7	4.8	9.1
7603	959.0	8.4	12.3	5.0	7.1
7606	607.3	10.7	15.8	11.6	23.7
7609	438.0	12.9	15.3	11.1	18.6
7612	947.0	10.5	12.5	1.0	11.2
7703	916.7	4.1	4.6	8.2	14.5
7706	348.0	10.9	13.2	21.4	28.5
7709	462.7	8.1	10.4	13.3	21.4
7712	1069.0	10.0	8.6	3.4	11.0
7803	1038.0	9.3	12.0	4.9	5.9
7806	497.3	13.0	24.5	10.0	15.6
7809	319.0	7.5	8.1	14.0	16.2
7812	687.7	8.6	14.0	8.3	12.2
7903	1226.7	7.7	14.0	3.9	8.3
7906	438.7	11.8	18.4	13.7	18.7
7909	467.3	17.7	29.16	10.3	16.3
7912	591.3	8.4	13.2	7.7	10.0
8003	1594.7	10.4	17.3	5.0	10.3
8006	451.7	13.7	19.0	17.7	23.3
8009	286.7	8.8	10.8	17.7	20.7
8012	443.0	4.7	5.2	6.0	17.3
8103	494.0	3.6	5.5	22.3	24.3
8106	279.3	17.9	20.2	19.0	23.0
8109	214.7	4.2	9.8	15.7	17.0
8112	812.0	12.2	14.2	8.3	13.0
8203	637.7	10.8	16.7	4.7	17.0
8206	478.3	17.7	18.4	9.7	21.3
8209	376.0	20.7	14.7	14.7	20.7
8212	-1.0	12.4	13.5	10.0	18.0
8303	-1.0	-1.0	-1.0	8.7	10.7
8306	-1.0	-1.0	-1.0	17.7	23.0

THIS REPORT IS FOR STATION 2

DER PROJECT
SEASONAL AVERAGES

	RIVERFLOW	APAL RAIN	EB RAIN	SALINITY,T	SALINITY,B
7201	1286.5	15.8	24.3	-1.0	-1.0
7203	701.0	7.3	12.1	3.9	20.2
7206	494.3	11.7	21.9	5.6	19.7
7209	303.3	7.4	12.3	10.0	17.8
7212	1350.3	10.9	16.9	.3	5.7
7303	1499.3	14.0	21.1	0.0	3.3
7306	769.7	9.9	21.6	4.6	14.7
7309	388.7	10.5	14.1	5.5	9.7
7312	1071.3	5.0	9.5	1.3	6.8
7403	809.0	11.1	16.6	1.7	15.5
7406	424.3	15.7	25.1	1.9	21.9
7409	345.7	16.6	16.2	5.5	23.4
7412	852.0	11.9	12.5	.7	12.8
7503	1305.7	9.6	11.0	1.0	1.0
7506	759.0	23.1	30.7	2.8	15.9
7509	610.7	12.4	13.7	.5	5.8
7512	798.7	9.4	9.7	1.7	1.7
7603	959.0	8.4	12.3	1.2	10.1
7606	607.3	10.7	15.8	1.6	20.4
7609	438.0	12.9	15.3	1.9	11.0
7612	947.0	10.5	12.5	.3	2.6
7703	916.7	4.1	4.6	2.9	14.2
7706	348.0	10.9	13.2	11.0	22.6
7709	462.7	8.1	10.4	5.7	17.8
7712	1069.0	10.0	8.6	0.0	3.0
7803	1038.0	9.3	12.0	.9	.7
7806	497.3	13.0	24.5	1.6	10.5
7809	319.0	7.5	8.1	10.8	12.6
7812	687.7	8.6	14.0	0.0	0.0
7903	1226.7	7.7	14.0	0.0	0.0
7906	438.7	11.8	18.4	.8	2.3
7909	467.3	17.7	29.6	.3	5.0
7912	591.3	8.4	13.2	0.0	3.7
8003	1594.7	10.4	17.3	0.0	0.0
8006	451.7	13.7	19.0	1.7	13.7
8009	286.7	8.8	10.8	4.3	7.3
8012	443.0	4.7	5.2	4.3	8.7
8103	494.0	3.6	5.5	3.7	5.3
8106	279.3	17.9	20.2	12.0	18.3
8109	214.7	4.2	9.8	5.0	11.0
8112	812.0	12.2	14.2	3.7	4.7
8203	637.7	10.8	16.7	.3	7.0
8206	478.3	17.7	18.4	1.3	10.7
8209	376.0	20.7	14.7	3.7	15.7
8212	-1.0	12.4	13.5	0.0	0.0
8303	-1.0	-1.0	-1.0	1.3	4.0
8306	-1.0	-1.0	-1.0	5.7	14.3

THIS REPORT IS FOR STATION 3

DER PROJECT
SEASONAL AVERAGES

	RIVERFLOW	APAL RAIN	EB RAIN	SALINITY,T	SALINITY,B
7201	1286.5	15.8	24.3	-1.0	-1.0
7203	701.0	7.3	12.1	.4	.4
7206	494.3	11.7	21.9	4.0	13.0
7209	303.3	7.4	12.3	8.8	9.9
7212	1350.3	10.9	16.9	12.2	16.2
7303	1499.3	14.0	21.1	-1.0	-1.0
7306	769.7	9.9	21.6	-1.0	-1.0
7309	388.7	10.5	14.1	-1.0	-1.0
7312	1071.3	5.0	9.5	-1.0	-1.0
7403	809.0	11.1	16.6	2.3	10.3
7406	424.3	15.7	25.1	1.5	1.5
7409	345.7	16.6	16.2	7.5	9.3
7412	852.0	11.9	12.5	1.0	1.0
7503	1305.7	9.6	11.0	.8	1.0
7506	759.0	23.1	30.7	3.6	5.9
7509	610.7	12.4	13.7	1.7	2.2
7512	798.7	9.4	9.7	0.0	0.0
7603	959.0	8.4	12.3	.4	.7
7606	607.3	10.7	15.8	4.2	2.3
7609	438.0	12.9	15.3	1.4	2.9
7612	547.0	10.5	12.5	0.0	.2
7703	916.7	4.1	4.6	.9	1.2
7706	348.0	10.9	13.2	8.0	13.5
7709	462.7	8.1	10.4	4.9	9.7
7712	1069.0	10.0	8.6	.5	3.0
7803	1038.0	9.3	12.0	0.0	0.0
7806	497.3	13.0	24.5	2.9	8.5
7809	319.0	7.5	8.1	3.7	6.3
7812	687.7	8.6	14.0	0.0	.3
7903	1226.7	7.7	14.0	0.0	0.0
7906	438.7	11.8	18.4	1.6	6.2
7909	467.3	17.7	29.6	.3	1.0
7912	591.3	8.4	13.2	.3	.3
8003	1594.7	10.4	17.3	1.0	6.7
8006	451.7	13.7	19.0	2.6	3.2
8009	286.7	8.8	10.8	4.0	4.0
8012	443.0	4.7	5.2	4.3	6.7
8103	494.0	3.6	5.5	5.0	5.7
8106	279.3	17.9	20.2	8.7	10.0
8109	214.7	4.2	9.8	6.3	5.3
8112	812.0	12.2	14.2	.7	.7
8203	637.7	10.8	16.7	2.0	3.0
8206	478.3	17.7	18.4	3.7	10.0
8209	376.0	20.7	14.7	2.0	2.7
8212	-1.0	12.4	13.5	0.0	0.0
8303	-1.0	-1.0	-1.0	.7	.7
8306	-1.0	-1.0	-1.0	5.0	6.3

THIS REPORT IS FOR STATION 5

DER PROJECT
SEASONAL AVERAGES

	RIVERFLOW	APAL RAIN	EB RAIN	SALINITY,T	SALINITY,B
7201	1286.5	15.8	24.3	-1.0	-1.0
7203	701.0	7.3	12.1	4.7	8.0
7206	494.3	11.7	21.9	8.6	20.4
7209	303.3	7.4	12.3	13.0	13.9
7212	1350.3	10.9	16.9	5.3	5.6
7303	1499.3	14.0	21.1	.1	.1
7306	769.7	9.9	21.6	.7	5.2
7309	388.7	10.5	14.1	12.5	10.7
7312	1071.3	5.0	9.5	0.0	2.3
7403	809.0	11.1	16.6	.8	4.6
7406	424.3	15.7	25.1	4.2	11.5
7409	345.7	16.6	16.2	9.5	15.9
7412	852.0	11.9	12.5	1.7	3.5
7503	1305.7	9.6	11.0	1.5	1.3
7506	759.0	23.1	30.7	6.1	8.8
7509	610.7	12.4	13.7	5.9	11.0
7512	798.7	9.4	9.7	1.2	1.2
7603	959.0	8.4	12.3	1.2	1.2
7606	607.3	10.7	15.8	5.8	9.0
7609	438.0	12.9	15.3	4.7	5.1
7612	947.0	10.5	12.5	.4	6.4
7703	916.7	4.1	4.6	7.5	12.3
7706	348.0	10.9	13.2	10.2	16.3
7709	462.7	8.1	10.4	5.8	12.2
7712	1069.0	10.0	8.6	0.0	2.4
7803	1038.0	9.3	12.0	3.1	5.4
7806	497.3	13.0	24.5	3.4	10.0
7809	319.0	7.5	8.1	17.4	19.8
7812	687.7	8.6	14.0	6.2	6.5
7903	1226.7	7.7	14.0	0.0	0.0
7906	438.7	11.8	18.4	6.0	8.0
7909	467.3	17.7	29.6	7.0	9.7
7912	591.3	8.4	13.2	2.7	3.7
8003	1594.7	10.4	17.3	0.0	1.3
8006	451.7	13.7	19.0	9.3	11.0
8009	286.7	8.8	10.8	12.3	15.3
8012	443.0	4.7	5.2	5.0	7.7
8103	494.0	3.6	5.5	4.7	6.3
8106	279.3	17.9	20.2	12.0	19.3
8109	214.7	4.2	9.8	11.0	12.3
8112	612.0	12.2	14.2	3.0	4.0
8203	637.7	10.8	16.7	2.3	3.0
8206	478.3	17.7	18.4	4.3	10.3
8209	376.0	20.7	14.7	10.0	17.7
8212	-1.0	12.4	13.5	7.3	10.3
8303	-1.0	-1.0	-1.0	1.0	1.0
8306	-1.0	-1.0	-1.0	3.7	13.7

THIS REPORT IS FOR STATION 1A

DER PROJECT
SEASONAL AVERAGES

	RIVERFLOW	APAL RAIN	EB RAIN	SALINITY,T	SALINITY,B
7201	1286.5	15.8	24.3	-1.0	-1.0
7203	701.0	7.3	12.1	-1.0	-1.0
7206	494.3	11.7	21.9	23.3	31.5
7209	303.3	7.4	12.3	22.0	27.1
7212	1350.3	10.9	16.9	13.4	19.3
7303	1499.3	14.0	21.1	19.7	24.1
7306	769.7	9.9	21.6	19.1	25.4
7309	388.7	10.5	14.1	28.1	27.8
7312	1071.3	5.0	9.5	16.8	20.5
7403	809.0	11.1	16.6	15.9	18.5
7406	424.3	15.7	25.1	18.2	23.8
7409	345.7	16.6	16.2	24.0	28.9
7412	852.0	11.9	12.5	6.9	11.9
7503	1305.7	9.6	11.0	5.7	13.2
7506	759.0	23.1	30.7	21.5	33.6
7509	610.7	12.4	13.7	13.1	15.5
7512	798.7	9.4	9.7	14.4	19.0
7603	959.0	8.4	12.3	12.3	16.2
7606	607.3	10.7	15.8	17.4	27.5
7609	438.0	12.9	15.3	20.6	23.3
7612	947.0	10.5	12.5	8.6	16.6
7703	916.7	4.1	4.6	18.5	21.1
7706	348.0	10.9	13.2	22.2	29.7
7709	462.7	8.1	10.4	18.4	21.2
7712	1069.0	10.0	8.6	10.5	12.1
7803	1038.0	9.3	12.0	11.5	21.9
7806	497.3	13.0	24.5	15.3	19.6
7809	319.0	7.5	8.1	18.3	20.9
7812	687.7	8.6	14.0	13.7	18.4
7903	1226.7	7.7	14.0	8.3	17.9
7906	438.7	11.8	18.4	24.1	25.9
7909	467.3	17.7	29.6	14.0	19.7
7912	591.3	8.4	13.2	11.7	15.7
8003	1594.7	10.4	17.3	16.0	19.6
8006	451.7	13.7	19.0	21.3	22.0
8009	286.7	8.8	10.8	22.0	27.0
8012	443.0	4.7	5.2	18.0	20.7
8103	494.0	3.6	5.5	29.7	30.0
8106	279.3	17.9	20.2	26.3	26.3
8109	214.7	4.2	9.8	17.7	17.3
8112	812.0	12.2	14.2	12.7	16.0
8203	637.7	10.8	16.7	18.7	23.0
8206	478.3	17.7	18.4	24.7	32.3
8209	376.0	20.7	14.7	17.0	22.0
8212	-1.0	12.4	13.5	18.7	26.0
8303	-1.0	-1.0	-1.0	16.0	21.0
8306	-1.0	-1.0	-1.0	25.7	27.3

THIS REPORT IS FOR STATION 1B

DER PROJECT
SEASONAL AVERAGES

	RIVERFLOW	APAL RAIN	EB RAIN	SALINITY,T	SALINITY,B
7201	1286.5	15.8	24.3	-1.0	-1.0
7203	701.0	7.3	12.1	-1.0	-1.0
7206	494.3	11.7	21.9	21.3	33.4
7209	303.3	7.4	12.3	27.7	31.7
7212	1350.3	10.9	16.9	3.7	27.3
7303	1499.3	14.0	21.1	16.2	28.0
7306	769.7	9.9	21.6	13.0	28.7
7309	388.7	10.5	14.1	28.8	30.2
7312	1071.3	5.0	9.5	14.3	23.9
7403	809.0	11.1	16.6	10.0	22.7
7406	424.3	15.7	25.1	20.1	29.2
7409	345.7	16.6	16.2	21.5	29.4
7412	652.0	11.9	12.5	14.1	31.1
7503	1305.7	9.6	11.0	13.2	23.4
7506	759.0	23.1	30.7	22.5	32.8
7509	610.7	12.4	13.7	12.8	27.7
7512	798.7	9.4	9.7	13.7	28.5
7603	959.0	8.4	12.3	12.9	30.1
7606	607.3	10.7	15.8	17.8	30.4
7609	438.0	12.9	15.3	17.3	26.0
7612	947.0	10.5	12.5	4.9	28.5
7703	916.7	4.1	4.6	17.1	30.0
7706	348.0	10.9	13.2	26.9	30.8
7709	462.7	8.1	10.4	20.1	27.2
7712	1069.0	10.0	8.6	7.9	13.0
7803	1038.0	9.3	12.0	9.5	22.6
7806	497.3	13.0	24.5	19.1	26.9
7809	319.0	7.5	8.1	25.3	28.1
7812	687.7	8.6	14.0	16.9	24.6
7903	1226.7	7.7	14.0	12.2	17.3
7906	438.7	11.8	18.4	21.3	24.2
7909	467.3	17.7	29.6	21.0	19.7
7912	591.3	8.4	13.2	20.0	27.7
8003	1594.7	10.4	17.3	15.0	22.7
8006	451.7	13.7	19.0	26.7	27.3
8009	286.7	8.8	10.8	26.0	27.3
8012	443.0	4.7	5.2	17.0	25.3
8103	494.0	3.6	5.5	26.7	29.3
8106	279.3	17.9	20.2	29.3	30.0
8109	214.7	4.2	9.8	19.3	22.7
8112	812.0	12.2	14.2	15.7	28.3
8203	637.7	10.8	16.7	12.3	22.7
8206	478.3	17.7	18.4	25.0	27.7
8209	376.0	20.7	14.7	24.0	26.0
8212	-1.0	12.4	13.5	17.3	23.3
8303	-1.0	-1.0	-1.0	10.3	13.7
8306	-1.0	-1.0	-1.0	21.7	24.7

THIS REPORT IS FOR STATION 1C

DER PROJECT
SEASONAL AVERAGES

	RIVERFLOW	APAL RAIN	EB RAIN	SALINITY,T	SALINITY,B
7201	1286.5	15.8	24.3	-1.0	-1.0
7203	701.0	7.3	12.1	-1.0	-1.0
7206	494.3	11.7	21.9	20.4	22.5
7209	303.3	7.4	12.3	30.4	31.3
7212	1350.3	10.9	16.9	9.4	9.2
7303	1499.3	14.0	21.1	15.3	18.3
7306	769.7	9.9	21.6	9.6	12.8
7309	388.7	10.5	14.1	20.0	25.0
7312	1071.3	5.0	9.5	10.9	14.9
7403	809.0	11.1	16.6	8.1	17.8
7406	424.3	15.7	25.1	19.7	25.0
7409	345.7	16.6	16.2	22.1	25.8
7412	652.0	11.9	12.5	10.3	22.3
7503	1305.7	9.6	11.0	8.5	14.2
7506	759.0	23.1	30.7	13.2	24.4
7509	610.7	12.4	13.7	11.2	21.4
7512	798.7	9.4	9.7	12.4	16.1
7603	959.0	8.4	12.3	13.7	18.3
7606	607.3	10.7	15.8	16.6	28.0
7609	438.0	12.9	15.3	19.7	23.1
7612	947.0	10.5	12.5	5.9	20.3
7703	916.7	4.1	4.6	13.3	19.6
7706	348.0	10.9	13.2	23.8	27.0
7709	462.7	8.1	10.4	22.9	25.7
7712	1069.0	10.0	8.6	7.9	13.4
7803	1038.0	9.3	12.0	8.2	11.3
7806	497.3	13.0	24.5	16.3	19.9
7809	319.0	7.5	8.1	25.3	28.3
7812	687.7	8.6	14.0	13.0	17.4
7903	1226.7	7.7	14.0	7.0	10.6
7906	438.7	11.8	18.4	13.7	15.9
7909	467.3	17.7	29.6	22.3	23.0
7912	591.3	8.4	13.2	16.7	21.3
8003	1594.7	10.4	17.3	11.0	14.0
8006	451.7	13.7	19.0	23.7	25.0
8009	286.7	8.8	10.8	27.0	27.0
8012	443.0	4.7	5.2	14.7	17.7
8103	494.0	3.6	5.5	19.7	21.3
8106	279.3	17.9	20.2	24.3	28.0
8109	214.7	4.2	9.8	13.0	20.3
8112	812.0	12.2	14.2	14.0	17.3
8203	637.7	10.8	16.7	10.0	19.7
8206	478.3	17.7	18.4	20.7	25.7
8209	376.0	20.7	14.7	22.7	26.7
8212	-1.0	12.4	13.5	13.7	18.7
8303	-1.0	-1.0	-1.0	7.0	12.7
8306	-1.0	-1.0	-1.0	19.0	26.0

THIS REPORT IS FOR STATION 1X

DER PROJECT
SEASONAL AVERAGES

	RIVERFLOW	APAL RAIN	EB RAIN	SALINITY,T	SALINITY,B
7201	1286.5	15.8	24.3	-1.0	-1.0
7203	701.0	7.3	12.1	-1.0	-1.0
7206	494.3	11.7	21.9	-1.0	-1.0
7209	303.3	7.4	12.3	-1.0	-1.0
7212	1350.3	10.9	16.9	-1.0	-1.0
7303	1499.3	14.0	21.1	-1.0	-1.0
7306	769.7	9.9	21.6	-1.0	-1.0
7309	388.7	10.5	14.1	-1.0	-1.0
7312	1071.3	5.0	9.5	-1.0	-1.0
7403	809.0	11.1	16.6	-1.0	-1.0
7406	424.3	15.7	25.1	13.5	20.0
7409	345.7	16.6	16.2	25.2	25.9
7412	852.0	11.9	12.5	17.6	19.3
7503	1305.7	9.6	11.0	13.2	13.9
7506	759.0	23.1	30.7	14.4	21.4
7509	610.7	12.4	13.7	13.8	15.8
7512	798.7	9.4	9.7	15.4	17.9
7603	959.0	8.4	12.3	16.1	16.8
7606	607.3	10.7	15.8	17.2	22.0
7609	438.0	12.9	15.3	21.0	21.3
7612	547.0	10.5	12.5	4.8	8.4
7703	516.7	4.1	4.6	19.5	20.9
7706	348.0	10.9	13.2	22.6	25.7
7709	462.7	8.1	10.4	19.6	22.6
7712	1069.0	10.0	8.6	9.5	10.7
7803	1038.0	9.3	12.0	8.7	10.5
7806	497.3	13.0	24.5	17.5	20.4
7809	219.0	7.5	8.1	25.5	26.8
7812	687.7	8.6	14.0	15.3	18.7
7903	1226.7	7.7	14.0	13.8	16.3
7906	438.7	11.8	18.4	14.8	16.2
7909	467.3	17.7	29.6	22.7	23.3
7912	591.3	8.4	13.2	21.3	23.0
8003	1594.7	10.4	17.3	16.7	18.9
8006	451.7	13.7	19.0	23.1	24.6
8009	286.7	8.8	10.8	27.3	27.3
8012	443.0	4.7	5.2	16.0	25.7
8103	494.0	3.6	5.5	25.0	27.0
8106	279.3	17.9	20.2	28.3	30.7
8109	214.7	4.2	9.8	15.7	15.0
8112	812.0	12.2	14.2	18.0	21.0
8203	637.7	10.8	16.7	11.0	26.7
8206	478.3	17.7	18.4	24.7	26.3
8209	376.0	20.7	14.7	25.0	27.3
8212	-1.0	12.4	13.5	15.7	16.3
8303	-1.0	-1.0	-1.0	8.3	12.0
8306	-1.0	-1.0	-1.0	22.7	24.0

THIS REPORT IS FOR SALINITY,T

DER PROJECT
SEASONAL AVERAGES

	STATION 1	STATION 2	STATION 3	STATION 5	STATION 1A	STATION 1B	STATION 1C	STATION 1X
7201	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7203	15.7	3.9	0.4	4.7	-1.0	-1.0	-1.0	-1.0
7206	17.9	5.6	4.0	8.6	23.3	21.3	20.4	-1.0
7209	20.7	10.0	8.8	13.0	22.0	27.7	30.4	-1.0
7212	10.0	.3	12.2	5.3	13.4	8.7	9.4	-1.0
7303	8.9	0.0	-1.0	.1	19.7	16.2	15.3	-1.0
7306	7.8	4.6	-1.0	.7	19.1	13.0	9.6	-1.0
7309	17.8	5.5	-1.0	12.5	28.1	28.8	20.0	-1.0
7312	4.6	1.3	-1.0	0.0	16.8	14.3	10.9	-1.0
7403	4.4	1.7	2.3	.8	16.9	10.0	8.1	-1.0
7406	13.7	1.9	1.5	4.2	18.2	20.1	19.7	18.5
7409	20.2	6.5	7.5	9.5	24.0	21.5	22.1	25.2
7412	4.2	.7	1.0	1.7	6.9	14.1	10.3	17.6
7503	2.7	1.0	.8	1.5	6.7	13.2	8.5	13.2
7506	6.7	2.8	3.6	6.1	21.5	22.5	13.2	14.4
7509	7.8	.5	1.7	5.9	13.1	12.8	11.2	13.8
7512	4.8	1.7	0.0	1.2	14.4	13.7	12.4	15.4
7603	5.0	1.2	.4	1.2	12.3	12.9	13.7	16.1
7606	11.6	1.6	4.2	5.8	17.4	17.8	16.6	17.2
7609	11.1	1.9	1.4	4.7	20.6	17.3	19.7	21.0
7612	1.0	.3	0.0	.4	8.6	4.9	5.9	4.8
7703	8.2	2.9	.9	7.5	18.5	17.1	13.3	19.5
7706	21.4	11.0	8.0	10.2	22.2	26.9	23.8	22.6
7709	13.3	5.7	4.9	6.8	18.4	20.1	22.9	19.6
7712	3.4	0.0	.5	0.0	10.5	7.9	7.9	9.5
7803	4.9	.9	0.0	3.1	11.5	9.5	8.2	8.7
7806	10.0	1.6	2.9	3.4	15.3	19.1	16.3	17.5
7809	14.0	10.8	3.7	17.4	18.3	25.3	25.3	25.5
7812	8.3	0.0	0.0	5.2	13.7	16.9	13.0	15.3
7903	3.9	0.0	0.0	0.0	8.3	12.2	7.0	13.8
7906	13.7	.8	1.6	6.0	24.1	21.3	13.7	14.8
7909	10.3	.3	.3	7.0	14.0	21.0	22.3	22.7
7912	7.7	0.0	.3	2.7	11.7	20.0	16.7	21.3
8003	6.0	0.0	1.0	3.0	16.0	15.0	11.0	16.7
8006	17.7	1.7	2.6	9.3	21.3	26.7	23.7	23.1
8009	17.7	4.3	4.0	12.3	22.0	26.0	27.0	27.3
8012	6.0	4.3	4.3	5.0	18.0	17.0	14.7	16.0
8103	22.3	3.7	5.0	4.7	29.7	26.7	19.7	25.0
8106	19.0	12.0	8.7	12.0	26.3	29.3	24.3	28.3
8109	15.7	5.0	6.3	11.0	17.7	19.3	18.0	15.7
8112	8.3	3.7	.7	3.0	12.7	15.7	14.0	18.0
8203	4.7	.3	2.0	2.3	18.7	12.3	10.0	11.0
8206	9.7	1.3	3.7	4.3	24.7	25.0	20.7	24.7
8209	14.7	3.7	2.0	10.0	17.0	24.0	22.7	25.0
8212	10.0	0.0	0.0	7.3	18.7	17.3	13.7	15.7
8303	8.7	1.3	.7	1.0	16.0	10.3	7.0	8.3
8306	17.7	5.7	6.0	8.7	25.7	21.7	19.0	22.7

THIS REPORT IS FOR SALINITY, B

CER PROJECT
SEASONAL AVERAGES

	STATION 1	STATION 2	STATION 3	STATION 5	STATION 1A	STATION 1B	STATION 1C	STATION 1X
7201	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
7203	17.5	20.2	0.4	8.0	-1.0	-1.0	-1.0	-1.0
7206	23.7	19.7	13.0	20.4	31.5	33.4	22.5	-1.0
7209	21.2	17.8	9.9	13.9	27.1	31.7	31.3	-1.0
7212	9.9	5.7	16.2	5.6	19.3	27.3	9.2	-1.0
7303	16.1	3.3	-1.0	.1	24.1	28.0	18.3	-1.0
7306	15.7	14.7	-1.0	5.2	25.4	28.7	12.8	-1.0
7309	17.2	9.7	-1.0	10.7	27.8	30.2	25.0	-1.0
7312	16.3	6.8	-1.0	2.3	20.5	23.9	14.9	-1.0
7403	13.4	15.5	10.3	4.6	18.5	22.7	17.8	-1.0
7406	20.6	21.9	1.5	11.5	23.8	29.2	25.0	20.0
7409	23.8	23.4	9.3	15.9	28.9	29.4	25.8	25.9
7412	9.9	12.8	1.0	3.5	11.9	31.1	22.3	19.3
7503	3.8	1.0	1.0	1.3	13.2	23.4	14.2	13.9
7506	18.7	15.9	5.9	8.8	33.6	32.8	24.4	21.4
7509	13.5	5.8	2.2	11.0	15.5	27.7	21.4	15.8
7512	9.1	1.7	0.0	1.2	19.0	28.5	16.1	17.9
7603	7.1	10.1	.7	1.2	16.2	30.1	18.3	16.8
7606	23.7	20.4	2.3	9.0	27.5	30.4	28.0	22.0
7609	18.6	11.0	2.9	5.1	23.3	26.0	23.1	21.3
7612	11.2	2.6	.2	6.4	16.6	28.5	20.3	8.4
7703	14.5	14.2	1.2	12.3	21.1	30.0	19.6	20.9
7706	28.5	22.6	13.5	16.3	29.7	30.8	27.0	25.7
7709	21.4	17.8	9.7	12.2	21.2	27.2	25.7	22.6
7712	11.0	3.0	3.0	2.4	12.1	13.0	13.4	10.7
7803	5.9	.7	0.0	5.4	21.9	22.6	11.3	10.5
7806	15.6	10.5	8.5	10.0	19.6	26.9	19.9	20.4
7809	16.2	12.6	6.3	19.8	20.9	28.1	28.3	26.8
7812	12.2	0.0	.3	6.5	18.4	24.6	17.4	18.7
7903	8.3	0.0	0.0	0.0	17.9	17.3	10.6	16.3
7906	18.7	2.3	6.2	8.0	25.9	24.2	15.9	16.2
7909	16.3	5.0	1.0	9.7	19.7	19.7	23.0	23.3
7912	10.0	3.7	.3	3.7	15.7	27.7	21.3	23.0
8003	10.3	0.0	6.7	1.3	19.6	22.7	14.0	18.9
8006	23.3	13.7	3.2	11.0	22.0	27.3	25.0	24.6
8009	20.7	7.3	4.0	15.3	27.0	27.3	27.0	27.3
8012	17.3	8.7	6.7	7.7	20.7	25.3	17.7	25.7
8103	24.3	5.3	5.7	6.3	30.0	29.3	21.3	27.0
8106	23.0	18.3	10.0	19.3	26.3	30.0	28.0	30.7
8109	17.0	11.0	5.3	12.3	17.3	22.7	20.3	15.0
8112	13.0	4.7	.7	4.0	16.0	28.3	17.3	21.0
8203	17.0	7.0	3.0	3.0	23.0	22.7	19.7	26.7
8206	21.3	10.7	10.0	10.3	32.3	27.7	25.7	26.3
8209	20.7	15.7	2.7	17.7	22.0	26.0	26.7	27.3
8212	18.0	0.0	0.0	10.3	26.0	23.3	18.7	16.3
8303	10.7	4.0	.7	1.0	21.0	13.7	12.7	12.0
8306	23.0	14.3	6.3	13.7	27.3	24.7	26.0	24.0

Table 11

Salinity
Pearson Correlation

Station	1	2	3	5	1A	1B	1C	1X
Flow	-.55*	-.38*	-.43*	-.64*	-.43*	-.42*	-.61*	-.51*
EB Rain	-.09	-.10	.02	-.16	-.02	-.002	-.09	.01
AP Rain	-.10	-.09	-.04	-.08	-.04	.007	-.03	-.003

* = significant at .01

Table 12

Analysis of Covariance

Salinity p-values

	1A	1B	1C	1	2	3	5
Cov	.001	.001	.001	.001	.001	.001	.001
TorB	.001*	.001	.001	.001*	.001	.001*	.001*
Mon	.001	.002	.001	.001	.001	.001	.001
Yr	.001	.001	.001	.001	.001	.001	.001
TM	.403	.002*	.853	.174	.001*	.101	.195
TY	.060	.001*	.003*	.235	.001*	.296	.516
MY	.001*	.001*	.001*	.001*	.001*	.001*	.001*

Cov = Covariate (Riverflow)

TorB = Top/Bottom Main Effect

Mon = Month Main Effect

Yr = Year Main Effect

TM = Top/Bottom by Month Interaction

TY = Top/Bottom by Year Interaction

MY = Month by Year Interaction

Table 13. Dates of dredging activities and sampling events at stations 1, 2, and 1B in Apalachicola Bay. The storm event was associated with a hurricane in the northern Gulf of Mexico (9/27/75). Dredge events were in the immediate vicinity of our sampling stations.

A. Two-mile Channel and Intracoastal Waterway (stations 1 and 2)

Sampled	Dredged	
11/16/75	11/20-11/26/75	station 2
12/17/75	12/2-12/3/75	station 2
3/19/76	3/7-3/31/75	station 1
4/21/76	4/1/4/31/76	station 1
3/21/77	3/29-3/31/77	station 2
4/28/77	4/20-4/25/77	station 2
5/23/78	5/8-5/17 & 5/30-5/31/78	station 2
9/2/75	9/23/75 STORM	

B. Sike's Cut (station 1B)

7/7/75	7/20-7/24/75	station 1B
3/19/76	3/24-3/27/76	station 1B
6/29/78	6/7-6/30/78	station 1B
7/12/78	7/1-7/12/78	station 1B
9/27/75	9/23/75 STORM	(S on graphs)

Table 14: Maximum daily average wind velocities and maximum wind velocities (per month) in the Apalachicola Bay region from 1975 through 1978. Data were provided by the National Oceanic and Atmospheric Administration (Apalachicola, Florida).

Month	Max. Daily Avg Speed (Day)	Max Speed (Date) Dir
1/75	---	26 (10) SE
2/75	---	26 (22) E
3/75	---	31 (18) S
4/75	---	24 (3) NW (4) N
5/75	---	23 (15) SE
6/75	---	---
7/75	10.9 (17, 2)	33 (6) E
8/75	10.1 (5)	18 (6) W (28) S
9/75	18.3 (23)	32 (23) SW
10/75	14.7 (16)	25 (17) SW
11/75	18.1 (13)	24 (12) N
12/75	15.2 (29)	26 (25) NW
1/76	17.0 (8)	25 (16) NW
2/76	14.7 (22)	25 (1) NW (2) N
3/76	12.8 (16)	23 (9) NW (27) N
4/76	10.8 (25)	17 (1, 7, 16, 17, 25, 26)
5/76	14.2 (14)	26 (28) S
6/76	11.1 (5)	21 (4) N
7/76	10.4 (13, 14)	17 (6, 14, 22)
8/76	11.5 (18)	23 (30) E
9/76	11.8 (12)	19 (12) SW

Table 14 (continued):

Month	Max. Daily Avg Speed (Day)	Max Speed (Date) Dir
10/76	12.5 (30)	22 (25) NW
11/76	14.4 (30)	22 (8) N
12/76	---	---
1/77	17.3 (10)	26 (3) SE
2/77	14.0 (16)	23 (24) NW
3/77	15.2 (28)	26 (22) N
4/77	13.7 (22)	24 (5) NW
5/77	13.1 (11)	19 (10, 11, 13)
6/77	10.4 (6)	22 (7) NW
7/77	11.8 (17)	28 (16) SE
8/77	15.8 (7)	32 (28) SE
9/77	15.1 (3)	23 (3) SE
10/77	12.8 (12)	21 (12) N
11/77	---	---
12/77	---	---
1/78	16.0 (26)	32 (9) N
2/78	14.4 (22)	28 (21) NW
3/78	15.2 (10)	26 (8) SE (9) NW
4/78	14.0 (26)	25 (26) NW
5/78	13.2 (3)	23 (3) SE
6/78	11.2 (16, 17)	31 (28) SE
7/78	10.5 (21)	21 (24) SW
8/78	9.5 (8)	22 (21) N
9/78	10.6 (30)	24 (2) SE

Table 14 (continued):

Month	Max. Daily Avg Speed (Day)	Max Speed (Date) Dir
10/78	10.6 (17)	17 (12) SE (15) NE
11/78	9.6 (27)	16 (27) N
12/78	13.7 (9)	24 (9) N

Table 15: Review of the short-term response of various physical and chemical water quality features of the Apalachicola estuary to high wind in the Apalachicola region. T = Surface; B = Bottom. Day readings taken from 1500-1615; night readings taken from 1930-2230. Color in J.T.U.; turbidity in Pt-Co units; temperature in ^{o}C; salinity in ppt. Readings on 12/14/83 taken from 1100-1430.

Wind 20-25 N-NW (gusts to 30 knots) Day 2/23/78					Wind 5-10 W Night 2/23/78				12/14/83 Winds 15-30 W (there was rain on the preceding day) Unprotected on west wind					Protected on west wind				
Sta.	Color	Turb	Temp	Salin	Color	Turb	Temp	Salin	Sta.	Color	Turb	Temp	Salin	Sta.	Color	Turb	Temp	
5C T	385	33	11.8	0	480	41	10.8	0	5A T	125	26	15.0	9	5B T	145	9	15.2	9
5C B	380	38	11.8	0	535	46	10.8	0	5A B	150	31	15.0	9	5B B	145	9	15.1	9
5B T	355	37	11.1	0	420	45	11.7	0	5 T	185	60	15.1	8	4A T	80	15	15.5	9
5B B	360	38	11.0	0	430	46	11.7	0	5 B	200	60	15.1	8	4A B	80	15	15.5	9
4A T	295	41	11.0	0	280	51	10.3	0										
4A B	300	48	11.1	0	310	56	10.2	0										

Station 5 is the least protected station of the group.

Avg. Daily   Highest Wind   Rain   Station 5B   Station 7, Surface   Station 7, Bottom

Table 16: Analysis of Variance of specific physical/chemical factors at various stations in Apalachicola Bay taken before and after the cessation of dredging in 1978.

	T	D	M	TD	TM	DM
D.O.						
1A	<.0001*	.0128†	<.0001*	.7373	.5739	.8349
1B	.0009*	.0083*	<.0001*	.2035	.2936	.9476
1C	.0003*	.0005*	<.0001*	.1247	.0335†	.9628
1X	.0359†	.0020*	<.0001*	.0042*	.8551	.6709
Log(color+1)						
1A	.7899	.2220	.0323†	.3739	.2165	.7040
1B	.0226†	.1415	.0703	.0798	.0181†	.1846
1C	.0044*	.1823	.0068†	.0059*	.0611	.6007
1X	.9004	.3271	.3412	.4570	.1461	.3977
Log(turbid.+1)						
1A	.0007*	.0456†	.1284	.9953	.5068	.6725
1B	.0009*	.0612	.3780	.1621	.0164†	.8044
1C	.0028*	.0192†	.2038	.2686	.1195	.9965
1X	.0031*	.0369†	.6931	.0189†	.3467	.3665
Temperature						
1A	.0006*	.6839	<.0001*	.2922	.0424†	.7531
1B	.0012*	.6768	<.0001*	.2056	.0167†	.8693
1C	.0013*	.7338	<.0001*	.9122	.5451	.9326
1X	.0066*	.7162	<.0001*	.8835	.1070	.9626

Table 16 (continued):

	T	D	M	TD	TM	DM
Salinity						
1A	<.0001*	.3213	.0001*	.2677	.6350	.4924
1B	<.0001*	.4621	<.0001*	.0039*	.0002*	.7009
1C	<.0001*	.1936	<.0001*	.0339†	.5409	.5669
1X	.0005*	.0416†	.1738	.4376	.0742	.9831

7/73 - 6/83 Stations 1A, 1B, 1C significant at †.05 *.01

7/74 - 6/82 Station 1X

T = Top/Bottom Main Effect

D = During/After Dredging Main Effect

M = Month Main Effect

TD = Top/Bottom by During/After Interaction

TM = Top/Bottom by Month Interaction

DM = During/After by Month Interaction

ST 1A, 1B, 1C
7/73 - 6/83 Data was used

ST 1X
7/74 - 6/82 Data was used

T 1 = Surface
2 = Bottom

D 1 = During
2 = After

M 1 = July 7 = Jan
2 = Aug 8 = Feb
3 = Sep 9 = Mar
4 = Oct 10 = Apr
5 = Nov 11 = May
6 = Dec 12 = Jun

Table 17: Mean (surface) salinities (ppt) in the Apalachicola Bay system before (August, 1953-August, 1954) and after (June, 1973-May, 1974) the opening of Sike's Cut. Comparison is made during periods of comparable rainfall and river flow (after Dawson, 1955, and Livingston, 1979).

Station	(1953-1954)	(1973-1974)
1	14.1	8.6
1A	19.8	20.3
1B	5.0	15.2
1E	16.8	15.0
1C	19.3	16.8
2	6.6	3.1
3	5.7	4.3
4	7.4	4.3
5	7.7	2.8
5A	7.3	4.8
7	2.7	---

Table 18: Correlation coefficients for fish (A) and invertebrate (B) indices taken at the Apalachicola stations over the study period (1972-1983).

A. FISHES

	NIND	NSP	BRDIV	HURL	BREVN
NSP	.146				
BRDIV	-.113	.624			
HURL	-.179	.235	.788		
BREVN	-.212	-.022	.616	.929	
LNIND	.438	.588	.187	-.187	-.339

B. INVERTEBRATES

	NIND	NSP	BRDIV	HURL	BREVN
NSP	.250				
BRDIV	.073	.892			
HURL	-.064	.621	.803		
BREVN	-.074	.529	.750	.954	
LNIND	.600	.618	.463	.154	.170

Table 19: ANOVA for fish and invertebrate indices before (1975-77) and after (1979-81) the cessation of dredging at Sike's Cut in 1978.

	STA	DRE	MON	SD	SM	DM
Log(number of individuals+1)						
Fish	.8740	.2638	.0023*	.9558	.1826	.0864
Invertebrates	.0101*	.7197	.1970	.3399	.2365	.7613
Number of species						
Fish	.2564	.0429*	.0071*	.2752	.5158	.3468
Invertebrates	.0092*	.7994	.4393	.1780	.2790	.7708
Brillouin diversity						
Fish	.7632	.0671	.0037*	.1935	.7566	.3918
Invertebrates	.0085*	.7511	.4101	.2003	.2078	.7559
Hurlbert diversity						
Fish	.5554	.1167	.4642	.3131	.2460	.4969
Invertebrates	.0329*	.9328	.3939	.1571	.0779	.9909
Brillouin evenness						
Fish	.3721	.1589	.6686	.3150	.6262	.1491
Invertebrates	.0559	.8887	.4123	.1311	.0827	.9726

STA = station main effect

DRE = dredge main effect

MON = month main effect

SD = station by dredge interaction

SM = station by month interaction

DM = dredge by month interaction

* = significant at $p < 0.05$

Table 19 (continued):

Factors in Community Parameter ANOVA, stations 1A and 1B

STA Station main effect: Is the average for station 1A different from that for station 1B when averaged over all times?

DRE Dredge main effect: Is the average of all points (regardless of station) during dredging different from that after dredging?

MON Month main effect: Is there at least one month whose mean differs from another month (averaged over station and time)?

SD Station by dredge interaction: Does the level of station influence the difference between stations?

SM Station by month interaction: Does the level of month influence the difference between stations?

DM Dredge by month interaction: Does the level of month influence the during/after dredge effect?

During dredging years are 75, 76, 77

After dredging years are 79, 80, 81

Table 20: Analysis of variance of selected physical/chemical variables taken at three stations in the Apalachicola estuary before and after the development of the two-mile extension in 1976.

3/72 - 8/83 Stations 1 & 2
4/74 - 8/83 Station 3

P-Values
Two-Mile Extension

	D.O.			Log(Color + 1)			Log(Turbidity + 1)			Temperature			Salinity		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
B	>.25	>.25	>.25	>.25	>.25	>.25	.1<p<.2	.1<p<.2	<.005*	>.25	>.25	>.25	>.25	>.25	>.25
BT	>.25	.05<p<.1	>.25	>.25	>.25	.2<p<.25†	>.25	>.25	.1<p<.2	>.25	.1<p<.2	>.25			

B = Before/After Main
BT = Before/After by Top/Bottom Interaction

significance at † .05 * .01

Table 21: Summary of station characteristics, water quality features, sediment analyses, and biological structure at stations in the Apalachicola estuary during the summer-fall of 1983 (after Livingston, 1983b).

			Water Quality				Sediments			Biology (Macroinvertebrates)			
Station	Location	(Near = N) (Far = F) Proximity to Development	Salinity	D.O.	B.O.D.&C.O.D.	fecal coliform other	% organics	grain size (type)	metals	numerical abundance	species richness	Brillouin species diversity	and evenness
D 1	Apalachicola Bay	dredge site (F)	meso	*	*	*	high	silty sand	*	242	3	0.74	0.69
D A6	Apalachicola Bay	St. Vincent Point (F)	meso	*	high B.O.D. high C.O.D.	*	*	sand		374	2	0.46	0.67
D A8	Apalachicola Bay	Cat Point (F)	meso	*	*	*	*	sand		374	5	1.16	0.73
D 4	East Bay	near causeway (F)	meso	*	*	*	*	silty sand	*	198	1	0.0	0.0
D 4A	Round Bay	upper East Bay (F)	oligo		high C.O.D.		high	silty sand		88	2	0.54	0.81
D 1C	Apalachicola Bay	dredge site (F)	meso	*	*	*	high	silty sand	*	938	14	2.19	0.84
D A7	Apalachicola Bay	dredge site (F)	meso	*	*	*	high	sandy silt	*	616	13	1.87	0.74
C 1E	Nick's Hole	St. George I. (F)	poly	*	high B.O.D. high C.O.D.	*	*	sand	*	1364	12	1.88	0.77
C V2	St. Vincent Sound	9-mile-Tilton (F)	poly	*	*	*	*	sand	*	1166	9	1.71	0.79
C V3	St. Vincent Sound	11-mile (F)	poly	*	*	*	*	sand	*	704	11	2.09	0.89
C V6	St. Vincent Sound	Gulf-Franklin line (F)	poly	*	*	*	*	sand	*	704	10	1.76	0.78
C 3	East Bay	causeway (F)	oligo	*	high C.O.D.	high	*	silty sand	*	924	11	1.54	0.65

Table 21 (continued).

Station	Location	(Near = N) (Far = F) Proximity to Development	Water Quality: Salinity	D.O.	B.O.D.&C.O.D.	fecal coliform other	Sediments: % organics	grain size (type)	metals	Biology (Macroinvertebrates): numerical abundance	species richness	Brillouin species diversity	and evenness
C G4	St. George Sound	Bulkhead Shoal (F)	poly	*	*	*	*	sand	*	4268	24	2.44	0.77
C 5	mid East Bay	(F)	meso	*	high C.O.D.	high	*	silty sand	*	3740	4	0.37	0.27
C 5A	upper East Bay	(F)	oligo	*	high C.O.D.	*	*	silty sand	*	286	4	0.77	0.57
C 6	Alligator Bayou	(F)	oligo	*	*	*	*	silty sand	*	308	4	0.97	0.71
C A1	Apalachicola boat basin	(N)	meso	*	high C.O.D.	high	high	silty sand	Cr, Cu, Pb, Zn	770	3	0.85	0.78
C A4	Apalachicola Bay	Carl's Creek (N)	poly	*	high C.O.D.	*	high	sandy silt	*	308	3	0.64	0.59
C V5	St. Vincent Sound	13-mile (F)	poly	*	*	*	*	sand	*	242	4	1.21	0.89
C V1	eastern St. Vincent Sound	(F)	poly	*	*	*	high	sandy silt	Cr, Ni, Pb, Zn	704	6	1.27	0.72
C A2	upper Apalachicola Bay	(N)	meso	*	*	*	*	sand	*	2068	6	1.07	0.60
C E1	East Bay	near Corrie Bridge (F)	meso	*	high B.O.D.	*	*	sand	Pb, Zn	1562	7	1.16	0.73
C A5	Apalachicola Bay	Green Point (F)	poly	*	*	*	*	sand	*	814	7	1.68	0.87
C E4	mid East Bay	shore (F)	meso	*	high B.O.D. high C.O.D.	high	*	sand	*	770	7	1.39	0.73
C E5	upper East Bay	creek (F)	meso	*	*	high	*	sand	*	1518	8	1.61	0.78
B 1A	West Pass	(F)	eu	*	high C.O.D.	*	*	sand	*	1320	8	1.62	0.78
B A11	Little St. George I.	(F)	eu	*	*	*	*	sand	*	2442	13	1.89	0.74
B 1B	Sike's Cut	(F)	eu	*	*	*	*	sand	*	7194	26	1.64	0.50
B 1X	Apalachicola Bay	St. George I. (F)	poly	*	*	*	*	sand	*	7194	20	1.35	0.45

Table 21 (continued).

	Sta-tion	Location	(Near = N) (Far = F) Proximity to Development	Water Quality: Salinity	D.O.	B.O.D.&C.O.D.	fecal coliform other	Sediments: % organics	grain size (type)	metals	Biology (Macroinvertebrates): numerical abundance	species richness	Brillouin species diversity	and evenness
B	G2	St. George Sound	East Point Channel (F)	poly	*	high C.O.D.	*	*	sand	*	484	11	2.08	0.89
B	G3	St. George Sound	Porter's Creek (F)	poly	*	high C.O.D.	*	*	sand	*	3256	16	1.95	0.71
B	G5	St. George Sound	East Hole (F)	poly	*	high C.O.D.	*	*	sand	*	3234	25	2.42	0.76
B	G6	St. George Sound	East Island (F)	poly	*	*	*	*	sand	*	5566	19	1.90	0.65
B	G7	St. George Sound	Shell Point (F)	poly	*	*	*	*	sand	*	2684	15	1.97	0.73
B	G9	St. George Sound	Goose Island (F)	poly	*	*	*	*	sand	*	1364	18	2.36	0.83
A	2	Apalachicola Bay	dredging site (N)	meso	*	*	*	*	sand	*	1958	4	0.57	0.41
A	A3	Apalachicola Bay	Hut restaurant (N)	meso	*	high C.O.D.	*	high	sandy silt	*	4378	3	0.56	0.51
A	R3	north Scipio Creek	(N)	oligo	low	*	*	*	silty sand	Cr, Cu, Pb, Zn	66	2	0.60	0.92
A	E3	upper Eagle Creek	(N)	oligo	low	*	*	*	sand	*	22	1	0.00	0.00
A	A9	St. George Boat Basin	(N)	oligo	low	high B.O.D. high C.O.D.	*	high	silty sand	Cr, Cu, Ni, Pb, Zn	198	3	0.66	0.62
A	R4	Apalachicola River	(F)	limnetic	*	*	*	*	sandy silt	*	22	1	0.00	0.00
A	R1	Apalachicola River	Standard Oil dock (N)	oligo	*	high B.O.D. high C.O.D.	high	*	silty sand	Cr, Cu, Pb, Zn	1100	7	1.42	0.74
A	R2	Scipio Creek Boat Basin	(N)	oligo	low	high B.O.D.	high	*	silty sand	Cr, Cu, Pb, Zn	1386	9	1.41	0.65
A	G8	St. George Sound	construction (N)	poly	*	high B.O.D.	high	*	sand	*	88	1	0.00	0.00
A	R5	Apalachicola River	Pinhook (F)	limnetic	*	*	*	*	sand	*	44	1	0.00	0.00
A	V4	St. Vincent Sound	Big Bayou (F)	poly	*	*	*	*	silty sand	*	66	2	0.60	0.92

Table 21 (continued).

	Sta-tion	Location	(Near = N) (Far = F) Proximity to Development	Water Quality: Salinity	D.O.	B.O.D.&C.O.D.	fecal coliform other	Sediments: % organics	grain size (type)	metals	Biology (Macroinvertebrates): numerical abundance	species richness	Brillouin species diversity and evenness	
A	R10	Apalachicola River	(F)	limnetic	*	*	*	*	sand	*	572	4	0.83	0.60
A	R9	Apalachicola River	St. Mark's Island (F)	limnetic	*	*	*	*	sand	*	264	2	0.28	0.41
A	R6	Murphy Creek	agricultural runoff (N)	limnetic	low	*	*	high	sandy silt	Cr, Ni	220	3	0.93	0.86
A	R7	Huckleberry Creek	?	limnetic	low	*	*	high	sandy silt	Cr, Ni	198	7	1.82	0.97
E'	R8	Clark's Creek	agricultural runoff (N)	limnetic	low	*	*	high	silty sand	Cr, Ni	0	0	0.00	0.00
E	5B	West Bayou	agricultural runoff (N)	meso	*	high C.O.D.	*	high	sandy silt	Cr, Cu, Ni, Pb, Zn	0	0	0.00	0.00
E	E2	mouth of Eagle Creek	urban runoff (N)	meso	low	high B.O.D. high C.O.D.	high	*	sand	Pb, Zn	0	0	0.00	0.00
E	G1	St. George Sound	East Point runoff (N)	poly	*	high C.O.D.	*	high	silty sand	Cr, Cu, Pb, Zn	0	0	0.00	0.00
E	A10	St. George dredged canals	urban runoff (N)	poly	*	high C.O.D.	*	high	silty sand		0	0	0.00	0.00

* within background levels

Figure 1: Chart showing the Apalachicola River-Bay system with stations used by the Florida State University Aquatic Study Group (Principal Investigator; R. J. Livingston) for analyses of water and sediment quality and the distribution in faunal benthic macroinvertebrates (Livingston, 1983b).

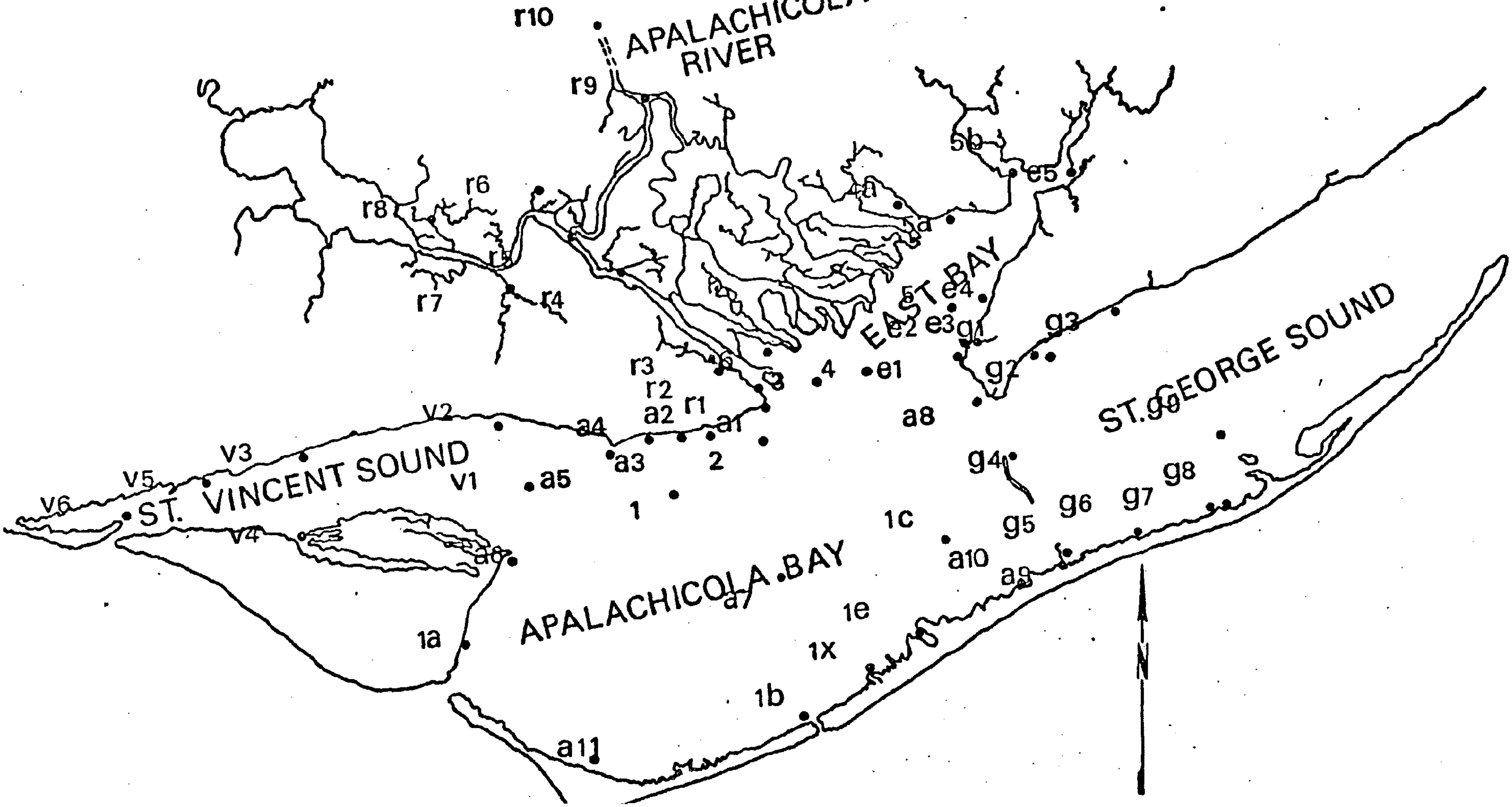


Figure 2: Net flow of water in the Apalachicola Bay system, averaged over a complete tidal cycle (data courtesy of Dr. B. A. Christensen, University of Florida).

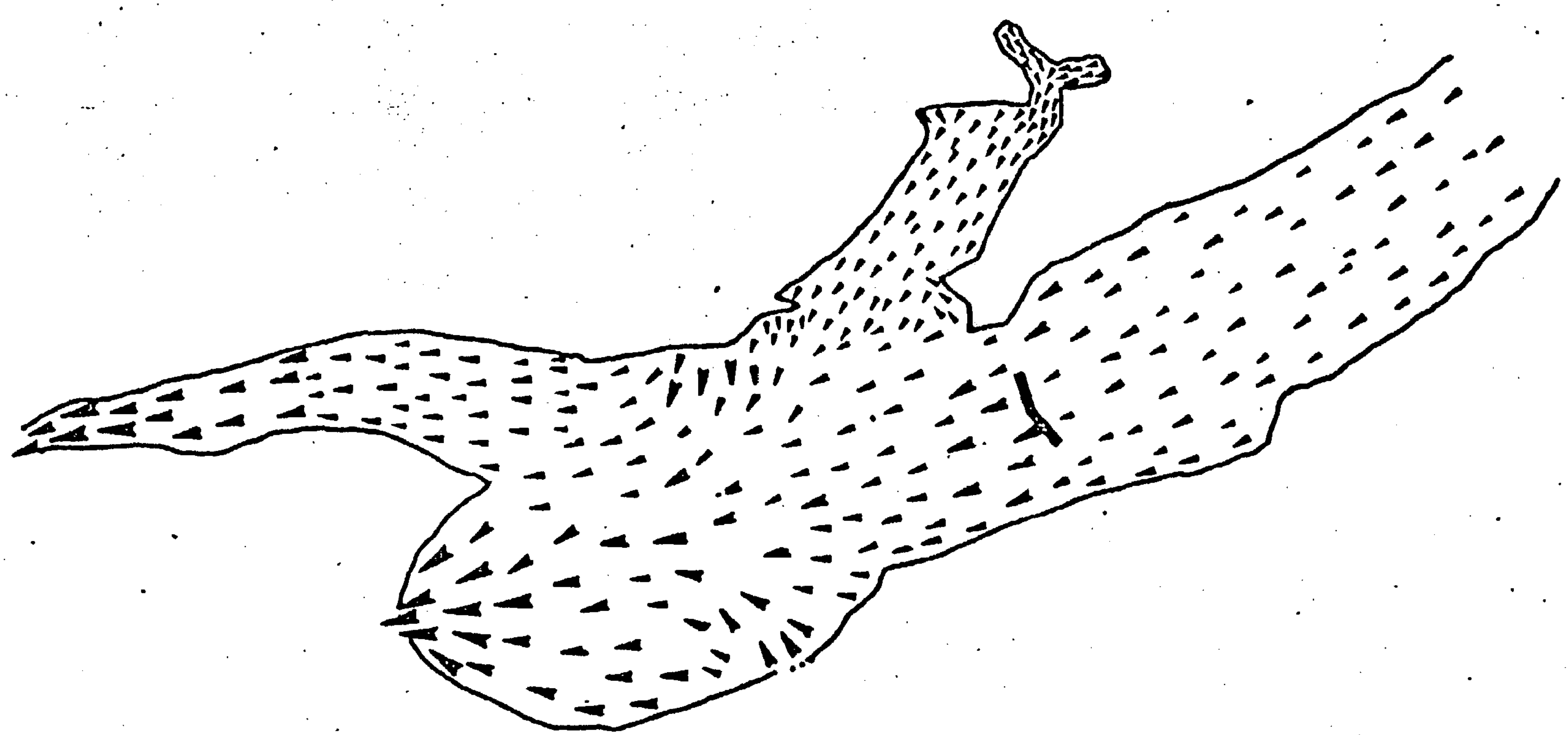


Figure 3: Drainage from Tate's Hell Swamp into the Apalachicola estuary via East Bay as observed during periods of high local rainfall and runoff or highly colored water from the Tate's Hell swamp (Figure 1). The influence of the combination of highly colored water coming out of the Tate's Hell Swamp through East and West Bayou is illustrated.

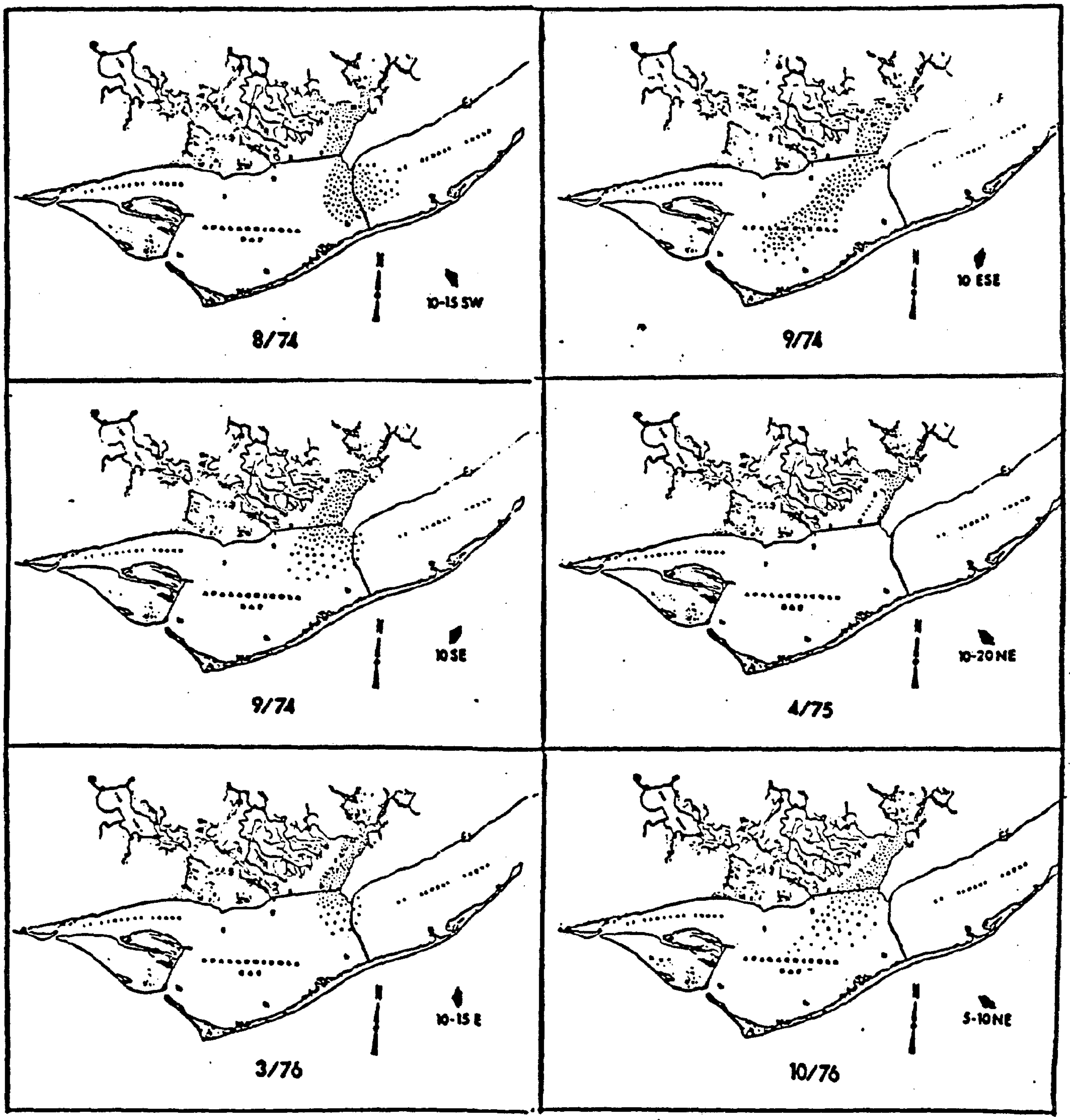


Figure 4: Factor train analysis of the major physical and chemical effects of dredging and spoil placement on bays, estuaries, and marshlands (from Darnell, 1976).

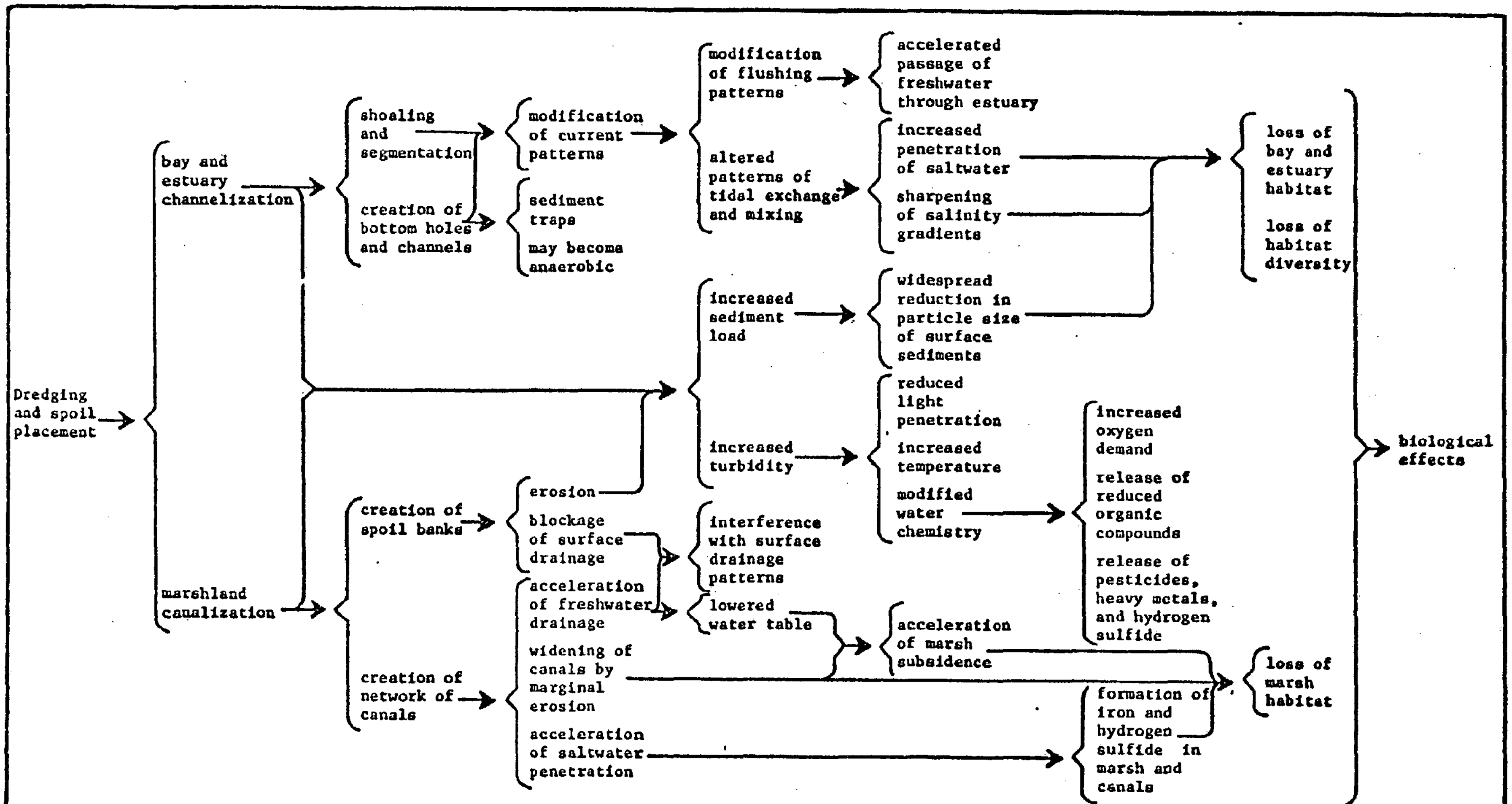


Figure 5: Permanent sampling stations established by the F.S.U. Aquatic Study Group for longterm field analyses in the Apalachicola River-Bay system (March, 1972-present).

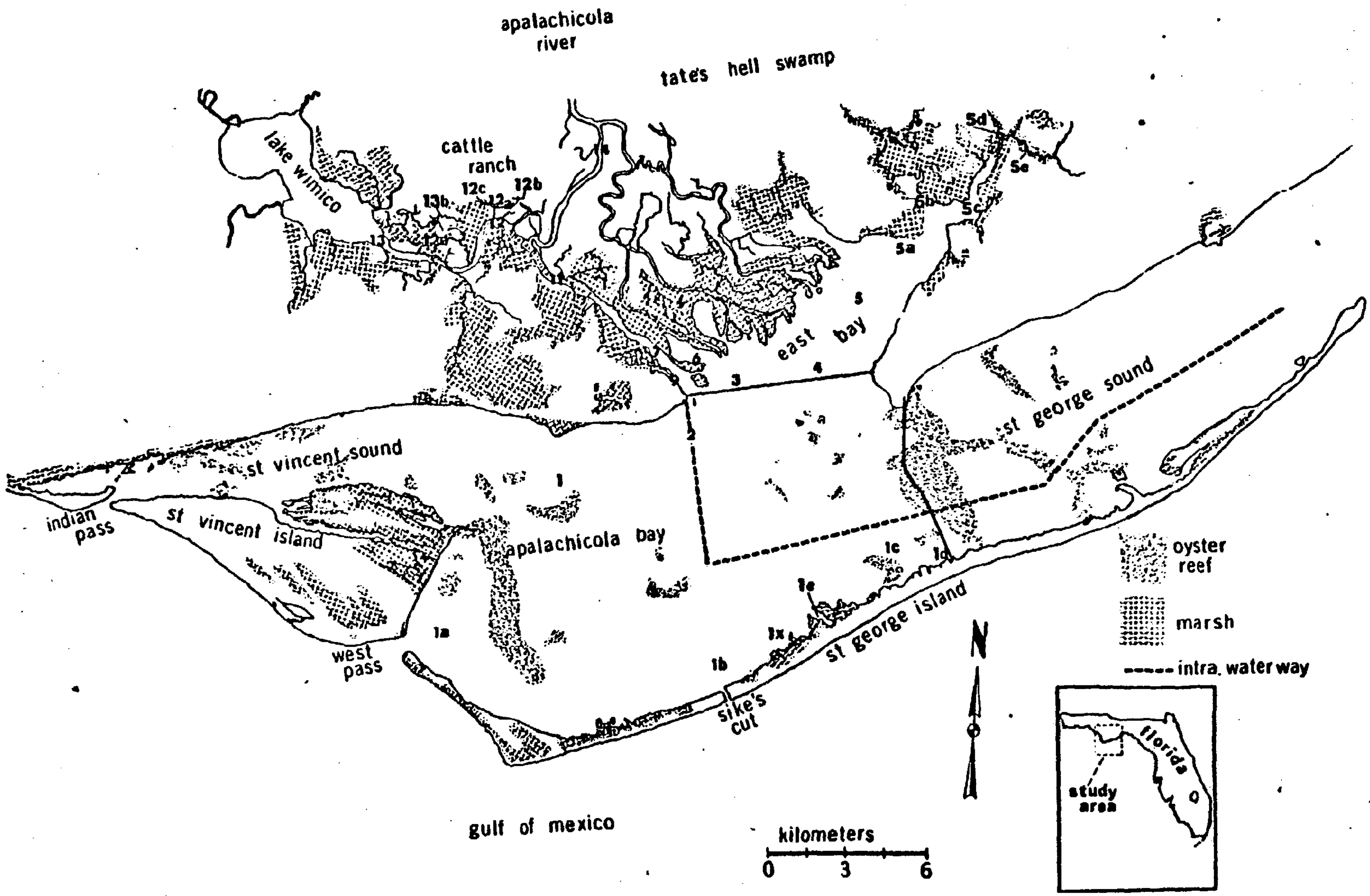


Figure 6: Dredge spoil disposal sites in Apalachicola Bay for the two-mile channel and extension, the Intracoastal Waterway, the Sike's Cut (St. George Island) Channel, and the East Point Channel.

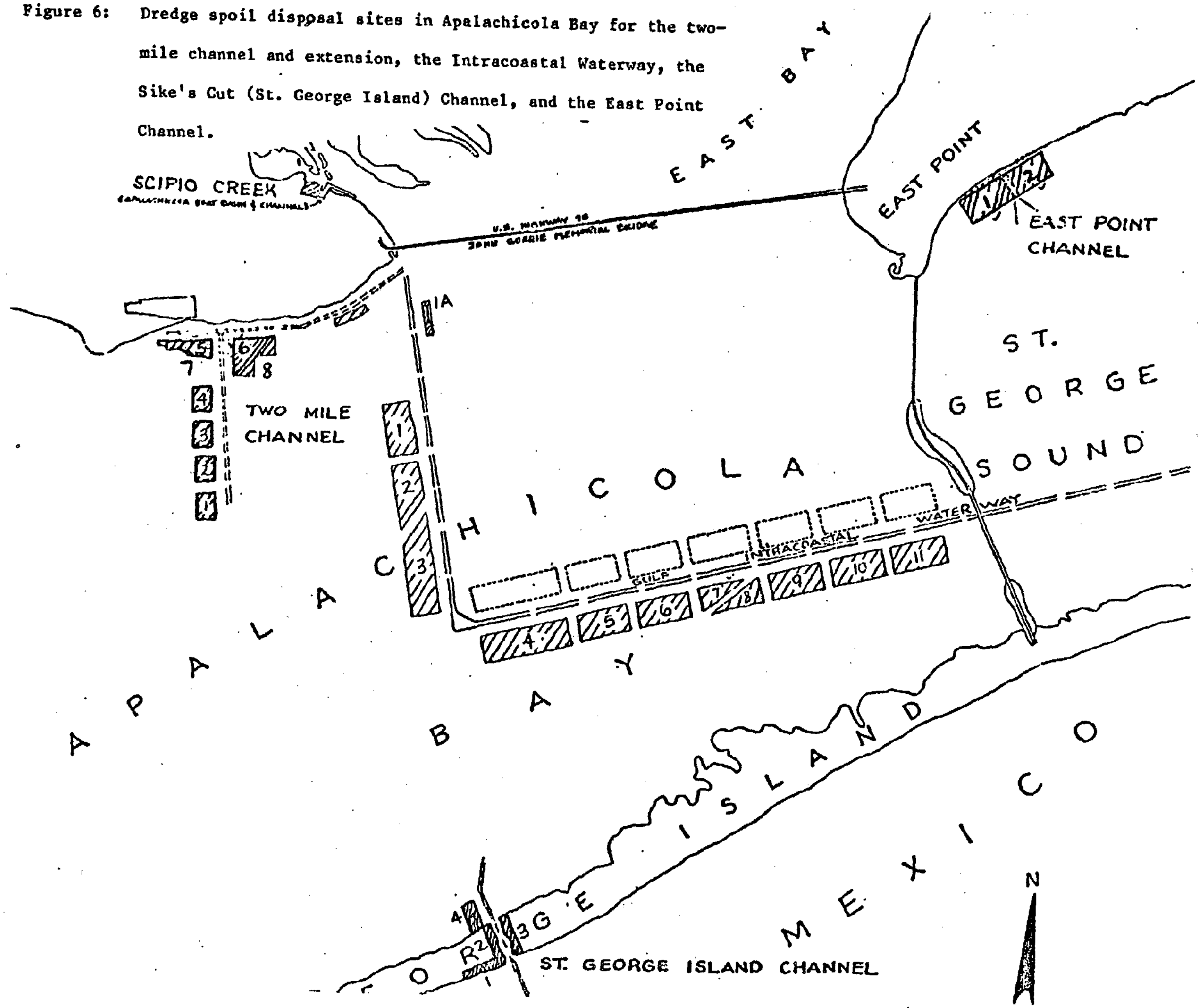
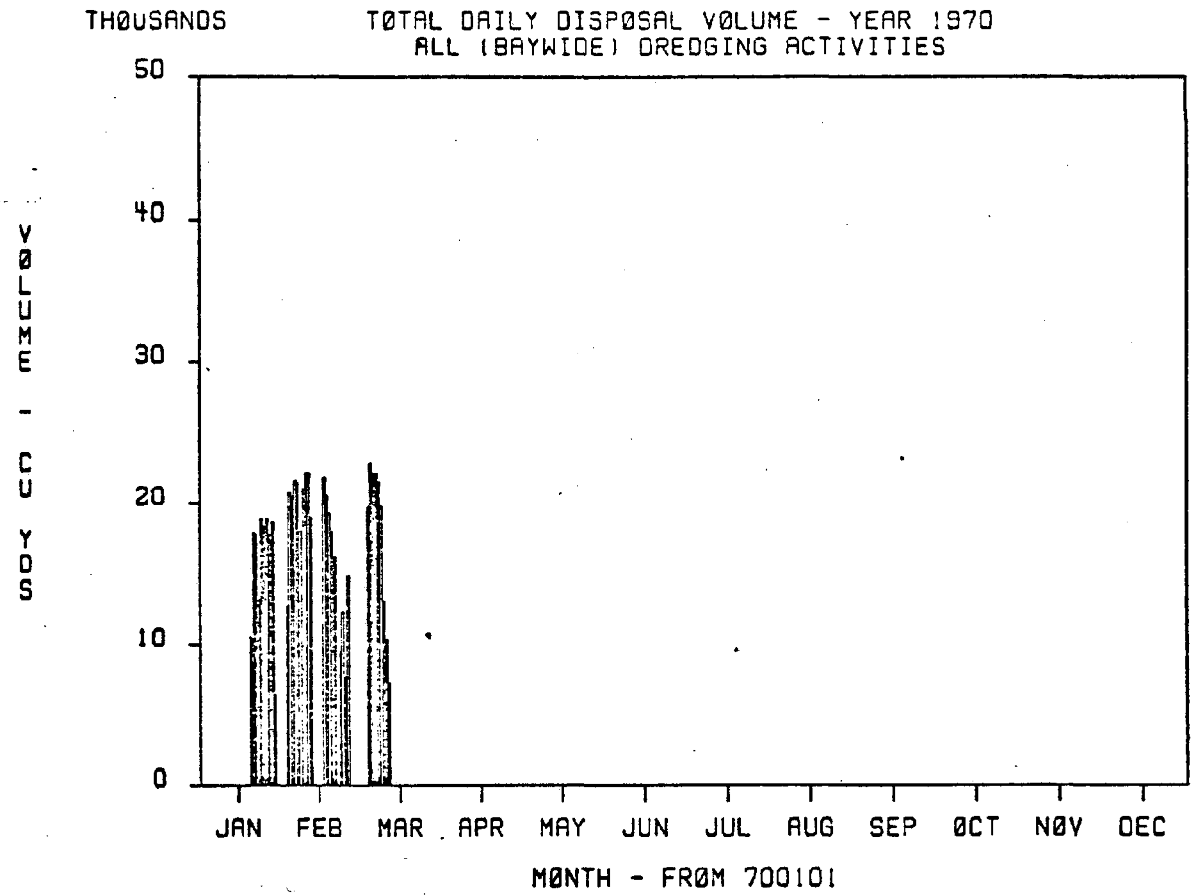
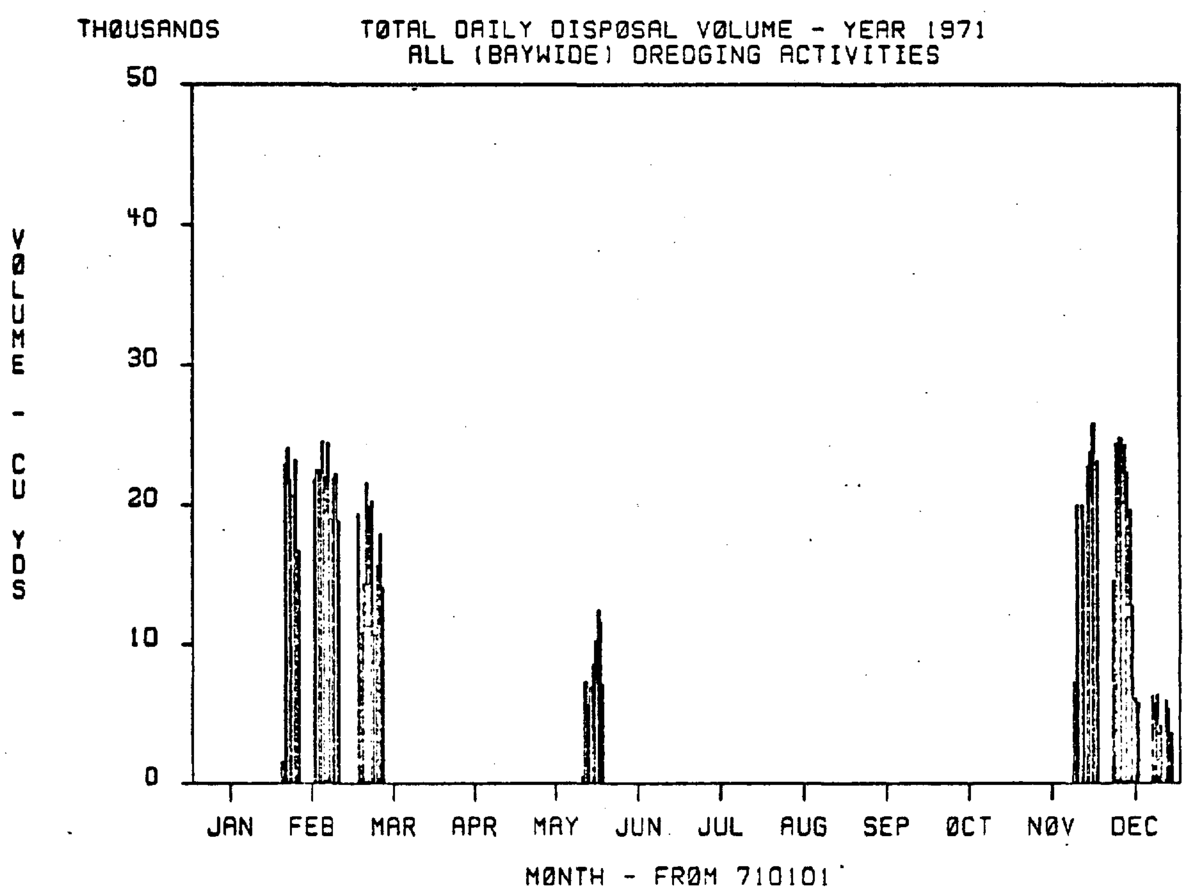
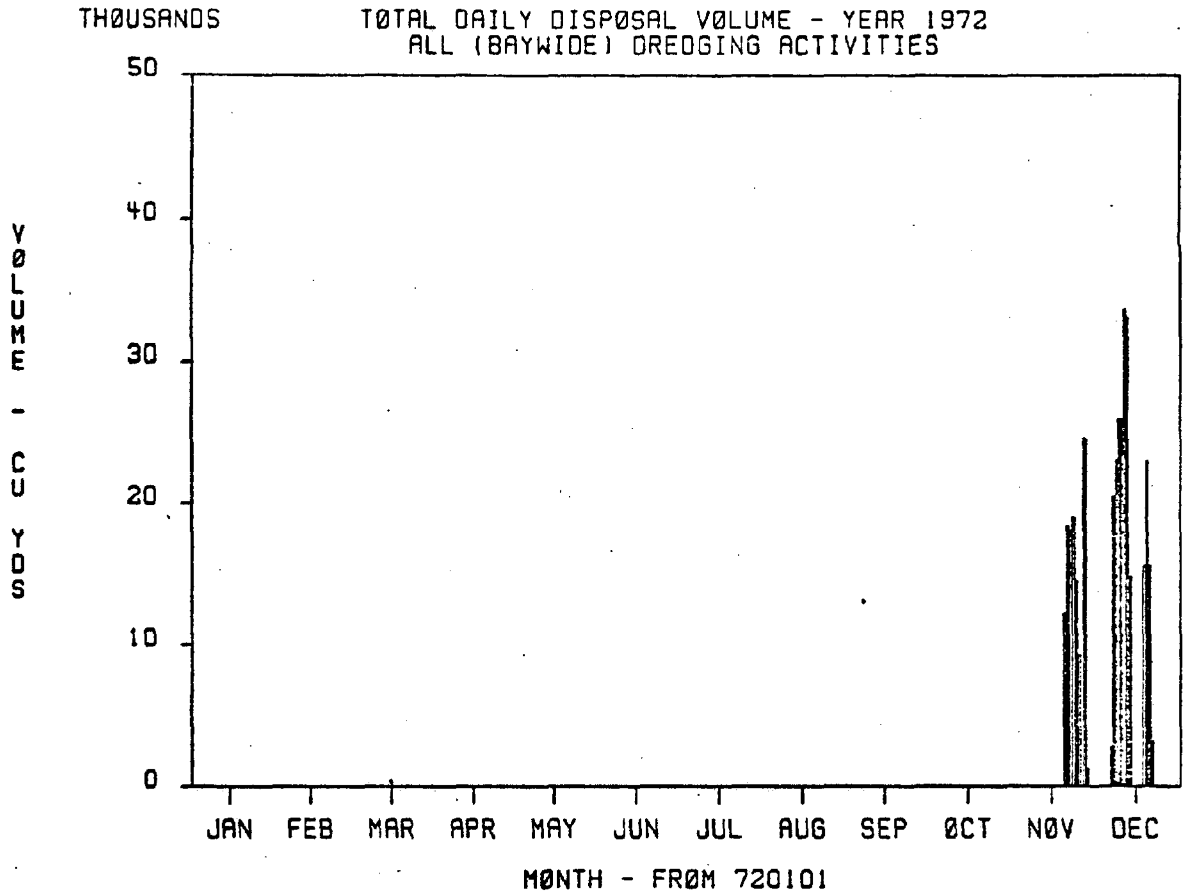
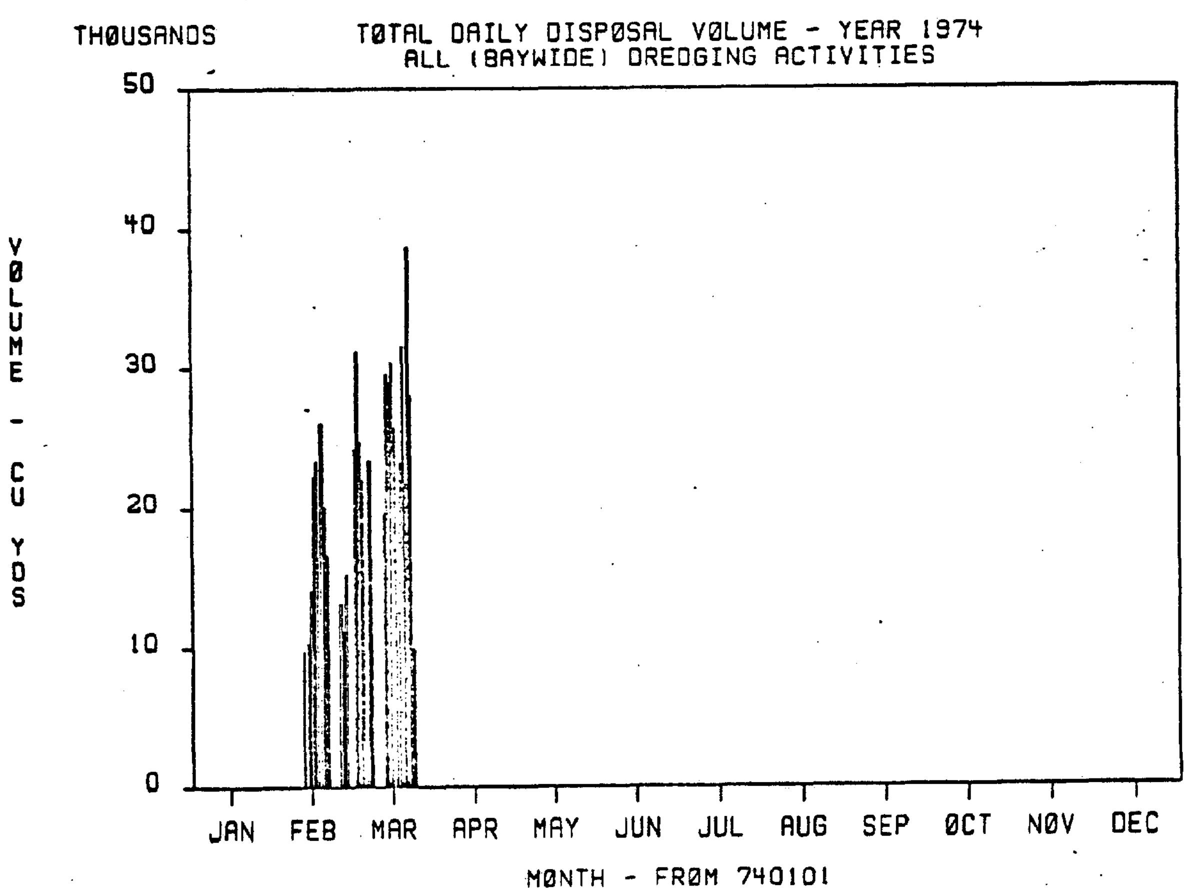


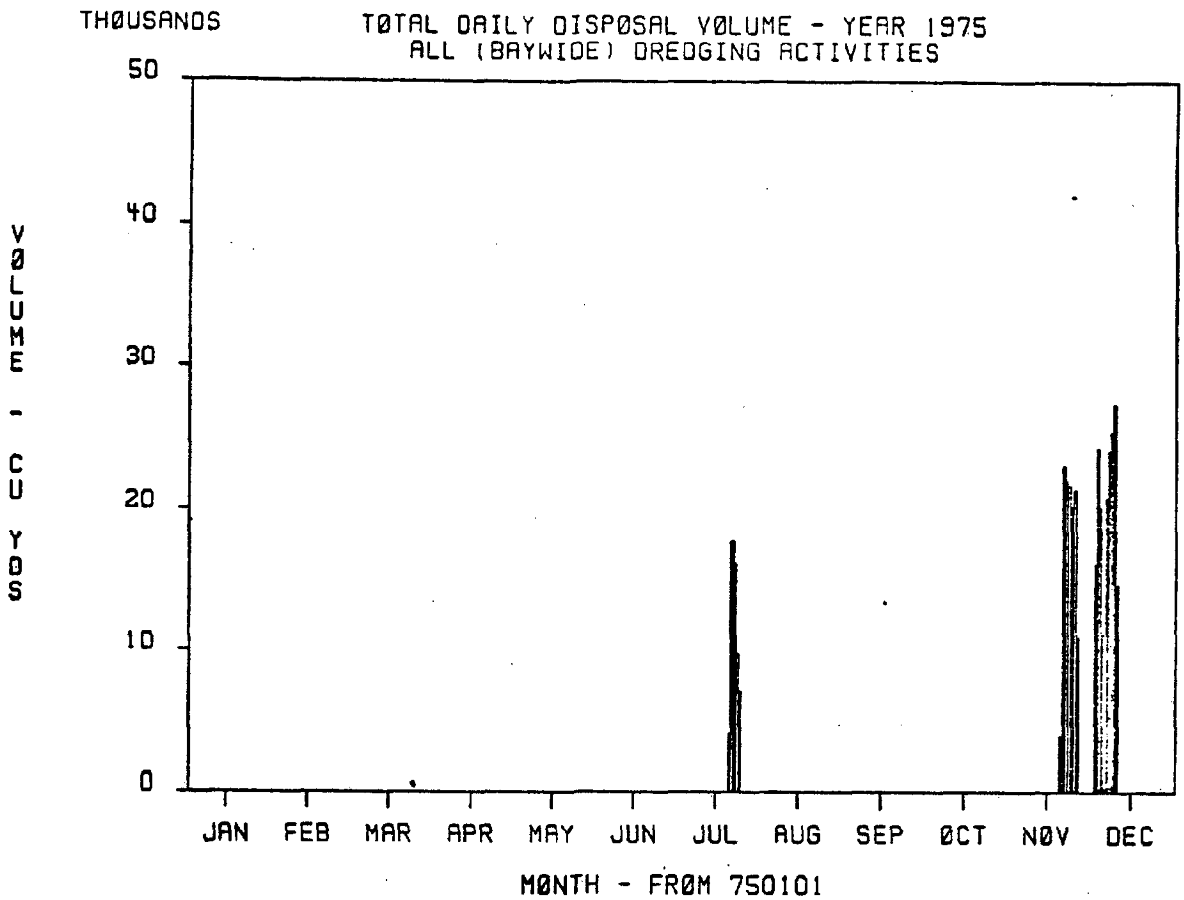
Figure 7: Total daily dredge spoil disposal volumes in Apalachicola Bay from 1970 to present.

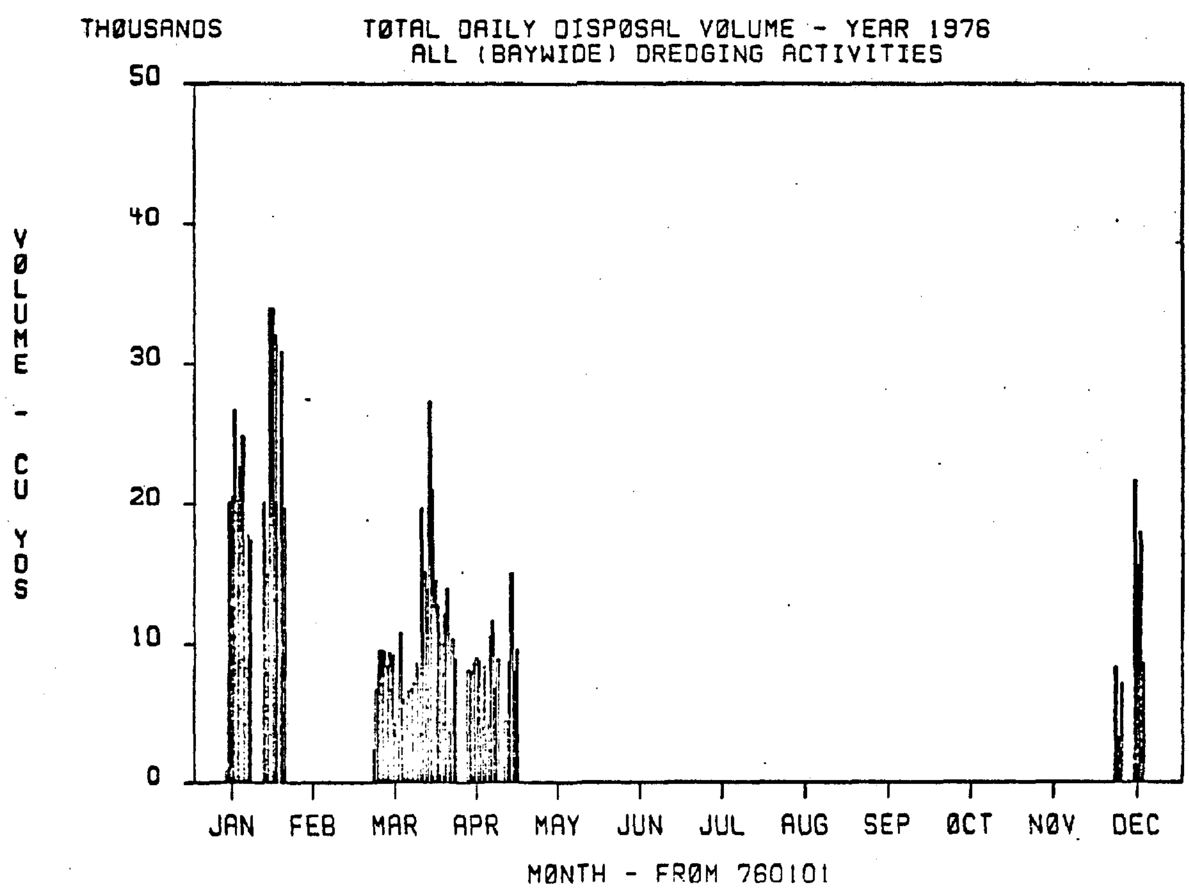


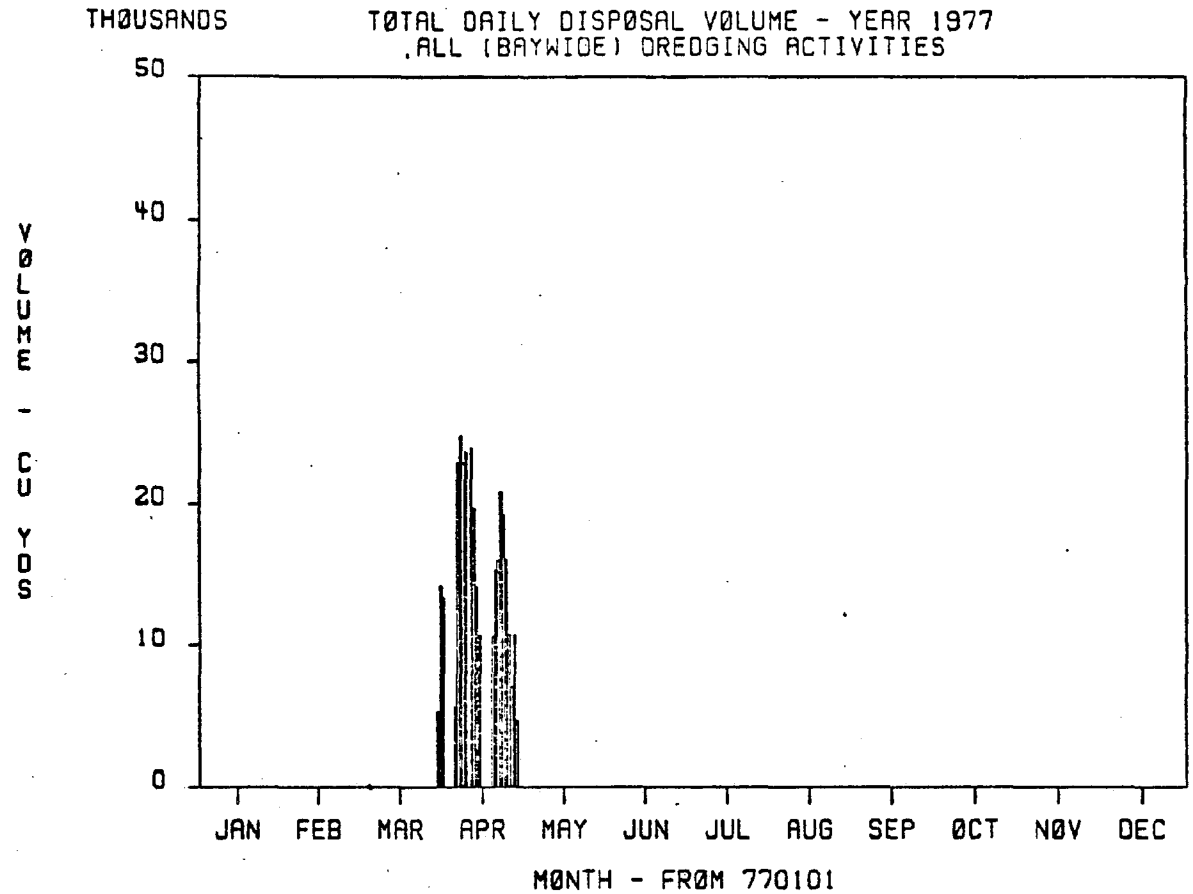



THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1972
ALL (BAYWIDE) DREDGING ACTIVITIES
50
40
30
20
10
0
VØLUME - CU YDS
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 720101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1974
ALL (BAYWIDE) DREDGING ACTIVITIES
50
40
30
20
10
0
VØLUME - CU YDS
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 740101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1975
ALL (BAYWIDE) DREDGING ACTIVITIES
50
40
30
20
10
0
VØLUME - CU YDS
JAN FEB MAR APR MAY JUN JUL AUG SEP ØCT NØV DEC
MØNTH - FRØM 750101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1976
ALL (BAYWIDE) DREDGING ACTIVITIES
50
40
30
20
10
0
VØLUME - CU YDS
JAN FEB MAR APR MAY JUN JUL AUG SEP ØCT NØV DEC
MØNTH - FRØM 760101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1977
ALL (BAYWIDE) DREDGING ACTIVITIES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 770101

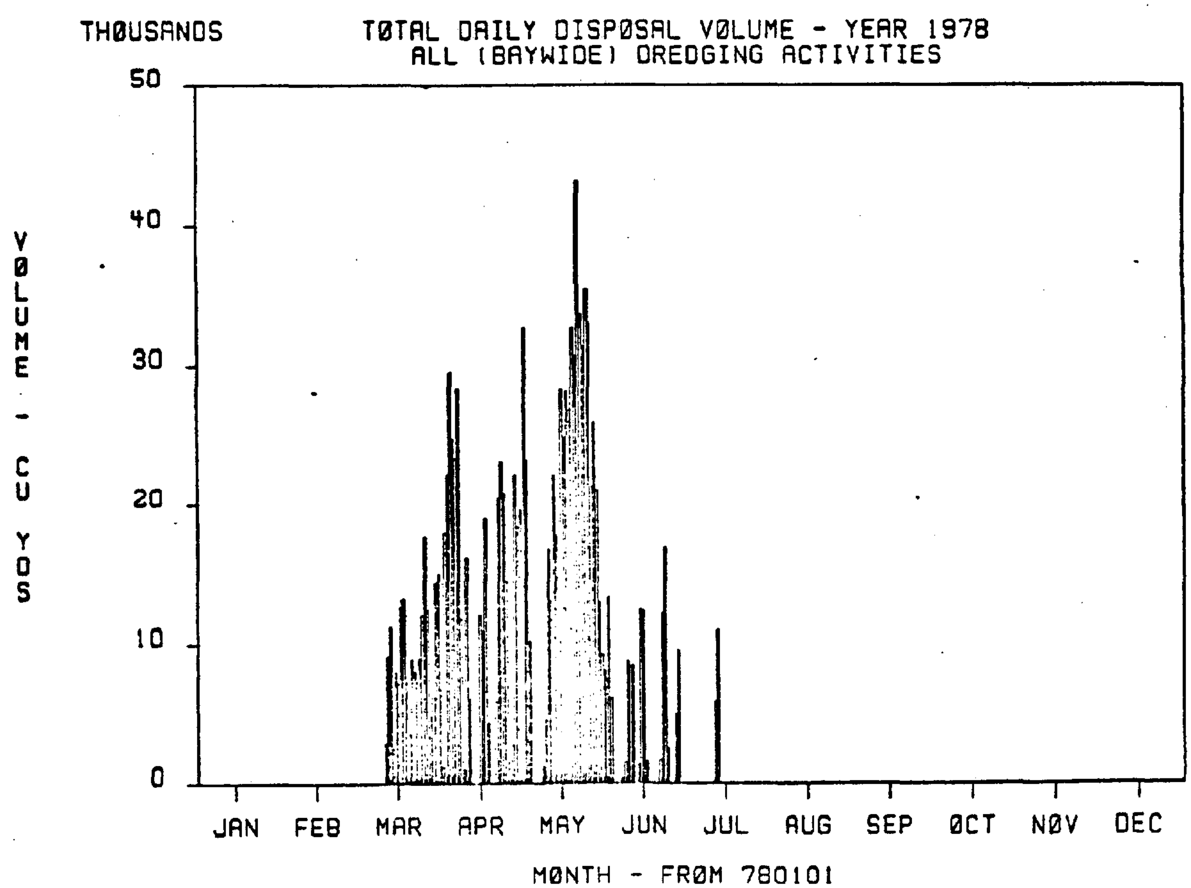
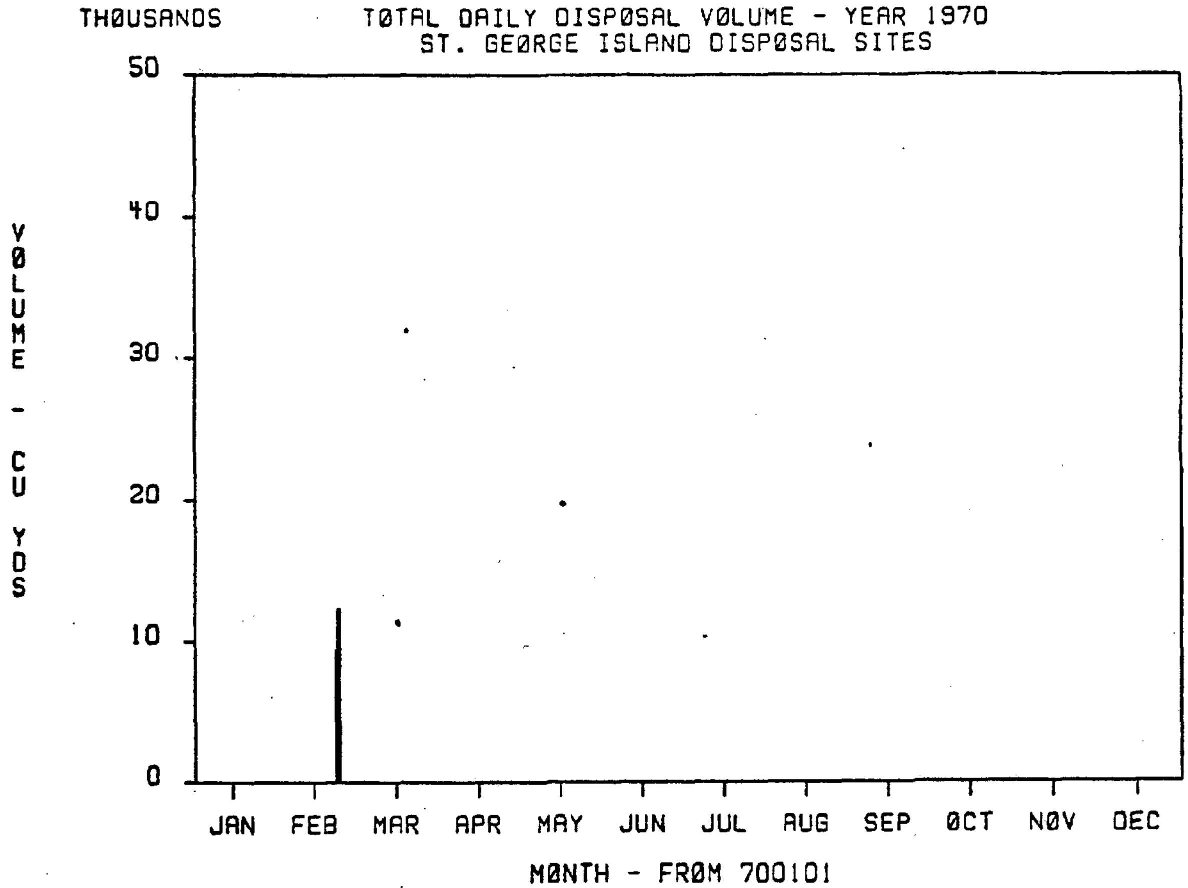
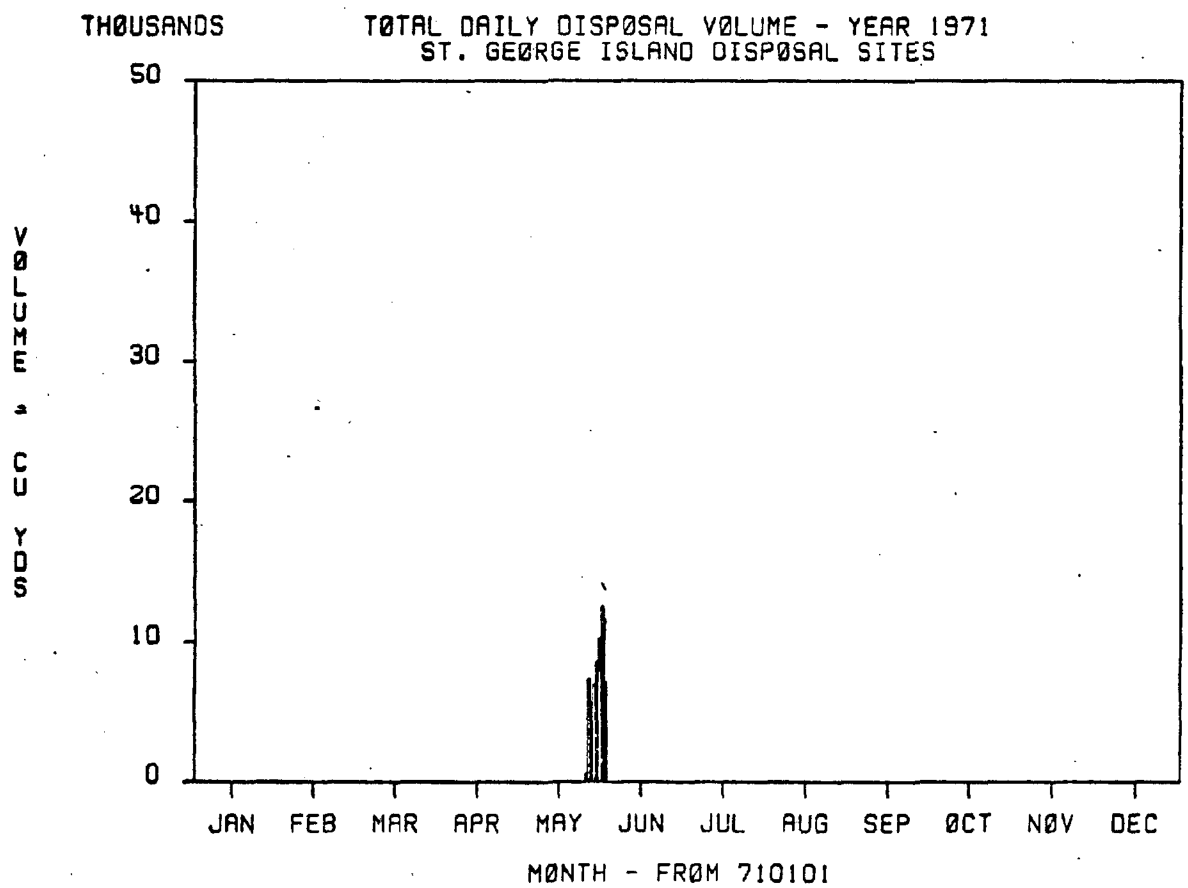
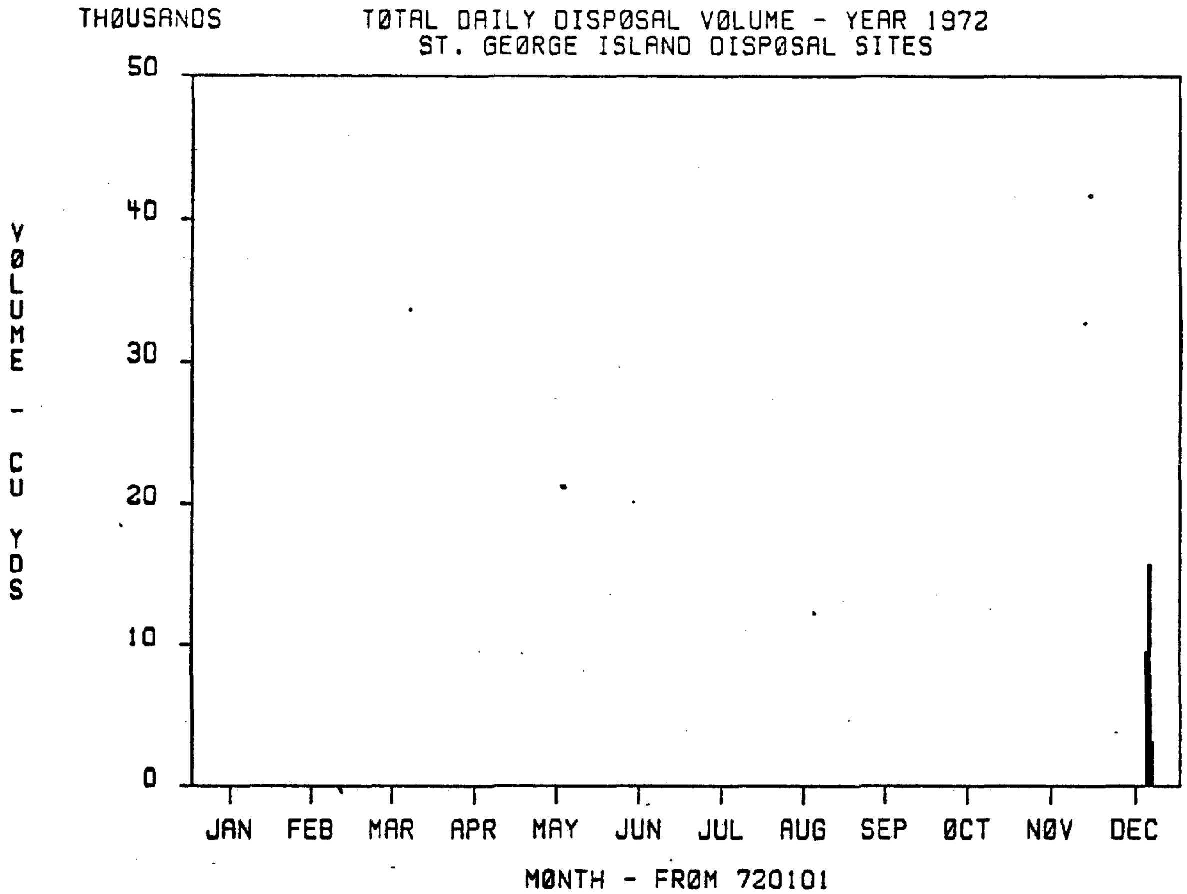
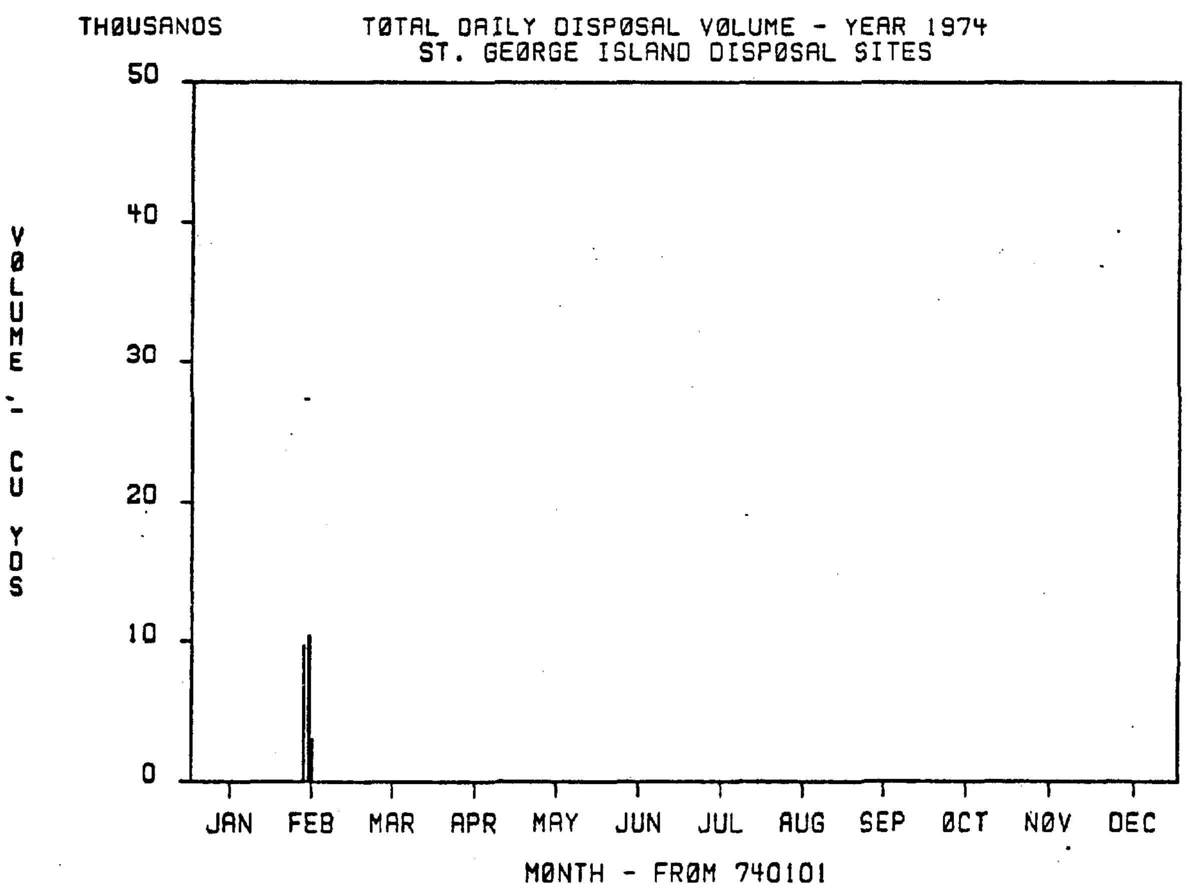

THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1978
ALL (BAYWIDE) DREDGING ACTIVITIES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 780101

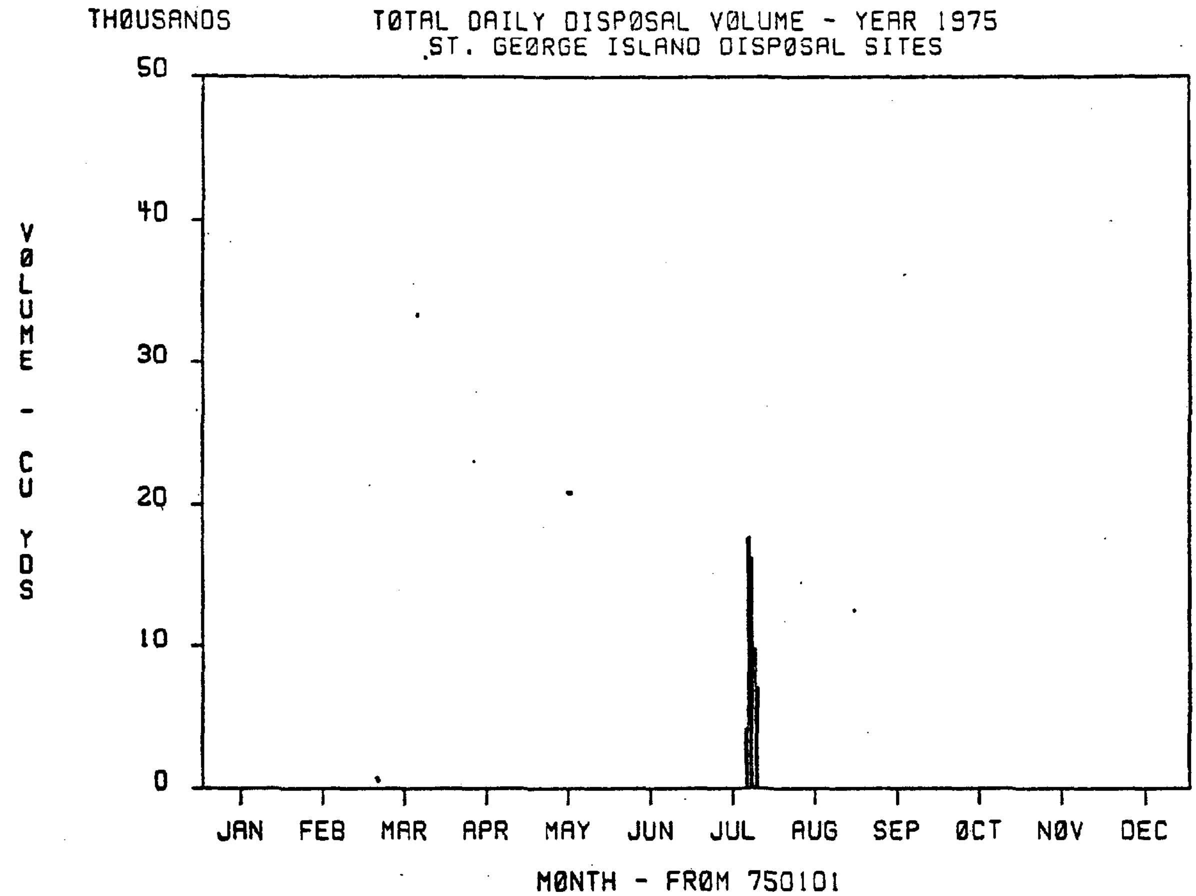
Figure 8: Total daily dredge spoil disposal volumes at Sike's Cut (St. George Island) from 1970 to present.

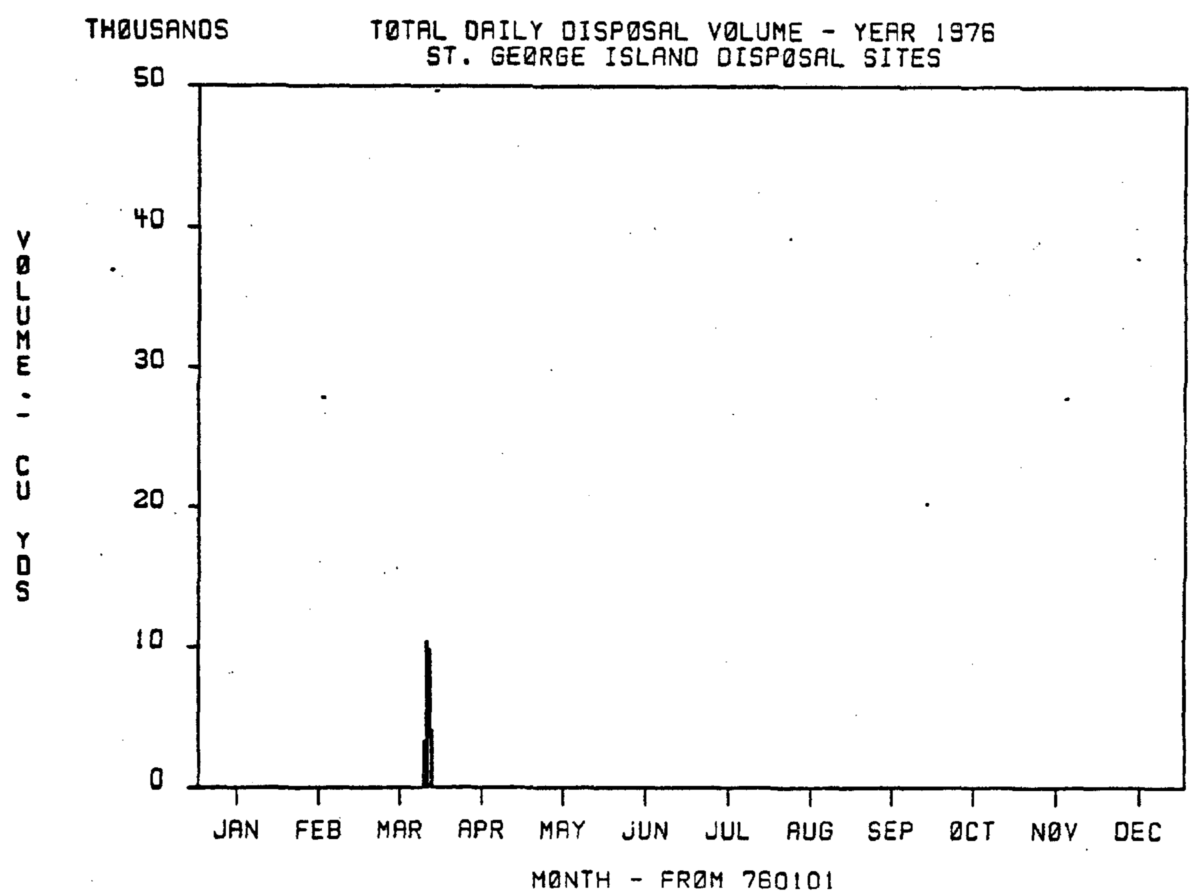





THOUSANDS
TOTAL DAILY DISPOSAL VOLUME - YEAR 1972
ST. GEORGE ISLAND DISPOSAL SITES
50
40
30
20
10
0
VOLUME - CU YDS
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH - FROM 720101


THOUSANDS
TOTAL DAILY DISPOSAL VOLUME - YEAR 1974
ST. GEORGE ISLAND DISPOSAL SITES
50
40
30
20
10
0
VOLUME - CU YDS
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH - FROM 740101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1975
ST. GEØRGE ISLAND DISPØSAL SITES
VØLUME - CU YDS
0
10
20
30
40
50
JAN FEB MAR APR MAY JUN JUL AUG SEP ØCT NØV DEC
MØNTH - FRØM 750101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1976
ST. GEØRGE ISLAND DISPØSAL SITES
VØLUME - CU YDS
0
10
20
30
40
50
JAN FEB MAR APR MAY JUN JUL AUG SEP ØCT NØV DEC
MØNTH - FRØM 760101

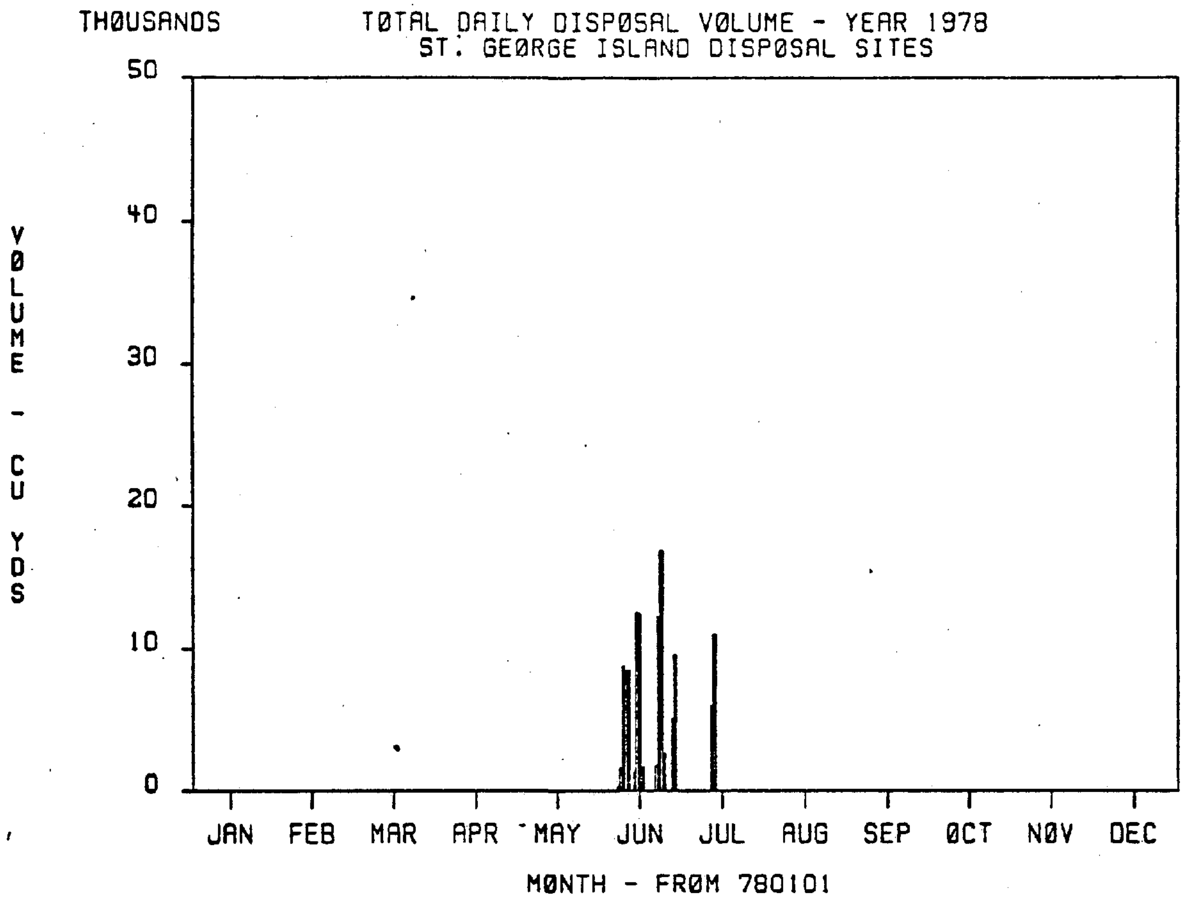
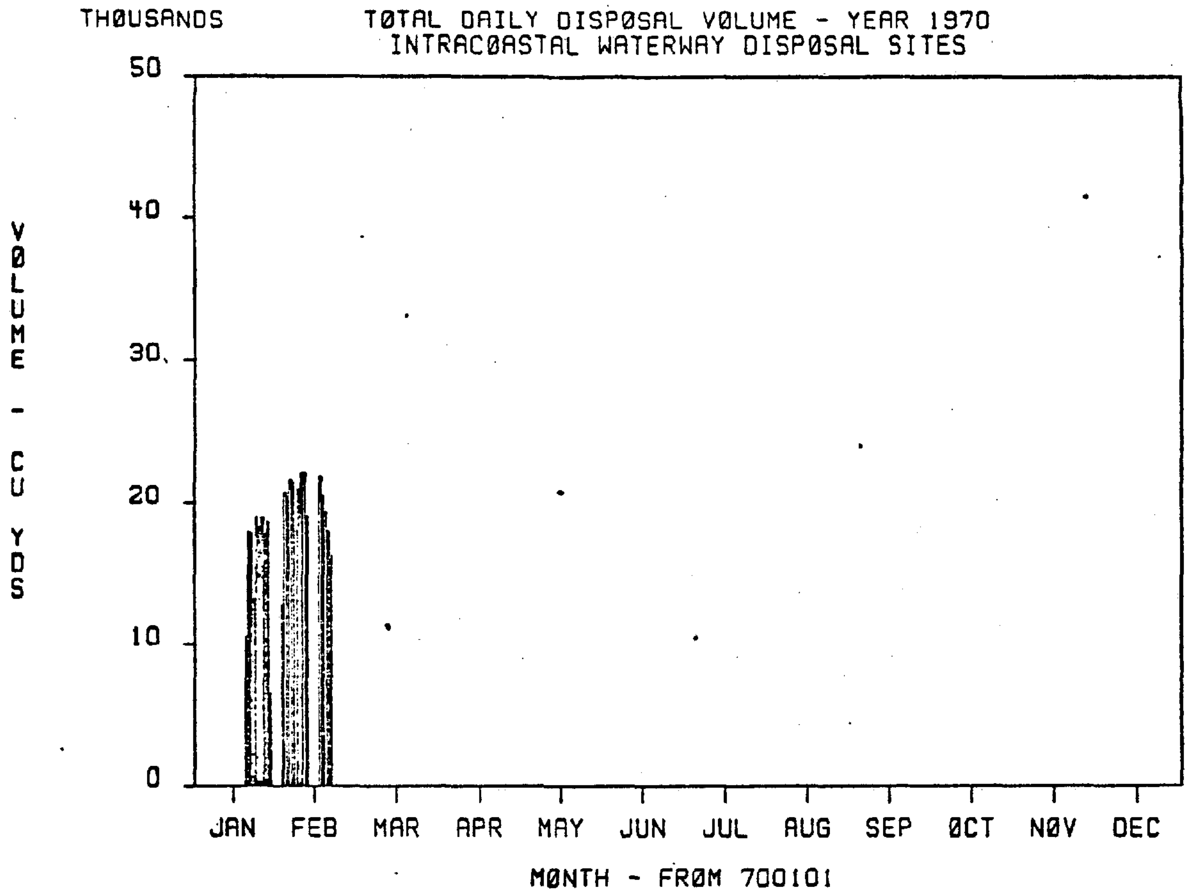
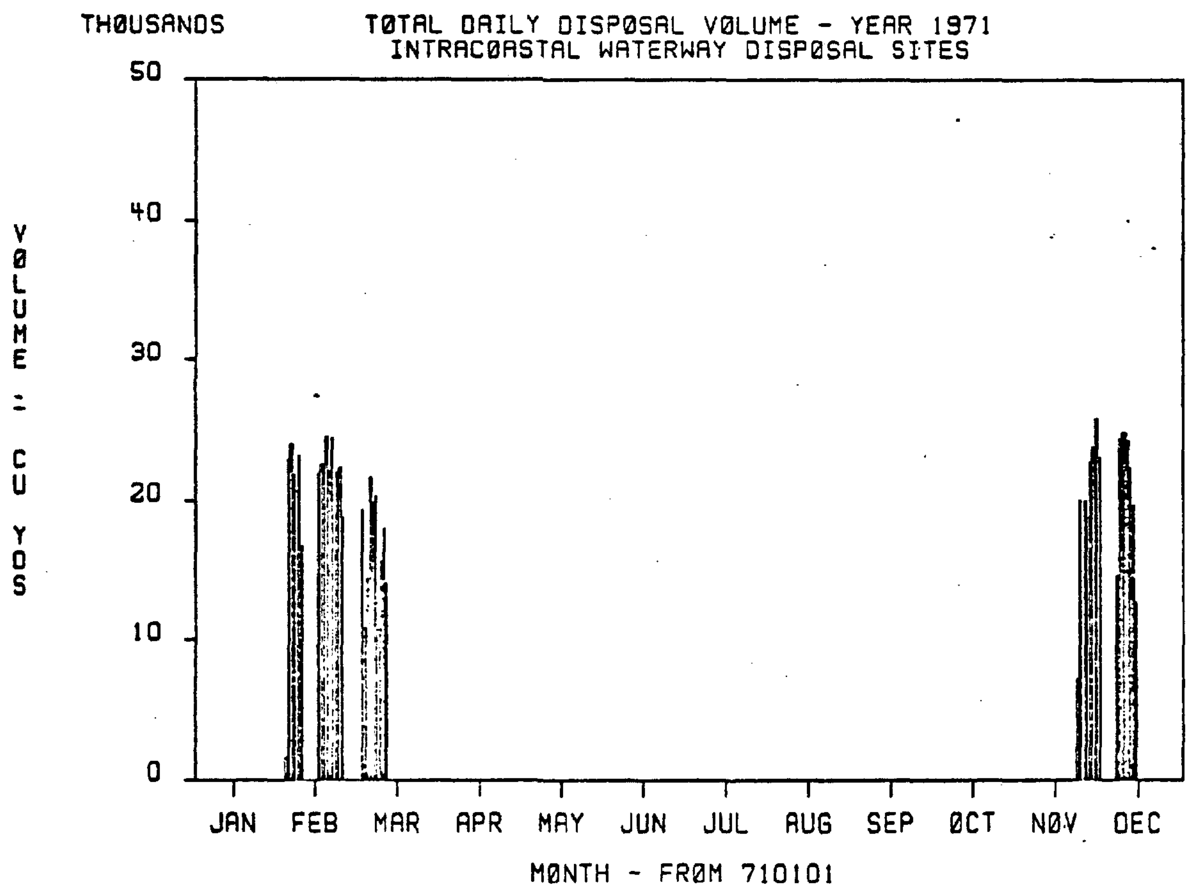
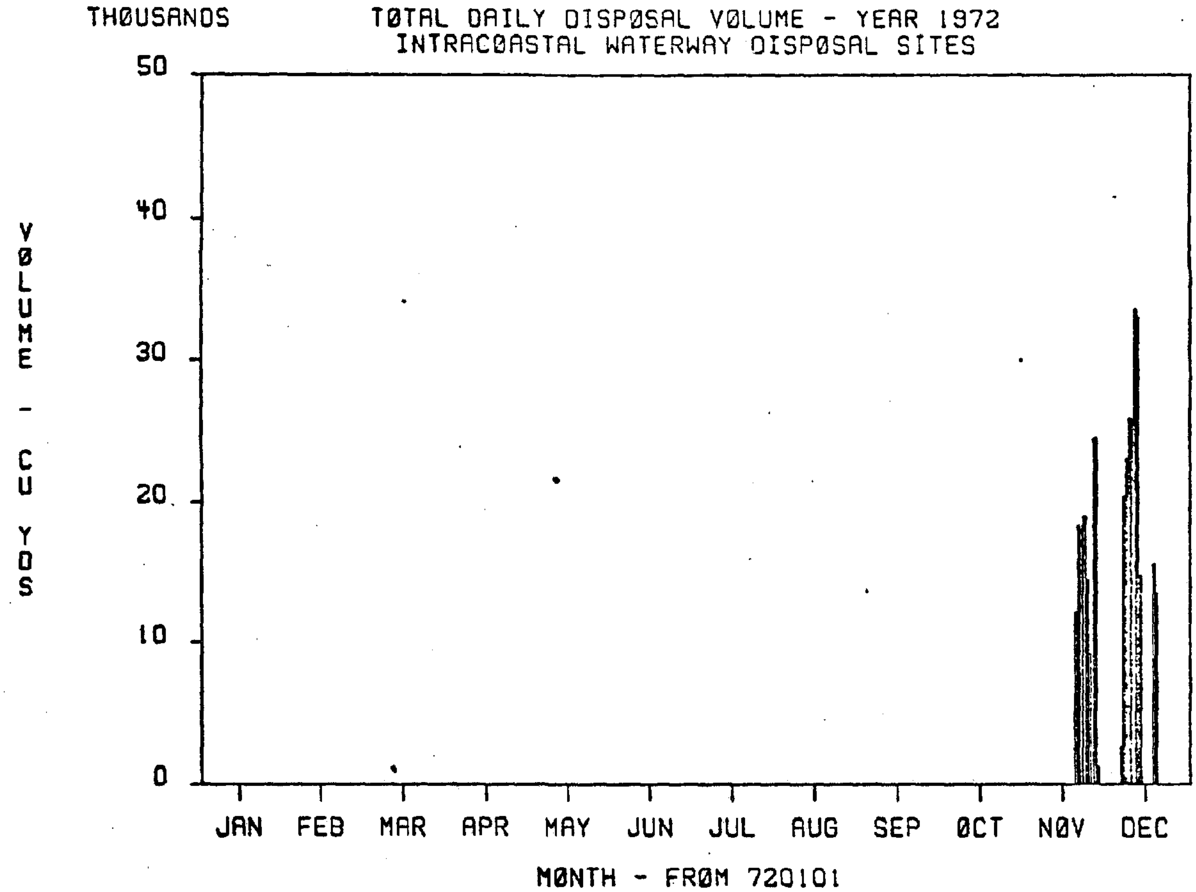
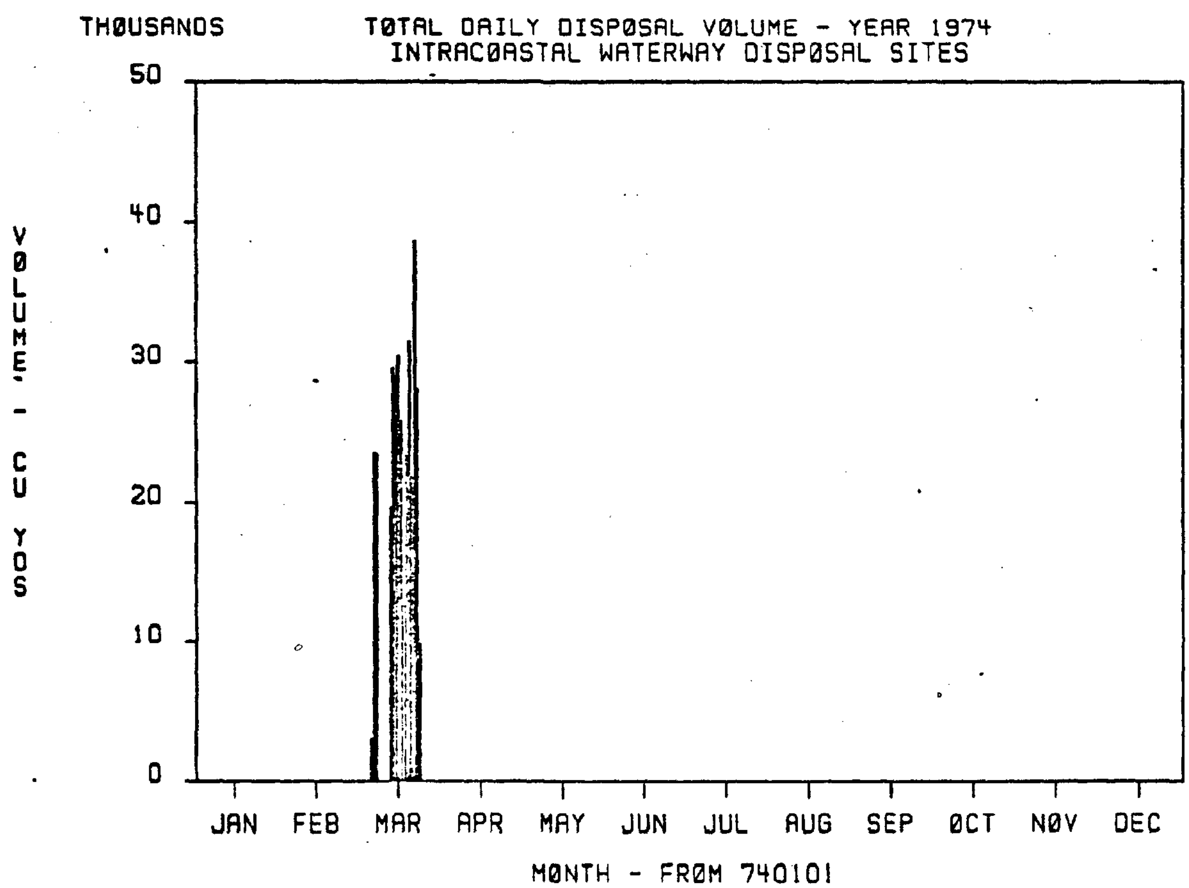

THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1978
ST. GEØRGE ISLAND DISPØSAL SITES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 780101

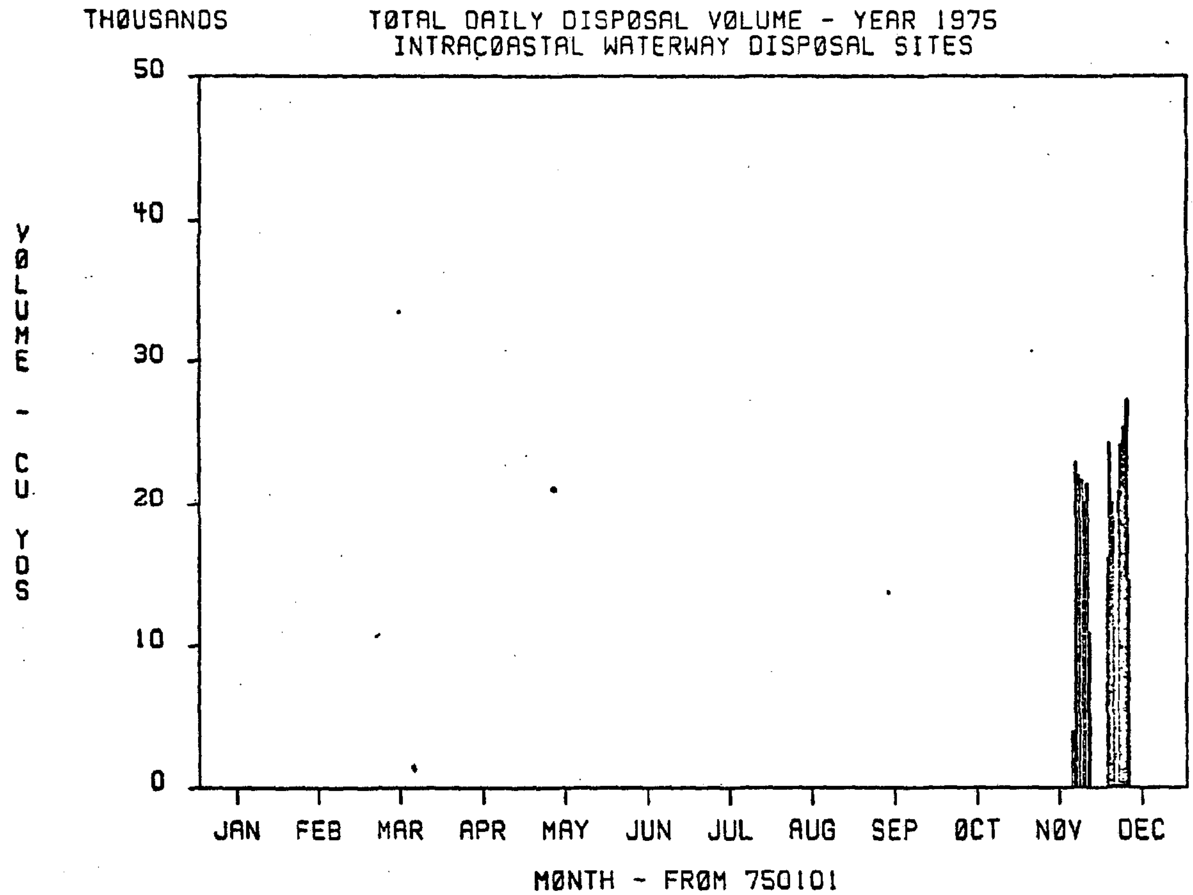
Figure 9: Total daily dredge spoil disposal volumes in the Intracoastal Waterway from 1970 to present.

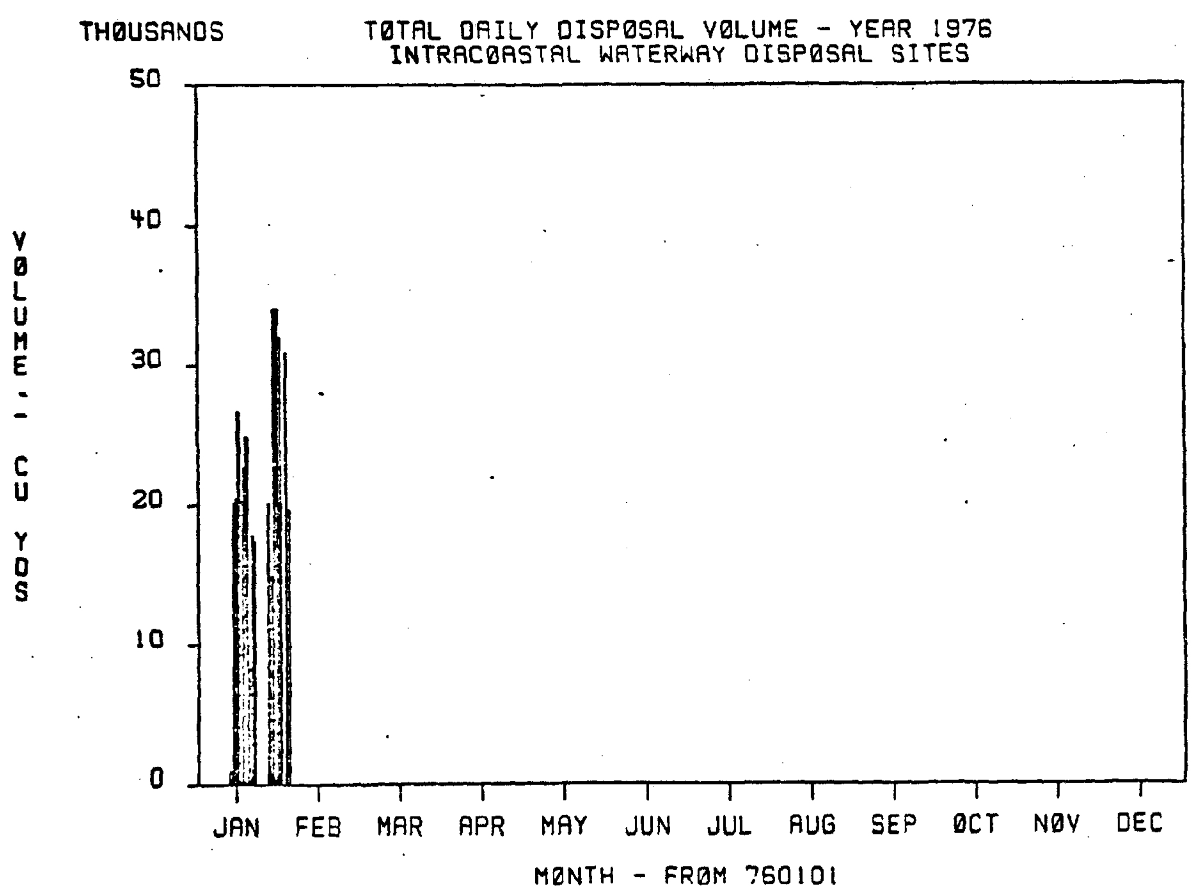


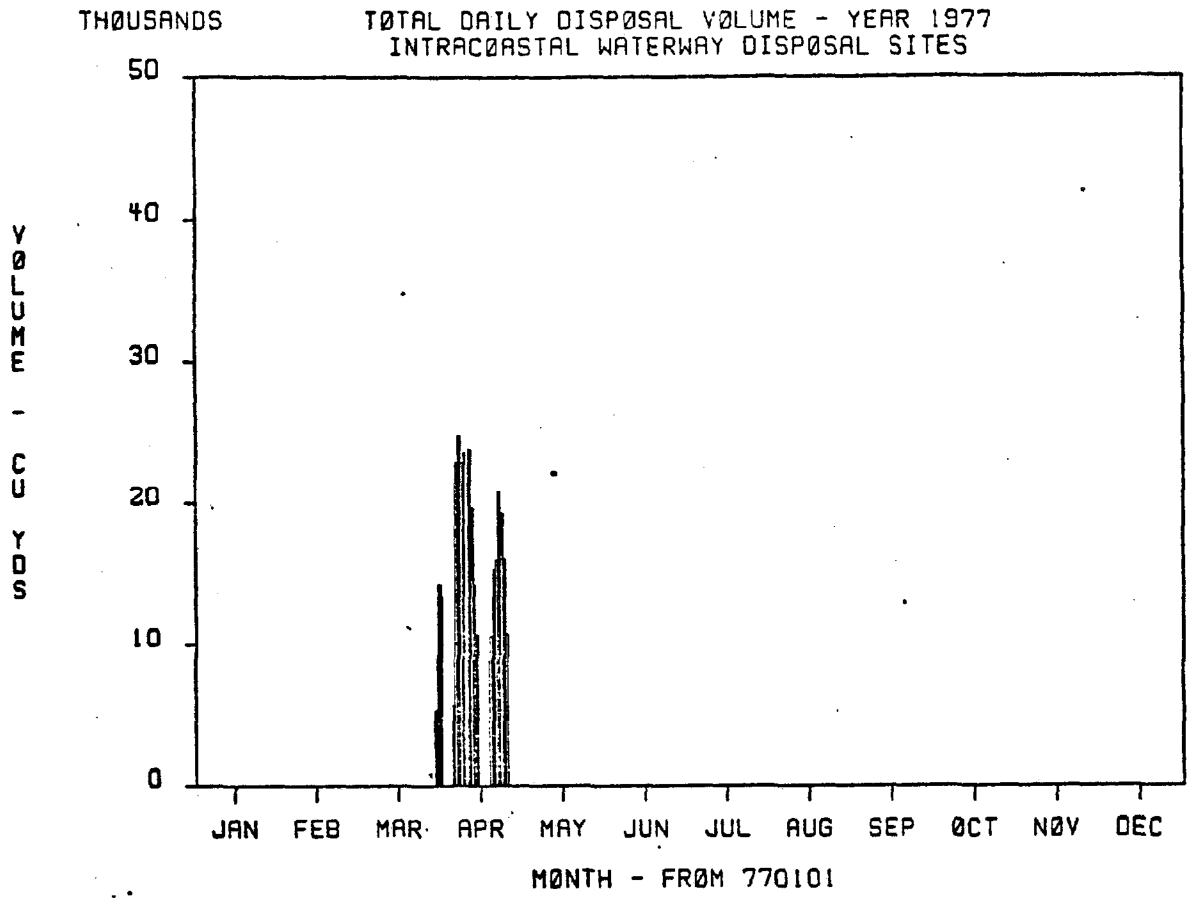



THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1972
INTRACØASTAL WATERWAY DISPØSAL SITES
50
40
30
20
10
0
VØLUME - CU YDS
JAN FEB MAR APR MAY JUN JUL AUG SEP ØCT NØV DEC
MØNTH - FRØM 720101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1974
INTRACØASTAL WATERWAY DISPØSAL SITES
50
40
30
20
10
0
VØLUME - CU YDS
JAN FEB MAR APR MAY JUN JUL AUG SEP ØCT NØV DEC
MØNTH - FRØM 740101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1975
INTRAÇØASTAL WATERWAY DISPØSAL SITES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 750101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1976
INTRACØASTAL WATERWAY DISPØSAL SITES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 760101


THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1977
INTRACØASTAL WATERWAY DISPØSAL SITES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 770101

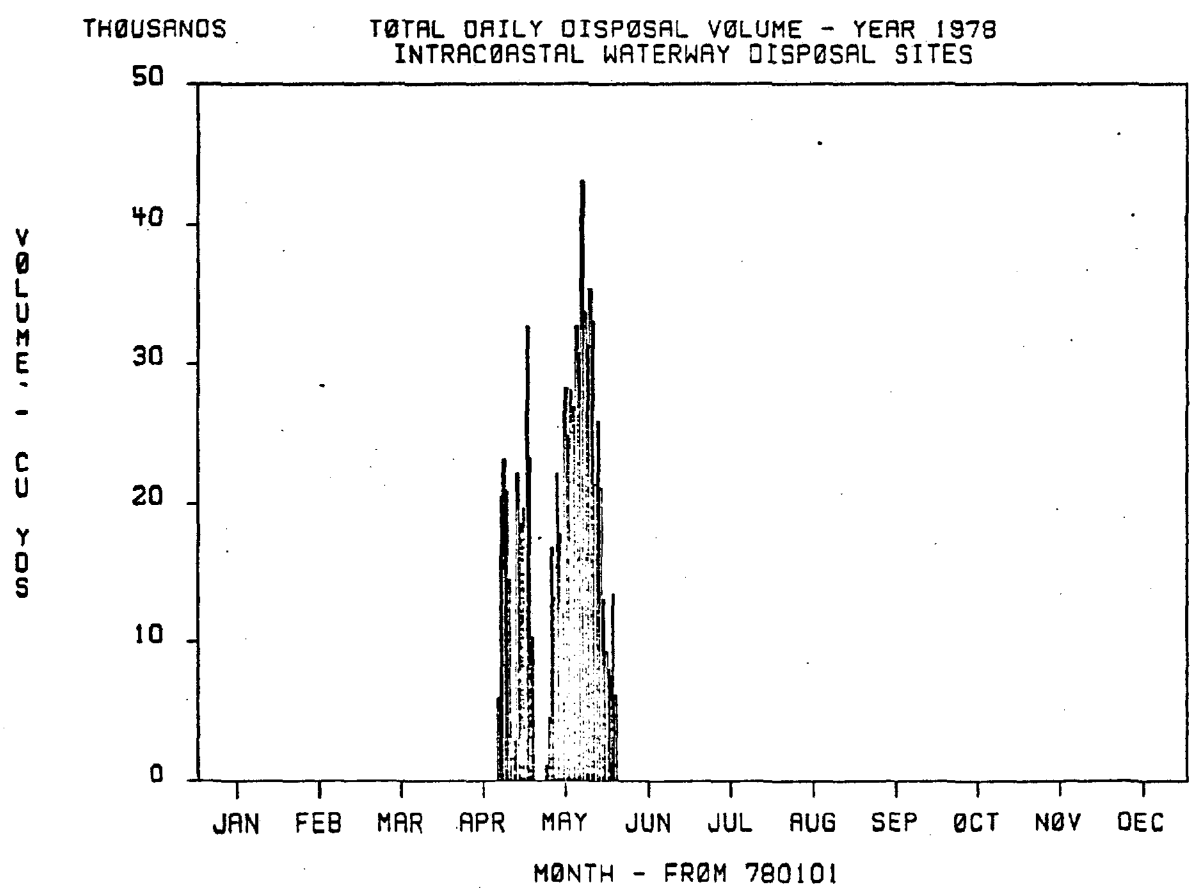
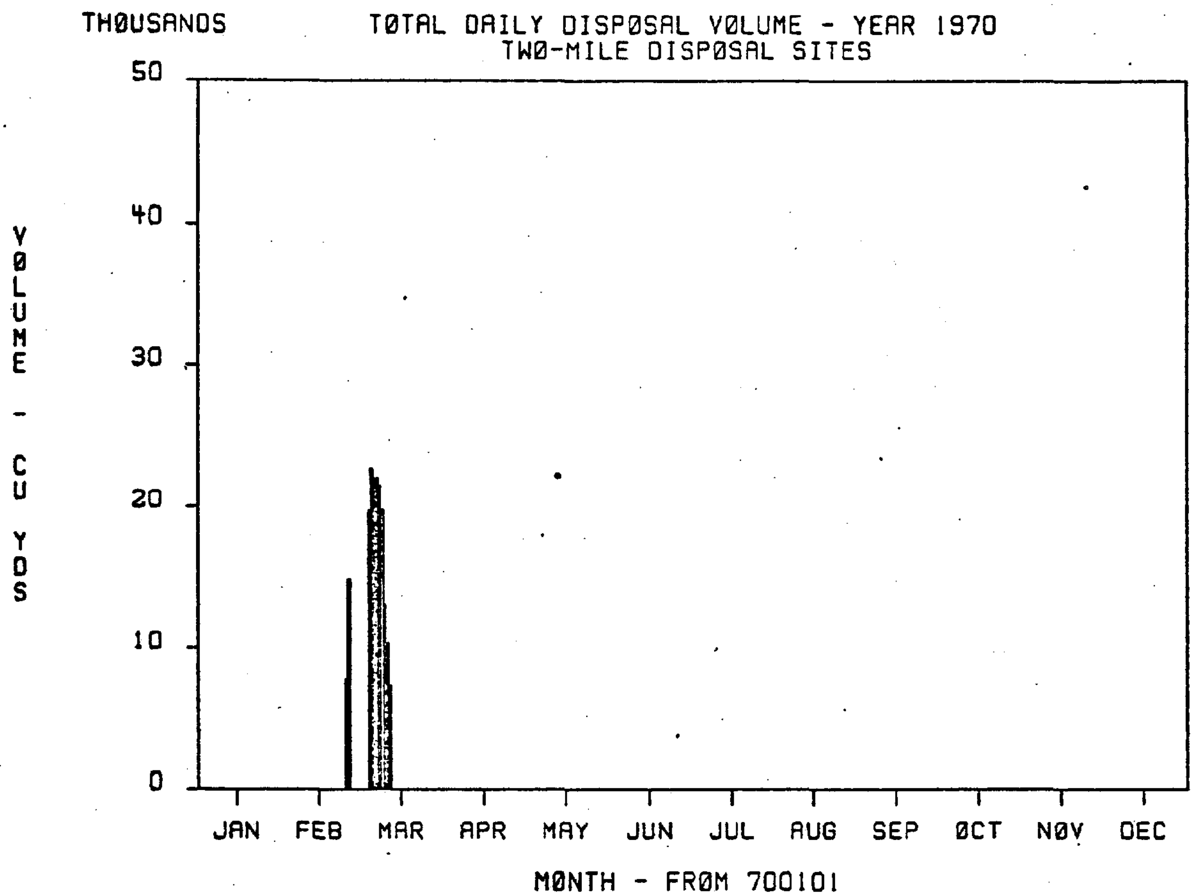
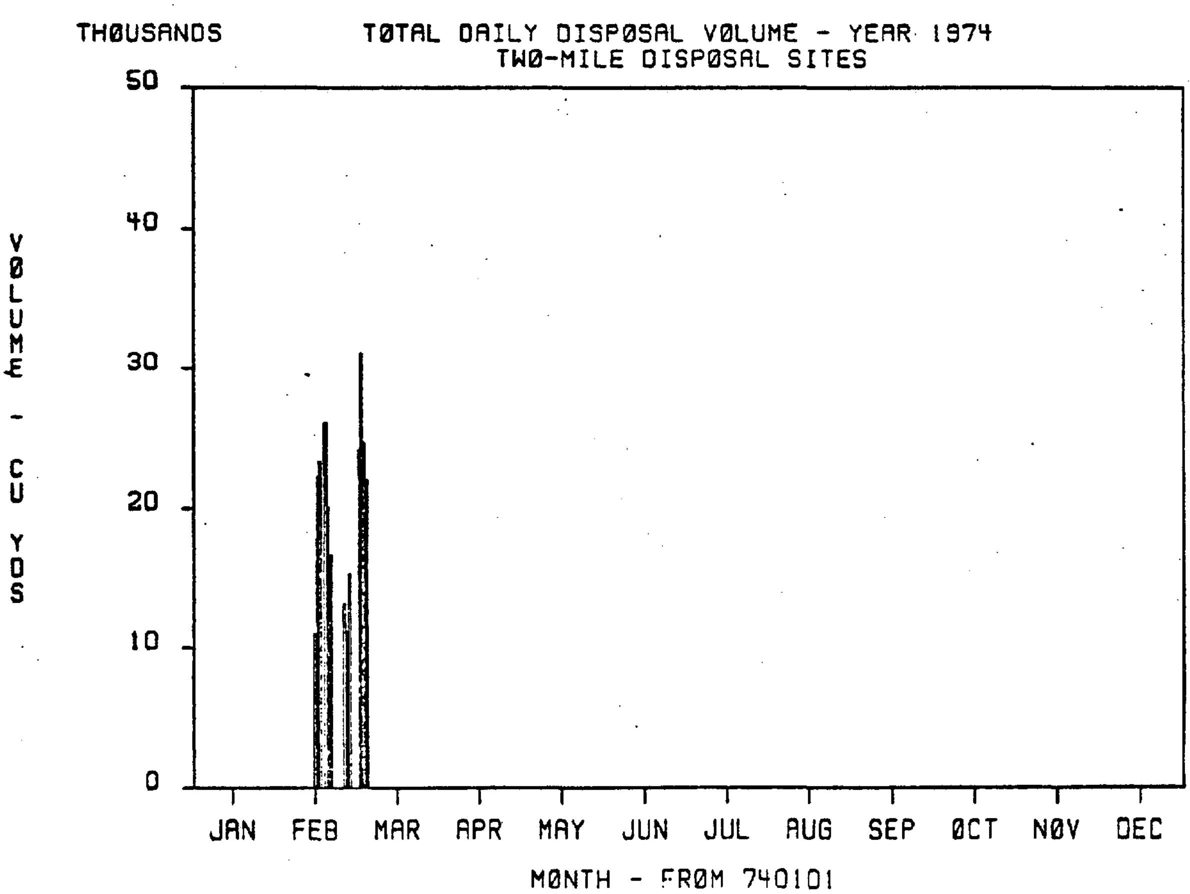
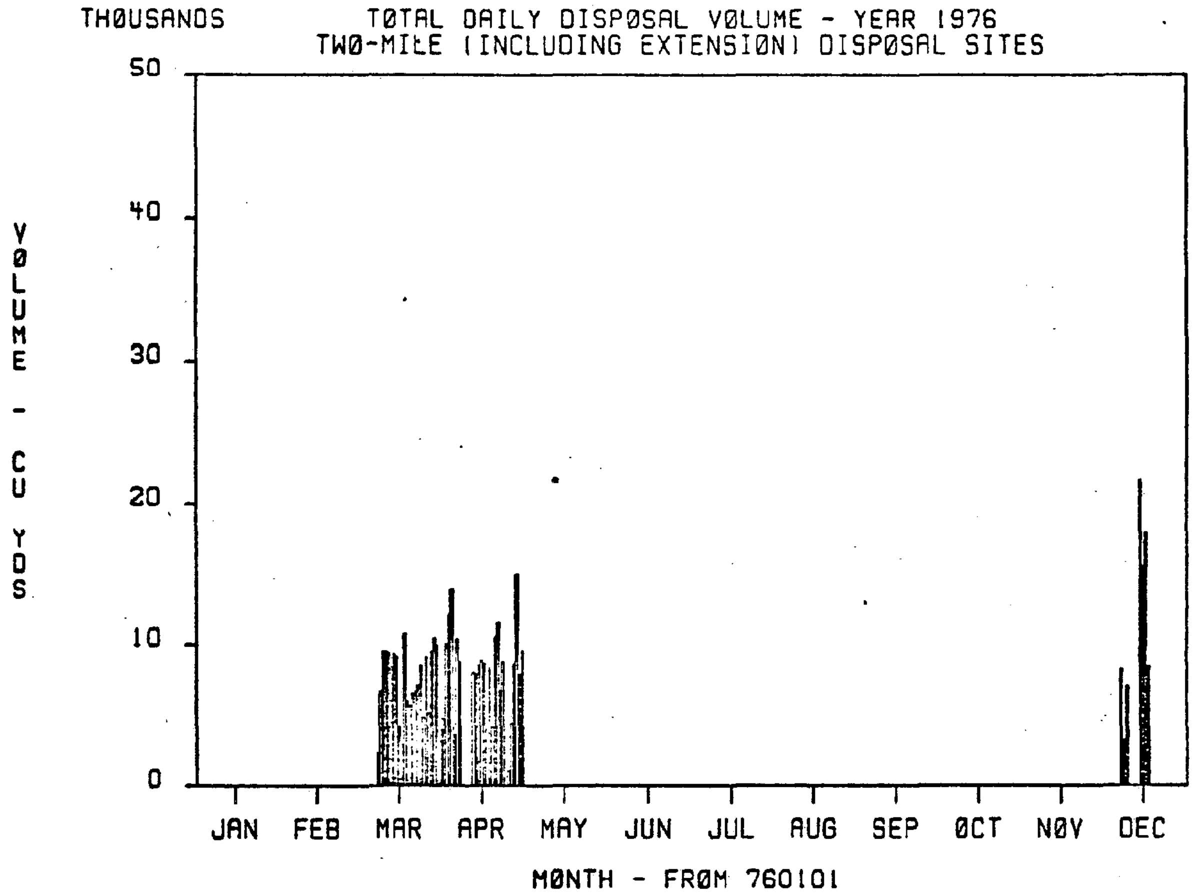

THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1978
INTRACØASTAL WATERWAY DISPØSAL SITES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 780101

Figure 10: Total daily dredge spoil disposal volumes at the two-mile channel and extension from 1970 to present.






THOUSANDS
TOTAL DAILY DISPOSAL VOLUME - YEAR 1976
TWO-MILE (INCLUDING EXTENSION) DISPOSAL SITES
VOLUME - CU YDS
0
10
20
30
40
50
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH - FROM 760101

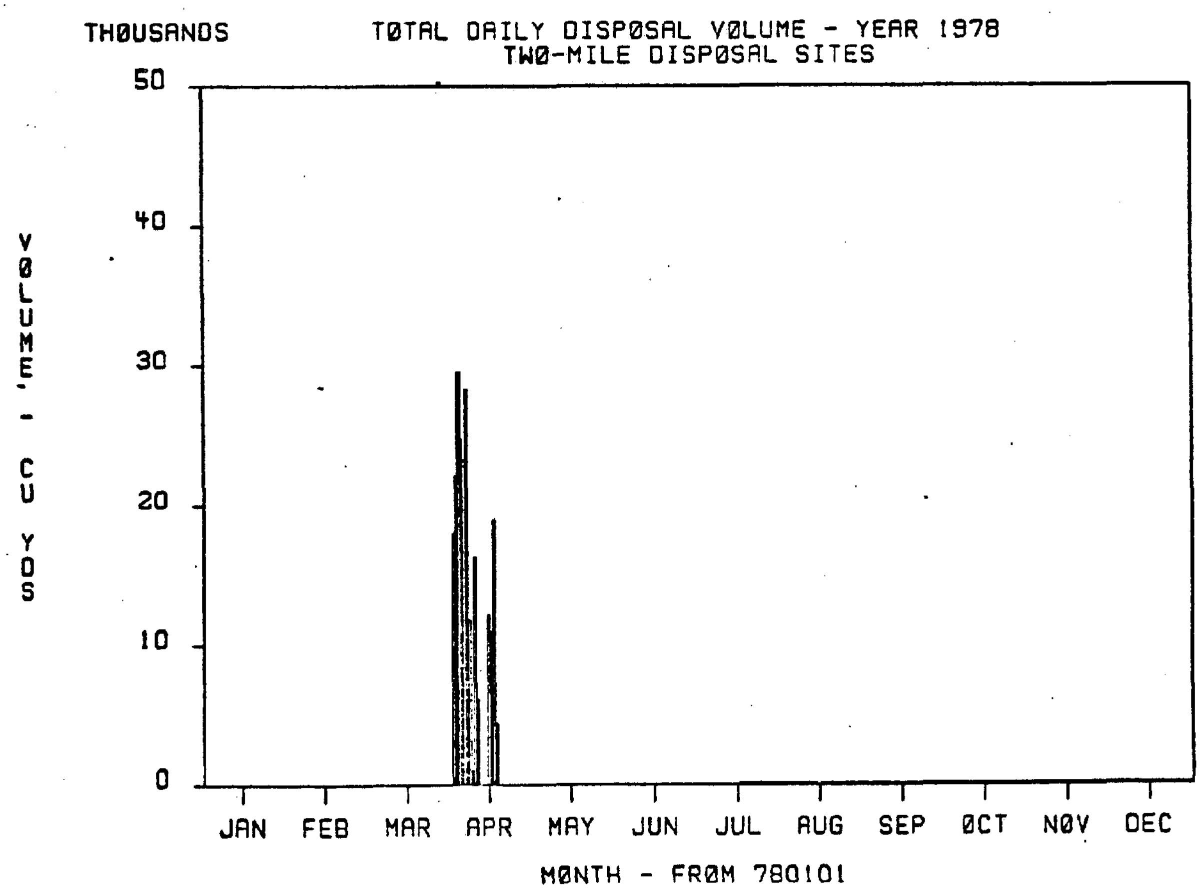
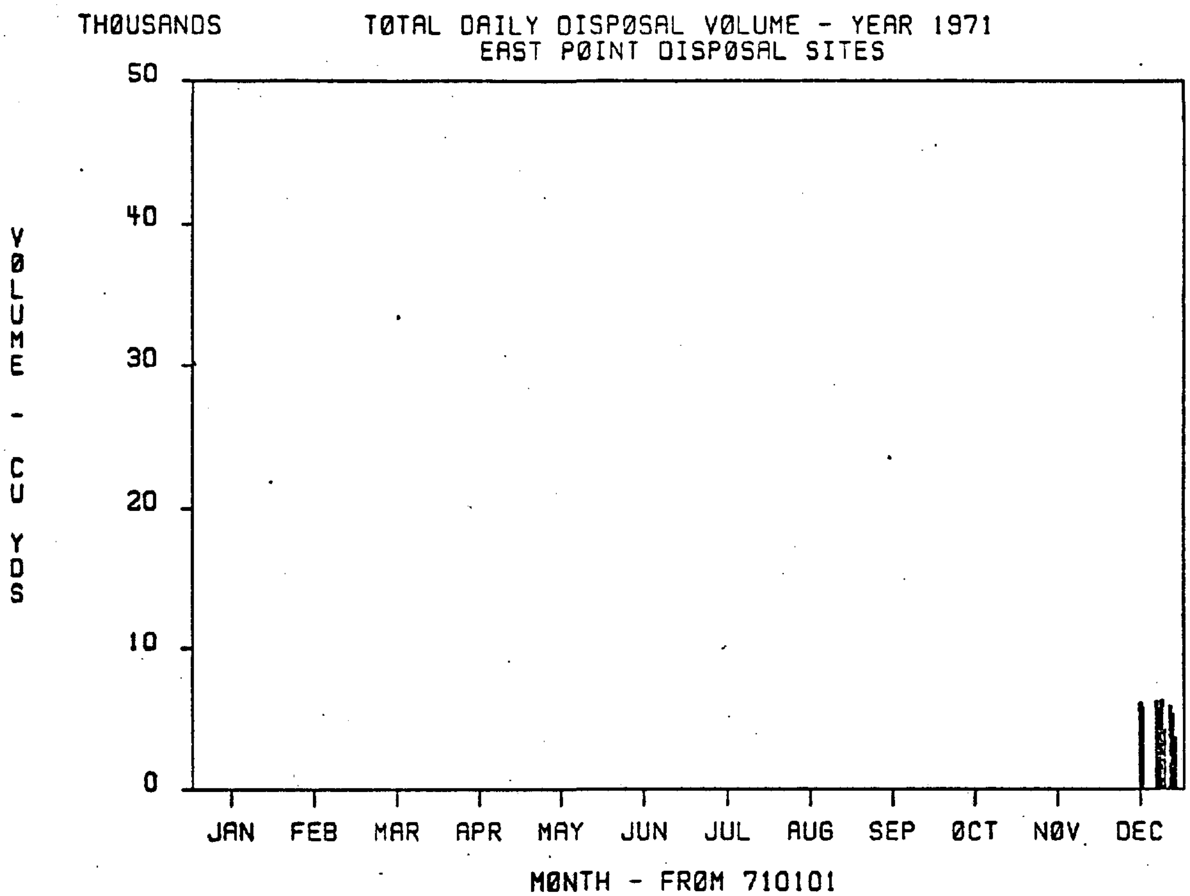
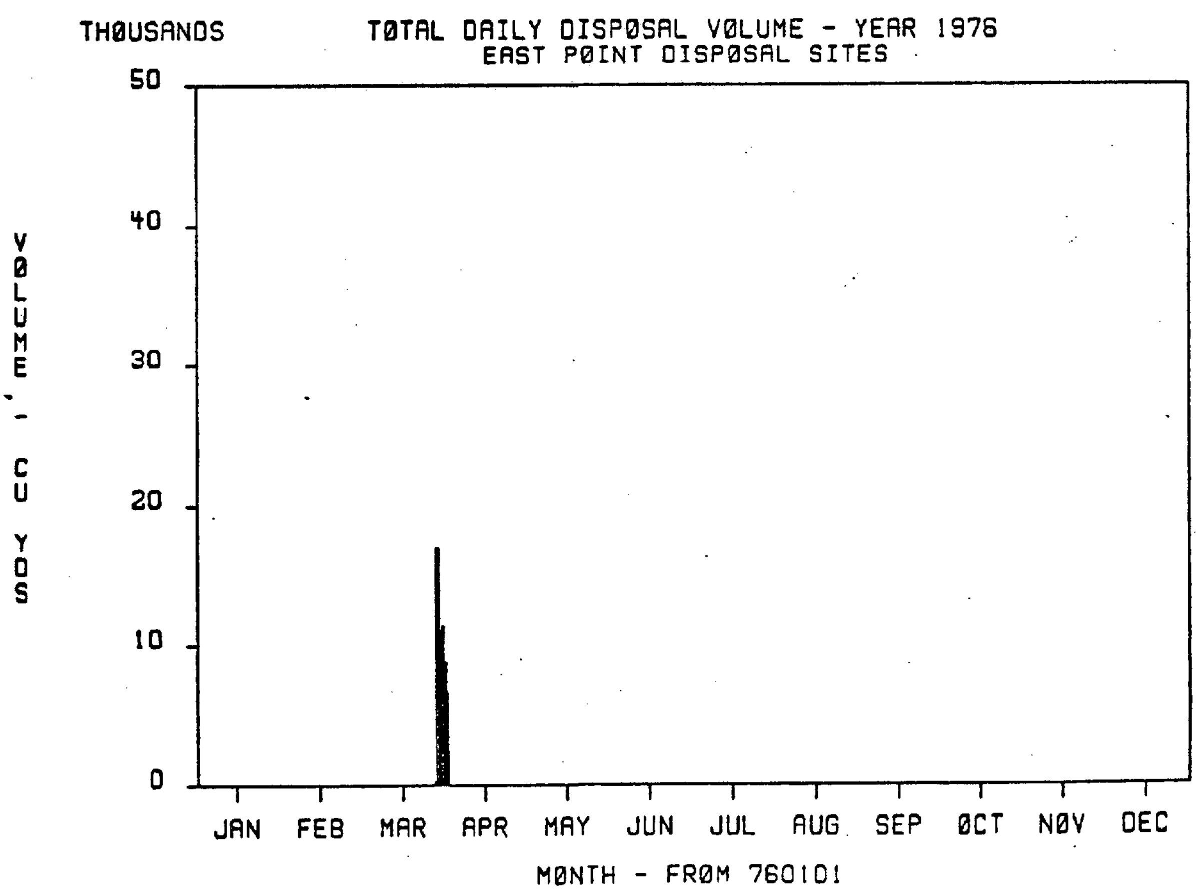
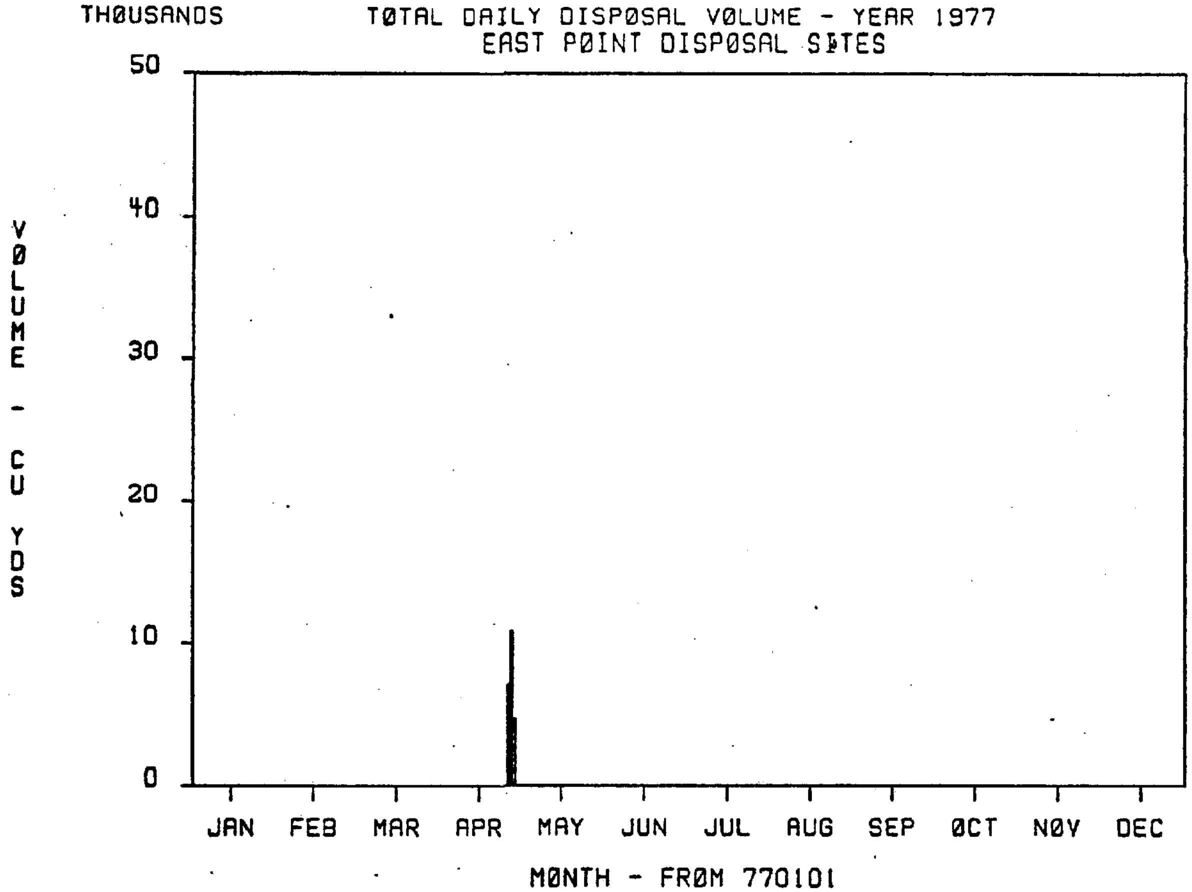

THOUSANDS
TOTAL DAILY DISPOSAL VOLUME - YEAR 1978
TWO-MILE DISPOSAL SITES
VOLUME - CU YDS
0
10
20
30
40
50
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
MONTH - FROM 780101

Figure 11: Total daily dredge spoil disposal volumes at the East Point Channel from 1970 to present.






THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1977
EAST PØINT DISPØSAL SITES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 770101

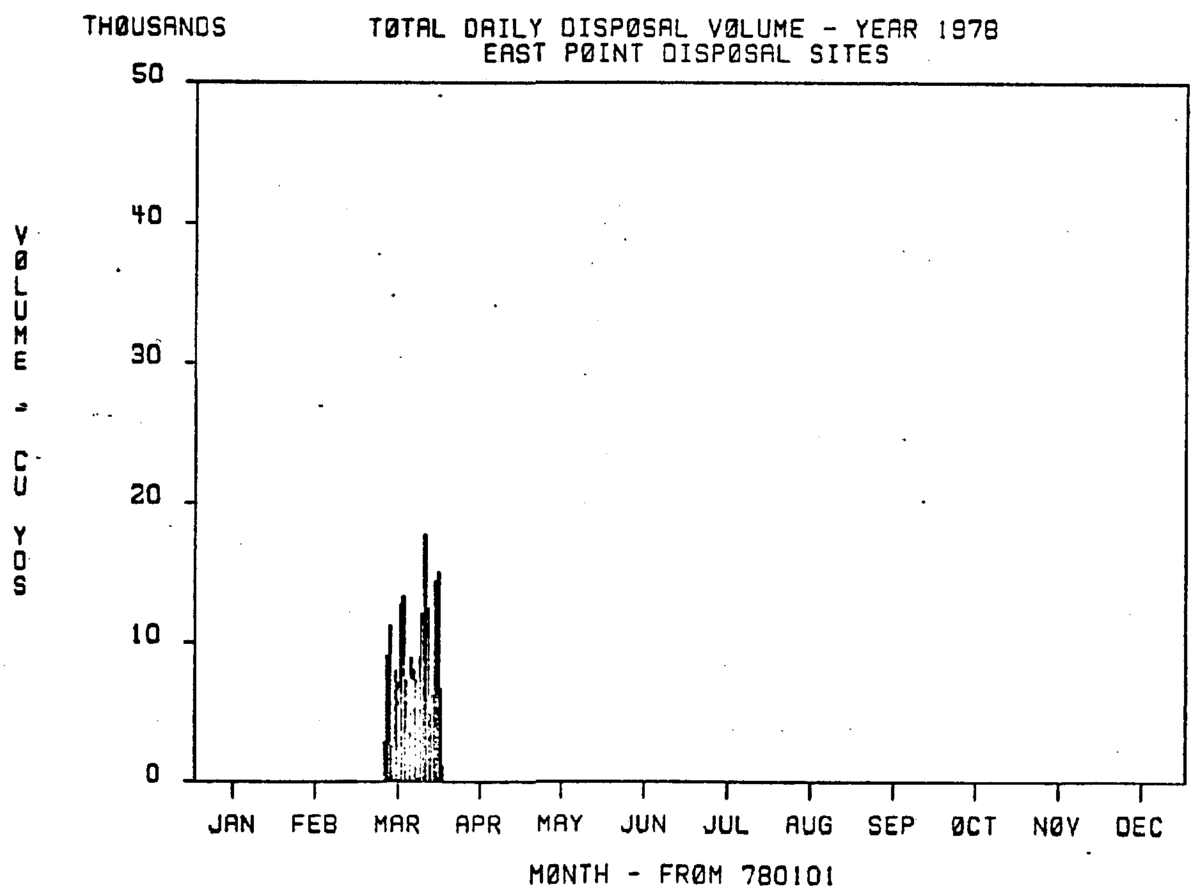
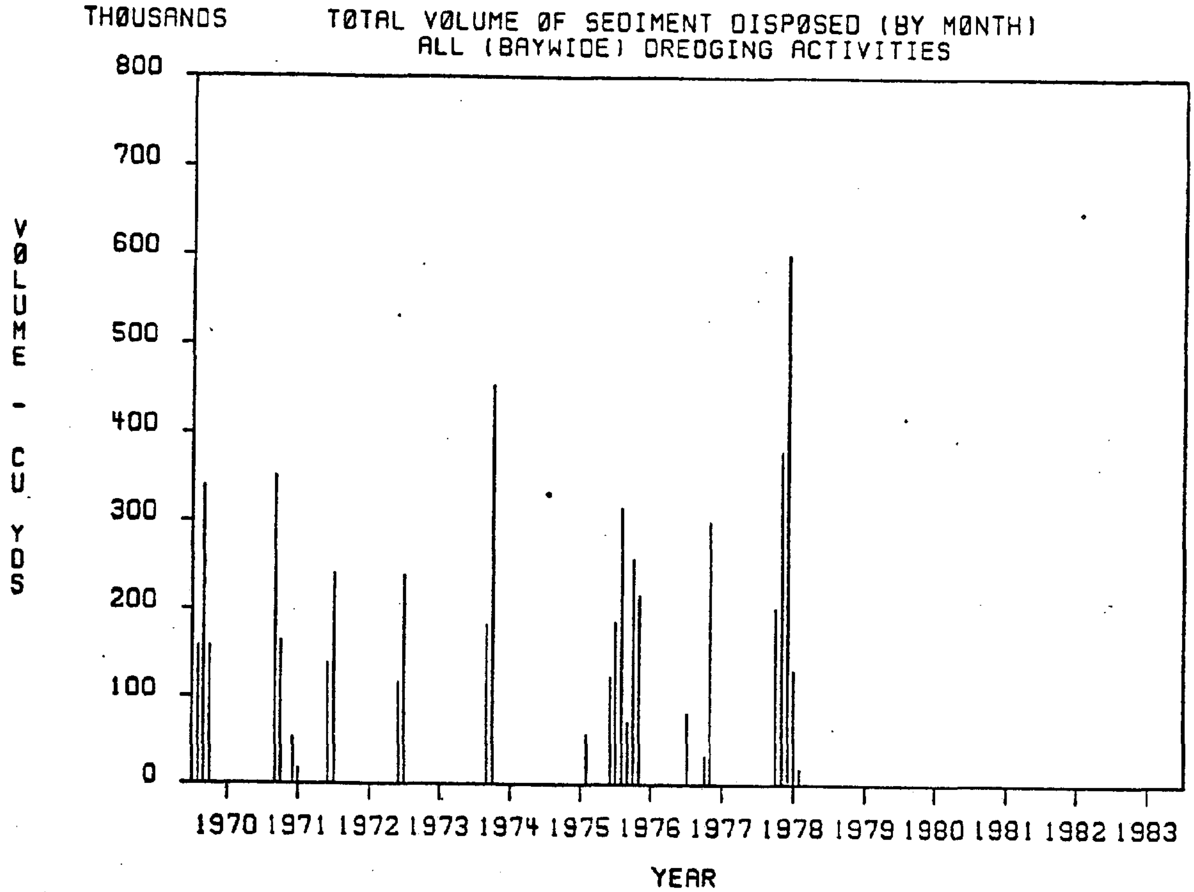
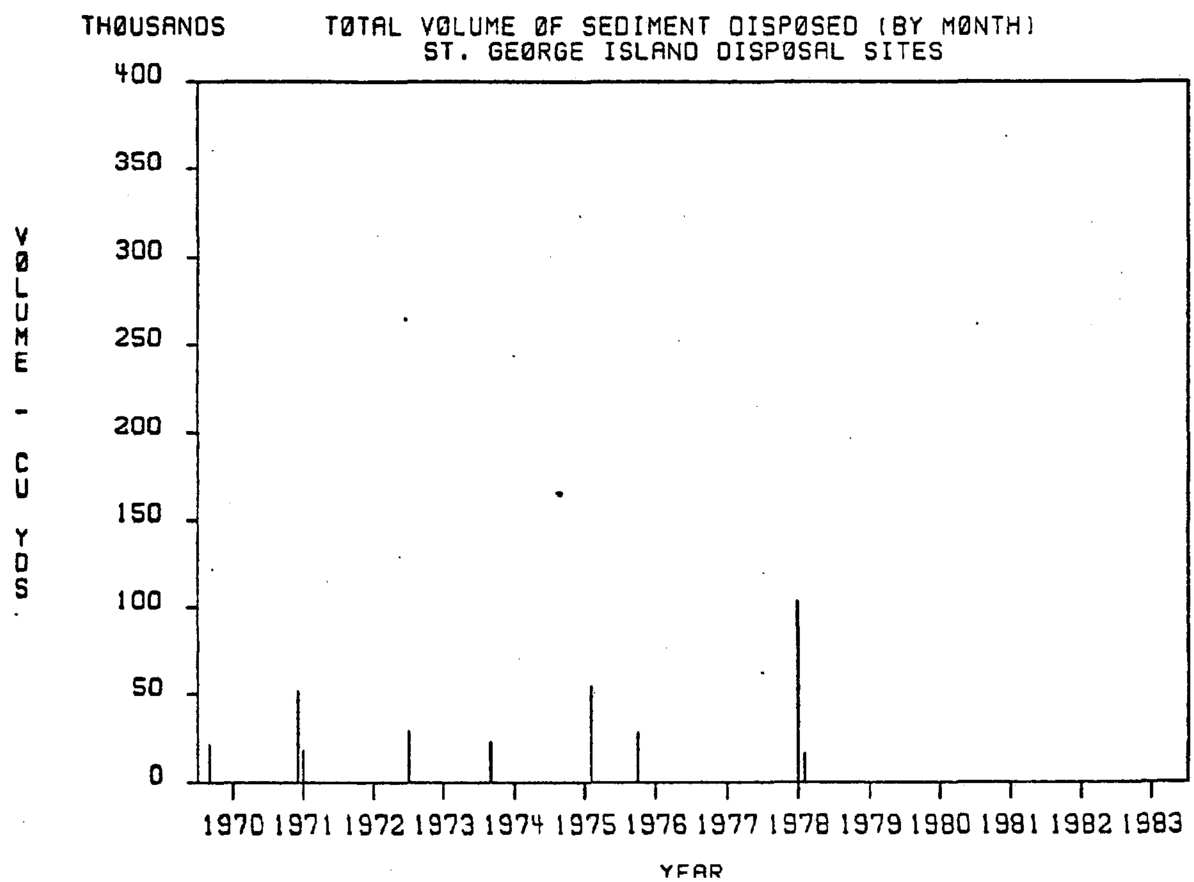
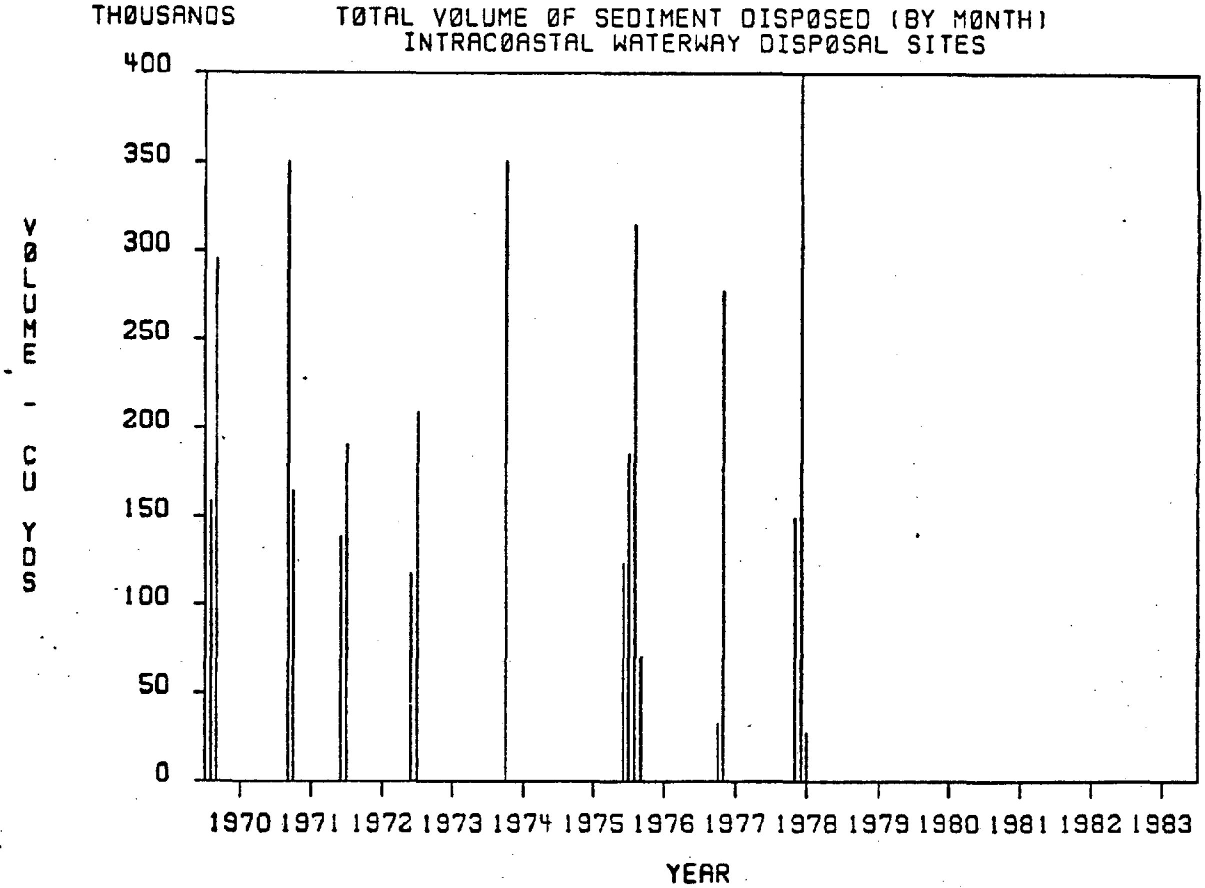

THØUSANDS
TØTAL DAILY DISPØSAL VØLUME - YEAR 1978
EAST PØINT DISPØSAL SITES
VØLUME - CU YDS
50
40
30
20
10
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
ØCT
NØV
DEC
MØNTH - FRØM 780101

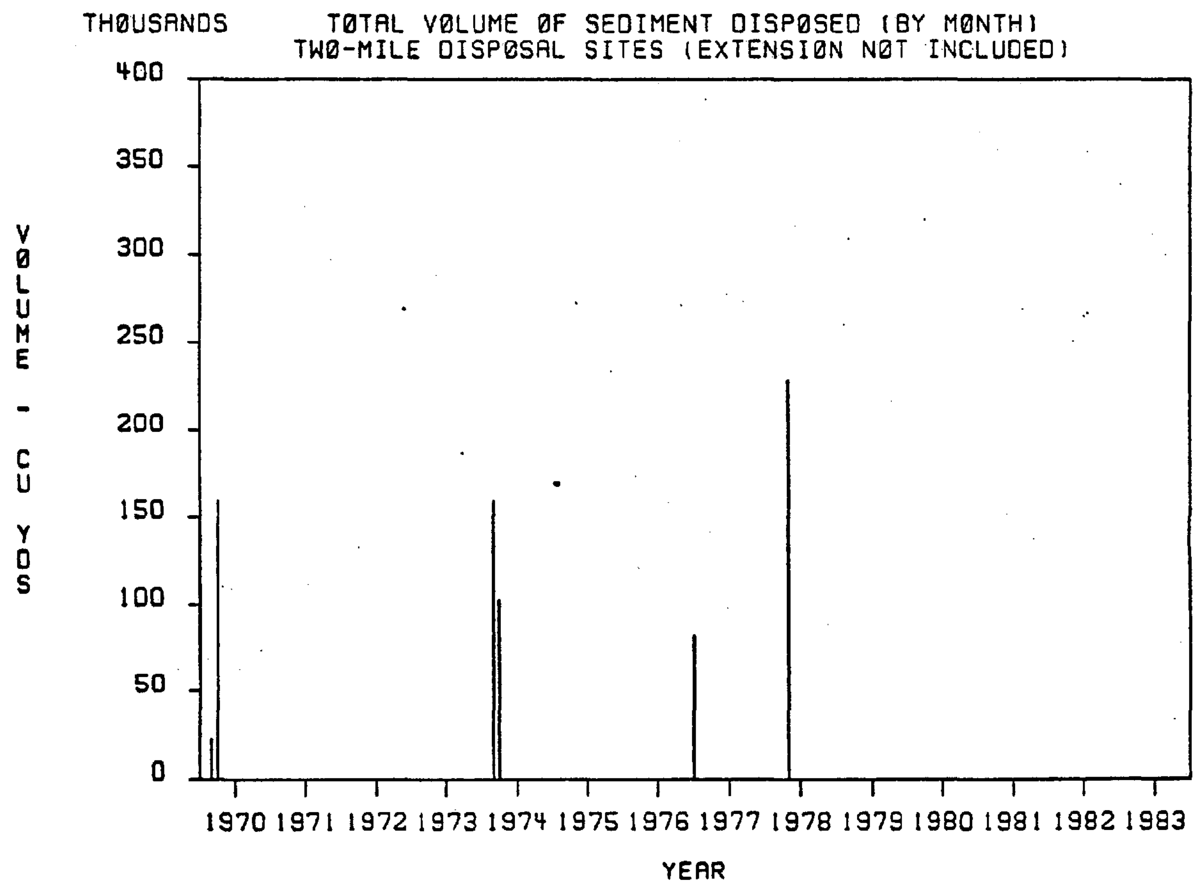
Figure 12: Monthly totals (cubic yards) of dredging baywide and at various disposal sites (lumped by site) in the Apalachicola estuary from 1970 to the present time.



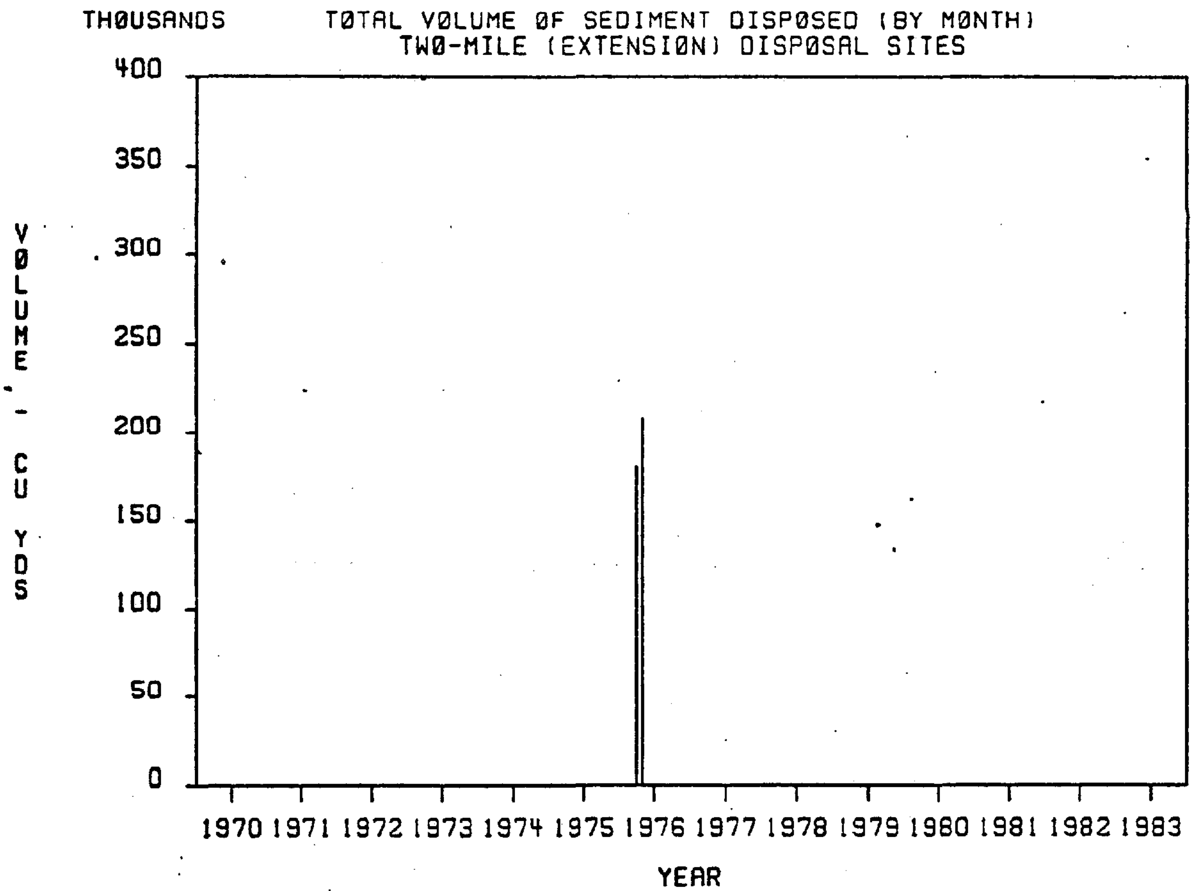




THOUSANDS
TOTAL VOLUME OF SEDIMENT DISPOSED (BY MONTH)
INTRACOASTAL WATERWAY DISPOSAL SITES
400
350
300
250
200
150
100
50
0
VOLUME - CU YDS
1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR



THOUSANDS
TOTAL VOLUME OF SEDIMENT DISPOSED (BY MONTH)
TWO-MILE DISPOSAL SITES (EXTENSION NOT INCLUDED)
400
350
300
250
200
150
100
50
0
VOLUME - CU YDS
1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR


THØUSANDS
TØTAL VØLUME ØF SEDIMENT DISPØSED (BY MØNTH)
TWØ-MILE (EXTENSIØN) DISPØSAL SITES
VØLUME - CU YDS
400
350
300
250
200
150
100
50
0
1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

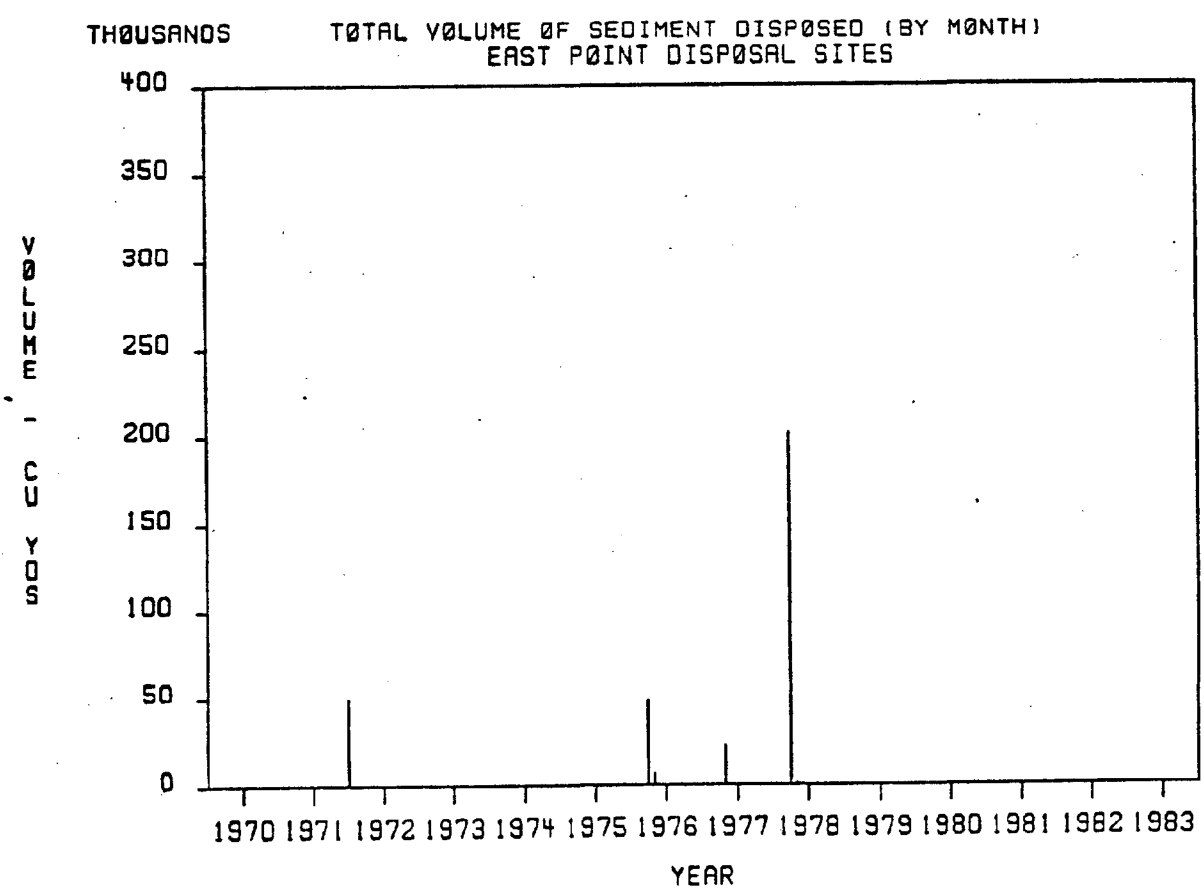
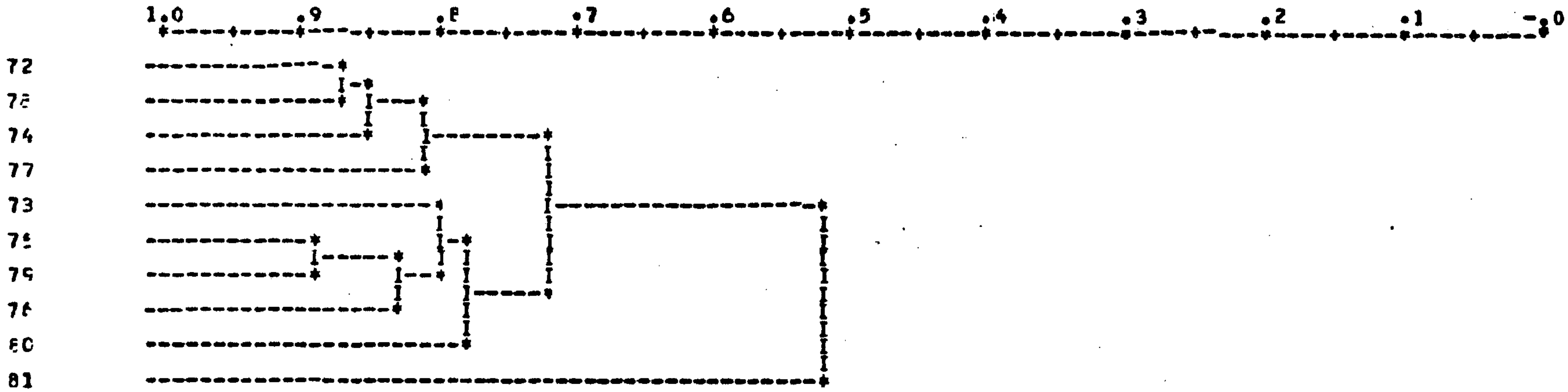

THØUSANDS
TØTAL VØLUME ØF SEDIMENT DISPØSED (BY MØNTH)
EAST PØINT DISPØSAL SITES
VØLUME - CU YDS
400
350
300
250
200
150
100
50
0
1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

Figure 13: Cluster analysis of total annual Apalachicola River Flow (1972-1982).

DER PROJECT - RIVERFLOW - NO LOGS
DENDROGRAM OUTPUT
MINIMUM DISTANCE = .5199



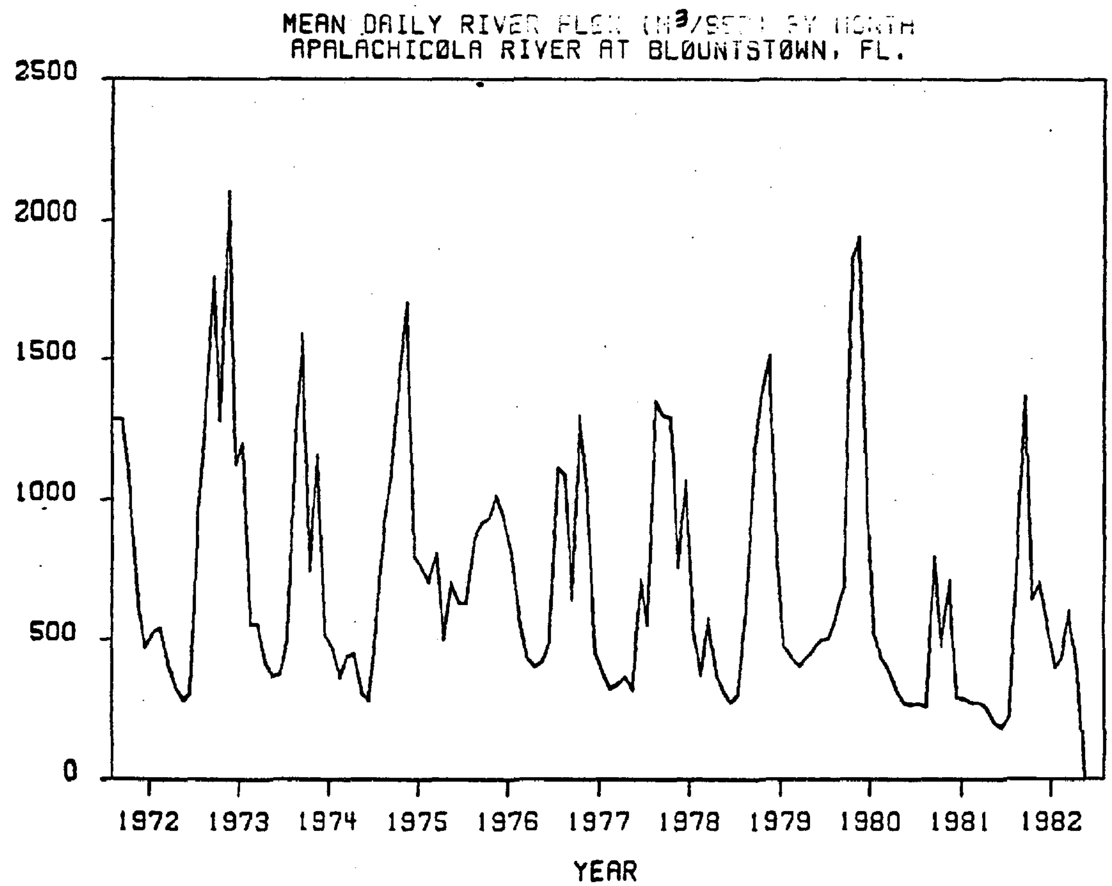
CLUSTERING STRATEGY IS FLEXIBLE GROUPING (WITH BETA)
SIMILARITY COEFFICIENT IS CZEKANOWSKI

CLUSTER LEVEL JOINS	GROUP NAME	WITH SUBGROUP	(WHERE GROUP NAME NOW REFERS TO A CLUSTER CONTAINING THE FOLLOWING CLUSTER UNITS)							
.8500	75	79	75	79						
.8672	72	78	72	78						
.8519	72	74	72	74	78					
.8322	75	76	75	76	79					
.8127	72	77	72	74	77	78				
.7964	73	75	73	75	76	79				
.7811	73	80	73	75	76	79	80			
.7188	72	73	72 80	73	74	75	76	77	78	79
.5199	72	81	72 80	73 81	74	75	76	77	78	79

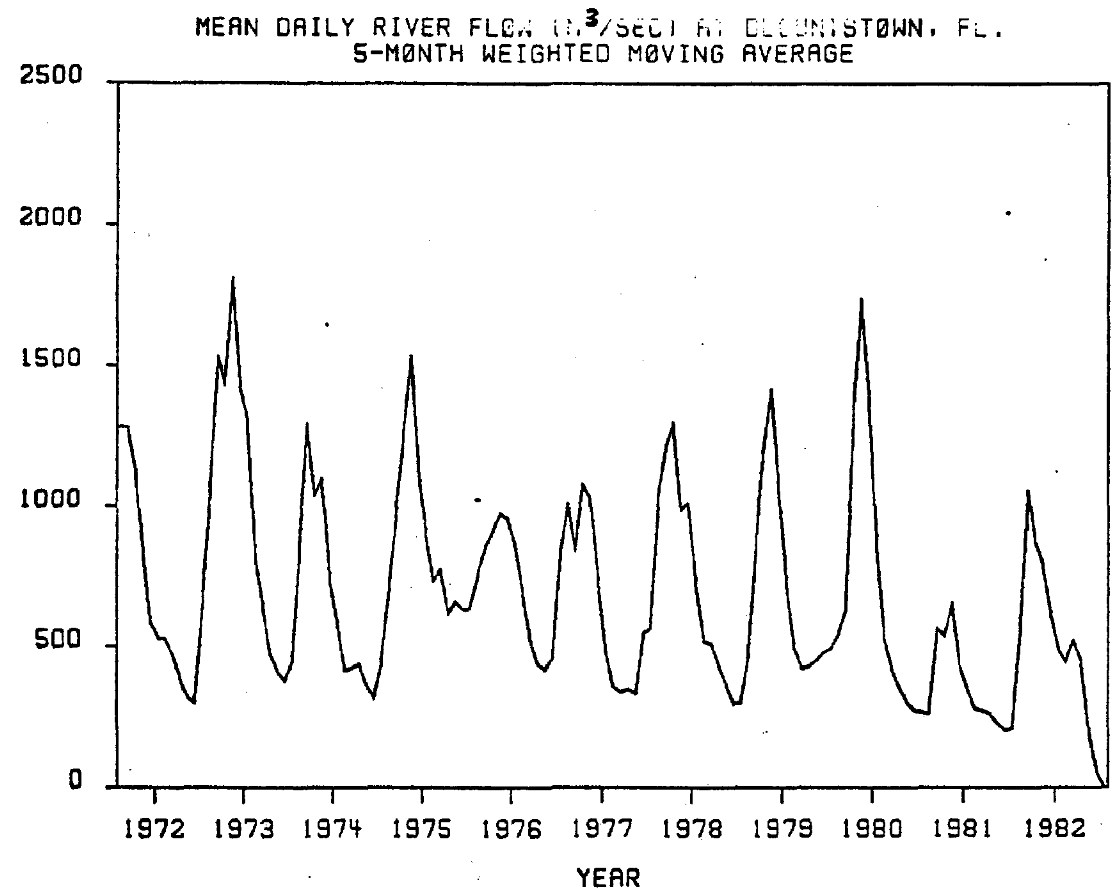
(ALL ONE GROUP)

Figure 14: Apalachicola River Flow from 1972 through 1982 showing:

(A) monthly mean river flow



(B) 5-month weighted moving averages of the monthly mean data



(C) monthly mean river flow averaged by season (winter = December, January, February; spring = March, April, May; summer = June, July, August; fall = September, October, December)

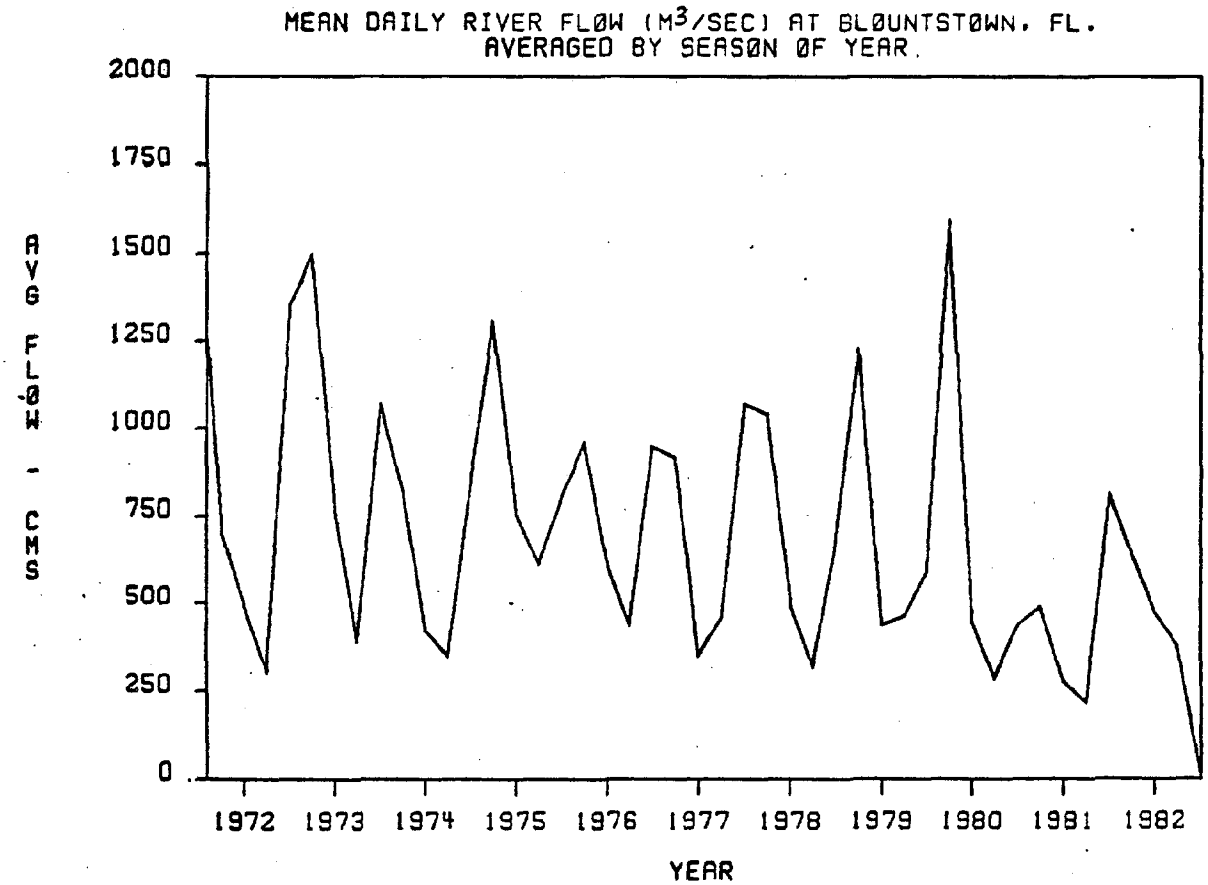
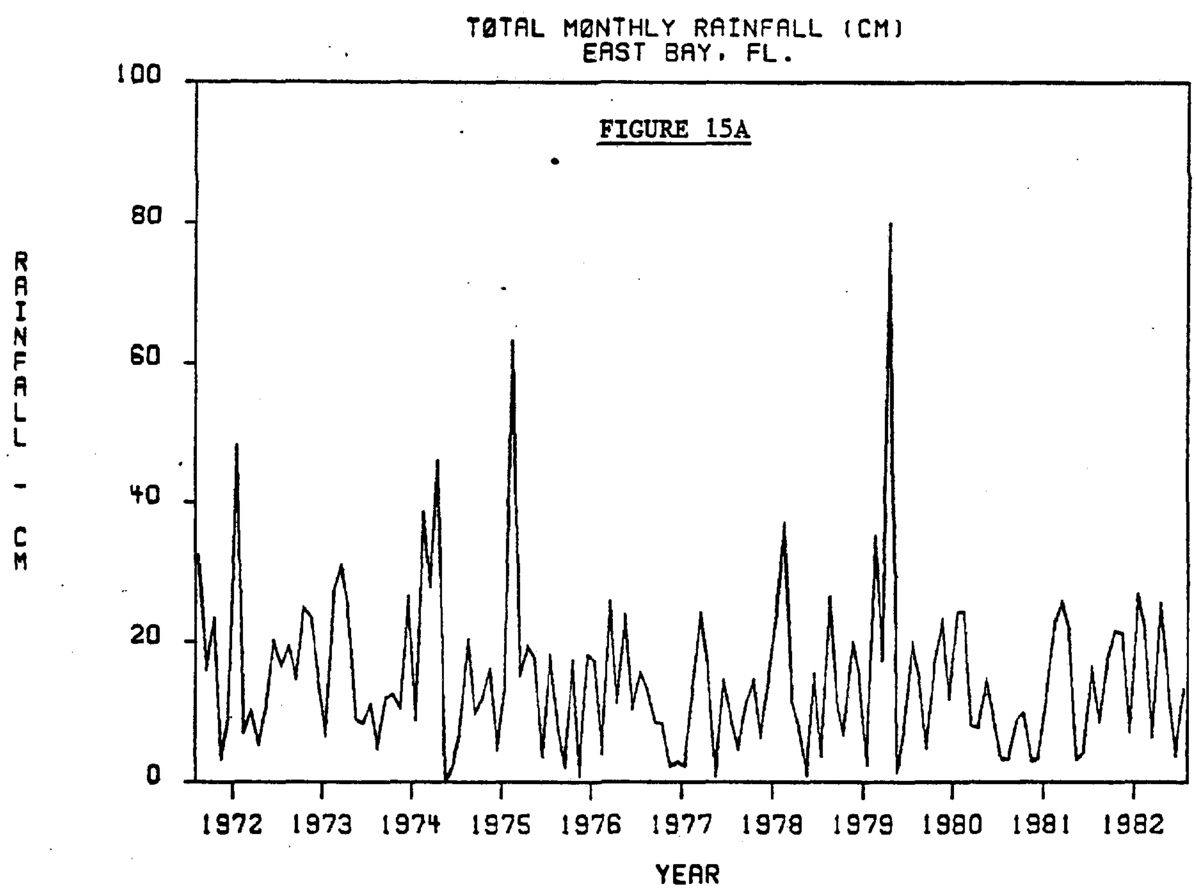
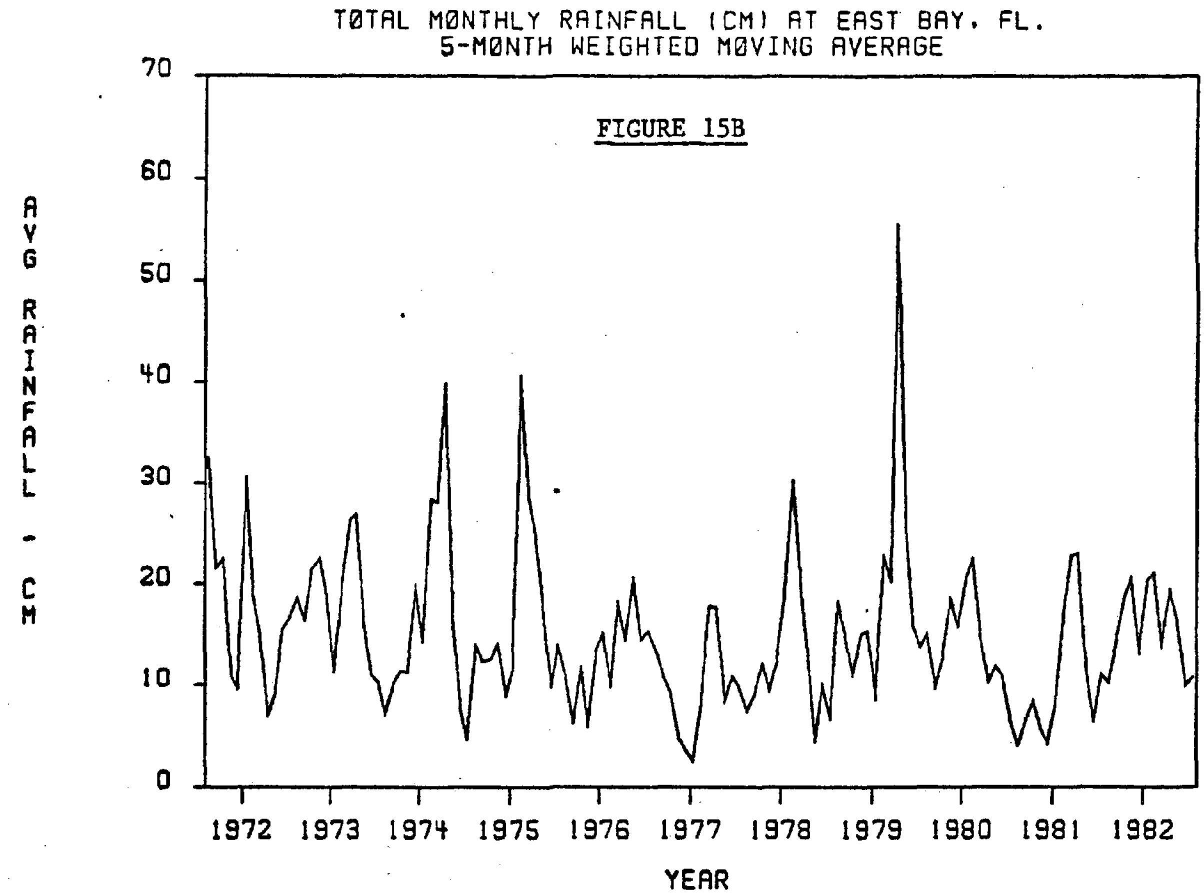


Figure 15: Total monthly rainfall (cm) in the Tate's Hell Swamp (East Bay Tower) from 1972 through 1982. Data are presented as totals per month (A), five month weighted moving averages (B), and as seasonal averages (C) (as defined in Figure 14).




TØTAL MØNTHLY RAINFALL (CM) AT EAST BAY, FL.
5-MØNTH WEIGHTED MØVING AVERAGE
FIGURE 15B
AVG RAINFALL - CM
70
60
50
40
30
20
10
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
YEAR

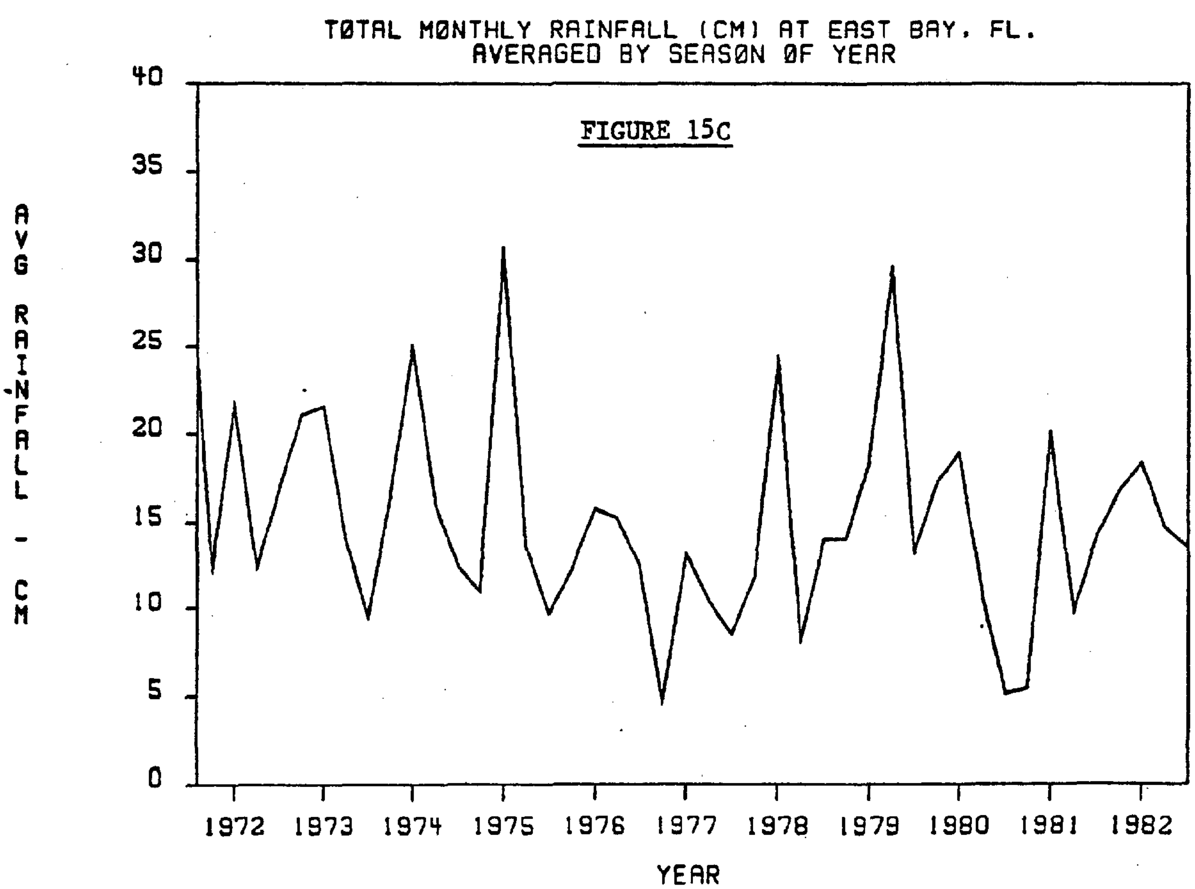
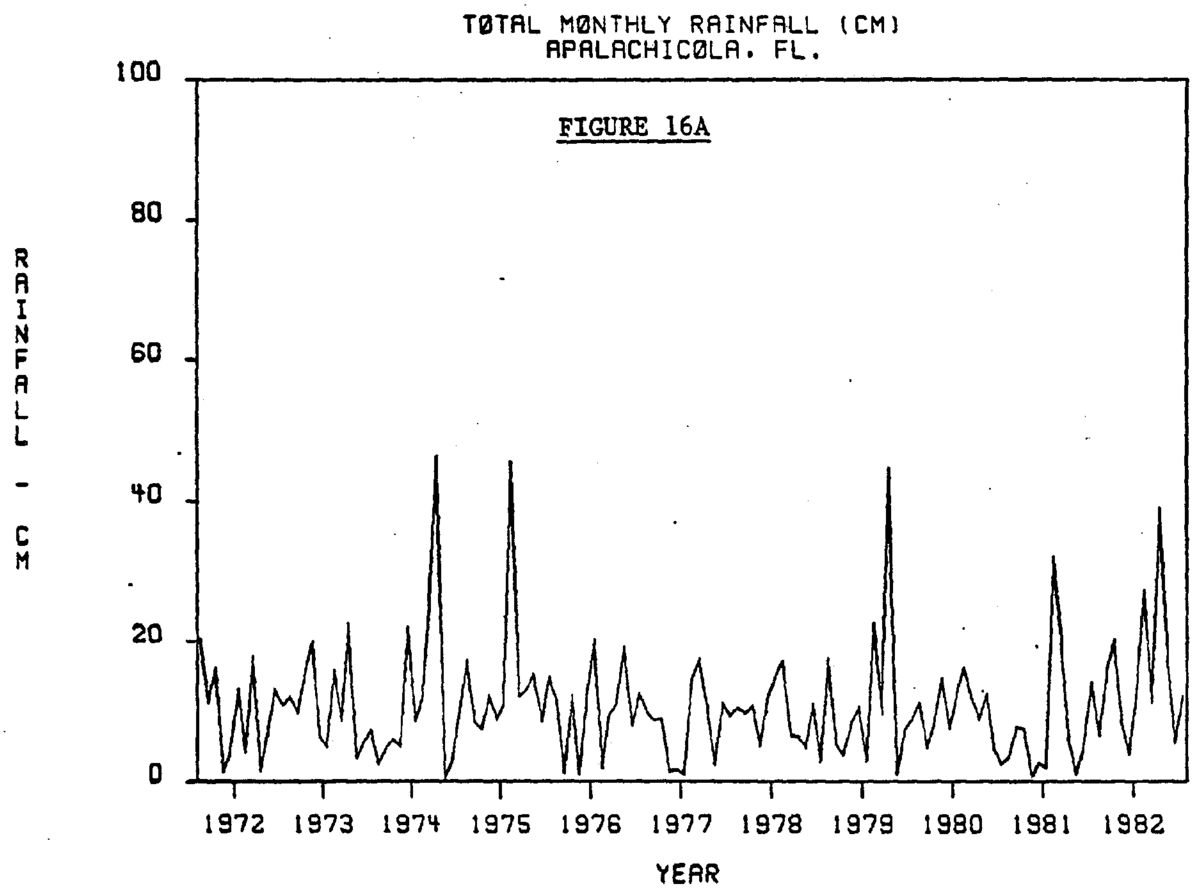
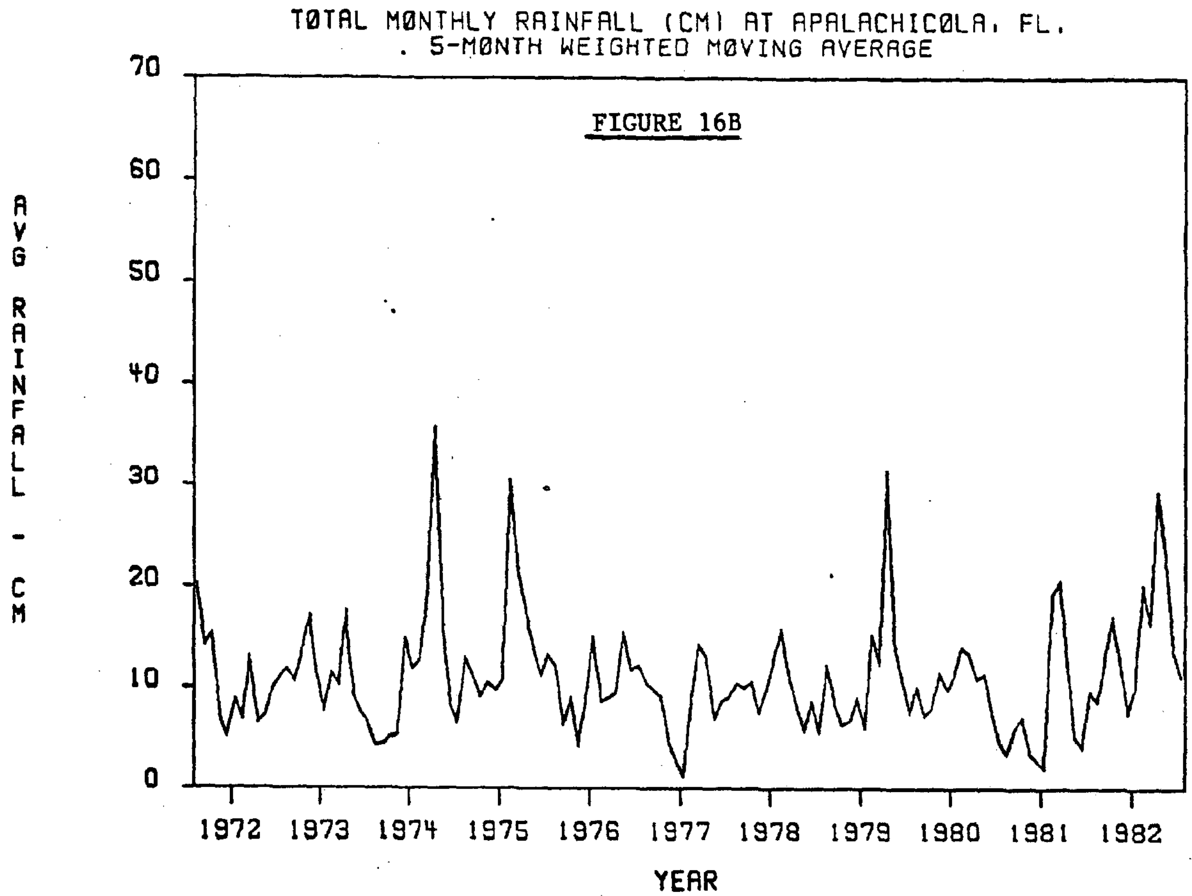

TØTAL MØNTHLY RAINFALL (CM) AT EAST BAY, FL.
AVERAGED BY SEASØN ØF YEAR
FIGURE 15C
AVG RAINFALL - CM
40
35
30
25
20
15
10
5
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
YEAR

Figure 16: Total monthly rainfall (cm) in the Apalachicola (NOAA station at the airport) from 1972 through 1982. Data are presented as totals per month (A), five month weighted moving averages (B), and as seasonal averages (C) (as defined in Figure 14).




TØTAL MØNTHLY RAINFALL (CM) AT APALACHICØLA, FL.
. 5-MØNTH WEIGHTED MØVING AVERAGE
FIGURE 16B
AVG RAINFALL - CM
70
60
50
40
30
20
10
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
YEAR

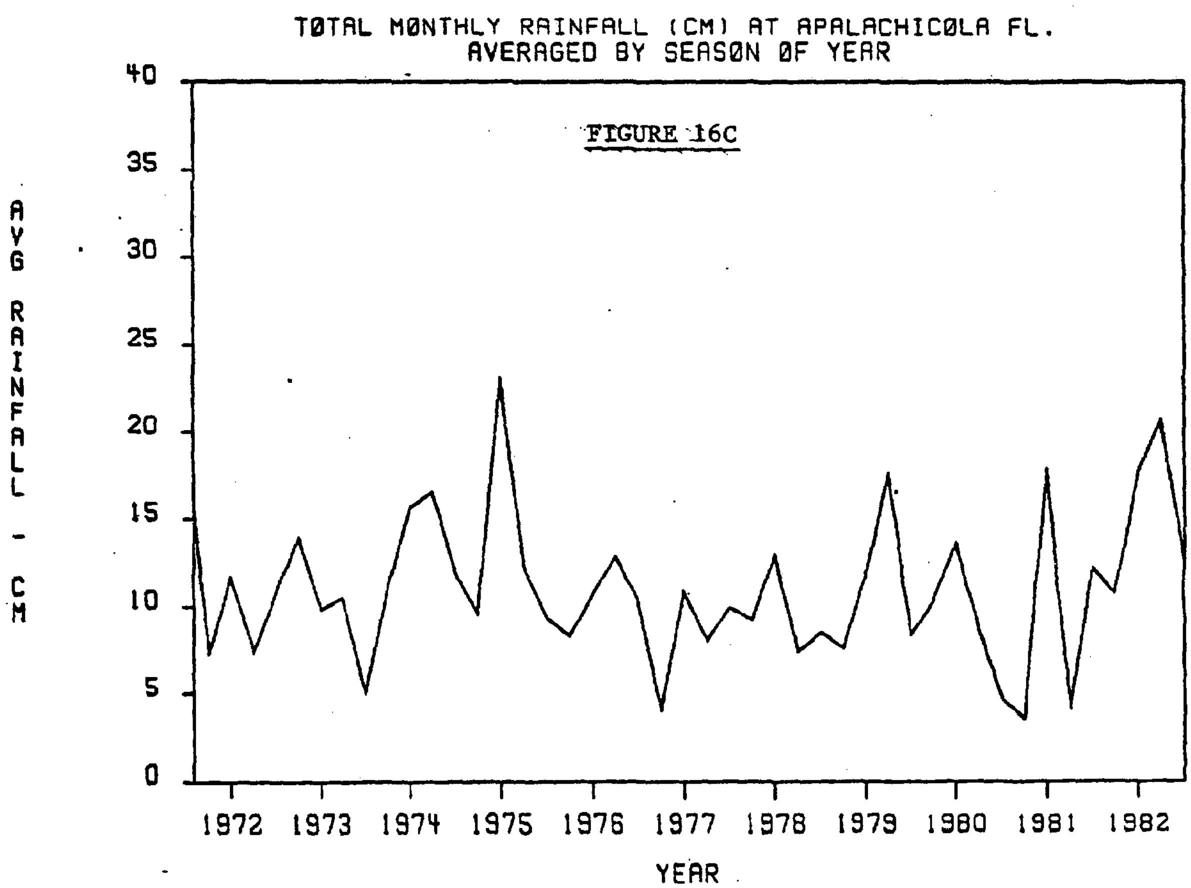
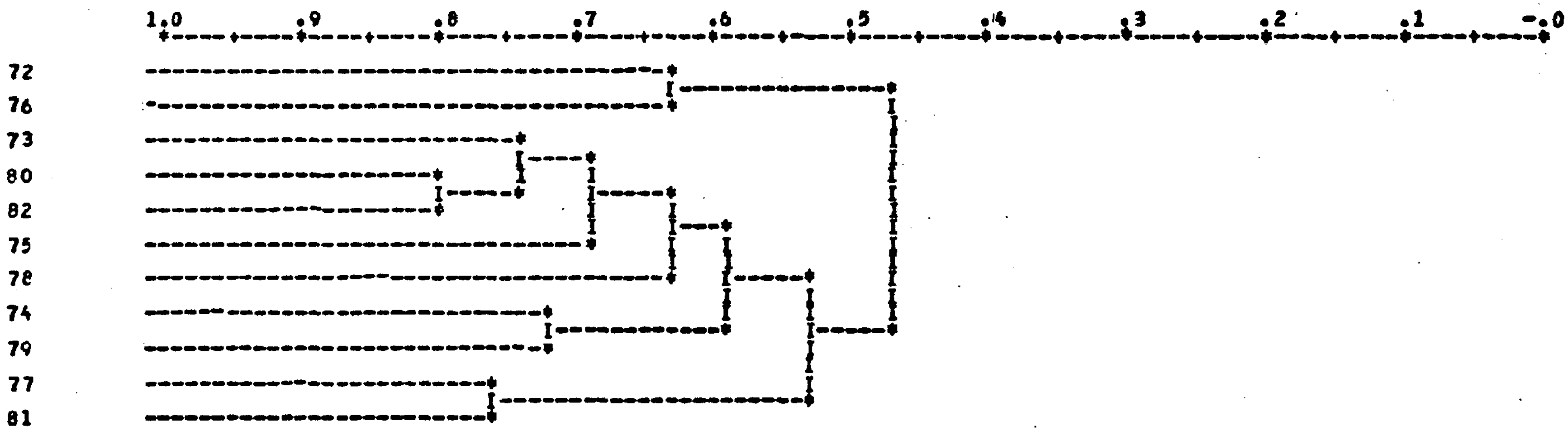

TØTAL MØNTHLY RAINFALL (CM) AT APALACHICØLA FL.
AVERAGED BY SEASØN ØF YEAR
FIGURE 16C
AVG RAINFALL - CM
40
35
30
25
20
15
10
5
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
YEAR

Figure 17: Cluster analysis of rainfall (year by monthly totals) in East Bay (A) and Apalachicola (B).

FIGURE 17A

DER PRCJECT - EAST BAY RAIN - CLUSTER YEARS - NO LOGS
DENDROGRAM OUTPUT
MINIMUM DISTANCE = .4679



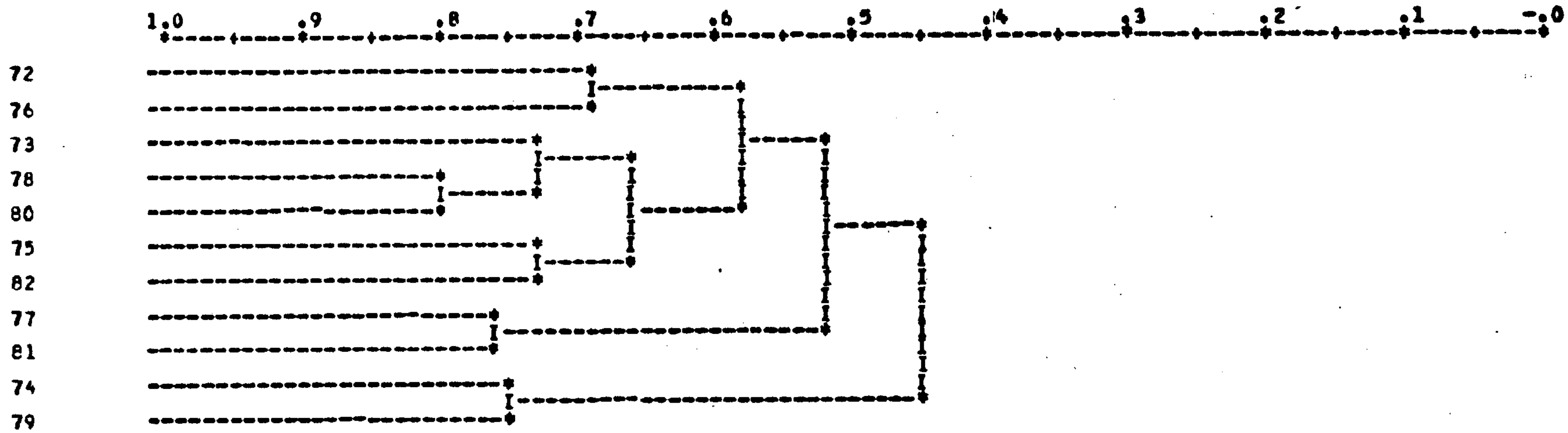
DER PRCJECT - EAST BAY RAIN - CLUSTER YEARS - NO LOGS

CLUSTERING STRATEGY IS FLEXIBLE GROUPING (WITH BETA)
SIMILARITY COEFFICIENT IS CZEKANOWSKI

CLUSTER LEVEL	JOINS GROUP NAME	WITH SUBGROUP	(WHERE GROUP NAME NOW REFERS TO A CLUSTER CONTAINING THE FOLLOWING CLUSTER UNITS)
.7966	80	82	8C 82
.7621	77	81	77 81
.7438	73	80	73 80 82
.7223	74	79	74 79
.6854	73	75	73 75 80 82
.6280	72	76	72 76
.6278	73	78	73 75 78 80 82
.5877	73	74	73 74 75 78 79 80 82
.526C	73	77	73 74 75 77 78 79 80 81 82
.4679	72	73	72 73 74 75 76 77 78 79 80 81 82 (ALL ONE GROUP)

FIGURE 17B

DER PROJECT - APALACHICOLA RAIN - CLUSTER YEARS - NO LOGS
DENDROGRAM OUTPUT
MINIMUM DISTANCE = .4499



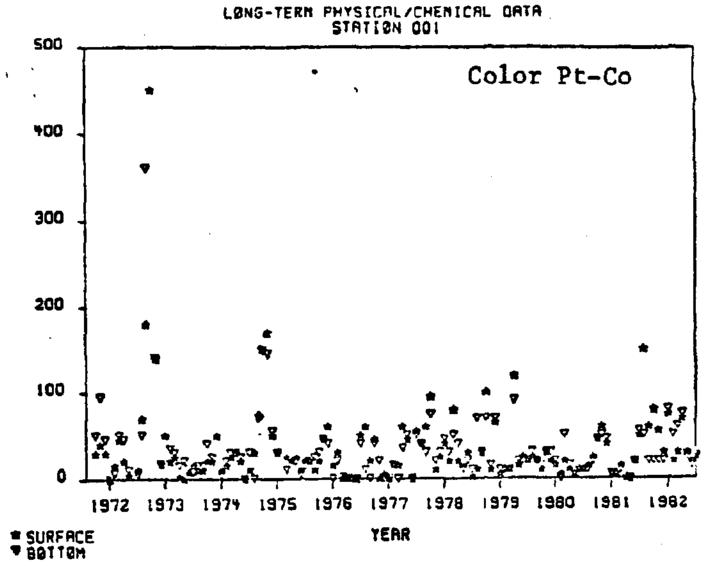
DER PROJECT - APALACHICOLA RAIN - CLUSTER YEARS - NO LOGS

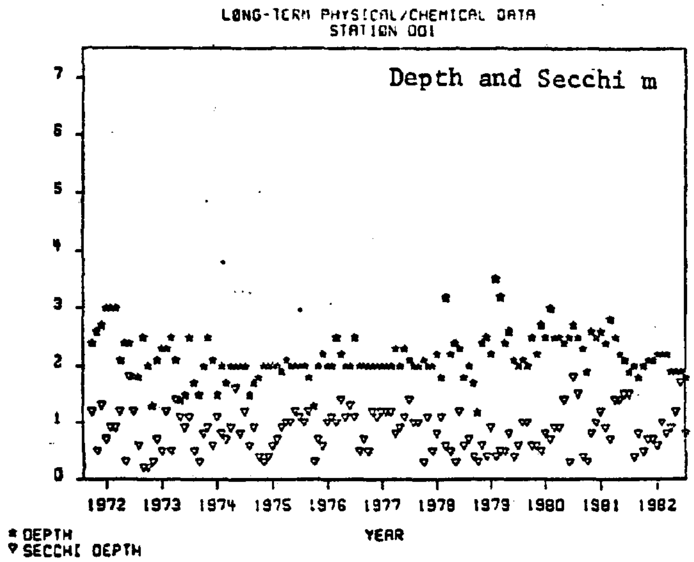
CLUSTERING STRATEGY IS FLEXIBLE GROUPING (WITH BETA)
SIMILARITY COEFFICIENT IS CZEKANOWSKI

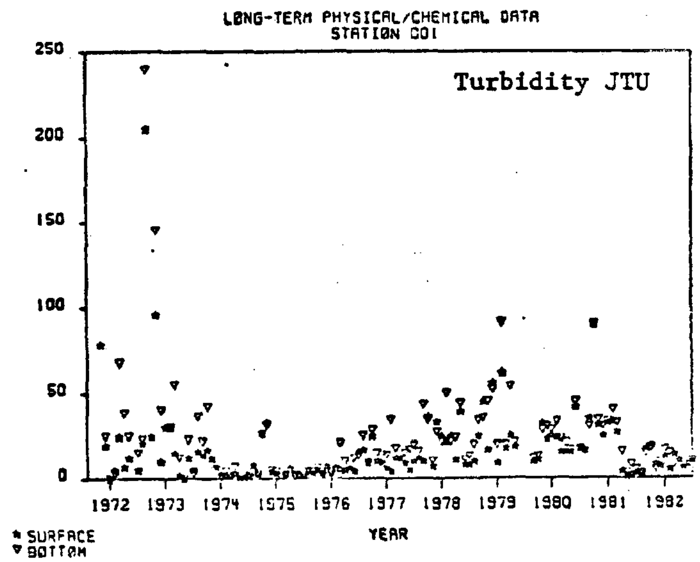
CLUSTER LEVEL	JOINS GROUP NAME	WITH SUBGROUP	(WHERE GROUP NAME NOW REFERS TO A CLUSTER CONTAINING THE FOLLOWING CLUSTER UNITS)							
.7951	78	80	78	80						
.7587	77	81	77	81						
.7546	74	79	74	79						
.7341	75	82	75	82						
.7337	73	78	73	78	80					
.6870	72	76	72	76						
.6559	73	75	73	75	78	80	82			
.5791	72	73	72	73	75	76	78	80	82	
.5179	72	77	72 82	73	75	76	77	78	80	81
.4499	72	74	72 80	73 81	74 82	75	76	77	78	79

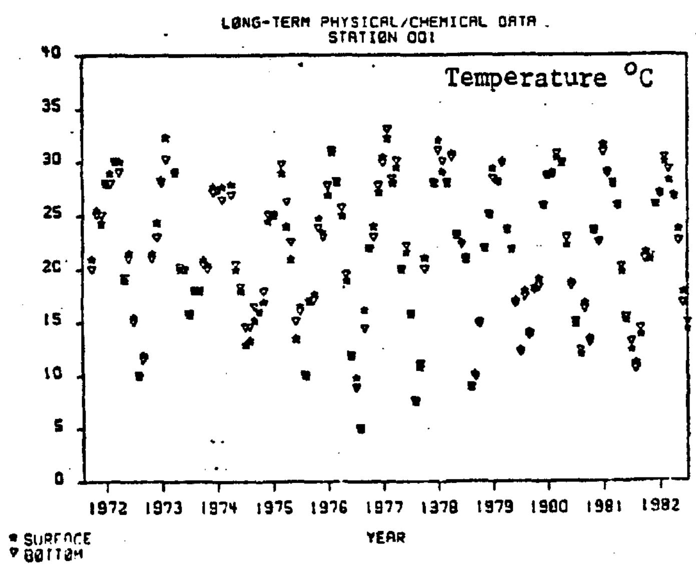
(ALL ONE GROUP)

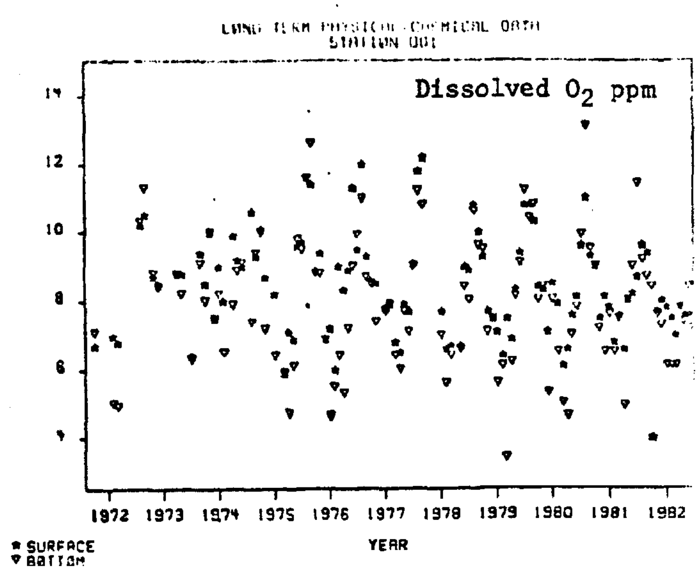
Figure 18: Scattergrams of the raw data concerning depth/Secchi depth (m), turbidity (JTU), dissolved oxygen (ppm), color (Pt-Co units), and temperature (^{o}C) at permanent stations in the Apalachicola estuary from 1972 through 1982.

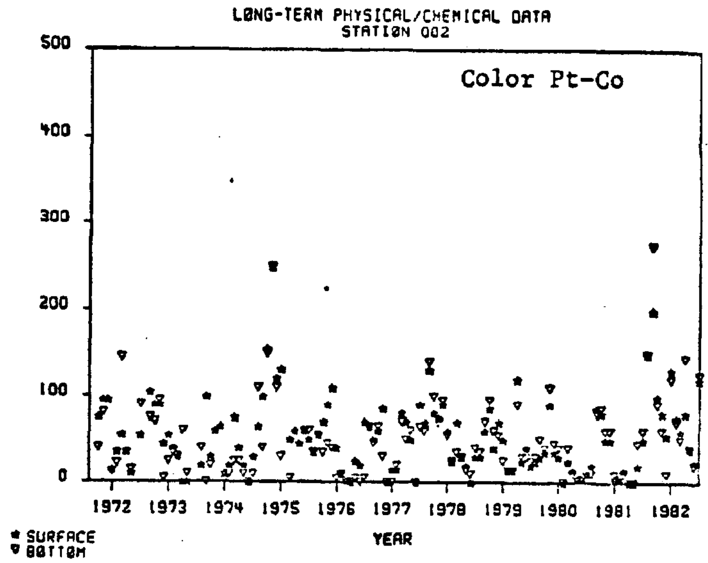


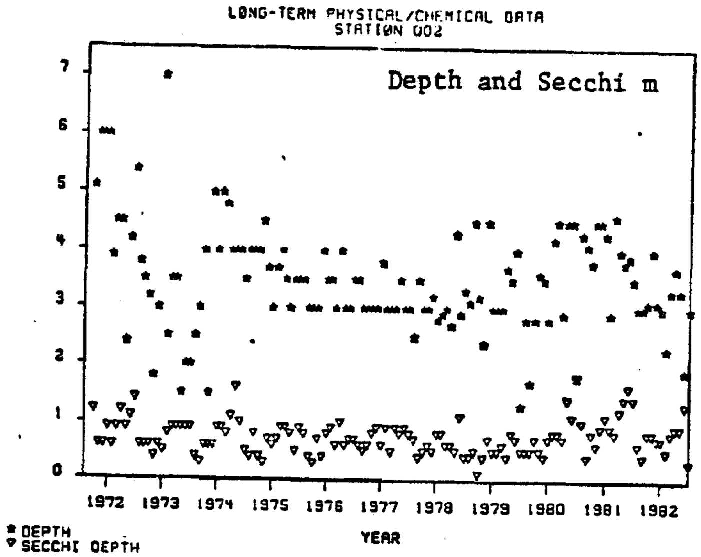


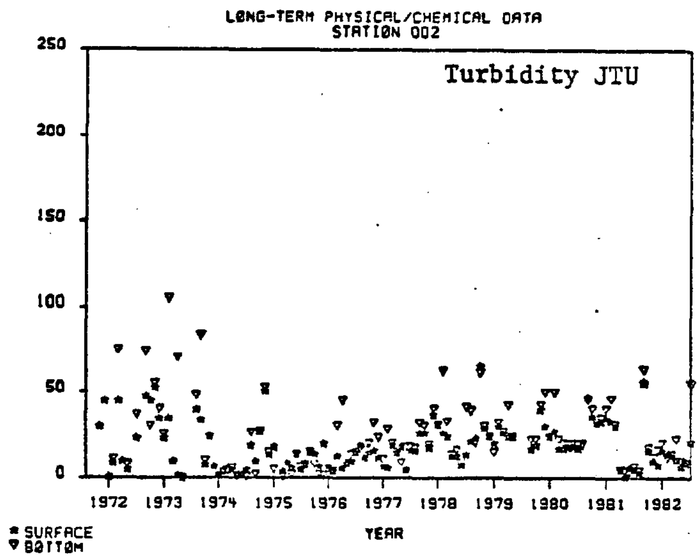


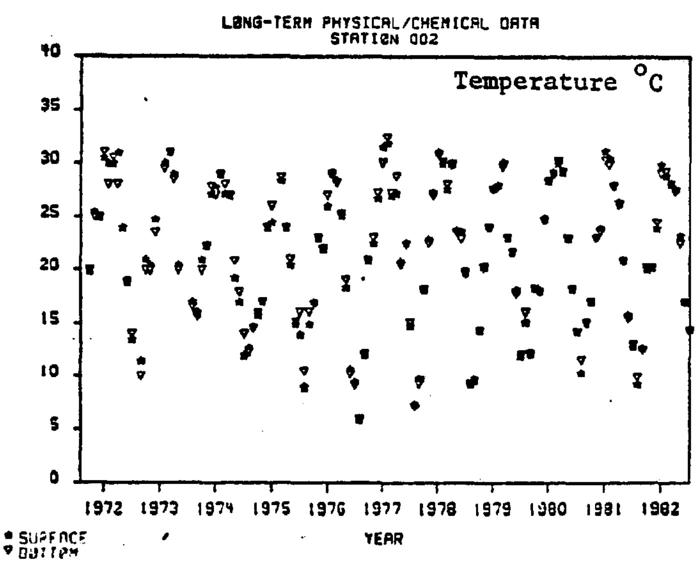


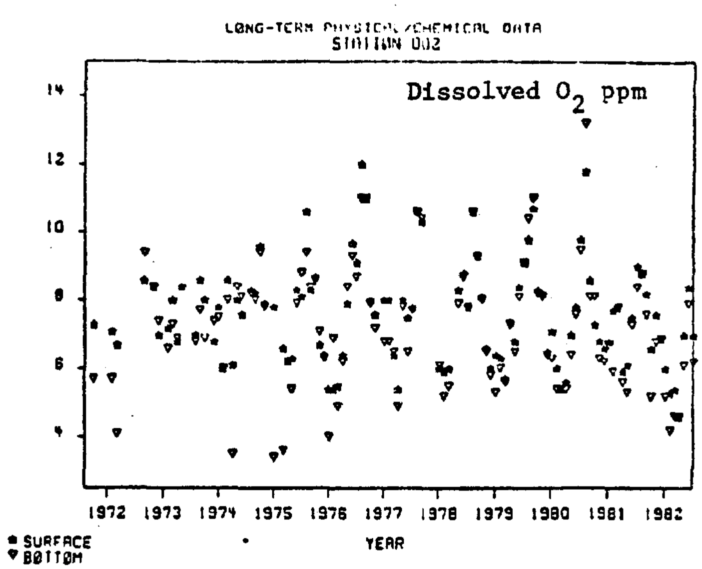


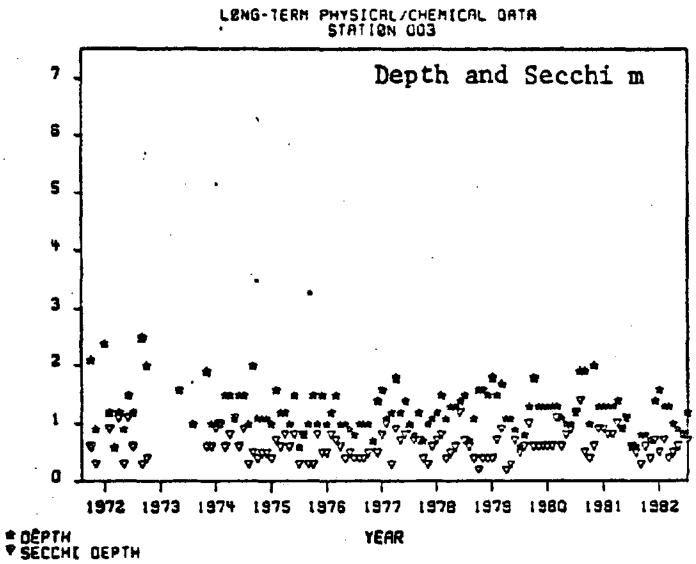

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 002
Color Pt-Co
SURFACE
BOTTOM
YEAR

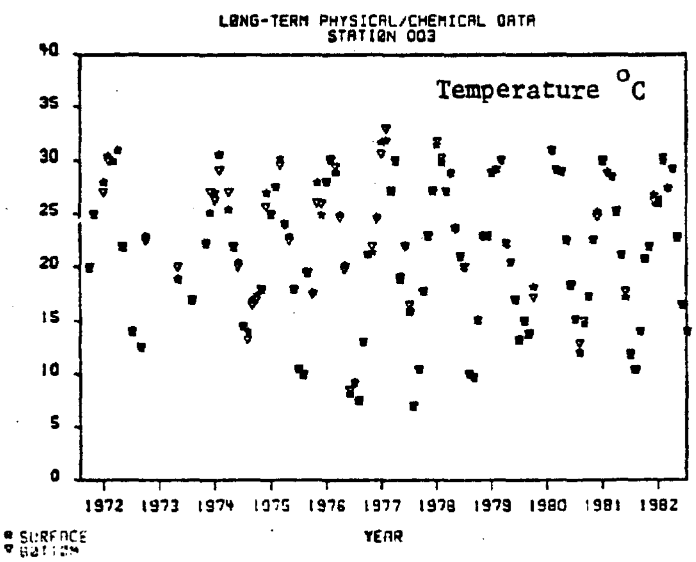

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 002
Depth and Secchi m
DEPTH
SECCHI DEPTH
YEAR

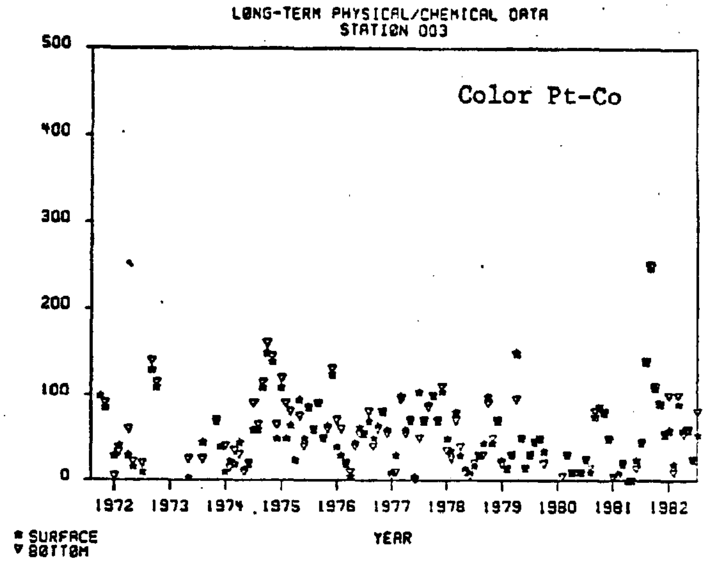

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 002
Turbidity JTU
SURFACE
BOTTOM
YEAR

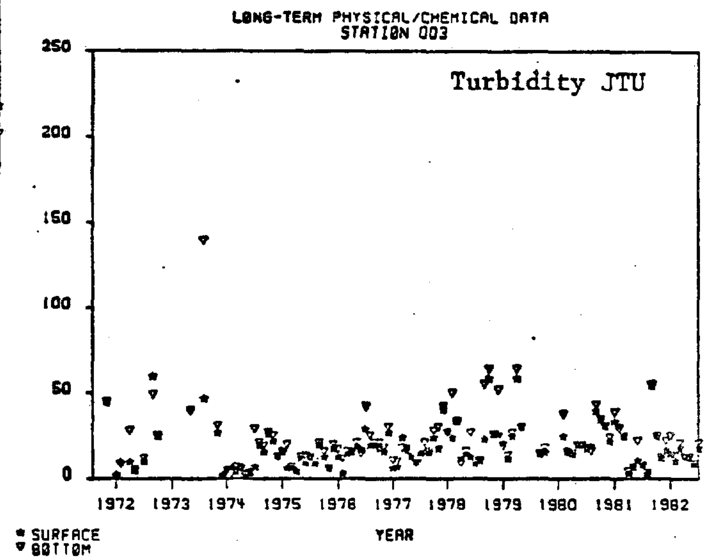

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 002
Temperature °C
SURFACE
BOTTOM
YEAR

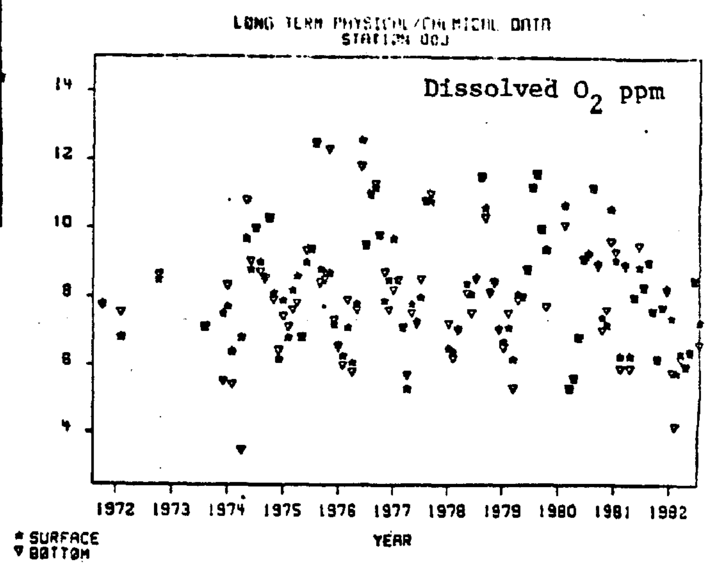

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 002
Dissolved O2 ppm
SURFACE
BOTTOM
YEAR

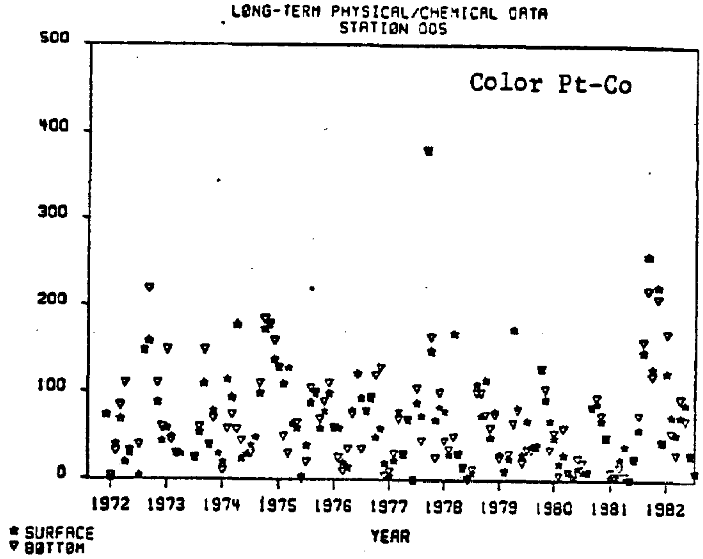

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 003
Depth and Secchi m
* DEPTH
▽ SECCHI DEPTH
YEAR
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
0 1 2 3 4 5 6 7

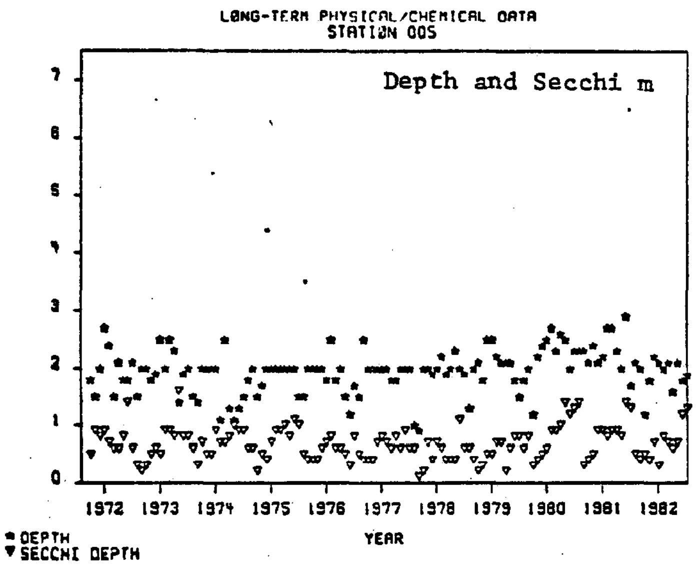

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 003
Temperature °C
* SURFACE
▽ BOTTOM
YEAR
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
0 5 10 15 20 25 30 35 40

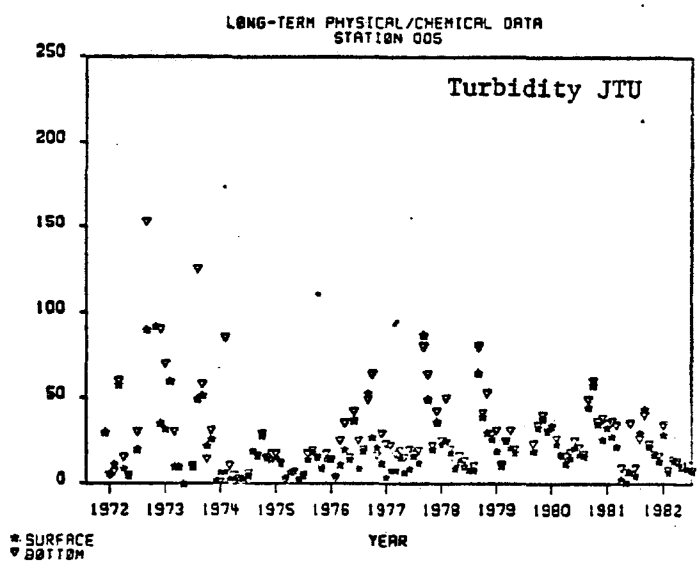

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 003
Color Pt-Co
* SURFACE
▽ BOTTOM
YEAR
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
0 100 200 300 400 500

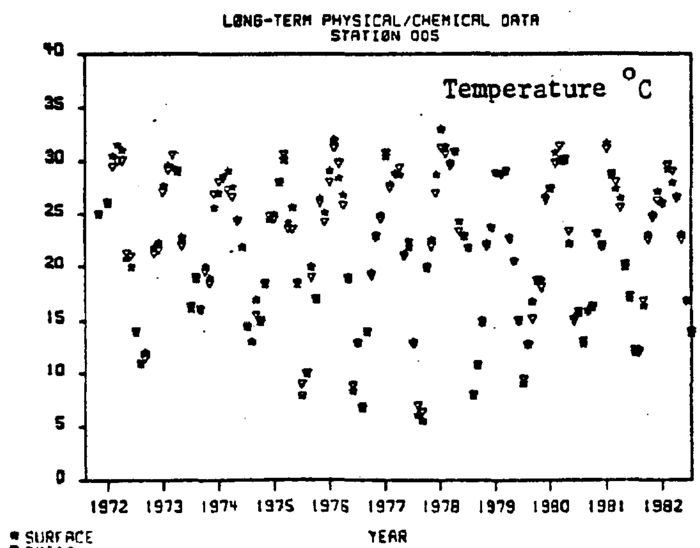

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 003
Turbidity JTU
* SURFACE
▽ BOTTOM
YEAR
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
0 50 100 150 200 250

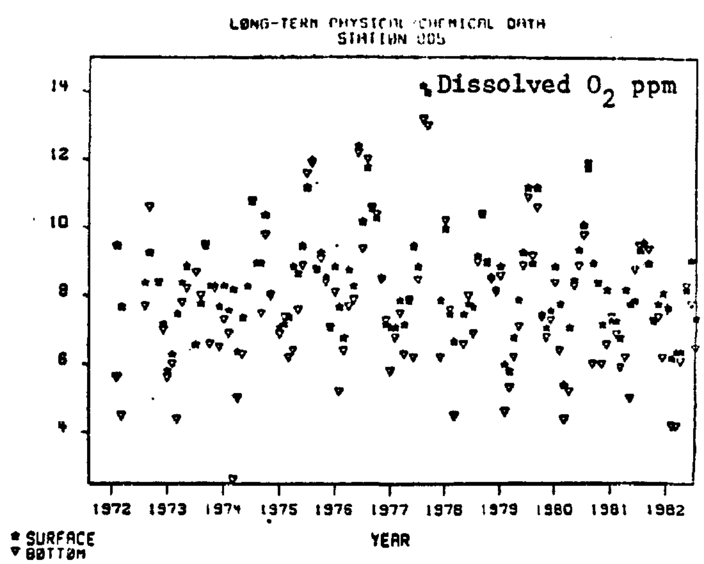

Dissolved O_2 ppm
* SURFACE
▽ BOTTOM
YEAR
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
4 6 8 10 12 14


LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 005
Color Pt-Co
0
100
200
300
400
500
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BØTTØM

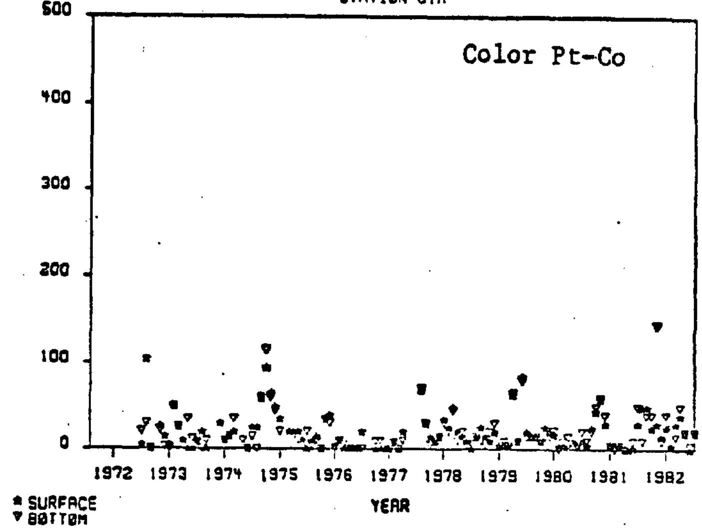

LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 005
Depth and Secchi m
0
1
2
3
4
5
6
7
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* DEPTH
▽ SECCHI DEPTH


LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 005
Turbidity JTU
0
50
100
150
200
250
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BØTTØM

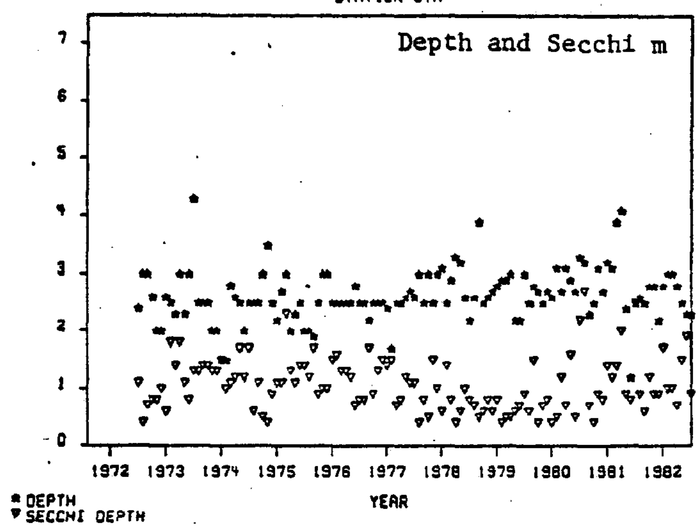

LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 005
Temperature °C
0
5
10
15
20
25
30
35
40
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BØTTØM


LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 005
Dissolved O2 ppm
4
6
8
10
12
14
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BØTTØM

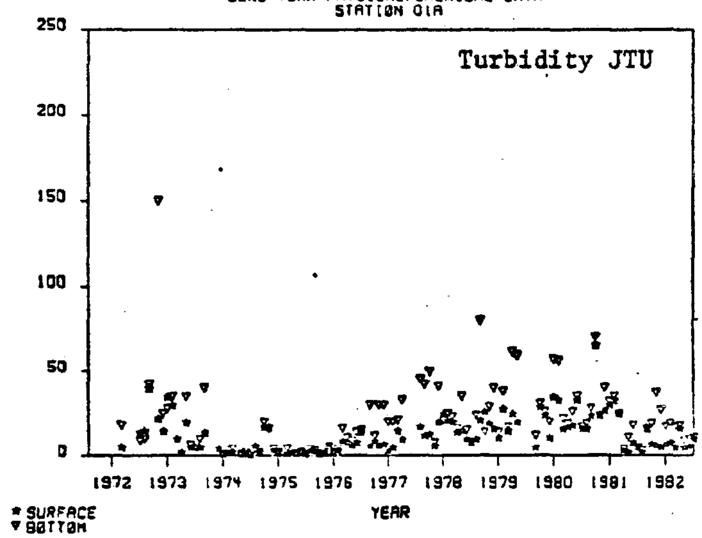
LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01A



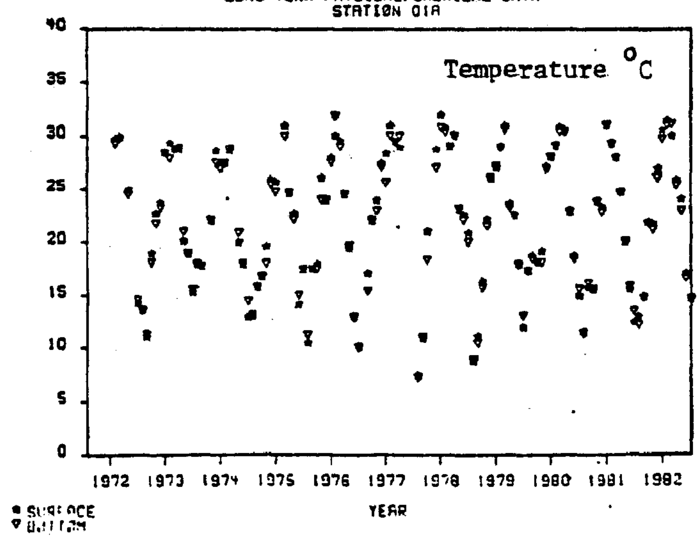
LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01A



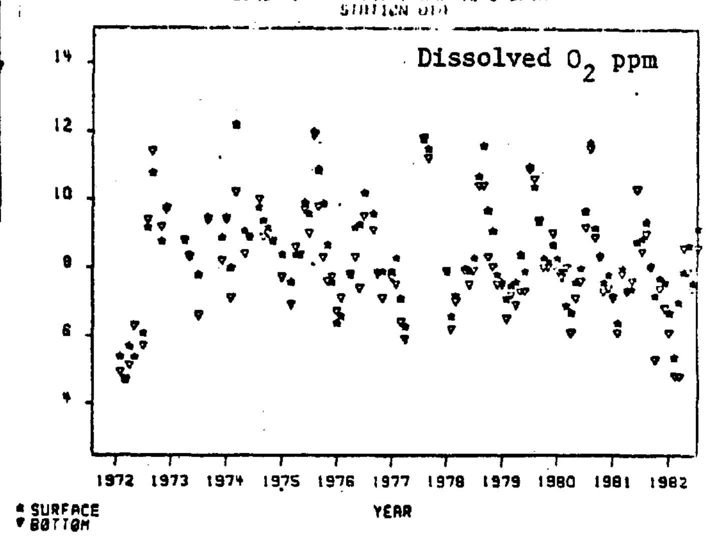
LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01A



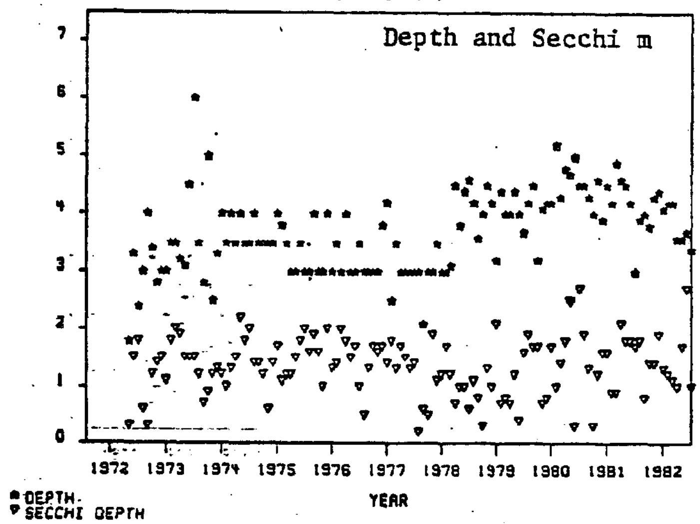
LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01A



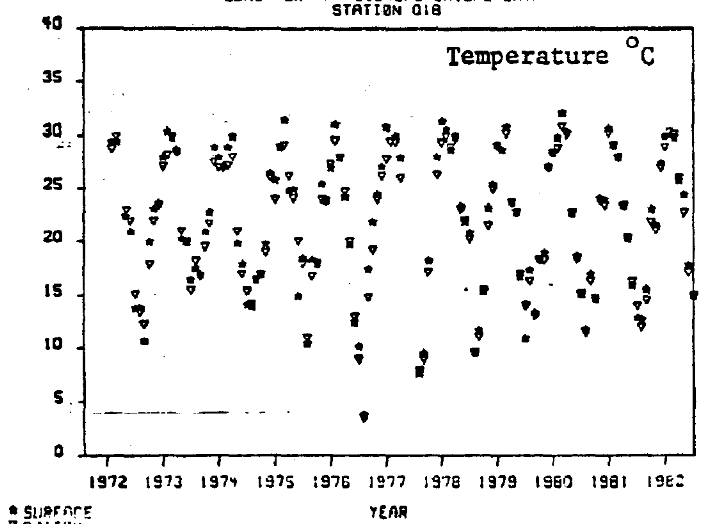
LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01A



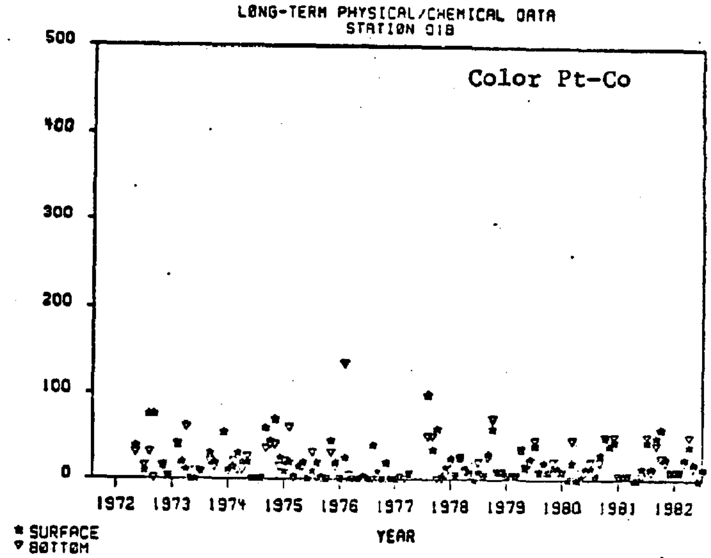
LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 018



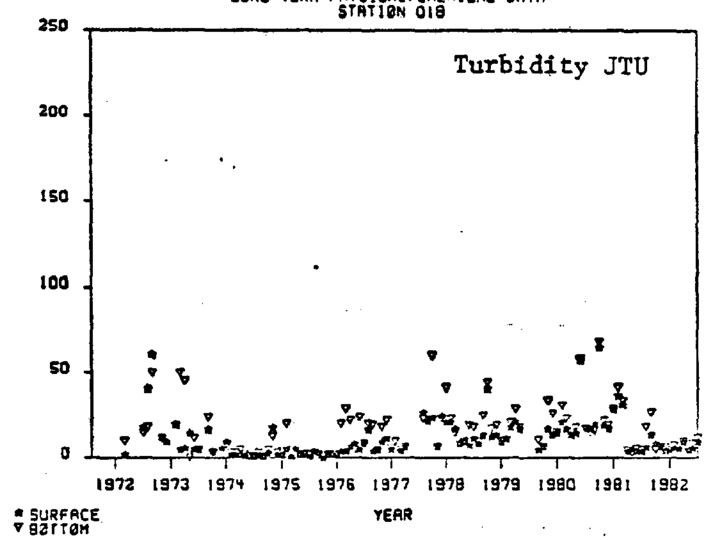
LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 018



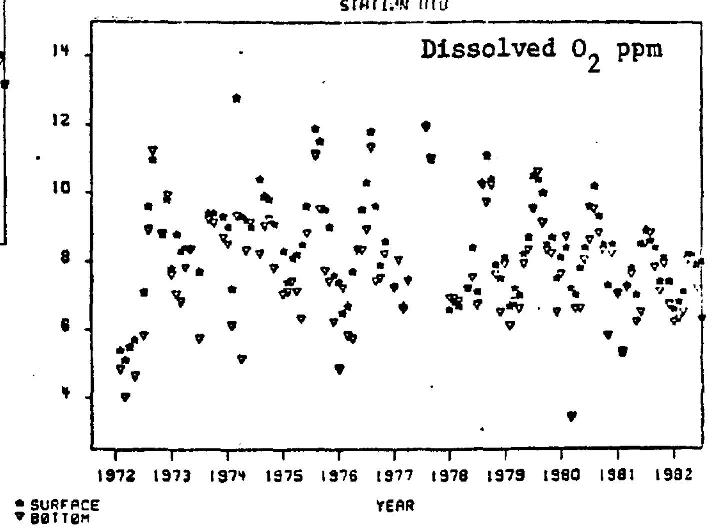
LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 018

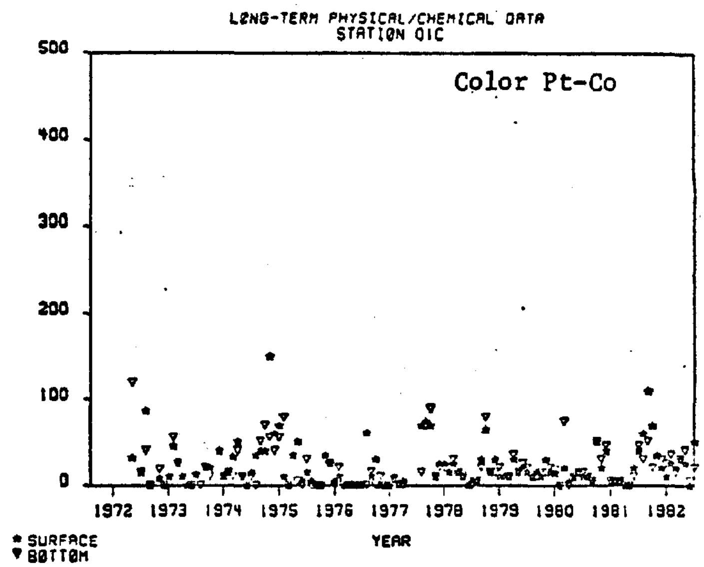


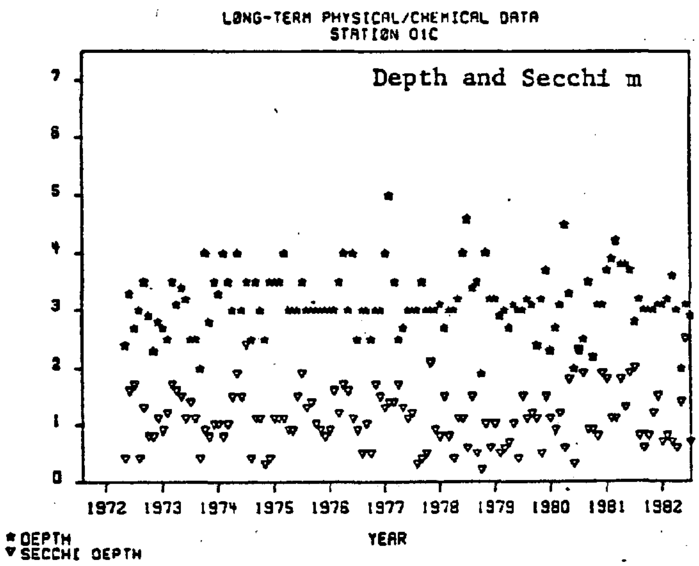
LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 018

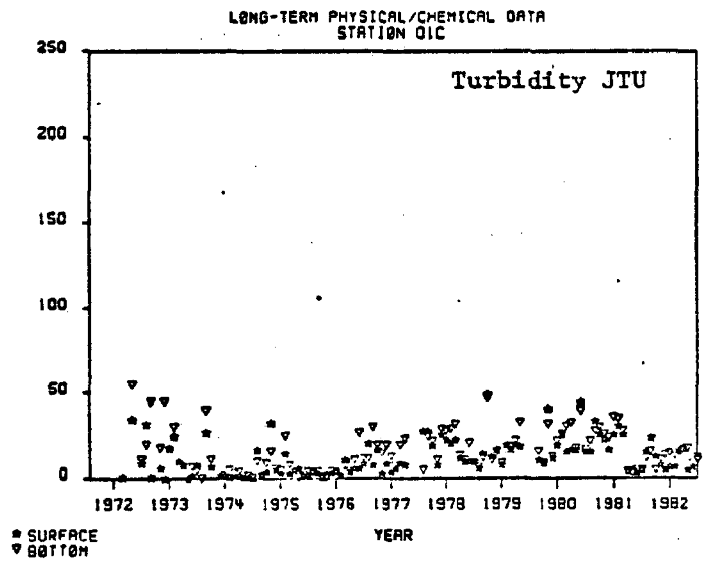


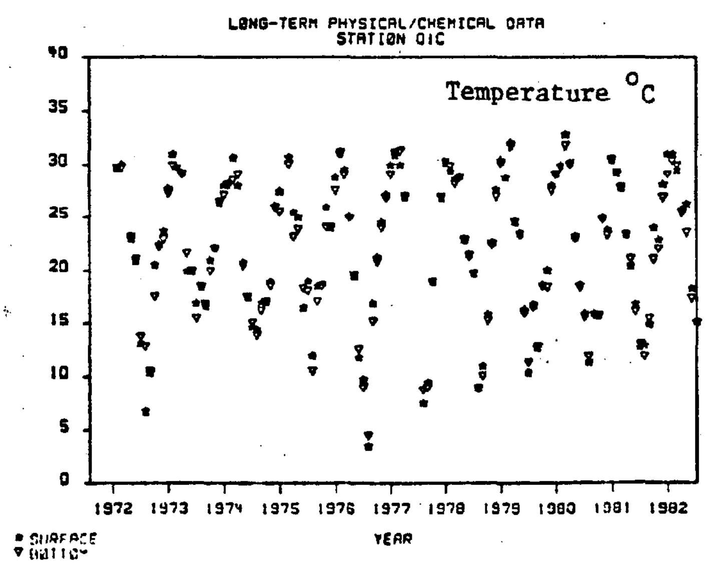
LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 018

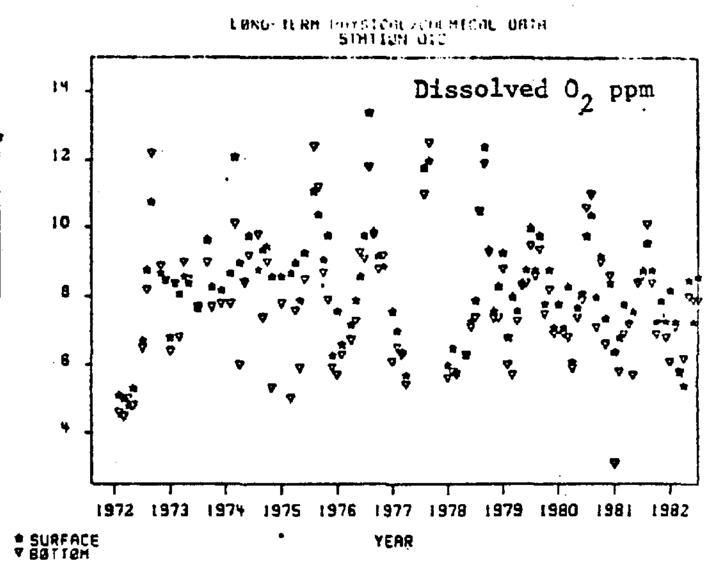


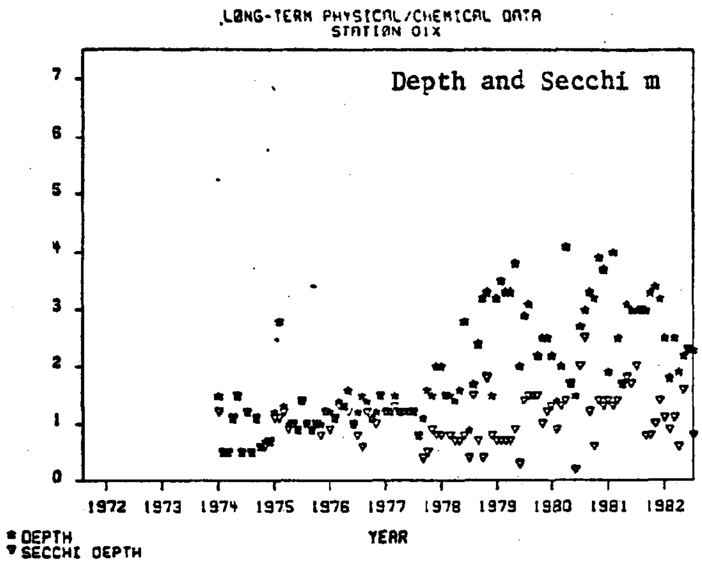

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01C
Color Pt-Co
0
100
200
300
400
500
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BOTTOM

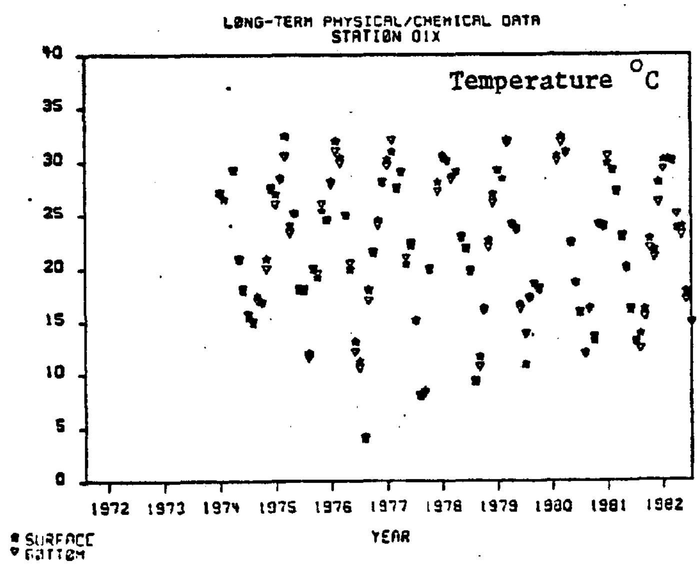

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01C
Depth and Secchi m
0
1
2
3
4
5
6
7
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* DEPTH
▽ SECCHI DEPTH

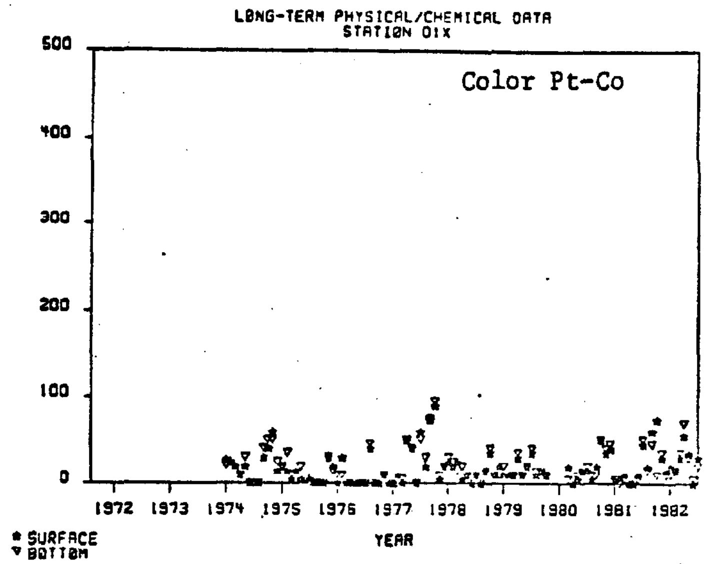

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01C
Turbidity JTU
0
50
100
150
200
250
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BOTTOM

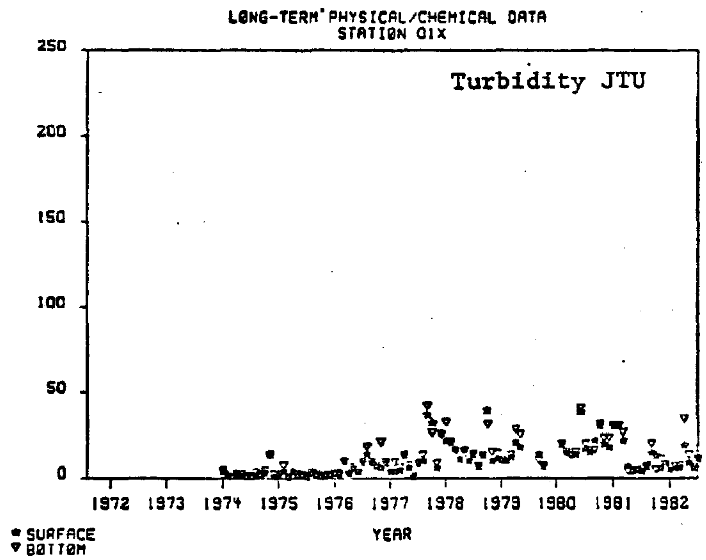

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01C
Temperature °C
0
5
10
15
20
25
30
35
40
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BOTTOM


Dissolved O2 ppm
4
6
8
10
12
14
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BOTTOM


LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01X
Depth and Secchi m
0
1
2
3
4
5
6
7
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* DEPTH
▽ SECCHI DEPTH


LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01X
Temperature °C
0
5
10
15
20
25
30
35
40
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BOTTOM


LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01X
Color Pt-Co
0
100
200
300
400
500
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BOTTOM


LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01X
Turbidity JTU
0
50
100
150
200
250
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BOTTOM

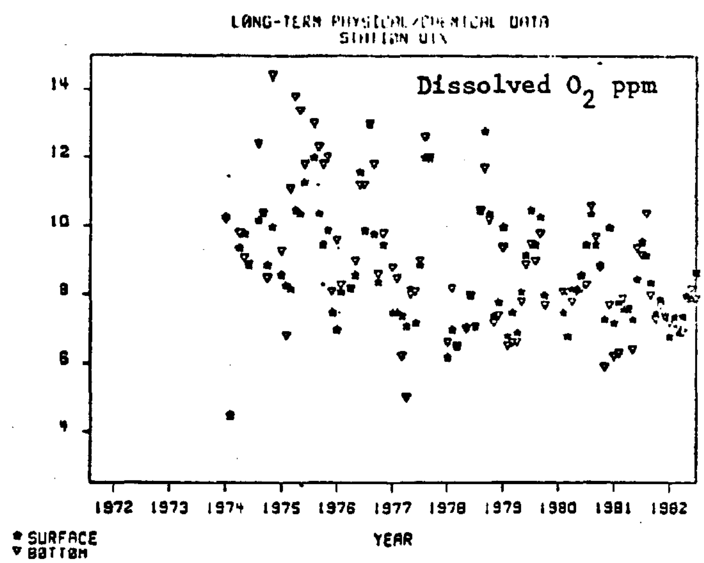
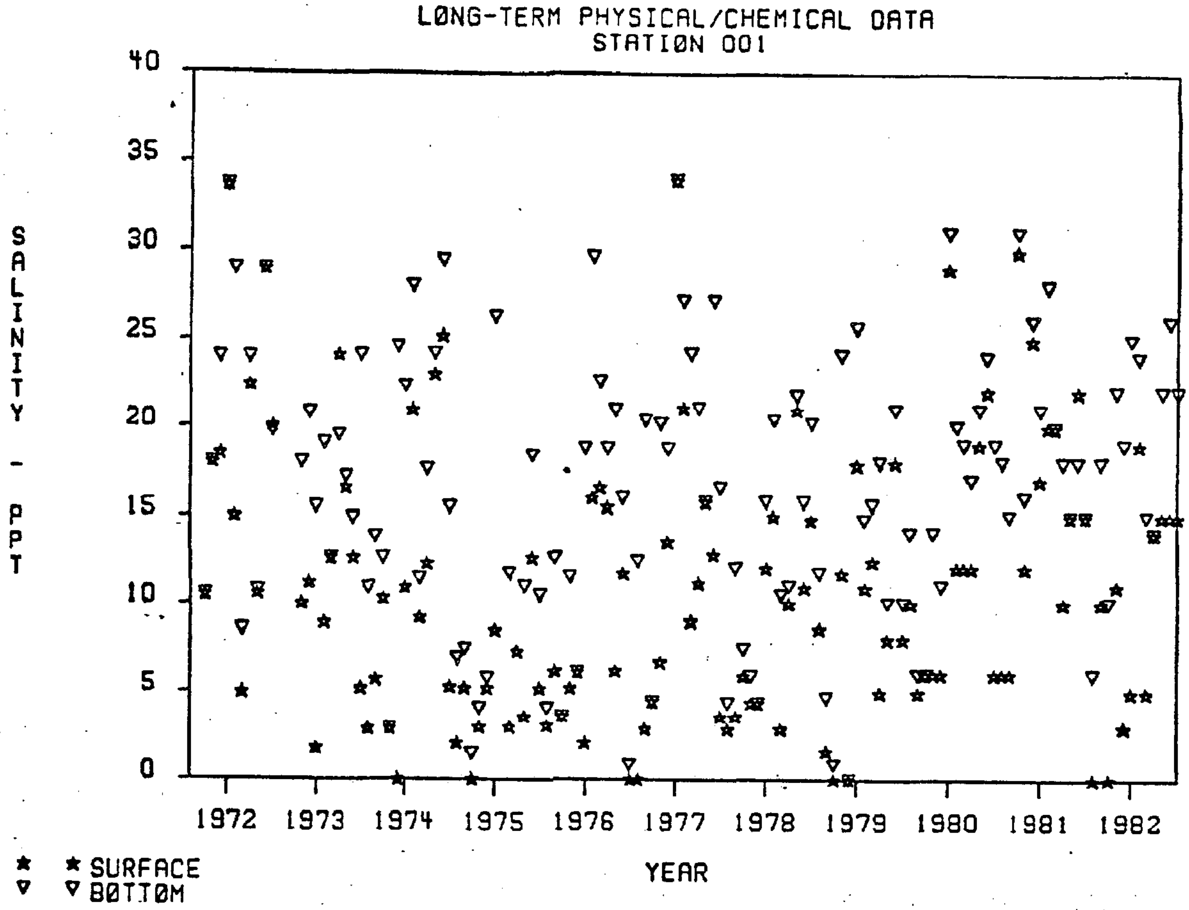
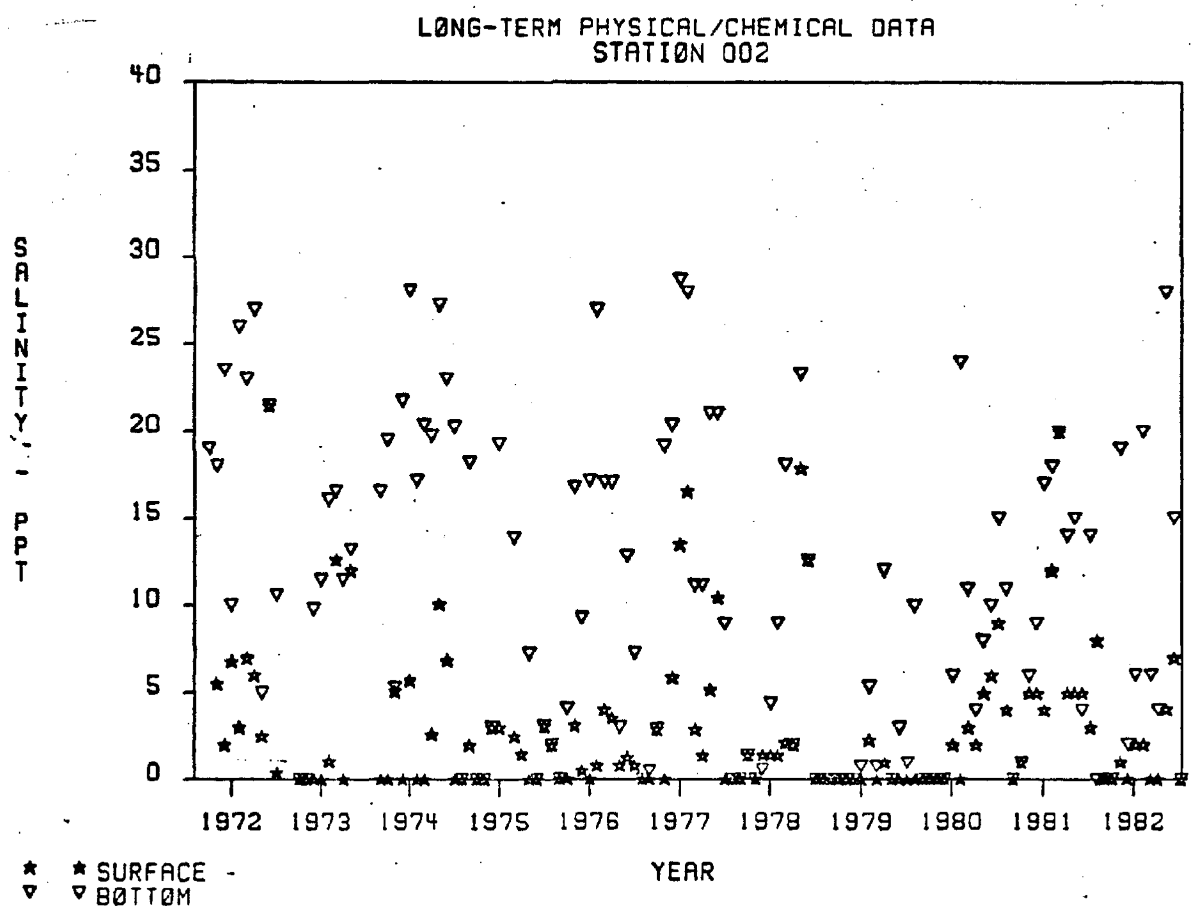
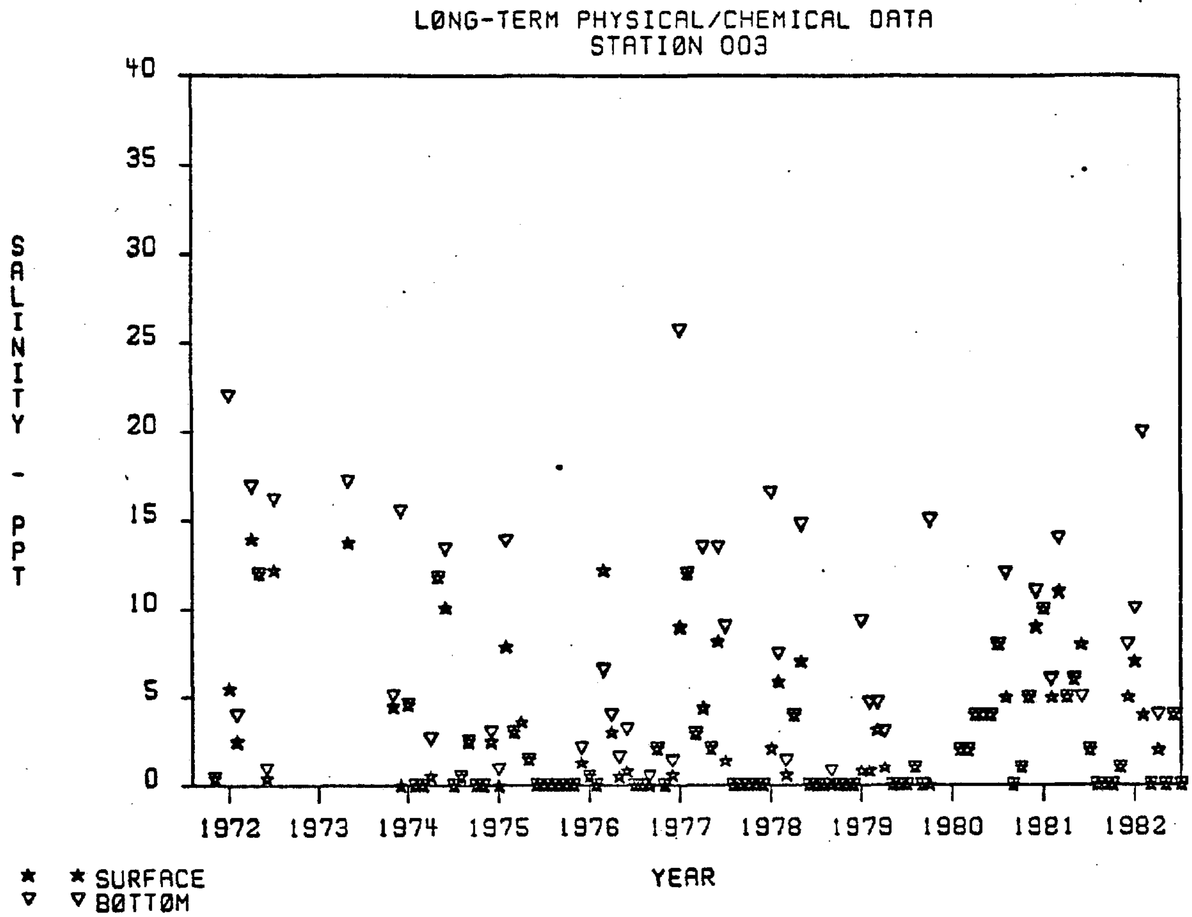
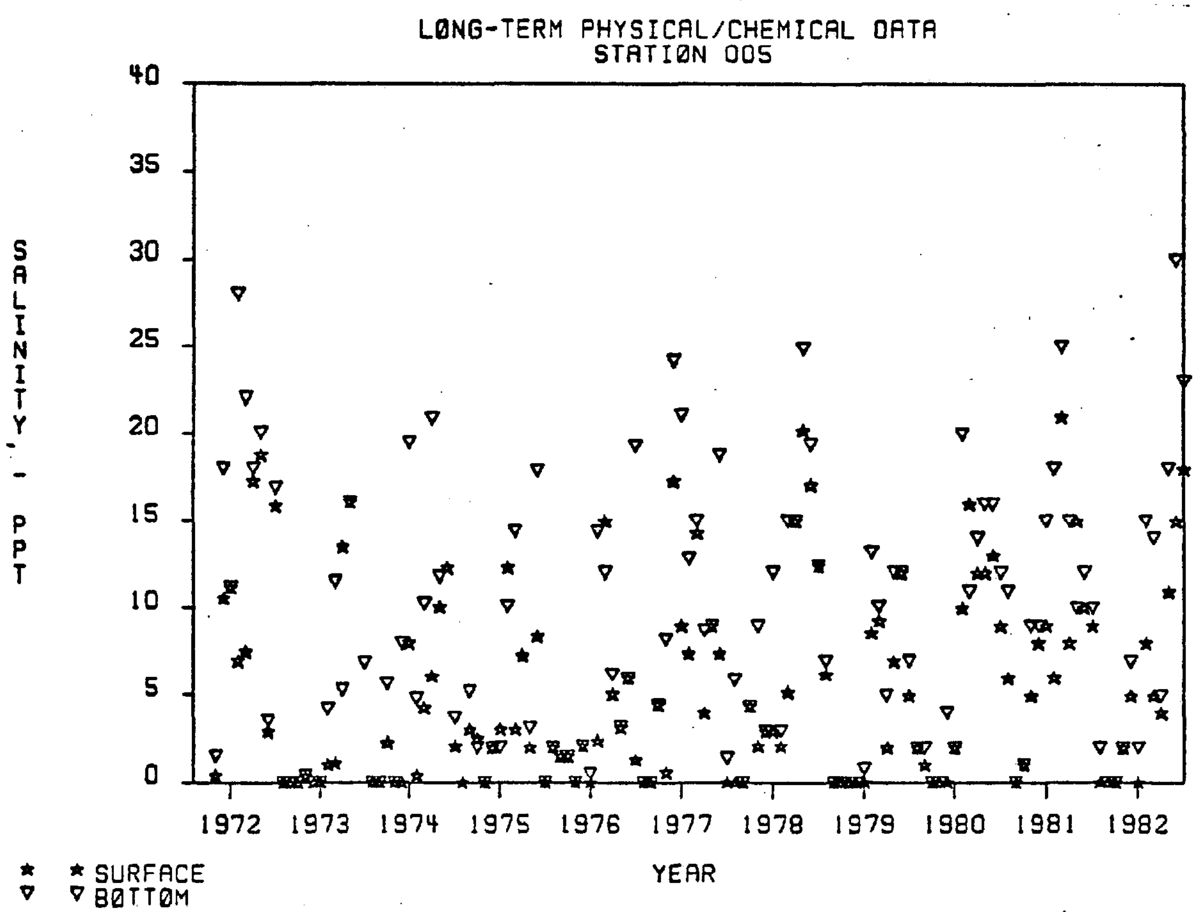

LONG-TERM PHYSICAL/CHEMICAL DATA
STATION 01X
Dissolved O2 ppm
4
6
8
10
12
14
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
▽ BOTTOM

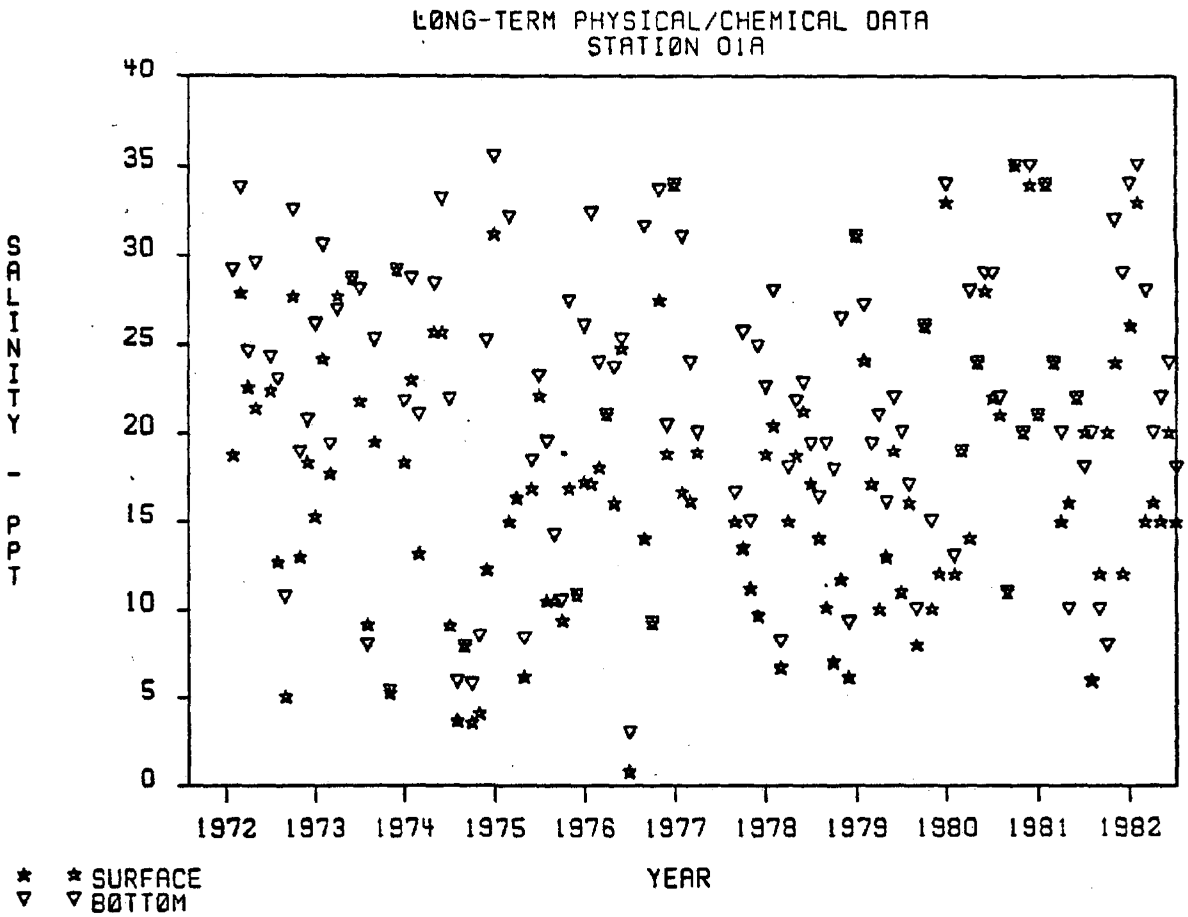
Figure 19: Scattergrams of salinity (ppt) at permanent stations in the Apalachicola estuary from 1972 through 1982.

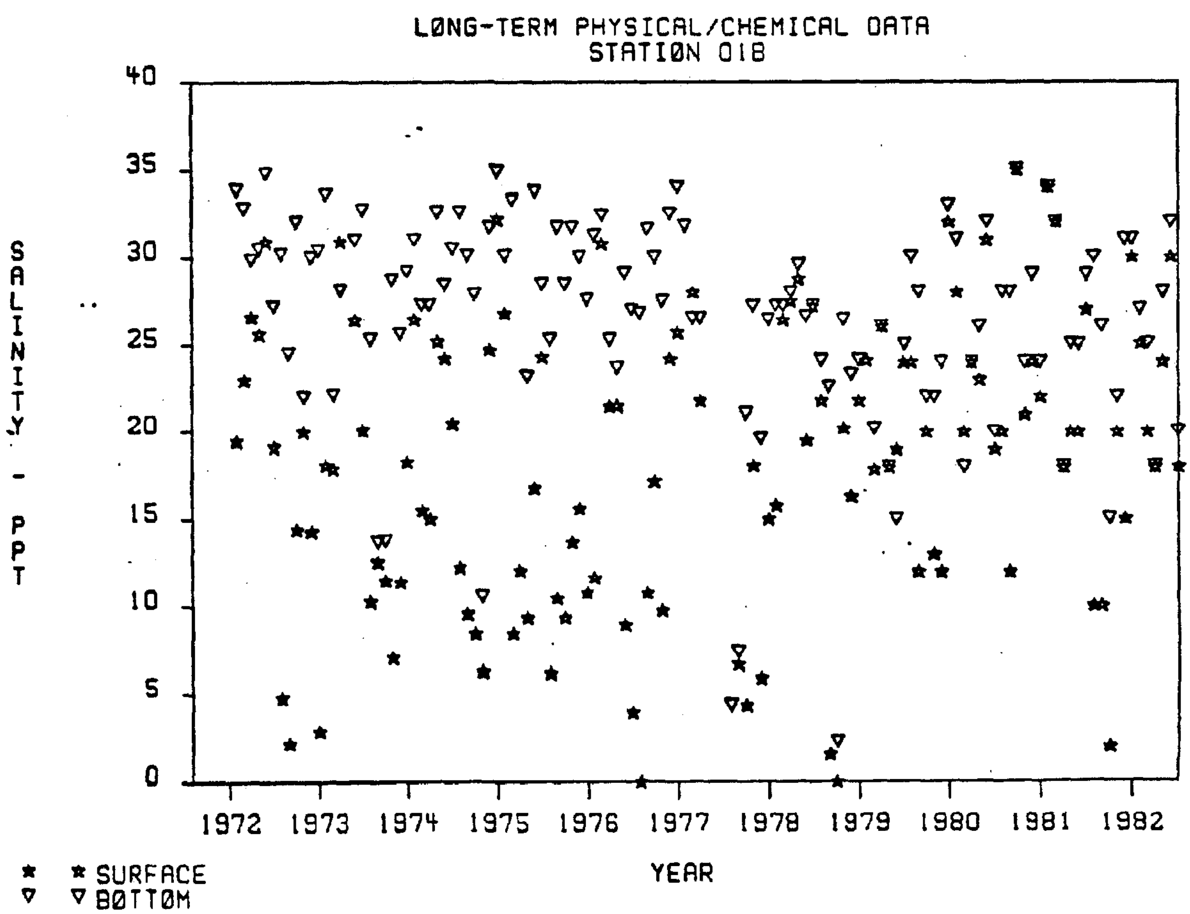


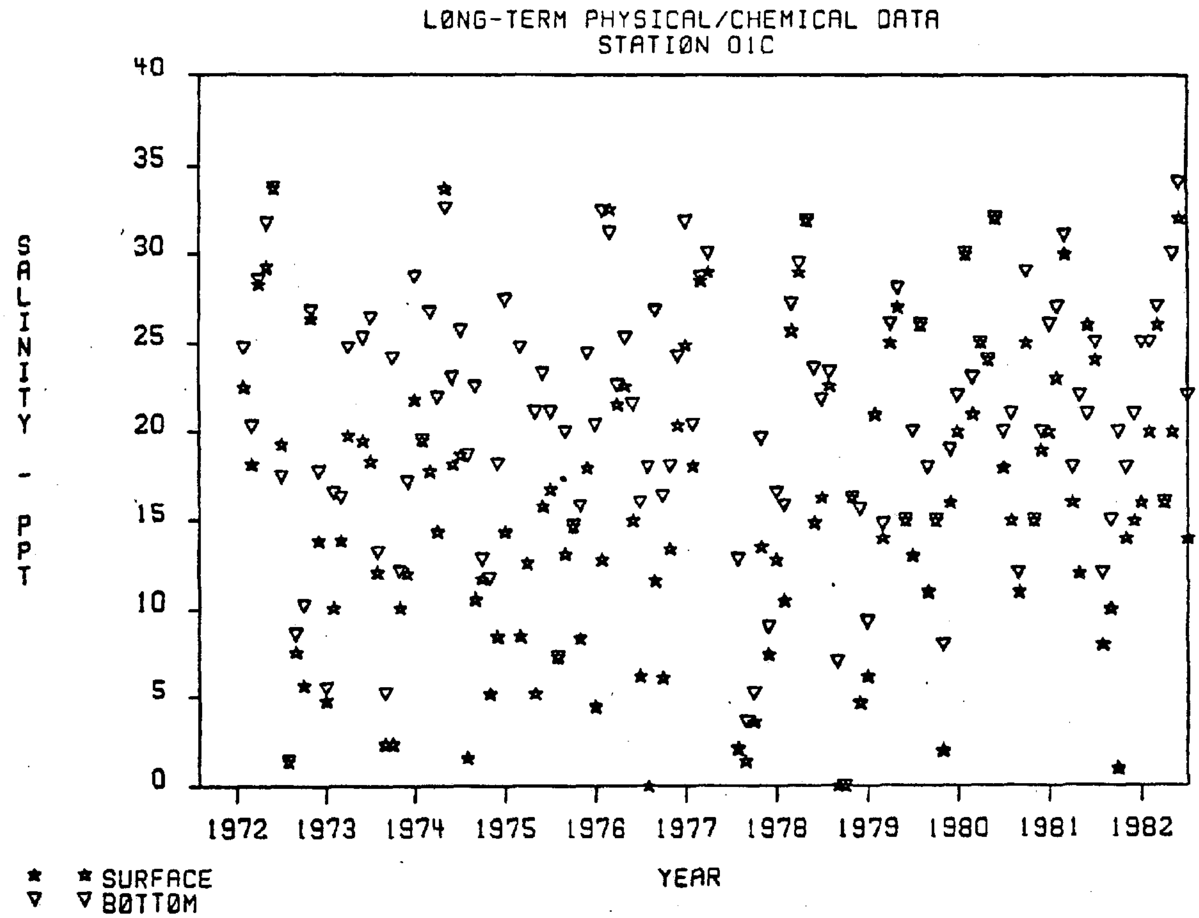



LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 003
SALINITY - PPT
YEAR
★ SURFACE
▽ BØTTØM

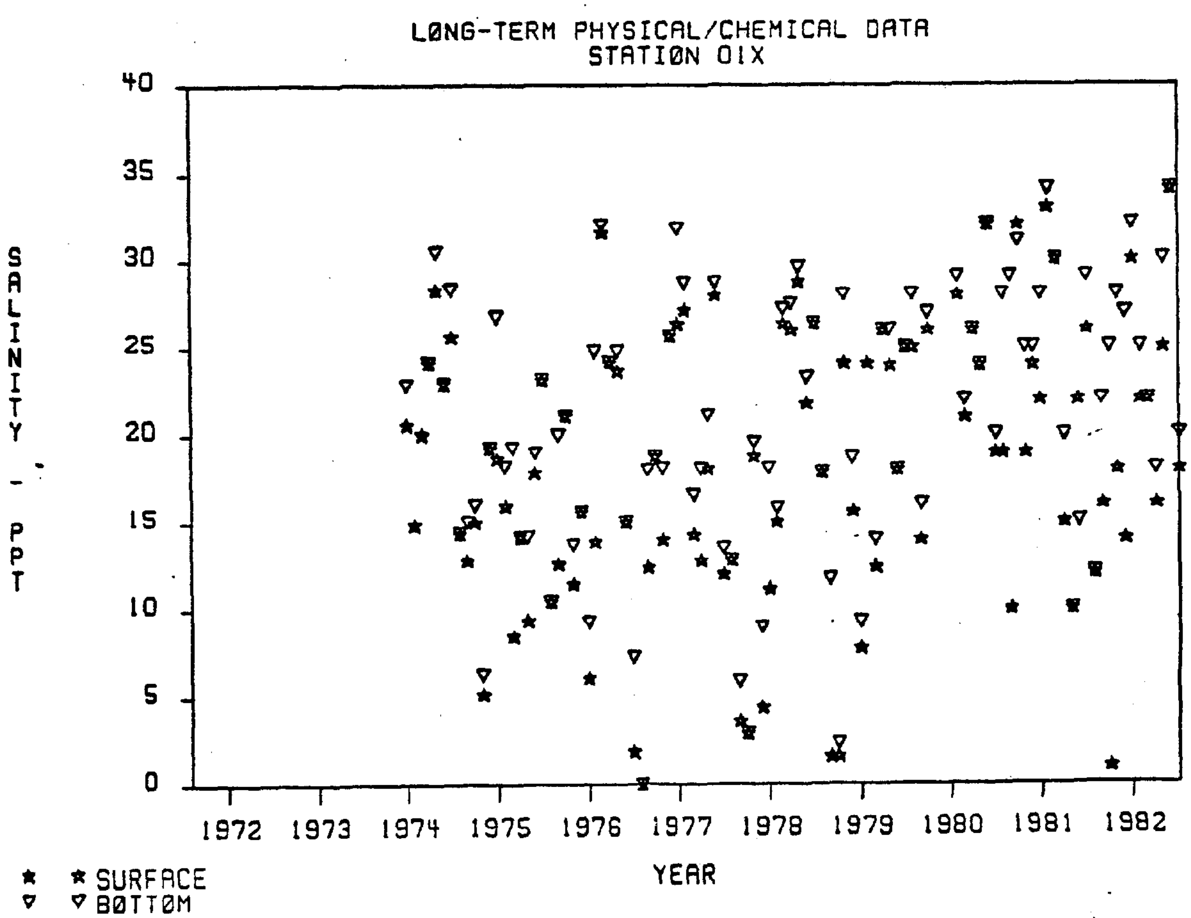

LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 005
SALINITY - PPT
YEAR
★ SURFACE
▽ BØTTØM


LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01A
SALINITY - PPT
40
35
30
25
20
15
10
5
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
YEAR
SURFACE
BØTTØM


LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01B
SALINITY - PPT
40
35
30
25
20
15
10
5
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
YEAR
SURFACE
BØTTØM

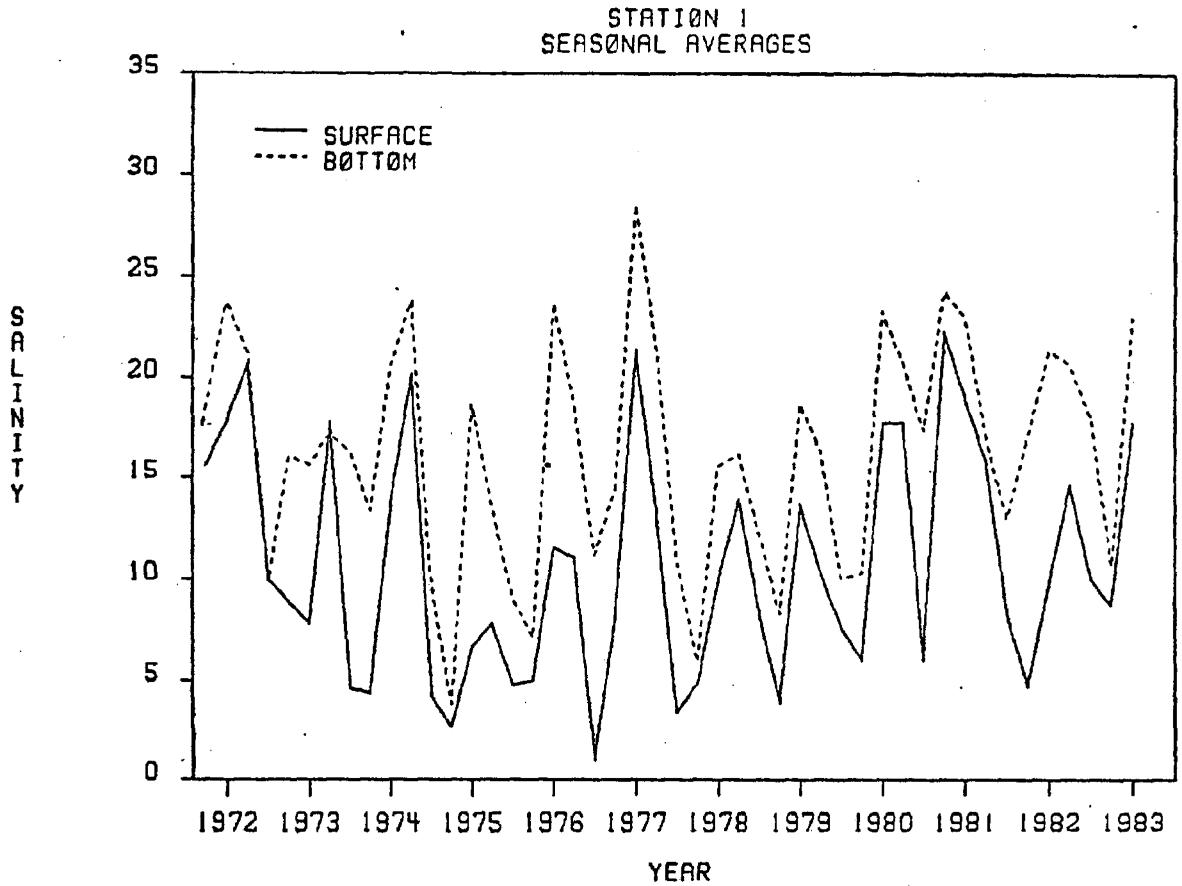


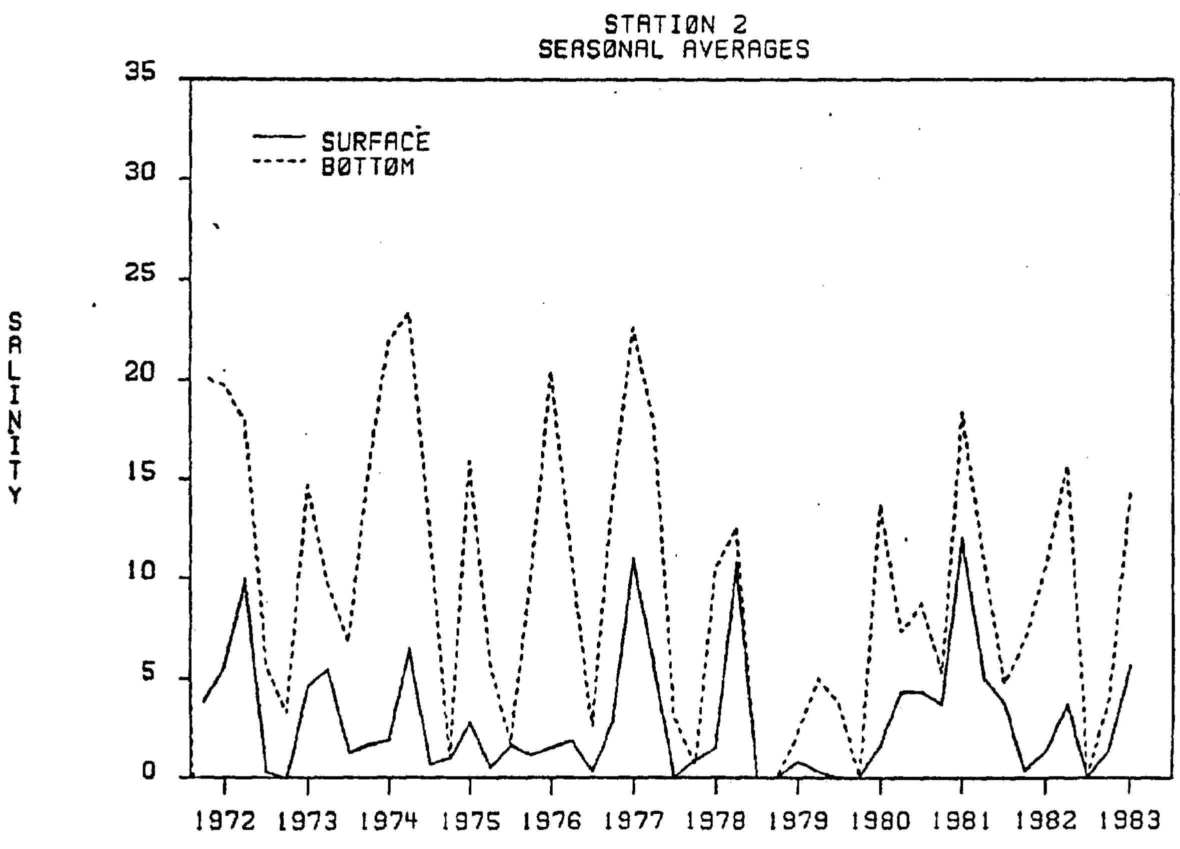
LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01C
SALINITY - PPT
0
5
10
15
20
25
30
35
40
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
∇ BØTTØM

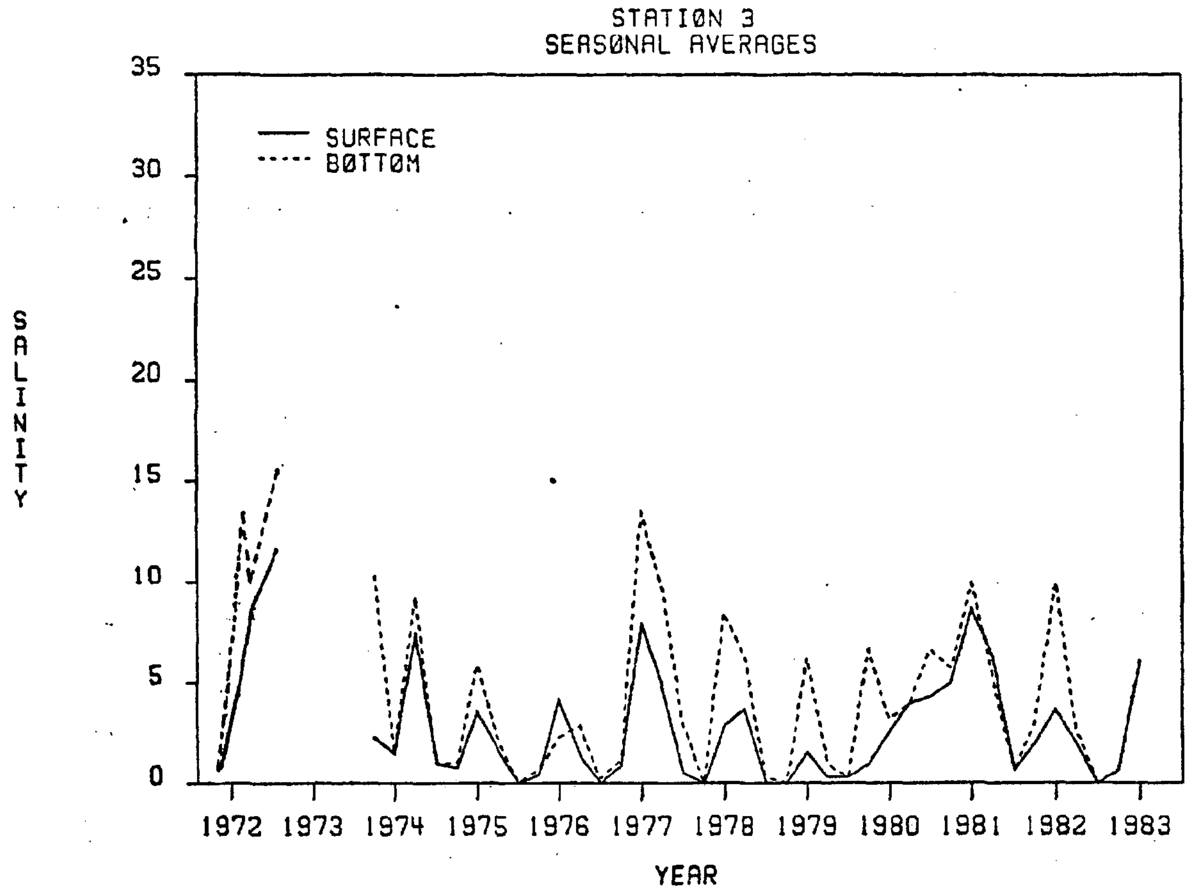


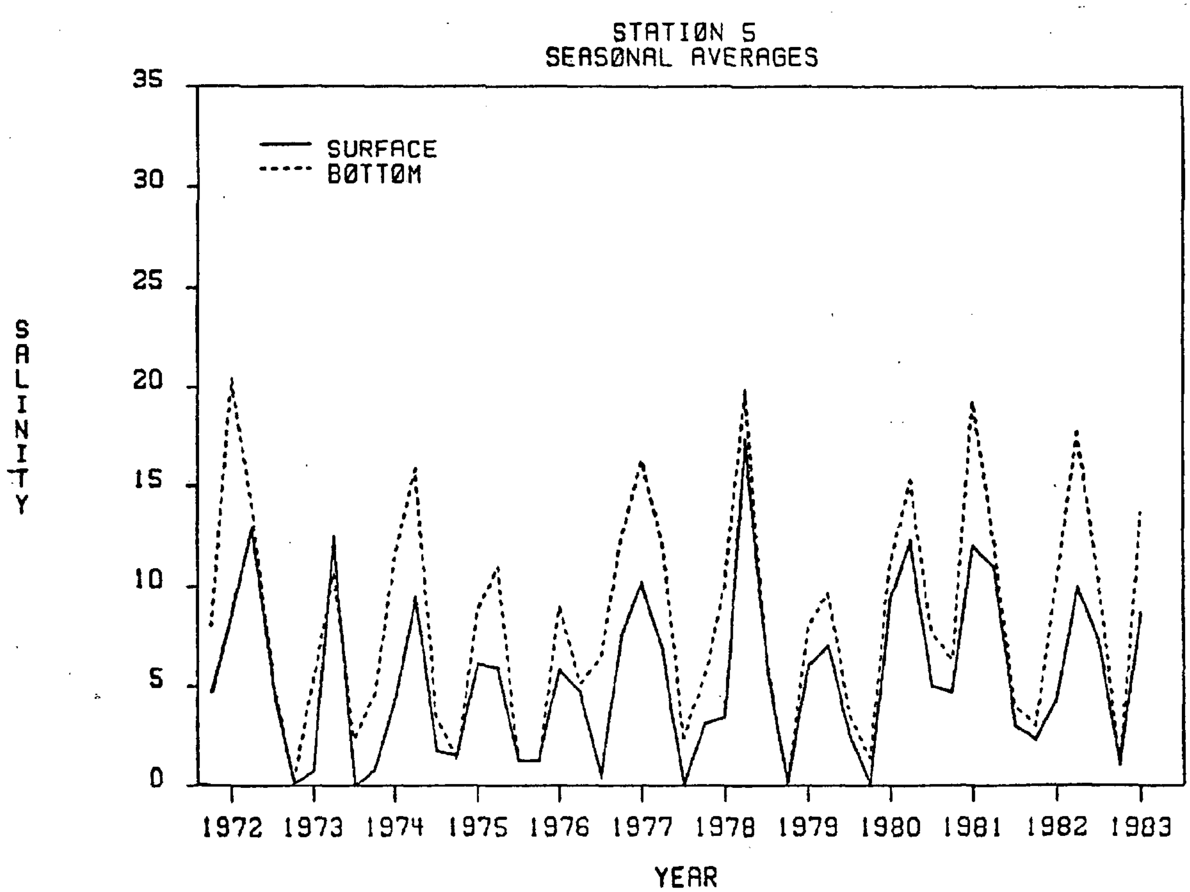
LØNG-TERM PHYSICAL/CHEMICAL DATA
STATIØN 01X
SALINITY - PPT
0
5
10
15
20
25
30
35
40
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982
YEAR
* SURFACE
∇ BØTTØM

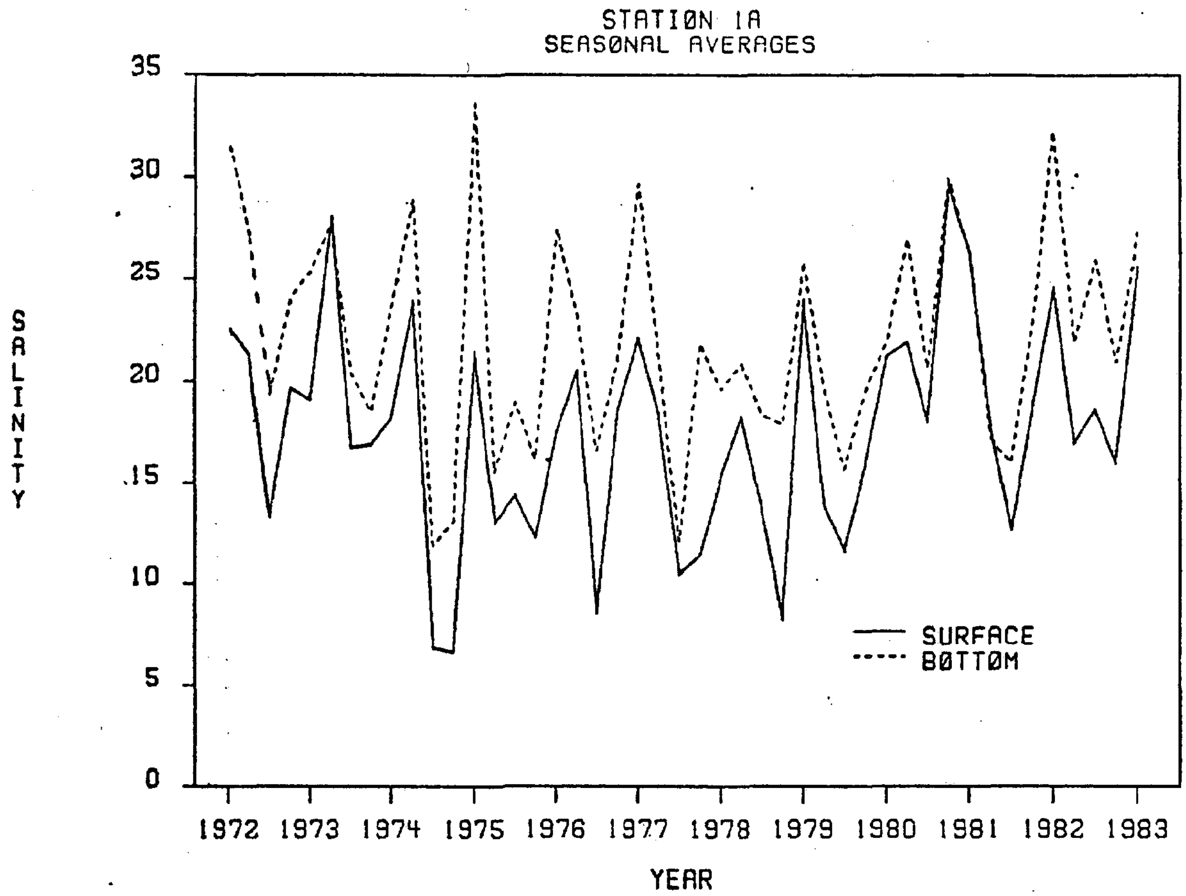
Figure 20: Salinity (surface and bottom; $^{o}/_{oo}$) at various stations in the Apalachicola estuary from March, 1972 through June, 1983. Data have been averaged by season as described above.

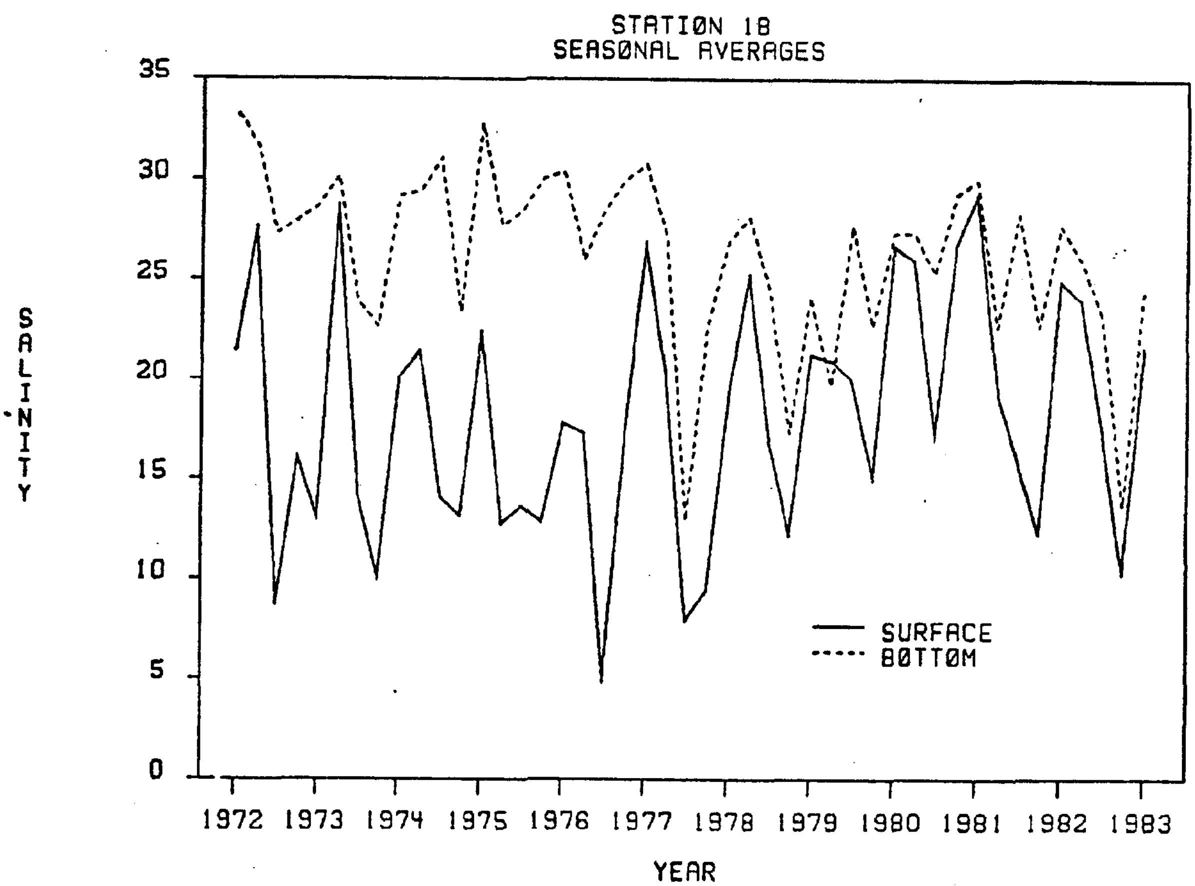


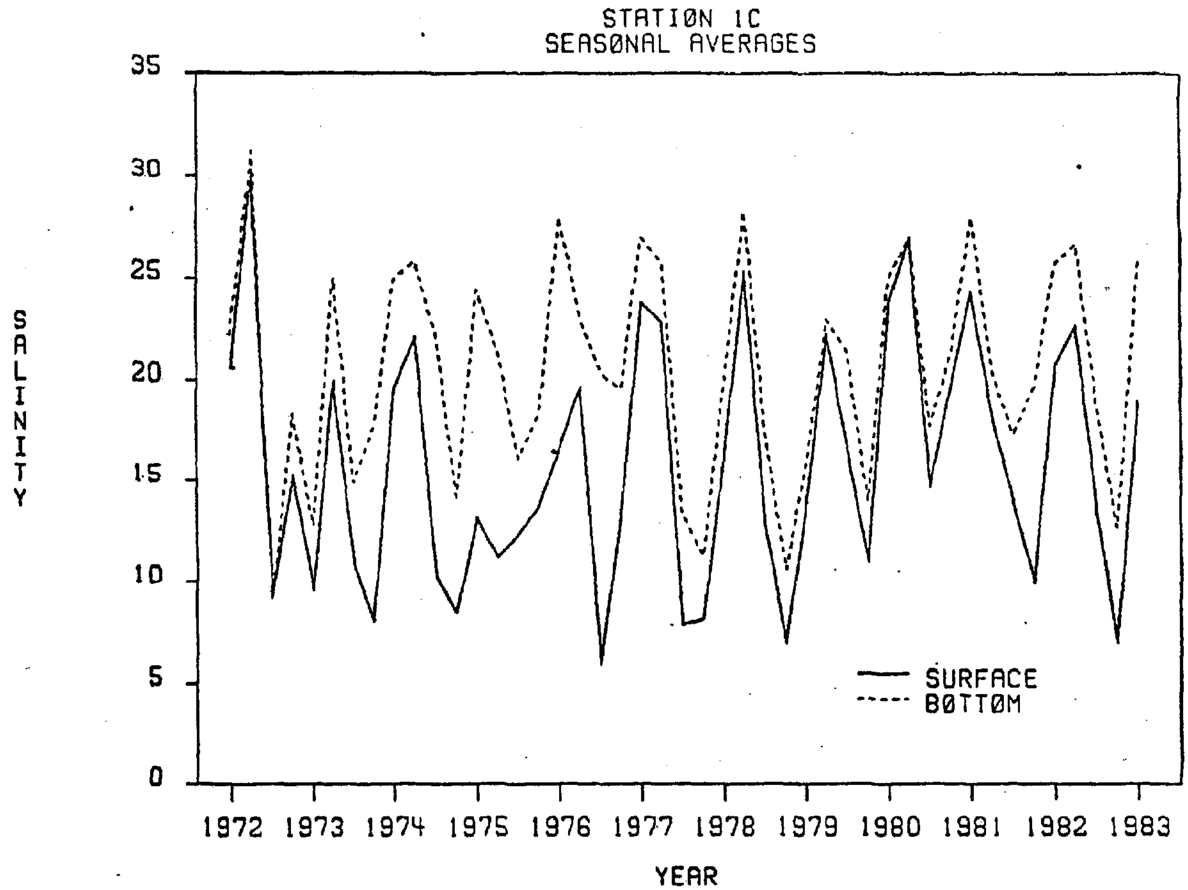



STATIØN 3
SEASØNAL AVERAGES
SURFACE
BØTTØM
SALINITY
35
30
25
20
15
10
5
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR


STATIØN 5
SEASØNAL AVERAGES
SURFACE
BØTTØM
SALINITY
35
30
25
20
15
10
5
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR


STATIØN 1A
SEASØNAL AVERAGES
SALINITY
35
30
25
20
15
10
5
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR
SURFACE
BØTTØM


STATIØN 1B
SEASØNAL AVERAGES
SALINITY
35
30
25
20
15
10
5
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR
SURFACE
BØTTØM


STATIØN 1C
SEASØNAL AVERAGES
SALINITY
YEAR
SURFACE
BØTTØM
0
5
10
15
20
25
30
35
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983

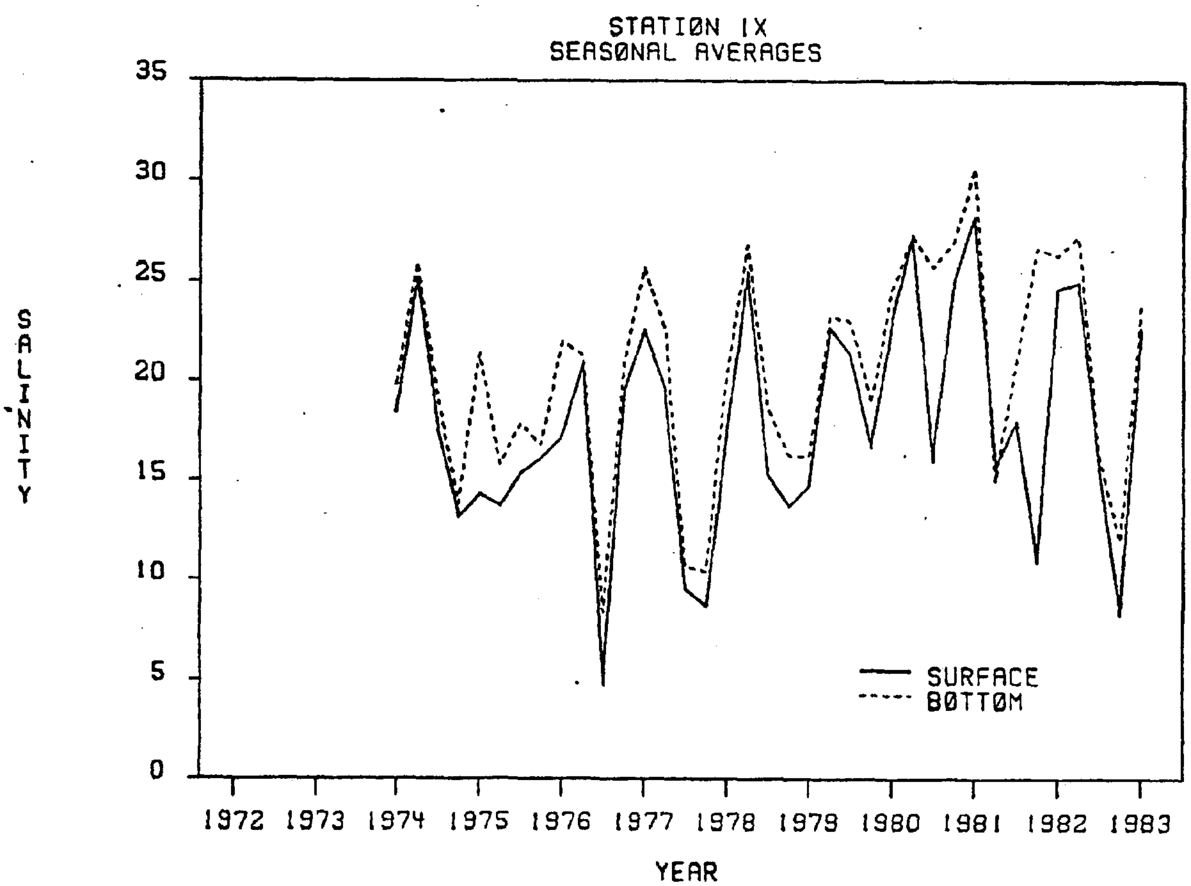

STATIØN IX
SEASØNAL AVERAGES
SALINITY
YEAR
SURFACE
BØTTØM
0
5
10
15
20
25
30
35
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983

Figure 21: Surface physical-chemical factors taken monthly at station 1 from 1975 through 1978. Dredge events near station 1 and wind (storm) conditions are also shown.

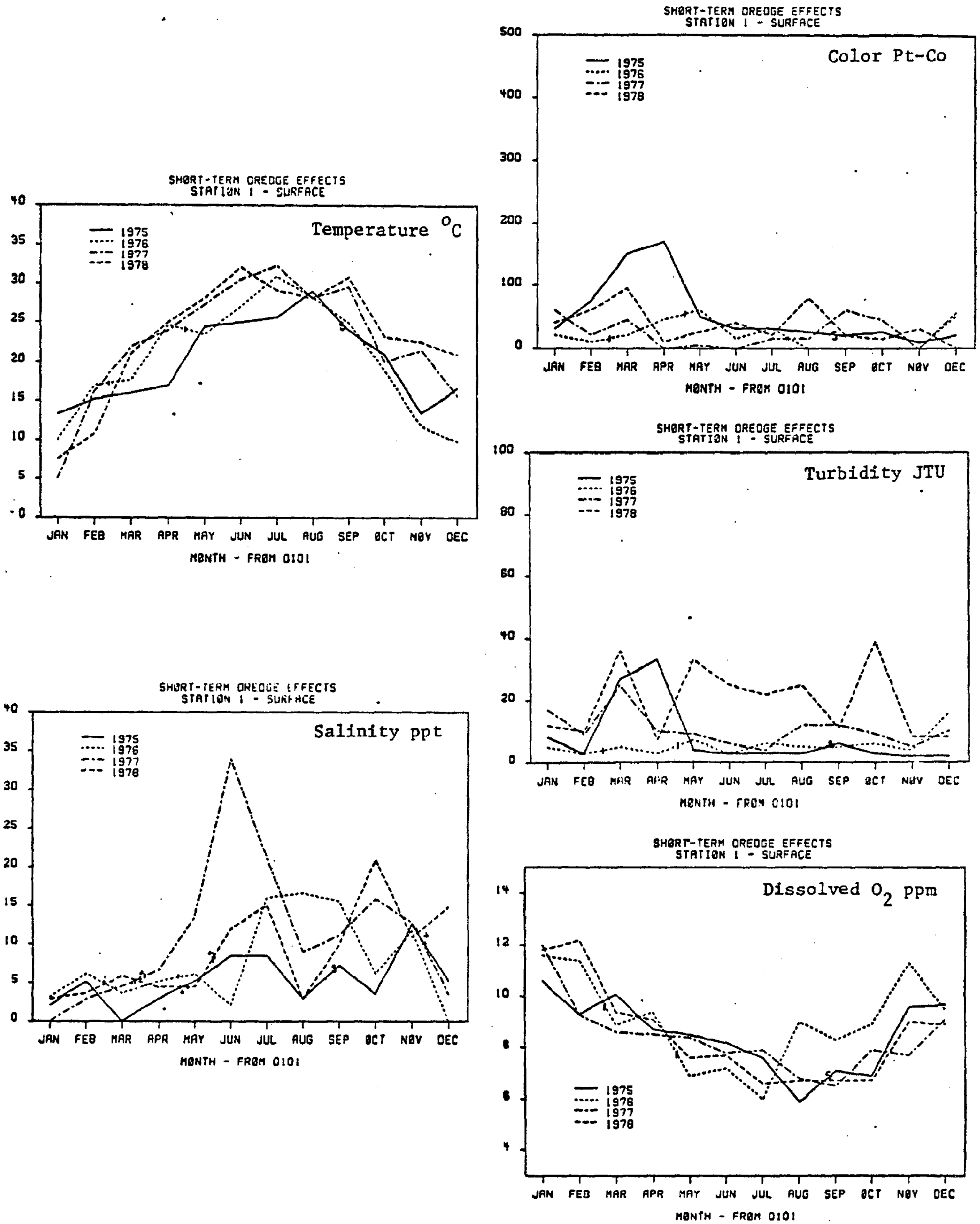


Figure 22: Bottom physical-chemical factors taken monthly at station 1 from 1975 through 1978. Dredge events near station 1 and wind (storm) conditions are also shown.

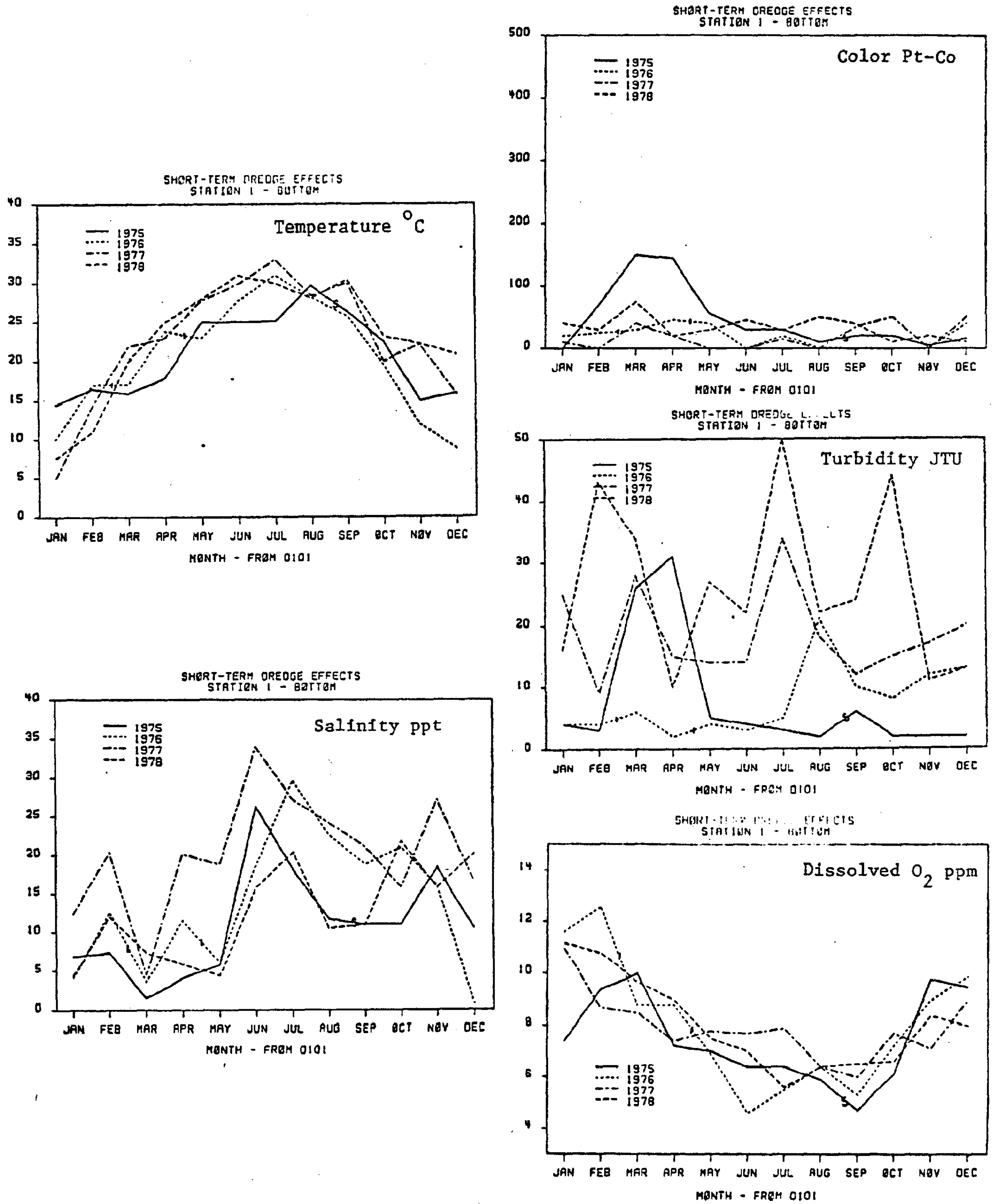


Figure 23: Fishes (numerical abundance, species richness, diversity, and evenness) taken monthly by trawls at station 1 from 1975 through 1978. Dredge events near station 1 and wind (storm) conditions are also shown.

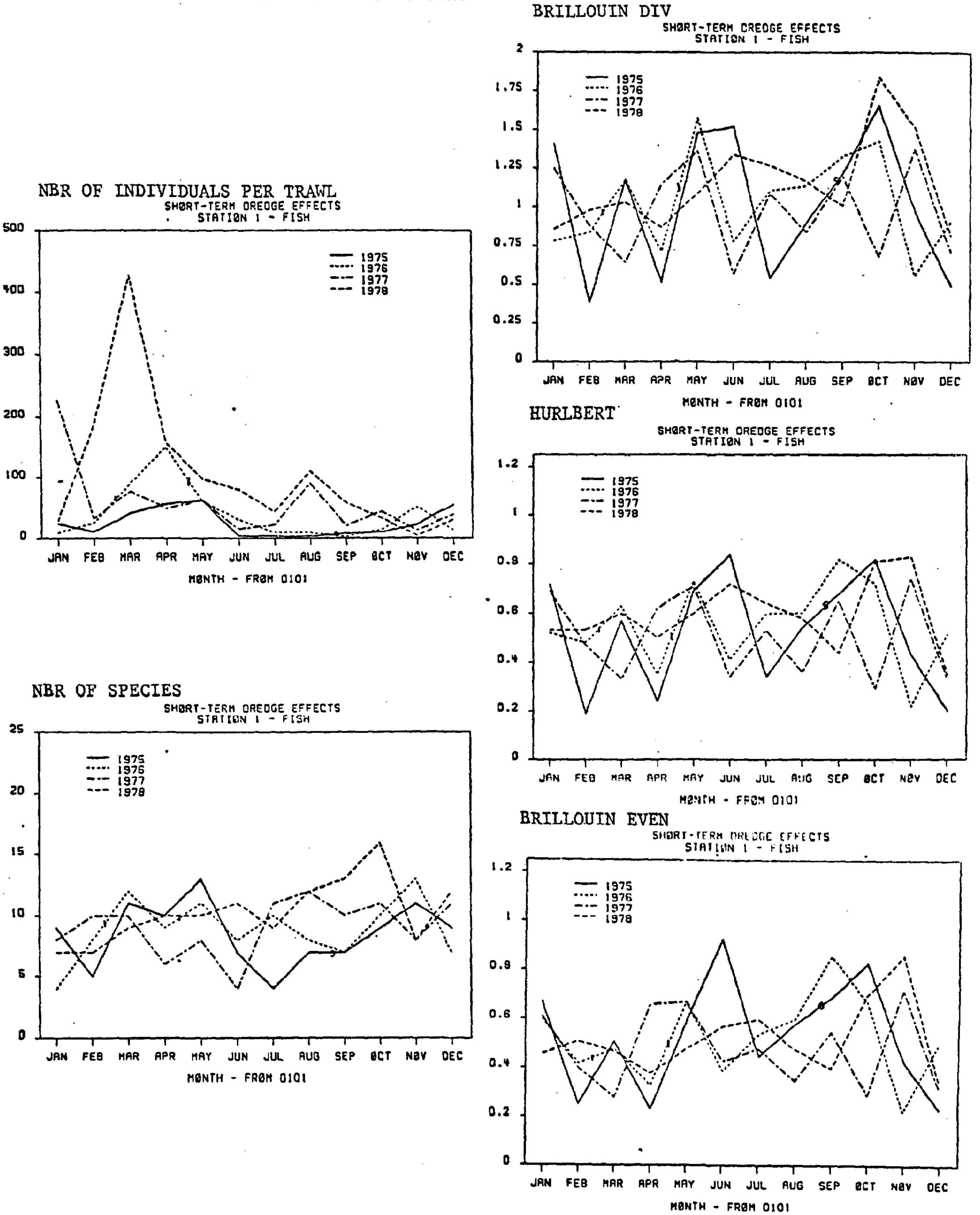


Figure 24: Epibenthic invertebrates (numerical abundance, species richness, diversity, and evenness) taken monthly by trawls at station 1 from 1975 through 1978. Dredge events near station 1 and wind (storm) conditions are also shown.

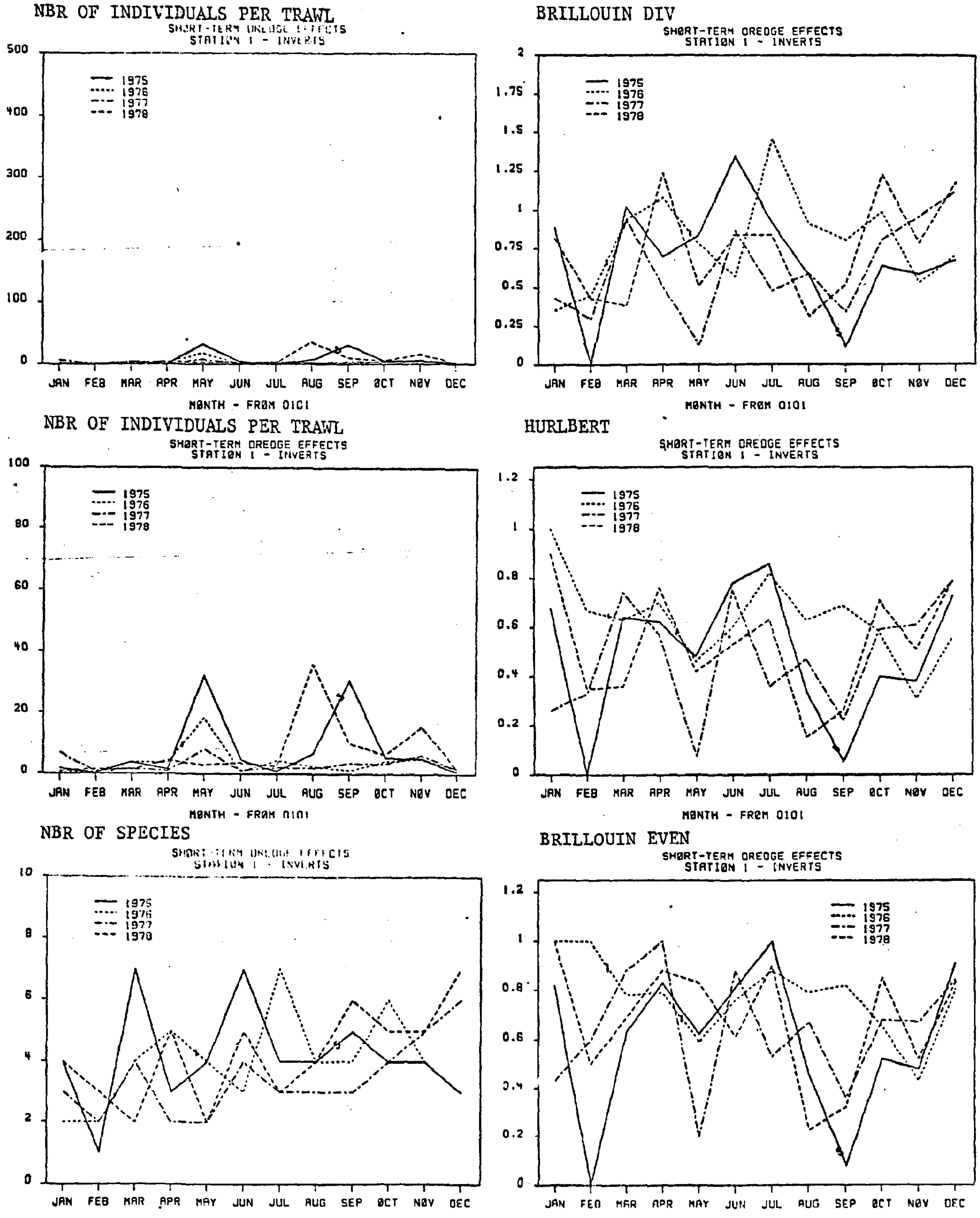


Figure 25: Numerical abundance of dominant fish and epibenthic invertebrate populations taken monthly by trawls at station 1 from 1975 through 1978. Dredge events near station 1 and wind (storm) conditions are also shown.

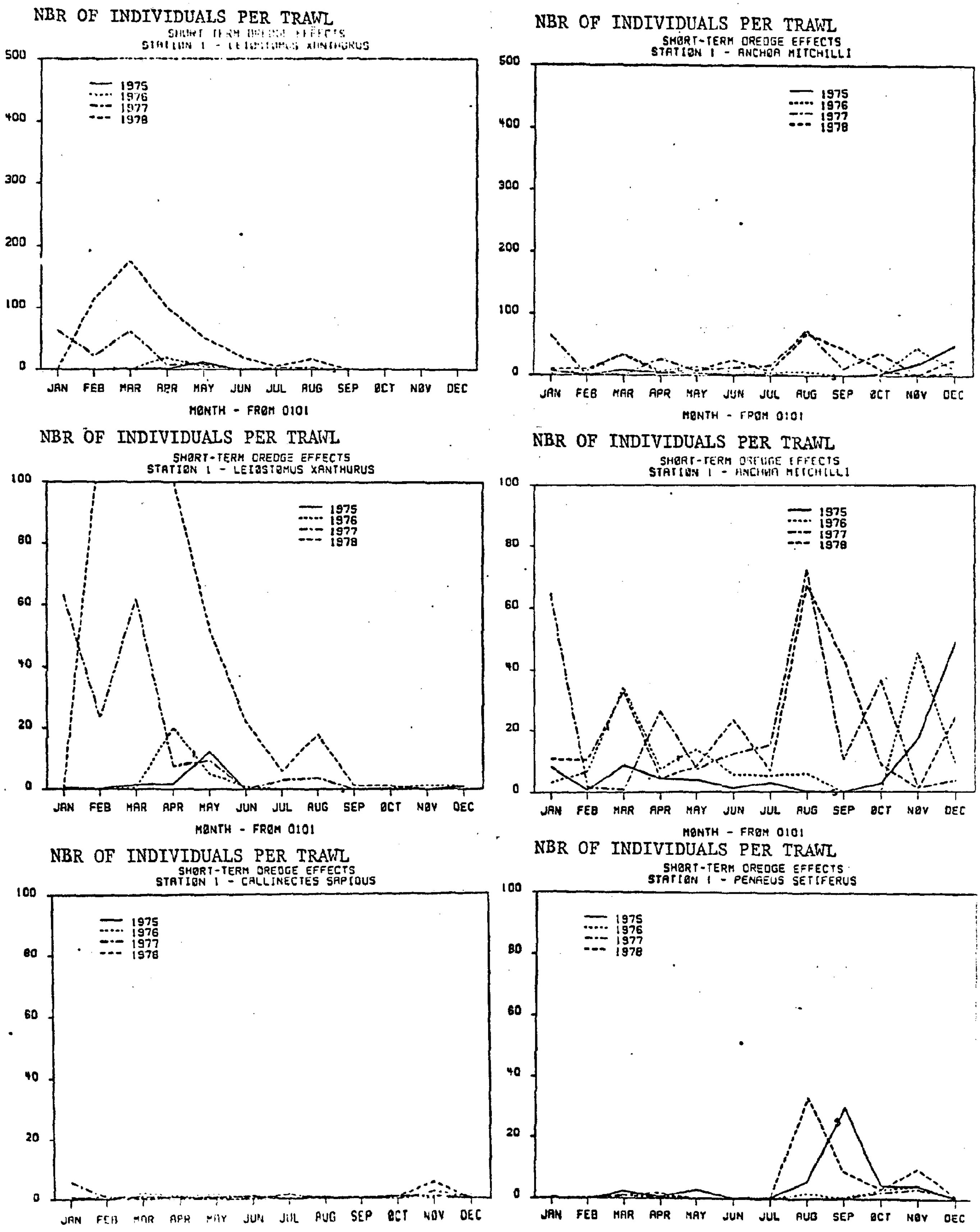


Figure 26: Surface physical-chemical factors taken monthly at station 2 from 1975 through 1978. Dredge events near station 2 and wind (storm) conditions are also shown.

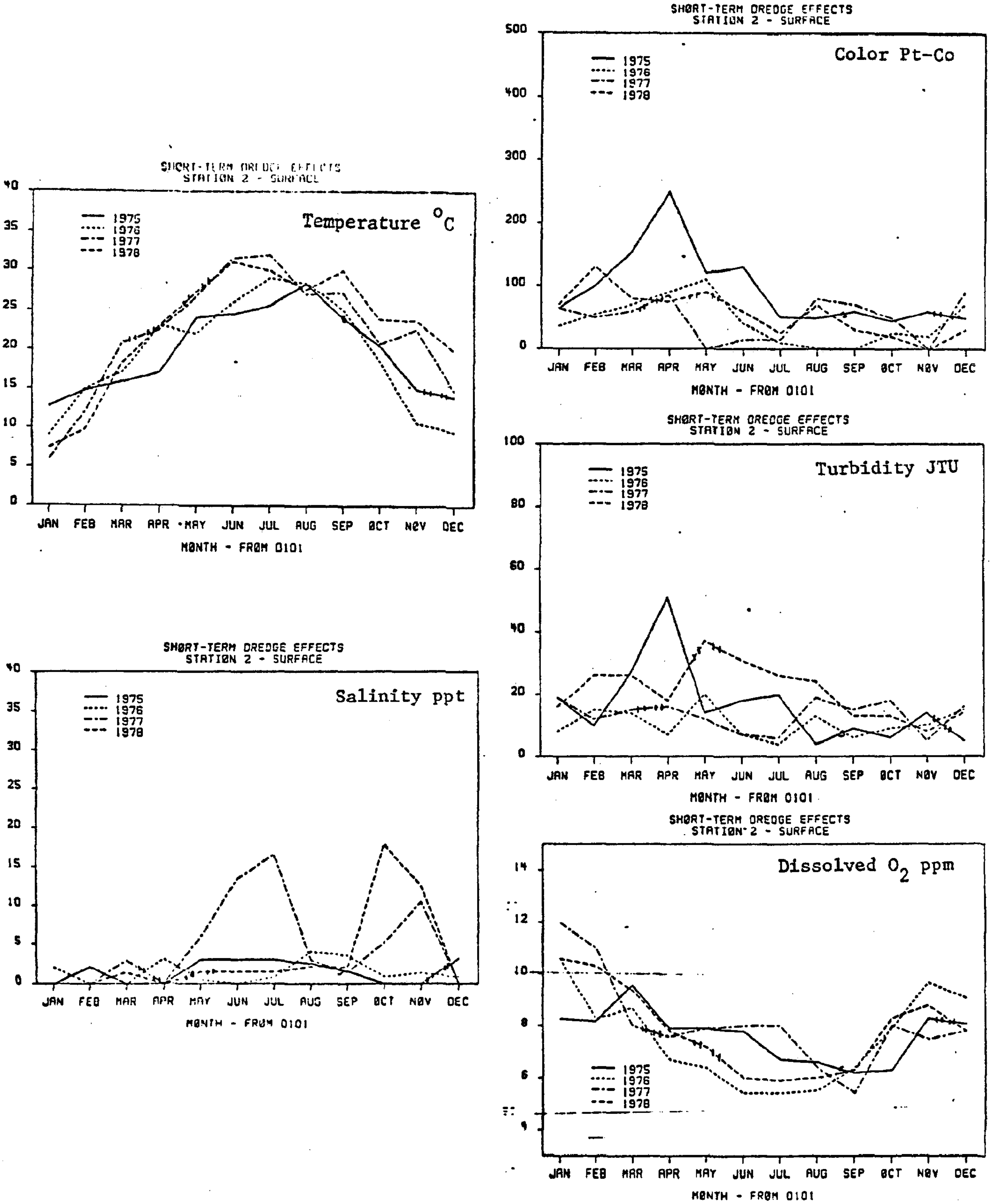


Figure 27: Bottom physical-chemical factors taken monthly at station 2 from 1975 through 1978. Dredge events near station 2 and wind (storm) conditions are also shown.

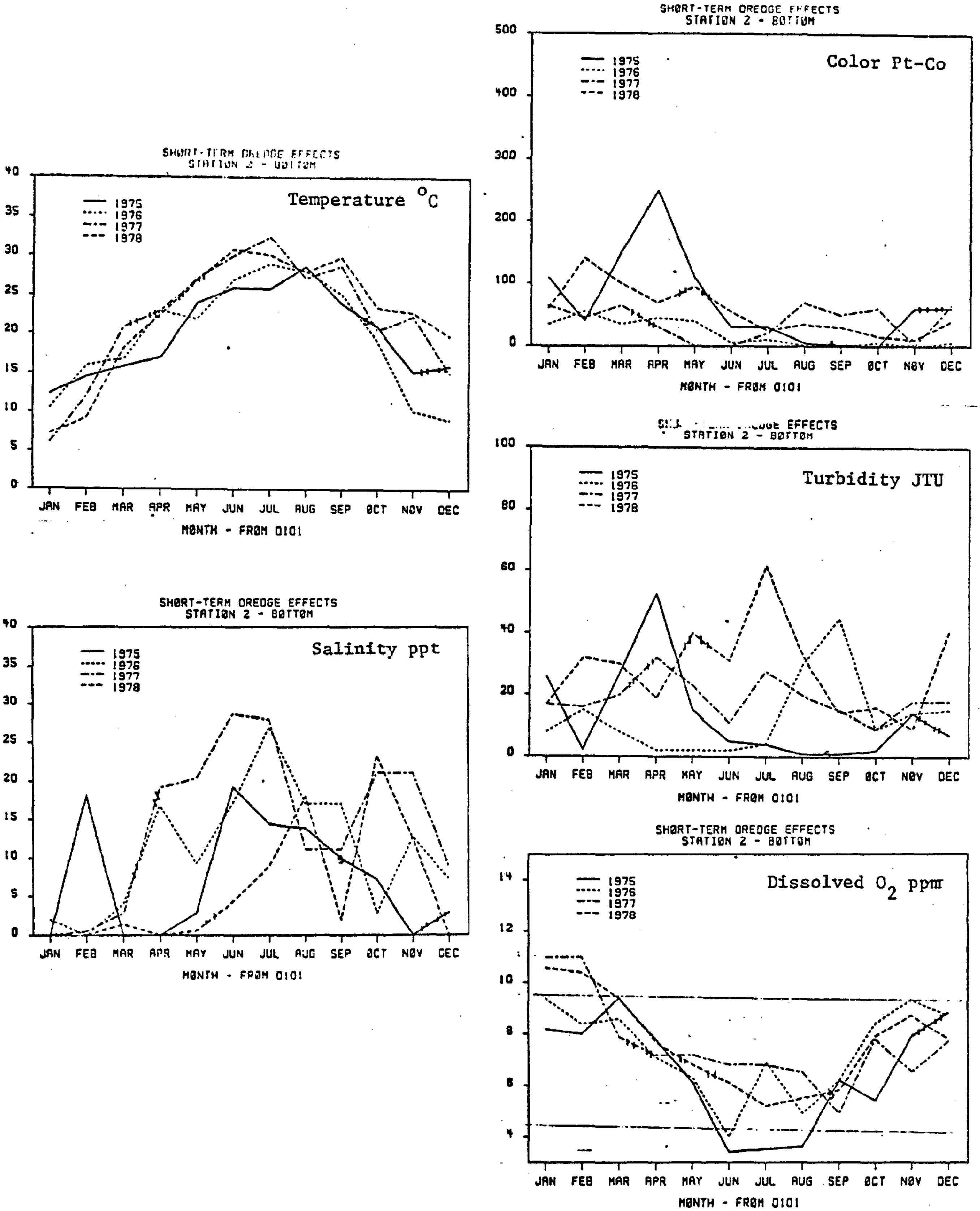


Figure 28: Fishes (numerical abundance, species richness, diversity, and evenness) taken monthly by trawls at station 2 from 1975 through 1978. Dredge events near station 2 and wind (storm) conditions are also shown.

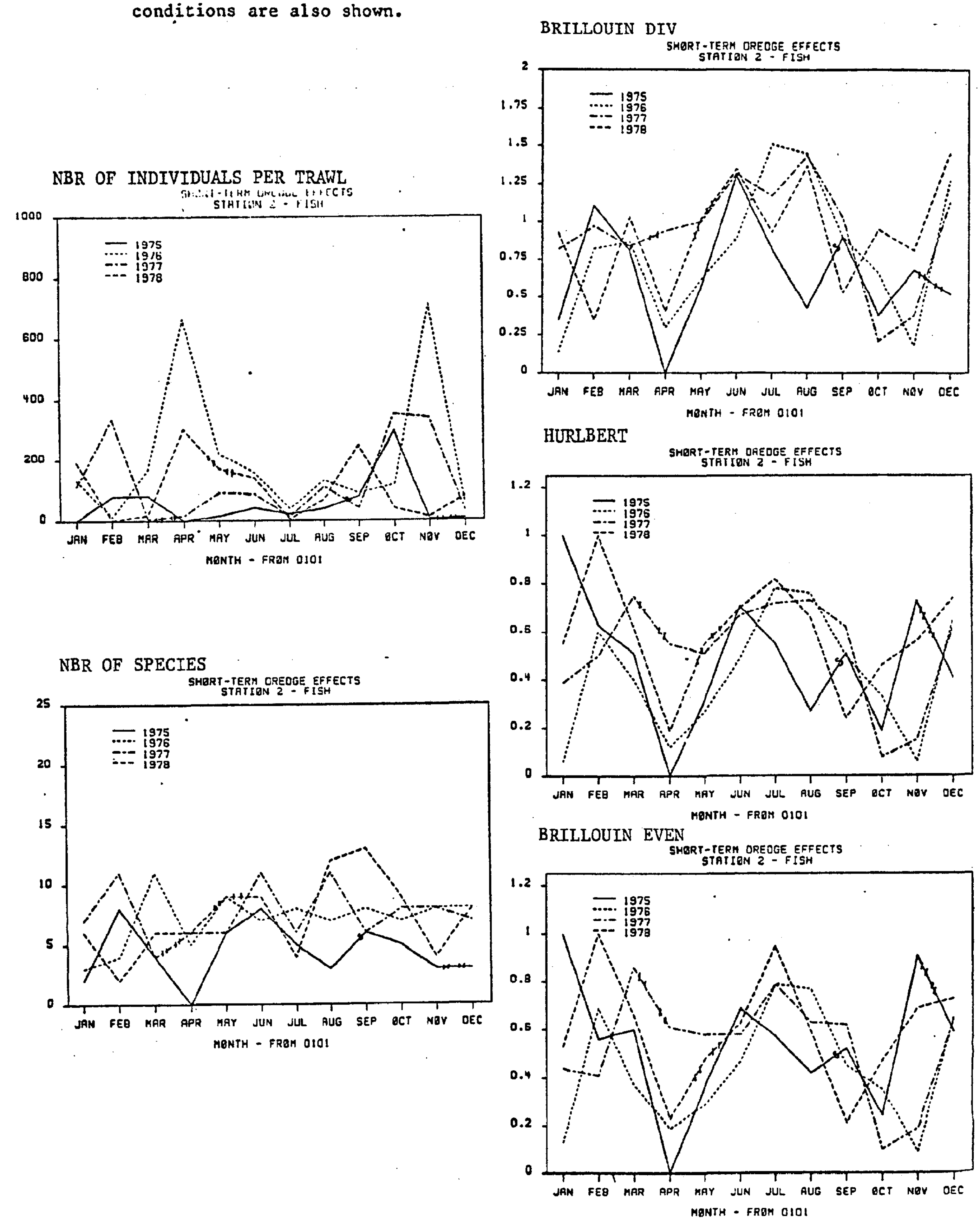


Figure 29: Epibenthic invertebrates (numerical abundance, species richness, diversity, and evenness) taken monthly by trawls at station 2 from 1975 through 1978. Dredge events near station 2 and wind (storm) conditions are also shown.

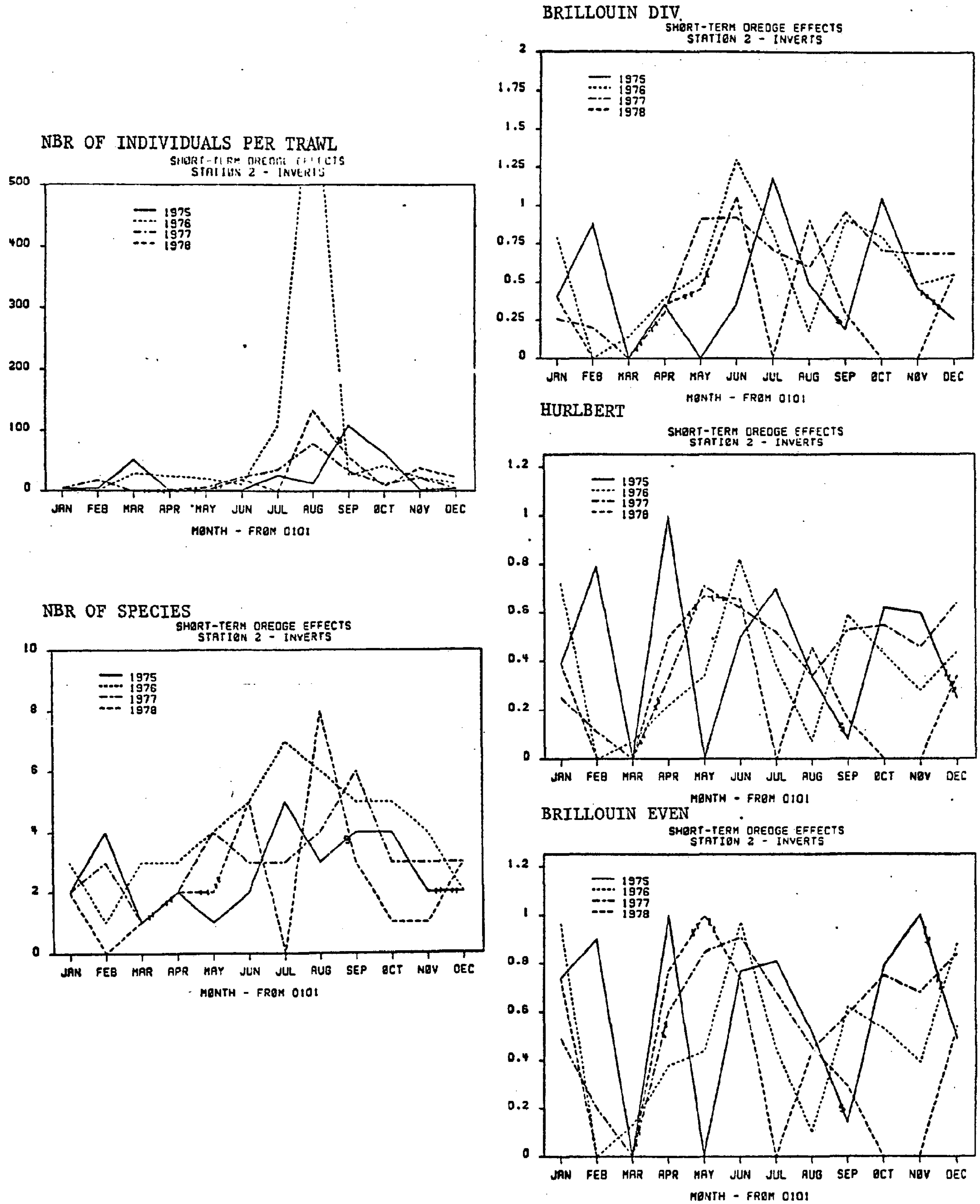


Figure 30: Numerical abundance of dominant fish and epibenthic invertebrate populations taken monthly by trawls at station 2 from 1975 through 1978. Dredge events near station 2 and wind (storm) conditions are also shown.

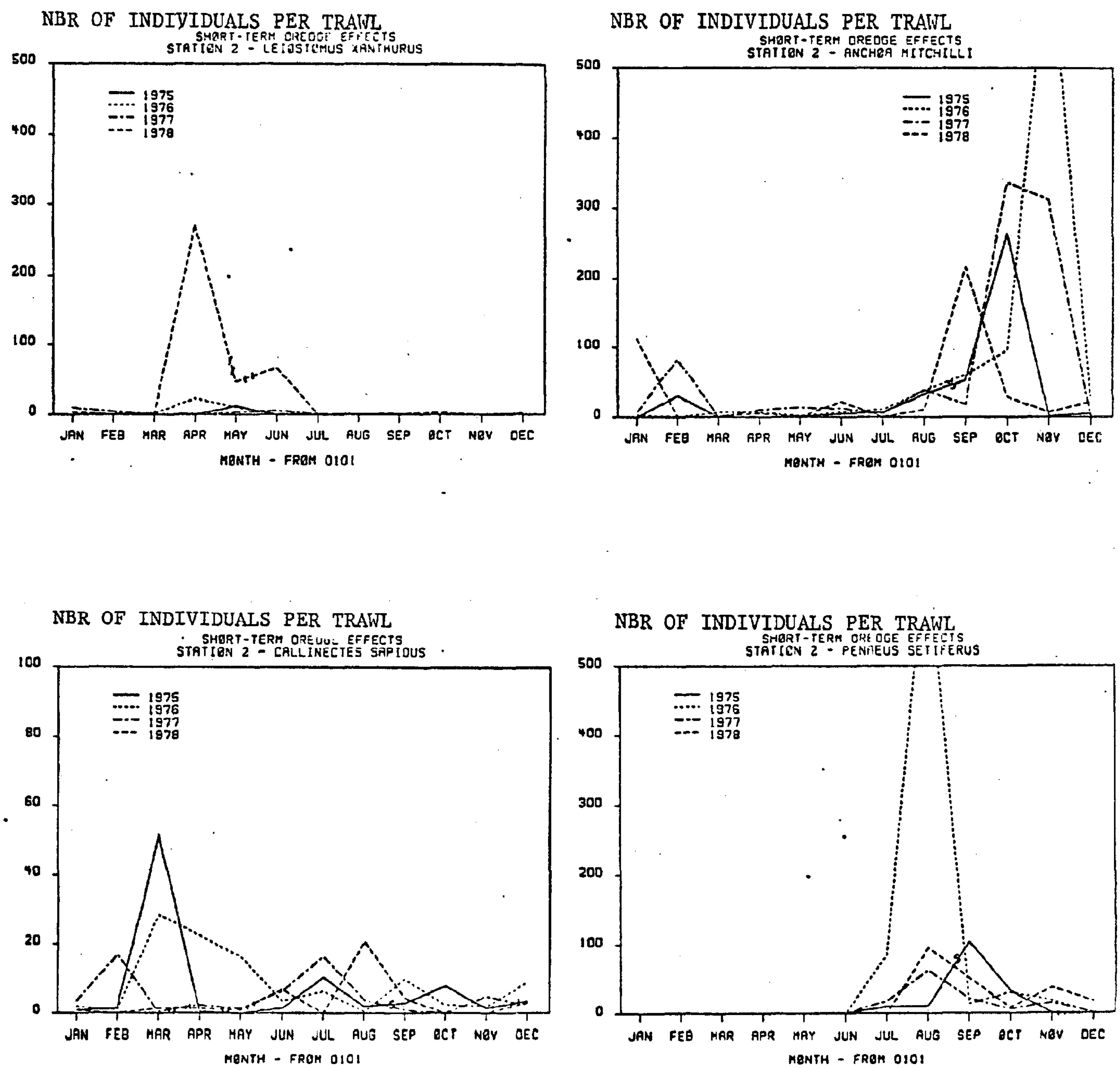


Figure 31: Surface physical-chemical factors taken monthly at station 1A from 1975 through 1978. Dredge events near station 1A and wind (storm) conditions are also shown.

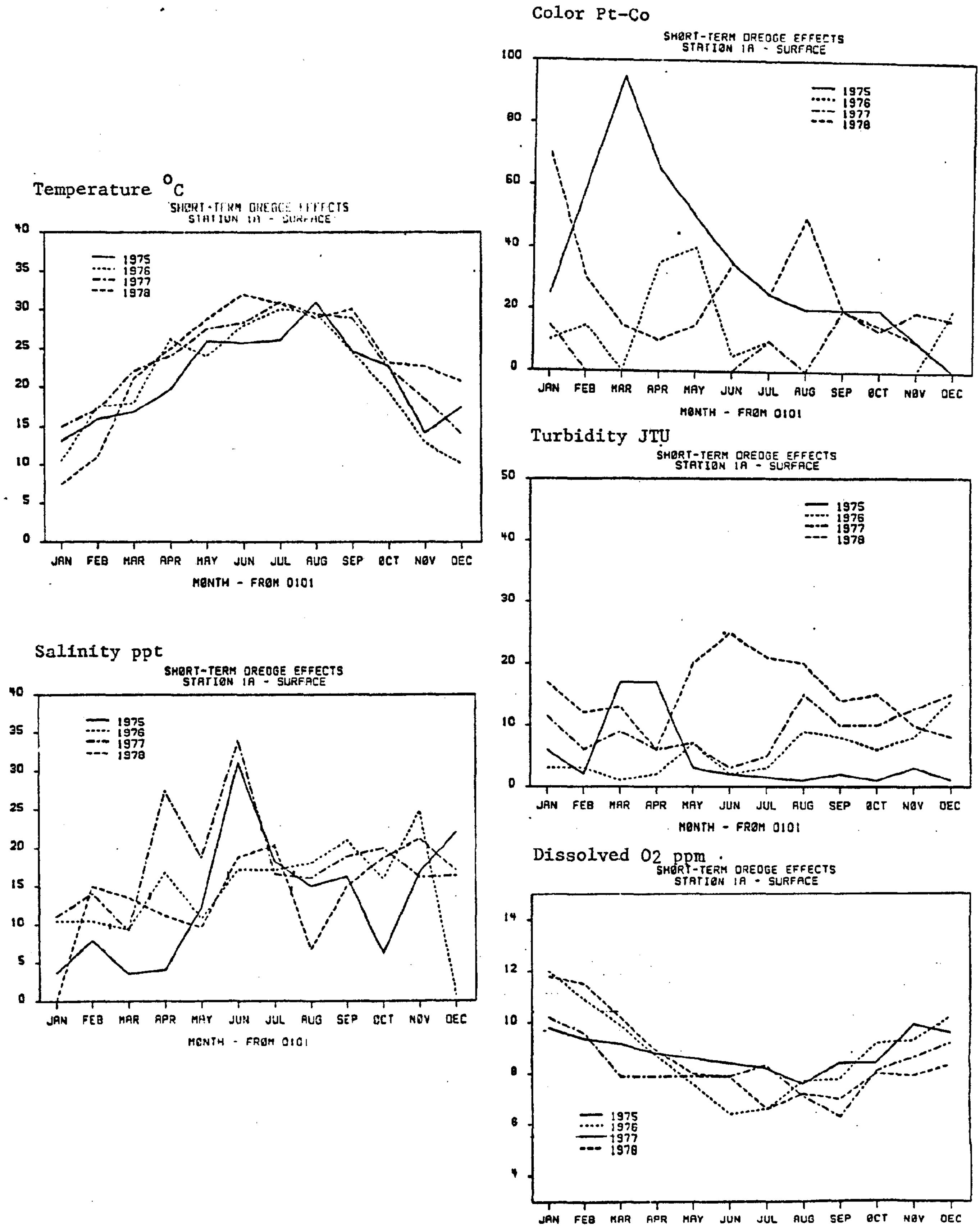
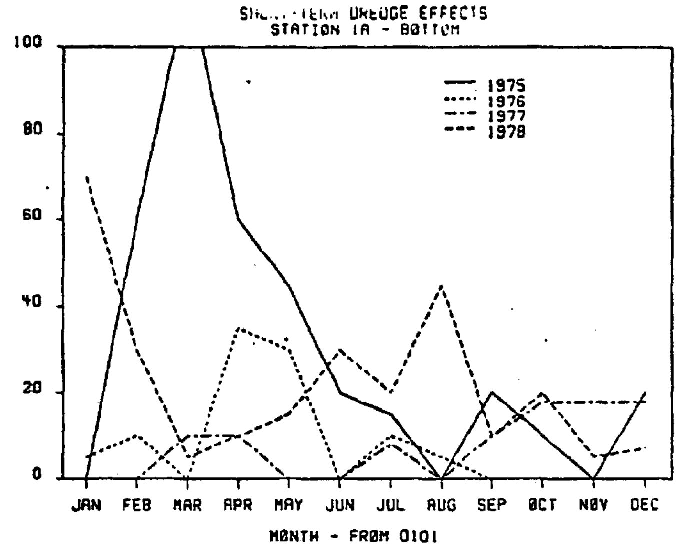
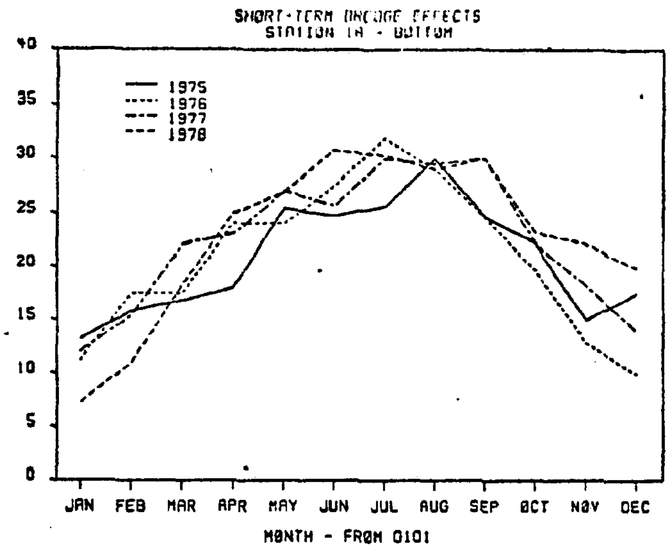


Figure 32: Bottom physical-chemical factors taken monthly at station 1A from 1975 through 1978. Dredge events near station 1A and wind (storm) conditions are also shown.

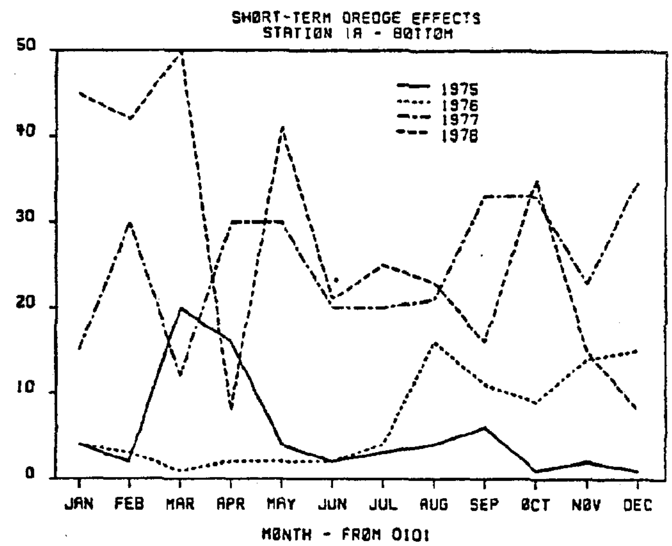
Color Pt-Co



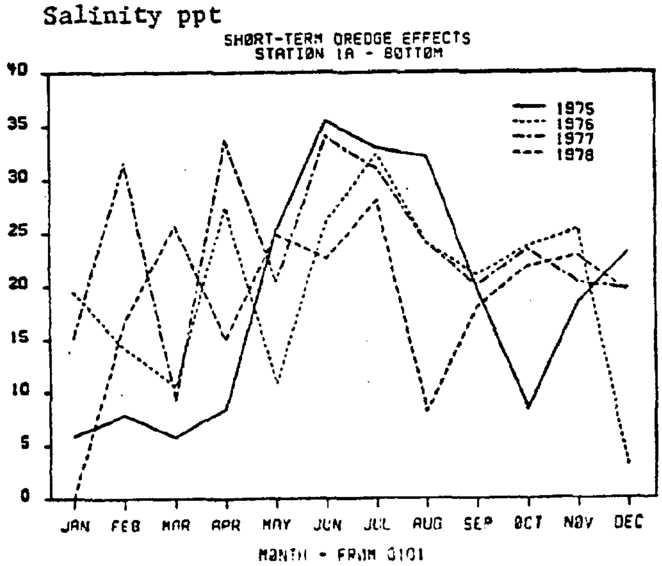
Temperature °C



Turbidity JTU



Salinity ppt



Dissolved O_2 ppm

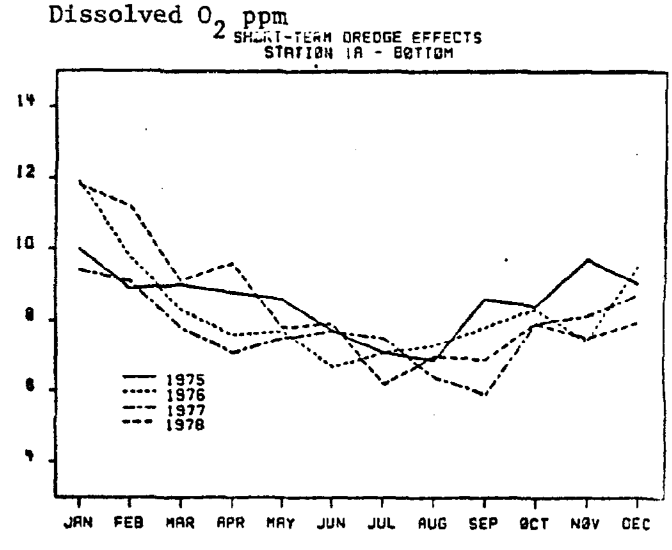
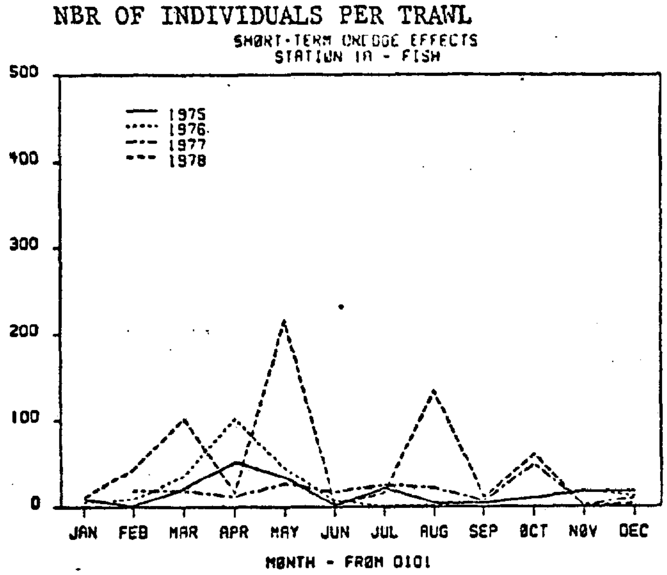
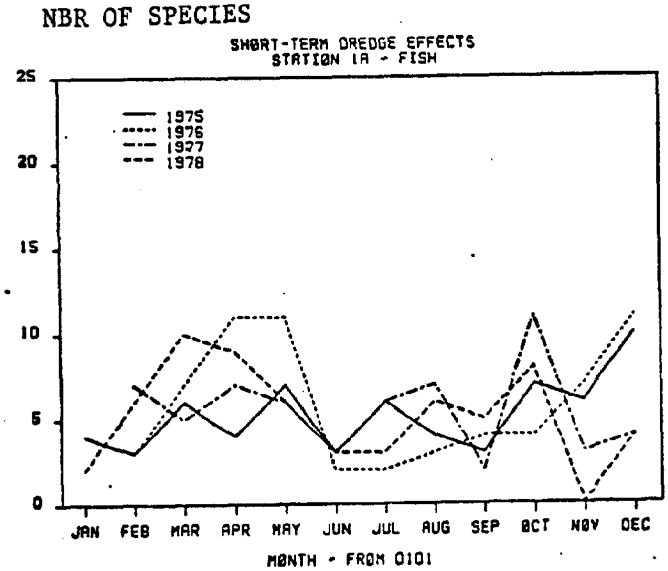


Figure 33: Fishes (numerical abundance, species richness, diversity, and evenness) taken monthly by trawls at station 1A from 1975 through 1978. Dredge events near station 1A and wind (storm) conditions are also shown.

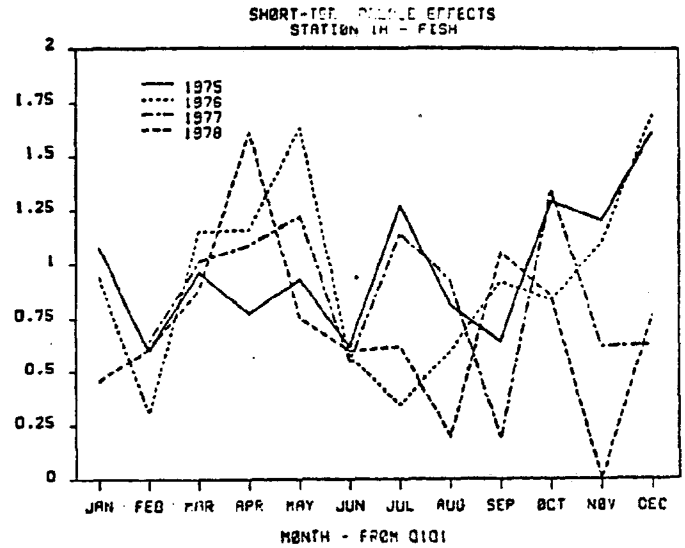
NBR OF INDIVIDUALS PER TRAWL



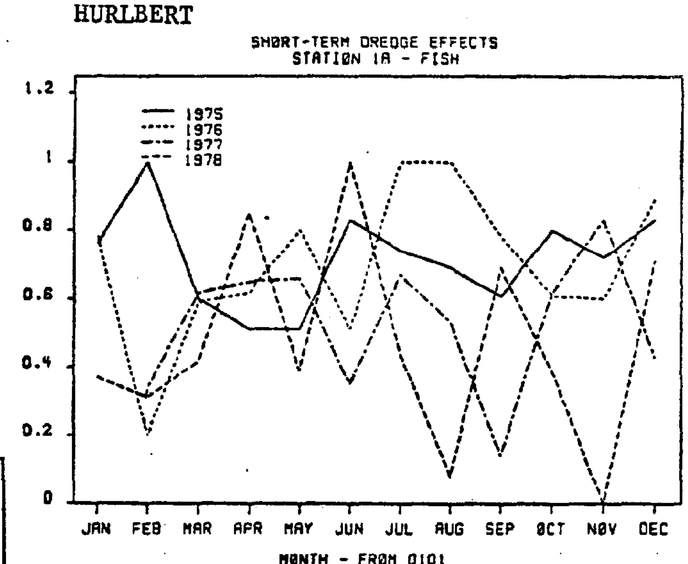
NBR OF SPECIES



BRILLOUIN DIV



HURLBERT



BRILLOUIN EVEN

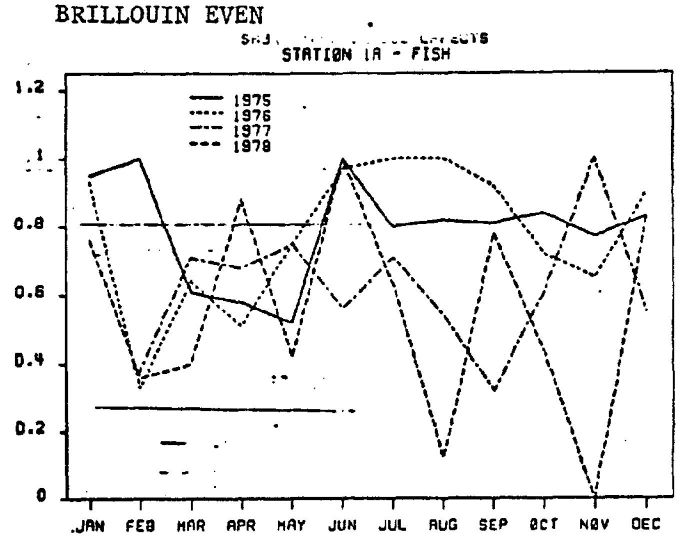
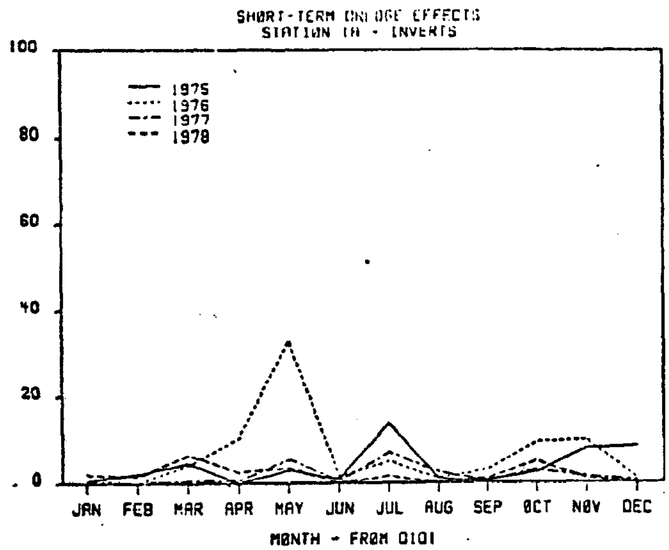
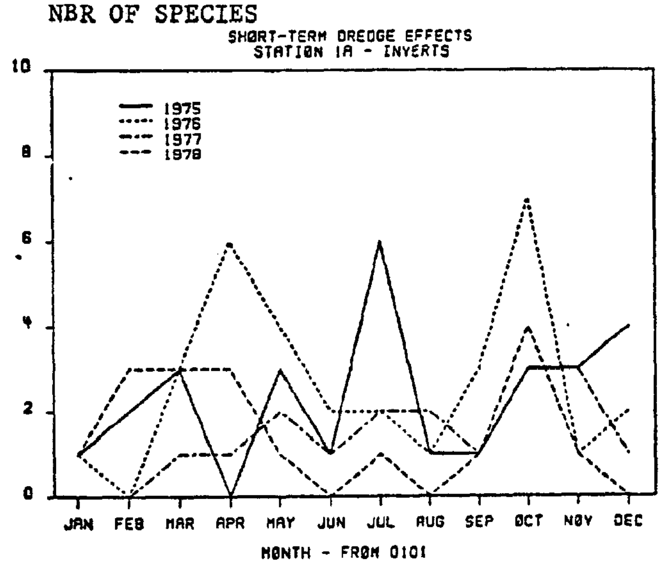


Figure 34: Epibenthic invertebrates (numerical abundance, species richness, diversity, and evenness) taken monthly by trawls at station 1A from 1975 through 1978. Dredge events near station 1A and wind (storm) conditions are also shown.

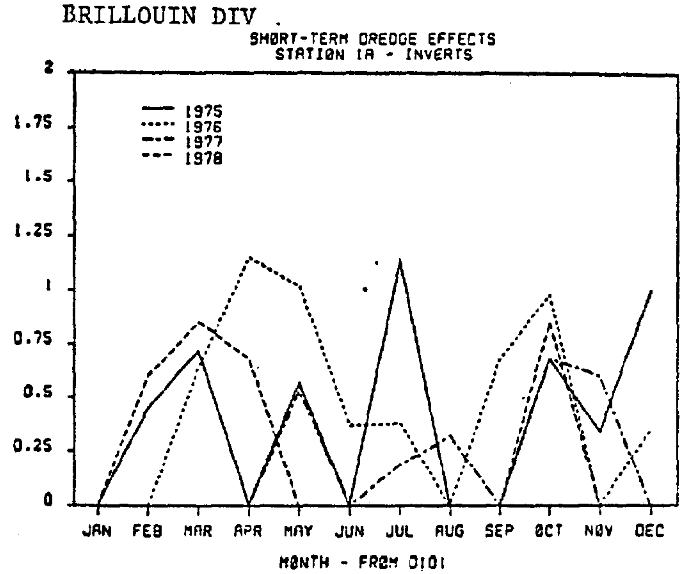
NBR OF INDIVIDUALS PER TRAWL



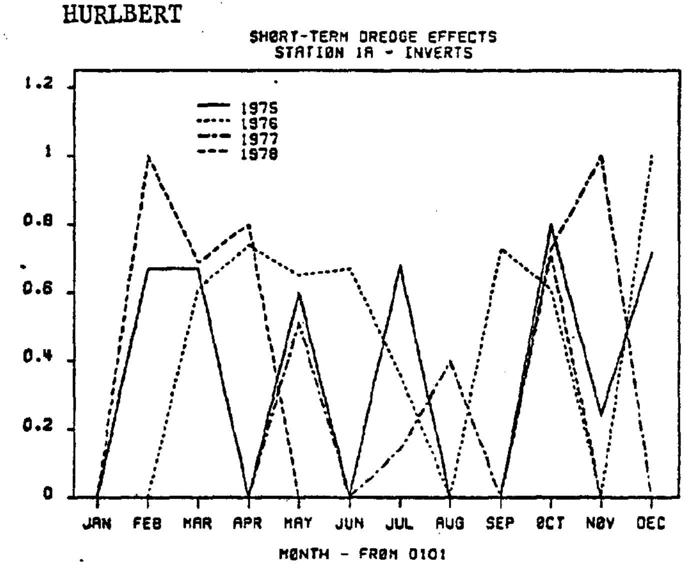
NBR OF SPECIES



BRILLOUIN DIV



HURLBERT



BRILLOUIN EVEN

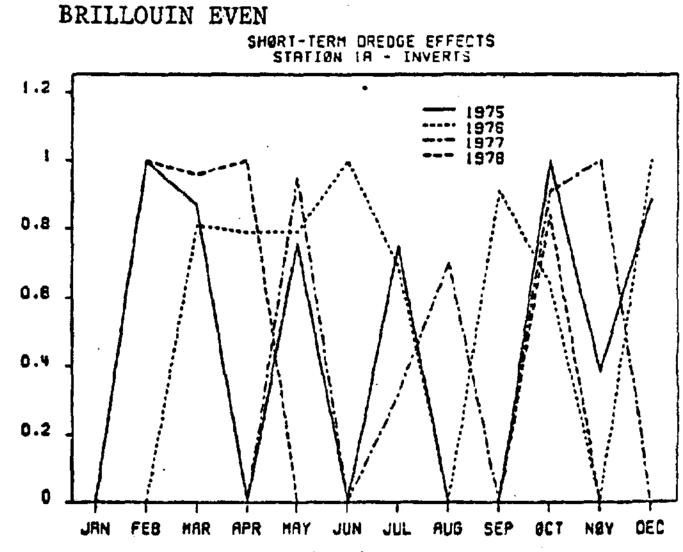


Figure 35: Numerical abundance of dominant fish and epibenthic invertebrate populations taken monthly by trawls at station 1A from 1975 through 1978. Dredge events near station 1A and wind (storm) conditions are also shown.

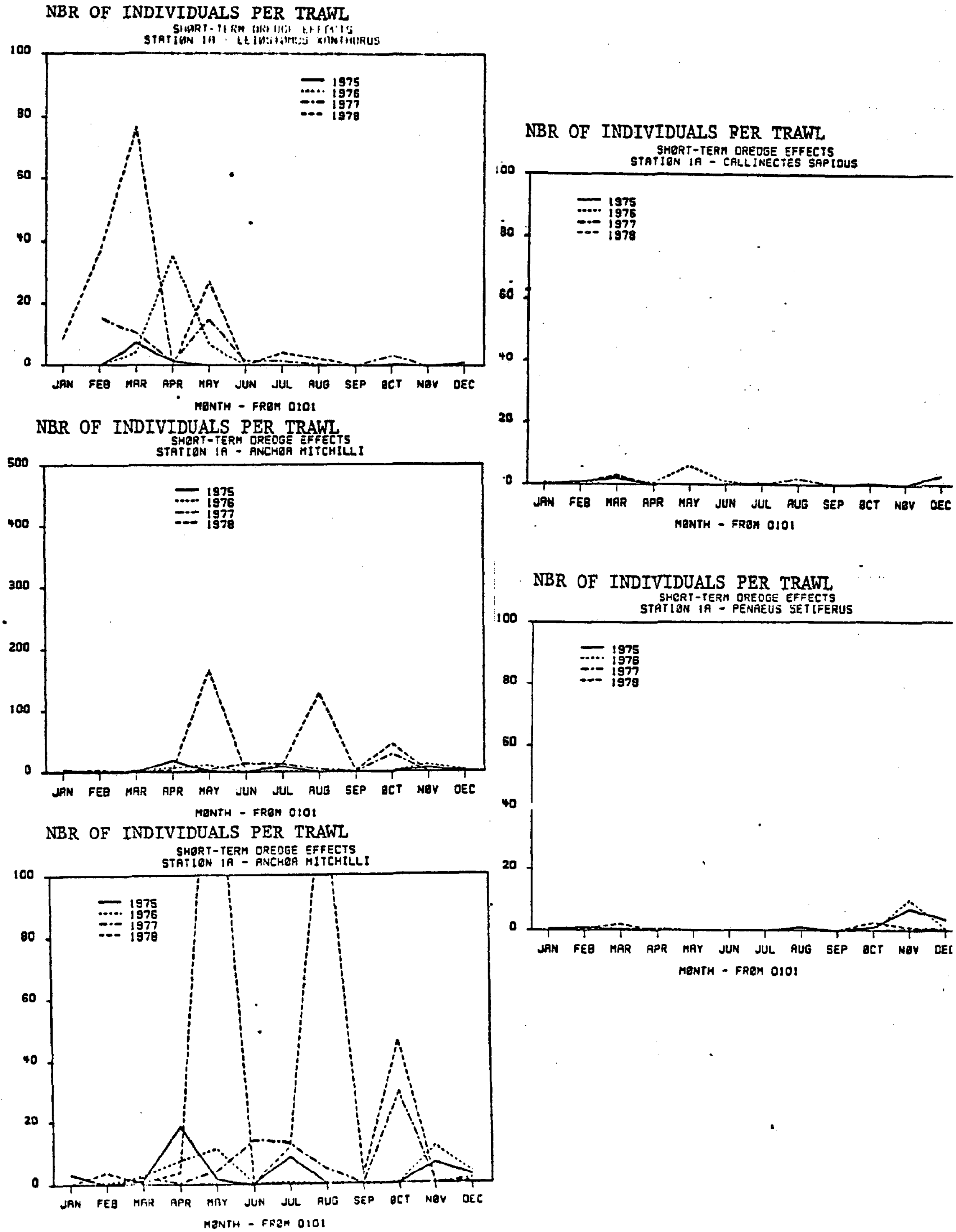


Figure 36: Surface physical-chemical factors taken monthly at station 1B from 1975 through 1978. Dredge events near station 1B and wind (storm) conditions are also shown.

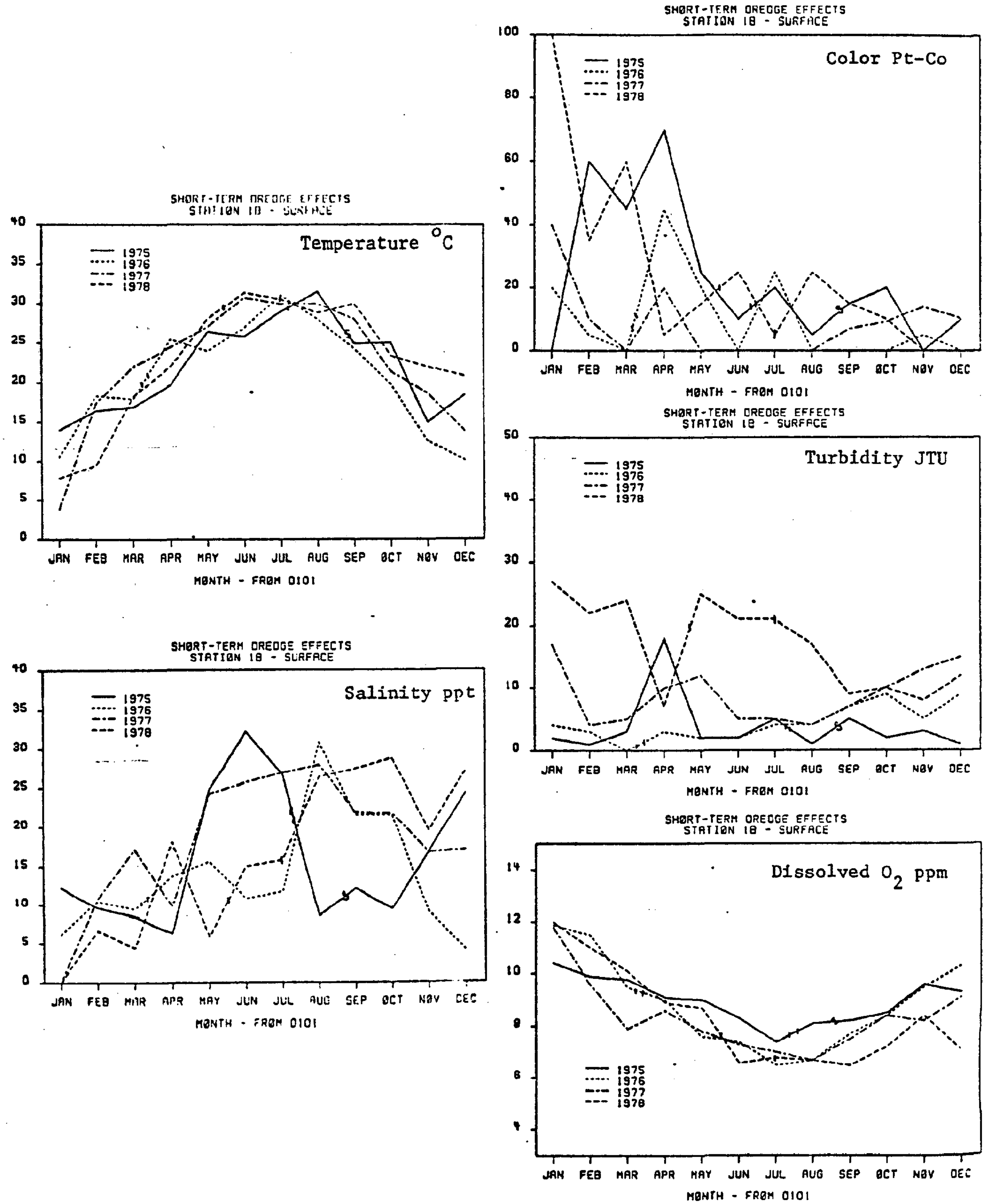
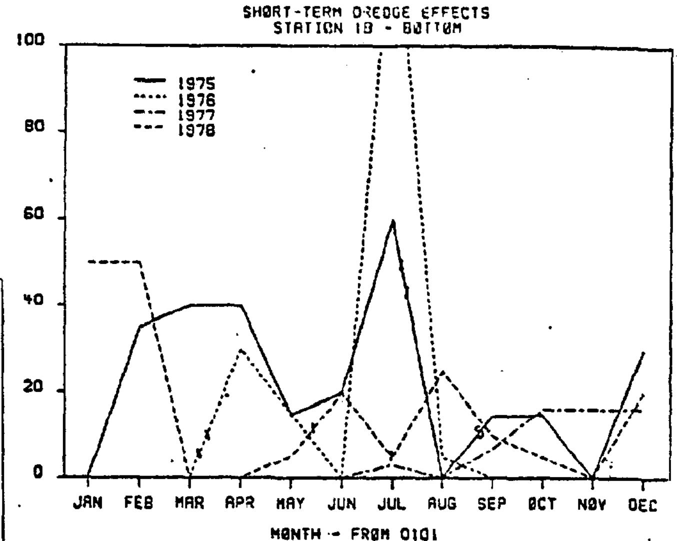
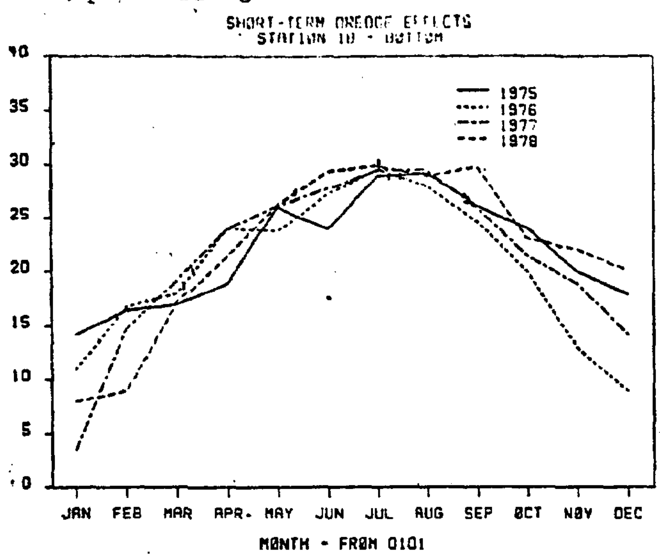


Figure 37: Bottom physical-chemical factors taken monthly at station 1B from 1975 through 1978. Dredge events near station 1B and wind (storm) conditions are also shown.

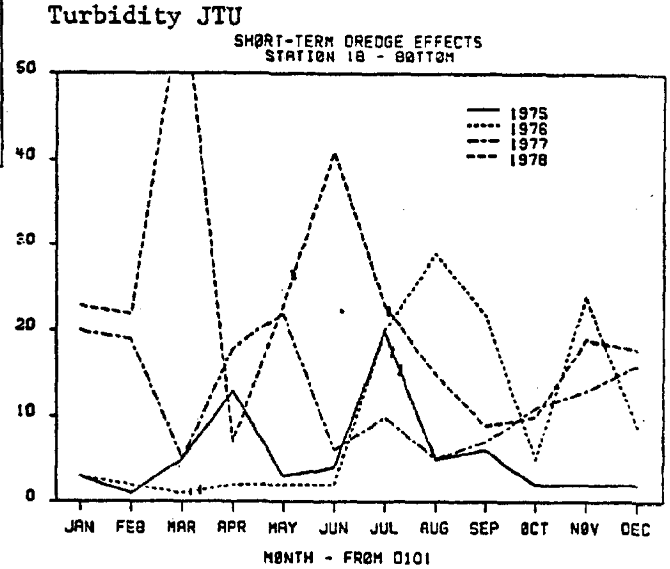
Color Pt-Co



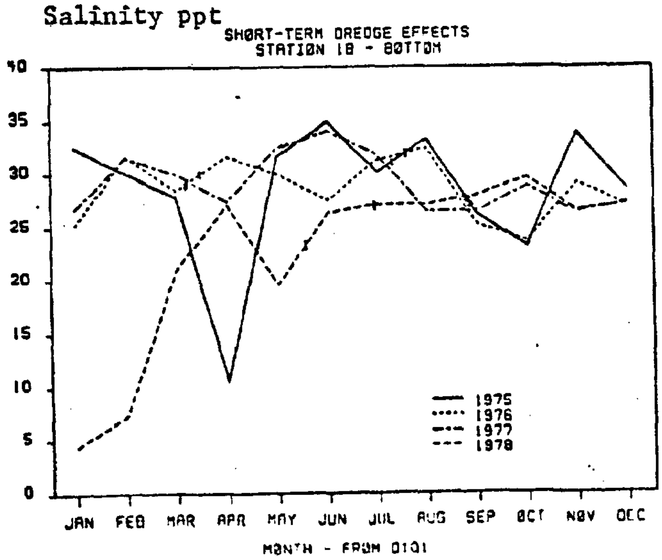
Temperature ^{o}C



Turbidity JTU



Salinity ppt



Dissolved O_2 ppm

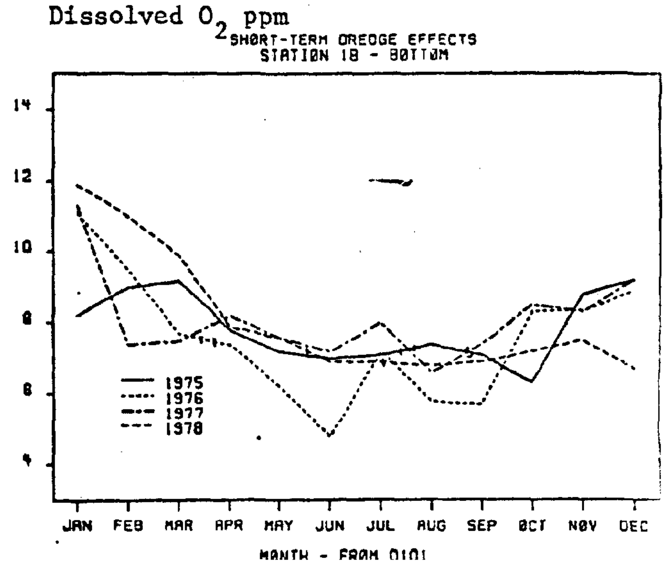


Figure 38: Fishes (numerical abundance, species richness, diversity, and evenness) taken monthly by trawls at station 1B from 1975 through 1978. Dredge events near station 1B and wind (storm) conditions are also shown.

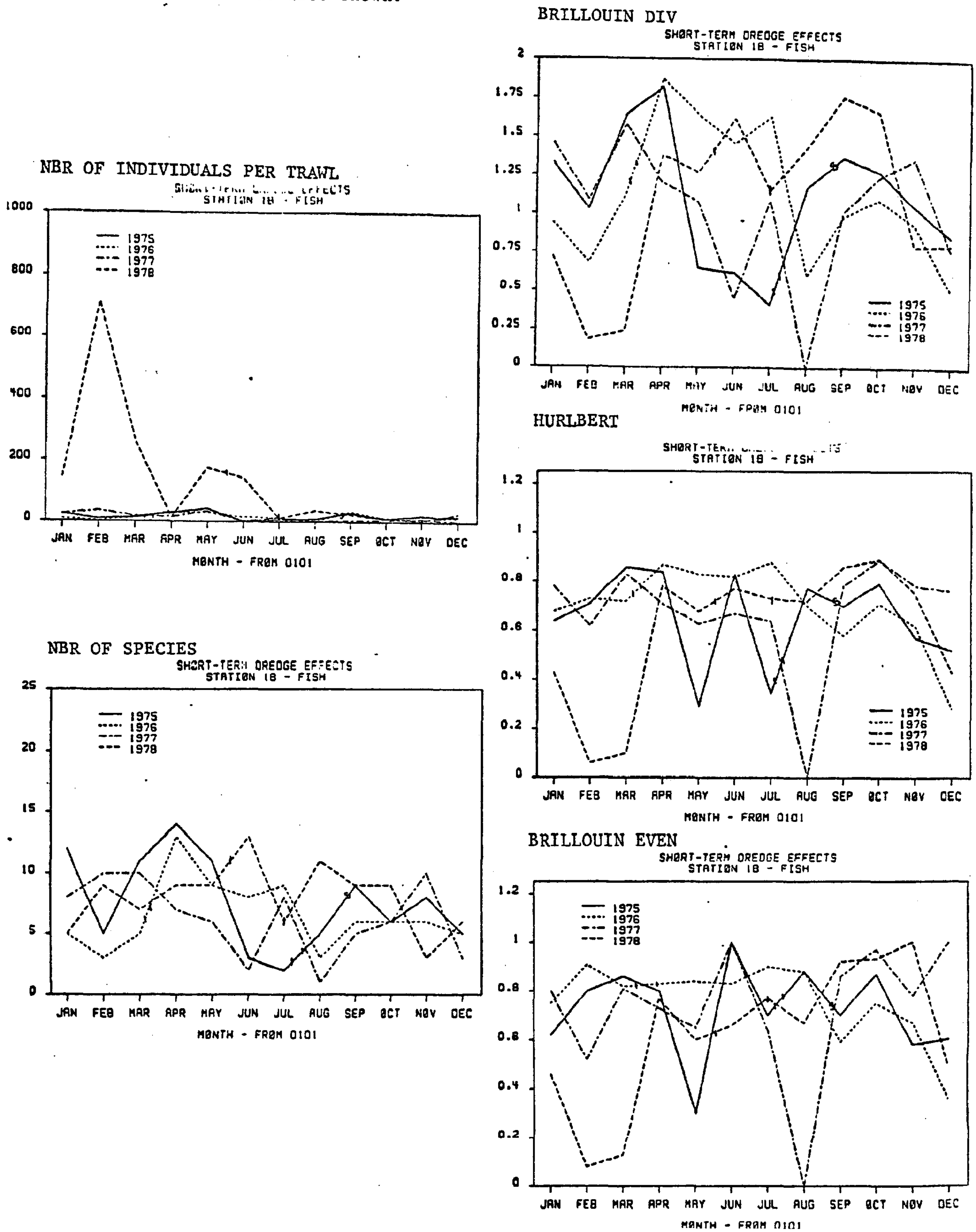


Figure 39: Epibenthic invertebrates (numerical abundance, species richness, diversity, and evenness) taken monthly by trawls at station 1B from 1975 through 1978. Dredge events near station 1B and wind (storm) conditions are also shown.

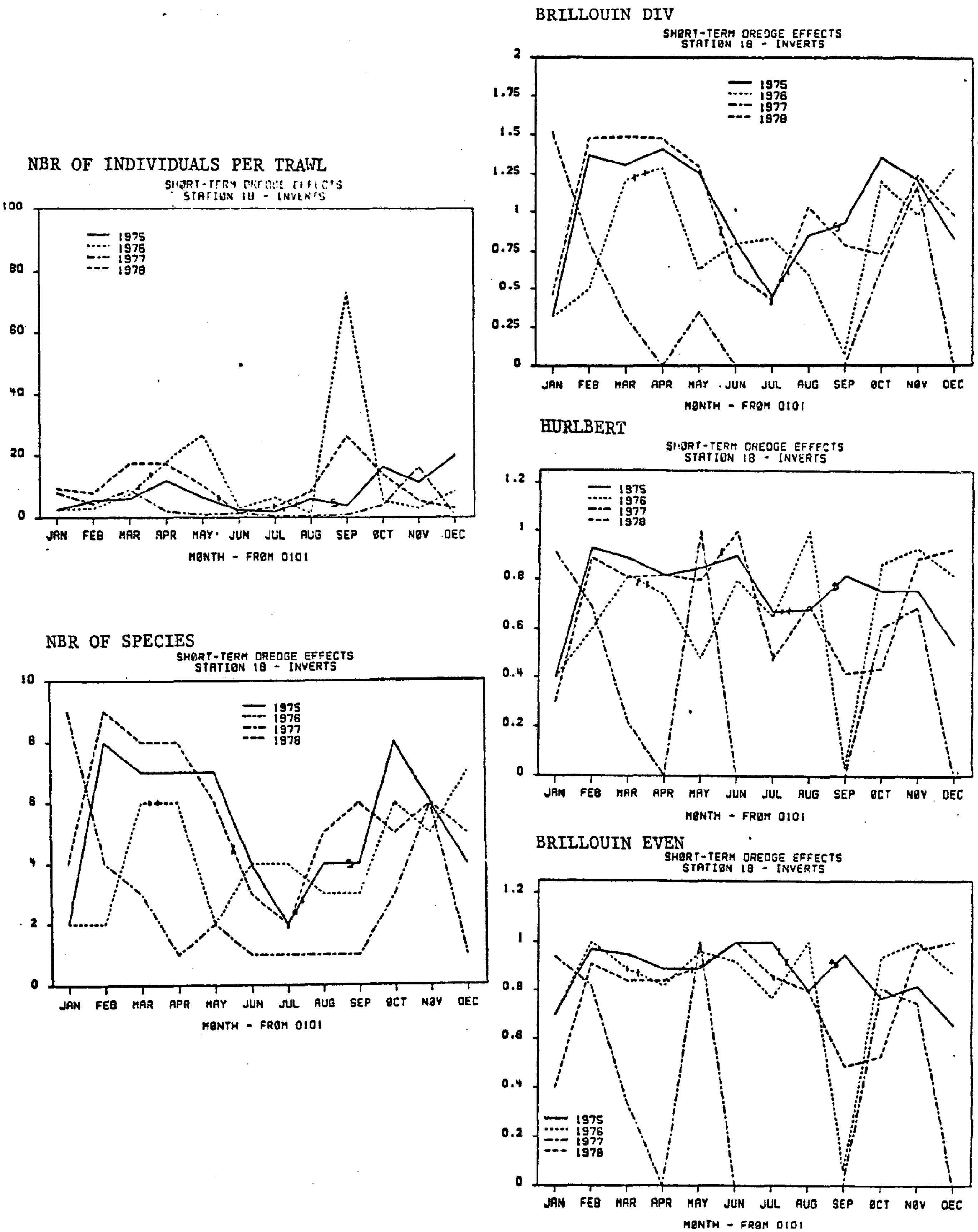


Figure 40: Numerical abundance of dominant fish and epibenthic invertebrate populations taken monthly by trawls at station 1B from 1975 through 1978. Dredge events near station 1B and wind (storm) conditions are also shown.

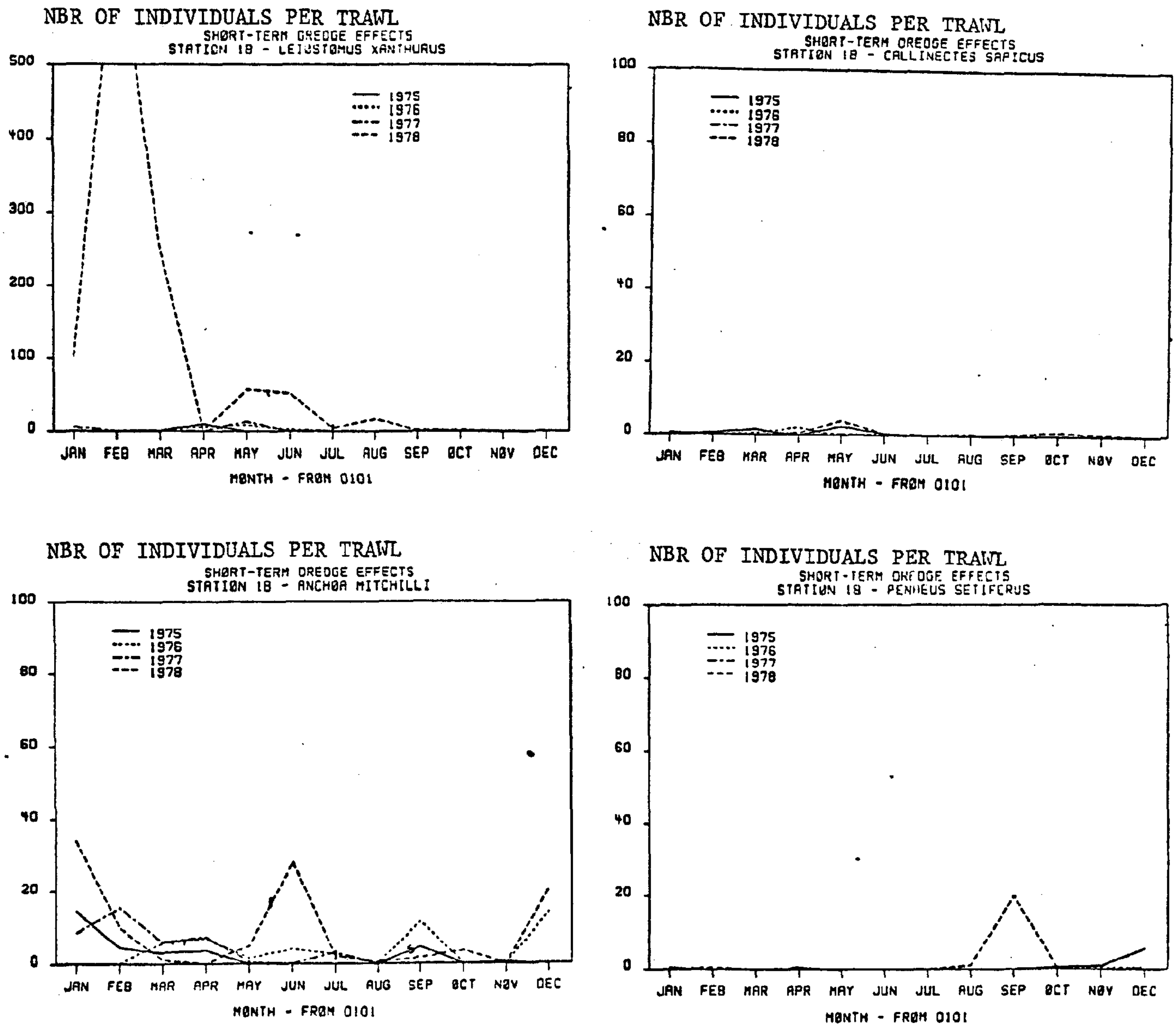


Figure 41: Long-term variation of salinity (bottom, ppt) at various stations in the Apalachicola estuary (June, 1972, to May, 1977).

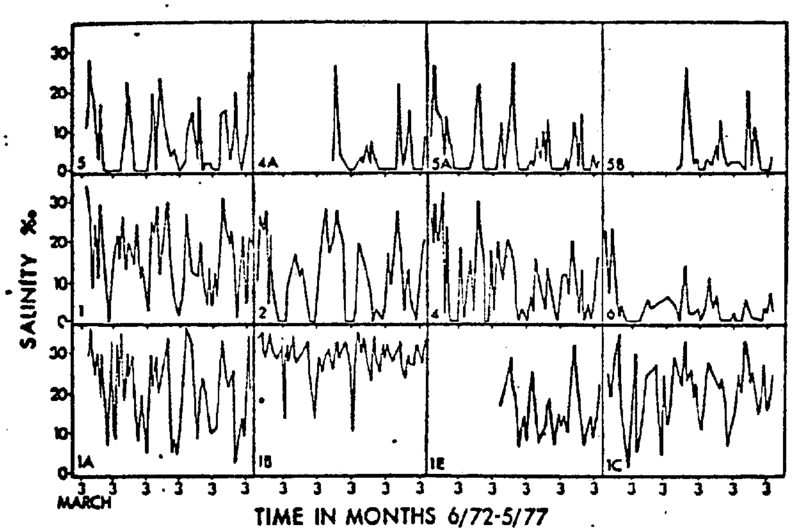


Figure 42: Cluster analysis of years by species of fishes at West Past (1A) and Sike's Cut (1B) in the Apalachicola estuary from 1972 through 1982.

STATION 1A FISH, YEARS BY SPECIES (LOG NO. IND.), BRAY-CURTIS

CLUSTERING STRATEGY IS FLEXIBLE GROUPING (WITH BETA)
SIMILARITY COEFFICIENT IS CZEKANOWSKI

CLUSTER LEVEL JOINS	GROUP NAME	WITH SUBGROUP	(WHERE GROUP NAME NOW REFERS TO A CLUSTER CONTAINING THE FOLLOWING CLUSTER UNITS)
.7902	7/77-6/78	7/78-6/79	7/77-6/78 7/78-6/79
.7526	7/75-6/76	7/80-6/81	7/75-6/76 7/80-6/81
.7337	7/75-6/76	7/76-6/77	7/75-6/76 7/76-6/77 7/80-6/81
.7145	7/72-6/73	7/74-6/75	7/72-6/73 7/74-6/75
.7066	7/77-6/78	7/81-6/82	7/77-6/78 7/78-6/79 7/81-6/82
.6590	7/73-6/74	7/79-6/80	7/73-6/74 7/79-6/80
.6223	7/72-6/73	7/75-6/76	7/72-6/73 7/74-6/75 7/75-6/76 7/76-6/77 7/80-6/81
.5868	7/72-6/73	7/73-6/74	7/72-6/73 7/73-6/74 7/74-6/75 7/75-6/76 7/76-6/77 7/79-6/80 7/80-6/81
.5447	7/72-6/73	7/77-6/78	7/72-6/73 7/73-6/74 7/74-6/75 7/75-6/76 7/76-6/77 7/77-6/78 7/78-6/79 7/79-6/80 7/80-6/81 7/81-6/82 (ALL ONE GROUP)

STATION 1A FISH, YEARS BY SPECIES (LOG NO. IND.), BRAY-CURTIS
DENDROGRAM OUTPUT
MINIMUM DISTANCE = .5447

```
          1.0        .9         .8         .7         .6         .5         .4         .3         .2         .1        -.0
           *----+----*----+----*----+----*----+----*----+----*----+----*----+----*----+----*----+----*----+----*----+----*
7/72-6/73 ------------------------------*
                                        I--------*
7/74-6/75 ------------------------------*        I
                                                 I--*
7/75-6/76 --------------------------*            I  I
                                    I-*          I  I
7/80-6/81 --------------------------* I----------*  I
                                      I             I----*
7/76-6/77 ----------------------------*             I    I
                                                    I    I
7/73-6/74 -----------------------------------*      I    I
                                             I------*    I
7/79-6/80 -----------------------------------*           I
                                                         I
7/77-6/78 ----------------------*                        I
                                I-------*                I
7/78-6/79 ----------------------*       I----------------*
                                        I
7/81-6/82 ------------------------------*
```

STATION 1B, YEARS BY SPECIES (LOG NO. IND.), BRAY-CURTIS

CLUSTERING STRATEGY IS FLEXIBLE GROUPING (WITH BETA)
SIMILARITY COEFFICIENT IS CZEKANOWSKI

CLUSTER LEVEL	JOINS GROUP NAME	WITH SUBGROUP	(WHERE GROUP NAME NOW REFERS TO A CLUSTER CONTAINING THE FOLLOWING CLUSTER UNITS)
.7111	7/74-6/75	7/75-6/76	7/74-6/75 7/75-6/76
.7033	7/76-6/77	7/80-6/81	7/76-6/77 7/80-6/81
.6642	7/73-6/74	7/74-6/75	7/73-6/74 7/74-6/75 7/75-6/76
.6634	7/77-6/78	7/78-6/79	7/77-6/78 7/78-6/79
.6518	7/79-6/80	7/81-6/82	7/79-6/80 7/81-6/82
.6448	7/72-6/73	7/73-6/74	7/72-6/73 7/73-6/74 7/74-6/75 7/75-6/76
.6288	7/76-6/77	7/77-6/78	7/76-6/77 7/77-6/78 7/78-6/79 7/80-6/81
.5324	7/72-6/73	7/76-6/77	7/72-6/73 7/73-6/74 7/74-6/75 7/75-6/76 7/76-6/77 7/77-6/78 7/78-6/79 7/80-6/81
.4986	7/72-6/73	7/79-6/80	7/72-6/73 7/73-6/74 7/74-6/75 7/75-6/76 7/76-6/77 7/77-6/78 7/78-6/79 7/79-6/80 7/80-6/81 7/81-6/82 (ALL ONE GROUP)

STATION 1B, YEARS BY SPECIES (LOG NO. IND.), BRAY-CURTIS
DENDROGRAM OUTPUT
MINIMUM DISTANCE = .4986

```
         1.0       .9        .8        .7        .6        .5        .4        .3        .2        .1       -.0
          *----+----*----+----*----+----*----+----*----+----*----+----*----+----*----+----*----+----*----+----*
7/72-6/73 ------------------------------------*
                                              I----------*
7/73-6/74 ----------------------------------* I          I
                                            I-*          I
7/74-6/75 -----------------------------*    I            I
                                       I----*            I
7/75-6/76 -----------------------------*                 I--*
                                                         I  I
7/76-6/77 ------------------------------*                I  I
                                        I------*         I  I
7/80-6/81 ------------------------------*      I         I  I
                                               I---------*  I
7/77-6/78 ----------------------------------*  I            I
                                            I--*            I
7/78-6/79 ----------------------------------*               I
                                                            I
7/79-6/80 -----------------------------------*              I
                                             I--------------*
7/81-6/82 -----------------------------------*
```

Figure 43: Plots of fish and invertebrate indices at stations 1A and 1B before (1975-77) and after (1979-81) the cessation of dredging at Sike's Cut in the Apalachicola estuary in 1978.

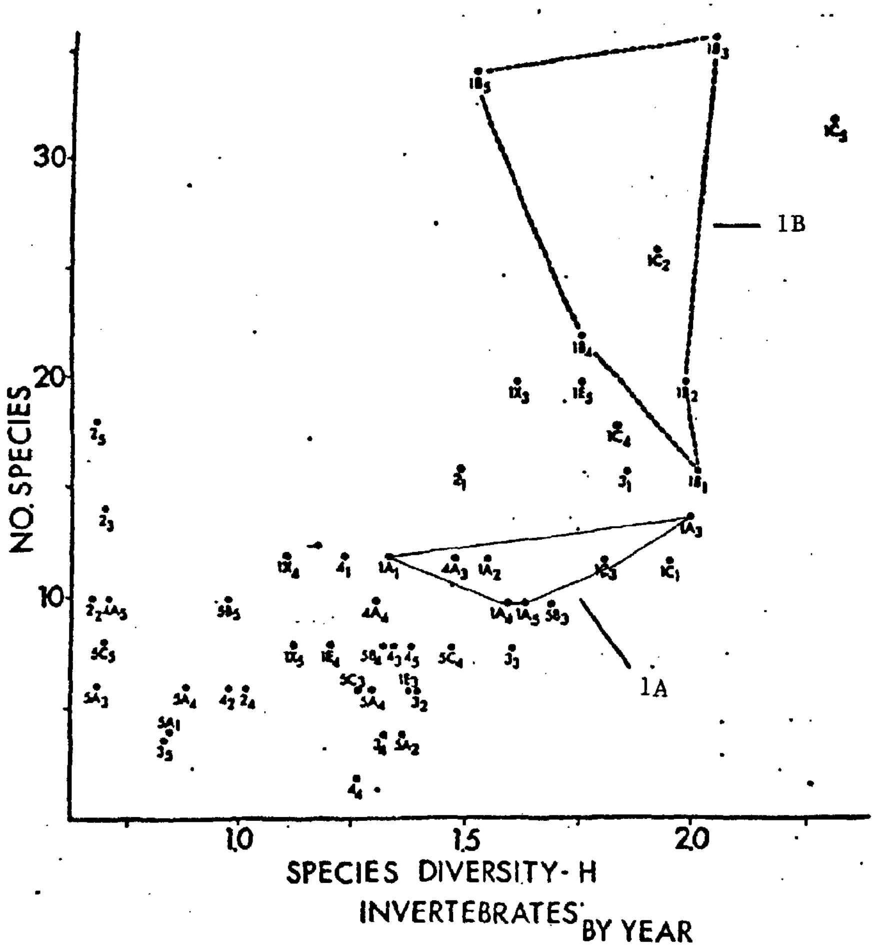


FIGURE 43B. *Diversity-richness relationships of epibenthic invertebrates taken monthly at permanent stations in the Apalachicola estuary. Indices (number of species, Brillouin Diversity Index) were computed from annual total numbers of individuals at each station from year 1 to year 5. Results at station 1B (Sike's Cut) have been highlighted by dashed lines.*

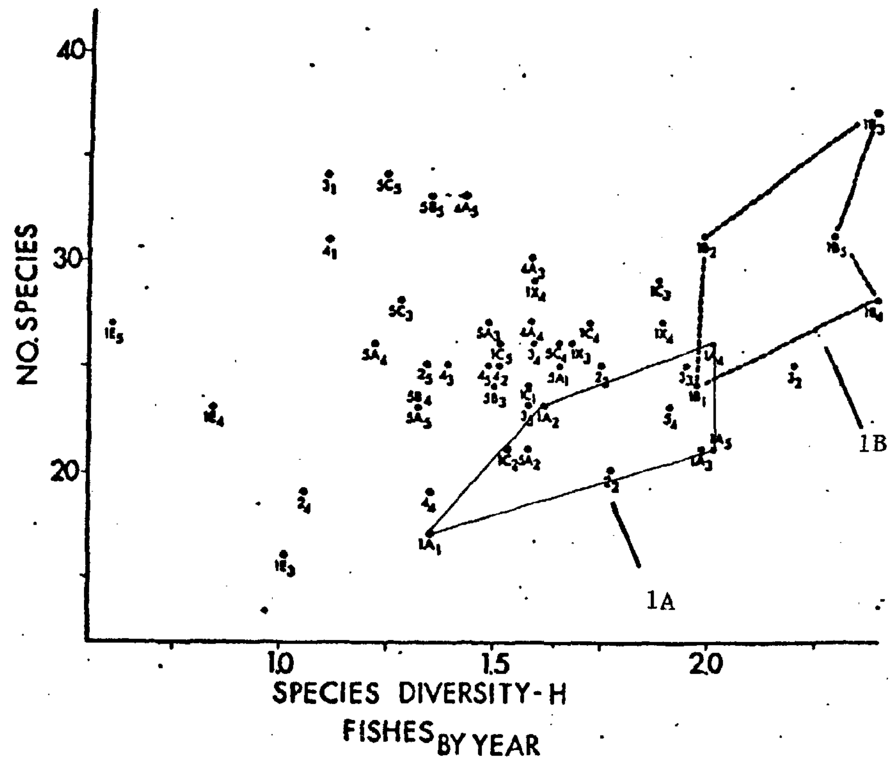


FIGURE 43A. *Diversity-richness relationships of epibenthic fishes taken monthly at permanent stations in the Apalachicola estuary. Indices (number of species, Brillouin Diversity Index) were computed from annual total numbers of individuals at each station from year 1 to year 5. Results at station 1B (Sike's Cut) have been highlighted by dashed lines.*

Figure 44: Analysis of salinity (ppt) at stations 1A and 1B and dredging events (cubic yards at Sike's Cut) from 1971 through 1983.

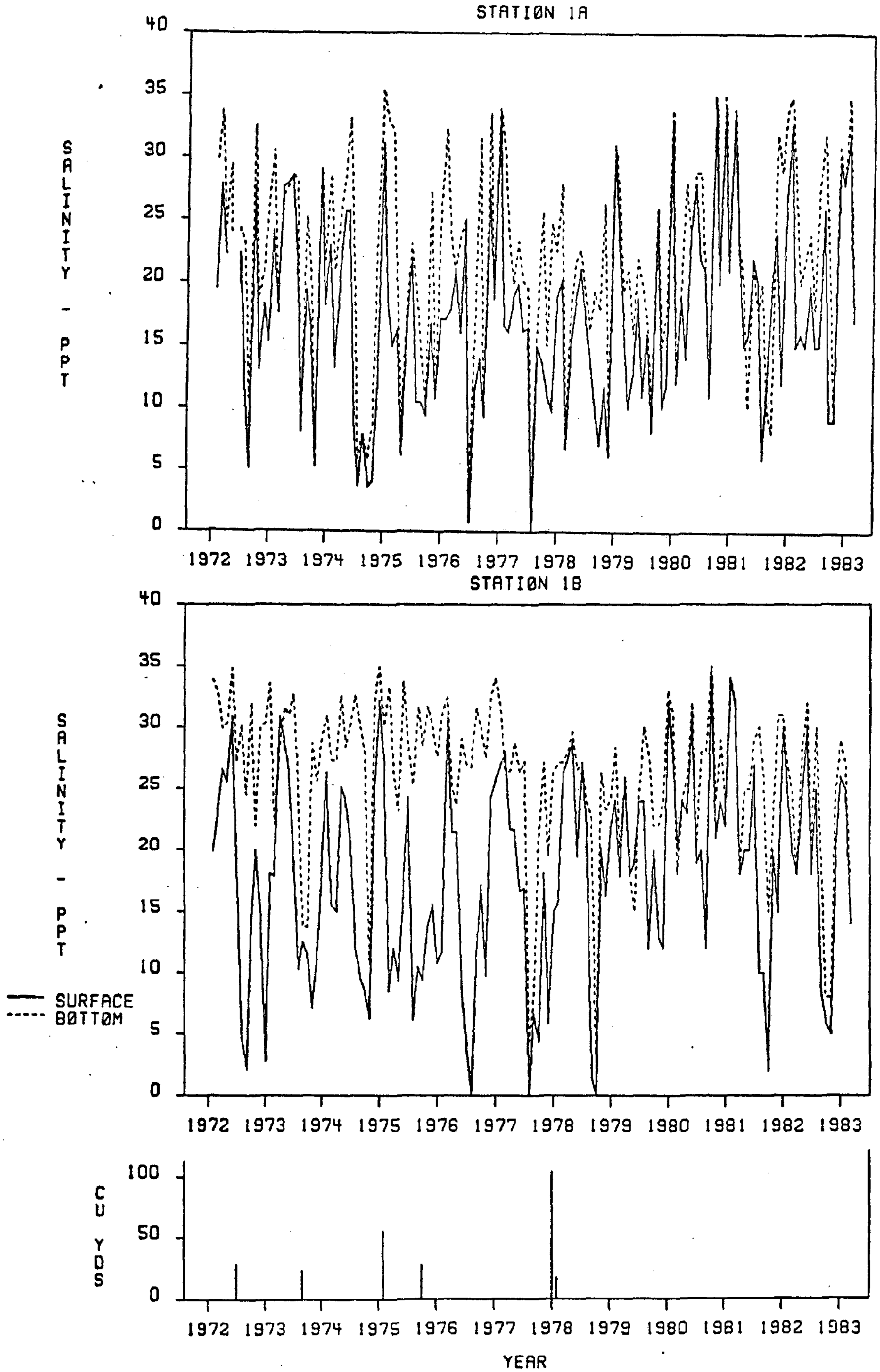
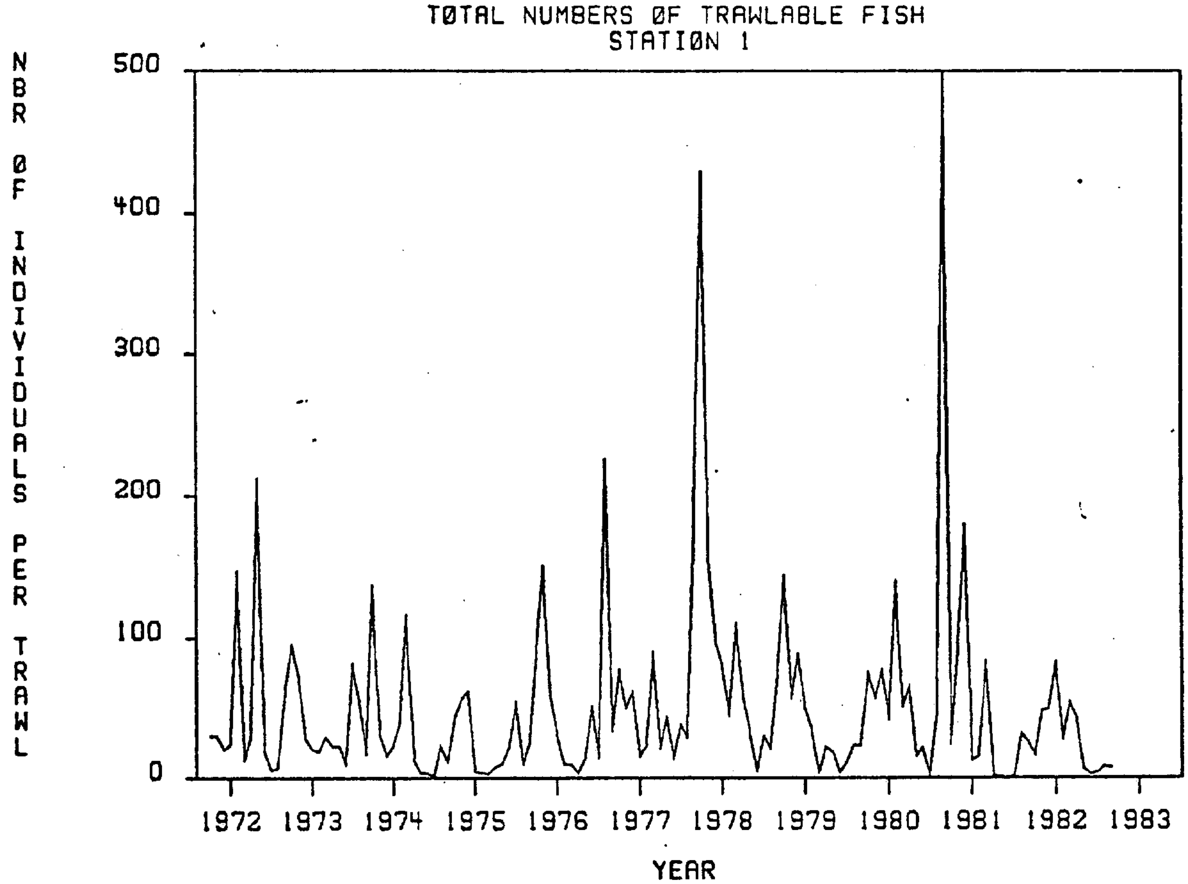
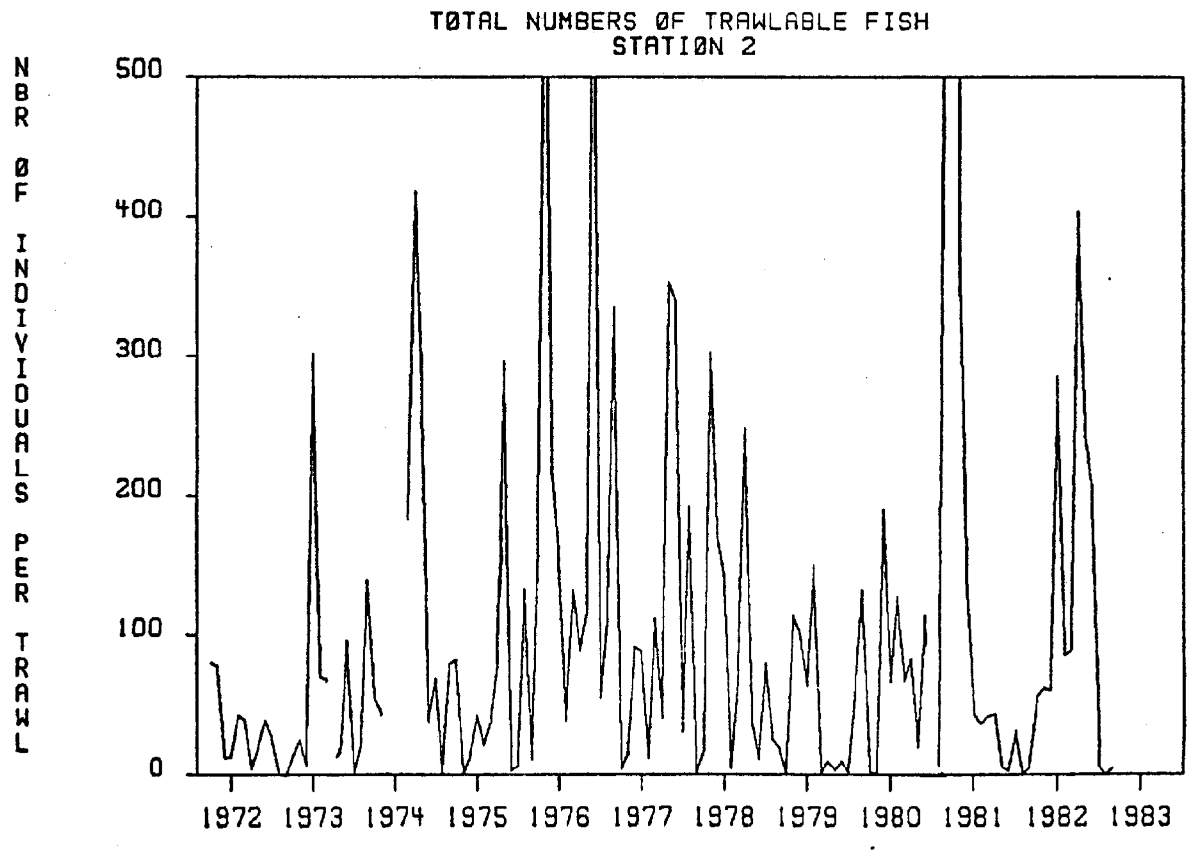
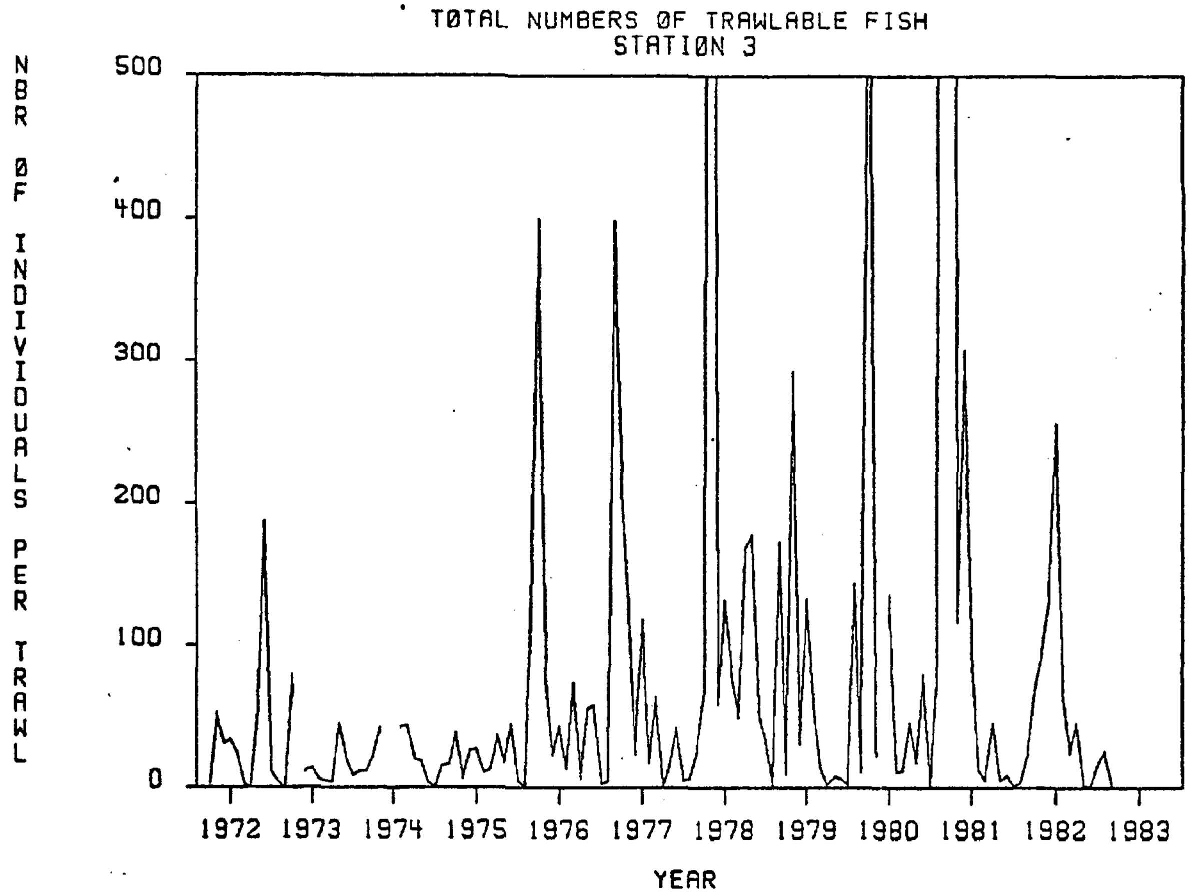


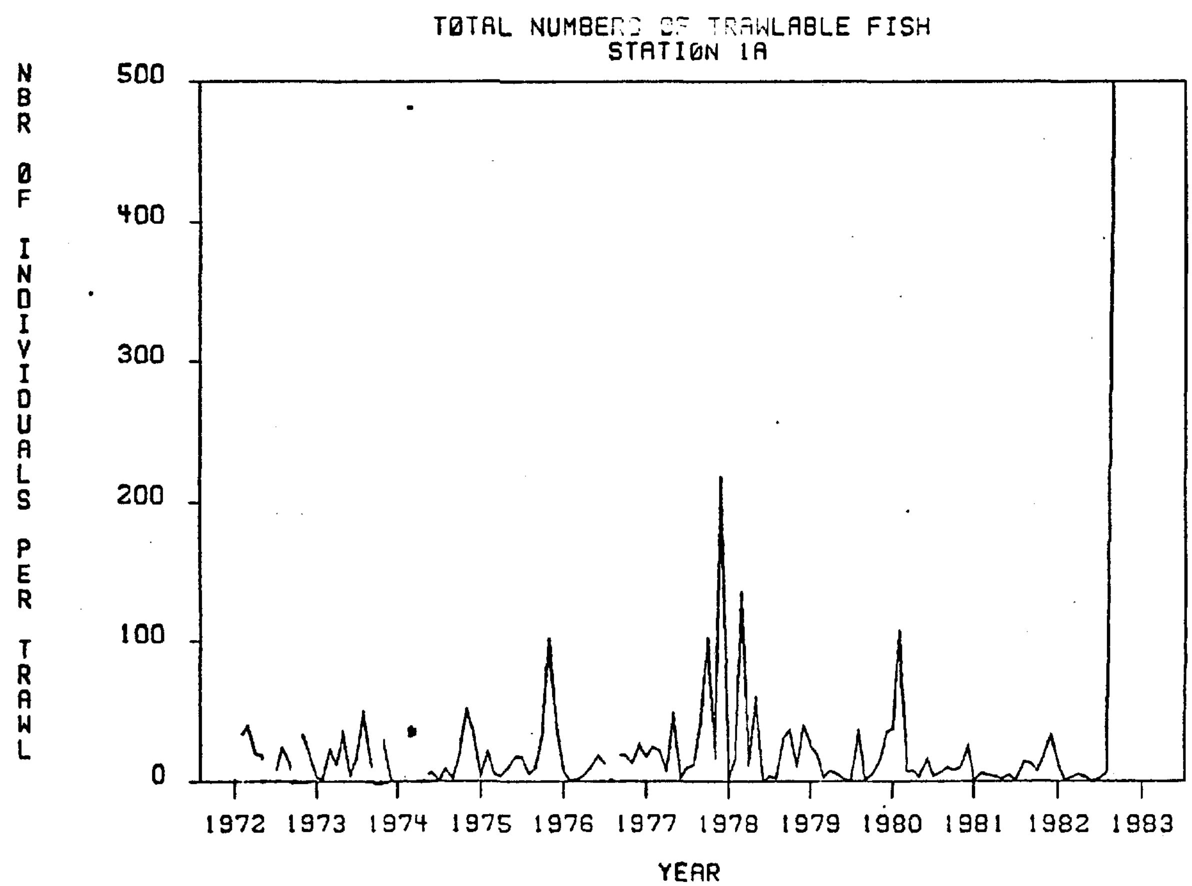
Figure 45: Numbers of epibenthic fishes taken per trawl tow at stations 1, 2, 3, 1A, 1B, and 1X in the Apalachicola estuary from 1972 through 1983.



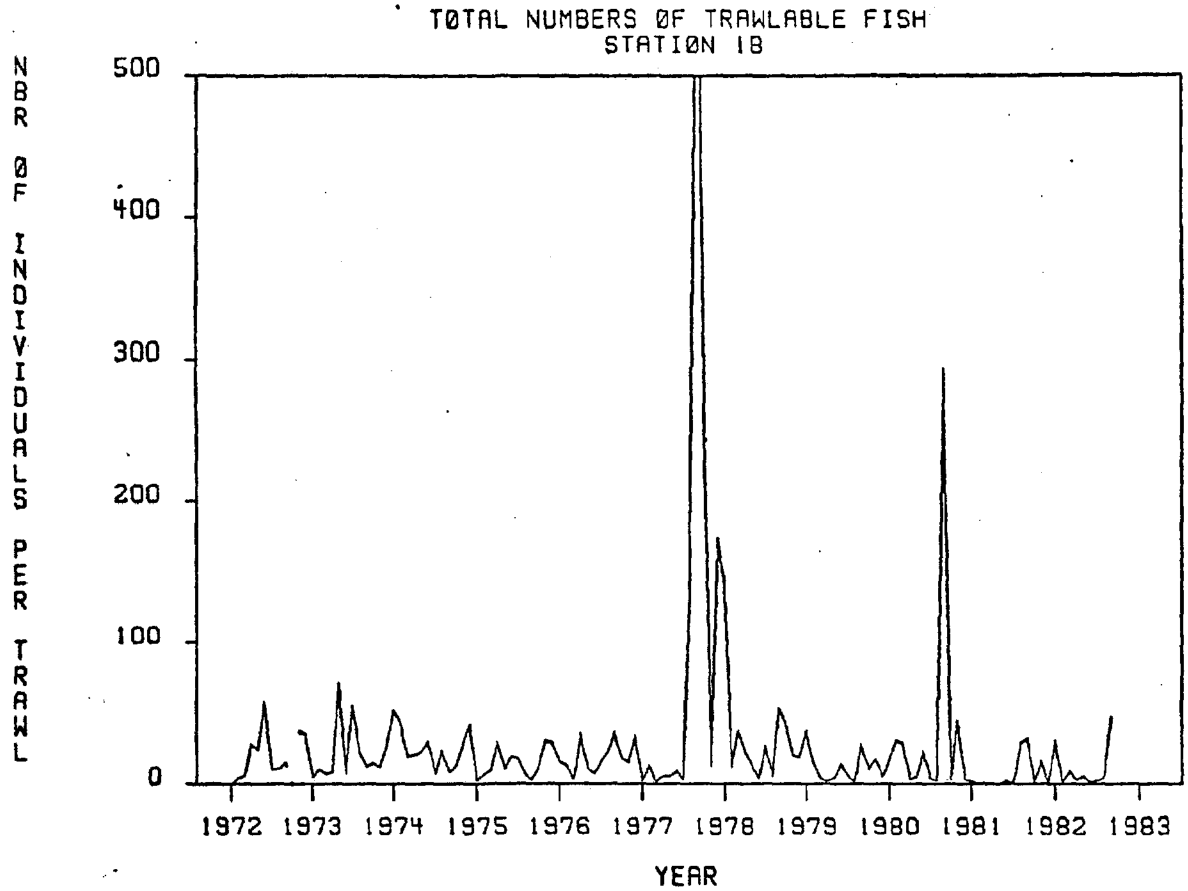




TØTAL NUMBERS ØF TRAWLABLE FISH
STATIØN 3
NBR ØF INDIVIDUALS PER TRAWL
500
400
300
200
100
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR



TØTAL NUMBERS ØF TRAWLABLE FISH
STATIØN 1A
NBR ØF INDIVIDUALS PER TRAWL
500
400
300
200
100
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR


TØTAL NUMBERS ØF TRAWLABLE FISH
STATIØN 1B
NBR ØF INDIVIDUALS PER TRAWL
500
400
300
200
100
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

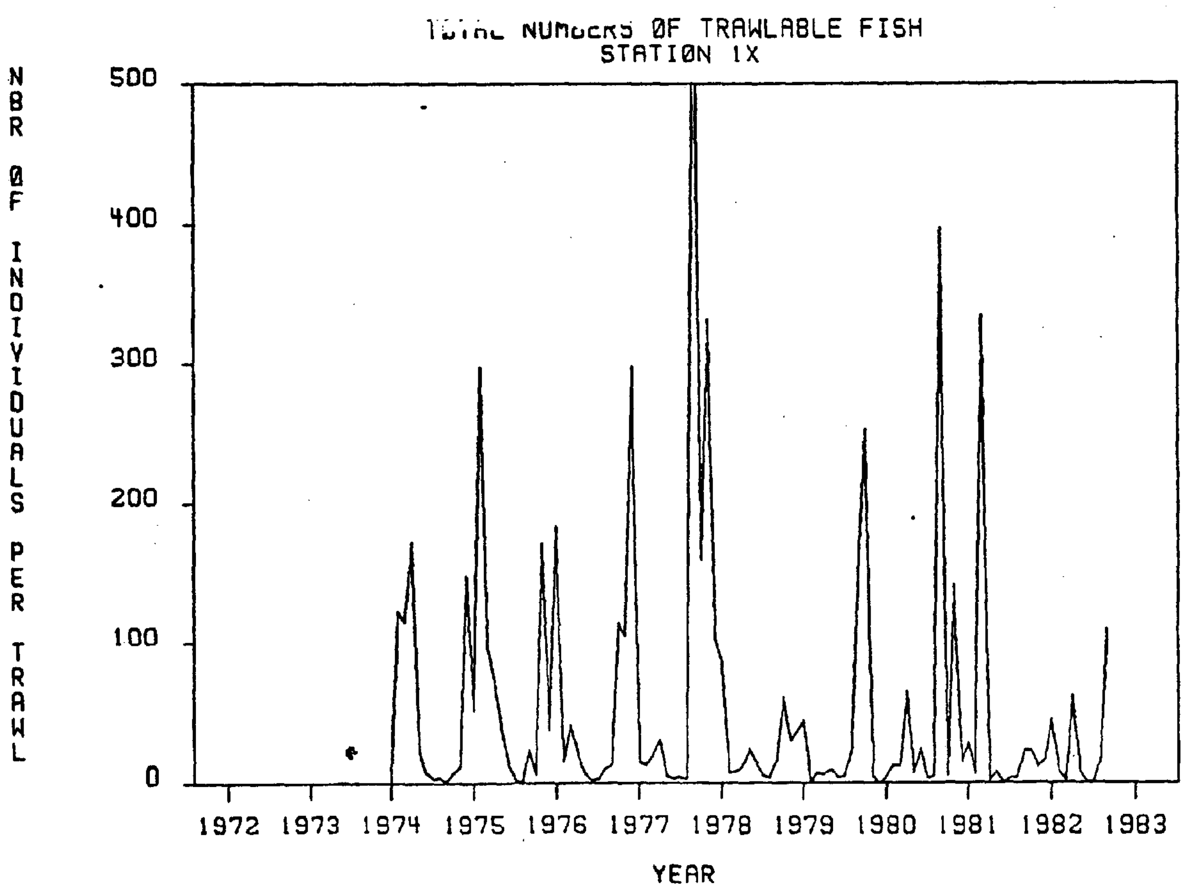
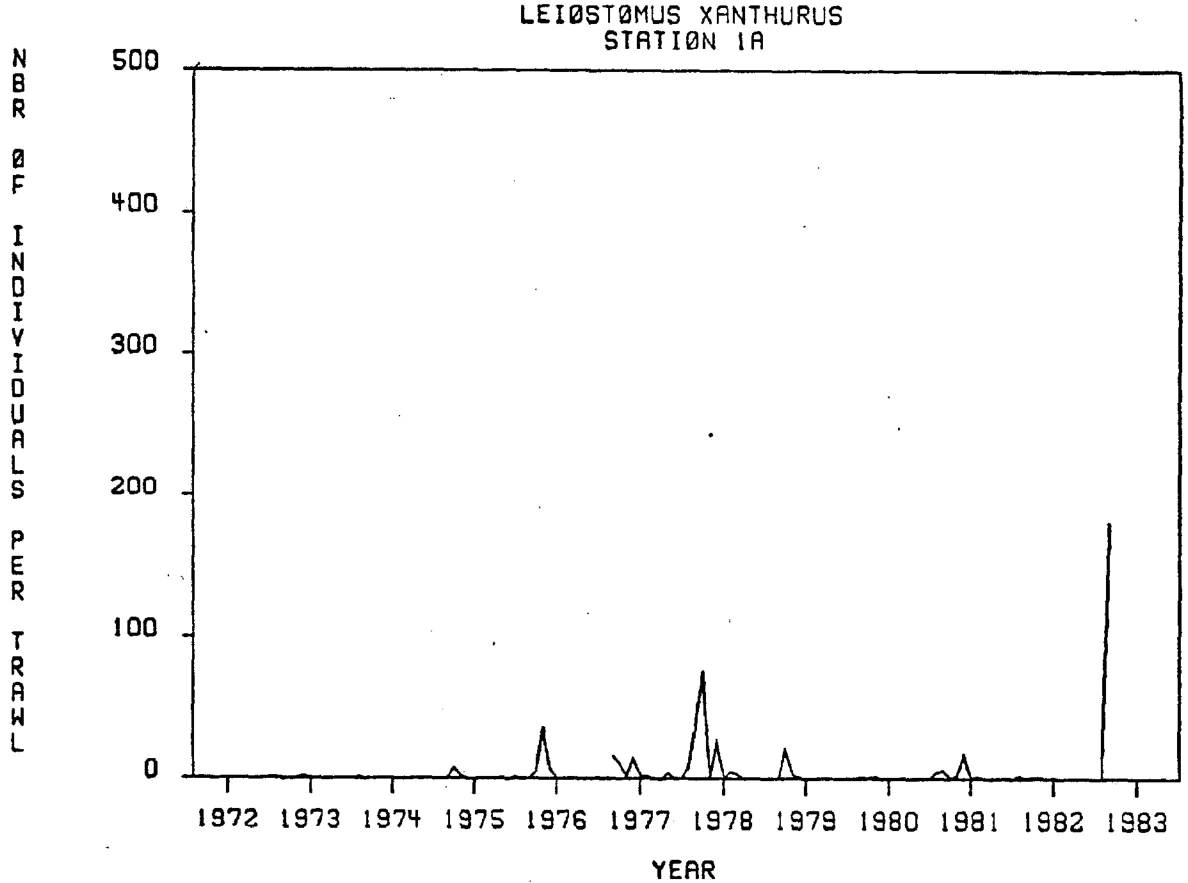

ØF TRAWLABLE FISH
STATIØN 1X
NBR ØF INDIVIDUALS PER TRAWL
500
400
300
200
100
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

Figure 46: Numbers of spot (Leiostomus xanthurus) taken per trawl tow at stations 1A and 1B in the Apalachicola estuary from 1972 through 1983.



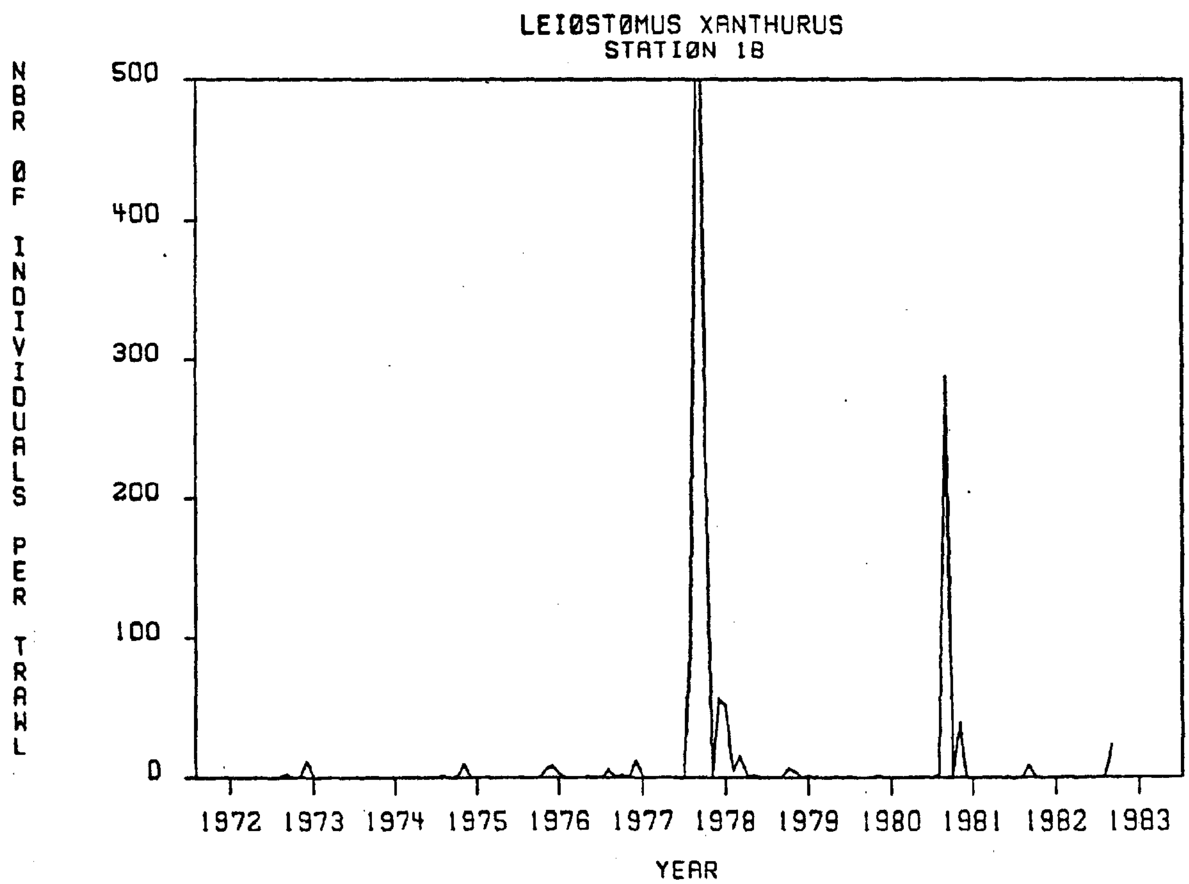
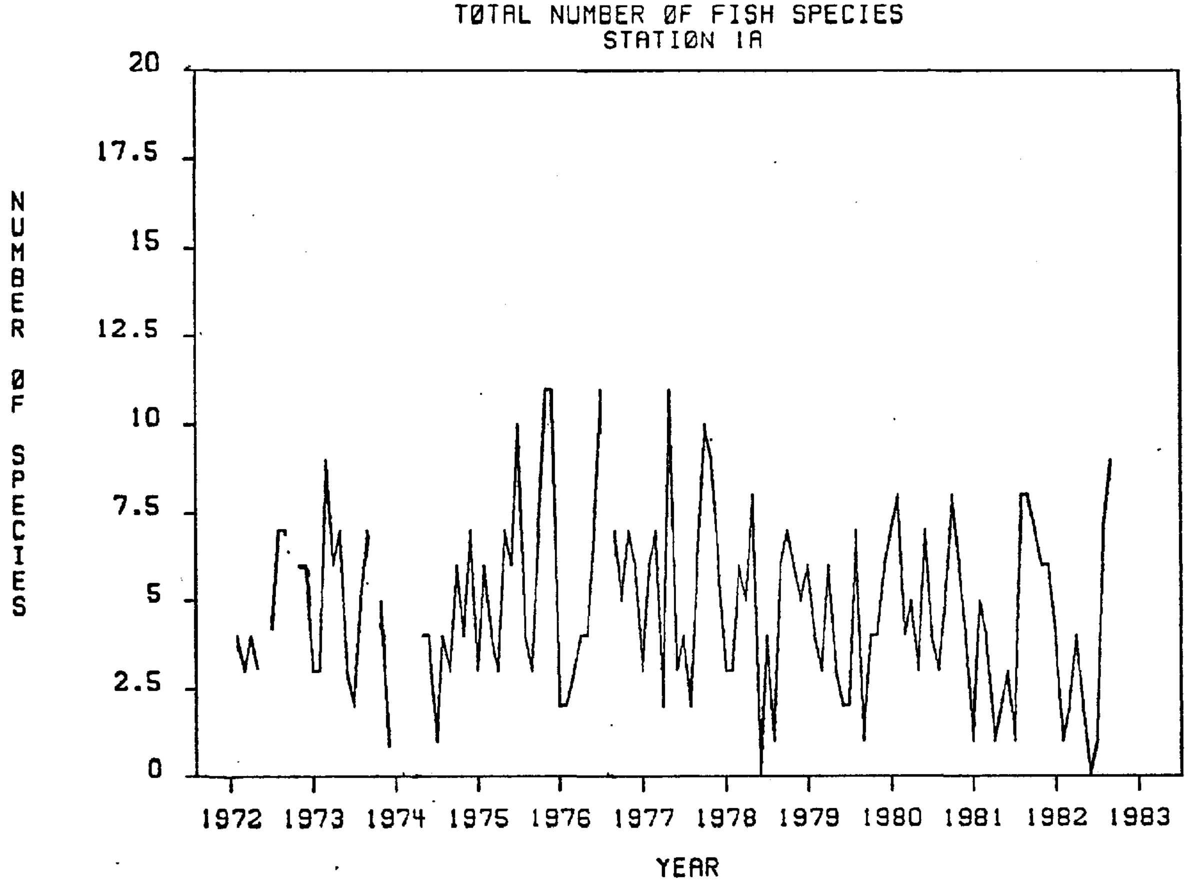
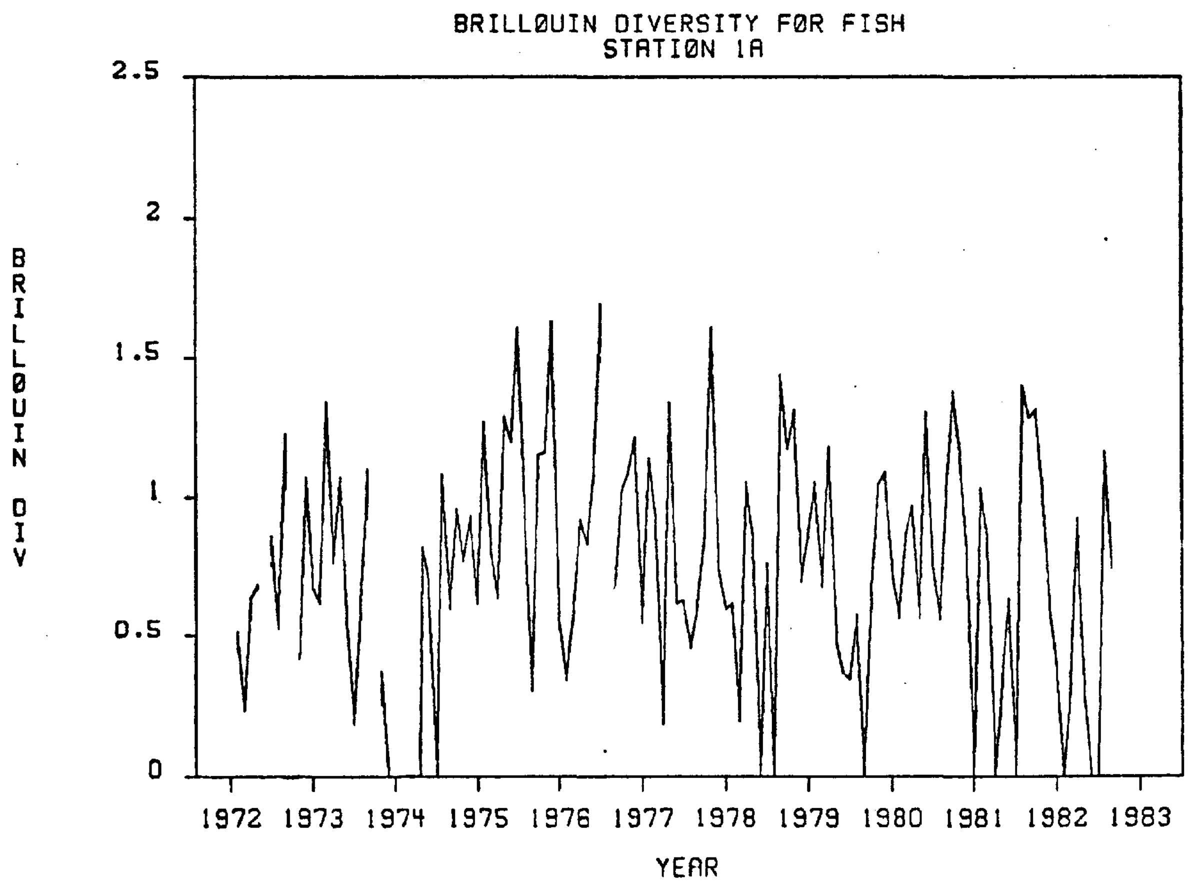
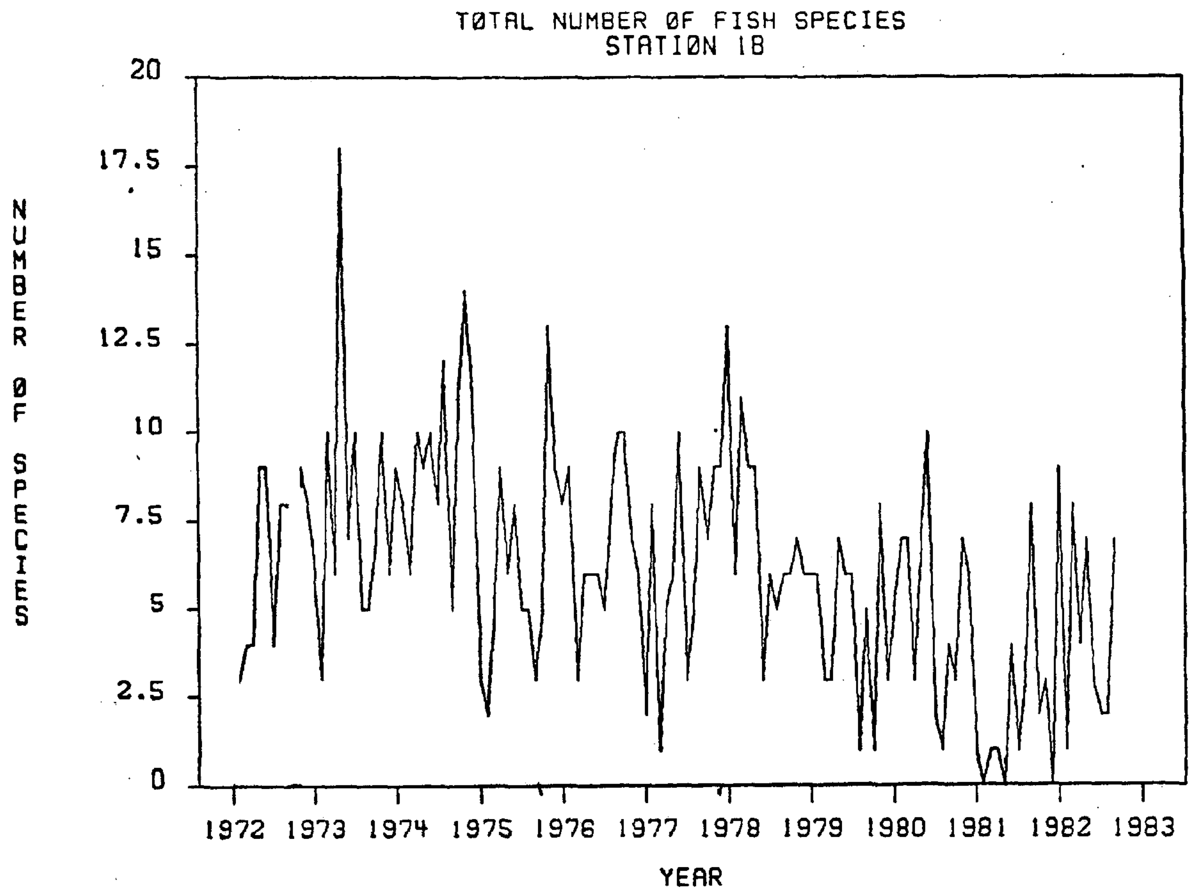


Figure 47: Total numbers of species and Brillouin species diversity for fishes taken at stations 1A and 1B, in the Apalachicola estuary from 1972 through 1983.






TØTAL NUMBER ØF FISH SPECIES
STATIØN 1B
NUMBER ØF SPECIES
20
17.5
15
12.5
10
7.5
5
2.5
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

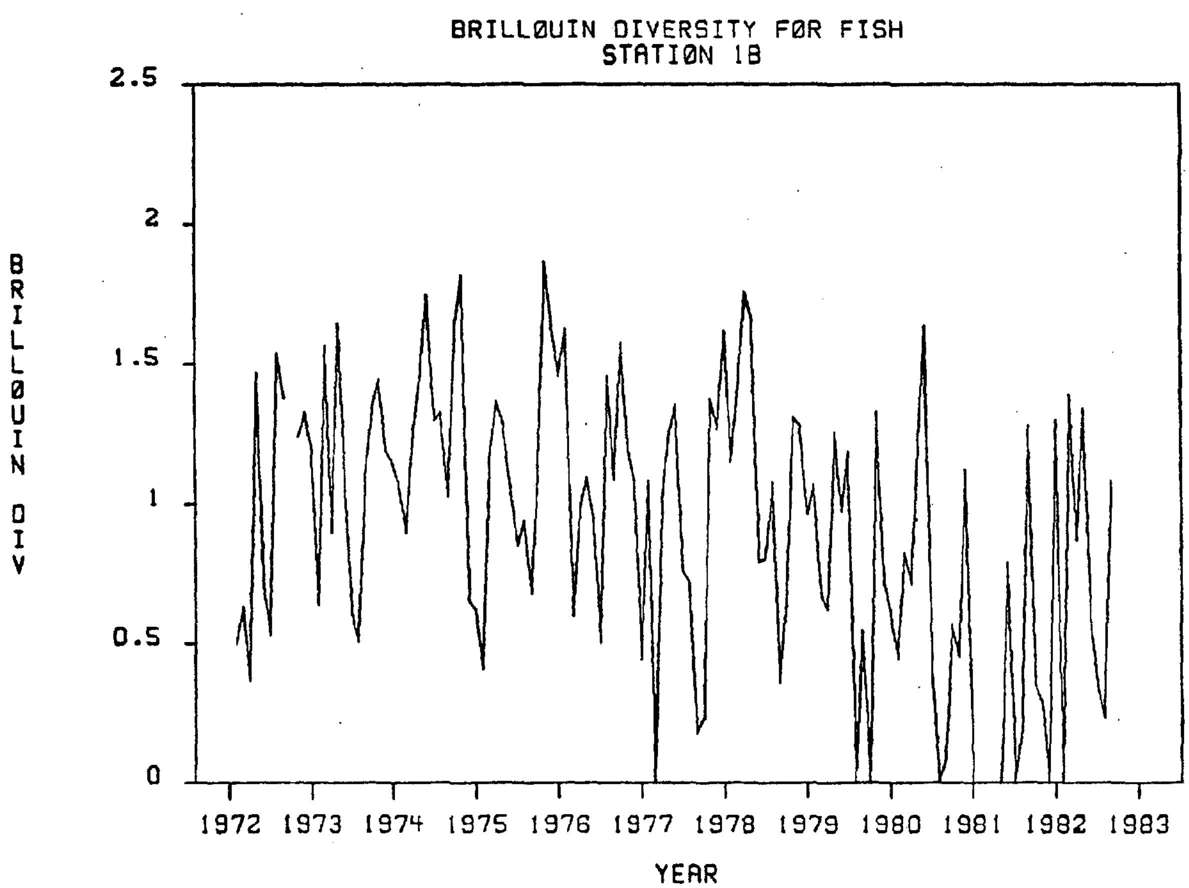
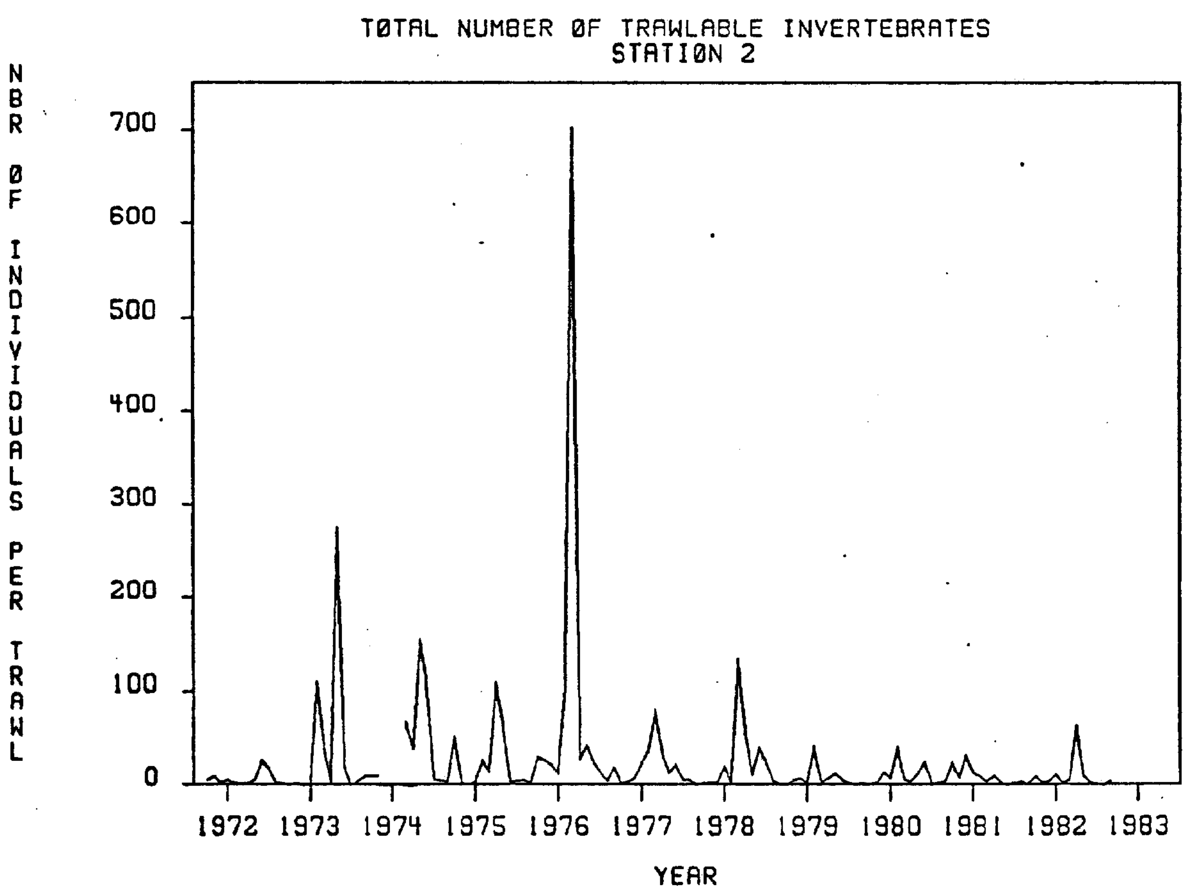
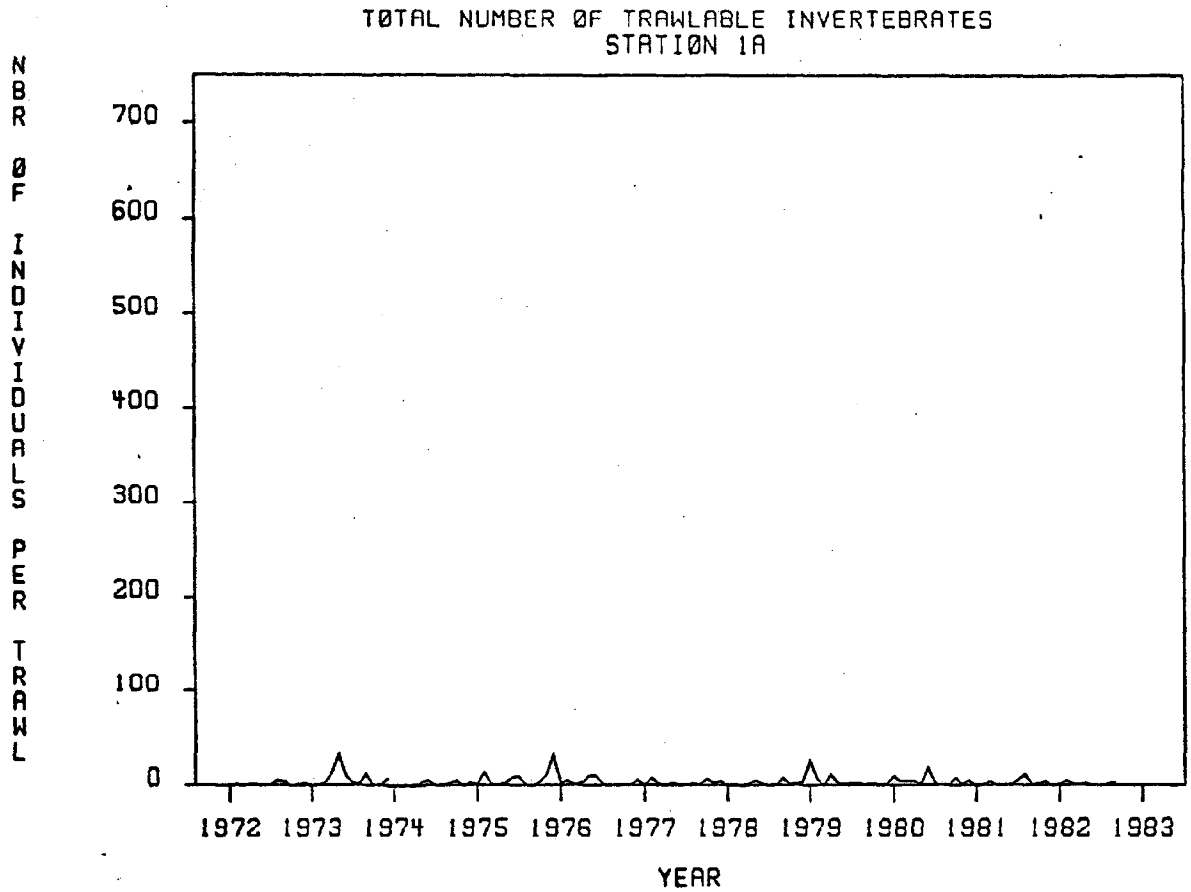

BRILLØUIN DIVERSITY FØR FISH
STATIØN 1B
BRILLØUIN DIV
2.5
2
1.5
1
0.5
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

Figure 48: Numbers of epibenthic invertebrates per trawl tow at stations 2, 1A, and 1B in the Apalachicola estuary from 1972 through 1983.




TØTAL NUMBER ØF TRAWLABLE INVERTEBRATES
STATIØN 1A
NBR ØF INDIVIDUALS PER TRAWL
700
600
500
400
300
200
100
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR

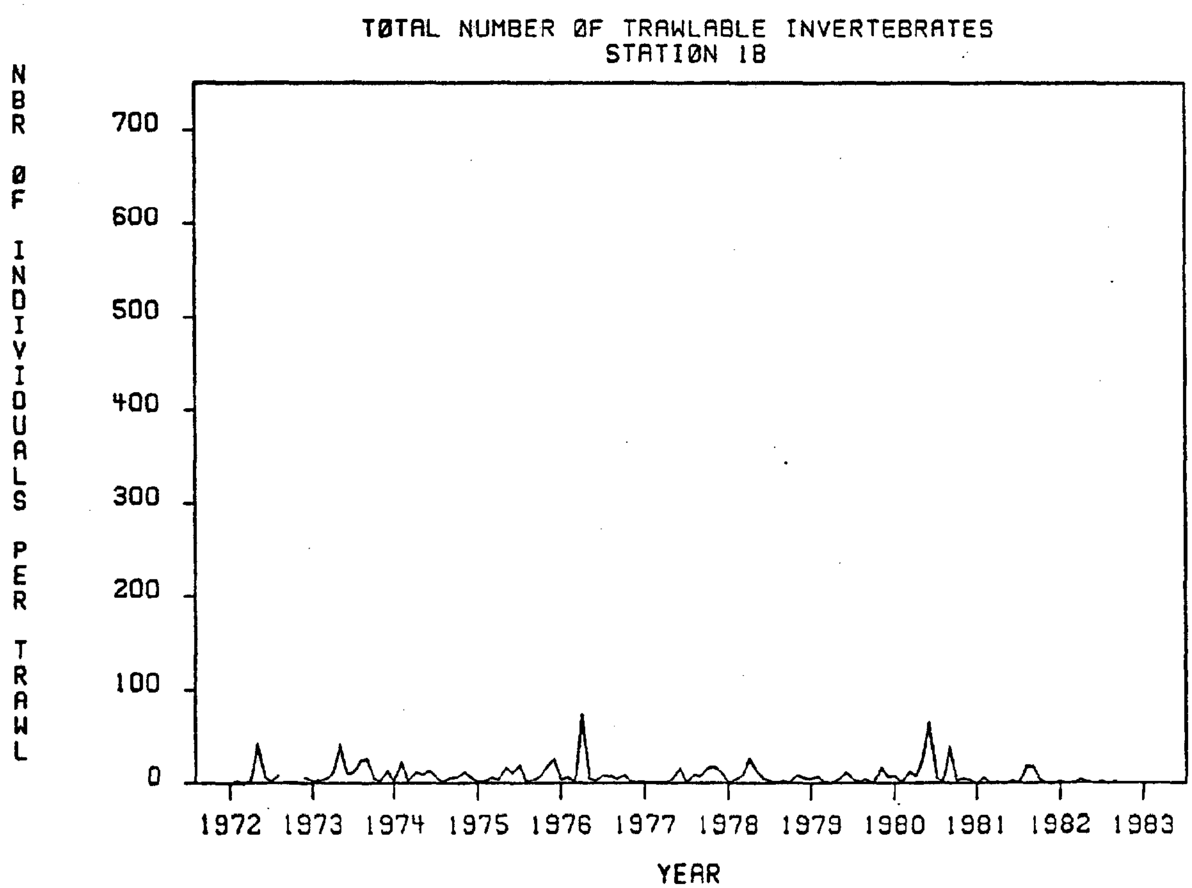
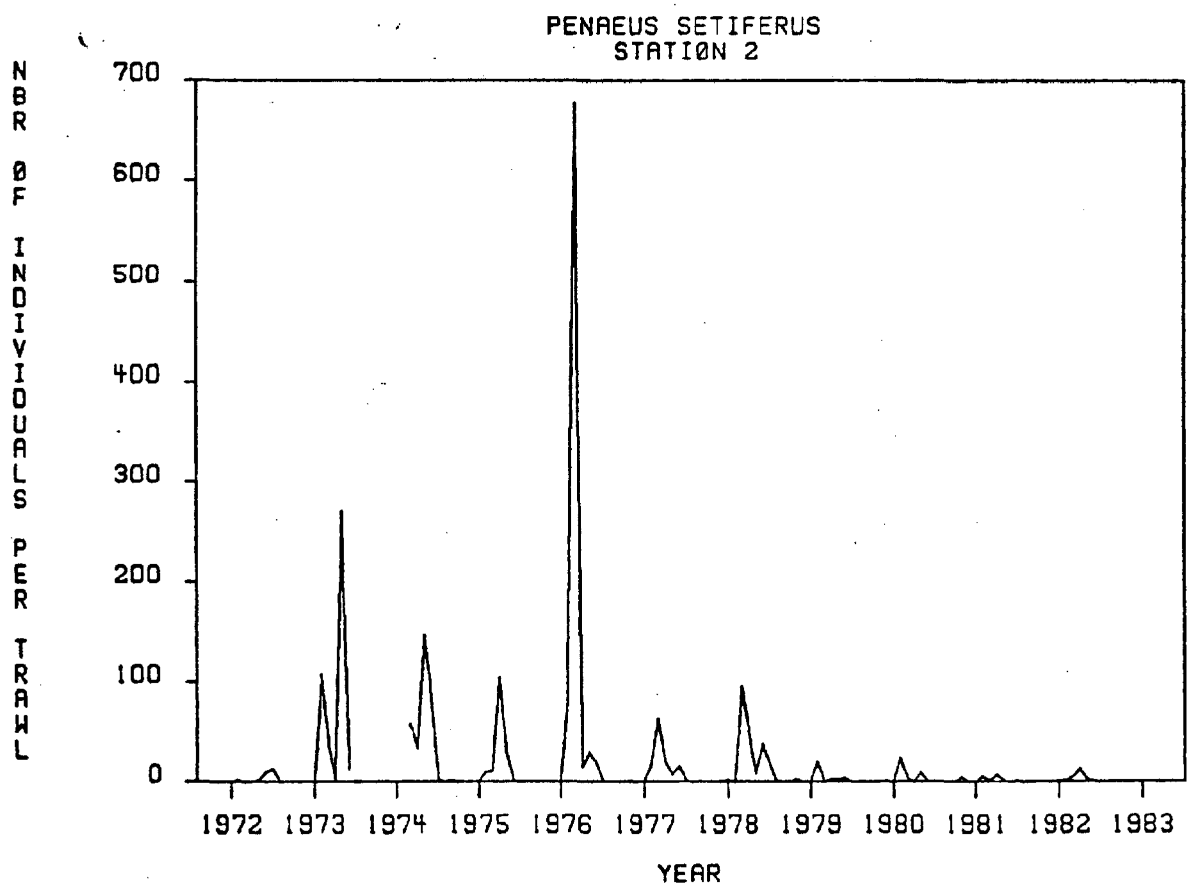
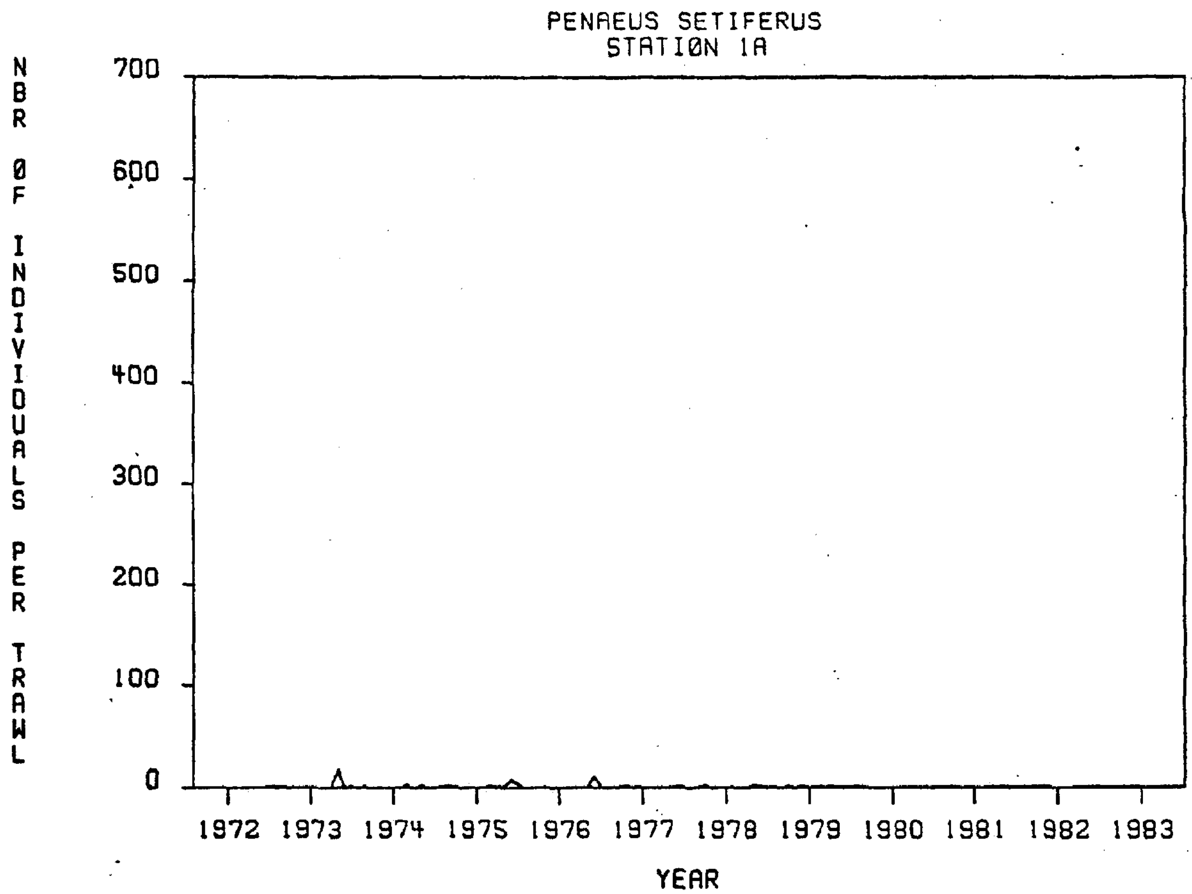

TØTAL NUMBER ØF TRAWLABLE INVERTEBRATES
STATIØN 1B
NBR ØF INDIVIDUALS PER TRAWL
700
600
500
400
300
200
100
0
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
YEAR

Figure 49: Numbers of white shrimp (Penaeus setiferus) taken per trawl tow at stations 2, 1A, and 1B in the Apalachicola estuary from 1972 through 1983.




PENAEUS SETIFERUS
STATIØN 1A
NBR ØF INDIVIDUALS PER TRAWL
700
600
500
400
300
200
100
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

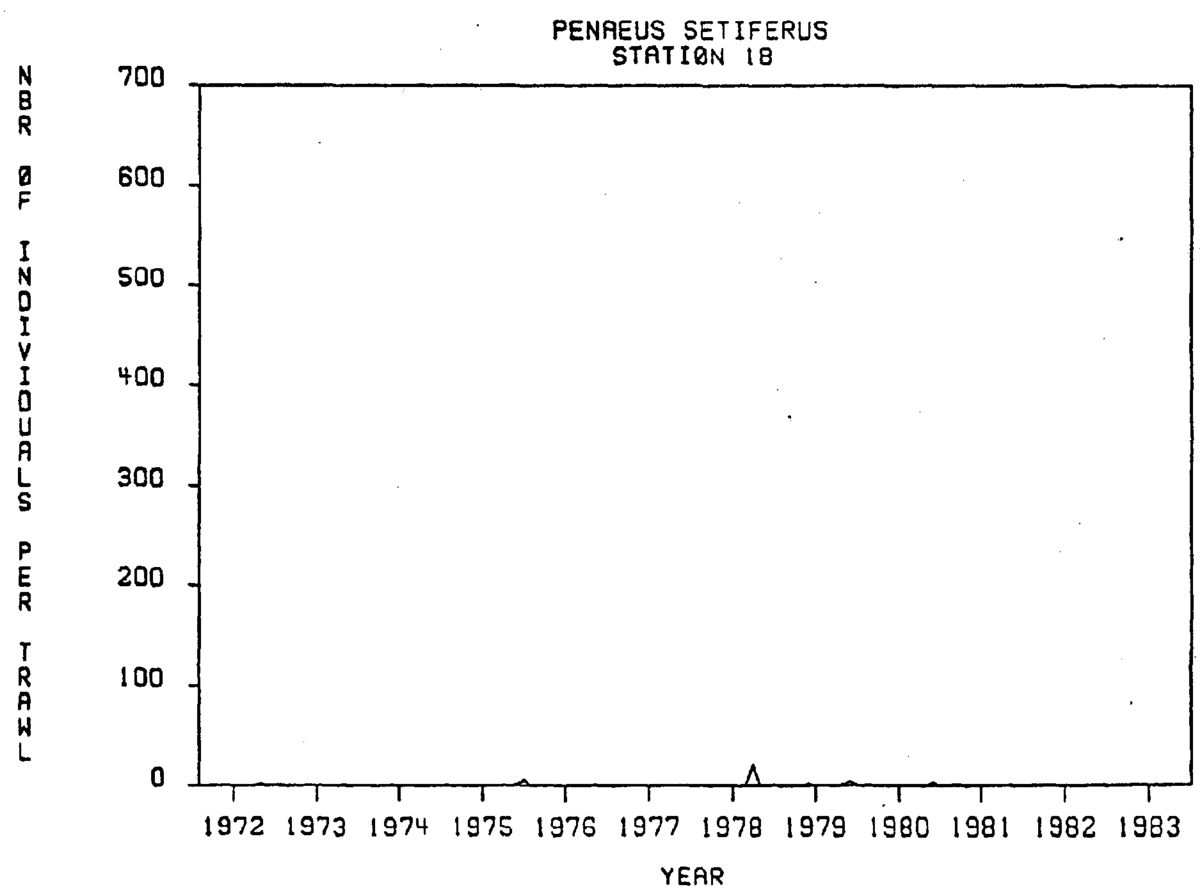
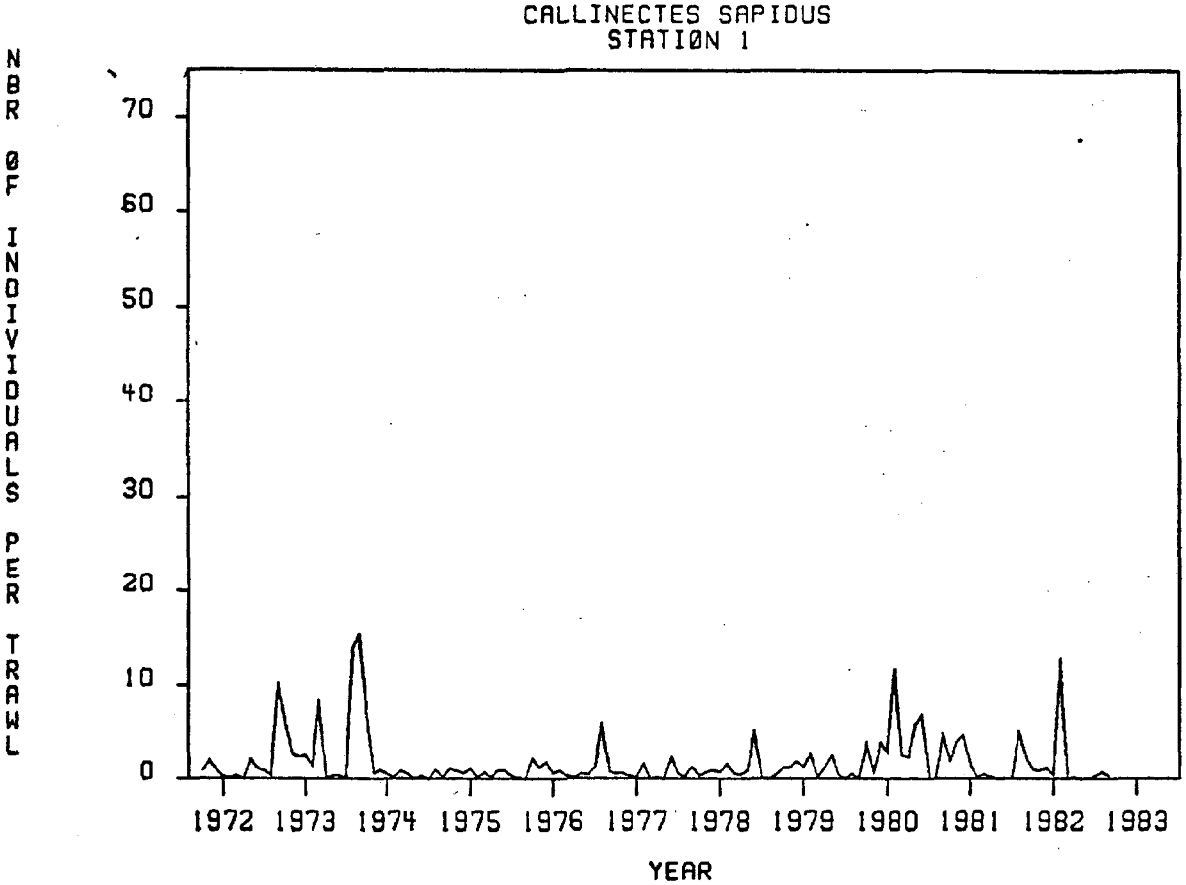
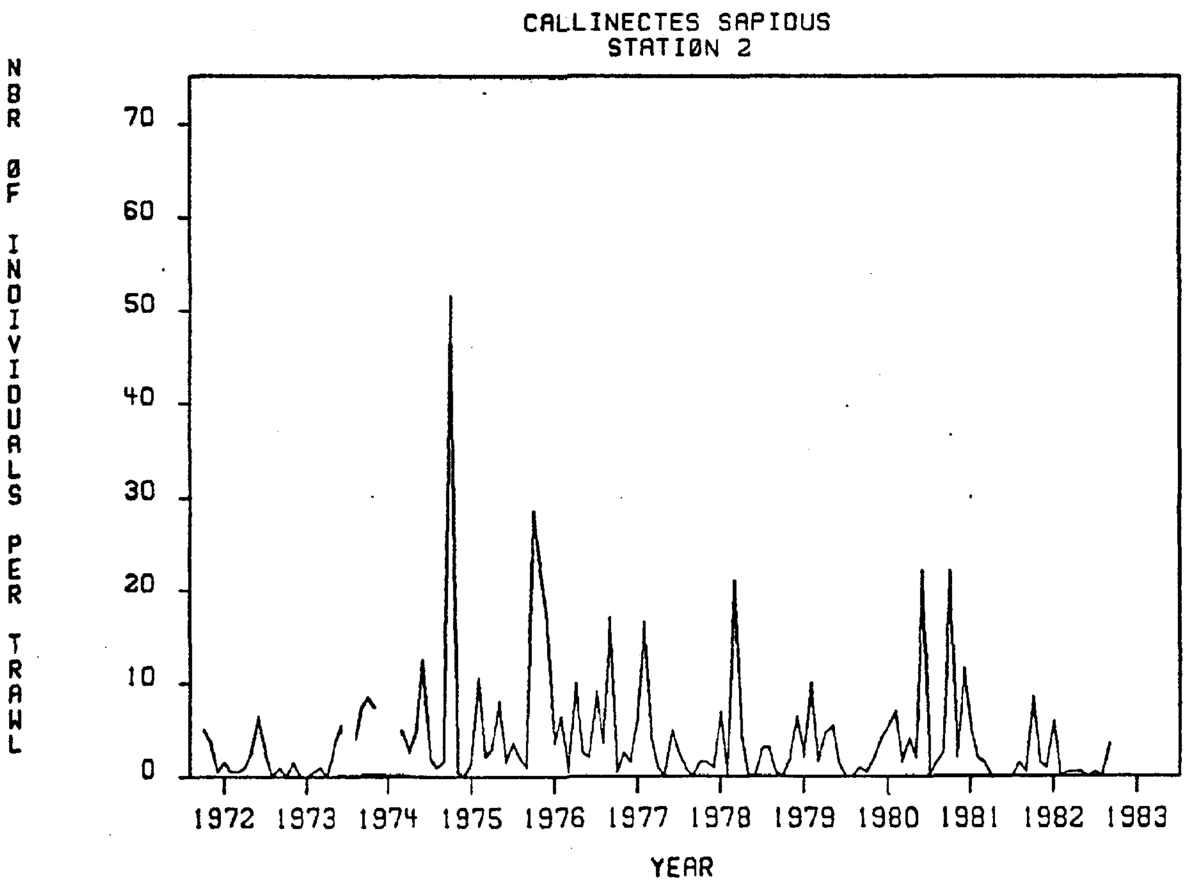
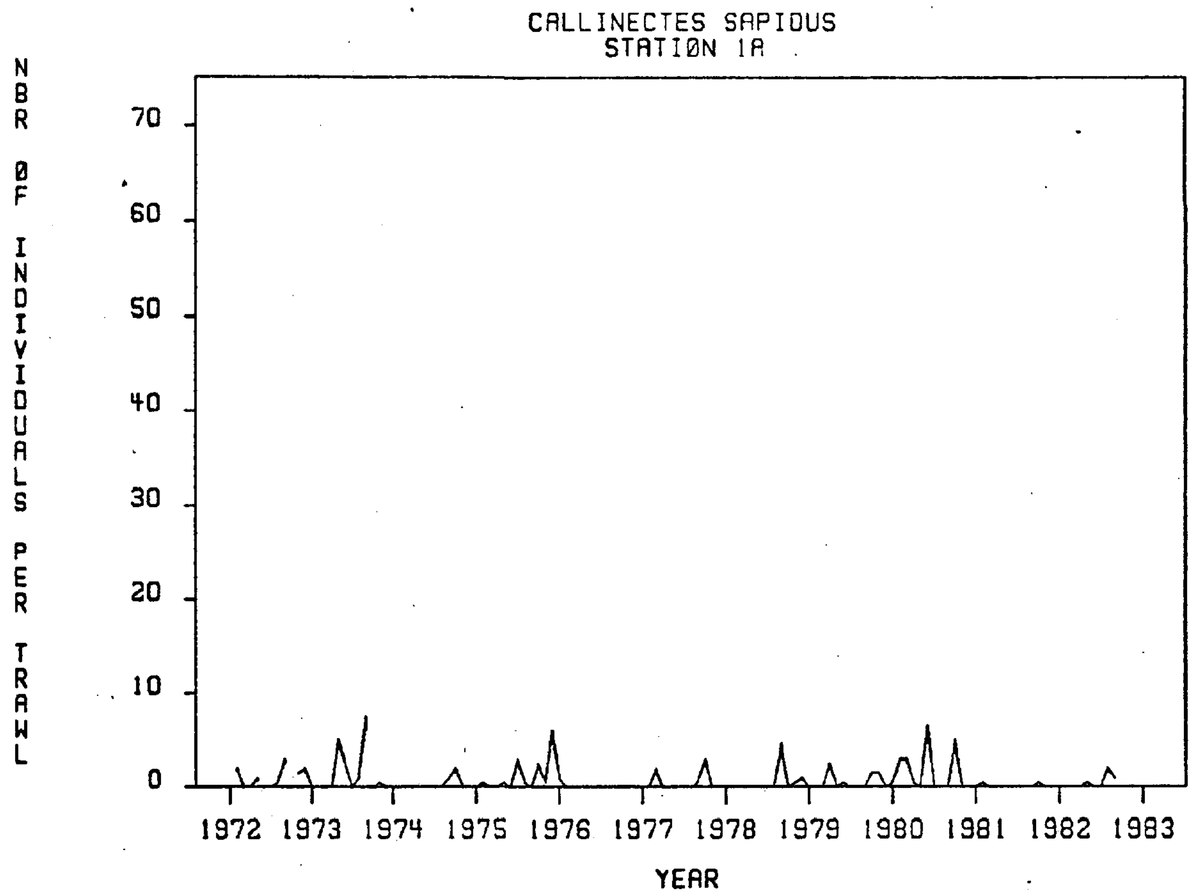

PENAEUS SETIFERUS
STATIØN 1B
NBR ØF INDIVIDUALS PER TRAWL
700
600
500
400
300
200
100
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

Figure 50: Numbers of blue crabs (Callinectes sapidus) taken per trawl tow at stations 1, 2, 1A, and 1B in the Apalachicola estuary from 1972 through 1983.






CALLINECTES SAPIDUS
STATIØN 1A
NBR ØF INDIVIDUALS PER TRAWL
70
60
50
40
30
20
10
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

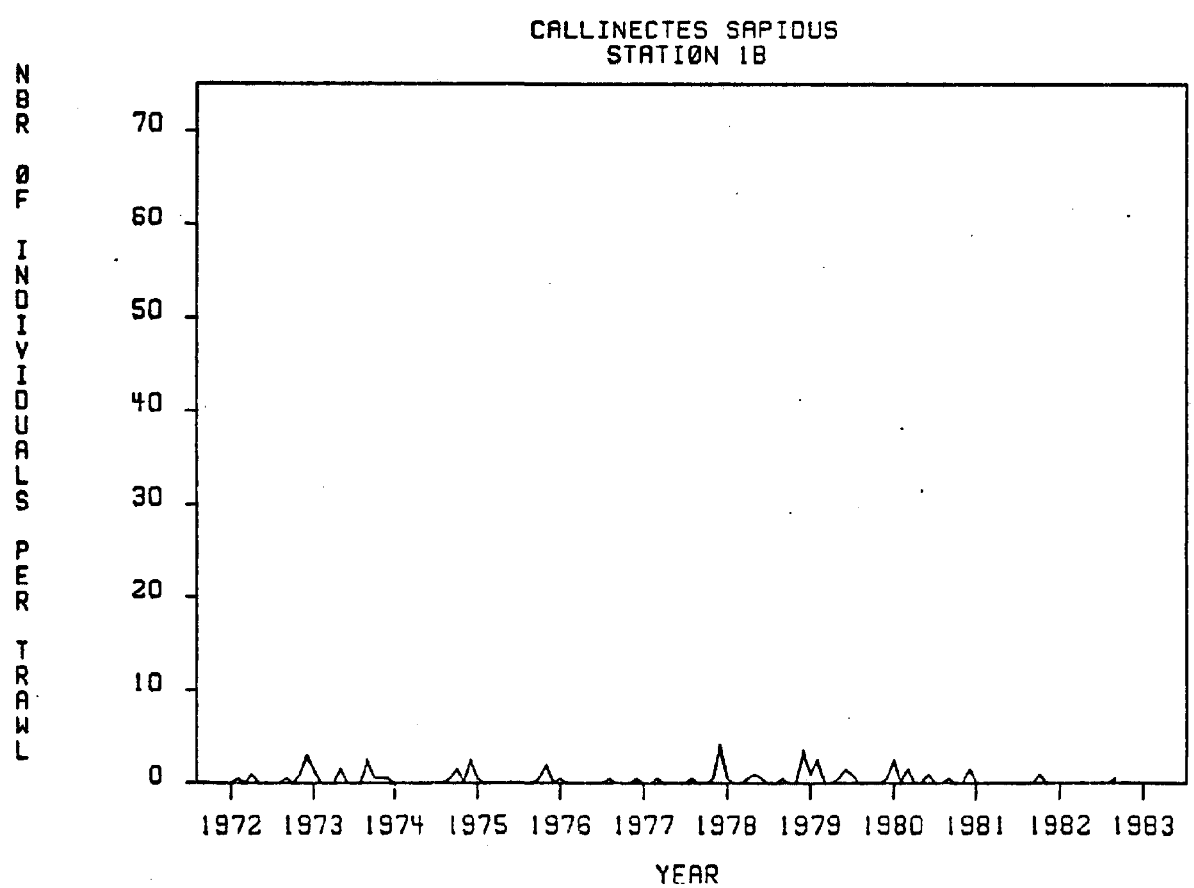
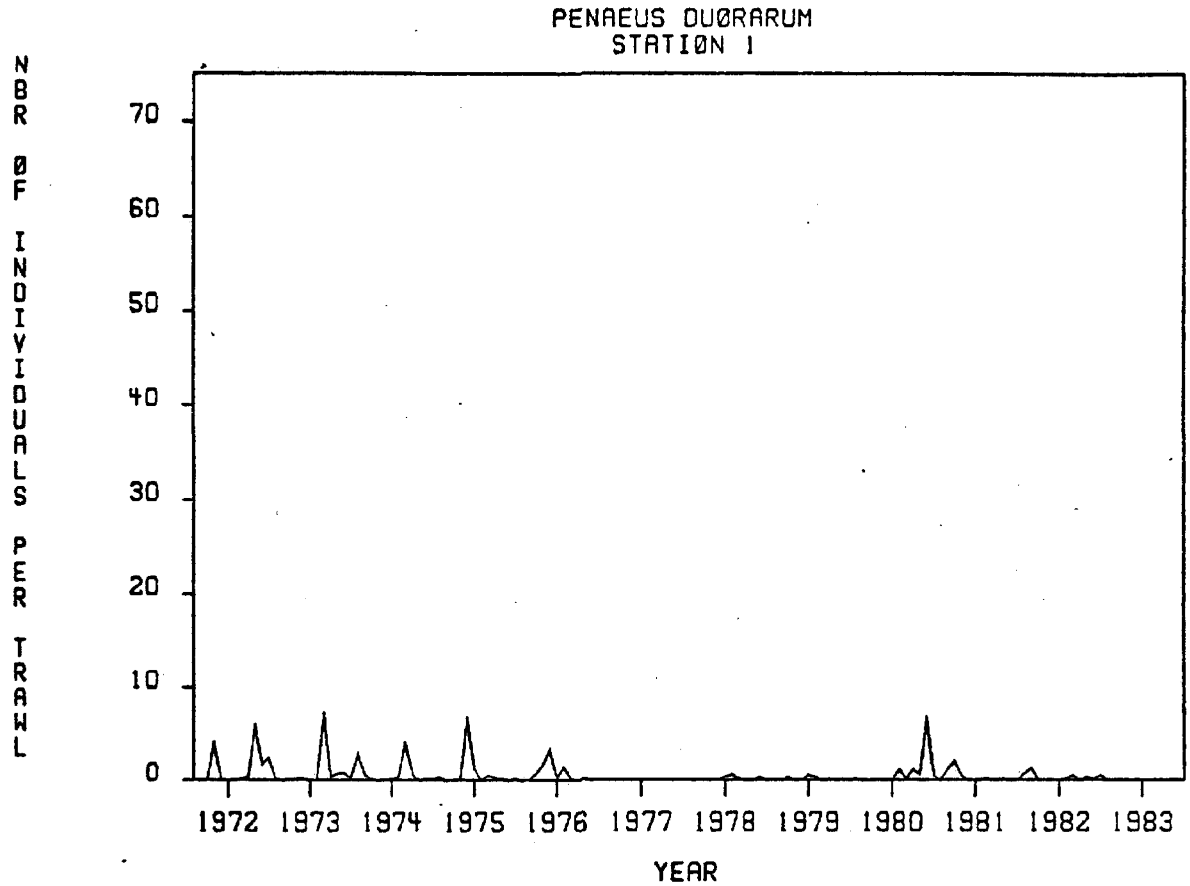
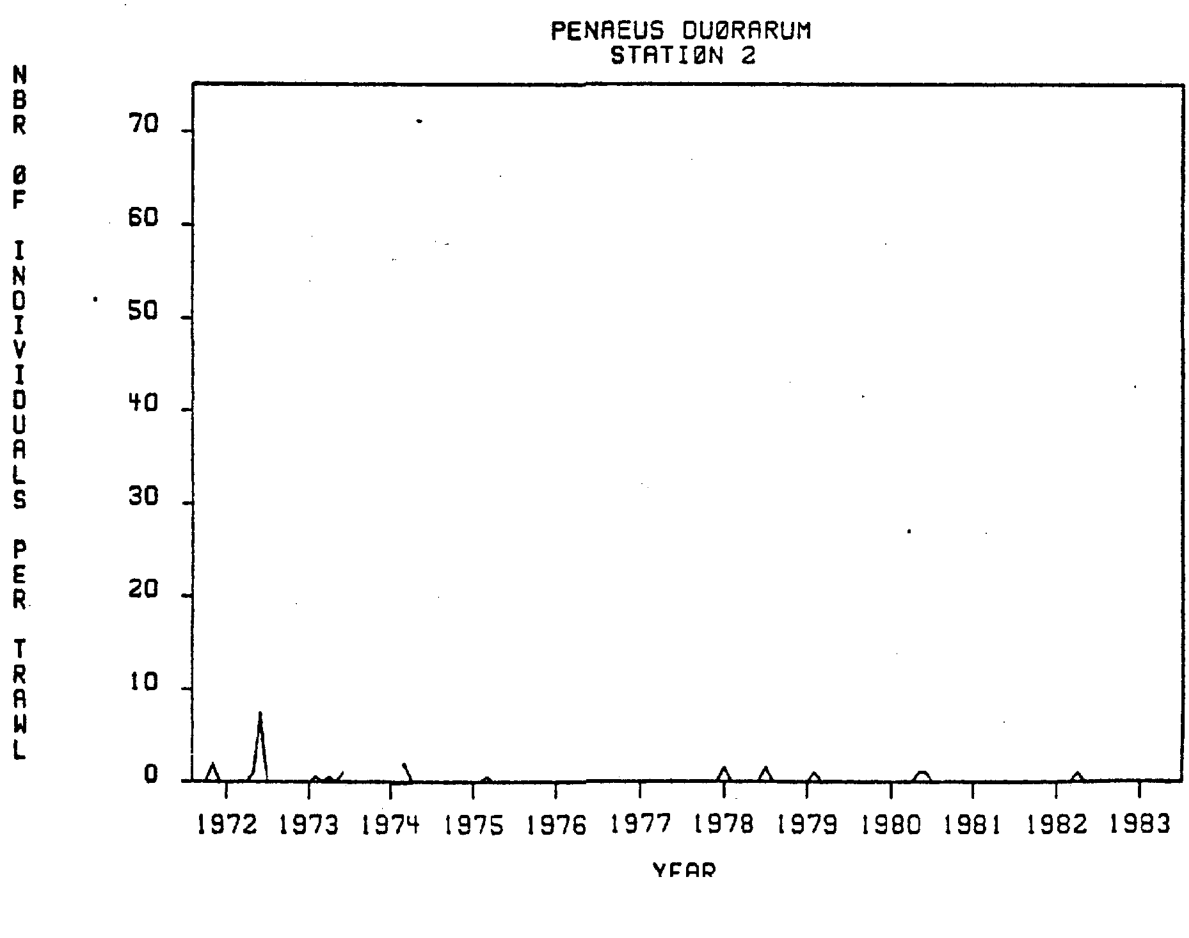
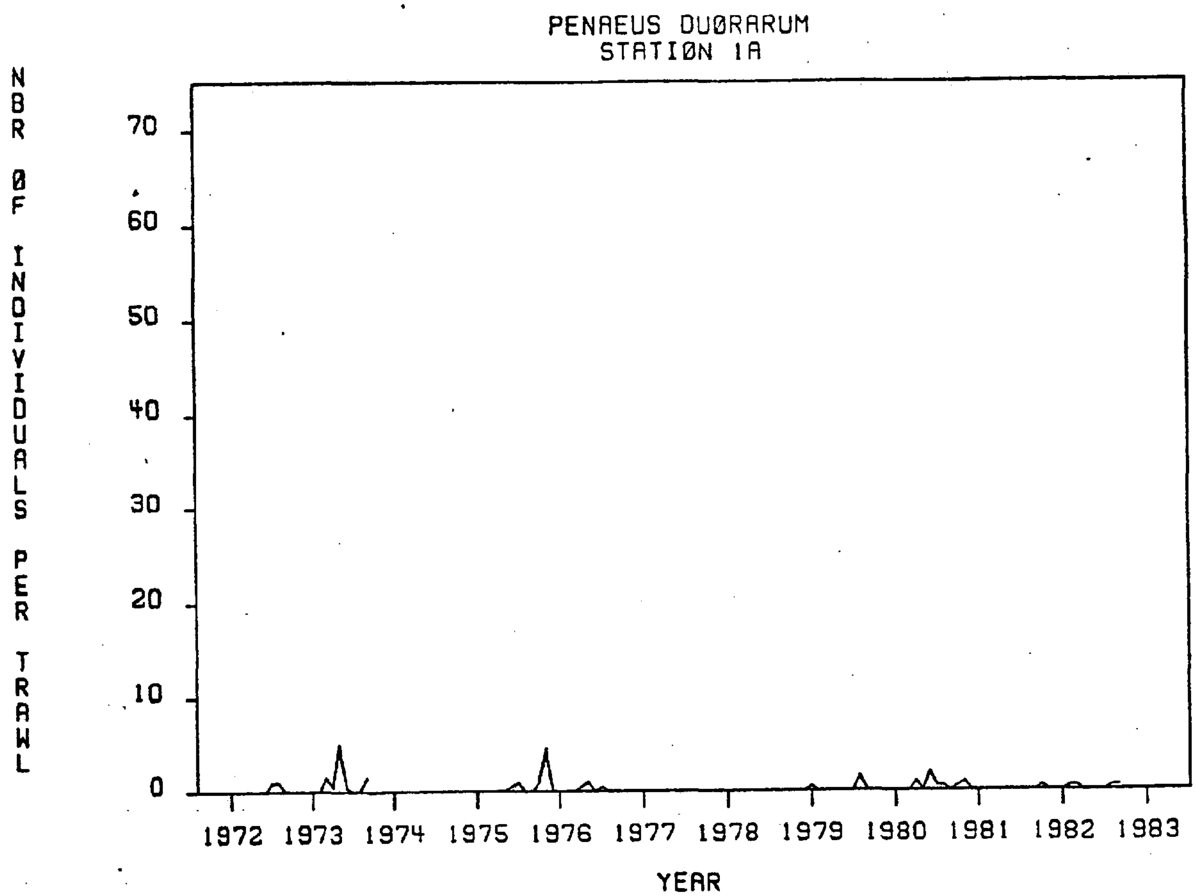

CALLINECTES SAPIDUS
STATIØN 1B
NBR ØF INDIVIDUALS PER TRAWL
70
60
50
40
30
20
10
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

Figure 51: Numbers of pink shrimp (Penaeus duorarum) taken per trawl tow at stations 1, 2, 1A, and 1B in the Apalachicola estuary from 1972 through 1983.






PENAEUS DUØRARUM
STATIØN 1A
NBR ØF INDIVIDUALS PER TRAWL
70
60
50
40
30
20
10
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

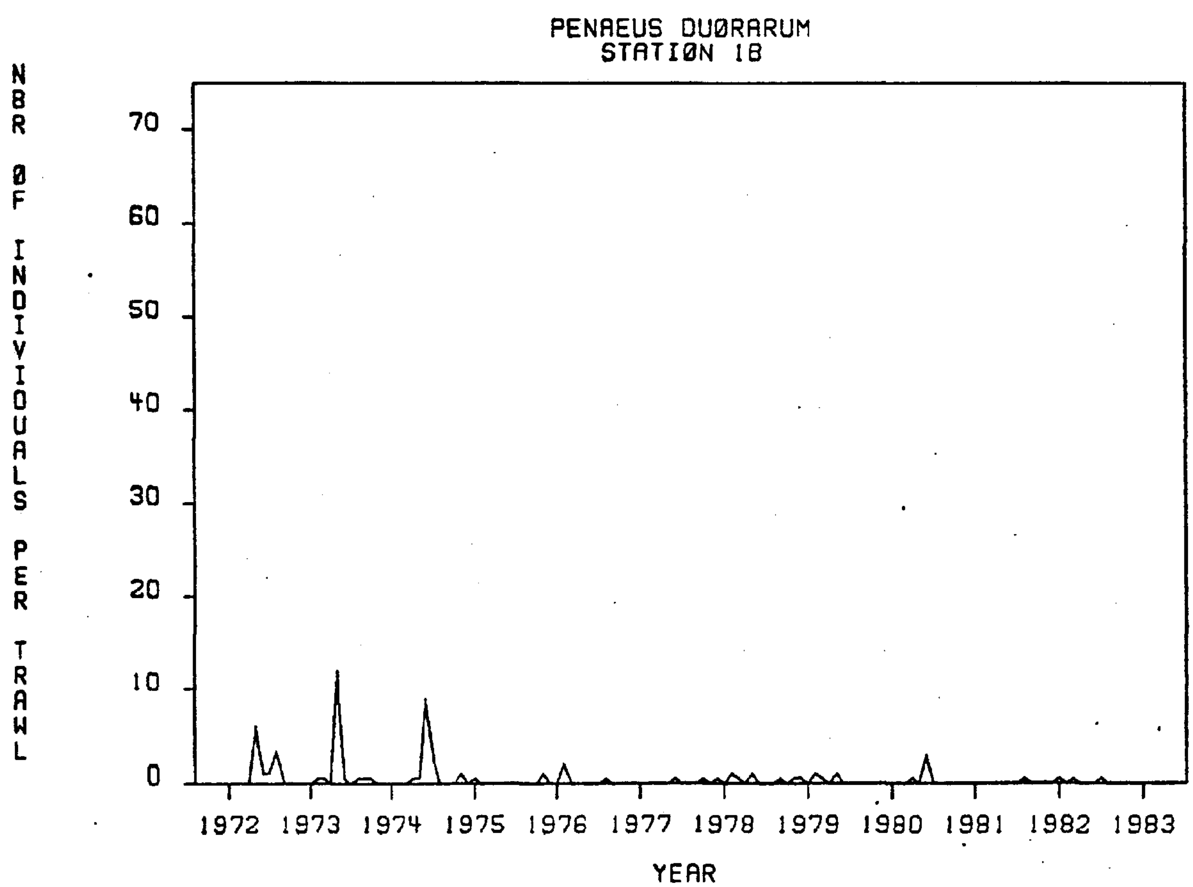
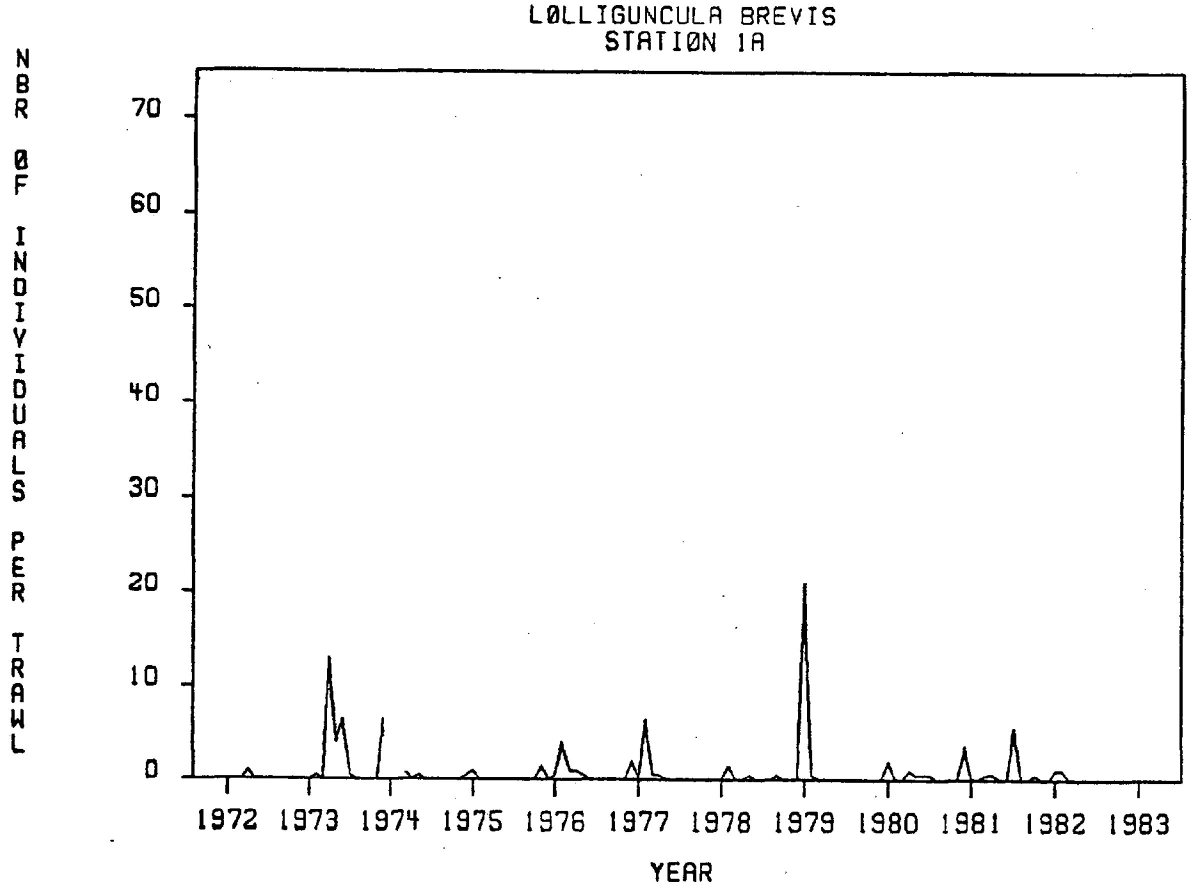

PENAEUS DUØRARUM
STATIØN 1B
NBR ØF INDIVIDUALS PER TRAWL
70
60
50
40
30
20
10
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

Figure 52: Numbers of brief squid (Lolliguncula brevis) taken per trawl tow at stations 1A and 1B in the Apalachicola estuary from 1972 through 1983.



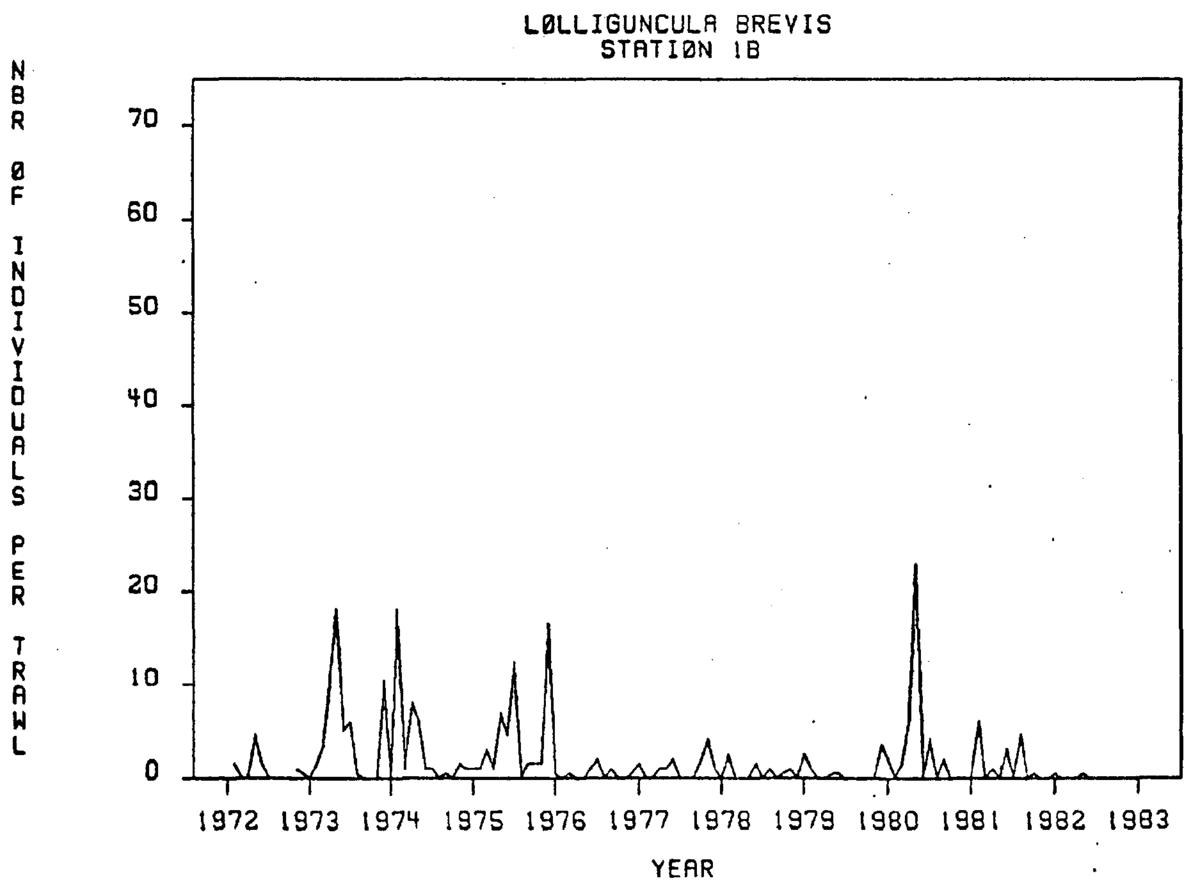
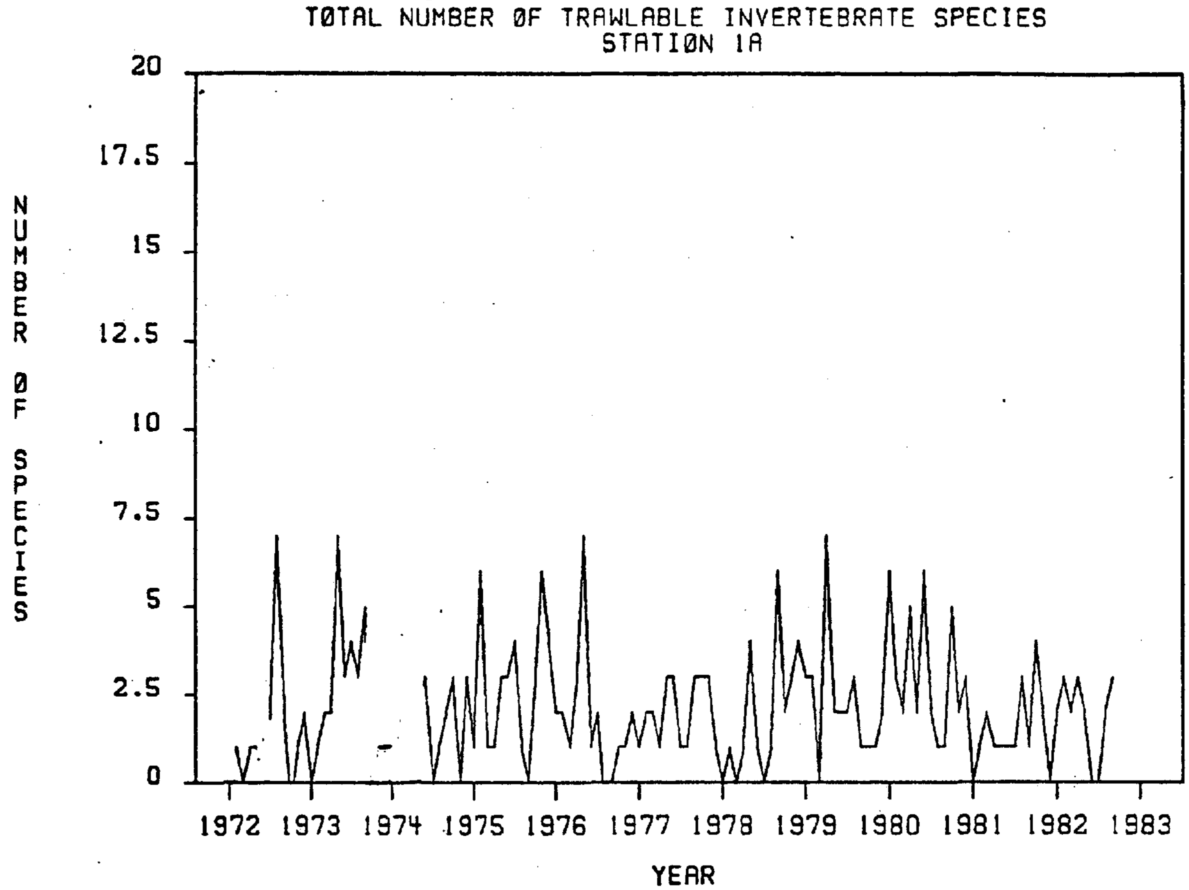
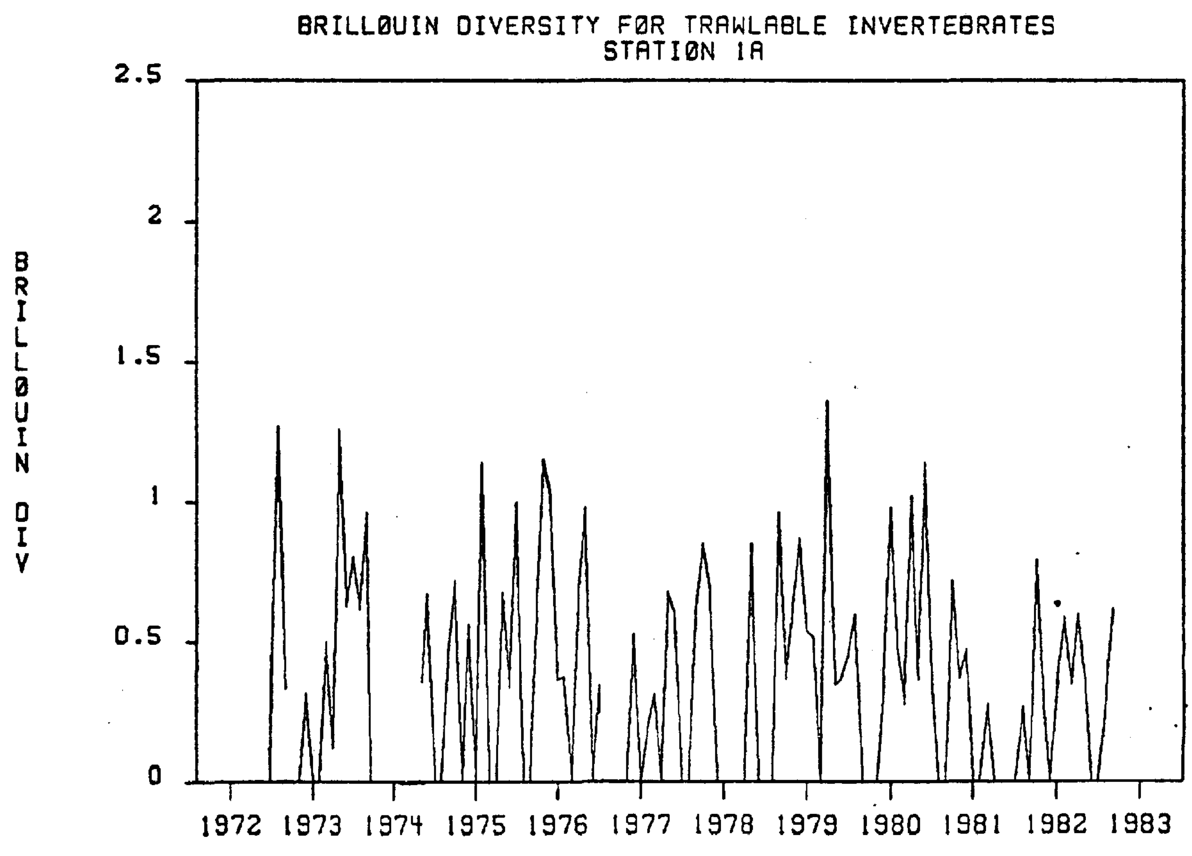
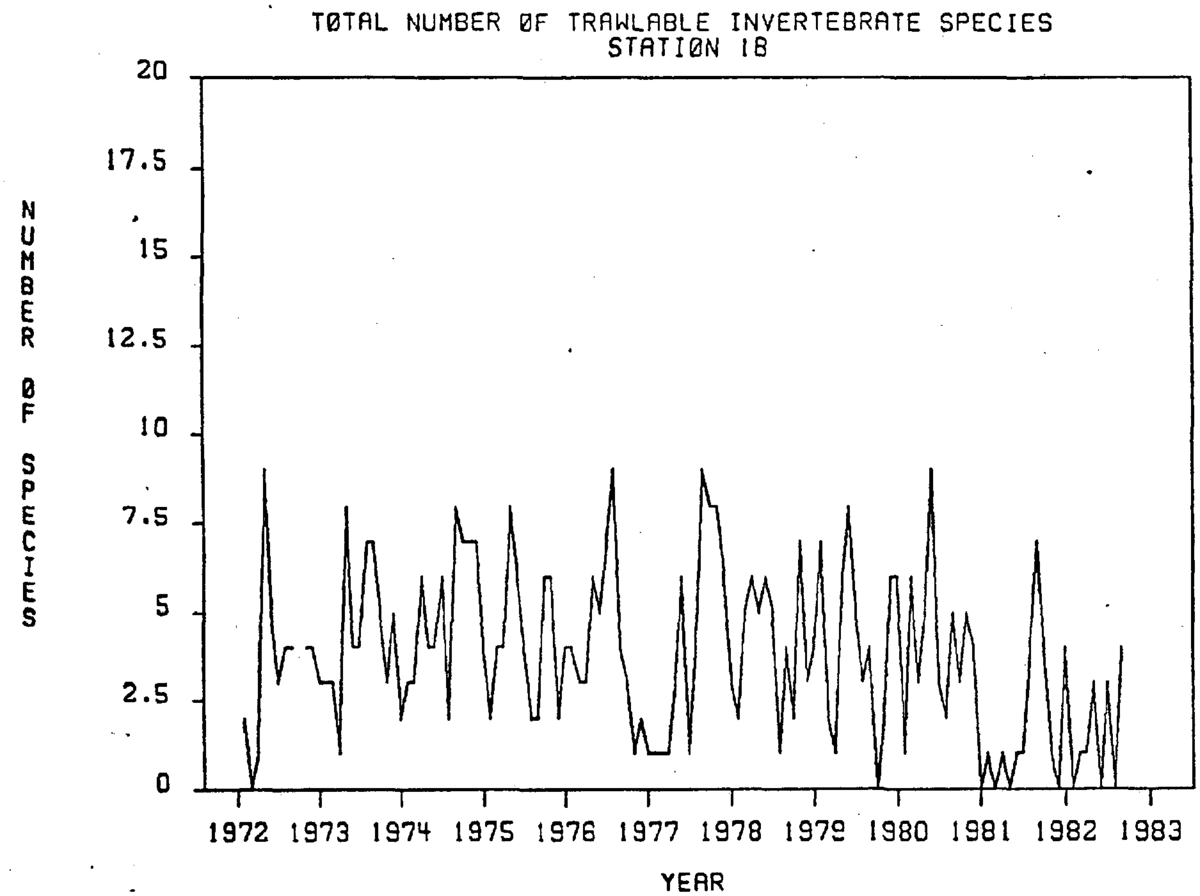


Figure 53: Total number of invertebrate species and invertebrate species diversity at stations 1A and 1B in the Apalachicola estuary from 1972 through 1983.






TØTAL NUMBER ØF TRAWLABLE INVERTEBRATE SPECIES
STATIØN 1B
NUMBER ØF SPECIES
20
17.5
15
12.5
10
7.5
5
2.5
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

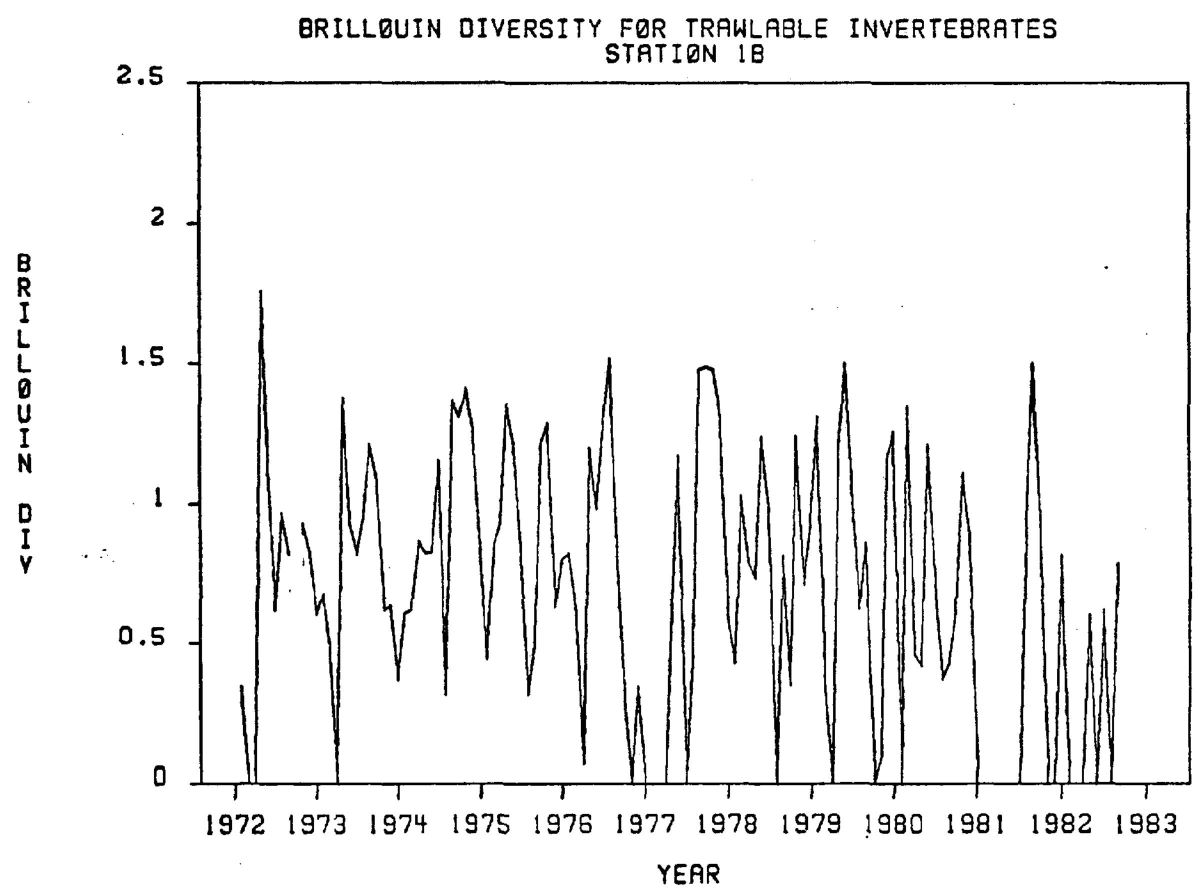
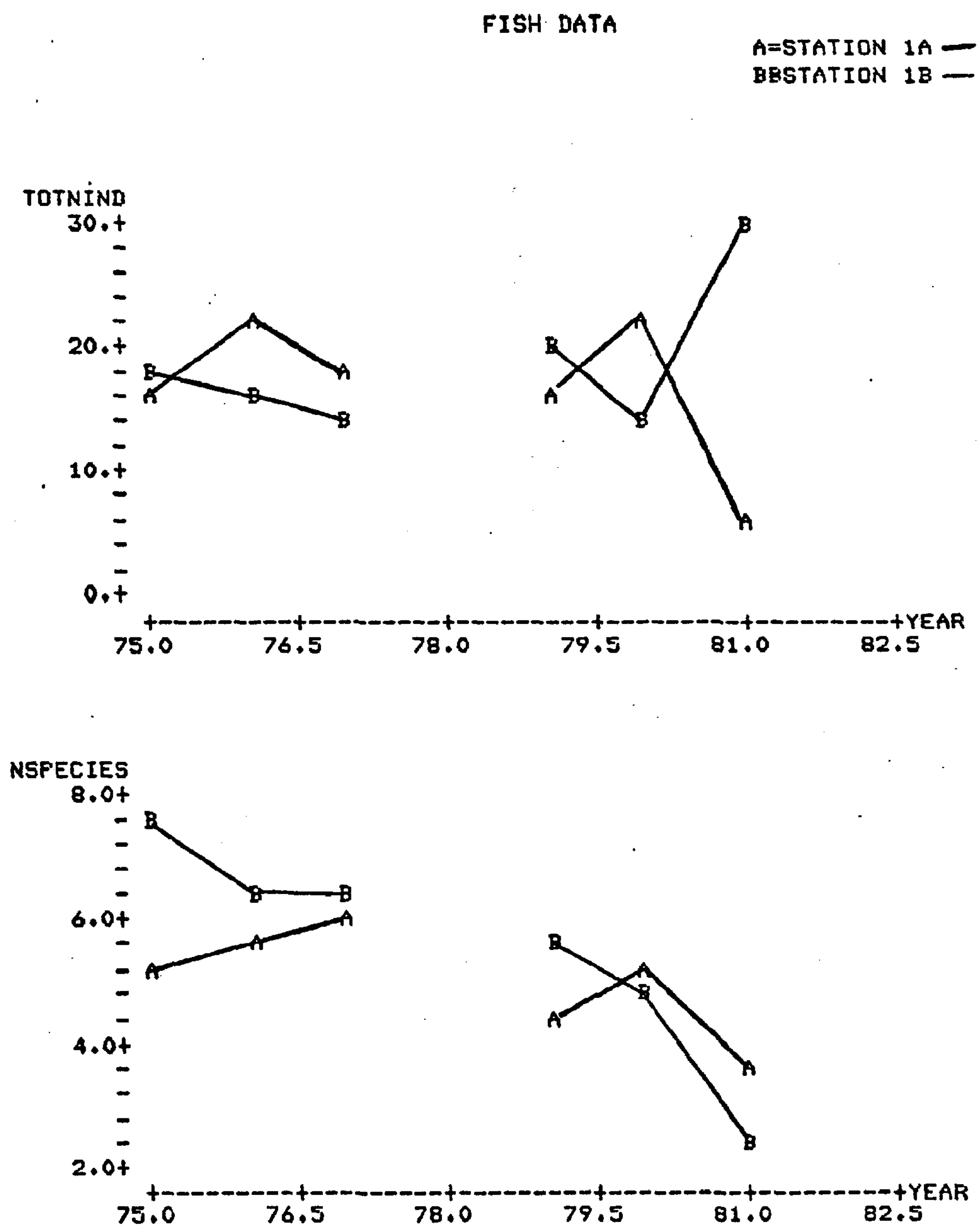
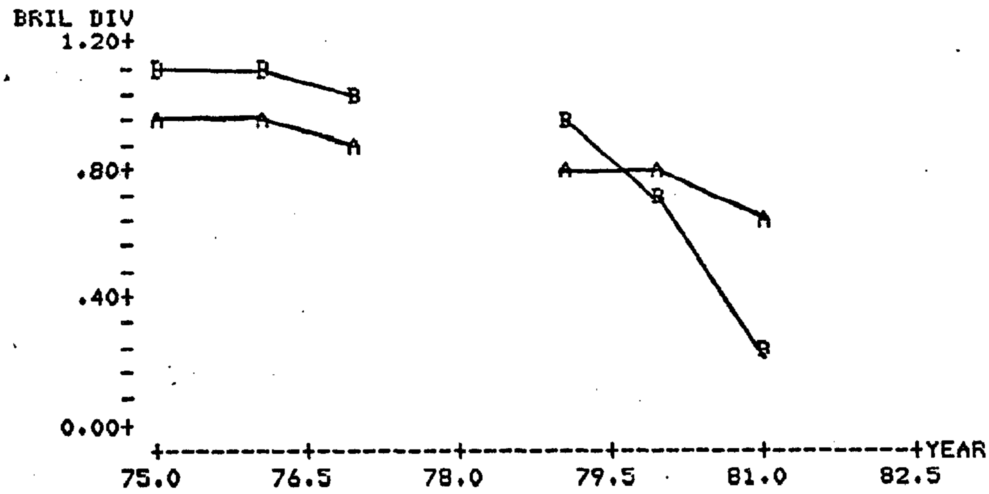
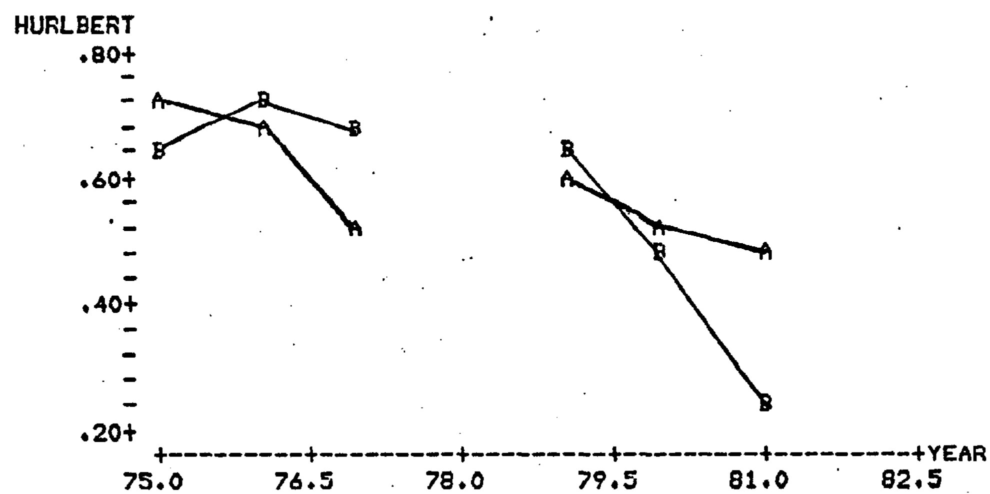

BRILLØUIN DIVERSITY FØR TRAWLABLE INVERTEBRATES
STATIØN 1B
BRILLØUIN DIV
2.5
2
1.5
1
0.5
0
1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983
YEAR

Figure 54: Analyses of fish and invertebrate data at stations 1A and 1B three years before and three years after cessation of dredging at Sike's Cut in 1978.




BRIL DIV
1.20
.80
.40
0.00
YEAR
75.0
76.5
78.0
79.5
81.0
82.5


HURLBERT
.80
.60
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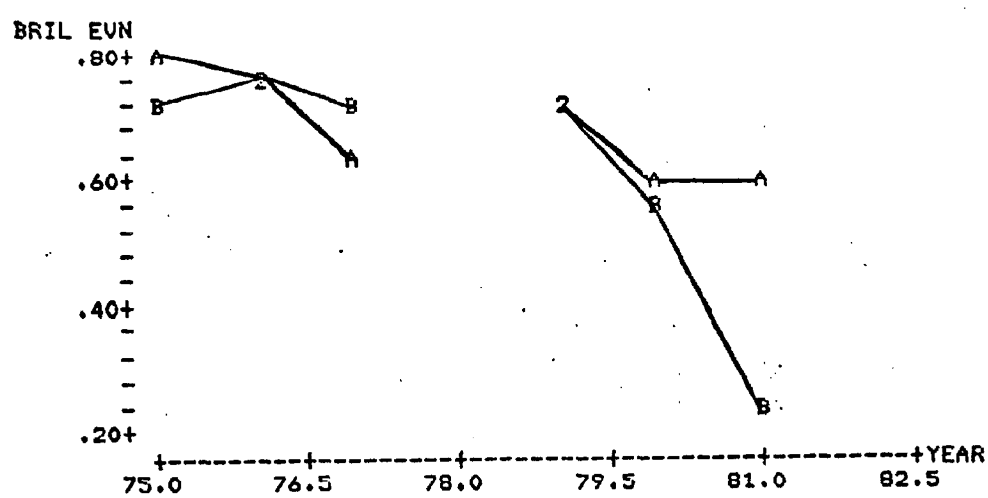
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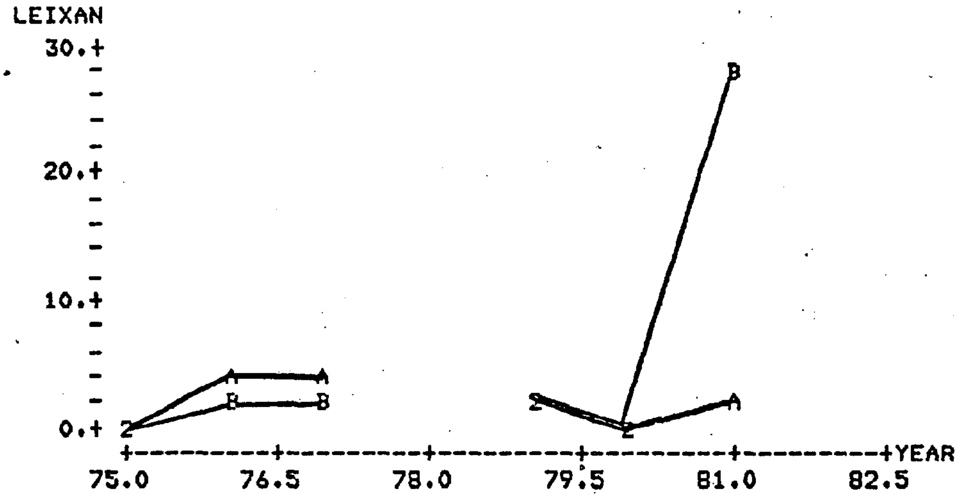
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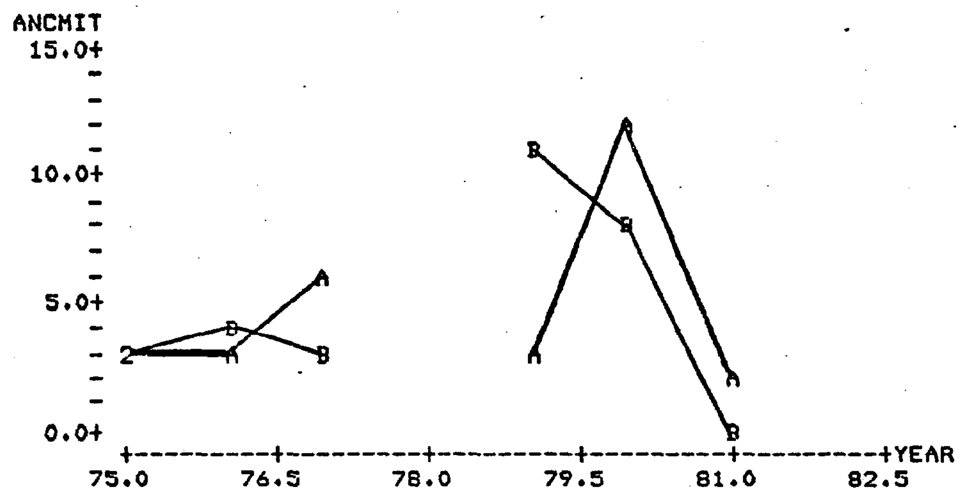
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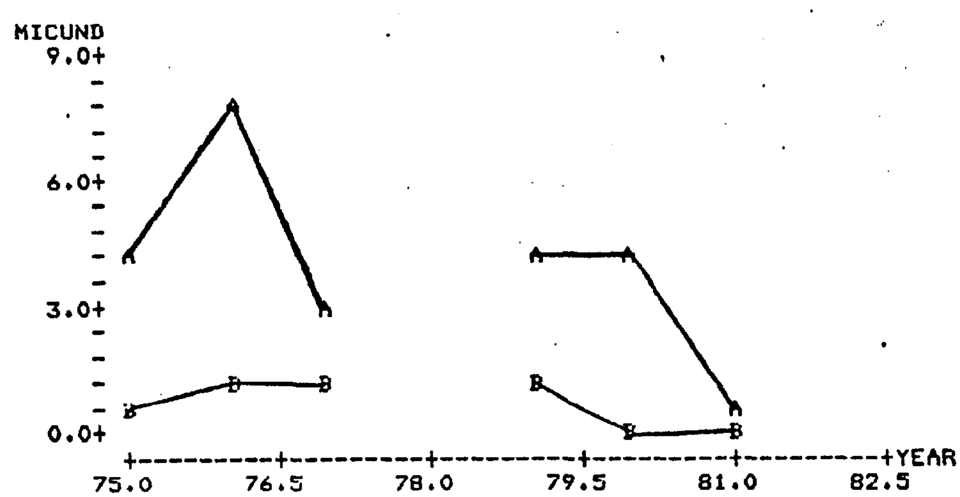
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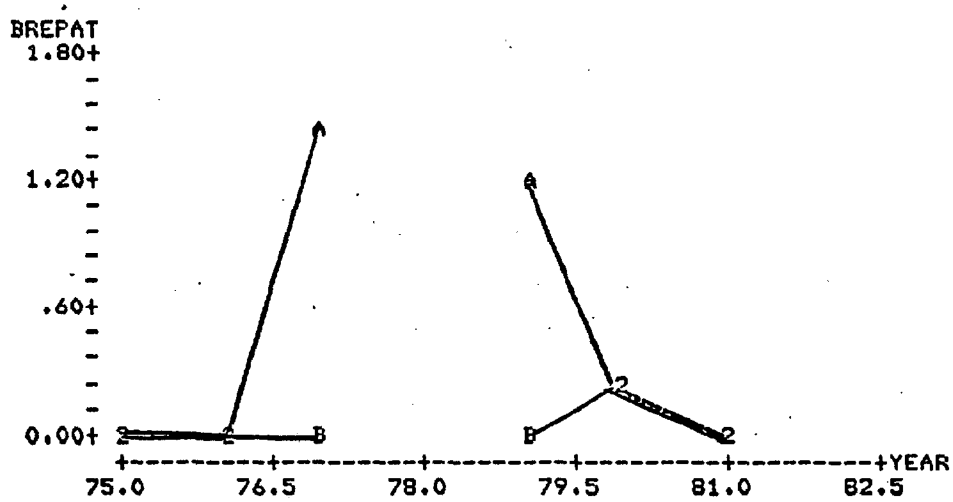

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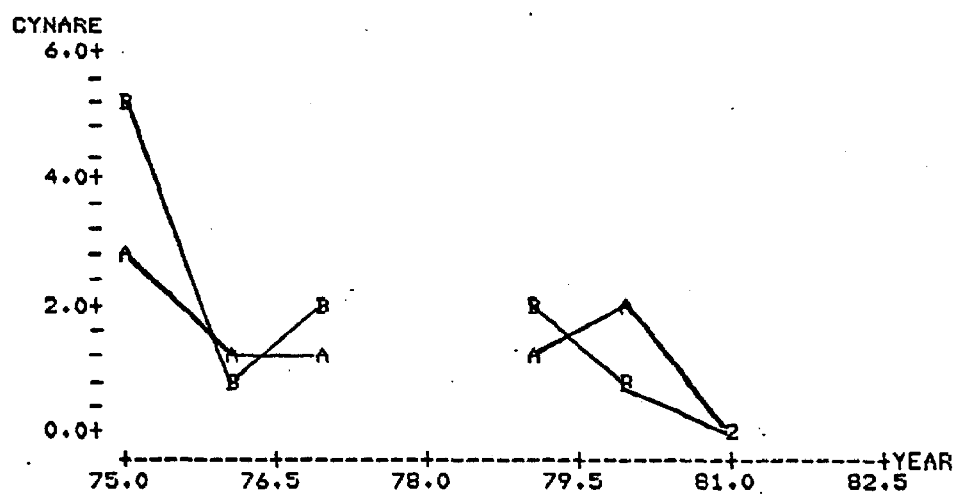

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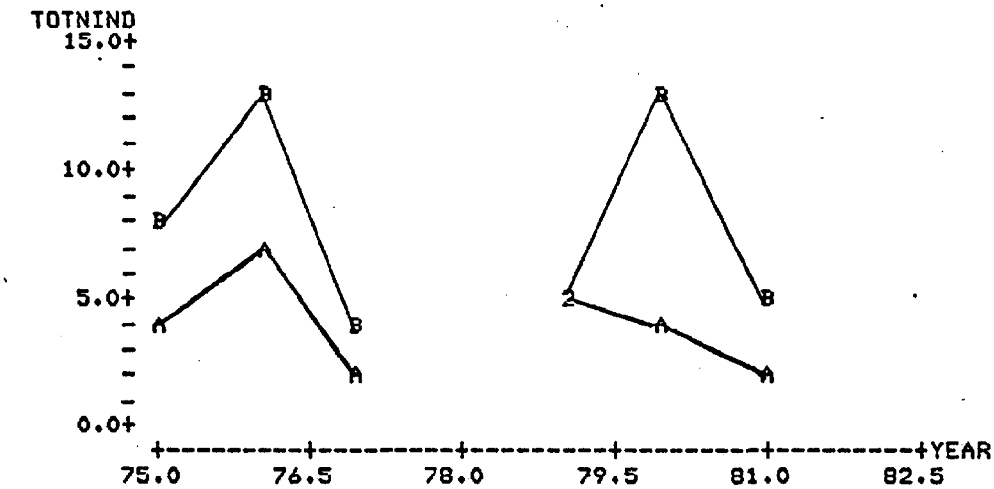

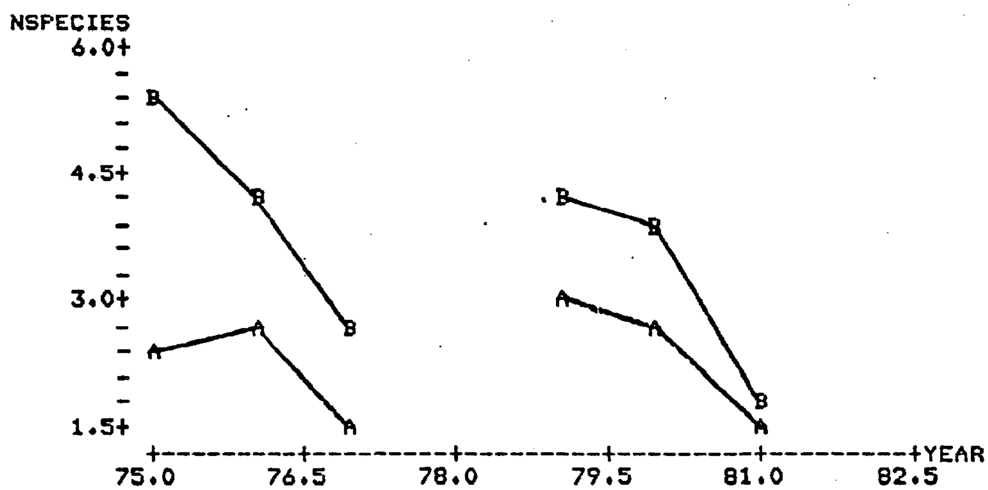

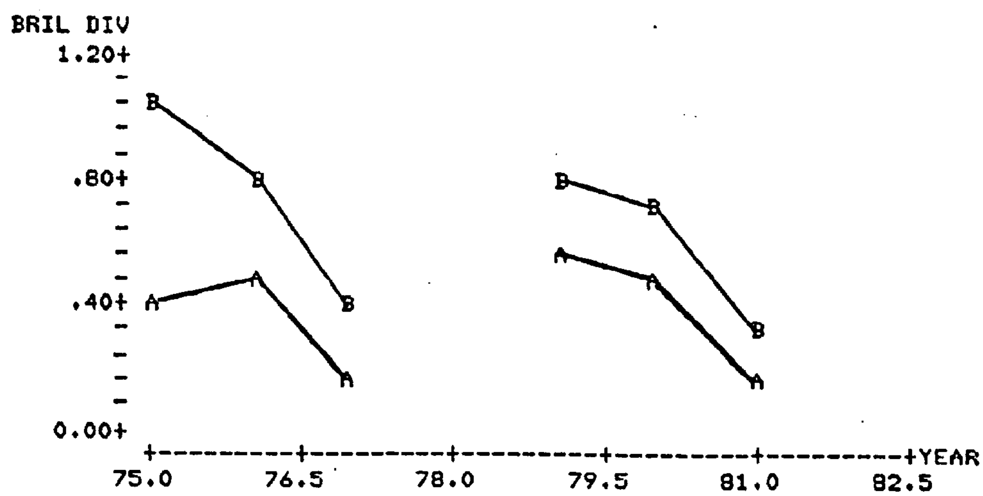

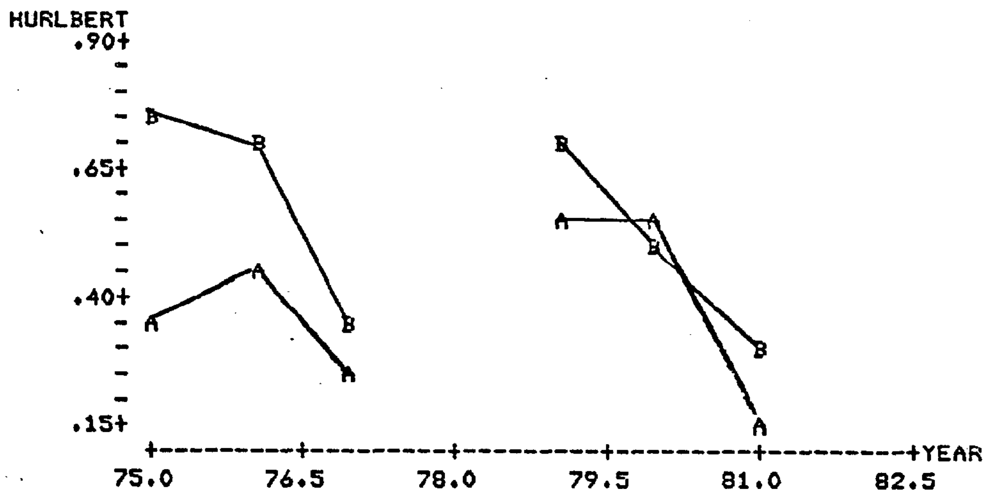
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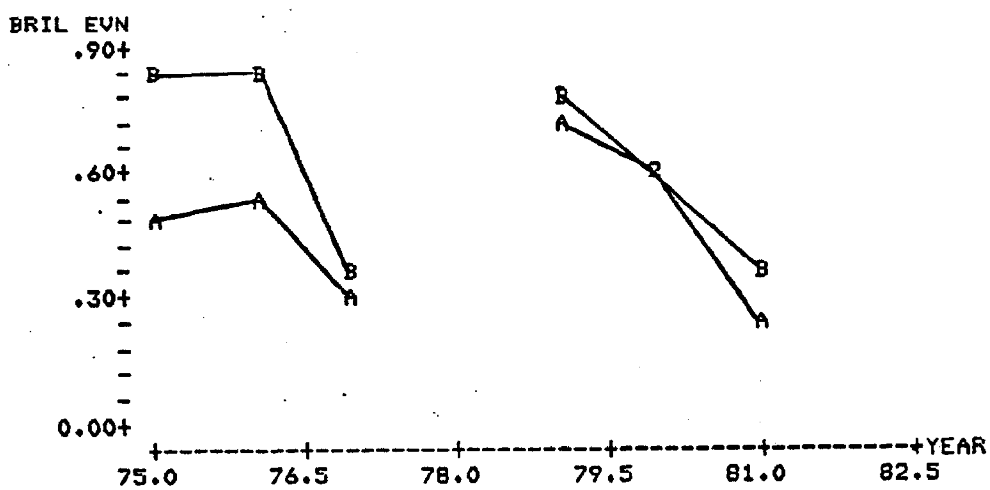
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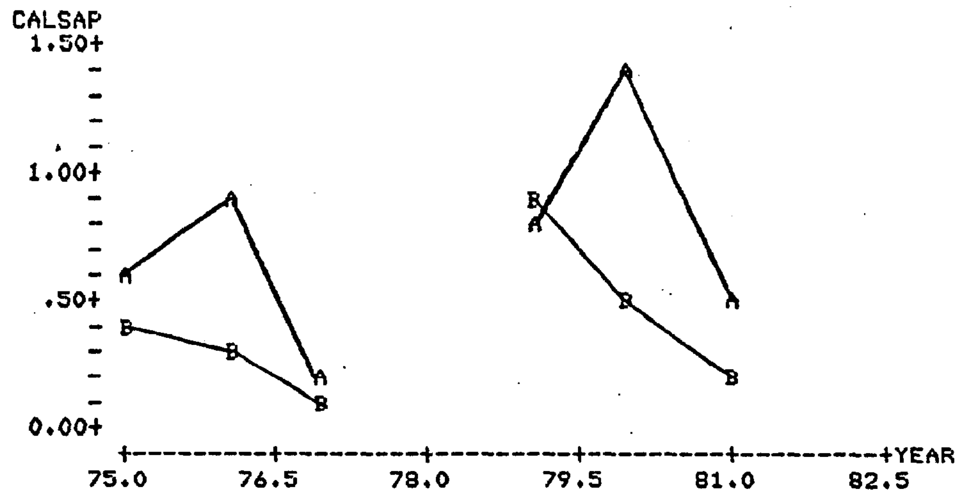

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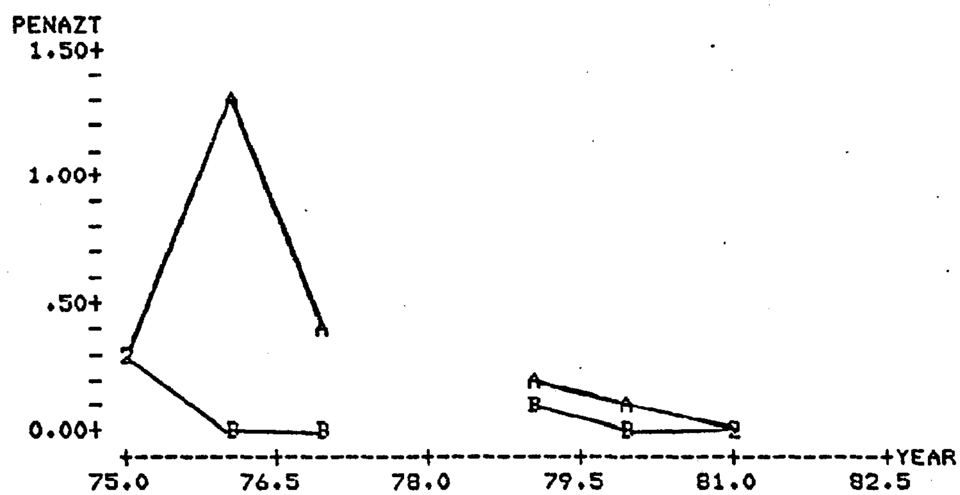

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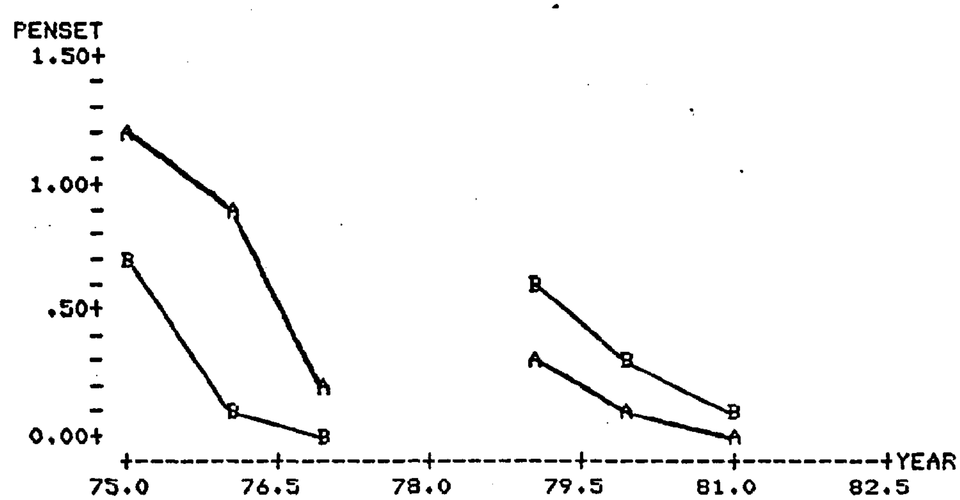

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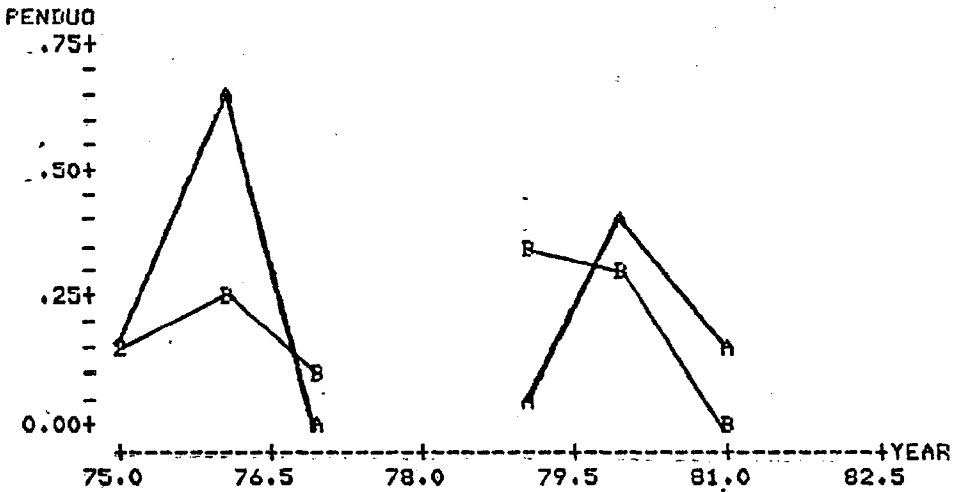
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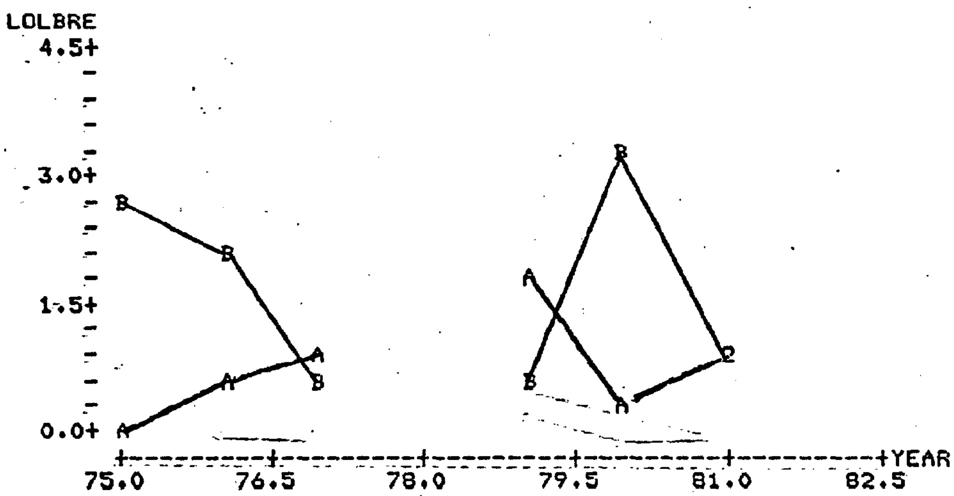
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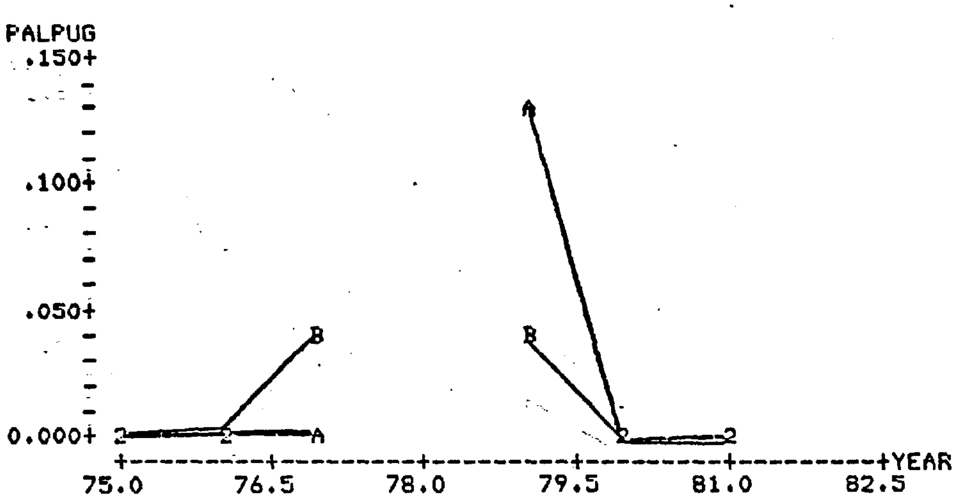
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Appendix A: Synopsis of findings on the review of dredging and the proposed East Point Breakwater (Livingston, 1983a).

Review and Analysis of the Environmental Implications of the Proposed Development of the East Point Breakwater and Associated Dredging Operations within the East Point Channel (Apalachicola Bay System, Florida)

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Summary of Conclusions and Recommendations

1. Because of the need (for funding purposes) for the breakwater project and the channel dredging project to be issued and evaluated as separate projects (U. S. Army Corps of Engineers, Mobile District), there was some confusion concerning whether or not the environmental impact analysis should be considered as one project. While it is true that the breakwater project does not depend on maintenance dredging, if the breakwater is established, such dredging will be needed and may be changed because of altered sedimentation rates and spoiling procedures and effects. Consequently, there is a functional association between the two projects and this evaluation was carried out under the assumption that the two projects are interrelated from the standpoint of environmental response.

2. No hard scientific data were available regarding the rate of sedimentation that would occur behind the breakwater; hence, while the estimates of the U. S. Army Corps of Engineers (i.e., 50,000 cubic yards at 18-month intervals) were used for this review, such figures are tentative. The last time maintenance dredging was carried out in the East Point channel was 1978.

3. Construction of the breakwater and open water spoiling associated with the dredging of the East Point Channel will eliminate the immediate benthic (bottom) communities in areas of rock and spoil placement. Such effects will be mitigated to a certain (undetermined) degree by increased habitat diversity associated with the rock substrate and projected rapid recolonization of the spoil banks by organisms that are adapted to the natural variability of the highly turbid estuary.

The relatively short life cycles of various benthic organisms in this area will add to the speed of recovery.

4. The construction of the breakwater should have negligible effects on the current structure and tidal circulation of St. George Sound and the salinity structure of the Apalachicola estuary.

5. Construction of the breakwater (rock placement and small-scale spoiling) will have temporary, though negligible, effects on water quality in the area. Such effects include short-term increases in turbidity and sedimentation in the immediate vicinity. Such construction will probably exacerbate, to some degree, seasonal reductions of water quality (i.e., dissolved oxygen). However, such effects will be slight compared to the existing poor water quality conditions due to urban runoff (point and non-point sources) from East Point, heavy boat use, and previous dredging and spoiling effects.

6. The dredging and spoiling activities associated with the East Point Channel maintenance should have a negligible influence on the current structure and salinity regime of the estuary.

7. The dredged channel should act as a sink for nutrients and other pollutants from urban runoff from East Point and boat traffic in the area. Because of organic loading, the Biochemical Oxygen Demand in the channel, will probably be increased. Analyses in the East Point and Two-Mile channels show high concentrations of nutrients (nitrogen and phosphorus compounds), oils and greases, and toxic metals. Such substances are probably associated with the finer (i.e., silt) fractions of the sediments.

8. Elutriate tests that mimic the open water spoiling of dredged sediments indicate that such spoiling will probably cause temporary increases in nutrient levels in the water. Elutriate studies at various dredged sites in the Apalachicola estuary also indicate that under conditions similar to open-water spoiling, the metal contaminants will remain, primarily, with the sediments. Since iron is naturally high in estuaries and is known to have minimal toxic impact on estuarine biota, this metal should not be a cause of concern. The elutriate data, while not entirely conclusive, would indicate that water quality deterioration due to the release of metals at the spoil sites will be minimal. There is a possibility that sediment movement away from the spoil banks could lead to some movement of metals into local areas.

9. Background information (including 11 years of field work in the Apalachicola Bay system) and detailed studies of water quality, sediment composition, and benthic macroinvertebrates in St. George Sound (off East Point) were analyzed to determine existing environmental conditions in the study area. A direct relationship was noted between the degree of urban development, boat traffic and dredging activities, and the deterioration of the biological structure of associated bay areas. Such human activities were associated with the postulated destruction of near-shore grassbeds and the deterioration of the benthic macroinvertebrate community . There was a direct correlation of sediment quality (i.e. siltation, high nutrients, oils/grease, and metals) and adverse biological impact. Biotic recovery was noted in areas associated with the construction area of the proposed breakwater and spoil sites.

10. Dredged areas proximate to areas of urban runoff act as a sediment trap for silt, which is often associated with pollutants such as nutrients, oils and greases, and metals. Such areas are largely devoid of macrobenthic organisms. Dredging and open water spoiling associated with the East Point project will have (smothering) effects at the immediate spoil sites and temporary increases of nutrients in the surrounding waters. Because of the existing deteriorated state of inshore areas of St. George Sound off East Point and the fact that there are no grassbeds or oyster bars in the immediate vicinity, adverse biological effects due to the combined projects should be minimal in areas inshore (north) of the breakwater. Adverse effects south of the breakwater should be largely confined to the local areas and should be subject to some form of recovery.

11. The determination of whether or not these projects should be carried out depends on a balanced judgement of potential environmental impact versus community needs. It has been rightly pointed out that the Apalachicola estuary is a special area: Class II waters, an Aquatic Preserve and Special Waters, Outstanding Florida Waters, and a National Estuarine Sanctuary. For this reason, all dredging and spoiling in the area should be carefully evaluated. Upland spoiling, in environmentally appropriate areas, should be considered as a more preferable alternative to open-water spoiling. On the other side is the real need of protection that will be afforded a community that represents more than 1/3 of Florida's oyster industry. This need is a historic one, and the issue should be resolved immediately.

12. Based on the above considerations, I would recommend that a variance be issued by the Florida Department of Environmental Regulation so that the East Point Breakwater can be constructed along with maintenance of the East Point Channel. As part of this project, I would recommend the following stipulations:

A. The search for an upland spoil site should be continued. Such an option remains preferable to open-water spoiling.

B. The Army Corps of Engineers (Mobile District), the Florida Department of Environmental Regulation, and the Franklin County Commission should initiate a program of study to evaluate the environmental effects of the East Point projects. Such a study could be carried out within the auspices of the Apalachicola River and Bay Estuarine Sanctuary. Such a study would be most valuable in the evaluation of such dredging and spoiling activities throughout the bay system. In addition, should any adverse effects be noted, it would provide a stronger case for the upland spoil option.

C. All construction activities, including the maintenance dredging and spoiling, should be carried out during winter-early spring months of naturally high turbidity, sedimentation, and dissolved oxygen.

The above recommendations would thus allow the development of a needed facility for the people of East Point while minimizing the environmental impact and providing needed information for possible improvement of dredging activities in the estuary.

I. Review of Existing Data

A. Proposed Breakwater and Dredging Operations

A detailed description of the proposed breakwater project is given in the revised Draft Environmental Impact Statement (U. S. Army Corps of Engineers, Mobile District; 1982) with further revisions as outlined in Appendix III. Briefly, the plan is to provide a sheltered harbor approximately 500 ft offshore and parallel to East Point, Florida (Figure 1). This is to be accomplished by construction of a breakwater (Figure 2). The proposed structure would require the placement of about 18,500 cubic yards of bedding material and about 8,300 cubic yards of well graded cover stone in St. George Sound. Approximately 12,000 cubic yards of sandy material dredged from the breakwater area would be placed south of the alignment. No flotation channel would be necessary (this concession was made by the U. S. Army Corps of Engineers to a request by the Florida Department of Environmental Regulation). The proposed action would also require maintenance dredging of approximately 50,000 cubic yards from the channel behind the proposed breakwater (Appendix III). It is estimated that such dredging would occur once every 18 months and spoils would be moved by a hydraulic pipeline and placed into open water sites adjacent to the channel (Figure 3). The disposal sites would be elevated above mean low water. An alternative plan is to use an upland disposal site (U. S. Army Corps of Engineers, 1982; Appendix II, Appendix III) for the dredge spoils from the East Point Channel. While it has been "noted that the plan for the breakwater is not dependent upon maintenance dredging" (Appendix III), the obverse is probably true since maintenance dredging could be altered by the contruction of a breakwater. Further, the exact amount of spoil and timing of the dredging operation remain unclear without exact data concerning sedimentation rates behind the breakwater. While these two projects have been separately presented, sedimentation rates (hence the necessity to dredge) and spoiling procedures (should the open water spoiling option be taken) would be dependent in various ways on the breakwater. This dependence would mean that, in a functional sense, the breakwater and proposed channel dredging should be evaluated as a functional unit for any environmental evaluation.

According to conversations with personnel from the U. S. Army Corps of Engineers (Dru Barrineau, Doug Nestor, Mobile; personal communication, 1983), the breakwater operation and maintenance dredging come from two different authorities; the breakwater is a new project while the dredging is part of an existing program. The East Point Channel was last dredged in 1978. Funding is thus from different sources and under different authorities for the two projects. The Florida Department of Environmental Regulation has chosen to tie the two projects together in terms of a water quality evaluation so that neither project can be certified without the other. According to the DER (J. Craft; personal communication, 1983), the breakwater and spoiling from the dredged channel will both cause direct habitat destruction (which cannot be denied since subsrate will be lost as a result of such actions). Also, both actions will also cause degeneration of the water quality (J. Craft; personal communication, 1983); according to this line of reasoning, water quality will be affected behind the breakwater (the marginal to bad water quality will be exacerbated by the breakwater) and in front of the breakwater as a direct effect of spoiling. The Army Corps of Engineers disagrees with this evaluation and consequently has no problem with either action (Dru Barrineau, Doug Nestor, personal communication; U. S. A. C. O. E., 1982).

Because of the confusing state of affairs generated by the differing points of view of the Corps and the DER, both aspects of the problem will be treated both separately and as a whole or uniform action in terms of evaluation of potential environmental effects. The environmental questions cannot be so easily separated because the impact of one project (dredging) depends on that of the other (the formation of the breakwater). Overall, the environmental assessment will thus address both issues as they relate to possible habitat destruction and water quality changes in the Apalachicola system.

B. Potential Physical/Chemical Impacts

1. Breakwater

Several factors should be considered in the construction of the breakwater. These include modifications to existing current and salinity conditions and changes in habitat and water quality.

a. Modification of current and salinity structure of the bay

According to the Raney (2-dimensional) model (U. S. A. C. O. E., 1982), which is based on a breakwater approximately 500' from shore, the breakwater should have a negligible effect on the overall tidal circulation in Apalachicola Bay. Any effects will probably be confined to the local area as delineated by a 2-mile radius from the East Point shoreline. According to model projections, the breakwater should produce a slight channelling effect with minor elevations of current velocities behind the breakwater. There is some controversy on this point, but the significance of this action on circulation remains minimal.

b. <u>Modification of water quality behind the breakwater</u>

There is some reason to consider that the construction of the breakwater will increase sedimentation behind the breakwater although there is no universal agreement on this issue (U. S. A. C. O. E., 1982; J. Craft, Florida Department of Environmental Regulation, personal communication). The likelihood is that water quality conditions (such as the dissolved oxygen and turbidity) of the water behind the breakwater will undergo a slight deterioration. This change would mean lower dissolved oxygen and higher turbidity. Such impacts would have to be evaluated within the context of the area in question (i.e., there are already serious water quality problems in the area because of previous dreding and storm water runoff from East Point; see below). In this context, it is doubtful that there would be a significant alteration of water quality behind the breakwater.

c. <u>Direct effects of rock placement</u>

There is no doubt that the benthic (bottom) habitat will be destroyed by placement of the bedding material and stone on the sediments. Attendant water quality effects will probably result in local, temporary increases in turbidity and sedimentation. Such impacts will be minimal in terms of the overall turbidity levels of the area involved, if this action is carried out during winter-spring periods of high natural turbidity, sedimentation and dissolved oxygen. Dredging directly associated with the breakwater (about 12,000 cubic yards of sandy material) will have direct adverse effects on the benthic habitat in areas of dredging and spoiling. Such effects should be relatively transitory considering the limited nature of the dredging operation and the types of spoil being placed in the area.

In summary, the environmental impact of the placement of the breakwater will probably be confined to areas immediately affected by the deposition of rock and spoil associated with the project. Such loss of habitat shold be mitigated to a certain degree by new habitat or substrate provided by the breakwater itself and the relatively rapid colonization of spoil banks by organisms adapted to the high turbidity and sedimentation of the estuary, as long as the project is carried out during a winter-early spring period.

2. Dredging Operations Within the East Point Channel

Considerations of the dredging operations behind the breakwater and spoiling south of the breakwater are complicated by the lack of certainty concerning the magnitude and frequency of such operations (see above) and the relatively low quality of the spoils (see below). Because of the lack of more exact data, I will use the projected levels for this evaluation (i.e., 50,000 cubic yards of spoil taken from behind the breakwater and deposited south of the breakwater once every 18 months; U. S. A. C. E., 1982; Appendix III).

a. Modifications of current and salinity structure of the bay

While I can find no direct information on this point relating to effects of dredging and spoiling operations *per se*, it is probable that the above treatment of the breakwater (section I-B-1-a) would apply to this situation (i.e., minimal impact on current patterns and salinity structure of the bay).

b. Modification of water quality

It is in this area that most of the potential problems (and, correspondingly, most of the controversy) exist for the proposed project (see letter from J. Craft, Appendix II). A detailed response to this issue is thus appropriate.

1. <u>Sources of pollution and organic enrichment</u>

Sources of pollution in the East Point area are varied. There is point and non-point pollution from urban runoff from East Point. Heavy boat traffic will contribute organic material and metals. Dredging activities will cause the concentration of fine sediments (clay/silt fractions) in the dredged channels. Estimates of organic loading [as determined by Biochemical Oxygen Demand (B.O.D.) in mg/l; U. S. A. C. E., 1982] from the 18 oyster processing plants approximate 2,361 gallons per day, 50% of which enters St. George Sound. This figure is considered to be a maximum since there is considerable daily and seasonal variability in the oyster packing and processing industry. Since estimates of non-point B.O.D. waste loads are unavailable, the high point of the estimated range of 2 mg/l to 2,070 mg/l was used to calculate maximum dissolved oxygen deficits for the area. This is reasonable but is probably on the low side during specific periods of high temperature, heavy rainfall, and lateral runoff from the East Point area into the sound. The waste assimilative capacity for the existing navigation channel for various offshore breakwater alignments was calculated according to these estimates. The projected dissolved oxygen (D.O.) deficits ranged from 0.0 (minimum point source B.O.D. loadings) to 3.1 mg/l [maximum combined (point and non-point) source B.O.D. loadings for plan 3]. The D.O. deficit for the modified plan 5 (recommended) was 1.5 mg/l. According to a letter from Ms. V. Tschinkel, Secretary of the Florida Department of Environmental Regulation, elimination of the direct discharge of washdown from seafood processing houses would be one condition for permitting. Such modification would partially alleviate the loading rates from East Point into St. George Sound.

In any case, during summer periods of high temperature and local rainfall (and urban runoff), the dissolved oxygen levels at depth in the channel will probably be low.

2. Sediment quality: a comparison

The chief concern, in terms of permitting, is the water quality question relating to dredging in the East Point channel and spoiling south of the breakwater. As noted above, while this project is not part of the breakwater project *per se*, and while the breakwater is not directly dependent on maintenance dredging, the two actions are functionally associated, so the water quality issue concerning dredging activities will have an important bearing on the breakwater issue. Data concerning the quality of sediments in these areas are given in Table 1. Sediment quality in the St. George Island Channel is relatively good. Most of the sediments here fall within the range of fine to coarse grained sand. Within the two-mile channel area, oils and greases are higher, especially at sites GI 2 (Gulf Intracoastal Waterway disposal area) and TM3 (Two-Mile extension channel). Sediments within these channels are enriched in nutrients and metals such as copper (Cu), iron (Fe), lead (Pb), and Zinc (Zn). Sediments at TM2 and TM3 are higher in the silt/clay fractions than stations TM4, TM5 and GI 2, which are mainly characterized by fine sand. Sediments from the East Point Channel area are also relatively high in oils and greases (EP1, EP5), nutrients (EP1, EP2, EP3, EP5), and metals such as copper (EP1), iron (EP1, EP3, EP5), lead (EP3, EP5), and zinc (EP1, EP5). Silt/clay fractions are relatively high at stations EP1 (inshore, west), EP3 (within the dredged channel(, and EP5 (inshore, east). Stations in the spoil banks (EP2, west; EP4, east) are dominated by fine to coarse-grained sands. Such a pattern indicates sedimentation within the dredged channels and erosion of the spoil disposal areas.

As is consistent with most studies on the subject, oils and greases, nutrients, and metal contamination were most closely associated with the fine-grained sediments (i.e., the silt-clay fractions). The area off East Point was higher in nutrient enrichment than either of the other study areas. Oil/grease and metal contamination was low at the St. George Channel site and comparable at the two-mile/Gulf Intracoastal Waterway site and the East Point Channel Site.

3. Associated water quality questions

The environmental assessments by the Florida Department of Environmental Regulation (Table 2) point out certain problems with the proposed actions. The receiving area is within Class II waters of the state of Florida. This area is also an Aquatic Preserve and Special Waters (Section 17-3.041, (2)(f) and (g)), Outstanding Florida Waters (Florida Administrative Code), and a National Estuarine Sanctuary (Coastal Zone Management Act, P.O. 92-583 with amendments P.O. 94-370). While no scientific data are given, a qualitative evaluation indicated low water quality in the East Pont channel (with attendant poor levels of biota in the sediments) but relatively healthy animal populations at the proposed spoil disposal sites. The biological impact of dredging in "mucky, anaerobic and possibly toxic" sediments of Two-mile, East Point and Scipio Creek would be less, according to this evaluation, than in channels further out in the bay ("sandy and aerobic"). The impact of placing of the breakwater and dredging would be to destroy benthic organisms within the construction area; such organisms would possibly repopulate submerged surfaces of the breakwater after construction. The DER evalation indicates that the breakwater may worsen the dissolved oxygen concentration in the existing channel; mixing of such water may cause "harm to adjacent waters" according to this evaluation. According to the DER assessment, open water disposal of "mucky" bottoms from such areas would generate turbidity problems although organisms of the bay are probably "moderately tolerant of turbidity." Upland spoil disposal is recommended (Figure 4).

Because of concessions regarding the elimination of the work channel and direct discharge from washdown water, the primary question concerning the permitting of the East Point Breakwater and dredging and open water spoiling of sediments taken from the East Point channel pertains to water quality in the dredged channel and spoiling areas. According to an undated, anonymous D.E.R. briefing paper (Appendix IV), spoil quality is low because of high oil/grease levels, ammonia-nitrogen, and metal concentrations. Elutriate data (Table 1) indicate violations of water quality standards for copper, iron, and lead. Such violations in other parts of the bay evidently have been overcome by variances given by D.E.R. (J. Craft, personal communication).

Judging from such data in the G.I.C.W.W. and the Two-mile Channel (Table 1), there is little substantive difference in spoil quality in terms of oils and grease and metals between these areas and the East Point Channel area. Basic differences exist between the U. S. A. C. E and DER regarding water quality and water flow and sedimentation rates in the East Point Channel and water quality changes due to open water spoiling. Since channel conditions are already poor, the main question centers on water quality problems associated with the disposal of dredged channel sediments. It includes the main question of whether metals such as copper, iron, and lead will disassociate from the sediments and contaminate surrounding water. For this question, we need the elutriate analyses.

4. Elutriate analyses

The results of the elutriate tests by the U. S. A. C. E. for various areas of the bay are given in Table 1. Virtually no water quality effects are shown at the St. George Island site, as might be expected since the sediments are not contaminated to any degree. Tests in the two-mile channel show increased ammonia-nitrogen, phosphorus, and iron content in the elutriates. Iron is naturally abundant in the estuary and should cause no adverse biological effects. The tests show increased ammonia-nitrogen and phosphorus levels in the elutriate; lead levels in the elutriate are slightly increased from sediments taken in the western (inshore) and highly contaminated portions of the East Point Channel. These data indicate that there should be an immediate, short-term or temporary release of nitrogen and phosphorus compounds in the spoiling areas but that the metals will remain largely with the sediments. There could be a movement of such metals with the sediments because of erosion of the sediments away from the original spoil site. However, these data do not support water quality degeneration by metals within the spoil sediments.

II. Biological Evaluation of the East Point Study Site

A. Materials and Methods

1. Water Quality and Sediment Composition

An analysis was carried out concerning water quality, sediment composition, and the benthic macroinvertebrate (infaunal) assemblages in areas associated with the proposed projects (Figure 4). Such areas include the East Point Channel (1-1, 3-1), proposed breakwater and spoil sites (1-2, 3-2), channel areas (2-1, 2-2, 2-3), offshore areas (1-3, 2-3, 3-3; 5-1, 5-2, 5-3, 5-4) and a reference transect (outside of the influence of the East Point area) 4-1, 4-2, 4-3). These studies were based on, and coordinated with, previous studies carried out within the Apalachicola Bay system (Livingston 1980, 1983; Livingston et al., 1983).

All samples were taken on 15-16 March, 1983. Surface and bottom water samples were taken with a 1-liter Kemmerer bottle. Turbidity was measured with a Hach model 2100-A turbidimeter, and color was determined using an American Public Health Association platinum-cobalt standard test. Temperature was determined using a stick thermomometer, and salinity was measured with a temperature-compensated refractometer. Field measurements of dissolved oxygen and pH were made with metering devices. A standard Secchi disk was used to determine light penetration. Sediments were taken with a corer (diameter 7.62 cm), and analyses were carried out using the top 10 cm of each core sample according to processes described by Inman (1952), Folk (1966), Cummings and Waycheck (1971), and Ingram (1971). This analysis included determination of particle size and sediment organic composition with a computer program developed by J. P. May (Department of

Geology, Florida State University). Detailed descriptions of these methods are given by Livingston (1978).

2. Benthic Macroinvertebrates

Benthic macroinvertebrates were sampled with a hand-held corer (diameter 7.7 cm) at sediment depths of 15 cm. Ten subsamples were taken at each station. Each subsample was washed through a 0.5-mm screen. Organisms were fixed with 10% buffered formalin and rose bengal (200 mg l^{-1}). Animals were then transferred to 40% isopropyl alcohol, sorted and identified to species and counted. All biological sampling was based on previous assessments relative to microhabitat distribution, runoff patterns, and spatial/temporal trends of biotic composition (Livingston 1976, 1978; Livingston et al., 1976a). Sampling effort in all cases was determined by analysis of species accumulation using multiple sub-samples (Livingston et al., 1976b). Data analysis was carried out with an interactive computer program under the KRONOS operating system on a Cyber 74 computer (Florida State University Computing Center). All computations were based on numerical abundance and numbers of species. Statistical calculations were made using the Statistical Package for the Social Sciences. Specific indices and tests for significance have been detailed by Livingston (1975, 1978), Livingston and Duncan (1979), and Livingston et al. (1978).

B. Background Information

Permanent sampling sites (visited monthly from March, 1972, to present to collect data concerning water quality and biological structure) are shown in Figure 5. In addition, a complete habitat assessment was made by divers and scientists of all inshore waters of the Apalachicola Bay system (from Indian Pass to Alligator Harbor, Livingston, 1980). The onshore portions of the East Point study area are characterized by 31 oyster houses, which are concentrated on the eastern portion of the along-shore transect (Figure 4; offshore transects 1-x, 2-x, 3-x). The number of houses goes down as one proceeds from west to east; transect 4-x was established in an area devoid of upland development (just across from the highway patrol station). Transects 1-x and 3-x were run through the existing channel and proposed spoil sites; transect 2-x ran through the existing channel. Existing grassbeds (Figure 6) are located east of the study area and, together with upland marshes, are almost entirely lacking in the East Point drainage area. Oyster bar distribution (Figure 7) is lacking in the study area. Field notes concerning the area in question (Table 3; Livingston, 1980) provide more details of the general environmental setting, which is characterized by urban runoff, high levels of boat traffic, and disturbance from dredging and filling. Recovery to a more natural setting is apparent from the radio tower (our station 4-x) eastward.

Key climatological, physical, and chemical features of the Apalachicola River and Bay system are given in Figures 8-10. A general summary of physical and biological features (Fig. 11 indicates that, during the March study period, infaunal macroinvertebrate numbers of individuals are high but declining while numbers of species are moderately high. Long-term changes in benthic macroinvertebrate assemblages in nearby East Bay (Figure 12) are the result of complex interactions (physical, chemical, biological), which have been worked out for this area. Such relationships are simply too involved for a reasonable discussion here (Livingston, 1983). Weekly samples of benthic macroinvertebrates at 2 stations in East Bay (Table 4) give some indication of background levels that may be expected in unpolluted portions of the estuary. Biomass trends give a detailed account of seasonal trends of macroinvertebrates around the Apalachicola Bay system.

C. Results of Field Analyses at East Point

1. Physicochemical Features

The results of the physical and chemical analyses are given in Table 6. Station distribution is shown in Figure 13. The extreme differences in salinity reflect rapid changes due, probably, to tidal effects in the area between the two sampling dates. As might be expected for this time of the year, dissolved oxygen levels were relatively high, as were color and turbidity values. The pH levels were also relatively uniform. These data conform to conditions observed previously in the estuary at this time of the year.

2. Sediment Analyses

The results of the sediment analyses are given in Table 7. All classification of sediment types is based on Briggs (1977). The data clearly indicate that sediments in the dredged, inshore channels are composed largely of silts. Farther offshore,at the proposed spoil sites (1-2, 3-2), medium sand prevails. This appears to be the case at the end of the channel (2-3), at the inshore reference site (4-1), and on the Cat Point transect (5-2). Fine sand was noted on the reference transect (4-2, 4-3), on the offshore point on the western transect (1-3), and on the inshore portion of the Cat Point transect (5-1). As the oyster bars off Cat Point were approached, there was an increasingly hard substrate.

These data clearly show that dredged areas proximate to storm water runoff from urban portions of East Point act as sediment traps for finer particles (i.e., silt). Such fine particles are also associated with various pollutants (i.e., oils/greases, nutrients, metals) (see above). The combination of dredging and human activities have contributed to the pollution in the East Point portion of St. George Sound, and this area closely resembles that along the Two-mile Channel and the Gulf Intra-coastal Waterway in terms of sediment type and quality.

3. Benthic Macroinvertebrates

Resuls of the biological survey are given in Table 8. Inshore dredged channels characterized by pollutant-laden silts (1-1, 1-3) were almost devoid of macroinvertebrates. The dredged channel (inshore; 2-1, 2-2) also was depauperate of such infauna with recovery noted at the end of the channel (2-3). This pattern is consistent with the sediment analysis (Table 7). The highest numbers of organisms were taken on the inshore station of the reference transect (4-1). In an unpolluted near-shore system characterized by medium sand, such a community should be optimal in terms of productivity, standing crop, and species richness. Farther offshore, in areas characterized by fine sand (4-2, 4-3; 5-1), the biota is characterized by moderate to low numbers of individuals and moderate numbers of species. This situation, also, is consistent with what we know about macroinvertebrate (infaunal) distribution. Areas of recovery, which include the proposed spoil areas (1-2, 3-2), are characterized by relatively high number of individuals and species. The reduction of toxic impact, together with high nutrient and organic input, often leads to such increases of macrofauna in such recovery areas. Even in fine sand (1-3), the nutrient recovery zones is characterized by high numbers of individuals and species.

Cluster analysis of the data (log numbers of individuals and untransformed data) corroborate the generalizations noted above. Station 1-1 was generally by itself while stations 2-1, 2-2, and 3-1 were closely associated. In this way, the silty, polluted areas showed the same general form and distribution of benthic infaunal species. Recovery areas (1-2, 1-3, 3-2) were associated with inshore reference areas (4-1) and offshore recovery areas in the dredged channel (2-3). Offshore reference points (4-2, 4-3; 5-1, 5-2) formed associated clusters as might be expected. In this way, the benthic macroinvertebrates are good indicators of natural environmental conditions and human activities in the area.

Further analysis of the biological data (Table 10) indicate that the lowest Shannon diversity indices (AH) (as well as other community indices) occurred at stations 1-1, 2-1, 2-2, and 3-1. Such indices give further proof of the biological response to dredging and urban runoff as noted above. When compared with those from other areas of the bay (Table 4, Figure 12), these data appear to show that the above areas are biologically stressed and that such areas correspond to concentrations of silt and pollutants as indicated elsewhere in this report. There is an almost direct association of urban buildup with damage to the biological integrity of St. George Sound.

III. Estimation of Impact of the Proposed Breakwater and Dredge/Spoil Projects

Based on the available information, certain qualified estimates can be made concerning the environmental impact of the proposed breakwater and dredging/spoiling projects on the Apalachicola Bay system. St. George Sound, in the area of urban runoff from East Point and previous dredging and spoiling, shows all the signs of a seriously polluted system. Grassbeds are lacking, and the effects of point and non-point urban runoff, heavy boat traffic, and dredging have contributed to the elimination of the biological integrity of inshore portions of the system.

Construction of the East Point Breakwater will eliminate all benthic organisms in areas of construction. Such losses should be partially offset by the increased habitat of the breakwater itself. Inshore areas (north of the breakwater) will probably have slight reductions in water quality in terms of organic loading, sedimentation, etc., as a result of the breakwater construction. Such effects will be proportional to the increased extent of the breakwater itself. However, such effets will have a minimal impact on the biological organization of the area since such areas are already seriously affected by dredging and urban runoff (point and non-point) from of East Point. On balance, considering the area and the construction activities, the breakwater project (and associated, limited dredging) should have minimal adverse impact on the biota of St. George Sound. The same conclusion can be reached with regard to the imnpact of the breakwater on the Apalachicola estuary in general, since projected effects of the breakwater on the current structure and salinity regime of the system should be minimal.

An evaluation of the dredging and spoiling associated with maintenance of the East Point Channel (assuming the breakwater is constructed) is more complex. Such an evaluation must, by necessity, be based on relatively few data. However, the available information is relatively consistent.

wherever there is a combination of dredging and urban runoff (together with associated boat traffic and related activities), there is a buildup of various pollutants (i.e., nutrients, oils/greases, metals). Such pollutants appear to be associated with the silt fraction of the sediments. When the sediments are placed at open water spoil sites, there is probably an immediate (temporary) release of nutrients (i.e., nitrogen and phosphorus-based compounds). The metals appear to be tightly bound to the silt particles and elutriate studies indicate that such pollutants do not get released into the water in significant amounts. What happens to the silt in the spoil bank is less clear, but it is probably eroded in time. This effect is offset by the natural high turbidity of the bay and the fact that most indigenous organisms in this portion of the estuary are adapted to heavy siltation and highly turbid conditions. Consequently, except in areas dominated by grassbeds or oyster bars, the effects of spoiling will probably be limited to the immediate spoil site and nearby (or adjacent) areas. Because of the rapid rate of reproduction and recruitment of associated benthic macroinvertebrates in soft sediment areas, biological recovery of the spoil bank would probably occur on a seasonal basis.

Specific exceptions to the above generalizations would apply in case there are alterations in current structure or salinity regime due to open water spoiling. Such is not the case here. The exact environmental effects of the dredging and spoiling depend not only on the nature and extent of such activities but on the specific area in question. There is no doubt that all adverse effects (temporary and long-term) of open water spoiling can be eliminated by upland disposal of the spoils. Assuming that the upland disposal site is suitable for such a purpose, this option will usually be the most desirable alternative in terms of reduction of habitat destruction and elimination of associated adverse effects in the subject aquatic system.

With respect to the deposition of spoil taken from the East Point Channel and placed south of the breakwater, there will be a loss of benthic productivity in the immediate spoil areas. Such loss will be proportional to the type and amount of spoil and the frequency of deposition. Using the given conditions or estimates of activity (i.e., 50,000 cubic yards at 18-month intervals), such spoiling will have an adverse (i.e., smothering) impact on the benthic organization at spoil sites. Such organization is currently composed of a diverse and productive soft-sediment community. Because it is a relatively turbid, high-energy area (relative to other portions of the sytem), devoid of grassbeds and producing oyster bars in the immediate vicinity, the effects of such an operation should be temporary and limited to the immediate area of the dredging and spoiling activities. Such adverse effects would increase in proportion to the dredging extent and frequency. Adverse water quality changes should be temporary. Movement of spoil away from the spoil site could have an adverse effect on the biological integrity of the immediate vicinity. For all these reasons, there should be a careful evaluation of the benefits of such an operation to the community at large since indiscriminate dredging and open water spoiling will have adverse effects on the bay. However, because of the various environmental factors concerning the East Point area, there should not be widespread or long-term adverse effects on the water quality in the area and the environmental impact should be largely restricted to the immediate impact area. If for any reason the spoil contaminants should be released into the water (and thus be transported to a much broader area), such an operation could have more extensive adverse effects on the environment of St. George Sound. The available data do not indicate that this will happen, however.

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