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Nichols, M. M., Lynch, M. P., & Virginia Institute of Marine Science. (1964) Shelf observations hydrography, cruises of January 22-25, July 15-19, 1963. Special scientific report (Virginia Institute of Marine Science); no. 48. Virginia Institute of Marine Science, College of William and Mary. <https://doi.org/10.21220/V52G63>

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VIRGINIA INSTITUTE OF MARINE SCIENCE
GLOUCESTER POINT, VIRGINIA

Shelf Observations - Hydrography
Cruises of January 22-25,
July 15-19, 1963

SPECIAL SCIENTIFIC REPORT No. 48

1964

Virginia Institute of Marine Science
Gloucester Point, Virginia

SHELF OBSERVATIONS - HYDROGRAPHY

Cruises of January 22-25,

July 15-19, 1963

M. M. Nichols and H. P. Lynch

Special Scientific Report 48

W. J. Hargis, Jr.

Director

April 1964

SHELF OBSERVATIONS-HYDROGRAPHY

Cruises of January 22-25,
July 15-19, 1963

The data in this report were obtained during two cruises on the inner continental shelf off Chesapeake Bay, January 22-25 and July 15-19 1963. The observations are part of a long-continued study to investigate all aspects of the shelf environment.

METHODS

Stations were established at intervals of two miles along traverses 4 and 8 miles apart (Fig. 1). Station numbers (e.g. 720-20) are derived from the latitude with the first digit taken from the degrees north of 30°N (e.g. 37°) and the subsequent two digits referring to minutes of latitude ($37^{\circ} 20'$ or 720). The second group of numerals, following the hyphen, is derived from the distance in miles east of the 76° meridian of longitude through the mouth of Chesapeake Bay.

Observations consist of: (1) Vertical profiles at fixed stations, and (2) track measurements of surface water.

On the January cruise temperature and salinity were measured in situ with an I C T I (induction conductivity temperature indicator) calibrated and adjusted to give readings with an accuracy of $\pm 0.02^{\circ}\text{C}$ and $\pm 0.05^{\circ}/_{\infty}$. During the July cruise temperature and salinity profiles were measured in situ with a portable salinometer of the RS-5 series. Accuracy of readings with this instrument after correction and adjustment is $\pm 0.3^{\circ}\text{C}$ and $\pm 0.1^{\circ}/_{\infty}$. Surface bucket temperatures and chlorinity titrations provided a check on measurements of the electronic units and

these data were used, where necessary, to correct values of the depth profiles. ICTI and RS-5 temperature profiles were supplemented with bathythermograph lowerings. Transparency was measured with an ordinary Secchi disk 20 cm in diameter. Time is reported in Eastern Standard Time. Isopleths of surface temperature and salinity distributions were drawn and positioned using both station data and track measurements.

RESULTS

The greater part of this report contains the tabulation of hydrographic data. Table 1 lists values for vertical profiles for January; Table 2 lists values for July. Figures 2-4, 6-9, present the distribution of measured parameters for each cruise period: temperature, salinity, disc depth. Figures 5 and 9 give the distribution of density (σ_t) derived from calculations based on Knudsen's equation.

January.--Vertical patterns of temperature (Fig. 2) indicate that waters were largely isothermal. Differences from surface to bottom varied less than 1.6°C. Salinity distributions are also typically uniform both areally, Fig. 3, and vertically, Fig. 4. The freshening influence of Chesapeake Bay was limited to surface water in the vicinity of Cape Charles where values range from 26 - 30 ‰ salinity (Fig. 3). Varying position of isohalines with time (from January 22-25) at one place, within a zone 8 miles off shore, suggest displacement by the tide (Fig. 3). The distribution of density (σ_t) (Fig. 5), reflects the relatively broad gradients of temperature and salinity. In general, sigma t values increase slightly with distance offshore, from about 25.00 to 26.00, in agreement

with the slight increase of salinity. Sloping isocynals suggest a weak southerly drift but circulation, as well as structure of the water, were probably influenced most by fresh to strong northwest winds during the period.

July.--The patterns of measured parameters in July were a marked contrast to those of January. Bathythermograph sections exhibit a pronounced thermocline at the 40-60 foot depth (Fig. 6) with gradients reaching $5.76^{\circ}\text{C}/10$ feet, section 722. At about 15 miles offshore, the thermocline rises steeply toward shore and becomes less pronounced. Patterns of surface temperature (Fig. 7) partly reflect the thermal variations beneath the surface. Thus, a zone of relatively cool water ($< 22.5^{\circ}\text{C}$) parallels the shore between traverse 710 and 734 where isotherms shoal near the surface and where vertical gradients are relatively weak. Coolest surface water, 19.9°C , occurred just southeast of Cape Charles, and a low temperature of 21.4°C was measured in Wachapreague Inlet. These distributions suggest that cool water in the lower layer of the inner shelf may participate in tidal exchange of eastern shore bays and the lower Chesapeake Bay. Cool surface water paralleling shore may be related to mixing processes associated with dissipation of energy in the landward shoaling of the shelf profile. Surface salinity was characterized by broad horizontal gradients with freshened water (28.5 - 30.5 ‰) spread northeast of Cape Charles (Fig. 8). Accompanying vertical distributions (Fig. 9) were relatively uniform, except in traverse 710 where haline stratification was present. Variations of density generally parallel variations of temperature over most of the area. Vertical

sections (Fig. 10) delineate a fairly stable density pattern with isocynals sloping slightly upward toward shore. This trend suggests a northerly flow along the inner shelf. The northeasterly spread of freshened surface water from the Chesapeake entrance gives further evidence of a northerly flow. Evidently the forces producing a southerly transport in the area most of the time were relaxed and a new force was at work activating the northerly drift. Disc visibility decreases with distance toward shore from 66 feet (station 722-33) to 4 feet (station 734-22) off Wachapreague Inlet. This probably reflects the relatively high concentrations of suspended matter near shore including fine grained sediments stirred up by wave activity or discharged from tidal inlets.

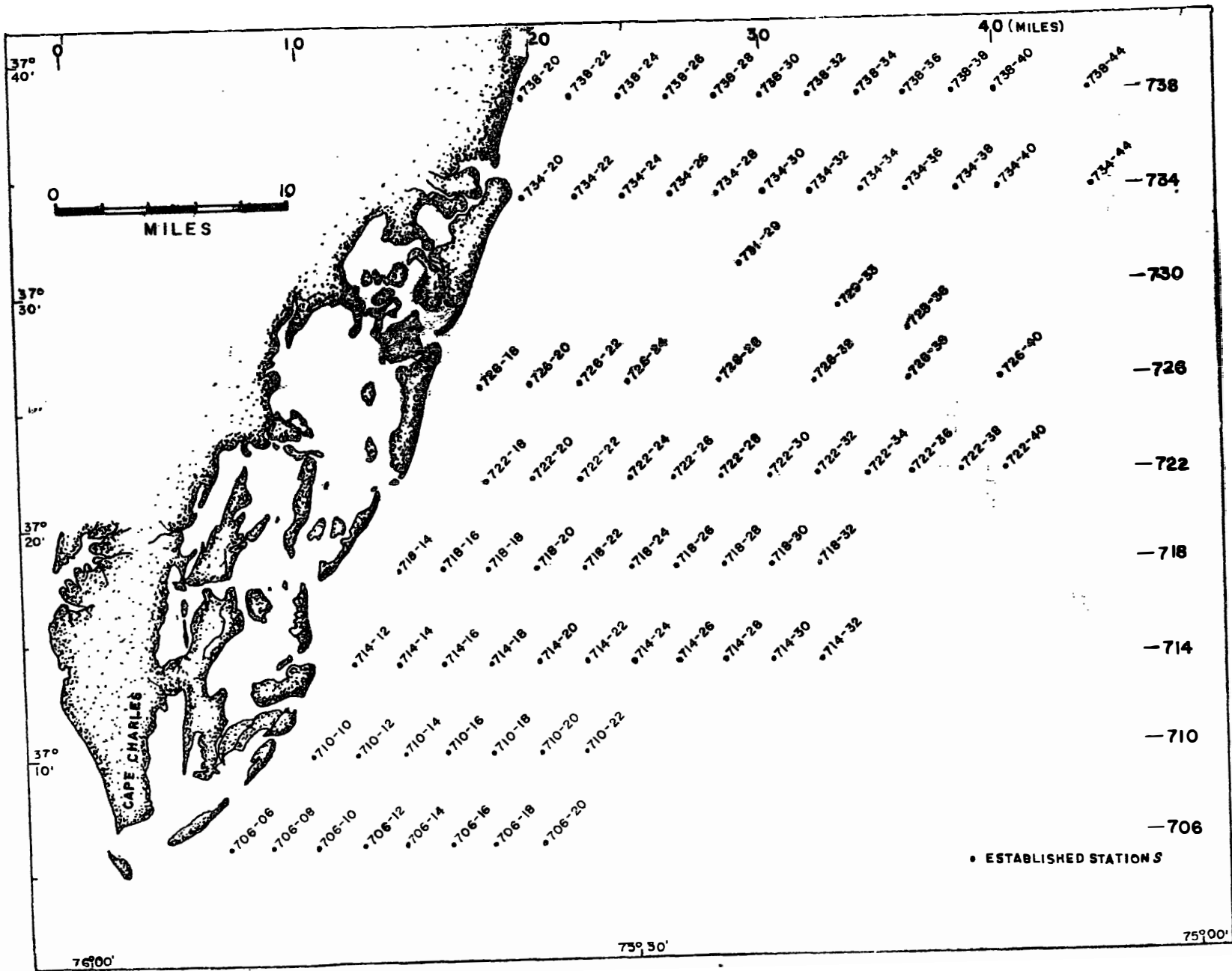


Fig. 2. Bathythermograph section, January 22-25, 1963.

Top, traverse 706

Middle, traverse 714

Bottom, traverse 718

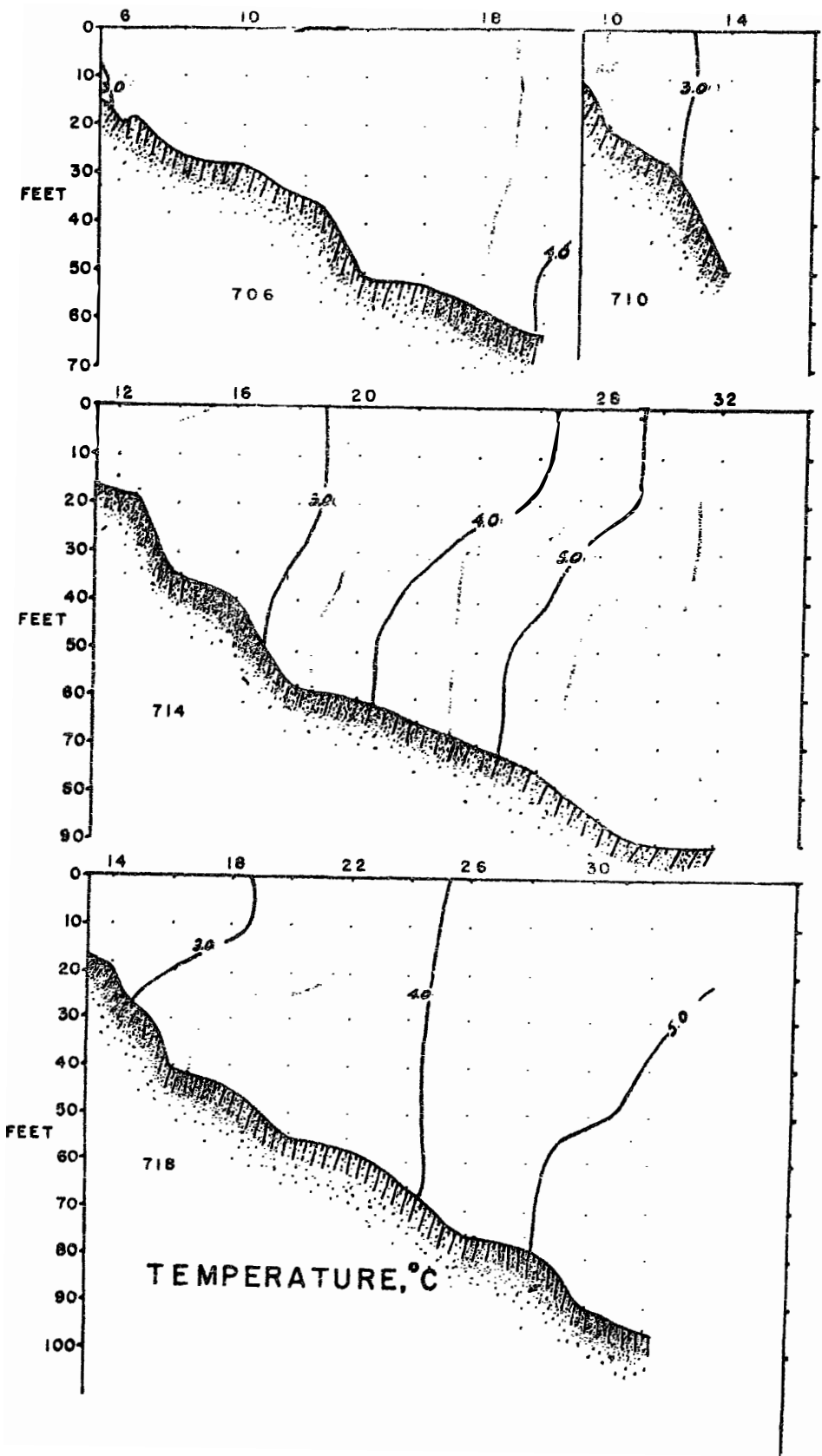


Fig. 3. Distribution of surface salinity.

Top, January 22, 1963

Middle, January 23, 1963

Bottom, January 25, 1963

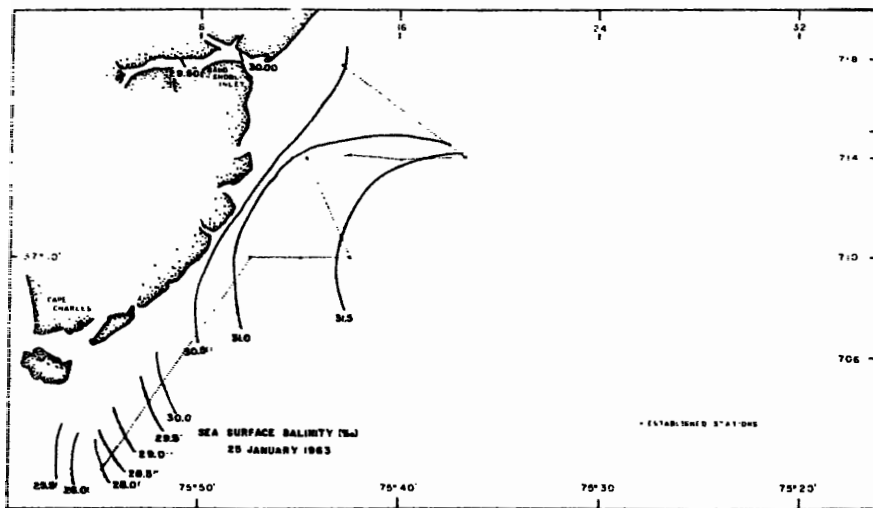
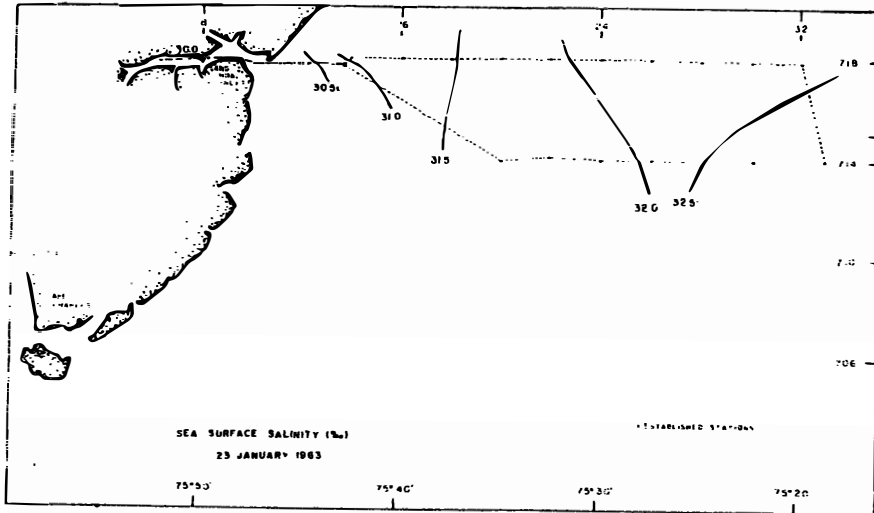
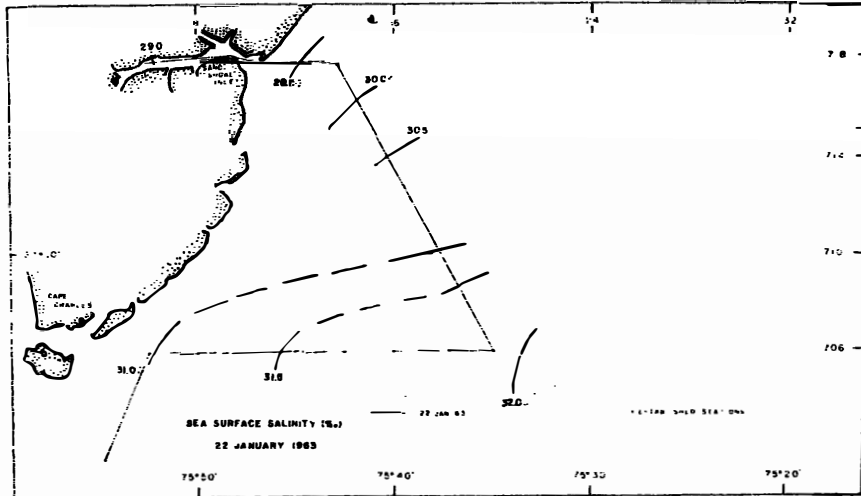


Fig. 4. Vertical distribution of salinity, January 22-25, 1963.

Top, traverse 706

Middle, traverse 714

Bottom, traverse 718

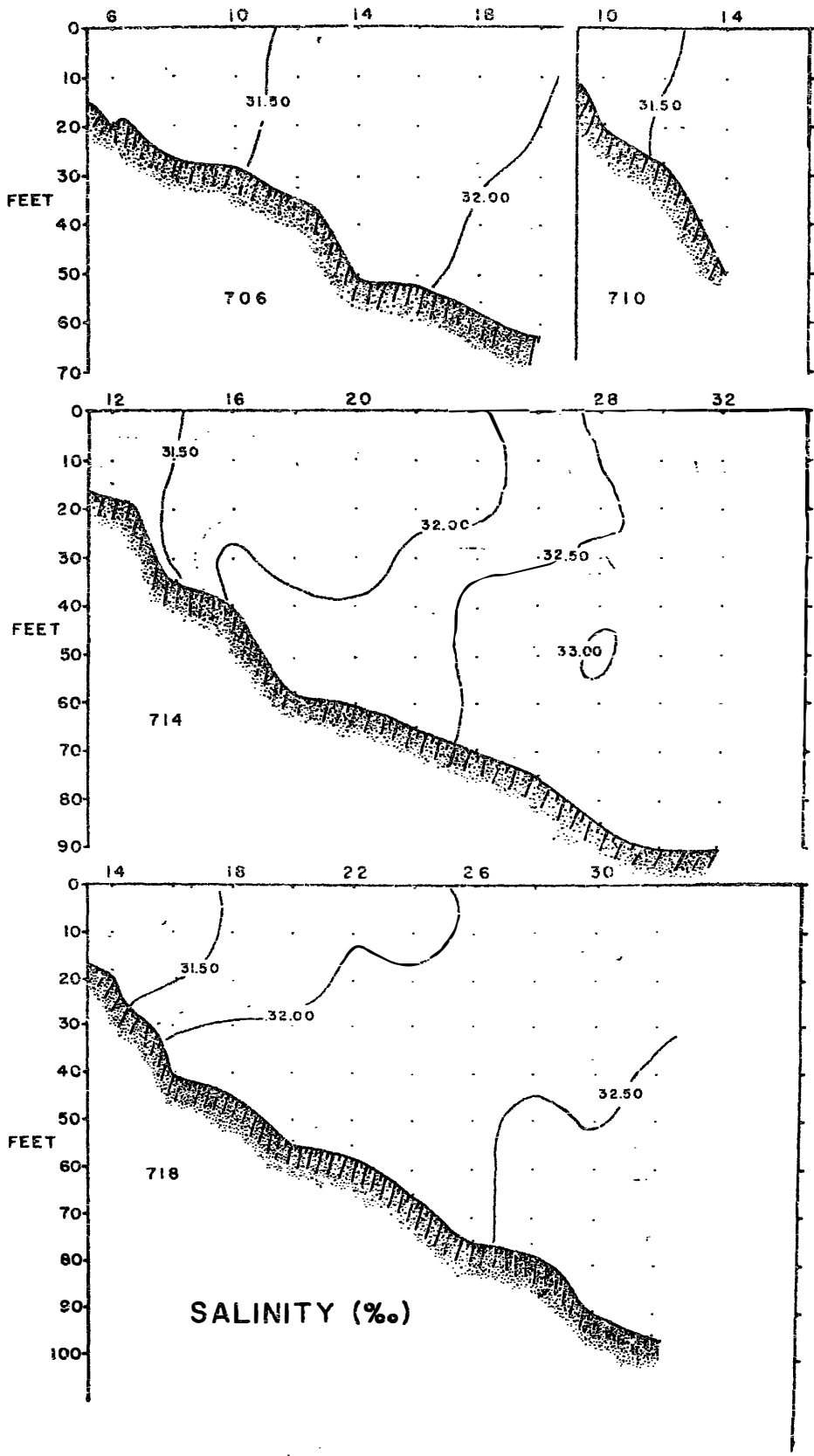
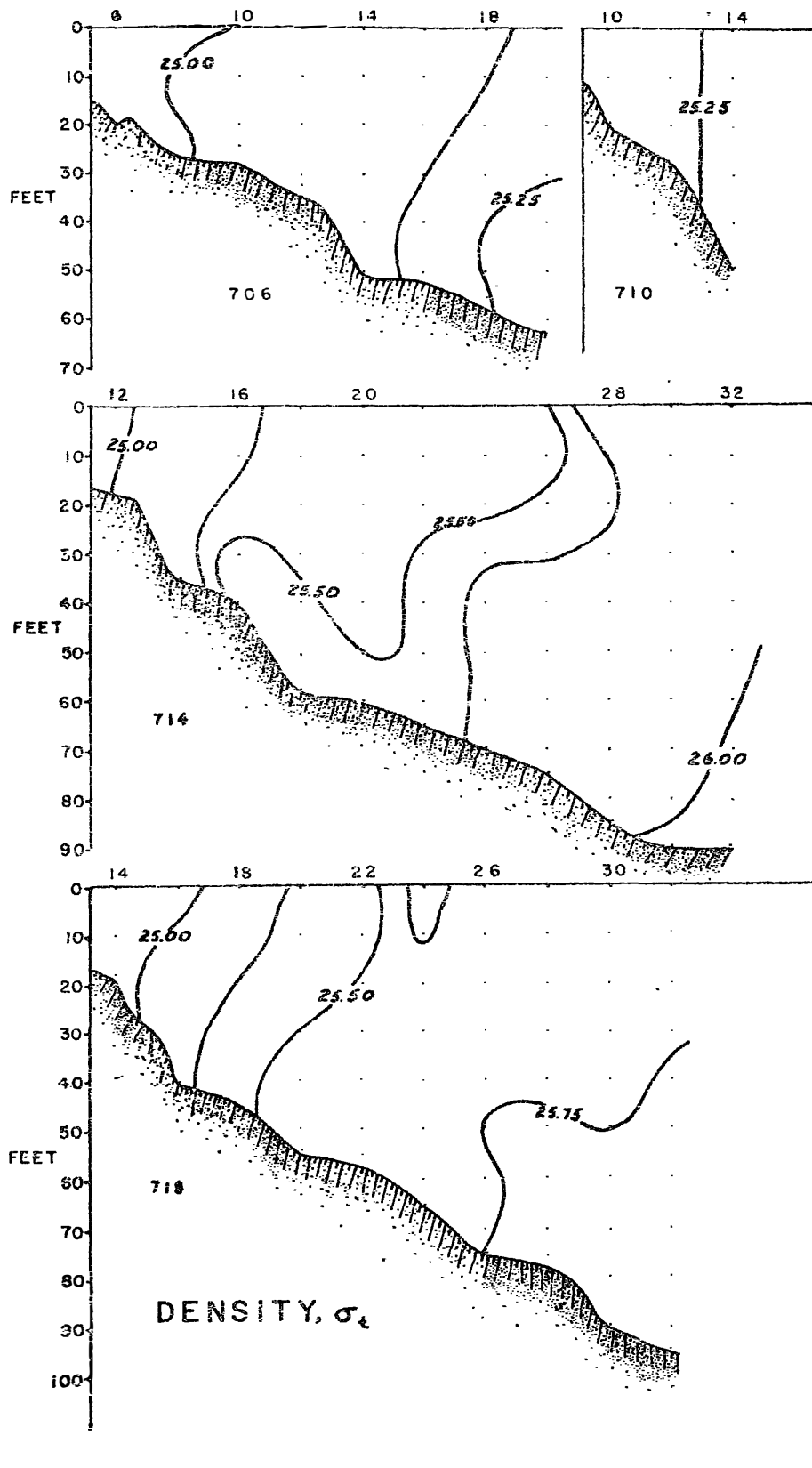


Fig. 5. Vertical distribution of density, January 22-25, 1963.

Top, traverse 706

Middle, traverse 714

Bottom, traverse 718



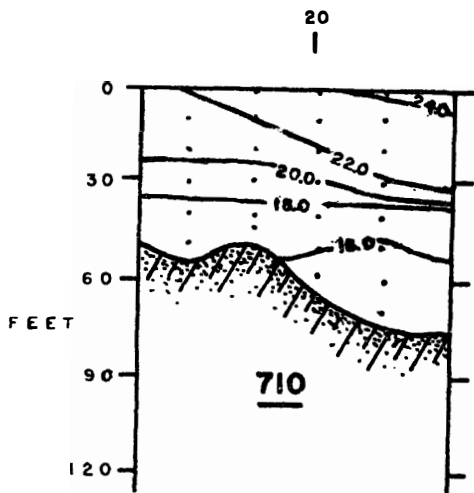
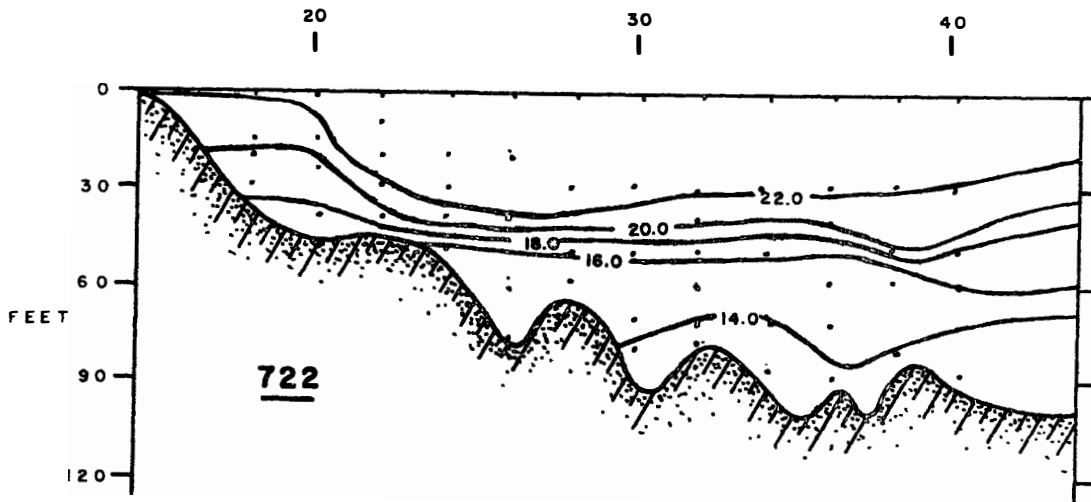
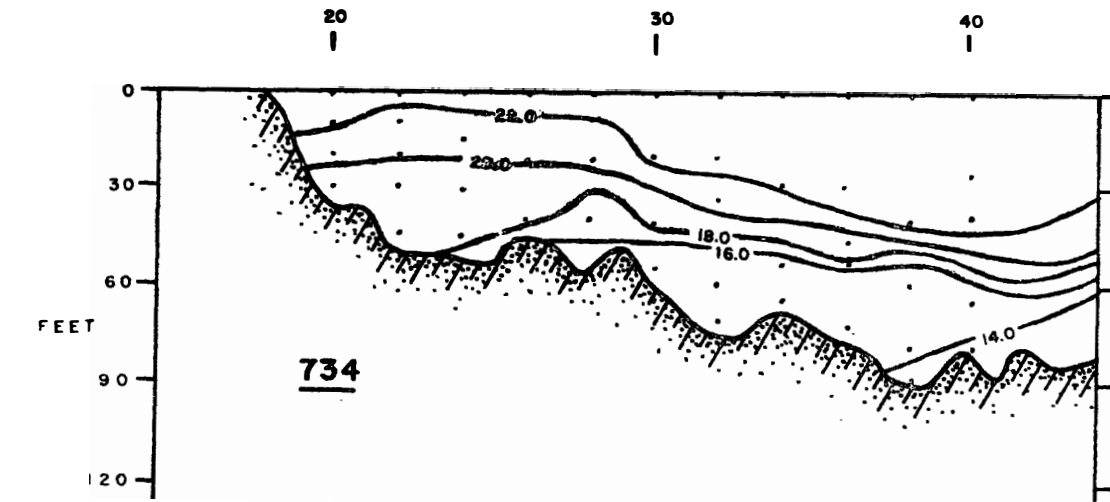


Fig. 6. Bathythermograph section, temperature $^{\circ}\text{C}$, traverse 734 (upper), traverse 722, (middle), traverse 710 (lower). July 15-18, 1963

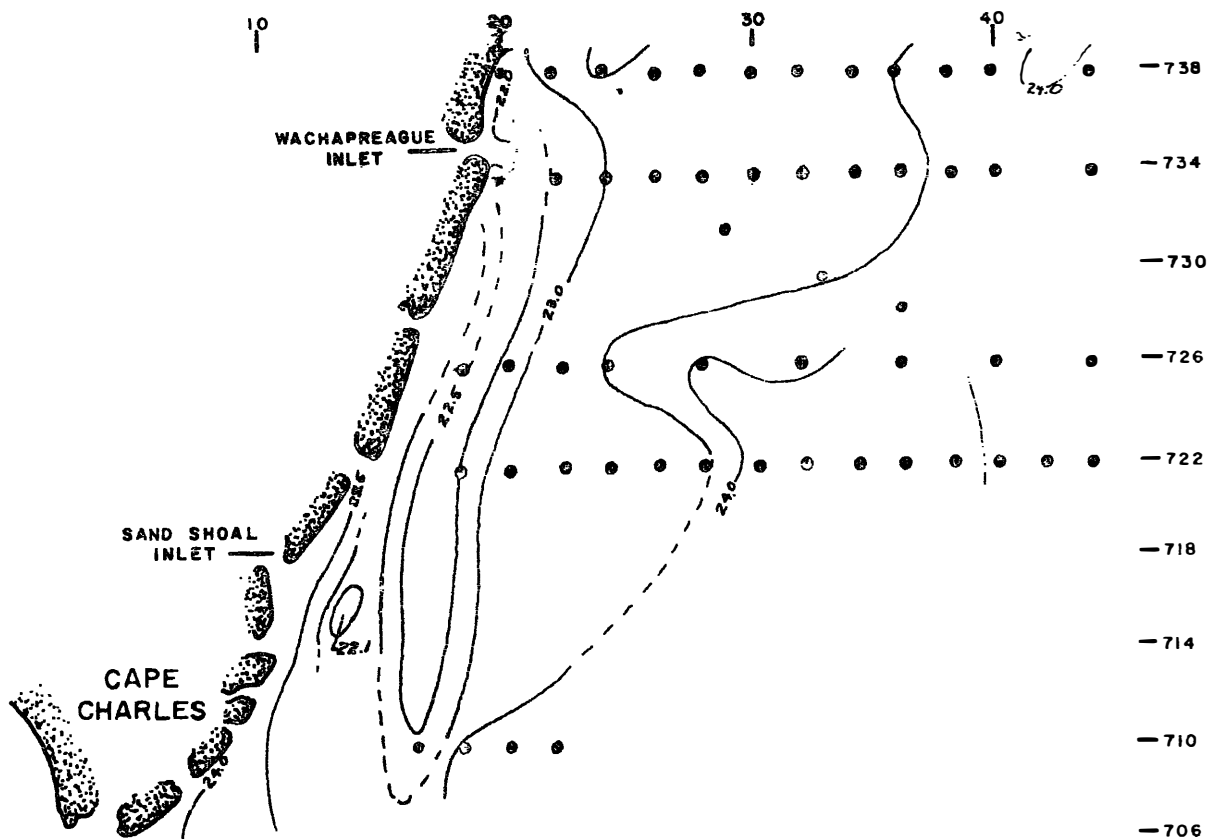


Fig. 7. Distribution of surface temperature, °C, July 15-18, 1963. From track measurements and station data. Inferred isotherms, dashed.

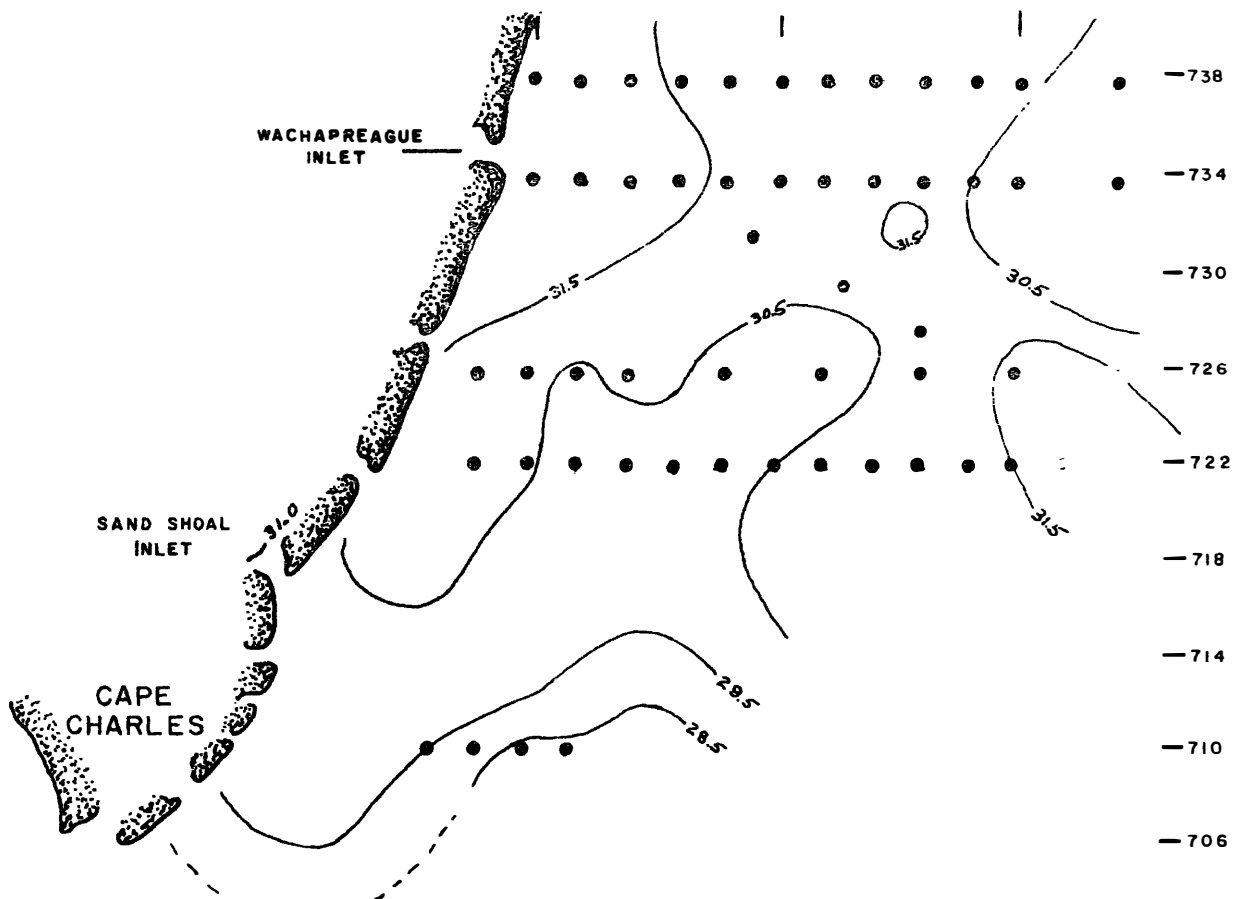


Fig. 8. Distribution of surface salinity, ‰, July 15-18, 1963. From track measurements and station data. Inferred isohalines, dashed.

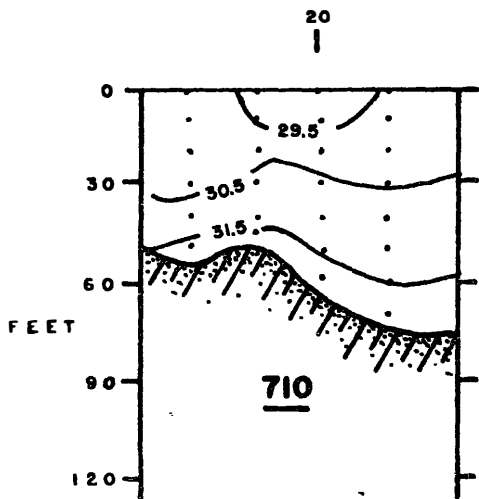
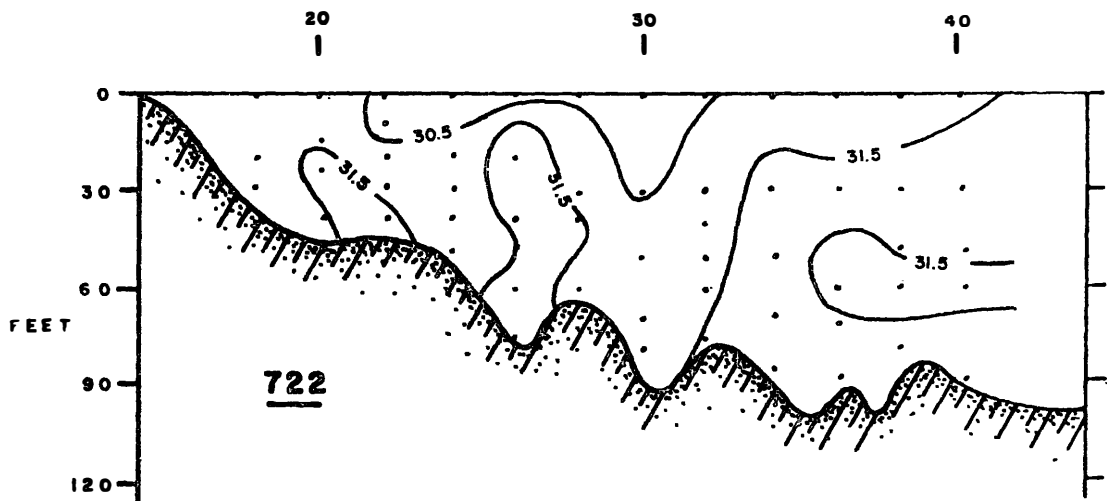
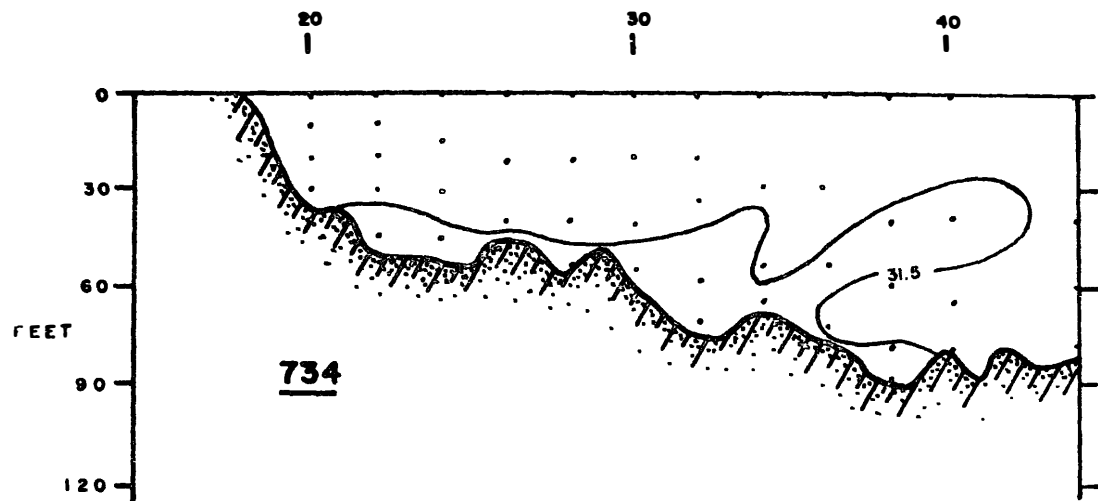


Fig. 9. Vertical distribution of salinity, o/oo, traverse 734 (upper), traverse 722 (middle), traverse 710 (lower), July 15-18, 1963.

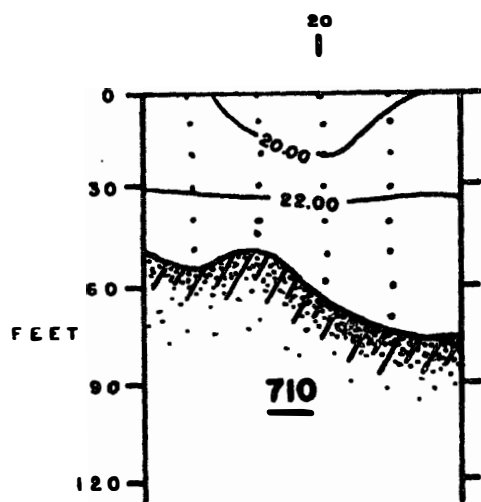
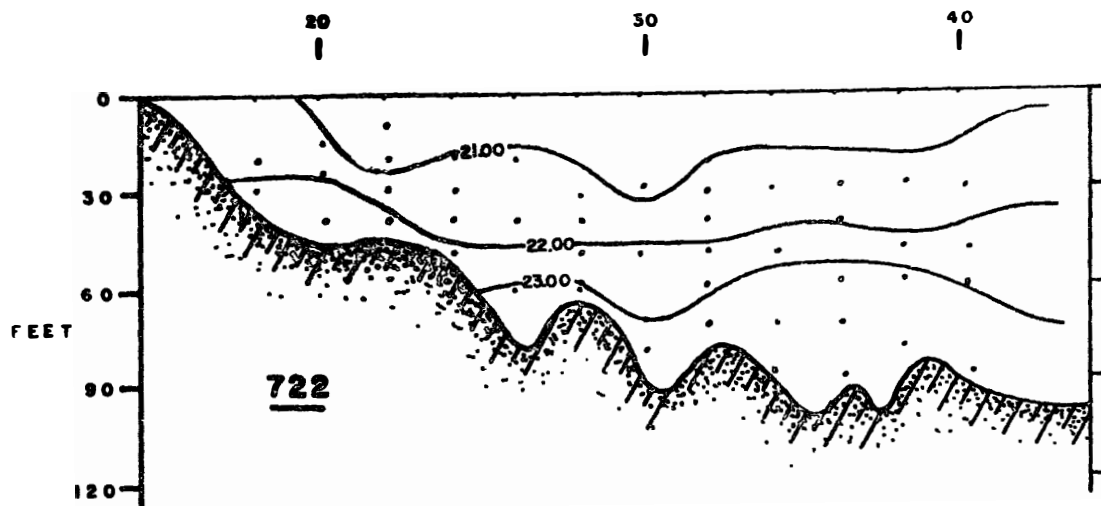
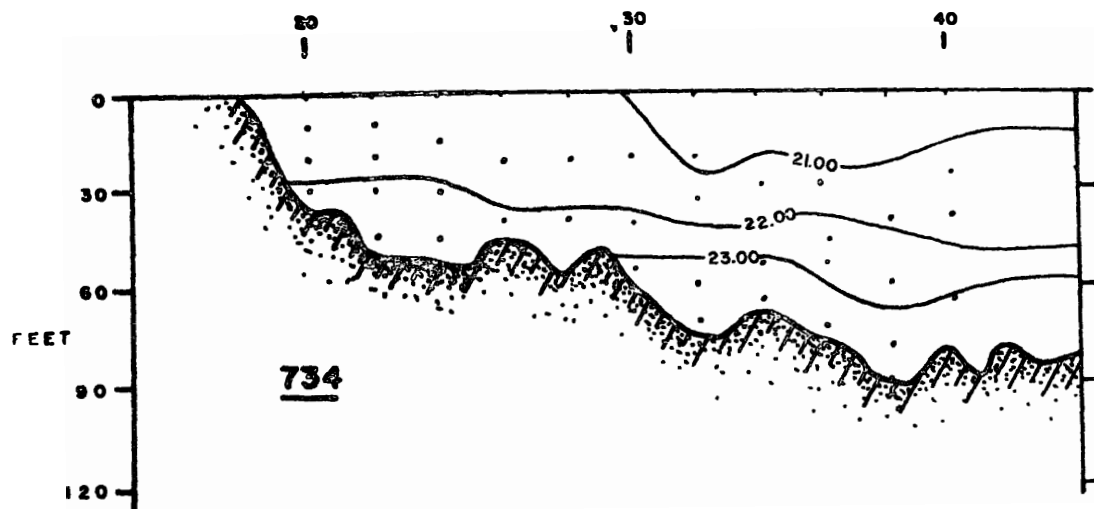


Fig. 10. Vertical distribution of density, σ_t , traverse 734 (upper), traverse 722 (middle), traverse 710 (lower), July 15-18, 1963.

TABLE I - DEPTH PROFILES

CRUISE OF JANUARY 22 - 25, 1963

	DEPTH (Feet)	TEMPERATURE (°C.)	SALINITY (‰)	DENSITY (σ _t)
706-06	0	3.16	31.11	24.79
22 Jan.	10	3.07	31.15	24.84
1242	17	3.04	31.20	24.88
706-08	0	3.19	31.27	24.92
22 Jan.	10	3.19	31.38	25.01
1328	20	3.16	31.35	24.99
706-10	0	3.26	31.37	25.00
22 Jan.	10	3.24	31.40	25.03
1339	20	3.24	31.43	25.06
	25	3.24	31.44	25.06
706-12	0	3.25	31.56	25.15
22 Jan.	10	3.25	31.62	25.20
1359	20	3.20	31.60	25.19
	30	3.18	31.60	25.19
	40	3.18	31.62	25.20
706-14	0	3.40	31.57	25.14
22 Jan.	10	3.36	31.60	25.16
1415	20	3.34	31.64	25.21
	30	3.30	31.65	25.22
	40	3.30	31.65	25.22
	50	3.30	31.65	25.22

Table I (cont'd)

	DEPTH (Feet)	TEMPERATURE (°C.)	SALINITY (‰)	DENSITY (σ _t)
706-16	0	3.37	31.61	25.18
22 Jan.	10	3.38	31.62	25.19
1430	20	3.38	31.62	25.19
	30	3.26	31.66	25.23
	40	3.38	31.10	24.78
	50	3.38	31.86	25.38
706-18	0	3.33	31.58	25.16
22 Jan.	10	3.32	31.68	25.24
1444	20	3.36	31.73	25.28
	30	3.37	31.99	25.49
	40	3.45	32.01	25.49
	50	3.46	32.02	25.50
	55	3.46	31.99	25.48
706-20	0	3.65	31.89	25.37
22 Jan.	10	3.65	31.98	25.44
1502	20	3.64	32.00	25.46
	30	3.64	32.00	25.46
	40	3.90	32.27	25.64
	50	4.06	32.15	25.55
	60	4.06	32.21	25.60
710-10	0	2.50	31.46	25.13
25 Jan.	10	2.50	31.43	25.10
1112	20	2.50	31.46	25.13
710-12	0	2.84	31.48	25.12
25 Jan.	10	2.84	31.49	25.13
1055	20	2.92	31.53	25.15
	28	2.94	31.51	25.13

Table I (cont'd)

	DEPTH (Feet)	TEMPERATURE (°C.)	SALINITY (‰)	DENSITY (σ_t)
710-14	0	3.22	31.82	25.36
25 Jan	10	3.28	31.81	25.34
1032	20	3.31	31.78	25.32
	30	3.36	31.78	25.32
	40	3.36	31.88	25.40
	50	3.36	31.85	25.37
714-12	0	2.28	31.23	24.96
25 Jan.	10	2.30	31.26	24.99
0955	15	2.32	31.29	25.01
714-14	0	2.63	31.48	25.13
25 Jan.	10	2.66	31.50	25.15
0935	20	2.67	31.53	25.17
	30	2.68	31.53	25.17
	35	2.68	31.47	25.12
714-16	0	2.55	31.59	25.23
25 Jan.	10	2.56	31.58	25.22
0916	20	2.64	31.68	25.29
	30	2.70	32.05	25.59
	40	2.71	32.05	25.59
714-18	0	2.69	31.79	25.38
25 Jan.	10	2.70	31.75	25.35
0851	20	2.76	31.75	25.35
	30	2.98	31.79	25.36
	40	3.34	32.06	25.54
	50	3.46	32.07	25.54
	58	3.46	32.07	25.54
714-20	0	3.58	31.79	25.30
23 Jan.	10	3.54	31.76	25.28
1327	20	3.54	31.80	25.31
	30	3.53	31.73	25.26
	40	3.69	32.01	25.47
	50	3.94	32.06	25.49
	60	3.98	32.14	25.54

Table I (cont'd)

	DEPTH (Feet)	TEMPERATURE (°C.)	SALINITY (‰)	DENSITY (σ _t)
714-22	0	3.55	31.80	25.38
23 Jan.	10	3.52	31.92	25.41
1308	20	3.52	31.94	25.42
	30	3.86	32.17	25.58
	40	4.12	32.22	25.59
	50	4.14	32.21	25.58
	60	4.14	32.31	25.66
	65	4.14	32.34	25.69
714-24	0	3.58	31.89	25.46
23 Jan.	10	3.58	31.97	25.45
1246	20	3.68	31.86	25.35
	30	4.56	32.44	25.72
	40	4.65	32.59	25.83
	50	4.74	32.52	25.77
	60	4.75	32.57	25.81
	70	4.75	32.54	25.78
714-26	0	3.88	32.07	25.50
23 Jan.	10	3.87	32.04	25.47
1227	20	4.16	32.18	25.56
	30	4.53	32.46	25.74
	40	4.95	32.58	25.80
	50	5.40	32.83	25.94
	60	5.44	32.85	25.95
	70	5.44	32.87	25.97
	75	5.44	32.88	25.98
714-28	0	4.65	32.55	25.80
23 Jan.	10	4.64	32.50	25.76
1206	20	4.65	32.45	25.72
	30	5.40	32.76	25.88
	40	5.53	32.90	25.98
	50	5.54	33.01	26.07
	60	5.73	32.69	25.79
	70	5.54	32.88	25.97
	80	5.55	32.88	25.97
	85	5.55	32.88	25.97

Table I (cont'd)

	DEPTH (Feet)	TEMPERATURE (°C.)	SALINITY (‰)	DENSITY (σ _t)
714-30	0	5.19	32.66	25.82
23 Jan.	10	5.19	32.66	25.82
1146	20	5.23	32.62	25.79
	30	5.40	32.69	25.83
	40	5.44	32.68	25.82
	50	5.52	32.80	25.90
	60	5.60	32.85	25.93
	70	5.62	32.86	25.94
	80	5.63	32.90	25.97
	90	5.64	32.98	26.03
714-32	0	5.69	32.94	25.99
23 Jan.	10	5.68	32.90	25.96
1112	20	5.68	32.88	25.95
	30	5.67	32.88	25.95
	40	5.66	32.91	25.97
	50	5.66	32.92	25.98
	60	5.66	32.94	25.99
	70	5.66	32.99	26.03
	80	5.66	32.99	26.03
	88	5.66	32.94	25.99
718-14	0	2.66	31.26	24.96
23 Jan.	10	2.64	31.25	24.95
0744	18	2.65	31.26	24.96
718-16	0	2.79	31.19	24.89
23 Jan.	10	2.80	31.43	25.08
0806	20	3.00	31.50	25.13
	30	3.32	-	-
	40	3.36	-	-
718-18	0	2.95	31.58	25.19
23 Jan.	10	2.95	31.58	25.19
0843	20	3.13	21.68	25.26
	30	3.68	32.04	25.49
	40	3.78	32.06	25.50

Table I (cont'd)

	DEPTH (Feet)	TEMPERATURE (°C.)	SALINITY (‰)	DENSITY (σ_t)
718-20	0	3.09	31.70	25.27
23 Jan.	10	3.09	31.70	25.27
0843	20	3.22	31.75	25.30
	30	3.82	32.06	25.50
	40	3.87	32.08	25.50
	50	3.88	32.12	25.54
	55	3.88	32.09	25.51
718-22	0	3.36	31.93	25.44
23 Jan.	10	3.37	31.96	25.46
0902	20	3.61	32.05	25.51
	30	3.79	32.04	25.48
	40	3.84	32.11	25.54
	50	3.86	32.18	25.58
	55	3.86	32.16	25.57
718-24	0	3.87	31.24	24.84
23 Jan.	10	3.86	31.14	24.76
0922	20	3.85	32.21	25.61
	30	3.85	32.19	25.59
	40	3.86	32.21	25.61
	50	3.86	32.18	25.58
	60	3.87	32.22	25.61
	65	3.87	32.22	25.61
718-26	0	4.14	32.32	25.67
23 Jan	10	4.15	32.29	25.65
0939	20	4.22	32.31	25.65
	30	4.24	32.33	25.67
	40	4.40	32.30	25.63
	50	4.40	32.46	25.75
	60	4.41	32.38	25.69
	70	4.43	32.41	25.71
	75	4.44	32.45	25.75

Table I (cont'd)

	DEPTH (Feet)	TEMPERATURE (°C.)	SALINITY (‰)	DENSITY (σ _t)
718-28	0	4.12	32.27	25.63
23 Jan.	10	4.11	32.16	25.55
1001	20	4.09	32.43	25.76
	30	4.15	32.27	25.63
	40	4.64	32.41	25.69
	50	4.89	32.59	25.81
	60	4.93	32.62	25.83
	70	4.94	32.58	25.80
	75	4.96	32.64	25.84
718-30	0	4.34	32.32	25.65
23 Jan.	10	4.34	32.22	25.57
1020	20	4.31	32.28	25.62
	30	4.30	32.25	25.60
	40	4.31	32.33	25.66
	50	4.73	32.49	25.74
	60	5.18	32.67	25.84
	70	5.28	32.65	25.81
	80	5.31	32.69	25.84
	87	5.32	32.78	25.91
718-32	0	4.62	32.44	25.71
23 Jan.	10	4.62	32.42	25.70
1039	20	4.60	32.47	25.74
	30	4.77	32.39	25.67
	40	5.17	32.61	25.79
	50	5.37	32.62	25.77
	60	5.36	32.75	25.89
	70	5.37	32.75	25.86
	80	5.38	32.80	25.91
	90	5.38	32.80	25.91
	95	5.38	32.80	25.91

TABLE 2 - DEPTH PROFILES
CRUISE OF JULY 15-17, 1963

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (‰)	DENSITY (σ_t)	DISK DEPTH (Feet)
710-16 15 July 1963 1330	S	23.00	29.94	20.16	22
	10	21.84	29.62	20.21	
	20	21.32	30.22	20.81	
	30	19.04	30.82	21.85	
	40	17.00	31.42	22.80	
	50	16.72	31.62	23.00	
710-18 15 July 1963 1415	S	23.08	28.78	19.23	25
	10	22.52	28.94	19.51	
	20	21.88	29.62	20.20	
	30	19.88	31.14	21.88	
	40	16.52	31.38	22.88	
	45	20.00	31.58	22.18	
710-20 15 July 1963 1434	S	23.40	28.14	18.67	25
	10	22.76	28.94	19.45	
	20	22.88	29.30	19.69	
	30	20.80	30.50	21.16	
	40	16.68	31.18	22.69	
	50	15.24	31.18	23.01	
	60	14.88	31.70	23.49	
710-22 15 July 1963 1500	S	24.48	29.26	19.20	30
	10	23.32	29.90	20.01	
	20	23.16	29.98	20.11	
	30	22.76	30.02	20.26	
	40	17.20	31.26	22.63	
	50	16.00	31.26	22.91	
	60	14.76	31.46	23.32	
	70	14.04	31.66	23.63	
722-18 16 July 1963 0810	S	22.10	31.41	21.50	13
	20	20.96	31.22	21.66	
	30	18.36	31.30	22.38	
722-20 16 July 1963 0830	S	22.96	30.91	20.88	24
	15	21.84	30.70	21.03	
	25	18.68	31.50	22.45	
	40	16.96	31.42	22.81	

TABLE 2 - DEPTH PROFILES (cont.)

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (°/oo)	DENSITY (σ_t)	DISK DEPTH (Feet)
722-22 16 July 1963 0852	S	22.20	30.30	20.63	31
	10	21.96	30.30	20.70	
	20	22.26	30.50	20.76	
	30	21.64	31.22	21.48	
	40	18.38	31.54	22.57	
722-24 16 July 1963 0911	S	22.72	30.18	20.40	35
	20	22.36	30.98	21.10	
	30	22.04	31.38	21.49	
	40	21.00	31.42	21.80	
	50	15.24	30.46	22.45	
722-26 16 July 1963 0930	S	22.73	30.18	20.39	36
	20	22.80	31.51	21.37	
	40	22.40	31.58	21.54	
	50	19.52	31.49	22.25	
	60	14.92	31.58	23.38	
	75	14.25	31.81	23.71	
722-28 16 July 1963 0954	S	23.65	30.41	20.30	35
	30	22.52	31.42	21.38	
	40	22.12	31.58	21.62	
	60	14.81	31.42	23.28	
722-30 16 July 1963 1014	S	24.05	30.22	20.05	37
	30	24.52	30.46	20.08	
	50	16.80	30.63	22.24	
	70	14.40	30.82	22.90	
	80	14.04	30.99	23.11	
722-32 16 July 1963 1044	S	23.76	30.94	20.67	36
	30	22.60	31.34	21.31	
	40	21.72	31.58	21.73	
	50	18.40	30.98	22.13	
	60	14.60	31.36	23.28	
	75	13.76	31.82	23.81	

TABLE 2 - DEPTH PROFILES (cont.)

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (‰)	DENSITY (σ_t)	DISK DEPTH (Feet)
722-34 16 July 1963 1145	S	24.20	30.94	20.54	40
	30	22.68	31.54	21.44	
	50	16.92	31.54	22.91	
	70	14.04	31.82	23.75	
	85	13.64	31.82	23.84	
722-36 16 July 1963 1204	S	24.40	31.26	20.73	35
	30	22.72	31.62	21.49	
	60	14.56	31.42	23.33	
	90	14.08	31.66	23.62	
722-38 16 July 1963 1230	S	29.96	31.46	19.12	66
	30	22.40	31.56	21.52	
	50	20.60	31.78	22.18	
	60	15.12	31.46	23.25	
	80	14.00	31.66	23.64	
722-40 16 July 1963 1352	S	24.12	31.50	20.99	65
	30	22.00	31.86	21.86	
	50	-- --	31.92	-- --	
	60	16.64	31.46	22.91	
	90	13.32	31.82	23.90	
726-18 17 July 1963 1300	0	22.28	31.46	21.49	---
	10	21.88	31.62	21.72	
	20	18.52	31.30	22.34	
726-20 17 July 1963 1227	S	23.64	30.94	20.71	---
	20	18.48	31.58	22.57	
	35	16.16	31.58	23.11	

TABLE 2 - DEPTH PROFILES (cont.)

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (‰)	DENSITY (σ_t)	DISK DEPTH (Feet)
726-22 17 July 1963 1215	S	23.80	30.26	20.15	---
	20	23.68	30.50	20.36	
	40	16.44	31.10	22.68	
	55	15.52	31.54	23.22	
726-24 17 July 1963 1143	S	23.68	30.14	20.09	---
	15	23.04	30.18	20.31	
	30	22.20	31.58	21.60	
	60	14.40	31.26	23.24	
726-28 17 July 1963 1105	S	24.48	29.86	19.65	---
	25	23.42	31.38	21.10	
	40	22.68	31.54	21.44	
	70	15.28	31.34	23.12	
726-32 18 July 1963 1025	S	24.24	30.14	19.93	---
	30	23.48	31.22	20.96	
	55	22.52	31.42	21.39	
	70	22.28	31.74	21.70	
	90	21.60	31.86	21.97	
726-36 18 July 1963 0940	S	24.44	30.94	20.47	---
	30	22.48	31.62	21.55	
	50	20.88	31.58	21.96	
	70	15.56	31.30	23.03	
	90	14.56	31.54	23.43	
726-40 18 July 1963	S	24.08	31.66	21.12	---
	30	22.44	32.06	21.89	
	50	21.88	32.06	22.05	
	70	21.60	32.06	22.12	
	90	21.60	32.06	22.12	

TABLE 2 - DEPTH PROFILES (cont.)

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (‰)	DENSITY (σ_t)	DISK DEPTH (Feet)
728-36 18 July 1963 0825	S	24.24	31.22	20.74	---
	30	21.92	31.94	21.95	
	55	15.80	30.66	22.49	
	75	14.80	31.62	23.44	
	95	14.32	31.70	23.60	
729-33 18 July 1963 0750	S	23.28	30.94	20.81	---
	30	22.80	31.98	21.73	
	50	20.64	32.54	22.75	
	75	13.68	31.74	23.76	
731-29 18 July 1963 0650	S	22.60	30.66	20.79	---
	30	22.48	31.42	21.40	
	50	16.32	31.38	22.92	
	65	15.28	31.74	23.43	
734-20 17 July 1963 0520	S	22.52	31.94	21.78	6
	10	22.16	31.82	21.79	
	20	21.20	31.42	21.75	
	30	19.52	31.38	22.16	
734-22 17 July 1963 0539	S	22.92	31.66	21.46	4
	10	21.64	31.54	21.73	
	20	20.60	31.42	21.91	
	30	18.80	31.46	22.39	
	45	17.92	31.62	22.73	
734-24 17 July 1963 0602	S	23.28	31.54	21.27	11
	15	21.52	31.10	21.41	
	30	18.92	31.38	22.30	
	45	18.16	31.50	22.59	

TABLE 2 - DEPTH PROFILES (cont.)

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (‰)	DENSITY (σ _t)	DISK DEPTH (Feet)
734-26 17 July 1963 0620	S	23.24	31.50	21.25	13
	20	21.68	31.14	21.41	
	40	18.68	31.34	22.33	
734-28 17 July 1963 0650	S	22.56	31.22	21.22	27
	20	21.68	31.06	21.34	
	40	16.44	31.42	22.93	
	55	15.36	31.74	23.41	
734-30 17 July 1963 0721	S	23.20	31.14	20.98	28
	20	22.20	31.18	21.29	
	40	18.20	31.46	22.55	
	55	15.68	31.58	23.22	
734-32 17 July 1963 0735	S	23.24	30.86	20.76	36
	20	23.00	30.96	20.91	
	35	21.80	31.26	21.47	
	60	15.28	31.58	23.31	
	70	14.76	31.82	23.60	
734-34 17 July 1963 0756	S	23.44	30.86	20.70	42
	30	22.84	31.50	21.36	
	55	15.28	31.46	23.21	
	65	14.68	31.78	23.59	
734-36 17 July 1963 0816	S	23.48	30.86	20.69	37
	30	23.12	31.38	21.18	
	50	19.12	31.62	22.45	
	75	14.20	31.42	23.41	

TABLE 2 - DEPTH PROFILES (cont.)

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (‰)	DENSITY (σ_t)	DISK DEPTH (Feet)
734-38 17 July 1963 0835	S	23.80	30.86	20.60	40
	40	22.80	31.74	21.55	
	60	14.96	31.14	23.04	
	80	14.16	31.62	23.57	
	90	13.80	31.82	23.81	
734-40 17 July 1963 0920	S	23.80	31.10	20.78	39
	40	22.84	31.90	21.66	
	65	14.92	31.18	23.08	
	80	13.96	31.42	23.46	
734-44 17 July 1963 0956	S	23.88	30.86	20.58	42
	40	20.40	31.34	21.90	
	60	13.76	31.30	23.40	
	80	13.12	31.46	23.66	
738-20 17 July 1963 1455	S	23.16	31.90	21.57	---
	10	22.44	31.70	21.62	
	20	20.40	31.54	22.05	
738-22 17 July 1963 1430	S	23.28	31.74	21.42	---
	20	20.32	31.38	21.95	
	40	19.16	31.58	22.41	
738-24 17 July 1963 1410	S	23.68	31.74	21.30	---
	20	20.44	31.22	21.80	
	40	18.72	31.54	22.48	
738-26 17 July 1963 1350	S	23.36	31.18	20.97	---
	20	21.60	31.10	21.39	
	40	18.20	31.38	22.48	

TABLE 2 - DEPTH PROFILES (cont.)

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (‰)	DENSITY (ϵ_t)	DISK DEPTH (Feet)
738-28	S	23.92	31.42	20.99	---
17 July 1963	20	22.48	30.82	20.94	
1330	30	19.68	31.42	22.14	
	40	18.20	31.54	22.61	
738-30	S	23.60	30.86	20.66	---
17 July 1963	20	22.44	30.82	20.95	
1308	35	18.44	31.34	22.39	
	45	16.88	31.42	22.83	
738-32	S	23.94	30.94	20.65	---
17 July 1963	30	21.76	31.30	21.51	
1250	40	18.68	31.34	22.33	
	55	16.12	31.42	23.00	
738-34	S	23.76	30.70	20.49	---
17 July 1963	40	19.12	31.16	22.17	
1237	60	16.00	31.42	23.03	
738-36	S	23.76	-- --	-- --	---
17 July 1963	40	22.20	31.70	21.69	
1220	60	15.48	31.14	22.93	
738-38	S	24.12	30.74	20.42	---
17 July 1963	40	23.00	31.18	21.07	
1154	60	15.44	31.14	22.94	
	80	13.96	31.34	23.39	
738-40	S	24.04	30.94	20.59	---
17 July 1963	40	22.88	31.58	21.41	
1132	60	15.08	31.58	23.35	
	80	13.52	31.62	23.70	

TABLE 2 - DEPTH PROFILES (Cont.)

	DEPTH (Feet)	TEMPERATURE (°C)	SALINITY (‰)	DENSITY (σ_t)	DISK DEPTH (Feet)
738-44	S	23.84	30.92	20.64	44
17 July 1963	40	20.40	31.54	22.05	
1055	65	14.88	31.58	23.40	
	80	12.72	31.54	23.80	