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BATHYMETRY OF THE ST. LUCIE ESTUARY

by

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**Water Resources Division
Resource Planning Department
South Florida Water Management District**

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Section 1. Executive Summary

In 1981 a comprehensive depth survey was undertaken by the District in the St. Lucie Estuary. These measurements were needed for preparation of the geometry input for the St. Lucie Estuary model by the Water Resources Division, and as background data for a sediment survey conducted by the Environmental Sciences Division. Available depth data were on the order of twenty years old, and these data did not provide adequate resolution of the bottom topography for modeling purposes.

In preparation for making depth measurements, the District's Survey & Right of Way Division extended the existing level network around the estuary and located depth measurement transects on a set of aerial photographs. Depths along these transects were measured from a boat, and the data were reduced and corrected for local tides, winds, and depth recorder calibration. Benchmarks were also provided for a series of water level recorders installed by the Data Management Division.

The depth data were entered on the District's Cyber computer and used to calculate water volumes for the estuary model. The transects were plotted, and a contour map of the bottom topography was created by the Geographic Sciences Division. The SFWMD set of approximately 8000 depth data points provides more than twenty times as many points as are available from the National Ocean Service (NOS) chart for the St. Lucie Estuary. In addition to providing data that are more recent, the District data provide an order-of-magnitude improvement in the resolution of depth in the estuary.

A comparison of the depths available from the NOS chart and the District contour map shows some areas of agreement, and some areas in which depths are significantly different. The contour map, printed in 30 by 40 inch format, provides a substantially improved representation of the bottom topography of the St. Lucie Estuary.

This report may be used by state or Federal agencies as well as by private citizens interested in the physical characteristics of the St. Lucie Estuary. Primarily, it is a reference to the bottom topography of the estuary as it was found in 1981, and against which future measurements can be compared. It will be of interest to commercial enterprises and recreational users of the estuary. In addition, it may be used by physical, biological, and geological researchers planning on conducting studies in the estuary in the future.

Section 2. Introduction

Bathymetry is the term commonly used for the measurement of the depth of a body of water. It is a contraction of the two Greek words *bathos*, for depth, and *metro*, to measure. Bathymetry is the technique of describing the topography of the bed of a waterbody by means of a series of depth measurements. This report describes the methods used, and results of, the bathymetry of the St. Lucie Estuary in 1981 and 1982, as performed by the South Florida Water Management District (SFWMD).

The bottom topography of an estuary changes over time. It is changed indirectly by rainfall, which erodes soil and introduces sediments from drainage canals and tributaries; by erosion and deposition, or bottom movement or shifting of sediments by currents within the estuary; and by the loss of sediment through the mouth of the estuary to the ocean or other connecting waterbody. Such changes can take place fairly rapidly through the action of large regulatory discharges from tributary canals, or by severe storms, and less rapidly by land development in the tributary drainage basins. There are also likely to be seasonal depth changes associated with shifts in the offshore littoral drift, the movement of sand outside the inlet along the continental shelf.

The St. Lucie Estuary is located on the East Coast of Florida. The North Fork of the St. Lucie River begins at the confluence of Five and Ten Mile Creeks in St. Lucie County and flows southward, while the Old South Fork flows northward from its source in Martin County. The North and South Forks join at Stuart and flow eastward to the Indian River and to the St. Lucie Inlet, which is located at the south end of Hutchinson Island (Figure 1).

Depths in the St. Lucie Estuary and St. Lucie Inlet have been published previously on charts prepared by the U.S. Coast & Geodetic Survey (C&GS), National Ocean Service (NOS/NOAA), and the Army Corps of Engineers (COE), as listed in Table 1. Since the most recent complete survey of the estuary had been conducted in 1963, the SFWMD decided to conduct a bathymetric survey in the St. Lucie Estuary and the North and South Forks of the River in 1981 and 1982, in order to obtain recent bottom topography for a numerical model of the estuary and for an independent sediment study.

Depth measurements were needed for calculations of the volume of water in sections of the estuary. The model predicts, both spatially and in time, the

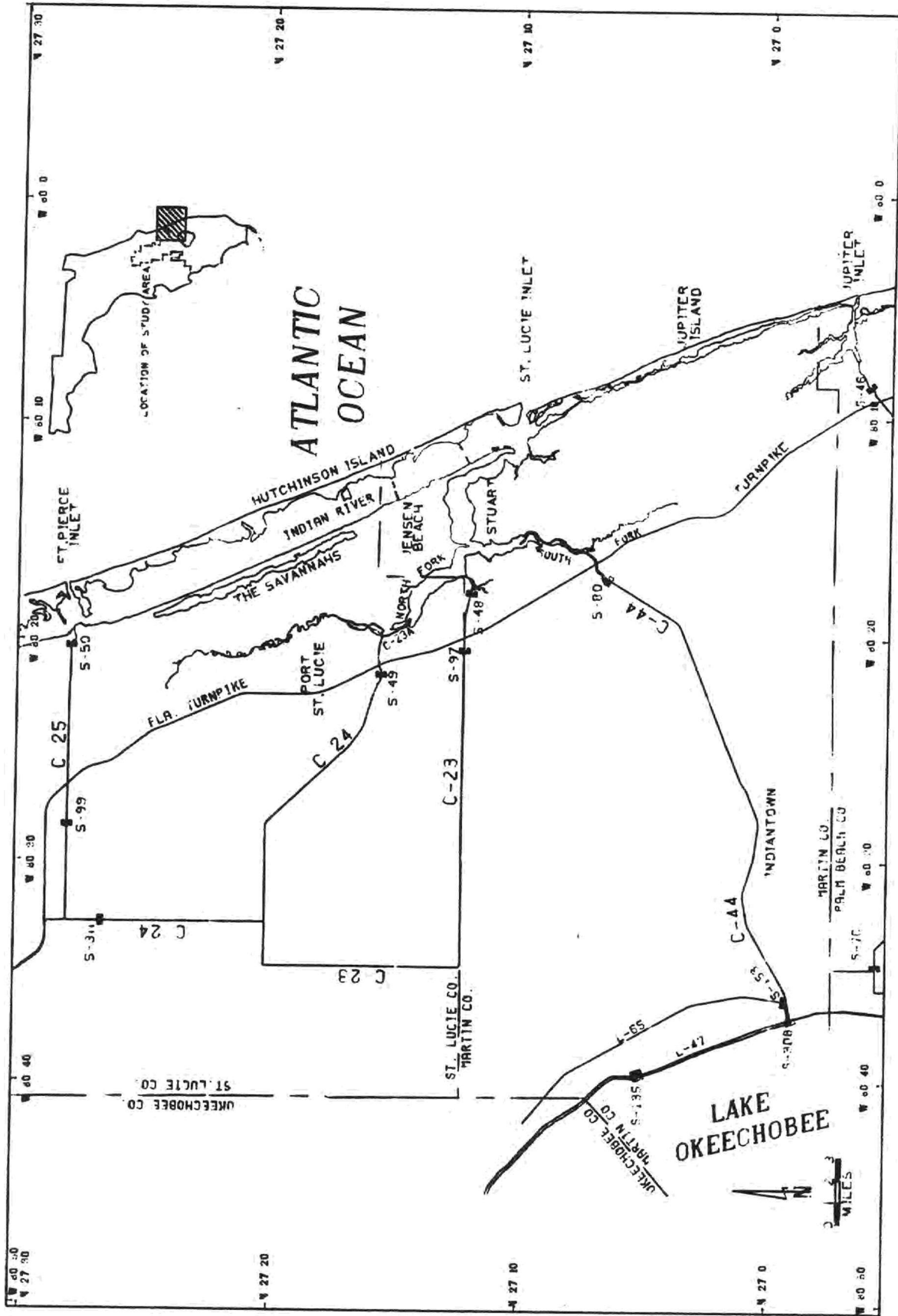


Figure 1 FLOOD CONTROL CANALS AND STRUCTURES IN THE ST. LUCIE ESTUARY DRAINAGE BASINS

TABLE 1. SOME BATHYMETRIC CHARTS FOR ST. LUCIE INLET AND THE ST. LUCIE RIVER

<u>Agency Number</u>	<u>Agency</u>	<u>Description of Chart</u>	<u>Scale</u>	<u>Chart Date</u>
1571	C&GS	Indian River, Eden to Jupiter Narrows North and South Forks, St. Lucie River Manatee Pocket Great Pocket south to 27° 5.5' N	1:20000	1883-94
H-5023	C&GS	St. Lucie Inlet Indian River north to 27° 11.9' N Great Pocket W. of Sewall Pt. to 27° 10.5' N mouth of Manatee Creek	1:10000	1930
11472	NOS	St. Lucie Inlet Outer Estuary east of 80° 13' (depths to MLW, not NGVD)	1:40000	1963 periodically updated
11428	NOS	St. Lucie River North Fork South Fork and S-80 Lock and Dam (depths to MLW, not NGVD)	1:40000 1:80000	1963 periodically updated
H-8954	C&GS	St. Lucie Inlet Vicinity Indian River to Great Pocket West to 80° 11.2' W	1:10000	1967
15-34132	COE	St. Lucie Inlet Monitoring Study	February 1:12000	1983
120-34070	COE	Intracoastal Waterway Channel 6 through 12 ft project	1:12000	March-April 1984

changing volume of water in the estuary from rainfall and evaporation, tributary inflow, and groundwater seepage. It predicts the movement of water under the influence of tides and winds, and it calculates the amount of salinity at predetermined locations in the estuary. The accuracy of predictions of flow and salinity by the model is directly influenced by the accuracy of the calculations of water volume in the sections of the estuary, which in turn is directly influenced by the accuracy of the bathymetry.

Water depth is usually measured from a shallow draft boat, which is subject to the vertical movement of waves and tides during the survey. The normal procedure for depth measurements is to establish stations along the shoreline which are referenced to a common datum (horizontal plane), and to make all vertical measurements relative to this datum. During

the measurement period the local water levels due to tide and wind must be recorded, and during data reduction the depth measurements must be referenced back to the datum by subtracting the measured tide and wind effects.

Many decades ago the only practical method for obtaining the depth of water at a particular location was to lower a weighted rope or line, marked at appropriate intervals, from the side of the boat to the bottom. It was known that the line itself could be bent by water currents, and methods were devised to make corrections for sounding lines that could not be made to drop vertically.

More recently, acoustic signals have been used to measure the depth of water. This measurement is based on the fact that sound travels through water at a

known speed. The time required for the sound to travel to the bottom and be reflected back to the boat is measured and divided by two and by the speed of the sound pulse. The speed of sound varies with water temperature and salinity, however, and also the sound pulses are absorbed and reflected in different ways by the type of material on the bottom and in the water column. Therefore, even when modern acoustic depth recorders are used, extreme care must be taken in the reduction of data so that errors will be minimized.

Section 3. The Level Net

A level net is a network of stations, consisting of various kinds of survey monuments, for which the elevations have been established to a common plane, or datum. It provides a set of locations to which the level of the water surface or the depth of water can be accurately referenced.

The level net established by the SFWMD for the St. Lucie Estuary refers to Coast & Geodetic Survey (C&GS) first order benchmarks, and second and third order benchmarks established by the SFWMD and other agencies. All elevations referenced to this net are given in terms of feet NGVD, where NGVD is the National Geodetic Vertical Datum and is equivalent to 1929 mean sea level (MSL). Periodically, NGVD is locally updated by the NOS.

To compare the depths referenced to mean low water (MLW) on federal navigation charts to the SFWMD survey depths, a correction factor to convert from MLW to NGVD must be applied. This correction factor is published by the NOS with other information on tidal benchmarks. For the St. Lucie Estuary, the correction factor for the Sewall Point station (NOS 872-2371) is based on 26 months of record (July 1969 to October 1973), as published on June 2, 1983. Depths referenced to MLW in this area are corrected to NGVD by subtracting 0.21 ft.

SFWMD survey personnel initiated their survey from existing first order benchmarks wherever avail-

able. These were recovered in the vicinity of the City of Stuart and along the Florida East Coast Railway northward to Jensen Beach as denoted by filled triangles in Figure 2. The basic accuracy of these first order benchmarks is calculated to be ± 0.01 ft (Table 2).

Second order level lines were surveyed by the District from existing first order stations for the purpose of leveling water level recorders previously installed for the St. Lucie Estuary project. The SFWMD uses Class 1 surveying procedures, where the class of a level line refers to the permitted closure error. The basic accuracy of second order leveling is 0.02 ft for a distance of 1 km. The elevation accuracy of a benchmark on the St. Lucie Estuary can be calculated by assuming that the elevation of each intermediate benchmark is independent of any others and that accuracies combine linearly. For example, assuming 1 km distance between benchmarks, Order 2 Class 1 leveling, accuracy is $6 \text{ mm} \times 1 = 0.0197$ ft for one benchmark. For six sequential 1 km level lines, the estimated cumulative error for Order 1, Class 1 surveying, would be the square root of $6 \times (.0197 \text{ ft})^2 = 0.048$ ft.

The names of those St. Lucie water level recorder installations that are associated with first or second order benchmarks are summarized in Table 3, and located in Figure 3. Three third order level lines were extended for the water level recorders in the North and South Forks of the St. Lucie River and for the Bessey Creek recorder. One was extended from benchmark MAR 101 to Kellstadt Bridge, the eastern of two Port St. Lucie Boulevard bridges. The second started from a third order benchmark at St. Lucie Lock and Dam (benchmark FCE 3528), ran to the Old South Fork water level recorder named Harbor Drive, and was extended to a recorder called Cardinal Trail upstream near benchmark SF (DOT). A recorder was also established at Bessey Creek, on the west side of the North Fork above its junction with the South Fork, by extending a level line from benchmark FCE 2130. The basic accuracy of third order benchmarks is ± 0.04 ft for 1 km distance (Table 2). The names of St. Lucie

TABLE 2 CALCULATED ELEVATION ACCURACY OF BENCHMARKS FOR 1 KM DISTANCES

Benchmark		Calculated Accuracy Equation	Accuracy (ft)
Order	Class		
1	1	3 mm x square root (distance, km)	.010
1	2	5 mm x square root (distance, km)	.016
2	1	6 mm x square root (distance, km)	.020
2	2	8 mm x square root (distance, km)	.026
3	--	12 mm x square root (distance, km)	.039

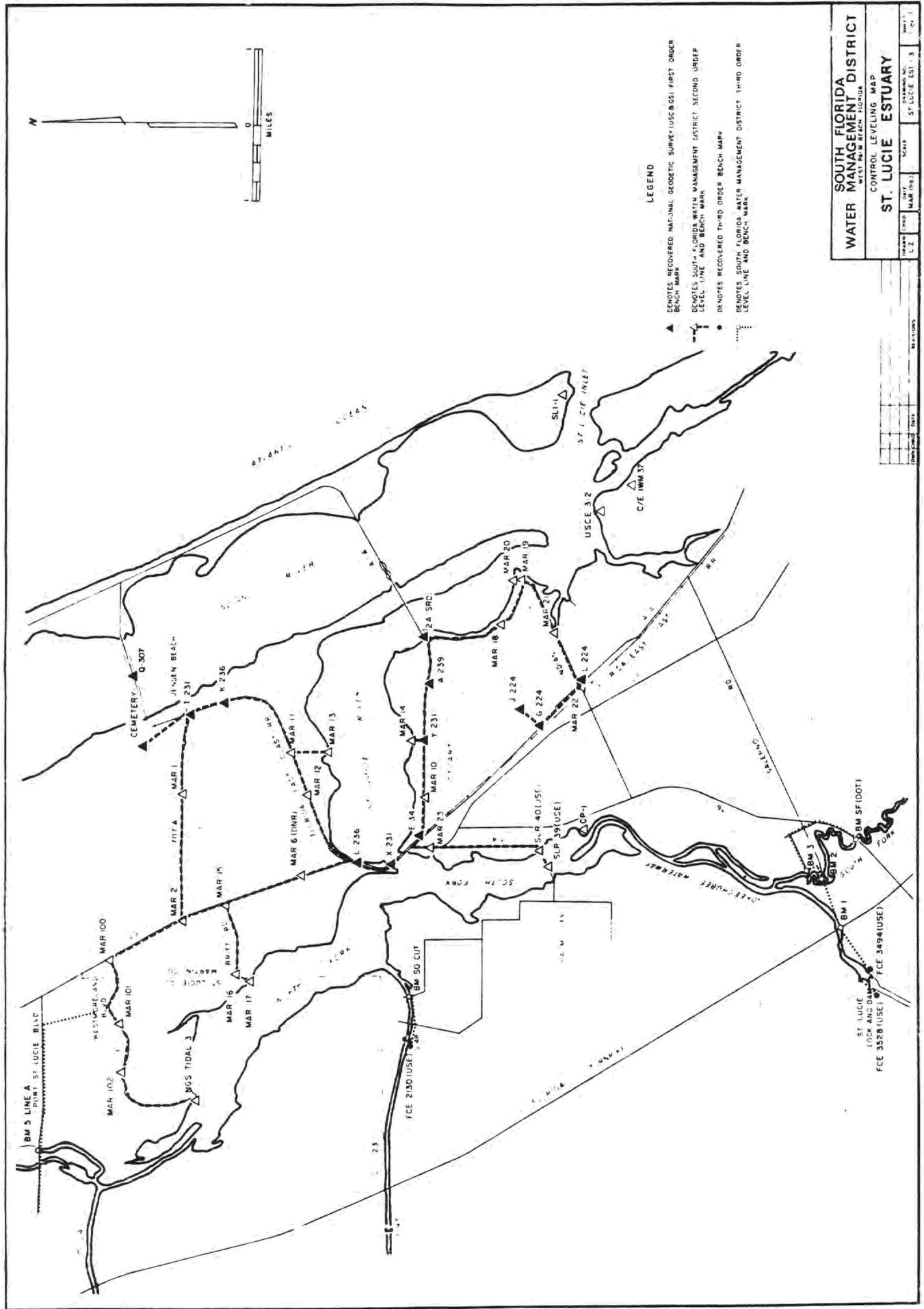


Figure 2 LEVEL NETWORK MAP FOR ST. LUCIE ESTUARY

TABLE 3. ST. LUCIE WATER LEVEL RECORDER STATIONS ASSOCIATED WITH FIRST AND SECOND ORDER BENCHMARKS

<u>Benchmark Name</u>	<u>Order</u>	<u>Name of Water Level Recorder Location</u>
MAR-20	2	Hell Gate
2-A (SRD)	2	A1A Bridge, St. Lucie River
MAR-14	2	Florida Oceanographic Society
X-231	1	Roosevelt Bridge
SLR-39 (USE)	2	Palm City Bridge
MAR-17	2	Britt Creek
NGS Tidal-3	2	Sandpiper Bay
CP-1	2	Cabana Point

water level recorder installations that are associated with third order benchmarks are summarized in Table 4 and located in Figure 3.

TABLE 4. ST. LUCIE WATER LEVEL RECORDER STATIONS ASSOCIATED WITH THIRD ORDER BENCHMARKS

<u>3rd Order Benchmark</u>	<u>Name of Water Level Recorder Location</u>
BM-5 line A	Kellstadt Bridge
FCE 2130 (USE)	Bessey Creek
FCE 3494 (USE)	Harbor Drive
FCE 3494 (USE)	Cardinal Trail

The other benchmarks shown in Figure 2, but not listed in Tables 3 or 4, were established at a later time for additional water level recorders, after the bathymetry of the St. Lucie Estuary had been completed.

Section 4. Mapping and Depth Measurements

A series of aerial photographs of the St. Lucie Estuary were obtained so that the transects, or the paths that the survey team would follow across the river for taking depth measurements, could be established before field work was initiated. These photographs, at a scale of 1 inch = 500 ft (1:6000), clearly show shorelines, roads, buildings, and other features that can be identified by personnel on the site to provide reference points for ranges. Figure 4 is an

index to the SFWMD aerial photographs of the St. Lucie Estuary.

Depths in the St. Lucie Estuary were measured along the designated transects, which were oriented perpendicular to the channel and spaced approximately 1000 ft apart. The transects were initially drawn on the aerial photographs, as shown in the example in Figure 5, so that precise starting and ending locations could be planned before the survey crew arrived on site. The entire series of these aerial photographs is reproduced, in reduced size, in Appendix A, in order to show the level of detail available from the original maps. Since it is difficult to read some of the transect identification numbers on the reduced aerial photographs, the area covered by each aerial map is reproduced in a series of maps plotted by computer. Transect lines on all maps and computer plots in this report are oriented with the starting point to the left and the ending point to the right when the transect identification number is right side up. An example of the computer-drawn map is shown in Figure 6, and the full series of the computer maps is included in Appendix B.

Depth measurements were taken from a shallow draft boat, which was positioned along the transect by means of radio messages from a shore station. An automatic distance measuring device (Geodimeter Model 112) at the shore station provided continuous readings of the distance of the boat from this station. This instrument is capable of obtaining relatively fast measurements, which will permit accurate measurements of distances for boat speeds up to 5 knots. At 500 ft intervals along the transect the shore crew sent a "mark" message to the boat crew to mark the recorder chart. Water levels at the shoreline were recorded periodically from a tide staff mounted inside a stilling well.

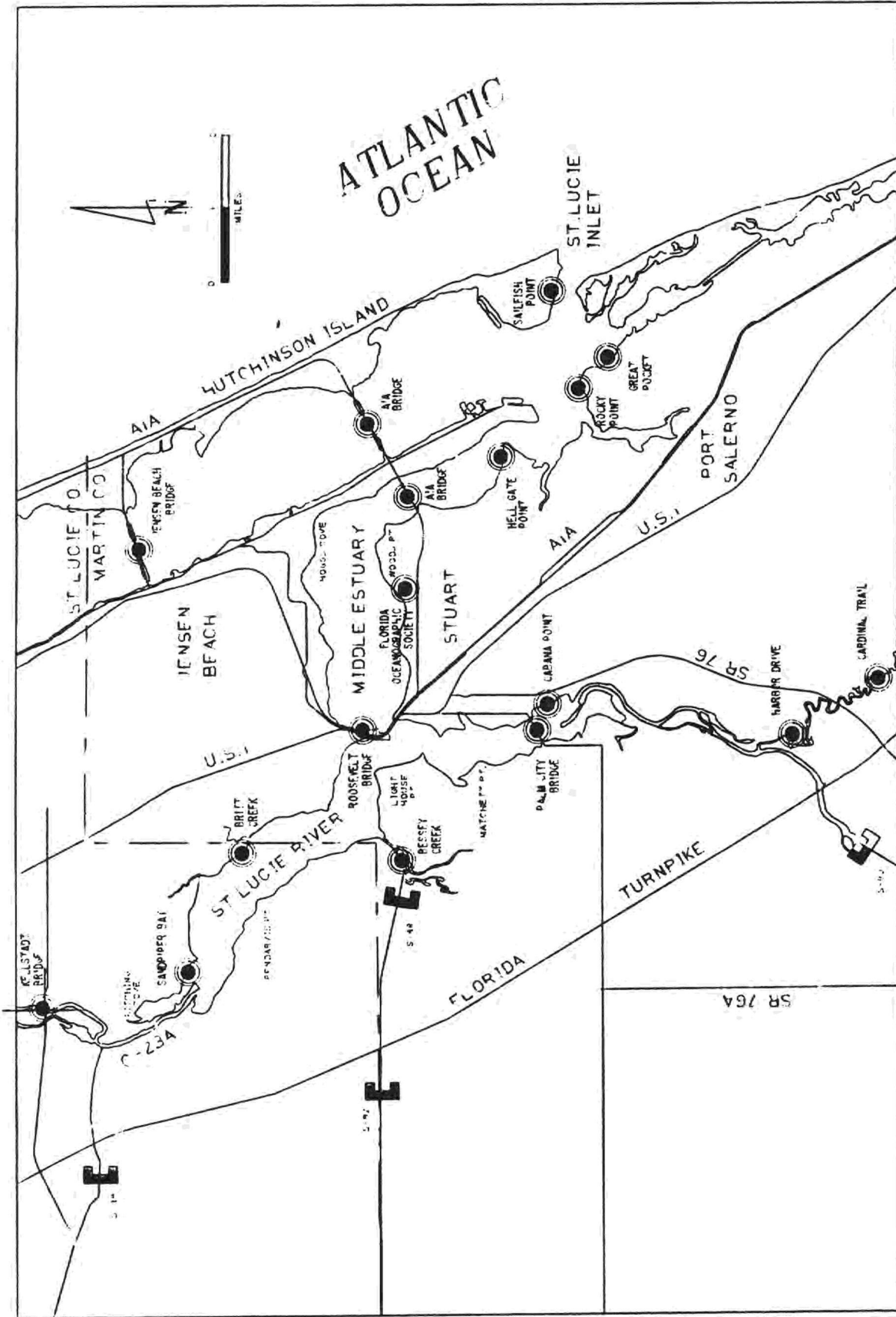


Figure 3 LOCATIONS OF S.F.W.M.D. WATER LEVEL RECORDING STATIONS IN THE ST. LUCIE ESTUARY

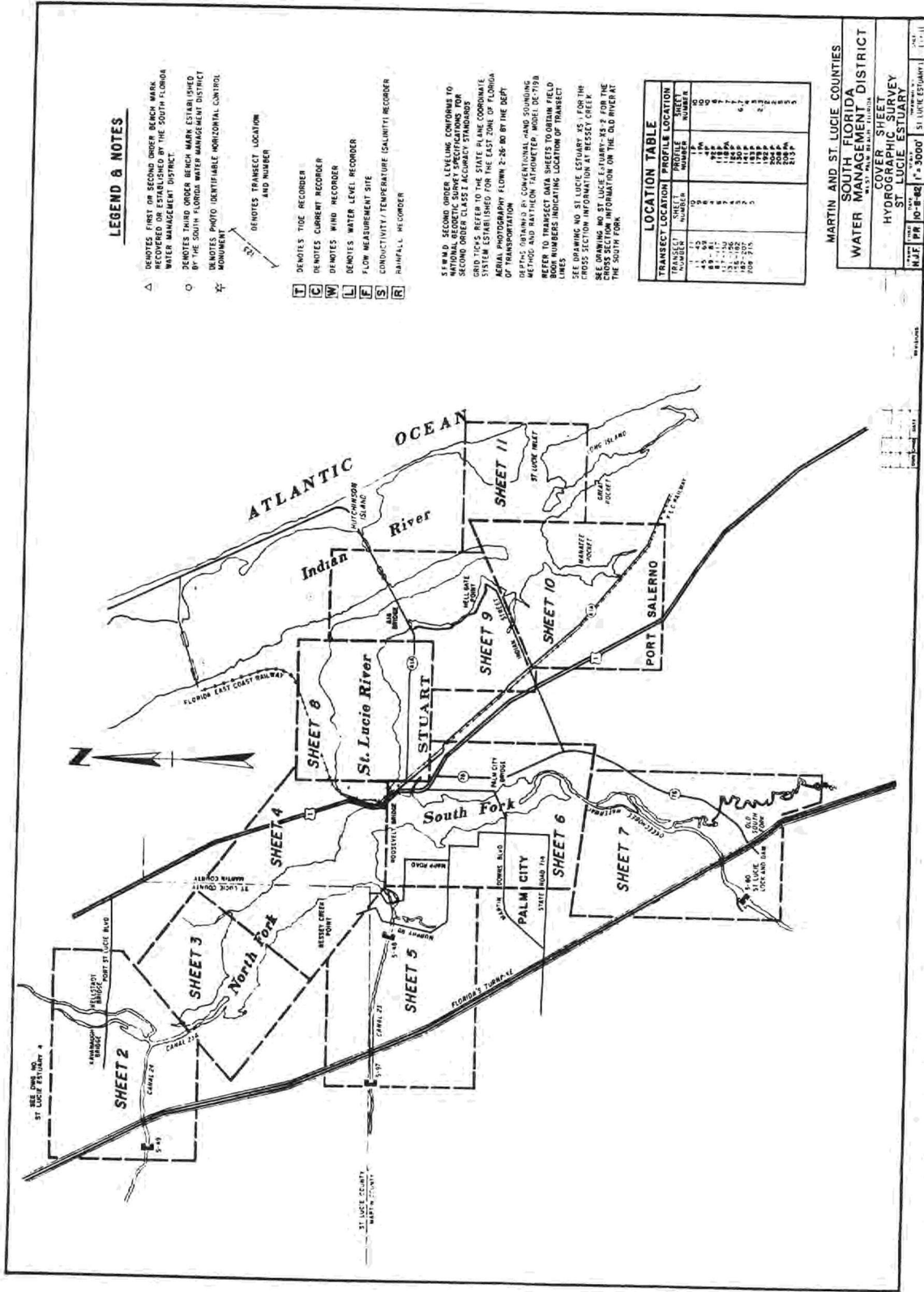


Figure 4 LOCATIONS OF TRANSECT PLOTS AND AERIAL PHOTOGRAPHS, ST. LUCIE ESTUARY



Figure 5 EXAMPLE OF REDUCED AERIAL PHOTOGRAPH SHOWING LOCATIONS OF TRANSECTS AND OTHER REFERENCES, ST. LUCIE ESTUARY

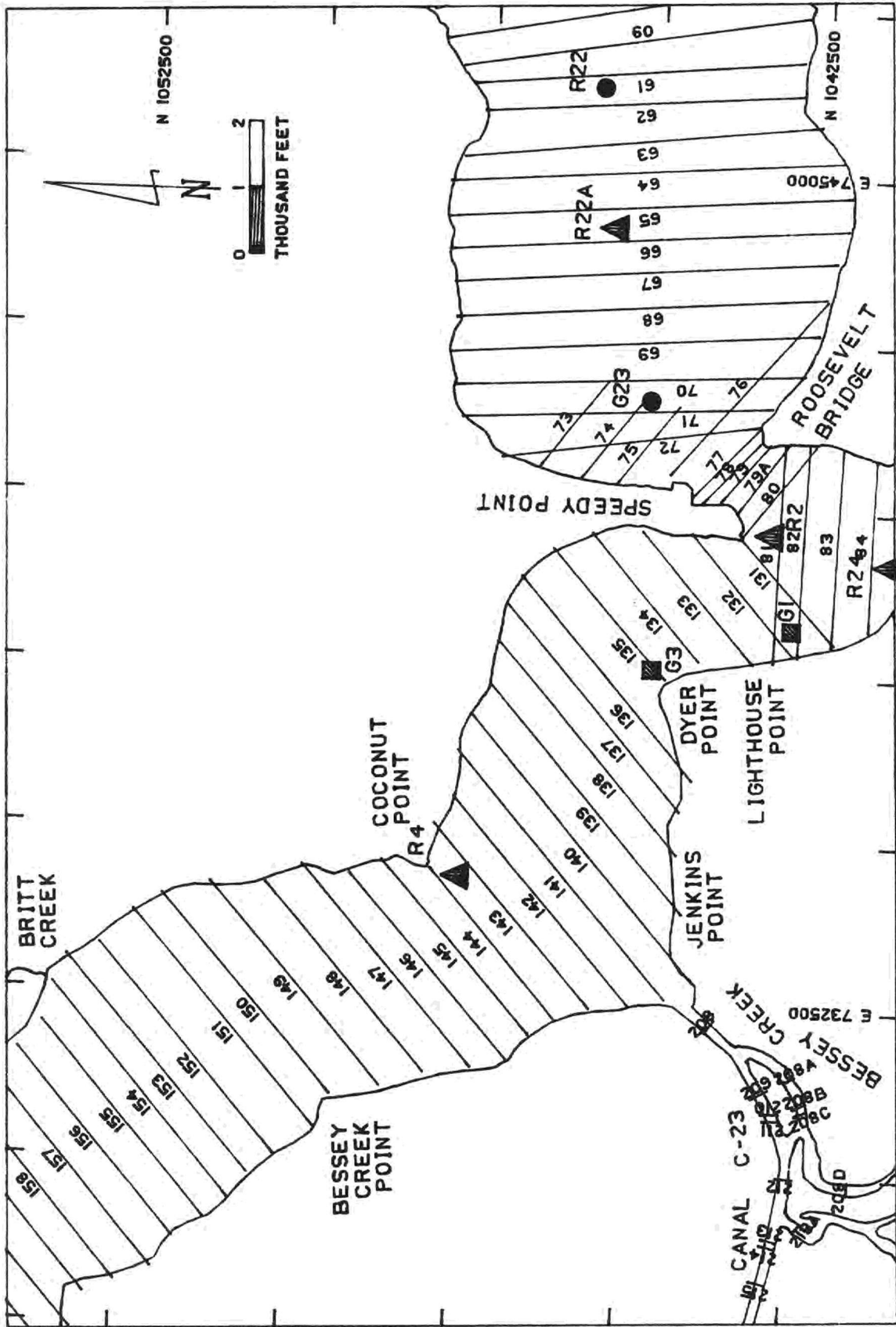


Figure 6 EXAMPLE OF PLOTTED TRANSECT AND NAVIGATION MARKER LOCATIONS, VICINITY OF ROOSEVELT BRIDGE, ST. LUCIE ESTUARY

A Raytheon DB719B survey fathometer (depth recorder) mounted on the boat continuously recorded the depth of water from the acoustic transducer to the bottom of the estuary. Several times each day the recorder was calibrated in shallow water by direct measurements of depth. Since the recorder was unable to measure depths in less than about three feet, crews made direct measurements in shallower areas.

In the North and South Forks and the middle estuary east of Roosevelt Bridge, a total of 266 transects were measured. Some transect numbers have letter extensions which were assigned during the field work to add transects where necessary. These do not use the letter "I" so that there will be no confusion with the digit "1". In addition, centerline depth profiles were recorded in the narrow portions of the North Fork into Five- and Ten-Mile Creeks, (as shown in the index map in Figure 7) and in the Old South Fork (Appendix A, sheet 7). These transects and profiles are numbered as indicated in Appendix C. The full set of reduced aerial photographs of the North Fork centerline depth profile locations is contained in Appendix D.

In situations where there is little change in bottom topography, depths are more efficiently stored in a computer data base if values are taken only where there is a significant change in the local bottom slope, instead of at even increments of distance from the shoreline. These data are called "breakpoint" data. In the St. Lucie, breakpoint data were taken unless there was no significant change for 500 ft along a transect, in which case a data point would be tabulated. During the data reduction phase, corrections to the depth data were made by adding or subtracting the depth calibration, tide, and wind effects recorded at the time of measurement. Corrections for distance were made

by subtracting the distance from the shoreline to the automatic distance measuring instrument. The results were tabulated, keypunched, and plotted to check for proper location and orientation with respect to the shorelines.

The accuracy of the bathymetric data points can be estimated by assuming that the individual accuracies of each component can be combined linearly in a least squares process. Each of these accuracy factors are listed in Table 5, and the combined least squares accuracy is calculated to be less than 0.32 ft by taking the square root of the sum of the squares of each of the five depth factors listed in Table 5.

One example of a plotted transect is shown in Figure 8. The remainder of the transect plots are included in Appendix E. The distance range of each plot is adjusted to fill the available space on the plot to the nearest 100 or 1000 ft; the depth range on each plot is adjusted to the nearest 5 ft NGVD. Each graph is labeled to indicate its approximate location in the estuary, and these location labels are listed in Appendix C.

The width and cross-sectional area of each transect were obtained from the corrected depths and used to calculate the mean depth of the transect. For the St. Lucie Estuary model, the volume of each section of the estuary was obtained by summing the volumes between pairs of transects. The transect lengths (estuary widths), cross-sectional areas, mean and maximum depths, and starting and ending locations are summarized in Appendix F. The lengths, areas, and depths for those transects which contain a part above water level between the two ends of the transect (T104 through T111) are tabulated separately for each part in Appendix F.

TABLE 5. ESTIMATED ACCURACY OF DEPTH MEASUREMENT

1. DEPTH

Transducer and recorder	± 0.50% ± 1 inch of indicated depth
Benchmark Level	± 0.04 ft
Tidal Height	± 0.01 ft
Waves	± 0.20 ft
Data Reduction from recording	± 0.10 ft
Combined accuracy by square root of sum of squares:	
For depth of 5 ft	± 0.26 ft
For depth of 26 ft	± 0.32 ft

2. POSITIONING

Location	within 25 ft radius of desired point
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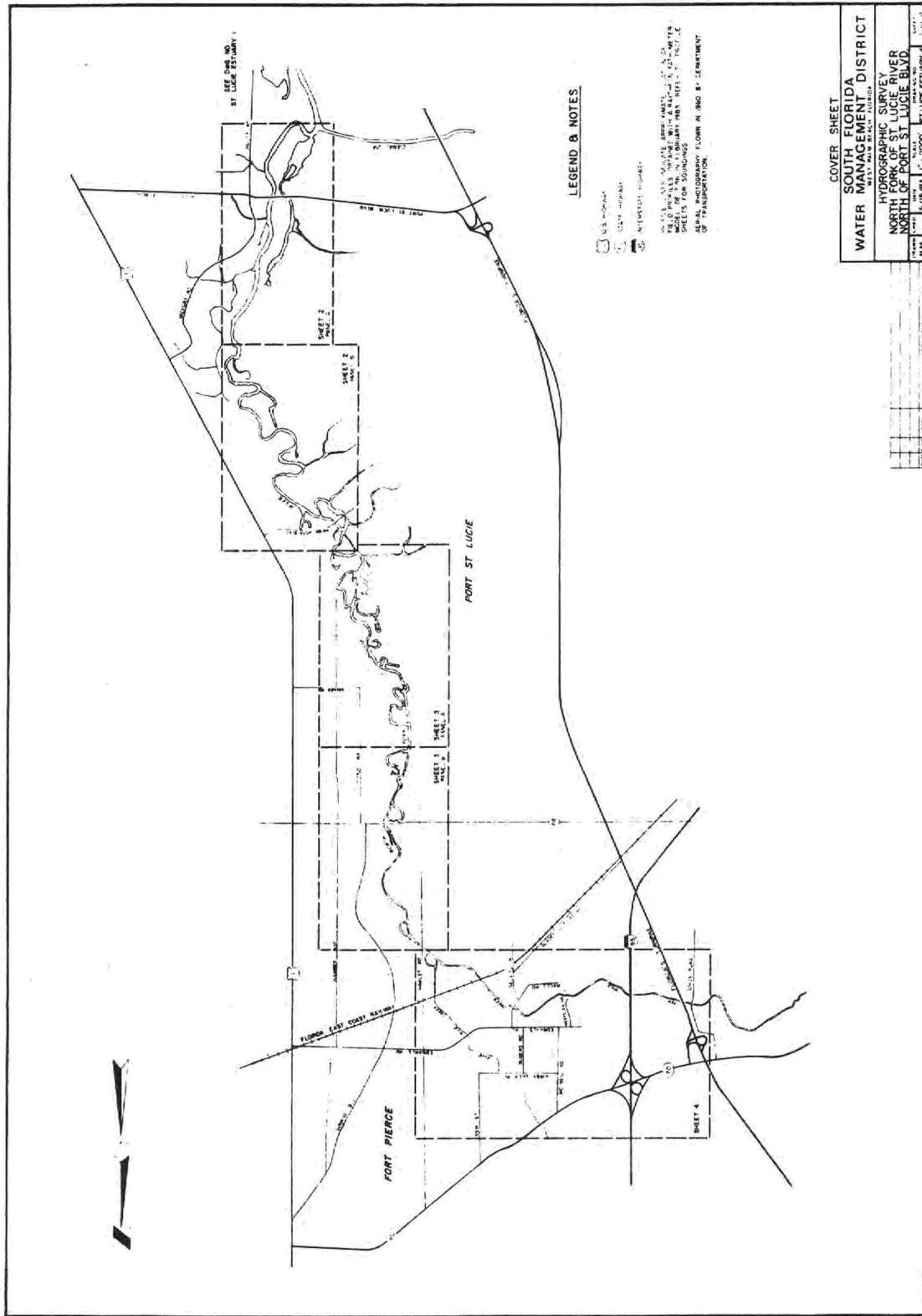


Figure 7 LOCATIONS OF NORTH FORK AERIAL PHOTOGRAPHS AND CENTERLINE PROFILES, ST. LUCIE ESTUARY

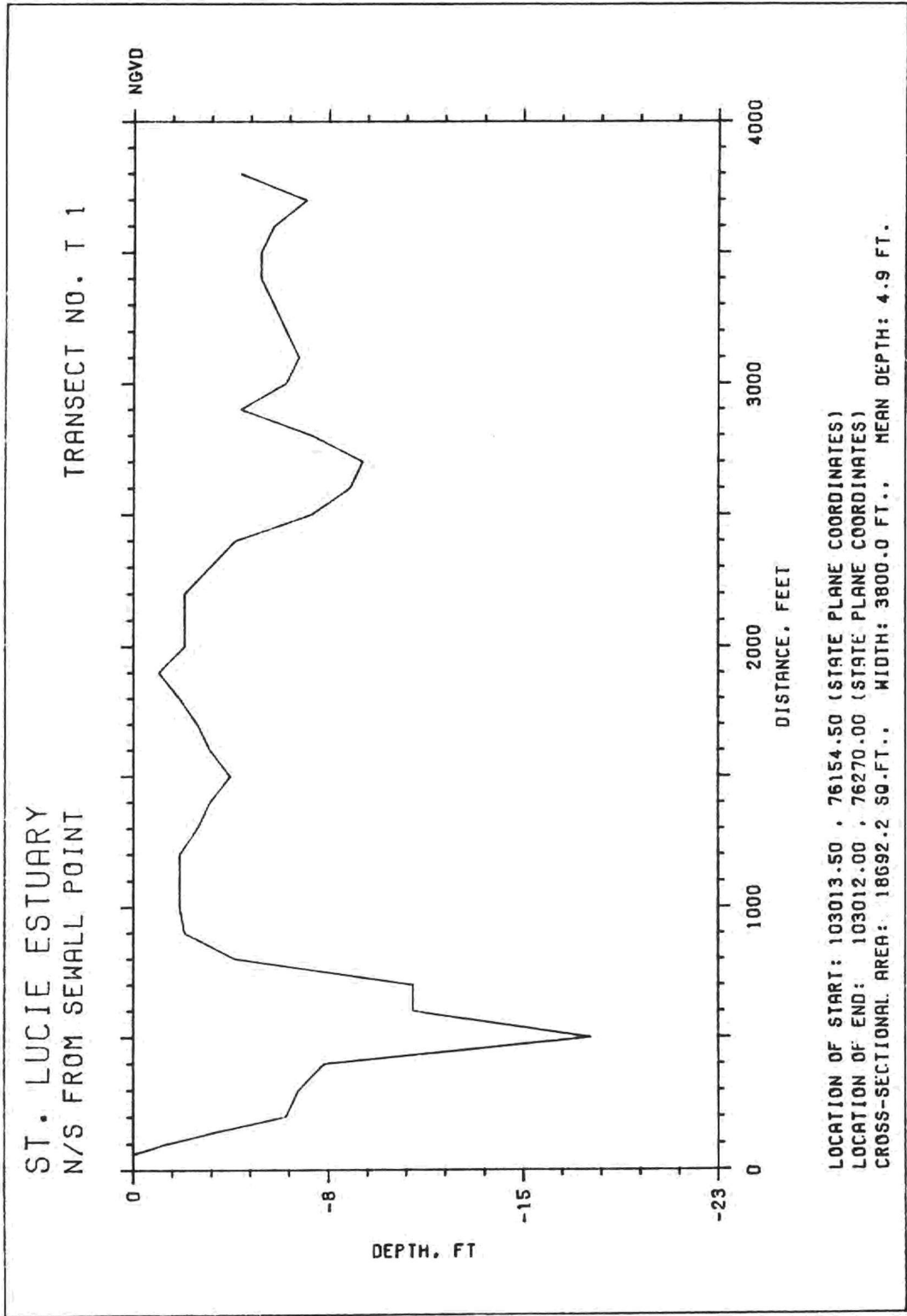


Figure 8 EXAMPLE OF A TRANSECT FROM THE ST. LUCIE ESTUARY BATHYMETRY

The SFWMD set of approximately 8000 depth data points provides more than twenty times as many points as are available from the NOS chart for the St. Lucie Estuary. In addition to providing data that are more up-to-date, the District data provide an order-of-magnitude improvement in the resolution of the topography of the estuary.

Section 5. Depth Contour Lines

One useful way in which the results of depth measurements can be presented is in the form of contour lines. A contour line, or isobath, is a line joining points with the same depth. Several of these together clearly show the topography of a surface, such as the bottom of the estuary.

A depth survey based on breakpoints, as described in Section 3, produces irregularly spaced data. Contouring of irregularly spaced data involves three basic steps:

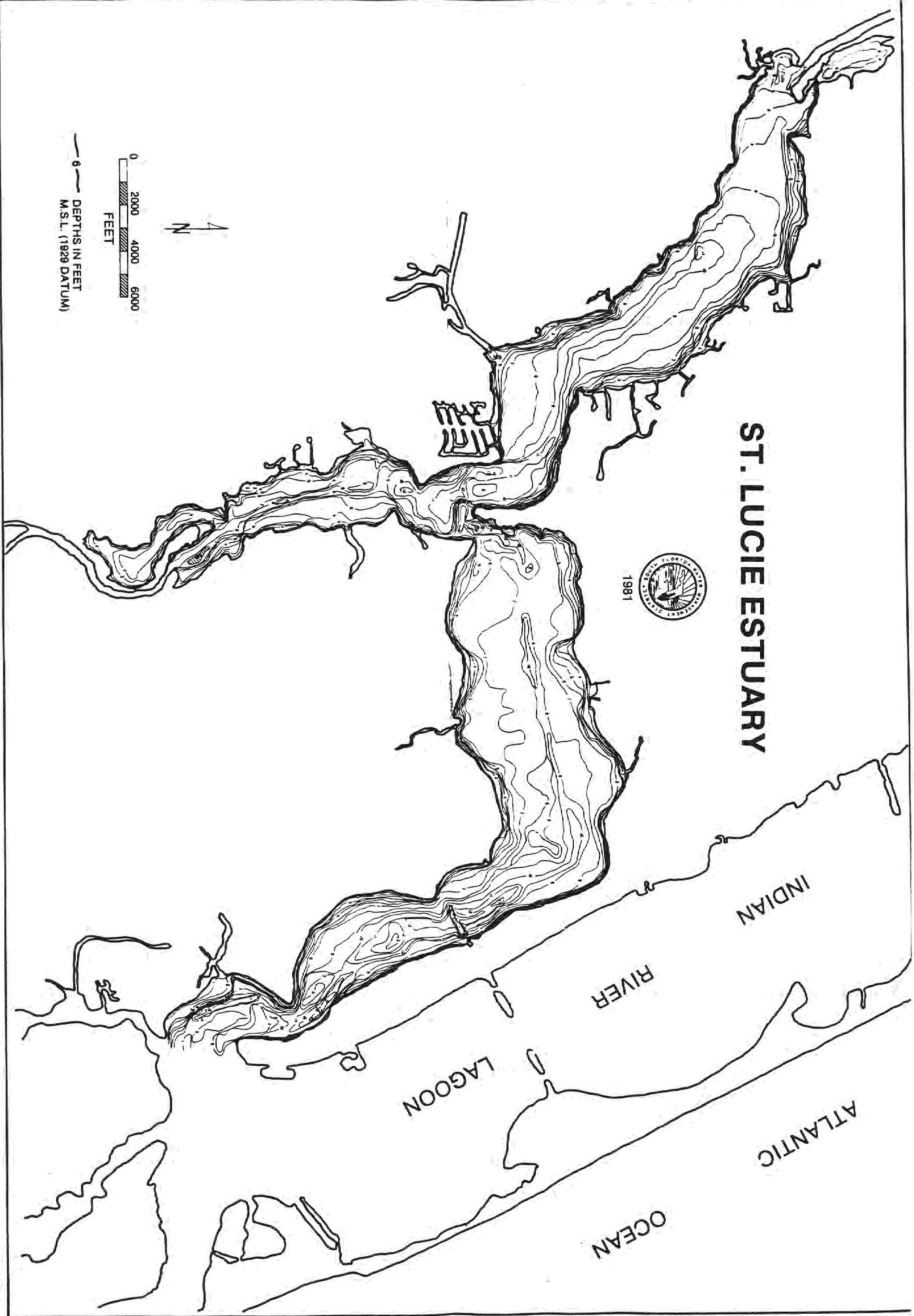
- a. the data are converted to a square or rectangular grid of values by linear interpolation,
- b. the lines connecting these regular grid points are interpolated for the crossing points of the selected contour values. Interpolation in this step is usually non-linear (using curves instead of straight lines), and
- c. these contour point values are then fitted with straight lines or curves to produce contour lines.

If the spacing of the original data points is relatively constant in all directions, the numerical procedures for conversion to the regular grid will work smoothly and the gridded points will be correctly interpolated. If, on the other hand, the data points are spaced much differently in one direction than the other, then the interpolation may become mathematically unstable and distorted regular grid values will be produced, because curves are fitted to the points and curve equations can result in unrealistic fluctuations if the data are not well ordered. The arrangement of the St. Lucie Estuary data points, at fairly close intervals (50 - 500 ft) on relatively widely spaced transects (1000 ft), proved to be particularly difficult to interpolate. Eventually, through a lengthy process involving manual adjustments and the creation of intermediate interpolations, a regular grid of data points was established on the District's Computervision graphics computer, and these were then contoured. The results of this process are shown in Plate 1.

Since the values of the contour lines plotted in Plate 1 are somewhat difficult to read because of its size, the contour map (Plate 1) has been broken up into five smaller areas. The index map for these areas is shown in Figure 9, and the individual maps are shown in Figures 10a through 10f.

A qualitative comparison of the results of the SFWMD bathymetry and the NOS charted depths, which are plotted in Figure 11, can be made by considering major parts of the estuary separately.

- a. Upper North Fork: From the mouth of Canal 23A, where it flows into the wide part of the North Fork, to Bessey Creek both data sets show a gradual depth increase; on the NOS chart the depths are from about 1 to 2 ft greater than the SFWMD measurements. The channel on the NOS chart is about 13 ft deep, compared to an 11 ft depression near Pendarvis Point and a 10 ft channel to the deeper area east of Lighthouse Point on the District chart. District-measured depths are up to 2 ft less in Kitching cove, but 4 to 5 ft greater in the cove to the west of C-23 mouth, and 4 to 11 ft greater at the mouth of Bessey Creek. (Figure 10a).
- b. Lower North Fork and Roosevelt Bridge Vicinity: In the area east and south of the mouth of Bessey Creek, SFWMD depths are approximately the same as the NOS depths to the area south of the bridge. In the immediate vicinity of the bridge, District contours extend to 20 ft in comparison to the maximum of 17 ft on the NOS chart. (Figures 10b and 10c).
- c. South of Roosevelt Bridge to Palm City Bridge: In the South Fork both the NOS and the District show a 12 ft depression off Arbeau Point. The channel depth on the NOS chart ranges from 5 to 8 ft to about 1000 ft north of the bridge, while the District shows an 8 ft channel depth. The SFWMD obtained a maximum depth of 10 ft east of the three canals south of Matchett Point, compared to 8 ft on the NOS chart in the same area. Just north of the Palm City Bridge the District chart shows an 8 ft channel, while the NOS chart has a maximum depth of only 5 ft. (Figures 10c and 10f).
- d. Palm City Bridge to Narrow Part of South Fork: Depths south of the Palm City Bridge are very similar in the two sets of data, 1 to 5 ft on both charts. An 8 ft channel is indicated on the SFWMD chart into the narrow part of the South Fork, which is not shown on the NOS chart. However, it is stated on the NOS chart



ST. LUCIE ESTUARY



0 2000 4000 6000
FEET
DEPTHS IN FEET
M.S.L. (1929 DATUM)



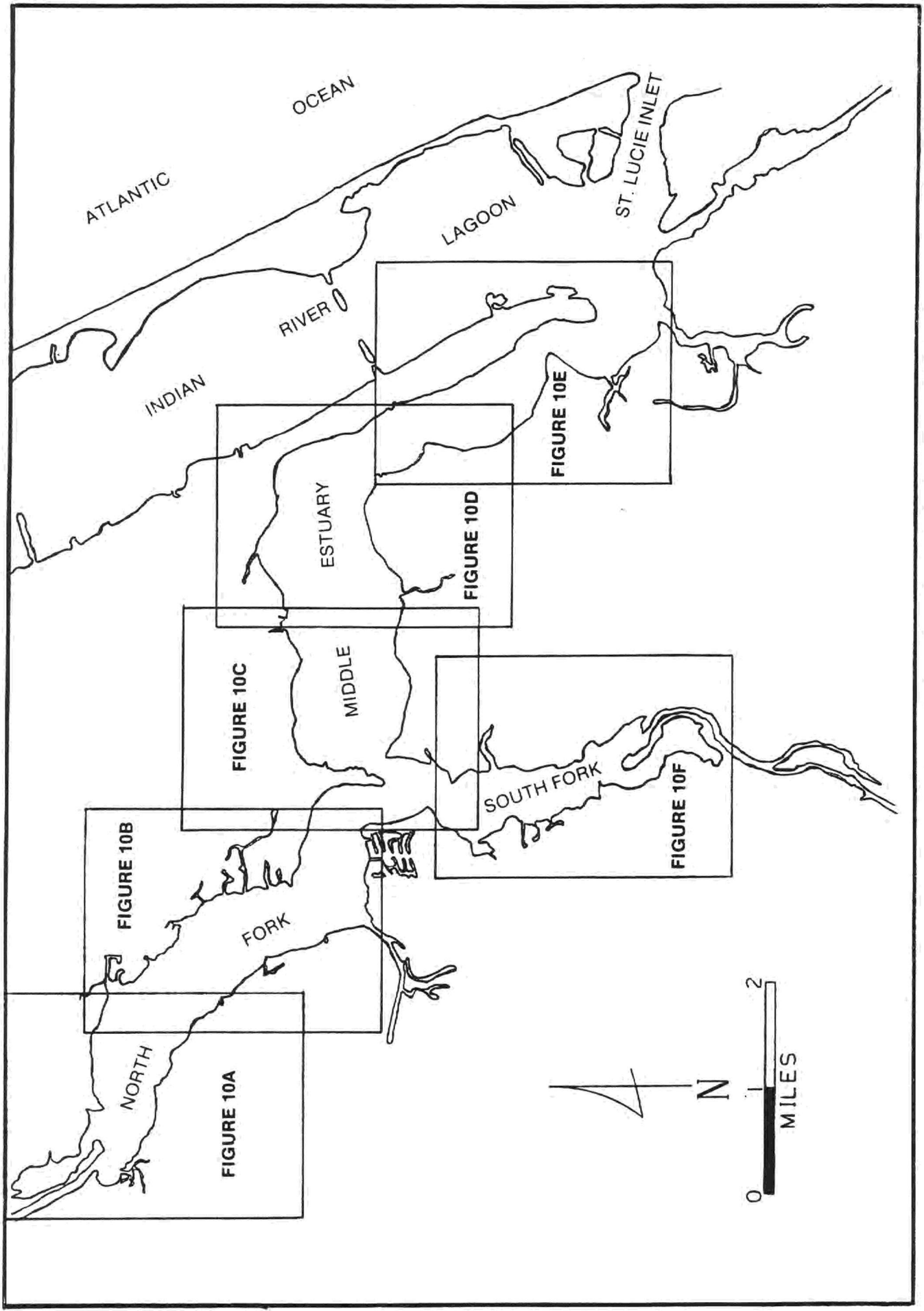


Figure 3 ST. LUCIE ESTUARY DEPTH CONTOUR MAP LOCATIONS

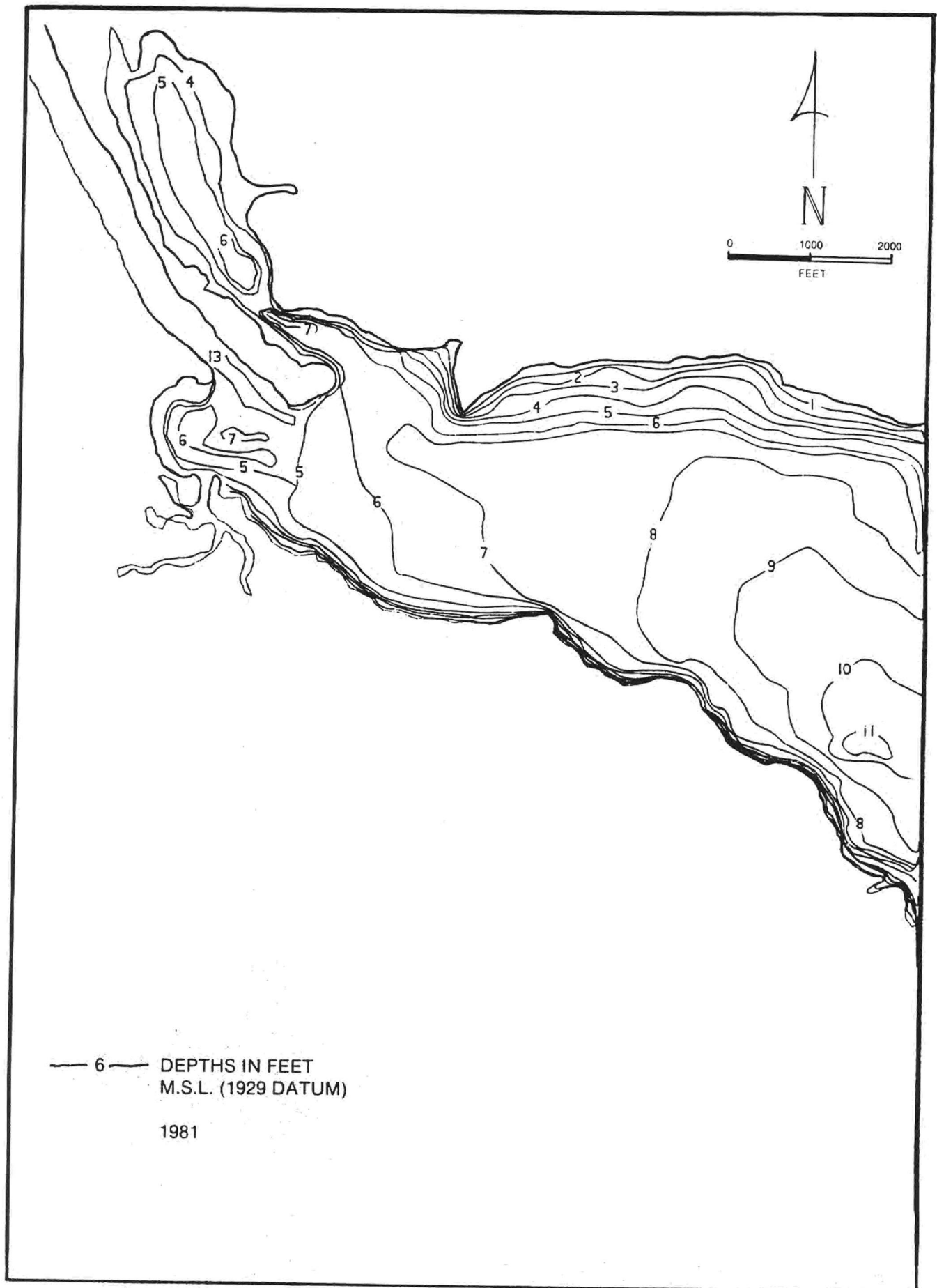


Figure 10A ST. LUCIE ESTUARY NORTH FORK DEPTH CONTOURS

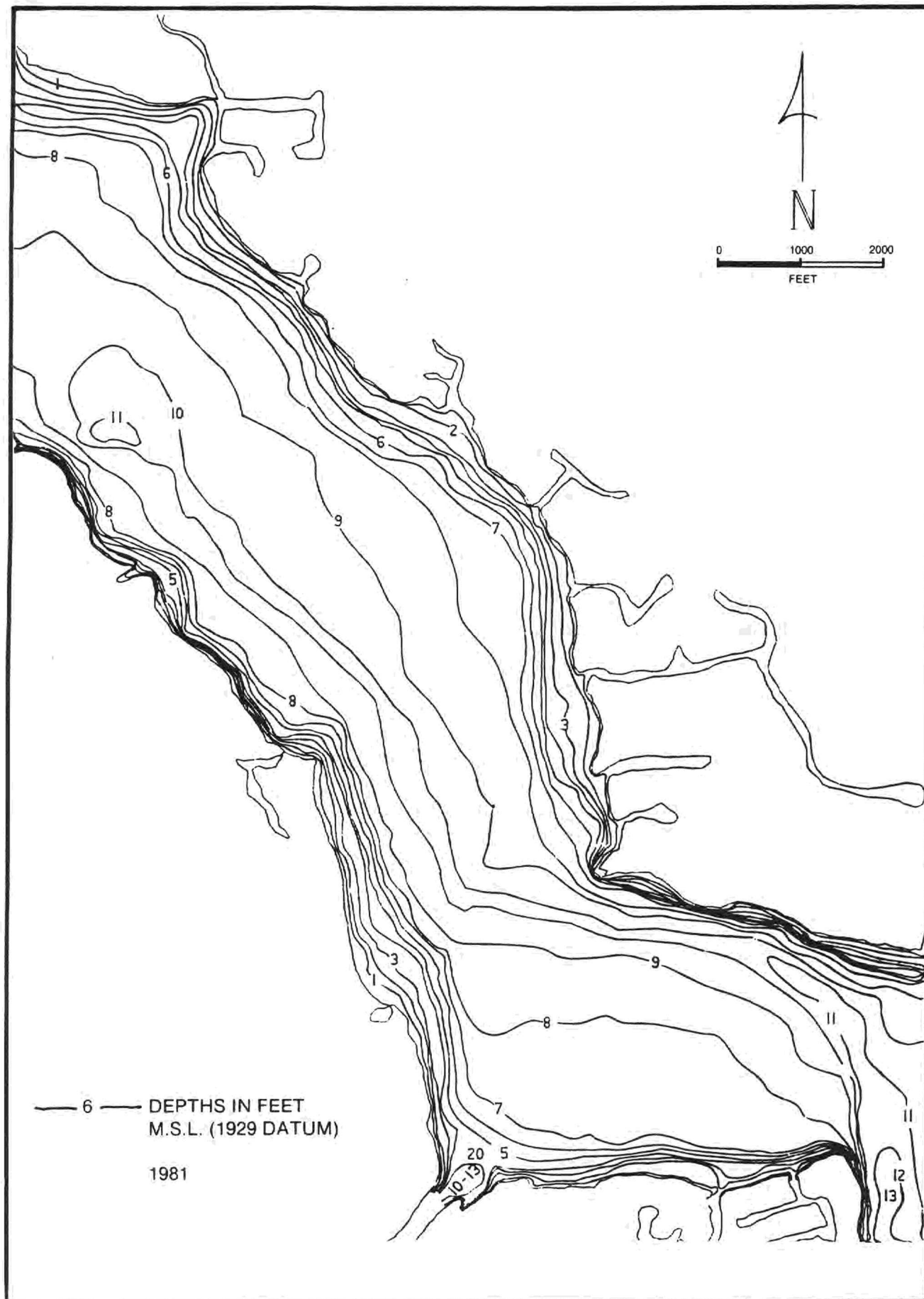
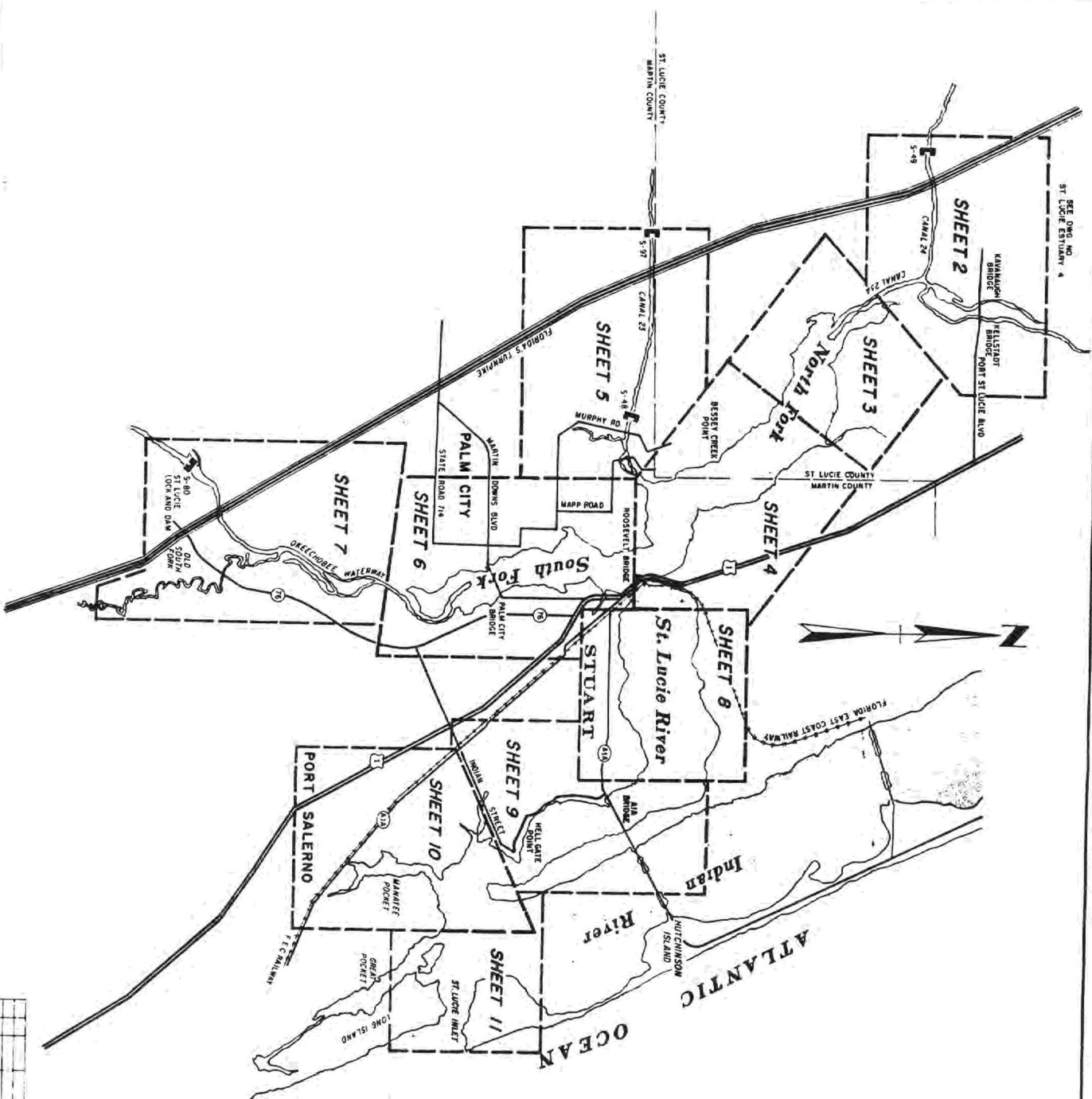


Figure 10B ST. LUCIE ESTUARY NORTH FORK DEPTH CONTOURS



- ### LEGEND & NOTES
- ▲ DENOTES FIRST OR SECOND ORDER BENCH MARK RECOVERED OR ESTABLISHED BY THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT.
 - DENOTES THIRD ORDER BENCH MARK ESTABLISHED BY THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT
 - ☆ DENOTES PHOTO IDENTIFIABLE HORIZONTAL CONTROL MONUMENT
 - 125 DENOTES TRAVERSE LOCATION AND NUMBER
 - T DENOTES TIDE RECORDER
 - C DENOTES CURRENT RECORDER
 - W DENOTES WIND RECORDER
 - L DENOTES WATER LEVEL RECORDER
 - F DENOTES FLOW MEASUREMENT SITE
 - S CONDUCTIVITY / TEMPERATURE (SALINITY) RECORDER
 - R RAINFALL RECORDER

S.F.W.M.D. SECOND ORDER LEVELING CONFORMS TO NATIONAL GEODETIC SURVEY SPECIFICATIONS FOR SECOND ORDER CLASS I ACCURACY STANDARDS. GRID TICS REFER TO THE STATE PLANE COORDINATE SYSTEM ESTABLISHED FOR THE EAST ZONE OF FLORIDA AERIAL PHOTOGRAPHY FLOWN 2-26-60 BY THE DEPT. OF TRANSPORTATION.

DEPT'S OBTAINED BY CONVENTIONAL HAND SOUNDING METHOD AND RATHEN FANOMETER, MODEL DE-7196 REFER TO TRAVERSE DATA SHEETS TO OBTAIN FIELD NUMBERS INDICATING LOCATION OF TRAVERSE LINES.

SEE DRAWING NO. ST LUCIE ESTUARY--XS-1 FOR THE CROSS SECTION INFORMATION AT BESSEY CREEK. SEE DRAWING NO. ST LUCIE ESTUARY--XS-2 FOR THE CROSS SECTION INFORMATION ON THE OLD RIVER AT THE SOUTH FORK.

TRANSECT LOCATION	SHEET NUMBER	PROFILE LOCATION	SHEET NUMBER
1-1	10	1-P	10
1-2	9	2-P	9
4-5-6-59	8	3-P	8
6-9-1-1	6	4-P	6
1-17-7-50	4	5-P	4
1-56-1-85	3	6-P	3
1-82-2-07	2	7-P	2
2-08-2-15	2	8-P	2
		9-P	9
		10-P	10
		11-P	11

MARTIN AND ST. LUCIE COUNTIES

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

COVER SHEET

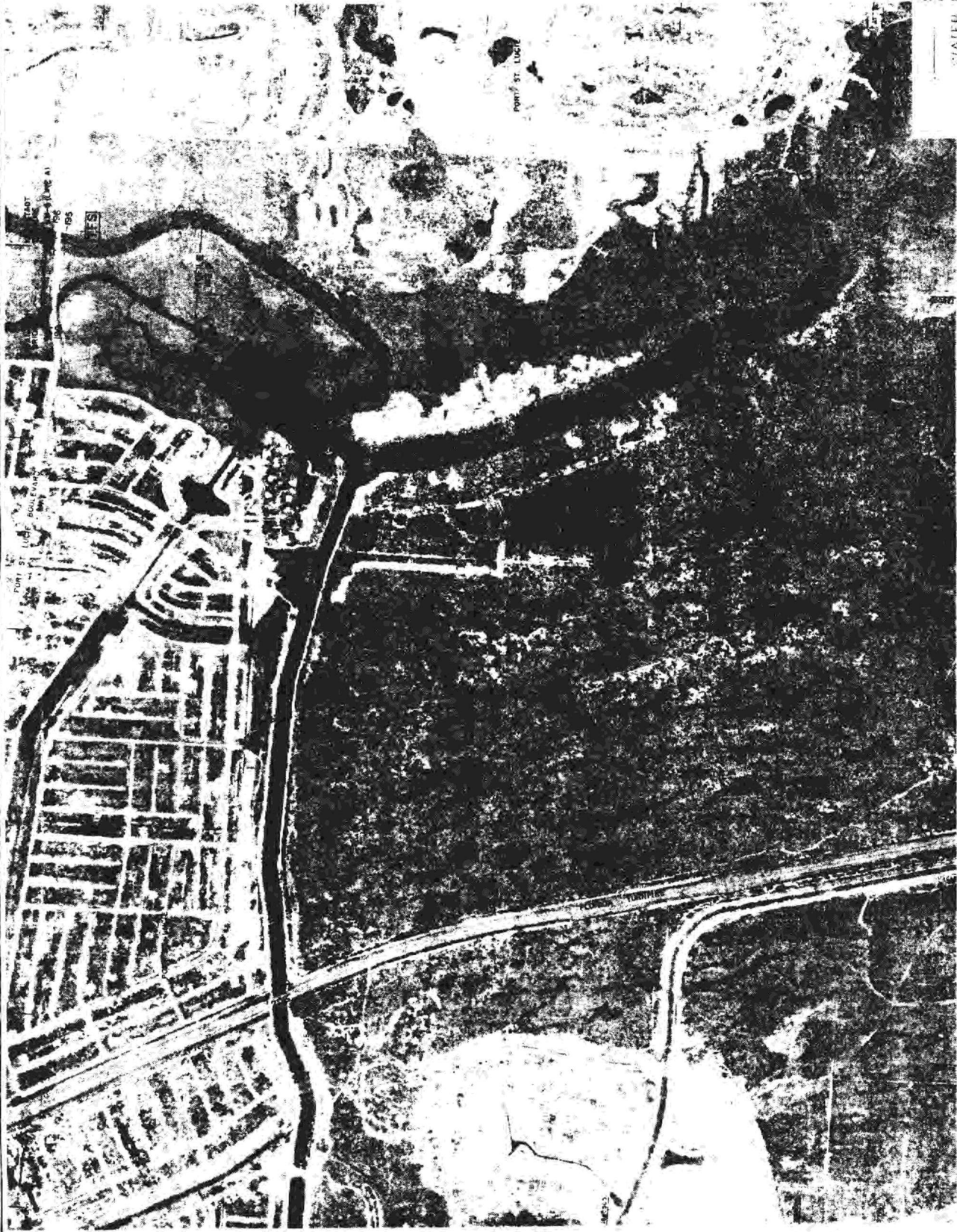
HYDROGRAPHIC SURVEY

ST. LUCIE ESTUARY

DATE: 10-8-82

SCALE: 1" = 3000'

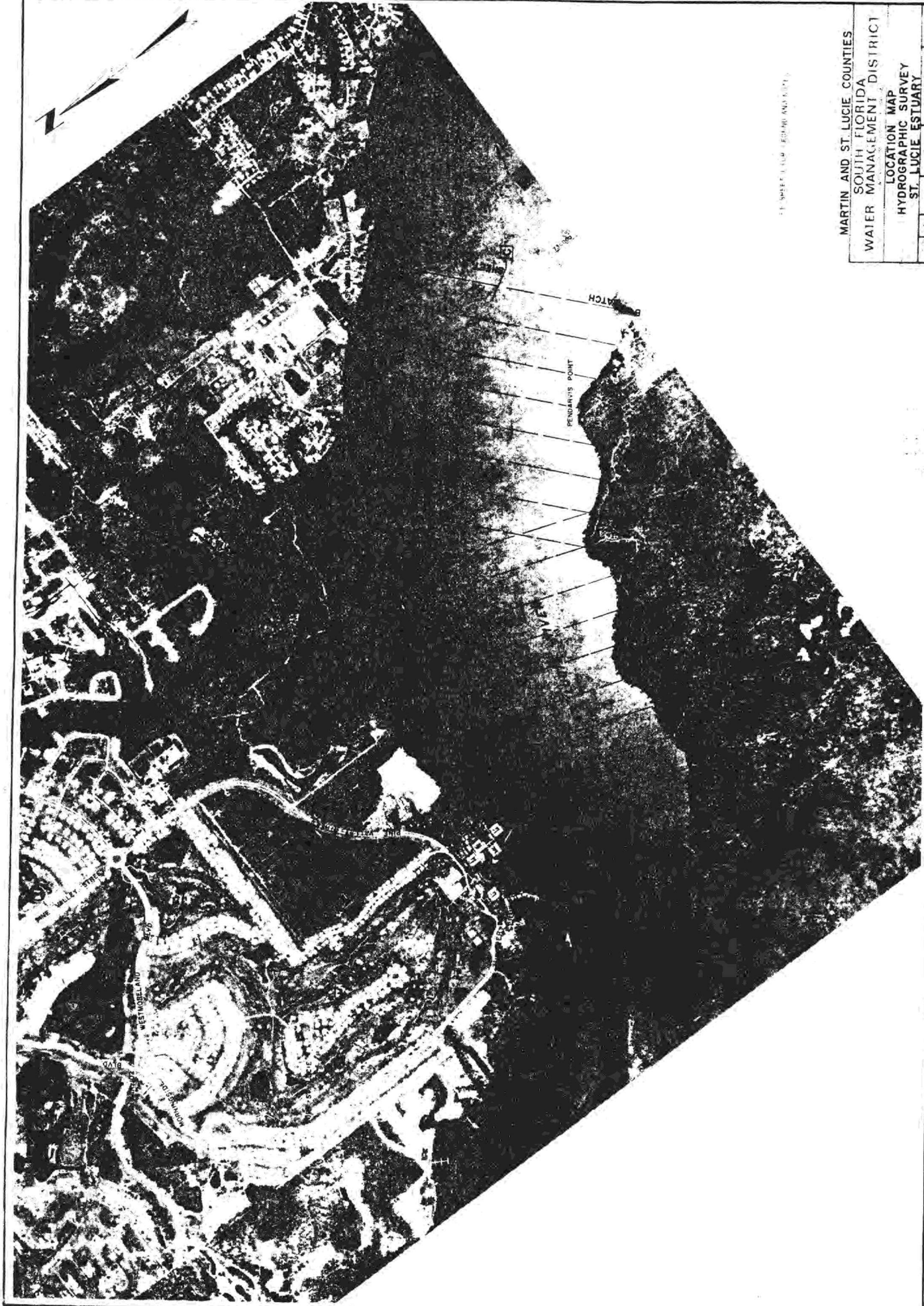
ST. LUCIE ESTUARY 1 | 10 | 11



ST. LUCIE COUNTY
SOUTH FLORIDA
WATER MANAGEMENT DISTRICT

LOCATION MAP
HYDROGRAPHIC SURVEY
ST. LUCIE ESTUARY

R.M. 17-28-81, 1" = 500' ST. LUCIE ESTUARY, 2-11



1:50000 (1" = 500')

MARTIN AND ST. LUCIE COUNTIES
 SOUTH FLORIDA
 WATER MANAGEMENT DISTRICT
 LOCATION MAP
 HYDROGRAPHIC SURVEY
 ST. LUCIE ESTUARY

P.M. 62 7-28-81 1" = 500' ST. LUCIE ESTUARY 3 1

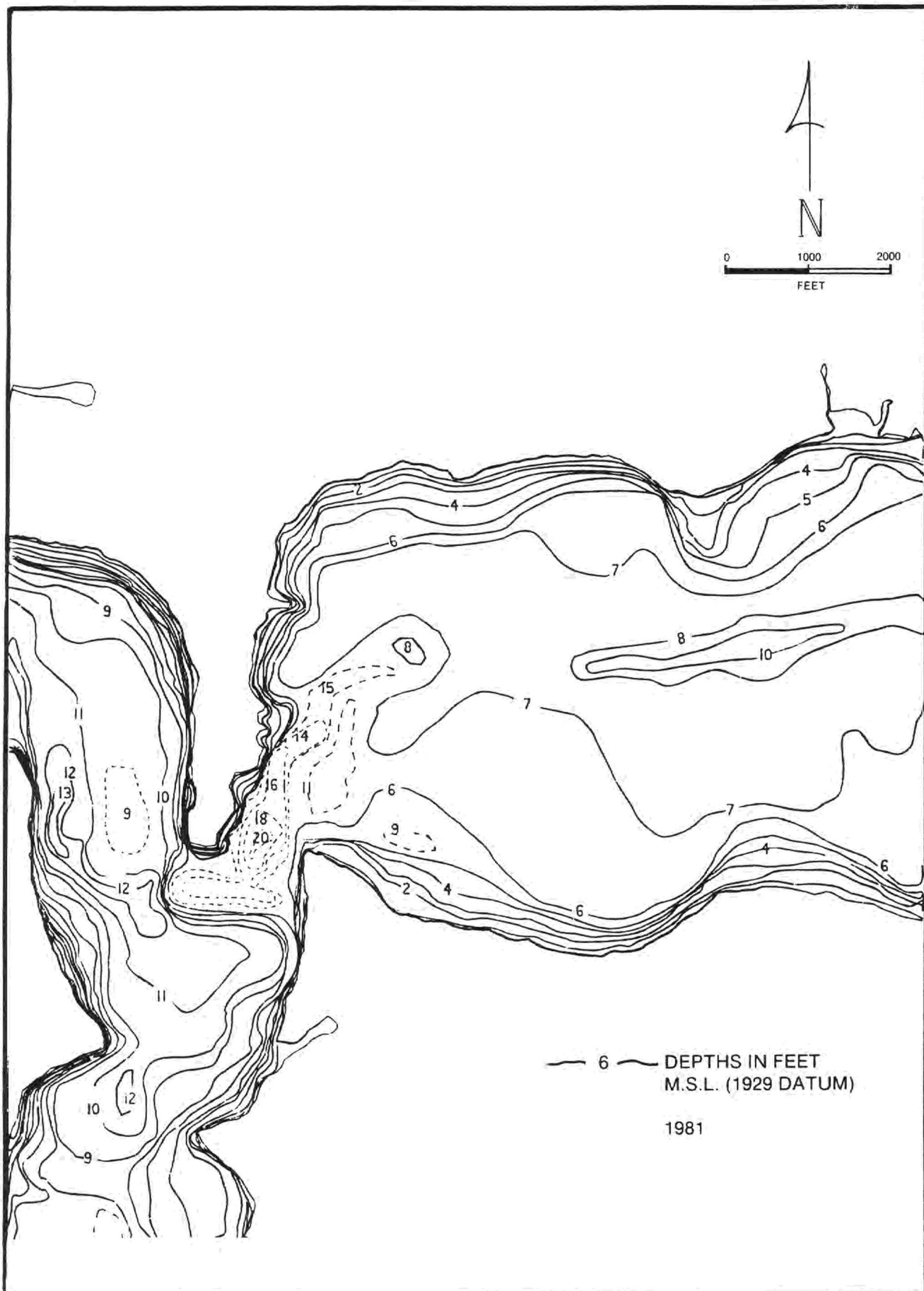


Figure 10C ST. LUCIE ESTUARY MIDDLE ESTUARY DEPTH CONTOURS

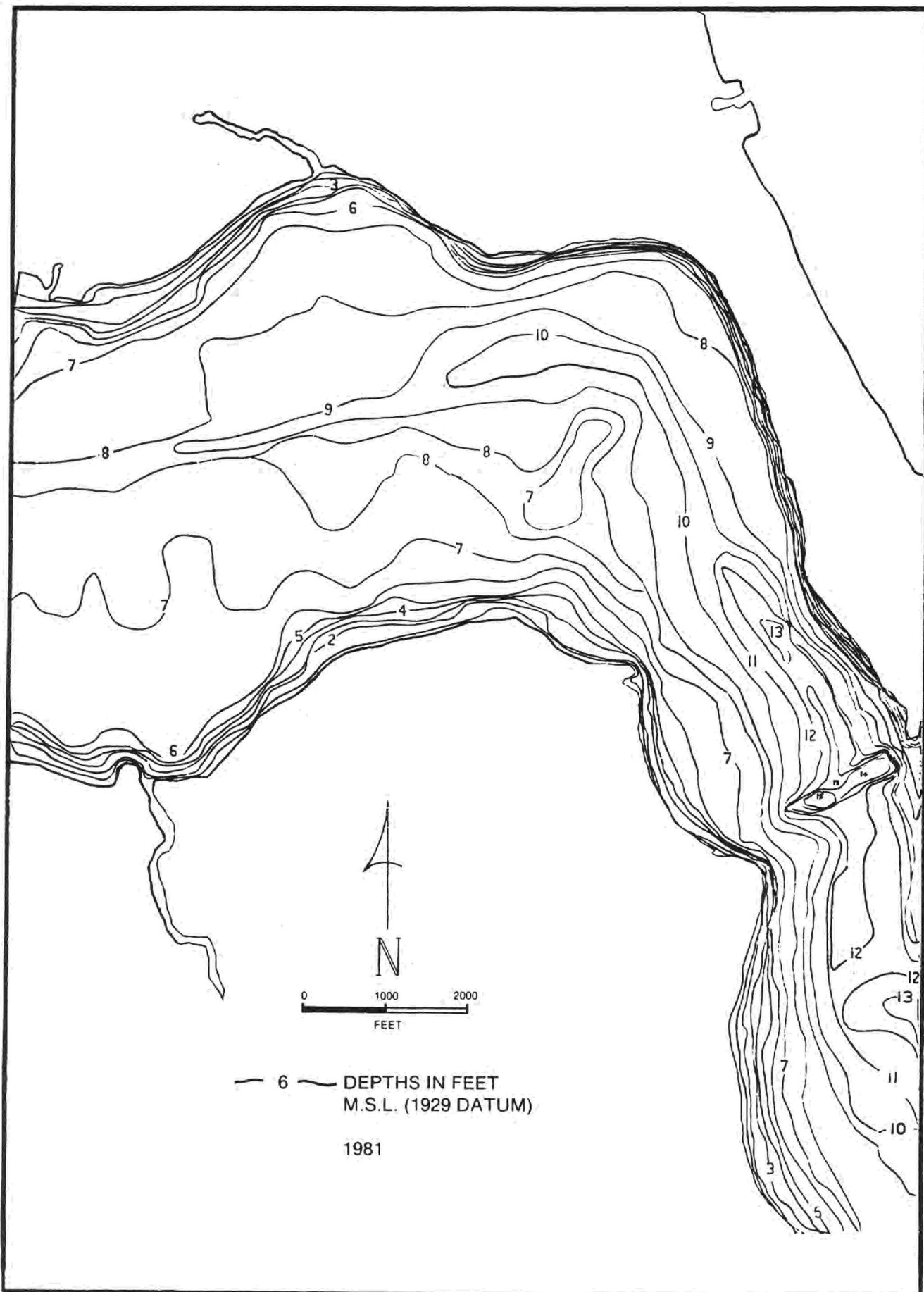


Figure 10D ST. LUCIE ESTUARY MIDDLE ESTUARY DEPTH CONTOURS

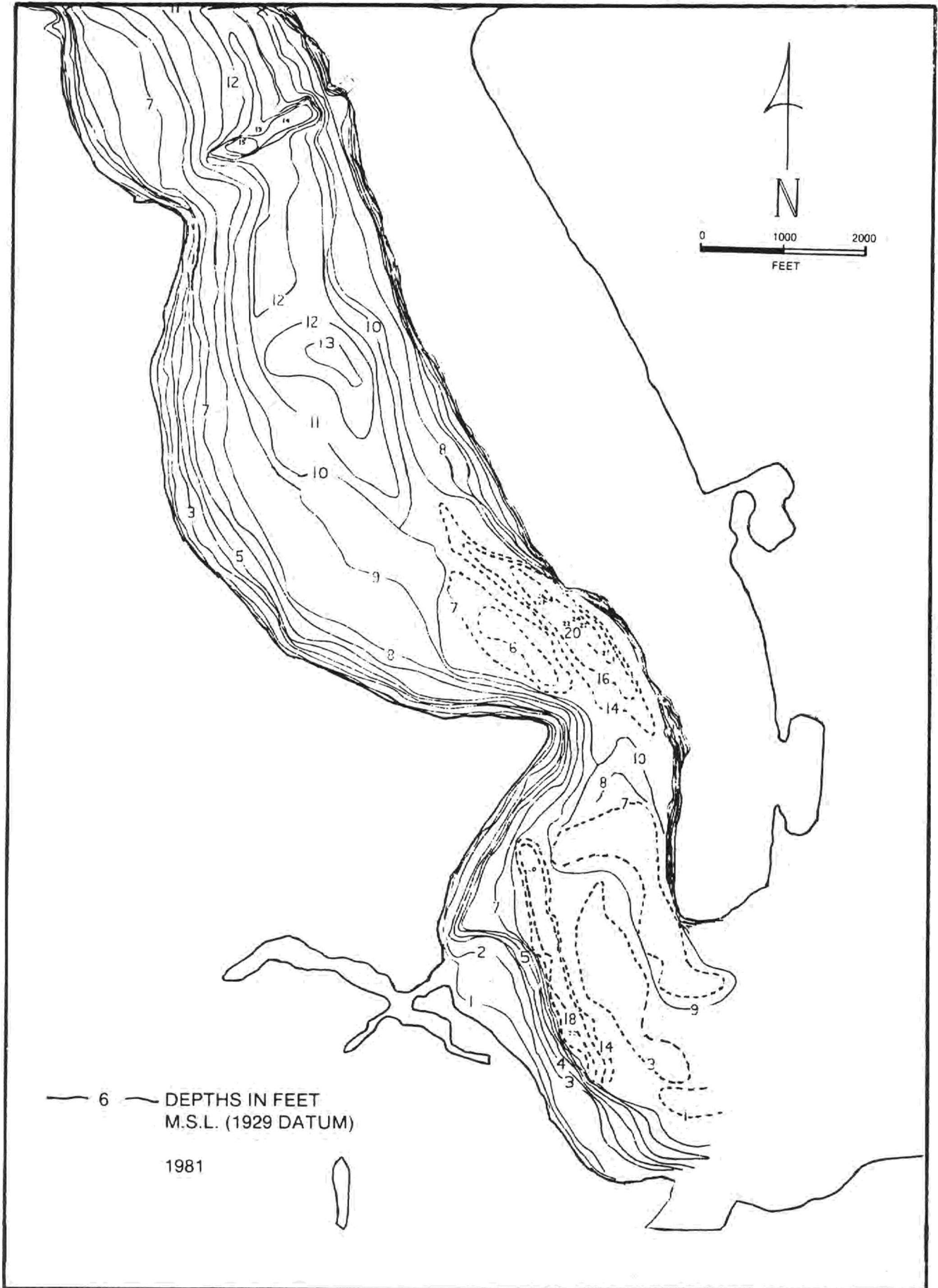


Figure 10E ST. LUCIE ESTUARY MIDDLE ESTUARY DEPTH CONTOURS

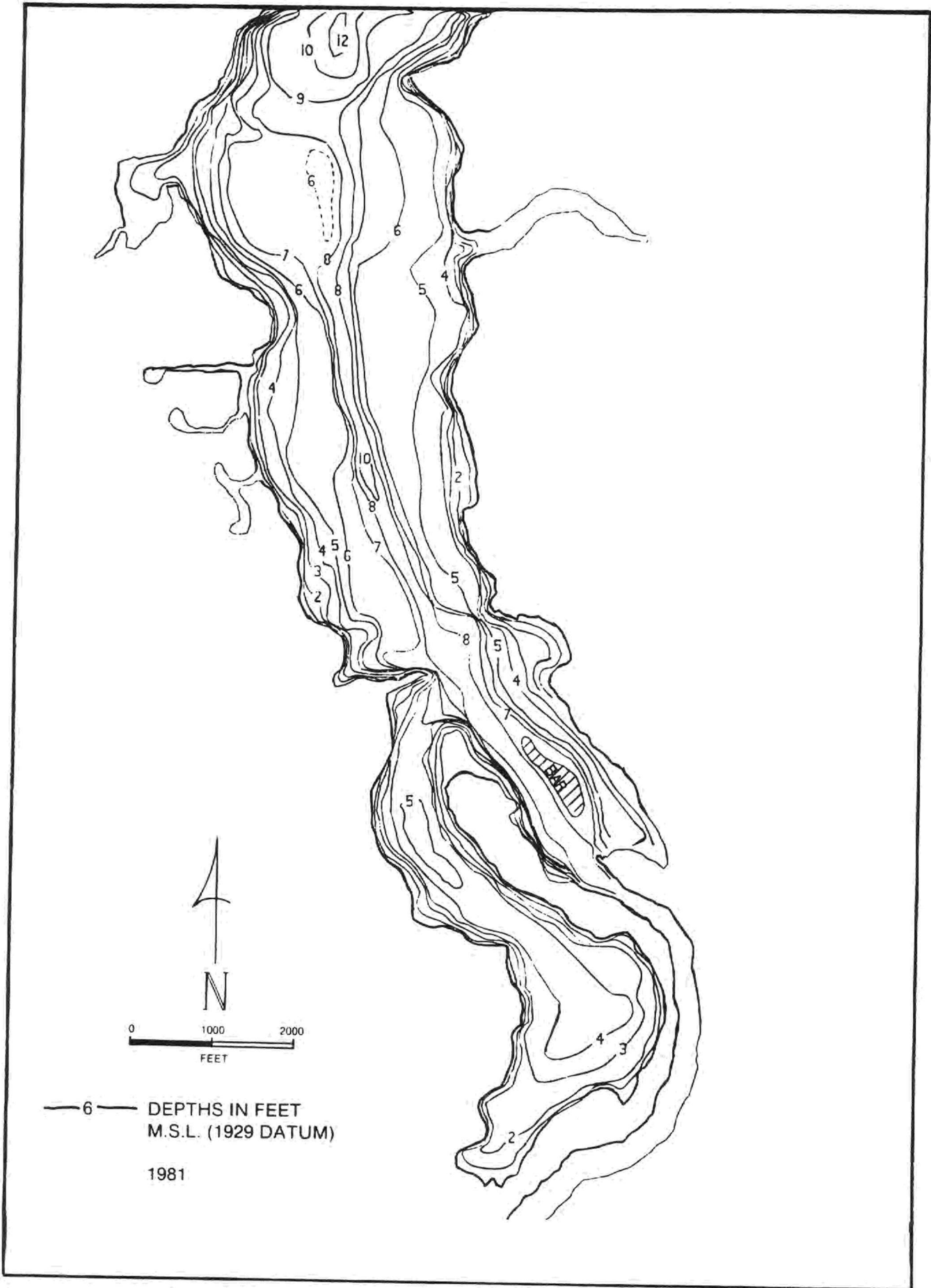


Figure 10F ST. LUCIE ESTUARY SOUTH FORK DEPTH CONTOURS

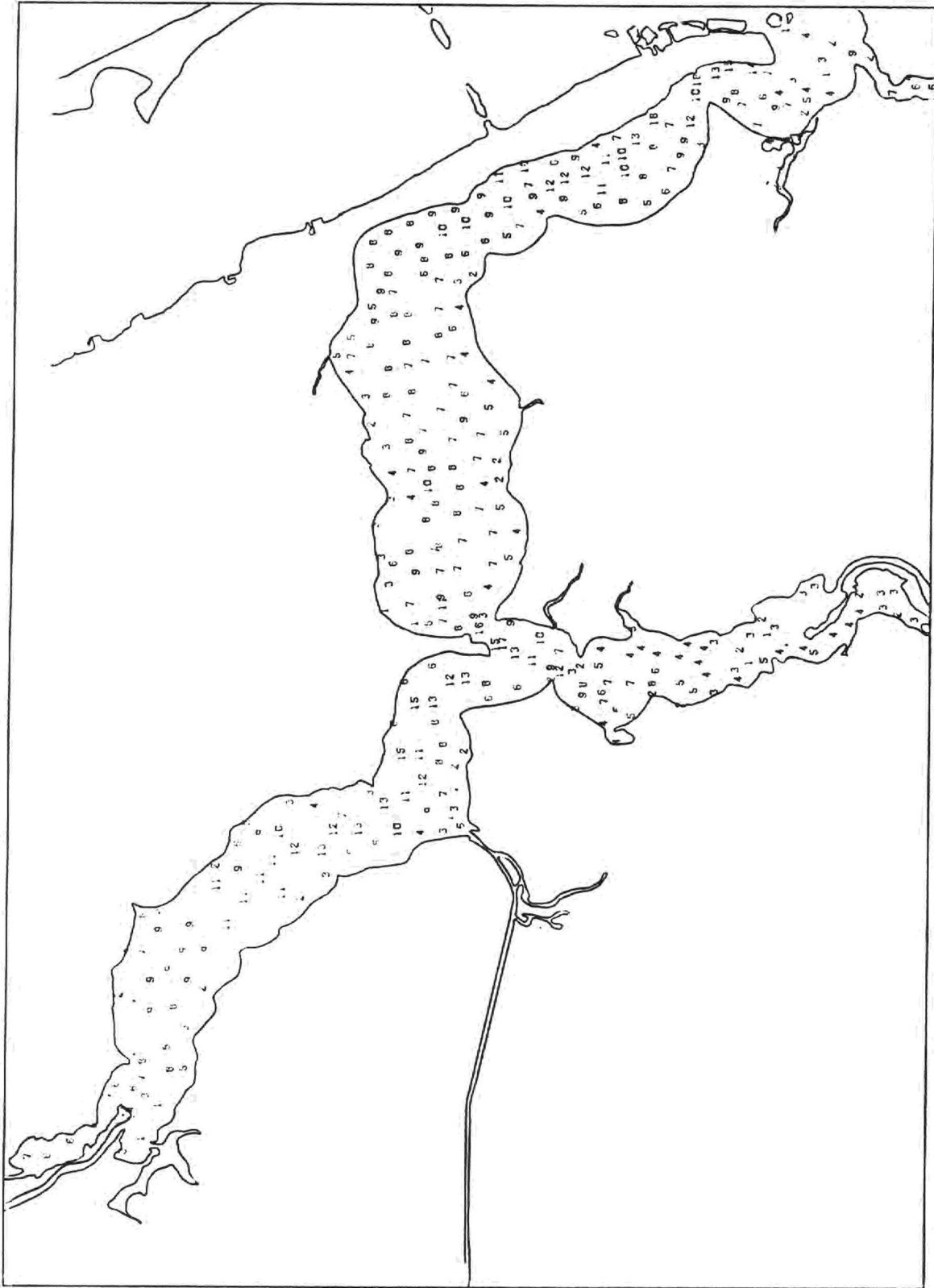


Figure 11 DEPTHS IN THE ST. LUCIE ESTUARY FROM N.O.S. (NOAA) NAUTICAL CHART 11428, REFERENCED TO MEAN LOW WATER (MLW)

that the navigable depth of the Okeechobee Waterway in the St. Lucie River, which extends from St. Lucie inlet past structure S-80 in the South Fork, is maintained at 8 ft. (Figure 10f).

- e. Roosevelt Bridge and Middle Estuary to A1A Bridge: Immediately to the east of the Roosevelt Bridge the NOS chart shows a maximum depth of 16 ft, whereas the District contours show depths from 14 to 20 ft. The middle estuary has a channel depth of 7 to 9 ft on the NOS chart, and 8 to 10 ft on the District chart. The north and south shore depths are comparable. East and south of the bend at Hoggs Cove/Woods Point the NOS channel depth is 10 ft, while the District channel depth ranges from 10 to 12 ft. (Figures 10c and 10d).
- f. South of A1A Bridge: The NOS chart shows channel depths of 10 to 13 ft to Hell Gate, comparable to the District channel depths. In the vicinity of Hell Gate, SFWMD measured depths to 24 ft as opposed to 18 ft on the NOS chart. South of Hell Gate the District channel depths along the west shoreline are in the range of 14 to 20 ft, compared to 7 to 18 ft on the NOS chart. The other shoal areas in this location of the estuary are comparable in both sets of data. (Figure 10e).

Section 6. Conclusions

The differences in depths found between the comparison of the SFWMD measurements and the depths published elsewhere may be attributed to natural changes in the estuary or to the discretization of measurements and/or the presentation of depths.

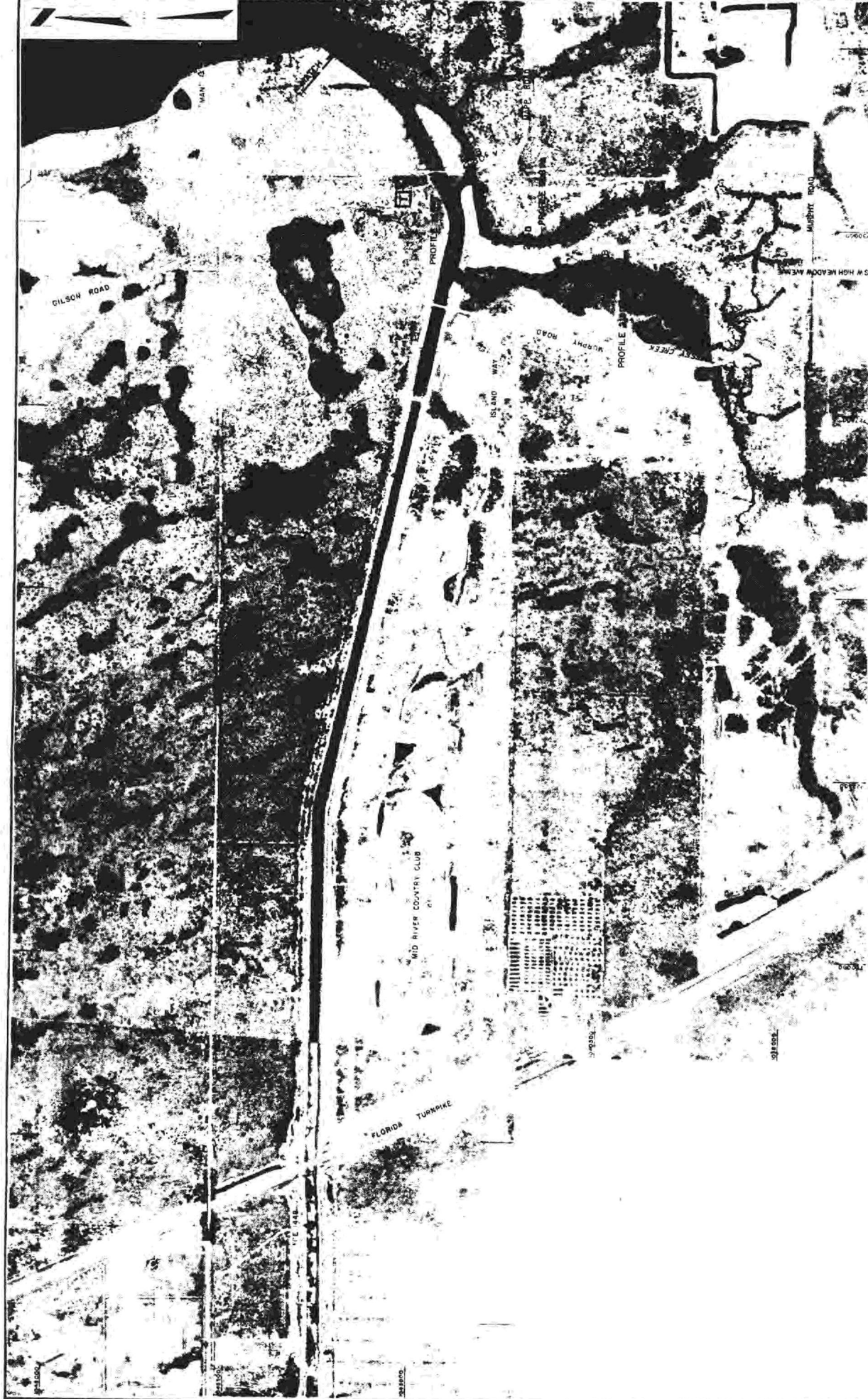
The depth in a river or estuary is constantly being changed by the action of natural forces. Sediment scour and deposition are caused by extremes in the velocity of water, and thus occur in response to changes in weather or climate, or to human activities affecting the tributaries or the uplands. Often, such differences show as consistent local trends, and if so, can be considered to be valid rather than in error. For example, shoaling in a particular area may be due to an increase in the sediment load from tributaries, and channel scour may be caused by an increase in the upstream tidal volume. These effects may manifest themselves over a relatively large reach of the waterbody, and the measurements would normally be accepted as indicators of actual changes in depth.

The discretization problem may occur either in the measurement phase or in the presentation of results. Measurements over an irregular bed are little more than random samples, with a low probability of being located at exactly the same spot as previous measurements. Also, there is the possibility that a point measurement will not be representative of the mean of depths in its vicinity. The National Ocean Service, in fact, selects depths for publication that are the shallowest (not the mean) over the surrounding area, as a conservative approach to navigation. In the presentation of the results, a point value should be representative of the depths in its immediately surrounding area, but may instead simply be the result of an interpolation between points much farther distant.

In conclusion, the depths measured by the SFWMD in 1981 provide a comprehensive baseline for future measurements of the bathymetry of the St. Lucie Estuary.

APPENDIX A

Reduced Aerial Transect Index and Locations



SEE SHEET 1 FOR LEGEND AND NOTES

MARTIN AND ST. LUCIE COUNTIES

SOUTH FLORIDA
WATER MANAGEMENT DISTRICT

LOCATION MAP

HYDROGRAPHIC SURVEY

ST. LUCIE ESTUARY

R.M. C.2 7-28-B1 1" = 500' ST. LUCIE ESTUARY 5-11



MARTIN COUNTY
 SOUTH FLORIDA
 WATER MANAGEMENT DISTRICT
 LOCATION MAP
 HYDROGRAPHIC SURVEY
 ST. LUCIE ESTUARY
 R.M. C.Z. 7-28-81 1" = 500' ST. LUCIE ESTUARY - 5

SEE SHEET FOR LEGEND AND NOTES



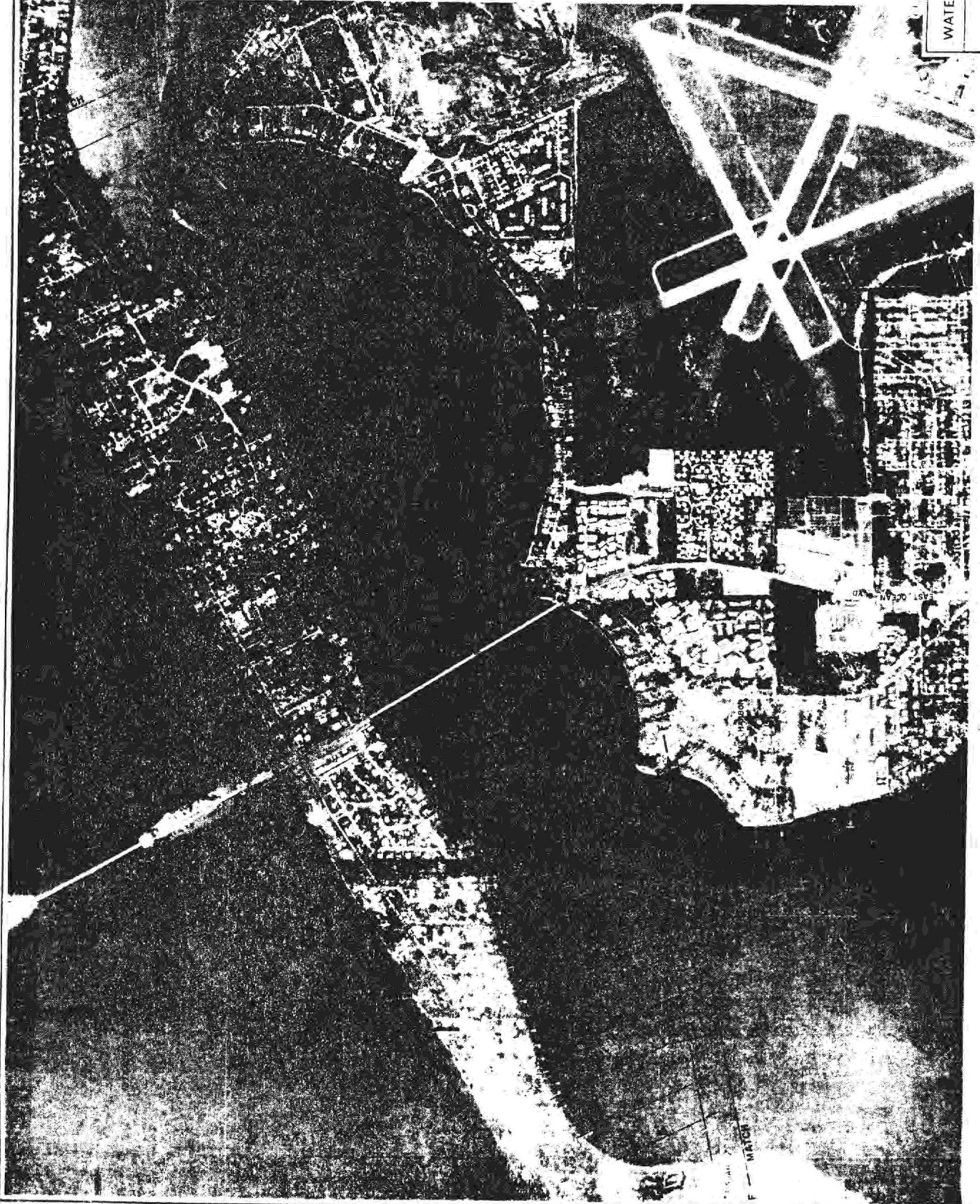
SEE SHEET 7-28-B1

MARTIN COUNTY
 SOUTH FLORIDA
 WATER MANAGEMENT DISTRICT
 LOCATION MAP
 HYDROGRAPHIC SURVEY
 ST. LUCIE ESTUARY

R.M. C. 2, 7-28-B1, 1" = 500', ST. LUCIE ESTUARY, B-11

SEE SHEET 1 FOR LEGEND AND SCALE

MARTIN COUNTY
SOUTH FLORIDA
WATER MANAGEMENT DISTRICT
LOCATION MAP
HYDROGRAPHIC SURVEY
ST. LUCIE ESTUARY
R.M. 62 7-28-81 1" = 300' ST.LUCIEESTUARY-4 9 11



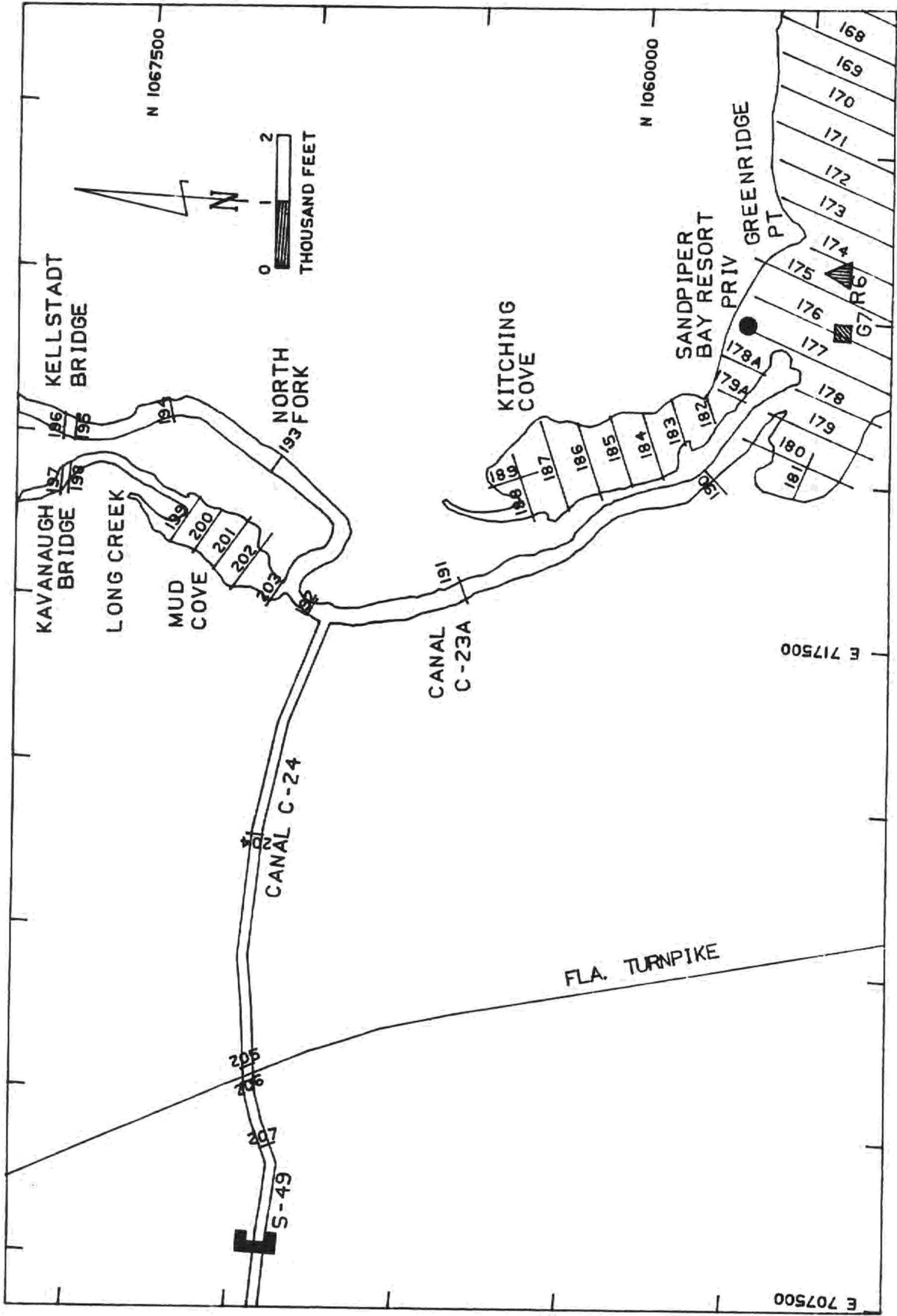


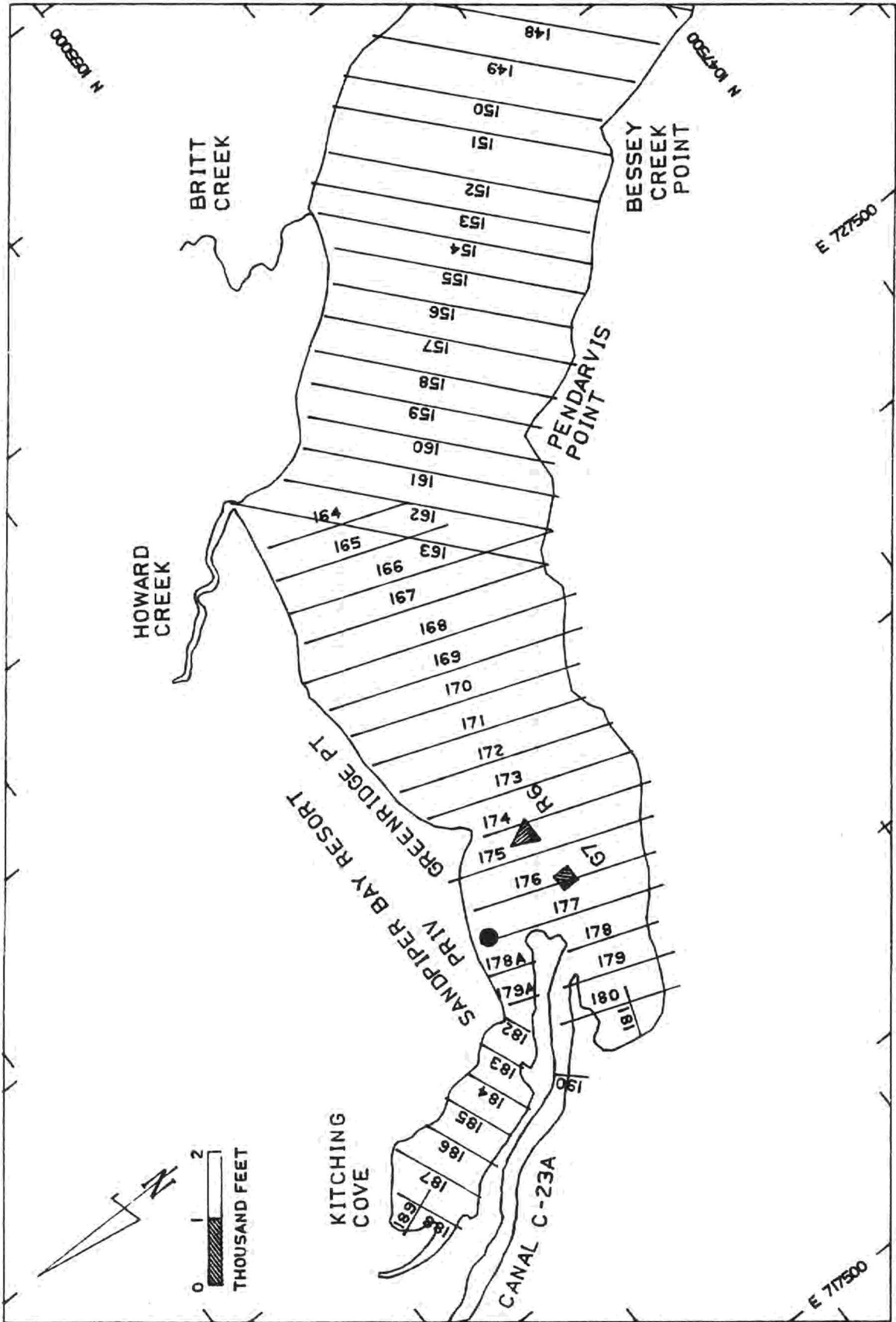
ST. LUCIE COUNTY

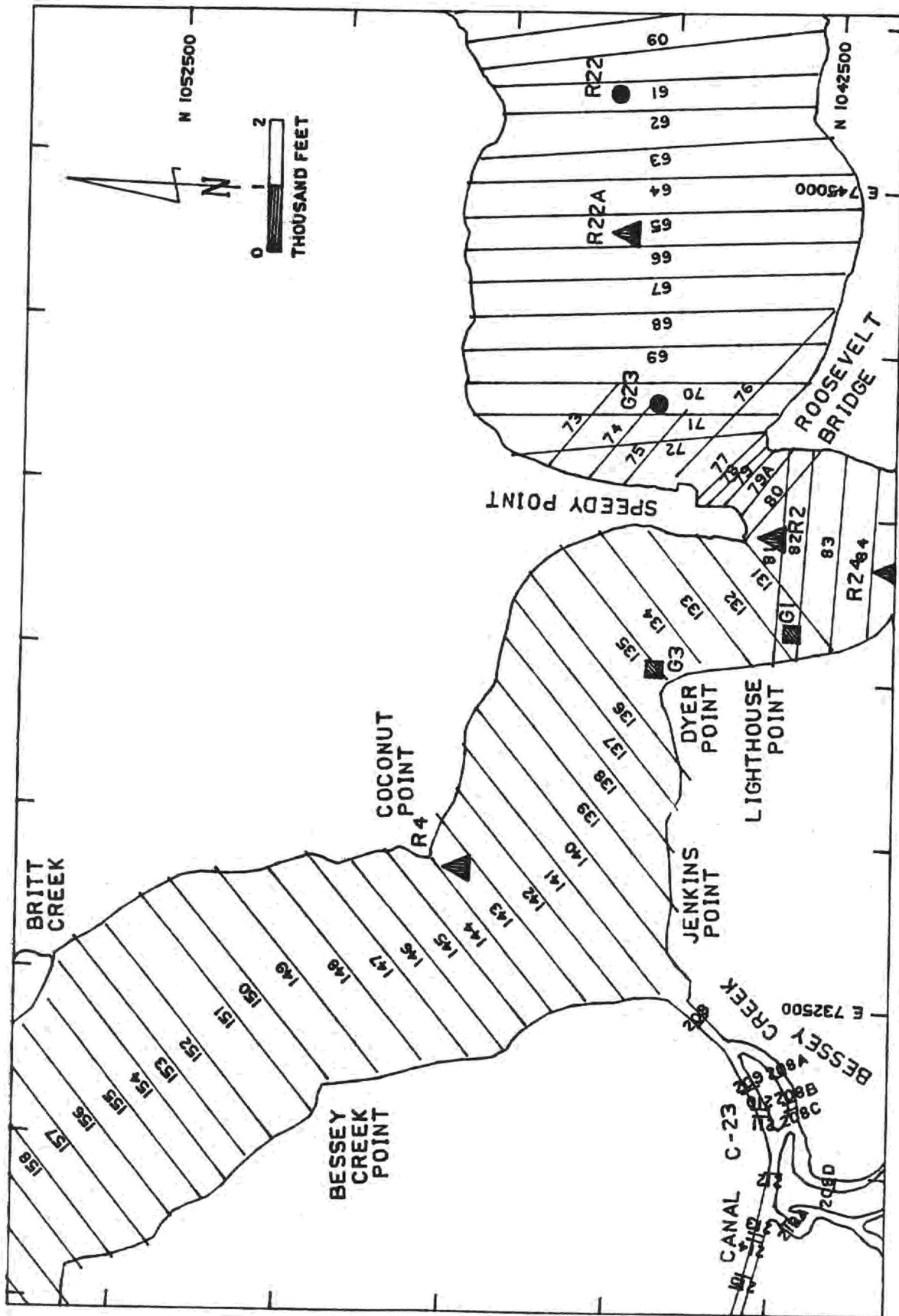
ST. LUCIE COUNTY
 SOUTH FLORIDA
 WATER MANAGEMENT DISTRICT
 LOCATION MAP
 HYDROGRAPHIC SURVEY
 ST. LUCIE ESTUARY

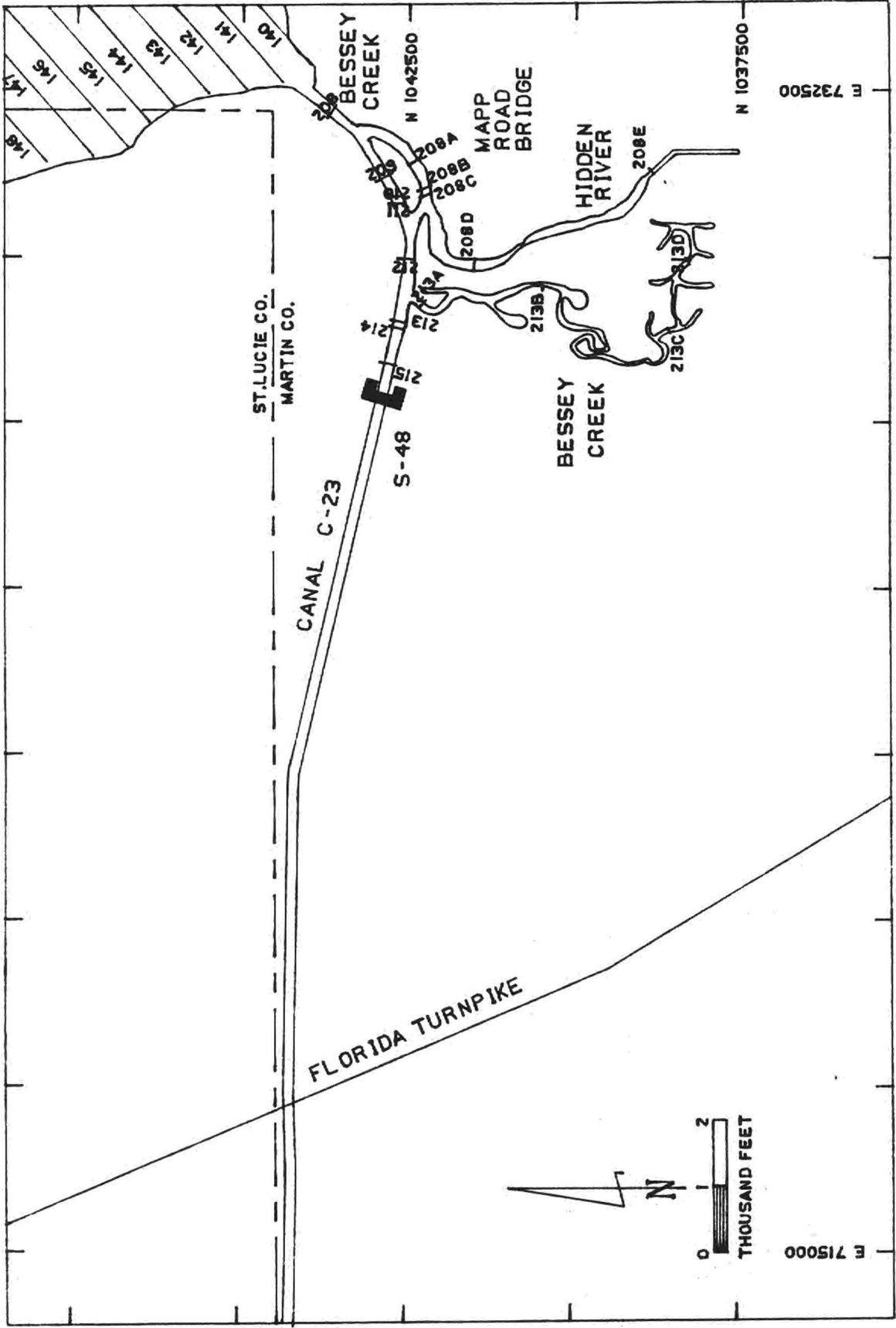


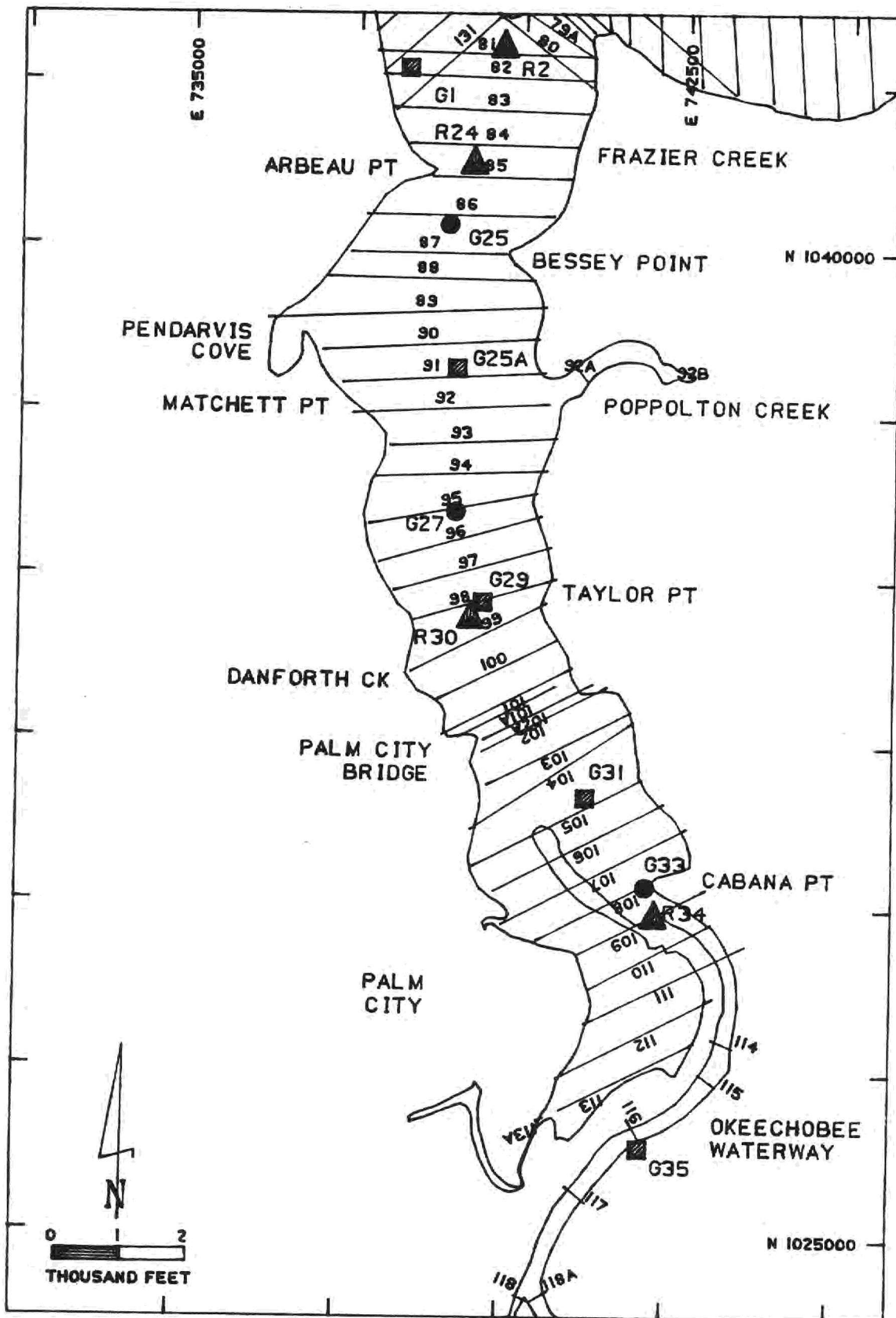
Appendix B
Computer Maps of Transect Locations

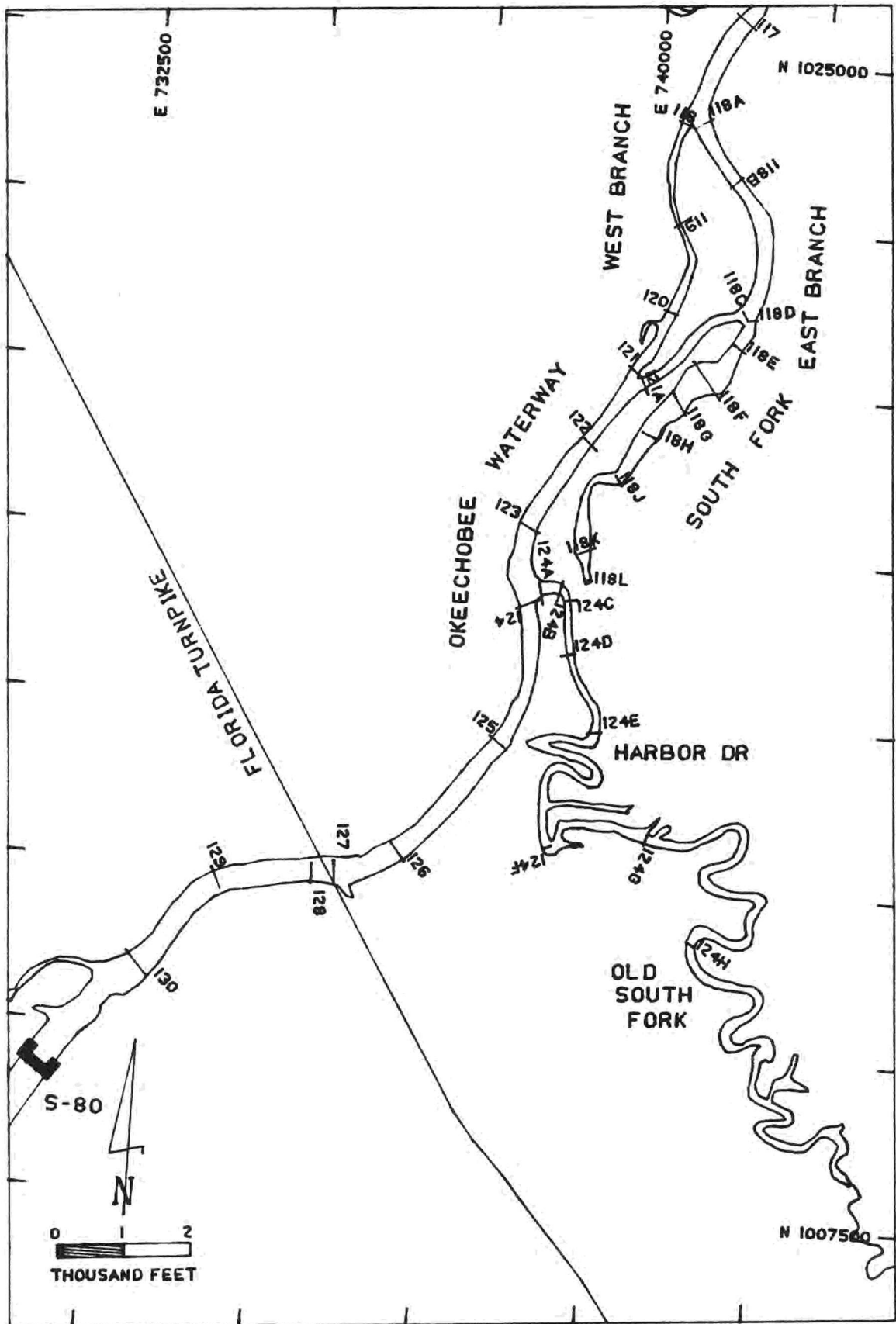


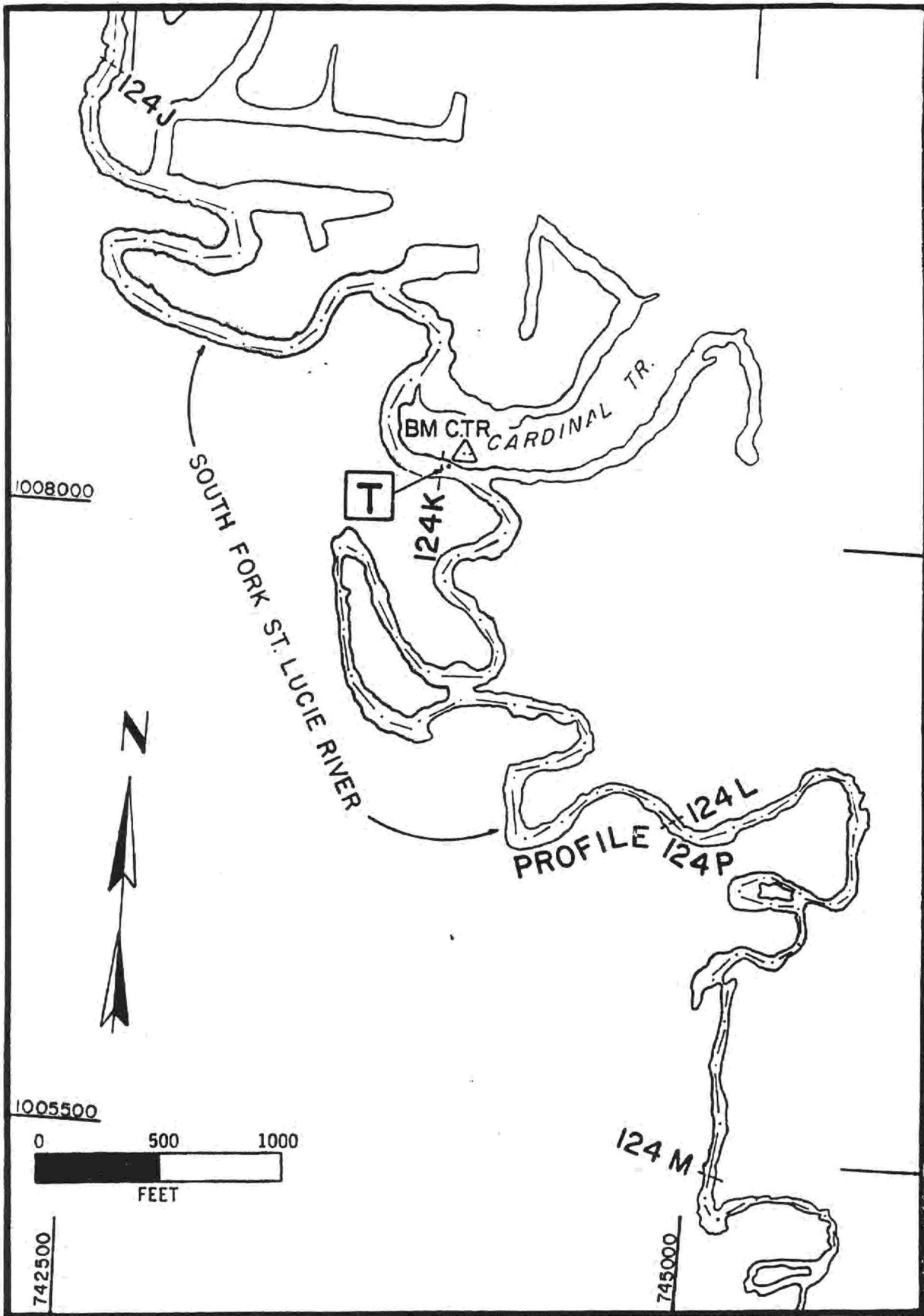


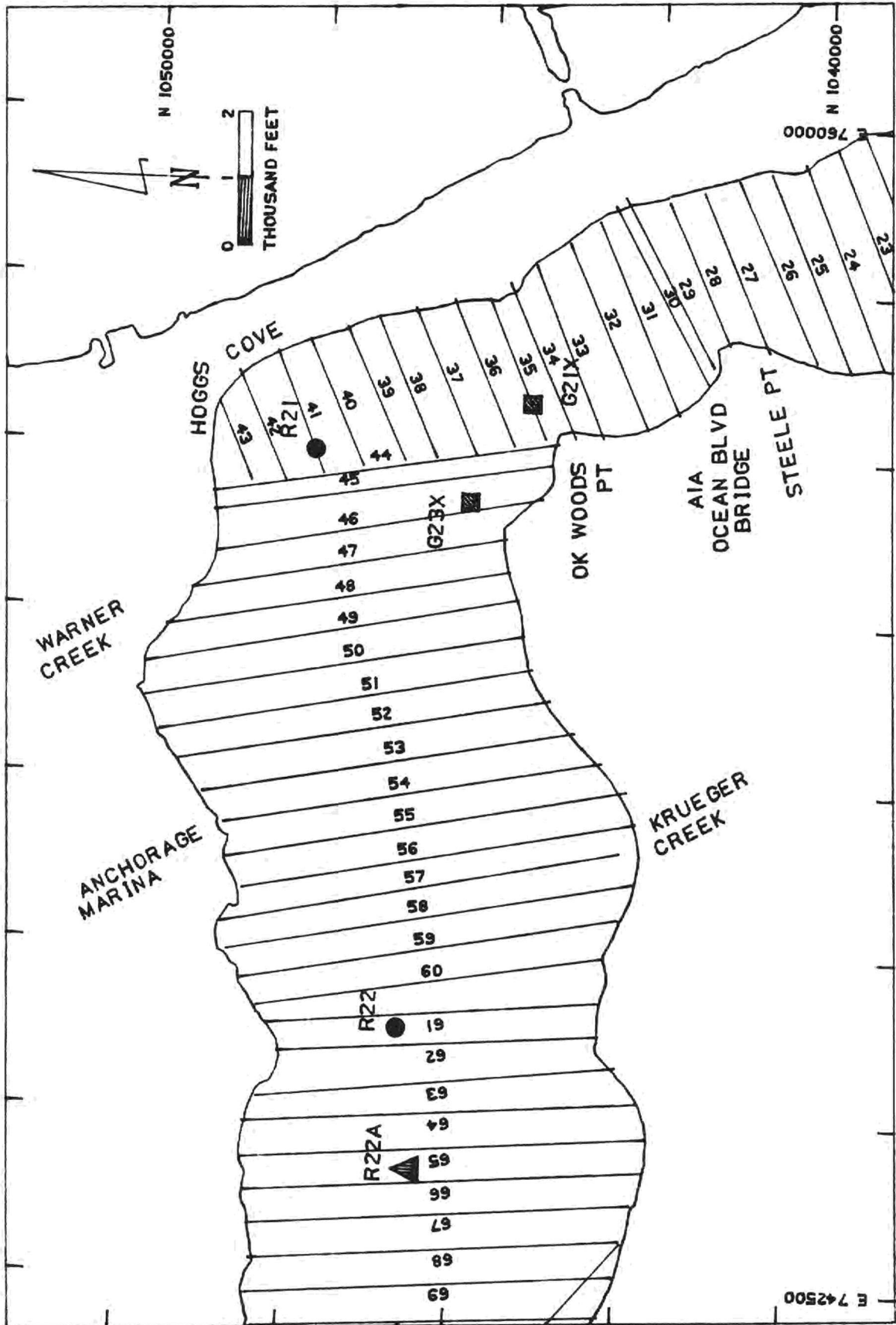


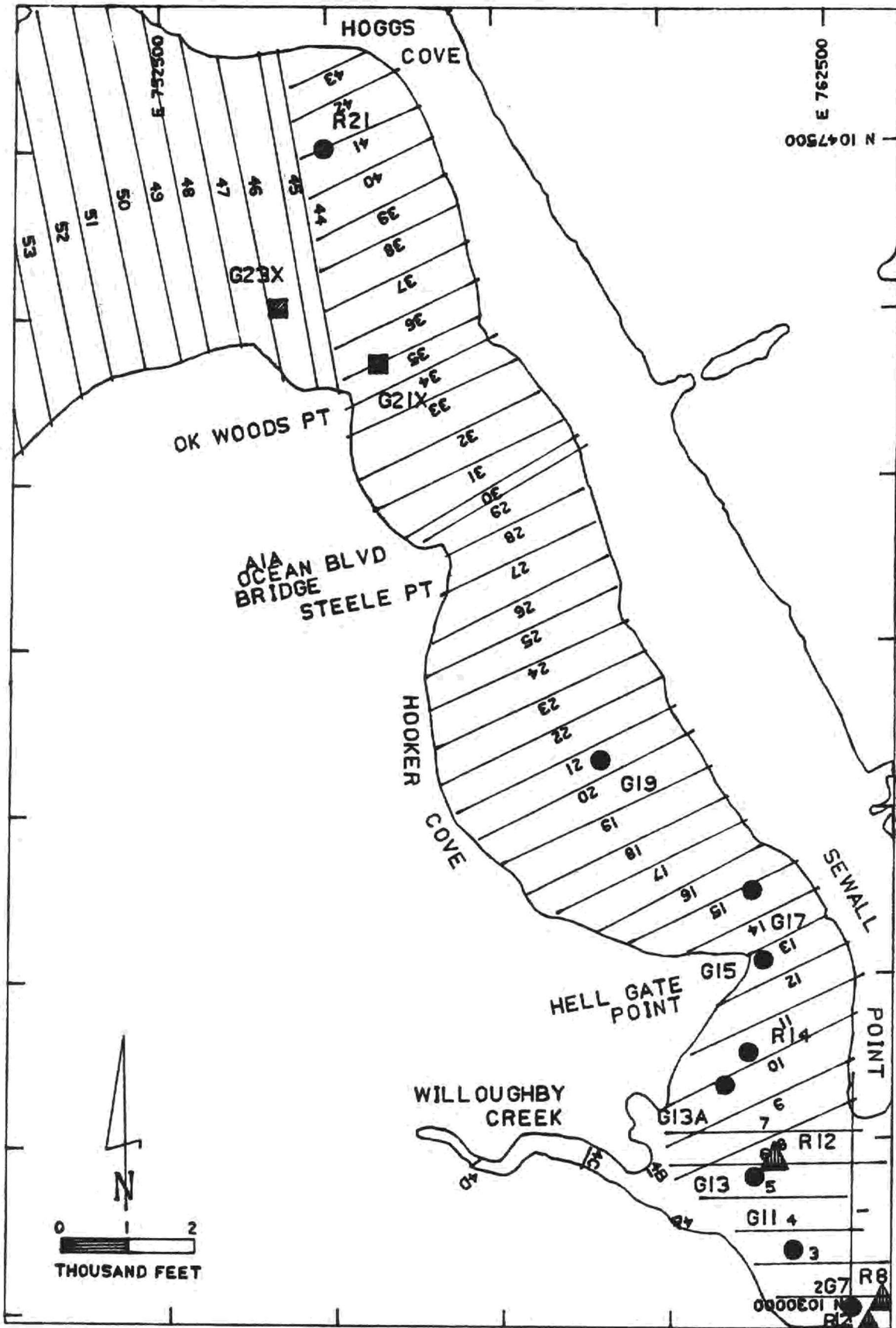


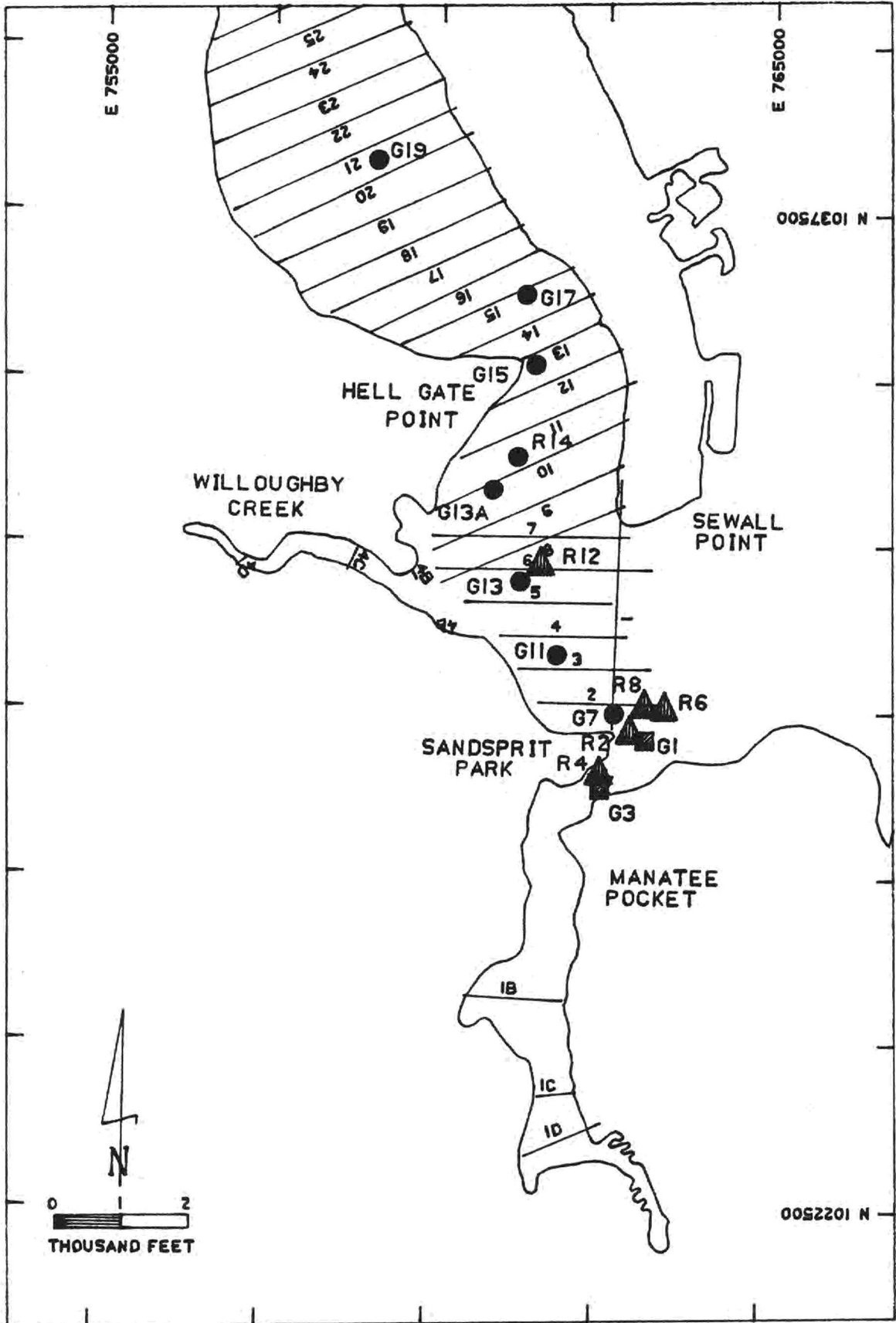


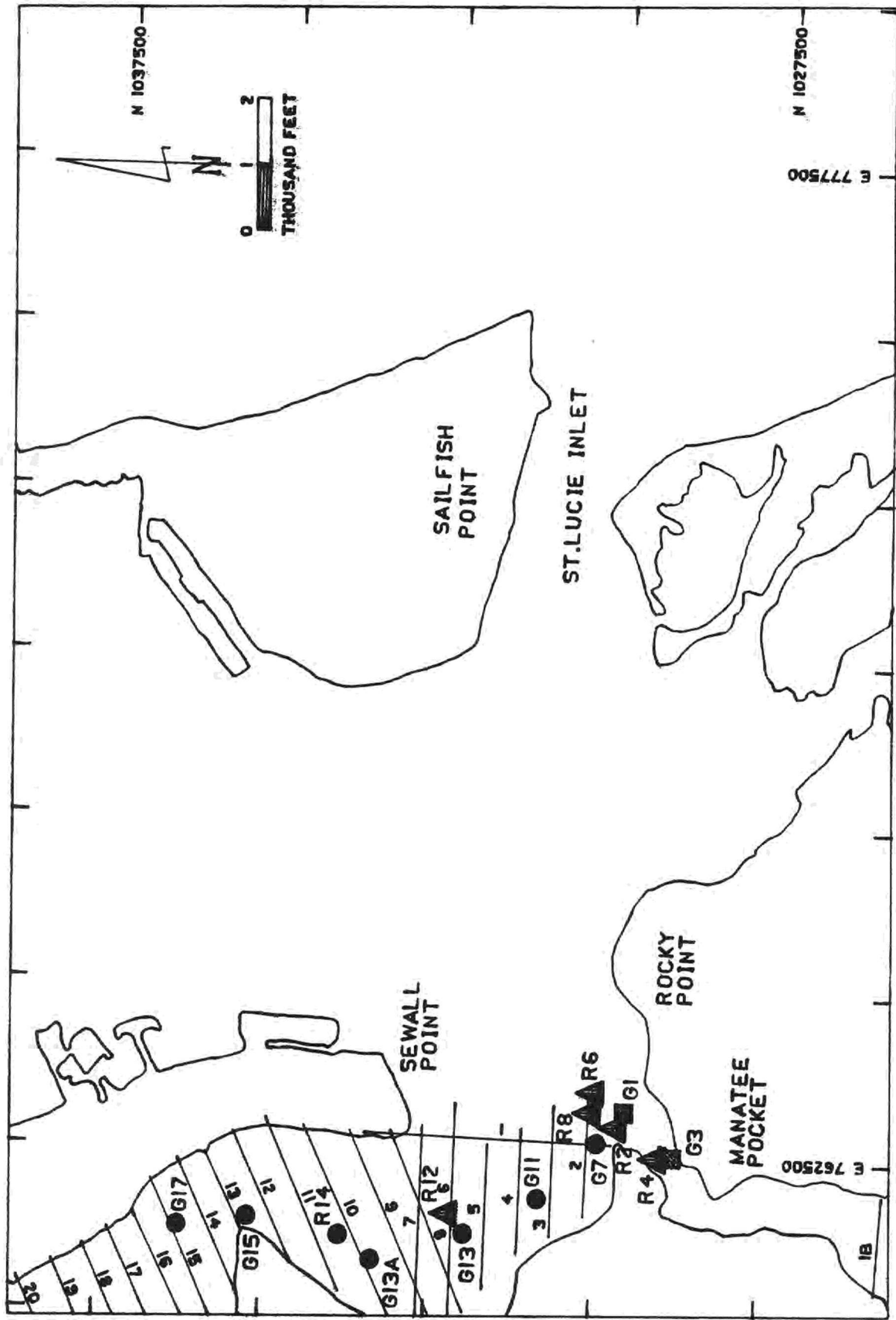












Appendix C

Transect and Profile Names and Locations

ABBREVIATIONS:

BETW -- BETWEEN
BLDGS -- BUILDINGS
BR -- BRIDGE
CK -- CREEK
E -- EAST
FECRR -- FLA EAST COAST RAILROAD
FL -- FLASHING
FR -- FROM
G -- GREEN
JUNC -- JUNCTION
LIGHTHSE -- LIGHTHOUSE
MRKR -- NAVIGATION MARKER
N -- NORTH
NUN -- NUN BUOY
NR -- NEAR
OKEE -- OKEECHOBEE
OMC -- OUTBOARD MARINE CORP
PK -- PARK
PT -- POINT
R -- RED
REC -- RECORDER
ROOS -- ROOSEVELT
ROOSVLT -- ROOSEVELT
S -- SOUTH
SR -- STATE ROAD
SUBM -- SUBMERGED
TR -- TRANSECT
W -- WEST
WKS -- WORKS
WWY -- WATERWAY

ST. LUCIE ESTUARY TRANSECTS

NUMBER	DESCRIPTION	SHEET	GENERAL LOCATION
T 001	N/S: FROM SEWALL POINT	10	MOUTH TO HELL GATE
T 001 A	NW/SE: INSIDE MANATEE POCK AT SANDSPRIT PK	10	MANATEE POCKET
T 001 B	W/E: INSIDE MANATEE POCK FR MOUTH OF CANAL	10	MANATEE POCKET
T 001 C	E/W: AT NARROW PART NR HEAD MANATEE POCKET	10	MANATEE POCKET
T 001 D	NE/SW: AT HEAD OF MANATEE POCKET	10	MANATEE POCKET
T 002	W/E: AT MRKRS FL G "7", R "6", & R "8"	10	MOUTH TO HELL GATE
T 003	W/E: 800 FT N OF SANDSPRIT PK, S OF R "10"	10	MOUTH TO HELL GATE
T 004	W/E: N OF MRKRS R NUN "10" & FL G "11"	10	MOUTH TO HELL GATE
T 004 A	ENE/WSW: INSIDE WILLOUGHBY CK, SE BRANCH	10	WILLOUGHBY CREEK
T 004 B	NNW/SSE: INSIDE MOUTH WILLOUGHBY CK	10	WILLOUGHBY CREEK
T 004 C	NNE/SSW: NW BRANCH WILLOUGHBY CK	10	WILLOUGHBY CREEK
T 004 D	NE/SW: NEAR HEAD NW BRANCH WILLOUGHBY CK	10	WILLOUGHBY CREEK
T 005	W/E: TO ISLAND S OF SEWALL PT, S OF G "13"	10	MOUTH TO HELL GATE
T 006	W/E: FROM WILLOUGHBY CK MOUTH, S OF R "12"	10	MOUTH TO HELL GATE
T 007	W/E: N OF WILLOUGHBY CK TO S OF SEWALL PT	10	MOUTH TO HELL GATE
T 008	SW/NE: N OF MRKRS FL G "13" & R "12"	10	MOUTH TO HELL GATE
T 009	SW/NE: N OF WILLOUGHBY CK MOUTH	10	MOUTH TO HELL GATE
T 010	SW/NE: AT MRKR FL "13A" & S OF FL R "14"	10	MOUTH TO HELL GATE
T 011	SW/NE: SUBM PILES TO OPPOSITE HELL GATE PT	10	MOUTH TO HELL GATE
T 012	SW/NE: SOUTH OF HELL GATE POINT	9	MOUTH TO HELL GATE
T 013	SW/NE: HELL GATE POINT & MRKR FL G "15"	9	MOUTH TO HELL GATE
T 014	SW/NE: HELL GATE TIDE RECORDER	9	HELL GATE TO A1A BRIDGE
T 015	SW/NE: MRKR FL G "17"	9	HELL GATE TO A1A BRIDGE
T 016	SW/NE: S OF HOOKER COVE	9	HELL GATE TO A1A BRIDGE
T 017	SW/NE: S OF HOOKER COVE	9	HELL GATE TO A1A BRIDGE
T 018	SW/NE: HOOKER COVE	9	HELL GATE TO A1A BRIDGE
T 019	SW/NE: HOOKER COVE	9	HELL GATE TO A1A BRIDGE
T 020	SW/NE: HOOKER COVE S OF MRKR FL G "19"	9	HELL GATE TO A1A BRIDGE
T 021	SW/NE: HOOKER COVE N OF MRKR FL G "19"	9	HELL GATE TO A1A BRIDGE
T 022	SW/NE: HOOKER COVE	9	HELL GATE TO A1A BRIDGE
T 023	SW/NE: HOOKER COVE	9	HELL GATE TO A1A BRIDGE
T 024	SW/NE: N OF HOOKER COVE	9	HELL GATE TO A1A BRIDGE
T 025	SW/NE: N OF HOOKER COVE	9	HELL GATE TO A1A BRIDGE
T 026	SW/NE: S OF STEELE PT	9	HELL GATE TO A1A BRIDGE
T 027	SW/NE: S OF STEELE PT	9	HELL GATE TO A1A BRIDGE
T 028	SW/NE: N OF STEELE PT	9	HELL GATE TO A1A BRIDGE
T 029	SW/NE: SOUTH OF A1A BRIDGE	9	HELL GATE TO A1A BRIDGE
T 030	SW/NE: NORTH OF A1A BRIDGE	9	A1A BRIDGE TO WOODS PT
T 031	SW/NE: N OF A1A BRIDGE	9	A1A BRIDGE TO WOODS PT
T 032	SW/NE: S OF WOODS PT	9	A1A BRIDGE TO WOODS PT
T 033	SW/NE: S OF WOODS PT	9	A1A BRIDGE TO WOODS PT
T 034	SW/NE: WOODS PT	9	A1A BRIDGE TO WOODS PT
T 035	SW/NE: MRKR G "21X"	9	NORTH OF WOODS PT
T 036	SW/NE: TRANSECT 44 TO NE SHORE	9	NORTH OF WOODS PT
T 037	SW/NE: TRANSECT 44 TO NE SHORE	9	NORTH OF WOODS PT
T 038	SW/NE: TRANSECT 44 TO NE SHORE	9	NORTH OF WOODS PT
T 039	SW/NE: TRANSECT 44 TO NE SHORE	9	NORTH OF WOODS PT
T 040	SW/NE: TRANSECT 44 TO NE SHORE	9	NORTH OF WOODS PT
T 041	SW/NE: MRKR FL G "21"	9	NORTH OF WOODS PT
T 042	SW/NE: TRANSECT 44 TO HOGGS COVE	9	NORTH OF WOODS PT

T 043	SW/NE: TRANSECT 44 TO HOGGS COVE	9	NORTH OF WOODS PT
T 044	S/N: FROM WOODS PT	9	NORTH OF WOODS PT
T 045	S/N: W OF WOODS PT, E OF MRKR G "23X"	9	NORTH OF WOODS PT
T 046	S/N: W OF WOODS PT, W OF MRKR G "23X"	8	WOODS PT TO KRUEGER CK
T 047	S/N: W OF WOODS PT, E OF WARNER CK	8	WOODS PT TO KRUEGER CK
T 048	S/N: W OF WOODS PT, E OF WARNER CK	8	WOODS PT TO KRUEGER CK
T 049	S/N: W OF WOODS PT, E OF WARNER CK	8	WOODS PT TO KRUEGER CK
T 050	S/N: MOUTH OF WARNER CK	8	WOODS PT TO KRUEGER CK
T 051	S/N: W OF WARNER CK, E OF KRUEGER CK	8	WOODS PT TO KRUEGER CK
T 052	S/N: W OF WARNER CK, E OF KRUEGER CK	8	WOODS PT TO KRUEGER CK
T 053	S/N: W OF WARNER CK, E OF KRUEGER CK	8	WOODS PT TO KRUEGER CK
T 054	S/N: W OF WARNER CK, E OF KRUEGER CK	8	WOODS PT TO KRUEGER CK
T 055	S/N: W OF WARNER CK, E OF KRUEGER CK	8	WOODS PT TO KRUEGER CK
T 056	S/N: FLA OCEANOGRAPHIC SOCIETY AT WARNER CK	8	WOODS PT TO KRUEGER CK
T 057	S/N: W OF KRUEGER CK MOUTH	8	KRUEGER CK TO ROOSVLT BR
T 058	S/N: W OF KRUEGER CK, E OF MRKR FL R "22"	8	KRUEGER CK TO ROOSVLT BR
T 059	S/N: W OF KRUEGER CK, E OF MRKR FL R "22"	8	KRUEGER CK TO ROOSVLT BR
T 060	S/N: W OF KRUEGER CK, E OF MRKR FL R "22"	8	KRUEGER CK TO ROOSVLT BR
T 061	S/N: E OF MRKR FL R "22"	8	KRUEGER CK TO ROOSVLT BR
T 062	S/N: W OF MRKR FL R "22"	8	KRUEGER CK TO ROOSVLT BR
T 063	S/N: W OF MRKR FL R "22", E OF ROOSVLT BR	8	KRUEGER CK TO ROOSVLT BR
T 064	S/N: W OF MRKR FL R "22", E OF ROOSVLT BR	8	KRUEGER CK TO ROOSVLT BR
T 065	S/N: E OF MRKR FL R "22A", E OF ROOSVLT BR	8	KRUEGER CK TO ROOSVLT BR
T 066	S/N: W OF MRKR FL R "22A", E OF ROOSVLT BR	8	KRUEGER CK TO ROOSVLT BR
T 067	S/N: W OF MRKR FL R "22A", E OF ROOSVLT BR	8	KRUEGER CK TO ROOSVLT BR
T 068	S/N: W OF MRKR FL R "22A", E OF ROOSVLT BR	8	KRUEGER CK TO ROOSVLT BR
T 069	S/N: W OF MRKR FL R "22A", E OF ROOSVLT BR	8	KRUEGER CK TO ROOSVLT BR
T 070	N/S: FROM ST. LUCIE MARINA, W OF ENTRANCE	4	KRUEGER CK TO ROOSVLT BR
T 071	N/S: FR BLDGS W OF RADIO TOWER, W OF G "23"	4	KRUEGER CK TO ROOSVLT BR
T 072	NNW/SSE: 1/3 BETWEEN DREDGE PIER & TOWER	4	KRUEGER CK TO ROOSVLT BR
T 073	NW/SE: DREDGE PIER TO CHANNEL CENTERLINE	4	KRUEGER CK TO ROOSVLT BR
T 074	NW/SE: GULF OIL BLDGS TO CHANNEL CENTERLINE	4	KRUEGER CK TO ROOSVLT BR
T 075	NW/SE: BETWEEN LYDIA BOAT WKS & GULF TO CHNL	4	KRUEGER CK TO ROOSVLT BR
T 076	NW/SE: OMC DOCK TO CHANNEL CENTERLINE	4	KRUEGER CK TO ROOSVLT BR
T 077	NW/SE: S END OMC PAST N END OF PT ON S BANK	4	KRUEGER CK TO ROOSVLT BR
T 078	NW/SE: E & PARALLEL TO FECRR BRIDGE	4	KRUEGER CK TO ROOSVLT BR
T 079	NW/SE: BETWEEN FECRR AND ROOSEVELT BRIDGES	4	KRUEGER CK TO ROOSVLT BR
T 079 A	NW/SE: W OF ROOSEVELT BRIDGE	4	ROOS BR TO LIGHTHOUSE PT
T 080	NW/SE: SPEEDY PT TO TRANSECT 81	4	ROOS BR TO LIGHTHOUSE PT
T 081	E/W: E END ROOS BR TO LIGHTS PT, S OF R "2"	4	ROOS BR TO LIGHTHOUSE PT
T 082	E/W: TO LIGHTHOUSE POINT	4	ROOS BR TO LIGHTHOUSE PT
T 083	E/W: TO LIGHTHOUSE POINT	6	ROOSVLT TO PALM CITY BRS
T 084	E/W: TO N OF ARBEAU PT, N OF MRKR R "24"	6	ROOSVLT TO PALM CITY BRS
T 085	E/W: N SIDE FRAZIER CK, S OF MRKR R "24"	6	ROOSVLT TO PALM CITY BRS
T 086	E/W: MRKR FL G "25" TO S OF ARBEAU PT	6	ROOSVLT TO PALM CITY BRS
T 087	E/W: FROM BESSEY PT	6	ROOSVLT TO PALM CITY BRS
T 088	E/W: BETWEEN BESSEY PT AND PNDARVIS COVE	6	ROOSVLT TO PALM CITY BRS
T 089	E/W: TO PNDARVIS COVE	6	ROOSVLT TO PALM CITY BRS
T 090	E/W: N OF MRKR G "25A"	6	ROOSVLT TO PALM CITY BRS
T 091	E/W: FR N SIDE POPPOLTON CK S OF G "25A"	6	ROOSVLT TO PALM CITY BRS
T 092	E/W: FR S SIDE POPPOLTON CK TO N OF MATCHETT	6	ROOSVLT TO PALM CITY BRS
T 092 A	NW/SE: INSIDE MOUTH OF POPPOLTON CK	6	ROOSVLT TO PALM CITY BRS
T 092 B	N/S: POPPOLTON CK ON W SIDE SR 76 BR	6	ROOSVLT TO PALM CITY BRS
T 093	E/W: TO S OF MATCHETT PT	6	ROOSVLT TO PALM CITY BRS

T 094	E/W: TO STRAIGHT CANAL	6	ROOSVLT TO PALM CITY BRS
T 095	ENE/WSW: PAST MRKR FL G "27" TO BENT CANAL	6	ROOSVLT TO PALM CITY BRS
T 096	ENE/WSW: TO DOUBLE CANAL	6	ROOSVLT TO PALM CITY BRS
T 097	ENE/WSW: DOCK TO N OF DANFORTH CK	6	ROOSVLT TO PALM CITY BRS
T 098	ENE/WSW: AT MRKR G "29", N OF MRKR R "30"	6	ROOSVLT TO PALM CITY BRS
T 099	NE/SW: TAYLOR PT TO DANFORTH CK, S OF R "30"	6	ROOSVLT TO PALM CITY BRS
T 100	NE/SW: TO S OF DANFORTH CK MOUTH	6	ROOSVLT TO PALM CITY BRS
T 101	NE/SW: N OF PALM CITY BRIDGE	6	ROOSVLT TO PALM CITY BRS
T 101 A	NE/SW: N OF PALM CITY BRIDGE	6	ROOSVLT TO PALM CITY BRS
T 102	NE/SW: END OF PIER TO S SIDE OF PARK	6	SOUTH OF PALM CITY BR
T 102 A	NE/SW: S OF PALM CITY BRIDGE	6	SOUTH OF PALM CITY BR
T 103	NE/SW: FROM N SIDE OF CANAL	6	SOUTH OF PALM CITY BR
T 104	NE/SW: FROM BETWEEN MOUTHS OF 2 CANALS	6	SOUTH OF PALM CITY BR
T 105	NE/SW: MRKR G "31" AND THROUGH ISLAND	6	SOUTH OF PALM CITY BR
T 106	NE/SW: THROUGH ISLAND	6	SOUTH OF PALM CITY BR
T 107	NE/SW: TO MOUTH OF CK THROUGH ISLAND	6	SOUTH OF PALM CITY BR
T 108	NE/SW: FR CABANA PT THROUGH ISLAND AT G "33"	6	SOUTH OF PALM CITY BR
T 109	NE/SW: FR CANAL S OF CABANA PT & MRKR R "34"	6	SOUTH OF PALM CITY BR
T 110	NE/SW: THROUGH SPOIL ISLAND W OF OKEE WWY	6	SOUTH OF PALM CITY BR
T 111	NE/SW: THROUGH SPOIL ISLAND W OF OKEE WWY	6	SOUTH OF PALM CITY BR
T 112	NE/SW: THROUGH SPOIL ISLAND W OF OKEE WWY	6	SOUTH OF PALM CITY BR
T 113	NE/SW: THROUGH SPOIL ISLAND W OF OKEE WWY	6	SOUTH OF PALM CITY BR
T 113 A	NE/SW: AT W END OF TRANSECT 113	6	SOUTH OF PALM CITY BR
T 114	ESE/WNW: ACROSS OKEECHOBEE WWY	6	SOUTH OF PALM CITY BR
T 115	SE/NW: ACROSS OKEECHOBEE WWY	6	SOUTH OF PALM CITY BR
T 116	SSE/NNW: ACROSS OKEE WWY AT MRKR G "35"	6	SOUTH OF PALM CITY BR
T 117	SE/NW: ACROSS OKEECHOBEE WWY	6	SOUTH OF PALM CITY BR
T 118	WNW/ESE: ACROSS OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 A	SW/NE: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 B	SW/NE: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 C	NW/SE: E BRANCH OKEE WWY & CONNECT TO MAIN	7	SOUTH OF PALM CITY BR
T 118 D	WSW/ENE: E BR OKEE WWY IN CONNECTION TO MAIN	7	SOUTH OF PALM CITY BR
T 118 E	WNW/ESE: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 F	NW/SE: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 G	NNW/SSE: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 H	WNW/ESE: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 J	NW/SE: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 K	SW/NE: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 118 L	W/E: E BRANCH OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 119	SW/NE: MAIN OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 120	WNW/ESE: MAIN OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 121	NW/SE: CONNECTION MAIN TO E BRANCH OKEE WWY	7	SOUTH OF PALM CITY BR
T 121 A	NNW/SSE: IN CONN BETW E BR AND MAIN OKEE WWY	7	SOUTH OF PALM CITY BR
T 122	NW/SE: MAIN BRANCH OKEE WWY AT S CANAL MOUTH	7	SOUTH OF PALM CITY BR
T 123	NW/SE: MAIN BRANCH OKEE WWY NEAR MAPP CK	7	SOUTH OF PALM CITY BR
T 124	WSW/ENE: MAIN OKEE WWY AT JUNC OLD S FORK	7	SOUTH OF PALM CITY BR
T 124 A	NNW/SSE: AT MOUTH OF OLD SOUTH FORK	7	SOUTH OF PALM CITY BR
T 124 B	NNE/SSW: INSIDE MOUTH OLD SOUTH FORK	7	SOUTH OF PALM CITY BR
T 124 C	WSW/ENE: S OF FIRST BEND IN OLD S FORK	7	SOUTH OF PALM CITY BR
T 124 D	WSW/ENE: OLD S FORK AT TANGLEWOOD TR	7	SOUTH OF PALM CITY BR
T 124 E	WSW/ENE: OLD S FORK N OF HARBOR STREET	7	SOUTH OF PALM CITY BR
T 124 F	WSW/ENE: OLD S FORK AT 180 DEG BEND	7	SOUTH OF PALM CITY BR
T 124 G	SSW/NNE: OLD S FORK	7	SOUTH OF PALM CITY BR
T 124 H	NW/SE: OLD S FORK W OF SR 76	7	SOUTH OF PALM CITY BR

T 124 J	NW/SE: OLD S FORK S OF SR 76	7	SOUTH OF PALM CITY BR
T 124 K	S/N: AT CARDINAL TRAIL TIDE RECORDER	7	SOUTH OF PALM CITY BR
T 124 L	SW/NE: OLD S FORK	7	SOUTH OF PALM CITY BR
T 124 M	WNW/ESE: OLD S FORK	7	SOUTH OF PALM CITY BR
T 125	NW/SE: MAIN OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 126	NW/SE: MAIN OKEECHOBEE WWY	7	SOUTH OF PALM CITY BR
T 127	S/N: E SIDE FLA TPK BRIDGE	7	SOUTH OF PALM CITY BR
T 128	S/N: W SIDE FLA TPK BRIDGE	7	SOUTH OF PALM CITY BR
T 129	SSE/NNW: MIDWAY BETW FLA TPK BRIDGE AND S-80	7	SOUTH OF PALM CITY BR
T 130	NW/SE: DOWNSTREAM S-80	7	SOUTH OF PALM CITY BR
T 131	NE/SW: SPEEDY PT TO TR 81, S OF MRKR G "1"	4	ROOSVLT BR TO BESSEY CK
T 132	NE/SW: N OF ROOS BR TO TR 81, N OF G "1"	4	ROOSVLT BR TO BESSEY CK
T 133	NE/SW: N OF ROOSVLT BRIDGE TO LIGHTHOUSE PT	4	ROOSVLT BR TO BESSEY CK
T 134	NE/SW: N OF ROOSVLT BRIDGE TO S OF DYER PT	4	ROOSVLT BR TO BESSEY CK
T 135	NE/SW: N OF ROOS BR TO DYER PT, AT G "3"	4	ROOSVLT BR TO BESSEY CK
T 136	NE/SW: TO W CANAL MOUTH ON LIGHTHOUSE PT	4	ROOSVLT BR TO BESSEY CK
T 137	NE/SW: TO JENKINS PT ON LIGHTHOUSE PT	4	ROOSVLT BR TO BESSEY CK
T 138	NE/SW: TO BOUNDARY OF LIGHTHOUSE PT	4	ROOSVLT BR TO BESSEY CK
T 139	NE/SW: TO E OF MOUTH OF C-23	4	ROOSVLT BR TO BESSEY CK
T 140	NE/SW: TO S OF MOUTH OF C-23	4	ROOSVLT BR TO BESSEY CK
T 141	NE/SW: TO N OF MOUTH OF C-23	4	ROOSVLT BR TO BESSEY CK
T 142	NE/SW: BETWEEN C-23 MOUTH AND COCOANUT PT	4	BESSEY CK TO SNDPPR BAY
T 143	NE/SW: N OF C-23 MOUTH, S OF MRKR R "4"	4	BESSEY CK TO SNDPPR BAY
T 144	NE/SW: COCOANUT POINT TO W BANK, N OF R "4"	4	BESSEY CK TO SNDPPR BAY
T 145	NE/SW: BETWEEN COCOANUT PT & BESSEY CK PT	4	BESSEY CK TO SNDPPR BAY
T 146	NE/SW: BETWEEN COCOANUT PT & BESSEY CK PT	4	BESSEY CK TO SNDPPR BAY
T 147	NE/SW: BETWEEN COCOANUT PT & BESSEY CK PT	4	BESSEY CK TO SNDPPR BAY
T 148	NE/SW: BETWEEN COCOANUT PT & BESSEY CK PT	4	BESSEY CK TO SNDPPR BAY
T 149	NE/SW: BETWEEN COCOANUT PT & BESSEY CK PT	4	BESSEY CK TO SNDPPR BAY
T 150	NE/SW: TO BESSEY CK PT	4	BESSEY CK TO SNDPPR BAY
T 151	NE/SW: BETWEEN BESSEY CK PT & BRITT CK MOUTH	4	BESSEY CK TO SNDPPR BAY
T 152	NE/SW: BETWEEN BESSEY CK PT & BRITT CK MOUTH	4	BESSEY CK TO SNDPPR BAY
T 153	NE/SW: FROM MOUTH OF BRITT CK	4	BESSEY CK TO SNDPPR BAY
T 154	NE/SW: FROM PT NORTH OF BRITT CK MOUTH	4	BESSEY CK TO SNDPPR BAY
T 155	NE/SW: BETWEEN BRITT CK AND PENDARVIS PT	4	BESSEY CK TO SNDPPR BAY
T 156	NE/SW: BETWEEN BRITT CK AND PENDARVIS PT	4	BESSEY CK TO SNDPPR BAY
T 157	NE/SW: BETWEEN BRITT CK AND PENDARVIS PT	3	BESSEY CK TO SNDPPR BAY
T 158	NE/SW: BETWEEN BRITT CK AND PENDARVIS PT	3	BESSEY CK TO SNDPPR BAY
T 159	NE/SW: TO PENDARVIS PT	3	BESSEY CK TO SNDPPR BAY
T 160	NE/SW: FROM PENDARVIS PT TO HOWARD CK	3	BESSEY CK TO SNDPPR BAY
T 161	NE/SW: FROM PENDARVIS PT TO HOWARD CK	3	BESSEY CK TO SNDPPR BAY
T 162	NE/SW: FROM PENDARVIS PT TO HOWARD CK	3	BESSEY CK TO SNDPPR BAY
T 163	NE/SW: FROM MOUTH OF HOWARD CK	3	BESSEY CK TO SNDPPR BAY
T 163 A	SW/NE: INSIDE MOUTH OF HOWARD CK	3	BESSEY CK TO SNDPPR BAY
T 163 B	NNE/SSW: INSIDE HOWARD CK	3	BESSEY CK TO SNDPPR BAY
T 164	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 165	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 166	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 167	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 168	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 169	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 170	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 171	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 172	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY

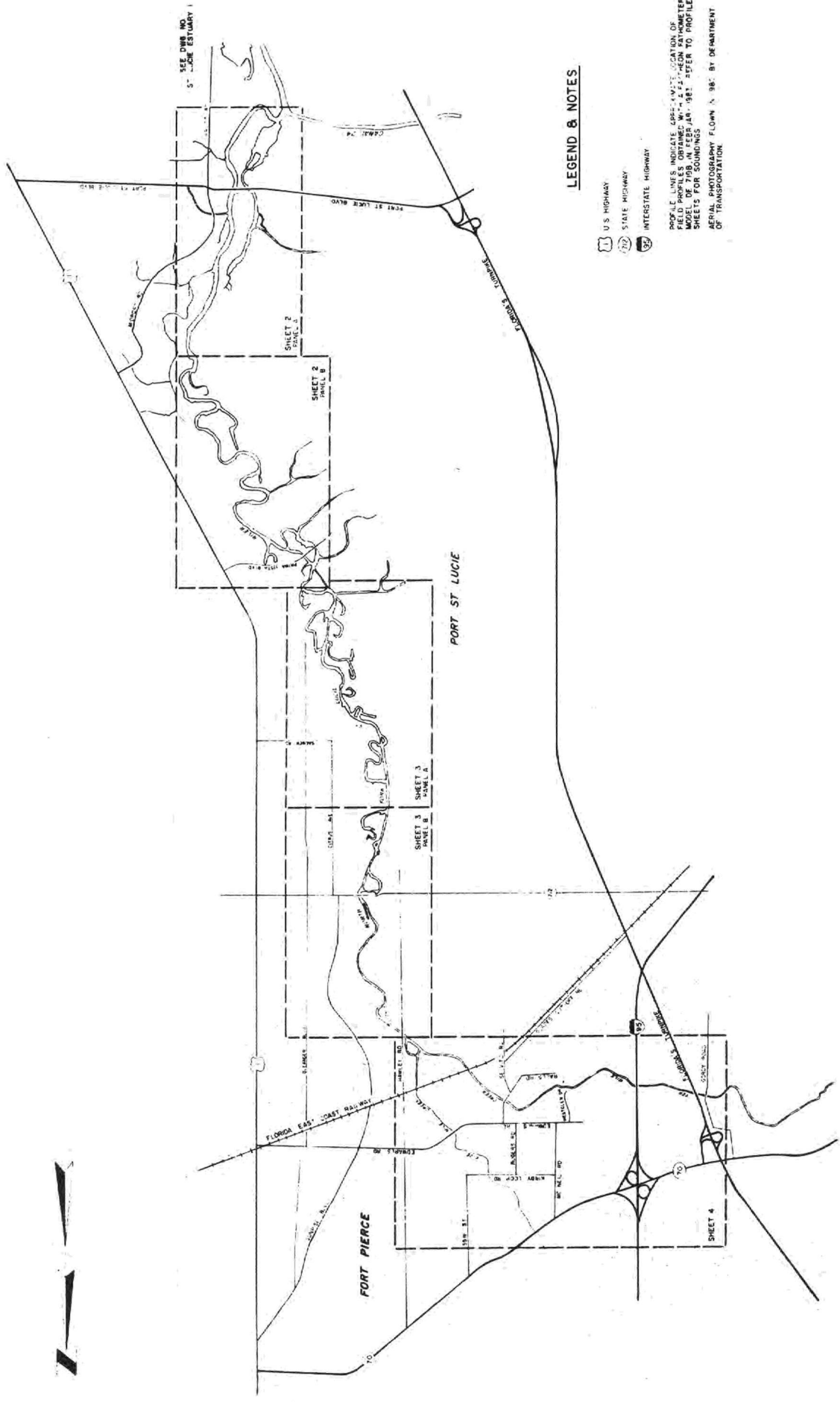
T 173	NNE/SSW: BETWEEN HOWARD CK & GREENRIDGE PT	3	BESSEY CK TO SNDPPR BAY
T 174	NNE/SSW: FR GREENRIDGE PT, S OF MRKR R "6"	3	BESSEY CK TO SNDPPR BAY
T 175	NNE/SSW: N OF GREENRIDGE PT, N OF MRKR R "6"	3	BESSEY CK TO SNDPPR BAY
T 176	NNE/SSW: FR SANDPIPER MARINA PAST MRKR G "7"	3	BESSEY CK TO SNDPPR BAY
T 177	NNE/SSW: N OF WL RECORDER, SANDPIPER MARINA	3	BESSEY CK TO SNDPPR BAY
T 178	NNE/SSW: PT AT C-23A CANAL MOUTH	3	BESSEY CK TO SNDPPR BAY
T 178 A	NNE/SSW: PT AT C-23A CANAL MOUTH	3	BESSEY CK TO SNDPPR BAY
T 179	NNE/SSW: N OF POINT AT C-23A MOUTH	3	BESSEY CK TO SNDPPR BAY
T 179 A	NNE/SSW: N OF POINT AT C-23A MOUTH	3	BESSEY CK TO SNDPPR BAY
T 180	NNE/SSW: FR PT AT C-23A MOUTH TO COVE	3	BESSEY CK TO SNDPPR BAY
T 181	WNW/ESE: INSIDE COVE W OF C-23A	3	BESSEY CK TO SNDPPR BAY
T 182	ENE/WSW: KITCHING COVE MOUTH	3	KITCHING COVE, N FORK
T 183	ENE/WSW: KITCHING COVE	2	KITCHING COVE, N FORK
T 184	ENE/WSW: KITCHING COVE	2	KITCHING COVE, N FORK
T 185	ENE/WSW: KITCHING COVE	2	KITCHING COVE, N FORK
T 186	ENE/WSW: FROM DOCK ON PT IN KITCHING COVE	2	KITCHING COVE, N FORK
T 187	ENE/WSW: S OF DOCK WITH 4 BOAT SLIPS	2	KITCHING COVE, N FORK
T 188	ENE/WSW: AT HEAD OF KITCHING COVE	2	KITCHING COVE, N FORK
T 189	NNW/SSE: FROM HEAD OF KITCHING COVE	2	KITCHING COVE, N FORK
T 190	NE/SW: INSIDE MOUTH OF C-23A AT WIDE N FORK	2	NORTH FORK
T 191	NE/SW: C-23A 1/3 DIST C-24 TO WIDE N FORK	2	NORTH FORK
T 192	NW/SE: N OF JUNC C-24 AND NORTH FORK	2	NORTH FORK
T 193	NW/SE: N FORK 1/2 DIST KELLSTADT BR TO C-24	2	NORTH FORK
T 194	WSW/ENE: N FORK S OF KELLSTADT BR	2	NORTH FORK
T 195	W/E: S OF KELLSTADT BR	2	NORTH FORK
T 196	W/E: N OF KELLSTADT BR	2	NORTH FORK
T 197	W/E: N OF KAVANAUGH BR	2	NORTH FORK
T 198	W/E: S OF KAVANAUGH BR	2	NORTH FORK
T 199	NW/SE: N END MUD COVE ON LONG CK	2	NORTH FORK
T 200	NW/SE: MUD COVE	2	NORTH FORK
T 201	NW/SE: MUD COVE	2	NORTH FORK
T 202	NW/SE: MUD COVE	2	NORTH FORK
T 203	NW/SE: MUD COVE	2	NORTH FORK
T 204	N/S: C-24 MIDWAY FLA TPK TO C-23A	2	CANAL C-24
T 205	NNW/SSE: C-24 E OF FLA TPK BRIDGE	2	CANAL C-24
T 206	NNW/SSE: C-24 W OF FLA TPK BRIDGE	2	CANAL C-24
T 207	NNW/SSE: C-24 DOWNSTREAM OF S-49	2	CANAL C-24
T 208	NW/SE: INSIDE MOUTH OF C-23	5	C-23 & BESSEY CK
T 208 A	NW/SE: BESSEY CK S OF ISLAND	5	C-23 & BESSEY CK
T 208 B	NNW/SSE: BESSEY CK E OF MAPP RD BRIDGE	5	C-23 & BESSEY CK
T 208 C	NNW/SSE: BESSEY CK W OF MAPP RD BRIDGE	5	C-23 & BESSEY CK
T 208 D	W/E: HIDDEN RIVER	5	C-23 & BESSEY CK
T 208 E	SW/NE: HIDDEN RIVER NEAR MURPHY RD	5	C-23 & BESSEY CK
T 209	NW/SE: C-23 AT CENTER OF ISLAND	5	C-23 & BESSEY CK
T 210	N/S: C-23 E OF MAPP RD BR AT BESSEY CK REC	5	C-23 & BESSEY CK
T 211	N/S: C-23 W OF MAPP RD BR	5	C-23 & BESSEY CK
T 212	N/S: C-23 BETW MOUTHS BESSEY CK & HIDDEN R	5	C-23 & BESSEY CK
T 213	NNE/SSW: C-23 E OF MURPHY RD BRIDGE	5	C-23 & BESSEY CK
T 213 A	NW/SE: IN MOUTH OF BESSEY CK ON C-23	5	C-23 & BESSEY CK
T 213 B	W/E: BESSEY CK	5	C-23 & BESSEY CK
T 213 C	SW/NE: BESSEY CK	5	C-23 & BESSEY CK
T 213 D	SW/NE: BESSEY CK N OF MURPHY RD	5	C-23 & BESSEY CK
T 214	NNE/SSW: C-23 W OF MURPHY RD BR	5	C-23 & BESSEY CK
T 215	NNE/SSW: C-23 DOWNSTREAM S-48	5	C-23 & BESSEY CK

ST. LUCIE ESTUARY CENTERLINE PROFILES

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>SHEETS</u>	<u>GENERAL LOCATION</u>
P 001	MANATEE POCKET	10	MOUTH OF ST. LUCIE RIVER
P 001 A	MANATEE POCKET, SW BRANCH	10	MOUTH OF ST. LUCIE RIVER
P 004	WILLOUGHBY CREEK	10	MOUTH OF ST. LUCIE RIVER
P 092	POPPOLTON CREEK	6	WIDE S. FORK ST. LUCIE
P 118	E CHANNEL, SOUTH FORK	7	OKEE WWY & OLD S. FORK
P 118 A	E CHANNEL, SOUTH FORK	7	OKEE WWY & OLD S. FORK
P 124	OLD SOUTH FORK	7	OKEE WWY & OLD S. FORK
P 130	CABANA PT TO S-80	6,7	OKEE WWY & OLD S. FORK
P 141	CANAL C-23	4	ROOSVLT BR TO BESSEY CK
P 163	HOWARD CK	3	BRITT CK TO C-23A
P 179	CANAL C-23A FR MOUTH TO JUNC C-24	2,3	BRITT CK TO C-23A
P 192	JUNC C-23A & C-24, N. FK TO MUD & LONG CK	2	N. FORK AND C-24
P 204	CANAL C-24	2	N. FORK AND C-24
P 208	BESSEY CK	5	C-23 & BESSEY CK
P 208 A	BESSEY CK & HIDDEN R	5	C-23 & BESSEY CK
P 213	BESSEY CK	5	C-23 & BESSEY CK

Appendix D

**Reduced Aerial North Fork Centerline Profile
Index and Locations**



LEGEND & NOTES

- U.S. HIGHWAY
- STATE HIGHWAY
- INTERSTATE HIGHWAY

PROFILE LINES INDICATE APPROXIMATE LOCATION OF FIELD PROFILES OBTAINED WITH 2.22-METER RATHOMETER. SHEETS FOR SOUNDINGS OBTAINED BY OTHER METHODS ARE SHOWN BY DASHED LINES. AERIAL PHOTOGRAPHY FLOWN IN 1967 BY DEPARTMENT OF TRANSPORTATION.

COVER SHEET

**SOUTH FLORIDA
WATER MANAGEMENT DISTRICT**

WEST PALM BEACH, FLORIDA

HYDROGRAPHIC SURVEY

NORTH FORK OF ST. LUCIE RIVER
NORTH OF PORT ST. LUCIE BLVD.

DRAWN BY	DATE	SCALE	DRAWING NO.	SHEET	OF
W.M.	5/15/63	1" = 2000'	ST. LUCIE ESTUARY-4	1	4



SEE SHEET 1 FOR LEGEND AND NOTES

WALLEN MAPPING

HYDROGRAPHIC SURVEY
NORTH FORK OF ST. LUCIE RIVER
NORTH OF FORT ST. LUCIE BLVD

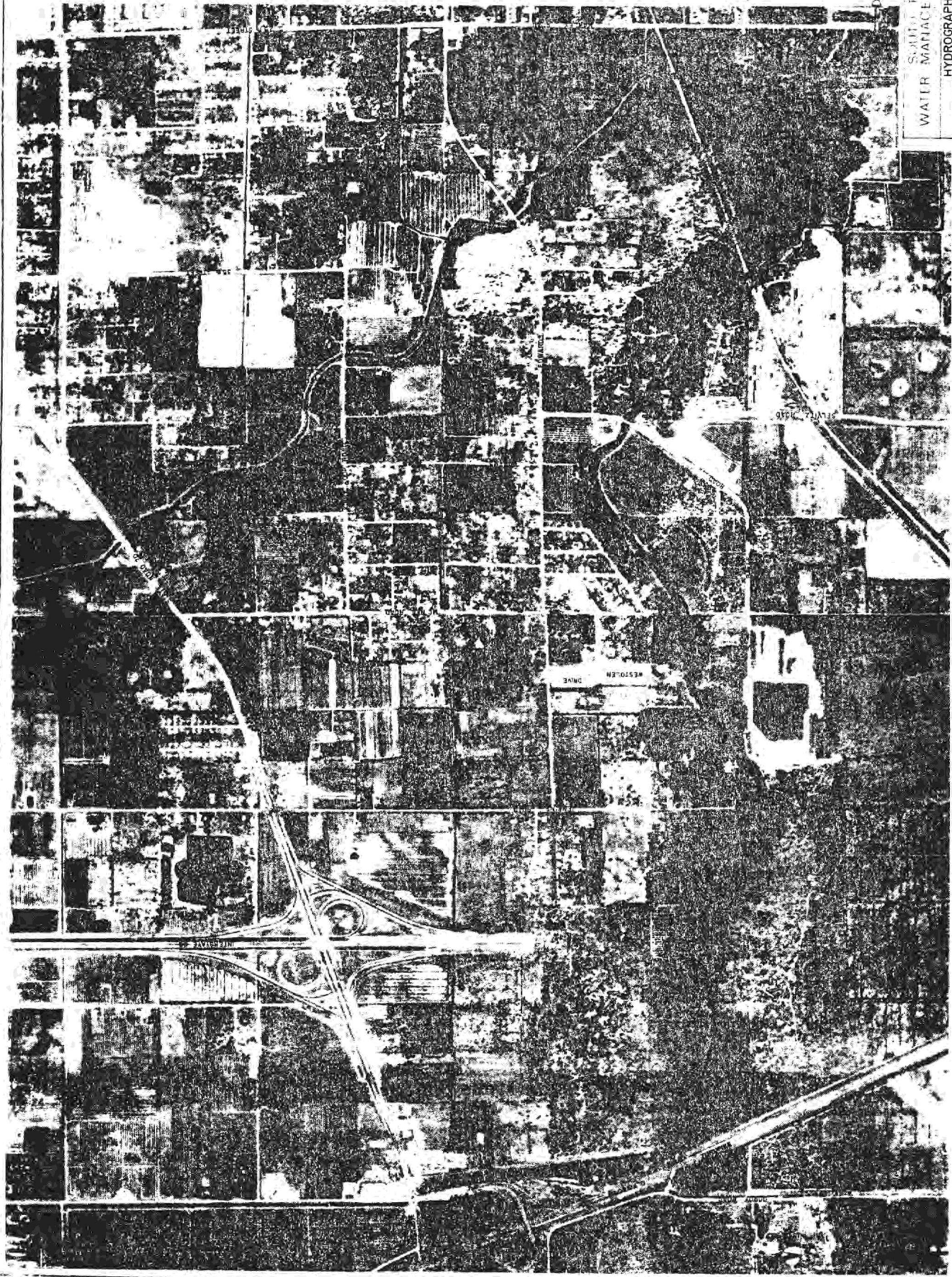
N.M. 6/1/83 1" = 500' EST. JAN. 4, 2 4





SEE SHEET 1 FOR LEGEND AND NOTES

SOUTH FLORIDA
WATER MANAGEMENT DISTRICT
HYDROGRAPHIC SURVEY
NORTH FORK OF ST. LUCIE RIVER
NORTH OF PORT ST. LUCIE, FLVD.
N.M. 6/7/83 1"=500' EST. APR-4 3 4

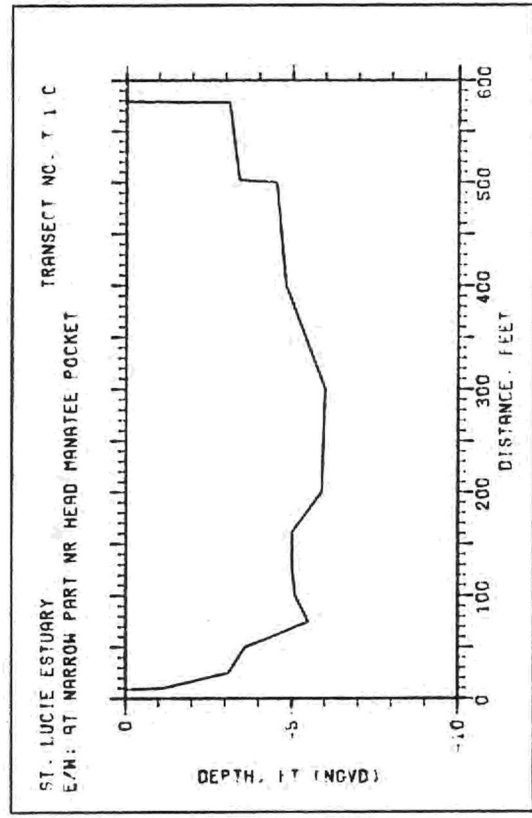
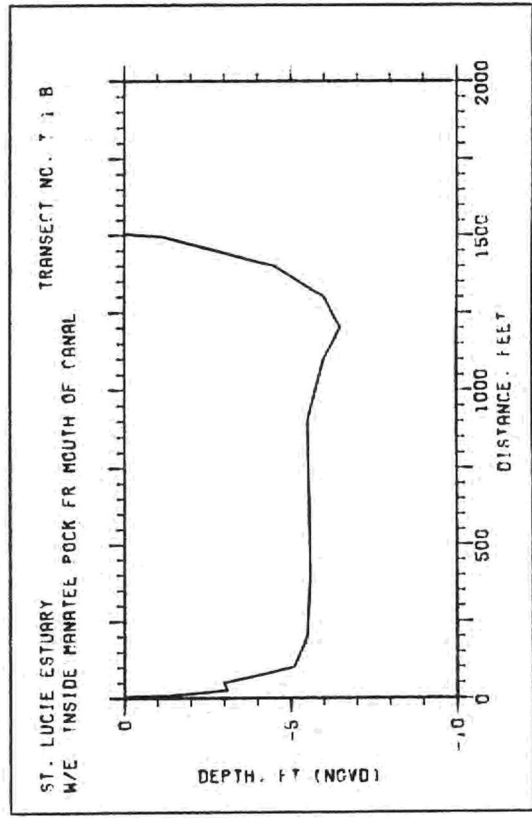
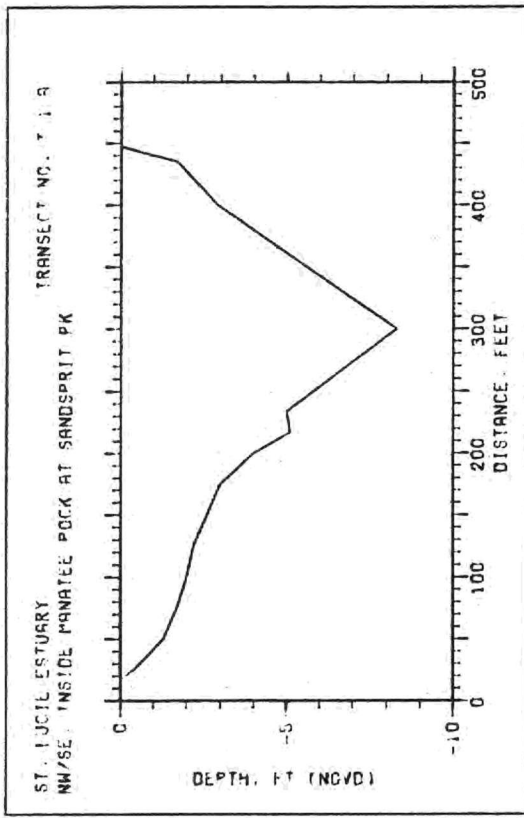
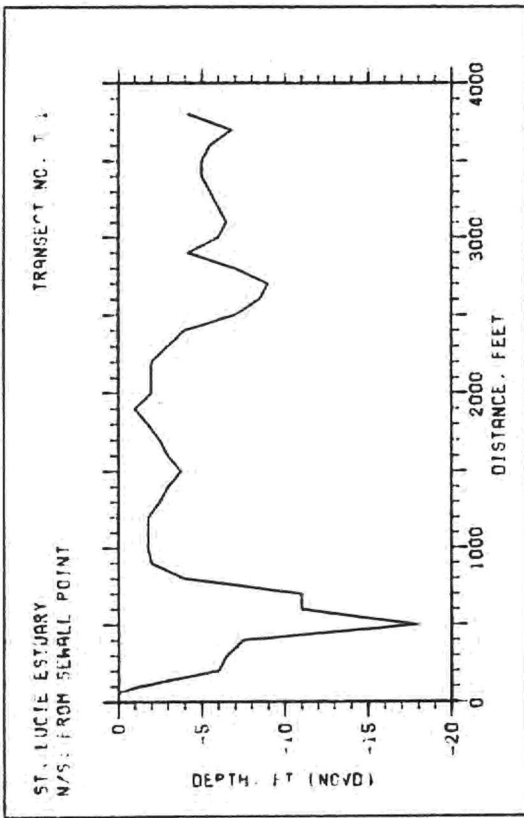


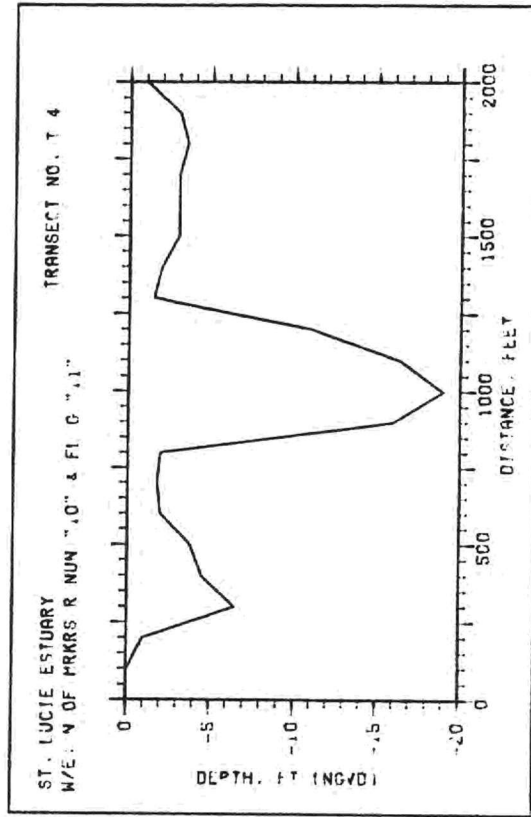
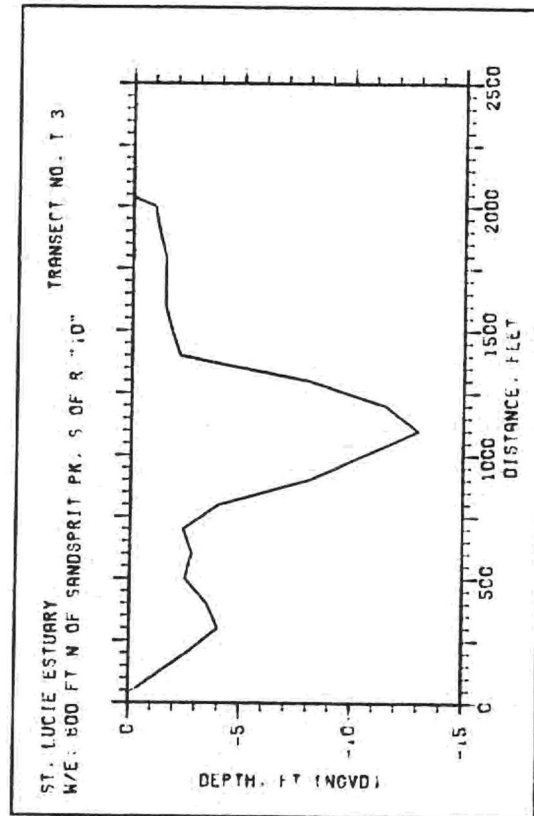
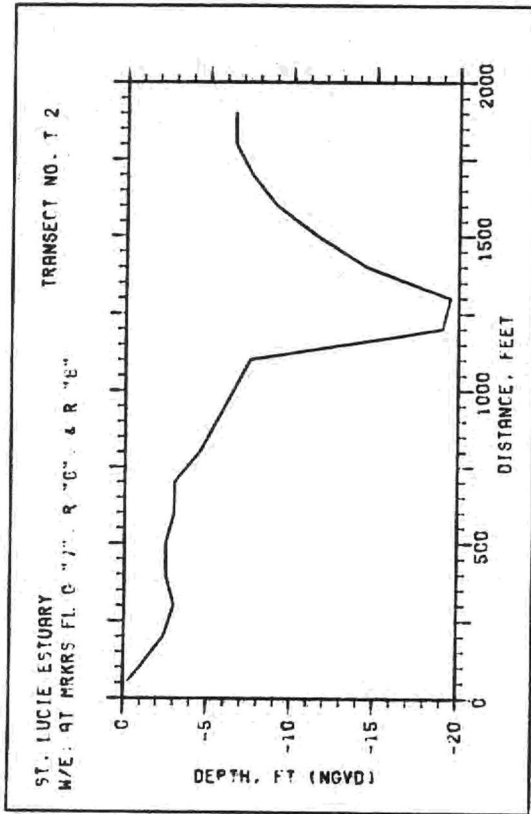
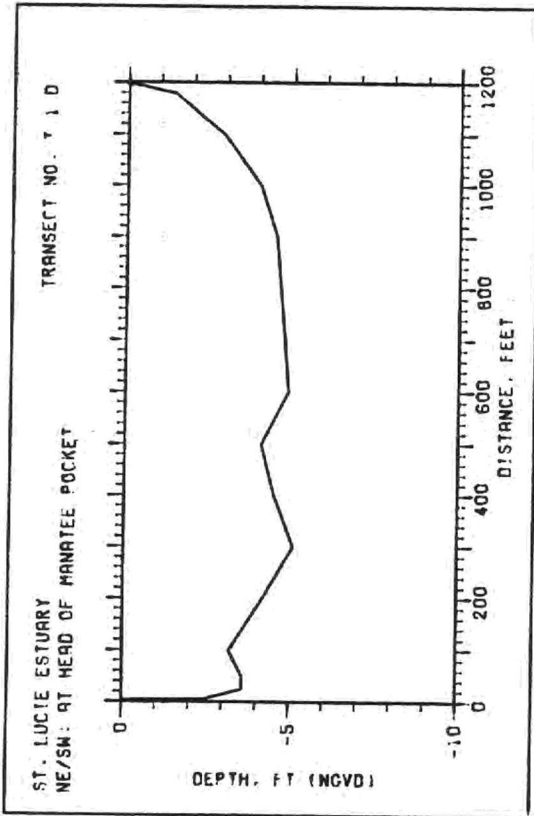
STATE OF FLORIDA
WATER MANAGEMENT DISTRICT

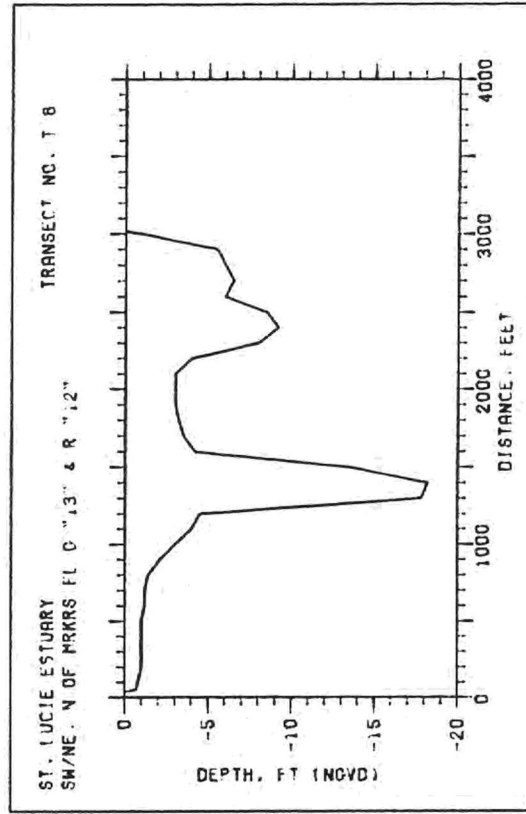
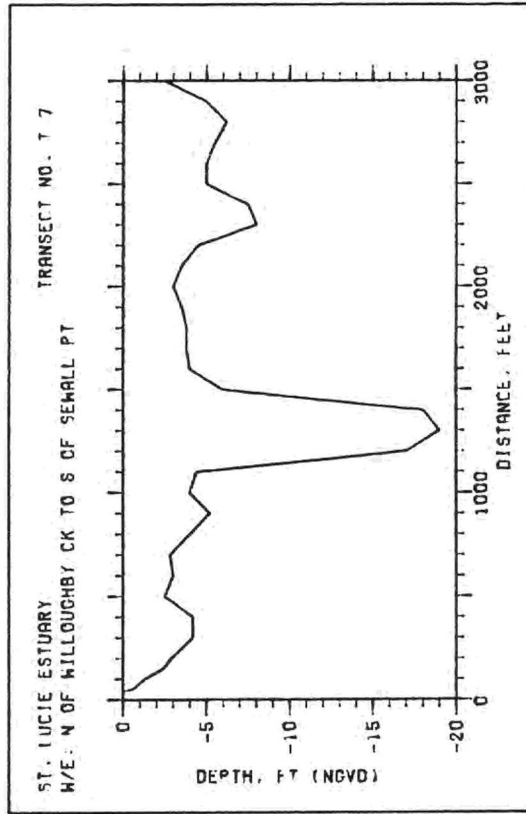
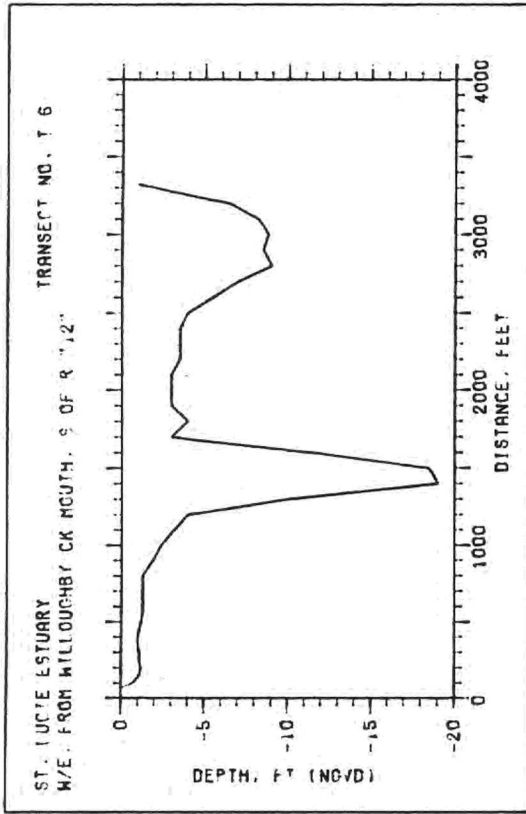
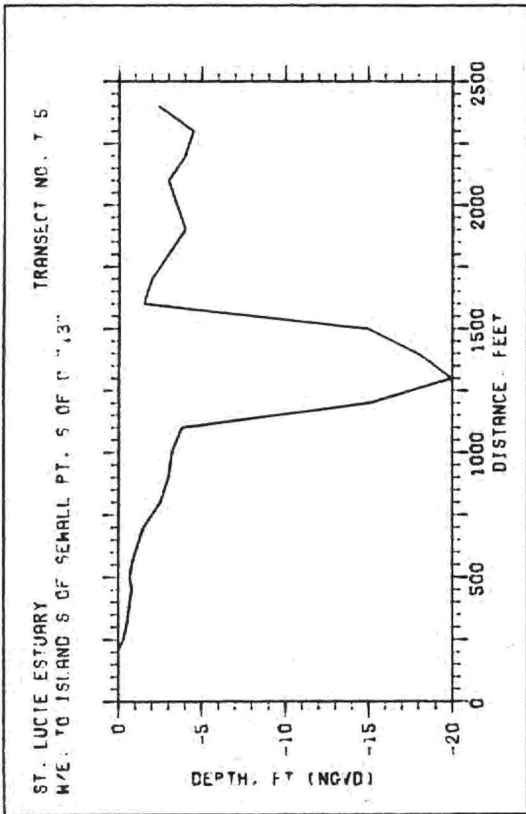
HYDROGRAPHIC SURVEY
NORTH FORK OF ST. LUCIE RIVER
NORTH OF PORT ST. LUCIE BLVD.

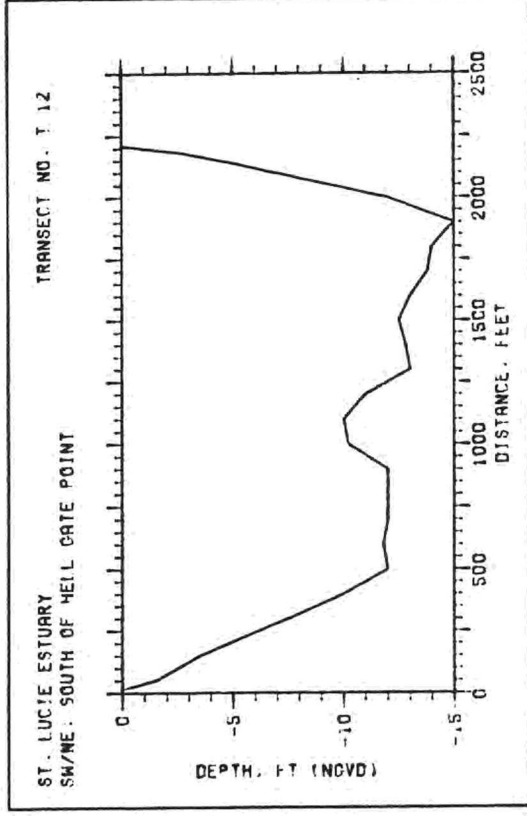
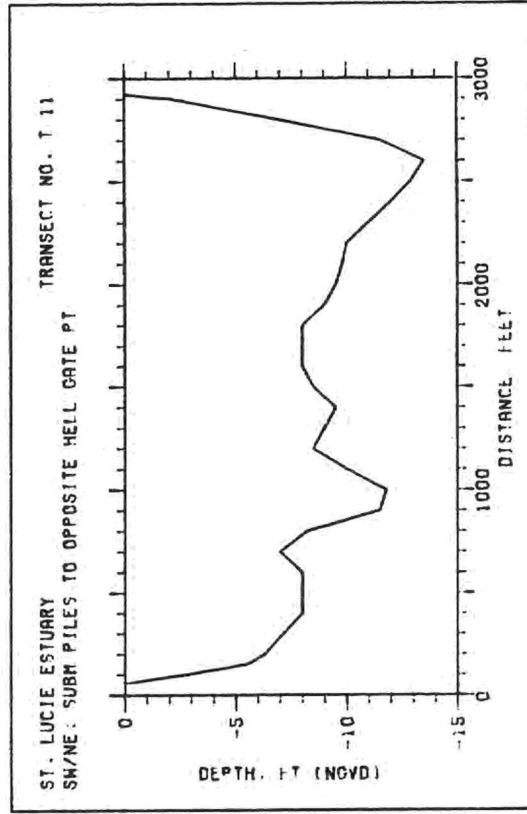
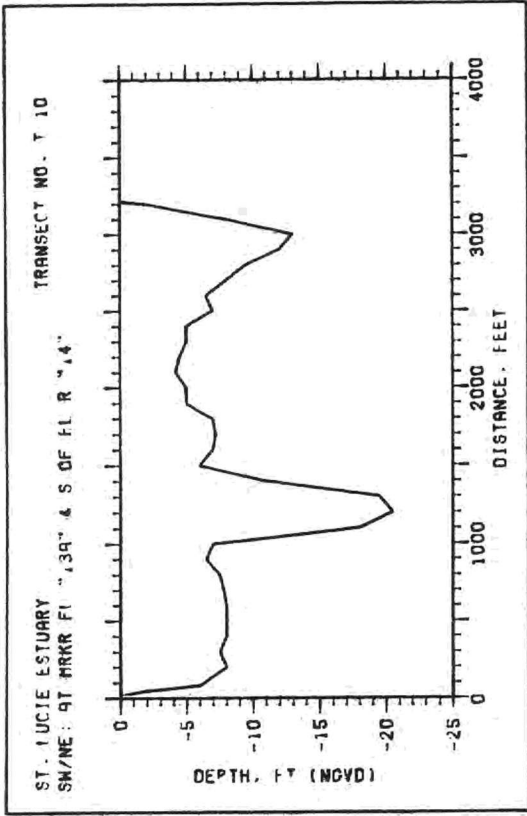
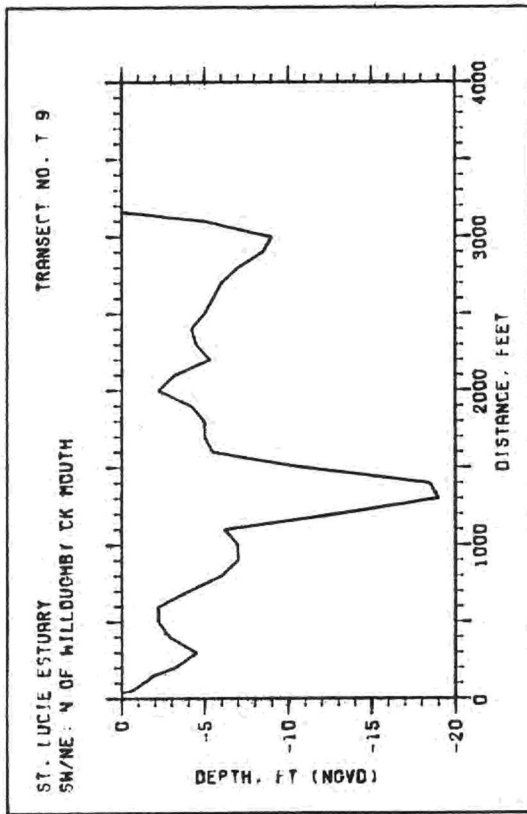
N.M. 6/1/83 1" = 500' ESTABLISHED 4-4

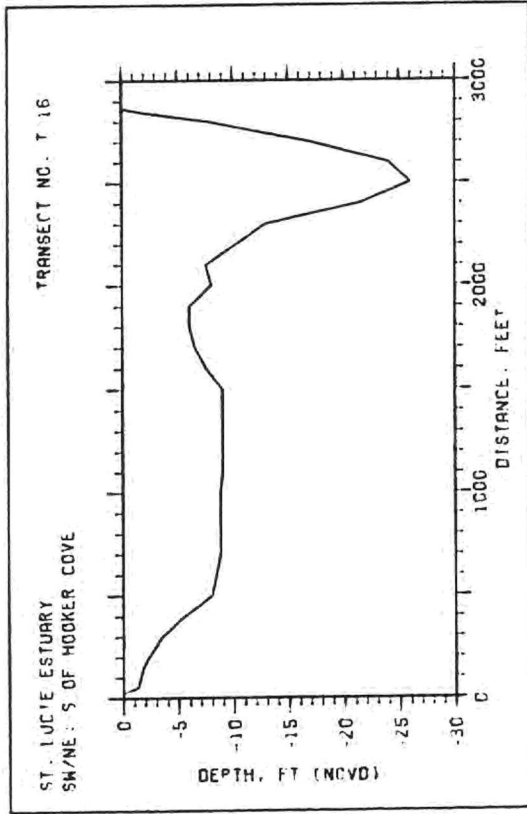
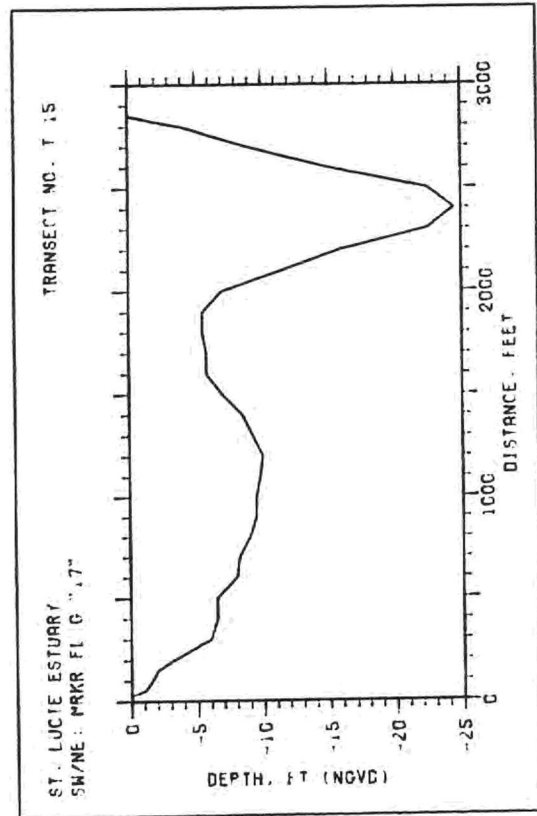
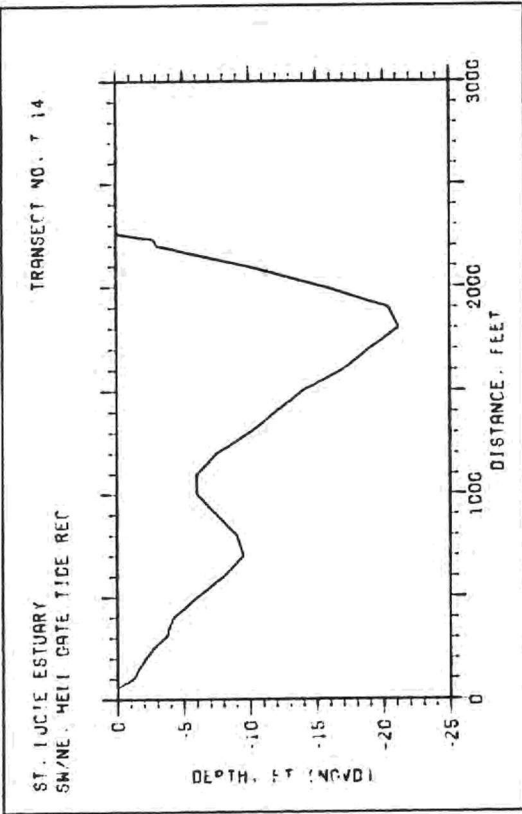
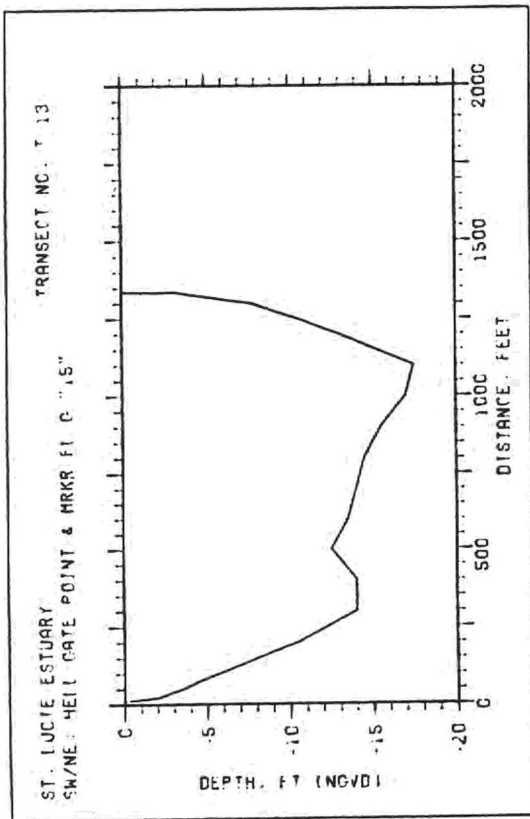
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Transects T1 - T215

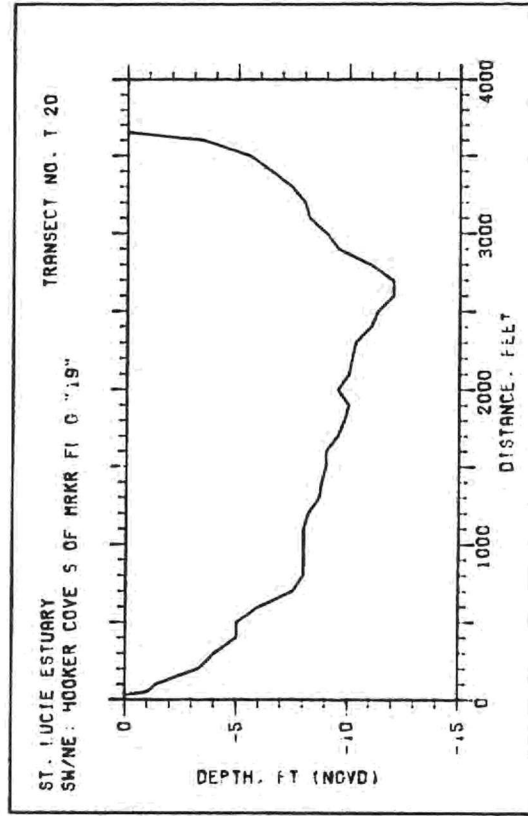
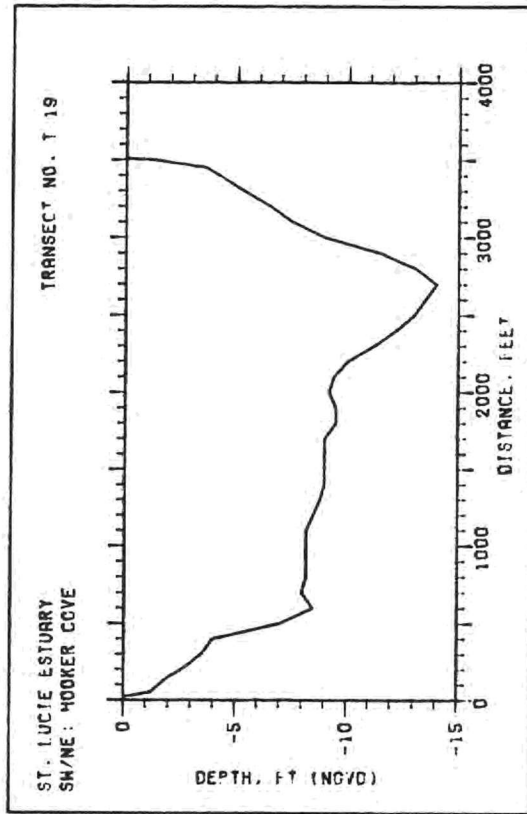
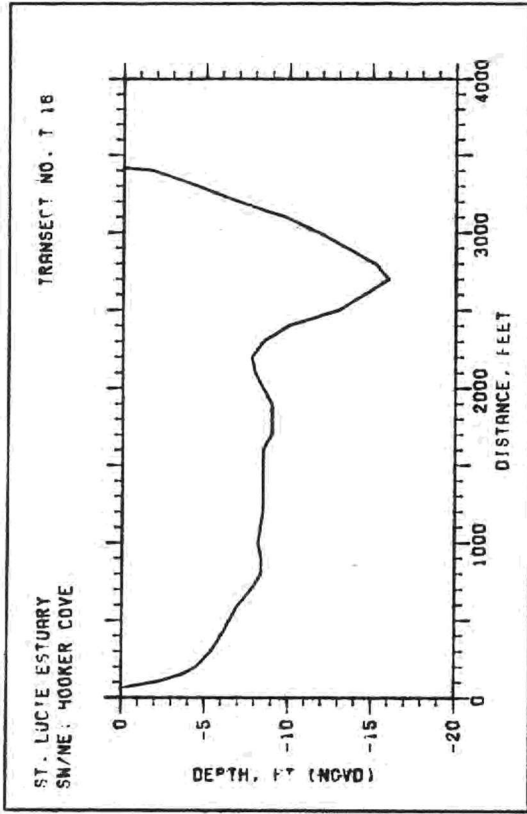
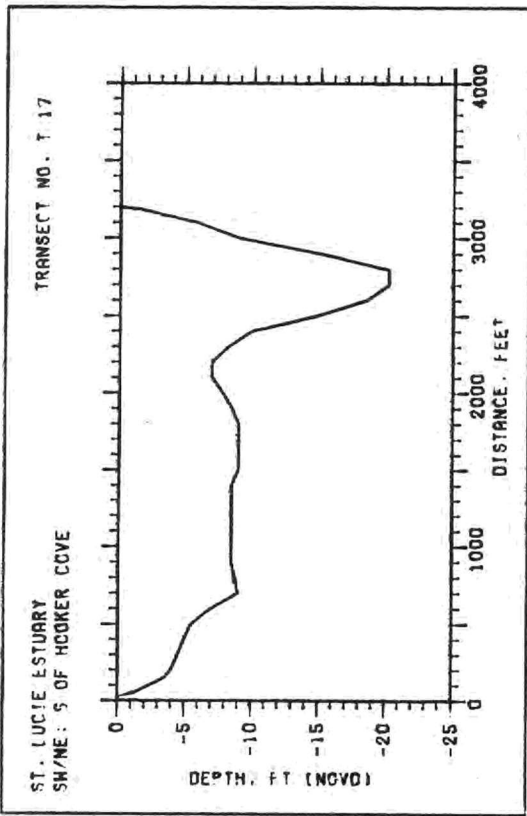


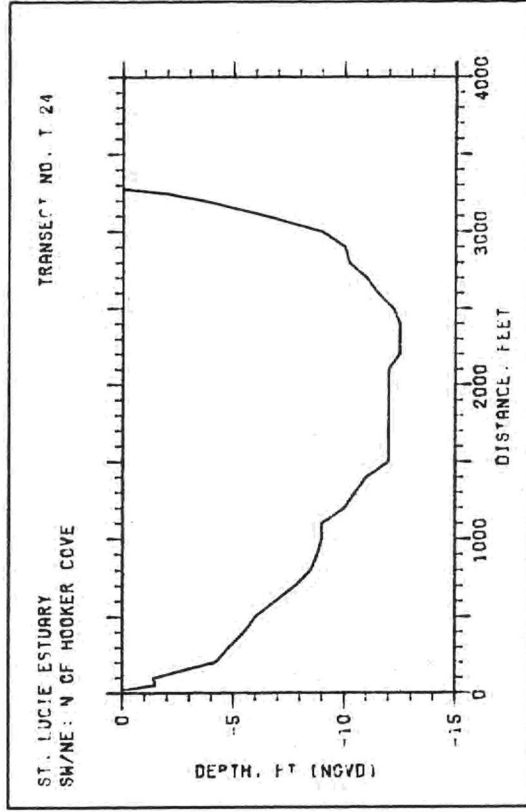
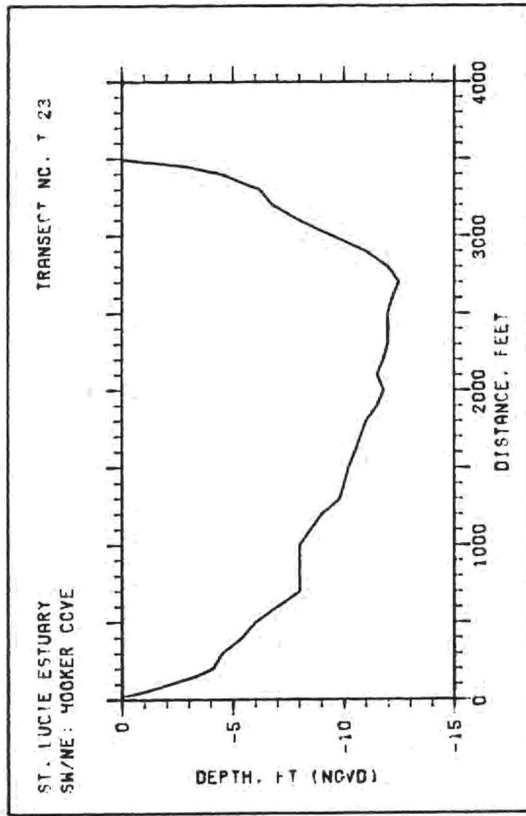
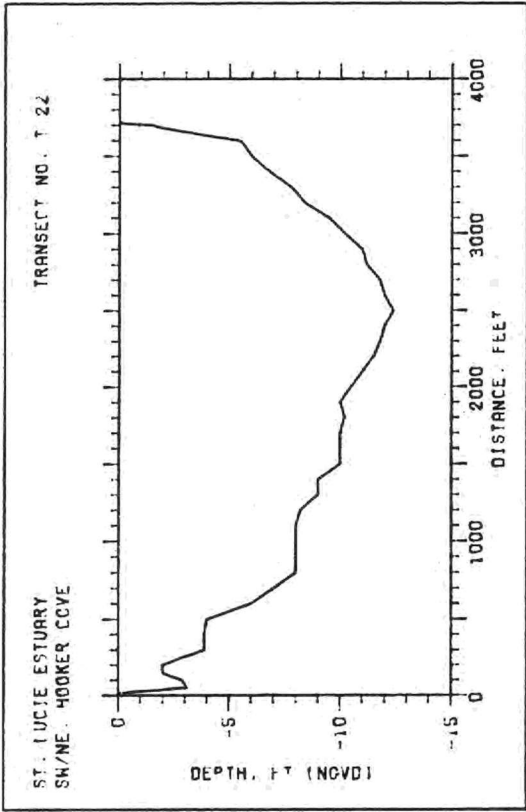
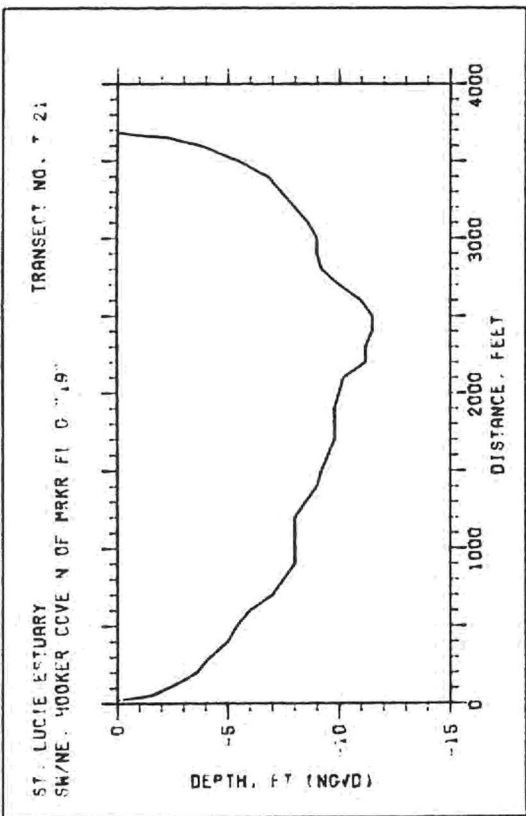


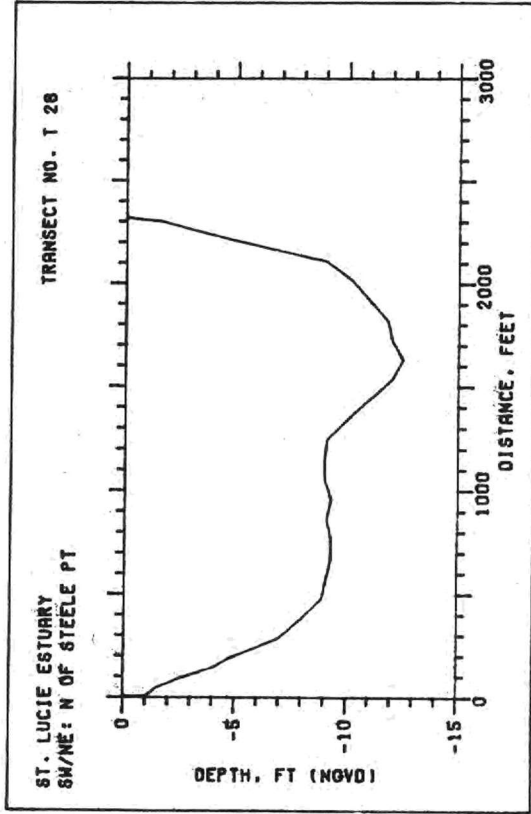
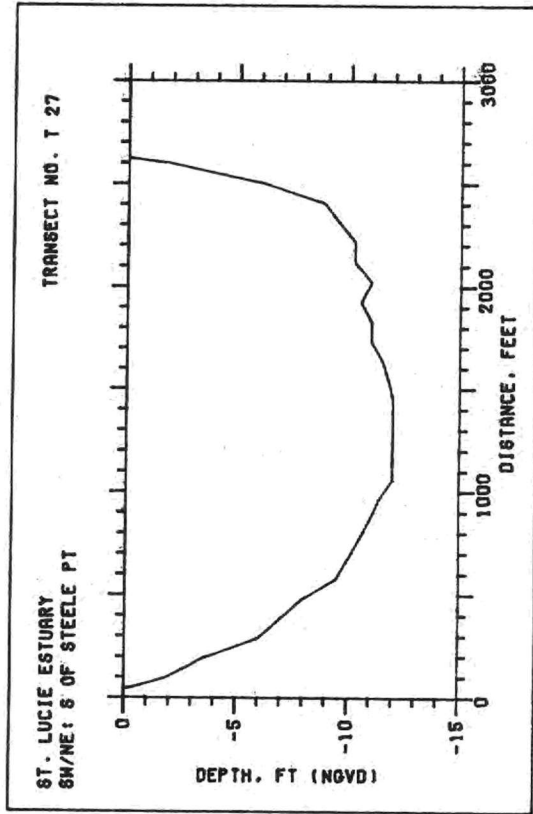
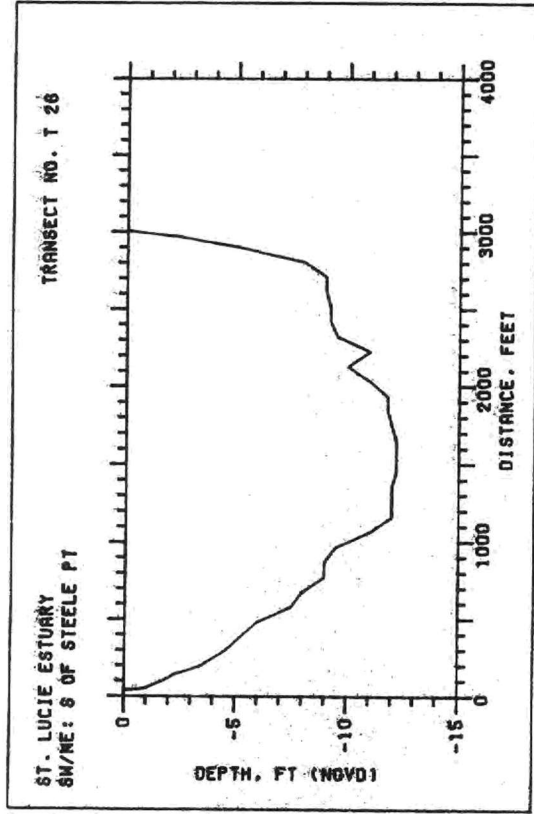
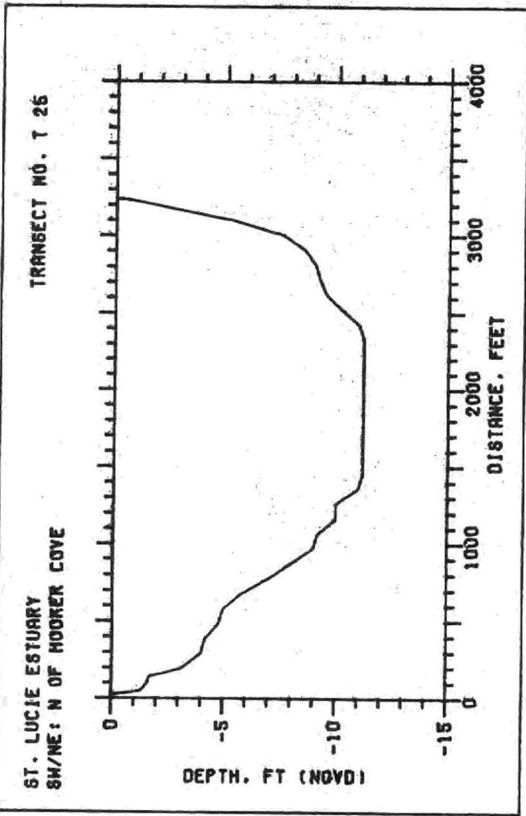


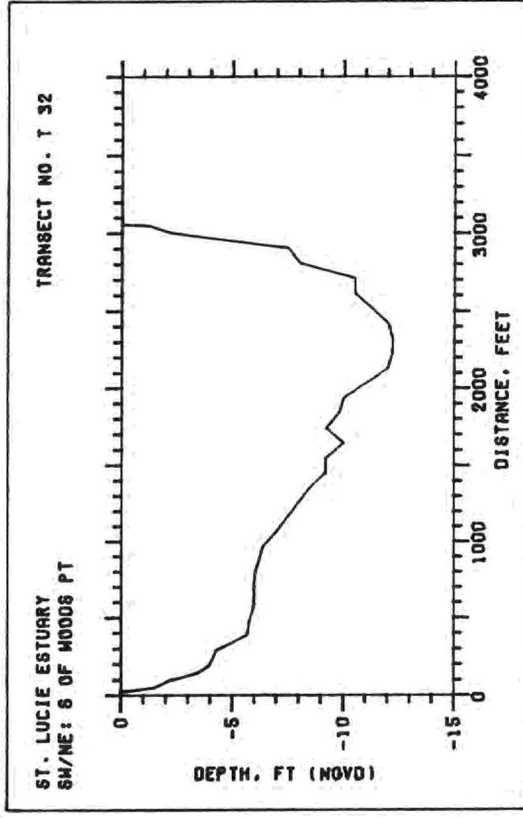
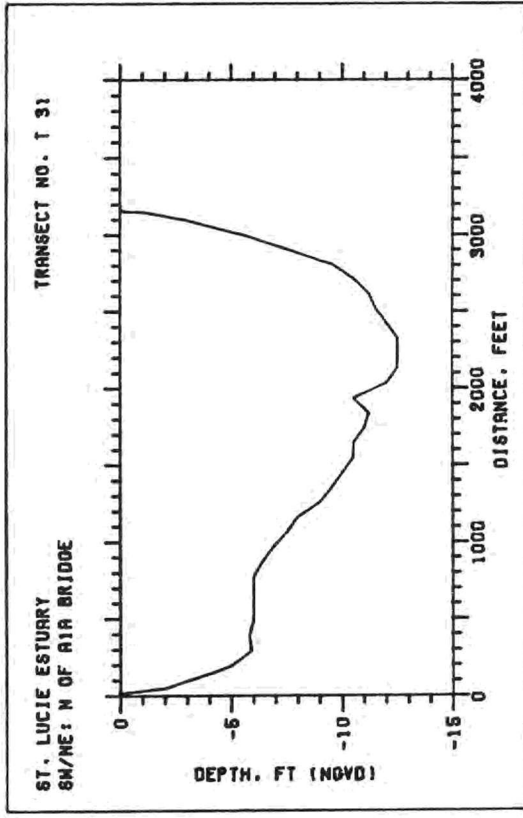
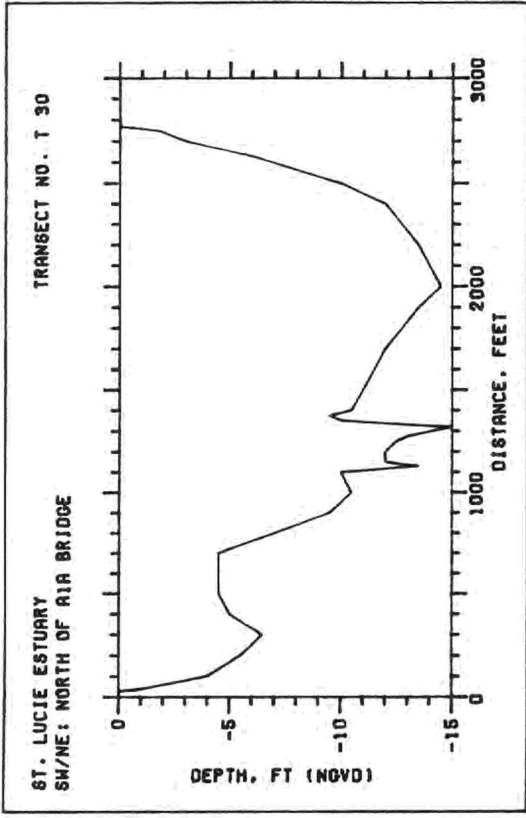
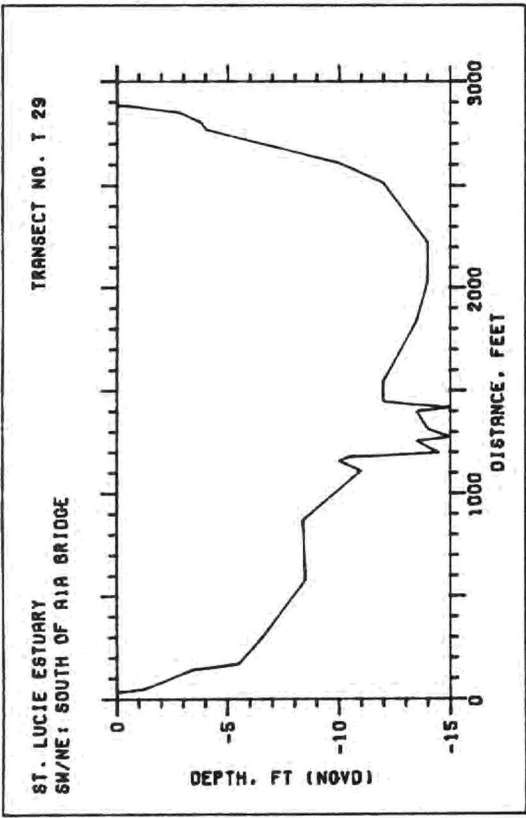


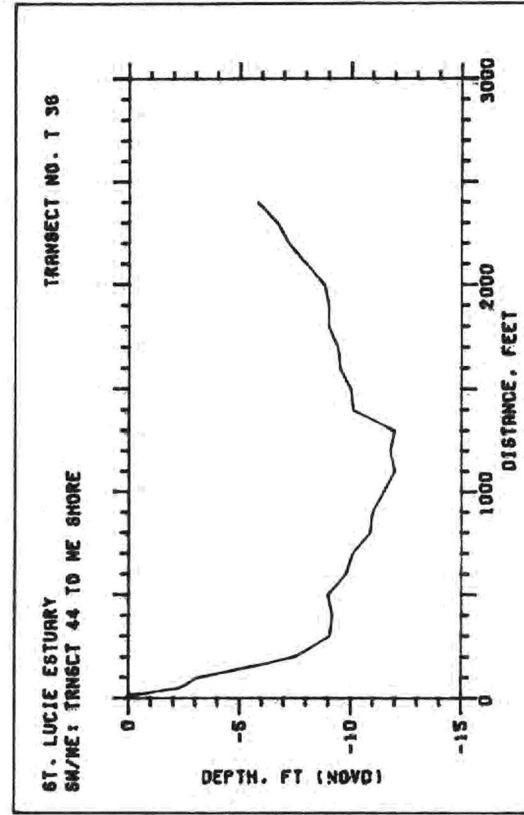
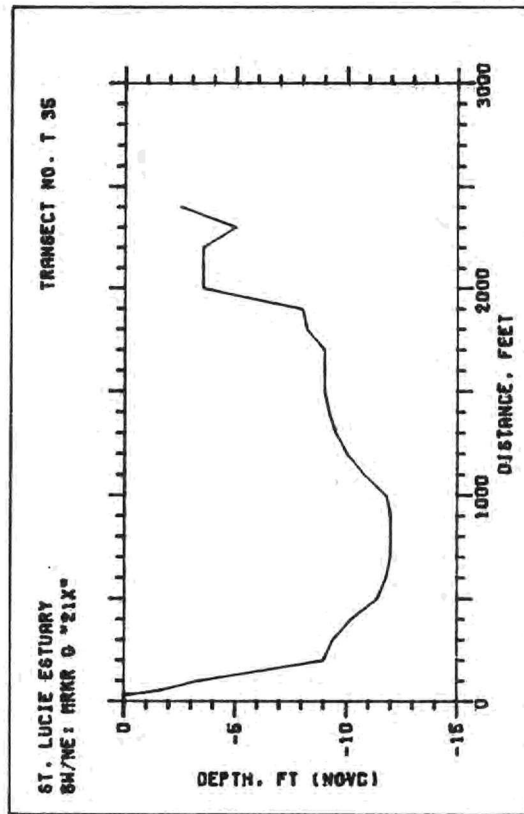
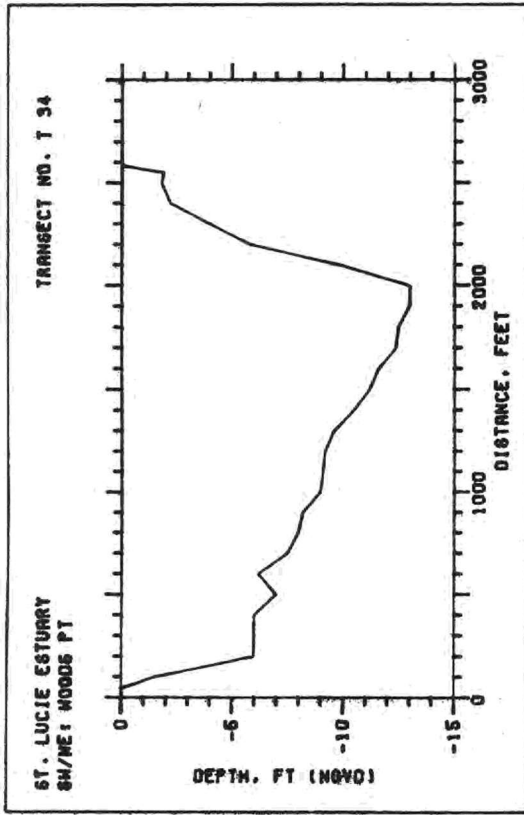
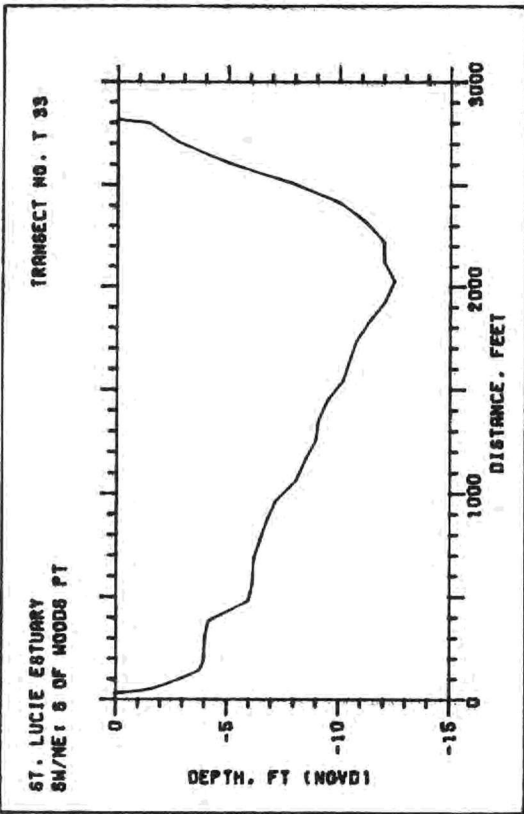


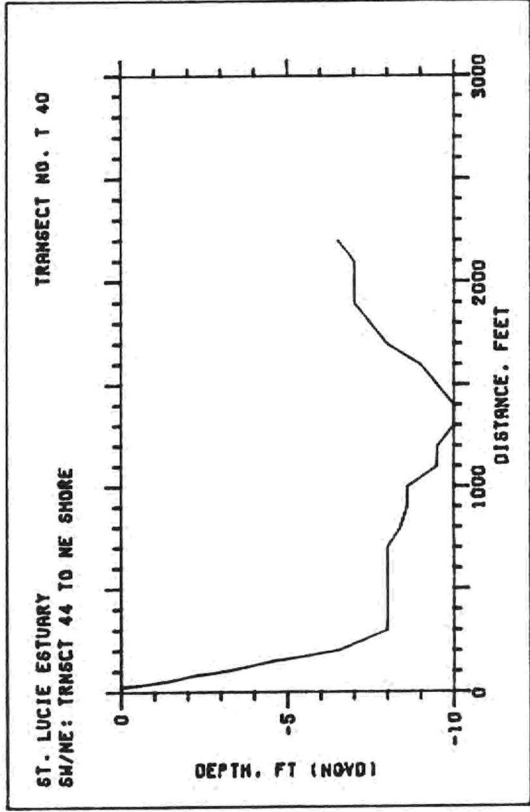
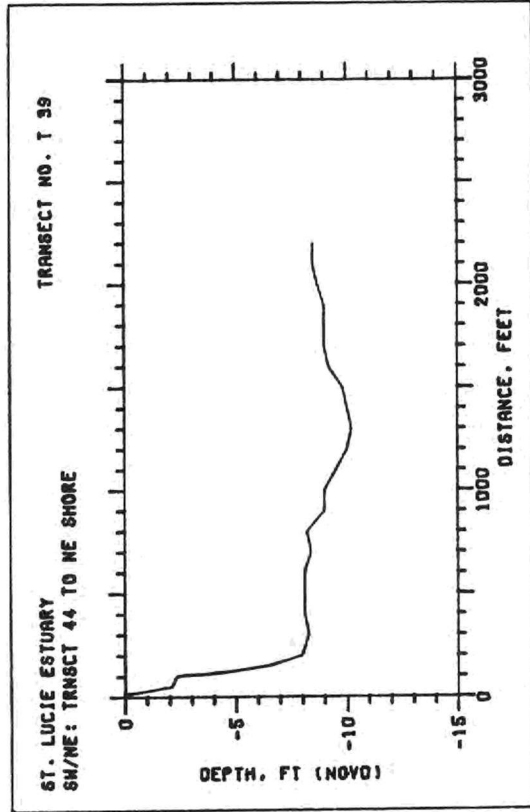
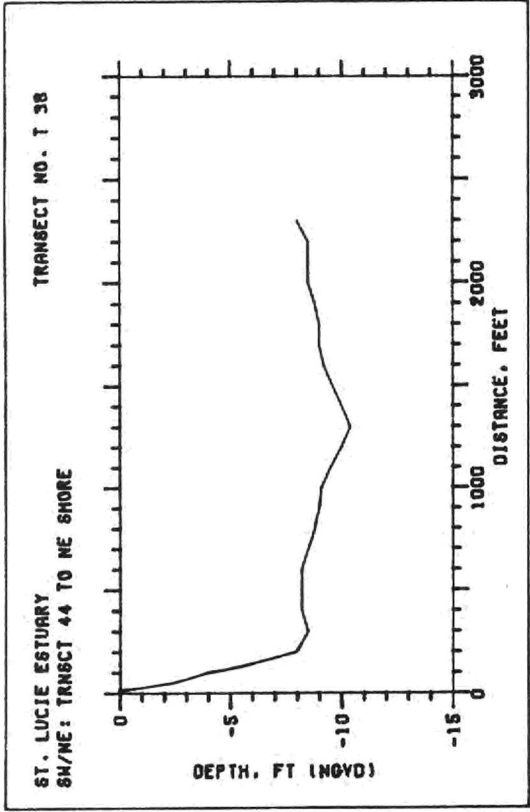
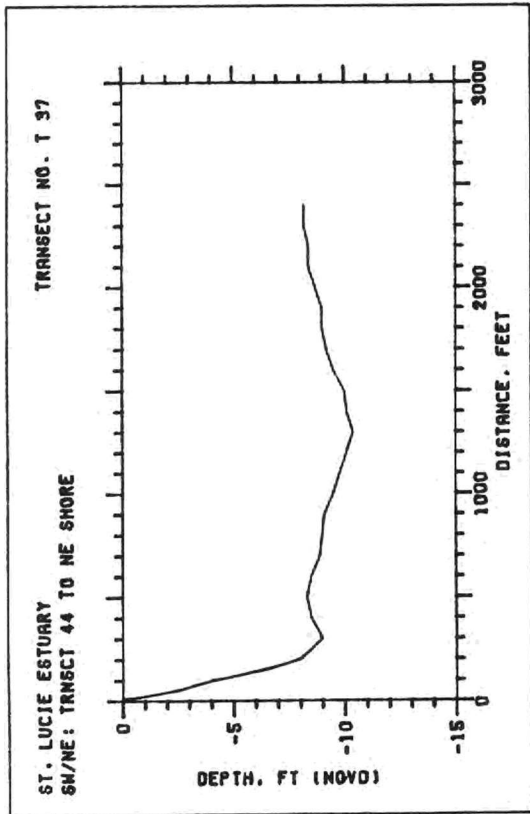


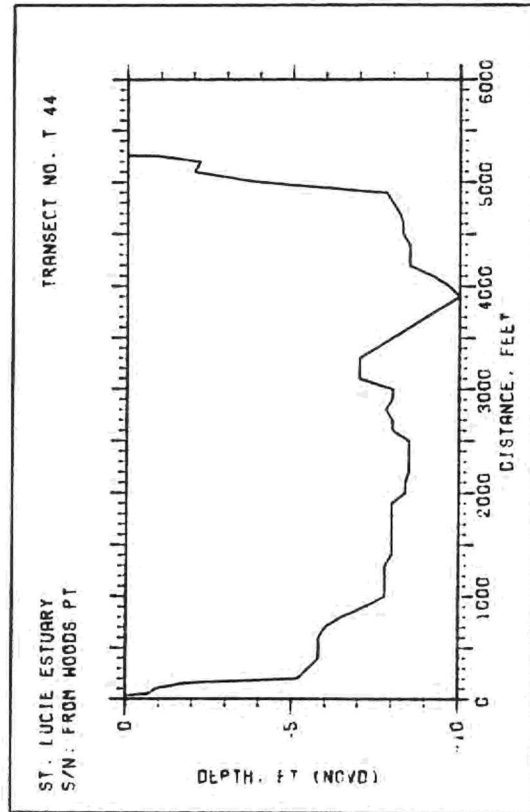
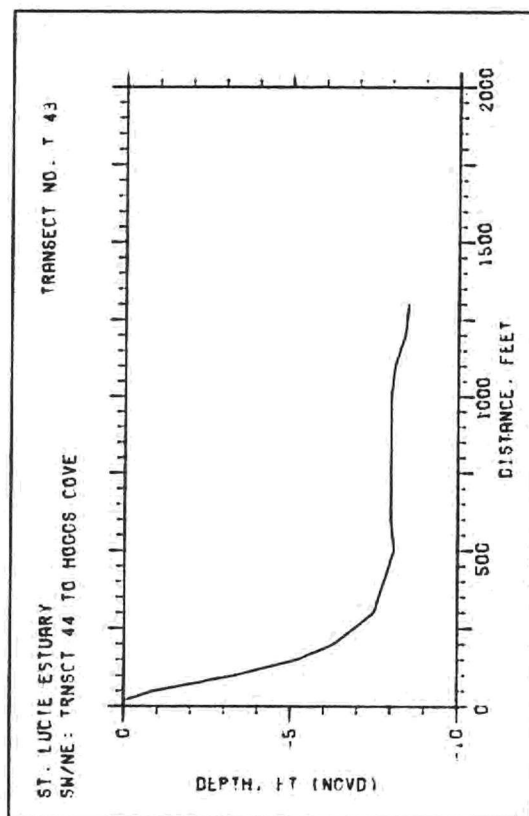
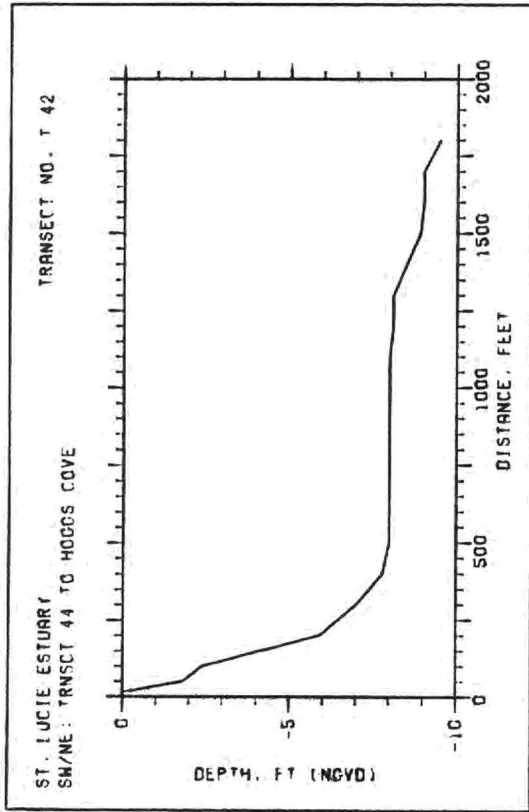
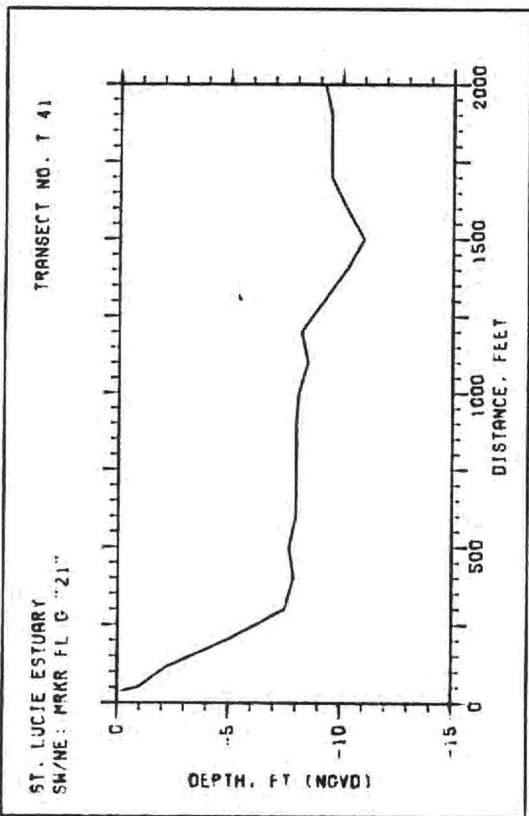


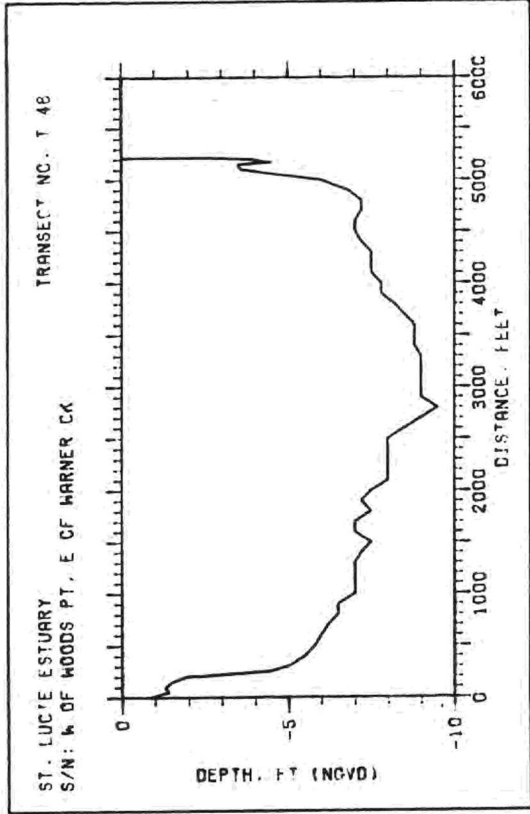
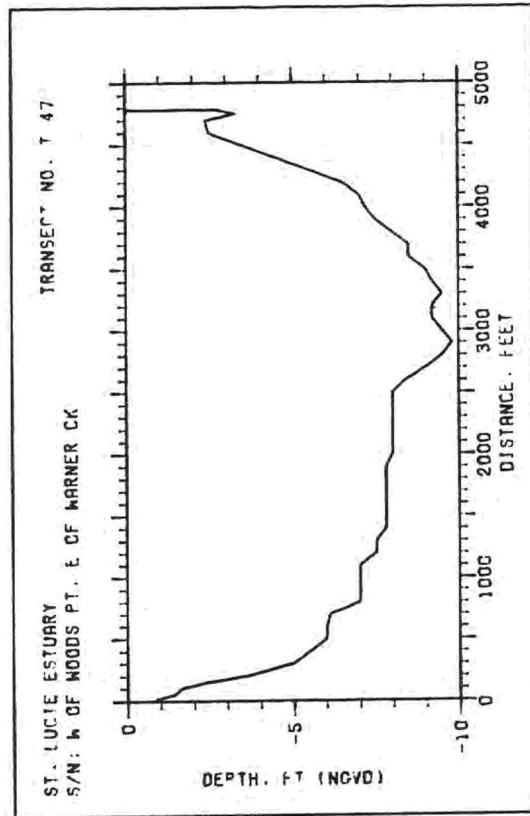
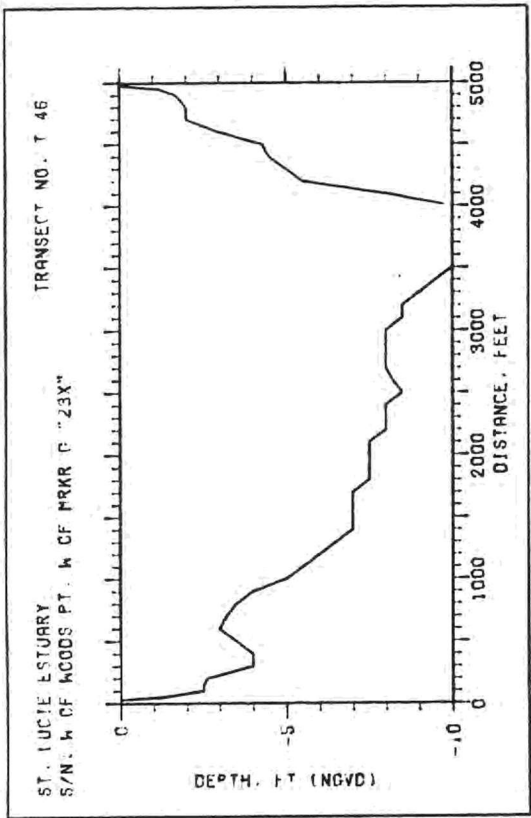
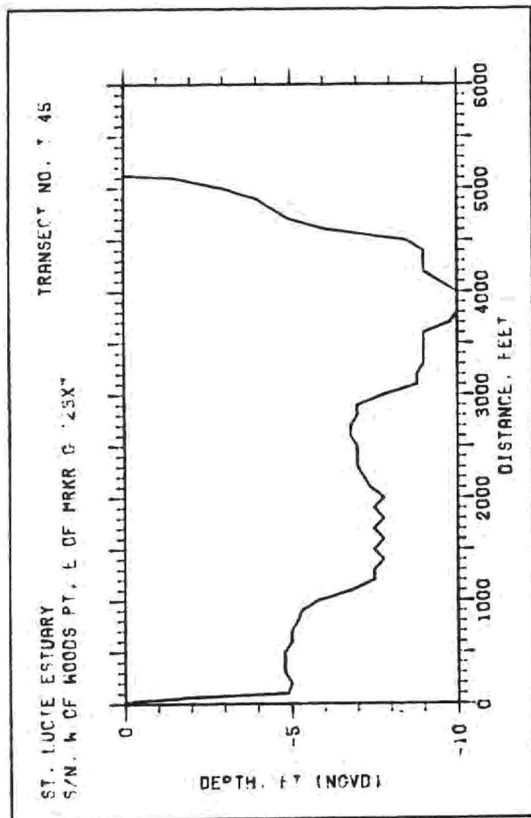


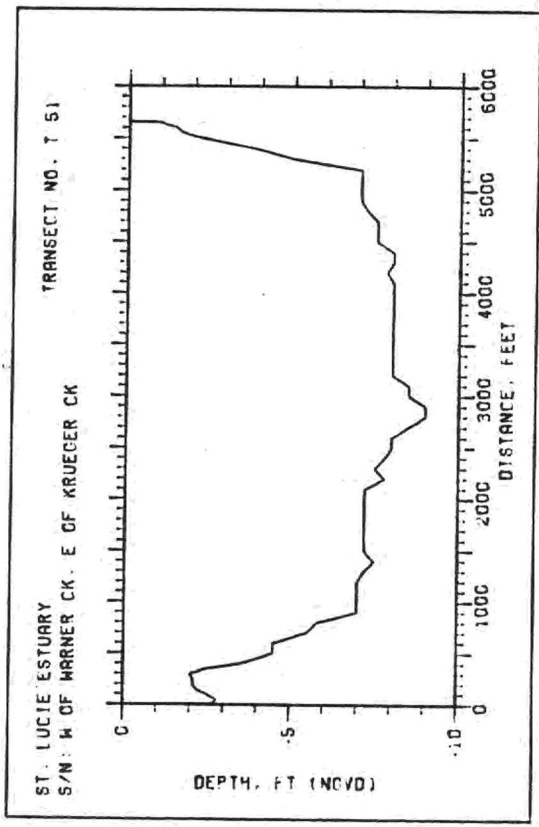
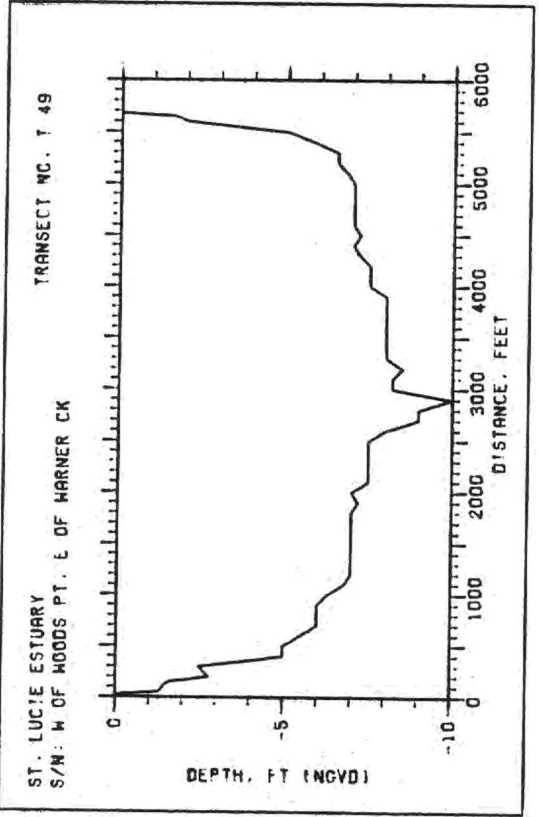
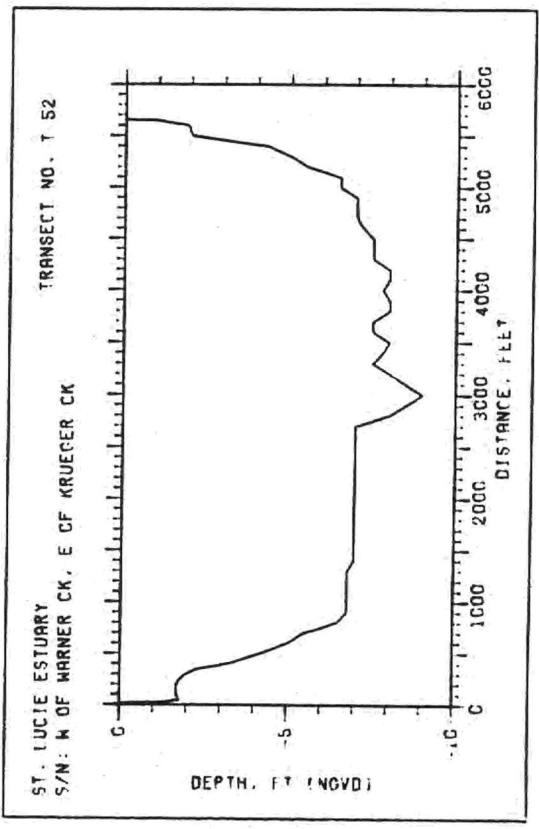
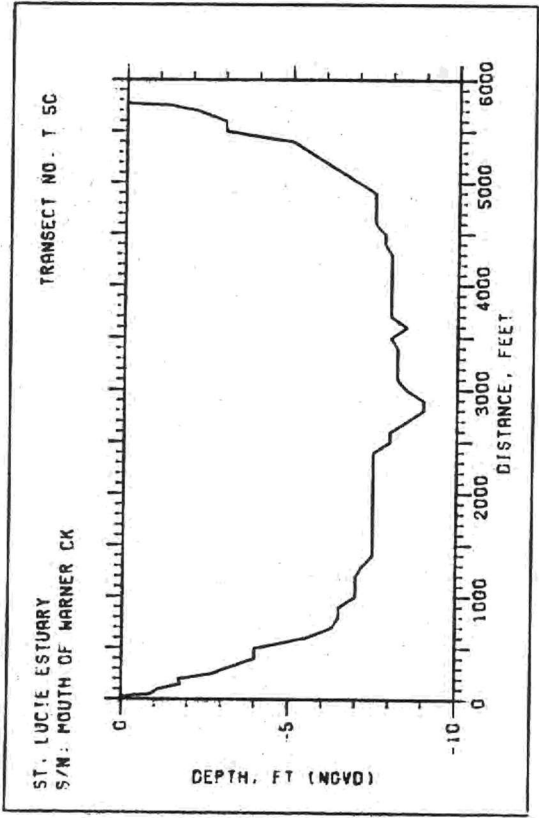


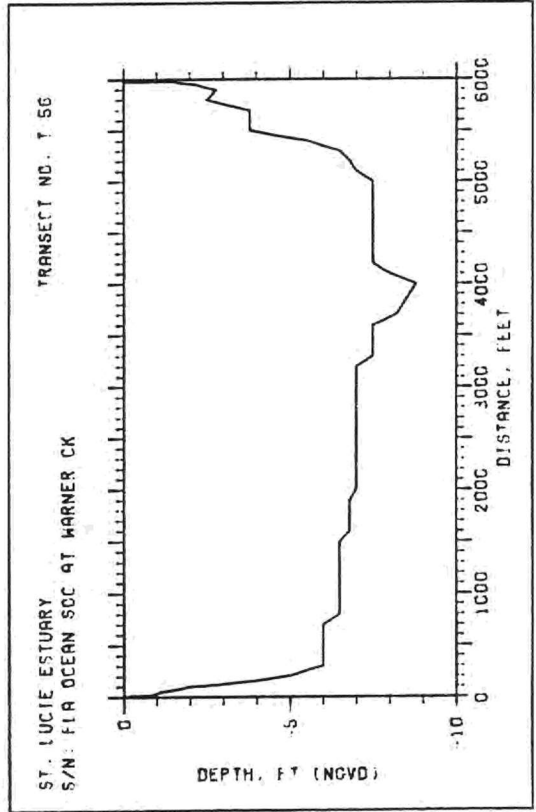
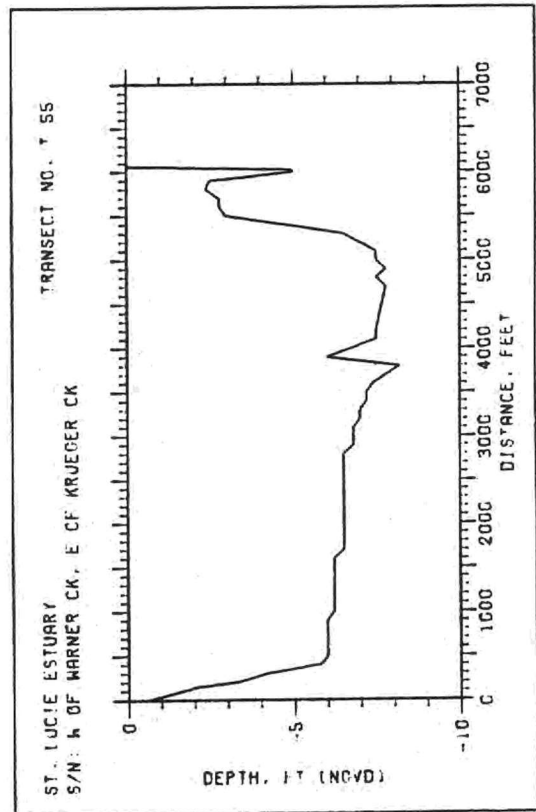
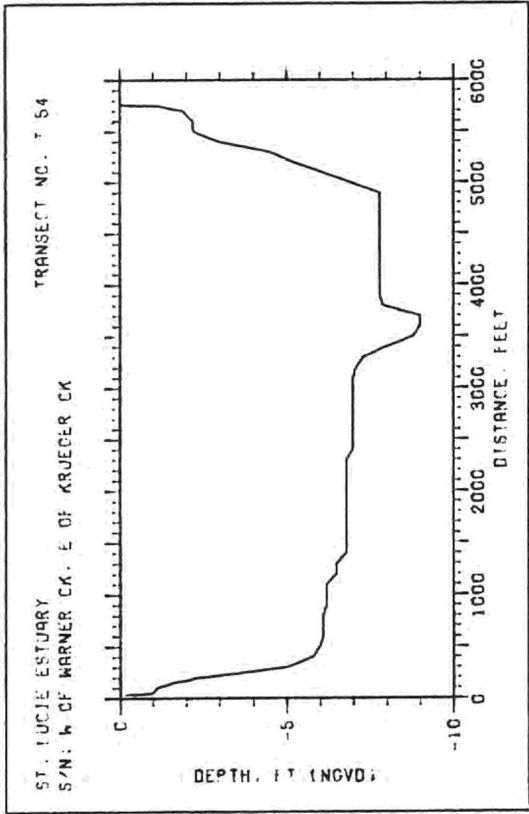
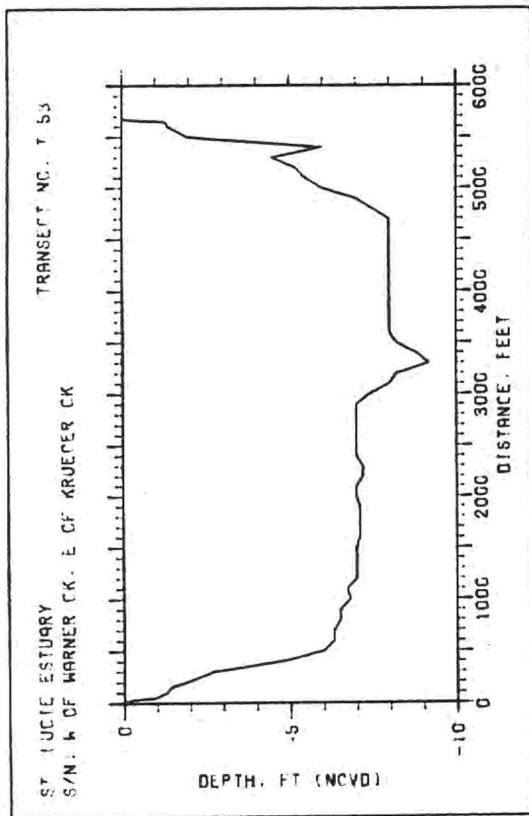


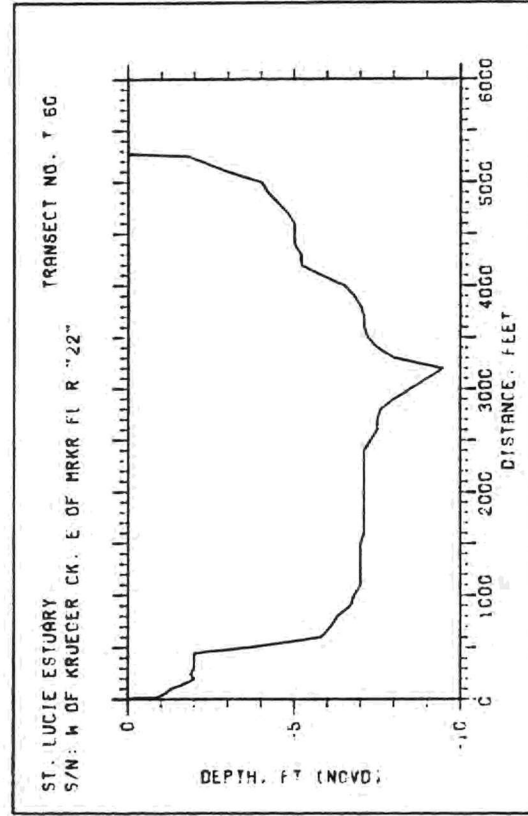
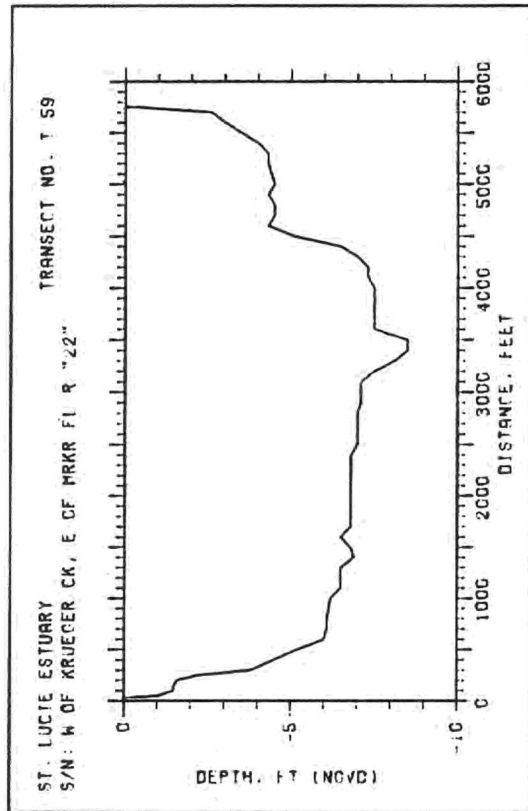
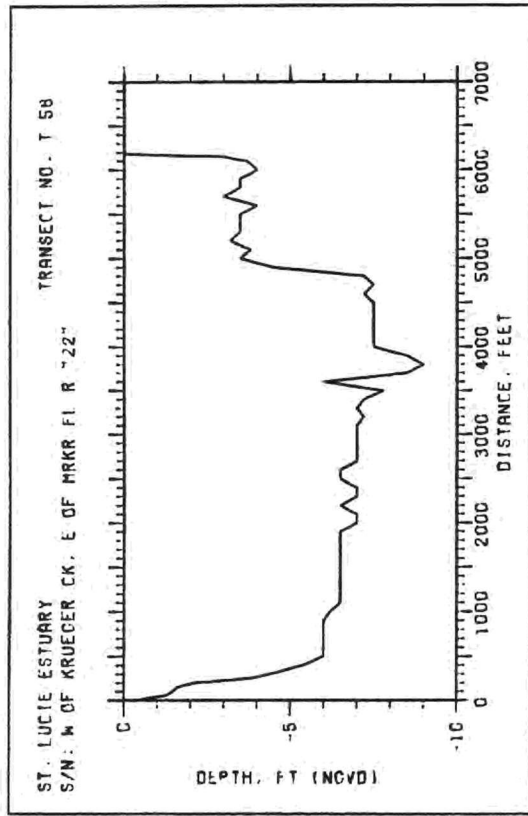
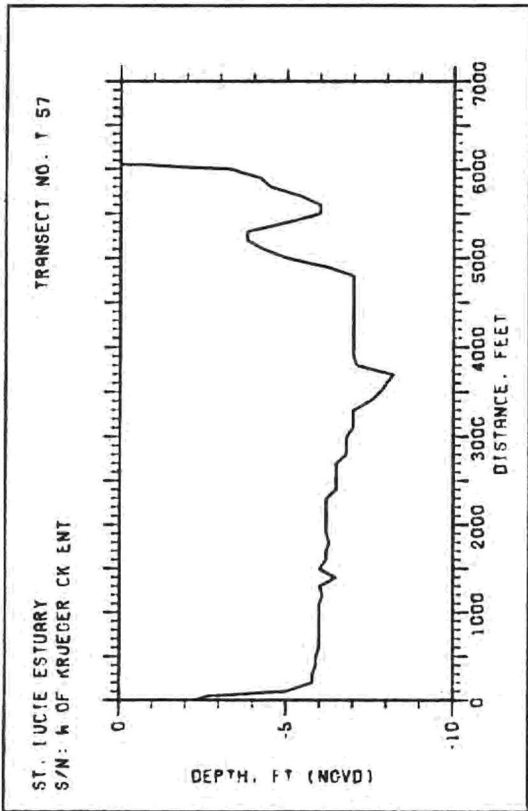


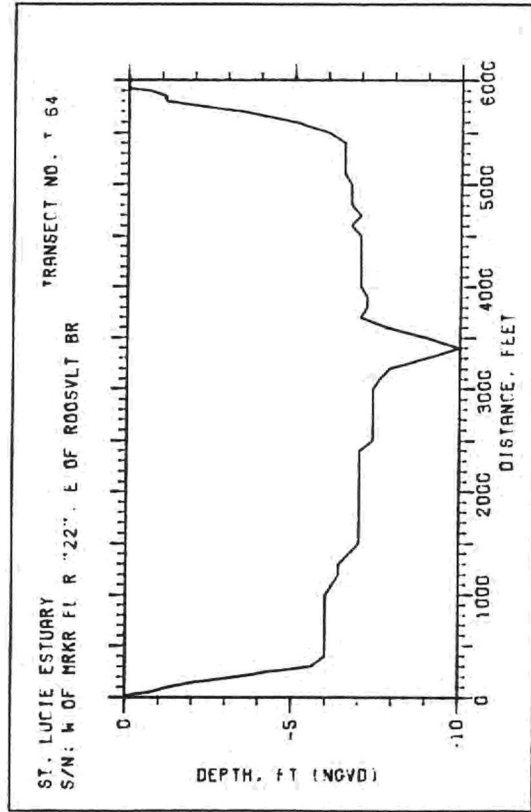
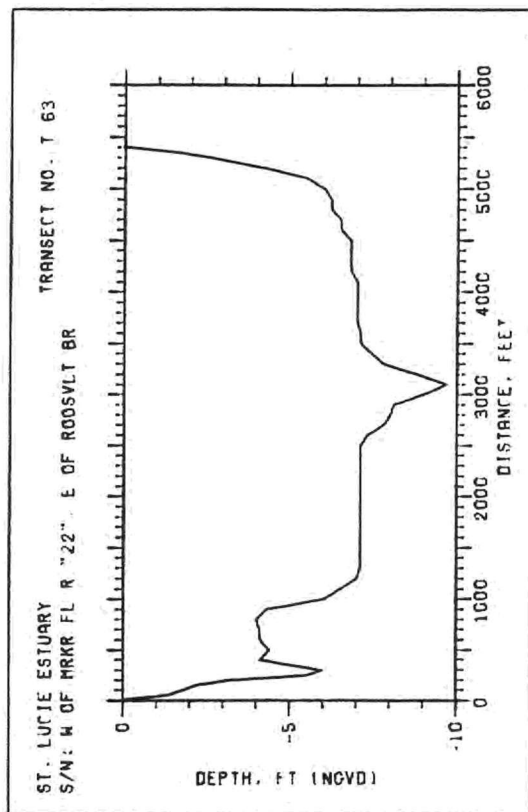
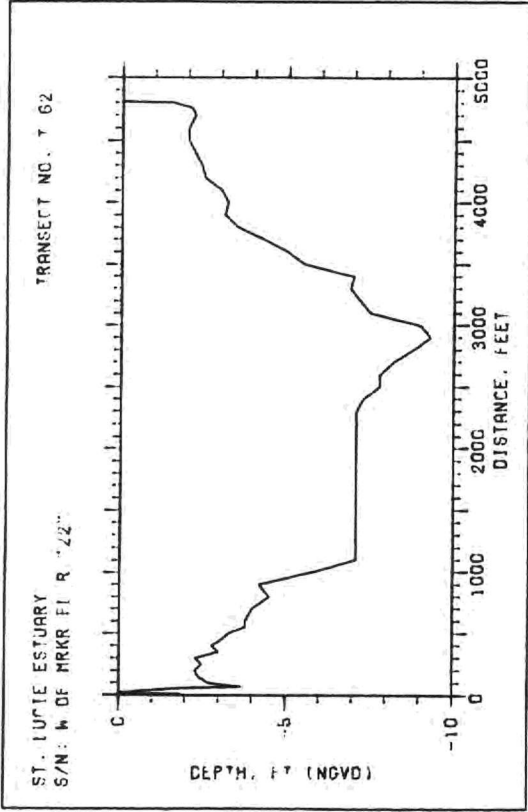
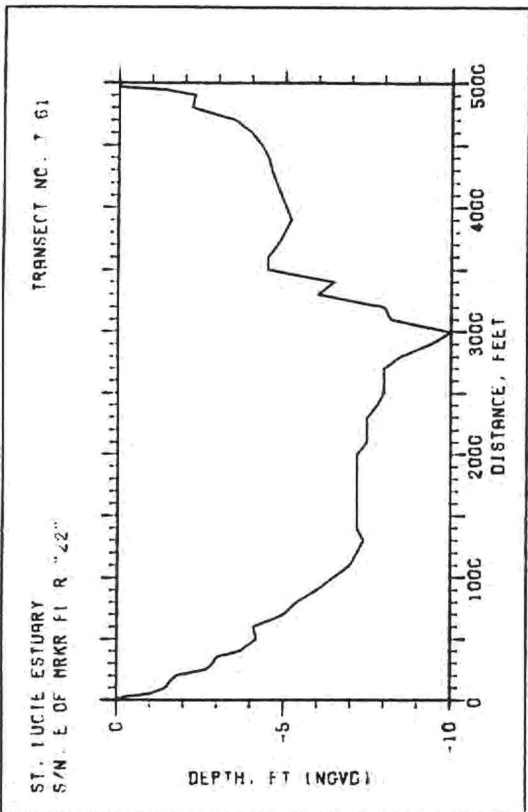


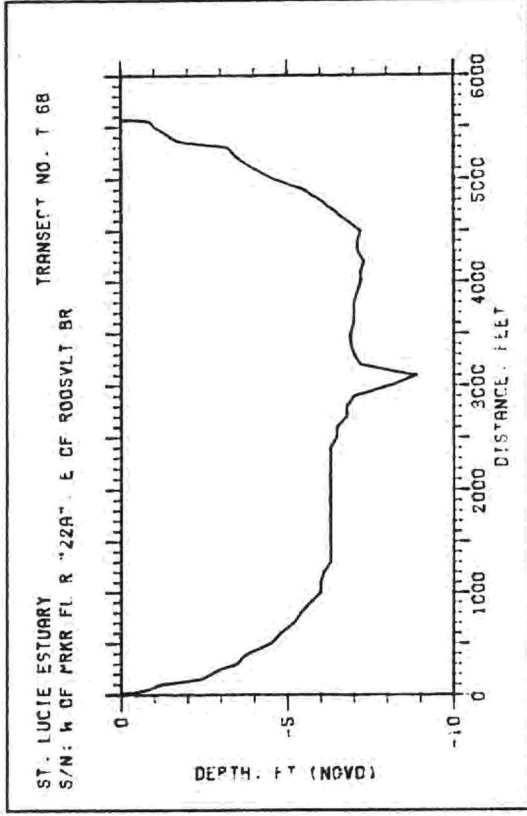
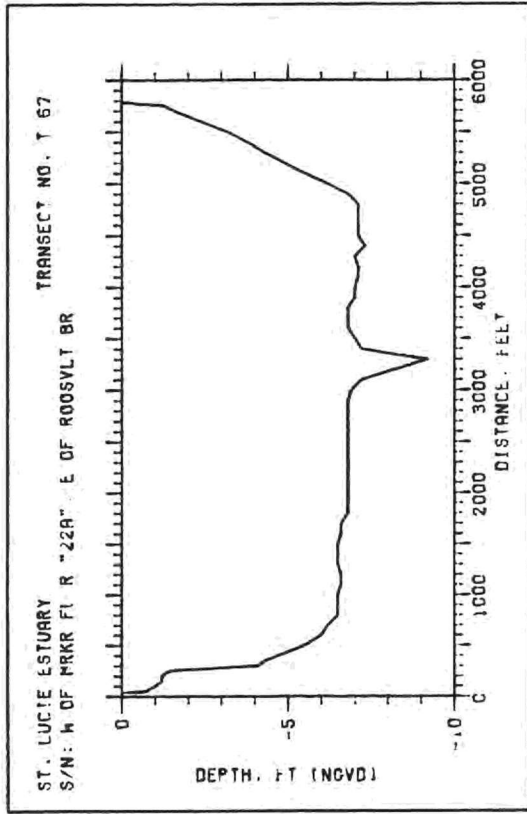
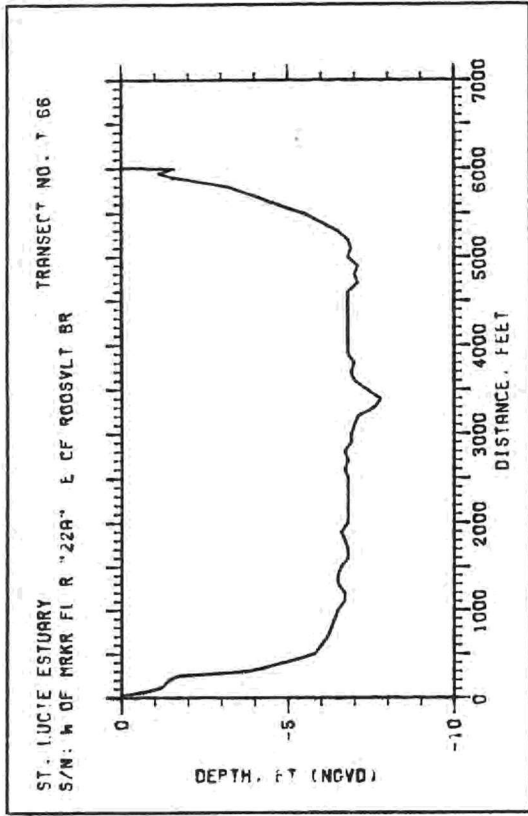
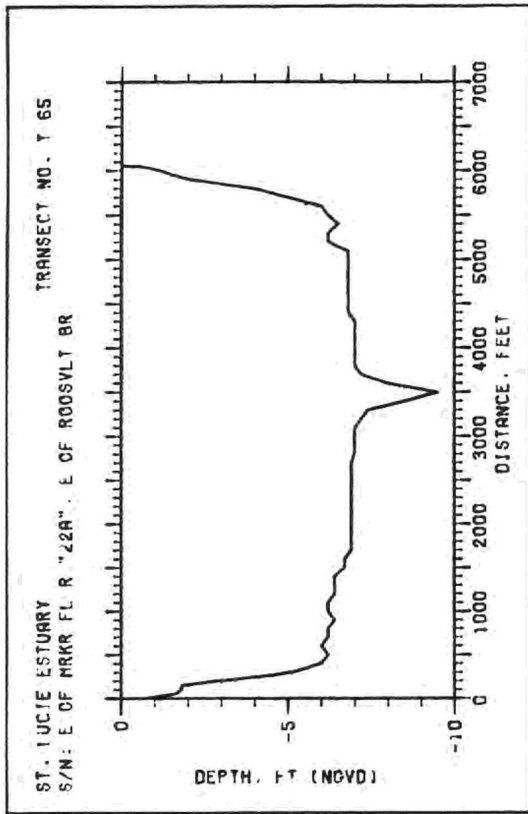


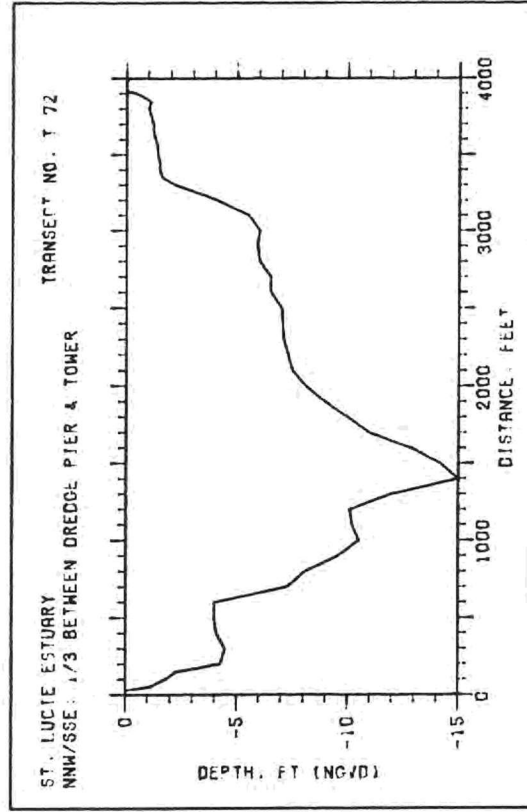
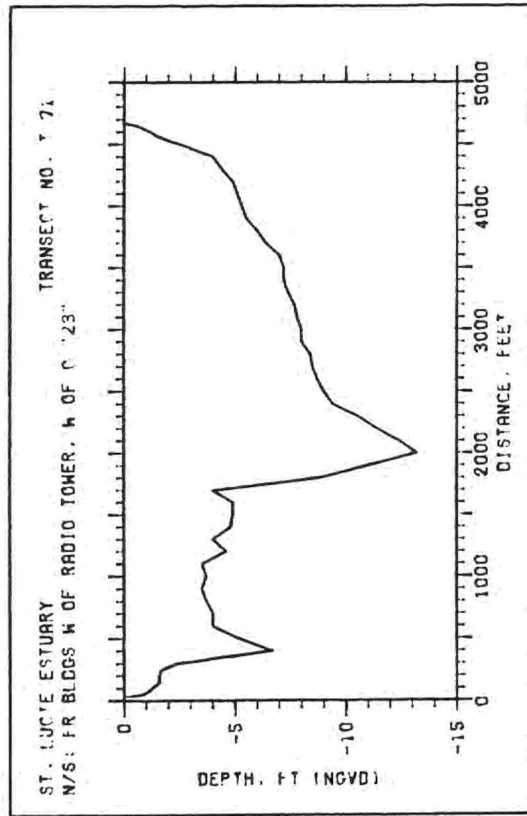
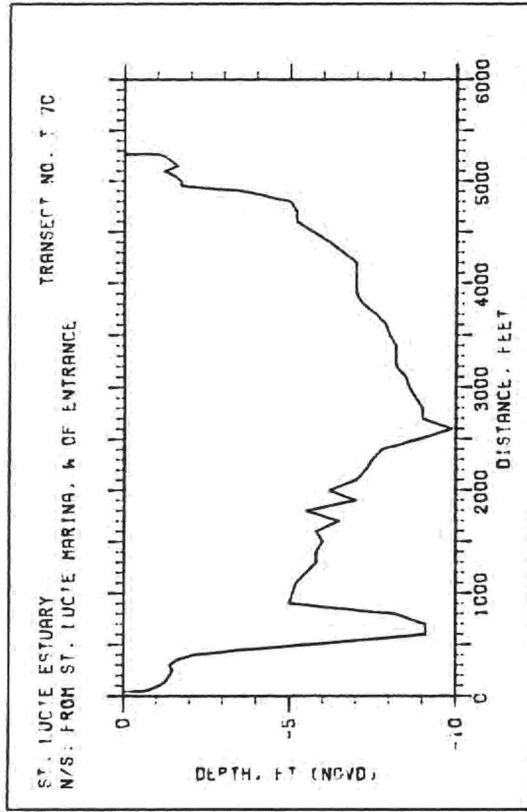
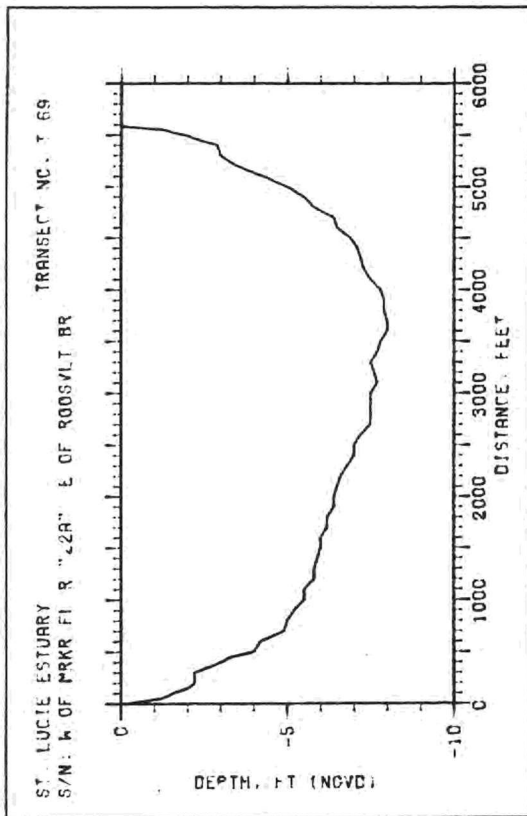


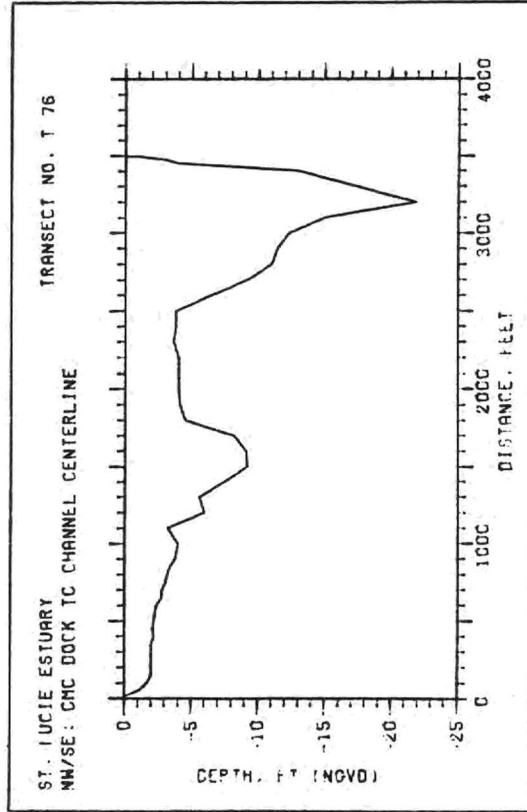
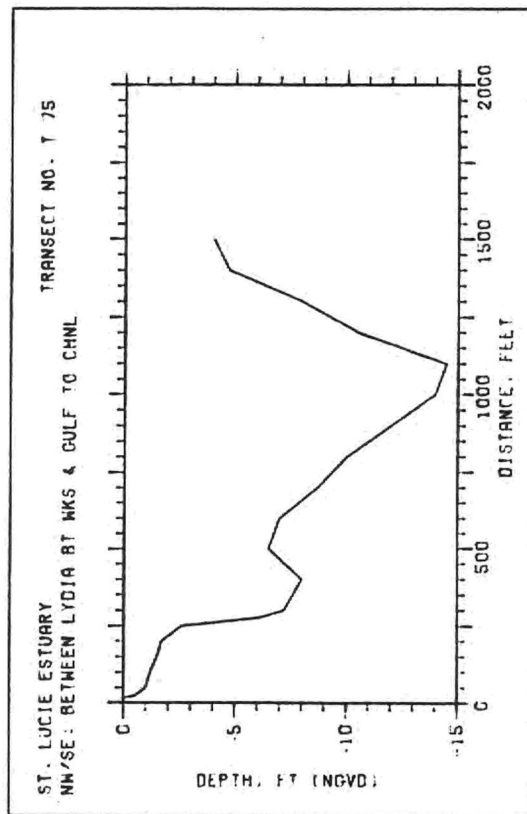
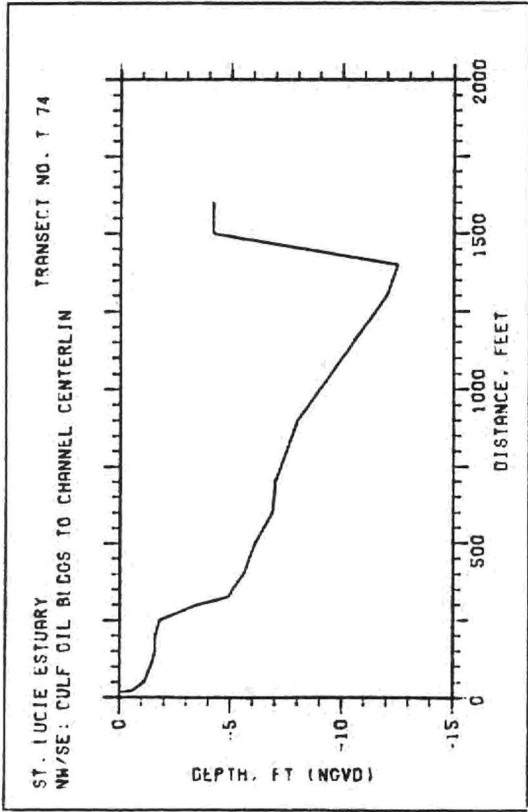
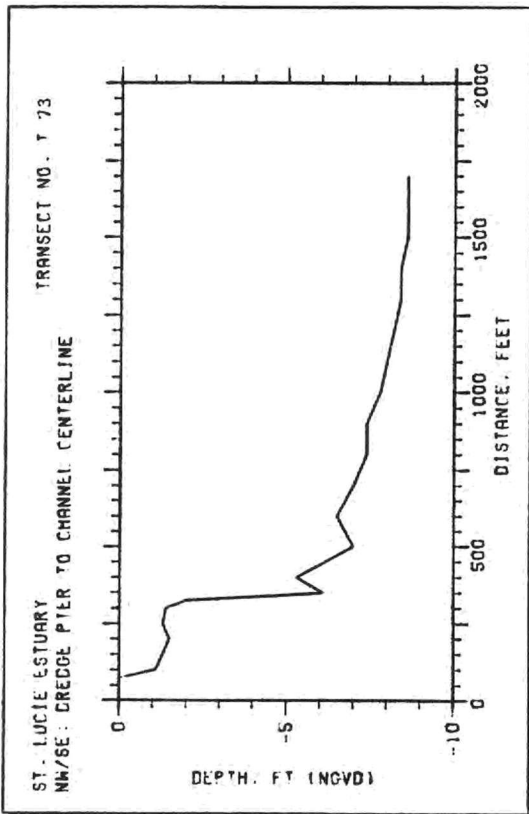


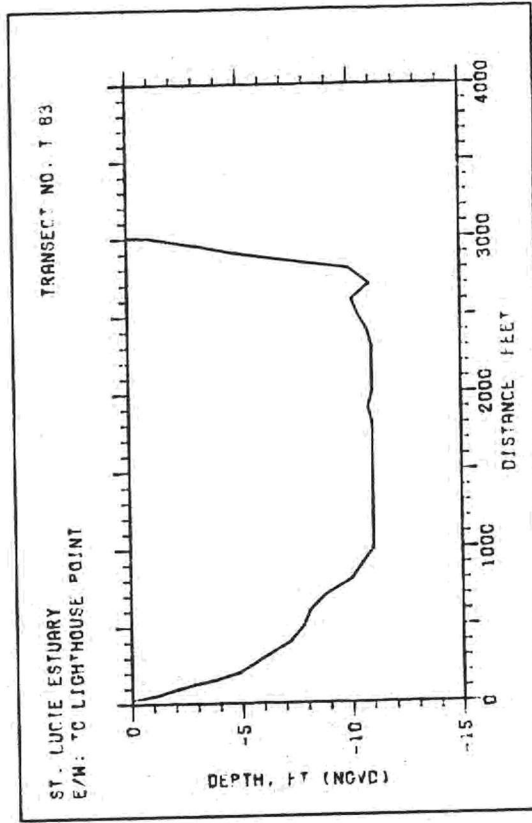
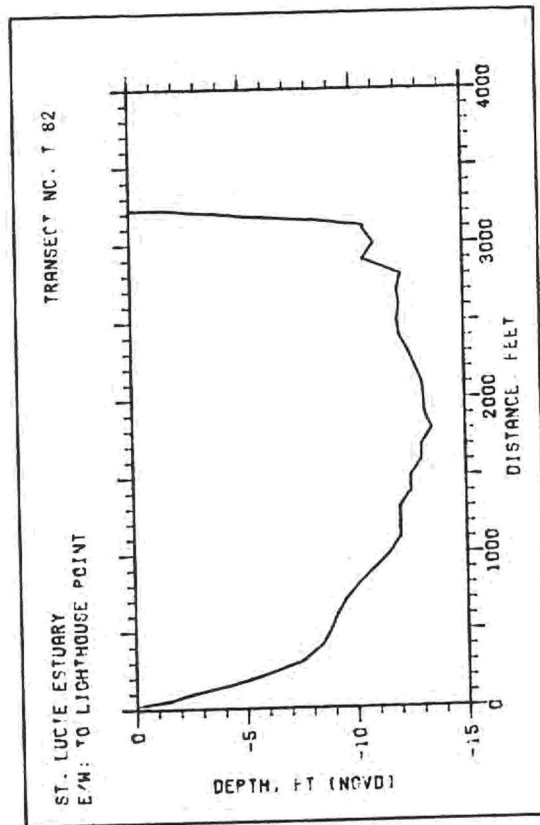
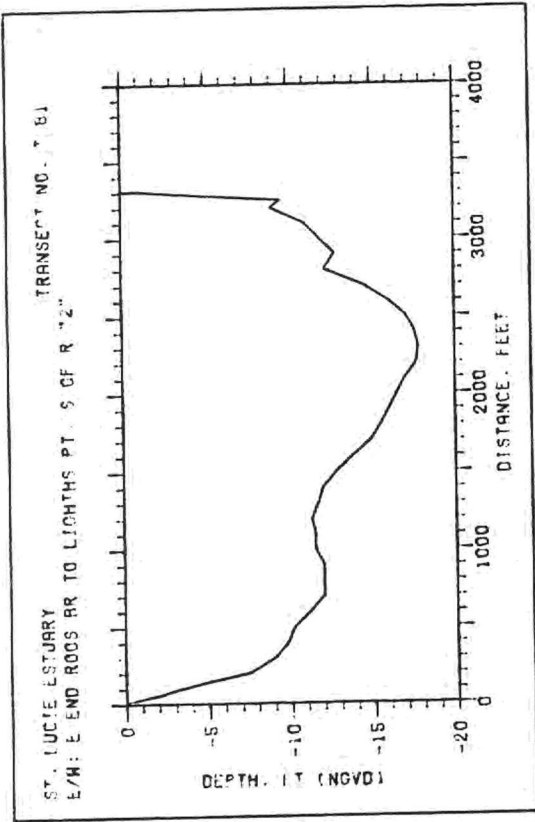
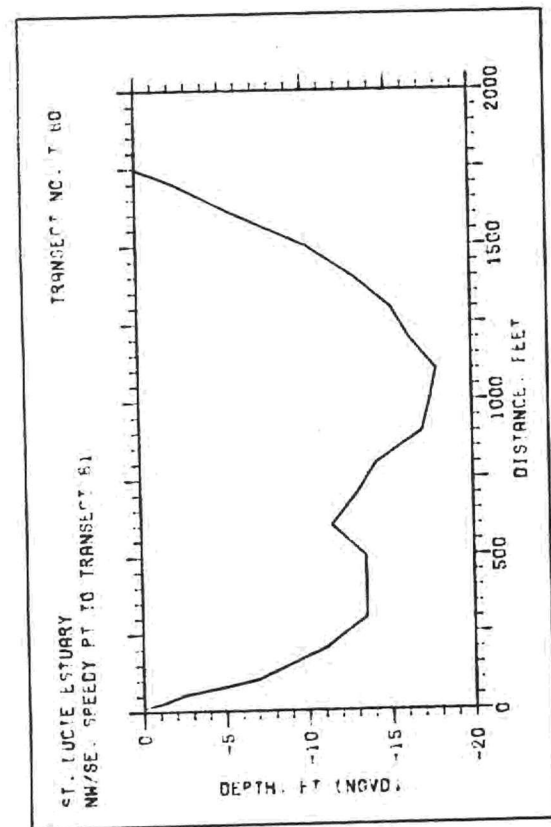


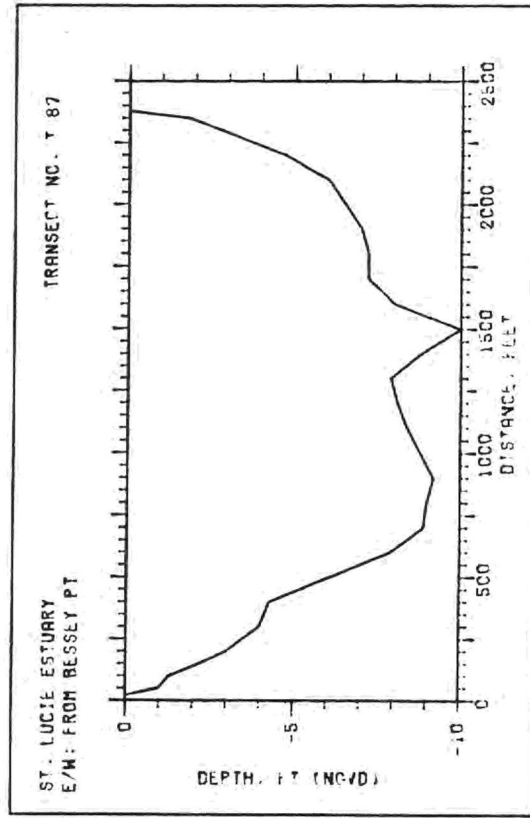
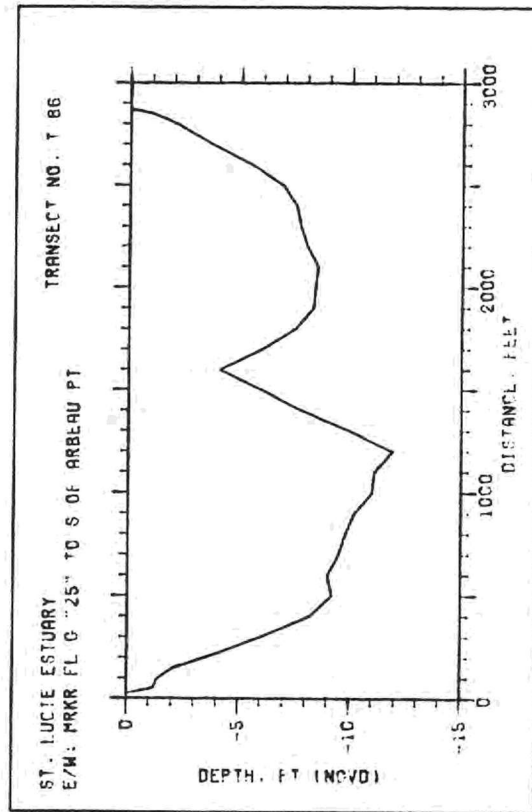
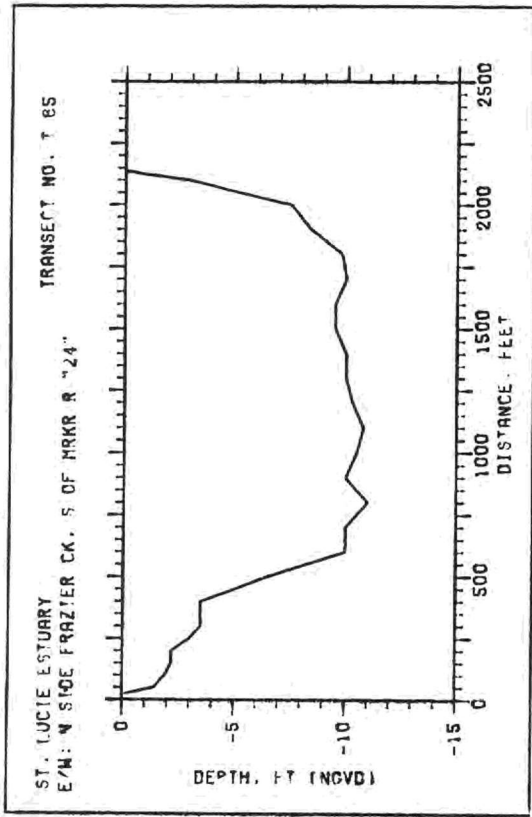
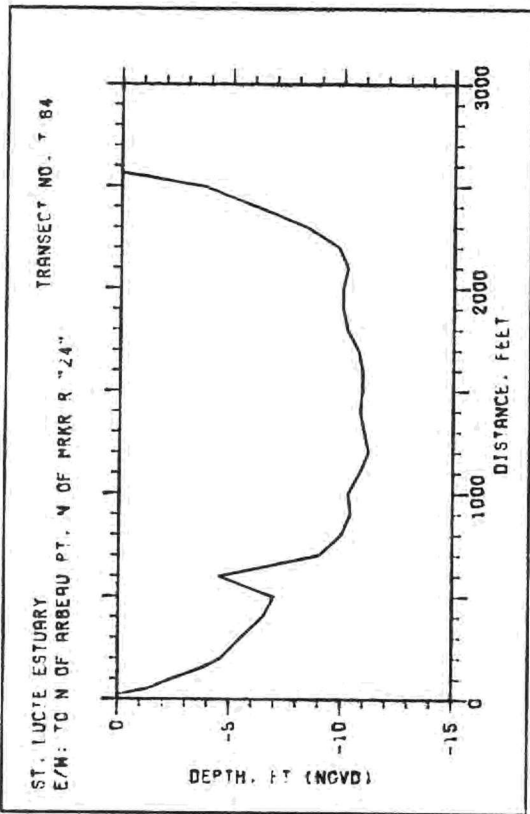


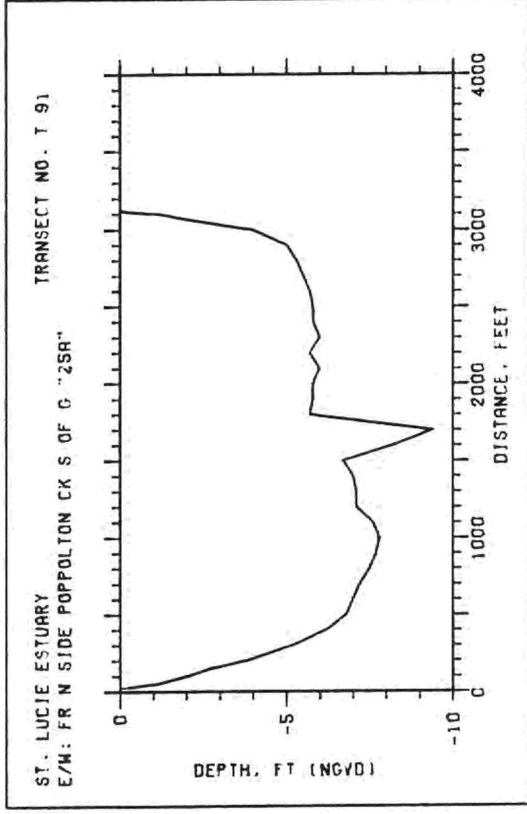
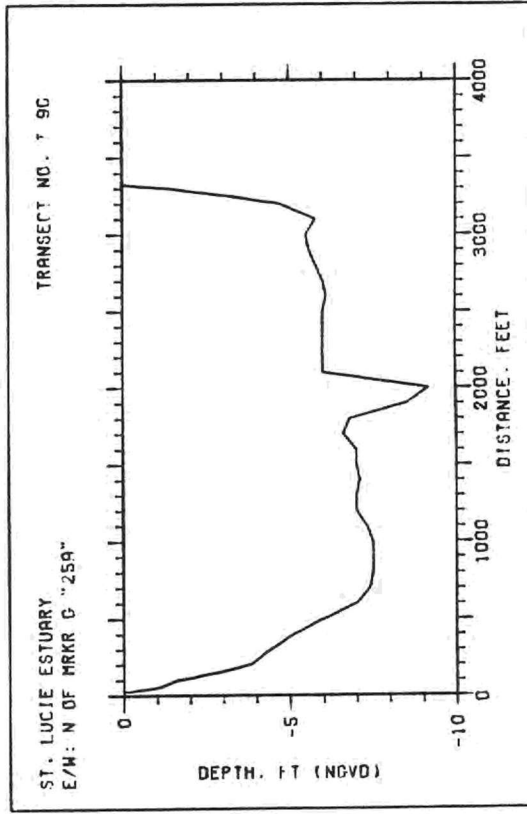
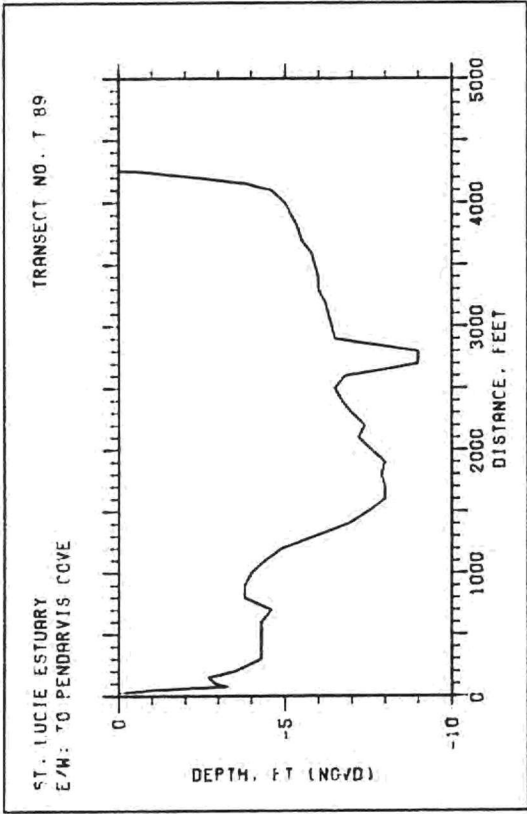
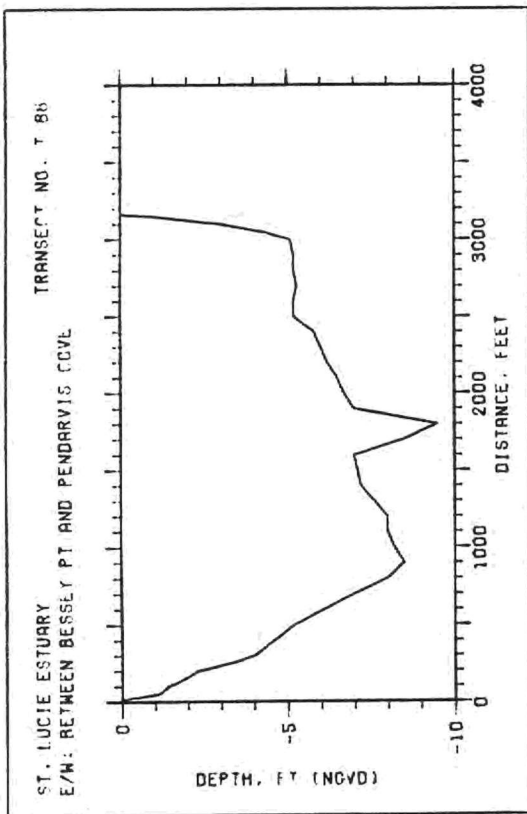


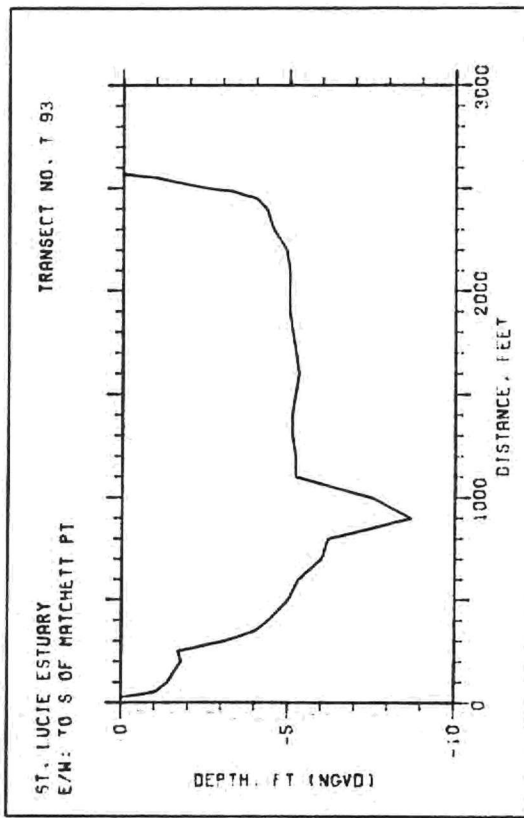
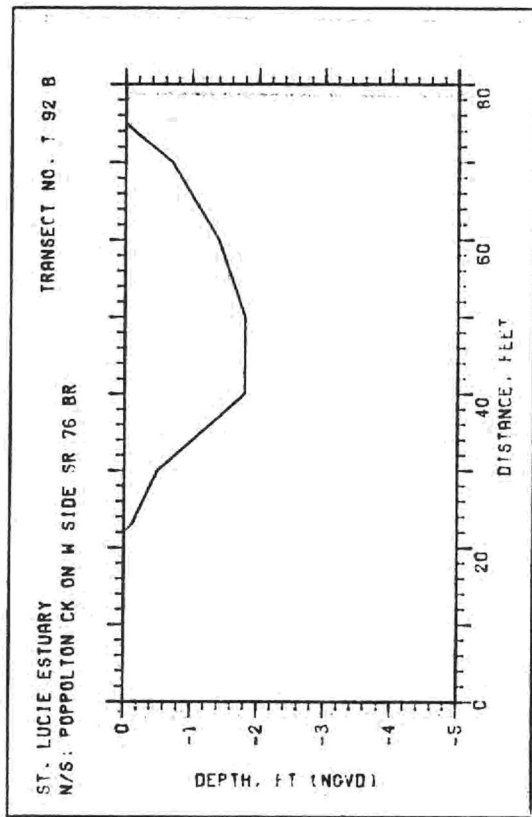
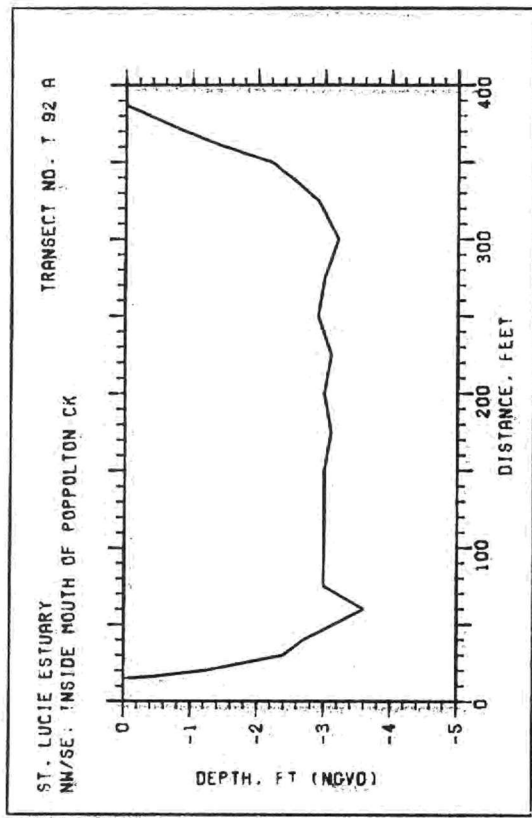
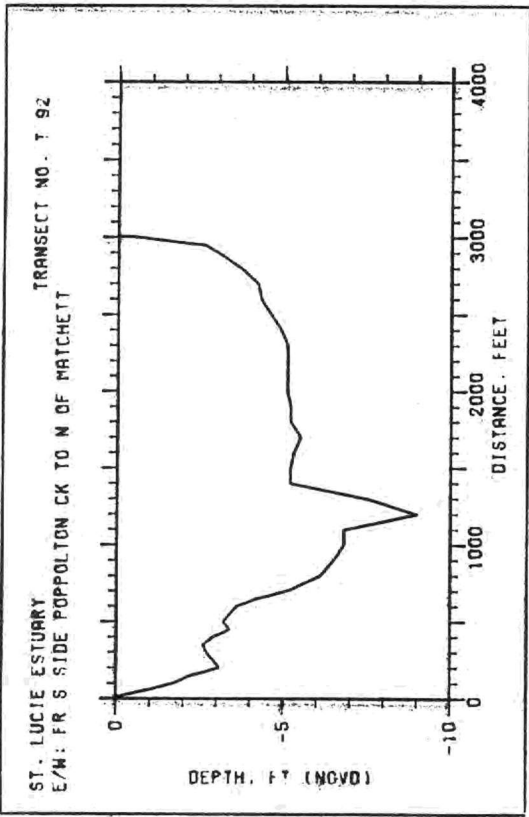


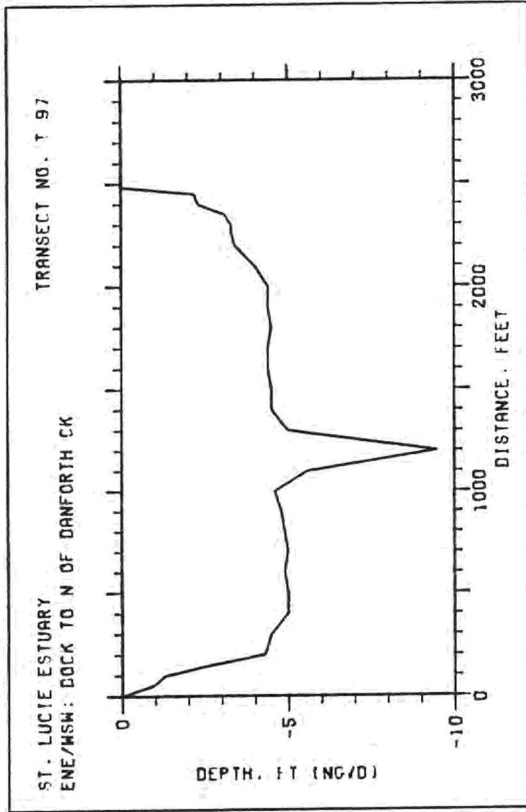
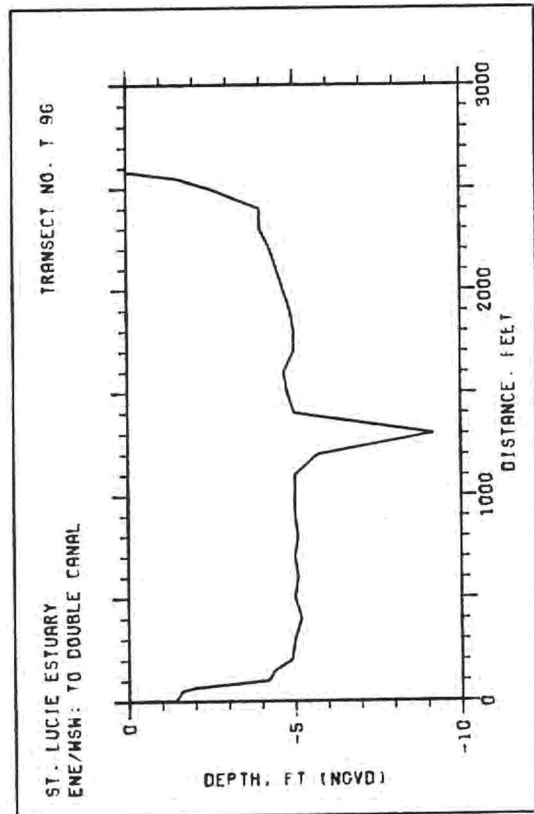
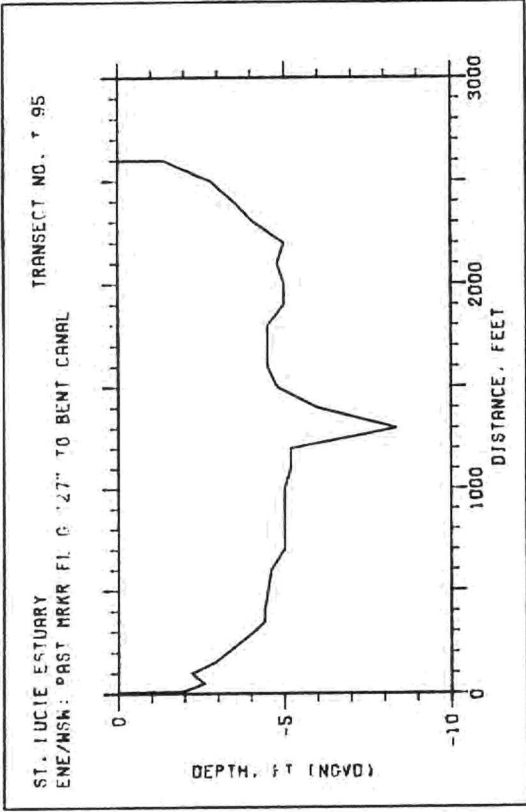
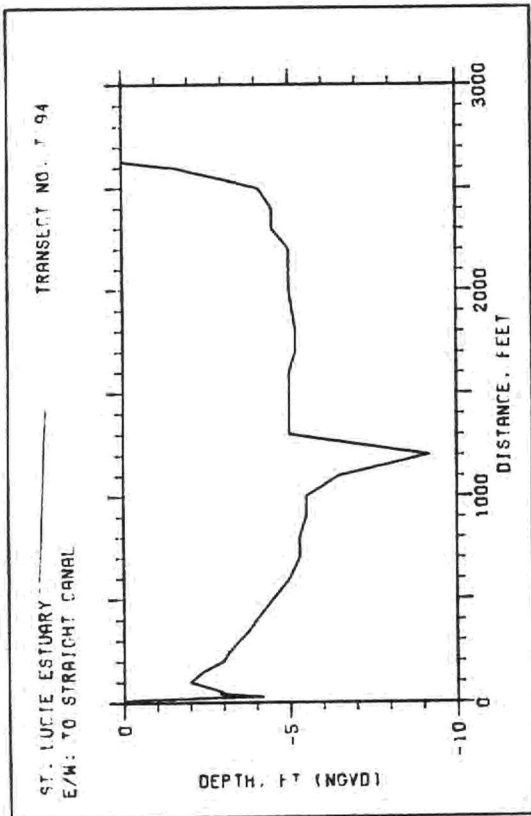


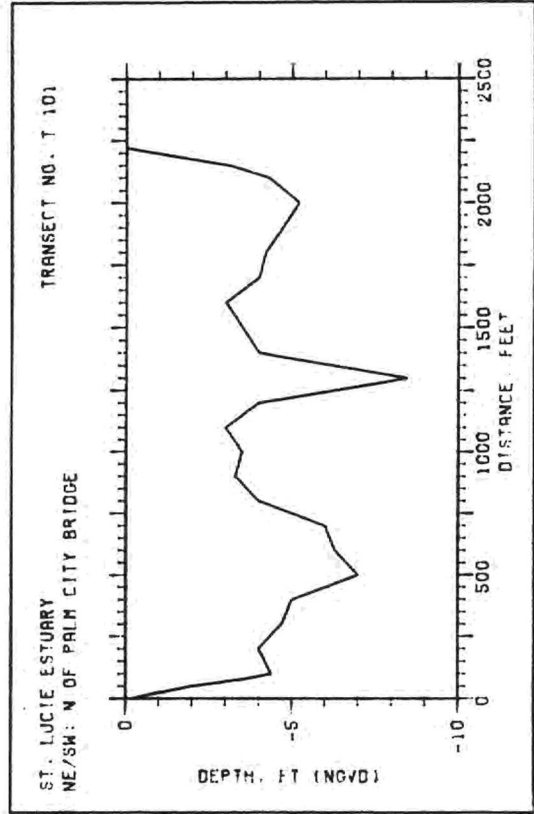
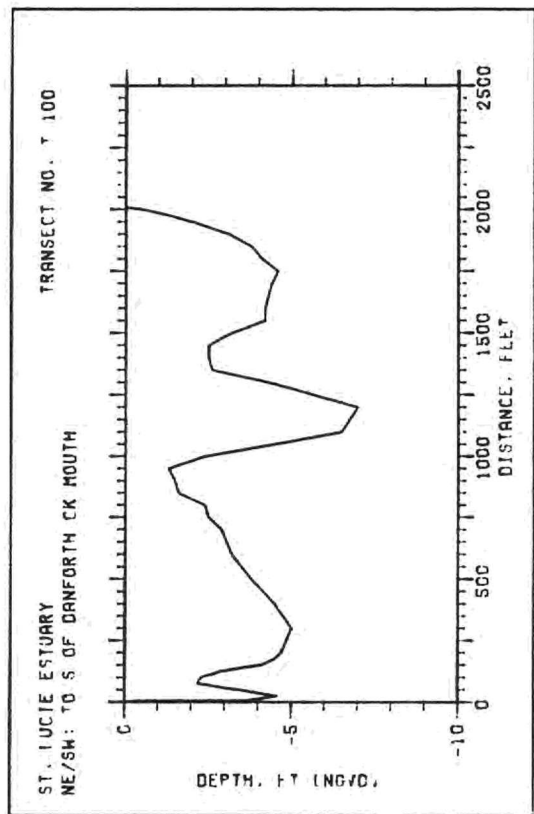
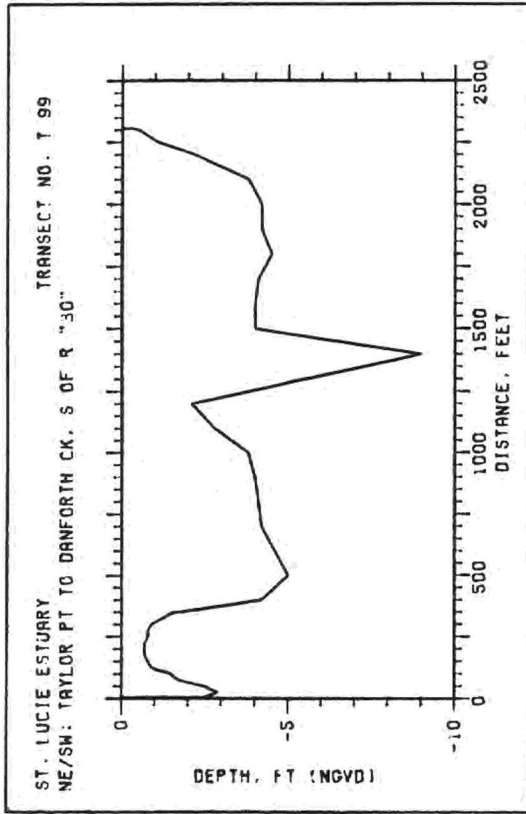
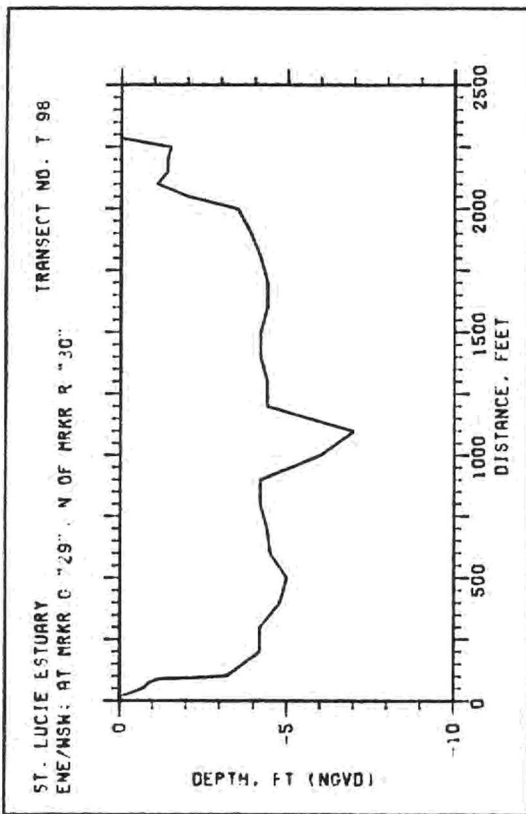


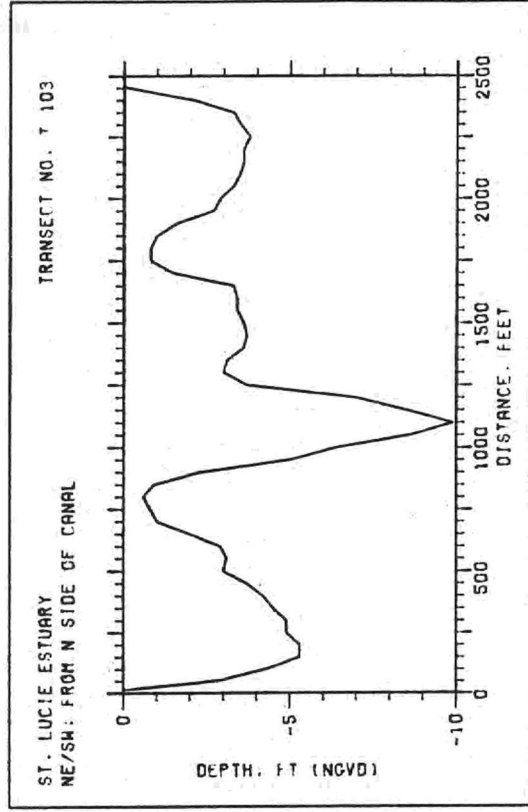
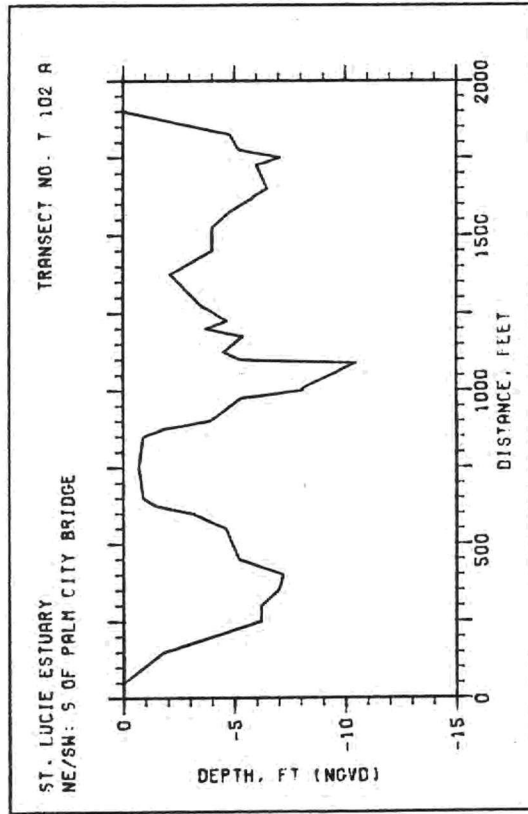
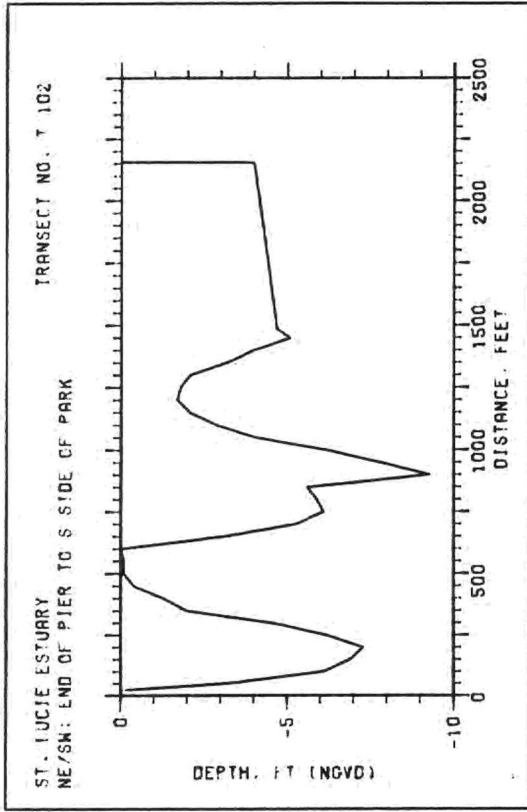
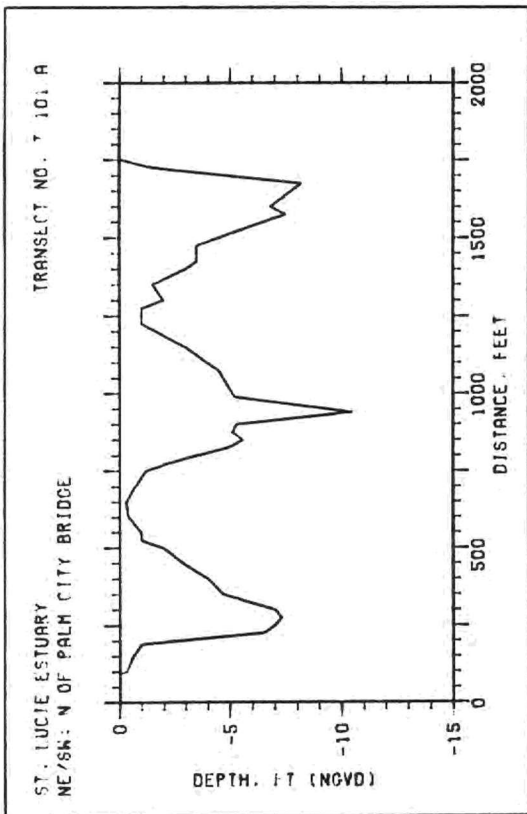


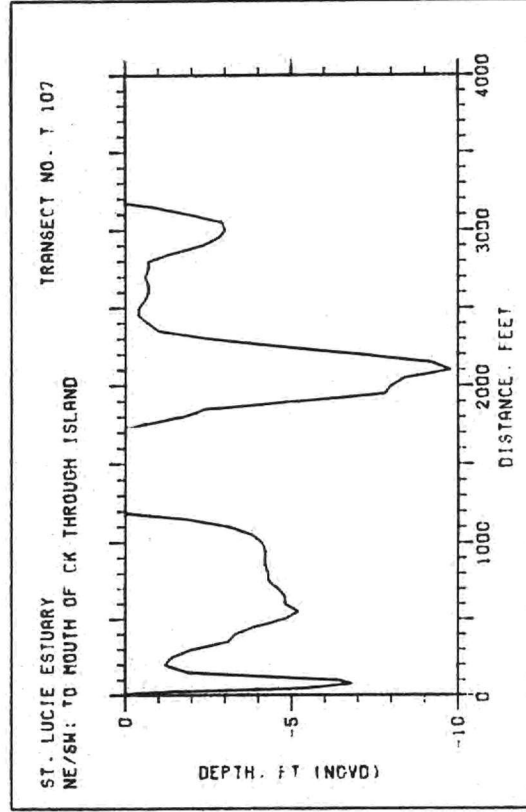
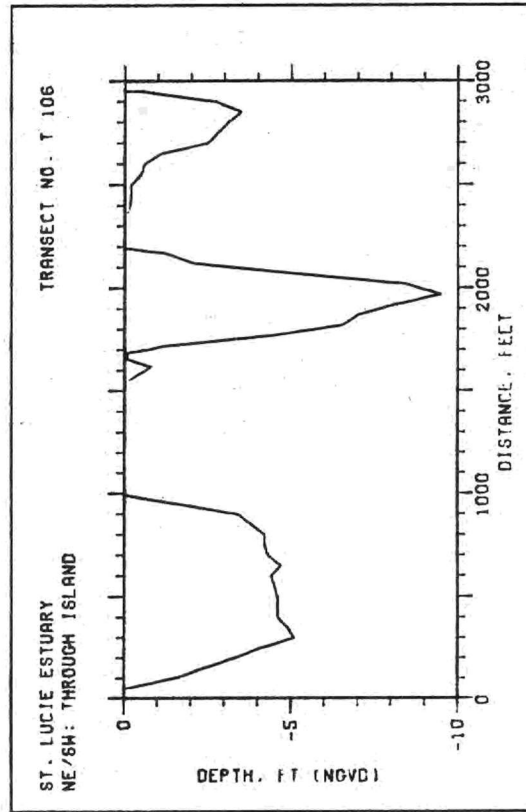
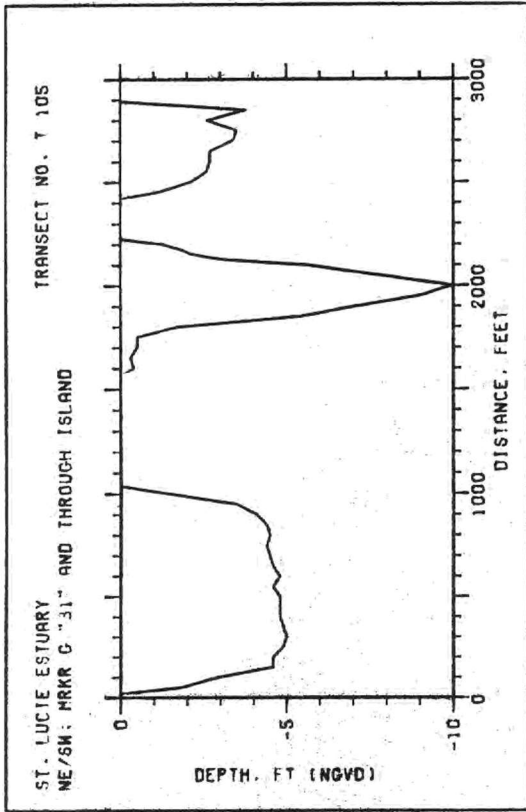
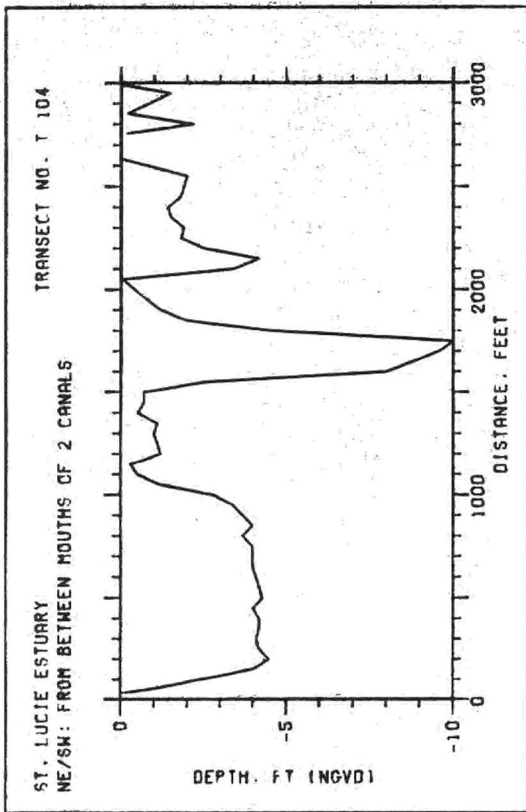


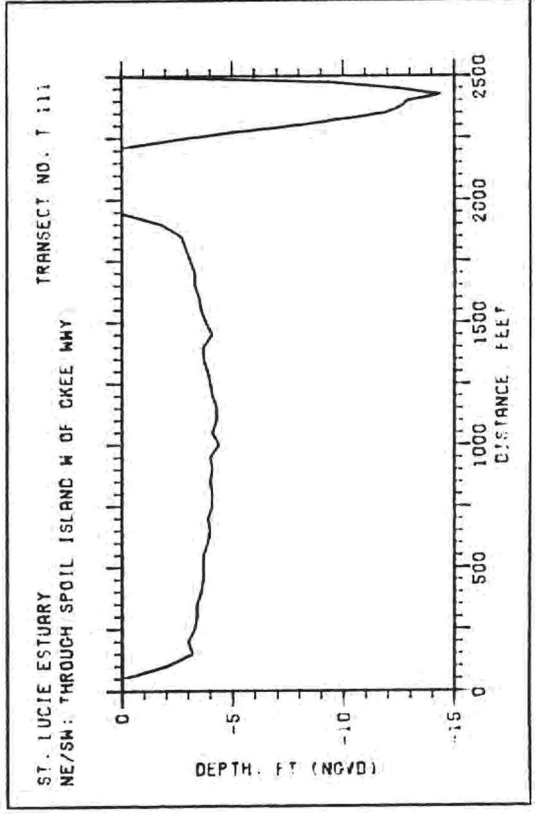
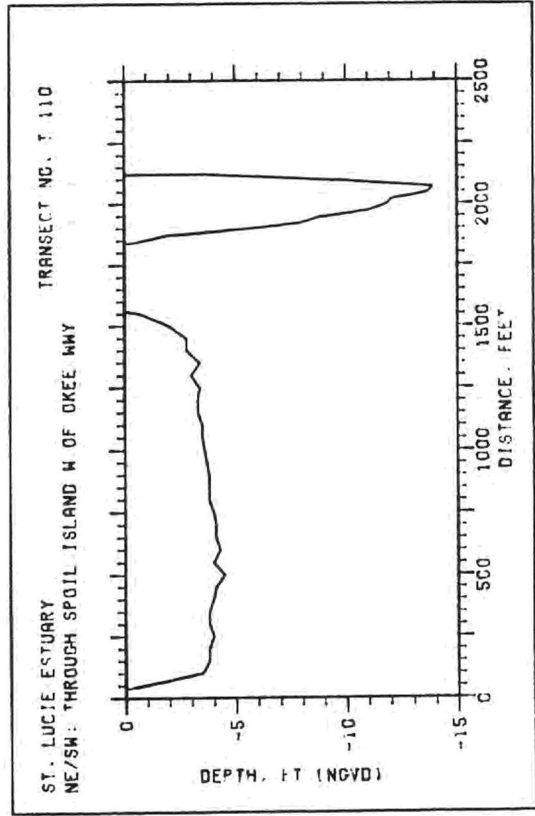
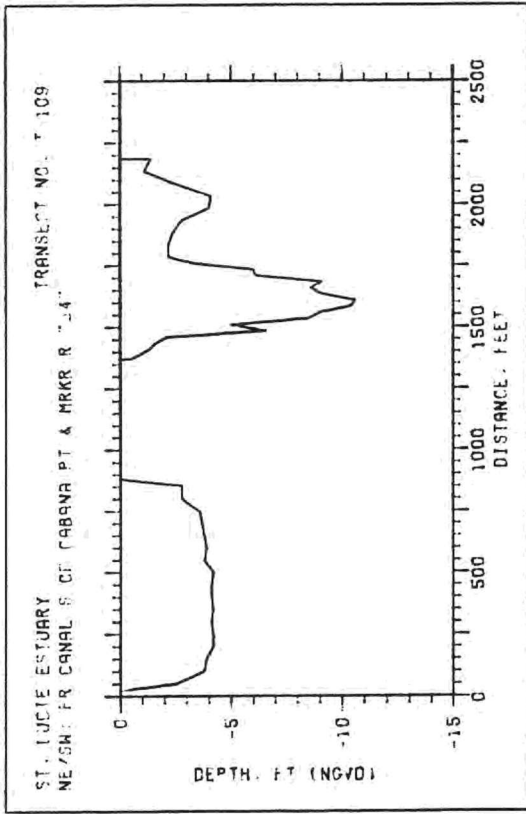
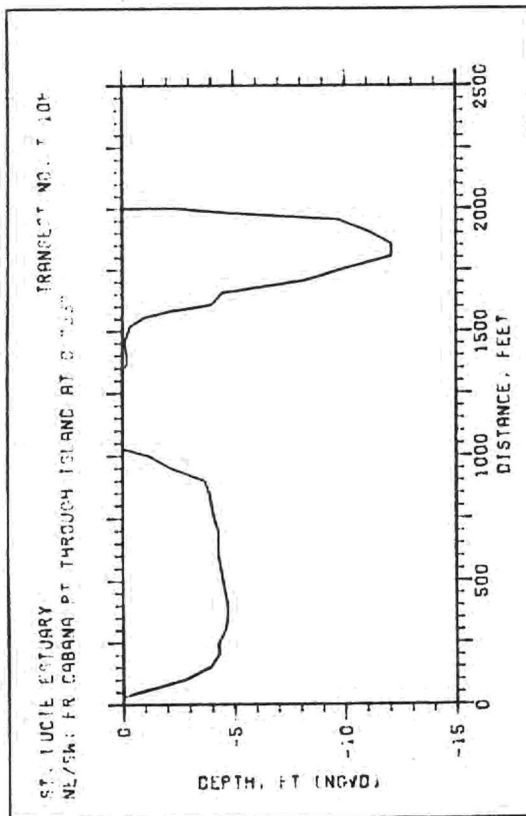


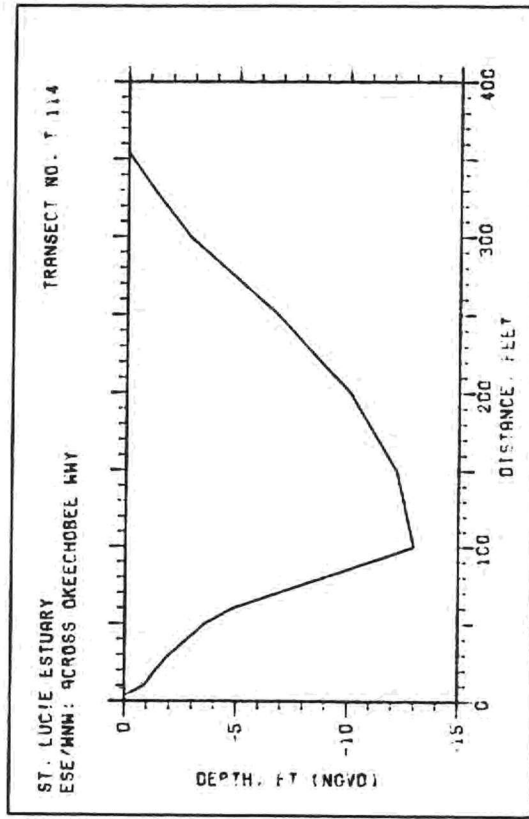
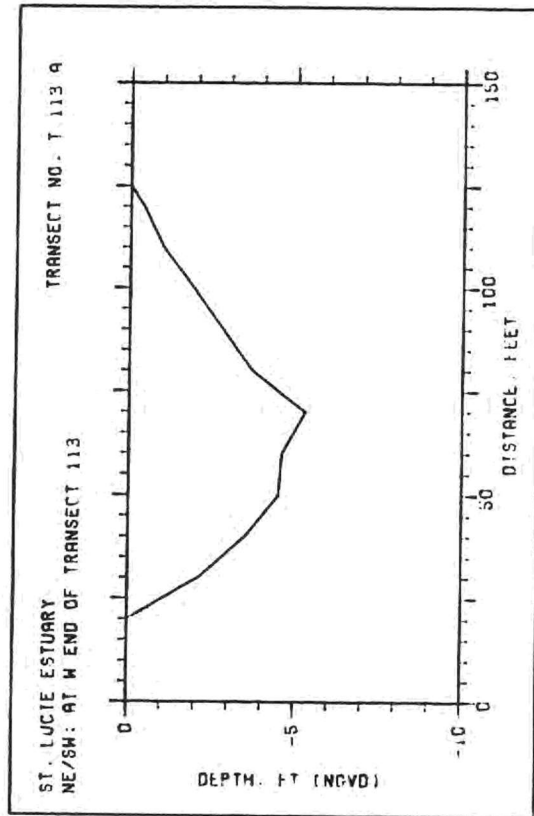
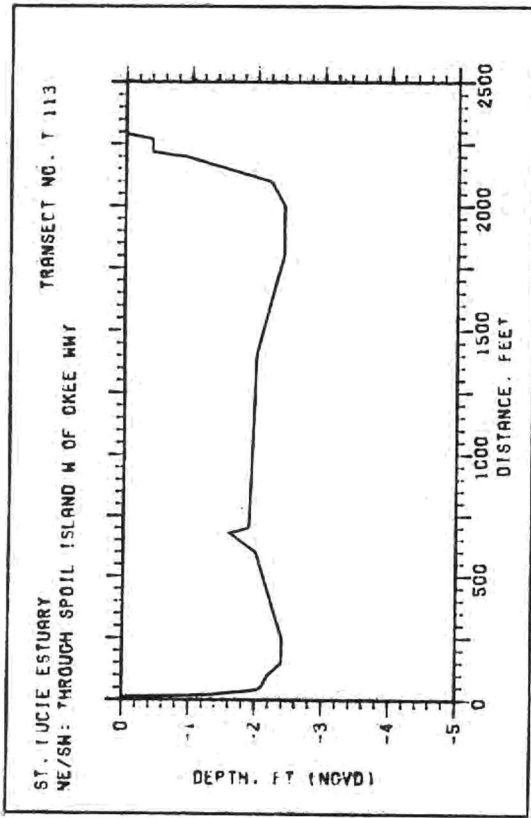
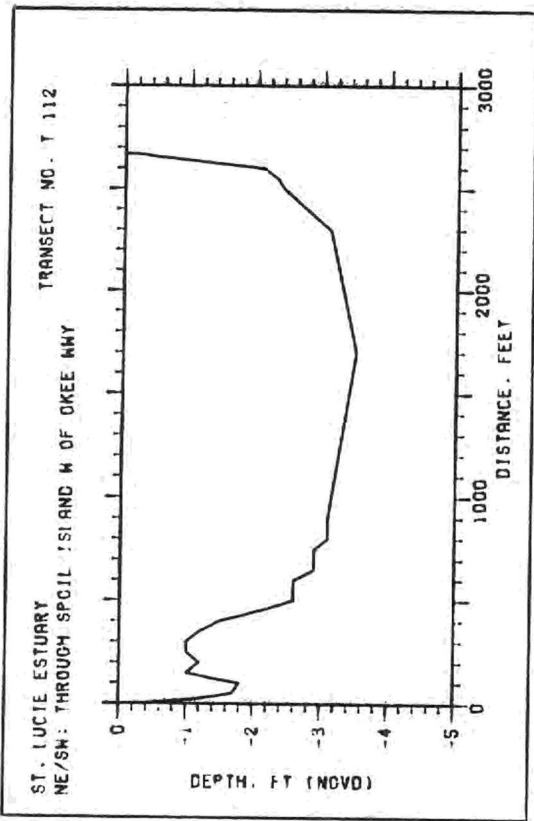


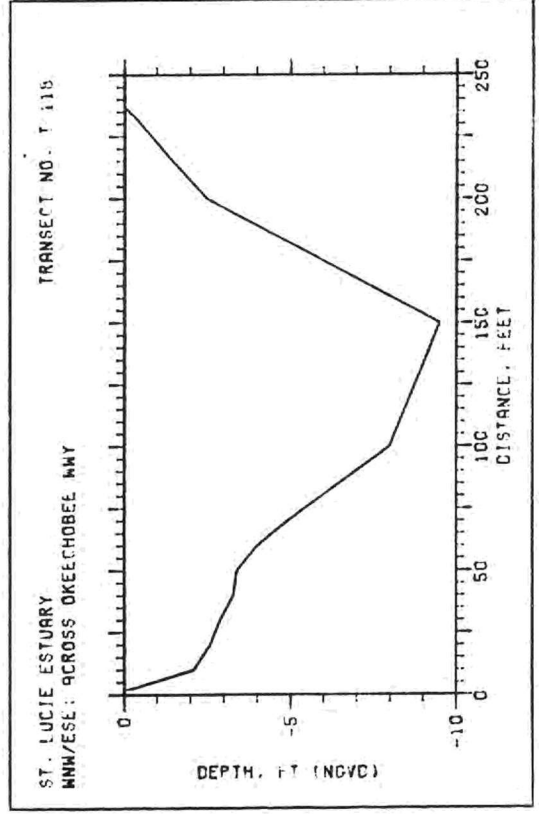
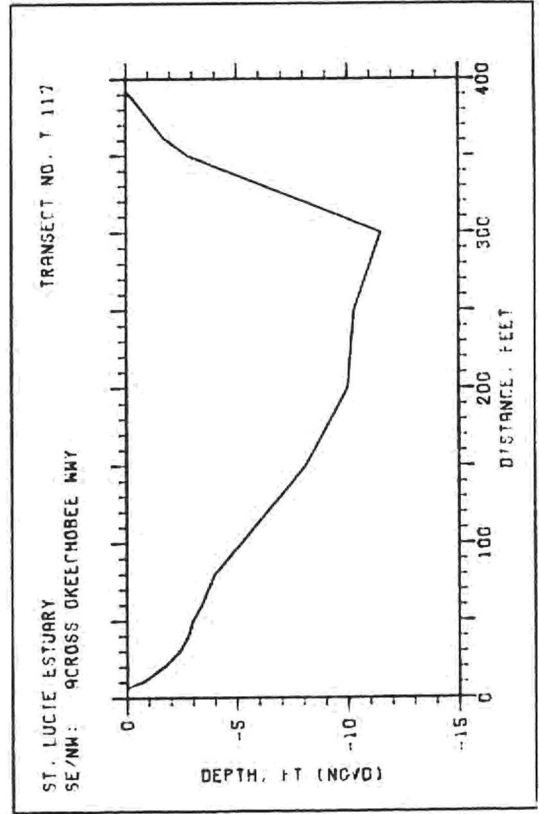
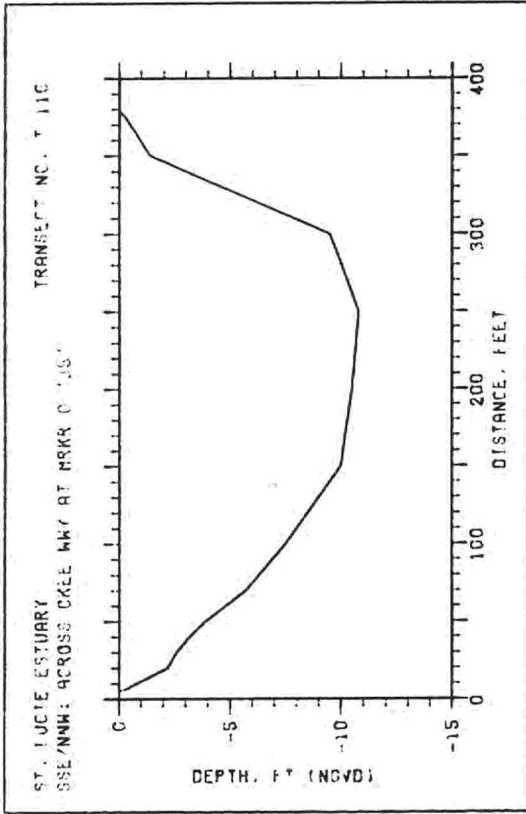
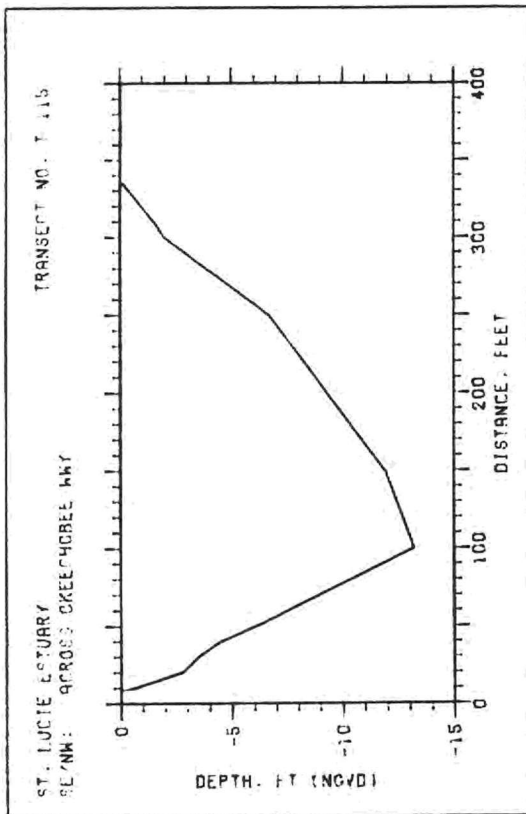


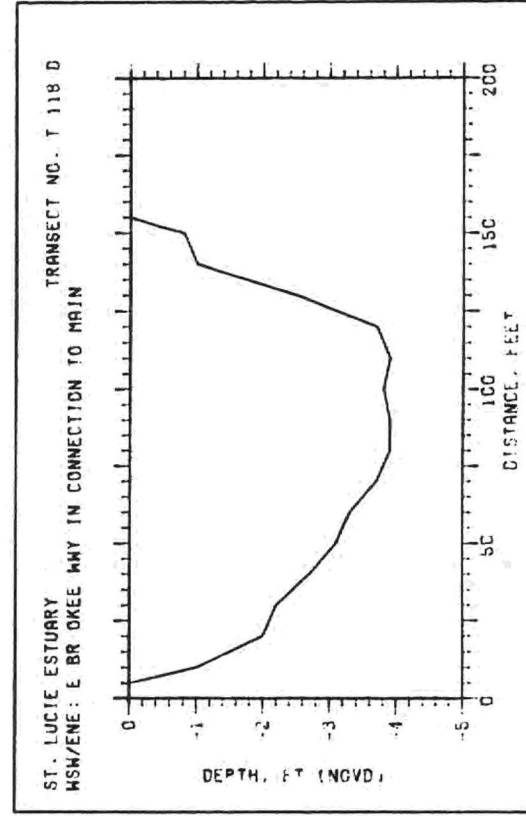
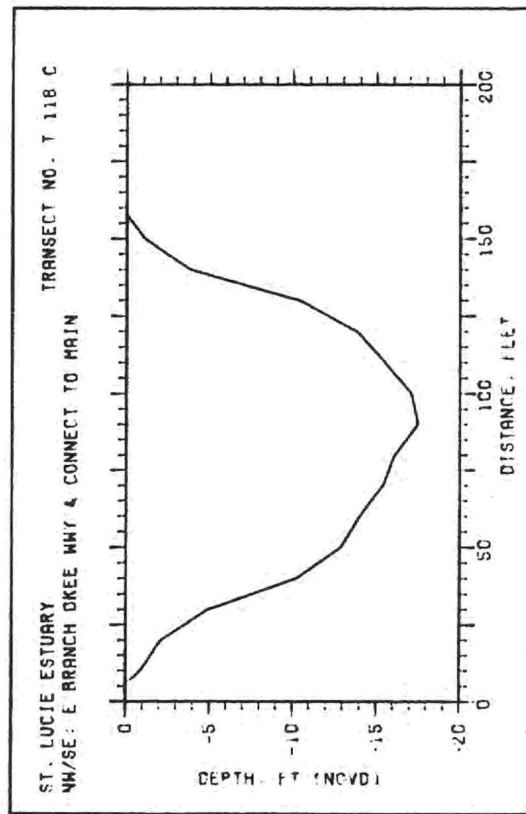
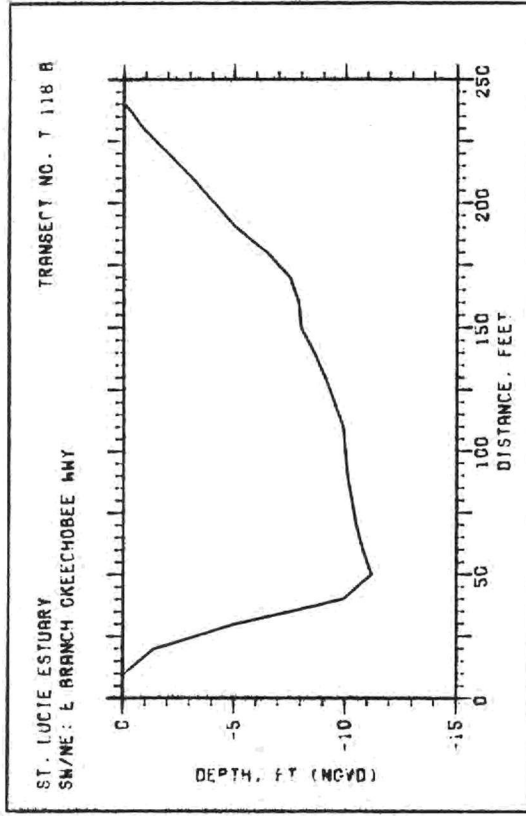
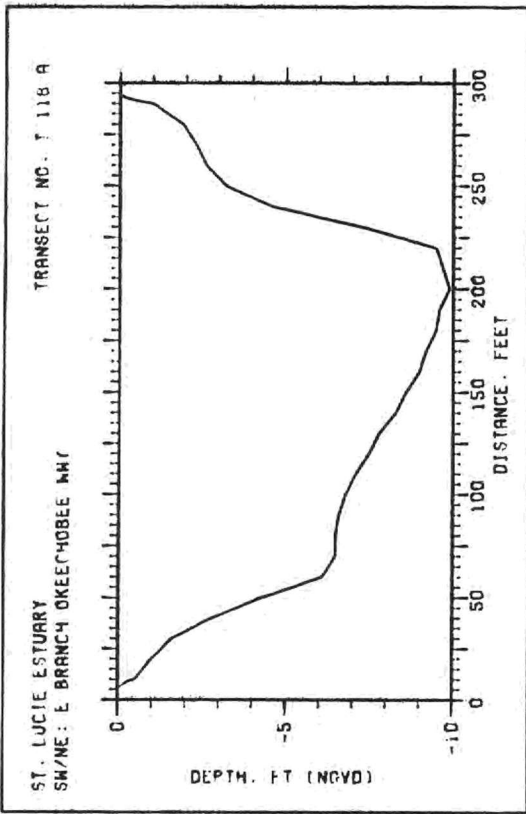


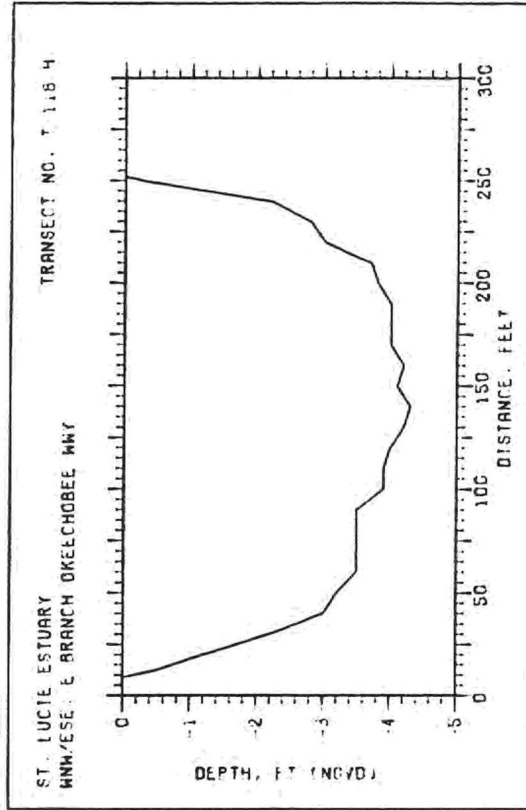
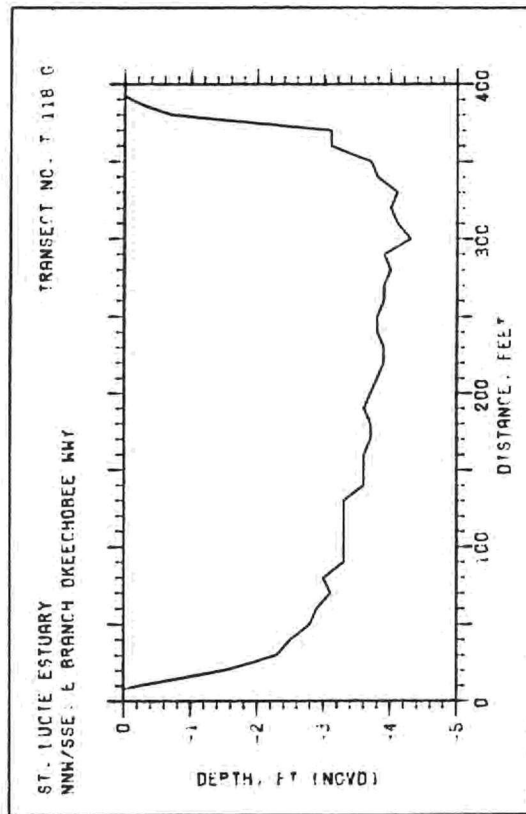
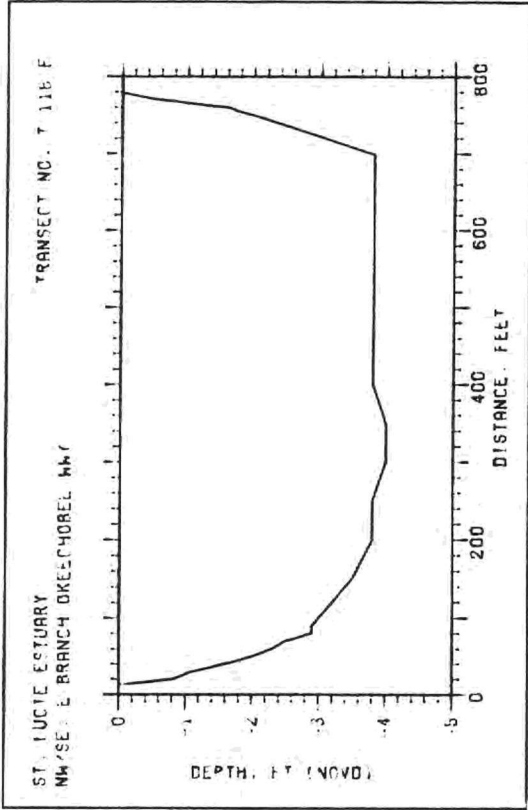
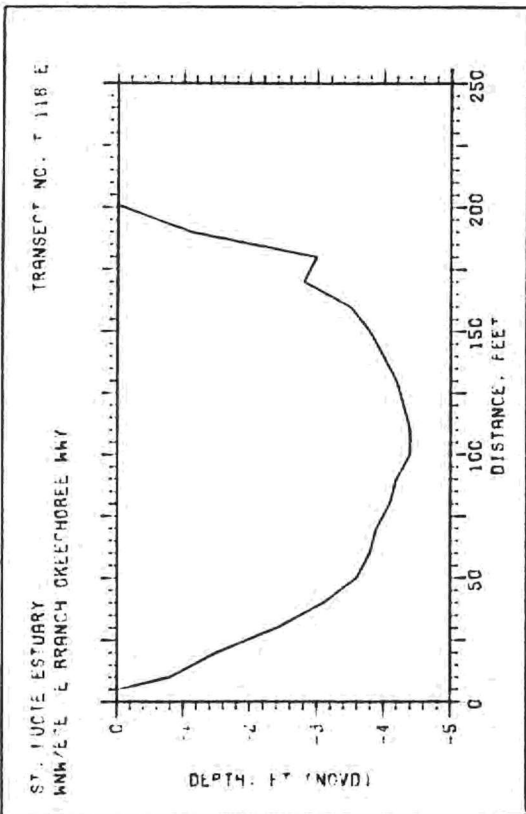


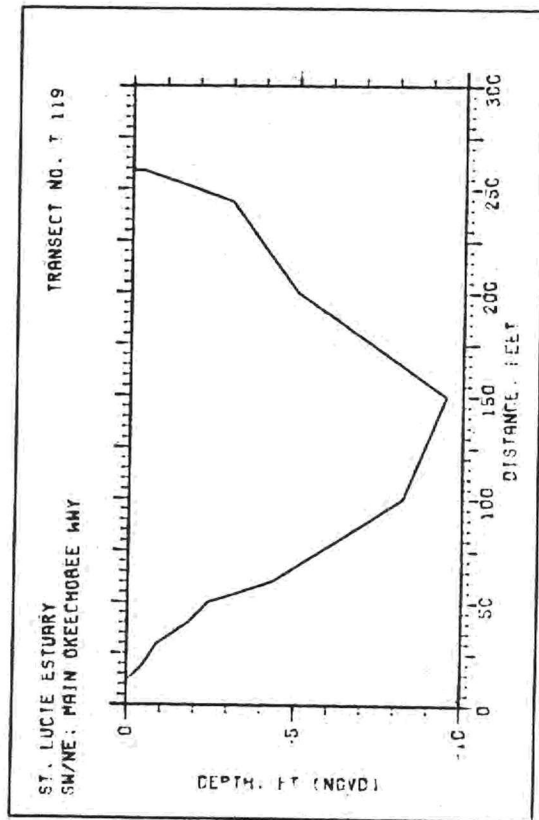
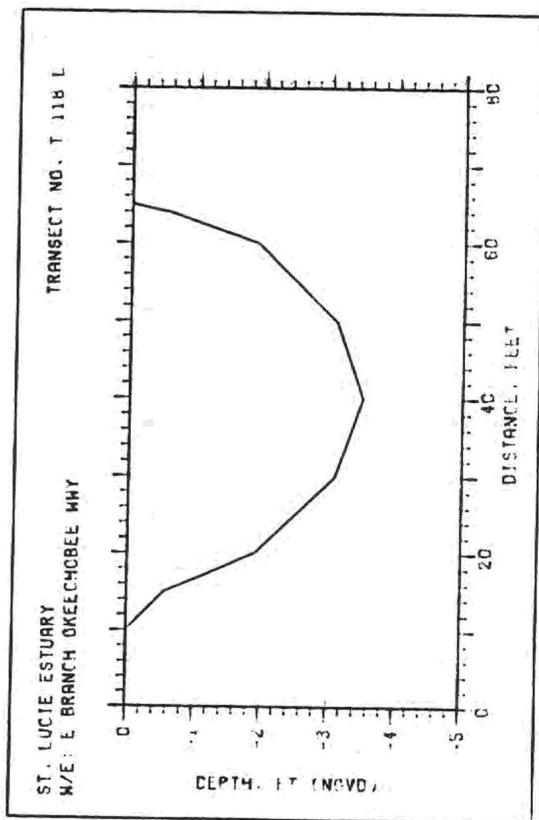
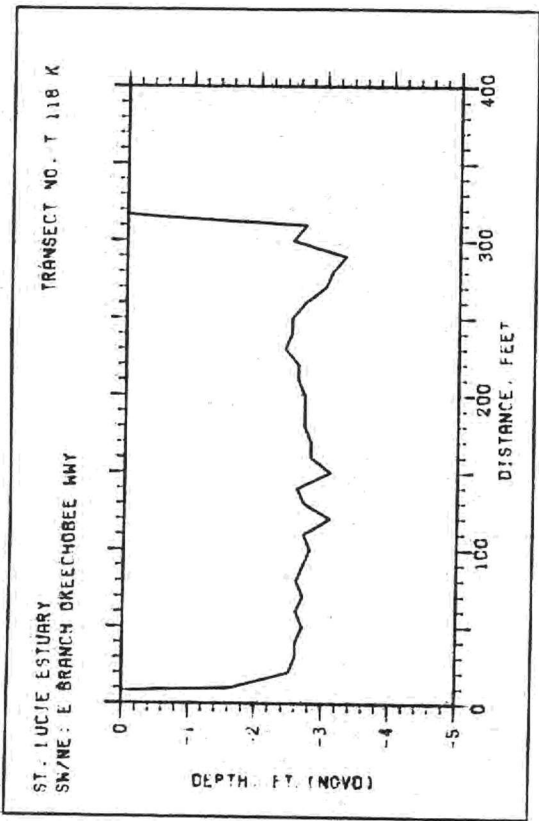
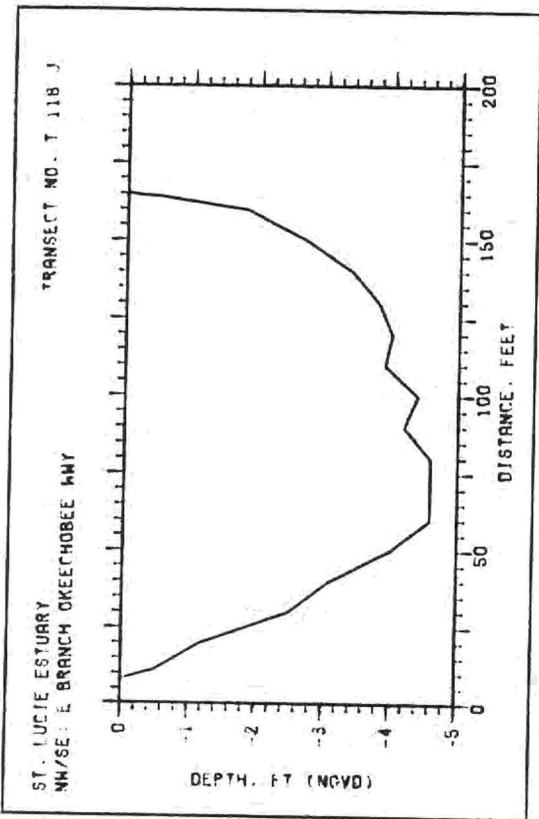


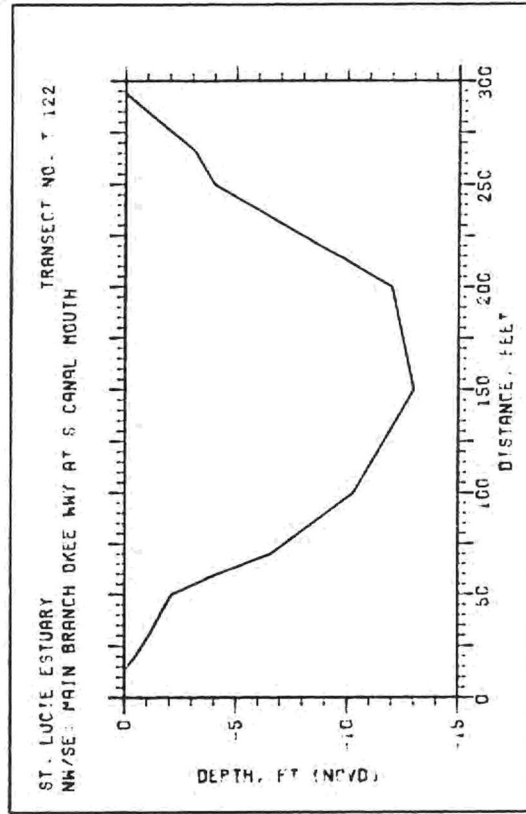
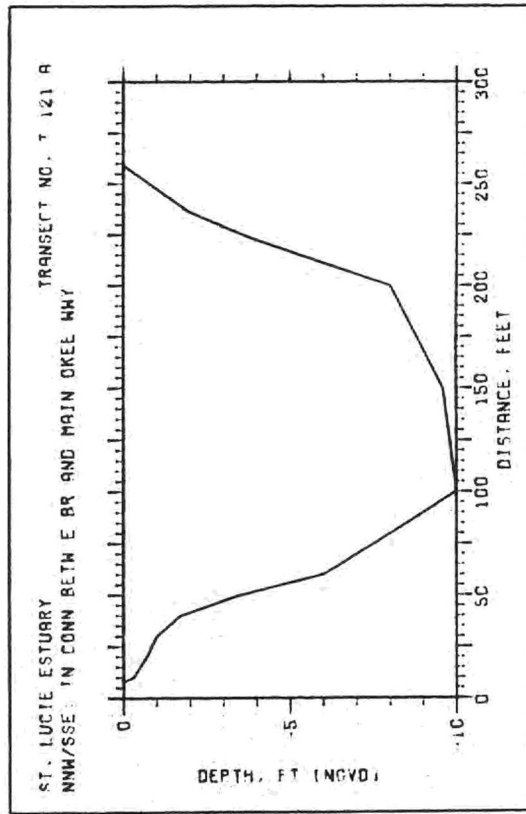
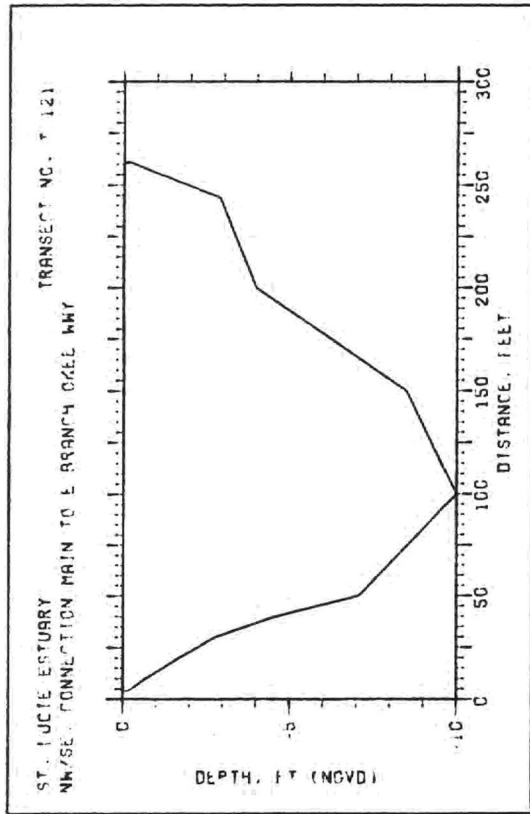
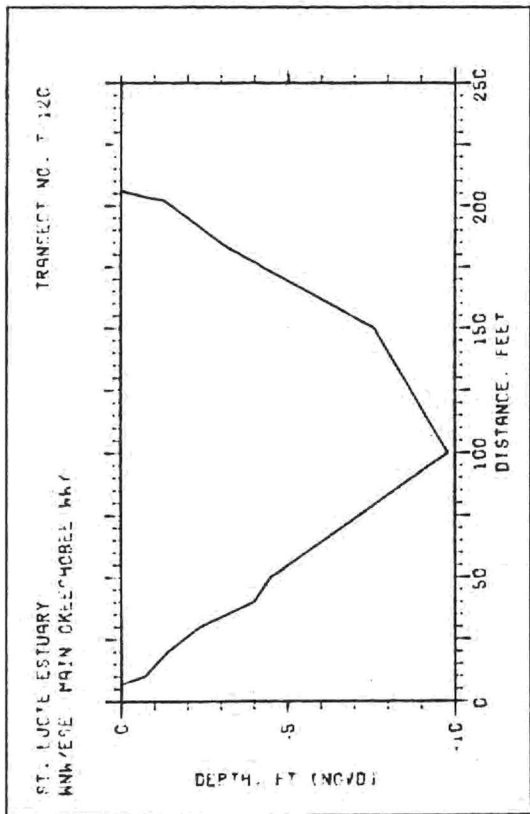


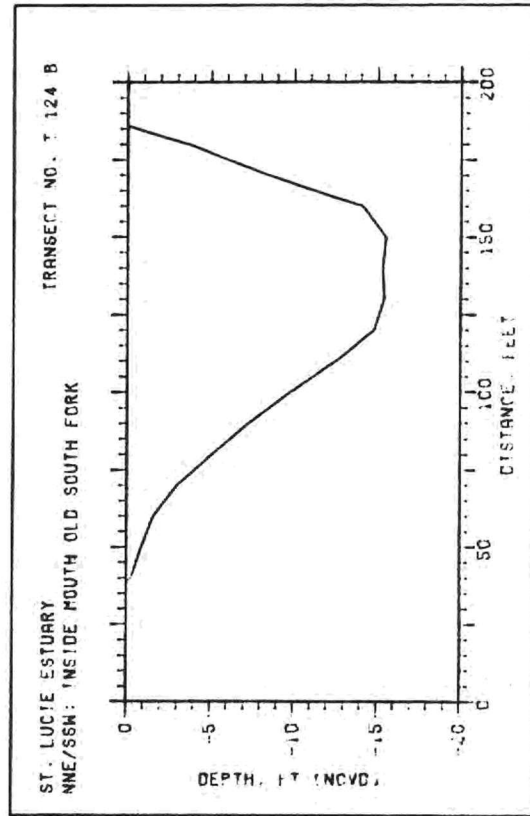
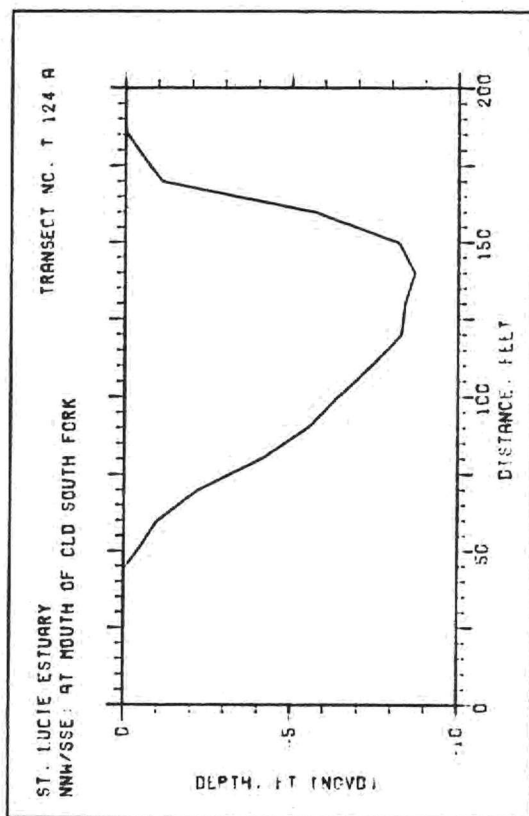
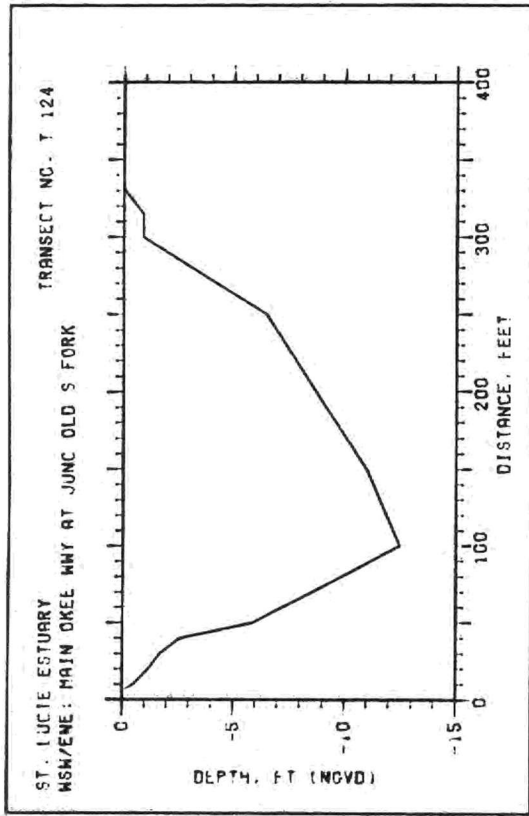
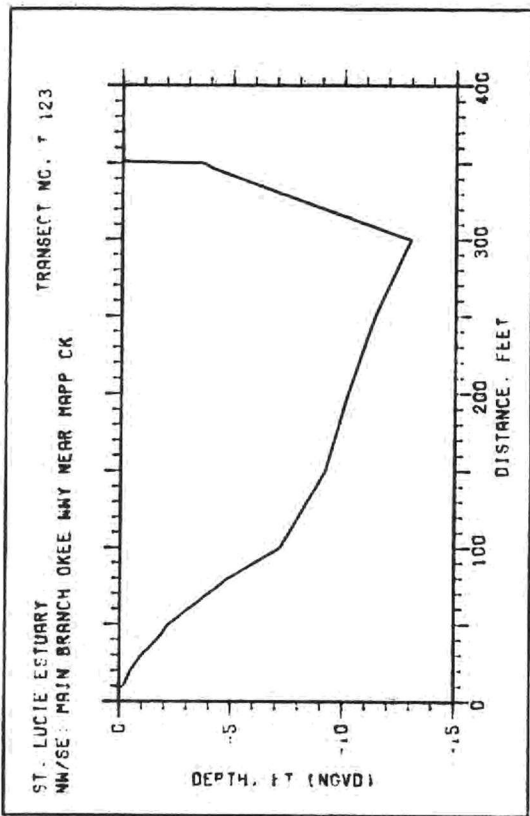


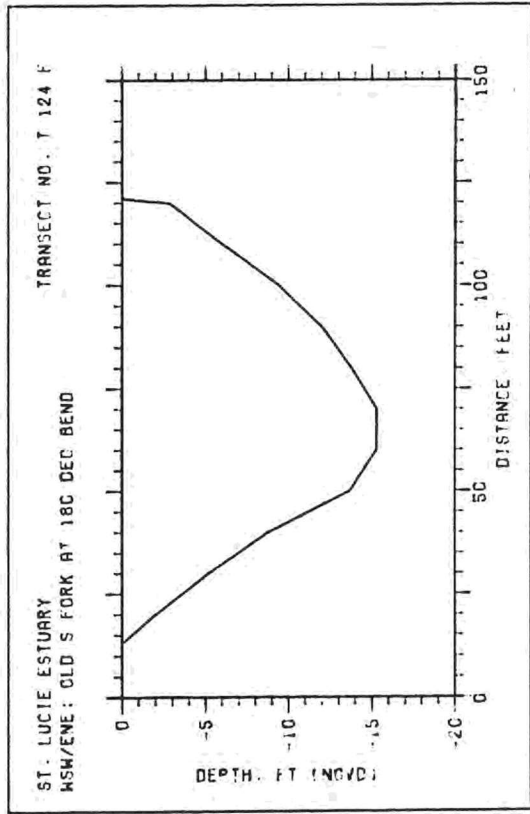
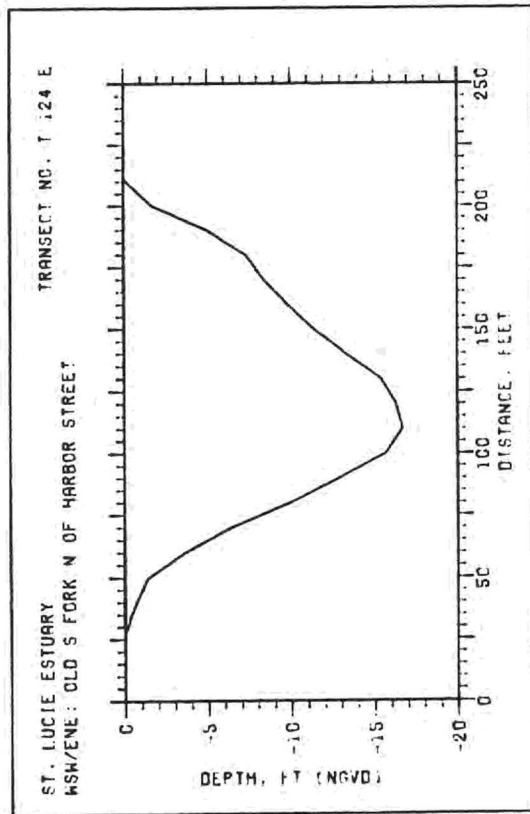
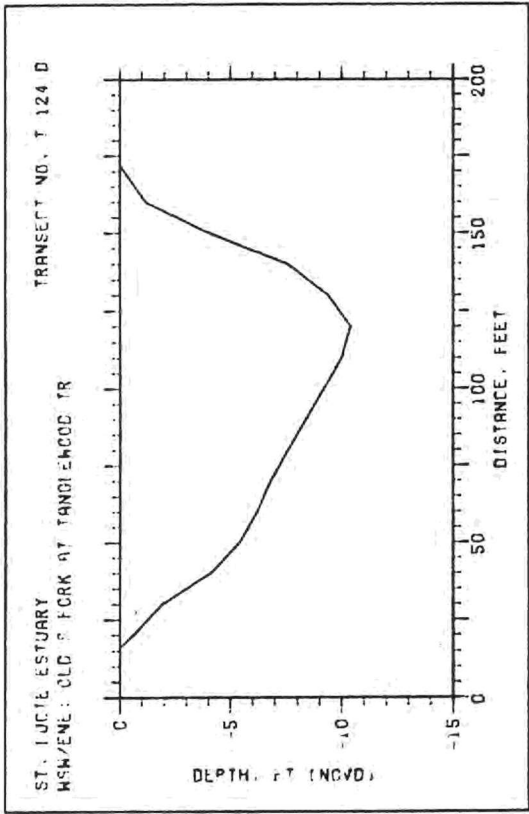
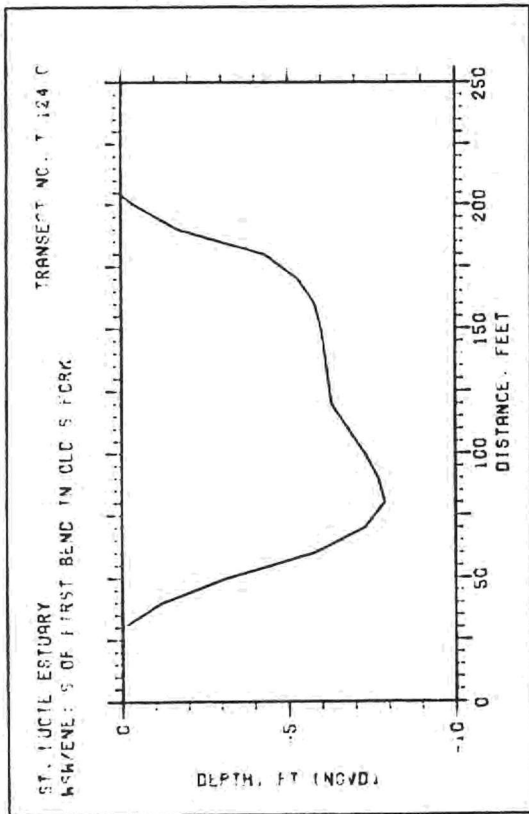


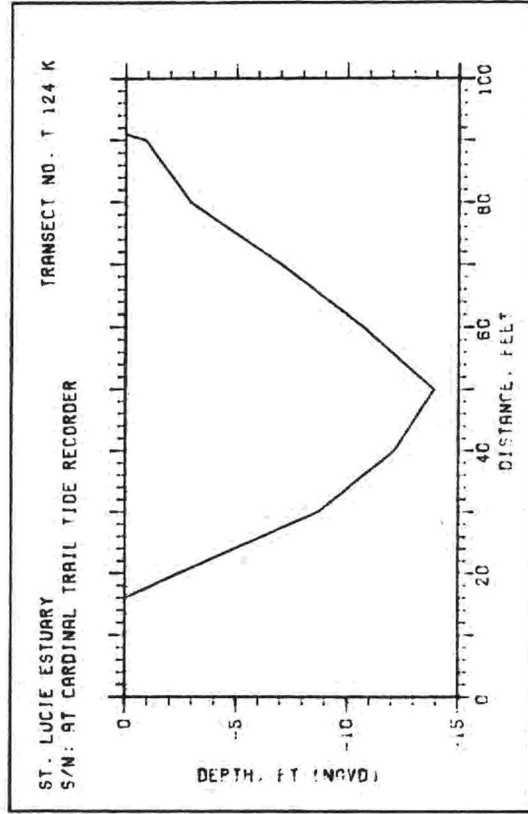
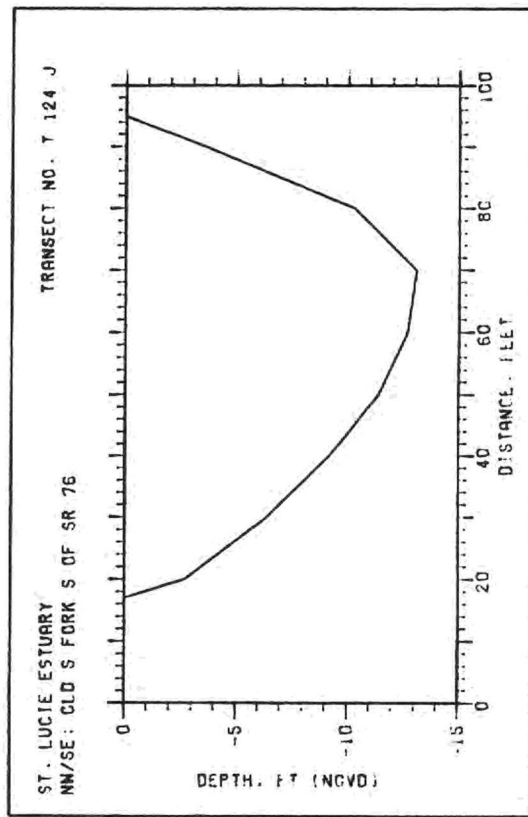
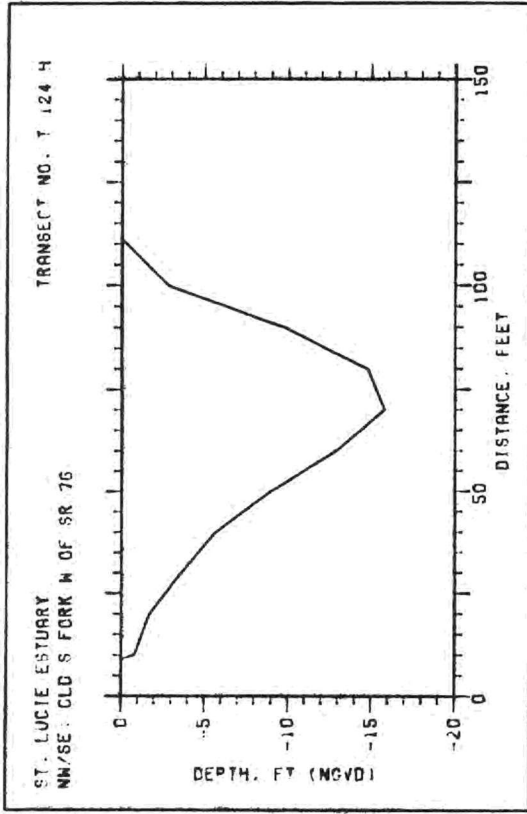
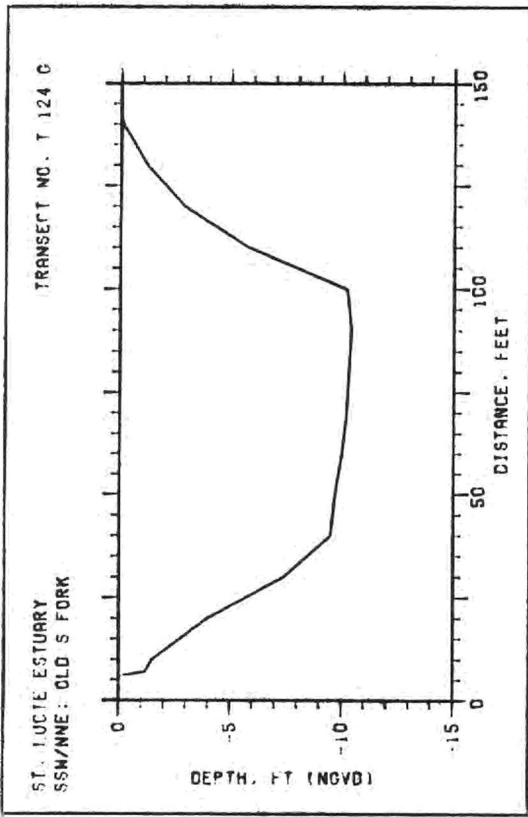


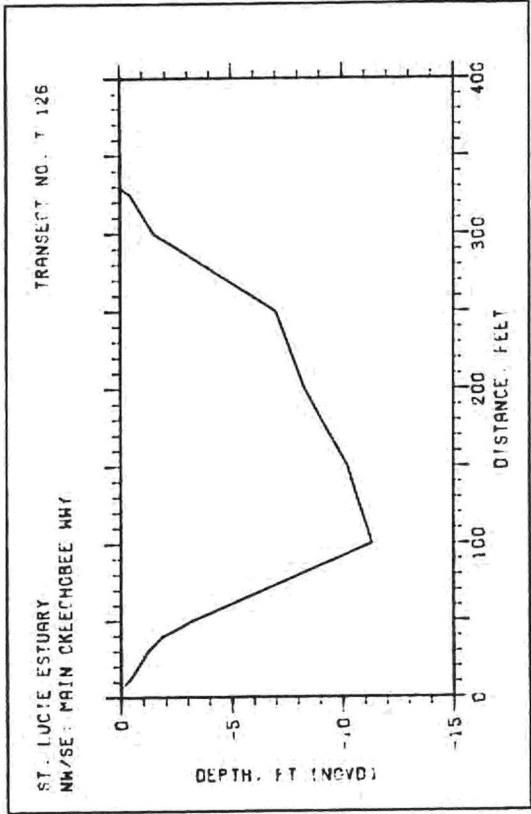
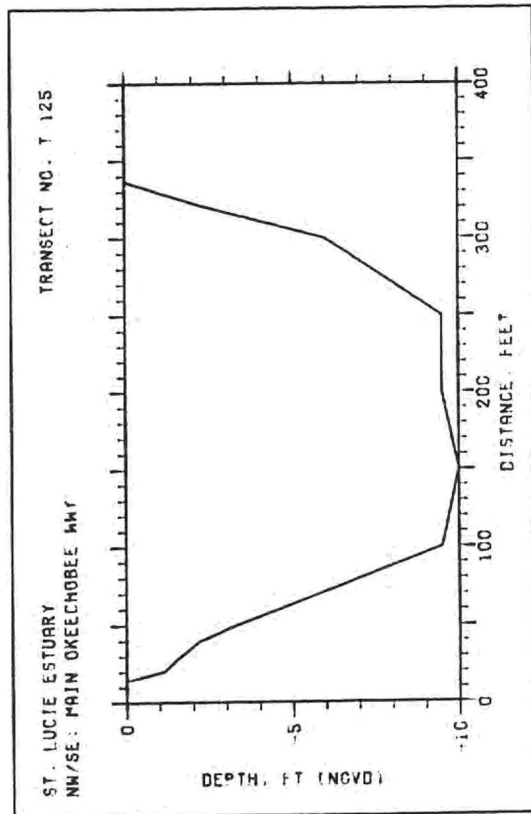
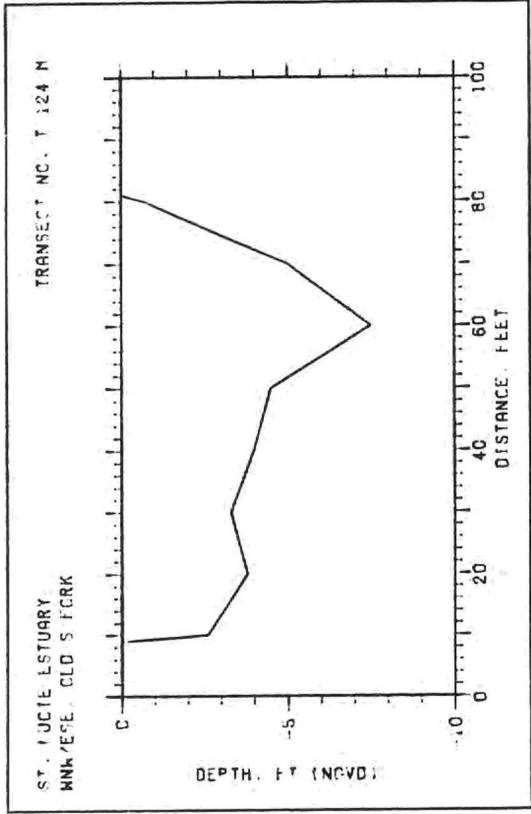
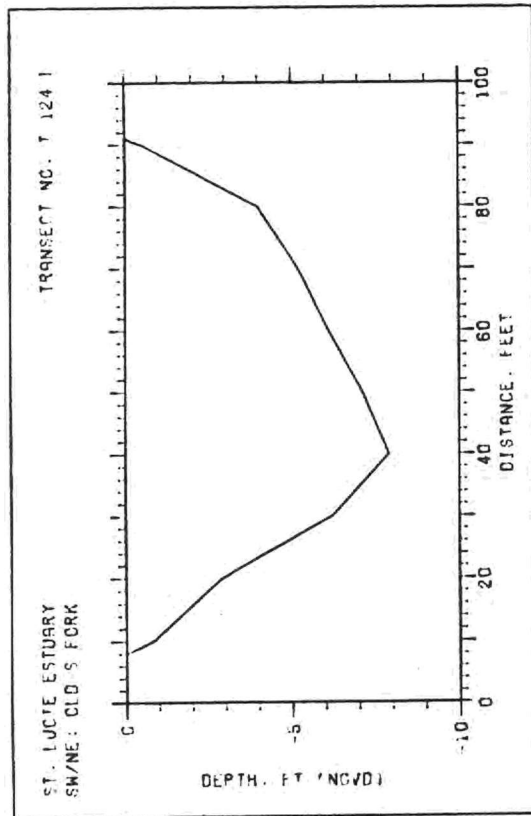


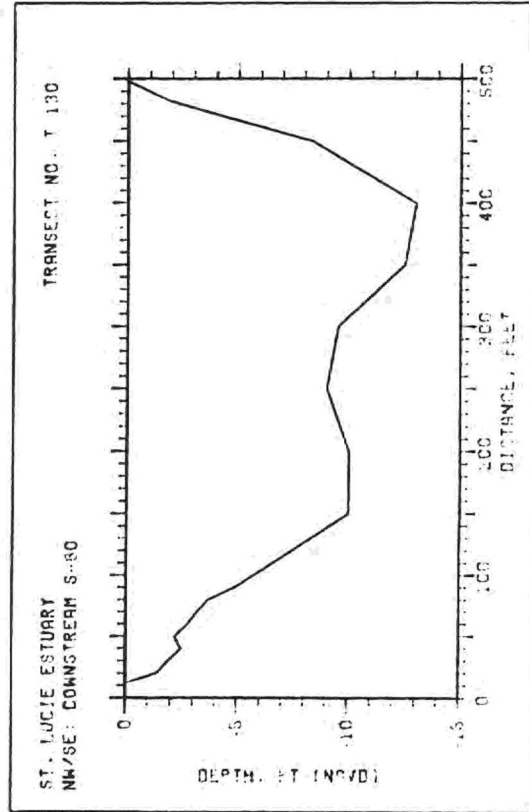
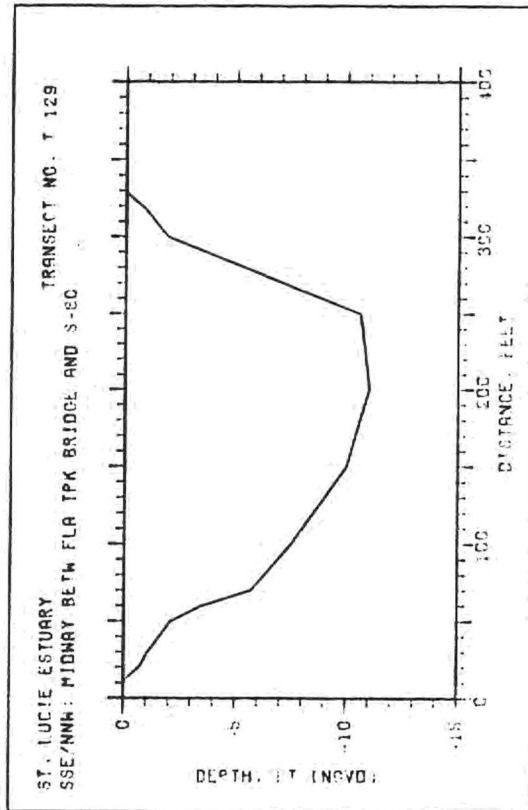
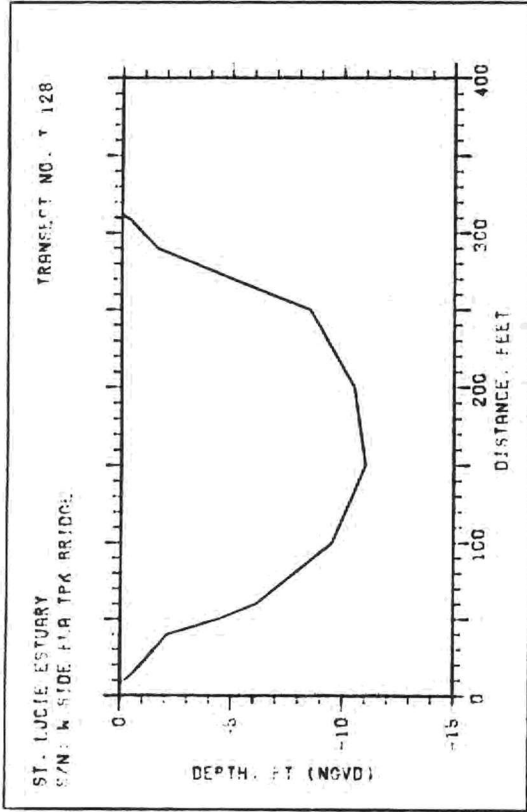
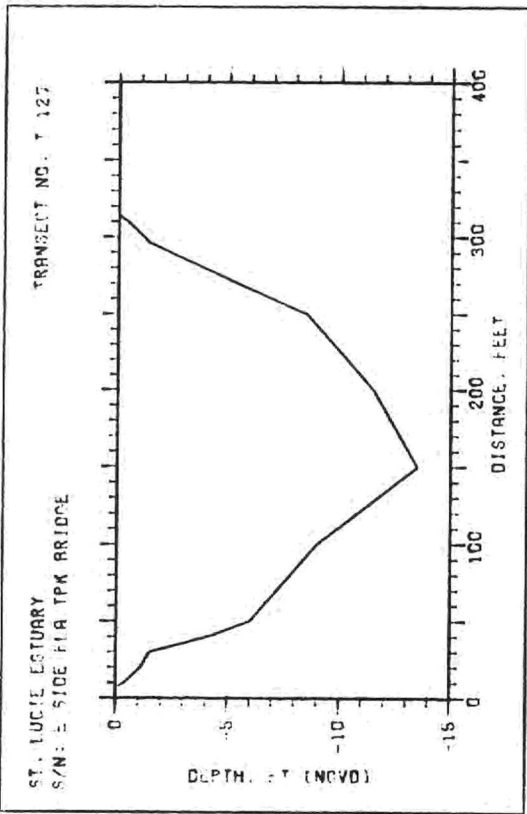


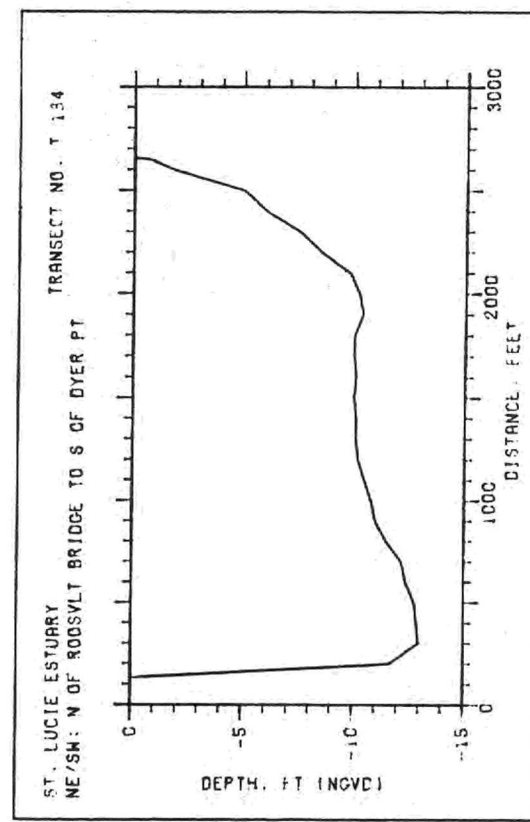
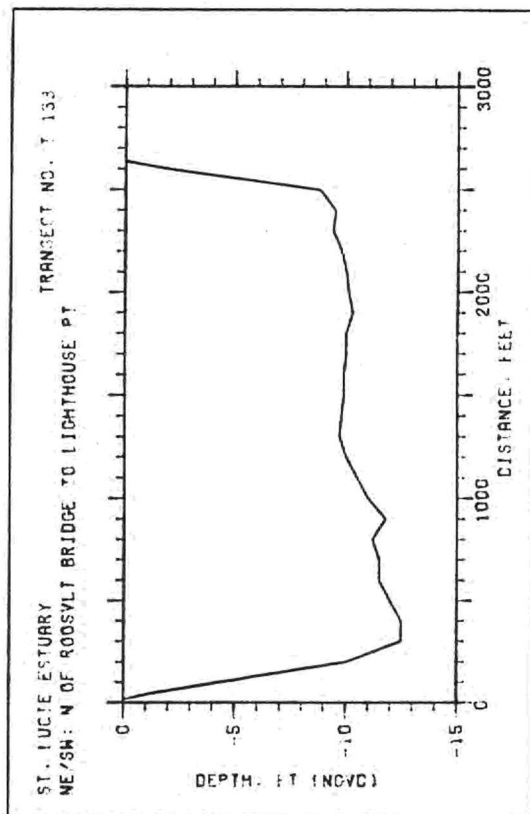
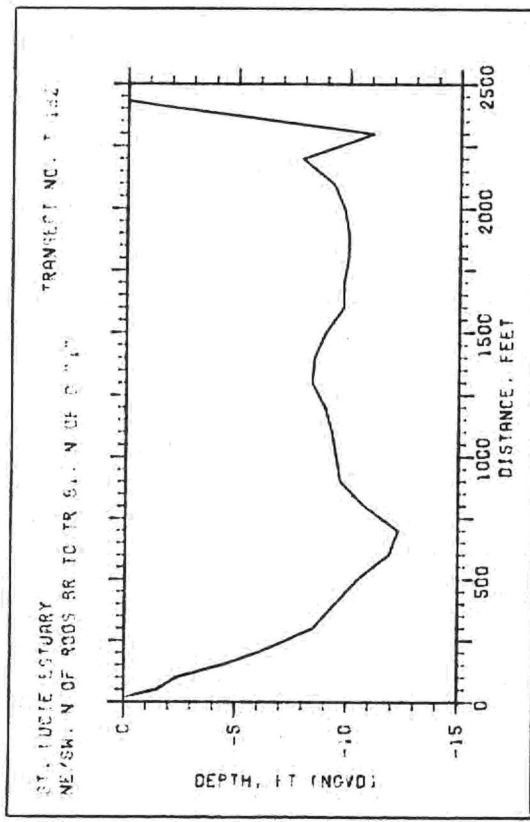
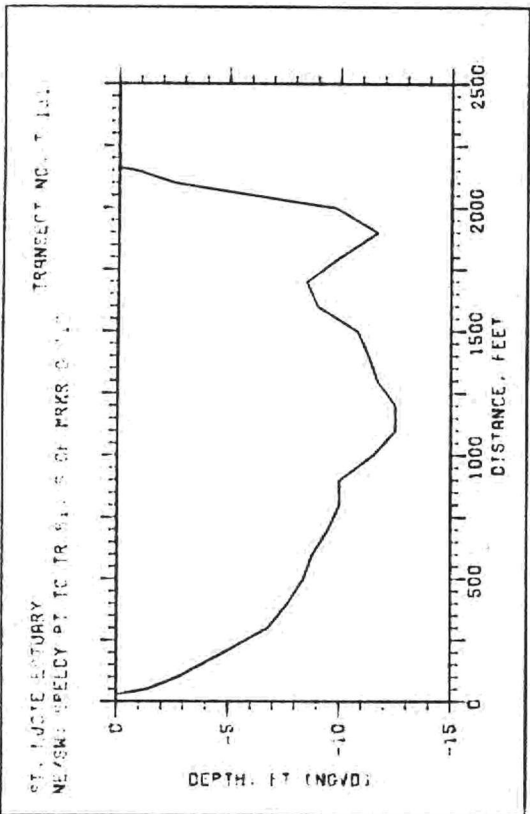


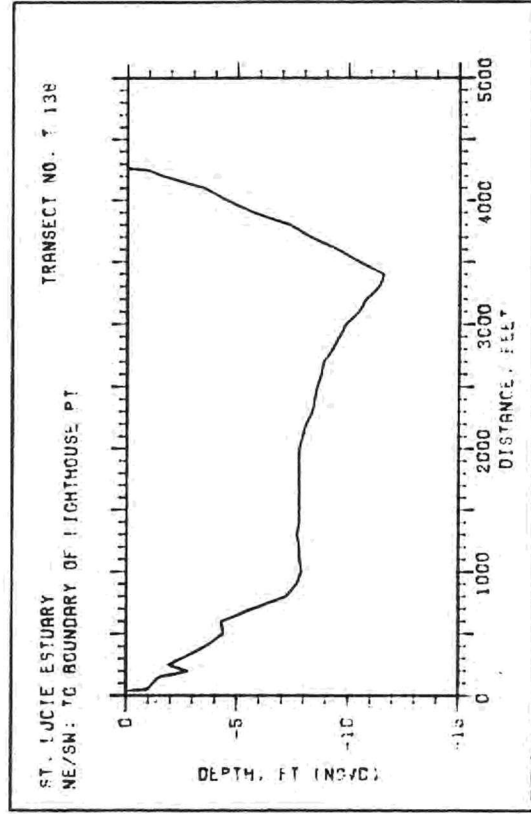
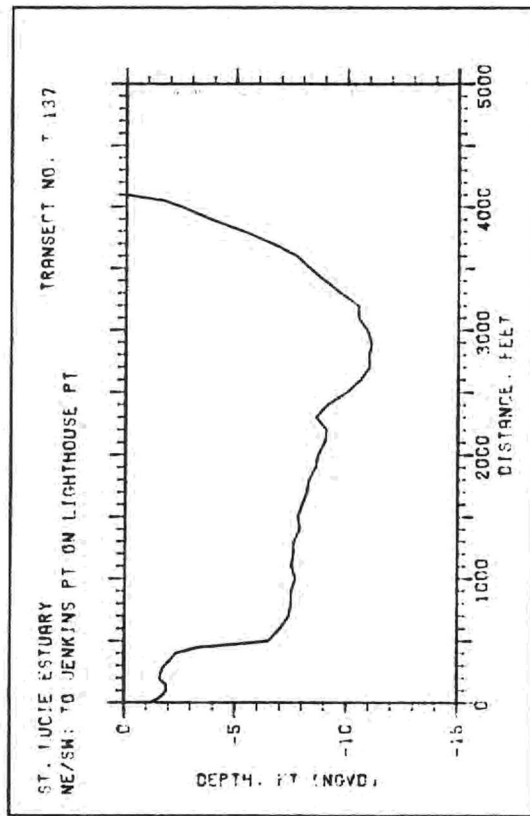
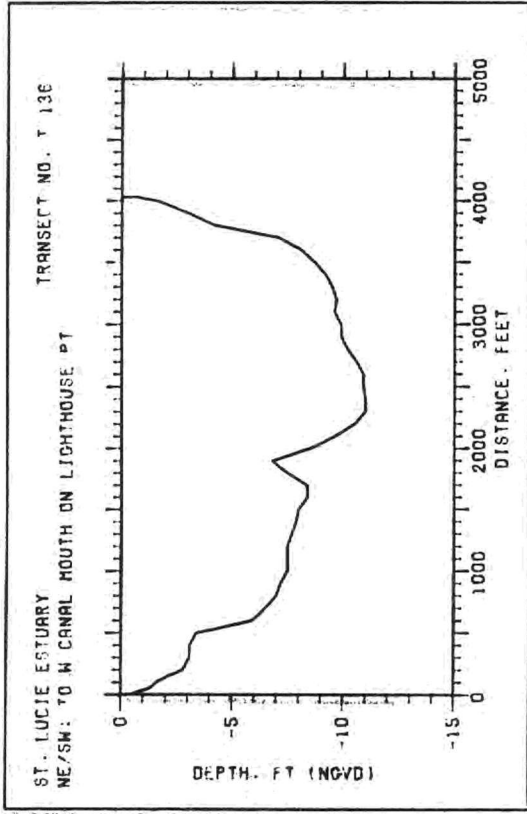
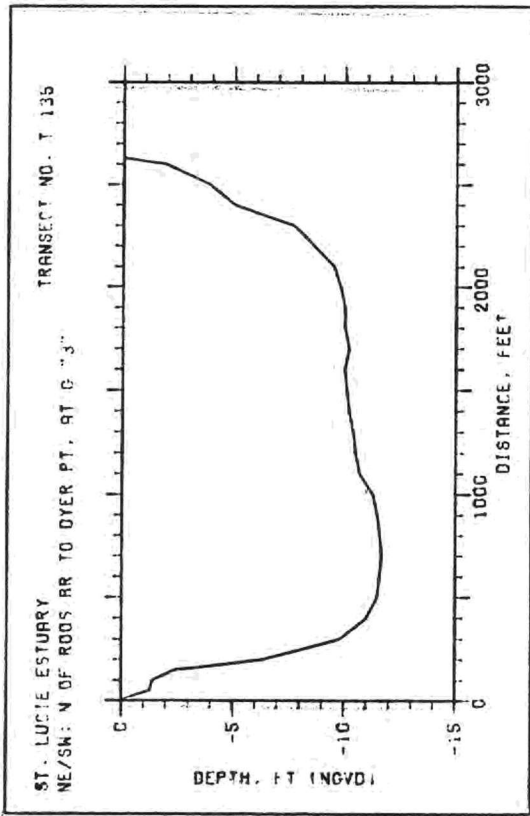


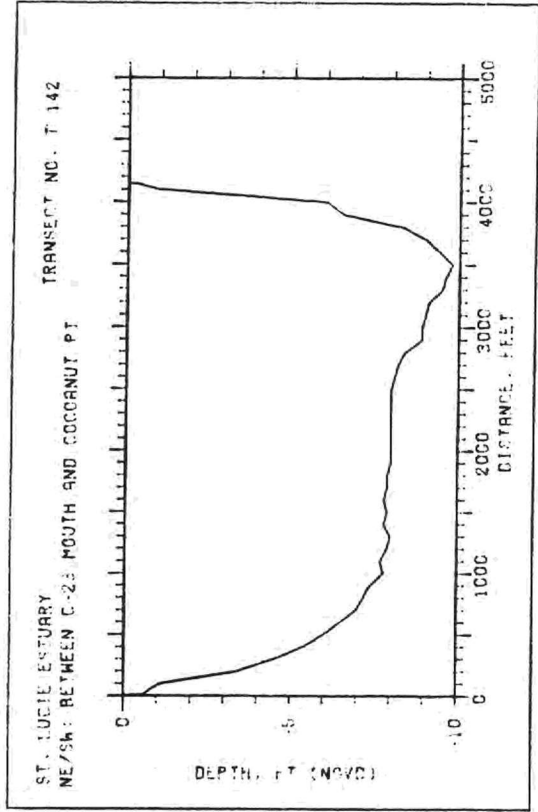
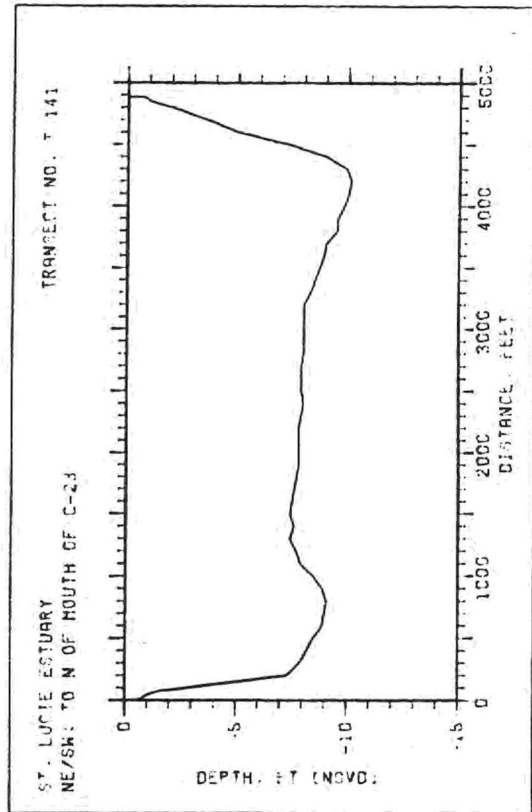
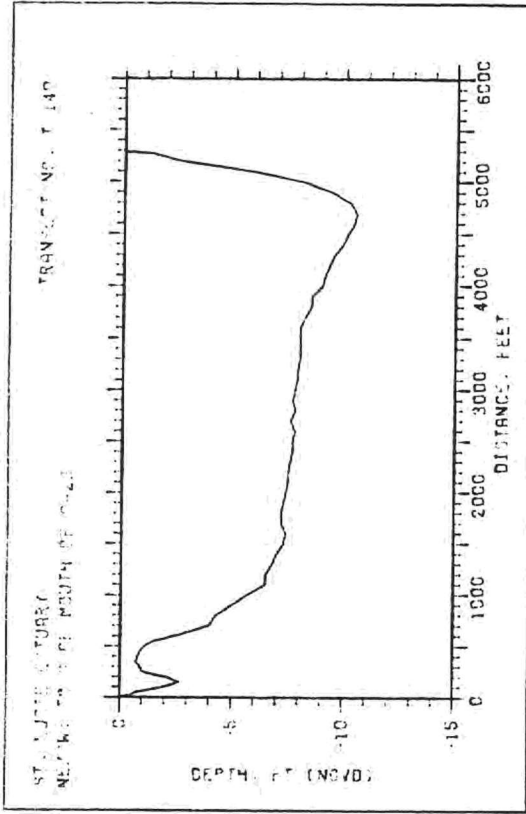
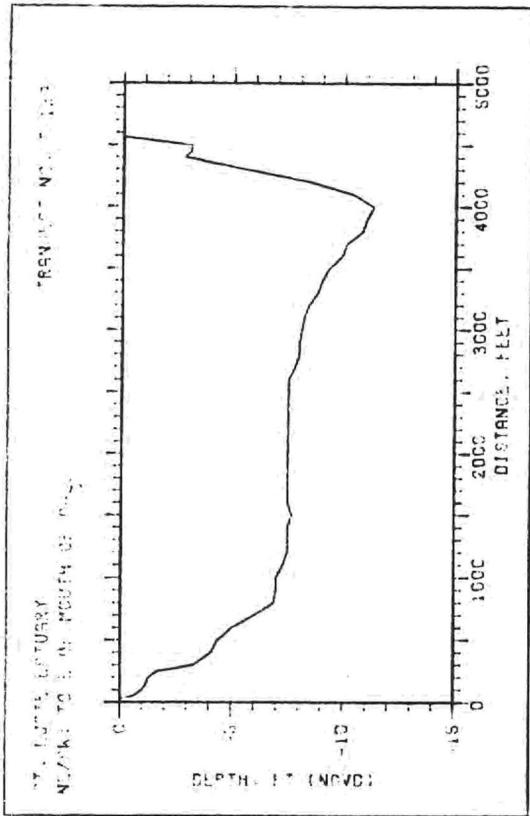


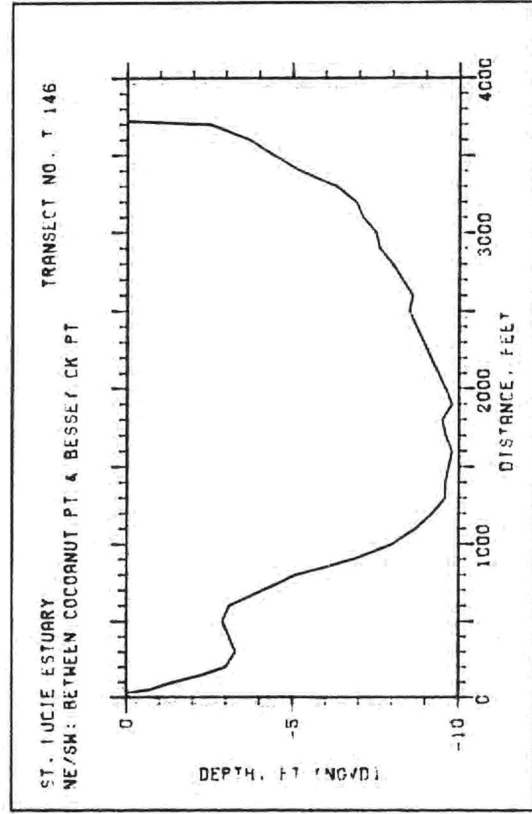
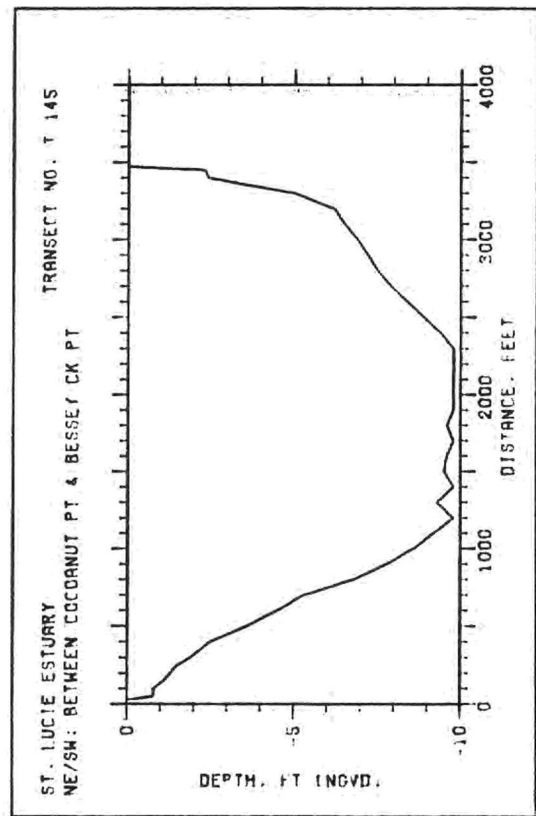
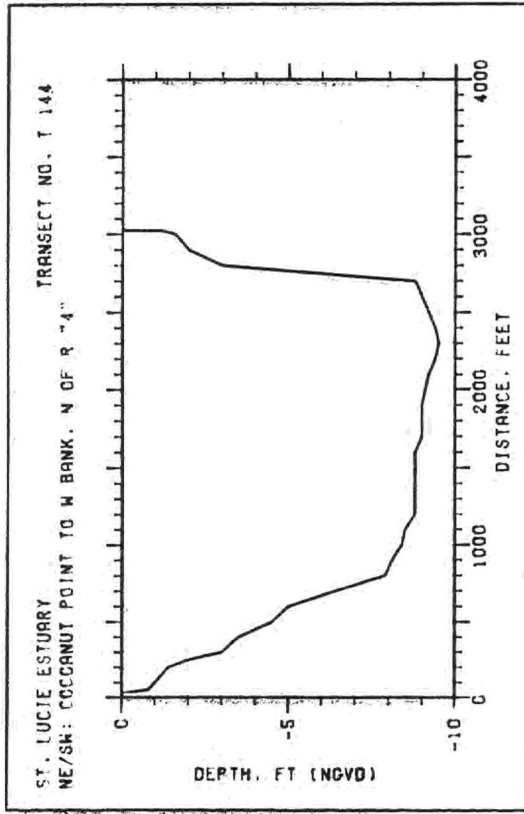
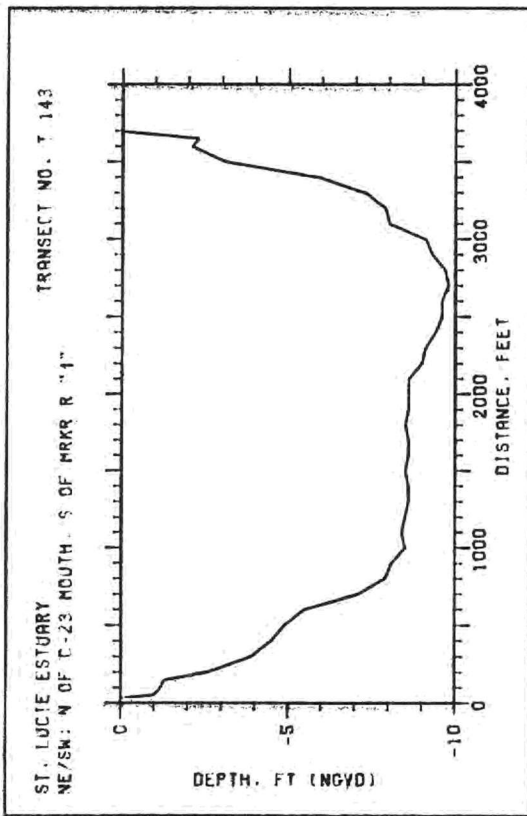


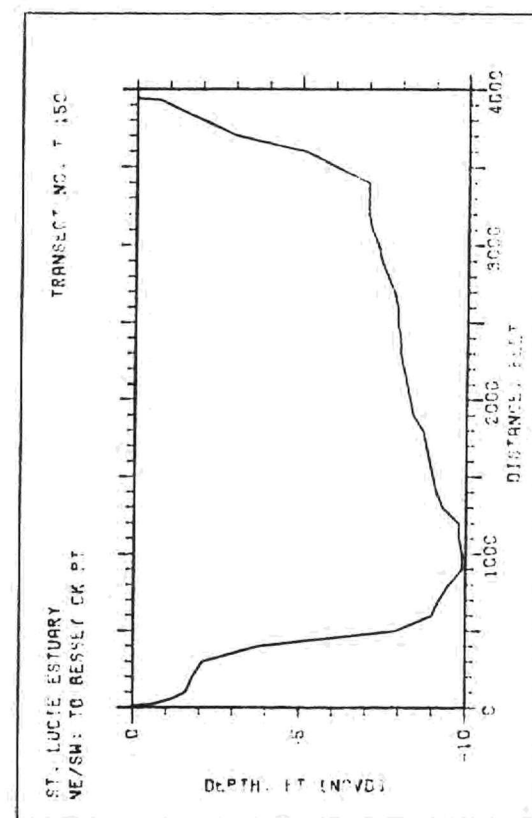
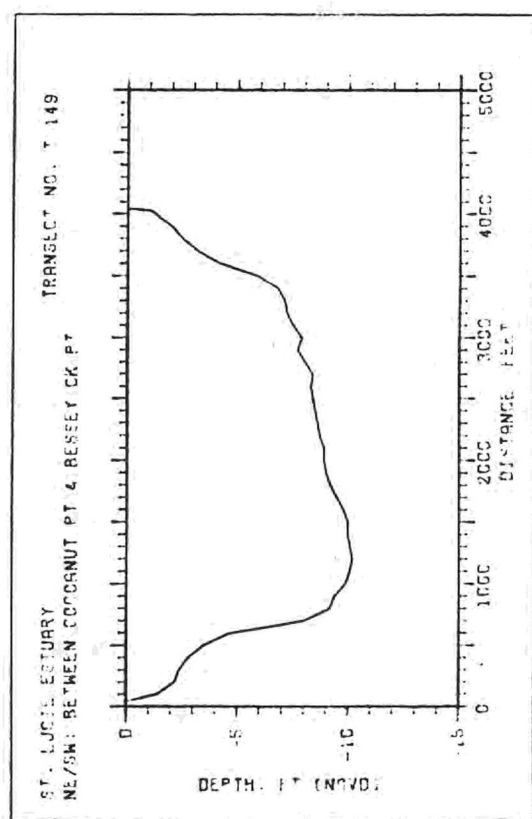
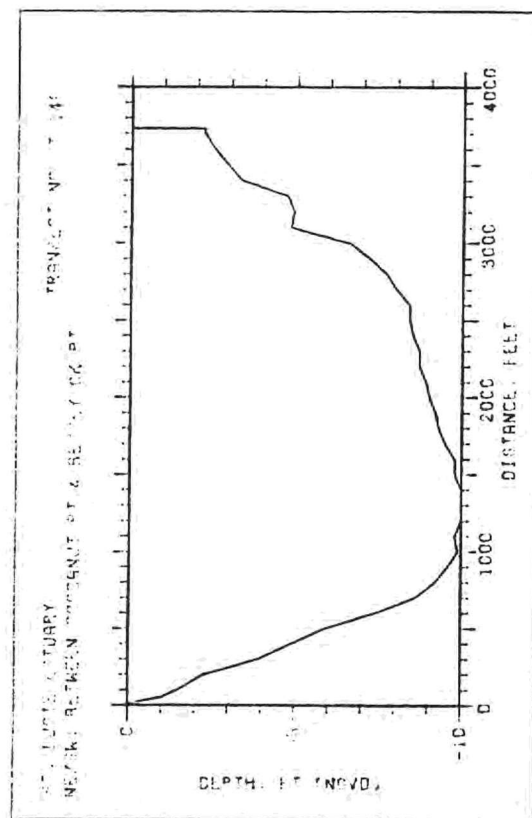
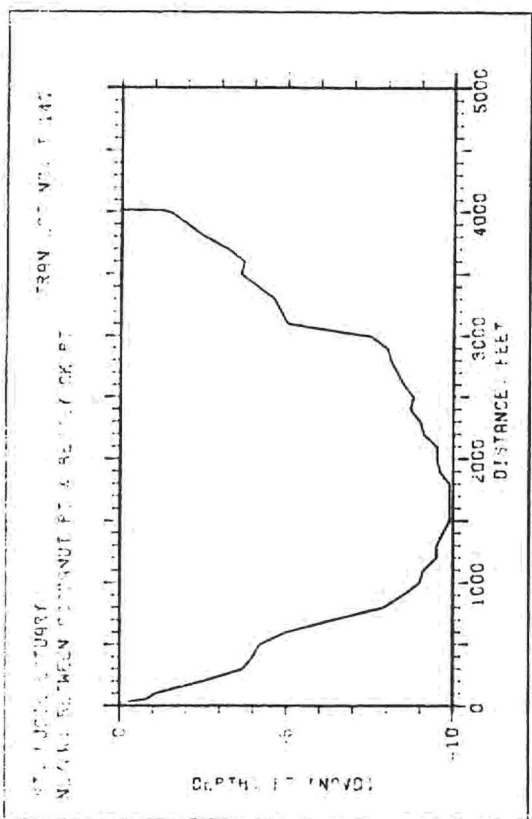


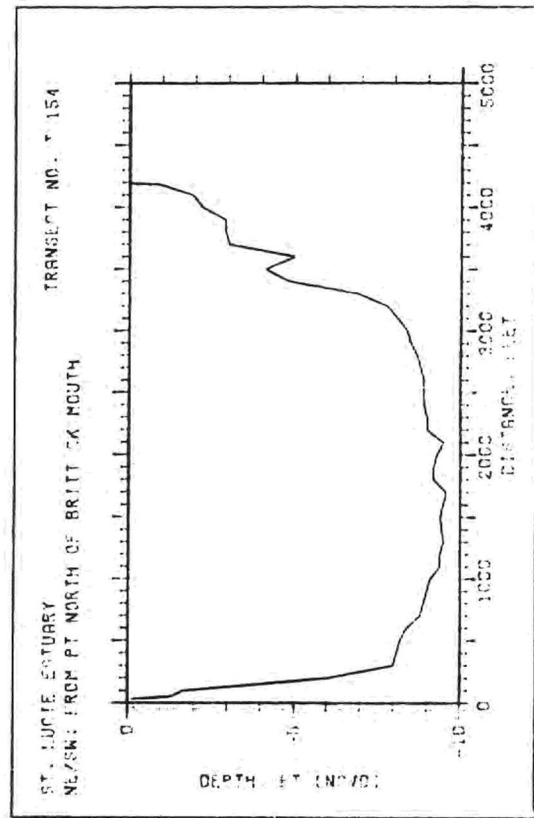
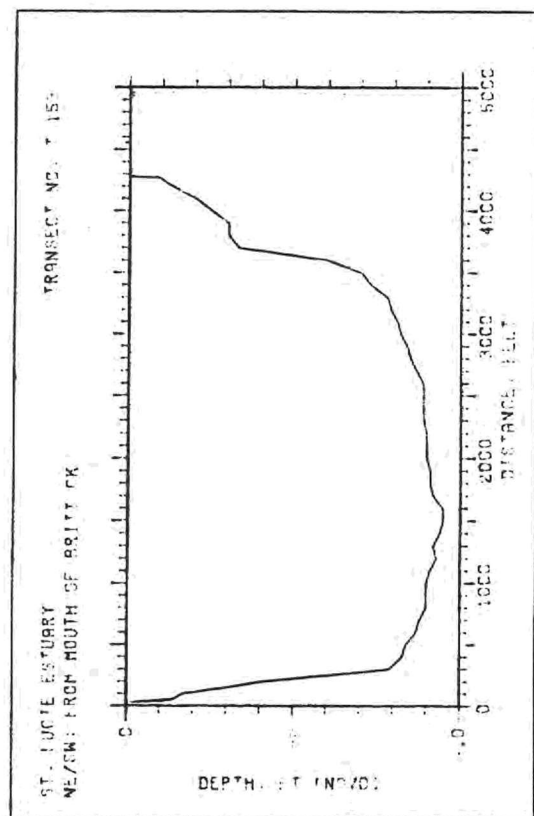
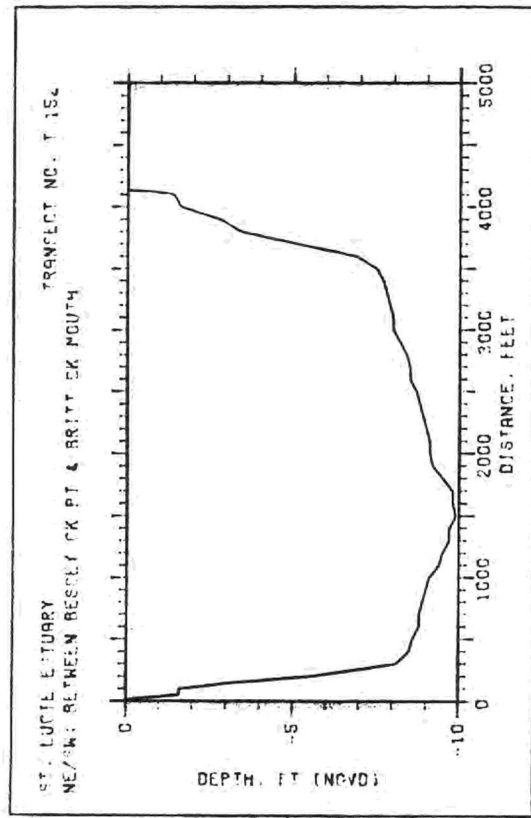
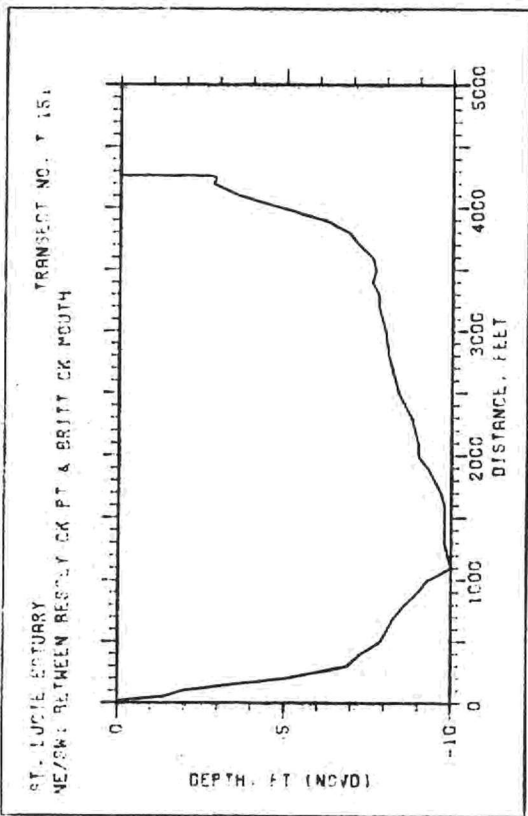


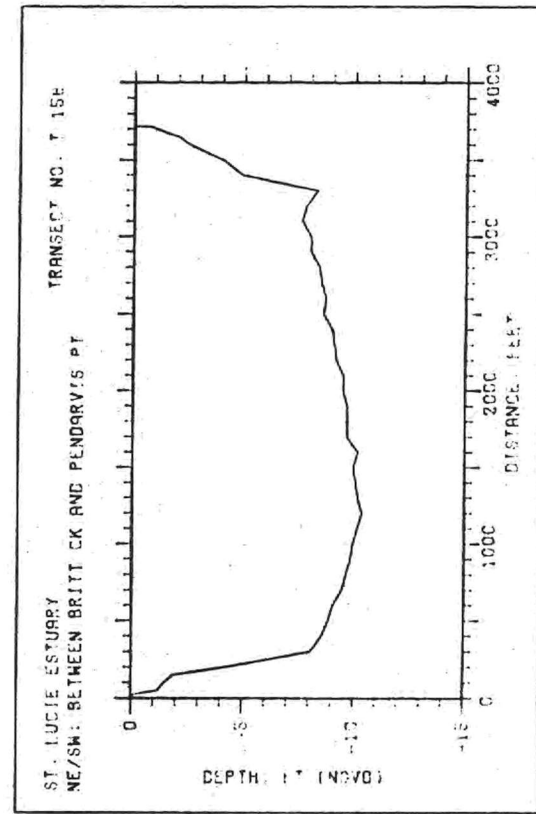
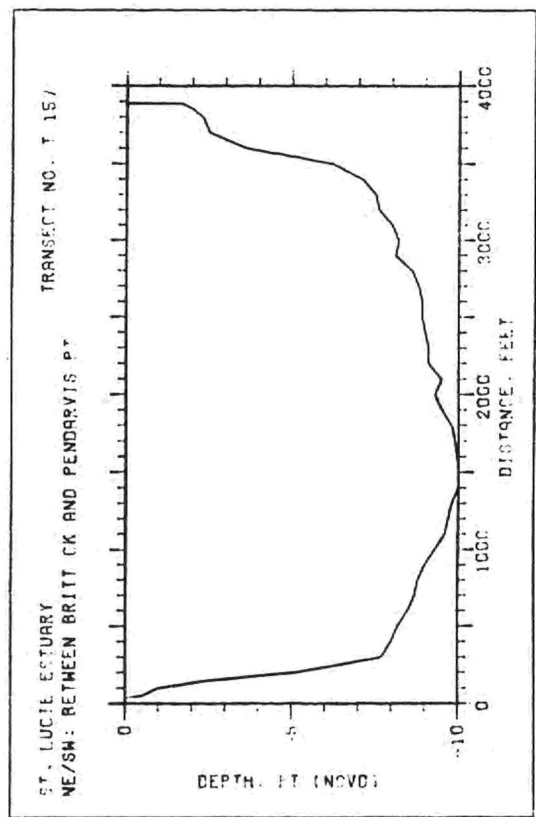
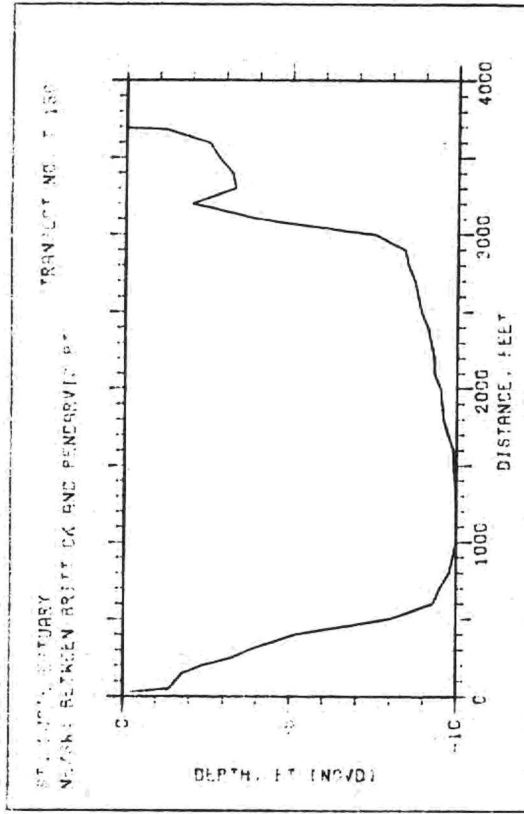
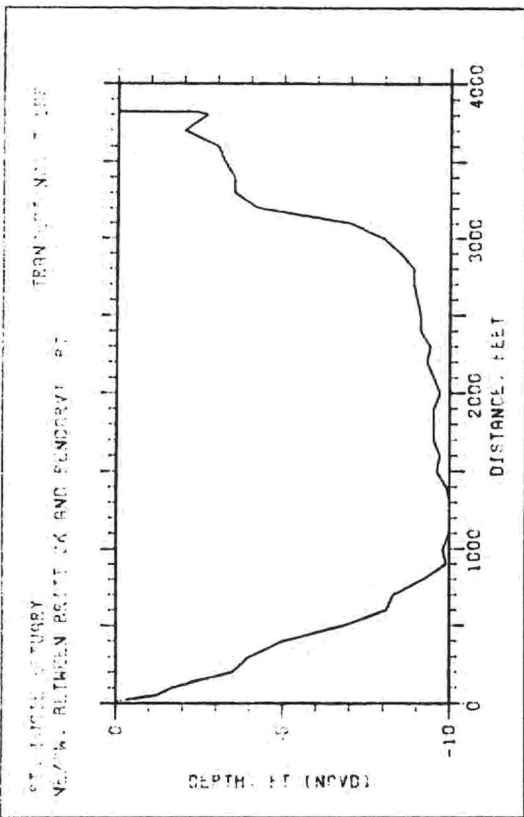


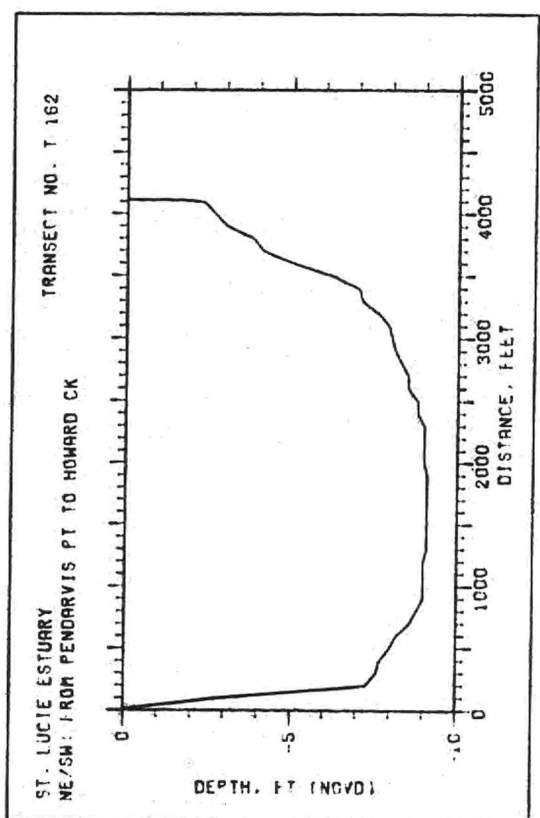
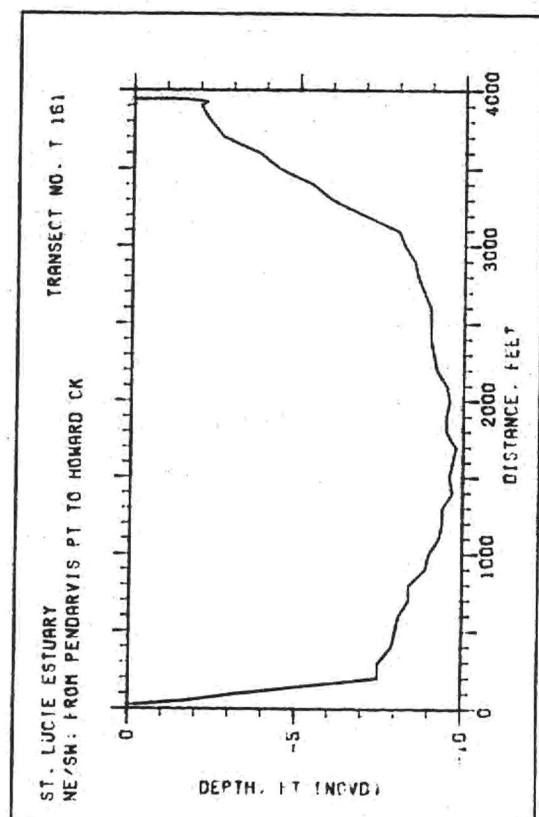
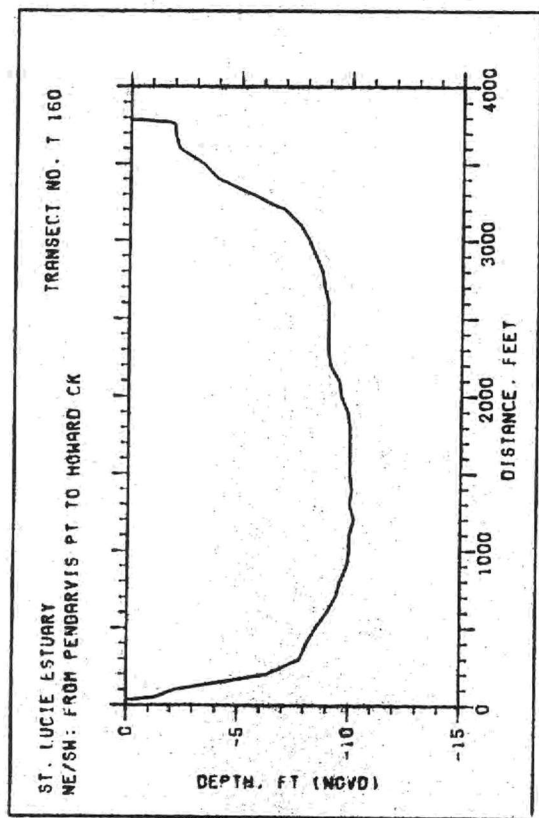
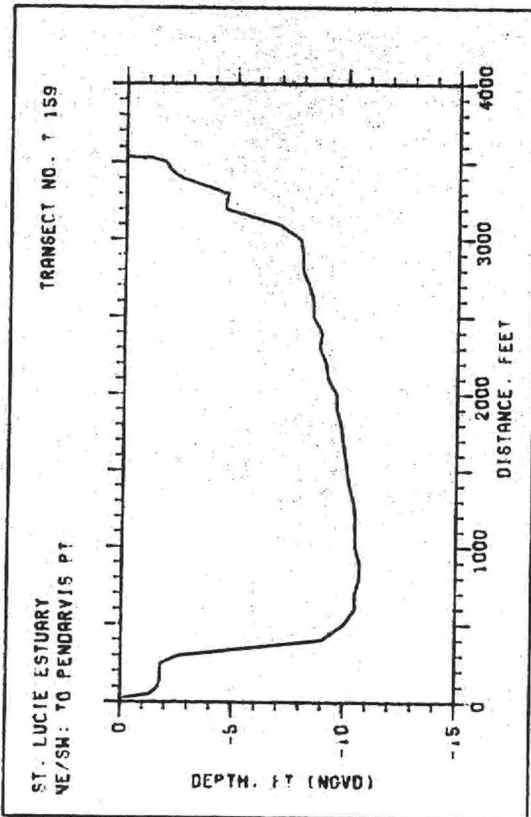


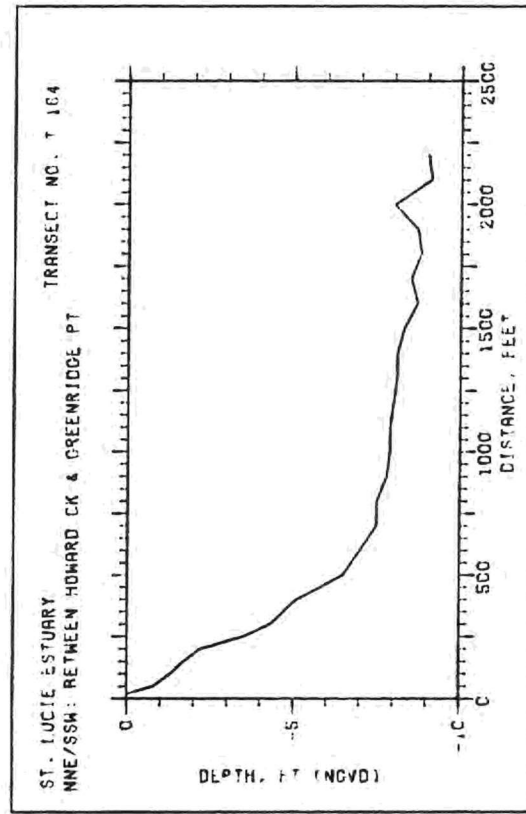
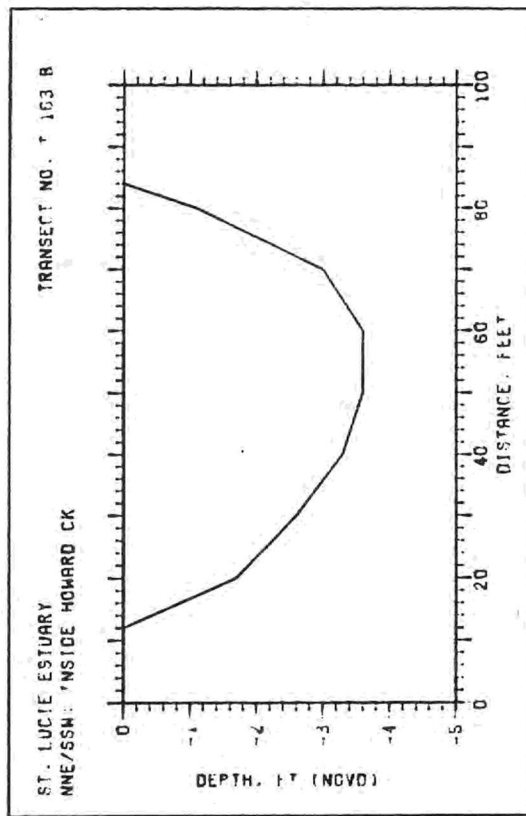
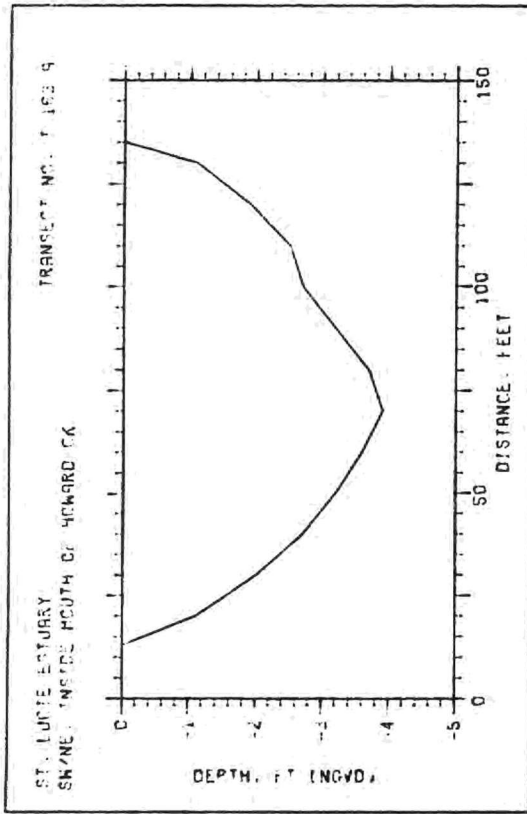
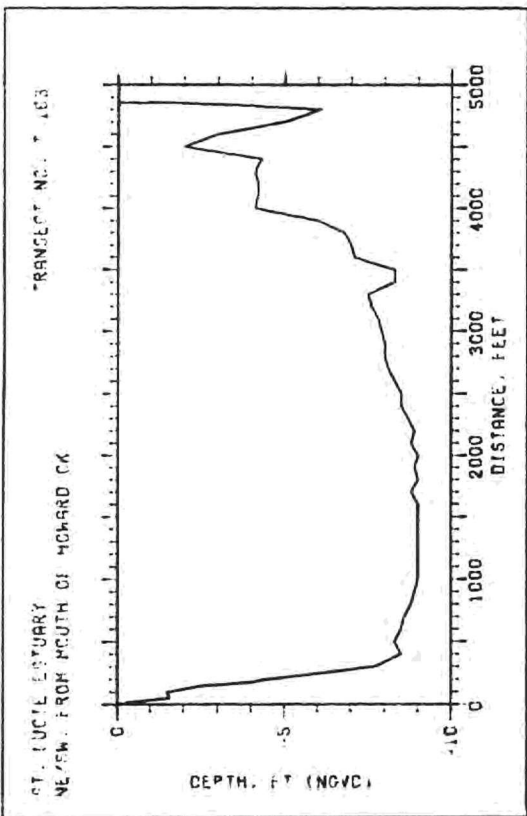


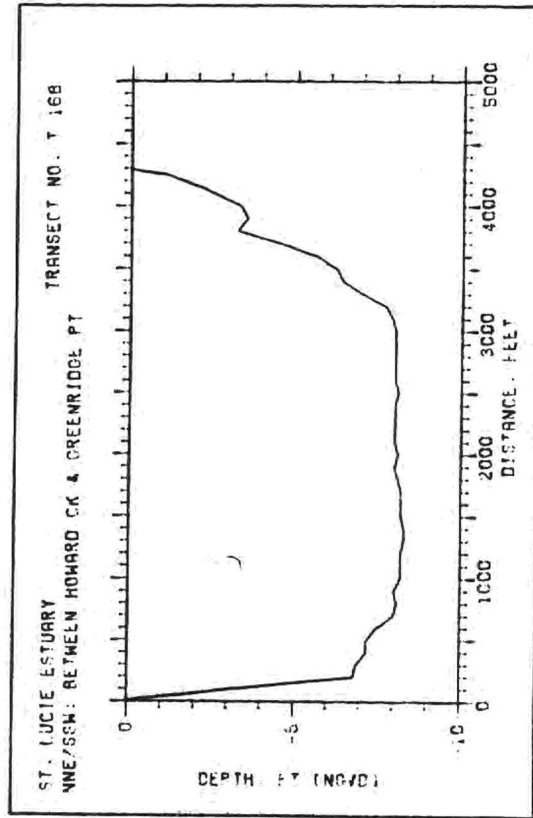
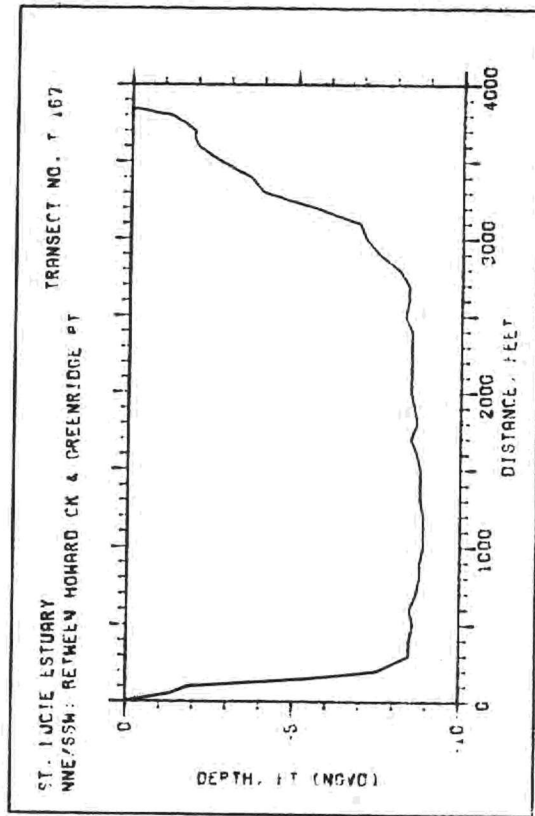
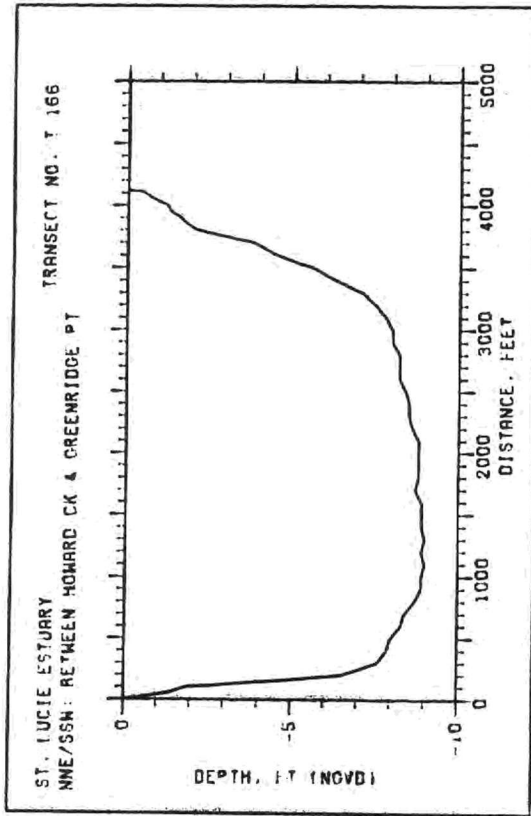
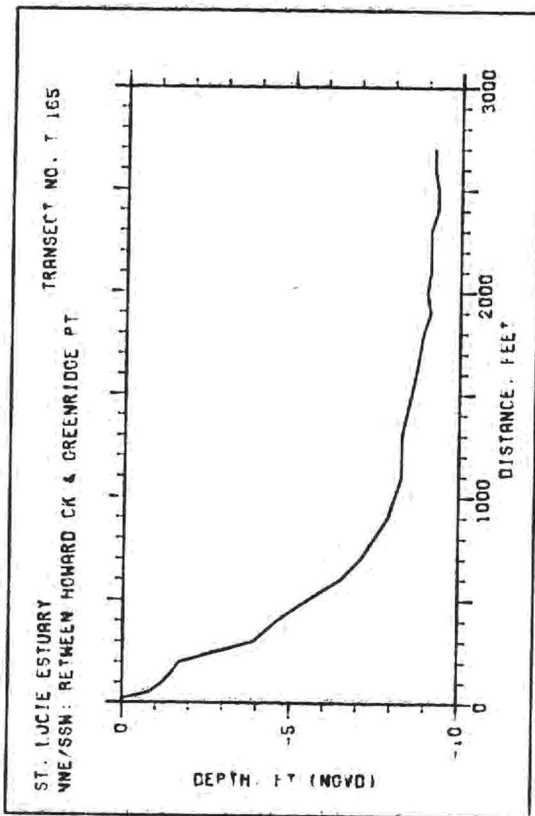


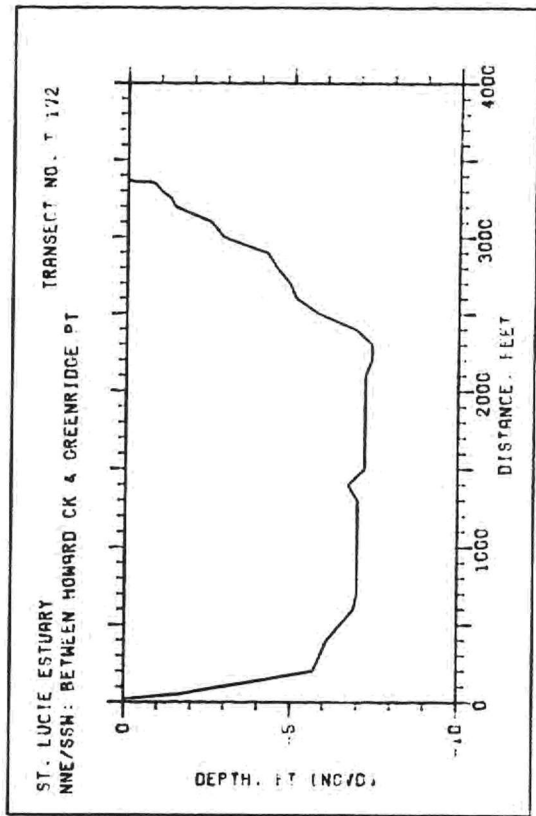
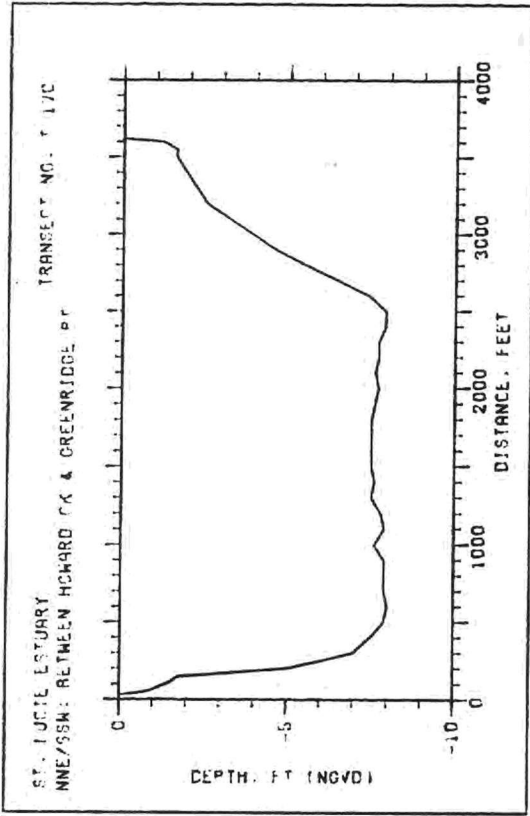
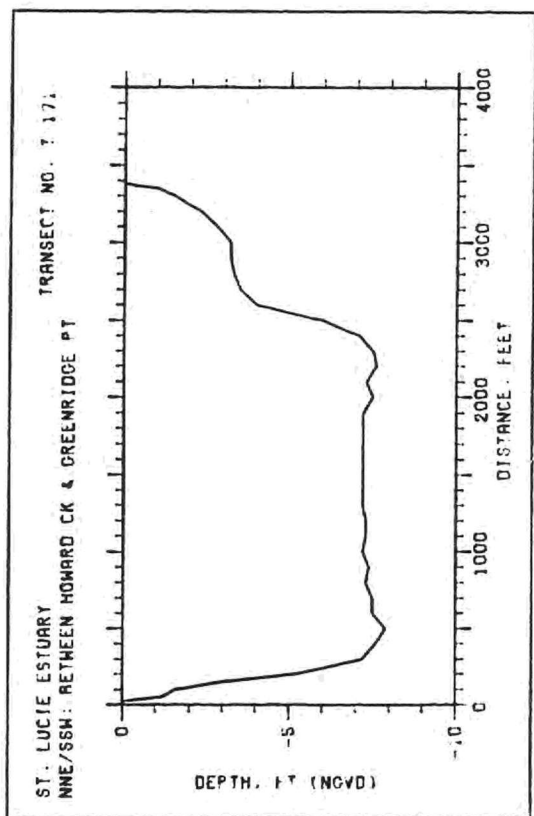
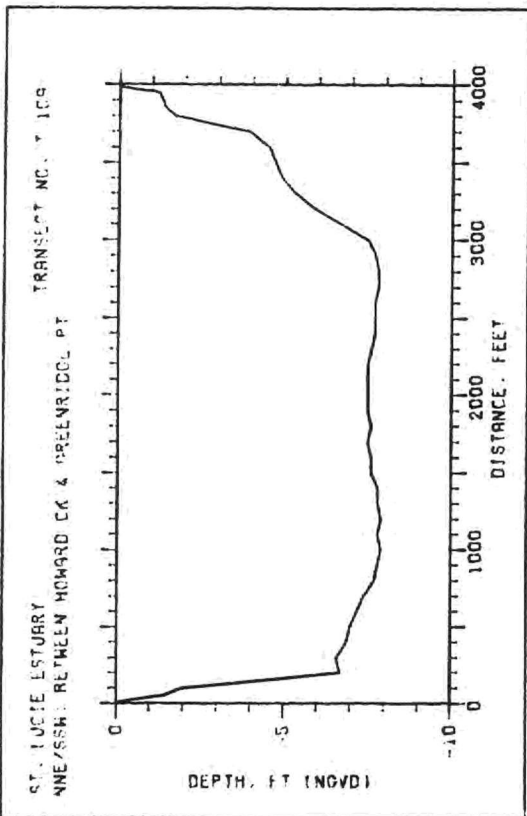


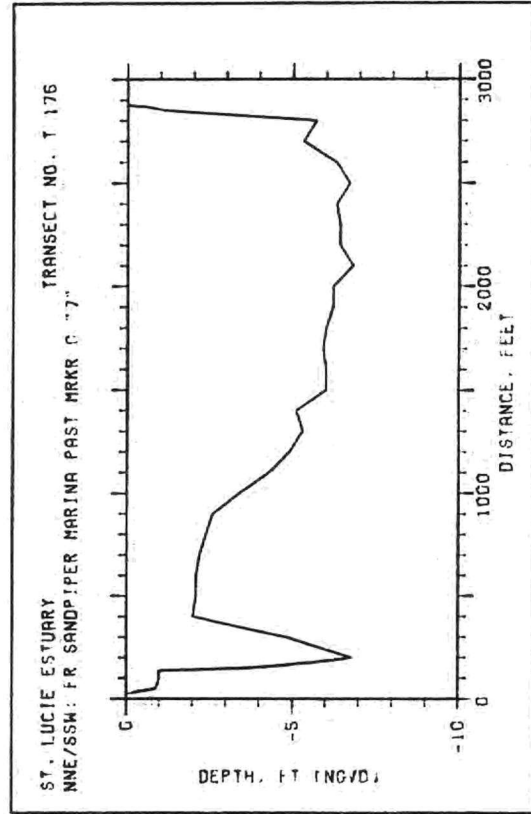
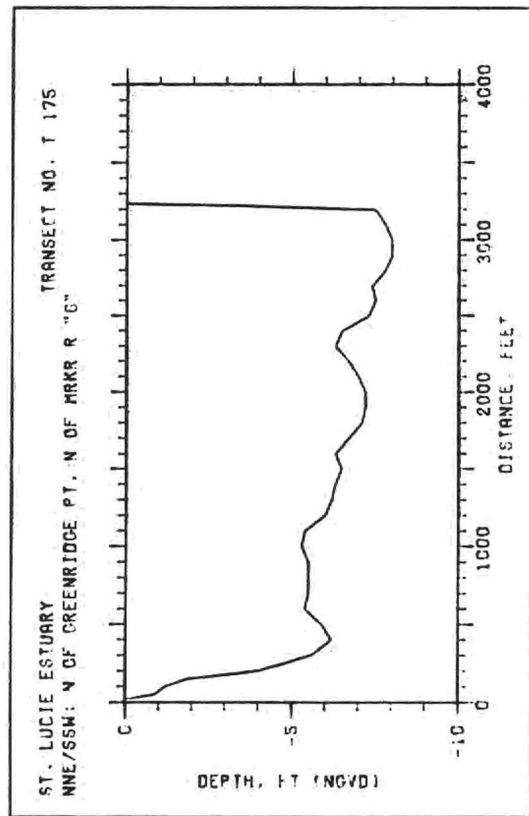
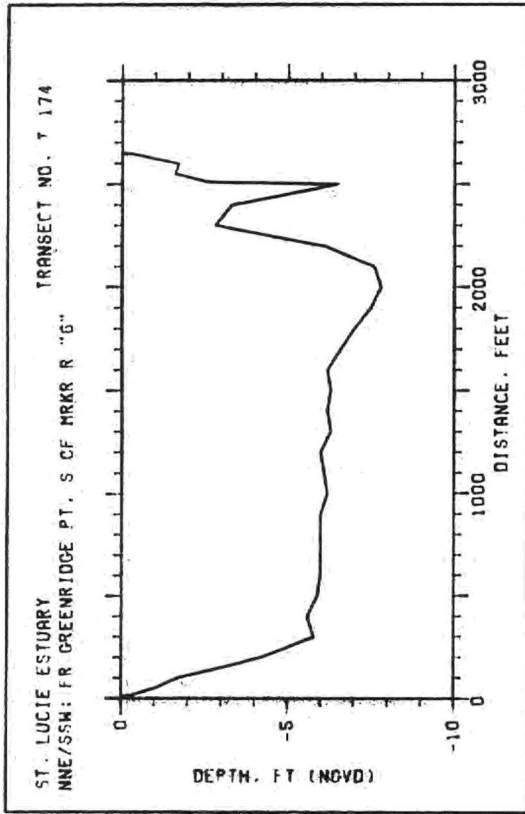
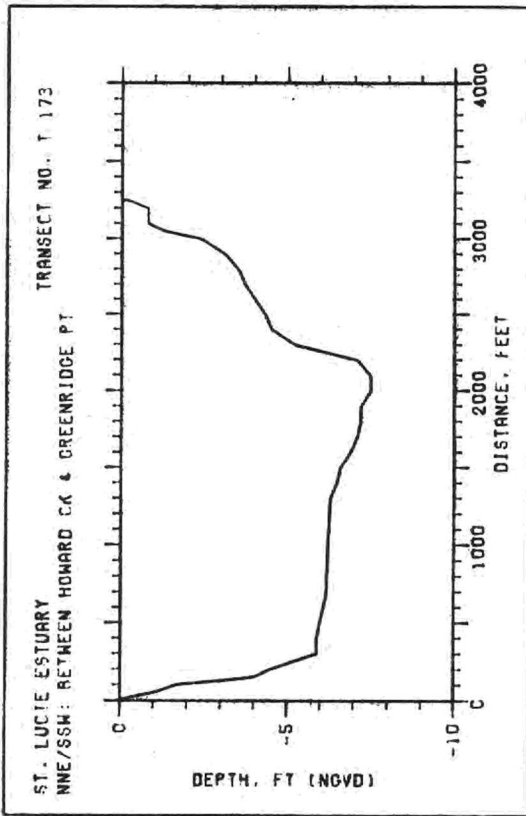


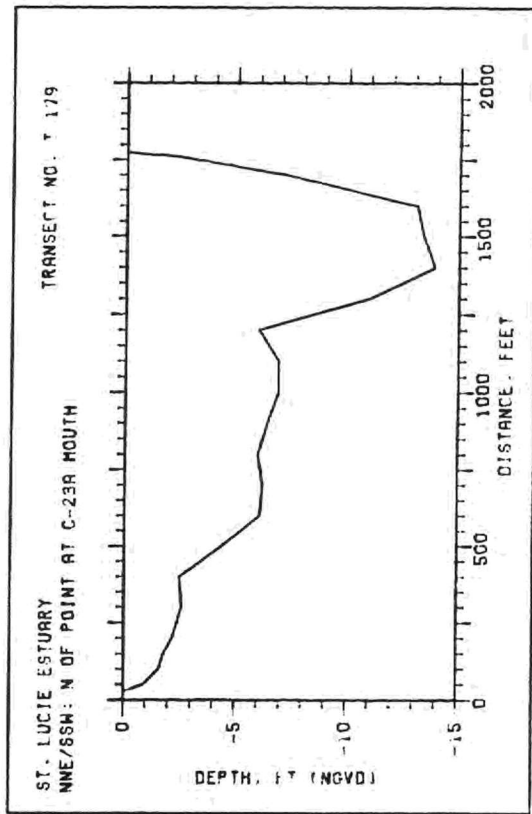
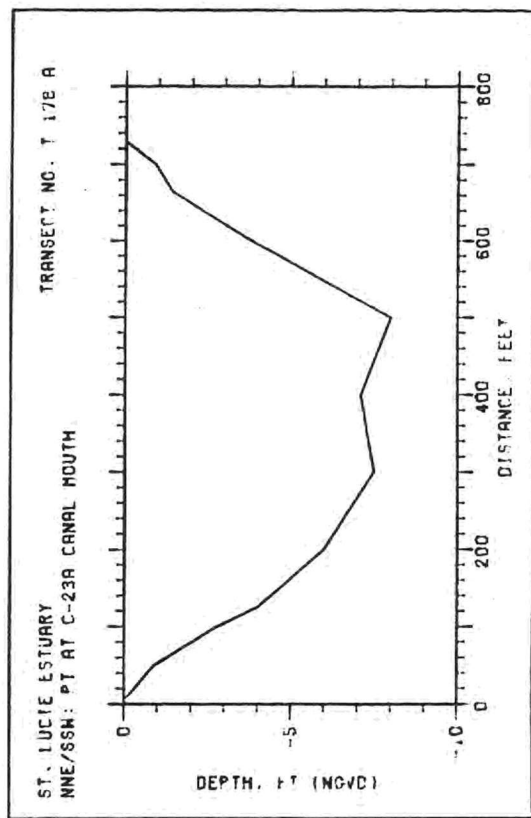
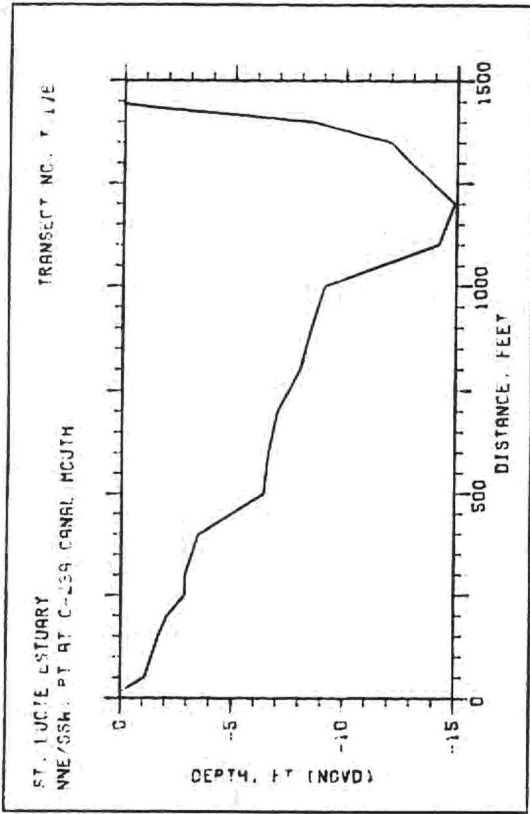
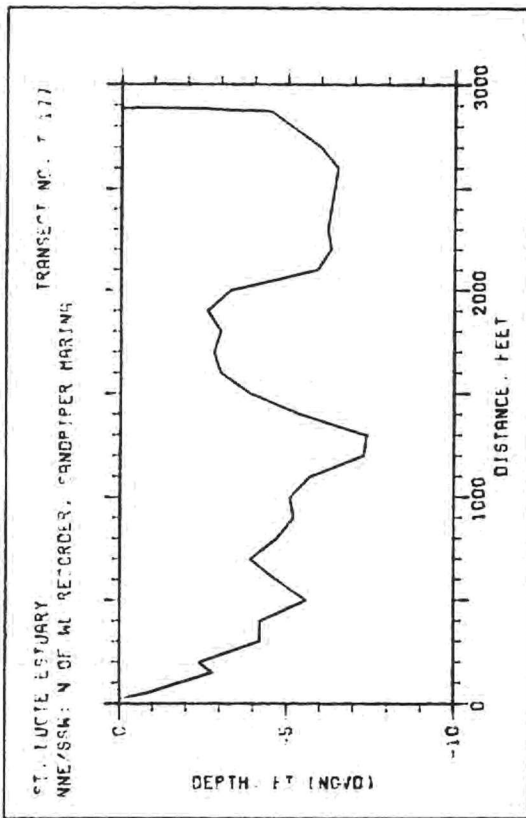


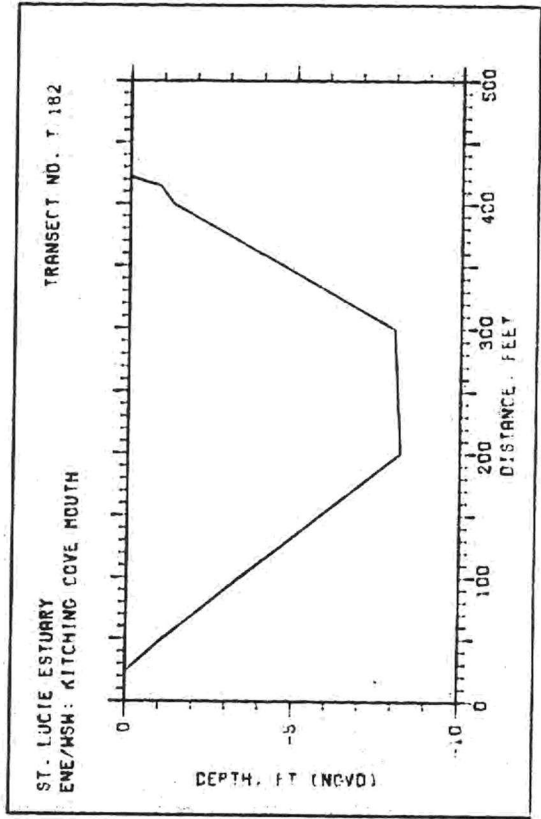
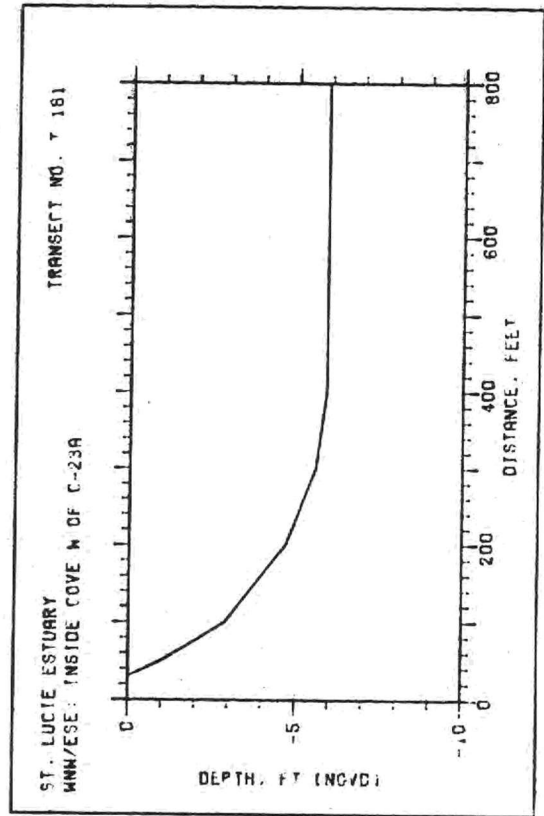
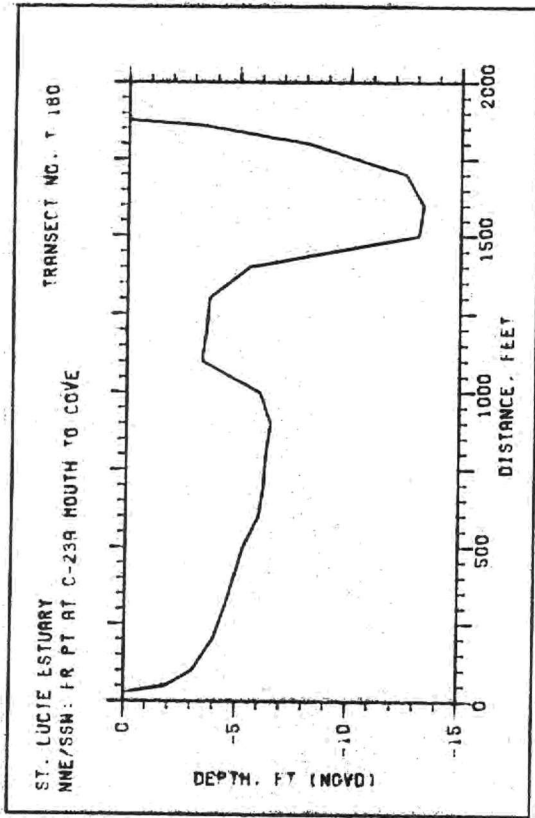
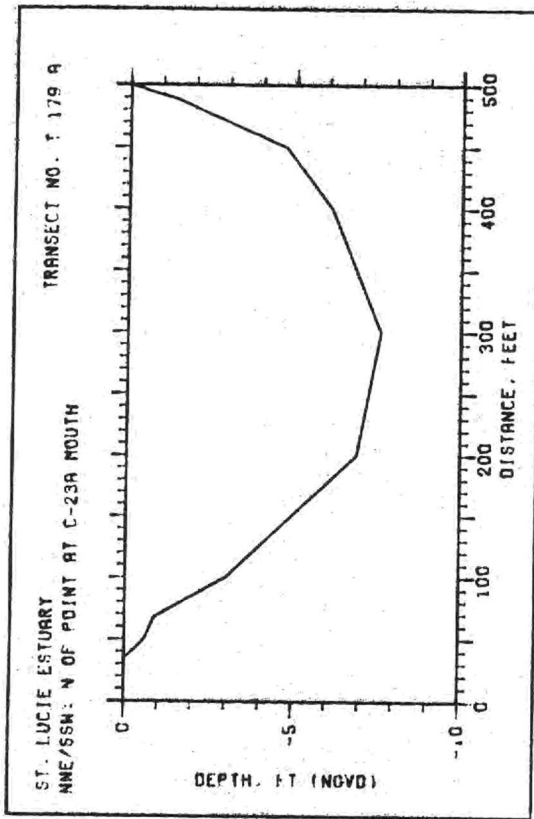


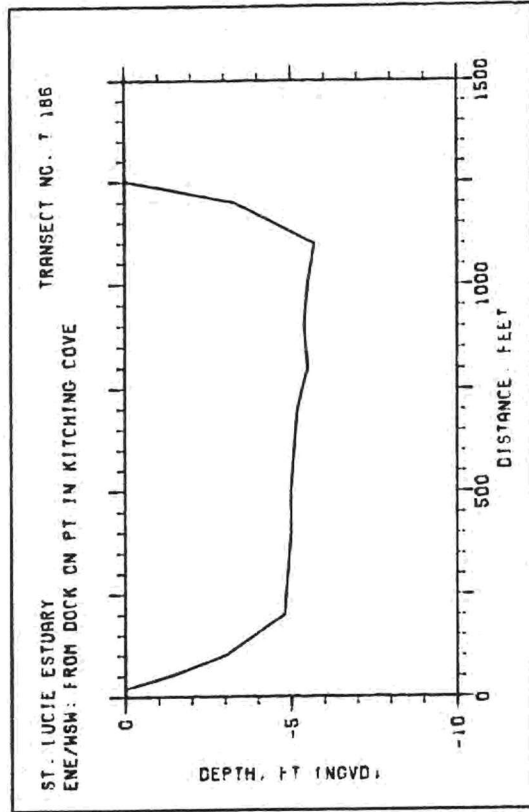
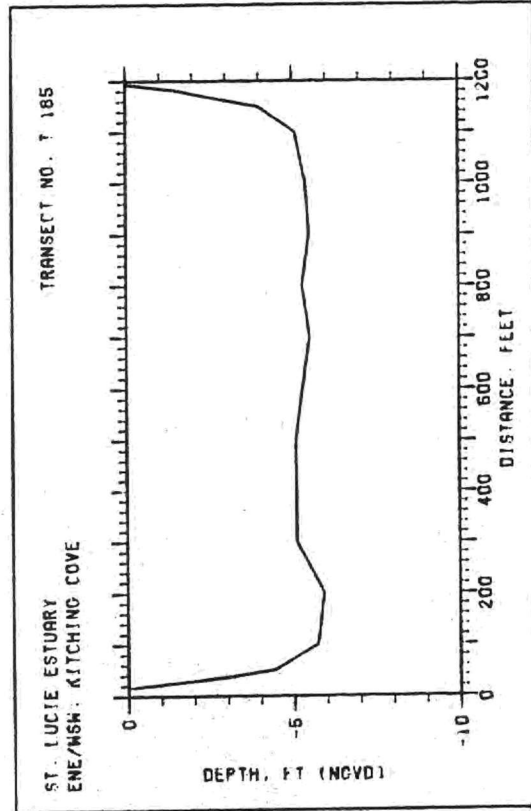
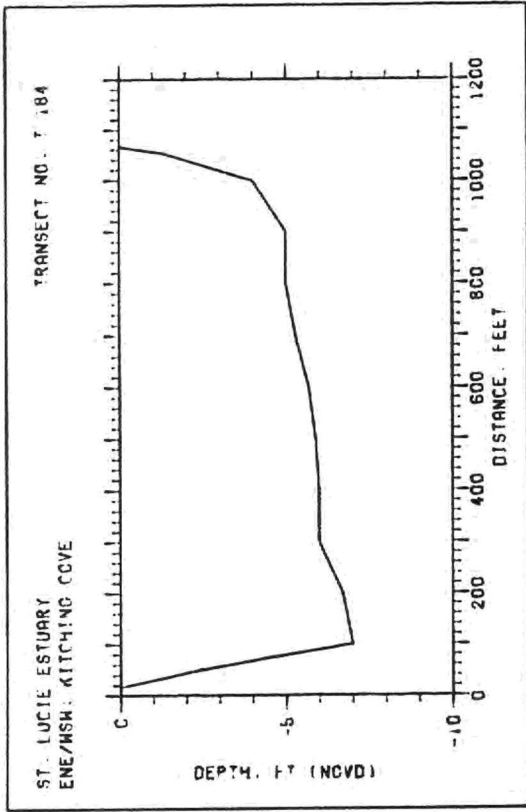
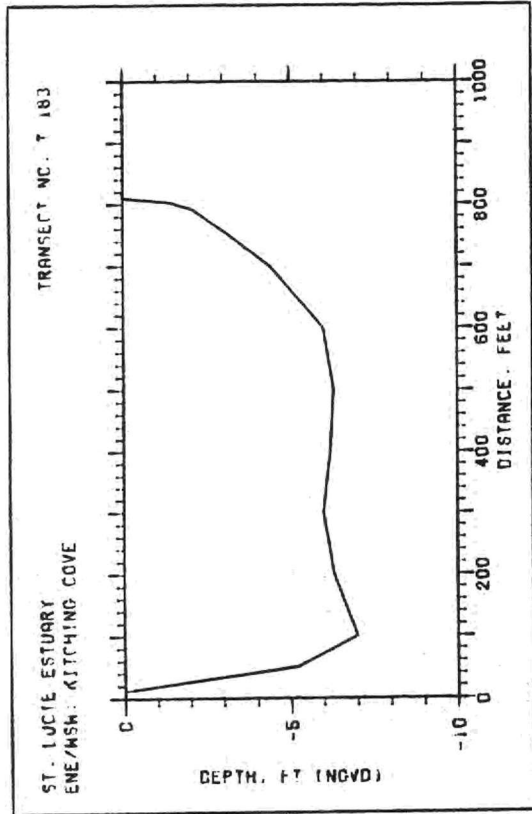


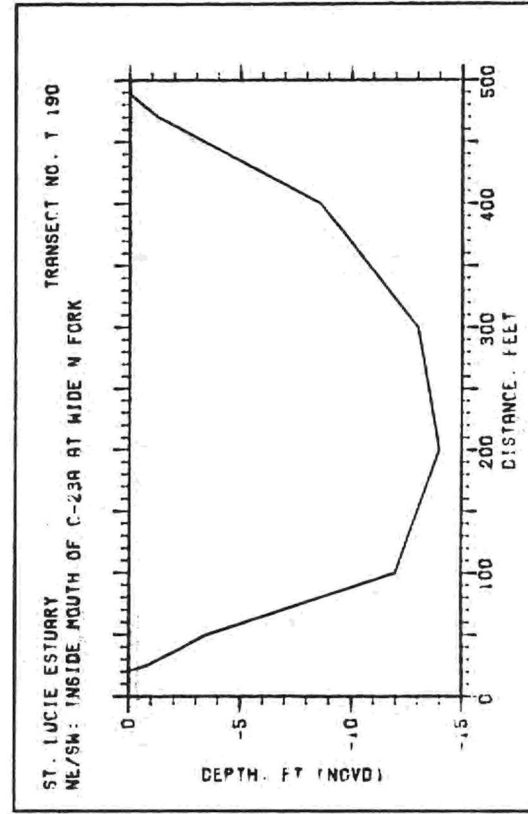
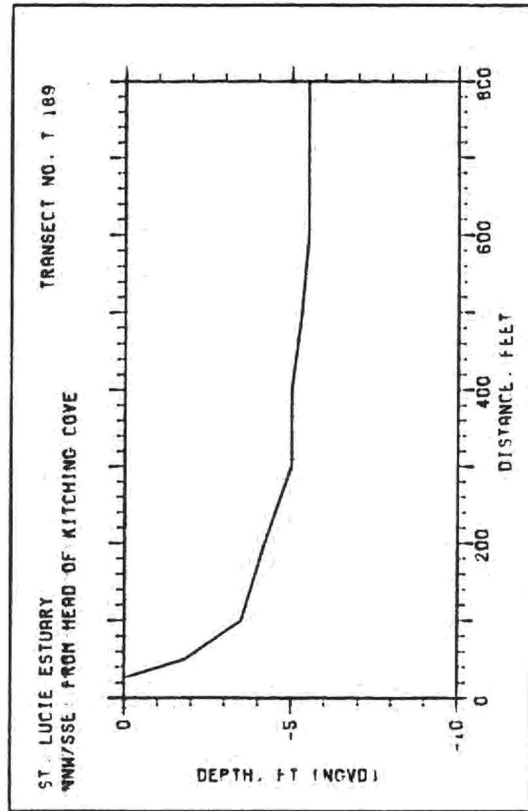
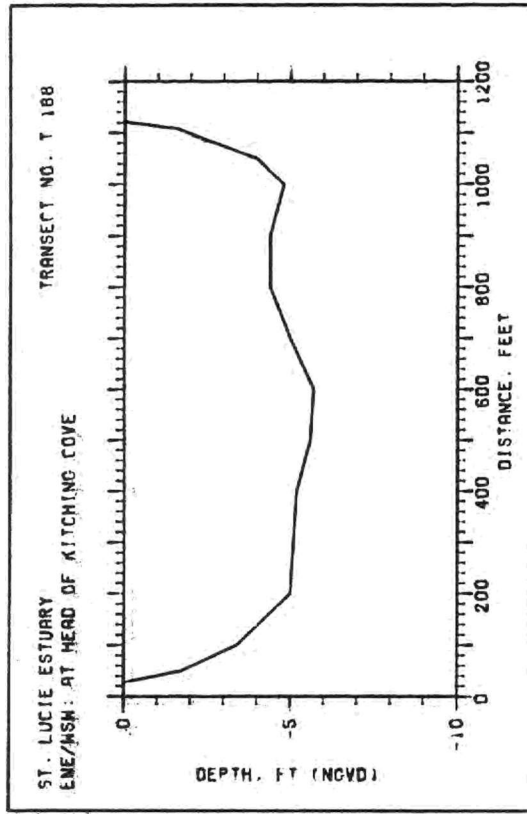
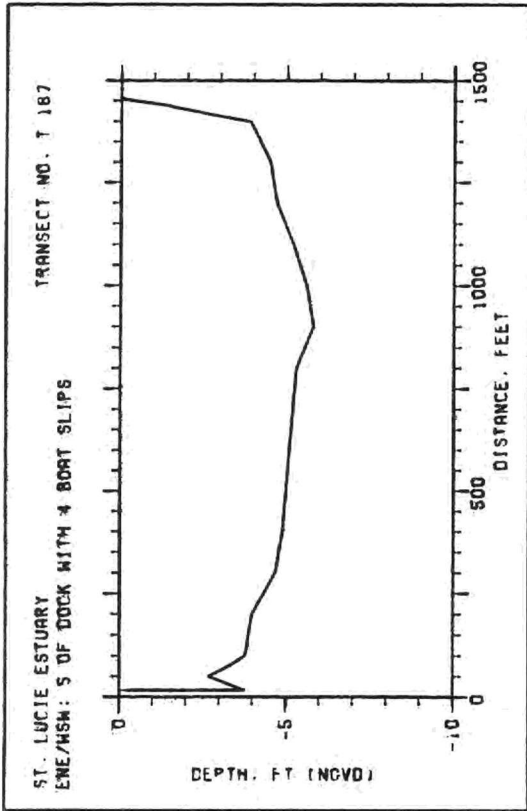


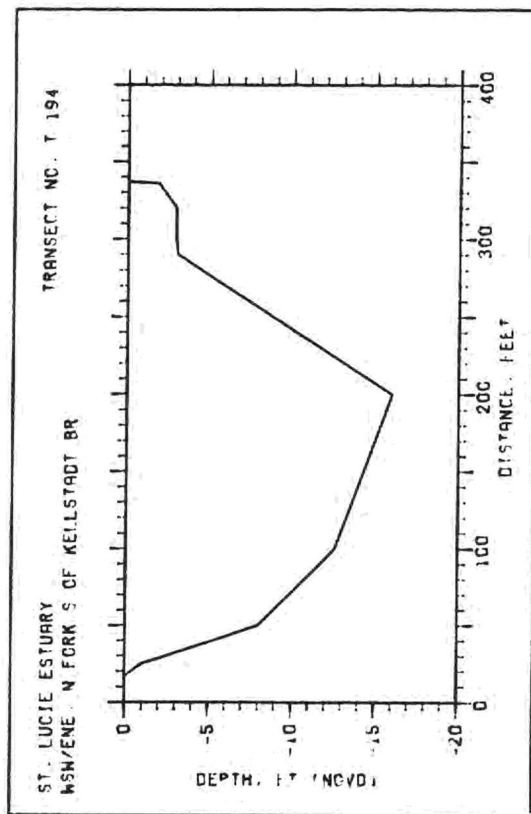
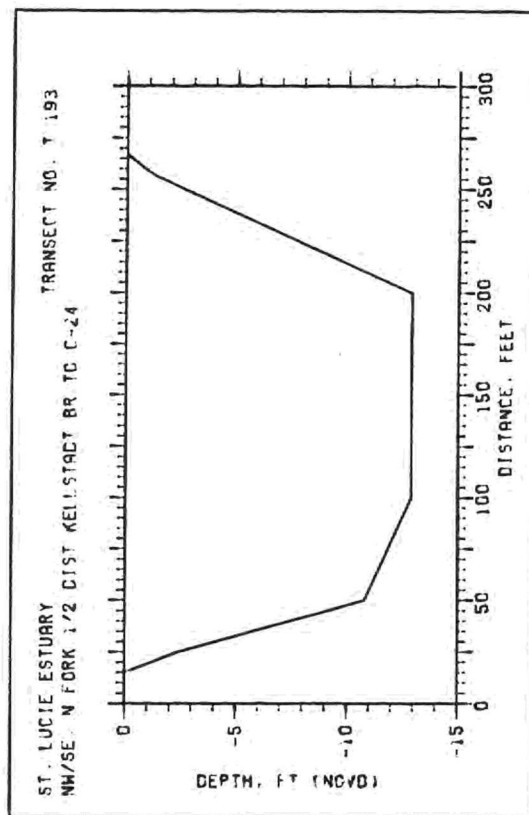
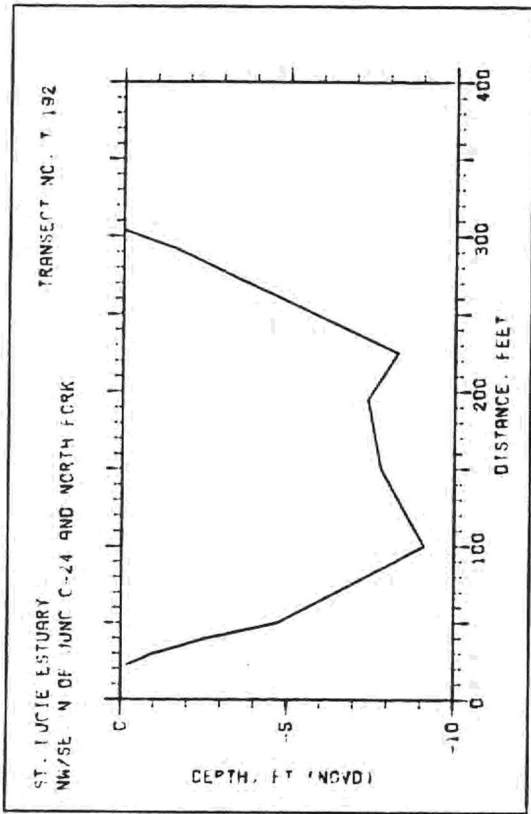
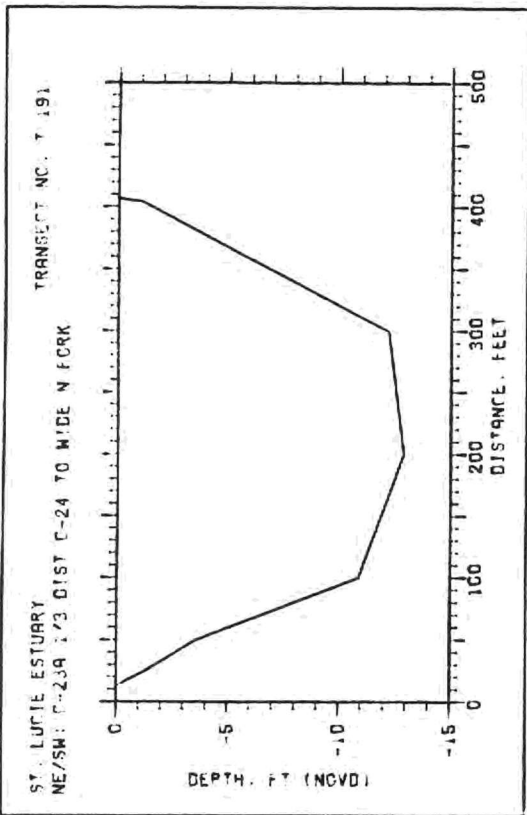


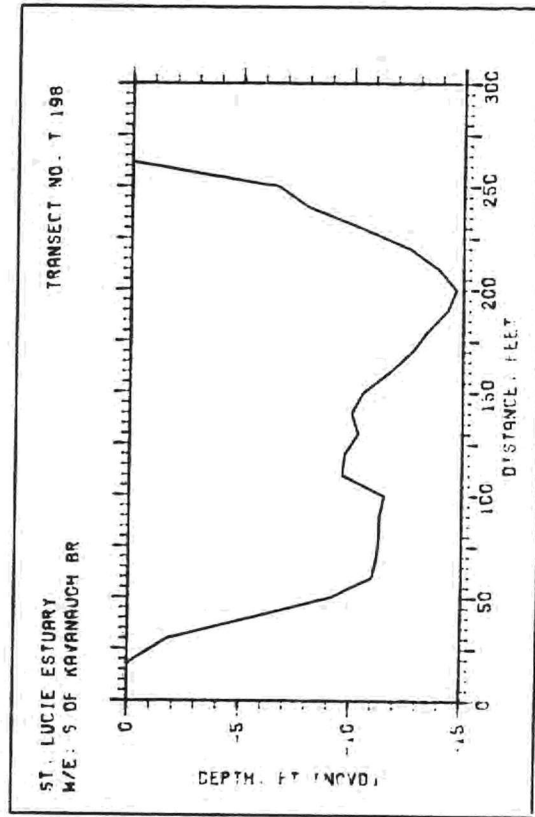
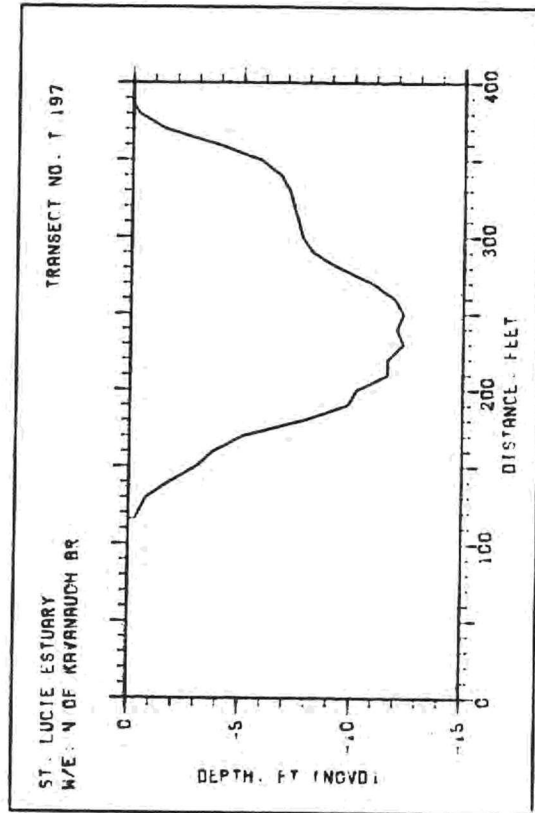
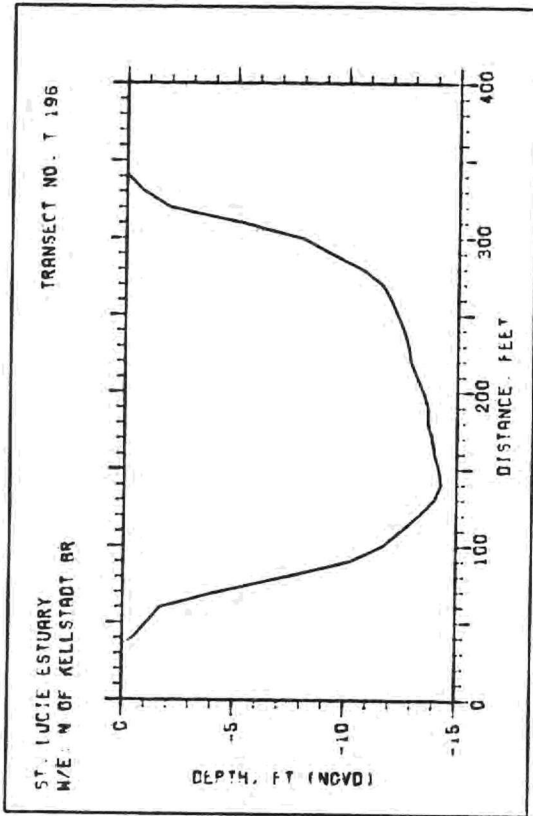
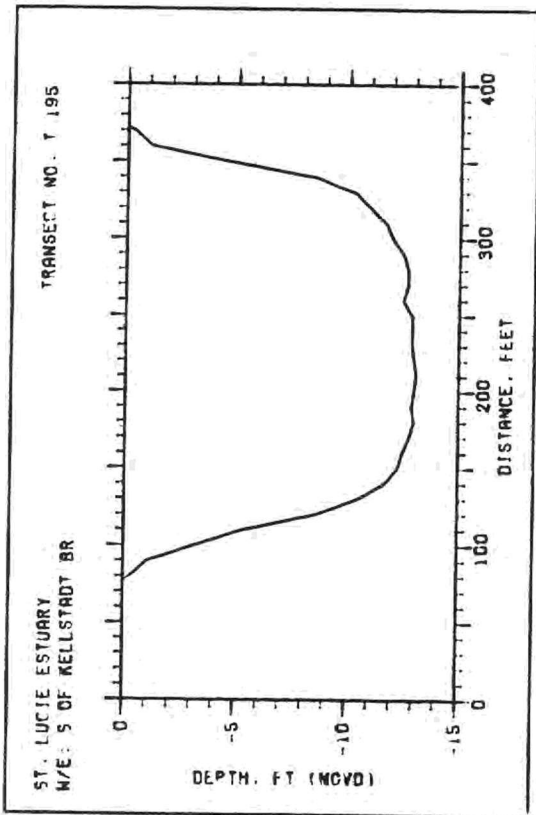


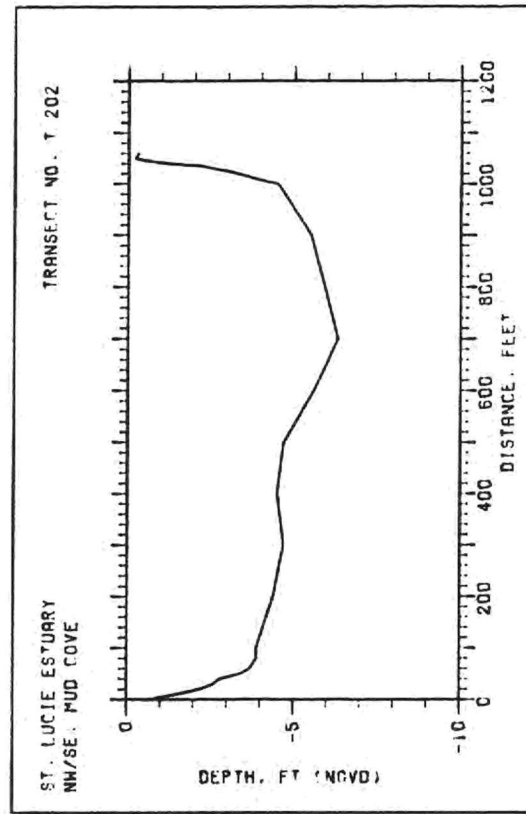
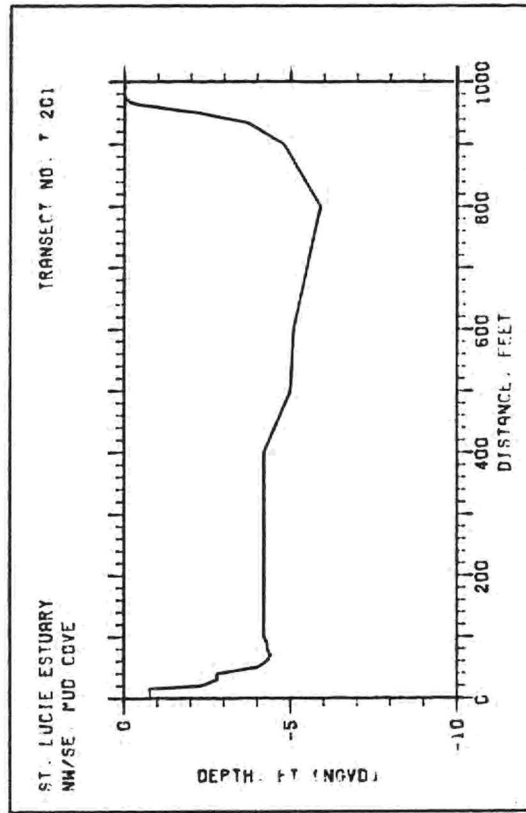
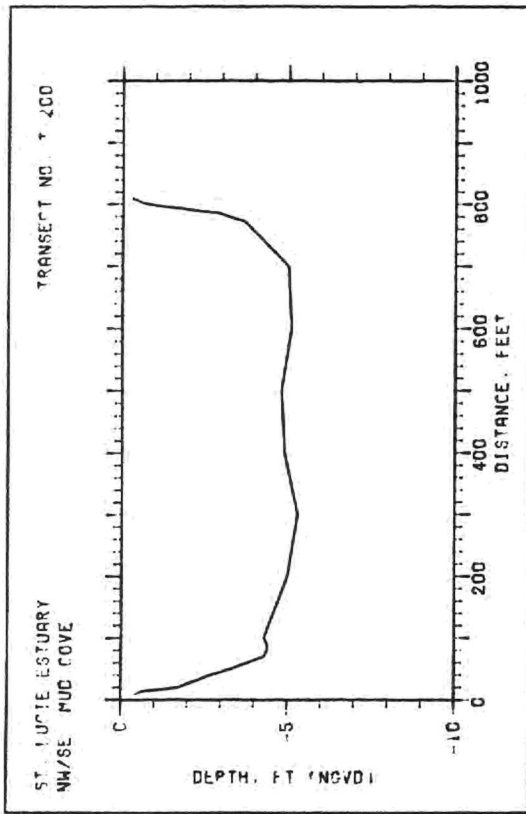
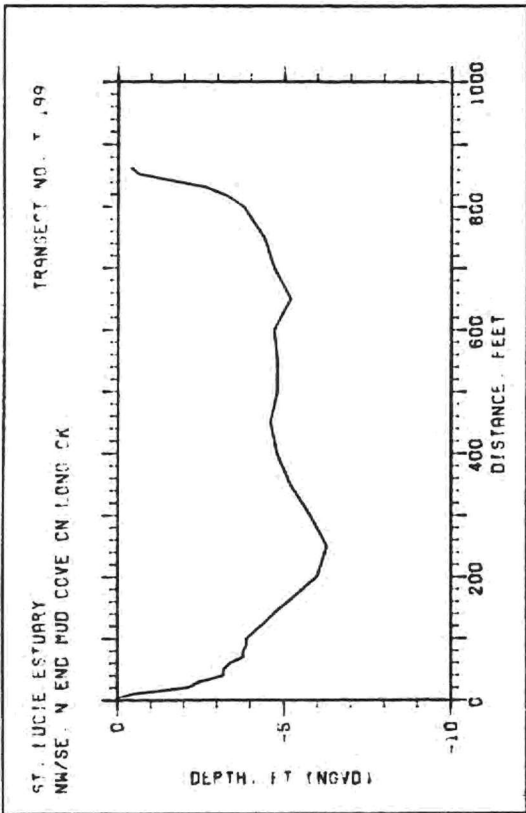


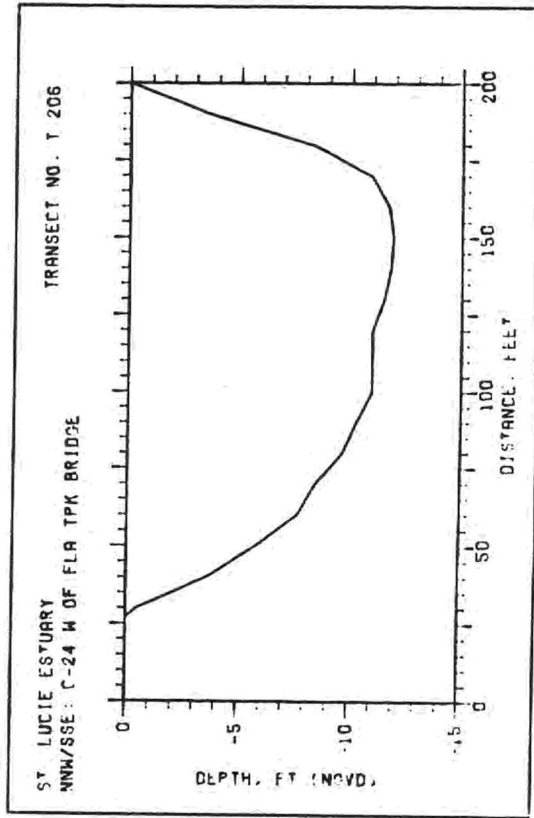
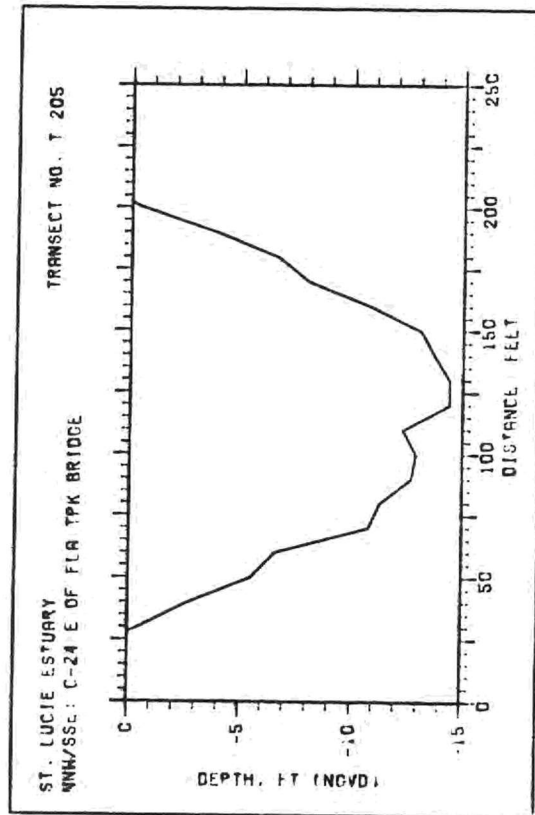
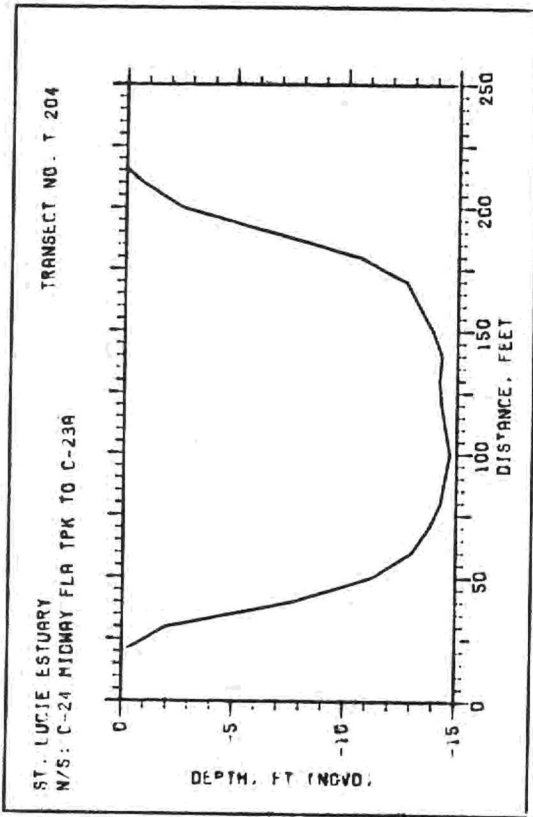
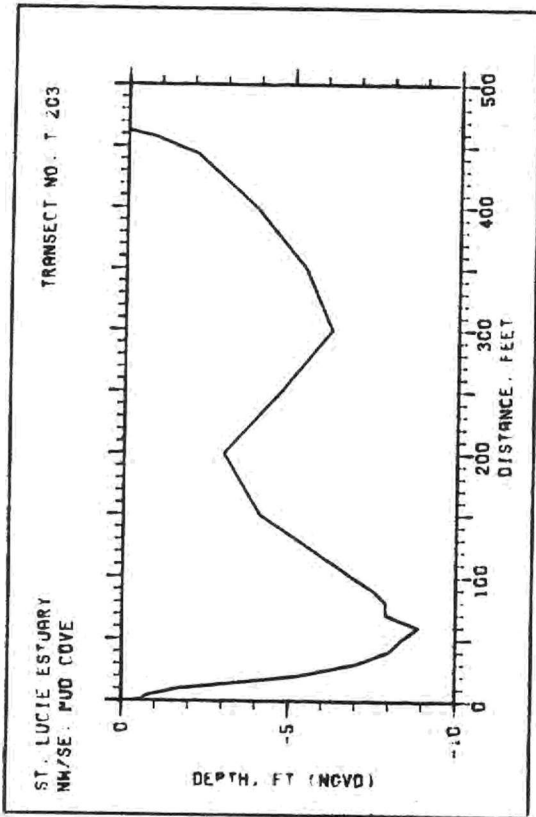


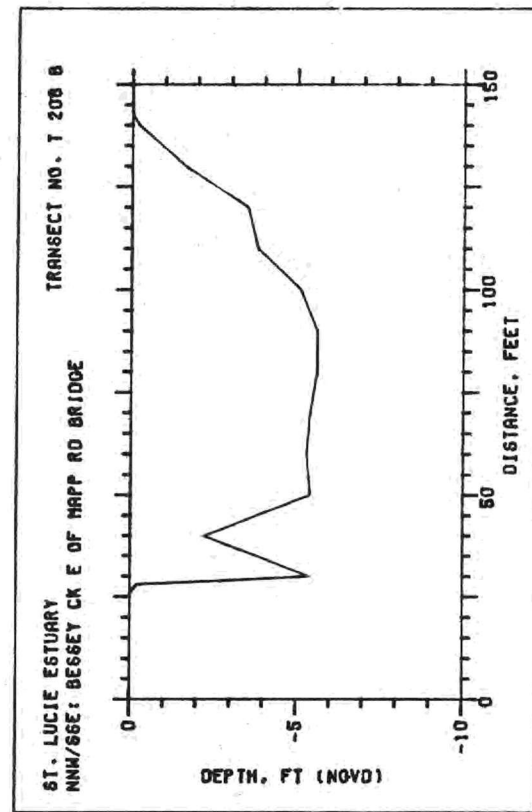
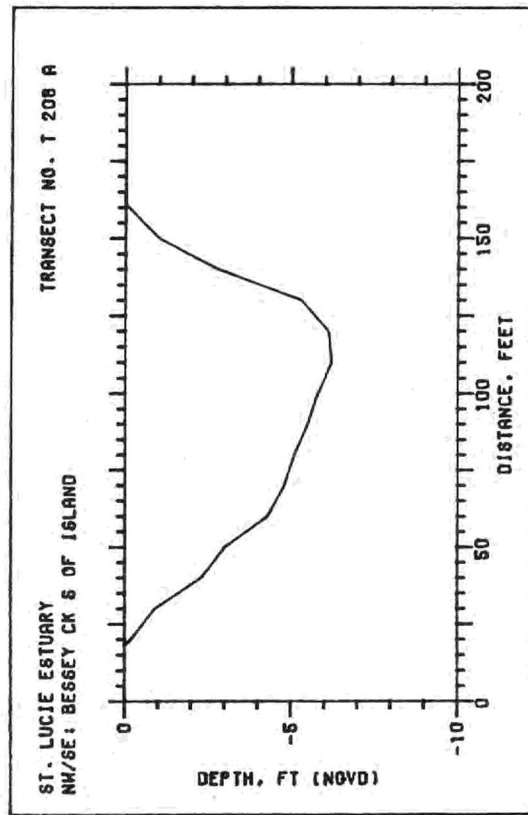
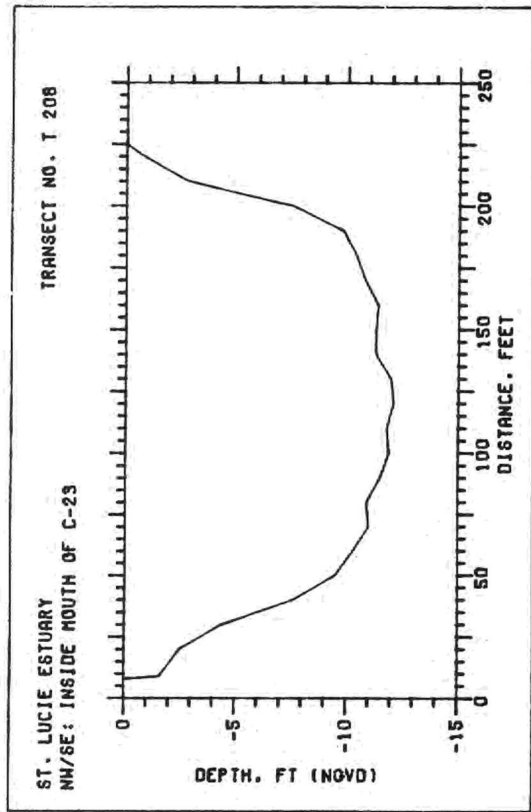
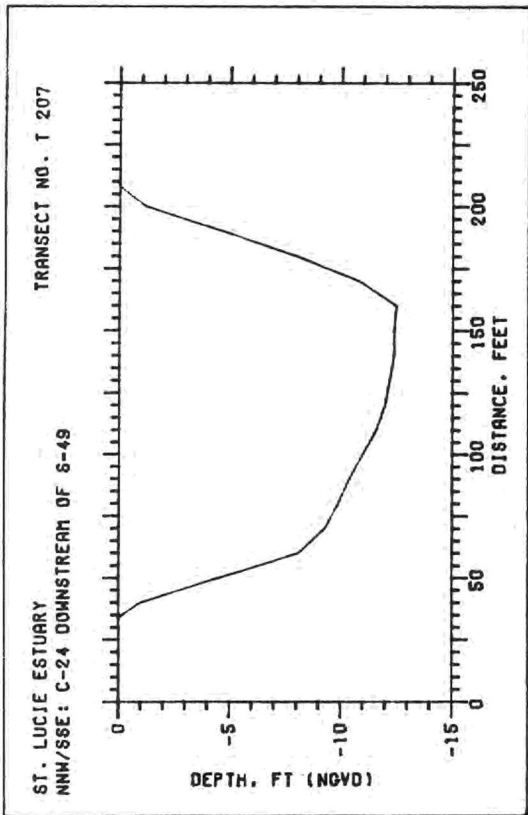


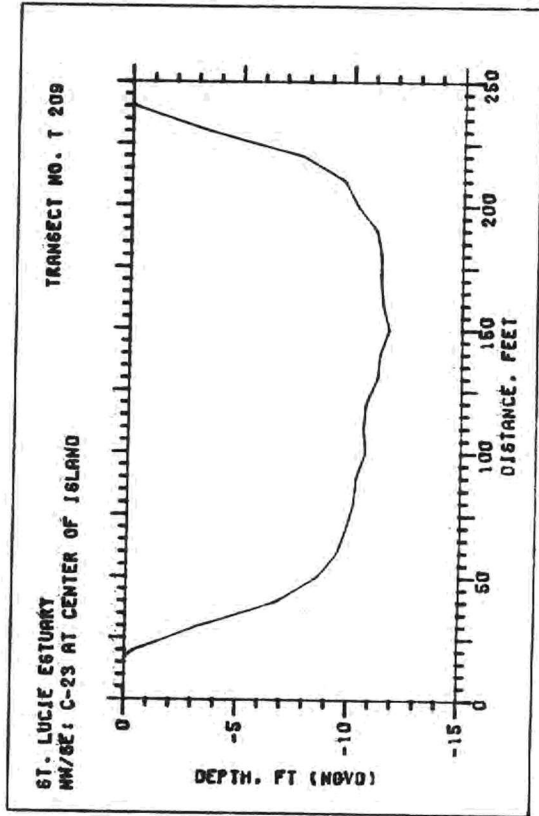
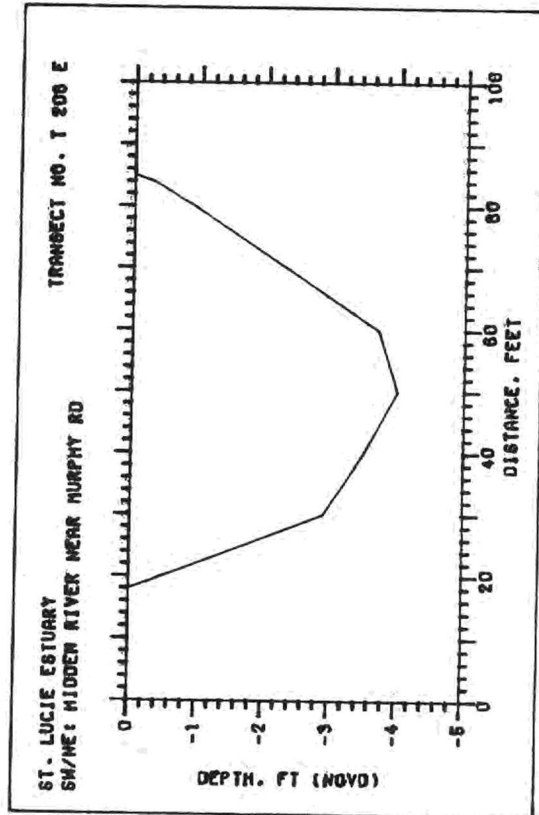
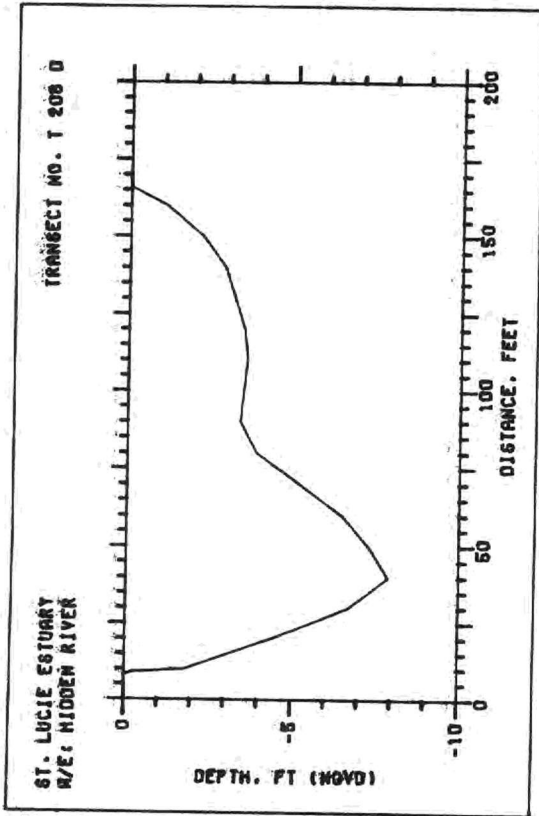
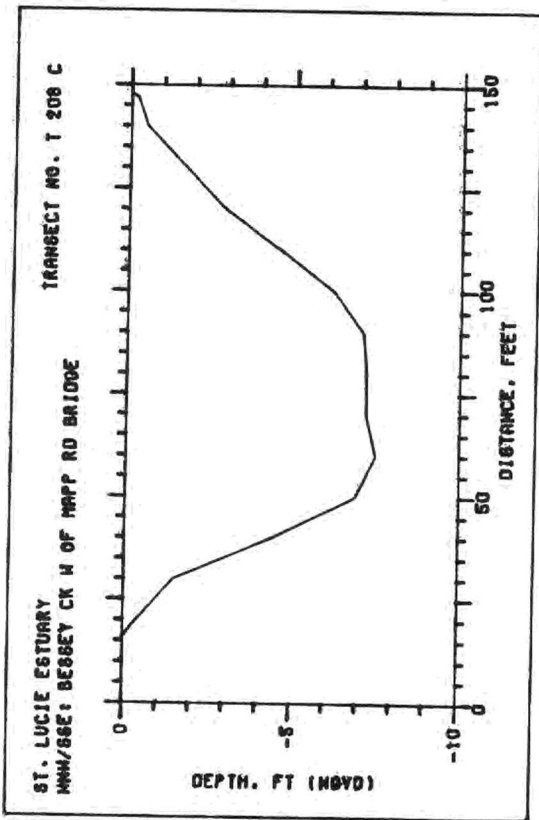


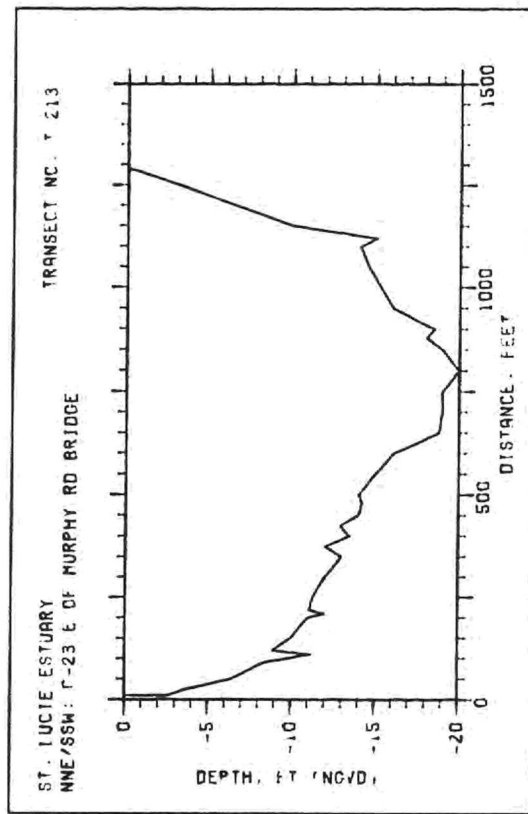
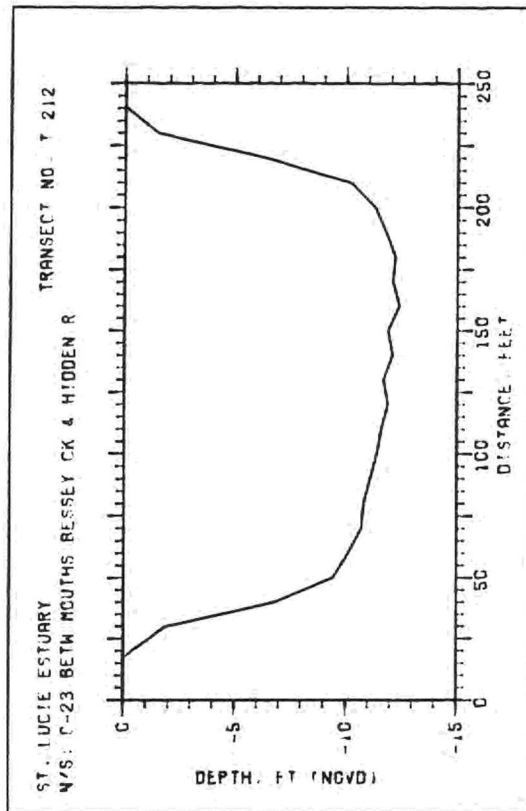
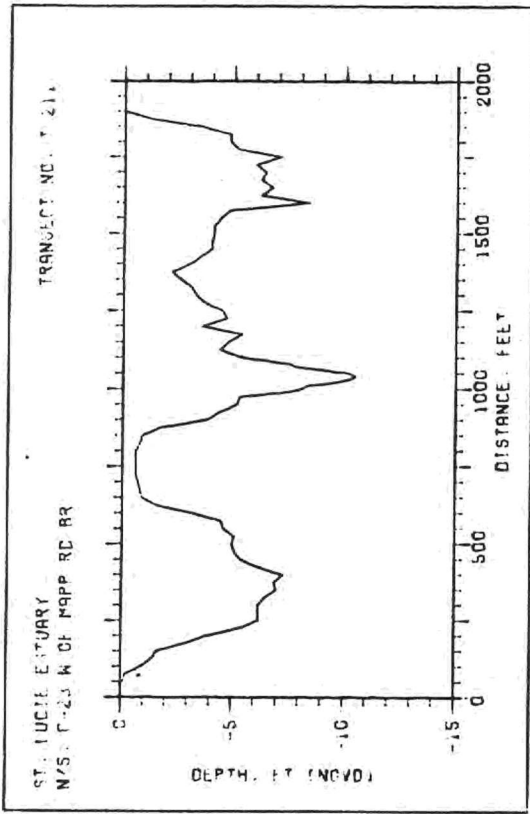
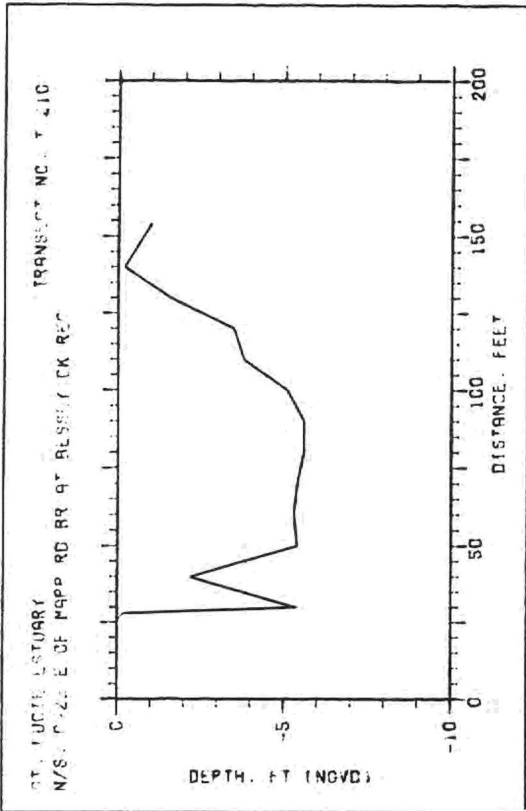


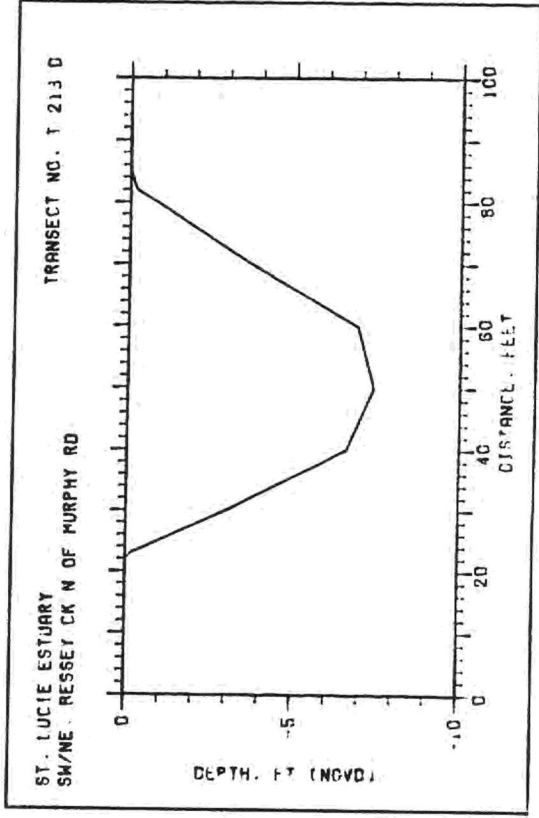
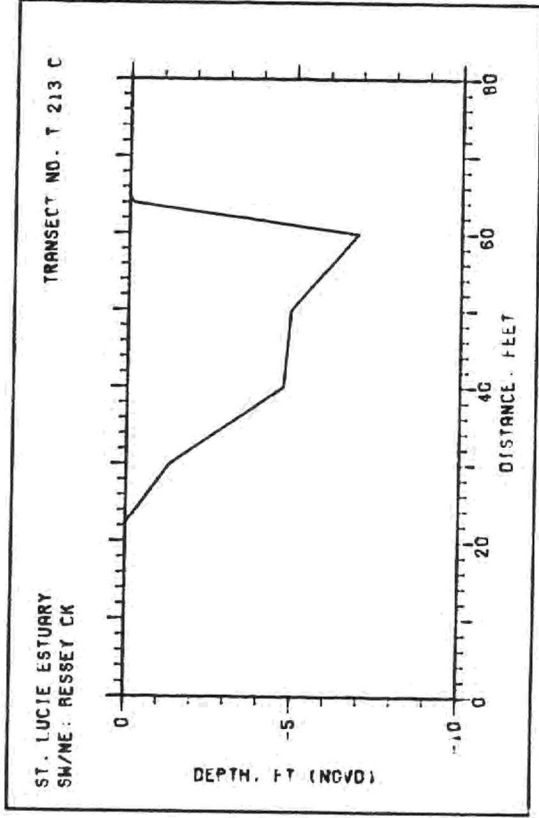
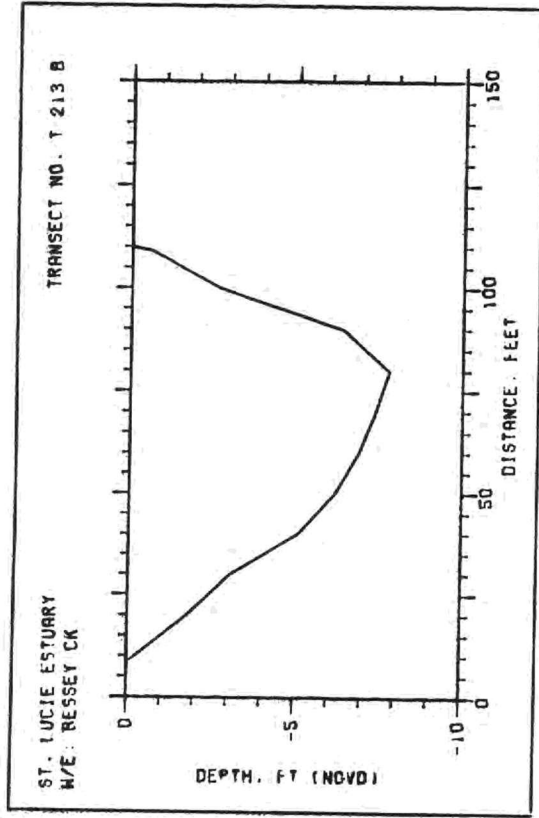
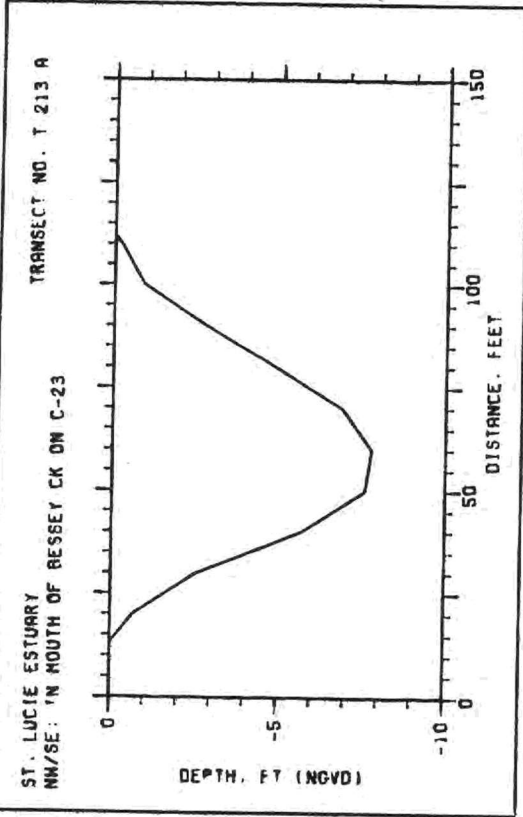


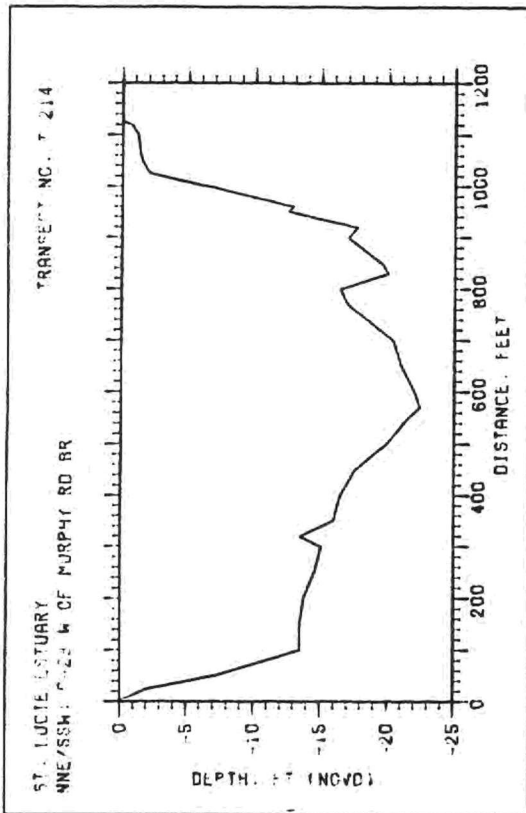
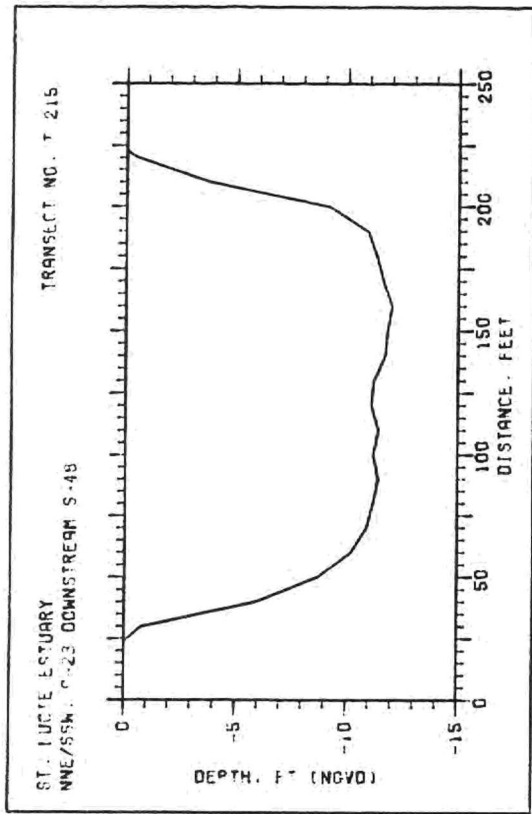












Appendix F

Transect Lengths, Cross-sectional Areas, Depths, and Locations

TRANSECT	C-S AREA SQ FT	LENGTH FT	DEPTH (FT)		STARTING LOCATION		ENDING LOCATION	
			MAX	MEAN	STATE PLANE	COORDINATES (FT)	STATE PLANE	COORDINATES (FT)
T 001	18692.2	3800.0	18.0	4.9	76154	103013	76270	103012
T 001 A	1629.5	448.0	8.3	3.6	76073	102573	76225	102563
T 001 B	7930.4	1505.0	6.5	5.3	76187	102421	76245	102427
T 001 C	2737.4	579.0	6.0	4.7	76168	102332	73282	102378
T 001 D	4880.1	1199.0	5.1	4.1	76155	103014	76270	103012
T 002	13195.3	1900.0	19.5	6.9	76123	103063	76271	103063
T 003	8399.3	2038.0	13.0	4.1	76090	103112	76271	103112
T 004	10352.9	2000.0	19.0	5.2	76004	103129	76014	103132
T 004 A	222.8	92.0	4.4	2.4	75968	103201	75973	103192
T 004 B	250.1	78.0	5.4	3.2	75882	103239	75868	103207
T 004 C	1020.1	336.0	4.5	3.0	75711	103219	75696	103208
T 004 D	355.0	156.0	4.0	2.3	76027	103162	76271	103161
T 005	11165.3	2400.0	20.0	4.7	75994	103212	76271	103212
T 006	16473.7	3322.0	19.0	5.0	75991	103261	76272	103261
T 007	16805.2	3000.0	19.0	5.6	76005	103189	76288	103311
T 008	14590.4	3018.0	18.2	4.8	75993	103238	76281	103371
T 009	19179.3	3159.0	19.0	6.1	75997	103300	76288	103442
T 010	26432.9	3218.0	20.5	8.2	76030	103377	76298	103498
T 011	25541.8	2924.0	13.5	8.7	76075	103452	76275	103546
T 012	22976.6	2210.0	15.0	10.4	76122	103528	76241	103587
T 013	16798.0	1337.0	17.5	12.6	76026	103532	76232	103629
T 014	21182.3	2259.0	21.2	9.4	75941	103548	76201	103670
T 015	26590.5	2850.0	24.5	9.3	75892	103565	76149	103695
T 016	26902.4	2864.0	26.0	9.4	75834	103595	76125	103733
T 017	28572.4	3200.0	20.2	8.9	75786	103622	76097	103769
T 018	29075.7	3418.0	16.0	8.5	75752	103669	76074	103815
T 019	29105.2	3509.0	14.0	8.3	75716	103706	76048	103868
T 020	29108.7	3651.0	12.0	8.0	75685	103747	76019	103905
T 021	29252.1	3682.0	11.5	7.9	75663	103790	76001	103949
T 022	30856.2	3716.0	12.4	8.3	75655	103844	75975	103988
T 023	30642.2	3497.0	12.5	8.8	75647	103902	75949	104034
T 024	29904.7	3279.0	12.5	9.1	75637	103949	75943	104089
T 025	26757.2	3239.0	11.2	8.3	75648	104000	75930	104137
T 026	26528.6	3005.0	12.2	8.8	75662	104073	75911	104189
T 027	24180.9	2624.0	12.0	9.2	75674	104134	75894	104240
T 028	20168.3	2317.0	12.5	8.7	75640	104155	75890	104302
T 029	29012.8	2885.0	15.0	10.1	75612	104162	75880	104318
T 030	25514.8	2770.0	15.0	9.2	75565	104204	75866	104345
T 031	26612.0	3159.0	12.5	8.4	75540	104250	75827	104386
T 032	24253.3	3059.0	12.2	7.9	75524	104316	75793	104434
T 033	21947.3	2816.0	12.5	7.8	75521	104357	75758	104469
T 034	20111.6	2583.0	13.0	7.8	75733	104498	75513	104399
T 035	20205.0	2400.0	12.0	8.4	75728	104551	75510	104450
T 036	21787.6	2400.0	12.0	9.1	75714	104608	75496	104506
T 037	20804.1	2400.0	10.4	8.7	75699	104662	75490	104566
T 038	19568.2	2300.0	10.4	8.5	75682	104709	75484	104612
T 039	18576.4	2200.0	10.2	8.4	75663	104765	75464	104670
T 040	17201.5	2200.0	10.0	7.8	75645	104812	75460	104734
T 041	16014.9	2000.0	11.0	8.0	75612	104868	75449	104790

TRANSECT	C-S AREA SQ FT	LENGTH FT	DEPTH (FT)		STARTING LOCATION ENDING LOCATION STATE PLANE COORDINATES (FT)			
			MAX	MEAN				
T 042	13559.0	1800.0	9.5	7.5	75565	104896	75437	104837
T 043	9348.9	1300.0	8.5	7.2	75516	104380	75427	104900
T 044	38418.6	5258.0	10.0	7.3	75484	104390	75399	104897
T 045	35830.7	5123.0	10.0	7.0	75433	104400	75337	104891
T 046	31532.5	4981.0	10.0	6.3	75370	104454	75281	104924
T 047	33703.4	4783.0	9.8	7.0	75321	104447	75224	104960
T 048	37233.0	5217.0	9.5	7.1	75280	104431	75166	104991
T 049	38240.5	5678.0	10.0	6.7	75225	104420	75115	104991
T 050	38972.0	5770.0	9.0	6.8	75175	104407	75065	104966
T 051	38100.1	5658.0	9.0	6.7	75129	104378	75022	104936
T 052	36439.2	5658.0	9.0	6.4	75083	104338	74974	104897
T 053	37352.4	5673.0	9.2	6.6	75039	104295	74930	104863
T 054	36899.4	5764.0	9.0	6.4	74997	104259	74878	104855
T 055	37166.7	6069.0	8.2	6.1	74949	104243	74832	104831
T 056	38984.1	5984.0	8.8	6.5	74904	104266	74780	104860
T 057	37205.9	6056.0	8.2	6.1	74858	104242	74738	104856
T 058	36668.0	6185.0	9.0	5.9	74804	104262	74696	104828
T 059	34118.4	5752.0	8.5	5.9	74745	104281	74656	104803
T 060	31750.2	5274.0	9.5	6.0	74677	104288	74630	104785
T 061	28794.8	4968.0	10.0	5.8	74627	104286	74589	104766
T 062	25754.7	4810.0	9.3	5.4	74581	104258	74519	104797
T 063	34246.2	5401.0	9.7	6.3	74528	104222	74481	104817
T 064	38257.9	5921.0	10.0	6.5	74475	104210	74427	104816
T 065	38341.9	6058.0	9.5	6.3	74425	104210	74378	104811
T 066	36856.2	6010.0	7.8	6.1	74376	104225	74329	104802
T 067	35078.9	5781.0	9.2	6.1	74322	104240	74277	104797
T 068	32284.5	5568.0	8.9	5.8	74268	104251	74225	104810
T 069	32796.7	5585.0	8.0	5.9	74207	104265	74177	104792
T 070	32434.7	5266.0	9.9	6.2	74156	104313	74128	104783
T 071	28341.5	4671.0	13.2	6.1	74128	104331	74070	104721
T 072	25567.4	3917.0	15.0	6.5	74054	104665	74189	104562
T 073	10735.6	1700.0	8.6	6.3	74041	104600	74168	104504
T 074	10866.7	1600.0	12.5	6.8	74035	104546	74154	104455
T 075	11554.0	1500.0	14.5	7.7	74320	104239	74052	104465
T 076	22375.2	3498.0	21.9	6.4	74129	104330	74019	104431
T 077	13109.5	1486.0	16.2	8.8	74105	104330	74010	104417
T 078	14903.2	1266.0	19.5	11.8	74102	104316	74014	104388
T 079	16260.5	1126.0	22.4	14.4	74106	104287	74000	104361
T 079 A	17055.9	1286.0	20.0	13.3	73961	104353	74105	104245
T 080	21121.4	1748.0	17.9	12.1	73773	104299	74103	104295
T 081	41210.4	3308.0	17.8	12.5	73782	104264	74105	104258
T 082	21716.4	3225.0	13.5	6.7	73798	104213	74100	104207
T 082	12755.6	3225.0	13.5	4.0	73798	104213	74100	104207
T 083	27713.0	3007.0	11.0	9.2	74084	104156	73824	104158
T 084	21430.7	2565.0	11.2	8.4	73859	104109	74073	104107
T 085	16710.1	2137.0	11.0	7.8	73761	104050	74052	104050
T 086	20855.6	2870.0	11.9	7.3	73738	103993	73979	103992
T 087	15520.1	2379.0	10.0	6.5	73705	103955	74024	103953
T 088	19045.3	3160.0	9.5	6.0	73616	103889	74043	103912

TRANSECT	C-S AREA SQ FT	LENGTH FT	DEPTH (FT)		STARTING LOCATION		ENDING LOCATION	
			MAX	MEAN	STATE PLANE	COORDINATES (FT)	STATE PLANE	COORDINATES (FT)
T 089	24518.7	4254.0	9.0	5.8	73698	103842	74034	103863
T 090	20175.9	3324.0	9.2	6.1	73730	103793	74044	103812
T 091	18689.4	3121.0	9.4	6.0	73747	103747	74076	103766
T 092	14225.1	3005.0	9.0	4.7	73805	103699	74065	103713
T 092 A	998.3	387.0	3.6	2.6	74267	103813	74267	103803
T 092 B	60.0	75.0	1.8	.8	73805	103699	74065	103714
T 093	12186.5	2569.0	8.7	4.7	73785	103652	74050	103663
T 094	12516.1	2630.0	9.2	4.8	73778	103580	74033	103630
T 095	11826.0	2600.0	8.4	4.5	73793	103522	74042	103596
T 096	12260.9	2580.0	9.2	4.8	73819	103479	74057	103548
T 097	10902.5	2483.0	9.5	4.4	73847	103434	74069	103500
T 098	8761.6	2285.0	7.0	3.8	73847	103356	74051	103462
T 099	8424.3	2306.0	9.0	3.7	73890	103315	74071	103407
T 100	7396.6	2008.0	7.0	3.7	73897	103261	74096	103365
T 101	9737.2	2220.0	8.5	4.4	73956	103235	74088	103305
T 101 A	5967.7	1752.0	10.5	3.4	73957	103252	74100	103327
T 102	8650.9	2156.0	9.3	4.0	73967	103185	74187	103300
T 102 A	7709.0	1900.0	10.5	4.1	74055	102675	74069	102682
T 103	8521.5	2456.0	9.9	3.5	73941	103115	74180	103277
T 104 1	7891.9	2991.0	10.0	2.6	73948	103060	74203	103196
T 104 2	439.7	2991.0	10.0	.1	73948	103060	74203	103196
T 105 1	4173.9	2894.0	10.0	1.4	73977	103021	74237	103159
T 105 2	3754.6	2894.0	10.0	1.3	73977	103021	74237	103159
T 106 1	3507.0	2951.0	9.5	1.2	73993	102972	74275	103123
T 106 2	3588.2	2951.0	9.5	1.2	73993	102972	74275	103123
T 107 1	4323.7	3170.0	9.8	1.4	74046	102947	74222	103041
T 107 2	4408.1	3170.0	9.8	1.4	74046	102947	74222	103041
T 108 1	3751.2	2002.0	12.1	1.9	74110	102927	74304	103029
T 108 2	3678.5	2002.0	12.1	1.8	74110	102927	74304	103029
T 109 1	3135.4	2186.0	10.6	1.4	74126	102874	74312	102976
T 109 2	3524.4	2186.0	10.6	1.6	74126	102874	74312	102976
T 110 1	5323.2	2121.0	13.9	2.5	74120	102821	74342	102932
T 110 2	2456.8	2121.0	13.9	1.2	74120	102821	74342	102932
T 111 1	6527.3	2501.0	14.4	2.6	74082	102739	74320	102865
T 111 2	3774.1	2501.0	14.4	1.5	74082	102739	74320	102865
T 112	7322.2	2668.0	3.5	2.7	74293	102797	74087	102690
T 113	4615.7	2290.0	2.4	2.0	74055	102675	74069	102682
T 113 A	297.0	125.0	5.3	2.4	74351	102789	74317	102803
T 114	2412.5	354.0	13.0	6.8	74326	102730	74299	102749
T 115	2437.9	335.0	13.2	7.3	74214	102647	74193	102680
T 116	2683.6	379.0	10.8	7.1	74134	102552	74103	102576
T 117	2534.9	392.0	11.5	6.5	74052	102396	74028	102405
T 118	1183.2	237.0	9.5	5.0	74053	102262	74032	102247
T 118 A	1708.0	294.0	9.9	5.8	74007	101994	73996	102019
T 118 B	1615.8	240.0	11.2	6.7	74148	102115	74141	102130
T 118 C	1553.2	157.0	17.5	9.9	74164	102117	74148	102115
T 118 D	410.5	155.0	3.9	2.6	74150	102066	74131	102079
T 118 E	627.6	201.0	4.4	3.1	74125	101993	74070	102051
T 118 F	2616.5	779.0	4.0	3.4	74068	101967	74047	102002

TRANSECT	C-S AREA SQ FT	LENGTH FT	DEPTH (FT)		STARTING LOCATION		ENDING LOCATION	
			MAX	MEAN	STATE PLANE	COORDINATES (FT)	STATE PLANE	COORDINATES (FT)
T 118 G	1260.5	392.0	4.3	3.2	74029	101928	74004	101939
T 118 H	799.9	252.0	4.3	3.2	73980	101855	73969	101868
T 118 J	526.2	165.0	4.6	3.2	73949	101759	73918	101746
T 118 K	820.5	317.0	3.3	2.6	73946	101709	73938	101710
T 118 L	128.7	65.0	3.5	2.0	74053	102262	74032	102247
T 119	1333.0	259.0	9.5	5.1	74045	102115	74024	102122
T 120	1121.1	206.0	9.8	5.4	73996	102019	73977	102037
T 121	1513.1	261.0	10.0	5.8	74007	101994	73996	102019
T 121 A	1549.2	259.0	10.0	6.0	73939	101903	73914	101922
T 122	2088.3	294.0	13.0	7.1	73863	101775	73832	101790
T 123	2729.5	351.0	13.0	7.8	73871	101677	73838	101662
T 124	2213.7	331.0	12.5	6.7	73838	101448	73811	101469
T 124 A	676.4	186.0	8.7	3.6	73900	101679	73903	101701
T 124 B	1289.3	186.0	15.5	6.8	73905	101677	73928	101680
T 124 C	891.8	204.0	7.9	4.4	73927	101597	73909	101593
T 124 D	928.4	172.0	10.4	5.4	73962	101489	73979	101475
T 124 E	1561.9	211.0	16.7	7.4	73896	101299	73908	101305
T 124 F	1027.4	121.0	15.3	8.5	74059	101323	74054	101307
T 124 G	928.8	142.0	10.4	6.5	74135	101172	74122	101179
T 124 H	767.1	111.0	15.8	6.9	74246	100972	74235	100978
T 124 J	675.6	95.0	13.1	7.1	74385	100827	74384	100817
T 124 K	574.8	91.0	13.9	6.3	74490	100689	74481	100683
T 124 L	401.6	91.0	7.9	4.4	74517	100545	74506	100549
T 124 M	299.2	81.0	7.5	3.7	73839	101449	73811	101469
T 125	2327.3	337.0	10.0	6.9	73695	101272	73674	101298
T 126	2039.7	329.0	11.3	6.2	73593	101234	73590	101265
T 127	2403.2	314.0	13.5	7.7	73558	101229	73557	101260
T 128	2178.8	312.0	11.0	7.0	73424	101213	73409	101244
T 129	2160.8	329.0	11.0	6.6	73326	101071	73293	101108
T 130	3983.0	498.0	13.0	8.0	73802	104207	73962	104356
T 131	19000.9	2161.0	12.5	8.8	73783	104268	73967	104430
T 132	21468.0	2431.0	12.3	8.8	73770	104328	73970	104505
T 133	25691.0	2637.0	12.5	9.7	73763	104402	73964	104579
T 134	24637.4	2856.0	13.0	9.3	73743	104459	73940	104637
T 135	23503.6	2628.0	11.7	8.9	73592	104413	73895	104680
T 136	30128.4	4031.0	11.0	7.5	73545	104430	73855	104702
T 137	30606.0	4096.0	11.1	7.5	73477	104429	73800	104714
T 138	30771.4	4263.0	11.6	7.2	73388	104418	73732	104722
T 139	32409.0	4561.0	11.3	7.1	73286	104398	73685	104748
T 140	36231.0	5285.0	10.5	6.9	73261	104440	73630	104766
T 141	37960.2	4887.0	10.1	7.8	73249	104493	73560	104770
T 142	30482.0	4144.0	9.8	7.4	73242	104550	73518	104797
T 143	26749.8	3695.0	9.8	7.2	73222	104600	73450	104800
T 144	20834.2	3024.0	9.5	6.9	73201	104640	73462	104874
T 145	24529.5	3472.0	9.8	7.1	73161	104670	73438	104920
T 146	25566.9	3720.0	9.8	6.9	73149	104724	73449	104992
T 147	26869.9	4013.0	9.9	6.7	73140	104795	73418	105044
T 148	26561.6	3731.0	10.0	7.1	73115	104857	73417	105127
T 149	28090.4	4041.0	10.2	7.0	73103	104934	73397	105199

TRANSECT	C-S AREA SQ FT	LENGTH FT	DEPTH (FT)		STARTING LOCATION ENDING LOCATION			
			MAX	MEAN	STATE	PLANE	COORDINATES (FT)	
T 150	27819.5	3940.0	9.9	7.1	73052	104955	73370	105240
T 151	33173.4	4263.0	10.0	7.8	73009	105013	73320	105289
T 152	31836.6	4133.0	9.9	7.7	72979	105051	73300	105338
T 153	31418.5	4279.0	9.5	7.3	72941	105079	73258	105357
T 154	30864.5	4192.0	9.6	7.4	72912	105115	73199	105369
T 155	28165.8	3820.0	10.0	7.4	72881	105159	73160	105406
T 156	27363.2	3694.0	10.0	7.4	72832	105188	73127	105444
T 157	30505.0	3885.0	10.0	7.9	72812	105243	73094	105487
T 158	30175.7	3716.0	10.4	8.1	72791	105287	73060	105522
T 159	28344.2	3534.0	10.7	8.0	72736	105305	73021	105554
T 160	30135.8	3784.0	10.2	8.0	72691	105329	72988	105589
T 161	30259.3	3941.0	9.8	7.7	72658	105369	72968	105640
T 162	30928.2	4109.0	9.1	7.5	72623	105406	72990	105725
T 163	35054.8	4855.0	9.0	7.2	72903	105722	72827	105516
T 163 A	286.6	135.0	3.9	2.1	72910	105820	72906	105811
T 163 B	184.0	84.0	3.6	2.2	72903	105723	72827	105516
T 164	15389.9	2200.0	9.1	7.0	72856	105743	72764	105489
T 165	20013.7	2700.0	9.3	7.4	72662	105370	72805	105757
T 166	29510.8	4118.0	9.0	7.2	72624	105405	72757	105768
T 167	27573.0	3843.0	8.9	7.2	72564	105399	72709	105805
T 168	29231.2	4292.0	8.3	6.8	72518	105423	72654	105800
T 169	25948.1	3987.0	7.9	6.5	72477	105457	72603	105800
T 170	22234.0	3619.0	8.0	6.1	72431	105482	72548	105803
T 171	19806.5	3378.0	7.9	5.9	72375	105474	72490	105795
T 172	19406.7	3365.0	7.4	5.8	72322	105477	72433	105785
T 173	16986.5	3252.0	7.5	5.2	72270	105484	72360	105736
T 174	14512.5	2648.0	7.8	5.5	72226	105512	72339	105820
T 175	20030.4	3239.0	8.0	6.2	72181	105542	72282	105816
T 176	13375.1	2875.0	6.8	4.7	72135	105563	72236	105835
T 177	13644.7	2886.0	7.4	4.7	72188	105855	72163	105785
T 178	10446.8	1443.0	14.9	7.2	72137	105861	72119	105812
T 178 A	3545.9	728.0	8.0	4.9	72097	105603	72146	105740
T 179	11567.8	1773.0	13.9	6.5	72000	105638	72065	105816
T 179 A	2382.4	500.0	7.6	4.8	72046	105611	72107	105780
T 180	11555.2	1877.0	13.3	6.2	71974	105732	72050	105705
T 181	3937.5	800.0	5.9	4.9	72124	105875	72083	105858
T 182	2001.5	422.0	8.2	4.7	72117	105928	72042	105897
T 183	4379.3	810.0	7.0	5.4	72091	105970	71990	105929
T 184	5533.0	1066.0	7.0	5.2	72085	106019	71973	105974
T 185	6017.4	1194.0	5.9	5.0	72071	106068	71953	106020
T 186	5739.1	1252.0	5.7	4.6	72069	106124	71933	106068
T 187	6773.4	1456.0	5.8	4.7	72017	106163	71912	106120
T 188	4820.0	1122.0	5.7	4.3	71960	106196	71990	106122
T 189	3654.1	800.0	5.5	4.6	71989	106833	72030	106832
T 190	4531.8	489.0	14.0	9.3	71781	106214	71821	106231
T 191	3569.8	407.0	12.9	8.8	71744	106456	71772	106441
T 192	1745.3	304.0	9.1	5.7	71960	106529	71985	106514
T 193	2467.4	267.0	12.9	9.2	72030	106682	72064	106691
T 194	3042.5	337.0	16.0	9.0	71989	106833	72030	106832

TRANSECT	C-S AREA SQ FT	LENGTH FT	DEPTH (FT)		STARTING LOCATION	ENDING LOCATION	COORDINATES (FT)	
			MAX	MEAN	STATE PLANE	PLANE		
T 195	2917.8	372.0	13.1	7.8	71989	106850	72030	106849
T 196	2973.1	341.0	14.3	8.7	71950	106846	71907	106847
T 197	1906.1	386.0	12.3	4.9	71950	106836	71909	106837
T 198	2419.6	262.0	14.7	9.2	71915	106633	71841	106677
T 199	3930.0	863.0	6.3	4.6	71897	106599	71827	106640
T 200	3659.2	810.0	5.3	4.5	71887	106555	71804	106606
T 201	4390.7	975.0	5.9	4.5	71865	106521	71775	106577
T 202	5018.0	1060.0	6.3	4.7	71795	106496	71754	106521
T 203	2254.9	463.0	8.9	4.9	71408	106521	71407	106497
T 204	2087.6	216.0	14.7	9.7	71050	106503	71060	106483
T 205	1602.0	202.0	14.4	7.9	71025	106501	71036	106481
T 206	1486.3	200.0	11.9	7.4	70929	106464	70937	106442
T 207	1516.8	208.0	12.5	7.3	73199	104393	73219	104378
T 208	1915.4	225.0	12.1	8.5	73132	104272	73141	104256
T 208 A	532.8	161.0	6.2	3.3	73099	104233	73093	104248
T 208 B	469.1	143.0	5.6	3.3	73090	104230	73083	104246
T 208 C	579.9	148.0	7.5	3.9	72978	104162	72997	104160
T 208 D	661.0	166.0	7.9	4.0	73125	103891	73131	103896
T 208 E	174.0	85.0	4.0	2.0	73011	104317	73012	104295
T 209	2012.2	241.0	11.7	8.3	73099	104233	73093	104248
T 210	477.2	154.0	5.6	3.1	73930	103256	74104	103344
T 211	7815.7	1901.0	10.5	4.1	72995	104274	72995	104248
T 212	2096.2	241.0	12.4	8.7	74107	104292	73998	104363
T 213	1800.5	208.0	13.9	8.7	72916	104246	72926	104236
T 213 A	399.2	112.0	7.8	3.6	72955	104055	72967	104054
T 213 B	477.1	110.0	7.8	4.3	72892	103860	72900	103865
T 213 C	154.3	32.0	6.9	4.8	72997	103831	73005	103838
T 213 D	277.5	85.0	7.4	3.3	74103	104316	74014	104389
T 214	16260.5	1126.0	22.4	14.4	72838	104308	72833	104283
T 215	1864.7	223.0	12.0	8.4	75618	104165	75878	104317