FINAL REPORT

CRYSTAL RIVER 316 STUDIES

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CRYSTAL RIVER 316 STUDIES

Prepared for

FLORIDA POWER CORPORATION

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Appendices

1.0 INTRODUCTION

In response to requirements of Part III-H, NPDES Permit No. FL0000159 dated July 9, 1979 for Crystal River Units 1, 2, and 3, Florida Power Corporation (FPC) has conducted an ecological monitoring program for the area adjacent to the Crystal River Power Station site. The sampling program was designed to address the effects of plant operation including: 1) thermal impacts on water quality, benthos, macrophytes, salt marsh and fisheries and 2) intake effects in the form of plankton entrainment and adult impingement. Thermal considerations are based primarily on comparison of control and thermally affected areas. Hydrodynamic and hydrothermal modeling were conducted to simulate offshore temperature increases under known plant operating conditions. Impingement and entrainment effects are quantified and compared to relevant population statistics. The elements of the program were grouped into four categories: Benthos, Impingement and Entrainment, Fisheries, and Physical Studies. These headings will be used in subsequent sections to provide specific information on field and laboratory procedures, results and impact assessments.

2.0 CRYSTAL RIVER UNITS 1, 2, AND 3

The Crystal River Power Station is located in Citrus County, Florida, about 13.7 km north of the town of Crystal River (see Figure 2.0-1). The site contains five units arranged as shown in Figure 2.0-2. Units 1 and 2 are coal-fired and Unit 3 is nuclear. These units utilize once through condenser cooling with water drawn from the Gulf of Mexico. Units 4 and 5 are coal-fired and have closed cycle cooling using natural draft cooling towers. Unit 4 went into operation shortly before initiation of field collections for the present program. Unit 5 became operational in October 1984, after data collection ended. Makeup for Units 4 and 5 is drawn from and blowdown is discharged to the discharge canal serving Units 1, 2, and 3. Thus, the physical and chemical environment of the discharge canal is related to operation of all operating units. However, neither the conditions of the discharge permit nor the plan of study (POS) included any separate consideration of Units 4 and 5. Therefore, the environmental descriptions and impact assessments are addressed solely in terms of Units 1, 2, and 3.

Construction at the site began in 1964 and has continued to date. Major offshore construction was completed in 1966, although dredging of the intake canal to increase the depth took place in 1979-1980. Spoil from initial offshore construction was used to create dikes adjacent to the intake and discharge channels.

Startup of Units 1, 2, and 3 spanned 12 years as shown in Table 2.0-1. Rated generating capacity, cooling water flow and condenser temperature rise are also given in the table. Actual operating conditions, however, exhibit considerable variation. Table 2.0-2 includes weekly average values of megawatts generated and temperature rise for each unit. Cooling water flows vary similarly. This variation occurs despite the units being operated to maximize operational efficiency within permitted limits. Planned or unplanned time offline is kept to a minimum. During the periods of field collection, Units 1, 2, and 3 were only offline for 72,66, and 87 days, respectively. The units were offline for periods of a week and more at the times shown in Table 2.0-2.

2.1 INTAKES

Water for all three units is drawn through a common canal located south of the units and extending generally westward into the Gulf of Mexico as shown on Figure 2.1-1. The canal has been dredged to -20 feet at MLW and is used to bring coal barges into the site. The barges dock on the south side of the canal just west of the intakes for Units 1 and 2. The dredged channel is confined between two dikes for about 5.5 km, at which point the southern dike terminates. The northern dike parallels the channel for another 8.5 km with the first opening at Fisherman's Pass occurring 2.3 km past the southern dike. Other openings occur at irregular intervals. Water flows eastward in the canal. Current velocities at the mouth of the canal were measured in August 1983 and January 1984 and ranged from 0.2 to 0.8 meters/second. Much of this range is accounted for by tidal rather than seasonal variation, however. Current velocities measured over a tidal cycle in August 1983 ranged from 0.2 to 0.6 meters/second.

Units 1 and 2

The intakes for Units 1 and 2 are very similar in construction and are immediately adjacent on the northern bank of the canal. They are located at the head of a slight embayment with the Unit 2 screenwell to the west as shown in Figure 2.1-2. A floating barrier and a coarse mesh wire fence extend across the embayment to keep floating or partially submerged debris away from the intakes. The combined intakes are about 43 meters across with external bar racks. The racks have 10.2 cm spacing between bars and are continuous from the slab of the screenwell to above the surface of the water. Each intake has four bays with a circulating water pump and traveling water screen in each bay.

The traveling water screens are the same in Units 1 and 2. Screen trays are 3 meters wide and are equipped with standard 9.5 mm (3/8 inch), square opening, wire mesh. The screens generally are operated once every 8 hours to keep the screens clean. When operating, the screens are cleaned by an internal spray wash directed at the front surface of the screens. Debris and any impinged organisms are washed from all screens of each unit into a common trough and directed to sumps located adjacent to the intakes. The Unit 1 trough is about 30.5 cm deep and slopes to the east; the Unit 2 trough is about 61 cm deep and slopes to the west. The troughs can be connected but were divided by a solid barrier throughout the present program. Screen carryover was monitored during impingement sampling and was found to be minimal.

Unit 1 has four circulating water pumps each rated as 4.9 cms (77,500 gpm); the four pumps in Unit 2 are rated at 5.2 cms (82,000 gpm). In general, the units operate with all pumps in operation, although operation with three pumps is not unusual. Rarely a unit will operate with two pumps or one pump in operation, but this is usually under circumstances when the unit is being shut down or coming back online. Also, in rare instances, pumps may be running without any heat rejection.

Unit 3

The intake structure for Unit 3 is separate from the intakes of Units 1 and 2 as indicated in Figure 2.1-2. A chain link fence extends across the entire width of the intake canal upstream of the intakes for Units 1 and 2. The fence both restricts access to the Unit 3 intake and collects floating debris.

This intake is about 36 meters across and has external bar racks. The racks have 10 cm spacing between bars and are continuous from above the surface of the water to the slab. There are 4 pump bays and seven traveling screen bays separated from the pump bays by a common plenum. An eighth traveling screen bay provides service water.

The traveling water screens are similar to those in Units 1 and 2. The screen trays are 3 meters wide and have 9.5 mm mesh. They are generally operated once every 8 hours, and they are cleaned by a front wash system. The screenwash trough slopes to the west where material is collected in a sump. The trough receives combined wash water from all screens.

Unit 3 operates with four circulating water pumps, each pump is rated at 10.7 cms (170,000 gpm). As with the other units, four pumps are generally in operation, three pumps are used occassionally, and rarely only two or one will be in use.

2.2 DISCHARGES

The common discharge canal for all units is located just north of Units 1, 2, and 3. The canal extends WNW for almost 2.6 km to the point-of-discharge (POD) at the shoreline, where the canal opens into a bay. The dredged channel, bordered to the south by a spoil bank, continues for another 1.9 km. Water depth in the canal is about 3 meters.

The discharges of the three units enter the canal near the eastern end. They are located as shown in Figure 2.1-2. The designs of the three discharges are all similar. Four circulating water lines enter an open, concrete discharge chamber. The pipes turn downward, discharging the flow in a basin. The discharge exits the chamber over a short weir and mixes immediately with water in the canal.

TABLE 2.0-1

CRYSTAL RIVER UNITS 1, 2, AND 3
OPERATING DATA

	MWe	Cooling water Flow (cms)	Condenser ΔT	Startup
Unit 1	440	19.6 (310,000 gpm)	$8.3^\circ C$ ($14.9^\circ F$)	1966
Unit 2	524	20.7 (328,000 gpm)	$9.4^\circ C$ ($16.9^\circ F$)	1969
Unit 3	855	42.7 (680,000 gpm)	$9.7^\circ C$ ($17.5^\circ F$)	1977

TABLE 2.0-2

CRYSTAL RIVER PLANT DATA
JUNE 1983 TO AUGUST 1984
MEAN VALUES FOR 7 DAY PERIODS STARTING ON SUNDAY

Date	Unit 1			Unit 2			Unit 3			POD
	MWe	Flow (10^3 gpm)	ΔT (°F)	MWe	Flow (10^3 gpm)	ΔT (°F)	MWe	Flow (10^3 gpm)	ΔT (°F)	Temp. (°F)
01JUN83*	346.61	301.12	13.73	458.14	322.02	14.11		170.00		94.04
05JUN83	352.75	306.31	11.93	433.52	300.10	12.98		170.00	1.07	93.28
12JUN83	362.32	308.62	11.80	423.52	322.14	12.01		181.13	1.20	91.43
19JUN83	358.91	310.00	13.17	480.03	328.00	13.34		170.00	1.07	94.20
26JUN83	330.07	297.93	12.85	466.81	326.53	13.71		208.68	0.68	95.29
03JUL83	369.13	310.00	13.60	422.74	317.26	12.26		366.31	0.77	95.45
10JUL83	357.40	310.00	14.18	473.73	325.56	13.48		342.02	0.45	94.88
17JUL83	359.63	310.00	14.08	453.46	328.00	13.11		443.21	0.48	95.29
24JUL83	334.98	290.16	14.39	459.07	325.07	14.40	274.51	629.40	4.66	95.00
31JUL83	352.08	310.00	14.42	425.44	328.00	13.30	539.75	620.30	12.83	97.35
07AUG83	309.40		14.53	429.54		14.14	616.50	678.99	13.25	99.18
14AUG83	357.42		14.50	344.47		16.72	637.76	680.00	13.47	99.89
21AUG83	356.48		15.03	374.76		13.56	549.74	579.22	12.35	100.09
28AUG83	326.03	305.69	14.61	455.18	328.00	13.44	616.81	622.32	14.57	99.54
04SEP83	345.41	309.08	14.66	447.45	328.00	13.95	631.21	642.56	13.37	98.46
11SEP83	341.52	292.47	15.16	413.99	321.17	14.43	536.24	614.23	13.54	96.31
18SEP83	348.06	310.00	15.27		129.83		646.10	680.00	13.26	92.73
25SEP83	324.87	293.85	15.67		135.69		626.59	571.73	13.65	85.78
02OCT83	349.06	306.77	14.52	454.66	291.88	12.20		474.83	1.47	85.51
09OCT83	280.81	308.15	14.16	466.38	313.85	13.14	811.46	631.91	3.80	87.15
16OCT83		298.93		459.47	328.00	13.04	753.02	656.73	7.96	86.81
23OCT83		307.31		452.59	328.00	12.93	863.18	680.00	16.62	87.86
30OCT83		310.00		426.33	325.56	11.91	885.32	680.00	17.30	85.08
06NOV83	356.15	309.54	16.81	452.46	327.02	13.03	826.19	643.57	16.18	83.83
13NOV83	317.21	289.24	16.41	445.87	328.00	13.10	823.29	657.74	16.80	80.26
20NOV83	283.89	268.48	15.85	395.05	328.00	12.69	817.95	637.50	16.35	78.13
27NOV83	311.83	305.39	15.26	335.36	327.02	10.09	899.85	680.00	17.28	78.65
04DEC83	276.94	306.77	14.38	337.84	328.00	9.35	894.74	680.00	17.39	79.09
11DEC83	282.75	289.24	14.91	347.27	291.27	10.62	808.00	626.37	17.06	75.01
18DEC83	309.97	304.46	17.02	312.72	328.00	10.14	891.36	673.93	17.46	74.85
25DEC83	325.40	291.55	19.53	426.74	308.96	14.70	786.96	630.12	16.32	65.67

*4 day average

TABLE 2.0-2 (Cont)

Date	Unit 1			Unit 2			Unit 3			POD
	MWe	Flow (10^3 gpm)	ΔT (^oF)	MWe	Flow (10^3 gpm)	ΔT (^oF)	MWe	Flow (10^3 gpm)	ΔT (^oF)	Temp. (^oF)
01JAN84	293.53	306.77	19.33	435.99	328.00	14.01	813.27	635.48	17.05	63.17
08JAN84	259.42	295.79	17.25	403.41	328.00	12.78	898.07	680.00	17.48	66.04
15JAN84	278.12	310.00	15.95	399.28	328.00	13.19	885.45	680.00	17.49	68.20
22JAN84	285.76	310.00	16.75	397.20	328.00	12.16	776.15	575.77	13.89	67.92
29JAN84	305.49	299.39	17.45	270.39	328.00	10.42	843.07	663.81	16.76	69.32
05FEB84	284.43	310.00	16.43	295.12	328.00	10.04	888.03	680.00	17.40	68.73
12FEB84	282.30	310.00	14.79	325.46	328.00	12.31	877.29	680.00	17.45	73.69
19FEB84	302.42	310.00	14.14	359.61	328.00	16.03	764.28	585.89	13.99	76.33
26FEB84	257.88	310.00	13.26	327.39	328.00	13.40	814.49	633.45	16.73	69.72
04MAR84	337.61		14.75				803.59	626.37	17.11	74.82
11MAR84	316.45		13.95				872.61	680.00	17.18	77.90
18MAR84	327.47		14.05				833.82	656.73	15.29	81.26
25MAR84	332.34		14.30				856.95	677.64	17.05	82.39
01APR84	292.61	285.78	13.03	393.64	301.16	11.13	845.97	648.63	10.67	72.08
08APR84		196.49		400.19	328.00	12.33	809.33	680.00	11.89	76.75
15APR84				413.46	328.00	12.61	782.78	442.20	4.75	73.44
22APR84		214.05		382.17	328.00	11.68	854.26	680.00	15.98	83.91
29APR84	327.65	310.00	14.71	439.85	328.00	12.79	850.16	680.00	17.44	88.96
06MAY84	334.64	310.00	15.40	400.40	328.00	12.18	761.14	634.46	17.07	90.24
13MAY84	304.63	310.00	15.16	368.61	328.00	11.16	852.35	680.00	17.00	88.81
20MAY84	300.19		14.63	363.15		11.99	840.71	680.00	17.37	90.21
27MAY84	268.37	295.34	13.98	361.09	328.00	11.60	814.67	664.82	17.45	88.90
03JUN84	317.64	307.13	14.75	384.63	328.00	12.36	804.09	654.70	17.42	91.00
10JUN84	301.42	288.13	15.34	395.19	326.90	11.80	846.07	663.81	17.22	92.84
17JUN84	323.58	310.00	15.31	404.64	324.99	12.43	865.27	680.00	17.44	95.17
24JUN84	332.51	303.72	15.80	404.32	326.34	12.59	811.97	654.70	17.40	95.72
01JUL84	313.49	301.50	15.21	393.30	316.57	11.95	821.48	648.63	17.23	93.73
08JUL84	321.83	265.64	14.37	419.84	328.00	12.80	861.71	680.00	17.15	96.92
15JUL84	325.02	310.00	15.05	391.31	326.94	11.67	836.71	680.00	15.43	95.30
22JUL84	332.18	300.66	15.90	380.04	325.99	11.71	856.40	680.00	17.12	95.19
29JUL84	321.39	310.00	14.24	380.01	327.02	11.58	837.07	678.99	17.09	95.47
05AUG84	328.88	310.00	14.10	404.22	304.43	12.42	822.32	673.93	16.97	99.42
12AUG84	325.70	310.00	13.24	412.03	299.80	11.25	791.75	645.60	17.03	98.90
19AUG84	339.28	301.17	14.86	280.93	190.78	10.25	808.62	654.70	16.69	96.30
26AUG84+	338.85	286.10	14.30	410.56	307.84	11.84	840.61	680.00	16.54	95.59

+ 6 day average

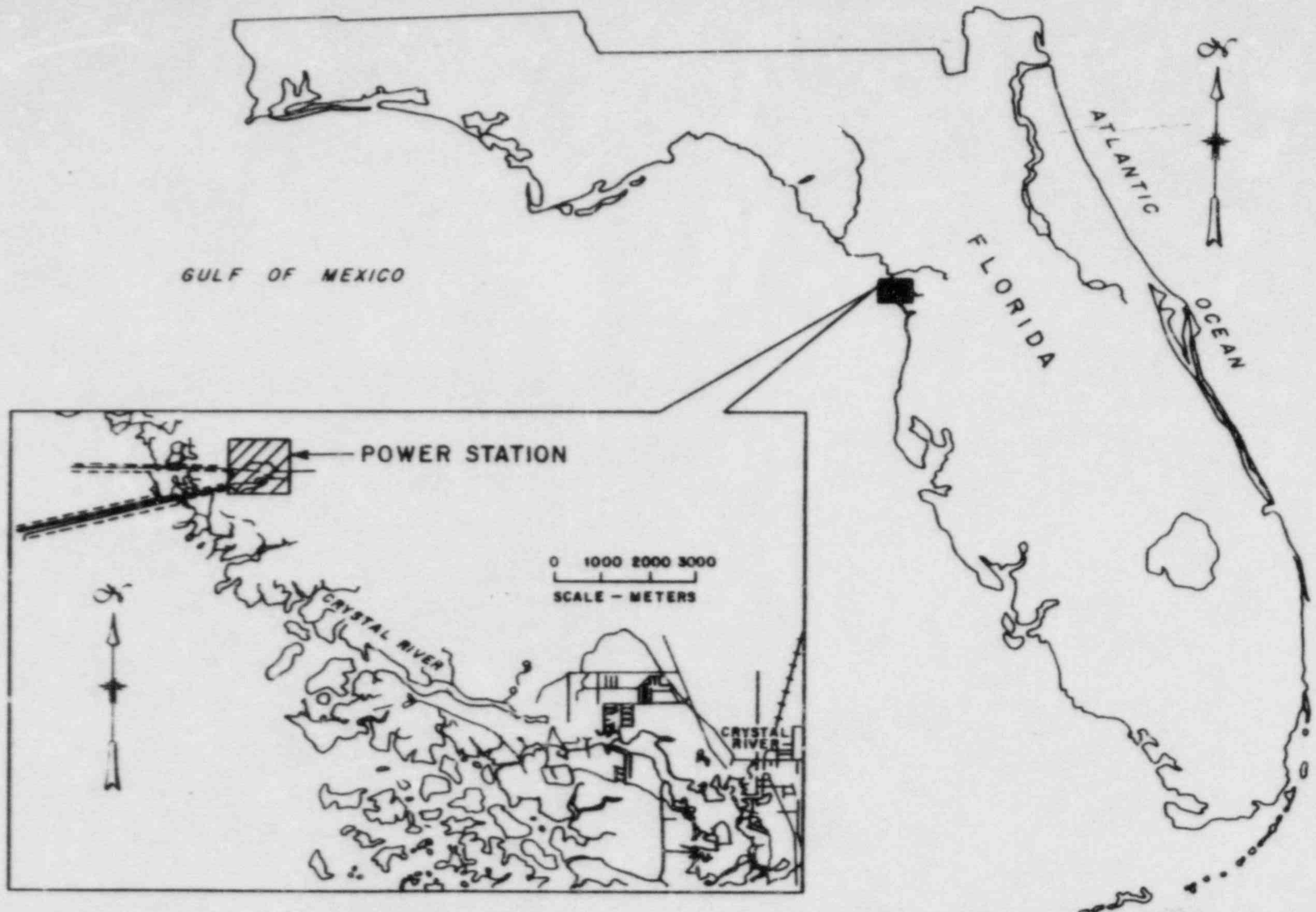
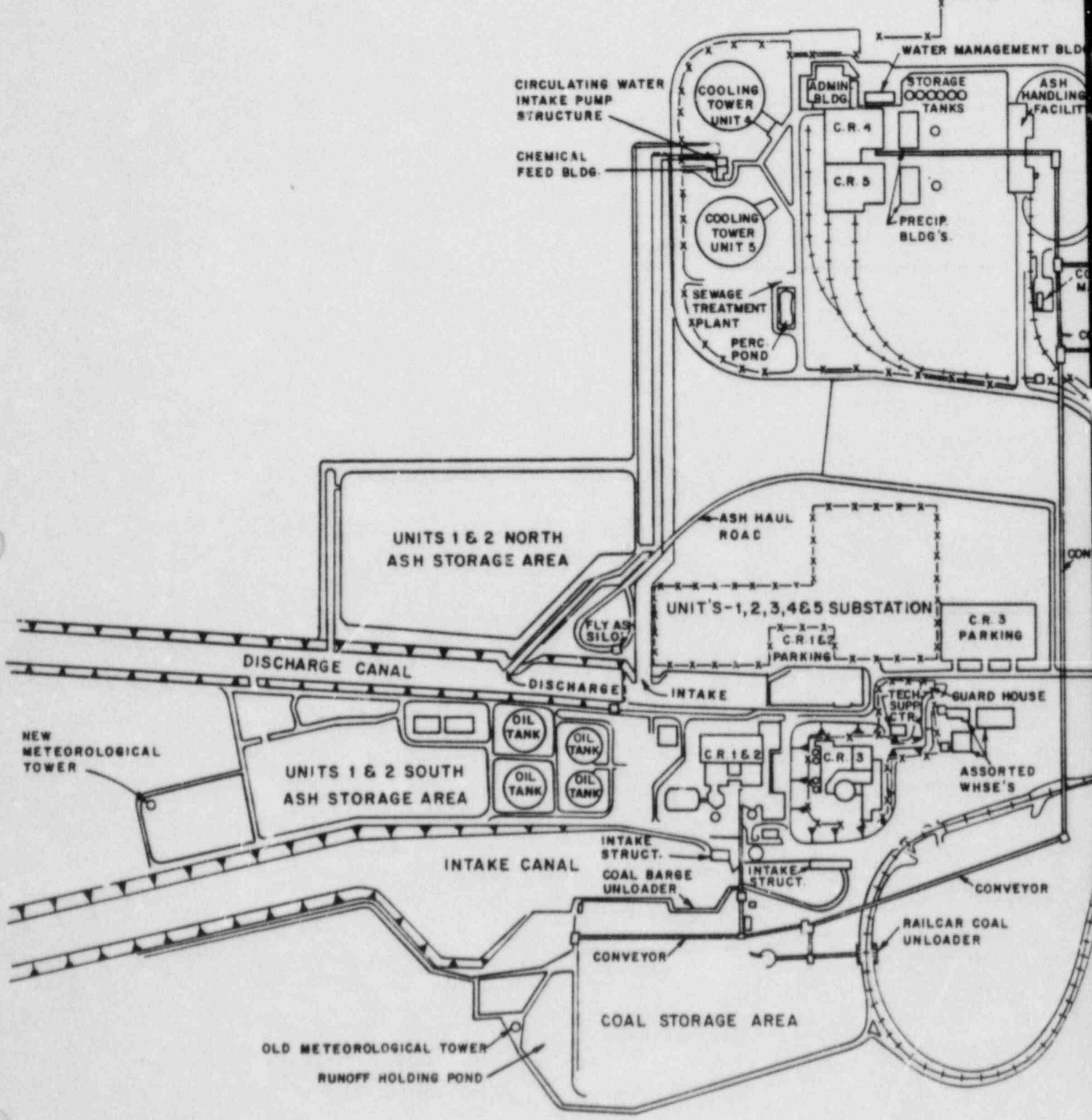
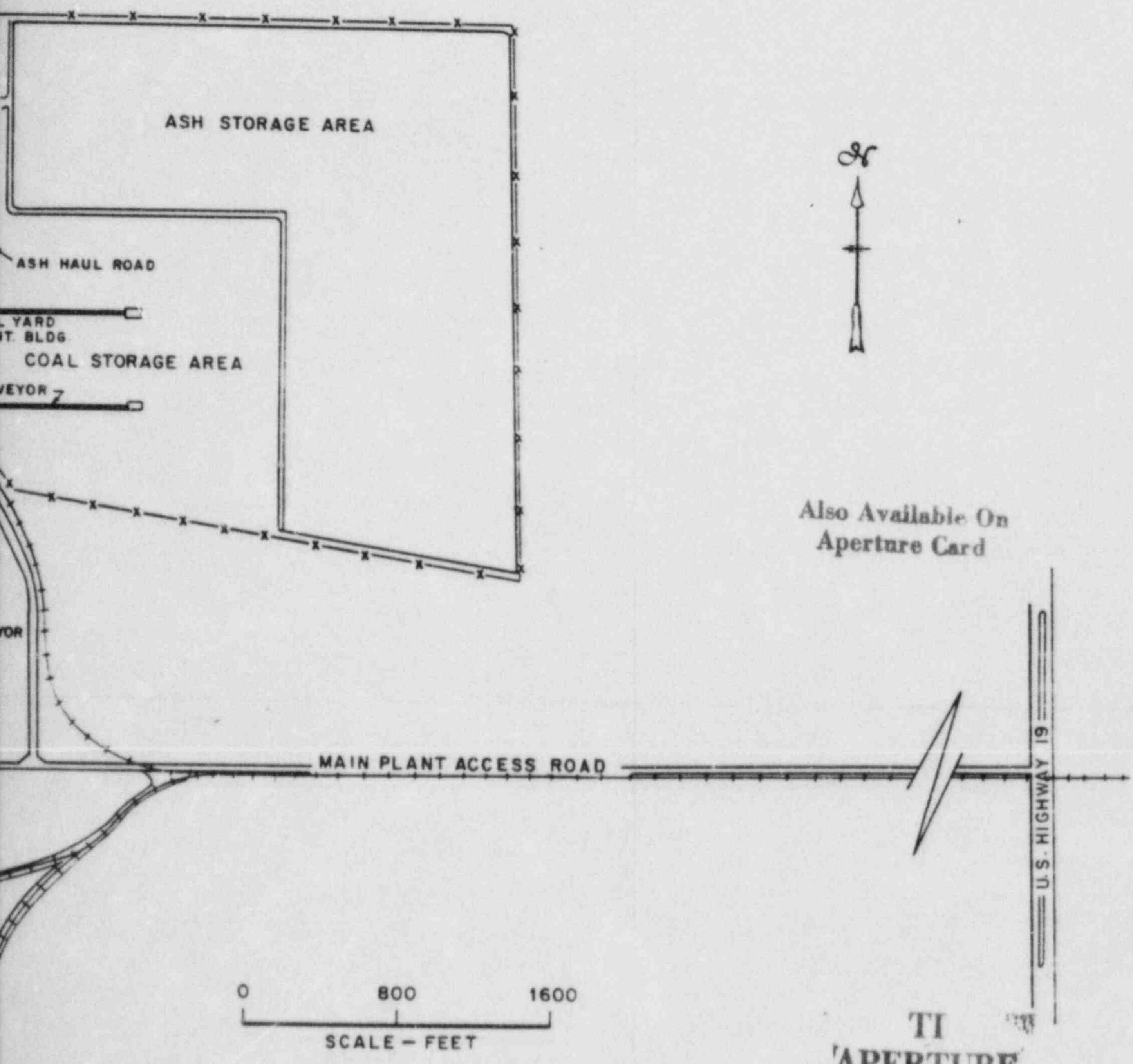


FIGURE 2.0-1

LOCATION OF THE
CRYSTAL RIVER POWER STATION
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION


WATER MANAGEMENT BLDG
CIRCULATING WATER INTAKE PUMP STRUCTURE
CHEMICAL FEED BLDG.
COOLING TOWER UNIT 4
COOLING TOWER UNIT 5
ADMIN BLDG
STORAGE TANKS
ASH HANDLING FACILIT
C.R. 4
C.R. 5
PRECIP. BLDG'S.
SEWAGE TREATMENT PLANT
PERC. POND
ASH HAUL ROAD
UNITS 1 & 2 NORTH ASH STORAGE AREA
UNIT'S-1, 2, 3, 4 & 5 SUBSTATION
FLY ASH SILO
C.R. 1 & 2 PARKING
C.R. 3 PARKING
DISCHARGE CANAL
DISCHARGE
INTAKE
TECH. SUPP. CTR.
GUARD HOUSE
NEW METEOROLOGICAL TOWER
OIL TANK
OIL TANK
OIL TANK
OIL TANK
UNITS 1 & 2 SOUTH ASH STORAGE AREA
C.R. 1 & 2
C.R. 3
ASSORTED WHSE'S
INTAKE STRUCT.
INTAKE CANAL
COAL BARGE UNLOADER
INTAKE STRUCT.
CONVEYOR
RAILCAR COAL UNLOADER
CONVEYOR
COAL STORAGE AREA
OLD METEOROLOGICAL TOWER
RUNOFF HOLDING POND



Also Available On
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FIGURE 2.0-2

STATION ARRANGEMENT
CRYSTAL RIVER POWER STATION
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

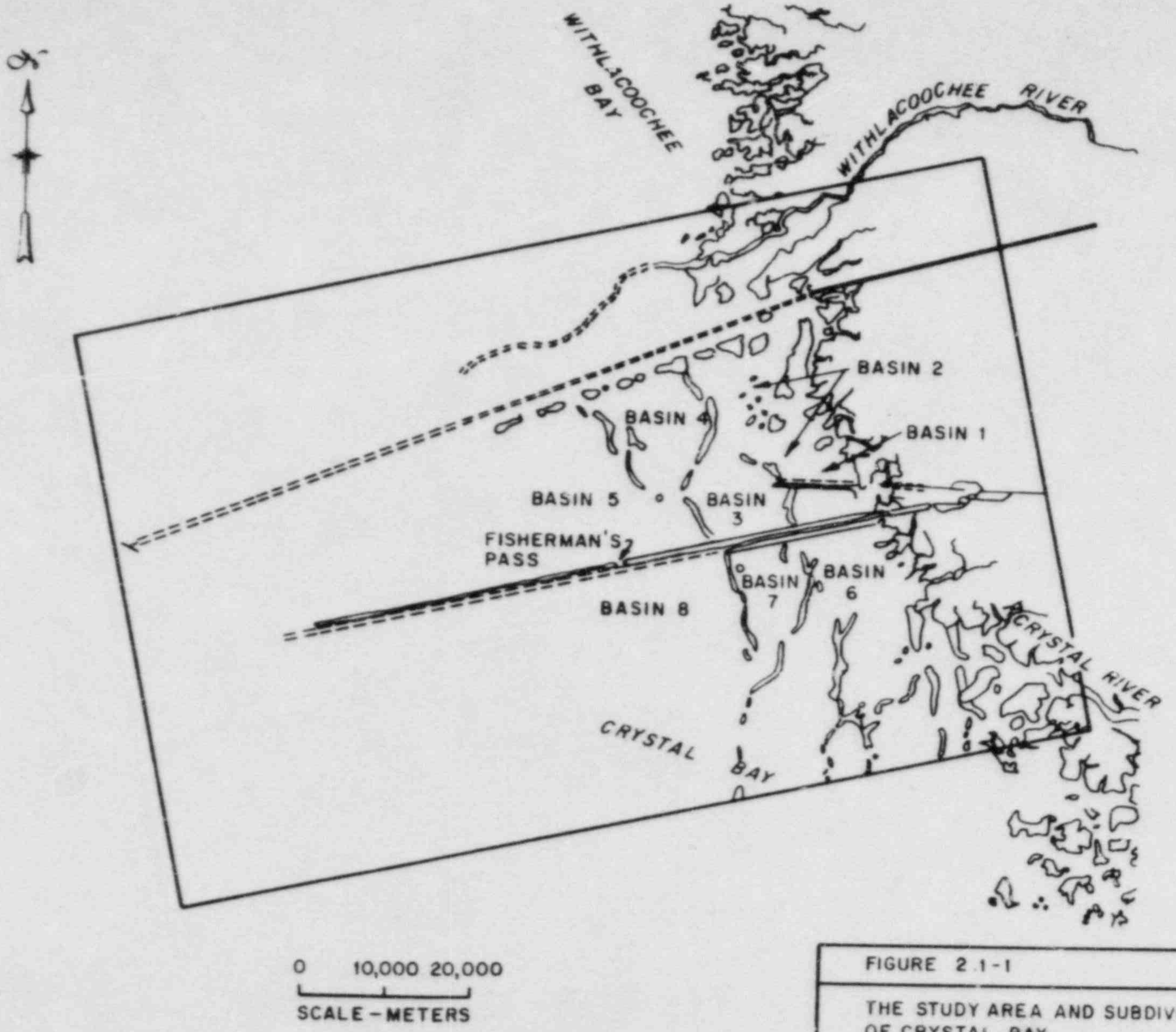


FIGURE 2.1-1

THE STUDY AREA AND SUBDIVISIONS OF CRYSTAL BAY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

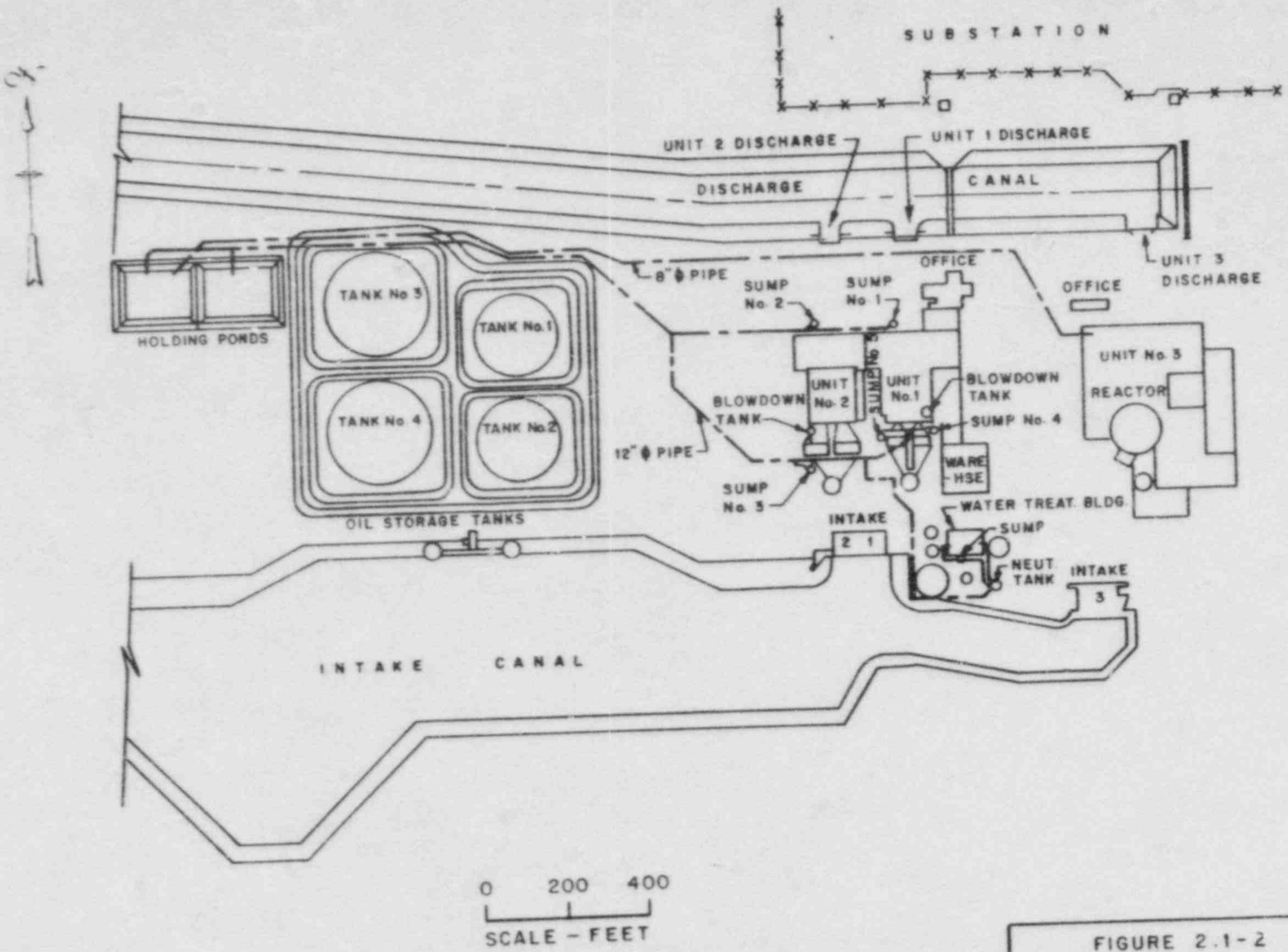


FIGURE 2.1-2

LOCATION OF INTAKES AND DISCHARGES FOR UNITS 1, 2 AND 3
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

3.0 DESCRIPTION OF CRYSTAL BAY

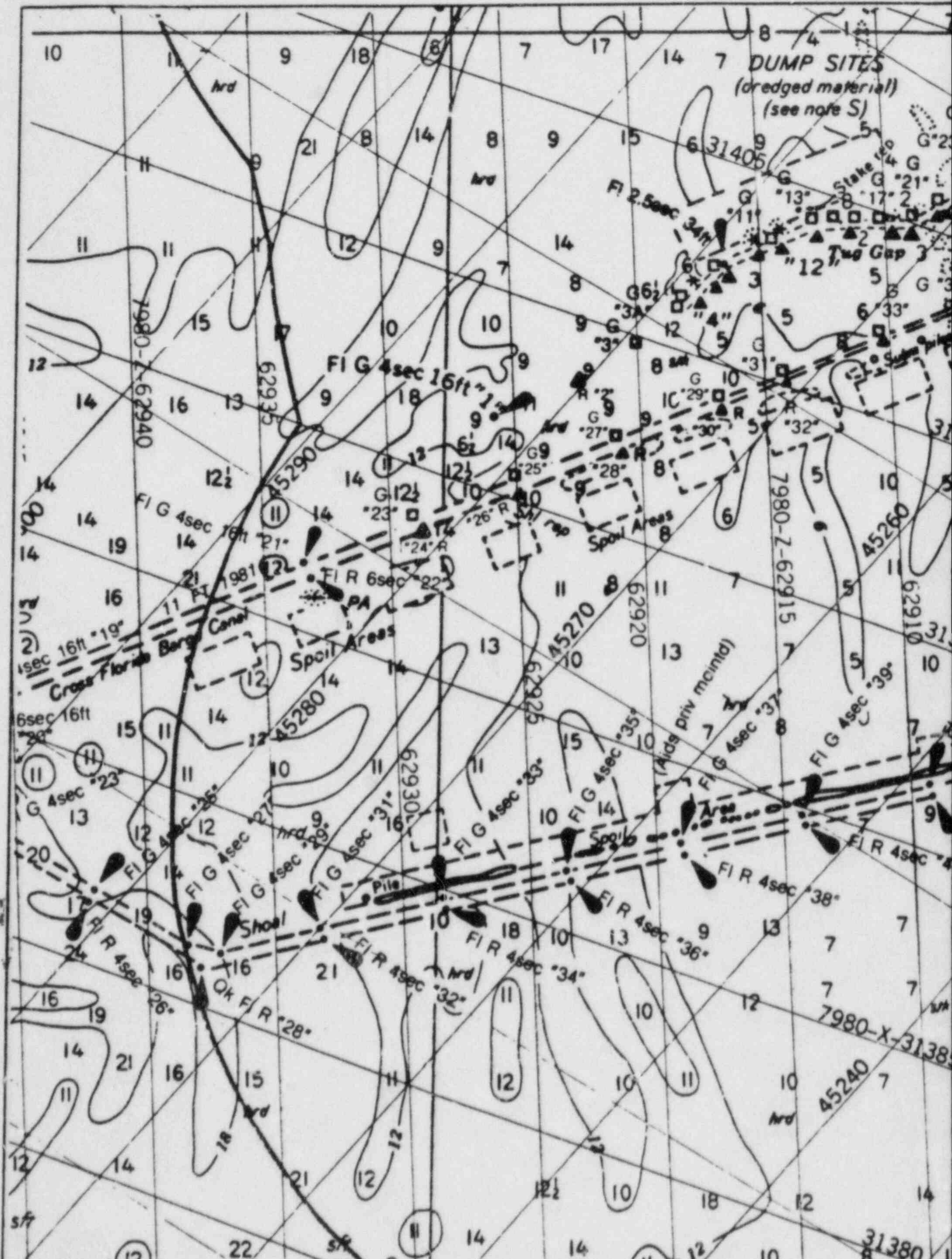
Navigation charts covering the area of the Gulf of Mexico adjacent to the Crystal River Power Station designate the waters off the mouth of the Crystal River as Crystal Bay (see Figure 3.0-1). This term will be used here to refer to that same area as well as the inshore waters north of the intake spoil as far as the mouth of the Withlacoochee River. The study area encompasses all of Crystal Bay and extends offshore about 16 km from the power plant as shown in Figure 2.1-1.

Crystal River enters Crystal Bay from the southeast. A navigation channel is maintained in the river and for several kilometers offshore. The Withlacoochee River enters the Bay from the northeast. It is somewhat smaller than the Crystal River, but it is navigable, and an offshore channel is maintained. About 1.6 km south of the Withlacoochee River lies the western terminus of the Cross Florida Barge Canal (CFBC). While the canal was never completed, the canal was dug far enough to the east to alter the local watershed and to permit drainage through the canal and into the Gulf. Flows in the canal are regulated by locks.

Offshore of the CFBC, a deep channel was dredged extending WSW from the canal. Dredge spoil was deposited south of the channel creating a series of islands paralleling the channel. Several natural islands also occur in Crystal Bay; these are generally close to shore. Larger islands such as Thumb, Drum, and Lutrell are located north of the discharge and Negro Island, and a few small islands, are found near Cutoff and Salt Creeks, south of the intake. Shell Island is located at the mouth of the Crystal River.

Crystal Bay tends to be very shallow; depths rarely reach 3 m as far out as Fisherman's Pass, and depths of 6 m infrequently occurred at the furthest offshore stations. The shallow inshore environment is dominated by oyster reefs or bars which are generally oriented parallel to shore at intervals from the shoreline. The reefs are composed of oyster shell with the bulk of the reef being composed of broken shell. Clumps of shells are apparent on the surface. The reefs are exposed at low tide, but almost all are covered at high tide. Sections of reef tend to be short with narrow passages between sections. When viewed from above, the pattern of reefs appears to define a series of basins with slightly deeper water in the center and the bottom gently sloping up to the surrounding reefs. Previous reports on Crystal Bay have defined and numbered the basins as shown in Figure 2.1-1.

The coastal area of Crystal Bay is characterized by salt marsh dominated by Juncus roemerianus with bands of Spartina alterniflora. The marshes are fairly flat and extend inland for about 1.6 km in places. A number of small creeks drain the marshes. The creek system adjacent to Basin 1 is particularly extensive.



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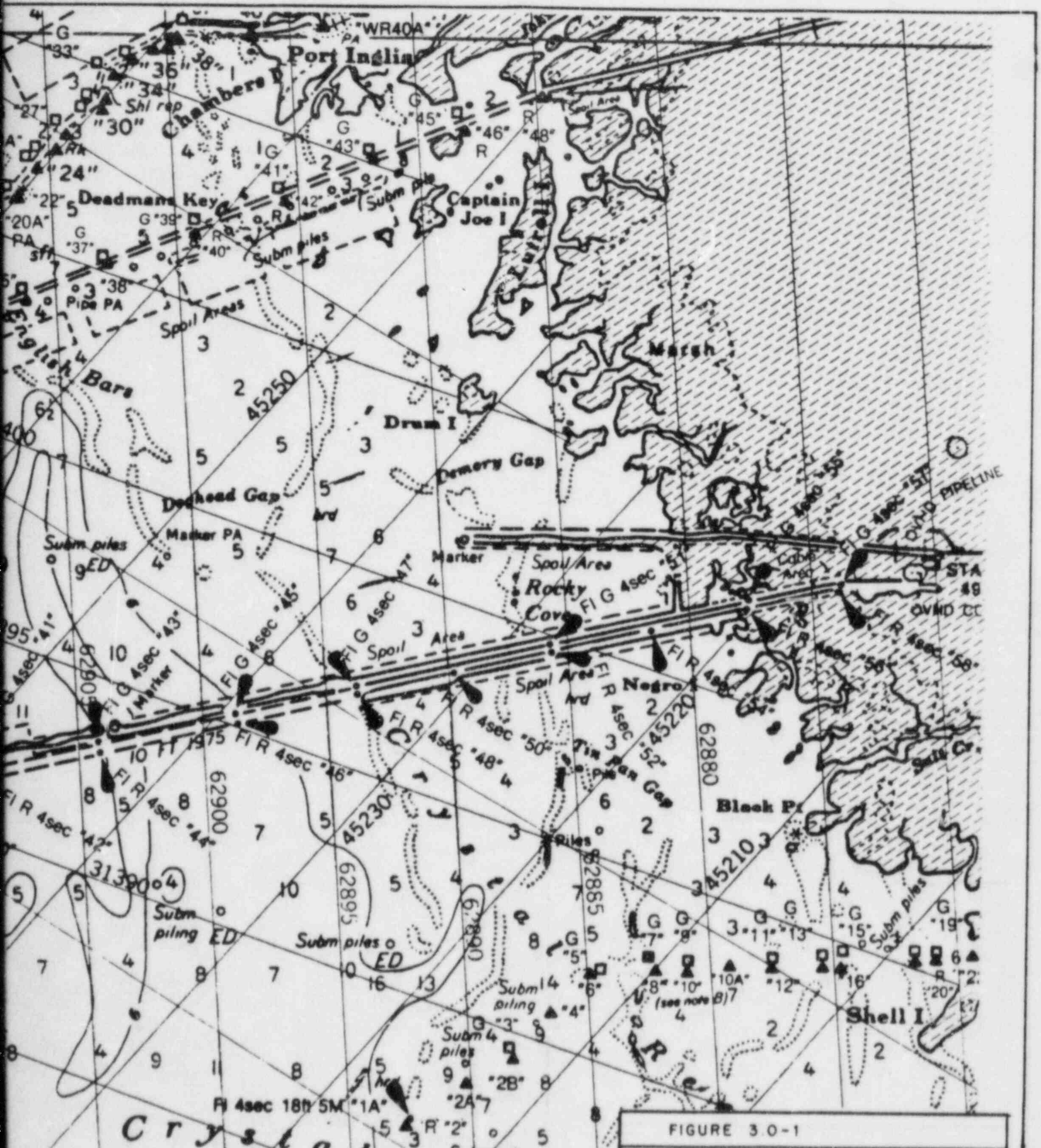

FIGURE 3.0-1

CRYSTAL BAY NAVIGATION CHART
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

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4.0 PREVIOUS STUDIES

The present program is one in a series of studies conducted at the Crystal River site. Most of the studies were intended to address the effects of power plant construction and operation on the local ecosystem. Three exceptions were Dawson's (1955) early study of oyster biology and hydrology, Phillips' (1960) study of marine plants, and the more recent study conducted by CH2M Hill (1983) to provide data for the Withlacoochee Regional Planning Council.

Comprehensive studies relating to the power plants essentially began in 1969 at which time Unit 1 was in operation, Unit 2 was starting up, and a construction permit had been issued for Unit 3. The studies were performed by the Florida Department of Natural Resources (DNR) and a series of publications resulted (Grimes 1971; Lyons et al 1971; Quick 1971; Steidinger and Van Breedveld 1971; Grimes and Mountain 1971; and Mountain 1972). The last data collection took place in 1971. In approximately the same time frame, the University of South Florida initiated studies of thermal effects (Carder 1970; Klausewitz 1972). Plume mapping and modeling were emphasized.

Licensing activities related to Unit 3 resulted in initiation of further studies in 1972. Personnel from the University of Florida performed a variety of studies; other participants were the University of South Florida, Gilbert and Associates, and Dames and Moore. In 1973, the studies came under the auspices of a specially formed Interagency Research Advisory Committee. Study results were presented in a multiple volume report (FPC 1974a) and several supplemental publications (FPC 1974b; FPC 1975; Osterling 1976). Predictive hydrothermal modeling continued through 1975 and into 1976. Results of the modeling addressed the effects of future operation of Unit 3 (Carder et al 1976).

Unit 3 began commercial operation in March 1977, and an operational monitoring program required by the environmental technical specifications began at that time. Initial participants in the program were the University of Florida, NUS and Connell, Metcalf and Eddy. Applied Biology held a contract in the later stages. Although the scope of the program varied over time, elements of the studies continued through 1981. Results were reported in a series of annual reports (FPC 1978a; 1978b; 1979a; 1979b; 1980; 1981; 1982a) and summarized in two publications (FPC 1982b; Applied Biology, 1983).

The publications cited above report studies of essentially all components of the Crystal Bay ecosystem; however, the results from almost all of these studies cannot be directly compared to results from the present study. Comparisons are limited because: 1) plant construction and operating conditions did not approximate present conditions until 1981, 2) collection techniques for particular biotic groups varied, and 3) laboratory and analytical techniques varied. The data from these previous studies were used in designing the present study.

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5.0 DEVELOPMENT OF THE PLAN OF STUDY

Field sampling conducted at Crystal River is described for each program element in subsequent sections of this report. The program originally was designed for FPC by a series of contractors and was described in the document entitled "Plan of Study, Crystal River 1, 2, and 3 NPDES 316(a) and 316(b) Ecological Monitoring Program." The Plan of Study (POS) was prepared in August 1979 and revised in November 1982. It was submitted to the U.S. Environmental Protection Agency (EPA) for approval on November 15, 1982.

Subsequent to approval of the POS, Mote Marine Laboratory (MML) reviewed the program and proposed changes to the Benthos, Impingement and Entrainment, and Fisheries sections. The changes were presented in "Proposed Revisions to Plan of Study, Crystal River 1, 2, and 3 NPDES 316." More limited changes were also proposed for water quality aspects of the Physical Studies section. FPC accepted the proposed revisions, obtained preliminary approval from regulatory personnel and submitted a request for proposal for the revised POS. Stone & Webster Engineering Corporation's (SWEC) proposal was to implement the program as written with the exception of the hydrodynamic/hydrothermal modeling which would accomplish the objectives using different models. Field collections remained unchanged. The proposed revisions and the pertinent proposal material were submitted to the EPA on February 22, 1983. In March 1983, SWEC was awarded the contract to implement the program. The field work and preparation of the Benthos section of the report were conducted by MML under contract to SWEC. MML utilized personnel from Mangrove Systems, Inc. to work on the macrophyte component. Personnel responsible for specific program elements are listed in Appendix I.

As the field program began in June 1983, some modifications to the sampling program were needed to accommodate local conditions or to enhance analysis of the resulting data. These changes were summarized in the First Quarterly Progress Report (SWEC 1983) and presented orally at the First Quarterly Progress Meeting held on October 27, 1983. All changes were discussed before implementation and written notice was provided to EPA and to the Florida Department of Environmental Regulation (DER). Formal approval of all changes in the program was received by FPC on April 17, 1984.

Throughout the program, quarterly reports have been issued containing summary data tables for the field components and other related information (SWEC 1983, 1984a, b, c, d). These reports were submitted to U.S. Fish and Wildlife Services (FWS) National Marine Fisheries Service (NMFS), EPA, DER, and the Nuclear Regulatory Commission (NRC). In addition to data tables, a tape of computerized data will be made available to EPA at the program's completion. Quarterly progress meetings have been held with state and federal regulatory agency personnel invited to participate. Regular participants have included the EPA and the DER. As a result of the meetings, phone conversations, correspondence or other discussions, any program changes initiated after the start of field sampling have been subject to prior approval by the agencies.

FPC summarized the above information in "Crystal River 316 Study, Plan of Study - Summary," to provide a single document outlining the program in its final form. Table 3.0-1 summarizes the field program and provides for each component the pertinent number of stations, replicates, samples, sampling frequency, and period of study. Field collections were completed in August

1984. The dates of these collections were summarized in the Fifth Quarterly Progress Report (SWEC, 1984d).

After collection and laboratory analysis of samples and summarization in the quarterly reports, the data were analyzed in a variety of ways for presentation in this report. Nearly all of the statistical summaries and analyses of data were done with Version 82.3 of the Statistical Analysis System (SAS) (SAS 1982). This system offers a high level language of commands (called PROCs) which follow many of the standardized statistical procedures found in most statistical methods texts such as Snedecor and Cochran (1967). The most frequently used SAS PROC for this study is the Generalized Linear Model (GLM) procedure. A linear model in this case could be represented as:

$$Y = b_1X_1 + b_2X_2 = b_3X_3$$

where Y represents the dependent variable (such as surface temperature), X represents a discrete (such as station) or continuous (water depth) independent variable or treatment, and b represents the i^{th} treatment mean or deviation of the i^{th} treatment mean (for the discrete case) or the slope of the least squares relation of Y on X (for the continuous case).

This SAS procedure provides an analysis of variance type summary of the relative importance of the independent variables in the model. The procedure also provides estimates of the values of the b's in the model. For nearly all the GLM analyses a Tukey's Honestly Significant Difference (HSD) test was provided. The anova type format confirms if at least one individual level, e.g., station, of an independent variable is statistically significantly different from at least one other level (station) of the same variable. The HSD test identifies which of the levels is different.

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TABLE 5.0-1

SUMMARY OF ECOLOGICAL PROGRAM
CRYSTAL RIVER STUDIES

Study Component	No. of Stations	No. of Rep.	Frequency	Total No. Samples	Study Period
I. Benthos					
A. Benthic core	20	6(+2)	Quarterly	600	15 mos
	20	6(+2)	6 wks	1200	15 mos
B. Macrophyte mapping	50	10	Quarterly + 1 Preliminary	3000	15 mos
	9(intens.)	10	6 wks	900	15 mos
	9(intens.)	5	6 wks	450	15 mos
	9(intens.)	3	6 wks	270	15 mos
C. Aerial photographs	1	1	3 times	3	15 mos
D. Oyster reef	9	90	Monthly & Bimonthly	14580	12 mos
E. Salt marsh program	8	24	6 wks	1920	15 mos
F. Physical					
a. Chlorophyll 'a'	8	2 depths	Weekly	1040	15 mos
b. Sediment	40	3	Quarterly	1200	15 mos
c. Photometry	40	1 profile	Weekly	2600	15 mos
d. Turbidity, D.O., pH, Salinity, Temperature	40	multiple depth	Weekly	5200	15 mos
e. Sediment Temperature, Eh	40	1 depth	Quarterly	200	15 mos
	20	1 depth	6 wks	200	15 mos

TABLE 5.0-1 (Cont)

Study Component	No. of Stations	No. of Rep.	Frequency	Total No. Samples	Study Period
II. Impingement and Entrainment					
A. Impingement	3	4	Weekly + 3 times	660	12 mos
B. Entrainment	15	3	Biweekly day/night	2880	15 mos
III. Fisheries					
A. Trawl	9	7	Monthly (night)	756	12 mos
B. Seines	4	2	Monthly	96	12 mos
C. Drop net	2	2	Monthly	48	12 mos
D. Creek trawls	4	7	Monthly (day)	336	12 mos
E. Crab traps	120	1	17 times	2040	4 mos
F. Crab impingement	1	1	17 times	17	4 mos
IV. Physical Studies					
A. Suspended loads	40	4 analyses	Biweekly	5120	15 mos
B. Bathymetry				1 survey	
C. Short-term	16	1		Variable	2 mos
D. Long-Term	51	1 or 2	Continuous	Variable	12 mos
E. Meteorology	1	1	Continuous	Variable	15 mos
F. Temperature profiles	Variable	2	Variable	Variable	2 mos

6.0 BENTHOS

The benthos component of the present study includes the following elements: water quality, sediments, benthic infauna, macrophytes, salt marsh, and oyster reefs. Each of these elements was sampled by unique methods and these methods, as well as results from each type of sampling, will be described separately in subsequent sections. For the biotic elements, impact assessment associated primarily with the station discharge will be addressed.

6.1 WATER QUALITY

6.1.1 Sampling and Laboratory Analysis

Water quality investigations during this study included both in situ and laboratory determinations performed weekly at 40 stations over a period of approximately 15 months, from June 9, 1983 to August 27, 1984. Station locations are shown in Figure 6.1-1. Sampling dates were selected to provide information for both high and low tide conditions.

Actual sampling times on each day were designed around two temporal windows. During a 90 minute interval centered on the predicted time of high or low tide, in situ temperature and conductivity data alone were collected at 27 selected stations (4-30). The second window was a 4 hour interval centered on local noon, during which measurements of water column depth, temperature, conductivity, pH, dissolved oxygen, and light penetration were made at all 40 stations. Salinities and corrected dissolved oxygen values were later calculated from these data.

Water samples for laboratory analysis were also collected from all stations during the 4 hours centered on local noon, the photometry window. Determinations of turbidity at the surface and bottom of each station were made weekly. Samples for chlorophyll analysis were collected at a randomly chosen eight of the 40 stations. On alternate weeks, surface and bottom samples were collected for suspended load analysis (total and volatile nonfilterable residue).

Station locations were typically identified by the use of onboard Loran C (Sitex Koden C787). Water column depths were recorded with either calibrated fathometers or with marked leadlines.

In situ measurements of temperature and conductivity were made with Beckman RS5-3 inductive salinometers. Surface and bottom measurements were made in depths less than 1 meter. For water column depths of 1-3 meters or less, surface, mid-depth, and bottom readings were taken. In depths greater than 3 meters, data were recorded from surface, one-quarter depth, mid-depth, three-quarters, and bottom. Calculations of salinity from these data were performed later using equations developed by Cox et al (1967), UNESCO (1966) oceanographic tables, and the salinity-conductivity relationships of Jaeger (1973).

Dissolved oxygen measurements were performed with YSI 57 dissolved oxygen meters and polarographic membrane electrodes. Measurement depths were surface and bottom for depths of 1 meter or less, and surface, mid-depth, and bottom for depths greater than 1 meter. These instruments were operated without the salinity correction function to minimize possibility of sampler error. Dissolved oxygen readings so obtained were later corrected for salinity and percent saturations were calculated using the polynomial relationship developed by Weiss (1970, cited in Riley and Skirrow 1975).

Measurements of pH were performed with Martek Mark VII multiparameter meters and/or an Orion 201 pH meter. Measurement frequencies were at the same depths as previously described for dissolved oxygen.

Quality assurance measures for these in situ parameters included: full bench calibration of meters before and after sampling; field calibration of salinometers and D.O. meters; a repetition of all water column measurements at one station out of ten; verification of the temperature function of the Beckman salinometers against thermometer readings or the temperature function of the Martek Mark VII meters; and collection of water samples at a rate of 1 for every 10 measurements for laboratory analysis of pH, dissolved oxygen, and conductivity. These water samples were preserved appropriately and the analytical values obtained were compared to the recorded field values.

Photometry measurements, quantification of solar radiation and extinction, were made in situ using LiCor integrating quantum radiometers. These instruments are sensitive in the photosynthetic spectrum of 400-700 nm and measurements were made in air, just below the water's surface, at secchi depth, and/or at bottom. The secchi depth and percent cloud cover were also recorded. The deck and submersible sensors for these instruments were calibrated by the manufacturer on an annual basis and checks of the mechanical zero were performed at the beginning of each sampling episode.

Surface water samples were collected from just below the surface as grab samples. Samples at depth were secured using a Niskin or Kemmerer type sampler. Samples for pH and conductivity analysis were maintained at ambient temperature, those for dissolved oxygen determinations were fixed with manganous sulfate and alkaline azide iodide solutions for later Winkler titrations. All remaining samples for turbidity, chlorophyll, and suspended load analyses were iced on collection and maintained either on ice or at 4°C until analysis.

Laboratory analyses were performed within the EPA recommended, parameter specific, holding times. Analytical methods employed were as follows:

<u>Conductivity</u>: Method 205, platinum electrode (APHA 1980).

<u>Dissolved Oxygen</u>: Method 360.2, azide modification of Winkler analysis, full bottle technique (EPA 1979).

<u>pH</u>: Method 150.1, electrometric (EPA 1979).

<u>Turbidity</u>: Method 180.1, nephelometric (EPA 1979).

<u>Chlorophyll 'a'</u>: Method 1002G, spectrophotometric determination of chlorophyll 'a', corrected for pheophytin 'a' (APHA 1980).

<u>Total and Volatile Nonfilterable Residue</u>: Method 209D and 209G, total nonfilterable residue dried at 103-105°C and volatile nonfilterable residue ashed at 550°C (APHA 1980).

Water quality data were analyzed using the SAS GLM procedures. The specific analysis varied with the parameter, however weekly values, either individually or averaged over depth, were most often evaluated by quarter and station. Other variables used included tide, depth, occurrence of storms, and barge traffic. Where appropriate, variation based on other water quality parameters was considered. For example, turbidity values were analyzed for variation with quarter, station, depth, storms, barge traffic, total suspended solids, conductivity and chlorophyll a.

6.1.2 Results

Samplings were divided into five groups of thirteen episodes each. Months were divided as follows: Summer - Quarter I, June, July, August; Fall - Quarter II, September, October, November, first week of December; Winter - Quarter III, December remaining, January, February; Summer - Quarter IV, March, April, May; Quarter V, June, July, August. Tabular means of parameter values are presented in Appendix II for each quarter and for the project as a whole. It should be noted that project means (Quarters I-V) cannot be used as annual averages, as they are biased by the inclusion of two summer quarters.

Tables of quarterly values were generated from the entire data base for all parameters except pH, dissolved oxygen, turbidity, and total suspended load. These means were computed during analyses of variance as a function of four or more independent variables. Occasionally, when an independent variable was missing, the dependent variable was not included in either the statistical analysis or the calculated mean.

The historical water quality data bases for the study site consist primarily of temperature and salinity observations collected either in conjunction with biological community analyses (Grimes 1971; Applied Biology 1982) or for numerical model calibration and verification efforts (Klausewitz 1973). Efforts have been made to separate the thermal effects attributable to the power plant from those produced by seasonal and daily insolation (Carder 1974). Modeling efforts have centered on prediction of the areal extent of the thermal plume under a number of seasonal, tidal, and plant operation conditions and to accurately simulate interbasin flows forced by the dredged spoil islands and naturally occurring oyster reefs (Klausewitz 1979).

Dissolved oxygen and chlorophyll levels were frequently recorded during previous studies of macrophytes and of phytoplankton communities and productivity/respiration ratios (FPC 1975; FPC 1980).

Subsequent to the construction of the intake and discharge dikes and the redirection of Double Barrel Creek, mapping of bottom types indicated a highly depositional environment in the discharge vicinity and was attributed to the rapid erosion of new stream beds (FPC 1975; Cottrell 1974). With the concern over the effect of light attenuation and non-catastrophic siltation on attached macrophytes and sessile infauna, turbidity, extinction coefficients (secchi depths), and sedimentation rates were quantified (Cottrell 1978; Knight and Coggins 1982; CH2M Hill 1983).

The present study was designed to provide a detailed record of local water quality conditions in the area. Sources of turbidity and suspended load were to be identified as possible sources of light attenuation. The effect of storms and plant related activities (barge traffic) on these parameters was also to be investigated. Chlorophyll concentrations were to be used as a first approximation of the distribution of phytoplankton (for input to the turbidity analyses.)

Temperature

Temperature data and other water quality data presented below were subjected to analyses of variance (ANOVA) using a Generalized Linear Model (GLM) procedure. These statistical procedures are designed for unbalanced data with more than one treatment variable. Comparisons of quarterly and station means were made with Tukey's Studentized Range Test (honestly significant difference) and at a confidence level of 95% (alpha = 0.05). Results of the ANOVA's are provided in Appendix II.

Individual analyses of variance were performed on surface temperatures (ST), and bottom temperatures (BT) as a function of quarter, station, tide, station-tide interaction, and depth. If more than one observation was made at a station during a sampling episode, only that taken closest to the time of predicted slack water was selected for analysis. The models generated for both dependent parameters were highly significant.

For surface and bottom temperatures, both quarter and station terms accounted for a significant portion of the data variability. Seasonal dependence of all temperatures at the site were indicated. The contribution of the station term suggested a constant spatial distribution of temperatures once seasonal fluctuations had been removed. This areal pattern could be the result of the thermal influence of the discharge, insolation and warming of shallow water bodies, or any other relatively constant heat source or sink in the study area.

Seasonal changes in water temperature resulted in quarterly mean surface and bottom values (all stations combined) that were significantly different from one another. The two summer quarters were also significantly different, although the absolute value of the difference between the means was only 0.70 and 0.56°C for surface and bottom temperatures. Temperature plots during those seasons with the lowest and highest mean bottom temperatures are presented in Figures 6.1-2 and 6.1-3.

Station by station statistical comparisons of tidally averaged surface and bottom temperatures (Figures 6.1-4 and 6.1-5) were compiled and stations were grouped based on the pattern of significant differences with other stations. Stations are in order of decreasing temperature means as determined by the GLM with Level A stations having the highest overall temperatures, and presumably the most direct thermal impacts, Level B the next highest, etc.

The highest mean temperatures were recorded at Station 17, the station most proximate to the POD and most likely to be directly influenced by the thermal discharge. Station comparisons produced a core group of four additional stations (13, 18, 19, 29) which are not dissimilar from Station 17. These five stations comprised Level A for both surface and bottom temperatures.

Level B stations, the group with the next highest project temperature means, were comprised of slightly different stations for surface and bottom observations. In addition to Stations 14, 20-22, 28, and 30, Stations 23 and 27 were included for surface but not for bottom temperatures, while Stations 4 and 5, near the CFBC, were included for bottom but not for surface.

Level C stations were those significantly different from the three warmest (17, 18 and 19) and were comprised of Stations 5, 6, 7, 15, and 16 for surface temperatures, and 15, 23, and 27 for bottom values. Level D surface stations were 4, 8, 9, and 24; bottom stations were 6, 7, and 16. These divisions are illustrated in Figures 6.1-6 and 6.1-7).

For the ST model and the BT model, depth did not contribute significantly. As the depth term was applied last in the analysis, and as the station variable is not truly independent of the depth observed on station, it is possible that such phenomena as solar warming of shallow water masses were already evaluated by the station variation.

The results of the ANOVA imply that as the tide term was not significant, there was no consistent fluctuation of temperatures with tide over the study area as a whole. The station-tide interactive term also indicated no significant interaction or multiplicative effect between these two parameters once the variability due to station has been removed. However, despite the insignificant effect of tide in the GLM procedures, isotherms of high and low tide means for the duration of the project showed large differences in the areas enclosed by selected isotherms (Figures 6.1-8 and 6.1-9) and temperature differentials of up to 2°C were observed at several stations (22, 23, 29, 30). A more continuous deseasonalization based on maximum daily air temperature or isolation (Figure 6.1-10) or the inclusion of plant operations (Figure 6.1-11) in the statistical model might have prevented the masking of temperature fluctuation due to tidal stage. Unfortunately, gaps in the meteorological record decreased the utility of this data base and the fluctuations apparently produced by plant discharges appeared to be less than those due to seasonal climatic temperature changes.

As illustrated in Figures 6.1-8 and 6.1-9, during low tides the thermal plume turns SW and includes Station 29 in the stations classified as Level A. During high tides, a steeper thermal gradient was maintained in the immediate discharge area, and temperatures at stations to the north (4, 5, 13) were elevated. These observations were compatible with the modeling and short term results (see Section 10).

Concern has been voiced previously (Carder 1974) that a large portion of the acreage of the observed thermal plumes was an artifact of water flowing from the CFBC and entering the study area, particularly on an ebbing tide. This water would have been confined and subject to warming from solar radiation and the effect should have been most evident at Stations 4 and 5. This solar warming phenomena was not observed to be the most influential factor on bottom temperatures at Stations 4 and 5 of the present study, although freshwater inputs from the CFBC to the study area were apparent. During low tide samplings, when CFBC influence was highest (lowest salinities) and surface to bottom salinity gradients were most pronounced. Warmer, more saline water was found at the bottom of the water column. More pronounced temperature differences (bottom higher) were observed at high tides. This pattern was observed during all quarters of the study, including Quarters I and V when maximum insolation and warming of the less saline waters of the Canal was expected.

Radiation absorption and subsequent heat transfer to the water column by bottom sediments was apparently not a factor in producing this temperature gradient at Stations 4 and 5, as only approximately 2% of the subsurface light reached the bottom on the average. Stations of comparable depths, south of the intake, did not develop thermal inversions to this extent even though 25% of the subsurface light reached the bottom.

Surface temperatures did not show an obvious effect of heat input from the CFBC. Tidally averaged surface temperatures of Stations 4, 5, and 6 during the summer (Quarter I, maximum insolation) (Figure 6.1-12) were cooler than adjacent stations (1, 7, or 14) and were comparable to Stations 31 and 38, nearshore stations south of the intake and less subject to freshwater influences. Finally, mean surface temperatures observed during low tides at Stations 4 and 5, when salinity indicated maximum input from the CFBC, were again less than observations at high tide (Figures 6.1-13 and 6.1-14).

Thermal stratification was investigated by an ANOVA of DT, surface temperature minus bottom temperature, as a function of quarter, station, tide, station-tide, and depth. Again quarter and station were the most significant factors in accounting for the variation in observed data. For this model, however, the F value produced for the quarter term, while still significant, was two orders of magnitude less than for the models of ST and BT, indicating seasonal fluctuations are less statistically significant. The station-tide interactive term and depth (a function of station) also contributed significantly to the variations observed.

Mean vertical gradients of temperature were inverted (negative values of DT) in Basins 2 and 3. This previously observed (Grimes and Mountain 1971), phenomenon was attributed to the withdrawal of waters from approximately 5.5 km offshore (salinity 23-24 o/oo) and discharge into a nearshore, less saline environment. The warmed discharge, however, was still denser than the receiving waters, and higher temperatures were observed by the authors at the bottom of the water column until mixing produced a more homogenous water mass.

During the project, repetitive temperature measurements made on a single station visit differed by an average of 0.06°C and the instrumental precision criterion that was generated allowed the detection of differing water masses when temperature differentials exceeded 0.22°C. Station means for the project showed thermal inversions of 0.22°C or more at Stations 4, 5, 13, 14, and 20 over the course of the project. The maximum inverted gradient, -0.68°C, was observed at Station 4. These stations were all considered Level A and B thermal stations for bottom waters. Salinities at Station 17 indicated that both surface and bottom waters were relatively uniform and highly saline. The station was also extremely shallow, and almost complete displacement of nearshore waters by the plume was assumed to have prevented any large thermal inversion from occurring. Salinities at Station 19 indicated that some mixing had occurred, again decreasing the thermal inversion.

Vertical temperature gradients were positive in Basins 4 and 5 with the maximum ($0.68^{\circ}C$) observed at Station 23. Isotherms of DT were compressed in the vicinity of the oyster bars separating Basin 3 from Basin 5, indicating a zone of rapid change. The plume, approximately 4 km offshore, was in that area mixing with salinities comparable to its origin, although still several degrees warmer than the point of intake (Station 34). The resulting density gradient favored the warmer water on the surface. This result was most prominent during low water (Figure 6.1-15).

Salinity

Salinity patterns in the study area are complex, but are simplistically summarized as two freshwater inputs to an estuary, with a saline input (the plant discharge) situated between. Average flows of the Crystal River and the Withlacoochee River have been reported as approximately 785 and 1183 cfs, respectively (Applied Biology 1982). The flow in the CFBC has been reported to vary between 100 and 3980 cfs (Carder 1974). The plant discharge is approximately 2937 cfs.

The salinity data collected nearest the time of predicted tide during each sampling episode were subjected to GLM procedures. Surface and bottom salinity (SC and BC), as well as the salinity gradient present (DC, surface minus bottom values) were each analyzed as a function of quarter, station, tide, station-tide, and depth. All three salinity models generated were highly significant. Each independent term accounted for a significant portion of the data variability with the single exception of the depth term in the model of DC.

Seasonal salinity differences, a typical response to variable freshwater flows and tidal heights, were strong enough for most quarters to be significantly different from one another. Surface quarterly means were highest in fall, Quarter II (SC, 22.45 o/oo) and lowest in the spring, Quarter IV (17.27 o/oo). Mean bottom salinities ranged between 24.21 o/oo during the second summer (Quarter V, Figure 6.1-16) and 18.31 o/oo in the spring (Quarter IV, Figure 6.1-17).

The seasonal salinity variations observed had no close relationship to rainfalls recorded either at the Crystal River Power Station (incomplete data) or in the Crystal River/Inglis area (National Weather Service unofficial monthly totals, Figure 6.1-18). Flows from the Crystal River, a spring fed river with a low piezometric elevation, have been reported to vary inversely with seasonal tidal heights (Mann and Cherry, 1970). Maximum discharge from this system would then be expected to have occurred during January and February, during periods of lowest predicted tides. Minimum salinities in the study area, however, were observed in March, April, and May.

The variation in salinity during the spring, however, was more pronounced for inshore stations, arguing a variable terragenic source of fresh water. On April 12, 1984, and April 18, 1984, high turbidities were recorded simultaneously with low salinities and indicated either storm conditions (when strong winds may alter times and heights of actual tides from predicted) or pulses of runoff with high suspended solids. A more extensive compilation of watershed rainfall records, assessment of antecedent conditions and soil types, and flow and stage records of the freshwater inputs would be required to fully relate the salinities observed in the study area to precipitation and tides.

The significance of the station term in the salinity ANOVAs illustrated that, once seasonal variations were removed, a relatively constant gradient of salinities existed across the study area. This distribution across the study area was strongly affected by tidal stage, and a station-tide interactive term was significant for models of surface and bottom salinities.

The maximum tidal change was observed at Station 1 (near the Withlacoochee River), approximately 5-6 o/oo. Minimum tidal differences were observed in the region of the discharge canal at Stations 17, 18, and 19 (Figure 6.1-19).

A compilation of station to station statistical comparisons showed a much more continuous distribution of salinities than of temperature in the study area. Groups of similar stations based on the pattern of significant differences were therefore smaller, and as there are two freshwater inputs to this system, similar stations were not always contiguous, occasionally being divided by the intake and discharge spoil dikes.

Maxima of vertical salinity gradients, DC, were observed near the regions of freshwater input (Figure 6.1-20). Negative values represent less saline lenses of water overriding denser, more saline water. Station 17 exhibited the least amount of stratification during both high and low tide conditions. Based on salinity observations, both surface and bottom waters at this station were primarily comprised of discharge from the plant, the volume of saline water discharged by the plant (2937 cfs) apparently overshadowing any less saline flow from the nearby marshes.

Dissolved Oxygen

Two different selections of independent variables were used for ANOVA of the dissolved oxygen (DO) data base. Values from the surface (DO1) and bottom (DO3) of the water column and the percent of dissolved oxygen saturation relative to equilibrium conditions at surface and bottom (DSS and DSB) were all treated separately. The first model type included quarter, station, temperature and chlorophyll concentrations as independent variables. The relatively small number of chlorophyll data points limited the amount of DO data subject to this treatment. Chlorophyll concentrations were found not to account for any significant variability in DO or percent saturation data. GLM procedures were repeated after elimination of the chlorophyll variable. The quarter, station and temperature and salinity terms all accounted for highly significant portions of the variation in the dissolved oxygen data.

Seasonal variations in DO were related to those produced by temperatures. The temperature dependence was to be expected from the thermodynamic laws governing the solubility of all gases in water and the inverse relationship of absolute concentrations to temperature. Solubilities at equilibrium conditions are also inversely related to salinity. Station related variables affecting DO concentrations in addition to those addressed by the GLM could have been the presence of productive submerged grass beds or algal mats, or unvegetated bottom types exerting a benthic oxygen demand. Seasons with minimum and maximum DO means are illustrated in Figures 6.1-21 and 6.1-22.

Spatial patterns of dissolved oxygen were mixed for surface and bottom waters. Station 17, as may have been expected from the elevated temperature observed, had the lowest mean surface DO, 6.7 mg/l. That value was not significantly different from those at stations in Basin 3 and the southern half of Basin 2. These stations were all within Levels A and B of the thermal impact stations.

Due to the number of stations that typically experienced salinity stratifications, dissolved oxygen levels were expected to be less at the bottom of the water column. In addition, this gradient would be exacerbated wherever thermal inversions occurred. Those stations with low bottom DO concentrations, however, were not exclusively the Level A or B thermal stations. Three stations in Basin 4 (7, 8 and 15) had low bottom DO values. Total organic carbon, percent silt clay and free sulfide levels in sediments at these stations imply a depositional environment with low water velocities and a potentially high benthic oxygen demand.

Macrophyte aerial surveys confirmed that Level A and B Thermal Stations that did not have low DO3 concentrations all had seagrass and algae accumulations. Station 38, with highest mean DO levels, was also heavily vegetated.

Models of percent saturation of DO, using the same variables of quarter, station, temperature and salinity, were also highly significant. All independent variables removed a significant portion of the sum of the squares with the exception of salinity for surface values. The difference between surface and bottom saturations was greatest and the overall percent of saturation at bottom was the least (91 percent) during the two summer quarters. This is consistent with elevated benthic demands during warmer weather. Surface waters were closer to equilibrium for all quarters.

The spatial patterns of percent saturation of DO also indicated contributing factors other than equilibrium solubilities as a function of temperature and salinity. The highest percent saturation, 100 and 103 percent for surface and bottom, was recorded at Station 38, where concentrations of seagrasses were observed. The lowest saturations were observed on the bottom at Stations 3-9, 14 and 15, in general those stations immediately south of the CFBC spoil islands and at the northern edge of the influence of the thermal plume (Figure 6.1-23). Absolute DO concentrations, however, were little different from the discharge. Saturation deficits were produced by the decrease in temperature between the discharge and these stations, or sediments producing an increase in theoretical solubility of DO with no change in the absolute concentration. The thermal and salinity stratification also observed would reduce the reaeration rates of bottom waters.

pH

Changes in temperature will affect the distribution of carbon dioxide among its various species. With a constant total carbon dioxide concentration, pH will fall with increasing temperature. Biological respiration and photosynthesis that deplete the total concentration of carbon dioxide present will also elevate pH values to daily maxima in late afternoon after periods of high productivity. Seasonal trends in pH are generally apparent in open oceans. Lowest carbon dioxide and highest pH values are observed in warmer months when productivity is high. This pattern is complicated nearshore by local weather conditions. The wet season in Florida typically occurs during the warmer months, and acidic runoff (low pH) is greatest when pH values are expected to be at a maximum.

Initial statistical analyses of pH data from Crystal Bay found chlorophyll to account for an insignificant portion of the variability in pH values. The ANOVA's were subsequently repeated after eliminating chlorophyll. Models generated were highly significant for surface (PH1) and bottom (PH3) values. The quarter, station, and temperature contributions to the model were all significant, and salinity was significant for PH3 but not for PH1.

Over all stations, the highest pH values were recorded during Quarter I, the first summer quarter (Figure 6.1-24). Lowest pH values occurred in the fall rather than during the spring quarter when runoff was most apparent and low pH values would be expected.

Based on the pattern of differences, two groups of stations were identified, one with low values over the course of the project, the other with high values. Those stations with low values included nearshore stations north of the discharge dike, both thermal (Stations 13, 14, and 17) as well as those most affected by the CFBC and the Withlacoochee River (Stations 1, 2, 4-7). Stations with elevated pH values were those nearshore in both thermal and nonthermal areas (Stations 27-34, 38, and 39). Although both temperature and salinity contribute to observed pH variations, the controlling influence on pH values appears to be a biological system other than phytoplankton that affects the carbonate - bicarbonate - carbon dioxide equilibria.

<u>Photometry</u>

Extinction coefficients were computed from submersible photometer readings using the equation:

$$K = (\ln (Iz / Io)) / - Z$$

where K = extinction coefficient in ft^{-1}

Io = light below the water surface

Iz = light at depth

Z = depth in feet

Measurements made at secchi depth (12 inch diameter) and surface were used to calculate a KS, and at bottom and surface to calculate a KB. When secchi depths were greater than the water column depth, no KS was calculated. Analyses of variance with independent variables of quarter, storm (quarter), station, depth, and turbidity were performed. All input variables were found to be highly significant.

Seasonal growth patterns of phytoplankton are possibly responsible for the significance of the quarter term in the models generated. The mean KS and KB of all stations during Quarter III was the lowest of any of the five quarters sampled (highest clarity waters). This coincides with temperature and chlorophyll concentration minima.

The storms were identified from the intermittent meteorological data and defined as four consecutive days with wind velocities averaging over 7 mph. The shallow waters of Crystal Bay made resuspension of unconsolidated sediments and erosion of the numerous spoil islands extremely likely during periods of prolonged high winds and resultant wave action. Depth of the water column also controlled the amount of resuspension generated by any given wave height. Since only 5 storms were identified, no attempt was made to weight storms for wind direction, velocity and variability.

The amount of light scattered or absorbed by suspended and dissolved materials in the water column (turbidity) will directly decrease the amount of light reaching a given depth. Turbidity accounted for a highly significant amount of the variability of KB and KS, and the distribution of extinction coefficients matched closely with turbidity isopleths.

The significance of the station term indicated that a consistent spatial pattern of light extinction existed. The highest mean values of KB, and therefore, the waters of lowest clarity, were observed at Stations 1, 2, 4, 5, 6, 7, and 8, those stations nearest the CFBC and the Withlacoochee River (Figure 6.1-25). Lowest coefficients were measured at the offshore stations and south of the intake dike.

The Crystal River, with groundwater as its primary source, had much lower color values than a "blackwater" river such as the Withlacoochee (MML, unpublished data) in addition to much lower flows. Suspended load data from the two rivers were quite comparable. The absorption of light by dissolved organics (humic acids), marsh export detritus, or erosional material from the CFBC spoil islands was believed primarily responsible for the differences in KB.

Differences between KS and KB values were examined to determine if salinity or thermal stratification decreased penetrant light. No consistent pattern was observed in quarterly station means for those stations closest to thermal or freshwater sources.

Quarter I, the quarter with the highest mean value of KB, was further analyzed by back calculating from KB the depths to which 10, 5, and 1 percent of the incident light would penetrate (Table 6.1-1). These depths were then compared to the mean depths recorded on station during that quarter. (Summer tides were among the highest predicted and water column depths and extinction coefficients during this quarter represent a worst case situation.) During Quarter I, quite a number of stations had average water column depths in excess of Z(10 percent), the depth at which all but 10 percent of the incident light has been absorbed. None, however, had depths which exceeded Z(1 percent). The average percent of surface radiation that reached the bottom is illustrated in Figure 6.1-26.

Turbidity

Initial GLM procedures on both surface and bottom turbidity data bases produced highly significant models using quarter, storm (quarter), station, depth, salinity, total suspended load, and chlorophyll as independent variables. The rationale for including many of these parameters was entirely analogous to their selection for the analysis of extinction coefficients and storm dates utilized were the same. Suspended loads should influence turbidity values directly and high chlorophyll concentrations would indicate a phytoplankton population that would also produce considerable light scattering and absorption.

Chlorophyll accounted for a significant portion of the variability in turbidity data but its inclusion in the model limited the number of turbidity values analyzed. For this reason, GLM procedures were repeated after replacing chlorophyll with temperature as an independent variable. Waters of extreme temperatures, either high or low, might be expected to have decreased biomass concentrations, and therefore lower turbidities.

The second set of models for turbidity were also highly significant. Temperature (other than that contained in the quarter variable) did not account for a significant portion of the variation in either model. Suspended load accounted for the greatest portion of the variation in the model. As expected, bottom turbidity values were higher overall than surface values, and more variability was observed at the bottom for a given station.

Highest surface and bottom turbidities were observed during the spring, Quarter IV, the period of lowest salinity and highest surface suspended loads. Over half of the stations both north and south of the intake spoil had maxima during this quarter. This quarter marked the resumption of rains after the dry season, and pulses of turbidity were observed coincident with salinity minima.

The storm (quarter) variable was highly significant. Station means for the quarter (with storm events removed) were calculated and subtracted from surface turbidities collected during storms. The increase in turbidity attributable to storm conditions is illustrated for the two most severe storms (Figures 6.1-27 and 6.1-28). Individual stations and the degree to which they were affected were obviously products of wind direction and strength. The small data base for storm conditions and the partial nature of the meteorological data, however, prevented a quantitative assessment of these contributions.

In general, surface turbidity distributions were inversely related to salinity isopleths for the discharges from the CFBC and the Withlacoochee River, decreasing with increasing salinity (Figure 6.1-29). Stations with the highest observed surface turbidities were 1, 4, 5, 6, and 8. A secondary group included 7, 9, and 17. Turbidity at these stations is most likely the result of precipitation of humic substances, export of salt marsh detritus, and erosion of CFBC spoil islands.

Stations lowest in surface turbidity included most of those south of the intake spoil. These were sheltered from the severest northerly winds and salinities were presumably controlled by the low humic waters of Crystal River. The marshes adjacent to Station 31 also appeared to have lower tidal exchange volumes and lower flows with less scouring. Finer grained material within the marsh itself and accumulated algal detritus also indicated more of a depositional environment than the area near Station 17. Less material appears to be exported from this southern marsh and sediment loads in the adjacent basins are correspondingly less (Cottrell 1974).

Suspended Solids

Suspended load analyses also included GLM procedures. Models were produced for surface and bottom total suspended load data as a function of quarter, storm (quarter), station, turbidity, temperature, and salinity. Storm dates were the same as those described in the analyses of extinction coefficients and turbidity.

Models generated were highly significant. ANOVA summaries indicated that turbidity values could account for a majority of the variation in the data. Quarter, storm (quarter), station and turbidity terms were all highly significant for both data sets. Salinity was only significant for surface turbidities. Temperature (beyond the effects accounted for by the quarter and station terms) was insignificant in accounting for suspended load data variation.

The spring quarter had the highest overall surface suspended load recorded. The lowest concentrations were recorded during the winter, Quarter III. This pattern, while compatible with the rainfall and salinity trends discussed earlier is much less clear cut than for turbidity. Bottom loadings were again more variable than surface and seasonal trends were slightly different from surface values. The lowest values recorded for turbidity and extinction coefficients were also during Quarter III. The effect of storms on suspended load was comparable to the effects on turbidity and the individual stations most affected were again dependent on wind strength and direction.

Similar to turbidity distributions, stations with highest overall values of total suspended load were concentrated along the southern side of the CFBC (Figure 6.1-30). Surface loads at Stations 1 and 6-9 were not significantly different from Station 5, which had the highest load over the course of the project. Those stations with the lowest observed surface values are those south of the intake dike and nearshore (Stations 31-33, 48-40) as well as Station 28.

Due to the variability of bottom TSS data, station to station comparisons produced fewer significant differences despite the wide spread in mean suspended load. Highest values were again observed at stations near the CFBC (1, 3-6, 8-10, and 15) and ranged from 29 to 17 mg/l. Those stations with the lowest suspended loads included stations south of the intake (35, 39, 40), offshore (24, 26), and some Level A and B thermal stations (27, 28, 29).

Volatile suspended solids were also analyzed by the GLM procedure. Independent variables of quarter, station, and chlorophyll were applied to surface and bottom data sets. The models produced were highly significant. Quarter and chlorophyll variables accounted for significant portions of data variability. The station term was significant for bottom values but not for surface.

Seasonal distributions of volatile suspended load were comparable to the trends shown by overall chlorophyll data. The lowest levels of suspended volatiles were recorded during the winter, Quarter III. This period coincided with the lowest quarterly means for turbidity, total suspended solids, and extinction coefficients.

Data variability permitted few significant differences to be observed between stations. Station 8 contained the highest average volatile solids (7 mg/l) for the project. This station also appeared to be a depositional area, as not only volatile but also total suspended solids were high here. Percent silt/clay, total organic carbon, and sulfide concentrations in the sediments at this station were among the highest of those observed in the study area, and the mean grain size was one of the smallest. Stations with volatile suspended loads not significantly different from 8 included those immediately south of the CFBC spoil islands and Level A and B thermal stations (13, 17, 20, 21, and 29). Values at Stations 3 and 33 were also high.

Barge Traffic

The effects of barge traffic on suspended load and turbidity were also investigated through GLM analyses. Surface and bottom data sets from Stations 17, 34, 35, 36, and 37 were selected as being those most likely to show any increases as a result of sediment resuspension. Station 17 was included as it receives the most direct exposure to waters that have passed through the plant condensor. Independent variables included quarter, storm (quarter), station, and barge (quarter-station). The degree of barge influence at these stations was selected based on the length of time since traffic had passed or, in the case of 17, the length of time in which a disturbed water mass could be expected to reach that station.

The models produced for surface and bottom turbidities were both highly significant. The quarter term accounted for most of the data variability in both models, and storm (quarter) was significant for the surface turbidities. No other variables were significant. Barge effects were either not apparent at the selected stations during the times sampled or were overridden by those due to wind or wave action. Other obscuring factors may be the transient nature of any disturbance. Velocities in the intake canal would act to rapidly disperse any elevated turbidities.

The model for bottom suspended load data was not significant. In that produced for the surface values, however, again only quarter and storm (quarter) accounted for any significant amount of variability. Barge influences were not apparent.

Chlorophyll

Surface and mid-depth chlorophyll concentrations were analyzed as a single data base by the GLM procedure, using quarter, station, extinction coefficient (KS), secchi depth, salinity, temperature, and volatile suspended solids as independent variables. Of these only temperature and salinity were insignificant and quarter, station, and KS were highly significant.

Highest overall chlorophyll levels were recorded during the second summer. Winter, Quarter III, levels were lowest. This is compatible with the expected seasonal growth patterns of phytoplankton and cold weather reductions in photosynthetic activity.

Station by station comparisons show few differences and data variability for some stations is quite large compared to stations with comparable means. Those stations with the highest levels are generally centered around the CFBC and the Withlacoochee River entrances to the study area (Stations 1, 3, 4, 5, 8, 9, and 15) (Figure 6.3-31). Lowest levels were observed at offshore and southerly stations.

As chlorophyll samples were collected from eight randomly selected stations per week and volatile suspended solids were only collected every other week, the data base for this statistical analysis was limited. The conjunction of these parameters was met for some stations only once during the entire project. When all weekly chlorophyll data was combined without regard to sampling depth, the seasonal and spatial patterns discussed above were confirmed.

6.1.3 Discussion

Water quality stations in the study area were statistically divided into five groups: four of decreasing thermal influence and those unaffected. The groupings were slightly different for surface and bottom waters, more stations being included for the affected surface waters. Stations 13, 17, 18, 19 and 29 in Basins 1, 2 and 3 were those most directly affected by thermal discharge. Little input of heat was observed from either the Cross Florida Barge Canal or the Withlacoochee River. The distribution of the thermal plume, as determined by station mean water temperatures, agreed well with that predicted by the numerical models.

Spatial salinity patterns were complex as the Crystal River, the Withlacoochee River and CFBC, and the plant (discharging offshore water nearshore) all act as inputs to the study area. Seasonal salinity trends were present but were not directly related to rainfall recorded either at the power plant or in the Crystal River/Inglis area. Minimum salinities were recorded during the spring quarter.

Dissolved oxygen levels were strongly and inversely related to temperature; summer minima and winter maxima were recorded. Percent saturation of dissolved oxygen was also lowest during the summer. The station with the lowest mean oxygen level was that with the highest mean temperature. Distribution of macrophytes affected both dissolved oxygen and percent saturation levels, and appeared to be one of the controlling variables in accounting for pH distributions. Chlorophyll levels displayed seasonal trends (winter minima) but did not control either DO or pH values.

Water clarity was most reduced at stations near the CFBC. High extinction coefficients were apparently the product of dissolved humics and particulate matter exported from the Withlacoochee River, the CFBC, and adjacent salt marshes. Erosion of the spoil islands is also indicated. These same factors also influenced the distributions of turbidity and total and volatile suspended loads. Waters of highest clarity were south of the intake spoil and offshore. Light was apparently not a limiting factor at those stations most affected by the thermal discharge.

Storms produced elevated values of extinction coefficients, turbidity, and suspended load. The stations and the degree to which each was affected were the product of wind directions and strengths. Wave and current resuspension of sediments also apparently contribute. The effect of barge traffic on these paramters was not apparent.

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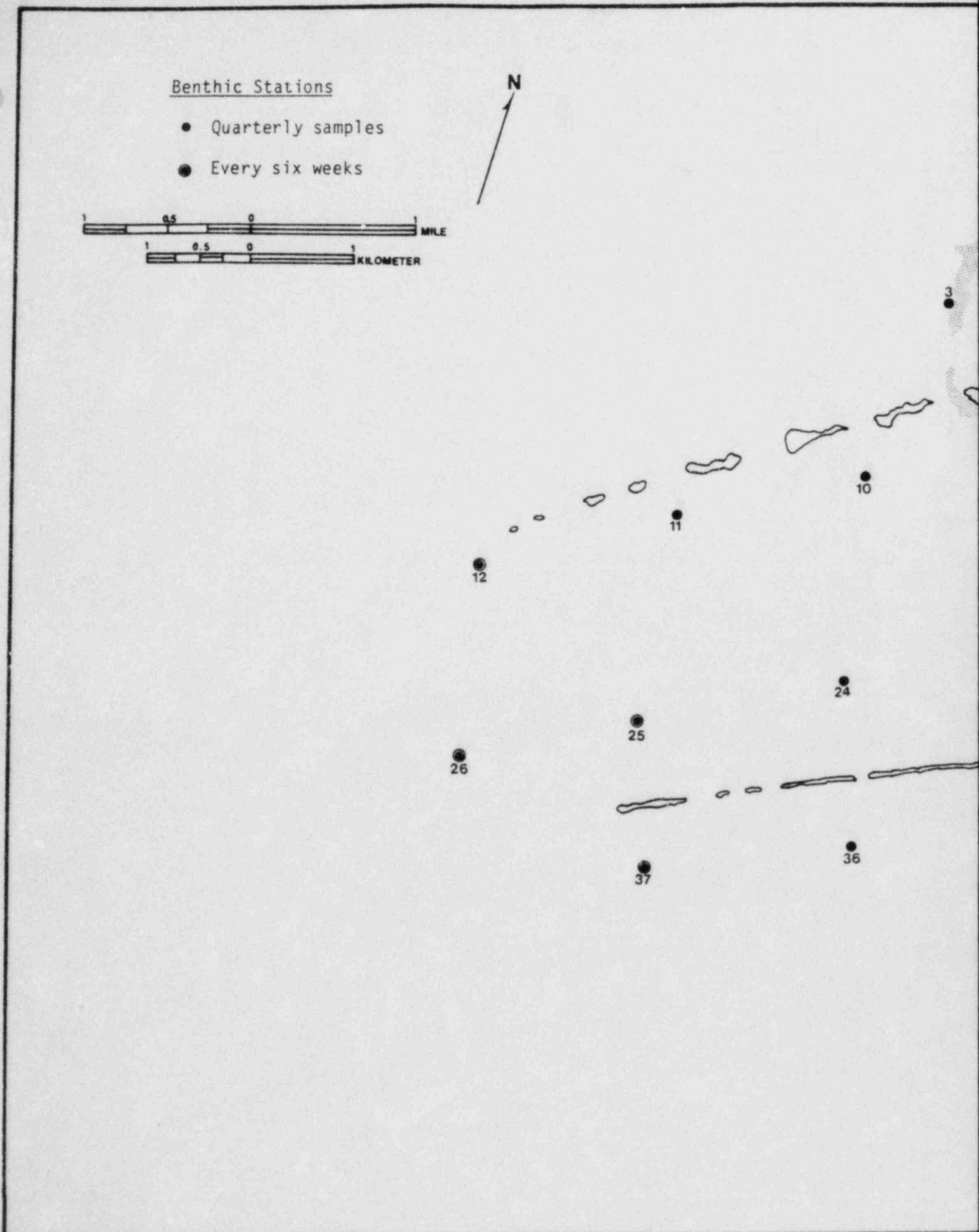
Table 6.1-1 Penetrant Light. Extinction coefficients KS, KB (ft^{-1}); station depths, D (ft); depth to which 1%, 5%, 10% of surface radiation penetrates, Z(1), Z(5), Z(10) (ft); percent surface radiation at bottom, %Io @ B (%).

Station	KS (ft^{-1})	KB (ft^{-1})	D (ft)	Z(1) (ft)	Z(5) (ft)	Z(10) (ft)	%Io @ B
1	0.54	0.53	2.6	8.7	5.7	4.3	25.2
2	0.49	0.48	4.0	9.6	6.2	4.8	14.7
3	0.40	0.42	7.5	11.0	7.1*	5.5*	4.2
4	0.51	0.63	5.8	7.3	4.8*	3.7*	2.6
5	0.47	0.76	5.1	6.1	3.9*	3.0*	2.1
6	0.53	0.54	5.0	8.5	5.5	4.3*	6.7
7	0.60	0.59	5.3	7.8	5.1*	3.9*	4.4
8	0.42	0.55	6.7	8.4	5.4*	4.2*	4.3
9	0.47	0.45	7.5	10.2	6.7*	5.1*	3.4
10	0.38	0.37	9.1	12.5	8.1*	6.2*	3.5
11	0.31	0.29	9.4	15.9	10.3	7.9*	6.5
12	0.23	0.20	14.4	23.0	15.0	11.5*	5.6
13	0.35	0.46	3.0	10.0	6.5	5.0	25.2
14	0.48	0.42	5.1	11.0	7.1	5.5	11.7
15	0.48	0.45	6.3	10.2	6.7	5.1*	5.9
16	0.37	0.39	7.2	11.8	7.7	5.9*	6.0
17	0.50	0.54	2.4	8.5	5.5	4.3	27.4
18	0.42	0.41	5.8	11.2	7.3	5.6*	9.3
19	0.45	0.41	4.8	11.2	7.3	5.6	14.0
20	0.36	0.41	7.4	11.2	7.3*	5.6*	4.8
21	0.43	0.43	8.5	10.7	7.0*	5.4*	2.6
22	0.45	0.39	8.4	11.8	7.7*	5.9*	3.8
23	0.39	0.34	10.6	13.5	8.8*	6.8*	2.7
24	0.29	0.29	9.8	15.9	10.3	7.9*	5.8
25	0.27	0.23	12.1	20.0	13.0	10.0*	6.2
26	0.24	0.23	14.4	20.0	13.0	10.0*	3.6
27	0.43	0.43	4.9	10.7	7.0	5.4	12.2
28	0.43	0.44	6.8	10.5	6.8	5.2*	5.0
29	0.36	0.36	6.2	12.8	8.3	6.4	10.7
30	0.41	0.40	6.4	11.5	7.5	5.8*	7.7
31	0.45	0.31	4.9	14.9	9.7	7.4	21.9
32	0.33	0.30	4.4	15.4	10.0	7.7	26.7
33	0.40	0.31	7.1	14.9	9.7	7.4	11.1
34	0.33	0.26	8.8	17.7	11.5	8.9	10.1
35	0.25	0.25	7.5	18.4	12.0	9.2	15.3
36	0.27	0.23	11.5	20.0	13.0	10.0*	7.1
37	0.21	0.25	13.3	18.4	12.0*	9.2*	3.6
38	0.26	0.34	4.0	13.5	8.8	6.8	25.7
39	0.27	0.27	7.4	17.1	11.1	8.5	13.6
40	0.22	0.20	13.3	23.0	15.0	11.5	7.0

*Calculated depth exceeded water column depth.


Benthic Stations
Quarterly samples
Every six weeks
N
1
0.5
0
1
MILE
1
0.5
0
1
KILOMETER
3
10
11
12
24
25
26
36
37

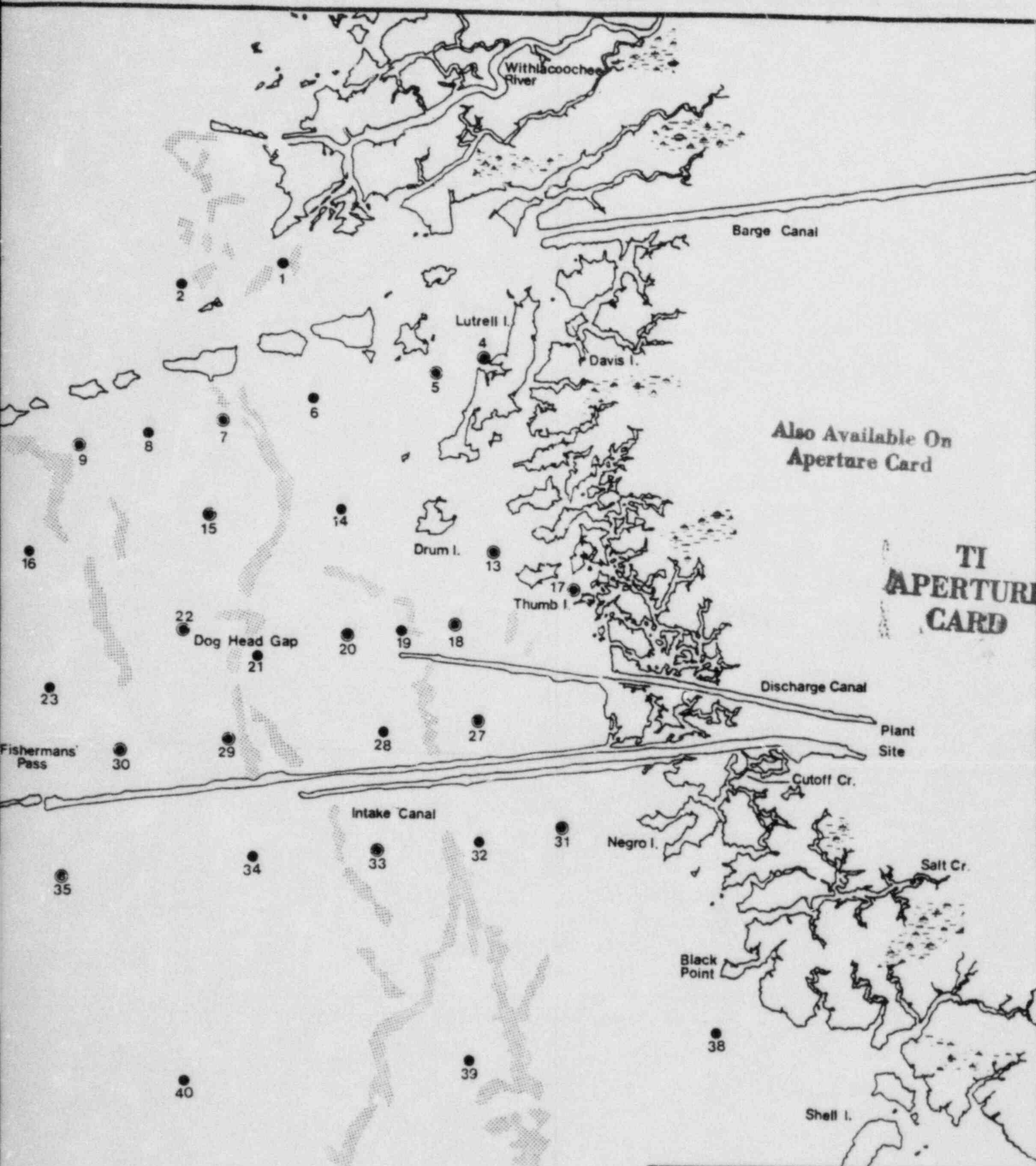


FIGURE 6.1-1.

WATER QUALITY AND BENTHIC STATIONS.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

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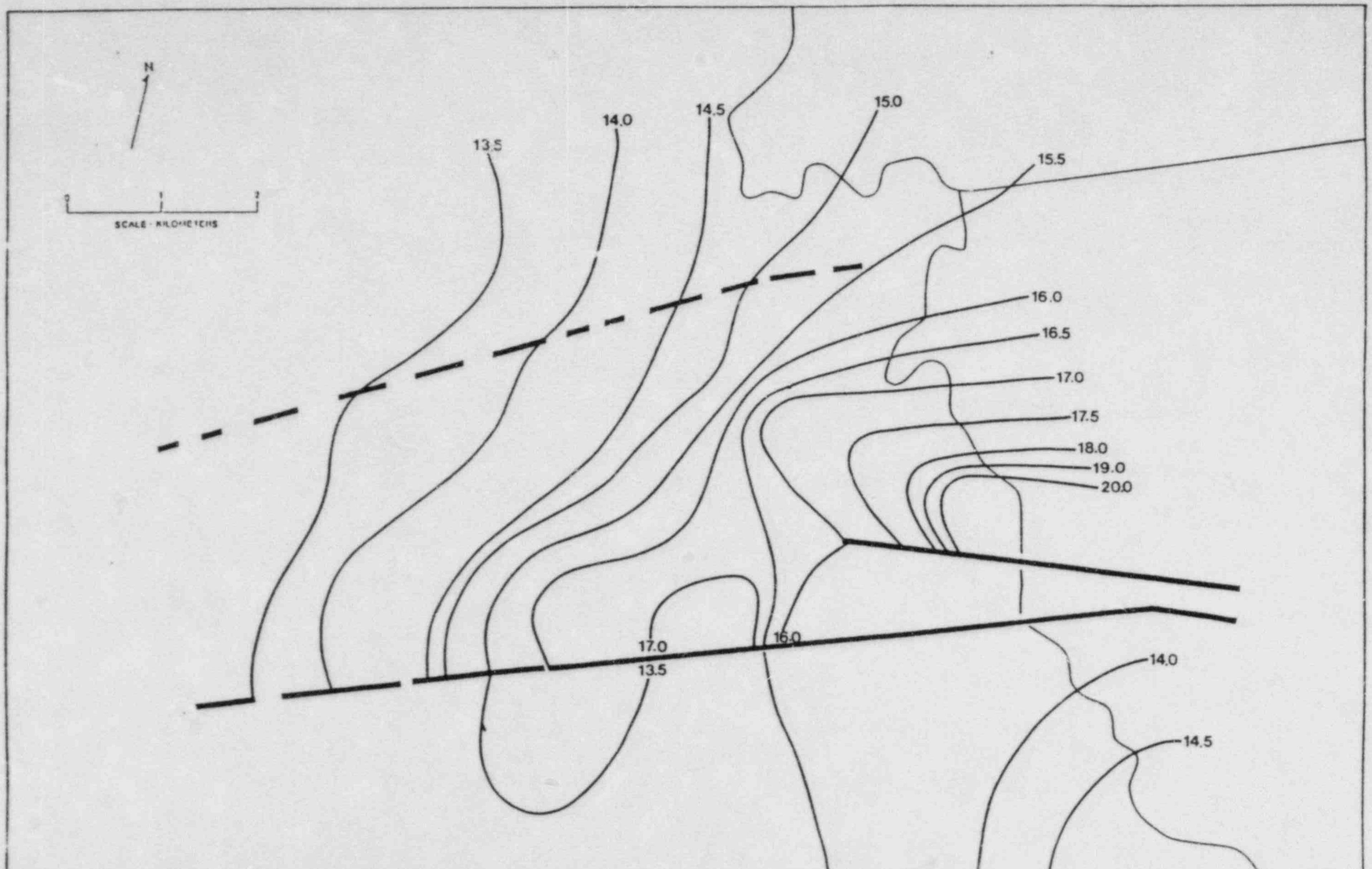

FIGURE 6.1-2.

BOTTOM TEMPERATURE (BT), MEANS DURING QUARTER III, (^{O}C).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

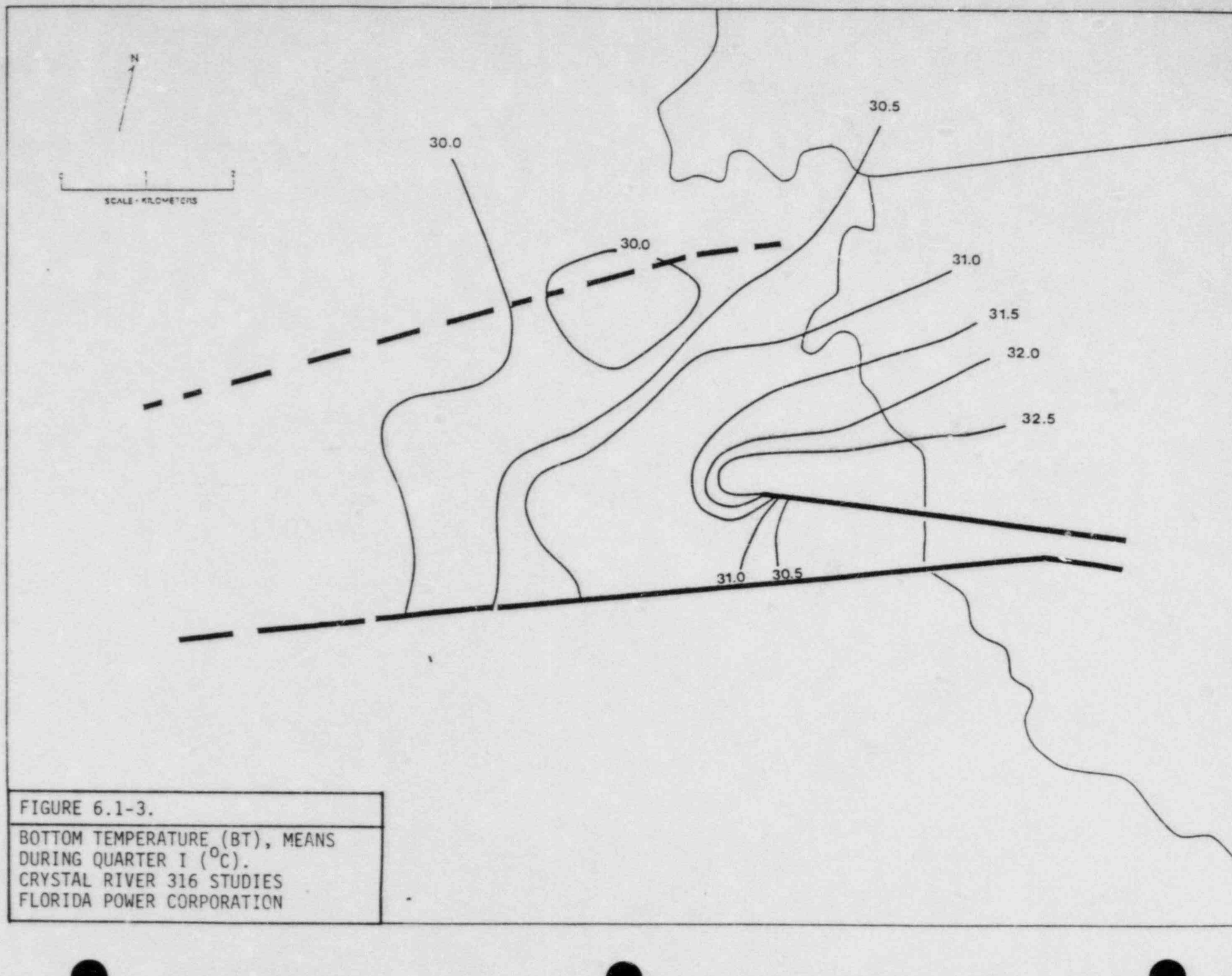

FIGURE 6.1-3.

BOTTOM TEMPERATURE (BT), MEANS
DURING QUARTER I (^{o}C).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

	LEVEL A					LEVEL B								LEVEL C					LEVEL D																			
	17	19	18	29	13	30	20	21	22	28	23	14	27	16	15	7	5	6	4	9	8	24	1	10	11	2	38	25	12	26	3	33	32	34	39	31	35	40	37	36
17	o	o	o	o	o	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
19	o	o	o	o	o	o	o	o	o	o	o	o	o	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
18	o	o	o	o	o	o	o	o	o	o	o	o	o	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
29	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
13	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
30	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	*
20	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
21	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
22	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
28	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
23	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
14	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
27	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
16	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
15	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
7	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
5	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
6	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
4	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
9	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
8	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
24	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
1	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
10	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
11	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
2	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
38	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
25	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
12	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
26	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
3	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
33	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
32	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
34	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
39	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
31	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
35	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
40	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
37	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
36	*	*	*	*	*	*	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

FIGURE 6.1-4.

SURFACE TEMP. RESULTS OF TUKEY'S TESTS BETWEEN STA. MEANS (* = SIGNIFICANT DIFFERENCES). CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

37	40	36	35	34	39	26	31	33	32	12	25	3	11	10	24	2	38	9	1	8	7	16	6	15	27	23	4	5	22	30	28	21	14	20	29	13	19	18	17		
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0	17	LEVEL A
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	18	
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	19	
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	
*	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	20	LEVEL B
*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	14	
*	*	*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	21	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	28	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	30	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	22	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	5	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	4	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	23	LEVEL C
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	27	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	15	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	6	LEVEL D
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	16	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	7	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	8	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	1	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	9	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	38	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	2	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	24	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	10	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	11	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	3	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	25	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	12	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	32	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	33	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	31	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	26	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	39	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	34	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	35	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	*	36	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	*	40	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	*	37	

FIGURE 6.1-5.

BOTTOM TEMP. RESULTS OF TUKEY'S TESTS BETWEEN STA. MEANS (* = SIGNIFICANT DIFFERENCES).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

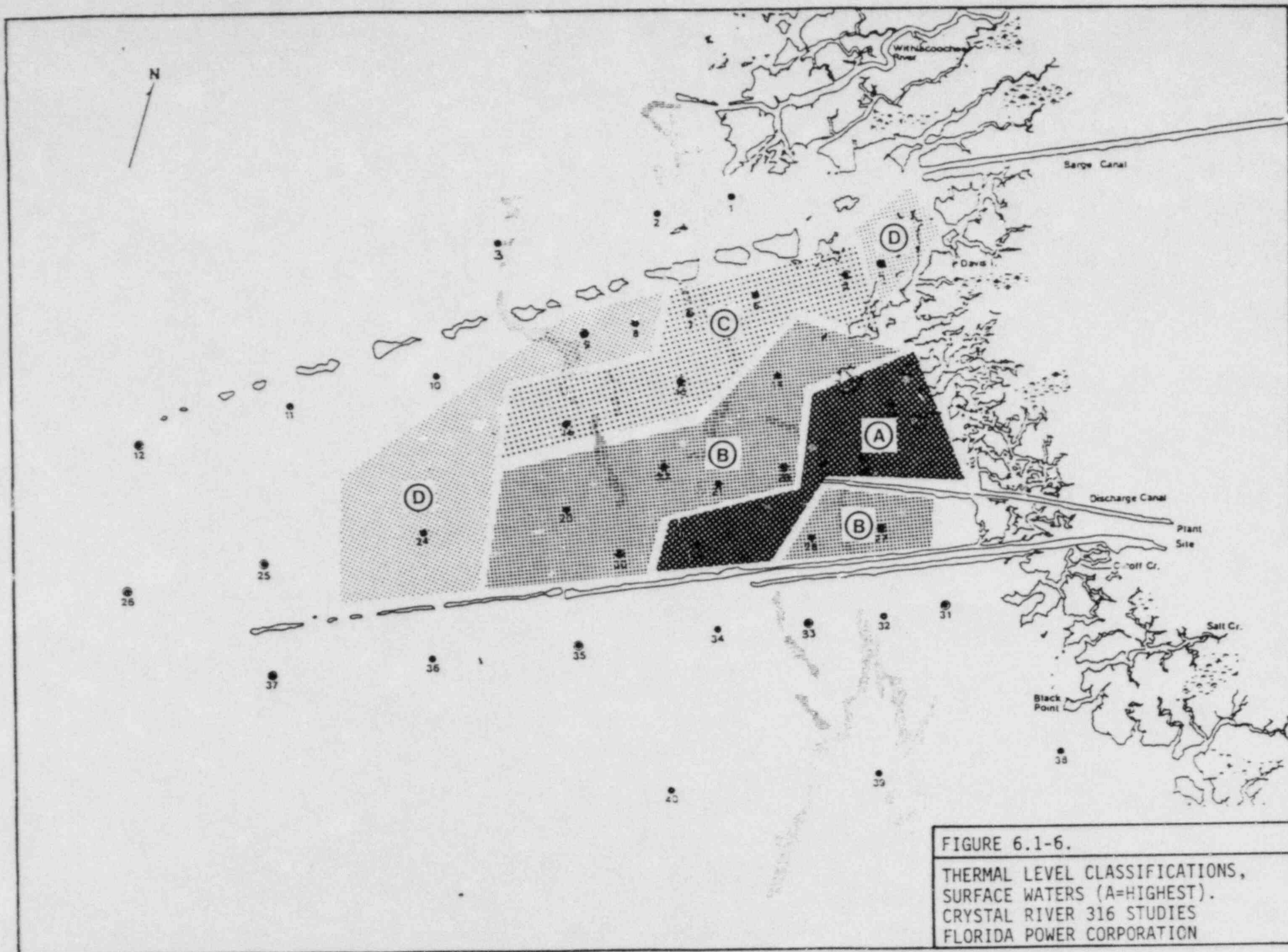

FIGURE 6.1-6.

THERMAL LEVEL CLASSIFICATIONS, SURFACE WATERS (A=HIGHEST). CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

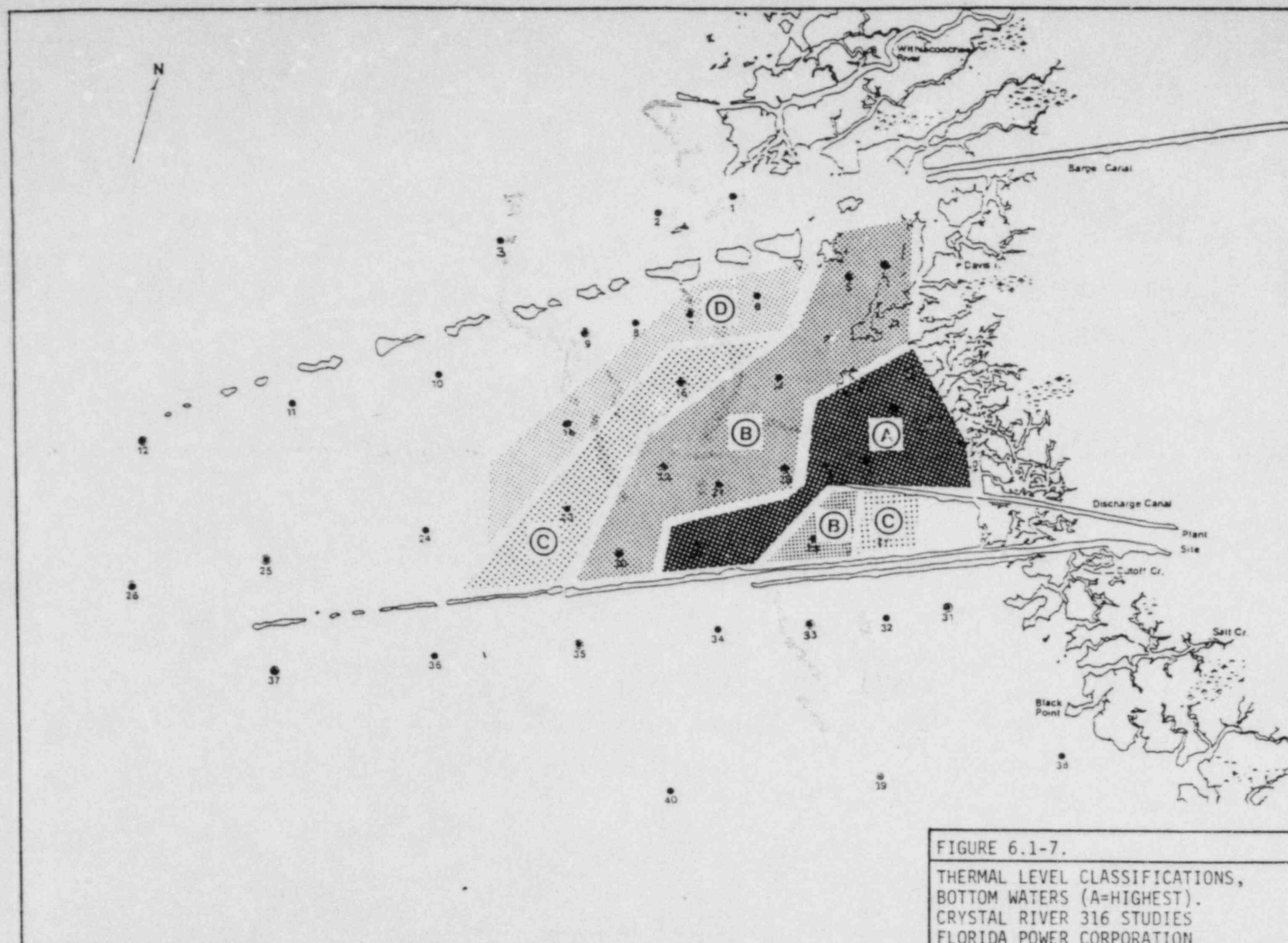

FIGURE 6.1-7.

THERMAL LEVEL CLASSIFICATIONS, BOTTOM WATERS (A=HIGHEST). CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

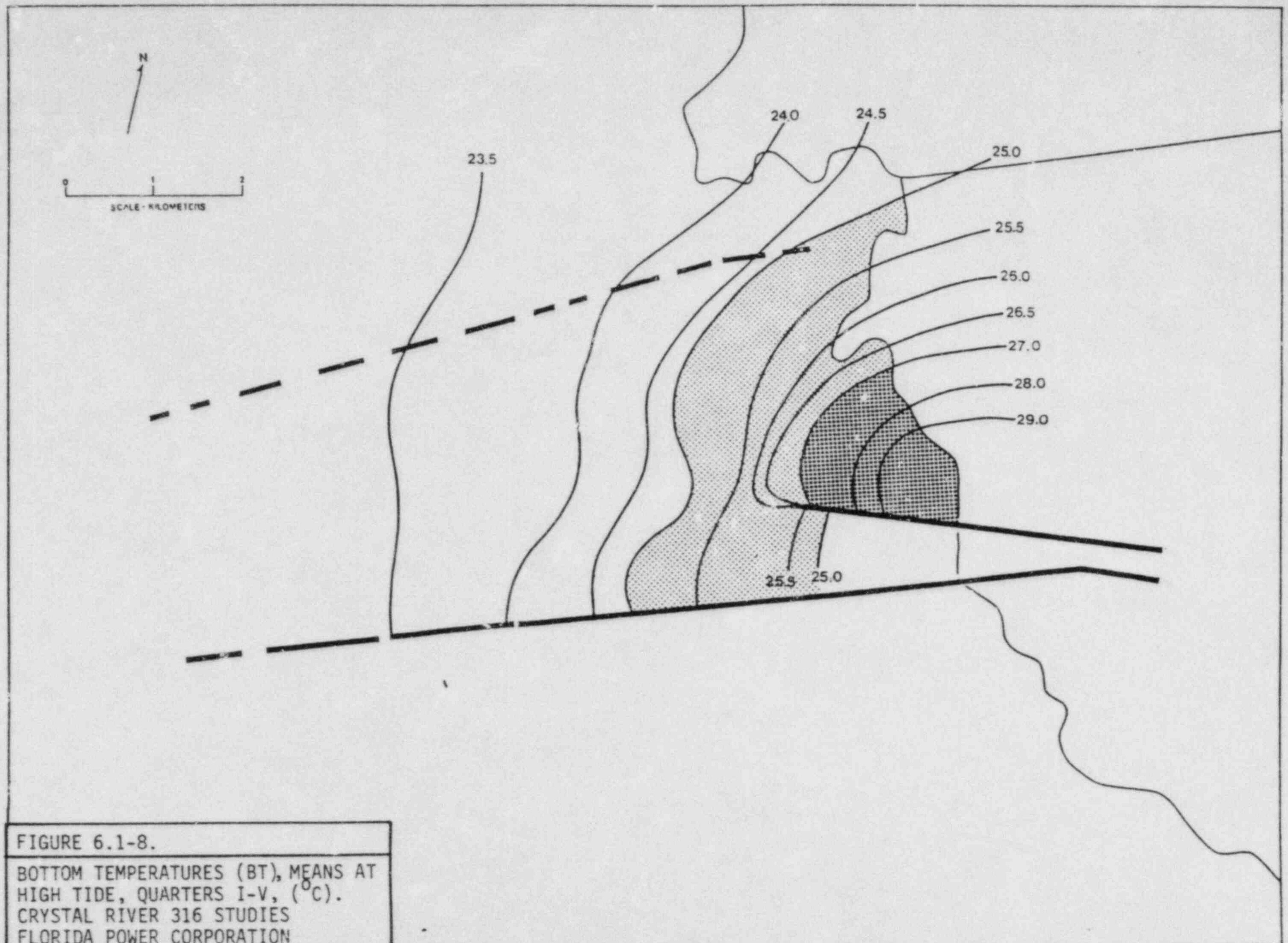

FIGURE 6.1-8.

BOTTOM TEMPERATURES (BT), MEANS AT HIGH TIDE, QUARTERS I-V, (^{0}C).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

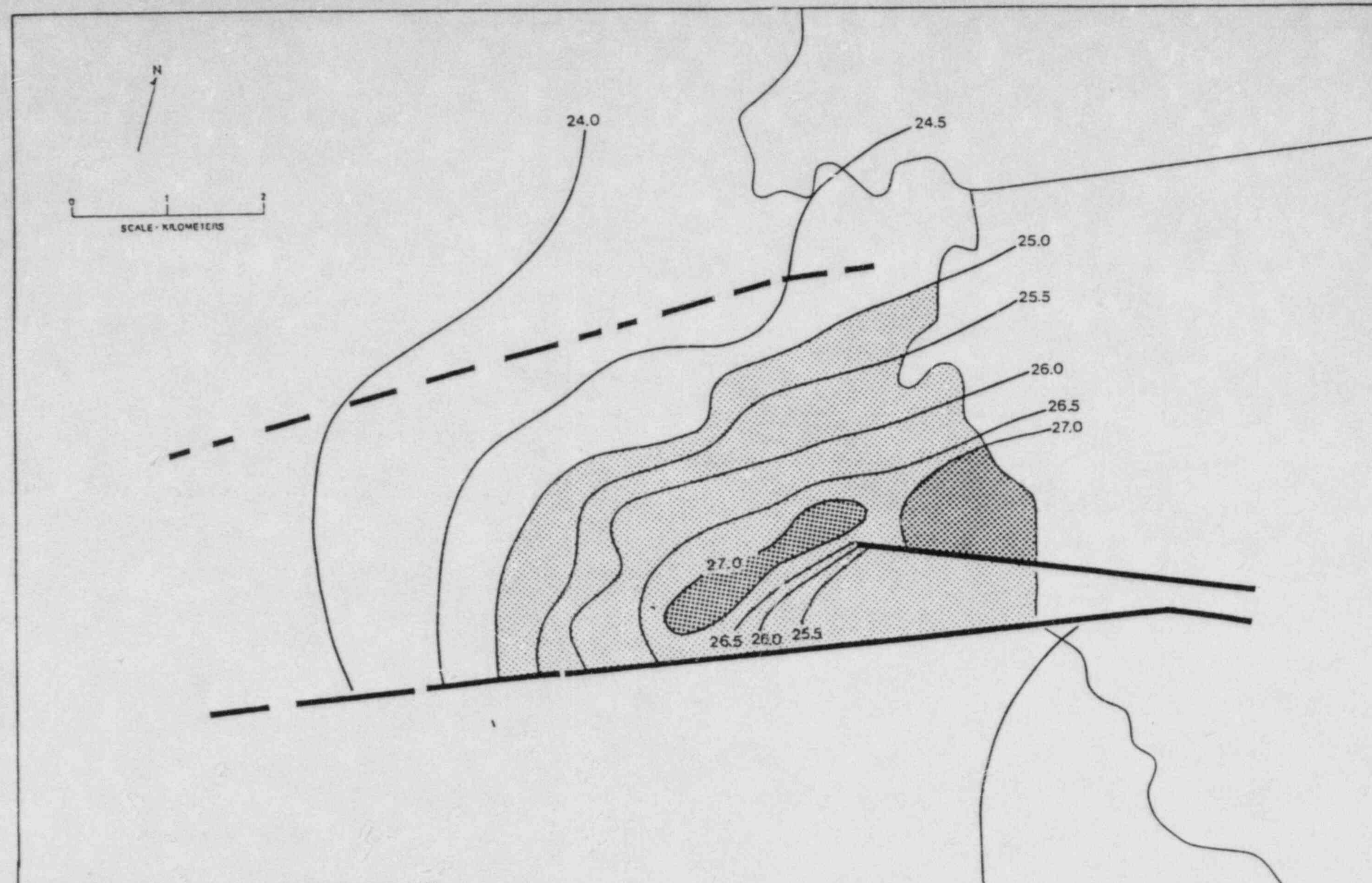

FIGURE 6.1-9.

BOTTOM TEMPERATURES (BT), MEANS AT LOW TIDE, QUARTERS I-V, (°C).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

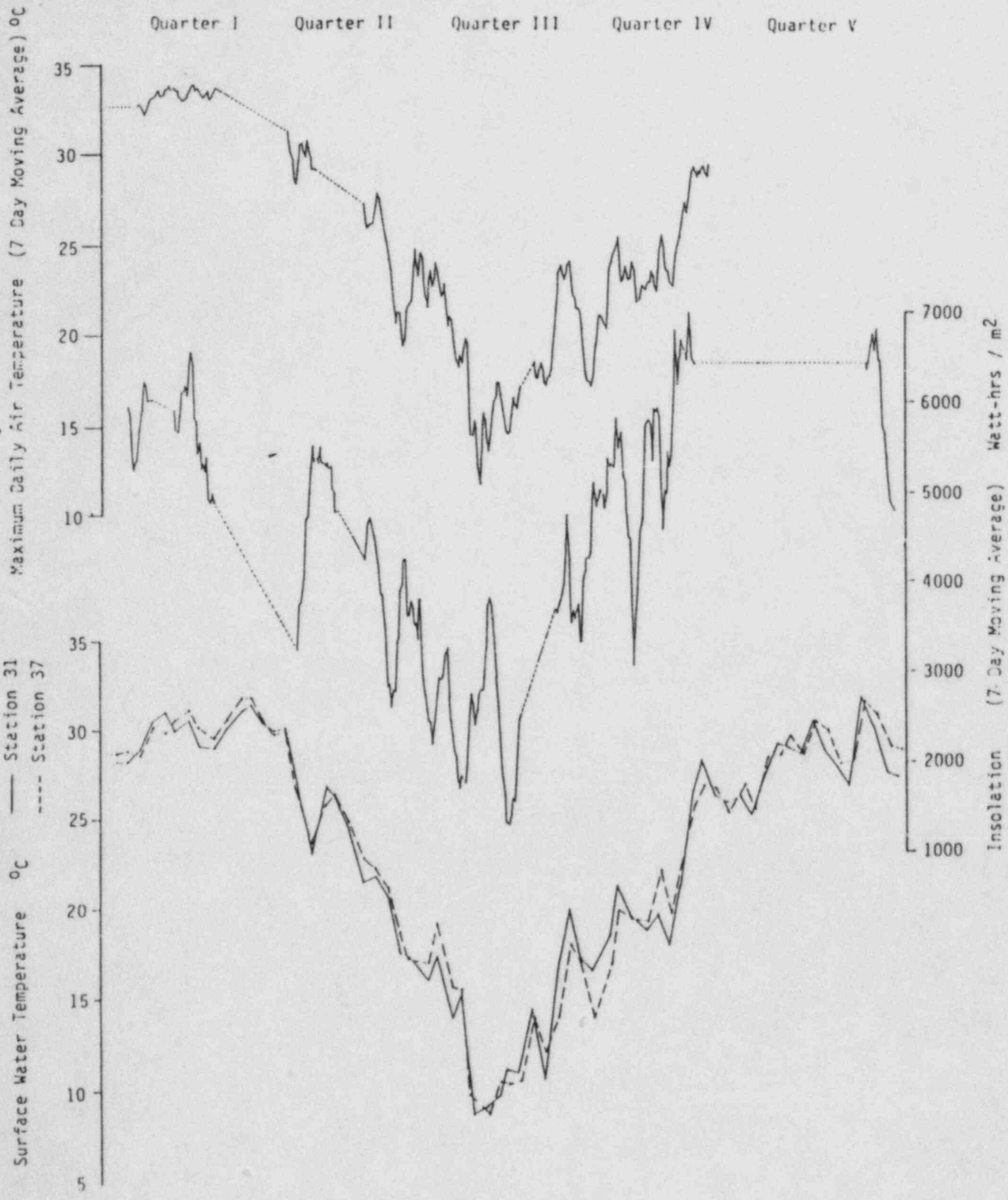

FIGURE 6.1-10.

MAXIMUM DAILY AIR TEMP. INSOLATION, SURFACE WATER TEMPERATURE. CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

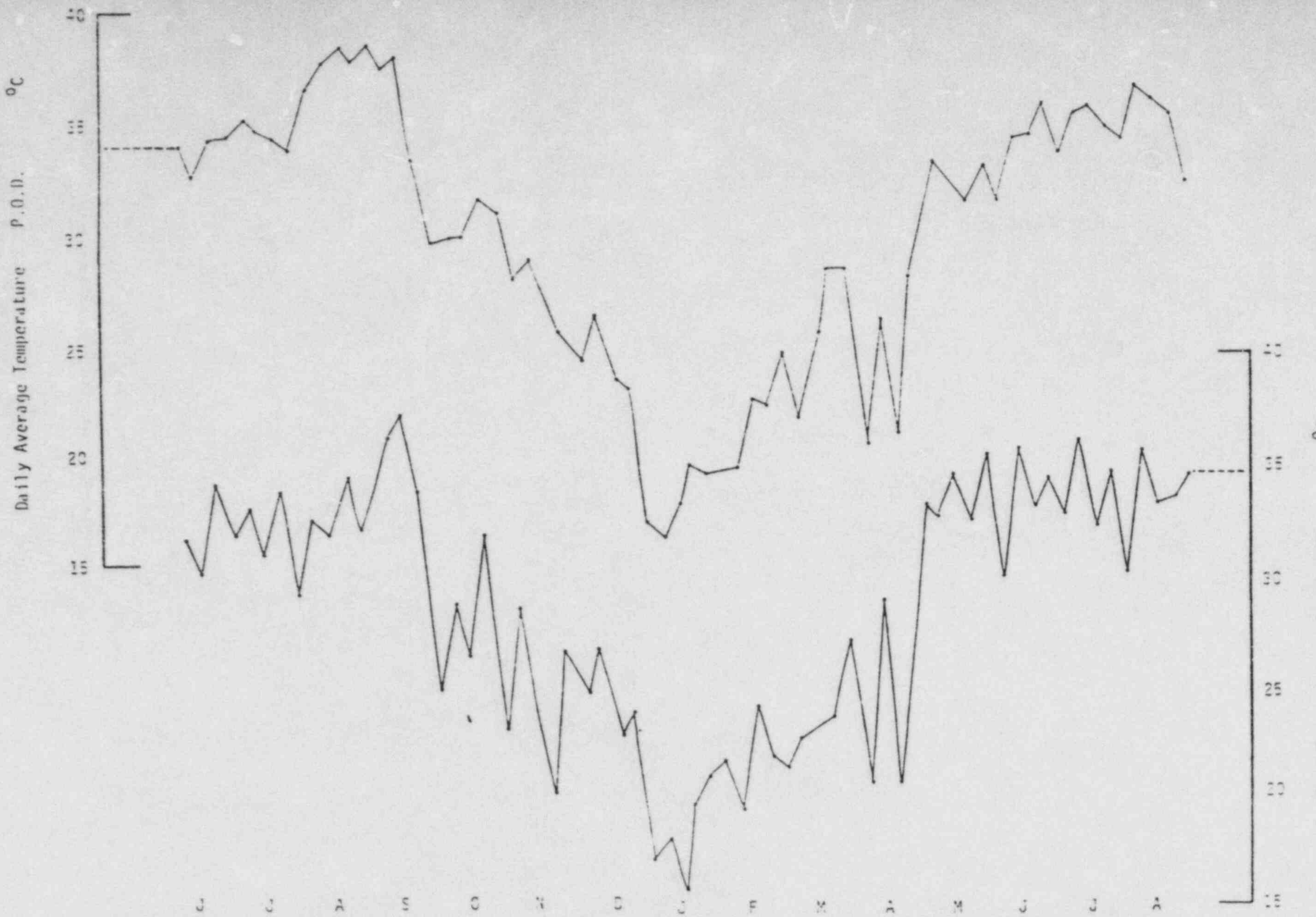

FIGURE 6.1-11.

TEMPERATURES AT P.O.D. AND STATION 17, SURFACE, (°C).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

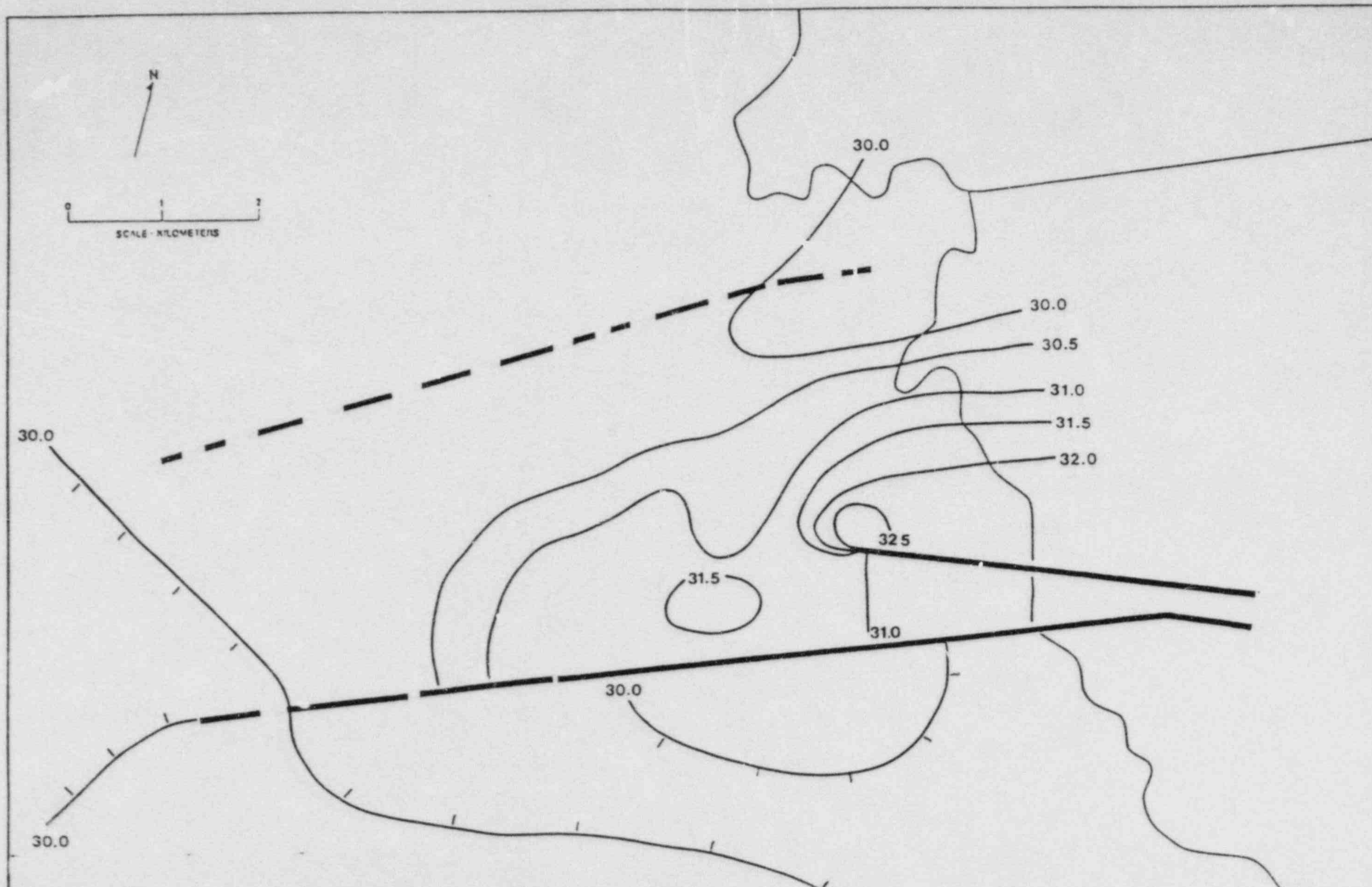

FIGURE 6.1-12.

SURFACE TEMPERATURES (ST), MEANS DURING QUARTER I, (^{o}C).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

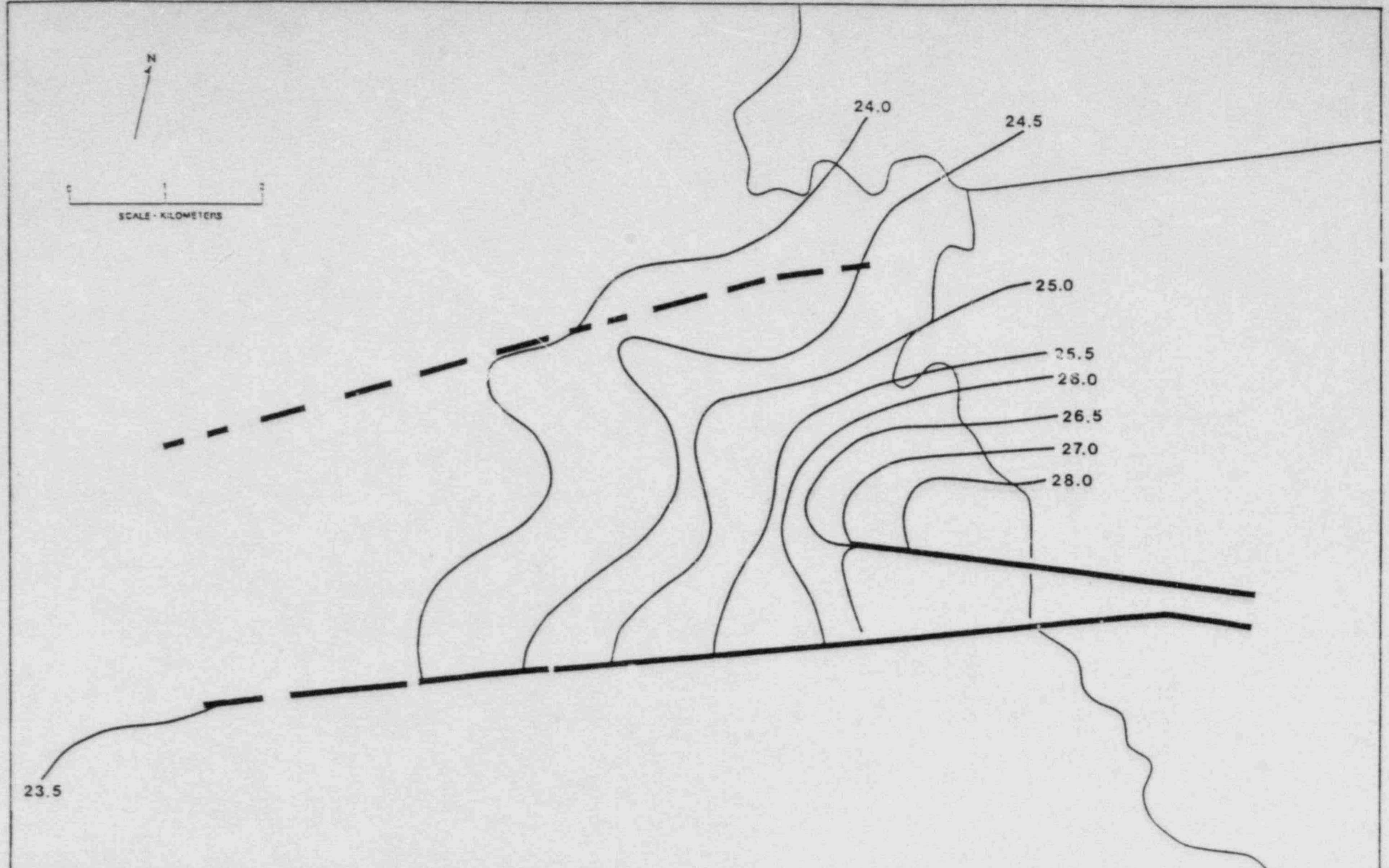

FIGURE 6.1-13.

SURFACE TEMPERATURES (ST) AT HIGH TIDE, QUARTERS I-V, (^{o}C).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

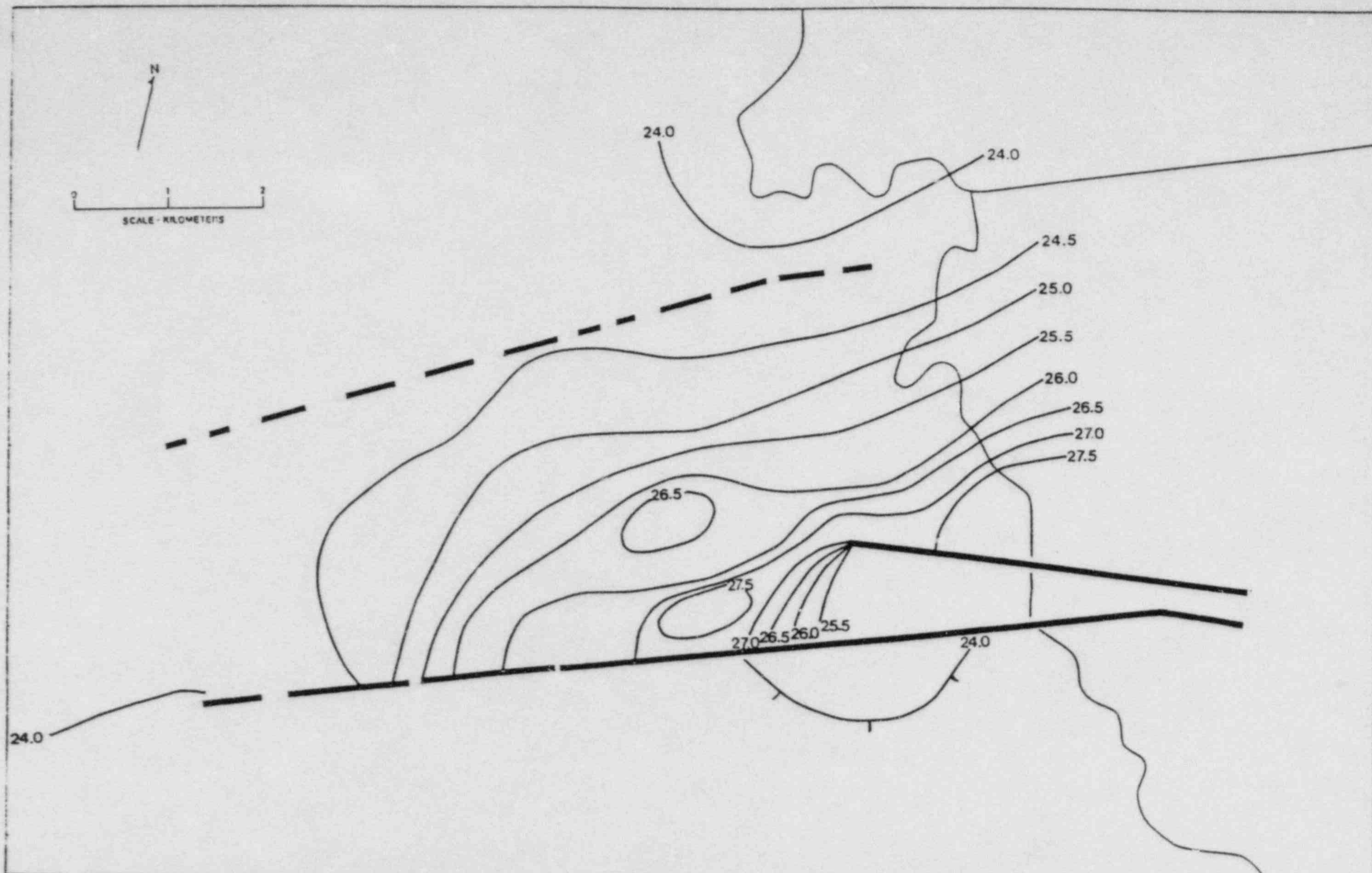

FIGURE 6.1-14.

SURFACE TEMPERATURES (ST), MEANS AT LOW TIDE, QUARTERS I-V, (^{0}C).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

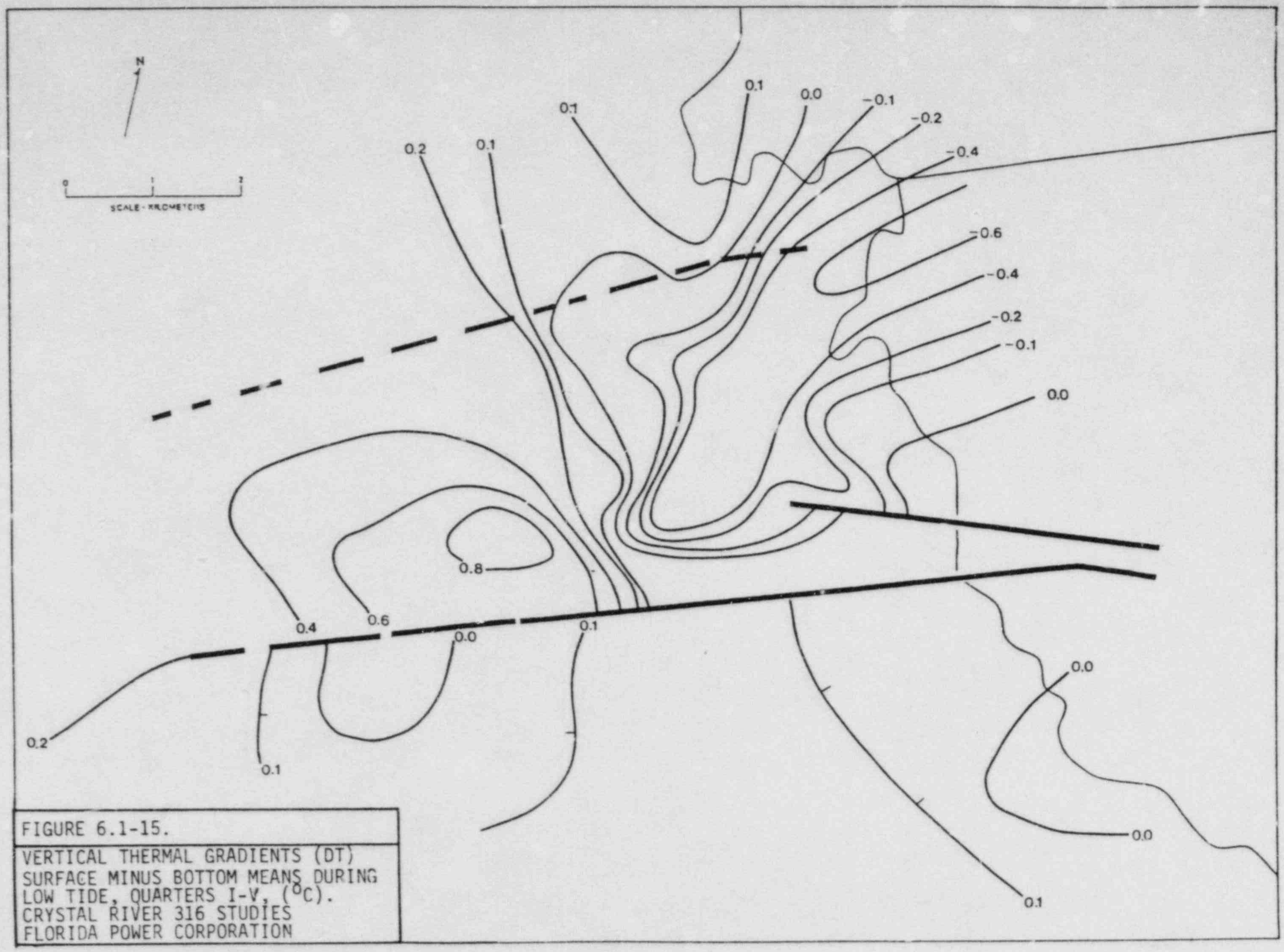

FIGURE 6.1-15.

VERTICAL THERMAL GRADIENTS (DT) SURFACE MINUS BOTTOM MEANS DURING LOW TIDE, QUARTERS I-V, (°C). CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

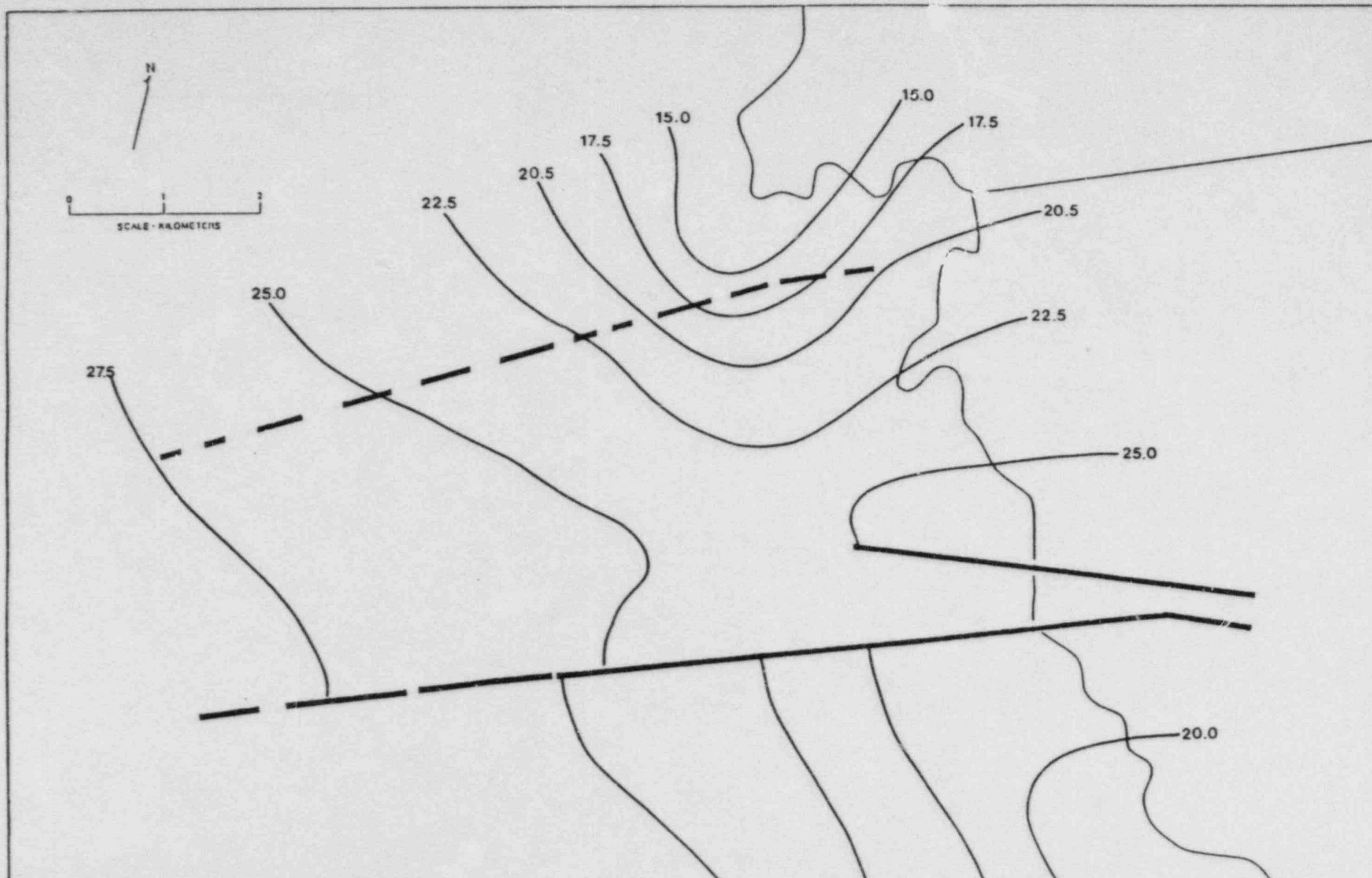

FIGURE 6.1-16.

BOTTOM SALINITY (BC), MEANS
DURING QUARTER V, (o/oo).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

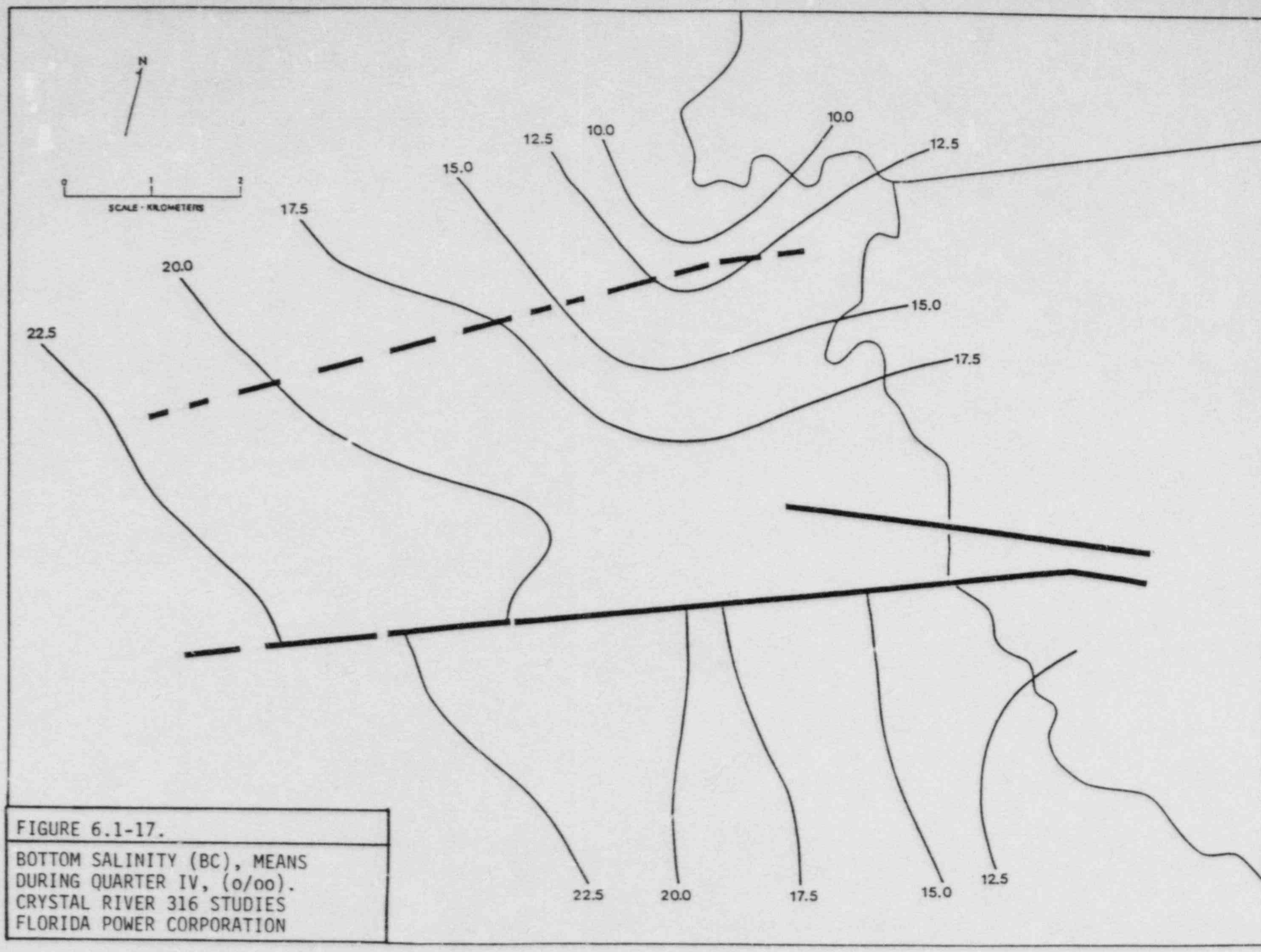

FIGURE 6.1-17.

BOTTOM SALINITY (BC), MEANS
DURING QUARTER IV, (o/oo).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

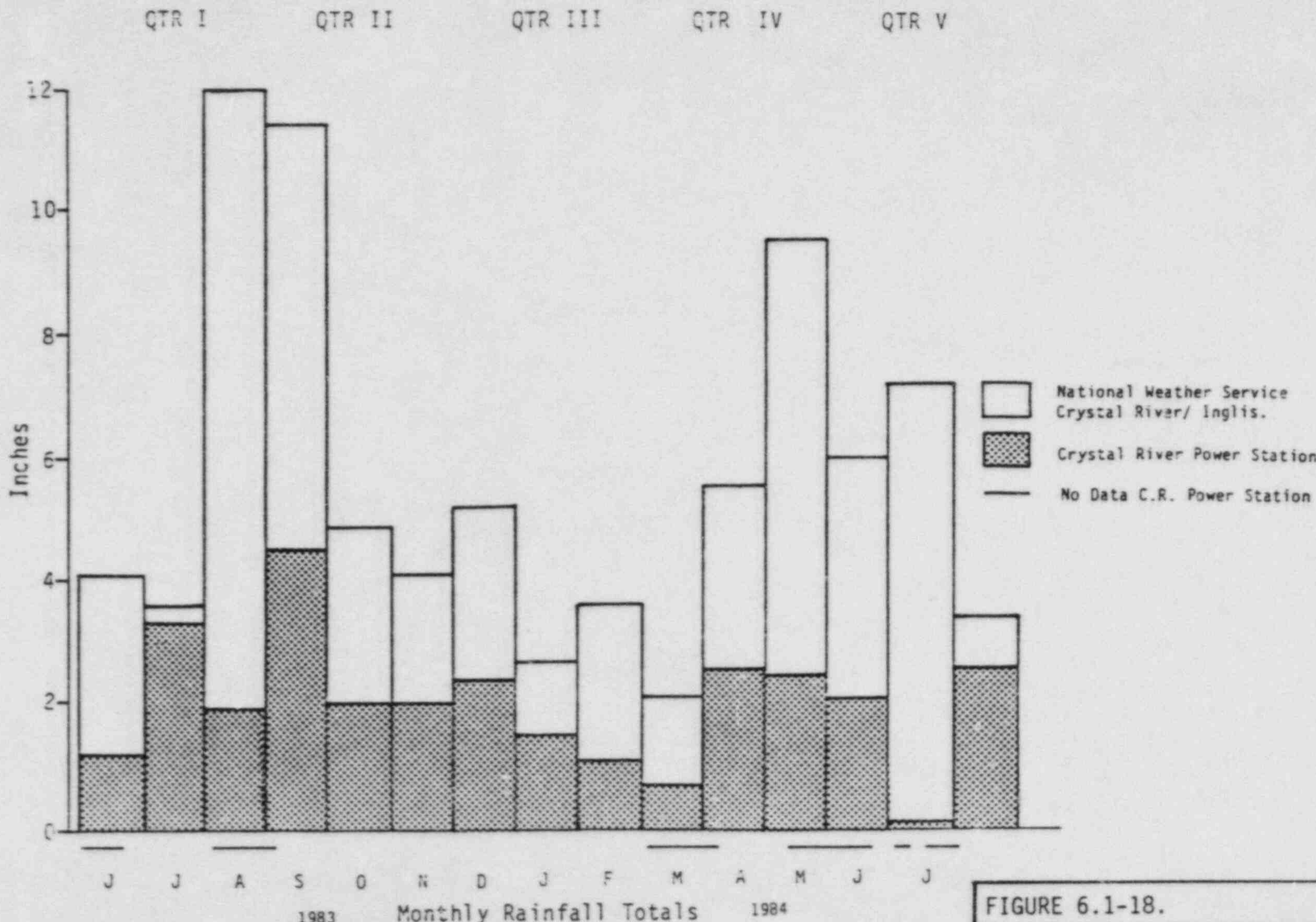

FIGURE 6.1-18.

MONTHLY RAINFALL TOTALS,
CRYSTAL RIVER AREA, (INCHES).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

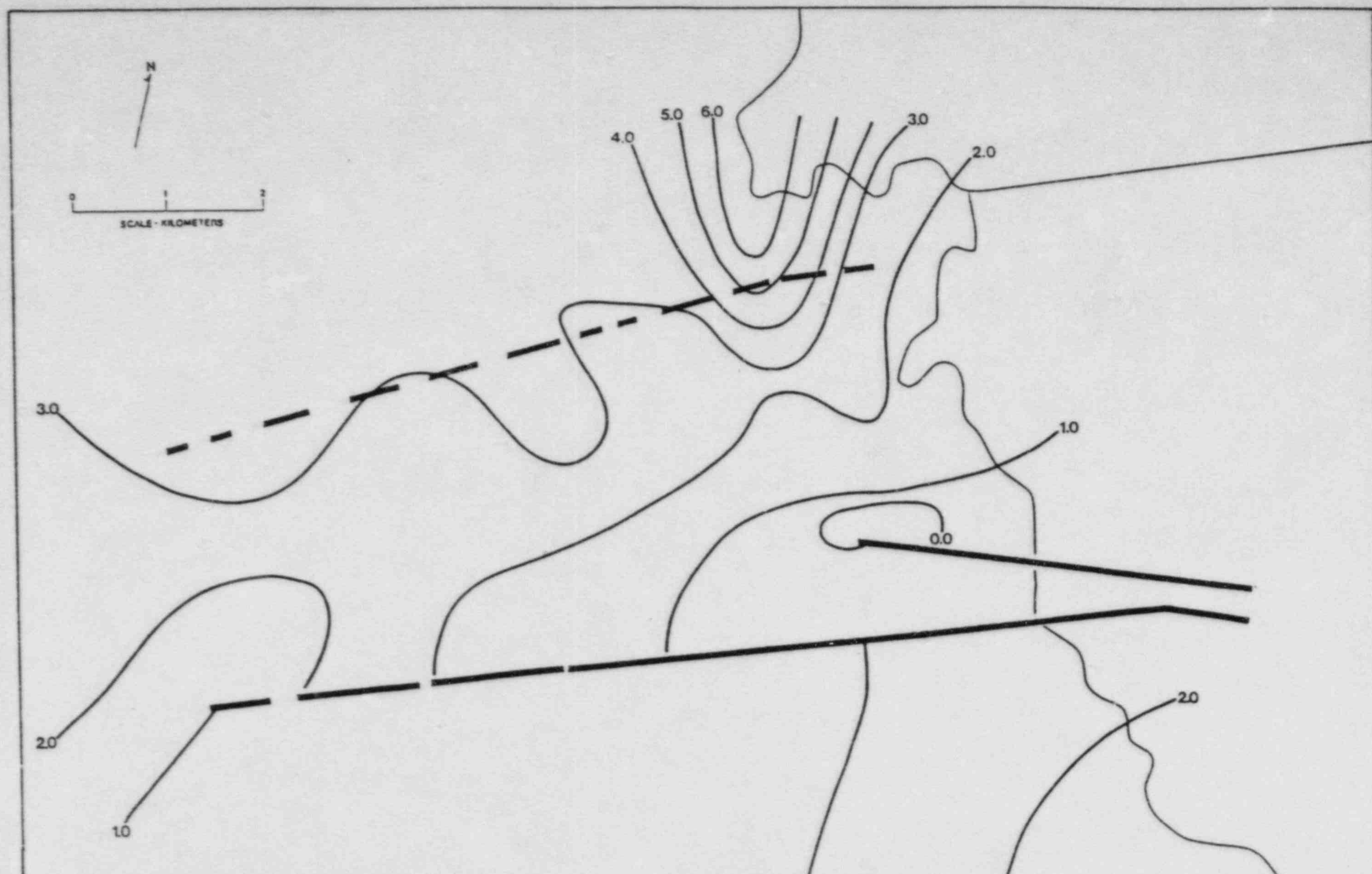

FIGURE 6.1-19.

BOTTOM SALINITY (BC), MEANS INCREASE FROM LOW TO HIGH TIDE, QUARTERS I-V, (o/oo). CRYSTAL RIVER 316 STUDIES/FLORIDA POWER CORPORATION.

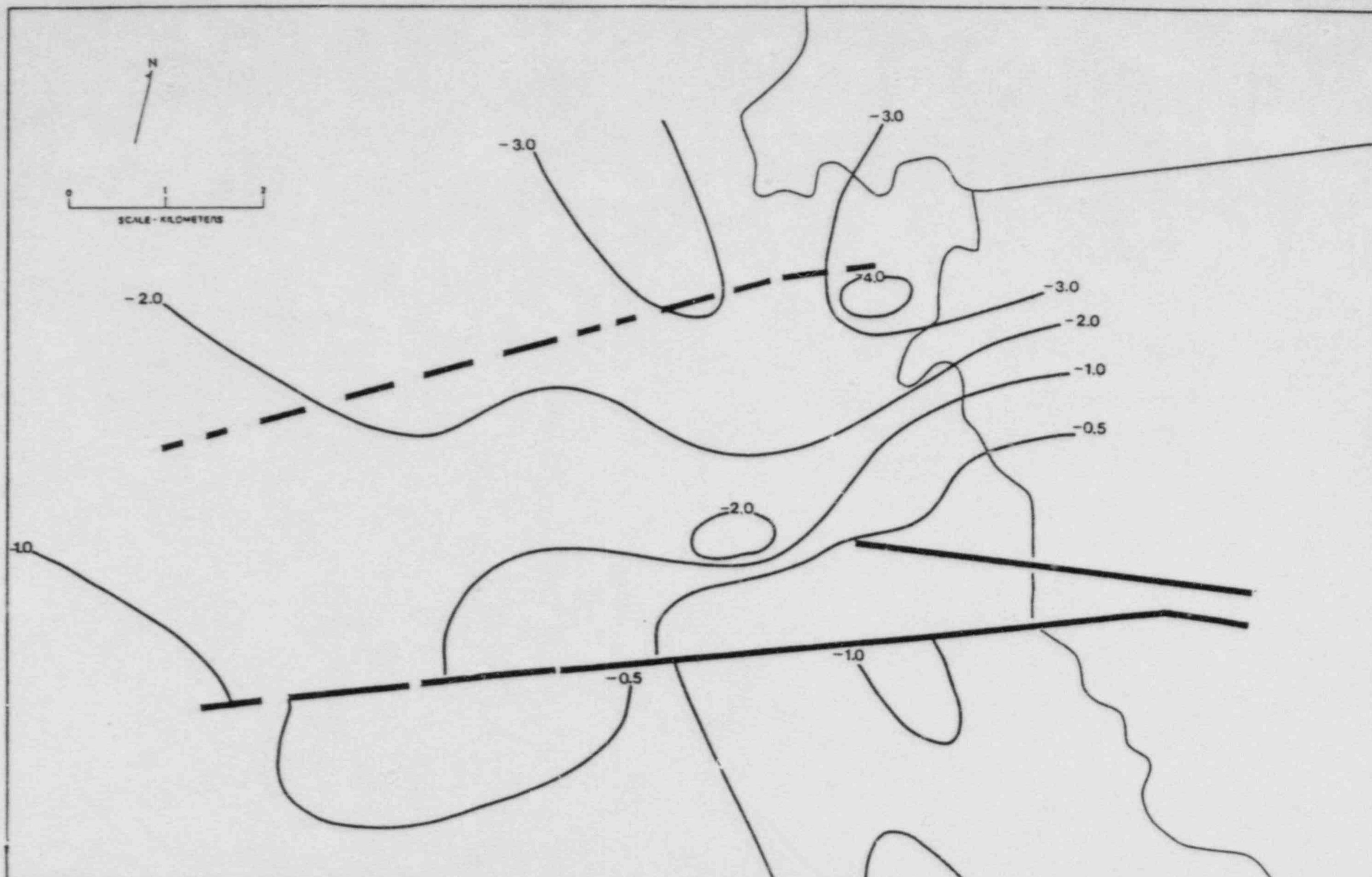

FIGURE 6.1-20.

VERTICAL SALINITY GRADIENTS (DC),
SURFACE MINUS BOTTOM, QUARTERS
I-V, (o/oo).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

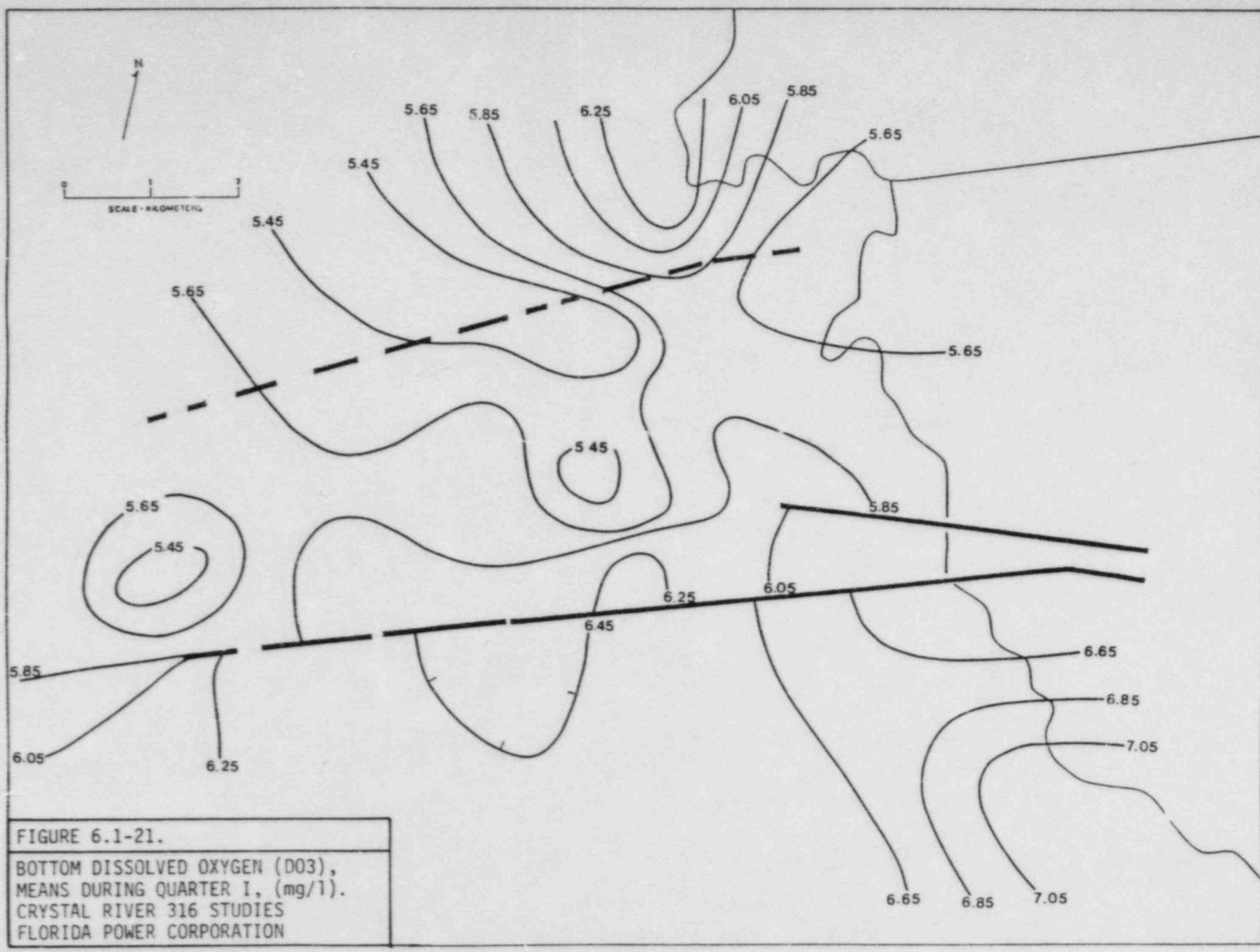

FIGURE 6.1-21.

BOTTOM DISSOLVED OXYGEN (DO3),
MEANS DURING QUARTER I, (mg/l).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

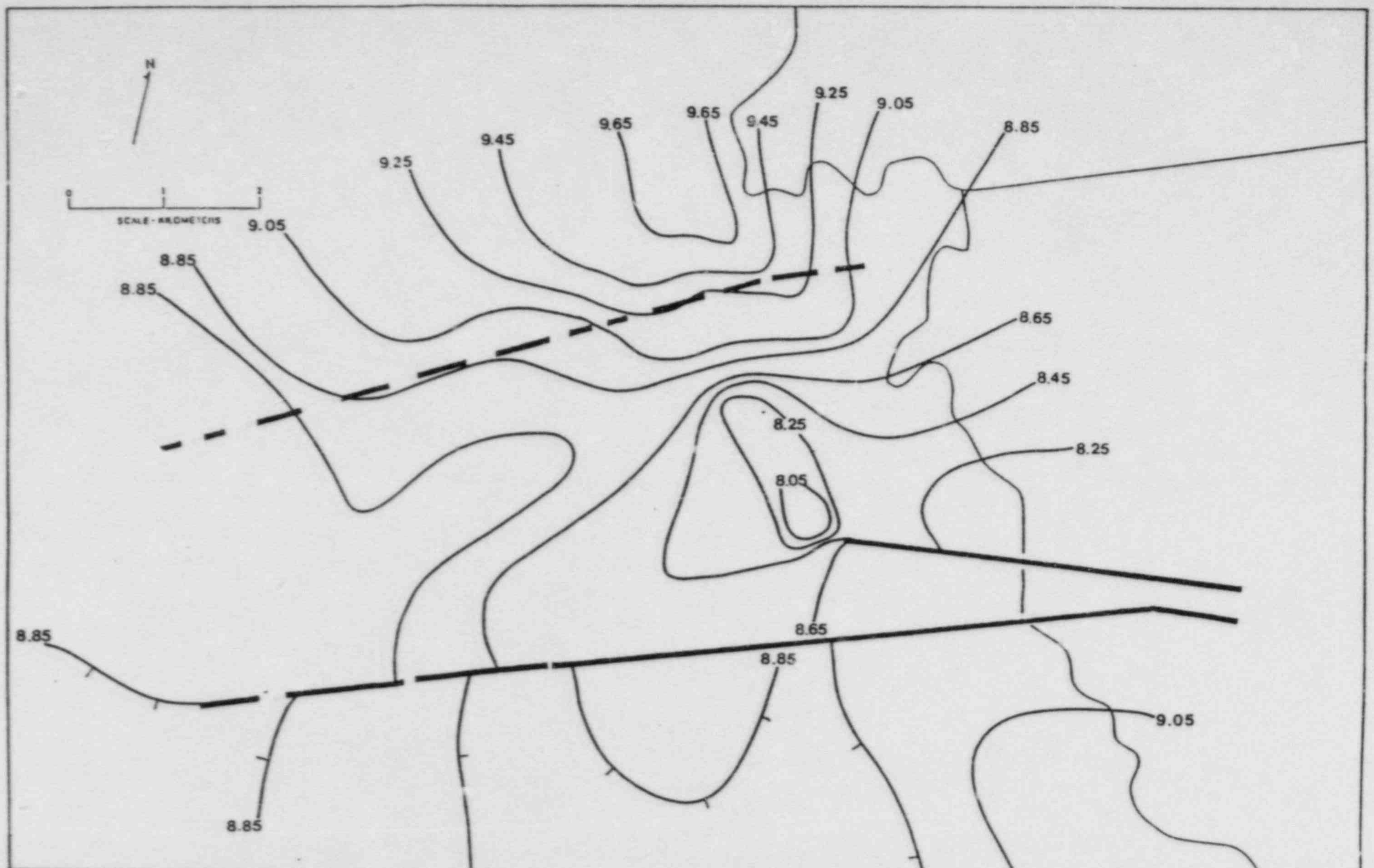

FIGURE 6.1-22.

BOTTOM DISSOLVED OXYGEN (DO3),
MEANS DURING QUARTER III, (mg/l).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

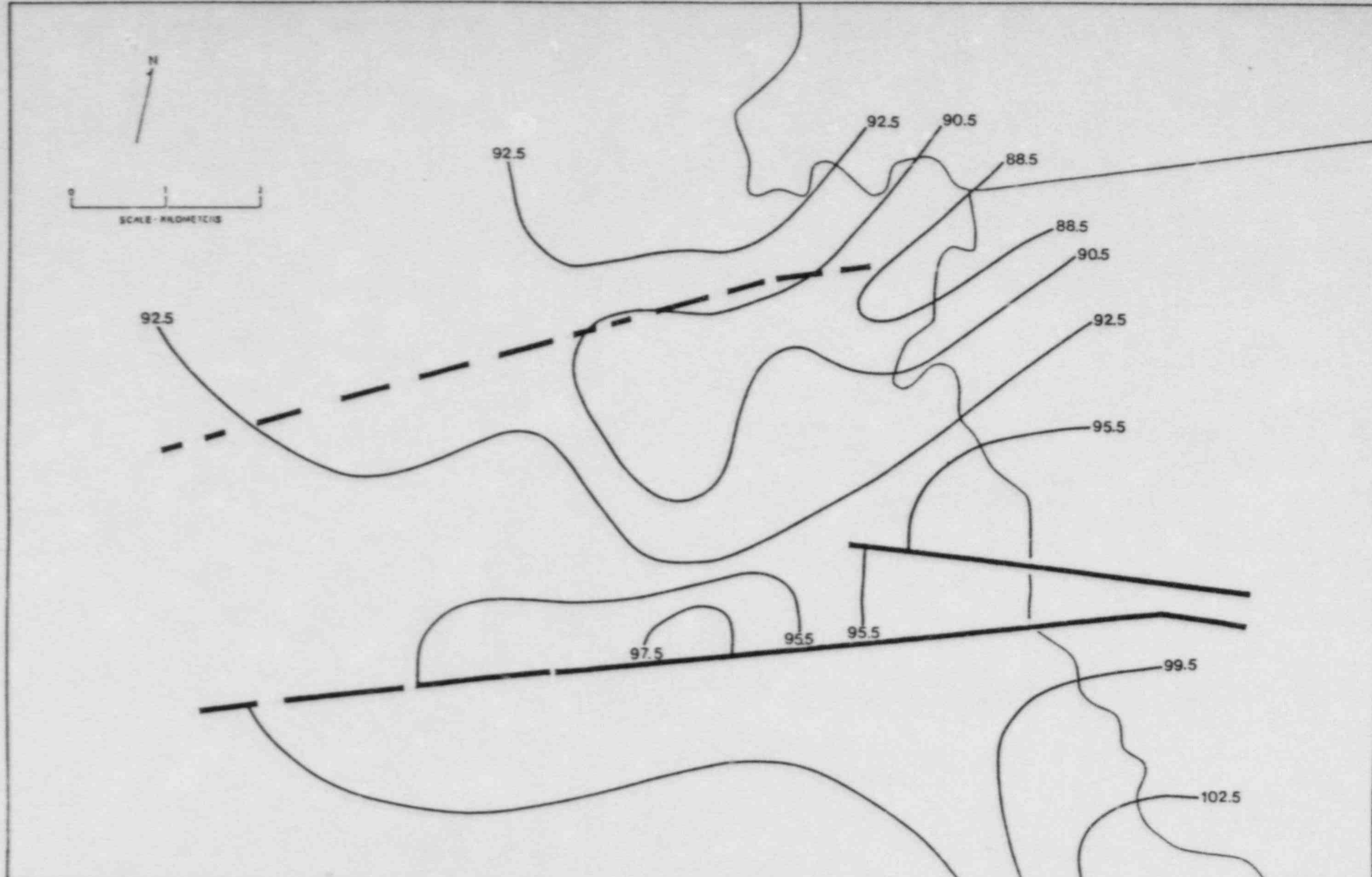

FIGURE 6.1-23.

PERCENT SATURATION OF DO AT BOTTOM (DSB), QUARTERS I-V, (%).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

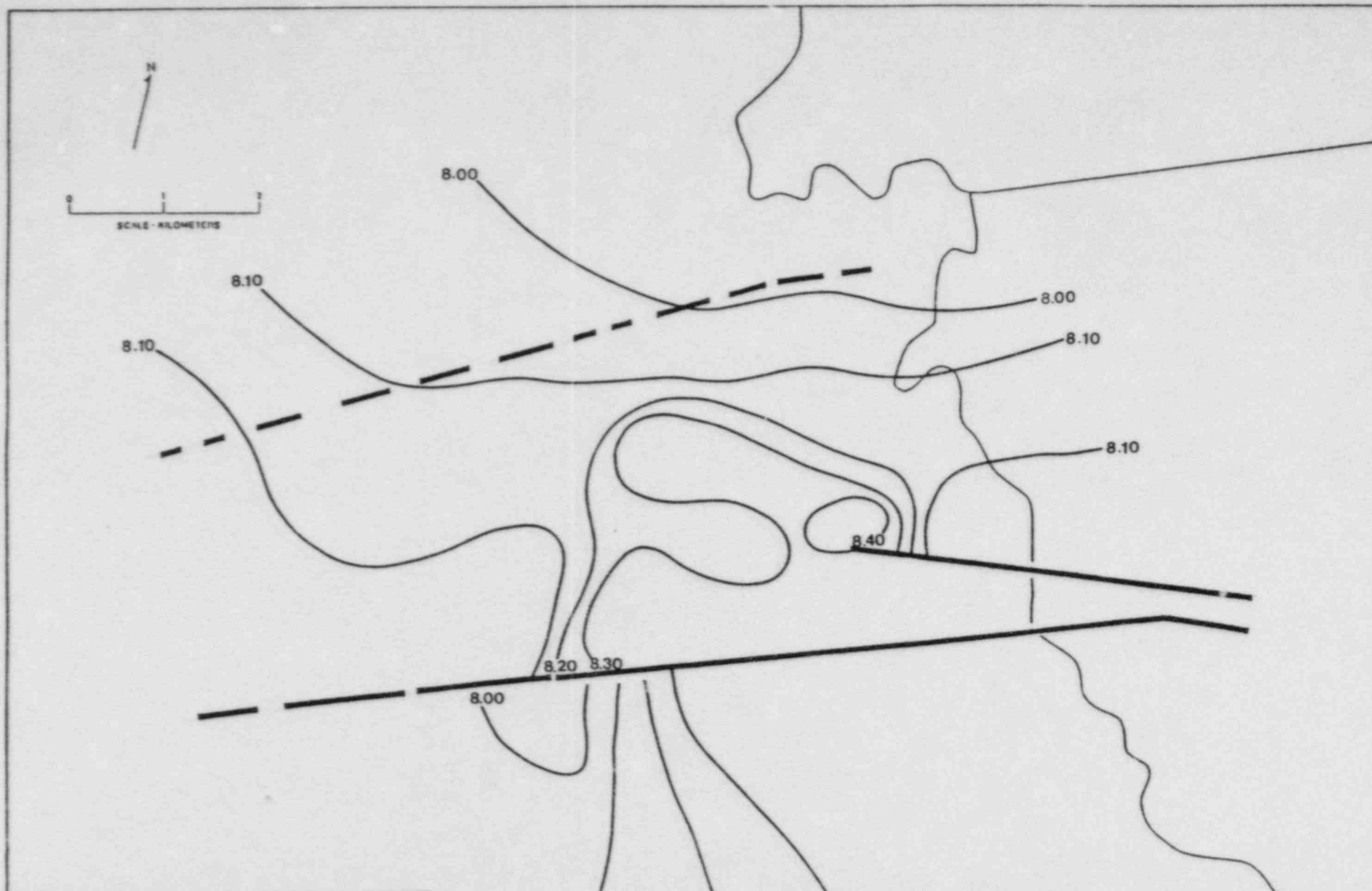

FIGURE 6.1-24.

SURFACE pH (PH1), MEANS DURING QUARTER I, (SU).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

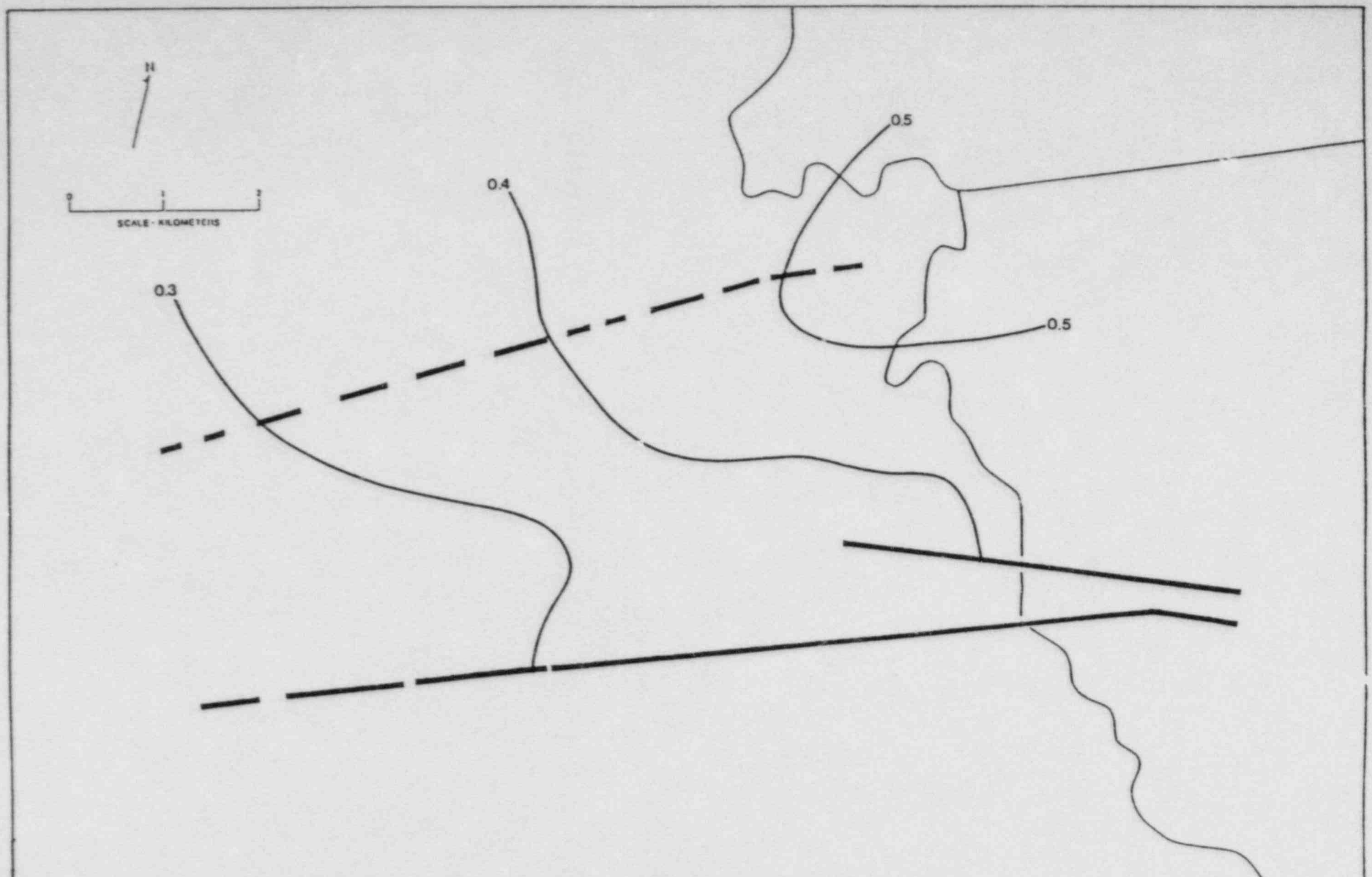

FIGURE 6.1-25.

EXTINCTION COEFFICIENTS (KB),
QUARTERS I-V, (ft^{-1}).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

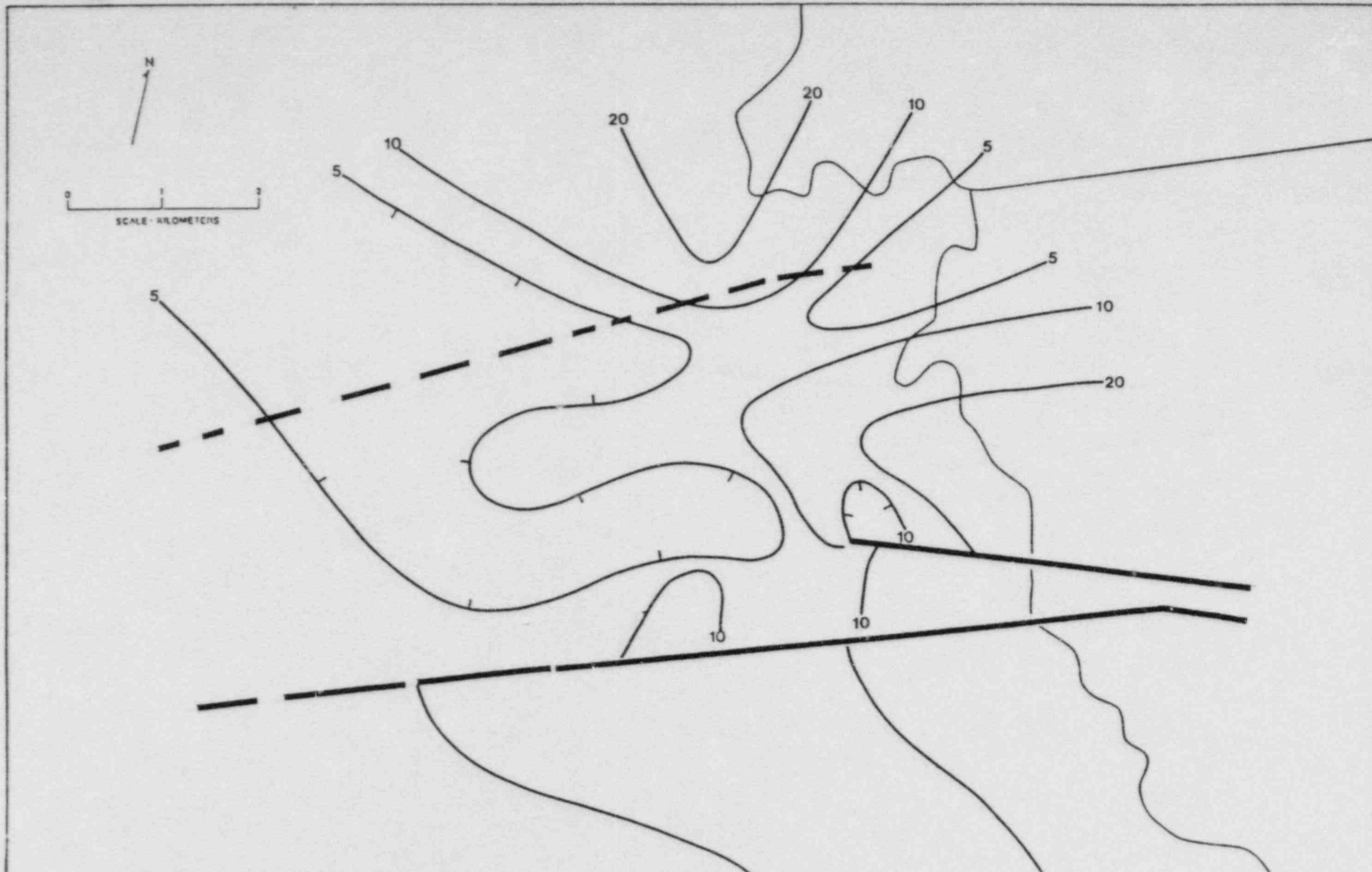

FIGURE 6.1-26.

PERCENT LIGHT AT BOTTOM,
QUARTERS I-V, (%).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

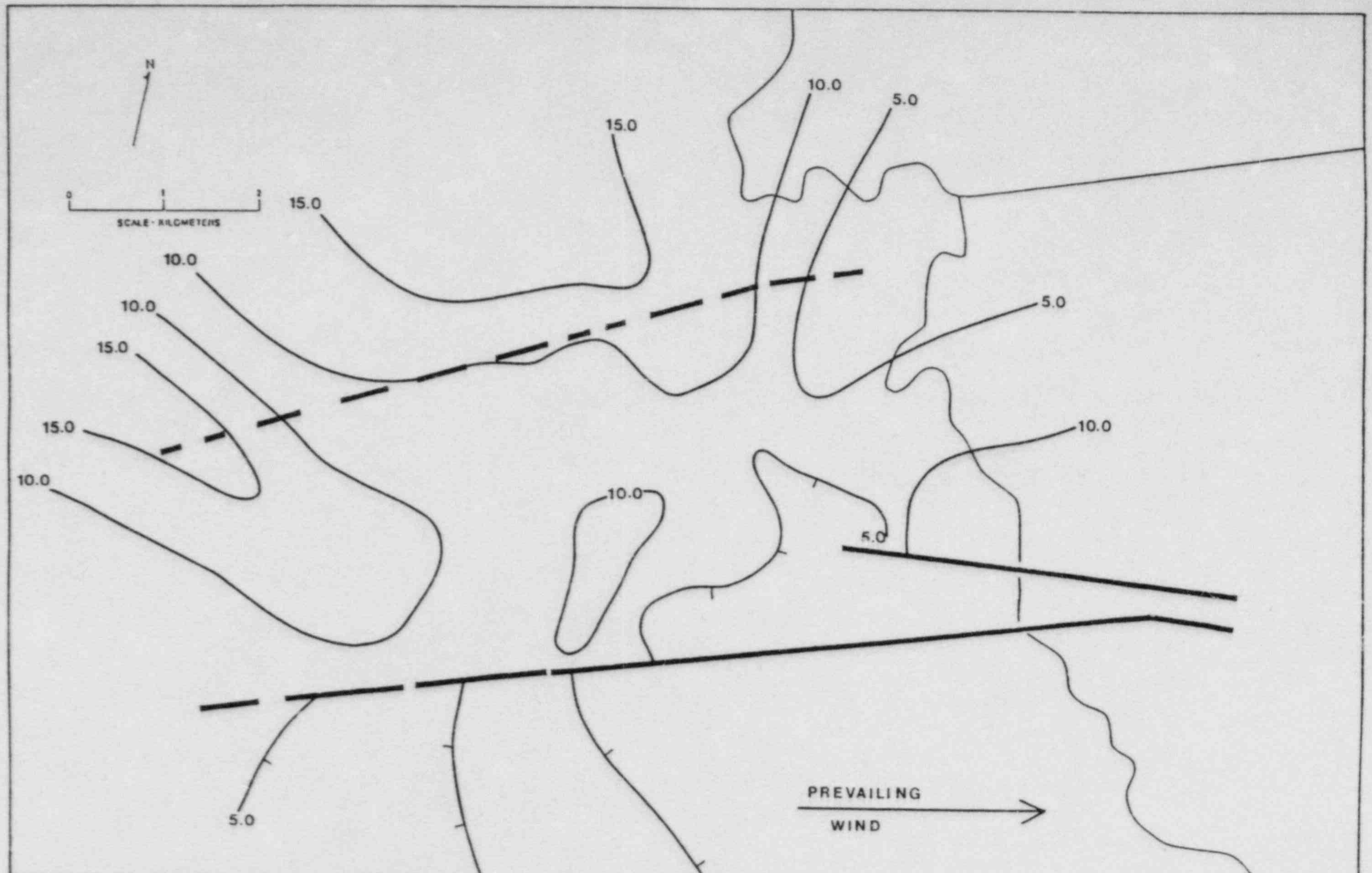

FIGURE 6.1-27.

ELEVATION OF TURBIDITY DUE TO STORM, 7/26/84, (NTU).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

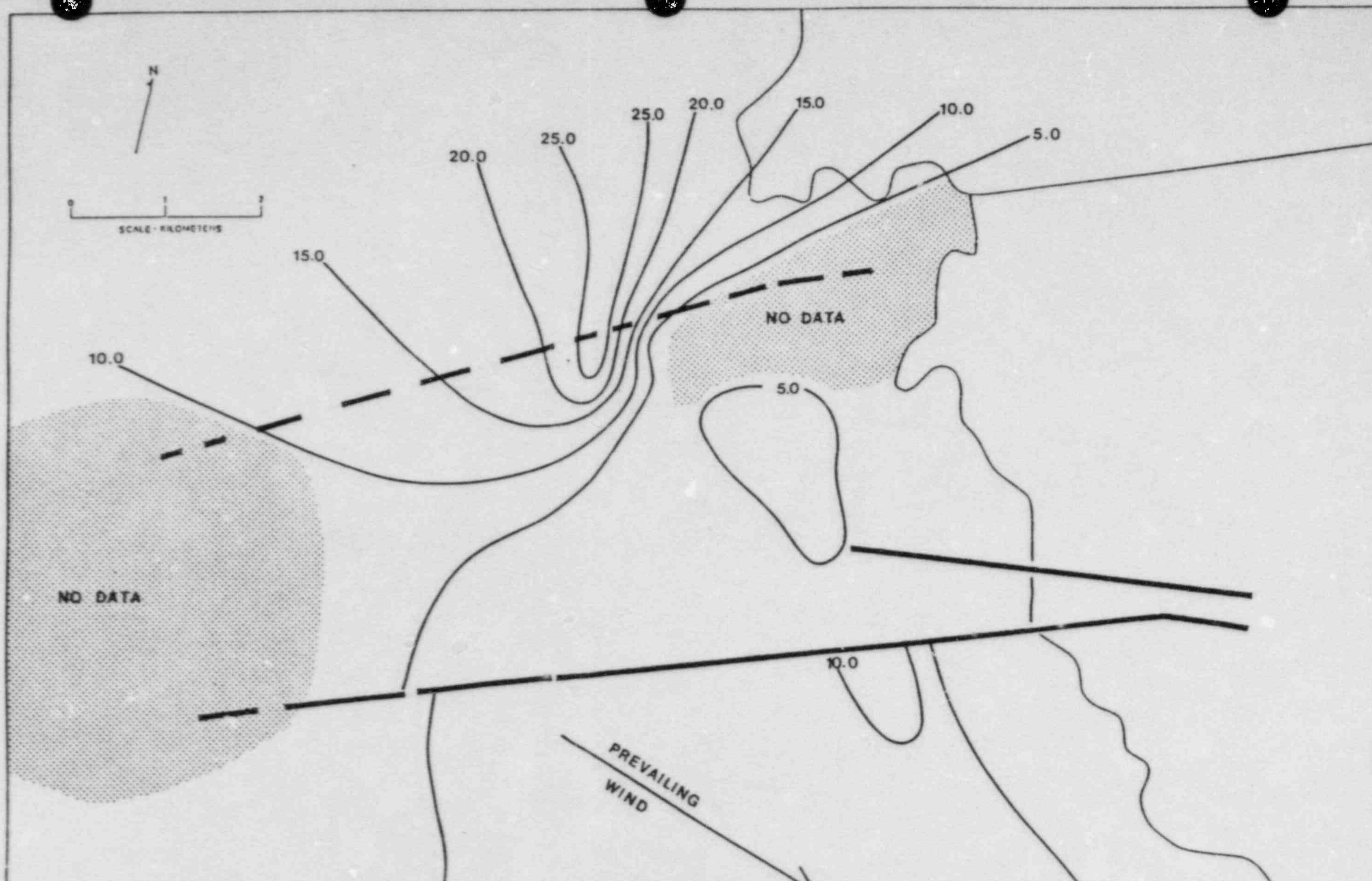

FIGURE 6.1-28.

ELEVATION OF TURBIDITY DUE TO STORM, 2/27/84, (NTU).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

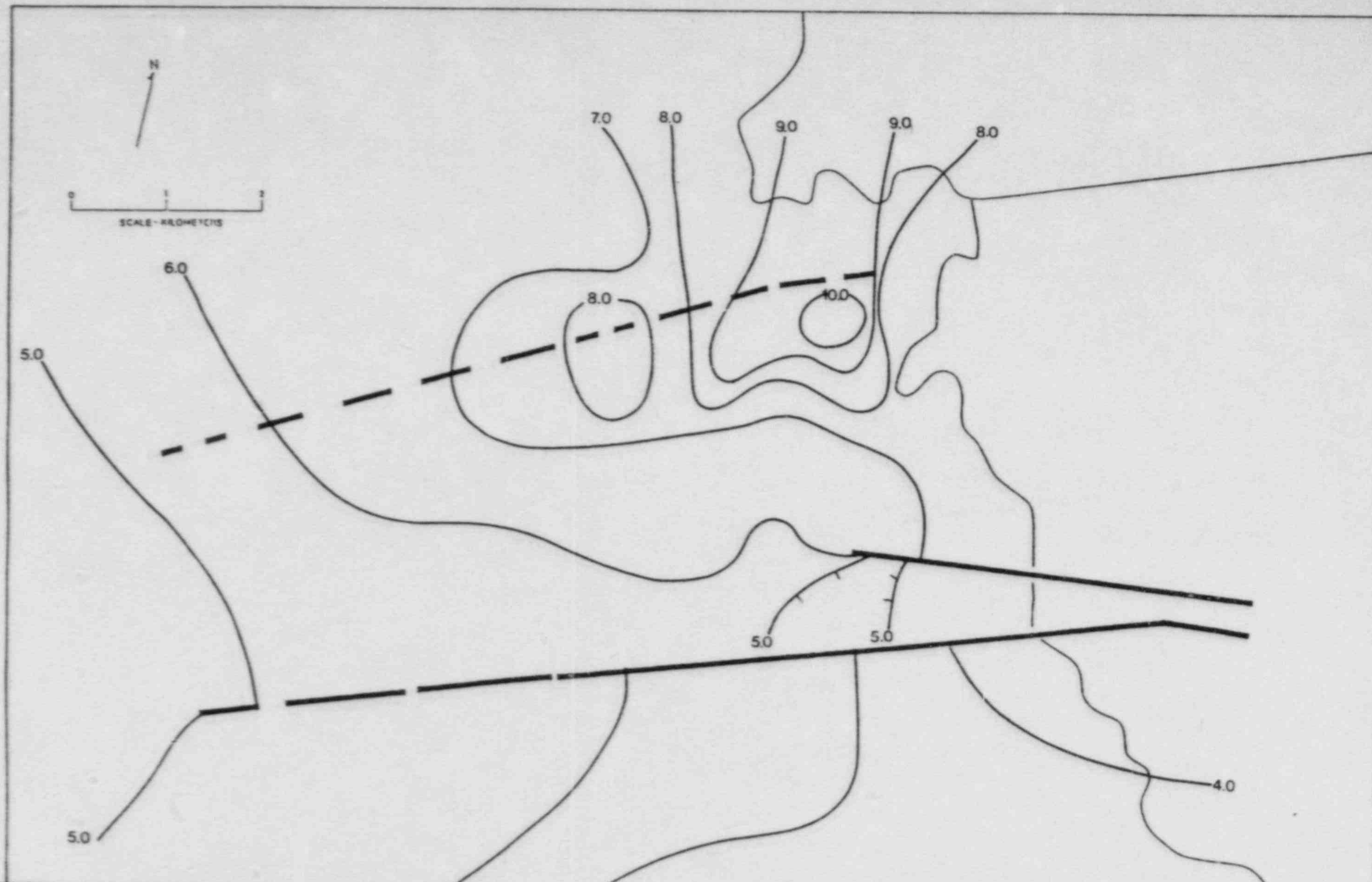

FIGURE 6.1-29.

SURFACE TURBIDITY,
QUARTERS I-V, (NTU).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

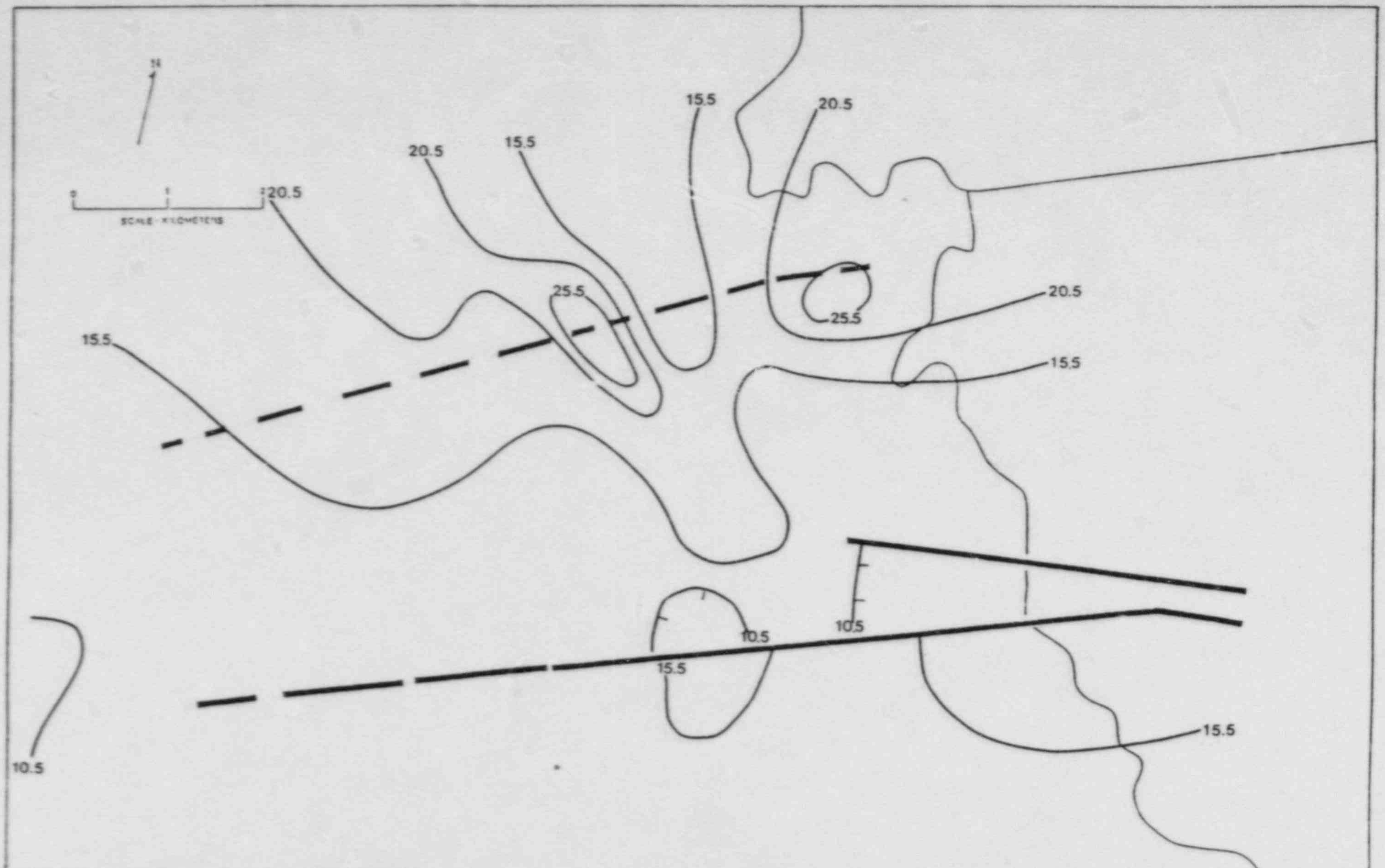

FIGURE 6.1-30.

TOTAL SUSPENDED SOLIDS AT BOTTOM,
QUARTERS I-V, (mg/l).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

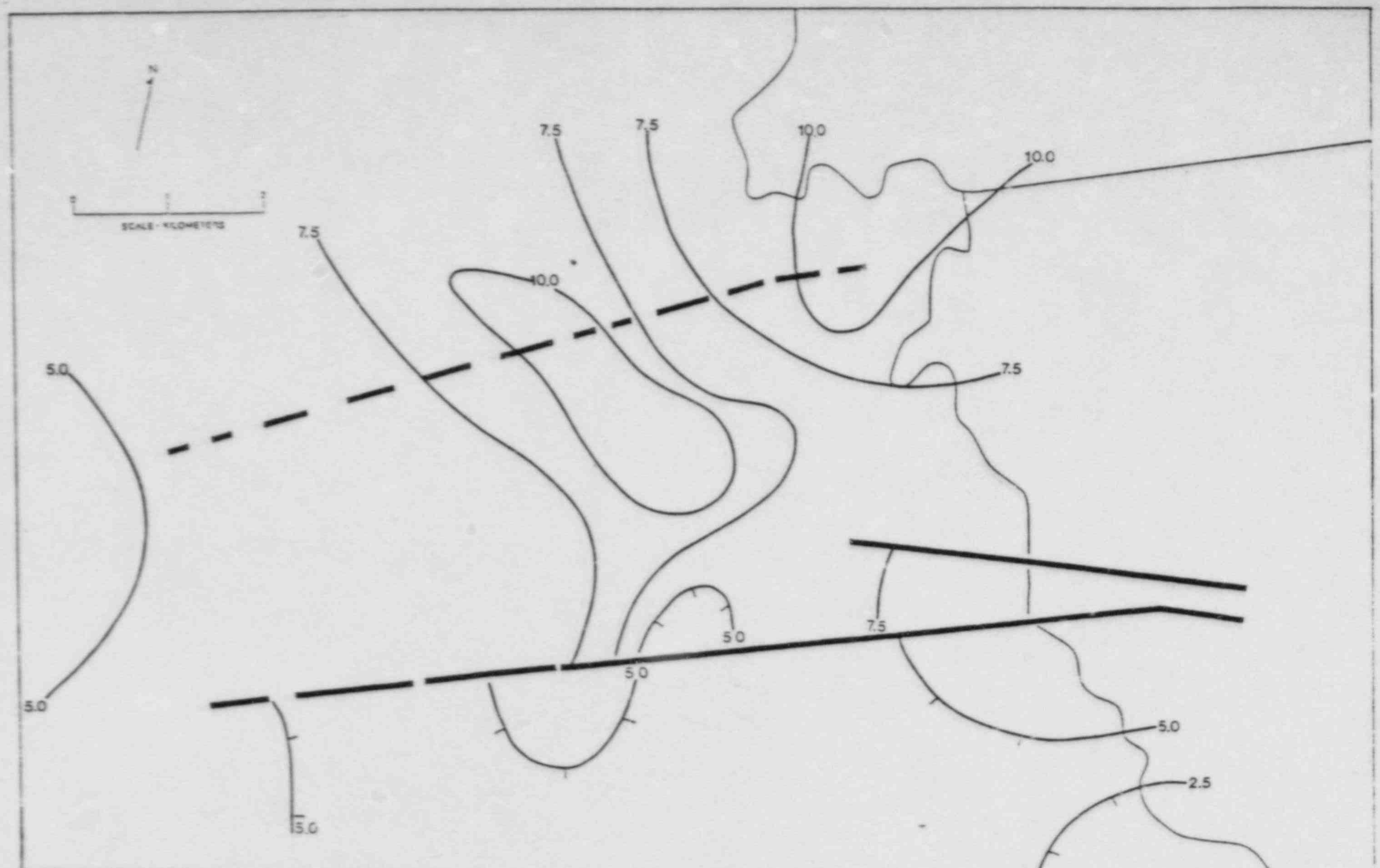

FIGURE 6.1-31.

CHLOROPHYLL 'a', SURFACE AND MID DEPTH, QUARTERS I-V, (mg/m^3).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

6.2 BENTHIC INFAUNA

6.2.1 Sampling and Laboratory Analysis

6.2.1.1 Field Sampling Procedures

Benthic faunal samples were collected at 40 stations (Figure 6.1-1) once a quarter for five quarters, and at 20 of these stations once every 6 weeks for five samplings, to provide quantitative information on the soft bottom macro-infauna of the study area. Samples were collected using benthic faunal box cores constructed after a design originally used by Saloman (1976). Inside core dimensions were 12.5 x 12.5 x 15 cm deep.

Stations locations were established using Loran C. Cores were obtained at each station by divers. The cores were inserted vertically into the substrate. The diver would then remove the sediments on one side of the core and slide a hand across the open end. The core was then inverted and a close weave cotton bag placed over the entire core. A total of eight faunal cores were collected for each station. Six of the cores were processed and two were archived for use if needed. After emptying the core contents into the cotton bag, each bag was submerged in a solution of 15 percent magnesium sulfate solution in seawater for narcotization (Russell 1963).

After narcotization of core samples for a minimum of 30 minutes, samples were washed through a 0.5 mm mesh sieve to remove the finer sediments, preserved in 10 percent formalin seawater and stained with rose bengal stain to facilitate rapid and accurate sorting (Mason and Yevich 1967; Korinkova and Sigmund 1968; Hamilton 1969; Williams and Williams 1974).

Sediment samples were collected each quarter at the 40 benthic faunal stations and analyzed to determine granulometric distribution, total organic carbon (TOC), and free sulfide content. Sediment samples for sulfides were collected from ten stations each day for four consecutive days (40 stations). Samples were collected as early as possible each day and immediately returned to the laboratory for processing. Because sulfides are easily oxidized, the transporting container excluded atmospheric oxygen, was purged with nitrogen after each opening and the entire device was stored and transported on ice.

For collection of the sulfide samples at each station three 3.81 cm (ID) by 15 cm PVC cores were utilized. Cores were collected by a diver. An uncapped core was pushed into the substrate with one hand until the sediment within the core reached the top rim. Cores were then capped on the upper end, sediment was removed from around the outside of the core, the contents of the core were retained by hand, the core was removed from the substrate and the open end capped. Cores were then returned to the support vessel and stored.

Concurrently with the faunal core collection three sediment core samples were collected at each station for granulometry and total organic carbon (TOC). Cores were collected using the method described above. On the surface vessel, the sediment was extruded into a 500 ml plastic sample jar. Each jar was stored on ice until returned to the field facility, where samples were inventoried and frozen. Samples remained frozen until processed.

Also in conjuction with the benthic faunal sampling, sediment temperature and Eh were measured with a Martek Mark VII multiparameter instrument equipped with a specialized sediment probe. Eh readings were taken once every 3 minutes for 25 minutes, while temperature was read with the last Eh reading. Eh and temperature measurements were made once every 6 weeks at the stations sampled for fauna.

6.2.1.2 Laboratory Procedures

After a minimum of 48 hours in 10 percent formalin preservative, benthic faunal samples were transferred to 70 percent isopropyl alcohol. In preparation for rough sorting, faunal samples were decanted into light and heavy fractions. The light fraction contained the majority of fauna and was sorted under a Unitron ZSB stereozoom binocular microscope. The heavy fraction, containing primarily molluscs and larger animals, was sorted with the unaided eye in the white background pan. Each sample was rough sorted into four major groups: polychaetes; crustaceans; molluscs; and miscellaneous.

Taxonomic identifications were performed under various powers of the binocular stereozoom (.7-40X) or a Nikon or Unitron compound microscope (40-1000X). Identifications of taxa to the lowest practical level were accomplished with the use of descriptive literature, comparison to reference collections, and the use of external consultants for verification of problem identification.

Sulfide cores were analyzed according to procedures described in Method 3-243 (EPA 1981), Method No. 112-71W (Technicon 1973), and Method 427 (APHA 1980). The methods are capable of detecting sulfide levels of 0-0.32 mg/l. Three sulfide cores were analyzed from each benthic station. Sample cores were subsampled, placed onto a prepurged, distillation apparatus, and purged with nitrogen into a cadmium sulfate trapping solution using constant, predetermined purge times and rates and reagent volumes. Samples were analyzed using Technicon's Industrial Method 112.71W and a Technicon AutoAnalyzer II. Sample concentrations were computed based on original sediment weight.

Laboratory methods used for grain size analysis follow the procedures of Folk (1974). In the laboratory, sediment samples were stirred thoroughly and subsamples removed for TOC analysis. The remaining sample was then split into replicate samples. Each aliquot was then washed with distilled water through a 0.063 mm screen to remove as much of the silt/clay fraction as possible. This fraction was collected and dried. The material greater than 0.063 mm was dried and then placed into a Wentworth sieve series of 1 phi intervals (2.0 mm, 1.0 mm, 0.5 mm, 0.25 mm, 0.125 mm, 0.063 mm and less than 0.063 mm catch pan). The material retained on each sieve was weighed (to 0.001 gm). Sediment fraction raw weights were then analyzed to yield the following: size class percentage; cumulative percentage; median phi value, mean grain size (phi); sorting coefficient; graphic skewness and graphic kurtosis. The calculations use equations as cited in Folk (1974).

Total organic carbon analyses were conducted using Method 1 (EPA 1981) and Oceanography International (OI) Corporation's Dry Oxidation Procedure (OI undated). The effective range of this procedure is 0.2 to 40 mgC/g.

Subsamples were weighed and then dried to a constant weight at $70^{\circ}C$ and weighed again to calculate percentage solids.

Inorganic carbon was removed from the samples by addition of HCl. Samples were then dried, treated with CuO, purged with O_2 and combusted. Samples were analyzed with an OI TOC analyzer (nondispersive infrared type) and quantified against standards and blanks prepared from known carbon concentrations.

6.2.1.3 Statistical Analyses

All of the benthic core summary statistics were calculated after the data set had been purged of species which were not representatively sampled by the core samplers. SAS procedures were used to calculate all summary statistics. The data were analyzed primarily with summary statistics which characterize the benthic community. Species richness, diversity (as measured by Shannon-Weaver, Pielou 1975), and evenness were calculated for each station and date of sampling. Morisita's index of faunal similarly was also calculated for each pairwise combination of station and sampling date. Faunal density (number per m^2) was the only non-community type metric calculated.

The hundreds of pairwise measures of Morisita's index were summarized using the EAP package (Eco Analysis 1984). The EAP package is a group of SAS style procedures which are serially compiled with the SAS package. This package provided a dendogram display of a group-averaged sorting, cluster analysis. The inverse of the Morisita's value was used as the distance metric. The dendograms were produced for each sampling period and with the species-station date collapsed over all sampling periods to assess spatial similarities among the stations. They were also produced for each station to assess temporal clustering of the community. Finally, cluster dendrograms were produced over all stations and periods to simultaneously assess spatial and temporal similarity clustering.

Abiotic parameters relevant to benthic core sampling were also analyzed using the SAS GLM procedures. Sulfide and Eh valves were analyzed relative to time, station, sediment temperature, and mean and median grain size of the sediments. The analysis of sulfide concentrations also included total organic carbon as a covariate.

6.2.2 Results

Introductory chapters to this report have described the general characteristics of the study site. In terms of the subtidal benthic habitats, the study area may be classified as shallow and heterogeneous. Sediment types range from mud to coarse sand and shell. The area contains limestone outcroppings and associated hard substrate, except in the discharge basin where the bottom consists primarily of fine sand and mud. Extensive oyster reefs and patchy seagrasses south of the intake canal add to the heterogeneity of the substrate in the study area. Depths ranged from less than one meter to slightly over four meters at the forty stations where benthic infauna were sampled (Table 6.2-1). Average depth at the stations was two meters. In general, depth increased gradually offshore.

In order to evaluate the effects of the thermal plume on the benthic communities of the study area, the influence of temperature and other abiotic parameters must be considered in evaluating the distribution of benthic infauna. Section 6.1 provides a detailed description of all water quality parameters (on a quarterly basis); the same data were utilized in this section but as six-week means of only bottom measurements to provide direct comparisons with the infauna.

Abiotic Parameters

Temperature

To compare with benthic infaunal data, distribution of bottom temperature at the site was analyzed from four types of information:

1. Weekly synoptic measurements at the 40 stations (collected in conjunction with photometry measurements);

2. Continuous thermograph measurements at or near the 40 stations;

3. Sediment temperature measurements at the time of benthic sampling;

4. Hydrodynamic model projections of the thermal plume under various tidal and seasonal conditions.

Since infaunal sampling was conducted once every six weeks, temperature data from synoptic sampling and thermographs were summarized as six-week averages at each station. In order to account for short-term fluctuations in temperature, the data were also examined as three-week means. The six-week and three-week averages included the week of benthic sampling. Synoptic data was generally collected on high and low tides during alternate weeks. Therefore, the averages mask tidal influence. Measurements of sediment temperature during the infaunal sampling were not synoptic; in light of the shallow nature of Crystal Bay and solar-induced temperature variations within a particular day, sediment temperature data can be used only to describe general trends.

Synoptic bottom temperature at the forty stations is summarized as six-week averages in Table 6.2-2. The three-week averages exhibited essentially the same trend as six-week averages. Lowest temperatures were during January-February and highest temperatures during July-September. Spatial and temporal trends were essentially similar between the three-week and six-week averages. Certain stations had consistently higher temperatures; those stations were 4 and 5 (northern Control Transect); 13-15 (Thermal Transect A); 17-23 (Thermal Transect B); and 23-30 (Thermal Transect C). Based on six-week averages, nine stations exceeded 32°C during September: 13, 14, 17, 18, 19, 20, 21, 28, and 29. The area enveloped by these stations is shown in Figure 6.2-1.

Utilizing plant intake temperatures as ambient temperature, bottom temperature variation from ambient for the six-week averages is presented in Table 6.2-3. The following groups of thermal stations (Figure 6.2-2) can be recognized from the data:

$1^{o}C$ - $2^{o}C$:	4, 5, 14, 22, 27, 28, and 30	(Group I)
$2^{o}C$ - $3^{o}C$:	13, 20, 21, and 29	(Group II)
Greater than $3^{o}C$:	17, 18, and 19	(Group III)

Group I stations may be considered marginally thermal stations (Stations 4 and 5 appear to be influenced by both the barge canal and the thermal effluent, as discussed in Section 6.1, and are not effective controls). Group II and Group III stations can be considered thermal stations which are directly influenced by the effluent. Group III stations can be considered maximally influenced by the effluent, since average temperatures at these stations are substantially higher than intake temperatures. It is interesting to note that Group II and Group III stations exceed $32^{o}C$ (average temperature) during the hottest period of the year (August-September). These groups were somewhat different from those identified with quarterly data in Section 6.1.

Six-week average temperature data from thermographs at or near the forty stations are presented in Table 6.2-4. Compared to the synoptic data, thermograph average temperatures were lower since they included night temperatures. However, the general trends related to bottom temperature distribution at the study site were similar to the trends exhibited by the synoptic data.

Sediment temperatures are summarized in Table 6.2-5. Consistently higher temperatures were measured at Stations 13, 14, 17, 18, 19, 20, 21, 27, 28 and 29. This grouping of highly thermal stations is similar to that derived through the analysis of synoptic and thermograph data.

Predicted thermal plume configurations are shown in Chapter 10.6. The $2^{o}C$ isotherm simulated under full plant load, worst case conditions closely approximates the offshore boundary of the thermal groups defined by the field temperature results (synoptic, thermograph, and sediment temperatures). This general agreement of the results obtained by different means confirms that the areas shown in Figures 6.2-1 and 6.2-2 are where thermal effects, if any, would most likely occur on the benthic communities.

Salinity

Bottom salinity information from the weekly synoptic surveys were analyzed as six-week means for each station, similar to the analysis of temperature data. Summary data are presented in Table 6.2-6. For a majority of the stations, temporal variation in salinity was minimal. In general, offshore stations and Stations 17 and 18 near the point of thermal discharge had a higher salinity, while stations near the two rivers (1, 2, 38) and the barge canal (4, 5, 6) had a much reduced salinity.

Turbidity

Bottom turbidity data from the weekly synoptic surveys were averaged as six-week means for each station; results are presented in Table 6.2-7. In general, turbidity values exhibited considerable variation both temporally and spatially. Offshore stations were less turbid and stations near the barge canal spoil islands (Stations 4, 5, 6, 8, 9, 10) and Stations 15 and 21 were most turbid.

Total Suspended Solids (TSS)

TSS information from the biweekly surveys were averaged as six-week means and results are presented in Table 6.2-8. TSS values varied substantially both in time and space, and as with turbidity, were lower at offshore stations and higher near the barge canal spoil islands.

Dissolved Oxygen (DO)

Bottom DO data from the weekly synoptic surveys were averaged as six-week means for each station; results are presented in Table 6.2-9. In general, DO values were high in the study area. Lowest values were observed during July-September. Anoxic conditions were not observed at any station. Lower DO values were observed at Stations 3, 5, 7, 8, 9, 15, 21, and 22 during August-September (1983).

Based on the results of the water quality parameters (six-week averages/bottom) presented above, thermal station groups identified in Figure 6.2-2 can be subdivided as follows:

Group I ($1^{o}C$-$2^{o}C$ increase):	A: Stations 4 and 5 (lower salinity and DO; higher turbidity and TSS)
	B: Stations 14, 22, 27, 28, and 30.
Group II ($2^{o}C$-$3^{o}C$ increase):	Stations 13, 20, 21, and 29.
Group III (greater than $3^{o}C$ increase):	A: Stations 17 and 18 (higher salinity)
	B: Station 19.

Sediment Characteristics

Granulometry

Mean grain size at the forty stations ranged from a low of -0.27 phi (coarse) at Station 29 to a high of 3.53 phi (very fine) at Station 8. Summarized data for all stations is presented in Table 6.2-10. Based on mean grain size, the following groups of similar stations can be discerned:

Group I	(coarse sand): Stations 19, 29, and 35.
Group II	(medium sand): Stations 2, 3, 11, 12, 15, 23, 25, 26, 30, 32, and 36.
Group III	(very fine sand): Stations 4, 5, 8, 21, and 40.
Group IV	(fine sand): all other stations.

Temporal variations in mean grain size were generally minimal except at Station 29 where sediments changed from coarse sand in June 1983 to fine sand in July 1984.

Slit/Clay Content

Percent of silt/clay content in the sediments at stations is summarized in Table 6.2-11. In general, silt/clay content was high at the study site. Except for Stations 1, 2, 19, 29, and 30, all other nearshore stations had a high content of silts and clays. This was especially true at Stations 4, 5, and 8. In general, offshore stations contained less than 5 percent silt/clay content (except Station 40), while nearshore stations frequently exceeded 15 percent silt/clay content.

Redox Potential (Eh)

Measured sediment Eh at the stations is summarized in Table 6.2-12. In general, high negative values of Eh (reducing environments) were very common in the study area, especially in the nearshore areas and areas near the barge canal and the two rivers. Temporal variability of Eh values were high and did not exhibit any specific seasonal trends.

Total Organic Carbon (TOC)

Sediment TOC values at the stations are summarized in Table 6.2-13. TOC values were generally high at the study area with considerable temporal variation. Lowest values were observed at Stations 1, 3, 11, 16, 24, 26, 29, and 35-37 and during July 1984. Only Station 29 is in the thermal area.

Sulfides

Sediment sulfide content at the stations is summarized in Table 6.2-14. In general, values were low at most stations. Extremely high sulfide content was evident at Stations 8, 17, and 38, followed by Stations 21 and 32. Moderately high values were observed at Stations 4, 5, 7, 37, and 39. Lowest sulfide values were observed at Stations 11, 12, 19, 25, and 26. Sulfide values were generally inconsistent from station to station.

Identification of Controls

Thermal groups identified in Figure 6.2-2 can be further subdivided as follows, based upon sediment characteristics:

Group I ($1^{o}C$-$2^{o}C$ increase):	A: 4 and 5 (very fine sand) B: 14 and 27 (fine sand) C: 22 and 28 (medium to fine sand) D: 30 (medium sand)
Group II ($2^{o}C$-$3^{o}C$ increase):	A: 21 (very fine sand) B: 13 and 20 (fine sand) C: 29 (coarse sand)
Group III (greater than $3^{o}C$ increase)	A: 17 and 18 (fine sand) B: 19 (coarse sand)

Stations 4 and 5 of Group I differ from similar sediment stations of other groups by exhibiting much lower salinities, DO content and higher turbidity and TSS. Stations 17 and 18 differ from Station 19 by exhibiting higher salinities also.

Based on the sediment type and selected water quality parameters, the most appropriate control station(s) for the sets of thermal stations (identified above) are:

IA:	Stations 4 and 5	Control: 1
IB:	Stations 14 and 27	Controls: 6, 7, 33, and 39
IC:	Stations 22 and 23	Controls: 2 and 38
ID:	Station 30	Controls: 2, 3, 12, 25, 26, 32, and 36
IIA:	Station 21	Controls: 8 and 40
IIB:	Stations 13 and 20	Controls: 6, 31, and 33
IIC:	Stations 29	Control: 35
IIIA:	Stations 17 and 18	Controls: 6, 31, and 33
IIIB:	Station 19	Control: 35

Faunal Parameters

Species Composition

A total of 918 taxa were identified from approximately 375,000 individuals collected during this study. Meiofaunal species such as ostracods, nematodes and copepods and species which were taxonomically lumped (oligochaetes, nemertines) and colonial species, although sorted and identified, were not included in the data analyses. Numerous species of polychaetes were frequently common and abundant. In terms of overall abundance, the following species contributed over fifty percent of the total fauna (in order of rank abundance): Fabricia sp. A; Streblospio benedicti; Aricidea philbinae; Tharyx cf. dorsobranchialis; Aricidea taylori; Mediomastus ambiseta; Axiothella mucosa; Mediomastus sp.; Myriochele oculata; Lumbrineris verrilli; Halmyrapseudes cf. cubanensis; and Haploscoloplos foliosus. All of these species with the exception of H. cf. cubanensis, a tanaid, were polychaetes.

Some spatial patterns of the abundant species were as follows: Fabricia sp. A occurred as a dominant species (in terms of temporally combined abundance) at over 50 percent of the stations. It was more abundant south and northwest of the intake dike (Figure 6.2-3). Numerical abundance of Streblospio benedicti was limited to the nearshore areas between the barge canal and the discharge canal (Figure 6.2-4). Aricidea philbinae was generally abundant nearshore (Figure 6.2-5). Tharyx cf. dorsobranchialis was abundant in the nearshore areas adjacent to the discharge spoil and Station 31 (Figure 6.2-6). Dominance of Aricidea taylori was limited to a few stations in Basins 3 and 4 and Station 17 (Figure 6.2-7). Mediomastus ambiseta had a patchy distribution south of the barge canal spoil islands and the intake spoil (Figure 6.2-8), while Mediomastus sp. was abundant mostly at offshore stations (Figure 6.2-9). Myriochele oculata was numerically abundant primarily at offshore stations (Figure 6.2-10). Lumbrineris verrilli was primarily abundant at mid depth stations (Figure 6.2-11). Axiothella mucosa was consistently abundant only at Stations 27, 28, 23, 30, and 35 (Figure 6.2-12). The tanaid, Halmyrapseudes cf. cubanensis was dominant only at Stations 1 and 4 (Figure 6.2-13). Haploscoloplos foliosus was numerically dominant at stations near the barge canal and the nearshore stations at the plant discharge (Figure 6.2-14).

Other dominant species which showed patchy distribution in the study area were as follows: Acteocina canaliculata was abundant in the thermal stations (18, 19, 20, 21, and 28) and Stations south of the intake spoil (31, 32). Ampelisca holmesi was abundant only at Stations 2 and 13. Paraprionospio pinnata, Haploscoloplos fragilis and Mysella planulata exhibited patchy distributions. Laonereis culveri and Neanthes succinea (Figures 6.2-15 and 6.2-16), both considered as thermally tolerant species (Logan and Maurer, 1975) occurred in the thermal areas. Polydora websteri and Heteromastus filiformis, also considered thermophilic, were abundant at nearshore thermal stations. Temporal variations in the abundance of the dominant species listed above were considerable.

The density and percent abundance of the ten most dominant species at each of the 40 stations during each sampling period are provided in Appendix III. Based on species dominance alone, the following four somewhat discrete communities can be recognized in the study area:

Stations 1 and 4:	Halmyrapseudes - Xenanthura - Streblospio community;
Station 3:	Brachidontes - Crepidula community;
Stations 2, 5-8, 13-15, 17-21, 27-33, 38, and 39:	Aricidea - Streblospio - Tharyx - Fabricia community;
Stations 9-12, 16, 23-26, 35-37 and 40:	Mediomastus - Myriochole - Goniadides community.

Each of these communities appears to intermix but still retain a distinct spatial pattern (Figure 6.4-17).

Species composition, especially the dominants, changed through the year. During the hottest period of the year (July-October), analyses of distributional patterns of the numerically abundant species (Appendix III) showed that Tharyx cf. dorsobranchialis, Mediomastus ambiseta, Aricidea philbinae and Aricidea taylori were abundant throughout the study area. Streblospio benedicti was abundant at all thermal and northern stations east of Fisherman's Pass and at Station 31 south of the intake spoil. Paraprionospio pinnata was abundant at all nearshore stations except in the area of thermal discharge (Figure 6.2-18). Myriochele oculata and Lumbrineris verrilli were abundant at all stations except stations nearshore. Haploscoloplos foliosus and H. fragilis were abundant in the summer only at Station 1 and Stations 4 through 9 near the barge canal spoil islands. Thermal indicators Laeonereis culveri and Neanthes succinea were both abundant only at Stations 13 and 17. In addition L. culveri was abundant at Stations 18 and N. succinea was abundant at Station 6 (Figures 6.2-19 and 20). Heteromastus filiformis, also considered a thermal indicator, was most abundant at only Station 17. Polydora websteri, a thermally tolerant species, was abundant at Stations 13, 19, and 29. Polydora websteri is associated with oyster reefs in the study area (see Section 6.5); Stations 19 and 29 were near oyster reefs.

Many of the species which were abundant at a few stations were present in small numbers at almost all of the sampled stations in the area. However, Halmyrapseudes cf. cubanensis did not occur at 17 of the 40 stations and Axiothella mucosa did not occur at 8 of the 40 stations. Also, Capitella capitata did not occur at 6 of the 40 stations (10, 11, 22, 25, 34, and 36). Other abundant species were ubiquitous and occurred at all or at a majority of the stations (Table 6.2-15). Rare or uncommon species were numerous in the southern and offshore areas; many of them did not occur in the thermal areas.

Oligomixity (dominance by one or two species) was generally high in the study area except at the following stations (Figure 6.2-21): 2, 11, 12, and 16 (Northern Control); 22, 24, 25, and 26 (Discharge transect - offshore); 31 through 40 (Southern Control). All stations within the area most probably enveloped by the thermal plume (Figures 6.2-1 and 6.2-2) exhibited a high degree of oligomixity.

In summary, results of the species composition of the infaunal communities in the study area show that:

1. Although the study area was extremely diverse in terms of the total number of species encountered, a few species dominated in terms of abundance.

2. Dominance distributional patterns of the species that were abundant ranged from cosmopolitan to very endemic at a few stations. Streblospio benedicti, an opportunistic species, appears to be most dominant in areas north of the intake dike, while Aricidea spp., Fabricia sp. A, and Tharyx cf. dorsobranchialis are widespread. Mediomastus sp. and Myriochele oculata exhibited highest dominance in the offshore areas. All other dominants were limited in their abundance to a few stations.

3. Four communities were defined from the area.

4. During the hottest period dominant species were abundant in both thermal and non-thermal areas. Neanthes succinea, Laonereis culveri, Heteromastus filiformis and Polydora websteri (thermal indicators) were most abundant at the nearshore thermal stations. Paraprionospio pinnata was least abundant at the thermal stations.

5. A majority of the dominants occurred at almost all stations; however, abundance of these species varied considerably spatially and temporally. Abundance and rank of dominant species changed at a majority of the stations between the common sampling periods (June-July) of the two years (1983-1984) indicating annual variations. Many of the rare species found in the southern area and offshore areas were not found in the thermal areas.

6. Oligomixity was generally high, especially in the nearshore areas north of the intake dike.

Faunal Density

Total faunal density (organisms/m^2) for all stations and sampling periods is summarized in Table 6.2-16. Overall, lowest densities occurred during July-

September and highest densities during April. Mean densities were considerably lower at Stations 5, 8, 18, and 24. Low densities were observed at Stations 2, 6, 7, 9, 14, and 15; high densities were observed at Stations 28, 29, 30, and 35. All other stations had moderate densities; no clear patterns in density related to the thermal areas were evident. Temporal variation in density was exceptionally high (over 200 percent change) at the following stations: 4, 5, 7, 8, 11, and 12 (Northern Transect); 13, 15, 16, 23, 26, 28, 29, and 30 (Thermal Transect); 33, 35, 36, and 37 (Southern Transect). Station 28 exhibited a dramatic increase in density between February and June, 1984 (34,059 to 113,387 organisms/m^2) mainly caused by a super abundance of Fabricia sp. A. Comparison of June/July data between 1983 and 1984 showed that considerable differences in density existed both in thermal and non-thermal areas. Overall, density was higher in June/July 1984 compared to June/July 1983.

Comparison of faunal density at thermal stations with control stations of similar sediment type with a 't' test (95 percent significance level) is shown in Table 6.2-17. In general, thermal stations were not significantly different in densities from corresponding southern stations. Thermal Station 17 was significantly higher in density compared to Control Stations 6 (north) and 31 (south) and was not different in density from Station 33 (south). Thermal Stations 21, 27, and 30 were significantly higher in density compared to northern control stations but were similar in density to southern stations.

When stations were grouped as Thermal (13, 17, 18, 19, 20, 21, and 29), South Control (31, 32, 33, 34, 35, 38, 39 and 40) and North Control (6, 7, 8, 9, 15, 16, and 23), density was significantly different between the North Control and South Control Stations. However, densities at both controls were not significantly different from density at the thermal stations.

Since polychaetes, molluscs and crustaceans were the major groups that dominated the study area, densities of these groups are summarized in Table 6.2-18 (Polychaeta); 6.2-19 (Mollusca); and 6.2-20 (Crustacea). Except for Stations 1 and 4 where crustaceans dominated, and Station 32 where molluscs and crustaceans co-dominated, polychaetes overwhelmingly dominated the faunal composition. Trends in total faunal density, therefore, were generally influenced by the patterns exhibited by the polychaete component.

Species Richness

The number of taxa collected at each station (species richness) during the various sampling periods is summarized in Table 6.2-21. Overall, highest species richness occurred during February and June 1984 and lowest during July and September 1983. Comparison of June/July data between 1983 and 1984 showed that considerable differences in species richness existed both in thermal and control areas. Overall, species richness was higher in 1984. Spatially, lowest species richness occurred at Stations 4 and 5 and highest at Stations 2, 11, 12, 16, 25, 30, 32-37, 39, and 40. In general, species richness increased offshore. Nearshore stations in the thermal area and near the barge canal had lower numbers of species than comparable nearshore stations south of the intake canal. Significant differences in species richness ('t'-test; 95% level) between comparable thermal and control stations are summarized in Table 6.2-22. Thermal Stations 13, 14, 17, 18, and 20 were not significantly different in species richness from corresponding northern control stations but contained a significantly lower number of species when compared to southern control stations. Thermal Stations 21, 22, 27, 28, and 30 were higher (or similar) in species richness compared to corresponding northern control stations but had a significantly lower numbers of species when compared to southern control stations. Thermal Stations 19 and 29 were significantly lower in species richness when compared to southern control Station 35. Thermal Stations 22, 28, and 30 were higher in species richness compared to northern stations but not significantly different from southern stations. Lower salinity thermal Stations 4 and 5 were not significantly different from northern control Station 1.

The Thermal, Northern and Southern station groupings (as for faunal density comparisons; see previous section), were significantly different from each other in species richness. Lowest species richness was encountered in thermal areas; slightly higher values in the northern transect; and highest values on the southern transect. In general, thermal stations were more comparable to the northern transect than to the southern transect (in terms of species numbers).

Species number for the three major components is summarized in Tables 6.2-23 (Polychaeta), 6.2-24 (Mollusca), and 6.2-25 (Crustacea). Unlike faunal density, molluscs contributed a much larger proportion to the total species richness; however, polychaetes provided the majority of the species. Numbers of molluscan species were particularly low at Stations 4, 5, 8, 13, 14, 15, 17, 18, 19, 20, 21, 28, and 29. A majority of these stations are in the thermal area. Lower numbers of crustacean taxa were found at Stations 4, 5, 8, 17, 18, and 20. All these stations, except 8, are in the thermal area. All of the southern stations were rich in crustacean and molluscan taxa.

Species Diversity and Equitability

Values of Shannon-Weaver diversity index and Pielou's equitability index are summarized in Tables 6.2-26 and 6.2-27, respectively. Lowest diversities (associated with both low equitability and species richness) were observed at Stations 1 and 4. Lower diversities were also observed at Stations 5, 6, 8, 14, 15, 17, 18, 19, 20, 21 and 29. A majority of these stations were in the thermal area. In general, diversity and equitability exhibited similar spatial and temporal trends as those exhibited by species richness; 't' tests of significance revealed the same dissimilarities between the compared stations, i.e., northern stations were generally more similar to the thermal stations. Both thermal and northern stations were different when compared to the southern stations.

Log-Normal Curves

Individuals in natural benthic communities are generally distributed in a log normal fashion among species. Variation from this distribution or from the slope of the straight line produced from a log-normal distribution has been reported to be indicative of stress (Gray and Mirza 1979). Polluted communities are purported to either show a break in the straight line or have angles to the x-axis lower than 35^{o}. Log-normal distribution of individuals per species was fitted and curves drawn for each station and sampling period according to the method described by Gray and Mirza (1979). Angles to the x-axis were measured from these curves and data is summarized in Table 6.2-28.

Utilizing mean angles, the information is portrayed graphically in Figure 6.2-22. Stations in the thermal area and the nearshore northern area had the least log-normal angles (30-35^{o}) indicating possible stress conditions. Offshore northern stations and the southern stations had higher log-normal angles (greater than 40^{o}).

Faunal Similarity

Utilizing Morisita's index, faunal similarity between stations for each of the sampling periods was computed and results are presented as trellis diagrams. Also for each of the periods, a cluster analysis was conducted (Morisita's Index, group average sorting) and results are presented as dendrograms.

Faunal similarity trends during each of the sampling periods can be summarized as follows:

June, 1983 (Figures 6.2-23 and 24): Thermal stations 17, 18, 19, and 27 (Rocky Cove) and Station 6 were similar to each other. Also, Thermal Stations 20 and 21 and Stations 15, 22, 28, and 30 were similar to each other. These groups of stations were generally dissimilar to all other stations. Interestingly, Thermal Station 13 was similar to northern Stations 2 and 7, while Thermal Station 14 was similar to southern Stations 31 and 39. Offshore stations were generally similar to each other, while Station 29 (thermal area) was dissimilar from all other stations.

July, 1983 (Figures 6.2-25 and 26): Thermal Stations 17 and 18 were similar to northern Station 5. Also, Thermal Stations 20, 22, and 29 were similar to each other and to Stations 7 and 15. Thermal Station 13 was similar to Station 27 (Rocky Cove) and Station 31 (Southern). Offshore stations were similar to each other. Stations 9 (Northern) and 30 (Thermal) were similar to each other; Station 4 was dissimilar from all other stations.

September, 1983 (Figures 6.2-27 and 28): Thermal Stations 13, 14, and 17 and Stations 20 and 21 were similar to each other. All other thermal stations were similar to each other and to several stations in the northern area. Southern nearshore areas grouped together in similarity, while most offshore stations were similar to each other. Stations 1 and 29 were dissimilar from all stations.

October, 1983 (Figures 6.2-29 and 30): Most Thermal Stations (13, 17, 18, 20, and 27) grouped together in similarity with northern nearshore stations. Thermal Stations 15 and 22 were similar to each other and Station 7 (northern) and 33 (southern). Offshore stations were similar to each other, while Stations 29 and 4 were dissimilar from all stations.

November, 1983 (Figures 6.2-31 and 32): Thermal Stations 13, 14, and 18 were similar to each other and to several northern nearshore stations and the southern Station 38. Thermal Stations 17, 19, and 29 were similar to each other and to the northern Station 3 and southern Station 32. Thermal Stations 20, 21, 28, and 15 were similar to each other, while Thermal Station 22 was similar to offshore Stations 16 and 24 and to Stations 31 (southern) and 2 (northern). Generally, offshore stations were similar to each other. Station 1 was dissimilar from all other stations.

January, 1984 (Figures 6.2-33 and 34): Thermal Stations 13, 18, 20, and 27 were similar to each other and similar to several northern stations. Thermal Station 17 was generally dissimilar from all stations. Most northern and offshore stations grouped together in similarity. Thermal Station 22 was similar to offshore Stations 26 and 37, while Thermal Station 29 was similar to offshore Station 12.

February, 1984 (Figures 6.2-35 and 36): Thermal Stations 14, 18 and 21 were similar to each other and several nearshore northern stations. Thermal Station 17 was similar only to Station 13 (thermal) and 38 (southern nearshore). Thermal Stations 19, 20, 22, 28, and 29 were similar to each other and were similar to Stations 23 (offshore thermal) and 32 (southern nearshore). Thermal Station 27 was similar to northern Station 3. Stations 1 and 11 were dissimilar from all other stations. Offshore stations generally grouped together in similarity.

April, 1984 (Figures 6.2-37 and 38): Thermal Stations 17, 18, 20, 22, and 29 were similar to several northern and some offshore stations. Thermal Station 13 was similar to offshore Stations 30 (thermal) and 35 (southern). Offshore Stations 25, 26, and 37 grouped together in similarity. Station 12 was dissimilar from all other stations.

June, 1984 (Figures 6.2-39 and 40): Thermal Stations 17, 20, 21, 22, and 27 were similar to each other and to Stations 16 (offshore), 2 and 9 (northern). Thermal Station 18 was similar to Stations 5, 7, 8 (northern), and 15 (offshore thermal). Thermal Station 13 exhibited generally low similarity to all stations but grouped closer to Station 38 (southern nearshore). Offshore stations generally were similar to each other. Stations 1 and 4 were similar to each other but dissimilar from all other stations.

July, 1984 (Figures 6.2-41 and 42): Thermal Stations 17, 20, 22, 27, and 29 were similar to each other and to Station 31 (southern nearshore). Thermal Station 18 was similar to northern Station 5 and 7, while Thermal Station 13 was similar to Station 30 (thermal offshore). In general, offshore stations grouped together. Station 4 was dissimilar from all other stations.

Temporal changes in similarity were examined at each of the 40 stations. Mean faunal similarity between sampling periods at each station is summarized in Table 6.2-29. In general, temporal variability in similarity was high at both thermal and non-thermal areas. Greatest variability occurred at Stations 11 and 29. Comparison of faunal similarity between June/July 1983 and 1984 showed that spatial, faunal affinities of thermal and non-thermal stations were somewhat different between years indicating that annual fluctuations may have altered communities in the study area at both thermal and non-thermal stations. Although these changes caused by annual fluctuations were evident, the groupings of stations for 1983 and 1984 were similar in that thermal stations group together and were similar to several northern control stations.

A faunal similarity analysis combining all quarterly data at each station (Figures 6.2-43 and 44) showed that Thermal Stations 13, 14, 17, and 27 were similar to each other and similar to Station 2 (nearshore northern). Thermal Stations 18, 20, and 21 were similar to each other and to northern Stations 5, 6, 7, and 8 and to Station 15 (thermal offshore). Thermal Station 28 was similar to Stations 23, 30 (offshore thermal), 35 and 36 (offshore southern). Thermal Stations 19 and 29 were somewhat similar to northern Station 3. Northern Stations 9 and 22 were similar to southern Stations 31, 32, and 39. Station 1 and 4 near the barge canal were similar to each other but different from all other stations. Offshore stations generally grouped together in similarity.

Utilizing six-week sampling data at 20 stations, a similar analyses provided essentially the same results (Figures 6.2-45 and 46) except that Thermal Stations 17 and 29 exhibited much lower similarities with other thermal and non-thermal stations. Thermal Station 13 was similar to Stations 30 (offshore thermal) and 35 (southern offshore). Thermal Station 18 was similar to northern Stations 5 and 7 and offshore Thermal Station 15, while Thermal Station 20 was similar to offshore Thermal Station 22 and northern Station 9. In examining temporally uncombined data for all stations (i.e., all possible combinations of time and space) with a faunal similarity cluster analysis, the same trends exhibited by the temporally combined data presented above were evident.

In summary, faunal similarity analyses showed that thermal stations were more often similar to each other and to the northern control stations. Certain stations (e.g., 29, 1, and 4) were different than all other stations. Offshore stations were generally similar to each other. Thermal stations most often similar to each other were: 17, 18, 19, 20, 21, and 22.

Biotic/Abiotic Relationships

Potential correlations between various abiotic parameters and faunal density, species richness and species diversity were examined with the use of linear regressions. Faunal density appeared to be correlated with grain size and to a lesser degree with silt/clay and total organic carbon (significant F value at 95 percent level). Faunal density appeared unrelated to other abiotic factors (temperature, salinity, turbidity, TSS and sediment sulfides, sorting and Eh; Table 6.2-30). Species richness appeared to be correlated with temperature and salinity and to a lesser degree with sediment parameters (Table 6.2-31). Similarly, species diversity appeared to be correlated with temperature and salinity and to a lesser degree with sediment parameters (Table 6.2-32).

In terms of sediment preference of the dominant species in the study area, Fabricia sp. A was most abundant at stations with coarser sediments (11, 13, 23, 26, 28, 29, 30, 34, 35, 36, and 38) at least during some times of the year. Streblospio benedicti was most abundant at stations with silty sediments (4, 5, 6, 8, 15, 18, and 21). However, S. benedicti was most abundant at siltier stations offshore and in the southern transects. Aricidea philbinae was abundant in a variety of sediment types and was most abundant in the thermal areas. Other dominant species did not exhibit any clear cut preference for sediments or other abiotic parameters.

In summary, temperature appears to affect species richness and diversity while sediment parameters control faunal density in the study area.

Annual Faunal Fluctuations

Long-term annual fluctuations in benthic communities have been observed by several investigators (Pearson 1975, Santos and Simon 1980; Dugan and Livingston 1982; Mahoney and Livingston 1982). Between June/July of 1983 and 1984 considerable changes in species composition, faunal density and species richness occurred in the study area indicating that annual fluctuations may be extremely important. Thermal effects on various community parameters appear to be similar between the two years. Evaluation of the magnitude of differences in community parameters between thermal and control areas showed: 1) annual fluctuations were clearly evident and 2) thermal effects were exhibited in addition to the annual fluctuations.

6.2.3 Impact Assessment

Introduction

The benthic community is generally considered to be the best faunal group for assessing environmental stress due to its relative lack of mobility and varied sensitivity to physiological stresses (Dills and Rogers 1972). In addition, the relatively long life histories of benthic organisms make them valuable indicators of past and present water quality (Mackenthun 1966; McKee 1966; Cairns and Dickson 1971).

Temperature is a primary environmental factor in the distribution and survival of aquatic organisms. Sediment type is a specific factor affecting the zonation of benthic organisms, particularly the infauna (Peterson 1913; 1915; 1918; Thorson 1957; Sanders 1958; Bloom et al 1972; Pearson 1975). Apart from other biological factors (such as competition, predation, etc.), temperature and sediment type seem to be the major factors in benthic faunal distribution. Since various species tolerate temperature increases to differing degrees and display temperature induced reproduction, increased temperature could have both "positive" and "negative" effects. In theory, when heated effluent is introduced into a benthic environment, the following species-specific processes would occur:

1. Some temperature "sensitive" (stenothermal) species would disappear.

2. Some new species would immigrate into the now warm environment.

3. Some species (eurythermal opportunists) would increase in abundance.

4. Some temperature "sensitive" species would decrease in abundance.

Depending on the balance of (1) and (2), diversity (species richness) of the heated environment would either increase or decrease. Dominance would probably be a prime factor in response to changes in (3) and (4). Seasonal changes would, of course, complicate the process.

In a natural eurythermal environment such as Crystal Bay, a shallow subtropical bay where there is a high incidence of eurythermal species, heated effluents (within lethal limits for individual species) may not have a pronounced or detectable effect on the benthic fauna. On the other hand, synergistic effects and biological changes in the other components of the ecosystem (e.g., plankton) would indirectly affect the composition and structure of benthos. This has been recognized by various authors in the past (Markowski 1960; Pearce 1969; Mackenthun 1969; Virnstein 1972; Davis 1972).

Rowe et al (1972) documented the effects of thermal pollution in the lower Mystic River. They identified zones of extreme stress characterized by low faunal density, biomass and species diversity. An interesting study by Logan and Maurer (1975) on the diversity of marine invertebrates in a thermally affected area of the Indian River (Delaware Bay), identified an extremely high diversity zone in the immediate vicinity of the thermal discharge caused by the existence of "pioneer" communities in a state of "non-active equilibrium" (i.e., a community with low dominance, high equitability and low faunal density). Similar zones were reported earlier by Warinner and Brehmer (1966) and Nauman and Cory (1969). A few opportunistic species (e.g., Nereis succinea, Heteromastus filiformis) have also been suggested by Logan and Maurer (1975) as indicators of thermal effects.

Temporally, the most severe effects of the thermal effluent on the benthic fauna would be expected in the summer (Naylor 1965; Warinner and Brehmer 1966; Pearce 1969; Nauman and Cory 1969). However, disruptions in communities due to "cold shock" in winter (due to variability of power plant operation) cannot be ruled out.

Bamber and Spencer (1984) in a recent study of thermal effects on benthic communities in River Medway Estuary showed that areas most influenced by the discharge are: (1) significantly depressed in species richness; (2) higher in densities caused by a few species, i.e., oligomixity; and (3) dominated by opportunistic species that were tolerant of thermal stress (and not organic stress, such as Capitella capitata). Overall, they concluded that thermal effects were limited to the discharge canal and where the thermal discharge impinged on the bottom.

Previous benthic faunal studies at Crystal River are not directly comparable to the present study because of significant differences in methodology and areas of investigation. Historical benthic information from the study area appears to indicate that thermal effects in the form of depressed species richness and abundance occur in the discharge basin. However, drawbacks in the methods used and the limited area of investigation inhibits any conclusion that can be comprehensive in terms of spatial and temporal thermal effects.

From studies described in literature, some of the expected thermal effects on the benthic infaunal communities in the vicinity of the power plant at Crystal River can be summarized as follows.

1. Reduced species richness;

2. Increased or decreased total abundance (faunal density);

3. Increase in the abundance of some eurythermal and opportunistic species;

4. Immigration and abundance of thermal pollution indicator species;

5. Emigration and/or decrease in the abundance of some stenothermal species;

6. Decreased diversity and equitability;

7. Increased dominance (i.e., oligomixity) of a few species;

8. Alteration of basic community structure;

9. Faunal dissimilarity compared to adjacent natural or undisturbed communities.

To evaluate thermal effects in the study area the nine characteristics listed above are tested as hypotheses statements (below) leading to an impact assessment of benthic communities in the vicinity of the power plant.

Species Richness

In general, all thermal stations were lower in species richness than corresponding southern control stations, but not the northern control stations. Therefore, it appears that the thermal effluent in concert with silty conditions found in the northern areas reduces total species richness in an area bounded by Stations 17, 13, 14, 21, and 27. However, no statistically significant differences in species richness between thermal stations and northern control stations were noted.

Examination of molluscan and crustacean species richness provides stronger evidence of thermal effects. Molluscan species richness was considerably lower at Thermal Stations 13, 14, 17-21, 28, and 29 and Stations 4, 5 (low salinity-thermal regime), 15 (slight thermal), and 8 (northern Control Station). Similarly, crustacean species richness was lower at Thermal Stations 17-20 and Stations 4, 5, and 8. Stations 8 and 15 have slightly higher temperatures than plant intake temperatures (Table 6.2-3). Stations 4, 5, and 8 had a high silt/clay content probably causing the reduced molluscan and crustacean species richness. Therefore, it appears that the thermal effluent reduces the species richness of molluscs and crustaceans primarily in an area bounded by Stations 13, 14, 17, 21, and 29 (Figure 6.2-47). The cause of depressed species richness at Station 15 is unknown.

Faunal Density

In general, faunal density at the thermal stations was not statistically different from densities at both southern and northern control stations. Thermal Stations 17, 21, and 27 were higher in densities when compared with northern control stations, while Station 18 was lower in density compared to its corresponding southern control station. Using either increased or decreased abundance as criteria of adverse thermal effects, it appears that the area bounded by Stations 17, 21, and 27 is adversely affected in terms of abundance (Figure 6.2-48). The change in density does not encompass all stations within this area, and therefore the extent of the thermal effect is not clear.

Eurythermal and Opportunistic Species

Streblospio benedicti, a eurythermal and opportunistic species, was most dominant in the northern nearshore areas, especially at the stations with silty conditions. Thermal Stations 18 and 20 had a greater abundance of S.

benedicti than other thermal and southern control stations. Aricidea philbinae was most abundant at Thermal Stations 13, 17, and 27. Tharyx cf. dorsobranchialis was most abundant at Thermal Stations 13, 14, 17, 20, 22, 27, 28, and 29, and appears to prefer areas with a higher temperature regime. Aricidea taylori exhibited increased abundance at Thermal Stations 17, 20, 22, and 27. The species abundance patterns discussed above appear to indicate that the area bounded by Stations 13, 14, 17, 22, and 29 is affected by the thermal effluent in the form of increased abundance of selected eurythermal opportunists (Figure 6.2-49).

Thermal Pollution Indicators

Greatest abundance of thermophilic opportunistic species, Laoenereis culveri and Neanthes succinea were at Stations 13, 17, 18, and 27. N. succinea was abundant also at northern control Stations 2, 3, and 6, Thermal Stations 19 and 29 and southern control Station 32. Heteromastus filiformis, also considered a thermophilic opportunist, was most abundant at Station 17. Polydora websteri was most abundant at Stations 13, 19, and 29. Based on the abundance of indicator species, the area bounded by Stations 17, 13, 19, and 29 appears to be adversely affected by the thermal effluent (Figure 6.2-50).

Stenothermal Species

Higher dominance and lower species richness at the thermal stations and northern control stations appears to have excluded several "rare" species found in the southern control areas. This exclusion of several species may be a response to higher temperatures in the thermal zone, especially during the summer. However, habitat heterogeneity in the southern areas (presence of seagrass beds and less silty conditions) probably plays a much larger role than temperature in determining presence or absence of rare species. In terms of dominant species, Paraprionospio pinnata, was the only species that was widespread among nearshore different habitat types but was least abundant at Thermal Stations (especially during the summer) 13, 14, 17, 18, 19, 27, 28, and 29 (Figure 6.2-18). Mediomastus ambiseta was most abundant at nearshore northern and southern controls but not at the thermal stations (Figure 6.2-8). Haploscoloplos foliosus and H. fragilis similarly appeared to avoid thermal areas, but were also not abundant in southern control areas. The thermal effluent, therefore, appears to adversely affect the distribution of P. pinnata and M. ambiseta and probably the distribution of H. foliosus, H. fragilis, and several rare species. Species which were more abundant offshore, such as Mediomastus sp., Myriochele oculata and Goniadides carolinae are probably stenothermal but do not occur in abundance in either of the nearshore control areas. Since many of the other dominant species (e.g., Fabricia sp. A) remained unaffected, and since the study area is expected to primarily contain eurythermal species (subtropical and shallow), exclusion and reduction in abundance of stenothermal species can be considered minimal.

Species Diversity and Equitability

In general, species diversity and equitability values were lower at Thermal Stations 14, 17-21, and 29 and at Stations 5 (low salinity-thermal), 8, 15 (slightly thermal), and 6 (northern control). Southern control stations were much higher in these parameters than the northern and thermal areas. Therefore, it appears that the area bounded by Stations 17, 14, 21, and 29 is adversely affected in diversity and equitability by the thermal effluent (Figure 6.2-51). Similar low values were found at the northern control stations.

Oligomixity

Dominance of few species (oligomixity) was a common phenomenon in the study area. This phenomenon was especially accentuated in the thermal areas and the northern nearshore control areas (Figure 6.2-21). The striking dissimilarity in oligomixity between the southern/offshore stations and the northern/thermal stations may be indicative of stress conditions imposed by a combination of temperature and silty conditions in the northern and thermal stations.

Community Structure

The study area appears to be composed of four types of communities (Figure 6.2-17). Areas dominated by Halmyrapseudes and Brachidontes were small. The offshore community dominated by Mediomastus, Myriochele, and Goniadides was distinct and widespread in both northern and southern areas. The nearshore community dominated by Aricidea, Tharyx, Streblospio, and Fabricia spanned thermal, northern and southern areas. Therefore, it appears that the basic components of the community remain unchanged by the effects of the thermal effluent. Evaluation of the log-normal distribution (Figure 6.2-22) among the communities at each station, however, shows that thermal areas bounded by Stations 17, 13, 21, and 29, the nearshore northern control stations (6 and 7), and the low salinity/high temperature stations (4 and 5) have an altered intrinsic structure indicating stress conditions (Sensu, Gray and Mirza, 1979). It can be surmised that environmental stress in different forms (silty conditions and/or temperature increases) change the basic log-normal distribution of communities. It appears, therefore, that while stations in the thermal regime are adversely affected by the effluent, stations in the north are adversely affected by silty conditions. The absence of such a change in the southern stations and the apparent gradient (Figure 6.2-22) in log-normal distribution with distance from the point of thermal discharge strengthens this conclusion. Other community structure parameters, such as faunal density, abundance of dominant species, diversity and equitability have been discussed earlier and tend to confirm the alterations to structure caused by the thermal effluent (as shown by the evaluation of log-normal distributions).

Faunal Similarity

Detailed descriptions of faunal similarities between stations are provided in the results section. In general, the area bounded by Stations 17, 13, 14, 21, and 28 exhibited faunal homogeneity (Figure 6.2-52) with some similarities to the northern control stations but was dissimilar from the southern control stations. During September (1983), Station 17 contained a unique species composition: over 75 percent of the total abundance was contributed by three species, Aricidea taylori, A. philbinae, and Laeonereis culveri, probably as a response to elevated temperatures during the summer period. Similar dominance of few species occurred at Stations 18, 19, 20, 21, and to a lesser extent at Stations 13, 14, 15, 27, 28, and 29. Aricides taylori, A. philbinae, L. culveri, Tharyx cf. dorsobranchialis, and Streblospio benedicti were dominant at these stations. In the winter (January 1984), Thermal Station 17 was dissimilar to all stations by having a super abundance of *A. philbinae*, probably as a response to elevated temperatures that were optimal for *A. philbinae*. Overall, the faunal similarity analyses indicated that thermal effects are limited to the area shown in Figure 6.2-52. However, similarity of many of the thermal stations to northern control stations indicate that although changes have occurred in the thermal areas, the significance of the change is questionable.

General Considerations/Summary

As expected, two factors appear to play a major role in the distribution of benthic infauna in the study area: sediment type and temperature. While sediment type seems to control density of organisms, temperature controls species richness and diversity (see Results). Therefore, in examining the effects of the thermal effluent, sediment type is the most important element to keep constant. Salinity plays a controlling role only at a few stations near the Withlacoochee River and the Barge Canal. To discern thermal effects, comparisons were made only between stations which were similar in sediment type. Utilizing this strategy, the examination of various community parameters and hypotheses in relation to the thermal effluent suggests that adverse effects caused by the discharge are generally minimal, because they have not encompassed large areas or caused catastrophic changes. However, there is strong evidence (as discussed earlier) to indicate that subtle adverse changes have occurred in the communities bounded by Stations 17, 13, 14, 21, and 29 (Figure 6.2-47). A lesser degree of change seems to have occurred at Stations 4, 5, 22, and 30. The greatest degree of adverse thermal effects appears to be limited to the area bounded by Stations 13, 17, and 18 (Figure 6.2-53).

Overall, the study area (especially the northern areas) can be classified as a stressed habitat for benthic infaunal communities. Natural perturbations in the form of storms appear to affect bottom conditions because of the shallow nature of the study area. Presence of seagrasses in the southern areas probably limits the perturbation caused by storms. Considering the effect of the storms, and the silty conditions associated with the barge canal spoil islands, benthic infaunal communities in the study area are probably resilient and adapted to disturbances. Characteristic of such communities is a preponderance of opportunists and species which have short lives and high reproductive rates, i.e., an 'r' selected community (sensu MacArthur and Wilson 1967; Pianka 1971). The effect of the thermal effluent on such a community is to further modify its structure toward an even more opportunistic and resilient state until survival is affected. This shift is evident only at Stations 13, 17, and 18; survivability does not seem to be affected.

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Table 6.2-1 Station Depths.

Station	$\bar{x}$ (m)	S.D. (m)	Station	$\bar{x}$ (m)	S.D. (m)
1	0.84	0.34	21	2.31	0.44
2	1.16	0.49	22	2.41	0.39
3	1.81	0.51	23	3.01	0.53
4	1.61	0.45	24	2.95	0.53
5	1.51	0.47	25	3.73	0.60
6	1.46	0.55	26	4.25	0.49
7	1.50	0.47	27	1.35	0.43
8	1.80	0.50	28	2.04	0.49
9	2.21	0.53	29	1.74	0.69
10	2.68	0.42	30	1.88	0.55
11	2.92	0.54	31	1.32	0.41
12	4.27	0.45	32	1.25	0.37
13	0.96	0.39	33	2.07	0.44
14	1.39	0.45	34	2.66	0.41
15	1.83	0.47	35	2.17	0.46
16	2.11	0.45	36	3.45	0.66
17	0.77	0.31	37	3.69	0.56
18	1.60	0.45	38	1.15	0.47
19	1.22	0.50	39	2.19	0.40
20	2.04	0.45	40	3.77	0.47

Table 6.2-2 Synoptic Bottom Temperatures in ^{o}C --- 6 Week Means.

Sta. #	June 1983	July 1983	Sept 1983	Oct 1983	Nov 1983	Jan 1984	Feb 1984	Apr 1984	June 1984	July 1984	Mean	Std. Dev.
1	28.58	30.17	30.43	26.70	21.47	14.81	15.23	20.21	27.03	29.05	24.37	5.99
2	28.42	30.25	30.40	27.08	21.29	14.36	14.07	19.46	26.88	29.50	24.17	6.38
3	27.95	30.11	30.34	26.87	21.12	13.85	13.56	19.20	26.72	29.51	23.92	6.52
4	28.26	30.57	31.67	27.79	22.66	16.03	16.11	20.94	28.13	30.63	25.28	5.93
5	28.26	30.46	31.59	27.70	23.05	16.10	16.11	19.52	28.00	30.47	25.13	5.98
6	23.51	30.34	31.12	27.24	22.00	15.54	15.69	20.35	27.74	29.86	24.34	5.84
7	25.09	30.10	31.05	27.56	22.23	15.01	15.09	19.61	27.50	29.86	24.31	6.05
8	28.11	30.06	30.85	27.32	22.11	14.80	15.18	19.69	27.34	29.76	24.52	6.13
9	27.97	30.12	30.55	27.10	21.73	14.39	14.38	18.96	26.96	29.93	24.21	6.37
10	28.19	30.01	30.43	26.87	21.50	14.44	13.74	19.36	26.82	29.33	24.07	6.36
11	28.33	29.86	30.37	26.82	21.31	14.34	13.25	19.17	26.51	29.16	23.91	6.45
12	28.37	29.92	30.27	26.70	21.35	14.38	12.94	18.90	26.43	29.10	23.84	6.50
13	29.72	31.67	33.10	28.43	24.37	19.29	17.35	22.41	29.96	32.72	26.90	5.68
14	28.72	31.21	32.28	28.10	23.87	17.52	17.15	21.01	28.89	31.21	26.00	5.71
15	28.20	30.41	31.10	27.38	22.12	15.21	15.52	20.15	27.76	30.35	24.82	6.11
16	28.16	30.14	31.08	27.26	22.04	15.05	14.78	19.93	27.03	29.77	24.52	6.16
17	30.80	32.11	33.77	30.58	25.63	22.06	21.09	24.23	32.42	33.60	28.63	4.88
18	30.74	32.56	34.03	29.20	25.25	18.67	17.83	22.78	31.24	32.74	27.51	5.98
19	30.44	32.30	33.64	29.56	25.23	17.46	18.01	22.88	30.56	33.19	27.33	6.08
20	29.48	31.47	32.33	28.32	23.91	16.40	18.28	21.27	30.12	31.91	26.35	5.93
21	29.03	30.98	32.25	28.41	23.85	16.54	17.62	21.07	29.49	31.60	26.09	5.88
22	33.20	30.48	31.09	27.99	23.39	16.47	16.81	20.07	28.34	30.08	25.79	6.15
23	27.85	30.02	30.56	27.46	23.13	16.43	15.84	19.97	26.69	29.67	24.76	5.58
24	27.94	29.89	30.43	26.73	21.41	14.96	13.76	19.28	26.29	29.08	23.98	6.20
25	28.06	29.81	30.29	26.64	21.43	14.42	13.12	19.07	26.23	29.14	23.82	6.40
26	28.06	29.83	30.46	26.62	21.37	14.31	12.90	18.96	26.31	29.06	23.79	6.49
27	28.65	30.30	31.62	27.35	21.97	16.14	15.95	21.21	28.11	30.01	25.14	5.87
28	28.76	31.16	32.15	27.79	23.04	16.80	16.25	22.35	28.84	31.04	25.82	5.87
29	29.17	31.05	32.68	29.06	24.65	17.13	17.44	21.49	29.04	32.05	26.38	5.85
30	28.25	30.41	31.21	27.78	23.75	16.56	16.18	21.07	27.71	30.30	25.32	5.64
31	27.67	29.97	30.37	26.45	20.58	13.65	14.11	19.60	26.57	29.31	23.83	6.38
32	28.04	30.09	30.38	26.40	20.72	13.66	14.18	19.60	26.56	29.35	23.89	6.39
33	27.78	29.95	30.39	26.46	20.93	13.68	13.72	19.16	26.61	29.39	23.81	6.47
34	27.76	30.08	30.26	26.45	20.91	13.84	13.47	19.52	26.05	29.26	23.76	6.42
35	28.38	29.84	30.24	26.35	21.18	13.96	13.43	19.32	26.10	29.18	23.80	6.42
36	28.34	29.49	30.32	26.31	21.20	14.04	13.22	19.22	26.15	29.13	23.74	6.42
37	28.40	29.77	30.30	26.35	22.38	14.38	13.11	19.15	26.17	29.17	23.92	6.38
38	28.38	29.90	30.06	26.90	21.18	14.88	15.23	19.70	26.34	29.49	24.21	5.97
39	27.74	29.86	30.27	26.57	20.81	13.76	13.88	19.27	26.20	29.17	23.75	6.37
40	28.28	29.99	30.33	26.33	20.93	13.91	13.09	19.27	27.83	29.05	23.90	6.60

Table 6.2-3 Synoptic Bottom Temperature Variation from 'Ambient'--6 Week Means.

Sta. #	June 1983	July 1983	Sept 1983	Oct 1983	Nov 1983	Jan 1984	Feb 1984	Apr 1984	June 1984	July 1984	Mean	Std. Dev.
1	0.70	-0.03	0.30	0.06	0.04	0.19	0.56	0.64	0.70	-0.08	0.31	0.32
2	0.54	0.05	0.27	0.44	-0.14	-0.26	-0.60	-0.11	0.55	0.37	0.11	0.39
3	0.07	-0.09	0.21	0.23	-0.31	-0.77	-1.11	-0.37	0.39	0.38	-0.14	0.50
4	0.38	0.37	1.54	1.15	1.23	1.41	1.44	1.37	1.80	1.50	1.22	0.48
5	0.38	0.26	1.46	1.06	1.62	1.48	1.44	-0.05	1.67	1.34	1.07	0.63
6	-4.37	0.14	0.99	0.60	0.57	0.92	1.02	0.78	1.41	0.73	0.28	1.67
7	-2.79	-0.10	0.92	0.92	0.80	0.39	0.42	0.04	1.17	0.73	0.25	1.14
8	0.23	-0.14	0.72	0.68	0.68	0.18	0.51	0.12	1.01	0.63	0.46	0.35
9	0.09	-0.08	0.42	0.46	0.30	-0.23	-0.29	-0.61	0.63	0.80	0.15	0.45
10	0.31	-0.19	0.30	0.23	0.07	-0.18	-0.93	-0.21	0.49	0.20	0.01	0.41
11	0.45	-0.34	0.24	0.18	-0.12	-0.28	-1.42	-0.40	0.18	0.03	-0.15	0.53
12	0.49	-0.28	0.14	0.06	-0.08	-0.24	-1.73	-0.67	0.10	-0.03	-0.22	0.61
13	1.84	1.47	2.97	1.79	2.94	4.67	2.68	2.84	3.63	3.59	2.84	0.98
14	0.84	1.01	2.15	1.46	2.44	2.90	2.48	1.44	2.56	2.08	1.94	0.70
15	0.32	0.21	0.97	0.74	0.69	0.59	0.85	0.58	1.43	1.22	0.76	0.38
16	0.28	-0.06	0.95	0.62	0.61	0.43	0.11	0.36	0.70	0.64	0.46	0.30
17	2.92	1.91	3.64	3.94	4.20	7.44	6.42	4.66	6.09	4.47	4.57	1.67
18	2.86	2.36	3.90	2.56	3.82	4.05	3.16	3.21	4.91	3.61	3.44	0.77
19	2.56	2.10	3.51	2.92	3.80	2.84	3.34	3.31	4.23	4.06	3.27	0.67
20	1.60	1.27	2.20	1.68	2.48	1.78	3.61	1.70	3.79	2.78	2.29	0.87
21	1.15	0.78	2.12	1.77	2.42	1.92	2.95	1.50	3.16	2.47	2.02	0.76
22	5.32	0.28	0.96	1.35	1.96	1.85	2.14	0.50	2.01	0.95	1.73	1.42
23	-0.03	-0.18	0.43	0.82	1.70	1.81	1.17	0.40	0.36	0.54	0.70	0.67
24	0.06	-0.31	0.30	0.09	-0.02	0.34	-0.91	-0.29	-0.04	-0.05	-0.08	0.36
25	0.18	-0.39	0.16	0.00	0.00	-0.20	-1.55	-0.50	-0.10	0.01	-0.24	0.51
26	0.18	-0.37	0.33	-0.02	-0.06	-0.31	-1.77	-0.61	-0.02	-0.07	-0.27	0.59
27	0.77	0.16	1.49	0.71	0.54	1.52	1.28	1.64	1.78	0.88	1.08	0.54
28	0.88	0.96	2.02	1.15	1.61	2.18	1.58	2.78	2.51	1.91	1.76	0.64
29	1.29	0.85	2.55	2.42	3.22	2.51	2.77	1.92	2.71	2.92	2.32	0.75
30	0.37	0.21	1.08	1.14	2.32	1.94	1.51	1.50	1.38	1.17	1.26	0.64
31	-0.21	-0.23	0.24	-0.19	-0.85	-0.97	-0.56	0.03	0.24	0.18	-0.23	0.44
32	0.16	-0.11	0.25	-0.24	-0.71	-0.96	-0.49	0.03	0.23	0.22	-0.16	0.43
33	-0.10	-0.25	0.26	-0.18	-0.50	-0.94	-0.95	-0.41	0.28	0.26	-0.25	0.46
34	-0.12	-0.12	0.13	-0.19	-0.52	-0.78	-1.20	-0.05	-0.28	0.13	-0.30	0.42
35	0.50	-0.36	0.11	-0.29	-0.25	-0.66	-1.24	-0.25	-0.23	0.05	-0.27	0.46
36	0.46	-0.71	0.19	-0.33	-0.23	-0.58	-1.45	-0.35	-0.18	0.00	-0.32	0.53
37	0.52	-0.43	0.17	-0.29	0.95	-0.24	-1.56	-0.42	-0.16	0.04	-0.14	0.66
38	0.50	-0.30	-0.07	0.26	-0.25	0.26	0.56	0.13	0.01	0.36	0.15	0.30
39	-0.14	-0.34	0.14	-0.07	-0.62	-0.86	-0.79	-0.30	-0.13	0.04	-0.31	0.35
40	0.40	-0.21	0.20	-0.31	-0.50	-0.71	-1.58	-0.30	1.50	-0.08	-0.16	0.79

Table 6.2-4 Thermograph Temperatures in ^{o}C --- 6 Week Means.

Sta. #	June 1983	July 1983	Sept 1983	Oct 1983	Nov 1983	Jan 1984	Feb 1984	Apr 1984	June 1984	July 1984	Mean	Std. Dev.
1	*	28.42	28.28	26.37	20.87	13.65	15.17	18.42	25.00	26.60	22.53	5.68
2	*	28.42	28.28	26.37	20.87	13.65	15.17	18.42	25.00	26.60	22.53	5.68
3	*	28.72	28.83	23.73	20.35	14.65	13.60	18.40	24.62	27.27	22.24	5.80
4	26.50	28.53	29.12	26.25	21.25	15.52	15.32	19.17	25.30	27.50	23.44	5.24
5	*	29.60	28.83	26.17	21.97	16.17	14.90	19.50	24.12	26.90	23.13	5.36
6	*	28.90	29.50	26.32	21.57	15.77	15.40	17.58	24.87	25.90	22.87	5.49
7	*	29.42	29.80	26.97	21.83	17.96	14.32	18.47	25.23	27.00	23.44	5.53
8	*	28.40	28.35	26.12	21.15	16.10	14.93	18.57	25.53	27.50	22.96	5.36
9	*	28.40	28.35	26.12	21.15	16.10	14.93	18.57	25.53	27.50	22.96	5.36
10	*	29.10	29.38	26.12	19.85	14.98	*	18.03	24.42	*	23.13	5.60
11	*	27.70	27.15	26.57	20.80	14.92	15.53	17.93	24.58	26.50	22.41	5.19
12	*	28.58	28.78	25.55	21.02	17.25	12.88	17.55	23.75	*	21.92	5.75
13	30.10	31.38	31.92	28.47	23.47	18.28	17.90	20.38	27.87	29.55	25.93	5.44
14	27.60	29.65	30.58	27.38	23.04	16.77	15.58	17.87	25.98	28.00	24.25	5.58
15	*	29.42	29.80	26.97	21.83	17.96	14.32	18.47	25.23	27.00	23.44	5.53
16	*	27.92	30.72	25.95	20.78	14.37	14.13	18.27	25.38	27.00	22.73	6.06
17	29.00	30.28	32.27	29.95	*	21.70	18.95	22.90	28.78	31.45	27.25	4.79
18	30.10	31.80	34.35	31.03	26.83	20.43	19.02	*	30.28	32.15	28.44	5.34
19	30.80	31.50	31.42	29.02	26.10	21.95	18.92	21.65	28.77	30.90	27.10	4.68
20	29.30	30.76	32.72	28.62	24.20	18.53	17.55	21.22	27.90	30.50	26.13	5.40
21	28.50	30.12	31.20	26.33	23.18	17.37	18.10	18.50	27.35	30.55	25.12	5.44
22	27.30	29.07	29.68	26.97	21.06	15.48	14.93	18.85	26.25	27.90	23.75	5.65
23	*	29.04	*	25.78	21.52	15.90	14.98	19.65	24.92	26.67	22.31	5.15
24	*	28.63	28.98	26.20	20.72	15.48	14.17	17.78	24.27	*	22.03	5.84
25	*	28.48	28.45	25.13	21.08	14.12	13.95	16.63	24.55	26.57	22.11	5.89
26	*	29.18	29.54	26.17	20.72	14.65	13.62	18.00	24.85	27.07	22.64	6.10
27	*	*	*	*	*	*	*	*	*	*	*	*
28	28.40	29.75	30.70	27.52	22.53	16.28	16.18	20.40	26.82	28.80	24.74	5.49
29	28.90	30.10	30.97	25.87	22.58	16.80	16.23	19.13	26.12	28.60	24.53	5.52
30	*	30.07	29.93	27.42	21.28	16.35	15.53	18.78	24.43	25.45	23.25	5.54
31	*	*	29.42	26.22	19.90	14.18	14.83	18.92	24.67	26.53	21.84	5.69
32	*	*	29.42	26.22	19.90	14.18	14.83	18.92	24.67	26.53	21.84	5.69
33	*	*	29.42	26.22	19.90	14.18	14.83	18.92	24.67	26.53	21.84	5.69
34	*	28.82	29.04	26.57	19.76	14.18	14.60	17.88	24.85	26.50	22.47	5.93
35	*	28.97	29.32	26.15	20.23	14.43	13.27	17.62	24.50	26.10	22.29	6.10
36	*	28.75	29.08	24.23	21.25	14.25	13.55	16.33	25.28	26.75	22.16	6.10
37	*	28.35	29.80	25.63	20.30	14.55	13.28	17.52	24.27	26.13	22.20	6.03
38	*	*	29.42	26.22	19.90	14.18	14.83	18.92	*	26.53	21.43	6.02
39	*	28.83	*	25.50	19.72	14.35	13.23	18.28	24.55	26.05	21.31	5.76
40	*	28.83	*	25.50	19.72	14.35	13.23	18.28	24.55	26.05	21.31	5.76

* = Missing data.

Table 6.2-5 Mean Sediment Temperature in C°.

Sta. #	June 1983	Sept 1983	Nov 1983	Feb 1984	June 1984	Mean	Std. Dev.
1	27.99	27.17	19.57	17.01	26.28	23.60	4.97
2	27.57	27.92	18.48	17.22	26.68	23.57	5.26
3	27.44	27.77	18.30	17.52	26.55	23.52	5.14
4	27.60	29.83	19.70	17.78	28.84	24.75	5.58
5	27.49	29.90	18.84	18.96	28.63	24.76	5.42
6	27.08	28.81	18.67	17.86	28.52	24.19	5.45
7	27.70	29.36	19.66	18.15	27.35	24.44	5.14
8	27.60	29.19	19.24	18.06	26.92	24.20	5.15
9	27.46	28.96	18.99	17.78	26.73	23.98	5.19
10	27.39	28.83	18.65	17.67	26.09	23.73	5.18
11	27.48	28.81	18.16	17.65	25.58	23.54	5.27
12	27.52	28.95	17.73	17.42	25.53	23.44	5.49
13	27.18	31.61	23.38	19.18	31.12	26.49	5.27
14	28.11	31.25	19.08	19.87	30.09	25.68	5.78
15	27.82	29.49	20.48	18.35	27.60	24.75	4.98
16	27.44	29.08	19.38	18.05	26.64	24.12	5.03
17	29.21	35.49	*	20.26	31.79	29.19	6.49
18	28.62	31.48	22.76	20.37	30.74	26.79	4.96
19	28.65	32.69	22.43	22.43	30.62	27.36	4.73
20	28.46	30.34	22.93	19.96	32.34	26.81	5.19
21	28.38	30.03	22.52	21.01	31.12	26.61	4.56
22	27.54	29.27	21.70	18.04	26.86	24.68	4.66
23	27.52	29.21	18.83	17.66	26.30	23.90	5.28
24	27.45	28.97	17.97	18.92	25.89	23.84	5.06
25	27.58	29.00	17.72	17.84	25.66	23.56	5.41
26	27.58	28.89	17.73	17.43	25.55	23.44	5.48
27	28.01	30.82	20.49	18.76	28.89	25.39	5.40
28	28.54	30.58	18.99	19.07	30.25	25.49	5.94
29	27.69	30.02	21.75	19.49	30.44	25.88	4.98
30	27.26	29.38	20.23	18.45	26.38	24.34	4.73
31	26.51	28.96	18.72	17.57	25.90	23.53	5.07
32	26.63	28.05	18.26	17.34	26.14	23.28	5.07
33	27.33	28.83	18.14	17.20	25.98	23.50	5.42
34	27.53	28.50	17.81	17.27	26.15	23.45	5.46
35	27.01	28.30	17.47	17.15	25.69	23.12	5.39
36	27.12	28.43	17.50	16.67	25.68	23.08	5.57
37	27.35	28.21	17.45	16.74	25.50	23.05	5.53
38	27.13	28.52	18.30	18.28	26.16	23.68	4.99
39	27.12	28.58	17.63	17.45	25.47	23.25	5.33
40	27.11	28.47	17.45	16.55	25.52	23.02	5.60

* = Missing data.

Table 6.2-6 Bottom Salinity in o/oo -- 6 Week Means.

Sta. #	June 1983	July 1983	Sept 1983	Oct 1983	Nov 1983	Jan 1984	Feb 1984	Apr 1984	June 1984	July 1984	Mean	Std. Dev.
1	14.31	13.48	12.00	12.76	12.88	11.35	8.56	8.70	8.04	12.39	11.45	2.23
2	16.55	18.11	19.67	21.27	18.84	14.38	14.78	13.53	14.30	18.88	17.03	2.68
3	21.01	22.88	22.89	21.82	21.69	18.59	19.32	16.28	17.45	23.77	20.57	2.53
4	19.25	18.46	16.86	19.00	18.80	18.04	17.00	13.28	14.83	19.83	17.54	2.09
5	19.40	19.36	17.77	18.27	19.25	17.87	16.25	12.33	15.15	18.89	17.45	2.28
6	20.51	19.35	16.85	18.04	18.16	16.01	16.35	12.42	15.76	18.89	17.24	2.29
7	23.10	21.13	20.26	22.00	22.50	18.73	19.93	15.17	17.07	20.81	20.07	2.48
8	21.32	21.93	22.09	21.06	21.95	18.69	19.58	16.19	17.35	22.42	20.26	2.20
9	22.06	23.26	21.93	20.98	22.53	20.57	19.21	17.15	18.48	23.55	20.97	2.12
10	24.12	25.92	25.84	24.53	24.91	22.55	23.70	20.02	20.22	25.19	23.70	2.14
11	24.81	26.68	27.00	25.82	26.68	24.29	24.02	21.80	23.22	27.10	25.14	1.81
12	25.29	29.91	28.79	28.37	28.39	26.05	26.12	22.85	25.12	28.53	26.94	2.19
13	20.88	23.22	22.33	23.31	24.01	24.15	21.09	17.21	19.48	24.10	21.98	2.30
14	19.95	22.97	22.10	21.42	22.81	21.92	19.42	14.27	18.18	21.33	20.44	2.65
15	21.30	24.92	22.92	22.69	22.43	20.23	19.05	15.73	18.82	22.64	21.07	2.66
16	23.58	25.01	24.98	24.27	24.57	22.46	20.44	18.85	20.66	24.84	22.97	2.24
17	22.63	26.07	24.87	26.01	26.33	24.79	23.47	19.90	21.27	25.18	24.05	2.18
18	22.32	23.86	24.04	25.49	25.86	23.50	22.83	18.56	20.81	24.35	23.16	2.19
19	22.41	24.71	23.65	25.12	25.38	23.43	21.80	18.23	20.02	23.60	22.84	2.29
20	22.35	24.93	23.85	24.68	24.57	22.74	22.19	18.12	20.20	23.85	22.75	2.18
21	20.06	24.70	24.63	24.71	24.52	23.56	22.02	18.04	20.17	24.08	22.65	2.43
22	20.90	25.27	25.41	24.47	24.64	23.40	21.72	19.22	20.63	24.73	23.04	2.23
23	22.96	25.34	26.10	25.97	25.35	24.17	22.17	19.91	21.14	25.03	23.81	2.16
24	21.49	26.74	27.23	26.50	26.19	25.03	20.55	21.30	22.87	26.90	24.48	2.64
25	25.31	28.17	28.53	28.07	27.85	25.63	25.53	22.87	24.39	28.11	26.45	1.96
26	26.35	30.56	29.12	28.62	28.80	27.32	25.99	23.07	25.42	28.92	27.42	2.22
27	20.60	24.87	22.76	24.10	23.56	22.78	21.90	18.59	19.39	22.27	22.08	2.02
28	21.47	24.44	23.31	24.32	24.57	23.51	22.31	18.59	19.71	24.05	22.63	2.09
29	22.36	25.14	24.29	25.81	25.22	23.87	22.13	19.24	19.87	24.13	23.21	2.26
30	22.18	25.17	25.13	25.20	25.13	23.20	22.16	19.85	20.76	24.68	23.35	2.02
31	20.77	21.73	20.02	22.75	22.24	19.86	21.21	15.83	15.86	20.82	20.11	2.42
32	20.53	22.57	21.04	22.57	23.59	21.00	20.93	16.92	16.54	21.14	20.69	2.30
33	22.64	24.39	23.95	25.07	25.16	22.49	23.14	18.66	18.52	24.57	22.86	2.44
34	24.24	25.94	25.57	25.81	26.47	23.51	23.42	19.90	21.18	26.62	24.27	2.29
35	24.67	27.64	26.78	26.71	27.45	25.49	24.23	22.01	23.10	27.23	25.53	1.97
36	25.11	28.41	28.13	27.73	27.83	26.26	24.71	22.64	24.08	28.01	26.29	2.04
37	26.41	29.07	29.14	28.52	28.07	25.61	25.64	23.04	25.35	28.79	26.97	2.06
38	16.14	18.85	16.22	15.10	17.18	14.97	12.90	12.96	12.28	17.30	15.39	2.16
39	21.87	24.00	21.94	22.78	22.26	19.38	20.01	15.98	18.96	24.18	21.14	2.55
40	26.53	28.14	25.77	27.84	27.21	24.29	24.63	22.05	23.55	28.01	25.80	2.10

Table 6.2-7 Bottom Turbidity in N.T.U.'s --- 6 Week Means.

Sta. #	June 1983	July 1983	Sept 1983	Oct 1983	Nov 1983	Jan 1984	Feb 1984	Apr 1984	June 1984	July 1984	Mean	Std. Dev.
1	8.10	7.87	8.33	8.07	7.38	7.30	4.53	13.53	12.28	9.93	8.73	2.59
2	4.95	7.85	8.27	5.95	8.13	3.78	3.03	13.82	6.77	8.78	7.13	3.06
3	10.00	9.77	10.68	9.40	4.85	4.88	3.82	20.63	9.00	9.52	9.23	4.65
4	15.55	8.63	22.82	15.82	8.55	8.98	4.55	13.63	13.73	22.50	13.48	6.02
5	9.90	7.70	13.33	28.73	9.78	26.58	5.72	19.10	13.22	9.98	14.40	7.89
6	10.40	9.37	36.08	20.92	11.24	7.88	4.13	12.72	9.40	9.37	13.15	9.12
7	9.90	8.43	11.27	16.37	9.03	6.52	3.83	13.92	6.18	13.07	9.85	3.87
8	7.70	10.93	15.45	14.72	11.95	7.70	4.30	14.18	11.30	11.62	10.99	3.52
9	15.55	8.00	11.00	9.82	5.65	8.07	4.43	42.02	11.60	16.97	13.31	10.83
10	8.50	18.02	10.42	9.65	5.08	5.38	4.48	23.32	10.92	17.58	11.33	6.33
11	5.05	5.53	7.75	7.53	5.63	5.10	4.86	20.93	7.38	6.13	7.58	4.82
12	5.30	5.58	5.02	6.08	4.52	4.20	5.30	14.43	7.98	4.25	6.27	3.07
13	6.35	6.47	8.88	8.30	6.25	4.85	4.83	9.18	8.12	7.70	7.09	1.57
14	6.00	7.98	10.97	9.53	7.30	5.98	5.25	10.13	7.12	8.90	7.92	1.92
15	6.80	11.12	11.37	11.87	9.70	10.30	5.70	17.88	14.38	17.33	11.64	3.99
16	12.00	8.38	10.77	9.85	4.40	4.40	3.15	14.83	10.17	8.95	8.69	3.71
17	10.50	8.08	9.97	6.52	5.37	5.78	4.75	10.28	16.10	8.15	8.55	3.38
18	12.95	6.42	8.73	7.00	11.02	4.95	4.45	9.38	8.22	6.80	7.99	2.64
19	9.35	5.18	10.23	7.60	4.48	3.92	3.62	9.93	7.12	5.65	6.71	2.51
20	9.95	8.37	16.15	8.77	5.05	5.53	4.45	11.57	12.45	9.63	9.19	3.64
21	13.00	8.85	31.73	8.85	30.77	5.62	5.38	14.13	12.77	12.27	14.34	9.41
22	6.75	10.28	13.45	8.12	5.50	7.38	2.65	14.83	8.67	9.50	8.71	3.59
23	8.85	8.60	23.50	8.00	4.47	4.28	3.83	10.93	7.68	6.23	8.64	5.70
24	5.90	6.33	5.08	6.92	4.78	4.75	2.97	14.02	9.07	5.87	6.57	3.06
25	5.25	6.95	6.96	8.18	5.28	5.30	3.83	16.58	10.05	6.32	7.47	3.65
26	3.60	5.03	3.90	6.20	4.27	4.00	3.33	17.22	7.05	3.48	5.81	4.19
27	8.70	9.53	11.42	9.58	5.23	3.57	2.27	6.60	3.82	7.88	6.86	3.05
28	9.20	9.25	8.47	10.17	4.20	3.23	2.65	11.08	4.78	5.02	6.80	3.13
29	8.10	4.68	6.80	13.45	4.45	3.67	3.27	13.55	6.97	6.18	7.22	3.91
30	8.00	8.90	10.03	8.18	4.50	3.99	3.47	12.02	7.13	10.78	7.70	2.94
31	7.20	14.55	2.90	5.17	3.18	3.93	4.28	6.97	3.53	26.78	7.85	7.49
32	5.75	5.22	2.82	4.15	4.10	2.43	3.93	9.22	3.32	6.83	4.78	2.06
33	14.95	10.27	5.88	23.52	5.73	5.58	2.88	13.32	4.90	8.40	9.54	6.24
34	8.90	5.98	5.22	6.50	4.80	4.33	2.08	12.65	17.33	5.13	7.29	4.54
35	5.50	4.58	5.05	5.85	5.20	3.75	2.68	13.18	7.07	5.18	5.87	2.84
36	5.10	3.29	5.47	5.03	5.45	3.03	2.72	15.53	7.98	5.55	5.92	3.71
37	4.80	5.49	6.87	7.10	5.27	3.33	3.00	17.30	9.33	5.08	6.76	4.14
38	3.50	5.43	4.93	3.25	3.50	5.33	2.82	6.78	4.22	9.23	4.90	1.95
39	7.15	3.02	4.58	23.90	4.62	3.48	3.33	9.17	5.75	7.88	7.29	6.19
40	4.35	3.61	6.08	6.78	4.22	2.70	2.38	12.43	8.03	4.43	5.50	3.01

Table 6.2-8 Mean Total Suspended Solids in mg/1.

Sta. #	June 1983	July 1983	Sept 1983	Oct 1983	Nov 1983	Jan 1984	Feb 1984	Apr 1984	June 1984	July 1984	Mean	Std. Dev.
1	10.00	11.00	13.67	14.00	11.33	10.00	6.67	14.67	13.00	25.00	13.43	5.12
2	8.00	11.00	9.00	7.33	5.67	7.00	5.33	10.00	7.00	9.67	8.00	1.88
3	16.00	59.67	15.00	9.33	5.33	10.33	5.67	27.00	8.33	17.00	17.37	16.22
4	19.00	15.67	38.33	15.00	9.00	11.67	9.67	18.67	33.00	15.00	18.50	9.73
5	23.00	38.00	17.00	23.00	19.33	13.00	17.67	15.00	29.67	13.33	20.90	7.89
6	16.00	29.33	18.00	23.33	20.67	14.33	6.33	12.67	10.00	13.00	16.37	6.74
7	36.00	13.00	12.00	16.67	9.67	23.33	6.00	15.33	9.00	10.00	15.10	8.80
8	247.00	15.67	31.00	14.67	17.00	10.67	6.00	16.33	14.33	14.67	38.73	73.45
9	55.00	18.67	15.33	9.33	8.33	10.33	7.67	16.67	12.33	20.33	17.40	13.93
10	127.00	23.67	14.33	14.00	7.33	9.33	8.33	21.67	13.67	25.00	26.43	35.89
11	11.00	10.00	10.00	11.33	8.00	12.00	7.00	33.33	10.33	10.33	12.33	7.53
12	13.00	6.00	9.00	12.67	10.33	9.33	8.00	23.67	10.67	9.33	11.20	4.84
13	10.00	10.00	13.67	15.67	9.33	8.33	6.67	10.33	9.67	13.33	10.70	2.71
14	9.00	8.00	22.33	11.00	7.67	9.00	13.00	12.33	11.00	11.00	11.43	4.22
15	26.00	11.67	13.00	15.00	13.00	20.33	7.00	27.33	23.33	19.67	17.63	6.72
16	24.00	15.33	15.33	15.00	7.33	8.67	7.00	11.67	16.33	11.00	13.17	5.16
17	10.00	9.67	14.00	11.00	8.33	11.00	7.33	17.33	17.33	12.67	11.87	3.46
18	10.00	10.67	16.67	11.00	12.00	9.33	8.67	13.00	10.67	10.00	11.20	2.29
19	15.00	11.00	11.33	13.00	8.33	8.67	7.33	14.33	11.00	9.00	10.90	2.61
20	15.00	13.00	19.67	12.00	7.67	10.00	11.67	14.00	11.00	33.33	14.73	7.28
21	18.00	17.33	52.33	13.33	8.00	13.00	9.67	12.33	16.33	10.67	17.10	12.81
22	10.00	17.33	16.00	14.67	9.00	15.33	7.33	15.00	11.33	11.00	12.70	3.38
23	19.00	9.00	18.00	10.00	7.00	10.00	6.00	11.67	21.33	13.00	12.50	5.26
24	13.00	12.00	10.33	10.33	6.00	11.00	6.00	14.67	11.00	9.67	10.40	2.74
25	15.00	8.67	11.33	14.33	7.33	12.33	7.67	13.33	12.33	9.67	11.20	2.74
26	7.00	8.33	10.67	9.00	6.00	10.00	6.67	18.67	10.33	9.00	9.57	3.57
27	28.00	8.33	12.33	13.00	6.67	6.67	5.67	9.33	6.67	9.67	10.63	6.58
28	41.00	18.00	14.33	9.00	7.00	6.00	6.33	9.67	6.33	9.33	12.70	10.67
29	13.00	9.00	10.00	22.33	10.00	8.33	6.67	9.33	10.33	10.67	10.97	4.32
30	17.00	16.67	17.00	12.67	5.67	7.67	10.00	11.67	9.00	9.67	11.70	4.07
31	12.00	78.33	11.67	7.33	4.67	7.33	8.00	10.00	6.00	7.33	15.27	22.28
32	12.00	28.67	10.33	8.00	7.00	5.67	7.00	8.33	6.67	6.00	9.97	6.86
33	12.00	24.67	11.00	8.67	10.00	6.00	7.33	14.33	8.33	9.67	11.20	5.29
34	14.00	9.67	12.00	12.67	5.67	7.33	6.00	13.33	78.33	9.00	16.80	21.83
35	12.00	7.00	11.67	11.33	7.33	7.00	8.33	17.67	14.67	8.33	10.53	3.60
36	12.00	8.00	12.00	8.67	10.00	7.00	9.33	20.67	10.00	9.67	10.73	3.83
37	15.00	11.67	15.67	9.00	7.33	7.67	7.67	25.00	15.00	9.33	12.33	5.53
38	7.00	14.00	5.33	6.67	9.33	4.50	12.67	11.00	7.67	14.00	9.22	3.53
39	16.00	10.00	12.33	6.67	9.67	7.33	7.67	11.67	13.67	11.33	10.63	2.97
40	7.00	9.33	18.67	14.33	8.00	6.33	6.33	14.00	9.67	8.00	10.17	4.14

Table 6.2-9 Dissolved Oxygen in mg/l --- 6 Week Means.

Sta. #	June 1983	July 1983	Sept 1983	Oct 1983	Nov 1983	Jan 1984	Feb 1984	Apr 1984	June 1984	July 1984	Mean	Std. Dev.
1	7.00	6.55	5.80	7.20	7.45	9.55	9.70	9.17	6.95	6.02	7.54	1.43
2	6.80	6.50	5.18	6.33	7.02	9.58	9.23	8.53	7.12	6.18	7.25	1.42
3	5.70	5.88	4.95	6.03	7.20	9.18	8.90	8.12	6.83	6.33	6.91	1.42
4	6.05	5.35	5.15	5.48	6.68	9.18	8.60	8.67	6.28	5.25	6.67	1.56
5	5.95	6.07	5.00	5.85	6.57	9.53	8.88	8.67	6.28	5.50	6.83	1.59
6	5.95	6.05	5.33	6.18	7.12	9.28	8.82	8.58	6.77	5.88	7.00	1.41
7	5.60	6.05	4.55	5.95	7.15	9.18	8.90	8.02	6.58	5.82	6.78	1.51
8	5.15	5.82	4.38	5.93	7.08	9.10	8.70	8.22	6.67	5.98	6.70	1.56
9	6.15	5.78	5.05	6.42	7.23	8.90	8.63	8.12	6.78	6.15	6.92	1.28
10	5.55	5.77	5.45	6.33	7.33	8.97	8.50	8.03	6.65	6.33	6.89	1.26
11	6.35	5.88	5.63	6.30	7.03	8.78	9.13	7.67	6.83	6.37	7.00	1.18
12	6.40	5.83	5.62	6.13	6.98	8.60	9.13	7.85	6.68	6.37	6.96	1.19
13	6.05	5.90	5.73	5.53	6.72	8.32	8.55	7.72	6.23	5.33	6.61	1.18
14	6.75	6.10	5.20	5.93	6.78	8.08	8.28	8.17	6.23	5.97	6.75	1.08
15	6.65	5.72	4.75	5.57	6.58	8.78	8.72	7.70	5.93	6.08	6.65	1.35
16	6.50	6.03	5.37	6.25	7.05	8.78	9.03	8.02	6.93	6.28	7.02	1.21
17	6.00	5.90	5.55	5.88	6.36	8.30	8.17	7.73	6.52	5.78	6.62	1.04
18	6.50	6.35	5.98	5.88	6.67	8.53	8.40	7.57	6.15	5.67	6.77	1.04
19	6.35	6.20	6.02	6.00	6.84	8.50	8.00	7.65	6.10	6.08	6.77	0.93
20	6.35	6.00	5.38	5.75	7.03	8.48	8.03	7.50	6.12	6.18	6.68	1.03
21	6.65	6.07	5.00	5.90	6.95	8.53	8.12	7.62	6.17	6.18	6.72	1.09
22	6.65	5.50	4.88	6.03	6.95	8.26	8.37	7.72	6.32	6.03	6.67	1.16
23	0.00	6.18	5.37	6.18	7.02	8.52	8.83	7.90	6.25	6.32	6.95	1.20
24	6.30	6.02	6.05	6.47	7.00	8.52	9.22	8.03	6.78	6.40	7.08	1.12
25	6.50	6.02	5.73	6.35	7.08	8.53	9.18	7.80	6.40	6.30	6.99	1.15
26	6.70	5.88	5.57	6.32	7.12	8.38	9.12	7.87	6.53	6.33	6.98	1.14
27	7.10	6.07	5.98	6.45	7.22	9.22	8.53	8.35	7.23	5.93	7.21	1.16
28	6.45	6.13	5.70	6.33	7.10	8.65	8.43	8.10	7.10	5.98	7.00	1.07
29	7.10	6.10	6.10	6.43	7.17	8.62	8.45	8.15	6.67	6.10	7.09	0.99
30	7.00	6.07	5.75	6.55	7.12	8.47	8.62	8.26	6.88	6.27	7.10	1.03
31	7.60	6.70	6.20	6.18	7.37	9.55	8.52	8.20	7.12	7.62	7.50	1.05
32	7.45	7.08	6.45	6.17	7.37	9.37	8.52	8.32	7.73	7.18	7.56	0.96
33	7.35	6.43	6.30	6.30	7.22	9.08	8.50	8.18	7.35	7.12	7.38	0.95
34	7.00	6.68	5.88	6.42	7.22	9.00	9.17	8.18	6.88	6.48	7.29	1.12
35	7.15	6.47	6.02	6.48	7.17	8.80	8.85	8.03	7.05	6.67	7.27	0.98
36	7.25	6.52	5.98	6.40	7.13	8.83	8.92	8.03	6.83	6.62	7.25	1.02
37	7.05	6.28	5.92	6.10	6.95	8.53	8.93	8.02	6.52	6.67	7.10	1.05
38	8.65	7.15	6.60	6.27	8.22	9.50	8.95	8.67	7.43	7.33	7.88	1.07
39	8.35	6.37	5.98	6.60	7.27	9.03	8.63	7.95	7.13	6.57	7.39	1.05
40	6.70	6.55	6.27	6.27	6.92	8.63	8.53	8.03	6.52	6.32	7.07	0.95

Table 6.2-10 Mean Grain Size in Phi Units.

Sta. #	June 1983	Sept 1983	Nov 1983	Feb 1984	June 1984	Mean	Std. Dev.
1	2.65	2.51	2.75	2.71	2.61	2.65	0.09
2	2.71	1.61	1.49	2.59	1.47	1.97	0.62
3	1.03	1.17	1.03	1.70	1.52	1.29	0.30
4	3.05	2.97	3.29	3.25	3.12	3.14	0.13
5	3.27	3.13	3.21	3.08	3.19	3.18	0.07
6	2.56	2.58	2.74	2.98	2.27	2.63	0.26
7	3.01	2.91	1.68	1.52	2.95	2.41	0.75
8	2.91	3.53	2.57	3.14	3.12	3.05	0.35
9	2.06	1.72	2.78	3.00	1.42	2.20	0.68
10	2.80	2.91	2.37	2.60	2.50	2.64	0.22
11	2.21	2.21	1.94	1.71	1.83	1.98	0.23
12	1.77	0.78	1.70	1.45	1.28	1.40	0.40
13	2.97	2.86	2.52	2.31	1.51	2.43	0.58
14	2.56	2.06	2.67	2.61	2.14	2.53	0.22
15	1.57	1.32	1.80	1.91	3.19	1.96	0.73
16	2.37	2.31	1.84	1.97	2.08	2.11	0.22
17	3.09	3.07	1.87	2.87	2.06	2.59	0.58
18	2.79	2.58	2.72	2.44	2.36	2.58	0.18
19	1.38	0.24	0.82	0.97	0.38	0.76	0.46
20	2.71	2.76	2.62	2.09	2.68	2.57	0.27
21	3.33	3.05	3.11	2.91	3.15	3.11	0.15
22	2.27	2.55	2.64	0.85	2.51	2.16	0.75
23	1.74	1.96	1.41	3.08	1.32	1.90	0.71
24	2.24	2.19	2.51	2.57	2.57	2.42	0.19
25	1.73	1.72	1.30	1.96	1.10	1.56	0.35
26	1.36	1.62	1.30	1.88	1.74	1.58	0.25
27	2.50	2.41	1.97	2.44	2.91	2.45	0.33
28	2.58	1.60	2.87	1.45	1.95	2.09	0.62
29	-0.46	-0.60	-0.27	0.61	2.30	0.32	1.20
30	1.94	1.63	1.89	1.01	2.00	1.69	0.41
31	2.86	2.72	2.35	2.95	1.97	2.57	0.41
32	1.04	1.89	2.03	2.20	2.36	1.90	0.51
33	3.00	2.78	2.54	2.30	2.69	2.66	0.26
34	2.40	1.65	1.88	2.45	1.71	2.02	0.38
35	1.18	0.94	0.81	0.81	0.76	0.90	0.17
36	2.50	2.28	1.73	0.63	2.72	1.97	0.84
37	2.06	2.47	2.14	2.69	2.12	2.30	0.27
38	2.22	2.01	2.80	2.38	1.41	2.16	0.51
39	2.16	2.18	2.55	2.85	2.94	2.54	0.36
40	3.03	3.06	3.05	2.62	3.02	2.95	0.18

Table 6.2-11 Percent Silt and Clay in Sediment.

Sta. #	June 1983	Sept 1983	Nov 1983	Feb 1984	June 1984	Mean	Std. Dev.
1	2.19	3.97	4.86	4.49	2.13	3.53	1.29
2	8.32	5.65	6.61	4.25	4.52	5.87	1.66
3	2.54	3.30	3.33	2.13	1.71	2.60	0.71
4	20.03	23.63	35.92	29.71	21.80	26.22	6.54
5	27.60	30.92	41.70	28.72	26.81	31.15	6.10
6	23.16	17.30	21.42	18.05	8.48	17.68	5.68
7	18.34	16.40	3.35	3.69	12.88	10.93	7.04
8	30.17	44.02	23.71	27.03	22.68	29.52	8.62
9	14.79	13.08	28.78	30.77	10.90	19.66	9.36
10	14.32	17.63	8.92	26.52	6.30	14.74	7.94
11	4.69	5.37	4.33	4.31	3.06	4.35	0.84
12	10.33	7.32	8.18	4.41	4.26	6.90	2.59
13	11.72	10.36	4.74	5.65	17.74	10.04	5.23
14	8.54	7.73	17.58	7.82	9.42	10.22	4.17
15	12.48	7.88	14.71	30.75	27.83	18.73	10.00
16	5.96	6.15	3.83	3.87	2.80	4.52	1.47
17	19.44	17.58	13.62	9.94	9.49	14.01	4.45
18	17.26	14.43	17.30	14.00	12.88	15.17	2.00
19	8.72	3.88	7.06	6.75	3.61	6.00	2.20
20	15.66	20.85	17.44	18.60	15.54	17.62	2.21
21	26.60	21.96	21.10	21.56	22.43	22.73	2.22
22	15.14	17.51	20.68	13.61	15.24	16.44	2.75
23	12.88	9.94	13.30	20.12	7.34	12.72	4.79
24	3.13	6.22	4.41	3.24	7.54	4.91	1.93
25	11.96	12.14	8.39	11.30	5.26	9.81	2.96
26	6.55	5.52	4.71	4.60	5.08	5.29	0.79
27	16.25	15.01	5.71	15.20	11.61	12.76	4.31
28	11.21	9.84	10.01	8.57	13.85	10.70	2.00
29	1.46	3.25	6.32	7.80	9.88	5.74	3.40
30	8.03	12.23	10.61	5.64	4.85	8.27	3.16
31	10.61	17.01	15.68	10.31	14.90	13.70	3.06
32	13.23	10.97	13.44	12.69	11.68	12.40	1.05
33	19.64	17.64	13.39	16.62	23.24	18.11	3.65
34	15.88	13.92	12.03	14.91	7.86	12.92	3.17
35	2.96	3.37	2.15	2.48	2.71	2.73	0.46
36	4.87	3.74	6.93	3.62	5.43	4.92	1.36
37	5.55	4.12	7.12	7.04	4.74	5.71	1.35
38	6.98	10.79	13.48	16.79	9.63	11.53	3.75
39	7.12	8.50	9.18	14.92	16.35	11.21	4.13
40	13.35	14.53	10.43	7.10	12.95	11.67	2.96

Table 6.2-12 Sediment Eh Levels in millivolts.

Sta. #	June 1983	Sept 1983	Nov 1983	Feb 1984	June 1984	Mean	Std. Dev.
1	-177	-113	-171	-85	-189	-147	45
2	-131	-32	-3	-98	-49	-63	51
3	-35	-146	52	-16	-29	-35	71
4	-208	-255	-315	-167	-185	-226	60
5	-242	-265	-279	-190	-235	-242	34
6	-214	-201	-209	-191	-213	-206	10
7	-105	-328	27	-174	-260	-168	138
8	-235	-345	-205	-191	-238	-243	61
9	-122	26	-209	-195	-47	-109	100
10	-51	-205	-143	-123	-203	-145	64
11	87	-187	76	136	-26	17	128
12	80	21	73	92	34	60	31
13	-229	-169	-163	18	-20	-113	106
14	-249	-126	-221	-167	-45	-162	81
15	15	-220	-145	-206	-337	-179	129
16	34	-145	46	-21	-3	-18	76
17	-293	-167	*	-101	-251	-162	117
18	-131	8	-170	-69	-42	-81	71
19	89	11	33	-79	-32	4	64
20	-156	-298	-9	-108	-215	-157	109
21	-207	-262	-179	-137	-213	-200	46
22	-240	-144	-131	18	-62	-112	96
23	68	-3	77	-141	23	5	88
24	130	-21	63	20	-148	9	104
25	67	-158	64	-145	*	34	110
26	11	-111	76	-171	-9	41	99
27	-336	18	22	17	-241	-104	172
28	-103	-72	-168	25	3	-63	79
29	-15	35	-8	10	-120	-20	59
30	-166	8	25	28	-79	-37	84
31	-266	-261	-77	-112	-189	-181	86
32	-47	-5	-19	*	-29	-20	19
33	-223	-302	-9	2	-181	-143	134
34	-146	-184	37	-83	21	-71	98
35	106	-139	72	46	79	33	98
36	68	-294	106	7	25	-18	159
37	85	-270	81	-53	-7[illegible]	-47	145
38	-110	-242	-163	*	-21	-107	100
39	-115	-250	-187	-151	-231	-167	56
40	-83	-163	-30	-37	-99	-82	54

Table 6.2-13 Sediment Total Organic Carbon in mg/g.

Sta. #	June 1983	Sept 1983	Nov 1983	Feb 1984	June 1984	Mean	Std. Dev.
1	1.87	2.97	4.17	5.30	2.07	3.28	1.45
2	5.50	4.80	6.70	3.53	2.13	4.53	1.77
3	3.80	3.00	3.43	4.90	1.40	2.51	1.28
4	15.43	10.93	14.03	10.67	4.83	11.18	4.09
5	17.50	13.67	19.53	27.40	6.63	16.95	7.64
6	15.47	8.17	12.27	16.33	2.57	10.96	5.68
7	7.17	7.60	3.87	11.37	3.80	6.76	3.13
8	20.43	19.73	11.73	13.13	5.57	14.12	6.15
9	8.73	5.40	13.70	13.67	5.10	9.32	4.23
10	6.60	7.87	5.13	5.43	3.17	5.64	1.75
11	3.97	3.53	3.77	3.80	2.07	3.43	0.78
12	6.77	4.47	5.00	6.53	3.33	5.22	1.44
13	6.40	5.37	2.87	4.57	6.43	5.13	1.48
14	2.30	4.83	4.13	11.57	2.47	5.06	3.80
15	6.73	5.13	5.50	24.23	9.00	10.12	8.03
16	[illegible].97	5.23	2.23	3.60	1.37	3.28	1.51
17	8.23	11.40	2.37	6.07	2.93	6.20	3.76
18	11.23	7.03	2.90	9.33	4.27	6.95	3.45
19	6.30	4.23	2.57	7.23	2.57	4.58	2.13
20	6.27	8.93	4.87	8.37	5.73	6.83	1.74
21	15.03	9.57	10.37	12.43	7.50	10.98	2.87
22	10.17	5.80	10.13	11.97	3.90	8.39	3.39
23	8.00	6.07	5.63	9.37	3.60	6.53	2.23
24	0.93	4.27	1.53	1.10	2.13	1.99	1.36
25	4.23	5.27	4.97	6.47	2.60	4.71	1.43
26	2.87	3.73	3.10	3.67	1.80	3.03	0.78
27	8.80	10.10	3.07	10.43	2.93	7.07	3.76
28	5.40	4.73	3.57	6.83	5.07	5.12	1.18
29	4.43	3.53	5.03	2.90	2.67	3.71	1.00
30	3.10	7.80	7.27	3.13	2.43	4.75	2.57
31	3.50	8.53	5.40	11.93	7.17	7.31	3.20
32	11.03	7.43	4.93	14.63	3.60	8.32	4.52
33	10.07	8.43	4.70	11.97	4.30	7.89	3.34
34	7.77	5.47	6.23	10.20	3.33	6.60	2.57
35	2.50	3.30	2.83	6.27	2.03	3.39	1.68
36	2.13	2.50	6.63	2.87	0.60	2.95	2.23
37	4.60	1.97	3.57	4.30	1.67	3.22	1.34
38	5.63	7.37	9.87	11.50	4.97	7.87	2.78
39	5.90	5.57	4.90	11.40	4.40	6.43	2.84
40	6.07	5.70	6.90	8.53	3.60	6.16	1.80

Table 6.2-14 Sediment Sulfide Levels in ug/g.

Sta. #	June 1983	Sept 1983	Nov 1983	Feb 1984	June 1984	Mean	Std. Dev.
1	0.001	0.008	0.028	0.026	0.013	0.015	0.012
2	0.013	0.042	0.080	0.016	0.036	0.037	0.027
3	0.003	0.047	0.008	0.018	0.000	0.015	0.019
4	0.234	0.172	0.022	0.045	0.029	0.100	0.097
5	0.117	0.245	0.034	0.031	0.024	0.090	0.095
6	0.012	0.045	0.026	0.077	0.039	0.040	0.024
7	0.197	0.072	0.026	0.014	0.112	0.084	0.074
8	0.240	0.780	0.185	0.029	0.051	0.257	0.306
9	0.007	0.144	0.058	0.021	0.080	0.062	0.054
10	0.052	0.050	0.017	0.035	0.080	0.047	0.023
11	0.001	0.009	0.006	0.005	0.000	0.004	0.004
12	0.000	0.008	0.018	0.004	0.003	0.007	0.007
13	0.068	0.031	0.011	0.024	0.031	0.033	0.021
14	0.061	0.078	0.013	0.037	0.005	0.039	0.031
15	0.167	0.260	0.015	0.097	0.089	0.125	0.093
16	0.004	0.039	0.016	0.010	0.002	0.014	0.015
17	0.423	0.361	0.350	0.086	0.139	0.272	0.149
18	0.001	0.180	0.036	0.019	0.019	0.051	0.073
19	0.000	0.021	0.004	0.002	0.000	0.005	0.009
20	0.031	0.045	0.009	0.022	0.042	0.030	0.015
21	0.018	0.003	0.559	0.038	0.188	0.161	0.234
22	0.015	0.096	0.135	0.012	0.000	0.052	0.060
23	0.011	0.102	0.021	0.032	0.005	0.034	0.039
24	0.031	0.069	0.019	0.019	0.000	0.028	0.026
25	0.012	0.006	0.018	0.010	0.000	0.009	0.007
26	0.013	0.003	0.006	0.001	0.000	0.005	0.005
27	0.430	0.021	0.011	0.027	0.111	0.120	0.178
28	0.077	0.007	0.008	0.042	0.009	0.029	0.031
29	0.019	0.008	0.028	0.008	0.000	0.013	0.010
30	0.084	0.006	0.018	0.004	0.009	0.024	0.034
31	0.043	0.127	0.043	0.011	0.068	0.058	0.043
32	0.044	0.171	0.137	0.067	0.360	0.156	0.125
33	0.042	0.004	0.041	0.028	0.022	0.027	0.016
34	0.034	0.164	0.005	0.022	0.013	0.048	0.066
35	0.038	0.005	0.006	0.002	0.062	0.023	0.026
36	0.044	0.108	0.008	0.004	0.161	0.065	0.068
37	0.037	0.421	0.001	0.003	0.012	0.095	0.183
38	0.052	0.892	0.147	0.120	0.045	0.251	0.361
39	0.090	0.121	0.100	0.064	0.028	0.081	0.036
40	0.053	0.046	0.003	0.012	0.043	0.031	0.022

Table 6.2-15. Abundant species occurring at all or at a majority of stations.

SPECIES OCCURRING AT ALL STATIONS
Tharyx cf. dorsobranchialis
Aricidea philbinae
Aricidea taylori
Lumbrineris verrilli
Haploscoloplos foliosus
Acetocina canaliculata

SPECIES OCCURRING AT ALL BUT ONE STATION	STATION WHERE ABSENT
Fabricia sp. A	18
Mediomastus ambiseta	35
Mediomastus sp.	38
Ampelisca holmesi	19
Mysella planulata	1
Chone americana	1
Scolelepis texana	40
Mitrella lunata	4
Scoloplos rubra	1

SPECIES OCCURRING AT ALL BUT FOUR OR LESS STATIONS	STATIONS WHERE ABSENT
Paraprionospio pinnata	1, 35
Streblospio benedicti	4, 25
Myriochele oculata	4, 6, 14, 38
Sphaerosyllis taylori	1, 8
Grandidierella bonneroides	4, 5
Erichthonius brasiliensis	18, 24, 38
Haploscoloplus fragilis	1, 34
Cirrophorus cf. furcatus	1, 6, 32
Ampelisca abdita	19, 20, 21
Spiophanes bombyx	1, 5, 13, 32
Paracaprella tenuis	1, 8, 38

Table 6.2-16 Total Faunal Density by Date and Station.

BENTHIC CORE FAUNAL DENSITY BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	7915	.	9515	.	16320	.	18667	.	4597	.	11403	5895
2	9728	.	4181	.	8768	.	13621	.	6763	.	8612	3515
3	13035	.	10784	.	27189	.	17163	.	24000	.	18434	7017
4	11147	26507	5067	4331	2059	4928	12544	9653	24395	1941	10257	8801
5	4395	3019	4843	3360	2848	7381	15456	3957	3840	2272	5137	3892
6	5771	.	2901	.	6677	.	12171	.	9611	.	7426	3573
7	3723	4181	3861	2869	11285	16181	8544	12523	3488	3371	7003	4792
8	1973	.	5045	.	3317	.	11627	.	3424	.	5077	3820
9	5579	7893	7669	1717	4299	8683	9312	7851	11243	9429	7367	2787
10	8757	.	9248	.	21429	.	8747	.	8811	.	11398	5611
11	4597	.	4747	.	24299	.	30443	.	16075	.	16032	11555
12	5611	2635	5280	11968	15381	12192	17536	21653	19925	6965	11915	6642
13	12267	2272	4811	2283	5184	11488	17621	57227	18613	14560	14633	16144
14	5803	.	2144	.	5312	.	11904	.	15179	.	8068	5317
15	4288	2880	10549	4299	12160	15093	18261	7360	4587	2656	8213	5510
16	4075	.	4128	.	32469	.	10421	.	11168	.	12452	11683
17	17269	14304	7883	9163	6144	18304	17387	33280	17035	11520	15229	7712
18	2827	2731	5835	4619	9323	11381	13856	6752	4800	4395	6652	3723
19	9429	.	6059	.	14859	.	11776	.	20320		12489	5435
20	5429	6645	10784	5248	6955	15573	17184	10048	9888	9216	9697	4041
21	6325	.	11531	.	10613	.	20107	.	9301	.	11575	5159
22	4320	5077	6688	3883	11328	13163	18187	9259	11947	6411	9026	4612
23	6464	.	3947	.	29419	.	9269	.	23861	.	14592	11330
24	3179	.	3104	.	5013	.	8064	.	15307	.	6933	5095
25	7093	8149	9803	8960	12789	12928	8971	14624	17899	7093	10831	3586
26	8235	4928	8960	12512	27659	7893	17696	14027	21845	6155	12991	7406
27	8395	7531	7659	11368	11616	14411	16224	20448	19093	13813	13116	4572
28	10059	.	14325	.	3445	.	34059	.	113387	.	35055	45251
29	30880	6069	44981	42091	63840	17941	20587	11477	24107	6037	26801	18776
30	8245	2912	22795	27563	28533	23851	41749	31349	69131	14251	27038	18667
31	3755	10016	5621	8683	8096	7957	13824	20171	15765	6283	10017	5086
32	23819	.	5664	.	12011	.	13579	.	31083	.	17231	10120
33	4320	9088	6869	3872	5376	26816	32608	21099	20149	4960	13516	10665
34	6496	.	15019	.	21152	.	14005	.	31947	.	17724	9503
35	7136	6379	9077	23712	46688	38965	61771	58752	30197	12875	29555	21198
36	4651	.	3403	.	42816	.	36971	.	5899	.	18748	19434
37	5536	5611	2240	14091	8096	12565	14571	16587	10165	5856	9532	4780
38	11584	.	5771	.	5216	.	5237	.	16352	.	8832	4987
39	8171	.	18667	.	8128	.	17045	.	5675	.	11537	5884
40	9056	.	6965	.	14005	.	21312	.	9781	.	12224	5688
MEANS	8033	6941	8461	10359	15303	14885	18002	19405	18516	7503		
STD DEV	5535	5516	7357	10188	13414	7814	10754	15315	19321	4050		

Table 6.2-17 Faunal density comparisons between thermal and control stations ('t' test; 95% significance level).

	CONTROL STATIONS																
THERMAL STATIONS	1	2	3	6	7	8	12	25	26	31	32	33	35	36	38	39	40
4	--																
5	--																
13				--						--		--					
14				--	--							--				--	
17				X						X		--					
18				--						--		o					
19													--				
20				--						--		--					
21						X											--
22		--													--		
27				X	X							--				--	
28		X													--		
29													--				
30		--	--				X	X	X		--			--			

Key: X = Thermal station significantly higher (95% level of certainty).
o = Thermal station significantly lower.
-- = No significant difference.

Table 6.2-18 BENTHIC CORE POLYCHAETA DENSITY BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	1291	.	779	.	1077	.	3637	.	1035	.	1564	1173
2	3093	.	3904	.	7104	.	8395	.	5237	.	5547	2199
3	2763	.	5259	.	12981	.	8277	.	6464	.	7149	3827
4	2336	2976	4160	4181	1984	4448	10411	5461	5120	1067	4214	2599
5	3723	2667	4704	3296	2656	7083	13440	3701	3019	1835	4612	3420
6	3637	.	2709	.	6389	.	10731	.	7093	.	6112	3165
7	1707	3392	3221	2293	10656	15072	7381	11477	2464	2432	6010	4805
8	1472	.	4768	.	2912	.	10699	.	2837	.	4538	3638
9	2784	6560	5451	1141	3243	8160	7573	7211	8661	6581	5737	2528
10	6272	.	5312	.	18667	.	7029	.	5973	.	8651	5633
11	2475	.	3136	.	17237	.	15957	.	10581	.	9877	6926
12	1515	1888	3029	8299	7701	9088	13259	15829	13621	5003	7923	5109
13	6763	1728	4373	1600	3808	9664	15947	45952	13856	10784	11447	13090
14	4693	.	1803	.	4779	.	11051	.	12640	.	6993	4623
15	3147	2613	9376	3360	11285	14453	10827	6187	3499	2229	6698	4426
16	1963	.	2987	.	24757	.	8971	.	8309	.	9397	9133
17	16117	13536	7541	8939	5216	17205	16203	31349	13173	9771	13905	7332
18	2475	2485	5803	4224	6912	10016	10581	5813	3509	3243	5506	2931
19	6709	.	4597	.	9867	.	8096	.	13312	.	8516	3302
20	4779	6421	10251	4981	5867	12309	13664	8032	8800	8277	8338	3015
21	6133	.	11328	.	9355	.	13643	.	8213	.	9734	2883
22	2592	4779	5867	3125	10453	9963	14837	7307	8523	4917	7236	3786
23	3755	.	3221	.	23029	.	7371	.	16981	.	10871	8755
24	1749	.	1621	.	3627	.	6475	.	9888	.	4672	3514
25	4576	6496	7319	5653	9696	9067	6144	12053	11531	5611	7818	2617
26	4128	3755	6144	8171	19381	4800	13504	10645	14683	4053	8927	5429
27	6283	5568	5739	6016	9088	12949	11552	12160	12085	10496	9194	3022
28	7904	.	12907	.	3040	.	26336	.	98421	.	29722	39376
29	3776	5440	20341	36555	31808	14912	17461	9237	19765	5056	16435	11221
30	5621	2315	15008	19616	24405	19936	31989	23147	48821	8629	19949	13653
31	2421	5920	2400	4096	5355	58[illegible]3	5813	7637	9504	3691	5264	2230
32	12373	.	2731	.	7787	.	8928	.	10432	.	8450	3630
33	2901	5376	4363	2475	3957	21237	27093	14709	13931	3552	9959	8783
34	4267	.	11765	.	17141	.	10699	.	16469	.	12068	5195
35	4224	4000	7072	14304	33248	30635	57227	52032	16779	6464	22598	19807
36	1675	.	2197	.	30837	.	29301	.	3157	.	13434	15205
37	3467	4149	1259	9909	6016	6880	11072	13387	5344	3691	6517	3826
38	8203	.	3744	.	4075	.	3520	.	10624	.	6033	3208
39	5675	.	9728	.	4864	.	9963	.	3296	.	6705	2993
40	6443	.	4779	.	10912	.	16960	.	7819	.	9382	4797
MEANS	4447	4603	5818	7612	10829	12184	13550	15166	12387	5369		
STD DEV	2965	2646	4073	8185	8716	6448	9626	13279	15935	2919		

Table 6.2-19 BENTHIC CORE MOLLUSCA DENSITY BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	1355	.	685	.	459	.	5621	.	565	.	1777	2177
2	1248	.	149	.	1173	.	2187	.	459	.	1043	792
3	9109	.	4853	.	10965	.	2816	.	12523	.	8053	4100
4	491	53	128	21	32	256	448	235	149	64	188	169
5	38[illegible]	117	32	53	32	267	1035	128	256	203	251	299
6	1237	.	53	.	203	.	928	.	555	.	595	493
7	843	331	363	352	203	576	288	128	651	448	418	217
8	85	.	171	.	96	.	768	.	203	.	265	286
9	2048	1003	1312	309	757	363	1067	395	1035	1707	999	578
10	1963	.	3104	.	2112	.	1099	.	2059	.	2067	712
11	1504	.	811	.	1856	.	2069	.	2571	.	1762	657
12	3125	341	1120	1536	3371	1259	1845	2720	2581	1291	1919	986
13	1045	160	149	107	235	587	501	1291	437	2528	704	752
14	619	.	267	.	288	.	576	.	1301	.	610	419
15	736	53	501	704	277	245	3893	459	651	171	769	1122
16	1269	.	960	.	2805	.	725	.	1173	.	1387	820
17	352	181	96	32	235	491	480	224	1131	1067	429	383
18	117	107	11	363	2133	693	1568	555	611	1003	736	683
19	405	.	1024	.	480	.	1248	.	4832	.	1598	1843
20	267	96	437	181	1024	3200	2635	1237	405	693	1018	1073
21	53	.	85	.	1024	.	3328	.	459	.	990	1364
22	1024	117	416	427	448	1824	2443	885	1877	939	1040	766
23	2112	.	565	.	4213	.	1141	.	5067	.	2620	1949
24	992	.	789	.	693	.	1003	.	3968	.	1489	1392
25	1760	683	1248	1111	1269	1717	1920	2080	3392	533	1574	816
26	2763	544	1557	1707	3424	1237	2101	2517	3403	1088	2034	981
27	907	395	757	2635	1408	789	1867	1408	2741	1803	1471	795
28	1163	.	512	.	203	.	5653	.	4512	.	2409	2498
29	24704	107	21163	3563	16149	1824	1952	1333	2421	683	7390	9433
30	1419	341	5909	5611	2432	2432	5152	3787	9611	2133	3883	2737
31	395	1760	2613	4043	1835	1589	4811	2368	3157	1419	2399	1312
32	7808	.	1728	.	2144	.	2315	.	12864	.	5372	4876
33	405	1472	1323	875	747	2944	2827	3925	2144	757	1742	1169
34	1568	.	1291	.	1696	.	2048	.	6944	.	2709	2383
35	2293	704	864	6848	5717	1813	1387	4448	8821	2325	3522	2794
36	2144	.	608	.	5707	.	1856	.	2016	.	2466	1913
37	1173	565	491	2357	832	3328	1653	2336	3008	885	1663	1034
38	555	.	1163	.	789	.	619	.	789	.	783	236
39	1045	.	6635	.	1952	.	4597	.	896	.	3025	2505
40	1856	.	1077	.	1621	.	1621	.	1141	.	1463	338
MEANS	2109	457	1681	1643	2076	1372	2052	1623	2839	1087		
STD DEV	4072	476	3498	1978	3077	1004	1453	1348	3201	712		

Table 6.2-20 BENTHIC CORE CRUSTACEA DENSITY BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	5248	.	7840	.	14741	.	9408	.	2997	.	8047	4473
2	5237	.	117	.	363	.	2923	.	960	.	1920	2157
3	1024	.	576	.	2944	.	5771	.	4875	.	3038	2290
4	8299	23456	768	128	43	224	1685	3957	18923	96	5758	8594
5	288	224	107	11	149	32	960	107	149	171	220	273
6	864	.	96	.	85	.	501	.	1419	.	593	563
7	1024	405	224	128	331	352	608	757	288	192	431	283
8	395	.	64	.	213	.	139	.	277	.	218	127
9	693	288	800	160	85	64	501	213	875	1035	471	357
10	245	.	299	.	405	.	363	.	597	.	382	135
11	512		533	.	4693	.	12288	.	2816	.	4169	4864
12	853	35[illegible]	971	1877	3915	1472	2112	[illegible]773	3307	597	1823	1203
13	4448	373	277	565	1120	1205	1163	9963	4320	1237	2467	3036
14	448	.	53	.	235	.	213	.	1195	.	429	451
15	384	192	672	117	555	277	3456	373	288	160	647	1002
16	789	.	139	.	4661	.	459	.	1483	.	1506	1833
17	747	587	245	192	693	533	672	1664	2688	672	869	753
18	181	117	21	21	256	651	1685	341	448	117	384	498
19	2304	.	437	.	4491	.	2421	.	2165	.	2364	1439
20	341	128	43	64	43	43	725	651	544	85	267	276
21	117	.	107	.	171	.	2656	.	544	.	719	1098
22	533	181	203	160	331	1323	843	533	715	181	500	377
23	533	.	117	.	1899	.	213	.	1653	.	883	834
24	352	.	395	.	576	.	331	.	928	.	516	250
25	576	672	1099	1813	1429	1856	352	416	2645	651	1151	763
26	1269	565	1003	2283	4256	1717	1824	715	3435	800	1787	1228
27	1131	1461	1013	3232	789	437	2709	6635	3637	1088	2213	1900
28	949	.	896	.	139	.	1536	.	10261	.	2756	4225
29	2272	501	3221	1792	15627	1077	1077	864	1888	192	2851	4577
30	1184	224	1824	1973	1408	1344	4469	3989	10549	3392	3036	2963
31	768	2197	597	256	608	192	587	10059	2752	533	1855	3004
32	3509	.	1163	.	1952	.	1995	.	7424	.	3209	2505
33	768	1333	1003	320	469	1600	1813	2005	3573	523	1341	979
34	373	.	1856	.	2037	.	418	.	8235	.	2590	3248
35	448	1547	1003	1995	7264	6251	2720	1696	4352	3563	3084	2266
36	768	.	544	.	5856	.	3776	.	619	.	2313	2402
37	683	768	363	1493	1056	1963	1589	704	1707	928	1125	529
38	2816	.	811	.	320	.	1045	.	4939	.	1986	1901
39	1259	.	1813	.	896	.	1408	.	1109	.	1297	345
40	640	.	672	.	1088	.	2368	.	533	.	1060	761
MEANS	1382	1779	850	929	2205	1131	2045	2421	3053	811		
STD DEV	1718	5134	1304	1004	3520	1373	2425	3075	3665	982		

Table 6.2-21 BENTHIC CORE SPECIES RICHNESS BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	36	.	33	.	32	.	48	.	28	.	35	8
2	67	.	40	.	81	.	71	.	71	.	66	15
3	83	.	92	.	123	.	130	.	125	.	111	21
4	33	41	23	23	19	31	44	41	39	26	32	9
5	28	28	18	16	26	19	45	21	45	33	28	10
6	57	.	23	.	31	.	38	.	70	.	44	19
7	54	57	37	54	68	67	61	63	59	41	56	10
8	29	.	25	.	36	.	40	.	39	.	34	7
9	75	81	76	39	49	50	68	48	100	110	70	24
10	72	.	64	.	88	.	73	.	102	.	80	15
11	90	.	74	.	147	.	156	.	128	.	119	36
12	102	64	82	127	135	109	134	167	143	101	116	31
13	71	35	41	43	52	60	79	73	49	69	57	15
14	60	.	22	.	38	.	48	.	81	.	50	22
15	77	36	55	52	70	54	88	61	57	36	59	16
16	74	.	64	.	144	.	98	.	101	.	96	31
17	58	36	20	24	34	33	55	44	70	45	42	16
18	43	31	13	24	45	31	58	52	60	42	40	15
19	50	.	29	.	59	.	72	.	77	.	57	19
20	46	33	23	39	40	46	65	71	63	53	48	15
21	44	.	35	.	48	.	82	.	79	.	58	21
22	80	54	60	61	83	95	97	85	92	77	78	15
23	87	.	51	.	108	.	79	.	122	.	89	27
24	75	.	76	.	81	.	90	.	112	.	87	15
25	97	79	122	109	116	116	101	119	167	101	113	23
26	114	84	118	113	180	121	145	131	157	101	129	28
27	78	63	61	69	62	71	78	85	91	81	74	10
28	70	.	63	.	41	.	104	.	119	.	79	32
29	57	46	75	102	78	99	91	81	84	52	77	19
30	96	50	116	128	123	112	124	132	154	129	116	28
31	65	102	68	85	89	64	79	99	101	71	82	15
32	124	.	93	.	105	.	115	.	126	.	113	14
33	81	117	97	80	88	120	139	127	131	74	105	24
34	110	.	114	.	130	.	114	.	169	.	127	24
35	103	104	103	123	148	145	145	160	169	174	138	27
36	71	.	77	.	179	.	170	.	79	.	115	54
37	109	105	59	133	96	134	132	121	120	96	111	23
38	55	.	67	.	49	.	58	.	69	.	60	8
39	95	.	120	.	95	.	126	.	105	.	108	14
40	87	.	85	.	102	.	126	.	87	.	97	17
MEANS	73	62	63	74	83	79	92	89	96	76		
STD DEV	24	28	32	42	43	39	36	41	38	37		

Table 6.2-22 Species richness comparisons between thermal and control stations ('t' test; 95% confidence level).

THERMAL STATIONS	CONTROL STATIONS																
	1	2	3	6	7	8	12	25	26	31	32	33	35	36	38	39	40
4	--																
5	--																
13				--						o		o					
14				--	--							o				o	
17				--						o		o					
18				--						o		o					
19													o				
20				--						o		o					
21						X											o
22		X													--		
27				X	X							o				o	
28		X													--		
29													o				
30		X	--				--	--	--		--			--			

Key: X = Thermal station significantly higher (95% level of certainty).

o = Thermal station significantly lower.

-- = No significant difference.

Table 6.2-23 BENTHIC CORE POLYCHAETA RICHNESS BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	13	.	12	.	13	.	21	.	13	.	14	4
2	25	.	25	.	44	.	28	.	35	.	31	8
3	40	.	42	.	60	.	71	.	60	.	55	13
4	15	21	12	16	12	18	19	21	16	13	16	3
5	14	15	9	13	15	12	24	13	26	17	16	5
6	21	.	12	.	19	.	18	.	25	.	19	5
7	23	25	18	33	37	37	34	42	25	18	29	8
8	18	.	15	.	18	.	20	.	22	.	19	3
9	36	52	38	22	27	29	32	29	53	54	37	12
10	30	.	32	.	46	.	40	.	43	.	38	7
11	43	.	39	.	74	.	83	.	65	.	61	19
12	39	35	37	55	56	51	64	83	65	39	52	15
13	32	20	27	21	32	34	50	37	25	39	32	9
14	29	.	11	.	21	.	29	.	40	.	26	11
15	42	24	28	25	42	31	43	36	31	15	32	9
16	29	.	30	.	72	.	53	.	61	.	49	19
17	29	25	13	15	23	24	35	26	36	30	26	8
18	21	18	10	17	29	22	37	29	29	18	23	8
19	25	.	17	.	40	.	49	.	43	.	35	13
20	30	22	12	24	29	31	40	42	34	32	30	9
21	31	.	23	.	29	.	37	.	38	.	32	6
22	38	40	35	34	54	52	55	49	52	39	45	8
23	40	.	27	.	52	.	47	.	65	.	46	14
24	34	.	37	.	45	.	49	.	58	.	45	10
25	48	46	64	65	55	54	61	69	87	60	61	12
26	46	52	54	61	83	55	66	66	78	45	61	13
27	33	32	25	26	31	37	36	30	37	38	33	5
28	39	.	35	.	27	.	55	.	62	.	44	14
29	29	28	43	57	51	67	53	47	43	32	45	13
30	52	29	63	48	62	57	64	63	69	52	56	12
31	35	45	27	51	47	34	40	34	44	32	39	8
32	55	.	41	.	46	.	53	.	49	.	49	6
33	40	64	48	38	44	54	71	59	61	40	52	12
34	58	.	53	.	63	.	60	.	78	.	62	9
35	54	49	58	64	67	68	66	83	80	77	67	11
36	30	.	37	.	71	.	87	.	38	.	53	25
37	55	60	28	65	57	54	69	75	59	53	58	13
38	23	.	31	.	25	.	23	.	34	.	27	5
39	49	.	53	.	46	.	62	.	46	.	51	7
40	47	.	42	.	48	.	63	.	45	.	49	5
MEANS	35	35	32	38	43	41	48	47	47	37		
STD DEV	12	15	15	19	18	16	18	21	19	17		

Table 6.2-24 BENTHIC CORE MOLLUSCA RICHNESS BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	11	.	9	.	8	.	13	.	7	.	10	2
2	16	.	7	.	19	.	20	.	14	.	15	5
3	24	.	26	.	30	.	29	.	33	.	28	4
4	5	4	4	1	3	5	9	10	8	4	5	3
5	7	4	3	2	3	4	7	5	7	6	5	2
6	16	.	3	.	5	.	8	.	18	.	10	7
7	15	14	5	9	12	19	11	8	15	13	12	4
8	5	.	3	.	6	.	13	.	6	.	7	4
9	21	15	18	9	9	13	18	11	21	30	17	7
10	25	.	17	.	22	.	16	.	29	.	22	5
11	27	.	16	.	31	.	27	.	24	.	25	6
12	28	14	22	37	29	22	28	41	30	30	28	8
13	16	6	9	9	5	11	12	17	10	16	11	4
14	14	.	5	.	8	.	7	.	20	.	11	6
15	21	5	13	14	10	12	16	13	8	9	12	4
16	25	.	20	.	33	.	19	.	21	.	24	6
17	11	4	4	3	4	4	7	6	13	8	6	3
18	8	5	1	4	9	4	8	7	16	14	8	5
19	6	.	5	.	7	.	10	.	10	.	8	2
20	8	4	5	7	7	9	10	11	16	11	9	3
21	5	.	6	.	9	.	19	.	18	.	11	7
22	22	7	12	14	15	19	16	15	20	16	16	4
23	24	.	14	.	25	.	14	.	24	.	20	6
24	25	.	16	.	20	.	21	.	26	.	22	4
25	24	14	22	17	24	23	22	29	33	14	22	6
26	31	10	29	33	38	22	30	32	28	25	28	8
27	18	11	14	17	13	14	16	22	21	22	17	4
28	13	.	14	.	5	.	22	.	18	.	14	6
29	13	6	9	14	10	14	15	13	20	12	13	4
30	20	11	27	40	31	26	26	30	40	27	28	9
31	14	25	22	18	24	19	21	25	28	17	21	4
32	31	.	29	.	28	.	27	.	41	.	31	6
33	16	23	22	20	16	32	26	35	34	16	24	7
34	26	.	25	.	35	.	30	.	44	.	32	8
35	25	23	26	24	35	35	31	33	36	36	30	5
36	25	.	17	.	56	.	35	.	18	.	30	16
37	22	18	13	30	13	44	29	23	26	17	24	9
38	17	.	21	.	11	.	17	.	15	.	16	4
39	20	.	37	.	26	.	31	.	28	.	28	6
40	23	.	20	.	25	.	25	.	17	.	22	3
MEANS	18	11	15	16	18	18	19	19	22	17		
STD DEV	8	7	9	12	12	11	8	11	10	9		

Table 6.2-25 BENTHIC CORE CRUSTACEA RICHNESS BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	10	.	11	.	10	.	14	.	8	.	11	2
2	22	.	7	.	13	.	19	.	17	.	16	6
3	16	.	20	.	29	.	24	.	29	.	24	6
4	12	14	6	6	4	8	16	10	11	7	9	4
5	7	8	6	1	7	3	13	2	10	8	7	4
6	18	.	6	.	7	.	11	.	24	.	13	8
7	12	13	11	8	16	8	13	10	15	5	11	3
8	4	.	5	.	8	.	5	.	7	.	6	2
9	16	11	14	5	4	5	11	5	18	21	11	6
10	10	.	9	.	14	.	12	.	21	.	13	5
11	13	.	12	.	34	.	38	.	34	.	26	13
12	27	12	17	27	42	28	31	33	37	27	28	9
13	22	8	4	12	13	14	16	18	14	13	13	5
14	15	.	4	.	8	.	8	.	18	.	11	6
15	12	5	14	9	15	7	26	6	12	10	12	6
16	18	.	11	.	30	.	17	.	13	.	18	7
17	16	7	3	6	7	4	11	10	19	6	9	5
18	11	7	2	2	5	3	11	14	13	8	8	5
19	18	.	7	.	10	.	12	.	23	.	14	6
20	6	7	4	6	2	4	9	14	9	7	7	3
21	6	.	5	.	7	.	22	.	18	.	12	8
22	15	7	7	8	10	21	22	14	13	13	13	5
23	19	.	7	.	24	.	12	.	27	.	18	8
24	11	.	16	.	13	.	13	.	23	.	15	5
25	17	12	31	18	28	29	13	18	34	20	22	8
26	32	19	27	38	48	38	39	26	40	24	33	9
27	23	18	20	23	14	14	22	28	26	16	20	5
28	15	.	13	.	6	.	21	.	34	.	18	11
29	12	11	19	24	14	13	20	19	20	6	16	5
30	22	8	21	31	21	27	28	30	37	45	27	10
31	9	27	18	11	16	9	12	36	26	15	18	9
32	33	.	21	.	28	.	29	.	33	.	29	5
33	17	24	21	18	21	28	34	26	31	15	24	6
34	18	.	32	.	24	.	16	.	42	.	26	11
35	18	29	19	27	40	34	36	34	47	52	34	11
36	13	.	19	.	45	.	35	.	17	.	26	14
37	22	23	14	28	21	30	29	16	30	19	23	6
38	14	.	12	.	11	.	15	.	20	.	14	4
39	21	.	26	.	19	.	23	.	27	.	23	3
40	13	.	15	.	23	.	27	.	19	.	19	6
MEANS	16	14	13	15	18	16	20	18	23	17		
STD DEV	6	7	8	11	12	12	9	10	10	13		

Table 6.2-26 BENTHIC CORE SHANNON INDEX BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	2.1167	.	1.1917	.	0.8181	.	1.9343	.	2.3835	.	1.6889	0.6579
2	2.6381	.	2.4542	.	3.3648	.	3.4679	.	3.2763	.	3.0403	0.4607
3	2.8281	.	3.3462	.	3.3637	.	3.4872	.	3.6275	.	3.3305	0.3027
4	1.7580	1.0867	1.7500	1.4600	1.7504	2.1684	2.0314	2.4935	1.2545	2.1647	1.7918	0.4386
5	2.1243	2.0240	1.3759	1.5522	2.2082	1.7352	2.0038	2.0771	2.5872	2.6772	2.0365	0.4104
6	2.7203	.	1.9802	.	2.0737	.	1.5741	.	3.0286	.	2.2754	0.5884
7	3.2475	2.9446	2.4215	3.2805	2.8259	2.3340	2.8687	3.1288	3.2583	2.8827	2.9203	0.3346
8	2.6881	.	1.3015	.	2.2992	.	1.9456	.	2.7518	.	2.1972	0.5968
9	3.5291	3.1633	3.3151	3.1894	2.5800	2.4003	2.6113	2.2466	3.6563	3.7869	3.0478	0.5501
10	2.7856	.	2.7937	.	2.8473	.	2.9545	.	3.7163	.	3.0195	0.3953
11	3.7598	.	3.6037	.	3.7809	.	3.3858	.	3.8171	.	3.6694	0.1783
12	3.8381	3.5378	3.6083	3.5313	3.9314	3.8667	3.5968	3.7337	3.5383	2.6971	3.5883	0.3467
13	3.0426	2.7745	2.4119	3.0829	3.1177	2.6813	3.1657	2.4632	2.5144	3.0387	2.8293	0.2948
14	2.7035	.	2.3129	.	2.4865	.	2.2243	.	2.7632	.	2.4981	0.2355
15	3.6684	2.6316	2.2081	2.7994	2.5499	1.9543	2.4826	2.8768	3.2376	2.6026	2.7011	0.4888
16	3.7309	.	3.1976	.	3.6608	.	3.5112	.	3.7786	.	3.5758	0.2343
17	2.5616	1.7293	1.7387	2.0222	2.6048	1.7429	2.1896	1.9708	2.6669	2.4636	2.1690	0.3801
18	2.6678	2.5017	1.1560	1.8203	2.3879	1.4466	2.5896	2.5484	3.3332	2.8395	2.3291	0.6622
19	2.6334	.	2.1611	.	2.8584	.	3.1995	.	2.7203	.	2.7145	0.3771
20	2.2281	2.0518	1.2269	2.0797	2.5946	2.5823	2.6692	2.9761	2.5447	2.2838	2.3237	C.4809
21	2.2325	.	1.4280	.	2.4540	.	2.8943	.	2.7849	.	2.3587	0.5831
22	3.6235	2.8410	2.8396	3.1994	3.1594	3.4643	3.4095	3.4959	3.1724	3.3429	3.2548	0.2650
23	3.5974	.	2.7520	.	2.8672	.	3.0954	.	3.4451	.	3.1514	0.3635
24	3.9419	.	3.7930	.	3.5319	.	3.4830	.	3.5747	.	3.6649	0.1949
25	3.3313	3.2588	3.6494	3.9080	3.6384	3.9771	3.7731	3.6498	4.1563	3.3753	3.6717	0.2926
26	3.7922	3.6956	3.7636	4.0392	3.8551	4.0280	3.4761	3.7446	3.8032	3.8905	3.8088	0.1633
27	3.0516	3.2138	2.9844	3.1755	2.8990	2.8128	3.2589	3.2890	3.2916	2.7727	3.0749	0.1988
28	3.1854	.	2.7169	.	2.9229	.	3.3660	.	1.9408	.	2.8264	0.5535
29	1.6356	2.5310	2.0223	2.3531	2.7904	3.4138	3.2840	3.0860	2.2869	2.9214	2.6324	0.5699
30	3.7223	3.2915	3.4474	3.2414	3.0317	2.9647	2.7767	3.1925	2.6137	3.7326	3.2014	0.3703
31	3.5742	3.8429	3.2023	3.0192	3.7524	3.0078	3.0820	3.5395	3.7146	3.2299	3.3965	0.3226
32	3.7326	.	3.9488	.	3.8381	.	3.7769	.	3.7010	.	3.7995	0.0981
33	3.7647	3.9503	3.8664	3.7209	3.6954	3.4799	3.2003	3.7088	3.9326	3.5350	3.6854	0.2291
34	3.8962	.	2.9350	.	3.2430	.	3.4956	.	4.0496	.	3.5239	0.4587
35	3.3420	3.8287	3.7535	3.3561	2.9745	2.5067	1.8817	2.2108	3.6639	4.4445	3.1962	0.7998
36	3.7029	.	3.3231	.	3.5276	.	3.1715	.	3.6147	.	3.4680	0.2175
37	3.8539	4.0192	3.7334	3.7007	3.8330	3.9592	3.7589	3.8636	3.8063	3.9065	3.8435	0.1000
38	2.4385	.	3.3500	.	2.6105	.	2.9548	.	2.8593	.	2.8426	0.3491
39	3.7739	.	3.6399	.	3.9102	.	3.9376	.	4.0446	.	3.8612	0.1569
40	3.5333	.	3.5271	.	3.1565	.	3.5519	.	3.2540	.	3.4046	0.1854
MEANS	3.1249	2.9459	2.7558	2.9267	2.9949	2.8253	2.9880	3.0148	3.2044	3.1294		
STD DEV	0.6553	0.7976	0.8786	0.7811	0.6701	0.8090	0.6199	0.6201	0.6398	0.6100		

Table 6.2-27 BENTHIC CORE FAUNAL EQUITABILITY BY DATE AND STATION

STATION	JUNE 1983	JULY 1983	SEPTEMBER 1983	OCTOBER 1983	NOVEMBER 1983	JANUARY 1984	FEBRUARY 1984	APRIL 1984	JUNE 1984	JULY 1984	MEAN	STANDARD DEVIATION
1	0.5907	.	0.3408	.	0.2361	.	0.4997	.	0.7153	.	0.4765	0.1916
2	0.6274	.	0.6653	.	0.7057	.	0.8135	.	0.7686	.	0.7281	0.0782
3	0.6400	.	0.7400	.	0.6990	.	0.7164	.	0.7513	.	0.7093	0.0438
4	0.5028	0.2926	0.5581	0.4656	0.5945	0.6315	0.5368	0.6715	0.3424	0.6644	0.5260	0.1289
5	0.6375	0.6074	0.4760	0.5598	0.6778	0.5893	0.5264	0.6822	0.6797	0.7657	0.6202	0.0860
6	0.6728	.	0.6315	.	0.6039	.	0.4327	.	0.7129	.	0.6108	0.1078
7	0.8141	0.7283	0.6706	0.8224	0.6697	0.5551	0.6978	0.7552	0.8015	0.7763	0.7291	0.0832
8	0.7983	.	0.4043	.	0.6416	.	0.5274	.	0.7511	.	0.6246	0.1616
9	0.8174	0.7198	0.7655	0.8706	0.6629	0.6136	0.6189	0.5803	0.7939	0.8056	0.7249	0.1006
10	0.6514	.	0.6717	.	0.6359	.	0.6886	.	0.8035	.	0.6902	0.0664
11	0.8355	.	0.8373	.	0.7576	.	0.6705	.	0.7867	.	0.7775	0.0687
12	0.8299	0.8507	0.8188	0.7296	0.8015	0.8242	0.7344	0.7295	0.7130	0.5844	0.7616	0.0802
13	0.7138	0.7804	0.6495	0.8197	0.7890	0.6549	0.7245	0.5741	0.6461	0.7177	0.7070	0.0765
14	0.6603	.	0.7483	.	0.6836	.	0.5746	.	0.6238	.	0.6591	0.0644
15	0.8445	0.7344	0.5510	0.7085	0.6002	0.4899	0.5545	0.6998	0.8008	0.7263	0.6710	0.1164
16	0.8668	.	0.7689	.	0.7366	.	0.7658	.	0.8187	.	0.7914	0.0515
17	0.6309	0.4826	0.5804	0.6363	0.7387	0.4985	0.5464	0.5208	0.6277	0.6472	0.5909	0.0798
18	0.7093	0.7285	0.4507	0.5728	0.6273	0.4213	0.6378	0.6450	0.8141	0.7597	0.6366	0.1272
19	0.6731	.	0.6418	.	0.7010	.	0.7481	.	0.6262	.	0.6781	0.0486
20	0.5820	0.5868	0.3913	0.5677	0.7034	0.6745	0.6394	0.6982	0.6142	0.5752	0.6033	0.0902
21	0.5899	.	0.4016	.	0.6339	.	0.6568	.	0.6374	.	0.5839	0.1048
22	0.8269	0.7122	0.6936	0.7783	0.7150	0.7607	0.7453	0.7869	0.7016	0.7696	0.7490	0.0432
23	0.8055	.	0.6999	.	0.6124	.	0.7084	.	0.7171	.	0.7087	0.0686
24	0.9130	.	0.8758	.	0.8037	.	0.7740	.	0.7576	.	0.8248	0.0669
25	0.7282	0.7458	0.7597	0.8330	0.7654	0.8366	0.8175	0.7637	0.8121	0.7313	0.7793	0.0416
26	0.8007	0.8341	0.7889	0.8139	0.7421	0.8399	0.6985	0.7681	0.7522	0.8430	0.7882	0.0477
27	0.7004	0.7757	0.7176	0.7500	0.7024	0.6599	0.7480	0.7403	0.7297	0.6310	0.7155	0.0439
28	0.7498	.	0.6558	.	0.7871	.	0.7248	.	0.4061	.	0.6647	0.1523
29	0.4045	0.6611	0.4684	0.5088	0.6405	0.7429	0.7280	0.7023	0.5161	0.7394	0.6112	0.1255
30	0.8155	0.8414	0.7252	0.6680	0.6300	0.6283	0.5760	0.6538	0.5189	0.7680	0.6825	0.1038
31	0.8562	0.8309	0.7589	0.6796	0.8360	0.7232	0.7054	0.7703	0.8049	0.7577	0.7723	0.0591
32	0.7744	.	0.8712	.	0.8247	.	0.7960	.	0.7653	.	0.8063	0.0429
33	0.8567	0.8295	0.8452	0.8491	0.8253	0.7269	0.6486	0.7656	0.8067	0.8213	0.7975	0.0659
34	0.8289	.	0.6197	.	0.6662	.	0.7381	.	0.7894	.	0.7285	0.0860
35	0.7211	0.8244	0.8001	0.6974	0.5952	0.5037	0.3781	0.4356	0.7142	0.8615	0.6531	0.1678
36	0.8687	.	0.7650	.	0.6800	.	0.6175	.	0.8273	.	0.7517	0.1033
37	0.8215	0.8636	0.9156	0.7567	0.8398	0.8084	0.7698	0.8056	0.7950	0.8559	0.8232	0.0473
38	0.6085	.	0.7967	.	0.6708	.	0.7277	.	0.6753	.	0.6958	0.0705
39	0.8287	.	0.7603	.	0.8586	.	0.8142	.	0.8691	.	0.8262	0.0430
40	0.7912	.	0.7939	.	0.6825	.	0.7344	.	0.7286	.	0.7461	0.0469
MEANS	0.7347	0.7215	0.6769	0.7044	0.6959	0.6592	0.6690	0.6874	0.7130	0.7401		
STD DEV	0.1140	0.1417	0.1476	0.1201	0.1065	0.1245	0.1066	0.0967	0.1132	0.0835		

Table 6.2-28 Log normal plot angles.

Station	June 1983	Sept. 1983	Nov. 1983	Feb. 1984	June 1984	Mean $\bar{x}$	S.D.
1	33	33	43	31	35	35	4.690
2	44	37	35	37	43	39	4.025
3	46	39	33	32	52	40.4	8.561
4	30	32	26	32	24	28.8	3.633
5	30	20	27	25	25	25.4	3.647
6	30	27	24	20	37	27.6	6.427
7	37	25	29	29	30	30	4.359
8	38	39	35	39	29	36	4.243
9	39	37	38	38	42	38.8	1.923
10	44	39	32	41	41	39.4	4.506
11	48	45	46	43	40	44.4	3.050
12	46	45	38	34	43	41.2	5.070
13	37	27	36	32	24	31.2	5.630
14	43	37	51	29	35	39	8.367
15	46	46	34	39	43	41.6	5.128
16	49	35	37	40	43	40.8	5.495
17	28	21	33	32	35	29.8	5.541
18	36	33	30	32	35	33.2	2.387
19	30	30	33	28	27	29.6	2.302
20	31	24	23	25	31	26.8	3.900
21	31	29	26	23	35	28.8	4.604
22	38	35	33	40	40	37.2	3.114
23	45	32	29	35	32	34.6	6.189
24	57	54	49	43	36	47.8	8.468
25	49	49	47	39	41	45	4.690
26	46	46	43	38	42	43	3.317
27	45	42	32	31	30	36	6.964
28	40	39	38	33	32	36.4	3.650
29	39	32	23	35	39	27.6	1.424
30	37	37	34	35	36	35.8	1.304
31	47	38	42	35	39	40.2	4.550
32	33	46	40	46	40	41	5.385
33	49	47	49	31	37	42.6	8.173
34	45	46	35	40	32	39.6	6.107
35	49	48	37	39	40	42.6	5.505
36	50	50	36	37	43	43.2	6.760
37	47	52	45	45	50	47.8	3.114
38	39	38	34	48	35	38.8	5.541
39	49	35	47	40	42	42.6	5.595
40	39	47	38	39	42	41	3.674

Table 6.2-29 Mean faunal similarity (Morisita's Index) for each station.

Station	Mean of 10 Periods	Station	Mean of 5 Periods
4	.38	1	.52
5	.61	2	.37
7	.61	3	.37
9	.33	6	.55
12	.29	8	.62
13	.50	10	.45
15	.54	11	.19
17	.66	14	.41
18	.48	16	.37
20	.54	19	.32
22	.55	21	.58
25	.57	23	.26
26	.40	24	.43
27	.42	28	.36
29	.19	32	.40
30	.56	34	.46
31	.40	36	.25
33	.52	38	.27
35	.40	39	.52
37	.47	40	.66

Table 6.2-30 Linear regression (R^2 values) for Fauna1 Density as the dependent variable (Y).

Independent Variable (X)	June 1983	July 1983	Sept. 1983	Oct. 1983	Nov. 1983	Jan. 1984	Feb. 1984	Apr. 1984	June 1984	July 1984
Synoptic Temperature	.0225	.0004	.0254	.0025	.0019	.0071	.0170	.0459	.0019	.0361
Thermographs	.0043	.0925	.0238	.0563	.0123	.0081	.0162	.0162	.0003	.0177
Sediment Temperature	.0002	.0461	.0005	.0329	.0082	.0272	.0331	.3440	.0100	.0067
Salinity	.0164	.1247	.0065	.1894	.1308	.1004	.0972	.0963	.0141	.0897
Turbidity	.0070	.0575	.0190	.0455	.0471	.0980	.0608	.1134	.0690	.0916
Total Suspended Solids	.0351	.0200	.0041	.0437	.0464	.0491	.0007	.0260	.0004	.0003
Mean Grain Size	.2939		.2884		.5548		.2946		.0723	
Median Grain Size	.3658		.2898		.5525		.2669		.0368	
Sorting Coefficient	.0066		.0622		.0918		.1186		.1498	
Silt-Clay	.0604		.0252		.2300		.1064		.0146	
Total Organic Carbon	.0082		.0168		.0821		.0459		.0026	
Sulfide	.0092		.0377		.0502		.0768		.0086	
Eh	.0000	.0040	.0631	.0809	.3067	.0530	.2464	.0598	.1252	.0000

Table 6.2-31 Linear regressions (R^2 values) for Species Richness as the dependent variable (Y).

Independent Variable (X)	June 1983	July 1983	Sept. 1983	Oct. 1983	Nov. 1983	Jan. 1984	Feb. 1984	Apr. 1984	June 1984	July 1984	Means
Synoptic Temperature	.0084	.5101	.3754	.3516	.2389	.2807	.3772	.2289	.2496	.2727	.3394
Thermographs	.0026	.3405	.1503	.3149	.2016	.3843	.2598	.3337	.1809	.2240	.2935
Sediment Temperature	.1950	.4559	.2377	.4751	.2547	.4113	.2199	.2858	.2589	.2656	.3110
Salinity	.3219	.1514	.2249	.5533	.3711	.4402	.3931	.6082	.3657	.4090	.0998
Turbidity	.2057	.0026	.2947	.1596	.1296	.2762	.1828	.0277	.0534	.1216	.3150
Total Suspended Solids	.0817	.0616	.1706	.0848	.2012	.1001	.0572	.0226	.0120	.0922	.1385
Mean Grain Size	.2086		.1569		.2792		.2805		.2456		.2636
Median Grain Size	.1592		.0766		.1581		.2115		.2057		.1805
Sorting Coefficient	.1895		.1597		.0761		.0708		.1341		.0846
Silt-Clay	.1926		.1611		.3272		.2293		.2217		.3361
Total Organic Carbon	.2019		.1761		.1496		.1602		.1566		.3157
Sulfide	.0586		.0520		.0823		.1662		.0124		.1559
Eh	.2140	.4024	.0228	.5039	.5704	.0213	.3366	.3974	.3225	.2153	.5179

Table 6.2-32 Linear regressions (R^2 values) for Species Diversity (Shannon's Index) as the dependent variable (Y).

Independent Variable (X)	June 1983	July 1983	Sept. 1983	Oct. 1983	Nov. 1983	Jan. 1984	Feb. 1984	Apr. 1984	June 1984	July 1984
Synoptic Temperature	.0184	.3985	.4315	.4715	.1613	.2643	.1977	.2579	.3512	.2983
Thermographs	.0040	.1151	.1986	.2494	.1401	.4115	.0879	.2647	.1653	.3274
Sediment Temperature	.1851	.2749	.2039	.5266	.1715	.3368	.0494	.2011	.4361	.2817
Salinity	.3201	.3526	.2420	.3567	.4327	.3471	.2156	.2488	.1943	.3053
Turbidity	.1174	.0036	.3004	.1119	.1571	.2152	.2173	.0354	.0373	.0772
Total Suspended Solids	.0093	.0162	.2547	.2034	.2500	.0898	.1302	.0062	.0002	.1758
Mean Grain Size	.0138		.0785		.1191		.0711		.0513	
Median Grain Size	.0025		.0286		.0561		.0451		.0396	
Sorting Coefficient	.0722		.0671		.0270		.0160		.0124	
Silt-Clay	.0799		.2412		.2268		.1653		.1141	
Total Organic Carbon	.1389		.2380		.1786		.1654		.0837	
Sulfide	.0387		.0216		.0273		.0873		.0061	
Eh	.1696	.5337	.0258	.3436	.4145	.0017	.1835	.3030	.0703	.1578

FIGURE 6.2-1.

AREA THAT EXCEEDS 32°C.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

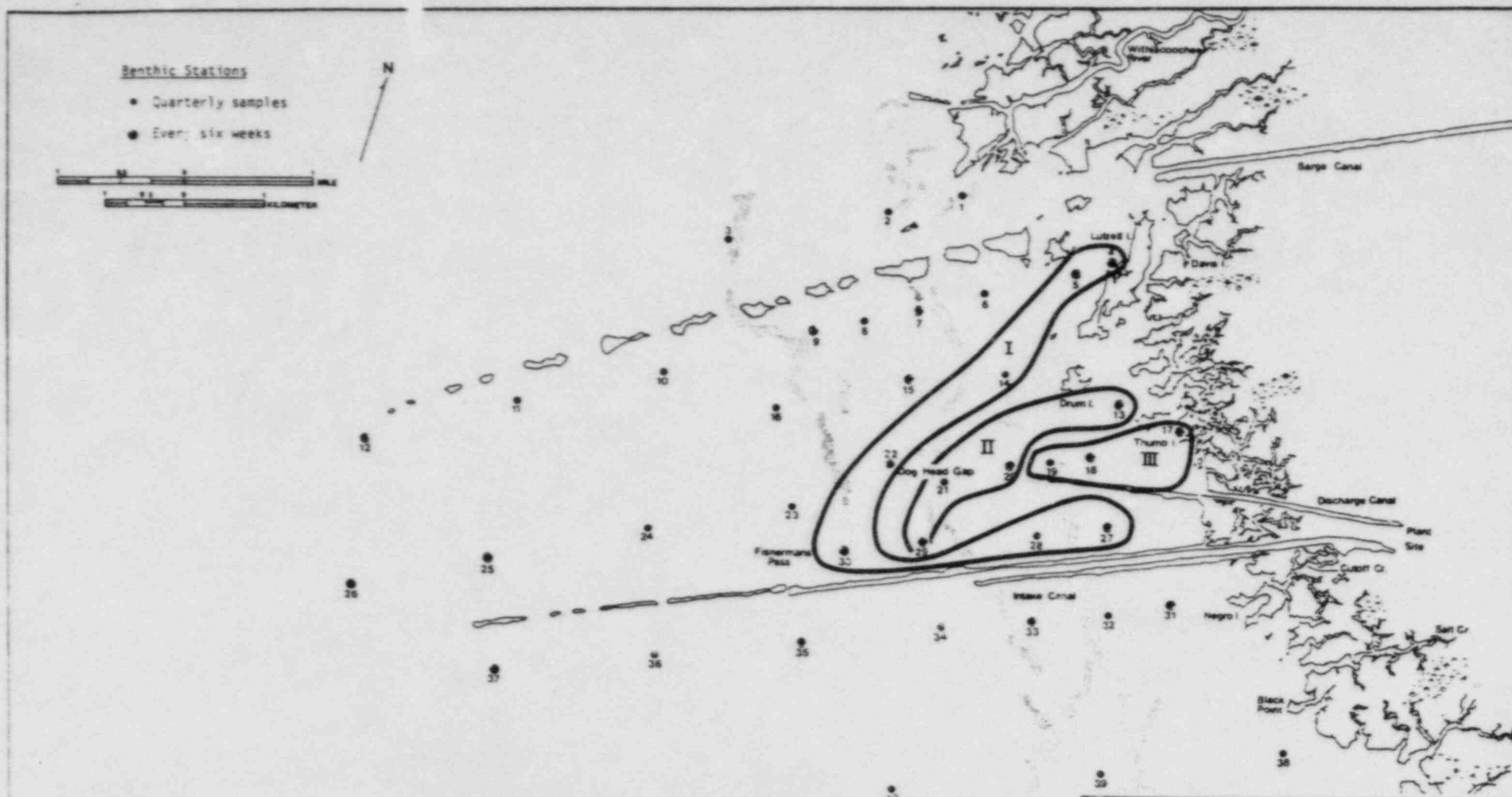

FIGURE 6.2-2.

THERMAL ZONES.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

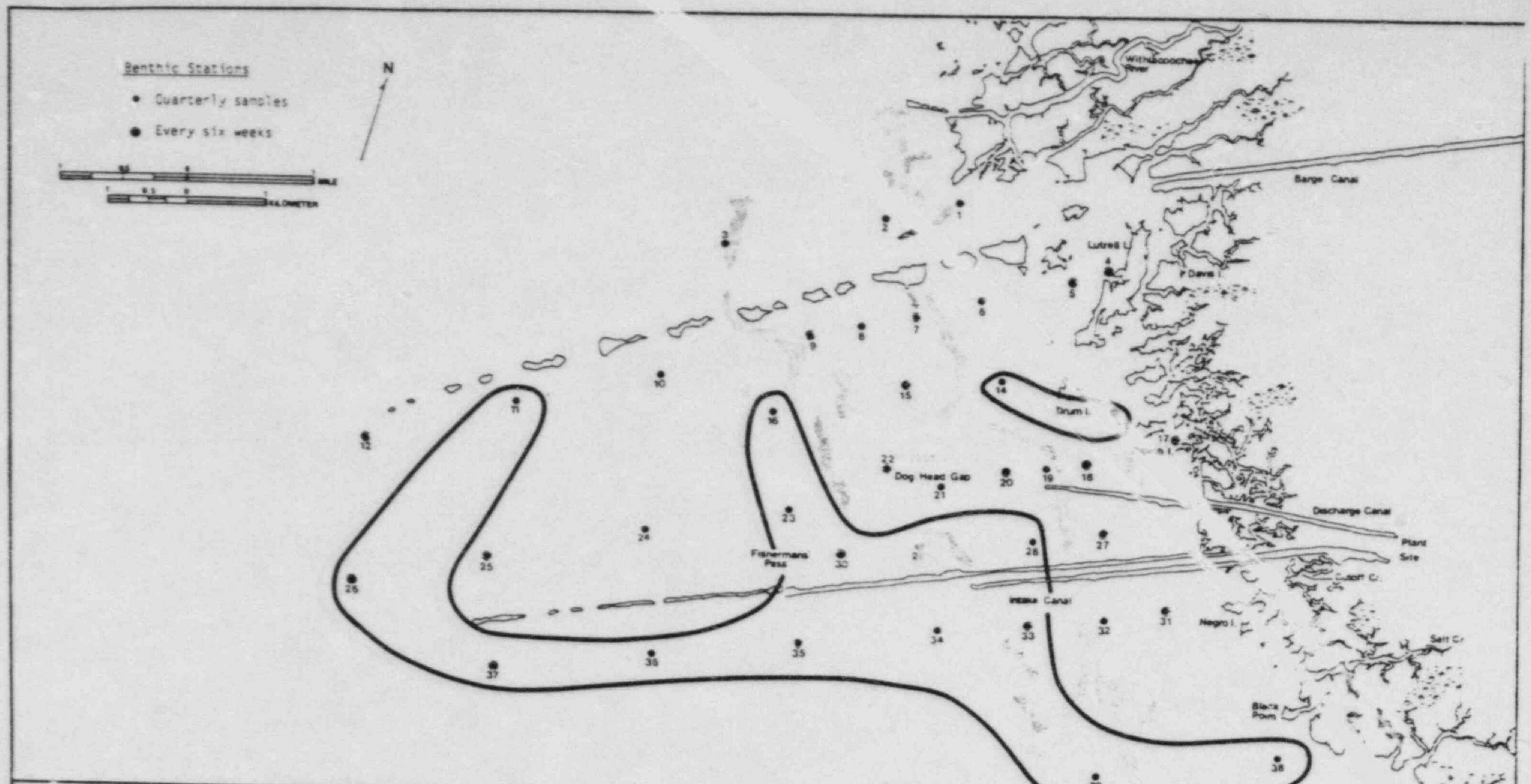

FIGURE 6.2-3.

ABUNDANCE DISTRIBUTION OF
FABRICIA SP.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

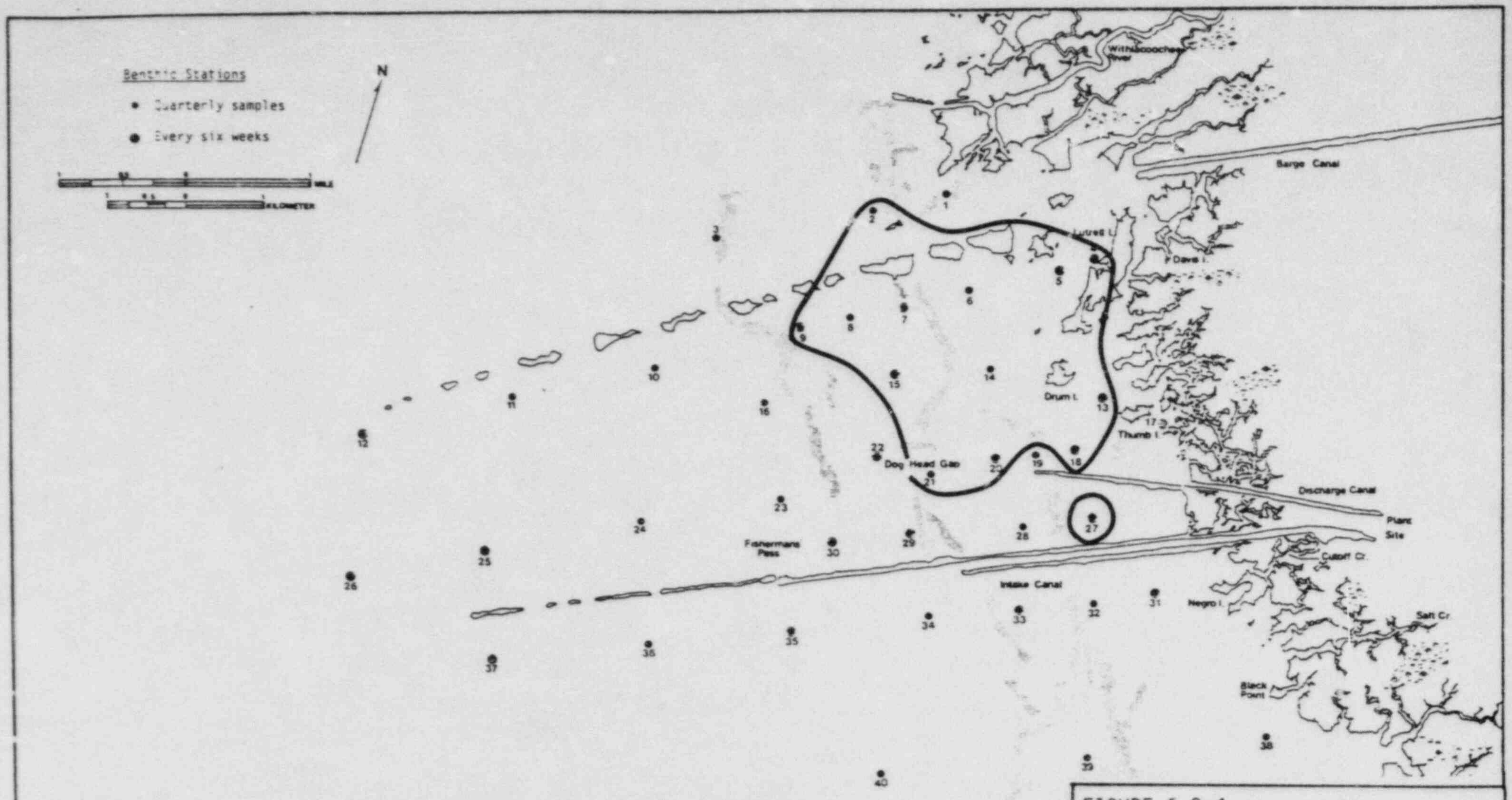

FIGURE 6.2-4.

ABUNDANCE DISTRIBUTION OF STREBLOSPIO BENEDICTI.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

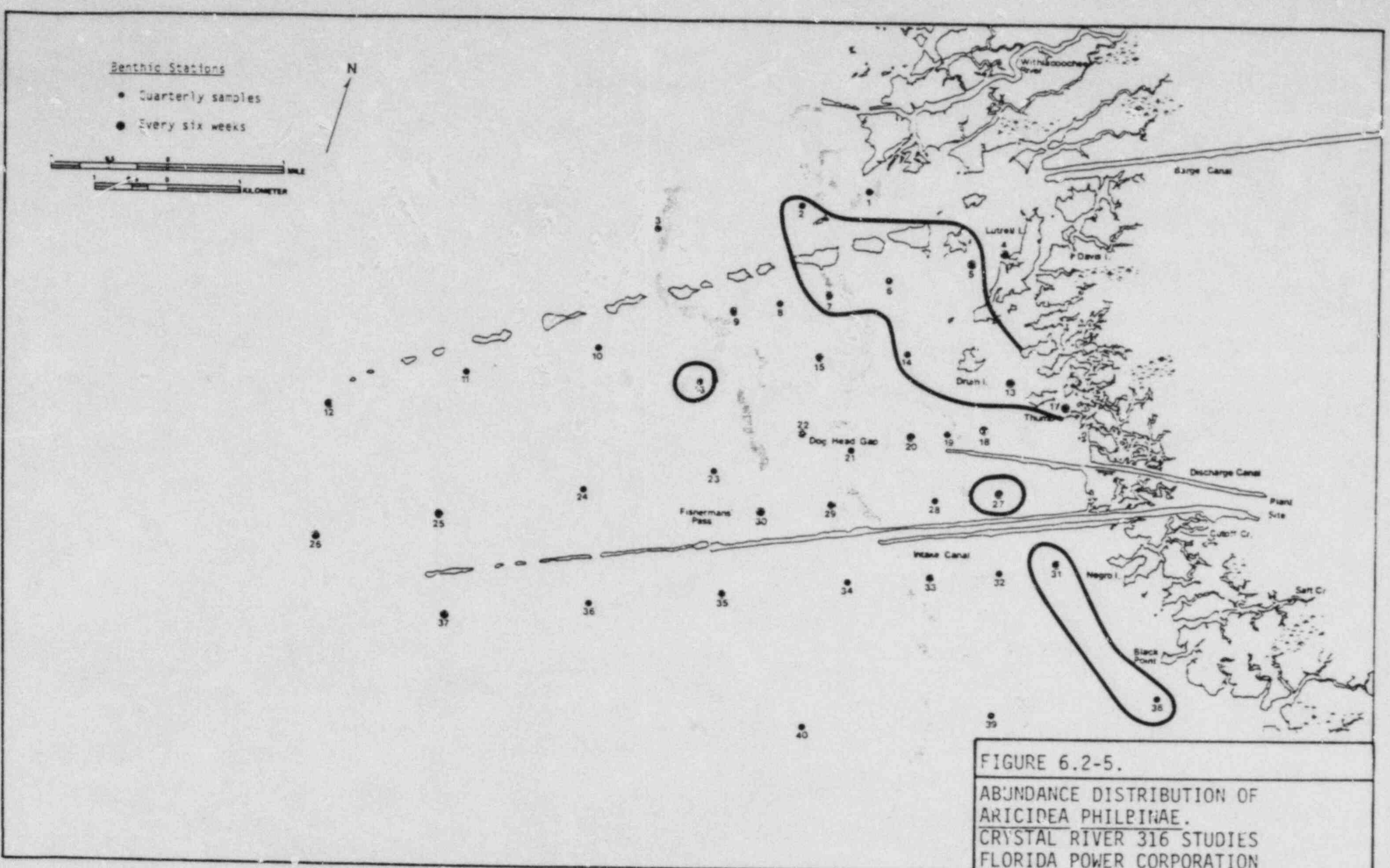

FIGURE 6.2-5.

ABUNDANCE DISTRIBUTION OF *ARICIDEA PHILBINAE*.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

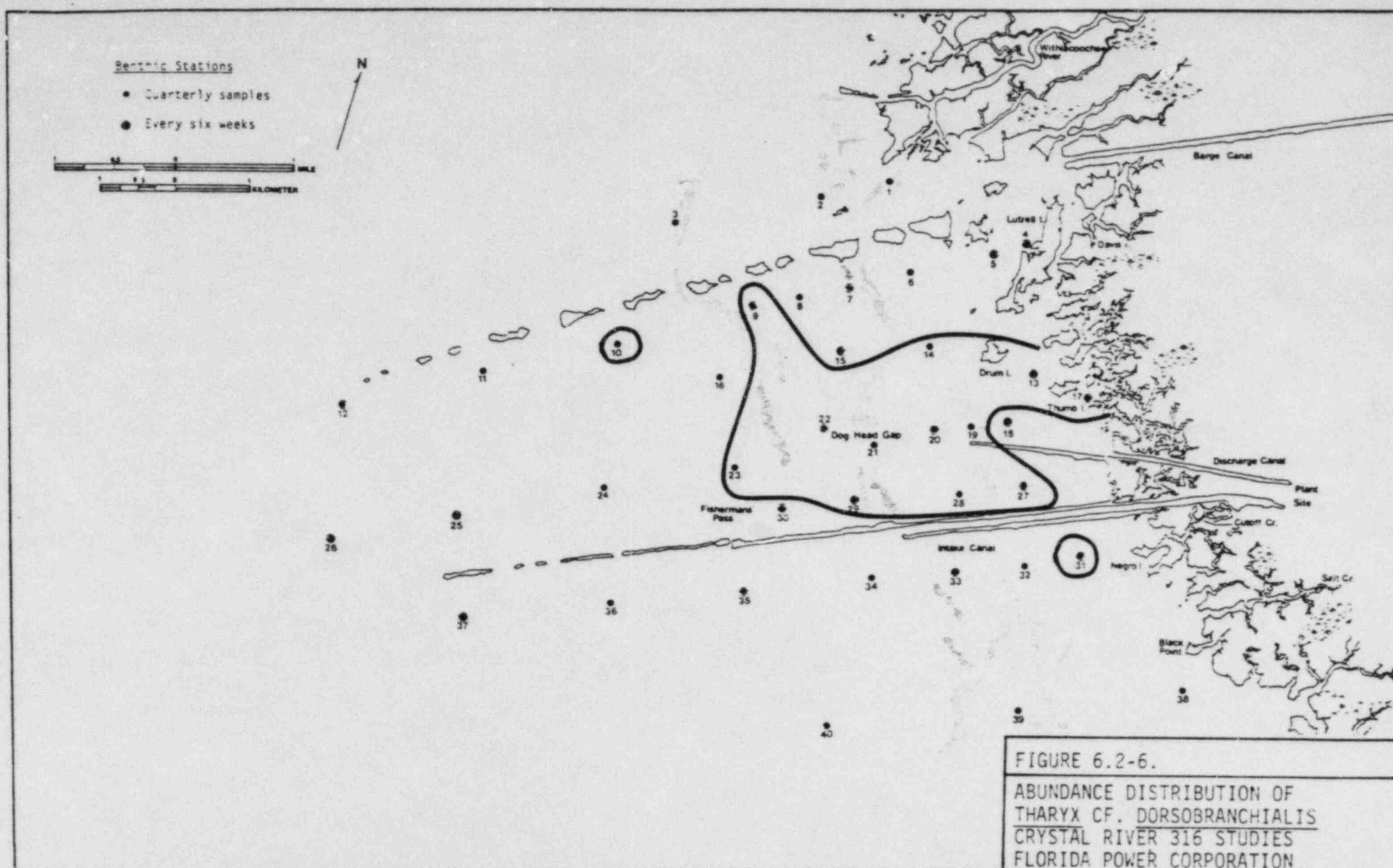

FIGURE 6.2-6.

ABUNDANCE DISTRIBUTION OF THARYX CF. DORSOBRANCHIALIS
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

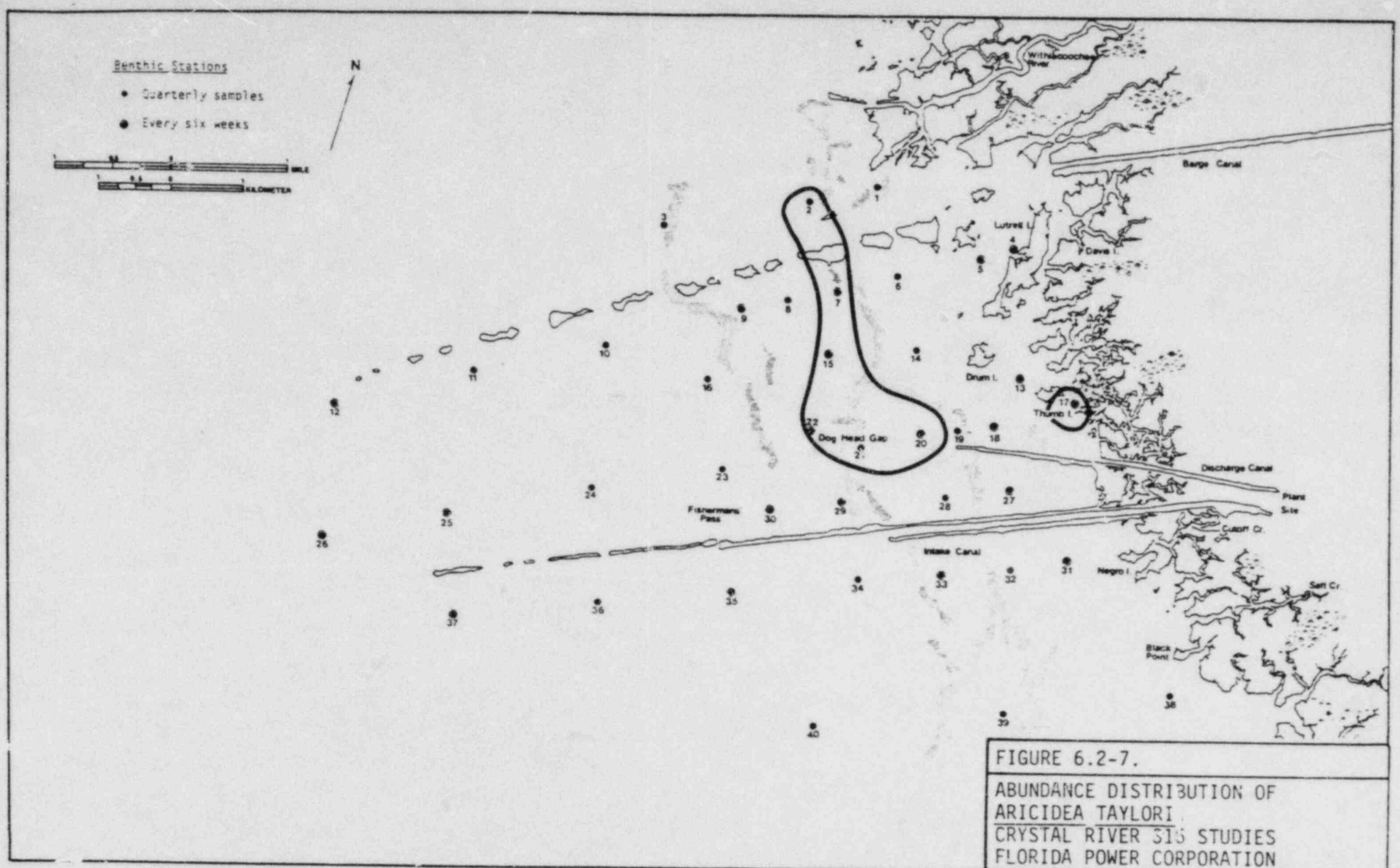

FIGURE 6.2-7.

ABUNDANCE DISTRIBUTION OF ARICIDEA TAYLORI
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

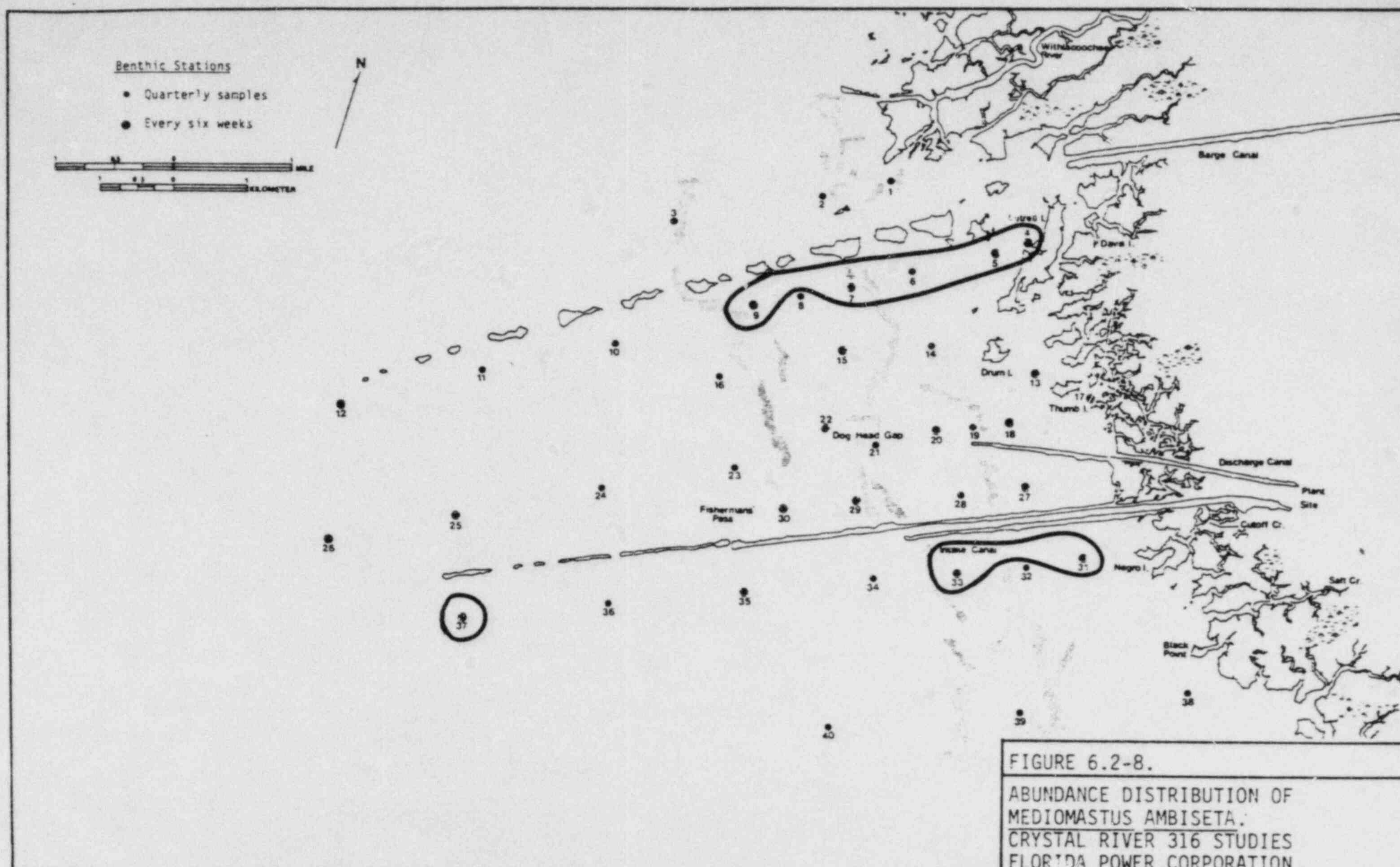

FIGURE 6.2-8.

ABUNDANCE DISTRIBUTION OF
MEDIOMASTUS AMBISETA.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

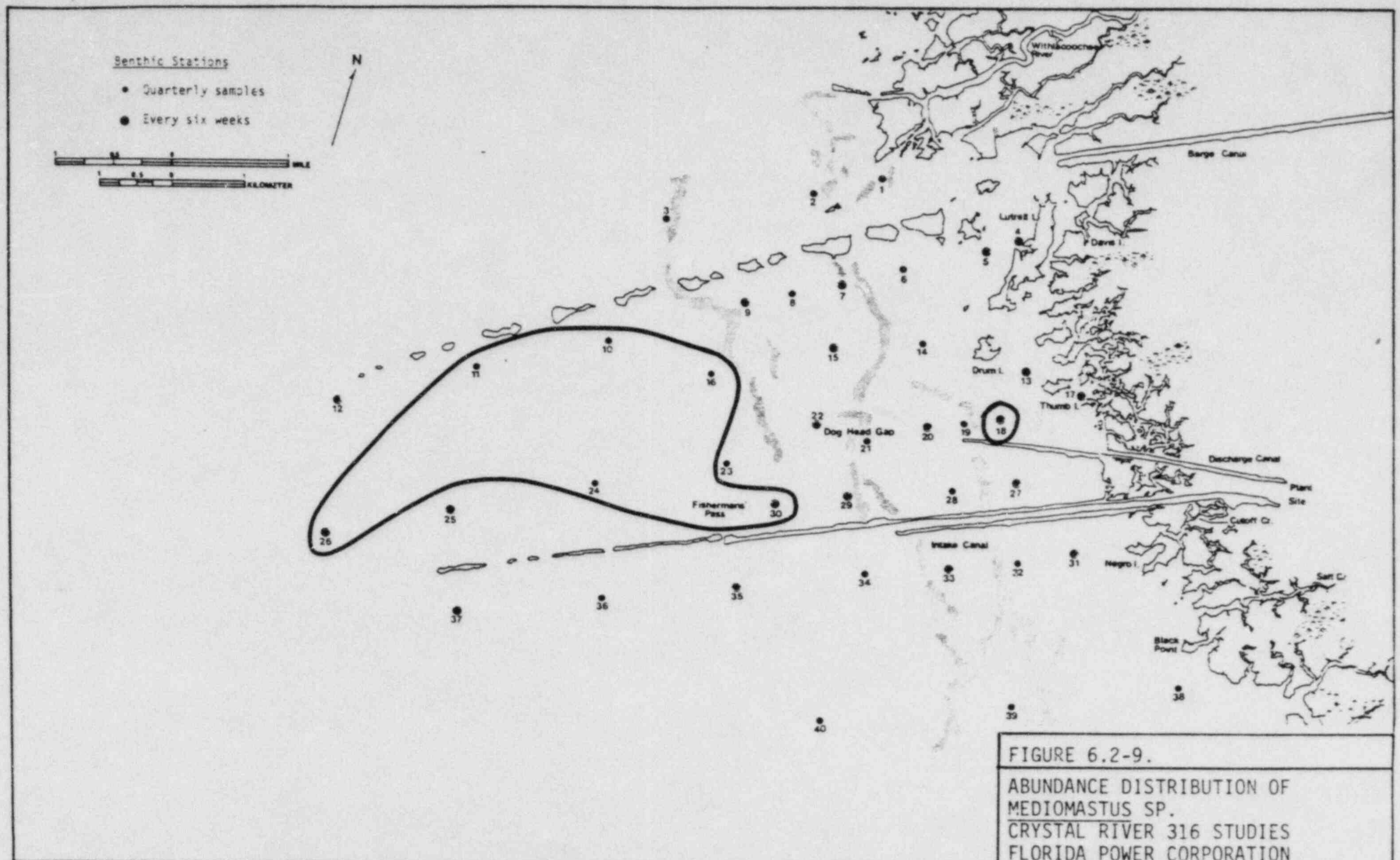

FIGURE 6.2-9.

ABUNDANCE DISTRIBUTION OF
MEDIOMASTUS SP.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

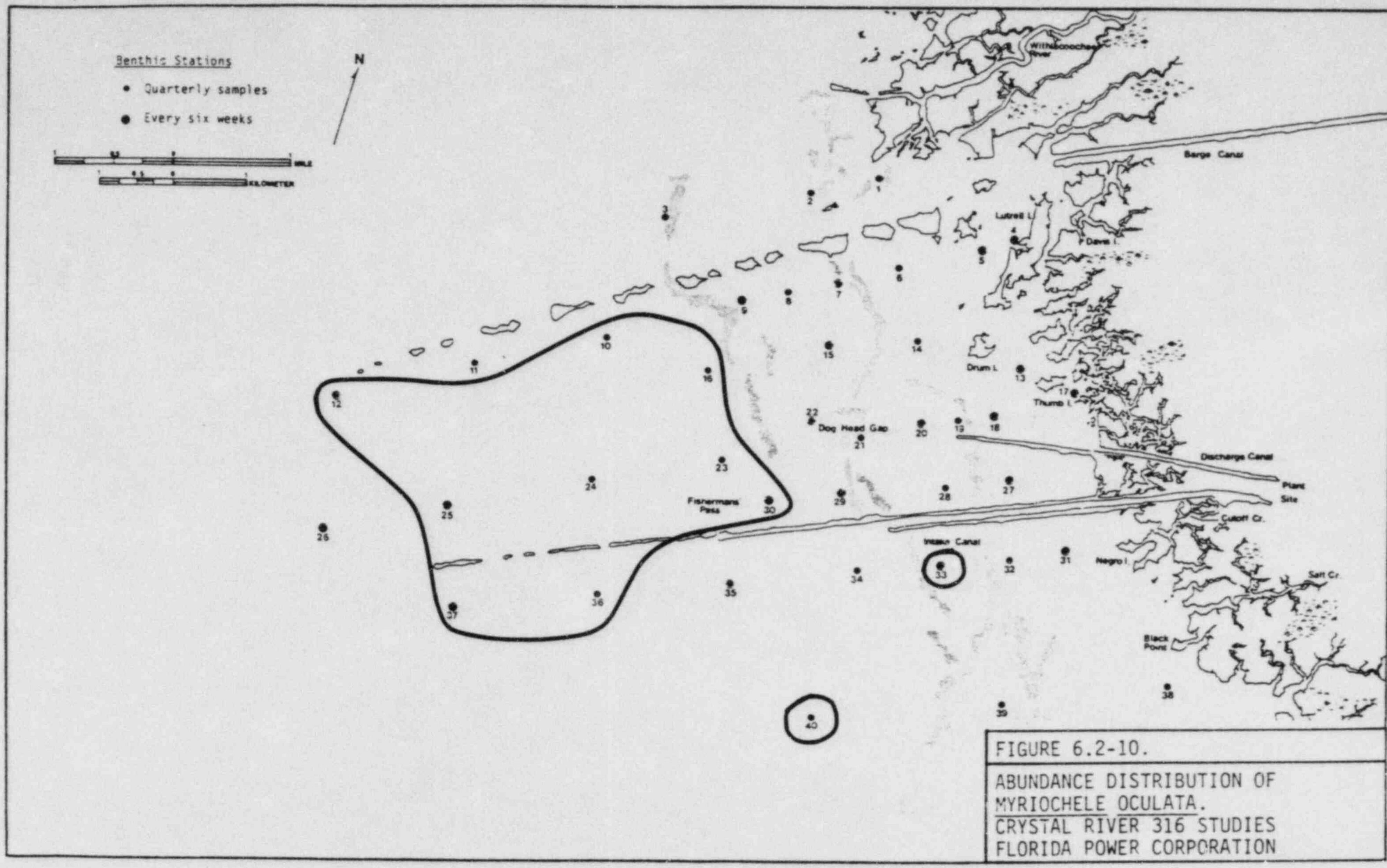

FIGURE 6.2-10.

ABUNDANCE DISTRIBUTION OF *MYRIOCHELE OCULATA*.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

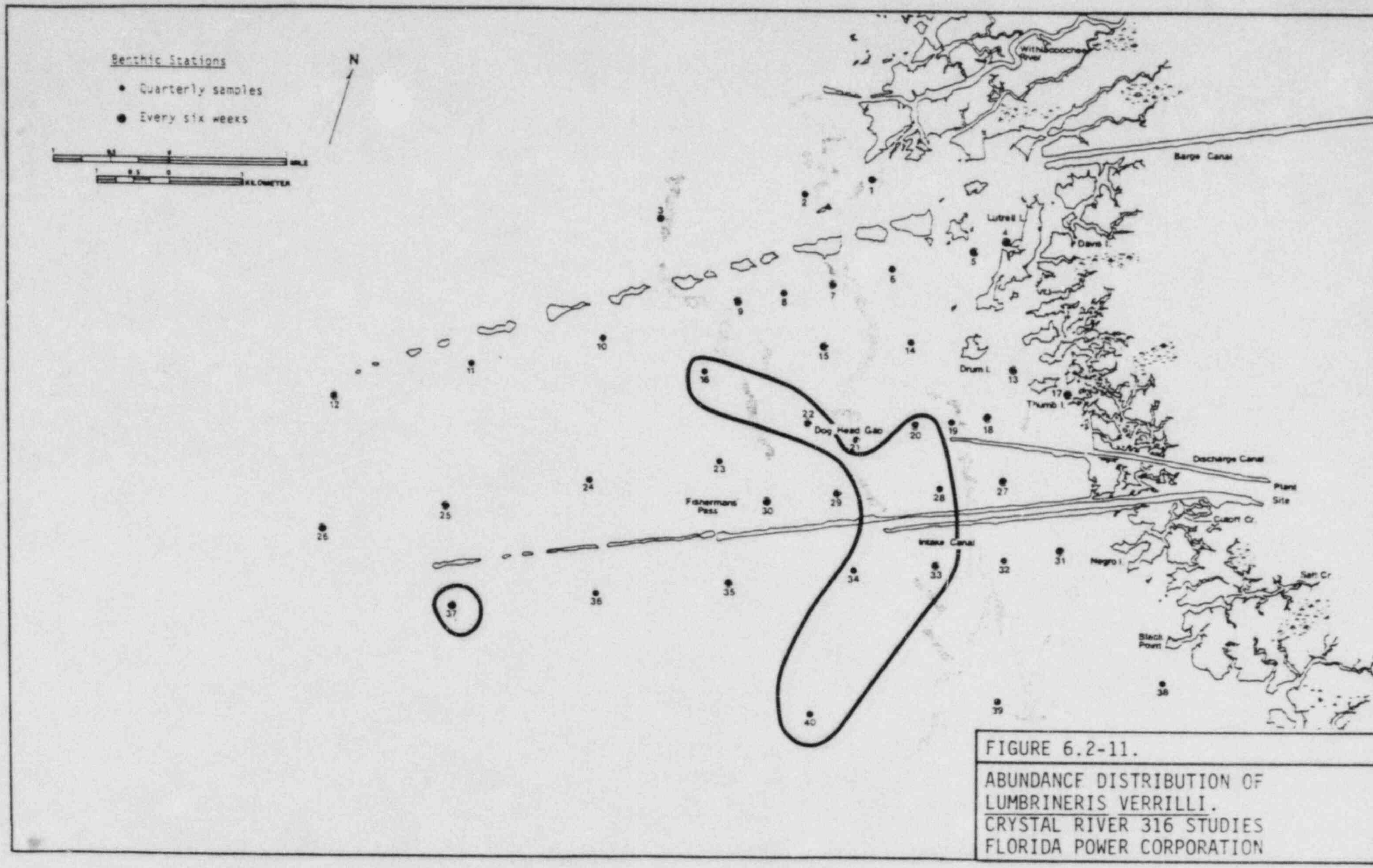

FIGURE 6.2-11.

ABUNDANCE DISTRIBUTION OF *LUMBRINERIS VERRILLI*.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

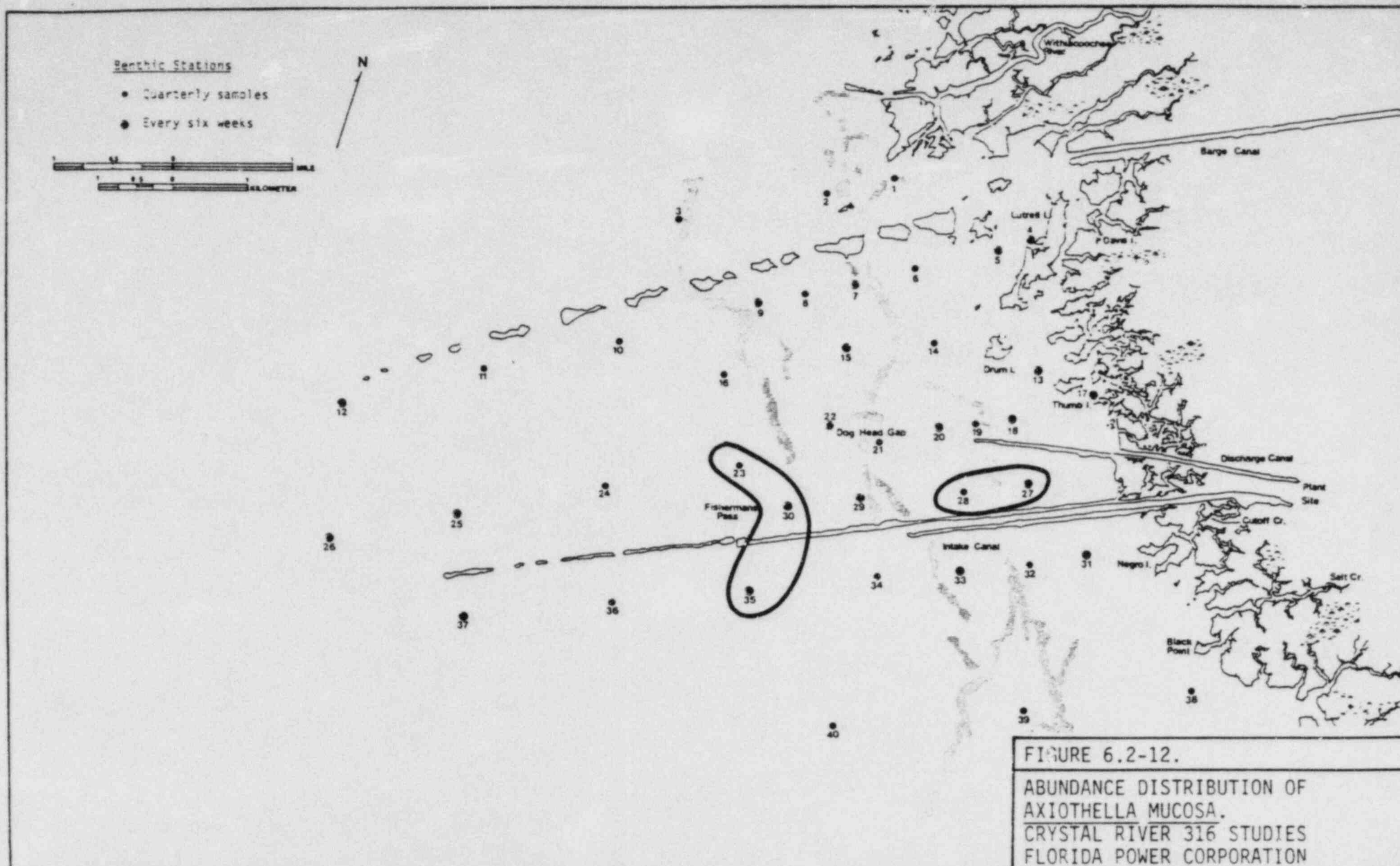

FIGURE 6.2-12.

ABUNDANCE DISTRIBUTION OF AXIOTHELLA MUCOSA.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

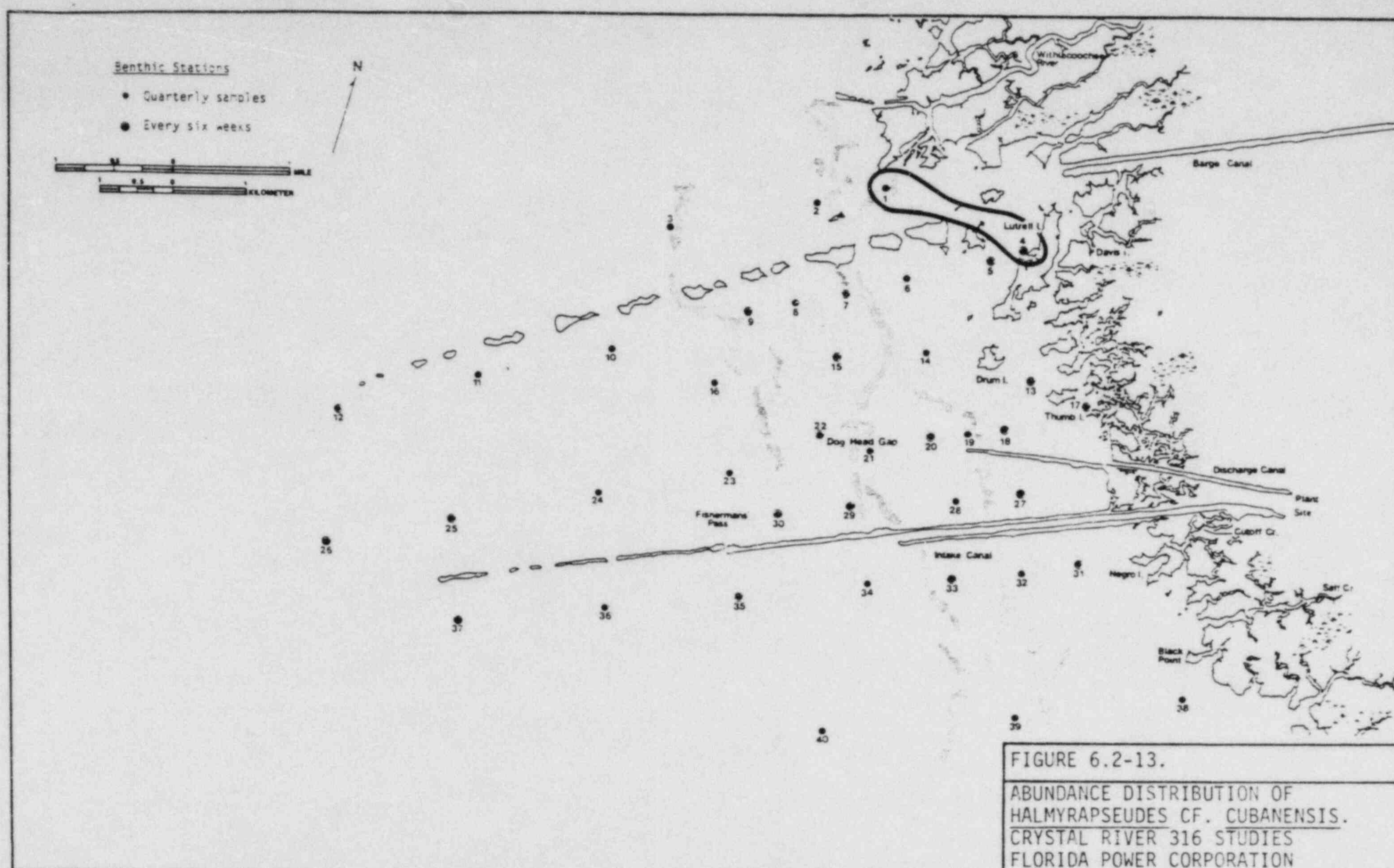

FIGURE 6.2-13.

ABUNDANCE DISTRIBUTION OF <u>HALMYRAPSEUDES</u> CF. <u>CUBANENSIS</u>.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

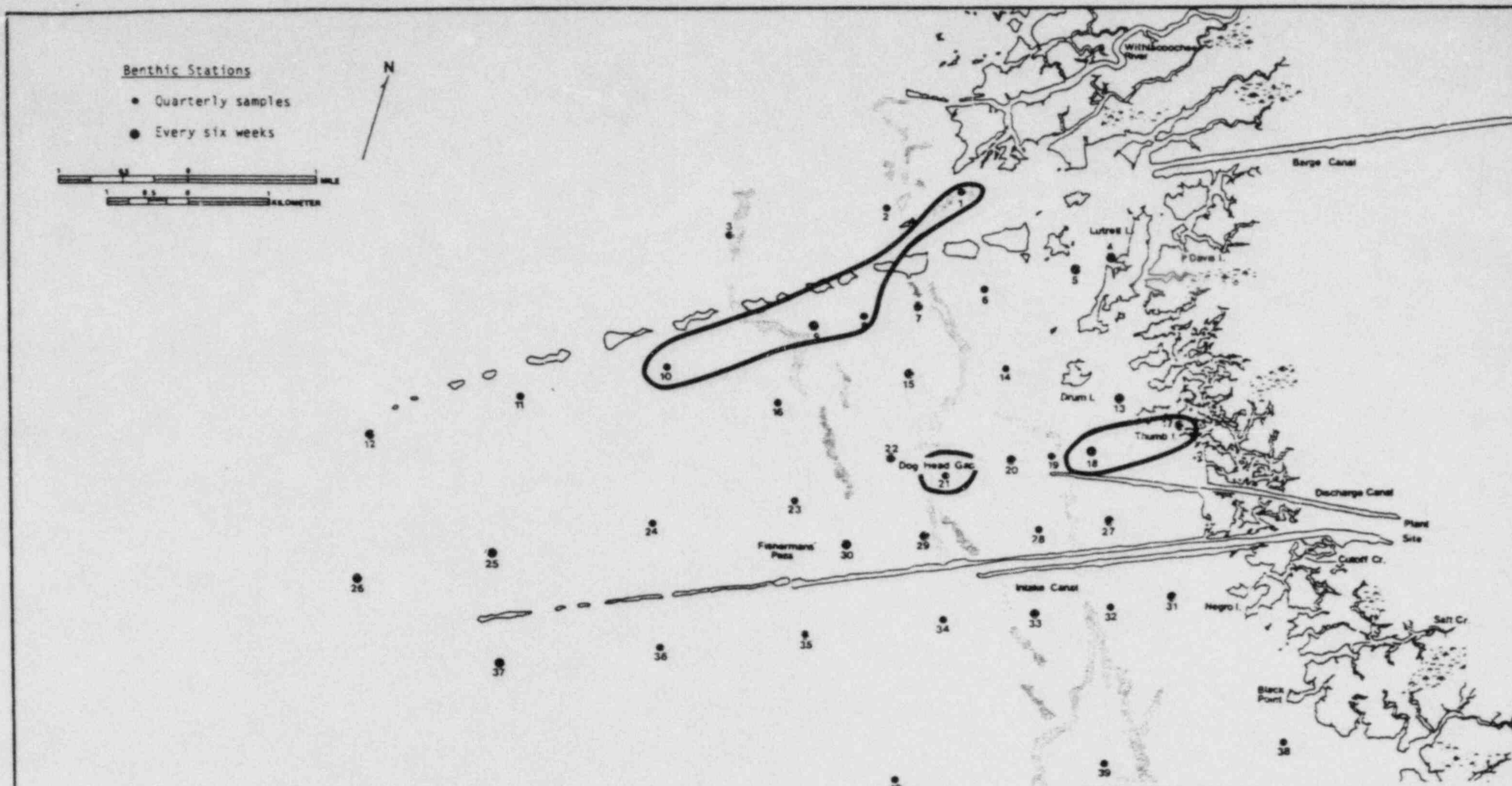

FIGURE 6.2-14.

ABUNDANCE DISTRIBUTION OF HAPLOSCOLOPLOS FOLIOSUS.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

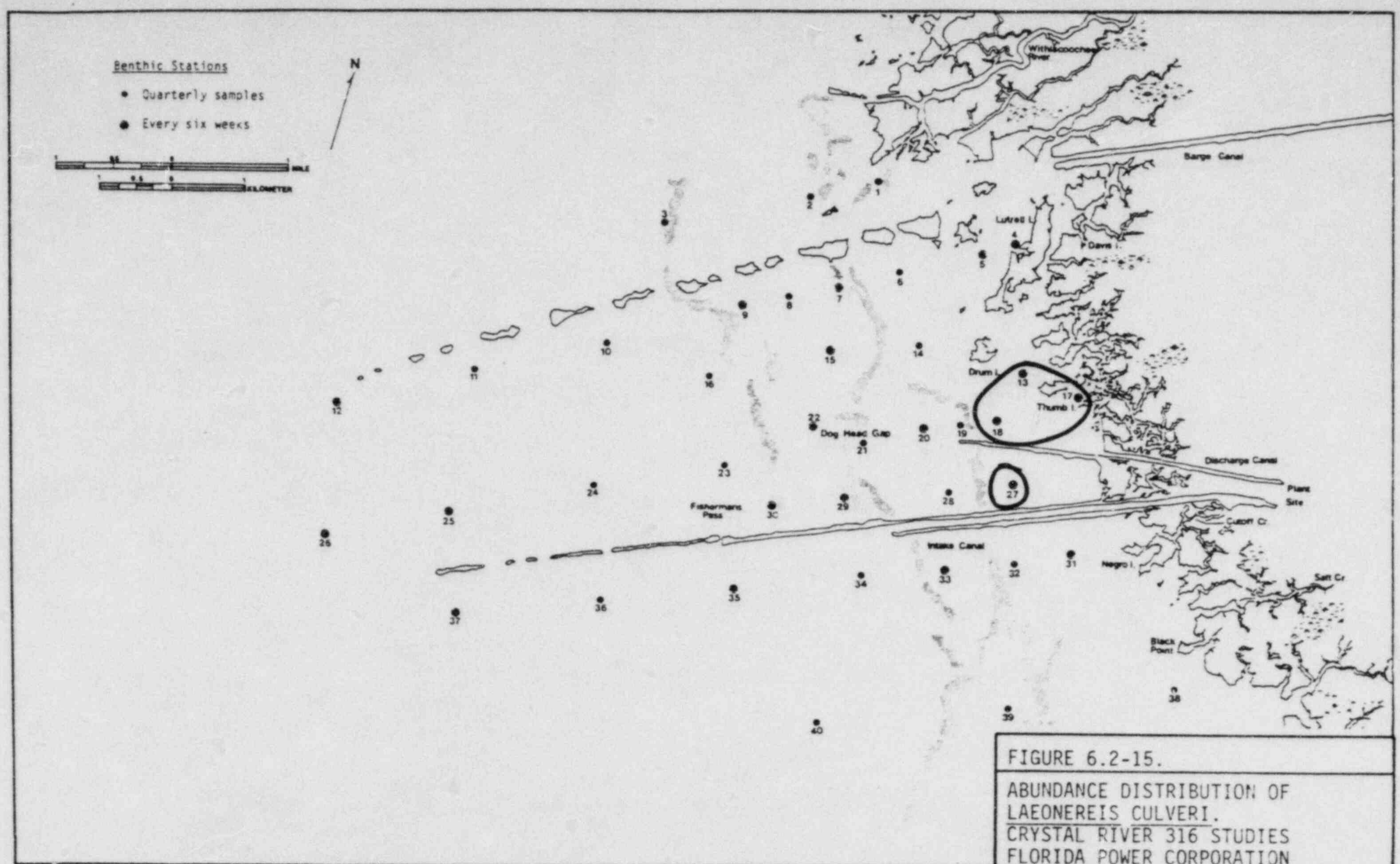

FIGURE 6.2-15.

ABUNDANCE DISTRIBUTION OF LAEONEREIS CULVERI.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

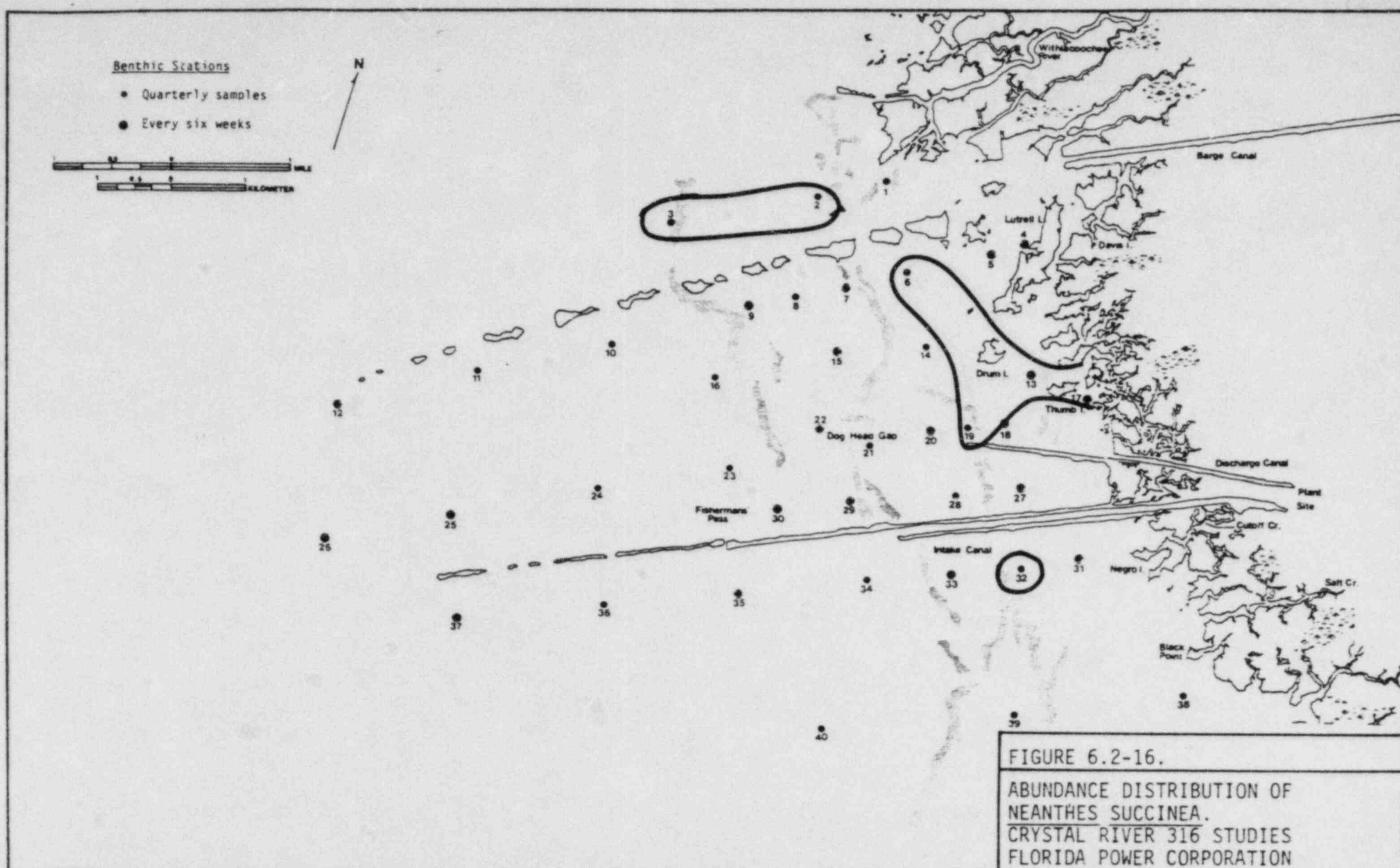

FIGURE 6.2-16.

ABUNDANCE DISTRIBUTION OF NEANTHES SUCCINEA.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

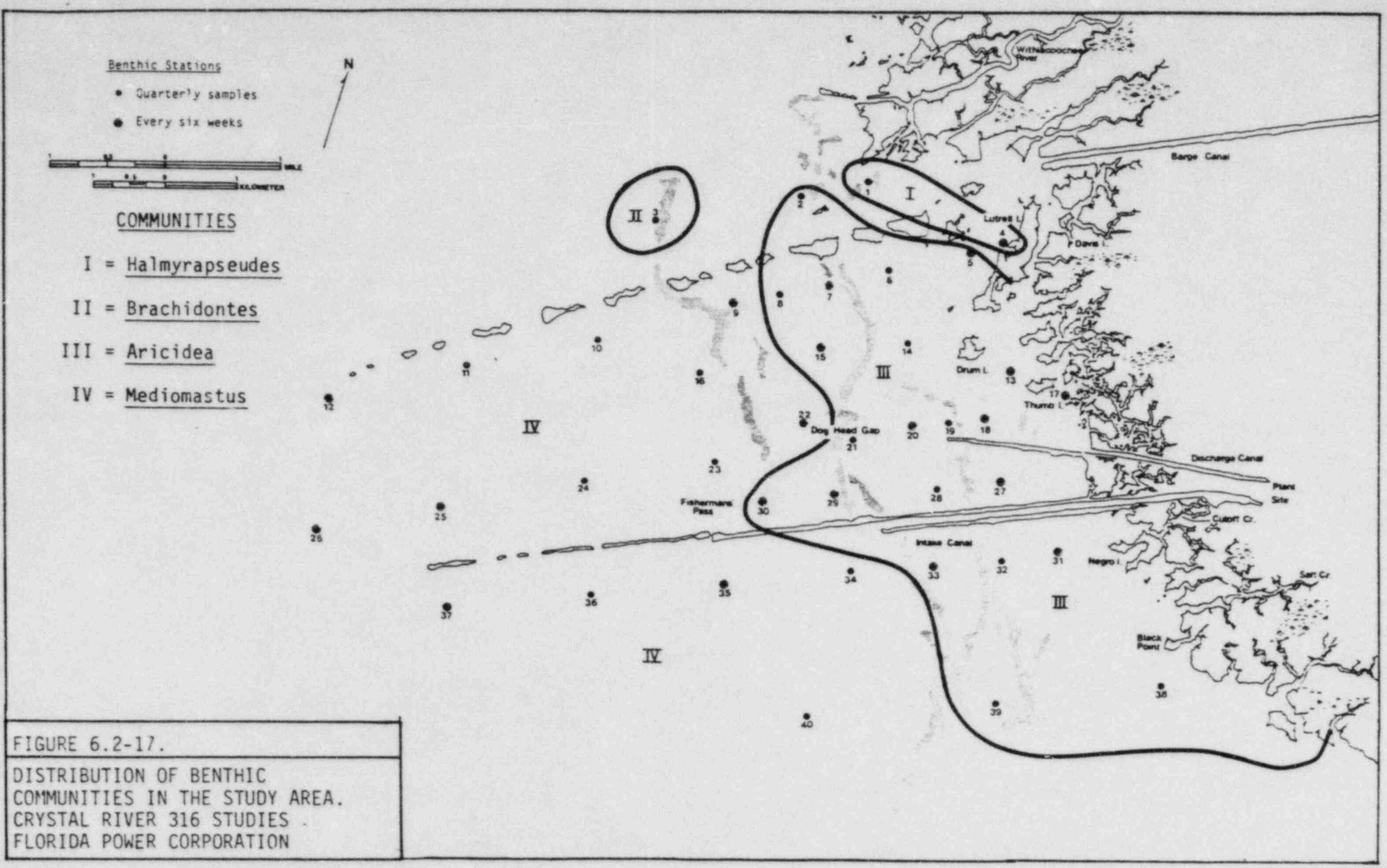

FIGURE 6.2-17.

DISTRIBUTION OF BENTHIC COMMUNITIES IN THE STUDY AREA. CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

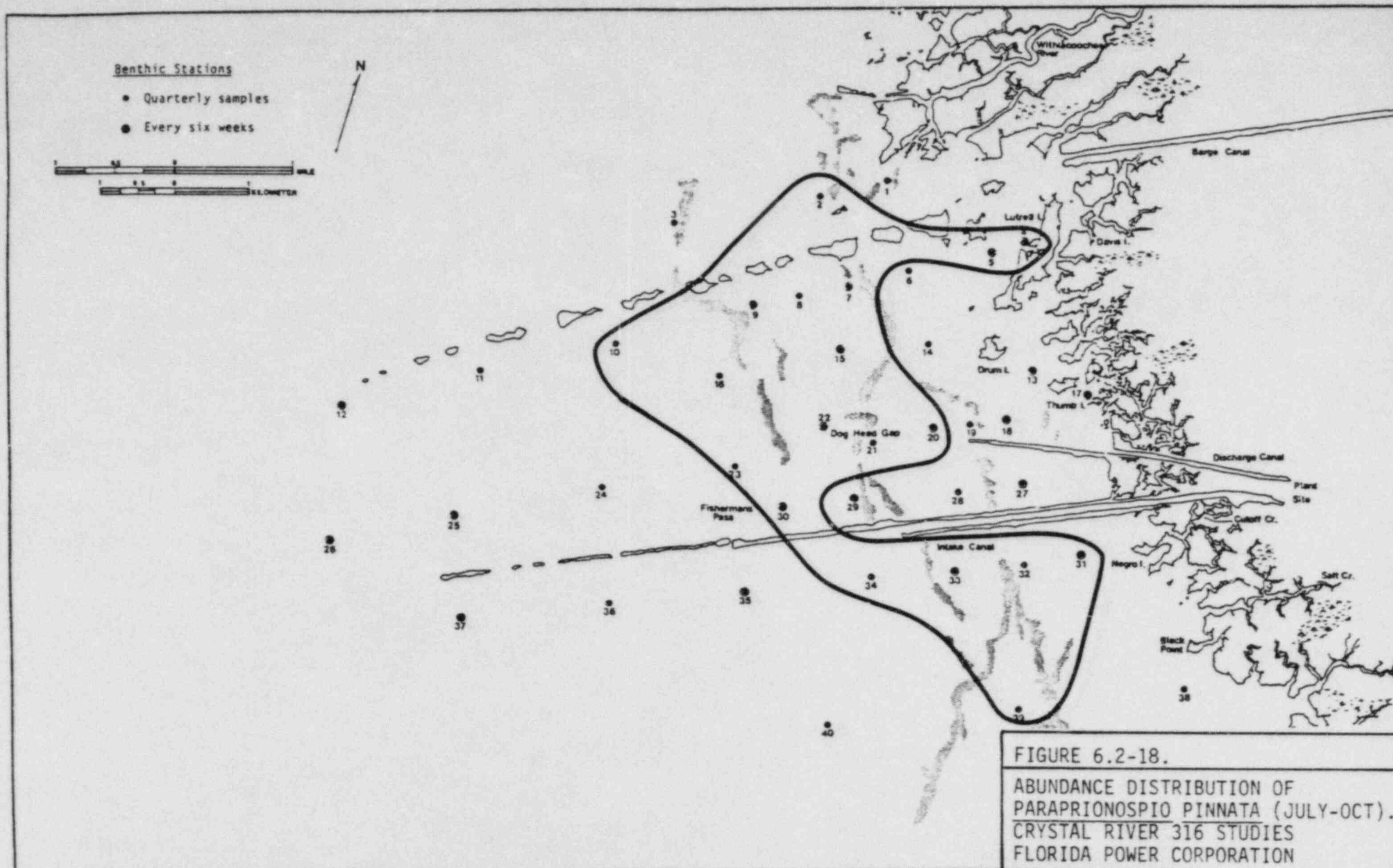

FIGURE 6.2-18.

ABUNDANCE DISTRIBUTION OF <u>PARAPRIONOSPIO PINNATA</u> (JULY-OCT).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

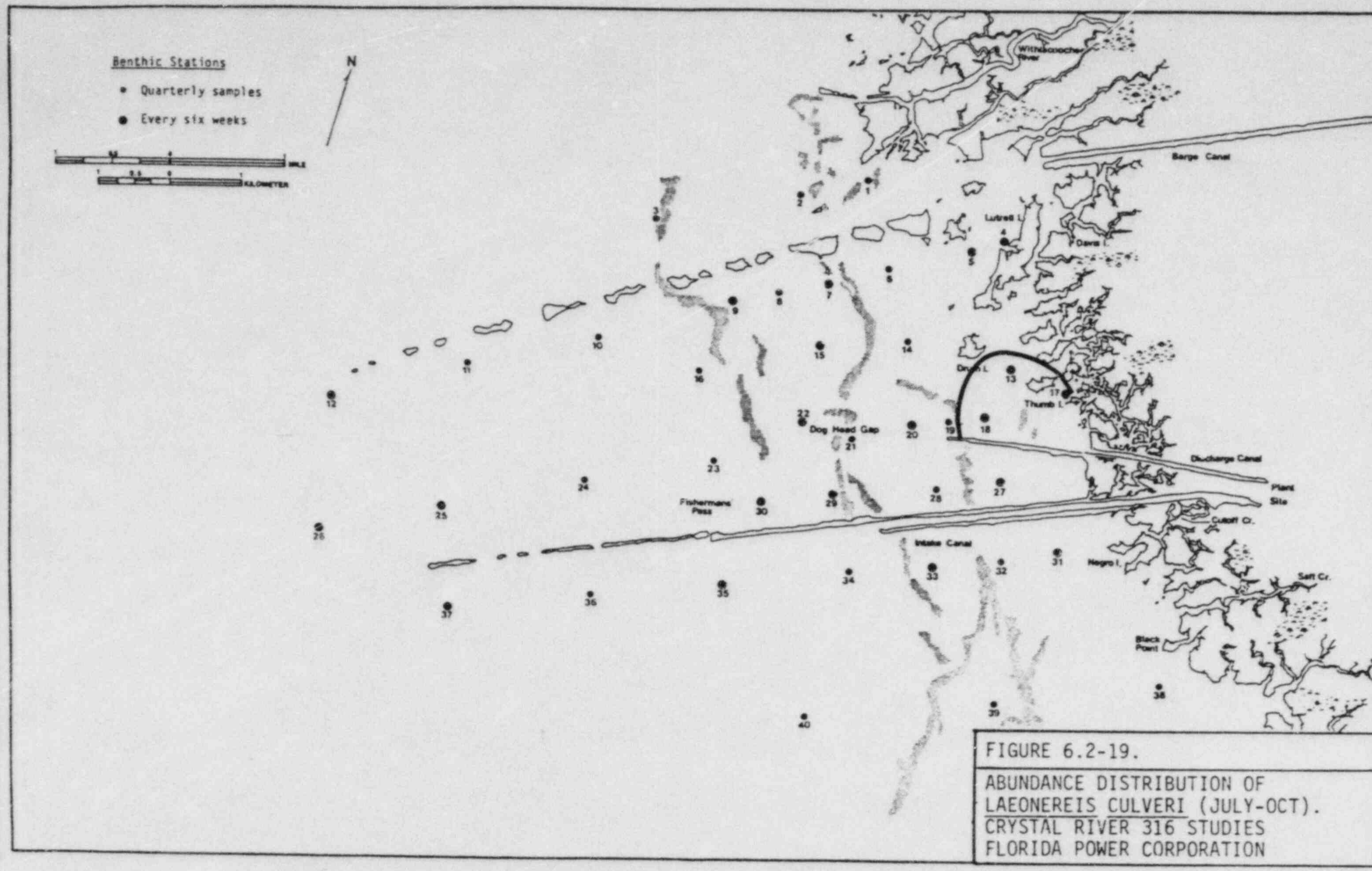

FIGURE 6.2-19.

ABUNDANCE DISTRIBUTION OF <u>LAEONEREIS</u> <u>CULVERI</u> (JULY-OCT).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

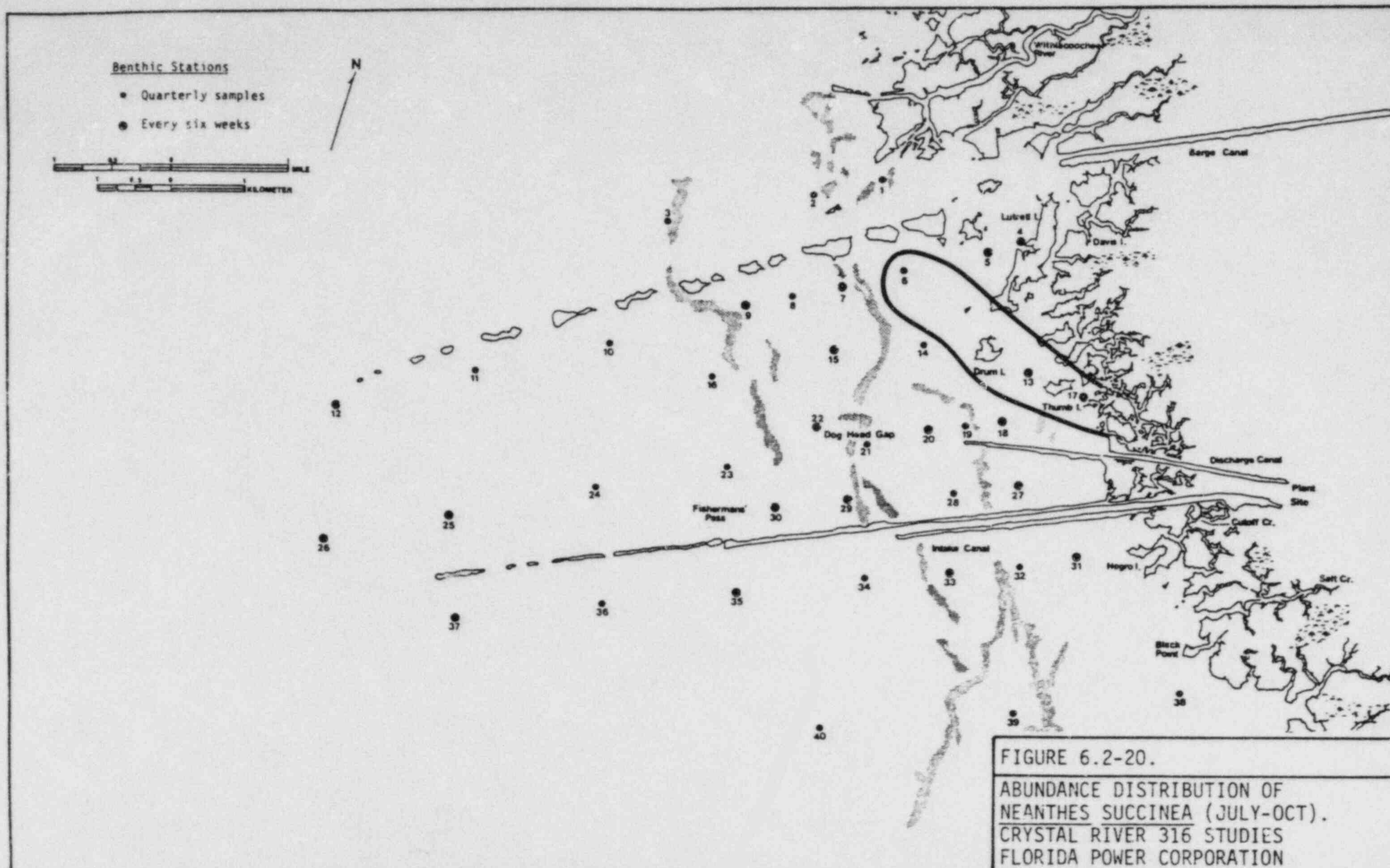

FIGURE 6.2-20.

ABUNDANCE DISTRIBUTION OF
<u>NEANTHES SUCCINEA</u> (JULY-OCT).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

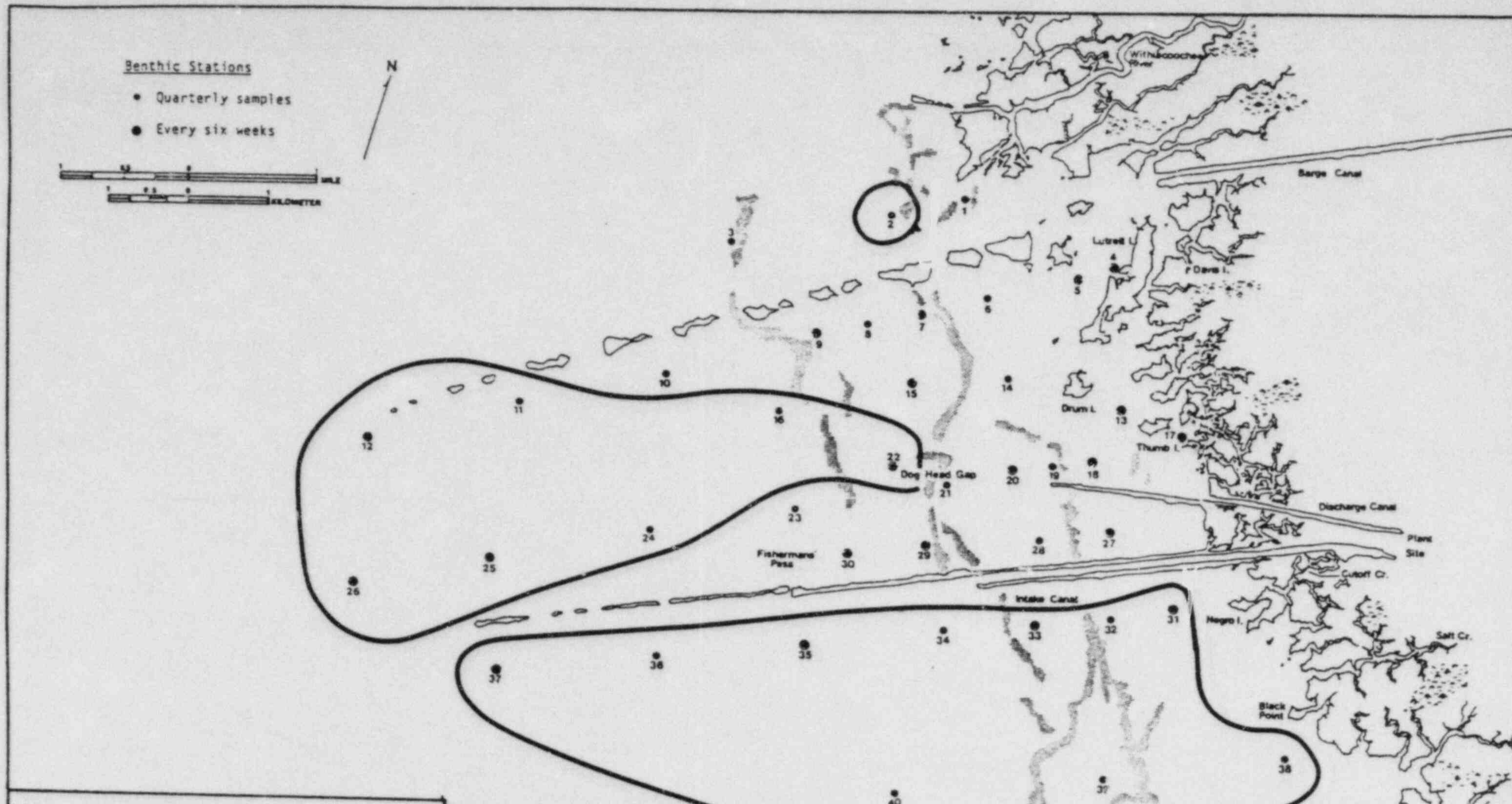

FIGURE 6.2-21.

AREAS OF LOW OLIGOMIXITY (i.e., LOW DOMINANCE).
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

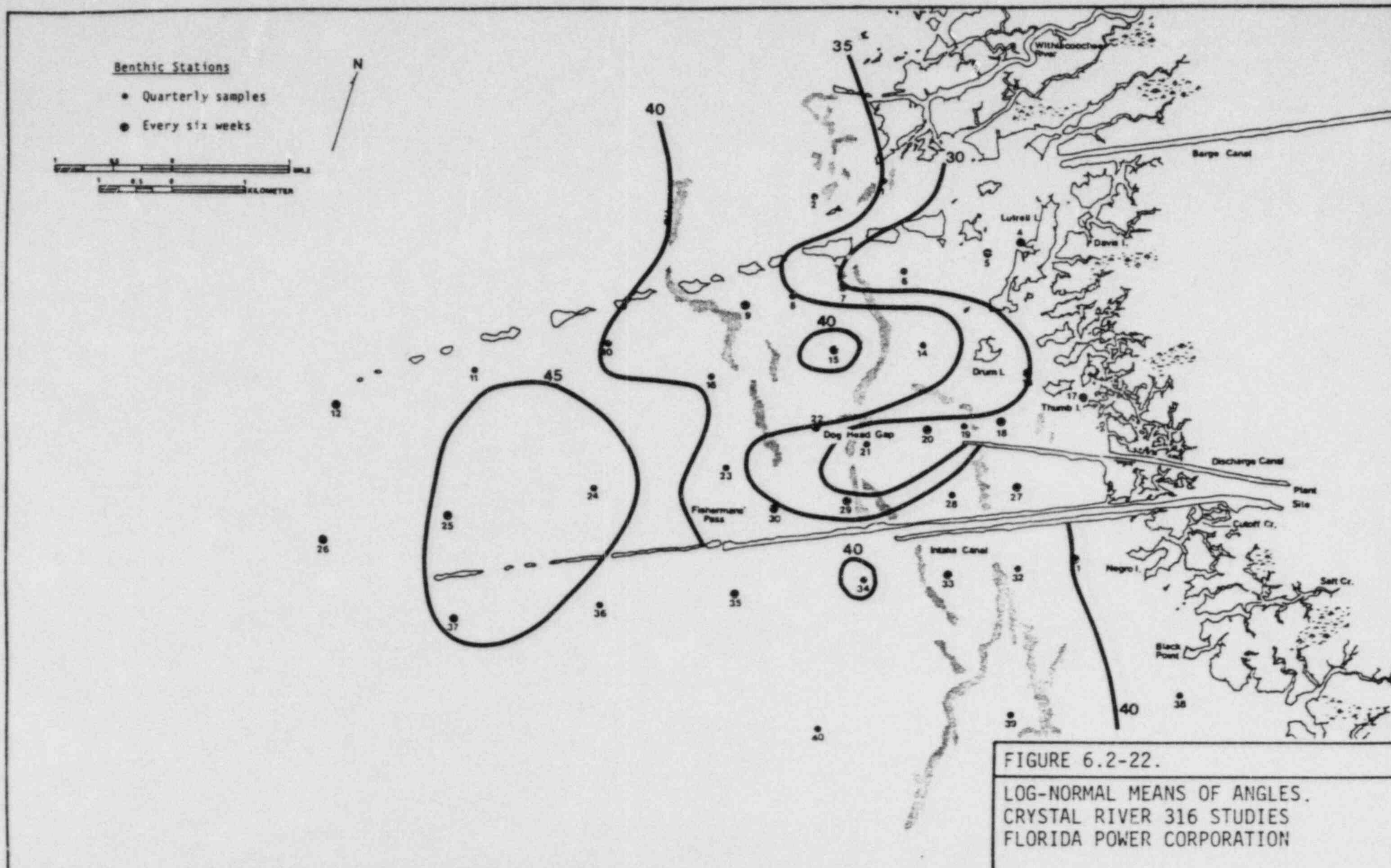

FIGURE 6.2-22.

LOG-NORMAL MEANS OF ANGLES.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

JUNE 1983

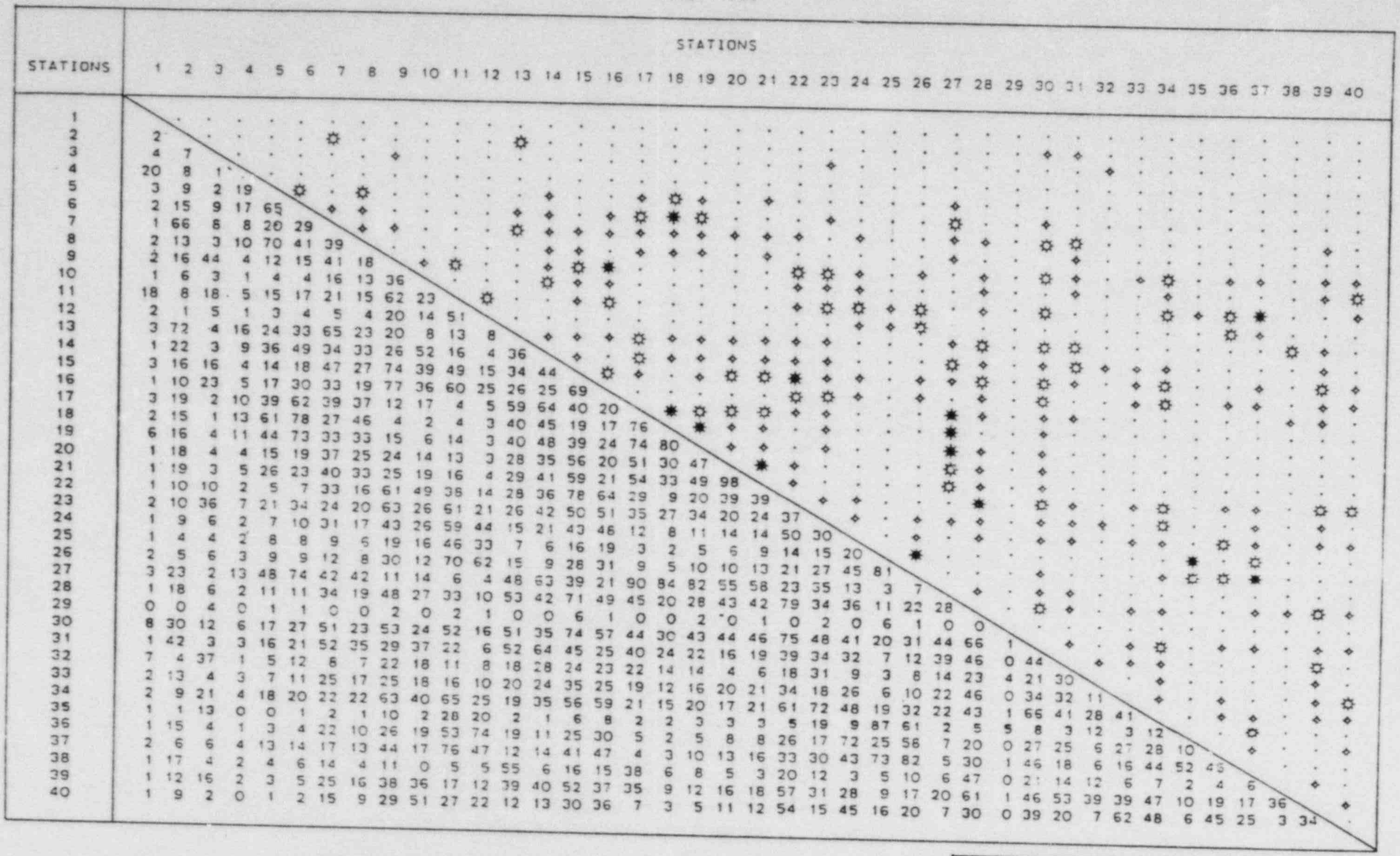

FIGURE 6.2-23.

MORISITA'S INDEX FOR JUNE 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

CLUSTER DENDROGRAM FOR JUNE 1983.

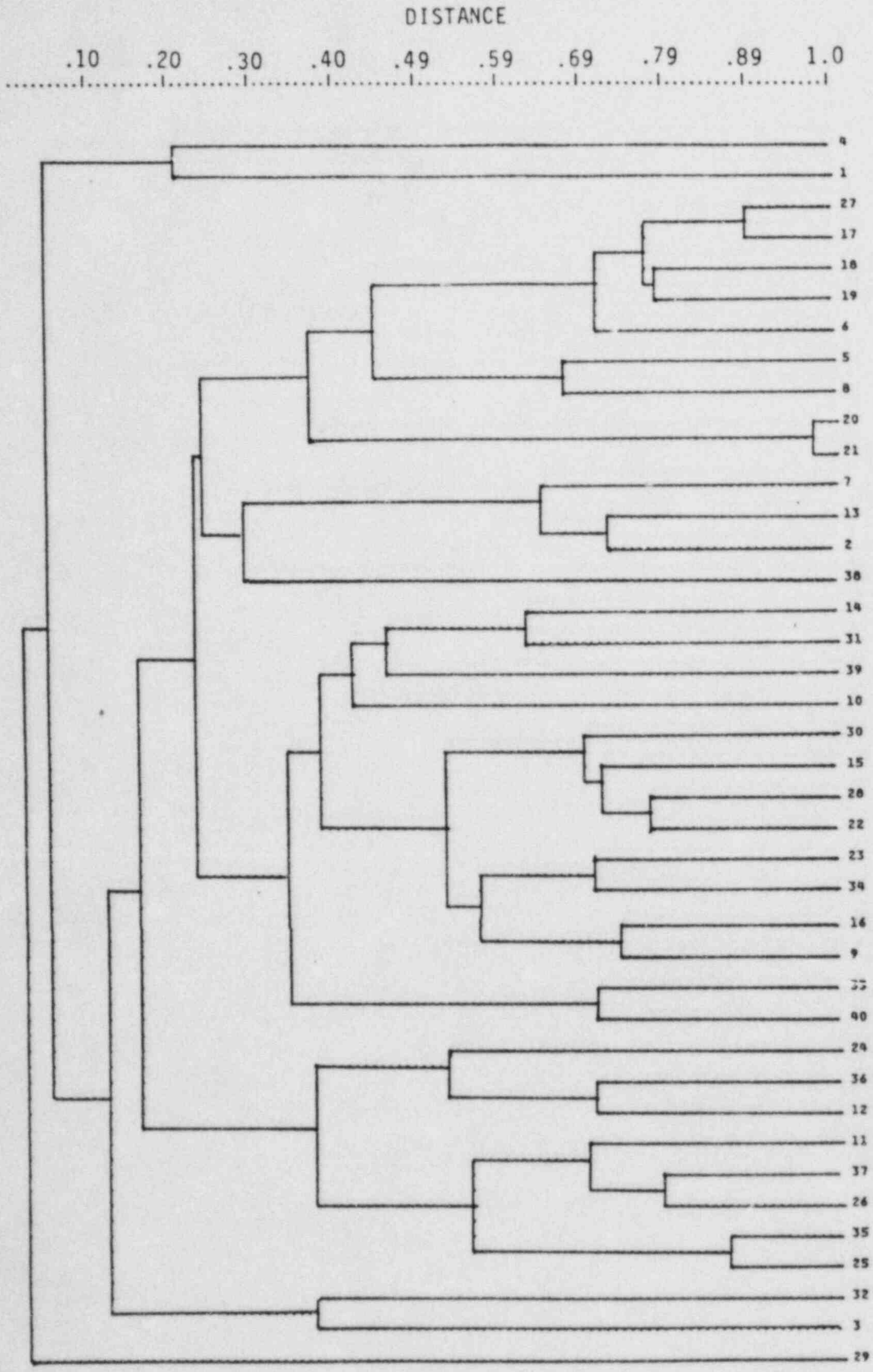

FIGURE 6.2-24.

CLUSTER DENDROGRAM FOR JUNE 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

JULY 1983

STATIONS	4	5	7	9	12	13	15	17	18	20	22	25	26	27	29	30	31	33	35	37
4		·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
5	7		☼	◆	·	◆	◆	◆	☼	◆	◆	·	·	◆	·	◆	·	·	·	·
7	4	58		◆	·	·	✸	◆	☼	☼	☼	·	·	◆	◆	◆	◆	◆	·	◆
9	4	46	39		◆	·	☼	·	◆	◆	☼	◆	☼	·	◆	✸	·	·	·	☼
12	2	19	19	48		·	◆	·	·	·	◆	☼	✸	·	·	◆	·	◆	✸	✸
13	1	27	24	12	8		·	◆	◆	·	·	·	·	☼	◆	·	◆	·	·	·
15	4	43	86	57	30	13		◆	◆	☼	☼	◆	◆	·	◆	☼	·	◆	·	◆
17	2	49	49	14	8	29	40		☼	☼	☼	·	·	☼	☼	·	◆	◆	·	·
18	4	72	60	44	14	35	36	65		☼	☼	·	·	☼	☼	◆	◆	◆	·	◆
20	3	34	73	32	8	15	63	55	69		☼	·	·	◆	☼	◆	·	·	·	·
22	3	36	60	72	33	21	67	56	70	70		◆	◆	◆	✸	☼	◆	☼	·	☼
25	1	13	17	34	65	8	26	14	13	10	30		☼	·	·	◆	·	·	◆	☼
26	2	23	22	55	86	16	30	8	22	16	39	69		·	·	◆	·	◆	☼	✸
27	3	44	40	14	12	63	22	56	59	26	36	11	16		◆	◆	☼	◆	·	·
29	2	6	39	42	14	30	41	51	58	73	85	17	21	29		◆	·	◆	·	◆
30	7	39	38	84	50	24	53	21	49	32	74	26	49	27	46		◆	☼	·	☼
31	2	18	27	15	19	32	22	36	27	13	32	14	15	65	25	27		·	·	·
33	1	9	16	24	13	8	18	19	18	13	33	11	12	17	23	28	19		·	◆
35	2	5	9	16	77	11	9	4	8	8	14	49	64	14	11	18	23	5		◆
37	2	20	25	62	81	15	33	8	28	18	50	55	84	14	30	70	21	17	50	

FIGURE 6.2-25.

MORISITA'S INDEX FOR JULY 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

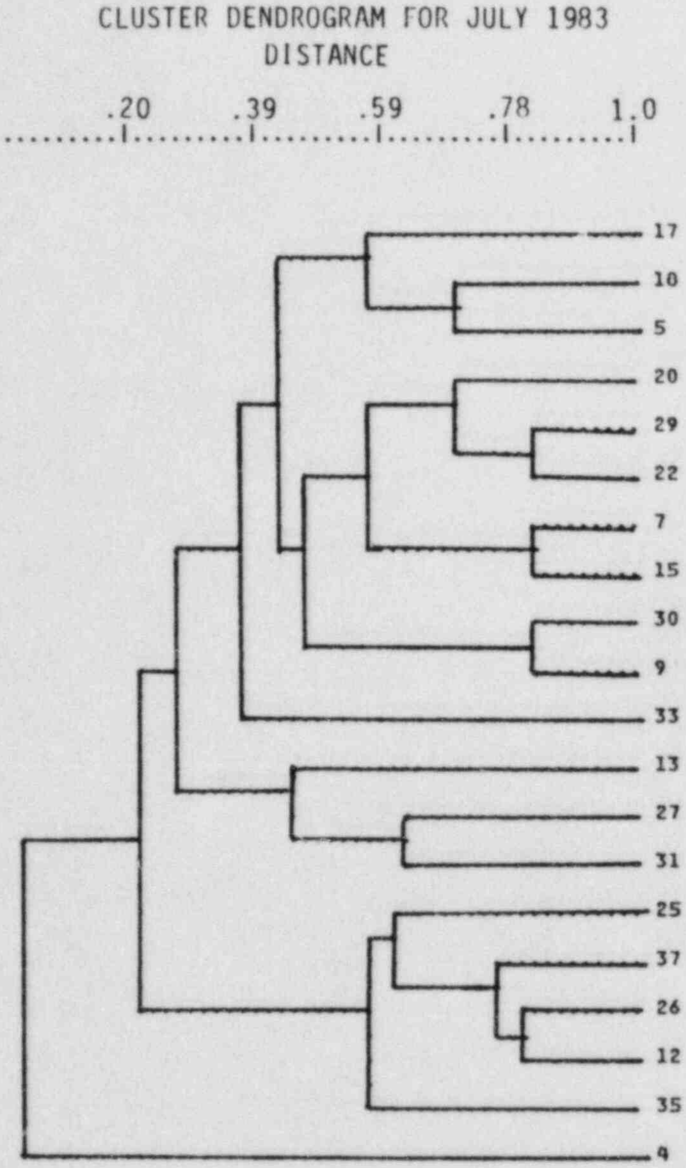

FIGURE 6.2-26.

CLUSTER DENDROGRAM FOR JULY 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

SEPTEMBER 1983

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1																																								
2	3																																							
3	1	38																																						
4	28	85	33																																					
5	3	59	26	80																																				
6	2	85	29	79	75																																			
7	1	93	38	78	47	67																																		
8	1	76	22	76	41	51	78																																	
9	1	72	51	64	47	55	71	48																																
10	0	19	15	17	17	17	23	10	27																															
11	0	12	18	9	12	14	13	1	31	68																														
12	0	1	7	0	0	1	1	0	8	7	14																													
13	1	57	27	33	25	53	58	27	37	34	40	2																												
14	1	62	28	41	23	50	63	39	50	37	44	7	90																											
15	1	93	32	82	46	67	93	90	61	15	7	1	52	59																										
16	1	49	37	49	47	48	47	28	74	35	43	20	25	29	36																									
17	1	36	17	16	14	33	44	16	14	11	9	1	74	49	40	9																								
18	1	77	24	75	39	51	79	95	47	9	1	0	37	42	92	26	35																							
19	0	9	30	6	8	11	9	2	9	10	13	2	22	21	8	7	14	3																						
20	1	76	27	70	36	48	83	89	18	10	2	1	45	47	92	27	51	94	5																					
21	1	77	28	70	37	48	84	86	48	11	3	1	47	49	92	27	55	92	6	100																				
22	1	79	43	64	42	53	86	57	77	30	29	4	67	68	78	56	57	63	12	74	76																			
23	2	47	34	61	73	55	46	27	67	31	30	8	18	18	31	82	6	24	6	25	26	53																		
24	0	5	10	3	3	4	8	1	23	63	85	17	17	19	4	46	5	1	5	2	3	21	24																	
25	0	2	8	0	0	1	3	1	11	9	24	71	6	13	3	22	4	1	3	2	3	8	14	27																
26	1	8	17	11	17	13	6	0	38	13	31	79	8	7	4	39	5	1	5	3	3	20	33	29	68															
27	1	89	31	66	39	77	81	61	63	15	13	3	58	63	81	40	32	62	10	60	60	65	26	6	4	6														
28	1	72	35	59	28	46	72	60	74	19	21	7	41	58	73	45	15	60	15	59	59	71	32	14	9	16	70													
29	0	1	2	1	1	1	1	2	2	0	0	0	1	1	2	1	0	1	4	1	1	1	1	0	13	2	1	17												
30	1	51	76	40	18	32	53	38	56	14	13	19	23	36	47	45	9	38	22	36	37	46	29	14	27	12	52	58	2											
31	0	24	17	8	10	30	20	3	17	23	31	1	51	45	14	18	26	3	12	5	5	21	14	18	4	5	33	13	0	10										
32	4	16	38	12	15	14	18	2	35	26	32	9	31	26	9	36	21	4	11	10	10	33	34	25	9	23	14	17	0	27	45									
33	0	7	12	2	1	3	13	2	27	30	51	17	27	28	6	46	10	1	7	4	4	25	25	49	20	23	10	18	0	16	26	33								
34	0	3	8	6	5	5	4	1	16	25	28	24	4	4	2	62	2	0	2	2	1	12	32	37	26	19	3	7	0	29	4	9	39							
35	0	4	17	1	0	2	4	1	15	9	26	72	12	13	4	15	4	1	6	2	3	10	7	18	66	78	9	18	2	21	10	25	18	11						
36	0	4	10	6	9	7	1	0	22	28	42	26	6	6	2	72	2	0	2	2	2	15	37	53	30	28	4	8	0	29	6	13	48	91	13					
37	0	6	12	6	9	8	6	0	29	21	62	17	12	14	3	43	2	0	4	1	1	20	30	65	26	38	6	18	0	11	16	29	48	24	19	42				
38	0	29	16	8	12	39	22	2	13	11	27	7	53	41	18	17	38	5	32	9	11	23	4	12	15	16	44	19	3	13	62	42	17	4	27	4	9			
39	1	15	20	14	20	18	17	4	35	19	26	8	16	14	6	46	7	1	5	4	3	24	48	23	9	24	13	15	0	16	37	56	38	14	16	18	29	26		
40	0	5	10	3	4	5	6	1	20	28	50	26	15	14	4	62	7	1	4	3	4	19	29	57	32	26	5	10	0	19	12	15	61	72	18	84	51	12	16	

FIGURE 6.2-27.

MORISITA'S INDEX FOR SEPTEMBER 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

CLUSTER DENDROGRAM FOR SEPTEMBER 1983

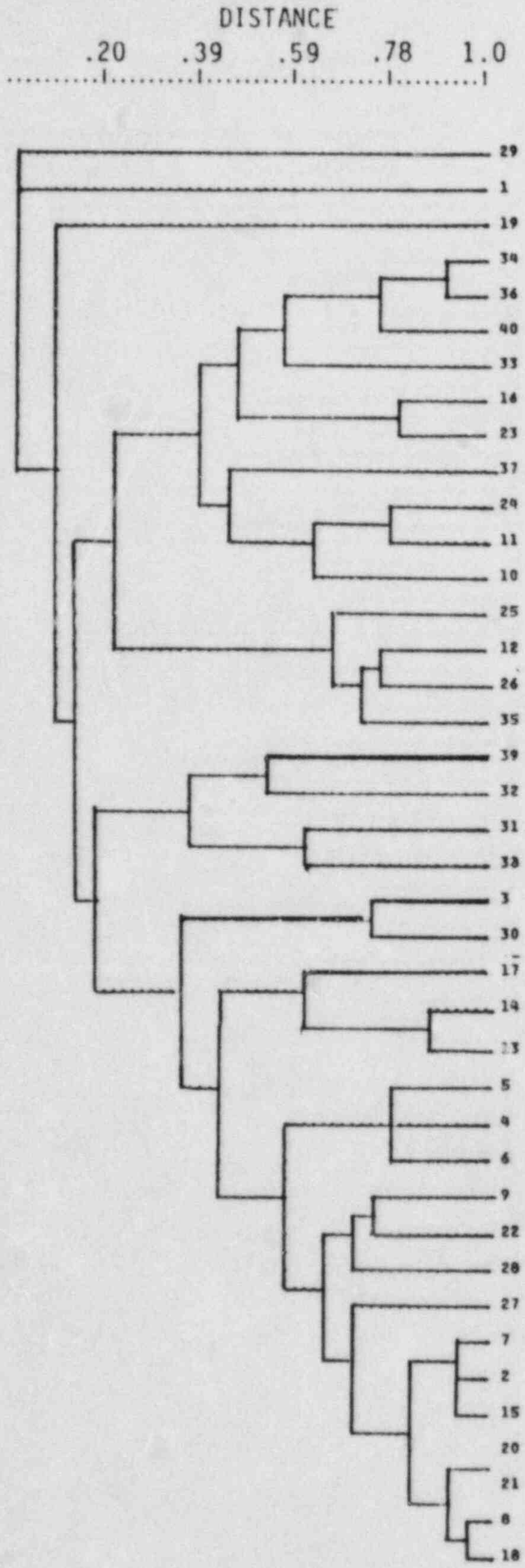

FIGURE 6.2-28.

CLUSTER DENDROGRAM FOR
SEPTEMBER 1983
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

OCTOBER 1983

STATIONS	4	5	7	9	12	13	15	17	18	20	22	25	26	27	29	30	31	33	35	37
4		◆	·	·	·	·	·	·	◆	◆	·	·	·	·	·	·	·	·	·	·
5	32		◆	◆	·	◆	◆	☼	☼	✱	·	·	·	◆	·	·	·	·	·	◆
7	13	37		☼	·	◆	✱	☼	◆	◆	✱	·	·	◆	·	·	·	☼	·	·
9	8	29	53		·	·	☼	·	·	◆	☼	·	·	·	·	·	·	◆	·	·
12	0	1	8	4		·	·	·	·	·	·	·	☼	·	·	·	·	·	·	·
13	15	38	31	17	3		·	◆	◆	◆	·	·	·	◆	·	◆	·	·	·	·
15	14	37	83	62	7	25		◆	◆	☼	✱	·	·	◆	·	·	·	☼	·	·
17	25	53	52	22	4	45	46		☼	◆	◆	·	·	◆	·	·	·	·	·	·
18	29	67	32	24	2	31	35	67		✱	·	·	·	◆	·	·	·	·	·	·
20	32	82	43	39	2	33	54	48	81		◆	·	·	◆	·	·	·	·	·	·
22	4	20	85	66	9	10	87	37	21	35		·	·	·	·	·	◆	☼	·	·
25	1	10	20	15	24	5	13	4	2	6	23		☼	·	·	·	·	◆	◆	☼
26	0	1	9	7	54	22	6	2	1	3	10	53		·	·	◆	·	·	◆	◆
27	14	32	31	21	2	41	33	35	28	32	14	3	3		·	·	·	◆	·	·
29	1	3	5	2	3	3	5	4	3	4	4	2	6	2		·	·	·	·	·
30	1	18	17	12	10	39	17	5	2	11	17	19	46	8	4		·	◆	◆	◆
31	5	13	22	18	3	10	24	9	18	19	33	9	4	9	2	8		◆	·	·
33	4	14	60	30	11	22	53	21	4	16	62	28	21	27	2	28	28		·	◆
35	0	6	5	4	16	17	3	1	0	2	4	36	35	3	2	27	5	8		·
37	1	29	23	18	19	17	12	6	2	14	24	58	33	4	1	10	10	50	25	

FIGURE 6.2-29.

MORISITA'S INDEX FOR OCTOBER 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

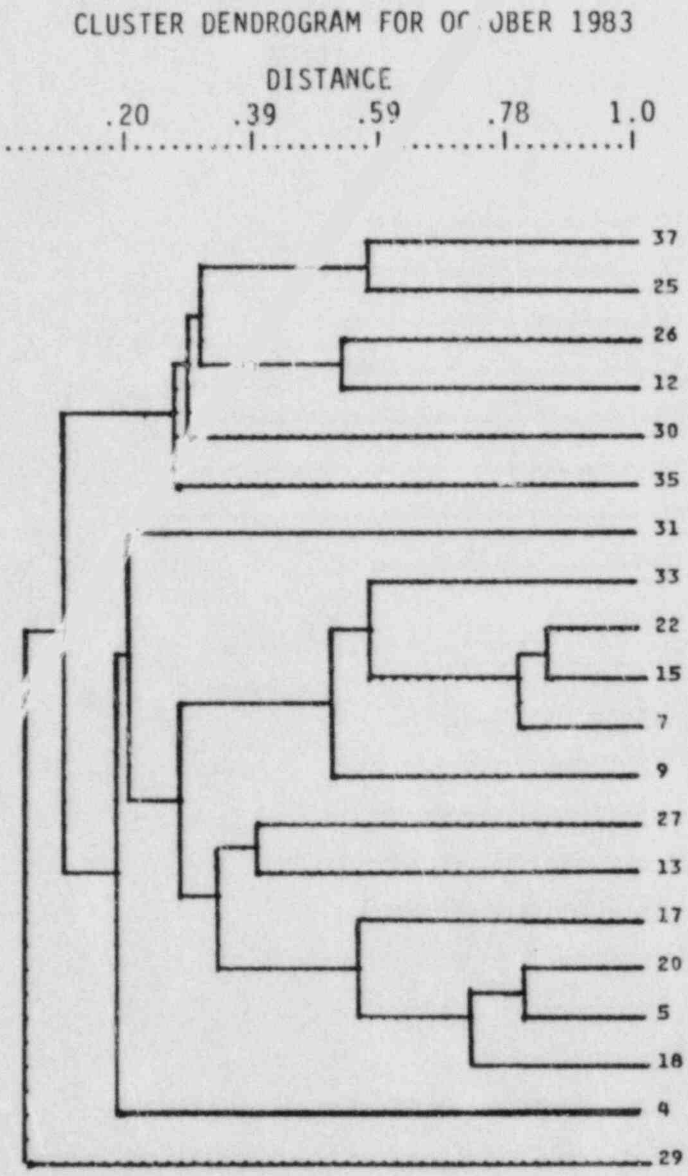

FIGURE 6.2-30.

CLUSTER DENDROGRAM FOR
OCTOBER 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

NOVEMBER 1983

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1		·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
2	2		◆	◆	◆	◆	✸	◆	◆	·	·	·	☼	☼	☼	☼	◆	☼	·	☼	◆	☼	·	◆	·	·	◆	☼	·	·	☼	◆	◆	·	·	·	·	☼	◆	·
3	0	27		·	·	·	·	·	·	·	·	·	·	·	·	·	◆	·	·	·	·	·	◆	·	·	·	·	·	◆	·	·	◆	·	·	·	·	·	·	·	·
4	3	42	1		✸	✸	☼	☼	·	·	·	·	☼	✸	☼	·	◆	✸	·	◆	◆	·	·	·	·	·	◆	◆	·	·	·	·	·	·	·	·	·	☼	·	·
5	3	49	2	98		✸	✸	☼	·	·	·	·	☼	✸	☼	·	◆	✸	·	◆	◆	◆	·	·	·	·	◆	◆	·	·	·	·	·	·	·	·	·	☼	·	·
6	2	49	2	99	100		✸	☼	·	·	·	·	☼	✸	☼	·	◆	✸	·	◆	◆	·	·	·	·	·	◆	◆	·	·	·	·	·	·	·	·	·	☼	·	·
7	1	78	8	70	78	79		◆	·	◆	·	·	☼	✸	☼	◆	☼	☼	·	◆	◆	◆	·	◆	·	·	◆	◆	·	·	◆	·	◆	·	·	·	·	✸	·	·
8	1	44	3	60	66	60	48		◆	·	·	·	◆	☼	☼	·	·	☼	·	☼	◆	◆	·	·	·	·	·	◆	·	·	·	·	·	·	·	·	·	◆	◆	·
9	0	28	14	3	9	6	17	27		·	·	·	·	·	·	·	·	·	·	·	·	☼	·	·	·	·	·	·	·	·	·	·	◆	·	·	·	·	·	◆	·
10	0	22	8	10	13	10	26	9	16		◆	·	·	·	·	◆	·	·	·	·	·	☼	·	☼	◆	·	·	·	·	◆	◆	·	◆	☼	·	◆	◆	·	·	✸
11	0	18	16	5	5	5	13	1	3	30		☼	·	·	·	☼	·	·	·	·	·	◆	☼	◆	◆	☼	◆	·	·	✸	☼	◆	◆	☼	☼	☼	◆	·	◆	◆
12	0	14	6	4	4	4	12	1	2	24	57		·	·	·	◆	·	·	·	·	·	·	◆	◆	◆	◆	·	·	·	◆	◆	·	·	·	·	◆	◆	·	◆	·
13	1	56	12	52	59	58	65	33	11	5	17	8		☼	☼	·	☼	☼	◆	◆	·	·	·	·	·	·	◆	◆	◆	·	◆	·	·	·	·	·	·	☼	·	·
14	2	56	13	82	90	90	81	62	19	4	3	1	63		✸	·	☼	✸	·	☼	·	·	·	·	·	·	◆	◆	·	·	·	·	·	·	·	·	·	✸	·	·
15	1	59	9	70	74	75	72	52	21	8	4	4	55	77		·	◆	☼	·	☼	☼	◆	·	·	·	·	◆	☼	·	·	·	·	·	·	·	·	·	☼	◆	·
16	0	57	24	14	17	17	47	16	9	50	63	41	23	16	14		·	·	·	·	·	☼	◆	☼	◆	◆	·	◆	·	☼	☼	◆	◆	◆	◆	◆	◆	·	◆	◆
17	1	46	31	43	48	49	54	24	21	3	8	2	57	69	42	16		◆	◆	◆	·	·	◆	·	·	·	·	·	◆	·	◆	☼	◆	·	·	·	◆	☼	·	·
18	1	52	3	80	83	81	68	53	4	18	9	8	59	76	66	23	35		·	☼	◆	◆	·	·	·	·	◆	◆	·	·	◆	·	·	·	·	·	·	☼	·	·
19	0	14	14	10	12	12	12	9	5	1	13	4	44	16	16	6	30	17		·	·	·	·	·	·	·	·	·	·	·	·	◆	·	·	·	·	·	·	·	·
20	0	53	23	30	36	35	40	53	20	13	9	4	31	53	58	24	44	51	17		☼	◆	·	·	·	·	·	☼	·	·	◆	◆	◆	·	·	·	◆	◆	◆	·
21	2	48	7	31	30	32	38	34	18	20	10	8	23	25	70	22	13	36	11	62		☼	·	·	·	·	·	☼	·	·	·	·	·	·	·	·	·	·	◆	·
22	1	57	18	23	26	25	47	32	56	53	27	24	22	24	42	59	22	31	8	42	55		·	☼	◆	·	·	☼	·	◆	◆	◆	☼	·	·	·	·	·	☼	◆
23	0	11	34	1	2	1	3	1	2	24	70	25	16	10	3	44	26	5	14	20	3	9		·	·	◆	◆	·	·	✸	◆	◆	·	☼	✸	✸	◆	·	·	◆
24	0	37	11	11	13	12	33	11	20	66	35	29	13	7	10	70	5	23	3	23	25	67	12		◆	◆	·	◆	·	◆	◆	·	☼	◆	·	·	◆	·	◆	◆
25	0	14	6	4	5	5	13	4	9	42	43	37	5	2	9	33	3	8	2	8	12	31	17	41		◆	·	·	·	·	·	·	◆	◆	·	◆	☼	·	·	◆
26	0	15	10	5	5	5	13	1	2	20	56	47	8	2	5	39	6	8	5	6	9	24	31	28	42		·	·	·	◆	◆	·	·	·	◆	◆	◆	·	·	·
27	0	26	6	32	36	35	35	20	1	9	26	15	39	37	29	23	25	34	15	18	9	8	40	10	8	13		·	·	◆	◆	·	·	·	☼	·	·	◆	·	·
28	1	53	9	37	43	41	50	47	24	21	13	8	38	44	59	29	23	44	12	64	56	53	5	35	19	9	19		·	·	◆	·	◆	·	·	·	◆	◆	◆	·
29	0	6	45	2	3	3	2	2	1	0	5	2	5	13	3	5	30	3	12	20	1	2	22	1	1	5	3	1		·	·	◆	·	·	·	·	·	·	·	·
30	0	22	13	10	10	10	18	5	4	41	76	34	20	5	7	63	9	15	9	9	12	29	87	34	25	37	44	14	3		☼	·	·	☼	✸	✸	·	·	·	◆
31	0	56	11	13	15	16	38	15	14	28	54	39	30	17	14	69	26	31	19	33	23	49	35	49	24	33	33	29	5	51		☼	◆	·	◆	◆	·	◆	☼	·
32	4	34	34	2	4	4	13	13	20	7	30	19	23	21	16	26	51	12	34	48	21	29	35	12	10	16	17	22	30	19	55		◆	·	·	◆	◆	·	◆	·
33	0	36	14	7	11	11	27	9	35	48	29	24	20	18	17	44	26	13	5	34	19	55	17	55	36	15	11	39	0	24	44	32		◆	·	◆	☼	◆	☼	☼
34	0	11	14	2	5	2	6	3	8	71	57	23	11	3	4	43	7	5	6	10	8	24	67	36	37	22	25	12	2	70	25	13	48		◆	✸	◆	·	·	✸
35	0	5	21	0	0	0	1	0	1	6	62	23	14	2	1	33	7	0	7	4	1	3	80	5	25	34	51	3	8	80	31	15	5	48		☼	·	·	·	·
36	0	8	20	1	2	1	3	0	3	42	73	39	15	7	2	45	21	2	12	15	3	11	80	20	37	38	25	6	14	74	29	28	33	79	63		◆	·	◆	☼
37	0	14	19	2	4	3	9	4	12	33	35	35	16	12	10	29	26	3	6	28	10	23	29	41	69	26	15	26	14	23	22	32	57	42	21	47		·	◆	◆
38	1	65	4	65	71	74	80	44	21	4	2	1	64	79	58	20	66	61	12	37	22	24	3	8	4	1	34	34	2	8	37	18	31	4	1	2	10		◆	·
39	0	42	11	3	7	7	18	25	37	17	27	27	19	15	23	31	15	14	7	43	30	45	20	23	15	14	18	40	1	24	54	47	62	21	17	26	32	24		·
40	0	5	10	0	4	1	3	2	13	78	29	13	5	4	5	30	7	5	3	20	12	28	38	45	36	11	15	20	3	39	14	11	64	86	18	59	49	4	24	

FIGURE 6.2-31.

MORISITA'S INDEX FOR NOVEMBER 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

CLUSTER DENDROGRAM FOR NOVEMBER 1983

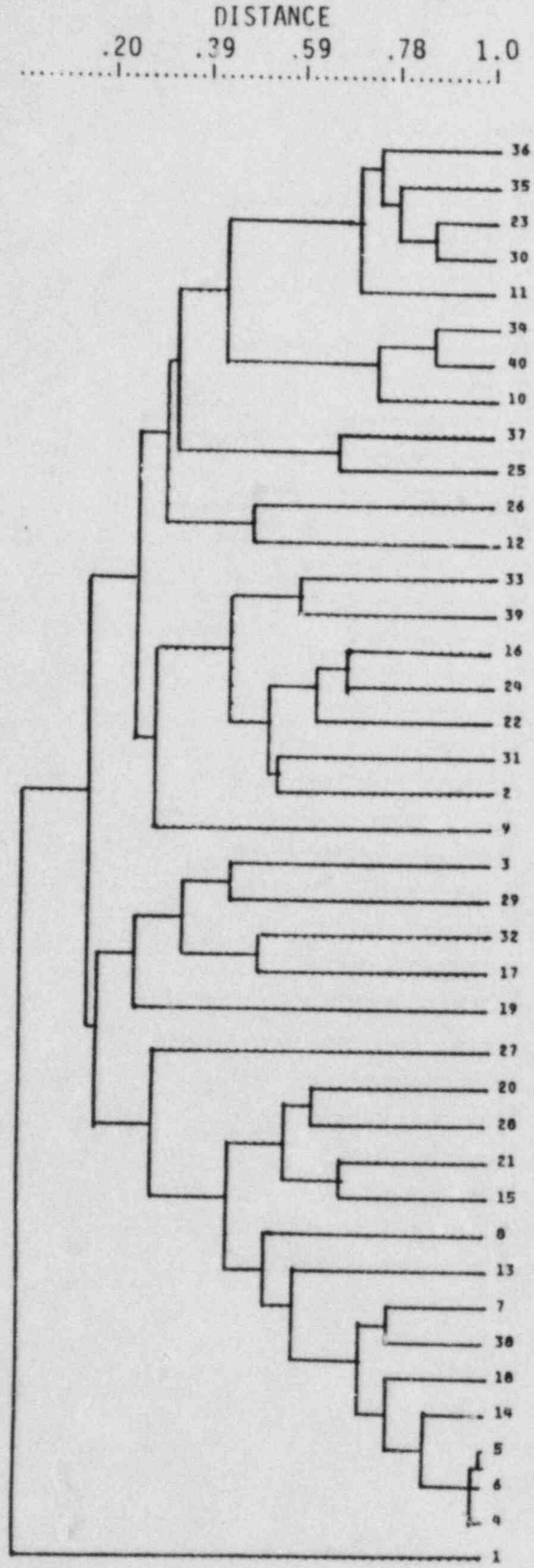

FIGURE 6.2-32.

CLUSTER DENDROGRAM FOR NOVEMBER 1983.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

JANUARY 1984

STATIONS	4	5	7	9	12	13	15	17	18	20	22	25	26	27	29	30	31	33	35	37
4		✱	✱	☼	·	☼	✱	·	✱	☼	·	·	·	☼	·	·	◇	·	·	·
5	97		✱	☼	·	☼	✱	◇	✱	☼	·	·	·	☼	·	·	◇	·	·	·
7	87	90		◇	·	☼	✱	·	✱	☼	·	·	·	☼	·	·	·	·	·	·
9	59	56	46		·	◇	◇	·	◇	◇	·	·	·	◇	·	·	◇	·	·	·
12	6	4	10	8		·	·	·	·	·	·	☼	◇	·	◇	◇	·	◇	·	◇
13	66	67	71	29	15		☼	◇	☼	☼	·	·		☼	·	☼	·	◇	☼	◇
15	85	90	97	49	6	65		·	✱	☼	·	·	·	☼	·	·	·	·	·	·
17	22	32	24	9	2	34	15		·	·	·	·	·	◇	·	·	◇	·	·	·
18	81	88	67	27	3	61	91	14		☼	·	·	·	◇	·	·	·	·	·	·
20	55	53	64	37	17	54	60	20	51		◇	·	·	◇	◇	·	◇	·	·	·
22	9	6	9	16	22	25	8	6	6	30		·	☼	·	◇	·	·	◇	·	☼
25	18	14	3	20	52	15	3	4	5	12	21		◇	·	·	◇	◇	☼	·	◇
26	[illegible]	1	2	3	50	21	1	3	1	6	54	36		·	·	·	·	·	·	✱
27	[illegible]	56	58	35	13	63	53	28	46	48	22	15	7		·	◇	·	·	·	·
29	10	8	21	8	47	25	14	4	9	47	42	19	23	17		◇	·	◇	·	◇
30	4	4	7	5	30	54	3	6	2	15	25	31	23	28	42		·	☼	✱	◇
31	37	33	12	34	14	29	8	34	13	33	20	46	6	21	22	18		☼	·	·
33	18	15	5	17	30	30	3	13	6	20	36	64	25	25	29	57	57		◇	◇
35	0	0	0	0	17	52	0	0	0	0	17	19	19	22	17	87	4	36		◇
37	4	3	2	7	41	29	1	6	1	8	60	49	77	15	29	43	12	48	34	

FIGURE 6.2-33.

MORISITA'S INDEX FOR
JANUARY 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

CLUSTER DENDROGRAM FOR JANUARY 1984

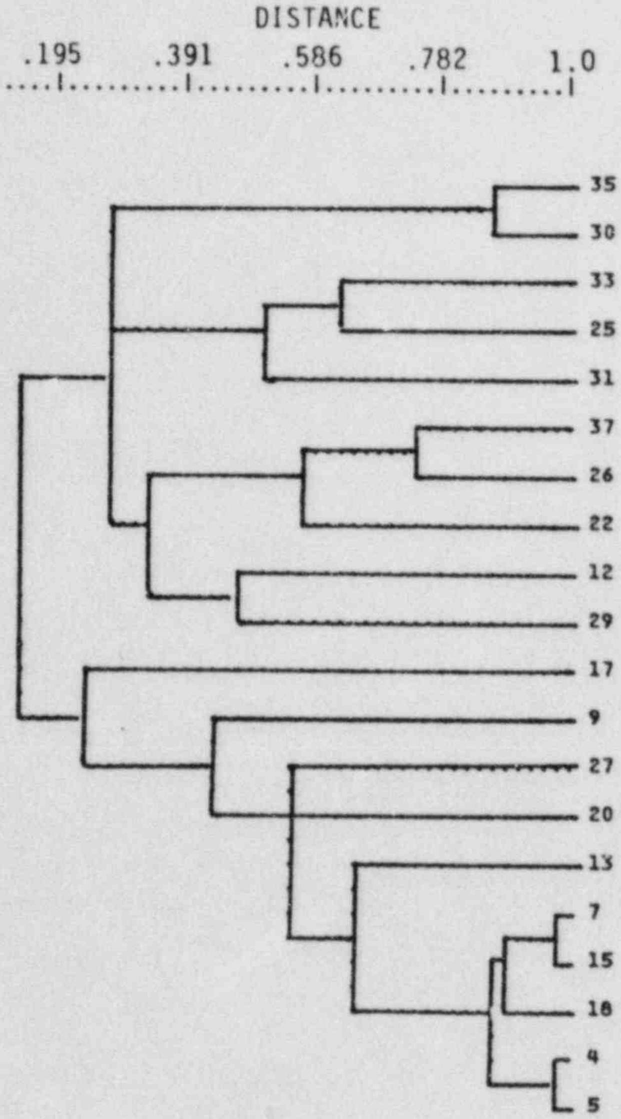

FIGURE 6.2-34.

CLUSTER DENDROGRAM FOR JANUARY 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

FEBRUARY 1984

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1																																								
2	8																																							
3	2	40																																						
4	22	41	13																																					
5	18	45	16	97																																				
6	18	32	6	96	93																																			
7	15	70	32	77	83	66																																		
8	19	34	6	76	77	73	59																																	
9	14	27	11	38	43	33	36	84																																
10	.7	16	10	8	12	5	13	48	75																															
11	1	5	17	1	3	1	5	3	5	9																														
12	1	21	33	7	9	2	23	2	7	8	14																													
13	6	42	22	27	33	24	46	22	16	13	10	17																												
14	18	43	7	91	90	90	78	75	39	16	2	3	34																											
15	18	40	18	92	89	90	72	70	30	4	8	2	21	90																										
16	2	51	45	13	21	5	55	10	23	32	12	42	36	13	3																									
17	6	33	2	21	33	22	35	24	22	16	2	1	56	28	14	28																								
18	17	44	11	76	76	69	70	77	54	28	4	6	37	80	76	13	27																							
19	2	21	22	8	9	6	20	6	9	18	6	11	45	21	10	22	8	31																						
20	5	32	23	26	30	21	45	22	23	30	4	20	34	46	24	42	15	47	58																					
21	12	52	20	44	48	38	54	59	60	48	17	13	28	53	41	35	22	69	37	60																				
22	3	34	33	14	16	9	34	13	17	31	10	30	28	21	12	49	9	33	39	59	42																			
23	4	21	9	8	11	6	21	25	41	69	5	8	23	32	8	34	13	24	46	72	47	43																		
24	1	31	23	9	12	4	40	8	11	18	14	21	13	13	5	75	12	14	12	22	18	27	23																	
25	1	14	16	3	4	1	33	3	8	44	12	29	9	5	1	45	3	5	13	20	14	42	40	39																
26	0	3	26	1	1	0	5	1	2	4	50	47	34	1	1	17	1	2	3	5	5	21	4	8	15															
27	5	26	35	13	16	11	23	24	31	31	14	13	37	20	21	19	22	29	25	27	30	24	28	8	8	17														
28	3	18	34	11	12	9	24	12	13	18	15	29	52	22	14	29	9	33	40	54	35	58	36	15	17	45	47													
29	1	25	31	5	7	3	23	7	9	20	15	27	41	20	5	40	13	33	49	68	40	70	47	34	24	34	28	72												
30	0	2	34	1	1	0	8	1	2	4	20	22	43	2	3	17	2	6	8	11	5	26	5	6	6	65	21	60	45											
31	3	37	15	16	19	13	28	18	18	15	5	11	23	21	15	29	24	33	21	39	48	20	27	27	11	3	14	25	32	4										
32	1	24	49	5	7	2	19	9	11	15	14	30	35	7	6	35	13	30	34	39	26	63	16	23	16	23	39	64	70	33	28									
33	1	16	46	6	10	2	25	1	6	11	18	37	47	4	2	50	6	8	13	27	14	38	14	26	21	58	21	60	49	79	16	41								
34	0	20	42	5	8	2	23	1	6	30	21	37	41	5	2	59	8	9	15	29	22	53	28	39	56	51	19	58	49	58	25	40	79							
35	0	0	22	0	0	0	5	0	1	1	14	22	31	0	0	11	0	1	1	3	1	11	1	2	2	52	14	45	27	87	2	17	65	43						
36	0	3	31	1	1	0	9	1	2	5	20	42	44	1	1	21	1	6	5	11	5	21	4	7	12	71	19	59	43	92	4	32	81	64	84					
37	1	36	55	13	20	4	43	3	12	15	19	58	28	4	3	80	11	7	15	34	21	44	15	43	42	31	14	29	36	27	21	38	58	63	19	33				
38	0	34	15	9	16	9	25	8	11	19	3	11	59	21	4	28	54	20	38	48	22	34	42	12	11	6	30	37	43	10	25	37	14	15	3	9	15			
39	1	25	30	3	5	2	15	7	11	18	14	22	29	7	3	39	9	19	19	29	35	38	25	34	35	32	21	50	51	33	47	46	47	61	23	36	34	15		
40	0	10	24	2	4	1	12	1	4	33	17	26	23	3	2	44	5	5	9	15	11	38	29	38	70	30	14	40	31	31	12	25	50	81	24	37	45	12	52	

FIGURE 6.2-35.

MORISITA'S INDEX FOR FEBRUARY 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

CLUSTER DENDROGRAM FOR FEBRUARY 1984

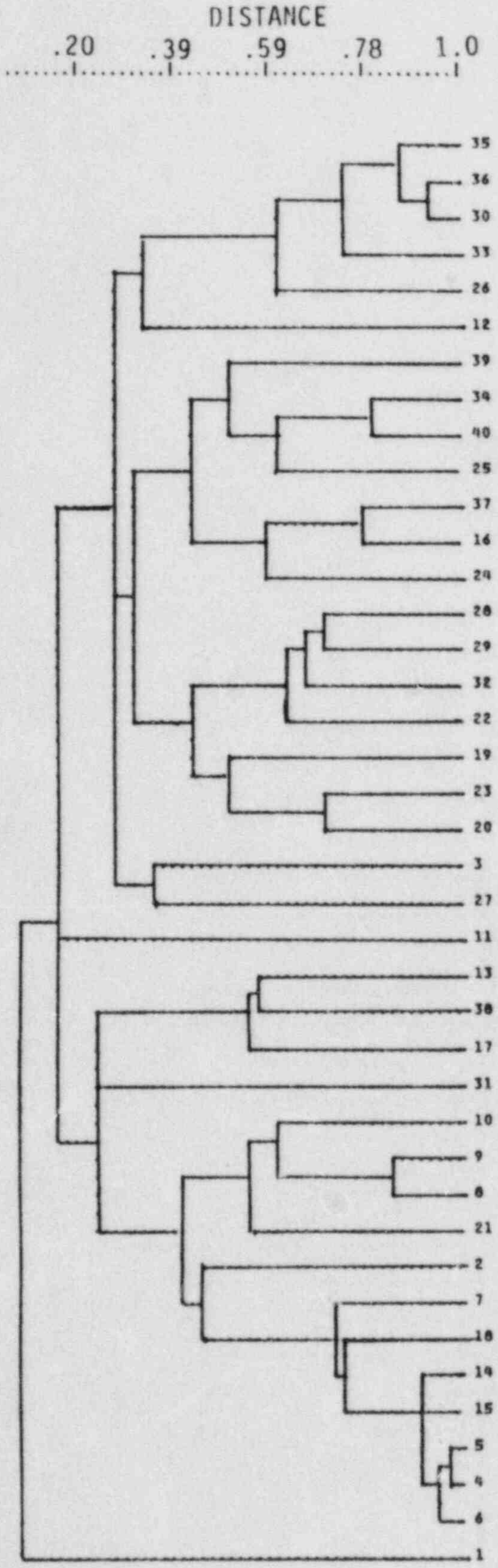

FIGURE 6.2-36.

CLUSTER DENDROGRAM FOR
FEBRUARY 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

APRIL 1984

STATIONS	4	5	7	9	12	13	15	17	18	20	22	25	26	27	29	30	31	33	35	37
4		◇	◇	·	·	·	◇	·	·	·	·	·	·	·	·	·	·	·	·	·
5	38		☼	◇	·	·	✱	◇	☼	·	◇	·	·	·	·	·	·	·	·	·
7	33	51		·	·	·	☼	◇	◇	◇	◇	·	·	◇	◇	·	·	·	·	◇
9	22	33	18		·	·	☼	·	✱	·	◇	·	·	·	·	·	·	·	·	·
12	1	1	4	2		·	·	·	·	·	·	·	◇	·	·	·	·	·	·	·
13	5	9	15	8	12		·	·	·	·	·	·	◇	◇	·	✱	·	☼	✱	·
15	40	80	54	60	2	8		·	☼	◇	☼	·	·	·	◇	·	·	·	·	·
17	12	38	49	11	1	18	16		·	·	·	·	·	·	·	·	·	·	·	·
18	21	55	37	86	2	13	72	21		◇	◇	·	·	·	◇	·	·	·	·	·
20	10	21	37	23	2	11	48	17	32		✱	◇	·	◇	☼	·	·	◇	·	·
22	17	26	36	40	3	10	57	13	46	80		☼	◇	◇	☼	·	·	☼	·	◇
25	1	1	10	9	12	21	5	4	13	29	53		✱	·	·	◇	·	☼	·	☼
26	2	3	8	12	34	36	7	4	16	23	43	81		·	·	◇	·	☼	◇	☼
27	11	24	32	2	6	32	23	24	12	26	31	12	17		◇	◇	✱	◇	·	·
29	11	8	32	22	5	16	31	13	33	61	63	25	17	36		·	·	◇	·	·
30	6	3	10	5	14	92	5	5	8	13	16	33	46	30	18		·	☼	✱	·
31	8	9	22	1	11	16	9	13	8	16	18	6	9	80	23	10		·	·	·
33	4	5	15	14	12	54	12	8	21	30	51	70	67	29	32	70	12		◇	◇
35	0	0	2	0	11	91	0	1	1	1	2	20	32	20	3	86	4	46		·
37	23	9	33	14	21	11	18	8	15	18	34	58	56	10	17	17	14	39	11	

FIGURE 6.2-37.

MORISITA'S INDEX FOR APRIL 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

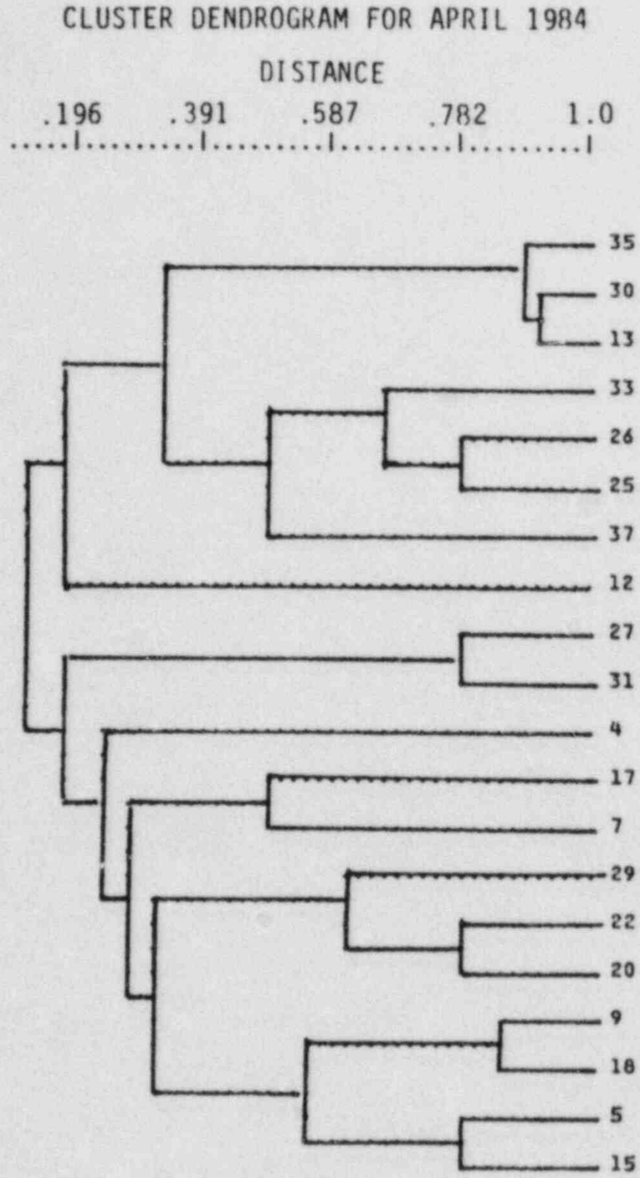

FIGURE 6.2-38.

CLUSTER DENDROGRAM FOR APRIL 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

JUNE 1984

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1																																								
2	4																																							
3	1	18																																						
4	59	2	1																																					
5	6	24	3	8																																				
6	8	48	11	8	55																																			
7	15	45	8	3	63	45																																		
8	8	34	3	7	77	53	85																																	
9	6	71	19	2	19	28	33	32																																
10	3	38	23	2	10	23	20	23	75																															
11	2	14	18	1	5	11	10	9	32	45																														
12	1	8	8	0	3	1	6	5	35	69	49																													
13	3	28	10	1	9	15	22	19	21	9	5	5																												
14	2	72	14	1	10	18	24	17	55	26	10	13	39																											
15	12	59	5	3	52	30	89	75	58	30	9	7	27	38																										
16	4	76	18	1	14	23	36	21	79	58	35	30	17	50	49																									
17	20	76	4	3	23	44	37	23	52	25	8	4	17	53	47	63																								
18	11	48	9	5	64	48	73	69	49	37	19	13	14	28	70	52	43																							
19	1	11	24	0	2	4	6	2	12	6	2	1	14	11	9	11	11	6																						
20	5	62	3	2	31	17	36	35	62	29	6	7	16	46	67	51	63	44	12																					
21	4	58	3	3	47	19	46	46	58	26	7	9	16	42	74	47	58	52	11	96																				
22	3	72	7	0	8	5	24	19	78	45	10	14	24	69	56	66	62	36	13	78	70																			
23	2	40	26	1	4	7	12	6	37	32	29	34	29	70	12	36	15	12	6	10	11	27																		
24	2	26	7	2	7	14	14	15	49	71	35	59	5	17	22	46	19	26	5	22	21	38	19																	
25	2	16	18	1	4	5	11	8	40	64	74	68	5	13	12	44	9	25	3	10	12	15	36	56																
26	2	10	7	0	2	3	7	4	17	16	79	27	3	7	9	22	7	14	3	8	8	7	20	12	56															
27	2	77	6	1	17	25	38	25	68	33	6	4	22	60	61	66	63	44	13	67	64	79	14	23	8	7														
28	1	27	11	0	2	2	6	3	15	6	8	12	28	69	6	14	10	4	2	8	7	19	68	3	10	5	9													
29	2	43	13	1	4	6	12	8	29	15	11	14	33	83	17	26	22	11	5	24	22	38	77	10	13	7	23	94												
30	1	28	15	1	3	6	7	4	14	8	11	16	28	69	4	14	7	4	2	3	4	15	77	5	13	7	5	97	95											
31	3	74	16	4	25	64	42	36	60	42	16	7	19	50	45	65	60	51	9	34	32	46	29	27	14	8	66	14	25	16										
32	3	29	21	2	9	26	24	12	22	17	8	6	10	27	19	23	18	22	10	12	12	16	24	12	11	6	47	14	19	18	45									
33	2	37	14	2	12	28	23	16	45	61	33	46	10	29	21	52	28	35	4	21	21	28	38	45	50	16	28	16	23	22	49	23								
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35	1	13	55	0	1	2	6	1	14	14	29	16	8	19	4	15	4	5	26	2	3	5	34	5	27	24	10	18	19	21	20	17	15	35						
36	0	15	11	0	5	5	14	7	16	28	20	20	2	7	10	29	11	19	2	8	9	23	12	40	33	13	13	2	6	3	14	8	38	15	11					
37	2	17	10	2	7	17	13	14	39	72	59	74	3	8	11	13	9	30	2	9	9	14	25	62	77	29	8	5	9	9	22	11	51	38	13	34				
38	4	31	13	2	12	38	20	14	15	6	6	7	16	38	13	17	15	12	5	8	8	14	33	4	7	4	19	30	33	32	35	30	15	11	10	2	5			
39	6	40	13	1	10	14	32	22	52	43	17	19	8	23	42	56	27	41	5	37	35	45	13	39	28	10	42	5	13	6	39	31	57	22	6	33	32	12		
40	0	11	3	0	5	4	10	7	18	28	14	23	2	7	10	25	10	15	2	14	13	21	8	34	21	5	13	2	4	2	10	4	43	12	10	69	24	2	31	

FIGURE 6.2-39.

MORISITA'S INDEX FOR JUNE 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

CLUSTER DENDROGRAM FOR JUNE 1984

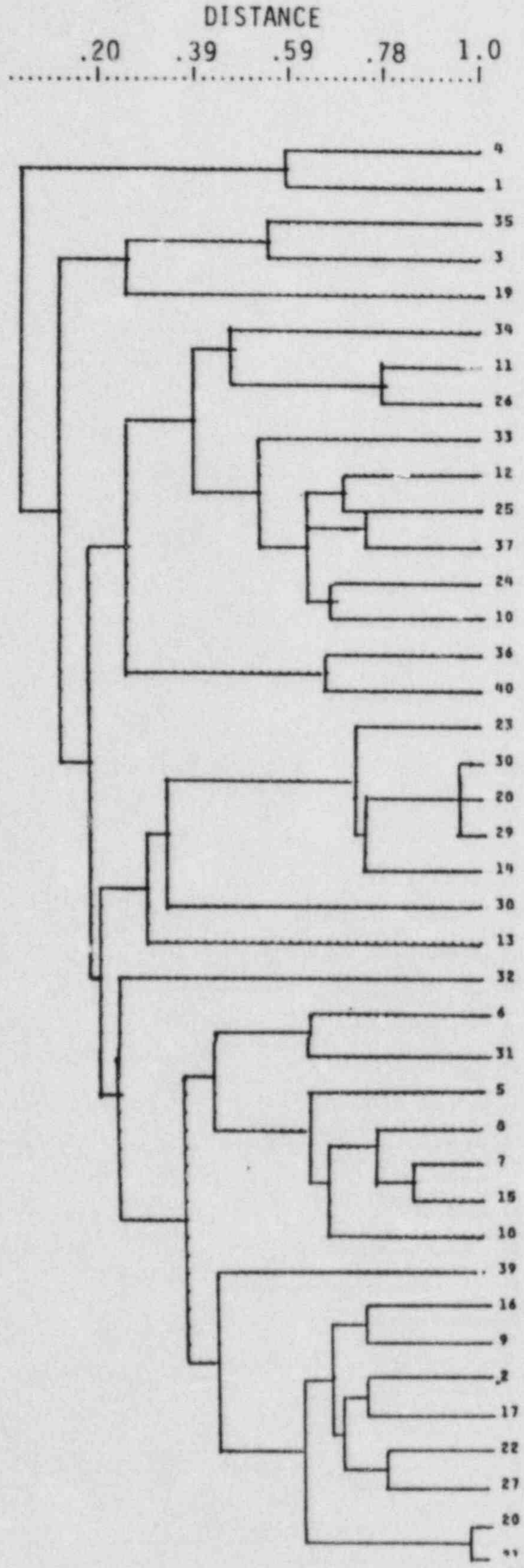

FIGURE 6.2-40.

CLUSTER DENDROGRAM FOR JUNE 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

JULY 1984

STATIONS	4	5	7	9	12	13	15	17	18	20	22	25	26	27	29	30	31	33	35	37
4		◆	◆	·	·	·	◆	·	·	·	·	·	·	·	·	·	·	·	·	·
5	40		✡	·	·	·	✡	◆	✡	◆	·	·	·	◆	·	·	◆	·	·	·
7	31	74		·	·	·	✡	◆	✸	✡	◆	·	·	◆	◆	·	◆	·	·	·
9	3	19	19		·	◆	·	◆	·	·	◆	·	·	·	◆	✡	◆	◆	✡	·
12	2	0	1	8		·	·	·	·	·		✡	·	·	·	◆	·	◆	◆	·
13	3	12	13	37	2		·	◆	·	·	◆	·	·	◆	◆	✡	◆	·	·	·
15	30	52	55	11	1	14		◆	◆	✡	◆	·	·	◆	◆	·	◆	·	·	·
17	7	27	34	26	2	47	38		◆	✡	✡	·	·	✸	✡	·	✡	◆	·	·
18	22	56	83	24	1	18	48	39		✡	◆	·	·	◆	◆	·	◆	◆	·	·
20	12	26	52	17	1	22	59	69	63		✡	·	·	✸	✡	·	◆	◆	·	·
22	10	25	38	45	15	31	49	64	44	67		·	◆	✡	✸	·	✡	✡	◆	◆
25	2	3	4	17	62	6	5	8	7	7	24		·	·	·	◆	·	◆	◆	◆
26	12	5	9	20	10	12	19	18	12	18	28	19		·	·	·	·	◆	◆	◆
27	9	28	42	22	1	38	46	92	47	82	71	8	19		✸	·	✡	◆	·	·
29	10	22	33	44	1	41	43	74	49	73	82	11	19	81		·	✸	◆	◆	◆
30	4	8	7	55	28	70	6	19	6	7	25	34	20	11	19		·	·	◆	·
31	9	28	38	36	2	36	32	62	43	45	66	11	16	68	78	13		◆	◆	◆
33	6	20	21	23	23	17	21	30	24	25	61	32	31	33	38	23	38		◆	◆
35	2	11	14	56	26	16	10	22	13	15	43	35	32	21	29	41	29	33		◆
37	3	7	12	22	17	20	11	21	14	15	37	49	39	23	30	18	34	35	33	

FIGURE 6.2-41.

MORISITA'S INDEX FOR JULY 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

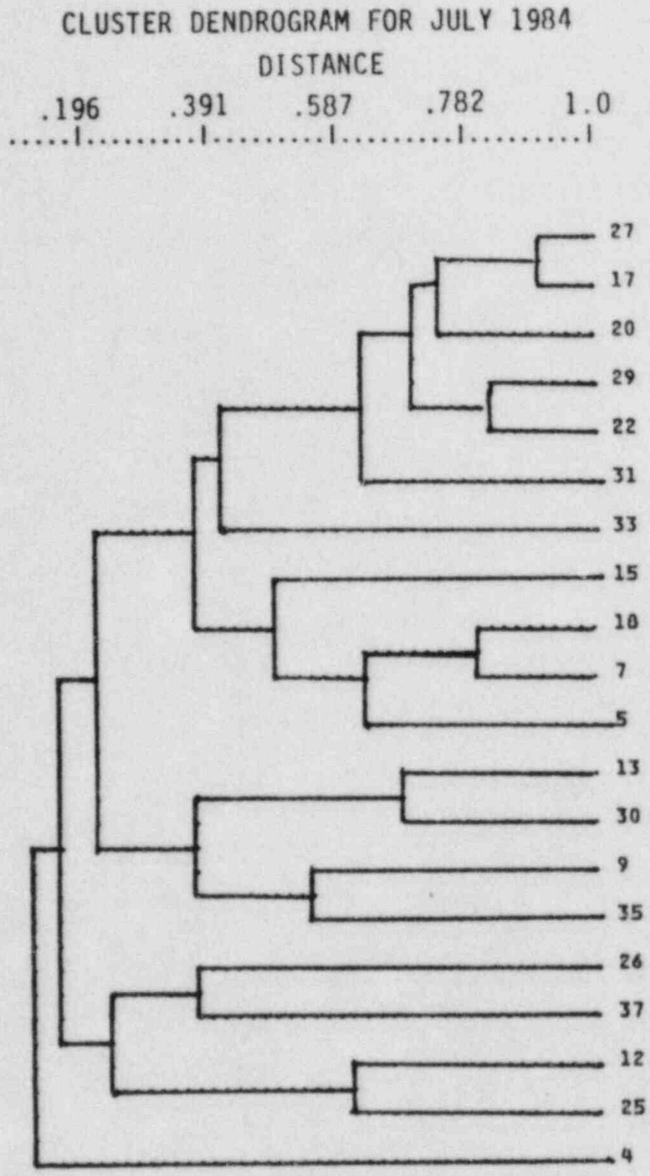

FIGURE 6.2-42.

CLUSTER DENDROGRAM FOR JULY 1984.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

ALL QUARTERLY DATES COMBINED

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1
2	1
3	1	27
4	86	20	6
5	7	45	11	45
6	7	53	11	42	56
7	5	75	16	33	78	85
8	8	39	7	37	82	80	71
9	5	52	33	16	39	38	54	47
10	1	21	13	4	9	8	21	14	55
11	1	16	25	3	6	6	13	4	30	32
12	1	13	17	3	6	5	11	3	27	51	55
13	3	62	19	16	38	47	56	32	40	15	25	16
14	4	59	16	26	61	67	74	59	59	28	18	12	68
15	7	51	14	37	83	85	82	84	40	11	6	4	42	72
16	1	47	32	7	18	21	45	13	51	53	55	48	41	37	15
17	4	55	9	13	35	49	53	21	28	15	9	6	57	56	34	34
18	7	49	10	36	81	84	80	83	43	14	7	7	44	68	89	21	34
19	1	26	23	4	12	16	22	7	21	11	10	6	43	28	16	19	32	19
20	4	59	16	23	53	54	68	54	58	27	10	10	46	74	73	29	51	67	28
21	5	55	12	23	53	54	67	60	52	22	10	9	39	59	74	24	49	68	23	92
22	2	52	24	10	23	24	48	26	76	57	32	30	45	64	37	58	40	35	29	74	60
23	1	22	41	4	9	9	17	8	38	37	54	45	50	45	10	56	21	12	16	22	15	44
24	1	30	17	4	10	9	27	7	46	70	40	50	16	21	9	69	14	12	11	23	18	55	31
25	0	15	16	2	4	4	12	4	28	53	47	83	10	10	6	46	8	7	7	13	12	36	33	65
26	0	14	20	2	4	3	10	2	19	17	76	66	23	17	4	41	10	6	9	10	9	23	49	25	60
27	3	62	19	14	37	47	60	32	51	23	20	15	63	68	46	40	60	45	36	54	46	57	34	20	12	17
28	1	13	15	3	7	8	12	8	17	9	31	19	44	45	11	29	18	11	10	16	11	23	72	7	9	29	22
29	1	14	34	2	4	5	9	4	18	9	21	13	29	22	7	23	12	7	31	16	10	28	42	10	15	23	16	29
30	1	14	22	5	9	9	13	7	16	13	39	27	45	38	10	38	17	9	10	10	8	21	81	11	15	35	20	95	32
31	1	58	24	10	26	32	47	17	52	30	27	22	48	49	22	60	47	30	31	41	30	54	37	42	22	21	65	18	17	19
32	2	32	46	5	8	11	19	6	35	17	32	23	34	29	15	39	22	14	38	25	17	40	43	24	21	29	54	21	31	25	60
33	1	28	26	6	14	13	21	5	41	40	51	47	45	36	8	64	24	9	15	24	16	47	77	44	35	41	34	52	28	60	47	40
34	3	16	27	5	7	7	13	3	35	75	57	65	26	21	7	59	14	8	12	16	12	41	65	59	56	44	20	33	20	43	28	27	68
35	0	7	23	0	1	1	4	0	9	5	36	30	37	30	2	28	10	1	6	3	2	13	76	4	20	39	21	88	29	90	15	22	52	36
36	0	11	23	1	2	2	7	1	17	31	50	55	43	31	3	46	12	4	8	8	5	25	87	25	42	53	19	75	34	84	19	30	72	64	80
37	1	32	26	9	20	16	22	5	44	46	51	70	23	17	7	59	14	8	11	21	15	41	42	67	67	49	21	16	16	23	41	31	61	58	20	43
38	2	43	21	9	22	30	33	14	26	10	33	22	63	52	18	43	47	22	27	23	18	29	65	12	12	31	49	61	28	65	47	40	58	33	58	64	24
39	1	39	26	4	10	10	26	11	51	37	41	36	33	33	12	64	22	17	18	34	27	57	50	48	33	34	38	26	20	30	66	51	65	44	24	38	50	38
40	0	12	12	1	4	4	9	3	31	71	34	50	16	15	6	47	9	6	7	17	13	42	42	64	50	[illegible]	18	19	11	24	19	15	59	78	20	47	54	19	41

FIGURE 6.2-43.

MORISITA'S INDEX FOR ALL QUARTERLY DATES COMBINED.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

CLUSTER DENDROGRAM FOR ALL QUARTERLY DATES COMBINED

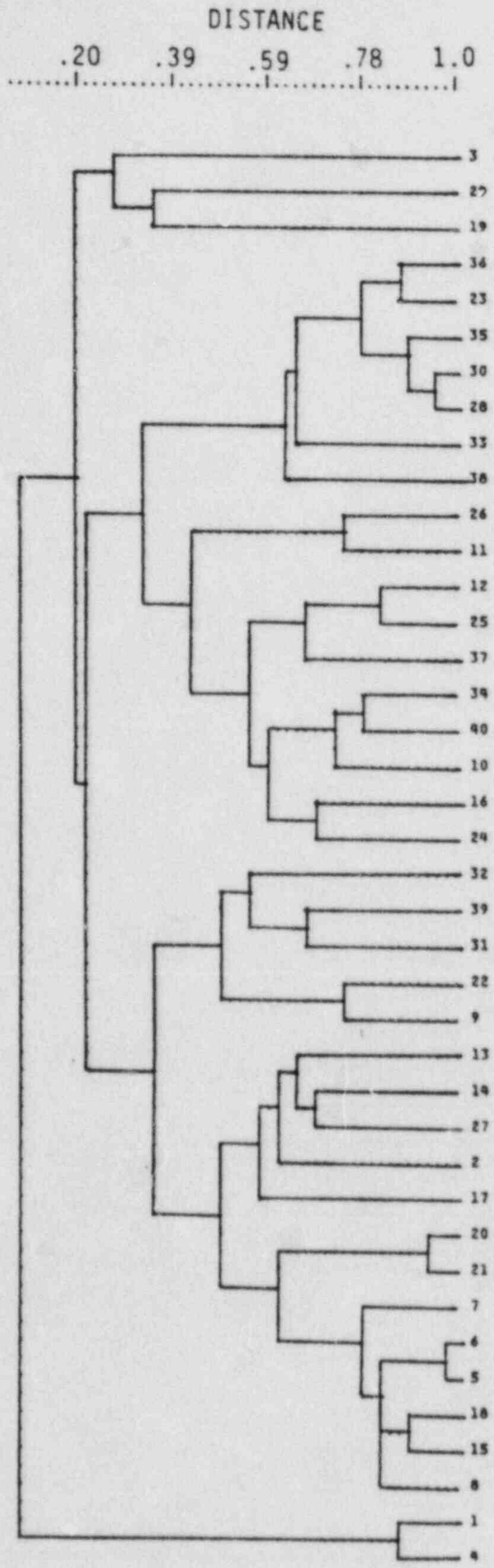

FIGURE 6.2-44.

CLUSTER DENDROGRAM FOR ALL QUARTERLY DATES COMBINED.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

MORISITA'S INDEX OF FAUNAL SIMILARITY (X100)

ALL QUARTERLY AND SIX WEEKS SAMPLES COMBINED

STATIONS	4	5	7	9	12	13	15	17	18	20	22	25	26	27	29	30	31	33	35	37
4		◇	◇	·	·	·	◇	·	◇	·	·	·	·	·	·	·	·	·	·	·
5	37		✱	◇	·	◇	✱	◇	✱	☼	·	·	·	◇	·	·	·	·	·	·
7	28	85		☼	·	◇	✱	◇	✱	☼	◇	·	·	☼	·	·	◇	·	·	·
9	16	42	51		◇	◇	◇	·	◇	◇	☼	◇	·	◇	·	·	◇	◇	·	◇
12	3	5	8	26		·	·	·	·	·	◇	✱	✱	·	·	◇	·	◇	·	☼
13	9	27	35	27	21		◇	◇	◇	◇	◇	·	◇	◇	◇	✱	◇	☼	✱	·
15	29	84	91	44	5	28		◇	✱	✱	◇	·	·	◇	·	·	·	·	·	·
17	11	41	47	19	4	38	29		◇	◇	◇	·	·	☼	·	·	◇	·	·	·
18	30	87	87	42	6	28	93	30		☼	◇	·	·	◇	·	·	·	·	·	·
20	18	53	73	49	11	28	76	43	69		☼	·	·	☼	·	·	◇	◇	·	·
22	8	21	44	66	33	31	37	31	30	70		◇	◇	☼	◇	·	☼	☼	·	◇
25	3	7	12	31	77	15	8	7	7	16	40		☼	·	·	·	·	◇	·	✱
26	2	4	9	22	77	36	6	6	6	12	31	62		·	◇	◇	·	◇	◇	☼
27	11	39	57	41	15	50	46	54	41	53	59	15	18		·	·	☼	◇	·	·
29	3	6	14	22	22	32	11	11	10	22	39	18	28	22		◇	·	◇	·	·
30	4	8	12	19	27	85	8	11	8	11	23	22	39	23	30		·	☼	✱	◇
31	9	24	36	45	23	33	21	36	23	38	56	25	23	69	23	18		◇	·	◇
33	6	14	20	44	46	55	10	20	11	25	53	44	45	38	29	57	49		◇	☼
35	0	1	3	10	25	78	2	5	1	3	13	20	38	21	25	92	11	46		·
37	7	15	18	43	74	24	8	10	10	19	47	76	65	22	23	26	39	63	21	

FIGURE 6.2-45.

MORISITA'S INDEX FOR ALL QUARTERLY AND SIX WEEK SAMPLES COMBINED. CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

CLUSTER DENDROGRAM FOR ALL SIX WEEK
AND QUARTERLY SAMPLES COMBINED

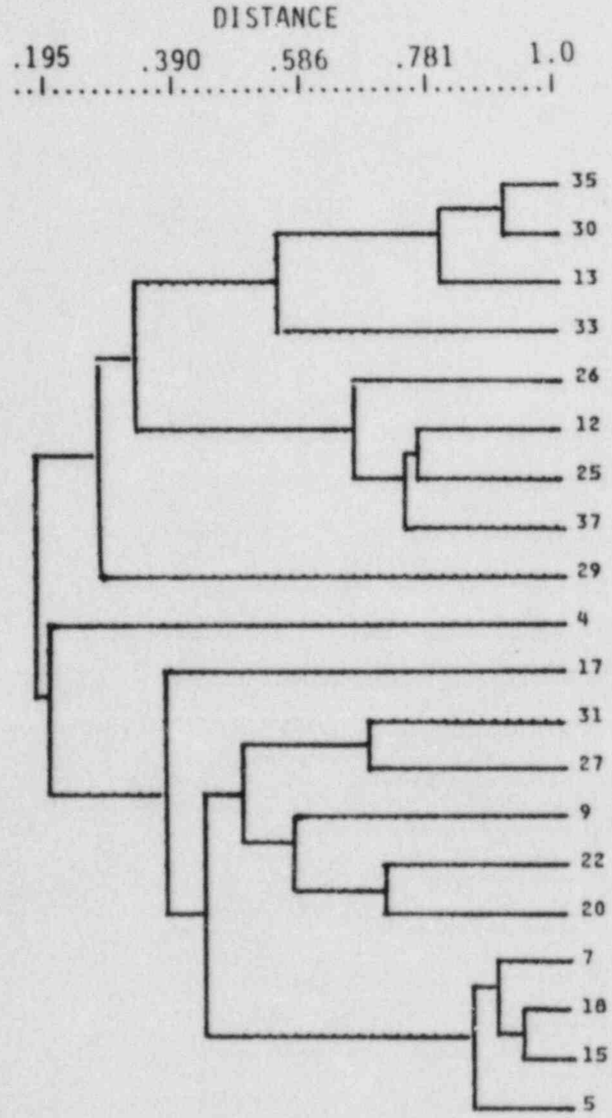

FIGURE 6.2-46.

CLUSTER DENDROGRAM FOR ALL QUARTERLY AND SIX WEEK SAMPLES COMBINED.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

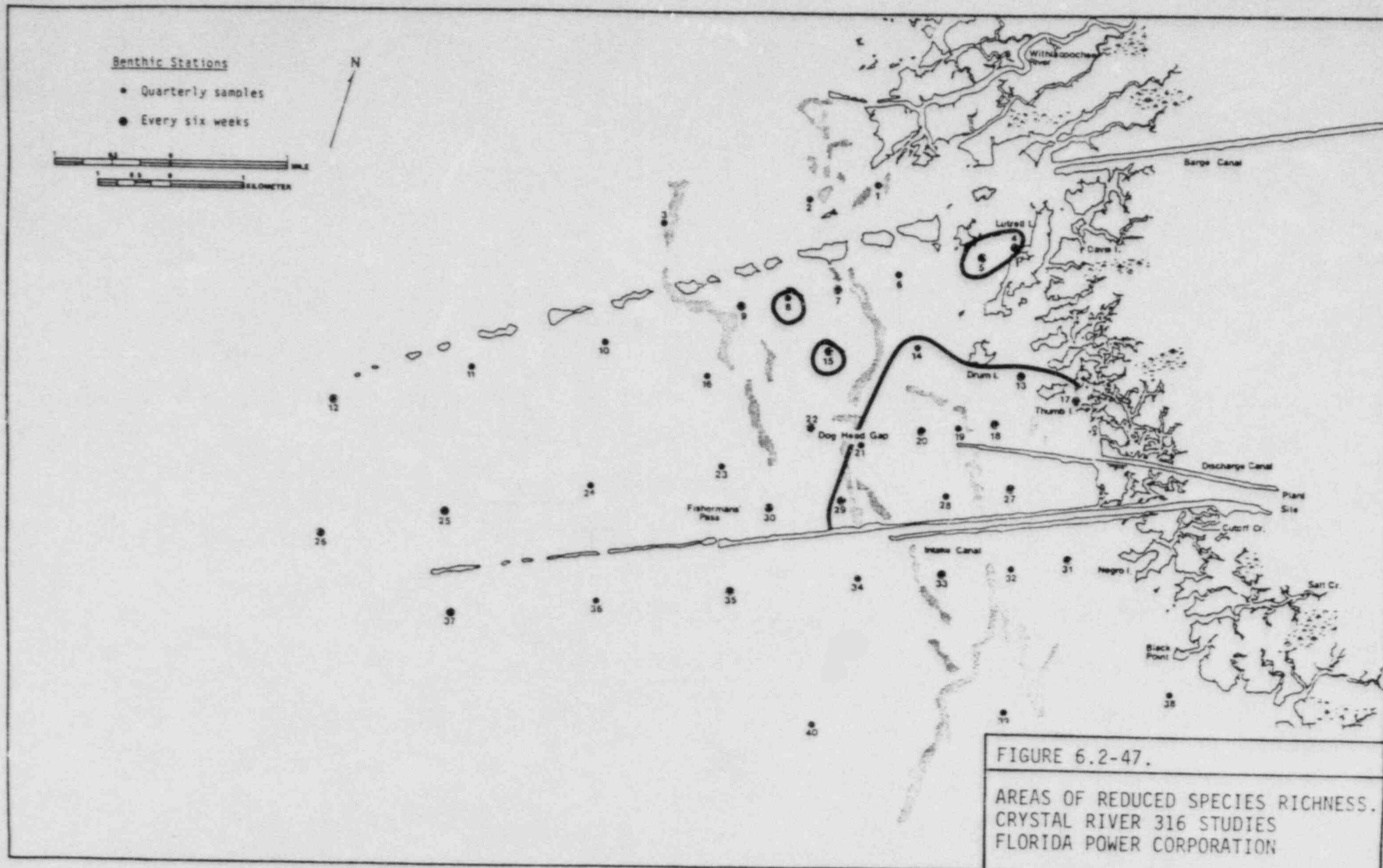

FIGURE 6.2-47.

AREAS OF REDUCED SPECIES RICHNESS.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

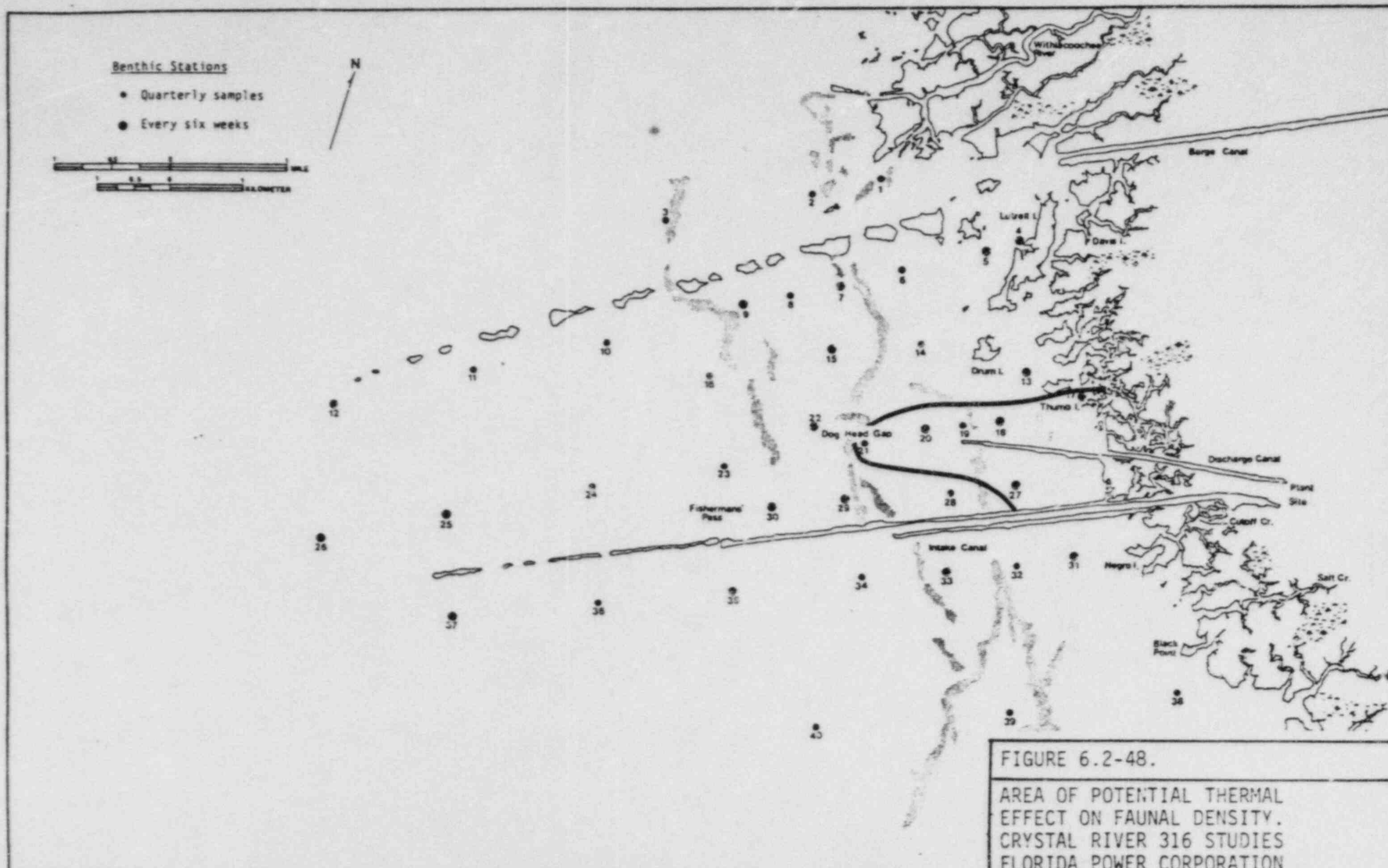

FIGURE 6.2-48.

AREA OF POTENTIAL THERMAL EFFECT ON FAUNAL DENSITY.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

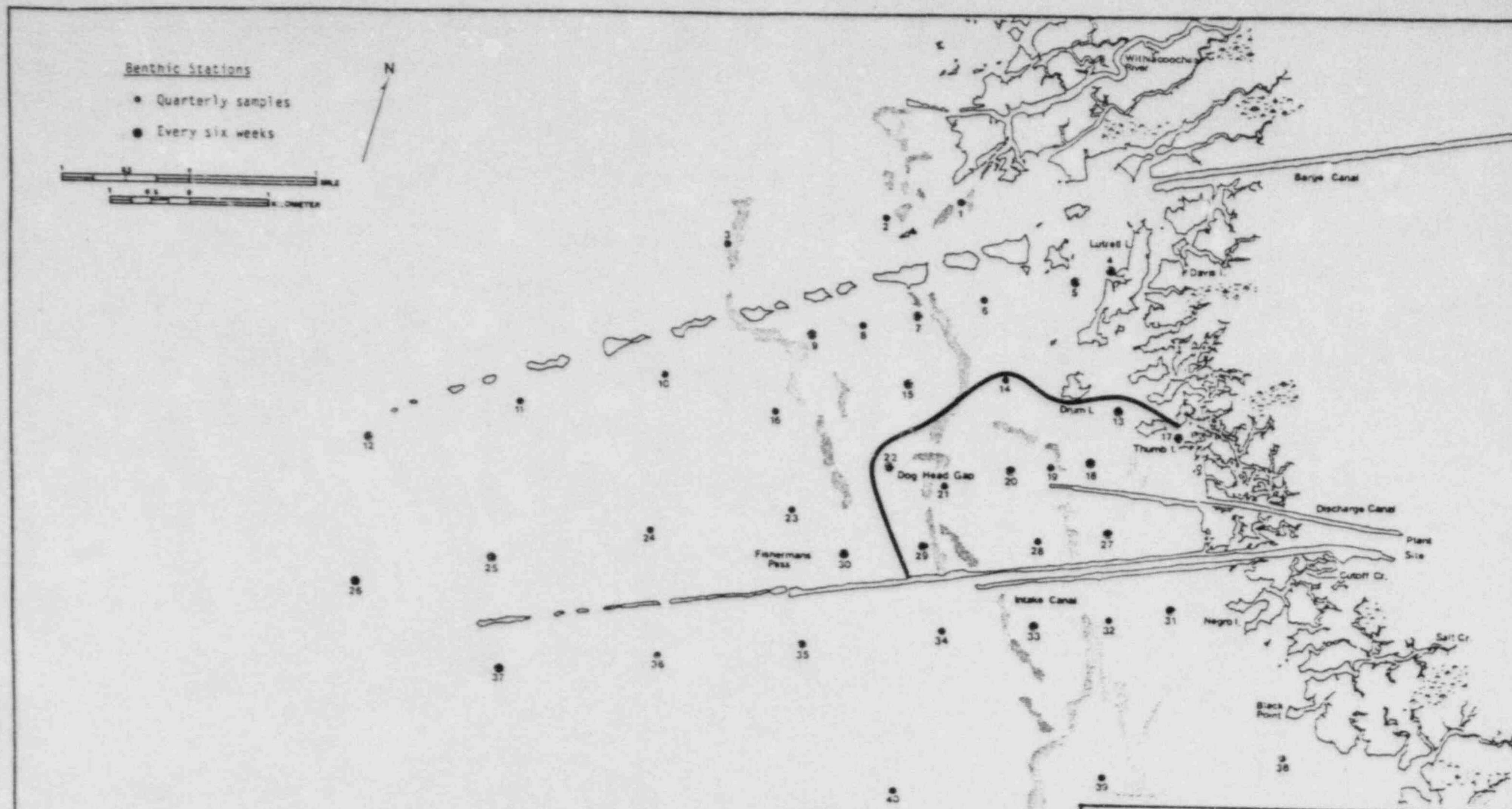

FIGURE 6.2-49.

AREA OF THERMAL EFFECTS ON EURYTHERMAL/OPPORTUNISTIC SPECIES. CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

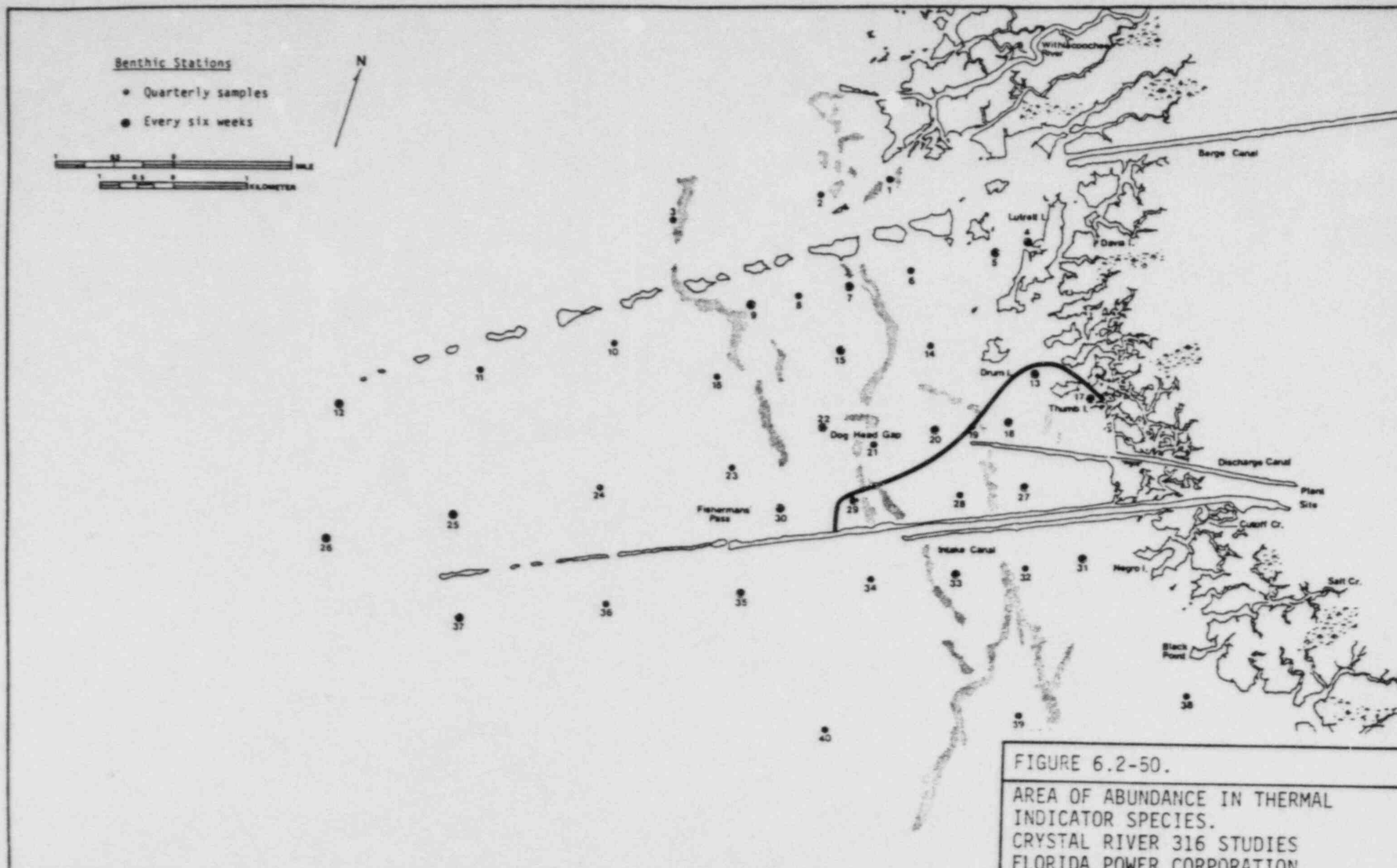

FIGURE 6.2-50.

AREA OF ABUNDANCE IN THERMAL INDICATOR SPECIES.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

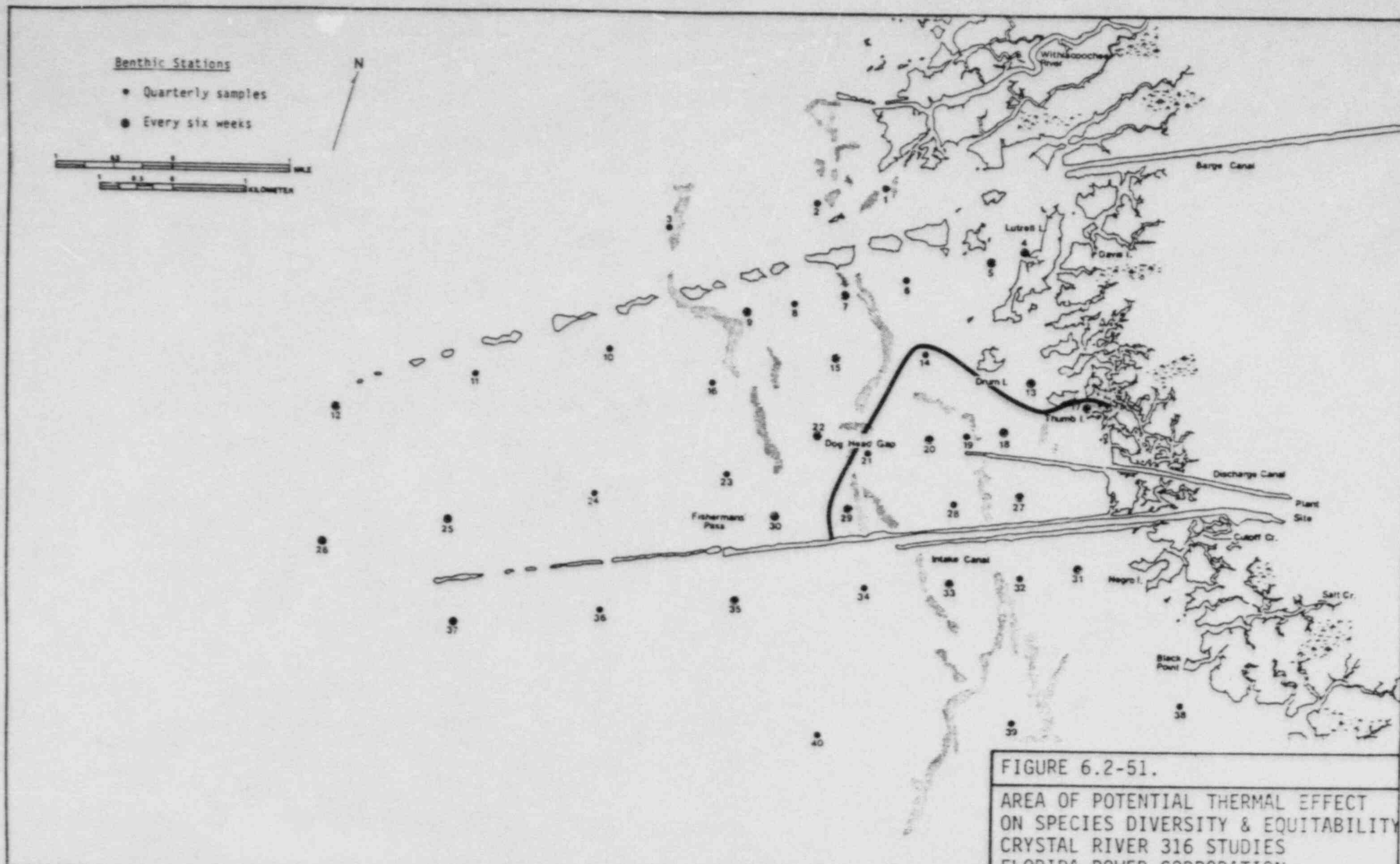

FIGURE 6.2-51.

AREA OF POTENTIAL THERMAL EFFECT ON SPECIES DIVERSITY & EQUITABILITY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

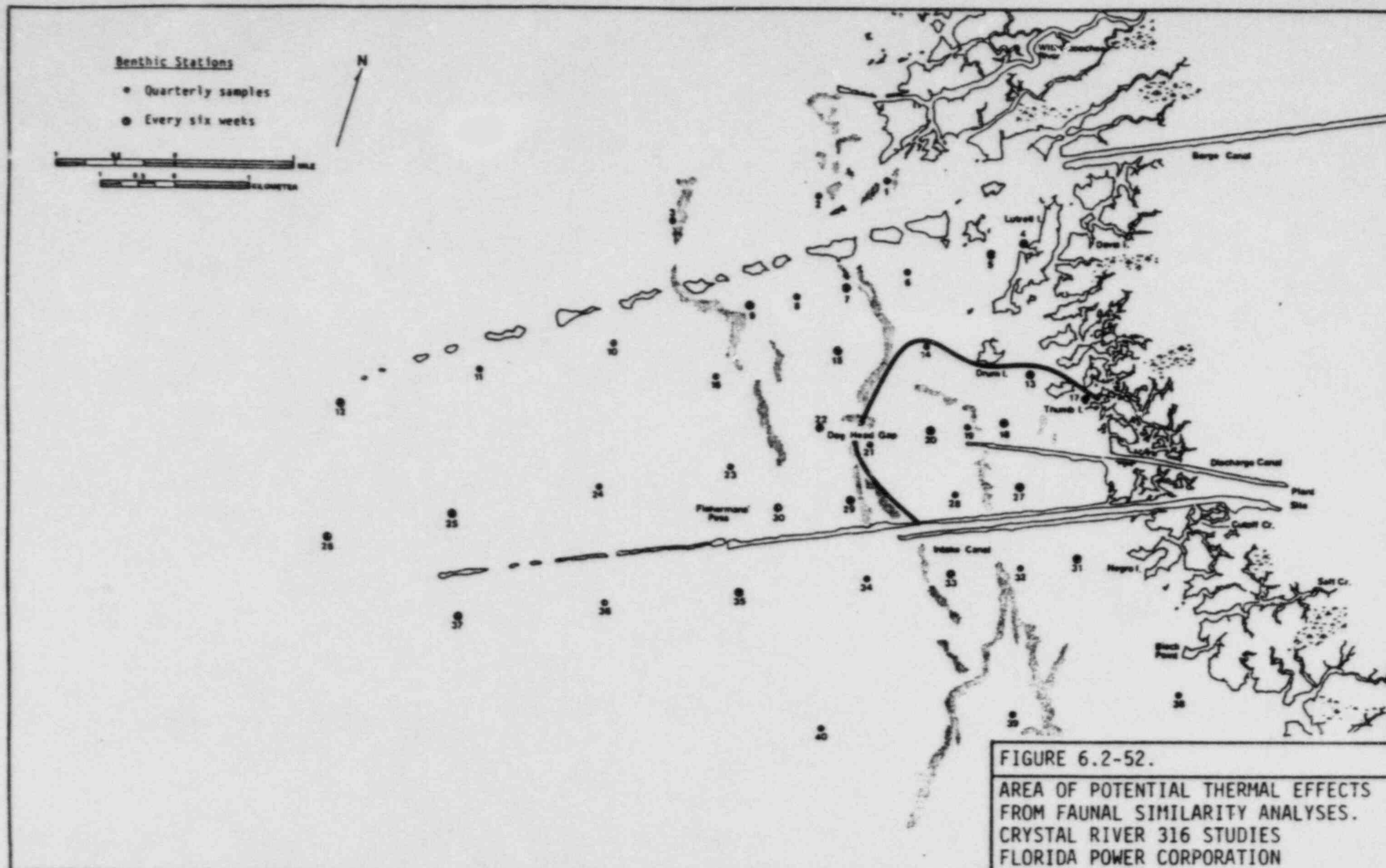

FIGURE 6.2-52.

AREA OF POTENTIAL THERMAL EFFECTS FROM FAUNAL SIMILARITY ANALYSES. CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

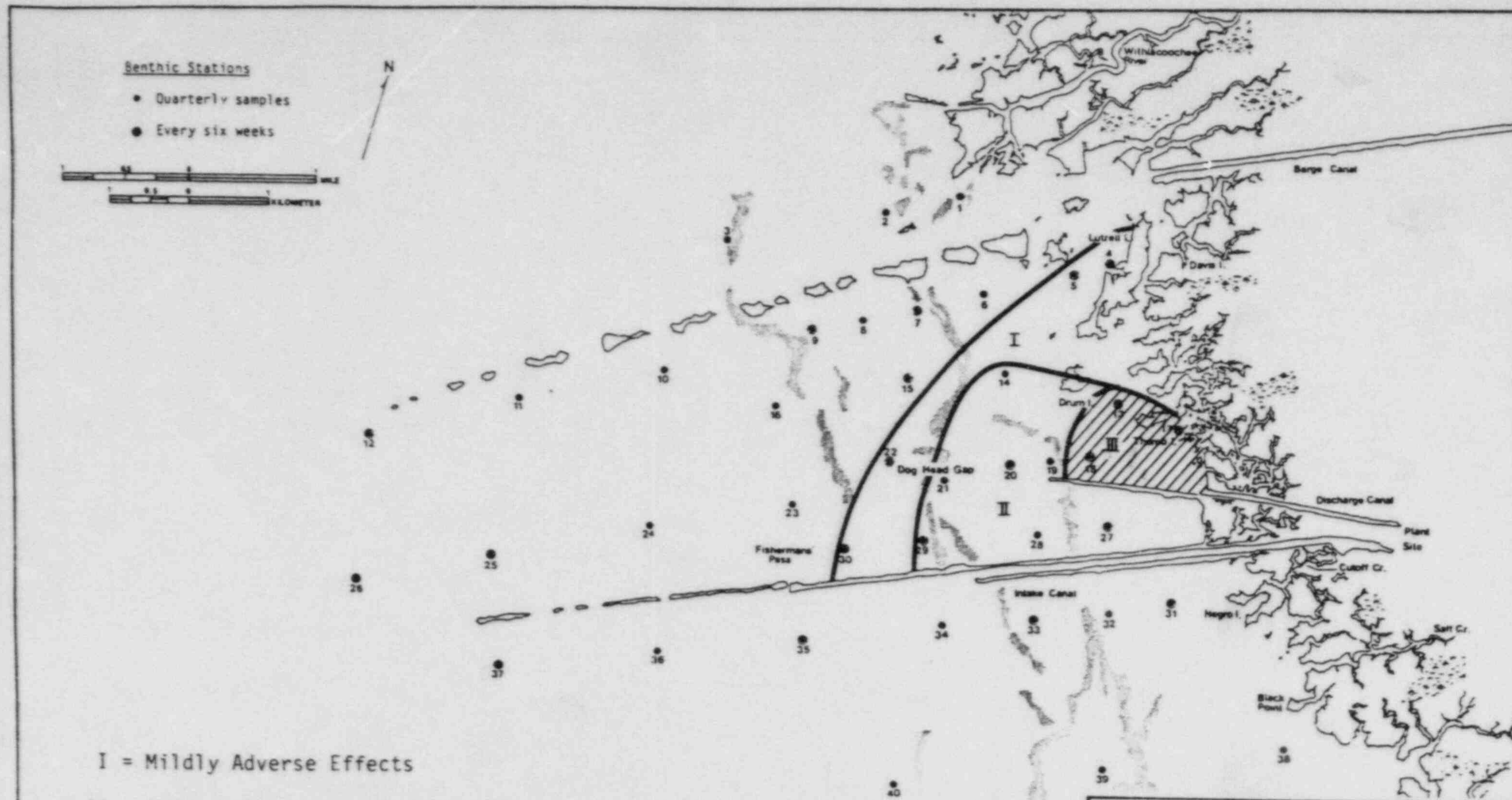

FIGURE 6.2-53.

ZONES OF ADVERSE THERMAL EFFECTS.
CRYSTAL RIVER 316 STUCIES
FLORIDA POWER CORPORATION

6.3 MACROPHYTES

6.3.1 Sampling and Laboratory Analysis

Three areas were selected to study the submergent macrophyte communities in Crystal Bay. The area between the CFBC and the intake spoil was defined as the thermally affected area. Two control areas were also sampled - one located off the Withlacoochee River and the CFBC and one off Crystal River. Fifty stations on 10 transects were established (Figure 6.3-1) for ground truthing. Of these stations, nine were designated as intensive monitoring (IM) stations and were subjected to a more extensive sampling program.

Quarterly overflights to shoot 1:18,000 (1 in. = 1,500 ft) scale vertical color aerial photographs were planned to map the distribution of the seagrass and macroalgae in the study area over the course of 15 months. However, conditions at the site prevented successful aerial photography as scheduled. Photographs which could be used for ground truthing were obtained only three times during the study (October 1983; February and April 1984). These photographs, along with others obtained from various sources were then groundtruthed each quarter by teams of divers.

Ground truthing was performed at each of the 50 stations using 10 randomly placed 1-m^2 quadrats. Quadrats were surveyed by divers who estimated percent cover for each species of seagrass and rhizophytic alga observed. An estimate of the percent bare bottom was also made during the latter part of the study. Estimates of percent coverage were facilitated by dividing each quadrat into 25 subunits (a 5 x 5 grid) and estimating percent cover in each subunit.

Of the nine stations selected (Figure 6.3-1) for intensive monitoring, three (A, D, and G) contained _Halodule wrightii_ as the dominant seagrass; 3 (B, E, and H) contained _Syringodium filiforme_ as the dominant seagrass; and 3 (C, F, and I) contained _Thalassia testudinum_ as the dominant seagrass. These stations were sampled at 6 week intervals between June 1983 and July 1984, for a total of 10 sampling episodes. In addition to percent cover estimates, biomass and productivity samples were collected during each sampling episode.

Above-ground biomass of seagrass and algae was sampled using a plexiglass clip box sampler (25 x 25 cm). The box was inserted into the sediment and all plant material was clipped at the sediment surface. The clipped material was retained in the box. Six replicates were collected in this fashion at each IM station during each sampling episode. Samples were preserved in the field in 5-10 percent formalin in seawater. Five replicates were analyzed by sorting the plant material to species; drying to constant weight at 70°C; and weighing. The sixth replicate was saved, principally in case of loss or damage to one of the first five; however, the sixth replicates were examined to identify the algal epiphytes present.

Estimates of seagrass productivity (after Zieman, 1975) were based on quadrat sampling. Quadrats measuring 10 cm x 10 cm were employed at _Halodule_ stations (A, D, and G); 10 cm x 20 cm quadrats were used at all other IM stations. Three quadrats were placed at the time the clip box samples were taken. After placement, all seagrass blades within the quadrats were clipped off level with the top of the quadrat and discarded. Two weeks later the uadrats were revisited and all new growth was harvested and preserved in

5-10 percent formalin/seawater. Samples were returned to the laboratory, sorted, dried to constant weight, and weighed. Shoot counts were made both at the time of quadrat placement and at harvesting using seven randomly placed 10 x 10 cm quadrats at Halodule stations and four 10 x 20 cm quadrats at Syringodium and Thalassia stations.

SAS was used to provide summary tables of percent cover, growth rates, total standing biomass, and total shoot density by time and station. The SAS GLM procedure was used to provide an analysis of covariance for the above four measures of macrophyte abundance. Tukey's HSD test was used to contrast means of main effect variables of station and time period. These analyses were also conducted by species to compare differences across stations for each species.

6.3.2 Results

Five species of seagrasses were observed in the Crystal Bay area during the course of this study: Ruppia maritima L., Halophila engelmannii Aschers; and Thalassia testudinum Banks ex Koenig, and Syringodium filiforme Kuetzing and Halodule wrightii Aschers.

Seagrass diversity (number of species) at the nine intensive monitoring stations over the course of this study is summarized, in Table 6.3-1. The three southern stations (A, B, and C, south of the intake canal) and the two central stations (E and F) usually contained the highest number of seagrass species, although in the last two sampling periods one or more of the three northern stations (G, H, or I) contained the greatest number of species. Station D (in Basin 1) routinely contained only one species of seagrass, Halodule wrightii.

Parameters of the seagrass communities which were measured were biomass (above ground standing crop), shoot density, productivity and percent cover. Table 6.3-2 summarizes the results of the ANOVA analyses on the seagrass data. Time (sampling date) and station were the two parameters which consistently had a significant effect on seagrass biomass, productivity, shoot density and percent cover. In most cases, the effect was highly significant (P less than 0.01, see Table 6.3-2). The other parameters tested showed no clear pattern. Temperature, salinity, pH, dissolved oxygen (DO), and the extinction coefficient (light penetration), all measured at the bottom, had a significant effect on the different species of seagrasses, but in a sporadic fashion, affecting various species differently (e.g., biomass in some cases, productivity in others, etc.). The environmental factors used in the ANOVA analyses are, of course, linked with the time of year and station location, and the relationship between these factors is examined in Section 6.1.

For all seagrasses combined, one or more of the three southern stations (A, B, and C) consistently had significantly higher biomass, shoot density and productivity than the other intensive monitoring stations. Appendix IV contains the results of the ANOVA analyses on the total seagrass data. There were some variations in this general pattern depending on the species of seagrass, i.e., Halodule stations tended to have higher shoot densities than Syringodium or Thalassia stations, since the former species is smaller, and thus has more shoots per unit area. Halodule stations had lower biomass and productivity compared to Thalassia and Syringodium stations, since the latter two species have larger blades than the former. Stations E and F typically exhibited intermediate seagrass biomass, shoot densities, and productivities. Stations G, H, I, and D usually displayed significantly lower seagrass parameters than the other stations. Temperature, salinity, pH and DO were environmental factors which significantly influenced the measures of abundance of total seagrasses.

The following paragraphs discuss the analytical results for each species of seagrass separately.

Halodule wrightii

The ANOVA analyses performed on the Halodule percent cover, biomass, shoot density, and productivity data are presented in Appendix IV. Table 6.3-3 summarizes annual means for each of these items. Station A exhibited significantly higher biomass, shoot density and productivity than the other two Halodule intensive monitoring stations (D and G). Stations D and G did not differ significantly with respect to biomass or productivity, but Station G had a significantly greater shoot density (number per area) than Station D. All three Halodule stations were similar with respect to percent cover (areal coverage). This is contrary to the ANOVA results, which indicate that station differences do exist for percent cover, however the multiple comparison test used (Tukey's test) is very conservative. In addition, Zieman (personal communication) has questioned the value of percent cover data as an indicator of thermal effects of seagrasses.

Typically, productivity, biomass, shoot density and percent cover of Halodule were all significantly higher during the late spring -summer - early fall sampling periods. Salinity, pH, DO and light levels were environmental factors which significantly influenced one or more of the Halodule measures of abundance. Appendix IV contains summary tables on Halodule biomass, productivity and shoot density by sampling date and station.

Syringodium filiforme

The ANOVA analyses performed on Syringodium percent cover, biomass, shoot density, and productivity are presented in Appendix IV. Station B had significantly higher biomass, productivity, shoot density and percent cover than the other two Syringodium intensive monitoring stations. Station E had significantly higher biomass, shoot density and percent cover than Station H, but these two stations did not differ with respect to productivity. The summer months typically exhibited significantly higher Syringodium biomass, shoot density, productivity and percent cover. However, percent cover tended to be significantly higher during the winter months relative to the other three parameters examined. Temperature, light, salinity and DO were the environmental factors which significantly influenced Syringodium parameters. Syringodium biomass, productivity and shoot density by station and month are summarized in Appendix IV. Annual means by station and sampling date are shown in Table 6.3-4.

Thalassia testudinum

The ANOVA analyses performed on Thalassia percent cover, biomass, shoot density, and productivity data are presented in Appendix IV. Station C exhibited significantly higher Thalassia biomass, shoot density, and productivity than Stations F and I, which did not differ for any of these parameters. Thalassia percent cover among stations was not tested, since in two cases (Stations E and F and Stations B and C), a Thalassia and a Syringodium station were located in the same grassbed and sampling results were for a mixed seagrass bed. For the four Thalassia parameters tested, significantly higher values were observed during the summer sampling periods, but the winter values for Thalassia tended to place relatively higher in the rank order, compared to the winter values of Syringodium and Halodule. Temperature, light and pH were environmental factors which significantly influenced the Thalassia measures of abundance. Thalassia biomass, productivity and shoot density by station and month are summarized in Appendix IV. Annual means by station and sampling data are shown in Table 6.3-5.

Macroalgae

Rhizophytic Algae

Table 6.3-6 lists the species of rhizophytic (attached) algae observed during the course of this study. More stations south of the power plant discharge (Stations 32 and higher) supported rhizophytic algae, compared to the northern stations, and the southern stations usually exhibited higher rhizophytic algal percent cover than the northern stations (see quarterly data tables). Percent cover was higher during the summer/fall period. Rhizophytic algal diversity is summarized in Table 6.3-7. More species of rhizophytic algae were found at the three southern intensive monitoring stations (A, B, and C) throughout the study period, compared to the other intensive monitoring stations.

Rhizophytic algal biomass was significantly correlated to time (sampling date), station and bottom DO. Results of the ANOVA analyses are found in Appendix IV. Station E had significantly higher biomass compared to the other stations. Other than for this station, however, no clear station trend was evident. Rhizophytic algal biomass was significantly higher during the summer/fall sampling periods.

Drift Algae

A number of species of drift algae were collected during the course of this study. These are listed in Table 6.3-6. Percent cover was the only drift algal parameter measured and statistically analyzed. Time, station, temperature and salinity at the bottom had significant effects. Station B had the significantly highest drift algal percent cover, but no other clear trends were evident. Drift algal percent cover tended to be significantly higher during winter and summer months.

Typically, a species of Gracilaria (G. tikvahiae or G. verrucosa) tended to dominate the drift algae throughout the year in the northern half of the study area (the discharge area and north), with Sargassum filipendula locally dominant in areas with rocky bottom. Gracilaria debilis and/or G. sjoestedii dominated the drift algae in the southern part of the study area in the winter. Drift algae appeared to form a lesser proportion of the total macrophyte cover during the summer months in the south part of the study area. Red algae, as a group, were the dominant component of the drift algae in the study area throughout the period of study.

Total Macrophyte Percent Cover

An estimate of the percent bare substratum was made when estimating percent cover of the different species of macrophytes, in order to obtain an estimtae of total macrophyte cover. Time, station, bottom temperature and DO had significant effects on total macrophyte cover (see Appendix IV). The southern intensive monitoring Stations A and 47 (B and C) had the significantly highest total macrophyte coverage. Stations 33 (E and F) and I were intermediate, and Stations D, H, and G had significantly lower total submergent macrophyte cover. Station D exhibited the lowest total macrophyte cover. Total macrophyte cover tended to be significantly higher during the summer months. Drift algal cover and occurrence in the thermal areas was lower during the summer than it was in other parts of the study area.

Macrophyte maps of the area show much higher total macrophyte cover in the south part of Crystal Bay (south of the intake canal and dike) compared to the northern region. Figures 6.3-2 to 6.3-10 show macrophyte distribution in Crystal Bay in February 1984.

Syringodium was not widely distributed at many of the stations in the northern half of the study area, but occurred frequently at many southern stations throughout the study period. This was not the case for the other species of seagrasses observed. These species typically occurred at similar numbers of southern and northern stations. Thalassia and Syringodium occurred at the fringes of Basins 1 and 3, but were not found within these basins at the hottest areas of the discharge. Halodule and Halophila engelmanni were the only species of seagrasses which occurred in the thermal area, occurring in Basin 3 and portions of Basin 1.

Seagrass or seagrass/rhizophytic algal assemblages dominated the macrophyte cover in the southern part of the study area. Thalassia and Syringodium were dominant offshore and Ruppia maritima and Halodule were dominant inshore. Dense patches of rhizophytic algae (generally Caulerpa sp.) were found locally in inshore areas of the southern part of the study area. Seagrasses formed a lesser proportion of the macrophyte cover in the northern half of the study area. Algae, particularly drift algae, were dominant there. Seagrasses and algae in the northern part of the area existed as small patches, while larger, more continuous areas of cover were found in the southern area.

An historical trend analysis of submergent macrophyte communities was compiled from seven sets of vertical aerial photography, dating back to October 1950. Trend analysis focused on the Basin 1 area. When available, data from past Crystal River monitoring reports were also used in compiling this summary.

Analysis of the early(1950 and 1960) photography indicated a general absence of strong signatures of submergent macrophyte communities in the Basin 1 area. Some seagrass and algae appear to be present; however, the quality of the black and white photography does not allow conclusive interpretation. Historically, the Basin 1 area appears to have been subjected to freshwater inundation from Rocky Creek, a tidal drainage creek of the type found throughout the study area. The flow of Rocky Creek was subsequently interrupted by construction of the Crystal River discharge canal. The obstruction of the freshwater flow may have permitted seagrasses to invade the

Basin 1 region, due to higher salinities. No field data are available to support the above, and thus it must be regarded as speculative. The 1972 aerial photography (color) shows the presence of photographic signatures consistent with relatively dense submergent macrophyte communities. FPC (1974) confirmed the presence of extensive beds of Halodule (= Diplanthera) wrightii in Basin 1. FPC (1978; 1979) also depicted extensive (> 50 percent coverage of the bottom) Halodule cover in Basin 1. The 1981 photography reveals a slight decrease in submergent macrophyte coverage, supported by percent cover data from FPC (1981). Current (1983-84) photography reveals further declines in macrophyte cover in Basin 1, a trend confirmed by the field verification and sampling program conducted in the present study. Although Halodule may be sparsely distributd throughout Basin 1 (as suggested by the aerial photography), field inspection indicated this was not so, Halodule being confined to the northeast portion of the basin. Other areas of Basin 1 were unvegetated mud bottom, sometimes associated with a blue-green algal mat. These mats, along with areas of benthic diatom concentrations, could be responsible for the "green mud" signatures visible in the recent photography of Basin 1.

6.3.3 Impact Assessment

Seagrasses

The effects of the effluent from the power plant discharge on seagrass received much attention in past studies (Van Tine 1977; FPC 1978; 1979; 1980; 1981) at Crystal River. It is known that the effluent from the plant results in a lower number of species of seagrasses in the area affected by the discharge. This was seen in the present study. Halodule wrightii, the most eurythermal of the seagrass species in the area (Phillips 1960; Zieman 1982), was the only species of seagrass found at Station D, the station most exposed to the power plant discharge. More seagrass species were observed at Stations E and F further offshore. These stations appeared to be only moderately impacted by the effluent plume. The greatest number of seagrass species throughout the period of study were seen at these two stations and at the three southern stations (A, B, and C). The three northern stations (G, H, and I) generally had a lower number of seagrass species throughout the study period.

The intensive monitoring stations (D, E, and F) located in the discharge area routinely exhibited significantly lower seagrass biomass, for all three species, compared to the three southern unimpacted stations (A, B, and C). Thalassia and Halodule biomass did not differ between thermal and northern stations (F and I; D and G, respectively), but Syringodium biomass was significantly higher at the impacted Station F than at the northern Station H. Previous monitoring studies at the Crystal River complex have not considered biomass of each species of seagrass separately (e.g., FPC 1978; 1979), or only considered biomass of Halodule, since it is the only species of seagrass found in the discharge area (FPC 1981). The past Crystal River monitoring reports, however, show the same general trends seen in this study: lower seagrass biomass in the discharge area compared to the southern area (the region south of the intake canal).

All three species of seagrass chosen for intensive monitoring displayed the same type of annual biomass trend: summer maxima and winter minima. The thermal effects from the effluent plume are likely to be more pronounced during the summer when the organisms are normally exposed to natural water temperatures closer to their thermal tolerance limits.

Like biomass, seagrass productivity was significantly lower in the discharge area than in the southern area. All three species of seagrass showed highest productivity at the three southern stations. None of the thermal stations differed from any of the respective northern stations, suggesting that thermal effects alone are not entirely responsible for the depressed productivity. None of the previous monitoring studies conducted at Crystal River specifically examined seagrass productivity. Zieman and Wood (1975) showed that Thalassia productivity (gm/m 2 /day) decreased linearly with increasing temperatures above 32°C. Thalassia has a temperature optimum for productivity of 28-30°C (Zieman and Wetzel 1980). Seagrass productivities in the present study exhibited summer maxima and winter minima for all three species of seagrass. Productivities during the winter were more similar in the thermal area and in the northern and southern control areas suggesting that thermal effects of the plant discharge are more pronounced during the summer.

Shoot densities of all three seagrass species were significantly higher at the three southern intensive monitoring stations (A, B, and C). The northern Halodule Station G had a significantly higher shoot density than the thermal Station D. Shoot density of Syringodium at the thermal Station E was significantly higher than at the northern Station H, while Thalassia shoot densities at thermal and northern stations (F and I) did not differ. Shoot densities did not show as pronounced an annual trend as biomass and productivity.

Percent cover of Halodule did not differ among the three intensive monitoring stations (A, D and G), while cover of Syringodium was significantly higher at Station B than at Station E, which in turn was significantly higher than cover at H. Thalassia percent cover was not tested among stations. Previous monitoring reports at Crystal River have principally used percent cover estimates to monitor the seagrass and macroalgal communities in the area. These reports (FPC, 1978; 1979; 1980; 1981) indicate that Halodule cover is reduced in the area immediately adjacent to the mouth of the discharge canal, but that in general Halodule cover does not differ between impacted and control areas. Syringodium and Thalassia, however, were generally not found in the inner discharge area (van Tine 1977, "Basin 1") and typically exhibited higher cover south of the intake canal. Similar trends were seen in the present study.

The seagrass coverage depicted in the macrophyte maps generally support the quantitative data, seagrass cover being greater in the southern part of the Crystal Bay area. The area impacted by the thermal plume was devoid of macrophytes, along with the area around the mouth of the Cross Florida Barge Canal.

Seasonally, percent cover tended to be significantly higher during the summer months for the three species of seagrass. FPC (1980) reported winter cover maxima (December) in the southern control and discharge areas of the Crystal River Plant, while FPC (1981) reported fall (September) cover maxima in the southern area, with no appreciable seasonal cover changes of seagrasses in the discharge area.

Macroalgae

Algae may be better indicators of thermal stress than seagrasses, since the buried rhizomes of seagrasses may be protected from thermal efects by the sediment (Zieman and Wood 1975). In particular, Zieman (pers. comm.) has noted that the rhizophytic green algae (members of the orders Siphonales and Dasycladales) are especially susceptible to thermal stress.

In the present study, rhizophytic algal diversity (number of species) was lower at all the thermal stations (D, E, and F) compared to the southern stations (A, B, and C). However, the northern stations also supported few species of these algae, once again suggesting that other factors, in addition to thermal stress, are regulating submergent macrophyte communities in the area.

Rhizophytic algal biomass (g dry wt/m^2) at the nine intensive monitoring stations was tested statistically. Station E had significantly higher algal biomass than any other station. No other clear station trend was evident. Rhizophytic algal biomass was significantly higher during the summer/fall period. Van Tine (1977) noted that very few species of siphonaceous green algae (Caulerpa spp., Udotea spp.) were found in the discharge area of the Crystal River Plant. Other monitoring studies at this site did not consider rhizophytic algae (FPC 1978; 1979; 1980), but FPC (1981) reported that siphonaceous algae did not occur in the discharge area of the plant. Zieman and Wood (1975) noted at Turkey Point that, in areas most severely impacted by thermal addition, the seagrass/macroalgal community was replaced by a blue-green algal mat. This phenomenon was also seen at Crystal River in the Basin 1 section of the discharge canal.

Drift algal diversity and biomass were not measured in the present study. A general impression was that a greater number of species of drift algae were found south of the intake canal. Drift algal percent cover was highest in the southern part of the Crystal Bay study area (Station B), but no other clear percent cover trends were evident from the percent cover analyses. Steidinger and Van Breedveld (1971) showed that the discharge area of the Crystal River Plant supported fewer species of algae than the rest of the Crystal Bay area. Van Tine (1977) also showed that the thermally impacted area of Crystal Bay supported a lower number of species of all three divisions of algae: Rhodophyta (red algae); Chlorophyta (green algae) and Phaeophyta (brown algae). He also showed that algal biomass was lower in the impacted area. FPC (1981) showed that drift red and brown algae were excluded from the Crystal River Plant discharge area.

In summary, the data and observations collected in the present study suggest that the thermal effluent from Crystal River exerts a negative effect on the seagrass and macroalgal communities in the inner part of the discharge area (Basin 1). The thermal effects appear to be more moderate in the outer parts of the discharge area (Basin 3). However, other factors are influencing the submergent macrophyte communities in the study area and the data gathered in the present study cannot distinguish between these different factors. Thus, the observed trends in macrophyte biomass, percent cover, etc, cannot be attributed solely to the effects of thermal addition. Increased turbidity and sedimentation, some of which may be due to the outflow current from the discharge canal, may be exerting a negative effect on the macrophyte communities in the discharge area. The selection of the three northern intensive monitoring stations (G, H, and I) in the region of the Cross Florida Barge Canal (CFBC) represented an attempt to distinguish between potential turbidity and sediment loading effects and any thermal effect, but the statistical analyses of the data failed to differentiate between stations located in the thermal and northern areas. Decreased light levels (associated with increased water turbidity) and increased sedimentation are suspected of causing declines in seagrass coverage (Zieman 1982). Other factors influencing the seagrass and macroalgal communities in the study area are nutrient concentrations in the water column, sediment type and depth and salinity changes associated with freshwater influx.

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TABLE 6.3-1

SEAGRASS DIVERSITY (NUMBER OF SPECIES) AT THE INTENSIVE MONITORING STATIONS

STATION	AUG. 1983	SEPT. 1983	OCT. 1983	DEC. 1983	JAN. 1984	MAR. 1984	APR. 1984	MAY 1984	JULY 1984	AUG. 1984
A (40)	3	3	4	4	2	2	1	1	1	2
B & C (47)	3	1	4	3	2	3	2	2	1	1
D (27)	1	1	1	1	1	1	1	1	1	1
E & F (33)	4	4	4	4	4	4	4	4	3	3
G (3)	3	1	2	1	3	2	2	2	4	1
H (9)	1	2	2	2	2	4	3	2	4	3
I (4)	2	0	2	2	2	3	2	2	2	3

A-I Intensive Monitoring Station

(40) Corresponding Ground-truthing Station

TABLE 6.3-2

SUMMARY OF THE ANOVA ANALYSES OF THE SEAGRASS DATA

	Time (Sampling Date)	Station	Bottom Temperature	Bottom Extinction Coefficient	Bottom Salinity	Bottom pH	Bottom Dissolved Oxygen
Halodule							
BM	**	**	NS	NS	*	**	NS
SD	**	**	NS	NS	NS	NS	NS
PR	**	**	NS	NS	NS	*	NS
PC	**	*	NS	*	NS	NS	**
Thalassia							
BM	**	**	NS	*	NS	NS	NS
SD	**	**	*	NS	NS	**	NS
PR	**	**	NS	NS	NS	NS	NS
PC	**	-	-	-	-	-	-
Syringodium							
BM	**	**	NS	NS	NS	NS	NS
SD	**	**	*	NS	NS	NS	NS
PR	**	**	NS	**	NS	NS	NS
PC	**	**	**	NS	**	NS	*
All Seagrasses							
BM	**	**	NS	NS	*	*	NS
SD	**	**	**	NS	NS	NS	**
PR	**	**	NS	NS	NS	NS	NS
PC	-	-	-	-	-	-	-

BM = biomass (g dry weight/m^2)
SD = shoot density (#/m^2)
PR = productivity (g dry weight/m^2/day)
PC = percent cover
* = significant at P 0.05
** = significant at P 0.01
NS = not significant
- = parameter not tested

TABLE 6.3-3

ANNUAL MEANS, BY STATION AND SAMPLING DATE, FOR THE HALODULE DATA

BIOMASS (g dry wt/m^2)

MEANS

SD	N	STANDBIO
2	10	12.4800000
3	15	12.0960000
4	10	9.2480000
5	15	0.6986667
6	15	0.7893333
7	5	0.5120000
8	15	2.7840000
9	15	4.0213333
10	15	12.5013333

STATION	N	STANDBIO
A	40	12.8400000
D	45	2.8373333
G	30	2.3973333

PRODUCTIVITY (g dry wt/m^2/day)

MEANS

SD	N	AVEGROW
2	9	0.30952381
3	9	0.08974359
4	5	0.04285714
5	9	0.08241758
6	9	0.02941176
7	8	0.05416667
8	9	0.08547009
9	9	0.10101010
10	8	0.38025210

STATION	N	AVEGROW
A	26	0.19884049
D	26	0.08899460
G	23	0.10800504

PERCENT COVER

MEANS

SD	N	PC
2	30	47.3666667
3	21	35.9523810
4	15	51.0000000
5	21	28.0000000
6	17	17.8823529
7	13	10.7692308
8	17	7.6470588
9	8	5.2500000
10	16	53.8750000
11	12	14.6666667

STATION	N	PC
A	27	33.9259259
D	92	31.7934783
G	51	26.3137255

SHOOT DENSITY (No./m^2)

MEANS

SD	N	BDEN
2	21	790.47619
3	21	633.33333
4	14	1371.42857
5	21	647.61905
6	21	709.52381
7	21	509.52381
8	21	1119.04762
9	21	1490.47619
10	21	2371.42857

STATION	N	BDEN
A	63	1425.39683
D	63	750.79365
G	56	996.42857

TABLE 6.3-4

ANNUAL MEANS, BY STATION AND SAMPLING DATE, FOR THE SYRINGODIUM DATA

BIOMASS (g dry wt/m^2)

MEANS

SD	N	STANDBIO
2	15	10.2613333
3	15	14.8266667
4	10	13.3760000
5	14	11.7314286
6	14	7.3028571
7	15	7.2320000
8	15	3.5466667
9	15	19.9786667
10	15	24.7786667

STATION	N	STANDBIO
B	45	24.7680000
E	45	9.2195556
H	38	2.1094737

PRODUCTIVITY (g dry wt/m^2/day)

MEANS

SD	N	AVEGROW
2	6	0.41666667
3	7	0.16483516
4	6	0.25595238
5	9	0.16559829
6	9	0.03819444
7	7	0.09047619
8	9	0.23041311
9	9	0.46969697
10	9	0.73046398

STATION	N	AVEGROW
B	27	0.47418589
E	20	0.27076476
H	24	0.09641170

PERCENT COVER

MEANS

SD	N	PC
2	20	16.6000000
3	11	12.8227273
4	13	39.2307692
5	20	30.8500000
6	23	43.7826087
7	23	30.3260870
8	17	23.5294118
9	26	22.5384615
10	23	45.8695652
11	17	15.1764706

STATION	N	PC
B	85	38.9647059
E	84	23.9053571
H	24	11.8125000

SHOOT DENSITY (No./m^2)

MEANS

SD	N	BDEN
2	12	512.50000
3	12	787.50000
4	8	837.50000
5	12	775.00000
6	12	683.33333
7	12	712.50000
8	12	820.83333
9	12	1070.83333
10	12	1254.16667

STATION	N	BDEN
B	36	1188.88889
E	36	740.27778
H	32	520.31250

TABLE 6.3-5

ANNUAL MEANS, BY STATION AND SAMPLING DATE, FOR THE *THALASSIA* DATA

BIOMASS
(g dry wt/m^2)

MEANS

SD	N	STANDBIO
2	15	21.4613333
3	15	19.8826667
4	10	16.6720000
5	15	10.3306667
6	12	6.0266667
7	15	3.6693333
8	15	2.9333333
9	15	11.8720000
10	15	34.1120000

STATION	N	STANDBIO
C	45	30.0088889
F	44	6.7181818
I	38	4.1305263

PRODUCTIVITY
(g dry wt/m^2/day)

MEANS

SD	N	AVEGROW
2	9	0.41269841
3	9	0.16666667
4	6	0.26190476
5	9	0.13431013
6	9	0.04963235
7	9	0.06481481
8	9	0.19764957
9	7	0.51948052
10	9	0.64752568

STATION	N	AVEGROW
C	25	0.38454299
F	27	0.24320132
I	24	0.17031086

PERCENT COVER

MEANS

SD	N	PC
2	10	62.8000000
5	9	41.6666667
6	8	44.1250000
7	9	6.6666667
8	9	23.1111111
9	10	22.7000000
10	10	25.7000000
11	2	1.0000000

SHOOT DENSITY
(No./m^2)

MEANS

SD	N	BDEN
2	12	412.500000
3	12	500.000000
4	8	443.750000
5	12	620.833333
6	12	562.500000
7	12	537.500000
8	12	487.500000
9	12	566.666667
10	12	666.666667

STATION	N	BDEN
C	36	715.277778
F	36	443.055556
I	32	440.625000

TABLE 6.3-6

SPECIES OF MACROALGAE COLLECTED
R = RHIZOPHYTIC ALGAE, ALL OTHERS ARE CONSIDERED DRIFT ALGAE

Division Chlorophyta
Order Ulvales
Family Ulvaceae

Enteromorpha intestinalis
Enteromorpha compressa
Ulva lactuca

Order Siphonales
Family Caulerpaceae

Caulerpa ashmeadii[R]
Caulerpa prolifera[R]
Caulerpa paspaloides[R]
Caulerpa mexicana[R]

Family Codiaceae

Codium taylori
Halimeda incrassata[R]
Penicillus capitatus[R]
Udotea conglutinata[R]
Udotea flabellum[R]

Order Dasycladales
Family Dasycladaceae

Acetabularia crenulata[R]
Bataphora oerstedi[R]

Division Phaeophyta
Order Ectocarpales
Family Ectocarpaceae

Ectocarpus siliculosus
Ectocarpus intermedius
Giffordia mitchelliae

Order Dictyotales
Family Dictyotacese

Padina vickersiae[R]

Order Fucales
Family Sargassaceae

Sargassum filipendula

TABLE 6.3-6 (Cont)

Division Rhodophyta
Order Gelidiales
Family Gelidiaceae

Pterocladia americana

Order Gigartinales
Family Gracilariaceae

Gracilaria debilis
Gracilaria foliifera var. *angustissima* (= *G. tikvahiae*)
Gracilaria verrucosa
Gracilaria sjoestedtii

Family Solieriaceae

Agardhiella tenera

Family Hypneaceae

Hypnea musciformis
Hypnea cervicornis

Order Rhodymeniales
Family Champiaceae

Champia parvula
Lomentaria baileyana

Order Ceramiales
Family Ceramiaceae

Centroceras clavulatum
Centroceras unidentified species
Ceramium fastigiatum
Spyridia filamentosa

Family Rhodomelaceae

Acanthophora spicifera
Chondria cnicophylla
Chondria sedifolia
Chondria tenuissima
Digenia simplex
Laurencia intricata
Laurencia obtusa
Laurencia poitei
Polysiphonia subtilissima
Polysiphonia ramentacea

TABLE 6.3-6 (Cont)

Family Dasyaceae

Dasya pedicellata
Dasya ramossissima

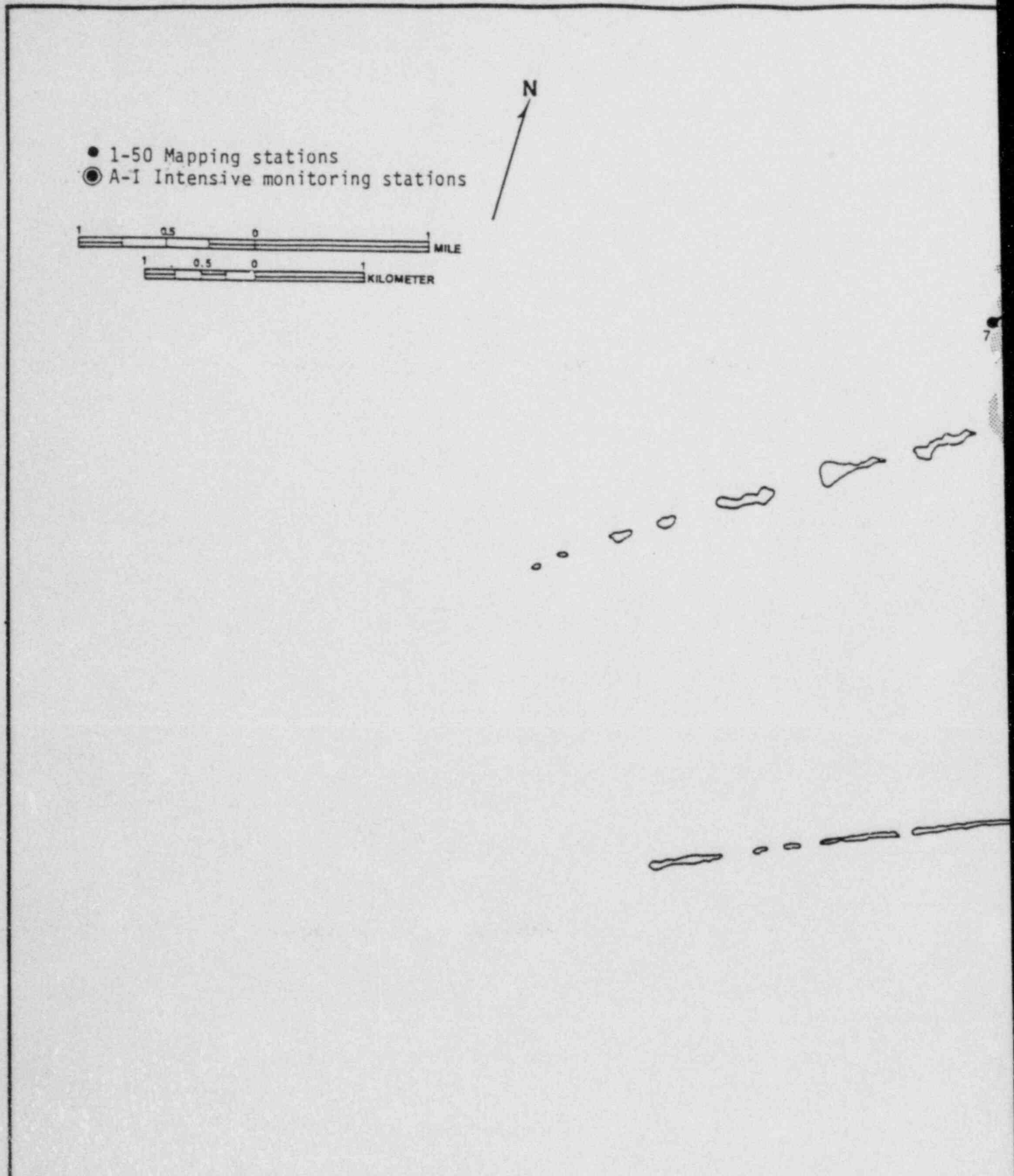
TABLE 6.3-7

RHIZOPHYTIC ALGAL DIVERSITY (NUMBER OF SPECIES)
AT THE INTENSIVE MONITORING STATIONS

STATION	AUG. 1983	SEPT. 1983	OCT. 1983	DEC. 1983	JAN. 1984	MAR. 1984	APR. 1984	MAY 1984	JULY 1984	AUG. 1984
A (40)	1	3	2	1	0	0	0	0	1	1
B & C (47)	5	3	4	4	2	5	3	3	4	3
D (27)	0	0	0	0	0	0	0	0	0	0
E & F (33)	1	1	1	1	1	1	2	1	1	0
G (3)	0	0	0	0	0	0	0	1	0	0
H (9)	0	1	1	1	0	0	1	1	1	0
I (4)	0	0	1	0	0	1	1	1	0	2

A-I Intensive Monitoring Station

(40) Corresponding Ground-truthing Station


N
• 1-50 Mapping stations
◉ A-I Intensive monitoring stations
1 0.5 0 1 MILE
1 0.5 0 1 KILOMETER
7

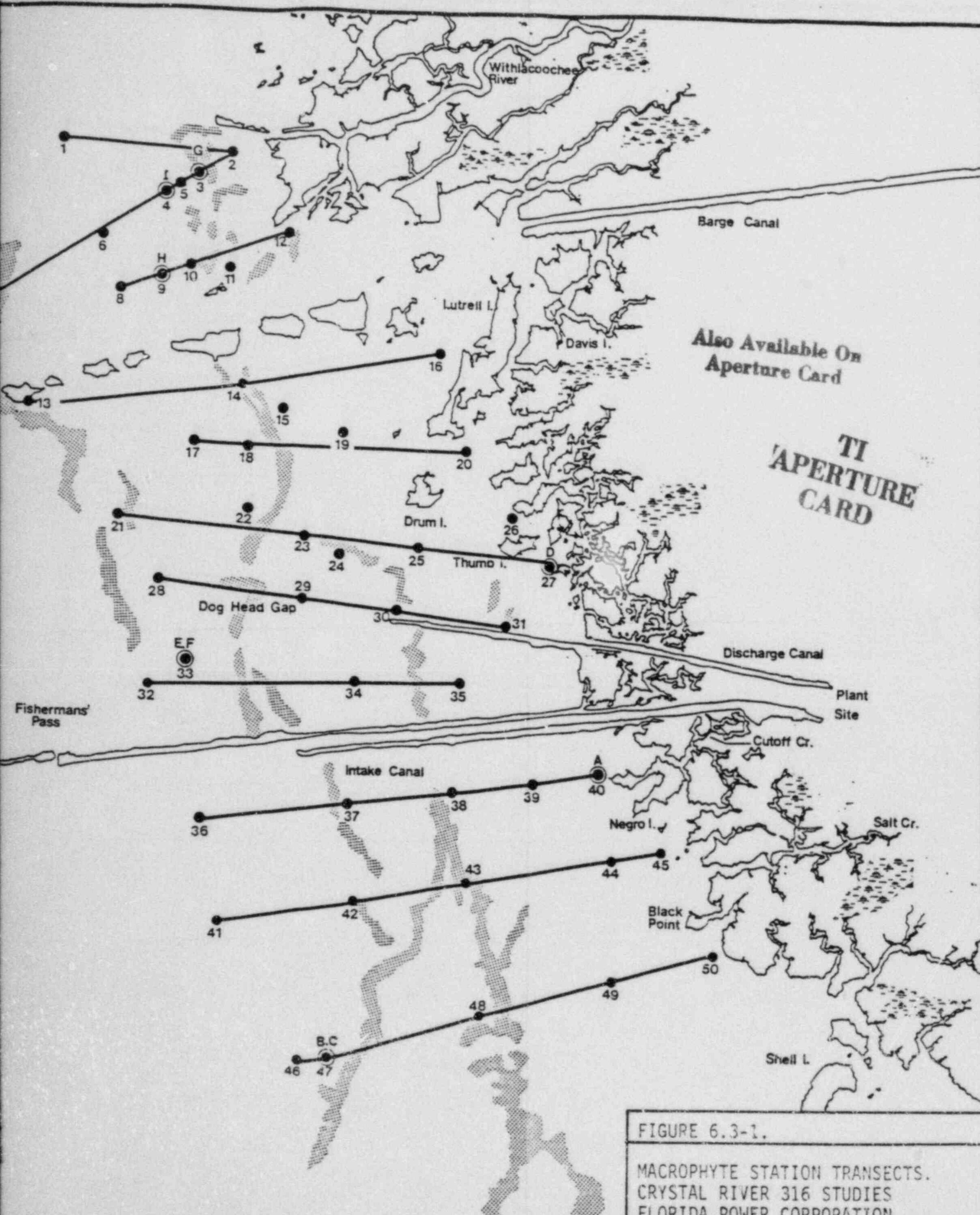


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FIGURE 6.3-1.

MACROPHYTE STATION TRANSECTS.
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8502120246-04

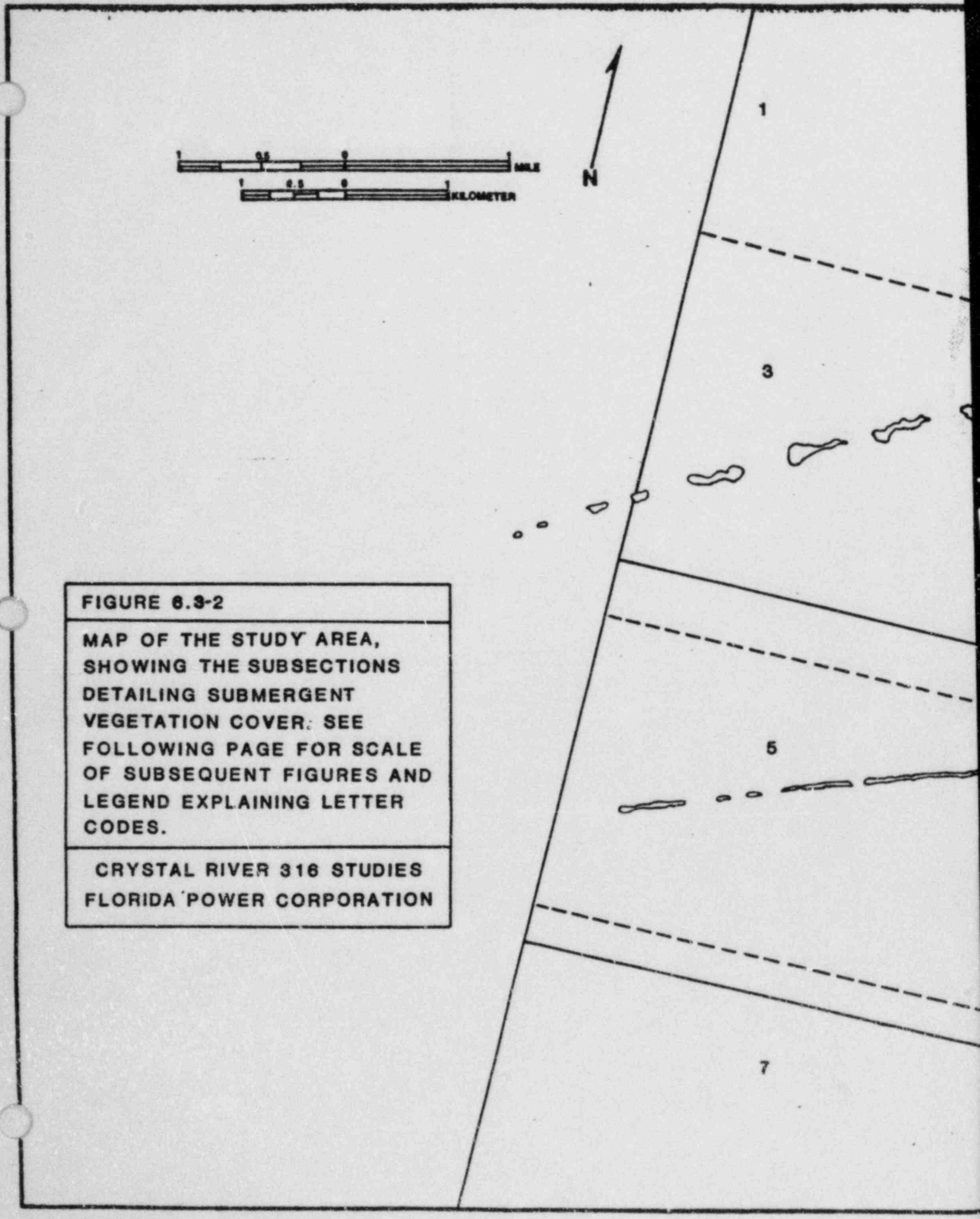

FIGURE 6.3-2

MAP OF THE STUDY AREA, SHOWING THE SUBSECTIONS DETAILING SUBMERGENT VEGETATION COVER. SEE FOLLOWING PAGE FOR SCALE OF SUBSEQUENT FIGURES AND LEGEND EXPLAINING LETTER CODES.

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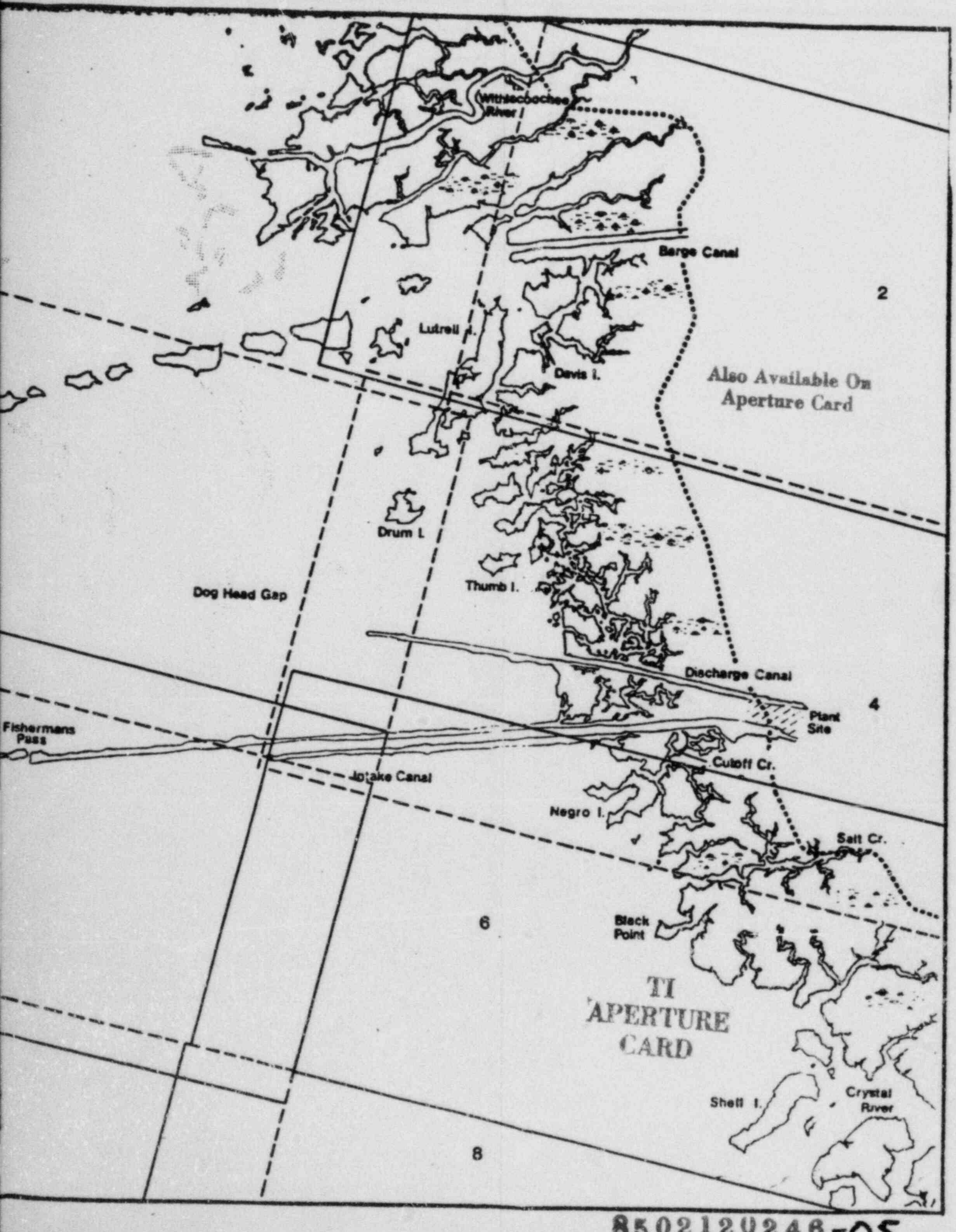

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CRYSTAL RIVER 316 STUDIES

MACROPHYTE MAPPING

SUBMERGENT VEGETATION

ALL SUBSEQUENT FIGURES TO SCALE INDICATED BELOW:

1 0.5 0 1 MILE

1 0.5 0 1 KILOMETER

SCALE 1:18 000

SOURCE: COLOR INFRARED VERTICAL AERIAL PHOTOGRAPHY 26 OCT 83
22 NOV 83

COMMUNITY DESIGNATION

S · SEAGRASS
A · ALGAE
O · UNVEGETATED
SA · SEAGRASS AND ALGAE (SEAGRASS DOMINANT)
AS · ALGAE AND SEAGRASS (ALGAE DOMINANT)

FIGURE 6.3-3

SUBMERGENT VEGETATION COVER IN SUBSECTION 1 (SEE FIGURE 6.3-2).

CRYSTAL RIVER 316 STUDIES

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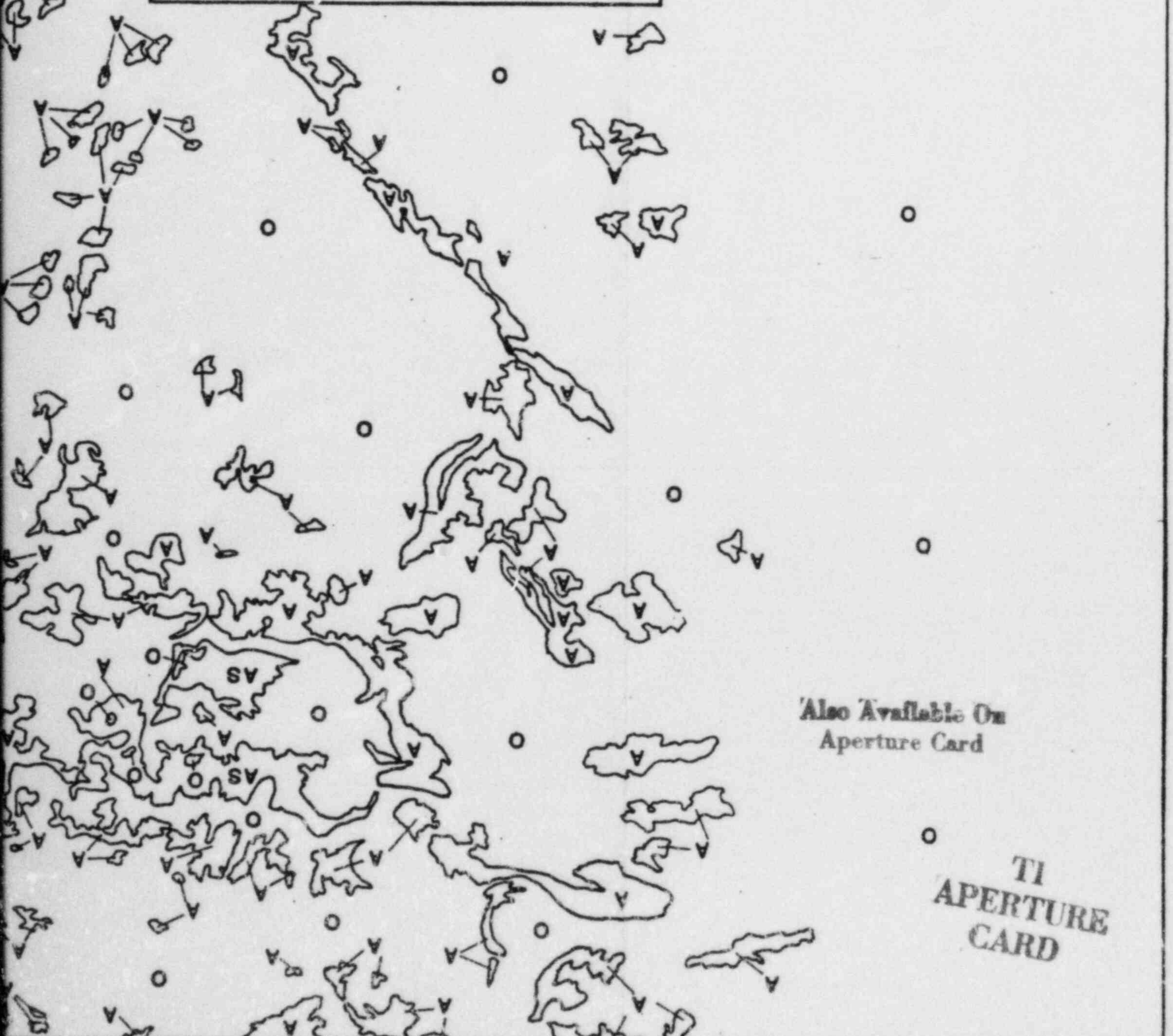

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WITHLACOOCHE RIVER

Also Available On
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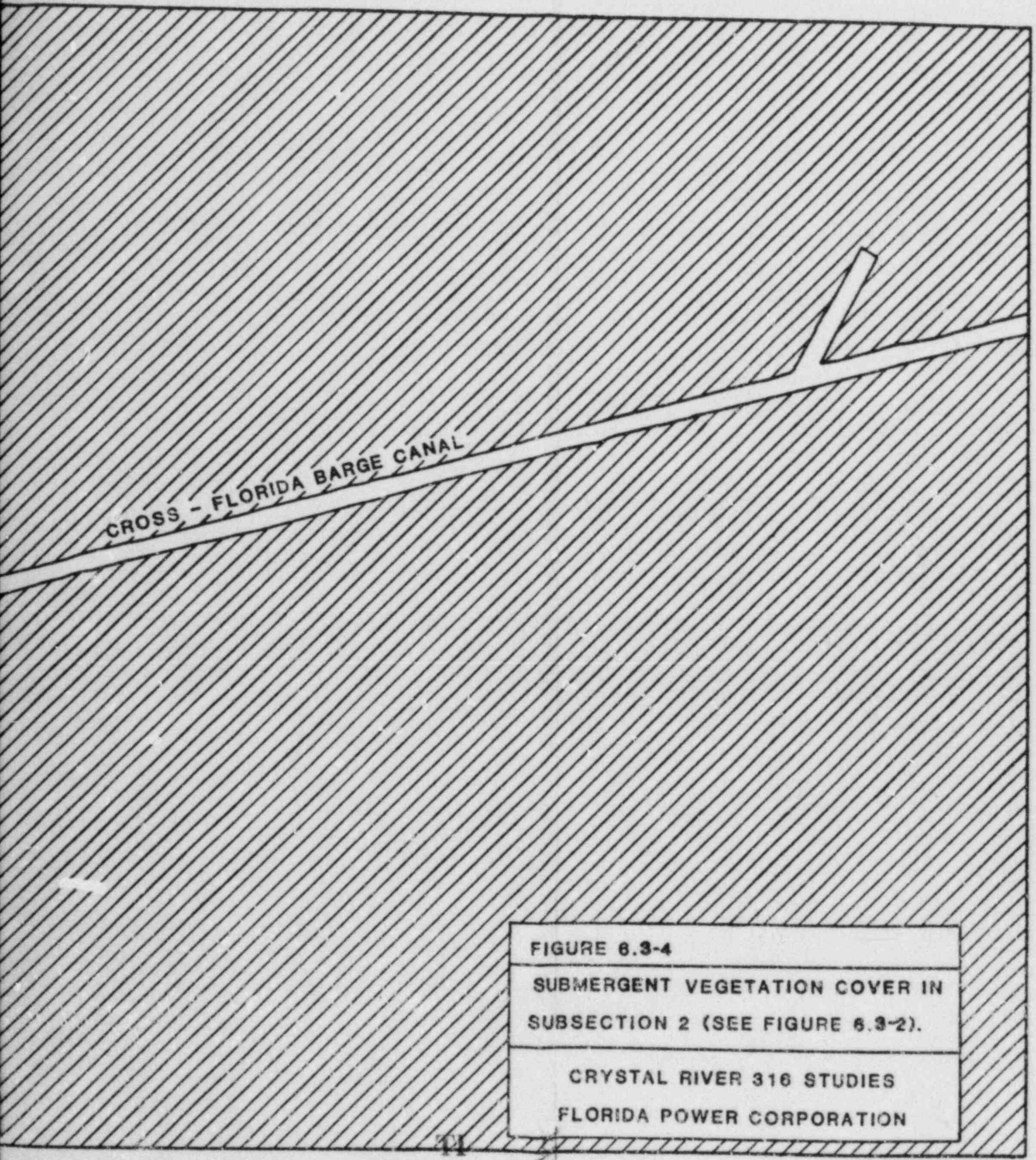

FIGURE 6.3-4

SUBMERGENT VEGETATION COVER IN SUBSECTION 2 (SEE FIGURE 6.3-2).

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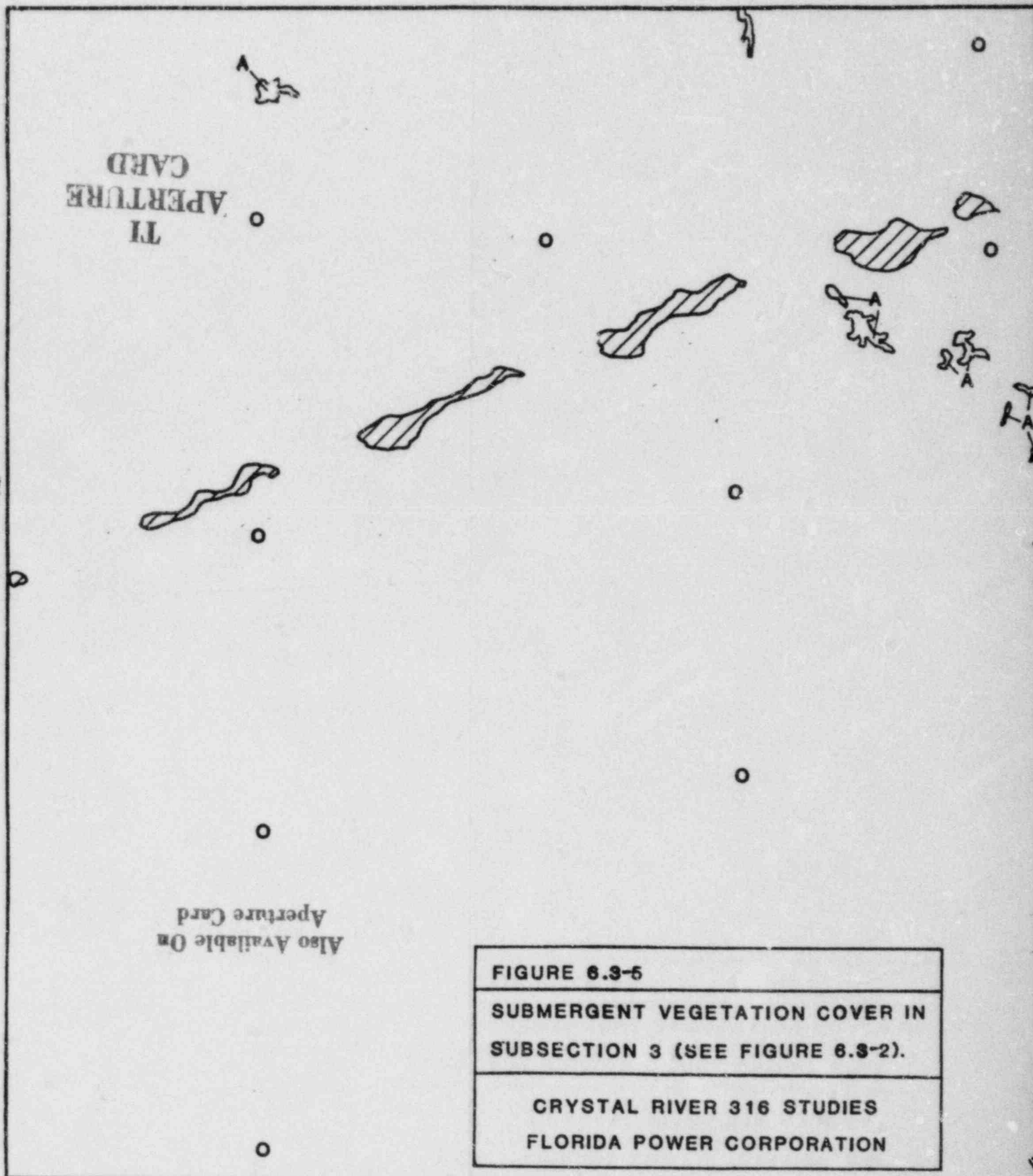

FIGURE 6.3-5

SUBMERGENT VEGETATION COVER IN SUBSECTION 3 (SEE FIGURE 6.3-2).

CRYSTAL RIVER 316 STUDIES
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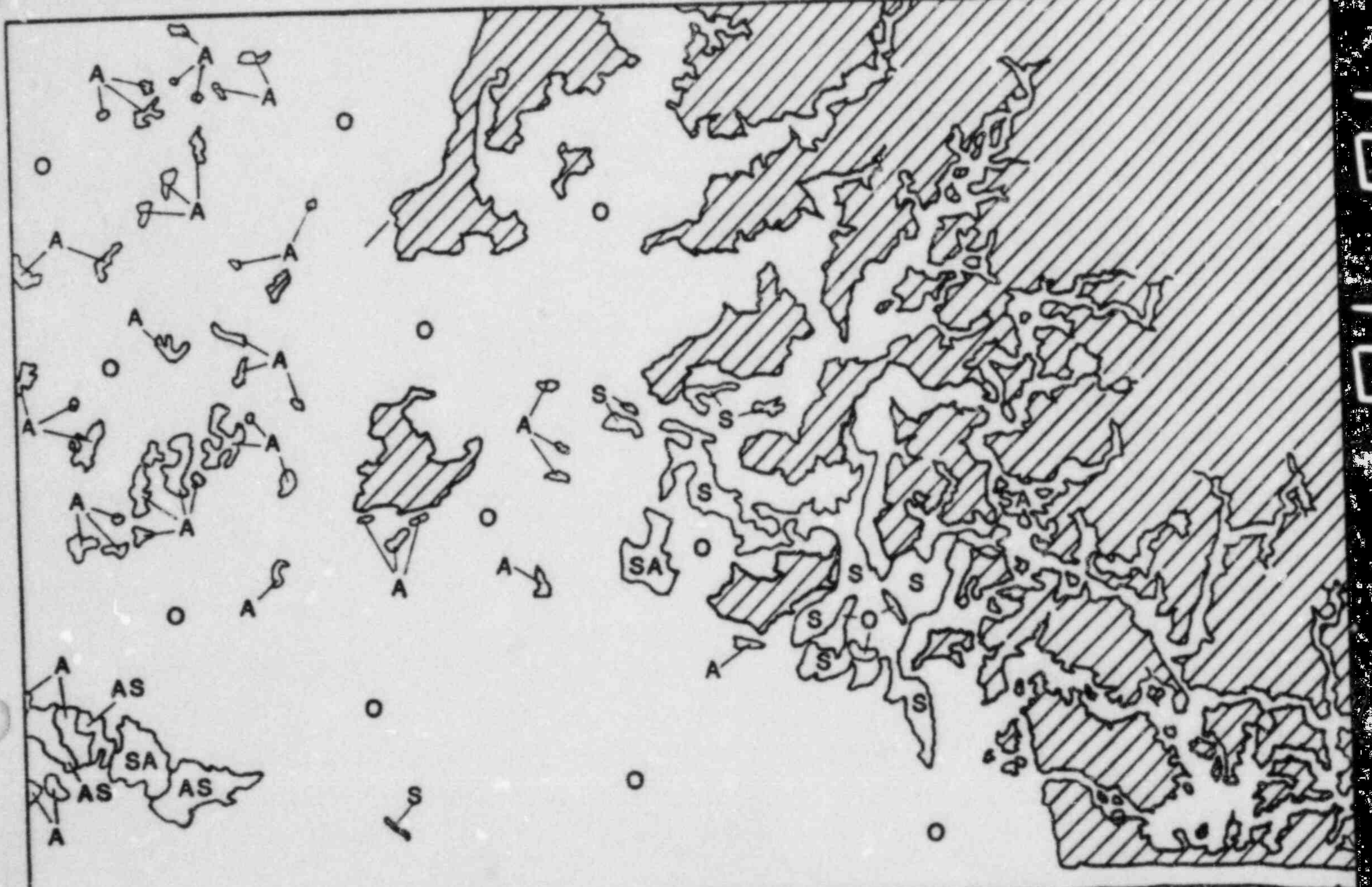

Also Available On
Aperture Card

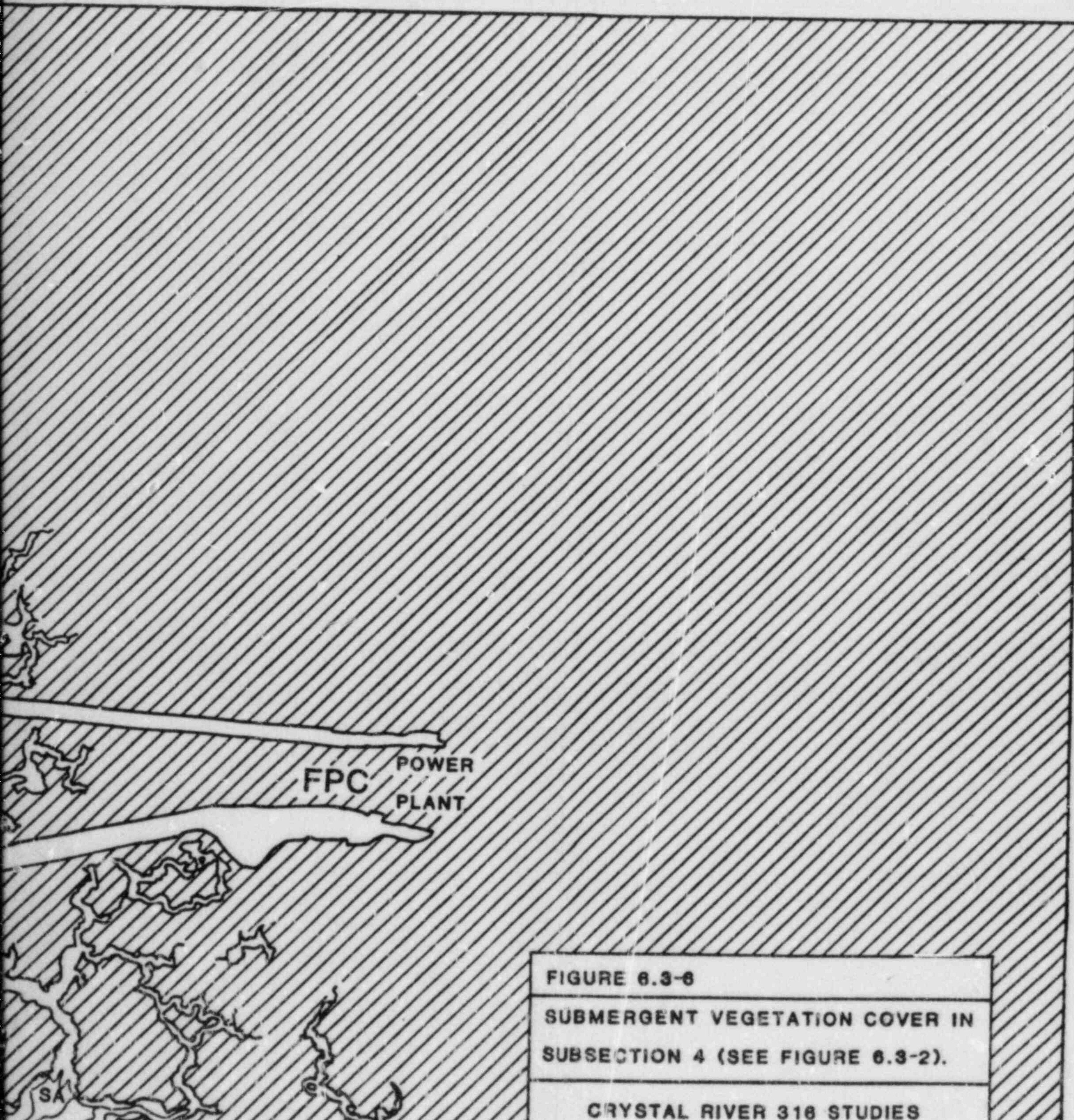

FIGURE 6.3-6

SUBMERGENT VEGETATION COVER IN SUBSECTION 4 (SEE FIGURE 6.3-2).

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FIGURE 6.3-7

SUBMERGENT VEGETATION COVER IN SUBSECTION 5 (SEE FIGURE 6.3-2).

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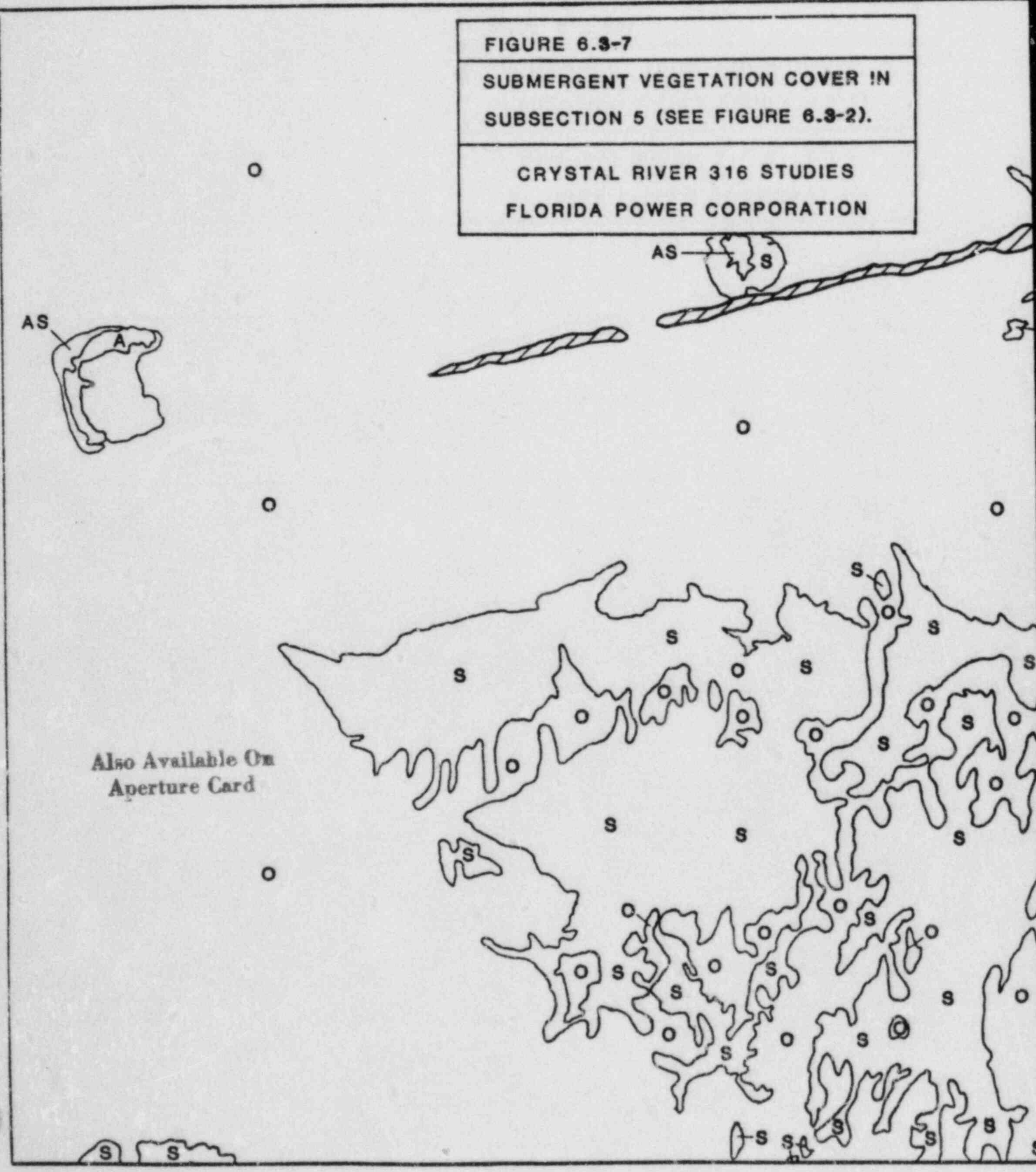

Also Available On
Aperture Card

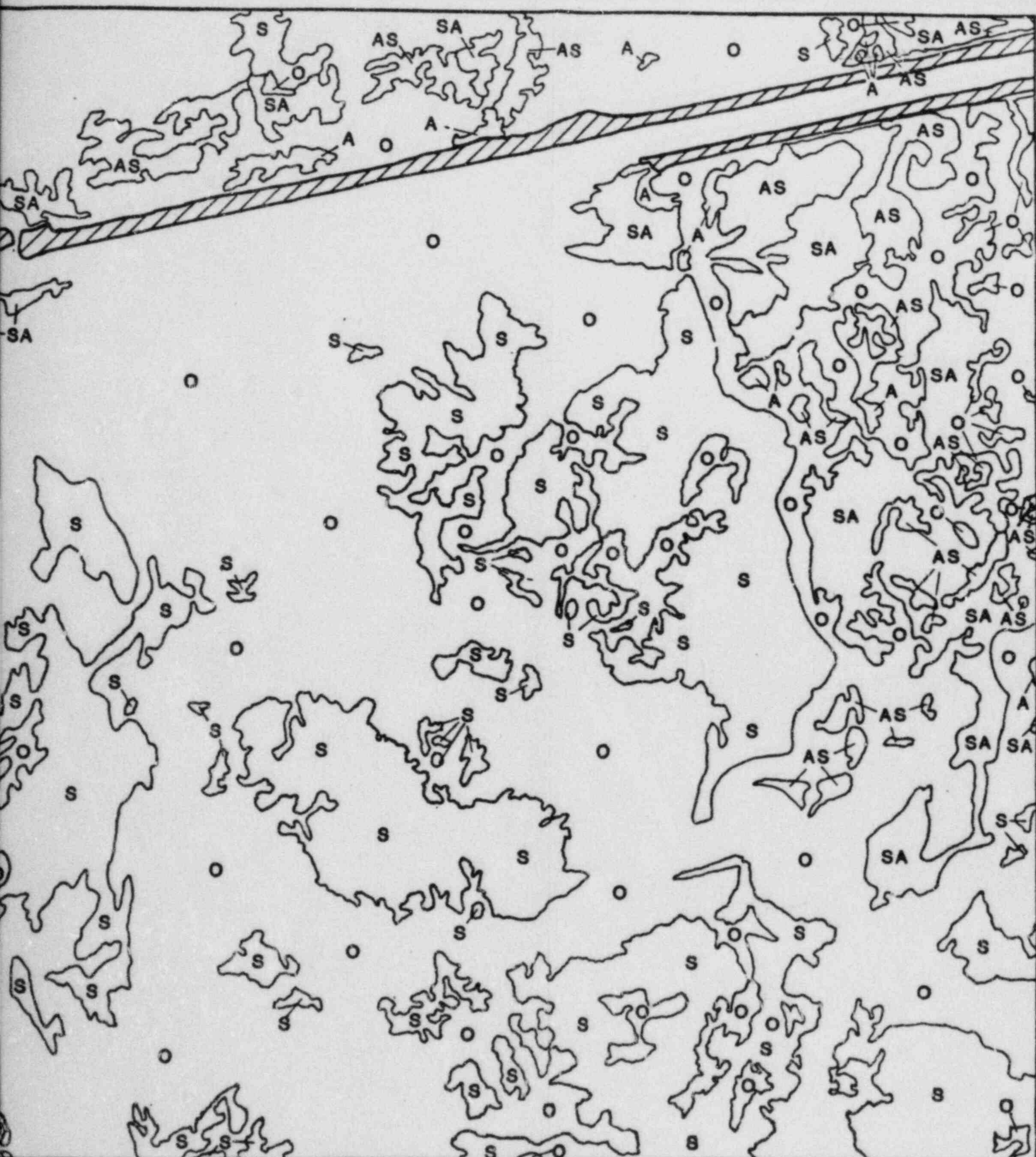

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FIGURE 6.3-8

SUBMERGENT VEGETATION COVER IN SUBSECTION 6 (SEE FIGURE 6.3-2).

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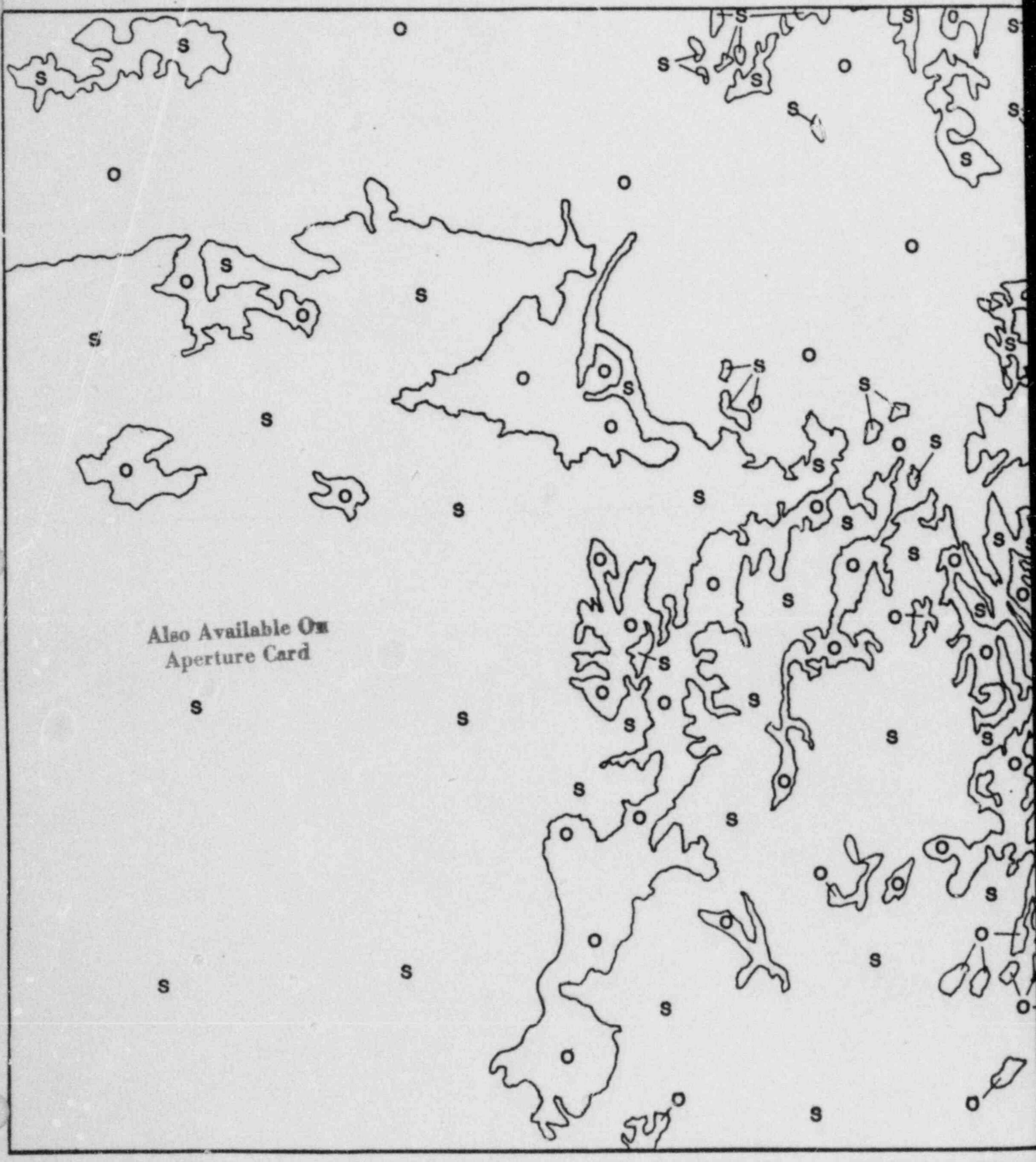

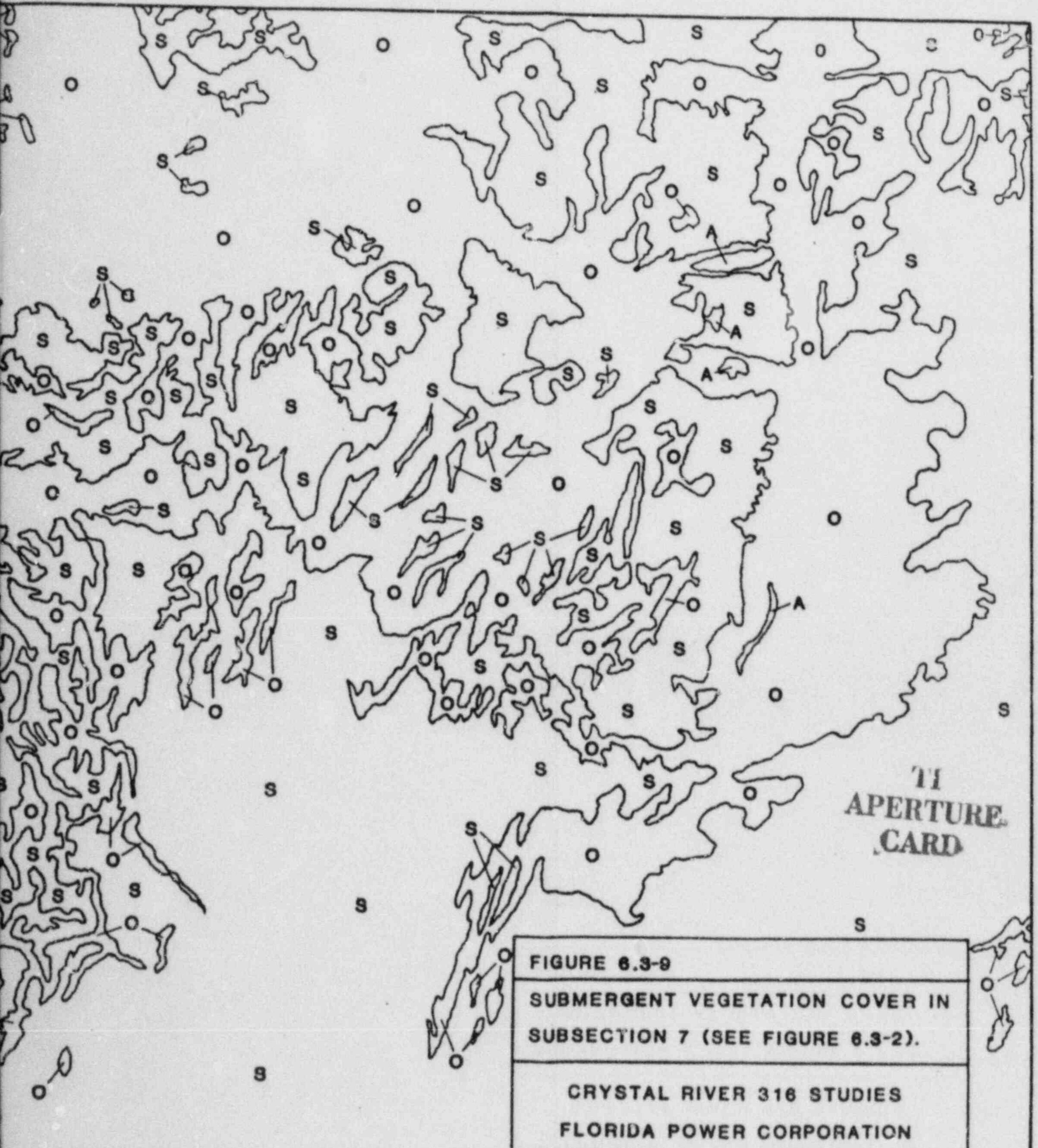

FIGURE 6.3-9

SUBMERGENT VEGETATION COVER IN SUBSECTION 7 (SEE FIGURE 6.3-2).

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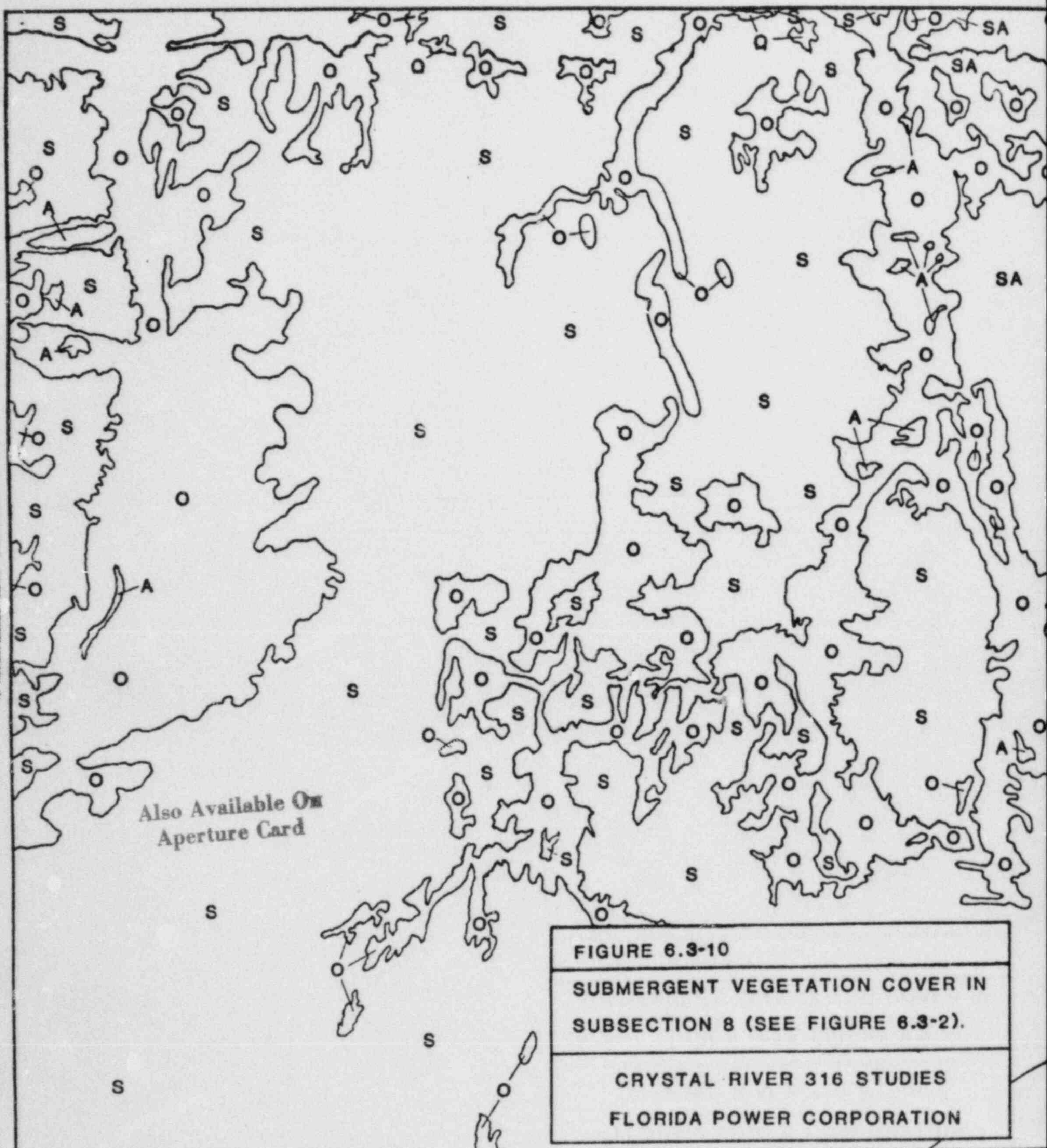

FIGURE 6.3-10

SUBMERGENT VEGETATION COVER IN SUBSECTION 8 (SEE FIGURE 6.3-2).

CRYSTAL RIVER 316 STUDIES

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6.4 SALT MARSH

6.4.1 Sampling and Laboratory Analysis

Eight general areas for salt marsh study were specified in the original POS. Locations of the eight areas are shown in Figure 6.4-1. A reconaissance was made in each area to identify suitable stations. Final station selection was made after considering such factors as accessibility, thickness of the marsh floor, apparent marsh elevation, species composition, exposure and fetch, and overall marsh physiognomy. Final station locations are described in Table 6.4-1.

Four Juncus roemerianus and four Spartina alterniflora sites were situated at each station. Depending on local conditions at each station, the four sites for each species were deployed over different microenvironmental features such as shoreline vs marsh interior; low vs high marshes; creek bank vs uniform marsh; and pure stands vs stands intermixed with other marsh species. Site locations are given in Figures 6.4-2 through 6.4-9.

Marshes were sampled during low tides. Stations 3-5 (Control, Midway, and Thermal), were accessible from land, while the other stations were accessible only by boat. Stations 3-5 were generally sampled first during each sampling period.

Thickness of peat at marsh stations was measured with a steel reinforcing bar driven by hand to resistance. At least 10 probes were made at each station. Data were recorded to the nearest 3 cm. Marsh elevations were estimated by correlating times and water depths at each marsh station at slack high water to simultaneous observations made at a staff gauge at the mouth of the discharge canal. The gauge is registered to mean low water.

Temperature was recorded continuously in one Juncus site and one Spartina site in each station, using Peabody Ryan Model J-90 (10-40°C) thermographs. Each unit was tethered to a concrete block and set on the marsh floor, then retrieved and replaced on subsequent sampling visits. Details of chart preparation and processing are given in Section 10.1.1.

All collections were made using 0.25 m^2 quadrats. Three replicates were collected at each site. Quadrat frames made of PVC were deployed on the marsh floor at sampling sites in a checkerboard pattern. All plants were manually clipped at the surface of the marsh floor and placed in prelabeled bags. At the field station, plants were rinsed with freshwater, counted, inspected for flowers or seeds, sorted into live, dead, and miscellaneous fractions, and bundled with nylon netting. Each batch was labeled, dipped in mildewcide to arrest respiration and fungal growth, and air-dried. All material from a single collection was dried further in a solar hot-house equipped with auxiliary heaters until weight loss was at least 97 percent (as determined by oven dried subsamples). Batches were unbundled and weighed to the nearest 0.01 gram.

Marsh samples occasionally bore epiphytic algal growth which was scraped from the shoots and preserved in 15 percent formalin for later inspection. Motile epifauna were collected when quadrat frames were set and again after plants were clipped. Animals were placed in prelabled jars containing 15 percent formalin in seawater and later identified and enumerated. Once a quadrat was clipped, all burrows in the area covered by the quadrat frames were counted.

A SAS GLM procedure was used to compare shoot densities (live and live plus dead), biomass (live and live plus dead) among stations, sampling dates, and for the station by date interaction. Burrow density and density of Littorina were compared spatially and temporally including a live weight covariate. Other covariates were explored as well. Tukey's HSD tests were used to compare means of station and time period of sampling.

6.4.2 Results

Introduction

This assessment is the fifteenth in a series of reports since 1974 on the subject of salt marsh thermal structure or response to thermal stress at Crystal River. Prior reports include Homer (1974), Young (1974), Klausewitz et al (1974), Florida Power Corporation (1975), Hornbeck (1978), Odum and Caldwell (1978), Goforth (1979), Goforth and Kosik (1980), Coggins (1980), Kosik (1981), Odum and Montague (1981), Applied Biology (1982; 1983) and Knight and Coggins (1982). Past salt marsh studies have produced a considerable volume of data and insight into salt marsh structure, metabolism, animal use, and response to thermal stress. Data collected in 1983-1984 address the geographical extent and nature of thermal impacts, if any, on salt marshes in the vicinity of the Crystal River Power Station. The study also addresses:

(a) The gradient of temperature in marshes related to the thermal discharge;

(b) Differences in standing crop, plant density, or invertebrate activity between previous thermal and control stations;

(c) Trends or patterns for standing crop, plant density or invertebrate activity at additional stations.

Historical data and evaluations of new data will be considered separately for Spartina alterniflora and Juncus roemerianus. In each case, the evaluation treats standing crop (live, total), plant densities, lengths, and flowering. Variables to be considered as measures of invertebrate activity include total species number, total faunal density, Littorina irrorata density, and burrow density.

Between 1974-1981, pre- and post operational marsh studies conducted by the University of Florida included productivity and respiration measurements and other parameters required to model marsh system metabolism. Beginning with Applied Biology, Inc. (ABI) studies in 1981, marsh studies have been limited to structural analyses of plants and invertebrate studies. The ABI studies and the present investigation were based on the assumption that marsh structure is a meaningful indicator of marsh system metabolism or that the measured parameters are independently useful indicators of environmental stress. Knight and Coggins (1982) reviewed four years of post-operational data and concluded that structural aspects such as shoot density had changed in thermal marshes in compensation for metabolic adaptations to heat.

Isolated measurements of marsh structure may be used as indicators of thermal adaptation as described above, but metabolic estimates cannot be performed entirely on structural data. On the other hand, marsh structure is useful as an independent indicator (Oviatt et al 1977).

Four assumptions of the present study are that stations have been comparable both between and within studies; that sampling techniques have been comparable and adequate; and that a gradient of temperature in marshes exists, but not other factors capable of affecting the marshes. Each assumption is addressed separately in the following paragraphs.

"Thermal" and "control" station locations have remained unchanged since the first postoperational study by Hornbeck (1978). Young (1974) conducted control measurements at Negro Point south of all postoperational control sites and also on the west shore of Luttrell Island. All "thermal" stations in past studies coincide with the Thermal Station, and Control Station is equivalent to "control" sites used since 1977.

Marshes used as controls for thermal impact comparisons are valid only to the extent that all other relevant variables are the same as found at the thermal site. While no two marsh sites can be perfectly comparable, the extent of differences between them for several factors can be evaluated.

Young (1974) stated that Control and Thermal sites were approximately the same in elevation and species composition but gave no data. The Thermal Station is exposed to Crystal Bay and a long northwesterly fetch resulting in moderate wave climates during winter frontal passages. The Control Station is sheltered to the northwest by the intake spoil and is exposed to the relatively quiet west-southwest. These differences are reflected by the steeper western shoreline at New Rocky Creek than at the Control Station.

Elevations of the Thermal and Control Stations have not been established by any study to date, but the fact that Rocky Creek has a higher water surface to marsh ratio than Cutoff Creek suggests that the thermal marsh is lower. Water levels were compared in each marsh to the tide staff at the POD.

Mean Elevation, m above MLW

Station	*Spartina*	*Juncus*
Thermal	2.49	2.90
Control	3.45	4.05

Spartina marshes were lower than *Juncus* by about 15 cm, which is consistent with findings from several other studies (Daiber and Ganzman 1978). Both Thermal marshes were lower than the Control counterparts by about 30 cm. Salinities differ between the Thermal and Control Stations. In Quarters I and III mean surface salinity at the Control Station was less than 20.0 o/oo, compared to mean salinities greater than 22.5 o/oo at the Thermal Station.

Six additional stations were sampled in 1983-84. Upper Salt Creek was completely sheltered, and Midway was protected to the northwest by the discharge dike. The Fence and Davis Island stations were partially protected.

Most marshes fronted onto shorelines with mild to moderate slope, except Upper Salt Creek and parts of Davis Island. The mean elevation above MLW of all Spartina marshes was 0.84 m (+/-0.22 m), about 0.12 m lower than the mean Juncus marsh elevation of 0.96 m (+/-0.22 m). The Thermal Station had mean marsh elevations near the overall means for Spartina and Juncus.

Mean salinities based on quarterly data varied from 12.5 o/oo to more than 22.5 o/oo. The Thermal Station had highest mean salinities (greater than 22.5 o/oo). Davis Island had consistently low mean salinity (12.5 -15.0 o/oo) due to the influence of the Withlacoochee River. The Thermal Station was a locus of high salinity surrounded by tiers of decreasing salinity both to the north and south. Salt Creek stations and Davis Island were shaded by nearby hammocks. Shading was greatest at Upper Salt Creek.

Overall, Thermal and Control Stations differ with respect to exposure and salinity and probably elevation. New stations in Salt Creek do not appreciably resemble the Control, especially due to an abundance of Distichlis spicata. Stations north of the POD represent approximately comparable marshes along a pronounced salinity gradient.

Marsh standing crop and shoot density have been determined in all pre-and post operational studies with 0.25 m^2 quadrats. Young (1974) determined that 9 Spartina and 5 Juncus quadrats maintained a minimum error of 15 percent about mean live and dead biomass (95 percent probability), and all subsequent studies until 1983 used the same sampling effort. Twelve quadrats were used in Spartina and Juncus marshes for the present study to provide for greater coverage of microenviromental differences such as proximity to creeks or intermixing of other marsh species. Intermixing is very common in marshes of the region. For the 8 stations in this study, 25 of 32 total Spartina sites were pure stands, whereas only 14 of 32 total Juncus sites were pure stands. It is not known whether only pure stands of each species were sampled in previous studies. Counts and collections of invertebrates have been made by the same techniques in all studies.

Penetration of the thermal plume into the salt marsh around New Rocky Creek was demonstrated by Carder (1971; 1972) and Homer (1974) for preoperational conditions. Young (1974) provided the first data on actual marsh temperatures and reported a 3-6°C increase in the "thermal" site over his Negro Island "control" site. Young also confirmed reports of 37°C temperatures in thermal marshes during summer. Hornbeck (1977) stated, "Water which flooded the thermally impacted marshes was 2.6° - 7.2°C higher than that which flooded the control marsh". Apparently, there have been no reports of in situ marsh water temperatures since 1977, essentially the entire postoperational period. Thermograph data for 1983-84 illustrate differences in marsh temperature between Thermal and Control Stations. Figure 6.4-10 is a comparison of mean daily temperature at the two stations for January 1984. Mean daily temperature at the thermal site exceeded mean control site temperature for nearly 75 percent of the month. The greatest temperature increase between paired means was 4.5°C. The mean monthly temperature of the Control marsh for January 1984 was 13.1°C (+/-2.1°C) compared to a monthly Thermal marsh mean of 14.0°C (+/- 3.1°).

Summer data for both stations were compared for August, the hottest month of 1983, based on temperatures during predicted slack high tides. Data were taken from thermograph traces from August 5 - September 5, 1983. Results are given in Table 6.4-2. Thermal marsh means were significantly higher than Control means for daytime, nighttime and all high tides in August. Overall, thermal marsh temperatures were increased more at night than during the day.

Temperature of the Control Station Spartina marsh rose at low tide and fell at high tide with relative stability during the night (Figure 6.4-11). The Thermal Station Spartina temperatures, on the other hand, exhibited the same cyclic temperature pattern but with an extra period of high temperature caused by the thermal plume at high tide. This phenomenon occurred during the night and day. The doubling of temperature cycles was evident at the Thermal Station in winter but with dampened amplitudes.

Table 6.4-3 summarizes high tide water temperatures in Spartina marshes north of the Control Station for the period August 6-15, 1983. Units 1 and 2 were operational for all but a few hours then, and Unit 3 ran uninterrupted. The Thermal Station was hotter during days, nights and overall than other stations. Patterns of mean daily and mean overall temperatures were similar. It was followed by northern stations and then the Control (in order of descending temperature). Mean nightly temperatures were the same at all stations except the Thermal marsh, which was warmer by about 8°C. Thermal Station means had low or lowest standard deviations due to moderating effects of the thermal plume. Salt marsh stations were classified by thermal range in Table 6.4-4.

Spartina marsh temperatures in winter were mildly warmer at Midway and Fence Stations and moderately warmer at Thumb Island, whereas summer temperature effects were detectable at Midway and Thumb Island (in addition to the Thermal Station). Since Spartina marshes were lower (elevation) than Juncus marshes at each station, it is probable that Spartina data accurately reflect thermal discharge effects.

Spartina Trends and Patterns

Two way analyses of variance were conducted using live standing crop and live plant density as dependent variables and time and station as independent variables. The analyses were performed once using all data for Spartina only in Spartina marshes and again for Spartina and Juncus combined, where they occurred together in Spartina marshes. Sampling periods and stations contributed significantly to observed variance in all analyses, and so did station-time interaction terms (Table 6.4-5). Consequently, pairwise comparisons of each parameter were made between sampling periods and between stations using Tukey's studentized range (HSD) test, with alpha = 0.05 and confidence = 0.95. Results are shown as network diagrams in which any stations or times connected by a line were significantly different at the 0.05 level.

Standing Crop

Figure 6.4-12 illustrates station differences for standing crop data compiled across all sampling periods. For the study as a whole, live weight of Spartina in Spartina marsh at Lower Salt Creek was significantly different than all other stations. The Thermal Station was like Rocky Cove, Thumb Island, and the Fence, but different than Control Stations and Davis Island.

Stations from Midway to Fence were alike but generally different than "end" stations. Figure 6.4-13 illustrates numerous differences between sampling periods for standing crop data compiled across all stations. Similarity of July and September 1983, and January and March 1984 suggest seasonality in live Spartina standing crop. Very distinct seasonality did occur as shown by Figure 6.4-14. Live Spartina weights increased in 1983 to maxima from October-December, then fell to minima in January-March. June and July 1984 weights were similar but significantly lower than summer 1983. This pattern was observed at all stations although 1983 means varied considerably. Thermal lower. Means at Midway, Thumb Island, and Fence were between those at Control and Thermal Stations in 1983 and greater than either in 1984, suggesting a gradient of stimulation centered at the Thermal Station. Lower Salt Creek and the Fence were similar and with Upper Salt Creek had lower than average mean Spartina weights.

Analyses were repeated with Juncus weights added because intermixed marshes are commonplace near Crystal River. Both time and station were significant as independent variables (Table 6.4-5), but patterns of similarity were exactly the same as for Spartina weights alone (Figures 6.4-12 and 6.4-13) except that Davis Island became similar to Lower Salt Creek and Control. It may be concluded from these results that Spartina marshes could be treated as either "pure" or "mixed" stands with regard to live weight. Figure 6.4-15 (combined live weight at thermal and control stations) illustrates that (a) means at each station are equal to or slightly greater than their respective counterparts in Figure 6.4-14 due to addition of live Juncus; (b) standard deviations are relatively great despite sample size of 12 due to the intentional effort to sample in different microenviroments at each station; and (c) live weights at the Thermal Station were signific ly greater than at the Control in some months of 1983 but none in 198

Plant Density

In the analysis of plant density, both time and station were significant independent variables (Table 6.4-5). Figure 6.4-16 illustrates station differences for data compiled across all sampling periods. The network is notably different than Figure 6.4-12, meaning that weight was not a simple consequence of density and that each parameter may respond differently to the same independent variable. Davis Island density means were unique; Control was like its neighboring stations and Thermal and Fence were similar. The network of live density means during each period (stations combined) is shown in Figure 6.4-17. Seasonality in plant density was strongly indicated because periods at the end of 1983, when the growing season was over, were different from one another (suggesting rapid change). Seasonality was further indicated by the affinity of successive periods in 1984, once the new seasonal density of live plants was established.

Trends in mean live Spartina density are illustrated in Figure 6.4-18. Means were at their highest in December 1983 and fell to minima in January 1984. Densiti s were steady in 1984 but trended downward to a level in July not significantly different than July 1983. The similarity of July means to January means suggests that baseline densities were established at the onset of the growing season. The Thermal Station had highest densities and was paralleled more closely by the Fence than other stations. Midway and Thumb Island had similar trends and their means were intermediate between Control and Thermal stations. Salt Creek Stations and Davis Island had typically low densities of live Spartina.

The addition of live Juncus shoots to Spartina densities did not affect the results of the ANOVA (Table 6.4-5) and had minor effects on station and time networks. As in the case of live standing crop, Spartina marshes could be treated as either "pure" or "mixed" stands with regard to live density. Figure 6.4-19 (combined live plant and shoot density at Control and Thermal Stations illustrates that (a) means are the same at Control and slightly more at Thermal in 1984 than their counterparts in Figure 6.4-18; (b) variances are not as great as for mean standing crop, meaning that density was affected less by microenvironmental changes; and (c) plant density at the thermal site was consistently greater than at the control and was usually significantly greater.

Marsh Height

At least 100 shoots were measured from each station in June 1984 when standing crop was high and densities stable (Figures 6.4-14 and 6.4-18). Results are shown in Figure 6.4-20. The inset shows that all but 4 comparisons were significantly different. Live Spartina at the Thermal Station was significantly shorter than neighboring stations or Control. Davis Island was significantly taller than all other marshes except Midway. Thumb Island and the Fence were intermediate in height between Thermal and Davis Island.

Shoot Weight

Data on live standing crop and density can be combined to assess shoot weight if shoot lengths are comparable or if the mean weights per unit length of shoot are comparable. Because the preceding section showed that mean shoot lengths were significantly different between stations in June 1984, standing crop and density data for the same period were used to assess variation of weights per unit length (Table 6.4-6). Mean weights per centimeter of live Spartina shoot ranged nearly twofold between means at Thermal and Midway Stations. The ranking of stations by shoot weight and standard shoot weight was essentially unchanged, meaning that shoot weight in live Spartina is a valid condition index and does not need correction for length.

Mean plant weights by station are shown in Figure 6.4-21. Salt Creek Stations and Davis Island were not plotted to simplify the figure. Shoot weights were highest in June-July of each year and lowest in January-March 1984. Mean weights at Control Station were consistently greater than Thermal Station means. It is evident in comparing Figures 6.4-14 and 6.4-18 that standing crop affects shoot weights more than density with regard to seasonality but that density is more important in the relation of Control to Thermal Stations.

Reproduction

The incidence of flowering was seasonal at all Spartina stations except Davis Island, which had nearly continuous flowering (Figure 6.4-22). Flowering at the Salt Creek Stations and Control peaked in October. Flowering at the Thermal Station also peaked in October but continued into 1984. Flowering at stations near Thermal peaked in December. Overall, flowering peaks differed on either side of the intake canal and marshes near the Thermal Station flowered later in the year.

Live and Dead Standing Crop and Density

Standing crop of dead Spartina varies seasonally (Figure 6.4-23), doubling at the end of the growing season. More dead Spartina was present at the outset of the 1984 growing season at the Thermal Station than at Control but both declined through time. Two way ANOVA were performed on total (live plus dead) standing crop and density of Spartina, both with and without intermixed species (Table 6.4-5). Time and station were significant as sources of variance. Total Spartina weight differences were identical to Figure 6.4-13 except that Thermal and Thumb Island Stations were significantly different. Even when dead weights of other species were added, the only novelty was that Midway and Thumb Island became dissimilar. Thus, the Spartina marshes under study varied consistently with respect to standing crop and observed trends and patterns were the same whether dead tissues or other species were considered.

A different result is obtained when temporal variation is considered. Figure 6.4-24 is a similarity network for total Spartina weight (and for total weight of all species) for each sampling period, averaged across stations. Figures 6.4-24 and 6.4-13 differ mostly with regard to summer conditions. Summer live weights differed from other periods, whereas summer total weights did not, and neither did weights for January 1984 because of the dead weight carry-over. Less seasonality can be expected in total weight measurements than live weight.

Mean total standing crop of Spartina varied as expected at all stations during the study (Figure 6.4-25). Total weights were greatest at the end of the growing season and lowest at the start. Annual variation was less definite than for live weight (Figure 6.4-14). On the other hand, relative station differences were more definite using combined total weight. For example, Lower Salt Creek, Control, and Davis Island were consistently lower than Thermal marshes or neighboring sites. Mean total weights at Control and Thermal Stations covaried but the latter had greater weights in 9 of 10 cases. Stations were significantly different in most months (Figure 6.4-26).

The total (live plus dead) Spartina density network is the same as Figure 6.4-16 except that Midway and Thumb Island became similar. Adding counts of other dead shoots was unimportant; thus, total density is as useful as total standing crop. A breakdown by time (Figure 6.4-27) indicates that seasonality patterns differed when dead shoots were considered (compare Figure 6.4-17). Overall, strong seasonality would not be expected in total shoot density, but differences between stations would be considered meaningful indices of marsh condition.

Seasonal trends of total Spartina density at all stations are given in Figure 6.4-28. Mean total weights rose at all stations but Davis Island to their respective station maxima from December to March and then fell. Relative to Thumb Island, Control and Fence Stations had consistently higher total weights. Control and Thermal Stations covaried, but Thermal was always higher (Figure 6.4-29).

Station Summary

Upper Salt Creek is like Davis Island relative to live and total standing crop of *Spartina* but unlike other stations. It was different than the Control Station, for reasons unrelated to the thermal discharge, where *Spartina* variables were concerned.

Live weight at Lower Salt Creek was similar to, but usually lower than, at Upper Salt Creek. Density was similar to that at Control Station and Midway. Lower Salt Creek *Spartina* marshes are more useful than Upper Salt Creek as controls but are not very similar to marshes at Control. No thermal effects were evident beyond the natural influence of the Crystal River.

The Control was similar to its neighbors relative to live plant density but differed from all northern stations relative to standing crop. Control had less dead material than Thermal. Density patterns in time were regular but values were lower than those at any northern station except Davis Island. Marsh heights in June 1983 were low but much higher than thermal marshes (p greater than .001). Flowering was typical. This site is an imperfect control for physical reasons; however, it more closely resembles the Thermal Station than either Salt Creek Station; and it is not affected by heated effluent. Use of Control as a control for *Spartina* assessments is therefore warranted but can be supplemented by data from stations north of the discharge canal.

Midway was unlike southern stations and Davis Island relative to live standing crop but similar to other northern stations. Mean live densities were like southern stations. Seasonally, weights at Midway were very similar to weights at the Thermal Station, whereas densities were comparable to values at the Control Station. Midway resembled controls in some regards and the Thermal Station in others. Overall it was a transitional *Spartina* marsh with definite affinities to the Thermal Station.

The Thermal Station, was like its neighbors in standing crop but unlike more distant stations. It was like Fence for live plant density but significantly different than all other sites, and it had higher densities through the study period than all other stations with the exception of Fence in 1984. Marsh height and specific shoot weight were lower than any other station, as was specific shoot weight. Flowering began during the same period as *Spartina* at Control Stations but lasted into January 1985. Otherwise, Thermal Station *Spartina* data were rarely intermediate. Means were usually extreme relative to other stations, and the overall placement of Thermal Station *Spartina* marshes at the upper end of marshes on a gradient of thermal response is justified.

Thumb Island *Spartina* marshes resembled Thermal marshes in terms of live standing crop, but densities were always lower, usually between mean counts at Control and Thermal. The marsh was significantly taller than thermal marshes. Flowering was prolonged into December and peaked about 6 weeks later than controls. Standing crop at Thumb Island was like that at Midway and Fence. Overall, the Thumb Island marsh was definitely related to the marsh at Thermal; and was different than the controls.

Fence was also different in standing crop from Control and Davis Island and different in density from all sites but Thermal. Seasonal changes in density were more similar to changes at Thermal than at any other station. Marsh height was above average but specific shoot weight was below average, like the Thermal Station. Flowering was limited to one episode in December, like marshes at Midway. Fence had surprising affinities to Thermal, in some cases more so than Thumb Island, and is the farthest station from Thermal with evidence of thermal influence.

Davis Island was the northernmost site and closest to the influences of the barge canal and Withlacoochee River. While different in all respects from southern stations, including controls, it is an accurate representative of low salinity, nonthermal marshes and helped to align Fence with the Thermal Station.

Juncus Trends and Patterns

Two way analyses of variance were conducted using live standing crop and live plant density as dependent variables and time and station as independent variables. The analyses were performed using all data for Juncus only in Juncus marshes and again for Juncus and Spartina combined, where they occurred together in Juncus marshes. Sampling periods and stations contributed significantly to observed variance in all analyses of live data and some of the combined data bases (Table 6.4-7). Consequently, network diagrams were made for differences at 0.05 probability level, using Tukey's Standardized Range Test.

Live Standing Crop

Figure 6.4-30 illustrates station differences for data compiled across all sampling periods. For the study as a whole, live Juncus weights at Control and Thermal Stations were significantly different than one another and all other stations. Midway was like Thumb Island and Fence among centrally located stations, and Salt Creek Stations were alike among distantly located sites. Overall, stations were more similar for Juncus live weight than for Spartina live weight. There were no significant differences in live Juncus weight between sampling periods (averaged across stations), implying a lack of seasonality in this parameter. Scrutiny of Figure 6.4-31 reveals that seasonality is not strong but that weights at Upper and Lower Salt Creek and Control were low in winter, weights at Midway, Thermal, and Thumb Island were relatively constant after September, and weights at Fence peaked in winter. There was considerable overlap of means and variances, but Control and Thermal Stations bracketed most station data as the respective maxima and minima (e.g., other station data were intermediate). Patterns of Juncus live weight therefore differ completely from Spartina patterns by lacking seasonality and by the control weights for Juncus exceeding thermal weights, whereas thermal Spartina outweighs its control (compare to Figure 6.4-14).

About one in two sites within Juncus marshes at the 8 stations were intermixed with varying amounts of Spartina. Analyses were repeated using Spartina weights to assess their effect on the outcome of station comparisons (Figure 6.4-32). Effects were significant, unlike the case where Juncus was added to Spartina. Midway became different from all stations except Thermal and Thumb Island, and Thermal became similar to neighboring stations. Moreover, several differences between sampling periods became significant (Figure 6.4-33). Opposite times in the growing season differed, although overall seasonality was not enhanced (Figure 6.4-34). Although comparisons of live standing crop in Juncus marshes near Crystal River were affected by the inclusion of other species, overall relationships were less affected. For example, Figure 6.4-35 illustrates mean live standing crop of all species at Control Station and Thermal Station. Compared to Figure 6.4-34, (a) Control was still greater than Thermal; (b) their covariance was the same; and (c) several mean differences were significant.

Live Shoot Density

Both time and station were significant as independent variables in the analysis of shoot density (Table 6.4-7). Figure 6.4-36 illustrates station differences for data compiled across all sampling periods. As in the case of Spartina density, the network is different than Figure 6.4-30, meaning that weight and density were separate indices of condition. The data indicate a gradient in shoot density since as control stations differ from Thumb Island, Fence, and Davis Island but not one another, and all neighboring stations were alike. Stations were more alike with regard to Juncus density than Spartina density (Figure 6.4-16).

The network of live density means during each period (stations combined) is shown in Figure 6.4-37 and illustrates that May and June 1984 differed from 1983 but that seasonality in shoot density was not pronounced. In fact, densities at all stations were aseasonal but trended upward into 1984, accounting for the distinction in May-June of that year (Figure 6.4-38). The suggestion of latitudinal gradients in live density was confirmed by Figure 6.4-38 because southern stations had consistently higher counts than northern ones and central stations had intermediate counts.

Addition of Spartina densities to Juncus densities affected station and time networks (Figure 6.4-39 and 6.4-40, respectively) but had negligible effects on trends depicted in Figure 6.4-38. Addition of Spartina made stations between Midway and the Fence more distinctive but the apparent difference of Control and Thermal Station must be regarded as an artifact (Figure 6.4-41). Spartina counts reversed the network of differences between time periods, which was consistent with the high densities of Spartina at the end of the growing season. Overall, data indicate a latitudinal gradient in Juncus shoot density compared to a gradient in Spartina density which corresponds to the thermal gradient between stations. Addition of Spartina counts distinguishes central Juncus stations from distant ones for reasons attributable to Spartina seasonality.

Marsh Height

At least 100 shoots were collected from each station in June 1984 and measured. Results are shown in Figure 6.4-42. The inset shows that all but 4 comparisons were significantly different. Live Juncus at Thermal was significantly shorter than at all other marshes. Thumb Island was similar to Midway and both were similar to Salt Creek marshes. Relative to Thermal, there was a trend both north and south of increasing height to a maximum, followed by lower marshes. Midway and Thumb Island were transitional between Thermal and distant stations. In these respects the height of Juncus marsh was related better to distance from Thermal than Spartina marsh heights.

Shoot Weight

Because mean _Juncus_ height in June 1984 was significantly different, weight and density data were used to assess variation in weight per unit length (Table 6.4-8). Mean weight per centimeter of live _Juncus_ shoot ranged from (0.015 to 0.021 g), a smaller amount than observed for _Spartina_. As expected, ranking of stations by shoot weight and standardized shoot weight did not cause large differences. Shoot weight in _Juncus_ does not need standardizing to compare stations, as was done in Figure 6.4-43. As in Figure 6.4-34 (live standing crop), Control and Thermal bracketed most other data. Midway and Thumb Island were clearly intermediate, and Fence covaried as Thermal but was more like Control than other stations. This condition index indicates affinity of Thermal to its nearest neighbors (Midway and Thumb Island) but not to Fence or the Control.

Reproduction

The incidence of flowering was continual at low levels in control marshes and at Fence and Davis Island. Flowering at the Thermal Station was low and limited to May-June, with no flowering from July-March. Midway flowered in September and May at low levels and Thumb Island flowered until September (Figure 6.4-44). Overall, _Juncus_ flowered more often but at lower levels than _Spartina_.

Live and Dead Standing Crop and Density

Standing crop of dead _Juncus_ was lowest in December and highest in January-February with a gradual decline during the growing season. Standing crop of dead _Juncus_ followed the same pattern as _Spartina_ dead weight (Figure 6.4-23), but total range and monthly changes were considerably less for _Juncus_. Between station differences in dead _Juncus_ standing crop were low.

Two way ANOVA were made on total standing crop and density of _Juncus_, both with and without intermixed species (Table 6.4-7). Time was not a significant source of variance for total standing crop of _Juncus_. This result is consistent with the non-seasonal aspect of live standing crop, and differs from _Spartina_ for the same reason. Addition of dead weights did affect _Juncus_ station differences whereas _Spartina_ networks were unaffected.

Station differences are given in Figure 6.4-45, which resembles Figure 6.4-30 except for the distinction of Davis Island. Comparing Figure 6.4-46 to Figure 6.4-31 reveals a dampening of station variation by the addition of dead weights but maintenance of each station's relation to other stations. Overall, station relationships were not affected by consideration of dead material.

Station differences were affected by addition of _Spartina_ total weights, which was an expected result given the degree of intermixing (Figure 6.4-47). This network depicts station similarity for total standing crop of intermixed marshes. Midway, Thermal and Thumb Island Stations were similar to one another but unlike more distant stations. The nature of this difference is illustrated in Figure 6.4-48. Total combined standing crop of _Juncus_ marshes was significantly greater at the Control Station than at the Thermal Station during the 1983 and 1984 growing seasons, even when intermixing by _Spartina_ was considered. Thermal enhancement of intermixed Spartina did not offset the thermal reduction of Juncus standing crop.

The total (live + dead) Juncus density network is the same as Figure 6.4-36 except that Midway differs from Thumb Island, and Control differs from Thermal Station. In all but one period, Control Station density was greater than Thermal Station density (Figure 6.4-49). Thumb Island had lower total shoot density than the Thermal Station, but the fact that Davis Island also had lower shoot density provides evidence for the latitudinal gradient described earlier. Comparison of Figures 6.4-38 and 6.4-49 also points out the role of dead Juncus in establishing a seasonal cycle in shoot abundance, with maxima in summer and minima in December and January. It follows from these findings that total shoot density was a meaningful index of Juncus marsh condition; that station differences occurred; and that, relative to thermal effects, total density was lower at stations nearer the discharge canal than at more distant stations.

Station Summary

Upper Salt Creek resembled most stations in live standing crop and densities of Juncus, but not the Control or Thermal Stations. It also differed from Thermal, but not Control, with respect to live standing crop and densities. Marsh height was average and flowering was typical. Intermixing was common in Upper Salt Creek so combined Juncus and Spartina data were above average. Overall, Upper Salt Creek was a vigorous Juncus marsh more similar to Lower Salt Creek than to Control, but it could be compared to Davis Island, where salinities were also low.

Lower Salt Creek was like Upper Salt Creek for live weight and like the other controls for density. It was consistently different than Thermal and Thumb Island relative to these parameters Lower Salt Creek had tall Juncus and typical flowering, and was structurally more like northern stations than Control Station.

Control was significantly different from northern stations with regard to all measures of standing crop and usually bracketed standing crop at other stations as an upper limit. Standing crop but not density was significantly greater at Control than Thermal during the growing season. Marsh height and shoot weight were above average and flowering was typical.

Midway was like Thumb Island with respect to all measures of standing crop but had higher values than the Thermal Station, at times significantly so. It was usually different than Control and the Fence Station. In both weight and density, Midway was average, between Control and Thermal. The marsh was shorter than at Control but taller than at Thermal; it was not significantly different in height than Thumb Island. It was also intermediate between Control and Thermal with respect to shoot weight and the cessation of flowering in 1983. Overall, Midway was a thermally affected station relative to structural measures of condition in Juncus, but was affected less than Thumb Island when both were compared to the Thermal Station.

The Thermal Station differed from Upper and Lower Salt Creek and Control in most comparisons and from at least two of the sites in all comparisons. The significance of its differences from neighboring stations depended upon whether dead Juncus and Spartina was included. Standing crop differed most from Control during the growing season. Marsh height and shoot density were lower at Thermal than at any other station and flowering was reduced to the greatest extent. Conditions at the Thermal Station were extreme in all comparisons and must be attributed to the influence of thermal enrichment.

Thumb Island always differed from Control. With respect to standing crop and density, it was like Thermal and often covaried in the same manner. The affinity of Thumb Island to Fence depended on whether dead material or any Spartina was included. Juncus height was lower at Thumb Island than at any other station but the Thermal Station, and flowering patterns resembled those at Midway. Overall, conditions in Juncus at Thumb Island resembled conditions at the Thermal Station more than at any other station, and the station should be included as a thermally influenced station.

The Fence differed significantly from the Thermal Station relative to any form of standing crop. Values of standing crop were lower than values at Control, and Fence differed from Control in density when Spartina was excluded. Weight trends at Fence were out of phase with other stations and density trends were more erratic than average. Marsh height and shoot weight at the Fence were higher than elsewhere; flowering was typical.

Davis Island bore no consistent relationship to any station for standing crop but was lower than average or lowest in shoot density. Perhaps the most interesting feature of Davis Island was its similarity to Thermal, Thumb Island, and Fence Stations and difference from controls or midway when only Juncus was considered, and the reverse (similarity to controls) when Spartina was added to the comparison. This result was due to intermixing in Juncus marshes north of the intake canal and the complicating influence of the Withlacoochee River.

Burrow Density Trends and Patterns

An analysis of variance was performed on burrow density data for all stations and sampling periods (Table 6.4-9). Time, station, marsh type and live weight of plant material were significant sources of variation in burrow densities. Average burrow density in Juncus marshes was $158/m^2$ (N = 948) compared to burrow density in Spartina marshes of $139/m^2$ (N = 947). Because this difference was highly significant, the remaining data are presented for Spartina and Juncus separately. The network of significant differences between overall station means is shown in Figure 6.4-50. The Thermal Station was different than distant stations, other than the Control. Thumb Island was different from all stations but the Thermal Station. Trends through time showed more definite patterns (Figure 6.4-51). Samples taken in 1983 differed from one another and from 1984 samples, whereas 1984 samples were similar to one another but different from those taken in 1983. This pattern suggests a seasonal trend in which changes through time were more rapid in 1983 than in 1984. As Figure 6.4-52 illustrates, seasonality was pronounced for burrow densities in Spartina marshes. Overall, density increased through the Spartina growing season and peaked in October when sea level was highest. Average densities were lowest from December to February and trended gradually upward in most cases, accounting for the pattern depicted in Figure 6.4-51. Compared to the Thermal Station, Midway and Thumb Island were most similar.

Station differences in Juncus marshes are depicted in Figure 6.4-53 and very closely resemble the network shown in Figure 6.4-50, except that the Thermal Station became different than the Control Station, and Midway differed from the Fence. Burrow densities varied between stations in a manner not dependent upon marsh type. Comparison of Figures 6.4-54 and 6.4-51, which Figure 6.4-54 resembles in essential elements, leads to the conclusion that seasonal patterns in burrow density were also independent of marsh type. As in Figure 6.4-51, 1983 samples in Figure 6.4-54 differ from one another and from 1984 periods, whereas 1984 sampling times are like one another but different than 1983 sampling periods. Seasonality suggested by Figure 6.4-54 is demonstrated in Figure 6.4-55. Figure 6.4-55 and 6.4-52 are similar insofar as maximum densities occurred in October and minimum densities occurred in January. The rate of density increases during the first half of 1984 was greater in Juncus marshes than in Spartina marshes. Thumb Island and the Fence exhibited a close covariance in Juncus marshes, and both had higher densities for most periods relative to the Thermal Station. Thus, burrow densities and Juncus marshes at Thumb Island and the Fence showed a greater response relative to the Thermal Station than did burrow densities in Spartina marshes at those two stations. Distant stations had low burrow densities compared to the Thermal Station, and Lower Salt Creek and Control had average densities with reduced seasonality.

Overall, burrow densities in Juncus marshes were better indicators of station differences than burrow densities in Spartina marshes. Elevation and the pattern of burrow seasonality in Juncus marshes is attributed to annual variation in sea level which affects the Juncus marshes considerably more than Spartina marshes growing at lower elevation. Station differences in burrow density within Juncus marshes can be interpreted relative to thermal effects with greater confidence due in part to the tidal sorting of thermal l ads. No useful patterns were found in plots of Spartina or Juncus live star ing crop against burrow count when station means or means per sampling periods were used, except for an affinity in the covariance of live Spartina weights and burrow count between the Thermal and Thumb Island Stations, and between Midway and the Fence relative to Upper and Lower Salt Creek and Davis Island.

Littorina Density Patterns and Trends

Littorina density data are summarized in Table 6.4-10. Periwinkles were more abundant in Spartina marshes than Juncus marshes, and the Fence Spartina marsh supported very high densities throughout the year. In the Spartina marshes, Midway had above average densities and Thermal densities were below average, like Lower Salt Creek. Mean densities for Midway, Thermal, and Thumb Island Stations were greater than means for Salt Creek and Control Stations in every quarter but spring 1984. Overall, thermally related effects on Littorina density in Spartina marshes were erratic and stimulatory if present at all.

Littorina density in Juncus marshes was considerably lower than in Spartina marshes except at Thumb Island. Fence Juncus had very few periwinkles, in contrast to high densities in Spartina marshes at that station. Mean density of Littorina in southern stations was not significantly greater than densities at stations with other indications of thermal influence.

Epiflora Patterns and Trend

Too few shoots of either marsh species were collected for meaningful intepretation, other than to mention that no algae were reported from thermal or Thumb Island Stations. The shoreline between Thermal and Fence Stations was inspected in June 1984 for evidence of macroflora. None was found south of the Fence. The only attached epiflora found in this segment was filamentous blue-green algae. Information on epiphytes within the marsh interior was not collected.

6.4.3 Impact Assessment

Introduction

Studies conducted both before and after construction of Unit 3 at Crystal River have demonstrated long term differences in the structure of *Spartina* and *Juncus* marshes near the point of discharge and at a site south of the intake canal. In studies conducted between 1974 and 1981, the relationship of marsh structure and productivity was documented, and monitoring programs thereafter focused on trends and patterns of particular structural features shown to be useful measures of marsh condition.

The historical Thermal and Control Sites differ with regard to exposure and salinity and probably elevation. New stations in Salt Creek do not appreciably resemble Control and will not be considered further. Stations between Midway and Fence represent approximately comparable marshes along a gradient of temperature and salinity. Davis Island was within the regular influence of the Withlacoochee River.

Thermal data generated in this study for temperatures in the salt marsh represent the first such information since operation of Unit 3. Plume effects were evident in winter and in summer. Winter temperatures at Thermal, Thumb Island, and Fence Stations were different than control temperatures. In the summer, temperatures at Midway, Thermal, and Thumb Island Stations were above background levels. Thus, possible thermal effects were evaluated at Midway, Thermal, Thumb Island, and Fence.

Spartina

Data from Midway, Thumb Island, and the Fence Stations were compared to the Thermal Station with respect to standing crop, density, height, shoot weight, and flowering (Table 6.4-11). Midway resembled the Thermal Station and differed from control stations with regard to standing crop and flowering patterns. Thumb Island standing crop and flowering were affected the same way, but values of live density and shoot weight were transitional between those of the Thermal Station and those at control stations. It is interesting that Fence marsh heights showed no effect and in this respect were similar to Midway and Thumb Island, but other parameters resembled the Thermal Station more than Thumb Island. Fence *Juncus* marshes did not exhibit similarities to Thermal marshes equal to those in *Spartina*.

Studies in *Spartina* marshes north of the intake canal reveal similarities among Thermal and adjacent stations. Effects were noticeable more to the north at Thumb Island and the Fence than to the south at Midway. The linear shoreline affected by thermal effluent extends northward to a point near the Fence, on Luttrell Island.

Juncus

Relative to the Thermal Station, Midway standing crop was different with regard to trends but the values were similar (Table 6.4-11). Live densities at Midway were transitional between Control and Thermal Stations, but total densities were higher than those at the Thermal Station. Marsh height was low and, shoot weight was higher than at the Thermal Station, but trends through time were synchronous. Flowering was reduced, similar to that at Thumb Island. Thumb Island had a live standing crop trend similar to that at the Thermal Station in 1983. Total density was not like that at the Control Station. Marsh height was low and intermediate between that at Thermal and Fence Stations. Flowering was reduced, not as much as at the Thermal Station but similar to that observed at Midway. Fence live standing crop was high, not at all like that at the Thermal Station. Live densities at Fence were like that at Thumb Island and Davis Island, whereas total densities were similar to Thumb Island and lower than Thermal.

Reference was made in preceding sections to the apparent gradient in live shoot densities within Juncus marshes which corresponded to a latitudinal gradient. No difference in this parameter other than the latitudinal gradient could be detected. Comparisons summarized by Table 6.4-11 were based on total densities. Overall, Juncus marshes at the Thermal Station exhibited structural characteristics consistent with those observed in previous studies, and the Thermal Station is therefore classified as a thermally affected station. Flowering in Juncus marshes at Midway was affected, and in this regard the Juncus and Spartina marshes there were similar. Other parameters for Juncus varied inconsistently with Spartina parameters, but it appears that Midway was thermally affected.

Juncus marshes at Thumb Island closely resembled those at the Thermal Station, whereas marshes at the Fence exhibited no thermal effects. Juncus marshes at Midway, therefore, are intermediate in terms of thermal impact between Thumb Island and the Fence. Thumb Island structural features all showed similarity to those at the Thermal Station, although the extent of standing crop response was not as great. In contrast, no similarities in standing crop, height, shoot weight, or flowering could be seen at the Fence and only total densities seemed affected. Overall, Fence Juncus marshes did not seem affected by thermal effluent.

Elevation differences in Spartina and Juncus marshes at the Fence may be responsible for the differential results of this study. Spartina marshes are exposed to the water column for a longer period of time than the higher Juncus marshes. Since heated waters accumulate in the northern portion of Crystal Bay and move northward on flood tides, it is possible that Spartina marshes at Fence were affected differently than Juncus marshes. The same explanation would not apply to effects observed in the Spartina marshes of Thumb Island. The evidence generated by this study for structural features of Juncus marshes is consistent with the finding for Spartina marshes that thermal effects are evident at Midway in Rocky Cove. Juncus marshes at Thumb Island were definitely affected, but the transition between affected and unaffected marshes is located between Thumb Island and Luttrell Island. This delineation of impact applies only to the marshes fringing the coast and not to the marsh interior.

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TABLE 6.4-1

SALT MARSH STATION DESCRIPTION

Station Name	Aspect	Approx. Elevation of Marsh Floor cm above MLW		Thickness of Marsh Floor, m	Horizon*	Avg. Summer Ht, cm	
		Spartina	Juncus			Spartina	Juncus
1 Upper Salt Creek	Sheltered well-scoured creek, steep banks; near hammocks	118	116	1.5(±0.9)	135°	88	140
2 Lower Salt Creek	*Spartina* sites exposed, *Juncus* sheltered; mild banks, much *Distichlis*.	49	82	1.0(±0.3)	140°	91	140
3 Control	Sheltered to north by intake canal levee, exposed to west; drift algae seasonally abundant.	106	122	1.0(±0.3)	180°	[illegible]	171
4 Midway	Sheltered by intake & discharge canal levees; relief affected by historical filling. Deeply incised creeks.	67	118	1.5(±0.5)	170°	98	143
5 Thermal	Similar to Station 1, sheltered to south by discharge canal levee, mild relief on open shore; steep creek banks.	76	88	1.1(±1.0)	180°	79	134
6 Thumb Island	Sheltered by Thumb Island; low relief across dissected marsh.	79	76	0.7(±0.2)	180°	88	140
7 Fence	Sheltered but subject to tidal currents; some sites on a deep creek; hammocks nearby.	85	79	1.3(±0.8)	180°	88	171
8 Davis Island	Sheltered, with steep to gently sloping banks; hammocks nearby.	94	88	1.4(±0.6)	165°	107	171

*Horizon refers to the solar arc between 090° and 270°, an estimate of relative insolation potential.

Table 6.4-2 Mean water temperature at slack high tide for the period August 5-September 5, 1983 at Crystal River Salt Marsh Control and Thermal Sites. Data are °C.

	Control	Thermal	N
Days	28.3 ± 3.5	34.3 ± 1.9	28
Nights	22.8 ± 1.4	32.9 ± 1.7	28
All times	25.0 ± 4.9	23.6 ± 1.9	56

Table 6.4-3 Mean water temperature at slack high water near Crystal River, August 6-15, 1983.

Value, °C	3 Control	4 Midway	5 Thermal	6 Thumb Island	7 Fence	8 Davis Island
Day Mean	28.1	29.3	33.9	32.4	28.4	28.0
Sd	3.1	2.1	1.8	3.7	2.8	0.9
N	10	10	10	10	10	10
Night Mean	23.8	24.9	33.3	23.6	24.5	25.0
Sd	1.5	1.1	0.7	1.6	2.3	1.7
N	10	10	10	10	10	10
Overall Mean	25.9	27.1	33.6	28.0	26.5	26.5
Sd	3.2	2.8	1.4	5.3	3.2	2.0
N	20	10	20	20	20	20

Table 6.4-4 Thermal characteristics of salt marsh stations.

Station	Temperature Range, ^{o}C Winter (December-February)	Summer (June-August)
1. Upper Salt Creek	>14.0	<30.0
2. Lower Salt Creek	>14.0	<30.0
3. Control	13.5-14.0	<30.0
4. Midway	<16.0	<31.0
5. Thermal	>20.0	32.5
6. Thumb Island	18.5-20.0	>31.5
7. Fence	15.5-16.5	<30.0
8. Davis Island	<15.5	<30.0

Table 6.4-5 GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: Spartina live weight in Spartina marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	79	3063996.88605691	38784.77071971	18.86	0.0001	0.629750	39.1700
ERROR	876	1801424.30469216	2056.42043915		ROOT MSE		WTLIVE MEAN
CORRECTED TOTAL	955	4865421.19154907			45.34777215		115.78012762

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	2310930.40705412	124.84	0.0001	9	2320670.46650450	125.39	0.0001
STATION	7	292056.92002352	20.29	0.0001	7	286676.79245122	19.92	0.0001
TIME*STATION	63	461509.27177927	3.56	0.0001	63	461509.27177927	3.56	0.0001

DEPENDENT VARIABLE: Spartina total weight in Spartina marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	71	2919497.33239346	41119.68073794	8.53	0.0001	0.435707	32.5515
ERROR	784	3781098.65533070	4822.82991751		ROOT MSE		STCROP MEAN
CORRECTED TOTAL	855	6700595.98772417			69.44659759		213.34387850

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	8	557550.51477045	14.45	0.0001	8	560703.68987452	14.53	0.0001
STATION	7	1736106.78017520	51.43	0.0001	7	1732061.29797611	51.31	0.0001
TIME*STATION	56	625840.03744773	2.32	0.0001	56	625840.03744773	2.32	0.0001

DEPENDENT VARIABLE: Spartina and Juncus live weight in Spartina marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	81	3090736.20495933	38157.23709020	18.56	0.0001	0.631773	39.2599
ERROR	876	1801424.30469151	2056.42043915		ROOT MSE		LIVECROP MEAN
CORRECTED TOTAL	957	4892160.50964503			45.34777215		115.50648225

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	11	2337178.60515165	103.32	0.0001	11	2344690.07407659	103.65	0.0001
STATION	7	292056.92002361	20.29	0.0001	7	286676.79245131	19.92	0.0001
TIME*STATION	63	461509.27177906	3.56	0.0001	63	461509.27177906	3.56	0.0001

DEPENDENT VARIABLE: Spartina and Juncus total weight in Spartina marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	81	3453073.62631377	42630.53057647	8.40	0.0001	0.436176	33.0556
ERROR	879	4463433.15168952	5078.00094610		ROOT MSE		TOTCROP MEAN
CORRECTED TOTAL	960	7916506.77800328			71.26065497		215.57835580

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	11	812551.[illegible]	14.55	0.0001	11	801237.17033761	14.34	0.0001
STATION	7	1660032.01704750	46.70	0.0001	7	1659379.13116739	46.68	0.0001
TIME*STATION	63	980409.35200192	3.06	0.0001	63	980409.35200192	3.06	0.0001

Table 6.4-5 continued.

DEPENDENT VARIABLE: Spartina live density in Spartina marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	79	145441.32984650	1841.02949173	13.52	0.0001	0.549480	34.3878
ERROR	876	119247.83333333	136.12766362		ROOT MSE		NOLIVE MEAN
CORRECTED TOTAL	955	264689.16317992			11.66737604		33.92887029

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	33409.06490093	27.27	0.0001	9	33097.26577909	27.01	0.0001
STATION	7	82190.01060556	86.24	0.0001	7	82020.01626746	86.07	0.0001
TIME*STATION	63	29851.45426009	3.48	0.0001	63	29851.45426009	3.48	0.0001

DEPENDENT VARIABLE: Spartina total density in Spartina marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	79	298174.90707810	3774.36591238	10.17	0.0001	0.478282	34.1000
ERROR	876	325254.08166667	371.29956811		ROOT MSE		SHDEN MEAN
CORRECTED TOTAL	955	623428.98874477			19.26900537		56.50732218

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	62873.60001209	18.82	0.0001	9	62593.27790323	18.73	0.0001
STATION	7	180250.26575356	69.35	0.0001	7	179999.66731537	69.26	0.0001
TIME*STATION	63	55051.04131166	2.35	0.0001	63	55051.04131166	2.35	0.0001

DEPENDENT VARIABLE: Spartina and Juncus live density in Spartina marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	81	147738.85977731	1823.93654046	13.40	0.0001	0.553357	34.4597
ERROR	876	119247.83333333	136.12766362		ROOT MSE		LIVEDEN MEAN
CORRECTED TOTAL	957	266986.69311065			11.66737604		33.85803758

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	11	35706.59483166	23.85	0.0001	11	36226.62009136	24.19	0.0001
STATION	7	82180.01060556	86.24	0.0001	7	82020.01626746	86.07	0.0001
TIME*STATION	63	29851.45426009	3.48	0.0001	63	29851.45426009	3.48	0.0001

DEPENDENT VARIABLE: Spartina and Juncus total density in Spartina marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	81	286905.94246419	3542.04867474	8.61	0.0001	0.442017	35.3573
ERROR	880	362178.08333333	411.56600379		ROOT MSE		TOTDEN MEAN
CORRECTED TOTAL	961	649084.02578753			20.28708958		57.37733888

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	11	56366.80723753	12.45	0.0001	11	57890.67993204	12.79	0.0001
STATION	7	170731.48229167	59.26	0.0001	7	170731.48229167	59.26	0.0001
TIME*STATION	63	59807.65312500	2.31	0.0001	63	59807.65312500	2.31	0.0001

Table 6.4-6. Shoot weight and specific weight of Spartina in June 1984. Weights in grams and grams/cm, respectively.

Station	Shoot		Specific Shoot	
	Weight	Rank	Weight	Rank
1	3.8	5	.035	7
2	3.7	7	.038	6
3	5.0	2	.055	2
4	6.2	1	.059	1
5	2.9	8	.033	8
6	4.7	3	.047	3
7	3.8	6	.039	5
8	4.7	4	.044	4

Note: shoot- average weight in grams of individual shoots
specific shoot- grams per centimeter of shoot

Table 6.4-7 GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: Juncus live weight in Juncus marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	79	3303440.46019007	41010.80020495	4.55	0.0001	0.290049	41.4097
ERROR	880	8095029.43580049	9195.23337335		ROOT MSE		HTLIVE MEAN
CORRECTED TOTAL	959	11398472.90329137			95.89177999		231.19800753

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	519929.11780000	6.52	0.0001	9	546199.04596393	6.60	0.0001
STATION	7	1440297.02789736	25.92	0.0001	7	1471309.40196939	25.97	0.0001
TIME*STATION	63	1095996.82603999	1.09	0.0001	63	1095996.52003591	1.09	0.0001

DEPENDENT VARIABLE: Juncus total weight in Juncus marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	71	7032619.15941930	99051.10527633	3.88	0.0001	0.260214	41.4202
ERROR	784	19991307.15962622	25499.21030997		ROOT MSE		STCROP MEAN
CORRECTED TOTAL	855	27024021.30924560			159.60479669		385.44912363

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	8	506651.90502901	2.40	0.0115	8	517300.41990639	2.59	0.0099
STATION	7	4954790.43716505	24.97	0.0001	7	4966500.92193267	25.02	0.0001
TIME*STATION	56	2069233.73242533	1.45	0.0199	56	2069233.73242532	1.45	0.0199

DEPENDENT VARIABLE: Juncus and Spartina live weight in Juncus marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	71	487770.36876063	6870.20680395	8.07	0.0001	0.422002	111.0017
ERROR	785	668105.41239057	851.08769731		ROOT MSE		LIVECROP MEAN
CORRECTED TOTAL	856	1155875.78115120			29.17399169		26.26309551

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	8	151652.07991599	22.57	0.0001	8	159199.20351932	22.65	0.0001
STATION	7	223580.39517077	37.53	0.0001	7	223600.09469402	37.53	0.0001
TIME*STATION	56	110557.12917309	2.32	0.0001	56	110557.12917309	2.32	0.0001

DEPENDENT VARIABLE: Juncus and Spartina total weight in Juncus marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	71	792673.05949016	11164.69090076	7.01	0.0001	0.385023	94.9303
ERROR	792	1261854.60109995	1593.25330523		ROOT MSE		TOTCROP MEAN
CORRECTED TOTAL	863	2054527.79079011			39.91557023		42.09370370

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	8	110329.04777732	9.20	0.0001	8	110329.04777732	9.20	0.0001
STATION	7	451730.72927900	40.50	0.0001	7	451730.72927900	40.50	0.0001
TIME*STATION	56	222630.20759676	2.50	0.0001	56	222630.20759676	2.50	0.0001

Table 6.4-7 continued.

DEPENDENT VARIABLE: Juncus live density in Juncus marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	79	311331.81154099	3940.90900710	3.18	0.0001	0.223493	41.0352
					ROOT MSE		JULIVE MEAN
ERROR	872	1081696.42121218	1240.47777642		35.22041709		85.82903193
CORRECTED TOTAL	951	1393028.43277311					

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	59099.19950557	5.29	0.0001	9	59517.09390545	5.33	0.0001
STATION	7	140201.17249369	16.15	0.0001	7	140860.99610963	16.22	0.0001
TIME*STATION	63	112034.29991173	1.43	0.0175	63	112034.29991173	1.43	0.0175

DEPENDENT VARIABLE: Juncus total density in Juncus marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	79	1000861.41602922	12669.13211176	3.74	0.0001	0.254112	40.7623
					ROOT MSE		JHDEN MEAN
ERROR	867	2937795.92272270	3388.96069519		58.21480613		142.80969625
CORRECTED TOTAL	946	3938656.85999650					

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	118781.81100817	3.89	0.0001	9	116652.31971131	3.83	0.0001
STATION	7	471079.90255199	19.86	0.0001	7	471626.07326913	19.88	0.0001
TIME*STATION	63	410202.99110759	1.92	0.0001	63	410202.99310759	1.92	0.0001

DEPENDENT VARIABLE: Juncus and Spartina live density in Juncus marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	79	24224.52151770	306.63951200	7.83	0.0001	0.415050	106.9017
					ROOT MSE		LIVEDEN MEAN
ERROR	872	34139.69696970	39.15102063		6.25707020		5.85313950
CORRECTED TOTAL	951	58364.21848737					

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	2810.84820293	7.98	0.0001	9	2779.55281790	7.89	0.0001
STATION	7	16799.90570009	61.30	0.0001	7	16739.03837417	61.08	0.0001
TIME*STATION	63	4613.67553472	1.87	0.0001	63	4613.69553472	1.87	0.0001

DEPENDENT VARIABLE: Juncus and Spartina total density in Juncus marshes.

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	79	876790.10256280	11098.61901970	3.71	0.0001	0.251152	36.2952
					ROOT MSE		TOTDEN MEAN
ERROR	873	2611870.56060604	2991.84073360		54.69840006		150.68205666
CORRECTED TOTAL	952	3488660.66314099					

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	75677.93991163	2.81	0.0030	9	75563.91516913	2.81	0.0031
STATION	7	409474.70090919	19.54	0.0001	7	409410.04270260	19.55	0.0001
TIME*STATION	63	390591.00279211	2.07	0.0001	63	390591.00279210	2.07	0.0001

Table 6.4-8. Shoot weight and specific weight of <u>Juncus</u> in June 1984. Weights in grams and grams/cm, respectively.

Station	Shoot Weight	Shoot Rank	Specific Shoot Weight	Specific Shoot Rank
1	2.2	7	.015	8
2	2.3	6	.015	7
3	3.2	2	.019	2
4	2.5	5	.016	5
5	1.9	8	.015	6
6	2.7	4	.018	3
7	3.6	1	.021	1
8	2.8	3	.017	4

Note: shoot- average weight in grams of individual shoots
specific shoot- grams per centimeter of shoot

Table 6.4-9 Analysis of Variance for Burrow Density.

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	82	3431689.52838145	41849.87229733	15.52	0.0001	0.412554	34.9042
ERROR	1812	4886472.82729137	2696.72893338		ROOT MSE		DEN MEAN
CORRECTED TOTAL	1894	8318162.35567283			51.93003803		148.77889182

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
TIME	9	1666421.99675243	68.66	0.0001	9	1363308.45252755	56.17	0.0001
STATION	7	675192.94917944	35.77	0.0001	7	665123.97724805	35.23	0.0001
TYPE	1	169628.75299059	62.90	0.0001	1	54376.51154099	20.16	0.0001
TNOLIVE	1	6820.92469851	2.53	0.1119	1	7746.23212453	2.87	0.0903
TNTLIVE	1	33075.73361870	12.27	0.0005	1	24104.85260428	8.94	0.0028
TIME*STATION	63	880549.17114178	5.18	0.0001	63	880549.17114178	5.18	0.0001

Table 6.4-10. *Littorina* density in *Spartina* and *Juncus* marshes near Crystal River.

A. *Spartina*

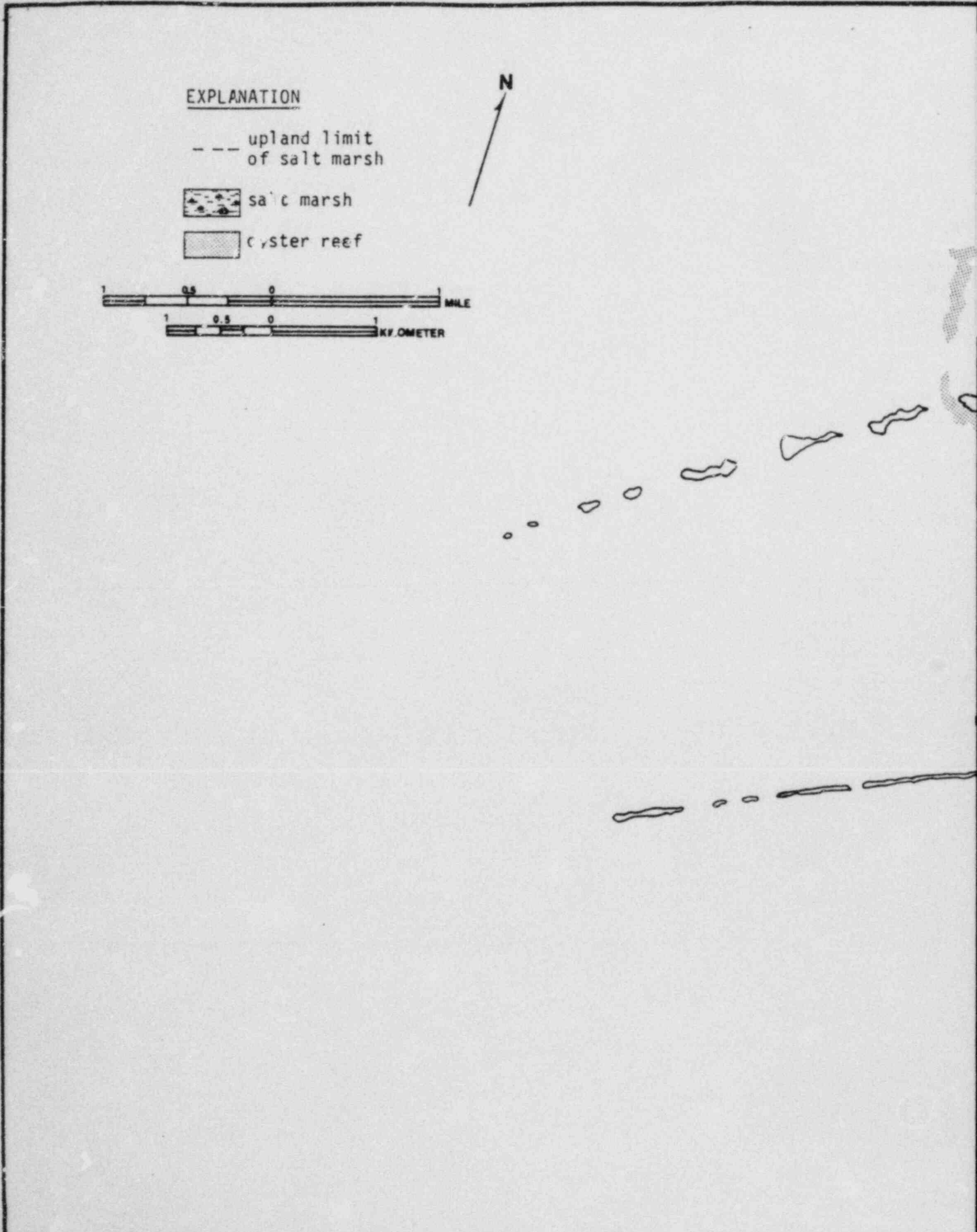
Quarter	Littorina Density, No./m^2 at Station 1	2	3	4	5	6	7	8
II 1983	5.2	4.3	0	6.0	11.3	3.6	54.3	4.3
III 1983	6.0	0	0.6	15.3	0	1.0	61.6	7.0
IV 1983-1984	1.7	0	0.3	3.6	0	2.0	33.0	3.0
I 1984	3.6	0.6	1.0	10.3	3.3	0.6	44.8	1.6
II 1984	3.6	45.6	0.6	10.3	0	1.3	32.6	1.0

B. *Juncus*

Quarter	1	2	3	4	5	6	7	8
II 1983	1.0	7.6	0.6	0.6	11.3	2.6	1.0	5.6
III 1983	1.0	2.3	0	0.3	0	0.6	0	8.0
IV 1983-1984	2.0	1.6	0	0.3	1.6	1.3	0	0.6
I 1984	2.0	0.6	1.3	0.3	0.3	0	0	1.0
II 1984	1.3	1.6	1.0	1.6	1.3	2.0	0	0.6

Table 6.4-11. Summary of impacts at Stations 4-7.

Parameter	STATION 4	5	6	7
Spartina				
Standing Crop	Thermal	Thermal	Thermal	Thermal
Live Density	No effect	Thermal	Transitional	Thermal
Height	No effect	Thermal	No effect	No effect
Shoot Weight	No effect	Thermal	Transitional	Thermal
Flowering	Thermal	Thermal	Thermal	Thermal
Juncus				
Standing Crop	No effect	Thermal	Transitional	No effect
Total Density	No effect	Thermal	Thermal	Transitional
Height	Transitional	Thermal	Thermal	No effect
Shoot Weight	Transitional	Thermal	Thermal	No effect
Flowering	Thermal	Thermal	Thermal	No effect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upland limit
of salt marsh
sa c marsh
c ster reef
1 0.5 0 1 MILE
1 0.5 0 1 KI OMETER
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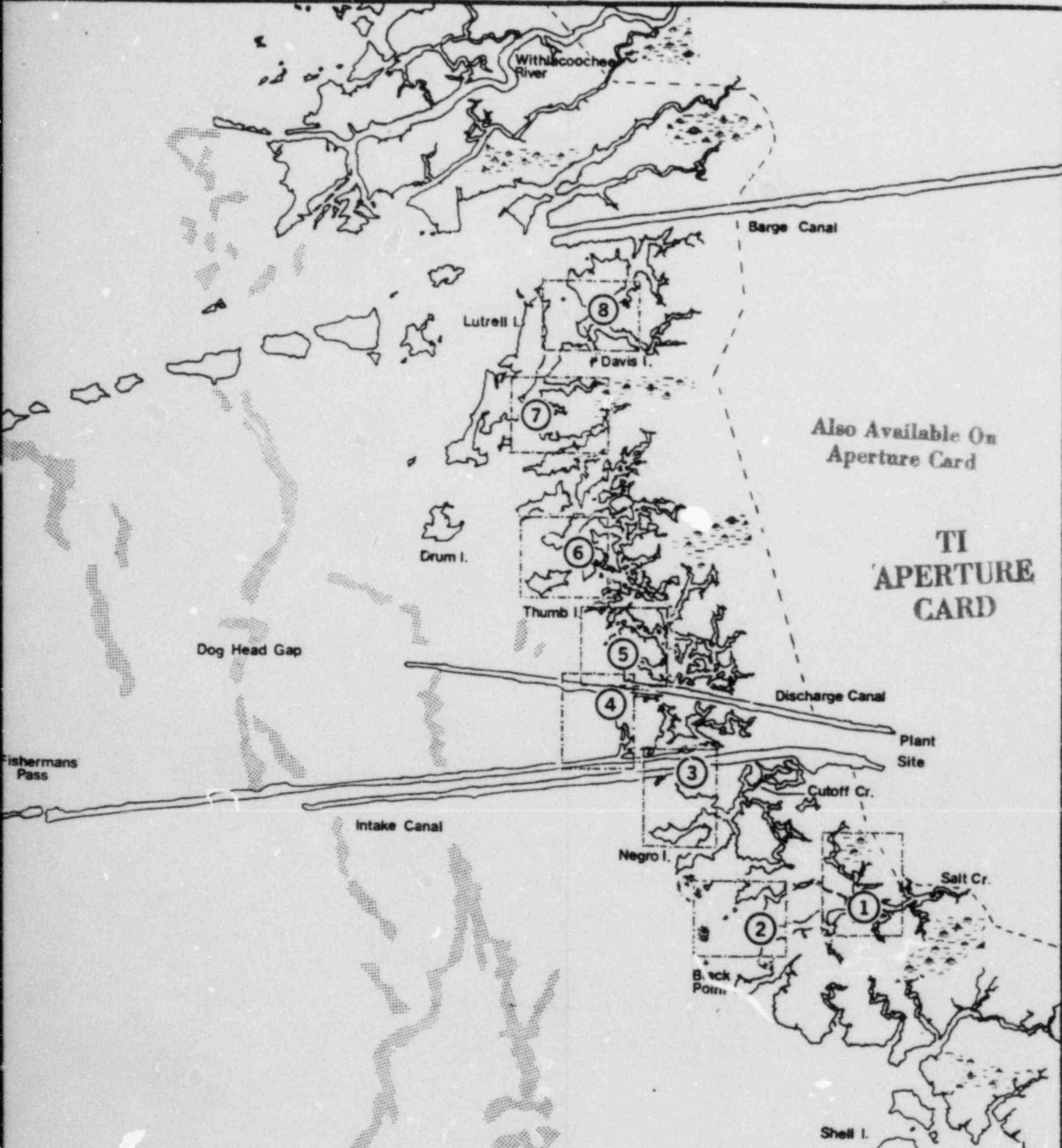
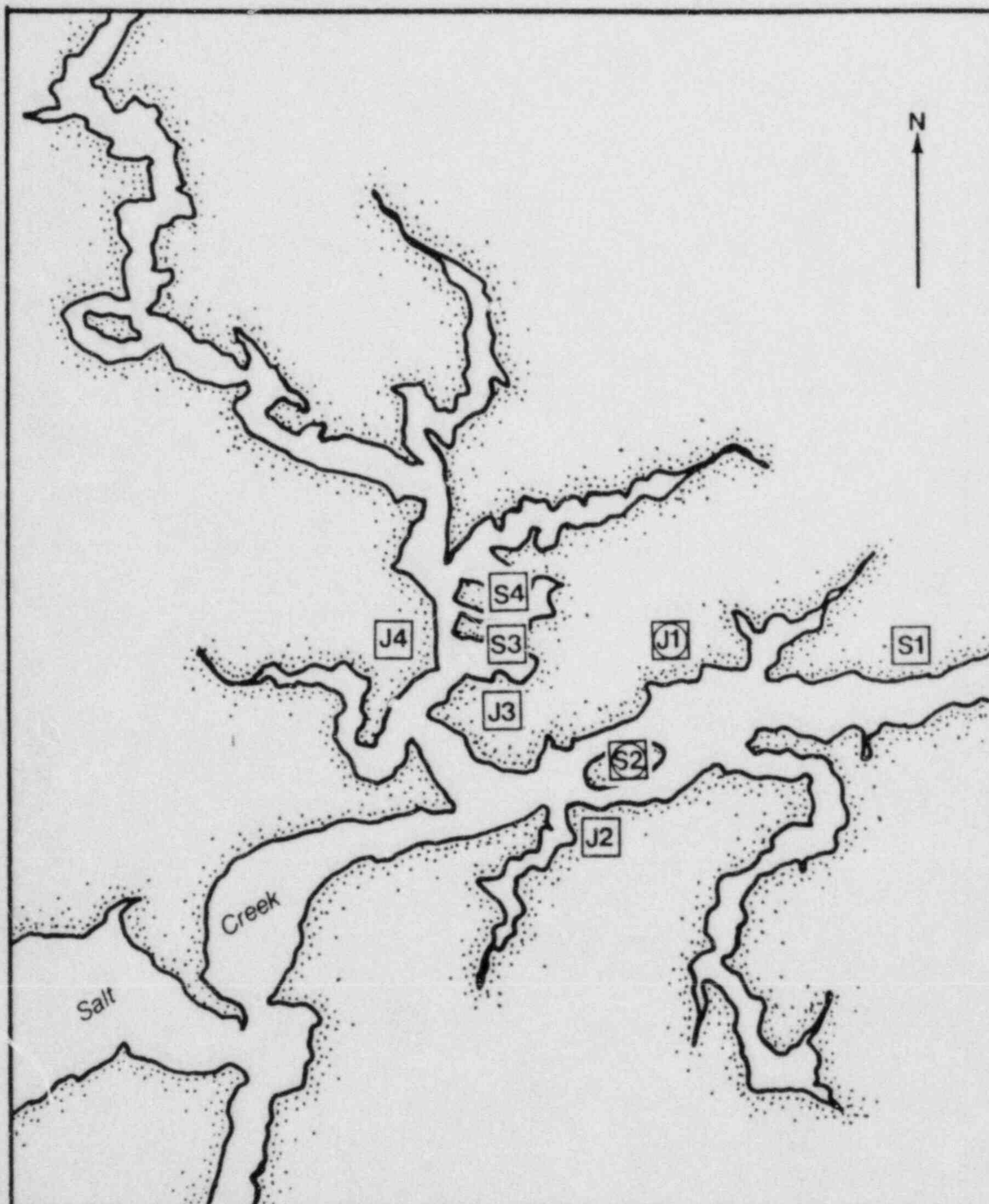


FIGURE 6.4-1
CONTROL (1-3) AND THERMAL (4-8) MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION 1: *UPPER SALT CREEK*

S = Spartina
J = Juncus
□ = Site location
○ = Denotes thermograph

FIGURE 6.4-2
STATION 1
MARSH SITES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

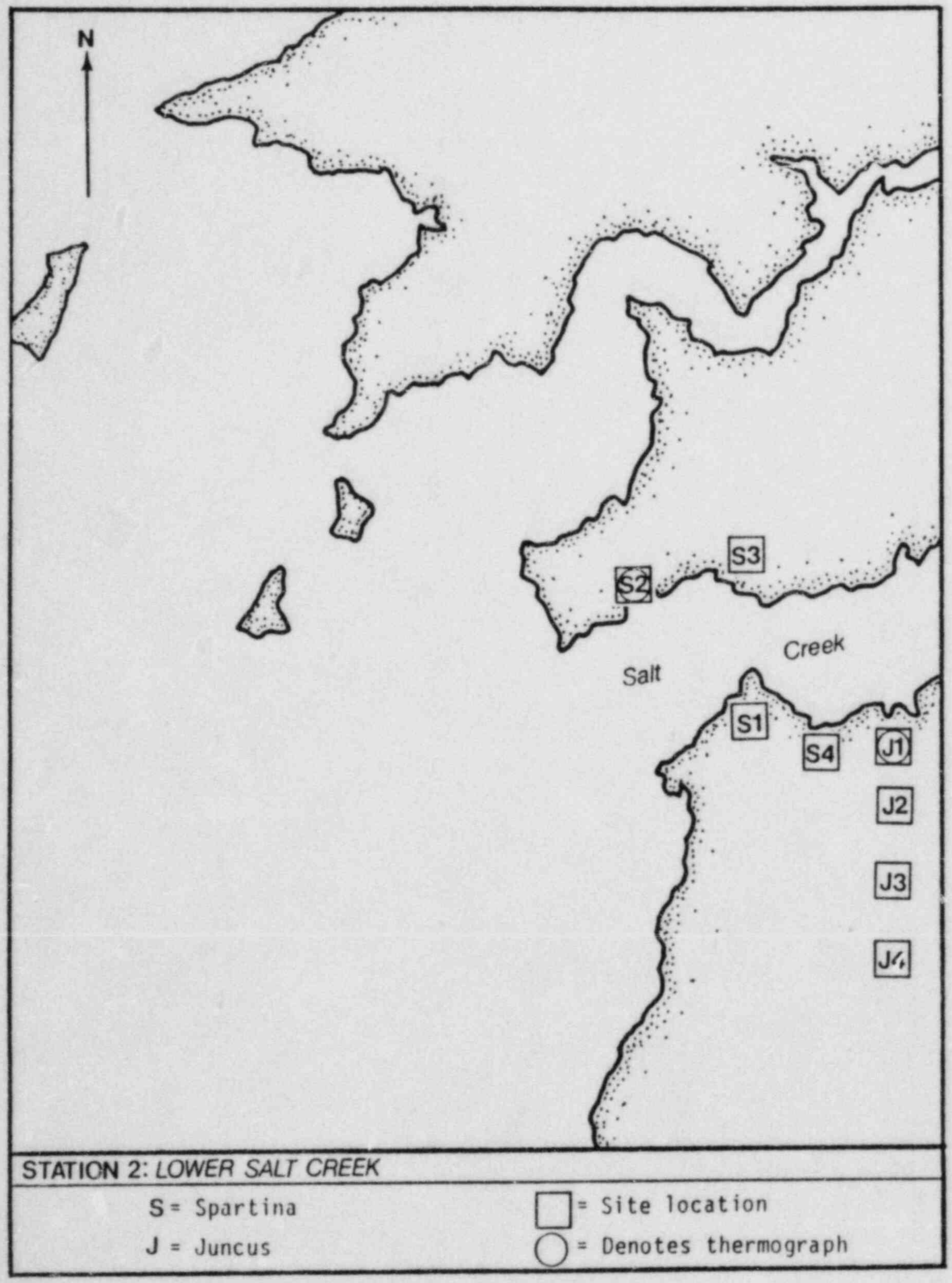


FIGURE 6.4-3
STATION 2
MARSH SITES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

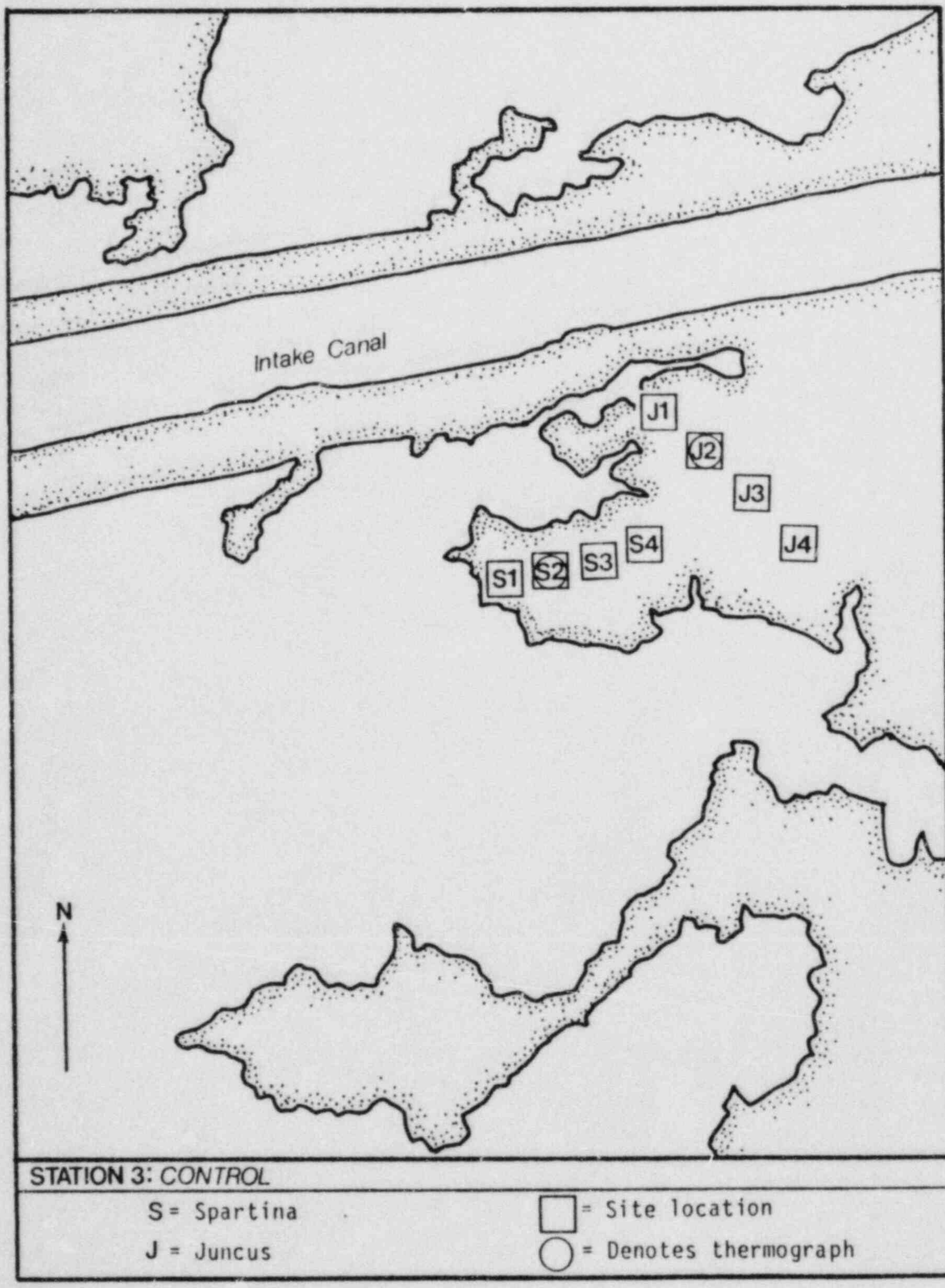


FIGURE 6.4-4
STATION 3
MARSH SITES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

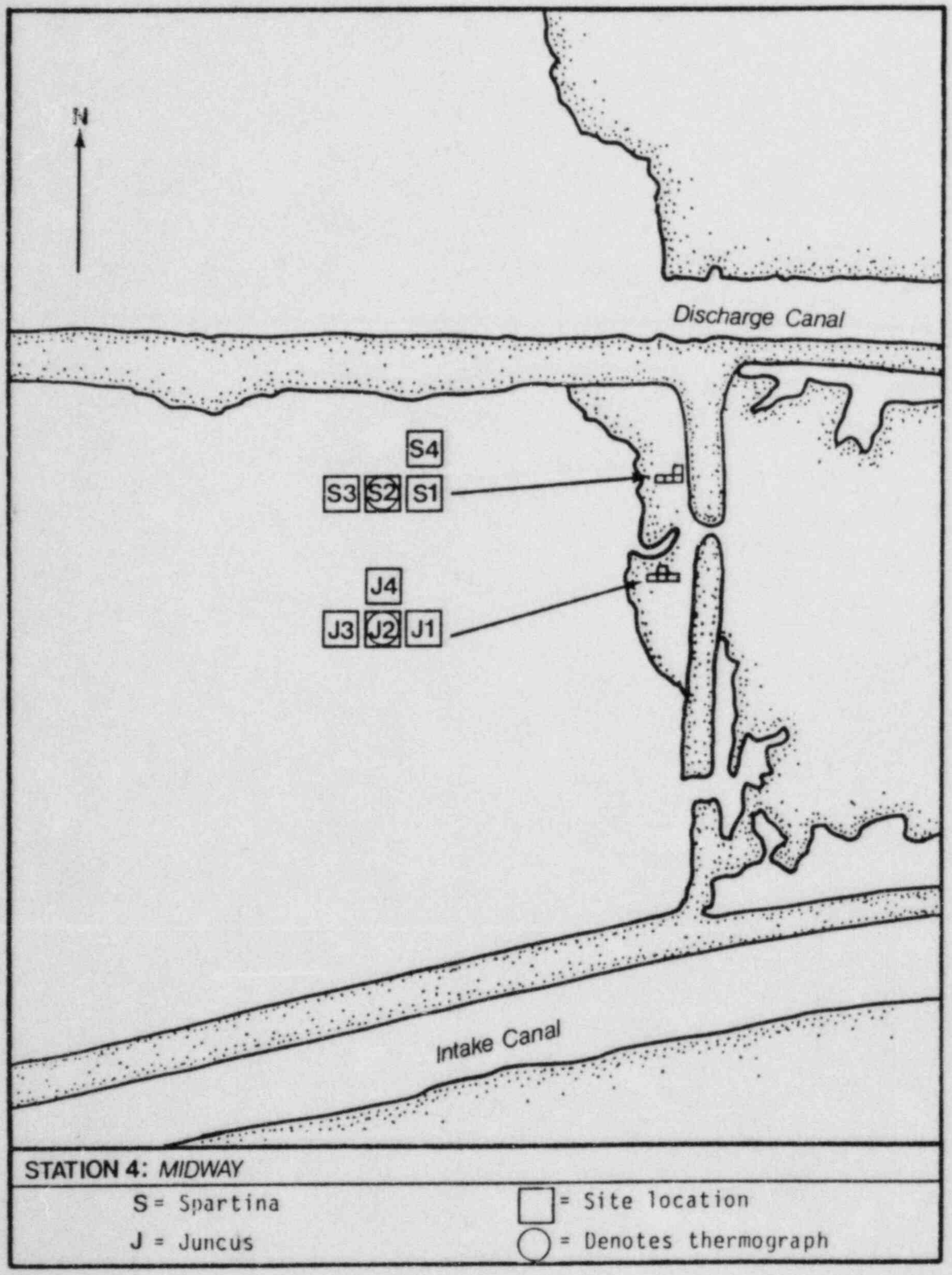
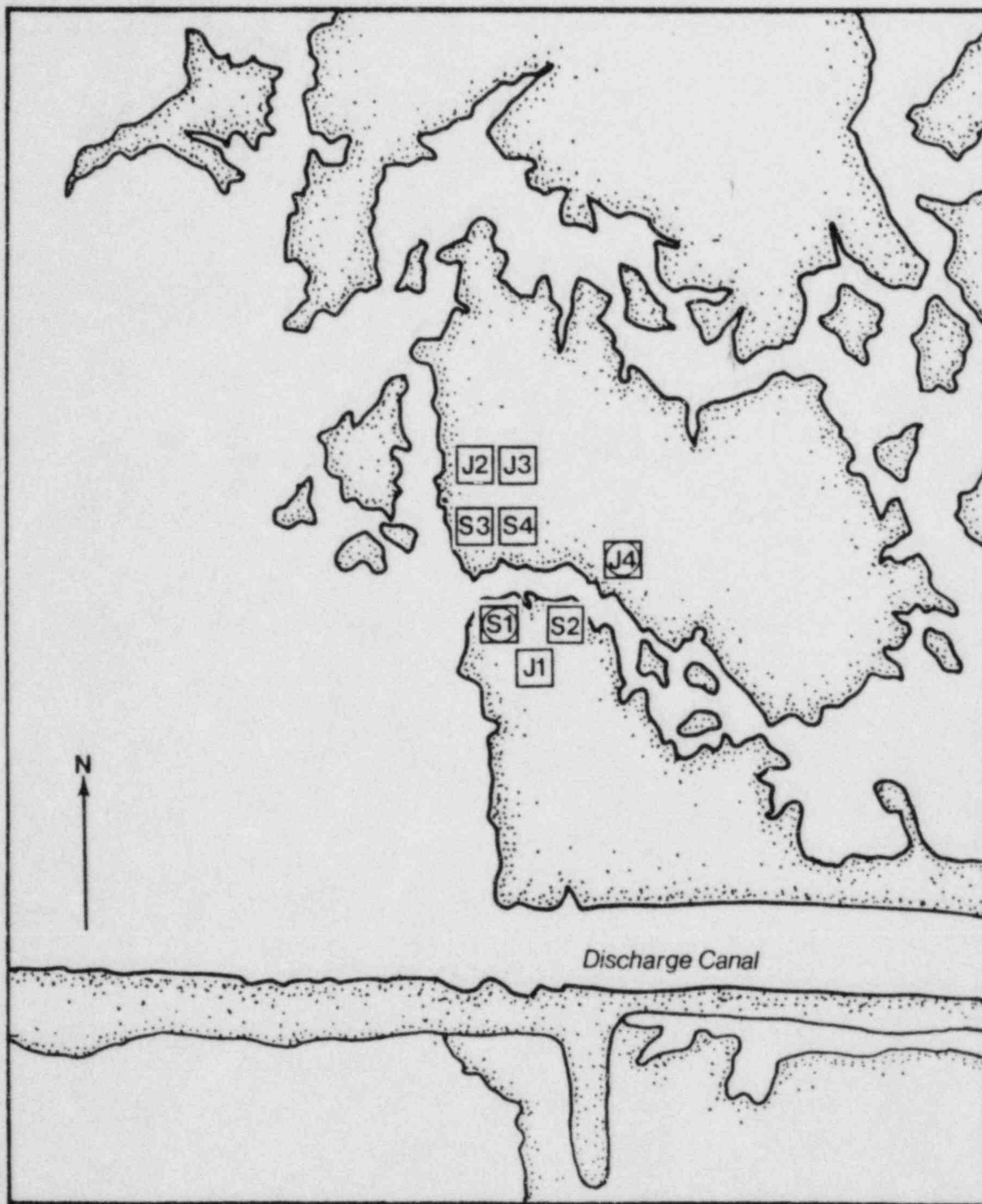


FIGURE 6.4-5
STATION 4
MARSH SITES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION 5: *THERMAL*

S = Spartina

J = Juncus

☐ = Site location

○ = Denotes thermograph

FIGURE 6.4-6

STATION 5
MARSH SITES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

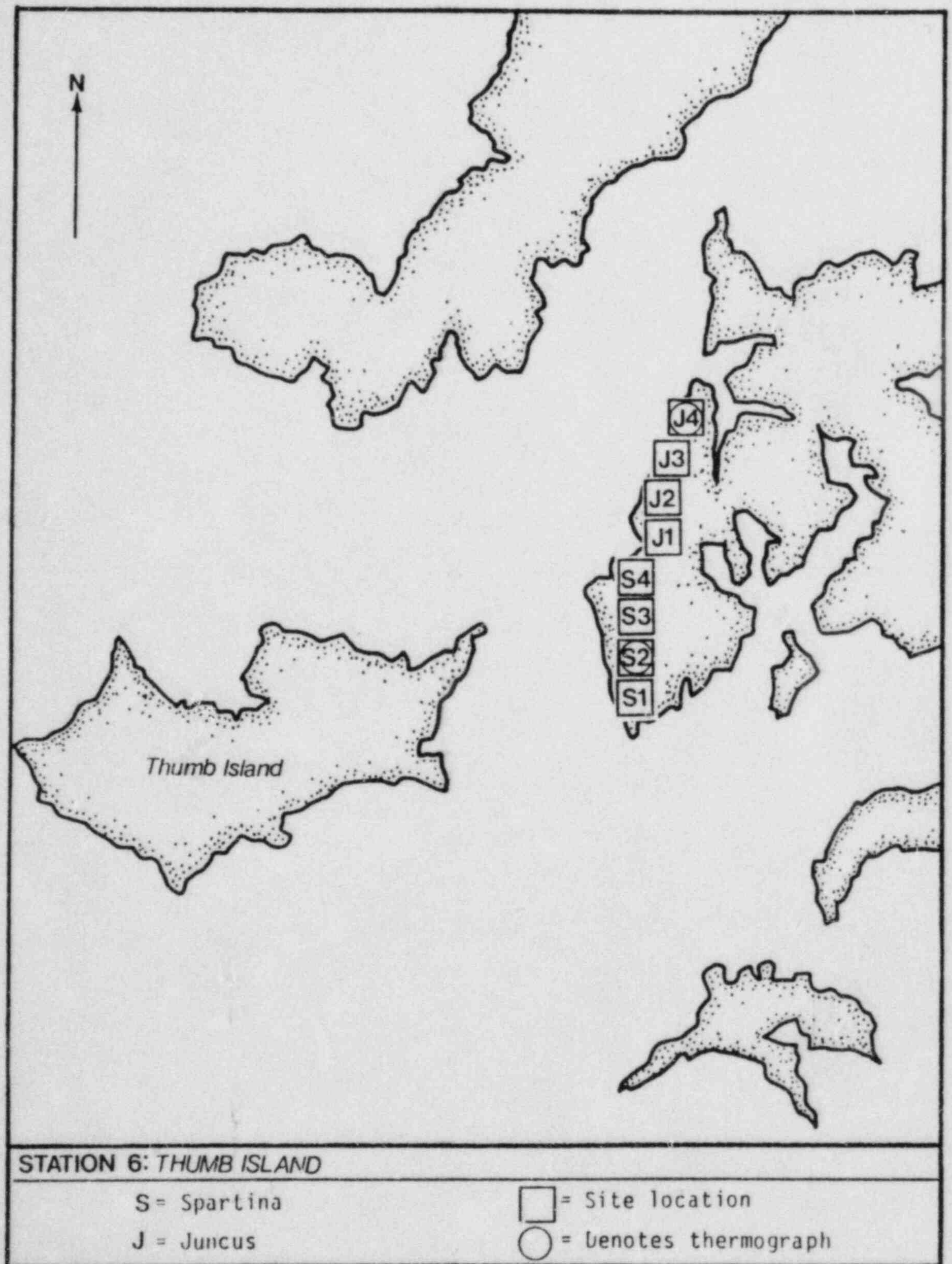


FIGURE 6.4-7

STATION 6
MARSH SITES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

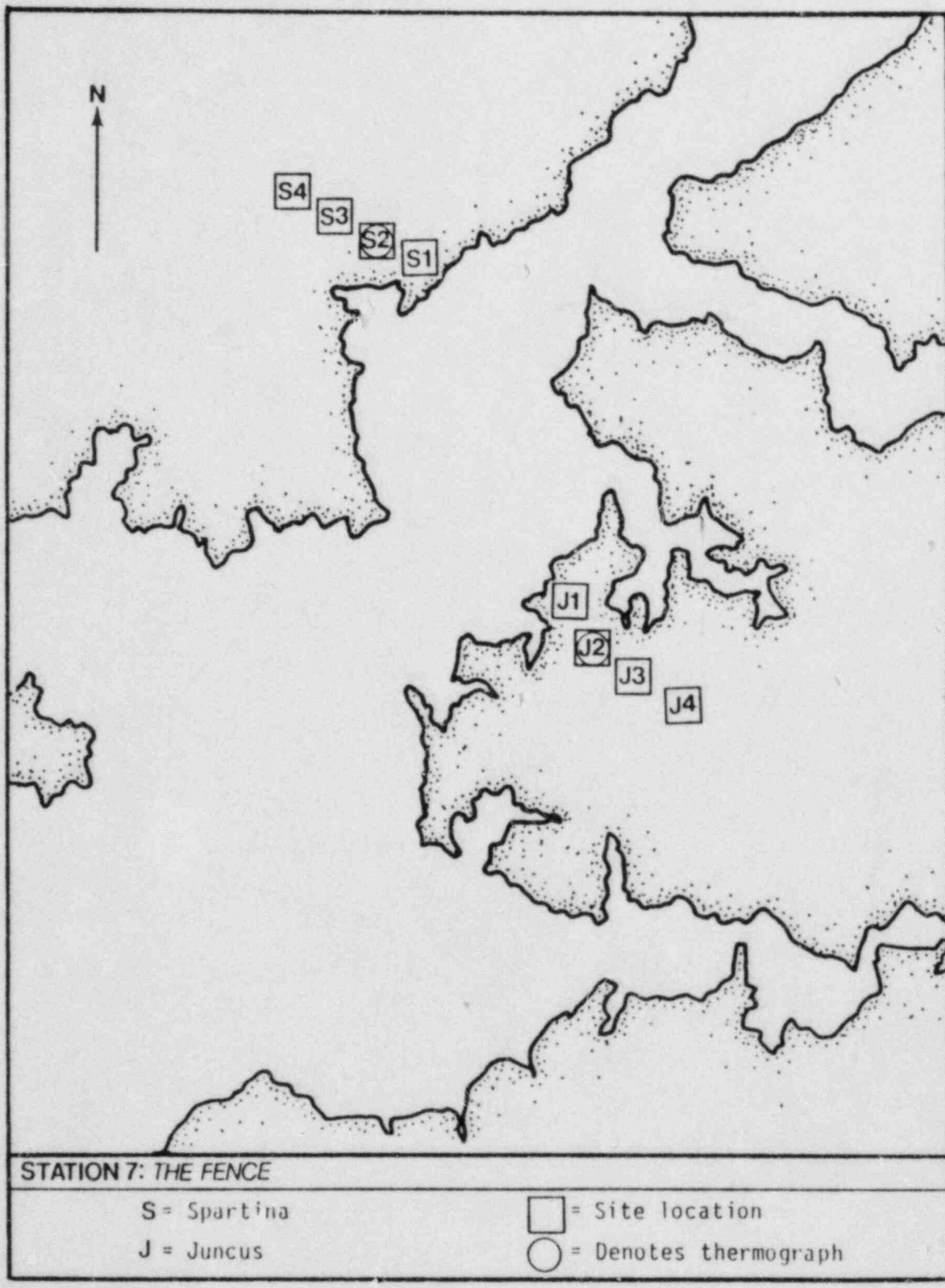
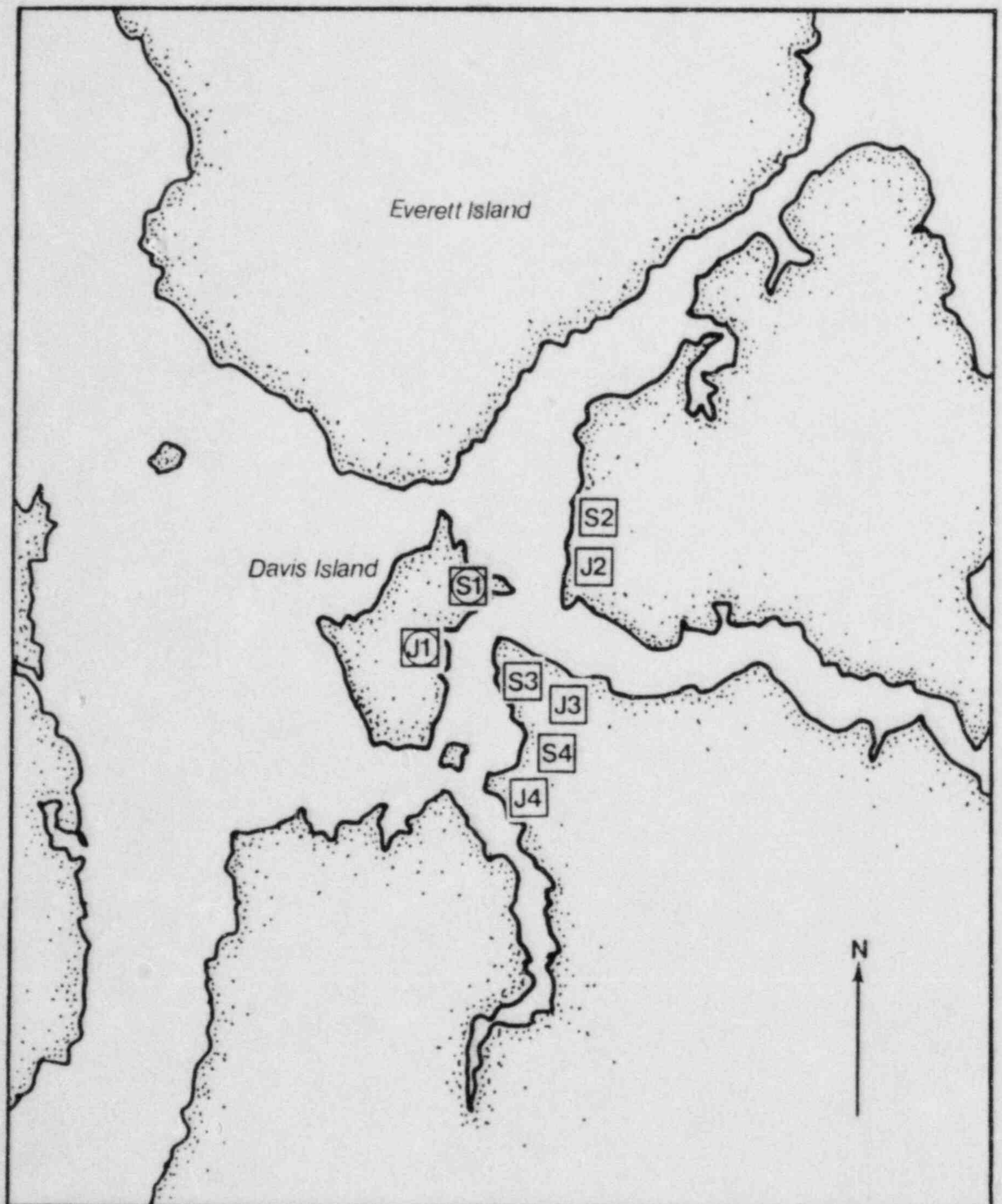


FIGURE 6.4-8

STATION 7
MARSH SITES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION 8: *DAVIS ISLAND*

S = Spartina

J = Juncus

□ = Site location

○ = Denotes thermograph

FIGURE 6.4-9

STATION 8
MARSH SITES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

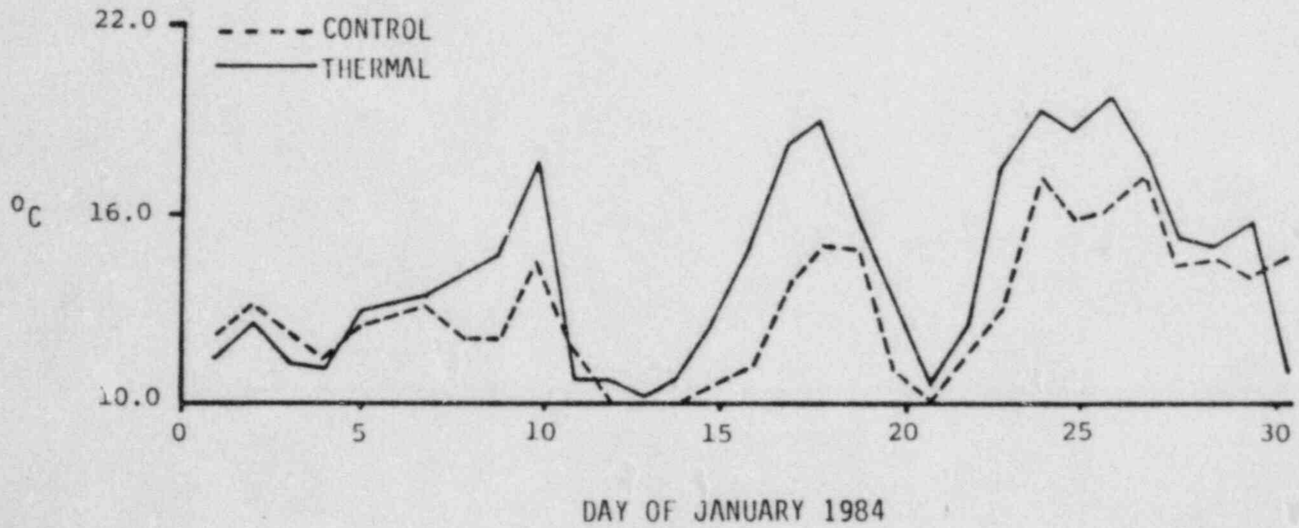
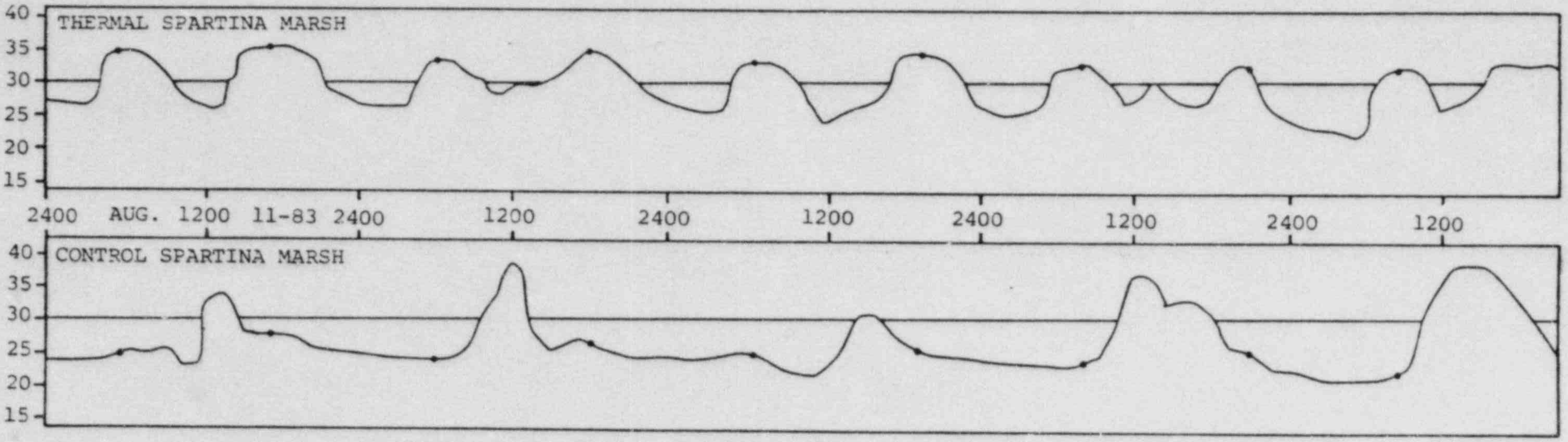


FIGURE 6.4-10

MEAN DAILY TEMPERATURE
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

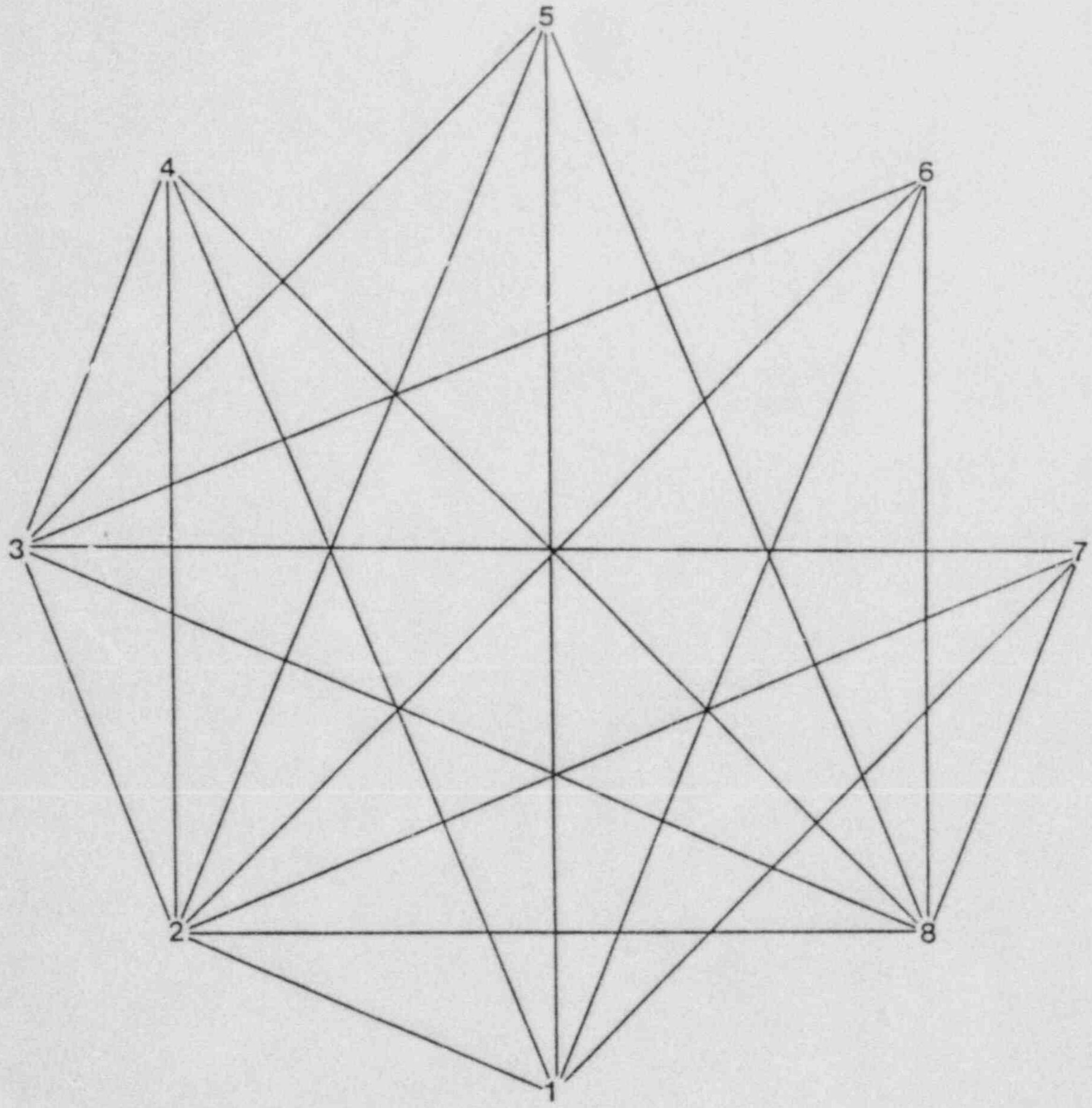


NOTE:

Closed circuits indicate times of slack high tide.

FIGURE 6.4-11

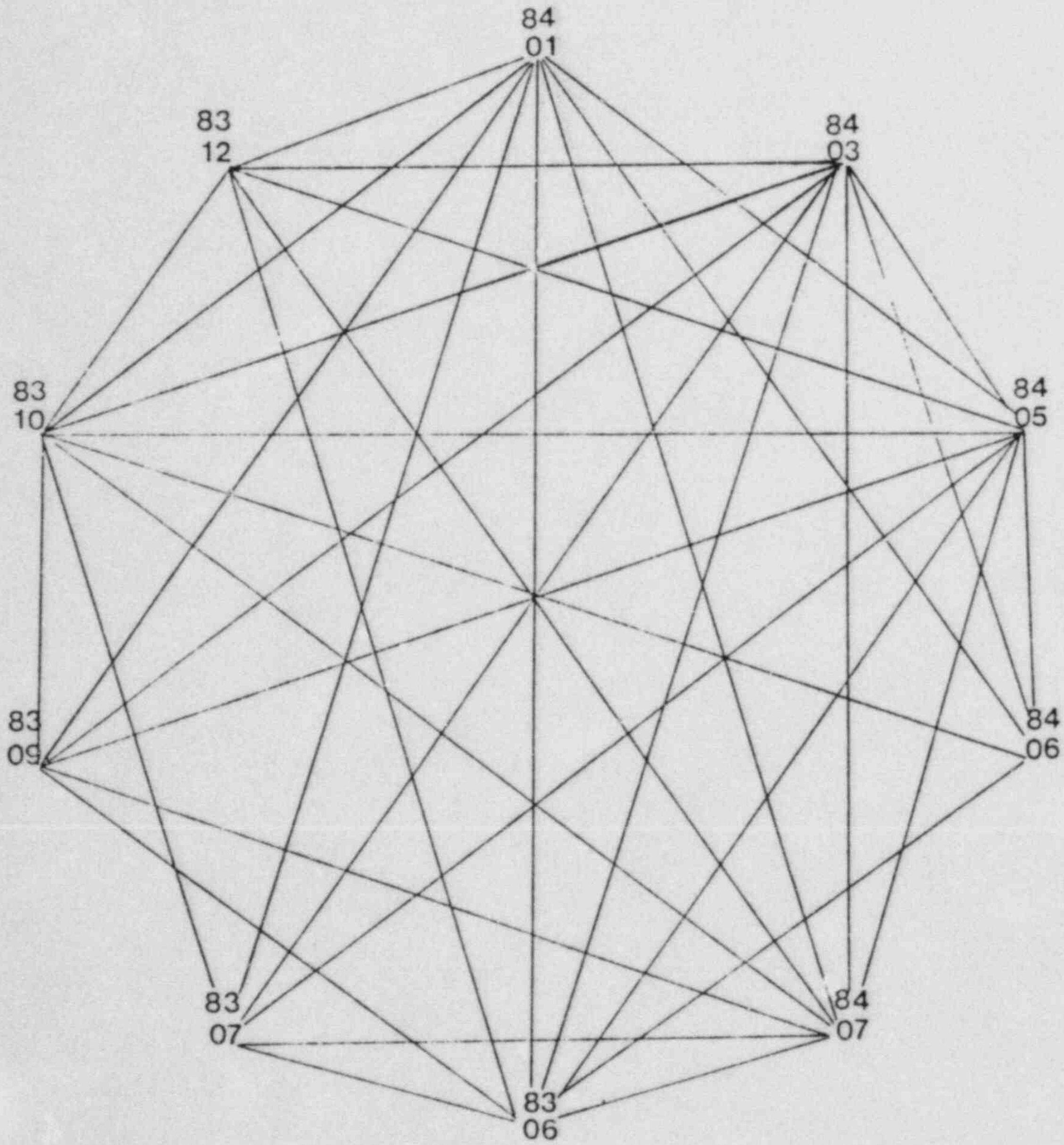
CONTROL AND THERMAL MARSH TEMPERATURES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-12

SPARTINA LIVE WEIGHT
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



TIME DIFFERENCES

FIGURE 6.4-13

SPARTINA LIVE WEIGHT
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

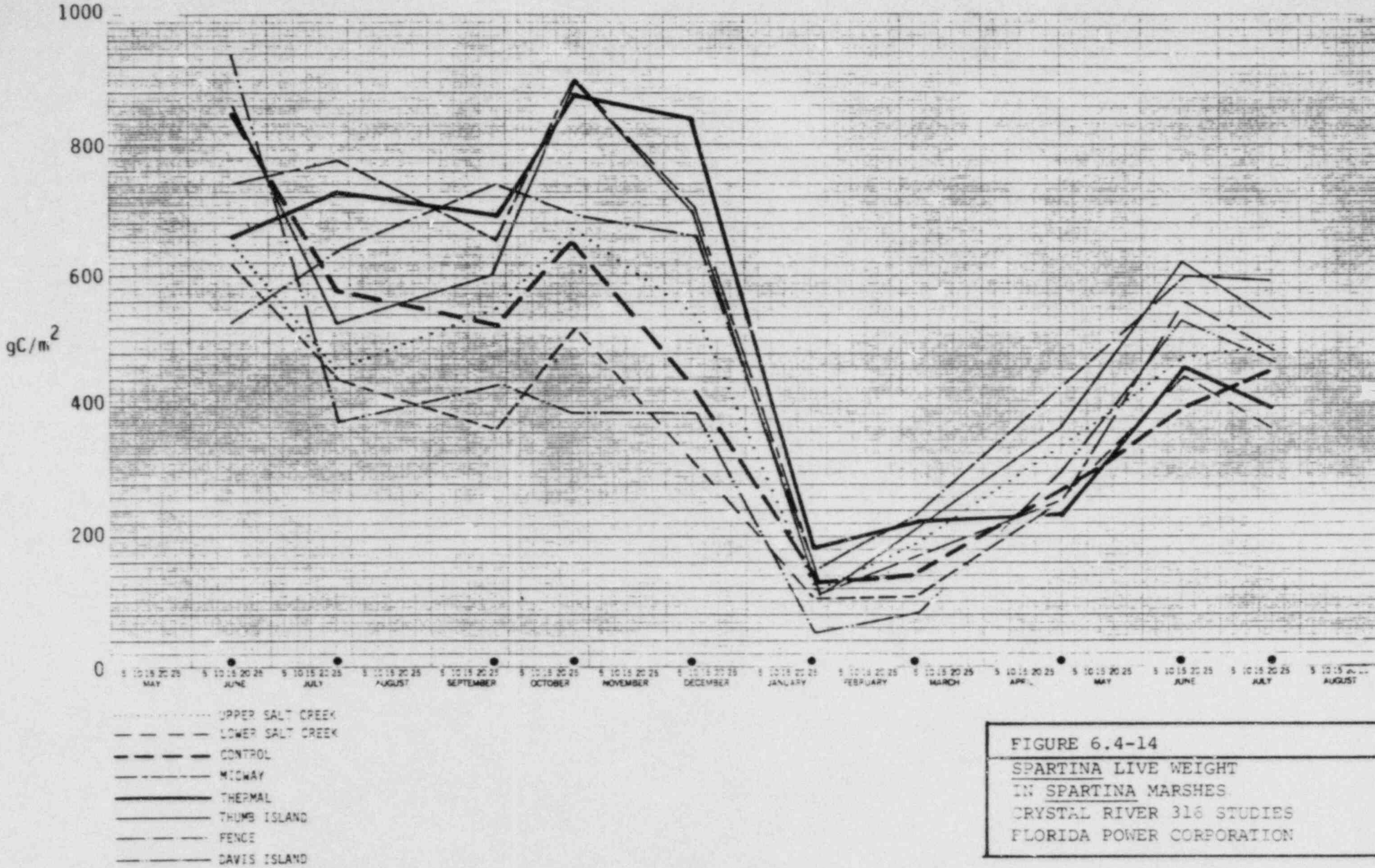


FIGURE 6.4-14

SPARTINA LIVE WEIGHT
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

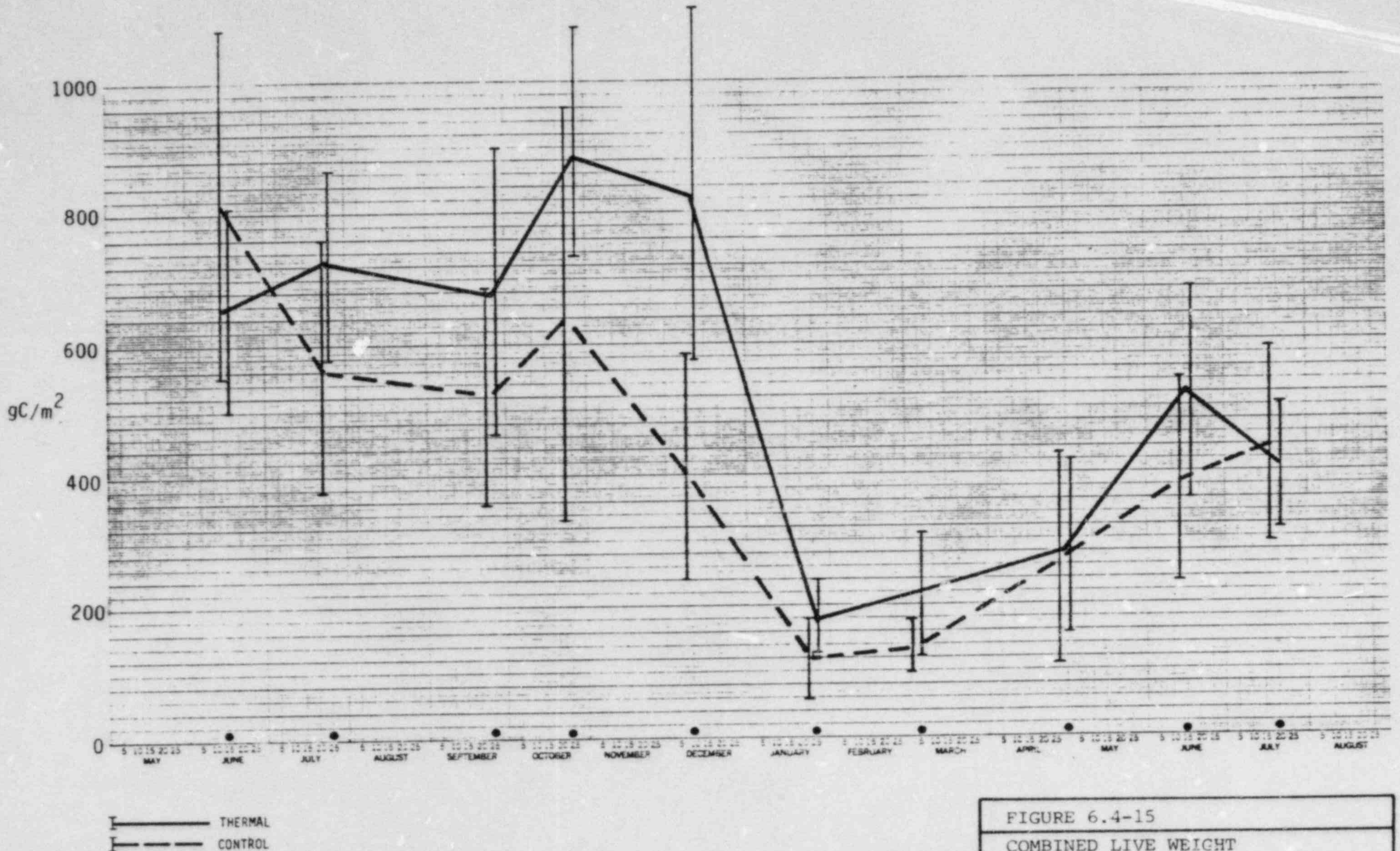
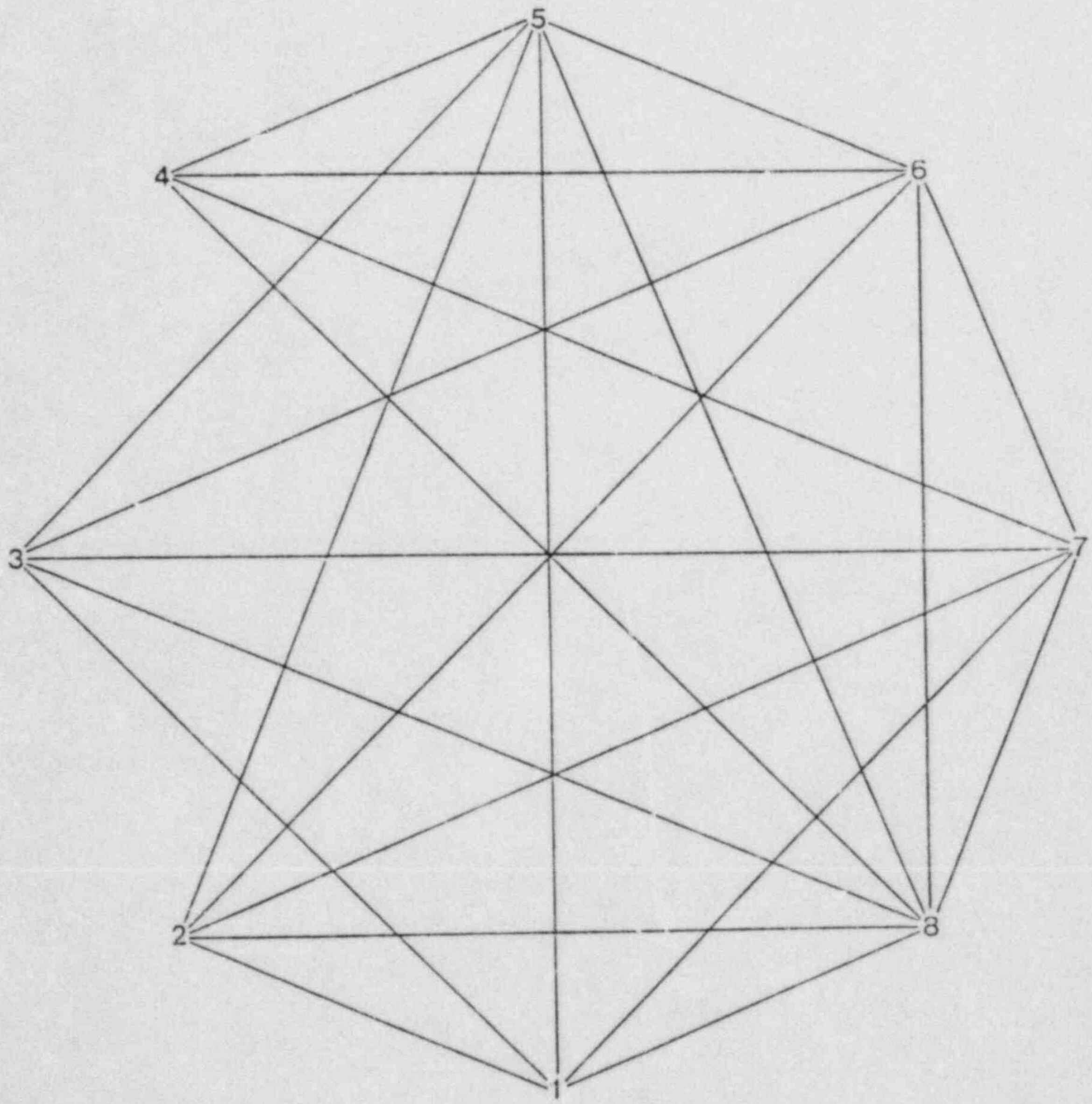


FIGURE 6.4-15

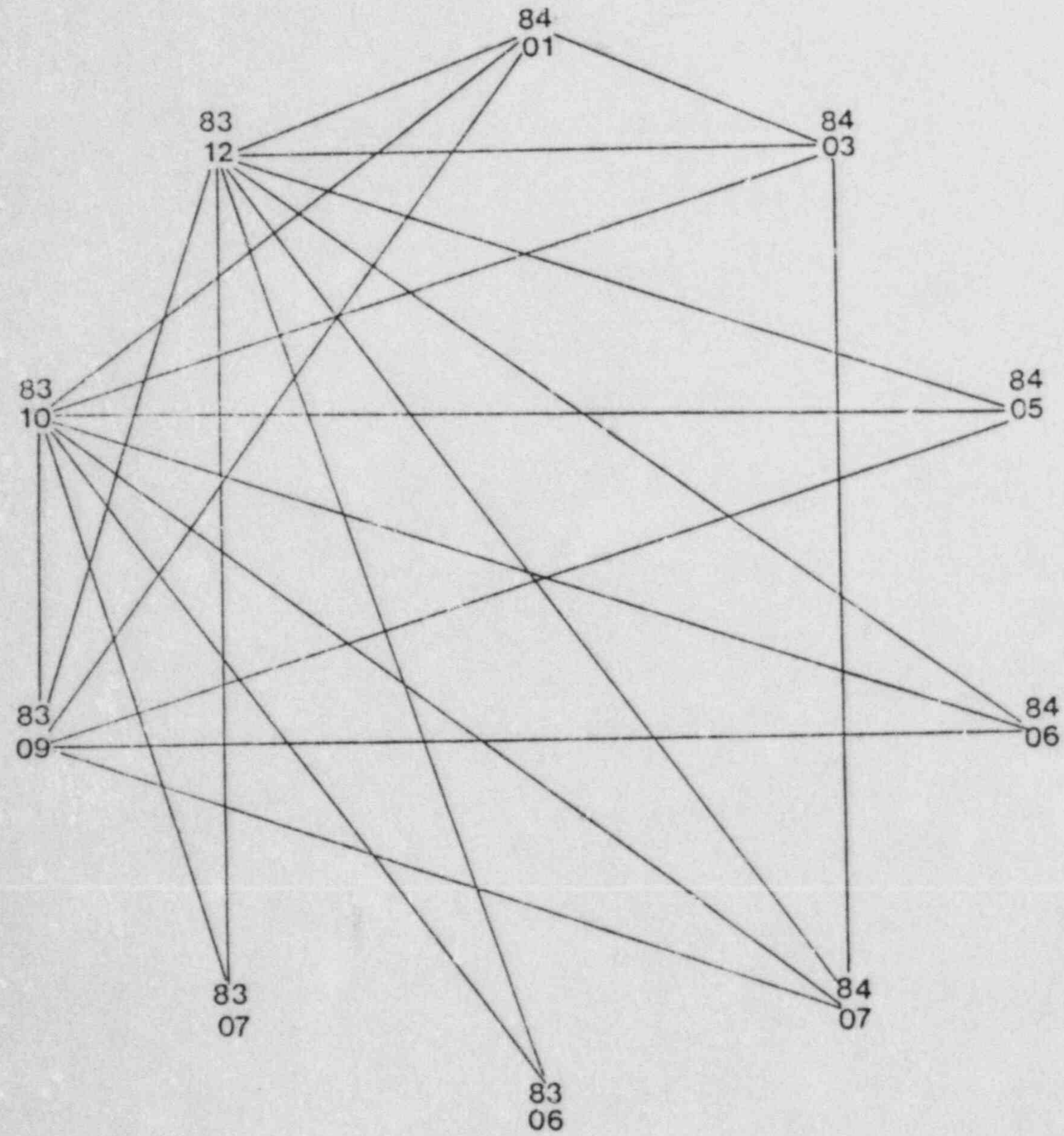
COMBINED LIVE WEIGHT
IN *SPARTINA* MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-16

SPARTINA LIVE DENSITY
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



TIME DIFFERENCES

FIGURE 6.4-17

SPARTINA LIVE DENSITY
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

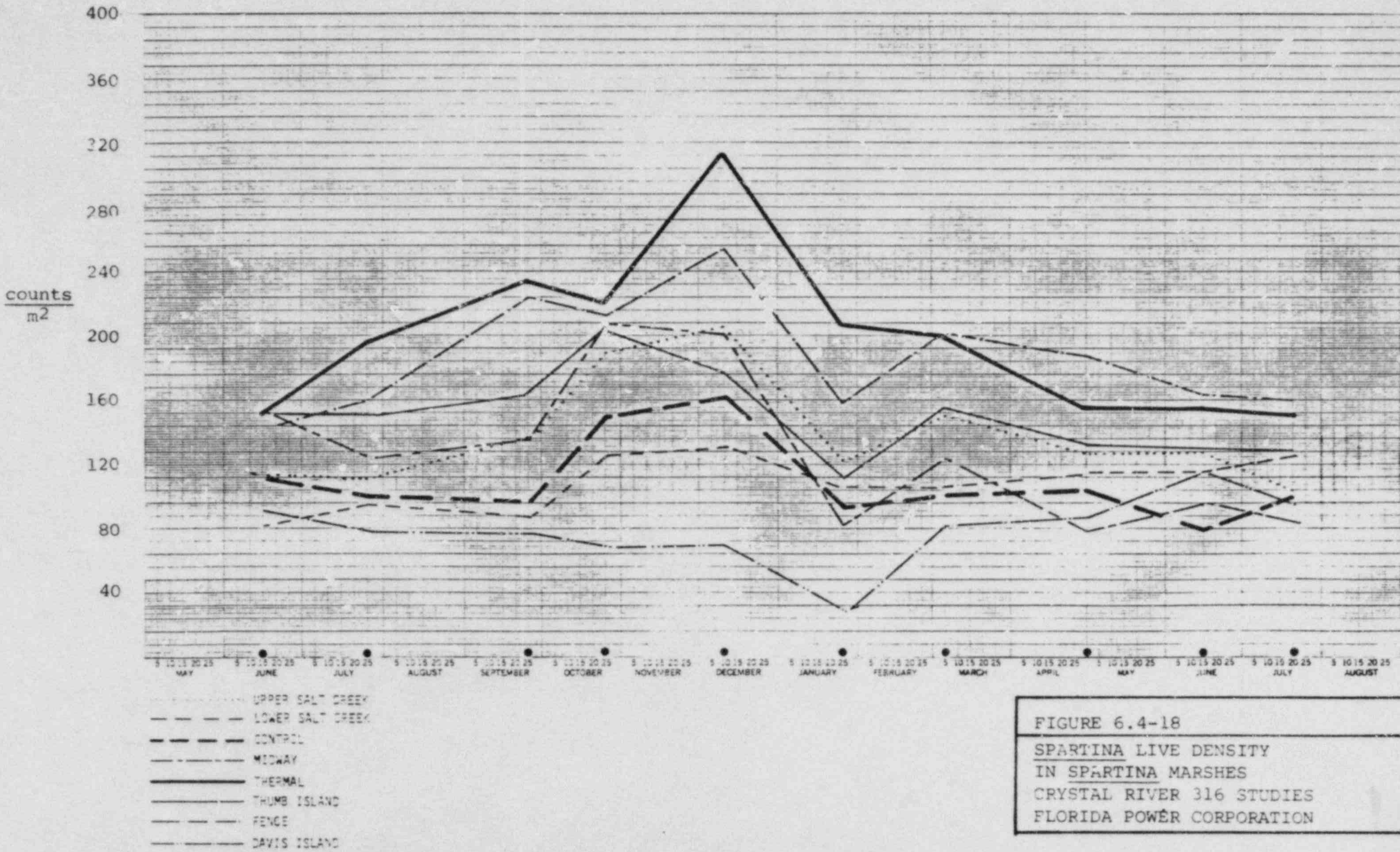


FIGURE 6.4-18

SPARTINA LIVE DENSITY
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

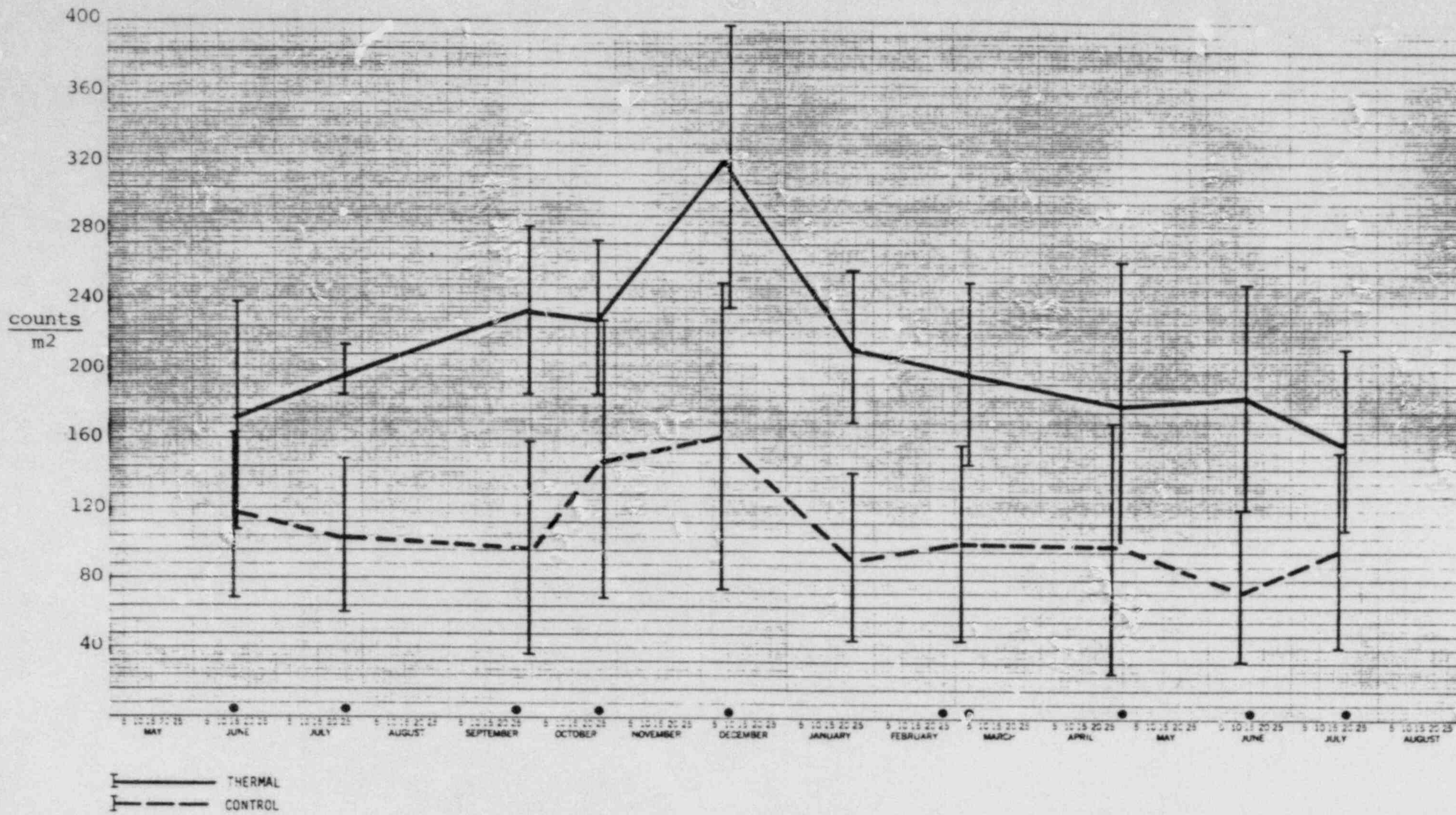


FIGURE 6.4-19

COMBINED LIVE DENSITY
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

	Thumb	Thermal	Davis	Upper Salt	Lower Salt	Control	Fence	Midway
Thumb								
Thermal	••							
Davis	••	••						
Upper Salt	••	N/S	••					
Lower Salt	•	••	••	••				
Control	••	••	••	N/S	••			
Fence	••	••	••	••	N/S	••		
Midway	N/S	••	••	••	••	••	••	

2 Sided P

•• = $p<.01$
• = $p<.05$
N/S= not significant

df≈238

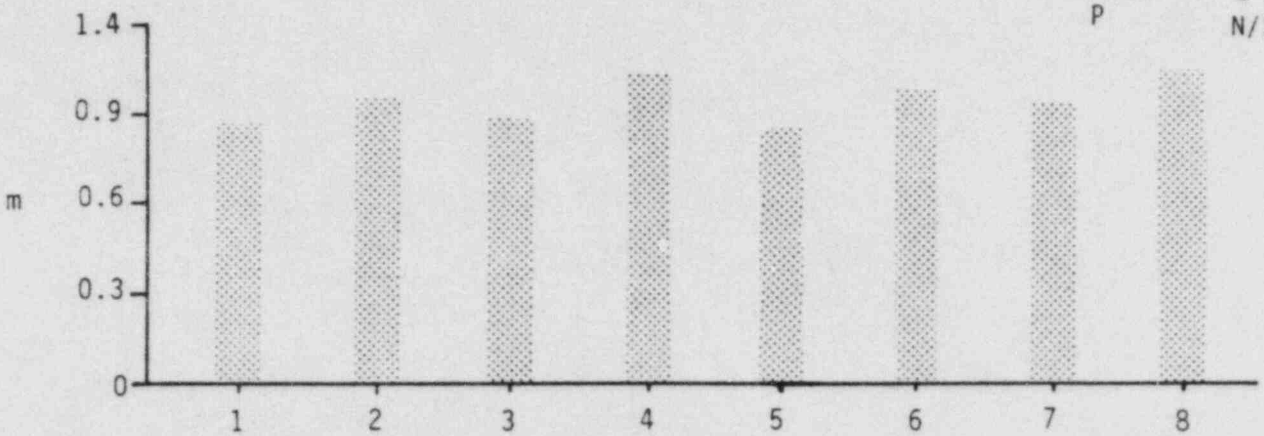


FIGURE 6.4-20

MEAN HEIGHT OF
SPARTINA JUNE 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

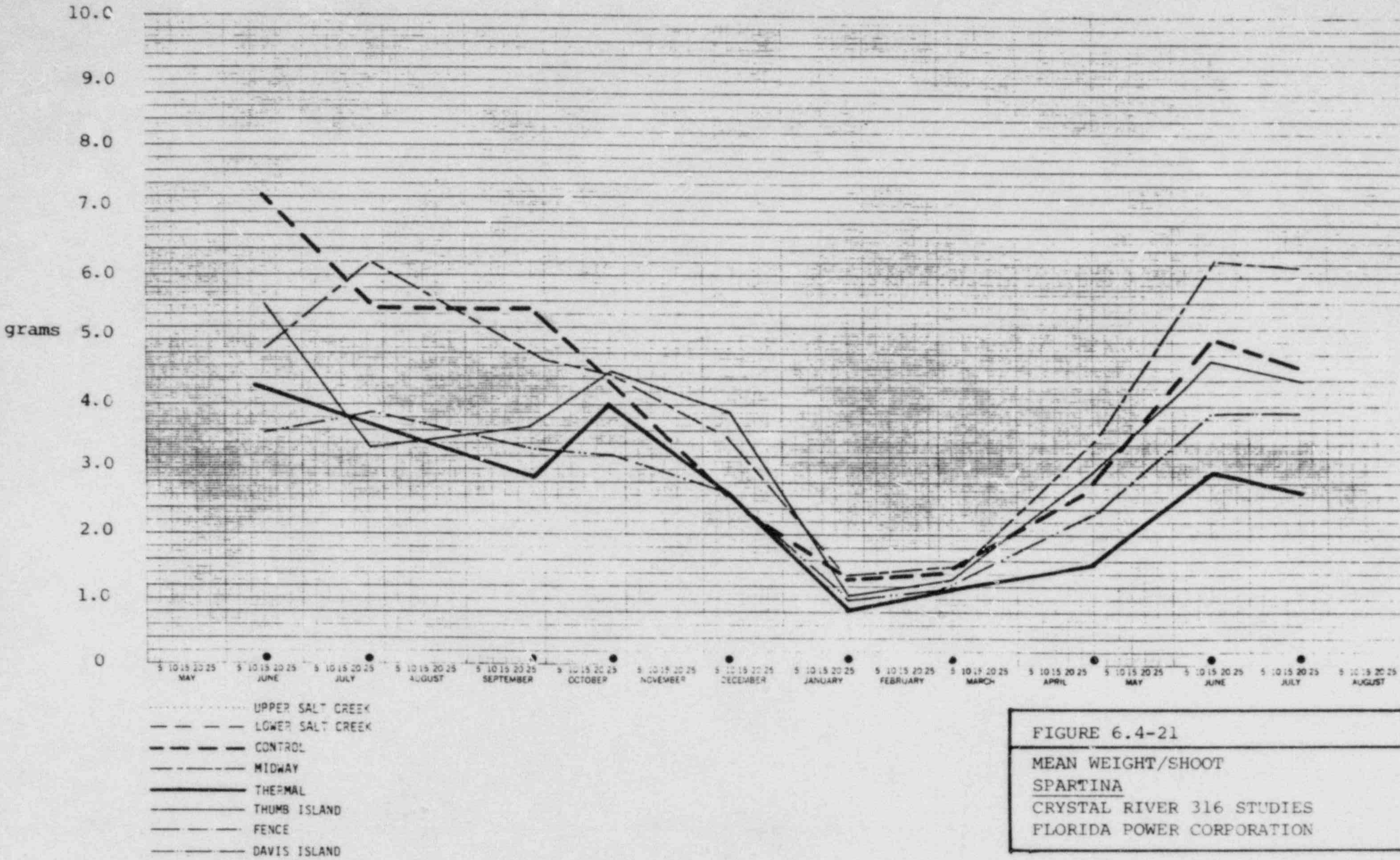


FIGURE 6.4-21

MEAN WEIGHT/SHOOT
SPARTINA
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

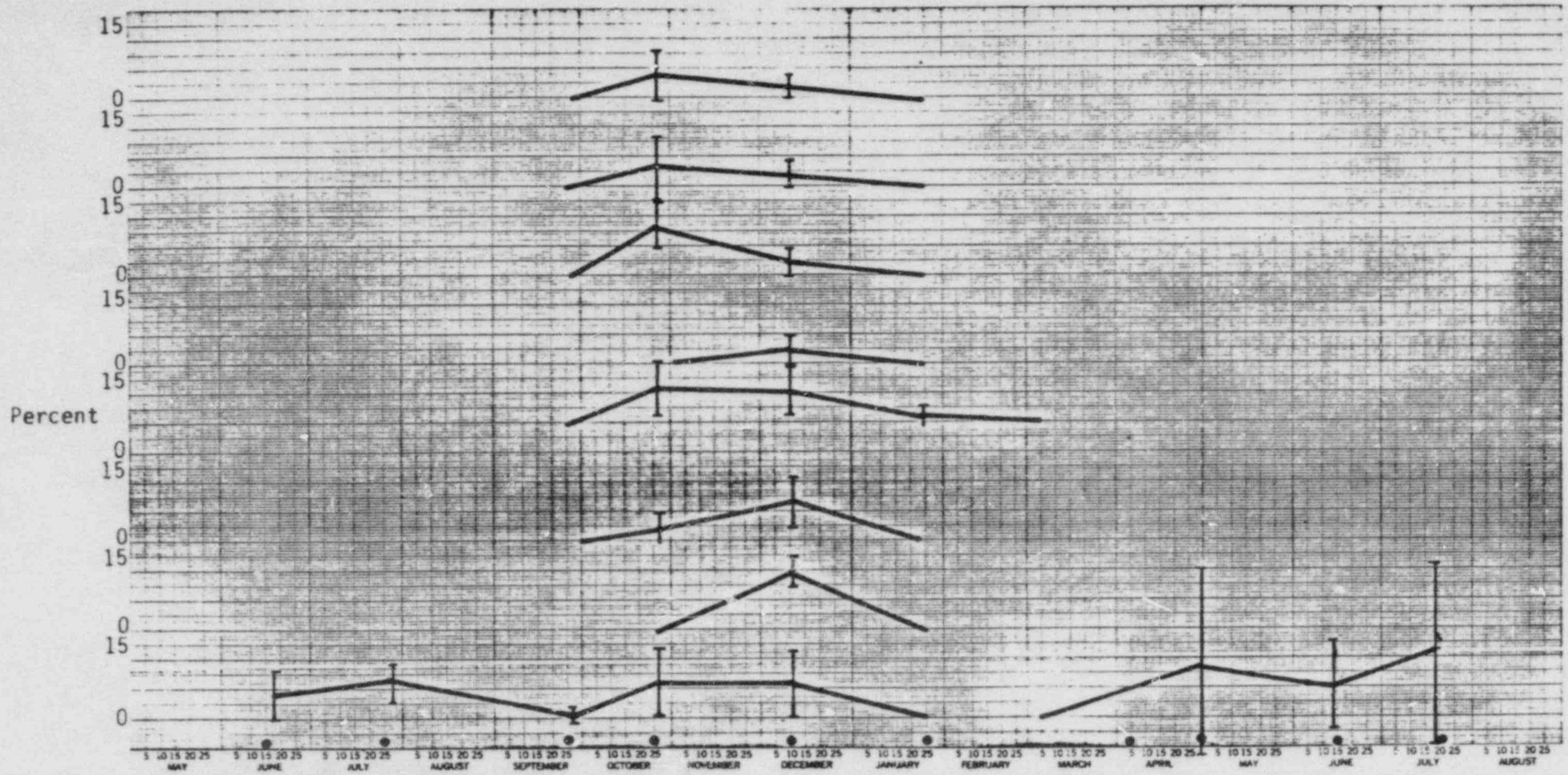


FIGURE 6.4-22

REPRODUCTIVE SPARTINA SHOOTS,
PERCENT TOTAL
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

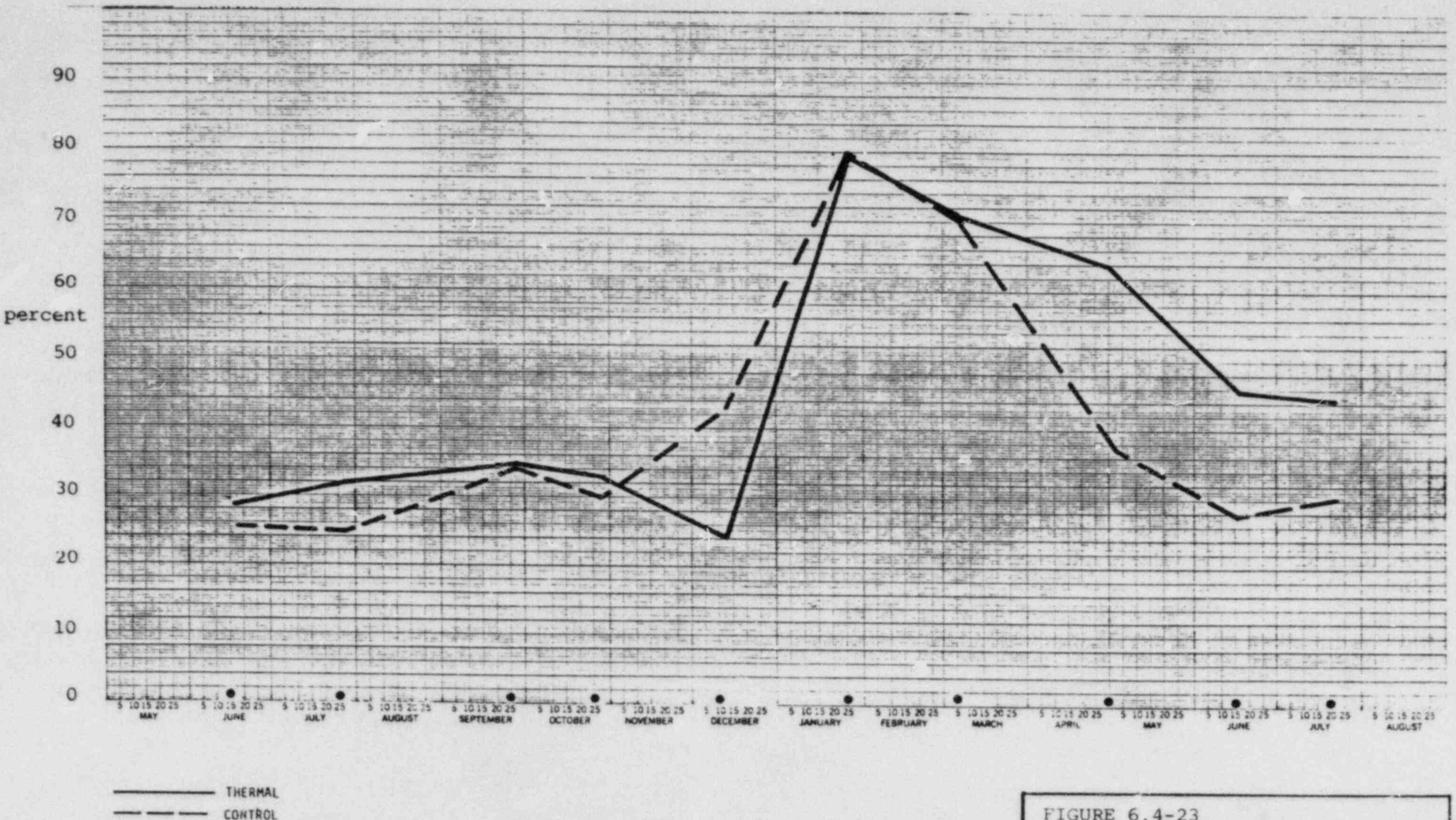
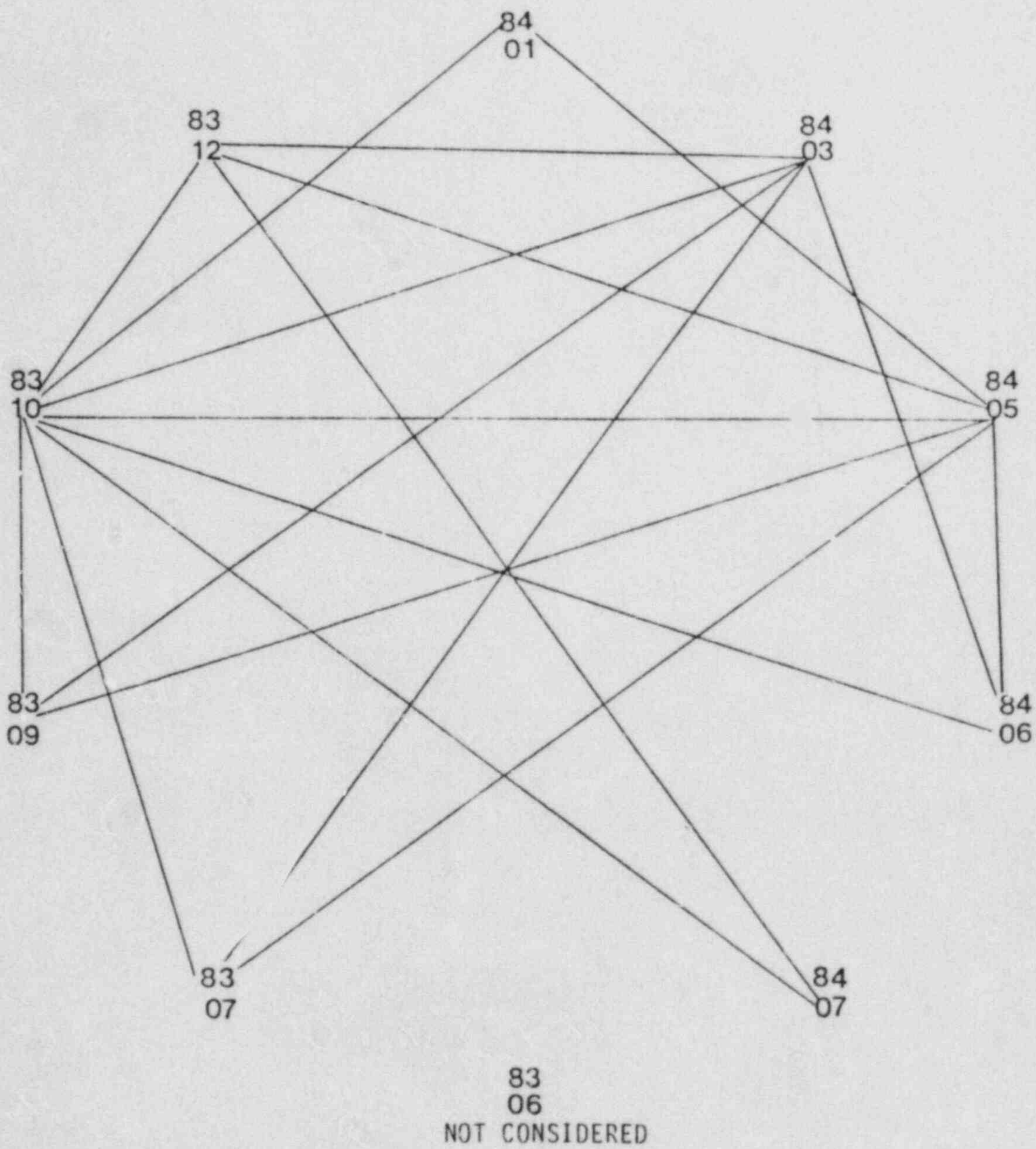


FIGURE 6.4-23

SPARTINA DEAD WEIGHT
(%) IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



TIME DIFFERENCES

FIGURE 6.4-24

SPARTINA TOTAL WEIGHT
IN *SPARTINA* MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

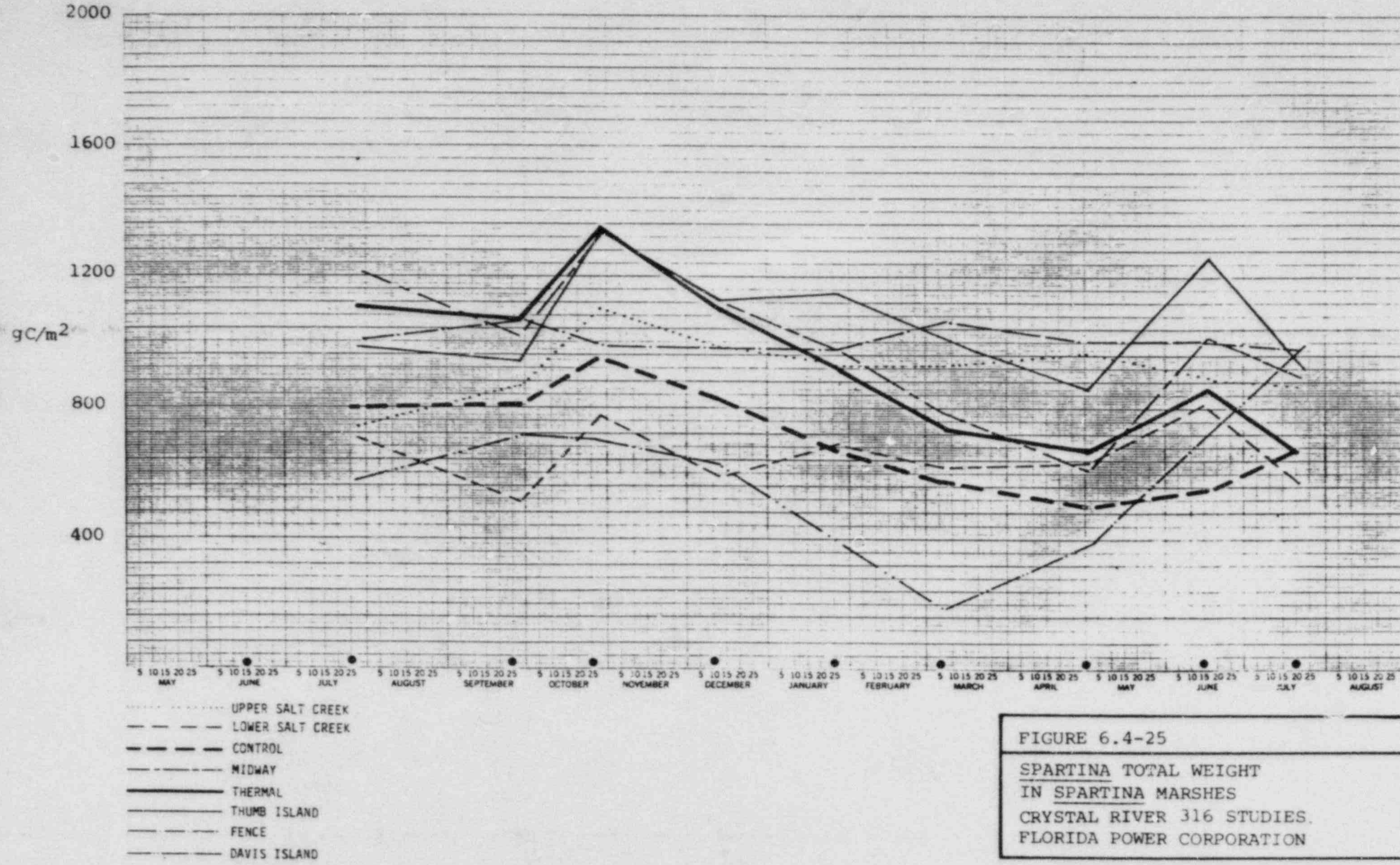


FIGURE 6.4-25

SPARTINA TOTAL WEIGHT
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES.
FLORIDA POWER CORPORATION

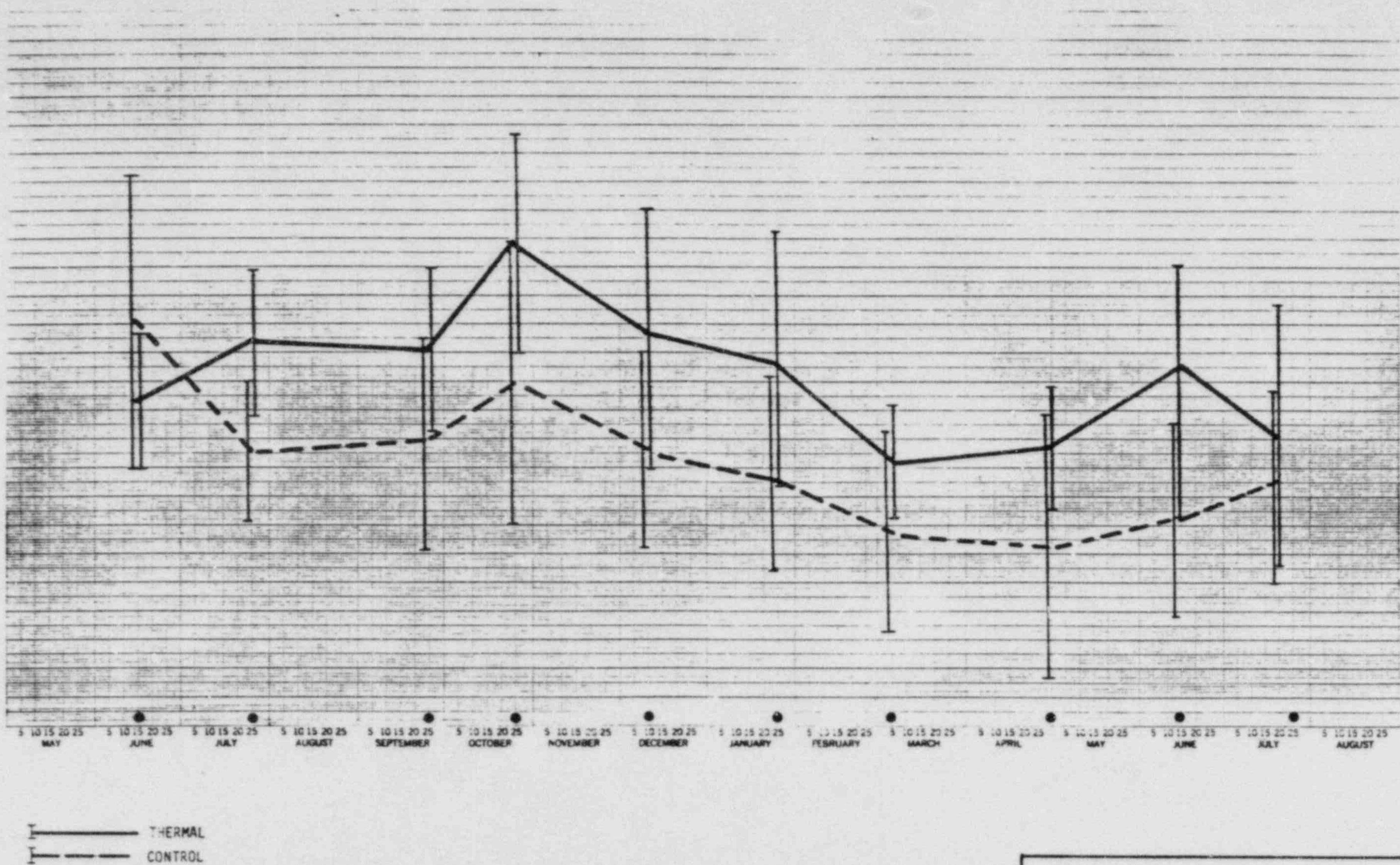
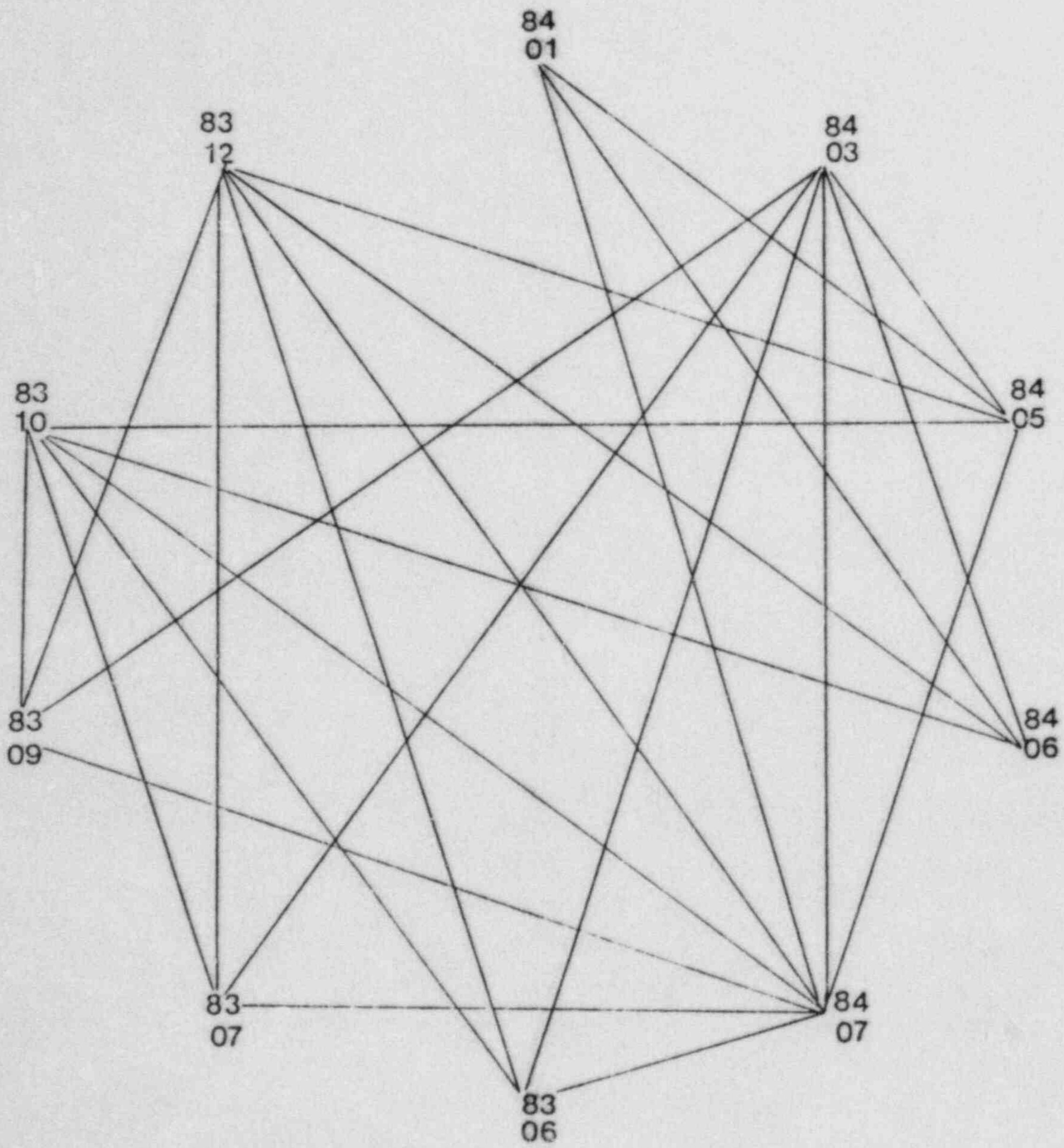


FIGURE 6.4-26

COMBINED TOTAL WEIGHT
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



TIME DIFFERENCES

FIGURE 6.4-27

SPARTINA TOTAL DENSITY
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

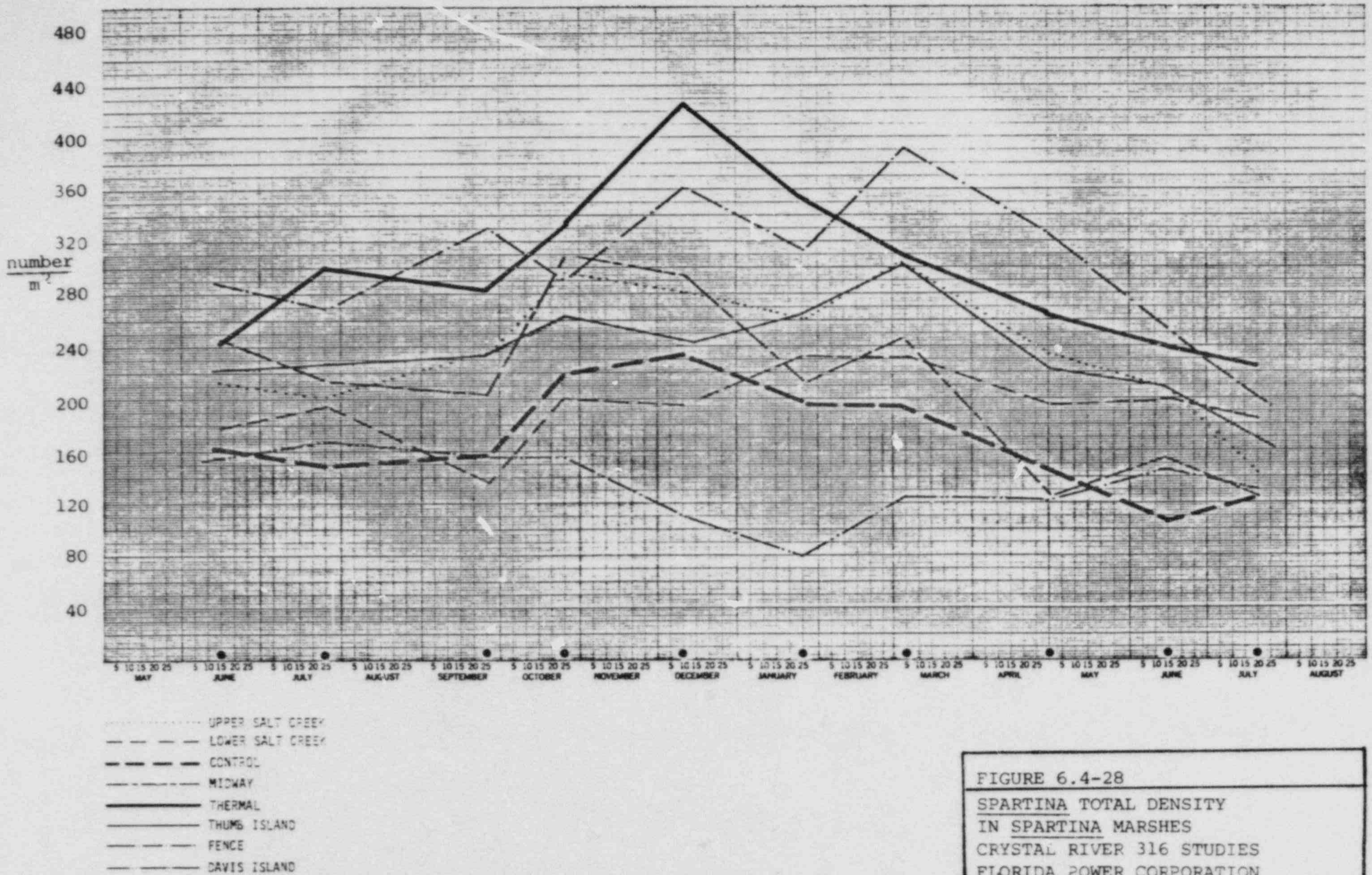


FIGURE 6.4-28

SPARTINA TOTAL DENSITY
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

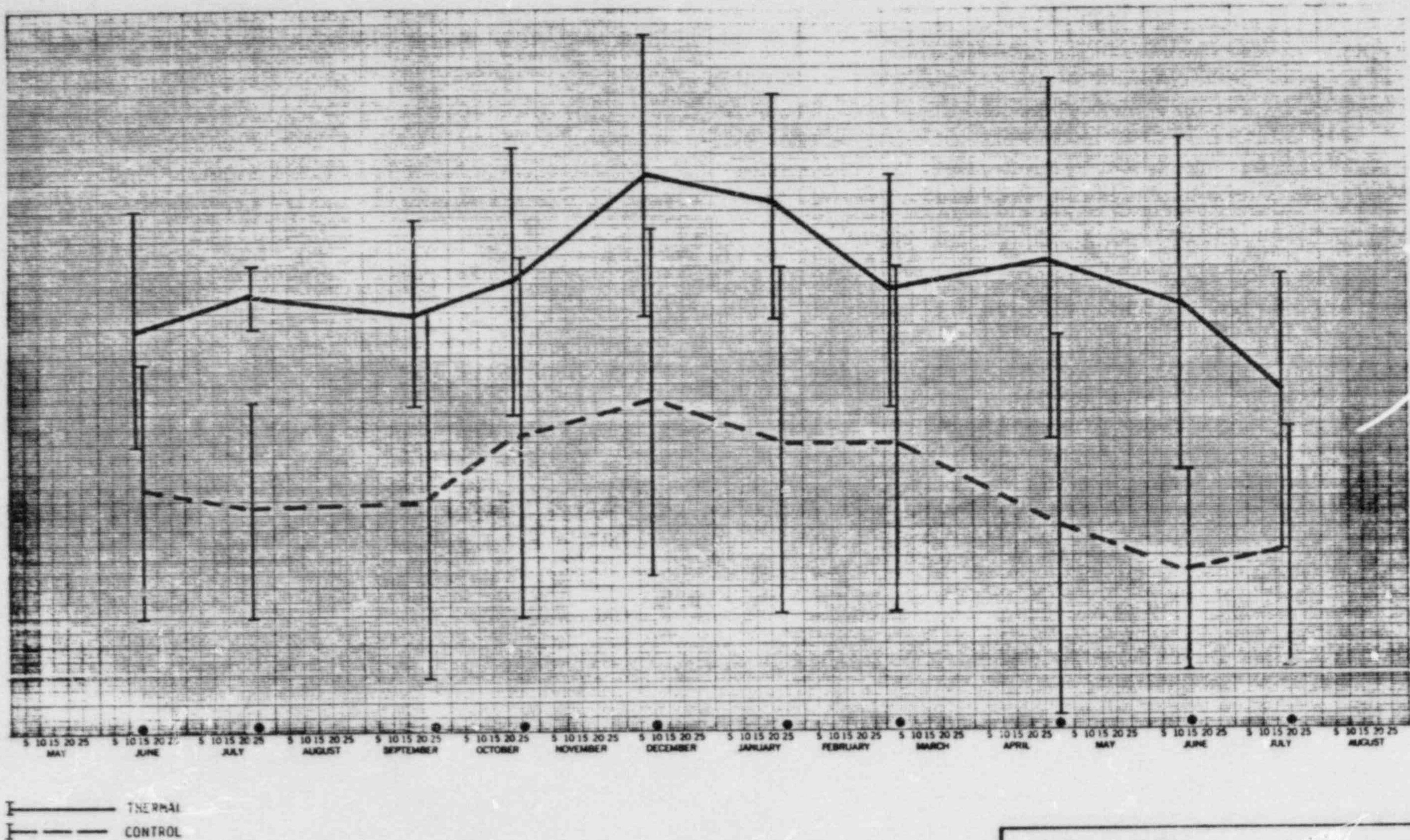
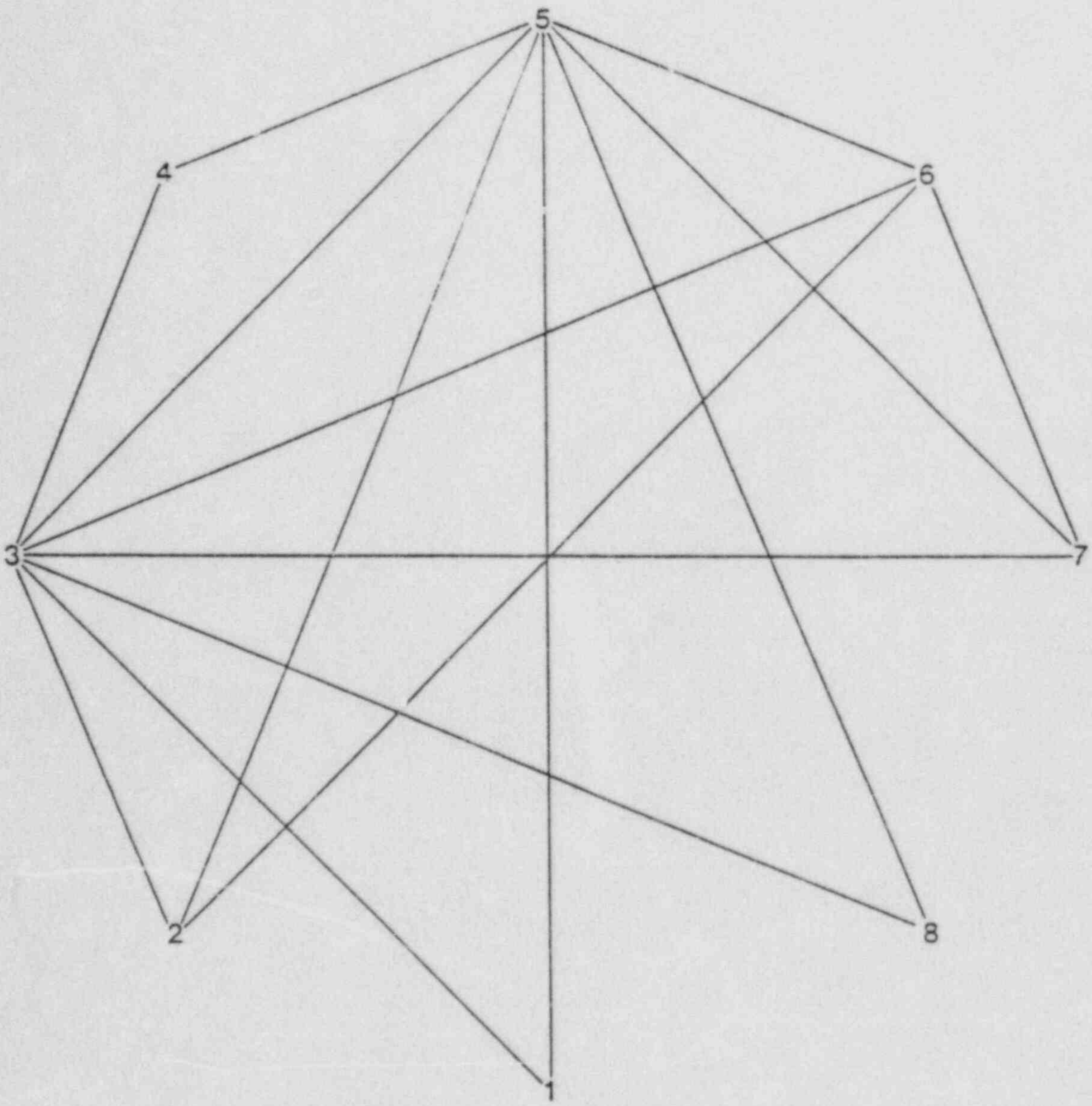


FIGURE 6.4-29

COMBINED TOTAL DENSITY
IN SPARTINA MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-30

JUNCUS LIVE WEIGHT
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

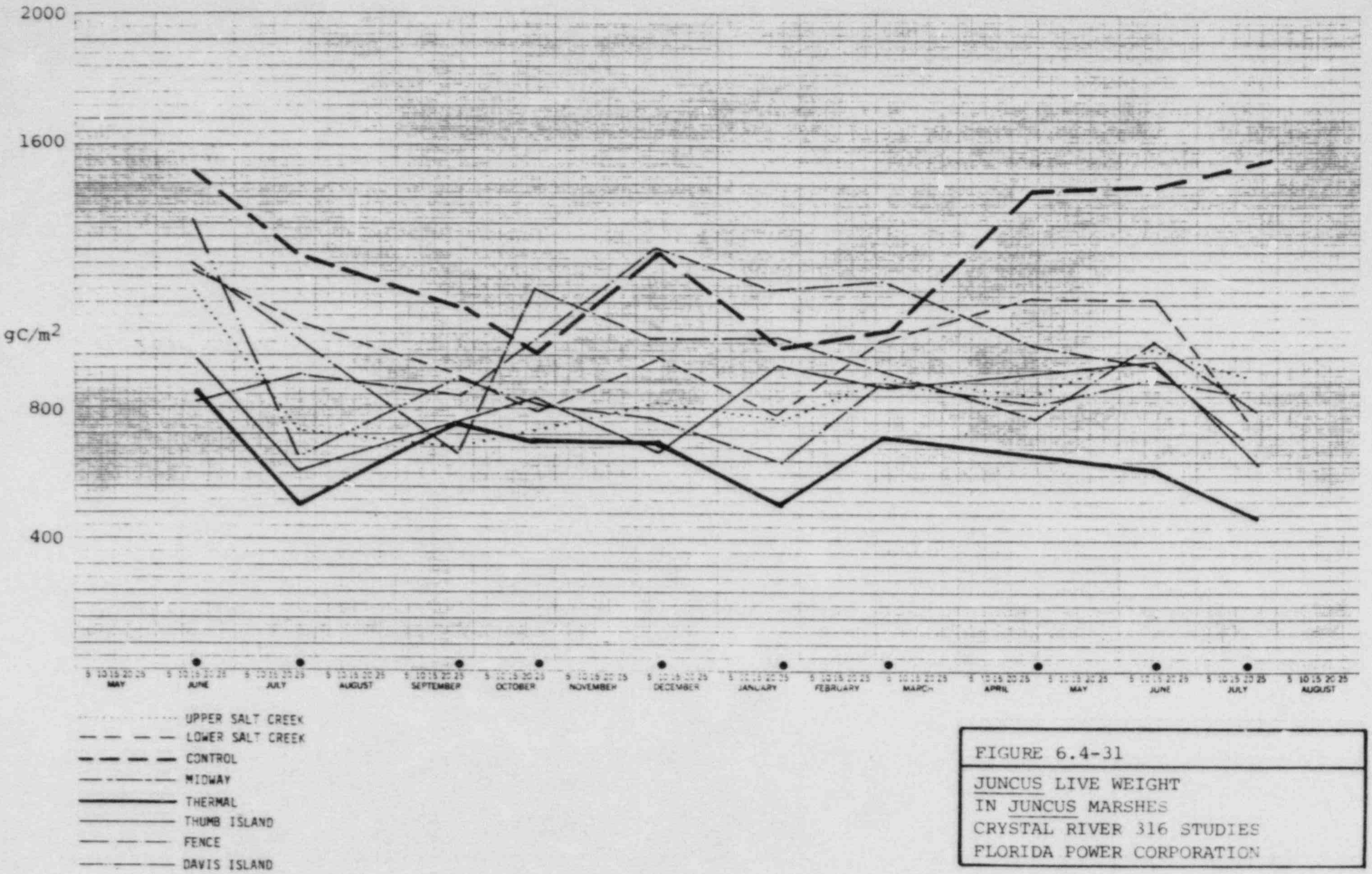
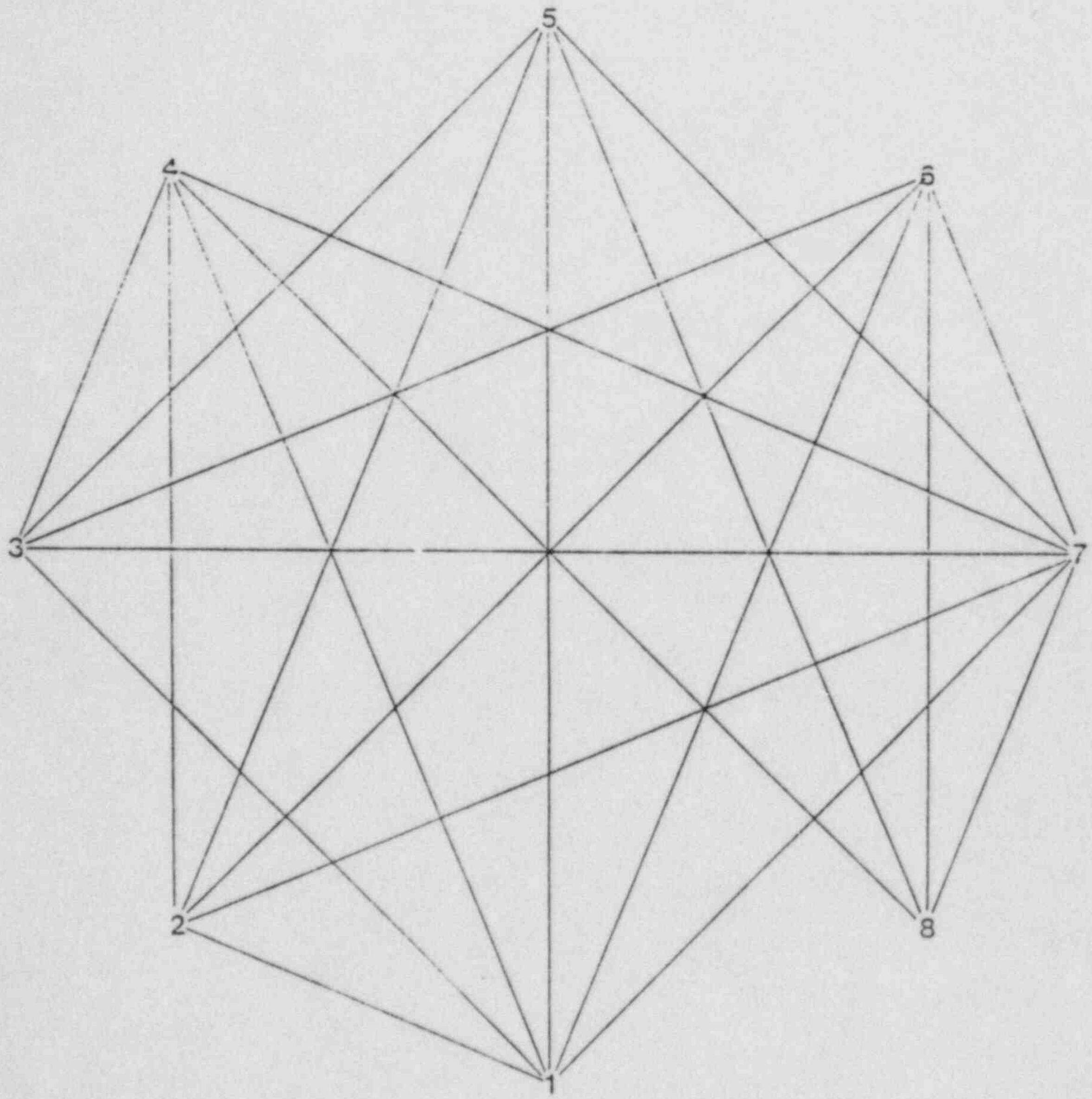


FIGURE 6.4-31

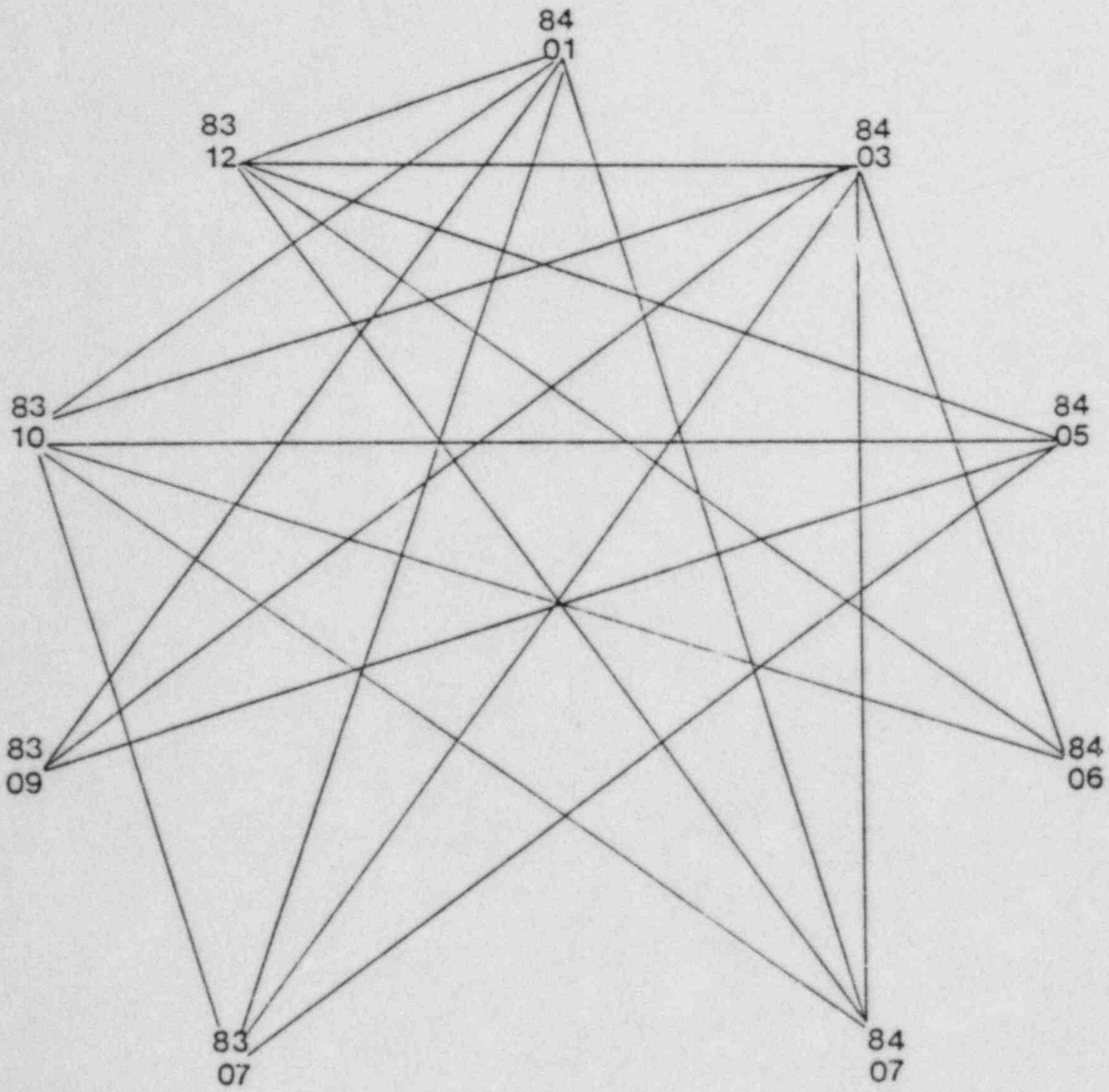
JUNCUS LIVE WEIGHT
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-32

COMBINED LIVE WEIGHT
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



83
06
NOT CONSIDERED

TIME DIFFERENCES

FIGURE 6.4-33

COMBINED LIVE WEIGHT
IN <u>JUNCUS</u> MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

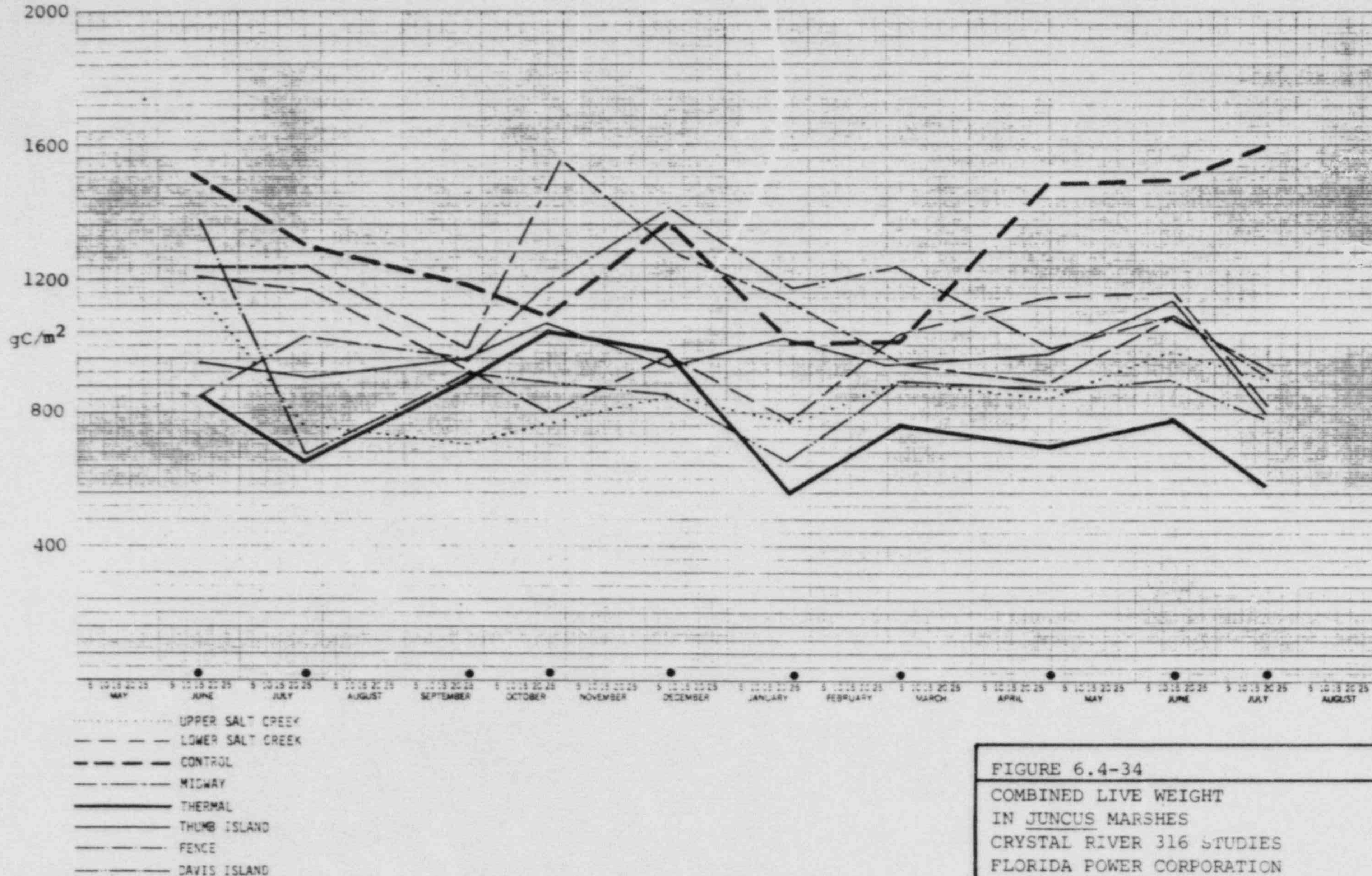


FIGURE 6.4-34

COMBINED LIVE WEIGHT
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

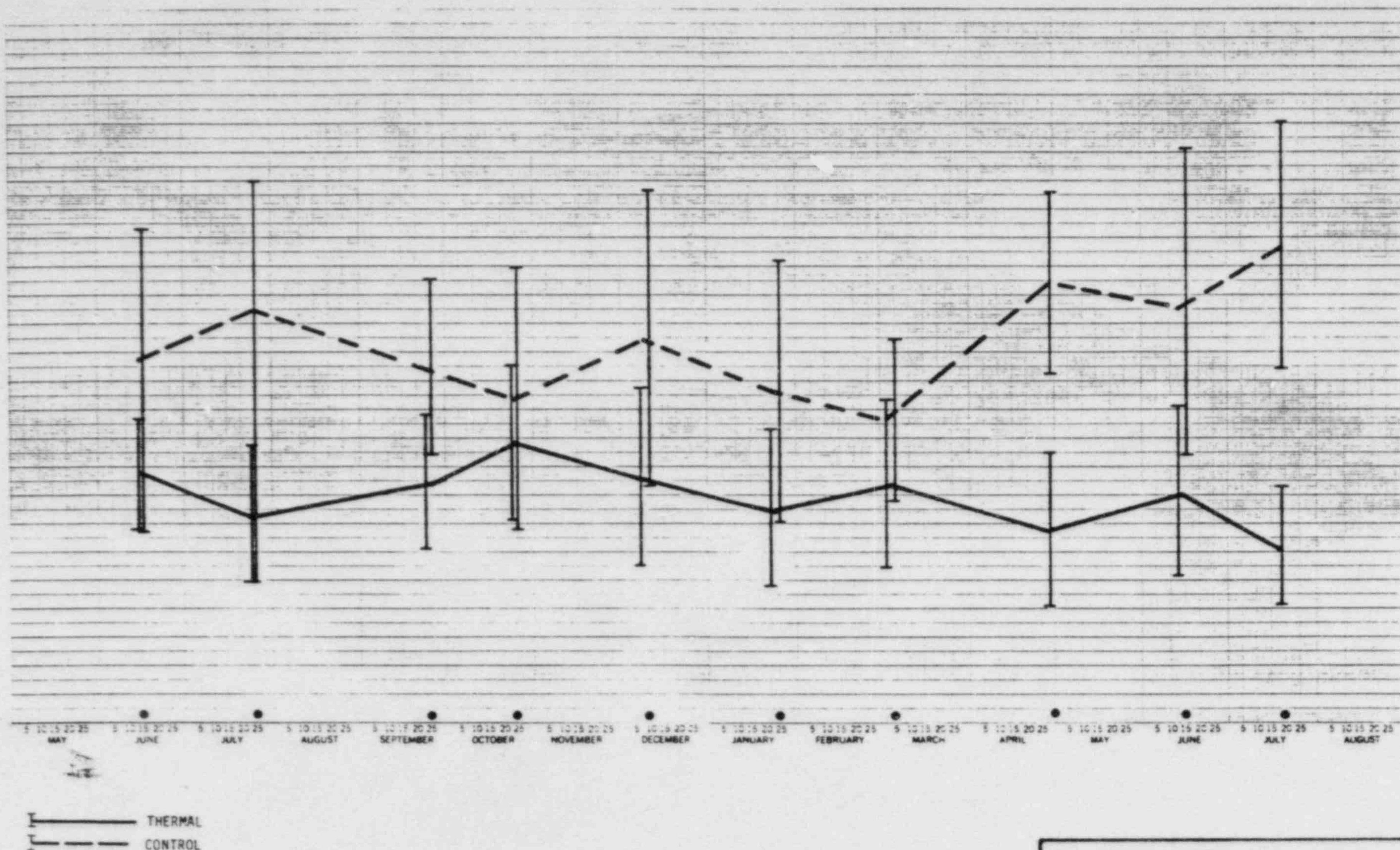
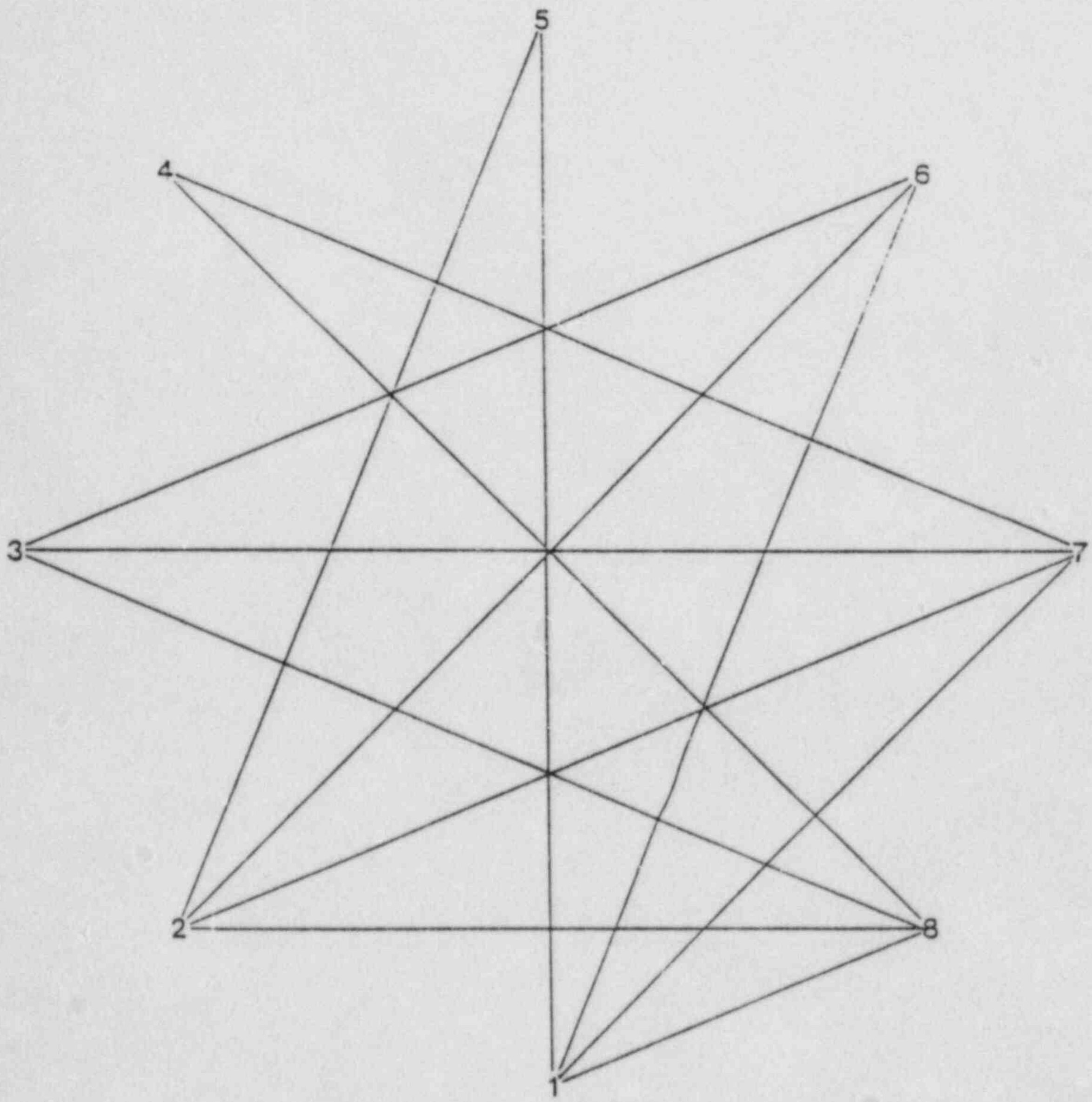


FIGURE 6.4-35

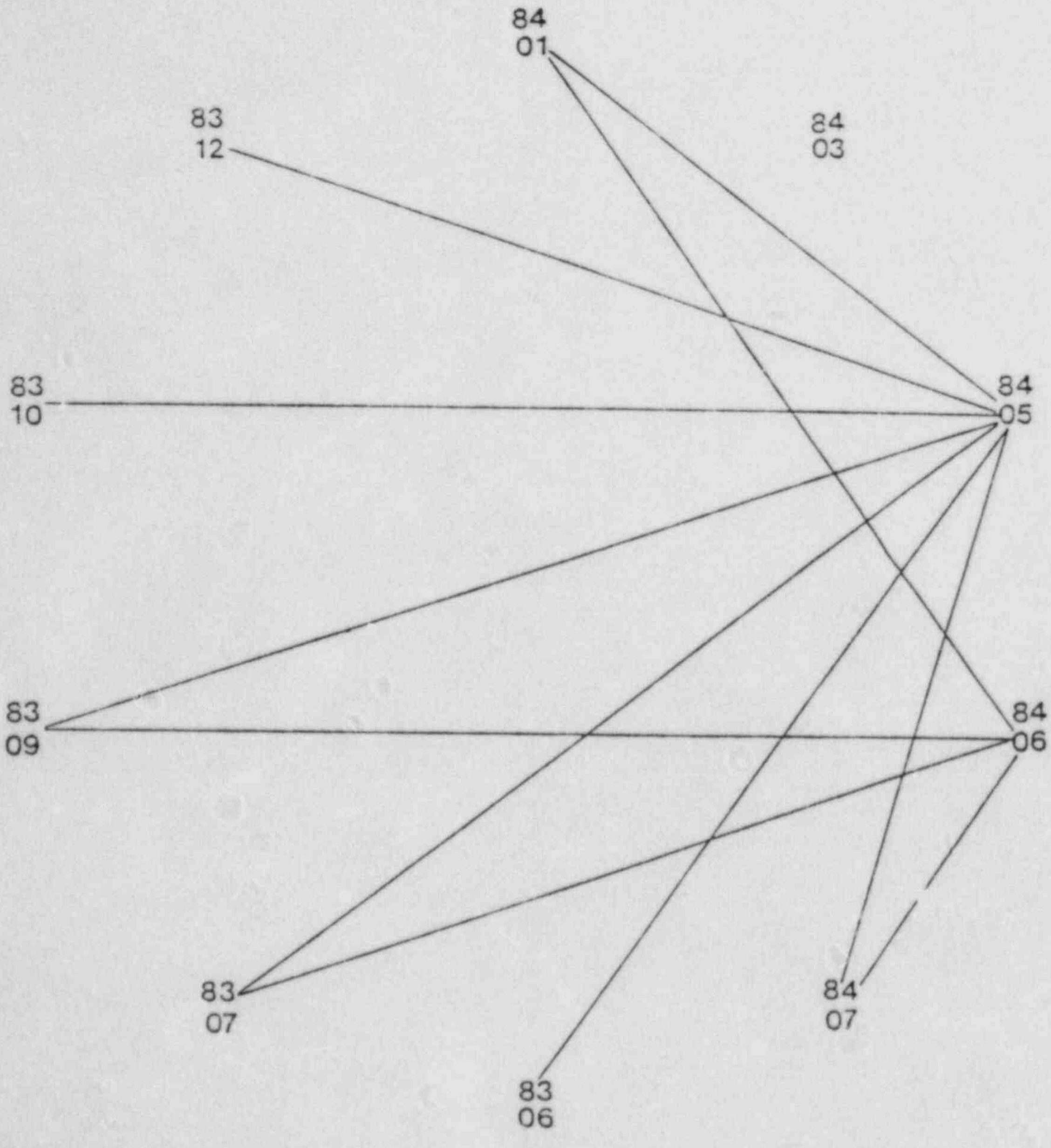
COMBINED LIVE WEIGHT
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-36

JUNCUS LIVE DENSITY
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



TIME DIFFERENCES

FIGURE 6.4-37

JUNCUS LIVE DENSITY
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

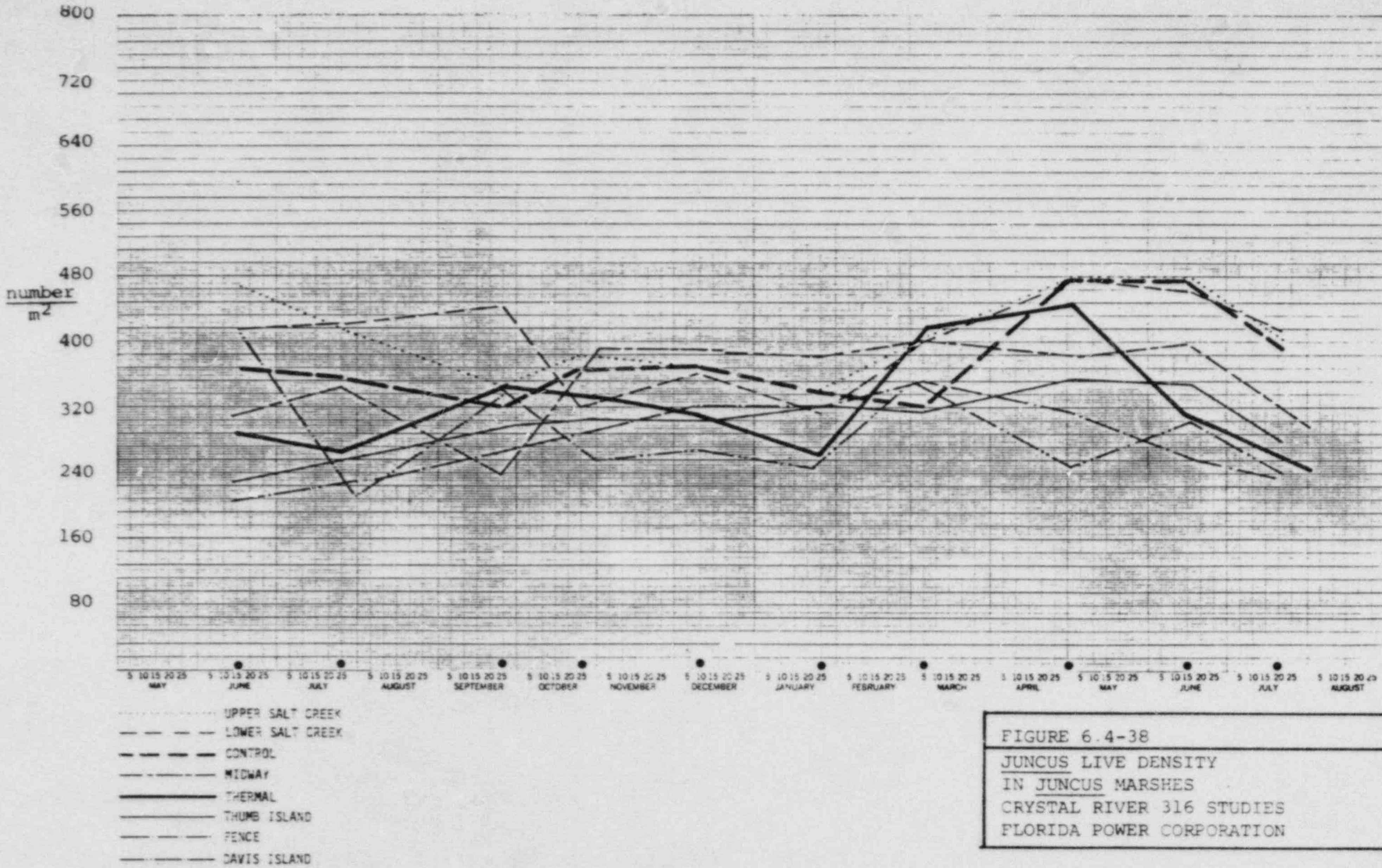
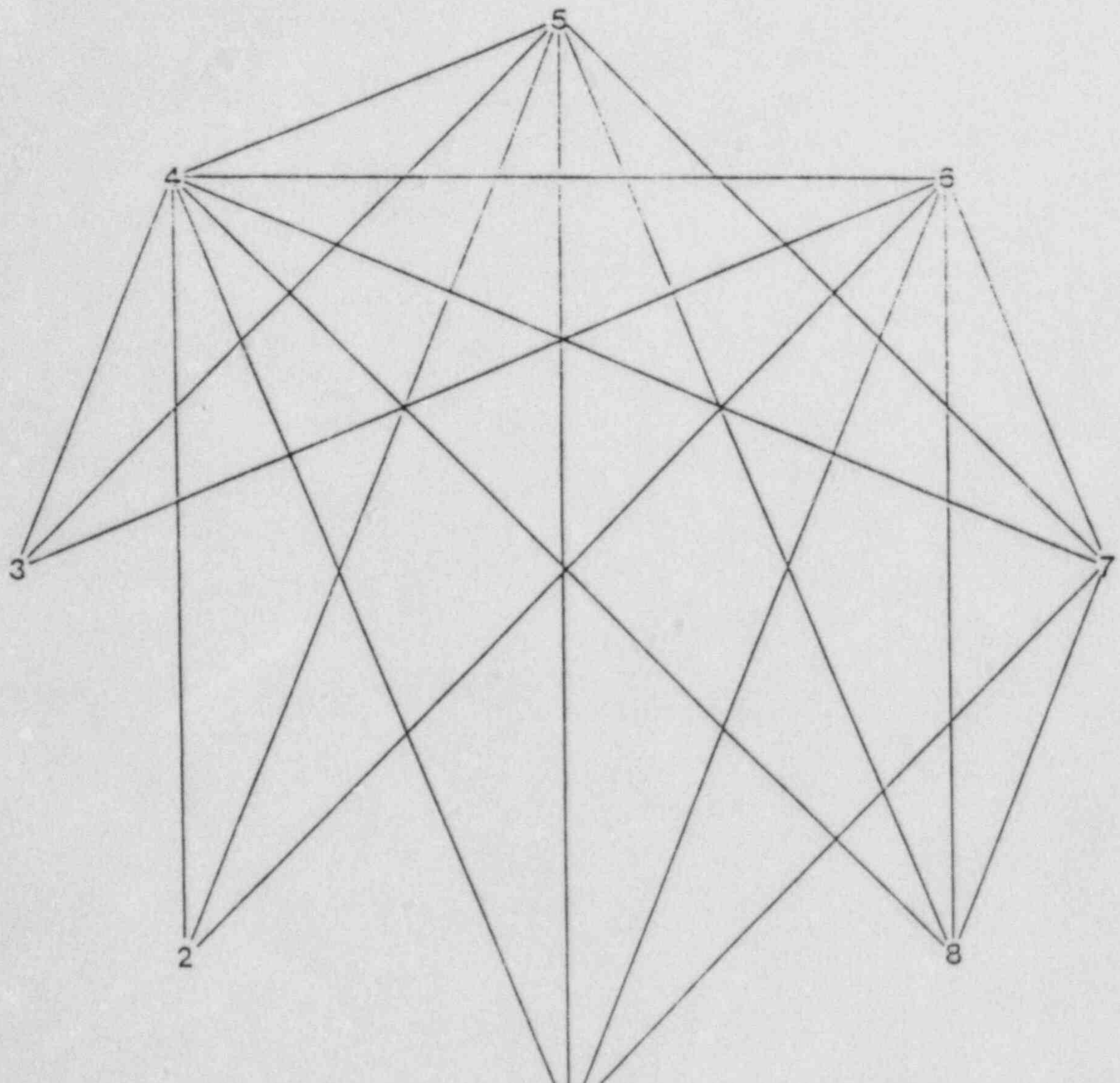


FIGURE 6.4-38

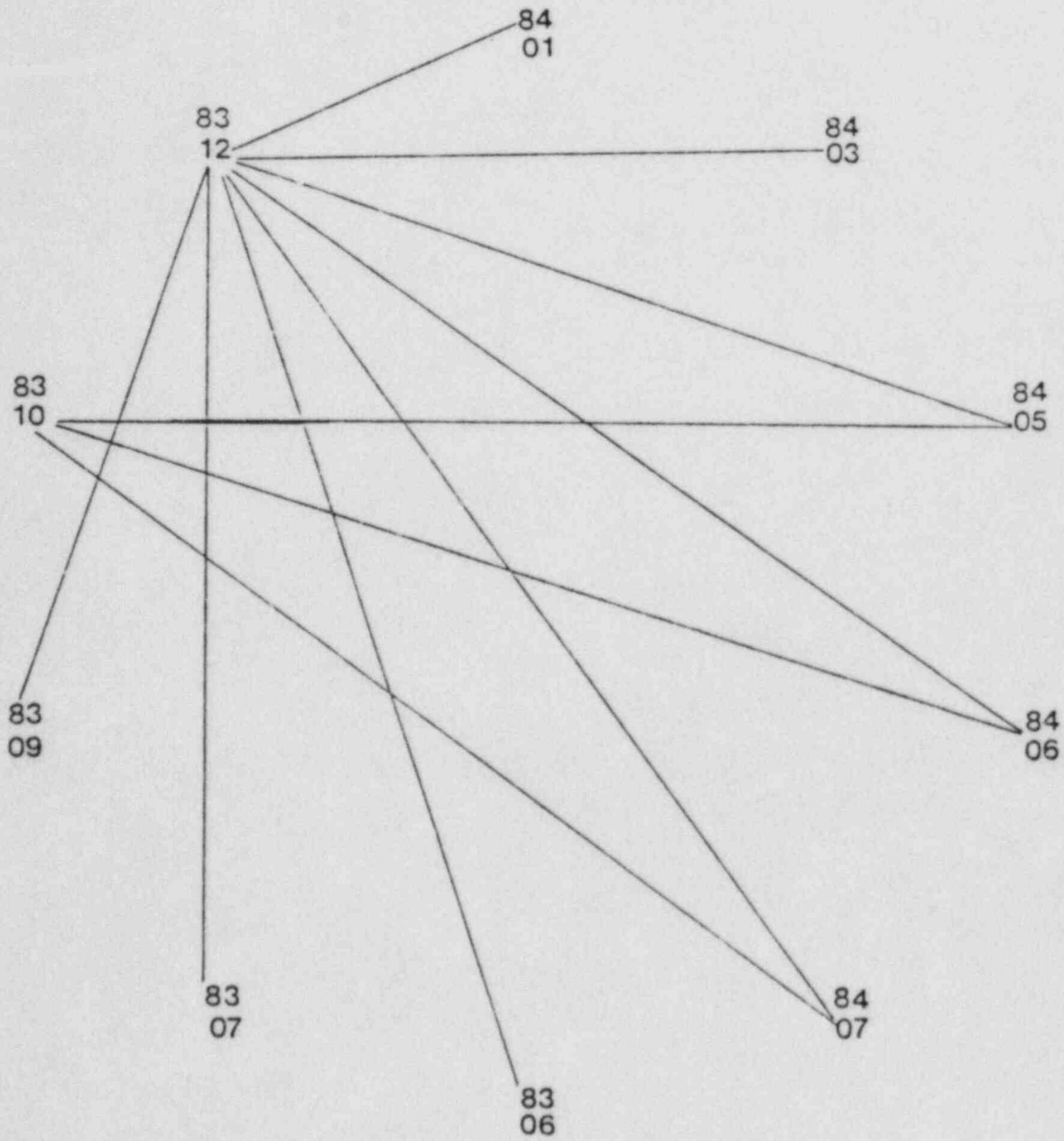
JUNCUS LIVE DENSITY
IN *JUNCUS* MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-39

COMBINED LIVE DENSITY
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



TIME DIFFERENCES

FIGURE 6.4-40
COMBINED LIVE DENSITY IN JUNCUS MARSHES CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

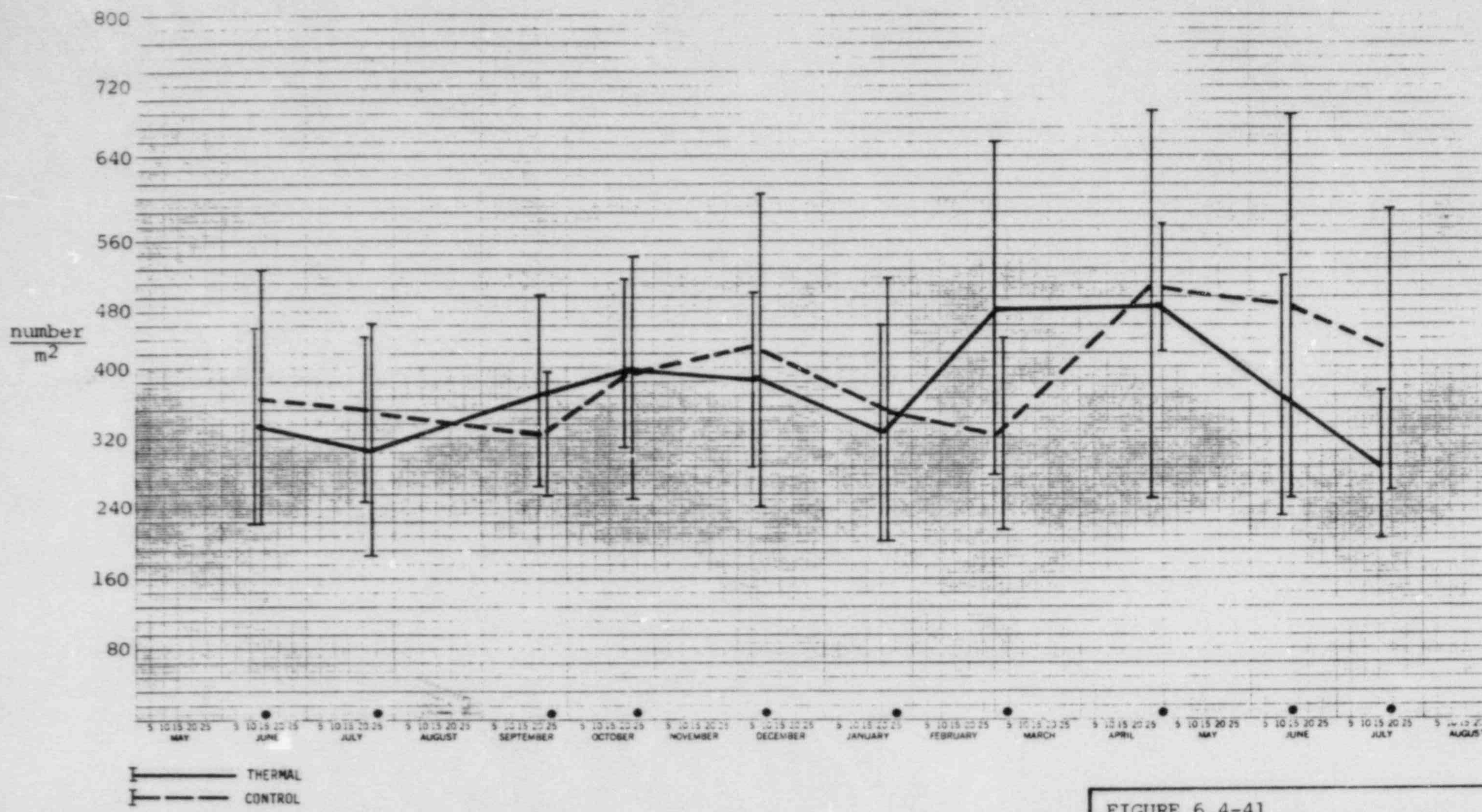


FIGURE 6.4-41

COMBINED LIVE DENSITY
IN *JUNCUS* MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

	Thumb	Thermal	Davis	Upper Salt	Lower Salt	Control	Fence	Midway
Thumb								
Thermal	••							
Davis	••	••						
Upper Salt	N/S	••	••					
Lower Salt	••	••	••	••				
Control	••	••	N/S	••	••			
Fence	••	••	••	••	••	••		
Midway	N/S	••	••	N/S	••	••	••	

2 Sided P

•• = $p<.01$

• = $p<.05$

N/S= not significant

df≈238

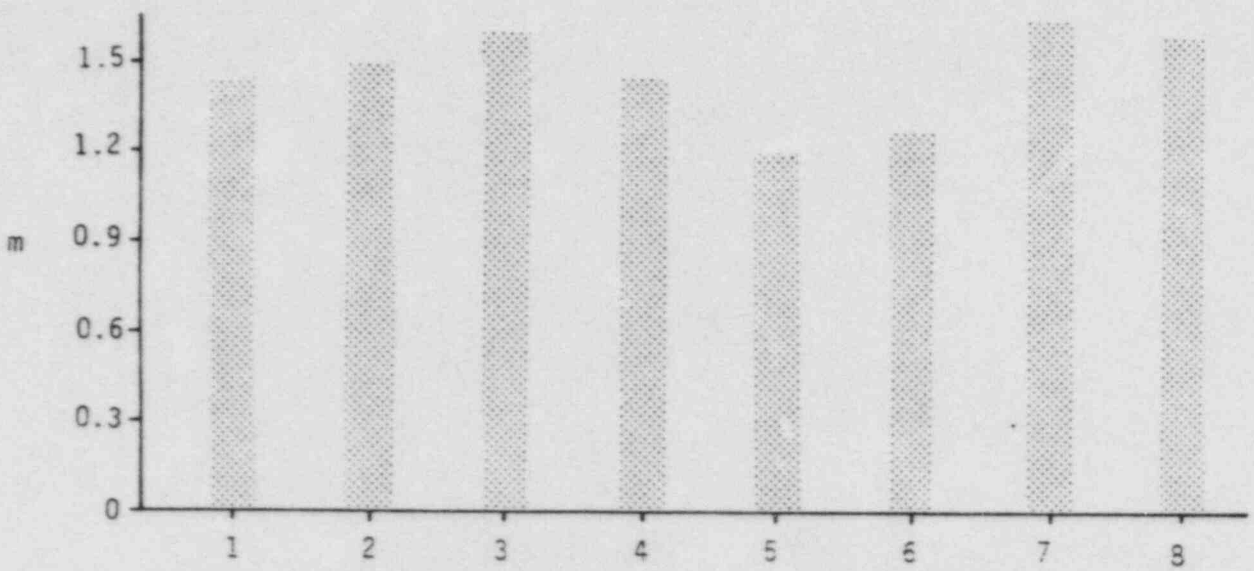


FIGURE 6.4-42

MEAN HEIGHT OF
JUNCUS JUNE 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

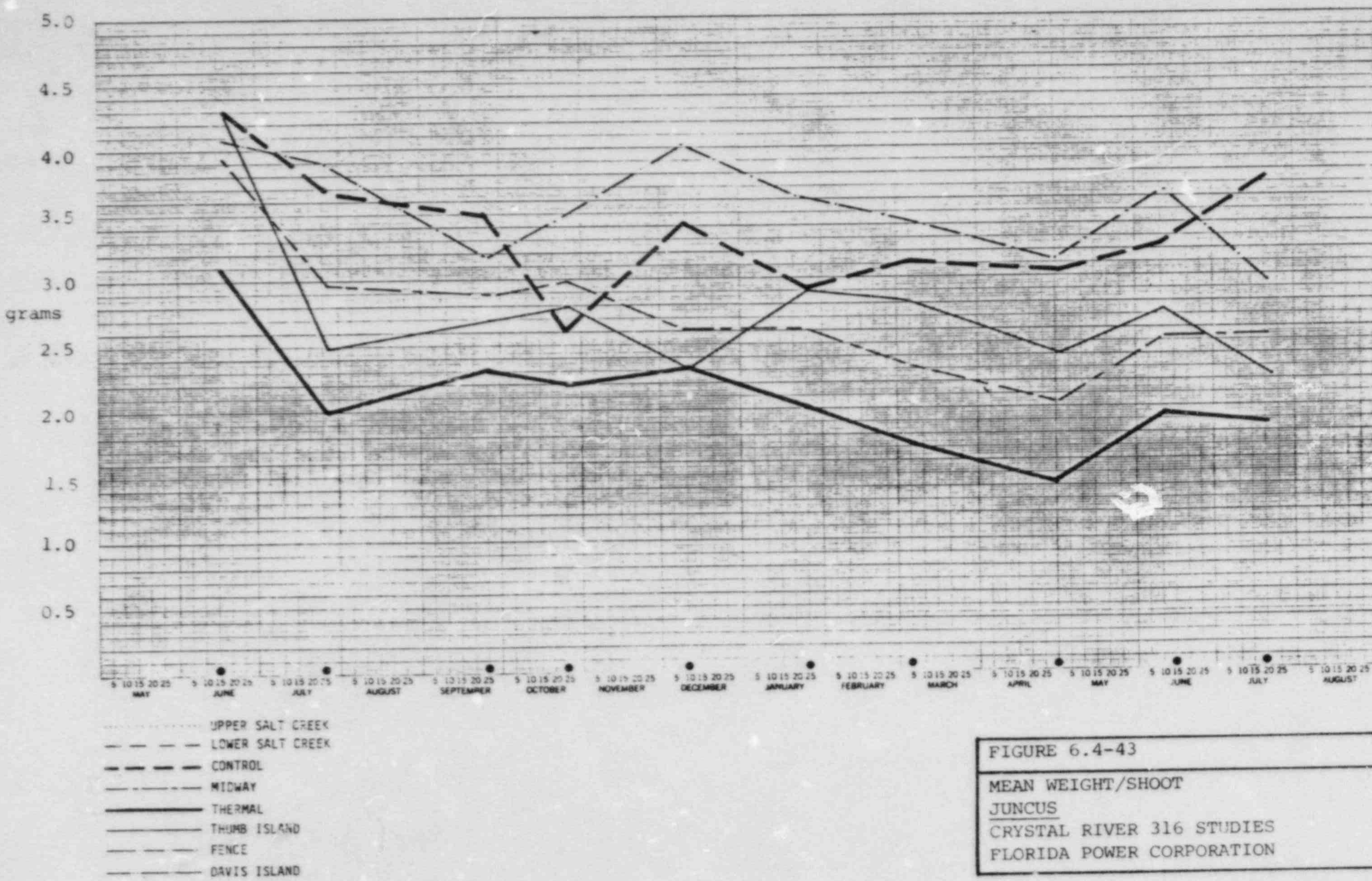


FIGURE 6.4-43

MEAN WEIGHT/SHOOT

JUNCUS

CRYSTAL RIVER 316 STUDIES

FLORIDA POWER CORPORATION

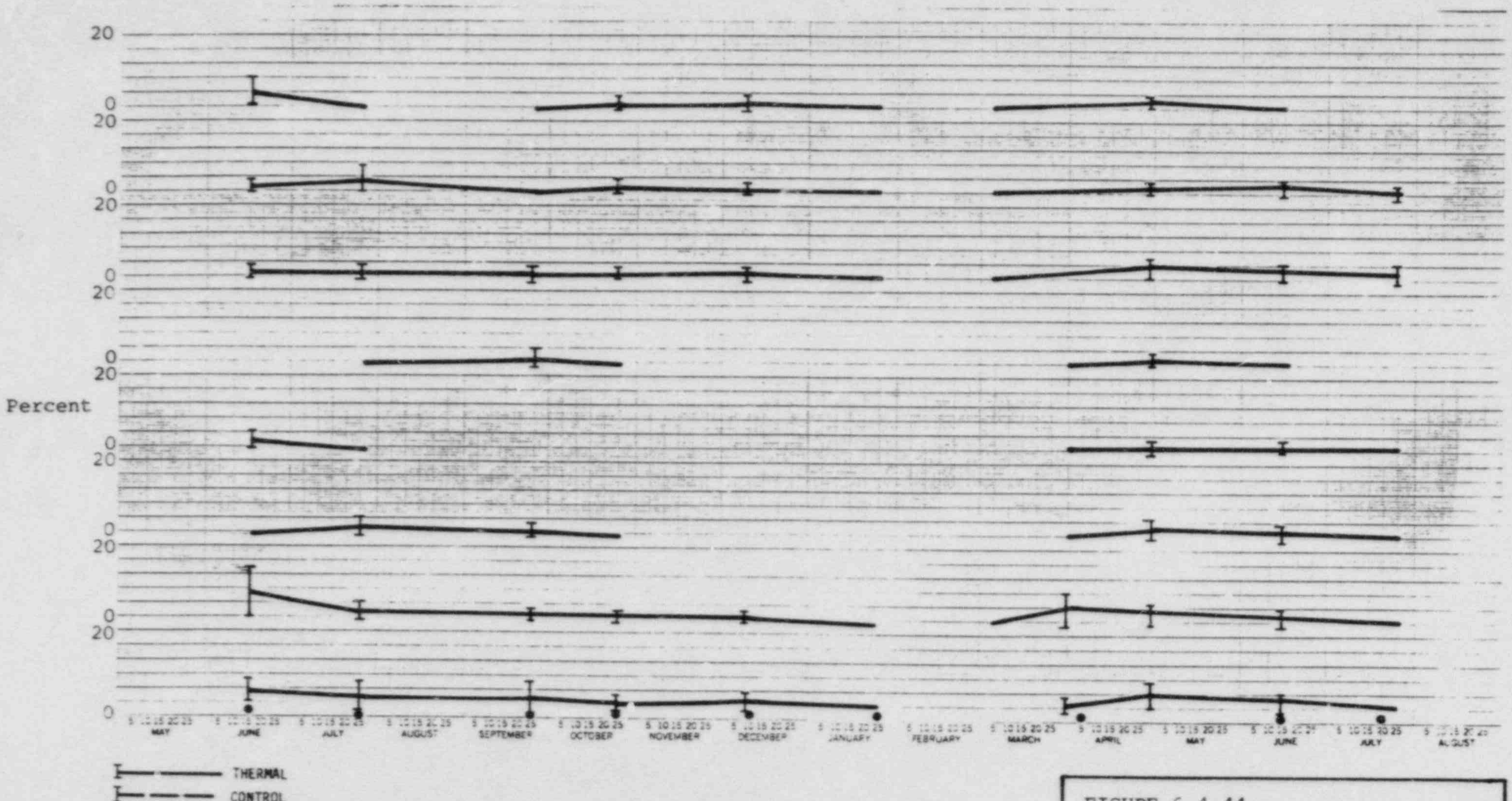
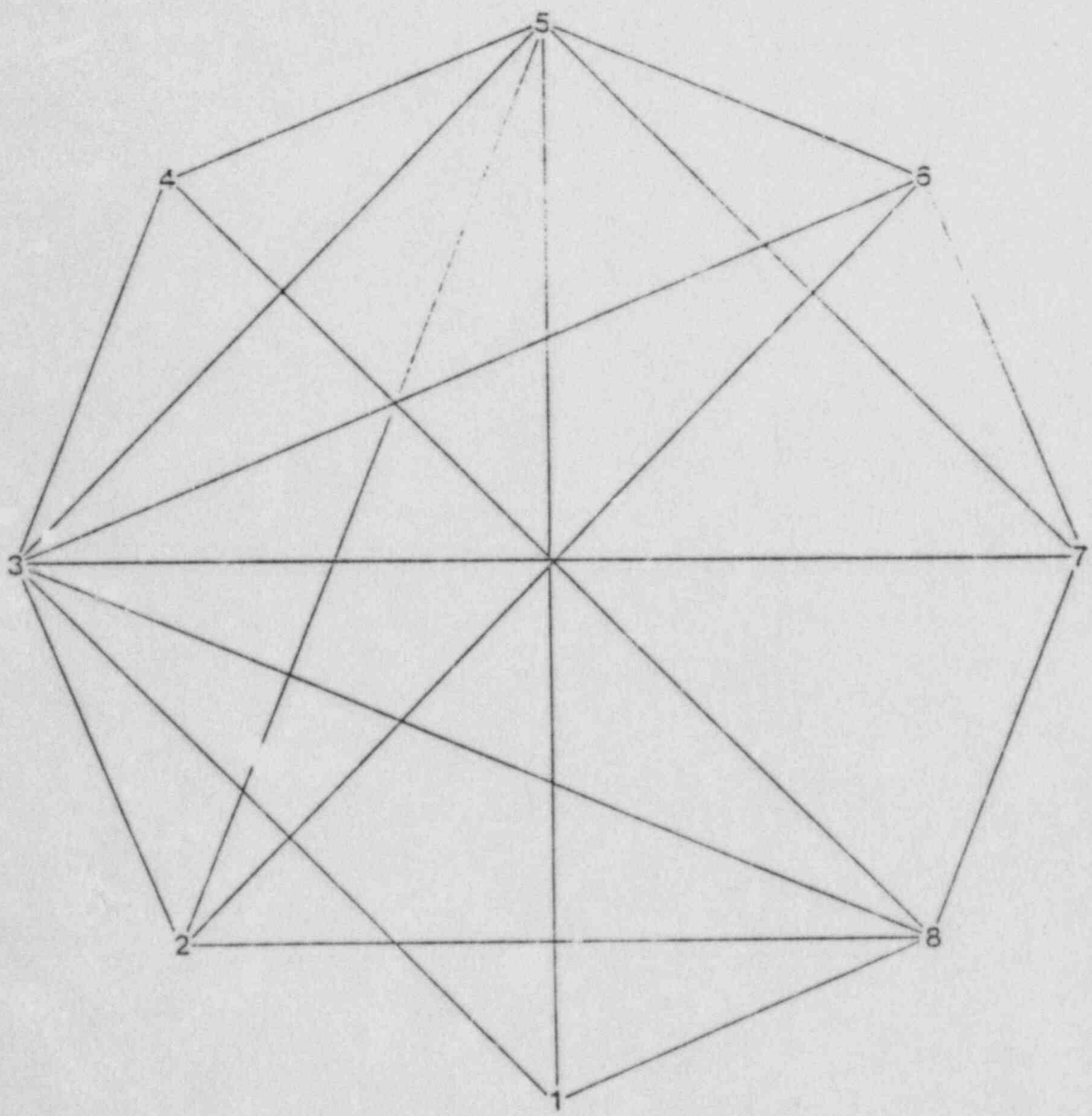


FIGURE 6.4-44

REPRODUCTIVE <u>JUNCUS</u> SHOOTS,
PERCENT TOTAL
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-45

JUNCUS TOTAL WEIGHT
IN *JUNCUS* MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

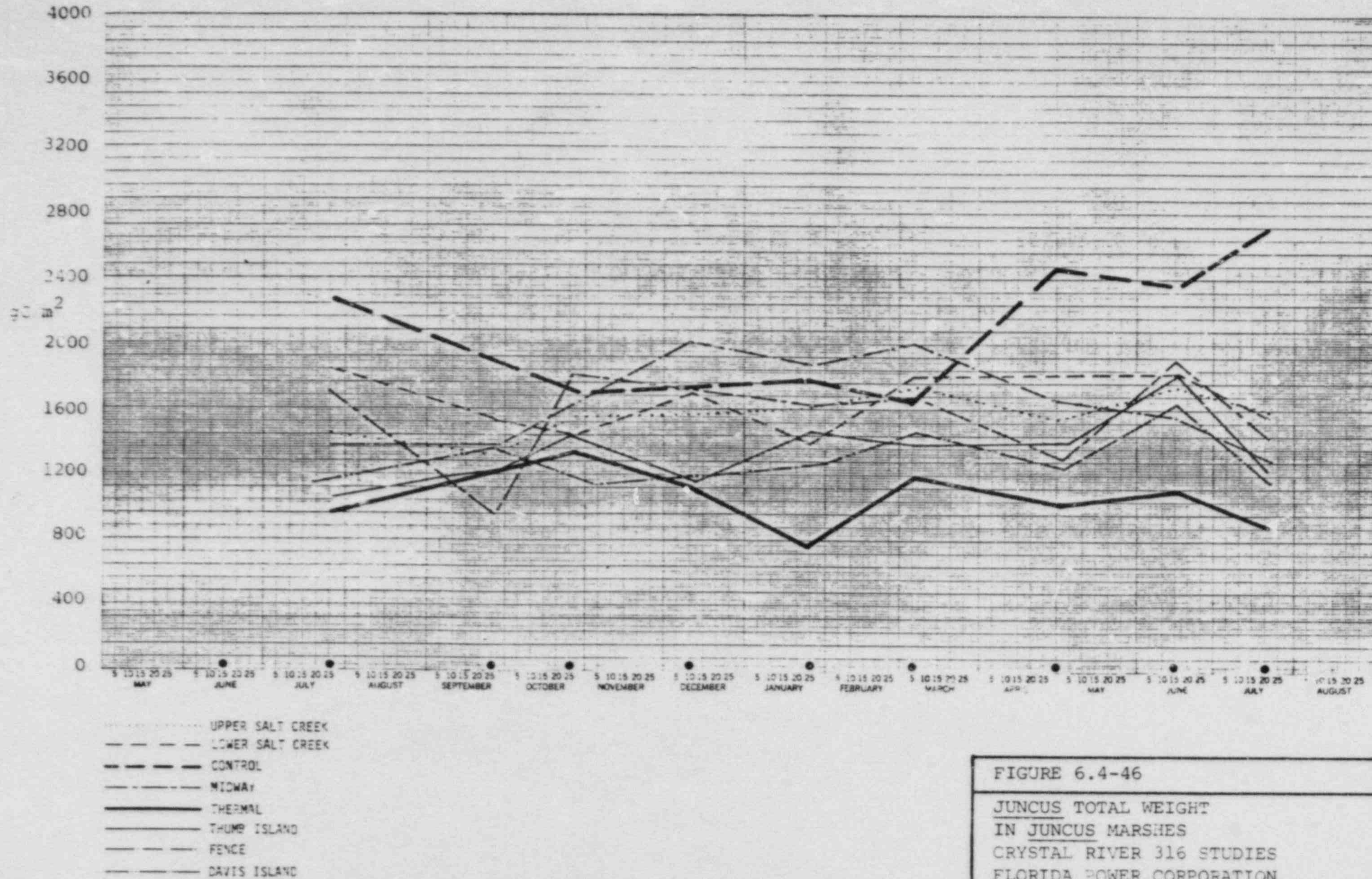
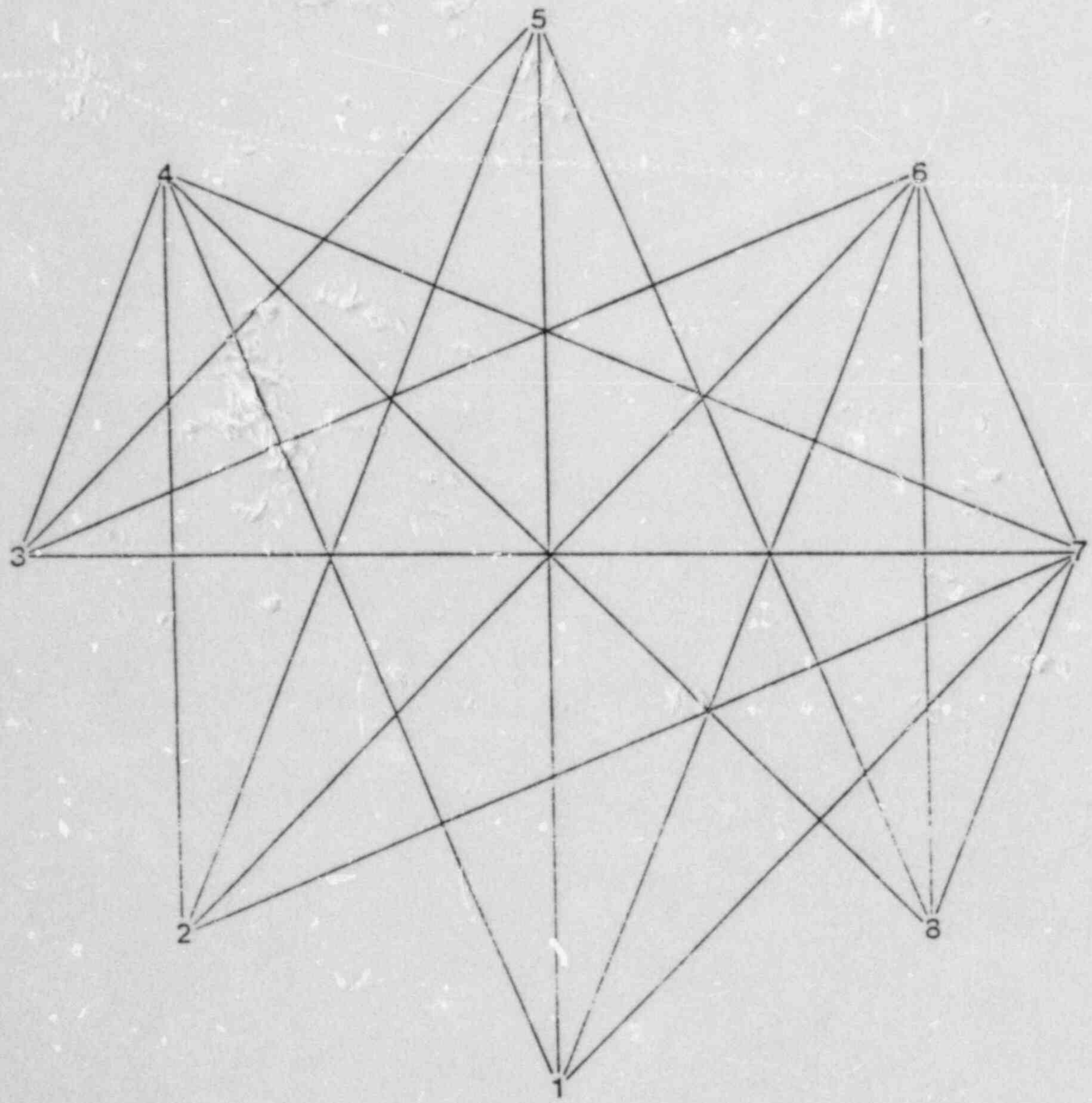


FIGURE 6.4-46

JUNCUS TOTAL WEIGHT
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-47

COMBINED TOTAL WEIGHT
IN *JUNCUS* MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

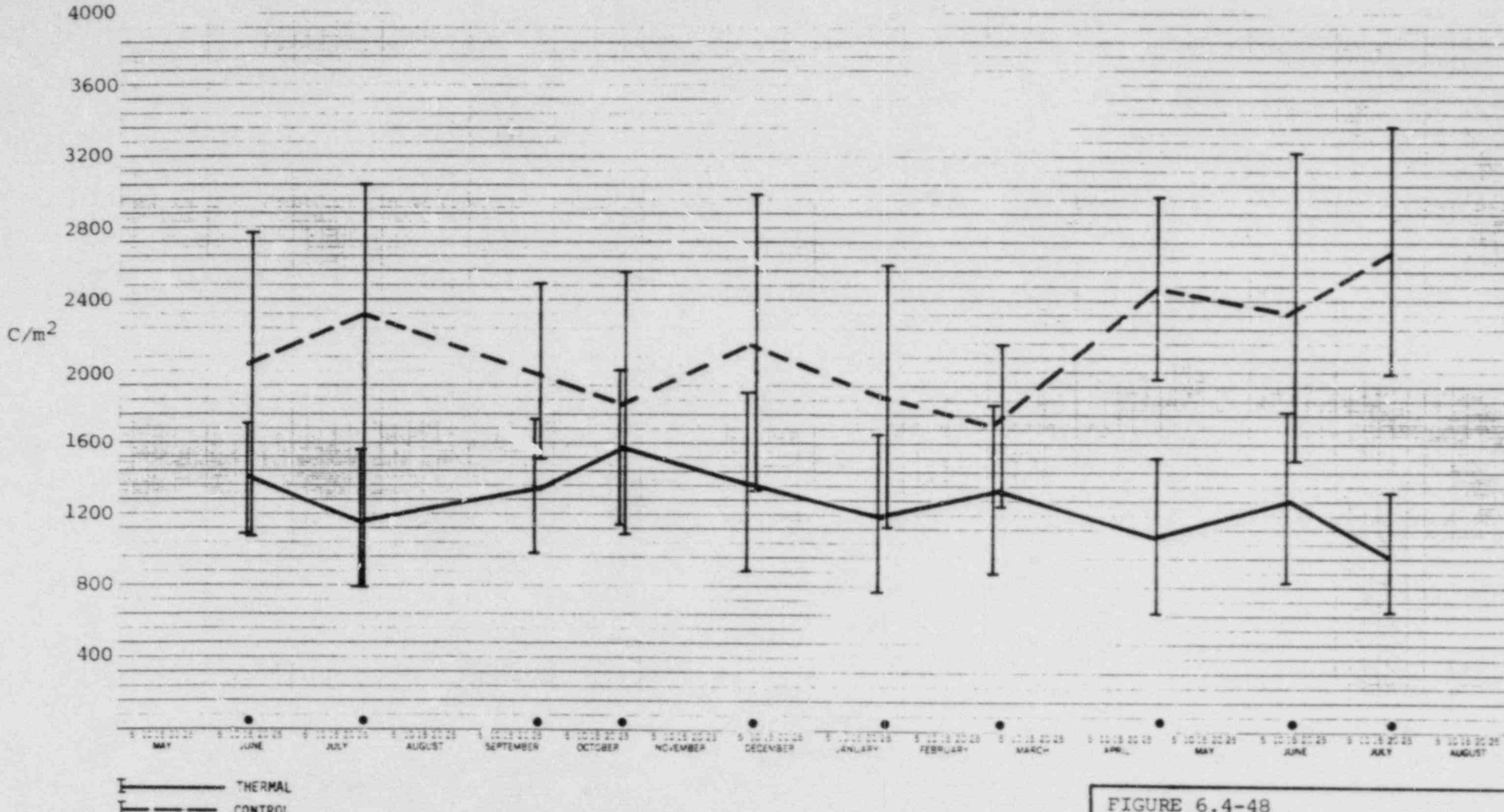


FIGURE 6.4-48

COMBINED TOTAL WEIGHT
IN <u>JUNCUS</u> MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

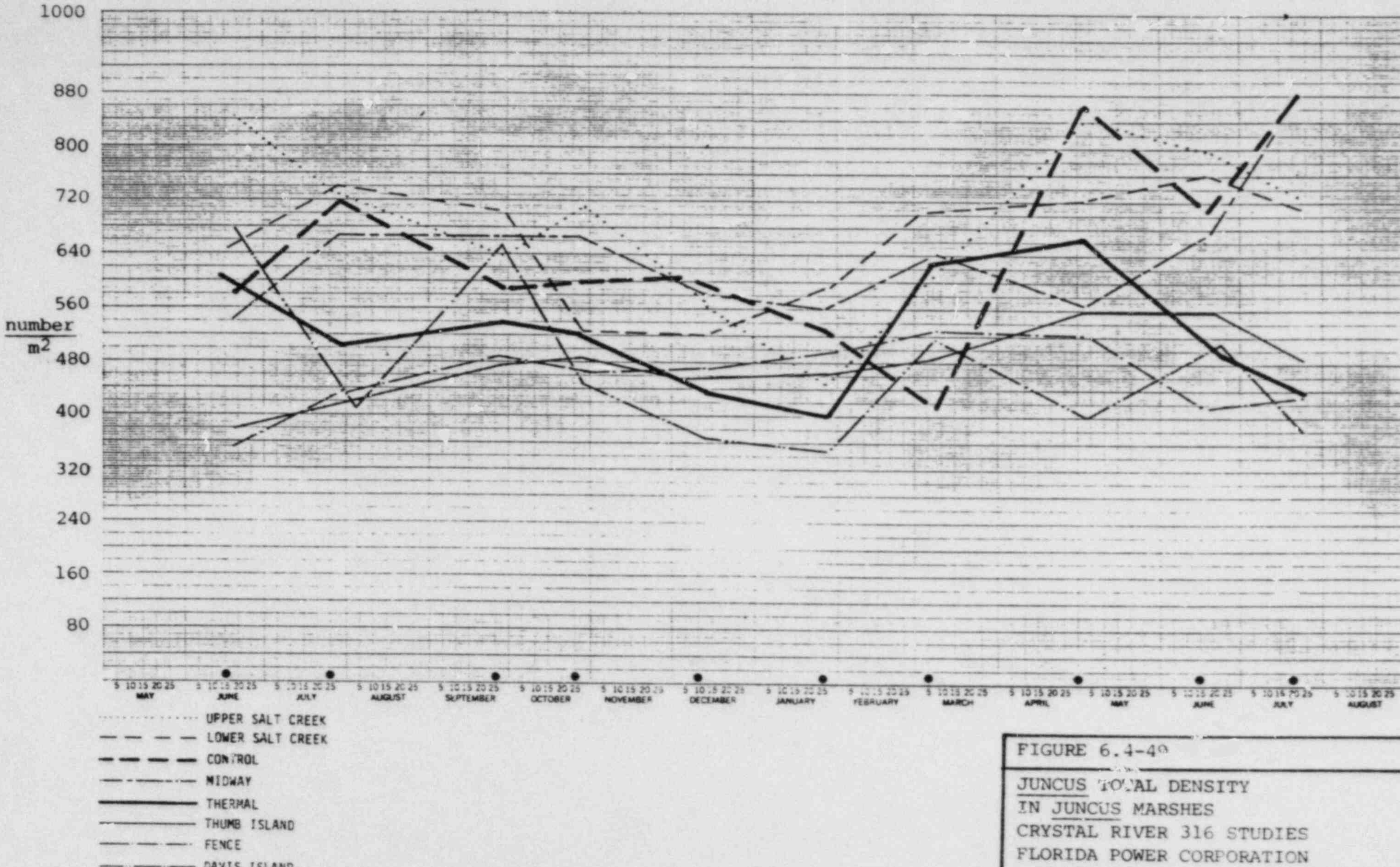
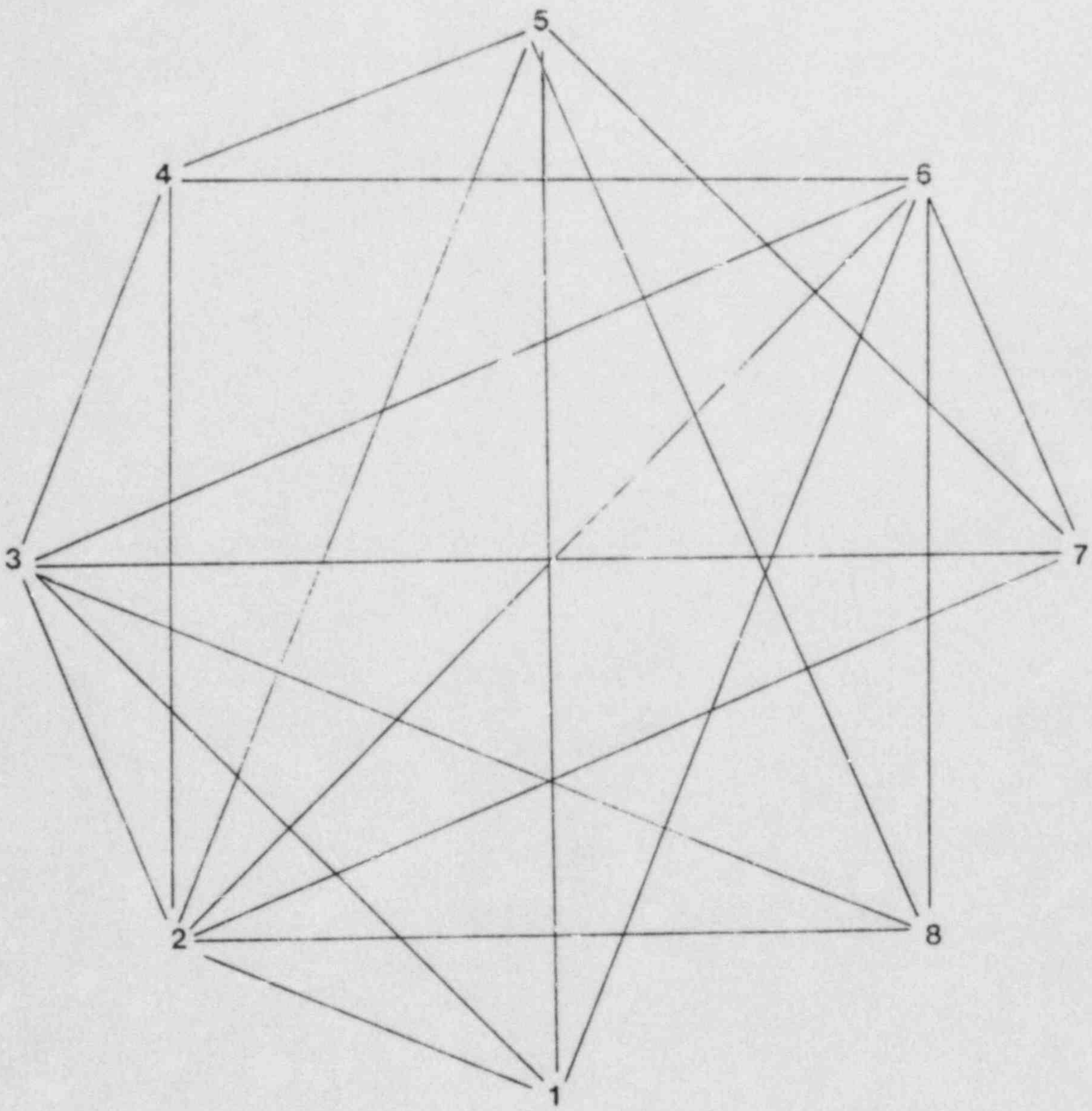


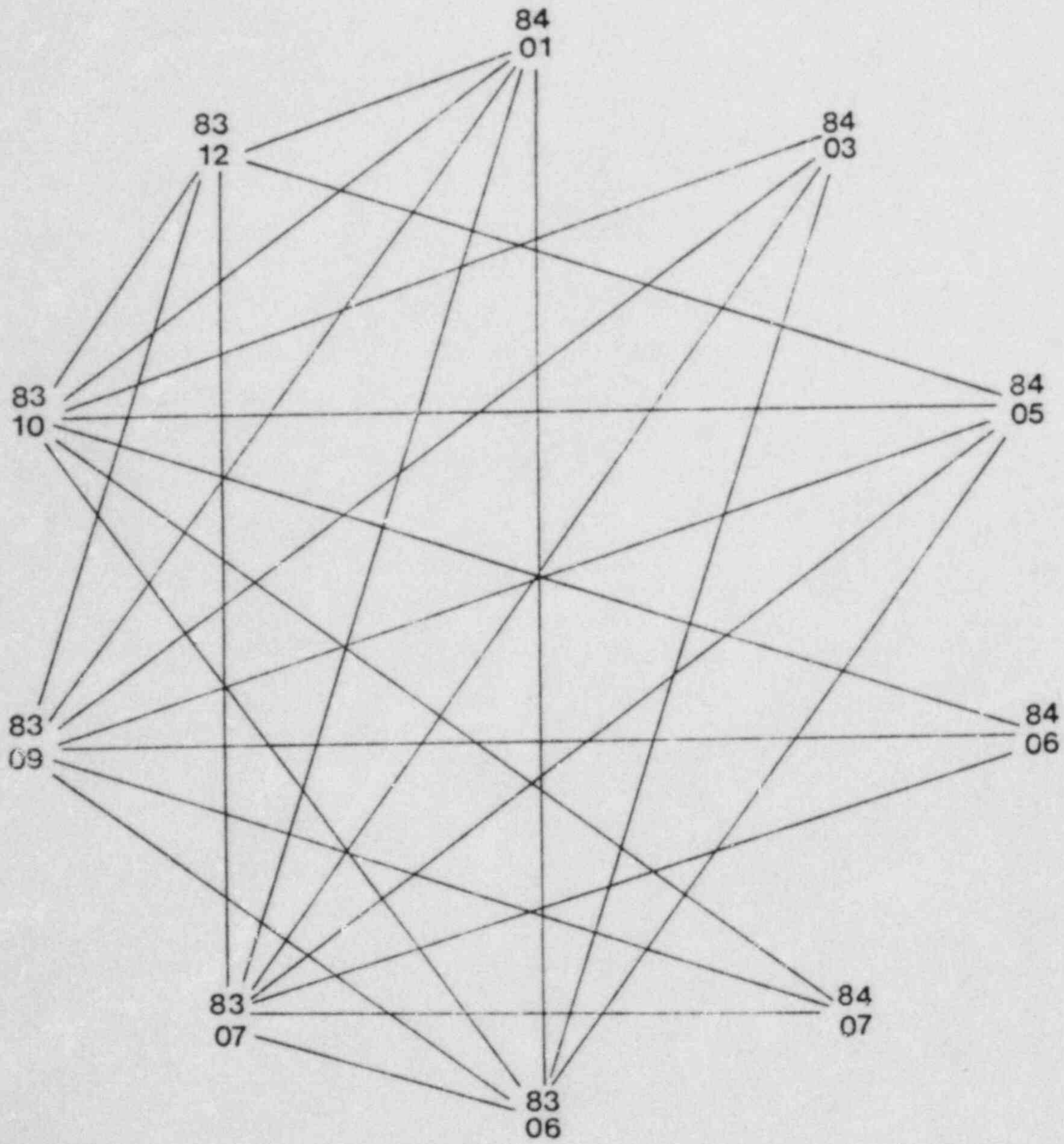
FIGURE 6.4-49

JUNCUS TOTAL DENSITY
IN JUNCUS MARSHES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-50
SPARTINA MARSH BURROW DENSITY CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION



TIME DIFFERENCES

FIGURE 6.4-51
SPARTINA MARSH BURROW DENSITY CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

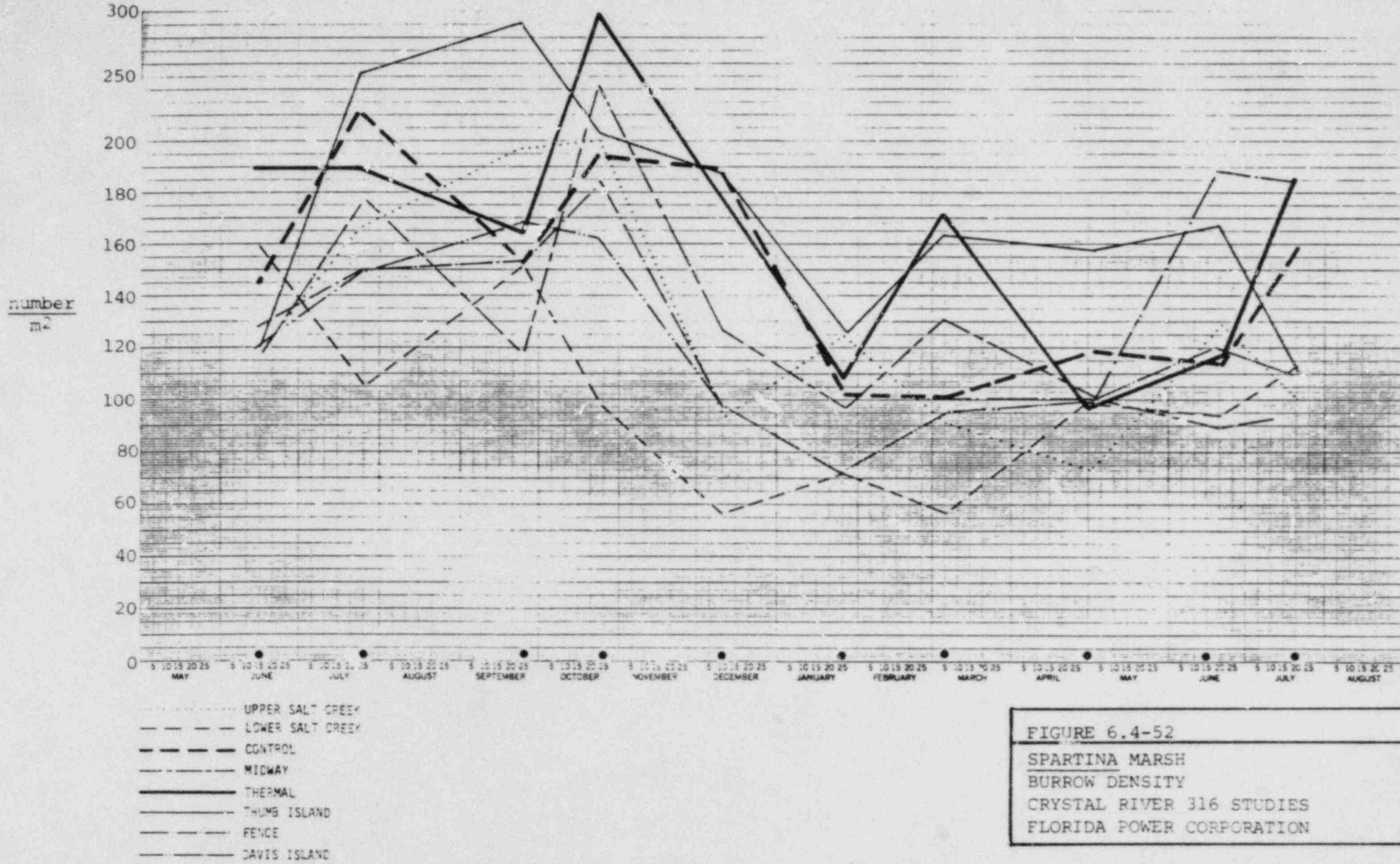
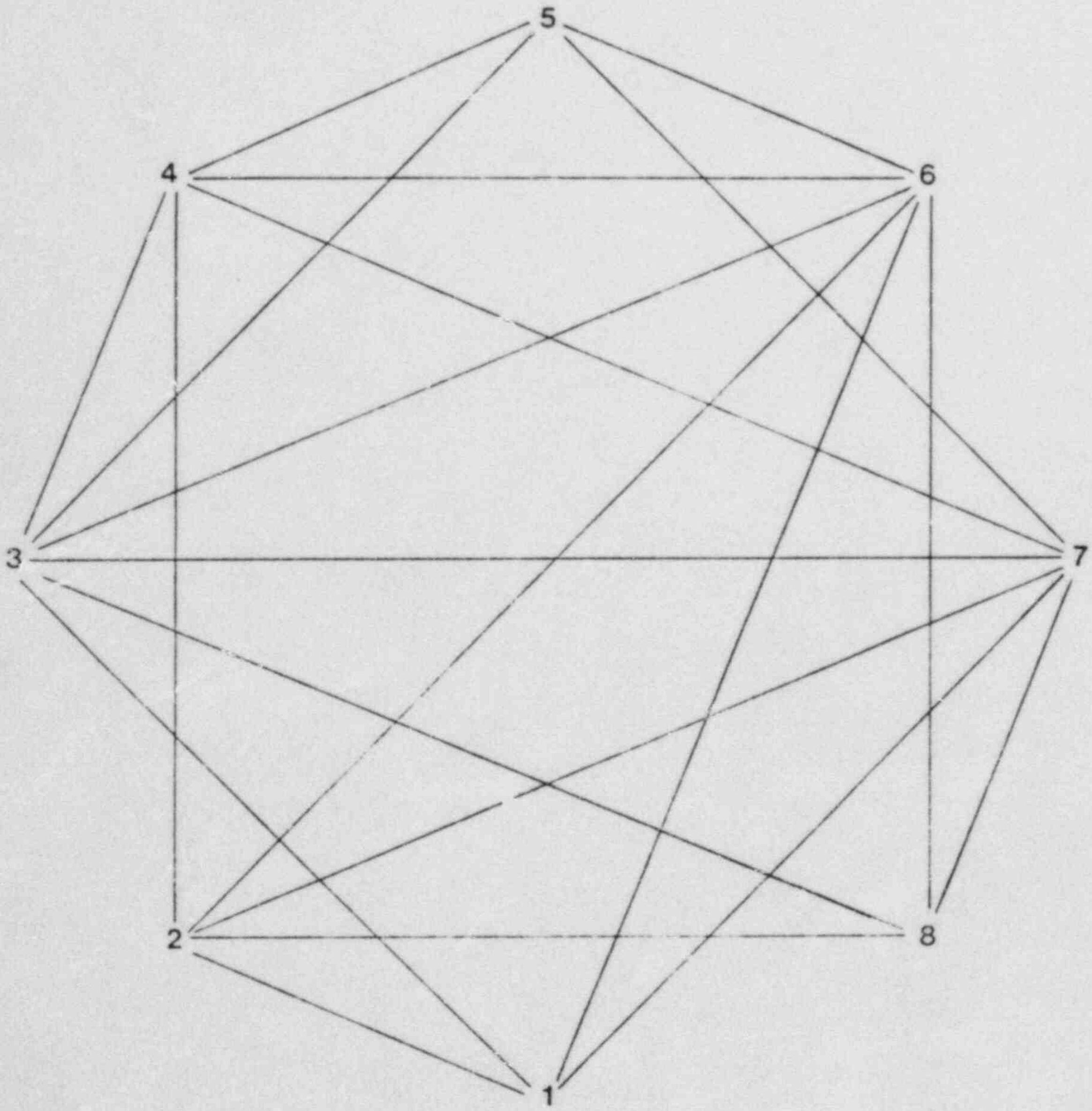


FIGURE 6.4-52

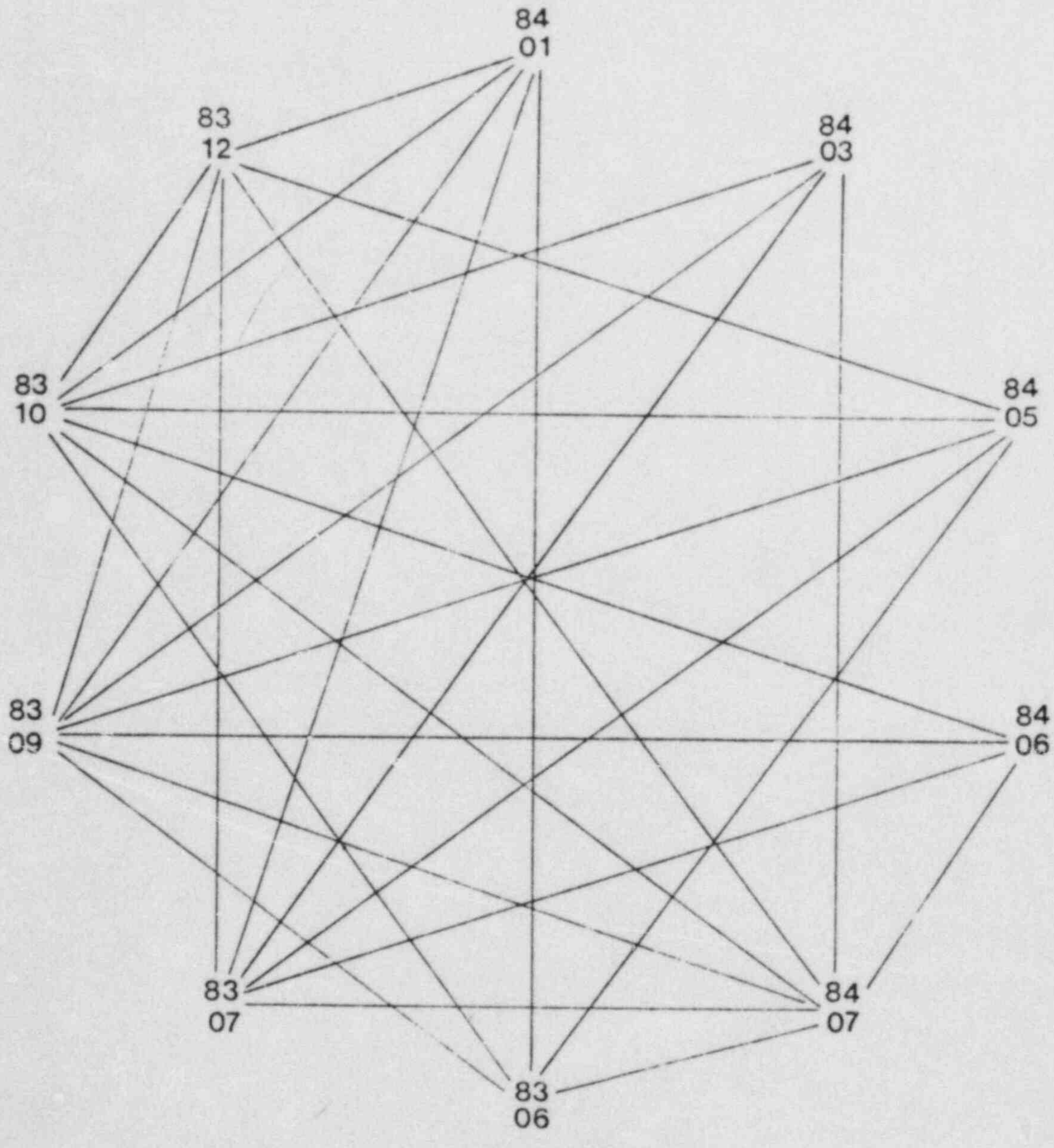
SPARTINA MARSH
BURROW DENSITY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



STATION DIFFERENCES

FIGURE 6.4-53

JUNCUS MARSH
BURROW DENSITY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



TIME DIFFERENCES

FIGURE 6.4-54
JUNCUS MARSH BURROW DENSITY CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

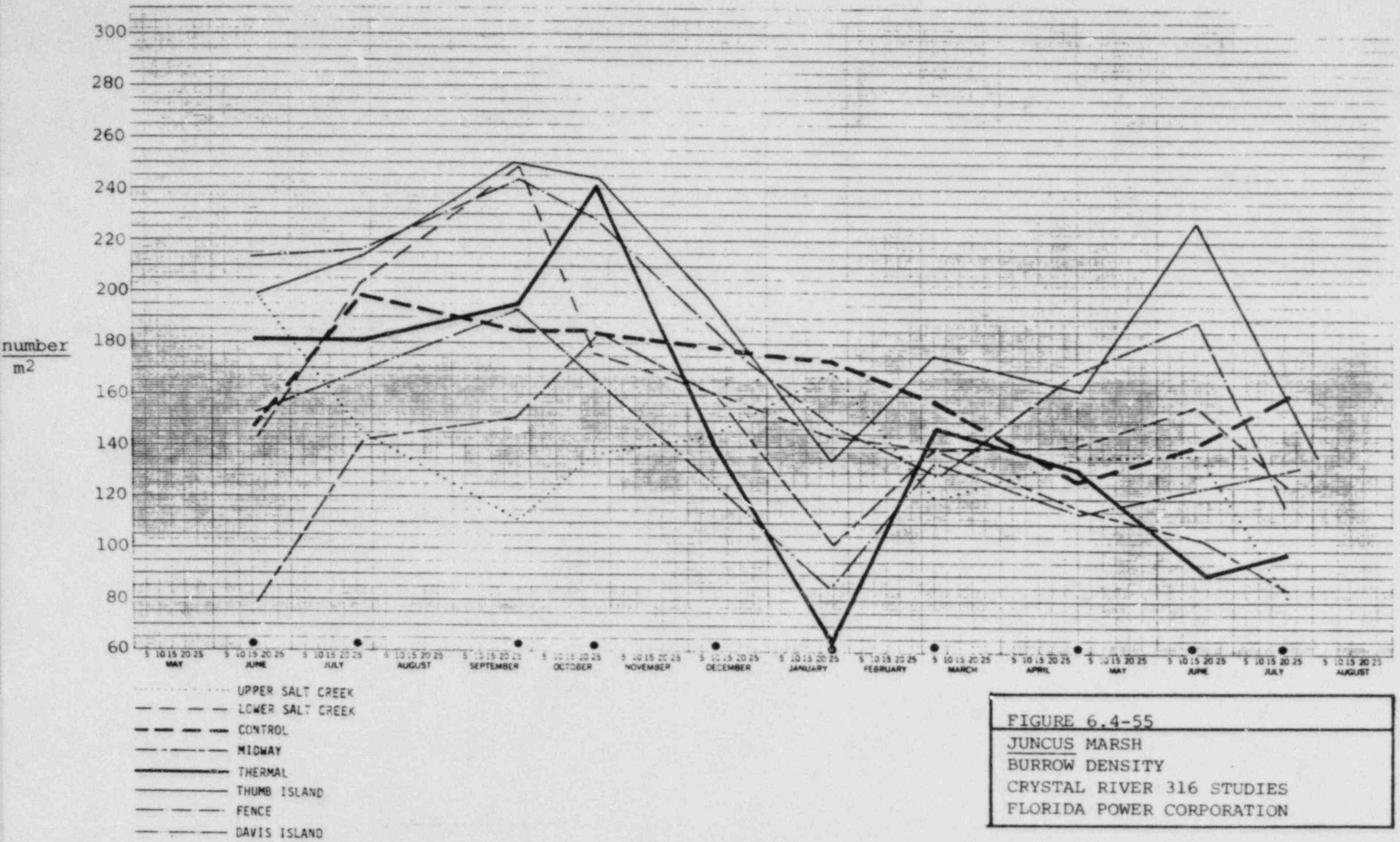


FIGURE 6.4-55

JUNCUS MARSH
BURROW DENSITY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

6.5 OYSTER REEFS AND ASSOCIATED FAUNA

6.5.1 Sampling and Laboratory Analysis

Nine stations were selected in the study area (Figure 6.5-1). At each station, cages of oysters were deployed under comparable conditions adjacent to an oyster reef. In all cases, the cages were placed about 1 ft below mean low water. Cages were constructed of 1/4 in. mesh, galvanized hardware cloth to contain the oysters for short and long term growth and mortality studies. Each cage consisted of 10 compartments each containing an oyster.

Prior to deployment oysters were collected near the barge canal. They were culled, cleaned with brushes, and then placed in the intake canal until processed. During processing the height, length, volumetric displacement and weight of each oyster was recorded. Height is measured as the distance from the dorsal to the ventral shell margin. Oyster length is the distance from the anterior to posterior shell margin. When nine cages had been filled, they were bundled together to form a station.

Each month one bundle of 90 premeasured oysters was anchored with cement blocks at each of the nine stations; the bundle placed the previous month was collected. Dead oysters were noted, and the live oysters were remeasured and weighed. Each live oyster was shucked, and the wet meat was weighed. The meat and shell were then baked in foil pans at 100°C for 24 hours, and then weighed.

Before they were shucked, ten retrieved oysters were chosen randomly from each station for each sampling and inspected under a dissecting microscope for oyster spat. If ten live oysters were not present at any station, the shells of dead retrieved oysters were substituted. The spat were counted, removed, and the combined meat weighed wet, then again after drying at 100°C for 24 hours.

In addition to the monthly sampling, six bundles of 90 premeasured oysters were placed at each of the nine stations in July 1983. One bundle was collected every other month for 1 year. The same analyses were performed on the long term oysters as on the short term oysters, including oyster spat analysis.

Each month three clumps of oysters were collected from the reefs at each station. The clumps were placed in cloth bags and then transported to the on-site facility. The bagged clumps were submerged in a 15 percent Mg_2SO_4 solution for narcotization of the associated fauna. Each clump was later broken up and the number of live oysters greater than 2 cm in height was noted. The sample was then concentrated by pouring through a 0.5 mm sieve. Most shell was rinsed and discarded. The samples were later sorted and organisms identified and enumerated.

The SAS GLM Procedure was used to compare changes in length, weight, height, volume, and condition index of monthly oyster collections. The effect of covariates in such a model were also explored. The live/dead data was analyzed with a contingency table analysis since this data was bivariate (live-dead). This type of analysis compares the relative numbers in a two-way table (for instance, live/dead vs station number) and determines if some stations have a statistically significant difference in relative proportion of live/dead by station (or period). Long-term oyster collections were similarly analyzed using the GLM procedures to compare treatment duration, station and duration-station interactions. Associated faunal data was evaluated by calculating Morisita's index of faunal similarity for all station pairs.

6.5.2 Results

Abiotic Parameters

The temperature and salinity measurements made weekly at photometry stations were used to characterize the environments of the oyster stations. Monthly averages were determined for each parameter at the photometry station nearest each oyster station. The mean monthly values were then determined for the nine selected stations and the differences from the mean were plotted (Figures 6.5-2 and 6.5-3). The temperature and salinity values obtained at photometry stations are referred to with the designation of the nearest oyster station (OR1, OR2, etc.). Maximum and minimum temperature and salinity values from weekly measurements at each station are presented in Table 6.5-1.

Stations OR1, OR2 and OR9 were well below the mean temperature (of all oyster stations) each month (Figure 6.5-2). Station OR3 also was slightly below the mean each month. Temperatures at OR7 and OR8 were similar, with temperatures near the mean. The effect of the thermal effluent is evident at Stations OR4, OR5, and OR6. A greater temperature difference between the stations south of the intake canal (OR1, OR2) and the thermal stations occcurred in winter than in summer. The temperature difference between OR1 and OR4 was nearly 12°C in December and only 4°C in July.

The deviations from the mean monthly salinity measurements are shown in Figure 6.5-3. Salinity was highest near the discharge and decreased with distance from the plant. Station OR9, however, had much lower salinities (about 10 ppt) than any other station. Lowest salinities occurred in April at each station. Highest salinities were generally observed in October and November.

Mortality

Oyster mortality was significantly correlated with both season and station. Significantly higher mortality occurred in September, October and November 1983 and February 1984, and at Stations OR4, OR5, and OR6. Figure 6.5-4 shows the percent mortality at each of the nine stations over the 12 monthly short-term oyster samplings. The seasonal trend of high late summer-early fall mortality and low winter mortality is roughly discernable at each station. The oysters collected during the February sampling period may have been stressed by subfreezing temperatures and very low tides. This may explain the increase in mortality rate which occurred at every station that month. Many gaping oysters with the meat still intact were observed on oyster reefs during the February field work. Increased mortality of Gulf oysters growing at mean low water levels during periods of sudden winter freezes has been documented (Butler 1954).

The high mortalities in September, October and November coincide with high water temperatures and the highest salinities of the study year at most stations. Higher oyster mortality in late summer is not uncommon (Copeland and Hoese 1966). Dawson (1955) observed an increasing rate of mortality of Crystal River oysters from April to July, when his study terminated.

Among stations, oysters at OR4, OR5, and OR6 had the highest mortalities. Incidences of mortality significantly higher than the mean at a station for each sampling date are indicated on Figure 6.5-4. Twelve of the fifteen significant points occurred at Stations OR4, OR5, and OR6. Higher salinities and temperatures were found at these stations. The detrimental effect of combined exposure to high temperatures and salinities combined has been demonstrated (Quick 1971). However, the salinities at OR4, OR5, and OR6 were only a few parts per thousand higher than those at any other stations with the exception of OR9. Salinities at OR9 were approximately 10 ppt lower than at all other stations. Mortalities at OR9 were similar to other stations.

The percent mortality of the long-term oysters is presented in Figure 6.5-5. Over 75 percent of the oysters from OR4 and OR5 were dead after only 2 months. Only at Station OR1 did many oysters survive the entire study period. At every other station more than 75 percent of the recovered oysters were dead at the last collection. Heavy siltation was observed on the oysters at Stations OR5 and OR6 and certainly contributed to the mortalities there. In January 1984, approximately 30 percent of the oysters at OR4 were observed to be buried. To counteract high sedimentation rates, the oyster cages were raised above the sediment. In February, however, about 15 percent of the oysters at OR4 and OR5 were silted over, and in April all OR4 and OR5 oysters were buried. None of the oysters deployed and collected monthly were silted over.

Short-Term Oyster Growth

The height, length, volume, and weight of each oyster were measured before and after deployment in the field. The mean monthly increases in growth are presented in Figures 6.5-6 and 6.5-7. The monthly oyster growth at each station is illustrated only for the parameter of weight (Figure 6.5-8). Results were fairly consistent, however, with all four growth parameters.

The rate of oyster growth was affected by the seasons (Figure 6.5-6). Overall growth rates increased during the fall, fell sharply in January and February, increased again during spring and appeared to be dropping again (with 3 of 4 parameters) in summer. An isolated peak of growth is apparent in March in the plot of each growth parameter. This peak follows two months of little or no growth. The drop in growth rates in June is probably related to spawning. Heavy spatfall occurred on the oysters collected in June (Figure 6.5-11). Dawson (1955) observed minimum growth of Crystal River oysters in March and April and maximum growth in December, January and June. Although the exact months do not coincide, observations by Dawson and the present study are in agreement on the existence of a minimum growth period in winter-spring and of two rapid growth periods - one immediately preceding the slow growth period and the other in May or June. The maximum growth in height of 0.8 mm weekly observed by Dawson is comparable to the maximum height increases observed in the present study.

Growth rates were low for the oysters at Station OR1 (Figure 6.5-7). Station OR2 oysters showed more growth than those at OR1 in each of the parameters measured. Both stations are control stations south of the intake canal. Water currents may have enhanced growth at OR2, which was located in a gap subject to strong currents.

Growth rates of oysters at Station OR8 were not high. Station OR7 oysters grew significantly greater than those at OR8 in 3 of 4 parameters measured, although temperatures and salinities were very similar at the two stations. Again, the growth difference may be related to water currents; OR7 was located in a high current location. Growth rates at Station OR3 were similar to those at OR7.

Oyster growth was not impeded at the thermal stations. Oysters at OR6 showed the greatest growth in 3 of 4 parameters. Station OR5 oysters, however, grew less than those at OR6, and in turn OR4 oysters grew less than those at OR5. Stations OR6, OR5, and OR4, respectively, fall along a gradient of increasing thermal exposure. In general, growth at the thermal stations, particularly OR5 and OR6 was greater than at control stations.

Salinities at Station OR9 were much less than at any other station, which complicates assessing thermal effects on growth rate through comparisons of OR9 to the other stations. Growth at OR9 was always greater than growth at the control Station OR1, however, and never significantly different than growth at OR2, another control station.

Long-Term Oyster Growth

The growth of the long-term oysters at all stations is illustrated in Figure 6.5-9. Each of the four growth parameters measured indicate slow growth of oysters collected during the first 10 months. Weight and height increases between the 4 and 6 month duration periods (collected in November and January) were not significantly different, nor were the increases between the 8 and 10 month duration periods (collected in March and May). Growth analysis of the short-term oysters revealed a rapidly declining growth rate in oysters collected in December and January (Figure 6.5-6), which coincides with the insignificant growth observed between the 4 and 6 month duration periods. The insignificant growth difference between the 8 and 10 month periods coincides with the drop in growth rate observed in the short-term oysters collected in April. The sharp increase in growth rate evident in the July collection of oysters does not coincide with a particularly rapid growth period in the last two months of the short-term oyster growth study, except in the parameter of weight.

Analysis of long-term oyster growth by station revealed poor growth at Station OR1 (Figure 6.5-10), consistent with that found in the short-term growth study. Again, growth at OR2 was significantly greater than at OR1 in each parameter. Greatest growth was observed at Stations OR6 and OR7. Unlike results of the short-term growth study, mean growth at OR4 and OR5 was much less than OR6 and OR7. Growth at OR4 and OR5 was not significantly different than at the control Stations OR1, OR2, and OR9, however.

Oysters at Station OR3 grew more in volume and weight (but not height and length) than oysters from OR1, OR2, OR4, OR8, and OR9. In the short-term growth study, oyster growth at OR8 was not high. In the long-term study, OR8 oysters grew significantly less in all four growth parameters than those only at Station OR7. Oysters at Stations OR6 and OR3 had higher growth rates than oysters at Station OR8 in some parameters.

In summary, the long term oyster growth analysis revealed greatest growth at two thermally affected stations (OR6 and OR7) and no significant differences in growth between the oysters subject to the highest discharge temperatures (OR4 and OR5) and those at the control stations.

Spat and Condition Index

Ten oysters retrieved monthly (short-term oysters) from each station were examined for the presence of oyster spat. Spat abundance is graphically illustrated in Figure 6.5-11. The seasonal pattern of heavy spatfall in fall and for a short period in spring is evident at most stations. Spatfall at Stations OR6, OR7, OR8, and OR9 was very similar, with greatest numbers of spat in June. Stations OR2 and OR3 had moderate spatfall with the fall and spring peaks nearly equal. Fewest spat were found at OR1, OR4, and OR5. Siltation on the oysters may have contributed to the smaller numbers of spat at Stations OR4 and OR5.

Oyster condition index (CI) of the short-term oysters is also presented on the graph of spat abundance (Figure 6.5-11.). CI is the dry oyster meat biomass times 100 divided by the shell cavity volume. The shell cavity volume is determined by subtracting the shell weight from the oyster weight. This method is valid because the effective density of cavity contents is close to 1 g per cm^3 Evaluation of CI may allow use of oysters as environmental monitors (Lawrence and Scott 1983). The peak of CI during the period of minimum spatfall is evident in Figure 6.5-11. An increase of CI after spawning has been previously demonstrated (Galtsoff 1964).

The CI of short- and long-term oysters were analyzed to identify differences between the oysters from different stations. Seasonal CI, mean CI at each station and results of a between station significance test for short-and long-term oysters are presented in Figure 6.5-12. The seasonal pattern of highest CI in spring is less conspicuous in the long-term oysters. Very few oysters survived to be analyzed for CI in the later sampling periods of the long-term study, however.

The similarity of the pattern of CI values at the nine stations in both the short- and long-term oyster studies reduces the concern that short-term CI values were biased by the condition of the oysters at the time of their deployment. Oysters at the thermally affected stations did not have reduced CI values. Station OR4 values were lower, however, than OR5 values, which, in turn, were lower than those at OR6 (short-term oysters). The CI was significantly greater at OR6 and OR7 than at the control Stations OR1 and OR9 in both the short- and long-term oyster studies. CI values at OR4 were not significantly different than values of OR1 and OR9 in either study. Oysters from OR3 had greater CI values than those at OR2, and OR2 oysters had greater values than those at OR1.

A similar pattern frequently occurred in the oyster growth and CI studies. The pattern was comprised of: increasing values from OR1 to OR2 to OR3;

decreasing values from OR3 to OR4; increasing values from OR4 to OR5 to OR6; decreasing values from OR6 to OR7 to OR8; and low to moderate values at OR9. This pattern occurred in the short-term oyster height and weight analysis (Figure 6.5-7) and the short-term CI analysis (Figure 6.5-12). Growth and CI showed a positive correlation.

Associated Fauna

Species Composition

A total of 59,840 organisms comprising 175 taxa were collected and identified during the study (Table 6.5-2). The most abundant individual taxon was the polychaete Polydora websteri, which comprised 11.5 percent of the total fauna. This species was particularly abundant in the thermal area (Stations OR4, OR5, and OR6) where it comprised 27 percent of the total fauna. The second most abundant taxon was the crab Eurypanopeus depressus, which comprised 9.5 percent of total faunal abundance. Third in overall abundance was the mollusc taxon Mytilidae spp. (9.0 percent of total fauna). The most abundant individual group of organisms was Mollusca, which comprised 30 percent of total abundance. Second in abundance was the group Polychaeta (28 percent of total abundance). Although these two groups were relatively close in total numbers, their distributions were quite different, with polychaetes dominant at thermal stations and molluscs dominant at south control stations.

Certain large and/or mobile organisms which are well known to be associated with oyster reefs (the American oystercatcher, Heamatopus palliatus; the lightning whelk, Busycon contrarium; the crown conch, Melongena corona; and the blue crab, Callinectes sapidus) were observed but not collected. The numbers of oysters reported in the associated fauna include only oysters greater than 2 cm in height. The group Nematoda and barnacles of the genus Balanus, although collected, were recorded only as present or absent.

Seasonal Comparisons

Oyster faunal abundance by species and sampling period are given in Appendix V. Total numbers of individuals collected through the twelve sampling periods are given in Figure 6.5-13. Seasonally, faunal densities were greatest in early fall, followed by marked decreases during winter and only a slight recovery during the following spring and summer. This limited recovery may be due in part to the extremely cold winter experienced in the Crystal River area during 1983-84. Unusually low tides, combined with air temperatures well below freezing, may have caused high mortality among the exposed associated faunal populations. Figures 6.5-14 through 6.5-19 show seasonal patterns for six of the most abundant organisms collected, including Crassostrea virginica. The effects of the harsh winter in Crystal River are best illustrated in abundances of Mytilidae sp. (Figure 6.5-15), Odostomia impressa (Figure 6.5-16), and Melita spp. (Figure 6.5-17). At stations within the immediate thermal area (OR4, OR5, OR6), values remained generally low or appeared to be unaffected by the cold temperatures. With the exception of a general decrease during the winter months, seasonal patterns of individual taxa are difficult to discern, particularly in certain opportunistic species, which reproduce throughout the year. This is best illustrated in the seasonal data for Polydora websteri (Figure 6.5-18) and

Platyhelminthes spp. A + B (Figure 6.5-19), which have numerous peaks in abundance throughout the year. In addition, it is extremely likely that since an oyster reef environment forms a non-uniform substrate, distribution of the associated fauna may be highly patchy, with numbers of individuals collected being dependent upon the number of crevices or gaping oysters available to provide a suitable habitat.

Spatial Comparisons

Total numbers of individuals collected at each station over the year are shown in Figure 6.5-13. Greatest numbers were found at control Stations OR1 and OR2. Lowest numbers were observed at Station OR4, followed by a progressive increase at Stations OR5, OR6, and OR7, respectively. Noticeably low numbers also occurred at Station OR9, which had values nearly as low as those found at the station closest to the point of discharge (OR4). This is believed to be due to the marked decrease in salinity and increase in suspended solids caused by the combined freshwater input from both the Withlacoochee River and the Cross Florida Barge Canal. Both species diversity (Shannon-Weaver H') and evenness (Pielou, J') exhibited a similar, nearly linear increase with distance from the point of discharge (Figure 6.5-20). Highest mean diversity observed was at Station OR1 (H' = 2.48). Lowest mean diversity was at Station OR4 (H' = 1.72). Neither species diversity or evenness exhibited any particular seasonal pattern, although there was a greater amount of variability in both H' and J' at Stations OR4, OR5, and OR6.

Figure 6.5-21 displays the percentage breakdown of major groups of associated fauna by station. The group Mollusca was the dominant component of the associated fauna at both stations OR1 and OR2. Polychaetes were the most abundant group at Stations OR3, OR5, OR6, and OR7. Amphipods were slightly greater in abundance at Station OR4, however. This is primarily due to a large number of the amphipod Corophium ascherusicum collected during the month of April. Abundances of molluscs decreased drastically at stations within the thermal area. Lowest numbers of molluscs occurred at Station OR4, where they comprised only 2.3 percent of the total faunal abundance. In contrast, molluscs comprised 38.5 percent at Station OR1 and 56.0 percent at Station OR2. Mollusc abundances gradually increased with increasing distance from the point of discharge, and once again became the most abundant group at Stations OR8 and OR9. Polychaete abundances remained relatively high at Stations OR8 and OR9 where they were second in overall abundance, as they were at Stations OR1 and OR2. In contrast to the high spatial variability exhibited by the molluscs and polychaetes, the Decapoda remained relatively constant in abundance among the 9 stations. The Amphipoda, although exhibiting a great deal of variability, showed no particular spatial patterns.

Although there was a great deal of variability in the spatial distribution of individual taxa, the general trend was for noticeably low abundances at Stations OR4, OR5, and OR9. Equally important is the trend toward increasing abundances from Station OR4 to OR7, which can be translated into increasing numbers of organisms with increasing distance from the point of discharge. This trend is particularly evident in the abundances of the common associated fauna presented in Figure 6.5-22. Abundances of the polychaete Polydora websteri remained relatively high at discharge Stations OR4, OR5, and OR6. It should be noted, however, that similar increasing values with distance from the discharge still occurred for this species.

Faunal Similarity

A list of similarity values (Morisita's Index) between all station combinations during each sampling period are given as trellis diagrams in Appendix V. Highest similarities were observed between Stations OR4 and OR5, which had a mean Morisita value of 0.75. High similarity was also observed between Stations OR1 and OR2 (0.73) and between Stations OR8 and OR9 (0.70). Lowest similarities observed during the study were between Stations OR2 and OR4 (0.18) and between Stations OR2 and OR5 (0.23).

Overall, Morisita's index values were consistently low when comparing south control Stations OR1 and OR2 to thermal Stations OR4, OR5, and OR6. In only 8 instances out of 72 possible comparisons were Morisita values greater than 0.50 between these two groups of stations. At no time throughout the year was there a Morisita value greater than 0.70 observed between these 2 groups. This suggests that southern stations, far removed from the influence of the Crystal River Power Station, are not only distinctly different from thermal stations in terms of abundance of associated fauna, but also in faunal composition.

6.5.3 Impact Assessment

Thermal effluent did not impede overall oyster growth. Growth was greatest at stations receiving moderate thermal effects. In the area of maximum temperatures, however, growth rates were somewhat lower. This may be the result of reduced ciliary action which occurs at temperatures over 32°C (Galtsoff 1964). Growth at the stations with maximum thermal impact was not, however, less than growth at the control stations. The CI of the oysters also was not reduced in the thermal area. CI values correlated closely with growth rates.

Number of oyster spat was low in the discharge basin (OR4 and OR5) but was also low at one control station. Heavy siltation was observed near the discharge canal and may have limited suitable substrate for spat settlement. Recent studies have indicated fewer spat in the discharge area (Applied Biology 1983).

The key factor in the assessment of the plant effects on the oysters may be the high mortalities in the discharge area. Few oysters survived the first two months in the discharge area in the long term study, and fewer oysters survived in the discharge area than in control areas in the short-term study. Quick (1971) reports that "35°C can cause rapid death in oysters when accompanied by high salinities, at least among oysters from cool waters with great reserves of glycogen or other storage products". Oysters used in this study were from relatively cool waters north of the power plant, and glycogen reserves of the oysters (as reflected by the CI) were moderate in summer. Salinities were somewhat higher in the discharge area but were still below open ocean values. Temperatures were near or greater than 35°C at the stations with highest mortalities.

Other factors not analyzed may have influenced oyster mortality. Heavy sedimentation, which may be highly destructive to an oyster community (Galtsoff 1964), was observed in the thermal area.

The most striking trend in the associated faunal data is the marked decrease in abundance of the majority of organisms in the immediate thermal area. This appears to be the result of thermal stress, although the additional role of sedimentation in the thermal area is uncertain. Consistently low abundances of organisms at Station OR9 can be attributed primarily to the combined effects of the outflow from both the Withlacoochee River and the Cross Florida Barge Canal, resulting in low salinities and high amounts of suspended material. As stated by Wells (1961) and Galtsoff (1964), lower salinities and increased suspended material will result in fewer associated fauna, as was observed at Station OR9.

Certain groups such as polychaetes appear to be relatively unaffected in the immediate thermal area. This may be due to the fact that as a group, these organisms may be opportunistic by nature, and may have an affinity for certain disturbed systems. Molluscs (including Crassostrea virginica), however, were greatly reduced in the thermal area, suggesting a low level of tolerance to thermal stress.

The nine oyster reef stations comprise a wide variety of environmental conditions. The Crystal River Power Station appears to have a significant effect on localized oyster reef populations. Effects seen include enhanced oyster growth and increased oyster mortality. Direct effects appear to be limited to the immediate vicinity of the discharge canal. The power plant also appears to have reduced abundance of oyster reef associated fauna at stations in close proximity to the discharge canal, although certain species appear to do well there.

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TABLE 6.5-1

MINIMUM AND MAXIMUM (BOTTOM) TEMPERATURES AND SALINITIES MEASURED AT PHOTOMETRY STATIONS NEAREST OYSTER STATIONS.

Station	Temperature (°C)		Salinity (ppt)	
	Minimum	Maximum	Minimum	Maximum
OR1	11.5 (Jan)	30.4 (Aug)	14.9 (Apr)	24.5 (Jul)
OR2	11.5 (Jan)	30.7 (Aug)	14.1 (Apr)	24.5 (Oct)
OR3	13.5 (Jan)	31.4 (Aug)	16.1 (Apr)	24.1 (Oct)
OR4	16.8 (Dec)	38.3 (Aug)	17.7 (Apr)	29.1 (Oct)
OR5	19.5 (Jan)	34.3 (Aug)	17.1 (Apr)	25.0 (Nov)
OR6	16.2 (Jan)	33.9 (Aug)	16.3 (Apr)	26.8 (Oct)
OR7	14.9 (Dec)	32.8 (Aug)	16.0 (Apr)	25.7 (Oct)
OR8	15.5 (Jan)	32.6 (Aug)	13.0 (Apr)	23.4 (Oct)
OR9	12.8 (Dec)	30.3 (Jul)	6.7 (Apr)	15.6 (Oct)

TABLE 6.5-2 OYSTER REEF ASSOCIATED FAUNA TAXA LIST.

PHYLUM PORIFERA
LISSODENDORYX ISODICTYALIS
CLIONA SPP.
PHYLUM CNIDARIA
CLASS ANTHOZOA
PHYLUM PLATYHELMINTHES
PLATYHELMINTHES SP.A
PLATYHELMINTHES SP.B
EUPLANA GRACILIS
STYLOCHUS SP.
PHYLUM NEMERTINEA
PHYLUM NEMATODA
PHYLUM ANNELIDA
CLASS POLYCHAETA
ORDER PHYLLODOCIDA
FAMILY POLYNOIDAE
LEPIDIASTHENIA VARIUS
LEPIDAMETRIA COMMENSALIS
FAMILY PHYLLODOCIDAE
PHYLLODOCE CASTANEA
FAMILY SYLLIDAE
AUTOLYTUS DENTALIUS
BRANIA CLAVATA
EHLERSIA CORNUTA
EXOGENE DISPAR
HAPLOSYLLIS SPONGICOLA
ODONTOSYLLIS ENOPLA
SPHAEROSYLLIS LONGICAUDA
SPHAEROSYLLIS TAYLORI
OPISTHOSYLLIS SP. B
TYPOSYLLIS CF.LUTEA
TYPOSYLLIS SPP.
FAMILY NEREIDAE
NEREIS PELAGICA
NEANTHES SUCCINEA
ORDER EUNICIDA
FAMILY EUNICIDAE
LYSIDICE NINETTA
MARPHYSA SANGUINEA
FAMILY LUMBRINERIDAE
LUMBRINERIS VERRILLI
FAMILY DORVILLEIDAE
SCHISTOMERINGOS RUDOLPHI
ORDER ARCIIDA
FAMILY ORBINIIDAE
HAPLOSCOLOPLOS FOLIOSUS
HAPLOSCOLOPLOS FRAGILIS
NAINERIS BICORNIS
NAINERIS LAEVIGATA
SCOLOPLOS TEXANA
ORDER SPIONIDA
FAMILY PARAONIDAE
ARICIDEA PHILBINAE
CIRROPHORUS LYRA
CIRROPHORUS CF. FURCATUS
FAMILY SABELLARIDAE
NOTAULAX PHAETAENIA
SABELLARIA SPP.
SABELLARIA VULGARIS
FAMILY SPIONIDAE
BOCCARDIELLA HAMATA
BOCCARDIELLA SP.A
POLYDORA SPP.
POLYDORA LIGNI
POLYDORA SOCIALIS
POLYDORA WEBSTERI

TABLE 6.5-2 OYSTER REEF ASSOCIATED FAUNA TAXA LIST.

- STREBLOSPIO BENEDICTI
- ORDER CIRRATULIDA
  - FAMILY CIRRATULIDAE
    - THARYX ANNULOSUS
    - THARYX CF. DORSOBRANCHIALIS
- ORDER CAPITELLIDA
  - FAMILY CAPITELLIDAE
    - CAPITELLA CAPITATA
    - MEDIOMASTUS CALIFORNIENSIS
  - FAMILY MALDANIDAE
    - CLYMENELLA TORQUATA
- ORDER OWENIIDA
  - FAMILY OWENIIDAE
    - MYRIOCHELE OCULATA
- ORDER TEREBELLIDA
  - FAMILY TEREBELLIDAE
    - AMAEANA TRILOBATA
    - POLYCIRRUS SP.
    - STREBLOSOMA HARTMANAE
- ORDER SABELLIDA
  - FAMILY SABELLIDAE
    - CHONE AMERICANA
    - FABRICIA SP.A
    - HYPISCOMUS PHAETAENIA
    - POTAMILLA RENIFORMIS
  - FAMILY SERPULIDAE
    - FILOGRANA IMPLEXA
    - HYDROIDES DIANTHUS
- CLASS OLIGOCHAETA

PHYLUM MOLLUSCA

- CLASS GASTROPODA
  - ORDER MESOGASTROPODA
    - FAMILY RISSOINIDAE
      - RISSOINA CATESBYANA
    - FAMILY CAECIDAE
      - CAECUM PULCHELLUM
      - CAECUM STRIGOSUM
    - FAMILY DIASTOMIDAE
      - DIASTOMA VARIUM
    - FAMILY CERITHIIDAE
      - CERITHIOPSIS GREENI
      - CERITHIUM EBURNEUM
      - SEILA ADAMSI
    - FAMILY CALYPTRAEIDAE
      - CREPIDULA MACULOSA
      - CREPIDULA PLANA
  - ORDER NEOGASTROPODA
    - FAMILY PYRENIDAE
      - ANACHIS OBESA.OSTREICOLA
      - MITRELLA LUNATA
    - FAMILY OLIVIDAE
      - OLIVELLA SPP.
  - ORDER PYRAMIDELLACEA
    - FAMILY PYRAMIDELLIDAE
      - ODOSTOMIA IMPRESSA
      - TURBONILLA SPP.
  - ORDER CEPHALASPIDEA
    - FAMILY ACTEOCINIDAE
      - ACTEOCINA CANALICULATA
  - ORDER BASOMMATOPHORA
    - FAMILY ELLOBIIDAE
      - MELAMPUS BIDENTATUS
  - ORDER APLYSIACEA
      - NUDIBRANCHIA SPP.
    - FAMILY STILIGERIDAE
      - STILIGER(ERCOLANIA) SP.

TABLE 6.5-2 OYSTER REEF ASSOCIATED FAUNA TAXA LIST.

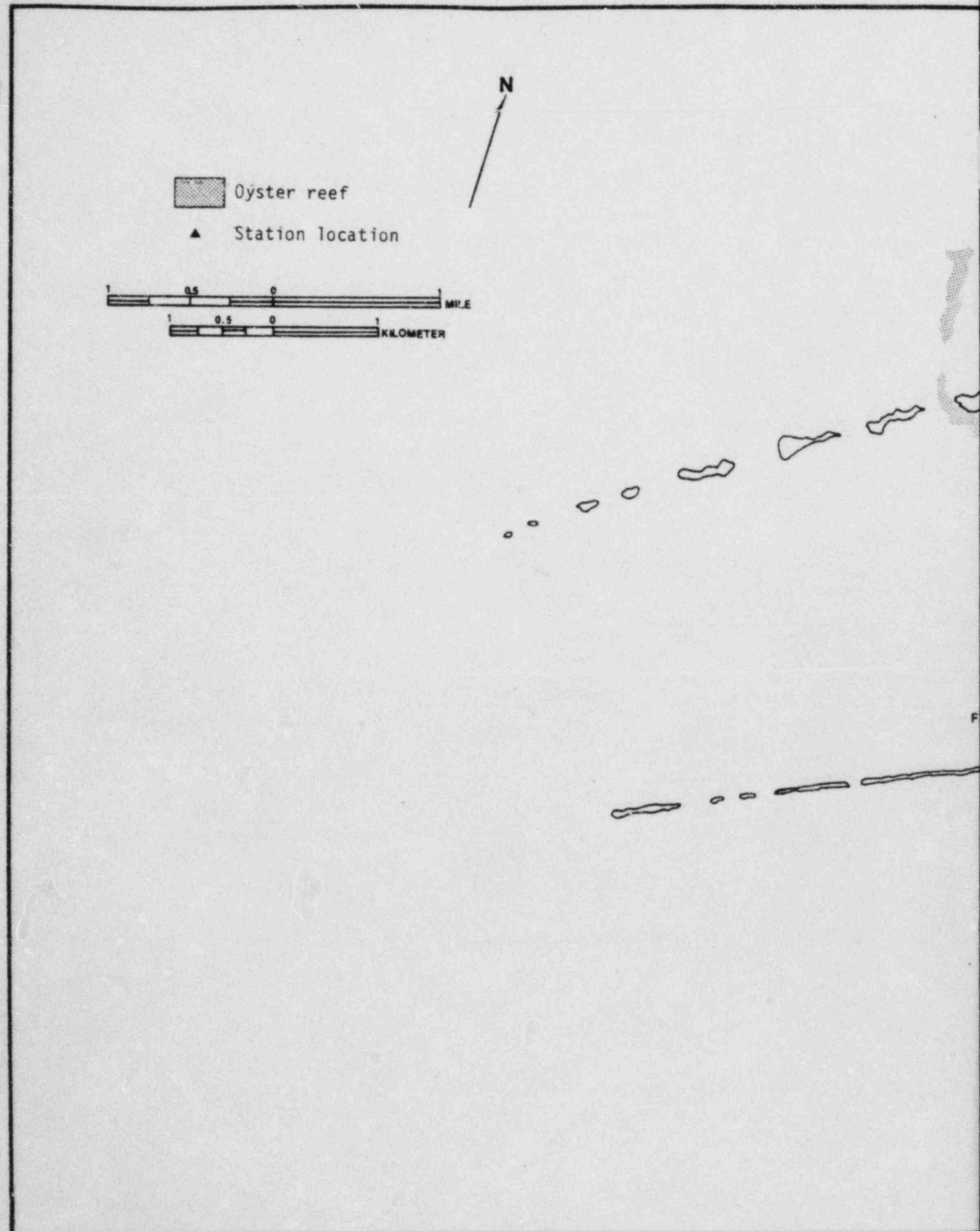
FAMILY AEOLIDIIDAE
BERGHIA SP.A
CLASS POLYPLACOPHORA
CLASS BIVALVIA
ORDER MYTILOIDEA
FAMILY MYTILIDAE
BRACHIDONTES EXUSTUS
GEUKENSIA DEMISSA.GRANOSISSIMA
ISCHADIUM RECURVUM
MUSCULUS LATERALIS
FAMILY OSTREIDAE
CRASSOSTREA VIRGINICA
FAMILY MONTACUTIDAE
MYSELLA PLANULATA
ORDER VENEROIDEA
FAMILY CARDIIDAE
PHYLUM ARTHROPODA
CLASS ARACHNIDA
ORDER ACARINA
HYDRACARINA SPP.
SUBPHYLUM CRUSTACEA
CLASS COPEPODA
CLASS BRANCHIURA
ORDER ARGULIDEA
FAMILY ARGULIDAE
ARGULUS SPP.
CLASS CIRREPEDIA
ORDER THORACICA
FAMILY CHTHAMALIDAE
CHTHAMALUS FRAGILIS
FAMILY BALANIDAE
BALANUS AMPHITRITE
BALANUS EBURNEUS
BALANUS IMPROVISUS
BALANUS VENUSTUS
SEMIBALANUS BALANOIDES
CLASS MALACOSTRACA
SUPERORDER PERACARIDA
ORDER CUMACEA
FAMILY NANNASTACIDAE
CUMELLA SP.B
FAMILY BODOTRIIDAE
CYCLASPIS SP.A
CYCLASPIS SP.B
ORDER TANAIDACEA
FAMILY APSEUDIDAE
HALMYRAPSEUDES CF.CUBANENSIS
FAMILY TANAIDAE
TANAIS CAVOLINII
FAMILY PARATANAIDAE
HARGERIA RAPAX
ORDER ISOPODA
FAMILY ANTHURIDAE
ANTHURIDAE SP.A
PANANTHURA FORMOSA
FAMILY CIROLANIDAE
CIROLANA SP.
FAMILY SPHAEROMATIDAE
CYMODOCE FAXONI
PARACERCEIS CAUDATA
FAMILY EXCORALLANIDAE
EXCORALLANA SPP.
EXCORALLANA QUADRICORNIS
EXCORALLANA TRICORNIS
ORDER AMPHIPODA
SUBORDER GAMMARIDEA

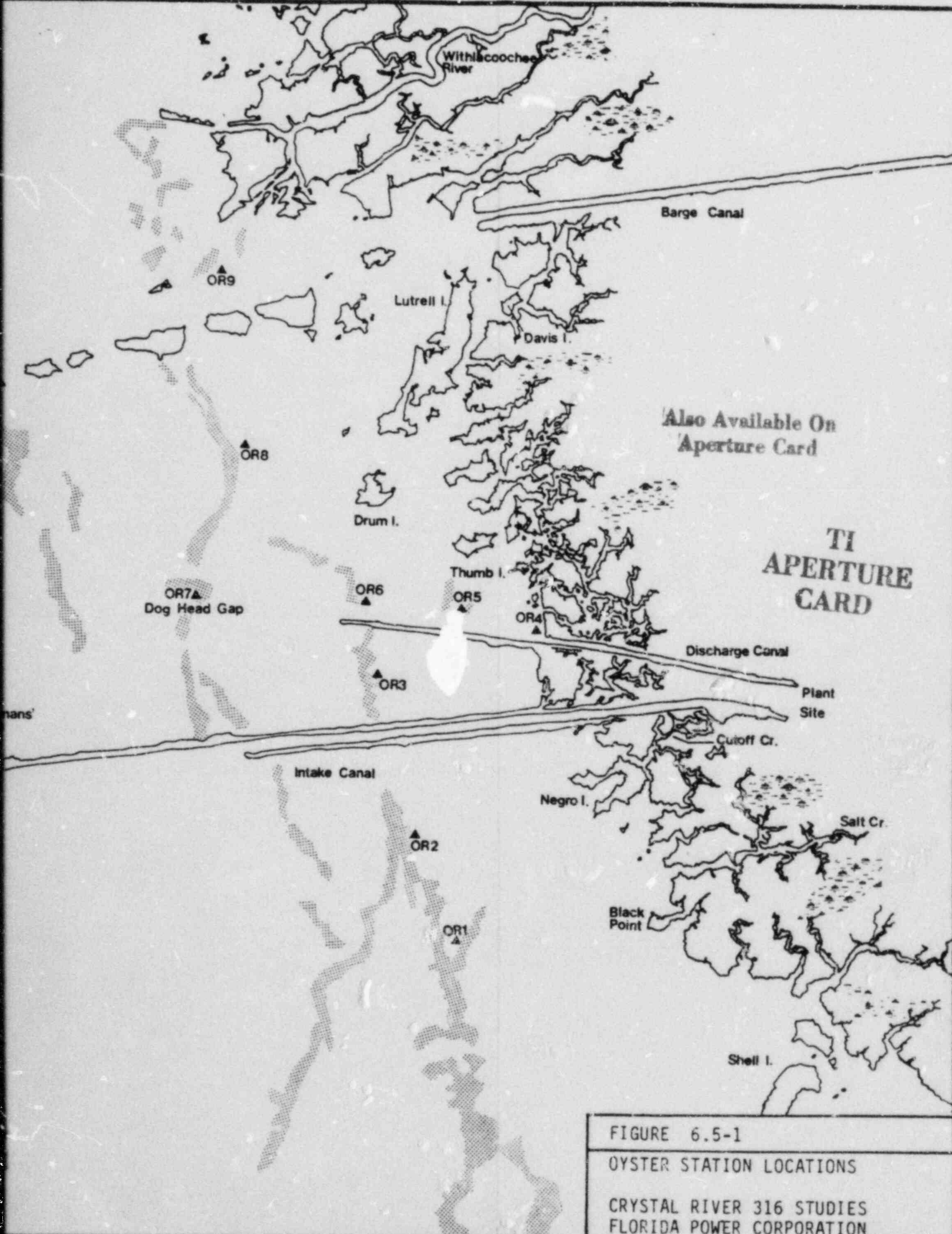
TABLE 6.5-2 OYSTER REEF ASSOCIATED FAUNA TAXA LIST.

FAMILY AMPHILOCHIDAE
GITANOPSIS SPP.
FAMILY AMPITHOILAE
CYMADUSA COMPTA
FAMILY AORIDAE
LEMBOS SMITHI
MICRODEUTOPUS MYERSI
FAMILY BATEIDAE
BATEA CF.CATHARINENSIS
FAMILY COLOMASTIGIDAE
COLOMASTIX HALICHONDRIAE
FAMILY COROPHIIDAE
COROPHIUM SPP.
COROPHIUM ACHERUSICUM
COROPHIUM LACUSTRE
COROPHIUM SIMILE
COROPHIUM TUBERCULATUM
COROPHIUM ACUTUM
COROPHIUM LOUISIANUM
ERICTHONIUS SPP.
ERICTHONIUS BRASILIENSIS
GRANDIDIERELLA BONNIEROIDES
FAMILY GAMMARIDAE
ELASMOPUS LEVIS
GAMMARUS MUCRONATUS
GAMMARIDAE SP. A
GAMMARIDAE SP. B
MAERA CF.WILLIAMSI
MELITA "COMPLEX"
MELITA APPENDICULATA
FAMILY HYALIDAE
HYALE SP.B=CF.PLUMOSA
FAMILY LEUCOTHOIDAE
LEUCOTHOE CF.SPINICARPA
FAMILY LYSIANASSIDAE
LYSIANOPSIS CF.ALBA
FAMILY PODOCERIDAE
PODOCERUS SPP.
FAMILY STENOTHOIDAE
STENOTHOE SPP.
STENOTHOE CF.GALLENSIS
STENOTHOE CF.MINUTA
FAMILY TALITRIDAE
ORCHESTIA UHLERI
SUBORDER CAPRELLIDEA
FAMILY CAPRELLIDAE
CAPRELLA SPP.
CAPRELLA EQUILIBRA
CAPRELLA PENANTIS
PARACAPRELLA TENUIS
PARACAPRELLA PUSILLA
HEMIAEGINA MINUTA
ORDER DECAPODA
SUBORDER PLEOCYEMATA
CARIDEA SPP.
BRACHYURA SPP.
FAMILY PALAEMONIDAE
PERICLIMENES LONGICAUDATUS
PALAEMON FLORIDANUS
FAMILY ALPHEIDAE
ALPHEUS ARMILLATUS
SUBORDER REPTANTIA
FAMILY CALLIANASSIDAE
UPOGEBIA AFFINIS
FAMILY PAGURIDAE
PAGURUS MACLAUGHLINAE

TABLE 6.5-2 OYSTER REEF ASSOCIATED FAUNA TAXA LIST.

PAGURUS STIMPSONI
FAMILY PORCELLANIDAE
PETROLISTHES ARMATUS
FAMILY XANTHIDAE
EURYPANOPEUS DEPRESSUS
PANOPEUS HERBSTII
MENIPPE MERCENARIA
FAMILY GRAPSIDAE
SESARMA CINEREUM
CLASS INSECTA
ORDER COLLEMBOLA
FAMILY PODURIDAE
ANURIDA MARTIMA
FAMILY ISOTOMIDAE
ORDER THYSANOPTERA
ORDER DIPTERA
FAMILY CHIRONOMIDAE
PHYLUM SIPUNCULA
PHYLUM CHORDATA
SUBPHYLUM UROCHORDATA
CLASS ASCIDIACEA
FAMILY CLAVELINIDAE
DISTAPLIA BERMUDENSIS
POLYCITORINAE
FAMILY STYELIDAE
STYELA PARTITA
FAMILY MOGULIDAE
SUBPHYLUM VERTEBRATA
CLASS OSTEICHTHYES
FAMILY BATRACHOIDIDAE
OPSANUS BETA
FAMILY GOBIESOCIDAE
GOBIESOX STRUMOSUS
FAMILY BLENNIIDAE
HYPSOBLENNIUS HENTZI
CHASMODES SABURRAE
FAMILY GOBIIDAE
GOBIOSOMA ROBUSTUM


N
Oyster reef
Station location
1 0.5 0 1 MILE
1 0.5 0 1 KILOMETER



Also Available On Aperture Card

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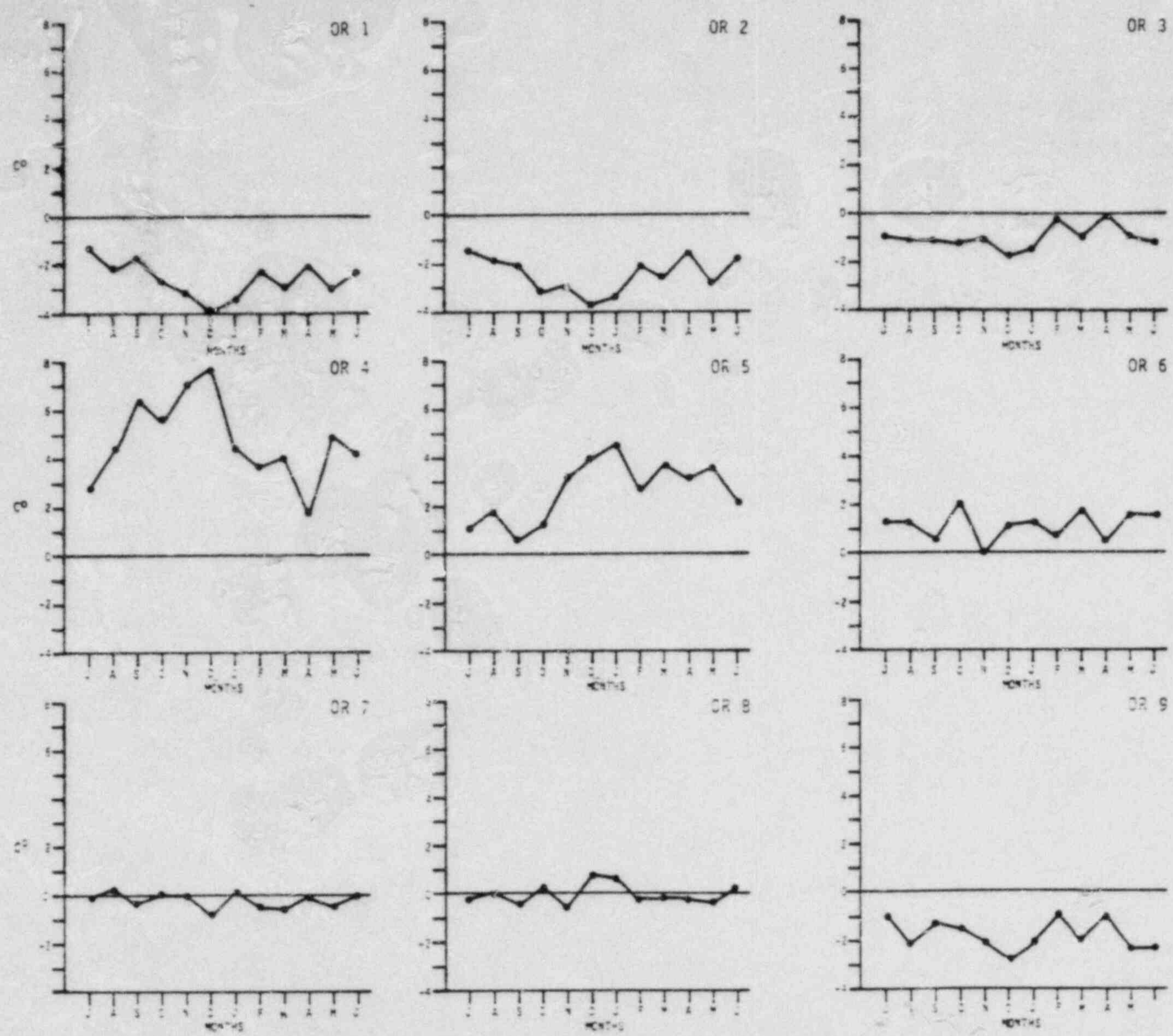
FIGURE 6.5-1

OYSTER STATION LOCATIONS

CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

8502120246-15

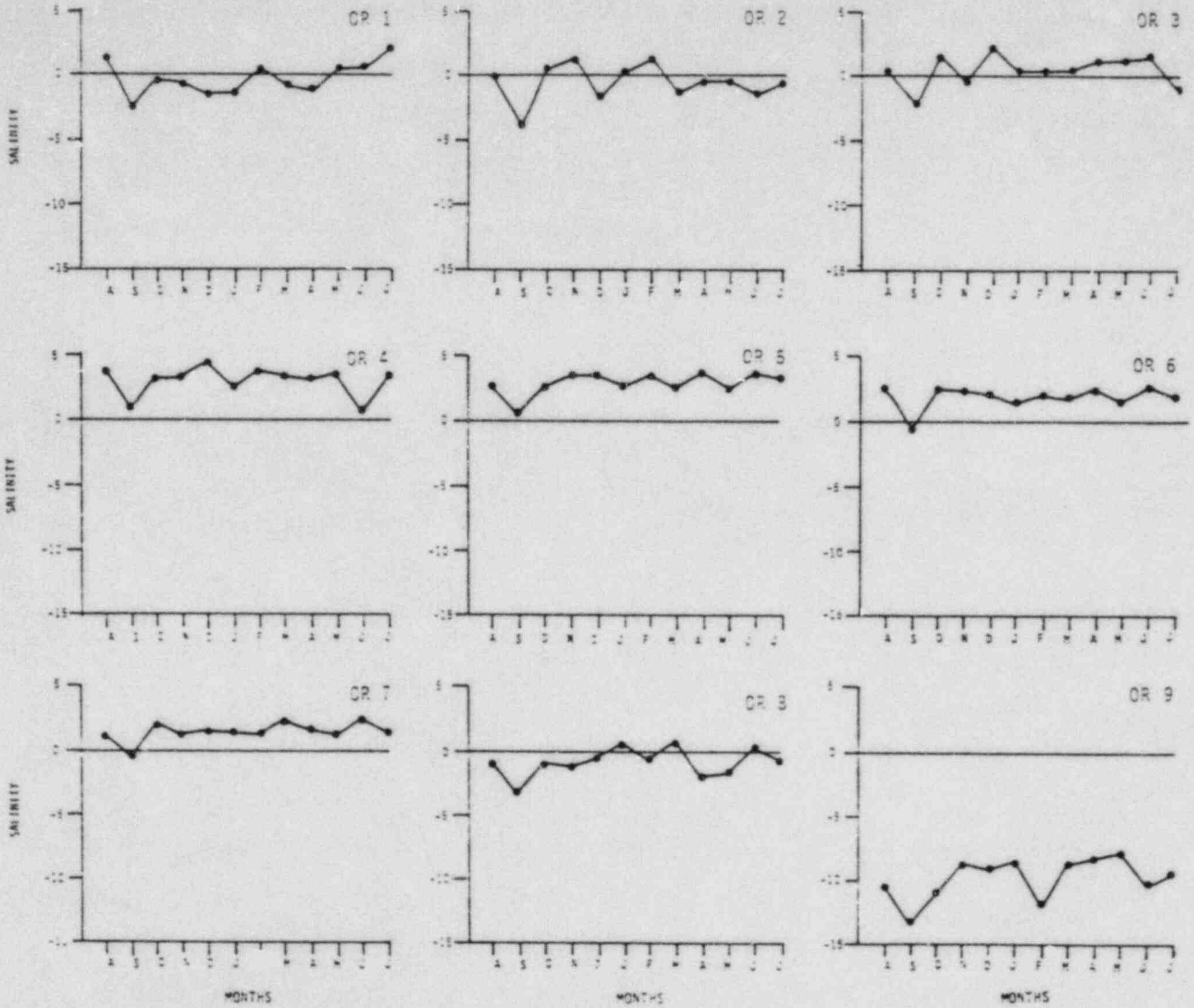


Variations from the mean temperature at each oyster station. The mean (0-line) is the mean of all stations each month.

FIGURE 6.5-2

OYSTER STATIONS, TEMPERATURES

CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

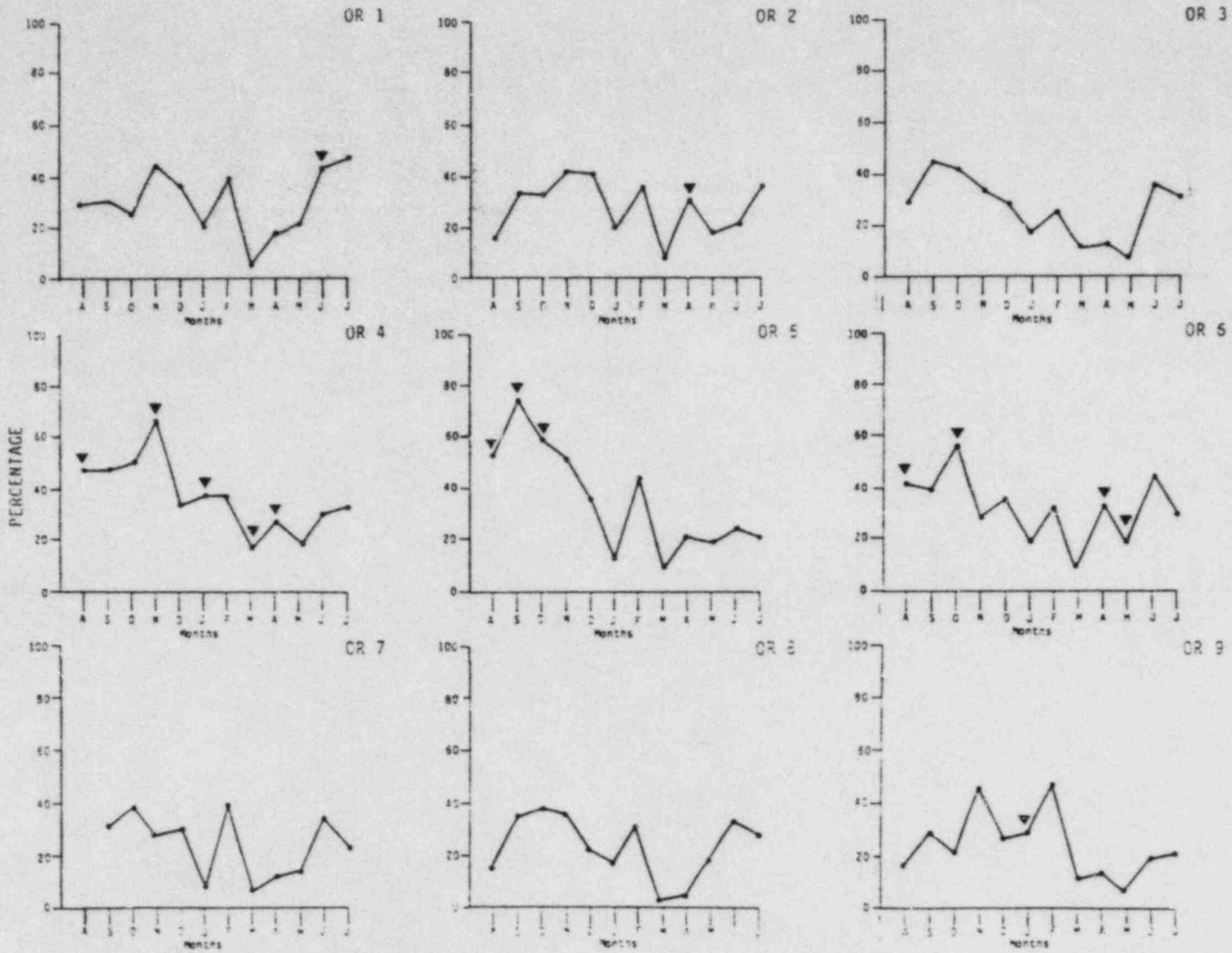


Variations from the mean salinity at each oyster station. The mean (0-line) is the mean of all stations each month.

FIGURE 6.5-3

OYSTER STATIONS, SALINITIES

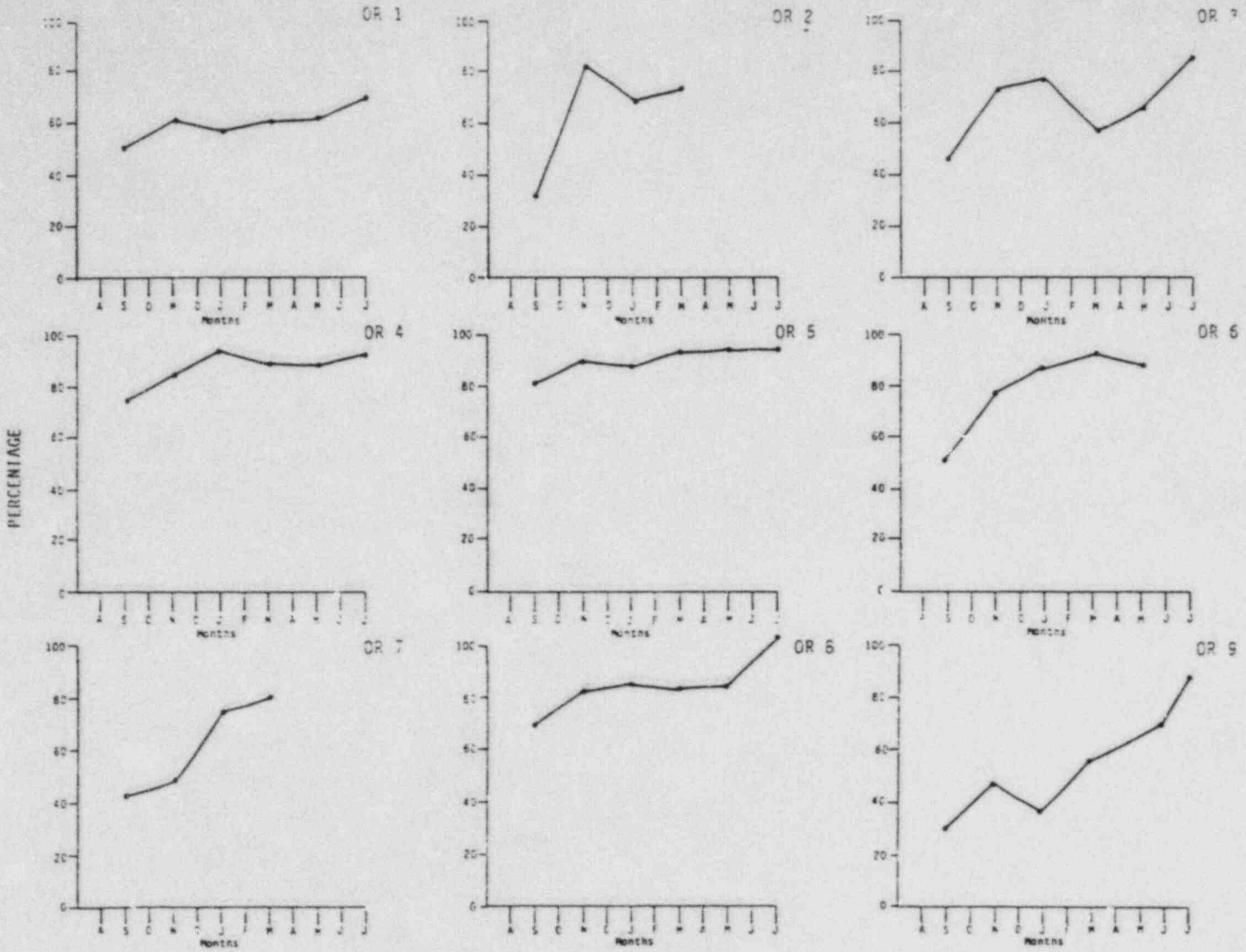
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Percent mortality of oysters at each station and collection date (Short Term Oyster Study). Symbols (▼) indicate mortality significantly higher than the mean for that collection date.

FIGURE 6.5-4

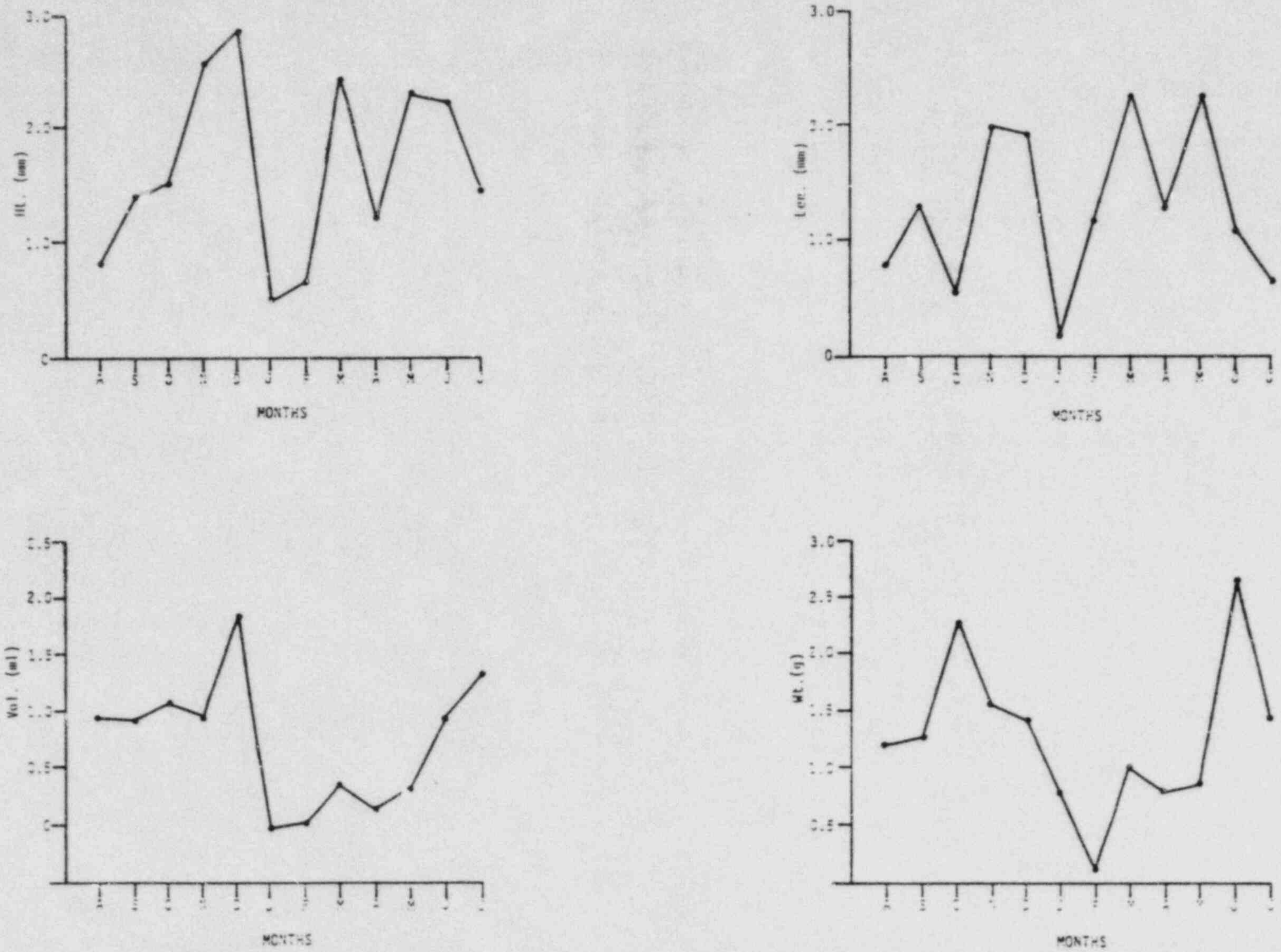
OYSTER MORTALITY, SHORT TERM STUDY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Percent mortality of oysters at each station and collection date (Long Term Oyster Study).

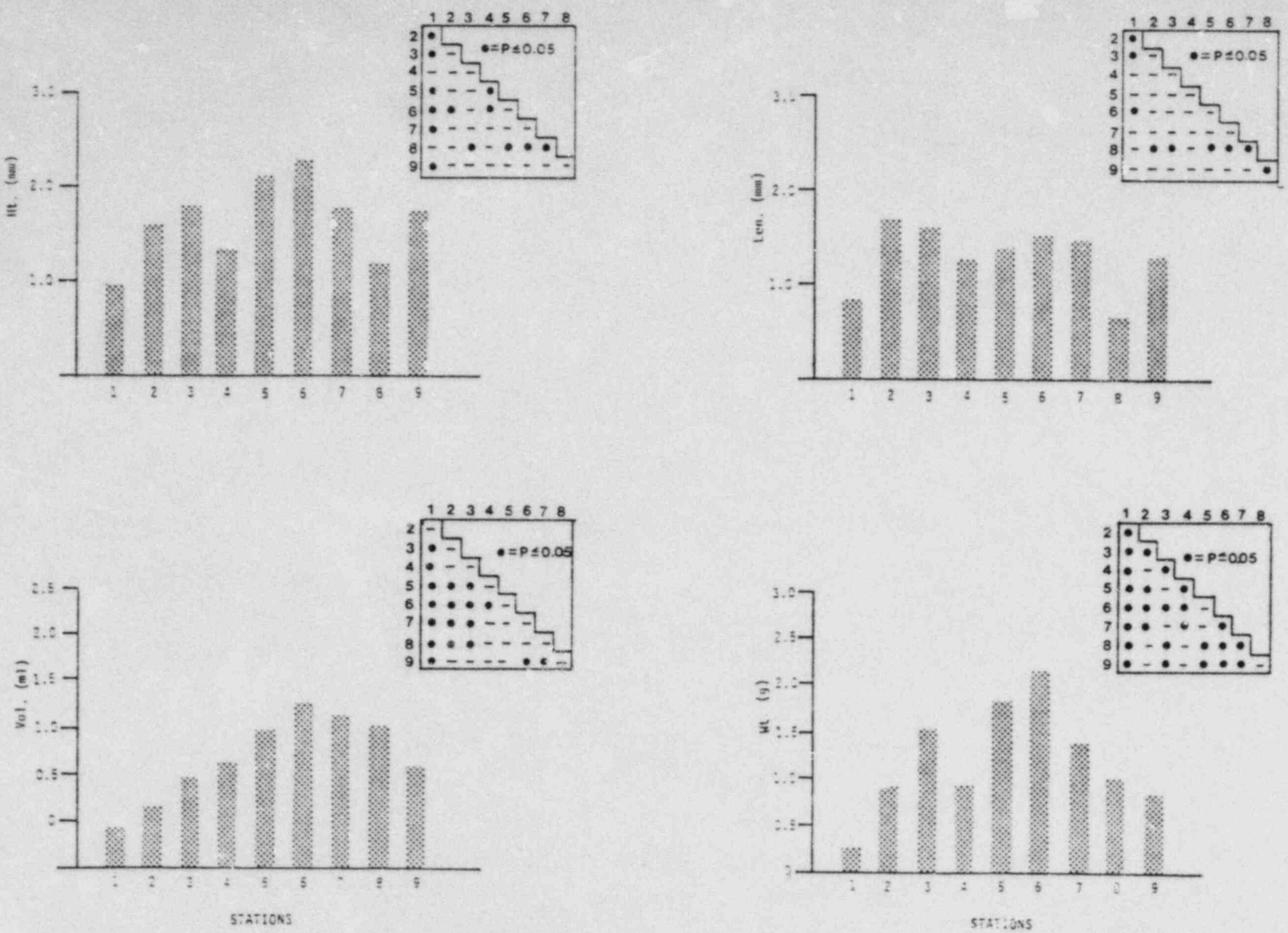
FIGURE 6.5-5

OYSTER MORTALITY, LONG TERM STUDY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



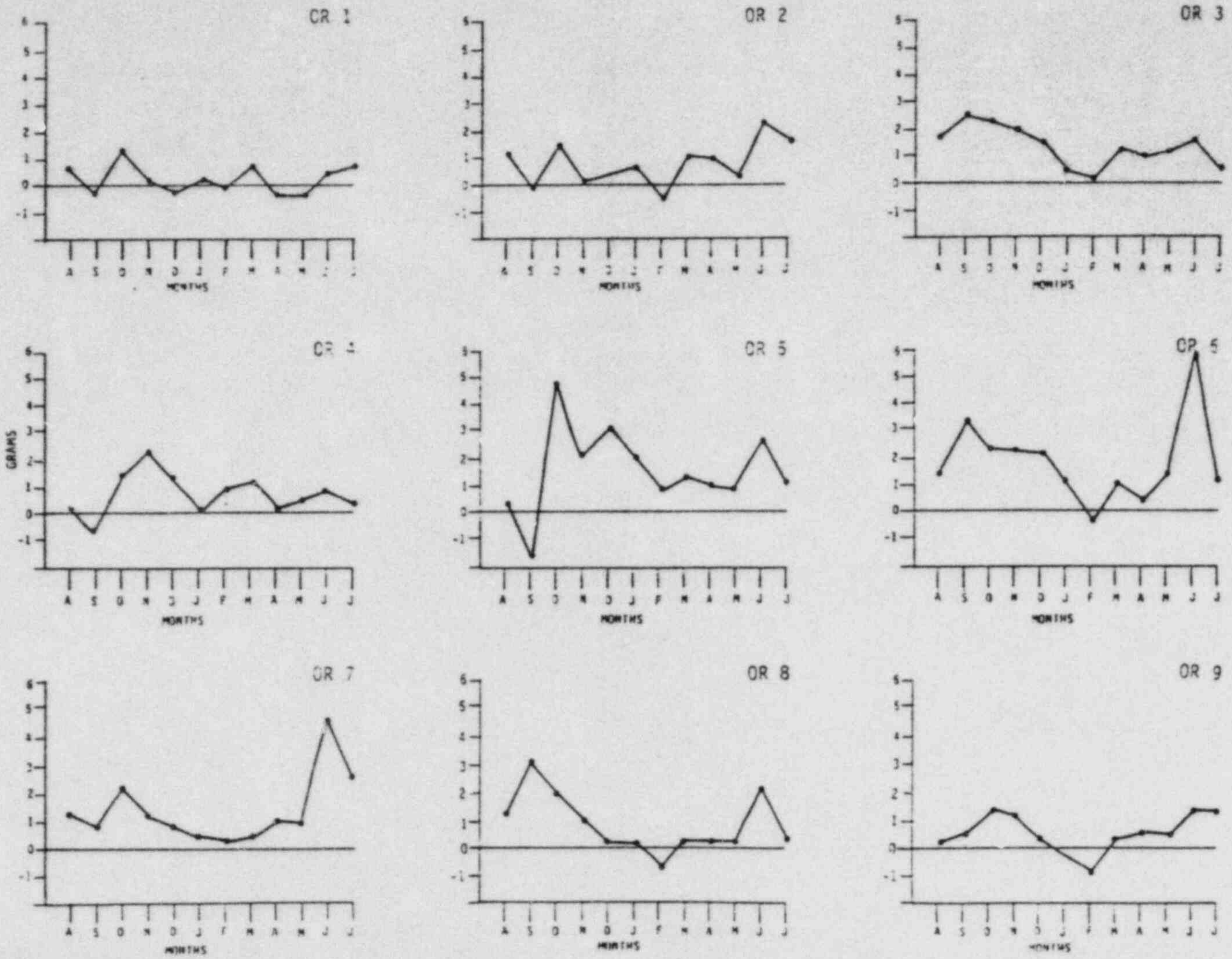
Mean monthly growth (height, length, volume and weight) of oysters at each collection date (Short Term Oyster Study). All stations are combined.

FIGURE 6.5-6
OYSTER GROWTH BY DATE, SHORT TERM STUDY CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION



Mean monthly growth (height, length, volume and weight) of oysters at each station (Short Term Oyster Study). Significant differences are indicated on insets (Tukey's Studentized Range (HSD) Test).

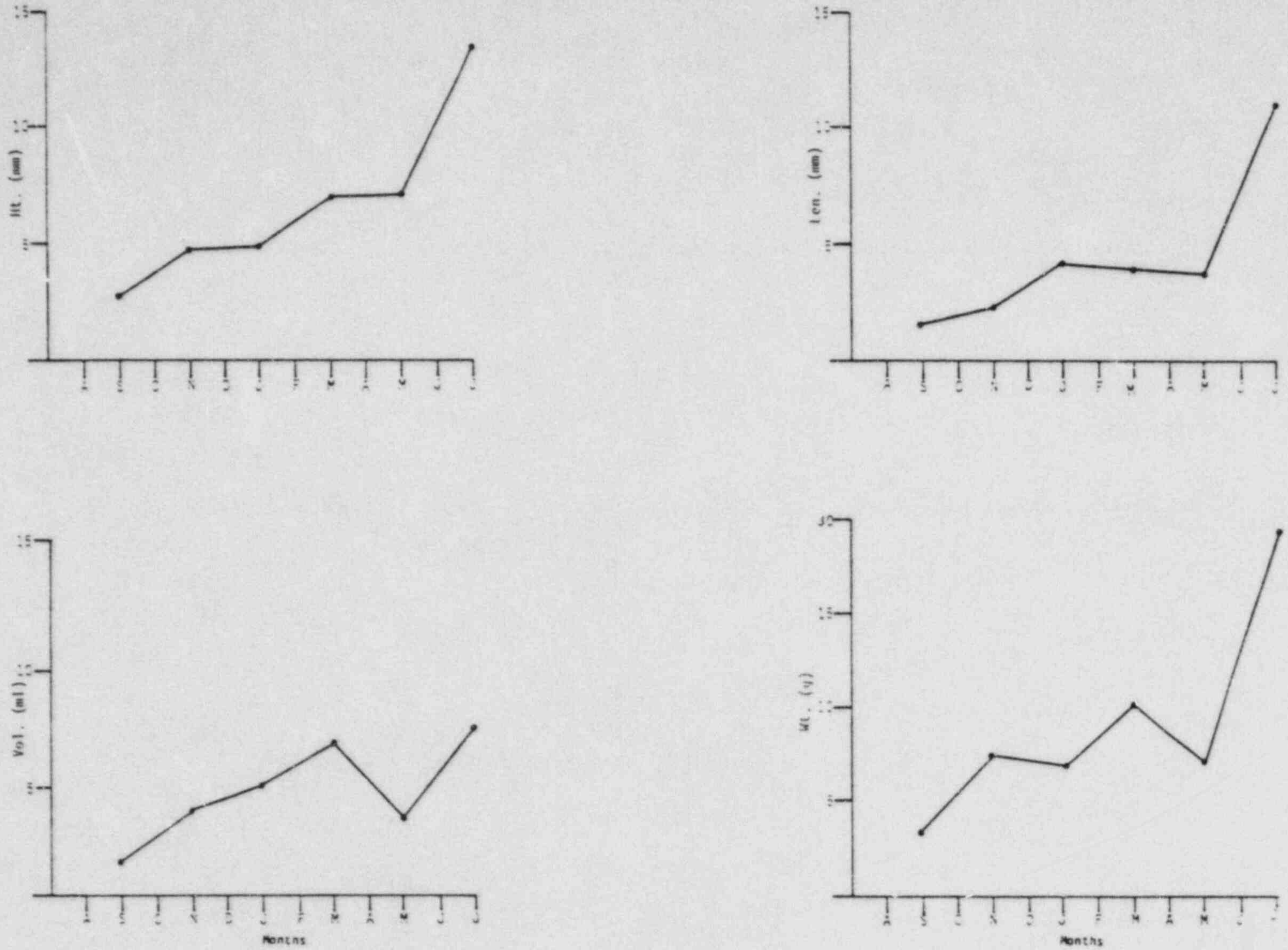
FIGURE 6.5-7
OYSTER GROWTH BY STATION, SHORT TERM STUDY CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION



Mean weight change of oysters deployed and collected monthly in oyster growth study (Short Term Oyster Study).

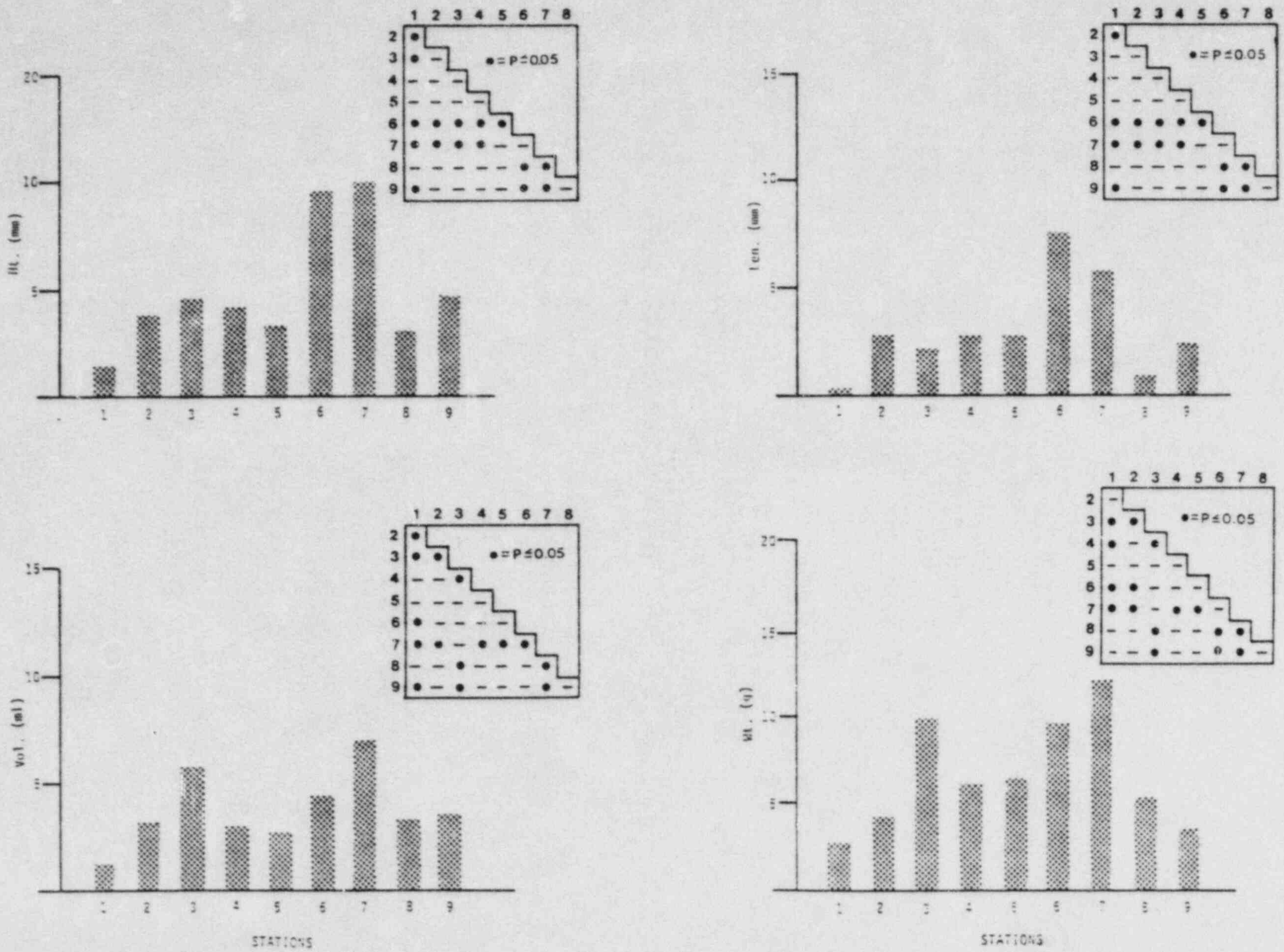
FIGURE 6.5-8

OYSTER WEIGHT CHANGES, SHORT TERM STUDY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Mean growth (height, length, volume, weight) of oysters at each collection date. All stations are combined. (Long Term Study).

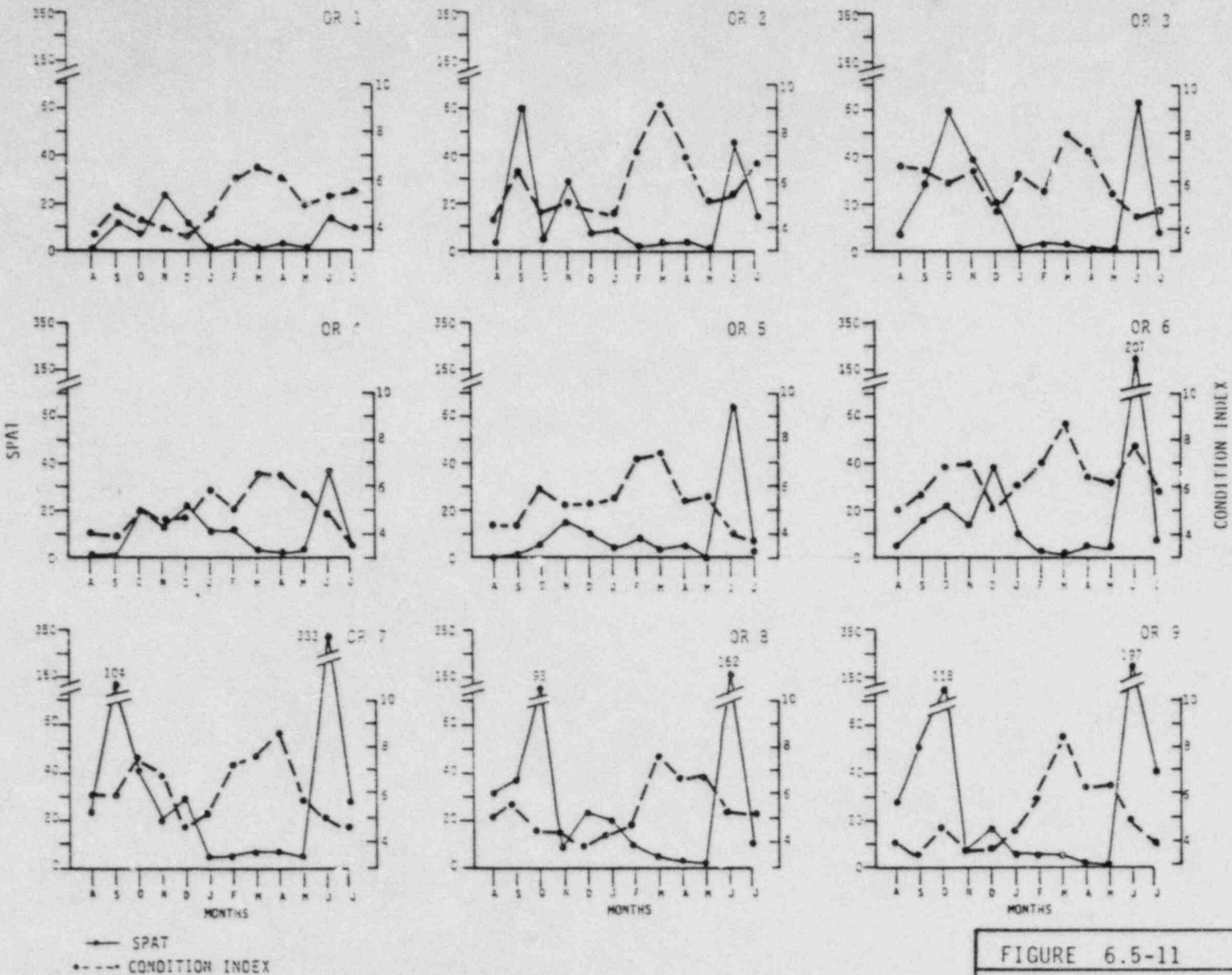
FIGURE 6.5-9
OYSTER GROWTH BY DATE, LONG TERM STUDY CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION



Mean monthly growth (height, length, volume and weight) of oysters at each station (Long Term Oyster Study). Significant differences are indicated on insets (Tukey's Studentized Range (HSD) Test).

FIGURE 6.5-10

OYSTER GROWTH BY STATION,
LONG TERM STUDY
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Number of spat on ten randomly selected oysters from each station each collection date in short term study. Superimposed is the mean Condition Index of oysters (short term study), each station each sampling.

FIGURE 6.5-11
OYSTER SPAT AND CONDITION INDEX
CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

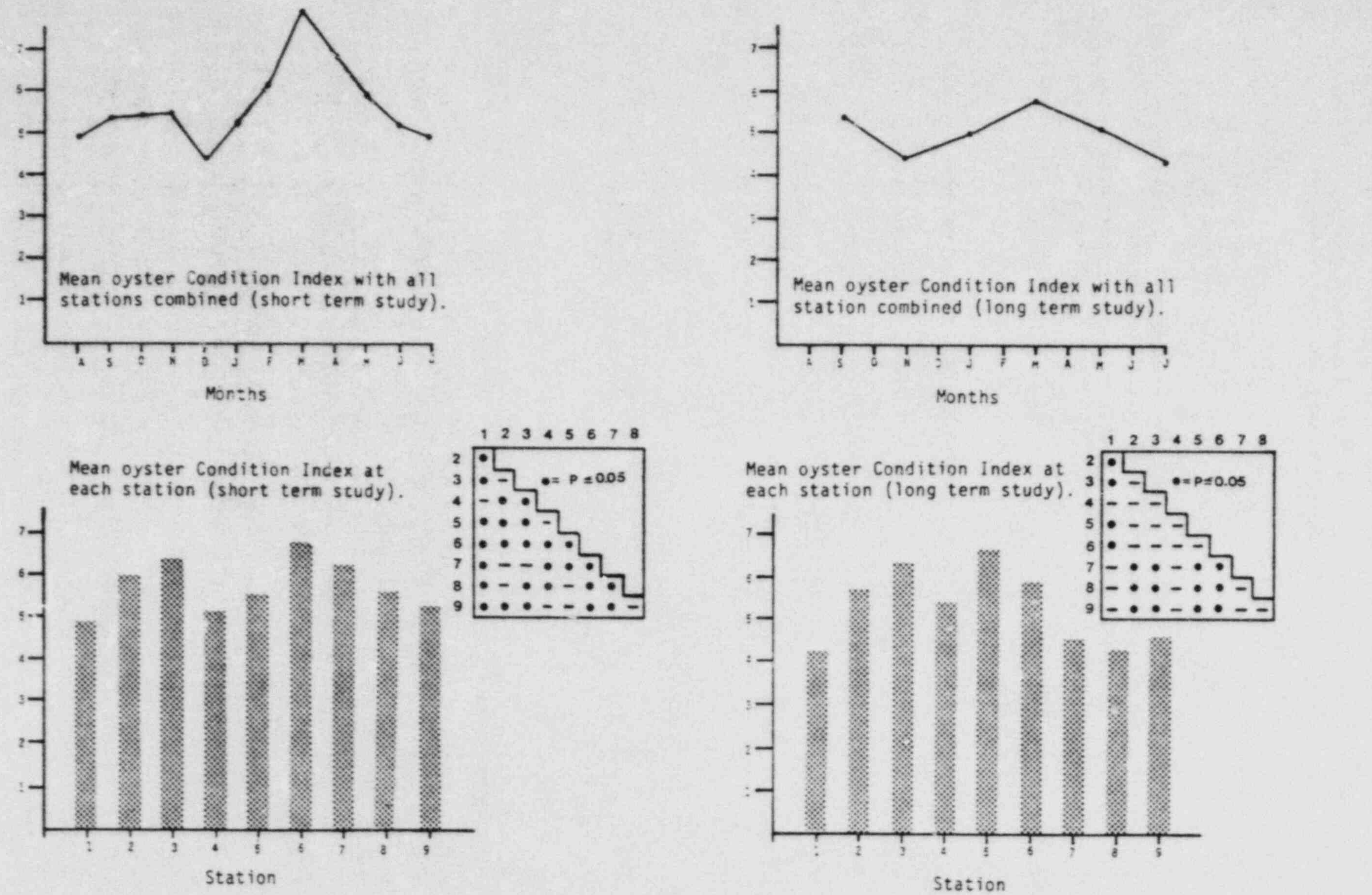
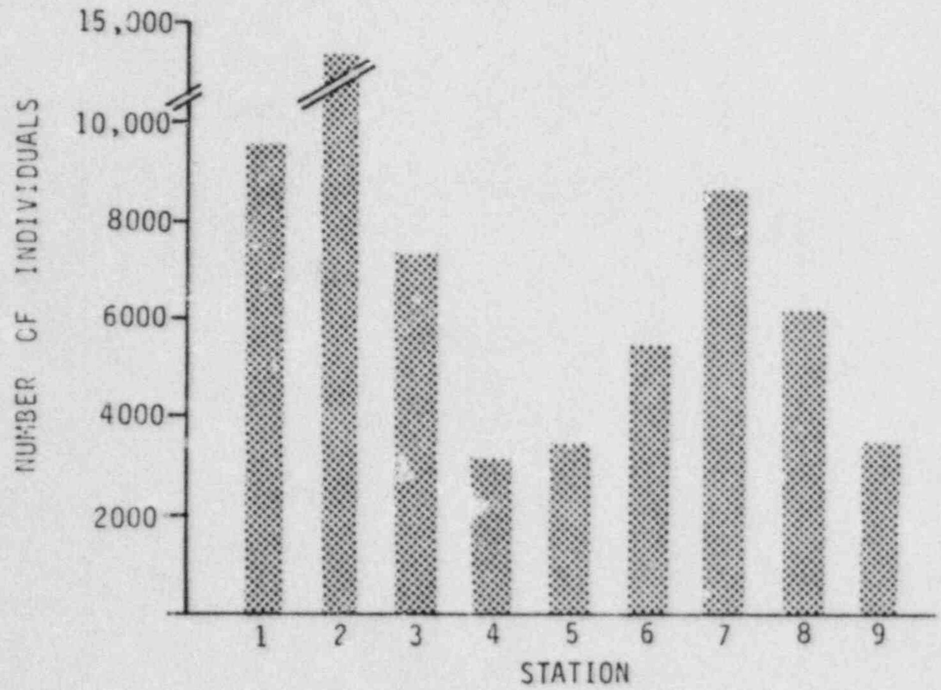


FIGURE 6.5-12

OYSTER CONDITION INDEX, BY DATE AND STATION
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

Total numbers of associated fauna collected at each station (top) and each sampling date (bottom).



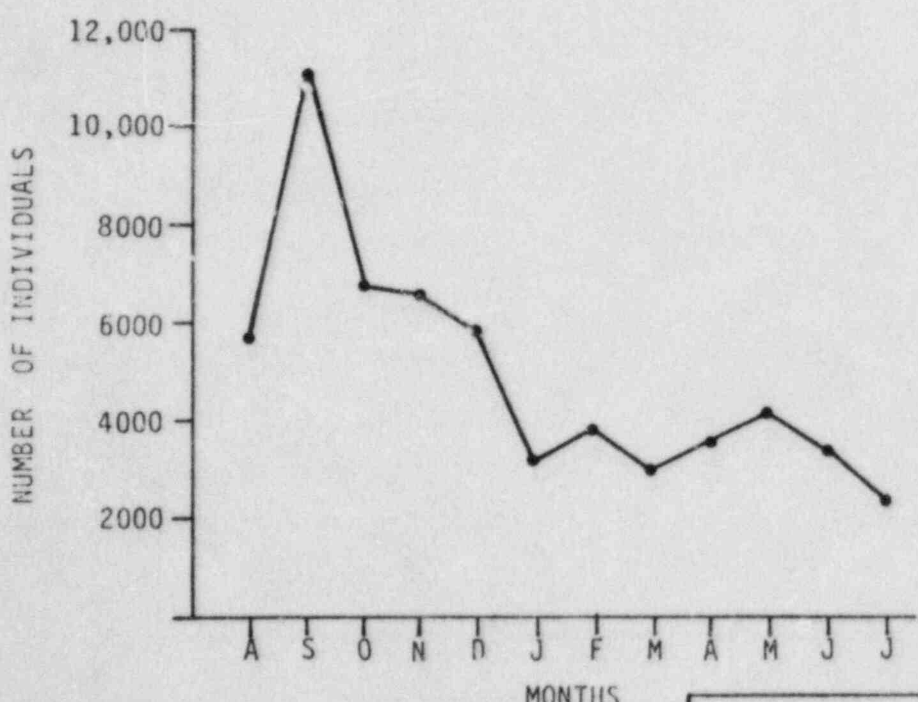
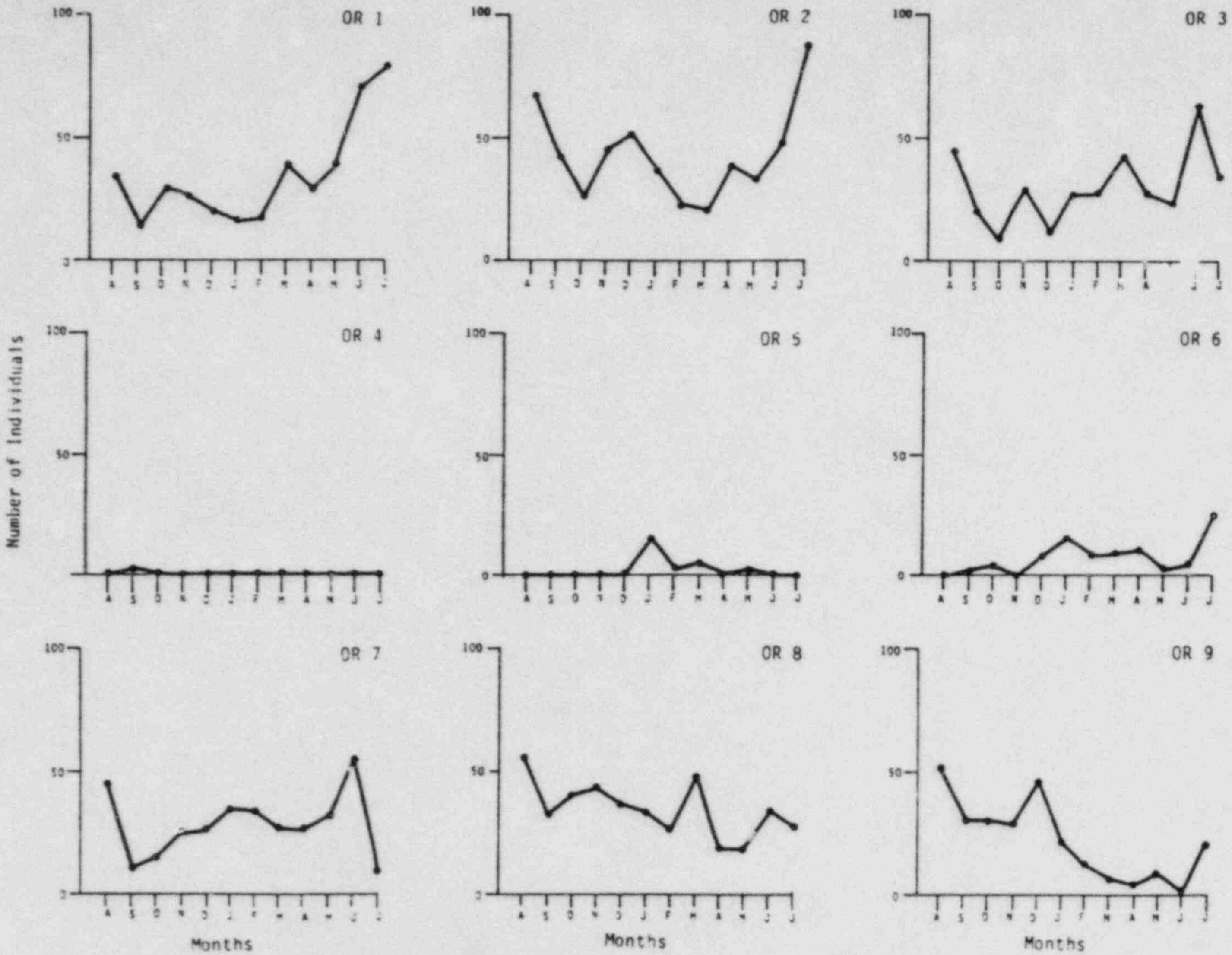


FIGURE 6.5-13

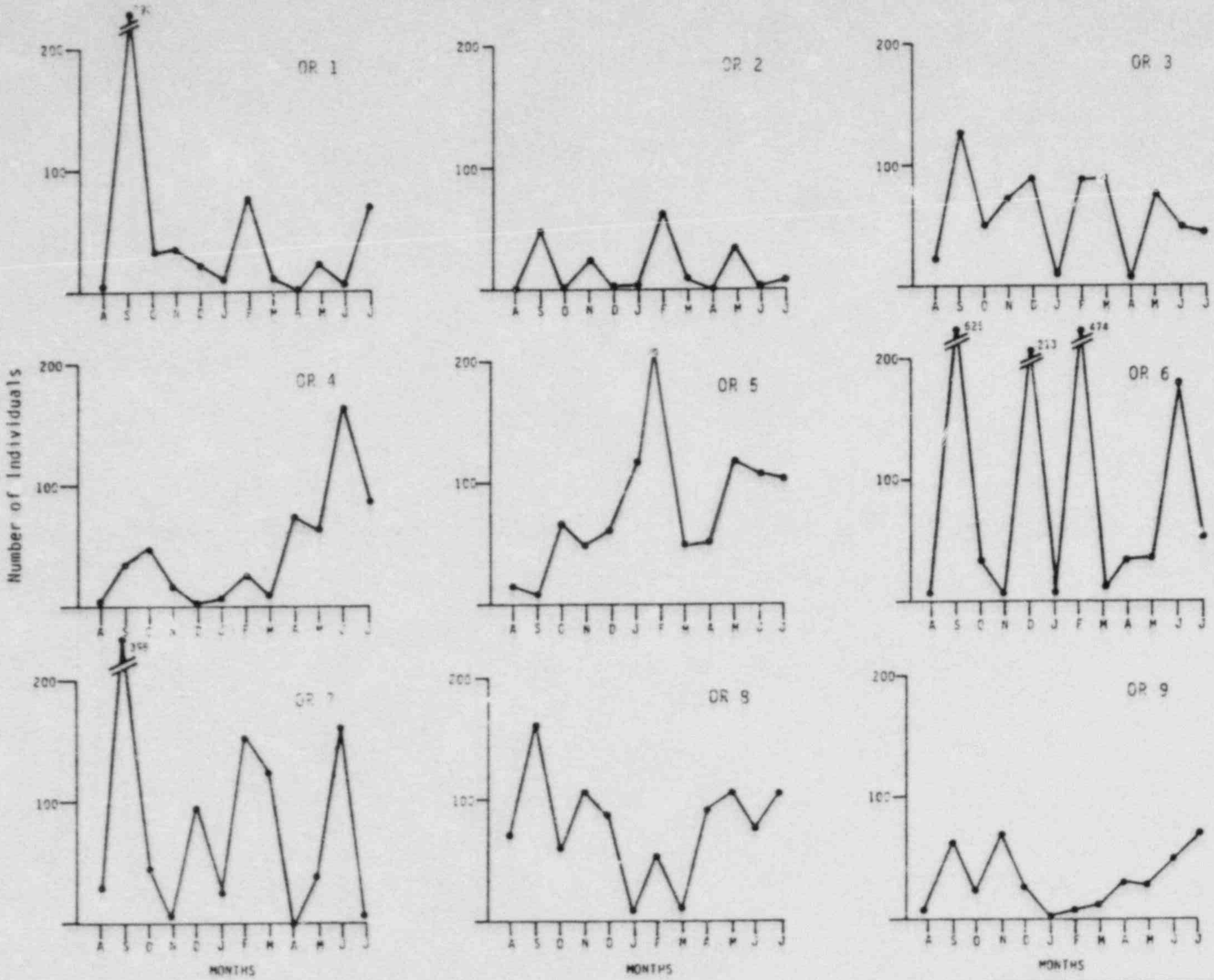
ABUNDANCE OF OYSTER REEF ASSOCIATED FAUNA
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Monthly abundances of Crassostrea virginica collected in three oyster clumps

FIGURE 6.5-14

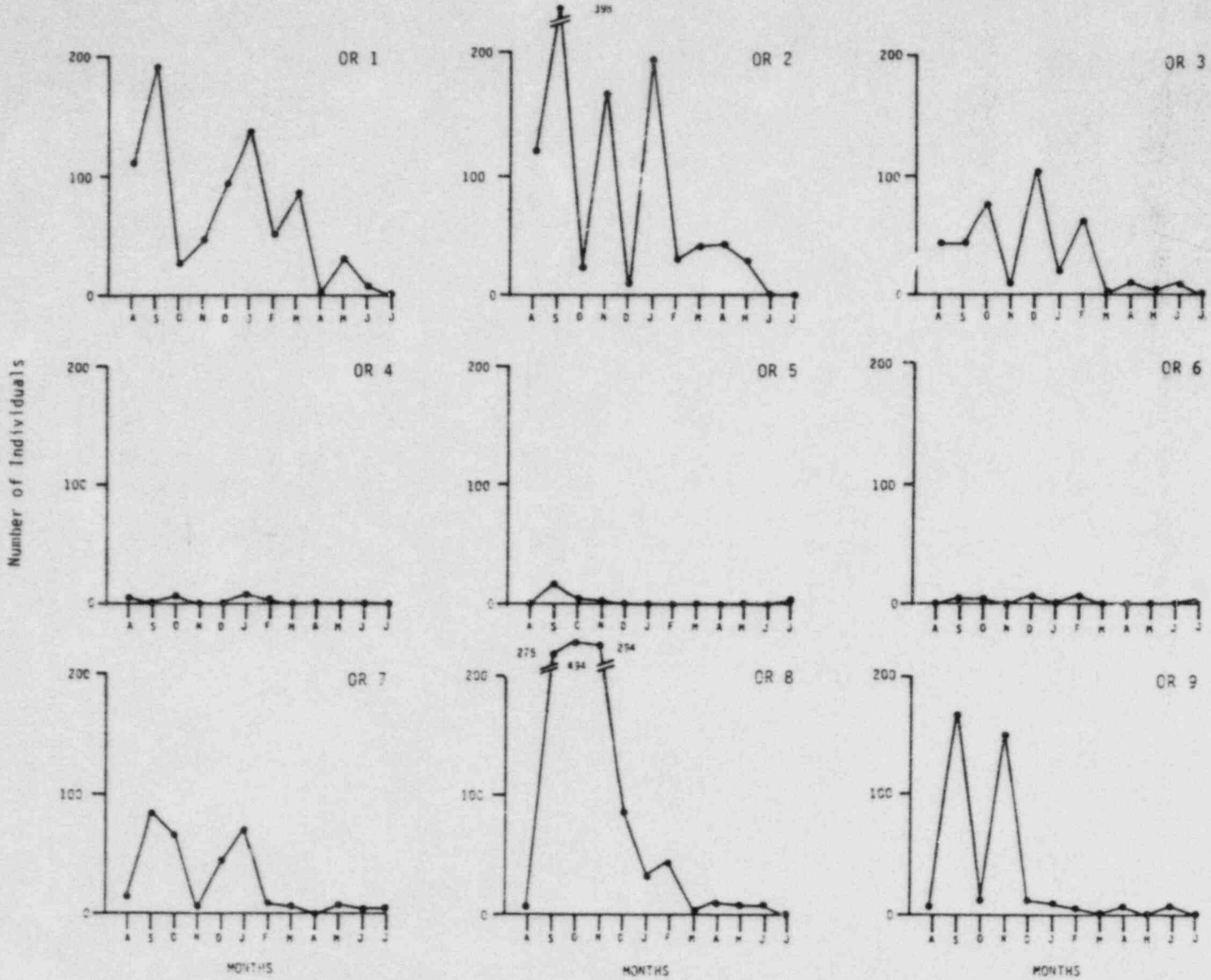
OYSTER REEF FAUNA-
Crassostrea virginica
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Monthly abundances of Mytilidae spp. collected in three oyster clumps

FIGURE 6.5-15

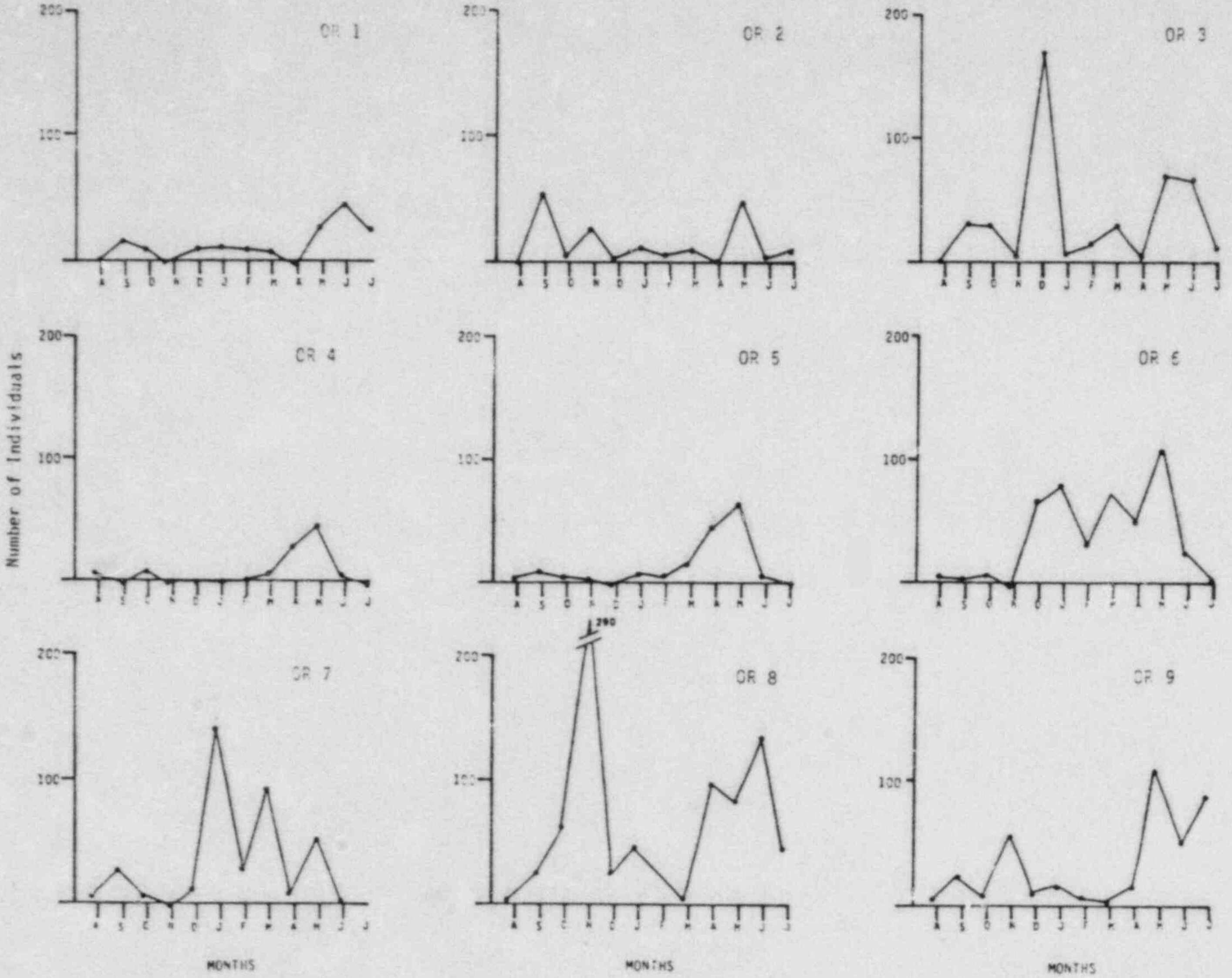
OYSTER REEF FAUNA-
Mytilidae spp.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Monthly abundances of Odostomia impressa collected in three oyster clumps.

FIGURE 6.5-16

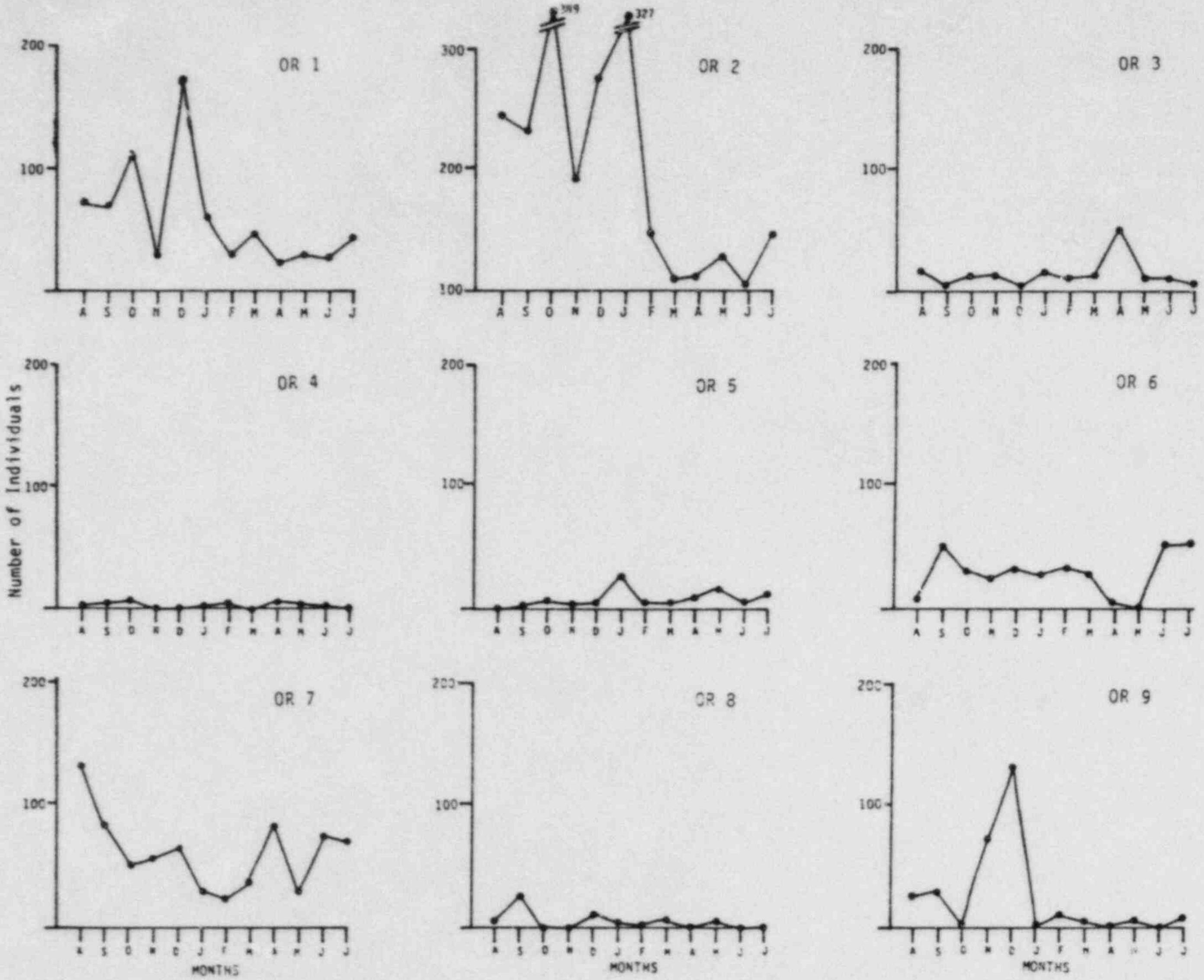
OYSTER REEF FAUNA-
Odostomia impressa
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Monthly abundances of Melita spp. collected in three oyster clumps

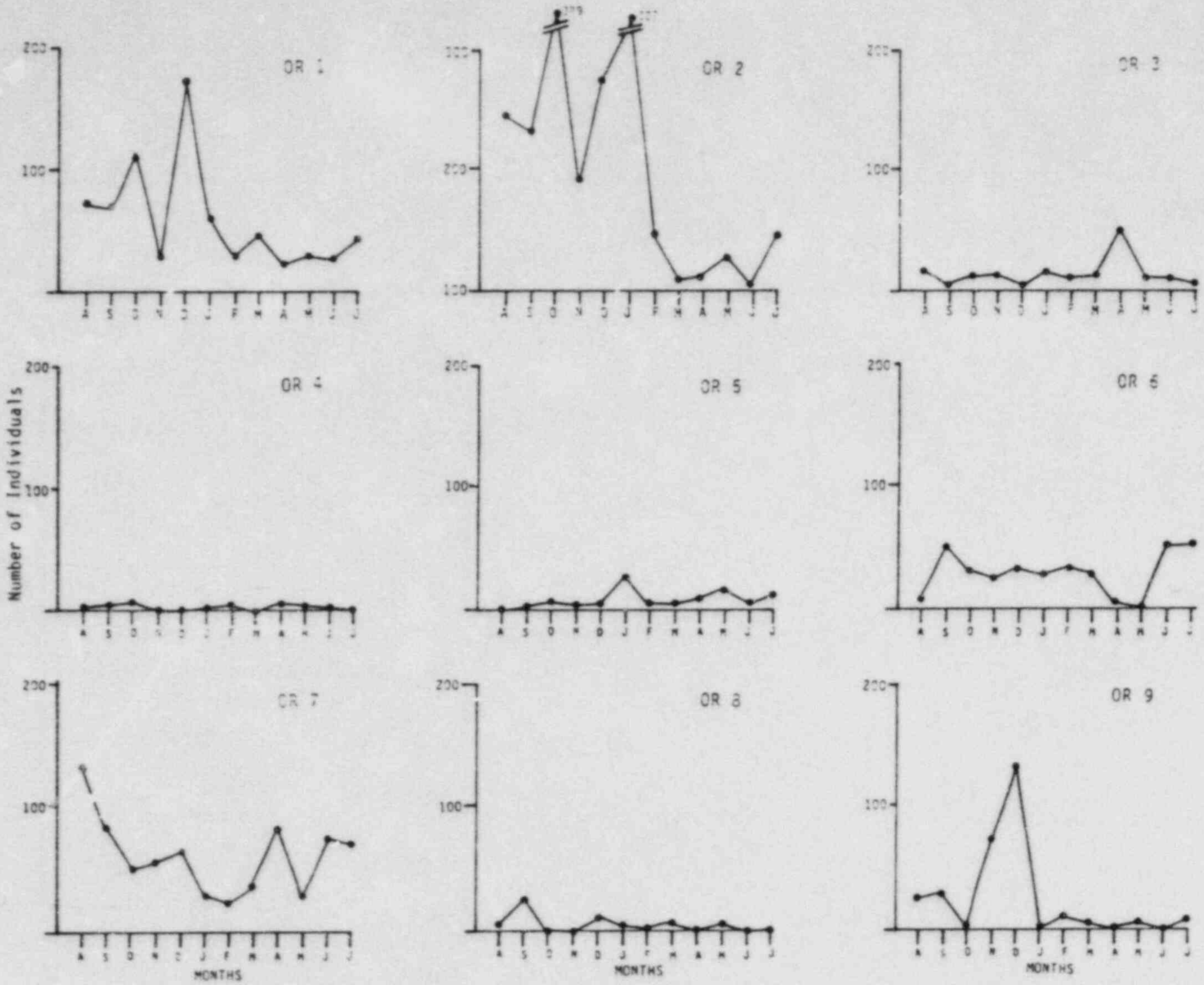
FIGURE 6.5-17

OYSTER REEF FAUNA-
Melita spp.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Monthly abundances of Polydora websteri collected in three oyster clumps

FIGURE 6.5-18
OYSTER REEF FAUNA- Polydora websteri CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

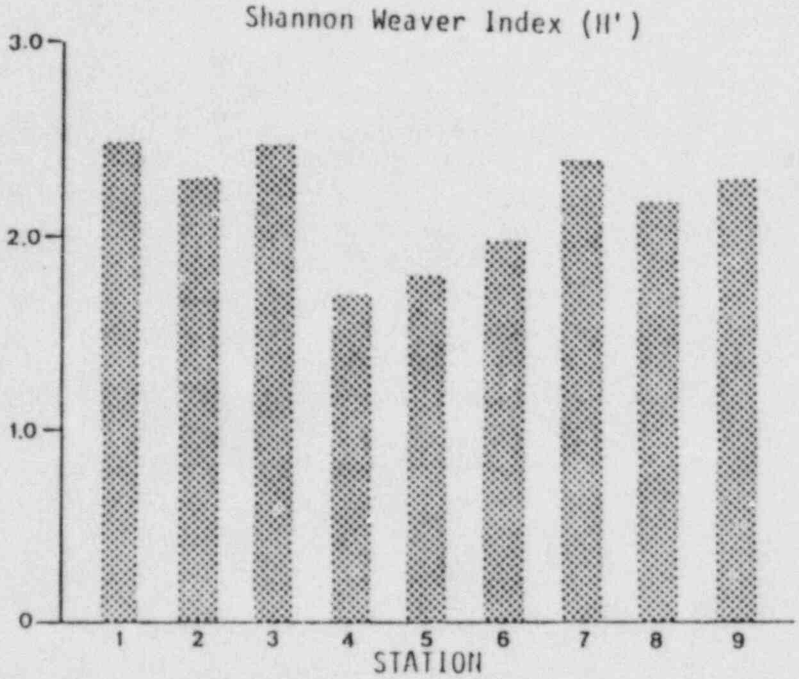


Monthly abundances of Platyhelminthes sp. A and sp. B collected in three oyster clumps.

FIGURE 6.5-19

OYSTER REEF FAUNA-Plathyhelminthes sp. A and sp. B
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

Mean values for species diversity (H') and evenness (J') for associated fauna by station.



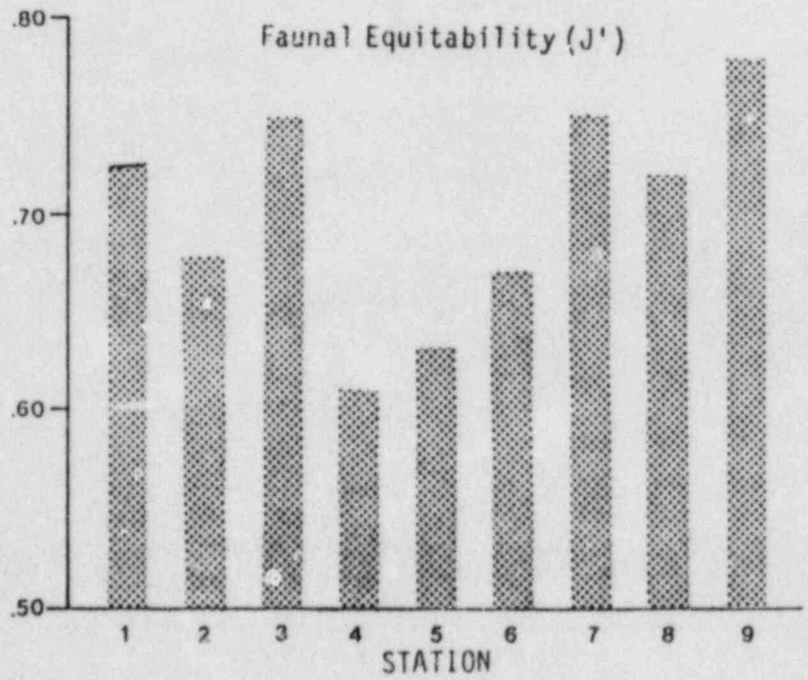
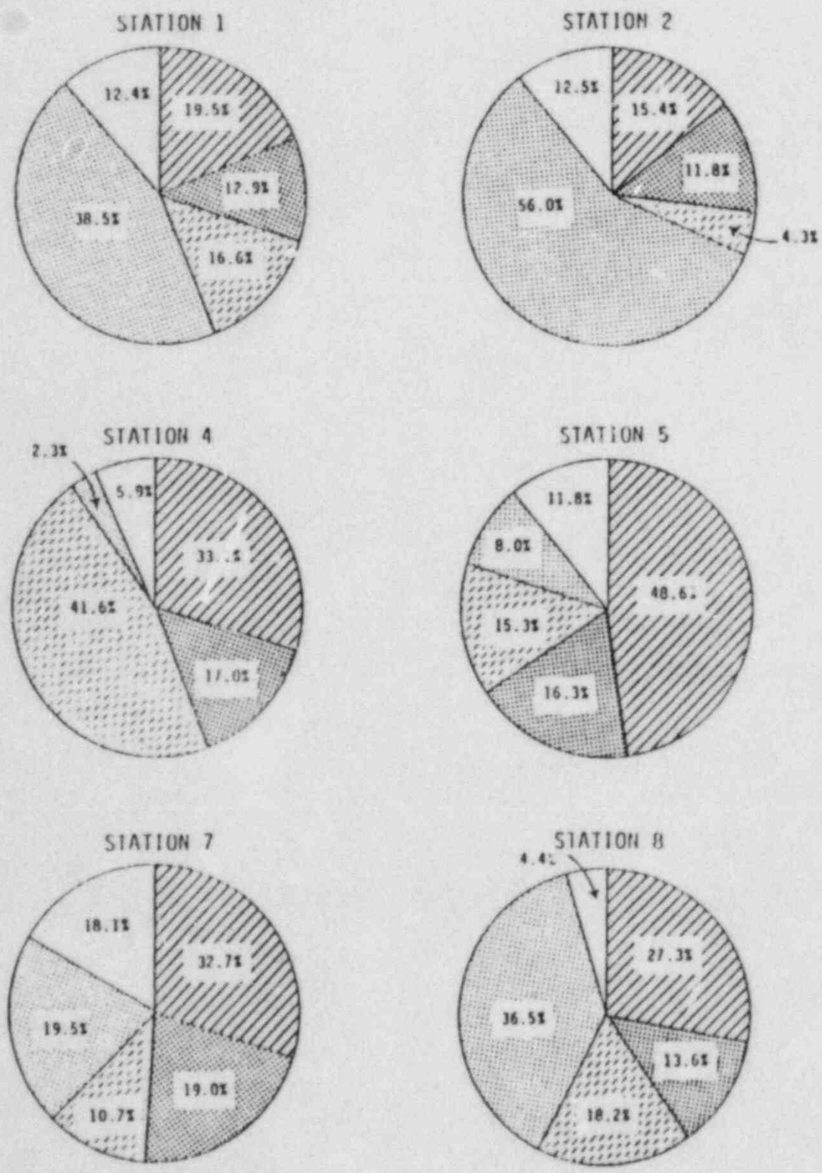


FIGURE 6.5-20

OYSTER REEF FAUNA, DIVERSITY AND EVENNESS
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



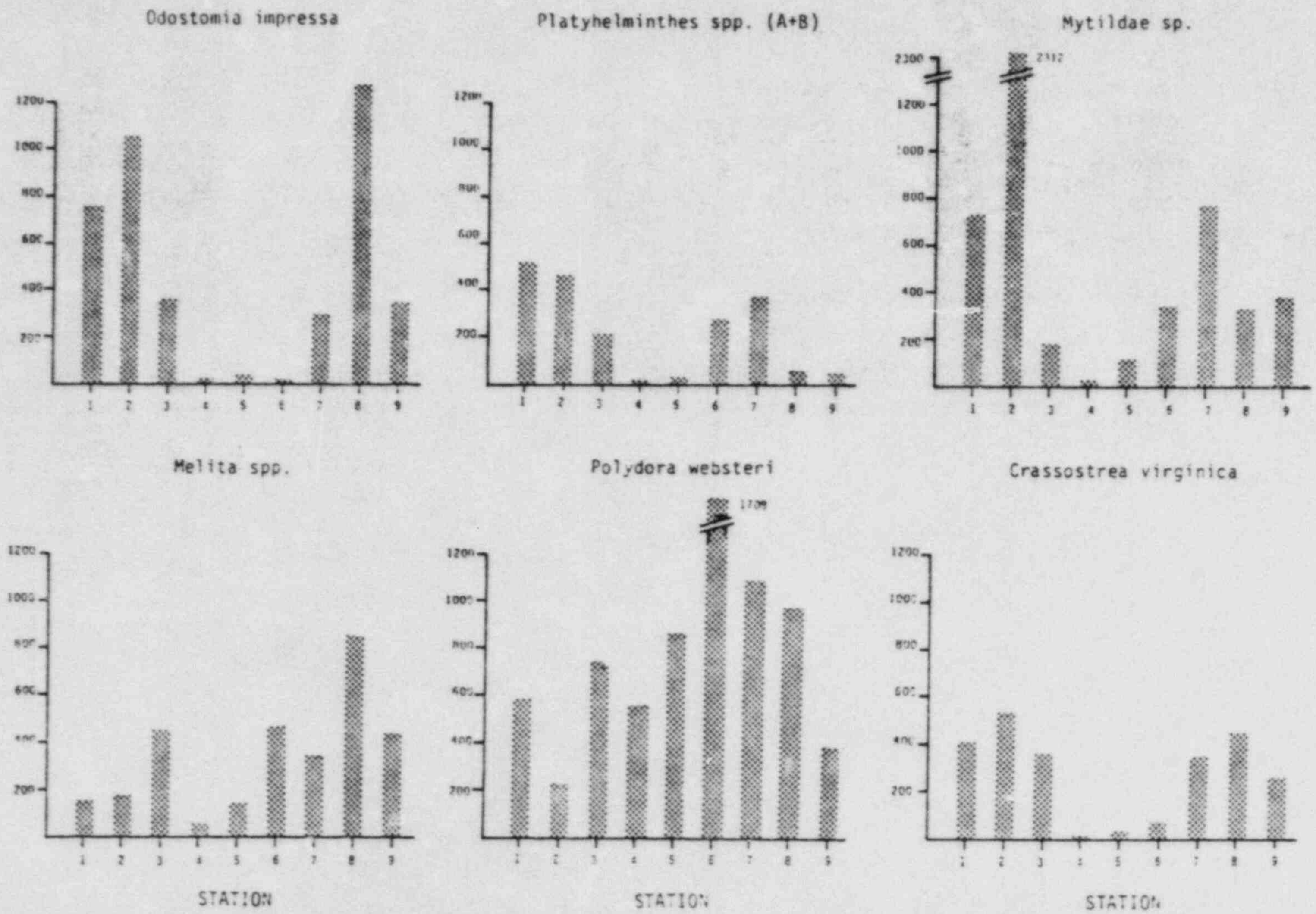
Percentage breakdown of major groups of oyster associated fauna by station

POLYCHAETA
DECAPODA
AMPHIPODA
MOLLUSCA
OTHER

FIGURE 6.5-21

OYSTER REEF FAUNA GROUPS

CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



Abundances of six common oyster associated fauna by station

FIGURE 6.5-22

ABUNDANCE OF SIX OYSTER REEF ASSOCIATED SPECIES
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

7.0 IMPINGEMENT

Collections were made on a weekly basis of organisms impinged on the travelling water screens. The results are intended to describe overall impingement throughout the study period and to allow evaluation of effects of impingement on selected taxa.

7.1 SAMPLING AND LABORATORY ANALYSIS

7.1.1 Sampling Procedures

Impingement sampling was conducted at the Crystal River site for one, randomly chosen, 24 hr period once a week for 12 months at Units 1, 2 and 3. During each 24 hr sampling period, samples were taken at each unit at 6 hr intervals for a total of four samples per unit. The travelling screens for Units 1 and 2 were cleaned at 0900 hr (the beginning of the first sampling interval) and then cleaned every 6 hr, so that collections were made at 1500 hr, 2100 hr, 0300 hr, and 0900 hr. The Unit 3 travelling screens were cleaned at 1000 hr and sampled at 1600 hr 2200 hr, 0400 hr, and 1000 hr. Each sample collected contained the organisms impinged during the 6 hr interval immediately preceding the collection.

Samples were collected in wire baskets designed to fit into the screen wash collection sumps of each unit. The screens were rotated and cleaned for 30 minutes to ensure that all organisms were washed from the travelling screens. At the end of the screen wash, fish and macroinvertebrates were separated from seagrass, algae, and other debris and then preserved.

At certain times during the year, samples collected contained excessive numbers of organisms. When this situation occurred, a random sample splitter was used to obtain the appropriate subsample. The percentage of sample to be analyzed (subsample) was determined by estimating the amount of sample which could be analyzed in approximately 2 hr. Both the percentage of sample analyzed (subsample) and the remaining percentage of unanalyzed sample were recorded. Total number and batch weights of each species contained in the complete sample were extrapolated. The unanalyzed portion of any split sample was sorted to avoid missing any new or rare species.

Sampling with a 3 mm mesh basket placed below the larger mesh basket was conducted once per month at each unit during one of the 6 hr intervals (a total of three collections per month). Sampling dates and sampling times were randomly chosen. The 3 mm samples were then sorted and processed separately and the results qualitatively compared to collections in the larger mesh.

Water temperature, dissolved oxygen, turbidity, and conductivity were taken 1 ft below the surface, at mid depth, and 1 ft above the bottom at each unit upon initial cleaning of the intake screens and at the end of each 24 hr period. Data on barge traffic, tidal stage, wind, weather conditions, and relative amount of seagrass in the sample were also recorded. Plant operational data (e.g., number of circulating water pumps and screens operating) were also noted.

7.1.2 Laboratory Analysis

Samples were processed as follows: all fish and macroinvertebrates were sorted, identified to species (when possible), counted and bulk weighed (by species). Size measurements (length and weight) were taken on the largest and smallest individuals of each species. Crabs of the family Xanthidae (with the exception of Menippe mercenaria) were grouped together for purposes of enumeration and measurements of biomass.

Samples collected at one 6 hr interval (randomly chosen) during each 24 hr period were subjected to detailed size-weight analysis. One such sampling was made for each of the three units for a total of three during each 24 hr sampling period. These samples were processed as follows: up to 30 individuals of fish and macroinvertebrate taxa designated as Selected Important Organisms (SIO) (Table 7.1-1) because of their economic or ecological importance were individually weighed and measured (in addition to the routine processing described above). When a large number of an SIO species was collected, the 30 individuals were selected at random.

Size measurements were recorded to the nearest mm and measured as follows: standard length for fish, maximum carapace width for crabs, maximum pen (gladii) length for squid, and maximum carapace length for shrimp. Individual and batch weights were recorded to the nearest 0.1 grams.

During the crab tagging study (see Section 9.1), impinged crabs were held in water tables for 24 hr. After 24 hr, mortality was recorded and healthy crabs were weighed, measured, tagged, and released.

Taxonomic references used for fish identifications include Hoese and Moore (1977), Parker (1972), and Walls (1975). Nomenclature followed Robins et al (1980). Taxonomic references used for macroinvertebrate identifications include Williams (1965), Felder (1973), Mutter (1976), Gosner (1971), Heard 1982), and Abbott (1968).

7.1.3 Statistical Analysis

Raw impingement numbers collected weekly from the traveling screens were converted to numbers collected per volume of water passed through the screens. This rate per unit volume impingement was analyzed using the SAS GLM procedure. Quarter of the year, barge traffic, unit, interactions of these main effects and numerous continuous and discrete covariates were explored in the analysis. The SAS graphics package was used to provide plots of impingement over time.

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TABLE 7.1-1

LIST OF SELECTED IMPORTANT ORGANISMS (SIO)

Species Name	Common Name
Anchoa mitchilli	Bay anchovy
Ogcocephalus radiatus	Polka-dot batfish
Orthopristis chrysoptera	Pigfish
Lagodon rhomboides	Pinfish
Bairdiella chrysura	Silver perch
Cynoscion nebulosus	Spotted seatrout
Leiostomus xanthurus	Spot
Sciaenops ocellatus	Red drum
Mugil cephalus	Striped mullet
Lolliguncula brevis	Brief squid
Penaeus duorarum	Pink shrimp
Menippe mercenaria	Stone crab
Callinectes sapidus	Blue crab

7.2 RESULTS

The number of organisms impinged each sampling day is shown graphically in Figure 7.2-1. Table 7.2-1 summarizes numbers of fish and invertebrates collected per 6 hour collection. The data are separated by unit and indicate that: 1) the impingement rate was highest for all units in the spring months (significant difference) and 2) the rate at Unit 3 was consistently higher than the rates for Units 1 and 2 (significantly different from Unit 1 only) throughout the study. Table 7.2-2 lists the calculated total annual impingement (fish and invertebrates combined) for each unit. The calculation assumes continuous plant operation with all pumps running. Based on these values, 60.9 percent of the total impingement occurred at Unit 3; Unit 2 accounted for 28.5 percent, and Unit 1 for 10.6 percent. Although the Units 1 and 2 intakes are immediately adjacent and much alike structurally, the number of organisms impinged at Unit 1 was consistently lower and significantly different from numbers at the other units.

Figures 7.2-2 through 7.2-13 summarize daily impingement data by unit for each SIO. Table 7.2-3 provides calculated impingement numbers and weights for each of these species. Both the seasonality of impingement and the unit at which a species was impinged in greatest numbers vary by species. Of the SIO fish species, bay anchovy was collected in the greatest numbers, mostly at Unit 3, and the number impinged peaked sharply in late March. Polka-dot batfish were second in abundance (first by weight), also peak in March, and are also most abundant at Unit 3. These two species account for over 72 percent of the annual impingement of SIO fish impinged.

Spot were the third most abundant species. Their peak numbers were impinged in late April and early May, at which time numbers at both Units 2 and 3 were high (about 650 per day). Projected annual impingement is slightly greater at Unit 2. Annual numbers at Unit 2 for impingement of pigfish, pinfish and striped mullet also exceed numbers at Unit 3. The numbers impinged at Unit 1 are consistently lowest. Silver perch showed the same seasonal pattern as bay anchovy and batfish but accounted for only 5 percent of the SIO fish total. Projected impingement is greater at Unit 3.

The number of SIO invertebrates impinged was much greater than the number of fish. SIO invertebrates represent 83.2 percent of the total number of SIO impinged annually and 42.3 percent of the total number of organisms impinged. Relatively few stone crabs (Figure 7.2-12) were impinged and brief squid (Figure 7.2-10) occurred in low numbers except during a March 1984 peak. In contrast, both pink shrimp (Figure 7.2-11) and blue crab (Figure 7.2-13) occurred throughout the spring in high numbers. For most collection dates and on an annual basis, the highest numbers of all invertebrate SIO were impinged at Unit 3.

The use of supplemental 3 mm mesh collection baskets yielded a limited number of organisms and relatively few species. Tables 7.2-4 and 7.2-5 provide the numbers of fish and invertebrates collected. A total of 113 specimens of fish representing 10 taxa and 109 invertebrates of 15 taxa were collected in the finer mesh. Of these organisms, all except <u>Anachis</u> sp. is represented by other specimens of the same taxa in the coarser mesh collection baskets. Species caught in larger numbers in the fine mesh were also caught in larger numbers in the coarse mesh.

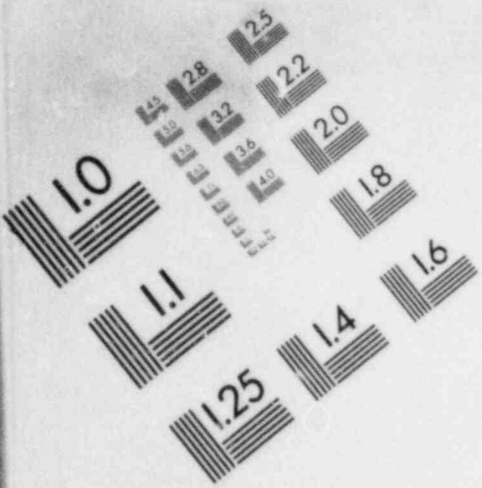
The GLM for impingement rates, both in terms of total numbers and for the SIO, included a number of variables in addition to unit and season. Preliminary analyses included turbidity, salinity, and dissolved oxygen concentration, however, impingement rate did not vary significantly with these variables and they were eliminated from further analysis. Independent variables tested further were barge traffic, day/night, wind (velocity and direction), tide stage, temperature, and combinations of season, unit, and day/night. Results of the ANOVA are provided in Table 7.2-6. There was no significant difference in impingement relative to day/night, however, temperature, barge traffic, and wind are highly correlated. Significantly higher rates of impingement occurred at lower temperatures.

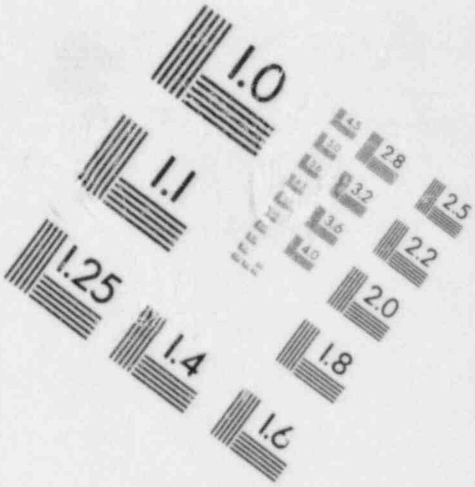
The significance of temperature relative to impingement rate could have been influenced by the low temperatures which occurred at Crystal River in December and January. Temperatures at Crystal River dropped quickly over the night of December 24, 1983, reaching -7.5°C the following morning. Freezing temperatures were recorded through December 27 and again on December 31 and January 1. Water temperatures dropped to 9-10°C from previous values in the 15-20°C range. When impingement sampling took place on December 29, large numbers of dead and decomposing fish and invertebrates, mostly jellyfish, burrfish and puffers, were observed in the water and appeared irregularly in collections during the 24 hour period. Because of their condition and numbers, they were treated as debris and not counted as part of the sample. The samples at this time contained primarily batfish, with relatively high numbers of catfish, tomtate, spotfin mojarra and silver jenny. Although no evidence remained of the fish kill when impingement sampling next took place (January 4-5, 1984), numbers of pinfish and silver perch collected then were the highest found during the program. Spotted seatrout also occurred in relatively high numbers.

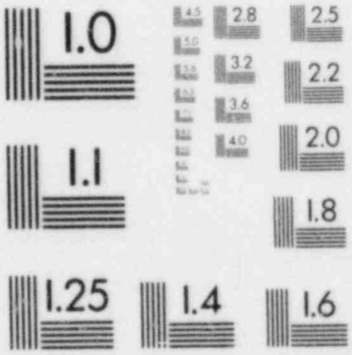
The GLM evaluated the effect of barge traffic by season. Traffic in or out within 2 hours of a sampling was considered. Only in spring, when most fish and invertebrates are collected, was the correlation significant. Higher numbers of both fish and invertebrates impinged were positively correlated with barge traffic. Winds of 5, 10, 15, and 20 mph were analyzed. Most of the data available were for 5 mph, and at that velocity wind from the west showed the highest positive correlation with number impinged. At higher velocities, the same trend appeared.

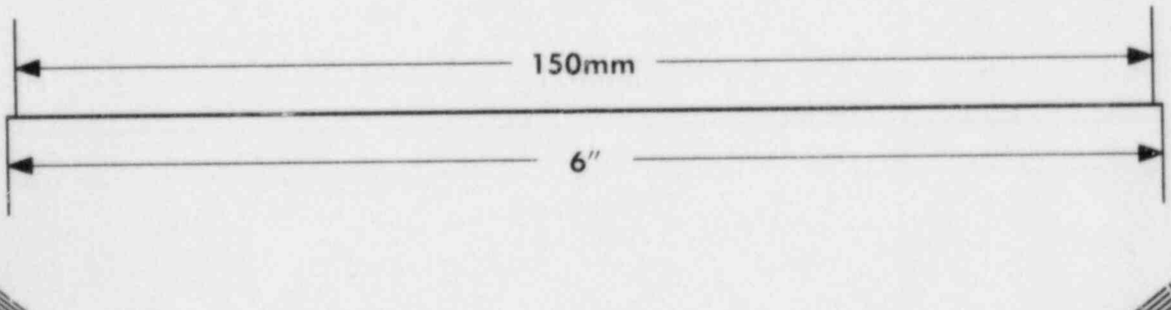
Tables 7.2-7 and 7.2-8 summarize the species and numbers of fish and invertebrates collected during impingement sampling. A total of 130 taxa of fish and 53 invertebrate taxa were identified. Highest total impingement values coincided both with highest meroplankton densities in the spring and to a lesser extent with the secondary peak in the fall (see Section 8.2). For a number of SIO, impingement peaks coincide with peak trawl catches (pink shrimp, blue crab, spotted seatrout, spot and pinfish in 1984, and pigfish). For bay anchovy, the March-April plankton density peak coincides with peak impingement. In several cases (squid, blue crab, silver perch, pinfish), impingement peaks are followed by peak plankton densities.

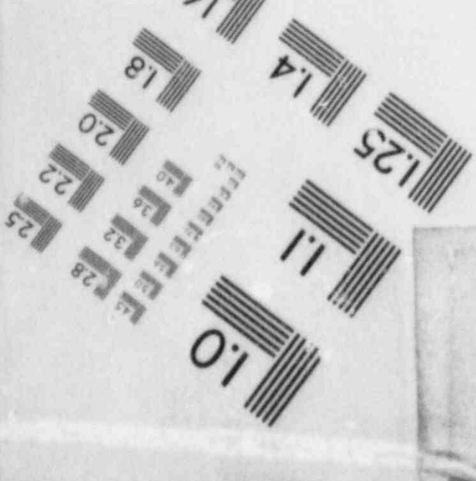
IMAGE EVALUATION TEST TARGET (MT-3)











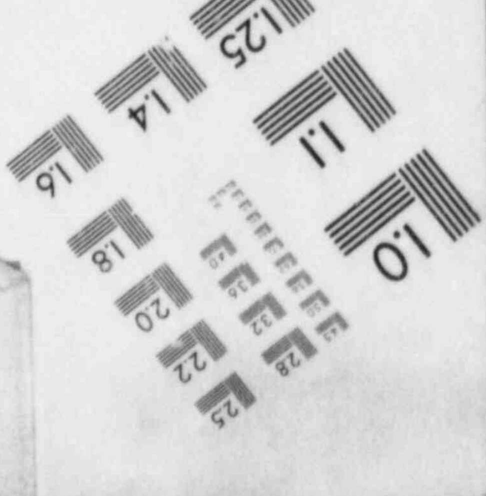


TABLE 7.2-1

FISH (F) AND INVERTEBRATE (I) IMPINGEMENT
AVERAGE NUMBER PER 6 HOUR COLLECTION

	Unit					
	1		2		3	
Month	F	I	F	I	F	I
June	7.50	24.50	31.25	107.50	-	-
July	16.50	20.50	56.72	72.72	12.63	39.63
August	8.63	26.88	73.94	112.81	40.57	276.86
September	16.35	28.15	61.75	66.83	49.65	210.80
October	7.00	25.38	41.56	56.00	41.50	115.06
November	20.14	21.00	29.36	38.91	43.00	65.25
December	33.80	65.85	51.15	127.90	52.75	127.95
January	36.95	296.00	91.15	311.10	147.05	515.25
February	132.38	238.13	417.00	276.88	639.25	1038.00
March	179.56	434.88	-	-	1053.88	1944.55
April	63.50	314.25	221.80	597.40	376.00	1424.42
May	18.06	152.82	131.62	560.56	59.40	1172.08

TABLE 7.2-2

TOTAL IMPINGEMENT BY UNIT

UNIT	NUMBER	WEIGHT IN KG
1	278854	2256.3
2	747830	10191.9
3	1601800	21505.6

TABLE 7.2-3

ANNUAL IMPINGEMENT BY UNIT

FOR SELECTED IMPORTANT ORGANISMS

	UNIT 1		UNIT 2		UNIT 3	
	NUMBER	WEIGHT IN KG	NUMBER	WEIGHT IN KG	NUMBER	WEIGHT IN KG
BAY ANCHOVY	7224	14.0	16236	29.8	64518	114.6
POLKA DOT BATFISH	11983	712.6	21772	1284.2	40728	1978.0
PIGFISH	487	1.2	2254	5.2	956	9.3
PINFISH	1990	6.5	7056	39.0	6189	33.5
SILVER PERCH	960	4.6	4826	24.1	6214	35.6
SPOTTED SEATROUT	257	1.2	940	3.3	1607	8.2
SPOT	1550	2.2	13800	31.0	12744	29.5
RED DRUM	0	0.0	0	0.0	8	0.0
STRIPED MULLET	68	4.3	690	24.2	362	5.1
PINK SHRIMP	100043	449.9	149387	676.2	391457	1952.6
BLUE CRAB	45488	350.3	82554	3570.4	255518	9186.0
STONE CRAB	400	16.4	527	11.2	608	34.5
BRIEF SQUID	4323	23.5	26916	90.1	55715	309.0

TABLE 7.2-4

TOTAL NUMBERS OF FISH COLLECTED IN 3MM IMPINGEMENT SAMPLING

CLUPEIDAE	96
UROPHYCIS FLORIDANA	4
ANCHOA MITCHILLI	3
LEIOSTOMUS XANTHURUS	3
MUGIL CEPHALUS	2
ANCHOA HEPSETUS	1
OPSANUS BETA	1
STRONGYLURA MARINA	1
SYNGNATHUS SP.	1
EUCINOSTOMUS ARGENTEUS	1

TABLE 7.2-5

TOTAL NUMBERS OF INVERTEBRATES COLLECTED IN 3MM IMPINGEMENT SAMPLING

XANTHIDAE	70
PORTUNUS GIBBESI	8
PALAEMON FLORIDANUS	7
ALPHEUS NORMANNI	4
ANEMONE	3
PENAEUS DUORARUM	3
CALLINECTES SAPIDUS	3
SQUILLA EMPUSIA	2
PETROLISTHES ARMATUS	2
MENIPPE MERCENARIA	2
ANNELIDA	1
TOZEUMA CAROLINENSE	1
PELIA MUTICA	1
ANACHIS SP.	1
LOLLIGUNCULA BREVIS	1

TABLE 7.2-6

IMPINGEMENT RATE OF FISH NUMBERS (NUMBER / 360,000,000 GALLONS)

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: NF

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	63	717710.17229569	11392.22495707	4.91	0.0001	0.484545	164.7871
ERROR	329	763493.01879600	2320.64747354		ROOT MSE		NF MEAN
CORRECTED TOTAL	392	1481203.19109169			48.17309907		29.23353676

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SEASON	3	194980.44685684	28.01	0.0001	3	158212.75563166	22.73	0.0001
BARGE(SEASON)	4	84172.01180794	9.07	0.0001	4	95914.60356377	10.33	0.0001
UNIT	2	27062.73095498	5.83	0.0032	2	22694.65364473	4.89	0.0081
DN	1	1207.91047878	0.52	0.4711	1	3892.03736825	1.68	0.1962
SEASON*UNIT	6	21048.98498277	1.51	0.1735	6	34912.37402159	2.51	0.0219
SEASON*DN	3	1768.95708274	0.25	0.8587	3	2382.80951711	0.34	0.7972
UNIT*DN	2	17767.06759960	3.83	0.0227	2	8077.99757501	1.74	0.1771
SEASON*UNIT*DN	6	40907.41289173	2.94	0.0083	6	41190.26344914	2.96	0.0079
WINDVEL*WINDDIR	29	147458.31541913	2.19	0.0006	29	105444.38436260	1.57	0.0345
TIDESTAG	3	29900.33599546	4.29	0.0056	3	24022.75249663	3.45	0.0168
TEMP	1	145742.18383031	62.80	0.0001	1	82756.41026613	35.66	0.0001
TURB	1	19.96599714	0.01	0.9262	1	54.20873296	0.02	0.8786
SAL	1	5340.88716828	2.30	0.1302	1	5331.70390160	2.30	0.1305
DO	1	132.96123000	0.06	0.8110	1	132.96123000	0.06	0.8110

TABLE 7.2-7

TOTAL NUMBERS OF FISH COLLECTED IN IMPINGEMENT SAMPLING

ANCHOA MITCHILLI	11220
OGCOCEPHALUS RADIATUS	8934
PRIONOTUS TRIBULUS	7964
UROPHYCIS FLORIDANA	3161
LEIOSTOMUS XANTHURUS	2904
ANCHOA HEPSETUS	1743
LAGODON RHOMBOIDES	1741
BAIRDIELLA CHRYSOURA	1485
SPHOEROIDES NEPHELUS	1361
PEPRILUS BURTI	1209
LACTOPHRYS QUADRICORNIS	1182
EUCINOSTOMUS ARGENTEUS	1146
ATHERINIDAE	1072
CHILOMYCTERUS SCHOEPFI	875
ARIUS FELIS	792
ACHIRUS LINEATUS	732
SYMPHURUS PLAGIUSA	722
EUCINOSTOMUS GULA	643
ANCYLOPSETTA QUADROCELLATA	627
HIPPOCAMPUS ERECTUS	590
CHLOROSCOMBRUS CHRYSURUS	561
OPSANUS BETA	544
OPHISTHONEMA OGLINUM	518
STRONGYLURA MARINA	482
BREVOORTIA PATRONUS	461
MONACANTHUS CILIATUS	457
MENIDIA SP.	440
TRINECTES MACULATUS	437
SELENE VOMER	400
HARENGULA JAGUANA	383
ORTHOPRISTIS CHRYSOPTERA	383
HAEMULON AUROLINEATUM	367
SYNGNATHUS FLORIDAE	354
ALUTERUS SCHOEPFI	343
PRIONOTUS SCITULUS	341
ETROPUS CROSSOTUS	327
CYNOSCION NEBULOSUS	324
HYPSOBLENNIUS HENTZI	269
SYNGNATHUS LOUISIANAE	228
MONACANTHUS HISPIDUS	218
MENIDIA BERYLLINA	217
SYNGNATHUS SCOVELLI	195
GYMNURA MICRURA	189
HYPORHAMPUS UNIFASCIATUS	175
OLIGOPLITES SAURUS	154
OPHICHTHUS GOMESI	149
MEMBRAS MARTINICA	145
CLUPEIDAE	143
CHAETODIPTERRUS FABER	128
CHASMODES SUBURRAE	124
SERRANIDAE	114
SYNODUS FOETENS	91
MUGIL CEPHALUS	90
CYNOSCION ARENARIUS	87
ALOSA ALABAMAE	84
ASTROSCOPUS Y-GRAECUM	83

PORICHTHYS PLECTRODON	81
DASYATIS SABINA	69
CLUPEID	62
ANCHOA SP.	60
DIPLECTRUM BIVITTATUM	59
GOBIESOX STRUMOSUS	55
STRONGYLURA NOTATA	54
OPISTOGNATHIDAE	44
PARALICHTHYS ALBIGUTTA	41
CENTROPRISTIS PHILADELPHIC	40
MENTICIRRHUS AMERICANUS	39
MYROPHIS PUNCTATUS	37
EUCINOSTOMUS SP.	37
MUGIL SP.	35
SPHOEROIDES SPENGLERI	33
UNIDENTIFIED-DAMAGED	30
CENTROPRISTIS STRIATA	26
OPHIDION GRAYI	22
POLYDACTYLUS OCTONEMUS	20
BREVOORTIA SMITHI	18
CARANX HIPPOS	13
HIPPOCAMPUS ZOSTERAE	12
ELOPS SAURUS	11
GYMNOTHORAX NIGROMARGINATU	11
APOGON AUROLINEATUS	11
BAGRE MARINUS	10
SERRANUS ATROBRANCHUS	10
TRACHINOTUS FALCATUS	10
TRICHIURUS LEPTURUS	10
SARDINELLA AURITA	9
LUTJANUS GRISEUS	9
SYNGNATHUS SP.	7
RACHYCENTRON CANADUM	7
ARCHOSARGUS PROBATOCEPHALU	7
DIPLODUS HOLBROOKI	7
BASCANICHTHYS SCUTICARIS	6
DIPLECTRUM FORMOSUM	6
LAGOCEPHALUS LAEVIGATUS	5
BELONIDAE	4
CYPRINODON VARIEGATUS	4
ECHENEIS NAUCRATES	4
UNIDENTIFIED CARANGID	4
SYNODUS SYNODUS	3
RYPTICUS SAPONACEUS	3
PEPRILUS ALEPIDOTUS	3
BREVOORTIA GUNTERI	2
ALOSA CHRYSOCHLORIS	2
SERRANUS SUBLIGARIUS	2
MUGIL CUREMA	2
MICROGOBIUS THALASSINUS	2
SCOMBEROMORUS MACULATUS	2
SCORPAENA BRASILIENSIS	2
CITHARICHTHYS MACROPS	2
SPHYRNA TIBURO	1
TRACHINOCEPHALUS MYOPS	1
OGCOCEPHALUS PARVUS	1
HIRUNDICHTHYS RONDELETI	1
FUNDULUS GRANDIS	1
FUNDULUS SIMILIS	1

HIPPOCAMPUS SP.	1
MYCTEROPERCA MICROLEPIS	1
HEMICARANX AMBLYRHYNCHUS	1
GERRIDAE	1
UNIDENTIFIED SPARID	1
POGONIAS CROMIS	1
SCIAENOPS OCELLATUS	1
OPISTOGNATHUS AURIFRONS	1
OPISTOGNATHUS MAXILLOSUS	1
BATHYGOBIUS SOPORATOR	1
GOBIONELLUS HASTATUS	1
UNIDENTIFIED BOTHID	1
CYNOGLOSSIDAE	1
SPHOEROIDES SP.	1
UNIDENTIFIED	1

TABLE 7.2-8

TOTAL NUMBERS OF INVERTEBRATES COLLECTED IN IMPINGEMENT SAMPLING

PENAEUS DUORARUM	76917
CALLINECTES SAPIDUS	41682
METOPORHAPHIS CALCARATA	16583
LOLLIGUNCULA BREVIS	10358
SQUILLA EMPUSIA	7546
PORTUNUS GIBBESI	6898
PALAEMON FLORIDANUS	4422
ALPHEUS HETEROCHAELIS	2956
XANTHIDAE	1619
TRACHYPENAEUS SIMILIS	1117
OVALIPES GUADULPENSIS	490
ALPHEUS NORMANNI	350
MENIPPE MERCENARIA	179
PETROLISTHES ARMATUS	143
TOZEUMA CAROLINENSE	77
UPOGEBIA AFFINIS	68
CALLINECTES ORNATUS	64
PALAEMONETES INTERMEDIUS	62
LYSMATA WURDEMANNI	62
HIPPOLYSMATA WURDMANNI	53
LIBINIA DUBIA	52
PORTUNUS SPINIMANUS	39
PALAEMONETES VULGARIS	26
LOLLIGO PEALI	21
APLYSIA WILCOXI	15
ANEMONE	14
SESARMA CINEREUM	14
PETROLISTHES GALATHINUS	10
APLYSIA SP.	10
SESARMA RETICULATUM	8
PELIA MUTICA	7
NEMERTINEA	6
PALAEMONETES PUGIO	5
DAMAGED CRAB	4
PODOCHELA SIDNEYI	4
PALAEMONIDAE	3
ANNELIDA	2
PENAEIDAE	2
PALAEMONETES SP.	2
UCA SP.	2
MACROCOELOMA TRISPINOSUM	2
POLINICES DUPLICATUS	2
PENAEUS SETIFERUS	1
PENAEUS SP.	1
PORTUNUS DEPRESSIFRONS	1
EURYPANOPEUS DEPRESSUS	1
NEOPANOPE TEXANA	1
PANOPEUS HERBSTII	1
UCA PUGILATOR	1
UCA SPECTOSA	1
LIBINIA EMARGINATA	1
PITHO LHERMINIERI	1
ANACHIS SP.	1

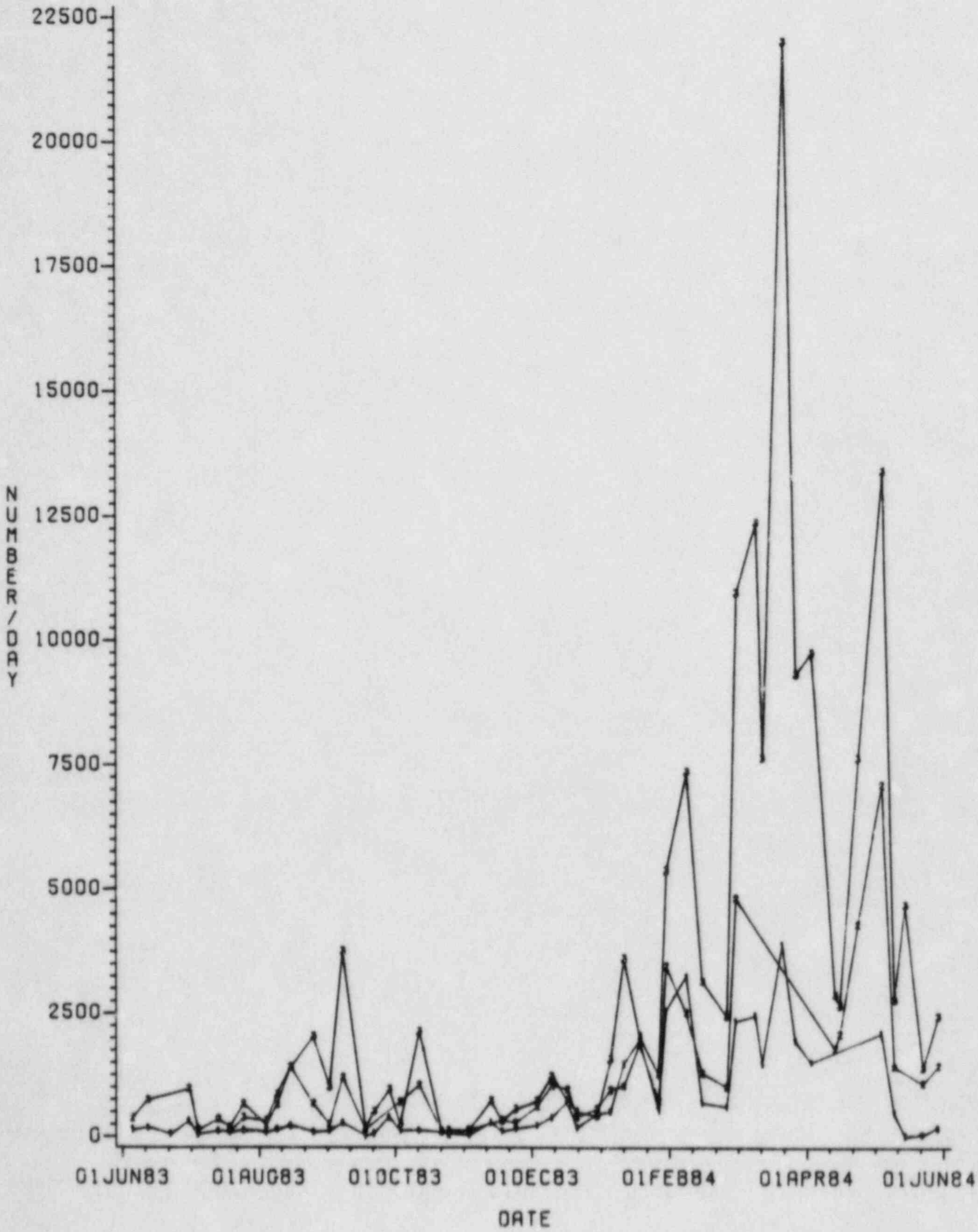


FIGURE 7.2-1
IMPINGEMENT BY DATE FOR
ALL SPECIES COMBINED
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

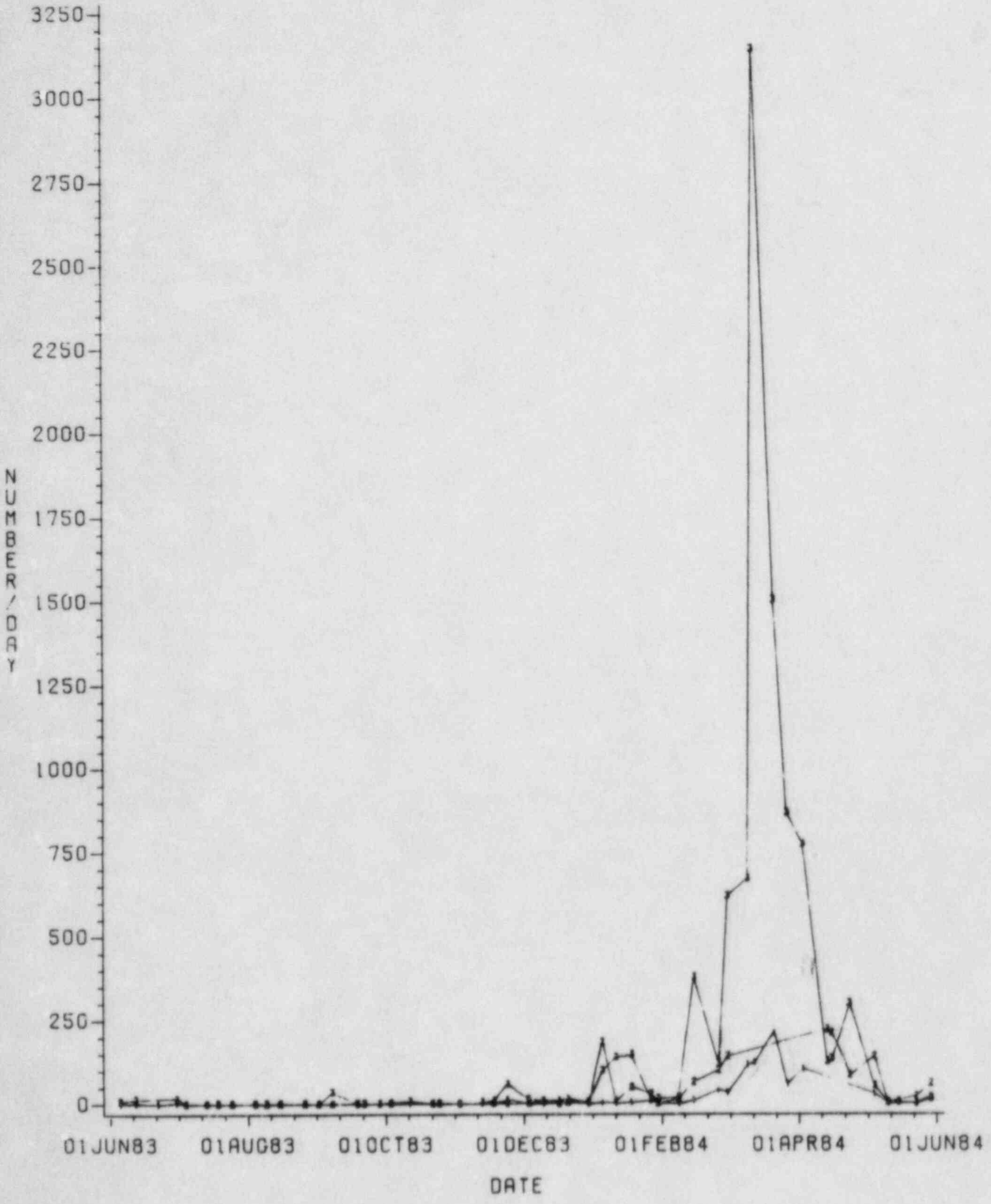


FIGURE 7.2-2
IMPINGEMENT BY DATE FOR
BAY ANCHOVY
CRYSTAL RIVER 316 STUDIES
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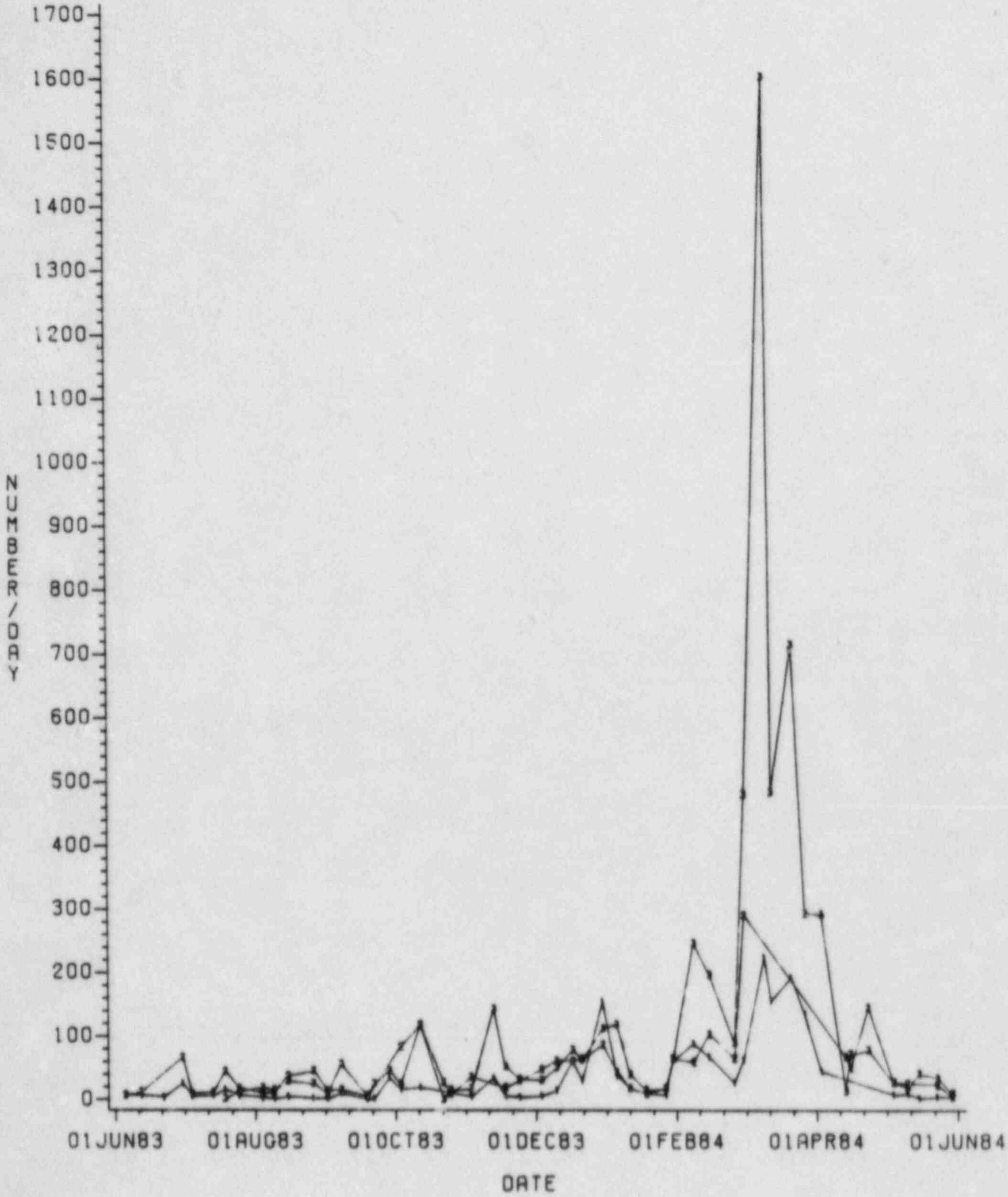

FIGURE 7.2-3
IMPINGEMENT BY DATE FOR
POLKA-DOT BATFISH
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

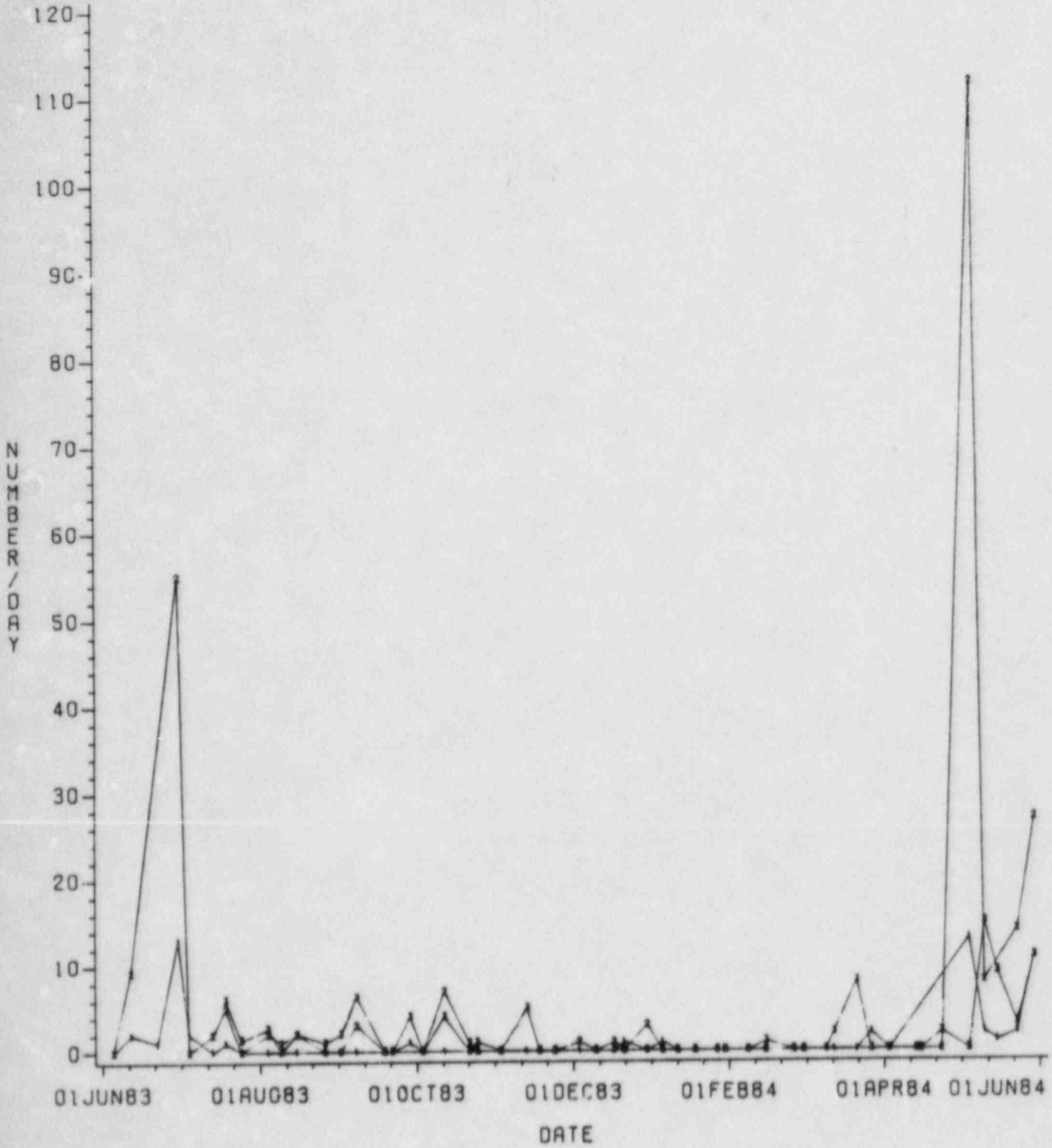

FIGURE 7.2-4
IMPINGEMENT BY DATE FOR
PIGFISH
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

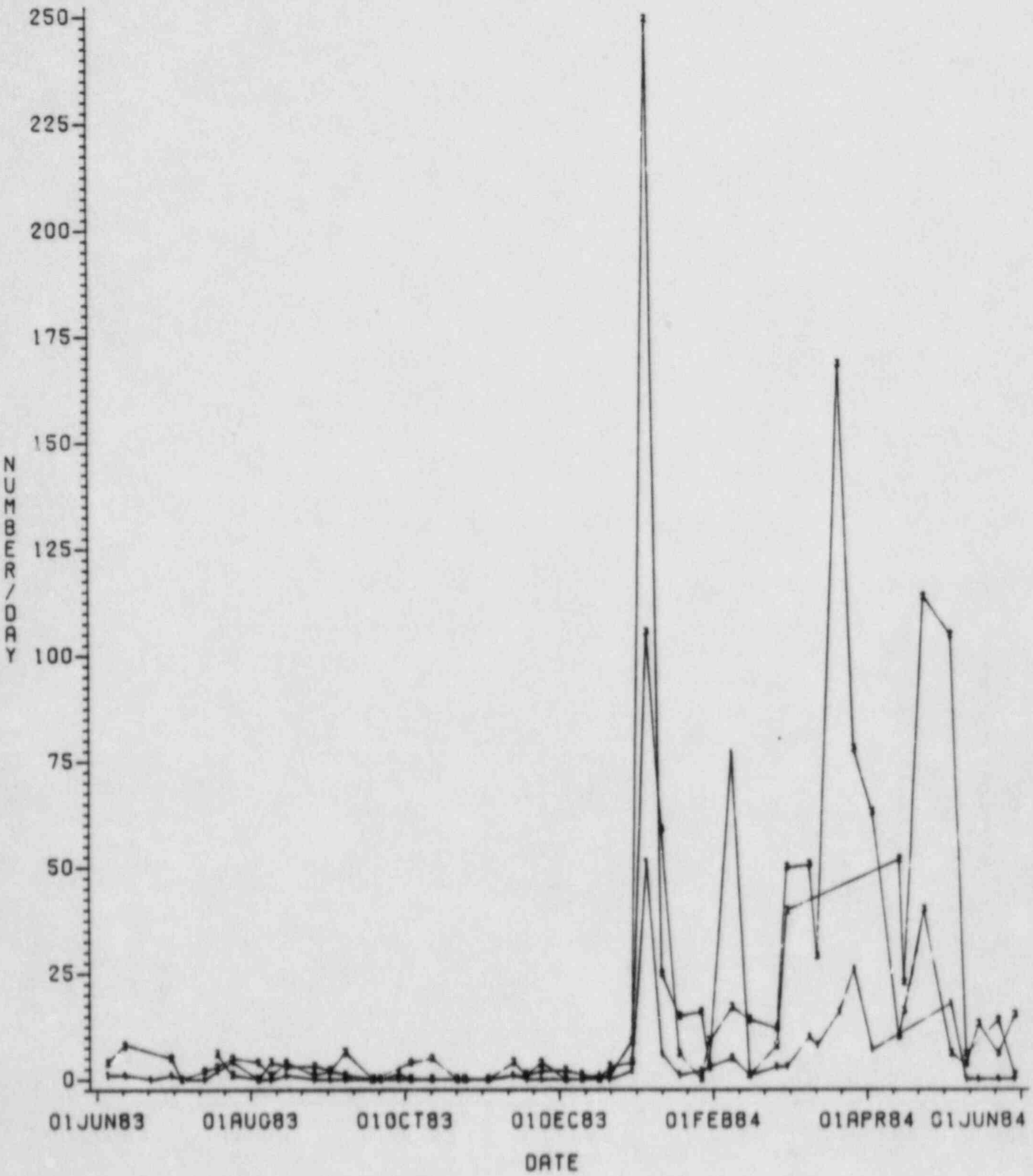

FIGURE 7.2-5
IMPINGEMENT BY DATE FOR
PINFISH
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

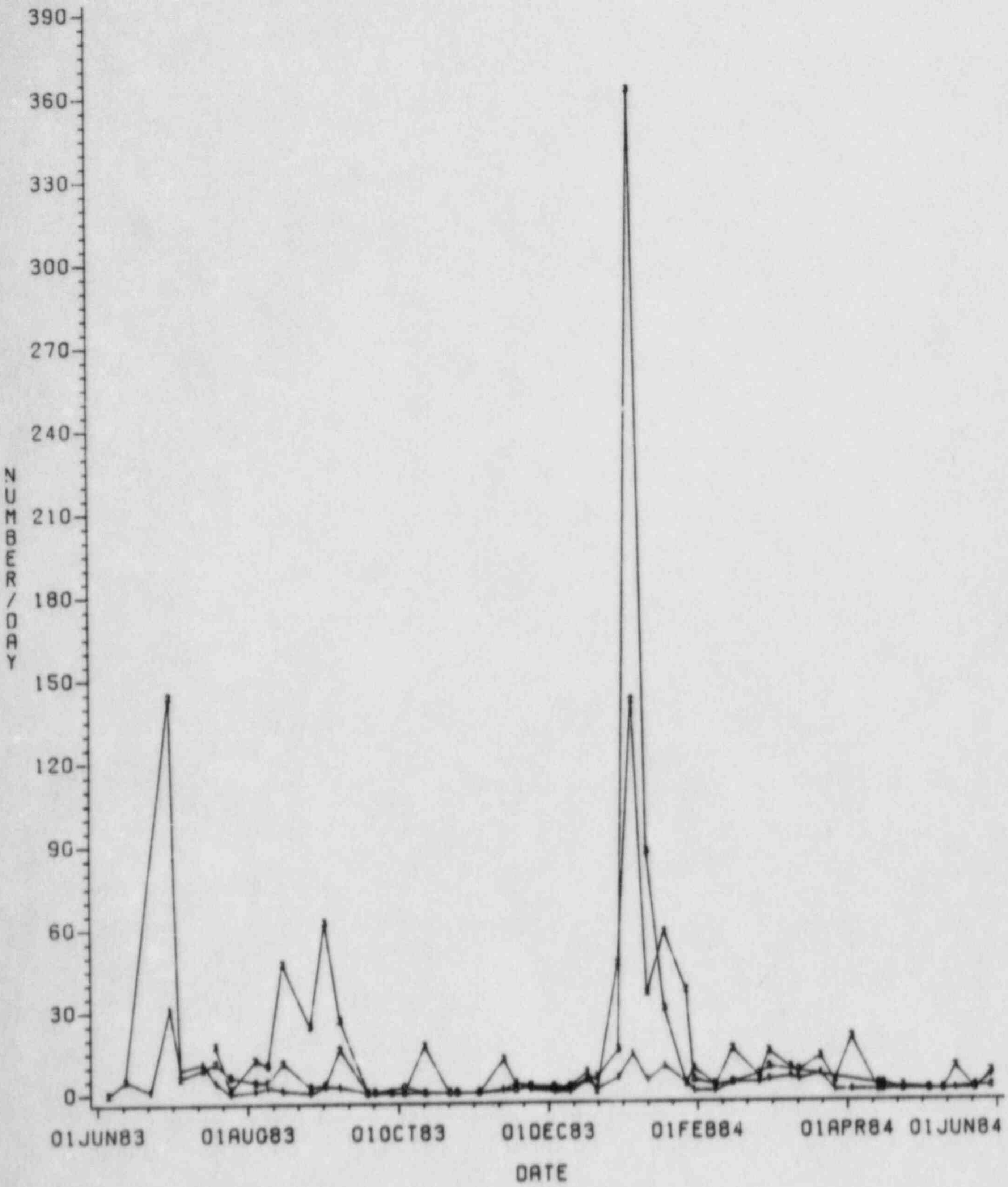

FIGURE 7.2-6
IMPINGEMENT BY DATE FOR
SILVER PERCH
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

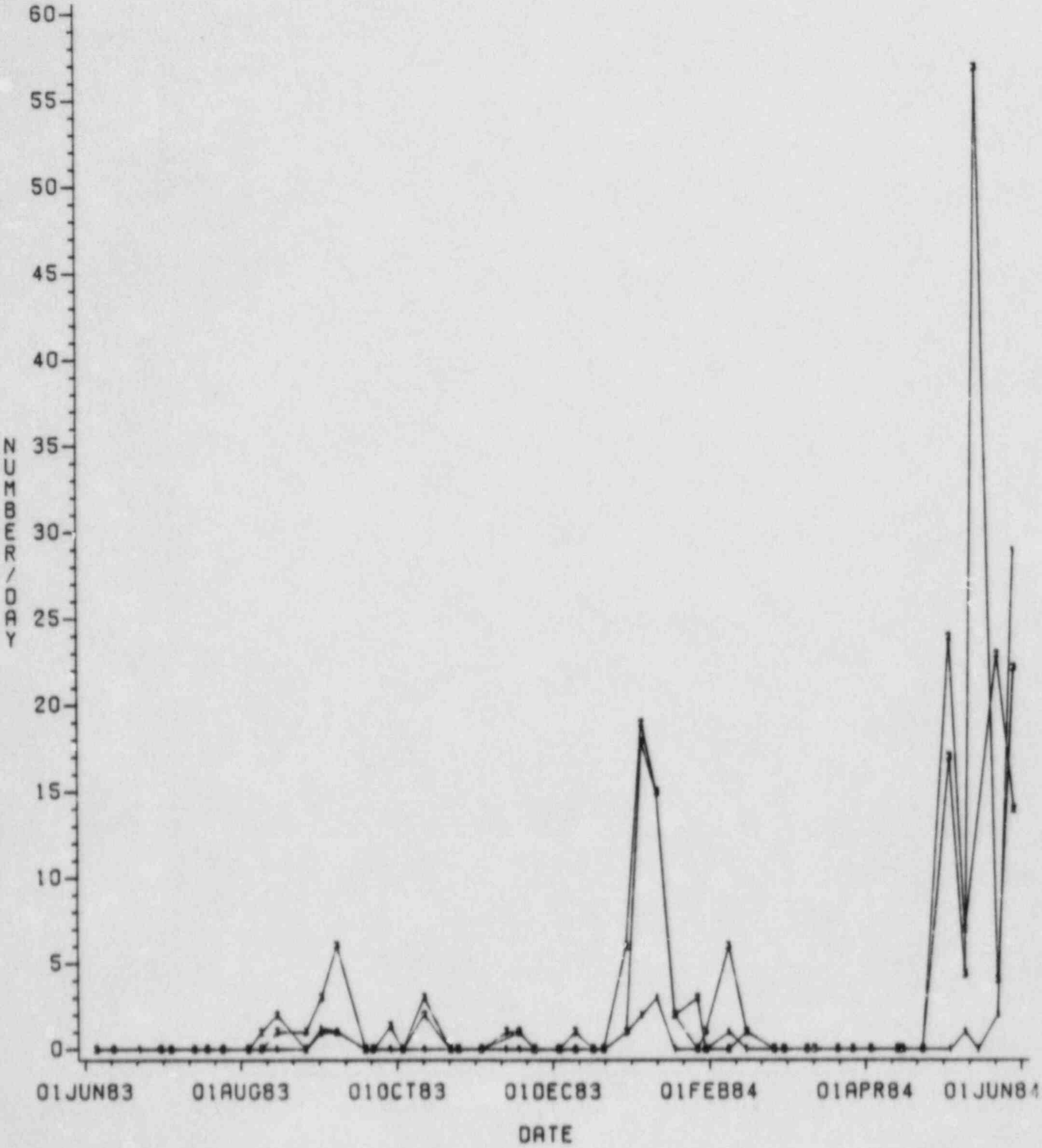

FIGURE 7.2-7
IMPINGEMENT BY DATE FOR
SPOTTED SEATROUT
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

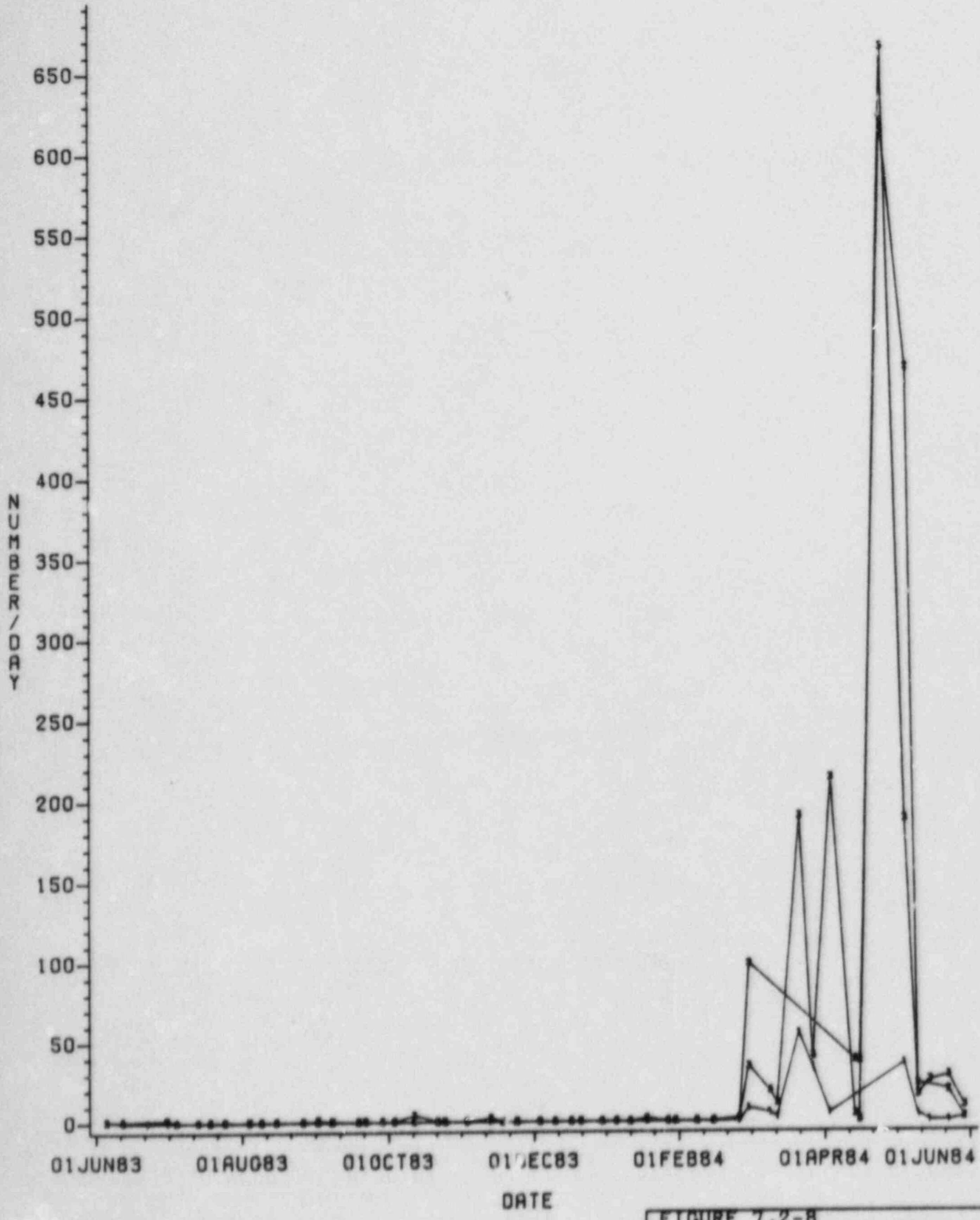

FIGURE 7.2-8
IMPINGEMENT BY DATE FOR
SPOT
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

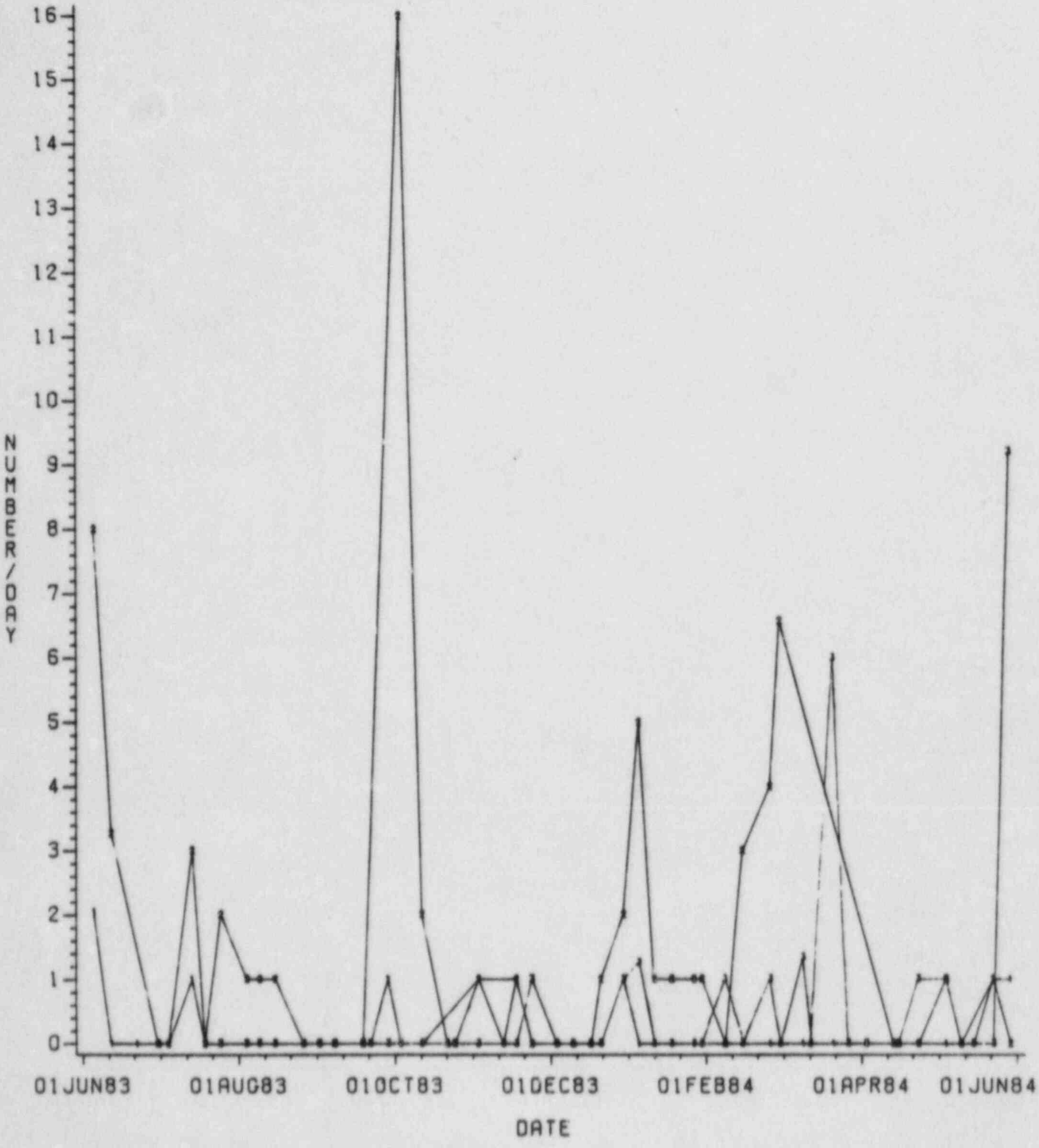

FIGURE 7.2-9
IMPINGEMENT BY DATE FOR
STRIPED MULLET
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

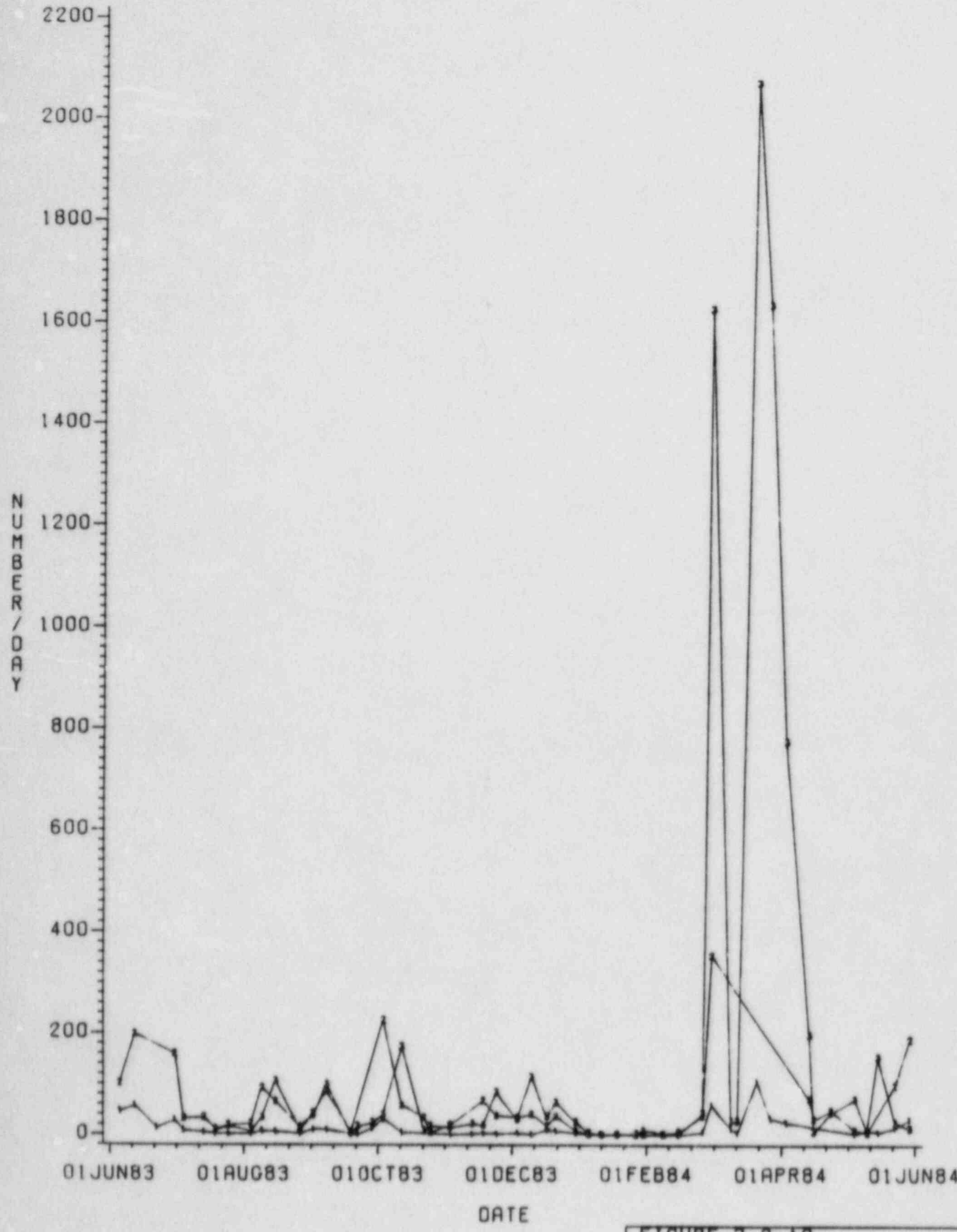

FIGURE 7.2-10
IMPINGEMENT BY DATE FOR
BRIEF SQUID
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

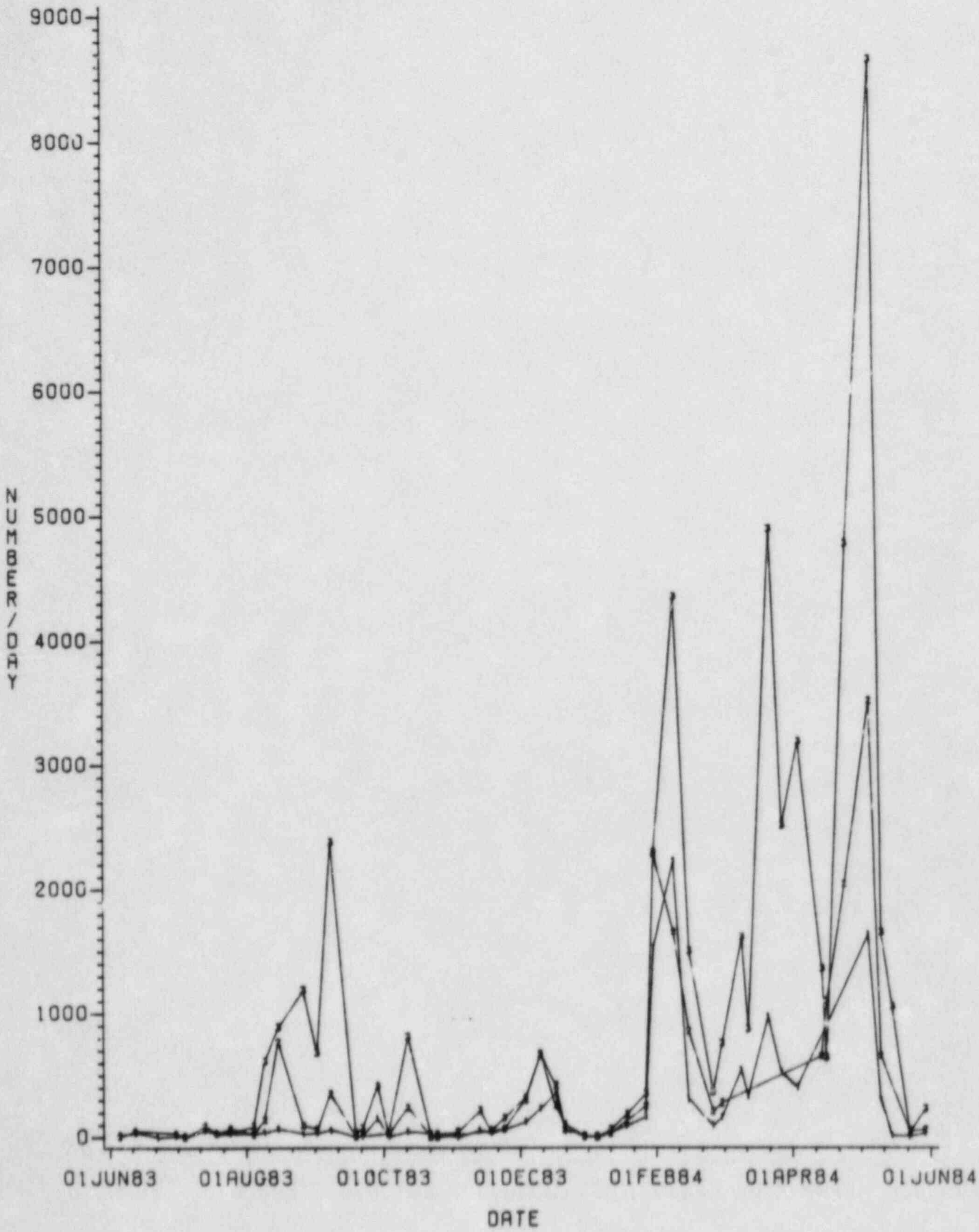

FIGURE 7.2-11
IMPINGEMENT BY DATE FOR
PINK SHRIMP
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

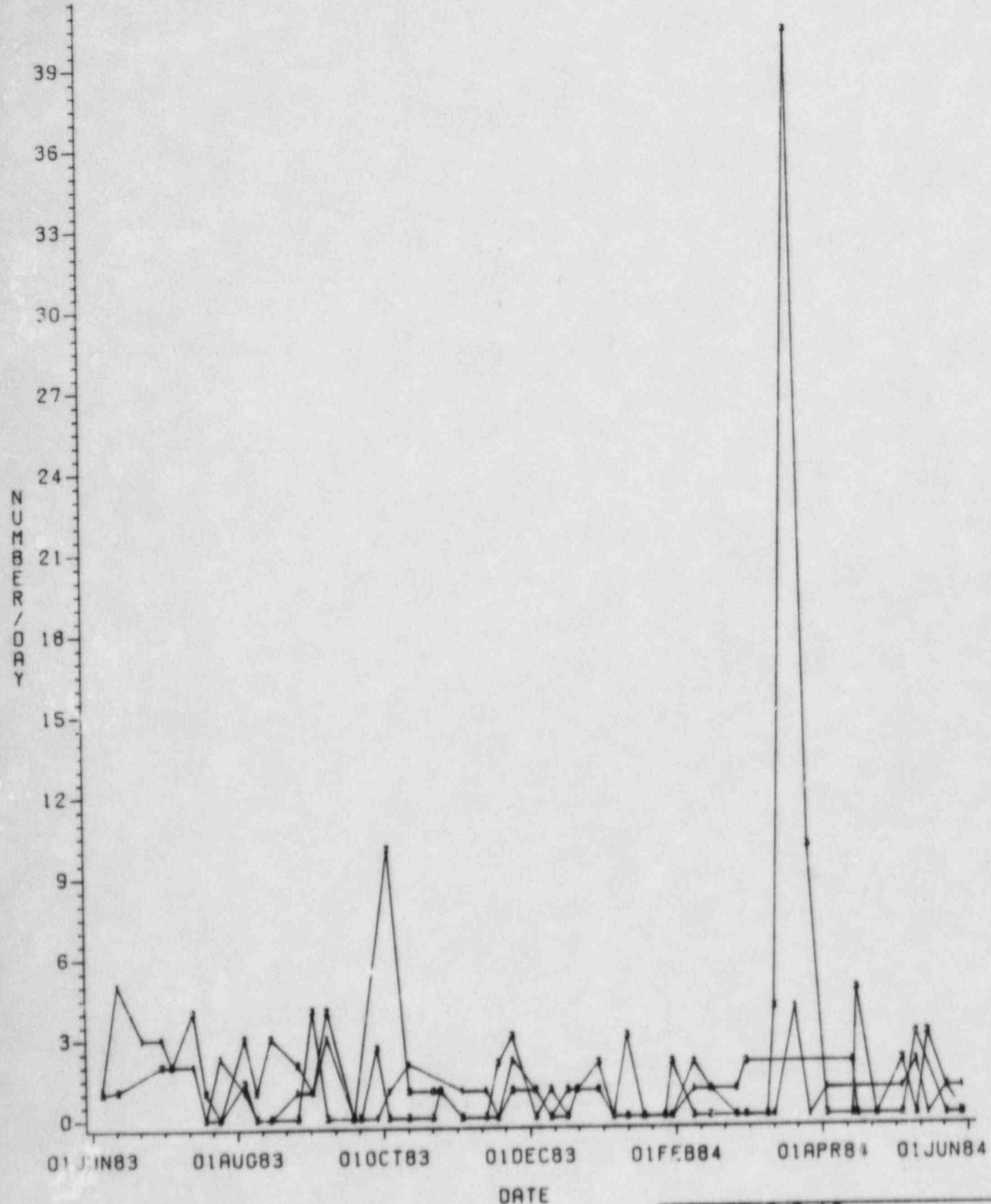

FIGURE 7.2-12
IMPINGEMENT BY DATE FOR
STONE CRAB
CRYSTAL RIVER 316 STUDIES
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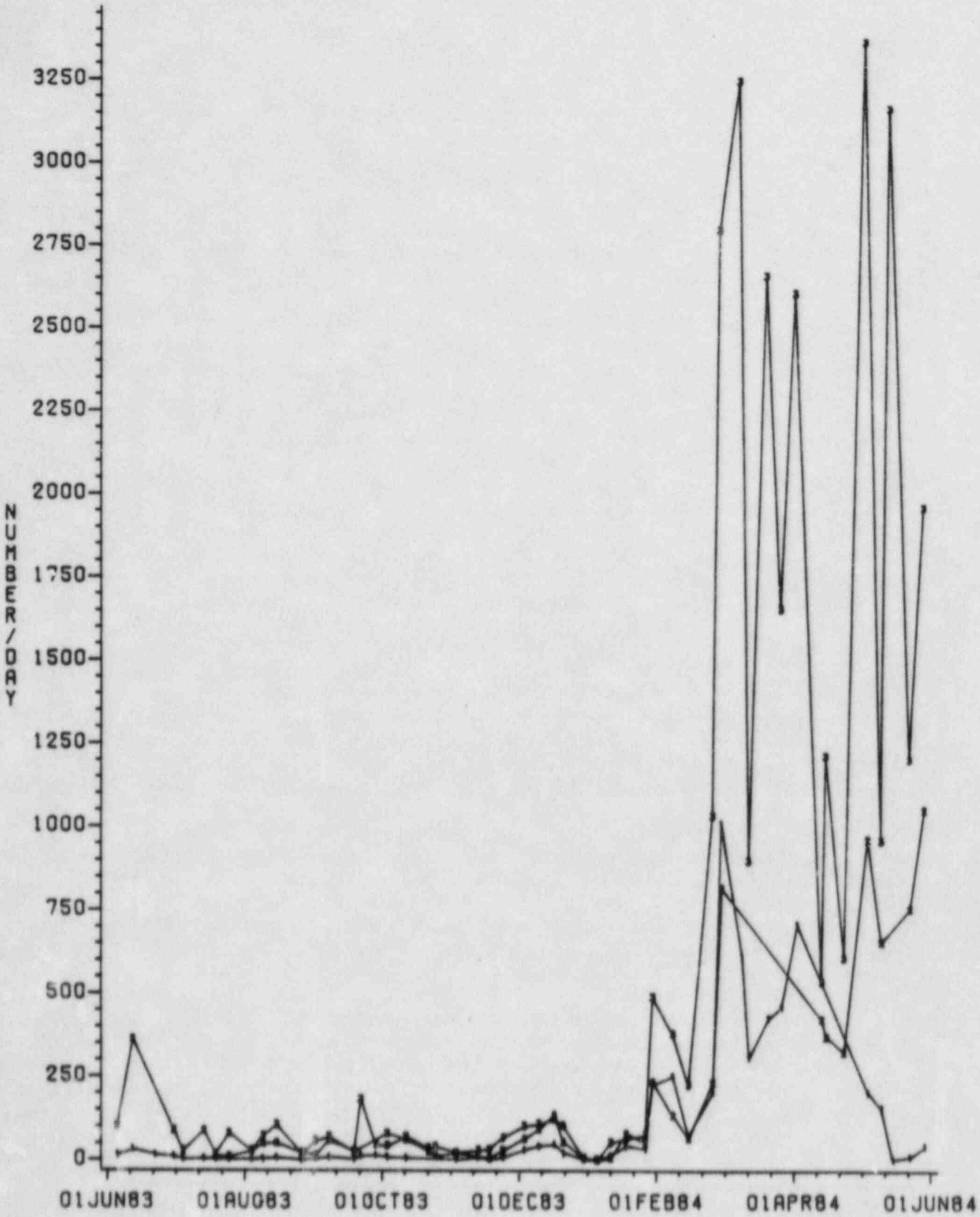

FIGURE 7.2-13
IMPINGEMENT BY DATE FOR
BLUE CRAB
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

7.3 IMPACT ASSESSMENT

The data reported in Table 7.2-2 for annual impingement of SIO has been used to evaluate the impact of impingement at Units 1, 2 and 3, combined. The numbers provided are conservative in the assumption of continuous operation, however, as noted in Section 2.0, the amount of time each unit is offline is minimized and circulating water flows are often maintained even if the unit is not generating electricity. In general, flows throughout the sampling year were close to or just below the maximum flow values (see Table 2.0-2). Exceptional periods of lower flows were usually of not more than 2 or 3 weeks duration other than during Units 3's shutdown in June and July 1983.

The data utilized represent a single year of collection, and thus do not address year-to-year variation. However, a previous impingement study was conducted at the same units sampled by the present study (NUS 1978). Projected annual impingement of pinfish and invertebrates was 2,642,732 and 721,053, respectively, with a total weight of 35,692 kg. These numbers can be compared to those in Table 7.2-1 for the current program. The total weight of organisms impinged is within 1760 kg or 5 percent of the 1983-84 value. The estimated total number of organisms impinged in 1977-78 was 28 percent greater than the 1983-84 number.

Several differences between sampling periods are apparent. Invertebrates are now taken in larger numbers than fish. Of the invertebrates, pink shrimp ranked first in both years, blue crab is now second but was previously fourth in abundance, Metoporhaphis calcarata ranked third in both years. Thus, given the similar species' rankings and higher current projections, it would appear that at least the most commonly impinged invertebrates were impinged in relatively greater numbers in 1983-84. Of the fish species impinged, scaled sardine was previously impinged in greatest numbers but is no longer common. Pinfish and silver perch have also decreased in relative ranking, while bay anchovy, spot and batfish have increased. The major difference in the present study is the lack of a major influx of scaled sardine and thread herring.

The impact of impingement on each SIO is addressed whenever possible in terms of a comparison between estimated annual impingement and local commercial landings or recreational catch. These values are used as an available indication of the local population size and of the yield being sustained by that population. Commercial landings cited are for 1982 (NOAA undated a), the most recent available. Similarly, the most recent catch data for 1980 is used (NOAA undated b).

For two SIO, no landings or catch data are available. It is estimated that 87,978 bay anchovy are impinged annually. Impinged specimens of this species average 0.004 lb. Thus the impinged fish represent about 350 lb of potential forage for aquatic species at higher trophic levels. The impingement rate can also be compared to seine collections. In September 1983, two seine hauls collected 1456 bay anchovy. Thus 121 seine hauls yielding similar numbers of bay anchovy would account for the number annually impinged. Overall, the species is a wide ranging one, occurring in large numbers in many areas including Crystal Bay, and the local impingement is probably small in comparison to the population size.

Batfish are also not a commercially important species and no catch or landings data are available. Based on impingement data, the species appears to be present at the site throughout the year. Based on fisheries data (Section 9.0), the species was not collected in large numbers in any gear at any time during the year. This occurred despite collection of almost 9,000 specimens in the impingement sampling. These results would indicate the presence of a moderate population of batfish in Crystal Bay, perhaps in the intake canal, not readily sampled by fishing gear. The losses to this population can not be quantified but would be judged large based on offshore samples. At the same time, this level of loss has been sustained since at least 1977-78 and presumably can continue to be sustained.

Pigfish are impinged in relatively low numbers. The projected annual impingement of 3697 fish is less than three times the number of fish collected in the fisheries gear during this program. There is no local fishery for pigfish but Florida west coast landings in 1982 amounted to 2158 pounds. Since the estimated annual weight of pigfish impinged is 34.6 lb, this equals 1.6 percent of the landings. This level of impingement loss should not adversely impact the fishery.

Annual impingement of pinfish is estimated to be 15,235 fish (174 lb). While there is no commercial fisheries data available, the marine recreational catch in 1980 in Region 4 (Taylor-Manatee Counties) was 6,395,000 fish. Thus the annual impingement would amount to 0.2 percent of the regional catch. A loss of this level should have no short or long-term adverse impact on the population. Large numbers of the species were taken offshore, particularly by trawl along the southern transect, throughout the study period with the plant operating.

Silver perch impingement is estimated to equal 12,000 fish (141.8 lb) per year. No commercial landings were recorded in 1982, however, the 1980 marine recreational catch in Region 4 was 3,491,000 fish. Thus the impingement at Crystal River amounts to 0.3 percent of the recreational catch, a level too low to adversely effect the population or fishery.

Spotted seatrout are estimated to be impinged in relatively low numbers. A total of 2,804 fish weighing 28 lb are projected. Seatrout are subject to both a commercial fishery and a recreational fishery. The 1982 landings in Citrus-Pasco and Levy Counties equaled 86,278 lb. The Region 4 recreational catch in 1980 was 1,849,000 fish. Given these values, the projected impingement would equal 0.03 percent of the commercial landings or 0.15 percent of the recreational catch. By either comparison the impact of impingement would be considered nominal.

Spot annual impingement is estimated to be 28,094 fish (138.3 lb). These values are strongly influenced by values at two sampling dates in May 1984. The number impinged is less than three times the number of spot taken by fisheries gear during the sampling program. Recreational catch data are not available for spot but the 1982 commercial landings in Citrus-Pasco and Levy Counties equalled 17,474 lb. Therefore, the number of spot impinged is equal to 0.8 percent of the commercial landings and should not adversely affect the fishery or the population.

A single red drum was impinged. When extrapolated to an annual value, it is estimated that 8 red drum are impinged. The 1980 Region 4 recreational catch was 229,000 fish and the 1982 Citrus-Pasco and Levy Counties commercial landings were 31,023 lb. The 8 fish equal 0.003 percent of the recreational catch. Using a weight of 1.07 lb per fish obtained from the seine samples, the weight of red drum impinged equals 0.03 percent of the commercial catch. By either indicator, the Crystal River impingement is negliglible.

A total of 1120 striped mullet (74.1 lb) are estimated to be impinged annually. This can be compared to the commercial landings of 2,656,954 lb in 1982 in Citrus-Pasco and Levy Counties and the impinged weight of mullet equals 0.003 percent of the landings. The marine recreational catch in 1982 in Region 4 is reported as 1,415,000 "mullets" but the proportion by species is not available. Based on the commercial landings, impingement at Crystal River would have a negligible effect on the commercial fishery.

Pink shrimp are impinged in large numbers at Crystal River. The annual impingement is estimated to be 640,887 shrimp (6788.5 lb). No recreational catch data for shrimp are available and the commercial data are more difficult to use than for some species since shrimp taken in the Citrus County area may be sold at docks in many different counties. Landings are also reported as bait and saltwater shrimp (heads-on), which are combined here. The reported 1982 landings in Citrus-Pasco and Levy Counties amounted to 1,076,759 lb. Based on this value, the Crystal River impingement would equal 0.6 percent of the commercial catch. Thus the plant is probably not adversely affecting the fishery.

A total of 383,560 blue crabs (28,900 lb) are estimated to be impinged annually. Recreational catch data are not available but the 1982 Citrus-Pasco and Levy Counties commercial landings amounted to 3,877,040 lb. This is the combined total of hard and soft crabs. The Crystal River impingement would equal 0.7 percent of this total. This level of impingement should not adversely effect the fishery or the population.

Stone crab were impinged in relatively small numbers. A total of 1535 crabs (136.9 lb) are calculated to be impinged annually. The number impinged is equal to 24.5 percent of the number of crabs taken offshore in 4 months of trapping. Recreational catches are not available but the Citrus-Pasco and Levy Counties commercial landings were 949,076 lb. The annual impingement would be equal to 0.01 percent of the commercial landings, a level too low to adversely affect the fishery. It is recognized that commercial landings represent a weight of claws while the impinged weight is for whole crabs. The loss percentage, therefore, should be conservative, since claw weight from impinged specimens, even accounting for potential regeneration, is unlikely to exceed 137 lb.

Brief squid are impinged at Crystal River in relatively large numbers. An annual impingement of 86,954 squid (931.8 lb) is projected. There is a local commercial fishery in Citrus-Pasco but it amounted to only 202 lb in 1982. Because local demand for squid is limited, this would not be considered a valid indication of the local population size or viability. Using the 1982 Florida West Coast landings as a better indication of the fishery for this species, the impingement estimate is 1.8 percent of the commercial landings (52,231 lb). While this is a small percentage of the Florida west coast fishery, it is not clear how it relates to the Crystal Bay area. This species is known to migrate (Laughlin and Livingston 1982) and the short, month-long period of peak impingement (Figure 7.2-10) would suggest that the squid found locally are part of a broadly distributed population. This would reduce potential for any adverse impact to the population as a result of a localized loss.

REFERENCES FOR 7.3

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NOAA. Undated a. Florida Landings by Districts, 1982. Florida Landings by Counties, 1982. National Marine Fisheries Service, Washington, D. C.

NOAA. Undated b. Estimated Total Number of Fish Caught by Marine Recreational Fishermen by Species Group and Planning Region, Jan. 1980 - Dec. 1980. National Marine Fisheries Service, Washington, D.C.

NUS. 1978. Impingement Report, March 13, 1977 to March 13, 1978. Crystal River, Unit 3. Environmental Technical Specifications. Report to Florida Power Corporation.

8.0 ENTRAINMENT

Plankton samples were collected every 2 weeks throughout the study period to define the existing conditions and to evaluate the extent and potential impacts of plankton entrainment into the cooling water systems of Units 1, 2 and 3. The assessment of entrainment effects emphasizes selected organisms as defined in Section 7.1.

8.1 SAMPLING AND LABORATORY ANALYSIS

8.1.1 Sampling Procedures

Plankton samples were collected at 15 stations in the vicinity of the Crystal River Power Station (Figure 8.1-1). Stations were sampled once during the day and once at night, every other week for 15 months. Sampling times varied to allow collections during both high and low tide conditions. Measurements of water temperature, turbidity, salinity, and dissolved oxygen were made at each station prior to sample collection. Water depth, tidal stage, and meteorological conditions were also noted.

A standard 1 m mouth diameter, 505 um mesh plankton net fitted with a calibrated General Oceanics Model 2030 digital flowmeter was used to sample at 11 stations (Stations A-K). A digital flowmeter was also suspended from the tow boat in such a way as to monitor unobstructed water flow past the moving boat during sampling. Tows were made obliquely through the water column. The weighted net was allowed to sink to near the bottom and then towed horizontally until it reached the surface. Tows were timed with a stopwatch to ensure that each tow was of equal duration (approximately 3 minutes, or to filter approximately 100 m^3 of water). Four replicates were collected serially at each station with one replicate intended as a backup.

Four replicate samples were collected during the daytime and at night in each of two tidal creeks (Stations N, P). Samples were collected with a 505 um mesh net fitted with a calibrated flowmeter attached to a frame which was lowered into the water to rest on the creek bottom. A second flowmeter mounted on the boat was used to monitor net clogging. The stationary net fished the tidal currents of the creeks.

Two stations in seagrass beds (Stations L and M) were sampled every other week during the day and at night. Samples were collected with a sled fitted with 505 um mesh netting and a calibrated flowmeter. Four replicate samples were collected by towing the sled across the seagrass bed. The location of Station L shown on Figure 8.1-1 was sampled as of October 24, 1983. Prior to that date, the station was located in Basin 1 at a grassbed which disappeared.

8.1.2 Laboratory Analysis

For all samples collected, entire replicate samples were analyzed where practicable. When large amounts of detritus, algae, or plankton necessitated subsampling, samples were fractionated using a random plankton splitter. The sample was agitated thoroughly, and aliquots were drawn off into a gridded petri dish. Each aliquot was examined twice, with agitation between examinations.

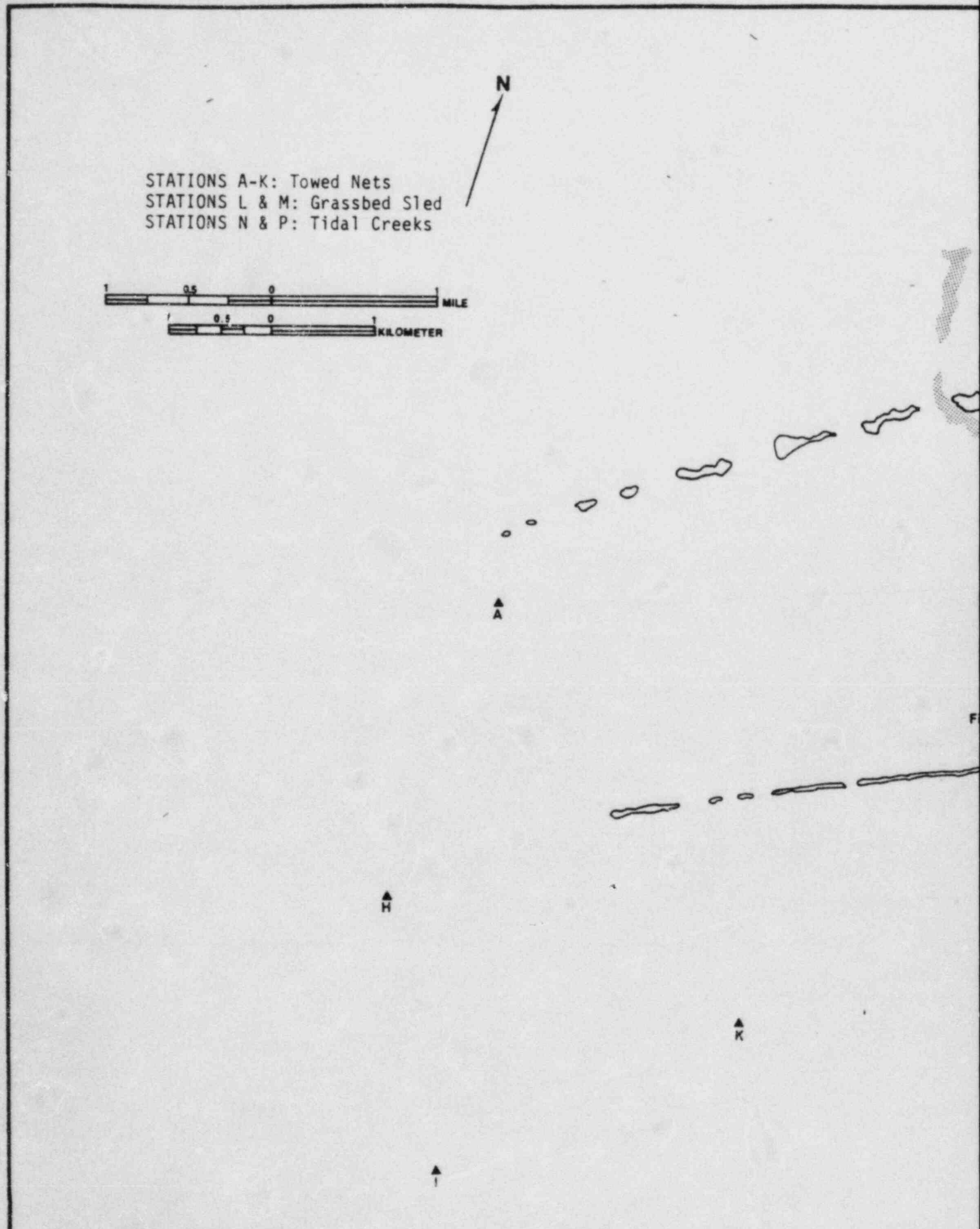
When meroplankton was abundant, samples were fractionated to the extent that approximately 100 specimens of each species were sorted. Subsamples were sorted consistently; that is, they were completely sorted for any fish eggs or larval organisms, for which less than 100 specimens had been picked from the sample.

Invertebrate meroplankton and ichthyoplankton was sorted, identified, and enumerated. Identification was made to the lowest practical taxon (usually family for eggs, species for larvae). Sorting, identification, and enumeration of the invertebrate plankton was limited to those taxa which are of commercial value in later lifestages. Developmental stages of SIO were separated, identified, and enumerated. Fish larvae of SIO were measured for standard length.

Identification of egg and larval specimens was made through the use of standard literature sources and MML's reference collection. Voucher specimens were referred to external taxonomic specialists for identification or confirmation as necessary. A reference collection of taxonomically confirmed species was maintained.

8.1.3 Statistical Analysis

For meroplankton density data, SAS was used to compare densities among stations, seasons, day/night, temperature, tide, and interactions of these variables. Tukey's HSD tests were used to compare means of station and season of sampling. The same procedures were also applied to densities of various life stages of SIO. These analyses were conducted only for stages or time periods when results would yield significant information. As with impingement data, pertinent data from Stations C, D, or E were annualized by using densities over a period of occurrence and the appropriate volume of flow through the units' circulating water system.


N
STATIONS A-K: Towed Nets
STATIONS L & M: Grassbed Sled
STATIONS N & P: Tidal Creeks
1 0.5 0 1 MILE
1 0.5 0 1 KILOMETER
A
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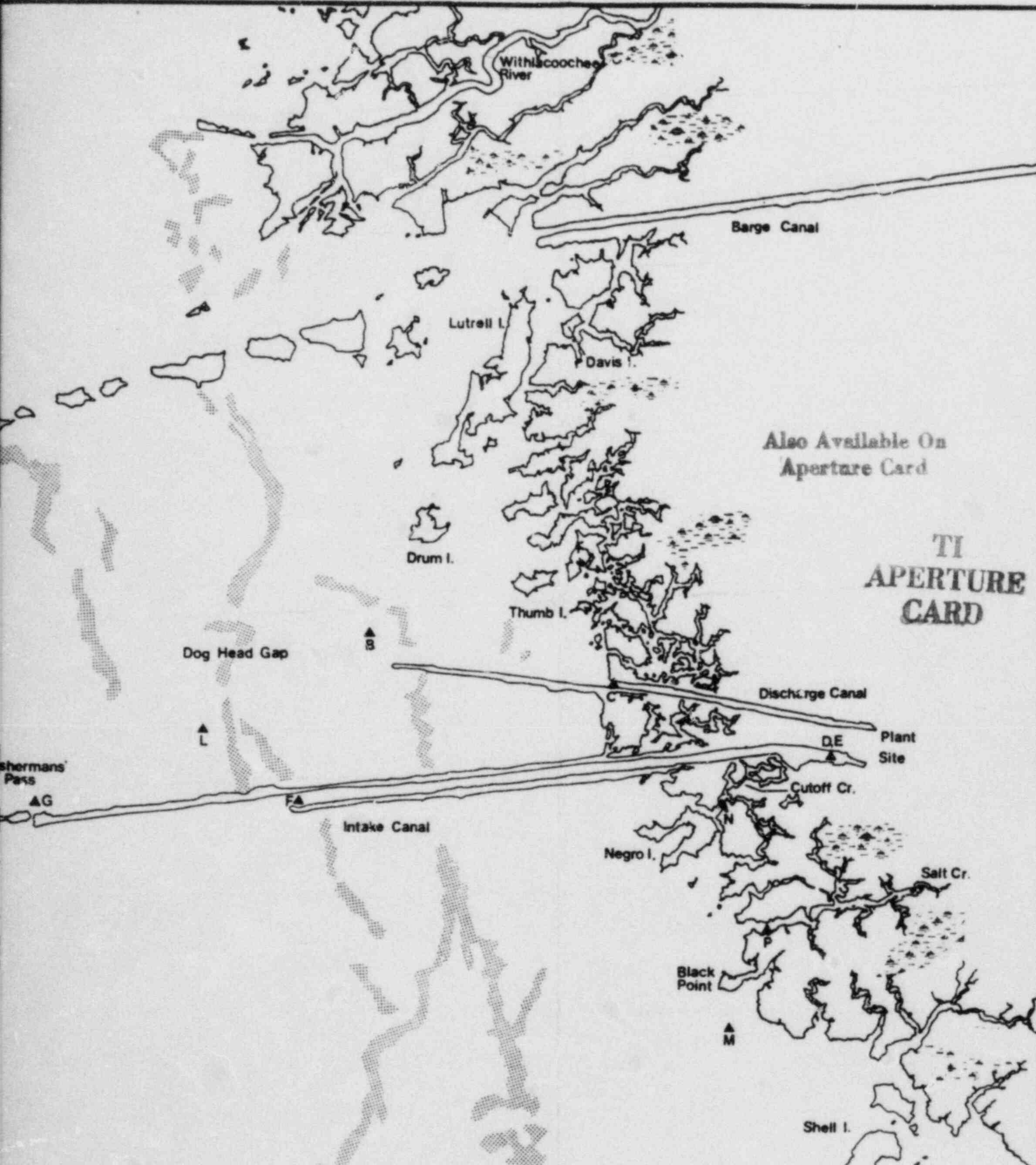

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FIGURE 8.1-1.

ENTRAINMENT STATIONS.
CRYSTAL RIVER 316 STUDIES
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8.2 RESULTS

Entrainment sampling was initiated in the middle of the 1983 spawning season and was terminated before the end of the 1984 spawning season. As a result, density data and seasonal variations must be carefully interpreted. Particular difficulty occurs with species for which spawning activity extends from before June 1 to after September 1.

8.2.1 Sampling at Stations A-K

Figure 8.2-1 summarizes the average plankton density at Stations A-K over the sampling period. Monthly average densities of total meroplankton from June into September 1983 were moderate (3.7-19.3 per m^3) compared to 1984 values (16.7-32.7 per m^3). Densities declined through September and October to significantly lower levels (less than 1 per m^3) which continued into March 1984. In early March, total meroplankton density increased rapidly, reaching significantly higher values in April (42.5 per m^3) and May. Densities from June through August were lower than in April 1984 but higher than in 1983.

Fish eggs, which comprise the majority of the ichthyoplankton, follow the same seasonal pattern defined for total plankton. Fish postlarvae did not reach the same levels as eggs in 1983 but the peaks occurred at the same times. In 1984, postlarvae increased in density in mid-March, reached a minor peak in April (3.2 per m^3), decreased in density through early June, and then increased to a maximum monthly average value in August (7.3 per m^3). In the study period, fish prolarval densities approached a monthly average of 1 per m^3 only in April 1984; a secondary, lower peak occurred in August (0.4 per m^3). Juveniles were in low numbers throughout the sampling periods (less than 0.25 per m^3).

Invertebrate meroplankton occurred in moderate densities from June to October 1983 (0.8 to 8.8 per m^3). Values were similar to those for fish eggs at this time. Low densities (less than 0.1 per m^3) continued from October through early May 1984 at which time densities increased to a moderate peak in July (5.2 per m^3) and a maximum value in August (10.2 per m^3).

Figures 8.2-2 through 8.2-12 summarize density data for each Selected Important Organism (SIO). The patterns of occurrence vary but are all characterized by sharp peaks, often representing a single sampling date. Bay anchovy spawning dominated plankton collections as indicated by comparing relative densities. For eggs, in particular, the pattern of densities over time for bay anchovies is essentially the pattern for total plankton. Other species contribute a smaller portion of the plankton at a particular time.

A limited amount of information on early life stages of most SIO is available from the Crystal River plankton collections. This may result from the species lifestage simply not occurring in the area, but more usually results from the inability to distinguish taxonomically between eggs and prolarvae of closely related species. Unidentifiable life stages were lumped at the lowest possible taxon. As a result, pigfish and red drum were only found as postlarvae; spot, spotted seatrout, and pinfish were found as postlarvae and juveniles; batfish were collected only as juveniles; and no silver perch eggs and few prolarvae were identified.

Invertebrate SIO plankton was dominated by stone crab larvae. Larval densities decreased with increasing life stage and generally peaked in late summer. Brief squid were the second largest component of the SIO invertebrate plankton. They occurred in low (less than 0.25 per 100 m^3), variable densities with highest densities in late fall and late spring. Blue crab larvae were identified only as megalops; these were collected during the summer.

The distribution of total meroplankton within the study area was defined primarily by the distribution of bay anchovy eggs and larvae, sciaenid eggs and larvae, and stone crab larvae. Other taxa contributed pulses of high density for shorter periods and perhaps at only a few stations, e.g., Gobiosoma robustum in spring and early summer, Brevoortia sp. in January and February, and spot in January.

From initiation of sampling in June 1983 through early September the spatial pattern of total plankton distribution on each sampling date was consistent (Figure 8.2-13). Concentrations at inshore Stations B, C, D, E, F, and J were relatively low; highest values were consistently at offshore Stations A, H, and K. By late September, values at all stations except K were less than 8 per m^3, and in October, values at all stations were down to less than 1.3 per m^3; this continued through February. In early March, large numbers of bay anchovies were collected only inshore to the south at Station J (66.5 per m^3). By late March, bay anchovies were concentrated at Stations D, G, I, and K. In early April, large numbers of bay anchovies were collected at B and G (136 and 31.6 per m^3), while sciaenids occurred in large numbers offshore at Stations I and K (39.2 and 42.8 per m^3). By the next collection, bay anchovies dominated and numbers peaked at inshore Stations D, E, F, G, and J. By May the pattern identified in 1983 was reestablished with low densities (less than 10 per m^3) inshore and high values (up to 90 per m^3) offshore (Figure 8.2-14). This continued through the end of sampling with the exception of early August when values at D, E, and G (inshore) were also high (33-85 per m^3), primarily as a result of stone crab and bay anchovy densities. Stone crabs and sciaenids also contributed significantly to levels reached offshore at Stations H, I, and K.

Statistical analyses of total plankton densities throughout the sampling period used a square root transformation of mean densities to reduce variations in the residuals and considered variation with season, station, day/night, temperature, tide and with season-station, season-day/night, and station-day/night. Results of the ANOVA are provided in Table 8.2-1. Densities did not vary significantly with tide. Season was a highly significant variable as were station and station-season. Day/night was also positively correlated but accounts for less of the variation. Temperature had an even smaller effect, but the analyses had already considered season.

Seasonal variation in density has been described above. Densities at night were significantly higher than those collected during the day. Analyses by station indicate that offshore Stations K, A, I, and H had the highest overall values and were not significantly different from one another. All were significantly different from inshore Stations E, D, F, C, and B. The observed seasonal grouping of Station J with the inshore stations was not apparent from this analysis. Station J was significantly different from the inshore stations and from Station K offshore but was similar to Stations A, G, H, and I.

Analyses of the effect of season, station, day/night, temperature, tide, and interactions on density were conducted using the mean densities. The analyses were run for selected life stages for each SIO during their periods of occurrence when enough data were available. Bay anchovy densities were analyzed for four life stages (Tables 8.2-2 to 8.2-5). Egg densities did not vary significantly with tide, temperature, or day/night. The density distribution was fairly uniform; Station A had the highest densities (17.16 per m^3) but was not significantly different from Stations B, E, F, G, J, and K. Station C had the lowest density (1.36 per m^3) but was significantly different only from offshore Stations A and J. Anchovy prolarvae were similarly uniform in distribution with no significant differences found between any stations. The distribution of postlarvae was similar to that of eggs with high values at Station A (2.2 per m^3), which was significantly different only from low values at B and C (0.67 and 0.57 per m^3). Juvenile bay anchovy were much less common than other stages. On the two dates when they did occur in significantly higher densities (max. 0.62 per m^3), they were concentrated at Stations B and G. All three later stages occurred in significantly higher numbers at night.

Sciaenid egg densities were analyzed and showed significant differences by season, tide stage, night/day, and station (Table 8.2-6). Offshore Stations K and I did not differ from one another but had significantly higher densities (9.96 and 8.62 per m^3) than other stations. Station B had the lowest densities (0.05 per m^3), but the value did not differ significantly from densities at Stations C-G and J.

Data on the number of postlarvae of spotted seatrout (Table 8.2-7), silver perch (Table 8.2-8), pinfish (Table 8.2-9), and spot (Table 8.2-10) collected were analyzed. Seatrout densities were highest offshore (Stations H, I, and K) (maximum 0.02 per m^3) and lowest at Stations B-F inshore. Pinfish densities were significantly higher at Stations G and F (0.17 and 0.08 per m^3) but otherwise uniform in distribution. Spot postlarval densities were highest at Station E (0.05 per m^3), but the value at that station was not significantly different from densities at Stations A, D, F, G, and I. Low densities at Station H (0.002 per m^3) were only different from values at E and I. Thus, values were generally low and fairly uniform. Densities of silver perch postlarvae were significantly higher at H (0.09 per m^3) and lower at E (0.004 per m^3), but intermediate values did not differ significantly.

The densities of all stages of stone crabs were combined and the data analyzed (Table 8.2-11). Neither tide nor day/night variation was significant. Highest densities were at Station K (14.3 per m^3), but values at Stations K, A, H, and I did not differ significantly. Low values at Station B (1.1 per m^3) did not differ significantly from Stations C-G and J. Shrimp postlarvae were similarly analyzed (Table 8.2-12) but their distribution was uniform except at Stations B and G where mean densities were higher (0.1 and 0.13 per m^3).

Stations D and E were located immediately in front of the intakes for Units 3 and 1 and 2, respectively. Thus, values from these stations can be utilized in assessing the effects of entrainment. In addition, samples taken at

Station C, because of its location and the local hydrodynamic conditions, are assumed to have contained organisms which may have passed through the units. Considered as a group, densities at these stations in 1983 showed moderate peaks in early July (stone crab) and late August (bay anchovy and stone crab), relatively low values for the remainder of the summer, and very low values from mid-October through February 1984 (see Figures 8.2-15 and 8.2-16). In late March, numbers increased to a sharp peak in April (bay anchovy) and then fell to very low values throughout May. Values increased slowly through June and July with a significant peak being reached in mid-August (bay anchovy and stone crab).

Differences between stations were not consistent, but peaks at Station C and to a lesser extent D were influenced primarily by stone crabs while peaks at D and sometimes E are dominated by bay anchovy. In July 1983, the highest densities were at Station C but by August, the bay anchovy densities were high throughout Crystal Bay and highest at Station E. In 1984, the March-April values peaked at D and E (bay anchovy); in August, the values again peaked at E and D and resulted primarily from bay anchovy and stone crab.

Other than for bay anchovy and stone crabs, SIO meroplankton densities were relatively low at Stations C, D, or E. Silver perch were taken in greatest numbers at C and pinfish at E. Spotted seatrout were evenly distributed. Spot were collected in highest densities at E and squid at C and E. Some species were collected in very small numbers. Batfish were collected only at E, pigfish and red drum at C, and blue crabs only at C and D. Mullet and shrimp were not collected at C, D, or E.

Ambient concentrations of each SIO were used to calculate an annual number entrained for each life stage at Stations C, D, and E. The results are provided in Tables 8.2-13, 14, and 15. The numbers are obtained by taking the average density during each sampling period, multiplying by the total flow (100%) for the three units, and adding the values for each sampling period to determine the annual entrainment (Reimann integration). Data from June through August 1984 were combined with 1983 data for the comparable time period. This effectively reduced the sampling periods used from two weeks to about one week.

Because of problems associated with identifying the early life stages of some species it is appropriate to consider the next highest taxon which could contain SIO. Tables 8.2-16, 17, and 18 present annual entrainment data for these taxa at Stations C, D, and E. <u>Anchoa</u> sp. probably contains very small larvae of <u>A. mitchilli</u> and larger damaged specimens as well as other species. Values for Haemulidae (including pigfish) and Mugillidae (including striped mullet) are for eggs and for postlarvae and juveniles, respectively. Each value is based on a single collection date. Numbers for Sciaenidae are significant but represent eggs and prolarvae of a number of species not restricted to SIO. Postlarvae and juveniles could be identified. Only the megalops stage of blue crabs were identified in the study area. The <u>Callinectes</u> sp. numbers can represent a number of species.

8.2.2 Sampling at Stations L, M, N, and P

Grassbed plankton sampling at Stations L and M yielded low densities (less than 5 per m^3) throughout 1983 (see quarterly tables). Both stations had comparable values. In 1984, values up to 45 per m^3 were recorded beginning in late March. Through April and again from mid-July through mid-August values at Station L were highest. Values at M were higher only in May. Species diversity at both L and M was less than diversity in offshore net tows, at most yielding 30 taxa and generally less than 20. Densities at Station L were dominated by bay anchovies and to a lesser extent by stone crabs and gobies. Collections at Station M were dominated primarily by gobies.

Collections made in Cutoff (Station N) and Salt Creeks (Station P) yielded low densities throughout the study. With the exception of the first two collections when Station N had high numbers of stone crabs and then bay anchovies, values at both stations were similar. Diversity was also similar at both stations; no more than 20 taxa were ever collected. Gobies frequently comprised the largest portion of the samples at both stations. Cutoff Creek also occasionally yielded blennies, which were not common at Salt Creek.

TABLE 8.2-1

TOTAL PLANKTON

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SQUARE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	111	822219.47253050	7407.38263541	19.39	0.0001	0.526324	81.9003
ERROR	1937	739972.24544041	382.01974468		ROOT MSE		SQUARE MEAN
CORRECTED TOTAL	2048	1562191.71797091			19.54532539		23.86477083

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SEASON	7	478491.42686787	178.93	0.0001	7	231700.25878913	86.64	0.0001
STATION	10	121458.36284226	31.79	0.0001	10	122645.18390898	32.10	0.0001
DN	1	33444.66177804	87.55	0.0001	1	32019.13444763	83.82	0.0001
SEASON*STATION	70	122712.34075223	4.59	0.0001	70	124145.22694732	4.64	0.0001
SEASON*DN	7	37612.04860204	14.07	0.0001	7	35402.92089036	13.24	0.0001
STATION*DN	10	17743.60268536	4.64	0.0001	10	16100.31277922	4.21	0.0001
TEMP	1	7853.36217603	20.56	0.0001	1	7878.36998742	20.62	0.0001
TIDE	5	2903.66680667	1.52	0.1790	5	2903.66680667	1.52	0.1790

TABLE 8.2-2

BAY ANCHOVY-EGGS

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	85	2645212740.2703809	31120149.8855339	4.51	0.0001	0.219918	316.7758
ERROR	1360	9382955624.8027970	6899232.0770609		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	1445	12028168365.0731780			2626.6389316		829.17916321

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SEASON	5	751080364.3887545	21.77	0.0001	5	720394628.8391129	20.88	0.0001
STATION	10	272749242.7943199	3.95	0.0001	10	302006470.0592446	4.38	0.0001
DN	1	6528326.4193280	0.95	0.3309	1	7084457.9743267	1.03	0.3111
SEASON*STATION	50	822460294.8539739	2.38	0.0001	50	865114179.6271774	2.51	0.0001
SEASON*DN	5	545456151.1021438	15.81	0.0001	5	534648339.2008721	15.50	0.0001
STATION*DN	10	135105513.7035924	1.96	0.0344	10	130606017.5773013	1.89	0.0421
TEMP	1	21877078.9683724	3.17	0.0752	1	14581282.1837330	2.11	0.1462
TIDE	3	89955768.0398959	4.35	0.0049	3	89955768.0398959	4.35	0.0049

TABLE 8.2-3

BAY ANCHOVY-PROLARVAE

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	49	2428739.75893670	49566.11752932	4.14	0.0001	0.189087	375.0740
ERROR	871	10415833.35984838	11958.47687698		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	920	12844573.11878508			109.35482100		29.15553529

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SEASON	2	533165.27894867	22.29	0.0001	2	392401.13272431	16.41	0.0001
STATION	10	227051.20173871	1.90	0.0420	10	585171.15637760	4.89	0.0001
DN	1	169661.23272726	14.19	0.0002	1	320417.26755194	26.79	0.0001
SEASON*STATION	20	795735.46246991	3.33	0.0001	20	761081.19757986	3.18	0.0001
SEASON*DN	2	348157.57603516	14.56	0.0001	2	294840.76791345	12.33	0.0001
STATION*DN	10	205173.06931105	1.72	0.0729	10	210663.84549267	1.76	0.0633
TEMP	1	125192.60944490	10.47	0.0013	1	131709.41387268	11.01	0.0009
TIDE	3	24603.32826104	0.69	0.5646	3	24603.32826104	0.69	0.5646

TABLE 8.2-4

BAY ANCHOVY-POSTLARVAE

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	73	39868304.61550998	546141.15911658	4.70	0.0001	0.216373	263.4953
ERROR	1243	144389277.70230388	116161.92896404		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	1316	184257582.31781386			340.82536432		129.34779803

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SEASON	4	9623863.78561706	20.71	0.0001	4	9937648.75841503	21.39	0.0001
STATION	10	3484791.01786677	3.00	0.0009	10	5623100.87621933	4.84	0.0001
DM	1	7974675.69957590	68.65	0.0001	1	7785797.34269059	67.03	0.0001
SEASON*STATION	40	8680118.10835452	1.87	0.0009	40	8703177.79052628	1.87	0.0009
SEASON*DM	4	3058408.60337458	6.58	0.0001	4	2936745.42708730	6.32	0.0001
STATION*DM	10	4372220.30543122	3.76	0.0001	10	4241143.87626479	3.65	0.0001
TEMP	1	2222619.21900139	19.13	0.0001	1	2150889.68074984	18.52	0.0001
TIDE	3	451657.87628855	1.30	0.2735	3	451657.87628855	1.30	0.2735

TABLE 8.2-5

BAY ANCHOVY-JUVENILES

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	72	338645.60388574	4703.41116508	8.46	0.0001	0.703389	276.4538
ERROR	257	142802.80464760	555.65293637		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	329	481448.40853333			23.57229171		8.52666667

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
DATE	4	8109.62171212	3.65	0.0065	4	8277.33218907	3.72	0.0058
STATION	10	110890.88949333	19.96	0.0001	10	96393.85642441	17.35	0.0001
DN	1	23900.33503030	43.01	0.0001	1	19225.51436354	34.60	0.0001
DATE*STATION	40	73348.84396121	3.30	0.0001	40	73112.97684561	3.29	0.0001
DATE*DN	4	8146.46607576	3.67	0.0060	4	9355.91056473	4.21	0.0026
STATION*DN	10	110975.45872970	19.97	0.0001	10	85963.45993135	15.47	0.0001
TEMP	1	343.69436058	0.62	0.4323	1	291.01327346	0.52	0.4699
TIDE	2	2930.29452273	2.64	0.0735	2	2930.29452273	2.64	0.0735

TABLE 8.2-6

SCIAENID EGGS

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	73	470122633.34303320	6440036.07319224	9.70	0.0001	0.363598	278.2807
ERROR	1240	822851421.98566180	663589.85644005		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	1313	1292974055.32869500			814.61024818		292.72972603

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SEASON	4	34983088.56316099	13.18	0.0001	4	32672465.88632432	12.31	0.0001
STATION	10	150582960.40980291	22.69	0.0001	10	148428878.16135836	22.37	0.0001
DN	1	58004536.29874186	87.41	0.0001	1	62053776.08873319	93.51	0.0001
SEASON*STATION	40	117975469.38893882	4.44	0.0001	40	117679464.37825978	4.43	0.0001
SEASON*DN	4	19058136.21396735	7.18	0.0001	4	12810948.78078237	4.83	0.0007
STATION*DN	10	72865468.34713550	10.98	0.0001	10	74246959.65125877	11.19	0.0001
TEMP	1	3456329.41774113	5.21	0.0226	1	3104594.70122555	4.68	0.0307
TIDE	3	13196644.70354479	6.63	0.0002	3	13196644.70354479	6.63	0.0002

TABLE 8.2-7

SPOTTED SEATROUT-POSTLARVAE

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SQUARE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	133	1365.08601008	10.26380459	15.33	0.0001	0.796831	62.5897
ERROR	520	348.05699213	0.66934037		ROOT MSE		SQUARE MEAN
CORRECTED TOTAL	653	1713.14300221			0.81813224		1.30713579

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
DATE	9	234.77917569	38.97	0.0001	9	113.48762680	18.84	0.0001
STATION	10	301.07862148	44.98	0.0001	10	237.14971569	35.43	0.0001
DN	1	111.51198763	166.60	0.0001	1	95.70779210	142.99	0.0001
DATE*STATION	90	448.80248349	7.45	0.0001	90	448.77483530	7.45	0.0001
DATE*DN	9	75.93010607	12.60	0.0001	9	75.80466737	12.58	0.0001
STATION*DN	10	187.51420222	28.01	0.0001	10	154.31251751	23.05	0.0001
TEMP	1	0.50951371	0.76	0.3834	1	0.26363402	0.39	0.5305
TIDE	3	4.95991979	2.47	0.0601	3	4.95991979	2.47	0.0601

TABLE 8.2-8

SILVER PERCH-POSTLARVAE

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	73	27008.61036864	369.98096395	3.74	0.0001	0.516103	226.9082
ERROR	256	25323.25139045	98.91895074		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	329	52331.86175909			9.94580066		4.38318182

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
DATE	4	5474.88933333	13.84	0.0001	4	4099.03311297	10.36	0.0001
STATION	10	2603.00288909	2.63	0.0046	10	2137.39531298	2.16	0.0206
DN	1	2686.98400758	27.16	0.0001	1	2767.30292452	27.98	0.0001
DATE*STATION	40	8235.79165333	2.08	0.0004	40	8873.70809038	2.24	0.0001
DATE*DN	4	5257.80164242	13.29	0.0001	4	5360.37287163	13.55	0.0001
STATION*DN	10	1925.23148909	1.95	0.0397	10	2154.72162063	2.18	0.0196
TEMP	1	29.15513348	0.29	0.5877	1	58.70341619	0.59	0.4418
TIDE	3	795.75422030	2.68	0.0466	3	795.75422030	2.68	0.0466

TABLE 8.2-9

PINFISH-POSTLARVAE

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	55	35251.77635171	640.94138821	9.43	0.0001	0.774549	146.5807
ERROR	151	10260.90130916	67.95298880		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	206	45512.67766087			8.24336029		5.62376812

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
DATE	3	10979.34796052	53.86	0.0001	3	3638.68712439	17.85	0.0001
STATION	10	4440.75108424	6.54	0.0001	10	4658.39559906	6.86	0.0001
DN	1	1871.48292910	27.54	0.0001	1	1268.93698029	18.67	0.0001
DATE*STATION	25	9662.48611756	5.69	0.0001	25	8177.35727845	4.81	0.0001
DATE*DN	2	3167.19734880	23.30	0.0001	2	4772.74018666	35.12	0.0001
STATION*DN	10	3869.86646215	5.69	0.0001	10	3382.68780853	4.98	0.0001
TEMP	1	226.33169601	3.33	0.0700	1	742.81300640	10.93	0.0012
TIDE	3	1034.36275333	5.07	0.0028	3	1034.36275333	5.07	0.0024

TABLE 8.2-10

SPOT-POSTLARVA

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	55	2980.30093187	54.18728967	3.95	0.0001	0.589914	209.3122
ERROR	151	2071.79374445	13.72048837		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	206	5052.09467633			3.70411776		1.76966184

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
DATE	3	115.96706737	2.82	0.0405	3	72.13458235	1.75	0.1570
STATION	10	554.89148824	4.04	0.0001	10	724.34974309	5.28	0.0001
DN	1	3.43946936	0.25	0.6173	1	11.54173183	0.84	0.3605
DATE*STATION	25	1365.24637358	3.98	0.0001	25	1315.76461170	3.84	0.0001
DATE*DN	2	125.92635657	4.59	0.0116	2	159.95998985	5.83	0.0036
STATION*DN	10	704.81387787	5.14	0.0001	10	678.64885240	4.95	0.0001
TEMP	1	13.94598298	1.02	0.3150	1	11.54926835	0.84	0.3604
TIDE	3	96.07031591	2.33	0.0750	3	96.07031591	2.33	0.0750

TABLE 8.2-11

STONE CRAB-ALLSTAGES

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	61	507534148.32661200	8320231.93981331	6.10	0.0001	0.273709	192.6289
ERROR	988	1346751913.64716500	1363109.22433924		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	1049	1854286061.97577710			1167.52268686		606.09930476

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SEASON	3	72088328.41075621	17.63	0.0001	3	65787483.89156937	16.09	0.0001
STATION	10	271670321.89273368	19.93	0.0001	10	292930926.71033113	21.49	0.0001
DN	1	792728.18028907	0.58	0.4459	1	1016871.00325960	0.75	0.3880
SEASON*STATION	30	118677149.64739511	2.90	0.0001	30	120813792.90175252	2.95	0.0001
SEASON*DN	3	1509195.34551343	0.37	0.7783	3	1351368.74279376	0.33	0.8056
STATION*DN	10	16461643.18342847	1.21	0.2816	10	14124456.03176733	1.04	0.4104
TEMP	1	26074561.26688104	19.13	0.0001	1	25656665.45421696	18.82	0.0001
TIDE	3	260228.40161532	0.06	0.9735	3	260228.40161532	0.06	0.9735

TABLE 8.2-12

PINK SHRIMP POSTLARVAE

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIAB' E: SUMDEN

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	49	39225.48679345	800.52013864	11.21	0.0001	0.450512	211.8144
ERROR	670	47843.13691641	71.40766704		ROOT MSE		SUMDEN MEAN
CORRECTED TOTAL	719	87068.62370986			8.45030574		3.98948611

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SEASON	2	502.28033564	3.52	0.0302	2	292.35[illegible]52695	2.05	0.1299
STATION	10	10744.75117337	15.05	0.0001	10	9353.93505471	13.10	0.0001
DN	1	10117.28601442	141.68	0.0001	1	7364.82996027	103.14	0.0001
SEASON*STATION	20	5333.58234882	3.73	0.0001	20	4624.44978615	3.24	0.0001
SEASON*DN	2	586.05308166	4.10	0.0169	2	1333.63492759	9.34	0.0001
STATION*DN	10	10808.92482383	15.14	0.0001	10	11545.38679613	16.17	0.0001
TEMP	1	9.59345137	0.1[illegible]	0.7141	1	1.24616865	0.02	0.8949
TIDE	3	1123.01556435	5.24	0.0015	3	1123.01556435	5.24	0.0015

TABLE 8.2-13

ANNUAL NUMBERS ENTRAINED (IN MILLIONS) BY SPECIES AND LIFESTAGE

BASED ON DENSITY AT STATION C

SPECIES NAME	LIFESTAGE	DAY ENTRAINMENT	NIGHT ENTRAINMENT	TOTAL ENTRAINMENT
TOTAL FISH	EGGS	1624	1657	3281
	PROLARVAE	38.06	57.24	95.3
	POSTLARVAE	836.5	1843	2679
	JUVENILES	.9875	169.3	170.3
TOTAL INVERTEBRATES	ALL	1685	589.3	2274
BAY ANCHOVY	EGGS	1538	513.1	2051
	PROLARVAE	34.3	53.14	87.44
	POSTLARVAE	54.09	212	266.1
	JUVENILES	.0000	154.6	154.6
POLKA-DOT BATFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PIGFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.7552	.7552
	JUVENILES	.0000	.0000	.0000
PINFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.9726	2.742	3.714
	JUVENILES	.0000	.1157	.1157
SILVER PERCH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0846	.0846
	POSTLARVAE	2.388	19.25	21.64
	JUVENILES	.0000	.2173	.2173
SPOTTED SEATROUT	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	2.061	3.258	5.32
	JUVENILES	.0000	.0000	.0000

SPOT	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	2.966	2.966
	JUVENILES	.2927	.1173	.4101
RED DRUM	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.2951	.2951
	JUVENILES	.0000	.0000	.0000
STRIPED MULLET	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PINK SHRIMP	MYSIS	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
BLUE CRAB	STAGE1	.0000	.0000	.0000
	STAGE2	.0000	.0000	.0000
	STAGE3	.0000	.0000	.0000
	STAGE4	.0000	.0000	.0000
	STAGE5	.0000	.0000	.0000
	MEGALOPS	1014	.0000	.1014
STONE CRAB	STAGE1	1593	529.1	2122
	STAGE2	75.66	26.22	101.9
	STAGE3	11.47	8.403	19.87
	STAGE4	2.471	1.45	3.921
	STAGE5	.2934	.0852	.3786
	MEGALOPS	.1092	.0699	.1791
BRIEF SQUID	ALL	.2598	.6462	.9060

TABLE 8.2-14

ANNUAL NUMBERS ENTRAINED (IN MILLIONS) BY SPECIES AND LIFESTAGE

BASED ON DENSITY AT STATION D

SPECIES NAME	LIFESTAGE	DAY ENTRAINMENT	NIGHT ENTRAINMENT	TOTAL ENTRAINMENT
TOTAL FISH	EGGS	3789	8589	12378
	PROLARVAE	78.36	731.9	810.3
	POSTLARVAE	736.6	1186	1923
	JUVENILES	5.568	13.35	18.92
TOTAL INVERTEBRATES	ALL	2012	751.6	2764
BAY ANCHOVY	EGGS	3744	7930	11674
	PROLARVAE	65.46	702.3	767.8
	POSTLARVAE	130.4	194.8	325.2
	JUVENILES	.0000	.2550	.2550
POLKA-DOT BATFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PIGFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PINFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	4.92	3.475	8.394
	JUVENILES	.0000	1.705	1.705
SILVER PERCH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	1.023	1.086	2.11
	JUVENILES	.0000	.0000	.0000
SPOTTED SEATROUT	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	3.921	2.241	6.161
	JUVENILES	.0000	.0000	.0000

SPOT	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	2.616	1.159	3.775
	JUVENILES	.0000	.0000	.0000
RED DRUM	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
STRIPED MULLET	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PINK SHRIMP	MYSIS	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
BLUE CRAB	STAGE1	.0000	.0000	.0000
	STAGE2	.0000	.0000	.0000
	STAGE3	.0000	.0000	.0000
	STAGE4	.0000	.0000	.0000
	STAGE5	.0000	.0000	.0000
	MEGALOPS	.1782	.1850	.3631
STONE CRAB	STAGE1	1807	684.5	2491
	STAGE2	170.3	26.02	196.3
	STAGE3	27.23	4.192	31.42
	STAGE4	5.889	.2796	6.168
	STAGE5	.0000	.1170	.1170
	MEGALOPS	.0000	.0000	.0000
BRIEF SQUID	ALL	.0891	.0000	.0891

TABLE 8.2-15

ANNUAL NUMBERS ENTRAINED (IN MILLIONS) BY SPECIES AND LIFESTAGE

BASED ON DENSITY AT STATION E

SPECIES NAME	LIFESTAGE	DAY ENTRAINMENT	NIGHT ENTRAINMENT	TOTAL ENTRAINMENT
TOTAL FISH	EGGS	6106	6433	12538
	PROLARVAE	61.09	395.1	456.2
	POSTLARVAE	1390	1253	2643
	JUVENILES	15.39	8.97	24.36
TOTAL INVERTEBRATES	ALL	2672	734.7	3407
BAY ANCHOVY	EGGS	6062	5378	11440
	PROLARVAE	50.6	188.7	239.3
	POSTLARVAE	534.3	152.3	686.6
	JUVENILES	.8850	.0000	.8850
POLKA-DOT BATFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.1944	.0000	.1944
PIGFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PINFISH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	13.93	2.753	16.69
	JUVENILES	1.571	.5836	2.154
SILVER PERCH	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	1.265	1.265
	JUVENILES	.0000	.0000	.0000
SPOTTED SEATROUT	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	4.197	2.301	6.497
	JUVENILES	.0000	.0000	.0000

SPOT	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	10.99	1.292	12.28
	JUVENILES	.4559	1.277	1.733
RED DRUM	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
STRIPED MULLET	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PINK SHRIMP	MYSIS	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
BLUE CRAB	STAGE1	.0000	.0000	.0000
	STAGE2	.0000	.0000	.0000
	STAGE3	.0000	.0000	.0000
	STAGE4	.0000	.0000	.0000
	STAGE5	.0000	.0000	.0000
	MEGALOPS	.0000	.0000	.0000
STONE CRAB	STAGE1	2388	641	3029
	STAGE2	222	32.62	254.6
	STAGE3	44.93	7.085	52.01
	STAGE4	13.44	1.405	14.84
	STAGE5	.0000	.3771	.3771
	MEGALOPS	1.412	.9391	2.351
BRIEF SQUID	ALL	.1183	.6862	.8044

TABLE 8.2-16

ANNUAL NUMBERS ENTRAINED (IN MILLIONS) BY SPECIES AND LIFESTAGE

FOR SELECTED GROUPS NOT IDENTIFIED TO THE SPECIES LEVEL

BASED ON DENSITY AT STATION C

SPECIES NAME	LIFESTAGE	DAY ENTRAINMENT	NIGHT ENTRAINMENT	TOTAL ENTRAINMENT
ANCHOA SP.	EGGS	.0000	.0000	.0000
	PROLARVAE	.6822	.1701	.8523
	POSTLARVAE	216.7	376	592.7
	JUVENILES	.0000	.0000	.0000
HAEMULIDAE	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
SCIAENIDAE	EGGS	32.98	1069	1102
	PROLARVAE	.1892	1.163	1.352
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
MUGILLIDAE AND MUGI	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PENAEUS SP.	MYSIS	.0000	.2173	.2173
	POSTLARVAE	1.962	16.87	18.83
	JUVENILES	.0000	.8453	.8453
CALLINECTES SP.	STAGE1	.0000	.0000	.0000
	STAGE2	.0000	.0000	.0000
	STAGE3	.0000	.0000	.0000
	STAGE4	.0000	.0000	.0000
	STAGE5	.0000	.0000	.0000
	MEGALOPS	.3587	5.277	5.636

TABLE 8.2-17

ANNUAL NUMBERS ENTRAINED (IN MILLIONS) BY SPECIES AND LIFESTAGE

FOR SELECTED GROUPS NOT IDENTIFIED TO THE SPECIES LEVEL

BASED ON DENSITY AT STATION D

SPECIES NAME	LIFESTAGE	DAY ENTRAINMENT	NIGHT ENTRAINMENT	TOTAL ENTRAINMENT
ANCHOA SP.	EGGS	.0000	.0000	.0000
	PROLARVAE	2.133	.2699	2.403
	POSTLARVAE	222.7	579	801.7
	JUVENILES	.0000	.0000	.0000
HAEMULIDAE	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
SCIAENIDAE	EGGS	9.791	588.2	598
	PROLARVAE	4.666	9.964	14.63
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
MUGILLIDAE AND MUGIL	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
PENAEUS SP.	MYSIS	.0000	.0000	.0000
	POSTLARVAE	.0862	6.222	6.308
	JUVENILES	.0000	.6575	.6575
CALLINECTES SP.	STAGE1	.0000	.0000	.0000
	STAGE2	.0000	.0000	.0000
	STAGE3	.0000	.0000	.0000
	STAGE4	.0000	.0000	.0000
	STAGE5	.0000	.0000	.0000
	MEGALOPS	1.487	29.21	30.7

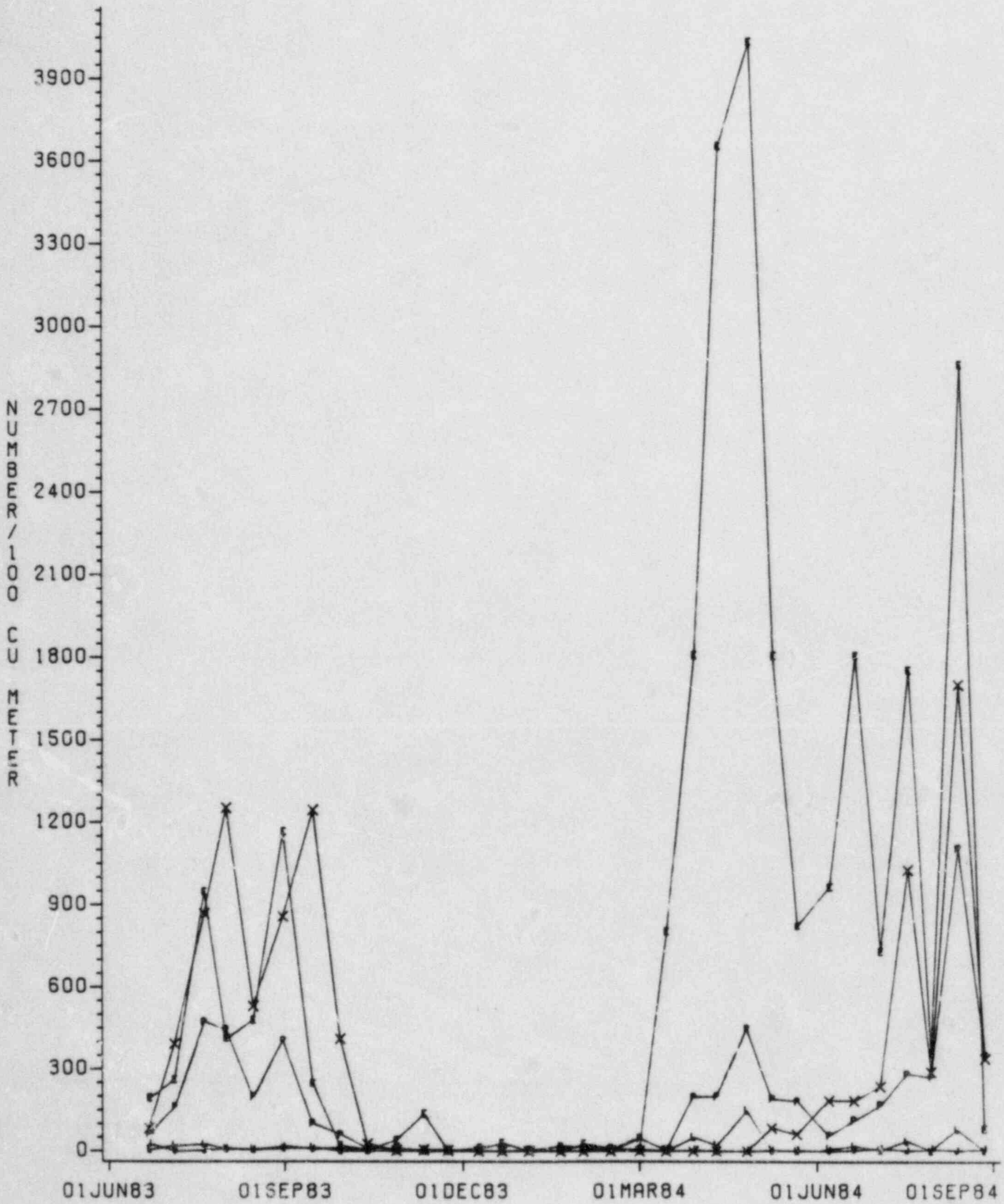
TABLE 8.2-18

ANNUAL NUMBERS ENTRAINED (IN MILLIONS) BY SPECIES AND LIFESTAGE

FOR SELECTED GROUPS NOT IDENTIFIED TO THE SPECIES LEVEL

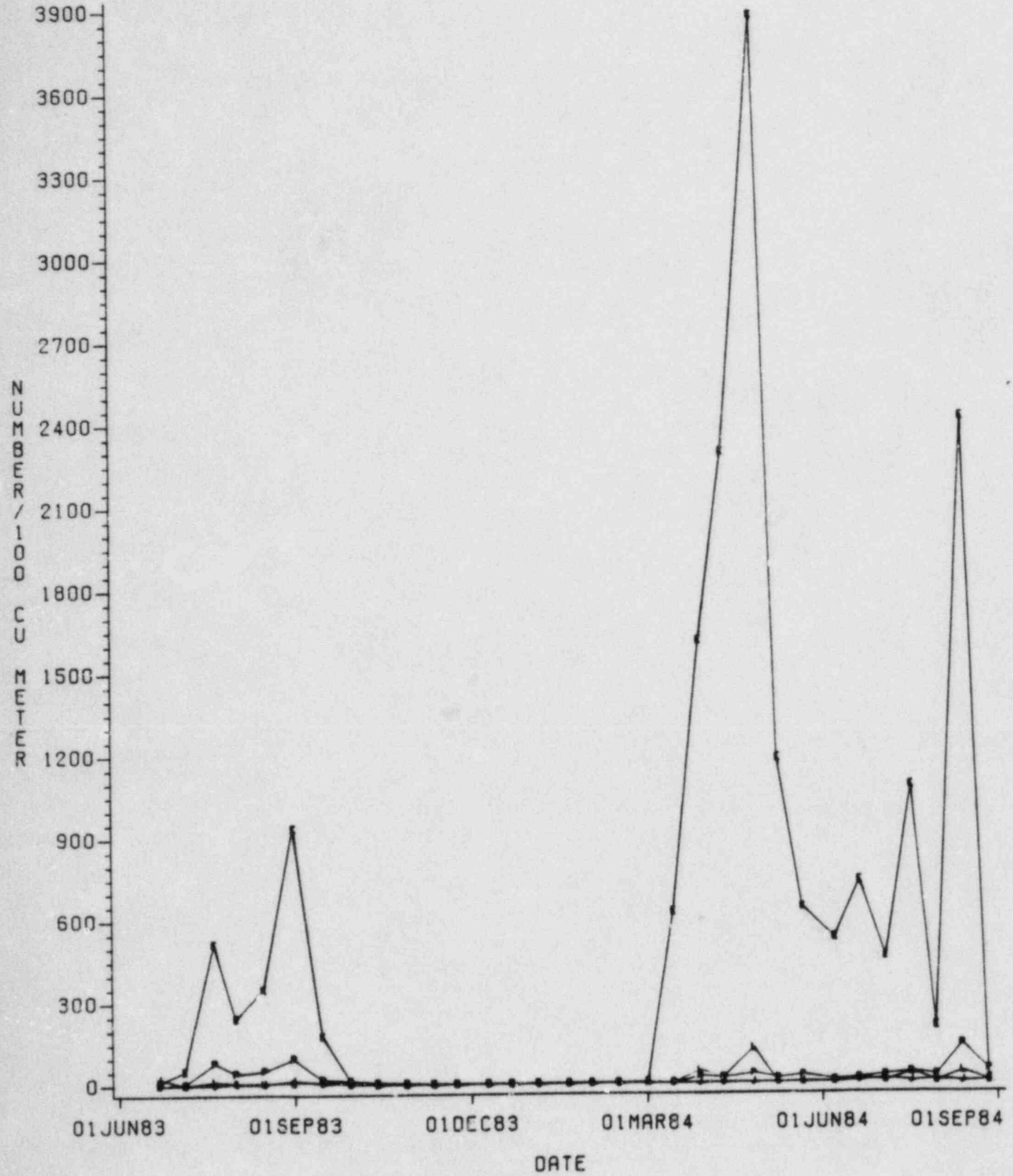
BASED ON DENSITY AT STATION E

SPECIES NAME	LIFESTAGE	DAY ENTRAINMENT	NIGHT ENTRAINMENT	TOTAL ENTRAINMENT
ANCHOA SP.	EGGS	.0000	.0000	.0000
	PROLARVAE	1.761	190.9	192.6
	POSTLARVAE	522.3	566	1088
	JUVENILES	.0000	.0000	.0000
HAEMULIDAE	EGGS	.0000	433.5	433.5
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
SCIAENIDAE	EGGS	14.11	529.5	543.6
	PROLARVAE	1.923	10.84	12.76
	POSTLARVAE	.0000	.0000	.0000
	JUVENILES	.0000	.0000	.0000
MUGILLIDAE AND MUGIL	EGGS	.0000	.0000	.0000
	PROLARVAE	.0000	.0000	.0000
	POSTLARVAE	.5699	.0000	.5699
	JUVENILES	3.503	.0000	3.503
PENAEUS SP.	MYSIS	.0000	.0000	.0000
	POSTLARVAE	.0000	16.18	16.18
	JUVENILES	.0000	1.023	1.023
CALLINECTES SP.	STAGE1	.0000	.0000	.0000
	STAGE2	.0000	.0000	.0000
	STAGE3	.0000	.0000	.0000
	STAGE4	.0000	.0000	.0000
	STAGE5	.0000	.0000	.0000
	MEGALOPS	1.981	32.85	34.83



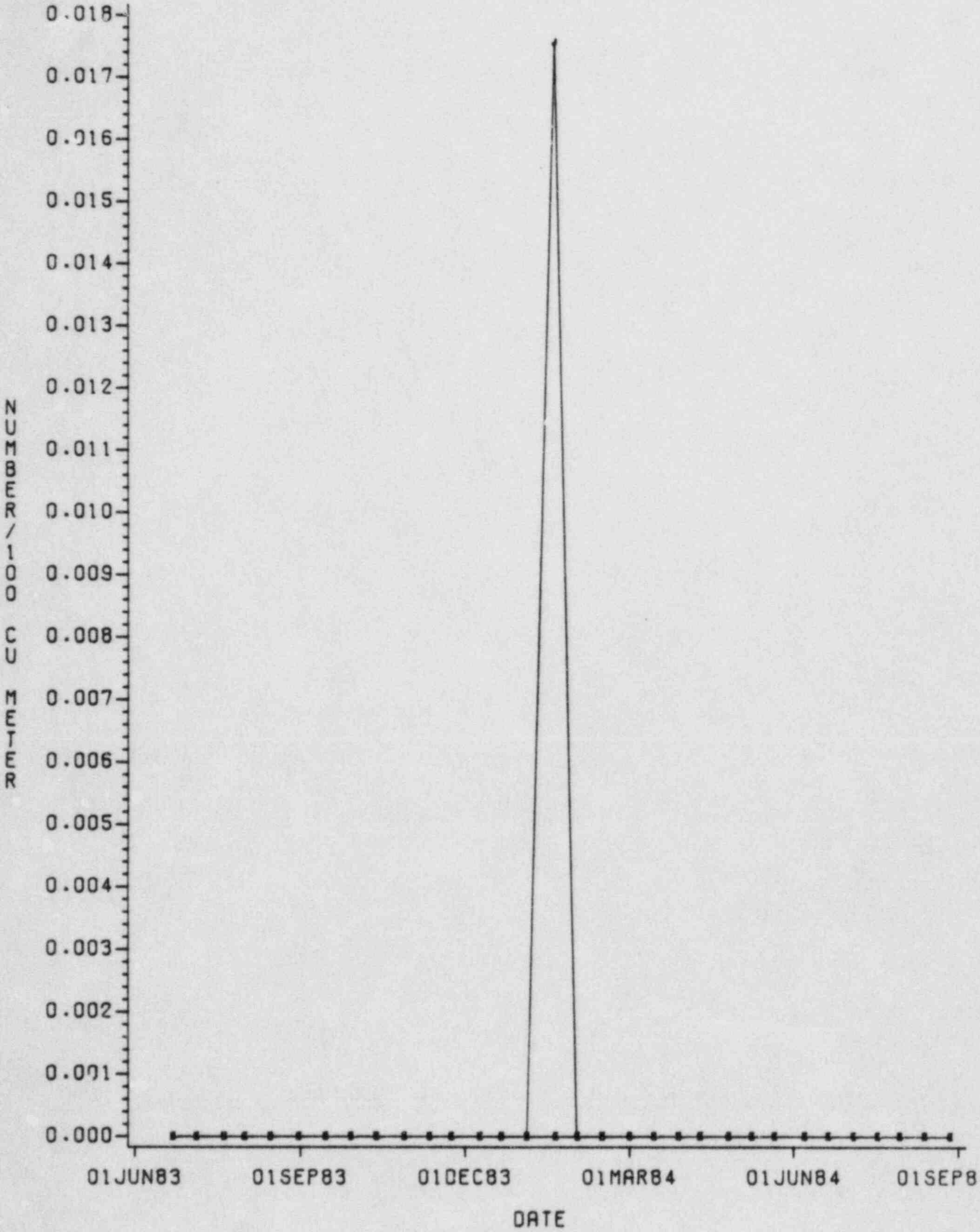
E=FISH EGGS
L=FISH PROLARVAE
P=FISH POSTLARVAE
J=FISH JUVENILES
X=INVERTEBRATES

FIGURE 8.2-1
AVERAGE PLANKTON DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



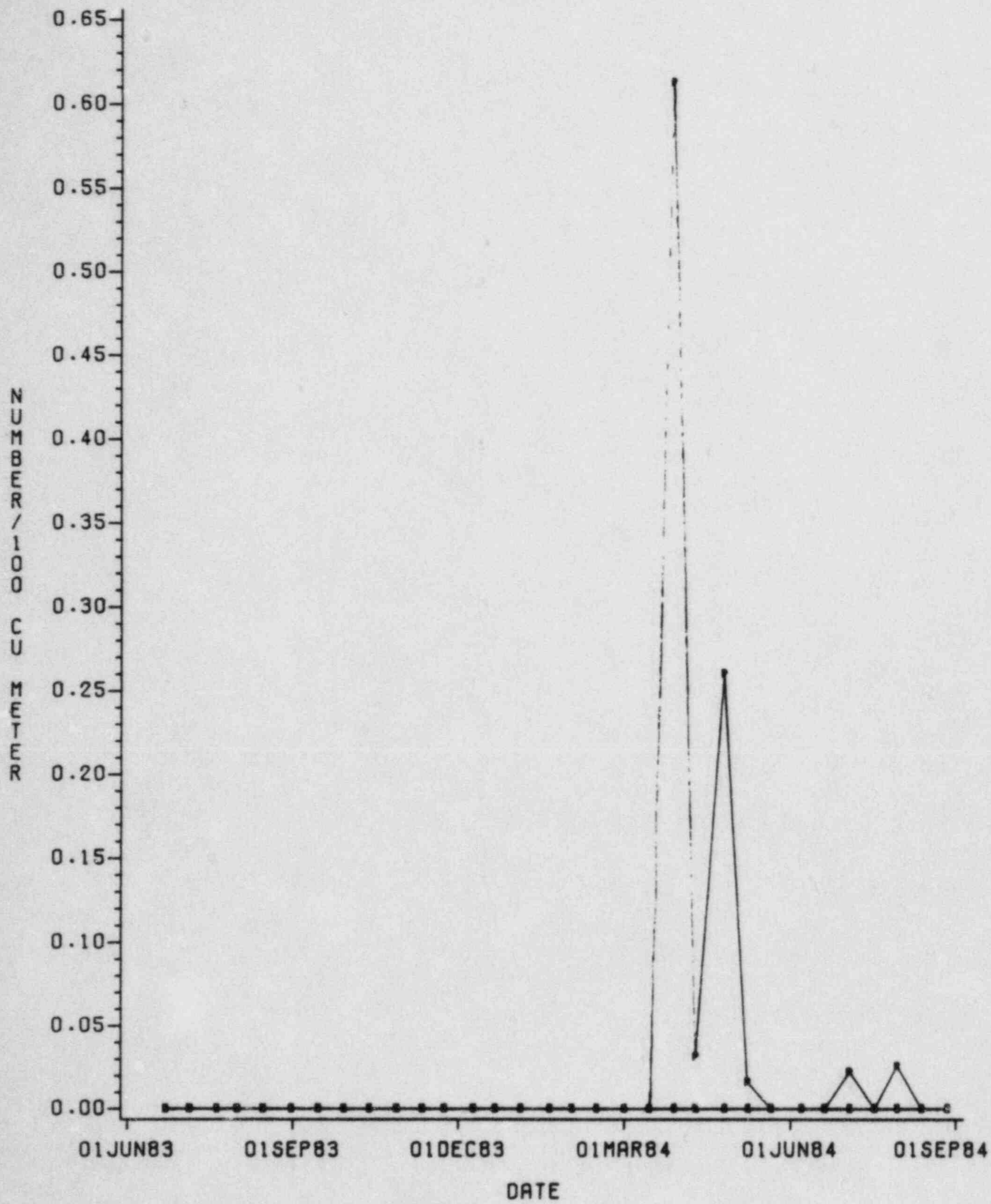
E=FISH EGGS
L=FISH PROLARVAE
P=FISH POSTLARVAE
J=FISH JUVENILES

FIGURE 8.2-2
BAY ANCHOVY DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



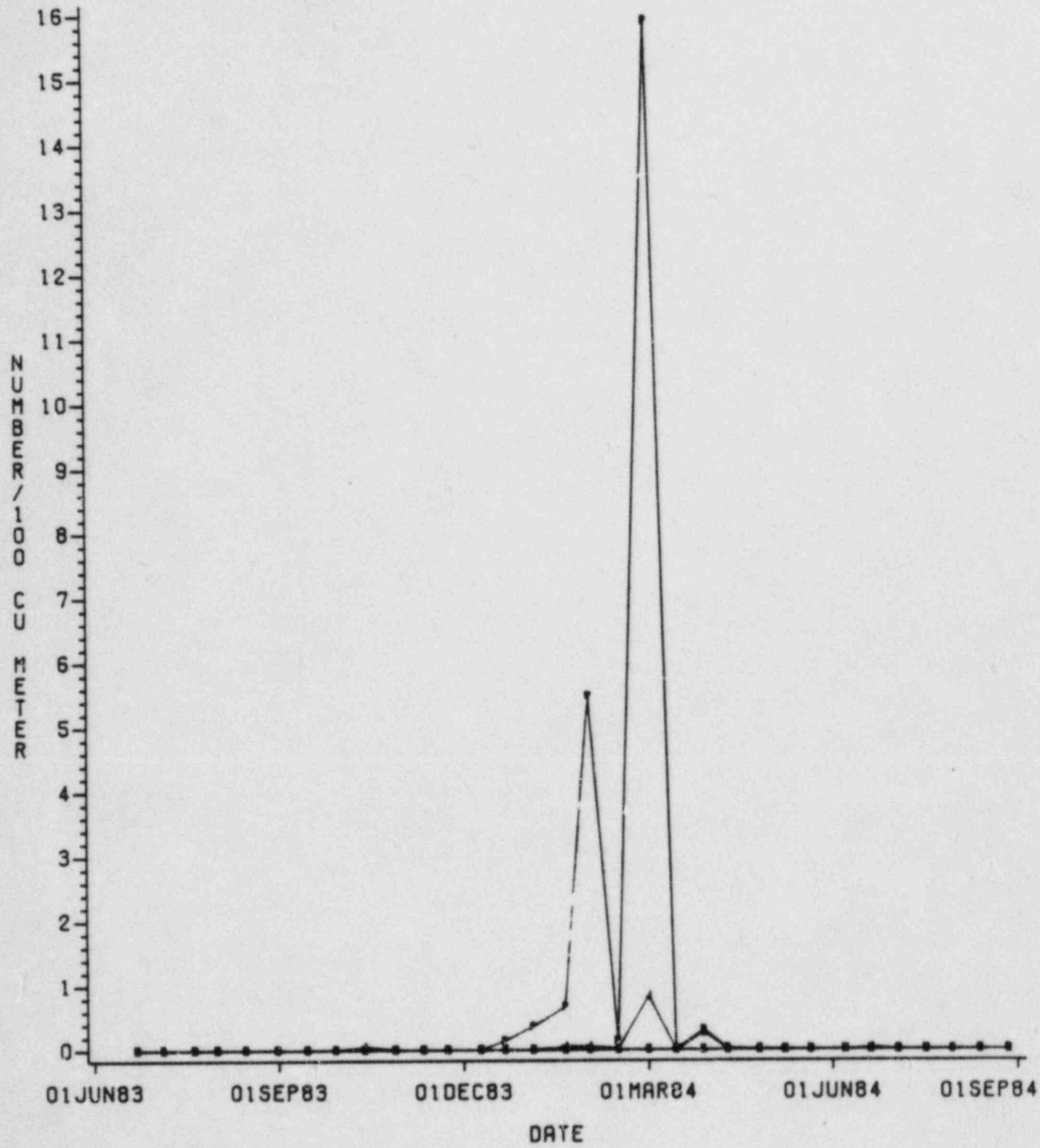
E=FISH EGGS
L=FISH PROLARVAE
P=FISH POSTLARVAE
J=FISH JUVENILES

FIGURE 8.2-3
POLKA-DOT BATFISH DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



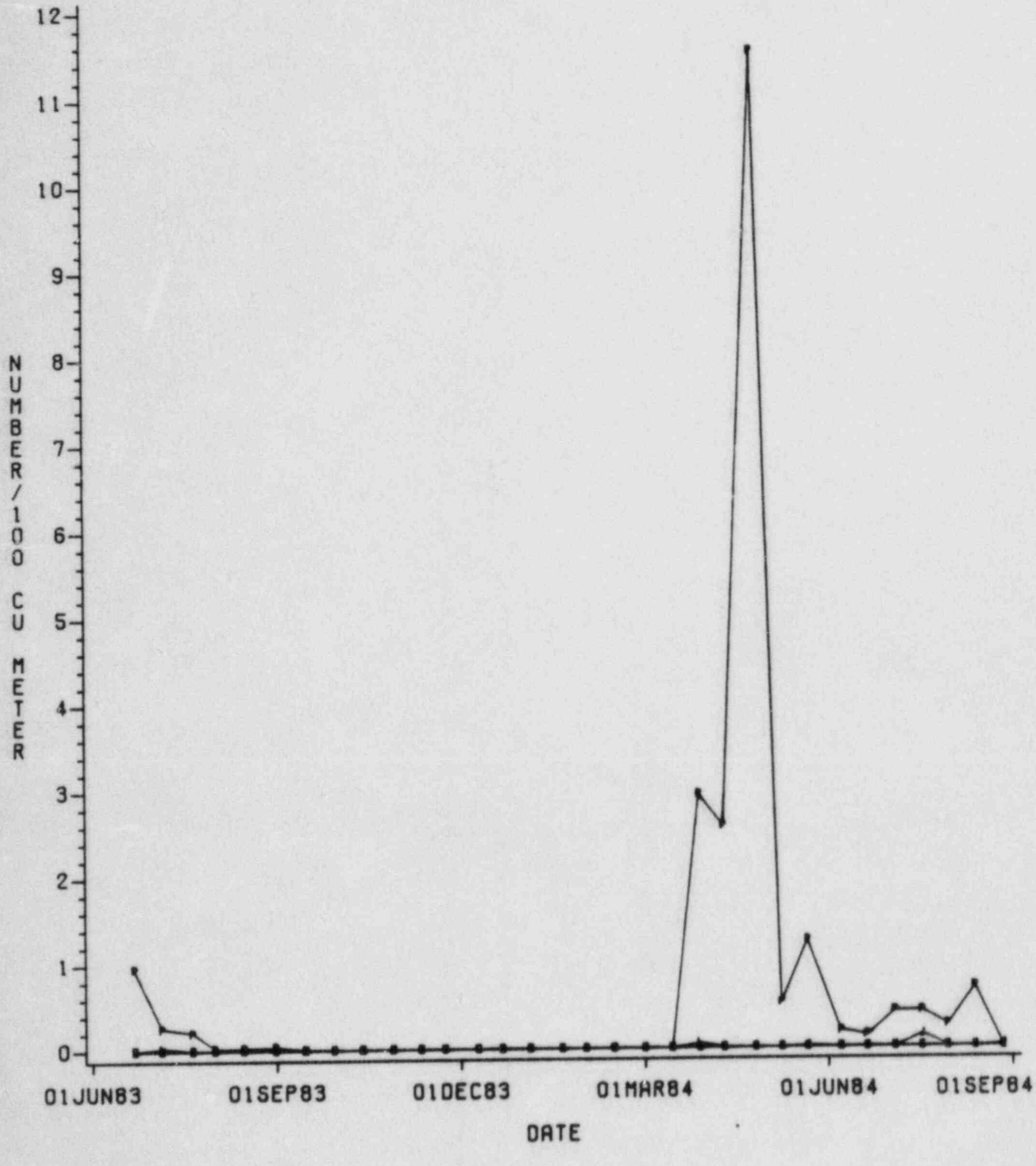
E=FISH EGGS
L=FISH PROLARVAE
P=FISH POSTLARVAE
J=FISH JUVENILES

FIGURE 8.2-4
PIGFISH DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



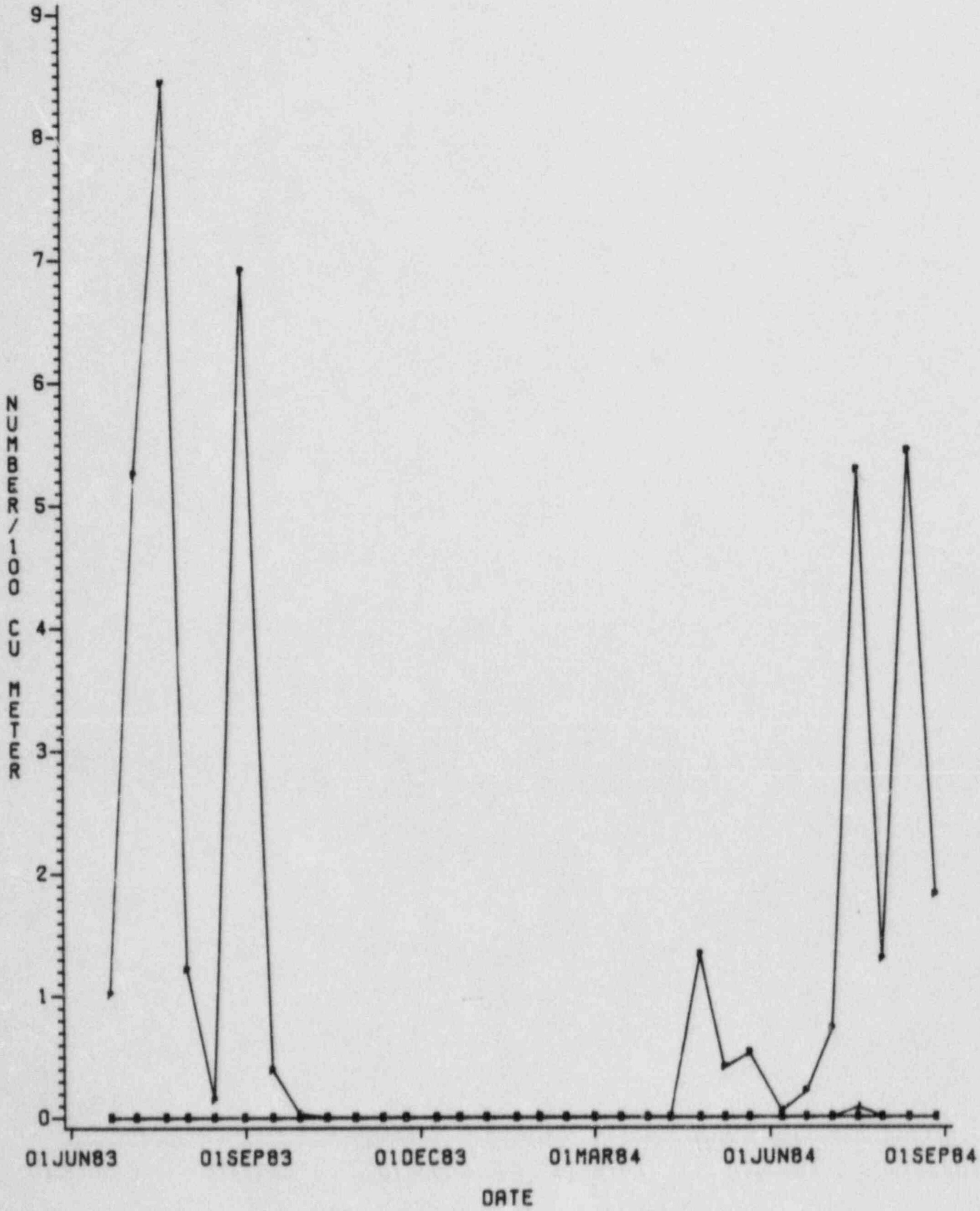
E=FISH EGGS
L=FISH PROLARVAE
P=FISH POSTLARVAE
J=FISH JUVENILES

FIGURE 8.2-5
PINFISH DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



E=FISH EGGS
L=FISH PROLARVAE
P=FISH POSTLARVAE
J=FISH JUVENILES

FIGURE 8.2-6
SILVER PERCH DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



E=FISH EGGS
L=FISH PROLARVAE
P=FISH POSTLARVAE
J=FISH JUVENILES

FIGURE 8.2-7
SPOTTED SEATROUT DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

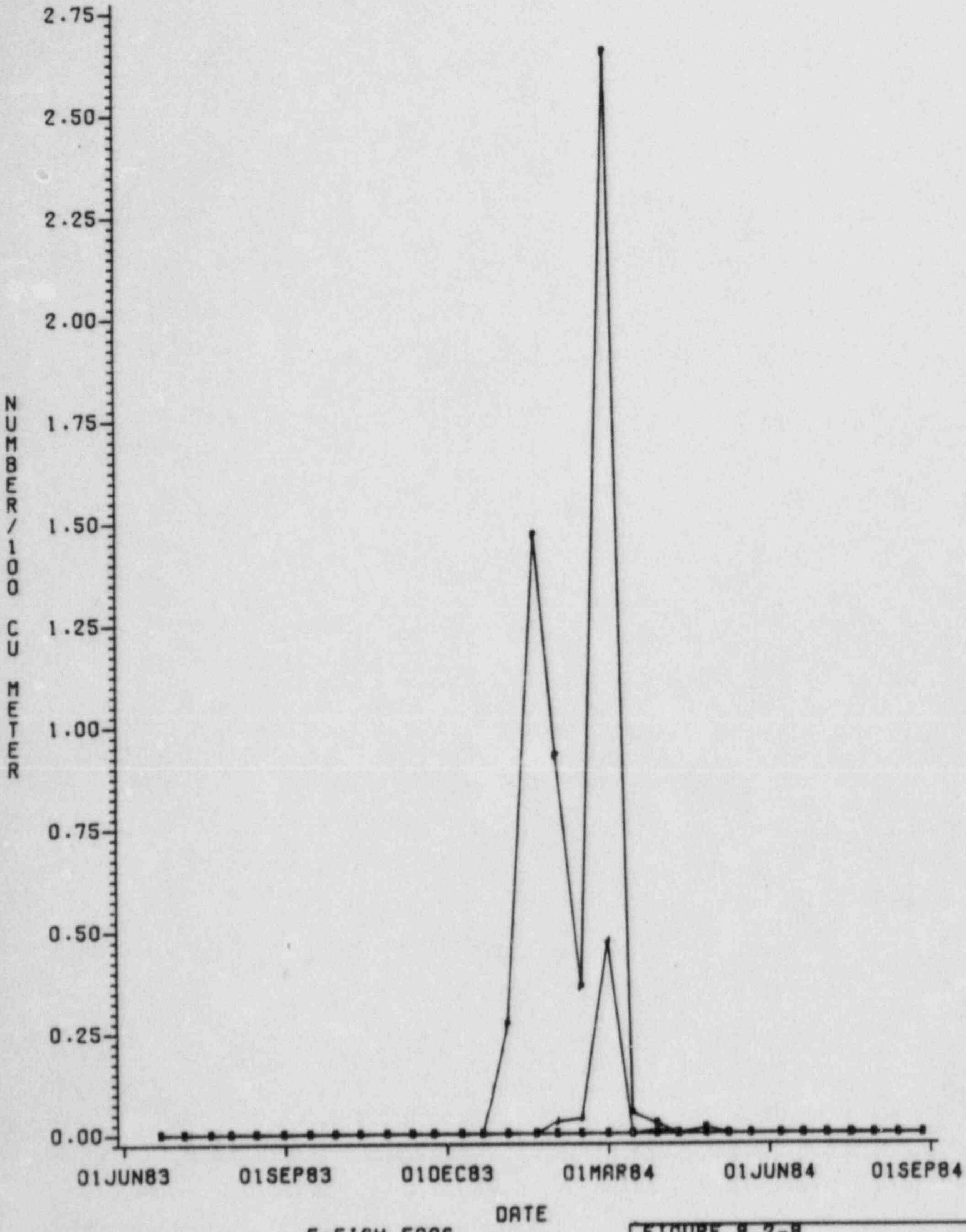
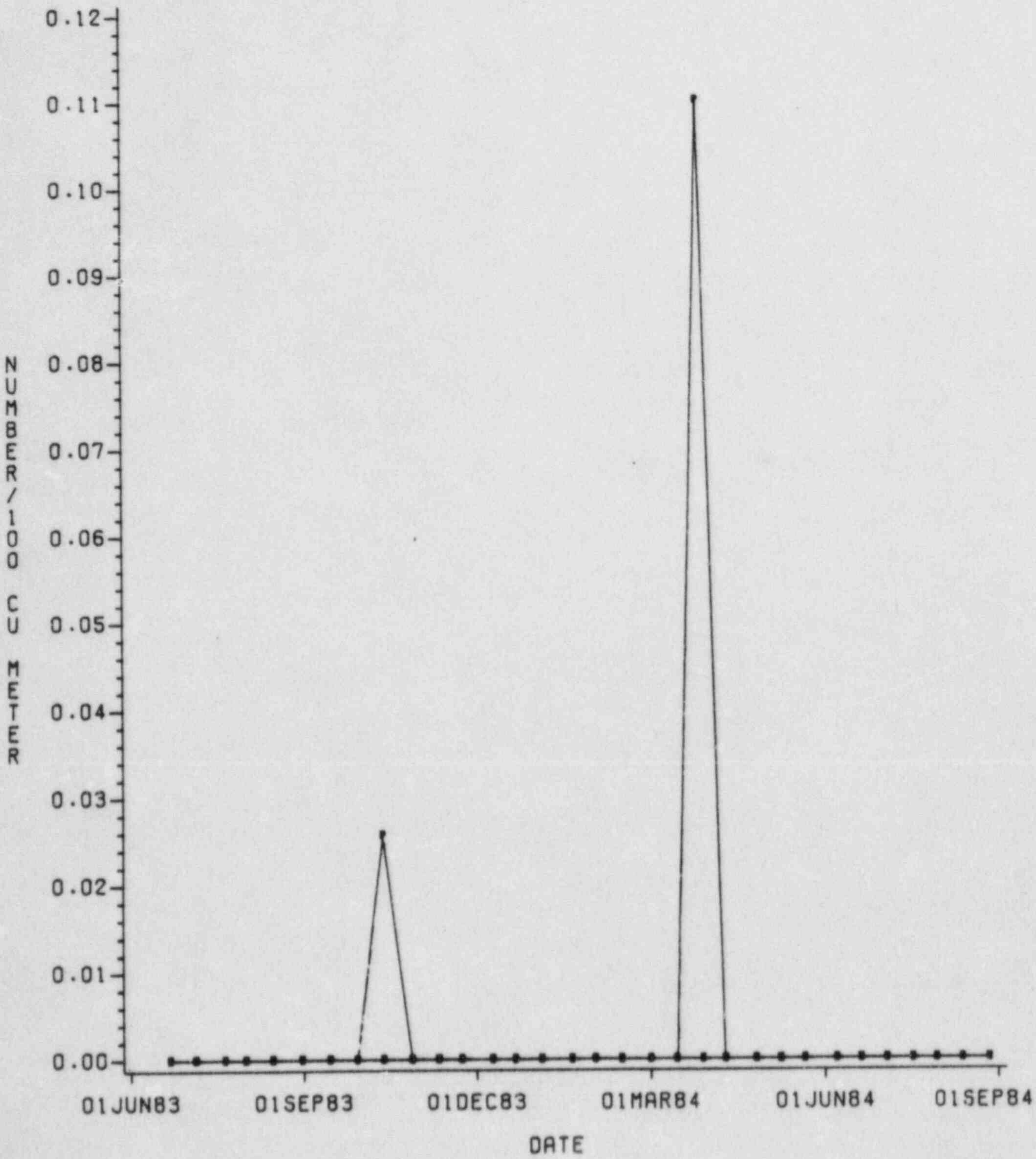


FIGURE 8.2-8
SPOT DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



E=FISH EGGS
L=FISH PROLARVAE
P=FISH POSTLARVAE
J=FISH JUVENILES

FIGURE 8.2-9
RED DRUM DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

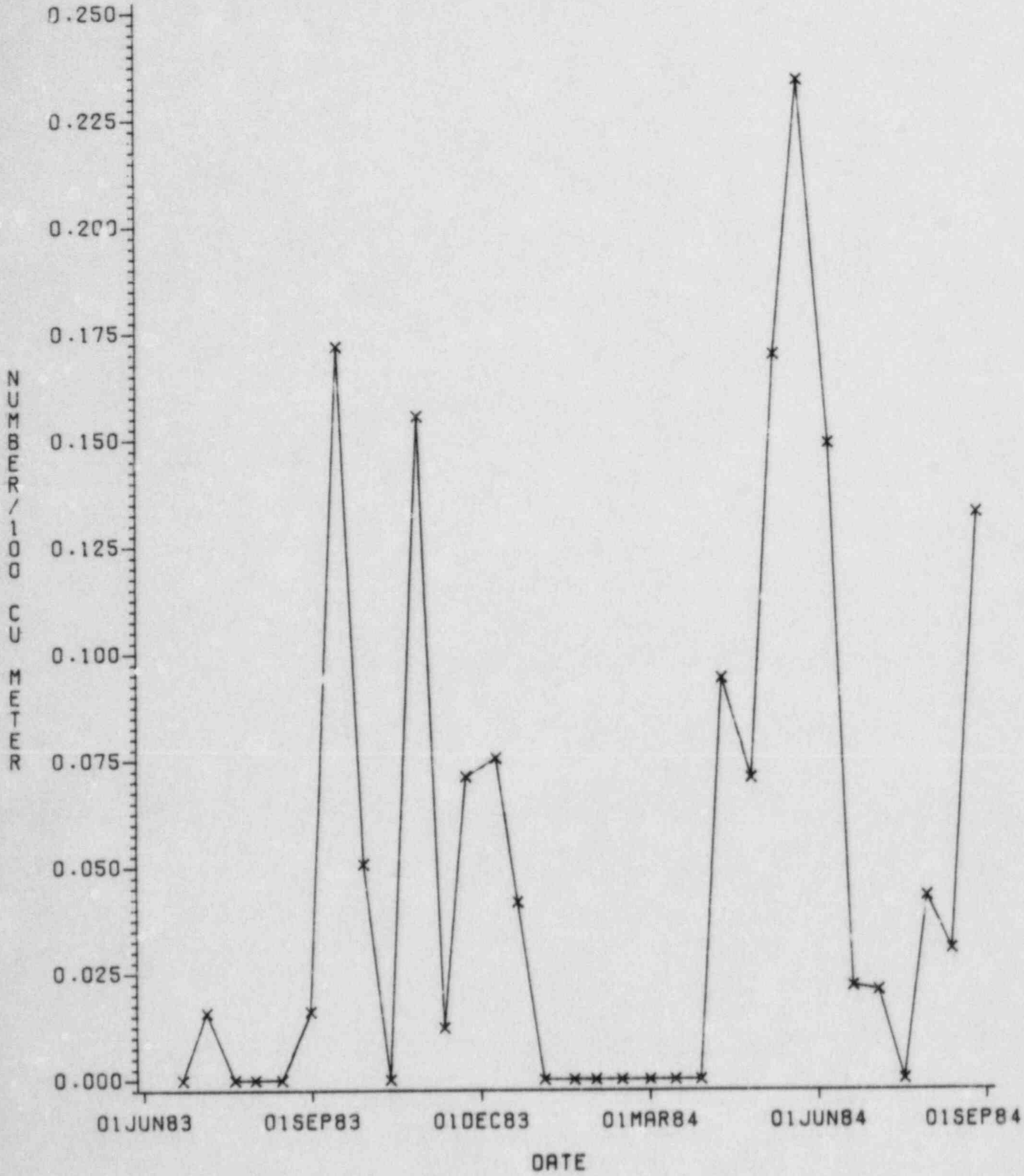


FIGURE 8.2-10
BRIEF SQUID PLANKTON
DENSITY BY DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

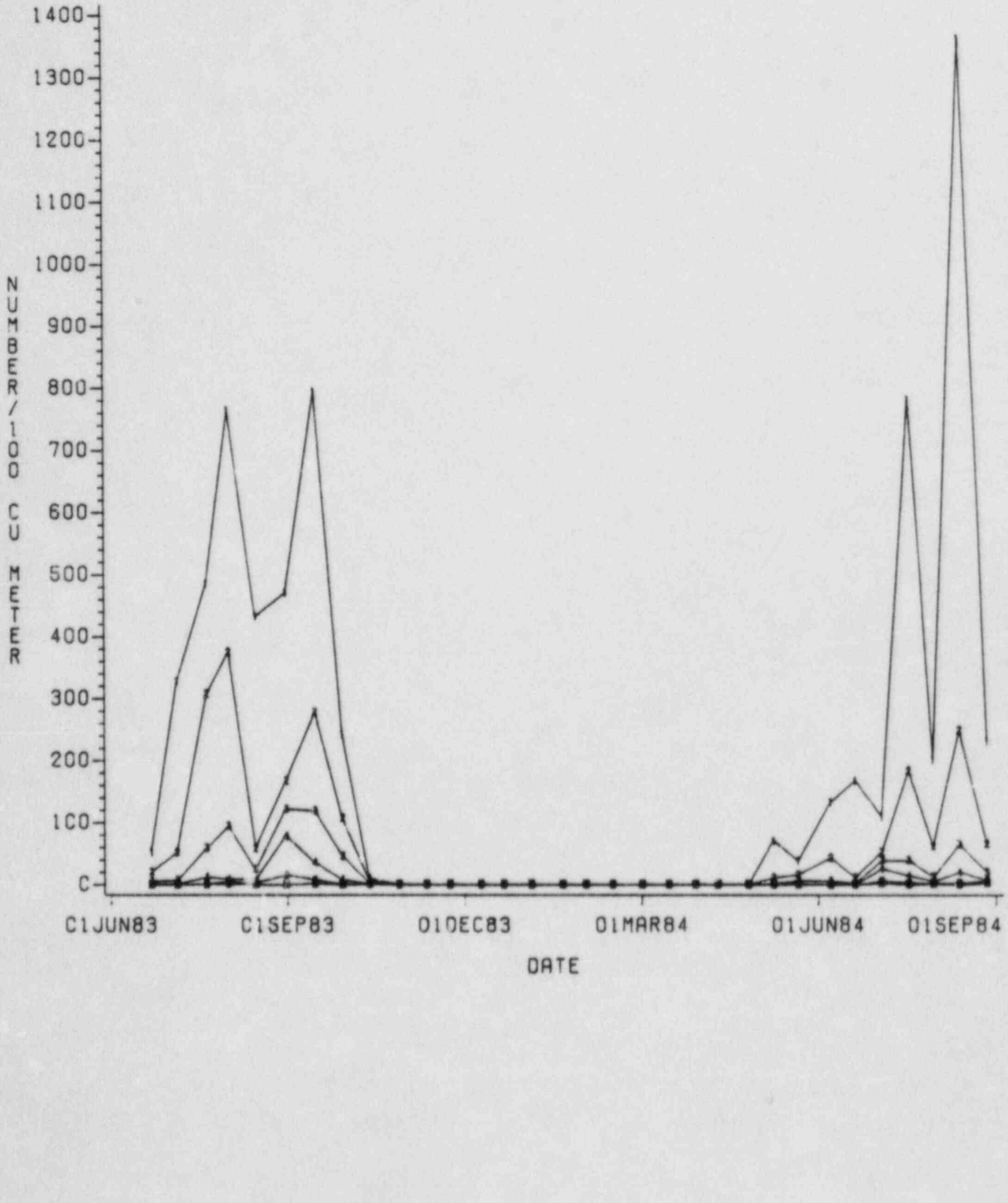


FIGURE 8.2-11
STONE CRAB DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

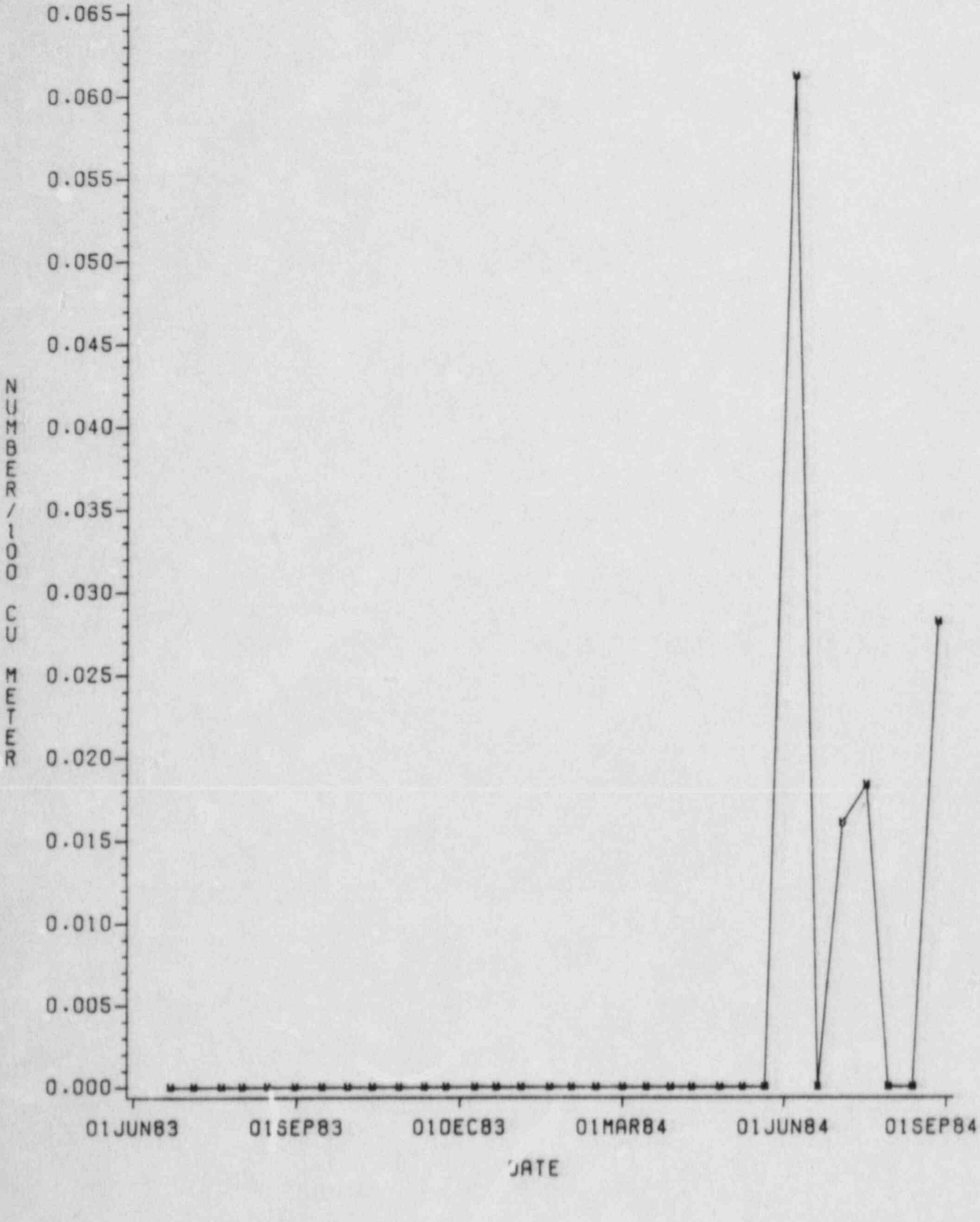


FIGURE 8.2-12
BLUE CRAB DENSITY
BY LIFESTAGE AND DATE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

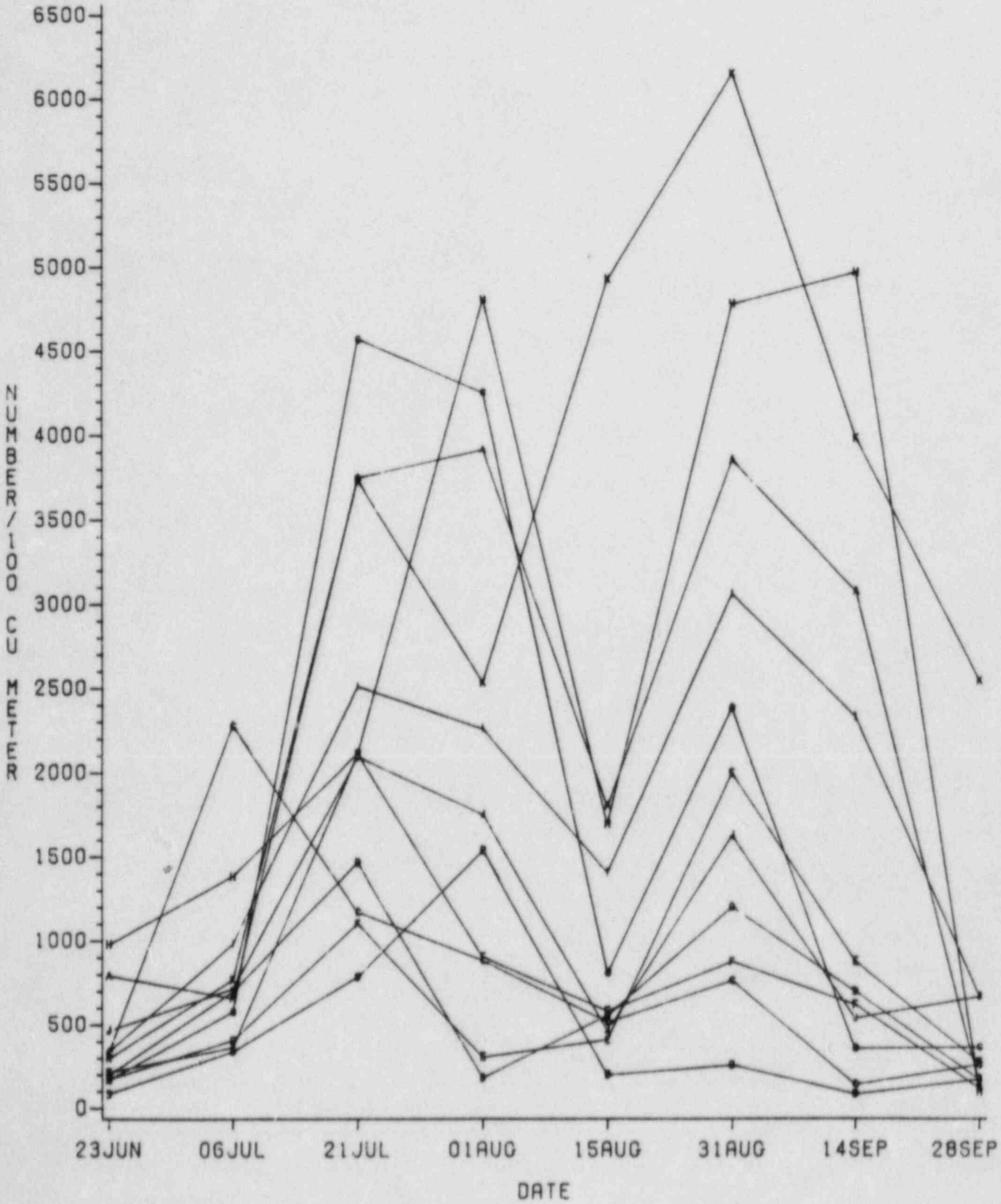


FIGURE 8.2-13
TOTAL PLANKTON DENSITY
BY STATION AND DATE-1983
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

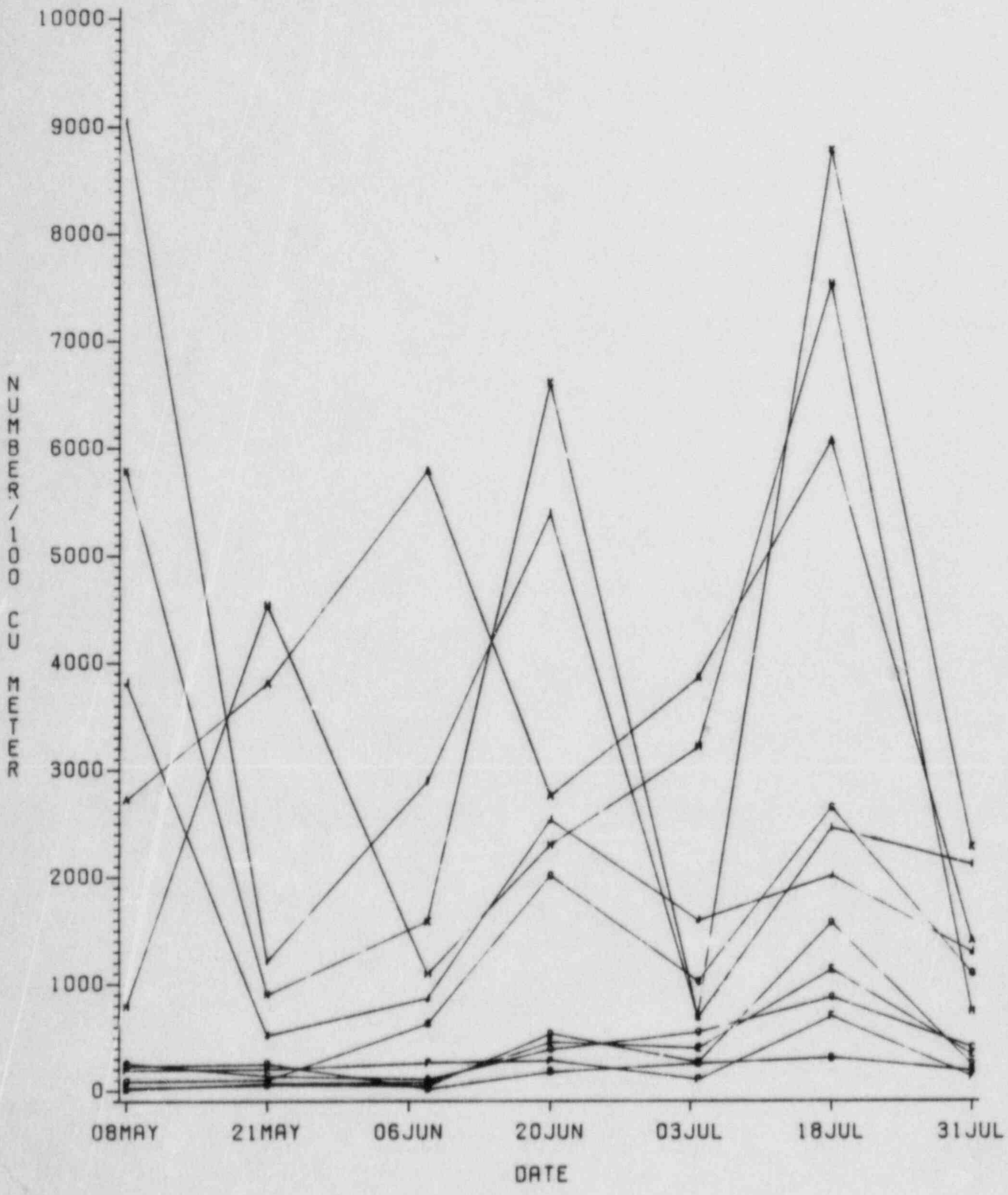


FIGURE 8.2-14
TOTAL PLANKTON DENSITY
BY STATION AND DATE-1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

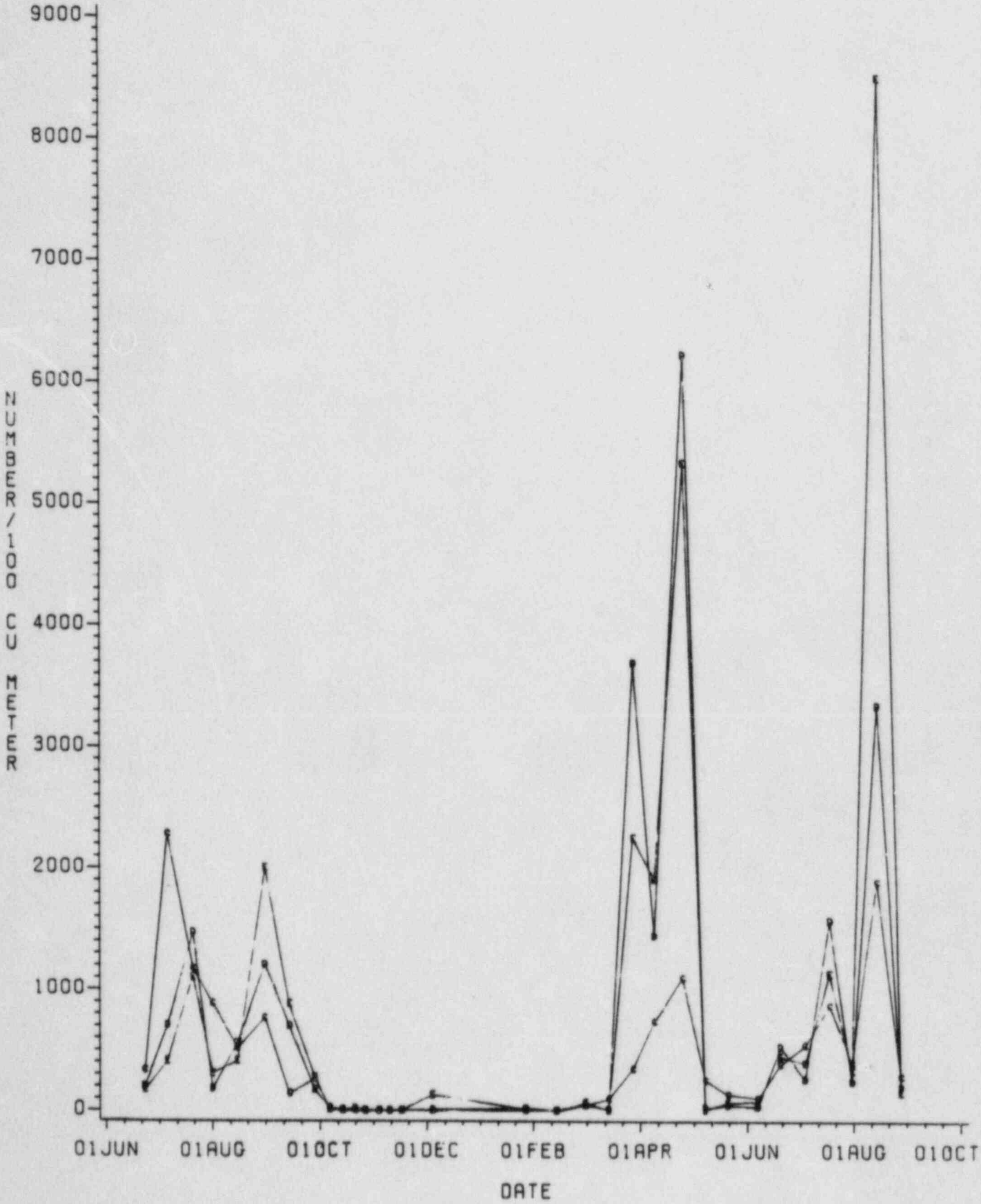


FIGURE 8.2-15
TOTAL PLANKTON DENSITY
AT STATIONS C,D AND E
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

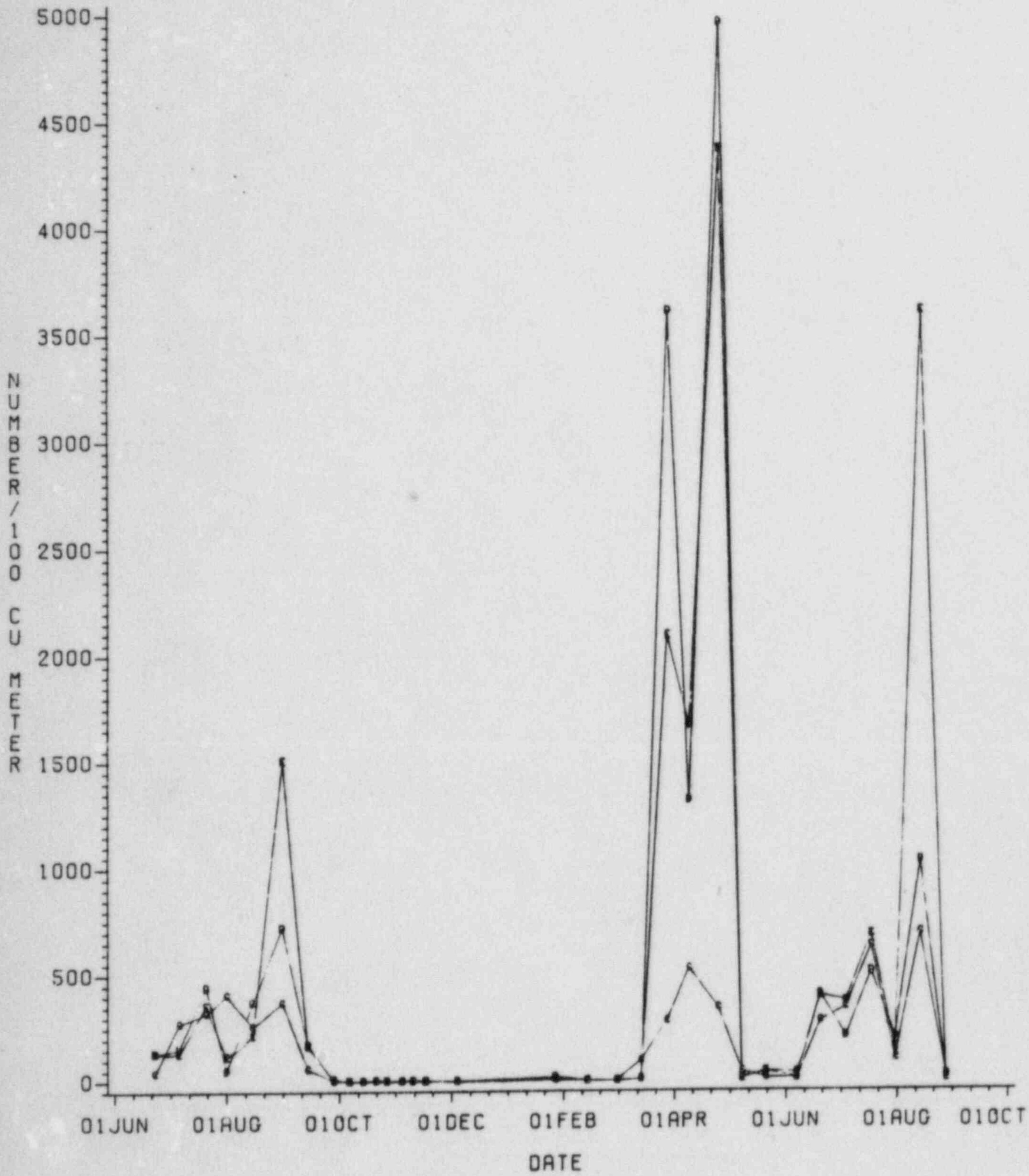


FIGURE 8.2-16
FISH EGG DENSITY
AT STATIONS C.D AND E
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

8.3 IMPACT ASSESSMENT

To estimate the effect of entrainment on the SIO a conservative approach was undertaken, which results in an overestimate of potential entrainment effects by substituting conservative assumptions where information is limiting. For example, organisms identifed only to family were added to organisms identified for selected species to obtain total entrainment estimates. In addition, the station, either C, D, or E, which provided the highest entrainment estimate was utilized in the entrainment calculations. In general, these were intake stations for early life stages and the discharge station for later life stages.

Densities calculated from the field collections during a species period of occurrence were multiplied by the flow of the power station to estimate the number or organisms entrained. The calculation assumes units are operating at 100 percent flow capacity, which represents the maximum situation. Tables 8.2-13 to 8.2-15 present total entrainment estimates utilizing Stations C, D, and E, respectively, for organisms identified to species. Tables 8.2-16 to 8.2-18 present information for organisms identified to family. Table 8.3-1 presents the maximum value for Tables 8.2-13 to 8.2-15 by species and life stage, which forms the basis of the entrainment assessment. Table 8.3-2 presents similar information for unidentified SIO.

Once the number of organisms entrained is estimated, the number of adults that could have potentially developed from these entrained individuals is calculated under the conservative assumptions of the equivalent adult model. This model, first formulated by Horst (1975 and 1978), has been widely reviewed and used in the assessment of entrainment effects (Dahlberg 1978; Saunders 1978; Taylor 1978). Goodyear (1978) has produced a U.S. Fish and Wildlife Service guide on the use of the equivalent adult model for assessing the effects of entrainment.

The actual formulation of the model is very simple: in equilibrum, the fecundity of a breeding pair will be reduced in one generation to two breeding adults: i.e.,

$$2 = S_e \times F \qquad (8.3\text{-}1)$$

where

S_e is the survival from egg to adult,

F is the fecundity of a female during her life.

or

$$S_e = 2/F \qquad (8.3\text{-}2)$$

The survivorship from egg to adult is equal to the product of the suvivorship from egg to larvae (E) and the survivorship from larvae to adult (S_1):

$$S_e = E \times S_1 \qquad (8.3\text{-}3)$$

Therefore, if the entrained life stage is larvae, then F in Equation 8.3-2 must be multiplied by the survival from egg to larvae to give the survivorship from larvae to adult.

$$S_l = 2/E \times F \qquad (8.3\text{-}4)$$

The number of entrained larvae (N_l) is multiplied by S_l, and the number of entrained eggs (N_e) is multiplied by S_e. The products are added together to give the number of adults (N_a) that would have resulted, assuming no density dependence.

$$N_a = S_l \times N_l + S_e \times N_e \qquad (8.3\text{-}5)$$

The model formulation relies on the following assumptions:

1. The population is in equilibrium, such that the number of fish in the population at any time and the proportion of fish at any age are constant, with stable age distribution. If the historical information on the fish population shows an increasing or decreasing trend in population size, the numerator of Equation 8.3-2 can be appropriately modified.

2. The lifetime of a fish in the population is the most probable age to which a fish will live or the mean generation time of the population.

3. The reference to a breeding pair applies to a situation where the number of males equals the number of females. If a skewed sex ratio exists in the population, Equation 8.3-2 can be altered accordingly.

4. The exploitation of eggs and larvae occurs at the times eggs are laid and larvae hatch.

5. The number of equivalent adults represents the annual loss in an equilibrium density-independent population with a stable age distribution. This loss is distributed in proportion to the stable age distribution.

Therefore, the minimal information required for the equivalent adult model is age of sexual maturity, longevity, and average fecundity. Fecundity is a relatively easy parameter to estimate and is generally available for most species.

Another perspective on entrainment can be seen in Section 10.6. The hydrodynamic model was utilized to investigate the effect of entrainment on the abundance patterns in the area of the plant. Several initial density gradients were utilized to correspond to the results of field sampling for the SIO (Section 8.2). Since the entrainment occurs at the intake and any organisms which suffer mortality will be absent at the discharge, abundance differences associated with entrainment occur at the discharge. Water with zero-density plankton was input to the model at the POD and mixed with water containing plankton at the previously established concentrations (dependent on initial density gradients). The results of the analysis described in Section 10.6 clearly show that the major source of organisms is offshore.

This conclusion is reached since entrainment effects are localized and do not extend throughout the area modeled. This result can only occur if the plankton concentrations within the modeled area are high enough to counteract the input of zero-density water at the POD. The use of three separate cases provides an indication of the differential effect of entrainment mortality on plankton concentrations to the northwest, to the southwest, or evenly distributed across the study area. The results indicate that populations concentrated offshore are less affected by entrainment, and populations concentrated offshore, in the northwest section of the study area, are affected least of all. For all three cases, this analysis clearly shows that even under conservative assumptions, entrainment has localized effects.

8.3.1 Assessment of SIO Entrainment

The following sections present available information on population parameters for each SIO. These data were utilized as input to the equivalent adult model and to evaluate the effects of plant operation on the species population in the Crystal Bay area. To assist in evaluating the assumption of 100 percent through-plant mortality and the existing distributions near the discharge area, available information on thermal tolerances of SIO has been summarized and provided in Appendix VI.

8.3.1.1 *Anchoa mitchilli* (Bay anchovy)

Spawning occurs in the Delaware River estuary from about May to September (Stevenson 1958). In the Tampa Bay area, Springer and Woodburn (1960) took almost ripe individuals in July, September, and December. Gunter (1945), working in Texas, took nearly ripe individuals from March until August when sampling was terminated. This indicates a very long breeding season. Spawning is reported to be protracted year-round in warmer waters (Hoese and Moore 1977). Houde (1974) collected anchovy eggs from Florida waters at all seasons of the year.

Anchovies migrate to shallow waters during the spring and summer (Stevenson, 1958). During spawning, the sex ratio is 1:1, but at other times there is a statistically significant larger number of females than males (Stevenson, 1958). Eggs are pelagic when spawned. Hildebrand and Cable (1930) reported that the eggs hatch at the surface and some young appear to descend to the bottom at a very early age. Kuntz (1914) reported that 12 to 16 hours after spawning, the eggs begin to sink. Stevenson (1958) gave numbers of eggs per 1/25th of the right ovary for 15 specimens; he estimated that 7 percent of the eggs in the ovary are spawned. Calculating from these numbers, the number of eggs spawned per right ovary ranges from 731 at a standard length of 51 mm to 1080 at a standard length of 75 mm. Numbers of eggs per individual are at least double this since the right ovary is generally smaller than the left. A regression of fecundity on standard length is also given (Stevenson 1958). In the present study, nine gravid first year females were found to have 1173 to 4387 eggs per female (aver. 2240).

Length-frequency tables from Springer and Woodburn's (1960) studies in Tampa Bay indicated that there were usually two and some times three year classes; this is in agreement with Gunter's (1945) findings. Stevenson (1958) concluded that individuals that were spawned early in the season could themselves spawn the next year at age one, while others first spawned at age two. Hildebrand and Cable (1930) reported spawning individuals of 2 1/2 to 3 months of age; however, Stevenson (1958) inferred that these fish were actually spawned very late the previous season. Sexual maturity is attained at a length of 35 to 40 mm in Delaware Bay (Stevenson, 1958); 40 to 50 mm in Chesapeake Bay (Hildebrand and Cable, 1930); 45 to 60 mm off North Carolina (Hildebrand, 1963, cited in FPC 1977); and 56.3 mm (males) and 60.0 mm (females) off Texas (Gunter, 1945).

The equivalent adult calculation assumes a one year life cycle with average fecundity of 2240. The eggs have a short duration; one day was assumed for the calculation. Based on Houde (1977), the eggs were estimated to have a 92 percent hatching success and 40 percent survival from prolarvae to postlarvae.

Equivalent adult estimates were derived from conservative assumptions which underlie Table 8.3-1. All life stages (eggs, prolarvae, postlarvae, and juveniles) were represented in the entrainment estimate. Bay anchovy was the most abundant organism entrained. The equivalent adults associated with the eggs, prolarvae and postlarvae are 10.4, 0.75, and 6.7 million, respectively. The loss of juveniles, assuming they are at the midpoint between postlarvae and adult, would result in 3.8 million equivalent adults.

Table 8.3-2 provides calculated entrainment numbers for those organisms not identified to species. For the bay anchovy, those organisms identified as Anchoa sp. were considered as bay anchovy. The prolarvae and postlarvae of Anchoa sp. are entrained in numbers comparable to those for the same life stages of A. mitchilli. Therefore, the addition of these unidentified organisms would not change any conclusions for bay anchovy.

8.3.1.2 Polka-dot Batfish

There is little life history information on this species, therefore, no equivalent adult calculation has been made. The effect of entrainment is very minor. Juveniles were the only life stage collected and the occurrence was short in duration and comprised of a few individuals. Station E was the only entrainment station at which any life stage was caught (Tables 8.2-13 and 8.2-15). The juvenile polka-dot batfish total entrainment was 190,000 (Table 8.3-1).

8.3.1.3 Orthopristis chrysoptera (Pigfish)

In the area of the Crystal River Generating Station, pigfish were present only 6 months of the year, being scarce during the cooler months (Grimes & Mountain 1971). In the Cedar Key area, pigfish were caught all year except January and were most abundant during the warm months (Reid 1954). In St. Andrew Bay, Florida, however, pigfish were least abundant in summer (Pristas et al 1978). Pigfish are winter-spring spawners (Hoese and Moore 1977) and spawning at Crystal River probably begins in March (Grimes and Mountain, 1971). Hildebrand and Schroeder (1928) reported spawning in June in Cheasapeake Bay. However, Joseph and Yerger (1956) felt that in Alligator Harbor, Florida, pigfish spawn several months earlier than this, and by June the young are approximately 40 mm in length. A statistically significant larger number of females than males was observed in fall in St. Andrew Bay (31.6% male), but not in winter or spring (summer not tested) (Pristas et al 1978). Three gravid females taken at Crystal River had 17302 to 28160 eggs per female (average 21660).

Since only pigfish postlarvae were identified, there is no effect projected to the earlier life stages. Table 8.3-1 shows that the largest number of larvae (760,000) was at Station C. Assuming that the average life expectency is 2 years, the survival from egg to adult would be 9.23×10^{-5}. There is no available information on the survival of egg and prolarval pigfish. If it is assumed that about 10 percent of each life stage survives, then the entrained postlarvae would represent about 71,000 equivalent adults.

These projections can be compared with the 1982 commercial landings of 2158 lb for the west coast of Florida, using an average weight of pigfish of 0.032 lb derived from the trawl collections at Crystal River. The number of adults lost through entrainment is roughly equivalent to the incidental commercial catch.

Consideration of all unidentified Haemulidae eggs (Table 8.3-2) as pigfish would add eggs as an entrainable life stage for the species. This would result in 40,000 equivalent adults. While adding the unidentified individuals increases the estimate of equivalent adults, it does not change the conclusion that entrainment effects are acceptable.

8.3.1.4 Lagodon rhomboides (Pinfish)

Pinfish apparently move offshore to spawn (Cameron, 1969) in November and December in the Crystal River area (Grimes and Mountain, 1971). Spawning begins early in December and lasts through March (Grimes and Mountain 1971). Fall spawning was reported by Reid (1954) for the Cedar Key region. Larvae migrate inshore to estuarine nursery areas between spring and fall (Kjelsen and Johnson 1976; Cameron 1969). Small larvae (less than 11 mm) are rarely found within estuaries, but postlarval stages (11-22 mm) do occur in nearshore and estuarine waters. Joseph and Yerger (1956) reported pinfish of 17 mm were first collected in Alligator Harbor in the latter part of May and were still common as late as July. Age 0 fish move away from the shallows to deeper water as cooler temperatures approach (Grimes and Mountain 1971).

Pinfish were most abundant in St. Andrew Bay in spring and fall; no statistically significant difference in numbers of males vs females were detected in spring, summer, or fall (winter not tested) (Pristas et al 1978). Cameron (1969) made reference to two age classes and presented growth curves from a number of studies. Spawning has apparently not been observed in nature, nor have ova or recently hatched larvae been described (Schimmel, 1977).

Caldwell (1957) reported the fecundity of pinfish as 90,000 and stated that spawning occurs at age 3. There is no information on the survival of eggs and larvae of pinfish, so a 10 percent survival was assumed for each life stage. Table 8.3-1 provides estimates for total entrainment. The equivalent adults associated with the entrainment of postlarvae is 37,000 and of juveniles is 47,000. Equivalent adults associated with entrainment represent slightly more than 1 percent of the recreational catch for Region 4 (Taylor-Manatee Counties) in 1980 which consisted of 6,395,000 individuals.

8.3.1.5 Bairdiella chrysoura (Silver perch)

Silver perch are found in deeper waters offshore in winter and move inshore to bays and coastal lagoons in spring to spawn (Gunter 1945; Springer and Woodburn 1960). Hildebrand and Cable (1930), though, found spawning in various North Carolina locations including harbors, estuaries, and sounds up to 15 miles out to sea. In the Tampa Bay area, Springer and Woodburn (1960) believed spawning to be in April and early May. Joseph and Yerger (1956) concluded that silver perch have a long spawning season in Alligator Harbor (northern Florida) since young were taken in June and September. Grimes and Mountain (1971) working in the Crystal River area reported spawning in the spring. Ripe individuals and eggs were taken at temperatures from 19.4° to 28°C (Miller 1965; Kuntz 1914). The eggs are pelagic (Welsh and Breder 1923; Kuntz 1914). Hatching time is temperature dependent; 40 to 50 hours at 18 to 21°C (Welsh and Breder 1923) as compared to 18 hours at higher temperatures (Kuntz 1914). Larvae have been taken at temperatures between 16.4 and 31.8°C (Jannke 1971), and juveniles between 4.8 and 32.5°C (Thomas 1971).

Silver perch attain a length of about 140 mm SL by the end of their first year, and perhaps gain an additional 60 mm during their second year. Sexual maturity is reached after the second year at a length of 150 to 210 mm SL (Welsh & Breder 1923; Hildebrand & Schroeder 1928). Fecundity of a mature female (140 mm SL) was estimated at 52,800 eggs (Hildebrand and Schroeder 1928). According to Moe and Martin (1965), longevity is slightly more than 2 years; however, older fish, including a 230 mm specimen (age VI), have been reported (Welsh and Breder 1923). Eleven females collected at Crystal River had from 17920 to 147050 eggs per female (average 48140).

Silver perch are sexually mature at age 2 with specimens as old as age VI collected. Silver perch was assumed to spawn 3 times at the average fecundity of 48,140. Eggs were assumed to have a 50 percent survivorship in view of the short duration of this life stage. Other life stages were assumed to have a 10 percent survival.

The entrained prolarvae, postlarvae, and juveniles (Table 8.3-1) are equivalent to 2, 6,000 and 600 adults, respectively. This is a very small fraction (0.19 percent) of the 1980 recreational catch for Region 4.

Unidentified sciaenid eggs and prolarvae, while a portion may be silver perch have been assumed for conservatism to be spot.

8.3.1.6 Cynoscion nebulosus (Spotted seatrout)

Spawning season as reported in various locations is as follows: Pearson (1929, in Texas - March to October, with peak in April and May; Klima and Tabb (1959), in northwest Florida - late April through September, with a peak in late May and early June; Moffet (1961) in west Florida (Fort Myers, Cedar Key, Apalachicola) - May through September, peaking in summer; Sundararaj and Suttkus (1962), in Louisiana - July and August; Springer and Woodburn (1960) in Tampa Bay - first occurs in April. Spawning occurs in bays and lagoons (Gunter, 1945), in less turbulent portions of estuaries (Tabb 1966), in bays and lagoons somewhat offshore in water not over 10-15 feet deep (Pearson 1929), at night close to shore (Pearson 1929), and in estuaries well above the reach of daily tides (Tabb 1966). Jannke (1971) indicated that spawning may occur year round in the Everglades. Eggs are initially buoyant (Fable et al 1978; Pearson 1929) but soon sink (Fable et al 1978; Tabb 1966; Futch 1970; Guest and Gunter 1958). The young are usually hatched inshore, but if hatched offshore they move inshore (Hildebrand and Cable 1934).

Estimates of fecundity are as follows: Pearson (1929) in Texas specimens: two nearly ripe seatrout of 48 and 62 cm, 427,819 and 1,118,000 eggs, respectively; Tabb (1961) in the west coast Florida and Texas samples: 15,000 eggs at 32.5 cm standard length, 150,000 at 44.2 cm, 400,000 at 50.0 cm, and 1,100,000 at 62.5 cm. Sundararaj and Suttkus (1962) in Louisiana reported: age I, 283 mm total length, 140,485 eggs (N=8); age II, 376 mm, 354,325 eggs (N=9); age III, 450 mm, 660,960 eggs (N=8), and age IV, 504 mm, 1,144,492 eggs (N=3). Miles (1950) in Texas found , age II, 100,000 eggs; age III, 300,000 eggs, and age IV, 560,000 eggs. Moody (1950) in Cedar Key, Florida reported: 464,000 almost mature eggs in a female of 397 mm. Sundararaj and Suttkus (1962) also give the percentage of total eggs spawned for each age group: I-8.6 percent, II-24.5 percent, III-40.6 percent, and IV-26.8 percent.

The growth rate of female spotted seatrout is greater than for males (Moffet 1961; Tabb 1961; Moody 1950) and the females apparently outlive the males (Moffet 1961). The sex ratio changes throughout the lifespan (Tabb 1961). Males are outnumbered by females nearly 2 to 1 in the first 3 year classes. By the sixth year males may be outnumbered by as much as 8 to 1 (Klima and Tabb 1959).

Distributions of lengths by gender for specimens from Laguna Madre, Texas were presented by Klima and Tabb (1959) as were average lengths by age class. Moffet (1961) presented mean standard lengths by age class and sex. Welsh and Breder (1923) and Pearson (1929) (cited in Moody 1950) presented average lengths by age class for the first six and eight winters, respectively. Futch (1970) graphed length vs age for a composite of six populations of spotted seatrout.

Most of the males die by the age of 5 or 6 years (Moffett 1961). Female longevity is estimated at 8 to 9 years (Moffett 1961; Pearson 1929), or perhaps 10 years (Tabb 1961). Sundararaj and Suttkus (1962) estimate longevity at 5 years for females and 3 years for males. Excluding the first year (age group 0), about 90 percent of the females are evenly distributed between age groups I and III (Sundararaj and Suttkus 1962); these also represent the largest spawning classes (Guest and Gunter 1958).

The only life stage of spotted seatrout identified in entrainment samples at Crystal River was postlarvae. Table 8.3-1 provides the estimate of 6.5 million for total entrainment. Utilizing an average fecundity from Sundararaj and Suttkus (1962), a 2 year reproductive life, and an assumed 10 percent survival for the egg and larval life stages resulted in an estimated 900 equivalent adults lost. This number of equivalent adults is a very small fraction (0.05 percent) of the recreational catch for 1980 for Region 4.

Identified sciaenid eggs and prolarvae, while a portion may be seatrout, have been assumed to be spot. The allocation of all unidentified organisms in this taxon to one species results in a conservative analysis.

8.3.1.7 Leiostomus xanthurus (Spot)

In the Cedar Key area spawning apparently takes place in winter and early spring (Reid 1954). Kilby (1950, cited in Reid 1954) indicated a breeding season of the January through March for the same area. Young were taken in January and February and were found in shallow waters, channels, and both deep and shallow flats (Reid 1954). Adults were present inshore most of the year but were scarce in mid-winter (Reid 1954; Pristas and Trent 1978). In St. Andrew Bay, Pristas and Trent (1978) found significantly fewer males in autumn and winter (26.3 percent and 35.6 percent males, respectively). Sundaravaj (1960, cited in Thomas 1971) assumed that the majority of spot died before reaching three years of age. Pacheo (1962, cited in Thomas 1971) suggested a mortaility rate of 50 percent after the first year for spot in Chesapeake Bay. Thomas (1971) presented some length-frequency data.

Spot have a fecundity of 70,000 to 90,000 (an average of 80,000 was used for analysis) and an average life expectency of 3 years. Spot were assumed to spawn once and have a 10 percent survival rate for early life stages. The entrainment of spot postlarvae and juveniles (Table 8.3-1) resulted in an estimated loss of 280,000 and 410,000 equivalent adults, respectively. Together these represent 20,700 lbs assuming an average weight equivalent to that derived from the trawl catch (0.03 lbs). This is approximately equivalent to the 1982 commercial landings for Citrus-Pasco and Levy Counties.

All unidentified sciaenid eggs and prolarvae were conservatively assumed to be spot. The unidentified individuals exceeded the identified individuals and were for earlier life stages. The effect of entrainment of eggs and prolarvae (Table 8.3-2) results in 27,500 and 360 equivalent adults, respectively. While this addition increases the estimates of equivalent adults, due to the conservatism of the analysis, this addition should not alter entrainment conclusions.

8.3.1.8 Sciaenops ocellatus (Red drum)

Pearson (1929) indicated, based on the occurrence of larvae and very young red drum, that spawning occurs from mid-October to mid-November off the coast of Texas. Theiling and Loyacano (1976) stated that it is generally accepted that red drum spawn from September through November. The eggs are buoyant (Vetter and Hodson 1983; Holt et al 1981a, 1981b) though they will sink at salinities of less than 25 ppt (Holt et al 1981b; Vetter and Hodson 1983). Spawning apparently occurs in the Gulf of Mexico near passes leading into tidal marshes (Pearson 1929; Bass and Avault 1975; Holt et al 1981a; Holt et al 1981b). Yolksac larvae are negatively buoyant (Holt et al 1981a). The young move shoreward to bays and lagoons which are used as nursery areas (Holt et al, 1981a; Bass and Avault, 1975; Pearson, 1929). The young remain inshore until six months of age in Louisiana (Bass and Avault 1975). They remain inshore for an indefinite period in Texas (Pearson 1929), while Osburn et al (1982) indicated that essentially non-migrating populations of immature fish (year classes I-III) are found in the bays. Mature adults are apparently remain offshore in the Gulf (Pearson, 1929; Simmons and Breuer 1962 cited in Osburn et al 1982; Yokel 1966 cited in Theiling and Loyacano 1975; Ross et al 1983).

Maturity does not occur until at least age IV, probably age V (Pearson 1929) at a total length of at least 75 cm. Modal total lengths for the first three year classes are approximately 34, 54, and 64 cm, while fish in the fourth year class have a mode of probably 75 cm; by the end of the fifth year the average length is 83 to 85 cm (Pearson 1929). A weight of 10 pounds or more is attained before first spawning (Pearson 1929). Using two methods of calculation, Pearson estimated fecundity of about 3,382,886 to 3,410,000 eggs for a female 90 cm long. Holt et al (1981a) stated that maturity is reached in 3-5 years, with the average female producing 1/2 to 2 million eggs per season. Vetter and Hodson (1983) reported one female which spawned in the lab produced approximately 10^6 eggs.

Only red drum postlarvae were identified from meroplankton collected at Stations C, D, or E. Table 8.3-1 provides an estimate of 300,000 for annual entrainment. An average fecundity of 3,400,000 for one reproductive period was used for analysis. A 10 percent survival of eggs and larvae was assumed. The entrainment of postlarvae results in the loss of 18 equivalent adults, which is an insignificant fraction of the 229,000 red drum reported in the recreational catch in 1980 for Region 4.

8.3.1.9 Mugil cephalus (Striped mullet)

Although many authors have reported that striped mullet spawn inshore or within a few miles of the beach, it seems that spawning occurs offshore on the northwest coast of Florida (Finucane et al 1978; Anderson 1958 cited in Finnucane 1978; Arnold and Thompson 1958; Broadhead 1953). The eggs are pelagic (Finucane et al 1978). According to Gunter (1945) spawing occurs off the Texas coast from late October to early January, peaking in late November and early December. Moore (1974), on the other hand, indicated that spawning occurs from December to May off Port Aransas, Texas and that individuals may spawn more than once in the same spawning season. Finucane et al (1978), indicated spawning occurs in early winter in the northwest Gulf of Mexico off Texas. Fish with mature or maturing gonads were mostly found to be three or more years old (Moore 1974). Prejuveniles leave the open ocean and enter intertidal estuarine areas (Major 1978).

Since no life stages were identified from meroplankton collections at Stations C, D, or E, there is no effect of entrainment calculated for the striped mullet population.

If all the Mugillidae noted in Table 8.3-2 are assumed to be striped mullet, the entrained life stages would be postlarvae and juveniles. Assuming a fecundity of 1.2 million (Futch 1966) and a 10 percent survival between life stages, the entrainment of postlarvae and juveniles results in 95 and 5800 equivalent adults. This represents a minor fraction of the over 2.5 million pounds of stripped mullet landed by commercial fisherman in Citris - Pasco and Levy Counties in 1982.

8.3.1.10 Penaeus duorarum (Pink shrimp)

Pink shrimp spawn offshore (Costello and Allen 1970; Tabb et al 1972; Williams 1955 in waters of 10-20 fathoms at temperatures between 19 and 31°C (Tabb et al 1972; Eldred et al 1965) at minimal bottom temperatures of 23.9°C (Williams 1965).

During spawning, eggs are cast free and drift for about one-half hour and then become demersal for approximately 14-16 hours prior to hatching (Tabb et al 1972). The highest spawning rate was observed from April to July in Florida (Tortugas area) (Cummings 1961), and spawning probably occurs year round in the Tortugas grounds (Perez-Farfante 1969). Eldred et al (1961) reported peak spawning to occur in the Tampa Bay area from April through September, with limited spawning in February and December. High temperatures may suppress spawning and more optimal temperatures probably cause peaks in spring and fall (Eldred et al 1961).

Fecundity estimates from a regression of fecundity and total length range from 66,000 (105 mm) to 460,000 (187 mm) ova for shrimp from the Tortugas and Sanibel fishing grounds (Martosubroto, 1974). Regressions on body weight and ovary weight were also given. Females probably spawn more than once during their lifespan (Cummings 1961; Perez-Farfante 1969), and a small female which spawns in the spring may spawn again in the fall after attaining a larger size (Eldred et al 1961). Kutkuhn (1962) also indicated semiannual spawning peaks. Males and females may achieve sexual maturity at minimum total lengths of 75 and 85 mm respectively at 9 or 10 weeks old (Eldred et al 1961). Kutkuhn (1962) gave an age estimate of 15 weeks and 107 mm total length as the age of recruitment to the Tortugas fishery. He also estimated 83 weeks to be the maximum lifespan. Juveniles inhabit coastal bays, estuaries, and as they grow, gradually move into deeper water (Costello & Allen 1966).

Survival rates of larvae on the Tortugas shelf average 83 percent per day (Munro et al 1968). From mark-recovery experiments on the Sanibel and Tortugas grounds of Florida, Costello and Allen (1966) estimated shrimp fishing mortality for Sanibel shrimp to be 6.8 percent for each 2-week period and all other losses were estimated to be 14.8 percent. For the Tortugas, fishing mortality was 13.1 percent for each 2-week period and all other losses were 19.7 percent. The instantaneous rates are: for Sanibel, .0689 for the fishery and .1644 for all others; for Tortugas, .1385 for the fishery and .2185 for all others. These rates, as the investigators pointed out, cannot be readily accepted as estimates of natural mortality since they include other losses such as migration and mortality from marking, handling, or releasing procedures. Also, true natural mortality may shift with changes in the fishing industry. Iversen (1962) reports the catchability of untagged shrimp (e.g., the instantaneous mortality due to fishing) from the Tortugas grounds to be .02393 and the instantaneous rate of emigration and natural mortality (e.g., instantaneous mortality rate due to other causes) to be .05998.

The sex ratio of males to females is about 1:1 for inshore populations (Tabb et al 1962; Eldred et al 1961; Saloman 1965) but varies geographically, seasonally, and with size class (Eldred et al 1961). As they mature, the larger shrimp move offshore; females attain larger size than males (Iversen and Idyll 1960; Williams 1955).

Since no life stages of pink shrimp were identified in meroplankton collections at Stations C, D, or E, there is no effect of entrainment calculated for the pink shrimp population.

Assuming that all Penaeus sp. are pink shrimp, the entrainment estimates from Table 8.3-2 have been used to estimate equivalent adults. An average lifetime fecundity of 200,000 was utilized, and 10 percent survival between life stages was assumed. The equivalent adults associated with mysis, postlarvae, and juveniles are 22, 18830, and 10230, respectively. Utilizing the average weight from the trawl samples at Crystal River of 0.007 lbs, the equivalent adults represent an insignificant fraction of the more than one million lbs of pink shrimp landed in Citrus-Pasco and Levy Counties in 1982.

8.3.1.11 Callinectes sapidus (Blue crab)

Williams (1965) reported that blue crabs mature in about 14 months and attain a maximum age of 3 years. Most spawn at about age 2 (Williams 1965; Pearson 1945; Churchill 1919.) Spawning occurs from late April (Williams 1965) and mid-May (Pearson 1948) until early or mid-September (Williams 1965; Pearson 1948). Some females produce two sponges (egg masses)in the same summer (Pearson 1948; Williams 1965). A third sponge may be produced the following year, at age 3 (Williams 1965; Pearson 1948; Churchill 1919). Williams reported the spawning peak to occur in June. Generally, gravid females move offshore where eggs hatch at higher salinities (Churchill 1919). Estimates of the number of eggs per sponge are given as 700,000 to two million by Williams (1965), 1,750,000 to 2,000,000 for a sponge of usual size by Churchill (1919), and up to 2,000,000 by Davis (1965). Of the eggs spawned, Van Engel (1958 cited in Oesterling 1976) estimated only about one ten-thousandth of one percent (.000001) will survive to become adults. Based on a study spanning 13 generations, Pearson (1948) reported the lack of a significant correlation between the abundance of the spawning stock and the number of offspring. Rather, there is a significant correlation between the volume of water discharged from the James and Potomac Rivers during the spawning season with the index of abundance for the resulting adults. This implies that salinity may be the important factor affecting survival of the young, at least at the level of fishing existing at the time.

Williams (1965) reported year round spawning occurs in Texas with peaks in June or early July. Nicols and Keney (1963, cited in Futch 1965) reported that spawning occurs primary throughout the year in Florida waters, but peaks from May through November. Oesterling (1976) reported that spawning occurs primarily during the spring and summer months, and is generally considered to occur in areas of higher salinity at the mouths of estuaries and offshore. However, unlike reports for the eastern seaboard, female crabs move, not offshore, but northward alongshore to a spawning area. There appears to be one primary spawning ground for the Gulf Coast in the Apalachicola Bay region, although spawning does occur all along the coast. In the St. Johns River, many if not all females spawn twice either in the same season or over two seasons, though few live more than one year past maturity (Tagatz 1968). The maximum age is little more than four years and crabs reach harvestable size in less than one year. Eggs number between one and two million per sponge (Tagatz 1968), while Futch (1965) reported that Florida female crabs produce about two million eggs per sponge.

Only megalops were identified from meroplankton collections at Stations C, D, or E. Table 8.3-1 provides an estimate of 360,000 entrained annually. The survival to megalops was assumed to be 10 percent and two sponges were assumed during the average life time. Therefore, the loss due to entrainment is about

2 equivalent adults. This is a nonsignificant fraction of the almost 4 million pounds of commercial landings in 1982 for Citrus-Pasco and Levy Counties.

The unidentified Callinectes sp. were assumed to be entrainable life stages of blue crab. The megalops (Table 8.3-2) entrained would represent about 200 additional equivalent adults. This addition does not change the conclusions for blue crab entrainment.

8.3.1.12 Menippe mercenaria (Stone Crab)

In North Carolina ovigerous females have been taken from May to August (Williams 1965). Futch (1966) reported that in Florida spawning apparently occurs throughout the spring and summer. Females, migrate offshore to spawn and are capable of producing six egg masses in 69 days, each containing 500,000 to one million viable eggs (Williams 1965). The postlarvae migrate inshore to bays and estuaries.

In the Cedar Key areas, however, it appears that females may remain inshore on the grass-flats to spawn. Spawning occurs from March through October with peaks in June and September (Bender 1971). In the Anclote area zoea were collected from March to November with peak densities from July to September, and megalops were collected from May to November, with most taken in July (FPC 1977). Juveniles under 8 mm carapace length were collected in Florida Bay from October through April indicating an extended spawning season (Manning 1960). Savage and Sullivan (1978) reported that sexual maturity is reached in about 10 months. Powell and Gunter (1968) reported a changing sex ratio in the number of males to females over the year at a jetty in the Port Aransas, Texas area. The ratios were 4.28 to 1 for December-January 1947-1948, 5.00 to 1 for May-June, and 2.65 to 1 for July - August.

The equivalent adult estimate for stone crabs utilized a fecundity of 750,000 and a lifetime production of 5 egg masses. Total survival was taken from Porter (1960), and a 10 percent survival from the last zoeal stage to megalops was assumed.

The equivalent adult estimate of less than 3,700 is mostly the result of Stage 1 zoeal entrainment (Table 8.3-1). The equivalent adult estimates are 3297, 6, 15, 6, 5 and 313 for zoeal Stages 1 to 5 and megalops, respectively. This number represents an insignificant fraction of the almost 950,000 lb landed in 1982 in Citrus-Pasco and Levy Counties.

8.3.1.13 Lolliguncula bevis (Brief squid)

Little is known about the ecology of brief squid in terms of short-term and long-term distribution patterns (Laughlin and Livingston 1982). Early life history data is also limited (Vecchione 1982). An eight year study of the brief squid's spatial and temporal distribution was conducted in the Apalachicola estuary by Laughlin and Livingston (1982). The most suitable habitat in the estuary was concluded to be channels and/or passes with high current velocity and salinities of 20-30 ppt. Small numbers occurred from January to April during times of relatively low salinities and temperatures. Abundance increased dramatically in May when mean salinities were intermediate and water temperatures high (22-25°C). A similiar situation was noted in October and November. While migration onshore and offshore is strongly correlated with temperature and salinity, fluctuations within the estuary were related to abunadnce of zooplankton (Laughlin and Livingston, 1982). Dragovich and Kelley (1964) reported that juvenile squid, which comprise most of the squid catches in estuaries (90%) feed preferentially on zooplankton.

Little life history information is available on the brief squid. It produces egg capsules that may contain up to 200 eggs per capsule and hundreds of the capsules are found in groups. Assuming a life time production of 500 eggs per individual, the entrainment estimate (Table 8.3-1) results in about 3600 equivalent adults. The brief squid was represented in low numbers from April to December at many stations. Therefore, the effect of entrainment can have only a minor effect on the population.

8.3.2 Entrainment Conclusions

The results of the entrainment estimates under conservative assumptions have provided the basis for equivalent adult projections. Where possible, these projections have been compared to other forms of population exploitation, such as commercial or sport fishing statistics. These analyses for the SIO demon-strate that for most species the entrainment effects represent a small fraction of present exploitation. Hydrodynamic modeling indicates that the source for the entrained organisms is not limited to the area immediately surrounding the plant. Therefore, entrainment is expected to have an acceptable level of exploitation on the SIO.

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TABLE 8.3-1

MAXIMUM ENTRAINMENT FOR EACH SIO BY LIFESTAGE
ANNUAL NUMBER ENTRAINED IN MILLIONS

Species	Life Stage	Total Entrainment	Station
Bay anchovy	Eggs	11674	D
	Prolarvae	767.8	D
	Postlarvae	686.6	E
	Juveniles	154.6	C
Polka-dot batfish	Juveniles	0.19	E
Pigfish	Postlarvae	0.76	C
Pinfish	Postlarvae	16.69	E
	Juveniles	2.15	E
Silver perch	Prolarvae	0.08	C
	Postlarvae	21.64	C
	Juveniles	0.22	C
Spotted seatrout	Postlarvae	6.50	E
Spot	Postlarvae	12.28	E
	Juveniles	1.73	E
Red drum	Postlarvae	0.30	C
Blue crab	Megalops	0.36	D
Stone crab	Stage 1	3029.43	E
	Stage 2	254.63	E
	Stage 3	52.01	E
	Stage 4	14.84	E
	Stage 5	0.38	C
	Megalops	2.35	E
Brief Squid	All	0.91	C

TABLE 8.3-2

MAXIMUM ENTRAINMENT FOR UNIDENTIFIED SIO TAXA

Species Name	Life Stage	Total Annual Entrainment (Millions)	Station
Anchoa sp.	Prolarvae	192.6	E
	Postlarvae	1088	E
Haemulidae	Eggs	433.5	E
Sciaenidae	Eggs	1102	C
	Prolarvae	14.63	D
Mugillidae	Postlarvae	0.57	E
	Juveniles	3.5	E
Penaeus sp.	Mysis	0.22	C
	Postlarvae	18.83	C
	Juveniles	1.023	E
Callinectes sp.	Megalops	34.83	E

9.0 FISHERIES

Samples of juvenile and adult fish were collected by using four different gear types at various locations throughout the study area. The data are intended to provide information on the local fish community and to support evaluation of thermal, impingement and entrainment effects on fish populations. As in the impingement and entrainment evaluations, selected species are emphasized.

The fisheries program included a short-term effort to collect blue and stone crabs and to tag and recapture blue crabs. These data were intended primarily to identify patterns of local movement and coastal migration.

9.1 SAMPLING AND LABORATORY ANALYSIS

9.1.1 Sampling Procedures

Fisheries samples were collected in the vicinity of the Crystal River Power Station at monthly intervals from June 1983 through May 1984. Several gear types, including otter trawls, beach seines and a drop net, were used. Open water otter trawls were collected at night. Tidal creek trawls and all other fisheries samples were collected during the day. Station locations are shown in Figure 9.1-1.

A 3.05 meter otter trawl constructed of 3.8 cm mesh in the body, 1.3 cm mesh in the cod end and a 6.5 mm mesh nylon cod end liner was used for the open water trawling. Seven samples were collected at each station. The net was released from a moving boat and dragged along the bottom for 2 minutes (per haul).

Duplicate beach seine collections were made at each station using a 22.9 meter long by 1.8 meter deep seine constructed of 6.5 mm mesh. The seine was deployed in the following manner: an anchor attached to the end of the seine was placed on the beach. The seine was payed out as the other end was walked perpendicular to the beach. When approximately three-quarters of the length of the seine had been deployed, the net was walked in a semicircular formation. After the distal wing was on the beach, the two ends of the net were drawn together and the net was hauled onto the beach.

The drop net apparatus consisted of a portable frame from which a 1.6 mm mesh net was suspended and then remotely triggered to enclose a 16 m^2 water column. The trigger line was pulled after an acclimation period of approximately 2 hr. After the net was dropped, the enclosed area was swept five times with a 6.5 mm mesh seine. This was followed with a series of three sweeps with a 1.0 mm mesh seine. Two replicates were collected on each sampling date.

Four creeks were sampled with a 3.05 meter otter trawl constructed of 3.8 cm mesh in the body, 1.3 cm mesh in the cod end, with a cod end liner of 3.2 mm mesh nylon. Seven samples were collected at each site. The net was released from a moving boat, and dragged along the bottom for 2 minutes (per haul).

A blue crab tagging/recapture study was conducted during a 16 week period from September through December 1983. A total of 120 plastic coated standard wire mesh crab traps were set and retrieved weekly along four transects, designated A through D, within the study area. Each transect consisted of 30 individual traps, which were evenly spaced into six groups containing five traps each. Each group of five traps along a transect was designated as an individual station (Figure 9.1-2).

Each individual crab trap was baited with shad. Traps were retrieved, emptied, and reset every 7 days, at which time all healthy viable blue crabs were tagged and released. To avoid tag loss due to molting or death, only mature healthy female crabs and healthy male crabs larger than 127 mm carapace width were tagged. Tags were fastened to the carapace of the blue crab with 40 pound test monel. The tags were sequentially numbered and contained information pertinent to how the tag was to be returned. The tag number, date, and location of capture, carapace width to the nearest millimeter, sex, and general appearance of each tagged crab were recorded. Crabs were released approximately 200 m from the point of capture. When previously tagged crabs were recaptured, the tag number, sex, carapace width, date, time, and location of recapture were recorded and the crab was then released.

In addition to tagged blue crabs, any stone crabs (Menippe mercenaria) which were captured, as well as any blue crabs which could not be tagged, were measured for carapace width, sex was noted, and the specimens released.

To supplement the number of blue crabs tagged, all blue crabs impinged on the travelling screens during a 24 hr period were collected once weekly during the tagging study. The dates and times of collection were designated to correspond with the regular impingement sampling schedule. During this time, all viable blue crabs were placed in a divided water table. At the end of a minimum 24 hr holding period, each healthy crab was removed and tagged in the same manner as described previously. All blue crabs, dead or alive, were also measured for carapace width and total weight for the impingement study. The total number of crabs held, as well as percent mortality, were recorded. Tagged impinged crabs were then divided randomly into three equal groups and transported to three predetermined release points within the study area. These release points were designated as Stations E, F, and G (Figure 9.1-2).

Along with the field work, an extensive public notification program was initiated in cooperation with the Florida Department of Natural Resources (FDNR). Notices of the tagging project were sent to local licensed commercial crabbers, bait shops, docks, and processing houses in an attempt to enhance the number of tag returns. Included in this notification was a description of the study and the tags used, and the announcement of a nominal reward for tag returns with desired information. FDNR coordinated the tag returns to provide consistency with their statewide program.

9.1.2 Laboratory Analysis

All fish and macroinvertebrates were identified, counted, and weighed by species. Identifications were made utilizing standard literature sources and MML's reference collection. Nomenclature of fishes followed that established by the American Fisheries Society. Taxonomy was based on external characteristics as given in major taxonomic keys. A voucher specimen for each species was retained. The identifications of any questionable specimens were verified by external taxonomic specialists. A reference collection of all taxonomically confirmed species was maintained.

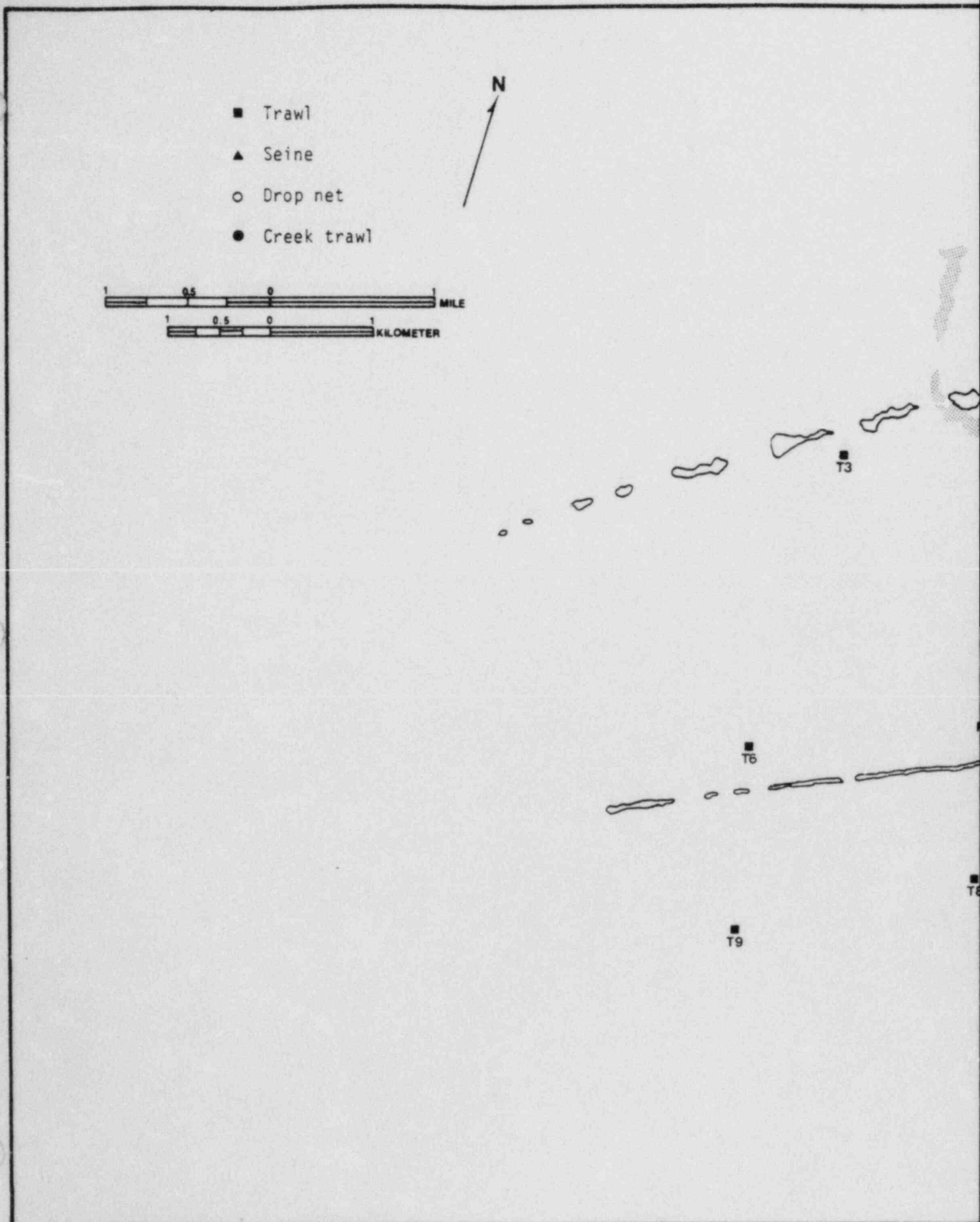
In addition to the general analyses, selected important organisms were examined in detail and analyzed for length-weight relationships, overt parasites, and disease. Additionally, certain species were analyzed for sex, reproductive condition, fecundity, and age as shown in Table 9.1-1.

Twenty-five individuals from each of the nine selected important species obtained by beach seining and trawling in each experimental (north of the intake canal) or control (south of the canal) area during each month were examined for obvious instances of parasitism and disease. External sexual characteristics were noted. Each species was also sexed internally, their stages of maturity recorded, and their reproductive condition examined. The latter was reported following standard classifications: immature, mature, ripe/gravid, or spent. Fecundity of ripe or gravid fish was determined by the gravimetric method. Age was determined using otoliths or scales for fish species subjected to fecundity analyses. Analyses were performed for each month of the study. Sex and reproductive state (e.g., gravid, egg-bearing) of important macroinvertebrates were recorded where possible.

TABLE 9.1-1

DETAILED STUDIES OF SELECTED IMPORTANT ORGANISMS

Species	Sex	Reproductive Condition	Fecundity	Age	Length-Width	Disease and Parasites
Polka-dot batfish	X	X			X	X
Pigfish	X	X	X	X	X	X
Pinfish	X	X	X	X	X	X
Silver perch	X	X	X	X	X	X
Spotted seatrout	X	X	X	X	X	X
Spot	X	X	X	X	X	X
Red drum	X	X	X	X	X	X
Striped mullet	X	X	X	X	X	X
Bay anchovy	X	X	X	X	X	X
Blue crab	X	X				
Stone crab	X	X				
Pink shrimp		X				



N
Trawl
Seine
Drop net
Creek trawl
1
0.5
0
1
MILE
1
0.5
0
1
KILOMETER
T3
T6
T9

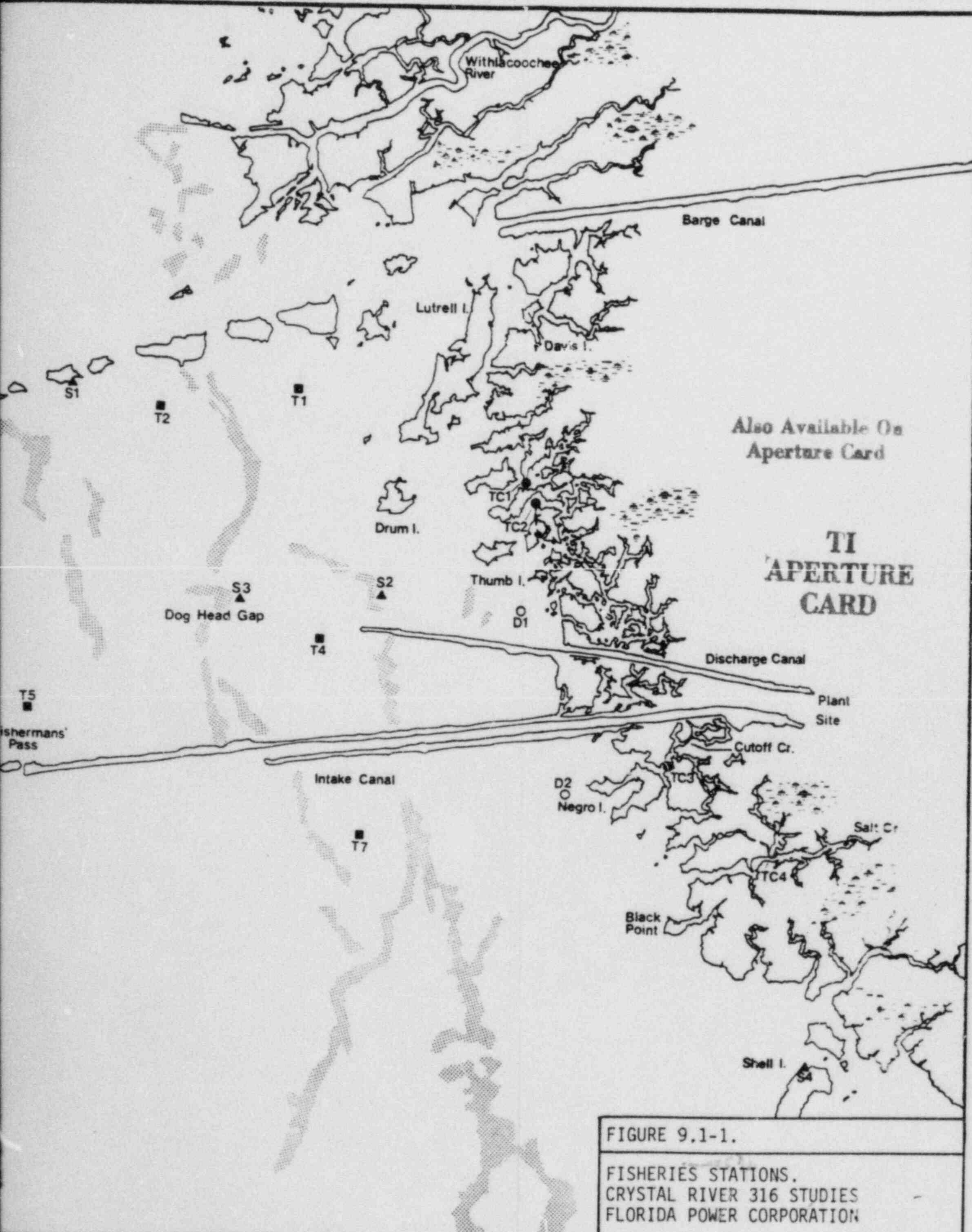


FIGURE 9.1-1.

FISHERIES STATIONS.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

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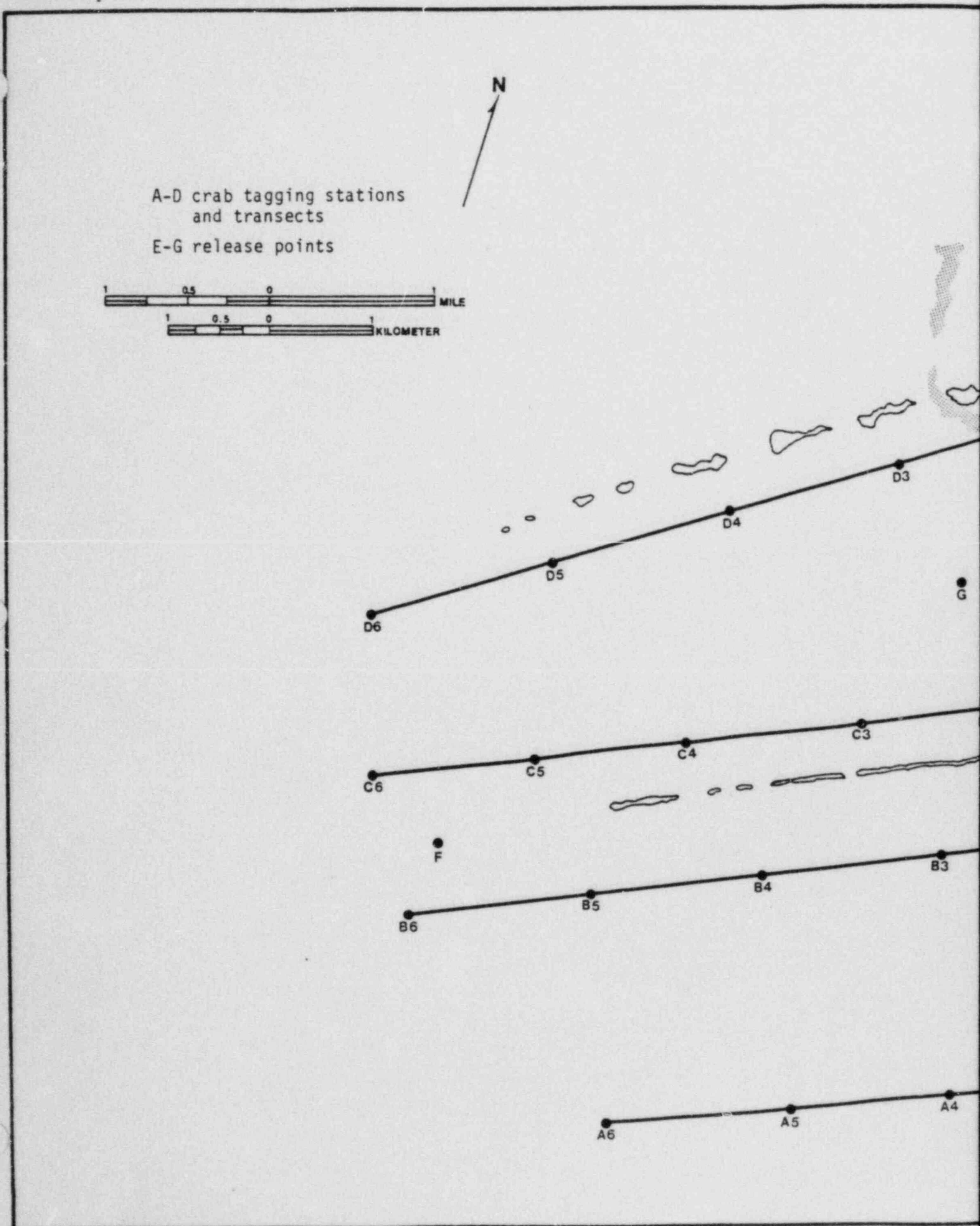

N
A-D crab tagging stations
and transects
E-G release points
1 0.5 0 1 MILE
1 0.5 0 1 KILOMETER
D3
D4
D5
D6
G
C3
C4
C5
C6
F
B3
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B6
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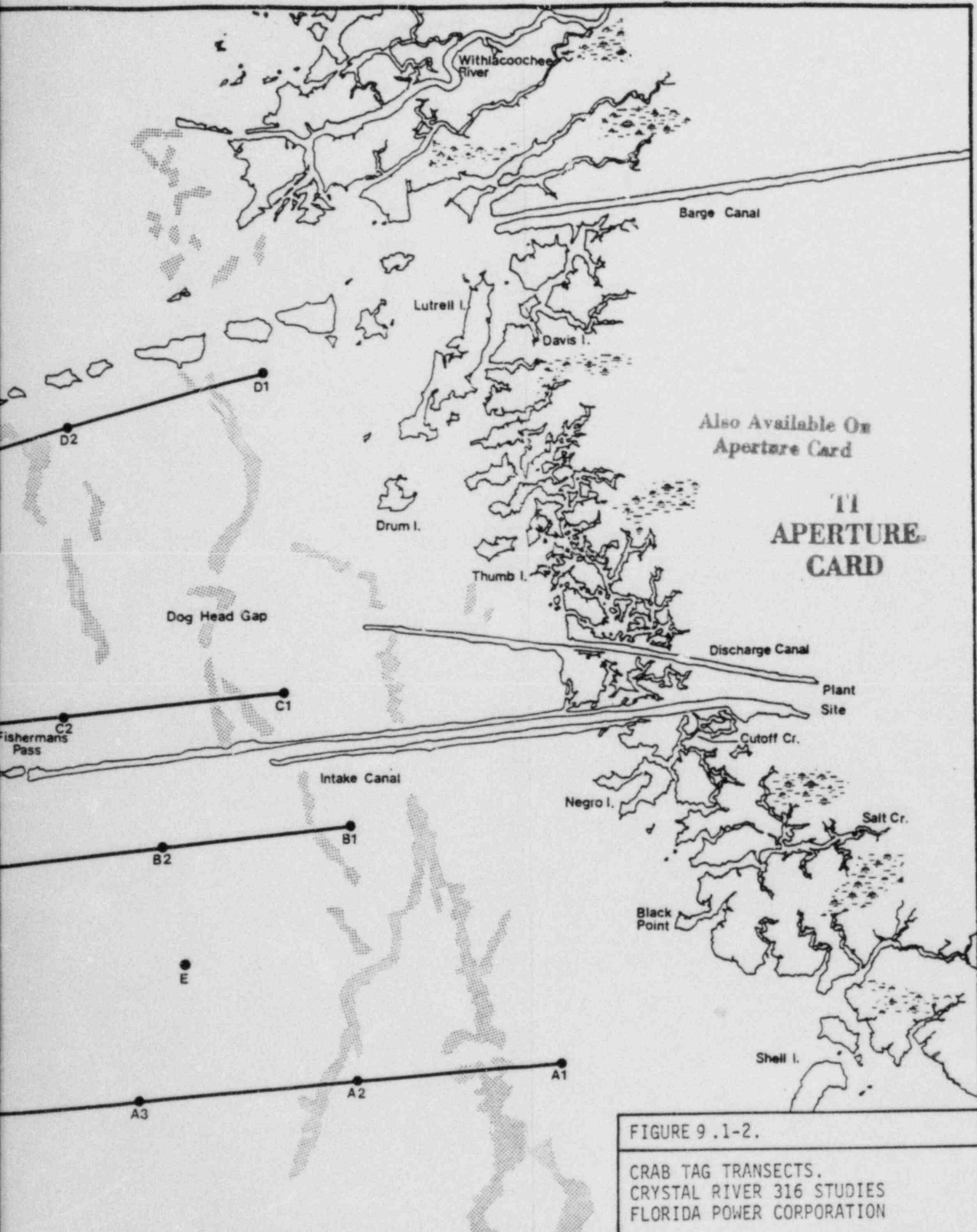


FIGURE 9.1-2.

CRAB TAG TRANSECTS.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

9.2 RESULTS

Fish and invertebrate numbers and biomass have been provided in quarterly reports by gear type, month, and station. Summary tables for SIO are provided in Appendix VII. In general, numbers were small, although occasional large collections did occur. As a result, one or two samples have a large effect on total values. Quantitative analyses which can be performed are limited. The following sections report the results of fisheries sampling by gear type.

9.2.1 Trawl

The trawls captured a total of 98 species of fish and 108 species of invertebrates. The total catch of fish varied seasonally with lowest numbers in January and February (see Figure 9.2-1). The peak number at any one station occurred in May (Station T9), but similarly high densities occurred in April, June, July, and August (Table 9.2-1). Highest densities at all stations occurred in late spring and summer (May, August, September, June). Invertebrate densities followed a similar seasonal pattern although low densities found in December and January continued through June, and then increased to a peak in July and August.

Fish biomass followed the same general seasonal pattern seen in the density data (see Figure 9.2-2). Invertebrate biomass was lowest from December through February, however, peak values occurred from March through May rather than in summer.

The variability in the data associated with capturing a school of fish can efffectively mask patterns of distribution. For example, trawling in April at Station T4 yielded 502 spot which was 91 percent of the catch at the station and 38 percent of the catch at all stations. At the same time, some general patterns do appear consistently from month to month. Comparisons among transects (northern, T1-3, central, T4-6, southern, T7-9) indicate the lowest densities of both fish and invertebrates along the central transect (see Tables 9.2-2 and 3). The transects to the north and south had similar numbers overall. Highest numbers of fish were collected to the north in 1983 and to the south in 1984. Numbers of invertebrates were consistently higher to the south. Fish biomass was highest to the south except in the fall. Based on average fish weights, the larger fish were collected along the central or southern transects.

Within transects, distributional trends vary from month to month, but to the north, Stations T1 or T2 generally had the highest numbers and T3 the lowest. On the central transect, the variation was similar with highest densities inshore at Station T4 and lowest offshore at Station T6. To the south, the offshore station (T9) frequently had the highest numbers and the central station (T8) had the lowest.

Diversity (Shannon-Weaver) evenness (after Pielou 1975) and richness (number of species) were calculated for each trawl station in each sampling month. A summary table is included in Appendix VII (Table VII-23). Comparing across transects, richness was often lower along the central transect and was considerably higher along the southern transect in 1984. Evenness was slightly higher on the central transect in the winter and spring. Diversity was generally similar on all three transects. During 1983, diversity within transects increased with distance offshore along the north and central transects. Evenness and richness also increased offshore. Along the southern transect, diversity was highest inshore until April 1984 at which time the offshore station was most diverse. Evenness was frequently highest at T8 and richness was highest at T7 or T9.

In addition to evaluating population parameters for trawl data, total density and biomass, the data for each SIO were summarized (see Appendix VII, Tables VII-1 to 22). Several species were captured in very low numbers precluding detailed evaluation of their distributions; these included squid, stone crab, and polka-dot batfish. Blue crab occurred in low numbers but peaked in April and May; they were most consistently found at T1 and T2. Spotted seatrout numbers were also low, peaked in May and concentrated at T1-3 and T5. Bay anchovy were rarely collected in trawls; numbers peaked in the summer with most anchovies taken at Stations T1-4.

Other SIO were collected in greater numbers. Spot was present throughout the year with highest numbers in spring and summer at Stations T1-4. Based on biomass values, the smaller specimens were inshore at Station T1 and T4 and the largest spot were at Station T3. Pigfish were collected primarily in spring and summer, but their concentration was to the south. Pinfish occurred at about the same time, and they were also collected primarily at the southern stations. Moderate numbers of pinfish were also taken at Stations T1 and T2.

Silver perch were most common in summer and fall with the highest densities inshore at Stations T1, T2, and T7. Based on average weight comparisons, the smaller specimens were found at these stations. Pink shrimp were taken throughout the program with highest densities occurring in the summer. Numbers were higher inshore at that time but showed considerable variation at other times.

9.2.2 Seine

Seine collections yielded 49 species of fish and 15 species of invertebrates. Figure 9.2-1 provides a summary by month of the total number of fish collected. In general, the seines sampled a limited number of species, and of the species collected, many occurred in small numbers. Invertebrates were rare except at Station S1 in February when several species of shrimp common in grassbed habitats were collected (see Table 9.2-1). Fish captured in large numbers were usually juveniles of schooling species. Large numbers were taken in March at Station S1 (clupeids, spot) and S2 (clupeids), in February at Station S1 (spot), and in September at Station S2 (bay anchovy). Excluding these particularly large catches, lowest densities occurred from November through April and the highest in June and July. No clear pattern of distribution emerged. Station S2 did have the lowest density and biomass seen at the site in any given month over half of the time, but values at other stations were rarely much higher. The highest density per sampling date occurs most frequently at Station S1.

Diversity, evenness, and richness (see Appendix VII, Table VII-46) were very variable, both across stations and month to month. Diversity remained relatively high at S4 and tended to be highest at Station S1 or S4. Lowest values in winter were at Station S2. Richness was highest in winter at Station S4 and in spring at Station S1.

SIO information from seines is very limited (Tables VII-24 to 45). Stone crab, pink shrimp, red drum, and pigfish were collected only on one date. Silver perch were collected twice. Small numbers of batfish were collected over 5 months; all but one occurred at Station S1. Low numbers of blue crabs were found at all stations over 8 months.

Spot were collected mostly in February and March with highest numbers at Station S1. Pinfish were also collected in highest numbers in February and March at Station S1. Bay anchovy were collected in all months except January, February, and April. The station at which the maximum density occurred varied over time but was most often S2. Striped mullet occurred in varying numbers, mostly from August through February. Only four specimens were collected at Station S2.

9.2.3 Drop Net

Drop nets sample primarily small, shallow water inhabitants and species which move into shallow areas with the tide. Drop net collections contained 42 species of fish and 24 species of invertebrates. Numbers of organisms were generally low and variable (see Figure 9.2-1). Highest numbers were collected in February, November, October, and September (see Table 9.2-1). Lowest numbers occurred in December and January. The number of fish caught at Station D1 generally exceeded the number at Station D2, except in June, August, January, and December. Fish biomass was also usually higher at Station D1; exceptions were in July, April, and March when biomass was greater at Station D2. In contrast, more invertebrates were consistently taken at D2. Biomass of invertebrates was also generally higher at Station D2.

Diversity at drop net stations was highest at D2 in 10 of 12 months (Table VII-67). Diversity was lower at Station D1 in the spring despite higher richness. Evenness was correspondingly lower. Richness was generally higher at D2.

Selected species were uncommon in drop net collections (see Tables VII-47 to 66). Seatrout and bay anchovy were taken only at Station D1. Mullet, batfish, and silver perch were collected only at Station D2. Of the species collected at both stations, spot occurred in larger numbers at Station D1 and pigfish and pink shrimp were mostly at Station D2. Pinfish and blue crabs were about evenly distributed.

9.2.4 Creek Trawl

Given the locations and conditions sampled, this gear sampled organisms moving in and out of the creeks on a relatively high tide. Forty-three species of fish and 27 species of invertebrates were collected. Juvenile fish predominated. The largest numbers of fish were collected from January through May with the peak in March (see Figure 9.2-1). Invertebrate numbers were highest from November through March (Table 9.2-1). Fish biomass was highest in the spring; a secondary peak occurred in November.

Fish densities tended to be lowest at Station TC4 and at Station TC1. Peak densities tended to be at Station TC2. The same pattern was observed for the invertebrates collected.

Diversity in creek trawl samples was almost always higher at TC4 or TC1 and lowest at TC2 (see Table VII-86). Evenness tended to be lowest at TC2 or TC3. Richness increased at TC2 in the fall and early winter; in the spring, highest richness was at TC1 or TC2.

Mullet, spotted seatrout, pigfish, and bay anchovy were collected in small numbers (see Tables VII-68 to 85). Silver perch were generally rare but a large number were collected in May at Station TC1. Pink shrimp were taken at all stations over all months with the largest numbers collected at Station TC2. Blue crabs showed similar seasonal and spatial patterns; numbers were slightly higher at TC1. Spot were collected in only 5 months but in relatively high numbers. Peak numbers were in February and March at Stations TC1 and TC2. Pinfish was the most commonly collected SIO with highest numbers from February through May, at Station TC2. These peak values were made up of small fish which began to appear in January. Average weight continued to increase through May.

9.2.5 Crab Traps

During the 4 months of trapping, 7294 blue crabs and 6251 stone crabs were captured (Table 9.2-4). Of the blue crabs, 6123 were collected in crab traps, tagged, and released. An additional 220 crabs were impinged, tagged, and released. These results and subsequent analyses utilize collection data without correction for Catch Per Unit Effort (CPUE). CPUE by station and week of sampling was reviewed and evaluated statistically, but the results and conclusions described below and displayed in subsequent tables were unchanged.

Only about 17 percent of the blue crab captures occurred in September and October. At the same time, 43 percent of the stone crabs were caught (Table 9.2-5). In general, blue crabs were captured in larger numbers inshore on all four transects. In September and October, Stations A1, B1, C1, D1, and D2 accounted for about 73 percent of the catch. Numbers generally decreased at stations toward the offshore end of each transect. Stone crabs were concentrated toward the offshore end and center of the transects. Densities along Transect B were somewhat more homogeneous in having comparable numbers of stone crabs at B1-3 and B6, but the largest numbers were at B4 and B5.

In November and December, stone crabs maintained the pattern of largest numbers offshore and in the center of the transects (see Table 9.2-6). Blue crabs continued to be caught in large numbers at the inshore stations, but similar numbers were taken at the first four stations on each transect indicating an increase in densities 4-7 kms offshore.

Highest numbers of blue crabs were trapped at Transect D throughout the study. Transect A yielded the next highest number. Transects B and C had similar numbers, with B yielding slightly more overall. Stone crabs were most abundant at Transect B and least abundant at Transect D.

Data from crab traps were also evaluated in terms of sex and carapace size. Overall, stone crabs were 65 percent males, the percentage lower in November and December (61 percent) compared to September and October (70 percent) (see Tables 9.2-7 to 9.2-10). The distribution along a transect is similar for both sexes; male stone crabs were collected in higher numbers along Transects A and B while females were least dense on Transect A. At almost all stations, females were smaller than males.

The blue crabs collected were about 74 percent females. In September and October, however, only about 48 percent were females. The population in November and December was about 79 percent females. Both males and females were most dense inshore in September and October. Later, the males contined to be most dense inshore while females occurred in larger numbers toward the center of the transects. Highest numbers of both males and females were at Transect D, lowest numbers were at Transects B and C. Female blue crabs were generally larger than males, but no pattern of distribution based on size was apparent.

Immature blue crabs were not collected in September but then appeared in increasing numbers through December. They made up less than 4 percent of the catch. Parasitized specimens were also taken in increasing numbers each month and represented 3 percent of the blue crabs collected. Parasitized specimens averaged 110.5 mm.

A total of 3422 tagged blue crabs were recaptured. One hundred thirty-three crabs were recaptured initially by MML; of these, 68 were recaptured more than once. Most of these multiple captures involve only a second recapture although one crab was taken four times. The number of crabs recaptured represented 54 percent of the tagged crabs; 96 percent of the recaptures were from fishermen while 4 percent were taken by MML crab traps. Of all the recaptures, about 67 percent came from Crystal Bay. Of the Crystal Bay recaptures, about 79 percent were females.

Numbers of crabs recaptured in Crystal Bay are shown by release location in Table 9.2-11. The table records multiple recaptures in terms of both the original release station and the secondary release point for each recapture. The recapture location numbers refer to grid elements as shown in Figure 9.2-3. For recaptures reported by fishermen, locations are approximated based on information reported with the tag return, conversations with fishermen, and field observations. Data on recaptures are also presented by sex, (Tables 9.2-12 and 9.2-13) but males are relatively few in number and the pattern of recaptures is similar for both sexes. Thus results are discussed in terms of total numbers. Comparing recaptures by transects provides the best indication of local north-south movement. Crabs released on Transect A are recaptured primarily on Transect A (39 percent) or Transect B (44 percent). Recaptures after release on Transect B were mostly (71 percent) on Transect B, recaptures from Transect C were either on Transect C (38 percent) or Transect D (54 percent), and those from Transect D were recaptured along Transect D (80 percent). The latter value is biased by the lack of traps further north. The data do indicate a movement of crabs to the north from all transects but particularly from A and C with more limited numbers released on Transect B being recaptured on C or D. There is also some movement to the south from Transects B, C, and D.

Within each transect, there was some east-west movement indicated. Crabs released at inshore stations, e.g., A1, B1, B2, D1, and D2, were often found further offshore. Crabs released at central stations, e.g., A4, B4, D3, and D4, tended to be recaptured inshore.

In Table 9.2-14, the release and recapture data is presented in terms of the average time between the two events in order to consider rate of movement. The times are highly variable, and the variation in number of crabs recaptured requires careful interpretation. For crabs released at a point on a given transect, recaptures occur more quickly on the same transect than on other transects. On Transect A, recaptures on Transects C or D occur over the same range of average times as recaptures on Transect B. It is possible, using weighted averages for recaptures on the four transects, to define the time from release along Transect A until recapture as increasing with distance north: Transect A (22.5 days), Transect B (29.1 days), Transect C (34.1 days), and Transect D (36.8 days).

In addition to recaptures in Crystal Bay, recaptures were recorded north and south. Table 9.2-15 provides a summary of the numbers of crabs recaptured at various locations. The southern section of Crystal Bay accounted for only 0.5 percent of the recaptures. About 27 percent of the total recaptures were from Waccasassa Bay and less than 6 percent from further north. As would be expected, releases from northern transects in Crystal Bay accounted for higher numbers of recaptures to the north. Recaptures to the south came mostly from Transects A and B. Males accounted for all but one of the crabs recaptured to the south but only about 5 percent of the crabs moving north.

Average time between release and recapture is provided in Table 9.2-16. In general, crabs were recaptured most quickly in Crystal Bay with the time span increasing with distance from Crystal Bay. Maximum times occurred with crabs recaptured near Apalachicola River (about 225 km NW). Crabs recaptured to the south (10 km) had unexpectedly high times, similar to times seen about 200 km northwest.

Over 900 crabs were recaptured in Waccasassa Bay. A comparison was made of recapture times in Waccasassa Bay and release stations along Transects B and C. For each comparably located station, the time to recapture is less from Transect B than Transect C. Comparing Transects D and B, three of the comparable stations on B have shorter times until recapture in Waccasassa Bay. Crabs from Transect A take longer than crabs from B but sometimes more and sometimes less time than crabs from C and D. Comparing weighted average times by transect indicates the shortest recapture time from Transect B (43.8 days) and the longest time from Transect C (52 days). The average time from Transect D (45 days) is similar to that from Transect B but lower than from Transect A (49.7 days).

9.2.6 Special Studies of SIO

Evidence of disease or parasitism was encountered in only two species. Fifty-seven batfish, all with an intestinal nematode, were collected and sacculinid parasites were found on 76 blue crabs of 422 collected. All but one batfish was from trawl collections, the largest number occurred at Station T7, and parasitized fish were taken in 10 of the 12 collections. Almost 72 percent of the parasitized batfish were collected in the control area. All but two of the blue crabs reported were also from trawl collections, the largest number were taken at Station T9, and they occurred in all months with higher numbers in April and May. In other gear, only 2 of 115 crabs were parasitized. In the trawls, a significantly greater percentage of parasitized crabs occurred in the thermal area (56 percent) compared to the control area (44 percent). This pattern was reversed only in the spring (control, 63 percent; thermal, 37 percent).

Gravid females of only three species were collected and analyzed; all were less than 1 year old. Three pigfish were collected in March 1984 at Stations T7 and T9. Fecundity ranged from 17302 to 28160 (average 21660) eggs per female. Nine bay anchovies were found to have 1173 to 4387 (average 2290) eggs per female. One specimen was taken in June 1983 at Station T4, three were collected in March 1984 at Stations T1 and T2, and the remainder were at Stations T7 and T8 in April. Eleven silver perch ranged from 17920-147050 (average 48140) eggs per female. All were collected in March at Stations T1 and T4 or in April at Stations T1, T4, T8. While the numbers involved are too small to warrant quantitative analysis, it can be noted that the March occurrence of silver perch and bay anchovy was at stations closest to the thermal discharge.

The SIO collected for special studies were analyzed for several other parameters to identify possible differences between thermal and control areas. For these analyses, thermal stations were defined as T1, T2, T4, S2, S3, D1, TC1, and TC2. These were compared to fish collected at Stations T7, T8, T9, S4, D2, TC3, and TC4.

Age

Each SIO was evaluated by age class in each month of the study. The number of specimens was generally small and variable. Bay anchovy were all first year fish. In all months when they were found only in one area (July, September, November, January, February), the fish were in the thermal area. In March and April higher numbers occurred at control stations while in May, August, and October, numbers were higher at thermal stations. Pigfish were 0-3 year classes; older fish were generally found at the control stations. Young-of-the-year were also most commonly at control stations.

Pinfish were of the 0 or 1 year classes. Numbers of young fish were highest at control stations except in early summer when comparable numbers were collected in both areas. Older specimens were more common at control stations. Silver perch were 0, 1, or 2 year classes; young fish occurred in higher numbers at the thermal stations throughout the year. Spotted seatrout were 0, 1, or 3 year classes but fish for which age was determined were too uncommon to consider distribution. One spot was in its second year; all others were young-of-the- year. Numbers were either equal in both areas (November, February, March, April, May) or higher at thermal stations. Mullet were 0, 1, or 2 year classes, but generally occurred in low numbers in one area or the other. Only two red drum were collected; both were age 1.

Sex

Each SIO for which sex was determined was considered in terms of total numbers at thermal or at control stations. Results are shown in Table 9.2-17. The ratio of females to males was higher in the thermal area compared to the control area for bay anchovy, batfish, silver perch, and pink shrimp. The ratio was lower for pigfish, pinfish, seatrout, mullet, and blue crab.

Reproductive Condition

The reproductive condition of specimens analyzed for each SIO was considered in terms of total numbers in control and thermal areas. Most species were either not collected in comparable conditions in both areas or were collected in similar numbers in both areas. Immature specimens found in larger numbers at thermal stations included bay anchovy, silver perch, spotted seatrout, spot, pink shrimp, and blue crabs. Immature batfish, pigfish, and pinfish were more common in control areas. Numbers of mature pinfish were higher in the control area. Mature bay anchovies had higher numbers in the thermal area.

Only bay anchovies, pigfish, pinfish, and silver perch were found in significant numbers for any condition other than immature. More mature silver perch tended to be collected in the thermal area; pinfish and pigfish were the reverse. Anchovies in all conditions were either in similar numbers in both areas or in higher numbers in the thermal area.

Length-Weight

The length-weight and condition index data were available in sufficient abundance for analysis of six species: bay anchovy, batfish, pigfish, pinfish, silver perch, and spot. The analysis examined differences in length-weight and condition factor by sex, season, and location (thermal vs control). The analysis is a regression of log of weight on log of length using one of the above factors as a covariate.

The analysis of the effect of sex on the length-weight relationship indicated that significant differences existed only for silver perch. Silver perch females have a greater rate of increase in weight by length (slope) than male silver perch.

In the analysis of the effects of season on the length-weight relationship a separate seasonal analysis was conducted for each sex for silver perch and for all specimens of the other five species. These tests revealed differences in log weight vs log length slopes for four species. For bay anchovy, the fall and spring specimens had a lower slope than summer and winter collected specimens. Mean size also differs with season with the smaller specimens being collected in the summer. Summer collected pinfish were large in size and had a weight-length slope greater than all other seasons. Fall collected pinfish were also large in size and had significantly greater slope than winter and spring collected specimens. Silver perch females were significantly smaller in the summer, but the larger spring specimens had a lower weight-length slope than specimens collected at other times of the year. Spot collected in the spring, while moderate in size, had weight-length slope significantly greater than specimens collected at other times of the year.

In the analysis of the effects of thermal vs control areas, four species displayed significant differences. In spring and fall, bay anchovy in the thermal area had a significantly lower weight-length slope than those collected in the control area. Spot collected in summer, fall, and winter showed the same pattern, but significantly larger specimens were collected in the thermal area. Female silver perch collected in summer, fall, and winter in the thermal area had a significantly greater weight-length slope than specimens collected in the control area. Pigfish showed the same pattern and were significantly smaller in size in the thermal area.

Reference for 9.2

Pielou, E. C. 1975. Ecological Diversity. John Wiley and Sons, New York. 165 pp.

TABLE 9.2-1

FISHERIES SAMPLING DATA
NUMBERS OF FISH (F) AND INVERTEBRATES (I)

Month	Sampling Gear: Trawl F	Trawl I	Seine F	Seine I	Creek Trawl F	Creek Trawl I	Drop Net F	Drop Net I
June	1742	625	1342	4	-	-	190	379
July	1277	2005	1084	-	444	172	151	501
August	2130	1834	559	13	334	129	42	79
September	1912	989	2047	1	314	117	410	-
October	1004	455	576	3	233	79	449	122
November	679	392	108	3	555	354	533	1021
December	554	269	36	26	80	807	28	292
January	121	605	67	2	788	2665	40	42
February	435	855	2898	147	1644	889	1418	6
March	1033	890	9846	7	3575	386	76	1
April	1304	774	75	13	636	125	136	-
May	2448	449	1028	10	1489	326	56	-

TABLE 9.2-2

NUMBER OF FISH COLLECTED BY TRAWL

Location	Month												
	J	J	A	S	O	N	D	J	F	M	A	M	
Northern Transect:													
T1	540	375	362	369	83	60	74	8	96	335	96	318	
T2	327	226	475	377	201	139	112	25	52	41	68	311	
T3	62	121	139	191	86	109	17	7	25	24	33	280	
Transect Total	929	722	976	937	370	308	203	40	173	400	197	909	6164
Central Transect:													
T4	82	28	67	197	105	92	169	15	25	40	551	103	
T5	49	61	158	144	59	29	58	8	13	23	20	154	
T6	19	24	68	41	26	21	24	6	18	19	37	107	
Transect Total	150	113	293	382	190	142	251	29	56	82	608	364	2660
Southern Transect:													
T7	145	97	215	155	111	99	12	17	89	152	358	249	
T8	46	31	231	49	140	59	72	16	56	64	61	156	
T9	472	314	415	389	193	71	16	19	61	335	80	770	
Transect Total	663	442	861	593	444	229	100	52	206	551	499	1175	5815

TABLE 9.2-3

NUMBER OF INVERTEBRATES COLLECTED BY TRAWL

Location	Month												
	J	J	A	S	O	N	D	J	F	M	A	M	
Northern Transect:													
T1	72	489	217	166	25	30	31	45	127	50	36	36	
T2	88	186	264	85	28	24	18	73	92	129	132	74	
T3	40	409	120	40	28	16	13	28	41	89	79	48	
Transect Total	200	1084	601	291	81	70	62	146	260	268	247	158	3468
Central Transect:													
T4	30	214	108	75	39	28	4	4	20	92	102	20	
T5	47	164	73	25	23	15	25	17	27	26	41	42	
T6	13	99	76	30	29	16	33	22	27	13	22	12	
Transect Total	90	477	257	130	91	59	62	43	74	131	165	74	1653
Southern Transect:													
T7	77	165	248	145	86	137	13	83	249	216	204	45	
T8	40	41	218	56	67	19	56	99	92	69	54	25	
T9	218	238	510	367	130	107	76	234	180	206	104	147	
Transect Total	335	444	976	568	283	263	145	416	521	491	362	217	5021

TABLE 9.2-4

NUMBER AND AVERAGE WIDTH OF CRABS TRAPPED

FROM SEPTEMBER 1983 THROUGH JANUARY 2, 1984

STATION	BLUE CRAB NUMBER	BLUE CRAB WIDTH (MM)	STONE CRAB NUMBER	STONE CRAB WIDTH (MM)
A1	742	142.9	11	79.8
A2	333	144.2	252	80.7
A3	325	148.5	368	80.3
A4	462	149.7	271	82.2
A5	63	153.2	362	82.8
A6	58	149.9	295	84.5
B1	533	146.1	238	81.9
B2	370	149.8	287	79.1
B3	312	147.6	288	79.3
B4	209	149.1	409	81.1
B5	100	147.8	464	81.6
B6	0		382	80.6
C1	351	140.5	144	78.3
C2	174	148.3	175	76.5
C3	435	149.4	185	78.3
C4	224	151.3	276	79.7
C5	111	145.5	332	79.4
C6	50	153.2	340	81.3
D1	574	152.8	6	82.7
D2	765	152.5	17	81.1
D3	605	148.2	148	79.2
D4	378	148.3	246	79.9
D5	95	148.2	344	80.1
D6	25	153.3	411	79.7

TABLE 9.2-5

NUMBER AND AVERAGE WIDTH OF CRABS TRAPPED

THROUGH OCTOBER 31, 1983

STATION	BLUE CRAB NUMBER	BLUE CRAB WIDTH (MM)	STONE CRAB NUMBER	STONE CRAB WIDTH (MM)
A1	228	141.6	2	84.5
A2	56	138.9	97	79.7
A3	23	142.3	131	80.7
A4	25	140.2	123	82.2
A5	3	141.7	127	85.6
A6	0	.	92	87.4
B1	147	149.8	115	82.3
B2	28	148.7	115	77.7
B3	14	148.0	144	78.7
B4	15	154.0	223	81.5
B5	4	150.8	240	83.1
B6	0	.	105	81.8
C1	119	137.2	74	78.0
C2	23	146.7	56	77.5
C3	30	151.1	107	79.3
C4	26	148.2	161	80.4
C5	13	150.7	117	79.8
C6	5	147.6	164	83.6
D1	211	153.8	1	70.0
D2	182	146.0	9	82.4
D3	38	145.1	107	78.8
D4	13	160.9	122	80.9
D5	5	163.8	132	80.4
D6	4	148.8	106	80.6

TABLE 9.2-6

NUMBER AND AVERAGE WIDTH OF CRABS TRAPPED

FROM NOVEMBER 1, 1983 THROUGH JANUARY 2, 1984

STATION	BLUE CRAB NUMBER	BLUE CRAB WIDTH (MM)	STONE CRAB NUMBER	STONE CRAB WIDTH (MM)
A1	514	143.4	9	78.8
A2	277	145.2	155	81.3
A3	302	148.9	237	80.1
A4	437	150.2	148	82.3
A5	60	153.8	235	81.3
A6	58	149.9	203	83.2
B1	386	144.8	123	81.6
B2	342	149.9	172	80.0
B3	298	147.6	144	80.0
B4	194	148.7	186	80.7
B5	96	147.6	224	79.9
B6	0	.	277	80.1
C1	232	142.1	70	78.6
C2	151	148.6	119	76.0
C3	405	149.3	78	76.9
C4	198	151.7	115	78.8
C5	98	144.9	215	79.1
C6	45	153.9	176	79.2
D1	363	152.3	5	85.2
D2	583	154.5	8	79.6
D3	567	148.4	41	80.2
D4	365	147.8	124	79.0
D5	90	147.3	212	79.9
D6	21	154.1	305	79.4

TABLE 9.2-7

NUMBER AND AVERAGE WIDTH OF FEMALE CRABS TRAPPED

THROUGH OCTOBER 31, 1983

STATION	BLUE CRAB NUMBER	BLUE CRAB WIDTH (MM)	STONE CRAB NUMBER	STONE CRAB WIDTH (MM)
A1	105	145.6	1	90.0
A2	31	144.9	4	74.8
A3	16	143.1	18	74.7
A4	13	150.5	21	75.0
A5	2	154.0	12	76.9
A6	0	.	3	75.0
B1	67	159.8	8	78.3
B2	12	161.6	46	73.7
B3	9	156.6	64	77.3
B4	14	154.8	52	74.1
B5	4	150.8	63	77.3
B6	0	.	7	81.4
C1	40	142.8	19	75.5
C2	15	142.7	27	78.1
C3	18	156.4	51	76.5
C4	24	149.5	66	75.9
C5	11	156.1	41	75.4
C6	5	147.6	28	78.2
D1	29	146.3	0	.
D2	66	157.7	2	86.0
D3	23	154.0	73	77.2
D4	8	159.1	61	78.0
D5	4	165.3	61	77.0
D6	4	148.8	46	77.1

TABLE 9.2-8

NUMBER AND AVERAGE WIDTH OF MALE CRABS TRAPPED

THROUGH OCTOBER 31, 1983

STATION	BLUE CRAB NUMBER	BLUE CRAB WIDTH (MM)	STONE CRAB NUMBER	STONE CRAB WIDTH (MM)
A1	107	141.4	1	79.0
A2	23	133.6	93	79.9
A3	7	140.4	113	81.6
A4	11	130.5	102	83.7
A5	1	117.0	115	86.5
A6	0		89	87.8
B1	71	143.5	99	82.6
B2	14	142.7	69	80.4
B3	5	132.6	80	79.8
B4	1	143.0	171	83.8
B5	0		177	85.2
B6	0		98	8[illegible].8
C1	58	143.1	52	79.3
C2	8	154.0	26	77.5
C3	11	144.2	45	83.7
C4	2	132.5	77	84.1
C5	2	121.0	63	83.0
C6	0		111	85.0
D1	181	155.3	1	70.0
D2	70	144.7	7	81.4
D3	10	141.6	34	82.2
D4	4	166.8	61	83.8
D5	1	158.0	71	83.2
D6	0		60	83.3

TABLE 9.2-9

NUMBER AND AVERAGE WIDTH OF FEMALE CRABS TRAPPED

FROM NOVEMBER 1, 1983 THROUGH JANUARY 2, 1984

STATION	BLUE CRAB NUMBER	BLUE CRAB WIDTH (MM)	STONE CRAB NUMBER	STONE CRAB WIDTH (MM)
A1	212	157.6	1	89.0
A2	185	153.8	25	79.7
A3	251	152.4	58	76.8
A4	409	151.0	56	76.9
A5	57	155.5	84	76.1
A6	54	151.4	6[illegible]	77.1
B1	192	155.8	15	81.9
B2	273	155.4	49	76.2
B3	264	150.3	59	78.2
B4	186	149.7	72	76.8
B5	38	151.0	113	77.7
B6	0	.	92	76.7
C1	95	151.9	8	79.6
C2	104	152.4	46	74.3
C3	365	151.6	43	75.7
C4	184	153.2	56	76.1
C5	78	149.1	117	77.0
C6	40	157.8	86	75.4
D1	64	162.6	0	.
D2	411	160.6	6	77.5
D3	496	151.2	26	81.5
D4	335	149.8	64	75.7
D5	84	148.8	98	75.6
D6	19	155.0	147	78.4

TABLE 9.2-10

NUMBER AND AVERAGE WIDTH OF MALE CRABS TRAPPED

FROM NOVEMBER 1, 1983 THROUGH JANUARY 2, 1984

STATION	BLUE CRAB NUMBER	BLUE CRAB WIDTH (MM)	STONE CRAB NUMBER	STONE CRAB WIDTH (MM)
A1	228	137.1	8	77.5
A2	49	141.4	130	81.7
A3	30	143.5	179	81.2
A4	20	146.8	92	85.5
A5	1	132.0	151	84.2
A6	1	128.0	143	85.7
B1	149	137.6	108	81.5
B2	33	139.3	123	81.6
B3	17	144.9	85	81.2
B4	4	138.8	101	83.6
B5	3	125.3	111	82.2
B6	0		185	81.8
C1	118	139.7	62	78.5
C2	40	145.0	73	77.0
C3	21	138.2	35	78.3
C4	6	147.2	59	81.4
C5	8	145.5	98	81.7
C6	3	126.0	90	82.9
D1	288	151.3	5	85.2
D2	129	148.1	2	86.0
D3	35	139.8	15	77.9
D4	14	142.7	60	82.6
D5	4	132.3	114	83.6
D6	2	146.0	158	80.4

TABLE 9.2-11

TOTAL NUMBER OF CRABS RECAPTURED

RECAPTURE LOCATION	RELEASE LOCATION A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	E	F	G
01	.	.	2	3	.	.	.	1	1	2	.	.	2	.	7	.	4	.	1	6	2	8	.	1	.	.	.
03	.	.	1	.	.	.	.	.	1	.	.	.	1	.	2	.	.	.	.	.	.	1	.	.	.	.	.
04	.	3	.	1	.	.	.	.	3	1	.	.	.	.	1	2	.	.	.	1	4	6	.	.	.	.	.
05	6	2	6	3	1	3	5	7	5	4	4	.	14	10	43	12	6	2	19	63	86	16	8	3	2	2	.
06	4	1	.	6	.	.	3	6	2	2	1	.	9	6	12	2	4	3	7	48	23	14	1	.	.	3	6
07	.	.	.	1	.	.	.	2	2	.	.	.	1	1	2	.	1	.	1	14	3	1	.	1	.	.	.
08	.	.	.	1	.	.	1	.	.	1	.	.	5	2	5	.	.	.	67	10	.	1	1	.	1	1	1
09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.
11	14	9	14	25	1	3	27	10	18	18	2	.	6	1	2	4	2	1	3	5	2	5	.	.	1	2	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
13	.	.	1	.	.	.	.	.	1	1	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	1	.	.	1	1	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	.	1
15	.	.	.	.	.	.	2	.	1	.	.	.	.	.	3	1	.	.	.	1	.	.	1	1	.	.	.
16	1	.	6	8	.	2	2	.	1	2	3	.	10	8	2	.	1	.	.	.	.	.	.	.	.	1	.
17	1	1	1	3	.	.	.	.	.	.	1	.	12	11	.	2	2	1	37	5	2	1	1	1	.	.	.
18	.	.	.	.	.	.	.	.	.	1	.	.	21	6	5	4	2	.	8	8	2	3	1	.	.	1	.
19	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
21	3	4	2	6	1	2	.	.	6	1	.	.	.	.	.	.	.	.	.	1	1	.	.	.	2	.	.
22	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	3	3	3	8	2	6	11	10	3	.	8	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.
24	13	15	17	33	9	6	37	65	38	42	13	.	3	.	1	.	1	.	.	1	.	.	.	.	4	1	.
25	15	7	16	25	2	3	15	25	18	9	5	.	.	.	2	3	.	.	.	.	1	.	.	.	1	.	.
26	5	9	6	7	.	2	10	4	12	4	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	27	9	11	20	6	1	37	33	9	2	3	.	.	1	1	2	.	.	1	.	.	1	.	.	3	4	.
28	13	8	2	6	1	.	37	7	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	.
29	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.
30	3	.	.	.	.	.	7	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
37	18	14	25	15	.	1	.	8	11	5	1	.	.	.	2	1	1	.	1	.	.	2	.	.	2	.	.
38	73	26	4	4	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	2	.
39	28	10	1	4	.	1	3	2	2	1	.	.	.	.	.	.	1	.	.	.	2	.	.	.	.	1	.
40	44	12	10	6	1	1	10	6	3	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.

TABLE 9.2-12

NUMBER OF FEMALE CRABS RECAPTURED

RELEASE LOCATION

RECAPTURE LOCATION	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	E	F	G
01	.	.	1	3	.	.	.	1	1	2	.	.	2	.	7	.	4	.	1	5	2	8	.	1	.	.	.
03	.	.	1	.	.	.	.	.	1	.	.	.	1	.	2	.	.	.	.	.	.	1	.	.	.	.	.
04	.	3	.	1	.	.	.	.	3	1	.	.	.	.	1	2	.	.		1	4	5	.	.	.	.	.
05	5	2	6	3	1	3	4	5	5	4	3	.	11	9	40	12	5	2	1	52	78	16	8	2	2	2	.
06	3	1	.	6	.	.	2	6	2	2	1	.	7	6	11	2	4	3	4	39	23	12	1	.	.	1	4
07	.	.	.	1	.	.	.	2	1	.	.	.	.	1	2	.	1		.	3	3	1	.	1	.	.	.
08	.	.	.	1	.	.	1	.	.	1	.	.	1	.	4	.	.	.	1	.	.	1	1	.	.	.	.
09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11	14	9	14	25	1	3	24	10	16	18	2	.	5	1	2	4	2	1	.	5	2	5	.	.	1	1	.
12	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
13	.	.	1	.	.	.	.	.	1	1	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	1	.	.	1	1	.	.	.	.	1	.	[illegible]	.	.	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	1	.	1	.	.	.	.	.	3	1	.	.	.	1	.	.	1	1	.	.	.
16	1	.	6	8	.	2	2	.	1	2	3	.	7	7	1		.	.	.	.	.	.	.	.	.	1	.
17	1	.	1	3	.	.	.	.	.	.	1	.	6	6	.	2	2	1	3	2	2	1	1	1	.	.	.
18	.	.	.	.	.	.	.	.	.	1	.	.	14	4	5	3	2	.	1	3	2	3	.	.	.	1	.
19	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
21	.	3	2	6	1	2	.	.	6	1	.	.	.	.	.	.	.	.	.	1	1	.	.	.	2	.	.
22	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	3	3	3	8	2	6	8	10	3	.	8	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.
24	10	12	17	31	9	6	34	56	36	42	13	.	1	.	1	.	1	.	.	1	.	.	.	.	3	1	.
25	12	7	14	25	2	3	11	25	17	9	5	.	.	.	2	3	.	.	.	.	1	.	.	.	1	.	.
26	3	6	6	7	.	2	8	4	12	4	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	18	8	11	18	6	1	27	30	6	2	3	.	.	.	.	2	.	.	.	.	.	1	.	.	2	2	.
28	7	8	2	6	1	.	8	5	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
30	1	.	.	.	.	.	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
37	12	12	24	12	.	1	.	7	10	4	1	.	.	.	2	1	.	.	1	.	.	1	.	.	2	.	.
38	53	22	2	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	1	.
39	10	8	.	3	.	1	2	2	2	1	.	.	.	.	.	.	1	.	.	.	2	.	.	.	.	.	.
40	18	10	10	6	1	1	8	4	3	1	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.

TABLE 9.2-13

NUMBER OF MALE CRABS RECAPTURED

RECAPTURE LOCATION	RELEASE LOCATION A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	E	F	G
01	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
03	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
04	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
05	1	.	.	.	.	.	1	2	.	.	1	.	3	1	3	.	1	.	8	11	8	.	.	1	.	.	.
06	1	.	.	.	.	.	1	.	.	.	.	.	2	.	1	.	.	.	3	9	.	2	.	.	.	2	2
07	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	1	11	.	.	.	.	.	.	.
08	.	.	.	.	.	.	.	.	.	.	.	.	4	2	1	.	.	.	66	10	.	.	.	.	1	1	1
09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.
11	.	.	.	.	.	.	3	.	2	.	.	.	1	.	.	.	.	.	3	.	.	.	.	.	.	1	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
15	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.	.	.	.	3	1	1	.	1	.	.	.	.	.	.	.	.	.	.
17	.	1	.	.	.	.	.	.	.	.	.	.	6	5	.	.	.	.	34	3	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.	.	.	.	7	2	.	1	.	.	7	5	.	.	1	.	.	.	.
19	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
21	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
24	3	3	.	2	.	.	3	9	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	1	.	.
25	3	.	2	.	.	.	4	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
26	2	3	.	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	9	1	.	2	.	.	10	3	3	.	.	.	.	1	1	.	.	.	1	.	.	.	.	.	1	2	.
28	6	.	.	.	.	.	29	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
29	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.
30	2	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
37	6	2	1	3	.	.	.	1	1	1	.	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.
38	20	4	2	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
39	18	2	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
40	26	2	.	.	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

TABLE 9.2-14

AVERAGE TIME BETWEEN RELEASE AND RECAPTURE IN DAYS

RECAPTURE LOCATION	RELEASE LOCATION A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	E	F	G
01	.	.	40	42	.	.	.	40	35	24	.	.	78	.	36	.	43	.	39	40	39	28	.	49	.	.	.
03	.	.	102	.	.	.	.	.	8	.	.	.	45	.	21	.	.	.	.	.	.	16	.	.	.	.	.
04	.	36	.	14	.	.	.	.	14	46	.	.	.	.	4	15	.	.	.	11	6	8	.	.	.	.	.
05	26	63	10	26	69	39	30	16	22	17	50	.	37	24	22	23	27	20	29	25	22	19	30	60	10	18	.
06	45	14	.	46	.	.	26	16	37	23	18	.	54	34	22	20	20	34	46	26	21	28	17	.	.	18	34
07	.	.	.	98	.	.	.	45	58	.	.	.	21	36	32	.	63	.	25	22	24	33	.	16	.	.	.
08	.	.	.	14	.	.	36	.	.	15	.	.	22	8	17	.	.	.	18	24	.	22	7	.	14	5	9
09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11	7	.	.	.	.	.	.	.
11	21	21	19	18	18	20	22	22	17	18	26	.	57	28	33	24	19	26	99	49	40	29	.	.	11	18	.
12	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.
13	.	.	34	.	.	.	.	.	28	28	16	.	.	.	.	28	.	.	.	.	.	.	.	.	.	.	.
14	.	.	.	.	46	.	.	28	14	.	.	.	.	35	.	7	.	.	.	.	.	.	.	.	.	.	24
15	.	.	.	.	.	.	16	.	14	.	.	.	.	.	7	7	.	.	.	64	.	.	6	6	.	.	.
16	111	.	89	87	.	84	131	.	92	84	74	.	18	7	25	.	79	.	.	.	.	.	.	.	.	89	.
17	5	52	52	52	.	.	.	.	.	.	48	.	26	15	.	53	47	47	50	49	52	52	83	47	.	.	.
18	.	.	.	.	.	.	.	.	.	81	.	.	24	48	67	49	78	.	48	38	63	46	6	.	.	105	.
19	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13	.	.	.	.	.	.	.
21	30	45	27	47	54	42	.	.	19	23	.	.	.	.	.	.	.	.	.	103	41	.	.	.	22	.	.
22	.	.	101	.	.	.	.	.	.	.	.	.	140	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	55	13	54	32	6	30	10	19	16	.	11	.	.	.	.	8	.	.	.	.	.	.	9	.	.	.	.
24	29	27	25	27	17	34	15	11	17	26	21	.	23	.	11	.	9	.	.	63	.	.	.	.	39	24	.
25	22	10	27	25	3	17	28	17	12	14	17	.	.	.	32	49	.	.	.	.	4	.	.	.	25	.	.
26	21	18	24	21	.	17	31	13	9	14	15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
27	23	36	37	21	12	20	22	15	41	32	24	.	.	92	58	40	.	.	71	.	.	28	.	.	26	44	.
28	46	69	25	60	149	.	69	49	.	128	128	.	.	51	.	.	.	.	.	.	.	.	.	.	203	.	.
29	64	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	80	24	.
30	8	.	.	.	.	.	13	14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
34	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
35	.	.	.	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
36	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
37	19	27	25	31	.	24	.	30	22	26	24	.	.	.	43	82	36	.	107	.	.	44	.	.	11	.	.
38	17	10	15	16	10	.	12	.	.	.	.	.	.	.	.	.	.	.	.	15	.	.	.	.	27	19	.
39	20	25	104	4	.	23	31	20	6	19	.	.	.	.	.	.	3	.	.	.	6	.	.	.	.	12	.
40	25	33	37	66	25	92	24	16	13	36	.	.	.	.	.	.	.	119	59	.	.	.	.	.	.	.	.

TABLE 9.2-15

TOTAL NUMBER OF CRABS RECAPTURED

	RELEASE LOCATION																										
RECAPTURE LOCATION	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	E	F	G
SOUTH CRYSTAL BAY	5	1	1	1	.	.	8	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	.
CRYSTAL BAY	274	133	130	188	27	31	208	188	138	98	51	.	85	48	90	37	26	7	148	167	128	59	14	7	20	19	8
WACCASASSA BAY	16	14	21	38	9	7	25	37	37	21	14	.	21	40	85	45	21	17	37	133	136	104	31	10	7	11	16
SUWANEE SOUND	1	1	2	4	1	.	.	.	2	1	.	.	.	1	8	1	.	1	1	15	12	7	2	.	.	2	1
HORSESHOE COVE	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	1	.	.	.	.	.	1
DEADMAN BAY	.	.	.	.	1	.	.	1	1	.	.	.	1	.	2	1	.	.	1	3	6	1	2	.	.	2	.
FENHOLLOWAY RIVER AREA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	4	3	.	.	.	1	1
APALACHEE BAY	2	1	1	7	.	.	1	1	5	1	.	.	3	1	9	7	4	3	.	8	7	7	5	.	4	.	3
DOG SOUND	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	1	2	1	.	.	.	.	.
APALACHICOLA RIVER AREA	.	.	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.
WEST OF CAPE SAN BLAS	.	.	.	1	.	.	.	1	.	1	.	.	.	.	1	.	.	.	.	3	1	.	.	.	.	.	.

TABLE 9.2-16

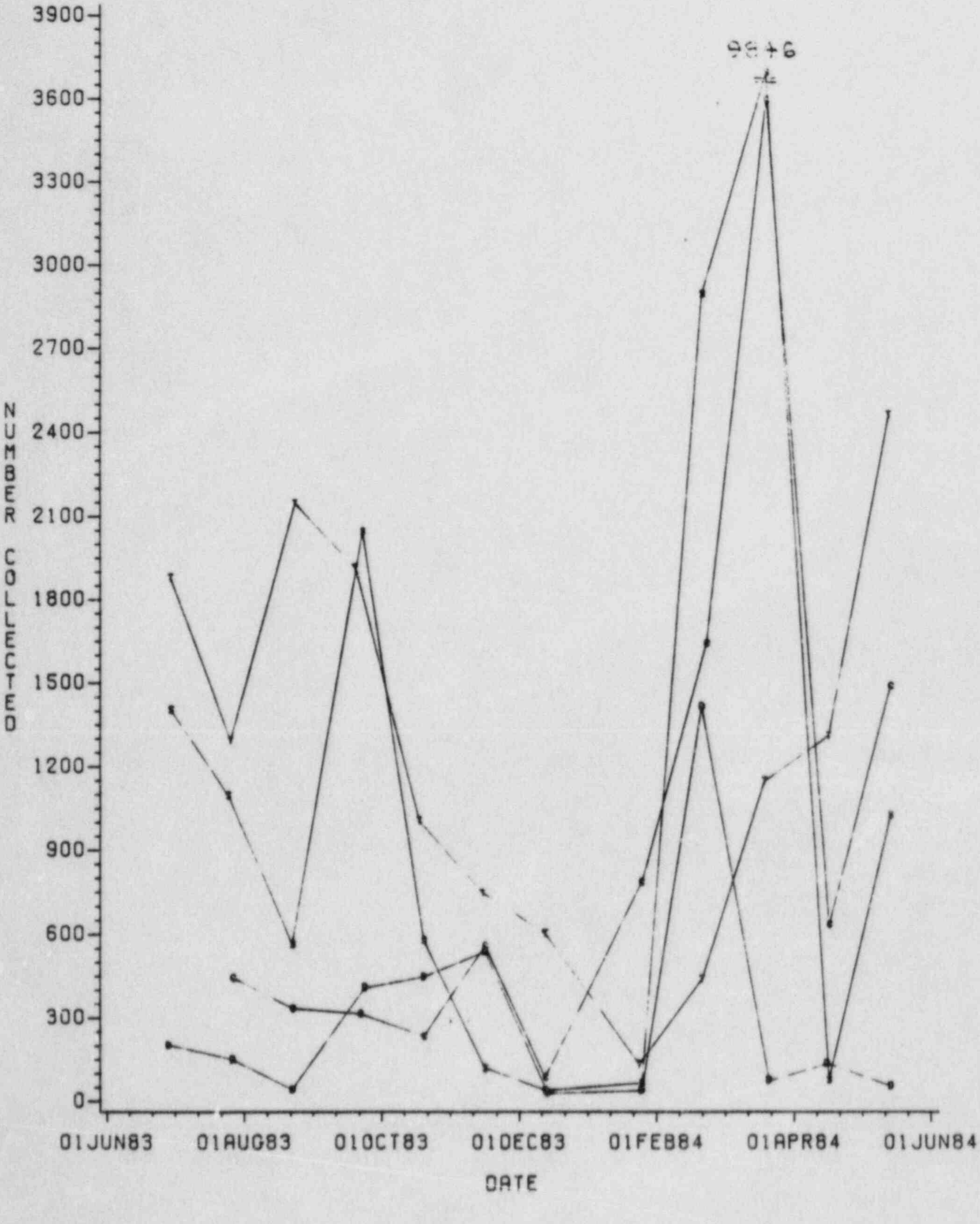
AVERAGE TIME BETWEEN RELEASE AND RECAPTURE IN DAYS

RECAPTURE LOCATION	RELEASE LOCATION																										
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	E	F	G
SOUTH CRYSTAL BAY	134	150	157	177	.	.	148	.	.	.	.	.	.	.	.	.	.	.	.	157	.	.	.	.	.	15	.
CRYSTAL BAY	24	26	31	31	23	34	31	17	19	26	26	.	34	25	26	30	35	31	34	28	23	25	26	42	38	32	30
WACCASASSA BAY	33	57	43	58	45	55	54	46	45	35	30	.	59	52	47	52	76	40	38	49	44	39	67	28	82	46	81
SUWANEE SOUND	22	18	70	60	78	.	.	.	69	40	.	.	.	121	82	81	.	63	70	54	87	71	69	.	.	82	27
HORSESHOE COVE	.	.	125	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	31	100	93	.	.	.	.	.	59
DEADMAN BAY	.	.	.	.	96	.	.	104	107	.	.	.	158	.	68	101	.	.	83	60	83	79	80	.	.	70	.
FENHOLLOWAY RIVER AREA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	119	.	.	.	.	78	101	61	.	.	.	115	73
APALACHEE BAY	100	181	147	175	.	.	102	131	109	108	.	.	133	133	116	118	125	98	.	138	142	105	84	.	173	.	79
DOG SOUND	.	.	.	.	.	.	126	103	.	.	.	.	.	.	.	.	.	.	.	108	123	100	.	.	.	.	.
APALACHICOLA RIVER AREA	.	.	.	189	.	.	.	.	.	187	.	.	.	.	.	.	.	.	.	181	198	.	.	.	.	.	.
WEST OF CAPE SAN BLAS	.	.	.	141	.	.	.	130	.	108	.	.	.	.	180	.	.	.	.	147	135	.	.	.	.	.	.

TABLE 9.2-17

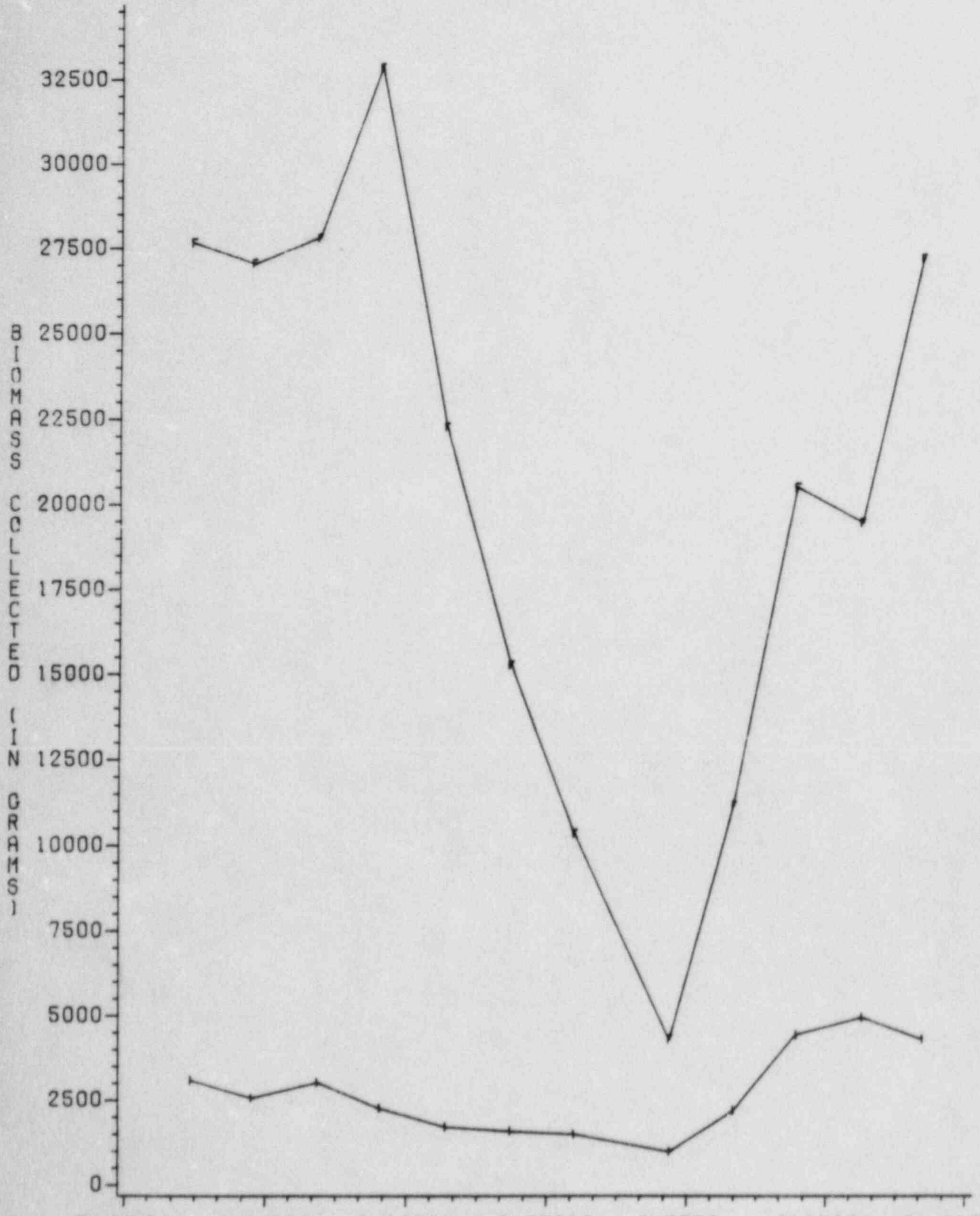
NUMBERS OF SIO IN THERMAL AND CONTROL AREAS

Species	Male		Female	
	Thermal	Control	Thermal	Control
Bay anchovy	45	34	142	83
Polka-dot batfish	1	14	15	26
Pigfish	30	141	36	220
Pinfish	124	253	100	262
Silver perch	98	105	217	115
Spotted seatrout	6	4	5	4
Spot	239	69	213	61
Red drum		1	1	
Striped mullet	20	1	34	8
Pink shrimp	339	284	369	276
Blue crab	85	37	132	89
Stone crab		9	2	5



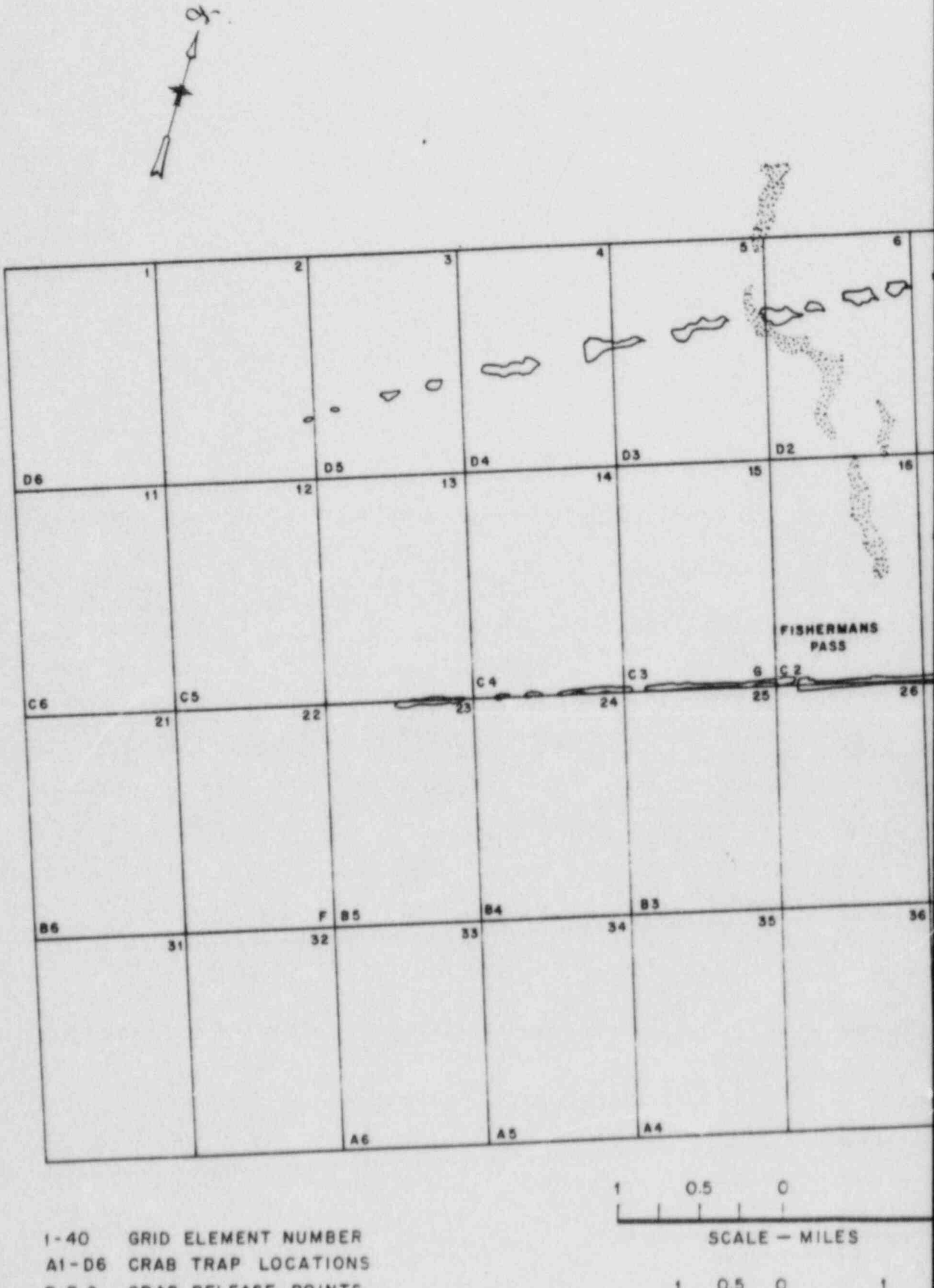
T=TRAWL
C=CREEK TRAWL
S=SEINE
D=DROP NET

FIGURE 9.2-1
NUMBER OF FISH COLLECTED
EACH MONTH BY GEAR TYPE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



F=FISH
I=INVERTEBRATES

FIGURE 9.2-2
FISH AND INVERTEBRATE
TRAWL BIOMASS
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



1-40 GRID ELEMENT NUMBER
A1-D6 CRAB TRAP LOCATIONS
E, F, G CRAB RELEASE POINTS

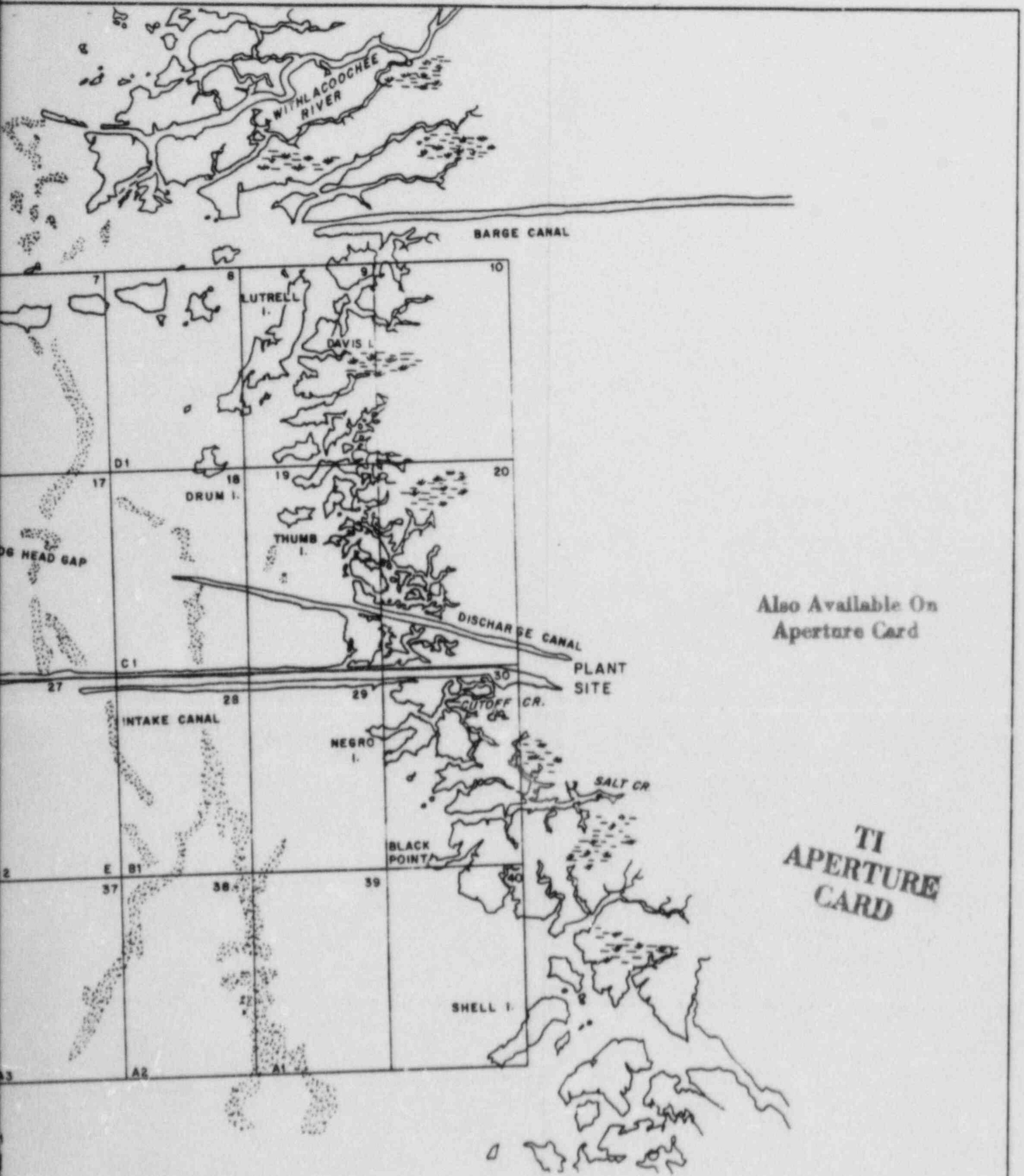


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FIGURE 9.2-3

CRAB TAG RETURN GRID AND CORRESPONDING TRAP LOCATIONS CRYSTAL RIVER 316 STUDIES FLORIDA POWER CORPORATION

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9.3 IMPACT ASSESSMENT

The fish and invertebrate populations sampled by fisheries gear are subject to direct impacts of station operation in the form of impingement and entrainment. These subjects have been dealt with previously in Sections 7.3 and 8.3. Indirect effects associated with the thermal discharge and the intake spoil will be discussed in this section.

9.3.1 Thermal Discharge

The fisheries' samples contain juveniles and adults of species which either inhabit Crystal Bay all year or migrate to and from the area. Both short-distance, onshore-offshore movements and wider ranging migrations occur. Given the ability of these species to move and the continuing operation of Units 1, 2, and 3 over several years, the sampling results are indicative of established patterns of movement and other activities in response to the local environment. Comparisons of SIO distributions sampled in the area of the thermal discharge to their distribution in areas unaffected by the discharge can provide an indication of the ability of each species to adapt to the conditions of the discharge. Additional information can be gained by considering thermal-control differences in disease or parasitism, age, sex ratio, reproductive condition, and the weight-length relationship.

The interpretation of sampling results is limited by two key factors: 1) the relatively low numbers of several of the SIO in all or some of the sampling gear and 2) the complex nature of Crystal Bay which confounds possible thermal effects with other environmental parameters. The low numbers of some species, such as red drum or squid preclude statements on effects of the thermal discharge. Higher but limited numbers of species like batfish or striped mullet force reliance on trends in the existing data and limit the value of conclusions.

Habitat differences within Crystal Bay complicate interpretation of results by providing other factors to which the SIO respond and modify their distributions. Freshwater inflows from Crystal River to the southeast and the Withlacoochee River to the northeast appear, based on water quality data, to create strong localized influences and broader areas of steep salinity gradients. Such gradients could be a stronger influence on distribution than the plant discharge. Squid, for example, have been reported to migrate in response to temperature and salinity (Laughlin and Livingston 1982). Another important factor may be the presence or absence of attached submerged vegetation which can provide cover and food. While the absence or limited amount of vegetation in the present discharge area could have been directly influenced by the plant discharge (see Section 6.3), its present distribution has a secondary influence on fish and inverterate species which seek out such areas. Such species in Crystal Bay would be found offshore of the thermal discharge, assuming depth is not a controlling factor, or south of the intake where attached vegetation is widely distributed over all depths. A variety of other factors such as depth, substrate type, use of deeper channels for onshore-offshore movement or exposure of shallow areas at low tide could also influence a given species' distribution.

Each SIO for which fisheries information are available to address thermal discharge effects will be considered separately. Overall distribution of fish and invertebrates in Crystal Bay has been noted in Section 9.2 and will not be addressed further, since the SIO are considered representative and individual species preferences and avoidances are the ultimate influence on total species distribution.

Evidence, primarily from seine and drop net collections, indicate that bay anchovy occur primarily in the thermal area, potentiallly experiencing ΔT's of 4-7°C. Summer conditions did not eliminate the species from the discharge area. Females occurred in relatively higher abundance in the discharge area. Gravid females were found inshore in the spring and were in both thermal and control areas. Young-of-the-year, both immature and mature, were more common in the thermal area, except in the spring. Of specimens analyzed, those in the thermal area did not weigh as much at the same length as specimens in the control area. Overall, bay anchovy appear to prefer the thermal area and may grow (length) faster there than elsewhere.

Batfish were rare offshore but more were found north or south of the discharge area than in the thermal area. The ratio of females to males was higher in the thermal area and immature specimens were most common in the control area. Parasitism occurred in all specimens. Preference for or avoidance of the thermal area is not clearly indicated.

Data on pigfish distribution comes primarily from trawl collections in which larger numbers were taken in the spring and summer at the southern stations. At other times, a more uniform distribution existed. Females, including gravid ones, predominated at stations to the south. Older specimens, young-of-the-year, immature and mature individuals were more common to the south. Smaller specimens occurred in the thermal area but their weights by length were higher than in control areas in all seasons except spring. Thus, pigfish appear to avoid the thermal area in the spring and summer. Reproduction at the site probably occurs to the south and is not limited by the discharge. At other times of the year, pigfish do utilize the discharge area.

Pinfish are similar in distribution to pigfish. In trawls they were most common to the south and at T1 and T2 in the spring and summer. Numbers were higher inshore on the north and central transects and offshore to the south. In seines, lowest numbers were at the thermal stations. In the drop net, numbers at D2 were generally higher than in the thermal area; the exception was in February. In the creek trawls, highest numbers occurred in February through May at TC2; these were primarily small fish. Young-of-the-year, 1 year old, immature and mature fish were all more abundant in the control areas. Based on weight-length analyses, growth occurs most rapidly in summer and fall when fish are concentrated to the south, with samller numbers at T1 and T2. Pinfish generally tend to avoid the thermal area where ΔT's are in excess of about 2°C, but small specimens appear to utilize the creek habitat adjacent to the thermal area in the spring.

Silver perch were collected in largest numbers by trawl inshore to the north and south. These were generally smaller specimens. Few were collected in other gear except in May at TC1. Both mature and immature fish were most common in the thermal area (T1, T2). Females were more common than males in the thermal area, they were smaller than males, and grew more rapidly in the thermal area. The latter was not the case, however, over the entire study area. Gravid females were primarily at T1 and T4 in the spring. Young-of-the-year were most abundant in the thermal area. Generally, the species utilizes inshore areas to the north and south. The fish avoid the higher temperature areas of the discharge but utilize areas subject to 2-3^{o}C ΔT. This appears to be particularly true for activities relating to reproduction.

Trawl collections provided the greatest number of spotted seatrout and the fish were primarily to the north (May at T1-3 and T5). All seatrout taken by drop net were in the discharge area (June, July, May). The few specimens taken by creek trawl were from TC1 or TC2. Immature seatrout were more common in the thermal area; of the mature specimens, males predominated in the thermal area. Overall, the species occurs primarily at the northern end of Crystal Bay. It is not excluded from the thermal area, but like the silver perch, the fish appear to utilize only the lower ΔT areas of discharge.

Spot were relatively common in all four gear types. The pattern of distribution from all gears is similar to that indicated for spotted seatrout and silver perch. Numbers were highest to the north and in the center of Crystal Bay and lower to the south. Smaller fish were inshore (T1) and the largest were offshore (T3). The analysis of immature fish indicated more in the thermal area. Growth (W-L) was lower in thermal than control areas in summer, fall, and winter. Thus, this species also appears to be using outer portions of the discharge area. Based on drop net collections, it may also be using higher T sections in early spring.

Data for red drum do not support any conclusions concerning thermal discharge impacts. Data on striped mullet is also limited and suggest only that the species may be more common in the northern section of Crystal Bay.

Pink shrimp data indicate a wide distribution in Crystal Bay with the location of peak numbers changing over time. Numbers at thermal trawl stations, even in the summer, do not indicate avoidance of this area. However, August drop net collections which sampled higher temperature water did not contain shrimp and more shrimp were generally collected at D2. This probably indicates avoidance of the warmest discharge temperatures. Creek trawls collected most shrimp at TC1 and TC2 indicating utilization of creeks adjacent to the discharge area.

Few blue crabs were taken by trawl or seine, but trawl, drop net and creek trawl collections, like the crab trapping, indicated peak abundance inshore. Numbers at the thermal drop net station were higher in the winter but lower in the summer than at the southern station. Comparisons of crab trap data indicate some reduction in numbers at thermally affected stations on Transect C. This was more apparent in September-October than in November-December. Thus, blue crabs appear to avoid the warmer parts of the discharge area, particularly during the summer, but they are not excluded from the discharge area and the population is probably not adversely affected.

Stone crabs were rarely taken in fisheries gear other than crab traps. Data from the traps indicate an offshore distribution which limits any thermal discharge effects. Comparison of inshore numbers by transect showed fewer stone crabs inshore on the northern transect and more inshore on the two southern transects. Numbers on Transect C, however, suggest that some factor other than the thermal discharge may be affecting the stone crab distribution, particularly on Transect D.

Brief squid were collected only in the trawls in low numbers. The numbers, distribution, and occurrence by month do not support conclusions on thermal discharge effects.

9.3.2 Intake Spoil

Questions have been raised concerning the effect of the intake spoil at Crystal River on longshore migration of female blue crabs. The present study was designed to address local and longer distance movements of the crabs and to consider adverse impacts associated with the presence of the spoil. The excellent return rate of tagged crabs should permit answers to these questions.

Local crab movements, as determined from tag returns from commercial crabbers, is strongly influenced by the location of crabbers' traps. Oesterling (1976) noted, and it is still the case, that traps are most concentrated along the southern side of the intake spoil and on the southern side of spoil islands bordering the CFBC. This results in: 1) large numbers of recaptures being reported in these locations and 2) a potential reduction in time to recapture from certain release points where crabs quickly encounter and are captured in the high density of fishermen's traps. The former did occur but the latter was not particularly evident.

The patterns of recaptures in Crystal Bay indicates a general west and north movement from the release points. This is most evident from releases on Transects A and C. Releases on Transect B are often recaptured to the west along the same transect. Releases from Transect B are often recaptured to the west along the same transect. Releases from Transect B were also common in grid element 11 (Figure 9.2-1), which is farthest offshore, and along Transect D. A similar pattern occurs for releases from Transect A. Thus, it appears that crabs to the south of the spoil move offshore and around the spoil. Subsequent movement is then north and northeast.

The pattern of movement noted indicates that the intake spoil does represent a structure to be bypassed and the original capture and recapture data indicate that the spoil could influence the number of crabs occurring in the area of Transect C and perhaps D. However, if crabs in the area of Transect A are considered representative of longshore migrants, data on time to recapture after release on Transect A show that the time to recapture on Transect C is about 6 days more than for recapture on Trasect B. At the same time, recapture on Transect B takes about 6 days more than recapture on Transect A. Based on distance between transects, it is clear that some delay is taking place, on the order of 2.5 days, but the delay is relatively short. In addition, movement is taking place past the intake spoil in spite of the concentration of traps.

Longer distance migrations are represented in recaptures of Crystal Bay releases north of Crystal Bay. About 33 percent of the recaptures by crabbers took place north of Crystal Bay indicating significant movement from the area. Larger numbers of recaptures resulted from the release at Transects A and B than from Transects C and D. In addition, as noted in Section 9.2, recaptures in Waccasassa Bay occurred more quickly from Transect B than from any other transect and more quickly from Transect A than from Transect C. Therefore, it can be concluded that the intake dike is little if any obstacle to movement to the north beyond Crystal Bay. It is also suggested that the local movements which result in blue crabs moving out and around the intake spoil may result in migration further offshore and perhaps more directly to areas north than the route available to crabs north of the intake spoil but still south of the CFBC spoil islands.

REFERENCE FOR 9.3

Laughlin, R. Q. and R. J. Livingston. 1982. Environmental and Trophic determinants of the spatial/temporal distribution of the brief squid (Lolliguncula brevis) in the Apalachicola estuary (North Florida, USA). Bull. Mar. Sci. 32(2): 489-497 pp.

Oesterling, M. 1976. Population structure, dynamics, and movement of the blue crab (Callinectes sapidus Rathbun) at Crystal River, Florida. Thesis, Univ. of Florida. 88 p.

10.0 PHYSICAL STUDIES

The physical studies conducted in Crystal Bay were primarily associated with data collection for and implementation of hydrodynamic and hydrothermal models. The models were specifically designed to characterize hydrodynamic conditions within the study area, and using that data, to simulate the thermal discharge resulting from operation of Crystal River Units 1, 2 and 3. The following sections detail field collection methods; describe results or define the means by which the results are incorporated into the modeling; describe the models, their calibration and verification; and discuss the simulation results. A source water body analysis, performed using results from the entrainment analyses (Section 8.0) as input to CAFE-1 and DISPER-1, is also discussed.

10.1 FIELD COLLECTION

10.1.1 Thermographs

This effort was designed to provide comprehensive, synoptic thermal data at a series of stations throughout the study area. Thermographs were deployed at 51 stations (Figure 10.1-1) to measure near-surface water temperatures. At 21 of these stations, thermographs also were deployed to measure subsurface temperature for detection of stratification.

Ryan Model J-90 (10-40°C) thermographs were deployed as shown in Figure 10.1-2. Charts were retrieved on a monthly basis, returned to the laboratory and copied to produce an archival record. They were then sent to Envirodata Corporation where each chart was digitized using a Bendix Datagrid system. The data were reduced to hourly averages with each hourly average calculated from a minimum of ten points per hour. After inspection and validation, tables of hourly average data by station and date were produced. These tables were then reviewed by SWEC and minor editing took place to remove outliers. These were related primarily to the first few hours of unit operation or to units recording values below any other values found throughout the study area. The edited dataset was then used to generate tables of hourly average values, tables of weekly averages, figures of chart replots, figures of daily averages and temperature ranges, and a computer tape.

10.1.2 Meteorological Station

Meteorological data were collected at the site. The parameters measured include: incident solar radiation flux, air temperature, wind speed and direction, relative humidity, barometric pressure, and rainfall. The meteorological station began operation the week of June 4, 1983, and it was removed from service the week of September 2, 1984.

A Weathertronics Automatic Weather Station was installed according to National Weather Service specifications. Basic components included: wind vane, wind anemometer, pyranometer with radiation shield, mast with crossarm, thermistor, rain gauge, barometric sensor, humidity probe, data acquisition system with tape recorder and printer, and a power system (battery, charger, lightning arrestor). The system was calibrated by the manufacturer and programmed according to the manufactuer's specifications. Hourly and instantaneous observations (daily checks performed by the operator) were automatically recorded on data-quality cassette tapes along with 24-hr summaries. The tapes were changed approximately every 6 weeks. A Weathertronics Cassette/Module Reader was used to transfer the analog-recorded data to ASCII text files from which 9-track computer tapes were generated. The 9-track tapes were then used for analysis.

Data from FPC's meteorological tower were used to supplement records from the on site station for August 1983.

10.1.3 Bathymetry

Three bathymetric mapping projects were carried out in support of the hydrodynamic modeling efforts:

- general bathymetric mapping of the study area
- intensive near-field mapping of the discharge area
- major tributary and channel cross-sections

Twenty-one transects were surveyed running perpendicular to the shoreline using a Raytheon 719B fathometer, Autotrack Depth Digitizer, and a Motorola Mini Ranger for positioning. Digitized depth printouts and chart recordings were produced. Staff gauge readings for tide heights were recorded regularly throughout the conduct of the surveys. In Basin 1, an additional seven north-south transects were surveyed using a Sitex-Honda HE-356 recording fathometer with an adjustable transducer mounted on a 16 ft Jon Boat.

The Withlacoochee River, Cross Florida Barge Canal, discharge and intake canals, and Crystal River were traversed and surveyed adjacent to Stations 8-12 (Figure 10.1-3) using the equipment described for the Basin 1 mapping.

The digitized bathymetric data were plotted on a map of the general study area showing transect locations and recorded depths along each transect. The chart recordings of Basin 1 were tabulated at 20 ft intervals except for Transect 12 which was at 40 ft intervals and plotted on a map of the discharge basin. The chart recordings of the channel cross-sections were tabulated at 20 ft intervals, but were not plotted.

10.1.4 Short-Term Physical Studies

10.1.4.1 In Situ Currents and Tides

This task was designed to provide current and tide data for calibration and verification of mathematical models for the site. Two 1-month periods (August 1983 and January 1984) were comprehensively and synoptically sampled by the deployment of in situ instruments at 16 locations (Figure 10.1-3). Sea Data Model TDR tide gauges and Endeco Model 174 current meters were deployed in paired arrays (Figure 10.1-4). The stations were revisited weekly to verify presence and operation of the current meters (via an acoustic link). The tide gauges were serviced (battery and tape change) at 2 week intervals. The current meters were capable of continuous operation for the 1 month period but were visually inspected during the tide gauge servicing.

The Sea Data tide gauges magnetically recorded water pressure and temperature (degrees Centigrade) at 3 minute intervals. The actual data were represented as four-place decimal fractional expressions of the thermistor resistance over a full range of -5 to 35 degrees or 5-95 percent of the full range of the strain gauge (0-30 psi-relative). The Endeco current meters magnetically recorded temperature, conductivity, and current speed and direction in separate three-digit codes. During the August 1983 sampling period, the current meters sampled every 2 minutes. The units were converted to sample every 3 minutes for the January 1984 period to match the tide gauges and extend tape capacity.

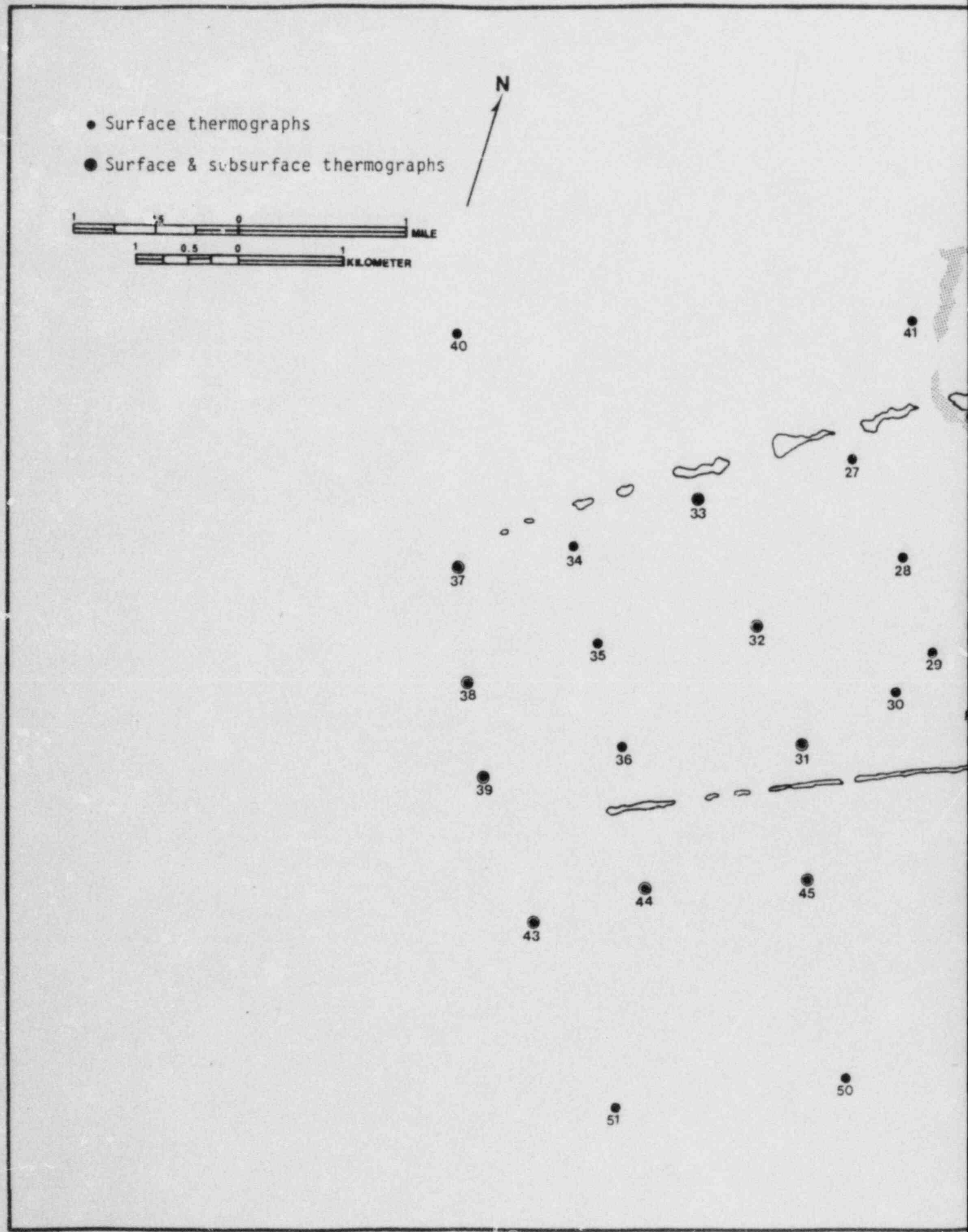
The equipment manufacturer's respective data translators were used to read the tapes producing a series of ASCII text files from which an IBM-compatible 9-track computer tape was produced. The computer tape was used for analysis.

10.1.4.2 Vertical Current Profiles

This task was designed to provide vertical current data at various depths adjacent to the in situ instrument arrays (Figure 10.1-3). In both August 1983 and January 1984 each station was sampled twice during incoming tides and twice during outgoing tides using Endeco Model 110 remote-reading current meters. The meters provided a readout of both current speed and direction. At stations in the CFBC, intake and discharge canals, Crystal River and Withlacoochee River, a series of vertical profiles were taken at locations along a transect across the channel.

10.1.5 Thermal Plume Delineation

This task was designed to describe thermal plume behavior under incoming and outgoing diurnal and semi-diurnal tidal conditions. Sampling was conducted during the two periods (August and January) when the in situ study was in progress. Four basins (Figure 10.1-5) near the discharge point were occupied by boat crews responsible for sampling five stations each within a 30 minute period. A fifth crew sampled opportunistically, searching for the bottom separation of the plume. Beckman RS 5-3 Salinity/Conductivity/Temperature meters were used to measure temperatures and conductivities four times during the semidiurnal tides and eight times during the diurnal tides at surface, mid-depth, and bottom. Each sample was replicated during the subsequent 30 minute period.


N
Surface thermographs
Surface & subsurface thermographs
1
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MILE
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KILOMETER
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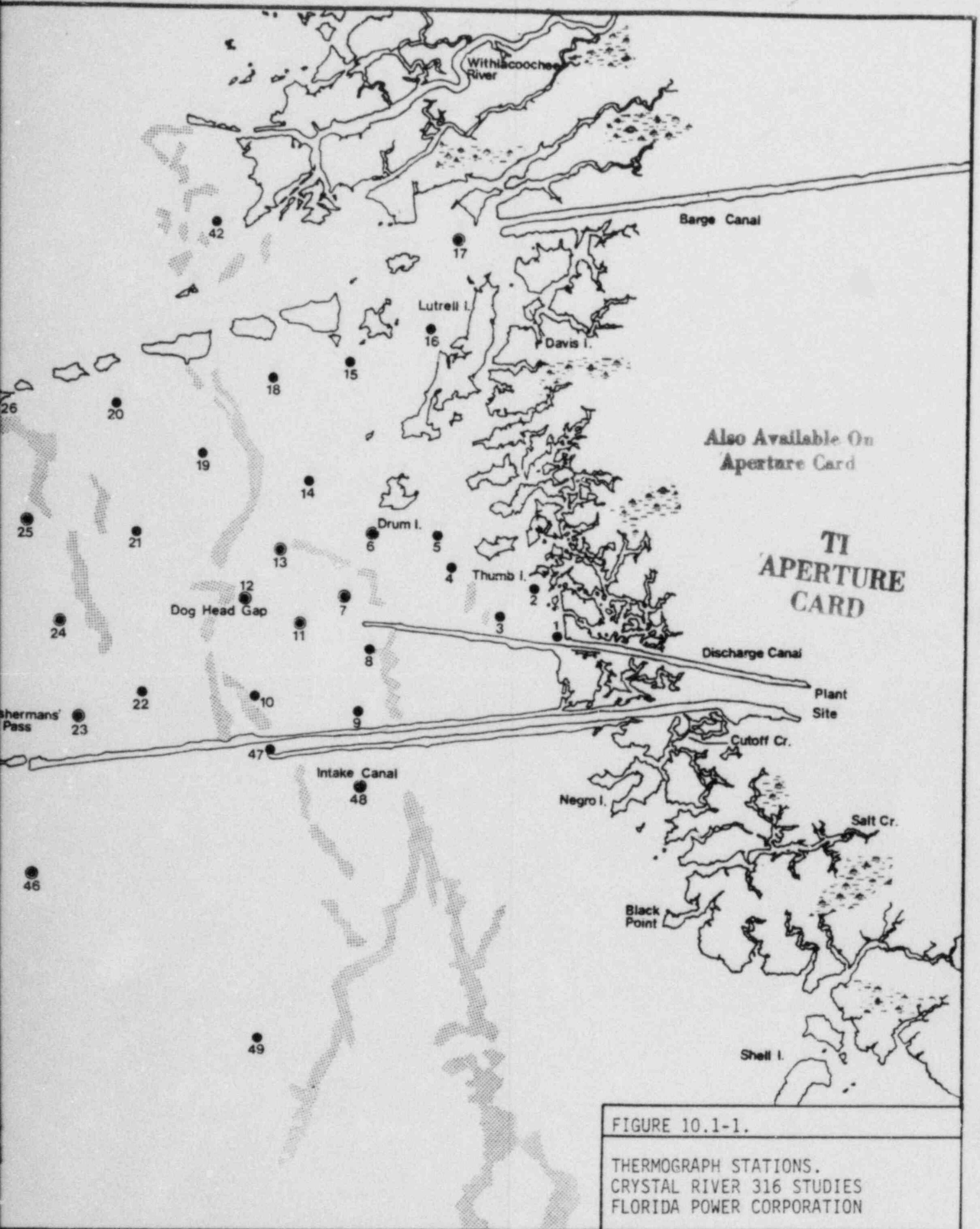


FIGURE 10.1-1.

THERMOGRAPH STATIONS.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

Also Available On Aperture Card

TI APERTURE CARD

8502120246-20

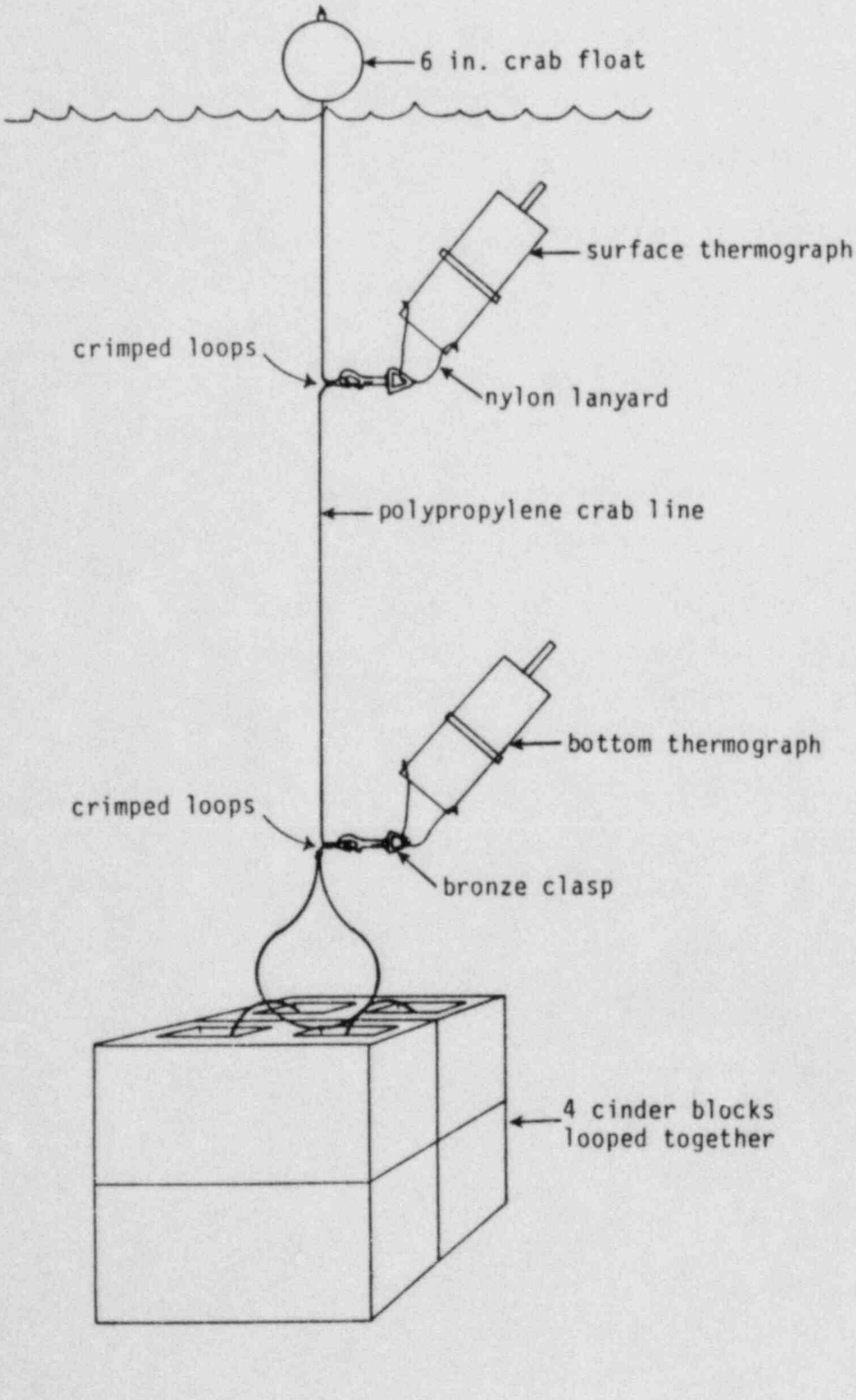
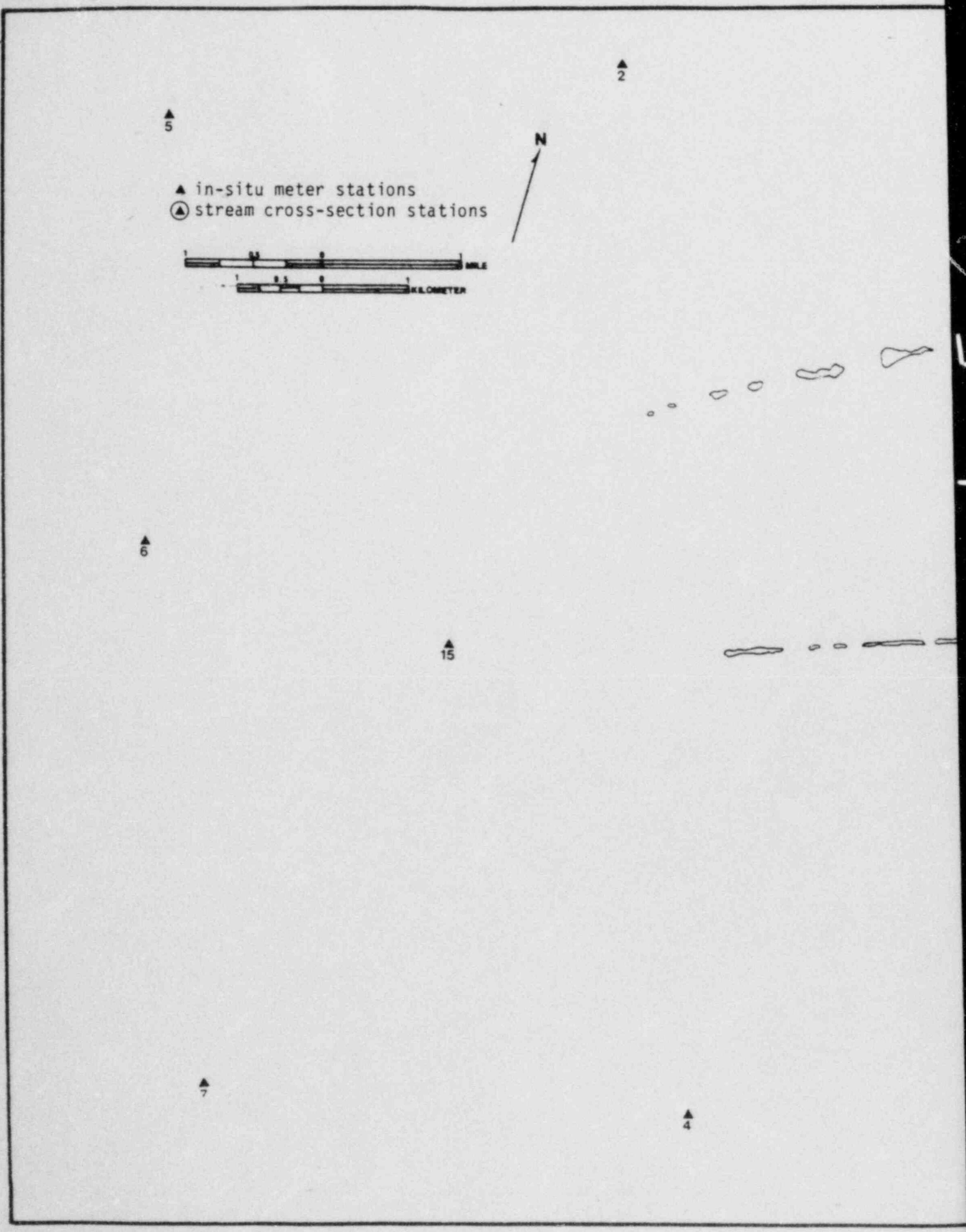
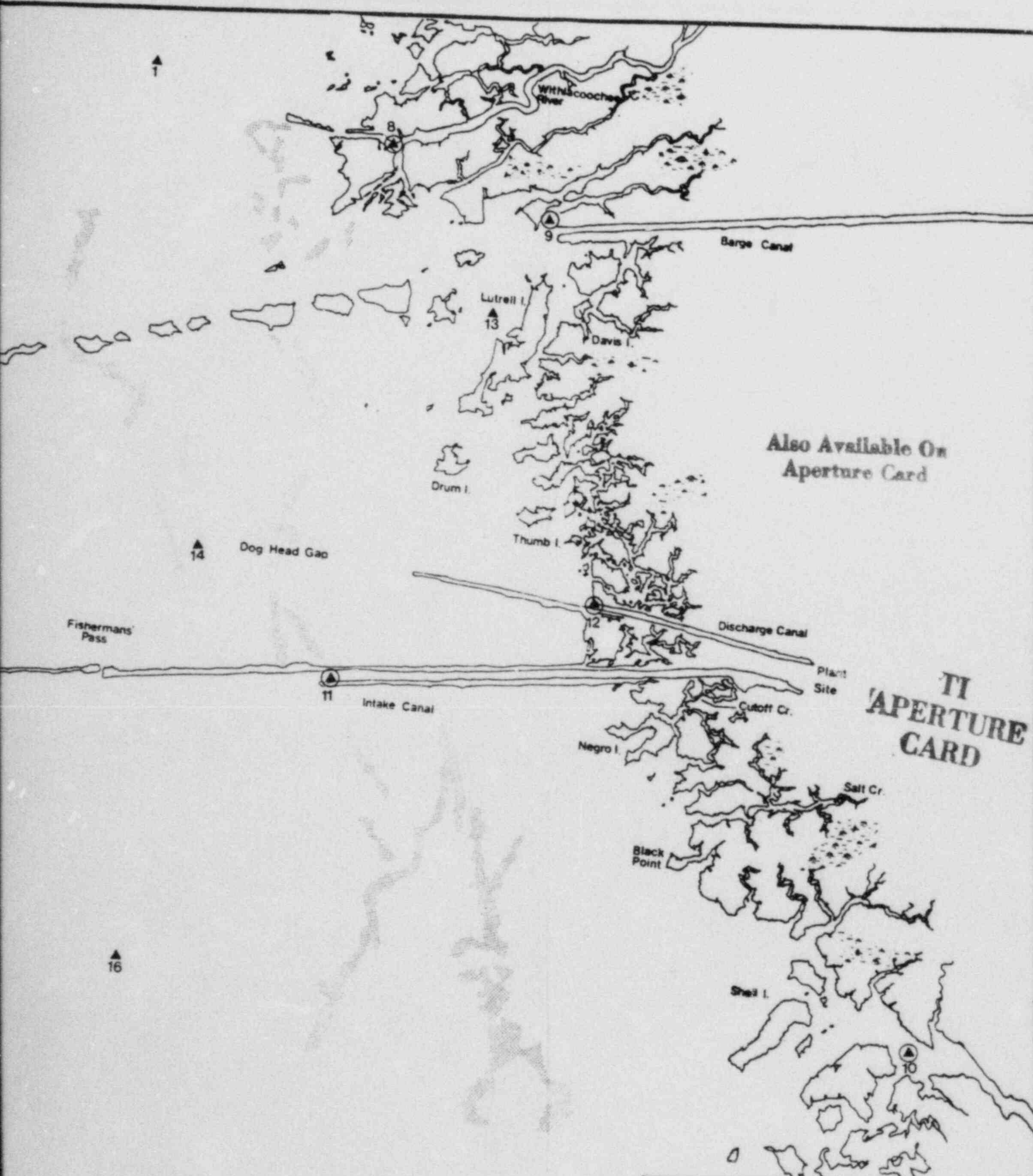


FIGURE 10.1-2.

THERMOGRAPH ARRAY.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION


2
5
N
▲ in-situ meter stations
stream cross-section stations
1
0.5
0
1
MILE
1
0.5
0
1
KILOMETER
6
15
7
4



Also Available On Aperture Card

TI APERTURE CARD

FIGURE 10.1-3.

IN SITU METER STATIONS.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

8502120246 -21

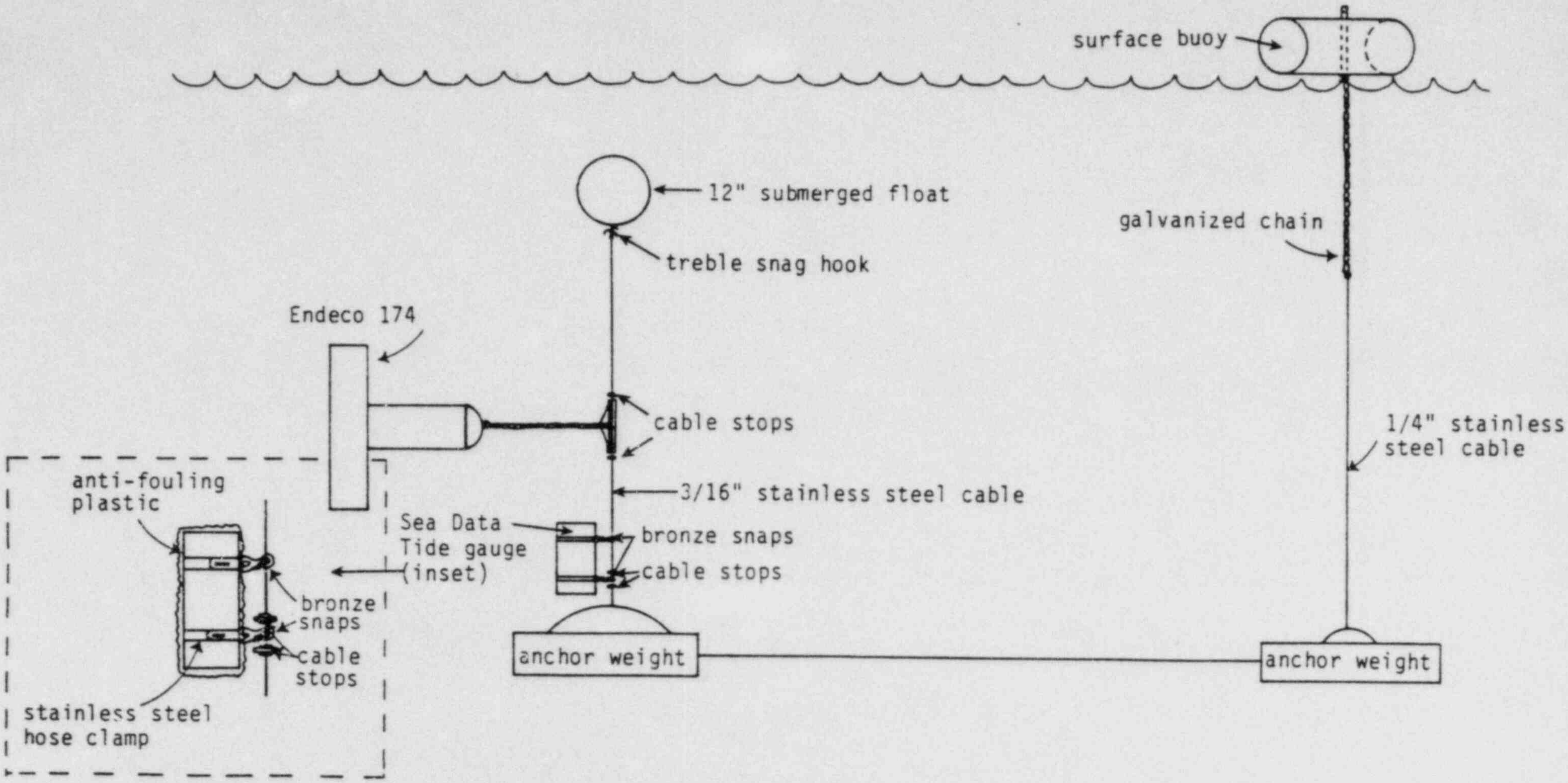


FIGURE 10.1-4.

IN SITU METER ARRAY.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

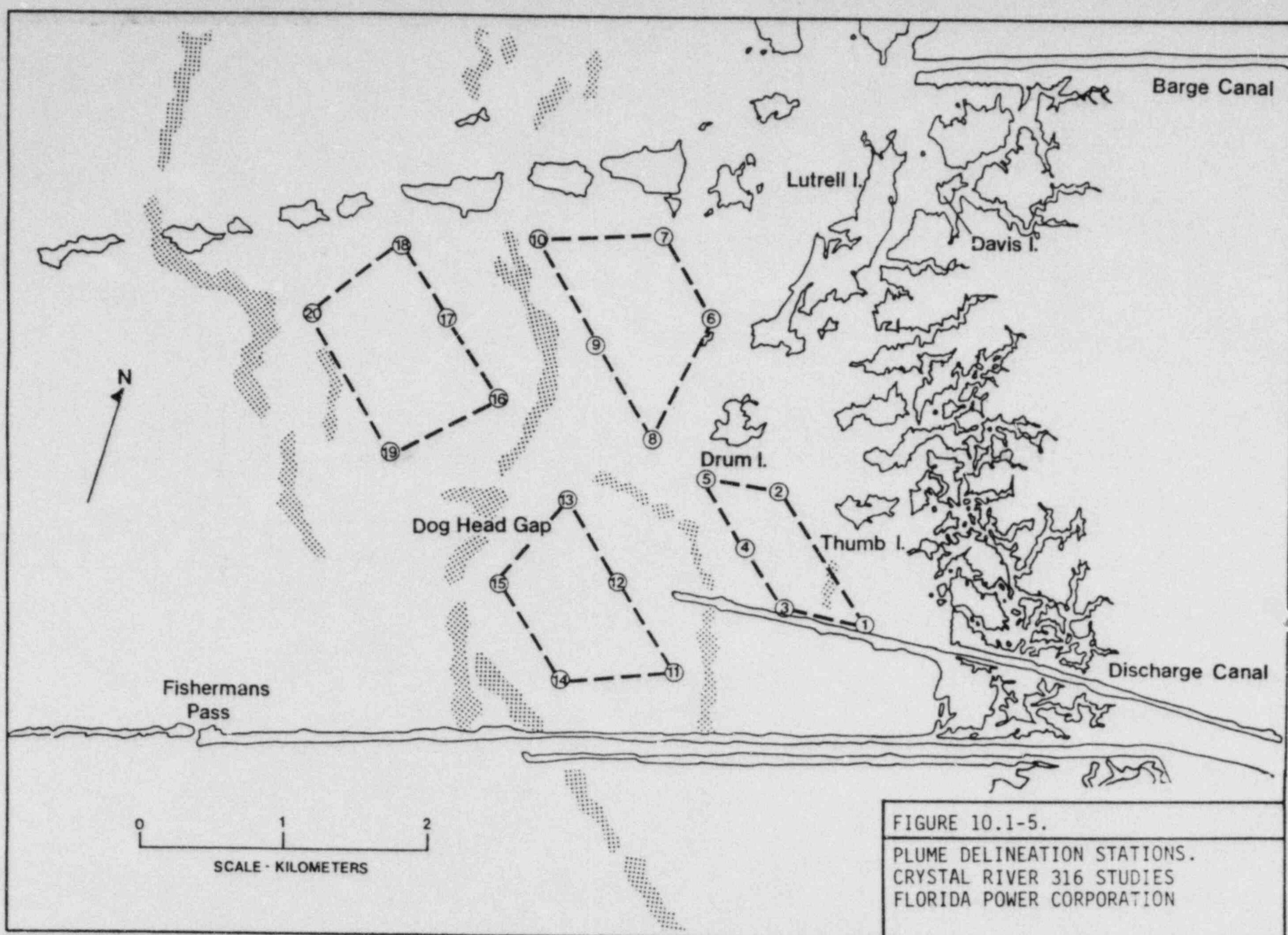


FIGURE 10.1-5.

PLUME DELINEATION STATIONS.
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

10.2 RESULTS OF FIELD COLLECTIONS

10.2.1 Thermographs

Thermograph data were collected to provide a long-term, continuous record of temperatures throughout the study area. While the data are available for comparison with data from any other study component, other means of measuring temperature were used to provide values for needed correlations with biological and water quality data. Therefore, data from the thermograph units serve primarily as a supplement to thermal plume delineation data and as a data base which can be used to examine short-term phenomena not measurable by sampling which is not continuous.

Over the sampling period, data are reported for about 87 percent of the potential parameter days, although monthly returns vary from 71.2 to 95.3 percent. Tables of hourly average thermograph data were presented in the Fifth Quarterly Progress Report (SWEC 1984d). Tables summarizing the weekly range of values and mean temperature for each station are provided in Appendix VIII. The Appendix also includes two sets of figures for Stations 1, 3, 12S, 12B, 29, and 38S. These stations approximate a transect beginning at the POD and extending offshore and provide a sample of the data collected in the discharge area, in an area intermittantly affected by the thermal discharge and in a relatively unaffected distant area. Data for Station 12 provide an indication of surface to bottom variation. August and January were chosen because these months coincide with the period of other in situ data collection. The figures show data collected in August 1983 and January 1984 in terms of: 1) chart replots in a calendar format and 2) graphs of daily temperature ranges and means.

The amount of data available cannot be readily summarized; however, the tables of hourly averages are particularly suited for identifying thermally affected areas, defining concurrent temperatures in other parts of the study area and recording tidal and diurnal variation. After reviewing several days' data, a sense can be gained of stations regularly affected by the station discharge. A precise delineation of the discharge area, however, is improbable because of the considerable variation seen over time, particularly at "fringe" stations which are affected by the discharge only under certain conditions.

Several cautions relative to interpretation of the thermograph data are appropriate:

a) Crystal Bay is a complex site with several features which affect data from specific stations. Certain stations, e.g., Station 2, are dry on a low tide, and the unit then may read air temperature (at night), a sun-induced, higher temperature (during the day) or some intermediate value. Other units located at very shallow stations, e.g., Station 3 or 5, may be subject to solar heating around mid-day or may float with the probe partially exposed at low tide when extra play occurs in the buoy line. Two stations (42 and 48) frequently yield results which may reault from freshwater inflows near the stations. Such station-specific variation requires care in interpreting station-to-station differences.

b) Units are calibrated by the manufacturer such that temperature variation is $\pm0.6^{o}C$. Thus, comparisons between units, e.g., surface to bottom or station to station, must take into account a potential variation of up to $1.2^{o}C$.

c) During the course of a month or more in the water, the data indicate that some units can begin to record anomalous temperatures. Temperatures as much as $5^{o}C$ below temperatures elsewhere at the site were noted on a few charts, and these records were deleted. Less distinctive low values may exist but cannot be consistently identified and edited. Anomalously high temperatures were almost impossible to identify because of the conditions being monitored.

The thermograph charts yielded a large data base which is unique because of its continuous nature and comprehensive coverage of the study area. With careful interpretation, the changing pattern of the thermal discharge can be approximated under a variety of conditions (station operation, season, tide, etc.).

10.2.2 Meteorological Data

Meteorological data was collected for the period of June 10, 1983 through September 5, 1984. After initial processing to produce records on magnetic tapes, the data format on these tapes was converted, and editing was done to remove random invalid data, invalid end-of-file markers, blank cards, etc. Particularly in the last third of the data, there were many occurrences of blank cards, code numbers followed by blank columns and cards with valid looking data but without hour and/or day information. These problems were overcome to the extent possible by data set editing and changes to the data handling program.

There were seven parameters monitored. Table 10.2-1 identifies the parameters, the units in which they are recorded, and the data recovery for each parameter. Data on barometric pressure in August 1983 and January 1984 were used in converting water pressure values recorded by in situ meters to tide heights. These values were input to the hydrodynamic model. The level of data recovery and the random discontinuous nature of the records preclude quantification of long-term temporal variation for correlation with biological or water quality parameters.

10.2.3 Bathymetry

Bathymetry data were used to assign depths to both the near-field and far-field models. Four sources of data were used. The primary source was the bathymetry survey performed specifically for the project and discussed in Section 10.1.3. Complementary data were obtained from NOAA Navigation Chart No. 11408 (Crystal River to Horseshoe Pt.), the useful portion of which is reproduced in Figure 3.0-1. Near shore detailed data were obtained from Figure 8, Bathymetry of the Discharge Basin, contained in Carder et al (1976). No additional data processing was undertaken other than to reproduce all of the bathymetry charts to the same scale as the finite element grid layout. The grid was superimposed on the bathymetry charts in order to determine or revise model depths for each element node. In addition, bathymetry data from cross-sectional profiles in the discharge channel were used in the application of the near-field model.

10.2.4 Short-Term Physical Studies

10.2.4.1 In Situ Currents and Tides

In situ current meter and tide data collected in the field were processed and analyzed in order to prepare the data for use in the far-field models, CAFE-1 and DISPER-1. Data files in the form of time series were produced. All records that did not contain data values were removed, the data were confirmed to be in proper order with no blocks missing, and the contents of each block were confirmed to be complete. Where data were missing, a data missing code was inserted.

Time-average data files with one entry for each 30-minute interval were then developed. Values which showed a large departure from the majority of values collected during any one interval were identified. If a sufficient number of values remained (neither disqualified nor recorded as missing), the arithmetic mean was determined. Otherwise a data missing code was entered for that 30-minute interval. The data files then were plotted, and any outliers which had not been eliminated by the program procedure were manually replaced with the data missing code.

A final program prepares a summary of both the processed current meter data and the processed tide gauge data. All unit conversions occur here. Conductivity is converted to salinity with the appropriate temperature correction. Tide pressure is converted to tide height with salinity and barometric pressure incorporated into the calculation.

Hard copy output of the summary data files were prepared for all 16 stations for the purpose of far-field modeling. Many of the files were also plotted as an aid to studying the results. Plots of tide and current data used in model calibration and verification are shown in Figures 10.2-1 through 10.2-14. A sufficient number of key stations produced usable data in order to successfully complete the calibration and verification of the far-field models, as described in Section 10.4.

10.2.4.2 Vertical Current Profiles

Current profiling data were obtained at each of the in situ current measurement stations as described in Section 10.1.4. For stations that were not located in channels, currents were measured from top to bottom in order to obtain vertical information on the current structure in the vicinity of each station. The intent of these measurements was to determine vertically averaged velocity values that could be compared to the point measurements from the in situ meters. A ratio of speed values and a correction factor for direction were determined from each pair of velocity values. These were used to develop an average speed ratio and an average direction correction factor for each station. These correction factors were then used to adjust in situ values to provide vertically averaged velocities at each station. The adjusted velocities and the corresponding depths at boundary stations were then used to develop boundary flux data as discussed in Section 10.4. A typical set of data is shown on Table 10.2-2. Measurements were not used in this analysis if the difference between in situ and vertically averaged values was judged to be too large to be explained by the shape of the vertical profile.

For in situ stations located in channels, current profiling measurements were taken at five locations across the channel and vertically from top to bottom. These measurements were intended to be used to determine channel average velocity values that could be compared to point measurements from the in situ meters. This could be used to convert all in situ velocities to channel average velocities. These values, along with the water level data from the tide gauge, could be averaged over a tidal cycle to determine the net inflow. Unfortunately, this analysis was never performed for any of the channel stations due to problems with either velocity or water level data. As discussed in Section 10.4, USGS data were used to develop river discharge data, and plant records were used to determine the plant discharge.

10.2.5 Thermal Plume Delineation

Temperature and conductivity were collected within the discharge basin, as discussed in Section 10.1.5. For each phase of the tide, values at the surface and bottom were reviewed, and any values that were clearly inconsistent were discarded. An arithmetic average was then calculated from the two replicate values which were each recorded within a 30-minute interval during the specified tidal phase.

Conductivity was converted to salinity by a relationship which included temperature. Surface and bottom values of both salinity and temperature were plotted on base maps. All of the results of the two plume delineation surveys in August 1983 and the two surveys in January 1984 were included in the Third Quarterly Progress Report (SWEC 1984b).

The salinity data were used to calibrate and verify DISPER-1. The temperature data were used to guide the development of the near-field model.

REFERENCES FOR 10.2

Carder, K. L., S. L. Palmer, B. A. Rodgers, and P. J. Behrens, 1976. Calibration of a Thermal Enrichment Model for Shallow, Barricaded Estuaries. Final Report to Office of Water Research and Technology, Dept. of the Interior. September 1976.

SWEC. 1984a. Second Quarterly Progress Report. Crystal River Studies. Report to FPC, January 1984.

SWEC. 1984b. Third Quarterly Progress Report. Crystal River Studies. Report to FPC, April 1984.

SWEC. 1984d. Fifth Quarterly Progress Report. Crystal River Studies. Report to FPC, November 1984.

TABLE 10.2-1

METEOROLOGICAL DATA PARAMETERS

Parameter	Units	% Recoverable Hourly Data
Relative Humidity	%	73.9
Barometric Pressure	mb	63.8
Dry Bulb Temperature	0.5 Deg C	73.8
Solar Radiation	w/m^2	72.9
Precipitation	0.01 Inches	74.1
Wind Speed	0.1 mph	45.9
Wind Direction	Degrees	45.8

TABLE 10.2-2

COMPARISON OF IN SITU AND
VERTICALLY AVERAGED PROFILING DATE - STATION 5, AUGUST 1983

Date	Time	Vertical Average Speed (cm/sec)	Vertical Average Direction	In Situ Speed (cm/sec)	In Situ Direction	Speed Ratio	Direction Difference
8/4/83	1515-1523	38.1	240°	32.8	240°	1.162	0°
8/5/83	0733-0744	22.1	61°	27.0	71°	0.819	-10°
8/5/83	1533-1539	37.6	251°	30.0	244°	1.253	7°
8/11/83	0825-0830	34.0	243°	25.3	246°	1.344	- 3°
8/11/83	1304-1310	39.1	58°	35.3	65°	1.108	- 7°
8/11/83	1349-1354	35.0	65°	35.4	67°	0.989	- 2°
				Average Value		1.112	- 2.5°

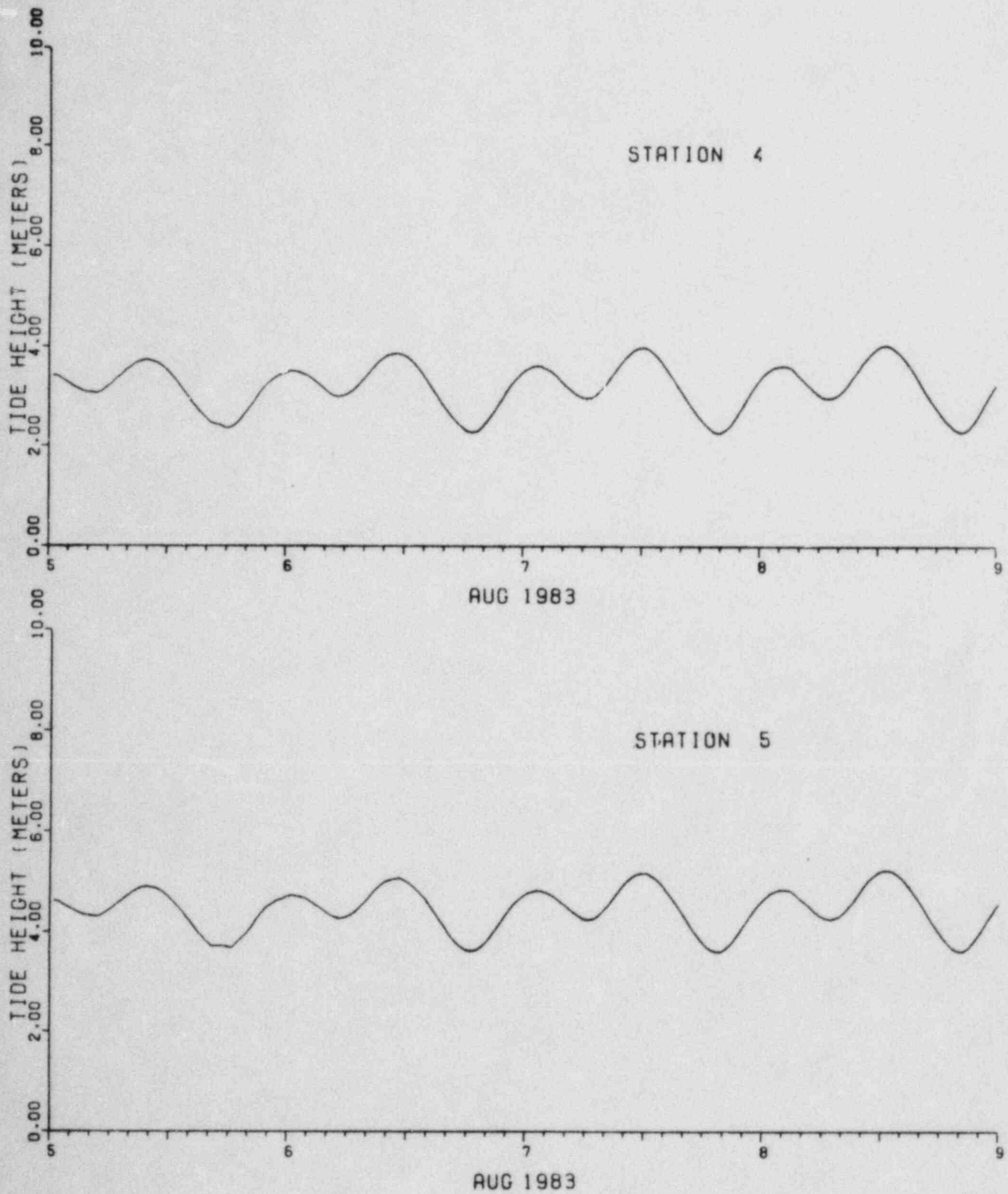
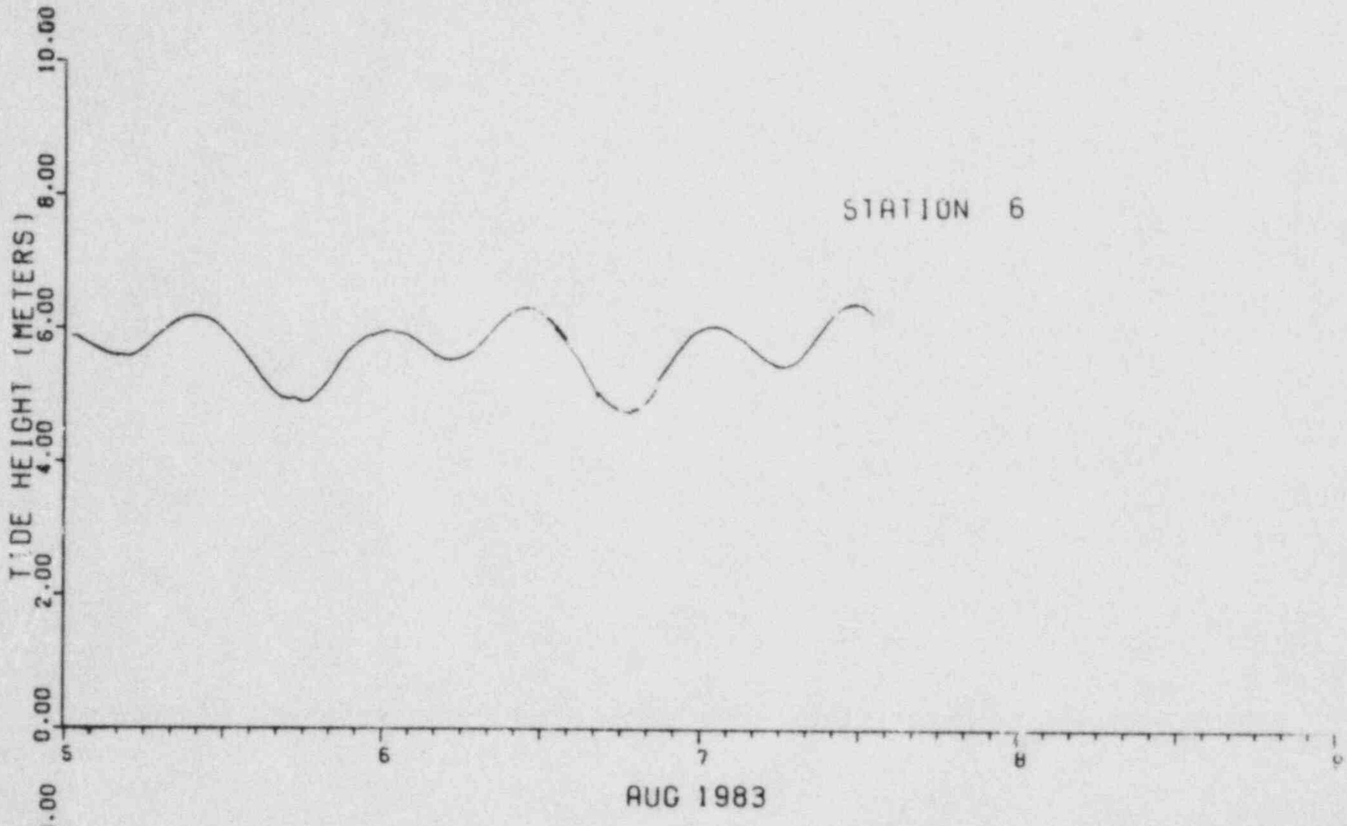


FIGURE 10-2-1

IN SITU TIDE DATA-
STATIONS 4 AND 5, AUGUST 1983
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION



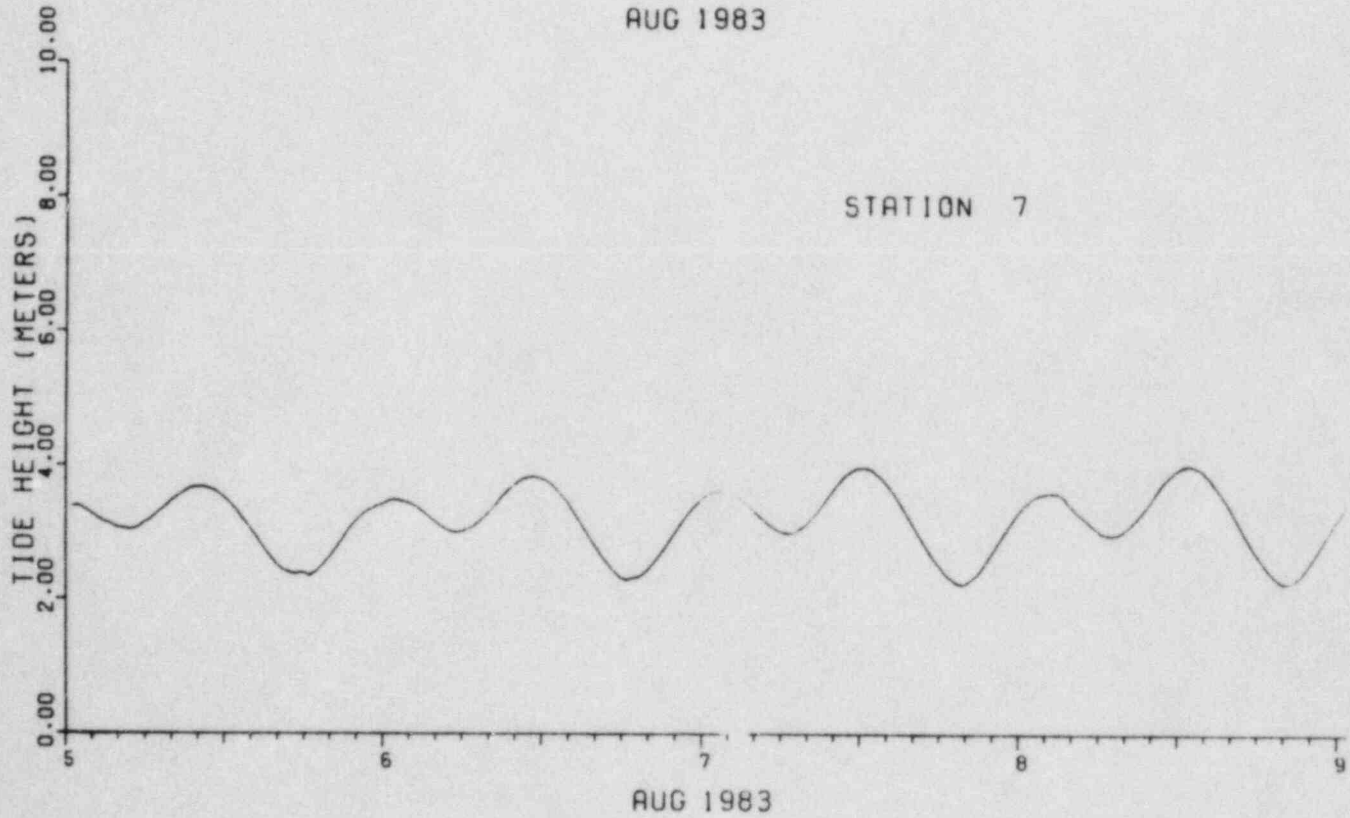


FIGURE 10.2-2

IN SITU TIDE DATA -
STATIONS 6 AND 7, AUGUST 1983
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

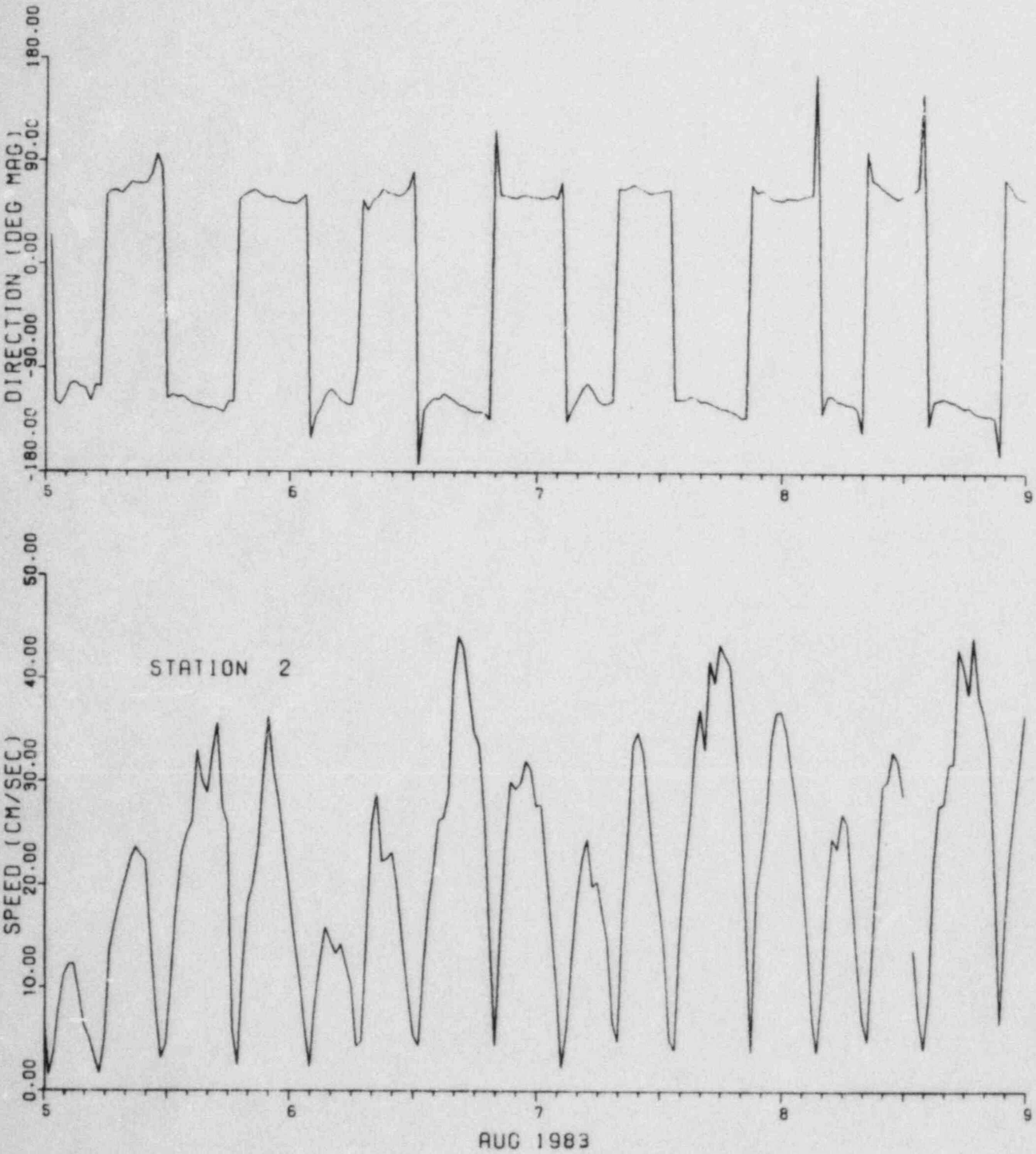


FIGURE 10.2-3

IN SITU CURRENT DATA-
STATION 2, AUGUST 1983
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

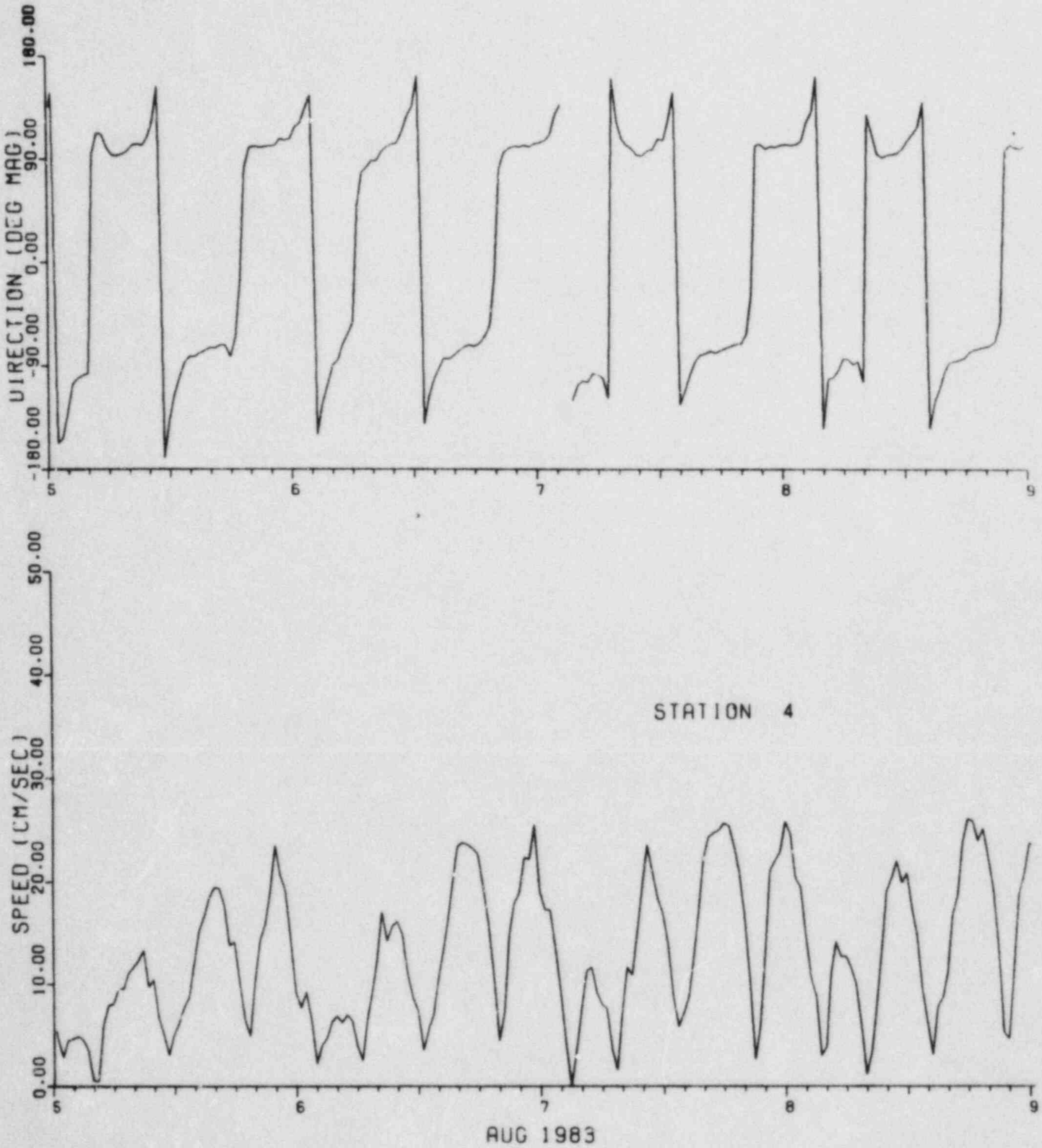


FIGURE 10.2-4

IN SITU CURRENT DATA-
STATION 4, AUGUST 1983
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

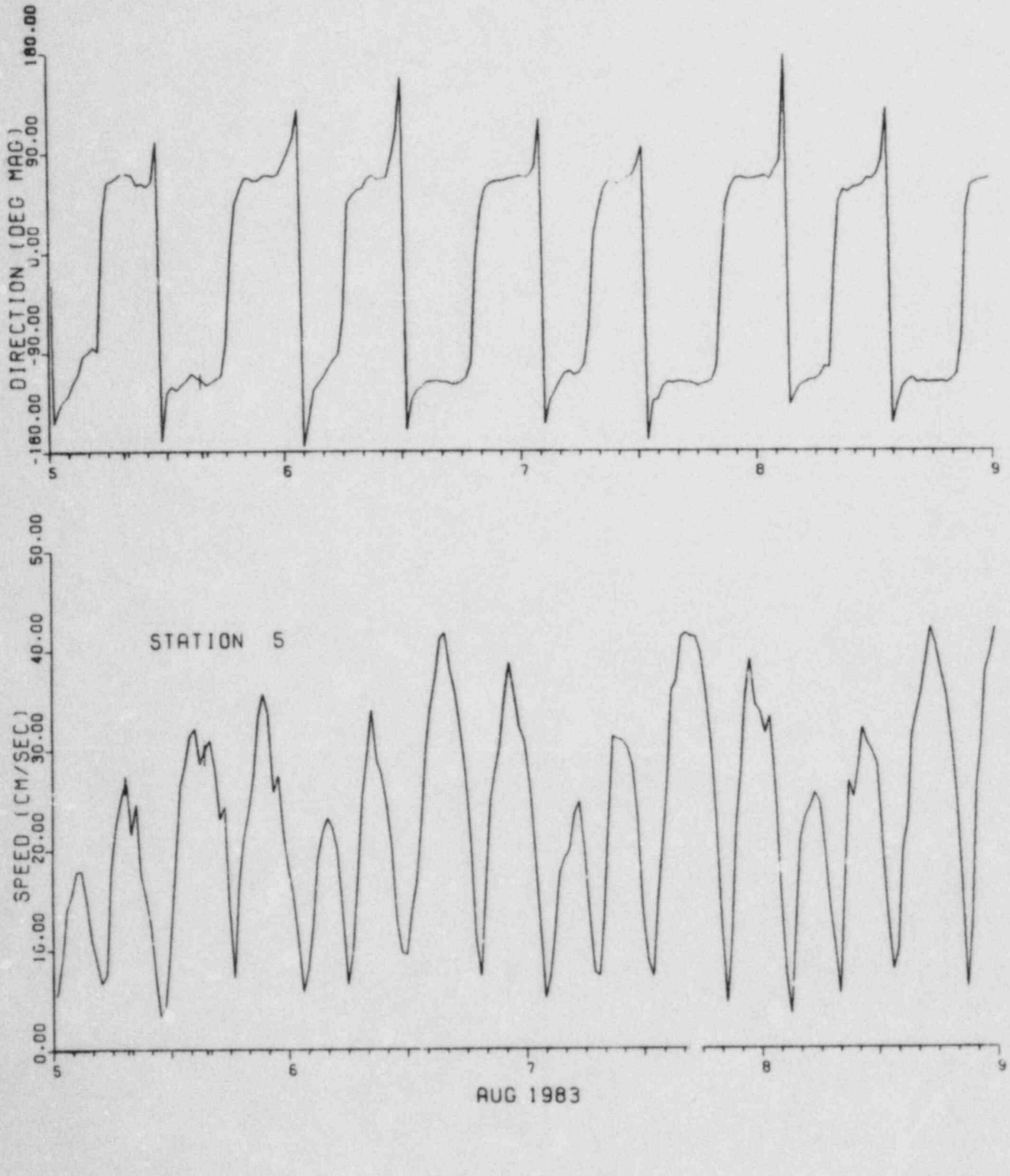


FIGURE 10.2-5

IN SITU CURRENT DATA-
STATION 5, AUGUST 1983
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

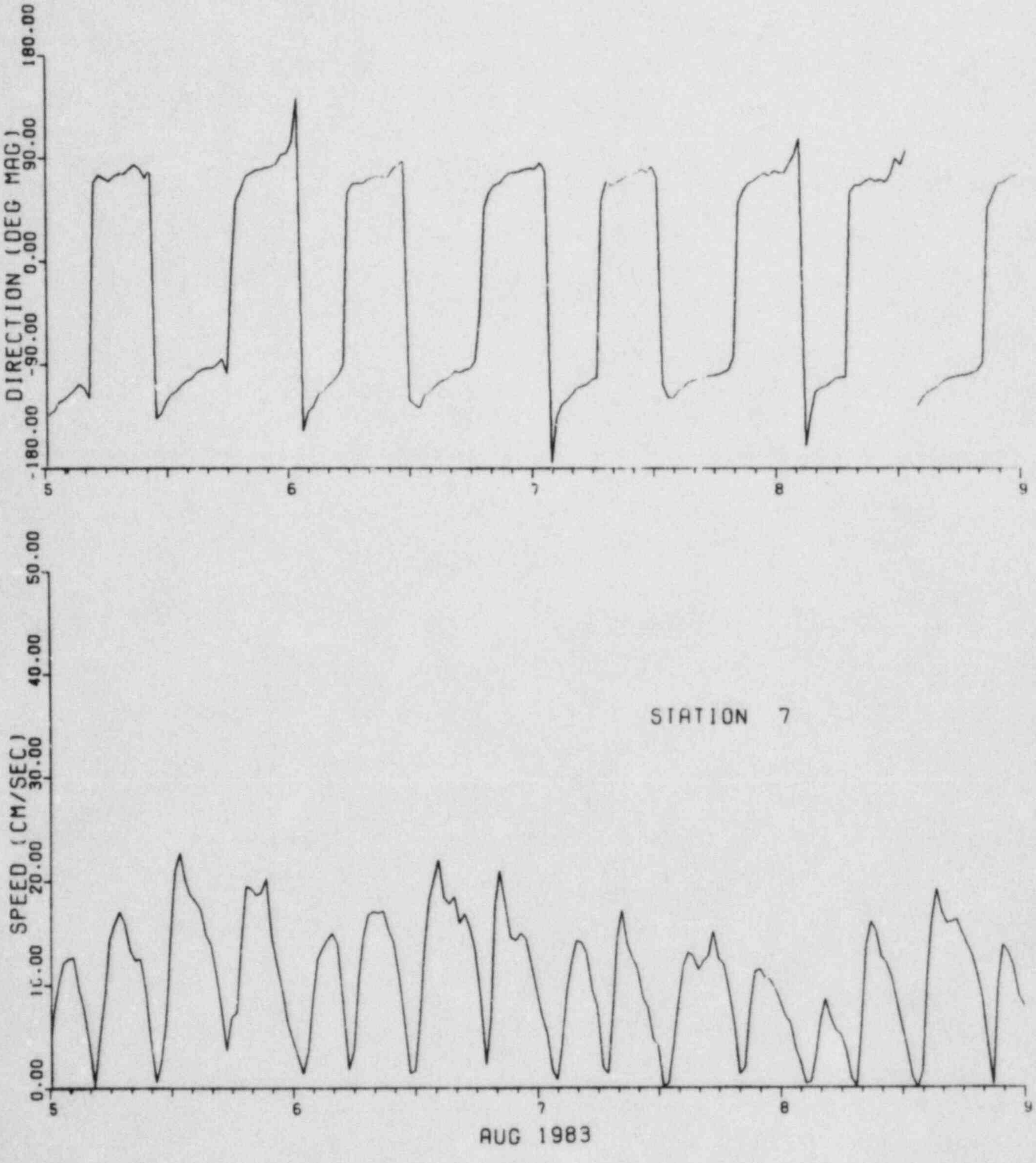


FIGURE 10-2-6

IN SITU CURRENT DATA-
STATION 7, AUGUST 1983
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

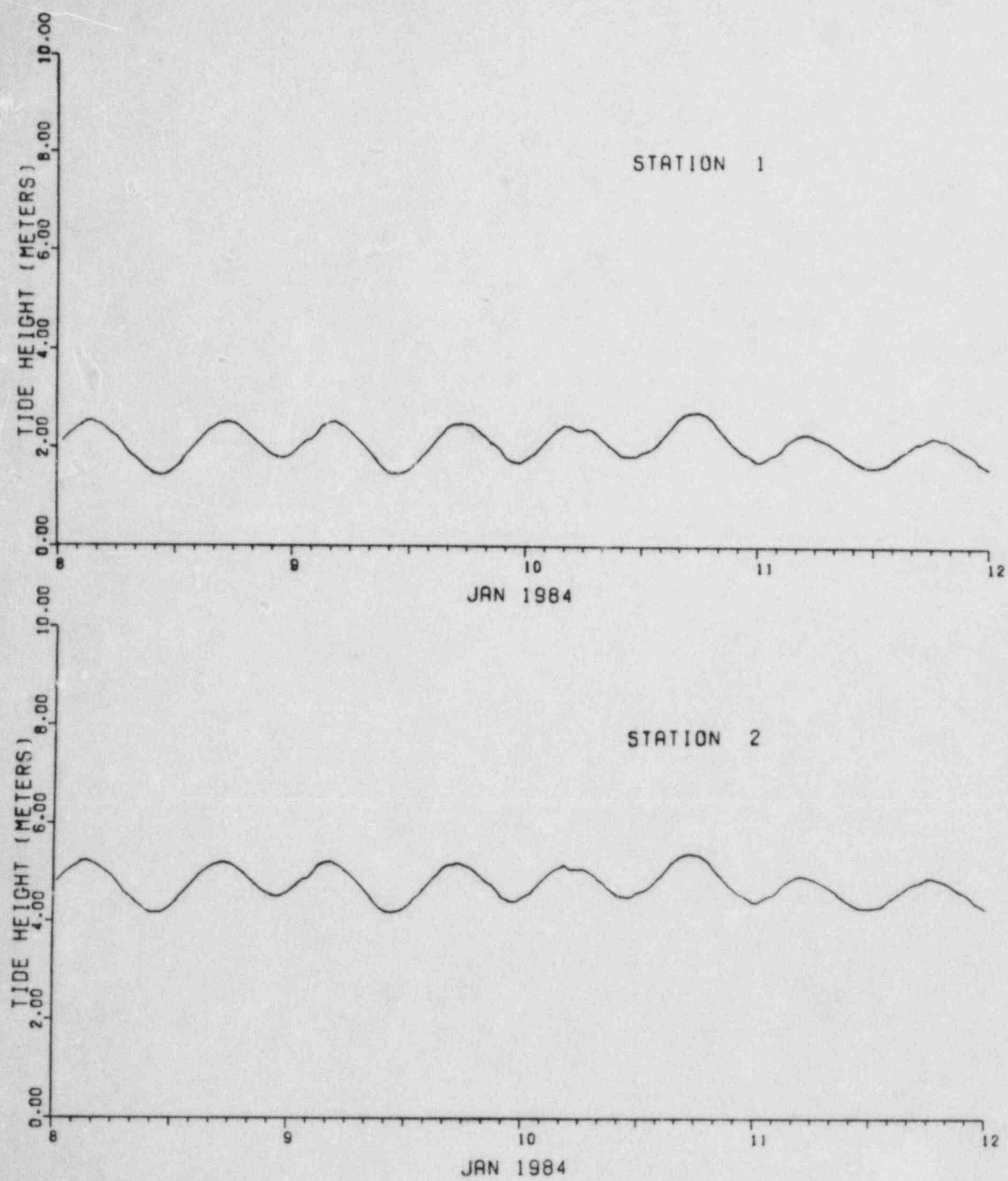


FIGURE 10.2-7

IN SITU TIDE DATA-
STATIONS 1 AND 2, JANUARY 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

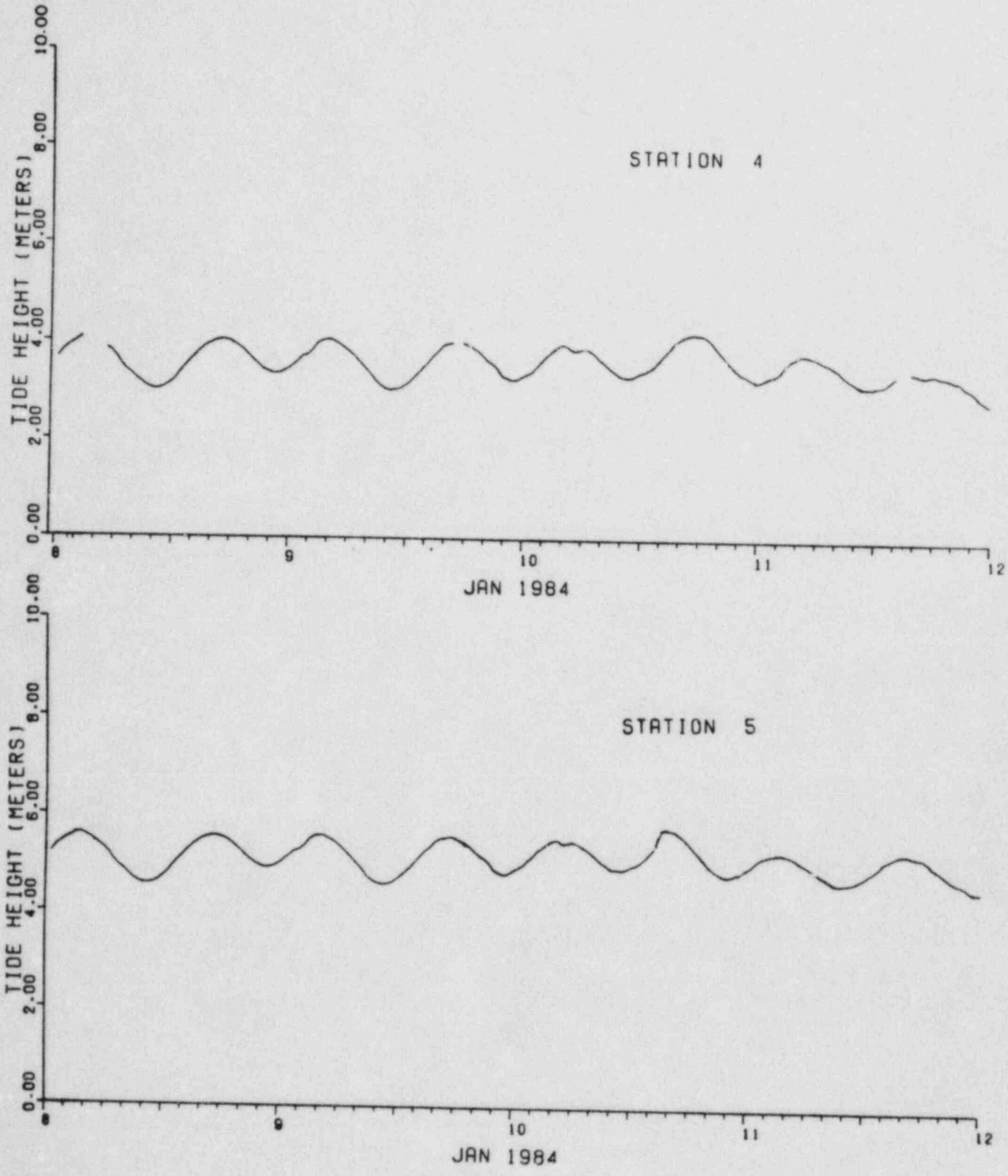


FIGURE 10.2-8

IN SITU TIDE DATA -
STATIONS 4 AND 5, JANUARY 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

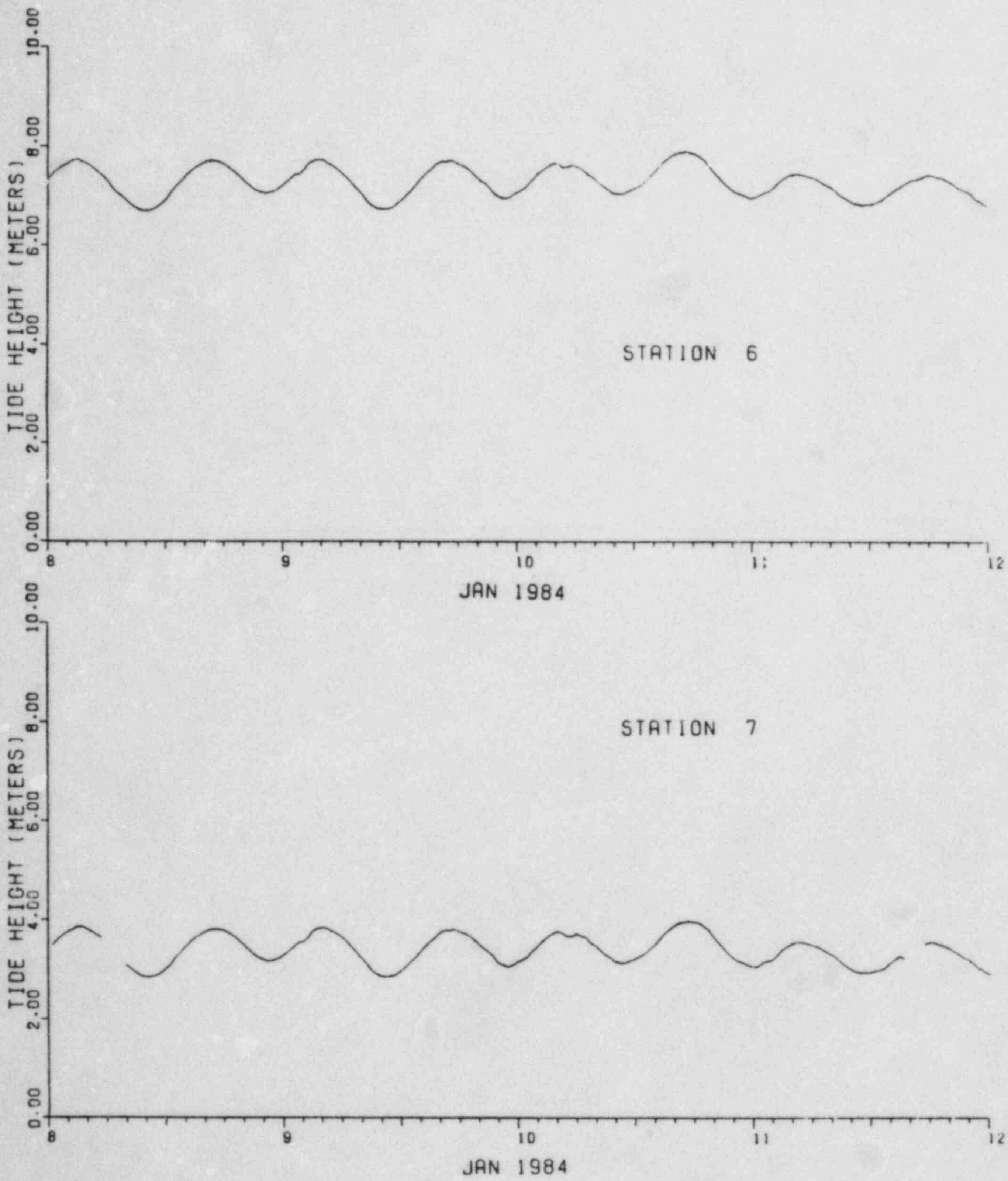


FIGURE 10.2-9

IN SITU TIDE DATA - STATIONS 6 AND 7, JANUARY 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

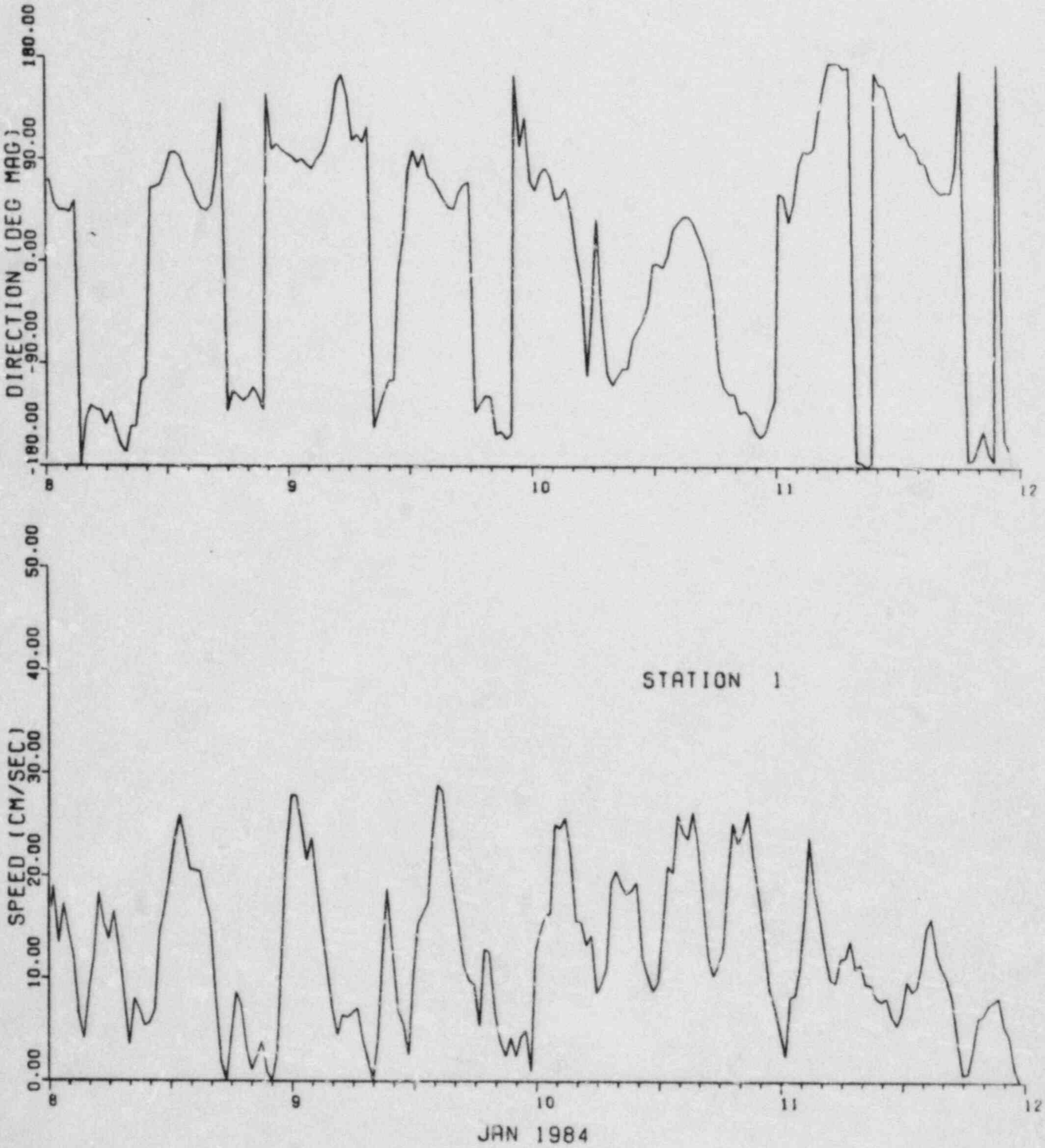


FIGURE 10.2-10

IN SITU CURRENT DATA-
STATION 1, JANUARY 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

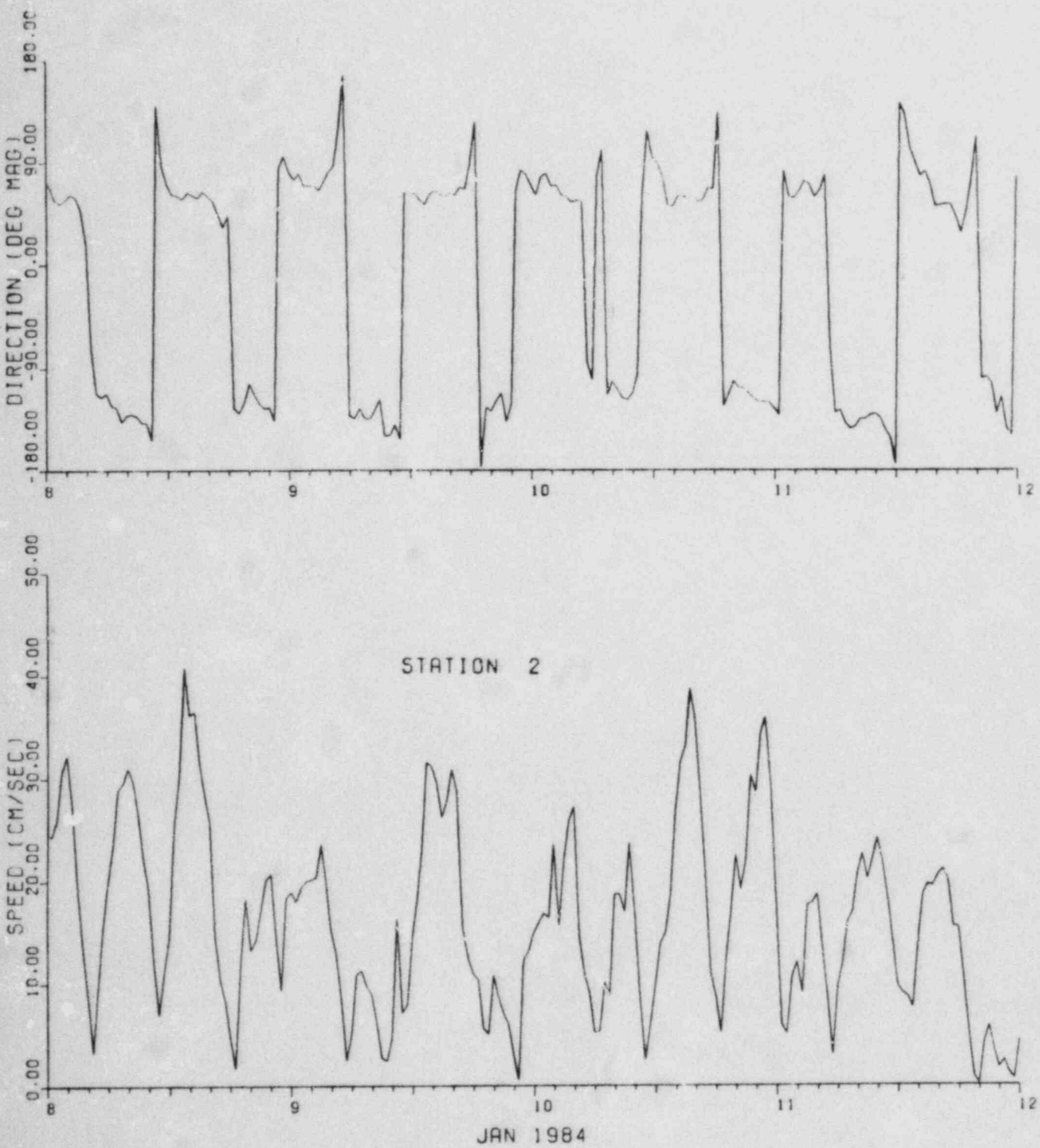


FIGURE 10.2-11

IN SITU CURRENT DATA -
STATION 2, JANUARY 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

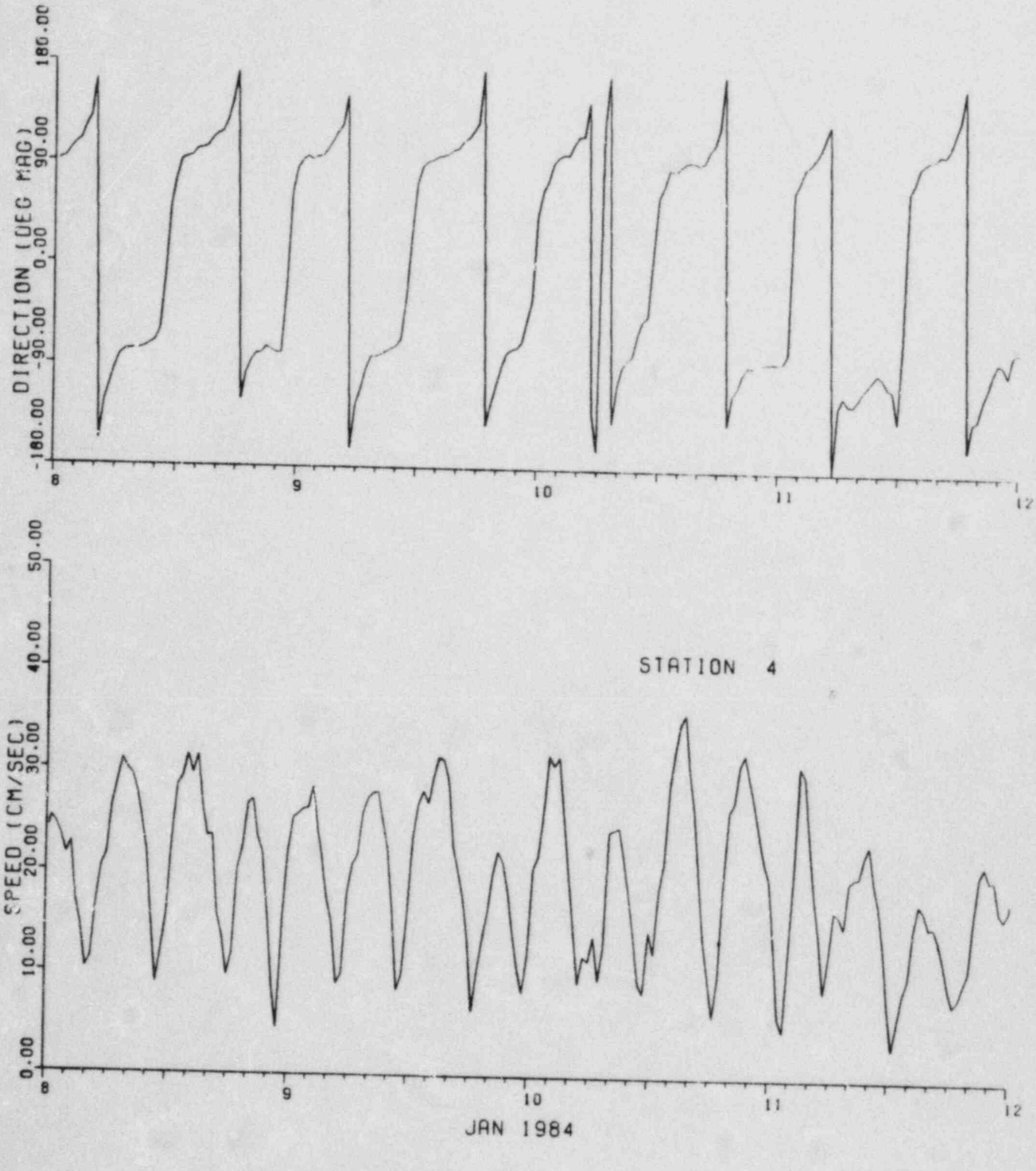


FIGURE 10.2-12

IN SITU CURRENT DATA - STATION 4, JANUARY 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

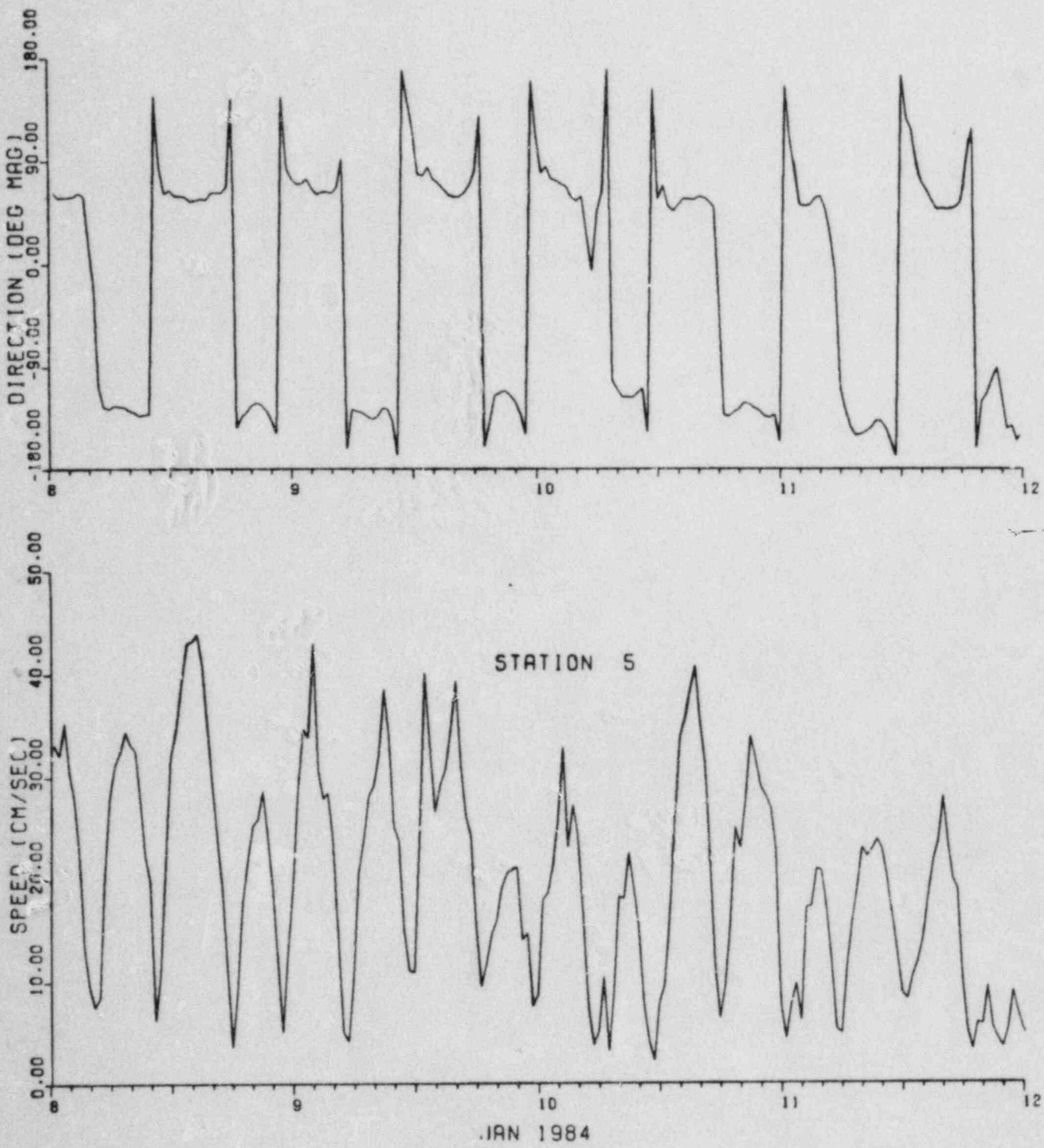


FIGURE 10.2-13

IN SITU CURRENT DATA-
STATION 5, JANUARY 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

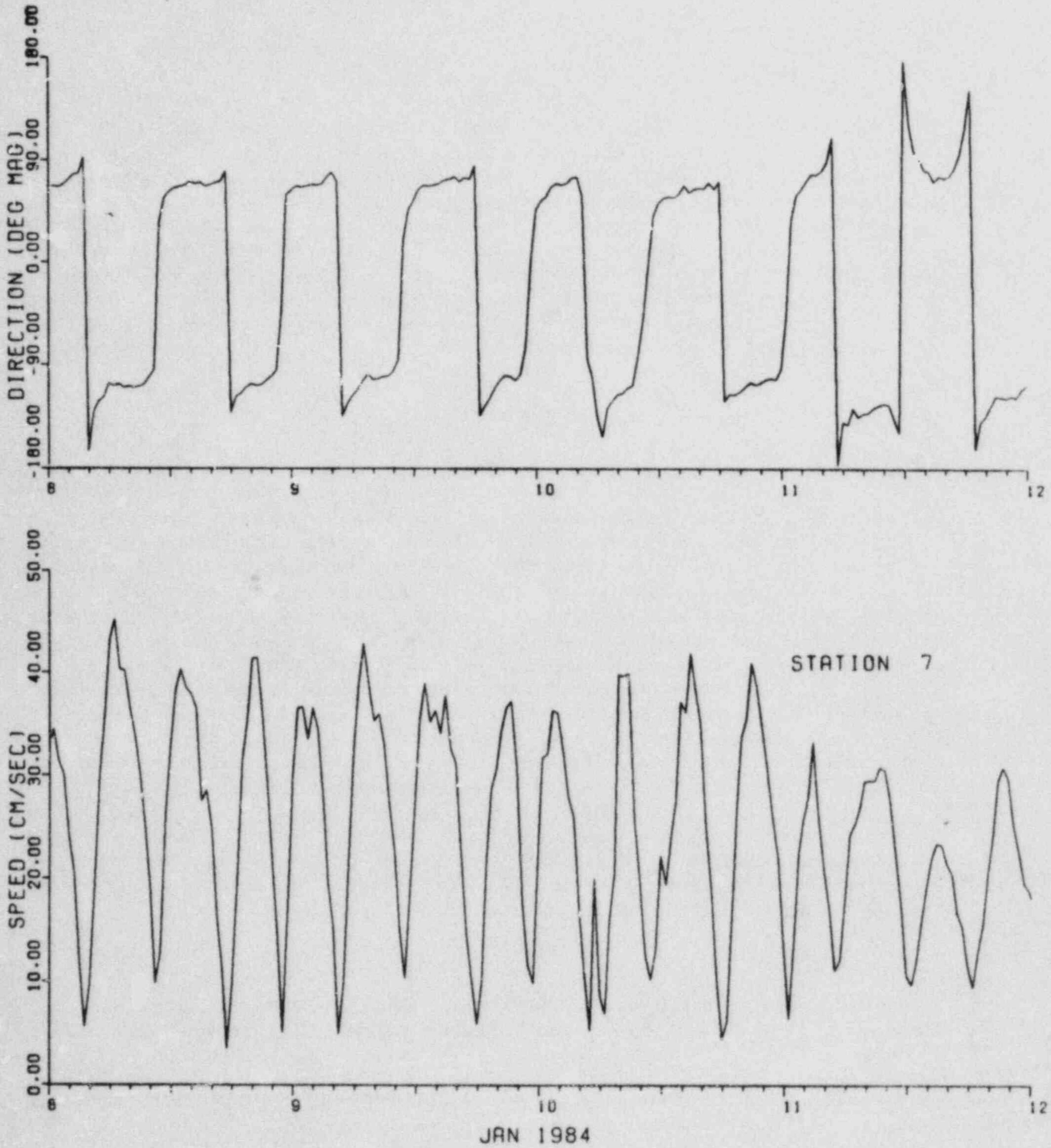


FIGURE 10.2-14

IN SITU CURRENT DATA-
STATION 7, JANUARY 1984
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

10.3 MODEL DESCRIPTIONS

10.3.1 Far-Field Models

The far-field modeling effort for Crystal River Station was conducted with a pair of mathematical models, CAFE-1 and DISPER-1 (Wang & Connor 1975; Leimkuhler et al 1975). Both are two-dimensional finite-element models which were developed at the Massachusetts Institute of Technology (MIT). CAFE-1 is a hydrodynamic model which predicts current velocities and water levels for use in DISPER-1, a dispersion model. Both models have been verified extensively by their originators (Wang & Connor 1975; Wang 1978; Leimkuhler et al 1975) and others in the engineering community (MIT 1977; Galya and Colangelo 1981; Galya and Horst 1982). Several changes were made to CAFE-1 and DISPER-1 during the course of the study. These changes are described below.

10.3.1.1 Hydrodynamic Model: CAFE-1

General

CAFE-1 treats a coastal water body as two dimensional and homogeneous in density. From input parameters such as boundary geometry, bottom topography and roughness, tidal fluctuation, river inflows, and wind, the model produces current velocities and surface elevations varying in time and space. The model formulation is based on the vertically integrated conservation of mass and momentum equations established for shallow water bodies. The basic notion of the finite-element method is that of subdividing the water body into an array of discrete subregions, or finite elements. Each element is represented by a set of the mass amd momentum equations, identical to all other elements. The model solves all the equations simultaneously so that an approximation of a continuous solution is obtained (for example, the tidal elevation and velocity varies gradually from one element to surrounding elements).

Two significant changes were made to CAFE-1 in order to meet specific objectives of this study. First, the ability to simulate oyster bars by using a restricted flow along element sides was added. Second, the ability to simulate flux boundary conditions with tabular input was added.

Model Formulation

This section presents a basic overview of the mathematical development of CAFE-1. More details on each aspect of model formulation are provided by Wang & Conner (1975).

The fundamental equations are the vertically integrated equations of conservation of mass and dynamic equilibrium, as follows:

Conservation of Mass (10.3-1)

$$H_{,t} + q_{x,x} + q_{y,y} = q_I$$

x equilibrium (10.3-2)

$$q_{x,t} + (\bar{U}q_x)_{,x} + (\bar{U}q_y)_{,y} - fq_y + (F_p - F_{xx})_{,x} - F_{yx,y} + \frac{1}{\rho_o}(\tau_x^{s} - \tau_x^{b}) - \bar{M}_x - \frac{1}{\rho_o}(p^{s}H_{,x} + \Delta\rho\, g\, H\, h_{,x}) - g\eta h_{,x} = 0$$

y equilibrium (10.3-3)

$$q_{y,t} + (\bar{V}q_x)_{,x} + (\bar{V}q_y)_{,y} - fq_x - F_{xy,x} + (F_p - F_{yy})_{,y} + \frac{1}{\rho_o}(\tau_y^{\,s} - \tau_y^{\,b}) - \bar{M}_y - \frac{1}{\rho_o}(p^s H_{,y} + \Delta\rho\, g\, H\, h_{,y}) - g\eta h_{,y} = 0$$

where (10.3-4)

$$F_p = gh\eta + \tfrac{1}{2} g\eta^2 + \tfrac{1}{2}\frac{\Delta\rho}{\rho_o} g H^2 + \frac{p^s}{\rho_o} H$$

(10.3-5)

$$F_{x_i x_j} = E_{ij}\left(\frac{\partial q_i}{\partial x_i} + \frac{\partial q_i}{\partial x_j}\right) i,\ j = 1,2 \text{ no summing over } i,j$$

(10.3-6)

$$\tau_x^{\,b} = C_f \rho \left(q_x^{\,2} + q_y^{\,2}\right)^{\frac{1}{2}} \frac{q_x}{H}$$

(10.3-7)

$\tau_y^{\,b}$ $= C_f \rho \left(q_x^{\,2} + q_y^{\,2}\right)^{\frac{1}{2}} \frac{q_y}{H}$

$\tau_x, \tau_y^{\,s}$ = x, y components respectively of wind stress, ρ airC_D U_{10}

h = depth of water with respect to datum,

η = height of water surface with respect to datum,

H $= h + \eta$

q_x, q_y = x, y components of flux,

$\bar{U}$, $\bar{V}$ = x, y components of vertically averaged velocity,

q_I = source flux,

$\rho_o, \Delta\rho, \rho_{air}$ = respectively, average density of water, change in density of water, density of air,

E_{ij} = eddy viscosity coefficient matrix,

C_f = bottom friction factor,

C_D = wind drag coefficient.

In equations 10.3-1, 10.3-2, and 10.3-3, partial differentiation is written as a subscript comma followed by the independent variable.

The boundary conditions used in the model formulation are separated into two categories: discharge boundaries and force boundaries.

For discharge boundaries

$q_n \quad = a_{nx} q_x + a_{ny} q_y$

$q_s \quad = - a_{ny} q_x + a_{nx} qy$

where

q_n, q_s = fluxes normal and tangential, respectively, to the boundary

q_x, q_y = x, y components of flux,

a_{nx} = cos (n, x).

a_{ny} = cos (n, y).

For force boundaries, the external forces are specified as:

$F_{nn} \quad = -F_p + a_{nx}^2 F_{xx} + a_{ny}^2 F_{yy} + 2 a_{nx} a_{ny} F_{xy}$

$F_{ns} \quad = (a_{nx}^2 - a_{ny}^2) F_{xy} + a_{nx} a_{ny} (F_{yy} - F_{xx})$

where

F_{nn}, F_{ns} = normal and tangential specific force measures (a specific force measure is equal to a force per unit width and density)

$F_p, F_{xx}, F_{xy}, F_{yy}, a_{nx}, a_{ny}$ are specified as above.

The solution to the equations given above is generally too complex to be obtained by analytical means. Thus, a numerical technique must be used to complete the solution. CAFE-1 employs the finite-element method to perform this task. In the finite-element method, the spatial domain of interest is divided into subregions called elements. In each element a function is approximated by a simple polynominal called a trial function. The functional relationship for a typical element is then developed and the contributions from all elements are summed to obtain the system equations. Details of the finite-element method are given by Connor (1973) and Wang & Connor (1975).

The restricted flow simulation is formed by two lines of nodes on opposite sides of the semi-permeable barrier causing the restricted flow. Flux through the barrier (q_{RF}) is specified as:

$$q_{RF} = q_{RFO} + q_{RFW}$$

where

$q_{RFO} \quad = C_o (h_2 - h_1)^{1/2}$

$q_{RFW} \quad = C_w (h_2 - h_1)^{3/2}$

h_1, h_2 = elevation at nodes 1 and 2 respectively on opposite sides of the semi-permeable barrier

C_o = coefficient for flux due to orifice-like flows through the semi-permeable barrier

C_w = coefficient for flux due to weir-like flows over the top of the semi-permeable barrier

Application of the Model

Schematization of a finite-element model of a water body depends on the specific objectives of the simulation. Once the objectives have been clearly defined, the structure of elements, or the grid pattern, may be designed.

There were two objectives for the far-field modeling:

1. Determine the far-field thermal plume configuration.

2. Determine station effects on far-field meroplankton concentrations.

The element grid developed for the Crystal Bay study is shown on Figure 10.3-1. The grid was developed so as to provide resolution sufficient for meaningful and distinguishable variability in the results. Thus, the element sizes were chosen to be smaller than the scale of these phenomena but not so small as to provide excessive detail. In particular, the smallest grid elements were concentrated near the POD, larger elements were assigned in more remote locations, and the largest elements were assigned at the extremities of the study area. Oyster bars were simulated using the restricted flow simulation developed for this study. Oyster bars are represented in the grid as strings of node pairs which appear to be parallel line segments between sub-regions of the study area.

Bottom depths in the study region were specified using data described in Section 10.2.3. An average water depth was assigned to each node by considering the bathymetric readings in the vicinity of the node.

Five types of boundary conditions were specified in this application of CAFE-1. First, at the western boundary, tide data were derived from the in situ meters and tabulated in terms of tide heights and times of occurrence throughout a tidal cycle. Second, for fixed land boundaries, a no-flux condition, which assumes that the land is impermeable, was employed. Third, for the north and south boundaries, tabular values of fluxes and times of occurrence were specified based on in situ current and tide data. Fourth, for river inflows and the intake and discharge, fluxes perpendicular to the shoreline were assigned. Finally, at the semi-permeable boundaries representing oyster bars, fluxes perpendicular to the barrier were specified depending on the predicted water elevation difference across the barrier.

10.3.1.2 Dispersion Model: DISPER-1

General

The dispersion model DISPER-1 completes the set of two-dimensional finite-element models used for the far-field modeling. CAFE-1 provided current velocities and water levels for input to DISPER-1. DISPER-1, with the appropriate input parameters, was used to determine the effect of station operation on meroplankton concentrations and temperature in the study area.

Model Formulation

This section presents a basic overview of the mathematical development of DISPER-1. The fundamental equation used in DISPER-1 is that for the mass balance of a constituent. This is expressed by the convection-diffusion equation (Leimkuhler et al 1975):

$$\frac{\partial C}{\partial t} + \frac{\partial}{\partial x} (\bar{U}C) + \frac{\partial}{\partial y} (\bar{V}C) = - \frac{\partial}{\partial x} Q_X - \frac{\partial}{\partial y} Q_Y + P \qquad (10.3\text{-}8)$$

where

$$Q_x = -\rho H E_{xx} \frac{\partial \bar{c}}{\partial x} - \rho H E_{xy} \frac{\partial \bar{c}}{\partial y} \qquad (10.3\text{-}9)$$

$$Q_y = -\rho H E_{yx} \frac{\partial \bar{c}}{\partial x} - \rho H E_{yy} \frac{\partial \bar{c}}{\partial y} \qquad (10.3\text{-}10)$$

$C = \rho \bar{c} H$ = vertically integrated concentration (mass per unit area),

ρ = mass density of water,

$\bar{c}$ = vertically averaged concentration (mass of constituent per mass of fluid),

H = total depth,

$\bar{U}$, $\bar{V}$ = vertically averaged values of horizontal velocity,

E_{xx}, E_{yy}, $E_{xy} = E_{yx}$ = dispersion coefficients

P = mass contribution due to sources and sinks.

Two types of boundary conditions are used in DISPER-1: one in which the concentration is specified and one in which the dispersive flux is specified.

As with CAFE-1, the solution of Equations 10.3-8, 10.3-9, and 10.3-10 is obtained by the finite-element method. Details of the application of the finite-element method to DISPER-1 and other detailed information on the model formulation of DISPER-1 have been presented by Leimkuhler et al (1975) and Christodoulou et al (1976).

For this study, a change was made to DISPER-1 to complement the change to CAFE-1 incorporating the ability to simulate semi-permeable boundaries. In DISPER-1, the semi-permeable boundary formulation used grid geometry, water levels and velocities from CAFE-1, and concentration (or temperature) data to determine the flux of material (or heat) out of the nodes that comprise the upstream portion of the semipermeable boundary. An equivalent flux of material is added at the nodes along the downstream portion of the boundary in order to represent the flux of material through the element sides.

Application of the Model

The grid used for the application of DISPER-1 was the same one used for CAFE-1. Development of this grid is discussed in Section 10.3.1. Water levels and velocities were obtained from output of CAFE-1. Applications of DISPER-1 for this study consisted of thermal simulations (Section 10.5) and meroplankton simulations for the source water body analysis (Section 10.6).

10.3.2 Near-Field Model

The selection of a near-field model for the Crystal River Power Station was based upon an examination of the results of the plume delineation surveys. No significant or consistent plume stratification could be detected due either to temperature or salinity. As noted in Section 6.1, temperature stratification with gradients up to 0.68°C was noted in mean quarterly water quality data. However, gradients of this magnitude are not sufficient to markedly affect hydrodynamic behavior. All candidate near-field models, which simulate rising or sinking plumes, were discarded, and a new near-field model was developed.

The near-field modeling was conducted with a portion of a model originally developed to describe the flow-away zone for a Tee diffuser in quiescent shallow water (Lee and Jirka 1980). The diffuser discharge portion of the model was discarded. The remainder left a model which describes a plume uniformly distributed over the water depth, having an initial momentum imparted at a rectangular outlet, but independent of what may have generated that initial condition.

10.3.2.1 Model Formulation

The equations of motion are written for a vertically uniform elementary length of the plume as follows:

Conservation of mass

$$\frac{d}{dx}\int_{o}^{b} u\,dy = -v_e \qquad (10.3\text{-}11)$$

Equilibrium of force and momentum flux

$$\frac{d}{dx}\int_{o}^{b} u^2 dy = -\frac{f}{8h}\int_{o}^{b} u^2 dy \qquad (10.3\text{-}12)$$

Conservation of heat

$$\frac{d}{dx}\int_o^b u\,\Delta T dy = 0 \qquad (10.3\text{-}13)$$

where

x, y	coordinate directions coincident with the centerline and normal to the centerline, respectively.
$u = u(x,y)$	velocity in the x direction
$v_e = v_e(x)$	entrainment velocity in the y direction
$b = b(x)$	nominal half-width of the plume
h	constant water depth
f	resistance coefficient
$\Delta T = \Delta T(x,y)$	temperature rise above ambient

A solution is achieved by assigning a normal distribution to both velocity and temperature rise and by assuming that the entrainment velocity is proportional to the local centerline velocity as follows:

$$u(x,y) = u_c(x) \exp\left[-\left(\frac{y}{b}\right)^2\right] \qquad (10.3\text{-}14)$$

$$\Delta T(x,y) = \Delta T_c(x) \exp\left[-\left(\frac{y}{b}\right)^2\right] \qquad (10.3\text{-}15)$$

and

$$v_e = -\alpha u_c \qquad (10.3\text{-}16)$$

where

$u_c = u_c(x)$	centerline velocity
$\Delta T_c = \Delta T_c(x)$	centerline temperature rise
α	entrainment coefficient

The differences between transverse heat transfer and momentum transfer are neglected. A system of three ordinary differential equations results.

$$\left.\begin{aligned} c\,\frac{d}{dx}\,(u_c b) &= \alpha\, u_c \\ \frac{d}{dx}\,(u_c^2 b) &= -\,\frac{f}{8h}\,u_c^2 b = -\,\beta\, u_c^2 b \\ \frac{d}{dx}\,(u_c\,\Delta T_c b) &= 0 \end{aligned}\right\} \qquad (10.3\text{-}17)$$

where

$$c = \int_0^{\infty} \exp\,(-\,\eta^2)\,d\,\eta = \frac{\sqrt{\pi}}{2}$$

the solutions of which are

$$u_c = u_o \exp\,(-\beta x)\left[1 + \gamma\,(1 - \exp\,(-\beta\, x))\right]^{-1/2} \qquad (10.3\text{-}18)$$

$$b = b_o \exp\,(\beta x)\left[1 + \gamma\,(1 - \exp\,(-\,\beta\, x))\right] \qquad (10.3\text{-}19)$$

$$\Delta T_c = \Delta T_o\left[1 + \gamma\,(1 - \exp\,(-\,\beta\, x))\right]^{-1/2} \qquad (10.3\text{-}20)$$

where

u_o initial centerline velocity

b_o initial nominal half-width of the plume

ΔT_o initial centerline temperature rise

and

$$\gamma = \frac{2\alpha}{\beta\, c b_o} \qquad (10.3\text{-}21)$$

10.3.2.2 Model Applications

The results from the near-field model are used to modify the isotherm locations predicted by the far-field model. The far-field model does not simulate all of the transport mechanisms that occur in the near-field, nor does it attempt to deceptively resolve fine details through a fine grid structure. Consequently, the far-field model supplies an approximate distribution to the average temperature in the region of the discharge point, and the near-field model provides the detailed distribution.

The near-field model formulation presumes the entrainment of ambient, unheated water. Far-field results show the near-field region to contain residual heat which must affect the prediction there, because the near-field plume sees what amounts to an augmented ambient condition. The model application procedure is first to estimate a value of the far-field temperature rise which will occupy the near-field region. Then, perform calculations with the near-field model with temperature rises all of which have been reduced by this value. As the concluding step, this value is then added to all of the results. Thus, near-field behavior is associated with only that portion of the temperature rise above the residual temperature, not above the ambient temperature.

When the near-field isotherms are superimposed on the far-field isotherms, the values do not coincide along the transition perimeter. Indeed, they should not. Transition implies a region where both near-field behavior and far-field behavior coexist but is not simulated accurately by either model. As a result, the isotherms are manually adjusted to show a continuous distribution.

Upon examination of the thermal plumes obtained from physical data at Crystal River, the only phases of the tide which exhibited any substantial near-field behavior were ebb tide and low water slack. Near-field behavior is apparent by the existence of locally elongated isotherms which follow and enclose a jet emerging from some release point. Temperature gradients are much higher here, and the temperature distribution departs substantially from the smooth variations typical of far-field behavior. Consequently, near-field predictions and modifications of far-field isotherms were limited to these conditions. Furthermore, an examination of the cross sections along the dredged discharge channel support the conclusion that heated water is primarily confined to the channel throughout its length, expecially at low tide levels. The application of the near-field model is simplified as a result of this occurrence. True near-field plume behavior would not begin until the discharge emerges from the channel into Basin 3. The model predictions included this assumption.

10.3.2.3 Parameter Assignment

Typical of most near-field models, the exchange of heat at the air-water interface has been ignored. The travel time of water in the near-field plume is short compared to the time in which a significant amount of heat would be released.

The entrainment coefficient, α, has been assigned to be 0.068. This value corresponds to that determined empirically by Albertson et al (1950) for a two dimensional (slot) momentum jet. The comparable nature of the two dimensional plume with bottom resistance and the slot jet without resistance favors this choice to account for side entrainment.

The bottom resistance coefficient, f, has been assigned to be 0.02. This value has also been adopted by Lee and Jirka (1980) as representative of coastal zone field conditions.

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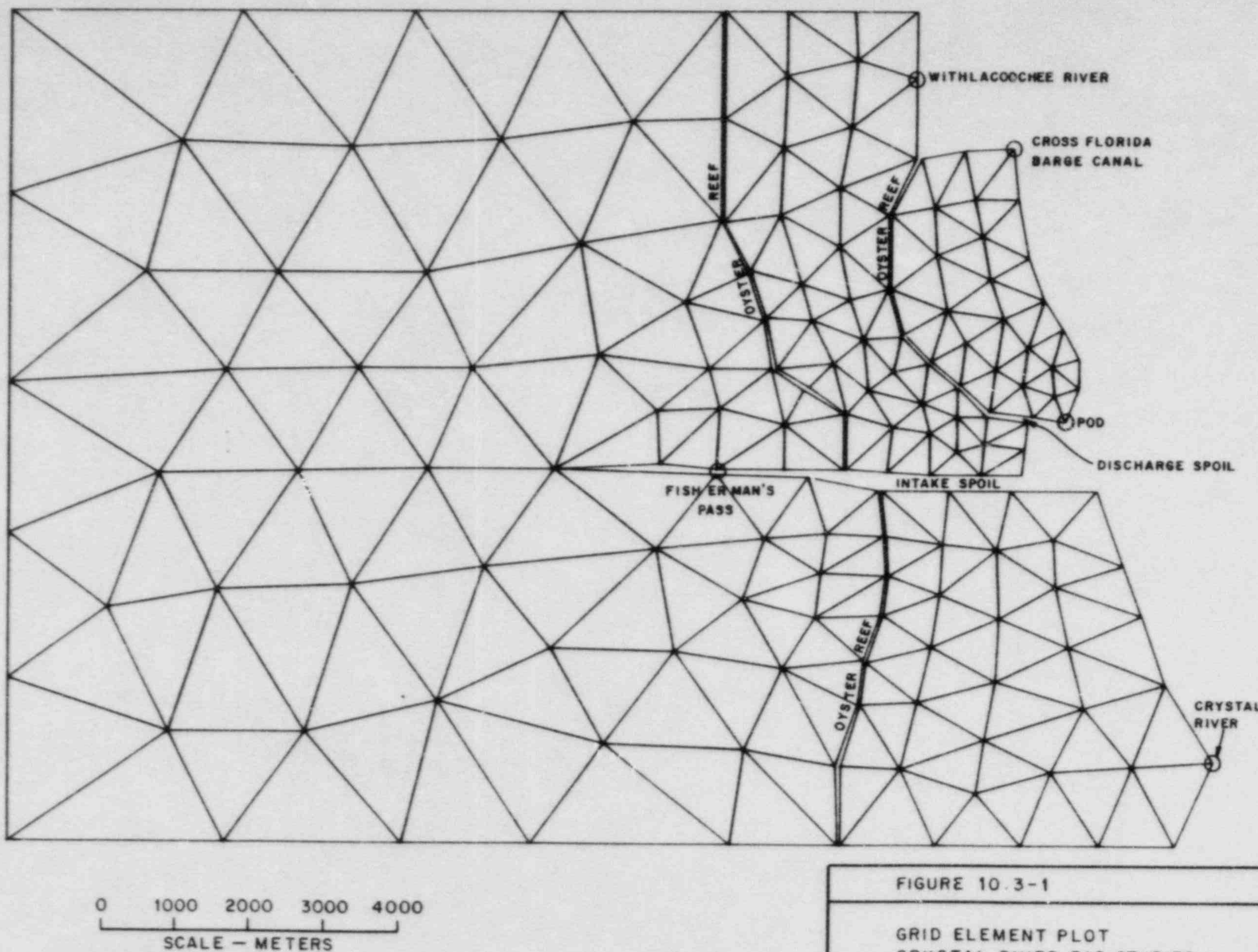

FIGURE 10.3-1

GRID ELEMENT PLOT
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

10.4 MODEL CALIBRATION AND VERIFICATION

10.4.1 CAFE-1

The calibration of CAFE-1 generally consists of varying the bottom friction coefficient to obtain model results which match field data. In performing this task, tidal, wind, and river inflow conditions existing during the period of short-term field data collection are prescribed in the model input. The eddy viscosity coefficient is generally not varied because it has little effect other than providing a stabilizing influence to model computation. In this study, it was also necessary to calibrate the coefficients related to the semi-permeable boundaries (or oyster bars).

Verification of the model consists of simulating a period of time that is independent of the calibration period. If it is possible, the hydrodynamic characteristics of the verification period should be significantly different from those of the calibration period. The period chosen for calibration in this study was during a diurnal mixed tide that occurred August 6 and 7, 1983. The period chosen for verification was during a semi-diurnal tide that occurred January 9, 1983.

Figures 10.2-1 and 10.2-2 show tidal elevation data for situ Stations 4, 5, 6, and 7 during the calibration period. These data were used to develop the tidal elevation boundary conditions at the western boundary of the study area. Figures 10.2-3, 10.2-4, 10.2-5, and 10.2-6 show the current data used to develop the flux information used for boundary conditions at the north and south boundaries of the study area. River discharges were estimated from previous flow data for August collected by the United States Geological Survey (USGS) (USGS 1974). Station intake and discharge data were obtained from plant records.

For the verification period, Figures 10.2-7 to 10.2-9 show the tidal elevation data used to develop boundary conditions. Figures 10.2-10 to 10.2-14 show the current data used to develop the flux boundary conditions at the north and south boundaries for the verification period. River discharges were estimated from previous flow data for January collected by the USGS. As in the calibration, station intake and discharge data were obtained from plant records.

Results of the calibration phase are shown on Figures 10.4-1 to 10.4-4. Figures 10.4-1 to 10.4-3 show model results and field data of tide elevations at in situ Stations 13, 15, and 16. Those stations are situated throughout the study area, at both offshore and onshore locations. The results shown in the figures indicate that the model correctly reproduces the tide elevations generated throughout the study area and the exchange of water between onshore and offshore areas. Figure 10.4-4 shows the model results and field data of longitudinal (X direction) and lateral (Y direction) flux at in situ Station 15. The results compare quite well, confirming that the model correctly simulates the flow of water shoreward during flood tide, seaward during ebb tide and along shore throughout the tidal cycle.

Figures 10.4-5 to 10.4-7 show the results of the verification study. These figures show model results and field data of tide elevation at in situ Stations 11, 13, and 14. Once again, the stations are located throughout the study area and the results indicate that the model correctly predicts the movement of water in the study region.

10.4.2 DISPER-1

DISPER-1 is generally calibrated by varying the dispersion coefficient until a good comparison between model results and field data is obtained. Various parameters or tracers can be used for this analysis, but it is always preferable to use a conservative constituent, such as salinity. Conditions under which salinity would be a good tracer would involve the presence of a significant lateral gradient, which exists in the study area. Temperature could be used as a tracer, but it is often difficult to determine both a precise value for the heat transfer coefficient and the distribution of ambient temperature.

The calibration period for DISPER-1 is the same as the calibration period for CAFE-1. Similarly, the verification period for DISPER-1 is the same as the verification period for CAFE-1. Each of the DISPER-1 simulations uses the corresponding output from CAFE-1 for water elevation and current velocity input. Boundary conditions for both simulations were obtained from the results of the plume delineation surveys and the in situ stations.

Results of the calibration study are shown on Figures 10.4-8 to 10.4-11. These figures show respectively the high water slack, ebb, low water slack and flood phases of tide. Figures 10.4-12 to 10.4-15 show corresponding tidal phases for the verification period. These figures compare salinity isopleths from model results with isopleths generated from field results. The plotted isopleths indicate that there is generally a favorable comparison between model and field results. Some of the comparisons are excellent, and all are acceptable. Of course, in the small region of the near-field during ebb and low water slack, no favorable comparison is expected. When comparing model results with field data, it should be emphasized that the distribution of parameters in the field is often of a transient, non-reproducible nature. That is, the distribution of parameters often will change from one tidal cycle to the next even if all the principal driving mechanisms (tides, inflow, alongshore currents, winds) remain unchanged. This is due to small-scale effects. These small-scale effects are represented in the model by the dispersion coefficient. Consequently, the model results probably will not match any one set of field data excactly but will represent an average of all the distributions that might occur under any one set of conditions.

The dispersion coefficients determined in this study range from 50 m^2 per sec in the near shore regions to 300 m^2 per sec in the furthest offshore area.

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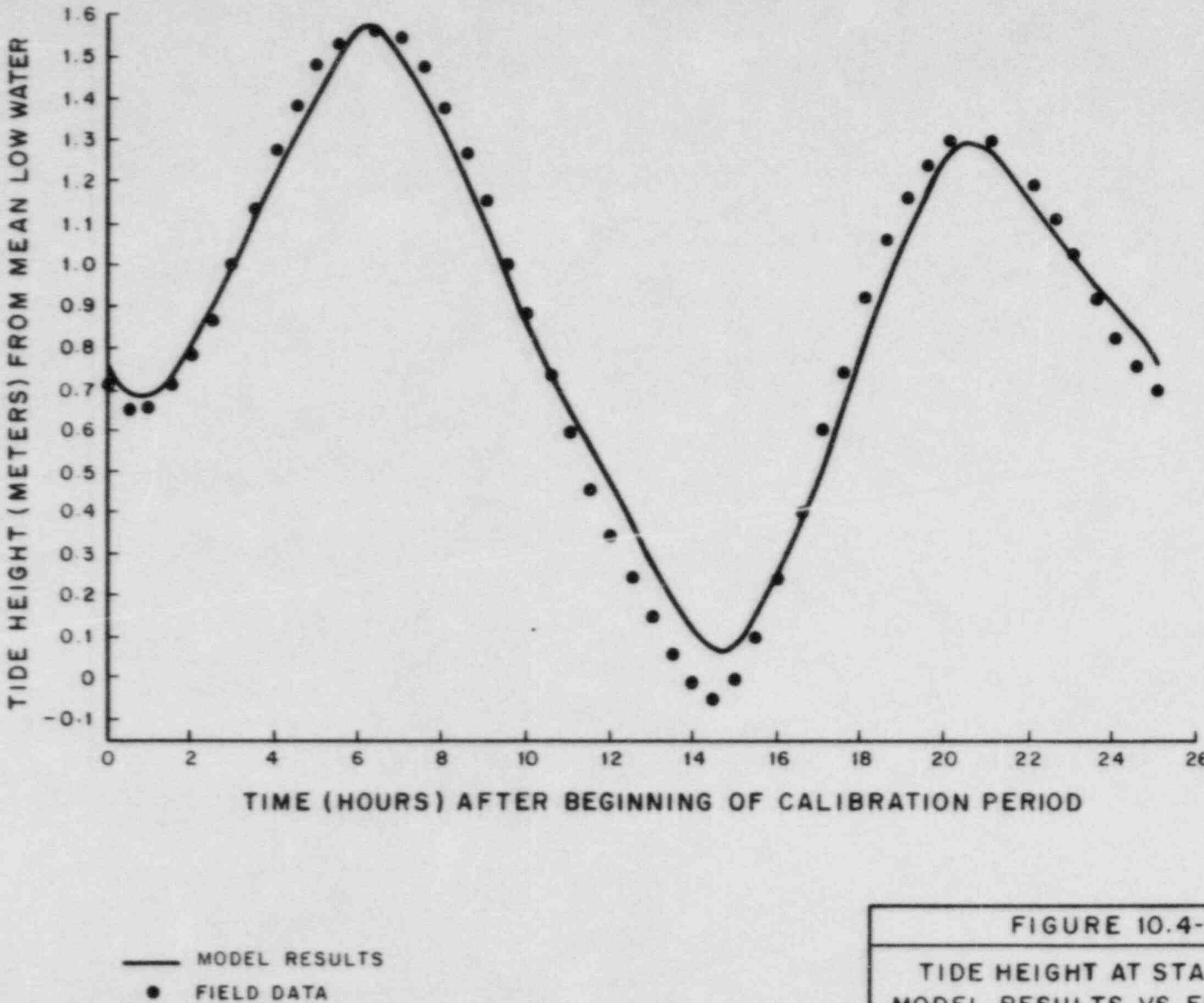

FIGURE 10.4-1

TIDE HEIGHT AT STATION 13
MODEL RESULTS VS FIELD DATA
-CALIBRATION PERIOD

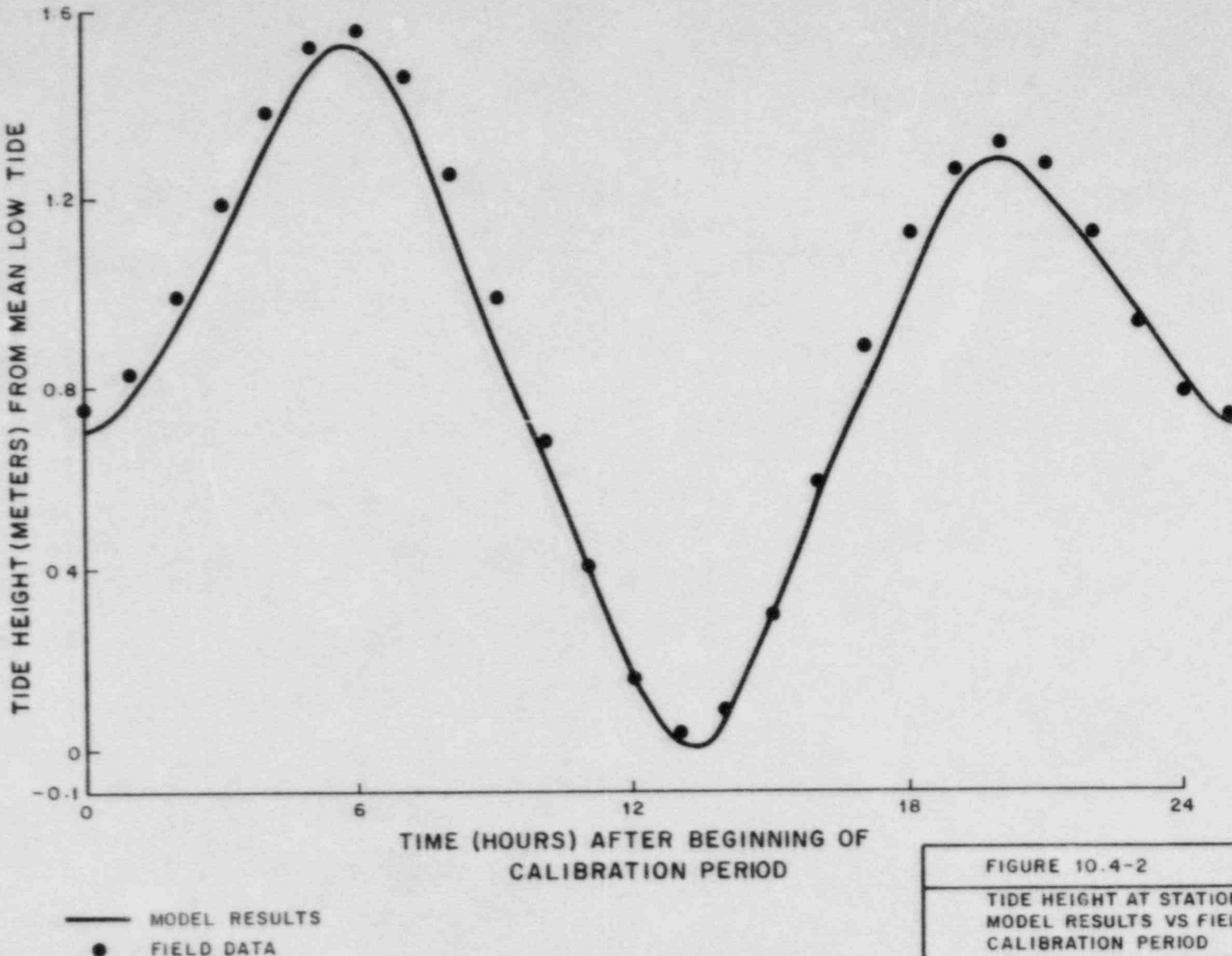

FIGURE 10.4-2

TIDE HEIGHT AT STATION 15
MODEL RESULTS VS FIELD DATA
CALIBRATION PERIOD
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

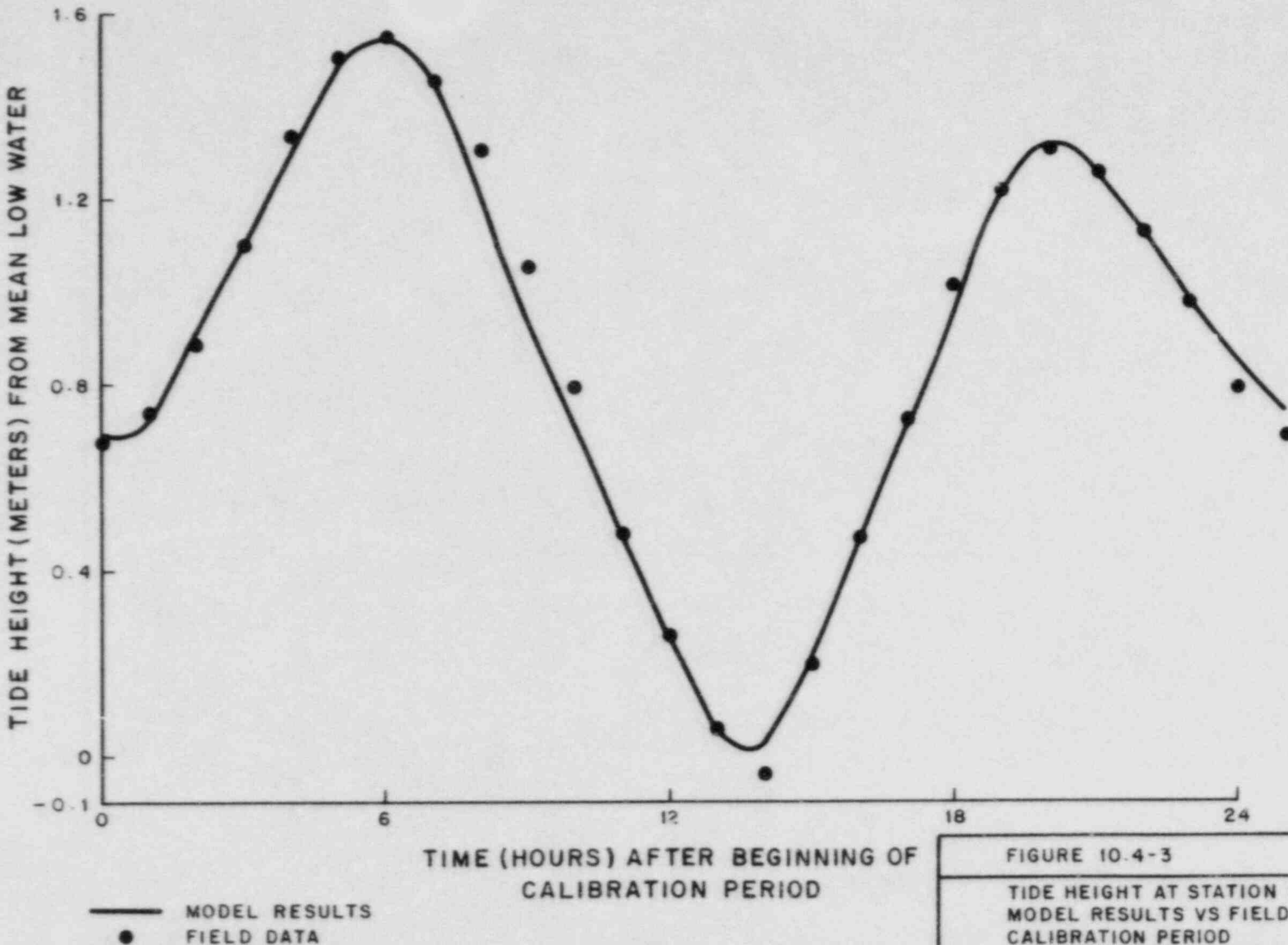

FIGURE 10.4-3

TIDE HEIGHT AT STATION 16
MODEL RESULTS VS FIELD DATA
CALIBRATION PERIOD
CRYSTAL RIVER 316 STUDIES
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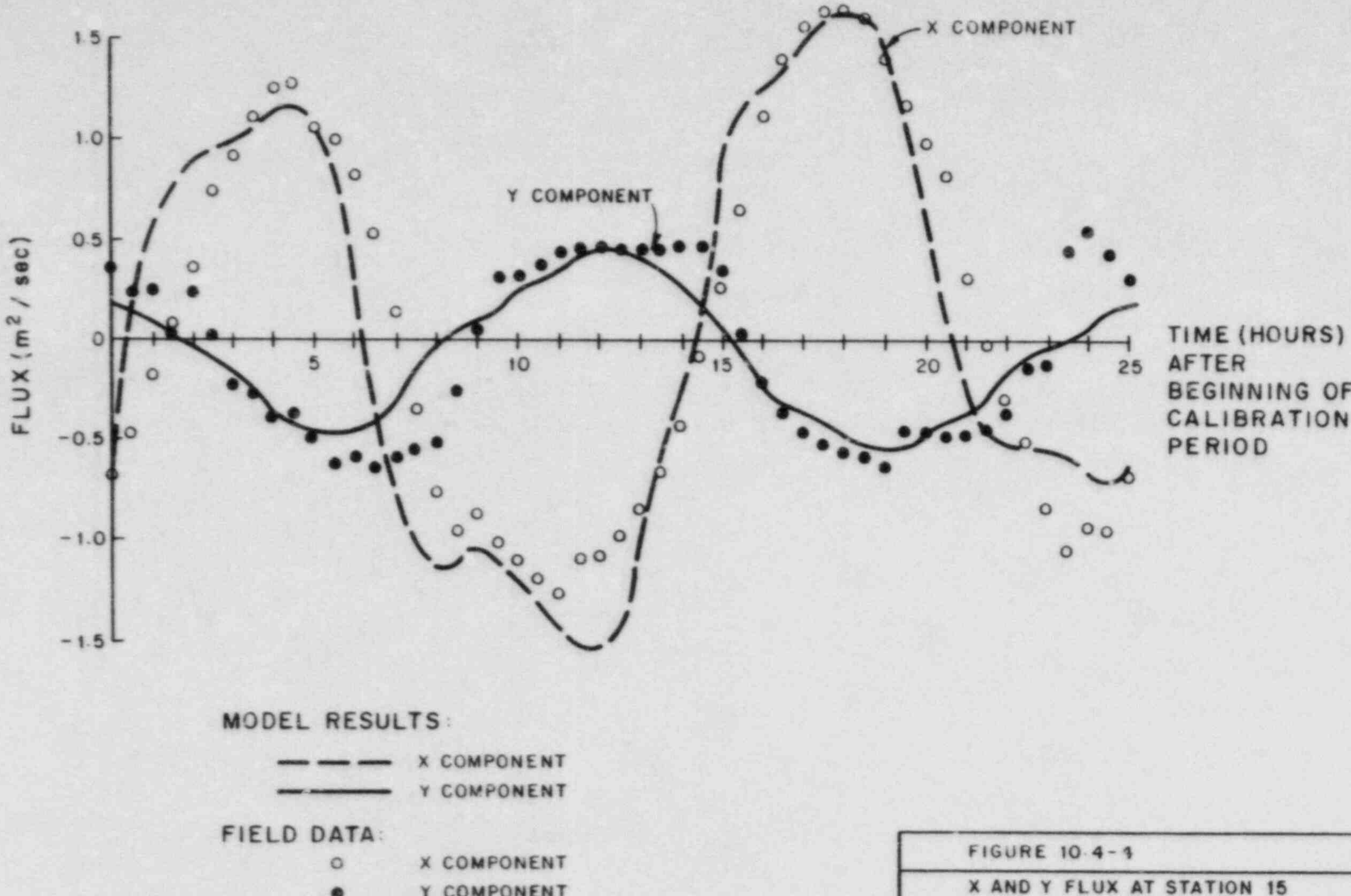

FIGURE 10-4-1

X AND Y FLUX AT STATION 15
MODEL RESULTS VS FIELD DATA
CALIBRATION PERIOD
CRYSTAL RIVER 316 STUDIES
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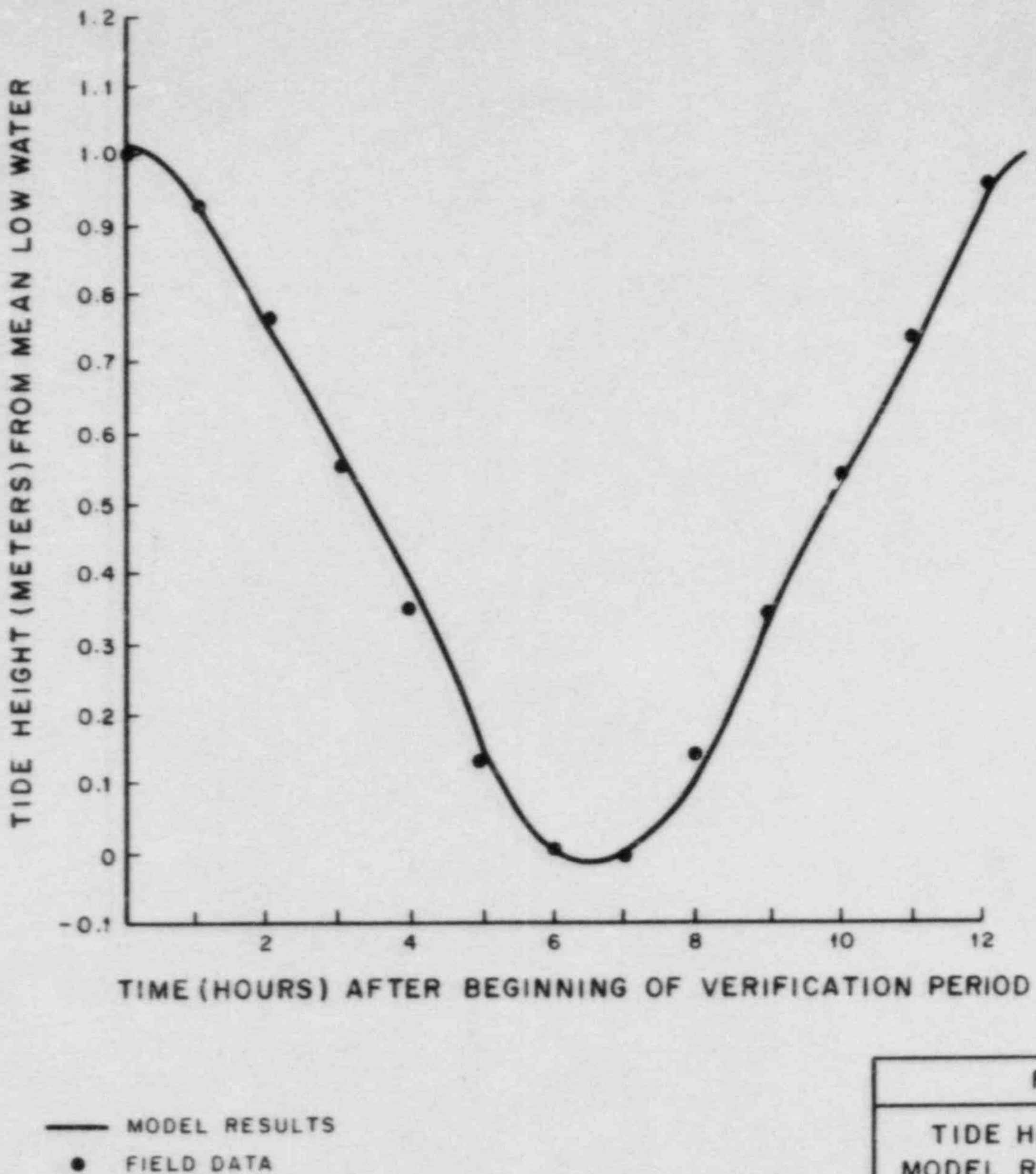

FIGURE 10.4-5
TIDE HEIGHT AT STATION 11 MODEL RESULTS VS FIELD DATA –VERIFICATION PERIOD

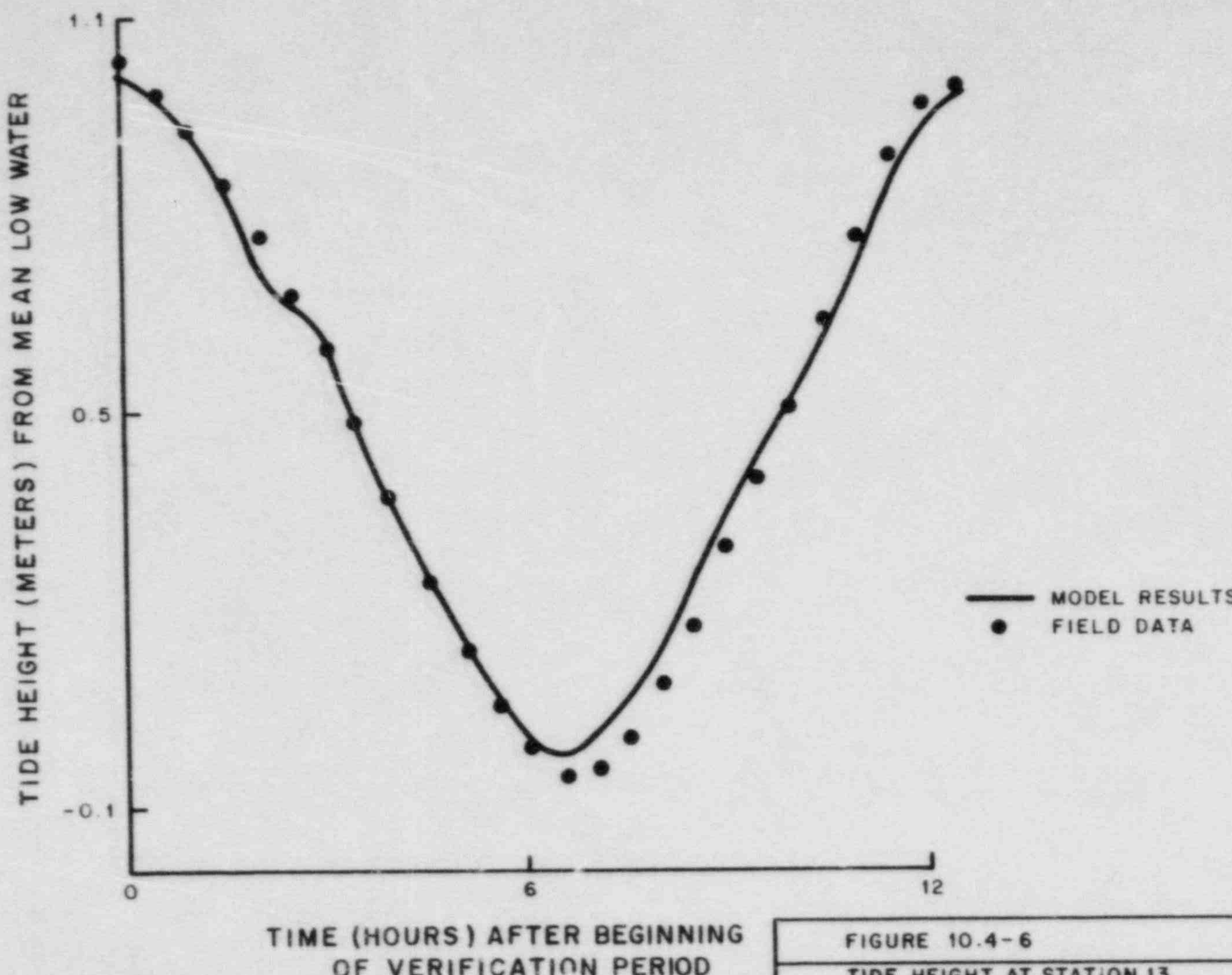

FIGURE 10.4-6

TIDE HEIGHT AT STATION 13
MODEL RESULTS VS FIELD DATA
VERIFICATION PERIOD
CRYSTAL RIVER 316 STUDIES
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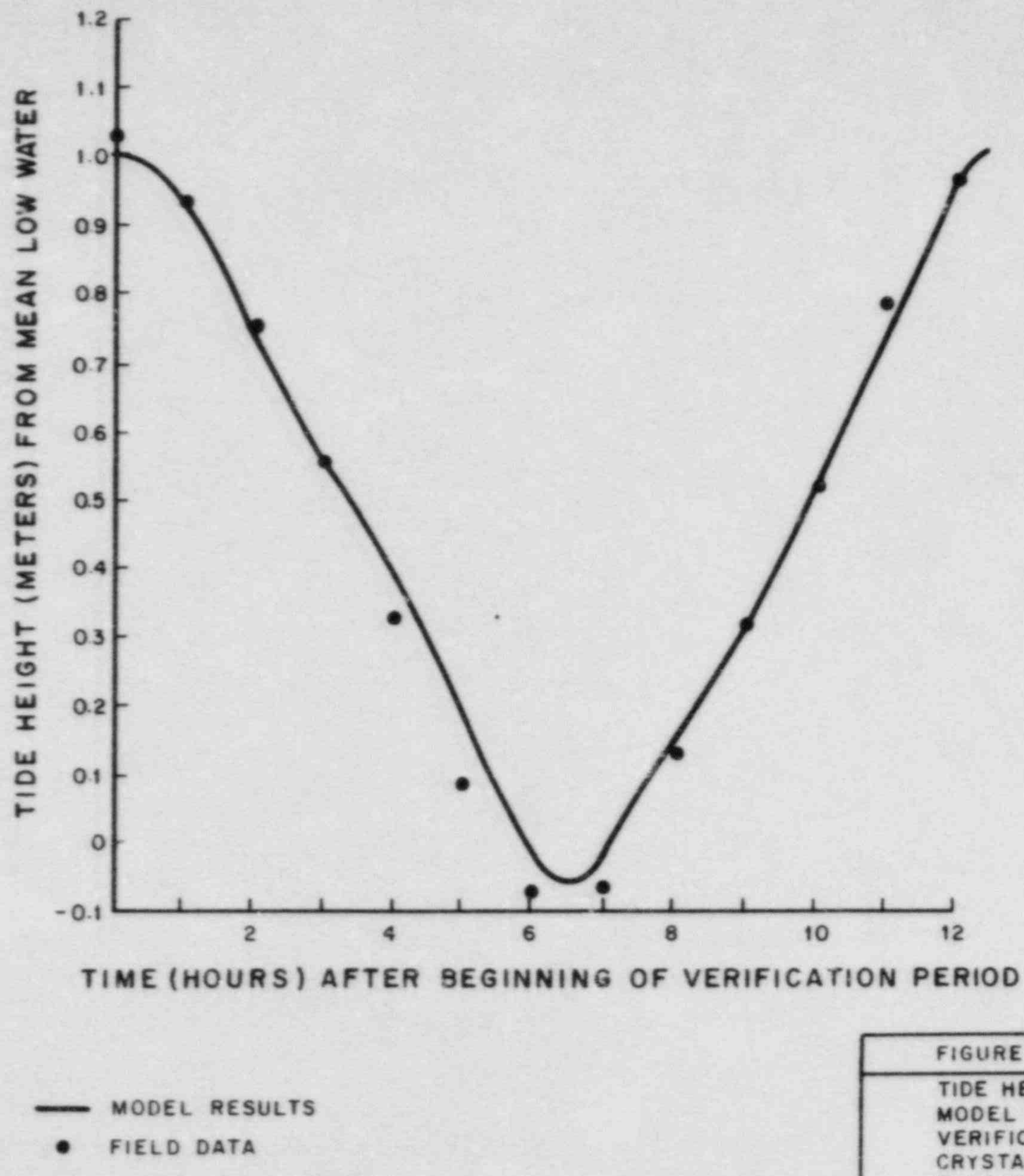

FIGURE 10.4-7

TIDE HEIGHT AT STATION 14
MODEL RESULTS VS FIELD DATA
VERIFICATION PERIOD
CRYSTAL RIVER 316 STUDIES
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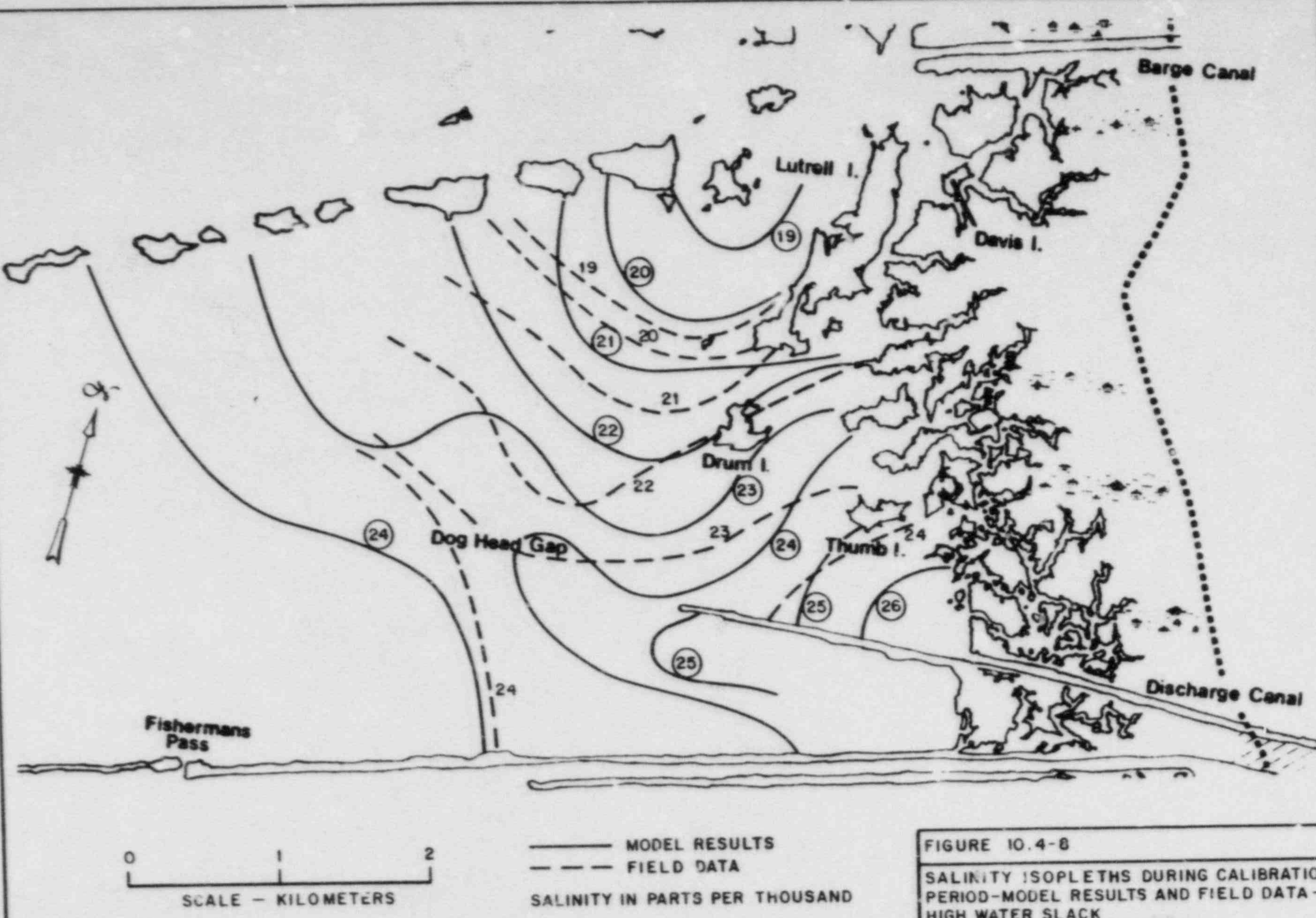

FIGURE 10.4-8

SALINITY ISOPLETHS DURING CALIBRATION PERIOD-MODEL RESULTS AND FIELD DATA-HIGH WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

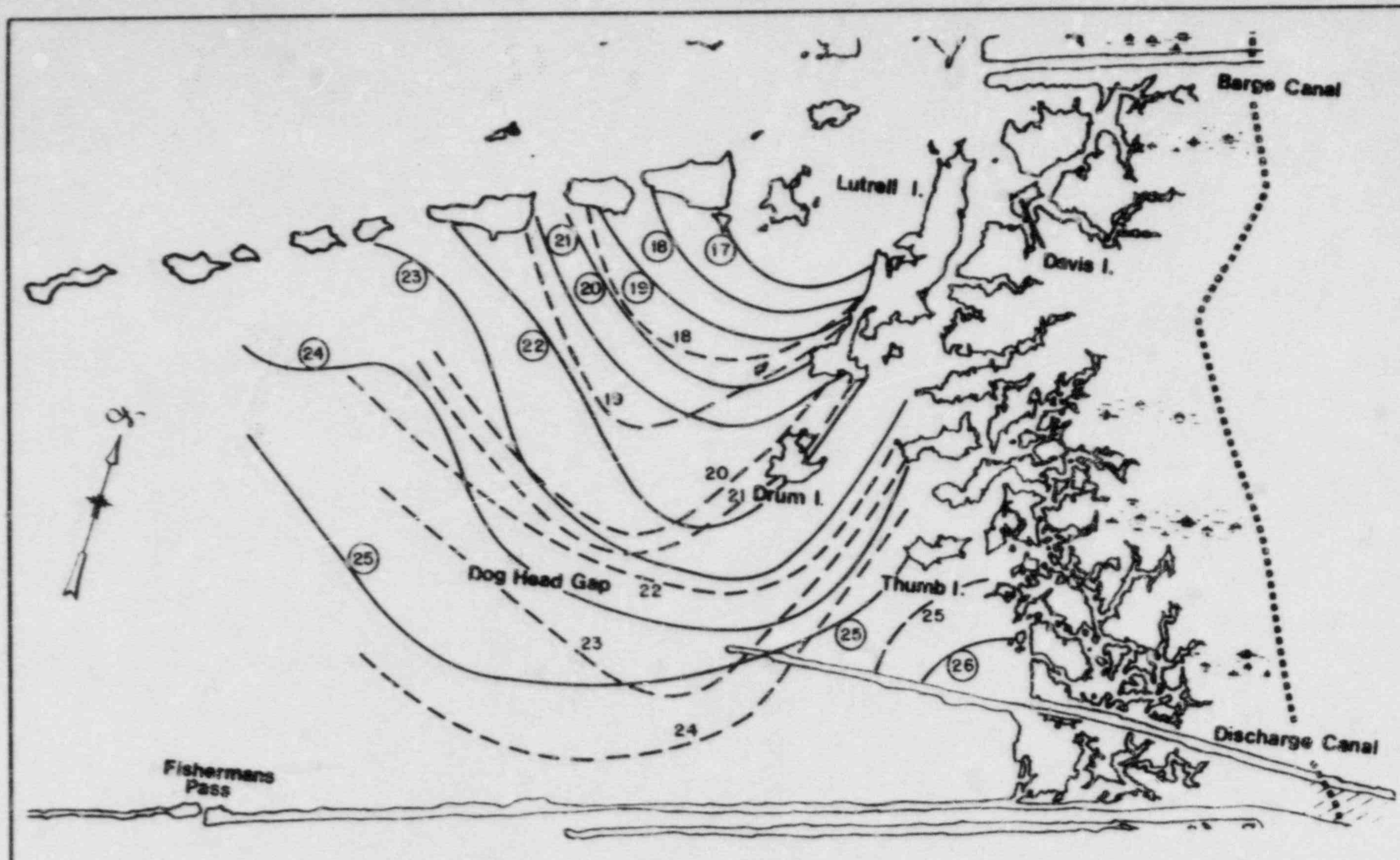

FIGURE 10.4-9

SALINITY ISOPLETHS DURING CALIBRATION PERIOD – MODEL RESULTS AND FIELD DATA – EBB
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

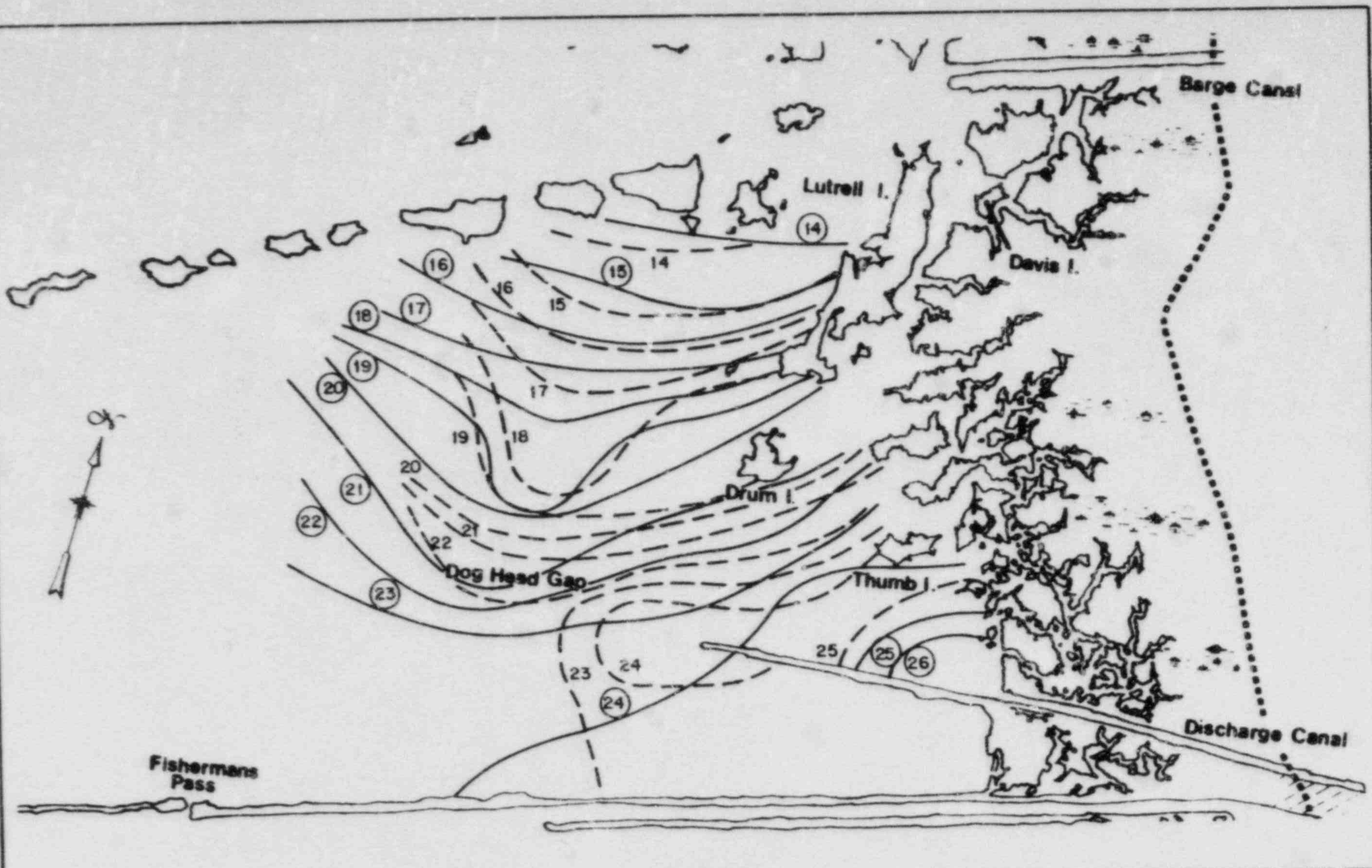

FIGURE 10.4-10

SALINITY ISOPLETHS DURING CALIBRATION PERIOD—MODEL RESULTS AND FIELD DATA—LOW WATER SLACK
CRYSTAL RIVER 316 STUDIES
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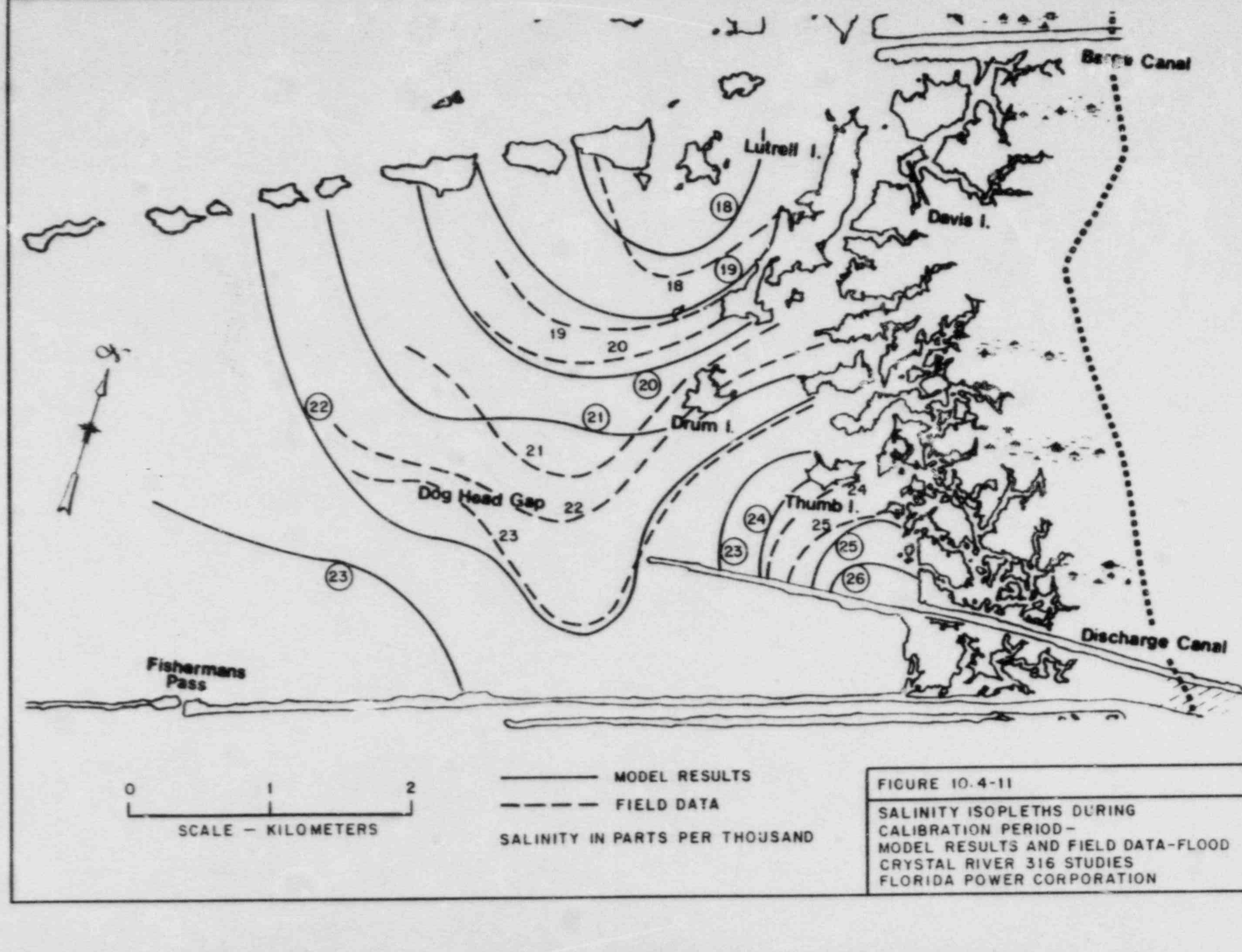

FIGURE 10.4-11

SALINITY ISOPLETHS DURING CALIBRATION PERIOD— MODEL RESULTS AND FIELD DATA-FLOOD
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

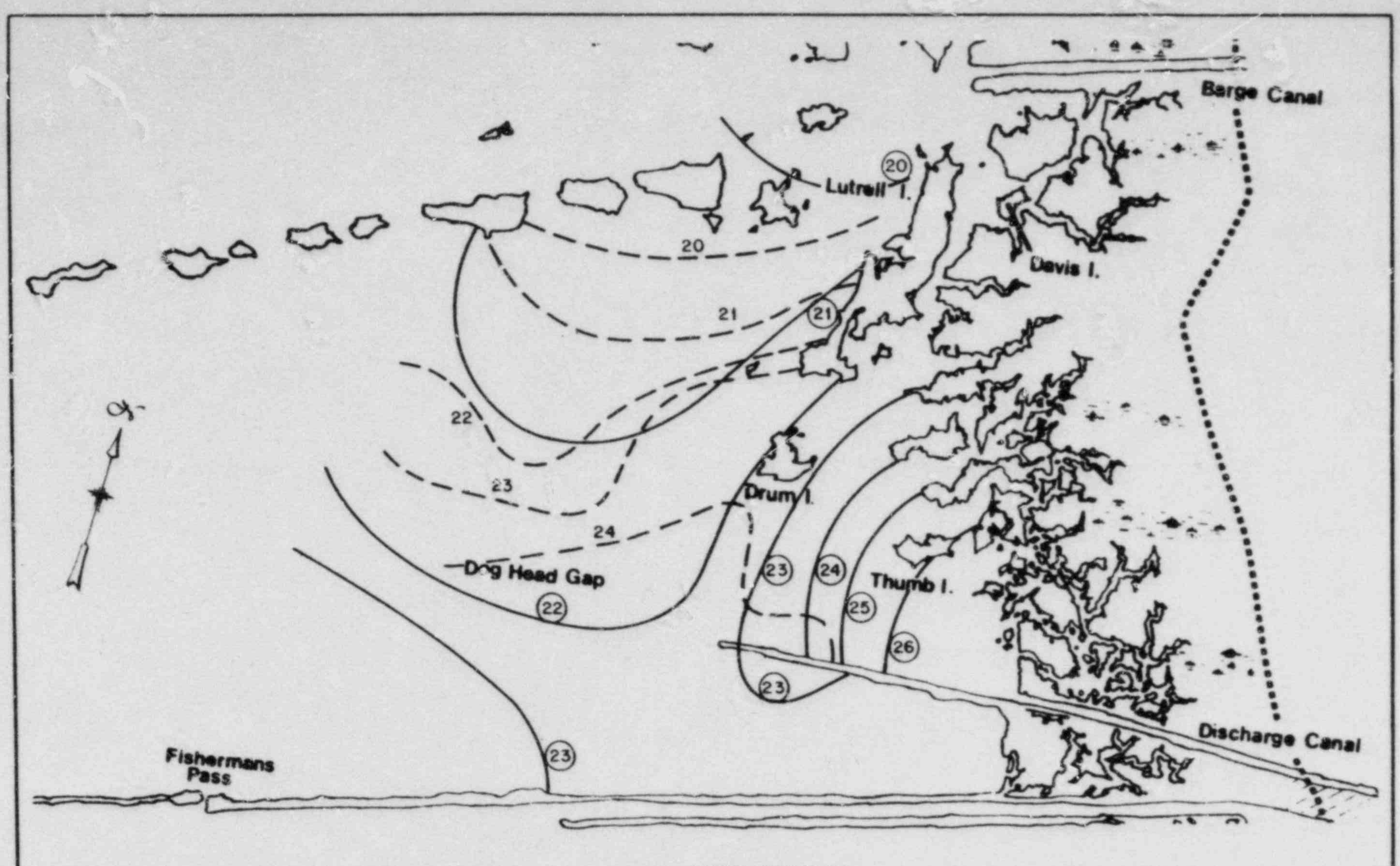

FIGURE 10.4-12

SALINITY ISOPLETHS DURING VERIFICATION PERIOD-MODEL RESULTS & FIELD DATA-HIGH WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

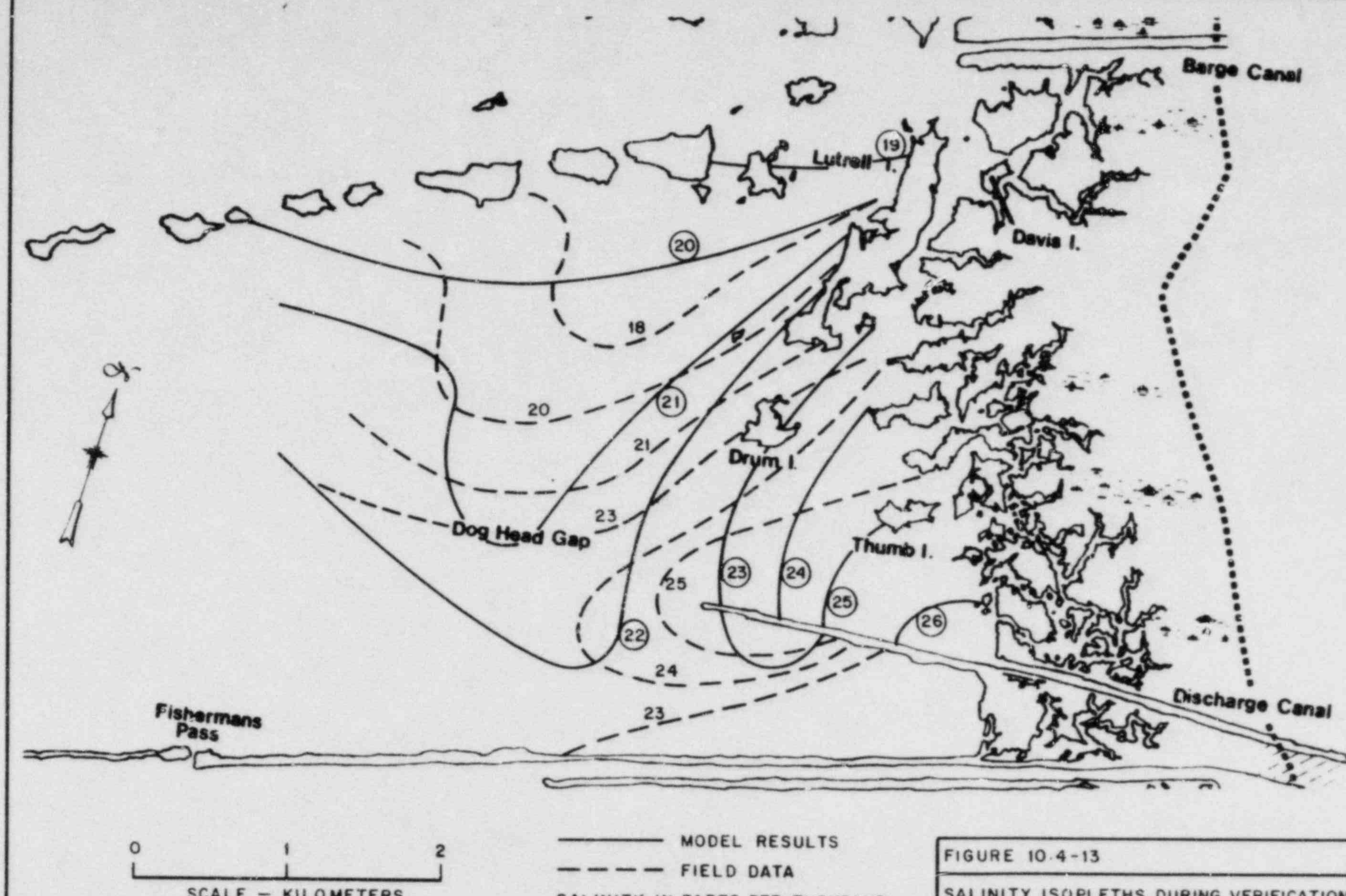

FIGURE 10.4-13

SALINITY ISOPLETHS DURING VERIFICATION PERIOD-MODEL RESULTS & FIELD DATA-EBB
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

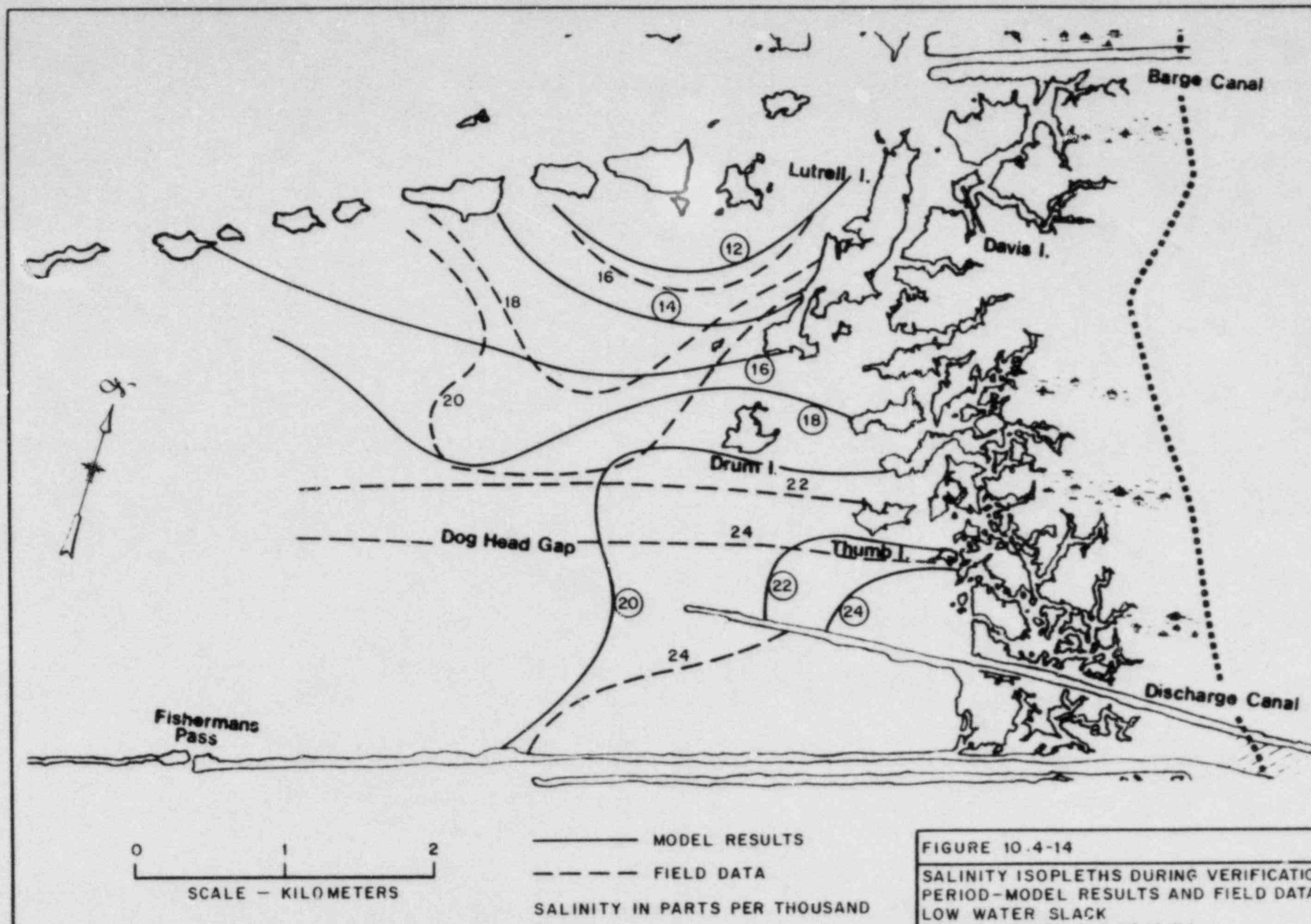

FIGURE 10.4-14

SALINITY ISOPLETHS DURING VERIFICATION PERIOD-MODEL RESULTS AND FIELD DATA-LOW WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

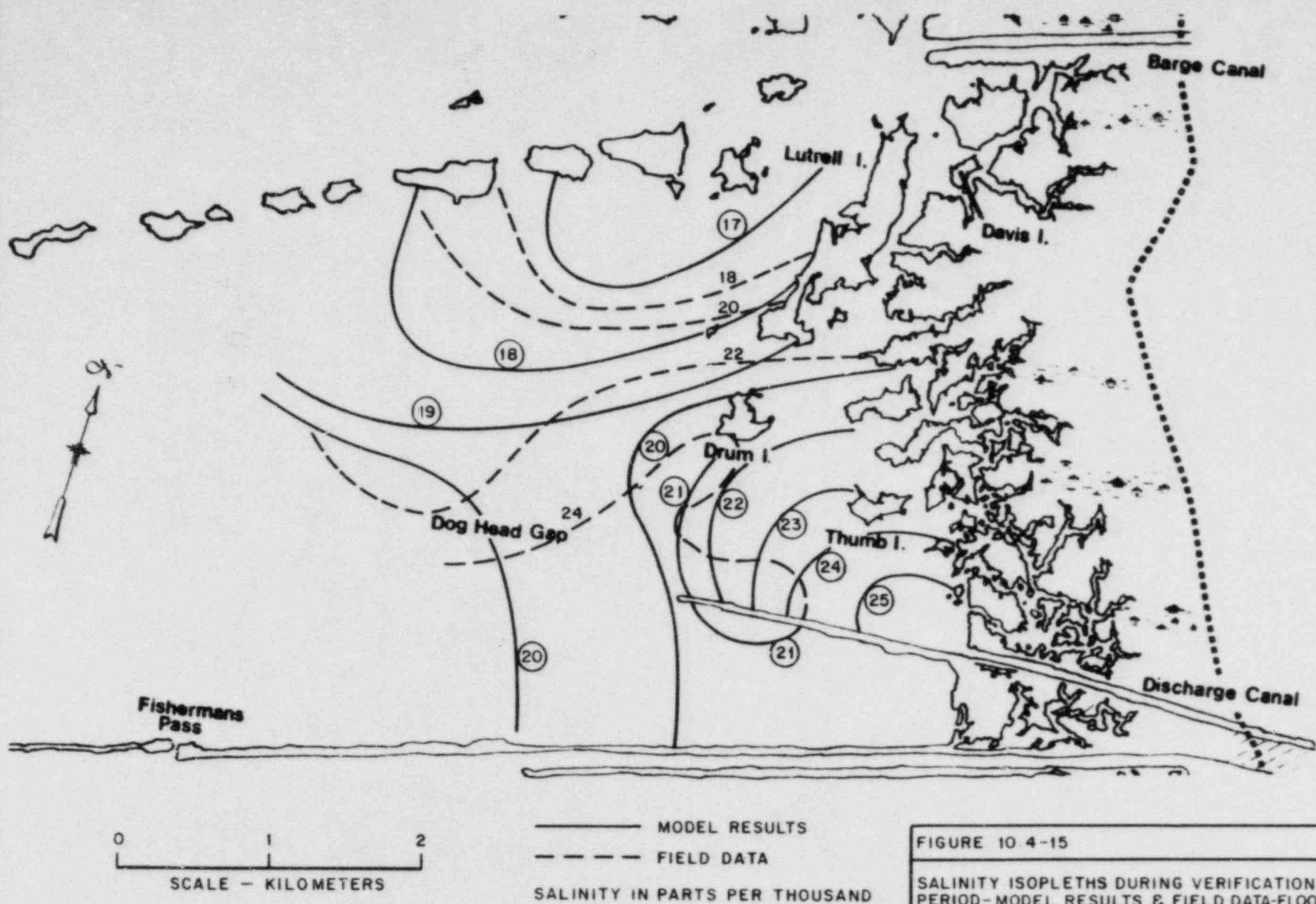

FIGURE 10.4-15

SALINITY ISOPLETHS DURING VERIFICATION PERIOD-MODEL RESULTS & FIELD DATA-FLOOD
CRYSTAL RIVER 316 STUDIES
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10.5 THERMAL ANALYSIS

The far-field thermal analysis employed model coefficients which were determined in the calibration and verification study. The plant operating conditions simulated in the analysis correspond to normal, full load operation, which is defined as a discharge flow rate of 1,318,000 gpm (83 cms) with a ΔT of 16.7°F (9.3°C). The hydrodynamic conditions simulated are identical to the conditions that occurred during the verification period (i.e., a semi-diurnal tidal cycle). Both summer and winter seasons are simulated.

The hydrodynamic results from CAFE-1 are presented in Figures 10.5-1 and 10.5-2. These figures show velocity predictions for the flood and ebb phases of the tidal cycle. Tidal currents are seen to be predominantly normal to the shoreline. The impedance produced by oyster bars was simulated by the procedure described in Section 10.3 at the locations indicated in Figure 10.3-1. A simplified local reduction of depth was used near shore south of the intake jetty. The simplified procedure is evident by a region of higher velocity. The simplified procedure is justified in areas lacking thermal plume activity.

The flow through Fisherman's Pass was included in the hydrodynamic simulation, because concerns have been expressed over the potential for thermal exhange there. Since Fisherman's Pass is a subscale phenomenon, i.e., smaller than the element size, it has been treated in the same way as the oyster bars.

The dispersion results of the thermal analysis are presented on Figures 10.5-3 to 10.5-10, which show Δ T isotherm plots in °C. Figures 10.5-3 to 10.5-6 show plots respectively for the high water slack, ebb, low water slack, and flood phases of tide for summer conditions. Figures 10.5-7 to 10.5-10 show similar plots for winter conditions. A dashed line is included on each plot showing the position of the 2°F isotherm for regulatory purposes.

The figures indicate that the far-field portion of the plume is larger during the winter than during the summer. This is because the heat transfer coefficient is larger in the summer than during the winter, which is accounted for primarily by evaporation differences. The expected range for summer conditions is from 150 to 200 Btu/ft^2 day°F. A conservative value was chosen, 150 Btu/ft^2 day°F (730 Kcal/m^{2}day°C), for summer to represent the worst case condition for the benthic community. Winter values range from 80 to 120 Btu/ft^{2}day°F. A typical value of 97 Btu/ft^{2}day°F (470 Kcal/m^{2}day°C) was used for the winter season. The near-field portion of the plume does not exhibit a seasonal change, because interfacial heat transfer is not a significant component in that region.

The results also indicate that the heated water is pushed nearer to shore and up to the north during the flood and high water slack phases. Near-field behavior is essentially absent during these tide phases. During ebb, the plume moves more offshore reaching the maximum offshore extent at low water slack. The furthest offshore extent of the plume is at low water slack during winter conditions, shown in Figure 10.5-9. The areal extent of the near-field portion of the plume is also greatest at low water slack. This feature is primarily attributable to the tide level being at its lowest and minimizing the opportunity for lateral mixing.

Individual isotherms can be compared throughout a tidal cycle or from season to season. For example, the $1^{\circ}C$ isotherm has a range of tidal displacement of no more than about 2 kilometers. It is never within the influence of the near-field. During the summer, it occupies Basin 3 during flood tide and high water slack but lies beyond the offshore boundary of the basin during ebb tide and low water slack. The maximum offshore position of the $1^{\circ}C$ isotherm does not extend as far as Fisherman's Pass. During the winter, the relationship between tide phase and position relative to Basin 3 remains the same, but for each tide phase, the isotherm is slightly farther offshore. It still does not reach Fisherman's Pass. Overall, the study results indicate that there is essentially no recirculation of the plume through Fisherman's Pass. All ΔT values south of the intake jetty are on the order of hundredths of a degree Centigrade.

The isotherms shown at the end of the dredged discharge channel in Figures 10.5-4, 5, 8, and 9 simulate combined results of near-field and far-field modeling for ebb tide and low water slack conditions. In both summer and winter, the $8^{\circ}C$ isotherm projects a small distance beyond the discharge spoil. This is consistent with confinement of the thermal discharge to the channel with no opposing tidal current to interfere with the seaward flow. Under these conditions, the near-field plume extends into Basin 3. The distance from the spoil and the areal extent of the 4-$7^{\circ}C$ isotherms are greater at low water slack than at ebb tide. Summer-winter differences are not seen in this area for the 5-$8^{\circ}C$ isotherms.

During flood tide and high water slack, the thermal discharge progressively flows beyond the channel boundaries as the water elevation increases and simultaneously encounters the opposing tidal currents. Under these conditions, the $3^{\circ}C$ isotherm is located near the end of the spoil, and higher isotherms are displaced toward the shore. The hydrodynamic behavior within and next to the channel is complex at this time and not easily simulated. Only far-field model results are displayed, recognizing that some minor imprecision exists in locating the isotherms where they intercept the channel.

All of the above discussion centers on the temperature rise above ambient. Ambient temperature conditions are recognized to be the local temperatures which would have occurred in the absence of station heat. Ambient temperature patterns are rather complex in character. Not only do the ambient temperatures vary throughout the study area, but they vary with time over the tidal cycle and from day to day.

If isotherm maps of total temperature are desired, one can generate them by the following procedure. First, isotherm maps of total temperature, perhaps one for each phase of the tide cycle, are prepared from the thermograph data. If the field data collected near shore is sparse, an estimate will have to suffice in this region. A corresponding set of model results of temperature rise for the same tide conditions and plant operating conditions are superimposed on the total temperature maps. Temperature rise is subtracted from total temperature leaving a suitable ambient temperature map upon which model results for other plant operating conditions can be applied.

The properties of the models and the behavior of field measurements must be recognized in order to properly interpret isotherm locations. First, isotherm locations cannot be considered exact. Remote from the point of discharge, temperature gradients are very small. A small change in any field variable can cause a large displacement in the measured position of any temperature in the field. Similarly, a small change in any model-generated or user-supplied variable can cause a large change in predicted isotherm location. High-value isotherms, those close to the point of discharge, are much more stable with respect to changes in other parameters. Here the temperature gradients are higher and the point of discharge tends to tie down the ends of the isotherm.

A similar property that applies to currents is common to both models and field measurements. Current speeds and directions are very sensitive to small changes in tide height. A small variation in the meteorological characteristics can manifest a significant change in current behavior in the field. Similarly, a small change in the boundary tide variable can result in a significant change in predicted currents. The boundary conditions applied to CAFE-1 at Crystal River were to assign field-measured fluxes to the north and south boundaries and tide heights limited to the western boundary of the model. This option may be credited in part to having achieved a favorable comparison between model and prototype.

Finally, it is important to appreciate what is represented by the isotherms that are predicted or that are derived from field measurements. Were it possible to achieve, two field surveys conducted under the ideal circumstances of having every significant parameter unchanged would still yield some differences in the results. Random eddies, not necessarily small in scale, distort isotherms, and while describing the same approximate shape, repeated isotherm measurements exhibit some anomalies not truly representative of the average condition. Field surveys yield the isotherms that occurred for a given short period of time.

In contrast, models must also acknowledge and account for eddies, but they are smaller than the grid element size and cannot be treated as part of the mechanism of advective (i.e., current produced) transport. Eddy transport is successfully moved into the dispersive (i.e., mixing) transport term, and as a result tends to time average the predicted result. Consequently, models yield isotherms that are absent of anomalies and representative of the average condition for repeated occurrences at that instant in time.

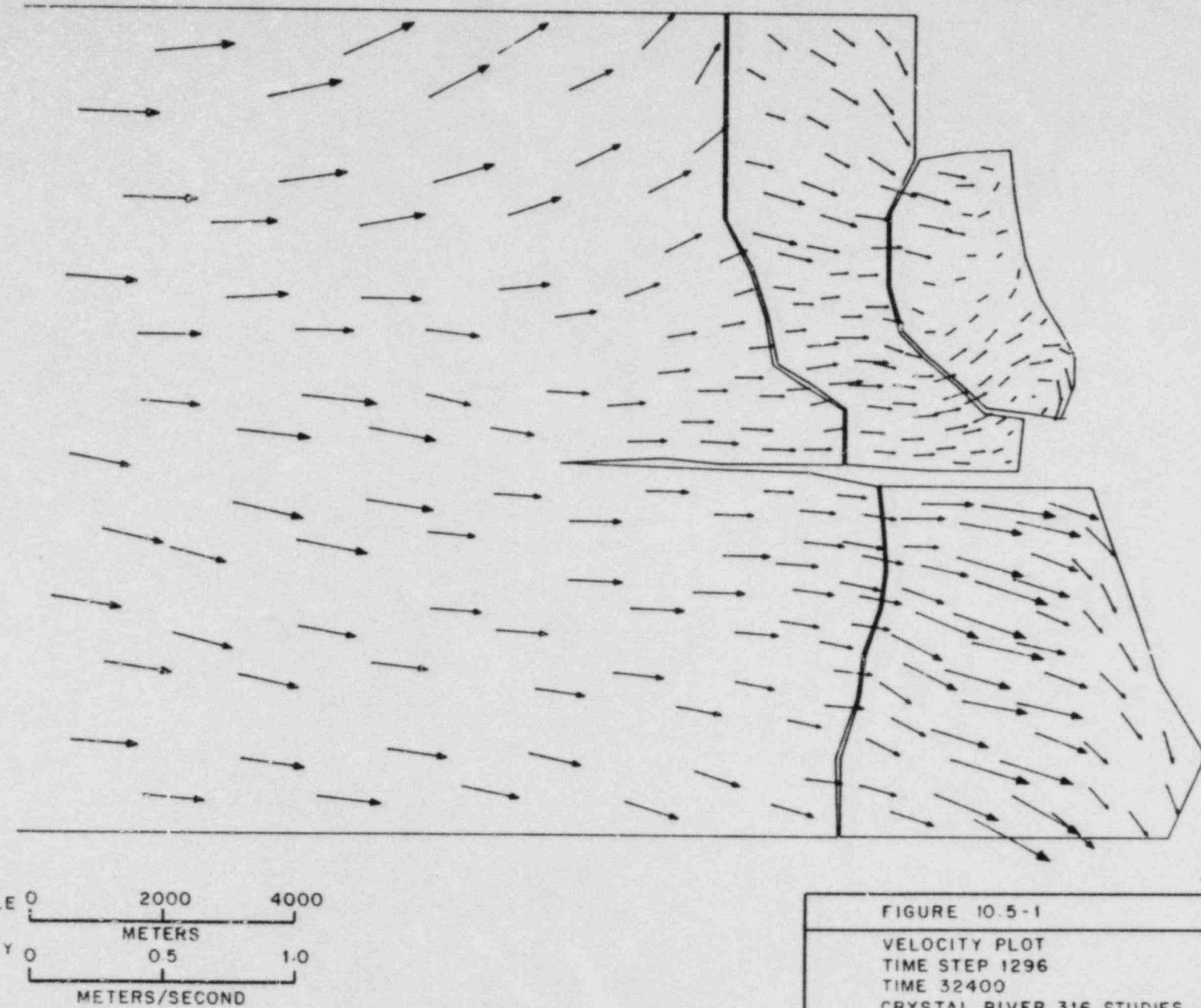

FIGURE 10.5-1

VELOCITY PLOT
TIME STEP 1296
TIME 32400
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

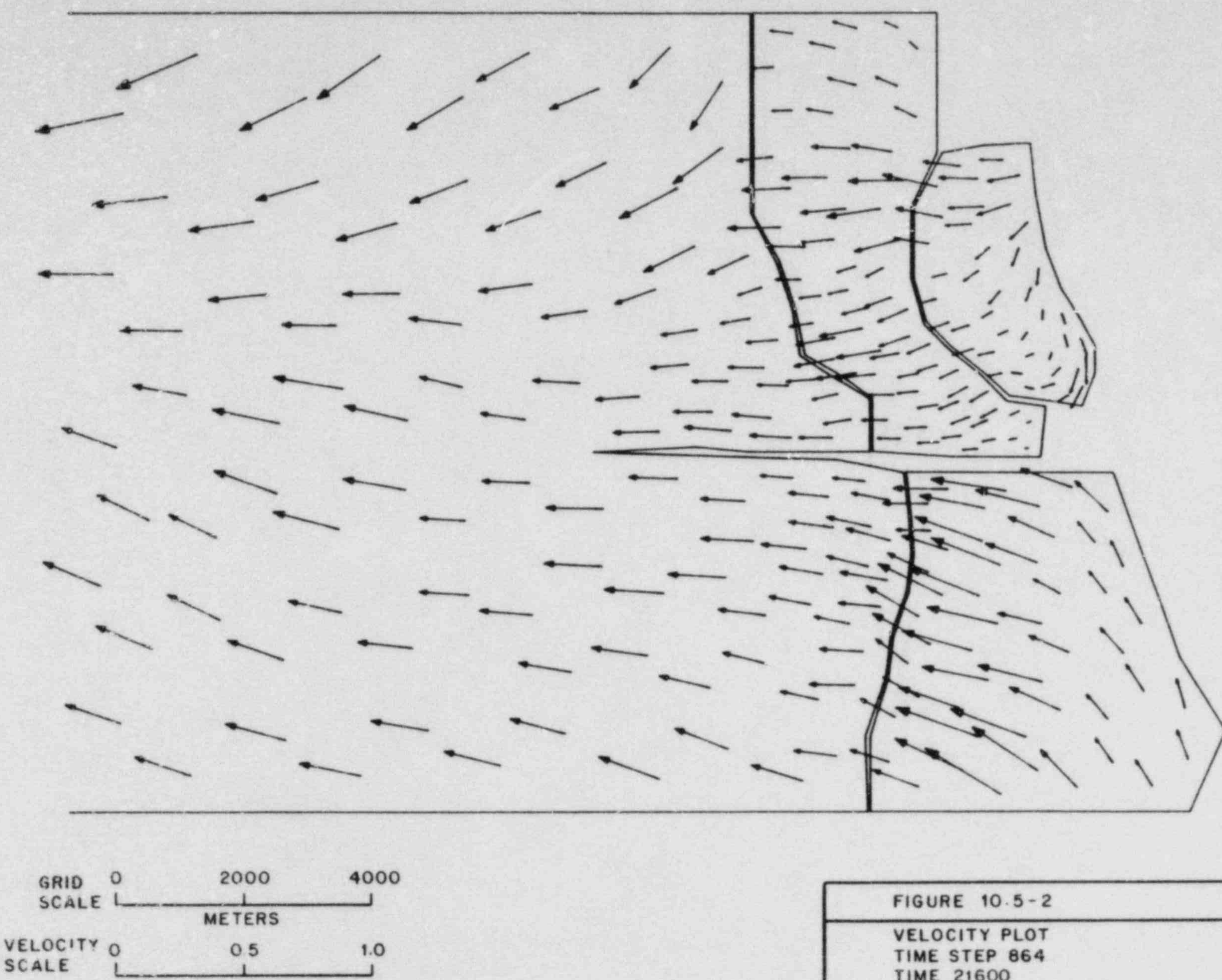

FIGURE 10.5-2

VELOCITY PLOT
TIME STEP 864
TIME 21600
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

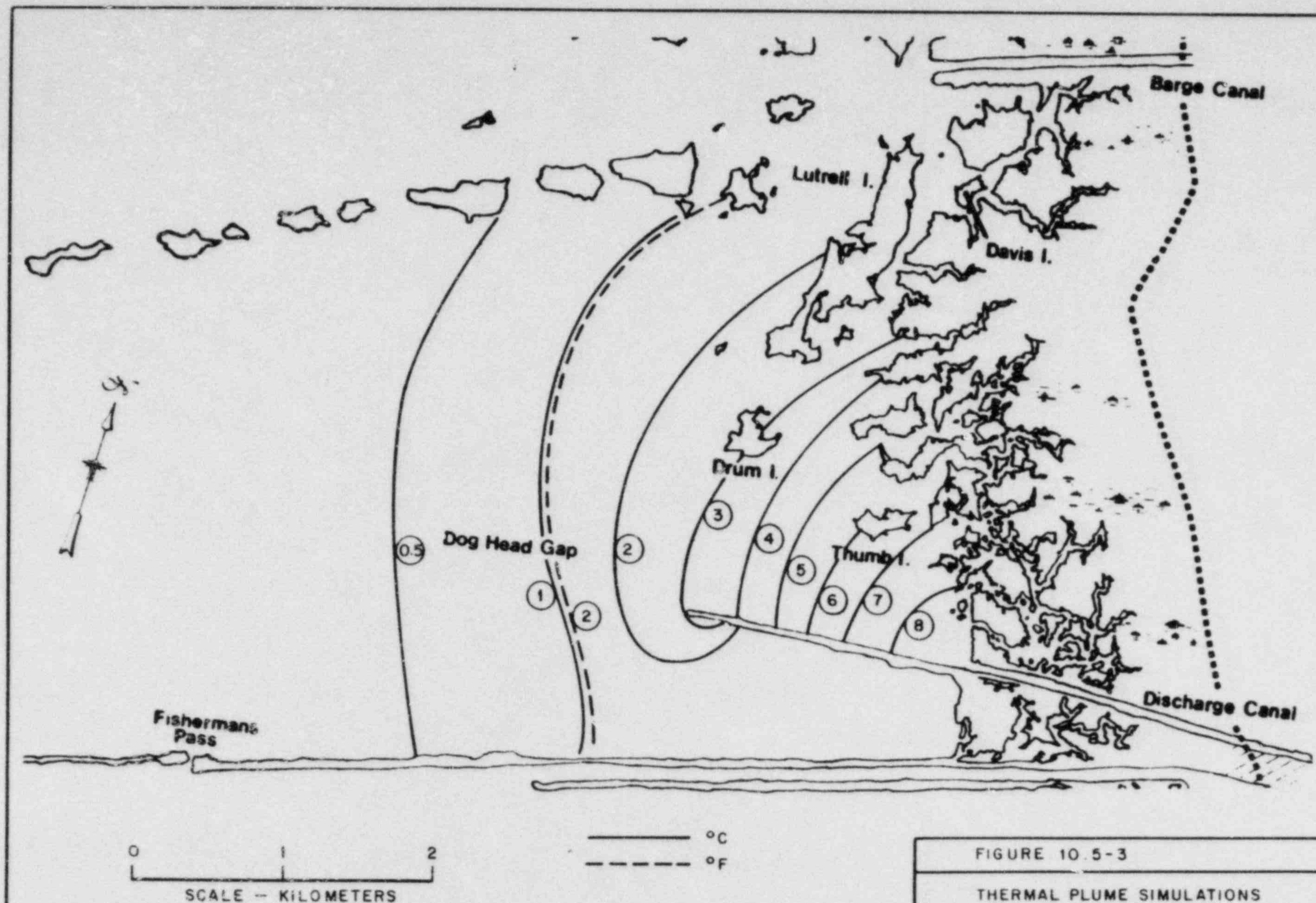

FIGURE 10.5-3

THERMAL PLUME SIMULATIONS
ΔT-SUMMER HIGH WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

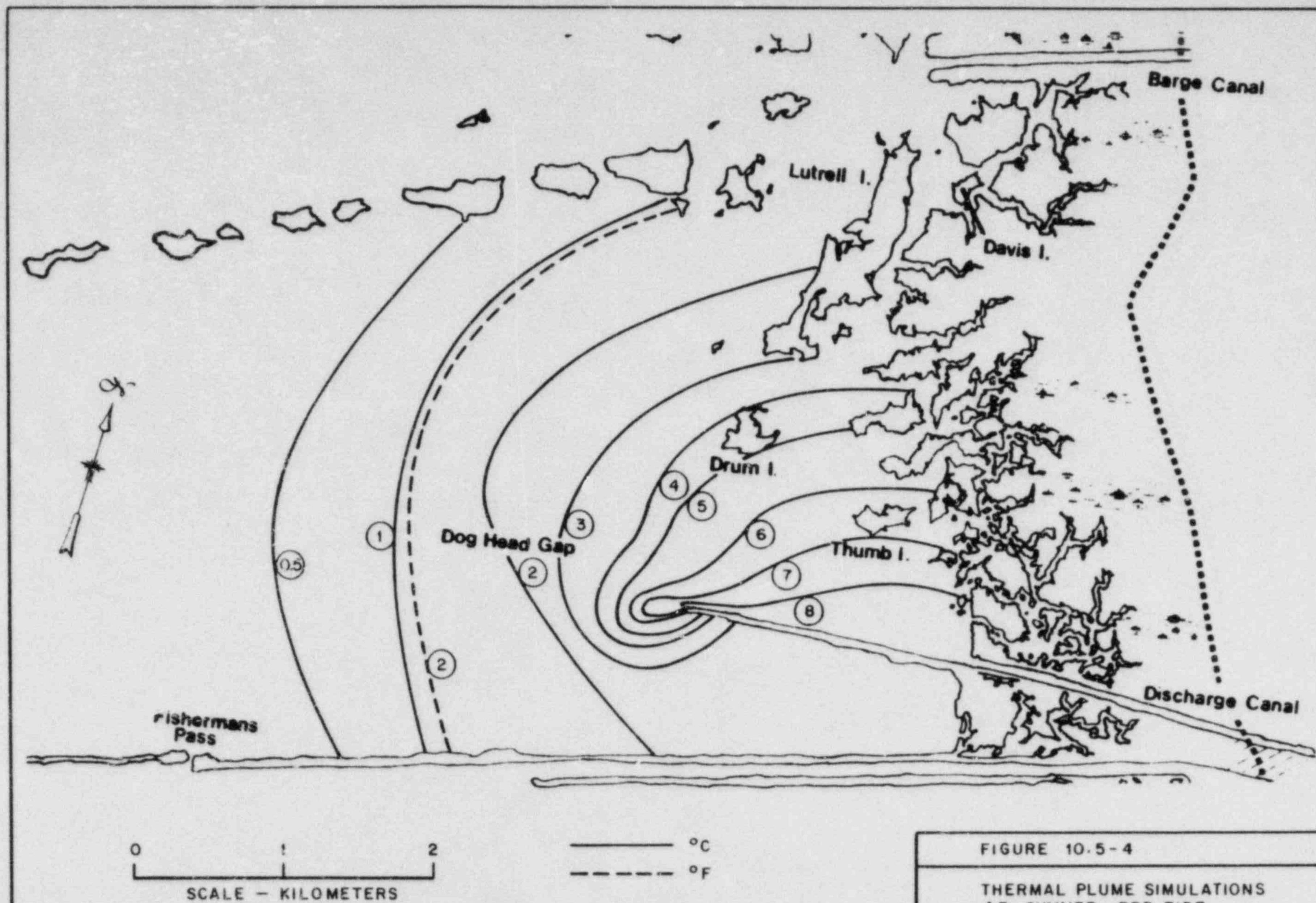

FIGURE 10.5-4

THERMAL PLUME SIMULATIONS
ΔT - SUMMER - EBB TIDE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

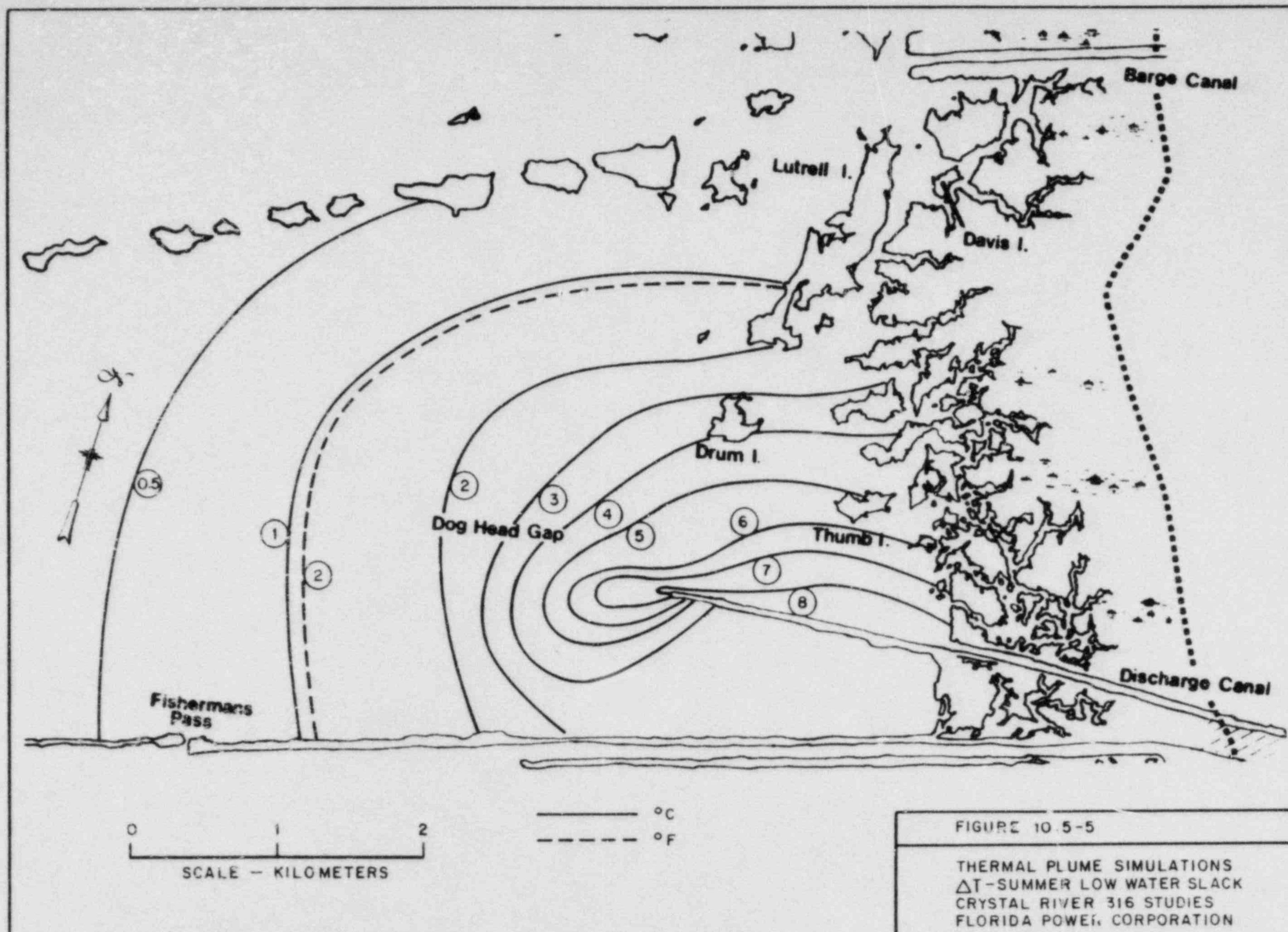

FIGURE 10.5-5

THERMAL PLUME SIMULATIONS
ΔT-SUMMER LOW WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

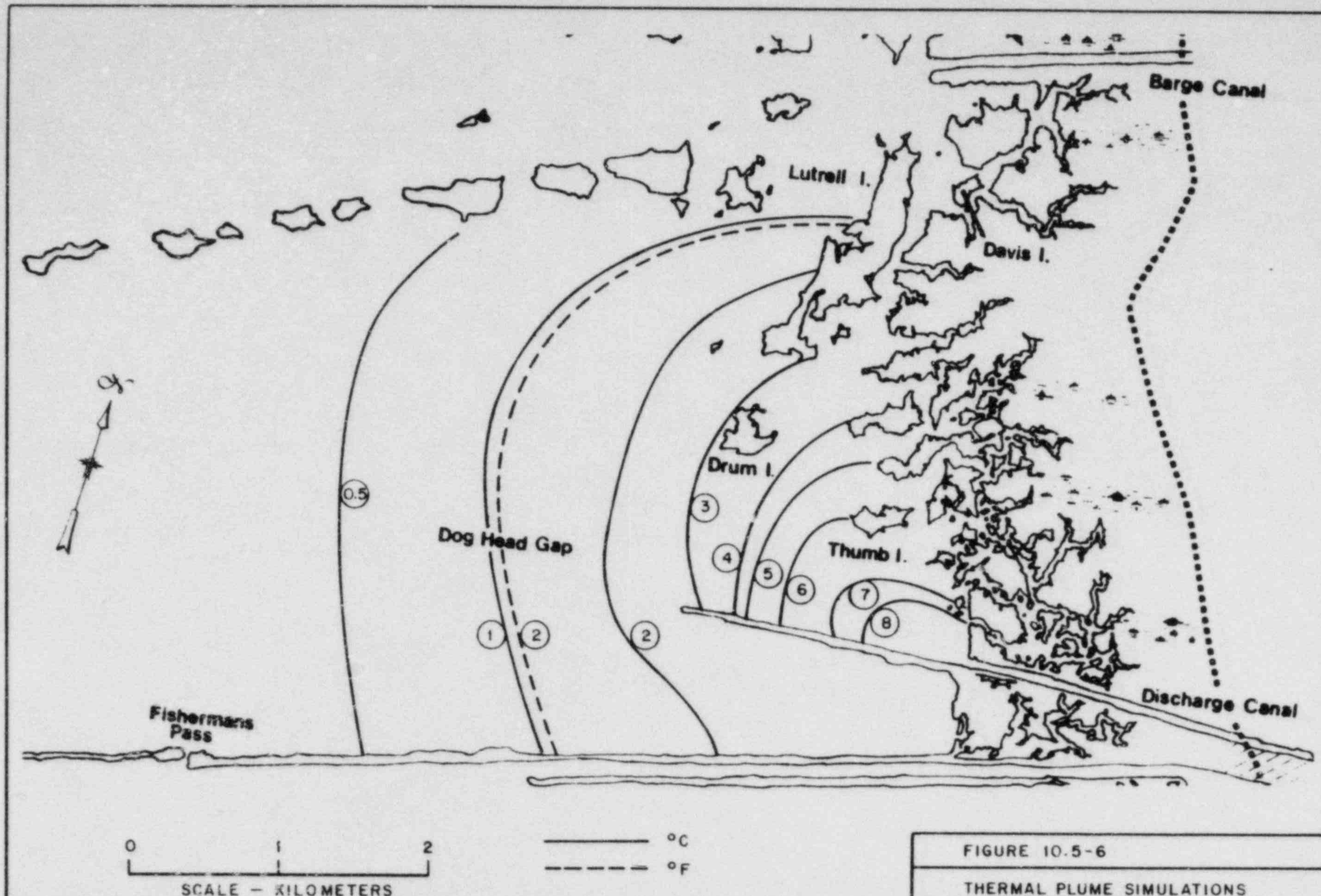

FIGURE 10.5-6

THERMAL PLUME SIMULATIONS
ΔT-SUMMER-FLOOD TIDE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

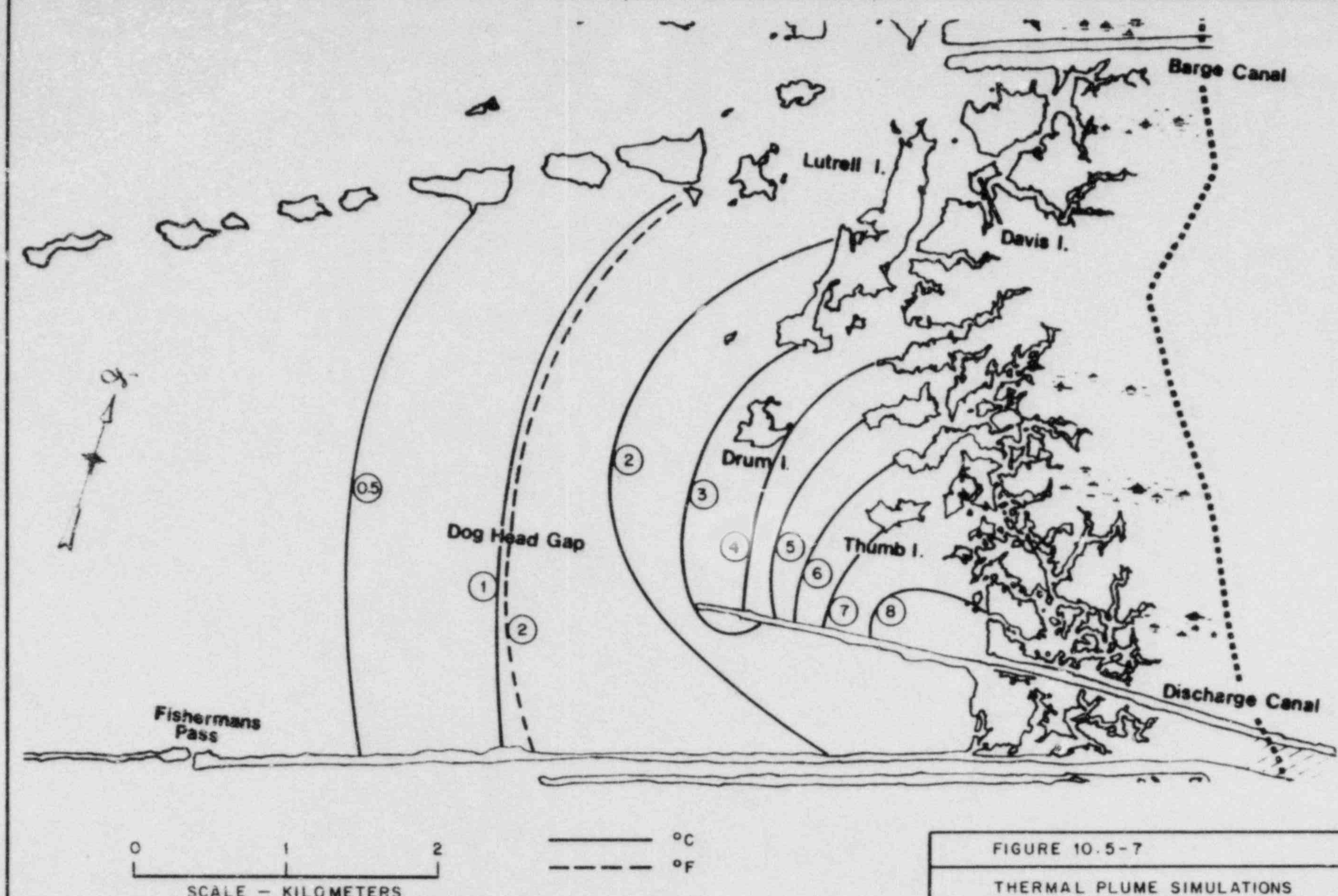

FIGURE 10.5-7

THERMAL PLUME SIMULATIONS
ΔT-WINTER-HIGH WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

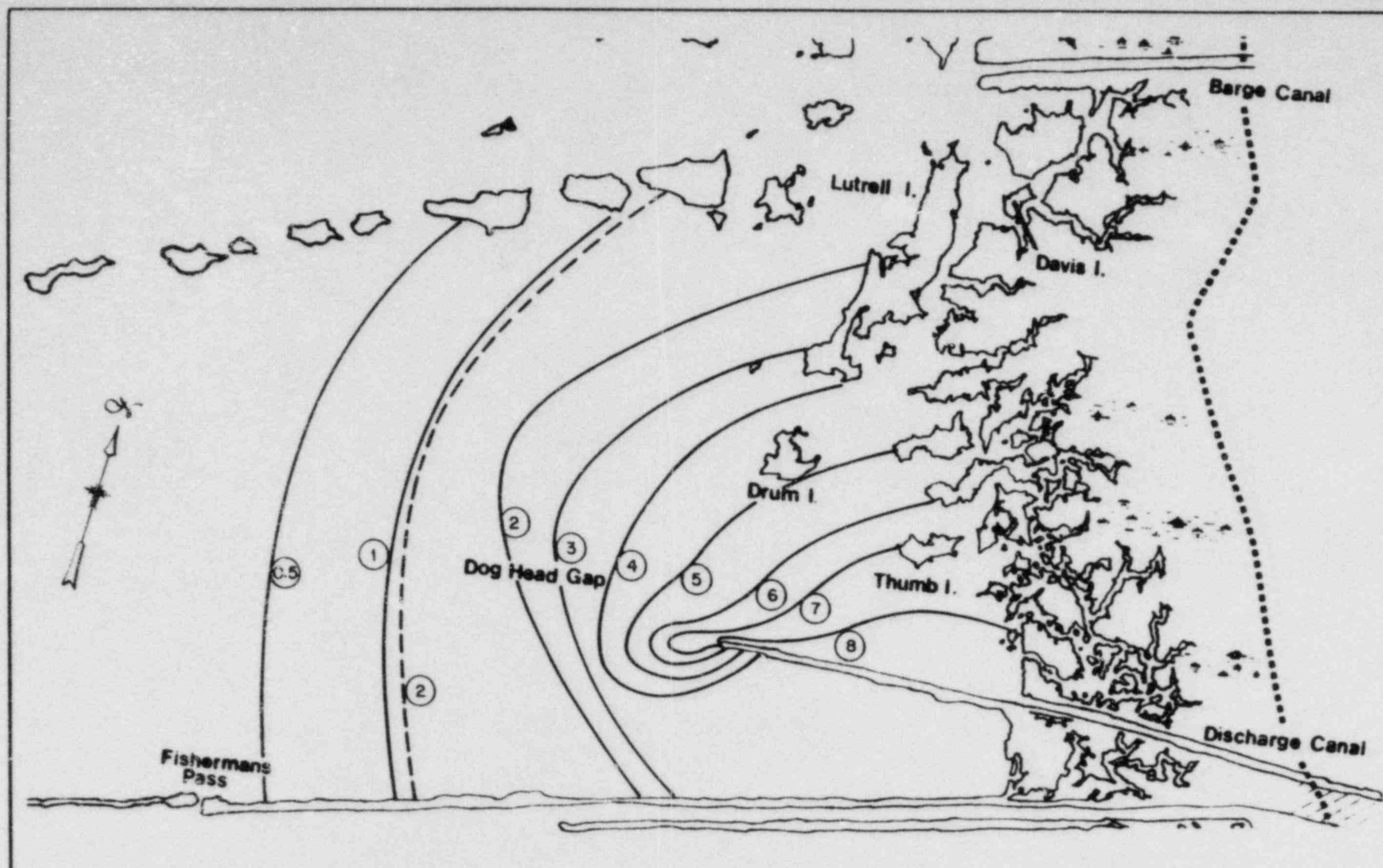

FIGURE 10.5-8

THERMAL PLUME SIMULATIONS
ΔT-WINTER-EBB TIDE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

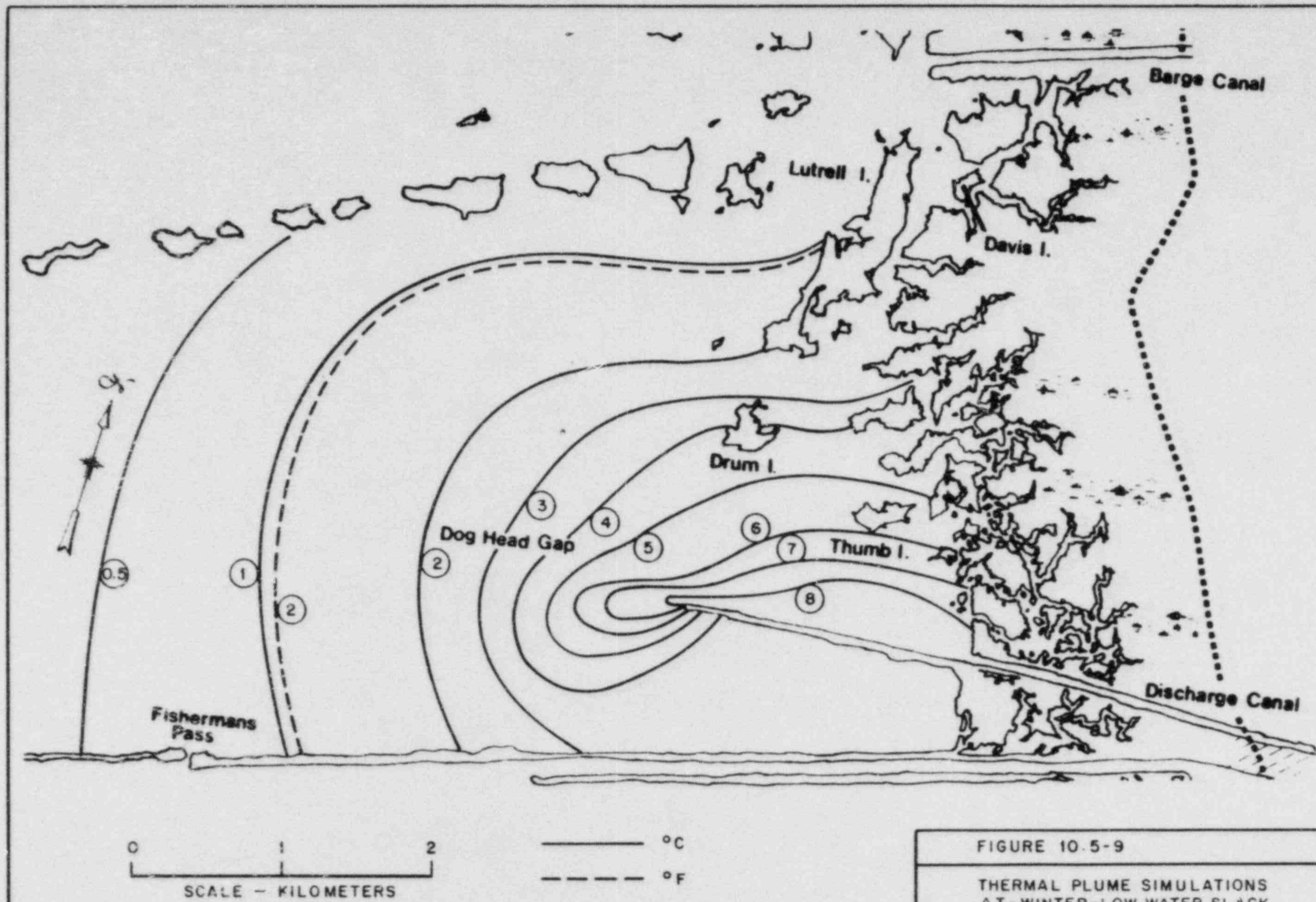

FIGURE 10.5-9

THERMAL PLUME SIMULATIONS
ΔT-WINTER-LOW WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

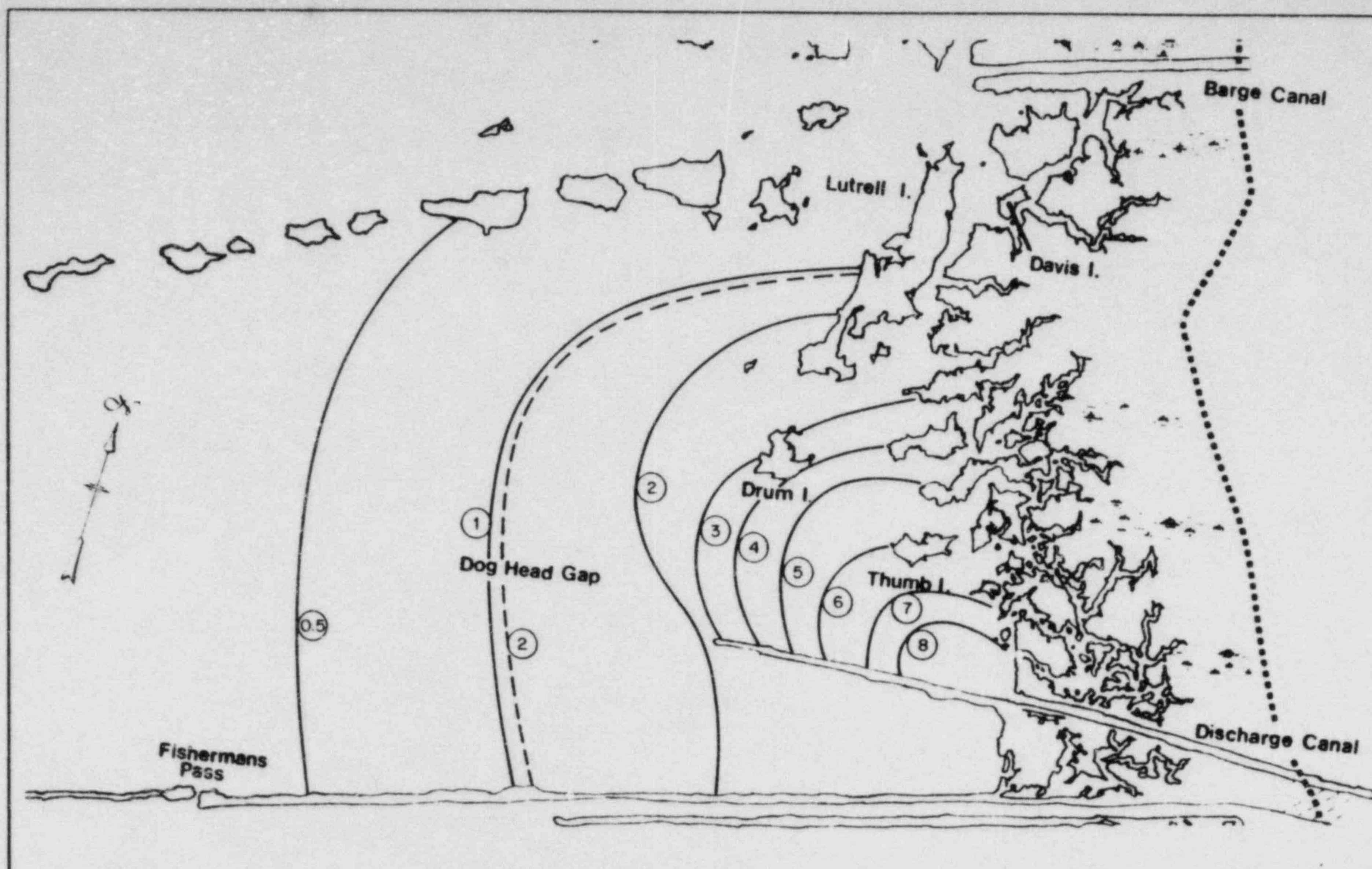

FIGURE 10.5-10

THERMAL PLUME SIMULATIONS
ΔT-WINTER-FLOOD TIDE
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

10.6 MEROPLANKTON ENTRAINMENT AND SOURCE WATER BODY ANALYSIS

The hydrodynamic and dispersion models used to simulate the thermal discharge into Crystal Bay can also be applied to the evaluation of meroplankton distribution and the effects on that distribution of entrainment. The meroplankton entrainment analysis was performed using CAFE-1 and DISPER-1. These models are described in Section 10.3. The purpose of this analysis was to determine the effects of power plant operation on meroplankton concentrations in the study area and secondarily to evaluate the source of entrained organisms.

For the hydrodynamic CAFE-1 simulation, the same representative tidal cycle used for the thermal anlaysis (Section 10.5) was used here. This simulation included the hydrodynamic effects of the intake and discharge.

For the DISPER-1 simulations, meroplankton concentration patterns measured in the field studies (Section 8.2) were used to develop ambient boundary and initial conditions. It was conservatively assumed that none of the meroplankton drawn into the intake will survive and that there will be a zero concentration of meroplankton in the discharge water. The effect of the power plant was introduced at the discharge as a loss of meroplankton.

Three cases with different ambient conditions were considered in this analysis: (1) ambient concentrations constant throughout the study area (2) a concentration ratio of five in the southwest region of the study area to one in the northeast region and (3) a concentration ratio of five in the northwest region of the study area to one in the southeast region. These cases are representative of plankton distributions identified in Crystal Bay for various species. The results of these simulations are presented in Figures 10.6-1 to 10.6-6. Figures 10.6-1 and 10.6-2 show, respectively, the high water slack and low water slack results for Case 1. Similarly, Figures 10.6-3 and 10.6-4 show the results for Case 2 and Figures 10.6-5 and 10.6-6 show the results for Case 3. These figures indicate that generally the greatest effect of the power plant is experienced by meroplankton with an ambient concentration represented by Case 1, i.e., the concentrations established as ambient prior to inclusion of plant withdrawals are reduced by the greatest percentage. Plankton distributed as in Case 1 are thus least able to overcome reductions in the discharge area. The next greatest effect is on Case 2 meroplankton with Case 3 meroplankton experiencing the smallest effect. The ecological significance of these results is discussed in Section 8.3.

Figures 10.5-1 and 10.5-2 show the current velocities throughout the study area for the flood and ebb phases of the tidal cycle. These figures indicate that the effects of power plant water withdrawal on flow patterns in the study area are minimal. The source of the water that is drawn into the intake is determined mainly by the large scale driving mechanisms of tide and wind. The current patterns shown in Figures 10.5-1 and 10.5-2 indicate the source of water passing by the intake during flood and ebb.

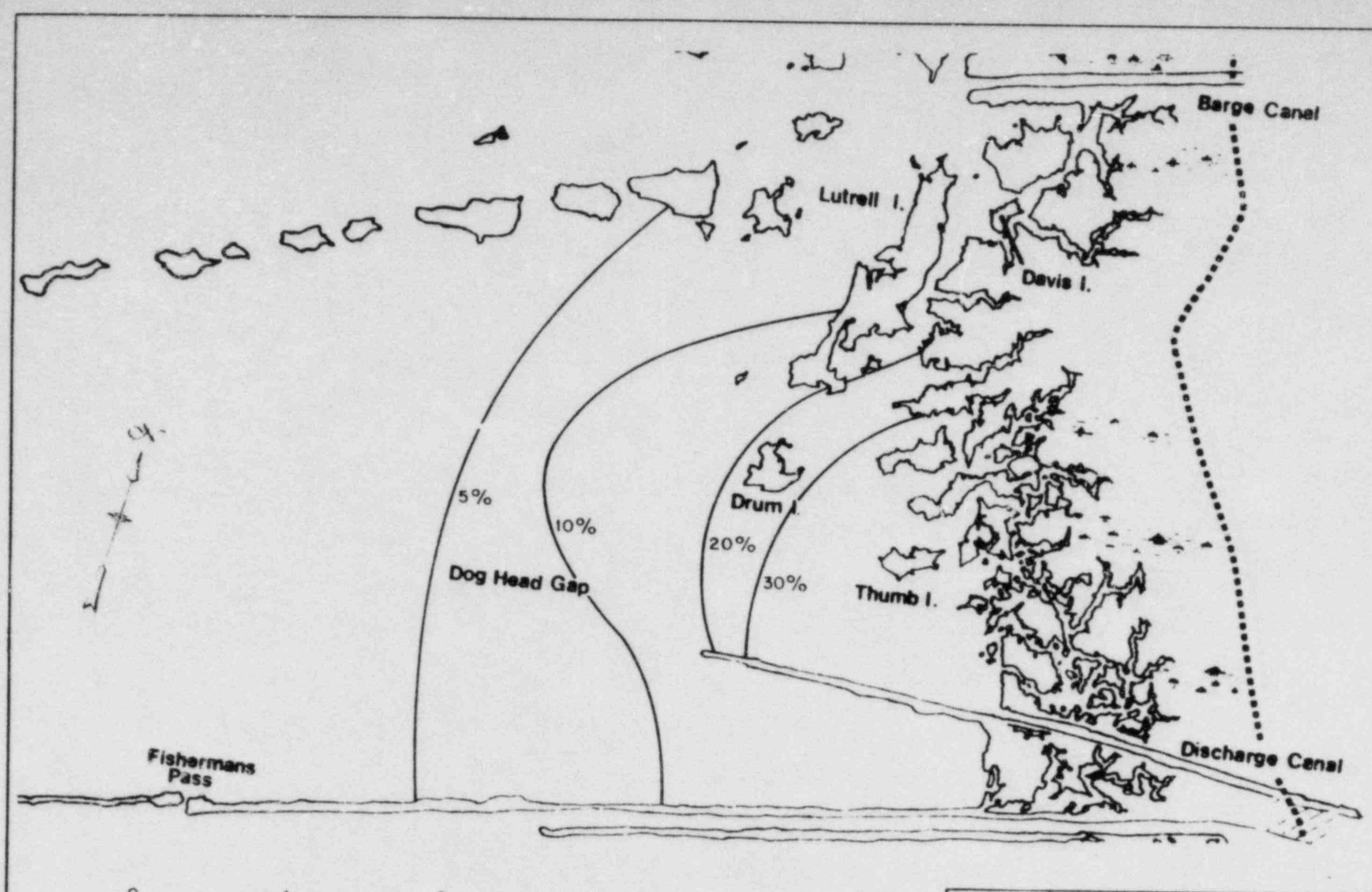

FIGURE 10.6-1

PERCENT REDUCTION IN MEROPLANKTON CONCENTRATION
CASE 1-HIGH WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

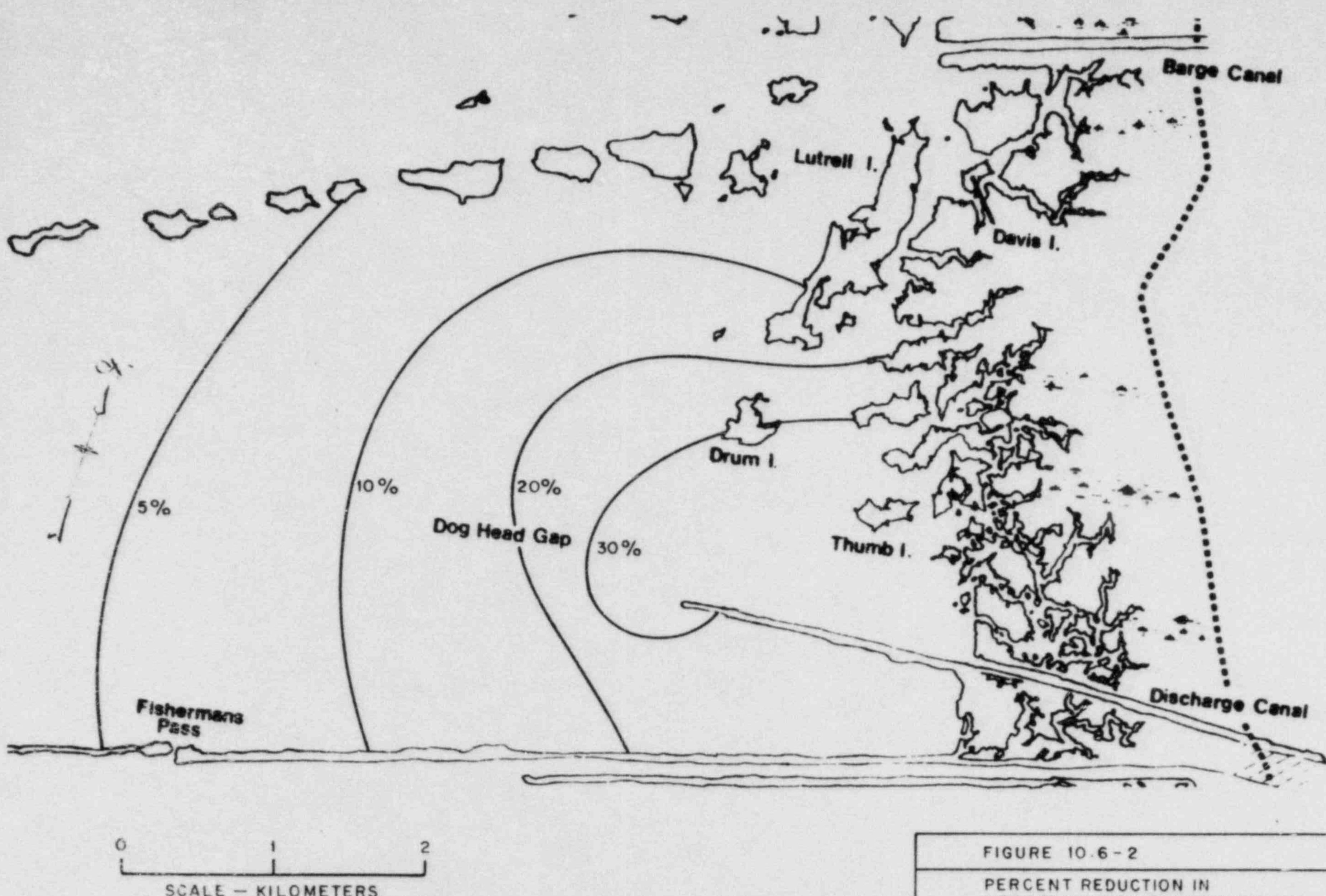

FIGURE 10.6-2

PERCENT REDUCTION IN
MEROPLANKTON CONCENTRATION
CASE 1 - LOW WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

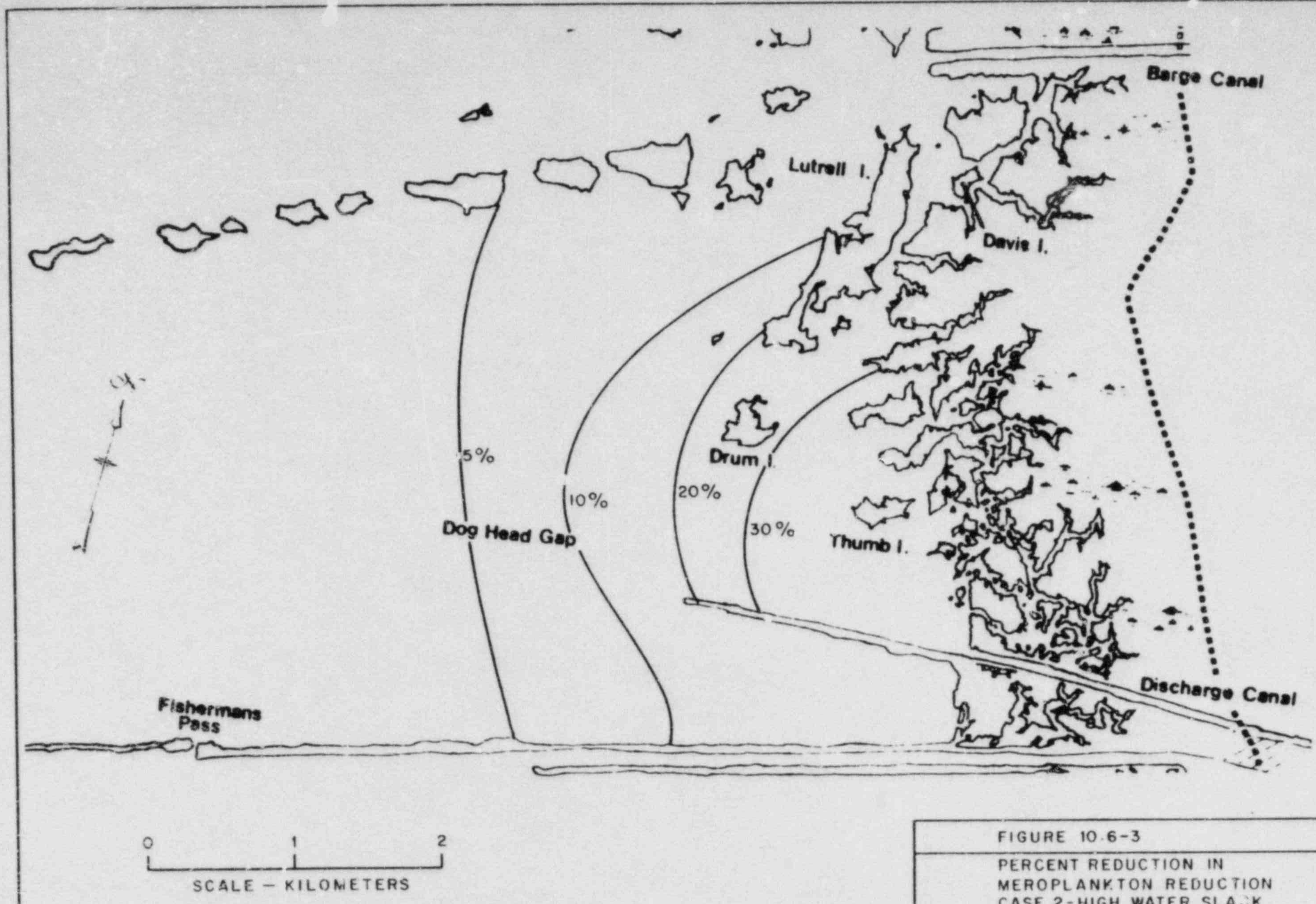

FIGURE 10.6-3

PERCENT REDUCTION IN MEROPLANKTON REDUCTION
CASE 2-HIGH WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

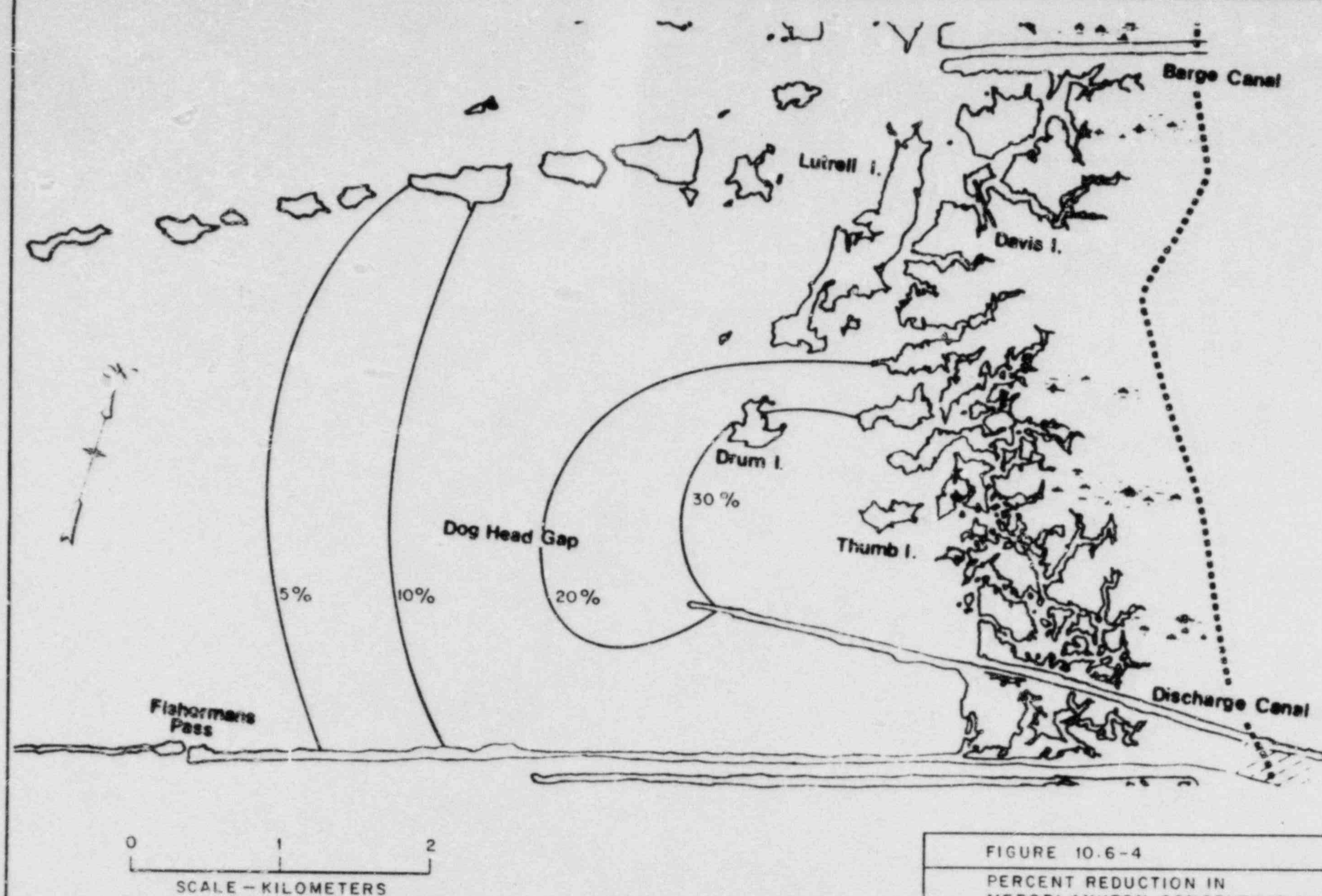

FIGURE 10.6-4

PERCENT REDUCTION IN
MEROPLANKTON CONCENTRATION
CASE 2-LOW WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

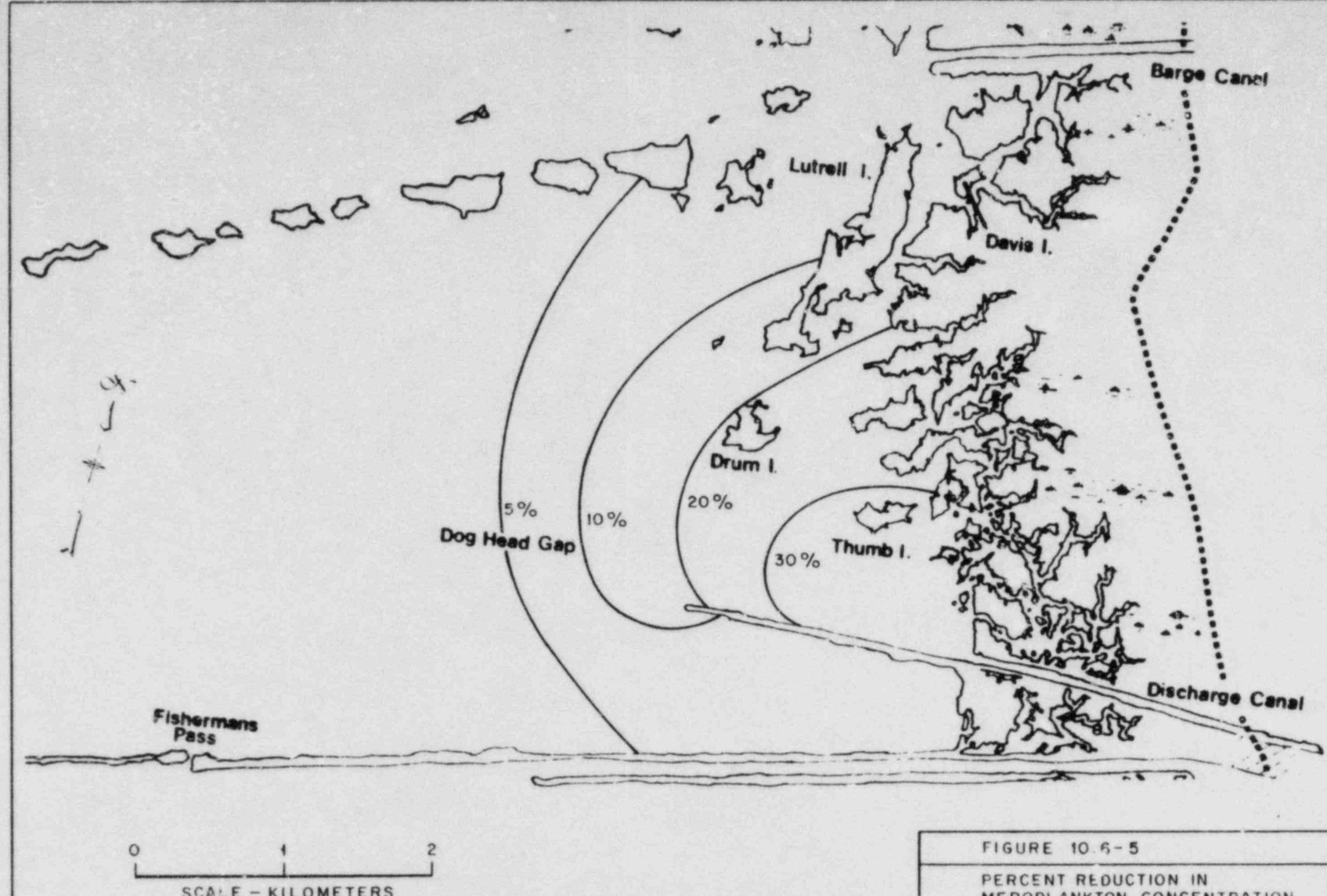

FIGURE 10.6-5

PERCENT REDUCTION IN MEROPLANKTON CONCENTRATION
CASE 3 - HIGH WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

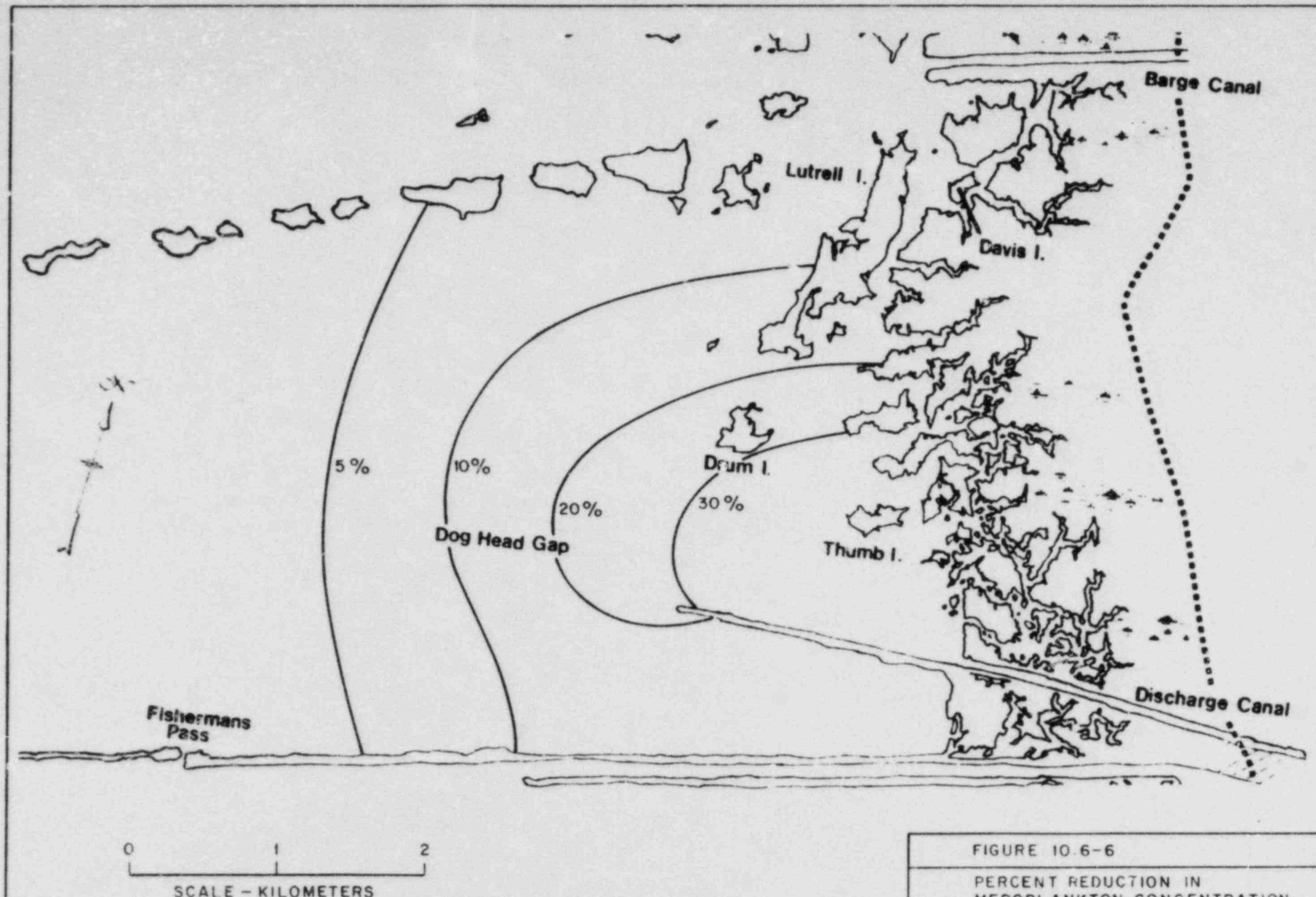

FIGURE 10.6-6

PERCENT REDUCTION IN MEROPLANKTON CONCENTRATION
CASE 3 - LOW WATER SLACK
CRYSTAL RIVER 316 STUDIES
FLORIDA POWER CORPORATION

11.0 SUMMARY

In response to conditions of discharge permit No. FL0000159 for Crystal River Units 1, 2, and 3, a study was designed to collect biological, physical, and chemical oceanographic data which would permit documentation of the effects of power plant operation on the local ecosystem. The study area encompassed about 10 square miles (see Figure 2.1-1). Study components identified in the report and summarized below were benthos, entrainment, impingement, fisheries, and physical studies. The data also served as input to hydrodynamic and hydrothermal mathematical models which would have the capability to simulate the station's thermal discharge under various operating conditions.

The effects of the discharge of heated water were investigated primarily in terms of benthic species of animals and plants which, depending on their location, would be chronically exposed to varying levels of elevated temperatures. In addition to monitoring water quality parameters including temperature, salinity, D.O., pH, turbidity, suspended solids, chlorophyll, and light penetration, biological data were collected on benthic infauna, macrophytes, salt marsh, and oyster reefs.

Thermal effects varied with the organisms involved but were identified within each component. In general, the effects were limited to an area within about 3.5 km of the point of discharge. The effects are summarized in Table 11.0-1. The results consistently indicated adverse effects due to the thermal discharge in Basin 1, Basin 3, and the southern section of Basin 2 (see Figure 2.1-1). Central areas of Basin 2 and the offshore edge of Basin 3 were found to be transitional with organisms showing limited, if any, adverse thermal effects.

Interpretation of results was complicated by other sources of stress, primarily low salinity and sedimentation, within Crystal Bay. Effects due to these sources were most evident in shallow northern areas near the Cross Florida Barge Canal and the Withlacoochee River. Particularly with benthic infauna, the effects of salinity and sedimentation are very similar to thermal effects, and thus there are numerous faunal similarities between the northern area and the area affected by the thermal discharge.

The thermal plume simulation results agreed well with results from the biological and water quality sampling. Basin 1, nearest the point of discharge consistently is exposed to water at the highest ΔT's, about 5-8°C. On ebb or low slack tides, however, the largest volume of the discharge is confined to the dredged channel adjacent to the discharge spoil and exits into Basin 3. The plume at that point tends toward the southwest, but rapidly becomes well mixed in the relatively shallow water. On flood or high tides, the plume effect in Basin 3 is lacking as the discharge spreads over Basin 1 and extends further north in southern Basin 2. Little variation is seen in the summer or winter cases. Simulations represent worst case, full load operation.

Meroplankton densities and distribution in space and time were sampled by towed nets. Densities of SIO taken at stations representing entrained populations were used to project annual entrainment (see Table 11.0-2), and the results were compared to available catch or landings data by estimating the number of adults equivalent to the entrained life stages. For the majority of the species, the level of entrainment estimated represented a small percentage (up to 1.3) of the commercial landings or recreational catch. For other species like bay anchovy and polka-dot batfish, lack of life cycle or catch data precluded this comparison. In the case of spot and pigfish, the station entrains about the same number of fish reported in annual fisheries statistics.

Impingement at Units 1, 2, and 3 was monitored for 12 months and was evaluated in terms of SIO. Annual impingement numbers were projected and the results compared to commerical landings or recreational catch data, if available. For all species, the numbers impinged were either small and represented a nominal percentage (0.003-1.8) of the fishery or were larger and represented a more abundant species more likely to tolerate impingement losses.

Fisheries data were collected using trawls, seines, creek trawls, and drop nets. Results were evaluated in terms of any apparent effects of thermal discharge on the species collected. Data on age, sex, reproductive condition, parasitism, fecundity, and length/weight were collected; the data were limited but did not indicate a pattern of adverse effects for any SIO. Distributional data yeilded varying results for the individual species; generally species seemed to be more abundant outside the warmest portion of the discharge but did occur regularly in outer portions of the thermal plume.

Crab tagging conducted in Crystal Bay was highly successful with well over 50 percent recaptures. The data on initial capture and recapture were analyzed to evaluate the effect of the intake spoil on blue crab movements. In general, movement to the north predominated and primarily females were involved. Short distance movement, within Crystal Bay, did appear to be delayed by the spoil for up to several days, but local recapture data may be affected to some extent by the concentration of crab traps just south of the spoil. Longer distance migration, beyond Crystal Bay, was not delayed by the spoil.

TABLE 11.0-1

SUMMARY OF IMPACTS OF STATION OPERATION
BENTHOS

Study Component	Impact Assessment
Benthic infauna	Adverse thermal effects limited to area bounded by Stations 13, 17, and 18, community alterations (considered minimal) have occurred in larger area bounded by Stations 4, 5, 22, and 30.
Macrophytes	Thermal effects in the form of reduced percent cover and species richness of seagrasses and macroalgae occurred in Basins 1 and 3.
Salt Marsh	Thermal effects on *Spartina* and *Juncus* at Thermal, nearest the discharge; decreasing effects on *Spartina* at Fence, Thumb Island, and Midway and on *Juncus* at Thumb Island and Midway.
Oyster Reef	Higher oyster mortality and reduced abundance of associated fauna at Stations OR4 and OR5 in Basin 1 and to lesser extent at OR6; growth enhancement and higher condition index around Basin 3.
Water Quality	Area of greatest thermal influence defined as Stations 13, 17, 18, 19, 29; second grouping includes Stations 4, 5, 14, 20, 21, 22, 28, and 30. Turbidity and TSS were affected by storms but not by barge traffic.

TABLE 11.0-2

SUMMARY OF IMPACTS OF STATION OPERATION ON SELECTED IMPORTANT ORGANISMS

SOURCE OF IMPACT

	Annual Entrainment (No. Equivalent Adults)	Annual Impingement Number	Thermal Discharge
Bay Anchovy	13283×10^6 (22.65×10^6)	87978	abundant in thermal area
Polka-Dot Batfish	0.19×10^6	74483	-
Pigfish	0.76×10^6 (71000)	3697	avoids discharge in warmest months
Pinfish	18.84×10^6 (84000)	15235	avoids highest Δ T's
Silver Perch	21.94×10^6 (6602)	12000	avoids highest Δ T's; utilizes outer plume areas
Spotted Seatrout	6.5×10^6 (900)	2804	utilizes outer plume areas
Spot	14.01×10^6 (690000)	28094	utilizes thermal area
Red Drum	0.3×10^6 (18)	8	-
Striped Mullet	-	1120	-
Brief Squid	0.91×10^6 (3600)	86954	-
Pink Shrimp	-	640887	avoids highest Δ T's; utilizes outer plume areas
Stone Crab	3353.6×10^6	1535	utilizes thermal area
Blue Crab	0.36×10^6 (2)	383560	avoids highest Δ T's; utilizes outer plume areas

APPENDICES

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APPENDIX I

PROGRAM PARTICIPANTS

The following individuals participated actively in the Crystal River 316 Studies and had responsiblity for the items indicated:

Contractor - Stone & Webster Engineering Corporation

Dr. Thomas Biffar	Program Manager - Sections 7 and 9
Dr. Thomas Horst	Manager of Analysis - Section 8
John Downing	Data Manager - data files, major analyses
David McDougall	Physical Studies - Section 10, near-field modeling
Donald Galya	Physical Studies - far-field modeling

Subcontractor - Mote Marine Laboratory

Dr. Kumar Mahadevan	Project Manager (Author Section 6.2)
David Bruzek	On-site Manager/Data Coordinator
Douglas Robison	previous On-site Manager
Suzanne Hofmann	On-site Sampling Supervisor
Cindy Vernale	On-site Laboratory Supervisor
James Culter	Team Leader Benthic Studies
Kellie Dixon	Team Leader Water Quality Studies (Author Section 6.1)
Dr. Ernest Estevez	Team Leader Wetlands Vegetation (Author Section 6.4)
R. Robin Lewis	Team Leader Macrophyte Studies
Geoffrey Patton	Team Leader Physical Studies
Duane Phillips	Team Leader Entrainment, Impingement, Fisheries
Dr. Stanley Rice	Team Leader Meteorology
Jay Gorzelany	Task Leader Crab Tagging (Co-Author Section 6.5)
Robert Mattson	Task Leader Macrophytes Studies (Author Section 6.3)
Jay Sprinkel	Task Leader Oyster Reef Studies (Co-Author Section 6.5)

APPENDIX II

WATER QUALITY DATA

Water temperature, mean surface (ST) and bottom (BT) temperatures (^{o}C) and standard deviations (σ) for each quarter and project as a whole.

	QUARTER I				QUARTER II				QUARTER III				QUARTER IV				QUARTER V				QUARTER I-V			
STATION	ST	σ	BT	σ	ST	σ	BT	σ	ST	σ	BT	σ	ST	σ	BT	σ	ST	σ	BT	σ	ST	σ	BT	σ
1	30.22	0.96	30.06	0.96	23.89	4.24	23.91	4.16	14.98	3.46	14.85	3.50	23.03	3.76	22.81	3.81	28.74	1.40	28.81	1.33	24.17	6.16	24.09	6.18
2	30.20	1.06	30.06	1.01	23.93	4.28	24.00	4.39	14.23	3.53	14.05	3.59	22.54	4.10	22.27	4.19	28.90	1.43	29.23	1.27	23.96	6.48	23.92	6.60
3	30.08	0.83	29.90	1.03	23.82	4.30	23.83	4.39	13.60	3.69	13.47	3.67	22.46	4.54	22.07	4.28	29.17	1.22	29.13	1.24	23.83	6.76	23.68	6.76
4	29.77	1.12	30.51	1.49	24.27	4.64	24.94	4.65	15.30	3.81	15.83	3.70	23.02	4.49	23.39	4.35	29.27	1.48	30.31	1.61	24.33	6.25	25.00	6.37
5	29.84	1.35	30.53	1.43	24.41	4.52	25.31	4.09	15.29	3.60	15.81	3.61	22.98	4.36	23.21	4.56	29.21	1.41	30.19	1.79	24.35	6.20	25.01	6.32
6	29.92	1.27	29.34	3.31	24.45	4.53	24.56	4.43	15.17	3.72	15.15	3.89	22.97	4.41	22.74	4.49	29.20	1.28	29.68	1.84	24.34	6.27	24.33	6.48
7	30.09	1.35	29.69	2.50	25.17	4.66	24.63	4.49	14.50	3.54	14.57	3.55	23.11	4.45	22.61	4.34	29.23	1.39	29.59	1.74	24.42	6.52	24.22	6.54
8	30.18	1.38	30.06	1.29	24.54	4.58	24.50	4.43	14.35	3.64	14.44	3.56	23.15	4.58	22.71	4.22	29.33	1.25	29.63	1.45	24.31	6.60	24.27	6.54
9	30.22	1.37	29.98	1.23	24.51	4.48	24.32	4.49	14.34	3.60	14.06	3.84	23.09	4.89	22.36	4.68	29.38	1.33	29.50	1.47	24.33	6.67	24.07	6.76
10	30.17	1.13	29.95	1.17	24.25	4.57	24.02	4.39	13.99	3.62	13.77	3.72	22.55	4.55	22.05	4.29	29.26	1.46	29.08	1.41	24.04	6.71	23.78	6.68
11	30.04	1.19	29.89	1.11	24.14	4.44	23.93	4.43	13.48	3.62	13.23	3.58	22.40	4.55	21.85	4.32	29.12	1.23	28.94	1.41	24.00	6.72	23.73	6.73
12	29.99	1.01	29.87	1.00	24.02	4.34	23.90	4.30	13.40	3.53	13.05	3.42	22.05	4.61	21.69	4.47	29.26	1.17	28.87	1.31	23.90	6.75	23.64	6.76
13	31.57	1.57	31.83	1.81	26.35	3.90	26.49	4.07	17.41	3.34	17.90	2.92	25.09	4.52	25.18	4.55	31.75	1.60	32.07	2.00	26.43	6.14	26.69	6.11
14	30.93	1.56	31.29	1.49	25.36	4.38	25.85	4.18	16.54	3.47	17.08	3.61	23.94	4.42	24.02	4.64	30.20	1.34	31.13	1.84	25.39	6.13	25.87	6.23
15	30.45	1.20	30.35	1.34	24.68	4.47	24.57	4.47	14.97	3.64	15.06	3.68	23.33	4.77	22.81	4.37	29.69	1.24	30.05	1.50	24.62	6.52	24.57	6.52
16	30.49	1.29	30.18	1.37	24.68	4.43	24.52	4.33	14.41	3.59	14.40	3.53	23.04	4.58	22.53	4.11	29.73	1.42	29.47	1.46	24.63	6.60	24.37	6.46
17	32.33	1.71	32.50	1.96	28.01	5.22	28.12	5.23	20.90	2.83	20.96	2.83	27.76	5.04	27.67	4.98	33.09	1.89	33.08	1.91	28.42	5.63	28.46	5.65
18	32.04	1.41	32.73	1.58	26.75	4.50	26.76	4.38	17.36	3.91	17.56	3.71	25.78	5.54	25.18	5.30	32.81	1.74	33.15	1.54	26.95	6.68	27.07	6.75
19	32.52	2.35	32.96	2.10	27.03	3.94	27.08	3.74	17.21	3.21	17.06	3.35	25.54	5.00	25.51	4.95	32.43	1.92	32.58	1.74	26.95	6.58	27.04	6.69
20	31.10	1.42	31.42	1.66	25.76	4.42	25.81	4.41	16.10	3.48	16.63	3.38	24.48	4.83	24.12	4.64	30.96	1.93	31.54	1.51	25.68	6.48	25.90	6.44
21	30.85	1.37	31.10	1.78	25.61	4.44	25.85	4.51	16.16	3.51	16.24	3.42	24.18	4.59	23.93	4.34	30.85	1.59	31.31	1.56	25.53	6.36	25.68	6.46
22	31.21	1.82	31.47	2.59	25.54	4.65	25.35	4.48	15.74	3.67	15.66	3.53	24.22	4.74	23.04	3.88	30.79	1.61	30.38	1.35	25.50	6.63	25.21	6.55
23	31.15	1.77	30.13	1.15	25.70	4.00	25.28	3.77	15.82	4.15	16.00	4.40	23.81	4.49	22.36	4.19	30.24	1.53	29.57	1.63	25.26	6.46	24.58	6.15
24	30.31	1.51	29.81	1.16	24.32	4.41	23.98	4.33	14.58	3.67	14.28	3.57	22.42	4.24	21.98	4.17	29.32	1.39	28.86	1.35	24.19	6.53	23.78	6.43
25	29.97	1.12	29.78	1.08	23.99	4.48	23.91	4.36	13.39	3.78	13.29	3.58	22.26	4.45	21.68	4.32	29.11	1.00	28.87	1.33	23.91	6.73	23.66	6.68
26	29.93	0.99	29.85	1.13	24.04	4.49	23.89	4.42	13.26	3.43	13.04	3.47	22.16	4.62	21.72	4.41	29.00	1.15	28.82	1.34	23.84	6.74	23.63	6.77
27	30.42	1.28	30.21	1.12	25.02	4.77	24.78	4.29	15.69	3.52	15.63	3.37	23.58	4.46	23.51	4.38	29.41	1.77	29.39	1.79	24.83	6.25	24.70	6.13
28	31.11	1.50	31.08	1.60	25.41	4.59	25.34	4.27	15.63	3.55	15.72	3.79	24.35	4.85	24.21	4.60	30.65	1.66	30.61	1.39	25.43	6.60	25.39	6.51
29	31.94	2.33	31.69	2.27	26.78	4.47	26.65	4.38	17.21	4.20	17.26	4.12	25.11	4.62	24.70	4.21	31.56	1.81	31.62	1.91	26.52	6.47	26.39	6.37
30	31.33	2.04	30.58	1.53	25.81	4.18	25.40	3.92	16.22	4.29	16.21	4.35	24.22	4.73	23.36	4.58	30.86	1.54	30.22	1.49	25.69	6.53	25.15	6.27
31	29.88	1.07	29.80	1.23	23.37	4.59	23.38	4.66	13.70	3.73	13.71	3.66	22.41	4.00	22.25	3.87	28.91	1.72	29.01	1.50	23.66	6.65	23.63	6.64
32	30.02	1.18	29.93	1.12	23.43	4.54	23.42	4.54	13.80	3.61	13.72	3.66	22.25	4.02	22.21	3.93	29.01	1.58	28.90	1.48	23.70	6.65	23.64	6.64
33	30.02	1.15	29.83	1.23	23.47	4.52	23.56	4.51	13.65	3.68	13.53	3.62	22.33	4.18	22.18	4.23	29.04	1.53	28.94	1.36	23.72	6.75	23.63	6.73
34	30.18	1.20	29.88	1.20	23.58	4.23	23.54	4.38	13.51	3.63	13.47	3.56	22.23	4.07	21.95	3.86	28.90	1.47	28.84	1.47	23.68	6.72	23.53	6.66
35	29.92	0.97	29.80	1.05	23.61	4.29	23.60	4.29	13.55	3.46	13.52	3.46	22.09	4.14	21.92	4.03	28.92	1.45	28.79	1.38	23.62	6.66	23.53	6.62
36	29.58	1.75	29.63	1.22	23.59	4.27	23.60	4.26	13.51	3.29	13.44	3.31	21.82	4.21	21.74	4.11	28.89	1.39	28.81	1.36	23.48	6.63	23.45	6.63
37	30.13	1.05	29.79	1.04	23.62	4.25	23.63	4.29	13.57	3.40	13.49	3.38	22.03	4.18	21.68	4.22	29.10	1.47	28.89	1.39	23.69	6.73	23.50	6.67
38	29.78	0.84	29.78	0.93	23.91	4.35	23.87	4.39	14.70	3.48	14.80	3.65	22.34	3.76	22.26	3.72	28.93	1.58	29.05	1.52	23.93	6.24	23.95	6.25
39	29.73	0.98	29.72	1.15	23.73	4.76	23.52	4.66	13.93	3.67	13.65	3.81	22.09	3.98	21.93	3.98	28.82	1.59	28.86	1.45	23.66	6.56	23.54	6.66
40	30.27	1.15	29.91	1.08	23.52	4.35	23.51	4.43	13.38	3.49	13.27	3.45	22.10	4.12	21.81	4.11	28.81	1.53	28.78	1.38	23.62	6.78	23.45	6.75

Salinity, mean surface (SC) and bottom (BC) values (o/oo) and standard deviations (σ) for each quarter, and project as a whole.

	QUARTER I				QUARTER II				QUARTER III				QUARTER IV				QUARTER V				QUARTER I-V			
STATION	SC	σ	BC	σ	SC	σ	BC	σ	SC	σ	BC	σ	SC	σ	BC	σ	SC	σ	BC	σ	SC	σ	BC	σ
1	10.54	4.20	12.79	4.13	8.20	5.34	12.16	5.90	8.88	5.25	10.39	5.63	7.33	4.02	8.28	3.83	9.72	4.48	12.53	4.84	8.93	4.68	11.23	5.07
2	14.28	3.29	18.38	3.41	15.91	3.90	19.51	3.28	12.69	5.76	14.90	5.02	11.33	3.68	13.54	4.43	14.67	3.86	19.09	3.48	13.77	4.36	17.08	4.55
3	18.32	3.35	22.48	2.59	18.98	3.72	21.62	3.41	17.56	3.82	19.31	3.79	15.59	3.42	17.01	3.62	19.84	4.15	23.26	3.57	18.06	3.87	20.74	4.04
4	13.44	3.23	17.89	3.85	15.44	2.59	18.85	3.02	14.12	4.34	17.09	3.98	10.99	4.44	13.78	4.12	14.53	3.75	20.13	2.57	13.70	3.92	17.55	4.07
5	13.82	3.88	18.80	2.95	15.35	3.28	19.18	3.27	13.36	4.42	16.29	3.65	10.56	4.25	13.27	3.80	13.30	3.43	19.57	3.41	13.28	4.07	17.42	4.09
6	15.32	3.07	18.27	3.74	17.37	2.43	18.44	3.64	14.11	4.45	15.66	3.82	11.41	4.34	13.07	4.14	14.74	2.81	18.74	3.01	14.59	3.92	16.84	4.20
7	17.96	2.77	21.00	3.49	19.30	2.52	22.39	3.78	16.73	4.23	19.31	2.98	13.80	4.21	15.87	3.81	17.83	3.28	21.34	4.05	17.12	3.85	19.98	4.21
8	18.88	3.12	21.98	3.39	19.83	2.71	21.67	2.34	17.31	4.55	19.48	3.56	14.55	4.50	16.61	3.25	19.16	2.95	23.11	3.14	17.95	4.02	20.57	3.85
9	20.18	3.02	22.57	2.66	20.34	3.98	22.04	3.84	17.54	4.72	19.53	4.52	16.59	4.20	18.14	3.16	21.03	2.43	23.71	3.13	19.17	4.03	21.24	3.98
10	22.34	2.35	25.17	1.98	22.88	3.06	25.10	2.31	20.50	3.91	22.84	2.69	18.19	3.73	19.74	3.47	23.21	3.06	25.82	2.73	21.42	3.68	23.73	3.42
11	24.67	3.06	26.40	2.23	25.57	3.19	26.39	2.91	22.47	3.69	24.12	3.13	20.71	3.89	22.00	3.34	25.95	2.07	27.23	2.68	23.89	3.72	25.24	3.40
12	27.75	4.46	28.69	3.89	27.20	3.20	28.26	1.80	24.45	3.13	26.18	2.23	22.79	3.80	23.78	2.99	26.95	3.61	28.75	2.52	25.85	4.04	27.15	3.33
13	21.92	2.55	22.62	2.84	23.03	2.15	23.69	1.86	21.18	3.62	22.40	2.36	17.47	4.09	18.14	3.78	23.37	2.31	24.34	2.25	21.39	3.63	22.24	3.41
14	18.65	3.05	21.95	1.86	20.19	2.77	22.14	2.64	19.40	2.92	20.65	2.97	14.24	4.98	16.17	4.31	19.19	3.16	22.32	2.75	18.33	3.98	20.65	3.74
15	19.24	3.21	22.63	2.40	20.53	2.88	22.45	3.12	18.50	3.24	19.60	3.20	15.24	4.56	17.16	3.86	20.32	2.99	23.31	2.70	18.77	3.81	21.03	3.80
16	22.55	2.28	24.33	2.10	23.35	2.51	24.26	2.48	20.47	3.32	21.19	3.39	18.48	3.93	19.16	3.65	23.64	3.24	25.25	2.54	21.72	3.60	22.86	3.63
17	24.77	1.78	25.14	1.66	25.89	1.68	25.86	1.51	23.84	1.86	23.90	1.77	19.65	3.14	19.70	3.18	25.76	1.35	25.89	1.57	23.98	3.05	24.10	3.05
18	23.12	2.53	24.79	1.77	24.67	1.64	25.12	1.70	22.27	2.00	22.68	2.00	18.69	3.88	18.93	3.74	24.16	2.42	25.27	1.70	22.58	3.30	23.36	3.30
19	23.34	2.49	24.63	1.58	24.47	1.54	24.97	1.62	22.14	1.67	22.17	1.63	18.33	3.85	18.49	3.84	23.77	2.02	24.35	2.14	22.41	3.24	22.92	3.32
20	21.70	2.17	23.77	1.46	23.27	1.32	24.51	1.66	21.13	1.68	22.51	1.24	17.64	4.08	18.45	3.74	22.46	2.41	24.43	2.25	21.24	3.12	22.74	3.15
21	21.36	2.68	23.94	2.18	23.01	1.49	24.65	1.71	20.70	2.74	22.84	1.59	17.34	4.26	18.65	3.58	22.03	2.93	24.81	1.96	20.89	3.46	22.98	3.21
22	22.60	2.81	24.43	2.32	23.91	1.90	24.69	1.77	21.61	2.56	22.76	1.82	18.54	4.05	19.57	3.17	23.36	2.62	25.17	2.18	22.00	3.37	23.32	3.04
23	23.84	1.87	25.36	1.44	25.08	1.58	25.55	1.60	22.35	2.73	23.06	2.06	19.21	3.43	20.30	3.04	24.60	2.31	25.60	2.59	23.00	3.22	23.95	3.01
24	24.66	2.23	26.37	1.48	25.65	2.34	26.28	2.34	22.79	3.32	23.45	3.46	20.64	4.56	21.67	3.63	25.76	2.90	27.11	2.43	23.90	3.65	25.98	3.41
25	26.68	2.34	27.82	1.65	27.10	2.52	27.88	1.86	24.21	3.61	25.56	2.50	22.63	3.53	23.07	3.45	27.16	3.19	28.65	2.43	25.58	3.50	26.61	3.15
26	28.32	3.95	29.33	3.47	28.04	2.54	28.60	1.81	25.43	3.11	26.57	2.76	23.50	3.44	24.08	3.26	28.26	2.78	29.35	2.33	26.73	3.67	27.60	3.40
27	22.55	1.35	22.82	1.33	24.22	0.89	23.70	1.64	21.76	2.19	22.03	2.06	18.29	1.97	18.22	2.36	23.37	1.63	23.43	2.70	22.14	2.68	22.04	2.84
28	22.75	1.73	23.44	1.38	24.16	1.17	24.12	1.32	22.08	1.52	22.59	1.51	18.67	2.42	18.69	2.48	23.82	1.66	24.40	1.62	22.29	2.60	22.65	2.67
29	23.57	1.87	24.48	1.45	25.23	1.25	25.29	1.23	22.69	2.08	22.91	2.19	18.71	3.95	19.35	2.80	23.97	2.07	24.40	1.88	22.84	3.24	23.29	2.87
30	24.01	1.80	24.54	1.95	25.01	1.60	25.20	1.72	22.52	2.88	23.06	2.14	19.29	3.70	19.91	3.33	24.27	2.31	25.06	2.26	23.02	3.23	23.56	3.02
31	20.15	2.30	21.04	2.28	20.88	2.83	21.92	2.70	19.85	2.70	20.52	2.45	14.10	2.84	14.80	2.40	19.81	2.80	21.65	2.89	18.96	3.60	19.99	3.63
32	21.13	2.30	21.55	2.33	22.22	2.52	22.41	2.58	20.81	2.10	20.95	2.10	15.47	2.76	15.93	2.16	20.94	2.97	21.97	3.00	20.11	3.44	20.62	3.39
33	22.72	2.10	24.15	1.55	23.49	2.64	24.70	1.76	22.37	1.58	22.82	1.83	17.13	2.50	17.90	2.10	22.91	3.09	24.68	1.94	21.80	3.28	22.93	3.09
34	24.54	2.19	25.52	1.55	24.73	2.40	25.96	1.62	23.25	1.22	23.49	1.33	19.27	1.84	20.12	1.70	24.77	3.07	26.81	1.75	23.31	3.02	24.38	2.88
35	26.33	1.66	26.94	1.37	26.70	1.44	26.78	1.33	24.67	1.58	24.76	1.57	21.16	1.58	21.86	1.84	26.75	2.15	27.54	2.11	25.12	2.70	25.58	2.65
36	27.69	2.01	27.79	1.69	27.04	2.99	27.58	1.29	25.06	2.49	25.37	2.01	22,75	2.39	22.93	2.48	27.97	1.93	28.41	2.22	26.10	3.04	26.42	2.80
37	27.81	1.52	28.69	1.46	28.03	1.62	28.20	1.52	25.27	2.60	25.68	2.22	23.28	2.67	23.82	2.76	28.35	2.29	29.33	2.21	26.55	2.91	27.14	2.91
38	16.40	2.70	17.69	3.11	15.21	2.62	15.86	3.02	13.78	3.87	14.59	4.05	10.70	2.52	11.65	2.33	16.12	3.27	18.31	4.25	14.44	3.61	15.62	4.10
39	20.89	2.86	23.01	2.08	20.12	2.85	22.12	2.14	18.47	3.22	20.01	2.40	15.26	2.63	16.55	2.52	21.00	3.27	24.38	2.46	19.15	3.60	21.21	3.55
40	26.08	1.91	26.89	3.01	26.49	2.42	27.27	2.11	23.63	1.63	24.57	1.57	21.29	2.23	22.16	2.14	27.34	1.91	28.76	1.80	24.97	2.98	25.93	3.15

pH. Arithmetic mean of pH (SU) values for surface (PH1) and bottom (PH3) for each quarter and project as a whole.

	QUARTER I		QUARTER II		QUARTER III		QUARTER IV		QUARTER V		QUARTER VI	
STA.	PH1	PH3	PH1	PH3	PH1	PH3	PH1	PH3	PH1	PH3	PH1	PH3
1	7.92	7.90	7.92	7.89	8.13	8.12	8.04	8.02	7.83	7.82	7.97	7.95
2	7.98	8.01	7.97	7.96	8.11	8.10	8.12	8.09	7.95	7.98	8.02	8.03
3	8.03	8.02	8.06	8.06	8.15	8.16	8.10	8.09	8.06	8.06	8.08	8.08
4	7.99	7.95	7.97	7.92	8.16	8.12	8.06	8.03	7.94	7.91	8.02	7.98
5	8.02	8.00	7.96	7.95	8.15	8.12	8.08	8.05	7.92	7.90	8.02	8.00
6	8.01	8.00	7.99	7.98	8.13	8.13	8.10	8.07	7.96	7.94	8.03	8.02
7	8.05	8.06	8.06	8.03	8.17	8.16	8.09	8.08	7.99	8.00	8.07	8.06
8	8.08	8.06	8.11	8.08	8.13	8.11	8.09	8.06	8.03	8.04	8.09	8.07
9	8.11	8.09	8.11	8.11	8.06	8.07	8.17	8.13	8.07	8.07	8.10	8.10
10	8.14	8.10	8.11	8.13	8.11	8.11	8.12	8.10	8.10	8.09	8.12	8.11
11	8.09	8.05	7.87	7.96	8.27	8.26	8.13	8.11	8.13	8.11	8.10	8.10
12	8.04	7.98	8.03	8.04	8.29	8.25	8.13	8.12	8.13	8.11	8.12	8.10
13	8.18	8.20	7.95	7.82	8.07	8.06	8.14	8.13	8.01	8.01	8.07	8.04
14	8.20	8.21	7.94	7.86	8.03	8.07	8.13	8.12	8.04	8.02	8.07	8.06
15	8.33	8.41	7.96	7.72	8.15	8.19	8.15	8.12	8.08	8.08	8.14	8.10
16	8.14	8.15	7.91	7.82	8.23	8.24	8.16	8.17	8.09	8.08	8.11	8.09
17	8.05	8.04	7.97	7.90	8.02	8.10	8.17	8.16	8.05	8.04	8.05	8.05
18	8.42	8.39	7.99	7.87	8.02	8.05	8.17	8.15	8.11	8.10	8.14	8.11
19	8.42	8.41	7.98	7.91	8.03	8.04	8.18	8.17	8.11	8.10	8.14	8.12
20	8.22	8.21	7.93	7.84	8.12	8.13	8.16	8.15	8.10	8.10	8.11	8.08
21	8.26	8.37	7.89	7.87	8.01	8.10	8.16	8.15	8.10	8.10	8.08	8.11
22	8.29	8.24	7.99	7.82	8.08	8.05	8.18	8.17	8.12	8.12	8.13	8.08
23	8.00	8.04	8.06	8.05	8.23	8.23	8.16	8.16	8.12	8.12	8.12	8.12
24	8.08	8.07	7.88	7.99	8.22	8.22	8.15	8.15	8.02	8.11	8.07	8.11
25	8.03	8.02	8.09	8.05	8.25	8.24	8.15	8.12	8.13	8.12	8.13	8.11
26	8.05	8.12	8.05	8.07	8.25	8.24	8.13	8.11	8.13	8.12	8.12	8.11
27	8.36	8.35	8.30	8.30	8.20	8.17	8.24	8.25	8.04	8.03	8.23	8.22
28	8.36	8.34	8.30	8.29	8.14	8.12	8.25	8.24	8.07	8.06	8.22	8.21
29	8.36	8.34	8.31	8.30	8.12	8.11	8.23	8.21	8.08	8.08	8.22	8.21
30	8.36	8.33	8.30	8.29	8.18	8.13	8.26	8.23	8.09	8.09	8.24	8.21
31	8.33	8.35	8.31	8.31	8.20	8.19	8.31	8.28	8.09	8.10	8.25	8.25
32	8.37	8.37	8.32	8.32	8.19	8.17	8.30	8.30	8.12	8.12	8.26	8.26
33	8.38	8.38	8.31	8.31	8.17	8.15	8.29	8.29	8.13	8.14	8.25	8.25
34	8.36	8.35	8.05	8.05	8.27	8.28	8.20	8.19	8.17	8.18	8.21	8.21
35	7.97	8.10	8.04	8.01	8.26	8.26	8.17	8.16	8.17	8.18	8.13	8.15
36	8.07	8.09	8.00	8.04	8.22	8.23	8.14	8.14	8.16	8.16	8.12	8.13
37	8.06	8.05	7.95	7.94	8.19	8.19	8.12	8.12	8.14	8.14	8.10	8.09
38	8.35	8.36	8.31	8.26	8.24	8.21	8.26	8.25	8.12	8.12	8.26	8.24
39	8.36	8.37	8.29	8.30	8.19	8.15	8.28	8.26	8.14	8.15	8.25	8.24
40	8.16	8.14	7.94	7.96	8.23	8.23	8.17	8.16	8.19	8.19	8.14	8.14

Dissolved oxygen (D.O.) and percent saturation (o/oo Sat.), mean D.O. (mg/l) and % saturation values (%) for surface (DO1, DSS) and bottom (DO3, DSB) for each quarter and project as a whole.

	QUARTER I				QUARTER II				QUARTER III				QUARTER IV				QUARTER V				QUARTER I-V			
	D.O.		% SAT.		D.O.		% SAT.		D.O.		% SAT.		D.O.		% SAT.		D.O.		% SAT.		D.O.		% SAT.	
STATION	DO1	DO3	DSS	DSB	DO1	DO3	DSS	DSB	DO1	DO3	DSS	DSB	DO1	DO3	DSS	DSB	DO1	DO3	DSS	DSB	DO1	DO3	DSS	DSB
1	6.3	6.3	89	89	8.0	7.5	99	95	9.8	9.7	102	101	8.4	8.4	102	101	6.2	6.1	85	85	7.7	7.6	95	94
2	6.3	6.0	91	88	7.2	6.8	93	90	9.6	9.6	101	101	8.0	8.1	99	100	6.3	6.0	92	88	7.5	7.3	95	93
3	6.2	5.4	91	81	7.1	6.7	93	90	9.3	9.2	99	99	8.0	7.7	100	96	6.5	6.2	95	93	7.4	7.0	96	92
4	6.5	5.3	93	78	6.9	6.2	91	83	9.2	8.9	99	98	8.0	7.7	98	97	6.2	5.0	87	73	7.3	6.6	93	86
5	6.5	5.6	93	82	7.0	6.3	91	85	9.5	9.2	101	101	8.0	7.7	98	97	6.2	5.2	88	78	7.4	6.8	94	89
6	6.5	5.8	93	85	7.1	6.7	94	88	9.3	9.1	99	98	8.0	7.9	99	98	6.2	5.6	88	82	7.4	7.0	94	90
7	6.4	5.4	94	79	7.2	6.5	98	88	9.3	9.1	99	99	7.7	7.5	98	95	6.3	5.6	90	83	7.3	6.8	96	89
8	6.3	5.1	93	76	7.2	6.5	96	88	9.1	8.9	99	98	7.9	7.6	99	97	6.4	5.9	93	87	7.4	6.8	96	89
9	6.5	5.5	97	82	7.1	6.9	95	93	9.1	8.8	98	96	7.9	7.6	100	96	6.4	6.0	95	89	7.4	6.9	97	91
10	6.6	5.5	100	84	7.2	6.9	97	94	9.0	8.8	99	97	7.8	7.5	100	96	6.5	6.0	97	90	7.4	6.9	98	92
11	6.4	5.8	97	89	6.9	6.8	94	93	9.2	9.0	101	100	7.7	7.5	100	96	6 5	6.1	98	92	7.3	7.0	98	94
12	6.2	5.8	96	90	6.9	6.7	96	93	9.1	9.0	101	100	7.8	7.4	102	96	6.4	6.1	98	93	7.3	7.0	98	94
13	6.0	5.8	93	90	6.4	6.3	90	89	8.6	8.4	102	101	7.3	7.2	97	97	5.7	5.4	88	84	6.8	6.6	94	92
14	6.3	5.8	94	89	6.7	6.5	91	89	8.3	8.2	95	96	7.6	7.4	97	95	6.3	5.9	93	90	7.1	6.8	94	92
15	6.4	5.5	94	83	6.8	6.1	91	83	8.8	8.8	96	98	7.5	7.1	95	90	6.5	5.8	96	87	7.2	6.7	94	88
16	6.5	5.8	98	88	6.9	6.8	95	93	9.0	8.9	100	99	7.9	7.7	101	99	6.4	6.0	96	91	7.3	7.0	98	94
17	5.7	5.7	91	91	6.4	6.4	94	94	8.2	8.2	106	106	7.3	7.3	102	103	5.8	5.8	93	93	6.7	6.7	97	97
18	6.4	6.2	99	98	6.5	6.4	94	92	8.4	8.4	99	101	7.3	7.1	99	96	5.9	5.6	94	90	6.9	6.8	97	95
19	6.5	6.2	101	98	6.6	6.5	95	94	8.4	8.0	99	94	7.3	7.2	97	96	6.1	5.9	95	94	7.0	6.8	98	95
20	6.6	5.7	101	89	6.8	6.5	95	91	8.5	8.3	97	97	7.4	7.1	97	93	6.2	5.9	95	91	7.1	6.7	97	92
21	6.7	5.6	101	87	6.8	6.5	95	92	8.5	8.4	97	97	7.4	7.1	96	94	6.3	5.9	96	92	7.1	6.7	97	92
22	6.6	5.4	100	84	6.9	6.5	96	92	8.5	8.5	98	98	7.6	7.3	100	95	6.3	6.0	96	91	7.2	6.7	98	92
23	6.3	5.7	98	88	6.8	6.7	96	94	8.8	8.6	101	100	7.8	7.4	102	95	6.3	6.0	97	92	7.2	7.0	99	94
24	6.3	6.0	97	92	6.9	6.8	95	94	8.9	8.9	99	99	7.9	7.6	102	98	6.5	6.2	98	94	7.3	7.1	98	95
25	6.3	5.4	97	91	6.9	6.8	96	94	9.0	9.0	100	100	7.8	7.3	101	94	6,4	6.1	97	93	7.3	7.0	98	95
26	6.1	5.8	95	90	6.9	6.8	96	95	9.0	8.8	100	99	7.7	7.5	101	97	6.4	6.1	98	93	7.2	7.0	98	95
27	6.3	6.2	96	93	6.9	7.0	96	96	8.9	8.3	102	101	7.7	8.0	99	105	5.8	5.9	68	68	7.1	7.2	98	98
28	6.6	6.0	101	92	6.8	6.8	96	95	8.5	8.6	98	98	7.7	7.7	102	102	6.0	5.6	92	86	7.1	7.0	97	95
29	6.4	6.3	100	98	6.8	6.9	98	98	8.6	8.6	102	102	7.7	7.5	104	101	6.2	6.0	96	93	7.2	7.1	100	98
30	6.7	6.1	103	93	6.9	6.9	97	97	8.6	8.6	100	100	7.7	7.7	101	100	6.4	6.3	98	96	7.2	7.1	100	97
31	6.3	6.6	94	98	6.5	6.9	90	92	9.0	9.0	98	98	7.9	7.9	98	98	6.4	7.3	93	108	7.3	7.5	94	99
32	6.7	6.9	100	103	6.9	6.9	91	92	9.0	8.9	98	97	8.0	8.2	100	103	6.4	6.7	93	99	7.4	7.5	96	99
33	6.5	6.6	98	99	6.8	6.8	92	92	8.7	8.8	96	96	7.9	7.9	100	100	6.5	6.7	97	101	7.3	7.3	96	98
34	6.5	6.5	99	98	6.9	6.9	94	94	9.0	9.1	99	100	8.0	7.8	103	100	6.7	6.5	100	98	7.4	7.3	99	98
35	6.4	6.4	98	98	6.9	6.9	94	95	8.8	8.8	99	99	8.0	7.8	103	101	6.6	6.6	100	99	7.3	7.3	99	98
36	6.4	6.5	99	99	6.8	6.8	93	94	8.9	8.9	99	100	7.8	7.7	102	100	6.6	6.5	100	99	7.3	7.3	99	98
37	6.4	6.2	100	97	6.7	6.6	93	92	8.9	8.8	100	98	7.8	7.5	102	98	6.5	6.4	100	99	7.3	7.1	99	97
38	6.9	7.2	100	104	8.0	8.1	103	104	9.3	9.2	99	99	8.2	8.3	100	101	6.8	7.2	97	104	7.8	8.0	100	103
39	6.6	6.5	98	98	7.0	7.0	93	93	8.9	8.8	96	96	7.8	7.8	97	98	6.5	6.4	95	95	7.4	7.3	96	96
40	6.6	6.5	101	100	6.7	6.7	92	92	8.8	8.6	97	95	7.9	7.5	102	97	6.5	6.3	99	96	7.3	7.1	98	96

Secchi Depths. Mean secchi depths (ft) by quarter and the percent of observation attempts that secchi depth was greater than water column depth (%SD >B).

Station	QUARTER I ft	QUARTER I %SD>B	QUARTER II ft	QUARTER II %SD>B	QUARTER III ft	QUARTER III %SD>B	QUARTER IV ft	QUARTER IV %SD>B	QUARTER V ft	QUARTER V %SD>B
1	2.9	62	2.5	85	2.0	92	3.3	85	2.6	46
2	3.1	38	3.9	62	3.2	85	2.7	54	2.8	31
3	3.6	0	3.8	38	3.3	85	3.5	15	3.1	0
4	3.0	8	3.0	23	3.9	77	3.5	0	2.7	0
5	3.0	8	3.3	23	3.9	85	3.3	0	2.7	0
6	3.1	15	3.1	23	--	100	3.4	8	2.8	0
7	4.9	8	3.5	46	4.0	92	3.6	23	3.3	15
8	3.5	0	3.4	8	3.5	77	3.5	15	3.1	0
9	3.5	0	4.1	15	4.9	38	3.8	8	3.1	0
10	4.1	0	4.6	0	5.1	15	4.0	0	3.5	0
11	5.5	0	6.1	0	6.1	0	4.6	8	5.2	8
12	6.7	0	7.3	0	6.4	0	5.2	0	6.9	0
13	2.9	31	2.7	77	4.0	92	3.0	46	3.3	62
14	2.9	0	2.7	38	3.8	77	3.2	15	3.3	15
15	2.8	0	3.2	15	3.2	62	3.1	8	3.4	15
16	4.0	0	4.7	38	5.3	77	4.2	8	4.2	15
17	2.5	54	4.3	92	--	100	2.6	62	2.8	92
18	3.1	0	3.4	54	4.3	77	3.0	8	3.5	31
19	2.9	0	3.0	46	4.5	85	2.6	46	3.7	62
20	2.8	0	3.3	8	4.9	31	3.0	0	3.9	0
21	2.9	0	3.4	8	4.7	23	3.0	0	3.6	0
22	3.1	0	3.9	0	4.9	15	3.1	0	3.7	0
23	4.7	0	9.9	15	6.4	15	4.8	8	5.1	0
24	5.5	0	5.8	15	6.0	8	4.3	8	5.3	0
25	6.3	0	6.8	0	6.9	0	5.0	0	5.9	0
26	7.0	0	7.4	0	6.9	0	5.2	0	6.9	0
27	3.7	23	4.0	69	4.3	92	3.1	62	4.8	77
28	3.6	0	4.5	23	5.8	77	4.2	23	4.6	38
29	4.2	8	4.5	62	5.5	77	3.7	23	4.1	62
30	3.8	0	4.3	54	5.3	77	3.6	23	4.0	8
31	3.5	85	--	100	3.3	85	3.8	69	4.0	92
32	3.5	85	--	100	2.5	92	3.4	62	4.5	85
33	3.9	23	6.0	54	4.0	85	3.7	31	4.8	23
34	4.9	15	6.8	31	5.3	77	4.8	8	5.6	15
35	5.7	8	6.0	62	5.5	85	4.4	23	4.6	38
36	6.5	0	6.7	15	7.3	8	4.8	0	5.9	8
37	7.0	0	7.0	0	6.9	0	4.8	0	6.7	0
38	4.5	92	4.0	92	3.5	85	4.5	85	5.5	85
39	4.9	38	5.9	54	4.7	77	4.3	15	5.4	23
40	7.6	0	6.8	8	8.1	15	5.3	0	7.0	0

Turbidity. Mean turbidity (NTU) from surface (TURBS) and bottom (TURBB) for each quarter and project as a whole.

	QUARTER I		QUARTER II		QUARTER III		QUARTER IV		QUARTER V		QUARTER I-V		
STA.	TURBS	TURBB	TURBS	TURBB	TURBS	TURBB	TURBS	TURBB	TURBS	TURBB	TURBS	TURBB	STA.
1	7.5	7.5	7.5	7.6	5.8	17.2	10.0	12.3	9.5	12.1	8.0	11.9	1
2	6.7	6.8	6.3	13.9	5.5	17.1	9.8	10.7	6.5	8.9	7.0	9.9	2
3	6.7	9.4	5.1	8.9	5.6	9.6	10.4	14.8	7.3	8.1	7.0	10.3	3
4	8.6	17.1	7.9	14.9	4.8	5.9	8.6	15.5	8.2	18.7	7.7	15.6	4
5	8.3	10.1	9.8	37.7	5.3	10.6	9.9	15.7	10.2	15.1	8.7	17.5	5
6	8.5	25.3	10.8	20.9	5.8	6.6	10.0	11.0	8.7	11.0	8.8	14.9	6
7	8.3	9.5	8.4	13.4	5.1	5.0	9.2	10.3	7.1	11.5	7.7	10.5	7
8	8.5	11.4	8.7	15.7	7.6	10.8	10.2	12.4	8.7	11.9	8.8	12.4	8
9	7.0	10.1	6.2	10.0	5.9	8.1	8.8	25.6	7.7	16.3	7.1	14.9	9
10	5.7	14.3	5.2	7.4	4.9	9.2	9.4	16.9	7.1	18.7	6.5	13.3	10
11	6.1	6.4	4.6	6.3	4.8	5.0	9.1	14.4	5.4	9.2	6.0	8.2	11
12	4.0	5.5	3.9	5.0	3.9	4.9	7.9	11.2	3.9	5.9	4.7	6.5	12
13	7.4	4.9	6.8	6.3	5.2	35.0	7.8	8.8	6.5	7.2	6.7	8.5	13
14	6.9	9.2	7.3	8.5	5.4	10.5	7.5	8.5	6.3	8.1	6.7	8.7	14
15	7.0	10.2	6.9	11.2	5.4	10.2	9.0	15.8	6.2	13.2	6.9	12.5	15
16	6.1	9.7	5.9	6.8	4.0	4.4	10.3	12.9	6.2	9.7	6.5	8.8	16
17	9.2	9.2	5.3		5.4		8.9	9.6	7.9	12.2	7.3	10.9	17
18	5.6	8.0	5.6	10.0	4.6	5.0	7.4	8.3	5.6	7.0	5.7	7.8	18
19	6.8	8.4	5.5	8.2	4.5	3.5	8.6	8.8	7.0	6.1	6.5	7.5	19
20	6.4	11.1	5.7	8.2	4.6	4.5	8.5	11.6	5.5	9.9	6.2	9.5	20
21	6.7	18.5	5.3	21.0	4.2	5.7	8.5	12.6	6.3	10.9	6.2	13.9	21
22	6.3	10.6	6.3	7.3	4.8	5.6	9.7	11.4	6.6	10.3	6.7	9.0	22
23	6.1	15.7	4.1	5.9	3.9	4.3	7.4	9.4	6.2	11.3	5.6	9.3	23
24	5.1	5.9	4.9	5.4	4.5	4.7	9.6	12.0	5.0	7.1	5.8	7.0	24
25	4.3	6.8	4.2	6.5	4.9	4.7	8.2	13.1	5.2	6.3	5.4	7.5	25
26	3.8	4.5	4.1	4.7	4.1	3.8	8.5	12.0	3.9	5.4	4.9	6.1	26
27	5.9	9.7	4.3	11.6	2.6	3.2	5.5	6.2	4.9	6.6	4.7	7.6	27
28	5.9	8.9	4.8	7.4	2.6	3.3	7.1	8.1	4.6	5.5	5.0	6.7	28
29	5.8	5.5	5.4	9.8	3.1	3.3	7.8	10.2	6.0	6.6	5.6	7.2	29
30	6.1	9.4	4.6	7.9	3.3	4.0	7.8	9.4	5.9	9.4	5.5	8.4	30
31	3.5	12.2	3.3	6.4	4.5	6.2	5.4	5.7	2.9	16.1	3.9	10.5	31
32	3.3	6.8	3.8	2.8	3.4	16.3	5,3	6.5	3.9	5.2	3.9	6.5	32
33	4.4	9.3	3.7	30.3	3.9	5.0	8.2	9.3	5.7	7.0	5.2	12.4	33
34	4.0	6.3	4.5	4.9	3.3	3.4	8.7	14.7	4.6	6.7	5.0	7.2	34
35	4.5	5.1	4.5	4.9	3.6	3.6	9.2	10.6	5.0	5.7	5.4	6.0	35
36	4.1	4.5	4.1	4.9	3.6	3.6	10.6	13.1	4.8	5.8	5.4	6.3	36
37	4.4	6.0	4.4	5.9	3.7	3.7	10.1	14.3	5.5	6.3	5.5	7.3	37
38	3.9	7.4	2.9	5.9	3.4	7.9	4.7	5.5	2.6	6.2	3.5	6.2	38
39	2.7	4.0	3.4	14.2	2.9	3.3	6.0	7.5	3.9	7.0	3.8	7.3	39
40	3.1	5.1	3.8	4.9	2.5	2.7	6.9	10.0	3.6	6.4	4.0	5.8	40

Suspended load. Mean total and volatile suspended load (mg/1) for surface (TSSS, VSSS) and bottom (TSSB, VSSB), for each quarter and project as a whole.

	QUARTER I				QUARTER II				QUARTER III				QUARTER IV				QUARTER V				QUARTER I-V			
	TSS		VSS		TSS		VSS		TSS		VSS		TSS		VSS		TSS		VSS		TSS		VSS	
STATION	S	B	S	B	S	B	S	B	S	B	S	B	S	B	S	B	S	B	S	B	S	B	S	B
1	11	13	5	7	13		4	12	11		4		11	16	4	5	13	20	4	5	12	18	4	5
2	9	10	5	3	8		4		14	42	4	11	14	11	5	4	8	9	3	4	10	12	4	4
3	8	34	4	9	6	9	2	5	11	20	3	5	13	19	4	6	9	14	3	4	9	21	3	6
4	11	29	5	8	12		4		9	10	3	3	10	26	4	6	12	16	5	5	11	21	4	6
5	11	29	5	8	21		6		9	24	2	5	14	23	4	6	16	26	5	7	14	26	4	6
6	10	25	6	7	22		7		10		3		10	12	3	4	11	16	4	5	12	17	5	5
7	12	16	4	7	13		4		15	6	3	2	11	14	4	4	10	12	3	4	12	13	4	5
8	9	62	5	12	12	13	4	4	14	22	3	4	13	16	4	5	13	21	4	5	13	29	4	7
9	9	22	4	7	8	10	3	3	12	22	3	4	13	16	5	5	19	15	4	4	12	18	4	5
10	8	19	4	7	8	11	3	4	9	21	2	5	12	19	4	6	10	22	3	6	9	20	3	5
11	9	10	4	4	8	10	4	4	8	10	2	3	13	24	4	6	9	21	3	5	9	15	3	4
12	8	8	3	4	9	12	4	3	8	9	3	3	12	19	3	6	9	11	2	3	9	12	3	4
13	11	10	4	6	13		4		8	17	3	9	10	11	4	3	11	13	3	4	10	12	4	4
14	9	13	4	4	9		3		10	19	3	5	10	13	4	4	9	10	3	4	9	13	3	4
15	11	17	4	4	12	15	4	4	10	16	3	4	11	26	4	6	8	17	3	5	10	18	4	5
16	10	17	3	5	10	10	4	2	8	10	3	3	10	17	3	5	10	11	4	3	10	13	3	4
17	11	12	5	1	10		3		9		3		12	16	4	5	12	14	3	3	11	14	4	4
18	13	12	4	4	12		3		9	11	3	3	11	12	4	4	9	11	3	4	11	11	3	4
19	10	12	3	4	11		3		8	9	2	3	11	13	5	4	11	10	3	3	10	11	3	4
20	10	16	3	5	10	8	3	2	8	11	3	3	11	13	3	5	9	23	3	5	10	16	3	4
21	9	36	3	7	9	11	4	4	9	[illegible]	2	3	11	13	4	4	9	15	3	4	9	17	3	5
22	10	16	5	6	9	12	4	5	9	[illegible]	3	3	11	13	4	5	12	14	4	9	10	13	4	6
23	9	14	4	4	9	9	3	3	8	8	2	2	8	18	4	5	10	12	3	3	9	12	3	3
24	9	11	3	4	9	8	4	3	10	10	3	3	11	15	4	5	8	11	3	3	10	11	3	3
25	8	10	3	4	7	11	2	4	9	10	[illegible]	3	9	14	3	5	9	13	2	3	8	12	3	4
26	9	9	3	3	9	8	3	2	8	8	2	2	13	15	4	5	10	11	3	4	10	10	3	3
27	10	13	9	4	10		3		6	6	2	2	10	11	3	4	9	10	3	3	9	10	4	3
28	8	21	4	6	8	8	4	2	6	6	2	2	8	9	3	4	7	9	2	3	7	11	3	3
29	9	11	4	8	15	11	4	3	7	7	2	3	9	11	4	4	10	12	3	3	10	10	3	4
30	11	17	5	5	9	9	3	3	7	10	3	3	9	12	3	4	9	11	3	4	9	12	3	4
31	6	46	3	8	8	4	3	1	7	15	2	4	8	10	3	3	6	6	2	2	7	19	3	4
32	8	25	3	5	8		2		9	28	3	6	8	9	2	3	5	7	2	2	7	13	2	3
33	8	17	3	5	6	10	2	3	7	9	2	3	9	12	3	5	5	10	2	3	7	12	2	4
34	8	11	3	4	7	9	2	3	7	7	2	2	11	46	4	9	9	11	3	3	8	16	3	4
35	9	10	4	4	8	9	3	3	8	8	2	2	13	18	4	5	10	10	3	3	10	11	3	3
36	9	10	4	4	8	9	3	3	8	10	2	2	15	19	5	5	9	11	3	3	10	12	3	3
37	9	14	3	5	9	9	3	3	8	9	2	3	13	22	4	6	10	12	[illegible]	4	10	13	3	4
38	6	30	3	9	8		3		9		3		8	9	4	3	4	10	1	4	7	11	3	4
39	7	11	3	4	5	9	2	2	6	7	2	3	9	13	3	5	7	12	2	4	7	11	2	4
40	7	14	4	4	7	11	3	4	6	6	2	2	9	15	4	4	8	11	2	3	7	11	3	3

Chlorophyll 'a'. Mean concentrations (mg/m^3) of all samples collected for each quarter and project as a whole (all depths combined).

STATION	QTR. I	QTR. II	QTR. III	QTR. IV	QTR. V	QTR. VI
1	4,3.5	5,5.5	3,6.1	4,6.6	6,10.7	22,6.8
2	4,6.4	4,6.6	1,3.8	4,7.9	8,6.4	21,6.6
3	6,8.5	4,6.5	3,2.7	7,13.7	4,10.6	24,9.3
4	3,8.7	4,8.5	4,5.3	4,7.1	6,11.7	21,8.6
5	7,11.7	2,10.5	3,5.6	7,11.8	6,11.1	25,10.8
6	5,7.6	3,11.1	2,4.2	7,9.7	2,11.3	19,9.0
7	4,10.7	5,13.9	6,6.2	4,7.1	4,7.1	23,9.0
8	2,11.2	4,10.5	4,6.7	6,9.5	7,12.2	23,10.2
9	9,8.1	4,8.9	6,5.2	6,9.1	4,11.1	29,8.2
10	6,6.4	4,3.3	6,5.8	4,9.8	6,9.2	26,7.0
11	6,5.1	4,5.5	7,4.4	4,12.1	4,5.6	25,6.2
12	7,4.0	5,5.4	4,5.5	7,7.9	6,5.6	29,5.7
13	4,5.6	4,12.5	4,5.0	6,6.8	5,5.9	23,7.1
14	5,6.7	7,7.7	4,4.7	6,6.5	4,11.2	26,7.3
15	5,11.5	4,8.9	4,5.5	6,11.4	4,8.8	23,9.5
16	4,4.2	4,7.3	9,3.8	4,7.0	7,6.1	28,5.4
17	3,7.7	4,3.2	3,3.3	7,6.2	4,3.6	21,4.9
18	4,7.7	7,7.0	4,2.9	5,6.7	6,5.0	26,6.0
19	4,6.8	4,4.7	4,3.3	5,5.5	6,6.4	23,5.4
20	6,8.0	3,8.3	11,3.4	6,7.8	4,8.3	30,6.3
21	6,11.1	7,5.1	5,4.3	4,9.2	6,8.3	28,7.5
22	6,9.4	5,9.0	6,5.4	6,6.5	8,10.2	31,8.2
23	4,4.1	8,5.3	6,7.1	6,7.5	4,5.7	28,6.0
24	4,6.5	6,4.9	6,6.7	8,10.7	4,6.5	28,7.4
25	8,5.7	2,4.3	6,3.7	8,6.6	4,9.9	28,6.0
26	8,6.2	2,5.2	4,4.2	6,7.4	4,3.7	24,5.7
27	3,10.6	6,5.8	3,6.1	4,4.0	6,4.5	22,5.8
28	5,8.9	4,4.6	5,3.3	6,5.9	4,5.2	24,5.7
29	3,6.1	8,4.3	1,3.4	6,7.7	6,6.4	24,5.9
30	6,7.3	2,6.3	3,4.5	7,6.3	7,7.6	25,6.7
31	3,3.9	5,5.3	4,2.3	6,4.1	6,3.4	24,3.9
32	5,3.7	5,2.7	3,3.9	7,3.8	5,8.1	25,4.4
33	6,3.4	4,3.2	6,2.2	7,3.8	4,4.5	27,3.4
34	7,4.5	5,3.8	4,4.2	4,4.7	6,4.2	26,4.3
35	4,4.8	7,2.9	4,4.1	4,6.8	6,7.2	25,5.1
36	6,3.9	4,2.7	2,7.6	4,4.7	6,4.5	22,4.3
37	7,4.2	5,4.9	4,4.5	5,9.3	8,6.3	29,5.8
38	3,3.4	3,3.7	4,4.4	4,2.8	6,4.4	20,3.8
39	7,4.9	4,3.2	7,3.2	5,4.6	8,5.1	31,4.3
40	6,9.5	6,3.7	6,3.1	3,6.7	9,3.7	30,5.0

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: ST

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	84	84346.47833347	1004.12474207	92.72	0.0001	0.757224	13.3355
ERROR	2497	27042.55497137	10.83001801		ROOT MSE		ST MEAN
CORRECTED TOTAL	2581	111389.03330484			3.29009927		24.67780015

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	80515.50778422	1858.62	0.0001	4	71373.29146329	1647.58	0.0001
STATION	39	3379.45603187	8.00	0.0001	39	2919.19707729	6.91	0.0001
TIDE	1	0.41971963	0.04	0.8440	1	15.67939913	1.45	0.2290
STATION*TIDE	39	421.28842137	1.00	0.4751	39	421.37480015	1.00	0.4747
DEPTH	1	29.80637639	2.75	0.0972	1	29.80637639	2.75	0.0972

DEPENDENT VARIABLE: BT

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	84	85198.81534302	1014.[illegible]161123	96.06	0.0001	0.763682	13.2039
ERROR	2497	26364.37485880	10.55842005		ROOT MSE		BT MEAN
CORRECTED TOTAL	2581	111563.19020182			3.24937225		24.60926414

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	80880.33897974	1915.07	0.0001	4	72117.72175580	1707.59	0.0001
STATION	39	3855.46323116	9.36	0.0001	39	3074.33746229	7.47	0.0001
TIDE	1	0.85345871	0.08	0.7762	1	10.41454575	0.99	0.3207
STATION*TIDE	39	446.48679844	1.08	0.3325	39	445.76900455	1.08	0.3352
DEPTH	1	15.67287497	1.48	0.2232	1	15.67287497	1.48	0.2232

DEPENDENT VARIABLE: DT

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	84	272.24025684	3.24095544	6.00	0.0001	0.167911	1072.4919
ERROR	2497	1349.10060931	0.54028659		ROOT MSE		DT MEAN
CORRECTED TOTAL	2581	1621.34086615			0.73504326		0.06853602

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	48.43659843	22.41	0.0001	4	46.76011231	21.64	0.0001
STATION	39	180.32005603	8.56	0.0001	39	142.93714521	6.78	0.0001
TIDE	1	0.07615976	0.14	0.7074	1	0.53665005	0.99	0.3190
STATION*TIDE	39	41.15557195	1.95	0.0004	39	41.43804143	1.97	0.0004
DEPTH	1	2.25187066	4.17	0.0413	1	2.25187066	4.17	0.0413

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SC

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	84	57574.88805669	685.41533401	96.04	0.0001	0.763648	12.8667
ERROR	2497	17819.60885505	7.13640723		ROOT MSE		SC MEAN
CORRECTED TOTAL	2581	75394.49691174			2.67140548		20.76211851

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	9364.06326515	328.04	0.0001	4	9183.48473248	321.71	0.0001
STATION	39	43433.57918822	156.06	0.0001	39	24495.29398770	88.01	0.0001
TIDE	1	3009.83704914	421.76	0.0001	1	1042.93048771	146.14	0.0001
STATION*TIDE	39	1471.69915531	5.29	0.0001	39	1481.10489118	5.32	0.0001
DEPTH	1	295.70939887	41.44	0.0001	1	295.70939887	41.44	0.0001

DEPENDENT VARIABLE: BC

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	84	45962.41319749	547.17158569	88.77	0.0001	0.749138	11.1695
ERROR	2497	15391.31387329	6.16392226		ROOT MSE		BC MEAN
CORRECTED TOTAL	2581	61353.72707078			2.48272476		22.22766073

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	12292.3[illegible]072	4[illegible].5[illegible]	0.0001	4	11982.60704880	486.00	0.0001
STATION	39	[illegible]	125.42	0.0001	39	13902.12493894	57.83	0.0001
TIDE	1	2079.60742398	337.38	0.0001	1	555.22550290	90.08	0.0001
STATION*TIDE	39	1106.87238770	4.60	0.0001	39	1130.75444887	4.70	0.0001
DEPTH	1	384.20820173	62.33	0.0001	1	384.20820173	62.33	0.0001

DEPENDENT VARIABLE: DC

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	8[illegible]	3453.22325878	41.10980076	13.32	0.0001	0.309436	119.6728
ERROR	2497	7706.49313212	3.08630081		ROOT MSE		DC MEAN
CORRECTED TOTAL	2581	11159.[illegible]629090			1.75678707		-1.46554222

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	412.85439882	33.44	0.0001	4	361.01653207	29.24	0.0001
STATION	39	2654.07358528	22.05	0.0001	39	2554.10765207	21.22	0.0001
TIDE	1	85.7[illegible]06059	27.78	0.0001	1	76.23404185	24.70	0.0001
STATI[illegible]TIDE	39	[illegible]77060[illegible]	2.45	0.0001	39	296.31040703	2.46	0.0001
DEPT[illegible]	1	[illegible]78415276	1.87	[illegible]1711	1	5.78415276	1.87	0.1[illegible]

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: PH1

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	45	22.34511510	0.49655811	6.99	0.0001	0.112197	3.2787
ERROR	2490	176.81372213	0.07100953		ROOT MSE		PH1 MEAN
CORRECTED TOTAL	2535	199.15883723			0.26647613		8.12742902

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	5.99750486	21.12	0.0001	4	6.42742607	22.63	0.0001
STATION	39	13.89489220	5.02	0.0001	39	12.18839642	4.40	0.0001
ST	1	2.31315962	32.58	0.0001	1	2.41214709	33.97	0.0001
SC	1	0.13955843	1.97	0.1611	1	0.13955843	1.97	0.1611

DEPENDENT VARIABLE: PH3

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	45	25.10214760	0.55782550	7.61	0.0001	0.121370	3.3345
ERROR	2480	181.72133399	0.07327473		ROOT MSE		PH3 MEAN
CORRECTED TOTAL	2525	206.82348159			0.27069306		8.11796912

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	7.54551798	25.74	0.0001	4	8.51056635	29.04	0.0001
STATION	39	14.36591835	5.03	0.0001	39	12.48193611	4.37	0.0001
ST	1	2.76067939	37.68	0.0001	1	3.05491539	41.69	0.0001
SC	1	0.41003188	5.60	0.0181	1	0.41003188	5.60	0.0181

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DO1

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	45	3267.92056870	72.62045708	173.95	0.0001	0.755590	8.8885
ERROR	2532	1057.07368751	0.41748566		ROOT MSE		DO1 MEAN
CORRECTED TOTAL	2577	4324.99425621			0.64613130		7.26902638

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	2365.73088206	1416.65	0.0001	4	46.05913618	27.58	0.0001
STATION	39	114.05128210	7.00	0.0001	39	39.60806760	2.43	0.0001
ST	1	736.32633362	1763.72	0.0001	1	682.88794334	1635.72	0.0001
SC	1	51.81207092	124.11	0.0001	1	51.81207092	124.11	0.0001

DEPENDENT VARIABLE: DO3

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	45	4112.49122021	91.38869378	165.78	0.0001	0.746603	10.5569
ERROR	2532	1395.78062153	0.55125617		ROOT MSE		DO3 MEAN
CORRECTED TOTAL	2577	5508.27184174			0.74246628		7.03301009

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	2853.92386112	1294.28	0.0001	4	25.44115931	11.54	0.0001
STATION	39	228.70233777	10.64	0.0001	39	155.33321462	7.23	0.0001
BT	1	961.21788087	1743.69	0.0001	1	845.44265856	1533.67	0.0001
BC	1	68.64714045	124.53	0.0001	1	68.64714045	124.53	0.0001

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: DSS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	45	22958.12805418	510.18062343	7.02	0.0001	0.110876	8.7968
ERROR	2532	184102.40529654	72.71027065		ROOT MSE		DSS MEAN
CORRECTED TOTAL	2577	207060.53335072			8.52703176		96.93296737

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	13484.31479053	46.36	0.0001	4	6091.60714617	20.95	0.0001
STATION	39	8263.90209706	2.91	0.0001	39	6640.93171141	2.34	0.0001
ST	1	1109.90459790	15.26	0.0001	1	1020.82325894	14.04	0.0002
SC	1	100.00656870	1.38	0.2410	1	100.00656870	1.38	0.2410

DEPENDENT VARIABLE: DSB

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	45	69160.56940519	1536.90154234	14.83	0.0001	0.208555	10.3046
ERROR	2532	262457.58783975	103.65623532		ROOT MSE		DSB MEAN
CORRECTED TOTAL	2577	331618.15724495			10.18117063		94.22981029

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	28232.68531961	68.09	0.0001	4	2348.53784841	5.66	0.0002
STATION	39	30874.25695573	7.64	0.0001	39	31811.63087098	7.87	0.0001
BT	1	8669.87292726	83.64	0.0001	1	7254.05817911	69.98	0.0001
BC	1	1383.75420259	13.35	0.0003	1	1383.75420259	13.35	0.0003

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: MS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	49	22.58978939	0.46101611	19.24	0.0001	0.355779	43.9306
ERROR	1707	40.90417268	0.02396261		ROOT MSE		MS MEAN
CORRECTED TOTAL	1756	63.49396207			0.15479861		0.35197033

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	3.15454833	32.91	0.0001	4	0.97172083	10.14	0.0001
STORM(QUARTER)	4	1.24515771	12.99	0.0001	4	0.11814027	1.23	0.2950
STATION	39	11.04245991	11.82	0.0001	39	3.31255464	3.54	0.0001
DEPTH	1	0.56292565	23.49	0.0001	1	0.10691419	4.46	0.0348
TURBS	1	6.58469778	274.79	0.0001	1	6.58469778	274.79	0.0001

DEPENDENT VARIABLE: MB

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	49	34.92387433	0.71273213	29.41	0.0001	0.368527	46.5048
ERROR	2469	59.84236568	0.02423749		ROOT MSE		MB MEAN
CORRECTED TOTAL	2518	94.76624000			0.15568395		0.33476942

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	4.72283420	48.71	0.0001	4	3.23140853	33.33	0.0001
STORM(QUARTER)	4	2.34768034	24.22	0.0001	4	0.63595799	6.56	0.0001
STATION	39	19.83477225	20.98	0.0001	39	5.87139566	6.21	0.0001
DEPTH	1	3.26466777	134.69	0.0001	1	2.42749250	100.15	0.0001
TURBS	1	4.75391977	196.14	0.0001	1	4.75391977	196.14	0.0001

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: TURBS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	50	13039.36952257	276.78739045	50.00	0.0001	0.699209	36.4201
ERROR	1247	5951.25074962	4.77245449		ROOT MSE		TURBS MEAN
CORRECTED TOTAL	1297	19790.62027219			2.18459481		5.99832820

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	1075.80018772	56.36	0.0001	4	213.59325924	11.19	0.0001
STORM(QUARTER)	3	2131.00791163	148.84	0.0001	3	358.79457132	25.06	0.0001
STATION	39	3416.49700360	18.36	0.0001	39	624.75109179	3.36	0.0001
DEPTH	1	689.50890322	144.48	0.0001	1	85.63229165	17.94	0.0001
SC	1	41.89396051	8.70	0.0031	1	5.76937617	1.21	0.2718
TSSS	1	6403.93660230	1350.62	0.0001	1	6401.50725205	1350.12	0.0001
ST	1	0.63407359	0.13	0.7155	1	0.63407359	0.13	0.7155

DEPENDENT VARIABLE: TURBB

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	50	30242.93006087	604.85861730	22.46	0.0001	0.536534	61.8106
ERROR	970	26124.25000694	26.93221650		ROOT MSE		TURBB MEAN
CORRECTED TOTAL	1020	56367.18007501			5.18962505		8.39601371

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	3329.90499074	30.91	0.0001	4	833.23580769	7.73	0.0001
STORM(QUARTER)	3	3918.74339873	48.50	0.0001	3	1547.83559955	19.16	0.0001
STATION	39	4900.15424769	4.67	0.0001	39	2137.72385645	2.04	0.0002
DEPTH	1	112.89777029	4.19	0.0409	1	74.41324620	2.76	0.0968
BC	1	36.33096160	1.35	0.2457	1	22.25169724	0.83	0.3636
TSSB	1	17931.99953027	665.82	0.0001	1	17943.06425173	666.26	0.0001
BT	1	12.89995354	0.48	0.4891	1	12.89995354	0.48	0.4891

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: TURBS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	56	2090.97966928	37.33892624	2.85	0.0001	0.374702	63.0155
ERROR	266	3409.40519512	13.11806464		ROOT MSE		TURBS MEAN
CORRECTED TOTAL	322	5500.38506440			3.62160609		5.74761610

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	1209.16804980	23.04	0.0001	4	325.55267451	6.20	0.0001
STORM(QUARTER)	4	290.59183373	5.54	0.0003	4	286.55550361	5.46	0.0003
STATION	4	215.36605665	4.10	0.0030	4	44.11251060	0.84	0.5004
BARGE(QUARTE*STATIO)	44	375.85392909	0.65	0.9535	44	375.85392909	0.65	0.9565

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: TSSS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	47	1140.46588807	24.26523166	1.82	0.0052	0.421832	38.0745
ERROR	117	1563.13411193	13.36012061		ROOT MSE		TSSS MEAN
CORRECTED TOTAL	164	2703.60000000			3.65514908		9.60000000

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	486.40476190	9.10	0.0001	4	334.50025907	6.26	0.0001
STORM(QUARTER)	3	246.81142857	6.16	0.0007	3	265.26135301	6.62	0.0004
STATION	4	115.41818182	2.16	0.0778	4	72.42211046	1.36	0.2533
BARGE(QUARTE*STATIO)	34	279.37247036	0.62	0.9481	34	263.64791712	0.58	0.9653
ST	1	1.60012438	0.12	0.7299	1	0.98464660	0.07	0.7865
SC	1	10.85892104	0.81	0.3691	1	10.85892104	0.81	0.3591

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: TSSS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	45	1128.00684265	25.06681873	1.89	0.0033	0.417224	37.9033
ERROR	119	1575.59315735	13.24027863		ROOT MSE		TSSS MEAN
CORRECTED TOTAL	164	2703.60000000			3.63871937		9.60000000

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	486.40476190	9.18	0.0001	4	360.56390620	7.19	0.0001
STORM(QUARTER)	3	246.81142857	6.21	0.0007	3	264.78062217	6.67	0.0004
STATION	4	115.41818182	2.18	0.0754	4	83.55031344	1.58	0.1850
BARGE(QUARTE*STATIO)	34	279.37247036	0.62	0.9451	34	279.37247036	0.62	0.9451

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: TSSS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	49	24465.27153516	499.29125582	44.54	0.0001	0.635483	34.8249
ERROR	1252	14033.40511615	11.20879003		ROOT MSE		TSSS MEAN
CORRECTED TOTAL	1301	38498.67665131			3.34795311		9.61367127

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	630.85504889	14.07	0.0001	4	186.60462140	4.16	0.0024
STORM(QUARTER)	3	3187.83265417	94.80	0.0001	3	57.52486627	1.71	0.1611
STATION	39	3849.60364964	8.81	0.0001	39	424.97750172	0.97	0.5200
TURBS	1	16681.42419233	1488.24	0.0001	1	16573.84421512	1478.65	0.0001
ST	1	0.25676192	0.02	0.8797	1	1.69645975	0.15	0.6973
SC	1	115.29922819	10.29	0.0014	1	115.29922819	10.29	0.0014

DEPENDENT VARIABLE: TSSB

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	49	124047.03390264	2531.57212046	18.42	0.0001	0.480719	82.1403
ERROR	975	133998.02365833	137.43387042		ROOT MSE		TSSB MEAN
CORRECTED TOTAL	1024	258045.05756098			11.72321929		14.27219512

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	8392.90304008	15.27	0.0001	4	5913.61105967	10.76	0.0001
STORM(QUARTER)	3	6057.25762050	14.69	0.0001	3	334.33570362	0.81	0.4907
STATION	39	17322.67149580	3.23	0.0001	39	6750.98909776	1.26	0.1344
TURBS	1	92159.25120184	670.57	0.0001	1	92151.53004910	670.52	0.0001
ST	1	66.67231221	0.49	0.4863	1	62.40169925	0.45	0.5006
SC	1	48.27823221	0.35	0.5535	1	48.27823221	0.35	0.5535

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: VSSS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	44	255.24925772	5.80111949	2.82	0.0001	0.360318	44.8498
ERROR	220	453.15074228	2.05977610		ROOT MSE		VSSS MEAN
CORRECTED TOTAL	264	708.40000000			1.43519201		3.20000000

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	58.94823697	7.15	0.0001	4	69.20913995	8.41	0.0001
STATION	39	116.69258937	1.45	0.0506	39	73.63749053	0.92	0.6151
CHLORAS	1	79.60843137	38.65	0.0001	1	79.60843137	38.65	0.0001

DEPENDENT VARIABLE: VSSB

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	44	1279.69208529	29.08391103	2.60	0.0001	0.418305	75.9146
ERROR	159	1779.53830687	11.19206482		ROOT MSE		VSSB MEAN
CORRECTED TOTAL	203	3059.23039216			3.34545435		4.40686275

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	233.66572881	5.22	0.0006	4	227.37580875	5.08	0.0007
STATION	39	711.85434839	1.63	0.0191	39	545.97752993	1.25	0.1700
CHLGRAB	1	334.17200809	29.86	0.0001	1	334.17200809	29.86	0.0001

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: CHLORAS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	48	1101.50671690	22.94805660	5.45	0.0001	0.671380	31.1656
ERROR	128	539.15509101	4.21214915		ROOT MSE		CHLORAS MEAN
CORRECTED TOTAL	176	1640.66180791			2.05235210		6.58531073

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
QUARTER	4	222.60020584	13.21	0.0001	4	110.97966334	6.59	0.0001
STATION	39	700.63874384	4.27	0.0001	39	323.98029225	1.97	0.0025
MS	1	103.40994534	24.55	0.0001	1	10.17810657	2.42	0.1225
SECCHI	1	40.94566448	9.72	0.0023	1	23.21081323	5.51	0.0204
SC	1	0.50928412	0.12	0.7286	1	0.45073636	0.11	0.7441
ST	1	8.06459137	1.91	0.1689	1	6.85955886	1.63	0.2042
VSSS	1	25.33826190	6.02	0.0155	1	25.33820190	6.02	0.0155

APPENDIX III

BENTHIC INFAUNAL DATA

Number per M^2 and percent composition for dominant species.

6-14-83

STATION 1

3477	43.9	COROPHIUM LACUSTRE
1035	13.1	ODOSTOMIA SP.
757	9.6	HALMYRAPSEUDES CF. CUBANENSIS
512	6.5	HAPLOSCOLOPLOS FOLIOSUS
405	5.1	XENANTHURA BREVITELSON
331	4.2	HETEROMASTUS FILIFORMIS
235	3.0	GRANDIDIERELLA BONNIEROIDES
224	2.8	AMPELISCA ABDITA
149	1.9	MEDIOMASTUS AMBISETA
107	1.3	APANTHURA MAGNIFICA

9-8-83

STATION 1

7200	75.7	HALMYRAPSEUDES CF. CUBANENSIS
448	4.7	TAGELUS PLEBIUS
395	4.1	XENANTHURA BREVITELSON
341	3.6	PARASTARTE TRIQUERTA
213	2.2	MEDIOMASTUS AMBISETA
128	1.3	HETEROMASTUS FILIFORMIS
117	1.2	HAPLOSCOLOPLOS FOLIOSUS
107	1.1	STREBLOSPIO BENEDICTI
107	1.1	APANTHURA CF. SIGNATA
85	0.9	PARANDALIA AMERICANA

11-23-83

STATION 1

13813	84.6	HALMYRAPSEUDES CF. CUBANENSIS
725	4.4	XENANTHURA BREVITELSON
341	2.1	TELLINA SP.
299	1.8	HAPLOSCOLOPLOS FOLIOSUS
235	1.4	STREBLOSPIO BENEDICTI
149	0.9	PARANDALIA AMERICANA
107	0.7	SCOLELEPIS TEXANA
75	0.5	CYATHURA POLITA
64	0.4	NEANTHES SUCCINEA
53	0.3	MEDIOMASTUS AMBISETA

2-23-84

STATION 1

6869	36.8	H[illegible]YRAPSEUDES CF. CUBANENSIS
4917	26.3	TA[illegible]LUS PLEBIUS
2176	11.7	XENANTHURA BREVITELSON
1621	8.7	STREBLOSPIO BENEDICTI
864	4.6	HAPLOSCOLOPLOS FOLIOSUS
373	2.0	POLYDORA LIGNI
373	2.0	PARASTARTE TRIQUERTA
181	1.0	HETEROMASTUS FILIFORMIS
149	0.8	CYATHURA POLITA
128	0.7	LAEONEREIS CULVERI

6-6-84

STATION 1

1250	27.4	HALMYRAPSEUDES CF. CUBANENSIS
811	17.6	XENANTHURA BREVITELSON
491	10.7	HAPLOSCOLOPLOS FOLIOSUS
491	10.7	COROPHIUM LOUISANIUM
320	7.0	MESANTHURA FLORIDENSIS
288	6.3	ODOSTOMIA SP.
149	3.2	TAGELUS PLEBIUS
117	2.6	PARANDALIA AMERICANA
96	2.1	HETEROMASTUS FILIFORMIS
85	1.9	LAEONEREIS CULVERI

6-14-83

STATION 2

4085	42.0	AMPELISCA HOLMESI
736	7.6	ARICIDEA TAYLORI
501	5.2	ARICIDEA PHILBINAE
469	4.8	MULINIA LATERALIS
437	4.5	MAGELONA PETTIBONEAE
331	3.4	AMPELISCA ABDITA
288	3.0	AMYGDALUM PAPYRIUM
277	2.9	KINBERGONUPHIS SIMONI
256	2.6	THARYX CF. DORSOBRANCHIALIS
235	2.4	CUMELLA SP. A.

9-8-83

STATION 2

1493	35.7	STREBLOSPIO BENEDICTI
565	13.5	ARICIDEA PHILBINAE
363	8.7	MEDIOMASTUS AMBISETA
256	6.1	MAGELONA PETTIBONEAE
245	5.9	ARICIDEA TAYLORI
192	4.6	THARYX CF. DORSOBRANCHIALIS
171	4.1	KINBERGONUPHIS SIMONI
149	3.6	PARAPRIONOSPIO PINNATA
96	2.3	CAPITELLA CAPITATA
85	2.0	SCOLOPLOS RUBRA

11-23-83

STATION 2

864	9.9	ARICIDEA PHILBINAE
811	9.2	STREBLOSPIO BENEDICTI
661	7.5	ARICIDEA TAYLORI
651	7.4	KINBERGONUPHIS SIMONI
629	7.2	MEDIOMASTUS SP.
576	6.6	SCOLELEPIS TEXANA
555	6.3	PARAPRIONOSPIO PINNATA
459	5.2	SPIOCHAETOPTERUS C. OCULATUS
437	5.0	ACTEOCINA CANALICULATA
341	3.9	MAGELONA PETTIBONEAE

2-23-84

STATION 2

1419	10.4	STREBLOSPIO BENEDICTI
1120	8.2	ARICIDEA TAYLORI
917	6.7	ARICIDEA PHILBINAE
885	6.5	MEDIOMASTUS AMBISETA
779	5.7	MOOREONUPHIS NEBULOSA
704	5.2	MYSELLA PLANULATA
555	4.1	MAGELONA PETTIBONEAE
555	4.1	GAMMARUS MUCRONATUS
512	3.8	OXYUROSTYLIS SMITHI
469	3.4	CYMADUSA COMPTA

6-6-84

STATION 2

1152	17.0	THARYX CF. DORSOBRANCHIALIS
747	11.0	ARICIDEA PHILBINAE
533	7.9	MOOREONUPHIS NEBULOSA
523	7.7	FABRICIA SP. A
416	6.2	ARICIDEA TAYLORI
384	5.7	AMPELISCA HOLMESI
288	4.3	MEDIOMASTUS AMBISETA
213	3.2	CAPITELLA CAPITATA
160	2.4	CREPIDULA PLANA
149	2.2	NEANTHES SUCCINEA

6-14-83

STATION 3

3947	30.3	BRACHIDONTES EXUSTUS
2368	18.2	AMYGDALUM PAPYRIUM
1664	12.8	CREPIDULA PLANA
267	2.0	MEDIOMASTUS AMBISETA
245	1.9	LUMBRINERIS VERRILLI
245	1.9	CUMELLA SP. A.
224	1.7	NEANTHES SUCCINEA
224	1.7	MYSELLA PLANULATA
213	1.6	MEDIOMASTUS CALIFORNIENSIS
192	1.5	COROPHIUM LACUSTRE

9-8-83

STATION 3

2240	20.8	CAECUM PULCHELLUM
1045	9.7	BRACHIDONTES EXUSTUS
960	8.9	STREBLOSPIO BENEDICTI
715	6.6	MEDIOMASTUS AMBISETA
469	4.4	ARICIDEA TAYLORI
331	3.1	THARYX CF. DORSOBRANCHIALIS
331	3.1	CREPIDULA PLANA
288	2.7	FABRICIA SP. A
277	2.6	MYSELLA PLANULATA
245	2.3	CIRROPHORUS CF. FURCATUS

11-23-83

STATION 3

5739	21.1	CREPIDULA PLANA
2528	9.3	MEDIOMASTUS CALIFORNIENSIS
1973	7.3	BRACHIDONTES EXUSTUS
1963	7.2	KINBERGONUPHIS SIMONI
1355	5.0	NEANTHES SUCCINEA
1291	4.7	COROPHIUM SP. A
1077	4.0	CRASSOSTREA VIRGINICA
704	2.6	SCOLELEPIS TEXANA
640	2.4	SPIOCHAETOPTERUS C. OCULATUS
608	2.2	THARYX CF. DORSOBRANCHIALIS

2-23-84

STATION 3

3125	18.2	CYMADUSA COMPTA
2155	12.6	MEDIOMASTUS AMBISETA
1333	7.8	FABRICIA SP. A
971	5.7	KINBERGONUPHIS SIMONI
725	4.2	OXYUROSTYLIS SMITHI
651	3.8	CAECUM PULCHELLUM
597	3.5	BRACHIDONTES EXUSTUS
597	3.5	COROPHIUM ACHERUSICUM
501	2.9	EXOGONE DISPAR
448	2.6	MITRELLA LUNATA

6-6-84

STATION 3

3616	15.1	CREPIDULA PLANA
2923	12.2	AMYGDALUM PAPYRIUM
2464	10.3	CAECUM PULCHELLUM
949	4.0	AMPELISCA ABDITA
821	3.4	FABRICIA SP. A
672	2.8	BRACHIDONTES EXUSTUS
661	2.8	COROPHIUM LACUSTRE
587	2.4	MYSELLA PLANULATA
501	2.1	GRANDIDIERELLA BONNIEROIDES
427	1.8	MELITA ELONGATA

6-14-83

STATION 4

4555	40.9	HALMYRAPSEUDES CF. CUBANENSIS
3477	31.2	AMPELISCA ABDITA
853	7.7	ARICIDEA PHILBINAE
587	5.3	MEDIOMASTUS AMBISETA
363	3.3	STREBLOSPIO BENEDICTI
235	2.1	MULINIA LATERALIS
213	1.9	CAPITELLA CAPITATA
203	1.8	ACTEON PUNCTOSTRIATUS
128	1.1	CUMELLA SP. A.
96	0.9	HAPLOSCOLOPLOS FRAGILIS

7-25-83

STATION 4

19435	73.3	HALMYRAPSEUDES CF. CUBANENSIS
3531	13.3	AMPELISCA ABDITA
1280	4.8	MEDIOMASTUS AMBISETA
576	2.2	STREBLOSPIO BENEDICTI
427	1.6	ARICIDEA PHILBINAE
181	0.7	THARYX CF. DORSOBRANCHIALIS
139	0.5	MELITA ELONGATA
85	0.3	HAPLOSCOLOPLOS FRAGILIS
85	0.3	AMPELISCA AGASSIZI
75	0.3	XENANTHURA BREVITELSON

9-8-83

STATION 4

2112	21.9	MEDIOMASTUS AMBISETA
2037	21.1	HALMYRAPSEUDES CF. CUBANENSIS
1301	13.5	AMPELISCA ABDITA
917	9.5	HAPLOSCOLOPLOS FRAGILIS
512	5.3	HAPLOSCOLOPLOS FOLIOSUS
373	3.9	CAPITELLA CAPITATA
352	3.6	STREBLOSPIO BENEDICTI
299	3.1	XENANTHURA BREVITELSON
288	3.0	ARICIDEA PHILBINAE
235	2.4	PARANDALIA AMERICANA

10-13-83

STATION 4

2421	55.9	MEDIOMASTUS AMBISETA
907	20.9	STREBLOSPIO BENEDICTI
480	11.1	ARICIDEA PHILBINAE
149	3.4	PARANDALIA AMERICANA
53	1.2	MELITA LONGISETOSA
43	1.0	CAPITELLA CAPITATA
43	1.0	HAPLOSCOLOPLOS FRAGILIS
32	0.7	PARAPRIONOSPIO PINNATA
32	0.7	OGYRIDES ALPHAEROSTRIS
21	0.5	CIRROPHORUS CF. FURCATUS

11-23-83

STATION 4

960	46.6	STREBLOSPIO BENEDICTI
341	16.6	HAPLOSCOLOPLOS FOLIOSUS
267	13.0	ARICIDEA PHILBINAE
213	10.4	MEDIOMASTUS SP.
75	3.6	PARAPRIONOSPIO PINNATA
32	1.6	CAPITELLA CAPITATA
32	1.6	HAPLOSCOLOPLOS FRAGILIS
21	1.0	PARANDALIA AMERICANA
11	0.5	CIRROPHORUS CF. FURCATUS
11	0.5	GYPTIS BREVIPALPA

1-4-84

STATION 4

1813	36.8	STREBLOSPIO BENEDICTI
821	16.7	MEDIOMASTUS AMBISETA
683	13.9	HAPLOSCOLOPLOS FOLIOSUS
448	9.1	CAPITELLA CAPITATA
213	4.3	ARICIDEA PHILBINAE
139	2.8	THARYX CF. DORSOBRANCHIALIS
96	1.9	ACTEON PUNCTOSTRIATUS
85	1.7	ODOSTOMIA SP.
75	1.5	HAPLOSCOLOPLOS FRAGILIS
75	1.5	PARANDALIA AMERICANA

2-23-84

STATION 4

6357	50.7	STREBLOSPIO BENEDICTI
1205	9.6	MEDIOMASTUS AMBISETA
768	6.1	CAPITELLA CAPITATA
597	4.8	AMPELISCA ABDITA
576	4.6	HAPLOSCOLOPLOS FOLIOSUS
544	4.3	CYCLASPIS SP. A
480	3.8	ARICIDEA PHILBINAE
480	3.8	HAPLOSCOLOPLOS FRAGILIS
288	2.3	HALMYRAPSEUDES CF. CUBANENSIS
203	1.6	ODOSTOMIA SP.

4-16-84

STATION 4

2091	41.3	STREBLOSPIO BENEDICTI
1291	25.5	MEDIOMASTUS AMBISETA
704	13.9	HALMYRAPSEUDES CF. CUBANENSIS
363	7.2	ARICIDEA PHILBINAE
96	1.9	HAPLOSCOLOPLOS FRAGILIS
85	1.7	THARYX CF. DORSOBRANCHIALIS
75	1.5	PARANDALIA AMERICANA
64	1.3	SCOLOPLOS RUBRA
64	1.3	EULIMASTOMA SP. A
53	1.1	PARAPRIONOSPIO PINNATA

6-6-84

STATION 4

17472	71.6	HALMYRAPSEUDES CF. CUBANENSIS
2176	8.9	MEDIOMASTUS AMBISETA
1152	4.7	AMPELISCA ABDITA
971	4.0	HAPLOSCOLOPLOS FRAGILIS
512	2.1	STREBLOSPIO BENEDICTI
427	1.7	CAPITELLA CAPITATA
320	1.3	ARICIDEA PHILBINAE
320	1.3	CIRROPHORUS CF. FURCATUS
203	0.8	PARANDALIA AMERICANA
128	0.5	ASCIDIACEA SP.

7-17-84

STATION 4

704	36.3	ASCIDIACEA SP.
384	19.8	HAPLOSCOLOPLOS FRAGILIS
277	14.3	MEDIOMASTUS CALIFORNIENSIS
96	4.9	STREBLOSPIO BENEDICTI
64	3.3	PARANDALIA AMERICANA
53	2.7	PARAPRIONOSPIO PINNATA
53	2.7	ARICIDEA SP. C
43	2.2	THARYX CF. DORSOBRANCHIALIS
32	1.6	ARICIDEA PHILBINAE
32	1.6	TELLINA SP.

6-14-83

STATION 5

1429	32.5	STREBLOSPIO BENEDICTI
1003	22.8	ARICIDEA PHILBINAE
544	12.4	MEDIOMASTUS AMBISETA
427	9.7	CAPITELLA CAPITATA
213	4.9	ACTEON PUNCTOSTRIATUS
128	2.9	HAPLOSCOLOPLOS FRAGILIS
85	1.9	CUMELLA SP. A.
85	1.9	MELITA ELONGATA
75	1.7	MULINIA LATERALIS
75	1.7	AMPELISCA ABDITA

7-25-83

STATION 5

1120	37.1	ARICIDEA PHILBINAE
864	28.6	MEDIOMASTUS AMBISETA
267	8.8	STREBLOSPIO BENEDICTI
107	3.5	HAPLOSCOLOPLOS FRAGILIS
85	2.8	MELITA ELONGATA
75	2.5	CAPITELLA CAPITATA
64	2.1	PARANDALIA AMERICANA
53	1.8	ARICIDEA TAYLORI
53	1.8	TELLINA VERSICOLOR
53	1.8	MICROPROTOPUS RANEYI

9-8-83

STATION 5

2528	52.2	MEDIOMASTUS AMBISETA
1173	24.2	STREBLOSPIO BENEDICTI
736	15.2	ARICIDEA PHILBINAE
107	2.2	HAPLOSCOLOPLOS FRAGILIS
64	1.3	PARAPRIONOSPIO PINNATA
32	0.7	PARANDALIA AMERICANA
32	0.7	SCOLOPLOS RUBRA
32	0.7	OGYRIDES ALPHAEROSTRIS
21	0.4	CAPITELLA CAPITATA
21	0.4	ALPHEUS HETEROCHAELIS

10-13-83

STATION 5

1376	41.0	STREBLOSPIO BENEDICTI
1013	30.2	MEDIOMASTUS SP.
512	15.2	ARICIDEA PHILBINAE
192	5.7	HAPLOSCOLOPLOS FRAGILIS
64	1.9	ARICIDEA TAYLORI
53	1.6	PARAPRIONOSPIO PINNATA
43	1.3	TELLINA SP.
21	0.6	PARANDALIA AMERICANA
11	0.3	FABRICIA SP. A
11	0.3	LUMBRINERIS VERRILLI

11-23-83

STATION 5

1141	40.1	STREBLOSPIO BENEDICTI
309	10.9	ARICIDEA PHILBINAE
309	10.9	HAPLOSCOLOPLOS FOLIOSUS
203	7.1	MEDIOMASTUS SP.
160	5.6	PARAPRIONOSPIO PINNATA
139	4.9	HAPLOSCOLOPLOS FRAGILIS
96	3.4	CAPITELLA CAPITATA
96	3.4	SCOLELEPIS TEXANA
75	2.6	OGYRIDES ALPHAEROSTRIS
53	1.9	THARYX CF. DORSOBRANCHIALIS

1-4-84

STATION 5

3285	44.5	STREBLOSPIO BENEDICTI
1248	16.9	MEDIOMASTUS AMBISETA
1163	15.8	HAPLOSCOLOPLOS FOLIOSUS
725	9.8	ARICIDEA PHILBINAE
224	3.0	HAPLOSCOLOPLOS FRAGILIS
171	2.3	CAPITELLA CAPITATA
128	1.7	ODOSTOMIA SP.
107	1.4	PARAPRIONOSPIO PINNATA
107	1.4	TELLINA SP.
64	0.9	SCOLELEPIS TEXANA

2-23-84

STATION 5

7136	46.2	STREBLOSPIO BENEDICTI
2037	13.2	MEDIOMASTUS AMBISETA
1483	9.6	ARICIDEA PHILBINAE
1013	6.6	HAPLOSCOLOPLOS FRAGILIS
949	6.1	HAPLOSCOLOPLOS FOLIOSUS
715	4.6	ODOSTOMIA SP.
395	2.6	COROPHIUM TUBERCULATUM
352	2.3	CAPITELLA CAPITATA
192	1.2	CYCLASPIS SP. A
181	1.2	TELLINA SP.

4-16-84

STATION 5

1088	27.5	STREBLOSPIO BENEDICTI
1067	27.0	HAPLOSCOLOPLOS FRAGILIS
587	14.8	ARICIDEA PHILBINAE
363	9.2	HAPLOSCOLOPLOS FOLIOSUS
160	4.0	MEDIOMASTUS AMBISETA
139	3.5	PARAPRIONOSPIO PINNATA
96	2.4	ETEONE LACTEA
75	1.9	CAPITELLA CAPITATA
75	1.9	AMPELISCA ABDITA
53	1.3	TELLINA SYBARITICA

6-6-84

STATION 5

1237	32.2	HAPLOSCOLOPLOS FRAGILIS
405	10.6	ASCIDIACEA SP.
395	10.3	ARICIDEA PHILBINAE
352	9.2	MEDIOMASTUS AMBISETA
245	6.4	HAPLOSCOLOPLOS FOLIOSUS
192	5.0	STREBLOSPIO BENEDICTI
149	3.9	CAPITELLA CAPITATA
96	2.5	TELLINA VERSICOLOR
75	1.9	PARAPRIONOSPIO PINNATA
64	1.7	MYSELLA PLANULATA

7-17-84

STATION 5

587	25.8	HAPLOSCOLOPLOS FRAGILIS
341	15.0	ARICIDEA PHILBINAE
235	10.3	STREBLOSPIO BENEDICTI
149	6.6	PARAHESIONE LUTEOLA
128	5.6	MEDIOMASTUS SP.
107	4.7	ODOSTOMIA SP.
96	4.2	MEDIOMASTUS AMBISETA
75	3.3	PARAPRIONOSPIO PINNATA
64	2.8	MELITA SP.
53	2.3	CAPITELLA CAPITATA

6-14-83

STATION 6

2080	36.0	ARICIDEA PHILBINAE
629	10.9	MEDIOMASTUS AMBISETA
395	6.8	DIASTOMA VARIUM
277	4.8	CYMODOCE FAXONI
213	3.7	CAPITELLA CAPITATA
213	3.7	MITRELLA LUNATA
181	3.1	ERICHSONELLA CF. ATTENUATA
171	3.0	STREBLOSPIO BENEDICTI
171	3.0	MULINIA LATERALIS
128	2.2	NEANTHES SUCCINEA

9-8-83

STATION 6

853	29.4	ARICIDEA PHILBINAE
736	25.4	STREBLOSPIO BENEDICTI
640	22.1	MEDIOMASTUS AMBISETA
107	3.7	NEANTHES SUCCINEA
96	3.3	PARANDALIA AMERICANA
96	3.3	SCOLOPLOS RUBRA
96	3.3	THARYX CF. DORSOBRANCHIALIS
32	1.1	HAPLOSCOLOPLOS FRAGILIS
32	1.1	AMYGDALUM PAPYRIUM
32	1.1	AMPELISCA HOLMESI

11-23-83

STATION 6

2827	42.3	STREBLOSPIO BENEDICTI
1003	15.0	ARICIDEA PHILBINAE
619	9.3	HAPLOSCOLOPLOS FOLIOSUS
555	8.3	MEDIOMASTUS SP.
373	5.6	HAPLOSCOLOPLOS FRAGILIS
245	3.7	PARAPRIONOSPIO PINNATA
224	3.4	SCOLELEPIS TEXANA
139	2.1	ARICIDEA TAYLORI
128	1.9	HAMINOE SUCCINEA
85	1.3	MEDIOMASTUS AMBISETA

2-23-84

STATION 6

7808	64.2	STREBLOSPIO BENEDICTI
864	7.1	HAPLOSCOLOPLOS FRAGILIS
768	6.3	ARICIDEA PHILBINAE
448	3.7	HAPLOSCOLOPLOS FOLIOSUS
405	3.3	MEDIOMASTUS AMBISETA
395	3.2	ODOSTOMIA SP.
320	2.6	TELLINA TEXANA
309	2.5	CYCLASPIS SP. A
128	1.1	POLYDORA LIGNI
117	1.0	CAPITELLA CAPITATA

6-6-84

STATION 6

1781	18.5	MEDIOMASTUS AMBISETA
1675	17.4	ARICIDEA PHILBINAE
939	9.8	CAPITELLA CAPITATA
683	7.1	NEANTHES SUCCINEA
469	4.9	ASCIDIACEA SP.
448	4.7	HAPLOSCOLOPLOS FRAGILIS
416	4.3	HAPLOSCOLOPLOS FOLIOSUS
341	3.6	STREBLOSPIO BENEDICTI
299	3.1	HARGERIA RAPAX
235	2.4	COROPHIUM LACUSTRE

6-14-83

STATION 7

565	15.2	AMPELISCA HOLMESI
448	12.0	MULINIA LATERALIS
363	9.7	ARICIDEA TAYLORI
277	7.4	HAPLOSCOLOPLOS FRAGILIS
213	5.7	ARICIDEA PHILBINAE
139	3.7	SCOLOPLOS RUBRA
128	3.4	CUMELLA SP. A.
117	3.2	MEDIOMASTUS AMBISETA
107	2.9	PARAPRIONOSPIO PINNATA
85	2.3	THARYX CF. DORSOBRANCHIALIS

7-25-83

STATION 7

949	22.7	STREBLOSPIO BENEDICTI
491	11.7	ARICIDEA PHILBINAE
459	11.0	ARICIDEA TAYLORI
384	9.2	MEDIOMASTUS AMBISETA
277	6.6	THARYX CF. DORSOBRANCHIALIS
171	4.1	SCOLOPLOS RUBRA
149	3.6	LUMBRINERIS VERRILLI
117	2.8	HAPLOSCOLOPLOS FRAGILIS
107	2.6	HAMINOE SUCCINEA
85	2.0	ERICHTHONIUS BRASILIENSIS

9-8-83

STATION 7

1355	35.1	STREBLOSPIO BENEDICTI
480	12.4	ARICIDEA TAYLORI
405	10.5	PARAPRIONOSPIO PINNATA
256	6.6	ARICIDEA PHILBINAE
256	6.6	MYSELLA PLANULATA
213	5.5	THARYX CF. DORSOBRANCHIALIS
181	4.7	MEDIOMASTUS AMBISETA
96	2.5	HAPLOSCOLOPLOS FRAGILIS
64	1.7	SCOLOPLOS RUBRA
53	1.4	MULINIA LATERALIS

10-13-83

STATION 7

363	12.6	THARYX CF. DORSOBRANCHIALIS
309	10.8	ARICIDEA TAYLORI
245	8.6	STREBLOSPIO BENEDICTI
203	7.1	PARAPRIONOSPIO PINNATA
181	6.3	SCOLOPLOS RUBRA
160	5.6	ARICIDEA PHILBINAE
149	5.2	MEDIOMASTUS SP.
107	3.7	KINBERGONUPHIS SIMONI
107	3.7	MAGELONA PETTIBONEAE
85	3.0	CREPIDULA SP.

11-23-83

STATION 7

2379	21.1	STREBLOSPIO BENEDICTI
1739	15.4	ARICIDEA PHILBINAE
1333	11.8	MEDIOMASTUS SP.
1301	11.5	SCOLELEPIS TEXANA
565	5.0	ARICIDEA TAYLORI
405	3.6	SCOLOPLOS RUBRA
384	3.4	MOOREONUPHIS NEBULOSA
373	3.3	PARAPRIONOSPIO PINNATA
363	3.2	THARYX CF. DORSOBRANCHIALIS
224	2.0	HAPLOSCOLOPLOS SP.

1-4-84

STATION 7

7168	44.3	STREBLOSPIO BENEDICTI
1429	8.8	HAPLOSCOLOPLOS FOLIOSUS
1312	8.1	MEDIOMASTUS SP.
1045	6.5	PARAPRIONOSPIO PINNATA
907	5.6	KINBERGONUPHIS SIMONI
811	5.0	ARICIDEA PHILBINAE
437	2.7	THARYX CF. DORSOBRANCHIALIS
352	2.2	SCOLELEPIS SQUAMATA
299	1.8	ARICIDEA TAYLORI
213	1.3	CYCLASPIS SP. A

2-23-84

STATION 7

2208	25.8	STREBLOSPIO BENEDICTI
1237	14.5	MEDIOMASTUS AMBISETA
768	9.0	SCOLELEPIS TEXANA
704	8.2	ARICIDEA PHILBINAE
427	5.0	MOOREONUPHIS NEBULOSA
341	4.0	THARYX CF. DORSOBRANCHIALIS
256	3.0	ARICIDEA TAYLORI
235	2.7	HAPLOSCOLOPLOS FOLIOSUS
213	2.5	PHORONIS ARCHITECTA
160	1.9	FABRICIA SP. A

4-16-84

STATION 7

1824	14.6	ARICIDEA PHILBINAE
1472	11.8	STREBLOSPIO BENEDICTI
1067	8.5	MEDIOMASTUS AMBISETA
1035	8.3	SCOLELEPIS TEXANA
853	6.8	THARYX CF. DORSOBRANCHIALIS
811	6.5	KINBERGONUPHIS SIMONI
661	5.3	SPHAEROSYLLIS TAYLORI
629	5.0	ARICIDEA TAYLORI
320	2.6	ETEONE LACTEA
299	2.4	STREPTOSYLLIS PETTIBONEAE

6-6-84

STATION 7

405	11.6	HAPLOSCOLOPLOS FRAGILIS
395	11.3	STREBLOSPIO BENEDICTI
363	10.4	HAPLOSCOLOPLOS FOLIOSUS
288	8.3	PARAPRIONOSPIO PINNATA
267	7.6	ARICIDEA PHILBINAE
181	5.2	MYSELLA PLANULATA
139	4.0	ODOSTOMIA SP.
117	3.4	SPIOCHAETOPTERUS C. OCULATUS
117	3.4	THARYX CF. DORSOBRANCHIALIS
107	3.1	CAPITELLA CAPITATA

7-17-84

STATION 7

[illegible]	23.7	STREBLOSPIO BENEDICTI
[illegible]	11.4	HAPLOSCOLOPLOS FRAGILIS
[illegible]	8.5	ARICIDEA PHILBINAE
92	5.7	PARAPRIONOSPIO PINNATA
181	5.4	THARYX CF. DORSOBRANCHIALIS
171	5.1	ARICIDEA TAYLORI
160	4.7	HOLOTHUROIDEA SP.
149	4.4	MYSELLA PLANULATA
128	3.8	MEDIOMASTUS SP.
117	3.5	TELLINA SP.

6-14-83

STATION 8

363	18.4	STREBLOSPIO BENEDICTI
267	13.5	OGYRIDES ALPHAEROSTRIS
235	11.9	HAPLOSCOLOPLOS FRAGILIS
203	10.3	ARICIDEA PHILBINAE
203	10.3	PARAPRIONOSPIO PINNATA
96	4.9	MEDIOMASTUS AMBISETA
85	4.3	ARICIDEA TAYLORI
85	4.3	CUMELLA SP. A.
53	2.7	SPIOCHAETOPTERUS C. OCULATUS
53	2.7	THARYX CF. DORSOBRANCHIALIS

9-8-83

STATION 8

3573	70.8	STREBLOSPIO BENEDICTI
501	9.9	PARAPRIONOSPIO PINNATA
149	3.0	ARICIDEA TAYLORI
139	2.7	HAPLOSCOLOPLOS FRAGILIS
128	2.5	EULIMASTOMA SP. A
96	1.9	MEDIOMASTUS CALIFORNIENSIS
85	1.7	ARICIDEA PHILBINAE
75	1.5	THARYX CF. DORSOBRANCHIALIS
53	1.1	MINUSPIO CIRRIFERA
32	0.6	CARAZZIELLA HOBSONAE

11-23-83

STATION 8

1184	35.7	PARAPRIONOSPIO PINNATA
768	23.2	STREBLOSPIO BENEDICTI
277	8.4	HAPLOSCOLOPLOS FOLIOSUS
117	3.5	OGYRIDES ALPHAEROSTRIS
107	3.2	CARAZZIELLA HOBSONAE
96	2.9	ARICIDEA TAYLORI
96	2.9	THARYX CF. DORSOBRANCHIALIS
85	2.6	SCOLELEPIS TEXANA
75	2.3	ARICIDEA PHILBINAE
53	1.6	SPIOCHAETOPTERUS C. OCULATUS

2-23-84

STATION 8

3925	33.8	STREBLOSPIO BENEDICTI
3360	28.9	HAPLOSCOLOPLOS FOLIOSUS
1387	11.9	PARAPRIONOSPIO PINNATA
1003	8.6	HAPLOSCOLOPLOS FRAGILIS
480	4.1	ODOSTOMIA SP.
427	3.7	MEDIOMASTUS SP.
117	1.0	ARICIDEA TAYLORI
96	0.8	SCOLELEPIS TEXANA
85	0.7	SPIOCHAETOPTERUS C. OCULATUS
75	0.6	TELLINA SP.

6-6-84

STATION 8

608	17.8	HAPLOSCOLOPLOS FRAGILIS
501	14.6	PARAPRIONOSPIO PINNATA
480	14.0	STREBLOSPIO BENEDICTI
352	10.3	MEDIOMASTUS AMBISETA
235	6.9	HAPLOSCOLOPLOS FOLIOSUS
171	5.0	ARICIDEA PHILBINAE
139	4.0	OGYRIDES ALPHAEROSTRIS
117	3.4	CAPITELLA CAPITATA
107	3.1	THARYX CF. DORSOBRANCHIALIS
85	2.5	AMPELISCA HOLMESI

6-14-83

STATION 9

565	10.1	AMYGDALUM PAPYRIUM
544	9.8	LUMBRINERIS VERRILLI
448	8.0	MEDIOMASTUS AMBISETA
384	6.9	CREPIDULA PLANA
331	5.9	CUMELLA SP. A.
299	5.4	MYRIOCHELE OCULATA
288	5.2	MULINIA LATERALIS
171	3.1	BOGUEA ENIGMATICA
160	2.9	THARYX CF. DORSOBRANCHIALIS
139	2.5	BRACHIDONTES EXUSTUS

7-25-83

STATION 9

1952	24.7	MEDIOMASTUS AMBISETA
1131	14.3	LUMBRINERIS VERRILLI
448	5.7	BRACHIDONTES EXUSTUS
395	5.0	EXOGONE DISPAR
363	4.6	MYRIOCHELE OCULATA
309	3.9	CIRROPHORUS CF. FURCATUS
299	3.8	THARYX CF. DORSOBRANCHIALIS
267	3.4	ARICIDEA TAYLORI
213	2.7	EULALIA SANGUINEA
128	1.6	FABRICIA SP. A

9-8-83

STATION 9

1440	18.8	STREBLOSPIO BENEDICTI
757	9.9	MEDIOMASTUS AMBISETA
651	8.5	LUMBRINERIS VERRILLI
384	5.0	SCOLOPLOS RUBRA
373	4.9	PARACAPRELLA TENUIS
352	4.6	THARYX CF. DORSOBRANCHIALIS
341	4.5	BRACHIDONTES EXUSTUS
331	4.3	PARAPRIONOSPIO PINNATA
256	3.3	AMYGDALUM PAPYRIUM
171	2.2	MYRIOCHELE OCULATA

10-13-83

STATION 9

245	14.3	PARAPRIONOSPIO PINNATA
181	10.6	HAPLOSCOLOPLOS FRAGILIS
117	6.8	STREBLOSPIO BENEDICTI
107	6.2	NEAEROMYA FLORIDANA
107	6.2	ERICTHONIUS BRASILIENSIS
96	5.6	MITRELLA LUNATA
75	4.3	MICROPHOLIS GRACILLIMA
64	3.7	ARICIDEA TAYLORI
64	3.7	THARYX CF. DORSOBRANCHIALIS
64	3.7	MEDIOMASTUS SP.

11-23-83

STATION 9

1205	28.0	THARYX CF. DORSOBRANCHIALIS
800	18.6	SPIOCHAETOPTERUS C. OCULATUS
587	13.6	NEAEROMYA FLORIDANA
373	8.7	PARAPRIONOSPIO PINNATA
149	3.5	ARICIDEA TAYLORI
117	2.7	MICROPHOLIS GRACILLIMA
107	2.5	POLYNOID GENUS D
75	1.7	MINUSPIO CIRRIFERA
64	1.5	MYRIOCHELE OCULATA
53	1.2	HAPLOSCOLOPLOS SP.

1-4-84

STATION 9

3093	35.6	HAPLOSCOLOPLOS FOLIOSUS
939	10.8	STREBLOSPIO BENEDICTI
907	10.4	PARAPRIONOSPIO PINNATA
768	8.8	MEDIOMASTUS AMBISETA
661	7.6	THARYX CF. DORSOBRANCHIALIS
480	5.5	SPIOCHAETOPTERUS C. OCULATUS
341	3.9	MYRIOCHELE OCULATA
299	3.4	SCOLELEPIS TEXANA
139	1.6	ARICIDEA TAYLORI
85	1.0	ACTEOCINA CANALICULATA

2-23-84

STATION 9

3477	37.3	HAPLOSCOLOPLOS FOLIOSUS
1099	11.8	STREBLOSPIO BENEDICTI
725	7.8	PARAPRIONOSPIO PINNATA
629	6.8	HAPLOSCOLOPLOS FRAGILIS
427	4.6	ODOSTOMIA SP.
373	4.0	MEDIOMASTUS AMBISETA
267	2.9	CYCLASPIS SP. A
256	2.7	THARYX CF. DORSOBRANCHIALIS
192	2.1	SPIOCHAETOPTERUS C. OCULATUS
192	2.1	MINUSPIO CIRRIFERA

4-16-84

STATION 9

3573	45.5	HAPLOSCOLOPLOS FOLIOSUS
736	9.4	PARAPRIONOSPIO PINNATA
608	7.7	STREBLOSPIO BENEDICTI
480	6.1	MEDIOMASTUS SP.
416	5.3	MEDIOMASTUS AMBISETA
288	3.7	SPIOCHAETOPTERUS C. OCULATUS
277	3.5	SCOLELEPIS TEXANA
181	2.3	CARAZZIELLA HOBSONAE
171	2.2	ACTEOCINA CANALICULATA
160	2.0	ARICIDEA TAYLORI

6-6-84

STATION 9

1877	16.7	THARYX CF. DORSOBRANCHIALIS
715	6.4	MEDIOMASTUS AMBISETA
715	6.4	MEDIOMASTUS SP.
704	6.3	MYRIOCHELE OCULATA
501	4.5	ARICIDEA TAYLORI
427	3.8	HAPLOSCOLOPLOS FOLIOSUS
341	3.0	FABRICIA SP. A
341	3.0	ASCIDIACEA SP.
320	2.8	KINBERGONUPHIS SIMONI
267	2.4	LUMBRINERIS VERRILLI

7-17-84

STATION 9

1077	11.4	MEDIOMASTUS SP.
821	8.7	MEDIOMASTUS AMBISETA
693	7.4	EXOGONE DISPAR
565	6.0	FABRICIA SP. A
555	5.9	BATEA CF. CATHARINENSIS
523	5.5	THARYX CF. DORSOBRANCHIALIS
341	3.6	CAULLERIELLA SP.
256	2.7	MYSELLA PLANULATA
245	2.6	KINBERGONUPHIS SIMONI
203	2.1	EULALIA SANGUINEA

6-14-83

STATION 10

2528	28.9	MYRIOCHELE OCULATA
1877	21.4	THARYX CF. DORSOBRANCHIALIS
565	6.5	LUMBRINERIS VERRILLI
384	4.4	NUCULANA ACUTA
341	3.9	NEAEROMYA FLORIDANA
245	2.8	MULINIA LATERALIS
213	2.4	MEDIOMASTUS AMBISETA
213	2.4	MINUSPIO CI RIFERA
192	2.2	MYSELLA PL, JLATA
171	1.9	TELLINA VERSICOLOR

9-8-83

STATION 10

2560	27.7	NEAEROMYA FLORIDANA
1323	14.3	THARYX CF. DORSOBRANCHIALIS
704	7.6	MYRIOCHELE OCULATA
651	7.0	MINUSPIO CIRRIFERA
555	6.0	MEDIOMASTUS AMBISETA
469	5.1	PARAPRIONOSPIO PINNATA
373	4.0	MICROPHOLIS GRACILLIMA
299	3.2	STREBLOSPIO BENEDICTI
267	2.9	POLYNOID GENUS D
192	2.1	LUMBRINERIS VERRILLI

11-23-83

STATION 10

5995	26.0	MYRIOCHELE OCULATA
3787	17.7	MEDIOMASTUS SP.
1941	9.1	MOOREONUPHIS NEBULOSA
1099	5.1	LUMBRINERIS VERRILLI
736	3.4	PARAPRIONOSPIO PINNATA
704	3.3	AXIOTHELLA MUCOSA
555	2.6	NUCULANA ACUTA
512	2.4	HAPLOSCOLOPLOS SP.
512	2.4	THARYX CF. DORSOBRANCHIALIS
480	2.2	SPIOCHAETOPTERUS C. OCULATUS

2-23-84

STATION 10

2176	24.9	HAPLOSCOLOPLOS FOLIOSUS
1397	16.0	MYRIOCHELE OCULATA
832	9.5	THARYX CF. DORSOBRANCHIALIS
384	4.4	MINUSPIO CIRRIFERA
341	3.9	HAPLOSCOLOPLOS FRAGILIS
341	3.9	NEAEROMYA FLORIDANA
341	3.9	TELLINA SP.
309	3.5	CARAZZIELLA HOBSONAE
267	3.0	SPIOCHAETOPTERUS C. OCULATUS
192	2.2	LUMBRINERIS VERRILLI

6-6-84

STATION 10

1355	15.4	MYRIOCHELE OCULATA
693	7.9	THARYX CF. DORSOBRANCHIALIS
619	7.0	MEDIOMASTUS AMBISETA
331	3.8	LUMBRINERIS VERRILLI
331	3.8	MEDIOMASTUS SP.
299	3.4	POLYCIRRUS SP.
277	3.1	CREPIDULA PLANA
256	2.9	BOGUEA ENIGMATICA
245	2.8	PARAPRIONOSPIO PINNATA
235	2.7	MYSELLA PLANULATA

6-14-83

STATION 11

544	11.8	MEDIOMASTUS AMBISETA
341	7.4	CREPIDULA PLANA
309	6.7	LUMBRINERIS VERRILLI
309	6.7	ABRA AEQUALIS
224	4.9	COROPHIUM LACUSTRE
149	3.2	POLYCIRRUS SP.
149	3.2	GONIADIDES CAROLINAE
139	3.0	APOPRIONOSPIO PYGMAEA
139	3.0	MYRIOCHELE OCULATA
128	2.8	CIRROPHORUS CF. FURCATUS

9-8-83

STATION 11

661	13.9	THARYX CF. DORSOBRANCHIALIS
373	7.9	NEAEROMYA FLORIDANA
288	6.1	MYRIOCHELE OCULATA
224	4.7	ARICIDEA SP. C
203	4.3	CIRROPHORUS CF. FURCATUS
203	4.3	MEDIOMASTUS AMBISETA
192	4.0	LUMBRINERIS VERRILLI
171	3.6	MICROPHOLIS GRACILLIMA
160	3.4	APOPRIONOSPIO PYGMAEA
160	3.4	AMPELISCA HOLMESI

11-23-83

STATION 11

3840	15.8	FABRICIA SP. A
1973	8.1	EXOGONE DISPAR
1600	6.6	MEDIOMASTUS SP.
1195	4.9	SABELLARIA VULGARIS
1109	4.6	GONIADIDES CAROLINAE
960	4.0	MICRODEUTOPUS MYERSI
939	3.9	MYRIOCHELE OCULATA
693	2.9	GRANDIDIERELLA BONNIEROIDES
683	2.8	CAULLERIELLA SP.
661	2.7	LUMBRINERIS VERRILLI

2-23-84

STATION 11

6443	21.2	ERICTHONIUS BRASILIENSIS
50[illegible]	16.6	HAPLOSYLLIS SPONGICOLA
2773	9.1	COROPHIUM ACHERUSICUM
1429	4.7	FABRICIA SP. A
1269	4.2	SPIOPHANES BOMBYX
981	3.2	MEDIOMASTUS SP.
683	2.2	AXIOTHELLA MUCOSA
501	1.6	APOPRIONOSPIO PYGMAEA
491	1.6	MYRIOCHELE OCULATA
469	1.5	NUCULANA ACUTA

6-6-84

STATION 11

2144	13.3	SABELLARIA VULGARIS
1195	7.4	ABRA AEQUALIS
1120	7.0	MEDIOMASTUS SP.
1013	6.3	COROPHIUM TUBERCULATUM
971	6.0	MYRIOCHELE OCULATA
469	2.9	CREPIDULA PLANA
437	2.7	APOPRIONOSPIO PYGMAEA
416	2.6	FABRICIA SP. A
395	2.5	EXOGONE DISPAR
384	2.4	MEDIOMASTUS AMBISETA

6-14-83

STATION 12

555	9.9	ABRA AEQUALIS
544	9.7	NUCULANA ACUTA
533	9.5	MUSCULUS LATERALIS
288	5.1	ACTEOCINA CANALICULATA
192	3.4	LYONSIA HYALINA FLORIDANA
192	3.4	SABELLARIA VULGARIS
149	2.7	MEDIOMASTUS AMBISETA
149	2.7	NUCULA PROXIMA
139	2.5	GONIADIDES CAROLINAE
128	2.3	MONOCULODES NYEI

7-25-83

STATION 12

395	15.0	GONIADIDES CAROLINAE
245	9.3	MEDIOMASTUS AMBISETA
181	6.9	LOIMIA MEDUSA
149	5.7	CIRROPHORUS CF. FURCATUS
107	4.0	MYRIOCHELE OCULATA
96	3.6	CAULLERIELLA SP.
85	3.2	THARYX CF. DORSOBRANCHIALIS
85	3.2	AXIOTHELLA MUCOSA
75	2.8	LUMBRINERIS VERRILLI
64	2.4	NUCULANA ACUTA

9-8-83

STATION 12

981	18.6	GONIADIDES CAROLINAE
320	6.1	PAGURIDAE SP.
299	5.7	MYRIOCHELE OCULATA
277	5.3	MEDIOMASTUS SP.
267	5.1	APANTHURA MAGNIFICA
224	4.2	OLIVELLA SP. B
192	3.6	CAULLERIELLA SP.
139	2.6	NEANTHES MICROMMA
107	2.0	CIRROPHORUS CF. FURCATUS
107	2.0	EXOGONE DISPAR

10-13-83

STATION 12

2912	24.3	HAPLOSYLLIS SPONGICOLA
768	6.4	APANTHURA CF. SIGNATA
693	5.8	GONIADIDES CAROLINAE
640	5.3	NEANTHES MICROMMA
469	3.9	CAULLERIELLA SP.
448	3.7	PAGURIDAE SP.
405	3.4	MEDIOMASTUS CALIFORNIENSIS
331	2.8	ARICIDEA CF. CATHERINAE
277	2.3	EXOGONE DISPAR
256	2.1	OLIVELLA SP. B

11-23-83

STATION 12

1291	8.4	CAULLERIELLA SP.
1077	7.0	ABRA AEQUALIS
1013	6.6	MEDIOMASTUS SP.
843	5.5	OLIVELLA SP. B
779	5.1	FABRICIA SP. A
672	4.4	EXOGONE DISPAR
597	3.9	CHONE AMERICANA
565	3.7	PRIONOSPIO CRISTATA
565	3.7	PAGURISTES HUMMI
491	3.2	SPHAEROSYLLIS SPP.

1-4-84

STATION 12

917	7.5	MEDIOMASTUS SP.
853	7.0	PRIONOSPIO CRISTATA
661	5.4	SPIO PETTIBONEAE
640	5.2	GONIADIDES CAROLINAE
480	3.9	CAULLERIELLA SP.
459	3.8	FABRICIA SP. A
437	3.6	ABRA AEQUALIS
405	3.3	THARYX CF. DORSOBRANCHIALIS
405	3.3	ARICIDEA CF. CATHERINAE
395	3.2	EXOGONE DISPAR

2-23-84

STATION 12

3253	18.6	GONIADIDES CAROLINAE
1792	10.2	MEDIOMASTUS AMBISETA
1003	5.7	FABRICIA SP. A
693	4.0	SPIOPHANES BOMBYX
693	4.0	NUCULANA ACUTA
619	3.5	OXYUROSTYLIS SMITHI
576	3.3	CAULLERIELLA SP.
555	3.2	SPIO PETTIBONEAE
555	3.2	AXIOTHELLA MUCOSA
523	3.0	SPHAEROSYLLIS TAYLORI

4-16-84

STATION 12

4832	22.3	MEDIOMASTUS CALIFORNIENSIS
1920	8.9	EXOGONE LOUREI
1152	5.3	SPHAEROSYLLIS PIRIFEROPSIS
779	3.6	PRIONOSPIO CRISTATA
747	3.4	FABRICIA SP. A
725	3.3	NUCULANA ACUTA
683	3.2	SPHAEROSYLLIS TAYLORI
480	2.2	EXOGONE ATLANTICA
469	2.2	BRANIA CLAVATA
373	1.7	EULALIA SANGUINEA

6-6-84

STATION 12

5120	25.7	MYRIOCHELE OCULATA
1600	8.0	CAULLERIELLA SP.
885	4.4	FABRICIA SP. A
864	4.3	ABRA AEQUALIS
821	4.1	GONIADIDES CAROLINAE
768	3.9	MEDIOMASTUS SP.
725	3.6	TIRON TRIOCELLATUS
544	2.7	SABELLARIA VULGARIS
501	2.5	LYONSIA HYALINA FLORIDANA
427	2.1	SPHAEROSYLLIS TAYLORI

7-17-84

STATION 12

3456	49.6	MYRIOCHELE OCULATA
448	6.4	HAPLOSYLLIS SPONGICOLA
267	3.8	OLIVELLA SP. B
181	2.6	GONIADIDES CAROLINAE
160	2.3	DIPLODONTA PUNCTATA
128	1.8	NUCULANA ACUTA
107	1.5	ABRA AEQUALIS
107	1.5	CAULLERIELLA SP.
96	1.4	ACTEOCINA CANALICULATA
85	1.2	FABRICIA SP. A

6-14-83

STATION 13

2571	21.0	AMPELISCA HOLMESI
1835	15.0	FABRICIA SP. A
1184	9.7	ARICIDEA PHILBINAE
896	7.3	ARICIDEA TAYLORI
800	6.5	AMPELISCA ABDITA
501	4.1	CHONE AMERICANA
373	3.0	THARYX CF. DORSOBRANCHIALIS
277	2.3	LAEONEREIS CULVERI
277	2.3	MITRELLA LUNATA
235	1.9	STREBLOSPIO BENEDICTI

7-25-83

STATION 13

523	23.0	FABRICIA SP. A
245	10.8	ARICIDEA PHILBINAE
224	5.9	CHONE AMERICANA
213	9.4	AMPELISCA HOLMESI
203	8.9	HAPLOSCOLOPLOS FOLIOSUS
107	4.7	NEANTHES SUCCINEA
85	3.8	THARYX CF. DORSOBRANCHIALIS
85	3.8	ACTEOCINA CANALICULATA
75	3.3	SCOLOPLOS RUBRA
53	2.3	CAPITELLA CAPITATA

9-8-83

STATION 13

1173	24.4	THARYX CF. DORSOBRANCHIALIS
907	18.8	ARICIDEA TAYLORI
789	16.4	ARICIDEA PHILBINAE
523	10.9	STREBLOSPIO BENEDICTI
267	5.5	LAEONEREIS CULVERI
235	4.9	XENANTHURA BREVITELSON
117	2.4	MAGELONA PETTIBONEAE
107	2.2	SCOLOPLOS RUBRA
96	2.0	MEDIOMASTUS AMBISETA
85	1.8	HETEROMASTUS FILIFORMIS

10-13-83

STATION 13

256	11.2	GRANDIDIERELLA BONNIEROIDES
245	10.7	ARICIDEA PHILBINAE
224	9.8	STREBLOSPIO BENEDICTI
203	8.9	FABRICIA SP. A
192	8.4	TYPOSYLLIS CF. LUTEA
171	7.5	NEREIDAE SP.
149	6.5	NEANTHES SUCCINEA
107	4.7	AXIOTHELLA MUCOSA
85	3.7	XENANTHURA BREVITELSON
64	2.8	MEDIOMASTUS SP.

11-23-83

STATION 13

811	15.6	STREBLOSPIO BENEDICTI
597	11.5	POLYDORA WEBSTERI
469	9.1	ARICIDEA PHILBINAE
384	7.4	LAEONEREIS CULVERI
373	7.2	GRANDIDIERELLA BONNIEROIDES
309	6.0	AMPELISCA HOLMESI
192	3.7	FABRICIA SP. A
171	3.3	THARYX CF. DORSOBRANCHIALIS
160	3.1	XENANTHURA BREVITELSON
139	2.7	ARICIDEA TAYLORI

1-4-84

STATION 13

2965	25.8	STREBLOSPIO BENEDICTI
2251	19.6	FABRICIA SP. A
1131	9.8	ARICIDEA PHILBINAE
693	6.0	POLYDORA WEBSTERI
512	4.5	AMPELISCA HOLMESI
405	3.5	ACTEOCINA CANALICULATA
395	3.4	GRANDIDIERELLA BONNIEROIDES
363	3.2	HAPLOSCOLOPLOS FOLIOSUS
352	3.1	THARYX CF. DORSOBRANCHIALIS
309	2.7	AXIOTHELLA MUCOSA

2-23-84

STATION 13

2923	16.6	ARICIDEA PHILBINAE
2144	12.2	FABRICIA SP. A
1280	7.3	STREBLOSPIO BENEDICTI
1205	6.8	BRANIA CLAVATA
1131	6.4	BOCCARDIELLA HAMATA
992	5.6	THARYX CF. DORSOBRANCHIALIS
896	5.1	POLYDORA WEBSTERI
672	3.8	SPHAEROSYLLIS TAYLORI
576	3.3	NAINERIS SP.
523	3.0	FILOGRANA IMPLEXA

4-16-84

STATION 13

24011	42.0	FABRICIA SP. A
4459	7.8	CHONE AMERICANA
3851	6.7	ARICIDEA PHILBINAE
3424	6.0	POLYDORA SOCIALIS
2549	4.5	AMPELISCA HOLMESI
2432	4.2	AXIOTHELLA MUCOSA
1867	3.3	HAPLOSCOLOPLOS FOLIOSUS
1792	3.1	CYMADUSA COMPTA
1707	3.0	THARYX CF. DORSOBRANCHIALIS
1675	2.9	GRANDIDIERELLA BONNIEROIDES

6-6-84

STATION 13

4853	26.1	POLYDORA WEBSTERI
2827	15.2	MELITA ELONGATA
2144	11.5	STREBLOSPIO BENEDICTI
2005	10.8	FABRICIA SP. A
1440	7.7	THARYX CF. DORSOBRANCHIALIS
981	5.3	NEANTHES SUCCINEA
725	3.9	BRANIA CLAVATA
576	3.1	XANTHIDAE SP.
459	2.5	EURYPANOPEUS DEPRESSUS
395	2.1	HAPLOSCOLOPLOS FOLIOSUS

7-17-84

STATION 13

3264	22.4	FABRICIA SP. A
1653	11.4	THARYX CF. DORSOBRANCHIALIS
1045	7.2	TYPOSYLLIS CF. LUTEA
971	6.7	BOCCARDIELLA HAMATA
864	5.9	CAECUM PULCHELLUM
789	5.4	AXIOTHELLA MUCOSA
715	4.9	AMPELISCA HOLMESI
533	3.7	ARICIDEA PHILBINAE
533	3.7	ACTEOCINA CANALICULATA
331	2.3	HAPLOSCOLOPLOS FOLIOSUS

6-14-83

STATION 14

1792	30.9	THARYX CF. DORSOBRANCHIALIS
992	17.1	ARICIDEA PHILBINAE
416	7.2	ARICIDEA TAYLORI
416	7.2	LUMBRINERIS VERRILLI
320	5.5	MEDIOMASTUS AMBISETA
171	2.9	AMPELISCA HOLMESI
149	2.6	STREBLOSPIO BENEDICTI
149	2.6	ACTEON PUNCTOSTRIATUS
149	2.6	ODOSTOMIA BISUTURALIS
107	1.8	SCOLOPLOS RUBRA

9-8-83

STATION 14

587	27.4	THARYX CF. DORSOBRANCHIALIS
352	16.4	STREBLOSPIO BENEDICTI
235	10.9	ARICIDEA TAYLORI
224	10.4	ARICIDEA PHILBINAE
192	9.0	MEDIOMASTUS SP.
117	5.5	AMYGDALUM PAPYRIUM
107	5.0	SCOLOPLOS RUBRA
96	4.5	SOLARIORBIS SHIMERI
32	1.5	LUMBRINERIS VERRILLI
32	1.5	PRIONOSPIO HETEROBRANCHIA

11-23-83

STATION 14

1771	33.3	STREBLOSPIO BENEDICTI
640	12.0	ARICIDEA PHILBINAE
491	9.2	MEDIOMASTUS CALIFORNIENSIS
373	7.0	SCOLELEPIS TEXANA
341	6.4	HAPLOSCOLOPLOS FRAGILIS
341	6.4	THARYX CF. DORSOBRANCHIALIS
309	5.8	PARAPRIONOSPIO PINNATA
139	2.6	ARICIDEA TAYLORI
85	1.6	CUMELLA SP. A.
64	1.2	ACTEOCINA CANALICULATA

2-23-84

STATION 14

5365	45.1	STREBLOSPIO BENEDICTI
1792	15.1	THARYX CF. DORSOBRANCHIALIS
587	4.9	ARICIDEA PHILBINAE
565	4.7	HAPLOSCOLOPLOS FOLIOSUS
480	4.0	SCOLELEPIS TEXANA
373	3.1	ACTEOCINA CANALICULATA
373	3.1	MEDIOMASTUS SP.
256	2.2	ARICIDEA TAYLORI
245	2.1	CHONE AMERICANA
235	2.0	PARAPRIONOSPIO PINNATA

6-6-84

STATION 14

4085	26.9	FABRICIA SP. A
3648	24.0	THARYX CF. DORSOBRANCHIALIS
971	6.4	CHONE AMERICANA
885	5.8	ARICIDEA PHILBINAE
405	2.7	STREBLOSPIO BENEDICTI
384	2.5	ACTEOCINA CANALICULATA
363	2.4	CAPITELLA CAPITATA
331	2.2	ARICIDEA TAYLORI
320	2.1	MALDANIDAE
267	1.8	GRANDIDIERELLA BONNIEROIDES

6-14-83

STATION 15

512	11.9	LUMBRINERIS VERRILLI
480	11.2	ARICIDEA TAYLORI
224	5.2	MEDIOMASTUS AMBISETA
213	5.0	THARYX CF. DORSOBRANCHIALIS
181	4.2	MYRIOCHELE OCULATA
149	3.5	FABRICIA SP. A
139	3.2	EHLERSIA CORNUTA
128	3.0	PARAPRIONOSPIO PINNATA
128	3.0	BOGUEA ENIGMATICA
117	2.7	AMYGDALUM PAPYRIUM

7-25-83

STATION 15

576	20.0	STREBLOSPIO BENEDICTI
480	16.7	MEDIOMASTUS AMBISETA
363	12.6	THARYX CF. DORSOBRANCHIALIS
341	11.9	ARICIDEA TAYLORI
160	5.6	HAPLOSCOLOPLOS FRAGILIS
139	4.8	OGYRIDES ALPHAEROSTRIS
117	4.1	HAPLOSCOLOPLOS FOLIOSUS
117	4.1	PARAPRIONOSPIO PINNATA
85	3.0	LUMBRINERIS VERRILLI
85	3.0	MYRIOCHELE OCULATA

9-8-83

STATION 15

5088	48.2	STREBLOSPIO BENEDICTI
1237	11.7	ARICIDEA TAYLORI
960	9.1	ARICIDEA PHILBINAE
576	5.5	THARYX CF. DORSOBRANCHIALIS
256	2.4	CIRROPHORUS CF. FURCATUS
203	1.9	HIPPOLYTE PLEURACANTHA
192	1.8	MEDIOMASTUS AMBISETA
192	1.8	BATEA CF. CATHARINENSIS
139	1.3	KINBERGONUPHIS SIMONI
128	1.2	MAGELONA PETTIBONEAE

10-13-83

STATION 15

544	11.9	STREBLOSPIO BENEDICTI
512	11.2	THARYX CF. DORSOBRANCHIALIS
480	10.5	HAPLOSCOLOPLOS FRAGILIS
395	8.6	ARICIDEA TAYLORI
331	7.2	HAPLOSCOLOPLOS FOLIOSUS
245	5.3	PARAPRIONOSPIO PINNATA
171	3.7	MYSELLA PLANULATA
160	3.5	SPIOCHAETOPTERUS C. OCULATUS
149	3.3	ODOSTOMIA SP.
128	2.8	HAPLOSCOLOPLOS SP.

11-23-83

STATION 15

3531	29.0	STREBLOSPIO BENEDICTI
2923	24.0	ARICIDEA TAYLORI
789	6.5	THARYX CF. DORSOBRANCHIALIS
768	6.3	CIRROPHORUS CF. FURCATUS
640	5.3	ARICIDEA PHILBINAE
416	3.4	MEDIOMASTUS SP.
395	3.2	PARAPRIONOSPIO PINNATA
352	2.9	SCOLELEPIS TEXANA
213	1.8	KINBERGONUPHIS SIMONI
181	1.5	MAGELONA PETTIBONEAE

1-4-84

STATION 15

7733	51.2	STREBLOSPIO BENEDICTI
1856	12.3	PARAPRIONOSPIO PINNATA
1771	11.7	HAPLOSCOLOPLOS FOLIOSUS
843	5.6	MEDIOMASTUS SP.
352	2.3	ARICIDEA TAYLORI
341	2.3	THARYX CF. DORSOBRANCHIALIS
320	2.1	SCOLELEPIS TEXANA
160	1.1	SPIOCHAETOPTERUS C. OCULATUS
139	0.9	MEDIOMASTUS AMBISETA
117	0.8	CYCLASPIS SP. A

2-23-84

STATION 15

8459	46.3	STREBLOSPIO BENEDICTI
1632	8.9	DIASTOMA VARIUM
1408	7.7	CYMADUSA COMPTA
971	5.3	ERICTHONIUS BRASILIENSIS
608	3.3	CAECUM PULCHELLUM
480	2.6	MYSELLA PLANULATA
405	2.2	BRACHIDONTES EXUSTUS
309	1.7	MITRELLA LUNATA
235	1.3	COROPHIUM LACUSTRE
213	1.2	MEDIOMASTUS AMBISETA

4-16-84

STATION 15

1259	17.1	STREBLOSPIO BENEDICTI
1163	15.8	HAPLOSCOLOPLOS FOLIOSUS
1099	14.9	HAPLOSCOLOPLOS FRAGILIS
512	7.0	ARICIDEA TAYLORI
459	6.2	THARYX CF. DORSOBRANCHIALIS
448	6.1	MEDIOMASTUS AMBISETA
416	5.7	PARAPRIONOSPIO PINNATA
213	2.9	CYCLASPIS SP. A
160	2.2	MOLGULIDAE SP.
139	1.9	ACTEON PUNCTOSTRIATUS

6-6-84

STATION 15

821	19.1	THARYX CF. DORSOBRANCHIALIS
811	18.9	PARAPRIONOSPIO PINNATA
512	11.9	STREBLOSPIO BENEDICTI
427	9.9	ARICIDEA TAYLORI
224	5.2	ARICIDEA PHILBINAE
213	5.0	CREPIDULA MACULOSA
203	4.7	CREPIDULA PLANA
139	3.2	MEDIOMASTUS SP.
64	1.5	TURBONILLA DALLI
53	1.2	PHORONIS ARCHITECTA

7-17-84

STATION 15

512	19.3	POLYDORA WEBSTERI
427	16.1	HAPLOSCOLOPLOS FRAGILIS
405	15.3	ARICIDEA TAYLORI
288	10.8	PARAPRIONOSPIO PINNATA
203	7.6	THARYX CF. DORSOBRANCHIALIS
181	6.8	STREBLOSPIO BENEDICTI
96	3.6	MEDIOMASTUS CALIFORNIENSIS
85	3.2	STYLOCHUS SP.
53	2.0	ODOSTOMIA SP.
43	1.6	OGYRIDES ALPHAEROSTRIS

6-14-83

STATION 16

373	9.2	LUMBRINERIS VERRILLI
288	7.1	MYRIOCHELE OCULATA
267	6.5	MITRELLA LUNATA
256	6.3	MEDIOMASTUS AMBISETA
203	5.0	AMYGDALUM PAPYRIUM
171	4.2	ARICIDEA PHILBINAE
160	3.9	POLYCIRRUS SP.
139	3.4	BATEA CF. CATHARINENSIS
128	3.1	FABRICIA SP. A
128	3.1	CUMELLA SP. A.

9-8-83

STATION 16

672	16.3	MYRIOCHELE OCULATA
555	13.4	MEDIOMASTUS AMBISETA
437	10.6	STREBLOSPIO BENEDICTI
320	7.8	LUMBRINERIS VERRILLI
267	6.5	PARAPRIONOSPIO PINNATA
213	5.2	ACTEOCINA CANALICULATA
117	2.8	LYONSIA HYALINA FLORIDANA
107	2.6	ARICIDEA PHILBINAE
107	2.6	NUCULANA ACUTA
96	2.3	THARYX CF. DORSOBRANCHIALIS

11-23-83

STATION 16

4683	14.4	MEDIOMASTUS SP.
2933	9.0	FABRICIA SP. A
2432	7.5	SCOLELEPIS TEXANA
1803	5.6	PARACAPRELLA TENUIS
1621	5.0	KINBERGONUPHIS SIMONI
1515	4.7	LUMBRINERIS VERRILLI
1440	4.4	ARICIDEA PHILBINAE
1387	4.3	MYRIOCHELE OCULATA
1333	4.1	PARAPRIONOSPIO PINNATA
779	2.4	EXOGONE DISPAR

2-23-84

STATION 16

1749	16.8	MEDIOMASTUS AMBISETA
1131	10.8	SCOLELEPIS TEXANA
736	7.1	ARICIDEA PHILBINAE
512	4.9	MYRIOCHELE OCULATA
416	4.0	HAPLOSCOLOPLOS FOLIOSUS
405	3.9	FABRICIA SP. A
395	3.8	ARICIDEA TAYLORI
384	3.7	CLYMENELLA TORQUATA
373	3.6	SPIOPHANES BOMBYX
363	3.5	THARYX CF. DORSOBRANCHIALIS

6-6-84

STATION 16

1323	11.8	THARYX CF. DORSOBRANCHIALIS
896	8.0	MEDIOMASTUS SP.
864	7.7	ARICIDEA PHILBINAE
544	4.9	AMPELISCA HOLMESI
448	4.0	ARICIDEA TAYLORI
437	3.9	LUMBRINERIS VERRILLI
416	3.7	MYRIOCHELE OCULATA
384	3.4	OXYUROSTYLIS SMITHI
341	3.1	FABRICIA SP. A
235	2.1	CIRROPHORUS CF. FURCATUS

6-14-83

STATION 17

3893	22.5	ARICIDEA PHILBINAE
2699	15.6	ARICIDEA TAYLORI
2080	12.0	FABRICIA SP. A
1696	9.8	LAEONEREIS CULVERI
1643	9.5	THARYX CF. DORSOBRANCHIALIS
1205	7.0	CHONE AMERICANA
757	4.4	HETEROMASTUS FILIFORMIS
501	2.9	AMPHICTEIS GUNNERI
501	2.9	HAPLOSCOLOPLOS FRAGILIS
373	2.2	CAPITELLA CAPITATA

7-25-83

STATION 17

4341	30.4	THARYX CF. DORSOBRANCHIALIS
4288	30.0	ARICIDEA PHILBINAE
3584	25.1	ARICIDEA TAYLORI
480	3.4	XENANTHURA BREVITELSON
427	3.0	CAPITELLA CAPITATA
235	1.6	HETEROMASTUS FILIFORMIS
224	1.6	NEANTHES SUCCINEA
85	0.6	ACTEOCINA CANALICULATA
64	0.4	MEDIOMASTUS AMBISETA
64	0.4	CHONE AMERICANA

9-8-83

STATION 17

3488	44.2	ARICIDEA TAYLORI
1493	18.9	ARICIDEA PHILBINAE
1013	12.9	LAEONEREIS CULVERI
544	6.9	THARYX CF. DORSOBRANCHIALIS
491	6.2	STREBLOSPIO BENEDICTI
320	4.1	HETEROMASTUS FILIFORMIS
213	2.7	XENANTHURA BREVITELSON
128	1.6	CAPITELLA CAPITATA
43	0.5	CAECUM PULCHELLUM
32	0.4	SAYELLA HEMPHILLI

10-13-83

STATION 17

2144	23.4	ARICIDEA PHILBINAE
2080	22.7	ARICIDEA TAYLORI
1749	19.1	STREBLOSPIO BENEDICTI
1152	12.6	LAEONEREIS CULVERI
843	9.2	NEREIDAE SP.
395	4.3	CAPITELLA CAPITATA
213	2.3	THARYX CF. DORSOBRANCHIALIS
192	2.1	HETEROMASTUS FILIFORMIS
64	0.7	CYMADUSA COMPTA
64	0.7	XENANTHURA BREVITELSON

11-23-83

STATION 17

1163	18.9	MEDIOMASTUS CALIFORNIENSIS
1013	16.5	ARICIDEA PHILBINAE
757	12.3	STREBLOSPIO BENEDICTI
597	9.7	NEANTHES SUCCINEA
523	8.5	THARYX CF. DORSOBRANCHIALIS
469	7.6	XENANTHURA BREVITELSON
213	3.5	POLYDORA WEBSTERI
203	3.3	TYPOSYLLIS CF. LUTEA
181	3.0	HAPLOSCOLOPLOS FRAGILIS
149	2.4	CAPITELLA CAPITATA

1-4-84

STATION 17

10571	57.8	ARICIDEA PHILBINAE
1397	7.6	STREBLOSPIO BENEDICTI
1344	7.3	ARICIDEA TAYLORI
1173	6.4	LAEONEREIS CULVERI
651	3.6	HAPLOSCOLOPLOS FOLIOSUS
555	3.0	MEDIOMASTUS CALIFORNIENSIS
469	2.6	XENANTHURA BREVITELSON
437	2.4	SCOLELEPIS TEXANA
373	2.0	ACTEOCINA CANALICULATA
277	1.5	CAPITELLA CAPITATA

2-23-84

STATION 17

8085	46.5	ARICIDEA PHILBINAE
1664	9.6	HAPLOSCOLOPLOS FOLIOSUS
1120	6.4	STREBLOSPIO BENEDICTI
1013	5.8	MEDIOMASTUS SP.
992	5.7	ARICIDEA TAYLORI
885	5.1	LAEONEREIS CULVERI
683	3.9	HETEROMASTUS FILIFORMIS
597	3.4	THARYX CF. DORSOBRANCHIALIS
320	1.8	ACTEOCINA CANALICULATA
256	1.5	XENANTHURA BREVITELSON

4-16-84

STATION 17

16501	49.6	ARICIDEA PHILBINAE
3723	11.2	HETEROMASTUS FILIFORMIS
2304	6.9	LAEONEREIS CULVERI
2176	6.5	THARYX CF. DORSOBRANCHIALIS
1728	5.2	ARICIDEA TAYLORI
1707	5.1	HAPLOSCOLOPLOS FOLIOSUS
1099	3.3	XENANTHURA BREVITELSON
821	2.5	CAPITELLA CAPITATA
779	2.3	STREBLOSPIO BENEDICTI
299	0.9	CHONE AMERICANA

6-6-84

STATION 17

3797	22.3	ARICIDEA PHILBINAE
3424	20.1	THARYX CF. DORSOBRANCHIALIS
1792	10.5	ARICIDEA TAYLORI
1707	10.0	XENANTHURA BREVITELSON
821	4.8	LAEONEREIS CULVERI
779	4.6	HETEROMASTUS FILIFORMIS
747	4.4	ACTEOCINA CANALICULATA
544	3.2	HAPLOSCOLOPLOS FOLIOSUS
491	2.9	MEDIOMASTUS SP.
416	2.4	AMPELISCA HOLMESI

7-17-84

STATION 17

2987	25.9	THARYX CF. DORSOBRANCHIALIS
1845	16.0	ARICIDEA PHILBINAE
1792	15.6	ARICIDEA TAYLORI
1099	9.5	LAEONEREIS CULVERI
533	4.6	XENANTHURA BREVITELSON
459	4.0	ACTEOCINA CANALICULATA
416	3.6	HETEROMASTUS FILIFORMIS
405	3.5	FABRICIA SP. A
384	3.3	CAECUM PULCHELLUM
267	2.3	MEDIOMASTUS SP.

6-14-83

STATION 18

843	29.8	ARICIDEA PHILBINAE
352	12.5	CHONE AMERICANA
288	10.2	LUMBRINERIS LATREILLI
213	7.5	STREBLOSPIO BENEDICTI
181	6.4	ARICIDEA TAYLORI
160	5.7	LAEONEREIS CULVERI
107	3.8	MEDIOMASTUS CALIFORNIENSIS
75	2.6	CAPITELLA CAPITATA
43	1.5	CIRROPHORUS CF. FURCATUS
43	1.5	HAPLOSCOLOPLOS FOLIOSUS

7-25-83

STATION 18

757	27.7	ARICIDEA PHILBINAE
448	16.4	LUMBRINERIS VERRILLI
395	14.5	ARICIDEA TAYLORI
213	7.8	MEDIOMASTUS AMBISETA
128	4.7	CAPITELLA CAPITATA
96	3.5	PRIONOSPIO HETEROBRANCHIA
75	2.7	LAEONEREIS CULVERI
75	2.7	MEDIOMASTUS CALIFORNIENSIS
64	2.3	STREBLOSPIO BENEDICTI
53	2.0	ACTEOCINA CANALICULATA

9-8-83

STATION 18

3776	64.7	STREBLOSPIO BENEDICTI
832	14.3	LAEONEREIS CULVERI
821	14.1	ARICIDEA TAYLORI
117	2.0	ARICIDEA PHILBINAE
96	1.6	CAPITELLA CAPITATA
43	0.7	CIRROPHORUS CF. FURCATUS
43	0.7	HAPLOSCOLOPLOS FOLIOSUS
43	0.7	THARYX CF. DORSOBRANCHIALIS
21	0.4	HETEROMASTUS FILIFORMIS
11	0.2	PARAPRIONOSPIO PINNATA

10-13-83

STATION 18

1973	42.7	STREBLOSPIO BENEDICTI
1141	24.7	LAEONEREIS CULVERI
437	9.5	ARICIDEA TAYLORI
277	6.0	NEREIDAE SP.
224	4.8	ACTEOCINA CANALICULATA
117	2.5	HAMINOE SUCCINEA
85	1.8	CAPITELLA CAPITATA
53	1.2	SCOLELEPIS TEXANA
43	0.9	ARICIDEA PHILBINAE
43	0.9	CIRROPHORUS CF. FURCATUS

11-23-83

STATION 18

3029	32.5	STREBLOSPIO BENEDICTI
1547	16.6	ACTEOCINA CANALICULATA
1013	10.9	MEDIOMASTUS SP.
736	7.9	LAEONEREIS CULVERI
491	5.3	HAMINOE SUCCINEA
352	3.8	SCOLELEPIS TEXANA
341	3.7	HAPLOSCOLOPLOS FOLIOSUS
299	3.2	PARAPRIONOSPIO PINNATA
267	2.9	LUMBRINERIS VERRILLI
203	2.2	GRANDIDIERELLA BONNIEROIDES

1-4-84

STATION 18

7509	66.0	STREBLOSPIO BENEDICTI
1141	10.0	MEDIOMASTUS AMBISETA
651	5.7	ACTEOCINA CANALICULATA
629	5.5	GRANDIDIERELLA BONNIEROIDES
288	2.5	CAPITELLA CAPITATA
203	1.8	SPHAEROSYLLIS TAYLORI
128	1.1	LUMBRINERIS VERRILLI
107	0.9	ARICIDEA PHILBINAE
96	0.8	POLYDORA SOCIALIS
75	0.7	CHONE AMERICANA

2-23-84

STATION 18

4032	29.1	STREBLOSPIO BENEDICTI
1664	12.0	HAPLOSCOLOPLOS FOLIOSUS
1515	10.9	SPHAEROSYLLIS TAYLORI
1301	9.4	ACTEOCINA CANALICULATA
1237	8.9	GRANDIDIERELLA BONNIEROIDES
821	5.9	MEDIOMASTUS SP.
395	2.8	ARICIDEA PHILBINAE
384	2.8	CAPITELLA CAPITATA
288	2.1	THARYX CF. DORSOBRANCHIALIS
213	1.5	LUMBRINERIS VERRILLI

4-16-84

STATION 18

2123	31.4	HAPLOSCOLOPLOS FOLIOSUS
1323	19.6	STREBLOSPIO BENEDICTI
469	7.0	ACTEOCINA CANALICULATA
448	6.6	MEDIOMASTUS SP.
320	4.7	CHONE AMERICANA
267	3.9	ARICIDEA PHILBINAE
213	3.2	CAPITELLA CAPITATA
181	2.7	THARYX CF. DORSOBRANCHIALIS
171	2.5	TYPOSYLLIS CF. LUTEA
160	2.4	SCOLELEPIS TEXANA

6-6-84

STATION 18

629	13.1	HAPLOSCOLOPLOS FRAGILIS
427	8.9	ACTEOCINA CANALICULATA
309	6.4	MEDIOMASTUS AMBISETA
299	6.2	HAPLOSCOLOPLOS FOLIOSUS
267	5.6	THARYX CF. DORSOBRANCHIALIS
256	5.3	ARICIDEA PHILBINAE
256	5.3	LUMBRINERIS VERRILLI
245	5.1	AMPELISCA HOLMESI
235	4.9	STREBLOSPIO BENEDICTI
192	4.0	CHONE AMERICANA

7-17-84

STATION 18

992	22.6	STREBLOSPIO BENEDICTI
373	8.5	ARICIDEA TAYLORI
373	8.5	HAMINOE SUCCINEA
363	8.3	MEDIOMASTUS AMBISETA
341	7.8	HAPLOSCOLOPLOS FRAGILIS
320	7.3	THARYX CF. DORSOBRANCHIALIS
267	6.1	LUMBRINERIS VERRILLI
192	4.4	ACTEOCINA CANALICULATA
181	4.1	ARICIDEA PHILBINAE
96	2.2	ODOSTOMIA BISUTURALIS

6-14-83

STATION 19

2485	26.4	ARICIDEA PHILBINAE
1163	12.3	ARICIDEA TAYLORI
907	9.6	GRANDIDIERELLA BONNIEROIDES
875	9.3	CHONE AMERICANA
864	9.2	EHLERSIA CORNUTA
629	6.7	MELITA LONGISETOSA
363	3.8	LUMBRINERIS VERRILLI
299	3.2	MEDIOMASTUS AMBISETA
203	2.1	MELITA SP.
181	1.9	MELITA ELONGATA

9-8-83

STATION 19

2432	40.1	TYPOSYLLIS CF. LUTEA
971	16.0	CAECUM PULCHELLUM
544	9.0	THARYX CF. DORSOBRANCHIALIS
320	5.3	EURYPANOPEUS DEPRESSUS
267	4.4	POLYDORA WEBSTERI
235	3.9	ARICIDEA PHILBINAE
235	3.9	ARICIDEA TAYLORI
224	3.7	CIRROPHORUS CF. FURCATUS
213	3.5	SCOLOPLOS RUBRA
160	2.6	MEDIOMASTUS AMBISETA

11-23-83

STATION 19

3392	22.8	GRANDIDIERELLA BONNIEROIDES
2315	15.6	TYPOSYLLIS CF. LUTEA
1643	11.1	BOCCARDIELLA HAMATA
949	6.4	POLYDORA WEBSTERI
640	4.3	MEDIOMASTUS CALIFORNIENSIS
576	3.9	STREBLOSPIO BENEDICTI
576	3.9	OPISTHOSYLLIS SP. B
565	3.8	COROPHIUM ACHERUSICUM
405	2.7	ARICIDEA TAYLORI
405	2.7	PRIONOSPIO HETEROBRANCHIA

2-23-84

STATION 19

1589	13.5	BOCCARDIELLA HAMATA
1472	12.5	THARYX CF. DORSOBRANCHIALIS
1013	8.6	GRANDIDIERELLA BONNIEROIDES
960	8.2	TYPOSYLLIS CF. LUTEA
800	6.8	POLYDORA WEBSTERI
693	5.9	SPHAEROSYLLIS TAYLORI
661	5.6	ACTEOCINA CANALICULATA
373	3.2	MEDIOMASTUS AMBISETA
373	3.2	COROPHIUM ACHERUSICUM
352	3.0	CAECUM PULCHELLUM

6-6-84

STATION 19

5739	28.2	FILOGRANA IMPLEXA
3851	19.0	CAECUM PULCHELLUM
1387	6.8	BOCCARDIELLA HAMATA
1195	5.9	TYPOSYLLIS CF. LUTEA
917	4.5	THARYX CF. DORSOBRANCHIALIS
821	4.0	GRANDIDIERELLA BONNIEROIDES
597	2.9	POLYDORA WEBSTERI
587	2.9	MYSELLA PLANULATA
448	2.2	TYPOSYLLIS PROLIFERA
416	2.0	MELITA ELONGATA

6-14-83

STATION 20

2347	43.2	ARICIDEA TAYLORI
981	18.1	LUMBRINERIS VERRILLI
416	7.7	ARICIDEA PHILBINAE
277	5.1	OGYRIDES ALPHAEROSTRIS
171	3.1	SCOLOPLOS RUBRA
139	2.6	MYRIOCHELE OCULATA
117	2.2	MEDIOMASTUS AMBISETA
96	1.8	STREBLOSPIO BENEDICTI
64	1.2	FABRICIA SP. A
64	1.2	THARYX CF. DORSOBRANCHIALIS

7-25-83

STATION 20

2261	34.0	ARICIDEA TAYLORI
1355	20.4	STREBLOSPIO BENEDICTI
1077	16.2	LUMBRINERIS VERRILLI
693	10.4	ARICIDEA PHILBINAE
224	3.4	MEDIOMASTUS AMBISETA
224	3.4	PARAPRIONOSPIO PINNATA
160	2.4	PRIONOSPIO HETEROBRANCHIA
107	1.6	THARYX CF. DORSOBRANCHIALIS
96	1.4	SCOLOPLOS RUBRA
64	1.0	OGYRIDES ALPHAEROSTRIS

9-8-83

STATION 20

2219	22.1	ARICIDEA TAYLORI
1237	12.3	THARYX CF. DORSOBRANCHIALIS
907	9.0	ACTEOCINA CANALICULATA
757	7.5	CHONE AMERICANA
629	6.3	LUMBRINERIS VERRILLI
565	5.6	HAPLOSCOLOPLOS FRAGILIS
565	5.6	MEDIOMASTUS SP.
459	4.6	HAPLOSCOLOPLOS FOLIOSUS
203	2.0	AMPELISCA HOLMESI
192	1.9	SCOLELEPIS TEXANA

10-13-83

STATION 20

2432	46.3	STREBLOSPIO BENEDICTI
704	13.4	PARAPRIONOSPIO PINNATA
448	8.5	MEDIOMASTUS SP.
395	7.5	LUMBRINERIS VERRILLI
235	4.5	ARICIDEA TAYLORI
171	3.3	THARYX CF. DORSOBRANCHIALIS
160	3.0	POLYDORA WEBSTERI
107	2.0	ACTEOCINA CANALICULATA
75	1.4	SCOLOPLOS RUBRA
53	1.0	SABELLARIA VULGARIS

11-23-83

STATION 20

1045	15.0	ARICIDEA TAYLORI
939	13.5	MEDIOMASTUS CALIFORNIENSIS
928	13.3	PARAPRIONOSPIO PINNATA
885	12.7	LUMBRINERIS VERRILLI
832	12.0	ACTEOCINA CANALICULATA
736	10.6	STREBLOSPIO BENEDICTI
213	3.1	HAPLOSCOLOPLOS FRAGILIS
213	3.1	SCOLOPLOS RUBRA
192	2.8	SCOLELEPIS TEXANA
128	1.8	THARYX CF. DORSOBRANCHIALIS

1-4-84

STATION 20

3061	19.7	STREBLOSPIO BENEDICTI
2720	17.5	ACTEOCINA CANALICULATA
2336	15.0	ARICIDEA TAYLORI
1013	6.5	MEDIOMASTUS SP.
907	5.8	SPHAEROSYLLIS TAYLORI
896	5.8	LUMBRINERIS VERRILLI
768	4.9	HAPLOSCOLOPLOS FOLIOSUS
704	4.5	SCOLELEPIS TEXANA
651	4.2	PARAPRIONOSPIO PINNATA
437	2.8	SCOLOPLOS RUBRA

2-23-84

STATION 20

4245	24.7	THARYX CF. DORSOBRANCHIALIS
2421	14.1	ACTEOCINA CANALICULATA
2155	12.5	SPHAEROSYLLIS TAYLORI
1952	11.4	MEDIOMASTUS AMBISETA
1333	7.8	STREBLOSPIO BENEDICTI
640	3.7	LUMBRINERIS VERRILLI
480	2.8	HAPLOSCOLOPLOS FOLIOSUS
459	2.7	PARACAPRELLA TENUIS
363	2.1	ARICIDEA TAYLORI
331	1.9	CHONE AMERICANA

4-16-84

STATION 20

6133	56.9	STREBLOSPIO BENEDICTI
3296	30.6	ARICIDEA TAYLORI
341	3.2	ACTEOCINA CANALICULATA
267	2.5	LUMBRINERIS VERRILLI
213	2.0	PARAPRIONOSPIO PINNATA
160	1.5	ARICIDEA PHILBINAE
85	0.8	THARYX CF. DORSOBRANCHIALIS
53	0.5	AMYGDALUM PAPYRIUM
43	0.4	SCOLOPLOS RUBRA
43	0.4	HOLOTHUROIDEA SP. A

6-6-84

STATION 20

2677	27.1	ARICIDEA TAYLORI
2336	23.6	THARYX CF. DORSOBRANCHIALIS
960	9.7	HAPLOSCOLOPLOS FRAGILIS
619	6.3	LUMBRINERIS VERRILLI
523	5.3	HAPLOSCOLOPLOS FOLIOSUS
299	3.0	MEDIOMASTUS AMBISETA
256	2.6	SCOLOPLOS RUBRA
245	2.5	AMPELISCA HOLMESI
224	2.3	ARICIDEA PHILBINAE
181	1.8	CYCLASPIS SP. A

7-17-84

STATION 20

3061	33.2	ARICIDEA TAYLORI
1963	21.3	THARYX CF. DORSOBRANCHIALIS
1323	14.4	STREBLOSPIO BENEDICTI
555	6.0	LUMBRINERIS VERRILLI
491	5.3	HAPLOSCOLOPLOS FRAGILIS
256	2.8	ODOSTOMIA BISUTURALIS
149	1.6	SCOLOPLOS RUBRA
117	1.3	ACTEOCINA CANALICULATA
117	1.3	HOLOTHUROIDEA SP.
107	1.2	SPHAEROSYLLIS TAYLORI

6-14-83

STATION 21

2645	41.8	ARICIDEA TAYLORI
875	13.8	LUMBRINERIS VERRILLI
491	7.8	ARICIDEA PHILBINAE
416	6.6	MEDIOMASTUS AMBISETA
405	6.4	STREBLOSPIO BENEDICTI
277	4.4	THARYX CF. DORSOBRANCHIALIS
213	3.4	MYRIOCHELE OCULATA
192	3.0	PARAPRIONOSPIO PINNATA
75	1.2	HAPLOSCOLOPLOS FRAGILIS
75	1.2	SCOLOPLOS RUBRA

9-8-83

STATION 21

6091	52.8	STREBLOSPIO BENEDICTI
3669	31.8	ARICIDEA TAYLORI
384	3.3	CIRROPHORUS CF. FURCATUS
213	1.9	THARYX CF. DORSOBRANCHIALIS
160	1.4	MEDIOMASTUS AMBISETA
149	1.3	PARAPRIONOSPIO PINNATA
107	0.9	SCOLOPLOS RUBRA
96	0.8	ARICIDEA PHILBINAE
75	0.6	CARAZZIELLA HOBSONAE
64	0.6	HAPLOSCOLOPLOS FRAGILIS

11-23-83

STATION 21

3648	34.4	ARICIDEA TAYLORI
1387	13.1	HAPLOSCOLOPLOS FOLIOSUS
1067	10.1	MEDIOMASTUS SP.
725	6.8	STREBLOSPIO BENEDICTI
693	6.5	ACTEOCINA CANALICULATA
597	5.6	PARAPRIONOSPIO PINNATA
448	4.2	LUMBRINERIS VERRILLI
192	1.8	SCOLELEPIS TEXANA
192	1.8	SCOLOPLOS RUBRA
181	1.7	SPIOCHAETOPTERUS C. OCULATUS

2-23-84

STATION 21

2816	14.0	ACTEOCINA CANALICULATA
2752	13.7	HAPLOSCOLOPLOS FOLIOSUS
2677	13.3	STREBLOSPIO BENEDICTI
2037	10.1	ARICIDEA TAYLORI
1995	9.9	COROPHIUM ACHERUSICUM
1163	5.8	THARYX CF. DORSOBRANCHIALIS
896	4.5	MEDIOMASTUS AMBISETA
715	3.6	HAPLOSCOLOPLOS FRAGILIS
651	3.2	SPHAEROSYLLIS TAYLORI
555	2.8	LUMBRINERIS VERRILLI

6-6-84

STATION 21

2336	25.1	ARICIDEA TAYLORI
1803	19.4	THARYX CF. DORSOBRANCHIALIS
1525	16.4	HAPLOSCOLOPLOS FRAGILIS
427	4.6	HAPLOSCOLOPLOS FOLIOSUS
288	3.1	STREBLOSPIO BENEDICTI
224	2.4	ARICIDEA PHILBINAE
171	1.8	MEDIOMASTUS AMBISETA
149	1.6	MYRIOCHELE OCULATA
139	1.5	MEDIOMASTUS SP.
117	1.3	CIRROPHORUS CF. FURCATUS

6-14-83

STATION 22

523	12.1	LUMBRINERIS VERRILLI
416	9.6	ALIGENA TEXASIANA
331	7.7	MYRIOCHELE OCULATA
267	6.2	ARICIDEA TAYLORI
235	5.4	THARYX CF. DORSOBRANCHIALIS
224	5.2	FABRICIA SP. A
160	3.7	CLYMENELLA TORQUATA
128	3.0	BATEA CF. CATHARINENSIS
96	2.2	MYSELLA PLANULATA
96	2.2	EDOTEA TRILOBA

7-25-83

STATION 22

1013	20.0	LUMBRINERIS VERRILLI
779	15.3	ARICIDEA TAYLORI
693	13.7	THARYX CF. DORSOBRANCHIALIS
555	10.9	MEDIOMASTUS AMBISETA
299	5.9	ARICIDEA PHILBINAE
171	3.4	STREBLOSPIO BENEDICTI
160	3.2	PARAPRIONOSPIO PINNATA
139	2.7	CIRROPHORUS CF. FURCATUS
117	2.3	MYRIOCHELE OCULATA
75	1.5	POLYCIRRUS SP.

9-8-83

STATION 22

1579	23.6	STREBLOSPIO BENEDICTI
1259	18.8	ARICIDEA TAYLORI
555	8.3	LUMBRINERIS VERRILLI
533	8.0	THARYX CF. DORSOBRANCHIALIS
491	7.3	MEDIOMASTUS AMBISETA
213	3.2	PARAPRIONOSPIO PINNATA
203	3.0	ACTEOCINA CANALICULATA
117	1.8	SCOLOPLOS RUBRA
107	1.6	MYRIOCHELE OCULATA
107	1.6	POLYNOID GENUS D

10-13-83

STATION 22

608	15.7	THARYX CF. DORSOBRANCHIALIS
565	14.6	ARICIDEA TAYLORI
523	13.5	PARAPRIONOSPIO PINNATA
181	4.7	MEDIOMASTUS SP.
171	4.4	LUMBRINERIS VERRILLI
171	4.4	ACTEOCINA CANALICULATA
149	3.8	STREBLOSPIO BENEDICTI
96	2.5	SCOLELEPIS TEXANA
85	2.2	SCOLOPLOS RUBRA
75	1.9	CIRROPHORUS CF. FURCATUS

11-23-83

STATION 22

1973	17.4	MEDIOMASTUS SP.
1813	16.0	THARYX CF. DORSOBRANCHIALIS
971	8.6	ARICIDEA TAYLORI
800	7.1	PARAPRIONOSPIO PINNATA
608	5.4	LUMBRINERIS VERRILLI
501	4.4	HAPLOSCOLOPLOS FOLIOSUS
491	4.3	MYRIOCHELE OCULATA
427	3.8	KINBERGONUPHIS SIMONI
331	2.9	SCOLELEPIS TEXANA
267	2.4	SPIOCHAETOPTERUS C. OCULATUS

1-4-84

STATION 22

2411	18.3	MEDIOMASTUS CALIFORNIENSIS
1163	8.8	THARYX CF. DORSOBRANCHIALIS
981	7.5	LUMBRINERIS VERRILLI
672	5.1	ACTEOCINA CANALICULATA
608	4.6	SCOLELEPIS TEXANA
608	4.6	MOOREONUPHIS NEBULOSA
587	4.5	FABRICIA SP. A
501	3.8	SPHAEROSYLLIS TAYLORI
288	2.2	CAECUM PULCHELLUM
277	2.1	AMAEANA TRILOBATA

2-23-84

STATION 22

2229	12.3	SPHAEROSYLLIS TAYLORI
1781	9.8	EXOGONE DISPAR
1344	7.4	THARYX CF. DORSOBRANCHIALIS
1269	7.0	MEDIOMASTUS AMBISETA
1237	6.8	CAECUM STRIGOSUM
1067	5.9	ARICIDEA TAYLORI
960	5.3	MYRIOCHELE OCULATA
619	3.4	CLYMENELLA TORQUATA
555	3.0	FABRICIA SP. A
533	2.9	STREBLOSPIO BENEDICTI

4-16-84

STATION 22

917	9.9	THARYX CF. DORSOBRANCHIALIS
917	9.9	MEDIOMASTUS SP.
853	9.2	ARICIDEA TAYLORI
843	9.1	HAPLOSCOLOPLOS FOLIOSUS
512	5.5	LUMBRINERIS VERRILLI
501	5.4	HAPLOSCOLOPLOS FRAGILIS
352	3.8	ACTEOCINA CANALICULATA
320	3.5	CLYMENELLA TORQUATA
277	3.0	HOLOTHUROIDEA SP.
213	2.3	PARAPRIONOSPIO PINNATA

6-6-84

STATION 22

3499	29.3	THARYX CF. DORSOBRANCHIALIS
949	7.9	ARICIDEA TAYLORI
736	6.2	ALIGENA TEXASIANA
544	4.6	LUMBRINERIS VERRILLI
523	4.4	FABRICIA SP. A
416	3.5	AMPELISCA HOLMESI
405	3.4	MYRIOCHELE OCULATA
373	3.1	NEAEROMYA FLORIDANA
320	2.7	ENTEROPNEUSTA SP.
288	2.4	HAPLOSCOLOPLOS FOLIOSUS

7-17-84

STATION 22

1099	17.1	THARYX CF. DORSOBRANCHIALIS
757	11.8	ARICIDEA TAYLORI
587	9.2	ALIGENA TEXASIANA
373	5.8	MEDIOMASTUS SP.
320	5.0	LUMBRINERIS VERRILLI
299	4.7	MYRIOCHELE OCULATA
235	3.7	HAPLOSCOLOPLOS FRAGILIS
213	3.3	PARAPRIONOSPIO PINNATA
149	2.3	MEDIOMASTUS AMBISETA
128	2.0	HAPLOSCOLOPLOS FOLIOSUS

6-14-83

STATION 23

1109	17.2	CREPIDULA PLANA
469	7.3	ARICIDEA PHILBINAE
416	6.4	MEDIOMASTUS AMBISETA
384	5.9	THARYX CF. DORSOBRANCHIALIS
320	5.0	CAULLERIELLA SP.
288	4.5	LUMBRINERIS VERRILLI
171	2.6	ARICIDEA TAYLORI
171	2.6	LYONSIA HYALINA FLORIDANA
160	2.5	FABRICIA SP. A
160	2.5	BRACHIDONTES EXUSTUS

9-8-83

STATION 23

1099	27.8	MEDIOMASTUS AMBISETA
491	12.4	PARAPRIONOSPIO PINNATA
405	10.3	STREBLOSPIO BENEDICTI
309	7.8	MYRIOCHELE OCULATA
288	7.3	LUMBRINERIS VERRILLI
213	5.4	ACTEOCINA CANALICULATA
128	3.2	TURBONILLA CONRADI
117	3.0	CARAZZIELLA HOBSONAE
64	1.6	SPIONIDAE SP.
53	1.4	PHYLLODOCE ARENAE

11-23-83

STATION 23

8181	27.8	FABRICIA SP. A
3573	12.1	MEDIOMASTUS CALIFORNIENSIS
2581	8.8	EXOGONE DISPAR
2507	8.5	MYRIOCHELE OCULATA
2283	7.8	AXIOTHELLA MUCOSA
1557	5.3	CREPIDULA PLANA
971	3.3	CAECUM PULCHELLUM
704	2.4	KINBERGONUPHIS SIMONI
[illegible]	2.1	ACTEOCINA CANALICULATA
587	2.0	COROPHIUM ACHERUSICUM

2-23-84

STATION 23

2336	25.2	THARYX CF. DORSOBRANCHIALIS
949	10.2	HAPLOSCOLOPLOS FOLIOSUS
651	7.0	MINUSPIO CIRRIFERA
597	6.4	MYRIOCHELE OCULATA
416	4.5	CLYMENELLA TORQUATA
405	4.4	ACTEOCINA CANALICULATA
395	4.3	MICROPHOLIS GRACILLIMA
299	3.2	POLYNOID GENUS D
277	3.0	MYSELLA PLANULATA
256	2.8	PARAPRIONOSPIO PINNATA

6-6-84

STATION 23

6048	25.3	FABRICIA SP. A
1451	6.1	CAULLERIELLA SP.
1259	5.3	MEDIOMASTUS SP.
1024	4.3	TURBONILLA CONRADI
864	3.6	EXOGONE DISPAR
789	3.3	THARYX CF. DORSOBRANCHIALIS
757	3.2	NUCULA PROXIMA
736	3.1	BOGUEA ENIGMATICA
7[illegible]5	3.0	MYSELLA PLANULATA
672	2.8	MYRIOCHELE OCULATA

6-14-83

STATION 24

192	6.0	LUMBRINERIS VERRILLI
181	5.7	NOTOMASTUS LATERICEUS
181	5.7	CHAETOZONE SP.
160	5.0	ABRA AEQUALIS
139	4.4	ARICIDEA CF. CATHERINAE
107	3.4	HAPLOSCOLOPLOS FRAGILIS
96	3.0	OXYUROSTYLIS SMITHI
85	2.7	APOPRIONOSPIO PYGMAEA
85	2.7	MULINIA LATERALIS
85	2.7	NUCULANA ACUTA

9-8-83

STATION 24

288	9.3	NEAEROMYA FLORIDANA
256	8.2	MYRIOCHELE OCULATA
181	5.8	MICROPHOLIS GRACILLIMA
149	4.8	THARYX CF. DORSOBRANCHIALIS
139	4.5	APOPRIONOSPIO PYGMAEA
139	4.5	LUMBRINERIS VERRILLI
117	3.8	NUCULANA ACUTA
107	3.4	POLYNOID GENUS D
96	3.1	AMPELISCA HOLMESI
96	3.1	NOTOMASTUS LATERICEUS

11-23-83

STATION 24

800	16.0	MEDIOMASTUS SP.
469	9.4	APOPRIONOSPIO PYGMAEA
416	8.3	LUMBRINERIS VERRILLI
384	7.7	MYRIOCHELE OCULATA
213	4.3	AMPELISCA HOLMESI
139	2.8	THARYX CF. DORSOBRANCHIALIS
128	2.6	PARAPRIONOSPIO PINNATA
128	2.5	SCOLELEPIS TEXANA
128	2.6	SPIOCHAETOPTERUS C. OCULATUS
117	2.3	TELLINA VERSICOLOR

2-23-84

STATION 24

1504	18.7	SCOLELEPIS TEXANA
629	7.8	MEDIOMASTUS SP.
619	7.7	MEDIOMASTUS AMBISETA
565	7.0	CLYMENELLA TORQUATA
352	4.4	SPIOPHANES BOMBYX
341	4.2	APOPRIONOSPIO PYGMAEA
320	4.0	LUMBRINERIS VERRILLI
256	3.2	BOGUEA ENIGMATICA
256	3.2	MYRIOCHELE OCULATA
192	2.4	MYSELLA PLANULATA

6-6-84

STATION 24

2133	13.9	MYRIOCHELE OCULATA
1963	12.8	CARAZZIELLA HOBSONAE
907	5.9	ALIGENA TEXASIANA
811	5.3	THARYX CF. DORSOBRANCHIALIS
683	4.5	MEDIOMASTUS AMBISETA
544	3.6	ABRA AEQUALIS
523	3.4	MEDIOMASTUS SP.
491	3.2	CLYMENELLA TORQUATA
459	3.0	MYSELLA PLANULATA
437	2.9	MINUSPIO CIRRIFERA

6-14-83

STATION 25

1984	28.0	GONIADIDES CAROLINAE
597	8.4	MEDIOMASTUS AMBISETA
565	8.0	ABRA AEQUALIS
309	4.4	MYRIOCHELE OCULATA
277	3.9	CIRROPHORUS CF. FURCATUS
213	3.0	MYSELLA PLANULATA
160	2.3	LYONSIA HYALINA FLORIDANA
149	2.1	CAECUM SP.
139	2.0	SPIOPHANES BOMBYX
128	1.8	PAGURIDAE SP.

7-25-83

STATION 25

1504	18.5	CARAZZIELLA HOBSONAE
1077	13.2	GONIADIDES CAROLINAE
587	7.2	MYRIOCHELE OCULATA
533	6.5	CIRROPHORUS CF. FURCATUS
533	6.5	MEDIOMASTUS AMBISETA
437	5.4	THARYX CF. DORSOBRANCHIALIS
256	3.1	NEAEROMYA FLORIDANA
256	3.1	AMPELISCA HOLMESI
203	2.5	LOIMIA MEDUSA
181	2.2	MICROPHOLIS GRACILLIMA

9-8-83

STATION 25

1440	14.7	GONIADIDES CAROLINAE
1099	11.2	CARAZZIELLA HOBSONAE
811	8.3	MEDIOMASTUS SP.
629	6.4	CIRROPHORUS CF. FURCATUS
608	6.2	MYRIOCHELE OCULATA
469	4.8	CAECUM STRIGOSUM
352	3.6	CAULLERIELLA SP.
352	3.6	NEANTHES MICROMMA
192	2.0	LUMBRINERIS VERRILLI
128	1.3	MICRODEUTOPUS MYERSI

10-13-83

STATION 25

1077	12.0	GONIADIDES CAROLINAE
459	5.1	CIRROPHORUS CF. FURCATUS
459	5.1	MEDIOMASTUS SP.
437	4.9	BRACHYURA SP. (JUV.)
405	4.5	COROPHIUM LOUISANIUM
320	3.6	PARAMPHINOME SP. B
288	3.2	MYRIOCHELE OCULATA
277	3.1	CARAZZIELLA HOBSONAE
277	3.1	CAULLERIELLA SP.
235	2.6	AMPELISCA HOLMESI

11-23-83

STATION 25

1867	14.6	GONIADIDES CAROLINAE
1579	12.3	CARAZZIELLA HOBSONAE
1035	8.1	MYRIOCHELE OCULATA
811	6.3	MEDIOMASTUS SP.
619	4.8	CAULLERIELLA SP.
501	3.9	CIRROPHORUS CF. FURCATUS
352	2.8	NEANTHES MICROMMA
277	2.2	LUMBRINERIS VERRILLI
277	2.2	ABRA AEQUALIS
245	1.9	CHONE AMERICANA

1-4-84

STATION 25

1301	10.1	MEDIOMASTUS AMBISETA
949	7.3	MYRIOCHELE OCULATA
672	5.2	GONIADIDES CAROLINAE
544	4.2	ABRA AEQUALIS
533	4.1	FABRICIA SP. A
491	3.8	CARAZZIELLA HOBSONAE
395	3.1	CIRROPHORUS CF. FURCATUS
331	2.6	LUMBRINERIS VERRILLI
320	2.5	SPHAEROSYLLIS TAYLORI
320	2.5	AXIOTHELLA MUCOSA

2-23-84

STATION 25

1035	11.5	MYRIOCHELE OCULATA
736	8.2	CLYMENELLA TORQUATA
512	5.7	NEAEROMYA FLORIDANA
416	4.6	NUCULANA ACUTA
405	4.5	CARAZZIELLA HOBSONAE
405	4.5	SPIOPHANES BOMBYX
331	3.7	MEDIOMASTUS AMBISETA
320	3.6	AMPHIURIDAE SP.
288	3.2	TEREBELLIDES STROEMI
277	3.1	THARYX CF. DORSOBRANCHIALIS

4-16-84

STATION 25

2517	17.2	MEDIOMASTUS SP.
1259	8.6	MYRIOCHELE OCULATA
992	6.8	GONIADIDES CAROLINAE
832	5.7	FABRICIA SP. A
597	4.1	LUMBRINERIS VERRILLI
491	3.4	CIRROPHORUS CF. FURCATUS
491	3.4	SPIOPHANES BOMBYX
373	2.6	NUCULANA ACUTA
363	2.5	NEANTHES MICROMMA
352	2.4	THARYX CF. DORSOBRANCHIALIS

6-6-84

STATION 25

1739	9.7	MYRIOCHELE OCULATA
1056	5.9	MEDIOMASTUS CALIFORNIENSIS
896	5.0	MEDIOMASTUS SP.
864	4.8	SABELLARIA VULGARIS
853	4.8	ABRA AEQUALIS
640	3.6	CIRROPHORUS CF. FURCATUS
533	3.0	FABRICIA SP. A
523	2.9	CAULLERIELLA SP.
448	2.5	GONIADIDES CAROLINAE
427	2.4	DIPLODONTA PUNCTATA

7-17-84

STATION 25

1408	19.8	MYRIOCHELE OCULATA
1003	14.1	CARAZZIELLA HOBSONAE
757	10.7	GONIADIDES CAROLINAE
480	6.8	CIRROPHORUS CF. FURCATUS
224	3.2	MEDIOMASTUS AMBISETA
149	2.1	AMPELISCA HOLMESI
149	2.1	AMPHIURIDAE SP.
128	1.8	THARYX CF. DORSOBRANCHIALIS
128	1.8	NEAEROMYA FLORIDANA
128	1.8	BRACHYURA SP. (JUV.)

6-14-83

STATION 26

1077	13.1	GONIADIDES CAROLINAE
1056	12.8	ABRA AEQUALIS
640	7.8	MEDIOMASTUS AMBISETA
320	3.9	NUCULANA ACUTA
235	2.8	CIRROPHORUS CF. FURCATUS
213	2.6	FABRICIA SP. A
213	2.6	LYONSIA HYALINA FLORIDANA
181	2.2	CHAETOZONE SP.
171	2.1	LUMBRINERIS VERRILLI
139	1.7	ARICIDEA TAYLORI

7-25-83

STATION 26

544	11.0	CIRROPHORUS CF. FURCATUS
512	10.4	GONIADIDES CAROLINAE
501	10.2	MEDIOMASTUS AMBISETA
213	4.3	NUCULANA ACUTA
192	3.9	CARAZZIELLA HOBSONAE
181	3.7	LUMBRINERIS VERRILLI
128	2.6	ARICIDEA TAYLORI
128	2.6	CHONE AMERICANA
107	2.2	FABRICIA SP. A
107	2.2	MYSELLA PLANULATA

9-8-83

STATION 26

1589	17.7	GONIADIDES CAROLINAE
693	7.7	LUMBRINERIS VERRILLI
619	6.9	MEDIOMASTUS AMBISETA
459	5.1	CIRROPHORUS CF. FURCATUS
437	4.9	NUCULANA ACUTA
288	3.2	CAULLERIELLA SP.
267	3.0	MYRIOCHELE OCULATA
192	2.1	FABRICIA SP. A
192	2.1	OLIVELLA SP. B
160	1.8	CHONE AMERICANA

10-13-83

STATION 26

1141	9.1	FABRICIA SP. A
1131	9.0	GONIADIDES CAROLINAE
832	6.6	HAPLOSYLLIS SPONGICOLA
747	6.0	MEDIOMASTUS CALIFORNIENSIS
501	4.0	CHONE AMERICANA
341	2.7	LUMBRINERIS VERRILLI
288	2.3	CIRROPHORUS CF. FURCATUS
277	2.2	EXOGONE LOUREI
267	2.1	PINNOTHERIDAE SP.
256	2.0	APANTHURA MAGNIFICA

11-23-83

STATION 26

4597	16.6	HAPLOSYLLIS SPONGICOLA
2059	7.4	MEDIOMASTUS SP.
2016	7.3	GONIADIDES CAROLINAE
1877	6.8	FABRICIA SP. A
1344	4.9	CHONE AMERICANA
907	3.3	ABRA AEQUALIS
715	2.6	EXOGONE DISPAR
608	2.2	CAULLERIELLA SP.
597	2.2	PRIONOSPIO CRISTATA
501	1.8	AMPELISCA ABDITA

1-4-84

STATION 26

736	9.3	MEDIOMASTUS CALIFORNIENSIS
469	5.9	POLYDORA WEBSTERI
405	5.1	ABRA AEQUALIS
373	4.7	HAPLOSYLLIS SPONGICOLA
352	4.5	FABRICIA SP. A
309	3.9	PRIONOSPIO CRISTATA
267	3.4	EXOGONE DISPAR
267	3.4	SPIO PETTIBONEAE
245	3.1	CHONE AMERICANA
224	2.8	OLIVELLA SP. B

2-23-84

STATION 26

3349	18.9	FABRICIA SP. A
2645	14.9	HAPLOSYLLIS SPONGICOLA
1280	7.2	GONIADIDES CAROLINAE
1205	6.8	MEDIOMASTUS CALIFORNIENSIS
875	4.9	SPIOPHANES BOMBYX
597	3.4	EXOGONE DISPAR
523	3.0	NUCULANA ACUTA
395	2.2	CHONE AMERICANA
373	2.1	SPIO PETTIBONEAE
267	1.5	PRIONOSPIO CRISTATA

4-16-84

STATION 26

2005	14.3	MEDIOMASTUS SP.
1387	9.9	FABRICIA SP. A
917	6.5	NUCULANA ACUTA
715	5.1	SPIOPHANES BOMBYX
683	4.9	GONIADIDES CAROLINAE
683	4.9	POLYDORA CF HARTMANAE
629	4.5	MEDIOMASTUS CALIFORNIENSIS
299	2.1	LUMBRINERIS VERRILLI
277	2.0	EULALIA SANGUINEA
267	1.9	PRIONOSPIO CRISTATA

6-6-84

STATION 26

4864	22.3	SABELLARIA VULGARIS
1195	5.5	MEDIOMASTUS CALIFORNIENSIS
1045	4.8	MEDIOMASTUS SP.
1024	4.7	CAULLERIELLA SP.
907	4.2	ABRA AEQUALIS
661	3.0	AMPELISCA HOLMESI
469	2.1	POLYDORA CF HARTMANAE
459	2.1	GONIADIDES CAROLINAE
427	2.0	GLYCINDE SOLITARIA
416	1.9	NUCULA PROXIMA

7-17-84

STATION 26

608	9.9	GLYCERA AMERICANA
459	7.5	MEDIOMASTUS CALIFORNIENSIS
416	6.8	SABELLARIA VULGARIS
309	5.0	LOIMIA MEDUSA
256	4.2	CIRROPHORUS CF. FURCATUS
224	3.6	ARICIDEA TAYLORI
192	3.1	NUCULA PROXIMA
192	3.1	NUCULANA ACUTA
171	2.8	THARYX CF. DORSOBRANCHIALIS
160	2.6	EXOGONE DISPAR

6-14-83

STATION 27

2187	26.0	ARICIDEA PHILBINAE
1376	16.4	ARICIDEA TAYLORI
757	9.0	LAEONEREIS CULVERI
533	6.4	THARYX CF. DORSOBRANCHIALIS
224	2.7	CHONE AMERICANA
203	2.4	STREBLOSPIO BENEDICTI
181	2.2	PRIONOSPIO HETEROBRANCHIA
181	2.2	ERICHSONELLA CF. ATTENUATA
117	1.4	GRANDIDIERELLA BONNIEROIDES
107	1.3	DIASTOMA VARIUM

7-25-83

STATION 27

1269	16.9	ARICIDEA PHILBINAE
683	9.1	THARYX CF. DORSOBRANCHIALIS
587	7.8	CHONE AMERICANA
544	7.2	FABRICIA SP. A
480	6.4	PRIONOSPIO HETEROBRANCHIA
427	5.7	CYMADUSA COMPTA
352	4.7	GITANOPSIS SP.
277	3.7	EHLERSIA CORNUTA
277	3.7	CAPITELLA CAPITATA
256	3.4	ARICIDEA TAYLORI

9-8-83

STATION 27

2048	26.7	STREBLOSPIO BENEDICTI
1301	17.0	ARICIDEA PHILBINAE
395	5.2	THARYX CF. DORSOBRANCHIALIS
384	5.0	EXOGONE DISPAR
277	3.6	PRIONOSPIO HETEROBRANCHIA
245	3.2	CHONE AMERICANA
235	3.1	CREPIDULA MACULOSA
181	2.4	CYMADUSA COMPTA
171	2.2	OLIVELLA MINUTA
149	1.9	ERICHTHONIUS BRASILIENSIS

10-13-83

STATION 27

1536	12.8	SPIRORBIS SPIRILLUM
1280	10.7	CYMADUSA COMPTA
1227	10.2	STREBLOSPIO BENEDICTI
1013	8.5	CREPIDULA MACULOSA
981	8.2	ARICIDEA PHILBINAE
544	4.5	PRIONOSPIO HETEROBRANCHIA
512	4.3	CAECUM PULCHELLUM
448	3.7	GRANDIDIERELLA BONNIEROIDES
416	3.5	POLYDORA WEBSTERI
395	3.3	THARYX CF. DORSOBRANCHIALIS

11-23-83

STATION 27

2176	18.7	AXIOTHELLA MUCOSA
1877	16.2	POLYCIRRUS SP.
1344	11.6	STREBLOSPIO BENEDICTI
1003	8.6	FABRICIA SP. A
661	5.7	GRANULINA OVULIFORMIS
501	4.3	ARICIDEA PHILBINAE
427	3.7	KALLIAPSEUDES SP. A
352	3.0	EHLERSIA CORNUTA
288	2.5	EXOGONE DISPAR
288	2.5	TYPOSYLLIS CF. LUTEA

1-4-84

STATION 27

2709	18.8	STREBLOSPIO BENEDICTI
2624	18.2	AMAEANA TRILOBATA
1963	13.6	AXIOTHELLA MUCOSA
1131	7.8	ARICIDEA PHILBINAE
939	6.5	HAPLOSCOLOPLOS FOLIOSUS
704	4.9	SCOLELEPIS TEXANA
640	4.4	SPHAEROSYLLIS TAYLORI
523	3.6	FABRICIA SP. A
299	2.1	ACTEOCINA CANALICULATA
288	2.0	THARYX CF. DORSOBRANCHIALIS

2-23-84

STATION 27

2965	18.3	AMAEANA TRILOBATA
1387	8.5	CYMADUSA COMPTA
1312	8.1	HAPLOSCOLOPLOS FOLIOSUS
800	4.9	DIASTOMA VARIUM
789	4.9	THARYX CF. DORSOBRANCHIALIS
736	4.5	ARICIDEA PHILBINAE
693	4.3	AXIOTHELLA MUCOSA
661	4.1	FABRICIA SP. A
533	3.3	STREBLOSPIO BENEDICTI
523	3.2	CHONE AMERICANA

4-16-84

STATION 27

3947	19.3	CYMADUSA COMPTA
2080	10.2	THARYX CF. DORSOBRANCHIALIS
1408	6.9	ARICIDEA PHILBINAE
1301	6.4	FABRICIA SP. A
1259	6.2	HAPLOSCOLOPLOS FRAGILIS
811	4.0	EHLERSIA CORNUTA
651	3.2	ACUMINODEUTOPUS NAGLEI
619	3.0	EXOGONE DISPAR
597	2.9	AMAEANA TRILOBATA
576	2.8	PRIONOSPIO HETEROBRANCHIA

6-6-84

STATION 27

4021	21.1	THARYX CF. DORSOBRANCHIALIS
1301	6.8	DIASTOMA VARIUM
1280	6.7	ARICIDEA TAYLORI
1173	6.1	ARICIDEA PHILBINAE
1003	5.3	CHONE AMERICANA
1003	5.3	SPIRORBIS SPIRILLUM
789	4.1	AMPELISCA HOLMESI
587	3.1	STREBLOSPIO BENEDICTI
576	3.0	AXIOTHELLA MUCOSA
544	2.8	CYMADUSA COMPTA

7-17-84

STATION 27

3979	28.8	THARYX CF. DORSOBRANCHIALIS
2613	18.9	ARICIDEA TAYLORI
1717	12.4	ARICIDEA PHILBINAE
491	3.6	STREBLOSPIO BENEDICTI
405	2.9	SPIRORBIS SPIRILLUM
331	2.4	AMPELISCA HOLMESI
309	2.2	DIASTOMA VARIUM
224	1.6	CAPITELLA CAPITATA
224	1.6	HOLOTHUROIDEA SP.
213	1.5	HAPLOSCOLOPLOS FRAGILIS

6-14-83

STATION 28

1717	17.1	LUMBRINERIS VERRILLI
1504	15.0	FABRICIA SP. A
725	7.2	ARICIDEA TAYLORI
683	6.8	THARYX CF. DORSOBRANCHIALIS
683	6.8	ALIGENA TEXASIANA
501	5.0	CHONE AMERICANA
363	3.6	SCOLOPLOS RUBRA
331	3.3	AMPELISCA HOLMESI
277	2.8	CLYMENELLA TORQUATA
235	2.3	MEDIOMASTUS AMBISETA

9-8-83

STATION 28

3840	26.8	STREBLOSPIO BENEDICTI
1824	12.7	LUMBRINERIS VERRILLI
1621	11.3	FILOGRANA IMPLEXA
1408	9.8	FABRICIA SP. A
1152	8.0	THARYX CF. DORSOBRANCHIALIS
512	3.6	MEDIOMASTUS SP.
427	3.0	TYPOSYLLIS CF. LUTEA
373	2.6	SCOLOPLOS RUBRA
373	2.6	PRIONOSPIO HETEROBRANCHIA
277	1.9	GRANDIDIERELLA BONNIEROIDES

11-23-83

STATION 28

491	14.2	SCOLOPLOS TEXANA
373	10.8	ARICIDEA TAYLORI
373	10.8	STREBLOSPIO BENEDICTI
341	9.9	SCOLOPLOS RUBRA
331	9.6	LUMBRINERIS VERRILLI
288	8.4	PARAPRIONOSPIO PINNATA
171	5.0	MEDIOMASTUS SP.
139	4.0	THARYX CF. DORSOBRANCHIALIS
85	2.5	AMPELISCA HOLMESI
75	2.2	CIRROPHORUS CF. FURCATUS

2-23-84

STATION 28

4725	13.9	FABRICIA SP. A
3360	9.9	SPHAEROSYLLIS TAYLORI
3328	9.8	AXIOTHELLA MUCOSA
2720	8.0	THARYX CF. DORSOBRANCHIALIS
2304	6.8	CAECUM PULCHELLUM
1941	5.7	ACTEOCINA CANALICULATA
1259	3.7	LUMBRINERIS VERRILLI
1099	3.2	EXOGONE DISPAR
1068	3.2	STREBLOSPIO BENEDICTI
832	2.4	EHLERSIA CORNUTA

6-6-84

STATION 28

71456	63.0	FABRICIA SP. A
7787	6.9	THARYX CF. DORSOBRANCHIALIS
2965	2.6	AXIOTHELLA MUCOSA
2816	2.5	CHONE AMERICANA
2464	2.2	ERICTHONIUS BRASILIENSIS
2357	2.1	MALDANIDAE
2059	1.8	GRANDIDIERELLA BONNIEROIDES
1536	1.4	LUMBRINERIS VERRILLI
1397	1.2	MYSELLA PLANULATA
1344	1.2	ACTEOCINA CANALICULATA

6-14-83

STATION 29

20011	64.8	CAECUM SP.
2880	9.3	CAECUM PULCHELLUM
1120	3.6	ACROCIRRUS FRONTIFILIS
971	3.1	MELITA LONGISETOSA
885	2.9	BRACHIDONTES EXUSTUS
789	2.6	PARAMPHINOME SP. B
629	2.0	MEDIOMASTUS AMBISETA
491	1.6	CREPIDULA PLANA
416	1.3	PARACERCEIS CAUDATA
245	0.8	MELITA ELONGATA

7-25-83

STATION 29

1440	23.7	ARICIDEA TAYLORI
1387	22.8	LUMBRINERIS VERRILLI
704	11.6	THARYX CF. DORSOBRANCHIALIS
480	7.9	MEDIOMASTUS SP.
437	7.2	FABRICIA SP. A
320	5.3	AMPELISCA HOLMESI
128	2.1	PRIONOSPIO HETEROBRANCHIA
85	1.4	ARICIDEA PHILBINAE
85	1.4	SCOLOPLOS RUBRA
75	1.2	KINBERGONUPHIS SIMONI

9-8-83

STATION 29

19968	44.4	CAECUM STRIGOSUM
11808	26.3	FILOGRANA IMPLEXA
2592	5.8	POLYDORA WEBSTERI
1845	4.1	MEDIOMASTUS CALIFORNIENSIS
704	1.6	PANOPEUS HERBSTII
629	1.4	XANTHIDAE SP.
565	1.3	ELASMOPUS LEVIS
480	1.1	TYPOSYLLIS CF. LUTEA
416	0.9	TYPOSYLLIS PROLIFERA
395	0.9	NEREIDAE SP.

10-13-83

STATION 29

20843	49.5	FILOGRANA IMPLEXA
4459	10.6	MEDIOMASTUS CALIFORNIENSIS
2453	5.8	BOCCARDIELLA HAMATA
1621	3.9	CRASSOSTREA VIRGINICA
1269	3.0	POLYDORA SOCIALIS
981	2.3	TYPOSYLLIS PROLIFERA
939	2.2	CREPIDULA PLANA
736	1.7	ARICIDEA TAYLORI
683	1.6	STREBLOSPIO BENEDICTI
597	1.4	THARYX CF. DORSOBRANCHIALIS

11-23-83

STATION 29

12725	19.9	POLYDORA CF WEBSTERI
8928	14.0	MEDIOMASTUS CALIFORNIENSIS
8405	13.2	ELASMOPUS LEVIS
6005	9.4	CREPIDULA PLANA
4256	6.7	CRASSOSTREA VIRGINICA
3381	5.3	MELITA ELONGATA
2304	3.6	CAECUM PULCHELLUM
1845	2.9	CAECUM STRIGOSUM
1632	2.6	COROPHIUM LACUSTRE
1568	2.5	PRIONOSPIO HETEROBRANCHIA

1-4-84

STATION 29

3819	21.3	MEDIOMASTUS SP.
1568	8.7	SPHAEROSYLLIS TAYLORI
1280	7.1	ACTEOCINA CANALICULATA
971	5.4	MEDIOMASTUS CALIFORNIENSIS
864	4.8	FABRICIA SP. A
832	4.6	LUMBRINERIS VERRILLI
533	3.0	THARYX CF. DORSOBRANCHIALIS
533	3.0	TYPOSYLLIS CF. LUTEA
491	2.7	POLYDORA WEBSTERI
405	2.3	CLYMENELLA TORQUATA

2-23-84

STATION 29

2624	12.7	SPHAEROSYLLIS TAYLORI
2389	11.6	THARYX CF. DORSOBRANCHIALIS
2229	10.8	MEDIOMASTUS SP.
1920	9.3	FABRICIA SP. A
1259	6.1	ARICIDEA TAYLORI
1056	5.1	ACTEOCINA CANALICULATA
949	4.6	MEDIOMASTUS AMBISETA
853	4.1	MEDIOMASTUS CALIFORNIENSIS
544	2.6	CAECUM PULCHELLUM
480	2.3	CLYMENELLA TORQUATA

4-16-84

STATION 29

2656	23.1	THARYX CF. DORSOBRANCHIALIS
1461	12.7	CHONE AMERICANA
981	8.6	SCOLOPLOS RUBRA
843	7.3	ACTEOCINA CANALICULATA
651	5.7	HAPLOSCOLOPLOS FOLIOSUS
608	5.3	LUMBRINERIS VERRILLI
405	3.5	MEDIOMASTUS SP.
267	2.3	CLYMENELLA TORQUATA
245	2.1	SCOLELEPIS TEXANA
224	2.0	BATEA CF. CATHARINENSIS

6-6-84

STATION 29

11456	47.5	FABRICIA SP. A
3285	13.6	THARYX CF. DORSOBRANCHIALIS
1312	5.4	MYSELLA PLANULATA
1152	4.8	AMPELISCA HOLMESI
1013	4.2	ARICIDEA TAYLORI
779	3.2	MEDIOMASTUS AMBISETA
576	2.4	LUMBRINERIS VERRILLI
384	1.6	CHONE AMERICANA
256	1.1	HAPLOSCOLOPLOS FOLIOSUS
256	1.1	TURBONILLA CONRADI

7-17-84

STATION 29

1589	26.3	THARYX CF. DORSOBRANCHIALIS
704	11.7	LUMBRINERIS VERRILLI
661	11.0	ARICIDEA TAYLORI
469	7.8	MEDIOMASTUS AMBISETA
245	4.1	MEDIOMASTUS SP.
203	3.4	HAPLOSCOLOPLOS FRAGILIS
160	2.7	PARAPRIONOSPIO PINNATA
160	2.7	SCOLOPLOS RUBRA
128	2.1	FABRICIA SP. A
96	1.6	HOLOTHUROIDEA SP.

6-14-83

STATION 30

747	9.1	ARICIDEA TAYLORI
555	6.7	ALIGENA TEXASIANA
533	6.5	LUMBRINERIS VERRILLI
437	5.3	AMPELISCA HOLMESI
427	5.2	ARICIDEA PHILBINAE
427	5.2	CARAZZIELLA HOBSONAE
405	4.9	MEDIOMASTUS AMBISETA
341	4.1	CIRROPHORUS CF. FURCATUS
331	4.0	FABRICIA SP. A
277	3.4	MYRIOCHELE OCULATA

7-25-83

STATION 30

427	14.7	MEDIOMASTUS AMBISETA
363	12.5	LUMBRINERIS VERRILLI
267	9.2	MYRIOCHELE OCULATA
171	5.9	PARAPRIONOSPIO PINNATA
139	4.8	THARYX CF. DORSOBRANCHIALIS
107	3.7	ARICIDEA PHILBINAE
107	3.7	FABRICIA SP. A
85	2.9	BOGUEA ENIGMATICA
75	2.6	ARICIDEA TAYLORI
75	2.6	CAULLERIELLA SP.

9-8-83

STATION 30

3531	15.5	CAECUM PULCHELLUM
3488	15.3	STREBLOSPIO BENEDICTI
1664	7.3	FABRICIA SP. A
1195	5.2	MEDIOMASTUS SP.
1088	4.8	MYRIOCHELE OCULATA
1077	4.7	CARAZZIELLA HOBSONAE
651	2.9	PARAPRIONOSPIO PINNATA
619	2.7	PAGURIDAE SP.
555	2.4	CAULLERIELLA SP.
523	2.3	PRIONOSPIO HETEROBRANCHIA

10-13-83

STATION 30

6763	24.5	FABRICIA SP. A
2656	9.6	MEDIOMASTUS SP.
2560	9.3	MYRIOCHELE OCULATA
2507	9.1	CREPIDULA PLANA
1525	5.5	EXOGONE DISPAR
1045	3.8	CAECUM PULCHELLUM
981	3.6	LUMBRINERIS VERRILLI
608	2.2	THARYX CF. DORSOBRANCHIALIS
491	1.8	ARICIDEA PHILBINAE
373	1.4	PARAPRIONOSPIO PINNATA

11-23-83

STATION 30

8416	29.5	FABRICIA SP. A
3157	11.1	MEDIOMASTUS SP.
2464	8.6	AXIOTHELLA MUCOSA
2453	8.6	MYRIOCHELE OCULATA
1653	5.8	EXOGONE DISPAR
715	2.5	LUMBRINERIS VERRILLI
651	2.3	KINBERGONUPHIS SIMONI
608	2.1	ARICIDEA PHILBINAE
587	2.1	ACTEOCINA CANALICULATA
427	1.5	GRANDIDIERELLA BONNIEROIDES

1-4-84

STATION 30

7136	29.9	FABRICIA SP. A
2795	11.7	AXIOTHELLA MUCOSA
1973	8.3	MEDIOMASTUS SP.
1301	5.5	MYRIOCHELE OCULATA
1013	4.2	BOGUEA ENIGMATICA
981	4.1	ACTEOCINA CANALICULATA
939	3.9	EXOGONE DISPAR
768	3.2	KINBERGONUPHIS SIMONI
619	2.6	MEDIOMASTUS AMBISETA
576	2.4	SCOLELEPIS TEXANA

2-23-84

STATION 30

16704	40.0	FABRICIA SP. A
3477	8.3	CAECUM PULCHELLUM
2912	7.0	EXOGONE DISPAR
1984	4.8	SPHAEROSYLLIS TAYLORI
1419	3.4	MEDIOMASTUS SP.
1408	3.4	MEDIOMASTUS CALIFORNIENSIS
1163	2.8	PARACAPRELLA TENUIS
928	2.2	SPHAEROSYLLIS LONGICAUDA
896	2.1	EXOGONE LOUREI
747	1.8	COROPHIUM ACHERUSICUM

4-16-84

STATION 30

11211	35.8	FABRICIA SP. A
1216	3.9	THARYX CF. DORSOBRANCHIALIS
1173	3.7	BOGUEA ENIGMATICA
1152	3.7	EXOGONE DISPAR
1024	3.3	MYRIOCHELE OCULATA
949	3.0	ACTEOCINA CANALICULATA
896	2.9	AMPELISCA ABDITA
885	2.8	CALLISTA EUCYMATA
864	2.8	MEDIOMASTUS SP.
779	2.5	LUMBRINERIS VERRILLI

6-6-84

STATION 30

35883	51.9	FABRICIA SP. A
3029	4.4	AMPELISCA ABDITA
2155	3.1	MEDIOMASTUS AMBISETA
1568	2.3	ACUMINODEUTOPUS NAGLEI
1472	2.1	MYSELLA PLANULATA
1376	2.0	TRANSENNELLA CONRADINA
1312	1.9	ERICTHONIUS BRASILIENSIS
1120	1.6	MYRIOCHELE OCULATA
1088	1.6	ARICIDEA PHILBINAE
1056	1.5	BOGUEA ENIGMATICA

7-17-84

STATION 30

2901	20.4	FABRICIA SP. A
1152	8.1	MYRIOCHELE OCULATA
683	4.8	MEDIOMASTUS SP.
565	4.0	CAULLERIELLA SP.
469	3.3	EXOGONE DISPAR
416	2.9	PAGURIDAE SP.
384	2.7	HIPPOLYTE PLEURACANTHA
373	2.6	THARYX CF. DORSOBRANCHIALIS
352	2.5	AMPELISCA ABDITA
331	2.3	CARAZZIELLA HOBSONAE

6-14-83

STATION 31

501	[illegible].4	THARYX CF. DORSOBRANCHIALIS
341	9.1	AMPELISCA HOLMESI
181	4.8	ASYCHIS ELONGATA
181	4.8	ORCHESTIA CF. PLATENSIS
160	4.3	ARICIDEA PHILBINAE
149	4.0	LAEONEREIS CULVERI
149	4.0	SCOLOPLOS RUBRA
139	3.7	PARAPRIONOSPIO PINNATA
117	3.1	LUMBRINERIS VERRILLI
117	3.1	OGYRIDES ALPHAEROSTRIS

7-25-83

STATION 31

960	9.6	THARYX CF. DORSOBRANCHIALIS
608	6.1	ARICIDEA PHILBINAE
565	5.6	CYMADUSA COMPTA
469	4.7	MYSELLA PLANULATA
416	4.2	TYPOSYLLIS CF. LUTEA
405	4.0	CREPIDULA MACULOSA
405	4.0	AMPELISCA ABDITA
341	3.4	MAGELONA PETTIBONEAE
341	3.4	AXIOTHELLA MUCOSA
331	3.3	GRANDIDIERELLA BONNIEROIDES

9-8-83

STATION 31

981	17.5	DIASTOMA VARIUM
651	11.6	ARICIDEA PHILBINAE
629	11.2	THARYX CF. DORSOBRANCHIALIS
288	5.1	CREPIDULA MACULOSA
245	4.4	MITRELLA LUNATA
235	4.2	PARAPRIONOSPIO PINNATA
224	4.0	ACTEOCINA CANALICULATA
224	4.0	BRACHIDONTES EXUSTUS
213	3.8	TURBONILLA CONRADI
149	2.7	ARICIDEA TAYLORI

10-13-83

STATION 31

2816	32.4	ACTEOCINA CANALICULATA
789	9.1	HAMINOE SUCCINEA
555	6.4	PARAPRIONOSPIO PINNATA
395	4.5	CARAZZIELLA HOBSONAE
373	4.3	CAULLERIELLA SP.
320	3.7	THARYX CF. DORSOBRANCHIALIS
299	3.4	STREBLOSPIO BENEDICTI
267	3.1	EXOGONE LOUREI
256	2.9	MEDIOMASTUS SP.
203	2.3	GLYCINDE SOLITARIA

11-23-83

STATION 31

725	9.0	MEDIOMASTUS SP.
693	8.6	ACTEOCINA CANALICULATA
523	6.5	FABRICIA SP. A
512	6.3	ARICIDEA PHILBINAE
331	4.1	MEDIOMASTUS AMBISETA
277	3.4	EXOGONE DISPAR
267	3.3	PARAPRIONOSPIO PINNATA
267	3.3	TYPOSYLLIS CF. LUTEA
245	3.0	LUMBRINERIS VERRILLI
235	2.9	PRIONOSPIO HETEROBRANCHIA

1-4-84

STATION 31

1931	24.3	MEDIOMASTUS AMBISETA
971	12.2	ARICIDEA PHILBINAE
800	10.1	ACTEOCINA CANALICULATA
384	4.8	THARYX CF. DORSOBRANCHIALIS
363	4.6	PHASCOLION SP.
352	4.4	PARAPRIONOSPIO PINNATA
299	3.8	SCOLELEPIS TEXANA
245	3.1	HAPLOSCOLOPLOS FOLIOSUS
235	2.9	SCOLOPLOS RUBRA
213	2.7	GRANULINA OVULIFORMIS

2-23-84

STATION 31

2272	16.4	HOLOTHUROIDEA SP.
2165	15.7	ACTEOCINA CANALICULATA
1760	12.7	MYSELLA PLANULATA
917	6.6	MEDIOMASTUS SP.
757	5.5	ARICIDEA PHILBINAE
629	4.6	MEDIOMASTUS AMBISETA
533	3.9	STREBLOSPIO BENEDICTI
459	3.3	PARAPRIONOSPIO PINNATA
352	2.5	CYCLASPIS SP. A
320	2.3	THARYX CF. DORSOBRANCHIALIS

4-16-84

STATION 31

4043	20.0	CYMADUSA COMPTA
1237	6.1	CHONE AMERICANA
1099	5.4	ERICHTHONIUS BRASILIENSIS
992	4.9	SPHAEROSYLLIS TAYLORI
949	4.7	COROPHIUM LACUSTRE
853	4.2	CAPITELLA CAPITATA
768	3.8	ARICIDEA PHILBINAE
629	3.1	THARYX CF. DORSOBRANCHIALIS
565	2.8	CYMODOCE FAXONI
459	2.3	OXYUROSTYLIS SMITHI

6-6-84

STATION 31

1696	10.8	ARICIDEA PHILBINAE
1632	10.4	THARYX CF. DORSOBRANCHIALIS
1365	8.7	MEDIOMASTUS AMBISETA
576	3.7	MYSELLA PLANULATA
544	3.5	AXIOTHELLA MUCOSA
512	3.2	FABRICIA SP. A
491	3.1	HARGERIA RAPAX
469	3.0	SPIRORBIS SPIRILLUM
448	2.8	CAPITELLA CAPITATA
416	2.6	CYMADUSA COMPTA

7-17-84

STATION 31

1237	19.7	THARYX CF. DORSOBRANCHIALIS
555	8.8	MYSELLA PLANULATA
523	8.3	HOLOTHUROIDEA SP.
469	7.5	HAMINOE SUCCINEA
309	4.9	ARICIDEA PHILBINAE
299	4.8	MEDIOMASTUS AMBISETA
245	3.9	PARAPRIONOSPIO PINNATA
235	3.7	LUMBRINERIS VERRILLI
213	3.4	AMPELISCA HOLMESI
203	3.2	GLYCINDE SOLITARIA

6-14-83

STATION 32

2101	8.8	BRACHIDONTES EXUSTUS
2048	8.6	MEDIOMASTUS CALIFORNIENSIS
1717	7.2	THARYX CF. DORSOBRANCHIALIS
1504	6.3	FILOGRANA IMPLEXA
1163	4.9	MITRELLA LUNATA
1109	4.7	CAECUM PULCHELLUM
1013	4.3	DIASTOMA VARIUM
896	3.8	CHONE AMERICANA
736	3.1	CARAZZIELLA HOBSONAE
715	3.0	FABRICIA SP. A

9-8-83

STATION 32

352	6.2	ACTEOCINA CANALICULATA
341	6.0	ARICIDEA TAYLORI
341	6.0	CYMADUSA COMPTA
309	5.5	MEDIOMASTUS AMBISETA
299	5.3	FABRICIA SP. A
256	4.5	THARYX CF. DORSOBRANCHIALIS
171	3.0	DIASTOMA VARIUM
160	2.8	ERICTHONIUS BRASILIENSIS
139	2.4	PARAPRIONOSPIO PINNATA
128	2.3	KINBERGONUPHIS SIMONI

11-23-83

STATION 32

1163	9.7	MEDIOMASTUS CALIFORNIENSIS
747	6.2	EXOGONE DISPAR
683	5.7	NEANTHES SUCCINEA
651	5.4	TYPOSYLLIS CF. LUTEA
576	4.8	ACTEOCINA CANALICULATA
544	4.5	THARYX CF. DORSOBRANCHIALIS
448	3.7	ARICIDEA TAYLORI
384	3.2	PARAPRIONOSPIO PINNATA
352	2.9	CYMADUSA COMPTA
331	2.8	PRIONOSPIO HETEROBRANCHIA

2-23-84

STATION 32

1888	13.9	SPHAEROSYLLIS TAYLORI
768	5.7	MEDIOMASTUS SP.
715	5.3	CYMADUSA COMPTA
651	4.8	FABRICIA SP. A
651	4.8	MEDIOMASTUS AMBISETA
587	4.3	SPHAEROSYLLIS LONGICAUDA
565	4.2	EXOGONE DISPAR
544	4.0	CAECUM PULCHELLUM
395	2.9	HAPLOSCOLOPLOS FOLIOSUS
373	2.7	ACUMINODEUTOPUS NAGLEI

6-6-84

STATION 32

5557	17.9	DIASTOMA VARIUM
1856	6.0	CYMADUSA COMPTA
1835	5.9	MYSELLA PLANULATA
1579	5.1	GRANDIDIERELLA BONNIEROIDES
1387	4.5	CAPITELLA CAPITATA
1269	4.1	FABRICIA SP. A
1035	3.3	MITRELLA LUNATA
928	3.0	ACTEOCINA CANALICULATA
917	3.0	THARYX CF. DORSOBRANCHIALIS
917	3.0	AMPELISCA ABDITA

6-14-83

STATION 33

651	15.1	LUMBRINERIS TENUIS
213	4.9	ASYCHIS ELONGATA
213	4.9	LUMBRINERIS VERRILLI
203	4.7	CUMELLA SP. A.
192	4.4	ARICIDEA TAYLORI
192	4.4	THARYX CF. DORSOBRANCHIALIS
160	3.7	NOTOMASTUS LATERICEUS
117	2.7	ARICIDEA PHILBINAE
117	2.7	ALIGENA TEXASIANA
107	2.5	AMPELISCA HOLMESI

7-25-83

STATION 33

907	10.0	THARYX CF. DORSOBRANCHIALIS
608	6.7	LUMBRINERIS VERRILLI
587	6.5	ASCIDIACEA SP.
480	5.3	BATEA CF. CATHARINENSIS
469	5.2	GRANULINA OVULIFORMIS
341	3.8	EXOGONE DISPAR
309	3.4	BOGUEA ENIGMATICA
299	3.3	MEDIOMASTUS AMBISETA
267	2.9	ARICIDEA TAYLORI
256	2.8	ARICIDEA PHILBINAE

9-8-83

STATION 33

693	10.1	MYRIOCHELE OCULATA
629	9.2	THARYX CF. DORSOBRANCHIALIS
427	6.2	LUMBRINERIS VERRILLI
320	4.7	PARAPRIONOSPIO PINNATA
299	4.3	NOTOMASTUS LATERICEUS
245	3.6	BATEA CF. CATHARINENSIS
203	3.0	ASYCHIS ELONGATA
203	3.0	LUMBRINERIS TENUIS
192	2.8	TURBONILLA CONRADI
160	2.3	ARICIDEA TAYLORI

10-13-83

STATION 33

363	9.4	THARYX CF. DORSOBRANCHIALIS
341	8.8	LUMBRINERIS VERRILLI
245	6.3	ARICIDEA PHILBINAE
235	6.1	PARAPRIONOSPIO PINNATA
235	6.1	GRANULINA OVULIFORMIS
139	3.6	POLYDORA WEBSTERI
139	3.6	MEDIOMASTUS SP.
117	3.0	ACTEOCINA CANALICULATA
107	2.8	PHASCOLION SP.
107	2.8	TURBONILLA CONRADI

11-23-83

STATION 33

683	12.7	LUMBRINERIS VERRILLI
512	9.5	MYRIOCHELE OCULATA
501	9.3	THARYX CF. DORSOBRANCHIALIS
331	6.2	ARICIDEA PHILBINAE
235	4.4	HAMINOE SUCCINEA
139	2.6	ASYCHIS ELONGATA
139	2.6	TURBONILLA CONRADI
128	2.4	MEDIOMASTUS SP.
107	2.0	EXOGONE DISPAR
107	2.0	GYPTIS BREVIPALPA

1-4-84

STATION 33

2944	11.0	MEDIOMASTUS AMBISETA
2859	10.7	LUMBRINERIS VERRILLI
2432	9.1	FABRICIA SP. A
1899	7.1	BOGUEA ENIGMATICA
1696	6.3	MYRIOCHELE OCULATA
1408	5.3	AXIOTHELLA MUCOSA
1269	4.7	EXOGONE DISPAR
1173	4.4	ARICIDEA PHILBINAE
1067	4.0	SCOLELEPIS TEXANA
576	2.1	ACTEOCINA CANALICULATA

2-23-84

STATION 33

8373	25.7	FABRICIA SP. A
3776	11.6	BOGUEA ENIGMATICA
3659	11.2	MEDIOMASTUS AMBISETA
1376	4.2	SPHAEROSYLLIS TAYLORI
1312	4.0	MYRIOCHELE OCULATA
843	2.6	EXOGONE DISPAR
843	2.6	LUMBRINERIS VERRILLI
779	2.4	ACTEOCINA CANALICULATA
757	2.3	SPHAEROSYLLIS LONGICAUDA
661	2.0	AXIOTHELLA MUCOSA

4-16-84

STATION 33

3157	15.0	FABRICIA SP. A
1984	9.4	MEDIOMASTUS SP.
1547	7.3	MYRIOCHELE OCULATA
1365	6.5	LUMBRINERIS VERRILLI
1035	4.9	ACTEOCINA CANALICULATA
704	3.3	BOGUEA ENIGMATICA
629	3.0	CLYMENELLA TORQUATA
597	2.8	TURBONILLA CONRADI
587	2.8	THARYX CF. DORSOBRANCHIALIS
523	2.5	HAPLOSCOLOPLOS FOLIOSUS

6-6-84

STATION 33

1803	8.9	MYRIOCHELE OCULATA
1333	6.6	LUMBRINERIS VERRILLI
1216	6.0	ARICIDEA PHILBINAE
1067	5.3	FABRICIA SP. A
1067	5.3	LUMBRINERIS TENUIS
928	4.6	BOGUEA ENIGMATICA
704	3.5	MEDIOMASTUS AMBISETA
693	3.4	SPIRORBIS SPIRILLUM
640	3.2	BATEA CF. CATHARINENSIS
533	2.6	THARYX CF. DORSOBRANCHIALIS

7-17-84

STATION 33

533	10.8	LUMBRINERIS TENUIS
384	7.7	MYRIOCHELE OCULATA
373	7.5	LUMBRINERIS VERRILLI
363	7.3	ALIGENA TEXASIANA
299	6.0	THARYX CF. DORSOBRANCHIALIS
277	5.6	ARICIDEA PHILBINAE
256	5.2	AMPELISCA HOLMESI
213	4.3	CLYMENELLA TORQUATA
203	4.1	ARICIDEA TAYLORI
107	2.2	HAPLOSCOLOPLOS FRAGILIS

6-14-83

STATION 34

523	8.0	CREPIDULA PLANA
405	6.2	MEDIOMASTUS AMBISETA
384	5.9	MYRIOCHELE OCULATA
352	5.4	THARYX CF. DORSOBRANCHIALIS
331	5.1	NEANTHES MICROMMA
288	4.4	ALIGENA TEXASIANA
267	4.1	LUMBRINERIS VERRILLI
213	3.3	POLYCIRRUS SP.
203	3.1	BOGUEA ENIGMATICA
181	2.8	ARICIDEA PHILBINAE

9-8-83

STATION 34

6336	42.2	MYRIOCHELE OCULATA
896	6.0	LUMBRINERIS VERRILLI
683	4.5	NEANTHES MICROMMA
661	4.4	PALMYRAPSEUDES CF. CUBANENSIS
384	2.6	MEDIOMASTUS AMBISETA
384	2.6	SABELLARIA VULGARIS
341	2.3	PARAPRIONOSPIO PINNATA
277	1.8	FABRICIA SP. A
256	1.7	ACTEOCINA CANALICULATA
256	1.7	APANTHURA MAGNIFICA

11-23-83

STATION 34

5600	26.5	MYRIOCHELE OCULATA
3381	16.0	FABRICIA SP. A
939	4.4	LUMBRINERIS VERRILLI
907	4.3	AXIOTHELLA MUCOSA
789	3.7	NEANTHES MICROMMA
715	3.4	COROPHIUM TUBERCULATUM
640	3.0	SABELLARIA VULGARIS
576	2.7	CAULLERIELLA SP.
469	2.2	KINBERGONUPHIS SIMONI
459	2.2	EXOGONE DISPAR

2-23-84

STATION 34

2155	15.4	FABRICIA SP. A
1600	11.4	MYRIOCHELE OCULATA
1024	7.3	MEDIOMASTUS AMBISETA
875	6.2	LUMBRINERIS VERRILLI
853	6.1	CLYMENELLA TORQUATA
565	4.0	EXOGONE DISPAR
512	3.7	ACTEOCINA CANALICULATA
459	3.3	MYSELLA PLANULATA
384	2.7	BOGUEA ENIGMATICA
384	2.7	MOLGULIDAE SP.

6-6-84

STATION 34

2763	8.6	HAPLOSYLLIS SPONGICOLA
1557	4.9	APSEUDES PROPINQUUS
1440	4.5	MYRIOCHELE OCULATA
1355	4.2	CAULLERIELLA SP.
1355	4.2	MEDIOMASTUS SP.
1355	4.2	COROPHIUM TUBERCULATUM
1344	4.2	FABRICIA SP. A
1323	4.1	SABELLARIA VULGARIS
1088	3.4	MITRELLA LUNATA
885	2.8	CREPIDULA PLANA

6-14-83

STATION 35

2144	30.0	GONIADIDES CAROLINAE
576	8.1	CAECUM PULCHELLUM
427	6.0	CREPIDULA PLANA
277	3.9	MEDIOMASTUS SP.
267	3.7	PARAMPHINOME SP. B
192	2.7	ABRA AEQUALIS
160	2.2	MYSELLA PLANULATA
149	2.1	LYONSIA HYALINA FLORIDANA
139	1.9	BRACHIDONTES EXUSTUS
128	1.8	TAGELUS DIVISUS

7-25-83

STATION 35

1088	17.1	GONIADIDES CAROLINAE
544	8.5	AXIOTHELLA MUCOSA
235	3.7	SPIO PETTIBONEAE
213	3.3	CIRROPHORUS CF. FURCATUS
192	3.0	COROPHIUM LACUSTRE
171	2.7	EULALIA SANGUINEA
149	2.3	MYSELLA PLANULATA
139	2.2	APANTHURA MAGNIFICA
139	2.2	ERICTHONIUS BRASILIENSIS
139	2.2	POECILOCHAETUS JOHNSONI

9-8-83

STATION 35

1419	15.6	GONIADIDES CAROLINAE
629	6.9	CIRROPHORUS CF. FURCATUS
597	6.6	FABRICIA SP. A
469	5.2	AXIOTHELLA MUCOSA
427	4.7	EXOGONE DISPAR
331	3.6	MEDIOMASTUS CALIFORNIENSIS
320	3.5	THARYX CF. DORSOBRANCHIALIS
299	3.3	POECILOCHAETUS JOHNSONI
235	2.6	LUMBRINERIS VERRILLI
213	2.4	EULALIA SANGUINEA

10-13-83

STATION 35

5035	21.2	BRACHIDONTES EXUSTUS
2581	10.9	AXIOTHELLA MUCOSA
2421	10.2	GONIADIDES CAROLINAE
1259	5.3	FABRICIA SP. A
1099	4.6	CAULLERIELLA SP.
811	3.4	CIRROPHORUS CF. FURCATUS
811	3.4	MEDIOMASTUS SP.
736	3.1	EXOGONE DISPAR
565	2.4	CAECUM PULCHELLUM
480	2.0	CREPIDULA PLANA

11-23-83

STATION 35

12384	26.5	FABRICIA SP. A
7499	16.1	AXIOTHELLA MUCOSA
4725	10.1	GONIADIDES CAROLINAE
3275	7.0	COROPHIUM TUBERCULATUM
2187	4.7	CREPIDULA PLANA
1728	3.7	BRACHIDONTES EXUSTUS
1429	3.1	EXOGONE DISPAR
1109	2.4	MAERA CF WILLIAMSI
939	2.0	MEDIOMASTUS CALIFORNIENSIS
715	1.5	SPIO PETTIBONEAE

1-4-84

STATION 35

17845	45.8	FABRICIA SP. A
5536	14.2	AXIOTHELLA MUCOSA
2283	5.9	MAERA CF WILLIAMSI
2048	5.3	EXOGONE DISPAR
864	2.2	COROPHIUM TUBERCULATUM
757	1.9	GONIADIDES CAROLINAE
523	1.3	MICRODEUTOPUS MYERSI
491	1.3	SPIO PETTIBONEAE
437	1.1	CREPIDULA PLANA
437	1.1	LEMBOS SMITHI

2-23-84

STATION 35

37184	60.2	FABRICIA SP. A
8448	13.7	AXIOTHELLA MUCOSA
3136	5.1	GONIADIDES CAROLINAE
1845	3.0	EXOGONE DISPAR
811	1.3	SPHAEROSYLLIS TAYLORI
736	1.2	MAERA CF. CAROLINIANA
661	1.1	COROPHIUM TUBERCULATUM
640	1.0	MEDIOMASTUS SP.
533	0.9	SPHAEROSYLLIS LONGICAUDA
480	0.8	PARAMPHINOME SP. B

4-16-84

STATION 35

30805	52.4	FABRICIA SP. A
9440	16.1	AXIOTHELLA MUCOSA
2176	3.7	CREPIDULA PLANA
1835	3.1	GONIADIDES CAROLINAE
1557	2.7	EXOGONE DISPAR
971	1.7	SPIOPHANES BOMBYX
928	1.6	SPHAEROSYLLIS TAYLORI
672	1.1	EULALIA SANGUINEA
555	0.9	PHYLLODOCE ARENAE
523	0.9	MALDANIDAE

6-6-84

STATION 35

4821	16.0	AXIOTHELLA MUCOSA
3787	12.5	CAECUM PULCHELLUM
2581	8.5	CREPIDULA PLANA
1739	5.8	FABRICIA SP. A
1653	5.5	GONIADIDES CAROLINAE
917	3.0	SABELLARIA VULGARIS
864	2.9	MEDIOMASTUS SP.
651	2.2	CAULLERIELLA SP.
629	2.1	COROPHIUM TUBERCULATUM
587	1.9	EXOGONE DISPAR

7-17-84

STATION 35

853	6.6	MYRIOCHELE OCULATA
736	5.7	MEDIOMASTUS SP.
512	4.0	THARYX CF. DORSOBRANCHIALIS
459	3.6	GLYCINDE SOLITARIA
416	3.2	SABELLARIA VULGARIS
405	3.1	COROPHIUM TUBERCULATUM
256	2.0	BATEA CF. CATHARINENSIS
245	1.9	ERICTHONIUS BRASILIENSIS
235	1.8	EXOGONE DISPAR
235	1.8	BRACHIDONTES EXUSTUS

6-14-83

STATION 36

512	11.0	ABRA AEQUALIS
384	8.3	NUCULANA ACUTA
277	6.0	ACTEOCINA CANALICULATA
192	4.1	LYONSIA HYALINA FLORIDANA
192	4.1	NOTOMASTUS LATERICEUS
171	3.7	AMPELISCA HOLMESI
160	3.4	GLYCERIDAE SP.
149	3.2	ORCHESTIA CF. PLATENSIS
139	3.0	LUMBRINERIS VERRILLI
139	3.0	APANTHURA MAGNIFICA

9-8-83

STATION 36

1013	29.8	MYRIOCHELE OCULATA
181	5.3	NUCULANA ACUTA
171	5.0	LUMBRINERIS VERRILLI
149	4.4	AMPELISCA HOLMESI
128	3.8	MEDIOMASTUS AMBISETA
117	3.4	NUCULA PROXIMA
96	2.8	NEANTHES MICROMMA
96	2.8	ARICIDEA SP. C
64	1.9	PINNIXA PEARSEI
53	1.6	EXOGONE LOUREI

11-23-83

STATION 36

8619	20.1	FABRICIA SP. A
6080	14.2	MYRIOCHELE OCULATA
3211	7.5	MEDIOMASTUS CALIFORNIENSIS
2101	4.9	PRIONOSPIO CRISTATA
1973	4.6	GONIADIDES CAROLINAE
1131	2.6	APANTHURA CF. SIGNATA
1013	2.4	EXOGONE LOUREI
864	2.0	CAECUM PULCHELLUM
779	1.8	LUMBRINERIS VERRILLI
757	1.8	GRANDIDIERELLA BONNIEROIDES

2-23-84

STATION 36

13493	36.5	FABRICIA SP. A
3029	8.2	GONIADIDES CAROLINAE
2155	5.8	SPHAEROSYLLIS TAYLORI
1696	4.6	MOLGULIDAE SP.
864	2.3	AXIOTHELLA MUCOSA
832	2.3	MYRIOCHELE OCULATA
800	2.2	SPIOPHANES BOMBYX
704	1.9	CIRROPHORUS CF. FURCATUS
651	1.8	COROPHIUM ACHERUSICUM
640	1.7	CARAZZIELLA HOBSONAE

6-6-84

STATION 36

693	11.8	LUMBRINERIS TENUIS
672	11.4	ALIGENA TEXASIANA
341	5.8	CLYMENELLA TORQUATA
341	5.8	TEREBELLIDES STROEMI
299	5.1	AMPELISCA HOLMESI
224	3.8	MYRIOCHELE OCULATA
213	3.6	MEDIOMASTUS CALIFORNIENSIS
171	2.9	ABRA AEQUALIS
171	2.9	TURBONILLA CONRADI
149	2.5	DIPLODONTA PUNCTATA

6-14-83

STATION 37

651	11.8	MEDIOMASTUS AMBISETA
619	11.2	GONIADIDES CAROLINAE
299	5.4	LUMBRINERIS VERRILLI
299	5.4	NUCULANA ACUTA
288	5.2	GYPTIS BREVIPALPA
192	3.5	POLYCIRRUS SP.
192	3.5	ABRA AEQUALIS
181	3.3	CIRROPHORUS CF. FURCATUS
117	2.1	CARAZZIELLA HOBSONAE
117	2.1	OXYUROSTYLIS SMITHI

7-25-83

STATION 37

501	8.9	MEDIOMASTUS AMBISETA
416	7.4	LUMBRINERIS VERRILLI
299	5.3	CIRROPHORUS CF. FURCATUS
299	5.3	GONIADIDES CAROLINAE
256	4.6	LOIMIA MEDUSA
213	3.8	MYRIOCHELE OCULATA
160	2.9	CERATONEREIS IRRITABILIS
128	2.3	AMPELISCA HOLMESI
117	2.1	BRACHYURA SP. (JUV.)
107	1.9	THARYX CF. DORSOBRANCHIALIS

9-8-83

STATION 37

181	8.1	LUMBRINERIS VERRILLI
117	5.2	DIPLODONIA PUNCTATA
107	4.8	APOPRIONOSPIO PYGMAEA
107	4.8	AMPELISCA HOLMESI
96	4.3	MYRIOCHELE OCULATA
96	4.3	AMPHIURIDAE SP.
96	4.3	CHAETOZONE SP.
85	3.8	THARYX CF. DORSOBRANCHIALIS
75	3.3	MEDIOMASTUS AMBISETA
75	3.3	ALIGENA TEXASIANA

10-13-83

STATION 37

2272	16.1	MEDIOMASTUS SP.
1557	11.1	LUMBRINERIS VERRILLI
800	5.7	MYRIOCHELE OCULATA
800	5.7	GONIADIDES CAROLINAE
683	4.8	CAULLERIELLA SP.
523	3.7	ABRA AEQUALIS
395	2.8	NUCULANA ACUTA
373	2.6	TELLINA VERSICOLOR
373	2.6	NEANTHES MICROMMA
320	2.3	LISTRIELLA CF. BARNARDI

11-23-83

STATION 37

747	9.2	CARAZZIELLA HOBSONAE
565	7.0	MYRIOCHELE OCULATA
491	6.1	LUMBRINERIS VERRILLI
480	5.9	MEDIOMASTUS CALIFORNIENSIS
416	5.1	AMPELISCA HOLMESI
363	4.5	ABRA AEQUALIS
352	4.3	CIRROPHORUS CF. FURCATUS
288	3.6	GONIADIDES CAROLINAE
277	3.4	CERATONEREIS IRRITABILIS
203	2.5	THARYX CF. DORSOBRANCHIALIS

1-4-84

STATION 37

1312	10.4	MEDIOMASTUS CALIFORNIENSIS
1131	9.0	FABRICIA SP. A
1077	8.6	ABRA AEQUALIS
555	4.4	LUMBRINERIS VERRILLI
384	3.1	TELLINA VERSICOLOR
352	2.8	NUCULANA ACUTA
341	2.7	POLYDORA WEBSTERI
320	2.5	MUNNA CF. HAYESI
277	2.2	EXOGONE DISPAR
267	2.1	MYRIOCHELE OCULATA

2-23-84

STATION 37

3040	20.9	MEDIOMASTUS AMBISETA
981	6.7	FABRICIA SP. A
917	6.3	SPIOPHANES BOMBYX
768	5.3	LUMBRINERIS VERRILLI
512	3.5	POLYDORA SOCIALIS
480	3.3	ARICIDEA PHILBINAE
395	2.7	NUCULANA ACUTA
352	2.4	MYRIOCHELE OCULATA
267	1.8	SPHAEROSYLLIS TAYLORI
213	1.5	CLYMENELLA TORQUATA

4-16-84

STATION 37

1451	8.7	GONIADIDES CAROLINAE
1237	7.5	MEDIOMASTUS AMBISETA
1131	6.8	SPHAEROSYLLIS TAYLORI
917	5.5	SPIOPHANES BOMBYX
843	5.1	LUMBRINERIS VERRILLI
704	4.2	NUCULANA ACUTA
661	4.0	MEDIOMASTUS SP.
576	3.5	MYRIOCHELE OCULATA
459	2.8	CIRROPHORUS CF. FURCATUS
427	2.6	HAPLOSCOLOPLOS FOLIOSUS

6-6-84

STATION 37

1429	14.1	MYRIOCHELE OCULATA
1045	10.3	ABRA AEQUALIS
491	4.8	NUCULANA ACUTA
491	4.8	AMPELISCA HOLMESI
448	4.4	MEDIOMASTUS AMBISETA
416	4.1	LYONSIA HYALINA FLORIDANA
405	4.0	MEDIOMASTUS SP.
352	3.5	GLYCINDE SOLITARIA
320	3.1	LUMBRINERIS VERRILLI
213	2.1	OXYUROSTYLIS SMITHI

7-17-84

STATION 37

363	6.2	CARAZZIELLA HOBSONAE
320	5.5	THARYX CF. DORSOBRANCHIALIS
309	5.3	TEREBELLIDES STROEMI
277	4.7	AMPHIURIDAE SP.
277	4.7	CHAETOZONE SP.
267	4.6	AMPELISCA HOLMESI
245	4.2	CIRROPHORUS CF. FURCATUS
245	4.2	MYRIOCHELE OCULATA
224	3.8	DIPLODONIA PUNCTATA
213	3.6	LOIMIA MEDUSA

6-14-83

STATION 38

5419	46.8	FABRICIA SP. A
800	6.9	AMPELISCA HOLMESI
544	4.7	EDOTEA TRILOBA
469	4.1	CUMELLA SP. A.
427	3.7	AMPHICTEIS GUNNERI
363	3.1	HARGERIA RAPAX
320	2.8	CIRROPHORUS CF. FURCATUS
309	2.7	ARICIDEA PHILBINAE
309	2.7	GRANDIDIERELLA BONNIEROIDES
267	2.3	MAGELONA PETTIBONEAE

9-8-83

STATION 38

907	15.7	ARICIDEA PHILBINAE
469	8.1	CIRROPHORUS CF. FURCATUS
363	6.3	TYPOSYLLIS CF. LUTEA
331	5.7	ARICIDEA TAYLORI
309	5.4	THARYX CF. DORSOBRANCHIALIS
309	5.4	CYMADUSA COMPTA
267	4.6	GRANDIDIERELLA BONNIEROIDES
256	4.4	FABRICIA SP. A
235	4.1	CREPIDULA MACULOSA
203	3.5	MAGELONA PETTIBONEAE

11-23-83

STATION 38

1429	27.4	ARICIDEA PHILBINAE
1067	20.4	STREBLOSPIO BENEDICTI
416	8.0	ACTEOCINA CANALICULATA
384	7.4	THARYX CF. DORSOBRANCHIALIS
245	4.7	HAMINOE SUCCINEA
213	4.1	PARAPRIONOSPIO PINNATA
203	3.9	SCOLELEPIS TEXANA
160	3.1	COROPHIUM ACHERUSICUM
107	2.0	PRIONOSPIO HETEROBRANCHIA
96	1.8	CAPITELLA CAPITATA

2-23-84

STATION 38

939	17.9	ARICIDEA PHILBINAE
704	13.4	THARYX CF. DORSOBRANCHIALIS
608	11.6	HAPLOSCOLOPLOS FRAGILIS
501	9.6	SPHAEROSYLLIS TAYLORI
448	8.6	OXYUROSTYLIS SMITHI
267	5.1	CAPITELLA CAPITATA
213	4.1	CYCLASPIS SP. A
139	2.6	MYSELLA PLANULATA
128	2.4	CAECUM PULCHELLUM
128	2.4	MONOCULODES NYEI

6-6-84

STATION 38

3936	24.1	CAPITELLA CAPITATA
2752	16.8	HARGERIA RAPAX
1856	11.4	FABRICIA SP. A
981	6.0	AMPHICTEIS GUNNERI
683	4.2	GRANDIDIERELLA BONNIEROIDES
533	3.3	HAPLOSCOLOPLOS FOLIOSUS
523	3.2	TYPOSYLLIS CF. LUTEA
501	3.1	ARICIDEA PHILBINAE
469	2.9	SPHAEROSYLLIS LONGICAUDA
448	2.7	THARYX CF. DORSOBRANCHIALIS

6-14-83

STATION 39

811	9.9	MEDIOMASIUS SP.
789	9.7	FABRICIA SP. A
768	9.4	THARYX CF. DORSOBRANCHIALIS
363	4.4	CUMELLA SP. A.
309	3.8	BRACHIDONIES EXUSIUS
267	3.3	MYRIOCHELE OCULATA
235	2.9	ARICIDEA TAYLORI
235	2.9	LUMBRINERIS VERRILLI
224	2.7	ASYCHIS ELONGATA
203	2.5	BOGUEA ENIGMATICA

9-8-83

STATION 39

2635	14.1	HAMINOE SUCCINEA
1675	9.0	PARAPRIONOSPIO PINNATA
1344	7.2	MEDIOMASTUS AMBISETA
1152	6.2	ACTEOCINA CANALICULATA
853	4.6	LUMBRINERIS VERRILLI
757	4.1	GLYCINDE SOLITARIA
736	3.9	CREPIDULA MACULOSA
576	3.1	FABRICIA SP. A
565	3.0	THARYX CF. DORSOBRANCHIALIS
491	2.6	EXOGONE DISPAR

11-23-83

STATION 39

629	7.7	THARYX CF. DORSOBRANCHIALIS
597	7.3	PARAPRIONOSPIO PINNATA
469	5.8	ARICIDEA TAYLORI
437	5.4	HAMINOE SUCCINEA
352	4.3	ACTEOCINA CANALICULATA
320	3.9	TURBONILLA CONRADI
309	3.8	FABRICIA SP. A
277	3.4	LUMBRINERIS VERRILLI
224	2.8	MEDIOMASTUS AMBISETA
213	2.6	MAGELONA PETTIBONEAE

2-23-84

STATION 39

1493	8.8	ACTEOCINA CANALICULATA
1365	8.0	FABRICIA SP. A
1109	6.5	TURBONILLA CONRADI
843	4.9	CLYMENELLA TORQUATA
832	4.9	MEDIOMASTUS SP.
608	3.6	ASYCHIS ELONGATA
448	2.6	MYRIOCHELE OCULATA
416	2.4	MEDIOMASTUS AMBISETA
395	2.3	ARICIDEA TAYLORI
384	2.3	PHASCOLION SP.

6-6-84

STATION 39

341	6.0	THARYX CF. DORSOBRANCHIALIS
309	5.5	ASYCHIS ELONGATA
309	5.5	LUMBRINERIS VERRILLI
256	4.5	SYNAPTULA HYDRIFORMIS
245	4.3	CLYMENELLA TORQUATA
203	3.6	AMPELISCA HOLMESI
192	3.4	ARICIDEA TAYLORI
192	3.4	HAPLOSCOLOPLOS FOLIOSUS
181	3.2	MYRIOCHELE OCULATA
181	3.2	ALIGENA TEXASIANA

6-14-83

STATION 40

1216	13.4	LUMBRINERIS TENUIS
1205	13.3	MYRIOCHELE OCULATA
523	5.8	NOTOMASTUS LATERICEUS
501	5.5	ALIGENA TEXASIANA
501	5.5	CLYMENELLA TORQUATA
341	3.8	LUMBRINERIS VERRILLI
288	3.2	MINUSPIO CIRRIFERA
245	2.7	THARYX CF. DORSOBRANCHIALIS
245	2.7	TEREBELLIDES STROEMI
235	2.6	ABRA AEQUALIS

9-8-83

STATION 40

1408	20.2	MYRIOCHELE OCULATA
544	7.8	LUMBRINERIS TENUIS
352	5.1	CLYMENELLA TORQUATA
299	4.3	AMPHIURIDAE SP.
277	4.0	LUMBRINERIS VERRILLI
267	3.8	THARYX CF. DORSOBRANCHIALIS
267	3.8	TURBONILLA CONRADI
213	3.1	NOTOMASTUS LATERICEUS
203	2.9	CIRROPHORUS CF. FURCATUS
192	2.8	GYPTIS BREVIPALPA

11-23-83

STATION 40

4373	31.2	MYRIOCHELE OCULATA
1717	12.3	LUMBRINERIS VERRILLI
736	5.3	AXIOTHELLA MUCOSA
619	4.4	FABRICIA SP. A
437	3.1	THARYX CF. DORSOBRANCHIALIS
384	2.7	MINUSPIO CIRRIFERA
341	2.4	STHENELAIS OBLIQUIS
277	2.0	HAMINOE SUCCINEA
224	1.6	MEDIOMASTUS CALIFORNIENSIS
213	1.5	TURBONILLA CONRADI

2-23-84

STATION 40

2859	13.4	CLYMENELLA TORQUATA
2699	12.7	MYRIOCHELE OCULATA
2144	10.1	LUMBRINERIS VERRILLI
1813	8.5	FABRICIA SP. A
1045	4.9	TEREBELLIDES STROEMI
757	3.6	AXIOTHELLA MUCOSA
704	3.3	MEDIOMASTUS AMBISETA
693	3.3	BOGUEA ENIGMATICA
352	1.7	SPIOPHANES BOMBYX
331	1.6	MINUSPIO CIRRIFERA

6-6-84

STATION 40

1984	20.3	LUMBRINERIS TENUIS
1717	17.6	CLYMENELLA TORQUATA
661	6.8	MYRIOCHELE OCULATA
437	4.5	LUMBRINERIS VERRILLI
341	3.5	ALIGENA TEXASIANA
320	3.3	MINUSPIO CIRRIFERA
309	3.2	AXIOTHELLA MUCOSA
213	2.2	THARYX CF. DORSOBRANCHIALIS
213	2.2	TELLINA VERSICOLOR
171	1.7	GYPTIS BREVIPALPA

APPENDIX IV

MACROPHYTE DATA

ALL SEAGRASSES COMBINED

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: STANDING BIOMASS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	21	88706.44541207	4224.11644819	26.36	0.0001	0.600651	88.0466
ERROR	368	58977.38940228	160.26464511		ROOT MSE		STANDBIO MEAN
CORRECTED TOTAL	389	147683.83481436			12.65956734		14.37825641

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	35044.05156102	27.33	0.0001	8	9896.96677269	7.72	0.0001
STATIONC	8	51845.36243852	40.44	0.0001	8	8020.73506371	6.26	0.0001
BT	1	83.73944850	0.52	0.4702	1	165.19460824	1.03	0.3106
KB	1	22.98310498	0.14	0.7051	1	604.19033377	3.77	0.0529
BC	1	728.01699256	4.54	0.0337	1	141.66394602	0.88	0.3477
PN3	1	950.11692940	5.93	0.0154	1	911.03572907	5.68	0.0176
DO3	1	32.17493799	0.20	0.6544	1	32.17493799	0.20	0.6544

ALL SEAGRASSES COMBINED

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: BLADEDENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	21	74725533.64553115	3653594.84026339	17.97	0.0001	0.565433	53.1909
ERROR	290	58967895.84164834	203337.57186775		ROOT MSE		BDEN MEAN
CORRECTED TOTAL	311	135693429.48717949			450.92967508		847.75641026

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	29178880.87606835	17.94	0.0001	8	30565165.89265710	18.79	0.0001
STATIONC	8	40543009.25925928	24.92	0.0001	8	37450952.39037747	23.02	0.0001
BT	1	5141007.51450715	25.28	0.0001	1	3949459.86594695	19.42	0.0001
MB	1	96251.10696169	0.47	0.4920	1	8321.27643529	0.04	0.8398
RC	1	52006.46809327	0.26	0.6134	1	688283.60776707	3.38	0.0668
PH3	1	305852.40606196	1.50	0.2210	1	594.23539469	0.00	0.9569
DO3	1	1408526.01457947	6.93	0.0089	1	1408526.01457947	6.93	0.0089

ALL SEAGRASSES COMBINED

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: GROWTH RATE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	21	10.69588827	0.50932801	11.66	0.0001	0.550482	91.3823
ERROR	200	8.73413610	0.04367068		ROOT MSE		AVEGROW MEAN
CORRECTED TOTAL	221	19.43002437			0.20897531		0.22868241

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	6.53000636	18.69	0.0001	8	2.19158537	6.27	0.0001
STATIONC	8	3.80065671	10.88	0.0001	8	0.50989932	1.46	0.1741
BT	1	0.00800763	0.18	0.6690	1	0.00484339	0.11	0.7395
KB	1	0.11413797	2.61	0.1075	1	0.04353993	1.00	0.3192
BC	1	0.02483358	0.57	0.4517	1	0.16423246	3.76	0.0539
PH3	1	0.07152540	1.64	0.2021	1	0.16903717	3.87	0.0505
DO3	1	0.14671062	3.36	0.0683	1	0.14671062	3.36	0.0683

HALODULE ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: STANDING BIOMASS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	5814.69122763	387.64608184	9.59	0.0001	0.592262	102.5336
ERROR	99	4003.07962455	40.43514772		ROOT MSE		STANDBIO MEAN
CORRECTED TOTAL	114	9817.77085217			6.35886371		6.20173913

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	2905.43207884	8.98	0.0001	8	1036.85720573	3.21	0.0028
STATIONC	2	2314.57976889	28.62	0.0001	2	230.99334228	2.86	0.0622
BT	1	14.85412421	0.37	0.5458	1	108.39554678	2.68	0.1047
MB	1	7.83249445	0.19	0.6608	1	303.23506573	7.50	0.0073
BC	1	173.86541075	4.30	0.0407	1	60.47604272	1.50	0.2242
PH3	1	388.67846546	9.61	0.0025	1	159.24798723	3.94	0.0500
DO3	1	9.44888502	0.23	0.6299	1	9.44888502	0.23	0.6299

HALODULE ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: BLADEDENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	76014429.00339864	5067628.60022658	16.44	0.0001	0.597611	52.3898
ERROR	166	51182768.79879916	308329.93252289		ROOT MSE		BDEN MEAN
CORRECTED TOTAL	181	127197197.80219781			555.27464603		1059.89010989

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	59301959.70695963	24.04	0.0001	8	47270460.53136773	19.16	0.0001
STATIONC	2	14453442.46031746	23.44	0.0001	2	4019910.62658574	6.52	0.0019
BT	1	28599.06960601	0.09	0.7611	1	15744.81035105	0.05	0.8215
MB	1	553196.11944391	1.79	0.1822	1	9495.38718843	0.03	0.8609
BC	1	88680.02440693	0.29	0.5925	1	420522.08782320	1.36	0.2445
PH3	1	713214.98419815	2.31	0.1302	1	65662.28373245	0.21	0.6451
DO3	1	875336.63846658	2.84	0.0939	1	875336.63846659	2.84	0.0939

HALODULE ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: GROWTH RATE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	1.29467345	0.08631156	7.63	0.0001	0.659940	80.0093
ERROR	59	0.66713157	0.01130731		ROOT MSE		AVECROH MEAN
CORRECTED TOTAL	74	1.96180502			0.10633586		0.13290438

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	1.02584425	11.34	0.0001	8	0.52017820	5.75	0.0001
STATIONC	2	0.17358330	7.68	0.0011	2	0.04214120	1.86	0.1642
BT	1	0.00295132	0.26	0.6113	1	0.01453223	1.29	0.2615
MB	1	0.02250433	1.99	0.1636	1	0.07010417	6.20	0.0156
BC	1	0.00965103	0.85	0.3593	1	0.00565686	0.50	0.4822
PH3	1	0.05297847	4.69	0.0345	1	0.02312248	2.04	0.1580
DO3	1	0.00716074	0.63	0.4293	1	0.00716079	0.63	0.4293

HALODULE ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: PERCENT COVER

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	16	60399.40356796	3774.96272300	7.[illegible]	0.0001	0.446457	72.5645
ERROR	153	74886.57290263	489.45472485		ROOT MSE		PC MEAN
CORRECTED TOTAL	169	135285.97647059			22.12362368		30.48823529

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	9	49090.68600517	11.14	0.0001	9	45142.46451950	10.25	0.0001
STATIONC	2	3781.42611316	3.86	0.0231	2	5454.50368774	5.57	0.0046
BT	1	1044.04182453	2.13	0.1462	1	704.69350498	1.44	0.2320
HB	1	1999.70445644	4.09	0.0450	1	1516.21158811	3.10	0.0804
BC	1	499.74552230	1.02	0.3139	1	3.97397863	0.01	0.9283
PH3	1	372.57000614	0.76	0.3843	1	18.82501259	0.04	0.8448
DO3	1	3611.22963822	7.38	0.0074	1	3611.22963822	7.38	0.0074

SYRINGODIUM ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: PERCENT COVER

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	16	54630.61676909	3414.41354807	9.25	0.0001	0.456838	66.1666
ERROR	176	64953.51343817	369.05405363		ROOT MSE		PC MEAN
CORRECTED TOTAL	192	119584.13020725			19.21077962		29.03393782

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	9	23837.62218899	7.18	0.0001	9	20216.23924139	6.09	0.0001
STATIONC	2	17334.67942993	23.49	0.0001	2	8432.26733642	11.42	0.0001
BT	1	5358.58873098	14.52	0.0002	1	5639.01215189	15.28	0.0001
KB	1	893.05289360	2.42	0.1216	1	2047.12813587	5.55	0.0196
BC	1	5009.58955098	13.57	0.0003	1	4001.30752261	10.84	0.0012
PH3	1	673.47815013	1.82	0.1785	1	199.32294170	0.54	0.4634
DO3	1	1523.60582448	4.13	0.0437	1	1523.60582448	4.13	0.0437

SYRINGODIUM ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: STANDING BIOMASS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	17444.62957185	1162.97530479	11.22	0.0001	0.600455	80.9575
ERROR	112	11607.74482815	103.64057882		ROOT MSE		STANDBIO MEAN
CORRECTED TOTAL	127	29052.37440000			10.18040170		12.57500000

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	5268.89447619	6.35	0.0001	8	1949.50242780	2.35	0.0224
STATIONC	2	11633.63283010	56.12	0.0001	2	955.86233886	4.61	0.0119
BT	1	25.21186446	0.24	0.6228	1	43.33793589	0.42	0.5192
MB	1	69.76665229	0.67	0.4137	1	191.85418017	1.85	0.1764
BC	1	168.92714067	1.63	0.2044	1	113.55453317	1.10	0.2975
PM3	1	230.16220170	2.22	0.1390	1	173.51510463	1.67	0.1984
DO3	1	48.03439845	0.46	0.4974	1	48.03439845	0.46	0.4974

SYRINGODIUM ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: BLADEDENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	13635803.66814455	909053.57787630	10.41	0.0001	0.639604	35.6914
ERROR	88	7683330.94724007	87310.57894591		ROOT MSE		BDEN MEAN
CORRECTED TOTAL	103	21319134.61538462			295.48363567		827.88461538

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	4547467.94871794	6.51	0.0001	8	3428729.22386077	4.91	0.0001
STATIONC	2	8139735.24305556	46.61	0.0001	2	704097.64694338	4.03	0.0211
BT	1	429752.25403371	4.92	0.0291	1	536629.59093167	6.15	0.0151
KB	1	184940.51386991	2.12	0.1491	1	297031.49979265	3.40	0.0685
BC	1	90797.11252251	1.04	0.3106	1	62514.54724921	0.72	0.3998
PH3	1	200255.48065286	2.29	0.1335	1	152633.92648786	1.75	0.1895
DO3	1	42855.11529205	0.49	0.4854	1	42855.11529205	0.49	0.4854

SYRINGODIUM ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: GROWTH RATE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	6.07405208	0.40493681	5.13	0.0001	0.583396	97.1092
ERROR	55	4.33748129	0.07886330		ROOT MSE		AVEGROW MEAN
CORRECTED TOTAL	70	10.41153338			0.28082610		0.28918584

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	3.27009441	5.18	0.0001	8	1.57709982	2.50	0.0216
STATIONC	2	1.91271343	12.13	0.0001	2	0.59207458	3.75	0.0296
BT	1	0.14098812	1.79	0.1867	1	0.06330335	0.80	0.3742
MB	1	0.57439492	7.28	0.0092	1	0.54330065	6.89	0.0112
BC	1	0.09781658	1.24	0.2703	1	0.04798237	0.61	0.4387
PH3	1	0.06190910	0.79	0.3795	1	0.04301969	0.55	0.4633
DO3	1	0.01613552	0.20	0.6528	1	0.01613552	0.20	0.6528

THALASSIA ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: PERCENT COVER

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	7	21157.18237977	3022.45462568	17.22	0.0001	0.671385	42.0681
ERROR	59	10355.56388889	175.51803202		ROOT MSE		PC MEAN
CORRECTED TOTAL	66	31512.74626866			13.24832186		31.49253731

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	7	21157.18237977	17.22	0.0001	2	538.51531273	1.53	0.2241
BT	0	0.00000000	.	.	0	0.00000000	.	.
KB	0	0.00000000	.	.	0	0.00000000	.	.
BC	0	0.00000000	.	.	0	0.00000000	.	.
PH3	0	0.00000000	.	.	0	0.00000000	.	.
DO3	0	0.00000000	.	.	0	0.00000000	.	.

THALASSIA ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: STANDING BIOMASS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	31028.14427450	2068.54295163	17.13	0.0001	0.698325	77.4061
ERROR	111	13404.10860109	120.75773514		ROOT MSE		STANDBIO MEAN
CORRECTED TOTAL	126	44432.25287559			10.98898244		14.19653543

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	11958.71858226	12.38	0.0001	8	3161.24706207	3.27	0.0022
STATIONC	2	17999.25164469	74.53	0.0001	2	3473.22524571	14.38	0.0001
BT	1	147.58096161	1.22	0.2713	1	333.67470229	2.76	0.0993
MB	1	814.98098448	6.75	0.0107	1	514.69540895	4.26	0.0413
BC	1	1.01086720	0.01	0.9273	1	11.34502368	0.09	0.7598
PH3	1	97.12670236	0.80	0.3717	1	106.22985098	0.88	0.3503
DO3	1	9.47453191	0.08	0.7799	1	9.47453191	0.08	0.7799

THALASSIA ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: BLADEDENSITY

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	2953534.09326466	196902.27288431	14.06	0.0001	0.705548	22.0583
ERROR	88	1232619.75288919	14007.04264647		ROOT MSE		BDEN MEAN
CORRECTED TOTAL	103	4186153.84615385			118.35135253		536.53846154

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	605841.34615384	5.41	0.0001	8	440856.94097280	3.93	0.0005
STATIONC	2	1849526.90972222	66.02	0.0001	2	57533.68346558	2.05	0.1344
BT	1	76692.53815651	5.48	0.0215	1	76493.45420777	5.46	0.0217
KB	1	24971.34654635	1.78	0.1853	1	1517.82740785	0.11	0.7428
BC	1	1802.77088693	0.13	0.7206	1	3770.58209106	0.27	0.6052
PH3	1	386811.95887796	27.62	0.0001	1	344494.81275896	24.59	0.0001
DO3	1	7887.22292085	0.56	0.4550	1	7887.22292085	0.56	0.4550

THALLASSIA ONLY

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: GROWTH RATE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	15	3.94873903	0.26324927	7.70	0.0001	0.658227	69.3185
ERROR	60	2.05031813	0.03417197		ROOT MSE		AVEGROW MEAN
CORRECTED TOTAL	75	5.99905716			0.18485662		0.26667725

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	3.02611673	11.07	0.0001	8	0.89248905	3.26	0.0037
STATIONC	2	0.74174133	10.85	0.0001	2	0.02630769	0.38	0.6822
BT	1	0.00180255	0.05	0.8191	1	0.00268132	0.08	0.7804
NB	1	0.03942742	1.15	0.2871	1	0.03254462	0.95	0.3330
BC	1	0.03184781	0.93	0.3382	1	0.10895394	3.19	0.0792
PH3	1	0.05122039	1.50	0.2256	1	0.07467274	2.19	0.1446
DO3	1	0.05658280	1.66	0.2031	1	0.05658280	1.66	0.2031

RHIZOPHYTIC ALGAE

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: STANDING BIOMASS

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	20	13878.08120079	693.90406004	3.95	0.0001	0.403259	169.4772
ERROR	117	20536.76666008	175.52792017		ROOT MSE		STANDBIO MEAN
CORRECTED TOTAL	137	34414.84786087			13.24869504		7.81739130

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	8	5022.99416925	3.58	0.0010	8	2342.09335431	1.67	0.1134
STATIONC	7	7237.21226685	5.89	0.0001	7	6197.62502556	5.04	0.0001
BT	1	384.45214118	2.19	0.1416	1	900.85400333	5.13	0.0253
KB	1	173.45701436	0.99	0.3222	1	100.97733400	0.58	0.4497
BC	1	86.89037467	0.50	0.4831	1	101.04688967	0.58	0.4478
PH3	1	254.29822223	1.45	0.2312	1	2.59719678	0.01	0.9034
DO3	1	718.77701225	4.09	0.0453	1	718.77701225	4.09	0.0453

Summary of seagrass biomass (mean g/m^2) at the nine intensive monitoring stations over the course of the study. Data are means of 5 replicates.

STATION/SEAGRASS	Aug.'83	Sep '83	Oct '83	Dec '83	Jan '84	Mar '84	Apr '84	May '84	July '84
A. *Halodule*	22.88	32.32	15.52	1.09	0.89	N/D	7.01	4.90	18.2
B. *Syringodium*	23.94	39.84	24.03	31.87	17.57	19.33	3.90	36.51	26.0
C. *Thalassia*	49.37	44.61	29.12	26.14	13.31	9.41	2.37	23.74	72.0
D. *Halodule*	2.08	0.58	2.98	0.64	1.06	0.51	0.86	3.04	13.8
E. *Syringodium*	3.65	2.59	2.72	0.74	1.73	1.15	6.40	21.76	42.2
F. *Thalassia*	4.35	8.38	4.22	1.71	0.58	0.93	5.57	7.87	25.5
G. *Halodule*	N/D	3.46	1.12	0.37	0 42	N/D	0.48	4.13	5.5
H. *Syringodium*	3.20	2.08	1.76	0.31	1.15	1.22	0.34	1.66	6.1
I. *Thalassia*	10.65	6.66	7.04	3.13	0.58	0.67	0.86	4.00	4.8

N/D = no data

Summary of seagrass productivity (mean g. dwt/m²/day) at the nine intensive monitoring stations over the course of the study. Data are means of 3 replicates.

STATION/SEAGRASS	Aug '83	Sep '83	Nov '83	Dec '83	Feb '84	Mar '84	Apr '84	Jun '84	July '84
A. Halodule	0.59	0.15	0.04	0.09	0.05	0.08	0.10	0.12	0.52
B. Syringodium	0.70	0.33	0.49	0.24	0.06	0.17	0.32	0.45	1.55
C. Thalassia	0.75	0.20	0.47	0.23	0.07	0.09	0.28	0.17	0.98
D. Halodule	0.07	0.05	0.04	0.06	Trace	0.02	0.10	0.07	0.33
E. Syringodium	N/D	0.04	0.06	0.13	0.03	0.02	0.29	0.80	0.46
F. Thalassia	0.25	0.08	0.09	0.09	0.03	0.07	0.10	0.70	0.81
G. Halodule	0.26	0.06	0.06	0.06	Trace	0.04	0.08	0.11	0.16
H. Syringodium	0.13	0.04	0.15	0.12	0.03	0.05	0.08	0.15	0.18
I. Thalassia	0.24	0.22	0.11	0.10	0.05	0.04	0.22	0.35	0.16

Summary of seagrass shoot densities (mean #/m²) at the nine intensive monitoring stations over the course of the study. Data are means of 4 replicates (*Halodule*) or 7 replicates (*Thalassia* and *Syringodium*).

Station	Seagrass	Aug '83	Sept '83	Oct '83	Dec '83	Jan '84	Mar '84	Apr '84	May '84	July '84
A	*Halodule*	1057.0	985.7	1700.0	628.6	842.9	985.7	1626.0	2371.0	2571.0
B	*Syringodium*	737.5	1413.0	1163.0	1288.0	875.0	1300.0	1175.0	1450.0	1300.0
C	*Thalassia*	500.0	650.0	525.0	937.5	812.5	775.0	462.5	812.5	962.5
D	*Halodule*	542.9	314.3	1043.0	528.6	557.1	142.9	700.0	871.4	2057.0
E	*Syringodium*	437.5	500.0	512.5	487.5	537.5	375.0	762.5	1338.0	1713.0
F	*Thalassia*	437.5	450.0	362.5	375.0	387.5	375.0	462.5	500.0	637.5
G	*Halodule*	771.4	600.0	1414.0	785.7	728.6	400.0	971.4	1229.0	2486.0
H	*Syringodium*	362.5	450.0	812.5	550.0	637.5	462.5	525.0	425.0	750.0
I	*Thalassia*	300.0	400.0	587.5	550.0	487.5	462.5	537.5	387.5	400.0

TOTAL MACROPHYTE COVER

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: PERCENT COVER

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V.
MODEL	18	284582.72658267	15810.15147681	29.06	0.0001	0.523537	44.0475
ERROR	476	258994.08957895	544.10523021		ROOT MSE		PC MEAN
CORRECTED TOTAL	494	543576.81616162			23.32606332		52.95656566

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR > F
SD	7	83441.82646244	21.91	0.0001	7	58304.64810458	15.31	0.0001
STATIONC	6	190486.56055327	58.35	0.0001	6	73104.56899551	22.39	0.0001
BT	1	6506.20569231	11.96	0.0006	1	5706.84800859	10.49	0.0013
KB	1	284.74810238	0.53	0.4682	1	525.01822750	0.97	0.3260
BC	1	11.78906202	0.02	0.8830	1	0.22658956	0.00	0.9837
PH3	1	352.02180509	0.65	0.4216	1	1418.06917411	2.61	0.1071
DO3	1	3497.57490515	6.43	0.0116	1	3497.57490515	6.43	0.0116

APPENDIX V

OYSTER REEF DATA

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR1.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
CREPIDULA PLANA	1375	16.0744	16.0744
EURYPANOPEUS DEPRESSUS	896	10.4746	26.5490
ODOSTOMIA IMPRESSA	765	8.9432	35.4922
BRACHIDONTES EXUSTUS	725	8.4756	43.9677
FABRICIA SP.A	675	7.6910	51.8588
POLYDORA WEBSTERI	584	6.8272	58.6860
PLATYHELMINTHES SP.A	473	5.5296	64.2156
CRASSOSTREA VIRGINICA	392	4.5827	68.7982
PHYLLODOCE CASTANEA	341	3.9864	72.7847
CERITHIOPSIS GREENI	298	3.4838	76.2684
XANTHIDAE SPP.	183	2.1394	78.4078
MELITA "COMPLEX"	176	2.0575	80.4653
ANTHOZOA SPP.	167	1.9523	82.4176
PETROLISTHES ARMATUS	146	1.7068	84.1244
HYDRACARINA SPP.	133	1.5548	85.6792
ANACHIS OBESA.OSTREICOLA	120	1.4029	87.0821
HYALE SP.B=CF.PLUMOSA	83	0.9703	88.0524
NEANTHES SUCCINEA	71	0.8300	88.8824
SEILA ADAMSI	71	0.8300	89.7124
OPISTHOSYLLIS SP. B	67	0.7833	90.4957
HARGERIA RAPAX	65	0.7599	91.2556
ANURIDA MARTIMA	63	0.7365	91.9921
OLIGOCHAETA SPP.	54	0.6313	92.6233
NEMERTINA	47	0.5495	93.1728
SIPUNCULA SPP.	45	0.5261	93.6989
CHIRONOMIDAE	40	0.4676	94.1665
PLATYHELMINTHES SP.B	35	0.4092	94.5756
HYDROIDES DIANTHUS	27	0.3156	94.8913
CAPITELLA CAPITATA	26	0.3040	95.1952
FILOGRANA IMPLEXA	25	0.2923	95.4875
COPEPODA SPP.	24	0.2806	95.7681
PAGURUS MACLAUGHLINAE	21	0.2455	96.0136
CYMADUSA COMPTA	20	0.2338	96.2474
NEREIDAE SPP.	20	0.2338	96.4812
TANAIS CAVOLINII	18	0.2104	96.6916
HAPLOSYLLIS SPONGICOLA	18	0.2104	96.9020
STREBLOSOMA HARTMANAE	16	0.1870	97.0891
ELASMOPUS LEVIS	16	0.1870	97.2761
EXCORALLANA QUADRICORNIS	14	0.1637	97.4398
LEPIDAMETRIA COMMENSALIS	13	0.1520	97.5916
CAECUM PULCHELLUM	12	0.1403	97.7321
PALAEMON FLORIDANUS	12	0.1403	97.8723
ISCHADIUM RECURVUM	11	0.1286	98.0009
EXOGENE DISPAR	11	0.1286	98.1295
STYELA PARTITA	11	0.1286	98.2581
BRANIA CLAVATA	11	0.1286	98.3867
COROPHIUM ACHERUSICUM	10	0.1169	98.5036
MEDIOMASTUS CALIFORNIENSIS	10	0.1169	98.6205

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR1.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
GITANOPSIS SPP.	9	0.1052	98.7257
CERITHIUM EBURNEUM	8	0.0935	98.8193
COROPHIUM LACUSTRE	7	0.0818	98.9011
PAGURIDAE SPP.	6	0.0701	98.9712
BALANUS EBURNEUS	6	0.0701	99.0414
TANAIDACEA SPP.	6	0.0701	99.1115
CREPIDULA MACULOSA	6	0.0701	99.1817
COLOMASTIX HALICHONDRIAE	4	0.0468	99.2284
TYPOSYLLIS CF.LUTEA	3	0.0351	99.2635
LEUCOTHOE CF.SPINICARPA	3	0.0351	99.2986
CAPRELLA PENANTIS	3	0.0351	99.3336
ODONTOSYLLIS ENOPLA	3	0.0351	99.3687
MITRELLA LUNATA	3	0.0351	99.4038
RISSOINA CATESBYANA	3	0.0351	99.4389
POLYCITORINAE	3	0.0351	99.4739
PANOPEUS HERBSTII	2	0.0234	99.4973
CARIDEA ZOEA	2	0.0234	99.5207
LEMBOS SMITHI	2	0.0234	99.5441
CAPRELLA SPP.	2	0.0234	99.5675
ASCIDACEA SP.	2	0.0234	99.5908
EUNICIDAE SPP.	2	0.0234	99.6142
PAGURUS STIMPSONI	2	0.0234	99.6376
BATEA CF.CATHARINENSIS	2	0.0234	99.6610
HALMYRAPSEUDES CF.CUBANENSIS	1	0.0117	99.6727
AUTOLYTUS DENTALIUS	1	0.0117	99.6844
MICRODEUTOPUS MYERSI	1	0.0117	99.6960
NUDIBRANCHIA SPP.	1	0.0117	99.7077
HEMIAEGINA MINUTA	1	0.0117	99.7194
POLYCIRRUS SP.	1	0.0117	99.7311
MELITA APPENDICULATA	1	0.0117	99.7428
MYRIOCHELE OCULATA	1	0.0117	99.7545
SPHAEROSYLLIS TAYLORI	1	0.0117	99.7662
EUPLANA GRACILIS	1	0.0117	99.7779
ERICTHONIUS BRASILIENSIS	1	0.0117	99.7896
MARPHYSA SANGUINEA	1	0.0117	99.8013
SABELLARIA VULGARIS	1	0.0117	99.8130
BOCCARDIELLA HAMATA	1	0.0117	99.8246
EXCORALLANA SPP.	1	0.0117	99.8363
EHLERSIA CORNUTA	1	0.0117	99.8480
EXCORALLANA TRICORNIS	1	0.0117	99.8597
CLYMENELLA TORQUATA	1	0.0117	99.8714
HYPSOBLENNIUS HENTZI	1	0.0117	99.8831
CHASMODES SABURRAE	1	0.0117	99.8948
ARACHNIDA SP.	1	0.0117	99.9065
MUSCULUS LATERALIS	1	0.0117	99.9182
MYSELLA PLANULATA	1	0.0117	99.9299
COROPHIUM SPP.	1	0.0117	99.9415

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR1.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
GASTROPODA SPP.	1	0.0117	99.9532
ISOPODA SPP.	1	0.0117	99.9649
MOLGULIDAE SP.	1	0.0117	99.9766
GRANDIDIERELLA BONNIEROIDES	1	0.0117	99.9883
THYSANOPTERA SP.	1	0.0117	100.0000

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR2.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
CREPIDULA PLANA	2980	22.8352	22.8352
BRACHIDONTES EXUSTUS	2410	18.4674	41.3027
ODOSTOMIA IMPRESSA	1053	8.0690	49.3716
EURYPANOPEUS DEPRESSUS	1047	8.0230	57.3946
PHYLLODOCE CASTANEA	1038	7.9540	65.3487
ANTHOZOA SPP.	676	5.1801	70.5287
CRASSOSTREA VIRGINICA	522	4.0000	74.5287
PLATYHELMINTHES SP.A	425	3.2567	77.7854
FABRICIA SP.A	342	2.6207	80.4061
XANTHIDAE SPP.	290	2.2222	82.6284
POLYDORA WEBSTERI	218	1.6705	84.2989
CHIRONOMIDAE	192	1.4713	85.7701
HYALE SP.B=CF.PLUMOSA	187	1.4330	87.2031
MELITA "COMPLEX"	185	1.4176	88.6207
PETROLISTHES ARMATUS	174	1.3333	89.9540
OPISTHOSYLLIS SP. B	172	1.3180	91.2720
ANACHIS OBESA.OSTREICOLA	156	1.1954	92.4674
CERITHIOPSIS GREENI	136	1.0421	93.5096
NEANTHES SUCCINEA	136	1.0421	94.5517
ANURIDA MARTIMA	113	0.8659	95.4176
NEMERTINA	69	0.5287	95.9464
ELASMOPUS LEVIS	66	0.5057	96.4521
PLATYHELMINTHES SP.B	65	0.4981	96.9502
MEDIOMASTUS CALIFORNIENSIS	47	0.3602	97.3103
SEILA ADAMSI	33	0.2529	97.5632
TANAIS CAVOLINII	33	0.2529	97.8161
CYMADUSA COMPTA	31	0.2375	98.0536
CAPRELLA EQUILIBRA	26	0.1992	98.2529
PORCELLANIDAE SPP.	20	0.1533	98.4061
COROPHIUM ACHERUSICUM	20	0.1533	98.5594
COROPHIUM LACUSTRE	15	0.1149	98.6743
STYELA PARTITA	13	0.0996	98.7739
OLIGOCHAETA SPP.	12	0.0920	98.8659
CAPITELLA CAPITATA	12	0.0920	98.9579
PARACAPRELLA TENUIS	10	0.0766	99.0345
ISCHADIUM RECURVUM	8	0.0613	99.0958
EXOGENE DISPAR	7	0.0536	99.1494
MITRELLA LUNATA	7	0.0536	99.2031
GOBIOSOMA ROBUSTUM	6	0.0460	99.2490
PARACERCEIS CAUDATA	6	0.0460	99.2950
SIPUNCULA SPP.	6	0.0460	99.3410
STREBLOSPIO BENEDICTI	6	0.0460	99.3870
HYDROIDES DIANTHUS	5	0.0383	99.4253
NUDIBRANCHIA SPP.	5	0.0383	99.4636
PALAEMON FLORIDANUS	4	0.0307	99.4943
HARGERIA RAPAX	4	0.0307	99.5249

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR2.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
SABELLARIA VULGARIS	3	0.0230	99.5479
BRANIA CLAVATA	3	0.0230	99.5709
TYPOSYLLIS CF.LUTEA	3	0.0230	99.5939
EHLERSIA CORNUTA	3	0.0230	99.6169
STREBLOSOMA HARTMANAE	2	0.0153	99.6322
EXCORALLANA TRICORNIS	2	0.0153	99.6475
LEMBOS SMITHI	2	0.0153	99.6628
CREPIDULA MACULOSA	2	0.0153	99.6782
COROPHIUM SIMILE	2	0.0153	99.6935
BERGHIA SP.A	2	0.0153	99.7088
CAPRELLA SPP.	2	0.0153	99.7241
EUPLANA GRACILIS	2	0.0153	99.7395
AMPHILOCHIDAE SPP.	2	0.0153	99.7548
COLOMASTIX HALICHONDRIAE	2	0.0153	99.7701
POLYDORA SPP.	2	0.0153	99.7854
LEUCOTHOE CF.SPINICARPA	2	0.0153	99.8008
GAMMARUS MUCRONATUS	1	0.0077	99.8084
AMAEANA TRILOBATA	1	0.0077	99.8161
BOCCARDIELLA HAMATA	1	0.0077	99.8238
EUNICIDAE SPP.	1	0.0077	99.8314
STYLOCHUS SP.	1	0.0077	99.8391
NEREIS PELAGICA	1	0.0077	99.8467
GITANOPSIS SPP.	1	0.0077	99.8544
AUTOLYTUS DENTALIUS	1	0.0077	99.8621
MYRIOCHELE OCULATA	1	0.0077	99.8697
POLYPLACOPHORA SPP.	1	0.0077	99.8774
GRANDIDIERELLA BONNIEROIDES	1	0.0077	99.8851
ODONTOSYLLIS ENOPLA	1	0.0077	99.8927
SYLLIDAE SPP.	1	0.0077	99.9004
HYDRACARINA SPP.	1	0.0077	99.9080
BIVALVIA SPP.	1	0.0077	99.9157
CERITHIIDAE SPP.	1	0.0077	99.9234
CIROLANA SP.	1	0.0077	99.9310
COPEPODA SPP.	1	0.0077	99.9387
ISOTOMIDAE SP.	1	0.0077	99.9464
NOTAULAX PHAETAENIA	1	0.0077	99.9540
OLIVELLA SPP.	1	0.0077	99.9617
TANAIDACEA SPP.	1	0.0077	99.9693

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR3.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
EURYPANOPEUS DEPRESSUS	880	13.1030	13.1030
POLYDORA WEBSTERI	747	11.1227	24.2257
PHYLLODOCE CASTANEA	561	8.3532	32.5789
MELITA "COMPLEX"	459	6.8344	39.4133
FILOGRANA IMPLEXA	454	6.7600	46.1733
CREPIDULA PLANA	427	6.3580	52.5313
FABRICIA SP.A	386	5.7475	58.2787
CRASSOSTREA VIRGINICA	366	5.4497	63.7284
ODOSTOMIA IMPRESSA	364	5.4199	69.1483
HYALE SP.B=CF.PLUMOSA	310	4.6158	73.7641
PLATYHELMINTHES SP.A	188	2.7993	76.5634
BRACHIDONTES EXUSTUS	187	2.7844	79.3478
OPISTHOSYLLIS SP. B	177	2.6355	81.9833
CHIRONOMIDAE	167	2.4866	84.4699
GITANOPSIS SPP.	107	1.5932	86.0631
ELASMOPUS LEVIS	96	1.4294	87.4926
CYMADUSA COMPTA	94	1.3996	88.8922
NEANTHES SUCCINEA	83	1.2359	90.1281
XANTHIDAE SPP.	70	1.0423	91.1703
BRANIA CLAVATA	64	0.9529	92.1233
COROPHIUM ACHERUSICUM	63	0.9381	93.0613
NEMERTINA	57	0.8487	93.9101
PETROLISTHES ARMATUS	55	0.8189	94.7290
TYPOSYLLIS CF.LUTEA	54	0.8041	95.5331
MITRELLA LUNATA	40	0.5956	96.1286
PLATYHELMINTHES SP.B	23	0.3425	96.4711
ANTHOZOA SPP.	22	0.3276	96.7987
STREBLOSOMA HARTMANAE	21	0.3127	97.1114
POLYDORA SOCIALIS	16	0.2382	97.3496
DIASTOMA VARIUM	13	0.1936	97.5432
EHLERSIA CORNUTA	13	0.1936	97.7367
OLIGOCHAETA SPP.	12	0.1787	97.9154
HEMIAEGINA MINUTA	11	0.1638	98.0792
CAPITELLA CAPITATA	10	0.1489	98.2281
COROPHIUM LACUSTRE	9	0.1340	98.3621
STREBLOSPIO BENEDICTI	8	0.1191	98.4812
HYDROIDES DIANTHUS	7	0.1042	98.5855
NAINERIS BICORNIS	7	0.1042	98.6897
COPEPODA SPP.	7	0.1042	98.7939
BOCCARDIELLA HAMATA	6	0.0893	98.8833
CAPRELLA SPP.	5	0.0744	98.9577
ANACHIS OBESA.OSTREICOLA	4	0.0596	99.0173
PANOPEUS HERBSTII	4	0.0596	99.0768
ERICTHONIUS BRASILIENSIS	4	0.0596	99.1364
CERITHIOPSIS GREENI	4	0.0596	99.1960
EXOGENE DISPAR	4	0.0596	99.2555
TANAIS CAVOLINII	3	0.0447	99.3002
COROPHIUM ACUTUM	3	0.0447	99.3448

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR3.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
GRANDIDIERELLA BONNIEROIDES	3	0.0447	99.3895
STILIGER(ERCOLANIA) SP.	3	0.0447	99.4342
PALAEMON FLORIDANUS	3	0.0447	99.4789
NUDIBRANCHIA SPP.	3	0.0447	99.5235
SABELLIDAE SPP.	2	0.0298	99.5533
EUNICIDAE SPP.	2	0.0298	99.5831
AMPHILOCHIDAE SPP.	2	0.0298	99.6129
AUTOLYTUS DENTALIUS	2	0.0298	99.6426
STYELA PARTITA	2	0.0298	99.6724
ISCHADIUM RECURVUM	1	0.0149	99.6873
PODOCERUS SPP.	1	0.0149	99.7022
HARGERIA RAPAX	1	0.0149	99.7171
SCHISTOMERINGOS RUDOLPHI	1	0.0149	99.7320
CAPRELLA EQUILIBRA	1	0.0149	99.7469
STENOTHOE SPP.	1	0.0149	99.7618
SABELLARIA SPP.	1	0.0149	99.7767
SABELLARIA VULGARIS	1	0.0149	99.7915
CREPIDULA MACULOSA	1	0.0149	99.8064
POLYDORA SPP.	1	0.0149	99.8213
LEPIDAMETRIA COMMENSALIS	1	0.0149	99.8362
POLYCITORINAE	1	0.0149	99.8511
PANANTHURA FORMOSA	1	0.0149	99.8660
TURBONILLA SPP.	1	0.0149	99.8809
AMAEANA TRILOBATA	1	0.0149	99.8958
CHONE AMERICANA	1	0.0149	99.9107
INSECTA SPP.	1	0.0149	99.9256
ISOTOMIDAE SP.	1	0.0149	99.9404
NOTAULAX PHAETAENIA	1	0.0149	99.9553
LUMBRINERIS VERRILLI	1	0.0149	99.9702
TEREBELLIDAE SPP.	1	0.0149	99.9851
THYSANOPTERA SP.	1	0.0149	100.0000

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR4.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
COROPHIUM ACHERUSICUM	1015	33.1266	33.1266
POLYDORA WEBSTERI	550	17.9504	51.0770
EURYPANOPEUS DEPRESSUS	481	15.6984	66.7755
NEANTHES SUCCINEA	192	6.2663	73.0418
ANURIDA MARTIMA	111	3.6227	76.6645
TYPOSYLLIS CF.LUTEA	108	3.5248	80.1893
GITANOPSIS SPP.	102	3.3290	83.5183
MELITA "COMPLEX"	90	2.9373	86.4556
EHLERSIA CORNUTA	52	1.6971	88.1527
GRANDIDIERELLA BONNIEROIDES	35	1.1423	89.2950
CREPIDULA PLANA	30	0.9791	90.2742
OLIGOCHAETA SPP.	24	0.7833	91.0574
MARPHYSA SANGUINEA	22	0.7180	91.7755
FABRICIA SP.A	20	0.6527	92.4282
BRACHIDONTES EXUSTUS	20	0.6527	93.0809
PETROLISTHES ARMATUS	19	0.6201	93.7010
COPEPODA SPP.	16	0.5222	94.2232
STREBLOSPIO BENEDICTI	14	0.4569	94.6802
EUNICIDAE SPP.	14	0.4569	95.1371
HYALE SP.B=CF.PLUMOSA	12	0.3916	95.5287
HAPLOSCOLOPLOS FOLIOSUS	11	0.3590	95.8877
XANTHIDAE SPP.	11	0.3590	96.2467
SPIONIDAE SPP.	10	0.3264	96.5731
ODOSTOMIA IMPRESSA	9	0.2937	96.8668
PANOPEUS HERBSTII	8	0.2611	97.1279
CAPRELLA EQUILIBRA	7	0.2285	97.3564
PHYLLODOCE CASTANEA	6	0.1958	97.5522
CRASSOSTREA VIRGINICA	5	0.1632	97.7154
COROPHIUM LOUISIANUM	5	0.1632	97.8786
TANAIS CAVOLINII	5	0.1632	98.0418
PLATYHELMINTHES SP.A	4	0.1305	98.1723
NEMERTINA	4	0.1305	98.3029
OPISTHOSYLLIS SP. B	3	0.0979	98.4008
CHIRONOMIDAE	3	0.0979	98.4987
PLATYHELMINTHES SP.B	3	0.0979	98.5966
ISCHADIUM RECURVUM	3	0.0979	98.6945
TYPOSYLLIS SPP.	2	0.0653	98.7598
CAPITELLA CAPITATA	2	0.0653	98.8251
SPHAEROSYLLIS LONGICAUDA	2	0.0653	98.8903
EXOGENE DISPAR	2	0.0653	98.9556
HAPLOSCOLOPLOS FRAGILIS	2	0.0653	99.0209
MAERA CF.WILLIAMSI	2	0.0653	99.0862
ARGULUS SPP.	2	0.0653	99.1514
COROPHIUM SPP.	2	0.0653	99.2167
BOCCARDIELLA HAMATA	1	0.0326	99.2493
HYDRACARINA SPP.	1	0.0326	99.2820
BATEA CF.CATHARINENSIS	1	0.0326	99.3146

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR4.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
CYMODOCE FAXONI	1	0.0326	99.3473
PARACERCEIS CAUDATA	1	0.0326	99.3799
MEDIOMASTUS CALIFORNIENSIS	1	0.0326	99.4125
SABELLARIA VULGARIS	1	0.0326	99.4452
ELASMOPUS LEVIS	1	0.0326	99.4778
SPHAEROSYLLIS TAYLORI	1	0.0326	99.5104
HARGERIA RAPAX	1	0.0326	99.5431
SCOLOPLOS TEXANA	1	0.0326	99.5757
CHONE AMERICANA	1	0.0326	99.6084
CARIDEA ZOEA	1	0.0326	99.6410
PALAEMON FLORIDANUS	1	0.0326	99.6736
LUMBRINERIS VERRILLI	1	0.0326	99.7063
MITRELLA LUNATA	1	0.0326	99.7389
COROPHIUM LACUSTRE	1	0.0326	99.7715
STENOTHOE CF. GALLENSIS	1	0.0326	99.8042
ERICTHONIUS SPP.	1	0.0326	99.8368
ERICTHONIUS BRASILIENSIS	1	0.0326	99.8695
STYLOCHUS SP.	1	0.0326	99.9021
CRUSTACEA SPP.	1	0.0326	99.9347
CYCLASPIS SP. A	1	0.0326	99.9674

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR5.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
POLYDORA WEBSTERI	979	31.9413	31.9413
EURYPANOPEUS DEPRESSUS	415	13.5400	45.4812
COROPHIUM ACHERUSICUM	260	8.4829	53.9641
ANURIDA MARTIMA	259	8.4502	62.4144
NEANTHES SUCCINEA	159	5.1876	67.6020
MELITA "COMPLEX"	150	4.8940	72.4959
BRACHIDONTES EXUSTUS	108	3.5237	76.0196
EHLERSIA CORNUTA	95	3.0995	79.1191
CREPIDULA PLANA	79	2.5775	81.6966
TYPOSYLLIS CF.LUTEA	71	2.3165	84.0131
OLIGOCHAETA SPP.	61	1.9902	86.0033
ARICIDEA PHILBINAE	53	1.7292	87.7325
XANTHIDAE SPP.	50	1.6313	89.3638
MARPHYSA SANGUINEA	43	1.4029	90.7667
CRASSOSTREA VIRGINICA	29	0.9462	91.7129
PETROLISTHES ARMATUS	26	0.8483	92.5612
PLATYHELMINTHES SP.A	22	0.7178	93.2790
ODOSTOMIA IMPRESSA	22	0.7178	93.9967
GRANDIDIERELLA BONNIEROIDES	17	0.5546	94.5514
STREBLOSPIO BENEDICTI	14	0.4568	95.0082
PHYLLODOCE CASTANEA	13	0.4241	95.4323
EUNICIDAE SPP.	12	0.3915	95.8238
HAPLOSCOLOPLOS FOLIOSUS	11	0.3589	96.1827
FABRICIA SP.A	9	0.2936	96.4763
HYALE SP.B=CF.PLUMOSA	8	0.2610	96.7374
BOCCARDIELLA HAMATA	7	0.2284	96.9657
COPEPODA SPP.	7	0.2284	97.1941
COROPHIUM SPP.	7	0.2284	97.4225
CAPITELLA CAPITATA	6	0.1958	97.6183
CAPRELLA EQUILIBRA	5	0.1631	97.7814
COROPHIUM TUBERCULATUM	5	0.1631	97.9445
ERICTHONIUS SPP.	4	0.1305	98.0750
HYDROIDES DIANTHUS	3	0.0979	98.1729
CARIDEA ZOEA	3	0.0979	98.2708
CHIRONOMIDAE	3	0.0979	98.3687
PLATYHELMINTHES SP.B	3	0.0979	98.4666
OPISTHOSYLLIS SP. B	3	0.0979	98.5644
SABELLARIA VULGARIS	3	0.0979	98.6623
LEMBOS SMITHI	3	0.0979	98.7602
BATEA CF.CATHARINENSIS	3	0.0979	98.8581
MEDIOMASTUS CALIFORNIENSIS	3	0.0979	98.9560
SYLLIDAE SPP.	2	0.0653	99.0212
GITANOPSIS SPP.	2	0.0653	99.0865
PODOCERUS SPP.	2	0.0653	99.1517
ISOTOMIDAE SP.	2	0.0653	99.2170
HARGERIA RAPAX	2	0.0653	99.2822

OYSTER REEF ASSOCIATED FAUNA FROM STATION ORS.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
POLYDORA SPP.	2	0.0653	99.3475
THARYX CF. DORSOBRANCHIALIS	2	0.0653	99.4127
BRACHYURA SPP.	2	0.0653	99.4780
STENOTHOE SPP.	1	0.0326	99.5106
PERICLIMENES LONGICAUDATUS	1	0.0326	99.5432
CYCLASPIS SP.A	1	0.0326	99.5759
HYDRACARINA SPP.	1	0.0326	99.6085
PANOPEUS HERBSTII	1	0.0326	99.6411
COROPHIUM LACUSTRE	1	0.0326	99.6737
CERITHIOPSIS GREENI	1	0.0326	99.7064
SEILA ADAMSI	1	0.0326	99.7390
EXOGENE DISPAR	1	0.0326	99.7716
ISOPODA SPP.	1	0.0326	99.8042
LYSIANOPSIS CF.ALBA	1	0.0326	99.8369
NAINERIS LAEVIGATA	1	0.0326	99.8695
PALAEMONIDAE SP.	1	0.0326	99.9021
PORCELLANIDAE SPP.	1	0.0326	99.9347
THYSANOPTERA SP.	1	0.0326	99.9674
STYLOCHUS SP.	1	0.0326	100.0000

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR6.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
POLYDORA WEBSTERI	1708	32.8398	32.8398
EURYPANOPEUS DEPRESSUS	821	[illegible]5.7854	48.6253
MELITA "COMPLEX"	431	8.2869	56.9121
HYALE SP.B=CF.PLUMOSA	419	8.0561	64.9683
BRACHIDONTES EXUSTUS	338	6.4988	71.4670
PLATYHELMINTHES SP.A	287	5.5182	76.9852
PHYLLODOCE CASTANEA	164	3.1532	80.1384
PETROLISTHES ARMATUS	106	2.0381	82.1765
CRASSOSTREA VIRGINICA	89	1.7112	83.8877
NEANTHES SUCCINEA	85	1.6343	85.5220
XANTHIDAE SPP.	85	1.6343	87.1563
COROPHIUM ACHERUSICUM	81	1.5574	88.7137
TYPOSYLLIS CF.LUTEA	65	1.2498	89.9635
FABRICIA SP.A	60	1.1536	91.1171
OPISTHOSYLLIS SP. B	53	1.0190	92.1361
GITANOPSIS SPP.	43	0.8268	92.9629
EHLERSIA CORNUTA	40	0.7691	93.7320
ANURIDA MARTIMA	39	0.7499	94.4818
CREPIDULA PLANA	37	0.7114	95.1932
OLIGOCHAETA SPP.	34	0.6537	95.8470
NEMERTINA	27	0.5191	96.3661
ANTHOZOA SPP.	26	0.4999	96.8660
CAPITELLA CAPITATA	16	0.3076	97.1736
ISCHADIUM RECURVUM	16	0.3076	97.4813
CHIRONOMIDAE	14	0.2692	97.7504
ODOSTOMIA IMPRESSA	10	0.1923	97.9427
PANOPEUS HERBSTII	10	0.1923	98.1350
STREBLOSPIO BENEDICTI	10	0.1923	98.3272
PALAEMON FLORIDANUS	8	0.1538	98.4811
STREBLOSOMA HARTMANAE	7	0.1346	98.6157
HYDROIDES DIANTHUS	5	0.0961	98.7118
CHTHAMALUS FRAGILIS	4	0.0769	98.7887
BOCCARDIELLA HAMATA	4	0.0769	98.8656
EUNICIDAE SPP.	4	0.0769	98.9425
MITRELLA LUNATA	3	0.0577	99.0002
LEPIDAMETRIA COMMENSALIS	3	0.0577	99.0579
MEDIOMASTUS CALIFORNIENSIS	3	0.0577	99.1156
TYPOSYLLIS SPP.	3	0.0577	99.1732
ARACHNIDA SP.	3	0.0577	99.2309
COROPHIUM SPP.	2	0.0385	99.2694
ELASMOPUS LEVIS	2	0.0385	99.3078
PORCELLANIDAE SPP.	2	0.0385	99.3463
COPEPODA SPP.	2	0.0385	99.3847
SCHISTOMERINGOS RUDOLPHI	2	0.0385	99.4232
THARYX CF. DORSOBRANCHIALIS	2	0.0385	99.4616
BRACHYURA SPP.	2	0.0385	99.5001

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR6.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
CYMADUSA COMPTA	2	0.0385	99.5386
ANTHURIDAE SP.A	1	0.0192	99.5578
ACTEOCINA CANALICULATA	1	0.0192	99.5770
HYDRACARINA SPP.	1	0.0192	99.5962
PERICLIMENES LONGICAUDATUS	1	0.0192	99.6155
CYCLASPIS SP.A	1	0.0192	99.6347
ALPHEUS ARMILLATUS	1	0.0192	99.6539
UPOGEBIA AFFINIS	1	0.0192	99.6731
SYLLIDAE SPP.	1	0.0192	99.6924
SPHAEROSYLLIS LONGICAUDA	1	0.0192	99.7116
BATEA CF.CATHARINENSIS	1	0.0192	99.7308
CAECUM STRIGOSUM	1	0.0192	99.7500
MENIPPE MERCENARIA	1	0.0192	99.7693
ERICTHONIUS SPP.	1	0.0192	99.7885
SIPUNCULA SPP.	1	0.0192	99.8077
GOBIESOX STRUMOSUS	1	0.0192	99.8270
NUDIBRANCHIA SPP.	1	0.0192	99.8462
STENOTHOE CF.GALLENSIS	1	0.0192	99.8654
PARACAPRELLA PUSILLA	1	0.0192	99.8846
STYLOCHUS SP.	1	0.0192	99.9039
COROPHIIDAE SPP.	1	0.0192	99.9231
LYSIANASSIDAE SP.	1	0.0192	99.9423
POLYNOIDAE SPP.	1	0.0192	99.9615
BRANIA CLAVATA	1	0.0192	99.9808
ODONTOSYLLIS ENOPLA	1	0.0192	100.0000

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR7.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
POLYDORA WEBSTERI	1084	13.4458	13.4458
EURYPANOPEUS DEPRESSUS	1001	12.4163	25.8621
BRACHIDONTES EXUSTUS	728	9.0300	34.8921
FABRICIA SP.A	700	8.6827	43.5748
PHYLLODOCE CASTANEA	513	6.3632	49.9380
CHIRONOMIDAE	479	5.9415	55.8794
HYALE SP.B=CF.PLUMOSA	408	5.0608	60.9402
CRASSOSTREA VIRGINICA	352	4.3662	65.3064
PLATYHELMINTHES SP.A	350	4.3414	69.6477
MELITA "COMPLEX"	334	4.1429	73.7906
ODOSTOMIA IMPRESSA	288	3.5723	77.3629
TANAIS CAVOLINII	287	3.5599	80.9228
PETROLISTHES ARMATUS	192	2.3815	83.3044
ANACHIS OBESA.OSTREICOLA	134	1.6621	84.9665
CREPIDULA PLANA	132	1.6373	86.6038
CARIDEA ZOEA	131	1.6249	88.2287
XANTHIDAE SPP.	117	1.4513	89.6800
NEANTHES SUCCINEA	115	1.4264	91.1064
OPISTHOSYLLIS SP. B	85	1.0543	92.1608
NEMERTINA	81	1.0047	93.1655
ANURIDA MARTIMA	67	0.8311	93.9965
CAPRELLA PENANTIS	53	0.6574	94.6539
CAPITELLA CAPITATA	51	0.6326	95.2865
ISCHADIUM RECURVUM	42	0.5210	95.8075
PLATYHELMINTHES SP.B	30	0.3721	96.1796
COROPHIUM ACHERUSICUM	29	0.3597	96.5393
EXOGENE DISPAR	28	0.3473	96.8866
HYDROIDES DIANTHUS	27	0.3349	97.2215
ELASMOPUS LEVIS	27	0.3349	97.5564
MITRELLA LUNATA	27	0.3349	97.8913
GITANOPSIS SPP.	24	0.2977	98.1890
TYPOSYLLIS CF.LUTEA	18	0.2233	98.4123
STREBLOSPIO BENEDICTI	18	0.2233	98.6356
CERITHIOPSIS GREENI	17	0.2109	98.8464
COROPHIUM LACUSTRE	10	0.1240	98.9705
COROPHIUM SPP.	9	0.1116	99.0821
EHLERSIA CORNUTA	8	0.0992	99.1813
STREBLOSOMA HARTMANAE	5	0.0620	99.2434
HARGERIA RAPAX	4	0.0496	99.2930
COPEPODA SPP.	4	0.0496	99.3426
TANAIDACEA SPP.	4	0.0496	99.3922
BOCCARDIELLA HAMATA	4	0.0496	99.4418
MEDIOMASTUS CALIFORNIENSIS	4	0.0496	99.4914
OLIGOCHAETA SPP.	3	0.0372	99.5287
PALAEMON FLORIDANUS	3	0.0372	99.5659
GOBIESOX STRUMOSUS	3	0.0372	99.6031
CYMADUSA COMPTA	2	0.0248	99.6279

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR7.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
ARACHNIDA SP.	2	0.0248	99.6527
ODONTOSYLLIS ENOPLA	2	0.0248	99.6775
HYDRACARINA SPP.	2	0.0248	99.7023
STYLOCHUS SP.	2	0.0248	99.7271
PANOPEUS HERBSTII	2	0.0248	99.7519
ERICTHONIUS BRASILIENSIS	2	0.0248	99.7767
SPHAEROSYLLIS LONGICAUDA	2	0.0248	99.8015
GAMMARUS MUCRONATUS	1	0.0124	99.8139
STENOTHOE SPP.	1	0.0124	99.8263
PARACERCEIS CAUDATA	1	0.0124	99.8387
LEPIDAMETRIA COMMENSALIS	1	0.0124	99.8512
SEILA ADAMSI	1	0.0124	99.8636
OPSANUS BETA	1	0.0124	99.8760
SCHISTOMERINGOS RUDOLPHI	1	0.0124	99.8884
GOBIOSOMA ROBUSTUM	1	0.0124	99.9008
POLYDORA SPP.	1	0.0124	99.9132
NUDIBRANCHIA SPP.	1	0.0124	99.9256
SYLLIDAE SPP.	1	0.0124	99.9380
GAMMARIDAE SPP.	1	0.0124	99.9504
GAMMARIDAE SP. B	1	0.0124	99.9628
PODOCERIDAE SP.	1	0.0124	99.9752
CYCLASPIS SP.A	1	0.0124	99.9876
AUTOLYTUS DENTALIUS	1	0.0124	100.0000

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR8.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
ODOSTOMIA IMPRESSA	1263	21.4832	21.4832
POLYDORA WEBSTERI	963	16.3803	37.8636
MELITA "COMPLEX"	849	14.4412	52.3048
ISCHADIUM RECURVUM	584	9.9337	62.2385
CRASSOSTREA VIRGINICA	431	7.3312	69.5697
NEANTHES SUCCINEA	388	6.5998	76.1694
CREPIDULA PLANA	207	3.5210	79.6904
FABRICIA SP.A	167	2.8406	82.5310
HYALE SP.B=CF.PLUMOSA	126	2.1432	84.6743
XANTHIDAE SPP.	112	1.9051	86.5794
GITANOPSIS SPP.	109	1.8541	88.4334
PHYLLODOCE CASTANEA	81	1.3778	89.8112
CHIRONOMIDAE	78	1.3268	91.1379
BRACHIDONTES EXUSTUS	55	0.9355	92.0735
PETROLISTHES ARMATUS	53	0.9015	92.9750
COROPHIUM LOUISIANUM	42	0.7144	93.6894
PLATYHELMINTHES SP.B	41	0.6974	94.3868
STREBLOSPIO BENEDICTI	41	0.6974	95.0842
HARGERIA RAPAX	38	0.6464	95.7306
ANTHOZOA SPP.	37	0.6294	96.3599
BOCCARDIELLA HAMATA	36	0.6123	96.9723
TANAIS CAVOLINII	24	0.4082	97.3805
NEMERTINA	21	0.3572	97.7377
CAPITELLA CAPITATA	21	0.3572	98.0949
CERITHIOPSIS GREENI	17	0.2892	98.3841
ANURIDA MARTIMA	17	0.2892	98.6732
OPISTHOSYLLIS SP. B	7	0.1191	98.7923
MITRELLA LUNATA	7	0.1191	98.9114
COROPHIUM LACUSTRE	7	0.1191	99.0304
COROPHIUM ACHERUSICUM	7	0.1191	99.1495
PLATYHELMINTHES SP.A	6	0.1021	99.2516
NEREIDAE SPP.	6	0.1021	99.3536
TANAIDACEA SPP.	3	0.0510	99.4047
HYDRACARINA SPP.	3	0.0510	99.4557
DIASTOMA VARIUM	3	0.0510	99.5067
TYPOSYLLIS CF.LUTEA	3	0.0510	99.5577
CYMADUSA COMPTA	3	0.0510	99.6088
COROPHIUM TUBERCULATUM	2	0.0340	99.6428
MARPHYSA SANGUINEA	2	0.0340	99.6768
EXOGENE DISPAR	2	0.0340	99.7108
CUMELLA SP.B	1	0.0170	99.7278
STYLOCHUS SP.	1	0.0170	99.7449
GAMMARUS MUCRONATUS	1	0.0170	99.7619
EHLERSIA CORNUTA	1	0.0170	99.7789
STENOTHOE SPP.	1	0.0170	99.7959
CAPRELLA SPP.	1	0.0170	99.8129
PALAEMON FLORIDANUS	1	0.0170	99.8299
MELAMPUS BIDENTATUS	1	0.0170	99.8469

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR8.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cumul. Percent
POTAMILLA RENIFORMIS	1	0.0170	99.8639
PANOPEUS HERBSTII	1	0.0170	99.8809
CREPIDULA MACULOSA	1	0.0170	99.8979
CHASMODES SABURRAE	1	0.0170	99.9150
ARACHNIDA SP.	1	0.0170	99.9320
ANACHIS OBESA.OSTREICOLA	1	0.0170	99.9490
INSECTA SPP.	1	0.0170	99.9660
ELASMOPUS LEVIS	1	0.0170	99.9830
THYSANOPTERA SP.	1	0.0170	100.0000

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR9.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
EURYPANOPEUS DEPRESSUS	543	15.3390	15.3390
MELITA "COMPLEX"	415	11.7232	27.0621
POLYDORA WEBSTERI	398	11.2429	38.3051
ODOSTOMIA IMPRESSA	362	10.2260	48.5311
BRACHIDONTES EXUSTUS	272	7.6836	56.2147
CRASSOSTREA VIRGINICA	265	7.4859	63.7006
NEANTHES SUCCINEA	175	4.9435	68.6441
ISCHADIUM RECURVUM	125	3.5311	72.1751
CHIRONOMIDAE	119	3.3616	75.5367
BOCCARDIELLA HAMATA	115	3.2486	78.7853
STREBLOSPIO BENEDICTI	95	2.6836	81.4689
HYALE SP.B=CF.PLUMOSA	78	2.2034	83.6723
XANTHIDAE SPP.	66	1.8644	85.5367
COROPHIUM LACUSTRE	64	1.8079	87.3446
FABRICIA SP.A	62	1.7514	89.0960
ANURIDA MARTIMA	60	1.6949	90.7910
HARGERIA RAPAX	59	1.6667	92.4576
OLIGOCHAETA SPP.	43	1.2147	93.6723
PLATYHELMINTHES SP.B	36	1.0169	94.6893
COROPHIUM LOUISIANUM	34	0.9605	95.6497
PHYLLODOCE CASTANEA	26	0.7345	96.3842
CAPITELLA CAPITATA	25	0.7062	97.0904
GITANOPSIS SPP.	23	0.6497	97.7401
HYDRACARINA SPP.	13	0.3672	98.1073
CREPIDULA PLANA	10	0.2825	98.3898
COROPHIUM ACHERUSICUM	8	0.2260	98.6158
PETROLISTHES ARMATUS	7	0.1977	98.8136
TANAIS CAVOLINII	5	0.1412	98.9548
NEMERTINA	5	0.1412	99.0960
POLYDORA SPP.	4	0.1130	99.2090
ANTHOZOA SPP.	2	0.0565	99.2655
CAPRELLA EQUILIBRA	2	0.0565	99.3220
OPISTHOSYLLIS SP. B	2	0.0565	99.3785
GAMMARIDAE SP. A	2	0.0565	99.4350
CARIDEA ZOEA	2	0.0565	99.4915
POLYDORA LIGNI	2	0.0565	99.5480
ARGULUS SPP.	1	0.0282	99.5763
ELASMOPUS LEVIS	1	0.0282	99.6045
ORCHESTIA UHLERI	1	0.0282	99.6328
HAPLOSCOLOPLOS FRAGILIS	1	0.0282	99.6610
HALMYRAPSEUDES CF.CUBANENSIS	1	0.0282	99.6893
CAPRELLA SPP.	1	0.0282	99.7175
EXOGENE DISPAR	1	0.0282	99.7458
COROPHIUM SPP.	1	0.0282	99.7740
PANOPEUS HERBSTII	1	0.0282	99.8023
SESARMA CINEREUM	1	0.0282	99.8305
CYCLASPIS SP.A	1	0.0282	99.8588

OYSTER REEF ASSOCIATED FAUNA FROM STATION OR9.

Taxonomic Categories & Sample Parameters	Total No. Of Indiv.	Percent of All Counts	Cummul. Percent
ARACHNIDA SP.	1	0.0282	99.8870
BRACHYURA SPP.	1	0.0282	99.9153
GAMMARUS MUCRONATUS	1	0.0282	99.9435
GEUKENSIA DEMISSA.GRANOSISSIMA	1	0.0282	99.9718
CIRROPHORUS CF. FURCATUS	1	0.0282	100.0000

Oyster Reef Associated Fauna Taxa not enumerated. Presence (+) is indicated for each oyster station.

	STATION								
	1	2	3	4	5	6	7	8	9
Porifera spp.	+			+					
Lissodendoryx *isodictyalis*		+							
Cliona spp.	+	+	+			+			
Nematoda spp.	+	+	+	+	+	+	+	+	+
Chthamalus *fragilis*	+	+	+			+	+	+	
Balanus *amphitrite*			+	+		+			
Balanus *eburneus*	+	+	+		+	+	+		+
Balanus *improvisus*	+	+	+	+	+	+	+	+	+
Balanus *venustus*	+								
Semibalanus *balanoides*	+								
Polycitorinae sp.	+						+		+

AUGUST 1983

STATIONS

	1	2	3	4	5	6	7	8	9
1									
2	.68								
3	.33	.31							
4	.27	.22	.35						
5	.05	.04	.03	.21					
6	.14	.14	.55	.19	.40				
7	.44	.53	.80	.48	.04	.38			
8	.30	.31	.54	.48	.06	.33	.56		
9	.37	.52	.62	.35	.02	.20	.69	.75	

OCTOBER 1983

STATIONS

	1	2	3	4	5	6	7	8	9
1									
2	.83								
3	.65	.55							
4	.53	.73	.63						
5	.49	.35	.46	.84					
6	.62	.48	.53	.75	.64				
7	.67	.58	.66	.62	.53	.80			
8	.39	.23	.57	.41	.32	.36	.52		
9	.50	.24	.49	.71	.59	.65	.64	.50	

SEPTEMBER 1983

STATIONS

	1	2	3	4	5	6	7	8	9
1									
2	.77								
3	.71	.52							
4	.38	.26	.75						
5	.50	.47	.82	.89					
6	.50	.17	.57	.58	.48				
7	.72	.45	.90	.63	.66	.77			
8	.55	.45	.64	.44	.67	.54	.64		
9	.59	.48	.69	.45	.68	.40	.51	.85	

NOVEMBER 1983

STATIONS

	1	2	3	4	5	6	7	8	9
1									
2	.67								
3	.37	.19							
4	.35	.15	.73						
5	.28	.11	.67	.99					
6	.36	.15	.82	.48	.40				
7	.30	.14	.71	.25	.19	.77			
8	.25	.18	.32	.34	.34	.13	.11		
9	.25	.22	.42	.43	.44	.25	.20	.85	

0-.25

.26-.50

.51-.75

.76-.99

Trellis diagrams depicting faunal similarity between oyster reef associated fauna stations (Morisita's Index).

DECEMBER 1983

STATIONS

	1	2	3	4	5	6	7	8	9
1									
2	.52								
3	.48	.17							
4	.22	.15	.16						
5	.19	.10	.09	.87					
6	.25	.21	.55	.30	.04				
7	.51	.47	.41	.25	.16	.67			
8	.39	.22	.41	.22	.21	.60	.69		
9	.61	.77	.21	.23	.20	.35	.57	.51	

FEBRUARY 1984

STATIONS

	1	2	3	4	5	6	7	8	9
1									
2	.59								
3	.27	.24							
4	.48	.28	.26						
5	.40	.26	.25	.93					
6	.37	.25	.25	.84	.97				
7	.58	.40	.30	.89	.88	.86			
8	.74	.52	.35	.61	.57	.54	.75		
9	.49	.25	.20	.47	.39	.37	.59	.60	

JANUARY 1984

STATIONS

	1	2	3	4	5	6	7	8	9
1									
2	.66								
3	.34	.46							
4	.29	.17	.23						
5	.19	.24	.33	.45					
6	.11	.17	.27	.26	.13				
7	.53	.45	.63	.45	.32	.41			
8	.47	.32	.40	.36	.26	.41	.79		
9	.41	.27	.48	.36	.27	.20	.54	70	

MARCH 1984

STATIONS

	1	2	3	4	5	6	7	8	9
1									
2	.38								
3	.35	.26							
4	.08	.05	.11						
5	.36	.30	.52	.26					
6	.40	.25	.26	.27	.50				
7	.36	.28	.57	.14	.68	.53			
8	.43	.12	.41	.11	.35	.35	.29		
9	.39	.17	53	.18	.83	.37	.70	.49	

0-.25
.26-.50
.51-.75
.76-.99

Trellis diagrams depicting faunal simi'arity between oyster reef associated fauna stations (Morisita's Index).

APRIL 1984

	STATIONS 1	2	3	4	5	6	7	8	9
1									
2	.70								
3	.68	.72							
4	.01	.01	.13						
5	.10	.12	.33	.97					
6	.28	.25	.61	.32	.57				
7	.42	.45	.25	.02	.07	.15			
8	.40	.22	.40	.07	.32	.75	.26		
9	.25	.20	.45	.17	.47	.81	.14	.84	

JUNE 1984

	STATIONS 1	2	3	4	5	6	7	8	9
1									
2	.52								
3	.46	.29							
4	.18	.07	.33						
5	.23	.12	.37	.98					
6	.38	.29	.49	.88	.93				
7	.35	.29	.35	.45	.50	.62			
8	.37	.14	.64	.49	.53	.62	.35		
9	.49	.19	.52	.55	.61	.71	.40	.81	

MAY 1984

	STATIONS 1	2	3	4	5	6	7	8	9
1									
2	.89								
3	.83	.64							
4	.49	.44	.59						
5	.66	.56	.73	.74					
6	.29	.27	.37	.37	.45				
7	.65	.61	.78	.40	.48	.32			
8	.53	.48	.70	.67	.83	.75	.60		
9	.35	.37	.48	.38	.39	.85	.51	.77	

JULY 1984

	STATIONS 1	2	3	4	5	6	7	8	9
1									
2	.71								
3	.59	.28							
4	.57	.10	.35						
5	.63	.21	.38	.97					
6	.70	.50	.49	.42	.53				
7	.48	.70	.27	.17	.32	.48			
8	.67	.17	.79	.65	.67	.50	.18		
9	.60	.21	.41	.53	.57	.41	.27	.78	

0-.25
.26-.50
.51-.75
.76-.99

Trellis diagrams depicting faunal similarity between oyster reef associated fauna stations (Morisita's Index).

APPENDIX VI

THERMAL TOLERANCE INFORMATION FOR SIO

Thermal Tolerance Information for SIO

Bay Anchovy

In laboratory experiments using embryos taken from Biscayne Bay (Rebel, 1973) a total of 480 embryos were incubated at 32 temperatures from 13.2°C to 35.8°C. Under experimental conditions survival seldom exceeded 50 percent. Highest survival was at 25.6°C, while 100 percent mortality was seen at temperatures of 15.1°C and lower, and at 35.8°C. Survival increased from 13 to 21°C, remained relatively constant from 21 to 31°C, and declined rapidly from 31 to 35°C. There were no significant differences in survival among temperature classes from 18.6 to 32.5°C.

Under natural conditions, anchovies were taken in trawls in Copano and Aransas Bays at all times of the year in temperatures ranging from 8.1 to 33.2°C, and in salinities from 2.3 to 36.9 ppt (Gunter 1945). The species occurs within Tampa Bay at temperatures between 10.8 and 32.5°C (Springer & Woodburn 1960). In studies conducted in the area of a thermal discharge in Galveston Bay (Texas), bay anchovies were most abundant at temperatures between 24.5 and 33°C with reduced numbers up to 37°C (Gallaway & Strawn 1974). Laboratory experiments indicate higher temperature preferences at low salinities (4.0-4.5 ppt) than at high salinities (27-29 ppt) (Meldrim & Gift 1971); Terpin et al 1977). At high salinities (27-29 ppt), the acclimation temperature does not significantly affect the preference temperature (Terpin et al 1977). Salinity apparently does not affect avoidance temperatures (Meldrim & Gift 1971; Meldrim et al 1974; Terpin et al 1977). Avoidance temperatures increased directly in relation to acclimation temperatures below 20°C, but avoidance temperatures (30 to 33°C) were unrelated to their acclimation temperatures (20 to 27°C) (Meldrim & Gift 1971; Meldrim et al 1974; Terpin et al 1977).

Pigfish

Grimes and Mountain (1971) conducted thermal studies at Crystal River while two units were operating. They found the frequency of occurrence at thermally affected and unaffected sampling locations not to vary significantly, nor were there any statistically significant differences in growth of age 0 fish. Length frequency comparisons indicated no difference in age composition of the fish from affected and unaffected stations. Rulifson (1977) reports a direct correlati n between time to impingement and temperature for young-of-the-year fish.

Pinfish

For larval and juvenile pinfish acclimated to [illegible]°C, critical thermal maxima are 31.0°C and 29.4°C (Hoss, Coston and Hettler 1971). During thermal studies at Crystal River, Grimes and Mountain (1971) reported no difference in frequency of occurrence between thermally affected and nonaffected areas, although age 0 fish left thermally affected areas with the approach of cooler temperatures at a later time than fish at nonaffected areas. Length frequency comparisons revealed no difference in age composition at affected and nonaffected areas. Rulifson (1977) reports direct correlation between time to impingement and temperature for young-of-the-year fish. Lethal temperatures are reported by Cameron (1969) to be between 6 and 8°C, and between 32 and 35°C. Fish apparently move to deeper water as a defense against temperature extremes (Cameron, 1969).

Silver Perch

Grimes (1971) and Grimes and Mountain (1971) have done thermal addition studies at Crystal River. No significant differences in frequency of occurrence, age composition, spawning time, or growth of age 0 fish were revealed between thermally affected and unaffected areas. The authors (Grimes and Mountain, 1971) did note that diversity was higher in water at affected shallow water stations except in summer. Also, fish in general remained at shallow, thermally affected areas a longer period of time with the approach of winter (Grimes, 1971).

The species is collected at temperatures ranging from 7.5°C (Dahlberg 1972) to 34.0°C (Roessler 1970); however, cold kills have been reported at temperatures even within the species' known tolerances (Gunter & Hildebrand 1951; Gunter 1945; Springer & Woodburn 1960; Moore 1976). Laboratory observations indicate a critical thermal maximum at temperatures greater than 34°C (Gift & Westman 1971).

Spotted Seatrout

In Texas waters, the trout were taken at temperatures as low as 8.1°C and as high as 34.9°C (Gunter 1945). Generally, they escape cold waters by moving to deeper areas (10-20 feet) (Tabb 1958; Moody 1950). Mortality due to cold was observed when temperatures of the deeper waters of the Indian and Banana River lagoons (east coast of Florida) had fallen from 65-70°F to 45°F and remained there for about 12 hours (Tabb, 1966). Although they can recover rapidly after being immobilized by cold for a short period, they are apparently always killed when exposed to 45°F for 24 hours (Tabb 1958). In North Carolina waters temperatures of 53 to 55°F were sufficient to numb the fish (Hildebrand and Cable 1934).

Spot

Gunter (1945) reported spot along the Texas coast in water from 3.1 to 32°C and 2.0 to 36.7 ppt salinity. Hartwell and Hoss (1979) conducted laboratory experiments on postlarval and juvenile spot held at three acclimation temperatures. For postlarval spot, median lethal shock temperatures at acclimation temperatures of 10, 15, and 20°C were, respectively: 28 to 29°C, 30 to 31°C, and 32 to 33°C. For juveniles the median lethal shock temperatures were, similarly: 33 to 34°C, 34 to 36°C, and 35 to 36°C (Hartwell and Hoss 1979). Carr and Giesel (1975) also cite spot as one species of fish having a marked diminution in numbers and biomass in a thermally affected marshland nursery as compared to a similar, unaffected area nearby (on the northeast coast of Florida).

Red Drum

In Texas red drum have been taken in water ranging from 2 to 33°C (Simmons and Breuer 1962 cited in Theiling and Loyacano 1976). In laboratory experiments, spawning ceased when temperatures dropped to 20°C (Holt et al 1981). Hatching and larval survival studies were done by Holt et al (1981) at combinations of three temperatures (20, 25 and 30°C) and four salinities (15, 20, 25 and 30 ppt); the best conditions for hatching and 24 hour larval survival were at 25°C and 30 ppt. Poorest larval survival was at 30°C and 15 ppt. As a reaction to cold weather (and presumably hot weather) young red drum may move into deeper water (Pearson 1929; Osburn et al 1982).

Striped Mullet

Moore (1974) stated an upper critical temperature in the summer of about 37°C, although striped mullet could withstand temperatures above 40°C for short periods. During sampling off south Texas, however, only one individual was taken at temperatures above 31°C (Moore 1974). In Hawaii prejuveniles were found in water with high (34.0 to 37.2°C), often near lethal (39.0 to 42.5°C), temperatures (Major 1978). However, these prejuveniles seemed to prefer temperatures of 30.0 to 32.4°C. Juveniles seemed to prefer temperatures around 29.0°C and remained seaward of the tide in more thermally stable water (Major 1978).

Pink Shrimp

Minimum temperature for survival of the shrimp is felt to be around 12°C (Eldred et al 1961). They bury to avoid extreme in cold (Eldred et al 1961; Williams 1960). They have been held in a refrigerated truck at 13.3°C for almost 12 hours with low mortality (Eldred et al 1961). In southwest Florida, shrimp move out of the shallows to deeper water during the cold and move back in again if it warms (Tabb et al 1962). The minimum temperature for activity is about 15°C and below 10°C they are narcotized by the cold (Williams 1955). Tabb et al (1972) report mortality at 10°C upon a 6-10 hour exposure, and all feeding ceases at temperatures below 18°C. Survival is better at low temperatures if salinity is moderate to high (Williams 1965).

The highest temperature at which shrimp were taken during Tampa Bay studies was 35.5°C (Eldred et al 1961). Thorhaug et al (1972) report limits near 36-37°C for all but a few of its life stages.

New larvae have been found in temperatures as low as 19.6°C (Jones et al 1964). Thermal tolerance lab studies on the early life stages of the pink shrimp have been conducted and are reported in detail by life stage by Thorhaug et al (1972) and Thorhaug et al (1971). Briefly, neither first protozoea, third protozoea nor mysis survived above temperatures in the range of 36.7 to 37.8°C; nauplii had a very abrupt lethal temperature (33-34°C) with a change of only 1 or 2°C often spelling the difference between 100 percent mortality or 100 percent survival. The naupliar stage metamorphosed to protozoea only between 24-25°C and 30.5-31.5°C. Later stages from protozoea to adult can safety withstand temperatures of 33-35°C. Juveniles from Turkey Point had a lethal temperature of 37.9-39.6°C for a 2-hour exposure, decreasing to 36.0-37.9°C after 16.5 to 24 hours. The lower thermal limit was tentatively set at 12.8°C.

Blue Crab

Sensitivity of adult and juvenile blue crabs to extremes in temperature is affected by the salinity of the water. Generally, the crabs are less tolerant to extremes at low (6.8 ppt) and high (34 ppt) salinites (Tagatz 1969).

In lab studies on the megalopa stage, Costlow and Bookhout (1969) tested combinations of salinities of 5, 10, 20, 30, 35, and 40 ppt with temperatures of 15, 20, 25 and 30°C. Salinites of 5 ppt with 15 or 20°C and a salinity of 10 ppt with 15°C did not allow completion of metamorphosis. In another study Costlow and Bookhout (1959) report that in all salinities tested (15, 20.1, 26.7, 31.1 ppt) larvae never developed beyond the first zoeal stage when maintained at 20°C. Sandoz and Rogers (1944) report that in laboratory studies eggs were hatched between 19°C and 29°C with no significant variation in percentage hatched within this range. At 14, 17, 30 and 31°C all eggs failed to hatch. Below 15°C and above 29°C first zoeae became inactive and ceased feeding. At 10°C crabs moved very little and practically ceased to eat (Churchill 1919). Favorable salinity and temperature for ecdysis through the first three stages were 21-28 ppt and 20 to 29°C (Sandoz and Rogers 1944). No successful ecdysis occurred below 20°C. According to lab studies on megalops reported by Costlow (1967) survival never exceeded 50 percent at 15°C and ranged from 70-100 percent at 20, 25 and 30°C over salinites of 20, 30, 35 and 40 ppt. The upper thermal tolerance for juvenile blue crabs (100 percent mortality) acclimated to 20°C appears to be between 37 and 38°C (Academy of Natural Sciences 1970). Tagatz (1969) found the 48-hour median thermal tolerance limits to be approximately 3?°C for junveniles and adults.

Accounts from Leffler (1972) indicate that mortality is directly proportional to temperature for temperatures between 13 and 34°C, as is mortality at ecdysis. Mortality at ecdysis is high, 9.4 percent, at 34°C. He further indicates that crabs living at elevated temperatures should be smaller when growth ceases than those living at lower temperatures; however, by actively selecting water temperature the blue crab could extend its growing season without decreasing size at maturity. Making specific reference to Crystal River, Leffler (1972) notes that 12 month growth would be possible (assuming sufficient food) rather than the normal 8 or 9 month growth period. By utilizing both the thermally affected and unaffected areas of the estuary, the juvenile crabs could shorten the time to maturity while maintaining maximal size and low mortality. Presumably, they would enter the effluent area when temperatures dropped below 20°C in the fall, and leave the area as it rose above 27°C in the spring.

Stone Crab

Stone Crab larvae are intolerant to sudden fluctuations in water temperature or salinity (Futch 1966); both temperature and salinity affect larval survival and development (Ong and Costlow 1970).

Ong and Costlow (1970) have reported on laboratory development and mortality of larvae at various combinations of temperature (20, 25 and 30°C) and salinity (10, 20, 25, 30, 35, and 40 ppt). All larvae in 10 ppt salinity at all temperatures died. Larvae at 20°C and 20-40 ppt salinity developed only to the megalopa stage. Only at temperatures of 25 and 30°C and salinities of 20-40 ppt did larvae survive to first crab stage. Optimum conditions, however, were believed to be at 30°C at a salinity range of 30-35 ppt.

Thorhaug et al (1971) have also studied in the laboratory the effect of temperature on stone crab eggs and larvae; salinities during testing averaged 33.9 ppt .20 ppt. Lethal temperature limits given here are for extended periods. A more detailed breakdown by length of exposure, zoeal stage, and temperature is given by Thorhaug et al (1971). After 40 hours, no hatchings of eggs was observed below 29.1°C and no eggs survived above 36.3°C. Apparently, they were tolerant of cold since they remained viable after 280 hours at 12.6°C. Of the larval stages, the megalops seems to be the most sensitive. Fifth zoea held between 16.7 and 30.5°C achieved megalops characteristics. Twenty-three hours above 30.5°C proved to be lethal to the megalops, though this mortality could be due either to the high temperature directly, or to inhibition of further metamorphosis. One hundred percent of juveniles survived during a 42 hour exposure to temperatures maintained between 12.6 and 37.0°C. Death occurred, however, at 38.0°C after 4 hours. Mature stone crabs encountered lethal temperatures near 35 to 37.5°C. In other laboratory studies (Thorhaug et al 1972) the upper temperature limit for megalops molting into juveniles was 28.9°C for a 24 hour exposure.

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APPENDIX VII

FISHERIES DATA

TABLE VII-1

FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	1	12	15	55	1	0	1	0	0
JULY 1383	16	2	6	0	3	1	0	0	0
AUGUST 1983	3	77	19	6	10	0	0	0	2
SEPTEMBER 1983	10	24	4	40	1	0	0	0	0
OCTOBER 1983	2	8	0	8	0	0	0	0	0
NOVEMBER 1983	0	17	1	2	2	1	0	0	0
DECEMBER 1983	1	1	0	2	0	0	1	4	0
JANUARY 1984	0	1	0	0	0	0	0	0	0
FEBRUARY 1984	0	3	0	1	0	0	0	0	0
MARCH 1984	1	6	8	0	0	0	8	2	1
APRIL 1984	0	1	0	2	0	0	2	17	10
MAY 1984	0	1	0	2	0	7	0	3	3
TOTAL NUMBER OVER ALL DATES	34	153	53	118	17	9	12	26	16

TABLE VII-2

FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
OGCOCEPHALUS RADIATUS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	0	1	1	0	5	1	5	0	0
JULY 1983	0	2	0	2	3	0	7	0	0
AUGUST 1983	0	1	0	0	1	1	1	0	0
SEPTEMBER 1983	0	0	0	0	4	1	1	3	0
OCTOBER 1983	0	0	0	0	4	1	0	0	1
NOVEMBER 1983	1	0	1	2	1	0	0	0	0
DECEMBER 1983	0	1	0	0	2	1	0	3	0
JANUARY 1984	0	0	0	0	0	0	0	1	0
FEBRUARY 1984	0	1	3	1	0	1	7	0	1
MARCH 1984	0	2	0	0	1	3	5	1	1
APRIL 1984	0	0	4	0	1	1	5	1	1
MAY 1984	0	0	2	0	4	1	0	0	1
TOTAL NUMBER OVER ALL DATES	1	8	11	5	26	11	31	9	5

TABLE VII-3
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
ORTHOPRISTIS CHRYSOPTERA

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	4	13	0	6	12	2	26	11	69
JULY 1983	7	16	2	2	2	3	21	17	54
AUGUST 1983	5	4	6	0	2	1	13	20	65
SEPTEMBER 1983	6	3	6	0	7	2	9	8	66
OCTOBER 1983	1	0	1	4	2	8	9	15	47
NOVEMBER 1983	1	0	17	2	0	3	4	3	12
DECEMBER 1983	1	1	0	0	0	5	0	4	2
FEBRUARY 1984	0	0	0	0	0	0	0	3	1
MARCH 1984	0	1	0	0	2	3	21	17	54
APRIL 1984	0	0	2	0	2	4	28	8	20
MAY 1984	0	0	6	14	4	3	109	28	364
TOTAL NUMBER OVER ALL DATES	25	38	40	28	33	34	240	134	754

TABLE VII-4

FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
LAGODON RHOMBOIDES

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	24	11	4	1	12	6	0	11	328
JULY 1983	17	32	2	0	1	2	2	1	216
AUGUST 1983	4	10	2	0	5	3	18	164	277
SEPTEMBER 1983	1	9	0	0	14	4	6	5	217
OCTOBER 1983	1	5	4	0	2	0	7	68	73
NOVEMBER 1983	11	1	12	0	1	0	11	10	21
DECEMBER 1983	9	10	0	1	5	0	8	32	2
JANUARY 1984	2	10	0	9	0	0	0	4	1
FEBRUARY 1984	48	8	0	6	3	2	50	34	9
MARCH 1984	4	1	0	7	4	6	74	24	254
APRIL 1984	9	4	2	16	0	7	221	10	11
MAY 1984	72	2	7	15	2	14	125	67	345
TOTAL NUMBER OVER ALL DATES	202	103	33	55	49	44	522	430	1754

TABLE VII-5
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
BAIRDIELLA CHRYSOURA

	STATION								
DATE	T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	160	241	5	13	0	0	86	5	21
JULY 1983	77	101	24	0	22	2	31	2	3
AUGUST 1983	13	112	11	3	14	5	72	4	3
SEPTEMBER 1983	96	119	18	12	29	5	9	4	26
OCTOBER 1983	8	56	26	15	9	1	10	2	13
NOVEMBER 1983	31	52	21	15	2	2	14	15	0
DECEMBER 1983	28	17	0	8	9	0	2	18	0
JANUARY 1984	0	0	0	0	0	0	0	1	0
FEBRUARY 1984	5	4	0	0	0	0	1	0	0
MARCH 1984	18	9	2	18	5	0	9	11	11
APRIL 1984	4	0	0	17	0	0	3	5	2
MAY 1984	19	44	13	14	7	11	1	2	5
TOTAL NUMBER OVER ALL DATES	459	755	120	115	97	26	238	69	84

TABLE VII-6
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
CYNOSCION NEBULOSUS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JULY 1983	0	3	3	0	0	0	0	0	1
AUGUST 1983	1	0	0	0	0	0	3	6	8
SEPTEMBER 1983	3	4	0	1	0	0	2	1	2
OCTOBER 1983	0	0	0	0	0	0	0	2	0
DECEMBER 1983	0	0	0	1	0	0	0	0	0
JANUARY 1984	0	0	1	1	0	0	0	0	1
FEBRUARY 1984	0	0	0	1	0	0	0	0	0
MAY 1984	25	15	110	4	52	0	1	0	0
TOTAL NUMBER OVER ALL DATES	29	22	114	8	52	0	6	9	12

TABLE VII-7
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
LEIOSTOMUS XANTHURUS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	338	12	20	0	0	0	0	3	10
JULY 1983	208	34	24	0	1	3	1	4	2
AUGUST 1983	136	112	4	40	9	10	0	0	0
SEPTEMBER 1983	137	63	50	17	7	6	0	1	1
OCTOBER 1983	48	56	2	7	1	2	1	2	0
NOVEMBER 1983	20	42	12	7	0	1	0	0	0
DECEMBER 1983	20	27	9	3	9	4	0	0	0
FEBRUARY 1984	36	16	0	9	0	1	0	0	0
MARCH 1984	387	5	4	1	0	1	2	0	0
APRIL 1984	74	48	10	502	4	7	57	0	1
MAY 1984	210	240	124	46	63	54	0	48	7
TOTAL NUMBER OVER ALL DATES	1614	655	259	632	94	89	61	58	21

TABLE VII-8
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
PENAEUS DUORARUM

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	53	33	7	15	10	2	2	0	5
JULY 1983	432	127	168	141	128	34	77	22	80
AUGUST 1983	177	199	69	104	56	5	164	106	120
SEPTEMBER 1983	147	53	29	66	10	6	83	32	145
OCTOBER 1983	18	11	12	26	9	3	64	16	39
NOVEMBER 1983	24	13	7	22	2	1	72	5	36
DECEMBER 1983	13	10	4	2	5	2	1	16	26
JANUARY 1984	14	6	2	2	0	0	12	12	9
FEBRUARY 1984	29	38	24	13	11	6	52	22	35
MARCH 1984	43	78	47	33	17	4	81	17	49
APRIL 1984	19	20	39	91	25	9	160	24	32
MAY 1984	29	48	39	8	20	4	21	2	71
TOTAL NUMBER OVER ALL DATES	998	636	447	523	293	76	789	274	647

TABLE VII-9
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
CALLINECTES SAPIDUS

	STATION								
DATE	T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	19	2	0	3	0	0	3	0	1
JULY 1983	2	6	2	5	0	0	1	0	0
AUGUST 1983	16	4	0	1	0	0	1	0	0
SEPTEMBER 1983	10	2	0	0	0	0	0	0	0
OCTOBER 1983	2	1	1	2	0	0	0	0	0
NOVEMBER 1983	3	0	2	2	0	0	0	0	0
DECEMBER 1983	3	2	0	0	0	0	1	1	0
JANUARY 1984	3	3	3	1	2	1	1	1	1
FEBRUARY 1984	1	0	1	1	0	1	1	0	2
MARCH 1984	6	11	5	4	2	0	4	0	2
APRIL 1984	5	18	22	7	10	8	7	21	24
MAY 1984	1	3	1	7	5	2	11	6	24
TOTAL NUMBER OVER ALL DATES	71	52	37	33	19	12	30	29	54

TABLE VII-10
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
MENIPPE MERCENARIA

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JULY 1983	0	0	0	0	0	2	2	0	2
AUGUST 1983	0	0	0	0	0	1	0	1	6
SEPTEMBER 1983	0	0	0	0	0	0	0	0	4
OCTOBER 1983	0	0	0	1	0	0	0	2	1
NOVEMBER 1983	0	0	0	0	0	0	0	1	0
JANUARY 1984	0	0	0	0	0	0	1	0	0
FEBRUARY 1984	0	0	0	0	0	0	0	2	0
MARCH 1984	0	0	0	0	1	0	0	0	1
APRIL 1984	0	0	1	0	0	0	0	0	0
MAY 1984	0	1	0	0	0	0	0	4	1
TOTAL NUMBER OVER ALL DATES	0	1	1	1	1	3	3	10	15

TABLE VII-11
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
LOLLIGUNCULA BREVIS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	0	2	2	1	0	0	0	0	0
JULY 1983	0	0	0	0	0	1	0	1	0
AUGUST 1983	0	0	0	0	0	1	0	0	0
SEPTEMBER 1983	0	0	1	0	0	1	0	0	0
OCTOBER 1983	0	1	0	0	0	1	1	0	0
FEBRUARY 1984	0	0	0	1	0	0	0	1	1
MARCH 1984	0	0	0	15	2	0	7	0	0
MAY 1984	0	0	0	1	0	3	0	0	1
TOTAL NUMBER OVER ALL DATES	0	3	3	18	2	7	8	2	2

TABLE VII-12

FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	1.7	5.4	15.4	15.2	0.3	0.0	1.6	0.0	0.0
JULY 1983	8.2	2.2	2.6	0.0	1.6	0.5	0.0	0.0	0.0
AUGUST 1983	2.6	51.4	16.1	4.7	6.3	0.0	0.0	0.0	2.0
SEPTEMBER 1983	10.4	26.0	3.2	29.9	0.9	0.0	0.0	0.0	0.0
OCTOBER 1983	1.9	10.2	0.0	7.3	0.0	0.0	0.0	0.0	0.0
NOVEMBER 1983	0.0	18.7	1.3	1.4	0.8	0.7	0.0	0.0	0.0
DECEMBER 1983	1.5	1.4	0.0	2.1	0.0	0.0	0.6	3.4	0.0
JANUARY 1984	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FEBRUARY 1984	0.0	4.6	0.0	0.9	0.0	0.0	0.0	0.0	0.0
MARCH 1984	2.5	10.1	12.7	0.0	0.0	0.0	12.8	6.2	1.9
APRIL 1984	0.0	2.1	0.0	3.4	0.0	0.0	4.4	30.5	16.6
MAY 1984	0.0	2.2	0.0	4.1	0.0	18.1	0.0	6.4	5.0
TOTAL BIOMASS OVER ALL DATES	28.8	135.3	51.3	69.0	9.9	19.3	19.4	46.5	25.5

TABLE VII-13

FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
OGCOCEPHALUS RADIATUS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	0.0	87.6	8.0	0.0	445.1	81.2	329.4	0.0	0.0
JULY 1983	0.0	25.0	0.0	23.4	189.5	0.0	458.1	0.0	0.0
AUGUST 1983	0.0	91.4	0.0	0.0	45.9	13.1	64.5	0.0	0.0
SEPTEMBER 1983	0.0	0.0	0.0	0.0	193.5	69.0	48.4	114.0	0.0
OCTOBER 1983	0.0	0.0	0.0	0.0	152.0	9.5	0.0	0.0	137.4
NOVEMBER 1983	160.4	0.0	4.3	181.5	14.7	0.0	0.0	0.0	0.0
DECEMBER 1983	0.0	165.4	0.0	0.0	63.0	17.6	0.0	176.1	0.0
JANUARY 1984	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.7	0.0
FEBRUARY 1984	0.0	172.7	42.0	1.4	0.0	67.2	252.4	0.0	122.3
MARCH 1984	0.0	374.6	0.0	0.0	36.2	141.3	44.6	2.9	2.8
APRIL 1984	0.0	0.0	179.5	0.0	1.9	87.9	173.0	37.9	2.8
MAY 1984	0.0	0.0	90.6	0.0	93.0	136.8	0.0	0.0	2.3
TOTAL BIOMASS OVER ALL DATES	160.4	916.7	324.4	206.3	1234.8	623.6	1370.4	340.6	267.6

TABLE VII-14
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ORTHOPRISTIS CHRYSOPTERA

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	27.4	63.4	0.0	58.5	460.2	147.3	953.2	151.4	1147.1
JULY 1983	102.9	175.2	22.8	18.4	30.0	15.5	366.0	325.5	921.3
AUGUST 1983	145.3	75.9	137.7	0.0	34.1	19.0	111.9	374.9	655.5
SEPTEMBER 1983	195.7	79.2	165.6	0.0	478.1	41.9	272.4	277.6	895.6
OCTOBER 1983	133.3	0.0	37.2	155.3	130.4	245.4	322.7	302.0	980.1
NOVEMBER 1983	29.1	0.0	314.1	62.7	0.0	77.7	94.7	38.8	188.6
DECEMBER 1983	22.2	27.7	0.0	0.0	0.0	104.3	0.0	97.6	36.5
FEBRUARY 1984	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.4	13.7
MARCH 1984	0.0	15.3	0.0	0.0	34.8	64.9	477.7	387.7	1037.4
APRIL 1984	0.0	0.0	50.6	0.0	45.1	119.6	910.8	222.6	753.8
MAY 1984	0.0	0.0	185.7	15.0	41.1	93.2	605.9	505.8	1270.0
TOTAL BIOMASS OVER ALL DATES	655.9	436.7	913.7	309.9	1253.8	926.8	4115.3	2731.3	7899.6

TABLE VII-15

FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
LAGODON RHOMBOIDES

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	268.1	260.4	113.1	10.1	346.8	187.4	0.0	257.2	6941.0
JULY 1983	291.6	528.8	17.9	0.0	2.8	5.2	76.2	15.9	5220.9
AUGUST 1983	80.9	72.3	55.0	0.0	128.1	107.0	194.5	4196.5	4825.1
SEPTEMBER 1983	21.5	160.3	0.0	0.0	412.2	196.6	57.4	107.9	4065.3
OCTOBER 1983	20.1	125.0	78.8	0.0	85.4	0.0	69.5	1979.9	1525.8
NOVEMBER 1983	286.9	22.0	236.5	0.0	29.6	0.0	228.4	189.3	320.8
DECEMBER 1983	170.7	173.2	0.0	40.3	100.3	0.0	62.1	460.6	78.8
JANUARY 1984	13.3	63.3	0.0	59.9	0.0	0.0	0.0	29.5	8.6
FEBRUARY 1984	481.7	78.4	0.0	56.0	29.3	36.7	895.8	969.7	226.3
MARCH 1984	13.7	0.2	0.0	38.2	53.8	106.1	974.2	355.6	5672.6
APRIL 1984	55.0	9.3	19.5	100.0	0.0	143.6	1527.1	121.6	199.6
MAY 1984	437.7	4.6	110.9	57.7	31.4	247.0	1529.6	1333.6	7790.3
TOTAL BIOMASS OVER ALL DATES	[illegible]141.2	1497.9	631.7	362.2	1219.7	1029.6	5614.8	10017.3	36875.1

TABLE VII-16

FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
BAIRDIELLA CHRYSOURA

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	270.0	437.7	134.5	10.4	0.0	0.0	595.7	84.9	655.7
JULY 1983	441.3	350.1	50.9	0.0	148.9	3.2	108.7	6.2	36.3
AUGUST 1983	263.1	517.4	67.9	20.6	198.7	216.0	195.3	15.1	51.4
SEPTEMBER 1983	887.3	1018.4	241.5	141.8	694.9	250.0	78.4	112.2	440.1
OCTOBER 1983	113.6	594.2	461.8	238.0	115.6	51.5	138.3	21.1	273.8
NOVEMBER 1983	507.6	677.5	333.1	245.4	33.7	43.3	218.0	224.4	0.0
DECEMBER 1983	289.6	240.2	0.0	148.1	134.3	0.0	32.0	325.2	0.0
JANUARY 1984	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0
FEBRUARY 1984	50.7	74.7	0.0	0.0	0.0	0.0	25.8	0.0	0.0
MARCH 1984	348.7	159.0	32.1	383.9	103.1	0.0	124.3	185.1	341.3
APRIL 1984	58.6	0.0	0.0	352.6	0.0	0.0	64.0	141.6	30.3
MAY 1984	268.0	204.9	317.0	342.1	211.5	252.1	19.5	47.2	120.2
TOTAL BIOMASS OVER ALL DATES	3498.5	4274.1	1638.8	1882.9	1640.7	816.1	1600.0	1167.7	1949.1

IMAGE EVALUATION
TEST TARGET (MT-3)

150mm

6"

TABLE VII-17
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
CYNOSCION NEBULOSUS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JULY 1983	0.0	5.8	0.9	0.0	0.0	0.0	0.0	0.0	0.3
AUGUST 1983	5.2	0.0	0.0	0.0	0.0	0.0	18.5	5.5	35.3
SEPTEMBER 1983	524.4	159.5	0.0	31.8	0.0	0.0	1.5	75.4	108.7
OCTOBER 1983	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.6	0.0
DECEMBER 1983	0.0	0.0	0.0	81.5	0.0	0.0	0.0	0.0	0.0
JANUARY 1984	0.0	0.0	213.5	22.9	0.0	0.0	0.0	0.0	67.7
FEBRUARY 1984	0.0	0.0	0.0	45.3	0.0	0.0	0.0	0.0	0.0
MAY 1984	88.9	6.7	45.4	2.3	25.0	0.0	0.9	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	618.5	172.0	259.8	1C3.8	25.0	0.0	20.9	133.5	212.0

TABLE VII-18
FISHERIES TRAWL SAMPLING COLLECTIONS.
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
LEIOSTOMUS XANTHURUS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	2888.2	314.4	578.4	0.0	0.0	0.0	0.0	107.6	371.4
JULY 1983	2711.4	944.2	1005.9	0.0	32.4	108.2	33.1	185.2	100.1
AUGUST 1983	2038.5	3390.1	161.8	1688.6	463.4	644.3	0.0	0.0	0.0
SEPTEMBER 1983	2781.8	2502.0	2424.5	625.3	304.2	264.5	0.0	34.2	32.6
OCTOBER 1983	1171.5	2256.4	116.3	399.2	47.8	90.2	54.1	71.0	0.0
NOVEMBER 1983	584.3	1499.8	462.3	271.2	0.0	47.0	0.0	0.0	0.0
DECEMBER 1983	478.9	643.5	252.5	120.5	277.0	169.5	0.0	0.0	0.0
FEBRUARY 1984	153.2	81.1	0.0	3.2	0.0	0.1	0.0	0.0	0.0
MARCH 1984	1051.4	14.3	129.3	3.2	0.0	36.3	47.8	0.0	0.0
APRIL 1984	330.4	200.8	162.4	3124.8	24.6	200.9	288.5	0.0	93.9
MAY 1984	948.2	1519.2	1319.3	437.2	782.2	826.1	0.0	521.8	107.8
TOTAL BIOMASS OVER ALL DATES	15137.8	13365.8	6612.7	6673.2	1931.6	2387.1	423.5	919.8	705.8

TABLE VII-19
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
PENAEUS DUORARUM

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	40.6	66.0	56.0	6.9	22.9	9.6	26.0	0.0	44.1
JULY 1983	363.3	139.3	253.2	70.7	82.1	25.6	71.5	23.6	96.3
AUGUST 1983	161.5	377.5	173.1	43.9	67.1	5.4	172.1	137.3	156.9
SEPTEMBER 1983	267.0	219.4	111.4	68.7	14.3	10.5	95.4	112.4	304.8
OCTOBER 1983	77.0	80.0	58.7	39.3	29.7	10.8	150.2	120.8	111.7
NOVEMBER 1983	177.2	111.8	73.9	60.7	8.7	3.0	213.0	27.3	113.0
DECEMBER 1983	66.7	125.6	47.6	3.8	31.5	17.1	10.6	92.5	106.1
JANUARY 1984	82.2	17.9	12.2	13.4	0.0	0.0	30.4	45.9	26.7
FEBRUARY 1984	133.0	204.4	182.2	87.1	45.1	24.8	186.7	118.3	173.4
MARCH 1984	382.3	631.1	381.0	237.4	137.4	37.4	339.1	122.5	305.3
APRIL 1984	166.6	133.2	299.1	803.8	222.8	88.2	575.6	179.1	174.2
MAY 1984	217.7	348.2	258.5	41.3	159.6	37.0	79.9	5.5	304.6
TOTAL BIOMASS OVER ALL DATES	2135.1	2454.4	1906.9	1477.0	821.2	269.4	1950.5	985.2	1917.1

TABLE VII-20
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
CALLINECTES SAPIDUS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	1133.6	82.4	0.0	98.7	0.0	0.0	247.7	0.0	120.7
JULY 1983	66.4	358.5	70.4	149.2	0.0	0.0	30.9	0.0	0.0
AUGUST 1983	183.8	131.6	0.0	57.0	0.0	0.0	26.2	0.0	0.0
SEPTEMBER 1983	172.3	40.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OCTOBER 1983	261.4	61.1	5.4	61.9	0.0	0.0	0.0	0.0	0.0
NOVEMBER 1983	30.8	0.0	349.2	41.4	0.0	0.0	0.0	0.0	0.0
DECEMBER 1983	506.4	23.9	54.2	0.0	0.0	0.0	43.5	16.7	0.0
JANUARY 1984	10.6	2.3	98.8	94.8	64.6	4.5	37.2	1.2	2.6
FEBRUARY 1984	57.9	0.0	71.5	13.8	0.0	1.1	140.0	0.0	248.0
MARCH 1984	194.4	97.6	111.0	25.0	76.2	0.0	200.9	0.0	193.2
APRIL 1984	52.0	206.2	308.1	32.2	229.8	159.2	172.4	477.6	520.2
MAY 1984	22.2	112.0	13.6	391.6	325.8	75.7	584.5	104.6	613.5
TOTAL BIOMASS OVER ALL DATES	2691.8	1115.8	1082.2	965.6	696.4	240.5	1483.3	600.1	1698.2

TABLE VII-21
FISHERIES TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
MENIPPE MERCENARIA

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JULY 1983	0.0	0.0	0.0	0.0	0.0	72.2	115.6	0.0	37:1
AUGUST 1983	0.0	0.0	0.0	0.0	0.0	152.0	0.0	0.1	6.4
SEPTEMBER 1983	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3
OCTOBER 1983	0.0	0.0	0.0	30.0	0.0	0.0	0.0	14.7	0.4
NOVEMBER 1983	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
JANUARY 1984	0.0	0.0	0.0	0.0	0.0	0.0	88.7	0.0	0.0
FEBRUARY 1984	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.8	0.0
MARCH 1984	0.0	0.0	0.0	0.0	166.2	0.0	0.0	0.0	0.7
APRIL 1984	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0
MAY 1984	0.0	0.8	0.0	0.0	0.0	0.0	0.0	31.8	0.8
TOTAL BIOMASS OVER ALL DATES	0.0	0.8	3.9	30.0	166.2	224.2	204.3	86.8	49.7

TABLE VII-22

FISHERIES TRAWL SAMPLING COLLECTIONS

TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR

LOLLIGUNCULA BREVIS

DATE	STATION T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	0.0	2.7	1.0	1.5	0.0	0.0	0.0	0.0	0.0
JULY 1983	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.6	0.0
AUGUST 1983	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
SEPTEMBER 1983	0.0	0.0	69.4	0.0	0.0	0.1	0.0	0.0	0.0
OCTOBER 1983	0.0	0.6	0.0	0.0	0.0	0.4	2.8	0.0	0.0
FEBRUARY 1984	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.5	0.3
MARCH 1984	0.0	0.0	0.0	62.0	31.2	0.0	25.5	0.0	0.0
MAY 1984	0.0	0.0	0.0	0.6	0.0	26.1	0.0	0.0	1.5
TOTAL BIOMASS OVER ALL DATES	0.0	3.3	70.4	67.1	31.2	30.0	28.3	1.1	1.8

TABLE VII-23

SPECIES DIVERSITY, EVENNESS AND RICHNESS

FOR TRAWL SAMPLING

		STATIONS								
		T1	T2	T3	T4	T5	T6	T7	T8	T9
JUNE 1983	DIVERSITY	1.4874	2.0214	2.6830	2.0498	2.9416	2.7568	2.462	2.7342	1.5755
	EVENNESS	0.4812	0.6066	0.8442	0.6631	0.8488	0.9202	.7311	0.8846	0.4894
	RICHNESS	22	28	24	22	32	20	29	22	25
JULY 1983	DIVERSITY	1.6753	2.3670	2.4250	1.6104	1.8539	2.3530	2.547	2.3796	2.1140
	EVENNESS	0.5028	0.6605	0.6767	0.5572	0.5506	0.7139	.7348	0.7488	0.5855
	RICHNESS	28	36	36	18	29	27	32	24	37
AUGUST 1983	DIVERSITY	2.0847	2.3636	2.5125	1.3694	2.4760	2.6698	2.327	2.0476	2.1463
	EVENNESS	0.6129	0.6760	0.7805	0.4939	0.7512	0.8012	.6544	0.6285	0.5858
	RICHNESS	30	33	25	16	27	28	35	26	39
SEPTEMBER 1983	DIVERSITY	2.1487	2.5411	2.5927	2.0039	2.3693	2.7705	2.674	2.3390	2.3051
	EVENNESS	0.6519	0.7546	0.7781	0.6582	0.8047	0.8963	.7521	0.7567	0.6713
	RICHNESS	27	29	28	21	19	22	35	22	31
OCTOBER 1983	DIVERSITY	2.0289	2.3445	2.5102	2.2537	2.7292	2.6340	2.424	2.4049	2.3785
	EVENNESS	0.6773	0.7196	0.7705	0.7291	0.8190	0.8651	.6873	0.7142	0.7064
	RICHNESS	20	26	26	22	28	21	34	29	29
NOVEMBER 1983	DIVERSITY	2.3598	2.1824	2.6489	2.0768	2.6412	2.4250	2.466	2.2212	2.4586
	EVENNESS	0.7634	0.7168	0.8229	0.7185	0.8817	0.8746	.7400	0.8011	0.7736
	RICHNESS	22	21	25	18	20	16	28	16	24

SPECIES DIVERSITY, EVENNESS AND RICHNESS

FOR TRAWL SAMPLING

		STATIONS								
		T1	T2	T3	T4	T5	T6	T7	T8	T9
DECEMBER 1983	DIVERSITY	2.3748	2.4055	2.5268	0.6130	2.5898	2.5235	2.469	2.4676	2.2897
	EVENNESS	0.7927	0.7569	0.8742	0.2790	0.8645	0.8289	.8906	0.7666	0.7521
	RICHNESS	20	24	18	9	20	21	16	25	21
JANUARY 1984	DIVERSITY	2.1663	2.6431	2.1371	1.9163	1.9640	2.4049	2.734	2.7264	2.1920
	EVENNESS	0.8208	0.8551	0.8332	0.8323	0.8938	0.8881	.8390	0.8097	0.6728
	RICHNESS	14	22	13	10	9	15	26	29	26
FEBRUARY 1984	DIVERSITY	2.1159	2.5015	1.7600	2.3337	2.3302	2.5968	2.78	2.7608	2.5216
	EVENNESS	0.7321	0.8093	0.6862	0.8237	0.8605	0.8819	.7537	0.8040	0.7651
	RICHNESS	18	22	13	17	15	19	40	31	27
MARCH 1984	DIVERSITY	0.9895	2.5317	2.2616	2.4014	2.4984	2.8425	2.952	2.7324	2.0990
	EVENNESS	0.3250	0.7179	0.7213	0.8016	0.8485	0.9336	.7509	0.8200	0.5857
	RICHNESS	21	34	23	20	19	21	51	28	36
APRIL 1984	DIVERSITY	1.6778	2.2597	2.1269	0.8978	2.1329	2.6285	1.953	2.5798	3.0923
	EVENNESS	0.5922	0.7543	0.7507	0.3169	0.7528	0.8927	.5539	0.7918	0.8077
	RICHNESS	17	20	17	17	17	19	34	26	46
MAY 1984	DIVERSITY	1.2927	1.4318	1.6644	2.1132	2.1935	2.0788	1.555	1.8615	1.6266
	EVENNESS	0.5614	0.4703	0.5758	0.7311	0.6583	0.6828	.4894	0.6322	0.4575
	RICHNESS	10	21	18	18	28	21	24	19	35

TABLE VII-24
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION S1	S2	S3	S4
JUNE 1983	0	2	0	52
JULY 1983	0	94	41	0
AUGUST 1983	59	2	1	0
SEPTEMBER 1983	10	1456	190	0
OCTOBER 1983	0	0	244	14
NOVEMBER 1983	0	1	0	0
DECEMBER 1983	2	0	0	0
MARCH 1984	2	24	0	0
MAY 1984	274	0	1	1
TOTAL NUMBER OVER ALL DATES	347	1579	477	67

TABLE VII-25

FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
OGCOCEPHALUS RADIATUS

DATE	STATION S1	S2	S3	S4
OCTOBER 1983	1	0	0	0
NOVEMBER 1983	2	0	1	0
FEBRUARY 1984	2	0	0	0
MARCH 1984	3	0	0	0
APRIL 1984	1	0	0	0
TOTAL NUMBER OVER ALL DATES	9	0	1	0

TABLE VII-26

FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
ORTHOPRISTIS CHRYSOPTERA

DATE	STATION S1	S2	S3	S4
MAY 1984	6	0	2	0
TOTAL NUMBER OVER ALL DATES	6	0	2	0

TABLE VII-27
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
LAGODON RHOMBOIDES

DATE	STATION S1	S2	S3	S4
JUNE 1983	0	1	0	29
JULY 1983	12	0	0	11
AUGUST 1983	2	0	0	7
SEPTEMBER 1983	3	0	0	14
OCTOBER 1983	0	0	0	6
NOVEMBER 1983	4	0	0	19
DECEMBER 1983	4	0	1	0
FEBRUARY 1984	87	32	27	1
MARCH 1984	346	5	3	20
APRIL 1984	15	4	0	6
MAY 1984	1	0	0	17
TOTAL NUMBER OVER ALL DATES	474	42	31	130

TABLE VII-28

FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
BAIRDIELLA CHRYSOURA

DATE	STATION S1	S2	S3	S4
JUNE 1983	1	0	0	0
MAY 1984	15	0	0	0
TOTAL NUMBER OVER ALL DATES	16	0	0	0

TABLE VII-29

FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
LEIOSTOMUS XANTHURUS

DATE	STATION S1	S2	S3	S4
JUNE 1983	0	0	0	2
AUGUST 1983	0	0	0	1
NOVEMBER 1983	0	0	0	2
FEBRUARY 1984	2400	23	33	46
MARCH 1984	1101	134	0	0
MAY 1984	0	0	0	26
TOTAL NUMBER OVER ALL DATES	3501	157	33	77

TABLE VII-30
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
SCIAENOPS OCELLATUS

	STATION			
DATE	S1	S2	S3	S4
DECEMBER 1983	0	0	1	0
TOTAL NUMBER OVER ALL DATES	0	0	1	0

TABLE VII-31
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
MUGIL CEPHALUS

DATE	STATION S1	S2	S3	S4
JUNE 1983	1	0	0	3
JULY 1983	0	0	1	5
AUGUST 1983	17	1	0	0
SEPTEMBER 1983	0	0	24	0
OCTOBER 1983	2	1	0	58
NOVEMBER 1983	1	1	27	0
DECEMBER 1983	0	0	0	3
JANUARY 1984	0	1	0	1
FEBRUARY 1984	187	0	0	0
MARCH 1984	6	0	0	0
APRIL 1984	0	0	6	0
MAY 1984	2	0	3	0
TOTAL NUMBER OVER ALL DATES	216	4	61	70

TABLE VII 32
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
PENAEUS DUORARUM

DATE	STATION S1	S2	S3	S4
AUGUST 1983	0	0	1	0
TOTAL NUMBER OVER ALL DATES	0	0	1	0

TABLE VII-33
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
CALLINECTES SAPIDUS

DATE	STATION S1	S2	S3	S4
JUNE 1983	0	0	0	1
AUGUST 1983	0	0	0	1
OCTOBER 1983	1	0	2	0
NOVEMBER 1983	0	0	0	3
DECEMBER 1983	0	0	1	1
FEBRUARY 1984	0	0	1	0
APRIL 1984	2	1	0	1
MAY 1984	1	0	2	4
TOTAL NUMBER OVER ALL DATES	4	1	6	11

TABLE VII-34
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
MENIPPE MERCENARIA

DATE	STATION S1	S2	S3	S4
APRIL 1984	1	0	0	0
TOTAL NUMBER OVER ALL DATES	1	0	0	0

TABLE VII-35

FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION S1	S2	S3	S4
JUNE 1983	0.0	0.1	0.0	14.5
JULY 1983	0.0	4.6	15.0	0.0
AUGUST 1983	19.0	0.3	0.2	0.0
SEPTEMBER 1983	0.6	133.3	16.6	0.0
OCTOBER 1983	0.0	0.0	9.7	5.9
NOVEMBER 1983	0.0	0.3	0.0	0.0
DECEMBER 1983	0.6	0.0	0.0	0.0
MARCH 1984	0.5	10.6	0.0	0.0
MAY 1984	44.8	0.0	0.3	0.3
TOTAL BIOMASS OVER ALL DATES	65.5	149.2	41.8	20.7

TABLE VII-36

FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
OGCOCEPHALUS RADIATUS

DATE	STATION S1	S2	S3	S4
OCTOBER 1983	40.0	0.0	0.0	0.0
NOVEMBER 1983	216.6	0.0	93.9	0.0
FEBRUARY 1984	135.9	0.0	0.0	0.0
MARCH 1984	193.3	0.0	0.0	0.0
APRIL 1984	44.7	0.0	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	630.5	0.0	93.9	0.0

TABLE VII-37
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ORTHOPRISTIS CHRYSOPTERA

DATE	STATION S1	S2	S3	S4
MAY 1984	0.8	0.0	1.1	0.0
TOTAL BIOMASS OVER ALL DATES	0.8	0.0	1.1	0.0

TABLE VII-38
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
LAGODON RHOMBOIDES

DATE	STATION S1	S2	S3	S4
JUNE 1983	0.0	2.7	0.0	366.8
JULY 1983	148.3	0.0	0.0	82.9
AUGUST 1983	133.1	0.0	0.0	58.5
SEPTEMBER 1983	89.7	0.0	0.0	109.2
OCTOBER 1983	0.0	0.0	0.0	57.6
NOVEMBER 1983	105.5	0.0	0.0	223.3
DECEMBER 1983	89.4	0.0	20.1	0.0
FEBRUARY 1984	11.4	5.6	1.6	14.4
MARCH 1984	67.7	3.9	1.2	148.9
APRIL 1984	607.5	6.8	0.0	40.1
MAY 1984	51.4	0.0	0.0	53.7
TOTAL BIOMASS OVER ALL DATES	1304.0	19.0	22.9	1155.4

TABLE VII-39

FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
BAIRDIELLA CHRYSOURA

DATE	STATION S1	S2	S3	S4
JUNE 1983	0.3	0.0	0.0	0.0
MAY 1984	1.9	0.0	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	2.2	0.0	0.0	0.0

TABLE VII-40
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
LEIOSTOMUS XANTHURUS

DATE	STATION S1	S2	S3	S4
JUNE 1983	0.0	0.0	0.0	70.9
AUGUST 1983	0.0	0.0	0.0	7.4
NOVEMBER 1983	0.0	0.0	0.0	19.2
FEBRUARY 1984	168.0	1.3	2.0	3.3
MARCH 1984	203.2	27.8	0.0	0.0
MAY 1984	0.0	0.0	0.0	64.8
TOTAL BIOMASS OVER ALL DATES	371.2	29.1	2.0	165.6

TABLE VII-41
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
SCIAENOPS OCELLATUS

DATE	STATION S1	S2	S3	S4
DECEMBER 1983	0.0	0.0	484.4	0.0
TOTAL BIOMASS OVER ALL DATES	0.0	0.0	484.4	0.0

TABLE VII-42
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
MUGIL CEPHALUS

DATE	STATION S1	S2	S3	S4
JUNE 1983	0.2	0.0	0.0	168.0
JULY 1983	0.0	0.0	351.6	414.3
AUGUST 1983	141.8	133.8	0.0	0.0
SEPTEMBER 1983	0.0	0.0	543.3	0.0
OCTOBER 1983	36.6	0.1	0.0	6.2
NOVEMBER 1983	112.9	0.3	1469.0	0.0
DECEMBER 1983	0.0	0.0	0.0	45.3
JANUARY 1984	0.0	320.9	0.0	0.1
FEBRUARY 1984	31.2	0.0	0.0	0.0
MARCH 1984	0.9	0.0	0.0	0.0
APRIL 1984	0.0	0.0	0.5	0.0
MAY 1984	0.3	0.0	307.2	0.0
TOTAL BIOMASS OVER ALL DATES	323.9	455.1	2671.6	633.9

TABLE VII-43
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
PENAEUS DUORARUM

DATE	STATION S1	S2	S3	S4
AUGUST 1983	0.0	0.0	1.5	0.0
TOTAL BIOMASS OVER ALL DATES	0.0	0.0	1.5	0.0

TABLE VII-44
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
CALLINECTES SAPIDUS

DATE	STATION S1	S2	S3	S4
JUNE 1983	0.0	0.0	0.0	144.5
AUGUST 1983	0.0	0.0	0.0	227.4
OCTOBER 1983	56.9	0.0	166.4	0.0
NOVEMBER 1983	0.0	0.0	0.0	11.5
DECEMBER 1983	0.0	0.0	9.1	34.1
FEBRUARY 1984	0.0	0.0	3.5	0.0
APRIL 1984	128.2	51.5	0.0	42.5
MAY 1984	5.4	0.0	146.1	155.8
TOTAL BIOMASS OVER ALL DATES	190.5	51.5	325.1	615.8

TABLE VII-45
FISHERIES SEINE SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
MENIPPE MERCENARIA

DATE	STATION S1	S2	S3	S4
APRIL 1984	0.9	0.0	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	0.9	0.0	0.0	0.0

TABLE VII-46

SPECIES DIVERSITY, EVENNESS AND RICHNESS

FOR SEINE SAMPLING

		STATIONS			
		S1	S2	S3	S4
JUNE 1983	DIVERSITY	0.2639	1.4922	1.0523	1.5763
	EVENNESS	0.1904	0.766[illegible]	0.4789	0.5973
	RICHNESS	4	7	9	14
JULY 1983	DIVERSITY	1.3735	1.4210	1.3863	1.0544
	EVENNESS	0.7058	0.6833	0.6667	0.4579
	RICHNESS	7	8	8	10
AUGUST 1983	DIVERSITY	1.2976	1.6988	2.0359	1.7528
	EVENNESS	0.5059	0.8730	0.7937	0.7612
	RICHNESS	13	7	13	10
SEPTEMBER 1983	DIVERSITY	1.8103	0.0544	1.1670	1.2609
	EVENNESS	0.8239	0.0496	0.5068	0.5739
	RICHNESS	9	3	10	9
OCTOBER 1983	DIVERSITY	0.8812	0.7963	0.7035	1.6394
	EVENNESS	0.4011	0.7248	0.3926	0.7884
	RICHNESS	9	3	6	8
NOVEMBER 1983	DIVERSITY	1.6094	0.6837	0.5819	1.4599
	EVENNESS	0.8982	0.6224	0.4197	0.6644
	RICHNESS	6	3	4	9

SPECIES DIVERSITY, EVENNESS AND RICHNESS

FOR SEINE SAMPLING

		STATIONS			
		S1	S2	S3	S4
DECEMBER 1983	DIVERSITY	1.4898	.	1.6094	2.1093
	EVENNESS	0.9256	.	0.8982	0.8224
	RICHNESS	5	0	6	13
JANUARY 1984	DIVERSITY	.	0.0000	0.5567	1.2592
	EVENNESS	.	.	0.8031	0.6471
	RICHNESS	0	1	2	7
FEBRUARY 1984	DIVERSITY	0.6752	1.1577	1.0089	0.5285
	EVENNESS	0.2558	0.8351	0.5631	0.3812
	RICHNESS	14	4	6	4
MARCH 1984	DIVERSITY	0.8108	0.1981	0.1769	1.1194
	EVENNESS	0.3381	0.1231	0.2552	0.8074
	RICHNESS	11	5	2	4
APRIL 1984	DIVERSITY	1.6384	1.5811	0.8982	1.1822
	EVENNESS	0.7115	0.8125	0.8176	0.8528
	RICHNESS	10	7	3	4
MAY 1984	DIVERSITY	0.8324	0.0000	1.9213	0.9740
	EVENNESS	0.3615	.	0.9240	0.4684
	RICHNESS	10	1	8	8

TABLE VII-47
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION D1	STATION D2
JUNE 1983	1	0
OCTOBER 1983	91	0
FEBRUARY 1984	9	0
MAY 1984	50	0
TOTAL NUMBER OVER ALL DATES	151	0

TABLE VII-48

FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
OGCOCEPHALUS RADIATUS

DATE	STATION D1	STATION D2
APRIL 1984	0	1
TOTAL NUMBER OVER ALL DATES	0	1

TABLE VII-49
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
ORTHOPRISTIS CHRYSOPTERA

DATE	STATION D1	STATION D2
JUNE 1983	2	17
JULY 1983	0	5
AUGUST 1983	0	2
TOTAL NUMBER OVER ALL DATES	2	24

TABLE VII-50

FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
LAGODON RHOMBOIDES

DATE	STATION D1	STATION D2
JUNE 1983	3	38
JULY 1983	1	17
AUGUST 1983	0	8
OCTOBER 1983	0	2
NOVEMBER 1983	0	14
FEBRUARY 1984	63	0
MARCH 1984	6	1
APRIL 1984	3	0
TOTAL NUMBER OVER ALL DATES	76	80

TABLE VII-51
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
BAIRDIELLA CHRYSOURA

DATE	STATION D1	STATION D2
JUNE 1983	0	2
JULY 1983	0	2
AUGUST 1983	0	1
OCTOBER 1983	0	2
TOTAL NUMBER OVER ALL DATES	0	7

TABLE VII-52
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
CYNOSCION NEBULOSUS

DATE	STATION D1	D2
JUNE 1983	2	0
JULY 1983	1	0
MAY 1984	1	0
TOTAL NUMBER OVER ALL DATES	4	0

TABLE VII-53

FISHERIES DROP NET SAMPLING COLLECTIONS

TOTAL NUMBER COLLECTED OVER ALL REPS FOR

LEIOSTOMUS XANTHURUS

DATE	STATION D1	D2
FEBRUARY 1984	1295	4
MARCH 1984	13	4
APRIL 1984	91	0
TOTAL NUMBER OVER ALL DATES	1399	8

TABLE VII-54
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
MUGIL CEPHALUS

DATE	STATION D1	STATION D2
JUNE 1983	0	1
TOTAL NUMBER OVER ALL DATES	0	1

TABLE VII-55
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
PENAEUS DUORARUM

DATE	STATION D1	STATION D2
JUNE 1983	56	21
JULY 1983	3	89
AUGUST 1983	0	69
OCTOBER 1983	0	10
NOVEMBER 1983	12	51
DECEMBER 1983	4	10
JANUARY 1984	0	1
TOTAL NUMBER OVER ALL DATES	75	251

TABLE VII-56
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
CALLINECTES SAPIDUS

DATE	STATION D1	STATION D2
JUNE 1983	1	3
JULY 1983	1	5
AUGUST 1983	0	4
OCTOBER 1983	1	1
NOVEMBER 1983	5	22
DECEMBER 1983	6	0
JANUARY 1984	5	0
FEBRUARY 1984	1	0
MARCH 1984	1	0
TOTAL NUMBER OVER ALL DATES	21	35

TABLE VII-57
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION D1	D2
JUNE 1983	0.1	0.0
OCTOBER 1983	22.2	0.0
FEBRUARY 1984	1.6	0.0
MAY 1984	6.3	0.0
TOTAL BIOMASS OVER ALL DATES	30.2	0.0

TABLE VII-58
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
OGCOCEPHALUS RADIATUS

DATE	STATION D1	STATION D2
APRIL 1984	0.0	66.3
TOTAL BIOMASS OVER ALL DATES	0.0	66.3

TABLE VII-59
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ORTHOPRISTIS CHRYSOPTERA

DATE	STATION D1	D2
JUNE 1983	3.0	35.9
JULY 1983	0.0	23.0
AUGUST 1983	0.0	10.5
TOTAL BIOMASS OVER ALL DATES	3.0	69.4

TABLE VII-60
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
LAGODON RHOMBOIDES

DATE	STATION D1	STATION D2
JUNE 1983	6.3	141.5
JULY 1983	14.1	86.8
AUGUST 1983	0.0	21.2
OCTOBER 1983	0.0	16.2
NOVEMBER 1983	0.0	88.8
FEBRUARY 1984	6.8	0.0
MARCH 1984	0.9	0.1
APRIL 1984	0.6	0.0
TOTAL BIOMASS OVER ALL DATES	28.7	354.6

TABLE VII-61
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
BAIRDIELLA CHRYSOURA

DATE	STATION D1	STATION D2
JUNE 1983	0.0	1.5
JULY 1983	0.0	2.2
AUGUST 1983	0.0	1.8
OCTOBER 1983	0.0	18.3
TOTAL BIOMASS OVER ALL DATES	0.0	23.8

TABLE VII-62
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
CYNOSCION NEBULOSUS

DATE	STATION D1	D2
JUNE 1983	4.2	0.0
JULY 1983	0.1	0.0
MAY 1984	0.1	0.0
TOTAL BIOMASS OVER ALL DATES	4.4	0.0

TABLE VII-63

FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
LEIOSTOMUS XANTHURUS

DATE		STATION D1	STATION D2
FEBRUARY 1984		250.2	0.4
MARCH 1984		2.0	1.5
APRIL 1984		13.7	0.0
	TOTAL BIOMASS OVER ALL DATES	265.9	1.9

TABLE VII-64

FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
MUGIL CEPHALUS

DATE	STATION D1	STATION D2
JUNE 1983	0.0	0.2
TOTAL BIOMASS OVER ALL DATES	0.0	0.2

TABLE VII-65
FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
PENAEUS DUORARUM

DATE	STATION D1	STATION D2
JUNE 1983	29.6	2.4
JULY 1983	0.8	14.7
AUGUST 1983	0.0	94.4
OCTOBER 1983	0.0	7.8
NOVEMBER 1983	3.9	24.2
DECEMBER 1983	1.8	2.8
JANUARY 1984	0.0	0.2
TOTAL BIOMASS OVER ALL DATES	36.1	146.5

TABLE VII-66

FISHERIES DROP NET SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
CALLINECTES SAPIDUS

DATE	STATION D1	D2
JUNE 1983	133.3	26.2
JULY 1983	0.5	72.4
AUGUST 1983	0.0	21.6
OCTOBER 1983	54.3	81.1
NOVEMBER 1983	0.9	31.8
DECEMBER 1983	1.5	0.0
JANUARY 1984	15.7	0.0
FEBRUARY 1984	0.3	0.0
MARCH 1984	0.4	0.0
TOTAL BIOMASS OVER ALL DATES	206.9	233.1

SPECIES DIVERSITY, EVENNESS AND RICHNESS

FOR DROP NET SAMPLING

		STATIONS D1	D2
DECEMBER 1983	DIVERSITY	1.0892	2.0925
	EVENNESS	0.7857	0.6873
	RICHNESS	4	21
JANUARY 1984	DIVERSITY	1.7914	1.7452
	EVENNESS	0.9206	0.7278
	RICHNESS	7	11
FEBRUARY 1984	DIVERSITY	0.3735	0.9650
	EVENNESS	0.2084	0.8783
	RICHNESS	6	3
MARCH 1984	DIVERSITY	0.8606	0.8877
	EVENNESS	0.6208	0.8080
	RICHNESS	4	3
APRIL 1984	DIVERSITY	0.8255	0.0000
	EVENNESS	0.4607	.
	RICHNESS	6	1
MAY 1984	DIVERSITY	0.3057	0.6931
	EVENNESS	0.2783	1.0000
	RICHNESS	3	2

TABLE VII-67

SPECIES DIVERSITY, EVENNESS AND RICHNESS

FOR DROP NET SAMPLING

		STATIONS	
		D1	D2
JUNE 1983	DIVERSITY	1.7839	2.0808
	EVENNESS	0.6759	0.6244
	RICHNESS	14	28
JULY 1983	DIVERSITY	0.8928	1.7059
	EVENNESS	0.3877	0.5603
	RICHNESS	10	21
AUGUST 1983	DIVERSITY	.	1.5227
	EVENNESS	.	0.5770
	RICHNESS	0	14
SEPTEMBER 1983	DIVERSITY	0.0000	0.0000
	EVENNESS	.	.
	RICHNESS	1	1
OCTOBER 1983	DIVERSITY	0.8413	2.0550
	EVENNESS	0.4323	0.7588
	RICHNESS	7	15
NOVEMBER 1983	DIVERSITY	0.6665	2.2244
	EVENNESS	0.2894	0.6606
	RICHNESS	10	29

TABLE VII-68
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION TC1	TC2	TC3	TC4
SEPTEMBER 1983	0	1	0	0
NOVEMBER 1983	118	0	0	0
TOTAL NUMBER OVER ALL DATES	118	1	0	0

TABLE VII-69

FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
ORTHOPRISTIS CHRYSOPTERA

DATE	STATION TC1	TC2	TC3	TC4
JULY 1983	0	1	2	0
SEPTEMBER 1983	0	0	0	1
MAY 1984	14	4	7	0
TOTAL NUMBER OVER ALL DATES	14	5	9	1

TABLE VII-71
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
LAGODON RHOMBOIDES

DATE	STATION TC1	TC2	TC3	TC4
JULY 1983	12	4	14	0
AUGUST 1983	3	0	0	3
SEPTEMBER 1983	1	5	8	1
OCTOBER 1983	0	14	0	1
NOVEMBER 1983	2	1	1	0
DECEMBER 1983	0	7	6	1
JANUARY 1984	7	374	144	42
FEBRUARY 1984	424	425	22	4
MARCH 1984	383	1390	190	273
APRIL 1984	41	312	133	22
MAY 1984	137	882	123	24
TOTAL NUMBER OVER ALL DATES	1016	3414	641	371

TABLE VII-70

FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
BAIRDIELLA CHRYSOURA

DATE	STATION TC1	TC2	TC3	TC4
JULY 1983	0	3	0	0
AUGUST 1983	2	0	0	0
SEPTEMBER 1983	0	0	6	0
MAY 1984	220	1	1	0
TOTAL NUMBER OVER ALL DATES	222	4	7	0

TABLE VII-72
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
CYNOSCION NEBULOSUS

DATE	STATION TC1	TC2	TC3	TC4
JULY 1983	2	0	0	0
AUGUST 1983	1	0	0	0
SEPTEMBER 1983	1	4	0	0
OCTOBER 1983	0	1	0	0
NOVEMBER 1983	0	2	0	0
MAY 1984	3	0	0	0
TOTAL NUMBER OVER ALL DATES	7	7	0	0

TABLE VII-73

FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
LEIOSTOMUS XANTHURUS

DATE	STATION TC1	TC2	TC3	TC4
NOVEMBER 1983	0	0	46	0
FEBRUARY [illegible]	421	137	110	42
MARCH 1984	26	505	201	145
APRIL 1984	3	10	67	1
MAY 1984	0	1	0	0
TOTAL NUMBER OVER ALL DATES	450	653	424	188

TABLE VII-74
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
MUGIL CEPHALUS

DATE	STATION TC1	TC2	TC3	TC4
APRIL 1984	0	1	0	0
TOTAL NUMBER OVER ALL DATES	0	1	0	0

TABLE VII-75
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
PENAEUS DUORARUM

DATE	STATION TC1	TC2	TC3	TC4
JULY 1983	6	0	0	0
AUGUST 1983	20	2	2	1
SEPTEMBER 1983	2	65	1	2
OCTOBER 1983	1	44	8	2
NOVEMBER 1983	15	16	0	0
DECEMBER 1983	1	46	1	3
JANUARY 1984	2	22	3	7
FEBRUARY 1984	11	15	4	0
MARCH 1984	4	1	3	4
APRIL 1984	0	0	3	2
MAY 1984	0	1	0	0
TOTAL NUMBER OVER ALL DATES	62	212	25	21

TABLE VII-76
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL NUMBER COLLECTED OVER ALL REPS FOR
CALLINECTES SAPIDUS

DATE	STATION TC1	TC2	TC3	TC4
JULY 1983	0	0	2	0
AUGUST 1983	1	0	0	1
SEPTEMBER 1983	0	2	1	1
OCTOBER 1983	1	2	1	0
NOVEMBER 1983	9	10	1	1
DECEMBER 1983	4	8	0	1
JANUARY 1984	69	25	7	8
FEBRUARY 1984	54	66	5	0
MARCH 1984	23	3	0	1
APRIL 1984	2	7	2	0
MAY 1984	3	5	0	0
TOTAL NUMBER OVER ALL DATES	166	128	19	13

TABLE VII-77

FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION			
	TC1	TC2	TC3	T4
SEPTEMBER 1983	0.0	0.1	0.0	0.0
NOVEMBER 1983	11.5	0.0	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	11.5	0.1	0.0	0.0

TABLE VII-77

FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ANCHOA MITCHILLI

DATE	STATION TC1	TC2	TC3	T4
SEPTEMBER 1983	0.0	0.1	0.0	0.0
NOVEMBER 1983	11.5	0.0	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	11.5	0.1	0.0	0.0

TABLE VII-78
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
ORTHOPRISTIS CHRYSOPTERA

DATE	STATION TC1	TC2	TC3	T4
JULY 1983	0.0	8.5	125.0	0.0
SEPTEMBER 1983	0.0	0.0	0.0	81.2
MAY 1984	7.0	1.4	5.0	0.0
TOTAL BIOMASS OVER ALL DATES	7.0	9.9	130.0	81.2

TABLE VII-79

FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
LAGODON RHOMBOIDES

DATE	STATION TC1	TC2	TC3	T4
JULY 1983	101.6	17.4	62.7	0.0
AUGUST 1983	47.1	0.0	0.0	42.0
SEPTEMBER 1983	15.8	35.6	109.8	22.5
OCTOBER 1983	0.0	114.8	0.0	11.4
NOVEMBER 1983	29.0	11.3	1.7	0.0
DECEMBER 1983	0.0	73.3	68.4	9.3
JANUARY 1984	0.7	34.6	8.0	2.1
FEBRUARY 1984	64.8	137.3	18.1	0.6
MARCH 1984	203.3	348.6	115.9	87.6
APRIL 1984	23.7	230.7	86.9	28.0
MAY 1984	189.6	1880.2	106.1	44.5
TOTAL BIOMASS OVER ALL DATES	675.6	2883.8	577.6	248.0

TABLE VII-80
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
BAIRDIELLA CHRYSOURA

DATE	STATION			
	TC1	TC2	TC3	T4
JULY 1983	0.0	6.2	0.0	0.0
AUGUST 1983	1.6	0.0	0.0	0.0
SEPTEMBER 1983	0.0	0.0	92.7	0.0
MAY 1984	41.3	0.2	0.2	0.0
TOTAL BIOMASS OVER ALL DATES	42.9	6.4	92.9	0.0

TABLE VII-81
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
CYNOSCION NEBULOSUS

DATE	STATION TC1	TC2	TC3	T4
JULY 1983	0.4	0.0	0.0	0.0
AUGUST 1983	3.0	0.0	0.0	0.0
SEPTEMBER 1983	1.0	11.1	0.0	0.0
OCTOBER 1983	0.0	3.7	0.0	0.0
NOVEMBER 1983	0.0	21.3	0.0	0.0
MAY 1984	0.4	0.0	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	4.8	42.1	0.0	0.0

TABLE VII-82
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
LEIOSTOMUS XANTHURUS

DATE	STATION TC1	TC2	TC3	T4
NOVEMBER 1983	0.0	0.0	794.3	0.0
FEBRUARY 1984	56.0	72.2	37.1	8.3
MARCH 1984	11.5	98.7	300.9	123.3
APRIL 1984	3.9	14.2	139.8	0.9
MAY 1984	0.0	2.0	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	71.4	187.1	1272.1	132.5

TABLE VII-83

FISHERIFS CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
MUGIL CEPHALUS

	STATION			
DATE	TC1	TC2	TC3	T4
APRIL 1984	0.0	0.1	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	0.0	0.1	0.0	0.0

TABLE VII-84

FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
PENAEUS DUORARUM

DATE	STATION TC1	TC2	TC3	T4
JULY 1983	1.5	0.0	0.0	0.0
AUGUST 1983	9.1	1.4	0.8	0.5
SEPTEMBER 1983	1.3	33.7	0.6	1.7
OCTOBER 1983	0.8	25.1	14.3	3.7
NOVEMBER 1983	6.8	9.6	0.0	0.0
DECEMBER 1983	0.6	32.4	2.3	3.6
JANUARY 1984	3.1	14.2	1.3	6.3
FEBRUARY 1984	26.3	16.2	6.5	0.0
MARCH 1984	16.0	1.3	5.4	17.5
APRIL 1984	0.0	0.0	10.7	6.6
MAY 1984	0.0	4.7	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	65.5	138.6	41.9	39.9

TABLE VII-85
FISHERIES CREEK TRAWL SAMPLING COLLECTIONS
TOTAL BIOMASS (IN GRAMS) OVER ALL REPS FOR
CALLINECTES SAPIDUS

DATE	STATION TC1	TC2	TC3	T4
JULY 1983	0.0	0.0	382.8	0.0
AUGUST 1983	9.2	0.0	0.0	185.0
SEPTEMBER 1983	0.0	87.7	1.9	203.5
OCTOBER 1983	11.3	131.5	0.6	0.0
NOVEMBER 1983	529.3	177.1	0.1	280.3
DECEMBER 1983	34.8	85.7	0.0	120.8
JANUARY 1984	195.2	21.5	28.4	5.9
FEBRUARY 1984	587.5	68.6	22.7	0.0
MARCH 1984	74.0	3.3	0.0	2.4
APRIL 1984	21.0	7.0	24.9	0.0
MAY 1984	88.1	190.8	0.0	0.0
TOTAL BIOMASS OVER ALL DATES	1550.4	773.2	461.4	797.9

TABLE VII-86

SPECIES DIVERSITY, EVENNESS AND RICHNESS

FOR CREEK TRAWL SAMPLING

		STATIONS			
		TC1	TC2	TC3	TC4
JULY 1983	DIVERSITY	1.6657	0.4451	0.6596	1.1075
	EVENNESS	0.6312	0.2141	0.3172	0.6181
	RICHNESS	14	8	8	6
AUGUST 1983	DIVERSITY	1.6178	0.6317	0.9340	2.0771
	EVENNESS	0.6130	0.4557	0.4800	0.9021
	RICHNESS	14	4	7	10
SEPTEMBER 1983	DIVERSITY	1.5868	1.5733	1.5475	2.3420
	EVENNESS	0.6891	0.6331	0.7043	0.9767
	RICHNESS	10	12	9	11
OCTOBER 1983	DIVERSITY	0.7937	1.5634	0.9240	1.9551
	EVENNESS	0.5726	0.6790	0.4444	0.8898
	RICHNESS	4	10	8	9
NOVEMBER 1983	DIVERSITY	1.5789	1.5115	1.2293	1.0986
	EVENNESS	0.5830	0.5229	0.4793	1.0000
	RICHNESS	15	18	13	3
DECEMBER 1983	DIVERSITY	1.4168	0.9065	1.7931	1.9356
	EVENNESS	0.6153	0.3079	0.8623	0.9308
	RICHNESS	10	19	8	8

SPECIES DIVERSITY, EVENNESS AND RICHNESS

FOR CREEK TRAWL SAMPLING

		STATIONS			
		TC1	TC2	TC3	TC4
JANUARY 1984	DIVERSITY	1.4910	1.0065	0.6159	1.7966
	EVENNESS	0.6218	0.3814	0.2131	0.7493
	RICHNESS	11	14	18	11
FEBRUARY 1984	DIVERSITY	1.4014	1.5389	1.1982	0.6190
	EVENNESS	0.5310	0.6418	0.5204	0.5634
	RICHNESS	14	11	10	3
MARCH 1984	DIVERSITY	1.3178	1.1267	1.2549	1.2142
	EVENNESS	0.4651	0.4393	0.5450	0.5064
	RICHNESS	17	13	10	11
APRIL 1984	DIVERSITY	1.1681	0.9694	1.1521	1.2784
	EVENNESS	0.5316	0.3779	0.5540	0.5818
	RICHNESS	9	13	8	9
MAY 1984	DIVERSITY	1.4821	0.9209	0.8367	0.8334
	EVENNESS	0.5473	0.3186	0.3808	0.7586
	RICHNESS	15	18	9	3

APPENDIX VIII

THERMOGRAPH DATA

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 01

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	21.4	33.3	30.4
6/18/83	20.5	34.3	28.8
6/25/83	22.7	33.6	31.2
7/ 2/83	23.1	34.1	32.1
7/ 9/83	25.7	34.5	32.5
7/16/83	25.4	35.8	32.4
7/23/83	27.8	34.6	32.7
7/30/83	24.9	33.8	32.2
8/ 6/83	27.4	36.8	33.8
8/13/83	33.8	36.5	35.0
8/20/83	33.5	37.4	35.6
8/27/83	32.4	37.9	35.7
9/ 3/83	32.1	37.4	35.1
9/10/83	29.8	36.4	34.2
9/17/83	31.5	36.8	35.2
9/24/83	31.0	36.2	32.6
10/ 1/83	23.7	32.4	29.4
10/ 8/83	27.0	31.3	28.7
10/15/83	27.7	32.6	29.8
10/22/83	26.4	32.6	29.6
10/29/83	26.5	32.9	30.0
11/ 5/83	26.8	29.6	28.1
11/12/83	22.2	28.5	27.4
11/19/83	22.3	26.4	25.2
11/26/83	19.4	25.9	24.1
12/ 3/83	23.8	26.0	25.0
12/10/83			
12/17/83			
12/24/83	22.2	24.6	23.6
12/31/83	15.5	23.2	18.3
1/ 7/84	15.3	18.8	16.8
1/14/84	17.5	20.5	18.8
1/21/84	15.3	20.7	19.2
1/28/84	16.6	21.2	19.0
2/ 4/84	18.7	21.5	20.2
2/11/84	18.6	20.9	19.7
2/18/84	19.3	23.6	21.7
2/25/84	20.2	25.6	23.0
3/ 3/84	15.4	24.2	19.6
3/10/84	18.2	24.8	22.1
3/17/84	21.7	26.8	24.2
3/24/84	21.2	28.8	26.2
3/31/84	21.2	29.2	26.1
4/ 7/84	19.8	26.3	23.0
4/14/84	20.6	29.1	25.6
4/21/84	21.1	29.7	23.8
4/28/84	26.0	32.3	29.6
5/ 5/84	30.2	34.1	32.5
5/12/84	30.6	35.9	33.2
5/19/84	29.5	34.7	32.3
5/26/84	29.5	34.5	32.4
6/ 2/84	28.6	34.2	31.9
6/ 9/84	29.6	34.9	32.9
6/16/84	32.8	35.5	34.4
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 02

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	20.7	32.6	29.0
6/18/83	20.3	31.9	28.0
6/25/83	21.6	33.4	29.7
7/ 2/83	22.3	34.1	30.4
7/ 9/83	23.6	34.7	31.1
7/16/83	25.2	35.7	31.4
7/23/83	25.6	34.3	31.1
7/30/83	23.2	[illegible]	30.2
8/ 6/83	23.1	40.0	31.8
8/13/83	24.5	36.9	32.4
8/20/83	22.9	39.7	32.9
8/27/83	23.6	38.4	33.1
9/ 3/83	27.0	38.6	33.2
9/10/83	25.5	40.0	33.1
9/17/83	24.2	38.0	30.7
9/24/83	19.0	34.8	28.7
10/ 1/83	19.7	37.2	27.3
10/ 8/83			
10/15/83			
10/22/83			
10/29/83			
11/ 5/83			
11/12/83			
11/19/83			
11/26/83			
12/ 3/83	13.5	29.7	22.9
12/10/83	16.2	31.9	23.5
12/17/83	10.0	25.2	19.8

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	12.8	24.3	20.6
12/31/83			
1/ 7/84			
1/14/84			
1/21/84	10.0	25.9	17.2
1/28/84	10.0	31.1	18.6
2/ 4/84	10.0	25.0	18.0
2/11/84	10.0	30.0	17.4
2/18/84	12.2	31.5	20.8
2/25/84	16.1	32.8	21.7
3/ 3/84			
3/10/84			
3/17/84	14.6	32.2	22.7
3/24/84	14.2	27.8	23.1
3/31/84	12.5	[illegible]	21.8
4/ 7/84	18.4	25.5	22.1
4/14/84	15.4	30.0	24.8
4/21/84	16.0	29.9	21.7
4/28/84	13.9	31.0	26.1
5/ 5/84	22.8	33.6	29.3
5/12/84	20.2	34.7	29.1
5/19/84	19.7	34.1	28.8
5/26/84	18.7	34.7	30.4
6/ 2/84	17.1	35.0	29.0
6/ 9/84	21.4	35.1	30.7
6/16/84	26.1	35.9	32.2
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 03

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	22.4	33.3	30.1
6/18/83	22.7	32.9	29.9
6/25/83	26.8	33.9	31.4
7/ 2/83	27.8	34.7	32.2
7/ 9/83	25.4	34.3	32.4
7/16/83	24.8	34.9	31.9
7/23/83	30.3	34.9	33.0
7/30/83	28.6	34.7	32.4
8/ 6/83	27.2	40.0	33.9
8/13/83	29.5	37.0	34.3
8/20/83	30.8	37.9	35.5
8/27/83	29.2	38.6	34.8
9/ 3/83	30.1	38.9	35.2
9/10/83	30.0	37.1	34.0
9/17/83	29.4	37.4	33.9
9/24/83	27.1	34.4	31.7
10/ 1/83	24.3	33.1	28.6
10/ 8/83	26.0	30.8	28.5
10/15/83	26.4	32.5	29.5
10/22/83	25.0	32.5	29.2
10/29/83	21.6	32.6	28.8
11/ 5/83	22.8	29.9	27.5
11/12/83	21.1	29.2	27.0
11/19/83	18.2	27.2	24.7
11/26/83	19.1	26.4	23.8
12/ 3/83	18.0	26.5	24.4
12/10/83	16.3	27.6	24.3
12/17/83	15.3	24.6	22.5
12/24/83	12.3	23.6	20.9
12/31/83	10.0	19.6	15.4
1/ 7/84	10.1	18.8	15.1
1/14/84	12.2	19.0	16.9
1/21/84	10.5	20.8	17.5
1/28/84	10.1	20.9	18.3
2/ 4/84	11.9	21.1	18.4
2/11/84	13.1	20.8	18.0
2/18/84	15.4	24.1	20.3
2/25/84	16.1	25.4	21.6
3/ 3/84	10.0	23.8	19.1
3/10/84			
3/17/84			
3/24/84			
3/31/84			
4/ 7/84			
4/14/84	19.6	29.5	25.1
4/21/84	18.0	29.0	22.8
4/28/84	19.1	31.2	27.9
5/ 5/84	24.4	33.5	30.5
5/12/84	23.4	35.3	31.3
5/19/84	22.1	33.9	30.0
5/26/84	26.8	34.6	32.0
6/ 2/84	22.2	34.3	30.0
6/ 9/84	26.3	34.6	31.7
6/16/84	30.8	34.0	32.6
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 04

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE	WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	25.6	33.3	30.8	12/24/83	15.6	21.4	19.6
6/18/83	26.3	33.1	30.3	12/31/83			
6/25/83	28.3	33.9	31.9	1/ 7/84			
7/ 2/83	30.2	34.8	32.7	1/14/84			
7/ 9/83	29.8	35.1	33.0	1/21/84	10.0	18.9	16.4
7/16/83	30.3	34.6	32.2	1/28/84	10.0	19.7	17.1
7/23/83	30.8	34.5	32.8	2/ 4/84	11.5	19.6	17.0
7/30/83	29.5	34.0	31.8	2/11/84	10.0	20.8	16.6
8/ 6/83	27.4	36.2	33.1	2/18/84	15.4	22.9	20.3
8/13/83	30.3	36.4	33.4	2/25/84	16.2	23.7	20.5
8/20/83	30.2	38.1	34.5	3/ 3/84	10.0	24.5	16.5
8/27/83	30.7	37.7	34.5	3/10/84	14.2	22.3	18.7
9/ 3/83	32.1	36.5	34.0	3/17/84	16.1	25.6	21.8
9/10/83				3/24/84	18.1	27.5	23.0
9/17/83				3/31/84	14.9	27.0	22.1
9/24/83	24.6	30.8	28.4	4/ 7/84	17.3	24.2	21.0
10/ 1/83	23.8	29.3	26.9	4/14/84	16.6	28.3	23.5
10/ 8/83	25.1	29.4	27.7	4/21/84	16.7	28.3	20.9
10/15/83	25.7	30.0	28.2	4/28/84	19.6	30.0	26.0
10/22/83	24.5	31.9	28.0	5/ 5/84	24.3	32.7	29.1
10/29/83	21.0	30.7	26.3	5/12/84	22.4	34.3	29.7
11/ 5/83	22.9	28.7	25.1	5/19/84	24.2	33.0	28.7
11/12/83	19.3	27.5	24.2	5/26/84	25.6	37.5	30.5
11/19/83	15.1	26.1	22.1	6/ 2/84	20.0	34.3	28.7
11/26/83	19.1	25.1	22.4	6/ 9/84	24.6	34.4	30.2
12/ 3/83	17.1	24.9	22.3	6/16/84	29.9	33.4	31.6
12/10/83	14.8	25.5	21.9	6/23/84			
12/17/83	16.5	22.2	19.8	6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 05

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	21.7	33.9	30.1
6/18/83	21.9	33.3	29.7
6/25/83	26.1	34.3	31.7
7/ 2/83	26.6	35.3	32.4
7/ 9/83	25.3	35.8	31.8
7/16/83	26.4	34.0	31.0
7/23/83	29.7	33.2	31.7
7/30/83	27.2	34.0	30.4
8/ 6/83	25.7	34.5	31.3
8/13/83	27.8	34.5	31.6
8/20/83	29.2	36.1	32.8
8/27/83	28.6	36.4	33.0
9/ 3/83	29.1	36.1	32.4
9/10/83	28.6	35.0	32.2
9/17/83	26.1	34.2	30.7
9/24/83	22.8	31.5	28.1
10/ 1/83	22.8	28.2	25.8
10/ 8/83	24.8	28.5	27.0
10/15/83	24.4	30.2	27.0
10/22/83	23.6	29.7	26.7
10/29/83	19.2	30.2	24.9
11/ 5/83	21.2	26.7	24.4
11/12/83	16.7	26.1	22.8
11/19/83	14.6	25.0	20.6
11/26/83	16.7	24.6	21.4
12/ 3/83	16.5	24.3	21.3
12/10/83	16.3	26.3	21.6
12/17/83	14.5	22.7	19.1

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	10.4	24.0	19.5
12/31/83	10.0	19.4	13.3
1/ 7/84	10.2	18.2	14.9
1/14/84	10.8	18.8	15.3
1/21/84	10.0	19.2	16.3
1/28/84	10.0	23.0	17.5
2/ 4/84	10.8	19.3	16.7
2/11/84	10.5	20.8	16.2
2/18/84	15.9	25.4	20.3
2/25/84	16.4	24.1	20.4
3/ 3/84	10.0	23.4	16.2
3/10/84	11.5	22.3	19.2
3/17/84	17.0	23.9	21.0
3/24/84	16.8	25.5	21.5
3/31/84	14.3	25.8	20.8
4/ 7/84	16.0	23.1	19.5
4/14/84	17.5	21.5	20.3
4/21/84			
4/28/84			
5/ 5/84			
5/12/84			
5/19/84	21.2	30.4	27.1
5/26/84	24.1	32.3	29.2
6/ 2/84	16.0	32.1	27.3
6/ 9/84	24.0	33.3	29.1
6/16/84	27.5	31.9	30.0
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 06B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE	WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	21.3	32.7	29.5	12/24/83	15.5	22.6	19.8
6/18/83	20.7	32.7	28.8	12/31/83	10.0	17.5	13.4
6/25/83	23.5	33.6	30.6	1/ 7/84	10.0	16.3	13.7
7/ 2/83	23.8	34.7	31.4	1/14/84	13.3	17.3	15.6
7/ 9/83	27.9	35.2	31.9	1/21/84	12.1	19.4	16.7
7/16/83	29.3	33.7	31.3	1/28/84	12.4	20.4	17.9
7/23/83	29.9	34.5	32.3	2/ 4/84	14.6	20.3	18.0
7/30/83	28.8	32.6	30.7	2/11/84	13.0	21.1	17.1
8/ 6/83	27.9	35.0	31.4	2/18/84	16.5	27.9	20.2
8/13/83	28.3	33.6	31.3	2/25/84	15.8	22.7	19.7
8/20/83	28.9	35.5	32.7	3/ 3/84	10.0	22.2	15.2
8/27/83	30.0	35.8	32.9	3/10/84	12.7	20.0	17.2
9/ 3/83	30.1	36.2	32.6	3/17/84	16.0	20.5	18.4
9/10/83	30.2	34.6	32.5	3/24/84			
9/17/83	27.4	34.1	31.4	3/31/84			
9/24/83	24.1	31.6	28.6	4/ 7/84			
10/ 1/83	24.2	28.3	26.8	4/14/84	19.7	25.9	22.7
10/ 8/83	26.5	28.6	27.6	4/21/84	17.3	26.9	20.3
10/15/83	26.7	29.5	28.1	4/28/84	20.1	28.3	24.9
10/22/83	25.4	30.4	27.9	5/ 5/84	24.2	29.6	27.6
10/29/83	23.2	28.8	26.0	5/12/84	24.3	32.5	28.5
11/ 5/83	22.5	26.2	24.8	5/19/84	24.2	30.0	27.6
11/12/83	20.3	26.3	23.9	5/26/84	26.2	33.0	30.1
11/19/83	18.0	25.1	21.9	6/ 2/84	22.7	31.6	28.1
11/26/83	18.2	23.9	21.3	6/ 9/84	25.5	33.3	29.5
12/ 3/83	18.8	24.1	21.9	6/16/84	28.3	31.9	30.1
12/10/83	17.7	25.3	22.2	6/23/84			
12/17/83	17.7	23.2	20.2	6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 06S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	22.9	33.0	29.8
6/18/83	23.8	32.9	29.6
6/25/83	25.1	34.1	31.0
7/ 2/83	27.2	35.1	31.9
7/ 9/83	27.8	35.1	31.8
7/16/83	28.1	34.2	31.4
7/23/83	30.2	34.1	32.2
7/30/83	29.2	33.1	31.0
8/ 6/83	29.4	34.5	31.9
8/13/83	29.5	34.4	32.1
8/20/83	30.8	36.3	34.0
8/27/83	30.7	36.6	33.6
9/ 3/83	29.2	36.0	32.7
9/10/83	28.3	35.0	31.8
9/17/83	26.7	33.8	30.6
9/24/83	23.3	31.2	27.8
10/ 1/83	23.6	28.0	26.0
10/ 8/83	25.9	28.1	27.0
10/15/83	25.5	29.1	27.2
10/22/83	24.7	29.4	26.9
10/29/83	22.5	33.4	25.2
11/ 5/83	20.8	26.4	24.1
11/12/83	18.6	25.7	22.8
11/19/83	15.4	24.6	20.6
11/26/83	17.9	23.1	20.7
12/ 3/83	17.0	23.6	21.1
12/10/83			
12/17/83			

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	16.9	22.5	19.7
12/31/83			
1/ 7/84	10.0	18.2	13.2
1/14/84	10.0	16.9	13.5
1/21/84	12.0	19.4	16.2
1/28/84	12.2	20.2	17.5
2/ 4/84	14.3	19.9	17.2
2/11/84	12.4	20.9	16.6
2/18/84	17.4	23.2	20.3
2/25/84	18.0	25.4	20.7
3/ 3/84	19.1	21.4	19.8
3/10/84	19.3	20.3	19.7
3/17/84	19.3	20.2	19.7
3/24/84			
3/31/84			
4/ 7/84			
4/14/84	19.0	25.9	22.8
4/21/84	17.4	27.2	20.5
4/28/84	20.0	28.2	24.9
5/ 5/84	24.7	30.0	27.7
5/12/84	23.0	32.3	28.4
5/19/84	23.1	30.2	27.4
5/26/84	23.2	32.5	29.1
6/ 2/84	21.9	31.3	27.4
6/ 9/84	24.3	32.0	28.6
6/16/84	27.4	31.2	29.6
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 07B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE	WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	28.7	33.4	30.8	12/24/83	19.6	22.1	20.9
6/18/83	28.7	31.3	29.9	12/31/83			
6/25/83	29.3	32.5	31.3	1/ 7/84			
7/ 2/83	31.5	32.9	32.2	1/14/84			
7/ 9/83	31.6	33.1	32.6	1/21/84	14.2	19.9	17.5
7/16/83				1/28/84	13.9	19.8	17.1
7/23/83				2/ 4/84	16.1	21.1	18.5
7/30/83				2/11/84	14.2	19.6	17.2
8/ 6/83	30.5	31.7	31.1	2/18/84	15.2	23.7	20.4
8/13/83	30.7	31.8	31.2	2/25/84	19.1	25.1	22.8
8/20/83	31.1	32.0	31.5	3/ 3/84	13.9	24.5	18.3
8/27/83	31.1	32.1	31.6	3/10/84	17.7	23.4	20.2
9/ 3/83	31.4	32.1	31.7	3/17/84	17.6	24.8	21.7
9/10/83				3/24/84	19.7	26.8	23.1
9/17/83	29.1	34.2	32.1	3/31/84	17.4	26.9	22.5
9/24/83	27.2	32.4	29.7	4/ 7/84	18.7	24.0	21.4
10/ 1/83	24.6	29.4	27.1	4/14/84	20.1	22.5	21.0
10/ 8/83	25.3	29.8	27.7	4/21/84			
10/15/83	27.1	31.0	28.5	4/28/84			
10/22/83	26.0	31.3	28.1	5/ 5/84			
10/29/83	24.1	30.3	27.3	5/12/84			
11/ 5/83	25.0	29.6	27.1	5/19/84	25.2	29.3	27.5
11/12/83	23.8	29.0	26.6	5/26/84	27.1	33.4	30.0
11/19/83	19.9	27.4	24.1	6/ 2/84	25.0	33.2	28.8
11/26/83	19.9	26.6	23.4	6/ 9/84	26.1	33.7	30.5
12/ 3/83	20.0	26.2	23.2	6/16/84	28.9	33.8	31.3
12/10/83	19.2	25.8	22.5	6/23/84			
12/17/83	17.8	23.6	21.2	6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 07S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	27.0	31.5	29.2
6/18/83	26.7	30.3	28.1
6/25/83	27.6	31.6	30.0
7/ 2/83	29.7	32.9	30.8
7/ 9/83	29.1	33.3	31.4
7/16/83	29.3	32.5	30.8
7/23/83	30.1	33.5	31.5
7/30/83	29.1	32.2	30.4
8/ 6/83	29.6	32.7	31.3
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83			
9/17/83	27.9	34.2	31.1
9/24/83	25.9	32.4	29.5
10/ 1/83	23.9	29.4	25.8
10/ 8/83	24.9	27.7	26.5
10/15/83	25.7	29.9	27.1
10/22/83	24.6	29.8	26.7
10/29/83	21.7	29.6	25.4
11/ 5/83	23.5	28.9	25.7
11/12/83	20.6	27.2	24.3
11/19/83	18.3	25.8	21.9
11/26/83	18.0	25.2	21.6
12/ 3/83	19.1	25.6	21.7
12/10/83	17.8	24.6	21.3
12/17/83	16.8	22.4	19.6

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	16.9	23.1	20.7
12/31/83	11.5	21.4	15.1
1/ 7/84	11.9	17.3	14.6
1/14/84	13.9	18.9	16.4
1/21/84	13.5	20.1	17.4
1/28/84	12.6	19.8	17.3
2/ 4/84	15.4	20.4	17.9
2/11/84	13.3	20.3	17.0
2/18/84	15.3	23.8	19.6
2/25/84	17.1	23.2	20.6
3/ 3/84	11.2	22.3	16.0
3/10/84	15.5	22.4	18.0
3/17/84	16.4	24.6	20.9
3/24/84	19.1	26.5	22.4
3/31/84	17.1	26.5	21.6
4/ 7/84	17.6	24.0	20.7
4/14/84	19.4	27.0	22.9
4/21/84	18.1	26.7	20.9
4/28/84	22.0	29.6	25.8
5/ 5/84	24.9	31.2	28.5
5/12/84	25.9	33.7	29.4
5/19/84	25.6	32.3	28.9
5/26/84	27.2	33.8	30.4
6/ 2/84	25.4	33.7	29.1
6/ 9/84	26.0	33.9	30.3
6/16/84	29.1	34.2	31.5
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 08

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	25.8	31.9	28.8
6/18/83	25.6	30.6	28.1
6/25/83	27.6	31.6	29.4
7/ 2/83	28.5	32.6	31.0
7/ 9/83	27.7	33.7	31.2
7/16/83	28.9	33.1	30.9
7/23/83	29.6	33.0	31.7
7/30/83	27.9	31.2	30.2
8/ 6/83	28.5	33.5	31.0
8/13/83	29.1	34.4	31.8
8/20/83	29.6	34.2	32.0
8/27/83	29.2	35.7	32.5
9/ 3/83	28.9	35.0	31.8
9/10/83	29.1	34.9	31.6
9/17/83	26.9	34.4	30.2
9/24/83	23.4	29.5	27.5
10/ 1/83	23.1	27.8	25.1
10/ 8/83	24.7	27.9	26.5
10/15/83	24.8	28.6	26.7
10/22/83	24.1	28.6	25.9
10/29/83	20.4	27.8	23.9
11/ 5/83	21.8	26.2	24.0
11/12/83	17.2	25.2	21.9
11/19/83	15.4	23.6	19.4
11/26/83	17.1	23.2	19.4
12/ 3/83	17.0	22.7	19.9
12/10/83	15.8	24.0	20.5
12/17/83	16.2	21.8	19.2

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.4	21.2	18.7
12/31/83	10.0	15.7	11.2
1/ 7/84	10.0	15.0	12.5
1/14/84	11.8	16.4	14.2
1/21/84	10.3	17.1	14.6
1/28/84	10.9	16.9	14.6
2/ 4/84	10.9	17.6	15.2
2/11/84	10.0	17.7	13.9
2/18/84	13.2	22.3	18.2
2/25/84	17.7	22.9	20.4
3/ 3/84	10.0	21.5	15.7
3/10/84	15.6	20.2	17.8
3/17/84	15.8	22.8	19.3
3/24/84	17.8	25.6	21.2
3/31/84	14.9	23.4	20.0
4/ 7/84	16.6	21.7	19.3
4/14/84	18.7	26.4	22.2
4/21/84	18.3	24.6	21.1
4/28/84	21.5	28.1	25.0
5/ 5/84	24.9	30.1	27.7
5/12/84	24.0	31.7	28.4
5/19/84	23.3	30.3	27.9
5/26/84	24.7	30.6	28.2
6/ 2/84	23.0	30.3	27.0
6/ 9/84	24.5	32.5	28.9
6/16/84	27.6	32.3	30.1
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 09

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	25.7	31.6	28.4
6/18/83	25.9	30.4	27.6
6/25/83	26.6	30.7	28.7
7/ 2/83	28.2	32.1	30.2
7/ 9/83	27.1	32.9	30.7
7/16/83	28.2	32.6	30.1
7/23/83	30.0	32.3	31.2
7/30/83	28.4	31.0	29.7
8/ 6/83	28.6	34.0	30.3
8/13/83	28.7	32.2	30.5
8/20/83	29.2	33.7	31.5
8/27/83	28.6	33.6	31.4
9/ 3/83	28.2	33.1	30.8
9/10/83	27.5	31.5	29.8
9/17/83	27.1	32.3	29.5
9/24/83	23.7	28.7	26.9
10/ 1/83	23.4	28.0	25.1
10/ 8/83	25.8	27.8	27.0
10/15/83	24.3	29.1	26.8
10/22/83	24.1	26.0	25.3
10/29/83	20.6	26.8	24.1
11/ 5/83	22.5	24.9	23.6
11/12/83	19.7	24.7	22.4
11/19/83	17.8	23.0	20.1
11/26/83	18.0	22.7	19.7
12/ 3/83	16.8	22.6	19.4
12/10/83	15.9	21.8	18.8
12/17/83	15.7	20.9	17.8

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	15.1	20.8	18.1
12/31/83	10.0	14.8	11.2
1/ 7/84	10.0	17.4	12.4
1/14/84	11.8	16.3	14.0
1/21/84	13.1	16.3	14.3
1/28/84	12.1	13.5	12.7
2/ 4/84	12.8	19.0	16.0
2/11/84	12.5	19.0	15.9
2/18/84	11.4	21.5	17.8
2/25/84	18.0	22.3	20.4
3/ 3/84	11.4	19.9	15.8
3/10/84	16.2	21.1	17.7
3/17/84	16.4	22.9	19.8
3/24/84	19.1	24.3	21.7
3/31/84	17.1	24.1	21.1
4/ 7/84	18.4	21.9	20.1
4/14/84	18.9	24.5	22.0
4/21/84	18.3	25.1	20.7
4/28/84	22.5	27.1	24.6
5/ 5/84	24.7	29.0	27.0
5/12/84	24.0	30.5	27.5
5/19/84	23.0	29.9	26.6
5/26/84	23.2	30.9	28.4
6/ 2/84	23.4	30.0	26.8
6/ 9/84	25.2	31.9	28.6
6/16/84	28.5	29.7	29.0
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 10

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	26.9	31.8	28.9
6/18/83	26.7	29.8	28.2
6/25/83	27.4	31.9	29.2
7/ 2/83	29.2	32.3	30.6
7/ 9/83	29.2	33.3	31.2
7/16/83	29.3	32.4	30.7
7/23/83	30.1	32.9	31.5
7/30/83	28.5	32.2	30.2
8/ 6/83	28.7	32.8	30.5
8/13/83	28.8	33.5	31.2
8/20/83	29.0	34.9	31.6
8/27/83	29.5	34.9	32.2
9/ 3/83	27.6	34.6	31.6
9/10/83	27.8	33.8	30.8
9/17/83	27.2	34.1	29.9
9/24/83	25.2	30.3	27.9
10/ 1/83	23.5	28.0	25.4
10/ 8/83	24.2	28.8	26.6
10/15/83	25.0	28.6	27.0
10/22/83	24.9	29.5	26.2
10/29/83	20.7	28.8	24.2
11/ 5/83	22.0	26.4	23.8
11/12/83	19.0	25.4	22.4
11/19/83	17.2	23.3	19.6
11/26/83	16.8	22.1	19.3
12/ 3/83	17.6	22.1	19.8
12/10/83	17.2	23.2	19.8
12/17/83	17.1	21.5	19.2

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	18.0	21.6	19.4
12/31/83			
1/ 7/84			
1/14/84	13.9	14.2	14.0
1/21/84	13.2	18.8	15.4
1/28/84	12.0	18.9	15.0
2/ 4/84	14.4	19.6	16.7
2/11/84	12.7	19.1	15.2
2/18/84	14.1	22.4	18.6
2/25/84	18.9	23.6	21.0
3/ 3/84	12.6	22.3	16.2
3/10/84	15.6	22.1	17.9
3/17/84	15.7	23.9	19.3
3/24/84	19.7	25.8	21.6
3/31/84	17.5	25.5	20.8
4/ 7/84	17.7	23.7	20.0
4/14/84	19.0	26.9	22.3
4/21/84	18.9	24.6	21.2
4/28/84	22.6	28.6	24.8
5/ 5/84	25.1	30.5	27.5
5/12/84	25.7	32.1	28.3
5/19/84	23.3	31.5	27.8
5/26/84	24.6	30.8	27.4
6/ 2/84	23.6	30.3	25.7
6/ 9/84	24.8	32.0	28.2
6/16/84	26.8	31.6	29.0
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 11B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	27.1	33.0	29.3
6/18/83	27.2	32.0	29.1
6/25/83	27.2	33.1	30.0
7/ 2/83	29.8	33.6	31.2
7/ 9/83	29.4	34.4	31.9
7/16/83	29.8	33.9	31.6
7/23/83			
7/30/83			
8/ 6/83	29.6	35.9	32.0
8/13/83	29.1	35.2	32.4
8/20/83	29.0	36.5	33.2
8/27/83	30.3	36.4	33.3
9/ 3/83	27.3	36.6	32.7
9/10/83	27.7	35.0	31.9
9/17/83	27.4	35.1	30.7
9/24/83	25.6	31.5	28.5
10/ 1/83	23.8	29.0	26.1
10/ 8/83	24.6	28.8	27.0
10/15/83	25.8	30.0	27.5
10/22/83	25.2	30.5	27.1
10/29/83	23.0	29.8	26.0
11/ 5/83	22.8	28.3	25.3
11/12/83	19.2	27.4	24.3
11/19/83	17.5	25.4	21.6
11/26/83	17.1	25.0	20.9
12/ 3/83	18.7	24.5	21.4
12/10/83	18.6	25.1	21.7
12/17/83	17.4	23.0	20.4

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	16.2	22.6	20.2
12/31/83	10.0	18.7	13.6
1/ 7/84	10.7	17.0	13.9
1/14/84	12.2	17.6	15.5
1/21/84	12.7	18.6	16.0
1/28/84	11.0	18.7	15.2
2/ 4/84	13.6	19.7	17.1
2/11/84	12.6	13.5	15.6
2/18/84	13.4	23.1	19.5
2/25/84	18.3	24.9	21.9
3/ 3/84	13.2	23.1	17.1
3/10/84	15.9	22.2	19.0
3/17/84	16.6	24.2	20.7
3/24/84	20.0	26.9	22.4
3/31/84	18.1	26.1	21.8
4/ 7/84	18.5	24.3	20.9
4/14/84	19.6	27.0	22.5
4/21/84	17.7	26.6	20.4
4/28/84	20.6	29.2	24.6
5/ 5/84	24.3	31.0	27.3
5/12/84	24.6	32.0	28.2
5/19/84	25.6	31.7	28.4
5/26/84	27.1	33.1	29.9
6/ 2/84	25.7	33.8	29.0
6/ 9/84	27.0	33.8	30.2
6/16/84	28.5	33.0	30.8
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

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STATION: 11S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	27.3	32.8	29.5
6/18/83	27.2	31.3	28.9
6/25/83	27.5	33.0	30.1
7/ 2/83	30.2	33.7	31.5
7/ 9/83	29.5	34.2	31.8
7/16/83	29.2	32.5	30.7
7/23/83	29.6	33.3	31.4
7/30/83	28.4	32.9	30.4
8/ 6/83	28.9	35.8	31.8
8/13/83	29.9	35.1	32.1
8/20/83	29.1	36.3	32.6
8/27/83	30.0	36.4	33.3
9/ 3/83	27.8	36.0	32.5
9/10/83	27.8	35.5	32.1
9/17/83	27.4	35.0	30.7
9/24/83	24.9	32.2	28.5
10/ 1/83	23.5	28.4	25.6
10/ 8/83	24.7	28.6	27.0
10/15/83	25.9	30.6	27.6
10/22/83	25.2	30.8	27.0
10/29/83	21.5	29.6	25.3
11/ 5/83	22.8	28.3	25.1
11/12/83	19.2	26.0	23.8
11/19/83	18.0	25.2	21.3
11/26/83	17.9	24.5	21.2
12/ 3/83	18.5	25.1	21.4
12/10/83	18.0	25.0	21.4
12/17/83	17.4	23.0	20.1
12/24/83	15.5	22.3	19.9
12/31/83	10.0	17.2	13.2
1/ 7/84	10.2	16.1	13.5
1/14/84	12.5	17.7	15.2
1/21/84	12.7	20.4	16.6
1/28/84	12.1	20.6	16.6
2/ 4/84	14.5	19.4	17.1
2/11/84	12.7	19.7	16.3
2/18/84	14.6	23.5	19.4
2/25/84	18.0	23.3	20.3
3/ 3/84	11.5	21.2	15.7
3/10/84	15.1	21.5	17.8
3/17/84	16.2	23.5	20.2
3/24/84	19.1	26.6	21.8
3/31/84	17.6	25.5	21.1
4/ 7/84	17.6	23.8	20.2
4/14/84	19.1	27.3	22.6
4/21/84	18.1	26.8	21.0
4/28/84	21.4	29.3	25.0
5/ 5/84	25.1	31.8	28.3
5/12/84	25.5	32.7	28.9
5/19/84	24.1	32.5	28.4
5/26/84	26.0	31.7	28.9
6/ 2/84	23.4	32.6	27.7
6/ 9/84	25.2	32.8	28.8
6/16/84	27.5	32.2	29.8
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 12B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	26.8	31.0	28.5
6/18/83	26.7	29.4	28.0
6/25/83	27.2	31.3	29.2
7/ 2/83	29.1	32.1	30.3
7/ 9/83	28.6	33.1	31.0
7/16/83	29.0	33.3	30.6
7/23/83	29.9	33.4	31.6
7/30/83	28.6	32.3	30.4
8/ 6/83	28.4	32.9	30.4
8/13/83	28.9	33.3	30.9
8/20/83	28.8	35.6	31.7
8/27/83	29.3	34.8	31.8
9/ 3/83	29.7	34.5	32.0
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	23.6	28.2	25.6
10/ 8/83	24.5	28.6	26.6
10/15/83	25.0	28.7	26.8
10/22/83	24.8	29.1	26.1
10/29/83	21.3	28.4	24.7
11/ 5/83	22.3	26.5	24.2
11/12/83	19.4	25.4	23.2
11/19/83	17.8	24.3	20.7
11/26/83	17.5	23.8	20.2
12/ 3/83	18.3	23.6	20.7
12/10/83	17.6	24.8	20.4
12/17/83	17.1	21.6	19.3

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	15.7	21.5	19.1
12/31/83	10.0	15.9	12.0
1/ 7/84	10.0	16.0	12.7
1/14/84	12.2	16.4	14.3
1/21/84	12.4	17.3	14.9
1/28/84			
2/ 4/84			
2/11/84			
2/18/84	14.0	21.8	18.8
2/25/84	18.1	23.5	20.6
3/ 3/84	11.1	23.0	15.1
3/10/84	13.9	19.8	17.2
3/17/84	13.7	21.0	17.7
3/24/84	16.9	23.2	19.2
3/31/84	15.3	23.3	18.6
4/ 7/84	15.9	20.4	17.8
4/14/84	17.1	25.8	20.5
4/21/84	17.7	24.1	20.0
4/28/84	20.7	27.8	23.9
5/ 5/84	24.4	29.4	26.6
5/12/84	24.6	31.2	27.4
5/19/84	25.2	30.9	27.8
5/26/84	26.6	33.2	29.6
6/ 2/84	25.6	32.9	28.8
6/ 9/84	27.3	33.6	30.3
6/16/84	28.8	33.0	30.8
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 12S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	26.3	31.3	28.5
6/18/83	26.2	29.7	27.8
6/25/83	27.2	30.7	29.1
7/ 2/83	29.0	31.8	30.4
7/ 9/83	27.6	32.8	30.8
7/16/83	28.1	32.9	30.4
7/23/83	29.8	33.5	31.3
7/30/83	28.5	31.8	30.0
8/ 6/83	28.4	33.7	30.8
8/13/83	29.2	33.1	31.0
8/20/83	28.0	34.4	31.5
8/27/83	29.6	34.3	31.9
9/ 3/83	30.5	33.4	31.7
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	23.9	29.1	26.0
10/ 8/83	25.4	28.3	27.1
10/15/83	25.7	29.1	27.3
10/22/83	25.4	29.8	26.6
10/29/83	21.3	28.8	24.5
11/ 5/83	22.5	26.6	24.1
11/12/83	18.5	24.8	22.6
11/19/83	17.3	23.9	20.0
11/26/83	17.4	24.0	20.4
12/ 3/83	18.2	23.7	20.4
12/10/83	17.4	24.6	20.3
12/17/83	17.2	21.7	19.0
12/24/83	15.3	20.8	18.4
12/31/83	10.0	15.5	11.1
1/ 7/84	10.0	14.6	11.8
1/14/84	11.5	16.5	13.7
1/21/84	12.7	19.6	15.6
1/28/84	11.5	19.4	16.0
2/ 4/84	14.3	19.2	16.7
2/11/84	12.4	19.8	15.6
2/18/84	14.6	25.1	18.8
2/25/84	17.7	22.1	20.0
3/ 3/84	11.5	21.2	15.2
3/10/84	14.5	21.6	17.2
3/17/84	15.6	21.5	18.9
3/24/84	17.8	24.0	20.3
3/31/34	16.3	23.4	19.6
4/ 7/84	16.6	21.6	19.0
4/14/84	18.7	24.6	20.5
4/21/84			
4/28/84			
5/ 5/84			
5/12/84			
5/19/84	26.8	32.2	29.2
5/26/84	28.6	34.2	31.4
6/ 2/84	26.2	34.1	30.0
6/ 9/84	28.0	34.1	31.3
6/16/84	30.8	33.6	32.3
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGPAPH DATA
DEGREES C

STATION: 13B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	25.9	29.5	27.6
6/18/83	25.6	29.2	27.5
6/25/83	27.6	30.4	28.8
7/ 2/83	27.4	31.6	29.8
7/ 9/83	26.8	32.2	30.5
7/16/83	27.6	33.3	30.2
7/23/83	29.8	32.7	31.2
7/30/83	28.5	31.0	29.6
8/ 6/83	28.6	33.9	30.3
8/13/83	29.0	31.8	29.8
8/20/83			
8/27/83			
9/ 3/83	27.9	34.5	31.0
9/10/83	28.2	32.0	30.3
9/17/83	26.8	31.9	29.5
9/24/83	23.0	29.8	26.5
10/ 1/83	23.0	28.6	25.2
10/ 8/83	24.8	27.5	26.3
10/15/83	25.0	28.1	26.7
10/22/83	24.0	28.1	25.7
10/29/83	21.3	28.0	24.2
11/ 5/83	21.9	27.2	23.9
11/12/83	18.2	25.3	22.6
11/19/83	15.2	23.5	20.3
11/26/83	18.4	24.1	20.5
12/ 3/83	16.6	23.4	20.3
12/10/83	16.1	23.5	19.8
12/17/83	15.0	21.5	18.3
12/24/83	13.0	20.5	18.0
12/31/83	10.0	15.4	11.9
1/ 7/84	10.0	15.8	12.7
1/14/84	12.5	17.2	14.8
1/21/84	10.6	19.2	14.6
1/28/84	10.0	20.0	15.0
2/ 4/84	12.1	20.0	15.7
2/11/84	10.9	18.1	14.4
2/18/84	12.9	26.1	17.5
2/25/84	15.8	21.2	18.5
3/ 3/84	10.0	19.9	13.7
3/10/84	11.5	18.4	15.4
3/17/84	13.6	23.7	19.1
3/24/84	18.3	23.3	20.9
3/31/84	15.0	23.0	20.1
4/ 7/84	17.2	21.[illegible]	19.3
4/14/84	16.3	24.[illegible]	21.4
4/21/84	17.4	24.4	20.2
4/28/84	20.7	27.3	24.0
5/ 5/84	24.5	28.6	26.6
5/12/84	19.7	30.1	26.9
5/19/84	22.0	29.1	25.8
5/26/84	24.1	31.0	28.4
6/ 2/84	17.0	30.2	26.4
6/ 9/84	24.2	30.3	28.1
6/16/84	27.5	29.9	28.8
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 13S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	24.8	29.7	27.2
6/18/83	24.8	28.7	27.1
6/25/83	27.2	29.9	28.5
7/ 2/83	27.6	31.4	29.8
7/ 9/83	26.8	31.9	30.4
7/16/83	28.6	33.3	30.4
7/23/83	29.9	32.9	31.5
7/30/83	28.5	31.7	29.9
8/ 6/83	28.4	34.2	30.6
8/13/83	28.4	33.3	30.5
8/20/83	28.0	34.4	31.6
8/27/83	29.9	34.5	31.9
9/ 3/83	30.2	33.7	31.9
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	23.3	27.8	25.0
10/ 8/83	24.6	27.0	25.9
10/15/83	24.7	27.6	26.2
10/22/83	23.8	27.8	25.4
10/29/83	20.7	26.1	23.7
11/ 5/83	22.1	25.5	23.5
11/12/83	17.8	24.5	22.1
11/19/83	15.7	23.1	19.7
11/26/83	17.9	23.9	20.3
12/ 3/83	17.3	23.3	20.3
12/10/83	17.2	24.1	20.5
12/17/83	16.2	21.9	18.6

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	12.4	20.8	17.3
12/31/83	10.0	13.7	10.5
1/ 7/84	10.0	14.6	11.5
1/14/84	10.0	16.1	13.0
1/21/84	11.6	18.4	14.6
1/28/84	10.8	20.1	16.4
2/ 4/84	13.1	18.8	16.8
2/11/84	12.0	19.5	15.6
2/18/84	15.5	21.0	18.2
2/25/84	14.7	25.1	19.1
3/ 3/84	10.0	20.4	14.2
3/10/84	13.3	19.4	16.1
3/17/84	14.0	21.7	18.4
3/24/84	17.4	23.8	20.1
3/31/84	15.2	22.4	19.3
4/ 7/84	16.2	20.4	18.5
4/14/84	18.0	23.8	20.7
4/21/84	16.6	23.6	19.3
4/28/84	18.1	26.7	23.1
5/ 5/84	23.8	28.2	26.1
5/12/84	21.4	29.7	26.3
5/19/84	22.4	28.6	25.6
5/26/84	24.9	30.9	28.3
6/ 2/84	22.4	30.2	26.6
6/ 9/84	24.0	30.6	28.2
6/16/84	27.1	30.2	28.8
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 14

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	26.0	29.5	27.6
6/18/83	25.5	29.3	27.5
6/25/83	27.2	29.7	28.6
7/ 2/83	28.5	31.9	30.0
7/ 9/83	28.4	32.4	30.6
7/16/83	27.9	33.2	30.1
7/23/83	29.6	32.9	31.1
7/30/83	28.3	30.9	29.5
8/ 6/83	28.4	32.5	30.1
8/13/83	28.5	31.9	29.8
8/20/83	28.6	33.8	31.4
8/27/83	29.0	34.1	31.4
9/ 3/83	28.8	34.1	31.3
9/10/83	29.0	31.9	30.3
9/17/83	26.3	32.0	29.3
9/24/83	24.2	28.4	26.8
10/ 1/83	23.5	26.9	25.1
10/ 8/83	24.7	27.4	26.2
10/15/83	24.7	28.5	26.6
10/22/83	24.3	28.4	25.8
10/29/83	21.2	27.0	24.0
11/ 5/83	21.9	24.5	23.0
11/12/83	17.1	24.8	21.8
11/19/83	17.6	23.2	20.6
11/26/83			
12/ 3/83	18.0	22.7	20.2
12/10/83	17.5	24.2	20.8
12/17/83	16.5	22.4	18.9
12/24/83	13.0	19.5	17.6
12/31/83	10.0	14.5	11.1
1/ 7/84	10.0	18.7	12.0
1/14/84	12.2	16.4	13.9
1/21/84	10.0	15.7	13.6
1/28/84	10.0	16.8	14.3
2/ 4/84	11.9	16.4	14.4
2/11/84	10.0	17.4	13.5
2/18/84	15.4	20.9	18.2
2/25/84	17.1	22.3	19.5
3/ 3/84	10.0	21.2	14.9
3/10/84	13.9	20.3	16.8
3/17/84	13.1	20.3	18.0
3/24/84	15.5	22.2	18.2
3/31/84	13.4	22.6	17.7
4/ 7/84	13.8	18.7	16.7
4/14/84	16.4	23.7	19.8
4/21/84	16.8	25.5	19.8
4/28/84	20.0	26.6	23.9
5/ 5/84	24.4	27.8	26.2
5/12/84	19.5	29.7	26.6
5/19/84	22.2	27.9	25.4
5/26/84	24.5	30.1	27.8
6/ 2/84	22.1	29.2	26.0
6/ 9/84	23.4	31.0	27.8
6/16/84	27.2	29.1	28.2
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 15

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83			
6/25/83			
7/ 2/83			
7/ 9/83			
7/16/83	26.4	31.6	29.4
7/23/83	27.8	31.6	29.8
7/30/83	26.2	29.7	28.0
8/ 6/83	26.6	30.2	28.1
8/13/83	27.4	30.7	28.3
8/20/83	26.9	31.0	29.4
8/27/83	27.5	31.7	29.7
9/ 3/83	27.3	32.4	29.5
9/10/83	26.7	32.8	29.0
9/17/83	24.7	31.0	27.4
9/24/83	22.0	26.8	25.0
10/ 1/83	22.0	29.7	24.5
10/ 8/83	24.5	26.6	25.5
10/15/83	23.5	27.5	25.6
10/22/83	23.1	25.7	24.5
10/29/83	21.2	25.7	23.5
11/ 5/83	21.4	25.2	23.0
11/12/83	17.7	24.2	21.7
11/19/83	14.4	22.2	19.1
11/26/83	18.0	24.2	20.0
12/ 3/83	16.9	23.2	19.4
12/10/83	16.5	23.7	19.6
12/17/83	14.5	21.0	17.3
12/24/83	11.1	20.6	17.1
12/31/83	10.0	14.6	11.2
1/ 7/84	10.0	17.6	12.4
1/14/84	12.7	17.7	14.7
1/21/84	10.4	16.6	14.1
1/28/84	10.0	17.2	14.6
2/ 4/84	12.6	17.8	15.2
2/11/84	10.5	18.2	13.8
2/18/84	15.0	18.8	16.8
2/25/84			
3/ 3/84			
3/10/84			
3/17/84	16.6	21.1	18.8
3/24/84	17.7	23.0	20.1
3/31/84	16.5	22.9	19.8
4/ 7/84	16.3	21.1	18.9
4/14/84	16.5	22.2	19.9
4/21/84	15.1	21.1	17.9
4/28/84	18.2	24.2	21.5
5/ 5/84	22.2	26.0	24.2
5/12/84	20.2	27.8	24.2
5/19/84	20.3	26.2	23.8
5/26/84	21.9	28.2	26.1
6/ 2/84	21.7	27.2	24.9
6/ 9/84	23.4	28.7	26.6
6/16/84	26.2	28.0	27.2
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 16

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	24.2	29.5	26.5
6/18/83	24.4	29.2	26.5
6/25/83	24.7	29.1	27.4
7/ 2/83	26.4	30.8	28.6
7/ 9/83	25.9	31.7	29.1
7/16/83	27.6	32.0	29.3
7/23/83	28.6	31.7	30.3
7/30/83	27.5	29.7	28.4
8/ 6/83	27.4	30.3	28.8
8/13/83	27.2	30.7	28.5
8/20/83	27.2	31.1	29.5
8/27/83	27.3	31.6	29.9
9/ 3/83	27.2	31.8	29.6
9/10/83	26.9	31.4	28.7
9/17/83	25.1	31.3	27.7
9/24/83	22.1	27.2	25.1
10/ 1/83	21.6	31.7	24.4
10/ 8/83	24.1	27.2	25.7
10/15/83	24.0	28.0	25.9
10/22/83	23.1	26.0	24.6
10/29/83	20.5	25.6	23.2
11/ 5/83	20.0	24.1	22.0
11/12/83	17.8	23.1	20.7
11/19/83	14.3	20.7	17.9
11/26/83	16.9	23.7	19.1
12/ 3/83	14.7	21.3	18.5
12/10/83	15.6	23.0	19.3
12/17/83	13.9	20.7	16.9

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	11.4	20.6	16.2
12/31/83	10.0	13.6	10.7
1/ 7/84	10.0	16.6	11.5
1/14/84	10.1	17.1	12.5
1/21/84	10.1	16.0	13.2
1/28/84	10.0	16.7	14.0
2/ 4/84	12.0	16.9	14.6
2/11/84	10.2	16.7	13.2
2/18/84	14.3	21.1	17.5
2/25/84	16.6	23.2	19.4
3/ 3/84	10.1	20.8	14.9
3/10/84	13.7	20.9	17.0
3/17/84	14.2	21.6	18.4
3/24/84	17.0	23.3	20.2
3/31/84	16.0	24.7	19.9
4/ 7/84	16.5	22.0	19.0
4/14/84	19.0	22.4	20.5
4/21/84			
4/28/84			
5/ 5/84			
5/12/84			
5/19/84	20.8	25.5	24.2
5/26/84	23.5	28.6	26.5
6/ 2/84	21.3	27.6	25.2
6/ 9/84	23.9	29.5	27.2
6/16/84	26.5	28.8	27.8
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 17B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE	WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83				12/24/83	14.2	16.7	15.7
6/18/83				12/31/83	10.0	14.5	10.4
6/25/83				1/ 7/84	10.0	11.0	10.1
7/ 2/83				1/14/84	10.3	12.2	11.0
7/ 9/83				1/21/84	10.6	15.5	12.9
7/16/83				1/28/84	11.0	15.5	13.1
7/23/83				2/ 4/84	13.7	16.3	15.0
7/30/83				2/11/84	12.1	16.2	13.5
8/ 6/83				2/18/84	13.4	15.2	14.2
8/13/83				2/25/84			
8/20/83	29.3	30.5	29.8	3/ 3/84			
8/27/83	29.1	31.2	30.3	3/10/84			
9/ 3/83	28.4	31.0	30.0	3/17/84	15.2	20.1	17.4
9/10/83	27.9	29.8	29.0	3/24/84	18.1	22.7	19.6
9/17/83	26.6	30.1	28.3	3/31/84	16.7	23.2	19.1
9/24/83	24.0	27.8	26.4	4/ 7/84	17.0	20.8	18.3
10/ 1/83	23.3	24.4	23.8	4/14/84	18.6	22.3	20.0
10/ 8/83	23.8	25.9	25.0	4/21/84	18.1	21.6	19.7
10/15/83	24.9	26.1	25.6	4/28/84	20.2	24.8	22.1
10/22/83	23.9	25.1	24.6	5/ 5/84	23.6	27.5	25.1
10/29/83	21.0	24.7	22.7	5/12/84	23.7	27.2	25.4
11/ 5/83	21.4	22.5	21.9	5/19/84	23.1	26.4	24.8
11/12/83	19.0	22.0	21.1	5/26/84	23.9	27.1	25.6
11/19/83	16.6	19.2	18.0	6/ 2/84	23.0	26.8	25.3
11/26/83	17.2	23.1	19.0	6/ 9/84	24.1	27.5	25.9
12/ 3/83	16.7	19.4	18.3	6/16/84	26.6	28.0	27.5
12/10/83	16.5	21.4	18.5	6/23/84			
12/17/83	15.6	17.9	16.7	6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 17S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83			
6/25/83			
7/ 2/83			
7/ 9/83			
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83			
8/20/83	26.7	29.6	28.7
8/27/83	27.8	30.3	29.0
9/ 3/83	27.0	29.9	28.6
9/10/83	26.6	28.9	27.8
9/17/83	24.9	28.8	26.6
9/24/83	22.7	25.9	24.7
10/ 1/83	22.3	23.3	22.9
10/ 8/83			
10/15/83			
10/22/83			
10/29/83	20.7	23.3	21.8
11/ 5/83	20.9	23.2	21.8
11/12/83	17.9	21.8	20.5
11/19/83	16.0	19.8	17.8
11/26/83	17.1	22.5	18.6
12/ 3/83	17.2	20.4	18.6
12/10/83	17.9	22.5	19.7
12/17/83	16.9	19.9	18.1
12/24/83	16.7	17.4	17.0
12/31/83			
1/ 7/84			
1/14/84			
1/21/84	11.1	14.9	13.5
1/28/84	10.2	16.6	13.3
2/ 4/84	13.0	16.9	15.0
2/11/84	10.8	15.5	13.2
2/18/84	13.5	19.3	17.0
2/25/84	17.8	20.6	19.4
3/ 3/84	11.6	19.7	15.7
3/10/84	14.6	20.3	17.2
3/17/84	15.7	20.5	17.9
3/24/84	18.4	22.9	20.2
3/31/84	17.3	23.3	20.1
4/ 7/84	17.9	21.1	19.2
4/14/84	19.1	22.9	20.8
4/21/84	18.5	22.7	20.5
4/28/84	20.9	25.5	23.3
5/ 5/84	23.8	27.4	25.6
5/12/84	24.0	28.3	25.9
5/19/84	22.6	27.1	25.1
5/26/84	23.0	27.5	25.3
6/ 2/84	22.1	26.4	24.5
6/ 9/84	23.3	27.4	25.5
6/16/84	26.0	27.6	26.7
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 18

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.2	28.4	26.9
6/25/83	26.4	29.2	27.7
7/ 2/83	27.8	30.5	28.9
7/ 9/83	27.7	31.5	29.8
7/16/83	27.7	32.2	29.4
7/23/83	29.2	32.0	30.7
7/30/83	27.6	30.0	28.8
8/ 6/83	27.1	30.5	28.8
8/13/83	27.5	30.5	28.7
8/20/83	27.3	32.0	30.2
8/27/83	31.0	31.9	31.5
9/ 3/83	27.8	30.3	29.0
9/10/83	27.2	31.7	29.2
9/17/83	25.4	31.4	28.2
9/24/83	22.9	27.7	25.6
10/ 1/83	22.6	25.3	23.9
10/ 8/83	23.5	26.5	25.2
10/15/83	23.8	27.4	25.8
10/22/83	23.5	25.2	24.3
10/29/83	20.3	25.8	23.3
11/ 5/83	20.7	24.2	22.3
11/12/83	16.7	23.8	21.1
11/19/83	16.2	21.7	19.1
11/26/83	17.5	22.7	19.3
12/ 3/83	17.1	22.4	19.3
12/10/83	17.0	23.3	19.9
12/17/83	16.0	21.1	18.0

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	10.7	18.2	15.8
12/31/83	10.0	12.8	10.5
1/ 7/84	10.0	14.7	11.1
1/14/84	10.0	15.4	11.9
1/21/84	10.3	17.2	13.5
1/28/84	10.1	18.0	15.3
2/ 4/84	13.5	18.1	16.0
2/11/84	12.2	18.6	14.8
2/18/84	13.2	21.1	16.2
2/25/84	14.2	19.1	16.6
3/ 3/84	10.0	17.8	12.5
3/10/84	11.4	17.2	14.1
3/17/84	12.7	19.8	16.7
3/24/84	16.1	21.6	18.7
3/31/84	15.0	21.7	18.5
4/ 7/84	14.6	19.3	17.4
4/14/84	17.4	23.1	20.1
4/21/84	17.2	23.0	19.8
4/28/84	20.0	26.0	23.4
5/ 5/84	24.3	27.4	25.9
5/12/84	23.1	29.7	26.3
5/19/84	20.6	27.8	24.8
5/26/84	21.9	27.1	25.1
6/ 2/84	19.8	25.9	23.7
6/ 9/84	22.1	28.7	25.6
6/16/84	24.9	27.2	26.2
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 19

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.0	28.4	27.3
6/25/83	27.4	29.7	28.5
7/ 2/83	28.3	30.8	29.6
7/ 9/83	27.9	32.2	30.4
7/16/83	28.4	32.3	29.8
7/23/83	29.6	32.4	30.9
7/30/83	27.8	30.6	29.2
8/ 6/83	28.2	31.4	29.3
8/13/83	28.4	31.0	29.3
8/20/83	28.6	32.3	30.2
8/27/83	28.1	32.4	30.4
9/ 3/83	28.3	32.0	30.4
9/10/83	28.7	31.1	29.9
9/17/83	26.8	31.3	28.9
9/24/83	23.2	28.5	26.6
10/ 1/83	23.0	26.6	24.4
10/ 8/83	24.6	26.9	25.9
10/15/83	24.4	27.7	26.1
10/22/83	23.9	25.9	24.9
10/29/83	21.0	25.6	23.5
11/ 5/83	21.5	25.9	22.8
11/12/83	16.9	24.0	21.3
11/19/83	15.9	21.7	18.7
11/26/83	18.2	23.1	19.8
12/ 3/83	16.0	22.7	19.5
12/10/83	16.9	23.2	19.8
12/17/83	15.9	21.4	18.2

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	16.1	19.3	17.6
12/31/83			
1/ 7/84	13.4	19.4	14.7
1/14/84	11.6	17.3	13.6
1/21/84	10.0	14.4	12.0
1/28/84	10.0	13.9	12.2
2/ 4/84	10.3	14.5	12.4
2/11/84	10.0	15.0	11.4
2/18/84	13.0	21.1	17.9
2/25/84	17.7	23.8	20.0
3/ 3/84	10.5	20.9	15.1
3/10/84	14.2	20.4	17.0
3/17/84	14.5	20.2	17.4
3/24/84	17.0	22.2	19.3
3/31/84	14.9	20.8	18.7
4/ 7/84	15.8	19.7	18.0
4/14/84	18.1	23.5	20.4
4/21/84	17.6	22.9	19.8
4/28/84	20.3	26.1	23.0
5/ 5/84	24.5	27.4	25.8
5/12/84	22.5	29.2	26.0
5/19/84	21.1	27.8	24.8
5/26/84	22.9	29.1	26.6
6/ 2/84	21.7	28.4	25.2
6/ 9/84	23.2	28.7	26.7
6/16/84	26.2	28.8	27.3
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 20

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.3	27.1	26.3
6/25/83	26.0	28.9	27.3
7/ 2/83	27.3	28.9	28.1
7/ 9/83	27.5	31.0	29.3
7/16/83	27.6	31.2	29.3
7/23/83	29.3	31.8	30.1
7/30/83	27.1	30.4	28.6
8/ 6/83	27.1	29.0	28.1
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83			
9/17/83	26.7	29.4	27.8
9/24/83	23.1	28.2	26.4
10/ 1/83	22.9	26.6	24.3
10/ 8/83	24.7	27.0	26.0
10/15/83	24.2	27.5	26.1
10/22/83	24.1	26.1	25.1
10/29/83	19.7	25.6	22.6
11/ 5/83	21.1	23.0	21.9
11/12/83	16.7	23.0	20.7
11/19/83	15.9	20.9	17.8
11/26/83	17.6	21.6	18.8
12/ 3/83	15.1	21.1	17.7
12/10/83	14.2	20.4	17.1
12/17/83	14.0	17.9	15.4

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.7	14.6	14.2
12/31/83			
1/ 7/84			
1/14/84			
1/21/84	10.6	15.3	13.2
1/28/84	10.0	15.7	13.6
2/ 4/84	13.0	16.3	14.5
2/11/84	10.8	16.7	13.3
2/18/84	15.1	19.8	16.7
2/25/84	16.6	19.9	18.3
3/ 3/84	10.0	17.9	12.9
3/10/84	12.5	16.8	14.7
3/17/84	14.1	20.8	17.4
3/24/84	18.2	22.3	20.1
3/31/84	16.6	21.4	19.5
4/ 7/84	17.3	19.9	18.8
4/14/84	18.7	23.4	20.9
4/21/84	18.2	22.3	20.3
4/28/84	20.8	25.5	23.1
5/ 5/84	24.7	27.3	25.9
5/12/84	23.8	29.0	26.3
5/19/84	22.8	27.5	25.2
5/26/84	23.7	28.9	27.0
6/ 2/84	22.3	28.2	25.7
6/ 9/84	24.3	28.7	27.0
6/16/84	27.2	29.1	28.0
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 21

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	25.4	30.2	27.3
6/18/83	25.7	28.3	26.9
6/25/83	26.8	29.4	28.0
7/ 2/83	28.2	30.6	29.3
7/ 9/83	27.7	31.8	29.9
7/16/83	28.3	32.4	29.7
7/23/83	29.5	32.2	30.6
7/30/83	27.5	30.4	29.1
8/ 6/83	27.7	31.0	29.2
8/13/83	28.5	31.1	29.6
8/20/83	27.8	31.9	29.4
8/27/83	28.6	32.7	30.6
9/ 3/83	27.1	32.1	30.2
9/10/83	27.2	32.1	29.6
9/17/83	25.9	32.0	28.3
9/24/83	23.2	27.9	26.2
10/ 1/83	23.1	24.4	23.8
10/ 8/83			
10/15/83			
10/22/83			
10/29/83	21.2	26.4	23.0
11/ 5/83	21.7	25.0	22.8
11/12/83	17.3	24.3	21.8
11/19/83	16.8	20.7	18.4
11/26/83	17.4	22.6	19.3
12/ 3/83	17.0	22.7	19.0
12/10/83	16.6	22.9	18.8
12/17/83	15.8	20.1	17.5
12/24/83	12.6	19.0	16.6
12/31/83	10.0	12.3	10.2
1/ 7/84	10.0	13.2	10.8
1/14/84	10.3	13.6	12.0
1/21/84	10.0	15.8	12.2
1/28/84	10.0	15.8	12.6
2/ 4/84	12.8	16.1	14.4
2/11/84	10.4	15.3	12.8
2/18/84	13.6	21.1	17.7
2/25/84	18.4	22.1	19.9
3/ 3/84	10.2	21.0	14.5
3/10/84	14.1	18.7	16.4
3/17/84	15.4	20.6	17.7
3/24/84	18.2	22.6	20.1
3/31/84	16.1	22.0	19.3
4/ 7/84	17.0	20.5	18.8
4/14/84	18.8	24.3	20.8
4/21/84	18.4	22.8	20.5
4/28/84	20.9	27.3	23.6
5/ 5/84	25.4	28.4	26.7
5/12/84	24.4	30.3	27.2
5/19/84	23.3	29.5	26.6
5/26/84	24.5	29.6	27.2
6/ 2/84	22.7	29.5	26.2
6/ 9/84	24.6	30.0	27.5
6/16/84	27.3	29.3	28.3
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 22

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	26.9	33.2	28.9
6/18/83	26.7	30.3	28.2
6/25/83	27.4	32.8	29.2
7/ 2/83	29.0	32.7	30.3
7/ 9/83	29.0	33.8	31.0
7/16/83	29.1	33.1	30.8
7/23/83	29.6	32.8	31.1
7/30/83	27.7	31.6	29.7
8/ 6/83	28.0	35.4	30.2
8/13/83	28.8	35.1	31.3
8/20/83	28.2	34.9	31.2
8/27/83	29.0	36.0	32.0
9/ 3/83	30.0	33.1	31.4
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	23.2	26.7	24.7
10/ 8/83	24.3	28.3	26.3
10/15/83	24.9	29.0	26.6
10/22/83	24.7	28.9	25.9
10/29/83	20.7	29.5	24.5
11/ 5/83	21.9	27.1	23.9
11/12/83	18.5	26.1	22.6
11/19/83	17.4	23.9	19.1
11/26/83	17.3	23.3	19.5
12/ 3/83	17.0	22.6	19.4
12/10/83	16.9	23.3	19.4
12/17/83	16.7	21.4	18.6

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	16.7	22.2	19.2
12/31/83	10.0	17.1	11.6
1/ 7/84	10.0	15.7	12.6
1/14/84	12.0	17.0	13.9
1/21/84	12.2	19.0	15.1
1/28/84	11.6	17.7	14.0
2/ 4/84	14.0	18.8	16.2
2/11/84	12.2	18.7	14.7
2/18/84	13.6	22.0	17.7
2/25/84	17.9	22.9	19.7
3/ 3/84	10.2	19.0	14.7
3/10/84	14.1	20.4	16.6
3/17/84	15.1	23.9	18.3
3/24/84	18.8	26.1	20.5
3/31/84	16.9	24.0	19.5
4/ 7/84	17.1	22.9	19.0
4/14/84	18.0	26.1	20.9
4/21/84	17.7	24.9	19.7
4/28/84	20.6	28.1	22.7
5/ 5/84	23.7	30.6	26.0
5/12/84	23.9	31.7	26.7
5/19/84	23.2	31.9	27.0
5/26/84	24.1	31.6	27.2
6/ 2/84	23.0	32.9	27.1
6/ 9/84	25.1	33.2	28.1
6/16/84	27.0	33.3	29.1
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 23B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83			
6/25/83			
7/ 2/83			
7/ 9/83	28.2	31.6	29.6
7/16/83	28.8	32.1	30.1
7/23/83	29.1	32.1	30.5
7/30/83	27.6	30.8	29.0
8/ 6/83	27.6	32.6	29.3
8/13/83	28.5	32.7	29.9
8/20/83	28.1	34.4	30.5
8/27/83	29.0	33.4	31.0
9/ 3/83	27.6	31.8	29.9
9/10/83	27.4	30.2	28.5
9/17/83	28.4	31.2	29.5
9/24/83	26.3	31.6	28.3
10/ 1/83	23.5	28.0	25.2
10/ 8/83	24.6	28.5	26.5
10/15/83	25.1	27.4	26.5
10/22/83	24.7	26.7	25.5
10/29/83	20.0	27.9	22.9
11/ 5/83	20.9	24.5	22.1
11/12/83	18.2	23.7	21.0
11/19/83	16.5	22.9	18.0
11/26/83	16.8	21.5	18.2
12/ 3/83	17.5	20.9	18.5
12/10/83	17.5	22.5	19.3
12/17/83	17.4	20.8	18.6

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	16.7	21.1	18.3
12/31/83	10.0	18.3	11.6
1/ 7/84	10.0	15.0	11.8
1/14/84	12.3	16.8	13.4
1/21/84	12.3	17.7	14.0
1/28/84	11.5	17.7	13.5
2/ 4/84	14.0	17.6	15.4
2/11/84	12.1	18.6	14.0
2/18/84	13.5	21.4	16.8
2/25/84	18.0	22.1	19.5
3/ 3/84	11.6	20.4	14.9
3/10/84	13.8	21.4	16.5
3/17/84	14.9	22.8	17.5
3/24/84	18.3	23.2	20.0
3/31/84	17.1	22.7	19.4
4/ 7/84	16.9	21.3	18.7
4/14/84	18.3	23.9	20.6
4/21/84	17.8	22.7	19.7
4/28/84	20.5	27.2	22.5
5/ 5/84	24.0	28.2	25.3
5/12/84	23.8	30.6	26.1
5/19/84	20.7	28.9	24.7
5/26/84	21.3	27.9	24.1
6/ 2/84	20.9	27.2	23.9
6/ 9/84	22.0	27.8	25.0
6/16/84	24.6	28.9	25.9
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 23S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83			
6/25/83			
7/ 2/83			
7/ 9/83	27.4	31.8	29.3
7/16/83	27.9	31.9	29.5
7/23/83	29.7	31.8	30.5
7/30/83	27.2	30.5	29.0
8/ 6/83	27.1	32.9	29.1
8/13/83	28.2	31.9	29.6
8/20/83	27.6	33.9	30.6
8/27/83	28.2	33.1	30.7
9/ 3/83	27.1	31.8	29.6
9/10/83	27.0	31.8	29.2
9/17/83	25.9	31.4	28.1
9/24/83	23.7	28.2	26.1
10/ 1/83	23.0	26.3	24.1
10/ 8/83	24.4	27.9	26.1
10/15/83	24.5	27.2	26.1
10/22/83	24.4	26.1	25.1
10/29/83	20.1	27.1	23.0
11/ 5/83	21.0	24.8	22.2
11/12/83	18.0	23.8	21.1
11/19/83	16.1	22.9	17.8
11/26/83	16.3	21.5	18.0
12/ 3/83	16.7	21.1	18.1
12/10/83	16.4	22.1	18.2
12/17/83	16.0	19.9	17.4
12/24/83	15.2	19.9	17.2
12/31/83	10.0	16.9	10.6
1/ 7/84	10.0	13.8	10.7
1/14/84	10.3	15.3	11.8
1/21/84	10.7	17.4	13.2
1/28/84	10.8	17.2	13.3
2/ 4/84	13.3	17.1	14.9
2/11/84	11.3	18.2	13.5
2/18/84	12.9	20.9	16.4
2/25/84	17.6	21.5	19.0
3/ 3/84	11.2	20.3	14.6
3/10/84	13.6	20.7	16.1
3/17/84	14.9	22.7	17.9
3/24/84	18.4	23.1	20.1
3/31/84	16.8	22.9	19.3
4/ 7/84	17.1	21.2	18.7
4/14/84	18.1	23.3	20.4
4/21/84	17.6	24.3	19.4
4/28/84	20.6	26.7	22.5
5/ 5/84	23.5	27.7	25.0
5/12/84	23.5	29.8	25.7
5/19/84	22.3	28.1	25.1
5/26/84	22.9	28.9	25.7
6/ 2/84	22.0	28.1	25.1
6/ 9/84	23.5	29.4	26.5
6/16/84	26.1	29.7	27.2
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 24B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.4	28.7	27.9
6/25/83	26.9	30.0	28.1
7/ 2/83	28.3	30.6	29.4
7/ 9/83	28.5	31.9	30.3
7/16/83	28.7	30.9	29.5
7/23/83			
7/30/83			
8/ 6/83			
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83	27.1	29.6	28.1
9/17/83	24.5	29.2	26.4
9/24/83	22.0	26.7	24.5
10/ 1/83	21.3	24.9	23.7
10/ 8/83	24.1	27.7	26.0
10/15/83	24.4	27.4	26.0
10/22/83	24.4	26.6	25.2
10/29/83	20.8	27.2	23.1
11/ 5/83	21.3	24.2	22.5
11/12/83	17.1	23.6	21.2
11/19/83	17.1	20.2	18.1
11/26/83	17.3	21.7	19.0
12/ 3/83	17.6	21.3	18.8
12/10/83	17.4	23.5	19.3
12/17/83	16.9	20.0	18.2

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.8	19.9	17.6
12/31/83	10.0	13.4	10.6
1/ 7/84	10.0	13.7	10.9
1/14/84	11.5	14.6	12.6
1/21/84	11.3	16.6	13.5
1/28/84	10.3	16.3	12.6
2/ 4/84	13.3	16.8	14.9
2/11/84	11.4	16.5	13.2
2/18/84	13.1	20.7	16.7
2/25/84	17.5	21.7	19.0
3/ 3/84	10.1	19.6	13.8
3/10/84	13.2	18.0	15.5
3/17/84	14.8	22.7	18.5
3/24/84	20.0	24.6	21.5
3/31/84	18.3	23.0	20.8
4/ 7/84	19.2	22.0	20.4
4/14/84	19.2	23.3	21.2
4/21/84	17.7	22.8	19.7
4/28/84	20.3	25.8	22.2
5/ 5/84	23.8	27.7	25.4
5/12/84	23.8	29.4	25.9
5/19/84	22.4	28.5	25.4
5/26/84	23.2	27.9	25.5
6/ 2/84	22.1	28.6	25.1
6/ 9/84	24.0	28.6	25.8
6/16/84	26.0	29.1	27.3
6/23/84	25.9	29.1	26.9
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 24S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.6	28.9	27.7
6/25/83	26.4	29.2	27.6
7/ 2/83	27.6	30.5	29.0
7/ 9/83	28.8	31.3	29.9
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83	28.7	31.5	30.0
9/17/83	26.1	31.6	28.3
9/24/83	23.7	28.7	26.3
10/ 1/83	23.0	26.5	24.4
10/ 8/83	24.4	27.4	26.1
10/15/83	24.5	27.5	25.9
10/22/83	24.6	27.2	25.5
10/29/83	18.2	26.7	21.6
11/ 5/83	19.4	22.4	20.6
11/12/83	15.5	21.6	19.3
11/19/83	14.8	19.0	16.3
11/26/83	15.2	20.1	17.0
12/ 3/83	15.7	20.3	17.4
12/10/83	16.0	22.6	18.2
12/17/83	15.4	18.9	16.9
12/24/83	12.7	19.0	16.5
12/31/83	10.0	12.6	10.3
1/ 7/84	10.0	13.0	10.6
1/14/84	10.7	14.4	11.9
1/21/84	10.9	17.7	13.4
1/28/84	10.5	17.8	13.4
2/ 4/84	13.4	17.2	15.2
2/11/84	11.4	16.4	13.6
2/18/84	14.1	22.2	18.1
2/25/84	19.2	23.0	20.6
3/ 3/84	11.6	20.3	15.4
3/10/84	15.2	19.3	17.2
3/17/84	15.5	21.3	18.3
3/24/84	18.5	22.9	20.1
3/31/84	16.2	22.5	19.3
4/ 7/84	17.0	20.7	18.8
4/14/84	18.8	23.4	20.6
4/21/84	17.4	24.4	19.7
4/28/84	20.3	26.2	22.6
5/ 5/84	24.0	28.0	25.6
5/12/84	24.4	29.7	26.2
5/19/84	22.4	28.6	25.5
5/26/84	23.4	29.1	26.3
6/ 2/84	22.1	29.4	25.3
6/ 9/84	23.8	28.9	26.6
6/16/84	26.3	29.7	27.7
6/23/84	26.0	29.3	27.4
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 25B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.1	27.3	26.4
6/25/83	26.5	28.5	27.4
7/ 2/83	27.4	29.5	28.6
7/ 9/83	28.6	30.2	29.3
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83	29.4	30.9	30.3
8/20/83	29.1	32.6	30.5
8/27/83	29.5	32.6	31.3
9/ 3/83	28.5	32.6	30.8
9/10/83	28.4	31.2	30.0
9/17/83	27.1	31.2	29.0
9/24/83	24.1	29.4	27.1
10/ 1/83	21.1	25.1	22.4
10/ 8/83	21.6	24.5	23.5
10/15/83	22.3	24.9	23.7
10/22/83	21.9	23.9	22.7
10/29/83	20.8	24.6	22.2
11/ 5/83	21.3	23.4	22.1
11/12/83	17.2	23.2	21.0
11/19/83	16.2	20.3	17.9
11/26/83	17.5	21.0	18.8
12/ 3/83	15.0	19.8	17.4
12/10/83	14.4	19.4	16.2
12/17/83	13.8	16.6	14.8

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.6	18.7	16.3
12/31/83	10.0	12.9	10.7
1/ 7/84	10.0	12.9	10.8
1/14/84	11.2	13.7	12.2
1/21/84	10.0	14.9	12.5
1/28/84	10.0	15.5	12.2
2/ 4/84	11.7	15.8	13.7
2/11/84	10.0	14.6	12.1
2/18/84	13.2	19.0	16.1
2/25/84	16.4	20.0	18.2
3/ 3/84	10.0	17.2	13.1
3/10/84	13.0	16.6	14.8
3/17/84	14.4	20.2	17.3
3/24/84	18.3	22.1	19.8
3/31/84	15.9	20.7	19.0
4/ 7/84	17.0	19.5	18.4
4/14/84	18.5	22.8	20.3
4/21/84	17.9	22.6	20.0
4/28/84	20.7	25.5	22.7
5/ 5/84	24.7	27.7	25.9
5/12/84	24.4	29.4	26.6
5/19/84	22.9	28.4	25.6
5/26/84	23.4	28.5	26.0
6/ 2/84	22.4	28.5	25.5
6/ 9/84	23.7	28.4	26.3
6/16/84	26.8	28.6	27.7
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 25S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83			
6/25/83			
7/ 2/83			
7/ 9/83			
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83	28.6	30.0	29.3
8/20/83	27.1	32.8	30.0
8/27/83	28.6	32.2	30.7
9/ 3/83	27.8	32.1	30.1
9/10/83	27.6	31.0	29.5
9/17/83	26.7	31.1	28.4
9/24/83	23.2	28.5	26.3
10/ 1/83	21.6	28.3	23.9
10/ 8/83	24.3	28.6	25.5
10/15/83	23.5	28.0	25.5
10/22/83	23.1	26.0	24.2
10/29/83	23.6	24.5	24.1
11/ 5/83			
11/12/83			
11/19/83			
11/26/83			
12/ 3/83	16.9	19.2	17.8
12/10/83	16.4	21.1	18.4
12/17/83	15.9	19.0	17.1
12/24/83	15.3	17.5	16.2
12/31/83	10.0	12.1	10.3
1/ 7/84	10.0	13.6	10.6
1/14/84	10.4	13.3	11.7
1/21/84	10.4	15.9	13.0
1/28/84	10.2	17.4	14.2
2/ 4/84	13.3	17.3	15.3
2/11/84	11.4	17.6	14.3
2/18/84	14.9	19.8	17.2
2/25/84	17.2	21.4	19.1
3/ 3/84	10.0	18.6	14.2
3/10/84	13.9	17.5	15.8
3/17/84	15.0	20.1	17.1
3/24/84	17.1	21.2	19.0
3/31/84	15.0	20.5	18.2
4/ 7/84	15.8	18.7	17.5
4/14/84	17.6	23.8	20.6
4/21/84	19.3	24.4	21.3
4/28/84	21.7	27.1	24.2
5/ 5/84	25.9	28.7	27.2
5/12/84	25.7	31.0	28.0
5/19/84	21.6	29.7	26.0
5/26/84	22.5	28.0	25.7
6/ 2/84	21.5	27.4	24.8
6/ 9/84	23.1	27.9	26.0
6/16/84	26.2	28.0	26.9
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 26B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.9	27.4	26.7
6/25/83	26.3	28.0	27.3
7/ 2/83	27.2	29.2	28.4
7/ 9/83	27.8	30.7	29.3
7/16/83	27.7	30.2	28.9
7/23/83	28.9	30.9	29.7
7/30/83	26.9	29.5	28.4
8/ 6/83	26.9	29.5	28.2
8/13/83	28.4	29.9	29.0
8/20/83	28.0	30.0	28.7
8/27/83	27.8	30.5	29.6
9/ 3/83	26.9	30.7	29.1
9/10/83	27.0	29.7	28.5
9/17/83	25.9	29.8	27.4
9/24/83	22.8	27.4	25.7
10/ 1/83	22.3	25.5	24.3
10/ 8/83	25.1	27.6	26.6
10/15/83	25.6	27.9	26.9
10/22/83	25.2	26.7	25.8
10/29/83	20.0	26.1	22.9
11/ 5/83	21.5	22.9	22.1
11/12/83	17.7	22.8	20.9
11/19/83	16.5	19.5	17.9
11/26/83	17.7	20.8	18.8
12/ 3/83	17.6	20.6	18.8
12/10/83	17.2	22.4	19.4
12/17/83	16.8	20.1	17.9
12/24/83	10.5	17.4	14.0
12/31/83	10.0	10.1	10.0
1/ 7/84	10.0	10.0	10.0
1/14/84	10.0	10.5	10.1
1/21/84	10.0	15.3	12.2
1/28/84	10.0	15.3	13.2
2/ 4/64	12.9	15.9	14.3
2/11/84	10.5	15.9	12.9
2/18/84	14.5	18.8	16.6
2/25/84	17.1	19.9	18.5
3/ 3/84	10.2	17.7	13.7
3/10/84	13.3	16.8	15.3
3/17/84	14.7	19.7	17.2
3/24/84	18.4	21.8	19.6
3/31/84	16.4	20.9	19.2
4/ 7/84	16.9	19.5	18.3
4/14/84	18.3	22.1	20.0
4/21/84	17.9	22.1	19.8
4/28/84	21.0	24.9	22.6
5/ 5/84	24.3	27.3	25.5
5/12/84	23.7	28.7	26.2
5/19/84	23.0	27.4	25.2
5/26/84	23.7	28.1	26.3
6/ 2/84	22.5	27.9	25.6
6/ 9/84	24.2	28.0	26.4
6/16/84	26.7	28.3	27.6
6/23/84	26.9	27.8	27.4
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 26S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.6	28.5	26.8
6/25/83	26.8	28.6	27.6
7/ 2/83	27.6	30.2	28.9
7/ 9/83	27.1	30.9	29.5
7/16/83	27.5	31.0	29.1
7/23/83	29.3	31.5	30.1
7/30/83	27.2	29.7	28.7
8/ 6/83	26.9	30.3	28.3
8/13/83	27.9	29.8	28.8
8/20/83	27.7	30.7	29.1
8/27/83	27.9	31.0	29.7
9/ 3/83	27.1	30.9	29.2
9/10/83	26.8	30.1	28.7
9/17/83	25.4	29.9	27.5
9/24/83	22.6	27.7	25.7
10/ 1/83	22.4	25.3	23.7
10/ 8/83	24.0	26.9	25.7
10/15/83	23.8	27.2	25.8
10/22/83	24.1	25.8	24.8
10/29/83	17.7	25.2	21.1
11/ 5/83	19.4	21.4	20.1
11/12/83	15.3	20.8	18.8
11/19/83	14.0	18.4	15.9
11/26/83	15.0	19.0	16.8
12/ 3/83	15.7	19.1	17.6
12/10/83	16.7	22.4	19.0
12/17/83	16.3	19.8	17.4
12/24/83	13.3	17.3	16.1
12/31/83	10.0	12.9	10.6
1/ 7/84	10.0	12.7	10.7
1/14/84	10.9	13.4	11.9
1/21/84	10.0	15.0	12.5
1/28/84	10.0	15.8	13.1
2/ 4/84	12.3	15.9	14.2
2/11/84	10.2	16.6	12.9
2/18/84	14.5	23.0	17.0
2/25/84	17.2	20.2	18.6
3/ 3/84	10.0	17.9	14.0
3/10/84	13.6	17.3	15.6
3/17/84	14.8	20.6	17.7
3/24/84	18.4	21.8	19.9
3/31/84	16.7	21.2	19.5
4/ 7/84	17.2	20.0	18.8
4/14/84	17.6	21.9	20.0
4/21/84	17.2	21.8	19.2
4/28/84	19.9	24.2	21.8
5/ 5/84	23.6	26.7	24.7
5/12/84	22.6	28.7	25.4
5/19/84	23.1	27.6	24.8
5/26/84	23.7	28.5	26.3
6/ 2/84	22.0	28.0	25.3
6/ 9/84	23.7	28.3	26.2
6/16/84	26.5	28.1	27.3
6/23/84	26.7	27.9	27.3
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 27

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.4	28.4	27.2
6/25/83	27.1	29.1	28.1
7/ 2/83	28.3	30.3	29.2
7/ 9/83	28.7	30.9	30.1
7/16/83	28.7	30.6	29.7
7/23/83	29.8	30.9	30.3
7/30/83	28.1	30.2	29.1
8/ 6/83	27.7	29.4	28.6
8/13/83	28.8	30.5	29.5
8/20/83	28.5	30.8	29.1
8/27/83	28.9	31.4	30.4
9/ 3/83	28.0	30.6	29.6
9/10/83	27.9	30.7	29.3
9/17/83	27.0	30.6	28.2
9/24/83	23.7	27.7	26.3
10/ 1/83	22.2	24.3	23.0
10/ 8/83	23.1	26.0	24.7
10/15/83	24.4	26.1	25.2
10/22/83	23.4	24.9	24.2
10/29/83	18.9	24.3	21.3
11/ 5/83	19.8	21.1	20.4
11/12/83	16.3	20.7	19.3
11/19/83	15.3	17.9	16.6
11/26/83	16.3	18.9	17.3
12/ 3/83	16.7	18.7	17.6
12/10/83	16.6	21.0	18.4
12/17/83	16.1	18.6	17.2

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.9	17.1	16.2
12/31/83	10.0	13.5	10.3
1/ 7/84	10.0	11.5	10.2
1/14/84	10.4	12.5	11.4
1/21/84	11.0	12.6	11.5
1/28/84			
2/ 4/84			
2/11/84			
2/18/84			
2/25/84			
3/ 3/84	13.0	13.3	13.2
3/10/84	12.7	16.2	14.6
3/17/84	14.4	19.8	16.8
3/24/84	18.7	21.7	19.6
3/31/84	16.5	20.8	19.0
4/ 7/84	17.2	19.6	18.4
4/14/84	18.6	21.4	19.8
4/21/84	17.9	21.0	19.4
4/28/84	20.6	24.0	21.7
5/ 5/84	23.7	26.1	24.8
5/12/84	23.9	27.4	25.6
5/19/84	24.2	26.9	25.6
5/26/84			
6/ 2/84			
6/ 9/84			
6/16/84			
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 28

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE	WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83				12/24/83	14.7	18.6	16.6
6/18/83	27.3	28.1	27.6	12/31/83	10.0	15.0	10.8
6/25/83	27.0	29.2	28.0	1/ 7/84	10.0	12.1	10.5
7/ 2/83	28.6	30.1	29.4	1/14/84	11.7	13.2	12.2
7/ 9/83	29.1	30.7	30.0	1/21/84	11.7	16.1	13.1
7/16/83				1/28/84	10.7	15.4	12.7
7/23/83	30.0	31.5	30.7	2/ 4/84	13.5	16.0	14.7
7/30/83	28.1	30.8	29.5	2/11/84	11.7	15.8	13.3
8/ 6/83	28.2	29.9	28.8	2/18/84	13.7	18.8	16.0
8/13/83	28.6	30.8	29.3	2/25/84	17.4	19.9	18.3
8/20/83	28.6	30.6	29.0	3/ 3/84	10.0	17.7	13.6
8/27/83	28.9	31.5	30.3	3/10/84	12.9	16.5	14.9
9/ 3/83	27.3	30.4	29.3	3/17/84	14.7	19.8	16.4
9/10/83	27.4	30.1	28.9	3/24/84	18.1	21.3	19.0
9/17/83	26.5	30.2	27.9	3/31/64	15.8	20.2	18.3
9/24/83	23.5	27.7	26.1	4/ 7/84	16.3	18.6	17.6
10/ 1/83	23.1	24.1	23.7	4/14/84	17.8	22.5	20.1
10/ 8/83				4/21/84	18.4	22.3	20.2
10/15/83				4/28/84	21.2	25.2	22.6
10/22/83				5/ 5/84	24.3	27.8	25.8
10/29/83	19.7	24.0	21.3	5/12/84	25.0	28.4	26.4
11/ 5/83	19.7	20.4	20.1	5/19/84	23.2	29.0	25.6
11/12/83				5/26/84	23.7	27.1	25.4
11/19/83				6/ 2/84	23.0	27.8	25.3
11/26/83				6/ 9/84	24.0	27.9	26.0
12/ 3/83	12.1	18.1	15.9	6/16/84	26.6	28.8	27.5
12/10/83	15.7	18.9	17.0	6/23/84			
12/17/83	14.9	17.2	16.0	6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 29

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE	WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83				12/24/83	15.1	21.2	17.2
6/18/83				12/31/83	10.0	14.7	10.7
6/25/83				1/ 7/84	10.0	13.2	10.8
7/ 2/83				1/14/84	11.3	14.7	12.2
7/ 9/83	28.7	31.6	30.1	1/21/84	11.2	17.7	13.0
7/16/83	28.8	31.9	29.6	1/28/84	10.0	15.8	12.1
7/23/83	29.6	31.3	30.2	2/ 4/84	13.0	16.7	14.6
7/30/83	27.5	30.9	29.0	2/11/84	11.2	16.5	12.9
8/ 6/83	27.5	31.0	28.6	2/18/84	12.9	20.6	15.9
8/13/83	28.1	32.1	29.5	2/25/84	16.9	21.1	18.0
8/20/83	28.2	31.3	29.0	3/ 3/84	10.3	18.2	13.7
8/27/83	28.8	33.0	30.6	3/10/84	12.7	17.0	15.0
9/ 3/83	27.4	31.2	29.5	3/17/84	14.6	21.7	16.8
9/10/83	27.3	31.8	29.1	3/24/84	18.2	22.4	19.3
9/17/83	26.1	30.8	27.6	3/31/84	16.5	20.3	18.6
9/24/83	23.3	27.4	25.7	4/ 7/84	16.8	20.8	18.3
10/ 1/83	22.6	25.1	24.1	4/14/84	17.9	22.9	20.1
10/ 8/83	24.4	27.5	26.0	4/21/84	18.1	22.3	19.8
10/15/83	24.7	26.9	26.2	4/28/84	20.6	25.3	22.0
10/22/83	24.9	26.2	25.3	5/ 5/84	24.0	28.9	25.4
10/29/83	21.4	27.7	23.4	5/12/84	24.6	28.6	26.0
11/ 5/83	21.6	25.2	22.4	5/19/84	25.1	30.1	26.9
11/12/83	18.7	23.2	21.4	5/26/84	23.4	29.7	25.3
11/19/83	17.7	20.3	18.5	6/ 2/84	24.0	28.9	25.9
11/26/83	17.9	21.5	19.2	6/ 9/84	23.5	29.5	26.1
12/ 3/83	16.7	20.3	18.3	6/16/84	24.3	29.1	26.3
12/10/83	16.6	20.7	18.2	6/23/84			
12/17/83	16.0	19.2	17.2	6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 30

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.2	28.7	27.6
6/25/83	27.1	28.5	27.7
7/ 2/83	28.1	29.1	28.6
7/ 9/83	28.3	29.9	29.2
7/16/83	28.0	29.9	28.9
7/23/83	29.3	30.2	29.8
7/30/83	27.5	29.4	28.7
8/ 6/83	27.3	29.6	28.3
8/13/83	28.2	30.0	28.9
8/20/83	28.0	30.9	28.9
8/27/83	28.6	30.9	30.0
9/ 3/83	26.2	30.6	29.1
9/10/83	27.2	29.8	28.4
9/17/83	26.2	29.5	27.5
9/24/83	23.4	26.5	25.7
10/ 1/83	22.6	23.6	23.2
10/ 8/83			
10/15/83			
10/22/83			
10/29/83	20.9	25.2	22.7
11/ 5/83	21.5	23.8	22.3
11/12/83	18.2	23.4	21.4
11/19/83	17.4	20.5	18.5
11/26/83	17.7	22.1	18.7
12/ 3/83	17.5	20.0	18.4
12/10/83	17.8	21.3	18.8
12/17/83	16.8	19.6	17.9

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	14.8	18.8	17.0
12/31/83	10.0	14.5	10.6
1/ 7/84	10.0	13.1	10.2
1/14/84	10.7	14.6	11.7
1/21/84	10.9	17.0	12.4
1/28/84	10.0	15.8	11.7
2/ 4/84	12.6	16.7	13.9
2/11/84	11.0	16.2	12.6
2/18/84	11.9	19.8	15.9
2/25/84	17.5	20.7	18.5
3/ 3/84	11.0	18.2	14.2
3/10/84	13.5	18.1	15.6
3/17/84	14.6	20.4	16.4
3/24/84	17.9	20.8	18.8
3/31/84	16.4	19.8	18.2
4/ 7/84	16.3	18.9	17.7
4/14/84	17.6	22.7	20.0
4/21/84	18.6	22.0	20.1
4/28/84	20.9	24.8	22.2
5/ 5/84	24.2	27.9	25.4
5/12/84	24.7	30.1	25.9
5/19/84	20.9	29.7	24.6
5/26/84	21.4	25.2	23.3
6/ 2/84	23.7	25.7	24.2
6/ 9/84			
6/16/84			
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 31B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.1	28.2	27.6
6/25/83	27.3	29.2	28.1
7/ 2/83	28.2	29.9	29.1
7/ 9/83	28.7	30.6	29.8
7/16/83	28.8	30.8	29.4
7/23/83	29.7	30.7	30.2
7/30/83	27.9	30.0	29.0
8/ 6/83	27.8	29.1	28.3
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83	28.4	30.1	29.0
9/17/83	26.4	29.8	27.7
9/24/83	23.3	26.9	25.8
10/ 1/83	21.4	23.8	22.9
10/ 8/83	22.2	26.4	24.4
10/15/83	22.4	26.2	24.6
10/22/83	22.4	25.4	23.5
10/29/83	20.4	24.7	22.6
11/ 5/83	21.2	22.2	21.6
11/12/83	17.7	22.3	20.6
11/19/83	16.7	20.6	17.8
11/26/83	16.9	20.4	17.7
12/ 3/83	17.4	18.8	18.0
12/10/83	17.1	20.6	18.4
12/17/83	16.3	19.4	17.4
12/24/83	15.4	19.1	16.7
12/31/83	10.0	14.9	10.5
1/ 7/84	10.0	12.1	10.1
1/14/84	10.9	14.4	11.8
1/21/84	11.2	16.1	12.6
1/28/84	10.1	16.5	12.3
2/ 4/84	13.3	17.0	14.4
2/11/84	11.4	17.3	13.0
2/18/84	12.9	14.0	13.4
2/25/84			
3/ 3/84			
3/10/84			
3/17/84	14.6	19.4	16.6
3/24/84	16.7	19.7	18.0
3/31/84	15.4	19.9	17.5
4/ 7/84	15.5	18.2	16.7
4/14/84	16.5	20.1	18.4
4/21/84	17.1	19.6	18.4
4/28/84	19.3	22.9	20.6
5/ 5/84	22.2	24.8	23.3
5/12/84	22.8	26.4	24.2
5/19/84	22.1	26.5	24.0
5/26/84	22.6	25.6	24.3
6/ 2/84	22.0	25.7	24.2
6/ 9/84	22.9	26.4	24.8
6/16/84	25.3	27.7	26.1
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 31S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.9	28.2	26.9
6/25/83	26.0	28.6	27.1
7/ 2/83	27.2	30.4	28.3
7/ 9/83	27.3	30.5	28.9
7/16/83	27.7	30.2	28.7
7/23/83	29.1	30.8	29.7
7/30/83	26.4	29.1	28.2
8/ 6/83			
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83	27.7	30.2	28.6
9/17/83	25.4	29.7	27.2
9/24/83	22.6	26.6	25.3
10/ 1/83	21.6	27.2	23.4
10/ 8/83	24.3	27.0	25.8
10/15/83	24.5	26.4	25.8
10/22/83	24.3	25.2	24.6
10/29/83	21.0	25.6	23.6
11/ 5/83	22.1	24.6	22.9
11/12/83	18.6	23.6	21.7
11/19/83	17.2	21.8	18.8
11/26/83	18.0	21.9	18.9
12/ 3/83	17.6	20.5	18.6
12/10/83	16.8	21.3	18.5
12/17/83	16.3	19.7	17.6

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	14.0	18.1	16.1
12/31/83	10.0	12.3	10.2
1/ 7/84	10.0	12.2	10.2
1/14/84	10.0	13.3	11.0
1/21/84	10.3	15.7	12.3
1/28/84	10.3	16.3	12.7
2/ 4/84	13.3	16.7	14.4
2/11/84	11.5	17.1	13.4
2/18/84	13.4	23.2	15.7
2/25/84	17.3	20.5	18.2
3/ 3/84	10.8	18.4	14.1
3/10/84	13.1	18.0	15.3
3/17/84	14.8	20.4	17.1
3/24/84	18.7	20.6	19.4
3/31/84	17.2	20.9	19.0
4/ 7/84	17.3	19.9	18.4
4/14/84	18.5	23.5	20.2
4/21/84	18.2	23.1	19.7
4/28/84	20.8	24.9	22.2
5/ 5/84	23.4	26.7	24.8
5/12/84	23.8	27.7	25.5
5/19/84	23.4	27.7	25.2
5/26/84	23.8	27.9	25.7
6/ 2/84	23.2	27.2	25.6
6/ 9/84	24.3	29.9	26.6
6/16/84	26.9	29.0	27.6
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 32B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	27.0	27.6	27.3
6/18/83	26.5	27.7	27.2
6/25/83	27.0	29.0	27.9
7/ 2/83	28.3	30.2	29.2
7/ 9/83	29.2	30.2	29.8
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83	28.4	29.8	28.9
8/20/83	28.0	30.1	28.5
8/27/83	28.4	30.9	29.7
9/ 3/83	27.3	29.5	28.8
9/10/83	27.2	29.4	28.4
9/17/83	26.3	29.4	27.6
9/24/83	23.3	26.7	25.7
10/ 1/83	22.6	25.4	24.3
10/ 8/83	24.9	27.4	26.3
10/15/83	25.3	27.2	26.6
10/22/83	25.1	26.2	25.7
10/29/83	21.1	25.8	23.2
11/ 5/83	21.5	22.8	22.1
11/12/83	18.2	22.7	21.2
11/19/83	17.1	19.5	18.3
11/26/83	17.3	20.2	18.3
12/ 3/83	17.2	19.0	18.2
12/10/83	17.3	19.8	18.4
12/17/83	16.8	18.4	17.5

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	14.8	17.9	16.8
12/31/83	10.0	14.4	10.5
1/ 7/84	10.0	11.7	10.2
1/14/84	11.1	13.0	11.7
1/21/84	11.0	15.7	12.5
1/28/84	10.0	15.0	12.0
2/ 4/84	13.2	15.9	14.2
2/11/84	11.1	15.5	12.7
2/18/84	12.6	13.9	13.4
2/25/84			
3/ 3/84			
3/10/84			
3/17/84			
3/24/84			
3/31/84			
4/ 7/84			
4/14/84	19.5	21.7	20.4
4/21/84	18.4	21.2	19.8
4/28/84	20.5	23.7	21.7
5/ 5/84	23.3	26.2	24.8
5/12/84	24.8	27.1	25.7
5/19/84	23.6	27.8	25.3
5/26/84	24.1	27.0	25.5
6/ 2/84	23.5	27.6	25.6
6/ 9/84	24.2	27.5	26.0
6/16/84	26.9	28.0	27.3
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 32S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83	26.6	27.7	27.2
6/18/83	25.9	28.6	27.1
6/25/83	27.2	29.5	28.0
7/ 2/83	28.3	30.6	29.3
7/ 9/83	29.3	30.7	30.0
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83	28.6	30.5	29.4
8/20/83	27.9	32.1	29.3
8/27/83	29.1	32.3	30.5
9/ 3/83	27.7	30.4	29.4
9/10/83	27.4	30.2	28.9
9/17/83	26.1	30.0	27.9
9/24/83	23.6	27.3	26.1
10/ 1/83	22.5	25.6	23.5
10/ 8/83	24.0	26.7	25.4
10/15/83	24.1	26.2	25.4
10/22/83	24.0	25.1	24.6
10/29/83	19.9	24.7	22.3
11/ 5/83	20.9	23.2	21.6
11/12/83	17.4	21.6	20.4
11/19/83	16.4	18.6	17.5
11/26/83	17.0	19.3	17.7
12/ 3/83	17.3	19.3	17.9
12/10/83	16.6	19.6	18.2
12/17/83	16.1	18.1	17.1
12/24/83	14.4	18.4	16.6
12/31/83	10.0	14.1	10.5
1/ 7/84	10.0	12.7	10.3
1/14/84	10.7	13.1	11.6
1/21/84	10.2	15.1	12.0
1/28/84	10.0	14.8	11.6
2/ 4/84	12.5	15.3	13.6
2/11/84	10.1	14.8	12.2
2/18/84	12.5	18.5	15.1
2/25/84	16.7	19.8	17.6
3/ 3/84	10.0	18.1	13.2
3/10/84	12.1	15.8	14.3
3/17/84	14.2	15.7	14.7
3/24/84			
3/31/84	16.0	20.5	18.2
4/ 7/84	16.5	18.8	17.8
4/14/84	17.7	21.1	19.1
4/21/84	17.2	21.5	18.6
4/28/84	19.5	23.7	20.9
5/ 5/84	22.5	25.4	23.6
5/12/84	23.0	26.8	24.5
5/19/84	22.8	26.9	24.5
5/26/84	23.4	27.4	25.3
6/ 2/84	22.9	27.5	25.2
6/ 9/84	23.8	27.7	25.7
6/16/84	26.5	28.0	26.9
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 33B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.1	26.6	26.4
6/25/83	26.1	27.5	26.7
7/ 2/83	27.1	28.5	27.9
7/ 9/83	27.3	29.2	28.5
7/16/83	26.9	28.8	28.0
7/23/83	28.0	29.6	28.7
7/30/83	26.3	28.7	27.7
8/ 6/83	26.2	27.2	26.6
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83	29.3	30.6	29.9
9/17/83	27.2	30.7	28.6
9/24/83	24.2	28.5	26.8
10/ 1/83	22.7	24.9	23.5
10/ 8/83	23.4	25.9	25.0
10/15/83	24.7	26.4	25.6
10/22/83	24.0	25.1	24.5
10/29/83	20.1	24.6	22.4
11/ 5/83	21.1	21.9	21.5
11/12/83	17.7	21.7	20.5
11/19/83	16.5	19.0	17.7
11/26/83	17.2	19.6	18.2
12/ 3/83	17.4	18.6	18.0
12/10/83	16.7	19.9	18.3
12/17/83	15.9	18.1	17.0

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.7	16.8	15.8
12/31/83	10.0	13.4	10.3
1/ 7/84	10.0	11.4	10.1
1/14/84	10.2	12.6	11.3
1/21/84	10.0	13.9	11.7
1/28/84	10.0	14.3	11.5
2/ 4/84	12.0	15.0	13.3
2/11/84	10.0	13.8	11.7
2/18/84	12.4	18.8	15.8
2/25/84	17.9	19.9	18.8
3/ 3/84	10.2	18.2	14.4
3/10/84	12.7	16.6	15.1
3/17/84	15.3	19.0	17.1
3/24/84	18.3	21.1	19.1
3/31/84	16.4	20.2	18.6
4/ 7/84	16.6	18.5	17.9
4/14/84	18.0	21.6	19.8
4/21/84	18.0	21.7	19.7
4/28/84	20.7	23.3	21.6
5/ 5/84	23.3	26.1	24.8
5/12/84	24.2	27.6	25.7
5/19/84	23.3	26.4	24.9
5/26/84	23.8	26.5	25.3
6/ 2/84	22.8	27.1	25.2
6/ 9/84	23.6	27.0	25.5
6/16/84	26.5	27.6	27.1
6/23/84	26.6	27.1	26.9
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 33S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.1	28.5	27.6
6/25/83	27.0	28.6	27.8
7/ 2/83	28.2	30.0	29.1
7/ 9/83	28.6	31.8	30.2
7/16/83	28.4	30.9	29.8
7/23/83	29.8	31.8	30.5
7/30/83	27.9	30.2	29.2
8/ 6/83	27.7	29.5	28.2
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83	28.6	30.2	29.2
9/17/83	25.9	30.5	28.0
9/24/83	23.4	28.5	26.1
10/ 1/83	23.0	24.8	23.7
10/ 8/83	24.1	26.8	25.8
10/15/83	24.9	26.8	25.9
10/22/83	24.5	25.6	25.0
10/29/83	20.3	25.2	22.6
11/ 5/83	21.1	22.1	21.6
11/12/83	17.8	21.7	20.5
11/19/83	16.3	18.9	17.7
11/26/83	17.2	19.9	18.3
12/ 3/83	17.8	19.1	18.4
12/10/83			
12/17/83			

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.1	15.9	15.0
12/31/83	10.0	12.6	10.2
1/ 7/84	10.0	11.5	10.1
1/14/84	10.0	11.8	10.6
1/21/84	10.0	14.2	11.6
1/28/84	10.0	15.3	11.9
2/ 4/84	12.2	15.0	13.6
2/11/84	10.0	15.1	12.0
2/18/84	12.7	17.9	15.3
2/25/84	16.7	19.0	17.6
3/ 3/84	10.0	17.3	13.5
3/10/84	12.5	16.0	14.5
3/17/84	14.3	18.2	15.9
3/24/84	17.6	20.7	18.4
3/31/84	15.2	20.3	17.9
4/ 7/84	15.5	18.1	17.2
4/14/84	17.3	20.9	19.1
4/21/84	17.3	21.7	18.9
4/28/84	19.9	23.4	21.1
5/ 5/84	22.9	24.3	23.5
5/12/84			
5/19/84	22.5	25.4	23.6
5/26/84	23.0	26.9	24.9
6/ 2/84	22.1	26.6	24.7
6/ 9/84	23.1	26.9	25.2
6/16/84	26.0	27.0	26.5
6/23/84	26.0	26.7	26.3
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 34

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE	WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83				12/24/83	13.6	16.0	15.0
6/18/83	26.8	27.9	27.1	12/31/83	10.0	13.3	10.2
6/25/83	27.0	28.2	27.5	1/ 7/84	10.0	10.1	10.0
7/ 2/83	27.8	29.3	28.6	1/14/84	10.0	11.5	10.4
7/ 9/83	28.7	30.2	29.4	1/21/84	10.0	12.6	10.8
7/16/83	28.8	29.7	29.2	1/28/84	10.0	12.9	10.6
7/23/83	29.0	30.1	29.6	2/ 4/84	11.3	13.4	12.3
7/30/83	27.9	29.7	28.8	2/11/84	10.0	12.6	10.8
8/ 6/83	27.4	28.7	28.0	2/18/84	11.0	16.3	13.5
8/13/83	28.2	29.4	28.7	2/25/84	15.0	17.4	16.2
8/20/83	28.0	29.4	28.3	3/ 3/84	10.0	15.8	12.4
8/27/83	28.9	30.8	29.9	3/10/84	11.0	14.2	13.0
9/ 3/83	28.9	29.6	29.3	3/17/84	13.0	18.9	15.7
9/10/83				3/24/84	18.3	21.1	19.0
9/17/83	25.4	26.3	26.0	3/31/84	16.5	20.2	18.6
9/24/83	22.8	26.1	25.1	4/ 7/84	17.2	18.7	18.0
10/ 1/83	21.9	23.3	22.9	4/14/84	17.9	20.2	18.7
10/ 8/83				4/21/84	17.3	20.1	18.8
10/15/83				4/28/84	19.5	22.3	20.5
10/22/83				5/ 5/84	22.2	24.6	23.5
10/29/83	20.7	22.0	20.9	5/12/84	23.7	25.9	24.6
11/ 5/83	20.8	21.5	21.2	5/19/84	23.5	26.6	24.8
11/12/83	17.7	21.3	20.1	5/26/84	24.4	26.3	25.2
11/19/83	16.4	18.5	17.4	6/ 2/84	24.0	27.2	25.6
11/26/83	16.6	18.6	17.6	6/ 9/84	24.3	26.7	25.5
12/ 3/83	15.6	18.1	16.6	6/16/84	26.4	27.6	27.2
12/10/83	15.1	17.8	16.4	6/23/84	27.0	27.4	27.2
12/17/83	14.4	16.1	15.3	6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 35

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.5	27.5	26.9
6/25/83	26.4	28.1	27.1
7/ 2/83	27.5	29.2	28.3
7/ 9/83	28.1	30.0	29.2
7/16/83	28.4	29.4	28.9
7/23/83	28.7	29.9	29.1
7/30/83	26[illegible]	29.0	27.6
8/ 6/83	25[illegible]	27.5	26.3
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83	28.6	30.4	29.1
9/17/83	26.5	29.7	27.8
9/24/83	23.4	26.8	26.0
10/ 1/83	22.9	24.4	23.5
10/ 8/83	23.6	26.5	25.4
10/15/83	24.6	26.3	25.7
10/22/83	24.1	25.4	24.7
10/29/83	19.8	24.9	21.9
11/ 5/83	20.2	21.3	20.8
11/12/83	17.1	20.9	19.6
11/19/83	15.9	18.2	17.0
11/26/83	16.2	18.2	17.1
12/ 3/83	16.8	18.4	17.3
12/10/83	16.6	18.7	17.6
12/17/83	15.8	17.6	16.6

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	12.2	16.2	14.4
12/31/83	10.0	12.0	10.1
1/ 7/84	10.0	10.0	10.0
1/14/84	10.0	10.5	10.0
1/21/84	10.0	13.9	11.4
1/28/84	10.0	14.1	11.4
2/ 4/84	12.7	14.7	13.5
2/11/84	10.5	14.2	12.1
2/18/84	12.2	18.1	15.1
2/25/84	16.9	19.4	17.9
3/ 3/84	10.0	17.6	13.7
3/10/84	12.7	16.1	14.7
3/17/84	14.8	15.3	15.1
3/24/84			
3/31/84	16.6	20.9	18.8
4/ 7/84	17.4	19.2	18.4
4/14/84	18.5	21.7	19.8
4/21/84	18.5	21.4	19.8
4/28/84	20.3	24.0	21.6
5/ 5/84	23.6	26.0	24.9
5/12/84	25.0	27.0	25.9
5/19/84	24.0	27.2	25.4
5/26/84	24.2	26.6	25.5
6/ 2/84	23.9	27.3	25.6
6/ 9/84	24.4	27.1	25.8
6/16/84	26.7	28.2	27.4
6/23/84	27.0	27.6	27.2
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 36

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.7	27.7	27.1
6/25/83	26.5	28.1	27.2
7/ 2/83	27.8	29.4	28.6
7/ 9/83	28.8	30.3	29.5
7/16/83	27.9	29.8	28.9
7/23/83	28.0	31.6	29.6
7/30/83	27.5	31.1	29.0
8/ 6/83	27.3	29.0	27.9
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	23.4	24.9	24.0
10/ 8/83	24.1	26.6	25.6
10/15/83	24.8	26.5	25.8
10/22/83	24.3	25.3	24.9
10/29/83	20.4	25.2	22.8
11/ 5/83	21.2	22.2	21.7
11/12/83	18.3	21.9	20.7
11/19/83	17.0	19.0	18.2
11/26/83	17.4	19.5	18.2
12/ 3/83	15.3	18.6	16.8
12/10/83	15.2	18.1	16.4
12/17/83	14.4	16.8	15.5
12/24/83	14.5	17.8	15.6
12/31/83	10.0	14.5	10.4
1/ 7/84	10.0	10.8	10.0
1/14/84	10.0	13.1	11.0
1/21/84	10.6	15.4	12.0
1/28/84	10.3	14.6	12.0
2/ 4/84	13.4	15.5	14.2
2/11/84	11.6	15.5	12.9
2/18/84	12.7	17.5	14.9
2/25/84	16.7	18.8	17.7
3/ 3/84	11.2	17.5	14.1
3/10/84	13.0	17.3	15.0
3/17/84	14.8	15.4	15.1
3/24/84			
3/31/84			
4/ 7/84			
4/14/84	18.7	21.2	19.8
4/21/84	18.3	20.7	19.6
4/28/84	20.5	23.6	21.8
5/ 5/84	23.3	25.6	24.5
5/12/84	24.7	26.9	25.6
5/19/84	23.3	27.1	25.0
5/26/84	23.7	26.5	25.1
6/ 2/84	23.5	26.9	25.3
6/ 9/84	24.0	27.2	25.6
6/16/84	26.5	28.0	27.2
6/23/84	26.8	27.1	26.9
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 37B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.9	27.5	27.2
6/25/83	27.0	28.2	27.4
7/ 2/83	28.0	29.6	28.8
7/ 9/83	28.7	30.1	29.5
7/16/83	28.9	29.4	29.1
7/23/83	28.9	30.1	29.5
7/30/83	27.1	29.4	28.6
8/ 6/83	27.5	29.1	28.1
8/13/83	28.4	29.9	29.0
8/20/83	28.0	29.7	28.4
8/27/83	28.8	30.9	29.8
9/ 3/83	27.7	29.8	28.8
9/10/83	27.6	29.2	28.4
9/17/83	26.1	28.9	27.3
9/24/83	23.1	26.6	25.7
10/ 1/83	22.2	23.9	22.9
10/ 8/83	22.6	25.3	24.3
10/15/83	24.1	25.4	24.7
10/22/83	23.3	24.3	23.9
10/29/83	20.8	24.9	22.7
11/ 5/83	21.6	22.7	22.0
11/12/83	18.6	22.2	20.9
11/19/83	17.0	19.3	18.3
11/26/83	17.4	19.3	18.3
12/ 3/83	17.1	18.9	17.8
12/10/83	16.7	19.2	17.8
12/17/83	16.2	17.6	17.0

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	16.3	16.7	16.4
12/31/83			
1/ 7/84			
1/14/84	11.1	12.6	11.5
1/21/84	10.0	12.6	11.2
1/28/84	10.0	12.9	10.6
2/ 4/84	11.4	13.4	12.4
2/11/84	10.0	12.9	11.1
2/18/84	11.2	17.3	14.6
2/25/84	16.6	18.7	17.4
3/ 3/84	10.3	17.2	13.7
3/10/84	12.2	15.5	14.3
3/17/84	14.6	19.2	16.4
3/24/84	18.4	21.0	19.1
3/31/84	16.6	20.3	18.7
4/ 7/84	17.2	19.0	18.2
4/14/84	17.2	20.1	18.6
4/21/84	17.7	20.0	19.0
4/28/84	19.7	23.0	21.1
5/ 5/84	22.5	25.2	24.0
5/12/84	23.8	26.5	25.0
5/19/84	23.9	25.8	24.9
5/26/84			
6/ 2/84			
6/ 9/84			
6/16/84			
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 37S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.1	28.3	26.7
6/25/83	26.2	27.7	26.9
7/ 2/83	27.1	29.4	28.3
7/ 9/83	28.2	31.6	29.4
7/16/83	28.3	30.2	29.0
7/23/83	29.1	30.5	29.7
7/30/83	27.8	29.6	28.8
8/ 6/83	27.6	28.5	27.8
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	22.5	25.1	23.3
10/ 8/83	23.5	26.2	25.3
10/15/83	24.3	26.0	25.4
10/22/83	24.1	25.6	24.7
10/29/83	20.4	25.1	22.8
11/ 5/83	21.0	22.9	21.8
11/12/83	18.3	21.9	20.8
11/19/83	16.7	19.2	18.1
11/26/83	17.5	19.4	18.3
12/ 3/83	17.3	19.2	18.1
12/10/83	15.7	19.6	17.5
12/17/83	15.6	17.9	16.5
12/24/83	15.3	16.3	15.8
12/31/83			
1/ 7/84			
1/14/84	11.2	12.8	11.7
1/21/84	10.5	13.[illegible]	12.2
1/28/84	10.0	16.2	12.4
2/ 4/84	12.8	15.2	13.9
2/11/84	10.6	16.1	12.9
2/18/84	11.8	15.7	13.6
2/25/84	14.5	17.5	15.5
3/ 3/84	10.0	15.7	12.0
3/10/84	10.5	14.3	12.5
3/17/84	12.7	18.8	16.1
3/24/84	17.8	21.3	18.7
3/31/84	16.1	20.0	18.3
4/ 7/84	16.3	18.3	17.6
4/14/84	16.5	19.4	17.7
4/21/84	15.9	19.5	17.3
4/28/84	18.2	21.8	19.6
5/ 5/84	20.9	23.7	22.2
5/12/84	20.8	24.8	23.2
5/19/84	21.9	24.0	23.0
5/26/84			
6/ 2/84			
6/ 9/84			
6/16/84			
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 38B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83			
6/25/83			
7/ 2/83			
7/ 9/83	28.9	30.3	29.7
7/16/83	29.0	30.7	29.7
7/23/83	30.0	31.0	30.4
7/30/83	28.5	30.5	29.6
8/ 6/83	28.0	29.2	28.6
8/13/83	28.5	29.6	29.0
8/20/83	28.1	30.1	28.6
8/27/83	28.9	30.7	29.9
9/ 3/83	27.9	29.7	28.9
9/10/83	27.7	29.8	28.7
9/17/83	26.5	29.4	27.7
9/24/83	23.8	27.0	26.1
10/ 1/83	22.9	25.4	24.0
10/ 8/83	23.9	26.1	25.4
10/15/83	24.4	26.0	25.6
10/22/83	24.2	25.0	24.6
10/29/83	21.5	25.9	23.3
11/ 5/83	22.1	23.0	22.5
11/12/83	18.9	22.7	21.4
11/19/83	17.5	19.6	18.7
11/26/83	17.9	19.8	18.7
12/ 3/83	16.7	19.2	17.9
12/10/83	16.2	18.7	17.5
12/17/83	15.4	17.1	16.4
12/24/83	15.1	16.8	16.3
12/31/83	10.0	14.8	10.6
1/ 7/84	10.0	10.3	10.0
1/14/84	10.1	12.3	11.1
1/21/84	11.0	13.9	12.0
1/28/84	10.4	14.1	12.0
2/ 4/84	12.9	15.1	13.7
2/11/84	11.3	14.6	12.7
2/18/84	12.7	17.4	15.0
2/25/84	16.7	18.7	17.8
3/ 3/84	10.5	17.9	14.2
3/10/84	12.9	16.0	14.8
3/17/84	13.2	16.8	14.7
3/24/84	16.3	18.0	16.8
3/31/84	14.4	17.9	16.4
4/ 7/84	14.9	16.7	15.9
4/14/84	16.0	21.5	19.5
4/21/84	18.9	21.0	20.1
4/28/84	20.8	23.5	21.8
5/ 5/84	23.5	25.7	24.7
5/12/84	24.8	27.0	25.8
5/19/84	23.3	26.7	24.9
5/26/84	23.5	26.2	24.9
6/ 2/84	23.6	26.2	25.1
6/ 9/84	23.9	26.5	25.2
6/16/84	26.0	27.5	26.8
6/23/84	26.3	26.9	26.5
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 38S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.5	28.3	27.9
6/25/83	27.6	29.1	28.2
7/ 2/83	28.6	30.7	29.5
7/ 9/83	29.1	31.0	30.2
7/16/83	29.4	30.8	30.1
7/23/83	30.0	31.4	30.6
7/30/83	28.4	30.5	29.6
8/ 6/83	28.0	29.6	28.8
8/13/83	28.8	30.1	29.3
8/20/83	28.1	30.6	29.0
8/27/83	29.2	31.2	30.3
9/ 3/83	28.1	30.0	29.3
9/10/83	27.9	29.9	29.0
9/17/83	26.1	30.1	27.8
9/24/83	23.6	27.1	26.1
10/ 1/83	22.1	24.3	23.0
10/ 8/83	23.1	25.7	24.8
10/15/83	23.6	25.6	25.0
10/22/83	23.2	24.5	24.0
10/29/83	20.7	24.9	22.7
11/ 5/83	21.4	22.4	21.8
11/12/83	18.3	21.7	20.7
11/19/83	17.1	19.3	18.3
11/26/83	17.6	19.3	18.2
12/ 3/83	16.5	18.7	17.5
12/10/83	16.2	18.7	17.4
12/17/83	15.6	17.2	16.4
12/24/83	14.3	16.4	15.7
12/31/83	10.0	13.9	10.6
1/ 7/84	10.0	10.6	10.0
1/14/84	10.2	11.9	10.9
1/21/84	10.8	13.7	12.1
1/28/84	10.4	14.4	12.3
2/ 4/84	13.5	15.3	14.2
2/11/84	11.5	15.0	13.1
2/18/84	13.3	18.0	15.5
2/25/84	17.3	19.1	18.1
3/ 3/84	11.6	18.0	14.8
3/10/84	13.6	16.3	15.3
3/17/84	14.6	18.5	16.1
3/24/84	17.8	19.7	18.6
3/31/84	16.3	19.6	18.3
4/ 7/84	16.6	18.5	17.7
4/14/84	17.9	21.7	20.0
4/21/84	18.8	21.6	20.2
4/28/84	21.0	24.2	22.3
5/ 5/84	23.7	26.1	25.1
5/12/84	25.2	27.8	26.3
5/19/84	21.8	27.5	24.5
5/26/84	22.2	25.1	23.6
6/ 2/84	21.9	25.0	23.7
6/ 9/84	22.4	25.3	24.0
6/16/84	24.6	26.1	25.4
6/23/84	25.0	25.8	25.3
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 39S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.2	29.7	28.1
6/25/83	27.1	28.7	28.1
7/ 2/83	28.0	30.9	28.9
7/ 9/83	28.6	30.8	29.7
7/16/83	28.8	31.1	29.8
7/23/83	29.5	31.8	30.5
7/30/83	28.1	30.3	29.3
8/ 6/83	28.0	28.7	28.3
8/13/83			
8/20/83	29.2	31.8	30.1
8/27/83	29.3	31.6	30.5
9/ 3/83	27.7	30.7	29.5
9/10/83	27.6	29.9	28.9
9/17/83	26.4	30.1	28.0
9/24/83	23.8	27.5	26.3
10/ 1/83	22.5	24.9	23.5
10/ 8/83	23.4	26.2	25.1
10/15/83	23.8	26.2	25.2
10/22/83	23.8	25.1	24.4
10/29/83	20.3	24.9	22.5
11/ 5/83	21.0	22.0	21.4
11/12/83	18.0	21.4	20.4
11/19/83	16.6	18.9	17.8
11/26/83	16.8	19.0	17.8
12/ 3/83	16.4	18.3	17.4
12/10/83	15.9	19.2	17.6
12/17/83	15.5	17.5	16.7

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.4	17.1	15.7
12/31/83	10.0	14.1	10.4
1/ 7/84	10.0	11.0	10.1
1/14/84	10.0	13.0	10.9
1/21/84	10.2	13.9	11.7
1/28/84	10.0	15.1	11.7
2/ 4/84	12.7	14.6	13.5
2/11/84	11.0	15.3	12.4
2/18/84	12.2	17.2	14.6
2/25/84	16.8	18.5	17.8
3/ 3/84	11.4	17.9	14.4
3/10/84	13.3	16.4	15.2
3/17/84	15.1	18.9	16.8
3/24/84	18.5	21.1	19.2
3/31/84	16.8	20.2	18.8
4/ 7/84	17.2	19.2	18.3
4/14/84	18.5	21.1	19.7
4/21/84	18.7	22.0	19.8
4/28/84	20.6	23.9	21.9
5/ 5/84	23.3	25.9	24.6
5/12/84	24.4	27.5	25.7
5/19/84	23.6	26.6	25.3
5/26/84	23.9	27.3	25.8
6/ 2/84	24.0	27.3	25.8
6/ 9/84	24.4	28.7	26.2
6/16/84	26.7	28.3	27.6
6/23/84	26.9	28.0	27.4
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 40

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.9	27.6	27.1
6/25/83	26.8	28.5	27.5
7/ 2/83	28.2	29.6	28.9
7/ 9/83	28.9	30.1	29.5
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83	29.0	30.6	29.6
8/20/83	28.6	30.4	29.1
8/27/83	29.2	31.2	30.3
9/ 3/83	29.4	30.5	29.9
9/10/83			
9/17/83			
9/24/83	23.7	27.6	25.9
10/ 1/83	23.4	24.4	24.0
10/ 8/83			
10/15/83			
10/22/83	24.7	25.6	25.2
10/29/83	19.8	25.4	22.3
11/ 5/83	20.4	21.5	20.9
11/12/83	17.5	21.2	19.9
11/19/83	15.8	18.3	17.1
11/26/83	16.4	18.7	17.5
12/ 3/83	16.0	18.0	17.1
12/10/83	14.7	19.0	17.0
12/17/83	14.9	16.6	15.8

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.9	16.0	15.4
12/31/83	10.0	13.6	10.2
1/ 7/84	10.0	10.2	10.0
1/14/84	10.0	11.8	10.0
1/21/84	10.8	13.4	12.0
1/28/84	10.0	13.9	11.6
2/ 4/84	12.5	14.7	13.7
2/11/84	11.1	13.9	12.3
2/18/84	12.5	18.2	15.7
2/25/84	17.7	19.4	18.4
3/ 3/84	10.9	18.0	14.5
3/10/84	12.9	16.7	15.4
3/17/84	14.9	18.7	16.1
3/24/84	17.9	20.4	18.7
3/31/84	16.2	19.5	18.3
4/ 7/84	16.5	18.5	17.6
4/14/84	17.9	21.3	19.8
4/21/84	18.4	21.1	19.9
4/28/84	20.8	23.8	22.0
5/ 5/84	23.4	25.7	24.7
5/12/84	23.7	27.1	25.5
5/19/84	23.9	26.6	25.0
5/26/84	24.1	26.8	25.5
6/ 2/84	23.6	27.3	25.7
6/ 9/84	24.1	26.7	25.5
6/16/84	26.2	27.5	27.1
6/23/84	27.1	27.5	27.3
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 41

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.1	27.5	27.3
6/25/83	26.9	28.9	27.7
7/ 2/83	27.8	30.2	28.9
7/ 9/83	28.2	30.9	29.6
7/16/83	28.2	30.4	29.1
7/23/83	28.9	30.7	29.7
7/30/83	27.0	29.8	28.5
8/ 6/83	27.3	29.4	28.2
8/13/83	27.8	29.8	28.7
8/20/83	27.8	31.0	28.7
8/27/83	27.8	31.4	29.7
9/ 3/83	28.6	30.1	29.2
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	22.2	23.4	22.6
10/ 8/83	22.7	25.2	24.2
10/15/83	23.8	25.1	24.4
10/22/83	22.5	24.3	23.4
10/29/83	19.8	23.8	21.7
11/ 5/83	20.4	21.9	21.2
11/12/83	20.0	22.0	20.8
11/19/83	16.7	21.1	18.1
11/26/83	15.5	17.7	16.9
12/ 3/83	16.6	19.6	18.0
12/10/83	15.5	20.7	17.9
12/17/83	15.2	17.9	16.4

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.7	16.6	15.4
12/31/83	10.0	13.3	10.2
1/ 7/84	10.0	10.8	10.0
1/14/84	10.0	13.1	10.8
1/21/84	10.3	15.1	12.4
1/28/84	10.5	15.8	12.9
2/ 4/84	13.1	16.3	14.7
2/11/84	11.9	15.4	13.2
2/18/84	13.8	16.1	14.8
2/25/84			
3/ 3/84			
3/10/84			
3/17/84	15.2	19.6	16.9
3/24/84	17.8	21.2	19.1
3/31/84	15.2	20.3	18.5
4/ 7/84	16.1	18.8	17.7
4/14/84	18.0	22.5	19.8
4/21/84	17.4	21.2	19.4
4/28/84	20.4	24.4	21.9
5/ 5/84	23.6	25.2	24.5
5/12/84	22.7	26.5	25.0
5/19/84	23.0	26.1	24.7
5/26/84	24.0	27.4	26.0
6/ 2/84	22.9	27.8	25.6
6/ 9/84	23.8	27.5	26.2
6/16/84	27.0	28.7	27.8
6/23/84	27.7	28.0	27.8
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 42

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	25.5	28.9	27.3
6/25/83	26.1	29.2	27.4
7/ 2/83	27.2	31.4	28.8
7/ 9/83	24.4	32.0	29.0
7/16/83	25.0	31.8	28.5
7/23/83	27.1	32.0	29.5
7/30/83	25.3	29.8	27.9
8/ 6/83	25.0	31.7	28.0
8/13/83	25.9	29.5	27.5
8/20/83	25.0	31.4	28.6
8/27/83	25.3	31.6	28.9
9/ 3/83	26.9	31.5	28.8
9/10/83	25.6	30.9	28.2
9/17/83	25.1	32.1	27.8
9/24/83	22.7	27.6	25.5
10/ 1/83	22.3	30.8	24.7
10/ 8/83	24.5	27.4	25.7
10/15/83	24.3	28.4	26.3
10/22/83	22.9	25.7	24.6
10/29/83	20.0	25.9	23.0
11/ 5/83	20.2	23.9	21.6
11/12/83	16.4	22.1	20.1
11/19/83	14.5	19.7	17.3
11/26/83	16.8	21.5	18.6
12/ 3/83	16.2	20.5	18.2
12/10/83			
12/17/83			

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	11.7	22.1	15.8
12/31/83	10.0	13.4	10.5
1/ 7/84	10.0	11.0	10.1
1/14/84	10.0	12.8	11.0
1/21/84	10.5	15.7	12.5
1/28/84	10.0	16.9	13.9
2/ 4/84	11.1	17.5	14.8
2/11/84	10.0	15.9	13.2
2/18/84	13.7	22.2	17.3
2/25/84	16.6	25.2	19.3
3/ 3/84	10.0	19.2	14.6
3/10/84	12.7	19.1	16.7
3/17/84	13.3	20.6	17.7
3/24/84	17.0	21.3	19.2
3/31/84	14.7	21.9	18.5
4/ 7/84	15.4	19.4	17.9
4/14/84	17.2	23.5	20.5
4/21/84	17.3	23.0	20.1
4/28/84	19.2	25.9	23.2
5/ 5/84	23.0	27.1	25.6
5/12/84	20.7	29.3	25.6
5/19/84	21.4	28.1	24.9
5/26/84	22.5	29.3	26.0
6/ 2/84	21.6	27.8	24.7
6/ 9/84	23.1	28.5	26.1
6/16/84	25.7	28.4	27.1
6/23/84	25.8	27.7	26.6
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 43B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83			
6/25/83			
7/ 2/83			
7/ 9/83	28.2	30.0	29.3
7/16/83	28.2	29.7	28.9
7/23/83	29.1	30.1	29.6
7/30/83	27.5	29.3	28.6
8/ 6/83	27.3	29.3	28.3
8/13/83	28.2	29.8	28.9
8/20/83	27.9	29.8	28.6
8/27/83	28.8	30.6	29.7
9/ 3/83	29.3	29.7	29.5
9/10/83	28.6	30.8	28.9
9/17/83	26.4	29.1	27.7
9/24/83	23.8	26.8	26.0
10/ 1/83	21.9	24.4	22.8
10/ 8/83	22.5	24.7	23.9
10/15/83	23.2	24.9	24.2
10/22/83	22.9	23.7	23.4
10/29/83	21.1	24.4	22.5
11/ 5/83	21.3	21.9	21.6
11/12/83	18.3	21.6	20.5
11/19/83	16.8	19.1	18.1
11/26/83	17.1	18.5	17.7
12/ 3/83	16.4	18.2	17.4
12/10/83	16.3	18.5	17.4
12/17/83	15.5	17.0	16.5
12/24/83	15.0	16.5	15.8
12/31/83	10.0	14.6	11.0
1/ 7/84	10.0	10.4	10.0
1/14/84	10.2	11.6	11.0
1/21/84	10.5	12.7	11.3
1/28/84	10.0	13.0	11.0
2/ 4/84	12.3	13.8	13.0
2/11/84	10.7	13.3	11.9
2/18/84	12.2	16.8	14.5
2/25/84	16.3	18.0	17.3
3/ 3/84	10.7	17.4	14.1
3/10/84	12.8	15.9	14.8
3/17/84	14.8	15.2	15.0
3/24/84			
3/31/84			
4/ 7/84			
4/14/84	20.5	21.8	21.2
4/21/84	19.7	21.6	20.7
4/28/84	21.3	24.5	22.5
5/ 5/84	24.1	26.3	25.5
5/12/84	25.8	28.4	27.0
5/19/84	24.2	27.5	25.8
5/26/84	24.3	26.5	25.4
6/ 2/84	24.1	26.8	25.6
6/ 9/84	24.4	27.2	25.7
6/16/84	26.6	27.9	27.4
6/23/84	27.1	27.4	27.1
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 43S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.0	27.6	26.6
6/25/83	26.0	27.5	26.6
7/ 2/83	27.0	29.8	27.9
7/ 9/83	28.0	29.9	28.9
7/16/83	28.0	29.9	28.8
7/23/83	28.8	30.2	29.5
7/30/83	27.5	29.4	28.4
8/ 6/83	27.3	28.1	27.6
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83	27.8	29.1	28.4
9/17/83	25.8	29.1	27.2
9/24/83	22.8	26.4	25.3
10/ 1/83	21.9	24.7	23.8
10/ 8/83	24.5	26.3	25.5
10/15/83	24.6	26.5	25.7
10/22/83	24.4	25.3	24.9
10/29/83	19.3	25.2	21.8
11/ 5/83	19.6	20.8	20.2
11/12/83	16.9	20.2	19.0
11/19/83	15.0	17.6	16.5
11/26/83	15.6	17.4	16.3
12/ 3/83	15.8	18.0	16.8
12/10/83	15.9	18.5	17.3
12/17/83	15.0	17.0	16.1
12/24/83	14.1	16.5	15.5
12/31/83	10.0	13.7	10.4
1/ 7/84	10.0	10.3	10.0
1/14/84	10.0	11.4	10.6
1/21/84	10.0	11.8	10.5
1/28/84	10.0	12.3	10.6
2/ 4/84	11.2	13.0	12.1
2/11/84	10.0	12.6	11.0
2/18/84	11.2	16.0	13.7
2/25/84	15.6	17.0	16.5
3/ 3/84	10.0	16.7	13.3
3/10/84	12.2	15.8	14.2
3/17/84	13.9	14.4	14.2
3/24/84			
3/31/84			
4/ 7/84			
4/14/84	19.4	20.5	20.0
4/21/84	18.4	21.7	19.5
4/28/84	20.3	23.1	21.5
5/ 5/84	22.7	25.1	24.0
5/12/84	23.3	27.1	25.1
5/19/84	23.6	26.9	24.8
5/26/84	23.8	27.0	25.4
6/ 2/84	23.3	26.7	25.3
6/ 9/84	23.9	27.3	25.8
6/16/84	26.5	27.7	27.2
6/23/84	26.8	27.3	27.0
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 44B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.1	27.9	27.5
6/25/83	27.0	28.2	27.6
7/ 2/83	28.0	29.9	28.8
7/ 9/83	29.0	30.0	29.5
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83	28.6	30.1	29.4
8/20/83	28.5	30.9	29.3
8/27/83	29.3	31.4	30.5
9/ 3/83	29.6	30.3	30.0
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	24.2	25.2	24.5
10/ 8/83	24.7	26.8	26.0
10/15/83	25.4	26.9	26.4
10/22/83	25.0	25.8	25.5
10/29/83	19.5	25.7	22.1
11/ 5/83	20.0	21.0	20.5
11/12/83	17.3	20.8	19.5
11/19/83	15.9	18.6	17.2
11/26/83	16.0	18.0	17.0
12/ 3/83	16.3	17.8	17.1
12/10/83	16.1	18.7	17.5
12/17/83	15.4	17.9	16.6
12/24/83	15.0	16.7	15.6
12/31/83	10.0	15.5	10.5
1/ 7/84	10.0	10.4	10.0
1/14/84	10.3	11.7	10.9
1/21/84	10.6	13.7	11.8
1/28/84	10.5	13.9	12.0
2/ 4/84	13.2	14.7	13.8
2/11/84	11.7	14.1	12.7
2/18/84	12.2	15.2	13.6
2/25/84	14.9	16.5	15.8
3/ 3/84	10.0	15.9	12.6
3/10/84	11.3	15.0	13.4
3/17/84	13.4	18.8	16.0
3/24/84	18.3	20.0	18.9
3/31/84	16.8	20.8	18.9
4/ 7/84	17.0	18.8	18.2
4/14/84	18.4	21.0	19.7
4/21/84	18.5	20.8	19.6
4/28/84	20.5	23.4	21.6
5/ 5/84	23.1	25.3	24.4
5/12/84	24.0	26.9	25.4
5/19/84	22.9	26.5	24.7
5/26/84	23.2	25.8	24.7
6/ 2/84	23.1	26.2	24.8
6/ 9/84	23.6	26.7	25.2
6/16/84	25.9	27.6	26.7
6/23/84	26.3	26.9	26.5
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 44S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.0	28.9	27.6
6/25/83	27.0	28.5	27.7
7/ 2/83	28.0	30.8	29.1
7/ 9/83	27.6	30.8	29.7
7/16/83	28.1	30.4	29.2
7/23/83	29.5	31.0	30.1
7/30/83			
8/ 6/83			
8/13/83	28.4	29.4	29.0
8/20/83	27.8	30.4	28.9
8/27/83	28.6	31.0	30.1
9/ 3/83	29.3	30.1	29.7
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	22.2	24.4	23.1
10/ 8/83	23.2	25.3	24.5
10/15/83	23.4	25.4	24.7
10/22/83	23.3	24.2	23.8
10/29/83	20.6	25.1	23.1
11/ 5/83	21.1	22.4	21.9
11/12/83	18.8	22.5	21.5
11/19/83	17.4	20.4	18.6
11/26/83	17.7	19.4	18.4
12/ 3/83	16.1	19.0	17.5
12/10/83	16.1	19.6	17.5
12/17/83	15.3	17.7	16.5

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	15.3	17.8	15.9
12/31/83	10.0	15.0	1[illegible].5
1/ 7/84	10.0	10.7	1[illegible].0
1/14/84	10.3	12.1	11.0
1/21/84	10.6	13.7	11.7
1/28/84	10.0	13.7	11.6
2/ 4/84	12.5	14.4	13.4
2/11/84	10.9	13.8	12.3
2/18/84	12.9	16.6	14.5
2/25/84	16.1	17.7	17.0
3/ 3/84	10.5	16.9	13.5
3/10/84	12.2	16.6	14.5
3/17/84	14.6	18.4	16.0
3/24/84	17.8	19.5	18.5
3/31/84	16.2	20.3	18.4
4/ 7/84	16.3	18.7	17.7
4/14/84	17.8	20.8	19.3
4/21/84	18.3	20.8	19.4
4/28/84	20.5	23.6	21.7
5/ 5/84	23.2	25.2	24.4
5/12/84	23.8	27.1	25.4
5/19/84	24.0	26.9	25.2
5/26/84	24.2	27.4	26.0
6/ 2/84	23.9	27.4	25.9
6/ 9/84	24.4	28.0	26.4
6/16/84	26.9	28.5	27.7
6/23/84	27.2	27.8	27.5
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 45B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/33			
6/18/83	26.7	27.9	27.2
6/25/83	26.7	28.4	27.5
7/ 2/83	28.0	30.1	28.9
7/ 9/83	28.6	30.8	29.7
7/16/83	28.4	30.6	29.2
7/23/83	29.4	30.5	30.0
7/30/83	27.7	29.9	28.8
8/ 6/83	27.5	29.2	28.4
8/13/83	28.4	30.0	29.0
8/20/83	27.9	30.4	28.9
8/27/83	28.8	30.7	29.9
9/ 3/83	29.0	29.9	29.5
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	22.2	23.8	23.0
10/ 8/83	23.3	25.6	24.7
10/15/83	23.7	25.9	25.0
10/22/83	23.5	24.3	23.9
10/29/83	21.3	25.8	23.2
11/ 5/83	21.8	22.5	22.1
11/12/83	19.0	22.3	21.2
11/19/83	17.3	19.7	18.7
11/26/83	17.7	19.5	18.4
12/ 3/83	15.6	19.0	17.0
12/10/83	15.4	18.1	16.9
12/17/83	14.5	16.9	15.8

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	14.4	17.0	15.5
12/31/83	10.0	15.1	10.3
1/ 7/84	10.0	10.2	10.0
1/14/84	10.0	12.2	10.6
1/21/84	10.4	13.4	11.5
1/28/84	10.0	13.9	11.6
2/ 4/84	12.5	14.3	13.5
2/11/84	11.2	14.0	12.4
2/18/84	12.2	16.8	14.8
2/25/84	16.5	18.1	17.5
3/ 3/84	11.5	17.4	14.3
3/10/84	12.9	16.4	15.1
3/17/84	13.7	17.1	15.2
3/24/84	16.4	18.2	17.1
3/31/84	15.2	18.8	17.1
4/ 7/84	15.4	17.1	16.4
4/14/84	16.5	17.8	17.1
4/21/84			
4/28/84			
5/ 5/84	24.6	25.5	25.0
5/12/84	24.1	27.5	25.7
5/19/84	23.3	26.7	25.0
5/26/84	23.7	26.4	25.3
6/ 2/84	23.5	26.7	25.4
6/ 9/84	24.0	27.5	26.0
6/16/84	26.6	28.2	27.5
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 45S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.0	27.0	26.4
6/25/83	25.8	27.3	26.6
7/ 2/83	26.8	29.2	27.8
7/ 9/83	27.9	29.8	28.7
7/16/83	27.5	29.8	28.4
7/23/83	28.5	30.0	29.2
7/30/83	27.0	28.9	28.0
8/ 6/83	26.6	28.6	27.5
8/13/83	27.4	28.8	28.0
8/20/83	27.0	29.3	27.9
8/27/83	27.4	29.6	28.7
9/ 3/83	27.9	29.0	28.4
9/10/83			
9/17/83			
9/24/83			
10/ 1/83	22.0	24.1	22.7
10/ 8/83	22.7	25.4	24.4
10/15/83	23.3	25.5	24.6
10/22/83	23.0	23.8	23.5
10/29/83	19.8	24.0	22.0
11/ 5/83	20.5	21.3	20.9
11/12/83	17.4	21.0	19.9
11/19/83	16.0	18.9	17.4
11/26/83	16.5	18.6	17.4
12/ 3/83	17.0	18.4	17.7
12/10/83	16.8	20.0	18.3
12/17/83	16.1	19.1	17.3
12/24/83	15.2	17.2	15.8
12/31/83	10.0	15.7	10.6
1/ 7/84	10.0	10.6	10.0
1/14/84	10.2	12.5	10.9
1/21/84	10.6	14.4	11.8
1/28/84	10.1	14.5	12.1
2/ 4/84	12.7	14.8	13.8
2/11/84	11.3	14.6	12.7
2/18/84	13.1	16.7	14.8
2/25/84	16.1	18.1	17.2
3/ 3/84	10.8	17.2	13.8
3/10/84	12.4	16.4	14.8
3/17/84	14.6	18.3	16.2
3/24/84	17.9	19.9	18.7
3/31/84	16.5	20.3	18.5
4/ 7/84	16.6	18.7	17.7
4/14/84	17.6	19.2	18.5
4/21/84			
4/28/84			
5/ 5/84	24.1	25.2	24.6
5/12/84	23.3	27.6	25.2
5/19/84	23.0	26.5	24.7
5/26/84	23.3	26.8	25.4
6/ 2/84	23.2	26.7	25.3
6/ 9/84	23.9	28.0	26.0
6/16/84	26.5	28.1	27.3
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 46B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.8	28.3	27.3
6/25/83	26.9	28.5	27.6
7/ 2/83	28.0	30.1	29.0
7/ 9/83	28.6	30.9	29.9
7/16/83	28.6	31.1	29.6
7/23/83	29.6	31.2	30.4
7/30/83	27.8	29.8	29.0
8/ 6/83	27.7	29.6	28.6
8/13/83	28.5	30.3	29.2
8/20/83	28.0	30.9	29.4
8/27/83	29.0	31.5	30.4
9/ 3/83	27.8	30.4	29.4
9/10/83	27.7	29.9	28.8
9/17/83	26.2	29.9	27.6
9/24/83	23.5	26.8	25.9
10/ 1/83	23.0	24.4	23.8
10/ 8/83	23.9	26.2	25.2
10/15/83	24.4	26.4	25.6
10/22/83	23.9	24.8	24.4
10/29/83	19.6	24.7	22.1
11/ 5/83	20.3	21.3	20.8
11/12/83	17.4	21.0	19.8
11/19/83	15.7	18.3	17.2
11/26/83	16.2	18.5	17.1
12/ 3/83	16.2	18.7	17.2
12/10/83	15.5	19.2	17.5
12/17/83	14.8	16.9	16.1
12/24/83	14.5	16.5	15.3
12/31/83	10.0	13.6	10.5
1/ 7/84	10.0	10.5	10.0
1/14/84	10.1	12.1	10.7
1/21/84	10.1	12.9	11.2
1/28/84	10.0	13.6	11.4
2/ 4/84	11.8	13.9	13.0
2/11/84	10.4	13.5	11.8
2/18/84	12.4	16.8	14.8
2/25/84	16.4	18.5	17.4
3/ 3/84	10.9	17.5	14.0
3/10/84	12.6	16.7	15.0
3/17/84	14.8	18.6	16.4
3/24/84	18.0	20.5	18.9
3/31/84	16.4	20.3	18.6
4/ 7/84	16.7	18.7	17.8
4/14/84	18.0	19.5	19.0
4/21/84			
4/28/84			
5/ 5/84			
5/12/84			
5/19/84	22.6	26.0	23.7
5/26/84	23.1	26.4	25.0
6/ 2/84	22.7	26.3	24.8
6/ 9/84	23.3	27.3	25.5
6/16/84	26.0	27.3	26.7
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 46S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.5	28.2	27.2
6/25/83			
7/ 2/83			
7/ 9/83			
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83			
8/20/83	28.6	30.5	29.6
8/27/83	28.3	30.8	29.8
9/ 3/83	27.5	30.0	29.0
9/10/83	27.2	29.5	28.5
9/17/83	25.8	29.3	27.3
9/24/83	23.2	26.7	25.6
10/ 1/83	22.0	24.0	22.8
10/ 8/83	23.2	25.1	24.3
10/15/83	23.0	25.3	24.5
10/22/83	23.0	24.0	23.5
10/29/83	19.9	24.2	22.1
11/ 5/83	20.7	21.5	21.2
11/12/83	17.9	21.4	20.3
11/19/83	16.5	18.9	17.9
11/26/83	16.9	19.7	18.2
12/ 3/83	16.5	20.2	18.1
12/10/83	15.7	19.5	17.8
12/17/83	15.2	17.4	16.4
12/24/83	14.7	16.6	15.8
12/31/83	10.0	14.0	10.5
1/ 7/84	10.0	11.3	10.1
1/14/84	10.4	12.5	11.3
1/21/84	10.8	14.4	12.4
1/28/84	11.2	15.1	13.1
2/ 4/84	13.3	15.6	14.6
2/11/84	12.1	17.2	13.7
2/18/84	13.9	16.7	15.0
2/25/84	16.2	18.0	17.2
3/ 3/84	10.8	16.9	13.8
3/10/84	12.7	16.3	14.9
3/17/84	14.5	18.8	16.6
3/24/84	18.1	20.4	19.0
3/31/84	16.7	20.7	18.9
4/ 7/84	16.9	18.9	18.2
4/14/84	18.3	20.8	19.7
4/21/84	18.2	20.7	19.4
4/28/84			
5/ 5/84	23.7	25.1	24.3
5/12/84	22.5	27.2	25.0
5/19/84	23.2	26.4	24.6
5/26/84	23.0	27.4	25.8
6/ 2/84	23.3	27.0	25.5
6/ 9/84	24.0	28.4	26.4
6/16/84	26.8	28.1	27.4
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 47

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.9	27.8	27.2
6/25/83	27.1	28.6	27.9
7/ 2/83	28.1	29.5	28.8
7/ 9/83	28.9	30.5	29.7
7/16/83	28.7	30.1	29.2
7/23/83	29.5	30.6	30.1
7/30/83	27.7	29.4	28.7
8/ 6/83	27.5	29.6	28.4
8/13/83	28.1	29.9	29.0
8/20/83	27.9	31.0	29.2
8/27/83	28.9	30.9	29.9
9/ 3/83	27.4	29.6	28.7
9/10/83	27.9	29.0	28.5
9/17/83			
9/24/83	24.7	28.2	26.4
10/ 1/83	24.1	25.1	24.8
10/ 8/83			
10/15/83			
10/22/83			
10/29/83	20.7	24.6	22.1
11/ 5/83	21.0	22.2	21.5
11/12/83	18.2	21.5	20.0
11/19/83	16.0	18.6	17.6
11/26/83	16.4	19.2	17.6
12/ 3/83	15.4	18.4	16.9
12/10/83	15.3	19.2	17.0
12/17/83	14.3	16.7	15.6

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	14.0	16.1	15.2
12/31/83	10.0	13.7	10.4
1/ 7/84	10.0	10.2	10.0
1/14/84	10.0	12.2	10.6
1/21/84	10.2	14.4	12.4
1/28/84	11.0	15.6	13.0
2/ 4/84	13.1	15.8	14.4
2/11/84	12.1	14.7	13.2
2/18/84	13.6	17.9	16.0
2/25/84	17.7	19.4	18.6
3/ 3/84	11.9	18.5	14.9
3/10/84	13.3	19.5	16.2
3/17/84	14.9	18.5	16.5
3/24/84	17.5	20.4	18.5
3/31/84	16.1	20.3	18.4
4/ 7/84	16.6	18.6	17.7
4/14/84	17.9	21.7	20.0
4/21/84	18.5	21.4	19.9
4/28/84	20.7	24.7	22.6
5/ 5/84	24.2	25.9	25.2
5/12/84	24.3	27.2	25.8
5/19/84	23.1	26.7	25.0
5/26/84	23.5	26.6	25.2
6/ 2/84	23.3	26.8	25.3
6/ 9/84	24.0	28.0	25.8
6/16/84	26.6	28.1	27.2
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 48B

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83			
6/25/83			
7/ 2/83			
7/ 9/83			
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83	27.8	30.3	28.9
8/20/83	27.9	31.7	29.7
8/27/83	28.2	31.7	30.1
9/ 3/83	27.1	30.7	29.0
9/10/83	27.8	29.6	28.8
9/17/83	25.5	29.5	27.1
9/24/83	22.8	26.8	25.6
10/ 1/83	22.6	23.7	23.4
10/ 8/83			
10/15/83			
10/22/83			
10/29/83	20.3	25.4	22.1
11/ 5/83	21.0	22.7	21.8
11/12/83	17.8	21.6	20.2
11/19/83	14.9	18.5	17.3
11/26/83	16.7	20.4	18.1
12/ 3/83	15.4	18.9	17.2
12/10/83	14.6	20.4	17.4
12/17/83	13.9	17.2	15.6
12/24/83	12.7	16.5	14.8
12/31/83	10.0	11.8	10.1
1/ 7/84	10.0	10.7	10.0
1/14/84	10.0	13.0	10.6
1/21/84	10.1	11.3	10.5
1/28/84			
2/ 4/84			
2/11/84			
2/18/84	15.0	18.3	16.2
2/25/84	16.5	19.6	17.8
3/ 3/84	10.0	17.9	14.0
3/10/84	12.8	18.9	15.6
3/17/84	14.7	20.7	17.9
3/24/84	18.7	22.9	20.4
3/31/84	16.8	22.3	20.0
4/ 7/84	17.5	20.3	19.1
4/14/84	19.3	21.3	20.5
4/21/84			
4/28/84			
5/ 5/84			
5/12/84			
5/19/84	22.4	26.4	23.8
5/26/84	23.0	27.5	25.4
6/ 2/84	22.1	26.7	24.8
6/ 9/84	23.2	27.9	26.0
6/16/84	26.1	28.1	27.0
6/23/84	26.1	26.9	26.6
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 48S

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.4	28.3	27.5
6/25/83	26.5	28.7	27.6
7/ 2/83	27.7	30.0	28.7
7/ 9/83	27.1	31.0	29.5
7/16/83	27.6	30.5	28.8
7/23/83	28.5	30.9	29.8
7/30/83	27.1	29.7	28.5
8/ 6/83	26.8	28.8	27.8
8/13/83			
8/20/83			
8/27/83			
9/ 3/83			
9/10/83			
9/17/83			
9/24/83			
10/ 1/83			
10/ 8/83			
10/15/83			
10/22/83			
10/29/83	20.1	24.6	21.9
11/ 5/83	20.6	22.8	21.4
11/12/83	17.2	21.3	19.8
11/19/83	14.8	18.3	17.0
11/26/83	16.5	20.3	17.8
12/ 3/83	14.3	19.4	17.4
12/10/83	14.9	24.9	18.0
12/17/83	13.5	17.6	15.8

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.1	17.3	15.7
12/31/83	10.0	12.5	10.3
1/ 7/84	10.0	15.8	10.4
1/14/84	10.0	14.1	11.5
1/21/84	10.1	17.4	12.3
1/28/84	10.0	16.6	13.5
2/ 4/84	11.2	15.6	13.9
2/11/84	10.0	15.9	12.5
2/18/84	14.7	19.1	16.5
2/25/84	16.4	19.8	18.0
3/ 3/84	10.1	18.2	14.3
3/10/84	13.3	19.3	16.0
3/17/84	15.2	19.4	17.3
3/24/84	17.3	21.2	19.0
3/31/84	15.2	21.1	18.8
4/ 7/84	16.2	19.0	17.8
4/14/84	18.1	22.6	20.1
4/21/84	17.1	22.7	19.5
4/28/84	20.3	25.1	22.6
5/ 5/84	23.9	26.2	25.0
5/12/84	22.5	27.8	25.4
5/19/84	21.8	26.6	24.6
5/26/84	23.6	27.8	26.1
6/ 2/84	22.1	27.1	25.1
6/ 9/84	23.9	28.4	26.6
6/16/84	26.6	28.5	27.4
6/23/84	26.6	27.4	27.0
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 49

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.6	27.7	27.0
6/25/83	26.8	28.5	27.6
7/ 2/83	27.7	29.5	28.8
7/ 9/83	28.7	31.0	29.8
7/16/83	28.9	31.0	29.5
7/23/83	29.8	31.0	30.3
7/30/83			
8/ 6/83			
8/13/83			
8/20/83			
8/27/83			
9/ 3/83	26.8	30.0	28.2
9/10/83	26.6	28.8	27.7
9/17/83	25.2	28.7	26.5
9/24/83	22.1	25.9	24.7
10/ 1/83	21.6	24.6	23.2
10/ 8/83	23.9	26.1	25.3
10/15/83	24.4	26.2	25.6
10/22/83	23.9	24.8	24.3
10/29/83	18.9	24.6	21.5
11/ 5/83	19.8	20.9	20.3
11/12/83	16.9	20.3	19.0
11/19/83	14.7	17.7	16.6
11/26/83	15.7	18.2	16.6
12/ 3/83	16.1	18.6	17.1
12/10/83	15.2	19.7	17.5
12/17/83	15.0	17.1	16.1

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.4	16.1	15.2
12/31/83	10.0	13.0	10.2
1/ 7/84	10.0	10.2	10.0
1/14/84	10.0	11.5	10.4
1/21/84	10.0	12.7	11.0
1/28/84	10.0	14.2	11.8
2/ 4/84	11.6	14.4	13.0
2/11/84	10.1	13.4	11.7
2/18/84	12.3	14.3	13.1
2/25/84	18.1	20.4	18.8
3/ 3/84	11.1	18.2	14.7
3/10/84	13.4	17.9	15.9
3/17/84	15.6	19.6	17.2
3/24/84	18.1	21.1	19.2
3/31/84	16.6	20.9	19.1
4/ 7/84	16.9	19.3	18.3
4/14/84	18.7	21.8	20.0
4/21/84	17.9	21.8	19.6
4/28/84	20.9	24.7	22.5
5/ 5/84	24.1	25.9	25.0
5/12/84	23.5	27.6	25.5
5/19/84	22.6	26.4	24.5
5/26/84	22.9	27.0	25.1
6/ 2/84	22.4	26.5	24.7
6/ 9/84	23.2	27.2	25.4
6/16/84	25.9	27.6	26.7
6/23/84			
6/30/84			

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FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 50

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	26.2	27.3	26.7
6/25/83	26.1	27.6	27.0
7/ 2/83	27.3	29.1	28.1
7/ 9/83	27.6	29.4	28.8
7/16/83	27.5	29.2	28.3
7/23/83	28.6	29.6	29.1
7/30/83	26.8	28.7	27.8
8/ 6/83	26.6	28.3	27.5
8/13/83	27.5	28.8	28.1
8/20/83	27.0	29.1	28.1
8/27/83	27.9	29.8	29.0
9/ 3/83	28.4	29.1	28.8
9/10/83			
9/17/83			
9/24/83	23.9	28.0	26.0
10/ 1/83	22.7	24.6	23.5
10/ 8/83	23.8	25.9	24.9
10/15/83	23.9	25.8	25.2
10/22/83	23.7	24.6	24.1
10/29/83	20.8	24.8	22.8
11/ 5/83	21.1	22.1	21.6
11/12/83	18.9	21.6	20.8
11/19/83	17.1	19.1	18.3
11/26/83	17.4	19.0	18.0
12/ 3/83	15.2	18.6	16.4
12/10/83	14.4	17.7	16.2
12/17/83	13.8	16.0	15.0

WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
12/24/83	13.8	16.5	15.3
12/31/83	10.0	14.4	10.4
1/ 7/84	10.0	10.3	10.0
1/14/84	10.0	11.2	10.6
1/21/84	10.5	13.1	11.7
1/28/84	10.2	14.2	12.0
2/ 4/84	12.8	14.7	13.7
2/11/84	11.4	14.0	12.5
2/18/84	12.7	16.5	14.5
2/25/84	16.0	17.5	16.9
3/ 3/84	10.9	17.1	13.9
3/10/84	12.6	16.0	14.7
3/17/84	14.5	18.6	16.3
3/24/84	17.8	19.7	18.5
3/31/84	16.6	20.5	18.7
4/ 7/84	16.8	18.5	17.8
4/14/84	18.0	21.7	20.0
4/21/84	18.8	21.7	20.2
4/28/84	21.4	24.4	22.6
5/ 5/84	23.7	25.7	25.0
5/12/84	24.5	27.7	25.9
5/19/84	22.8	26.7	24.9
5/26/84	23.3	26.3	25.1
6/ 2/84	22.9	26.7	25.1
6/ 9/84	23.6	27.2	25.6
6/16/84	26.3	27.6	27.0
6/23/84			
6/30/84			

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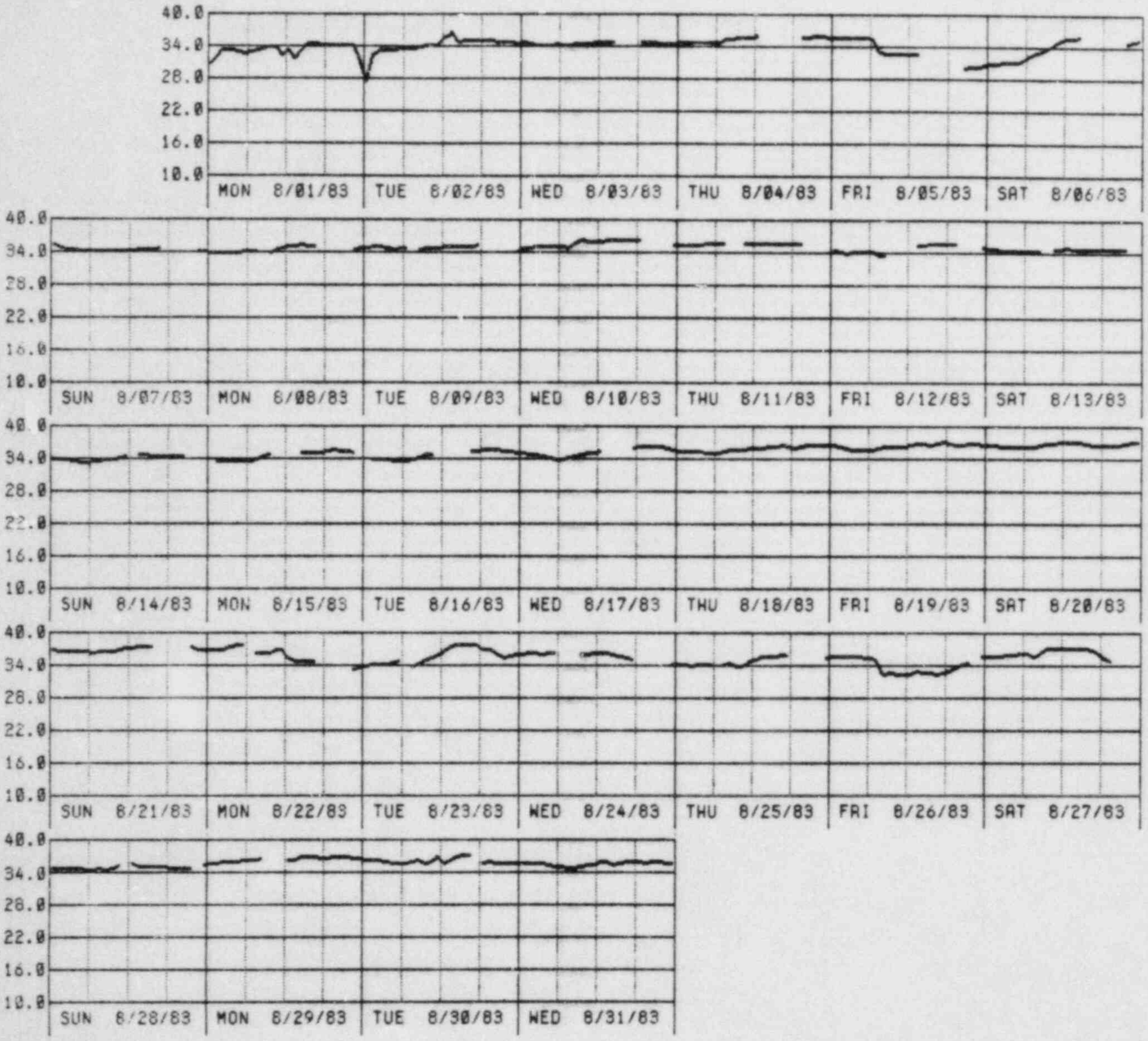
FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA
DEGREES C

STATION: 51

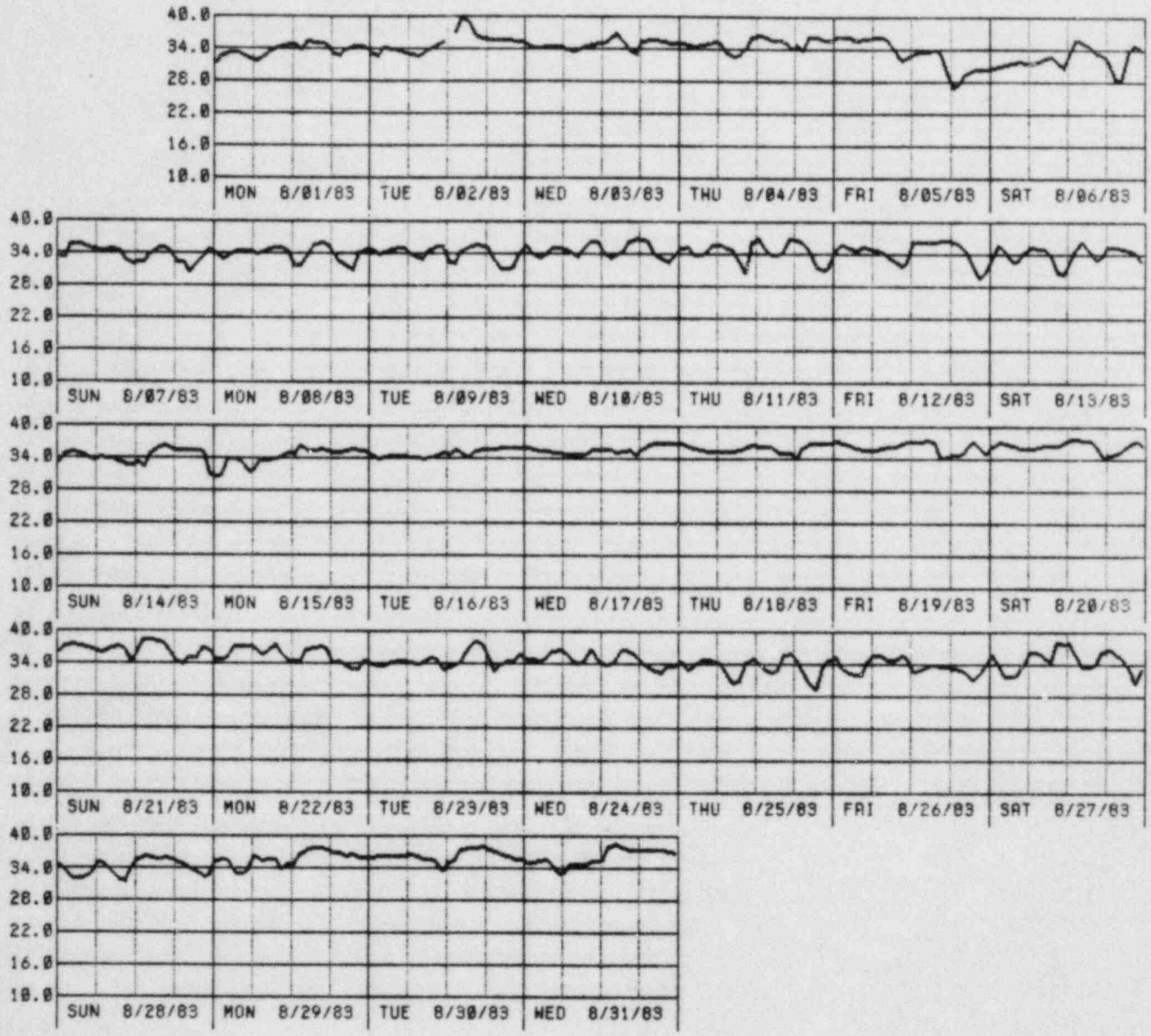
WEEK ENDING	MINIMUM VALUE	MAXIMUM VALUE	AVERAGE VALUE
6/11/83			
6/18/83	27.3	28.3	27.6
6/25/83	26.9	28.6	27.8
7/ 2/83	28.1	29.8	28.9
7/ 9/83	29.1	30.0	29.6
7/16/83			
7/23/83			
7/30/83			
8/ 6/83			
8/13/83	28.6	30.2	29.2
8/20/83	28.1	30.3	28.9
8/27/83	28.9	30.8	29.9
9/ 3/83	29.5	29.8	29.7
9/10/83	27.4	28.1	27.7
9/17/83	25.3	28.2	26.6
9/24/83	23.2	26.0	25.1
10/ 1/83	22.0	23.7	22.7
10/ 8/83	22.5	24.6	23.8
10/15/83	23.2	24.7	24.2
10/22/83	22.8	23.6	23.2
10/29/83	20.6	24.1	22.2
11/ 5/83	20.8	21.5	21.1
11/12/83	18.3	21.2	20.3
11/19/83	16.4	18.6	17.8
11/26/83	16.7	18.2	17.3
12/ 3/83	16.7	18.0	17.3
12/10/83	16.4	18.7	17.6
12/17/83	15.9	17.2	16.6
12/24/83	14.1	16.2	14.8
12/31/83	10.0	13.9	10.3
1/ 7/84	10.0	10.0	10.0
1/14/84	10.0	10.3	10.0
1/21/84	10.0	12.1	10.8
1/28/84	10.0	13.2	11.1
2/ 4/84	11.9	13.8	12.9
2/11/84	11.2	13.5	12.1
2/18/84	12.1	15.4	13.7
2/25/84	15.1	16.6	16.1
3/ 3/84	10.6	16.4	13.5
3/10/84	12.0	15.5	14.0
3/17/84	14.0	18.6	16.2
3/24/84	18.2	19.9	18.9
3/31/84	17.0	21.0	19.1
4/ 7/84	17.2	18.7	18.1
4/14/84	18.5	19.6	19.1
4/21/84			
4/28/84			
5/ 5/84			
5/12/84			
5/19/84	23.0	25.2	23.7
5/26/84	23.2	25.9	24.6
6/ 2/84	23.1	26.3	24.8
6/ 9/84	23.6	26.6	25.1
6/16/84	25.9	27.4	26.6
6/23/84			
6/30/84			

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



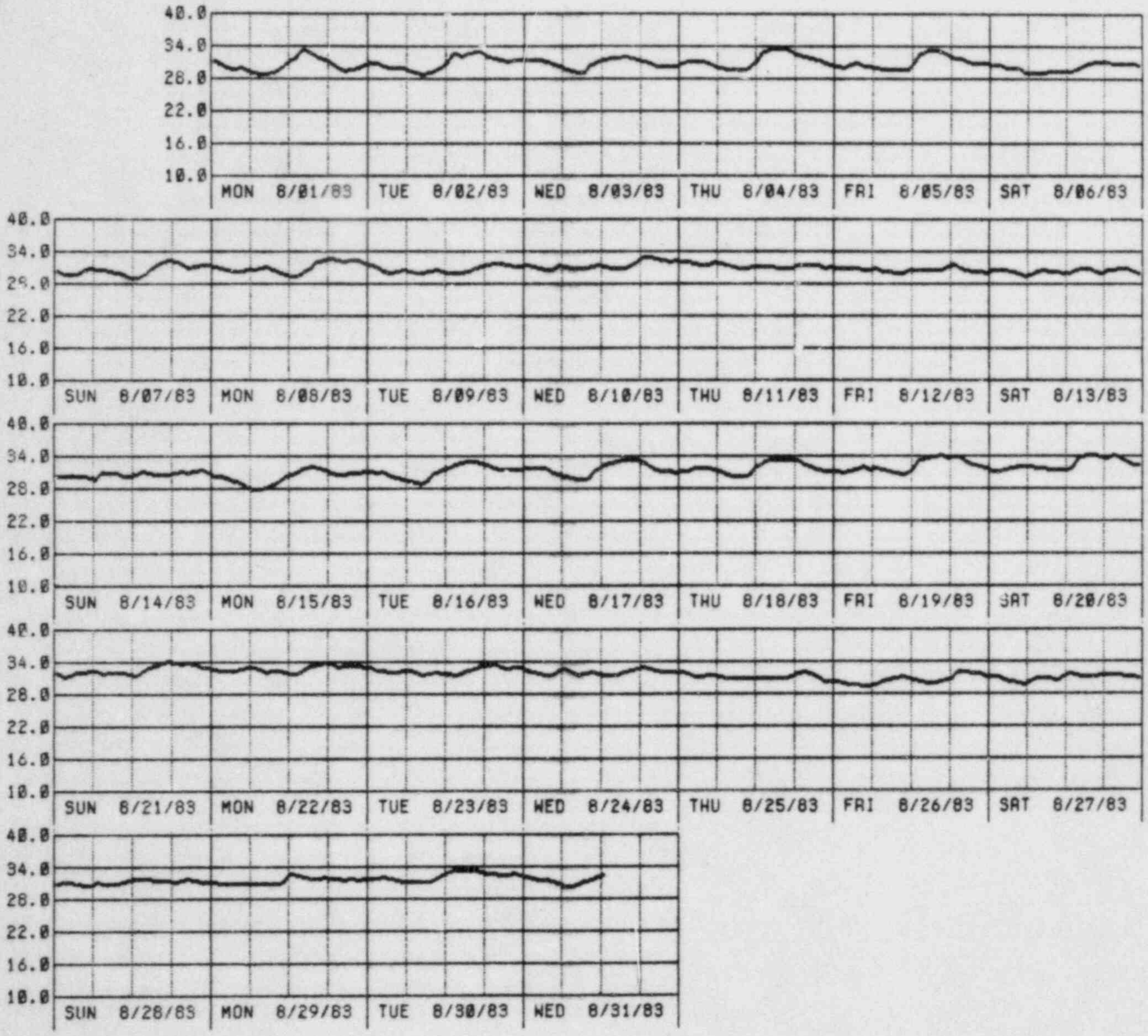
TEMPERATURE (DEG C), STATION 1

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



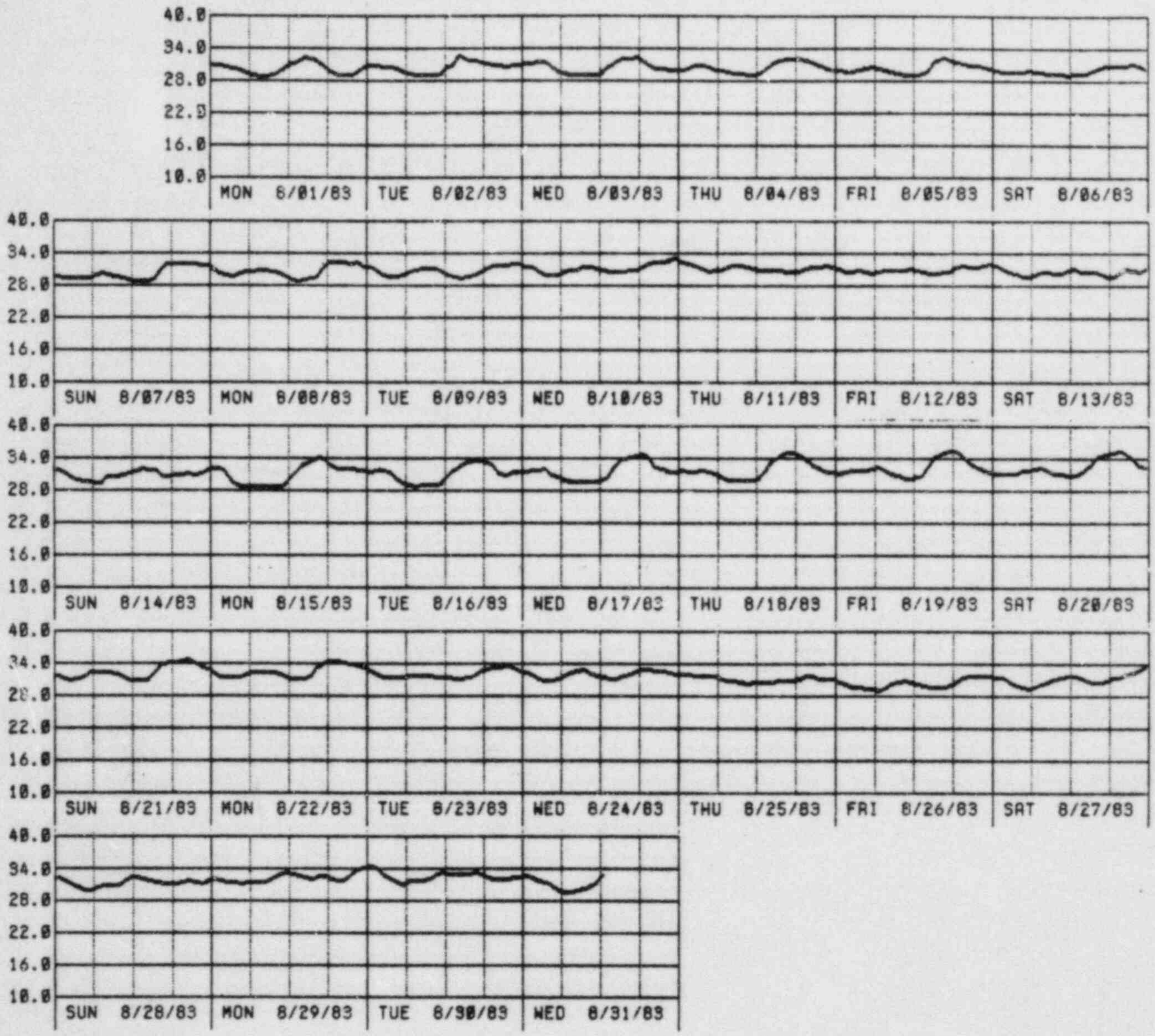
TEMPERATURE (DEG C), STATION 3

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



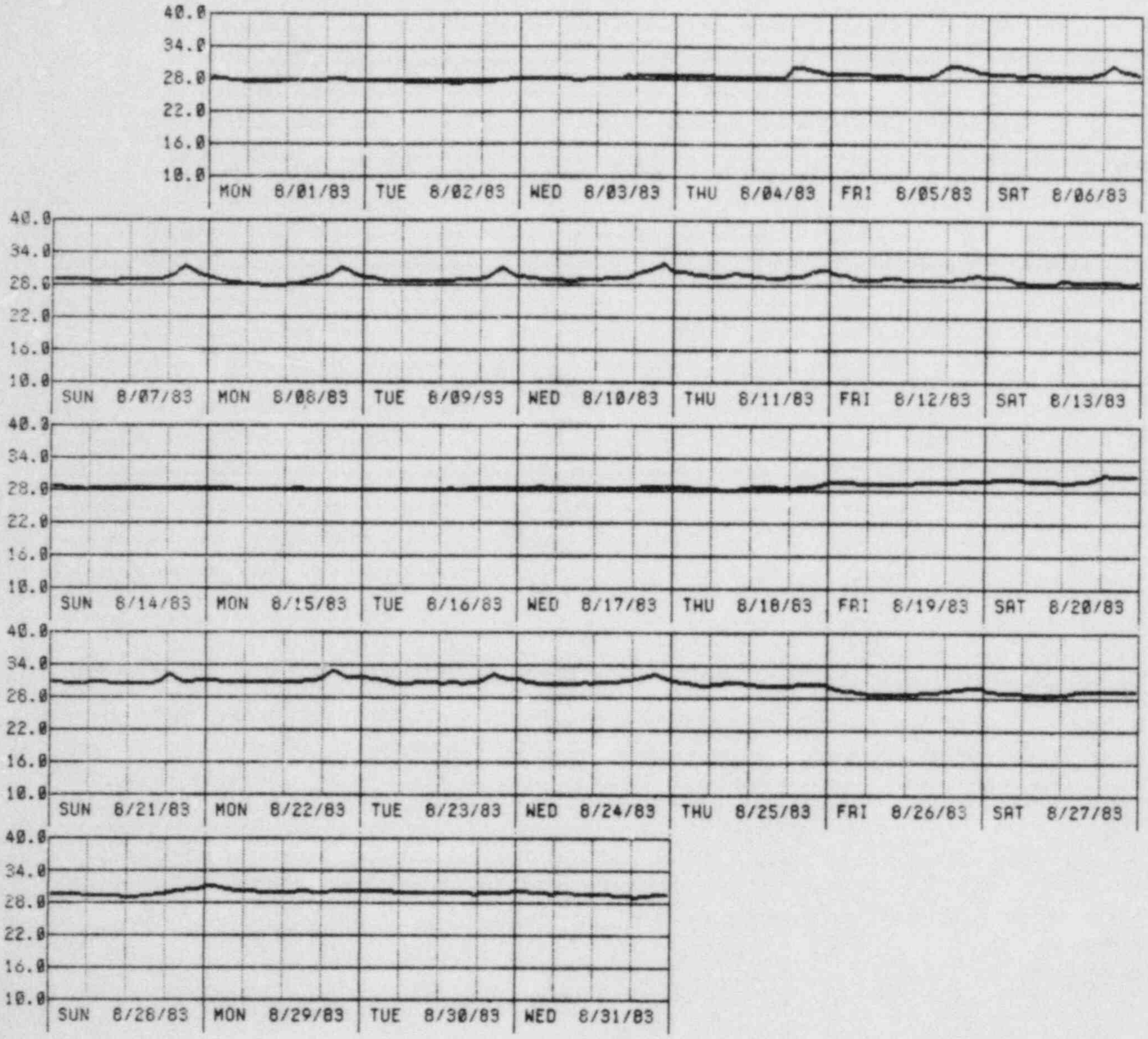
TEMPERATURE (DEG C), STATION 12S

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



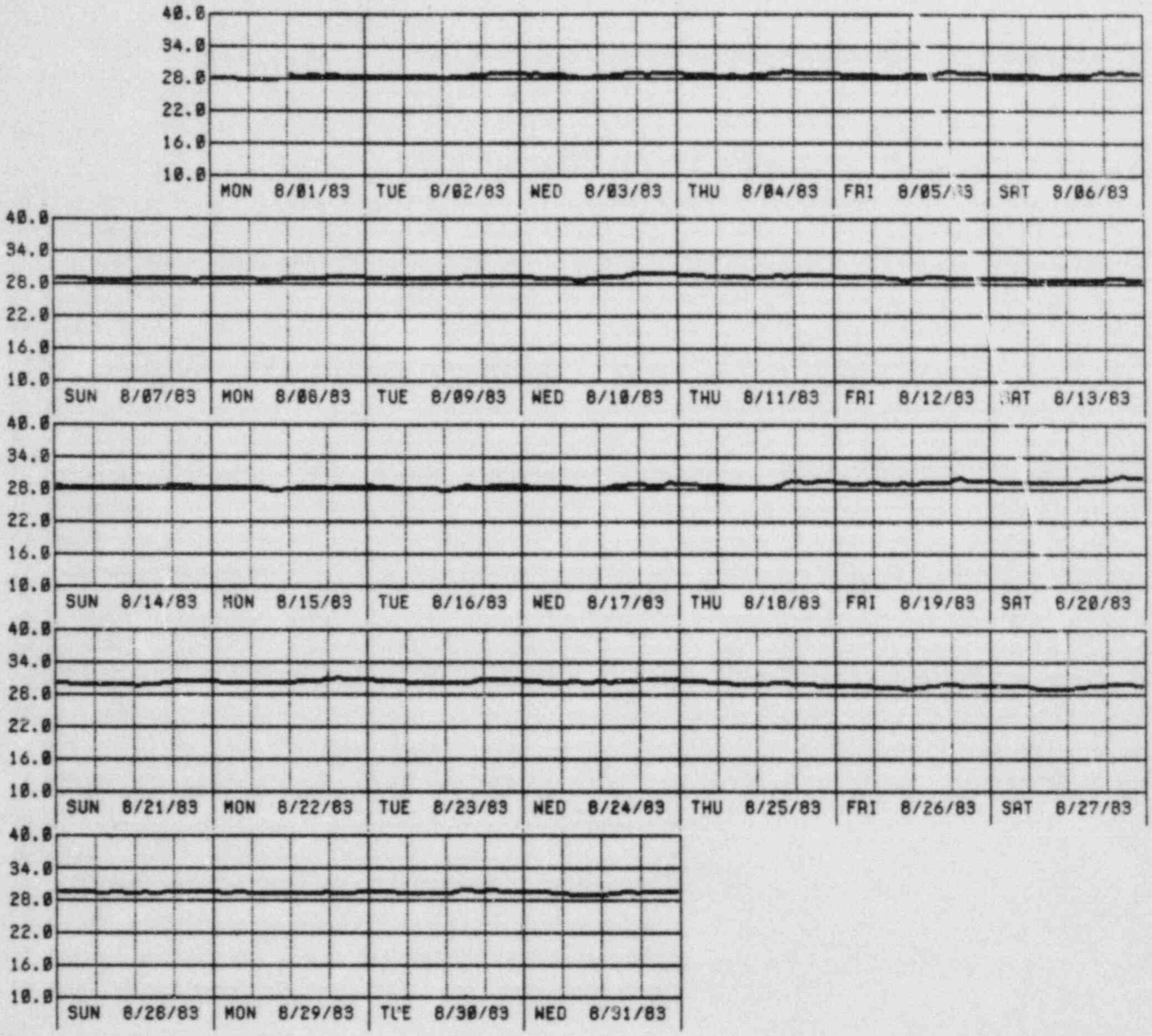
TEMPERATURE (DEG C), STATION 12B

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



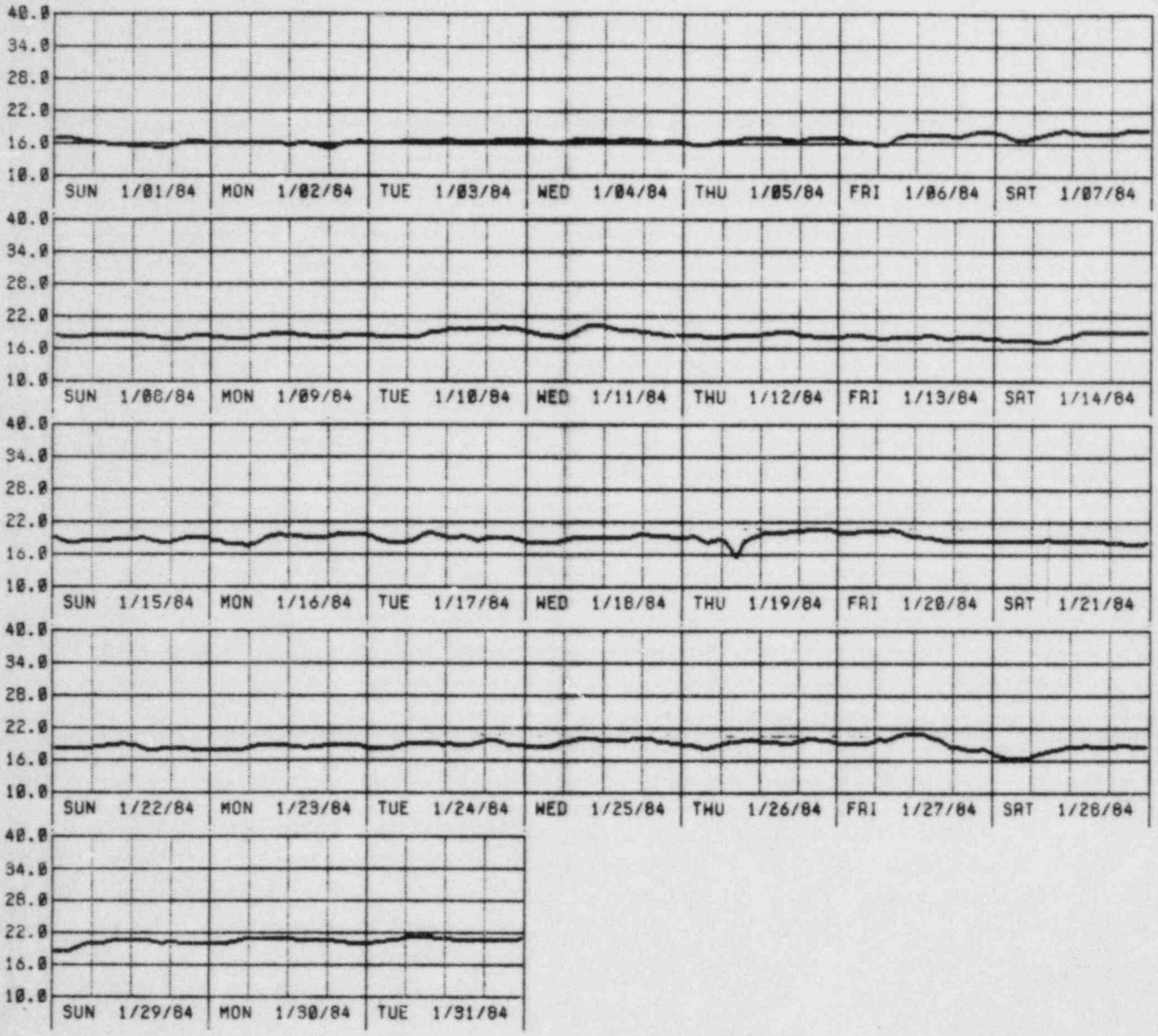
TEMPERATURE (DEG C), STATION 29

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



TEMPERATURE (DEG C), STATION 38S

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



TEMPERATURE (DEG C), STATION 1

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
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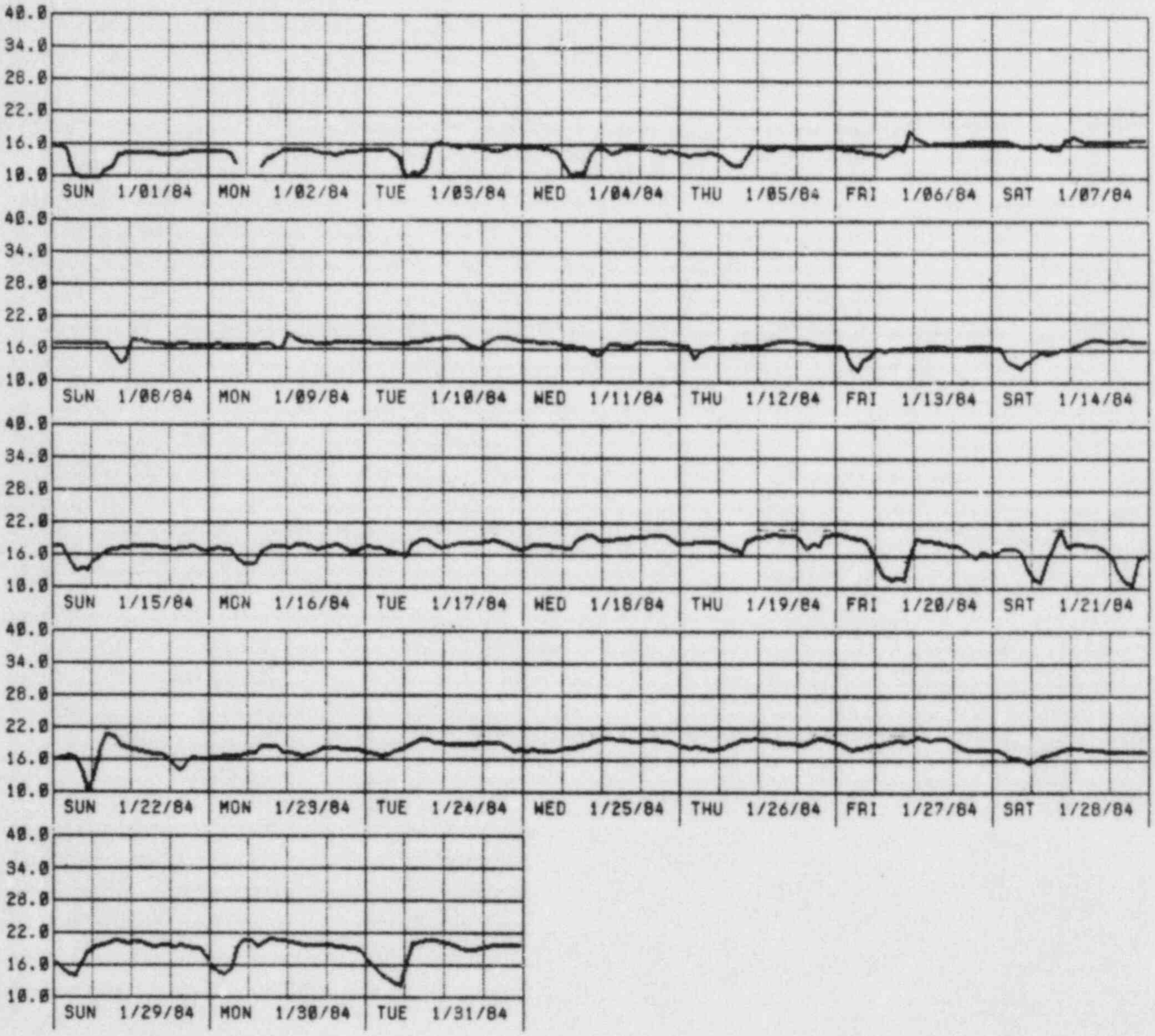

TEMPERATURE (DEG C), STATION 3

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
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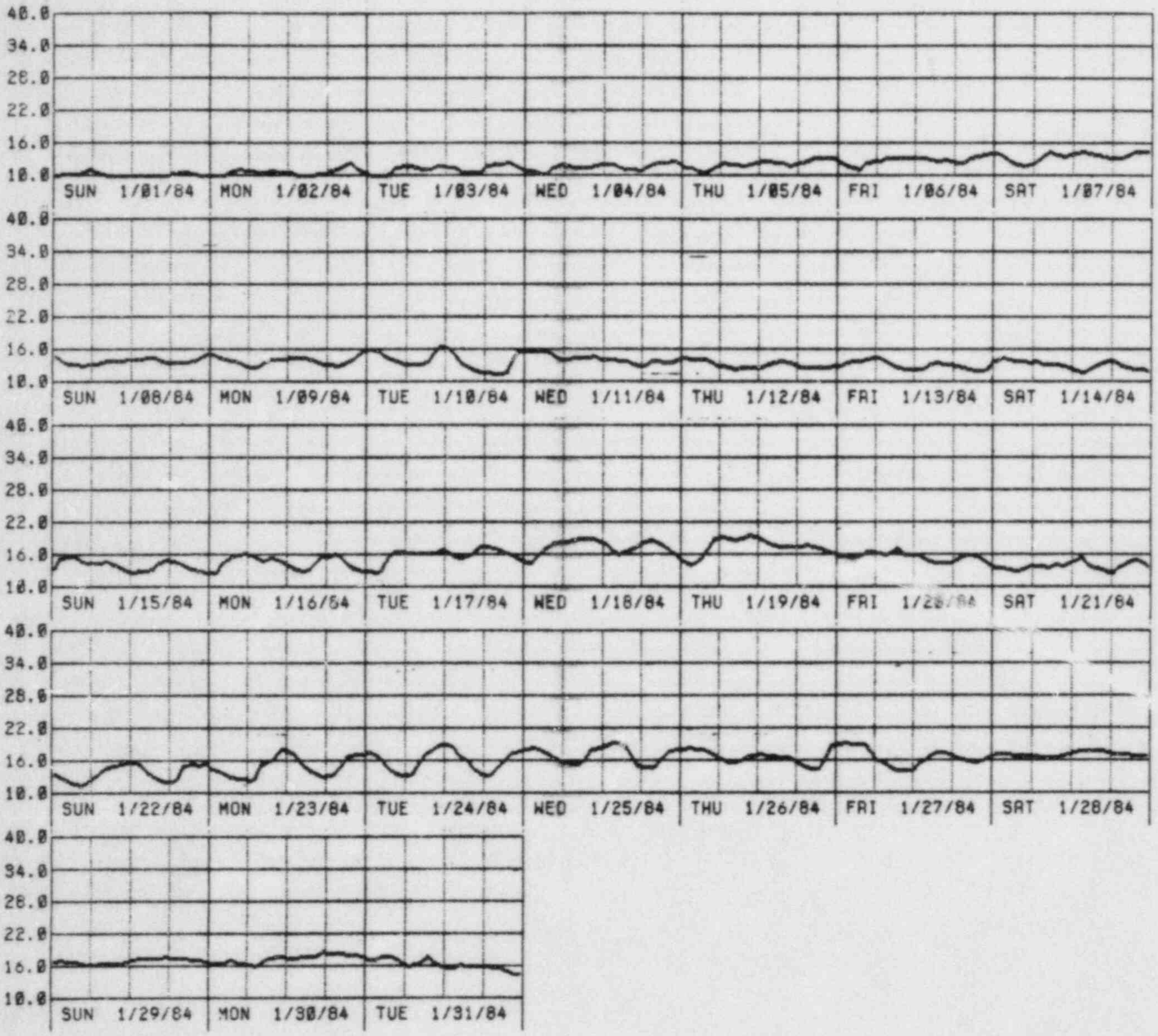

TEMPERATURE (DEG C), STATION 12S

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
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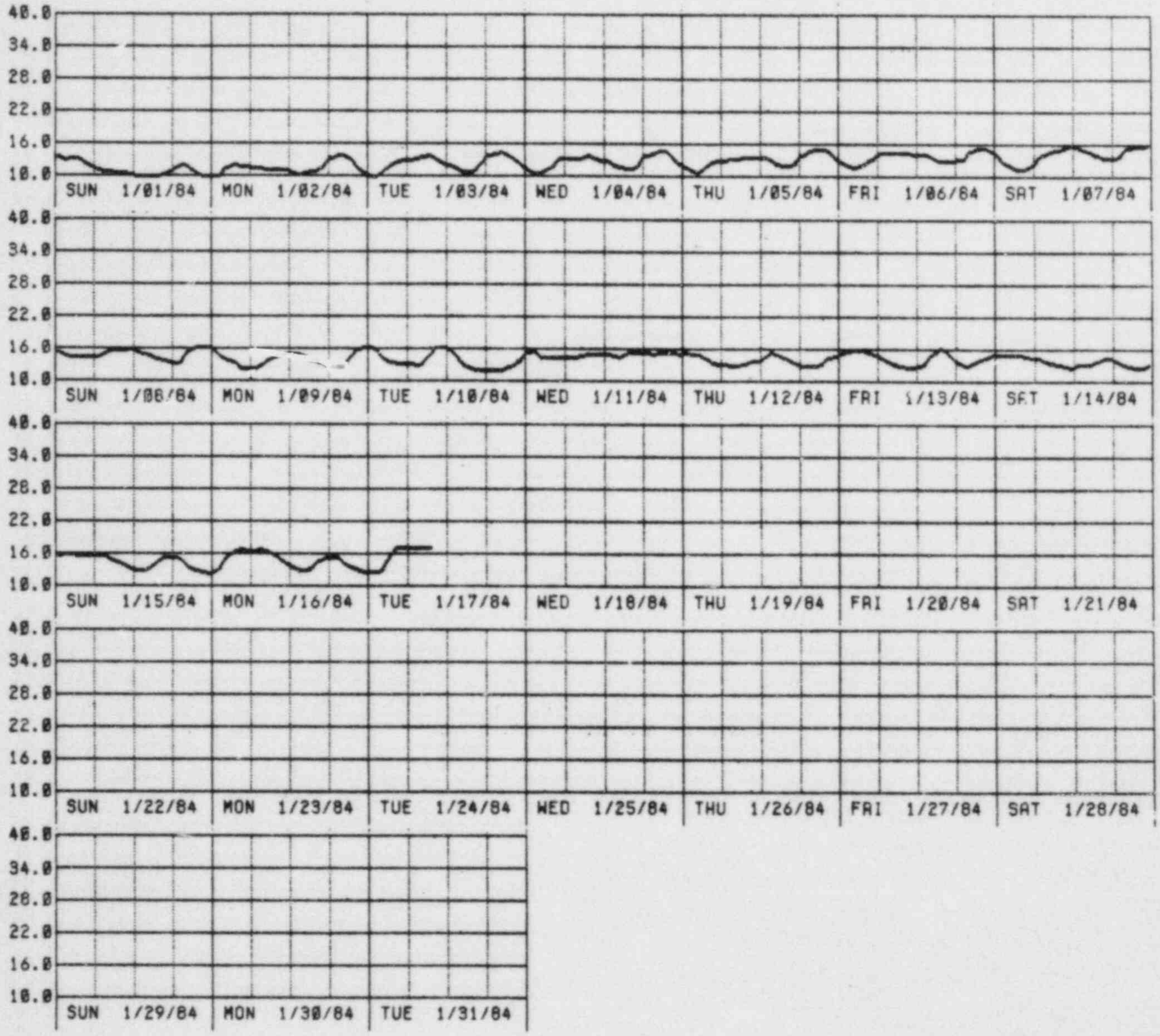

TEMPERATURE (DEG C), STATION 12B

FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
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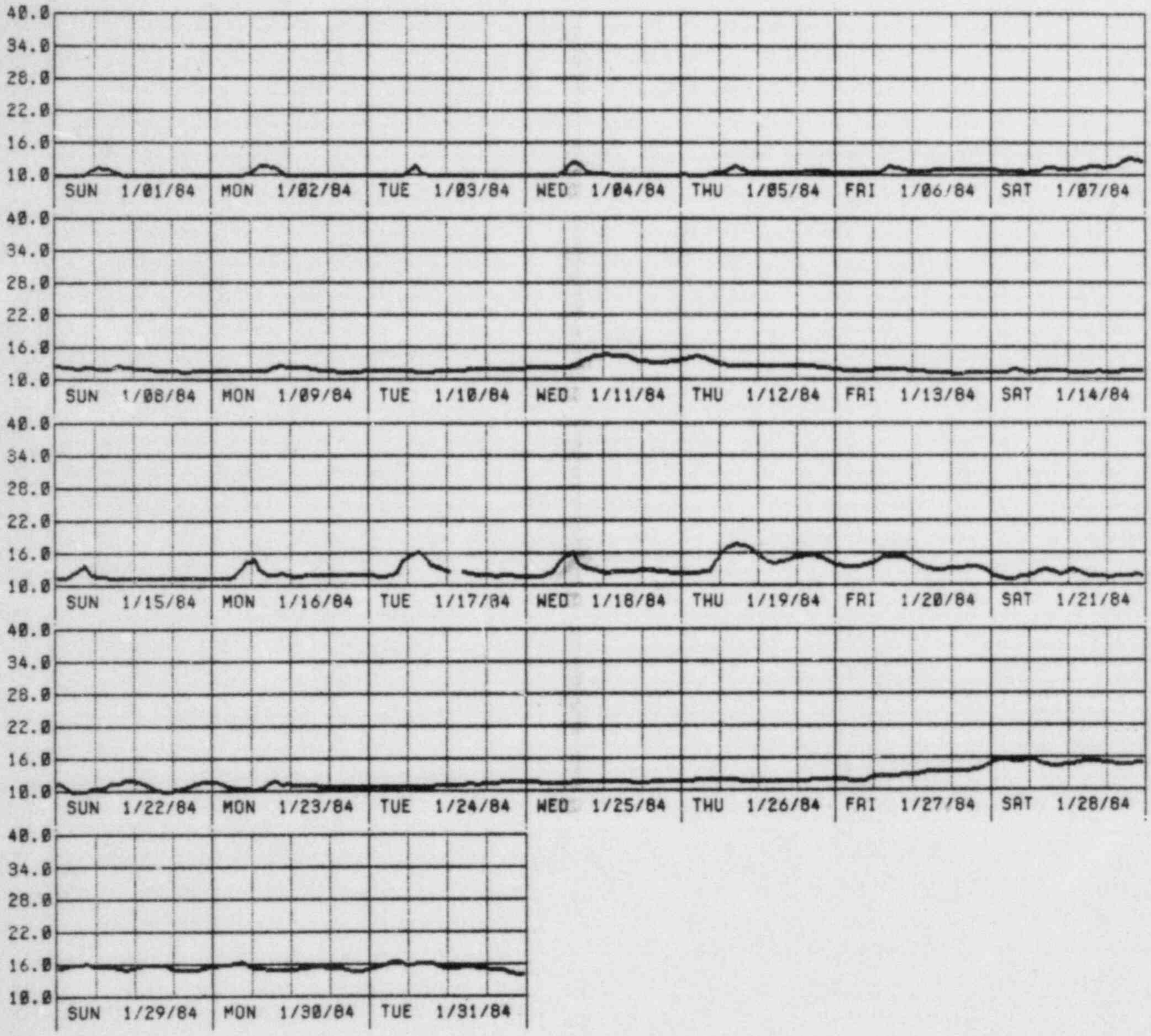
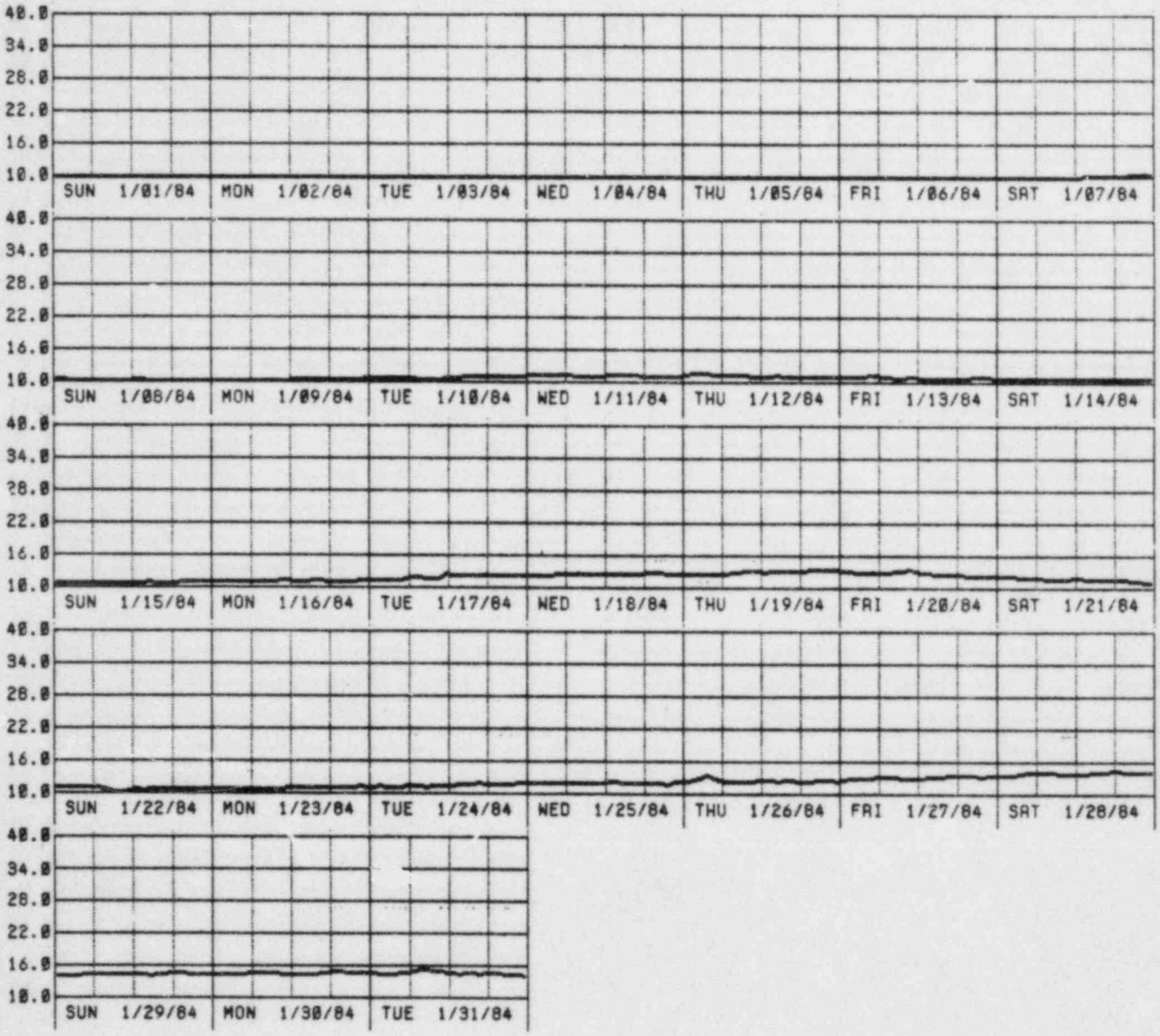


TEMPERATURE (DEG C), STATION 29

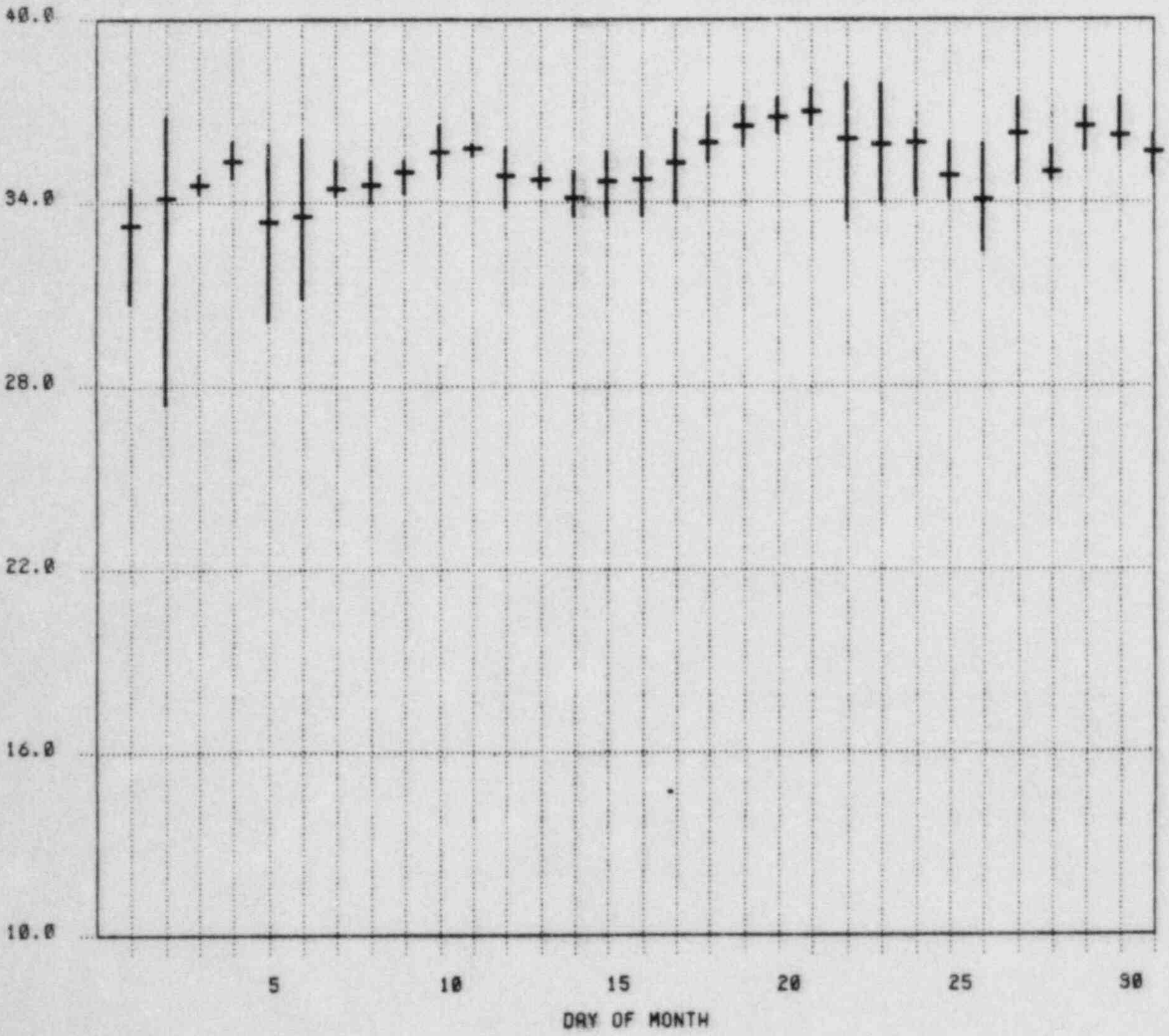
FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



TEMPERATURE (DEG C), STATION 38S

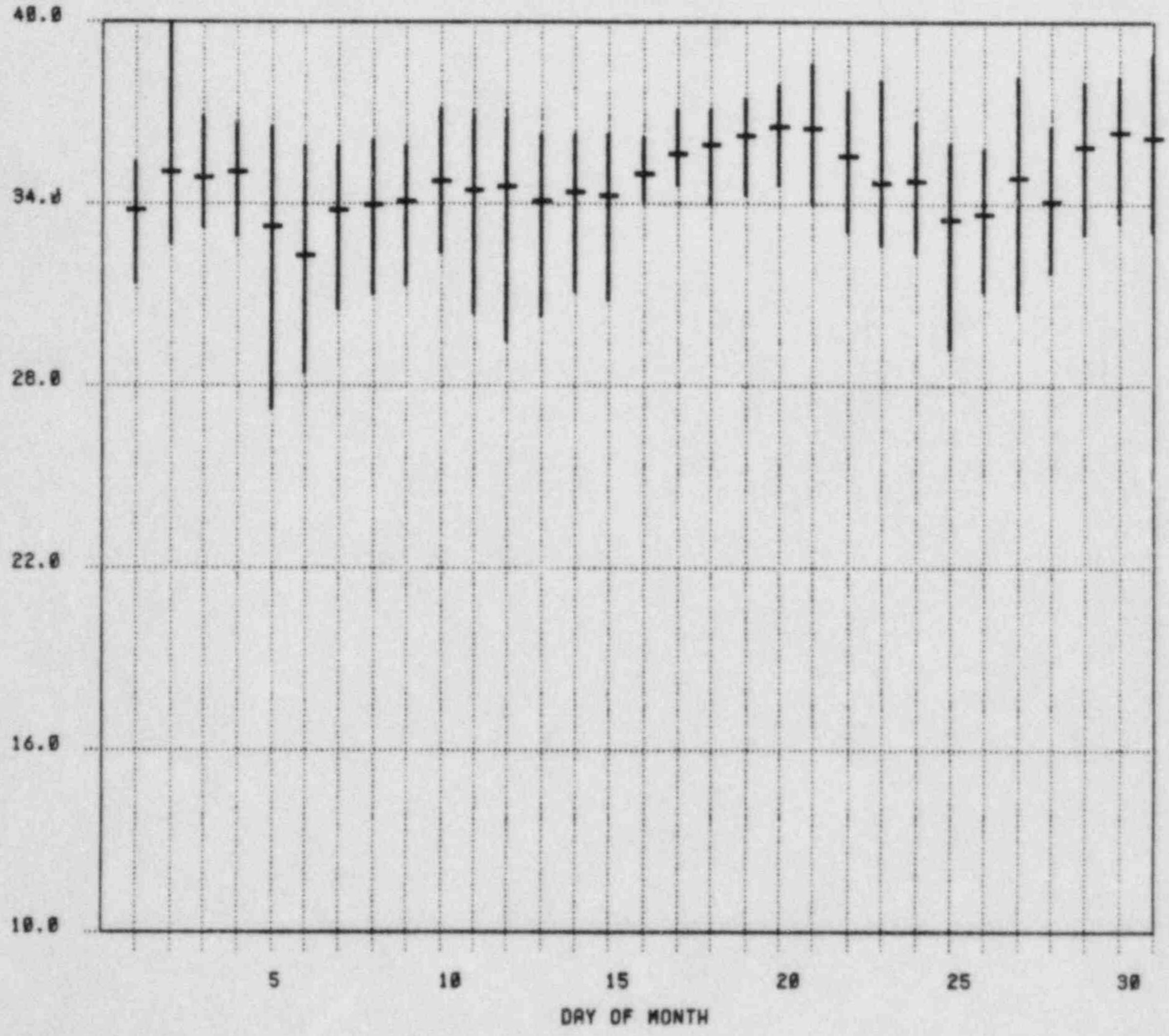
FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

MEAN, HIGH, AND LOW TEMPERATURE (DEG C), STATION 1
DATA FOR AUG 1983

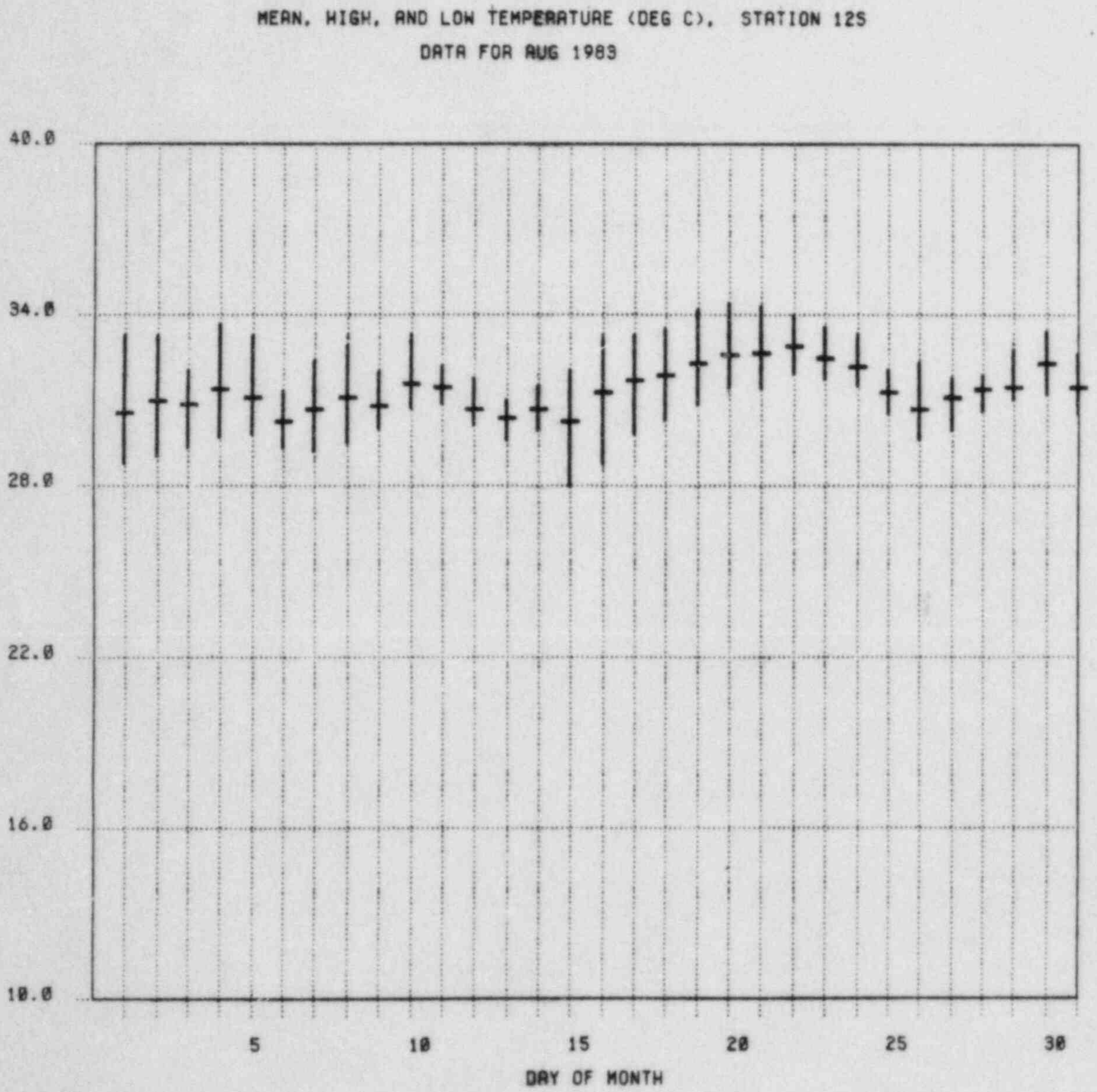


FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

MEAN, HIGH, AND LOW TEMPERATURE (DEG C), STATION 3
DATA FOR AUG 1983

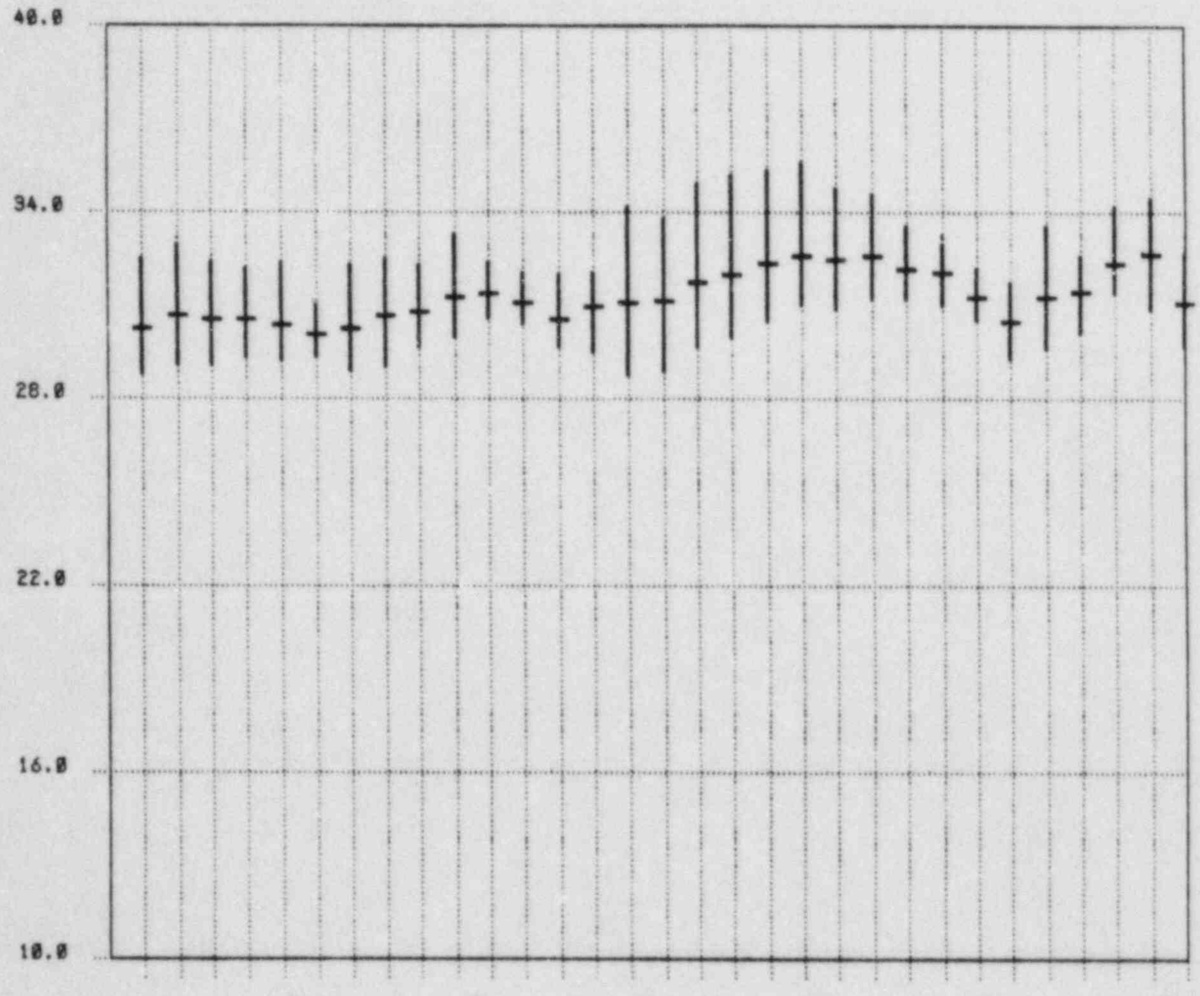


FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



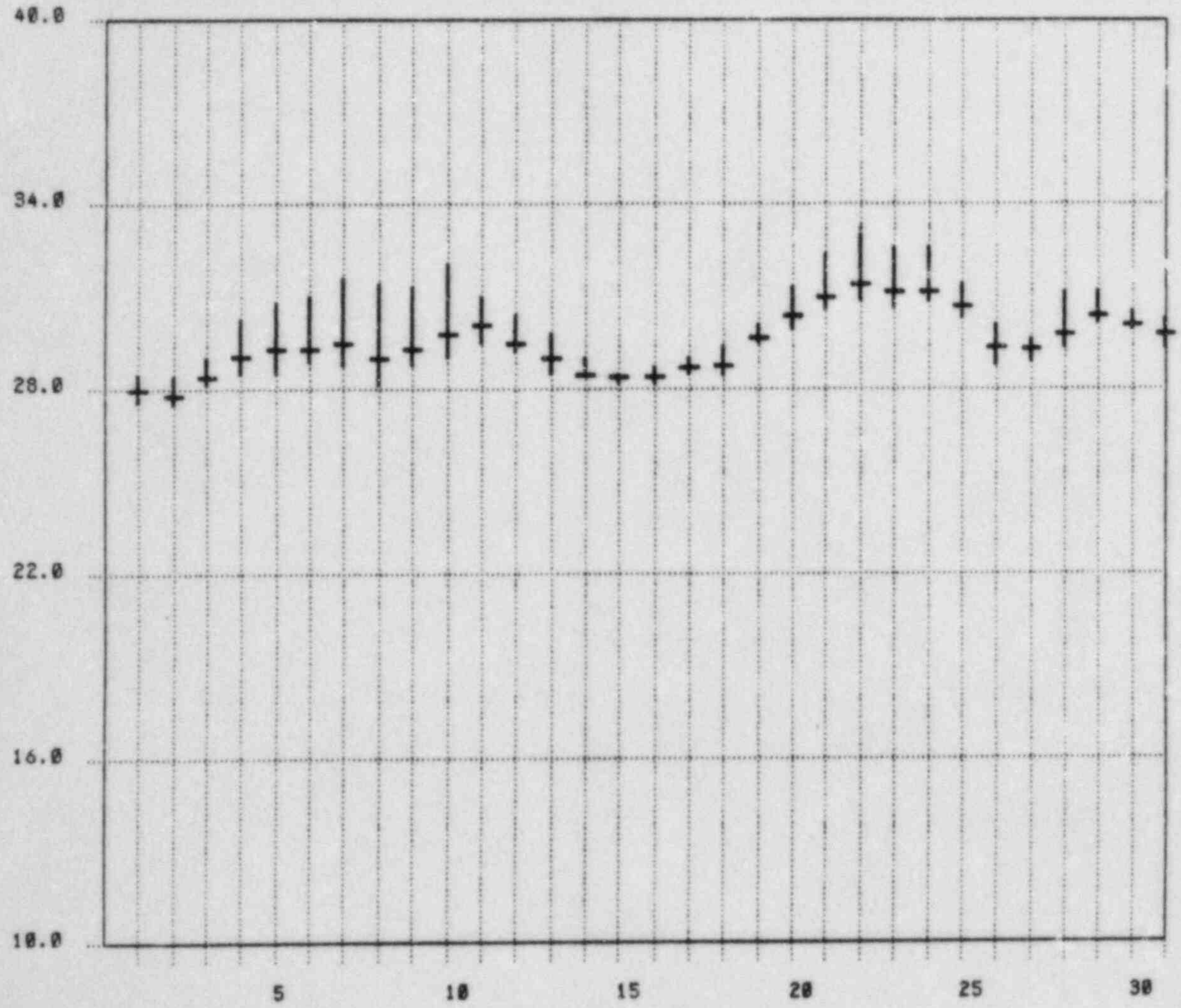
FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

MEAN, HIGH, AND LOW TEMPERATURE (DEG C), STATION 12B
DATA FOR AUG 1983



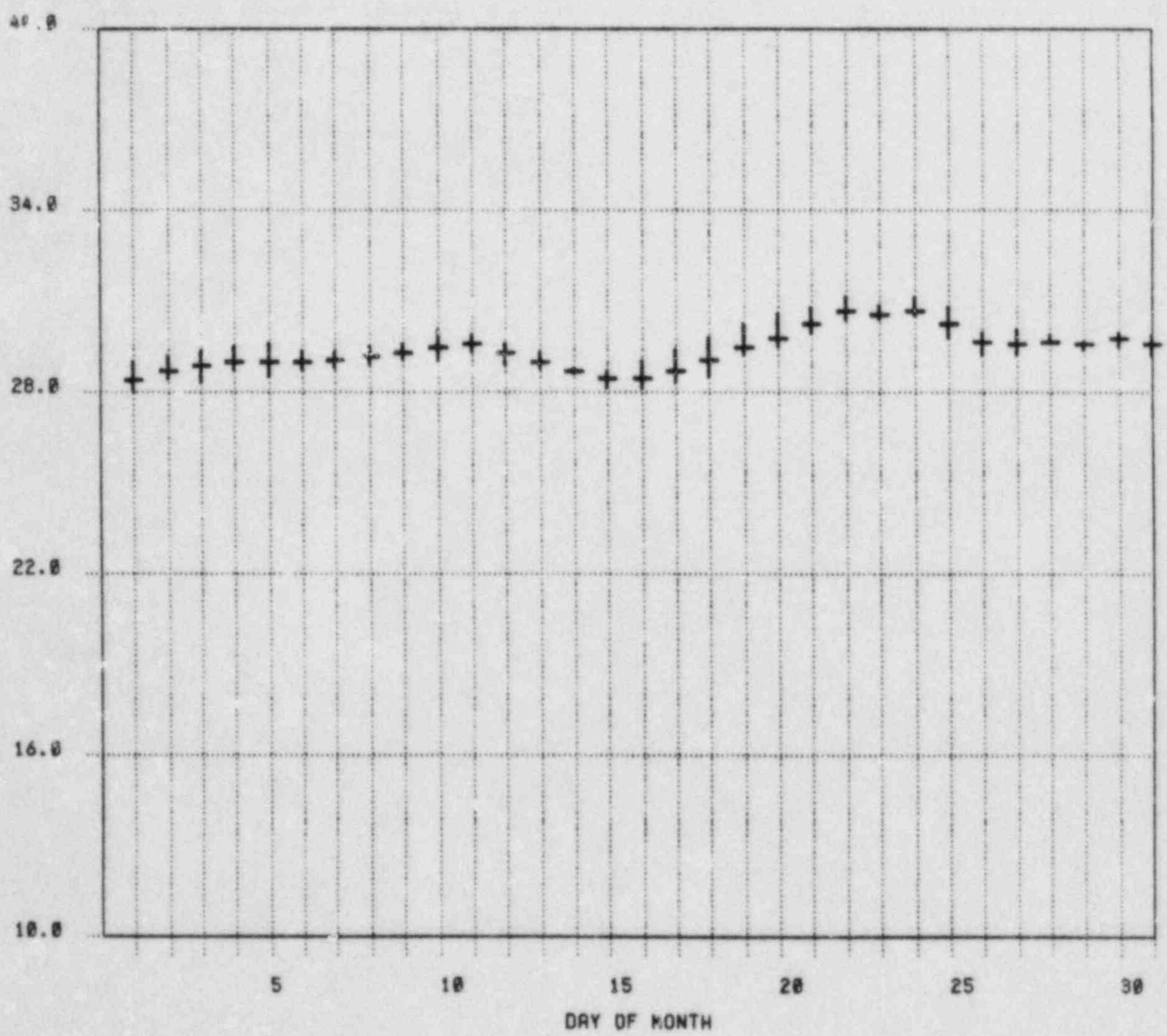
FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

MEAN, HIGH, AND LOW TEMPERATURE (DEG C), STATION 29
DATA FOR AUG 1983

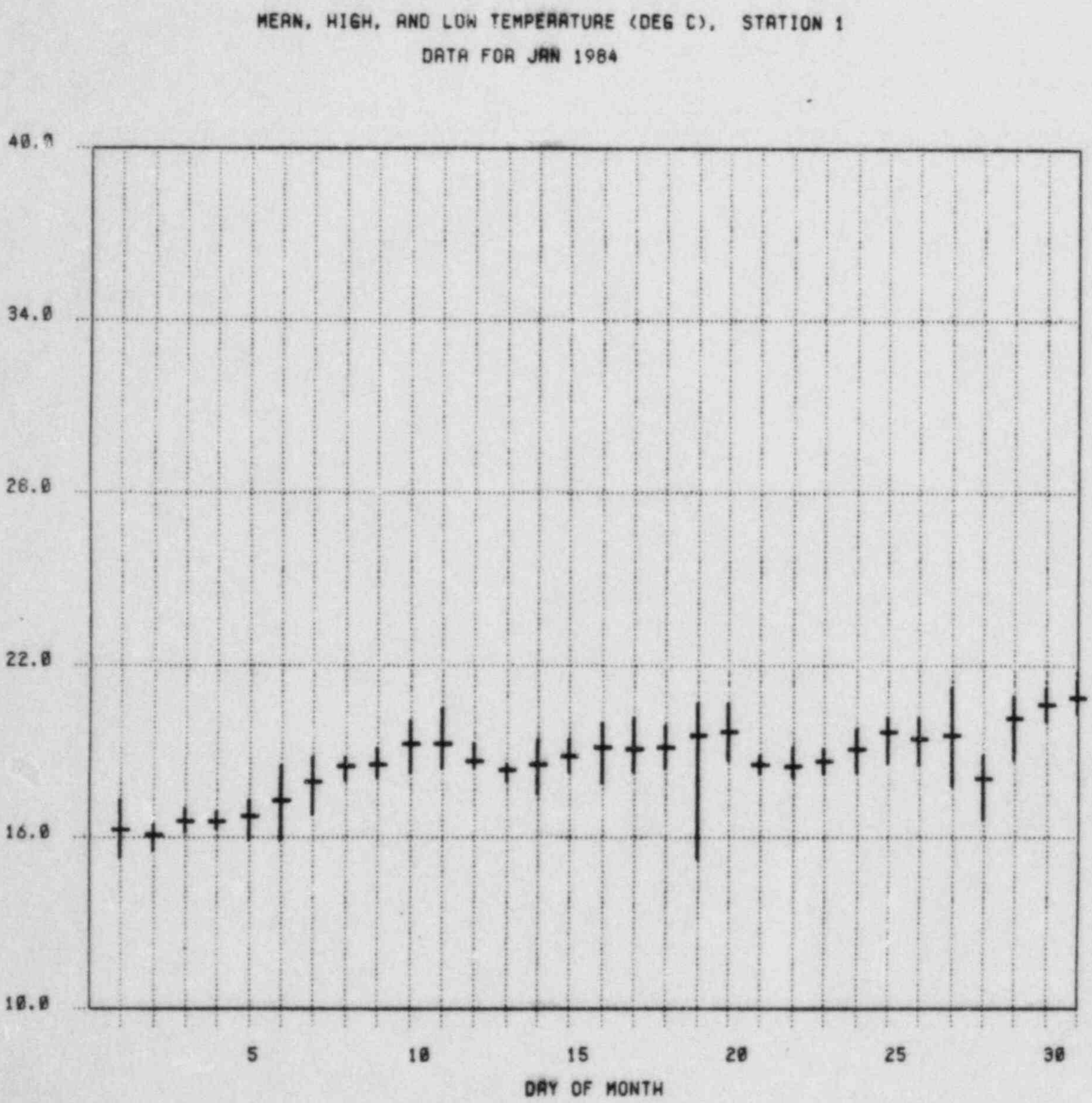


FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

MEAN, HIGH, AND LOW TEMPERATURE (DEG C), STATION 385
DATA FOR AUG 1983

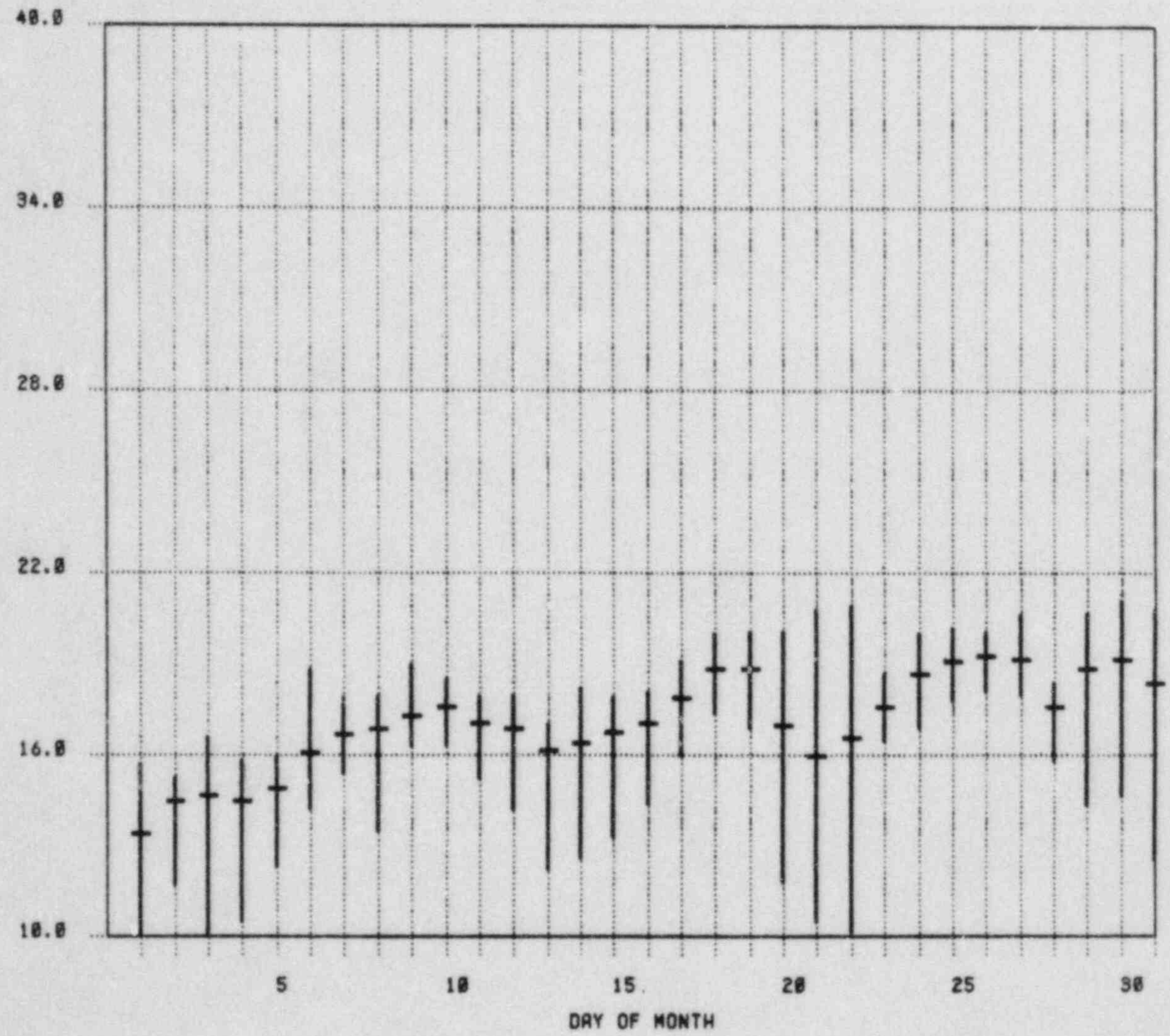


FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

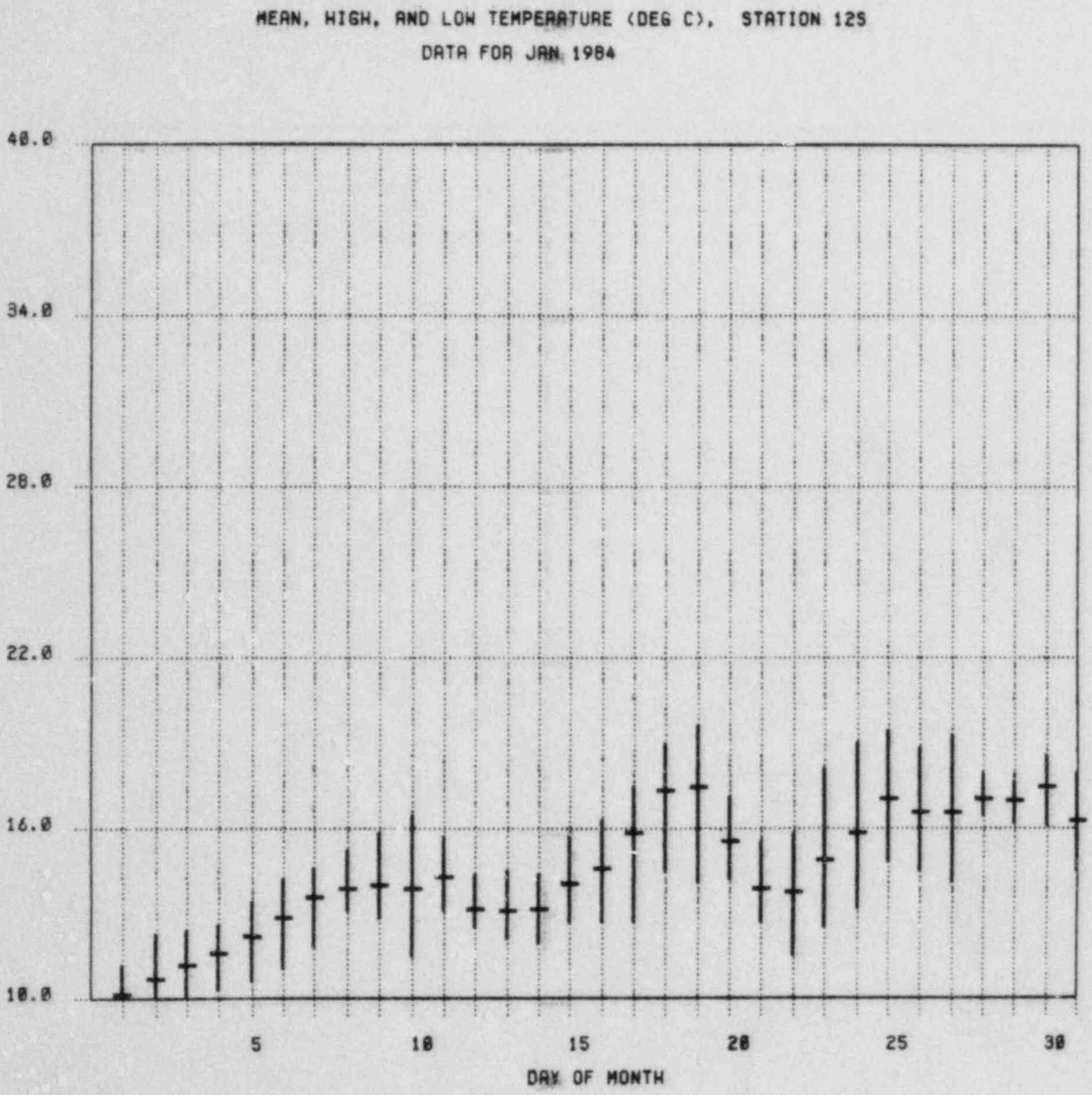


FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

MEAN, HIGH, AND LOW TEMPERATURE (DEG C), STATION 3
DATA FOR JAN 1984

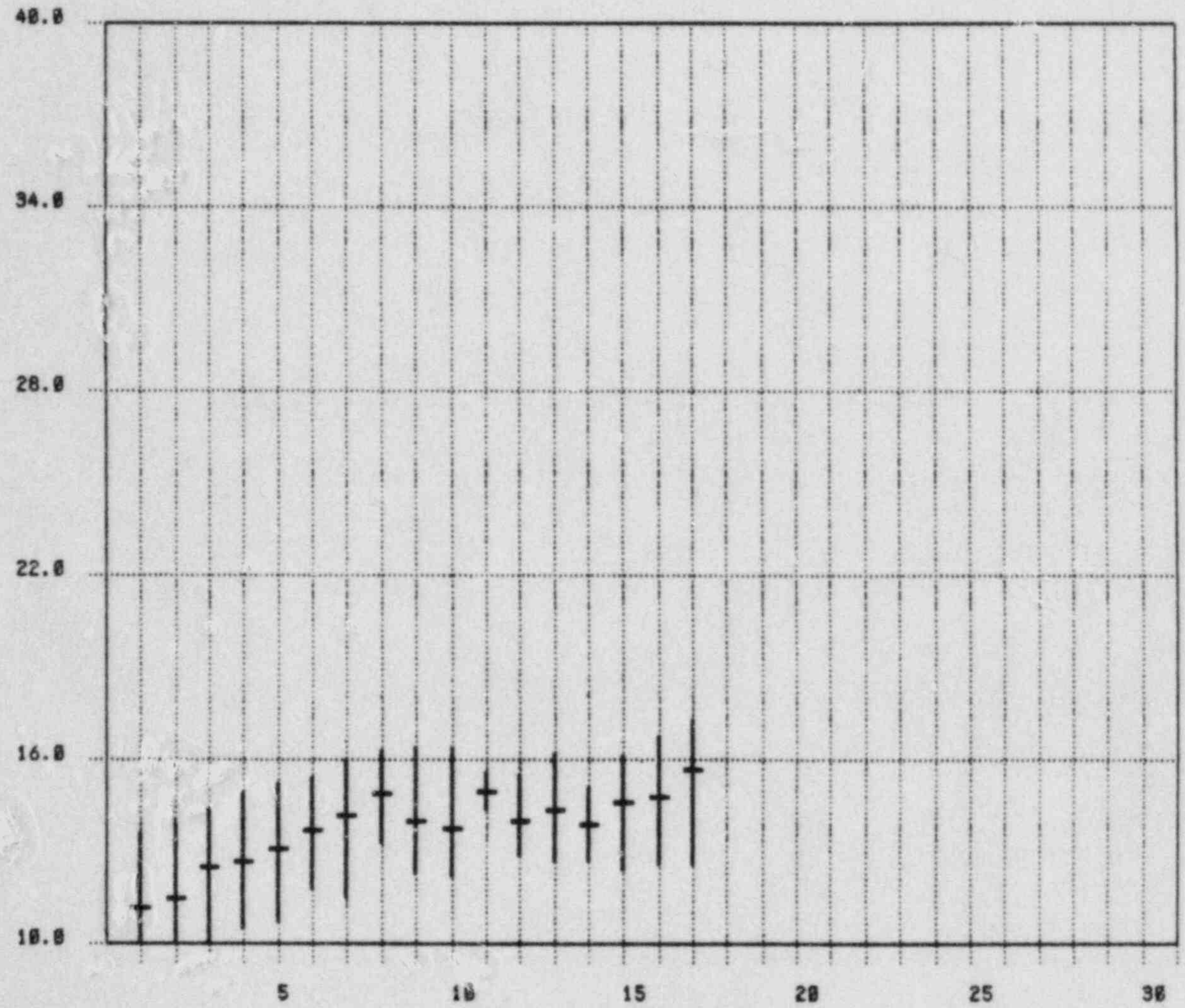


FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

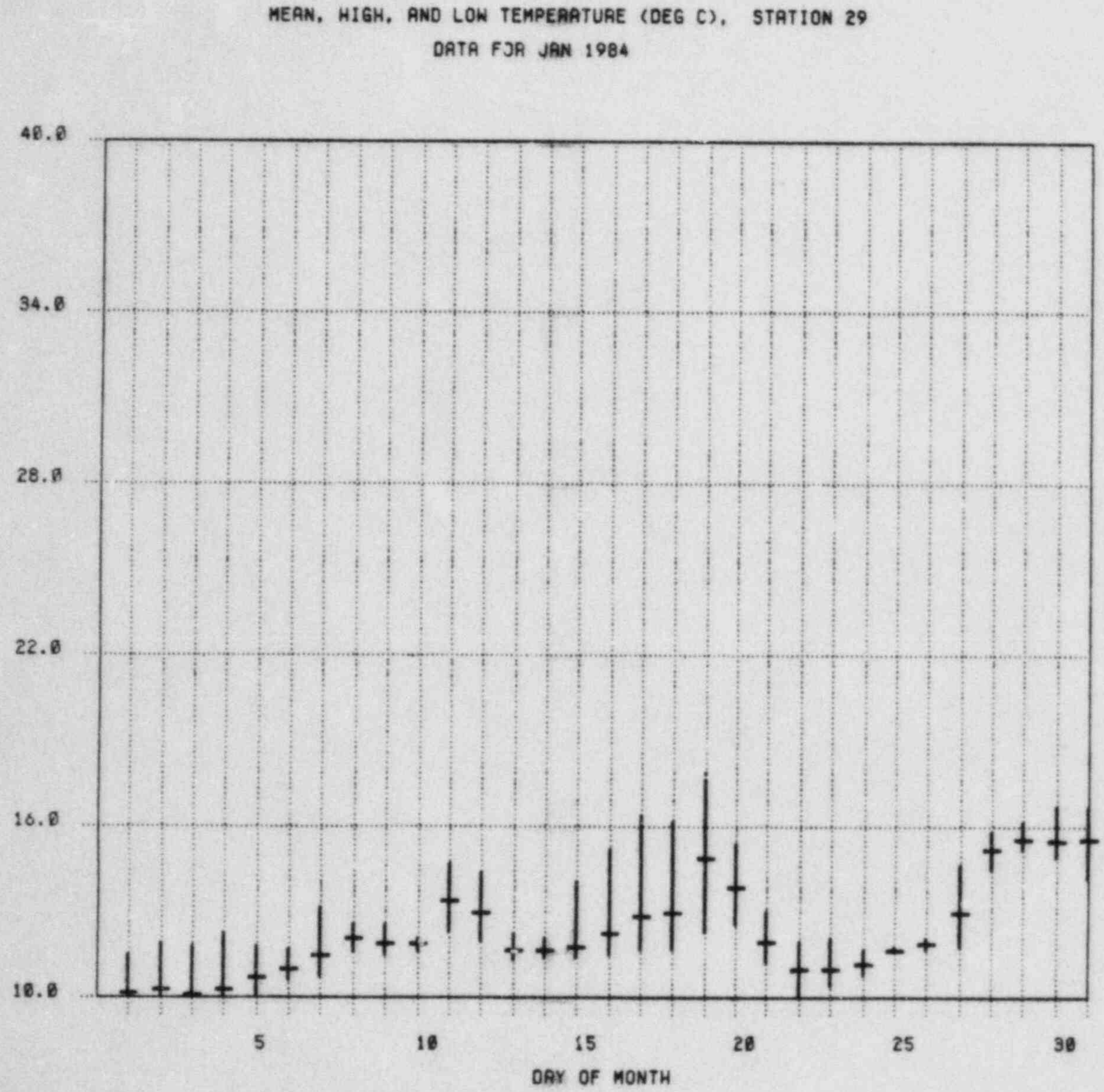


FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

MEAN, HIGH, AND LOW TEMPERATURE (DEG C), STATION 12B
DATA FOR JAN 1984



FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA



FLORIDA POWER CORPORATION
CRYSTAL RIVER 316 STUDIES
THERMOGRAPH DATA

MEAN, HIGH, AND LOW TEMPERATURE (DEG C), STATION 98S
DATA FOR JAN 1984