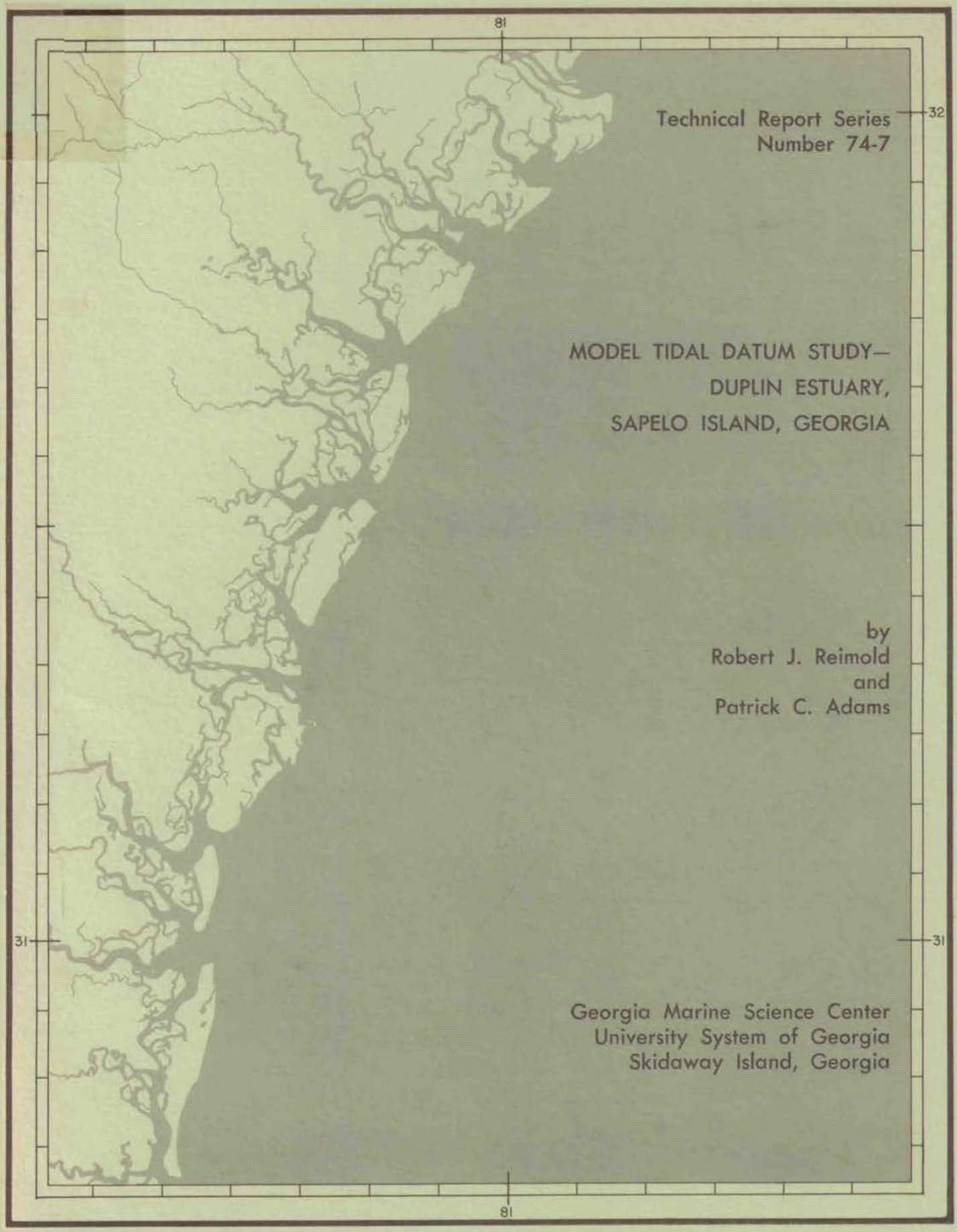

Technical Report Series
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MODEL TIDAL DATUM STUDY— DUPLIN ESTUARY, SAPELO ISLAND, GEORGIA

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and
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Skidaway Island, Georgia

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DEC 1975

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Summary

This report summarizes the research findings of a twelve month tidal analysis of the Duplin Estuary, a major salt marsh estuary adjacent to Sapelo Island, Georgia.

The purpose of the study was to determine the tidal datum including mean low water and mean high water for four stations along the estuary. The report is prepared as a model or guide for users to establish a similar tidal study.

Data were collected from four stations on the Duplin Estuary during a twelve month period. Mean high water and mean low water were determined for each of the four locations, and comparisons of simultaneous observations were made on a daily tidal basis, on a seasonal basis and on a yearly basis. Differences in mean high water and mean low water heights and times were also determined for these periods. Simultaneous observations were made between the four Duplin Estuary tide gauges and two primary standard National Ocean Survey tide stations at Ft. Pulaski, Georgia, and Mayport, Florida. The results of these simultaneous observations were used to reduce the tide data for Sapelo Island to the 18.6 year tidal cycle already determined by the National Ocean Survey.

Estimates of tidal flushing volumes were also computed. These exchange volumes varied from 45% to 96% of the total volume depending on the season of the year.

Acknowledgments

A sincere expression of gratitude is extended to Dr. Frederick C. Marland, Marshland Protection Section, Georgia Department of Natural Resources, who conceived this study.

We are indebted to Mrs. Thelma Richardson, Institute of Ecology, University of Georgia, for her assistance in the computer analysis of the data. We also acknowledge Mr. Paul T. O'Hargan, Tri-County Engineering, Sarasota, Florida, for many useful and instructive suggestions concerning the entire study. Thanks are extended to Leupold and Stevens Company and especially Mr. James Cook, for his willingness to supply technical literature related to the recording tide gauges.

The field assistance and editorial review of Dr. James Harding, Marine Extension Center, University of Georgia, are also acknowledged.

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Introduction

It has come to public attention that wetlands are in need of protection and preservation. Legally these valuable tracts of land must be defined in order to document private versus state or federal ownership. Most legislation regarding wetlands refers to a particular tidal datum such as mean high water or mean low water. The position of these lines often represents a conflict of interest between developers and conservationists.

In order to help individual users resolve this issue, it was deemed necessary to undertake a tidal study to determine the factual elevation of mean high water and the variations in its measurement. The purpose of this report is to outline in detail the steps necessary for conducting such a determination, and to identify related parameters that can easily be measured simultaneously. This report is designed to serve as a means of documenting how to conduct a program to establish tidal datum elevations and interpret their results so as to provide scientific accuracy and aid in establishing legal validity. Also, this report documents the great magnitude of local variation in a tidal datum. The results suggest mean high water may not be as easily defined and extrapolated from one area to another as heretofore was thought possible.

For those interested in greater detailed analyses of tides, the following references are recommended: Hicks and Shofnos, 1965; Marmer, 1951; Schureman, 1949; Shalowitz, 1962, 1964; Wiegel, 1953.

Methods

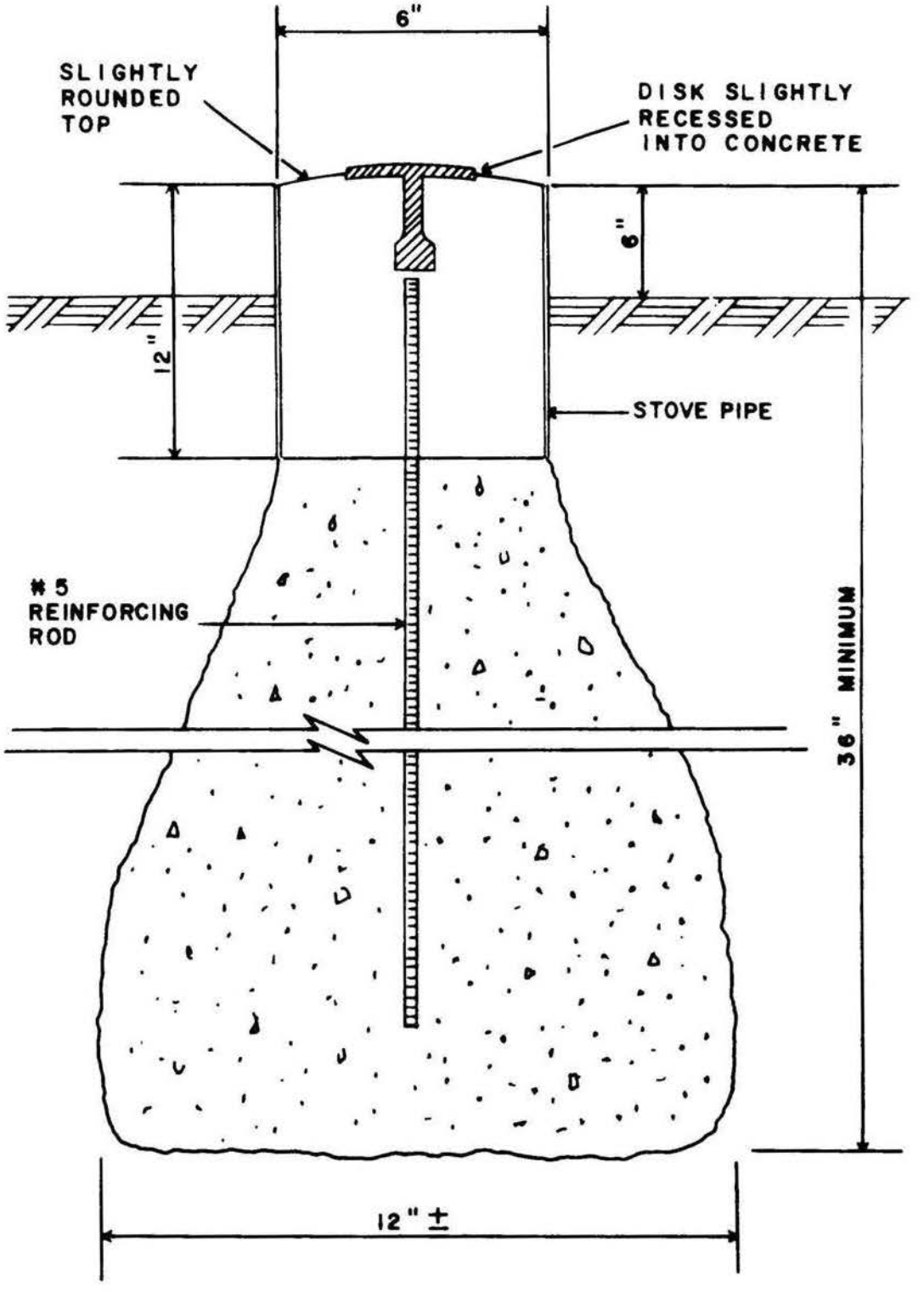
Initially twenty-five bench marks were established in the Duplin Estuary. These bench marks consisted of a brass disk set into the top of a concrete foundation which was buried to a depth of thirty-six inches leaving the brass disk above ground level (Figure 1). Each disk had an identifying number on it, but the elevation of each bench mark was not stamped until after completion of the study.

The bench marks were set along the western side of Sapelo Island, along the southern end of Sapelo Island, and on Little Sapelo Island (Figure 2). Three bench marks were set at each of the four locations adjacent to the four recording tide gauges. A complete description of all bench marks is listed in Appendix I.

Next, a first order level network was established to serve as a permanent reference for all tidal observations, and to tie in the stations to a common reference plane for comparison of mean values. This was done during May 1972 by a certified land surveyor from Tri-County Engineering, Inc., Naples, Florida, under contract to Sea Grant. A temporary mean low water datum established over a previous three-month period was used as a base figure for the survey.

Once the elevations were found for all the bench marks, tide staffs were installed at the four tide stations on the Duplin Estuary. These staffs were surveyed in so that "0" on the staff was equal to mean low water. The staffs consisted of Leupold and Stevens style "M" porcelain enameled iron gauges and figure plates attached to 2" x 6" treated posts (Figure 3). The staffs were attached to the docks such that they could be easily seen from the tide gauges.

FIGURE I. DIAGRAM OF BENCH MARK CONSTRUCTION



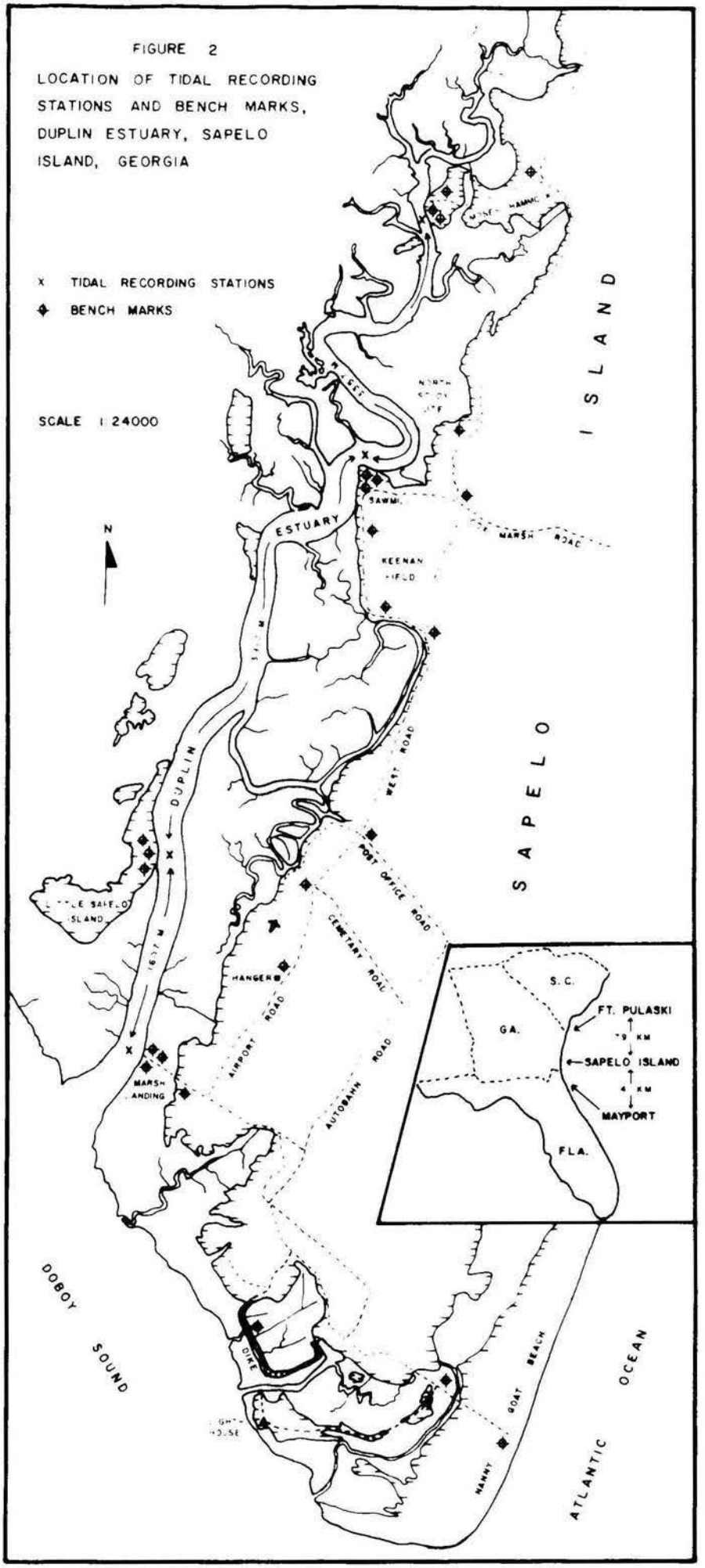


FIGURE 2
LOCATION OF TIDAL RECORDING STATIONS AND BENCH MARKS, DUPLIN ESTUARY, SAPELO ISLAND, GEORGIA
X TIDAL RECORDING STATIONS
BENCH MARKS
SCALE 1:24000
N
ESTUARY
DUPLIN
SAPELO ISLAND
DOBOY SOUND
ATLANTIC OCEAN
WEST ROAD
POST OFFICE ROAD
CEMETARY ROAD
AIRPORT ROAD
AUTOBAHN ROAD
MARSH LANDING
HANGER
DIKE
GOAT BEACH
KEENAN FIELD
MARSH ROAD
S. C.
GA.
FLA.
FT. PULASKI
9 KM
SAPELO ISLAND
4 KM
MAYPORT

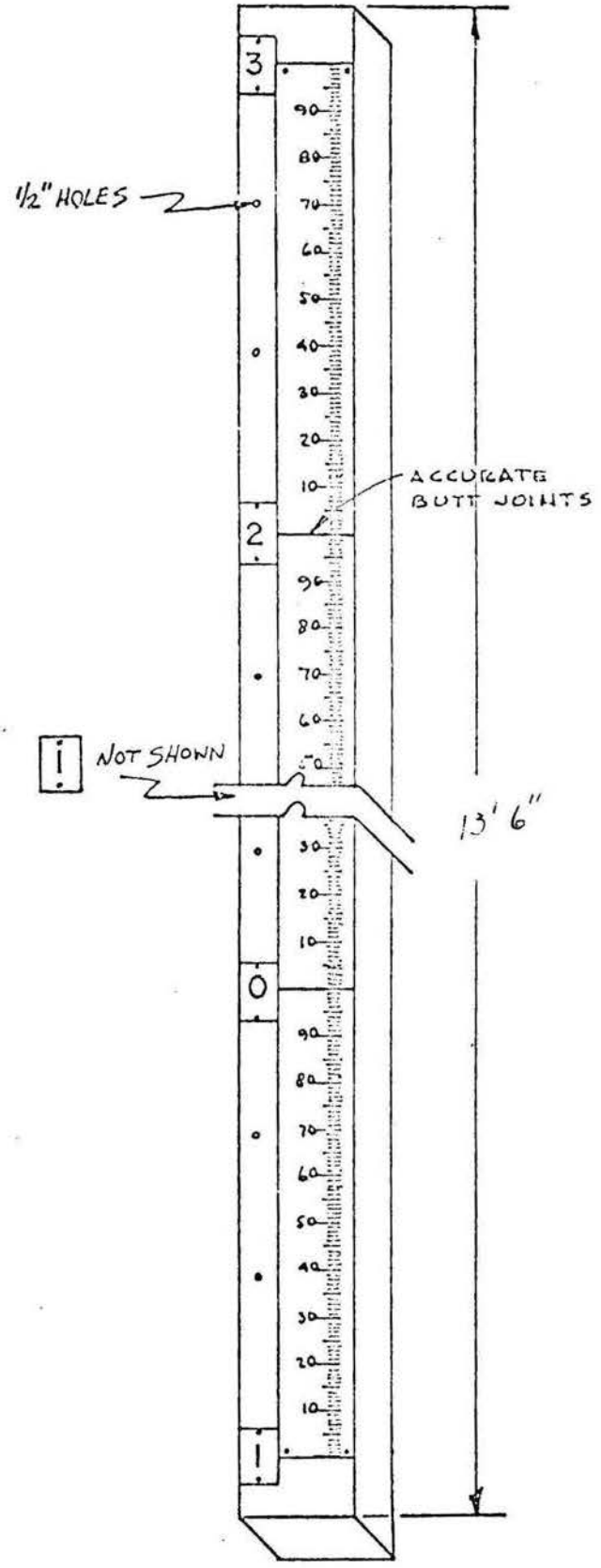


Figure 3. Diagram of Tide Staff Using Leupold & Stevens Style "M" Porcelain Enameled Iron Gauges and Figure Plates

The stilling wells for the tide gauges were made from corrugated aluminum pipe 18" in diameter and 18' in length with a 5/8" diameter hole drilled 6" from the sealed end of the well. The whole pipe was then coated with red lead anti-fouling paint.

A collar was bolted around the top of the pipe using 2" x 4" treated lumber thus allowing the tide gauge shelter to be seated on a square platform instead of the open round top of the pipe.

The well was lashed to the dock using 1/4" cable and turnbuckles. The bottoms of the wells were placed on the bottom of the river with the 5/8" hole turned at 90^{o} to the current flow. The pipes were turned in this direction so that the current could not flow directly into the holes thus creating turbulence and a higher water column inside the well than existed outside. The wells were then ready for the installation of the gauges and shelters.

Two types of recording tide gauges were used for the Duplin Estuary analysis, both made by Leupold and Stevens, Inc.

A Type F Recorder Model 68 with F-4 charts and Lux clock (Figure 4) was used at Marsh Landing. This gauge was equipped so that it was necessary to wind the clock and change the chart every eight days. The pen was filled only once every six months, and moving parts on the gauge were lubricated very lightly once a year.

This type of gauge utilizes a float on a wire with a counter weight on the opposite end. The wire lies over a wheel which turns as the float rises and falls with the tide. The wheel is attached to the drum which has the chart paper anchored to it so that the drum is free to turn with the wheel. The pen is attached to the clock such that it moves horizontally

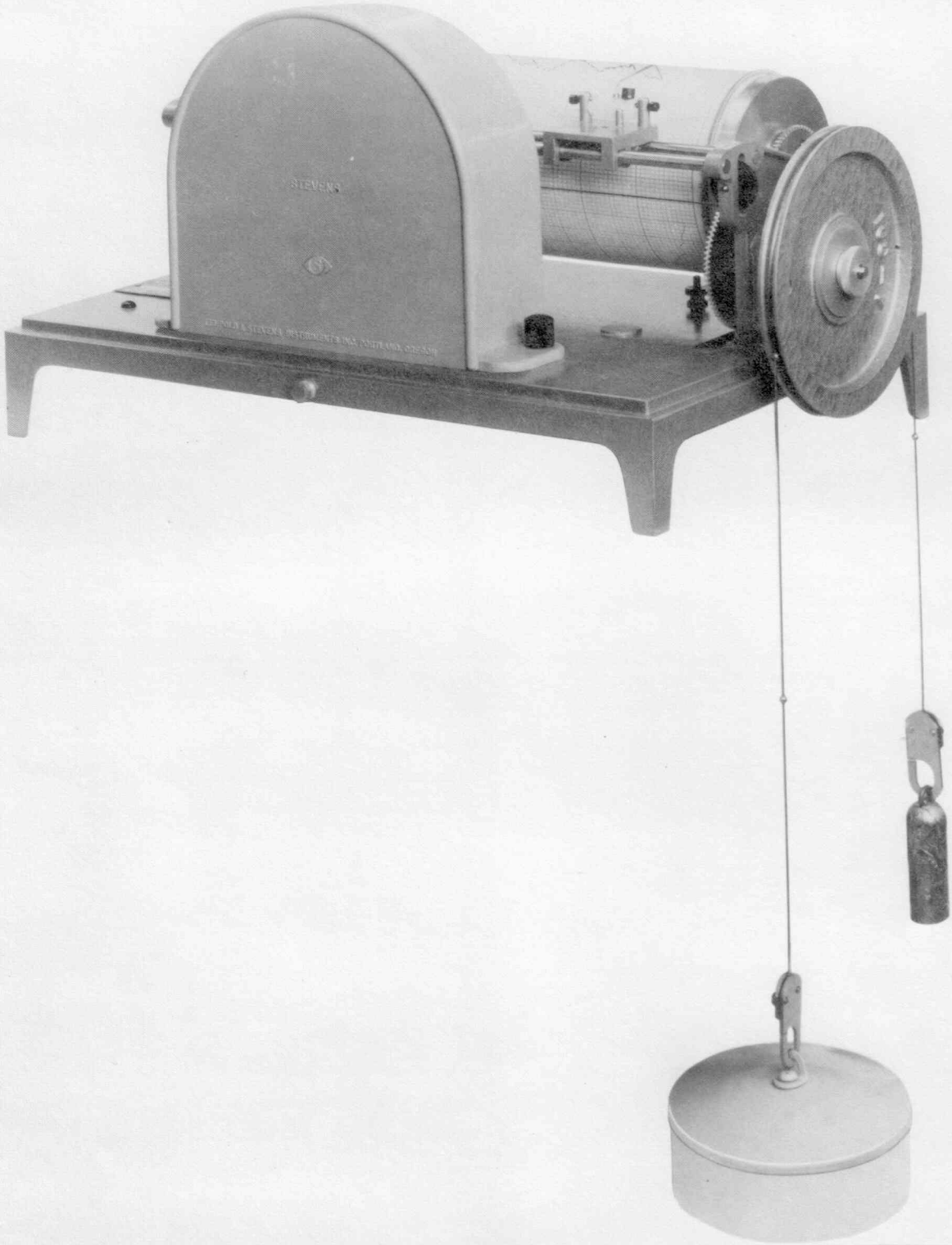


Figure 4. Type F Model 68 Tide Level Recorder Manufactured by Leupold & Stevens, Inc., Beaverton, Oregon

across the chart with time and produces a perpendicular curve on the chart as the drum turns with the ebb and flood of the tide.

The second type of gauge used was the Type A Model 71 with A-25 charts and Chelsea clock. This recorder (Figure 5) was used at the Little Sapelo, Sawmill, and Moses Hammock stations. This type of gauge is very similar to the Type F except that the paper is attached to the clock which moves it at a uniform rate, and the pen is attached to the float wheel so that it moves perpendicularly to the motion of the paper and proportional to the rise and fall of the tide.

The chart on the Type A and the ink supply in the pens has a data storage capacity of six months, but the clock only has to be wound every four and one-half months. Lubrication of moving parts on the gauge has to be done only once a year.

A time marker and a reversal indicator were installed on the A-71 gauges. The time marker was an auxiliary pen which marked the chart at 2.4 inch intervals to allow for corrections from possible errors due to humidity effects on the chart paper. The reversal indicator was another auxiliary pen which marked the chart when the tidal curve pen reversed itself because the amplitude of the tide exceeded the width of the chart (Figure 6). This was not activated by a tide stage reversal. The gauges were secured in locked shelters which were then bolted to the collars at the top of the stilling wells.

The reduced continuous curve on the scaled graphic paper that both gauges produce is called a "marigram" (Figure 6). It should be noted that each marigram has to be certified by the person reading it. This is done by recording the height of the tide, the time, date, and location of the gauge at the beginning and end of each marigram and the initials of the individual

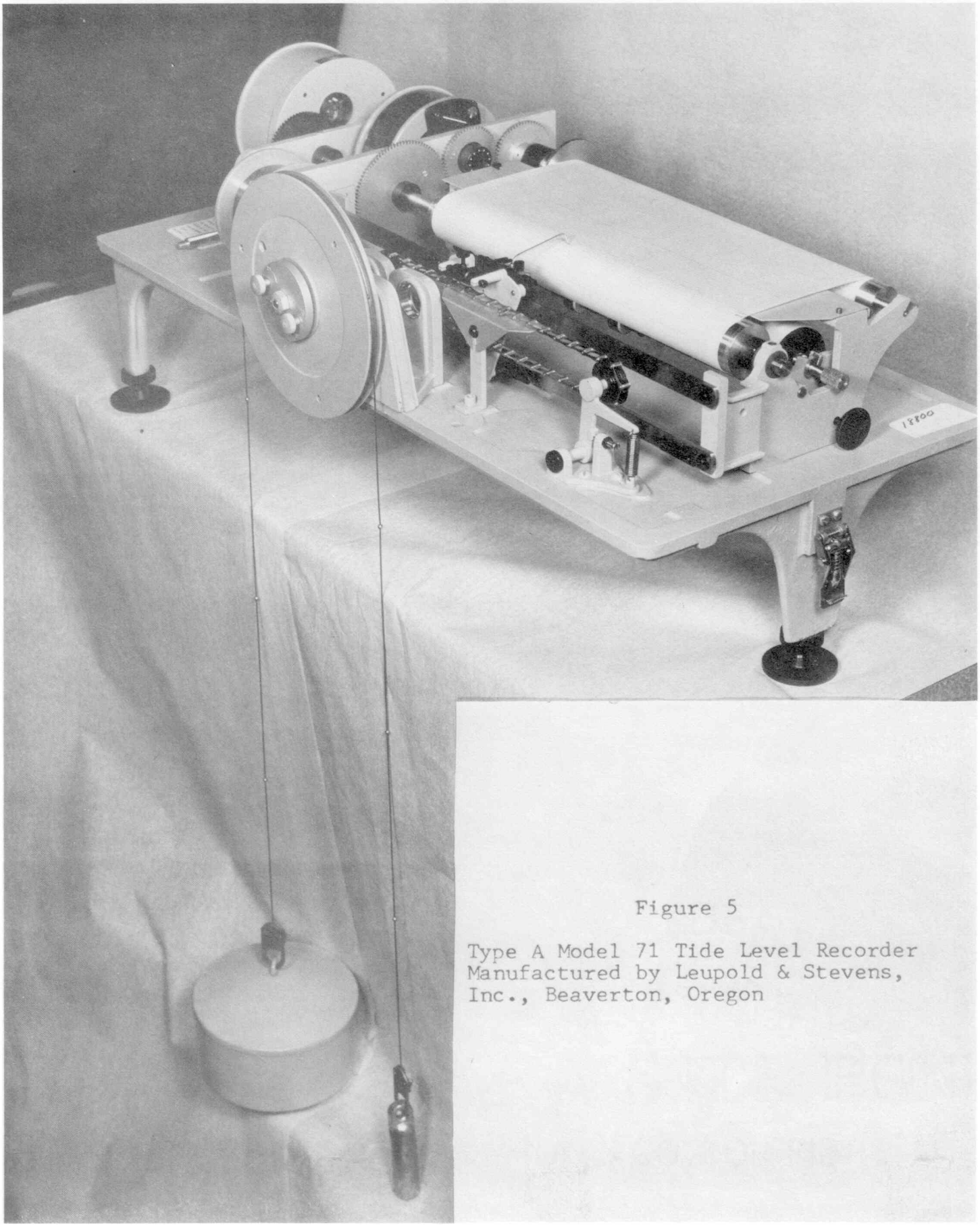


Figure 5

Type A Model 71 Tide Level Recorder Manufactured by Leupold & Stevens, Inc., Beaverton, Oregon

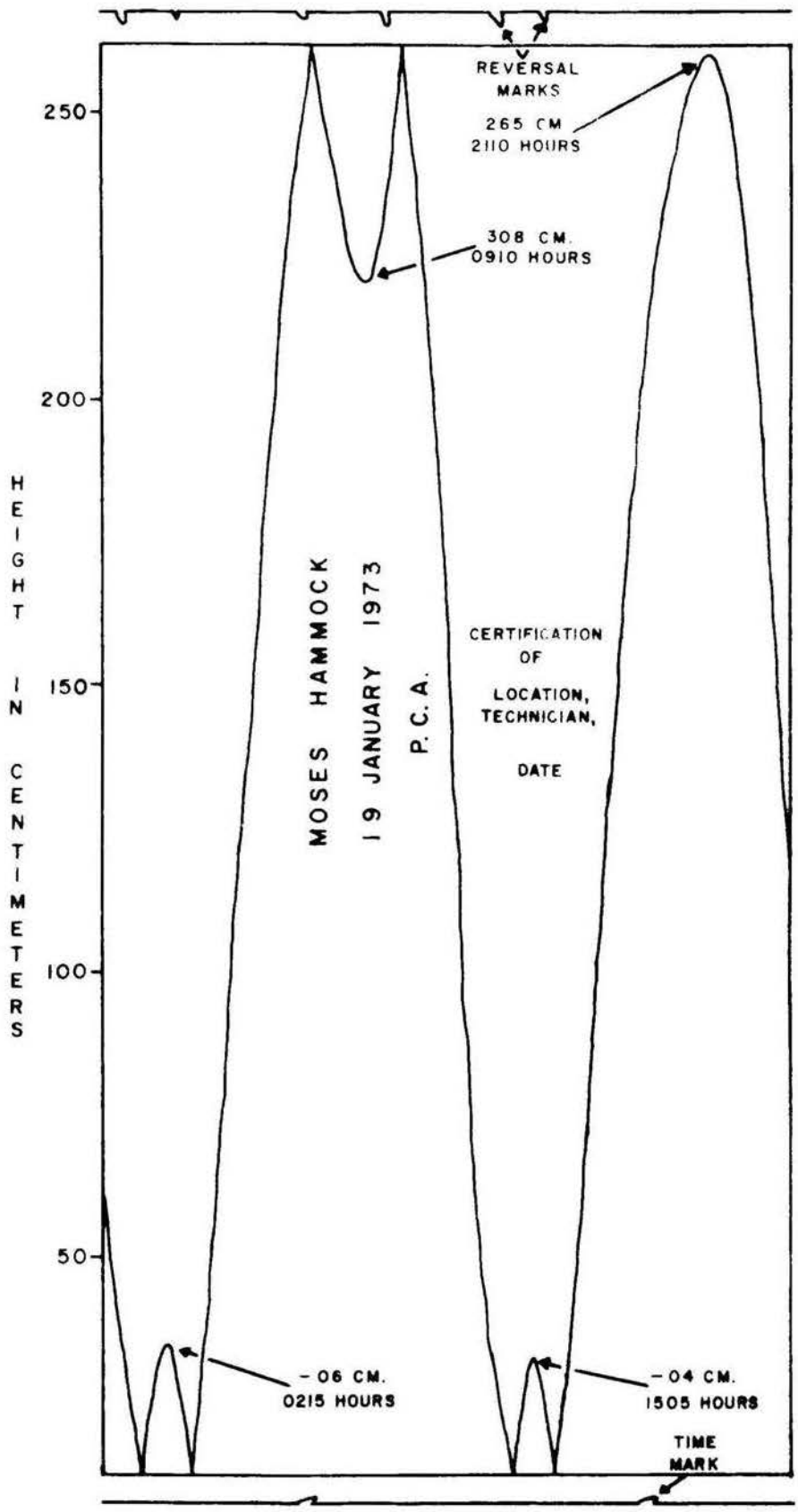


FIGURE 6. SAMPLE MARIGRAM FROM A STEVENS TYPE A MODEL 71 TIDE LEVEL RECORDER

making the certification. The height of the high or low water is then interpolated from the vertical scale. The time of high or low water is interpolated from the horizontal scale of the marigram.

Data collected from the four tide recorders on the Duplin Estuary were listed on monthly data sheets called "Tides: High and Low Waters", NOAA Form 77-10 (Figure 7). During the twelve month period of the study, data for the two primary tide stations, Ft. Pulaski, Georgia, and Mayport, Florida, were obtained from the National Ocean Survey (NOS), Rockville, Maryland.

Data collected from the four Duplin Estuary gauges and two NOS gauges were used to make a comparison of simultaneous observations between all six stations. Comparisons were made on a seasonal basis and an annual basis.

Simultaneous observations involved the comparison of tidal data from various stations on a daily basis for time and height of each tide. The reason for this comparison of our data with NOS standard stations was to mathematically reduce our data to a tidal epoch on which the NOS stations are based.

A tidal epoch is an 18.6 year period of time in which the tides at any one location vary from day to day, month to month, and year to year. This variation is due to the tide producing forces of phase, distance, and declination of the moon. In order to compare different locations and tides it is necessary to know the tidal epoch and the variation that may be associated with it. When simultaneous observations are conducted for a 12 month period, NOS reports that an accuracy of about $\pm$ 1.5 centimeters in tidal height and about 5 minutes in tidal time can be obtained.

For a small number of stations over a monthly period of time, the Coast and Geodetic Survey Form 248, "Tides: Comparison of Simultaneous

NOAA FORM 77-10
(2-71)
FORMERLY
FORM C&GS-2211
USCOMM-DC 34175-P71

Figure 7
TIDES: HIGH AND LOW WATERS

U.S. DEPARTMENT OF [illegible]
NATIONAL OCEANIC AND [illegible]
ADMINISTRATION

Station: _____ *Lat* _____

Time Meridian _____ *Height Datum* _____ *Long* _____

Highest Tide: Date _____ *Height* _____ *feet*

Year _____ *Month* _____ *Lowest Tide: Date* _____ *Height* _____ *feet*

DAY	MOON'S TRANSIT	TIME OF		LUNITIDAL INTERVAL		HEIGHT OF		DAY	MOON'S TRANSIT	TIME OF		LUNITIDAL INTERVAL		HEIGHT OF	
	GMT	HW	LW	HW	LW	HW	LW		GMT	HW	LW	HW	LW	HW	LW
	hours	*hours*	*hours*	*hours*	*hours*	*feet*	*feet*		*hours*	*hours*	*hours*	*hours*	*hours*	*feet*	*feet*
1	.	.	.	.	.	.	.	18	.	.	.	.	.	.	.
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4	.	.	.	.	.	.	.	21	.	.	.	.	.	.	.
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5	.	.	.	.	.	.	.	22	.	.	.	.	.	.	.
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6	.	.	.	.	.	.	.	23	.	.	.	.	.	.	.
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7	.	.	.	.	.	.	.	24	.	.	.	.	.	.	.
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8	.	.	.	.	.	.	.	25	.	.	.	.	.	.	.
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9	.	.	.	.	.	.	.	26	.	.	.	.	.	.	.
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10	.	.	.	.	.	.	.	27	.	.	.	.	.	.	.
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11	.	.	.	.	.	.	.	28	.	.	.	.	.	.	.
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12	.	.	.	.	.	.	.	29	.	.	.	.	.	.	.
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13	.	.	.	.	.	.	.	30	.	.	.	.	.	.	.
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14	.	.	.	.	.	.	.	31	.	.	.	.	.	.	.
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15	.	.	.	.	.	.	.		.	.	.				
	.	.	.	.	.	.	.	*Sums*	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	*Means*				.	.	.	.
	.	.	.	.	.	.	.	*Greenwich Interval*				.	.	.	.
17	.	.	.	.	.	.	.	*Lunar Interval*				.	.	.	*Mn*
	.	.	.	.	.	.	.	*Local Interval*				.	.	.	*MTL*

REMARKS

	Mn	*DHQ*	*DLQ*		*HHW*	*LLW*
Observed	.	.	.			
Factor	.	.	.	*Sums*	.	.
Corrected	.	.	.	*Means*	.	.
Tabulated by					.	
Reduced by					.	*Gt*
					.	*Greenwich*

Observations" (Figure 8) is generally used. For the present study, all data were placed on IBM cards and processed using the IBM 360-65. All the computations and comparisons depicted on Figure 8 were made using the computer.

The following comparison of simultaneous observations from all six locations were computed for each high and low water for the periods 1 August 1972 through 31 July 1973, 15 September 1972 through 14 October 1972, 15 December 1972 through 13 January 1973, 15 March 1973 through 13 April 1973, and 15 June 1973 through 14 July 1973: mean difference in time (to the nearest one hundredth hour) of high and low water respectively; mean difference in height (in centimeters) of high and low water respectively; mean height of high water (in centimeters); mean height of low water (in centimeters); mean height of first high tide of the day; mean height of second high tide of the day; mean height of first low water of the day; mean height of second low water of the day. For all the above computations, the statistical parameters computed were: variance, standard deviation, standard error of the mean, and coefficient of variation.

Using a survey chain, the distance between each of the tide gauges was measured. Using an inverted umbrella shaped sounding lead, survey chain, and small boat, cross sections of the estuary were measured at each of the four tide stations in the Duplin Estuary. Soundings were made at five meter intervals at high slack water. The exact time and height of the tide at the time the cross sections were measured was marked on each marigram. Depth was reported to the nearest five centimeters.

Using the computer program listed in Appendix II, the volume of the flood and ebb tides was computed for 11 September 1972, 15 December 1972, 15 March 1973, and 15 June 1973. By summing the observed volume changes

C&GS FORM 248
(11-67)

Figure 8

U.S. DEPARTMENT OF COMMERCE
ESSA
COAST AND GEODETIC SURVEY

TIDES : Comparison of Simultaneous Observations

(A) Subordinate station ..... Lat. ..... Long. .....
(B) Standard station ..... Lat. ..... Long. .....
Chief of party ..... Time Meridian: (A) ..... (B) .....

DATE. Year.	(A) STATION. Time of—		(B) STATION. Time of—		(A)−(B) Time difference.		(A) STATION. Height of—		(B) STATION. Height of—		(A)−(B) Height difference.	
	HW.	LW.	HW.	LW.	HW.	LW.	HW.	LW.	HW.	LW.	HW.	LW.
Mo. D.	Hours.	Hours.	Hours.	Hours.	Hours.	Hours.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
							HHW.	HLW.	HHW.	HLW.	HHW.	HLW.
Sums												
Means												
							LHW.	LLW.	LHW.	LLW.	LHW.	LLW.
Sums												
Means												

HW. LW.

(1) = ... | ..... = Mean difference in time of high and low water respectively.
(2) = ... | ..... = Correction for difference in longitude. (Table on back of form.)
(3) = ... | ..... = (1)+(2) = Mean difference in high and low water intervals, respectively.

Feet. Feet.

(4) = ... = Mean HHW height at (A).
(5) = ... = Mean HLW height at (A).
(6) = ... = Mean LHW height at (A).
(7) = ... = Mean LLW height at (A).
(8) = ... = (4)−(6) = 2DHQ at (A).
(9) = ... = (5)−(7) = 2DLQ at (A).
(10) = ... = ½[(4)+(6)] = Mean HW height at (A).
(11) = ... = ½[(5)+(7)] = Mean LW height at (A).
(12) = ... = (10)−(11) = Mn at (A).
(13) = ... = ½[(10)+(11)] = MTL at (A).

(14) = ... = Mean HHW difference.
(15) = ... = Mean HLW difference.
(16) = ... = Mean LHW difference.
(17) = ... = Mean LLW difference.
(18) = ... = (14)−(16) = 2DHQ difference.
(19) = ... = (15)−(17) = 2DLQ difference.
(20) = ... = ½[(14)+(16)] = Mean HW difference.
(21) = ... = ½[(15)+(17)] = Mean LW difference.
(22) = ... = (20)−(21) = Mn difference.
(23) = ... = ½[(20)+(21)] = MTL difference.

(24) = ... = (12)+[(12)−(22)] = Mn ratio.
(25) = ... = (8)+[(8)−(18)] = DHQ ratio.
(26) = ... = (9)+[(9)−(19)] = DLQ ratio.

Results from comparison of Stations A and B.	HWI.	LWI.	MTL.	Mn.	DHQ.	DLQ.
Length of Series.	Hours.	Hours.	Feet.	Feet.	Feet.	Feet.
Accepted values for standard station, from						
Differences and ratios: (3), (23), (24), (25), (26)				×	×	×
Corrected values for subordinate station						

Mean LW on staff at subordinate station = MTL − ½Mn = ... feet.
Mean LLW on staff at subordinate station = MTL − ½Mn − DLQ = ... feet.

Computed by ..... (Date.) Verified by ..... (Date.)

each quarter hour during the flooding tide, the flood tide volume was computed. Similarly, the fifteen minute ebb tide interval volumes were summed. The total volume exchange in cubic meters, and percent volume exchange were also computed.

Results

Cross sections at each tide gauge location, with mean high water and mean low water (on an annual basis), are depicted in Figures 9-12. These values represent the average of all tides during the period considered. Similar information relating to seasonal variation (based on all high and low waters in a one month period) in mean high and mean low water is portrayed in Figures 13-16. The annual tidal range at Marsh Landing was 212 cm; but the seasonal variation was a minimum of 202 cm (September-October), and a maximum of 215 cm (June-July). The annual tidal range for Little Sapelo was 210 cm while seasonal variations were 200 cm in September-October (minimum) and 213 cm in June-July (maximum). At the Sawmill station, the annual tidal range was greater (221 cm) than the preceding two locations; the seasonal variations were 215 cm (minimum) in December-January and 239 cm (maximum) in September-October. At the tide gauging station farthest up the estuary, Moses Hammock, the annual range of tides was 221 cm. Seasonal values demonstrated a minimum in September-October (214 cm), and a maximum in June-July (227 cm).

A summary of the tidal datums of mean high and mean low water for all stations considered (Table 1) reveals that mean high water at Marsh Landing (225.92 cm) was 44.6 cm less than mean high water at Moses Hammock (270.52 cm). This station, near the mouth of the estuary, and the other only 8.88 km upstream, revealed a nearly half meter difference in mean high water over a twelve month period. Comparison of mean low water at the two locations reveals that mean low water at Marsh Landing is 36.5 cm lower than that at Moses Hammock. Comparison of the other two locations in between (Little

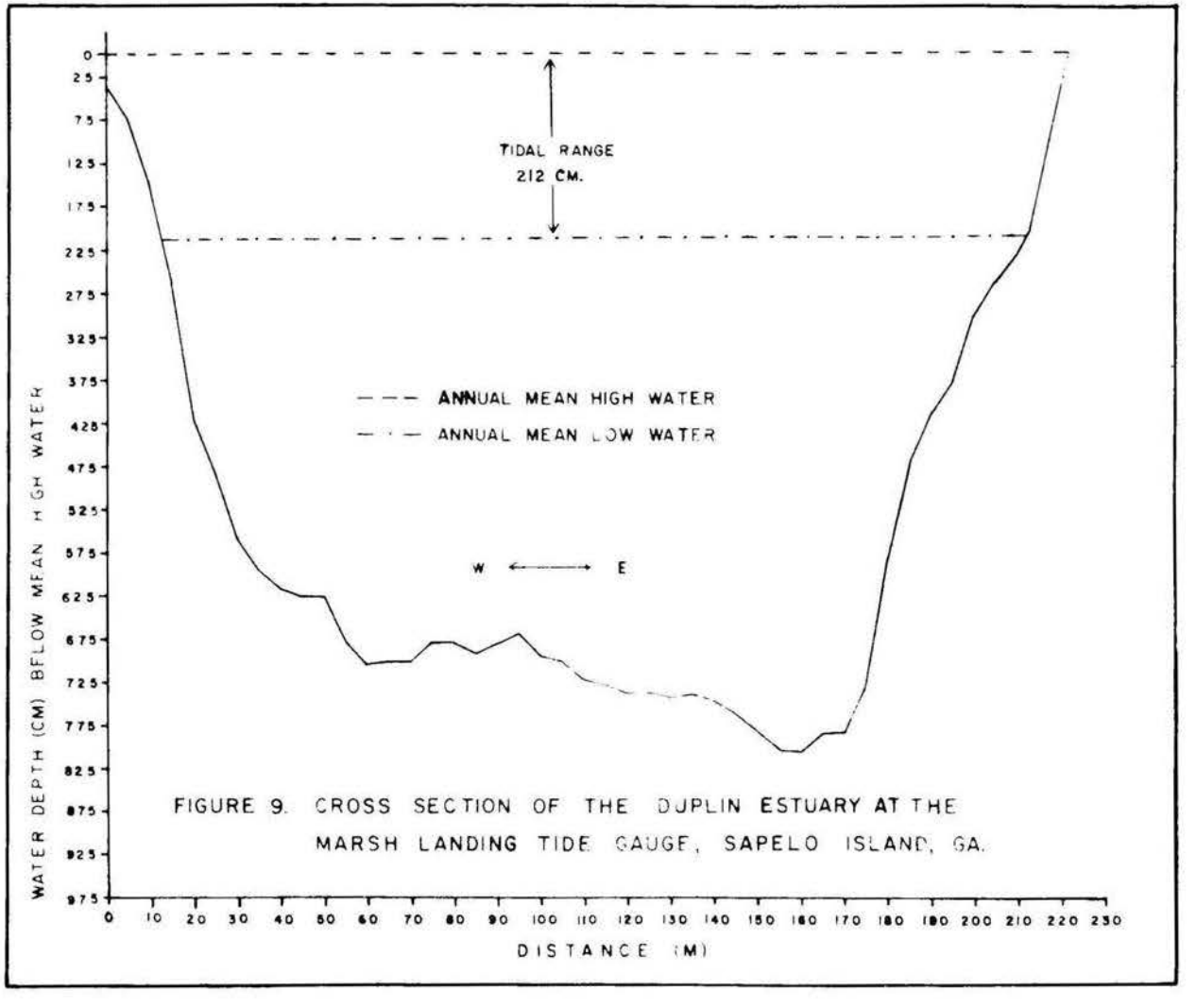

FIGURE 9. CROSS SECTION OF THE DUPLIN ESTUARY AT THE MARSH LANDING TIDE GAUGE, SAPELO ISLAND, GA.

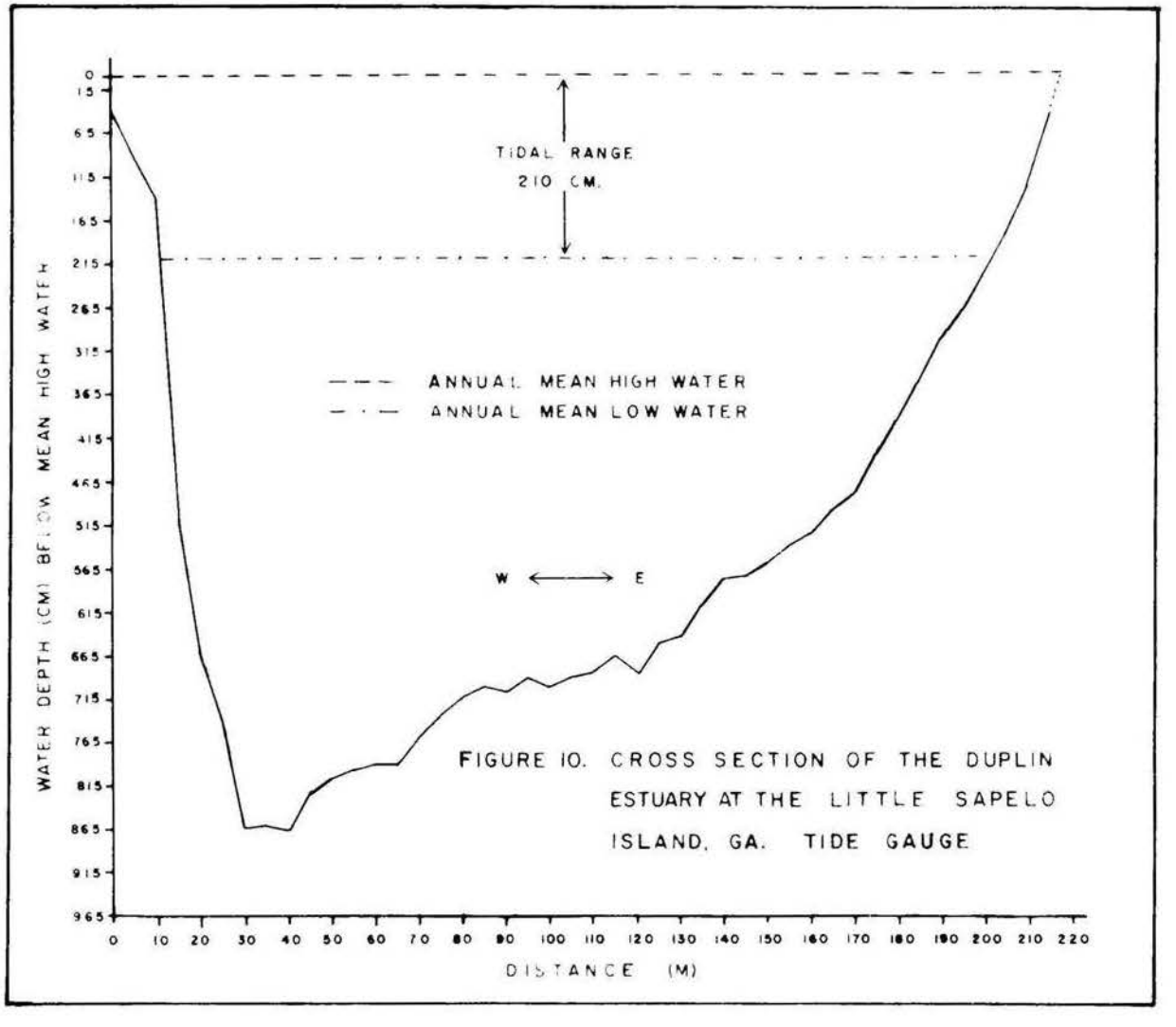

FIGURE 10. CROSS SECTION OF THE DUPLIN ESTUARY AT THE LITTLE SAPELO ISLAND, GA. TIDE GAUGE

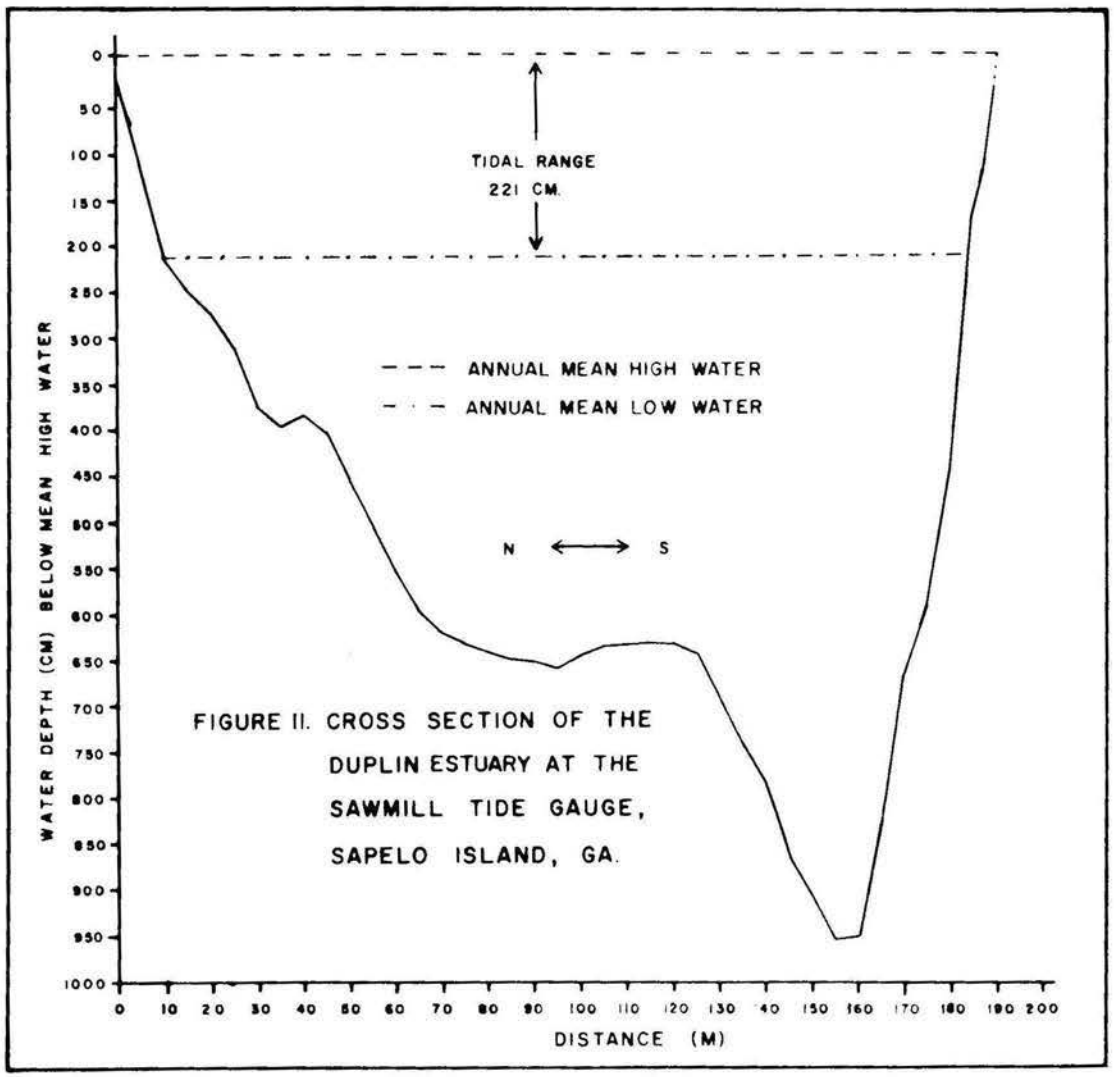

FIGURE II. CROSS SECTION OF THE DUPLIN ESTUARY AT THE SAWMILL TIDE GAUGE, SAPELO ISLAND, GA.

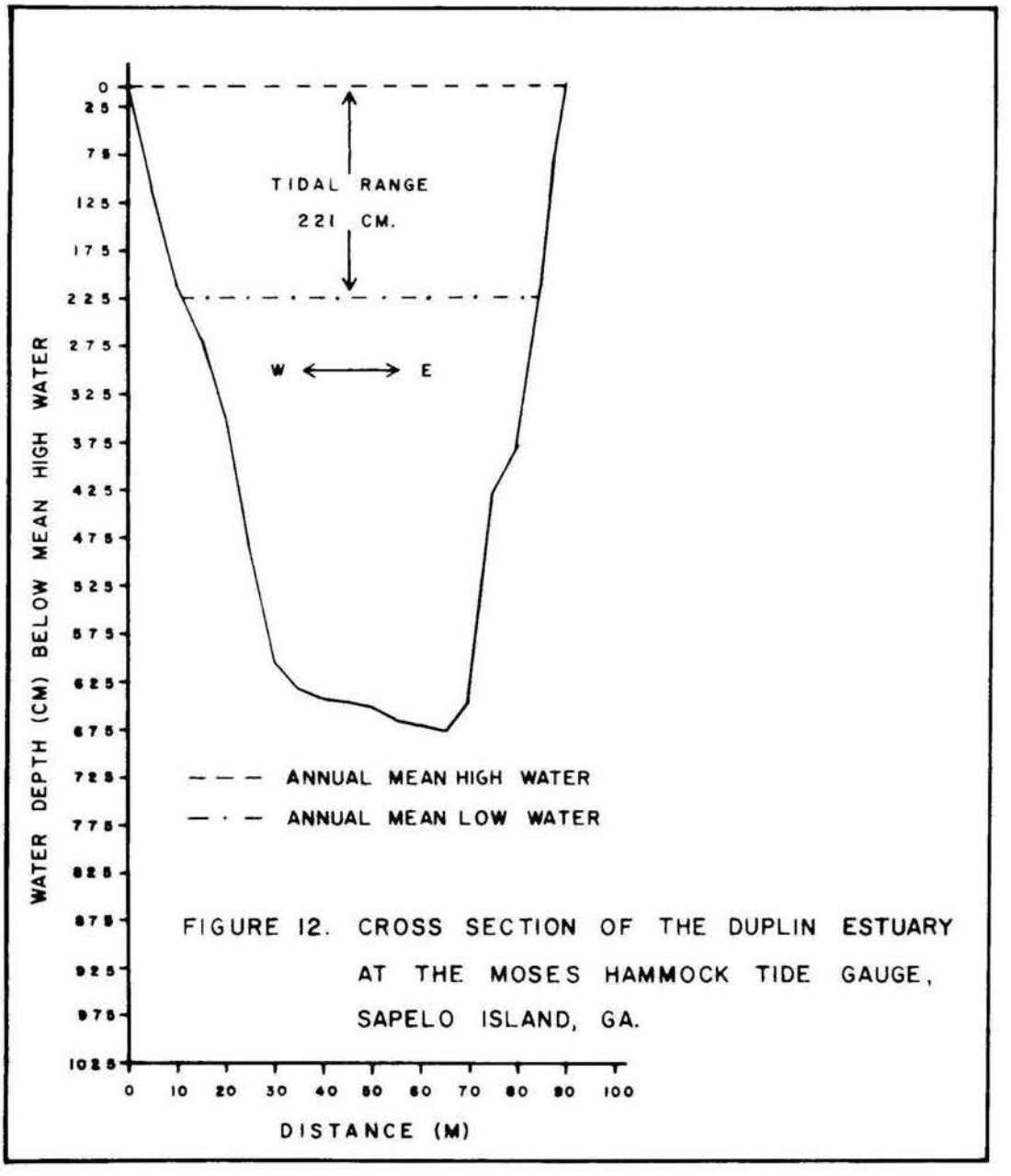

FIGURE 12. CROSS SECTION OF THE DUPLIN ESTUARY AT THE MOSES HAMMOCK TIDE GAUGE, SAPELO ISLAND, GA.

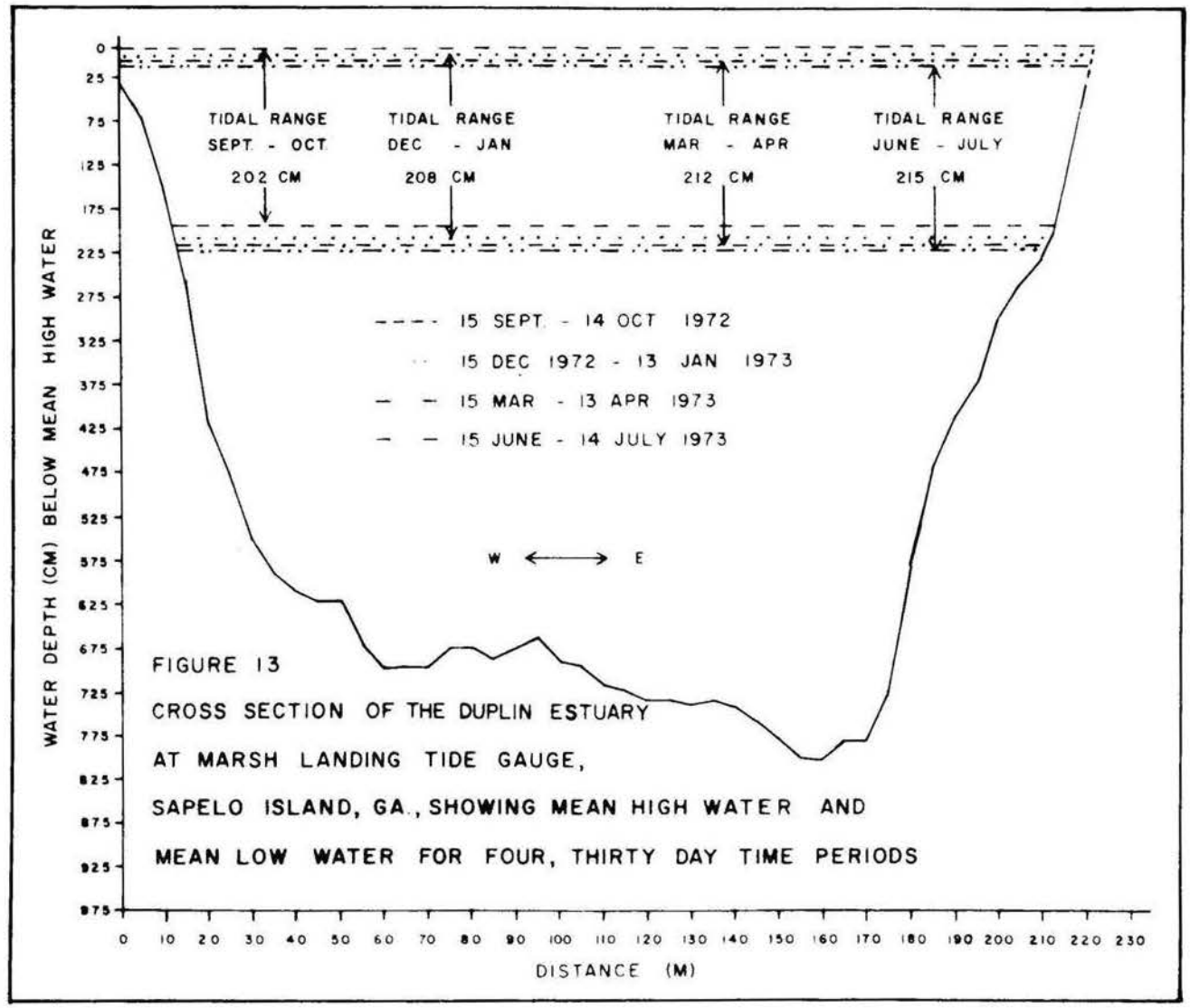

FIGURE 13

CROSS SECTION OF THE DUPLIN ESTUARY AT MARSH LANDING TIDE GAUGE, SAPELO ISLAND, GA., SHOWING MEAN HIGH WATER AND MEAN LOW WATER FOR FOUR, THIRTY DAY TIME PERIODS

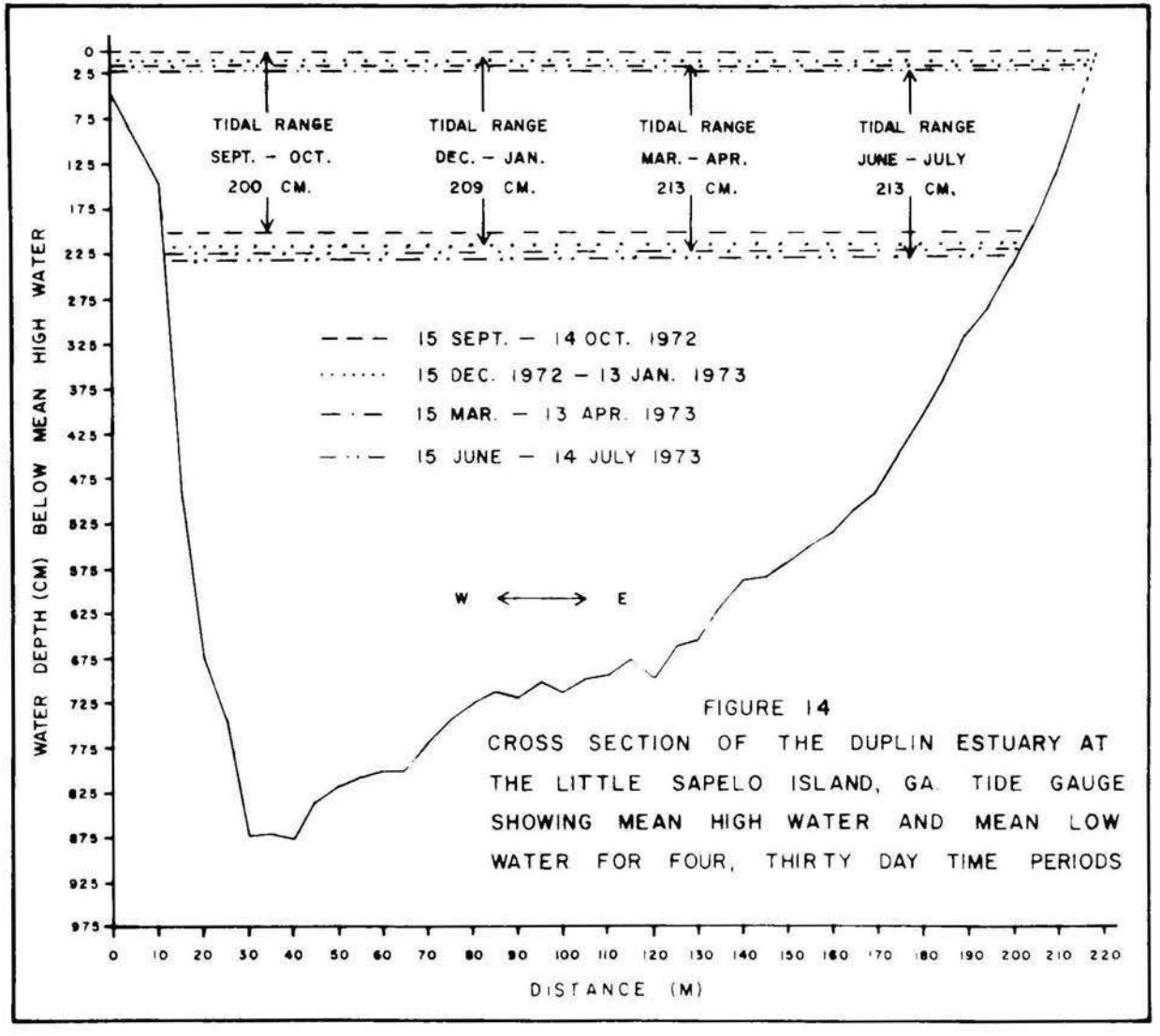

FIGURE 14

CROSS SECTION OF THE DUPLIN ESTUARY AT THE LITTLE SAPELO ISLAND, GA. TIDE GAUGE SHOWING MEAN HIGH WATER AND MEAN LOW WATER FOR FOUR, THIRTY DAY TIME PERIODS

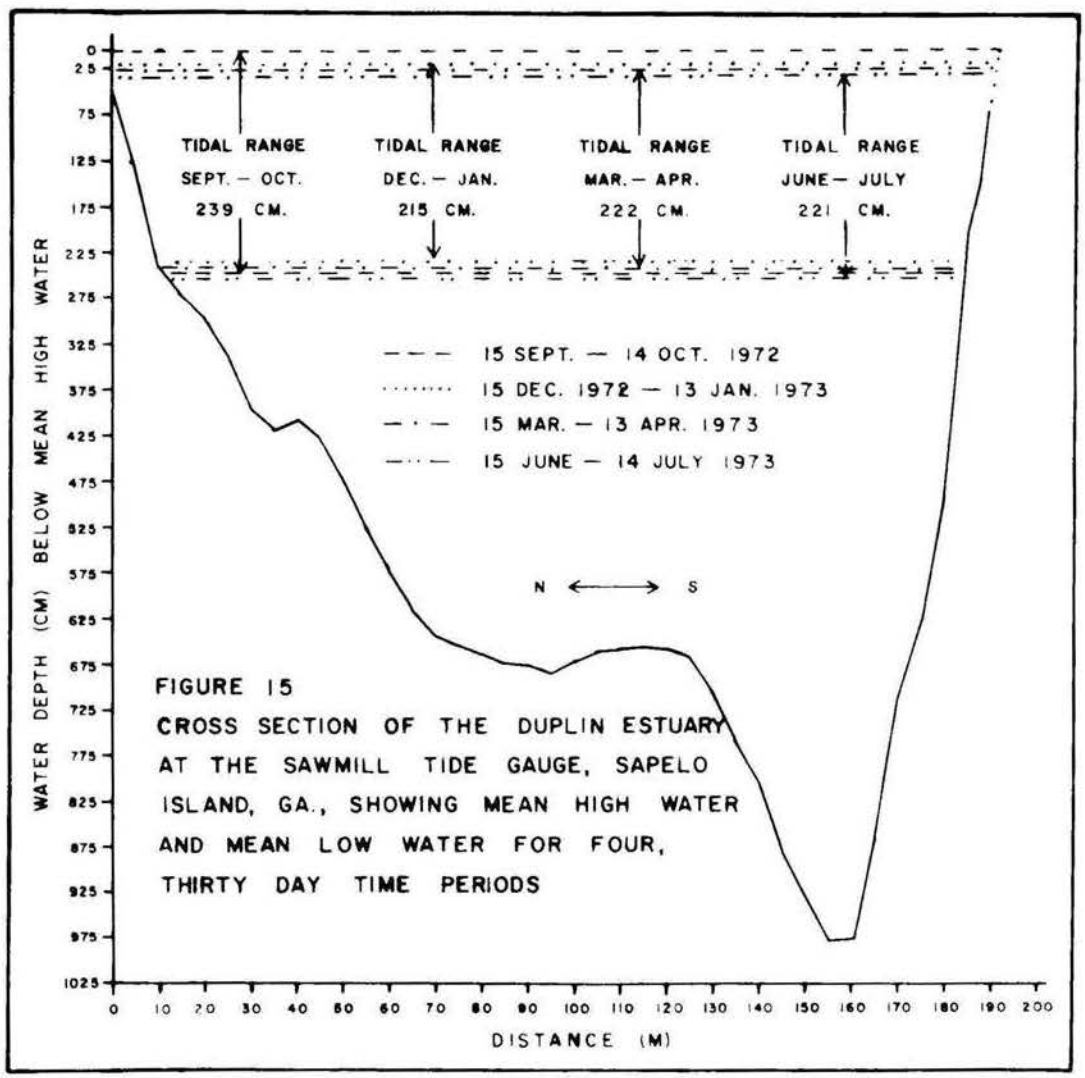

FIGURE 15
CROSS SECTION OF THE DUPLIN ESTUARY AT THE SAWMILL TIDE GAUGE, SAPELO ISLAND, GA., SHOWING MEAN HIGH WATER AND MEAN LOW WATER FOR FOUR, THIRTY DAY TIME PERIODS

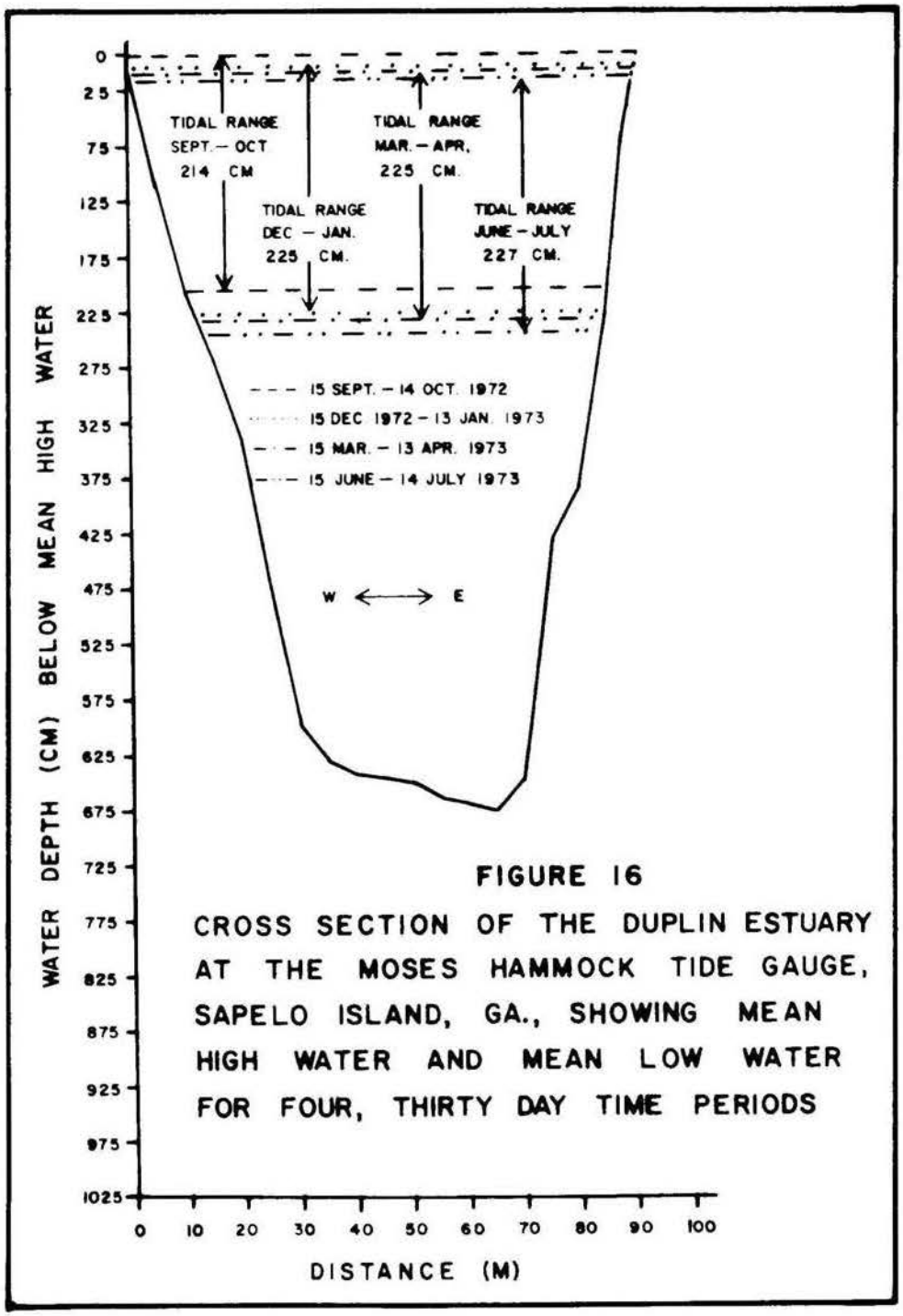

FIGURE 16

CROSS SECTION OF THE DUPLIN ESTUARY AT THE MOSES HAMMOCK TIDE GAUGE, SAPELO ISLAND, GA., SHOWING MEAN HIGH WATER AND MEAN LOW WATER FOR FOUR, THIRTY DAY TIME PERIODS

Table 1. TIDAL DATUMS OF MEAN HIGH WATER AND MEAN LOW WATER AND STATISTICS FOR ALL TIDAL STATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

Station	Mean High Water (cm.)	Mean Low Water (cm.)	Variance	Standard Deviation	Standard Error	Coefficient of Variation
Ft. Pulaski, Ga.	221.75		630.054	25.946	0.9460	0.1132
		17.14	834.744	28.892	1.0967	1.6857
Mayport, Florida	144.72		363.961	19.078	0.7327	0.1318
		9.84	479.991	21.909	0.8534	2.2274
Marsh Landing,	225.92		631.309	25.126	0.9947	0.1112
Sapelo Island, Ga.		13.32	884.422	29.739	1.1896	2.2329
Little Sapelo,	215.76		621.403	24.928	0.9748	0.1155
Sapelo Island, Ga.		5.82	905.771	30.096	1.1859	5.1754
Sawmill,	257.14		642.854	25.355	1.0492	0.0986
Sapelo Island, Ga.		36.54	962.677	31.027	1.2872	0.8492
Moses Hammock,	270.52		863.000	29.377	1.1324	0.1086
Sapelo Island, Ga.		49.85	949.910	30.821	1.1889	0.6183

Sapelo and Sawmill) also document that as one proceeds up the Duplin Estuary, mean low water and mean high water increase.

Table 1 reveals the comparison of water height in the Duplin Estuary with that at the two primary NOS tide stations, Ft. Pulaski, Georgia, and Mayport, Florida. These are the two closest NOS primary tidal stations to the Duplin Estuary. In the absence of the present data collected from the Duplin Estuary, the tidal datum from one of these two stations would be used to establish mean high and mean low water. If one were to extrapolate a tidal datum to the Duplin Estuary from Port Pulaski, Ga. (79 km north), the mean high water and mean low water value would be different from any recording station on the Duplin Estuary. Extrapolation from Mayport, Fla. (114 km south) would result in even greater differences. There is a significant difference between Ft. Pulaski and Mayport in terms of the height of mean high water. Without a local determination of tidal datum, the mean high water line would be in error (if only a primary tide station were used). Depending on its location, it would either favor the developer or the conservationist but indeed would not represent the correct local mean high water.

A comparison of the first and second high and low tide (on an annual basis) reveals differences (Table 2) of one to four centimeters.

Annual comparisons of mean high water (Table 3) reveal that high water occurs at Ft. Pulaski, Ga., 0.27 hours before high water at Marsh Landing. Delay of annual mean high water is such that mean high water at Little Sapelo is 0.16 hours after Marsh Landing; Sawmill mean high water occurs 0.51 hours after Marsh Landing; and Moses Hammock high water occurs 0.60 hours after Marsh Landing.

Table 2. TIDAL DATUMS OF MEAN HIGH AND MEAN LOW WATER AND STATISTICS FOR FIRST AND SECOND HIGH WATER AND FIRST AND SECOND LOW WATER FOR THE PERIOD 1 AUGUST 1972 THROUGH 31 JULY 1973

	Mean High Water (cm.)	Mean Low Water (cm.)	Variance	Standard Deviation	Standard Error	Coefficient of Variation
Ft. Pulaski, Ga.						
First High Tide	219.56		548.111	24.168	1.2738	0.1101
First Low Tide		16.05	800.762	28.298	1.4956	1.7634
Second High Tide	224.03		673.633	25.954	1.3994	0.1159
Second Low Tide		18.30	870.815	29.510	1.6099	1.6122
Mayport, Florida						
First High Tide	143.25		426.415	20.650	1.1038	0.1442
First Low Tide		9.29	493.518	22.215	1.2066	2.3923
Second High Tide	146.28		293.673	17.137	0.9462	0.1172
Second Low Tide		10.42	466.501	21.599	1.2074	2.0731
Marsh Landing, Sapelo Island, Ga.						
First High Tide	223.90		644.728	25.391	1.4085	0.1134
First Low Tide		11.78	867.227	29.449	1.6437	2.4995
Second High Tide	228.01		614.426	24.788	1.4011	0.1087
Second Low Tide		14.94	900.359	30.006	1.7210	2.0083
Little Sapelo, Sapelo Island, Ga.						
First High Tide	214.32		626.361	25.027	1.3653	0.1168
First Low Tide		4.51	898.590	29.976	1.6477	6.6458
Second High Tide	217.29		616.773	24.835	1.3927	0.1143
Second Low Tide		7.19	912.555	30.209	1.7075	4.1986

Table 2, continued

	Mean High Water (cm.)	Mean Low Water (cm.)	Variance	Standard Deviation	Standard Error	Coefficient of Variation
Sawmill, Sapelo Island, Ga.						
First High Tide	256.67		641.227	25.322	1.4596	0.0987
First Low Tide		35.25	991.551	31.489	1.8180	0.8934
Second High Tide	257.65		649.532	25.486	1.5150	0.0989
Second Low Tide		37.92	931.583	30.522	1.8208	0.8049
Moses Hammock, Sapelo Island, Ga.						
First High Tide	269.61		951.420	30.845	1.6582	0.1144
First Low Tide		48.73	924.817	30.411	1.6325	0.6241
Second High Tide	271.48		772.859	27.800	1.5374	0.1024
Second Low Tide		51.04	976.872	31.255	1.7337	0.6124

Table 3. DIFFERENCES IN TIME OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Time (1/10 hr.)					
Mayport	0.63				
Marsh Landing	0.27	-0.37			
Little Sapelo	0.44	-0.21	0.16		
Sawmill	0.82	0.19	0.51	0.31	
Moses Hammock	0.88	0.23	0.60	0.44	0.08
Variance of mean differences in High Tides - Time					
Mayport	0.226				
Marsh Landing	0.235	0.440			
Little Sapelo	0.355	0.539	0.464		
Sawmill	0.170	0.398	0.292	0.345	
Moses Hammock	0.167	0.344	0.280	0.366	0.147
Standard Deviation of mean differences in High Tides - Time					
Mayport	0.476				
Marsh Landing	0.485	0.663			
Little Sapelo	0.596	0.734	0.681		
Sawmill	0.412	0.631	0.540	0.588	
Moses Hammock	0.408	0.586	0.529	0.605	0.383
Standard Error of mean differences in High Tides - Time					
Mayport	0.0183				
Marsh Landing	0.0192	0.0268			
Little Sapelo	0.0233	0.0293	0.0281		
Sawmill	0.0171	0.0267	0.0234	0.0255	
Moses Hammock	0.0158	0.0231	0.0215	0.0237	0.0163
Coefficient of Variation of mean differences in High Tides - Time					
Mayport	0.7495				
Marsh Landing	1.8046	-1.7879			
Little Sapelo	1.3443	-3.4806	4.1742		
Sawmill	0.5049	3.2836	1.0622	1.9009	
Moses Hammock	0.4642	2.5656	0.8792	1.3819	4.5919

A statistical comparison of differences in tidal heights of mean high water on an annual basis (Table 4) reveals that mean high water at Mayport, Fla. (193 km south of Fort Pulaski, Ga.) is 76.52 cm less than that at Fort Pulaski. Considering the Duplin Estuary, Moses Hammock mean high water is 44.60 cm higher than Marsh Landing; Sawmill mean high water is 30.64 cm higher than Marsh Landing, and Little Sapelo (only 1.607 km upstream from Marsh Landing) mean high water is 10.81 cm lower than Marsh Landing.

A similar comparison of annual differences of mean low water at the various tide stations (Table 5) reveals that mean low water occurs at Little Sapelo and Marsh Landing at the same time. Sawmill mean low water occurs 0.19 hours after Marsh Landing, and Moses Hammock mean low water occurs 0.16 hours after Marsh Landing. This suggests the presence of a standing wave in the Duplin Estuary. The annual differences in height of mean low water at all stations is summarized in Table 6.

Consideration of the annual variations in the first and second low and high tides at all stations, in terms of time difference and height difference (Tables 7-14), simply validate the differences between tides. Generally, the second high tide of the day has a greater time delay than the first although their amplitude is nearly equal.

In order to consider the validity of a year's data versus a monthly observation, tidal information was retrieved for four 30 day periods spaced equally throughout the year. These comparisons were conducted for the periods 15 September 1972 through 14 October 1972, 15 December 1972 through 13 January 1973, 15 March 1973 through 13 April 1973, and 15 June 1973 through 14 July 1973. For each of these periods, differences in time and height of: mean high water, mean low water, first high water, second high water, first low

Table 4. DIFFERENCES IN TIDAL HEIGHT OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Height (cm.)					
Mayport	-76.52				
Marsh Landing	3.98	80.69			
Little Sapelo	-6.60	69.93	-10.81		
Sawmill	34.71	111.14	30.64	41.19	
Moses Hammock	48.65	124.91	44.45	55.18	14.55
Variance of mean differences in High Tides - Height					
Mayport	203.507				
Marsh Landing	99.268	145.833			
Little Sapelo	105.474	145.195	50.766		
Sawmill	122.249	150.249	47.023	65.025	
Moses Hammock	292.353	346.724	244.116	238.761	268.769
Standard Deviation of mean differences in High Tides - Height					
Mayport	14.266				
Marsh Landing	9.963	12.076			
Little Sapelo	10.270	12.050	7.125		
Sawmill	11.047	12.258	6.857	8.064	
Moses Hammock	17.098	18.621	15.624	15.452	16.394
Standard Error of mean differences in High Tides - Height					
Mayport	0.5491				
Marsh Landing	0.3954	0.4889			
Little Sapelo	0.4025	0.4812	0.2941		
Sawmill	0.4583	0.5184	0.2976	0.3493	
Moses Hammock	0.6606	0.7326	0.6357	0.6047	0.6972
Coefficient of Variation of mean differences in High Tides - Height					
Mayport	-0.1864				
Marsh Landing	2.5006	0.1497			
Little Sapelo	-1.5563	0.1723	-0.6589		
Sawmill	0.3182	0.1103	0.2238	0.1958	
Moses Hammock	0.3515	0.1491	0.3515	0.2800	1.1265

Table 5. DIFFERENCES IN TIME OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Time (1/10 hr.)					
Mayport	0.19				
Marsh Landing	0.13	-0.06			
Little Sapelo	0.15	-0.06	0.00		
Sawmill	0.39	0.23	0.19	0.18	
Moses Hammock	0.30	0.09	0.16	0.15	0.15
Variance of mean differences in Low Tides - Time					
Mayport	0.245				
Marsh Landing	0.681	0.613			
Little Sapelo	0.398	0.286	0.653		
Sawmill	0.374	0.243	0.668	0.204	
Moses Hammock	0.561	0.480	0.632	0.495	0.457
Standard Deviation of mean differences in Low Tides - Time					
Mayport	0.495				
Marsh Landing	0.825	0.783			
Little Sapelo	0.631	0.535	0.808		
Sawmill	0.612	0.493	0.817	0.451	
Moses Hammock	0.749	0.693	0.795	0.703	0.676
Standard Error of mean differences in Low Tides - Time					
Mayport	0.0194				
Marsh Landing	0.0332	0.0325			
Little Sapelo	0.0251	0.0219	0.0340		
Sawmill	0.0256	0.0212	0.0360	0.0197	
Moses Hammock	0.0291	0.0277	0.0327	0.0278	0.0289
Coefficient of Variation of mean differences in Low Tides - Time					
Mayport	2.5963				
Marsh Landing	6.4758	-13.7271			
Little Sapelo	4.1794	-9.1234	228.3627		
Sawmill	1.5499	2.1853	4.2392	2.4437	
Moses Hammock	2.5250	7.4100	4.8460	4.5749	-8.1264

Table 6. DIFFERENCES IN TIDAL HEIGHT OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Height (cm.)					
Mayport	-8.07				
Marsh Landing	-3.26	5.11			
Little Sapelo	-11.96	-4.30	-9.56		
Sawmill	20.99	28.28	23.67	33.05	
Moses Hammock	31.93	39.97	34.64	44.04	11.61
Variance of mean differences in Low Tides - Height					
Mayport	220.181				
Marsh Landing	130.656	147.614			
Little Sapelo	189.650	167.234	59.087		
Sawmill	149.631	180.647	33.947	90.574	
Moses Hammock	168.006	189.777	55.899	105.186	31.006
Standard Deviation of mean differences in Low Tides - Height					
Mayport	14.838				
Marsh Landing	11.430	12.150			
Little Sapelo	13.771	12.932	7.687		
Sawmill	12.232	13.441	5.826	9.517	
Moses Hammock	12.962	13.776	7.477	10.256	5.568
Standard Error of mean differences in Low Tides - Height					
Mayport	0.5802				
Marsh Landing	0.4602	0.5036			
Little Sapelo	0.5474	0.5279	0.3234		
Sawmill	0.5124	0.5768	0.2562	0.4154	
Moses Hammock	0.5042	0.5502	0.3073	0.4048	0.2379
Coefficient of Variation of mean differences in Low Tides - Height					
Mayport	-1.8397				
Marsh Landing	-3.5088	2.3768			
Little Sapelo	1.1516	-3.0098	-0.8038		
Sawmill	0.5828	0.4753	0.2462	0.2880	
Moses Hammock	0.4060	0.3447	0.2158	0.2329	0.4796

Table 7. DIFFERENCES IN TIME OF THE MEAN OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Time (1/10 hr.)					
Mayport	0.63				
Marsh Landing	0.24	-0.40			
Little Sapelo	0.45	-0.20	0.19		
Sawmill	0.79	0.17	0.50	0.26	
Moses Hammock	0.86	0.21	0.60	0.41	0.09
Variance of mean differences in First High Tide - Time					
Mayport	0.373				
Marsh Landing	0.260	0.594			
Little Sapelo	0.524	0.867	0.660		
Sawmill	0.154	0.560	0.295	0.546	
Moses Hammock	0.155	0.471	0.285	0.539	0.156
Standard Deviation of mean differences in First High Tide - Time					
Mayport	0.610				
Marsh Landing	0.509	0.771			
Little Sapelo	0.724	0.931	0.812		
Sawmill	0.392	0.748	0.543	0.739	
Moses Hammock	0.393	0.686	0.534	0.734	0.394
Standard Error of mean differences in First High Tide - Time					
Mayport	0.0328				
Marsh Landing	0.0283	0.0436			
Little Sapelo	0.0397	0.0518	0.0469		
Sawmill	0.0227	0.0441	0.0331	0.0446	
Moses Hammock	0.0212	0.0376	0.0304	0.0401	0.0234
Coefficient of Variation of mean differences in First High Tide - Time					
Mayport	0.9725				
Marsh Landing	2.1092	-1.9218			
Little Sapelo	1.5991	-4.6635	4.1791		
Sawmill	0.4986	4.5093	1.0975	2.7933	
Moses Hammock	0.4575	3.2879	0.8879	1.7888	4.2733

Table 8. DIFFERENCES IN TIDAL HEIGHT OF THE MEAN OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Height (cm.)					
Mayport	-75.07				
Marsh Landing	4.35	79.49			
Little Sapelo	-6.73	68.75	-11.41		
Sawmill	35.04	110.26	30.59	41.63	
Moses Hammock	49.37	124.39	44.87	56.02	15.29
Variance of mean differences in First High Tide - Height					
Mayport	190.283				
Marsh Landing	99.616	175.381			
Little Sapelo	101.564	149.547	54.135		
Sawmill	138.887	176.366	80.608	80.967	
Moses Hammock	355.363	423.150	325.914	301.632	367.587
Standard Deviation of mean differences in First High Tide - Height					
Mayport	13.794				
Marsh Landing	9.981	13.243			
Little Sapelo	10.078	12.229	7.358		
Sawmill	11.785	13.280	8.978	8.998	
Moses Hammock	18.851	20.571	18.053	17.368	19.173
Standard Error of mean differences in First High Tide - Height					
Mayport	0.7405				
Marsh Landing	0.5536	0.7485			
Little Sapelo	0.5523	0.6804	0.4248		
Sawmill	0.6827	0.7825	0.5464	0.5436	
Moses Hammock	1.0179	1.1273	1.0287	0.9489	1.1357
Coefficient of Variation of mean differences in First High Tide - Height					
Mayport	0.1838				
Marsh Landing	2.2957	0.1666			
Little Sapelo	-1.4969	0.1779	-0.6450		
Sawmill	0.3363	0.1204	0.2935	0.2161	
Moses Hammock	0.3818	0.1654	0.4024	0.3100	1.2538

Table 9. DIFFERENCES IN TIME OF THE MEAN OF THE SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Time (1/10 hr.)					
Mayport	0.64				
Marsh Landing	0.30	-0.34			
Little Sapelo	0.43	-0.22	0.13		
Sawmill	0.85	0.22	0.52	0.36	
Moses Hammock	0.90	0.25	0.60	0.47	0.07
Variance of mean differences in Second High Tide - Time					
Mayport	0.072				
Marsh Landing	0.209	0.277			
Little Sapelo	0.178	0.191	0.259		
Sawmill	0.185	0.226	0.289	0.130	
Moses Hammock	0.179	0.208	0.275	0.183	0.137
Standard Deviation of mean differences in Second High Tide - Time					
Mayport	0.268				
Marsh Landing	0.458	0.526			
Little Sapelo	0.422	0.437	0.509		
Sawmill	0.430	0.475	0.537	0.360	
Moses Hammock	0.423	0.457	0.524	0.428	0.371
Standard Error of mean differences in Second High Tide - Time					
Mayport	0.0148				
Marsh Landing	0.0259	0.0305			
Little Sapelo	0.0237	0.0251	0.0301		
Sawmill	0.0256	0.0289	0.0333	0.0224	
Moses Hammock	0.0234	0.0258	0.0305	0.0240	0.0226
Coefficient of Variation of mean differences in Second High Tide - Time					
Mayport	0.4173				
Marsh Landing	1.5398	-1.5511			
Little Sapelo	0.9752	-1.9614	3.8975		
Sawmill	0.5081	2.1601	1.0289	1.0114	
Moses Hammock	0.4697	1.8298	0.8716	0.9176	5.0166

Table 10. DIFFERENCES IN TIDAL HEIGHT OF THE MEAN OF THE SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Height (cm.)					
Mayport	-78.06				
Marsh Landing	3.61	81.95			
Little Sapelo	-6.46	71.19	-10.20		
Sawmill	34.37	112.07	30.70	40.72	
Moses Hammock	47.89	125.45	44.01	54.30	13.77
Variance of mean differences in Second High Tide - Height					
Mayport	213.495				
Marsh Landing	98.944	112.064			
Little Sapelo	109.864	137.954	46.668		
Sawmill	104.496	121.370	12.449	47.979	
Moses Hammock	226.019	265.933	159.444	171.750	163.467
Standard Deviation of mean differences in Second High Tide - Height					
Mayport	14.611				
Marsh Landing	9.947	10.586			
Little Sapelo	10.482	11.745	6.831		
Sawmill	10.222	11.017	3.528	6.927	
Moses Hammock	15.034	16.307	12.627	13.105	12.785
Standard Error of mean differences in Second High Tide - Height					
Mayport	0.8068				
Marsh Landing	0.5622	0.6143			
Little Sapelo	0.5878	0.6736	0.4032		
Sawmill	0.6077	0.6692	0.2184	0.4304	
Moses Hammock	0.8314	0.9218	0.7339	0.7349	0.7810
Coefficient of Variation of mean differences in Second High Tide - Time					
Mayport	-0.1872				
Marsh Landing	2.7577	0.1292			
Little Sapelo	-1.6228	0.1650	-0.6701		
Sawmill	0.2974	0.0983	0.1149	0.1701	
Moses Hammock	0.3139	0.1300	0.2869	0.2414	0.9286

Table 11. DIFFERENCES IN TIME OF THE MEAN OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Time (1/10 hr.)					
Mayport	0.19				
Marsh Landing	0.13	-0.06			
Little Sapelo	0.14	-0.07	0.00		
Sawmill	0.41	0.23	0.21	0.21	
Moses Hammock	0.33	0.13	0.18	0.20	-0.06
Variance of mean differences in First Low Tide - Time					
Mayport	0.094				
Marsh Landing	0.498	0.563			
Little Sapelo	0.279	0.333	0.646		
Sawmill	0.168	0.231	0.617	0.220	
Moses Hammock	0.147	0.191	0.615	0.218	0.123
Standard Deviation of mean differences in First Low Tide - Time					
Mayport	0.307				
Marsh Landing	0.706	0.750			
Little Sapelo	0.528	0.577	0.804		
Sawmill	0.410	0.481	0.786	0.469	
Moses Hammock	0.383	0.437	0.784	0.467	0.351
Standard Error of mean differences in First Low Tide - Time					
Mayport	0.0167				
Marsh Landing	0.0396	0.0435			
Little Sapelo	0.0293	0.0329	0.0472		
Sawmill	0.0239	0.0288	0.0483	0.0285	
Moses Hammock	0.0207	0.0243	0.0449	0.0257	0.0209
Coefficient of Variation of mean differences in First Low Tide - Time					
Mayport	1.6033				
Marsh Landing	5.5831	-11.8930			
Little Sapelo	3.7335	-8.3449	-211.8851		
Sawmill	1.0009	2.0540	3.7988	2.2295	
Moses Hammock	1.1499	3.3716	4.2636	2.2792	-5.9449

Table 12. DIFFERENCES IN TIDAL HEIGHT OF THE MEAN OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL STATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Height (cm.)					
Mayport	-7.58				
Marsh Landing	-3.66	4.07			
Little Sapelo	-12.42	-5.45	-9.58		
Sawmill	20.29	27.21	23.34	22.86	
Moses Hammock	31.73	39.26	34.68	44.40	11.97
Variance of mean differences in First Low Tide - Height					
Mayport	216.435				
Marsh Landing	146.060	134.386			
Little Sapelo	181.831	136.919	48.031		
Sawmill	174.396	178.525	38.847	74.306	
Moses Hammock	160.457	157.554	32.260	65.397	29.144
Standard Deviation of mean differences in First Low Tide - Height					
Mayport	14.712				
Marsh Landing	12.086	11.592			
Little Sapelo	13.484	11.701	6.930		
Sawmill	13.206	13.361	6.233	8.620	
Moses Hammock	12.667	12.552	5.680	8.087	5.399
Standard Error of mean differences in First Low Tide - Height					
Mayport	0.8014				
Marsh Landing	0.6777	0.6715			
Little Sapelo	0.7480	0.6667	0.4070		
Sawmill	0.7702	0.7999	0.3829	0.5236	
Moses Hammock	0.6860	0.6984	0.3252	0.4452	0.3209
Coefficient of Variation of mean differences in First Low Tide - Height					
Mayport	-1.9404				
Marsh Landing	-3.2989	2.8503			
Little Sapelo	-1.0853	-2.1465	-0.7237		
Sawmill	0.6510	0.4911	0.2670	0.2623	
Moses Hammock	0.3992	0.3197	0.1638	0.1821	0.4511

Table 13. DIFFERENCES IN TIME OF THE MEAN OF THE SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Time (1/10 hr.)					
Mayport	0.19				
Marsh Landing	0.13	-0.05			
Little Sapelo	0.16	-0.05	0.01		
Sawmill	0.38	0.22	0.18	0.16	
Moses Hammock	0.26	0.05	0.14	0.10	-0.11
Variance of mean differences in Second Low Tide - Time					
Mayport	0.407				
Marsh Landing	0.877	0.668			
Little Sapelo	0.525	0.238	0.664		
Sawmill	0.595	0.256	0.724	0.186	
Moses Hammock	1.002	0.785	0.651	0.783	0.815
Standard Deviation of mean differences in Second Low Tide - Time					
Mayport	0.638				
Marsh Landing	0.936	0.817			
Little Sapelo	0.725	0.488	0.815		
Sawmill	0.771	0.506	0.851	0.431	
Moses Hammock	1.001	0.886	0.807	0.885	0.903
Standard Error of mean differences in Second Low Tide - Time					
Mayport	0.0358				
Marsh Landing	0.0542	0.0485			
Little Sapelo	0.0413	0.0286	0.0491		
Sawmill	0.0464	0.0312	0.0536	0.0271	
Moses Hammock	0.0560	0.0508	0.0476	0.0501	0.0554
Coefficient of Variation of mean differences in Second Low Tide - Time					
Mayport	3.3586				
Marsh Landing	7.2919	-16.1204			
Little Sapelo	4.5007	-10.2505	72.2855		
Sawmill	2.0347	2.3373	4.7772	2.7393	
Moses Hammock	3.8822	16.1257	5.6482	8.8794	-8.2761

Table 14. DIFFERENCES IN TIDAL HEIGHT OF THE MEAN OF THE SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 1 AUGUST 1972 THROUGH 31 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Height (cm.)					
Mayport	-8.58				
Marsh Landing	-2.83	6.21			
Little Sapelo	-11.47	-3.08	-9.55		
Sawmill	21.74	29.41	24.02	33.25	
Moses Hammock	32.13	40.72	34.61	43.65	11.23
Variance of mean differences in Second Low Tide - Height					
Mayport	224.346				
Marsh Landing	114.345	159.663			
Little Sapelo	198.048	196.891	70.964		
Sawmill	122.696	181.086	28.693	108.213	
Moses Hammock	176.493	223.550	81.219	147.322	32.829
Standard Deviation of mean differences in Second Low Tide - Height					
Mayport	14.978				
Marsh Landing	10.693	12.636			
Little Sapelo	14.073	14.032	8.424		
Sawmill	11.077	13.457	5.359	10.403	
Moses Hammock	13.285	14.952	9.012	12.138	5.730
Standard Error of mean differences in Second Low Tide - Height					
Mayport	0.8413				
Marsh Landing	0.6184	0.7498			
Little Sapelo	0.8019	0.8211	0.5080		
Sawmill	0.6667	0.8282	0.3374	0.6527	
Moses Hammock	0.7427	0.8575	0.5320	0.6872	0.3520
Coefficient of Variation of mean differences in Second Low Tide - Height					
Mayport	-1.7456				
Marsh Landing	-3.7838	2.0355			
Little Sapelo	-1.2272	-4.5576	-0.8822		
Sawmill	0.5095	0.4576	0.2230	0.3128	
Moses Hammock	0.4134	0.3672	0.2604	0.2781	0.5102

water, and second low water were considered (Tables 15-62). These differences in time and height, along with their associated statistics, document the greater variability in data considered from only a monthly interval instead of the annual intervals, considered earlier. Also the variability between these data reflect the seasonal influences on the tide.

The summary of the tidal datum at each location (Figure 17) reveals the greatest tidal range at Moses Hammock and Sawmill, and the least range at Mayport, Fla. The highest mean high water occurred at Moses Hammock (270 cm above mean low water, based on the 18.6 year tidal epoch) contrasted with mean high water of 145 cm (above the same tidal epoch mean low water datum) for Mayport, Fla. Indeed, great errors could be introduced by attempting to extrapolate the elevation of mean high water from a nearby primary tide station to the location in question. This regional variability (between Ft. Pulaski, Marsh Landing, and Mayport) as well as the great local variability (between Marsh Landing and the other stations on the Duplin Estuary) document the need to locally determine a tidal datum before attempting to utilize it.

The results of the volume computation for the Duplin Estuary are summarized in Table 63. During the four different days of the year considered, wind velocity was at a minimum. The maximum percent exchange (96.4) occurred in June and the minimum in December (45.5%). These differences may be attributed to climatological and meterological events. There are differences in duration of flood and ebb tides also. For two of the periods considered (September and December) the flood tide lasted 7.0 hours while the ebb tide lasted 5.25 hours. During these times, the exchange over one tidal cycle was between 45% to 60% of the total volume. In June, the flood tide only lasted

5.25 hours while the ebb tide had a duration of 7.0 hours. With this longer duration of ebb, the system exhibited a 96% exchange during one tidal cycle. Considering these rather large variations in not only tidal exchange but also in tidal amplitude and duration, hydrographic studies should accompany any measurement of properties for which exchange volumes are desired.

Table 15. DIFFERENCES IN TIME OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Time (1/10 hr.)					
Mayport	0.63				
Marsh Landing	0.28	-0.35			
Little Sapelo	0.41	-0.22	0.10		
Sawmill	0.84	0.17	0.64	0.36	
Moses Hammock	0.98	0.35	0.65	0.56	0.18
Variance of mean differences in High Tides - Time					
Mayport	0.076				
Marsh Landing	0.140	0.170			
Little Sapelo	0.144	0.147	0.079		
Sawmill	0.037	0.028	0.041	0.012	
Moses Hammock	0.149	0.174	0.099	0.045	0.009
Standard Deviation of mean differences in High Tides - Time					
Mayport	0.275				
Marsh Landing	0.375	0.412			
Little Sapelo	0.379	0.384	0.282		
Sawmill	0.193	0.166	0.203	0.109	
Moses Hammock	0.386	0.417	0.314	0.212	0.093
Standard Error of mean differences in High Tides - Time					
Mayport	0.0361				
Marsh Landing	0.0565	0.0621			
Little Sapelo	0.0498	0.0504	0.0425		
Sawmill	0.0482	0.0416	0.0507	0.0273	
Moses Hammock	0.0512	0.0552	0.0479	0.0281	0.0233
Coefficient of Variation of mean differences in High Tides - Time					
Mayport	0.4355				
Marsh Landing	1.3514	-1.1841			
Little Sapelo	0.9205	-1.7520	2.8815		
Sawmill	0.2302	0.9849	0.3183	0.3070	
Moses Hammock	0.3954	1.1935	0.4860	0.3788	0.5320

Table 16. DIFFERENCES IN TIDAL HEIGHT OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Height (cm.)					
Mayport	-67.95				
Marsh Landing	4.30	72.18			
Little Sapelo	-2.47	65.48	-7.98		
Sawmill	34.94	101.63	31.31	39.06	
Moses Hammock	52.30	120.39	46.88	54.72	15.63
Variance of mean differences in High Tides - Height					
Mayport	382.927				
Marsh Landing	9.701	501.503			
Little Sapelo	26.569	400.219	2.395		
Sawmill	34.940	101.630	31.310	39.060	
Moses Hammock	33.500	407.065	13.963	9.635	1.717
Standard Deviation of mean differences in High Tides - Height					
Mayport	19.569				
Marsh Landing	3.115	22.394			
Little Sapelo	5.115	20.005	1.548		
Sawmill	1.389	35.217	1.991	1.237	
Moses Hammock	5.788	20.176	3.737	3.104	1.310
Standard Error of mean differences in High Tides - Height					
Mayport	2.5695				
Marsh Landing	0.4696	3.3761			
Little Sapelo	0.6768	2.6268	0.2333		
Sawmill	0.3472	8.8043	0.4977	0.3091	
Moses Hammock	0.7666	2.6724	0.5698	0.4111	0.3276
Coefficient of Variation of mean differences in High Tides - Height					
Mayport	-0.2880				
Marsh Landing	0.7251	0.3102			
Little Sapelo	-2.0906	0.3055	0.1940		
Sawmill	0.0398	0.3465	0.0636	0.0317	
Moses Hammock	0.1107	0.1676	0.0797	0.0567	0.0839

Table 17. DIFFERENCES IN TIME OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Time (1/10 hr.)					
Mayport	0.39				
Marsh Landing	0.10	-0.30			
Little Sapelo	0.09	-0.31	-0.02		
Sawmill	0.41	-0.06	0.33	0.15	
Moses Hammock	0.42	0.03	0.29	0.32	0.05
Variance of mean differences in Low Tides - Time					
Mayport	0.650				
Marsh Landing	0.120	0.177			
Little Sapelo	0.122	0.140	0.156		
Sawmill	0.025	0.053	0.061	0.016	
Moses Hammock	0.056	0.116	0.083	0.093	0.016
Standard Deviation of mean differences in Low Tides - Time					
Mayport	0.255				
Marsh Landing	0.346	0.420			
Little Sapelo	0.350	0.374	0.395		
Sawmill	0.159	0.231	0.247	0.126	
Moses Hammock	0.237	0.341	0.287	0.305	0.126
Standard Error of mean differences in Low Tides - Time					
Mayport	0.0337				
Marsh Landing	0.0511	0.0627			
Little Sapelo	0.0467	0.0504	0.0596		
Sawmill	0.0397	0.0577	0.0617	0.0316	
Moses Hammock	0.0311	0.0451	0.0424	0.0408	0.0316
Coefficient of Variation of mean differences in Low Tides - Time					
Mayport	0.6448				
Marsh Landing	3.3195	-1.4017			
Little Sapelo	3.9951	-1.2175	-24.8479		
Sawmill	0.3846	-4.1040	0.7453	0.8433	
Moses Hammock	0.5610	12.1328	0.9865	0.9393	2.5300

Table 18. DIFFERENCES IN TIDAL HEIGHT OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Height (cm.)					
Mayport	-3.54				
Marsh Landing	-0.17	3.73			
Little Sapelo	-6.64	-2.67	-7.93		
Sawmill	22.81	21.88	24.31	30.50	
Moses Hammock	37.72	41.30	36.41	44.46	12.50
Variance of mean differences in Low Tides - Height					
Mayport	122.217				
Marsh Landing	88.769	135.836			
Little Sapelo	140.997	170.298	38.577		
Sawmill	30.429	170.117	12.496	77.200	
Moses Hammock	131.046	183.143	22.781	30.145	0.800
Standard Deviation of mean differences in Low Tides - Height					
Mayport	11.055				
Marsh Landing	9.422	11.655			
Little Sapelo	11.874	13.050	6.211		
Sawmill	5.516	13.043	3.535	8.786	
Moses Hammock	11.448	13.533	4.773	5.490	0.894
Standard Error of mean differences in Low Tides - Height					
Mayport	1.4643				
Marsh Landing	1.3892	1.7374			
Little Sapelo	1.5868	1.7596	0.9363		
Sawmill	1.3791	3.2607	0.8837	2.1966	
Moses Hammock	1.5031	1.7925	0.7037	0.7337	0.2236
Coefficient of Variation of mean differences in Low Tides - Height					
Mayport	-3.1195				
Marsh Landing	-54.1750	3.1218			
Little Sapelo	-1.7875	-4.8826	-0.7830		
Sawmill	0.2418	0.5962	0.1454	0.2881	
Moses Hammock	0.3035	0.3277	0.1311	0.1235	0.0716

Table 19. DIFFERENCES IN TIME OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Time (1/10 hr.)					
Mayport	0.65				
Marsh Landing	0.27	-0.37			
Little Sapelo	0.45	-0.20	0.13		
Sawmill	0.85	0.17	0.69	0.32	
Moses Hammock	1.01	0.37	0.67	0.55	0.19
Variance of mean differences in First High Tide - Time					
Mayport	0.099				
Marsh Landing	0.144	0.173			
Little Sapelo	0.177	0.207	0.093		
Sawmill	0.054	0.025	0.024	0.019	
Moses Hammock	0.171	0.234	0.106	0.068	0.004
Standard Deviation of mean differences in First High Tide - Time					
Mayport	0.315				
Marsh Landing	0.379	0.416			
Little Sapelo	0.421	0.454	0.305		
Sawmill	0.233	0.158	0.155	0.139	
Moses Hammock	0.413	0.484	0.325	0.260	0.064
Standard Error of mean differences in First High Tide - Time					
Mayport	0.0575				
Marsh Landing	0.0774	0.0850			
Little Sapelo	0.0768	0.0830	0.0623		
Sawmill	0.0824	0.0559	0.0549	0.0491	
Moses Hammock	0.0768	0.0899	0.0678	0.0483	0.0227
Coefficient of Variation of mean differences in First High Tide - Time					
Mayport	0.4869				
Marsh Landing	1.3784	-1.1100			
Little Sapelo	0.9351	-2.3108	2.4431		
Sawmill	0.2741	0.9035	0.2258	0.4273	
Moses Hammock	0.4092	1.3121	0.4823	0.4742	0.3418

Table 20. DIFFERENCES IN TIDAL HEIGHT OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Height (cm.)					
Mayport	-66.13				
Marsh Landing	4.42	69.54			
Little Sapelo	-3.30	62.83	8.17		
Sawmill	35.50	94.50	31.00	39.38	
Moses Hammock	51.03	117.38	46.04	54.28	15.38
Variance of mean differences in First High Tide - Height					
Mayport	636.603				
Marsh Landing	8.775	823.391			
Little Sapelo	21.597	680.834	1.449		
Sawmill	1.714	2410.857	0.857	1.411	
Moses Hammock	24.821	700.460	3.044	1.781	2.268
Standard Deviation of mean differences in First High Tide - Height					
Mayport	25.231				
Marsh Landing	2.962	28.695			
Little Sapelo	4.647	26.093	1.204		
Sawmill	1.309	49.100	0.926	1.188	
Moses Hammock	4.982	26.466	1.745	1.335	1.506
Standard Error of mean differences in First High Tide - Height					
Mayport	4.6065				
Marsh Landing	0.6047	5.8573			
Little Sapelo	0.8485	4.7639	0.2457		
Sawmill	0.4629	17.3596	0.3273	0.4199	
Moses Hammock	0.9252	4.9146	0.3638	0.2478	0.5324
Coefficient of Variation of mean differences in First High Tide - Height					
Mayport	-0.3815				
Marsh Landing	0.6707	0.4126			
Little Sapelo	-1.4082	0.4153	0.1474		
Sawmill	0.0369	0.5196	0.0299	0.0302	
Moses Hammock	0.0976	0.2255	0.0379	0.0246	0.0979

Table 21. DIFFERENCES IN TIME OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Time (1/10 hr.)					
Mayport	0.33				
Marsh Landing	0.10	-0.25			
Little Sapelo	0.01	-0.32	-0.07		
Sawmill	0.39	0.04	0.29	0.17	
Moses Hammock	0.42	0.08	0.29	0.39	0.05
Variance of mean differences in First Low Tide - Time					
Mayport	0.069				
Marsh Landing	0.134	0.189			
Little Sapelo	0.101	0.156	0.165		
Sawmill	0.021	0.054	0.044	0.016	
Moses Hammock	0.050	0.146	0.099	0.082	0.020
Standard Deviation of mean differences in First Low Tide - Time					
Mayport	0.264				
Marsh Landing	0.366	0.434			
Little Sapelo	0.317	0.395	0.406		
Sawmill	0.146	0.233	0.210	0.128	
Moses Hammock	0.223	0.382	0.315	0.287	0.141
Standard Error of mean differences in First Low Tide - Time					
Mayport	0.0489				
Marsh Landing	0.0731	0.0887			
Little Sapelo	0.0589	0.0746	0.0829		
Sawmill	0.0515	0.0822	0.0743	0.0453	
Moses Hammock	0.0407	0.0709	0.0630	0.0533	0.0500
Coefficient of Variation of mean differences in First Low Tide - Time					
Mayport	0.7881				
Marsh Landing	3.5163	-1.7376			
Little Sapelo	22.9859	-1.2281	-5.7305		
Sawmill	0.3762	6.2029	0.7305	0.7324	
Moses Hammock	0.5351	4.6133	1.0781	0.7366	2.8284

Table 22. DIFFERENCES IN TIDAL HEIGHT OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Height (cm.)					
Mayport	-2.59				
Marsh Landing	1.56	3.83			
Little Sapelo	-7.38	-4.39	-9.38		
Sawmill	21.88	19.00	23.13	32.50	
Moses Hammock	37.83	40.48	35.92	45.31	12.50
Variance of mean differences in First Low Tide - Height					
Mayport	95.466				
Marsh Landing	44.757	150.754			
Little Sapelo	41.387	135.729	15.897		
Sawmill	46.696	221.143	9.839	1.429	
Moses Hammock	56.903	166.830	26.910	10.151	1.143
Standard Deviation of mean differences in First Low Tide - Height					
Mayport	9.771				
Marsh Landing	6.690	12.278			
Little Sapelo	6.433	11.650	3.987		
Sawmill	6.833	14.871	3.137	1.195	
Moses Hammock	7.543	12.916	5.188	3.186	1.069
Standard Error of mean differences in First Low Tide - Height					
Mayport	1.8144				
Marsh Landing	1.3380	2.5063			
Little Sapelo	1.1946	2.2017	0.8139		
Sawmill	2.4160	5.2576	1.1090	0.4226	
Moses Hammock	1.3772	2.3985	1.0375	0.5916	0.3780
Coefficient of Variation of mean differences in First Low Tide - Height					
Mayport	-3.7780				
Marsh Landing	4.2885	3.2030			
Little Sapelo	-0.8718	-2.6521	-0.4253		
Sawmill	0.3124	1.7827	0.1356	0.0368	
Moses Hammock	0.1994	0.3191	0.1444	0.0703	0.0855

Table 23. DIFFERENCES IN TIME OF SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Time (1/10 hr.)					
Mayport	0.61				
Marsh Landing	0.28	-0.31			
Little Sapelo	0.37	-0.24	0.06		
Sawmill	0.82	0.16	0.59	0.39	
Moses Hammock	0.94	0.33	0.62	0.57	0.16
Variance of mean differences in Second High Tide - Time					
Mayport	0.052				
Marsh Landing	0.144	0.172			
Little Sapelo	0.110	0.088	0.064		
Sawmill	0.025	0.034	0.058	0.004	
Moses Hammock	0.130	0.116	0.094	0.023	0.014
Standard Deviation of mean differences in Second High Tide - Time					
Mayport	0.229				
Marsh Landing	0.379	0.415			
Little Sapelo	0.332	0.296	0.254		
Sawmill	0.158	0.185	0.242	0.064	
Moses Hammock	0.360	0.341	0.307	0.151	0.119
Standard Error of mean differences in Second High Tide - Time					
Mayport	0.0433				
Marsh Landing	0.0848	0.0927			
Little Sapelo	0.0628	0.0560	0.0568		
Sawmill	0.0559	0.0653	0.0854	0.0227	
Moses Hammock	0.0681	0.0644	0.0685	0.0286	0.0420
Coefficient of Variation of mean differences in Second High Tide - Time					
Mayport	0.3726				
Marsh Landing	1.3543	-1.3161			
Little Sapelo	0.8940	-1.2196	3.9072		
Sawmill	0.1917	1.1365	0.4113	0.1654	
Moses Hammock	0.3823	1.0374	0.4985	0.2646	0.7309

Table 24. DIFFERENCES IN TIDAL HEIGHT OF SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Height (cm.)					
Mayport	-69.89				
Marsh Landing	4.15	75.35			
Little Sapelo	-1.57	68.32	-7.75		
Sawmill	34.38	108.75	31.63	38.75	
Moses Hammock	53.61	123.50	47.85	55.18	15.88
Variance of mean differences in Second High Tide - Height					
Mayport	117.063				
Marsh Landing	11.292	118.875			
Little Sapelo	31.291	97.486	3.566		
Sawmill	1.696	130.786	7.411	1.643	
Moses Hammock	40.250	98.111	25.503	17.711	1.268
Standard Deviation of mean differences in Second High Tide - Height					
Mayport	10.820				
Marsh Landing	3.360	10.903			
Little Sapelo	5.594	9.874	1.888		
Sawmill	1.302	11.436	2.722	1.282	
Moses Hammock	6.344	9.905	5.050	4.208	1.126
Standard Error of mean differences in Second High Tide - Height					
Mayport	2.0447				
Marsh Landing	0.7514	2.4380			
Little Sapelo	1.0571	1.8659	0.4222		
Sawmill	0.4605	4.0433	0.9625	0.4532	
Moses Hammock	1.1990	1.8719	1.1292	0.7953	0.3981
Coefficient of Variation of mean differences in Second High Tide - Height					
Mayport	-0.1548				
Marsh Landing	0.8097	0.1447			
Little Sapelo	-3.5597	0.1445	-0.2437		
Sawmill	0.0379	0.1052	0.0861	0.0331	
Moses Hammock	0.1183	0.0802	0.1055	0.0763	0.0709

Table 25. DIFFERENCES IN TIME OF SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Time (1/10 hr.)					
Mayport	0.46				
Marsh Landing	0.10	-0.36			
Little Sapelo	0.17	-0.29	0.05		
Sawmill	0.44	-0.15	0.38	0.12	
Moses Hammock	0.43	-0.03	0.29	0.26	0.05
Variance of mean differences in Second Low Tide - Time					
Mayport	0.054				
Marsh Landing	0.109	0.166			
Little Sapelo	0.138	0.128	0.146		
Sawmill	0.031	0.040	0.082	0.016	
Moses Hammock	0.065	0.083	0.067	0.099	0.014
Standard Deviation of mean differences in Second Low Tide - Time					
Mayport	0.233				
Marsh Landing	0.331	0.407			
Little Sapelo	0.371	0.358	0.382		
Sawmill	0.177	0.200	0.287	0.128	
Moses Hammock	0.255	0.288	0.259	0.314	0.120
Standard Error of mean differences in Second Low Tide - Time					
Mayport	0.0441				
Marsh Landing	0.0722	0.0888			
Little Sapelo	0.0714	0.0690	0.0854		
Sawmill	0.0625	0.0707	0.1013	0.0453	
Moses Hammock	0.0482	0.0544	0.0564	0.0605	0.0423
Coefficient of Variation of mean differences in Second Low Tide - Time					
Mayport	0.5102				
Marsh Landing	3.1583	-1.1393			
Little Sapelo	2.2264	-1.2247	7.6362		
Sawmill	0.4041	-1.3333	0.7643	1.0254	
Moses Hammock	0.5952	-10.0744	0.8905	1.2295	2.3907

Table 26. DIFFERENCES IN TIDAL HEIGHT OF SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 SEPTEMBER 1972 THROUGH 14 OCTOBER 1972

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Height (cm.)					
Mayport	-4.54				
Marsh Landing	-2.24	3.62			
Little Sapelo	-5.85	-0.89	-6.20		
Sawmill	23.75	24.75	25.50	28.50	
Moses Hammock	37.61	42.14	37.00	43.56	12.50
Variance of mean differences in Second Low Tide - Height					
Mayport	152.480				
Marsh Landing	137.790	125.448			
Little Sapelo	252.439	206.256	62.274		
Sawmill	16.500	124.500	13.714	154.857	
Moses Hammock	215.507	205.387	18.300	51.180	0.571
Standard Deviation of mean differences in Second Low Tide - Height					
Mayport	12.348				
Marsh Landing	11.738	11.200			
Little Sapelo	15.888	14.362	7.891		
Sawmill	4.062	11.158	3.703	12.444	
Moses Hammock	14.680	14.331	4.278	7.154	0.756
Standard Error of mean differences in Second Low Tide - Height					
Mayport	2.3360				
Marsh Landing	2.5615	2.4441			
Little Sapelo	3.0577	2.7639	1.7646		
Sawmill	1.4361	3.9449	1.3093	4.3997	
Moses Hammock	2.7743	2.7084	0.9335	1.3768	0.2673
Coefficient of Variation of mean differences in Second Low Tide - Height					
Mayport	-2.7225				
Marsh Landing	-5.2448	3.0948			
Little Sapelo	-2.7151	-16.1568	-1.2728		
Sawmill	0.1710	0.4508	0.1452	0.4366	
Moses Hammock	0.3904	0.3401	0.1156	0.1643	0.0605

Table 27. DIFFERENCES IN TIME OF MEAN HIGH WATER AND ASSOCIATED STATISTICS AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Time (1/10 hr.)					
Mayport	0.73				
Marsh Landing	0.43	-0.36			
Little Sapelo	-0.07	-0.81	-0.47		
Sawmill	0.59	-0.15	0.14	0.66	
Moses Hammock	0.76	0.03	0.29	0.83	0.17
Variance of mean differences in High Tides - Time					
Mayport	1.805				
Marsh Landing	0.446	2.531			
Little Sapelo	0.247	1.795	0.453		
Sawmill	0.116	1.901	0.476	0.241	
Moses Hammock	0.150	1.847	0.451	0.287	0.051
Standard Deviation of mean differences in High Tides - Time					
Mayport	1.344				
Marsh Landing	0.668	1.591			
Little Sapelo	0.497	1.340	0.673		
Sawmill	0.340	1.379	0.690	0.491	
Moses Hammock	0.387	1.359	0.672	0.536	0.226
Standard Error of mean differences in High Tides - Time					
Mayport	0.1764				
Marsh Landing	0.0955	0.2273			
Little Sapelo	0.0658	0.1775	0.0962		
Sawmill	0.0447	0.1810	0.0986	0.0650	
Moses Hammock	0.0508	0.1784	0.0960	0.0710	0.0297
Coefficient of Variation of mean differences in High Tides - Time					
Mayport	1.8294				
Marsh Landing	1.5371	-4.4800			
Little Sapelo	-6.9102	-1.6566	-1.4282		
Sawmill	0.5788	-9.4075	5.0464	0.7422	
Moses Hammock	0.5090	52.5481	2.2863	0.6432	1.3118

Table 28. DIFFERENCES IN TIDAL HEIGHT OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Height (cm.)					
Mayport	-74.03				
Marsh Landing	4.80	78.24			
Little Sapelo	-5.98	68.25	-11.14		
Sawmill	35.72	109.76	30.24	41.58	
Moses Hammock	51.64	125.67	46.49	57.49	15.91
Variance of mean differences in High Tides - Height					
Mayport	330.631				
Marsh Landing	198.499	82.315			
Little Sapelo	160.732	137.083	4.583		
Sawmill	177.186	126.399	6.772	5.785	
Moses Hammock	2455.183	2420.014	2692.090	2294.398	2282.887
Standard Deviation of mean differences in High Tides - Height					
Mayport	18.183				
Marsh Landing	14.089	9.073			
Little Sapelo	12.678	11.708	2.141		
Sawmill	13.311	11.243	2.602	2.405	
Moses Hammock	49.550	49.194	51.885	47.900	47.780
Standard Error of mean differences in High Tides - Height					
Mayport	2.3876				
Marsh Landing	2.0127	1.2961			
Little Sapelo	1.6792	1.5508	0.3058		
Sawmill	1.7478	1.4762	0.3718	0.3186	
Moses Hammock	6.5062	6.4594	7.4122	6.3445	6.2738
Coefficient of Variation of mean differences in High Tides - Height					
Mayport	-0.2456				
Marsh Landing	2.9377	0.1160			
Little Sapelo	-2.1192	0.1716	-0.1921		
Sawmill	0.3726	0.1024	0.0860	0.0578	
Moses Hammock	0.9596	0.3914	1.1161	0.8332	3.0024

Table 29. DIFFERENCES IN TIME OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Time (1/10 hr.)					
Mayport	0.07				
Marsh Landing	0.39	0.35			
Little Sapelo	-0.38	-0.45	-0.73		
Sawmill	0.11	0.04	-0.32	0.50	
Moses Hammock	0.14	0.07	-0.27	0.54	0.04
Variance of mean differences in Low Tides - Time					
Mayport	0.069				
Marsh Landing	2.621	2.651			
Little Sapelo	0.329	0.433	2.481		
Sawmill	0.130	0.175	2.583	0.252	
Moses Hammock	0.166	0.210	2.610	0.288	0.038
Standard Deviation of mean differences in Low Tides - Time					
Mayport	0.263				
Marsh Landing	1.619	1.628			
Little Sapelo	0.573	0.658	1.575		
Sawmill	0.360	0.418	1.607	0.502	
Moses Hammock	0.407	0.458	1.616	0.537	0.195
Standard Error of mean differences in Low Tides - Time					
Mayport	0.0355				
Marsh Landing	0.2337	0.2350			
Little Sapelo	0.0766	0.0879	0.2250		
Sawmill	0.0481	0.0559	0.2296	0.0660	
Moses Hammock	0.0544	0.0612	0.2308	0.0705	0.0256
Coefficient of Variation of mean differences in Low Tides - Time					
Mayport	3.5324				
Marsh Landing	4.1333	4.6799			
Little Sapelo	-1.5069	-1.4676	-2.1439		
Sawmill	3.3621	11.7154	-4.9843	1.0054	
Moses Hammock	2.8150	6.4158	-5.9080	1.0008	5.3939

Table 30. DIFFERENCES IN TIDAL HEIGHT OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Height (cm.)					
Mayport	-3.56				
Marsh Landing	1.46	6.15			
Little Sapelo	-9.68	-6.13	-11.53		
Sawmill	25.38	28.91	23.55	35.03	
Moses Hammock	35.23	38.77	33.47	45.00	9.97
Variance of mean differences in Low Tides - Height					
Mayport	136.584				
Marsh Landing	52.722	170.765			
Little Sapelo	25.095	133.820	33.088		
Sawmill	28.675	146.374	42.586	5.544	
Moses Hammock	43.783	168.073	96.921	20.105	21.157
Standard Deviation of mean differences in Low Tides - Height					
Mayport	11.687				
Marsh Landing	7.261	13.068			
Little Sapelo	5.009	11.568	5.752		
Sawmill	5.355	12.099	6.526	2.355	
Moses Hammock	6.617	12.964	9.845	4.484	4.600
Standard Error of mean differences in Low Tides - Height					
Mayport	1.5759				
Marsh Landing	1.0480	1.8862			
Little Sapelo	0.6694	1.5458	0.8217		
Sawmill	0.7156	1.6167	0.9323	0.3092	
Moses Hammock	0.8842	1.7324	1.4064	0.5888	0.6040
Coefficient of Variation of mean differences in Low Tides - Height					
Mayport	-3.2795				
Marsh Landing	4.9789	2.1263			
Little Sapelo	-0.5176	-1.8887	-0.4989		
Sawmill	0.2110	0.4185	0.2771	0.0672	
Moses Hammock	0.1878	0.3344	0.2941	0.0996	0.4616

Table 31. DIFFERENCES IN TIME OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Time (1/10 hr.)					
Mayport	0.87				
Marsh Landing	0.42	-0.56			
Little Sapelo	-0.02	-0.90	-0.41		
Sawmill	0.63	-0.24	0.19	0.66	
Moses Hammock	0.82	-0.05	0.36	0.84	0.19
Variance of mean differences in First High Tide - Time					
Mayport	3.438				
Marsh Landing	0.489	4.493			
Little Sapelo	0.232	3.353	0.424		
Sawmill	0.107	3.609	0.476	0.217	
Moses Hammock	0.147	3.493	0.447	0.258	0.061
Standard Deviation of mean differences in First High Tide - Time					
Mayport	1.854				
Marsh Landing	0.699	2.120			
Little Sapelo	0.481	1.831	0.651		
Sawmill	0.327	1.900	0.690	0.466	
Moses Hammock	0.384	1.869	0.669	0.508	0.246
Standard Error of mean differences in First High Tide - Time					
Mayport	0.3385				
Marsh Landing	0.1398	0.4239			
Little Sapelo	0.0894	0.3400	0.1303		
Sawmill	0.0598	0.3468	0.1380	0.0865	
Moses Hammock	0.0700	0.3412	0.1338	0.0944	0.0449
Coefficient of Variation of mean differences in First High Tide - Time					
Mayport	2.1231				
Marsh Landing	1.6485	-3.7853			
Little Sapelo	-23.2653	-2.0269	-1.5813		
Sawmill	0.5168	-7.9152	3.6702	0.7070	
Moses Hammock	0.4678	-35.0425	1.8582	0.6016	1.3177

Table 32. DIFFERENCES IN TIDAL HEIGHT OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Height (cm.)					
Mayport	-75.93				
Marsh Landing	6.44	80.68			
Little Sapelo	-4.83	71.55	11.36		
Sawmill	36.97	112.90	30.08	41.59	
Moses Hammock	61.80	137.73	56.92	66.72	24.83
Variance of mean differences in First High Tide - Height					
Mayport	197.308				
Marsh Landing	38.007	61.229			
Little Sapelo	26.005	165.116	5.407		
Sawmill	40.103	143.888	7.827	7.252	
Moses Hammock	3012.237	2960.618	3536.745	3056.136	2990.625
Standard Deviation of mean differences in First High Tide - Height					
Mayport	14.047				
Marsh Landing	6.165	7.825			
Little Sapelo	5.100	12.850	2.325		
Sawmill	6.333	11.995	2.798	2.693	
Moses Hammock	54.884	54.412	59.471	55.282	54.685
Standard Error of mean differences in First High Tide - Height					
Mayport	2.5646				
Marsh Landing	1.2330	1.5650			
Little Sapelo	0.9470	2.3861	0.4650		
Sawmill	1.1562	2.1900	0.5595	0.5001	
Moses Hammock	10.0204	9.9341	11.8941	10.2657	9.9844
Coefficient of Variation of mean differences in First High Tide - Height					
Mayport	-0.1850				
Marsh Landing	0.9573	0.0970			
Little Sapelo	-1.0563	0.1796	-0.2047		
Sawmill	0.1713	0.1062	0.0930	0.0648	
Moses Hammock	0.8881	0.3951	1.0448	0.8285	2.2021

Table 33. DIFFERENCES IN TIME OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Time (1/10 hr.)					
Mayport	0.10				
Marsh Landing	0.08	0.00			
Little Sapelo	-0.42	-0.50	-0.45		
Sawmill	0.04	-0.07	-0.08	0.47	
Moses Hammock	0.02	-0.10	-0.10	0.45	-0.02
Variance of mean differences in First Low Tide - Time					
Mayport	0.056				
Marsh Landing	0.631	0.662			
Little Sapelo	0.439	0.567	0.582		
Sawmill	0.142	0.233	0.615	0.255	
Moses Hammock	0.166	0.233	0.572	0.276	0.029
Standard Deviation of mean differences in First Low Tide - Time					
Mayport	0.236				
Marsh Landing	0.794	0.814			
Little Sapelo	0.663	0.753	0.763		
Sawmill	0.376	0.483	0.784	0.505	
Moses Hammock	0.407	0.483	0.756	0.525	0.169
Standard Error of mean differences in First Low Tide - Time					
Mayport	0.0445				
Marsh Landing	0.1588	0.1661			
Little Sapelo	0.1231	0.1423	0.1525		
Sawmill	0.0699	0.0913	0.1568	0.0921	
Moses Hammock	0.0756	0.0912	0.1512	0.0959	0.0309
Coefficient of Variation of mean differences in First Low Tide - Time					
Mayport	2.3570				
Marsh Landing	9.4533	-195.2979			
Little Sapelo	-1.5886	-1.4953	-1.7025		
Sawmill	9.9249	-6.7611	-9.8027	1.0815	
Moses Hammock	23.6141	-5.0052	-7.5609	1.1755	-8.4486

Table 34. DIFFERENCES IN TIDAL HEIGHT OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Height (cm.)					
Mayport	-3.57				
Marsh Landing	1.80	6.83			
Little Sapelo	-9.24	-5.29	-11.36		
Sawmill	25.41	29.36	23.12	34.67	
Moses Hammock	36.45	40.32	34.16	45.77	11.10
Variance of mean differences in First Low Tide - Height					
Mayport	105.884				
Marsh Landing	41.333	155.362			
Little Sapelo	23.333	120.063	16.240		
Sawmill	30.609	133.424	21.277	3.679	
Moses Hammock	22.042	119.634	22.224	4.392	3.610
Standard Deviation of mean differences in First Low Tide - Height					
Mayport	10.290				
Marsh Landing	6.429	12.464			
Little Sapelo	4.830	10.957	4.030		
Sawmill	5.532	11.551	4.613	1.918	
Moses Hammock	4.695	10.938	4.714	2.096	1.900
Standard Error of mean differences in First Low Tide - Height					
Mayport	1.9446				
Marsh Landing	1.2858	2.5443			
Little Sapelo	0.8970	2.0707	0.8060		
Sawmill	1.0274	2.1829	0.9225	0.3502	
Moses Hammock	0.8718	2.0670	0.9428	0.3826	0.3469
Coefficient of Variation of mean differences in First Low Tide - Height					
Mayport	-2.8812				
Marsh Landing	3.5717	1.8241			
Little Sapelo	-0.5227	-2.0730	-0.3547		
Sawmill	0.2177	0.3935	0.1995	0.0553	
Moses Hammock	0.1288	0.2713	0.1380	0.0458	0.1712

Table 35. DIFFERENCES IN TIME OF THE SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Time (1/10 hr.)					
Mayport	0.59				
Marsh Landing	0.45	-0.14			
Little Sapelo	-0.13	-0.71	-0.53		
Sawmill	0.54	-0.05	0.08	0.66	
Moses Hammock	0.70	0.11	0.22	0.82	0.16
Variance of mean differences in Second High Tide - Time					
Mayport	0.075				
Marsh Landing	0.422	0.500			
Little Sapelo	0.266	0.226	0.495		
Sawmill	0.125	0.117	0.491	0.275	
Moses Hammock	0.150	0.133	0.465	0.328	0.043
Standard Deviation of mean differences in Second High Tide - Time					
Mayport	0.273				
Marsh Landing	0.649	0.707			
Little Sapelo	0.516	0.476	0.704		
Sawmill	0.353	0.342	0.701	0.524	
Moses Hammock	0.387	0.364	0.682	0.572	0.206
Standard Error of mean differences in Second High Tide - Time					
Mayport	0.0516				
Marsh Landing	0.1326	0.1443			
Little Sapelo	0.0975	0.0899	0.1437		
Sawmill	0.0667	0.0645	0.1430	0.0991	
Moses Hammock	0.0732	0.0689	0.1393	0.1082	0.0390
Coefficient of Variation of mean differences in Second High Tide - Time					
Mayport	0.4663				
Marsh Landing	1.4566	-4.9910			
Little Sapelo	-4.1290	-0.6692	-1.3197		
Sawmill	0.6548	-7.3564	8.4088	0.7894	
Moses Hammock	0.5561	3.2921	3.0321	0.6969	1.3125

Table 36. DIFFERENCES IN TIDAL HEIGHT OF THE SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Height (cm.)					
Mayport	-72.00				
Marsh Landing	3.08	75.71			
Little Sapelo	-7.18	64.82	-10.92		
Sawmill	34.39	106.39	30.42	41.57	
Moses Hammock	40.75	112.75	35.63	47.93	6.36
Variance of mean differences in Second High Tide - Height					
Mayport	477.778				
Marsh Landing	368.601	94.739			
Little Sapelo	303.485	89.190	3.819		
Sawmill	327.433	89.583	5.906	4.476	
Moses Hammock	1710.120	1594.194	1686.331	1403.032	1424.164
Standard Deviation of mean differences in Second High Tide - Height					
Mayport	21.858				
Marsh Landing	19.199	9.733			
Little Sapelo	17.421	9.444	1.954		
Sawmill	18.095	9.465	2.430	2.116	
Moses Hammock	41.354	39.927	41.065	37.457	37.738
Standard Error of mean differences in Second High Tide - Height					
Mayport	4.1308				
Marsh Landing	3.9190	1.9868			
Little Sapelo	3.2922	1.7848	0.3989		
Sawmill	3.4197	1.7887	0.4961	0.3998	
Moses Hammock	7.8151	7.5456	8.3824	7.0787	7.1318
Coefficient of Variation of mean differences in Second High Tide - Height					
Mayport	-0.3036				
Marsh Landing	6.2267	0.1286			
Little Sapelo	-2.4268	0.1457	-0.1790		
Sawmill	0.5261	0.0890	0.0799	0.0509	
Moses Hammock	1.0148	0.3541	1.1527	0.7815	5.9363

Table 37. DIFFERENCES IN TIME OF THE SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Time (1/10 hr.)					
Mayport	0.05				
Marsh Landing	0.73	0.70			
Little Sapelo	-0.34	-0.39	-1.03		
Sawmill	0.18	0.14	-0.57	0.54	
Moses Hammock	0.28	0.24	-0.45	0.63	0.10
Variance of mean differences in Second Low Tide - Time					
Mayport	0.085				
Marsh Landing	4.687	4.497			
Little Sapelo	0.219	0.308	4.388		
Sawmill	0.111	0.100	4.618	0.256	
Moses Hammock	0.135	0.137	4.784	0.293	0.043
Standard Deviation of mean differences in Second Low Tide - Time					
Mayport	0.291				
Marsh Landing	2.165	2.120			
Little Sapelo	0.468	0.555	2.095		
Sawmill	0.333	0.316	2.149	0.506	
Moses Hammock	0.367	0.370	2.187	0.542	0.206
Standard Error of mean differences in Second Low Tide - Time					
Mayport	0.0561				
Marsh Landing	0.4514	0.4328			
Little Sapelo	0.0900	0.1049	0.4276		
Sawmill	0.0641	0.0596	0.4387	0.0957	
Moses Hammock	0.0706	0.0698	0.4465	0.1024	0.0390
Coefficient of Variation of mean differences in Second Low Tide - Time					
Mayport	6.0516				
Marsh Landing	2.9815	3.0293			
Little Sapelo	-1.3723	-1.4129	-2.0273		
Sawmill	1.8341	2.2089	-3.7375	0.9453	
Moses Hammock	1.3036	1.5443	-4.8161	0.8568	2.1399

Table 38. DIFFERENCES IN TIDAL HEIGHT OF THE SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 DECEMBER 1972 THROUGH 13 JANUARY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Height (cm.)					
Mayport	-3.56				
Marsh Landing	1.09	5.46			
Little Sapelo	-10.15	-6.96	-11.71		
Sawmill	25.33	28.46	24.00	35.43	
Moses Hammock	33.93	37.21	32.75	44.18	8.75
Variance of mean differences in Second Low Tide - Height					
Mayport	173.718				
Marsh Landing	67.265	192.607			
Little Sapelo	27.516	151.073	52.042		
Sawmill	27.692	164.332	66.261	7.440	
Moses Hammock	65.456	217.730	178.022	36.375	37.824
Standard Deviation of mean differences in Second Low Tide - Height					
Mayport	13.180				
Marsh Landing	8.202	13.878			
Little Sapelo	5.246	12.291	7.214		
Sawmill	5.262	12.819	8.140	2.728	
Moses Hammock	8.090	14.756	13.342	6.031	6.150
Standard Error of mean differences in Second Low Tide - Height					
Mayport	2.5365				
Marsh Landing	1.7101	2.8329			
Little Sapelo	1.0095	2.3228	1.4725		
Sawmill	1.0127	2.4226	1.6616	0.5155	
Moses Hammock	1.5570	2.7886	2.7235	1.1398	1.1623
Coefficient of Variation of mean differences in Second Low Tide - Height					
Mayport	-3.7069				
Marsh Landing	7.5454	2.5426			
Little Sapelo	-0.5169	-1.7649	-0.6161		
Sawmill	0.2077	0.4504	0.3392	0.0770	
Moses Hammock	0.2385	0.3965	0.4074	0.1365	0.7029

Table 39. DIFFERENCES IN TIME OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Time (1/10 hr.)					
Mayport	0.60				
Marsh Landing	0.43	-0.16			
Little Sapelo	0.32	-0.28	-0.14		
Sawmill	0.60	0.00	0.13	0.28	
Moses Hammock	0.84	0.24	0.39	0.53	0.25
Variance of mean differences in High Tides - Time					
Mayport	0.081				
Marsh Landing	0.157	0.180			
Little Sapelo	0.081	0.118	0.122		
Sawmill	0.127	0.164	0.175	0.068	
Moses Hammock	0.143	0.148	0.240	0.098	0.122
Standard Deviation of mean differences in High Tides - Time					
Mayport	0.285				
Marsh Landing	0.396	0.424			
Little Sapelo	0.285	0.343	0.349		
Sawmill	0.356	0.405	0.418	0.260	
Moses Hammock	0.378	0.385	0.490	0.313	0.349
Standard Error of mean differences in High Tides - Time					
Mayport	0.0374				
Marsh Landing	0.0550	0.0588			
Little Sapelo	0.0374	0.0451	0.0484		
Sawmill	0.0467	0.0532	0.0580	0.0341	
Moses Hammock	0.0497	0.0505	0.0679	0.0411	0.0458
Coefficient of Variation of mean differences in High Tides - Time					
Mayport	0.4764				
Marsh Landing	0.9123	-2.7219			
Little Sapelo	0.9019	-1.2146	-2.4190		
Sawmill	0.5966	-234.8320	3.1965	0.9247	
Moses Hammock	0.4488	1.5720	1.2608	0.5939	1.4157

Table 40. DIFFERENCES IN TIDAL HEIGHT OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Height (cm.)					
Mayport	-79.83				
Marsh Landing	1.17	81.29			
Little Sapelo	-9.69	70.14	-11.85		
Sawmill	33.29	113.12	31.17	42.98	
Moses Hammock	47.38	127.21	45.25	57.07	14.09
Variance of mean differences in High Tides - Height					
Mayport	201.656				
Marsh Landing	172.185	80.015			
Little Sapelo	160.674	68.332	25.231		
Sawmill	163.545	80.496	23.754	20.719	
Moses Hammock	151.047	80.694	14.858	14.488	13.905
Standard Deviation of mean differences in High Tides - Height					
Mayport	14.201				
Marsh Landing	13.122	8.945			
Little Sapelo	12.676	8.266	5.023		
Sawmill	12.788	8.972	4.874	4.552	
Moses Hammock	12.290	8.983	3.855	3.806	3.729
Standard Error of mean differences in High Tides - Height					
Mayport	1.8646				
Marsh Landing	1.8197	1.2405			
Little Sapelo	1.6644	1.0854	0.6966		
Sawmill	1.6792	1.1781	0.6759	0.5977	
Moses Hammock	1.6138	1.1795	0.5345	0.4998	0.4896
Coefficient of Variation of mean differences in High Tides - Height					
Mayport	-0.1779				
Marsh Landing	11.1859	0.1100			
Little Sapelo	-1.3082	0.1179	-0.4240		
Sawmill	0.3841	0.0793	0.1563	0.1059	
Moses Hammock	0.2594	0.0706	0.0852	0.0667	0.2647

Table 41. DIFFERENCES IN TIME OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Time (1/10 hr.)					
Mayport	0.13				
Marsh Landing	0.37	0.22			
Little Sapelo	0.13	-0.01	-0.25		
Sawmill	0.25	0.11	-0.14	0.12	
Moses Hammock	0.24	0.11	-0.15	0.11	-0.01
Variance of mean differences in Low Tides - Time					
Mayport	0.091				
Marsh Landing	0.187	0.186			
Little Sapelo	0.101	0.117	0.114		
Sawmill	0.143	0.174	0.148	0.062	
Moses Hammock	0.124	0.145	0.129	0.066	0.049
Standard Deviation of mean differences in Low Tides - Time					
Mayport	0.301				
Marsh Landing	0.433	0.431			
Little Sapelo	0.318	0.343	0.337		
Sawmill	0.378	0.417	0.385	0.249	
Moses Hammock	0.352	0.381	0.359	0.256	0.222
Standard Error of mean differences in Low Tides - Time					
Mayport	0.0399				
Marsh Landing	0.0606	0.0609			
Little Sapelo	0.0418	0.0454	0.0472		
Sawmill	0.0501	0.0557	0.0539	0.0330	
Moses Hammock	0.0463	0.0505	0.0502	0.0337	0.0293
Coefficient of Variation of mean differences in Low Tides - Time					
Mayport	2.2897				
Marsh Landing	1.1808	1.9229			
Little Sapelo	2.5281	-48.8342	-1.3438		
Sawmill	1.5409	3.6497	-2.7637	2.0300	
Moses Hammock	1.4705	3.5020	-2.4380	2.2537	-15.7861

Table 42. DIFFERENCES IN TIDAL HEIGHT OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Height (cm.)					
Mayport	-11.63				
Marsh Landing	-7.24	5.26			
Little Sapelo	-17.81	-6.35	-11.16		
Sawmill	15.79	27.32	22.37	33.65	
Moses Hammock	27.31	38.74	34.33	45.12	11.81
Variance of mean differences in Low Tides - Height					
Mayport	261.094				
Marsh Landing	216.984	293.461			
Little Sapelo	193.665	259.839	15.495		
Sawmill	282.026	369.349	78.319	61.768	
Moses Hammock	220.113	331.877	26.147	16.880	55.944
Standard Deviation of mean differences in Low Tides - Height					
Mayport	16.158				
Marsh Landing	14.730	17.131			
Little Sapelo	13.916	16.120	3.936		
Sawmill	16.794	19.218	8.850	7.859	
Moses Hammock	14.836	18.217	5.113	4.109	7.480
Standard Error of mean differences in Low Tides - Height					
Mayport	2.1402				
Marsh Landing	2.0627	2.4226			
Little Sapelo	1.8273	2.1351	0.5512		
Sawmill	2.2244	2.5682	1.2392	1.0410	
Moses Hammock	1.9481	2.4130	0.7160	0.5395	0.9907
Coefficient of Variation of mean differences in Low Tides - Height					
Mayport	-1.3892				
Marsh Landing	-2.0359	3.2568			
Little Sapelo	-0.7814	-2.5382	-0.3528		
Sawmill	1.0636	0.7034	0.3956	0.2336	
Moses Hammock	0.5432	0.4703	0.1489	0.0911	0.6335

Table 43. DIFFERENCES IN TIME OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Time (1/10 hr.)					
Mayport	0.63				
Marsh Landing	0.44	-0.19			
Little Sapelo	0.31	-0.32	-0.16		
Sawmill	0.58	-0.05	0.11	0.27	
Moses Hammock	0.91	0.28	0.47	0.60	0.33
Variance of mean differences in First High Tide - Time					
Mayport	0.067				
Marsh Landing	0.133	0.168			
Little Sapelo	0.064	0.083	0.139		
Sawmill	0.129	0.178	0.199	0.079	
Moses Hammock	0.164	0.141	0.312	0.138	0.188
Standard Deviation of mean differences in First High Tide - Time					
Mayport	0.259				
Marsh Landing	0.364	0.410			
Little Sapelo	0.253	0.288	0.373		
Sawmill	0.359	0.422	0.446	0.282	
Moses Hammock	0.405	0.375	0.559	0.371	0.433
Standard Error of mean differences in First High Tide - Time					
Mayport	0.0472				
Marsh Landing	0.0701	0.0789			
Little Sapelo	0.0462	0.0526	0.0718		
Sawmill	0.0655	0.0770	0.0859	0.0515	
Moses Hammock	0.0739	0.0685	0.1075	0.0677	0.0791
Coefficient of Variation of mean differences in First High Tide - Time					
Mayport	0.4126				
Marsh Landing	0.8259	-2.2149			
Little Sapelo	0.8255	-0.9005	-2.2906		
Sawmill	0.6222	-8.4323	3.8854	1.0437	
Moses Hammock	0.4446	1.3241	1.1975	0.6148	1.3001

Table 44. DIFFERENCES IN TIDAL HEIGHT OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Height (cm.)					
Mayport	-78.10				
Marsh Landing	1.41	80.11			
Little Sapelo	-9.00	69.10	-11.44		
Sawmill	34.40	112.50	32.11	43.40	
Moses Hammock	48.03	126.13	45.63	57.03	13.63
Variance of mean differences in First High Tide - Height					
Mayport	169.819				
Marsh Landing	193.866	70.644			
Little Sapelo	165.034	37.681	24.179		
Sawmill	187.145	64.534	40.026	22.731	
Moses Hammock	159.276	47.155	21.704	4.448	23.689
Standard Deviation of mean differences in First High Tide - Height					
Mayport	13.031				
Marsh Landing	13.924	8.405			
Little Sapelo	12.847	6.138	4.917		
Sawmill	13.680	8.033	6.327	4.768	
Moses Hammock	12.620	6.867	4.659	2.109	4.867
Standard Error of mean differences in First High Tide - Height					
Mayport	2.3792				
Marsh Landing	2.6796	1.6175			
Little Sapelo	2.3455	1.1207	0.9463		
Sawmill	2.4976	1.4667	1.2176	0.8705	
Moses Hammock	2.3042	1.2537	0.8966	0.3851	0.8886
Coefficient of Variation of mean differences in First High Tide - Height					
Mayport	-0.1669				
Marsh Landing	9.8931	0.1049			
Little Sapelo	-1.4274	0.0888	-0.4297		
Sawmill	0.3977	0.0714	0.1970	0.1099	
Moses Hammock	0.2627	0.0544	0.1021	0.0370	0.3570

Table 45. DIFFERENCES IN TIME OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Time (1/10 hr.)					
Mayport	0.16				
Marsh Landing	0.38	0.20			
Little Sapelo	0.15	-0.01	-0.23		
Sawmill	0.28	0.12	-0.11	0.14	
Moses Hammock	0.27	0.11	-0.12	0.12	-0.02
Variance of mean differences in First Low Tide - Time					
Mayport	0.087				
Marsh Landing	0.198	0.227			
Little Sapelo	0.078	0.107	0.076		
Sawmill	0.156	0.221	0.183	0.093	
Moses Hammock	0.129	0.177	0.147	0.067	0.057
Standard Deviation of mean differences in First Low Tide - Time					
Mayport	0.295				
Marsh Landing	0.446	0.477			
Little Sapelo	0.279	0.327	0.275		
Sawmill	0.395	0.470	0.428	0.305	
Moses Hammock	0.385	0.421	0.383	0.259	0.239
Standard Error of mean differences in First Low Tide - Time					
Mayport	0.0539				
Marsh Landing	0.0857	0.0918			
Little Sapelo	0.0509	0.0596	0.0530		
Sawmill	0.0721	0.0859	0.0823	0.0556	
Moses Hammock	0.0654	0.0769	0.0738	0.0473	0.0437
Coefficient of Variation of mean differences in First Low Tide - Time					
Mayport	1.8468				
Marsh Landing	1.1679	2.4287			
Little Sapelo	1.9011	-24.5001	-1.2189		
Sawmill	1.3936	3.8131	-3.9830	2.2284	
Moses Hammock	1.3443	3.9464	-3.2344	2.1598	-14.3623

Table 46. DIFFERENCES IN TIDAL HEIGHT OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Height (cm.)					
Mayport	-10.77				
Marsh Landing	-6.70	5.04			
Little Sapelo	-16.93	-6.17	-11.19		
Sawmill	15.90	26.67	21.41	32.83	
Moses Hammock	28.27	39.03	34.07	45.20	12.37
Variance of mean differences in First Low Tide - Height					
Mayport	247.702				
Marsh Landing	169.986	236.037			
Little Sapelo	154.341	246.764	4.387		
Sawmill	314.507	401.954	121.174	110.075	
Moses Hammock	171.099	285.551	11.072	4.786	104.240
Standard Deviation of mean differences in First Low Tide - Height					
Mayport	15.739				
Marsh Landing	13.038	15.363			
Little Sapelo	12.423	15.709	2.095		
Sawmill	17.734	20.049	11.008	10.492	
Moses Hammock	13.080	16.898	3.327	2.188	10.210
Standard Error of mean differences in First Low Tide - Height					
Mayport	2.8735				
Marsh Landing	2.5091	2.9567			
Little Sapelo	2.2682	2.8680	0.4031		
Sawmill	3.2378	3.6604	2.1185	1.9155	
Moses Hammock	2.3882	3.0852	0.6404	0.3994	1.8640
Coefficient of Variation of mean differences in First Low Tide - Height					
Mayport	-1.4618				
Marsh Landing	-1.9449	3.0501			
Little Sapelo	-0.7337	-2.5474	-0.1873		
Sawmill	1.1154	0.7518	0.5142	0.3195	
Moses Hammock	0.4628	0.4329	0.0977	0.0484	0.8256

Table 47. DIFFERENCES IN TIME OF THE SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Time (1/10 hr.)					
Mayport	0.57				
Marsh Landing	0.43	-0.12			
Little Sapelo	0.32	-0.24	-0.12		
Sawmill	0.62	0.05	0.15	0.29	
Moses Hammock	0.77	0.20	0.30	0.45	0.15
Variance of mean differences in Second High Tide - Time					
Mayport	0.098				
Marsh Landing	0.190	0.198			
Little Sapelo	0.102	0.157	0.107		
Sawmill	0.128	0.150	0.155	0.057	
Moses Hammock	0.116	0.158	0.157	0.046	0.038
Standard Deviation of mean differences in Second High Tide - Time					
Mayport	0.313				
Marsh Landing	0.436	0.445			
Little Sapelo	0.319	0.396	0.327		
Sawmill	0.358	0.387	0.394	0.239	
Moses Hammock	0.341	0.398	0.396	0.215	0.195
Standard Error of mean differences in Second High Tide - Time					
Mayport	0.0591				
Marsh Landing	0.0873	0.0889			
Little Sapelo	0.0603	0.0748	0.0654		
Sawmill	0.0677	0.0732	0.0788	0.0451	
Moses Hammock	0.0644	0.0752	0.0793	0.0407	0.0369
Coefficient of Variation of mean differences in Second High Tide - Time					
Mayport	0.5508				
Marsh Landing	1.0196	-3.5861			
Little Sapelo	0.9824	-1.6295	-2.6367		
Sawmill	0.5795	7.7461	2.6610	0.8151	
Moses Hammock	0.4419	1.9534	1.3037	0.4819	1.2716

Table 48. DIFFERENCES IN TIDAL HEIGHT OF THE SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Height (cm.)					
Mayport	-81.68				
Marsh Landing	0.92	82.56			
Little Sapelo	-10.43	71.25	-12.28		
Sawmill	32.11	113.79	30.16	42.54	
Moses Hammock	46.68	128.36	44.84	57.11	14.57
Variance of mean differences in Second High Tide - Height					
Mayport	236.451				
Marsh Landing	155.743	90.258			
Little Sapelo	160.846	101.306	27.043		
Sawmill	141.433	99.731	5.057	18.925	
Moses Hammock	146.819	117.056	7.724	25.806	3.439
Standard Deviation of mean differences in Second High Tide - Height					
Mayport	15.377				
Marsh Landing	12.480	9.500			
Little Sapelo	12.683	10.065	5.200		
Sawmill	11.893	9.987	2.249	4.350	
Moses Hammock	12.117	10.819	2.779	5.080	1.855
Standard Error of mean differences in Second High Tide - Height					
Mayport	2.9060				
Marsh Landing	2.4959	1.9001			
Little Sapelo	2.3968	1.9021	1.0401		
Sawmill	2.2475	1.8873	0.4498	0.8221	
Moses Hammock	2.2899	2.0446	0.5558	0.9600	0.3505
Coefficient of Variation of mean differences in Second High Tide - Height					
Mayport	-0.1883				
Marsh Landing	13.5649	0.1151			
Little Sapelo	-1.2161	0.1413	-0.4235		
Sawmill	0.3704	0.0878	0.0746	0.1023	
Moses Hammock	0.2596	0.0843	0.0620	0.0890	0.1273

Table 49. DIFFERENCES IN TIME OF THE SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Time (1/10 hr.)					
Mayport	0.10				
Marsh Landing	0.35	0.26			
Little Sapelo	0.10	0.00	0.28		
Sawmill	0.20	0.10	-0.17	0.11	
Moses Hammock	0.21	0.11	-0.18	0.11	-0.01
Variance of mean differences in Second Low Tide - Time					
Mayport	0.096				
Marsh Landing	0.183	0.143			
Little Sapelo	0.129	0.134	0.160		
Sawmill	0.131	0.126	0.112	0.030	
Moses Hammock	0.122	0.115	0.111	0.067	0.042
Standard Deviation of mean differences in Second Low Tide - Time					
Mayport	0.310				
Marsh Landing	0.427	0.378			
Little Sapelo	0.360	0.366	0.400		
Sawmill	0.362	0.355	0.335	0.173	
Moses Hammock	0.350	0.339	0.334	0.258	0.204
Standard Error of mean differences in Second Low Tide - Time					
Mayport	0.0597				
Marsh Landing	0.0872	0.0787			
Little Sapelo	0.0679	0.0704	0.0816		
Sawmill	0.0697	0.0696	0.0684	0.0333	
Moses Hammock	0.0661	0.0652	0.0681	0.0488	0.0393
Coefficient of Variation of mean differences in Second Low Tide - Time					
Mayport	3.1008				
Marsh Landing	1.2209	1.4719			
Little Sapelo	3.4711	******	-1.4327		
Sawmill	1.7777	3.4180	-1.9157	1.6111	
Moses Hammock	1.6608	3.0504	-1.8619	2.4089	-18.4010

Table 50. DIFFERENCES IN TIDAL HEIGHT OF THE SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 MARCH 1973 THROUGH 13 APRIL 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Height (cm.)					
Mayport	-12.59				
Marsh Landing	-7.83	5.52			
Little Sapelo	-18.75	-6.56	-11.13		
Sawmill	15.67	28.08	23.46	34.56	
Moses Hammock	26.29	38.41	34.63	45.04	11.19
Variance of mean differences in Second Low Tide - Height					
Mayport	284.251				
Marsh Landing	278.840	374.533			
Little Sapelo	241.306	284.333	28.723		
Sawmill	256.615	345.194	30.955	8.642	
Moses Hammock	278.804	396.097	44.158	30.481	3.464
Standard Deviation of mean differences in Second Low Tide - Height					
Mayport	16.860				
Marsh Landing	16.699	19.353			
Little Sapelo	15.534	16.862	5.359		
Sawmill	16.019	18.579	5.564	2.940	
Moses Hammock	16.697	19.902	6.645	5.521	1.861
Standard Error of mean differences in Second Low Tide - Height					
Mayport	3.2447				
Marsh Landing	3.4086	4.0353			
Little Sapelo	2.9357	3.2451	1.0940		
Sawmill	3.0829	3.6437	1.1357	0.5657	
Moses Hammock	3.1555	3.8302	1.3564	1.0434	0.3582
Coefficient of Variation of mean differences in Second Low Tide - Height					
Mayport	-1.3389				
Marsh Landing	-2.1317	3.5048			
Little Sapelo	-0.8285	-2.5722	-0.4817		
Sawmill	1.0225	0.6617	0.2372	0.0851	
Moses Hammock	0.6352	0.5182	0.1919	0.1226	0.1664

Table 51. DIFFERENCES IN TIME OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Time (1/10 hr.)					
Mayport	0.75				
Marsh Landing	-0.08	-0.82			
Little Sapelo	0.31	-0.43	0.39		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.85	0.10	0.93	0.54	0.0
Variance of mean differences in High Tides - Time					
Mayport	0.105				
Marsh Landing	0.184	0.271			
Little Sapelo	0.114	0.163	0.122		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.165	0.211	0.214	0.187	0.0
Standard Deviation of mean differences in High Tides - Time					
Mayport	0.324				
Marsh Landing	0.429	0.521			
Little Sapelo	0.338	0.403	0.349		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.406	0.459	0.462	0.432	0.0
Standard Error of mean differences in High Tides - Time					
Mayport	0.0433				
Marsh Landing	0.0564	0.0696			
Little Sapelo	0.0443	0.0539	0.0459		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.0533	0.0614	0.0607	0.0568	0.0
Coefficient of Variation of mean differences in High Tides - Time					
Mayport	0.4333				
Marsh Landing	-5.5321	-0.6310			
Little Sapelo	1.0822	-0.9331	0.8964		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.4783	4.4340	0.4995	0.8063	0.0

Table 52. DIFFERENCES IN TIDAL HEIGHT OF MEAN HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in High Tides - Height (cm.)					
Mayport	-81.43				
Marsh Landing	4.34	85.93			
Little Sapelo	-7.48	74.13	-11.83		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	43.97	125.59	39.62	51.45	0.0
Variance of mean differences in High Tides - Height					
Mayport	80.797				
Marsh Landing	31.949	72.287			
Little Sapelo	19.272	60.730	22.461		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	21.999	95.811	37.328	25.550	0.0
Standard Deviation of mean differences in High Tides - Height					
Mayport	8.989				
Marsh Landing	5.652	8.502			
Little Sapelo	4.390	7.793	4.739		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	4.690	9.788	6.110	5.055	0.0
Standard Error of mean differences in High Tides - Height					
Mayport	1.2012				
Marsh Landing	0.7422	1.1362			
Little Sapelo	0.5764	1.0414	0.6223		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.6159	1.3080	0.8022	0.6637	0.0
Coefficient of Variation of mean differences in High Tides - Height					
Mayport	-0.1104				
Marsh Landing	1.3009	0.0989			
Little Sapelo	0.5867	0.1051	-0.4007		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.1067	0.0779	0.1542	0.0982	0.0

Table 53. DIFFERENCES IN TIME OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Time (1/10 hr.)					
Mayport	0.24				
Marsh Landing	-0.25	-0.50			
Little Sapelo	0.04	-0.20	0.29		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.24	0.01	0.47	0.19	0.0
Variance of mean differences in Low Tides - Time					
Mayport	0.143				
Marsh Landing	0.199	0.398			
Little Sapelo	0.078	0.211	0.184		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.130	0.269	0.230	0.149	0.0
Standard Deviation of mean differences in Low Tides - Time					
Mayport	0.378				
Marsh Landing	0.446	0.631			
Little Sapelo	0.279	0.459	0.429		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.361	0.519	0.230	0.149	0.0
Standard Error of mean differences in Low Tides - Time					
Mayport	0.0519				
Marsh Landing	0.0591	0.0875			
Little Sapelo	0.0377	0.0649	0.0584		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.0474	0.0713	0.0636	0.0520	0.0
Coefficient of Variation of mean differences in Low Tides - Time					
Mayport	1.5530				
Marsh Landing	-1.8160	-1.2567			
Little Sapelo	6.4027	-2.2730	1.4749		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	1.5268	91.7030	1.0168	2.0017	0.0

Table 54. DIFFERENCES IN TIDAL HEIGHT OF MEAN LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Low Tides - Height (cm.)					
Mayport	-14.58				
Marsh Landing	-6.33	8.65			
Little Sapelo	-14.73	0.42	-8.54		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	22.38	36.91	28.81	37.20	0.0
Variance of mean differences in Low Tides - Height					
Mayport	97.901				
Marsh Landing	24.833	116.113			
Little Sapelo	33.276	69.759	19.574		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	170.696	335.472	205.087	229.089	0.0
Standard Deviation of mean differences in Low Tides - Height					
Mayport	9.895				
Marsh Landing	4.983	10.776			
Little Sapelo	5.769	8.352	4.424		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	13.065	18.316	14.321	15.136	0.0
Standard Error of mean differences in Low Tides - Height					
Mayport	1.3591				
Marsh Landing	0.6601	1.4943			
Little Sapelo	0.7778	1.1812	0.6021		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	1.7155	2.5159	1.8698	2.0409	0.0
Coefficient of Variation of mean differences in Low Tides - Height					
Mayport	-0.6784				
Marsh Landing	-0.7868	1.2452			
Little Sapelo	-0.3917	19.8861	-0.5182		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.5838	0.4963	9.4971	0.4069	0.0

Table 55. DIFFERENCES IN TIME OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Time (1/10 hr.)					
Mayport	0.75				
Marsh Landing	-0.17	-0.92			
Little Sapelo	0.22	-0.53	0.39		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.80	0.05	0.97	0.58	0.0
Variance of mean differences in First High Tide - Time					
Mayport	0.096				
Marsh Landing	0.139	0.184			
Little Sapelo	0.097	0.106	0.119		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.051	0.098	0.140	0.075	0.0
Standard Deviation of mean differences in First High Tide - Time					
Mayport	0.309				
Marsh Landing	0.372	0.429			
Little Sapelo	0.311	0.326	0.345		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.227	0.314	0.374	0.275	0.0
Standard Error of mean differences in First High Tide - Time					
Mayport	0.0565				
Marsh Landing	0.0680	0.0784			
Little Sapelo	0.0567	0.0596	0.0630		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.0414	0.0573	0.0682	0.0501	0.0
Coefficient of Variation of mean differences in First High Tide - Time					
Mayport	0.4125				
Marsh Landing	-2.1909	-0.4668			
Little Sapelo	1.4346	-0.6117	0.8926		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.2845	6.7231	0.3864	0.4736	0.0

Table 56. DIFFERENCES IN TIDAL HEIGHT OF THE FIRST HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First High Tide - Height (cm.)					
Mayport	-76.50				
Marsh Landing	5.93	82.43			
Little Sapelo	-6.57	69.93	-12.50		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	44.00	120.50	38.07	50.57	0.0
Variance of mean differences in First High Tide - Height					
Mayport	32.603				
Marsh Landing	22.616	35.705			
Little Sapelo	12.461	23.653	13.500		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	21.862	34.741	18.409	5.565	0.0
Standard Deviation of mean differences in First High Tide - Height					
Mayport	5.710				
Marsh Landing	4.756	5.975			
Little Sapelo	3.530	4.863	3.674		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	4.676	5.894	4.291	2.359	0.0
Standard Error of mean differences in First High Tide - Height					
Mayport	1.0425				
Marsh Landing	0.8683	1.0909			
Little Sapelo	0.6445	0.8879	0.6708		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.8537	1.0761	0.7834	0.4307	0.0
Coefficient of Variation of mean differences in First High Tide - Height					
Mayport	-0.0746				
Marsh Landing	0.8015	0.0725			
Little Sapelo	-0.5376	0.0695	-0.2939		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.1063	0.0489	0.1127	0.0467	

Table 57. DIFFERENCES IN TIME OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Time (1/10 hr.)					
Mayport	0.20				
Marsh Landing	-0.29	-0.50			
Little Sapelo	0.05	-0.15	0.35		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.30	0.11	0.57	0.25	0.0
Variance of mean differences in First Low Tide - Time					
Mayport	0.096				
Marsh Landing	0.187	0.278			
Little Sapelo	0.040	0.118	0.133		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.082	0.166	0.147	0.040	0.0
Standard Deviation of mean differences in First Low Tide - Time					
Mayport	0.309				
Marsh Landing	0.432	0.527			
Little Sapelo	0.199	0.344	0.365		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.286	0.407	0.383	0.201	0.0
Standard Error of mean differences in First Low Tide - Time					
Mayport	0.0584				
Marsh Landing	0.0803	0.1015			
Little Sapelo	0.0383	0.0688	0.0715		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.0522	0.0769	0.0711	0.0386	0.0
Coefficient of Variation of mean differences in First Low Tide - Time					
Mayport	1.5456				
Marsh Landing	-1.5107	-1.0625			
Little Sapelo	3.8337	-2.3253	1.0535		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.9636	3.5620	0.6771	0.7969	0.0

Table 58. DIFFERENCES IN TIDAL HEIGHT OF THE FIRST LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in First Low Tide - Height (cm.)					
Mayport	-13.93				
Marsh Landing	-7.76	6.30			
Little Sapelo	-16.41	-2.40	-8.85		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	22.03	35.64	29.97	38.59	0.0
Variance of mean differences in First Low Tide - Height					
Mayport	73.328				
Marsh Landing	17.975	91.370			
Little Sapelo	15.328	63.750	11.335		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	35.620	123.942	9.963	28.636	0.0
Standard Deviation of mean differences in First Low Tide - Height					
Mayport	8.563				
Marsh Landing	4.240	9.559			
Little Sapelo	3.915	7.984	3.367		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	5.968	11.133	3.156	5.351	0.0
Standard Error of mean differences in First Low Tide - Height					
Mayport	1.6183				
Marsh Landing	0.7873	1.8396			
Little Sapelo	0.7535	1.5969	0.6603		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	1.0896	2.1039	0.5861	1.0298	0.0
Coefficient of Variation of mean differences in First Low Tide - Height					
Mayport	-0.6148				
Marsh Landing	-0.5465	1.5182			
Little Sapelo	-0.2386	-3.3268	-0.3806		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.2709	0.3123	0.1053	0.1387	0.0

Table 59. DIFFERENCES IN TIME OF THE SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Time (1/10 hr.)					
Mayport	0.75				
Marsh Landing	0.02	-0.72			
Little Sapelo	0.41	-0.32	0.39		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.90	0.17	0.88	0.49	0.0
Variance of mean differences in Second High Tide - Time					
Mayport	0.120				
Marsh Landing	0.220	0.359			
Little Sapelo	0.116	0.208	0.130		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.286	0.341	0.298	0.309	0.0
Standard Deviation of mean differences in Second High Tide - Time					
Mayport	0.347				
Marsh Landing	0.469	0.599			
Little Sapelo	0.341	0.456	0.360		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.535	0.584	0.546	0.556	0.0
Standard Error of mean differences in Second High Tide - Time					
Mayport	0.0680				
Marsh Landing	0.0887	0.1175			
Little Sapelo	0.0644	0.0894	0.0680		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.1011	0.1146	0.1031	0.1051	0.0
Coefficient of Variation of mean differences in Second High Tide - Time					
Mayport	0.4646				
Marsh Landing	21.9012	-0.8375			
Little Sapelo	0.8224	-1.4452	0.9163		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.5922	3.4527	0.6186	1.1364	0.0

Table 60. DIFFERENCES IN TIDAL HEIGHT OF THE SECOND HIGH WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second High Tide - Height (cm.)					
Mayport	-87.12				
Marsh Landing	2.64	89.96			
Little Sapelo	-8.46	78.96	-11.11		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	43.93	131.46	41.29	52.39	0.0
Variance of mean differences in Second High Tide - Height					
Mayport	77.147				
Marsh Landing	37.349	86.040			
Little Sapelo	25.369	60.760	31.877		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	22.958	103.540	53.471	46.174	0.0
Standard Deviation of mean differences in Second High Tide - Height					
Mayport	8.783				
Marsh Landing	6.111	9.276			
Little Sapelo	5.037	7.795	5.646		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	4.791	10.175	7.312	6.795	0.0
Standard Error of mean differences in Second High Tide - Height					
Mayport	1.7226				
Marsh Landing	1.1549	1.8191			
Little Sapelo	0.9519	1.5287	1.0670		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.9055	1.9956	1.3819	1.2842	0.0
Coefficient of Variation of mean differences in Second High Tide - Height					
Mayport	-0.1008				
Marsh Landing	2.3124	0.1031			
Little Sapelo	-0.5951	0.0987	-0.5083		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.1091	0.0774	0.1771	0.1297	0.0

Table 61. DIFFERENCES IN TIME OF THE SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Time (1/10 hr.)					
Mayport	0.29				
Marsh Landing	-0.20	-0.51			
Little Sapelo	0.04	-0.26	0.24		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.17	-0.12	0.37	0.14	0.0
Variance of mean differences in Second Low Tide - Time					
Mayport	0.197				
Marsh Landing	0.215	0.544			
Little Sapelo	0.118	0.306	0.232		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.178	0.368	0.306	0.252	0.0
Standard Deviation of mean differences in Second Low Tide - Time					
Mayport	0.444				
Marsh Landing	0.464	0.738			
Little Sapelo	0.343	0.553	0.482		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.422	0.607	0.554	0.502	0.0
Standard Error of mean differences in Second Low Tide - Time					
Mayport	0.0889				
Marsh Landing	0.0877	0.1475			
Little Sapelo	0.0649	0.1106	0.0910		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.0798	0.1213	0.1046	0.0949	0.0
Coefficient of Variation of mean differences in Second Low Tide - Time					
Mayport	1.5217				
Marsh Landing	-2.2787	-1.4520			
Little Sapelo	9.6157	-2.1605	2.0134		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	2.4639	-5.2300	1.4761	3.6990	0.0

Table 62. DIFFERENCES IN TIDAL HEIGHT OF THE SECOND LOW WATER AND ASSOCIATED STATISTICS, AT ALL LOCATIONS, 15 JUNE 1973 THROUGH 14 JULY 1973

	Ft. Pulaski	Mayport	Marsh Landing	Little Sapelo	Sawmill
Mean differences in Second Low Tide - Height (cm.)					
Mayport	-15.32				
Marsh Landing	-4.86	11.20			
Little Sapelo	-13.11	3.24	-8.25		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	22.75	38.32	27.61	35.86	0.0
Variance of mean differences in Second Low Tide - Height					
Mayport	128.560				
Marsh Landing	28.423	134.750			
Little Sapelo	46.247	62.107	27.750		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	321.824	583.477	412.099	426.794	0.0
Standard Deviation of mean differences in Second Low Tide - Height					
Mayport	11.338				
Marsh Landing	5.331	11.608			
Little Sapelo	6.801	7.881	5.268		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	17.939	24.155	20.300	20.659	0.0
Standard Error of mean differences in Second Low Tide - Height					
Mayport	2.2677				
Marsh Landing	1.0075	2.3216			
Little Sapelo	1.2852	1.5762	0.9955		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	3.3902	4.8311	3.8364	3.9042	0.0
Coefficient of Variation of mean differences in Second Low Tide - Height					
Mayport	-0.7401				
Marsh Landing	-1.0976	1.0364			
Little Sapelo	-0.5188	2.4323	-0.6385		
Sawmill	0.0	0.0	0.0	0.0	
Moses Hammock	0.7885	0.6304	0.7353	0.5761	0.0

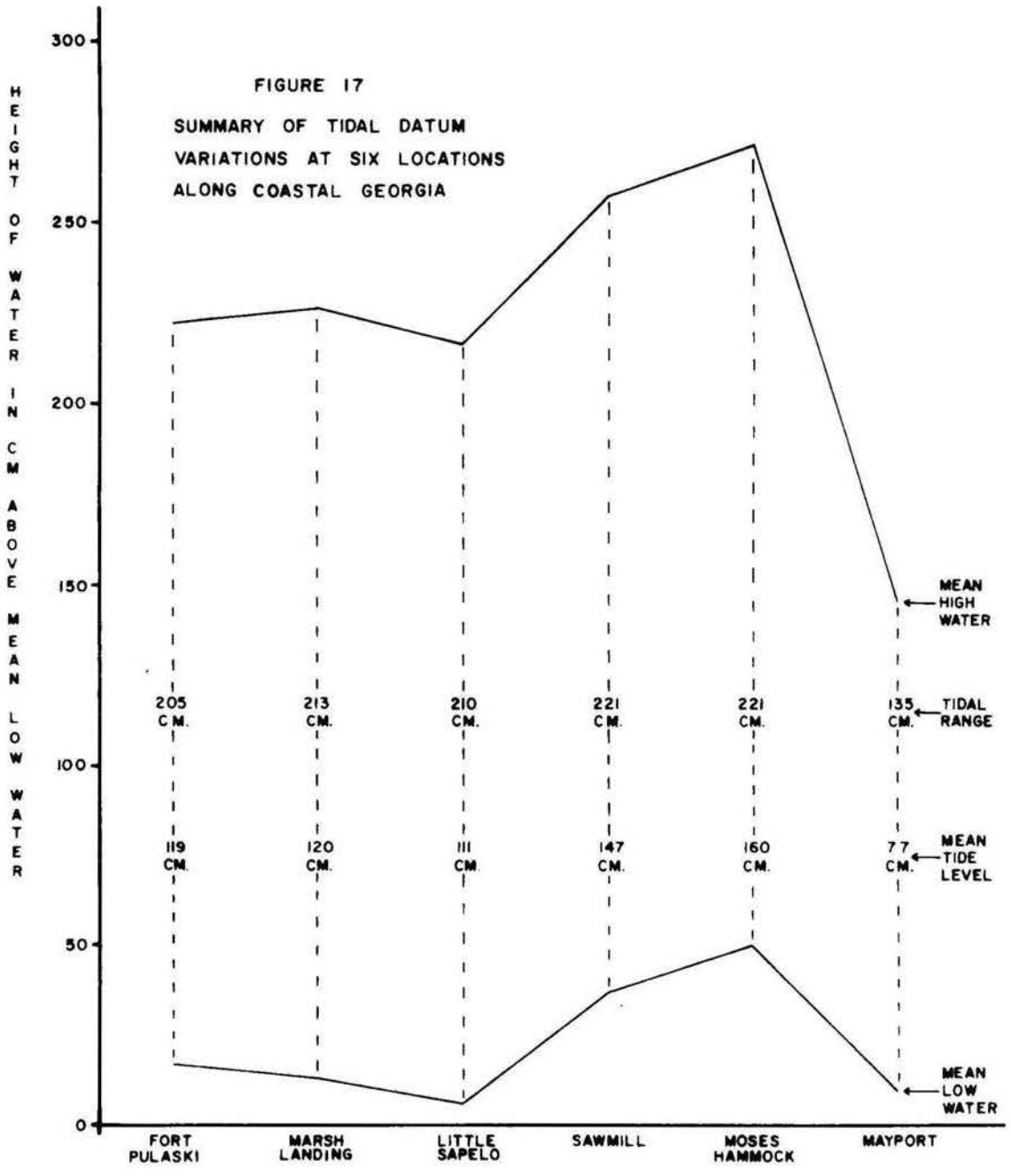
FIGURE 17
SUMMARY OF TIDAL DATUM VARIATIONS AT SIX LOCATIONS ALONG COASTAL GEORGIA
HEIGHT OF WATER IN CM ABOVE MEAN LOW WATER
300
250
200
150
100
50
0
205 CM.
213 CM.
210 CM.
221 CM.
221 CM.
135 CM.
TIDAL RANGE
119 CM.
120 CM.
111 CM.
147 CM.
160 CM.
77 CM.
MEAN TIDE LEVEL
MEAN HIGH WATER
MEAN LOW WATER
FORT PULASKI
MARSH LANDING
LITTLE SAPELO
SAWMILL
MOSES HAMMOCK
MAYPORT

Table 63. Summary of flood and ebb tide volume, duration, percent exchange and volume exchange, in the Duplin Estuary. Volumes are in cubic meters; duration is expressed in hours. Percent exchange is the percent of the flood tide which flows out on the following ebb tide.

Flood volume	Flood duration	Ebb volume	Ebb duration	Volume exchange	Percent exchange
11 September 1972					
576,425,000	7.0	344,321,000	5.25	232,104,000	59.7
15 December 1972					
382,686,000	7.0	174,216,000	5.25	208,470,000	45.5
15 March 1973					
402,021,000	6.25	245,567,000	6.0	156,454,000	61.1
15 June 1973					
233,766,000	5.25	225,338,000	7.0	8,427,000	96.4

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Appendix I

Location and Elevation of University of Georgia Bench Marks Established on Sapelo Island for Duplin Estuary Tidal Study

Bench Mark #	Elevation (cm.) above Mean Low Water	Description
1	319	Marsh Landing parking lot; concrete monument/ brass disk - flush with ground; concrete block pumphouse corner, 8.0' N; power pole, 23.5' E; witness post, 9.0' S.
2	291	Marsh Landing parking lot; concrete monument/ brass disk - flush with ground; concrete block pumphouse corner, 27.0' S 23° W; fuel oil tank, 15.0' S 21° E; witness post, 2.0' N.
3	338	Marsh Landing parking lot; concrete monument/ brass disk - flush with ground; timber bulkhead, 4.5' W; end of ramp to main dock, 8.5' NW; witness post, 5.0' W.
4	425	Little Sapelo Island on west bank of Duplin River near old dock; concrete monument/brass disk - flush with ground; 15" pine, 14.0' W; old fence perpendicular to Duplin River, 38.0' N; witness post, 2.0' N.
5	428	Little Sapelo Island on west bank of Duplin River near old dock; concrete monument/brass disk - flush with ground; old fence perpendicular to Duplin River, 24.0' S; old fence parallel to Duplin River, 3.0' W; BM #6, 82.0' W; witness post, 2.0' N.
6	428	Little Sapelo Island on west bank of Duplin River near old dock; concrete monument/brass disk - flush with ground; old fence perpendicular to Duplin River, 10.0' S; BM #5, 82.0' E; witness post, 2.0' N.
7	325	South side of Marsh Landing road; west of old post office site; concrete monument/brass disk - flush with ground; centerline of road, 22.0' NE; power pole, 50.0' N 38° E; live oak, 30.0' S 55° E; witness post, 12.0' S.
8	393	West side of Airport Road at entrance to hanger; concrete monument/brass disk - flush with ground; centerline of road, 12.0' SE; north gate post, 27.0' N 64° W; witness post, 46.0' N 2° W.
9	385	West side of Airport Road at intersection of Cemetery Road; concrete monument/brass disk- flush with ground; 30" live oak, 26.0' N 31° E; 30" live oak, 47.0' S 47° E; witness post, 2.0' N.

Bench Mark #	Elevation (cm.) above Mean Low Water	Description
10	402	Middle of intersection of West Road and Post Office Road, south of entrance to Georgia Game and Fish Division property; concrete monument/ brass disk - flush with ground; 30" live oak, 24.5' N 16° W; 24" live oak, 52.5' N 44° E; witness post, 12.0' N 65° E.
11	426	Southwest corner of intersection of Keenan Field Road and West Road; concrete monument/brass disk - flush with ground; 12" pine, 15.0' N 43° W; 10" live oak, 7.0' N 2° E; witness post, 2.0' N.
12	355	Southwest side of Keenan Field Road, 0.3 mi. from West Road; concrete monument/brass disk - flush with ground; twin 20" live oaks, 41.0' S 48° E; centerline of road, 25.0' NE; witness post, 2.0' N.
13	392	West side of Keenan Field Road, 0.5 mi. from BM #12, 0.8 mi. from West Road, adjacent to old home site; concrete monument/brass disk - flush with ground; 30" live oak, 43.0' S 70° E; 36" live oak, 34.0' S 30° W; witness post, 2.0' N.
14	340	West of old Sawmill site where Keenan Field Road ends at water's edge; concrete monument/ brass disk - flush with ground; BM #15, 81.0' S 50° W; BM #16, 89.5' N 54° W; witness post, 2.0' N.
15	324	West of old Sawmill site in open high marsh area; concrete monument/brass disk - flush with ground; BM #14, 81.0' N 50° E; BM #16, 107.0' N 4° W; witness post, 2.0' N.
16	352	West of old Sawmill site in small cedar hammock at water's edge; concrete monument/brass disk - flush with ground; BM #14, 89.5' S 54° E; BM #15, 107.0' S 4° E; witness post, 2.0' N.
17	425	Northeast side of intersection of West Road and Cox Marsh Road; concrete monument/brass disk - 6" above ground; triple 18" live oaks, 59.0' S 4° W; witness post, 2.0' E.
18	340	Approximately 525' W of West Road on north side of unnamed road to North Study Site; concrete monument/brass disk - flush with ground; forked oak, 14.0' N 83° E; 26" pine, 30.0' S 24° W; witness post, 2.0' N.

Bench Mark #	Elevation (cm.) above Mean Low Water	Description
19	414	Moses Hammock, in palmetto thicket on north side of path to dock; concrete monument/brass disk - flush with ground; forked oak, 10.0' N 77° E; 8" cedar, 18.0' S 45° W; witness post, 2.0' N.
20	411	Moses Hammock; concrete monument/brass disk - 2" above ground; forked oak, 17.0' N 82° W; 15" pine, 56.0' S 55° E; witness post, 2.0' N.
21	418	Moses Hammock; concrete monument/brass disk - 1" above ground; 15" pine, 89.0' S 3° W; 18" live oak, 63.0' S 77° W; witness post, 2.0' N.
22	494	Northwest corner of intersection of West Road and Moses Hammock Road; concrete monument/brass disk - flush with ground; 36" forked oak, 36.0' S 9° W; 24" pine, 33.0' W; witness post, 2.0' N.
23	320	North side of Nannygoat Beach Road at intersection of Lighthouse Road; concrete monument/brass disk - flush with ground; centerline of Nannygoat Beach Road, 10.0' SW; twin 6" pines, 21.5' S; witness post, 2.0' N.
24	359	South side of Nannygoat Beach Road where asphalt ends; concrete monument/brass disk - flush with ground; northwest corner of pavilion, 14.0' S 7° W; centerline of road, 30.0' NE; witness post, 4.0' S 49° W.
25	309	Near northwesternmost one acre research plot on dike bordering the southern edge of Reynold's marsh; concrete monument/brass disk - flush w th ground; concrete transformer pad, 9.5' SE; dike shed, 8.0' E; witness post, 2.0' N.

Appendix II

Computer Program Used to Compute Tidal Volume

```
 ISV4? JOB ORIGIN FROM GROUP=LOCAL    , DSP=CF , DEVICE=RDR1      . ))
//HHHHH JOB (2194220101?),JONES,MSGLEVEL=1,CLASS=F
//*MAIN  SYSTEM=SYER
// EXEC FORTGCG
//FORT.SYSIN DD *
//GO.SYSIN DD *
/*


 HHHHH     IEF403I HHHHH     STARTED     TIME=11.40.42
 HHHHH     IEF224E R 637,ASP637
*HHHHH     *62 IECASP0 637 IS HHHHH    A              FORT       SYSPRINT
*HHHHH     *63 IECASP0 630 IS HHHHH                   FORT       ASPI0001
 HHHHH     IEC202E K 630.013379.NL.HHHHH.FORT
 HHHHH     IEF234E R 637,ASP637
*HHHHH     *64 IECASP0 635 IS HHHHH    A              [illegible]  SYLOUT
*HHHHH     *65 IECASP0 637 IS HHHHH    A              [illegible]  FIC[illegible]
*HHHHH     *66 IECASP0 [illegible] IS HHHHH            [illegible]  ASPI[illegible]
 HHHHH     IEC202E K 636.023379.NL.HHHHH.GO
 HHHHH     IEF404I HHHHH     ENDED       TIME=11.41.51
//HHHHH JOB (2194220101?).JONES,MSGLEVEL=1,CLASS=F
// EXEC FORTGCG
XXFORTGCG PROC  PARM=A,OBJBLK=?8,DSET='SYS1.DUMMY'                    [illegible]
XXFORT      EXEC  PGM=IEYFORT,REGION=100K                              [illegible]
XXSYSLIN     DD DSN=&&LOADSET,DISP=(MOD,PASS),UNIT=SYSSQ,               [illegible]
XX                SPACE=(400,(&OBJBLK,20)),DCB=BLKSIZE=400              [illegible]
IEF653I SUBSTITUTION JCL - SPACE=(400,(?8,20)),DCB=BLKSIZE=400
XXSYSPRINT DD SYSOUT=&PAPER                                             [illegible]
IEF653I SUBSTITUTION JCL - SYSOUT=A
//FORT.SYSIN DD UNIT=(CTC,,DEFER),DSNAME=&&ASPI0001,
// DISP=(OLD,DELETE),VOL=SER=013379,DCB=(LRECL=80,BLKSIZE=80,RECFM=F)
IEF236I ALLOC. FOR HHHHH   FORT
IEF237I 231    ALLOCATED TO SYSLIN
IEF237I 637    ALLOCATED TO SYSPRINT
IEF237I 630    ALLOCATED TO SYSIN
IEF142I - STEP WAS EXECUTED - COND CODE 0000
IEF285I    SYS74196.T114031.RV001.HHHHH.LOADSET                PASSED
IEF285I    VOL SER NOS= UGA231.
IEF285I    SYS74196.T114031.RV001.HHHHH.ASPIA001               DELETED
IEF285I    VOL SER NOS= ASP637.
IEF285I    SYS74196.T114031.RV001.HHHHH.ASPI0001               DELETED
IEF285I    VOL SER NOS= 013379.
IEF373I STEP /FORT     / START 74196.1140
IEF374I STEP /FORT     / STOP  74196.1141 CPU   0MIN 02.86SEC STOR VIRT 128K
XXGO         EXEC  PGM=LOADER,COND=(4,LT,FORT)                          00000060
XXSYSLOUT    DD SYSOUT=&PAPER,SPACE=(TRK,(5,1),RLSE)                    00000070
IEF653I SUBSTITUTION JCL - SYSOUT=A,SPACE=(TRK,(5,1),RLSE)
XXSYSLIB     DD DSN=SYS1.FORTLIB,DISP=SHR                               00000080
XX           DD DSN=SYS1.UCALIB,DISP=SHR                                00000090
XX           DD DSN=&DSET,DISP=SHR                                      00000100
IEF653I SUBSTITUTION JCL - DSN=SYS1.DUMMY,DISP=SHR
XXSYSLIN     DD DSN=&&LOADSET,DISP=(OLD,DELETE)                         00000110
XX           DD DDNAME=LOADERIN                                         00000120
XXFT05F001   DD DDNAME=SYSIN                                            00000130
XXFT06F001   DD SYSOUT=&PAPER                                           00000140
IEF653I SUBSTITUTION JCL - SYSOUT=A
//GO.SYSIN DD UNIT=(CTC,,DEFER),DSNAME=&&ASPI0002,
// DISP=(OLD,DELETE),VOL=SER=023379,DCB=(LRECL=80,BLKSIZE=80,RECFM=F)
//
IEF236I ALLOC. FOR HHHHH   GO
```

```
IEF237I 635    ALLOCATED TO SYSOUT
IEF237I 152    ALLOCATED TO SYSLIB
IEF237I 152    ALLOCATED TO
IEF237I 152    ALLOCATED TO
IEF237I 231    ALLOCATED TO SYSLIN
IEF237I 636    ALLOCATED TO FT05F001
IEF237I 637    ALLOCATED TO FT06F001
IEF142I - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS74196.T114031.RV001.HHHHH.ASPCA002          DELETED
IEF285I   VOL SER NOS= ASP635.
IEF285I   SYS1.FORTLIB                                   KEPT
IEF285I   VOL SER NOS= UGAL85.
IEF285I   SYS1.UGALIB                                    KEPT
IEF285I   VOL SER NOS= UGAL85.
IEF285I   SYS1.DUMMY                                     KEPT
IEF285I   VOL SER NOS= UGALB5.
IEF285I   SYS74196.T114031.RV001.HHHHH.LODSET            DELETED
IEF285I   VOL SER NOS= UGA231.
IEF285I   SYS74196.T114031.RV001.HHHHH.ASPLOOO2          DELETED
IEF285I   VOL SER NOS= 023279.
IEF285I   SYS74196.T114031.RV001.HHHHH.ASPCA003          DELETED
IEF285I   VOL SER NOS= ASP637.
IEF373I STEP /GO        / START 74196.1141
IEF374I STEP /GO        / STOP  74196.1141 CPU    0MIN 02.73SEC SRB 0MIN 00.48SEC VIRT 464K
IEF375I  JOB /HHHHH    / START 74196.1140
IEF376I  JOB /HHHHH    / STOP  74196.1141 CPU    0MIN 05.55SEC
```

```
FORTRAN IV G LEVEL 21                    MAIN

0001                  DIMENSION A(100,4),VOL(100),FLOW(100),IDEP(100,4),DEP(100,4),Y(100
                     1)
0002                  DO 25 I=1,100
0003               25 Y(I)=.25*FLOAT(I-1)
0004                  DO 27 KKK=1,4
0005                  IF(KKK.EQ.1)WRITE(6,28)
0006                  IF(KKK.EQ.2)WRITE(6,29)
0007                  IF(KKK.EQ.3)WRITE(6,30)
0008                  IF(KKK.EQ.4)WRITE(6,31)
0009                  DO 17 I=1,97
0010               17 READ(5,2)(IDEP(I,J),J=1,4)
0011                2 FORMAT(19X,I4,4X,I4,4X,I4,4X,I4)
0012                  DO 18 I=1,97
0013                  DO 18 J=1,4
0014               18 DEP(I,J)=FLOAT(IDEP(I,J))
0015                  DO 19 I=1,97
0016                  A(I,1)=822.7+158.*DEP(I,1)+ DEP(I,1)**2*6.1321
0017                  A(I,2)=804.5+192.*DEP(I,2)+DEP(I,2)**2*6.1905
0018                  A(I,3)=672.5+173.*DEP(I,3)+DEP(I,3)**2*4.5249
0019               19 A(I,4)=231.5+73.*DEP(I,4)+DEP(I,4)**2*4.0915
0020                  DO 20 I=1,97
0021               20 VOL(I)=.5*(A(I,1)+A(I,2))*1607.+.5*(A(I,2)+A(I,3))*3417.+.5*(A(I,3
                     1)+A(I,4))*2257.
0022                  DO 21 I=1,97
0023               21 VOL(I)=VOL(I)*.000001
0024                  SUMO=0.0
0025                  SUMC1=0.0
0026                  SUMS1=0.0
0027                  SUMC2=0.0
0028                  SUMS2=0.0
0029                  SUMC3=0.0
0030                  SUMS3=0.0
0031                  SUMC4=0.0
0032                  SUMS4=0.0
0033                  SUMC5=0.0
0034                  SUMS5=0.0
0035                  SUMC6=0.0
0036                  SUMS6=0.0
0037                  FKK=2.*3.14159/51.
0038                  DO 22 I=1,51
0039                  SUMO=SUMO+VOL(I)
0040                  T=FLOAT(I-1)
0041                  SUMC1=SUMC1+VOL(I)*COS(FKK*T)
0042                  SUMS1=SUMS1+VOL(I)*SIN(FKK*T)
0043                  SUMC2=SUMC2+VOL(I)*COS(2.*FKK*T)
0044                  SUMS2=SUMS2+VOL(I)*SIN(2.*FKK*T)
0045                  SUMC3=SUMC3+VOL(I)*COS(3.*FKK*T)
0046                  SUMS3=SUMS3+VOL(I)*SIN(3.*FKK*T)
0047                  SUMC4=SUMC4+VOL(I)*COS(4.*FKK*T)
0048                  SUMS4=SUMS4+VOL(I)*SIN(4.*FKK*T)
0049                  SUMC5=SUMC5+VOL(I)*COS(5.*FKK*T)
0050                  SUMS5=SUMS5+SIN(5.*FKK*T)*VOL(I)
0051                  SUMC6=SUMC6+VOL(I)*COS(6.*FKK*T)
0052                  SUMS6=SUMS6+VOL(I)*SIN(6.*FKK*T)
0053               22 CONTINUE
0054                  VO=SUMO/51.
```

```
FORTRAN IV G LEVEL  21                          MAIN

0055                VC1=2.*SUMC1/51.
0056                VS1=2.*SUMS1/51.
0057                VC2=2.*SUMC2/51.
0058                VS2=2.*SUMS2/51.
0059                VC3=2.*SUMC3/51.
0060                VS3=2.*SUMS3/51.
0061                VC4=2.*SUMC4/51.
0062                VS4=2.*SUMS4/51.
0063                VC5=2.*SUMC5/51.
0064                VS5=2.*SUMS5/51.
0065                VC6=2.*SUMC6/51.
0066                VS6=2.*SUMS6/51.
0067                WRITE(6,4)V0,VC1,VC2,VC3,VC4,VC5,VC6
0068                WRITE(6,4)VS1,VS2,VS3,VS4,VS5,VS6
0069              4 FORMAT(1H0,2X,F10.4,2X,F10.4,2X,F10.4,2X,F10.4,2X,F10.4,2X,F10.4,2X,F10.4,2
                 1X,F10.4)
0070                DIMENSION VCAL(100),FLOC(100)
0071                DO 23 I=1,51
0072                T=FLOAT(I-1)
0073                VCAL(I)=V0+VC1*COS(EKK*T)+VC2*COS(2.*EKK*T)+VC3*COS(3.*EKK*T)+VC4*
                 1COS(4.*EKK*T)+VC5*COS(5.*EKK*T)+VS1*SIN(EKK*T)+VS2*SIN(2.*EKK*T)+V
                 2S3*SIN(3.*EKK*T)+VS4*SIN(4.*EKK*T)+VS5*SIN(5.*EKK*T)
0074                VCAL(I)=VCAL(I)+VC6*COS(6.*EKK*T)+VS6*SIN(6.*EKK*T)
0075                FLOC(I)=EKK*(-VC1*SIN(EKK*T)-2.*VC2*SIN(2.*EKK*T)-3.*VC3*SIN(3.*EK
                 1K*T)-4.*VC4*SIN(4.*EKK*T)-5.*VC5*SIN(5.*EKK*T)+VS1*COS(EKK*T)+2.*V
                 2S2*COS(2.*EKK*T)+3.*VS3*COS(3.*EKK*T)+4.*VS4*COS(4.*EKK*T)+5.*VS5*
                 3COS(5.*EKK*T))
0076                FLOC(I)=FLOC(I)+EKK*(-6.*VC6*SIN(6.*EKK*T)+6.*VS6*COS(6.*EKK*T))
0077             23 CONTINUE
0078                DO 126 I=52,97
0079                VCAL(I)=VCAL(I-51)
0080            126 FLOC(I)=FLOC(I-51)
0081                DO 127 I=1,97
0082            127 FLOC(I)=FLOC(I)*10000./15.
0083                WRITE(6,6)
0084              6 FORMAT(1H0,1X,4HHOUR,13X,6HVOLUME,20X,4HFLOW)
0085                WRITE(6,7)
0086              7 FORMAT(1H0,10X,8HOBSERVED,5X,10HCALCULATED)
0087                WRITE(6,8)
0088              8 FORMAT(1H ,9X,24=TEN  THOUSANDS CU METRES,10X,9HCU MS/MIN)
0089                DO 24 I=1,97
0090             24 WRITE(6,5)P(I),VOL(I),VCAL(I),FLOC(I)
0091              5 FORMAT(1H0,1X,F5.2,3X,F10.4,4X,F10.4,8X,F14.4)
0092             27 CONTINUE
0093             28 FORMAT(1H1,2X,24HFOR DAY 15 DEC 1972                                    )
0094             29 FORMAT(1H1,2X,24HFOR DAY 15 MAR 1973                                    )
0095             30 FORMAT(1H1,2X,25HFOR DAY 15 JUNE 1973                                   )
0096             31 FORMAT(1H1,2X,25HFOR DAY 11 SEPT 1973                                   )
0097                STOP
0098                END
```