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Description of the 1995 Oceanographic Conditions on the Northeast Continental Shelf

by

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Abstract

A summary of hydrographic observations for 23 surveys on the northeast continental shelf during 1995 is presented. Distributions of station position, surface and bottom temperature, salinity, and temperature anomaly are portrayed. The average surface and bottom temperature and salinity have been calculated for each survey in five geographic regions over the northeast continental shelf: western Gulf of Maine (GOMW), eastern Gulf of Maine (GOME), Georges Bank (GB), northern Middle Atlantic Bight (MABN) and southern Middle Atlantic Bight (MABS).

Unlike temperature, salinity properties of the northeast shelf exhibit large interannual variability (Manning 1990). Areal average salinity calculations are included in this report because yearly changes may be an important hydrographic characteristic. The 1995 regional distributions show that nearly the entire northeast shelf region experienced warmer surface temperatures except for the eastern Gulf of Maine. Both regions of the Gulf of Maine show fresher surface and bottom salinity values than the expected conditions.

This report is the 5th in a series of yearly compilations of hydrographic data collected on NEFSC cruises (Holzwarth and Taylor 1992-1994, Taylor and Almgren 1996).

Introduction

The Northeast Fisheries Science Center (NEFSC) conducts several different surveys off the northeast continental shelf each

year. Complete coverage of the shelf (Cape Hatteras to the Gulf of Maine) occurs during the spring and fall bottom trawl surveys only. Station coverage on other cruises throughout the year varies. 1995 marked the first intensive sampling year of the U.S. GLOBEC northwest Atlantic field program. Included in this report are hydrographic distributions from the six GLOBEC Broad-Scale surveys of Georges Bank that provided good coverage from February through July. Further information on the U.S. GLOBEC field program may be obtained in the individual cruise reports available through the GLOBEC program office.

Temperature and salinity observations from 23 NEFSC surveys conducted during 1995 are summarized and presented in this report. Cruise operation summaries are presented for all cruises. Distribution plots of surface and bottom temperature, salinity, and temperature anomaly are contoured where sufficient data are available. Areal average temperature and salinity and the corresponding anomalies are also presented for the five different regions on the shelf. The data are presented chronologically in atlas form. No attempt has been made here to analyze the data or discuss in detail individual observations from the cruises.

Data and Methods:

Temperature and salinity measurements were obtained with a Seabird SBE 19 conductivity, temperature and pressure recording profiling instrument (Profiler). This instrument measures the pressure, temperature and conductivity of the water twice per

second. Two different methods of deployment were used depending upon the type of work conducted at a station. Whenever a plankton haul was done, the Profiler was placed above the bongo nets, and a double oblique tow was made. If no plankton haul was done, the Profiler was deployed vertically down and up through the water column. Salinity samples are taken from the bottom of a vertical profile cast in order to calibrate the conductivity data. These samples are analyzed on shore with a Guildline Autosal salinometer.

All raw Profiler data were processed using the Seabird manufactured software: DATCNV, ALIGNCTD, BINAVG, DERIVE, and ASCIIOUT to produce 1 decibar averaged ascii files. The data were edited, cleaned, and converted to a standard 80-column ASCII formatted cruise file and are archived in the NEFSC anonymous FTP account (whsun2:/ftp/pub/hydro).

Station distributions and horizontal contour plots of the surface and bottom temperature, salinity, and temperature anomaly were prepared for each survey. Areal average temperatures and salinities were calculated for the five regions of the northeast continental shelf shown in Figure 1: western and eastern Gulf of Maine, Georges Bank, and the northern and southern Middle Atlantic Bight. The areal averaging was done using the method described in Holzwarth and Mountain (1990). The areal averages and anomalies were plotted against the mid-date (calendar day) of all observations within a region for each cruise.

Results

The NEFSC cruises for which data are presented in this report are listed in Table 1. A summary of each cruise is listed in Appendix A and includes information on the type of cruise, its objectives, dates, the number of hydrographic stations, type(s) of instruments used, salinity calibration value, and notes pertaining to instrument performance.

Table 2 lists the surface and bottom areal average temperatures and temperature anomalies that were calculated for each of the five regions. Table 3 lists the surface and bottom areal average salinity and salinity anomalies for the same five regions. For most cruises, the areal averages and anomalies could not be calculated for all regions due to limited station coverage. For several such cases a simple average (not an areal weighted mean) was determined for the observations in the region; these values are indicated in tables 2 and 3 by an asterisk. The standard deviations are also listed. SDV1 indicates how well the calculated anomaly represents the true regional average anomaly. SDV2 is an indicator of how closely the areal average matches the anomaly at any particular location within that region (see Holzwarth and Mountain, 1990 for explanation of SDV1 and SDV2).

Figures 2 through 5 present the time series of surface and bottom average temperature/salinity and temperature/salinity anomaly for each region. Station positions and distributions of surface and bottom temperature, salinity, and temperature anomaly for the different cruises are presented in Figures 6 through 99.

Contour figures were not prepared for the marine mammal cruises AJ9501, PE9501, and PE9502 because the there were not enough hydrographic stations occupied and/or the distribution of stations were too scattered for accurate contours to be generated. Temperature anomaly distributions were not produced for *R/V Relentless* 9501 because the distance to standard MARMAP stations was too great for a reliable comparison to be made. Temperature and salinity distribution figures were not preprared for the three GLOBEC Process cruises: SJ9503, SJ9505, and SJ9507. A bongo/Seabird survey was conducted only during the first 2 - 3 days of these cruises to identify a patch of larval cod and haddock in which more intensive sampling would later occur using a variety of sampling systems. Results from these surveys are described in the individual GLOBEC cruise reports.

Discussion

The areal average temperature distributions for each defined region show a fairly typical yearly pattern. With the exception of the eastern Gulf of Maine and Georges Bank, the temperature anomaly distributions show a trend of warmer surface and bottom temperatures during 1995 compared to the 1978-1987 MARMAP reference period. An intrusion of relatively cold and fresh water (salinity < 32.0 psu) occurred in the eastern portion of Georges Bank in March and persisted in varying degree through June. The regional temperature and salinity anomaly distributions for the Georges Bank region do not clearly show this event because of the averaging of

data from the entire Bank region. Small scale events may be obscured by the regional averaging done in this report.

The salinity anomaly distributions show that both the eastern and western portion of the Gulf of Maine were fresher than the MARMAP reference period for nearly all observations throughout the year. The areal average bottom temperature and salinity values from cruises KAT9502, SJ9507 and ALB9505 (calendar days 131, 132, and 133) were warmer (>1.4°C) and saltier (> 0.10 psu) than the MARMAP reference. This is believed to have been caused by a warm core ring located south of Georges Bank that resulted in the on-Bank movement of the shelf-slope front farther onto the Bank than its expected location.

References

Holzwarth, T.J. and D. Mountain. 1990. Surface and bottom temperature distributions from the Northeast Fisheries Center spring and fall bottom trawl survey program, 1963-1987. Woods Hole, MA: Northeast Fisheries Center. Reference Document 90-03. Available from: Information Services Section, NMFS/Northeast Fisheries Science Center, Woods Hole, MA; 02543

Holzwarth-Davis, T.J. and M. H. Taylor. 1992. Description of the 1991 oceanographic conditions on the northeast continental shelf. Woods Hole, MA: Northeast Fisheries Science Center. Reference Document 92-08. Available from: Information Services Section, NMFS/Northeast Fisheries Science Center, Woods Hole, MA; 02543

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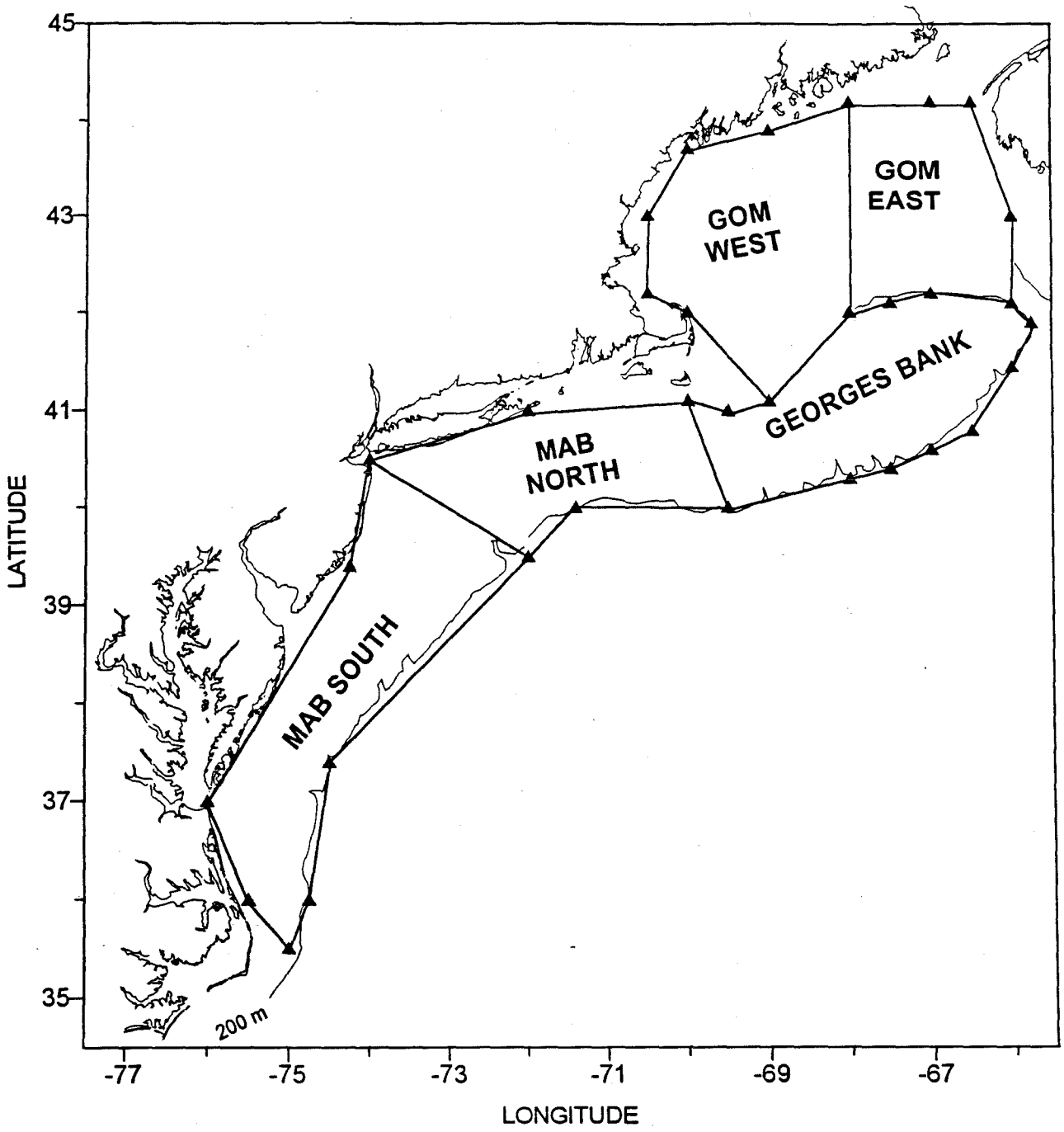

Figure 1. The regions of the northeast continental shelf covered by the Northeast Fisheries Science Center cruises during 1995

Table 1. Summary of 1995 Cruises

Cruise	Program	Dates	Region[1]
ALB9502	Gear Comparison	24 January - 2 February	MAB,GB
END9561	GLOBEC Broad Scale Survey #1	10 - 20 February	GB
ALB9503	Winter Btm Trawl Survey I-II	8 February - 2 March	MAB,GB
REL9501	Spring Harbor Porpoise Survey	11 - 28 March	MAB
END9563	GLOBEC Broad Scale Survey #2	13 - 23 March	GB
SJ9503	GLOBEC Process #1	15 - 17 March	GB
ALB9504	Spring Bottom Trawl Survey I-IV	7 March - 26 April	NE Shelf
SJ9505	GLOBEC Process #2	8 - 12 April	GB
END9565	GLOBEC Broad Scale Survey #3	11 - 23 April	GB
KAT9502	Predator/Prey Study legs 1-3	26 April - 28 May	GB
ALB9505	GLOBEC Broad Scale Survey #4	9 - 18 May	GB
SJ9507	GLOBEC Process #3	10 - 14 May	GB
ALB9506	GLOBEC Broad Scale Survey #5	6 - 15 June	GB
KAT9504	Pelagic Predator/Prey Study	20 - 25 June	GB
ALB9507	Sea Scallop Survey I-II	19-30 June, 25 July-Aug 5	MAB,GB
ALB9508	GLOBEC Broad Scale Survey #6	10 - 20 July	GB
PE9501	Marine Mammal Abundance Survey	10 July - 2 August	MAB
AJ9501	Summer Marine Mammal Survey I	11 July - 1 August	MAB
KAT9505	Demersal Predator/Prey Study	17 - 28 July	GB
AJ9502	Marine Mammal Survey II	8 August - 4 September	GOM
PE9502	Marine Mammal Survey II	9 August - 4 September	GB
ALB9510	Gulf of Maine Bottom Trawl	15 - 25 August	GOM
ALB9512	Fall Bottom Trawl Survey I-IV	6 September-24 October	NE Shelf

[1] Regional abbreviations

GB = Georges Bank
GOM = Gulf of Maine
MAB = Middle Atlantic Bight
NE Shelf = Northeastern Continental Shelf

Table 2. Areal average surface and bottom temperatures and temperature anomalies for the NEFSC 1995 cruises in the five regions of the northeast continental shelf as shown in Figure 1[1].

CRUISE	CD	SURFACE #Obs	Temp	Anomaly	SDV1	SDV2		BOTTOM #Obs	Temp	Anomaly	SDV1	SDV2
Gulf of Maine West												
al9504.dat	111	18	5.46	.26	.23	.76		17	5.83	.79	.20	.60
al9510.dat	233	25	17.07	1.64	.26	1.64	*	25	7.20	.44	.21	.88*
aj9502.dat	234	11	14.23	.22	.36	1.26	*	10	9.13	1.39	.35	1.37*
al9512.dat	288	40	13.25	.60	.20	.67		40	7.85	.58	.16	1.09
Gulf of Maine East												
en9561.dat	46	4	4.45	-.13	.46	.80	*	3	5.07	.33	.49	1.24*
en9563.dat	77	6	5.13	1.05	.41	.87	*	4	5.28	.75	.42	.46*
al9504.dat	106	16	4.25	-.44	.33	1.38		15	6.59	.75	.30	.79
en9565.dat	107	2	4.20	-.65	.76	.65	*					
al9505.dat	133	4	5.97	-.82	.48	.65	*	3	6.20	-.52	.49	.43*
kt9504.dat	173	3	11.50	.70	.59	1.52	*	3	8.43	-1.04	.54	1.07*
al9508.dat	196	3	14.17	1.77	.56	.53	*	2	7.10	-2.83	.55	1.05*
kt9505.dat	204	11	15.37	2.30	.26	1.09	*	11	8.25	-1.68	.24	1.67*
al9510.dat	233	5	15.72	1.40	.42	1.57	*	5	8.96	1.27	.38	1.03*
aj9502.dat	236	10	11.50	-.61	.37	1.65	*	10	8.91	.01	.35	1.41*
al9512.dat	282	18	13.66	1.08	.29	.98		15	9.31	-.28	.26	2.12
Georges Bank												
al9502.dat	25	4	7.70	1.78	.71	.61	*	4	7.72	1.45	.62	.28*
en9561.dat	46	28	5.58	.58	.27	.71		26	5.97	.41	.31	.88
al9503.dat	57	20	5.20	.59	.26	.56		17	5.26	.50	.23	.54*
sj9503.dat	75	19	4.77	.45	.22	.27	*	19	4.78	.20	.23	.58*
en9563.dat	77	46	5.03	.68	.25	.67		45	5.47	.71	.28	.96
al9504.dat	102	26	5.33	.29	.23	1.27		22	6.29	1.07	.27	1.57
sj9505.dat	100	70	4.87	.03	.13	.63	*	70	5.12	-.13	.16	.87*
en9565.dat	107	62	5.33	.19	.25	.52		61	5.56	.32	.26	.75
kt9502.dat	131	118	8.24	.54	.14	2.46	*	89	7.94	1.41	.14	2.49*
sj9507.dat	132	97	7.21	-.02	.11	1.53	*	96	9.15	2.58	.15	2.62*
al9505.dat	133	52	6.91	-.07	.26	.79		51	8.03	1.61	.29	2.20
al9506.dat	162	31	9.66	-.18	.28	.97		30	8.15	.08	.32	1.50
kt9504.dat	173	52	10.48	-.39	.13	1.08	*	52	9.01	-.38	.14	.95*
al9508.dat	196	30	14.18	.41	.28	1.83		29	10.01	-.09	.32	1.56
kt9505.dat	204	85	14.22	.79	.10	1.28	*	85	10.15	-.62	.11	1.11*
al9507.dat	212	37	15.96	.75	.21	2.30		36	11.05	.30	.24	1.77
pe9502.dat	234	21	18.33	2.04	.29	2.89		17	12.55	1.20	.33	1.81
al9512.dat	281	33	17.27	2.16	.25	1.73		30	15.00	2.21	.27	2.63
MAB North												
al9502.dat	30	26	7.15	1.27	.29	.49	*	22	7.20	1.23	.33	1.24*
al9503.dat	43	21	6.01	1.00	.43	1.29		19	5.96	1.06	.39	1.62*
re9501.dat	77	3	4.50	1.37	.87	.52	*	3	4.43	1.43	.99	.13*
al9504.dat	93	23	6.10	1.40	.37	1.01		21	6.81	1.11	.45	1.24
al9507.dat	186	25	18.61	.64	.29	2.84	*	25	8.29	.67	.31	1.82*
pe9501.dat	192	7	22.81	1.51	.77	1.75	*	3	7.83	-.59	1.05	.52*
al9512.dat	263	44	19.71	1.78	.31	.99		41	14.69	2.29	.36	2.42

Table 2 (cont.)

			MAB South								
al9503.dat	43	29	7.80	1.81	.34	2.42	27	7.85	2.03	.36	1.46
al9504.dat	77	34	7.87	2.00	.33	1.43	30	7.43	1.79	.40	1.38
re9501.dat	78	16	8.78	2.71	.49	2.95	12	8.28	2.00	.62	1.86*
al9507.dat	175	43	19.23	-.40	.27	.84 *	41	7.89	.46	.34	1.21*
pe9501.dat	204	8	23.04	.38	.79	1.73 *	3	6.80	-.87	1.38	.81*
al9512.dat	258	71	22.83	.84	.29	.71	68	17.10	2.46	.33	2.36

[1] "Cruise", the code name for a cruise: "CD", the calendar mid-date of all the stations within a region for a cruise: "#obs", the number of observations included in each average: "Temp", the areal average temperature: "Anomaly", the areal average temperature anomaly: "SDV1", the standard deviation associated with the average temperature anomaly: "SDV2", the standard deviation of the individual anomalies from which the average anomaly was derived.

* A true areal average could not be calculated due to poor station coverage. The average values listed were derived from a simple average of the observations within the region.

Table 3. Areal average surface and bottom salinities and salinity anomalies for the NEFSC 1995 cruises in the five regions of the northeast continental shelf as shown in Figure 1[1].

CRUISE	CD	SURFACE #Obs	Salt	Anomaly	SDV1	SDV2		BOTTOM #Obs	Salt	Anomaly	SDV1	SDV2
Gulf of Maine West												
al9504.dat	111	18	32.22	-.21	.11	.41		18	33.24	-.17	.08	.25
al9510.dat	233	25	31.67	-.31	.10	.42	*	25	32.58	-.56	.07	.37*
aj9502.dat	234	11	32.00	-.06	.14	.29	*	11	32.47	-.65	.08	.50*
al9512.dat	288	40	32.43	-.07	.08	.27		40	33.46	-.15	.06	.31
Gulf of Maine East												
en9561.dat	46	4	32.55	-.33	.18	.35	*	4	33.29	-.23	.12	.29*
en9563.dat	77	6	32.95	.09	.16	.41	*	6	33.51	-.22	.09	.36*
al9504.dat	106	16	32.06	-.43	.17	.55		16	33.79	-.12	.13	.33
en9565.dat	107	2	32.24	-.49	.30	.09	*	2	34.24	.16	.14	.11*
al9505.dat	133	4	32.38	-.39	.18	.38	*	4	33.36	-.12	.12	.20*
kt9504.dat	173	3	32.16	-.46	.24	.30	*	3	33.28	-.10	.21	.52*
al9508.dat	196	3	32.05	-.49	.22	.04	*	3	33.62	.07	.12	.16*
kt9505.dat	204	11	32.05	-.54	.10	.16	*	11	32.99	-.14	.09	.35*
al9510.dat	233	5	32.09	-.50	.20	.24	*	5	33.83	-.53	.11	.30*
aj9502.dat	236	10	32.30	-.12	.21	.34	*	10	32.91	-.45	.19	.68*
al9512.dat	282	17	32.54	-.03	.12	.32	*	17	34.11	-.02	.07	.57*
Georges Bank												
al9502.dat	25	4	33.11	.12	.21	.19	*	4	33.15	.05	.15	.07*
en9561.dat	46	28	33.09	.17	.09	.33		26	33.23	.12	.10	.35
al9503.dat	57	20	33.08	.17	.10	.31		17	33.10	-.01	.08	.32*
sj9503.dat	75	19	32.68	-.25	.08	.17	*	19	32.74	-.29	.07	.18*
en9563.dat	77	46	32.88	-.04	.08	.28		45	33.08	-.02	.09	.31
al9504.dat	102	26	32.87	-.05	.10	.48		22	33.30	.14	.10	.55
sj9505.dat	100	70	32.73	-.14	.05	.26	*	70	32.95	-.18	.05	.32*
en9565.dat	107	62	32.70	-.18	.08	.31		61	32.99	-.12	.09	.33
kt9502.dat	131	118	33.00	.10	.05	1.00	*	89	33.19	.10	.05	.84*
sj9507.dat	132	97	32.94	.13	.04	.52	*	96	33.81	.61	.05	.76*
al9505.dat	133	52	32.78	-.05	.09	.26		51	33.32	.27	.10	.60
al9506.dat	162	31	32.51	-.24	.09	.24		30	32.91	-.15	.11	.64
kt9504.dat	173	44	32.47	-.25	.05	.20	*	44	32.70	-.19	.05	.26*
al9508.dat	196	30	32.44	-.24	.10	.34		29	32.84	-.12	.11	.61
kt9505.dat	204	85	32.37	-.31	.04	.20	*	85	32.68	-.18	.03	.22*
al9507.dat	212	37	32.35	-.33	.08	.23		36	32.90	-.08	.09	.54
pe9502.dat	234	21	33.26	.48	.11	1.07		17	33.25	.14	.12	.72
al9512.dat	281	33	33.40	.65	.09	.74		30	33.48	.55	.09	.54
MAB North												
al9502.dat	30	26	33.14	.17	.13	.17	*	22	33.17	-.16	.12	.48*
al9503.dat	43	21	33.27	.19	.19	.55		19	33.39	.14	.13	.51*
re9501.dat	77	3	32.24	-.13	.39	.47	*	3	32.39	-.14	.37	.51*
al9504.dat	93	23	33.03	.17	.18	.36		21	33.49	.04	.15	.44
al9507.dat	186	25	32.12	.08	.14	.51	*	25	32.68	-.28	.11	.23*
pe9501.dat	192	7	32.80	-.39	.34	1.19	*	3	33.05	-.98	.31	.64*
al9512.dat	263	44	33.46	.78	.14	.77		41	33.43	.14	.13	.83

Table 3 (cont.)

MAB South

al9503.dat	43	29	33.93	.31	.19	.76		27	34.02	.37	.13	.49
al9504.dat	77	34	33.54	.45	.20	.71		30	33.62	.22	.16	.53
re9501.dat	78	16	33.29	.15	.26	1.84		12	33.62	.23	.24	.65*
al9507.dat	175	43	32.35	.31	.13	.41	*	41	33.37	-.09	.11	.45*
pe9501.dat	204	8	33.32	.89	.36	1.12	*	3	32.93	-.87	.49	.56*
al9512.dat	258	70	32.60	.53	.16	.64		67	32.70	-.46	.12	.78

[1] "Cruise", the code name for a cruise: "CD", the calendar mid-date of all the stations within a region for a cruise: "#obs", the number of observations included in each average: "Temp", the areal average temperature: "Anomaly", the areal average salinity anomaly: "SDV1", the standard deviation associated with the average salinity anomaly: "SDV2", the standard deviation of the individual anomalies from which the average anomaly was derived.

* A true areal average could not be calculated due to poor station coverage. The average values listed were derived from a simple average of the observations within the region.

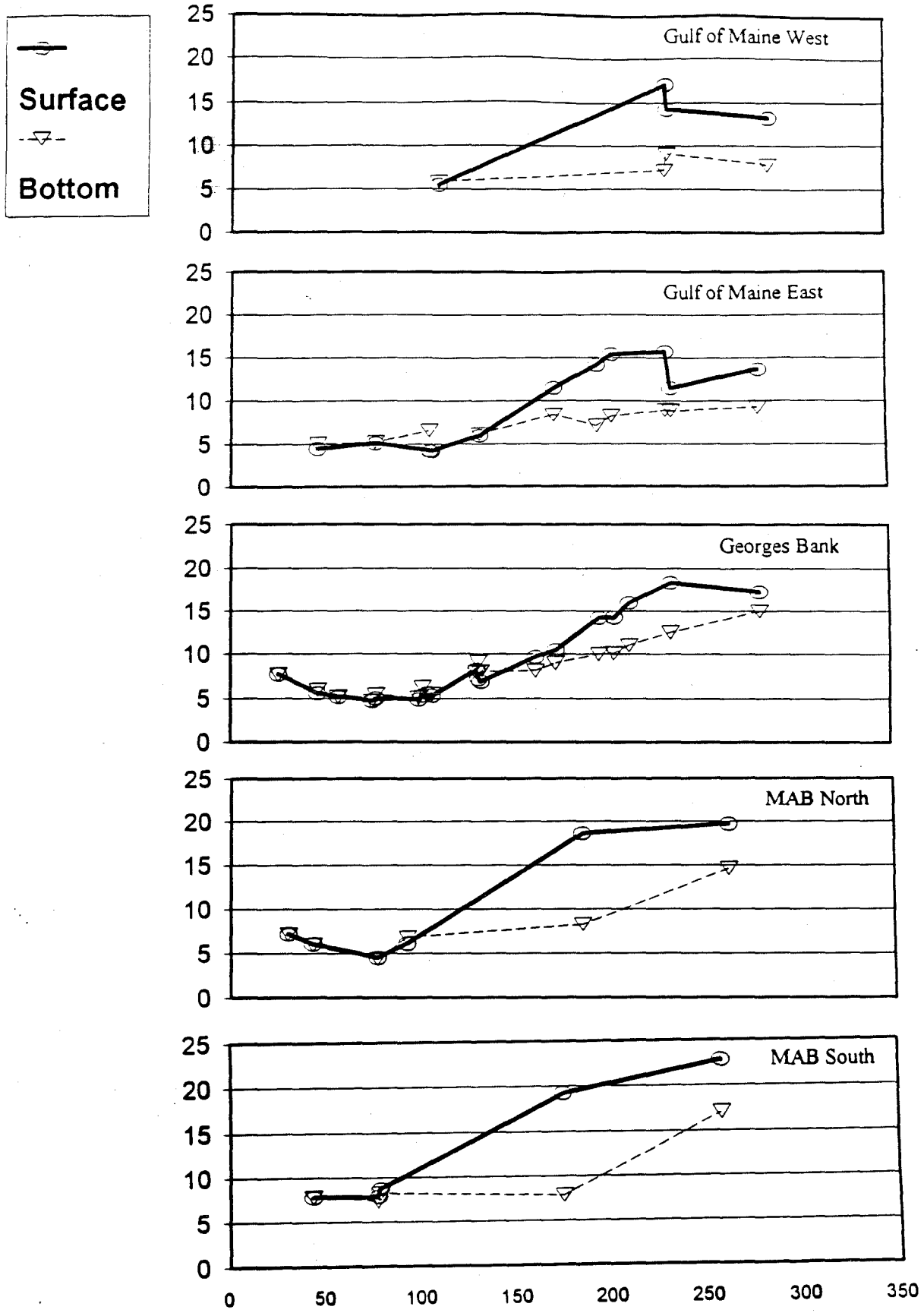

Figure 2. The 1995 areal average surface and bottom temperature values from Table 2

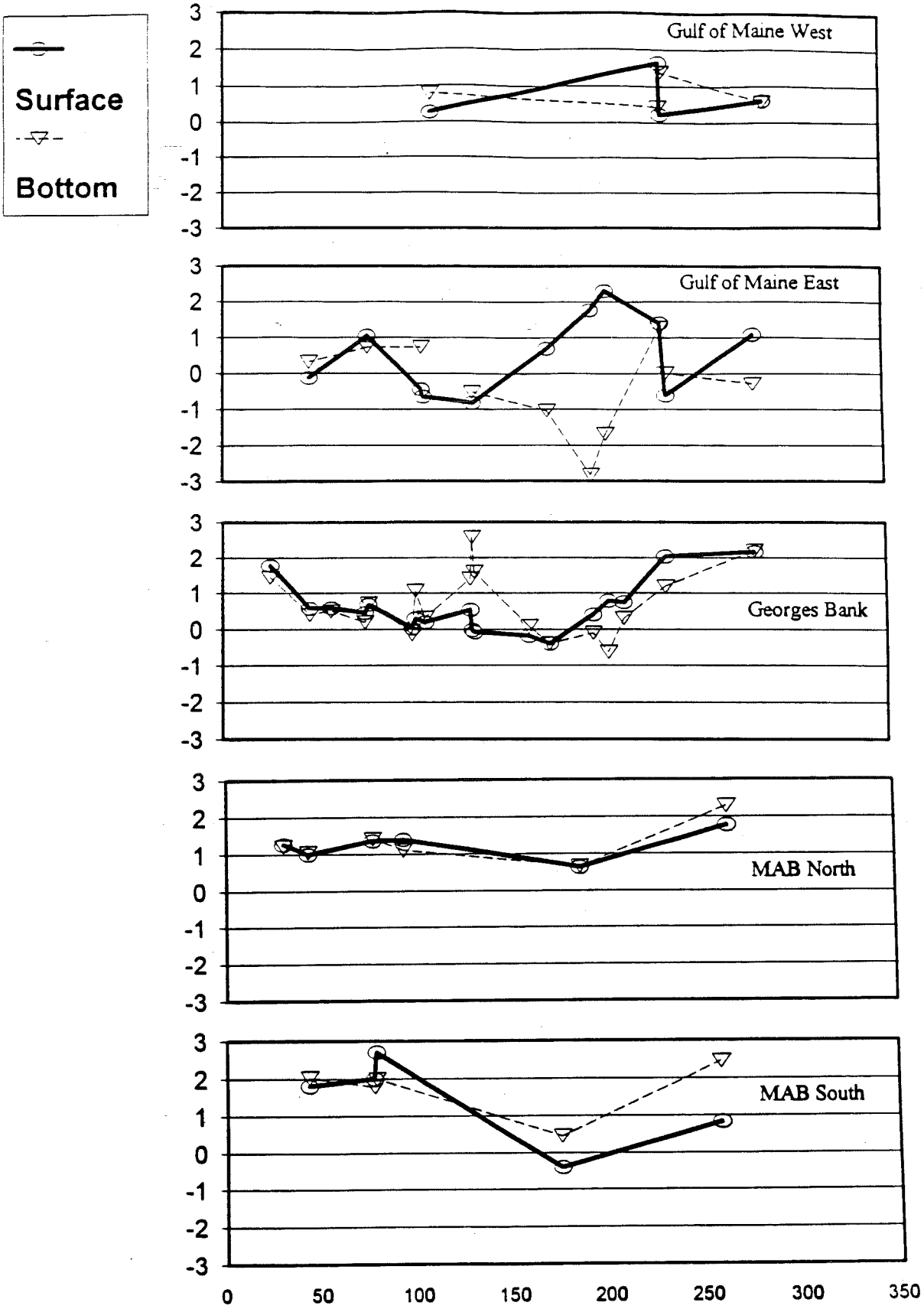

Figure 3. The 1995 areal average surface and bottom temperature anomalies from Table 2

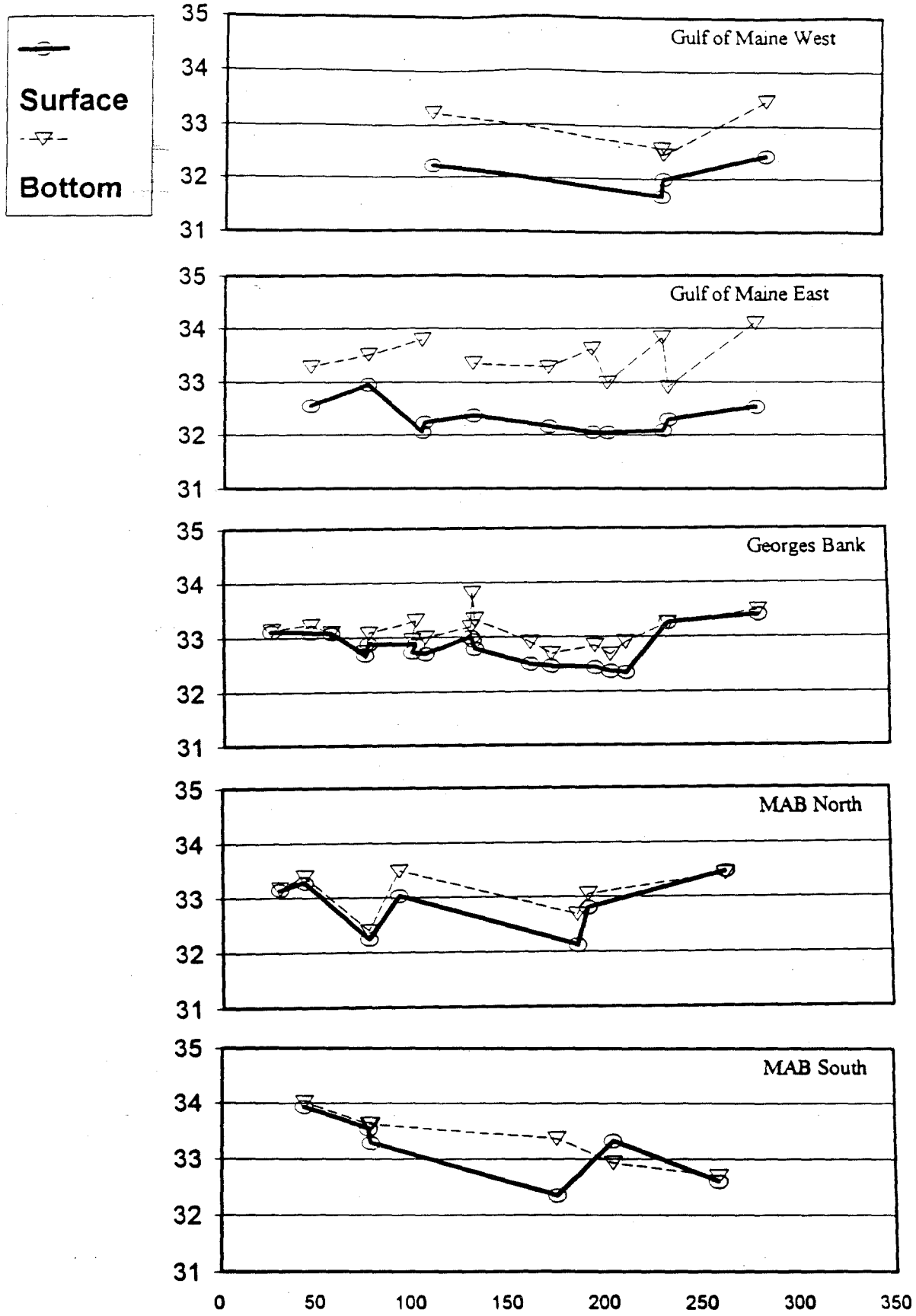

Figure 4. The 1995 areal average surface and bottom salinity values from Table 3.

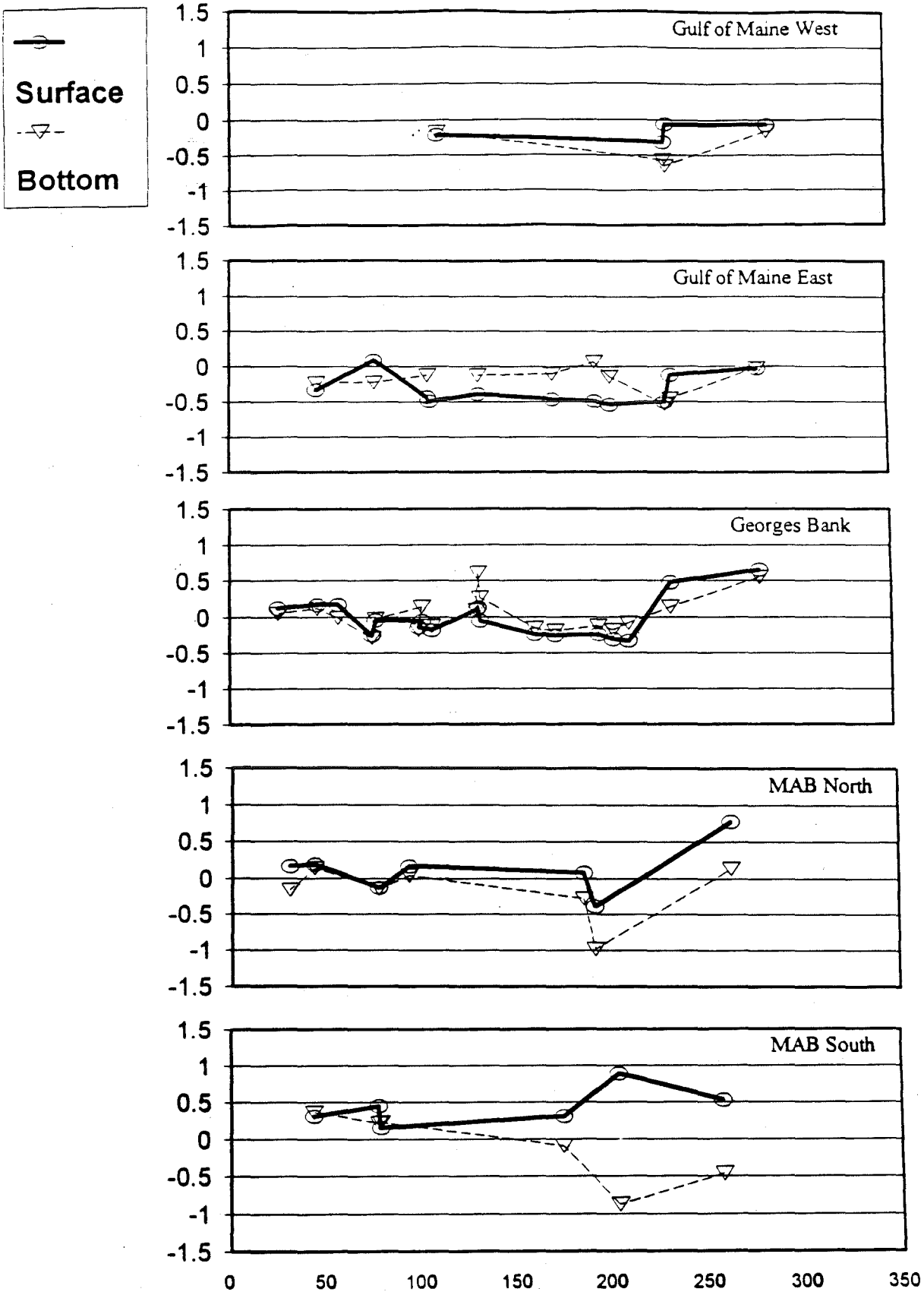

Figure 5. The 1995 areal average surface and bottom salinity anomalies from Table 3.

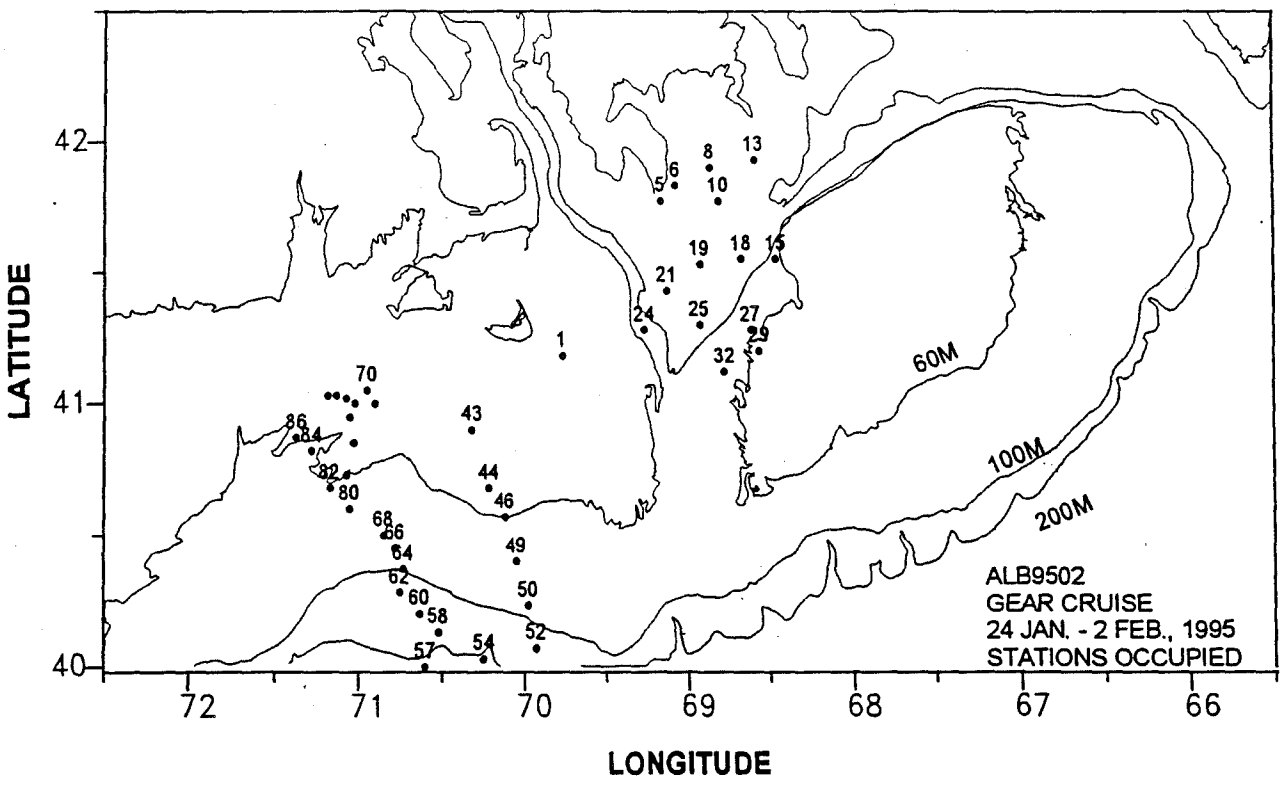

Figure 6. Hydrographic stations occupied during the Gear Comparison Study ALB9502.

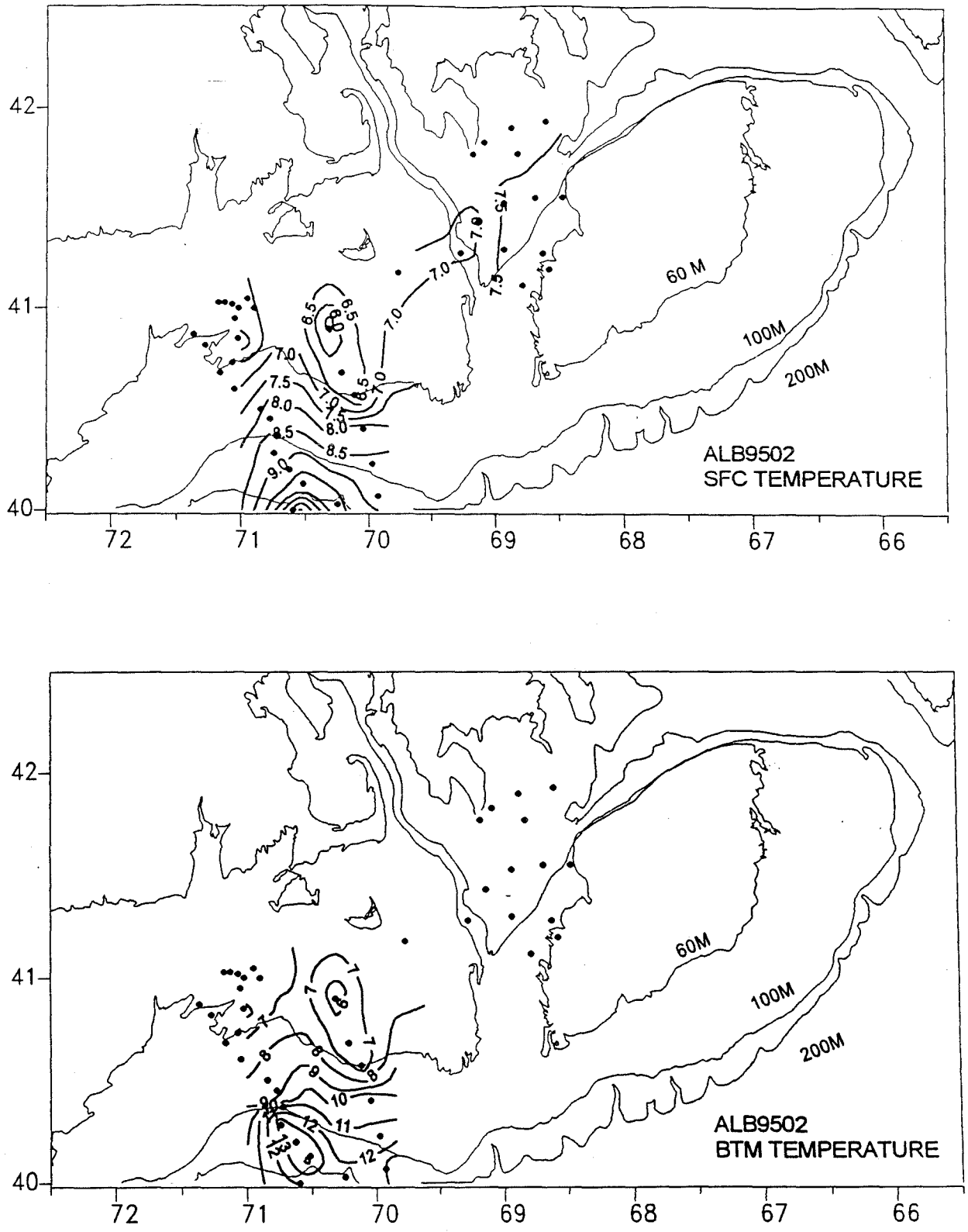

Figure 7. The surface and bottom temperature distribution for the Gear Comparison Study ALB9502.

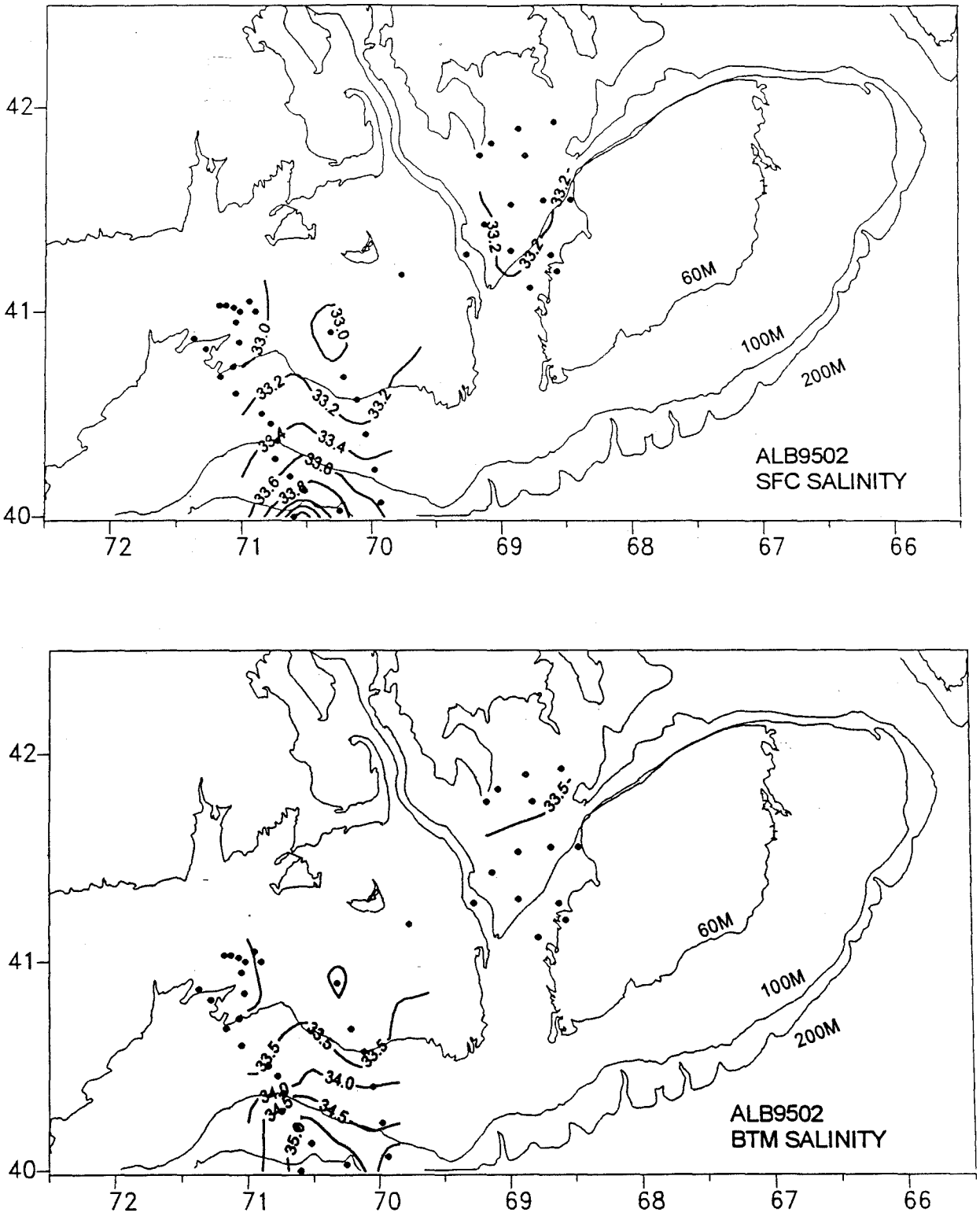

Figure 8. The surface and bottom salinity distribution for the Gear Comparison Study ALB9502.

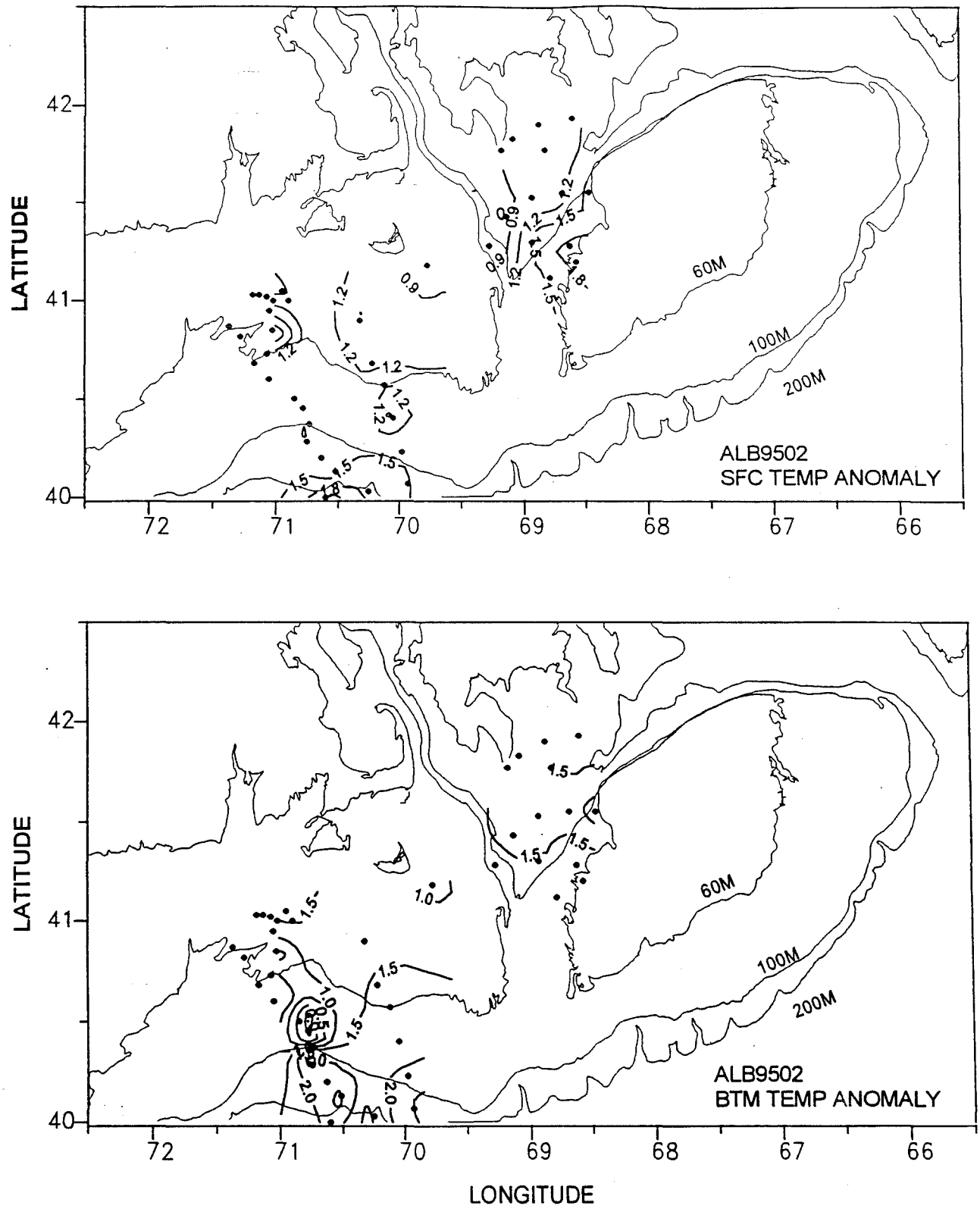

Figure 9. The surface and bottom temperature anomaly distribution for the Gear Comparison Study ALB9502.

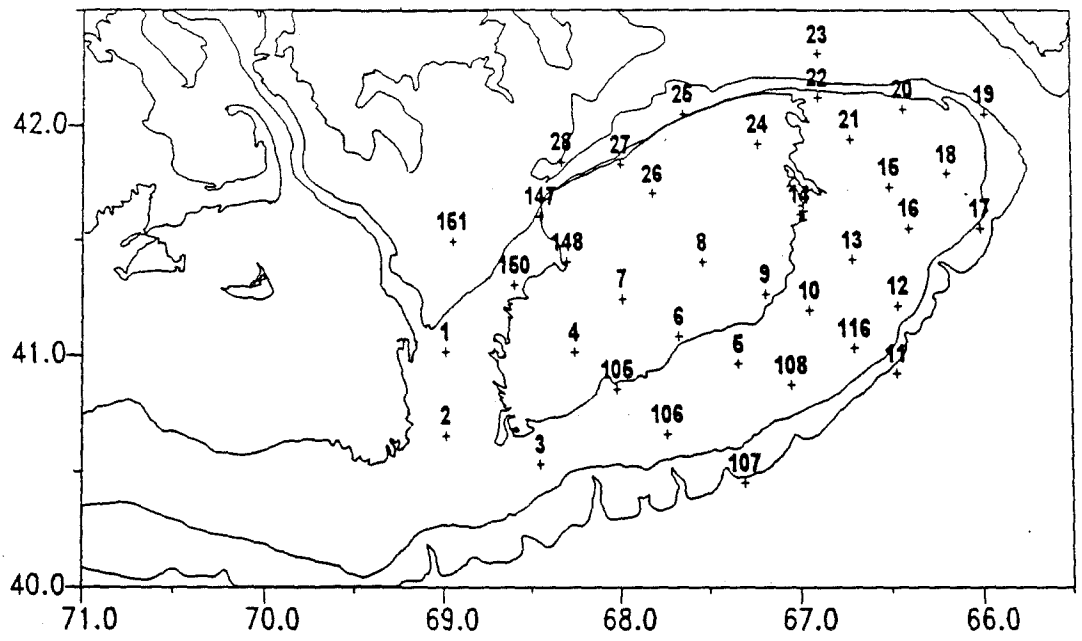

Figure 10. Hydrographic stations occupied during the U.S. GLOBEC Broad Scale Survey END9561.

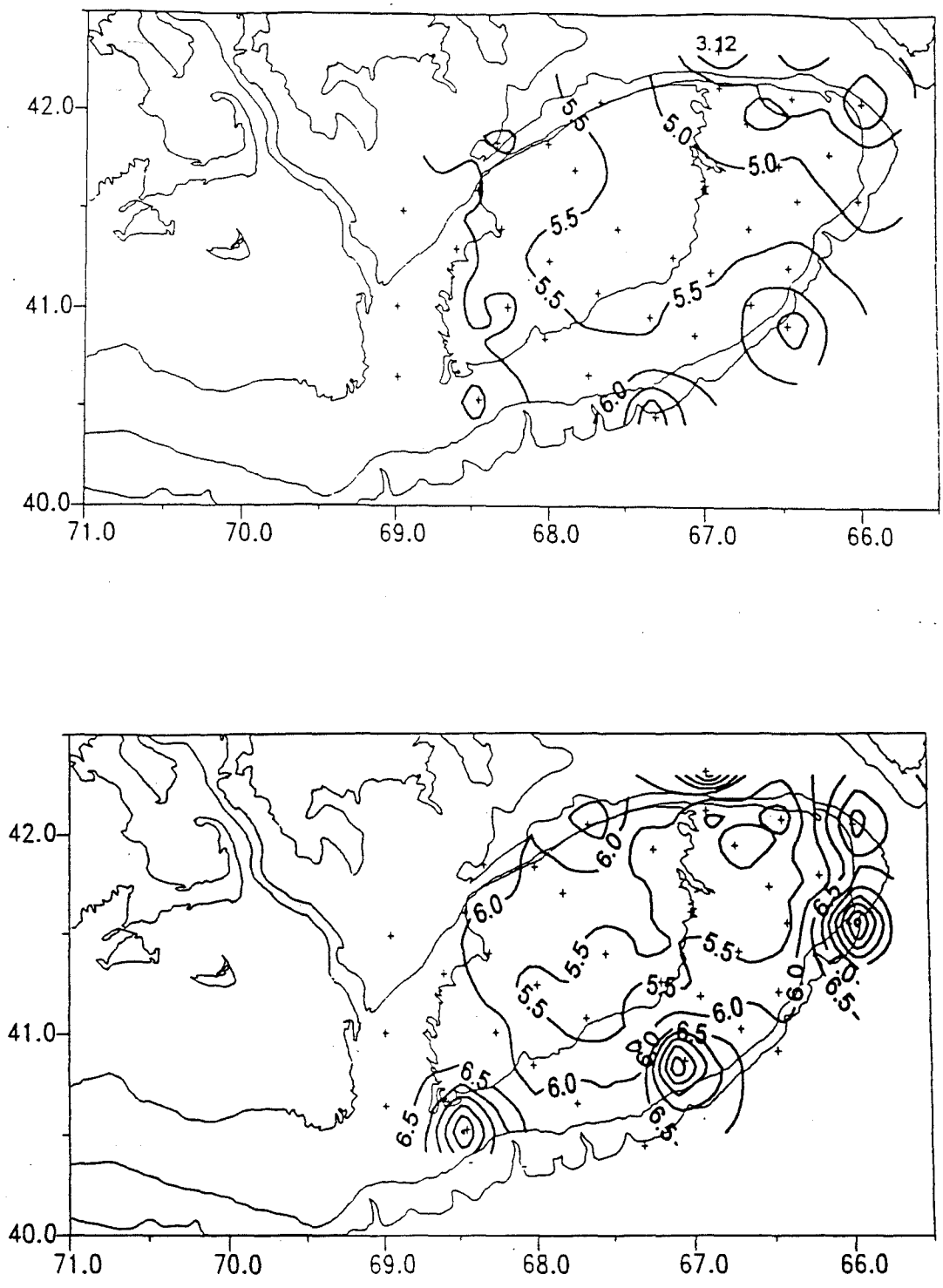

Figure 11. The surface and bottom temperature distribution for the U.S. GLOBEC Broad Scale Survey END9561.

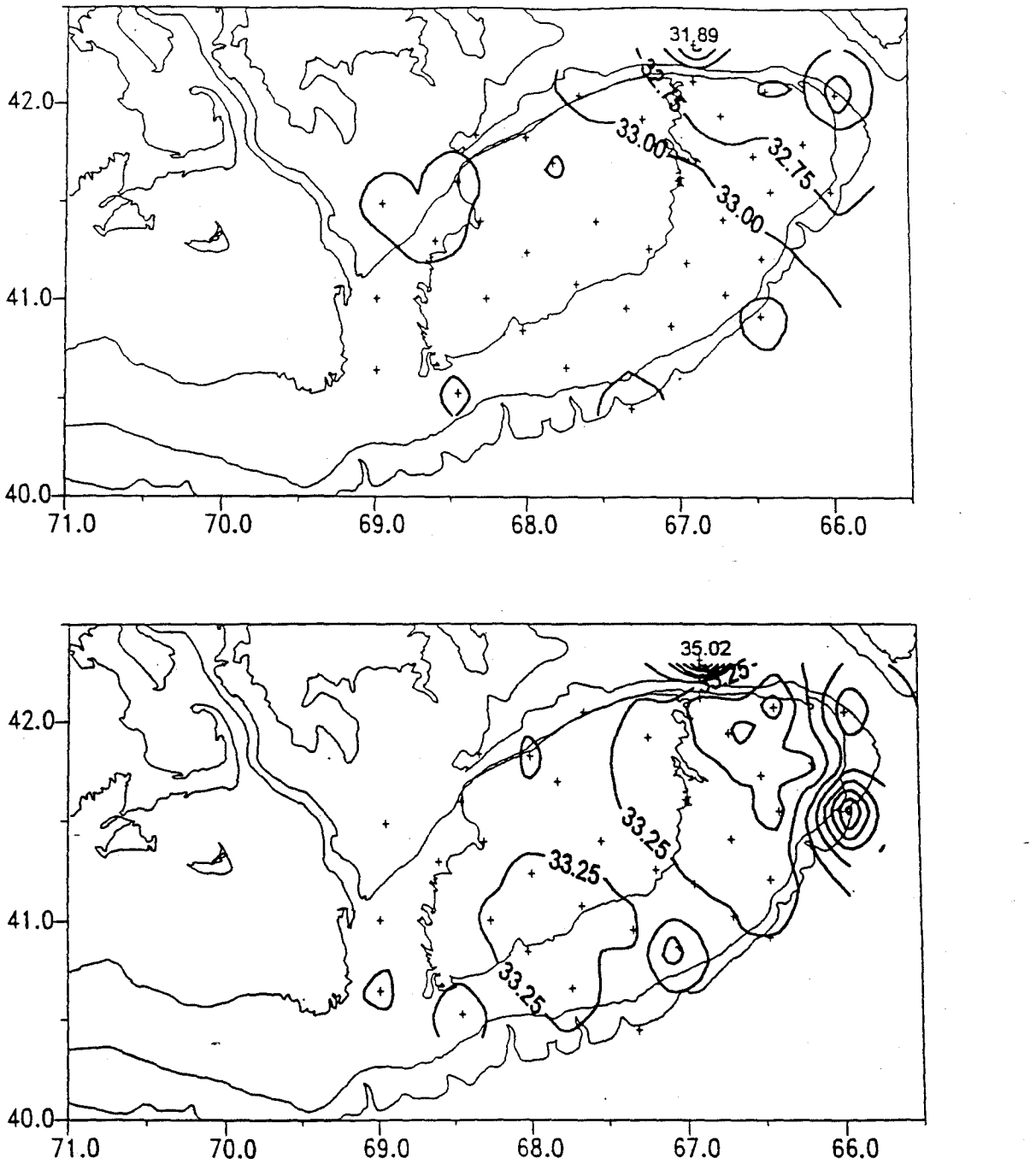

Figure 12. The surface and bottom salinity distribution for the U.S. GLOBEC Broad Scale Survey END9561.

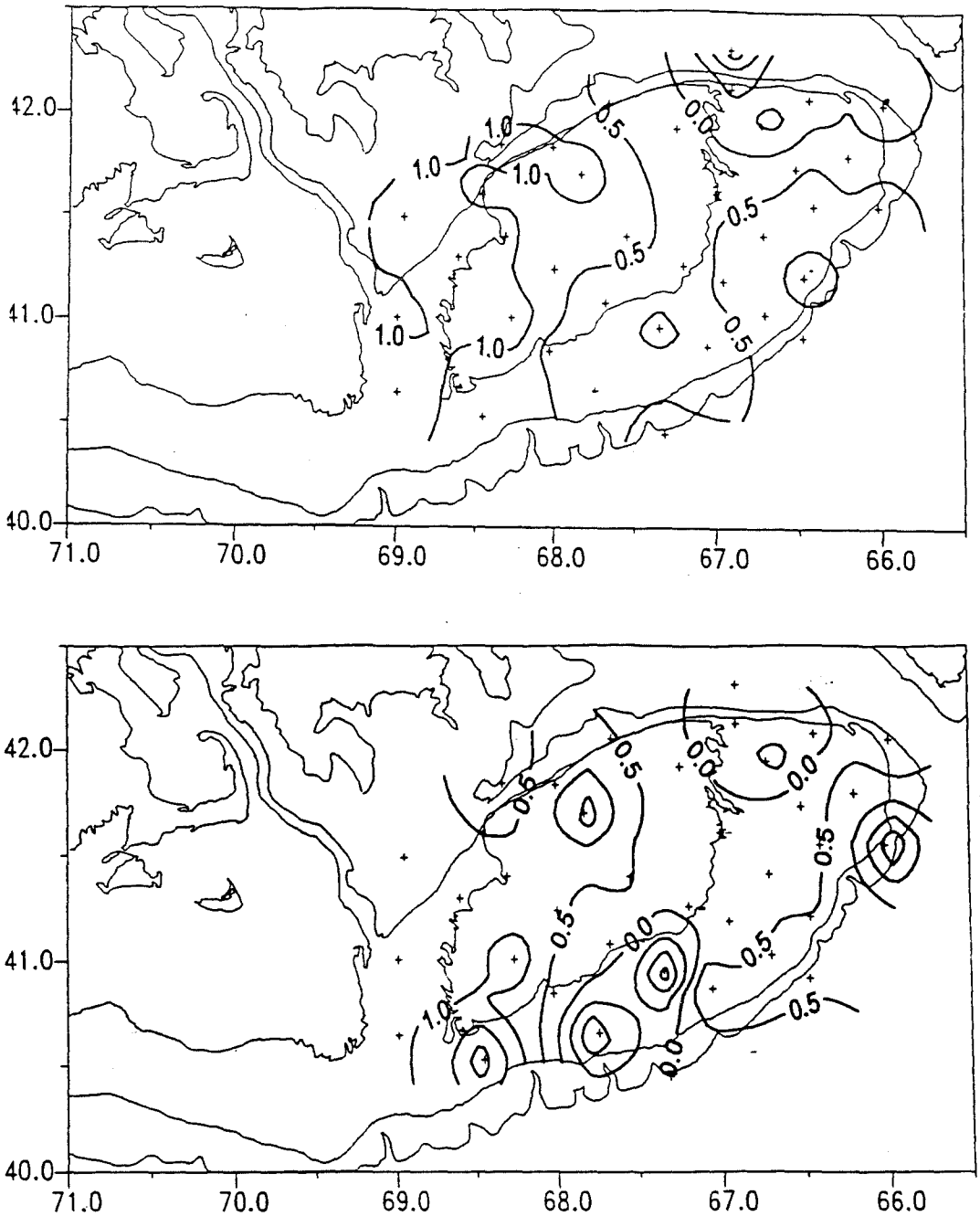

Figure 13. The surface and bottom temperature anomaly distribution for the U.S. GLOBEC Broad Scale Survey END9561.

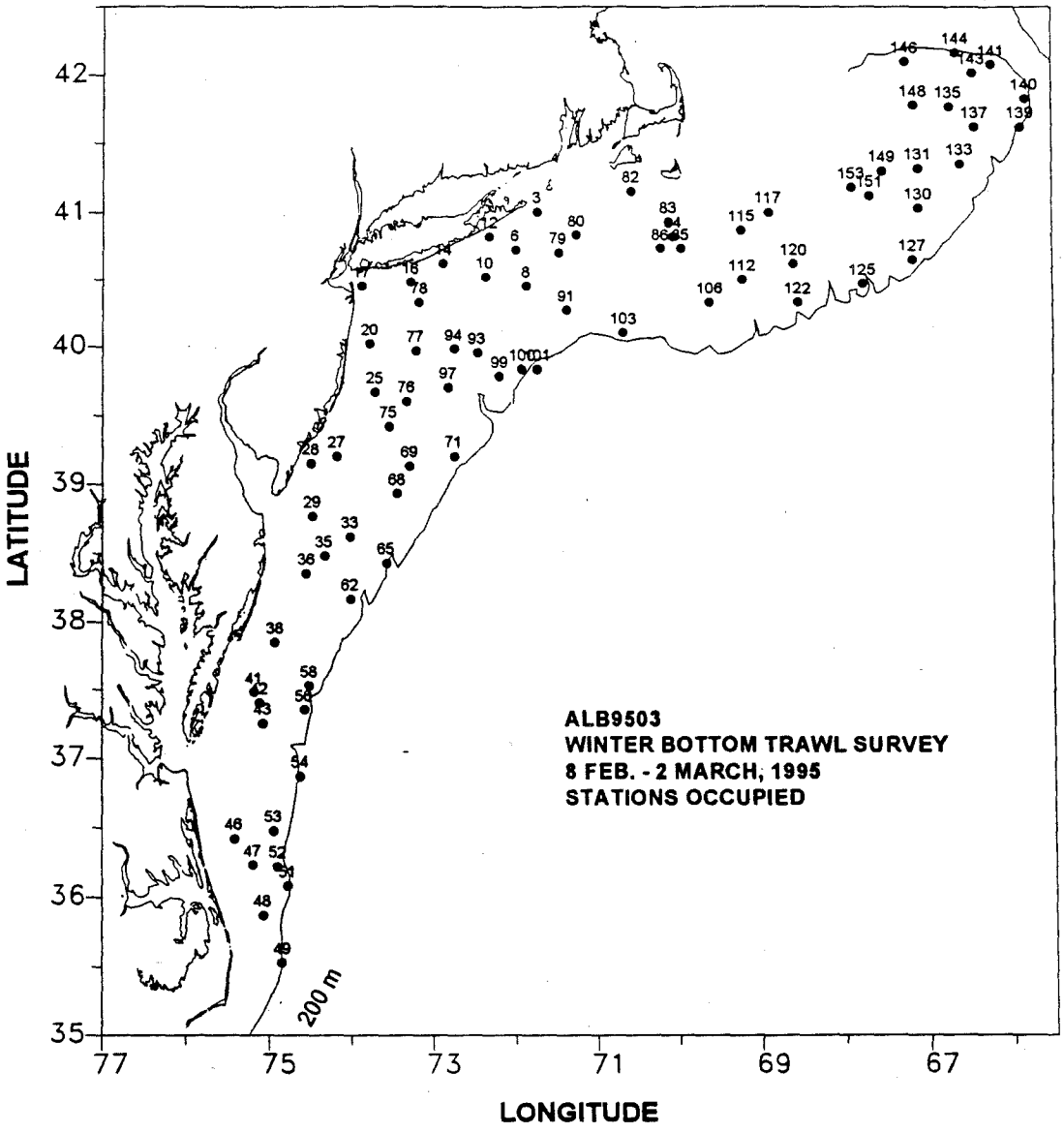

Figure 14. Hydrographic stations occupied during the Winter Bottom Trawl Survey ALB9503.

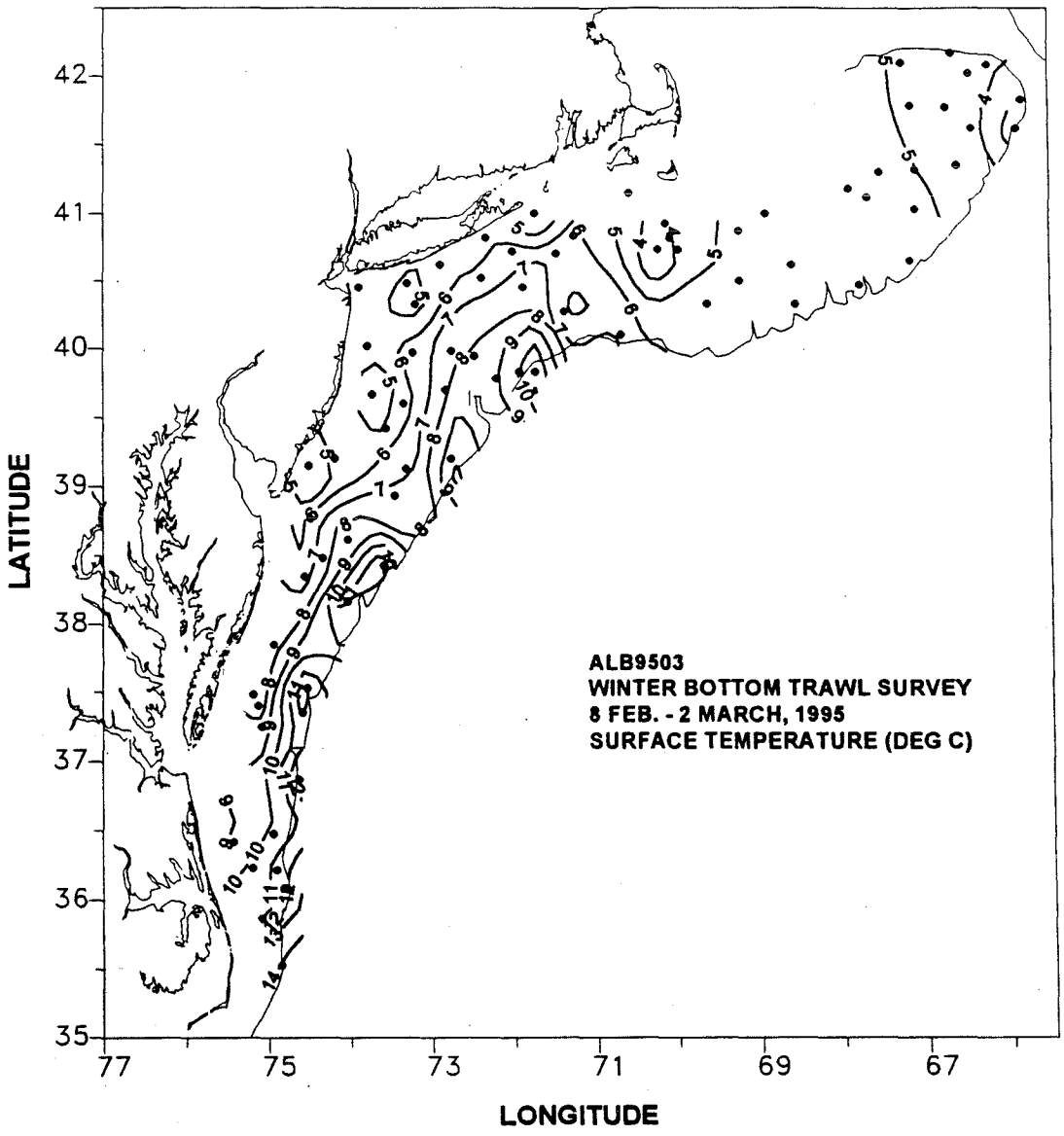

Figure 15. The surface temperature distribution for the Winter Bottom Trawl Survey ALB9503.

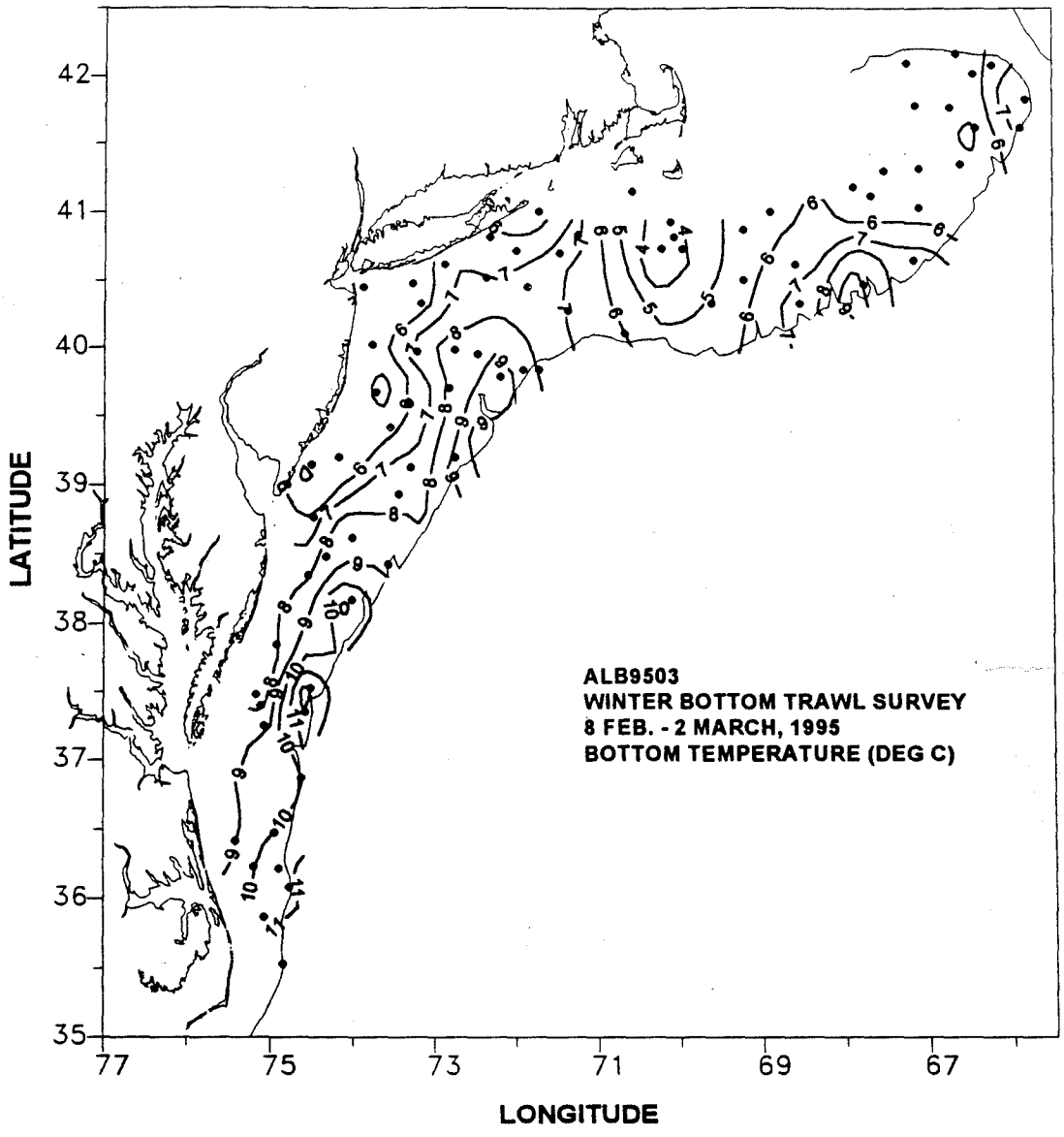

Figure 16. The bottom temperature distribution for the Winter Bottom Trawl Survey ALB9503.

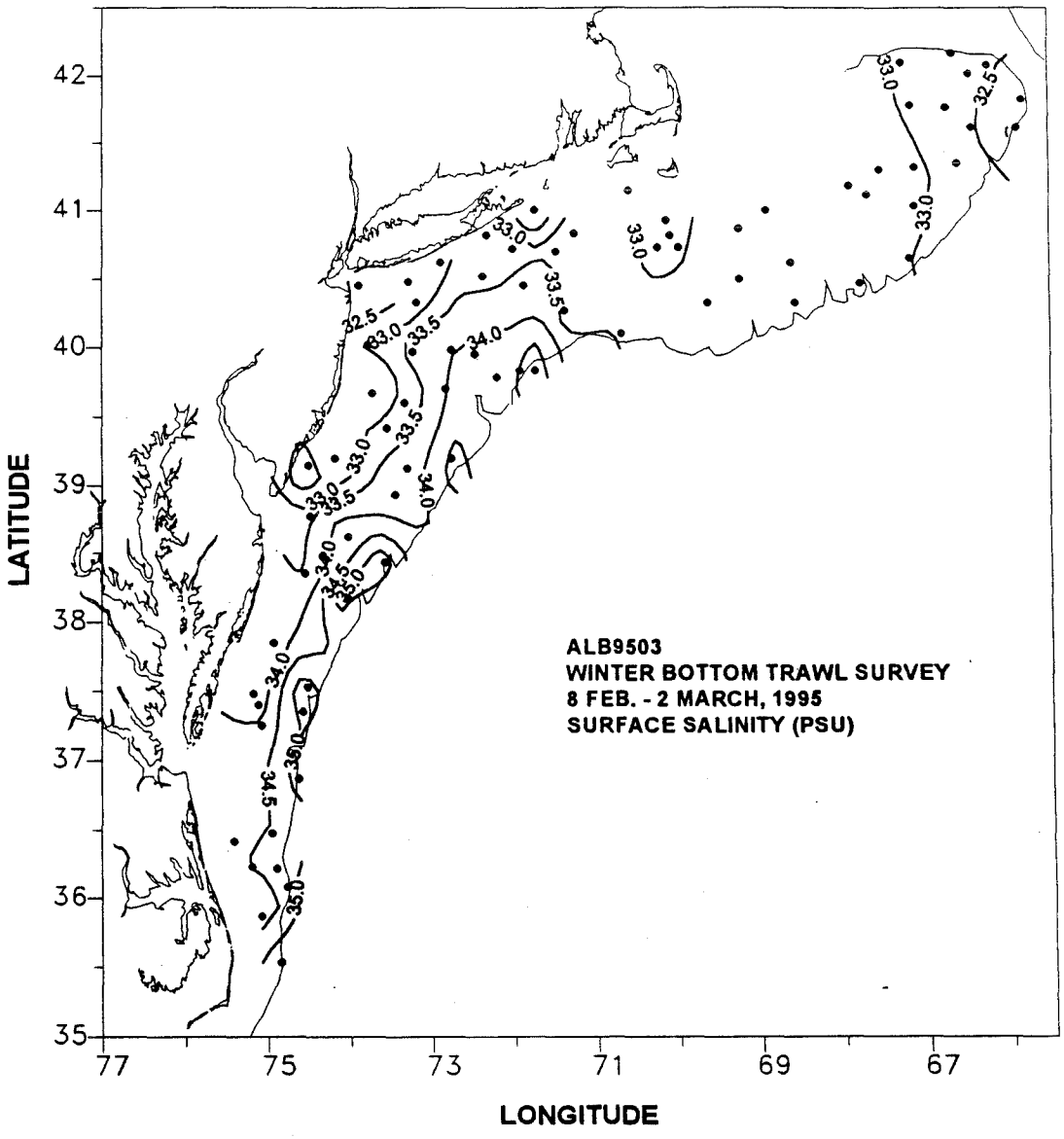

Figure 17. The surface salinity distribution for the Winter Bottom Trawl Survey ALB9503.

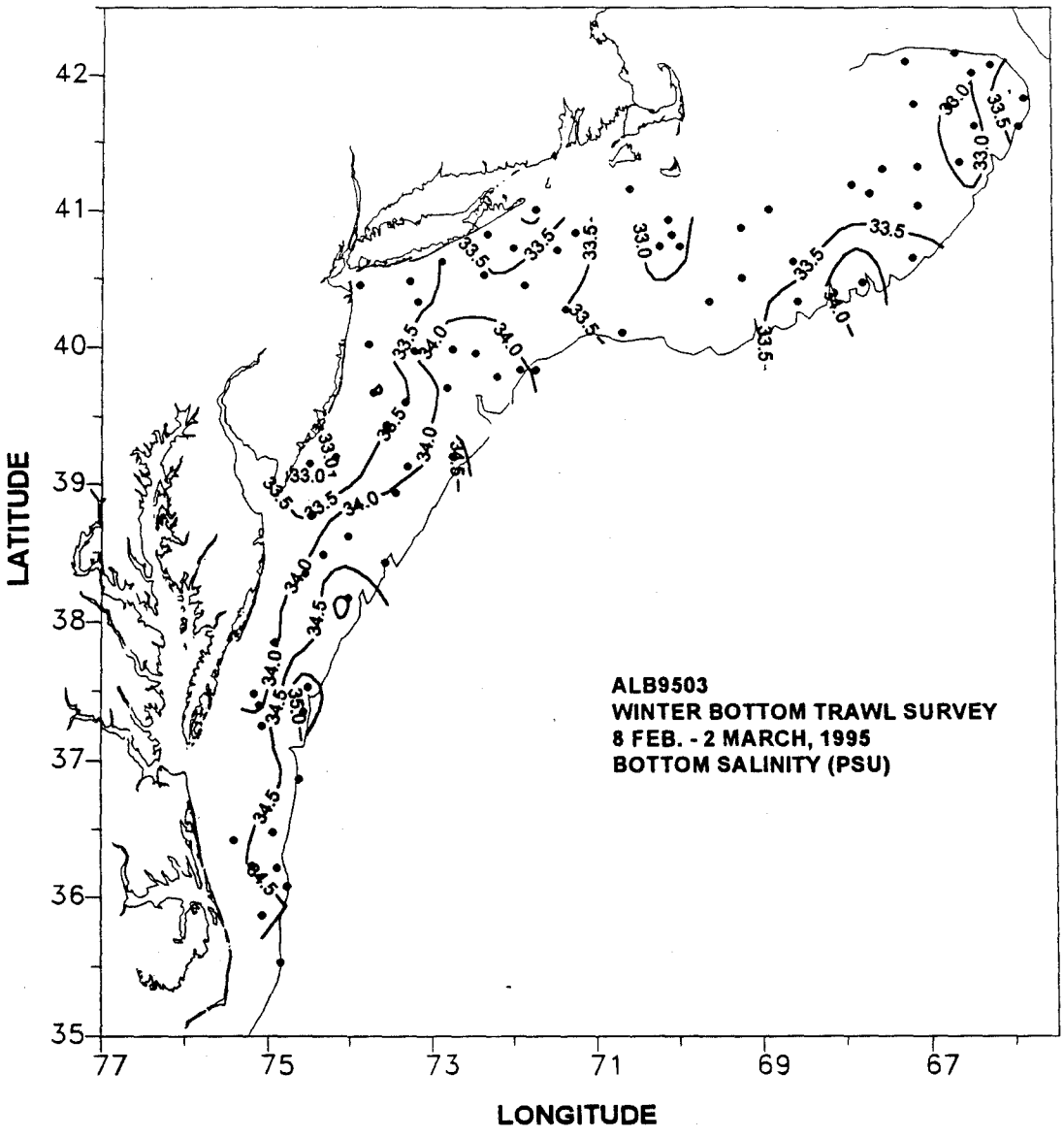

Figure 18. The bottom salinity distribution for the Winter Bottom Trawl Survey ALB9503.

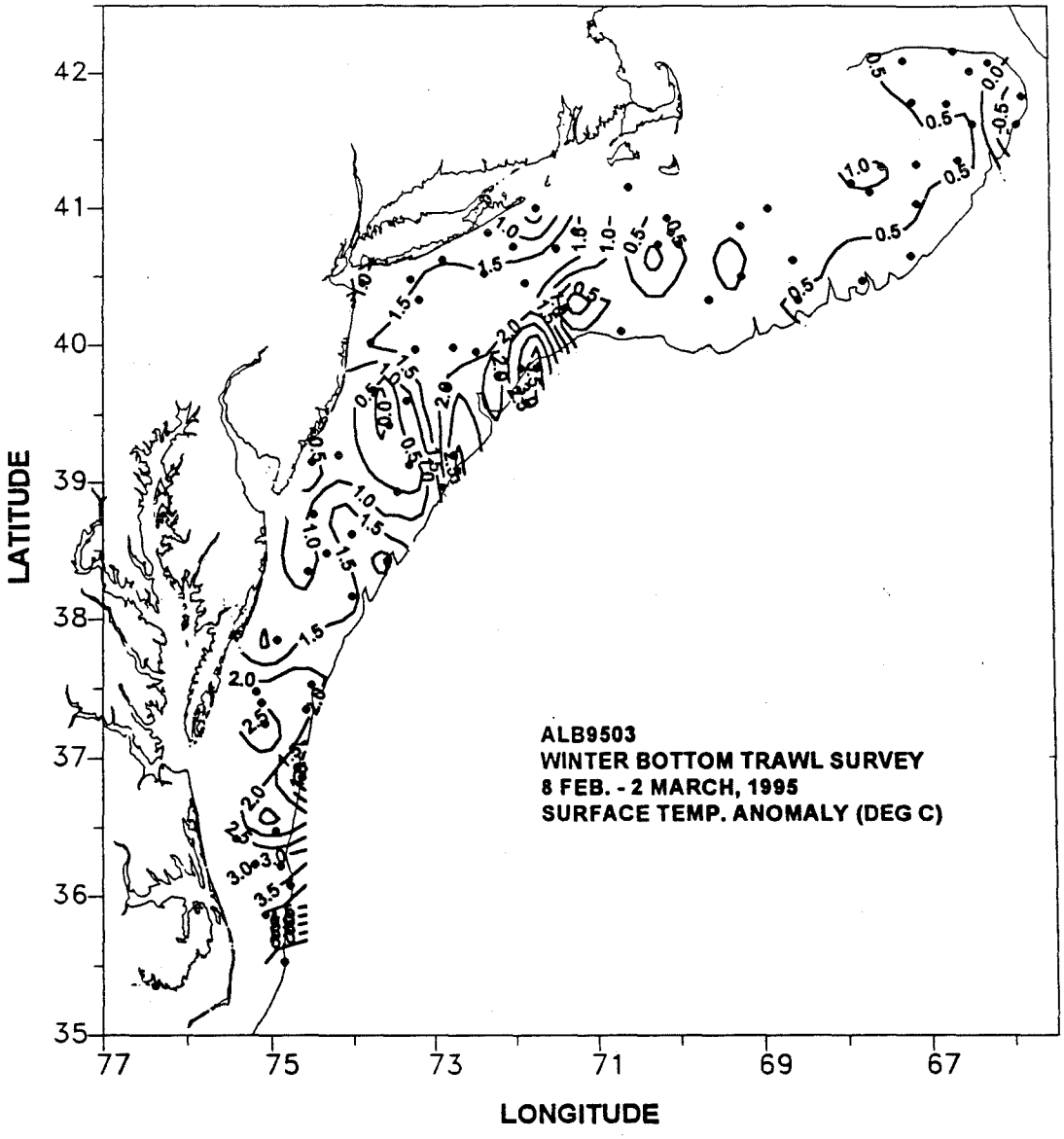

Figure 19. The surface temperature anomaly distribution for the Winter Bottom Trawl Survey ALB9503.

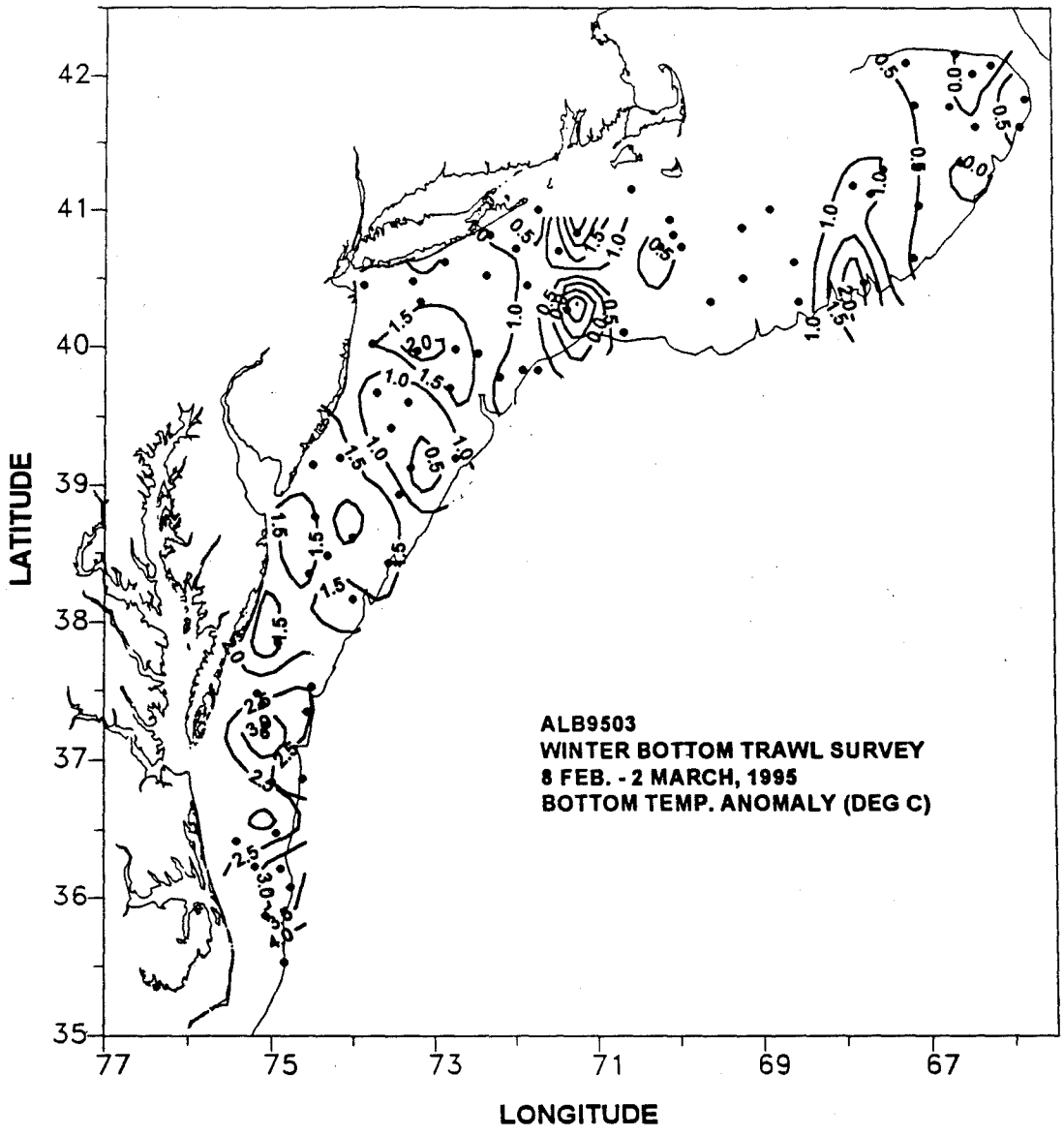

Figure 20. The bottom temperature anomaly distribution for the Winter Bottom Trawl Survey ALB9503.

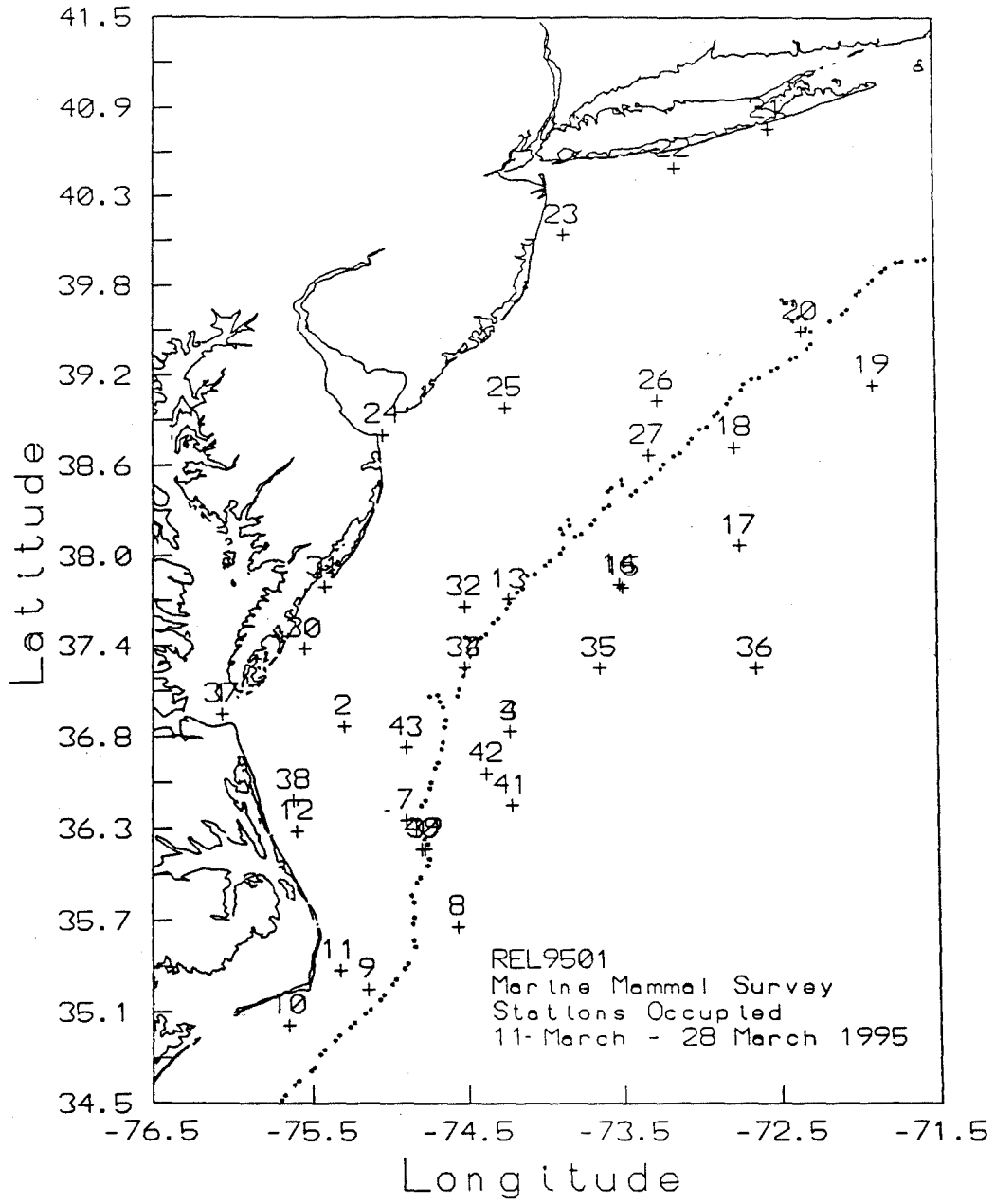

Figure 21. Hydrographic stations occupied during the marine mammal survey REL9501.

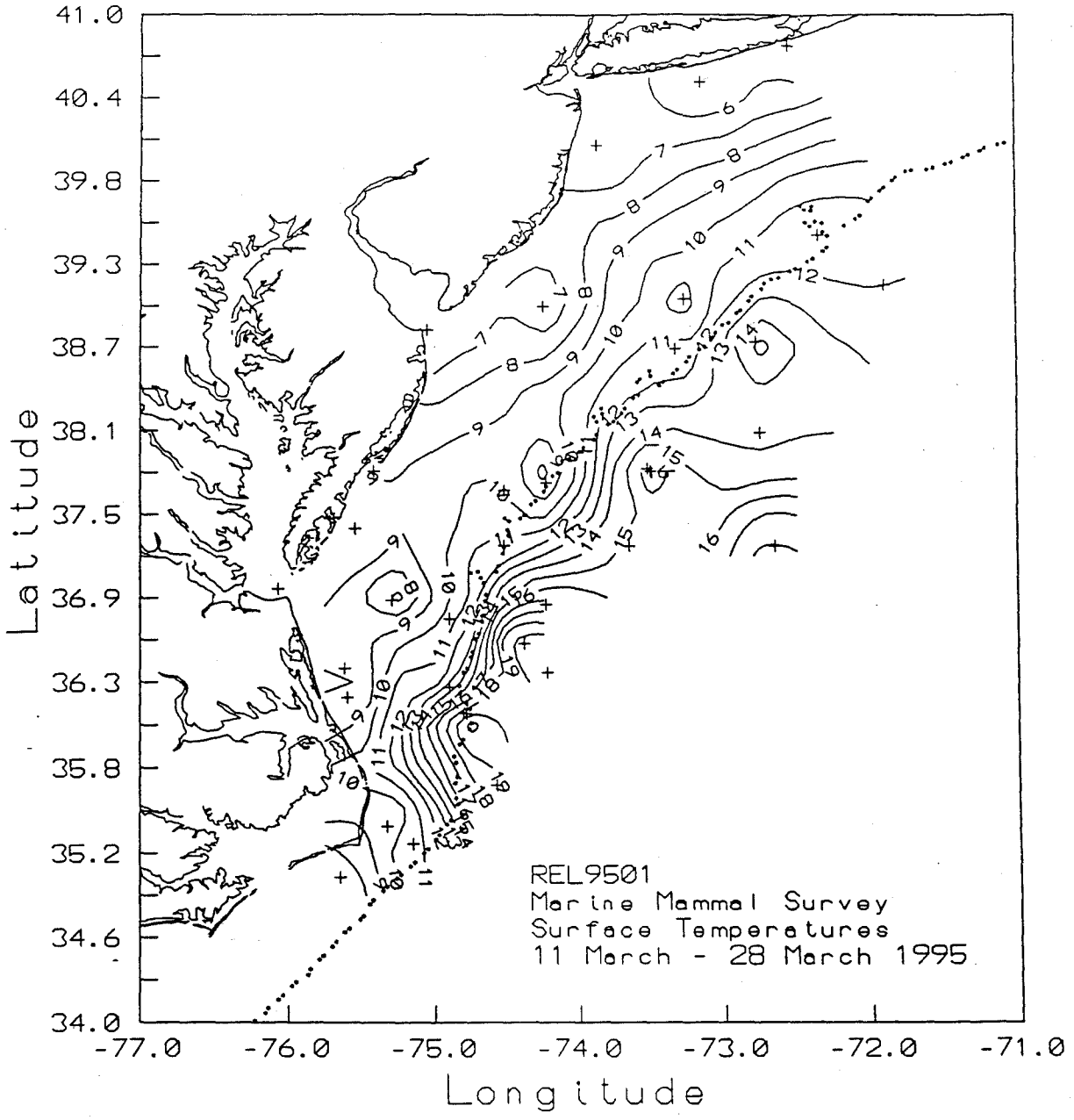

Figure 22. The surface temperature distribution for the Marine Mammal Survey REL9501.

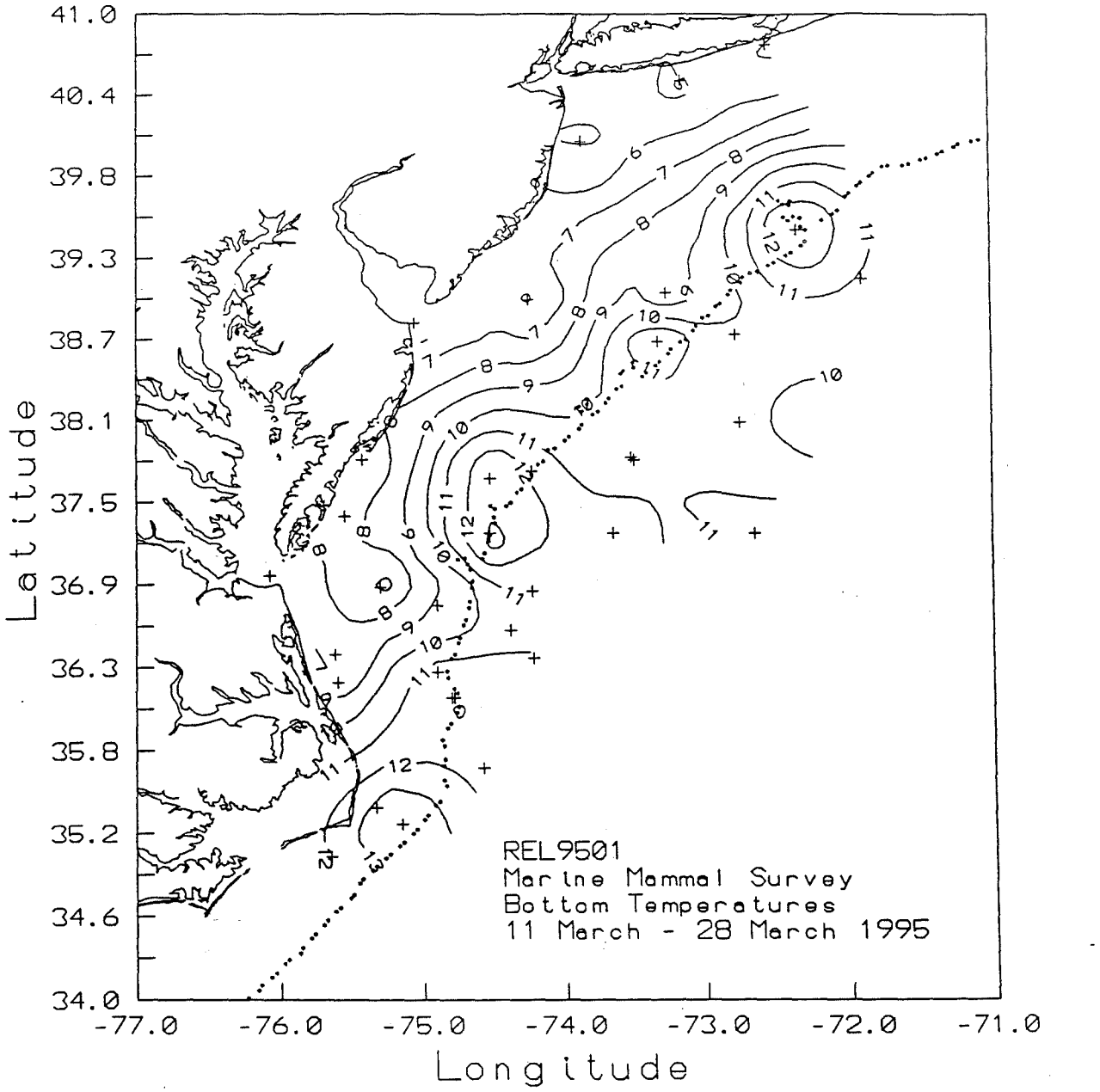

Figure 23. The bottom temperature distribution for the Marine Mammal Survey REL9501.

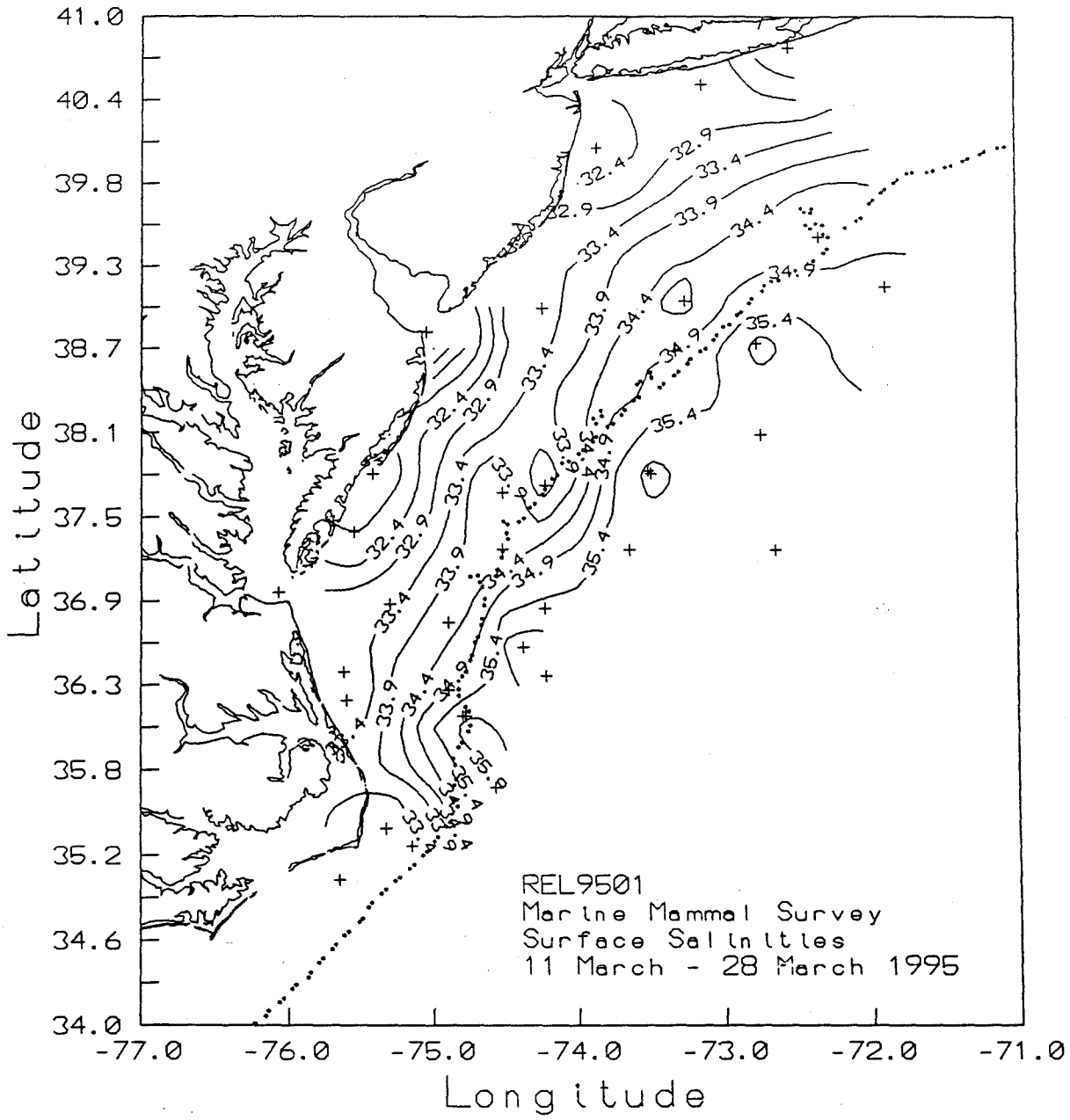

Figure 24. The surface salinity distribution for the Marine Mammal Survey REL9501.

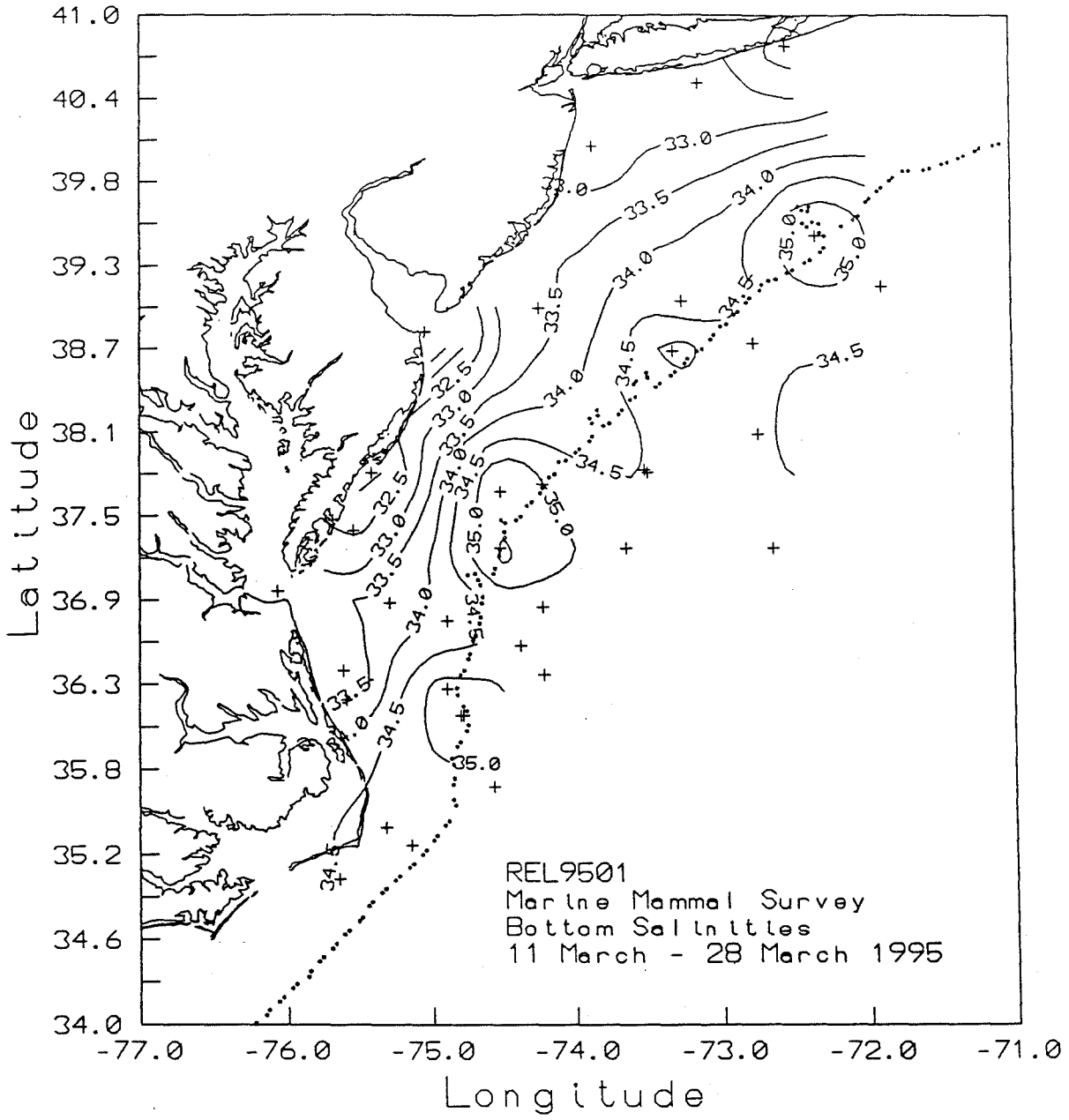

Figure 25. The bottom salinity distribution for the Marine Mammal Survey REL9501.

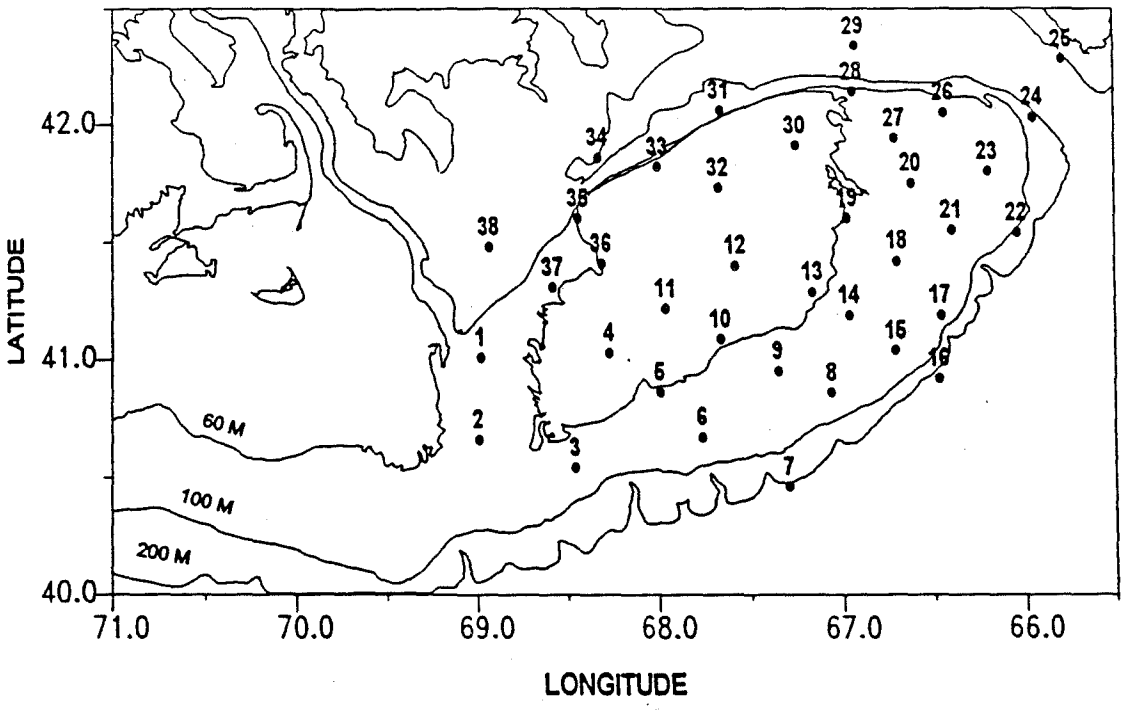

Figure 26. Hydrographic stations occupied during the U.S. GLOBEC Broad Scale Survey END9563.

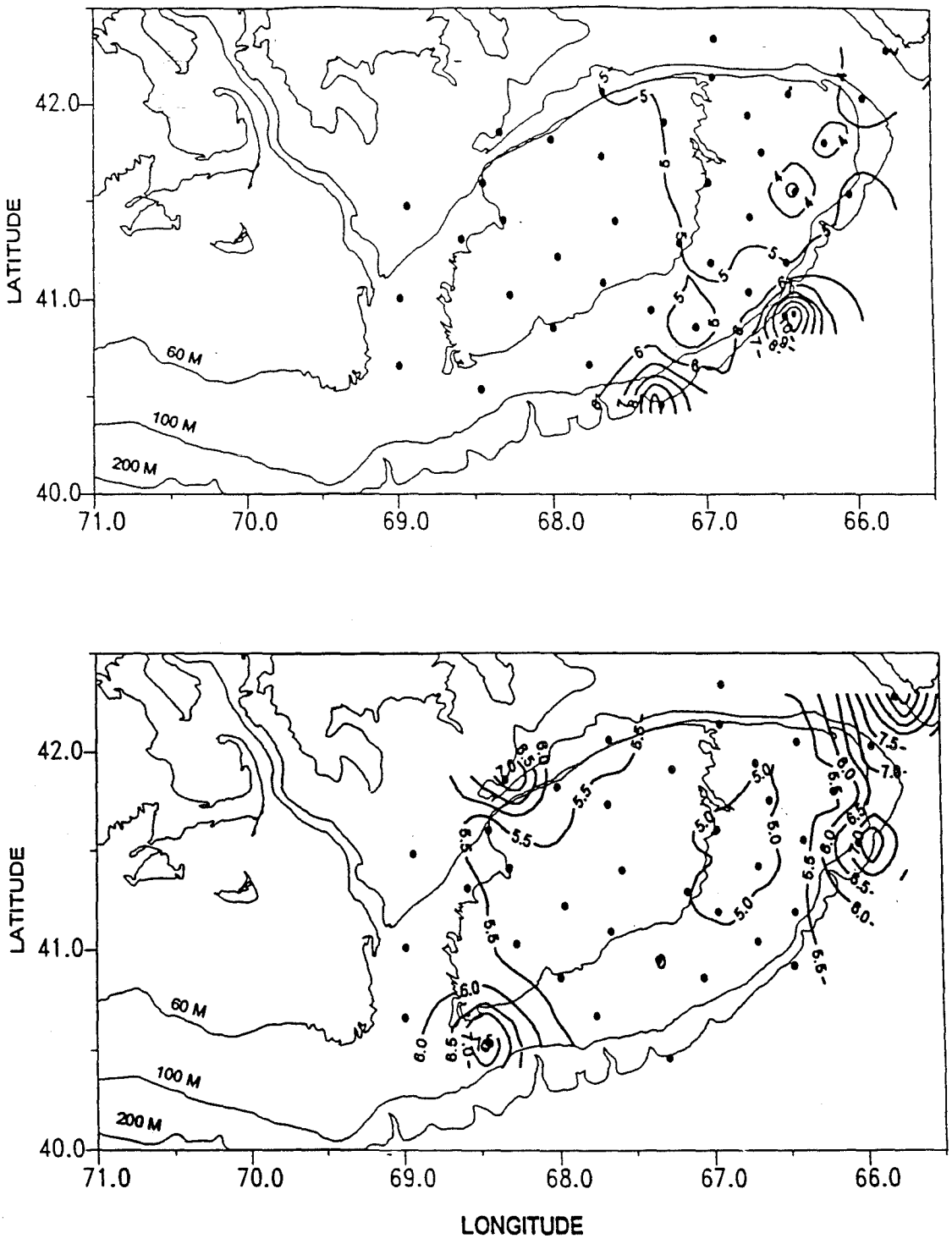

Figure 27. The surface and bottom temperature distribution for the U.S. GLOBEC Broad Scale Survey END9563.

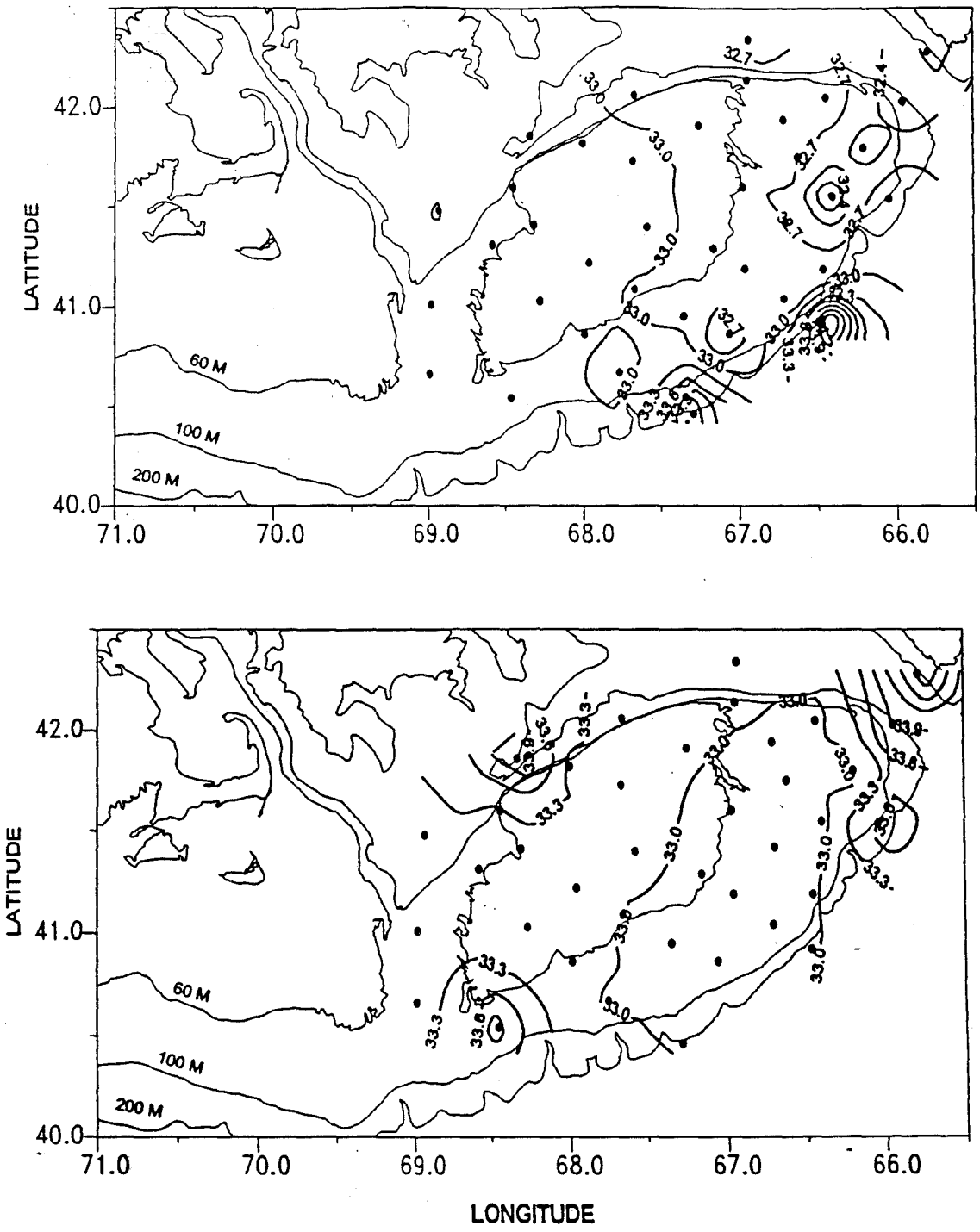

Figure 28. The surface and bottom salinity distribution for the U.S. GLOBEC Broad Scale Survey END9563.

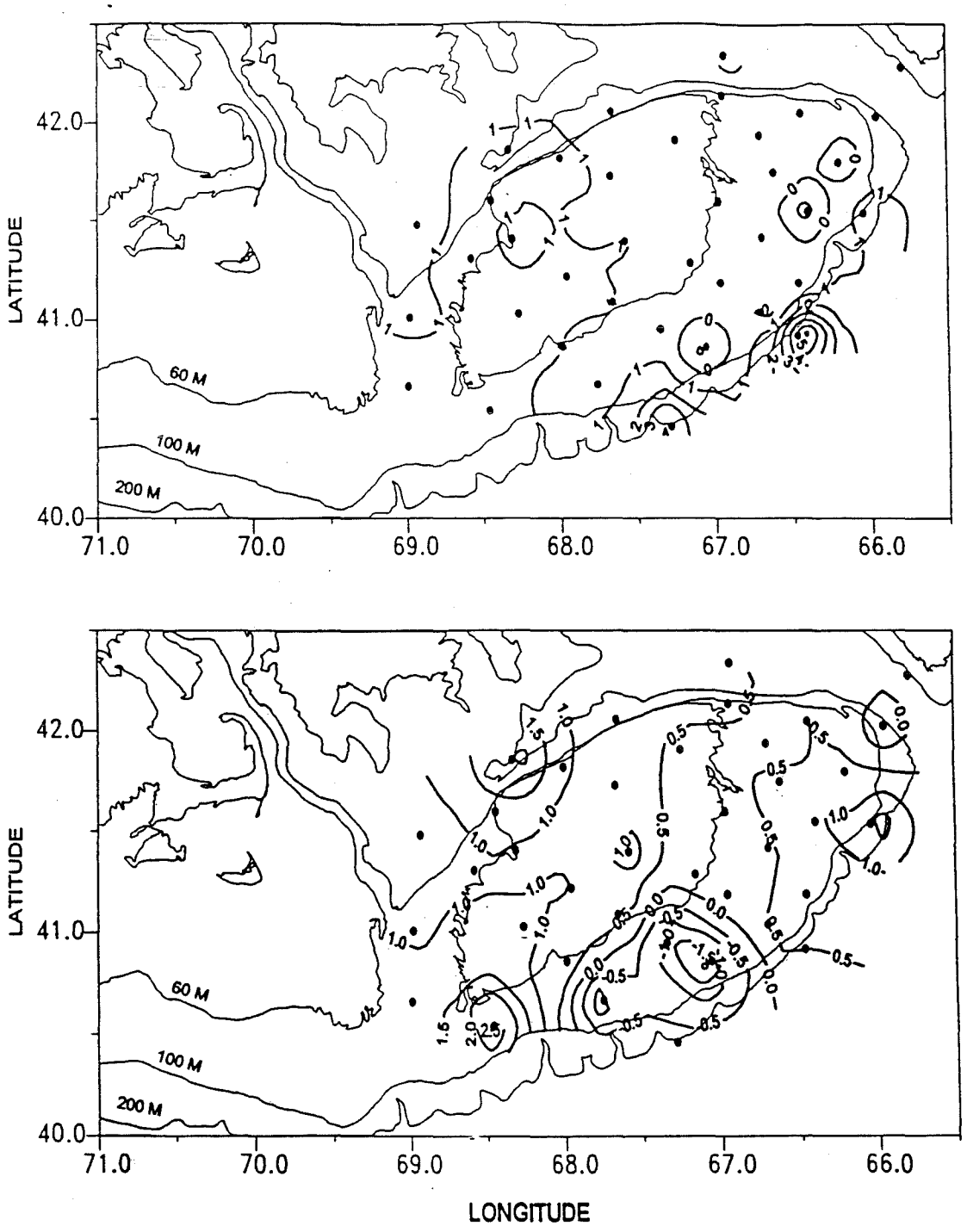

Figure 29. The surface and bottom temperature anomaly distribution for the U.S. GLOBEC Broad Scale Survey END9563.

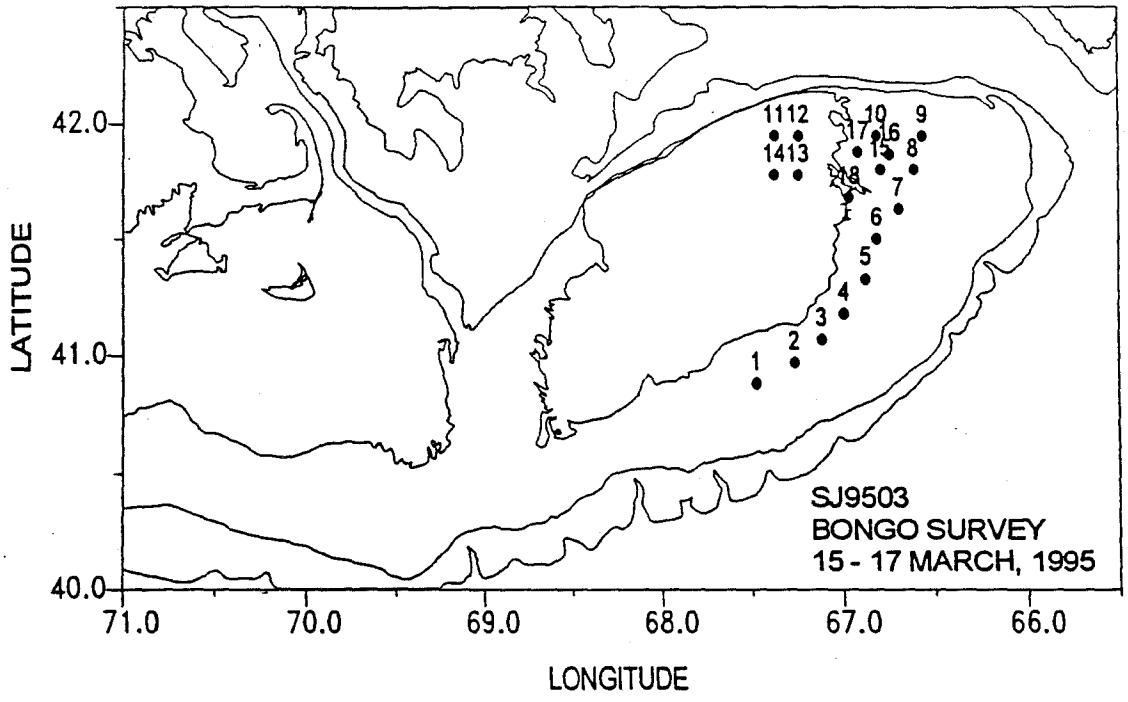

Figure 30. Hydrographic stations occupied during the U.S GLOBEC Process Cruise SJ9503.

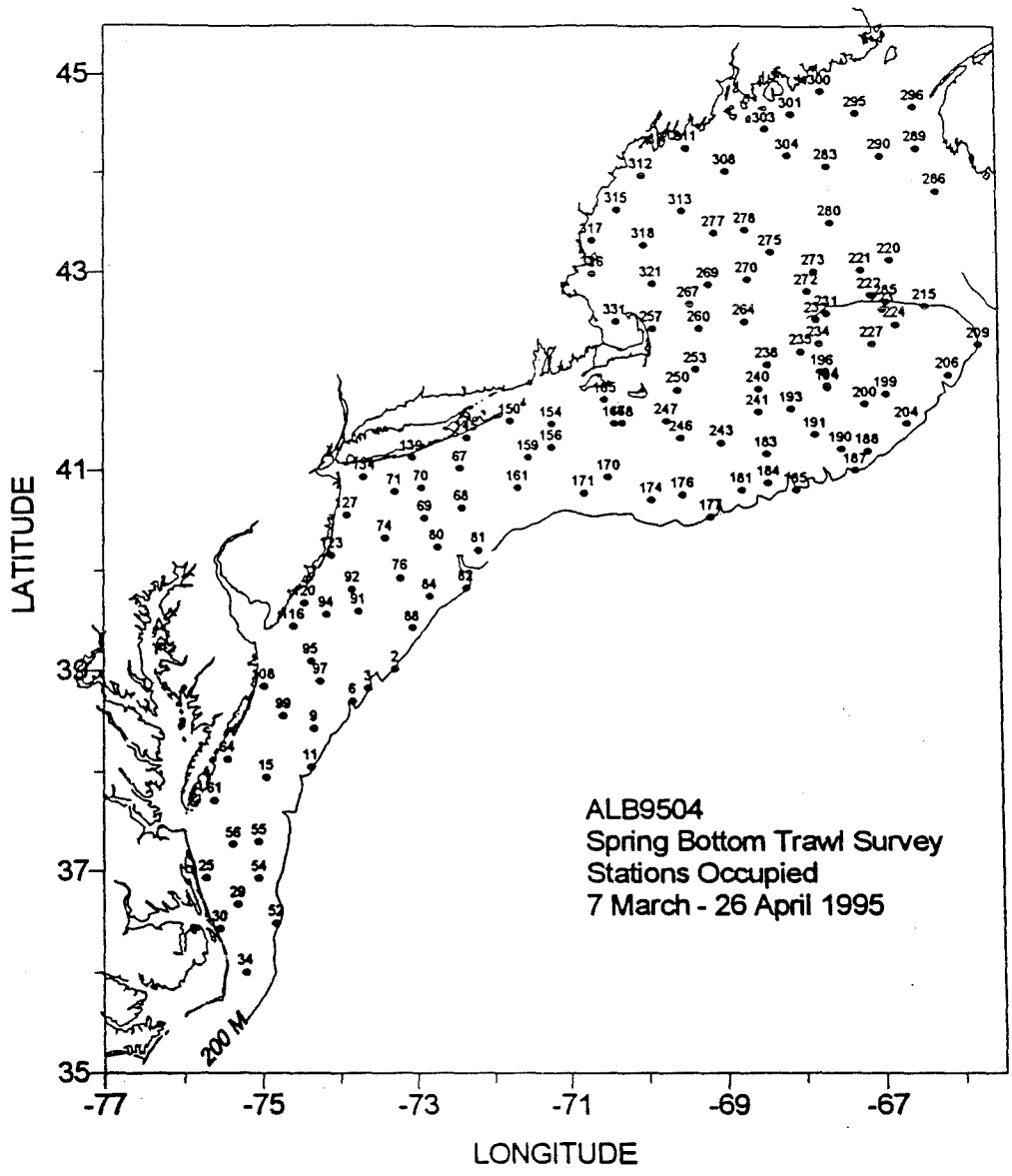

Figure 31. Hydrographic stations occupied during the Spring Bottom Trawl Survey ALB9504.

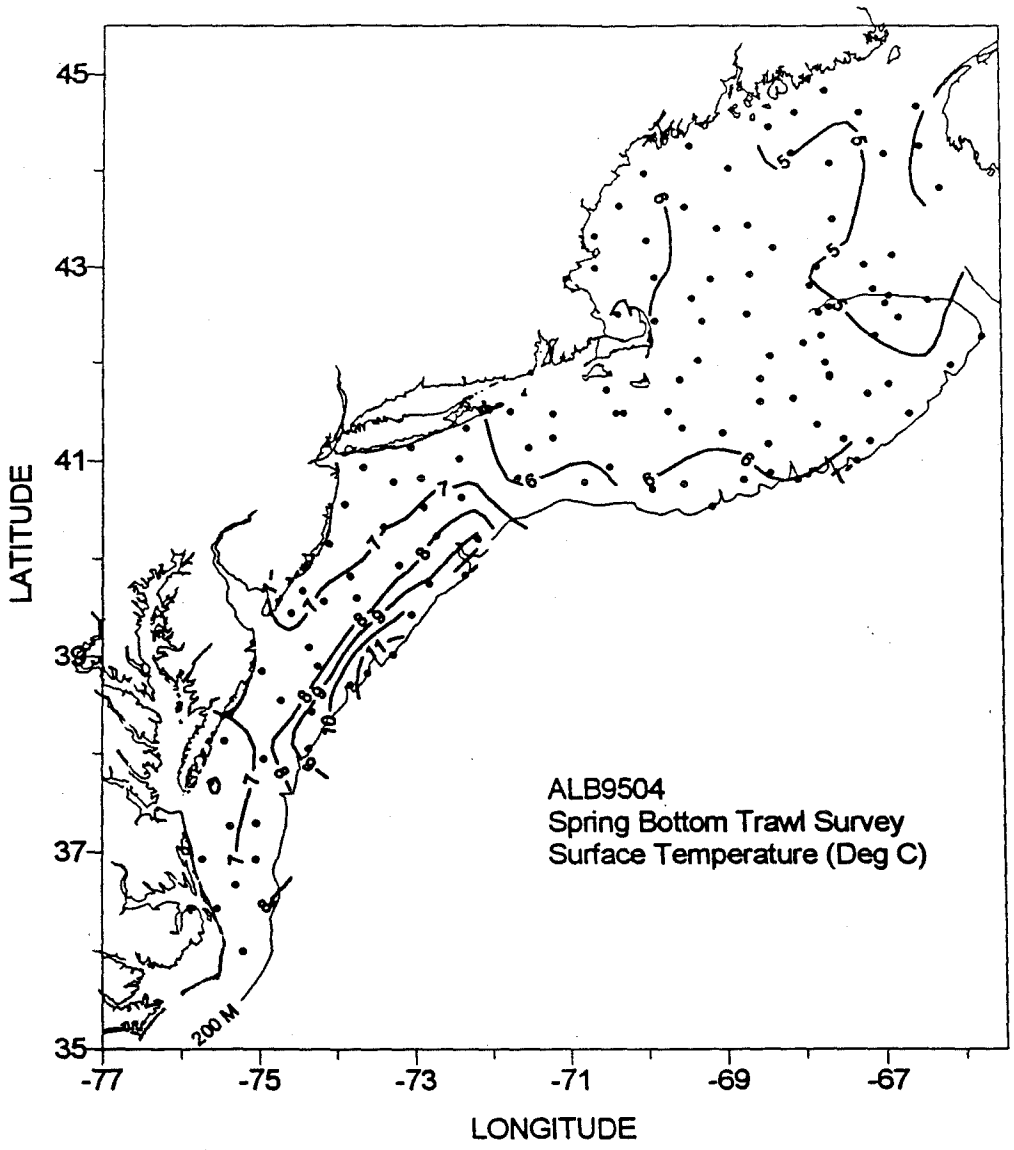

Figure 32. The surface temperature distribution for the Spring Bottom Trawl Survey ALB9504.

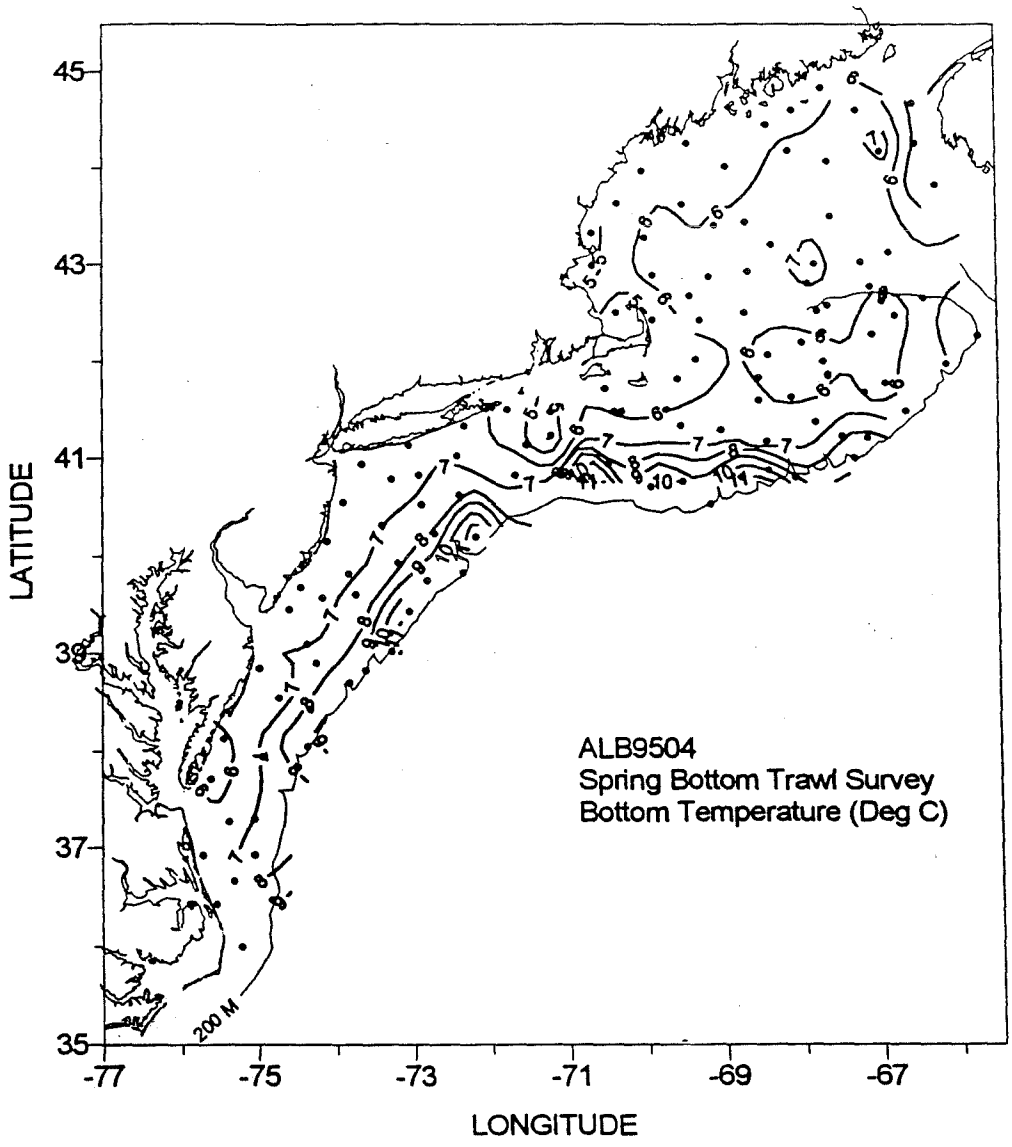

Figure 33. The bottom temperature distribution for the Spring Bottom Trawl Survey ALB9504.

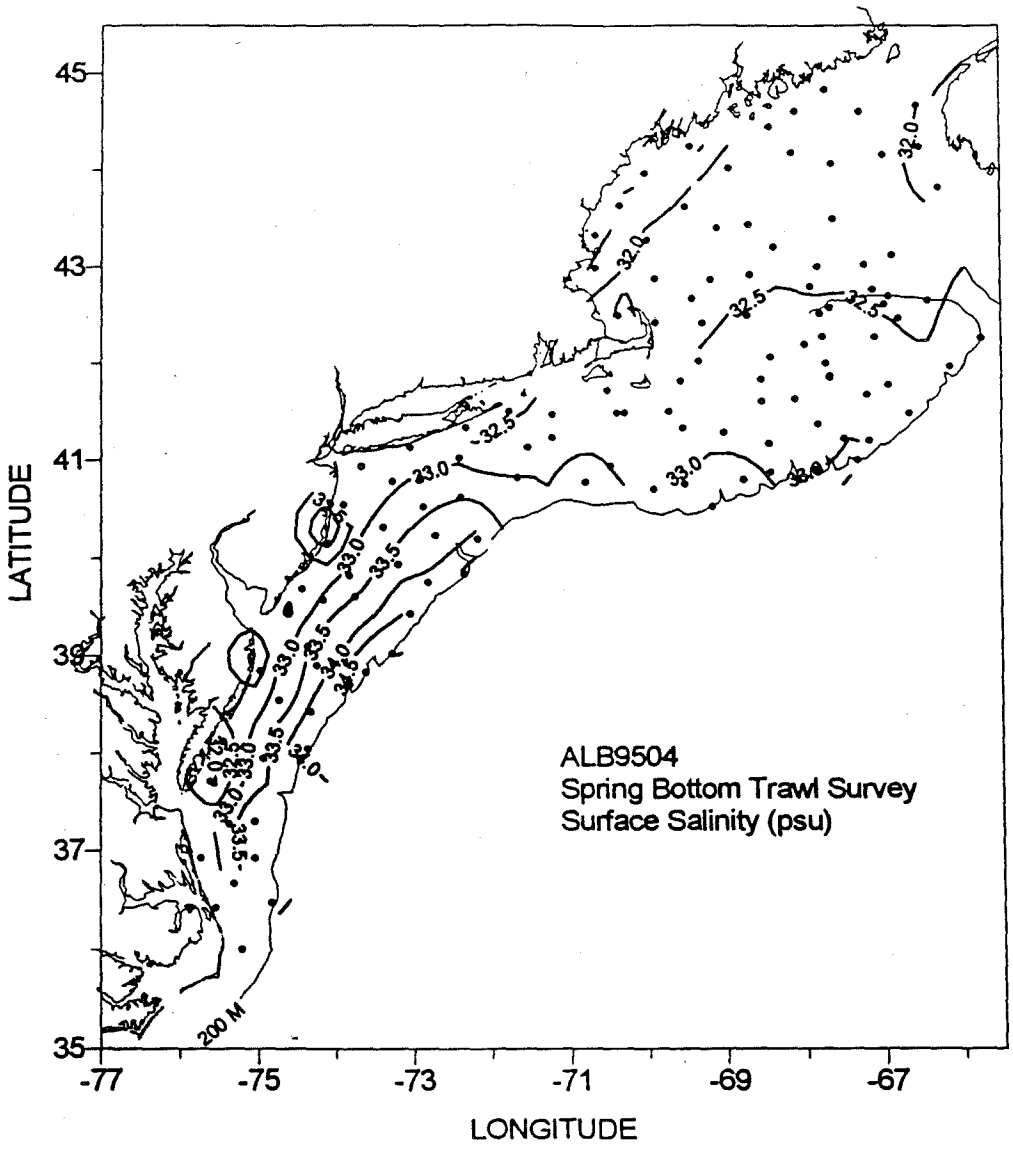

Figure 34. The surface salinity distribution for the Spring Bottom Trawl Survey ALB9504.

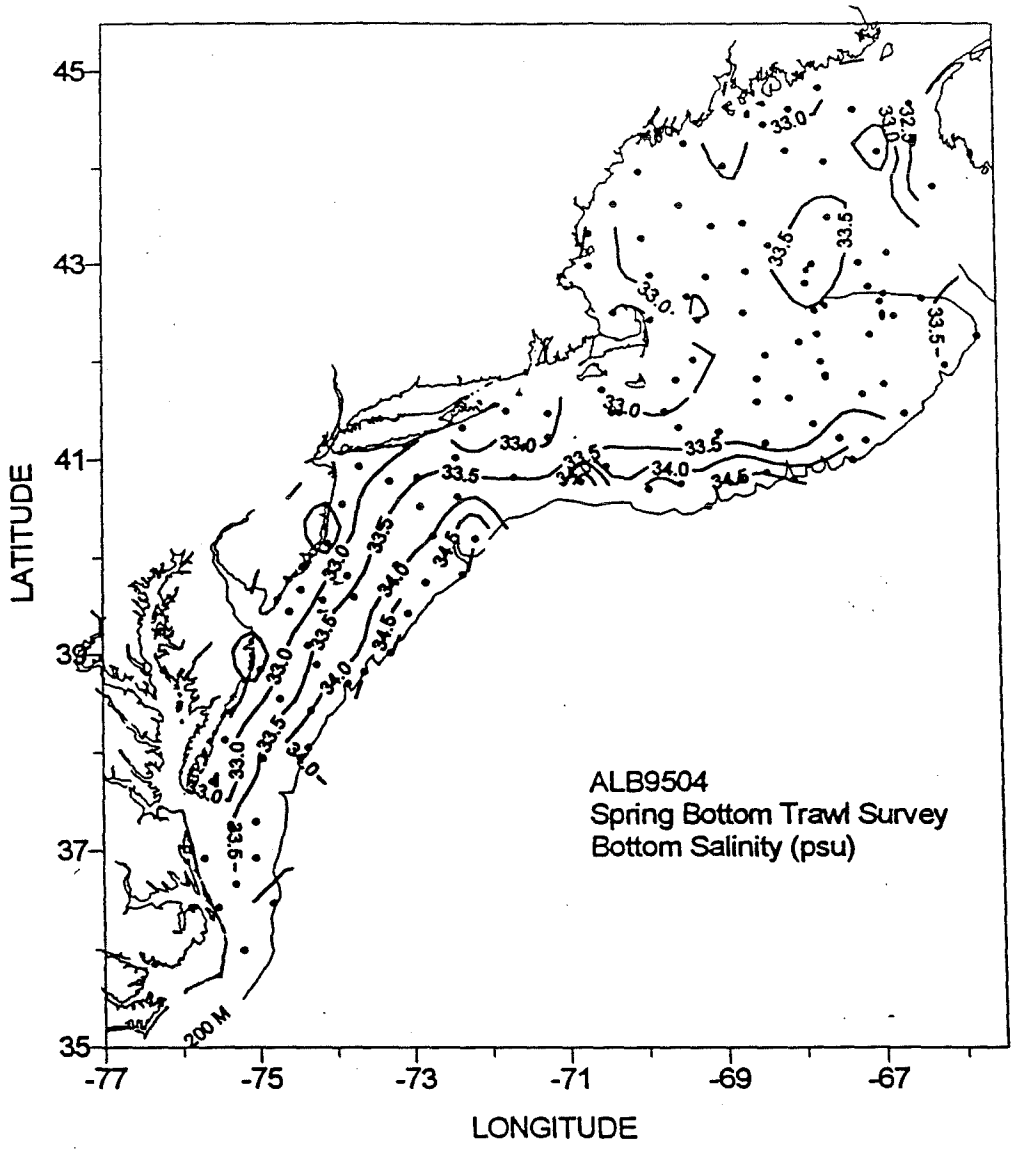

Figure 35. The bottom salinity distribution for the Spring Bottom Trawl Survey ALB9504.

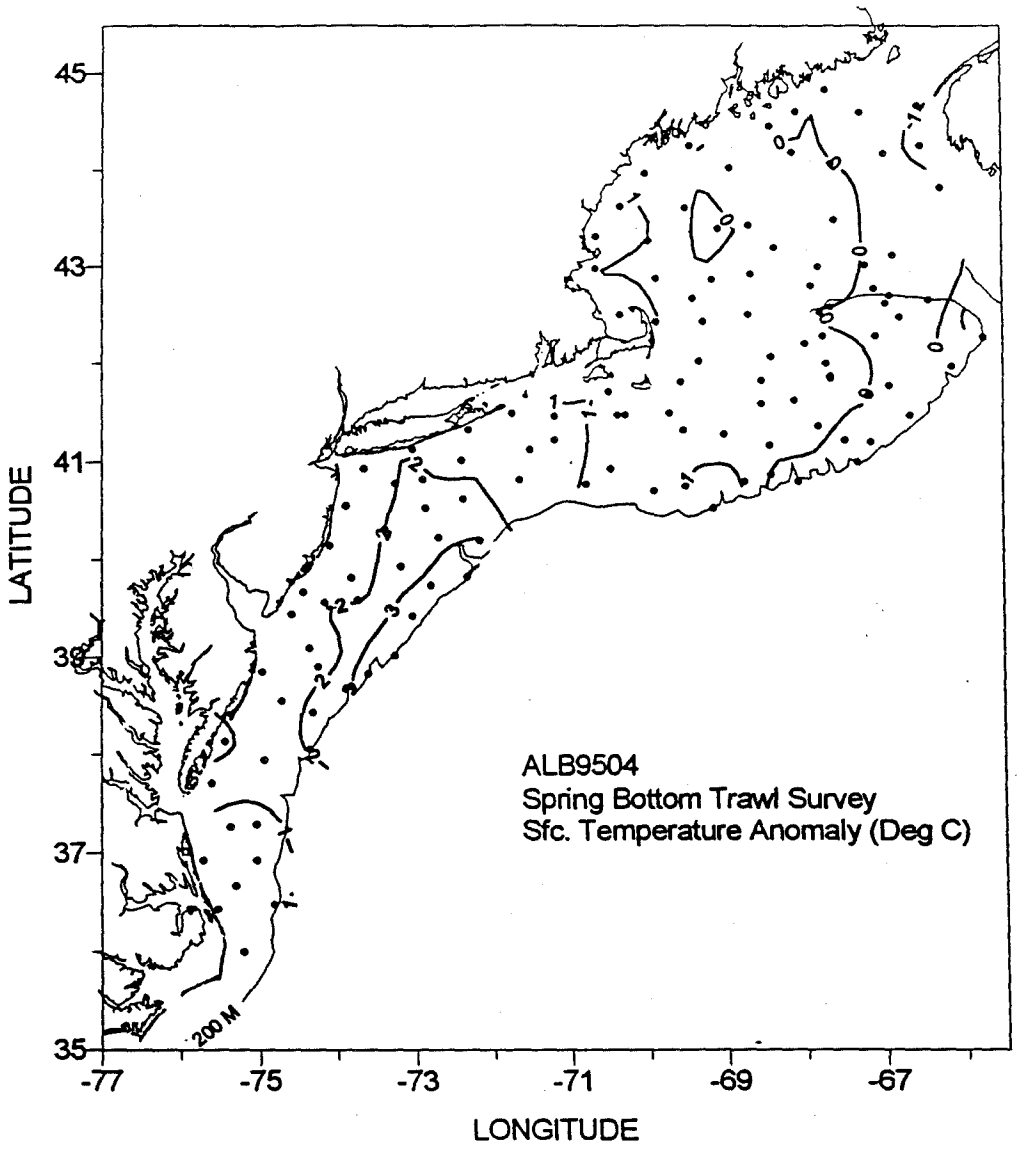

Figure 36. The surface temperature anomaly distribution for the Spring Bottom Trawl Survey ALB9504.

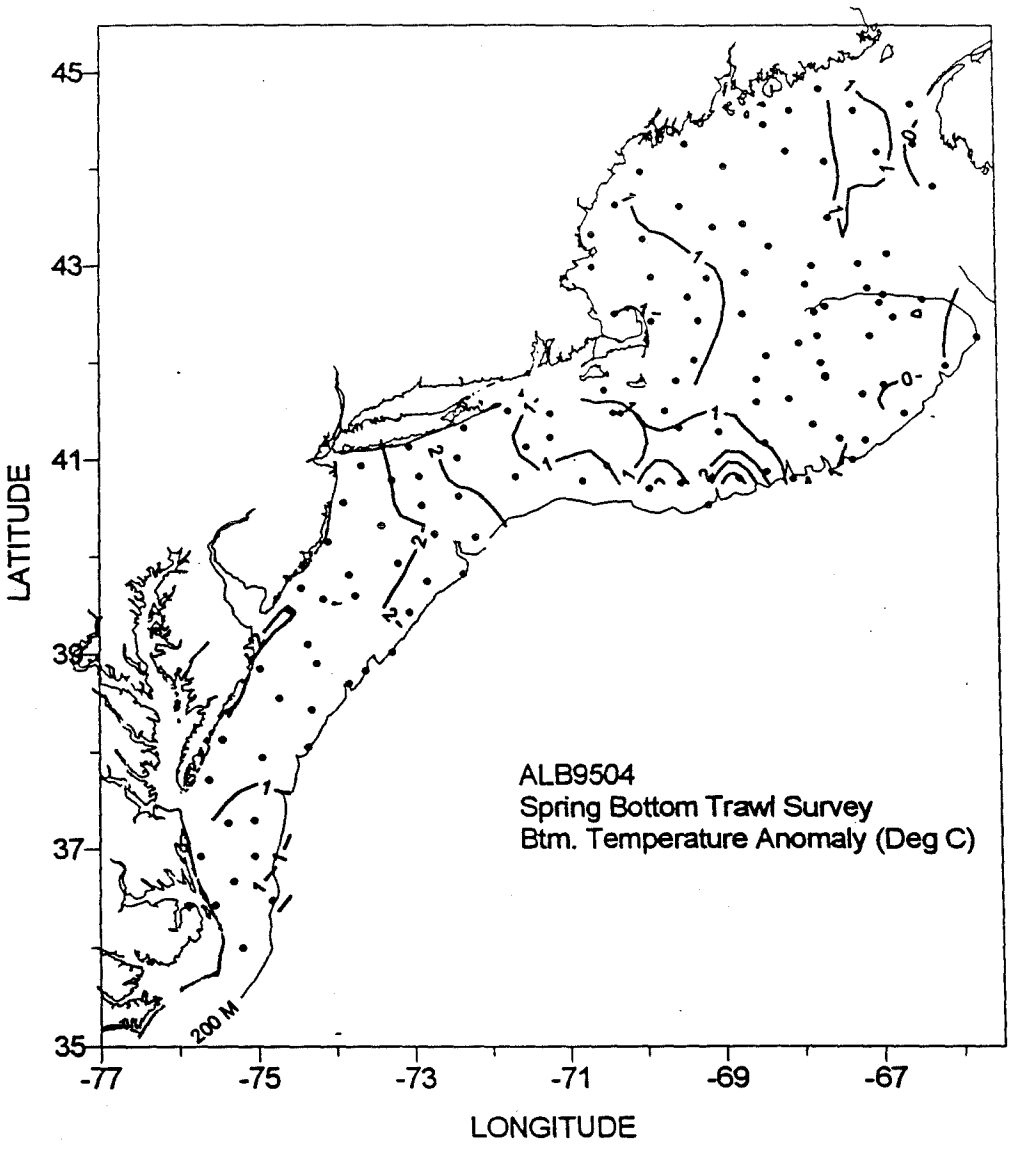

Figure 37. The bottom temperature anomaly distribution for the Spring Bottom Trawl Survey ALB9504.

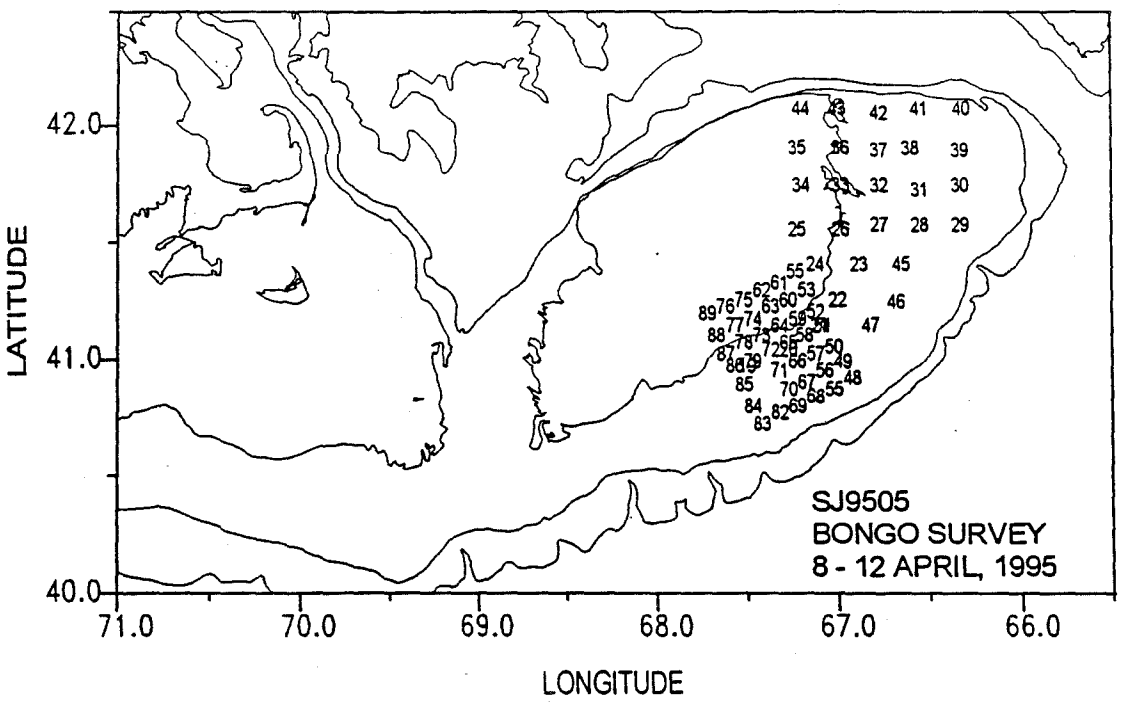

Figure 38. Hydrographic stations occupied during the U.S. GLOBEC Process Cruise SJ9505.

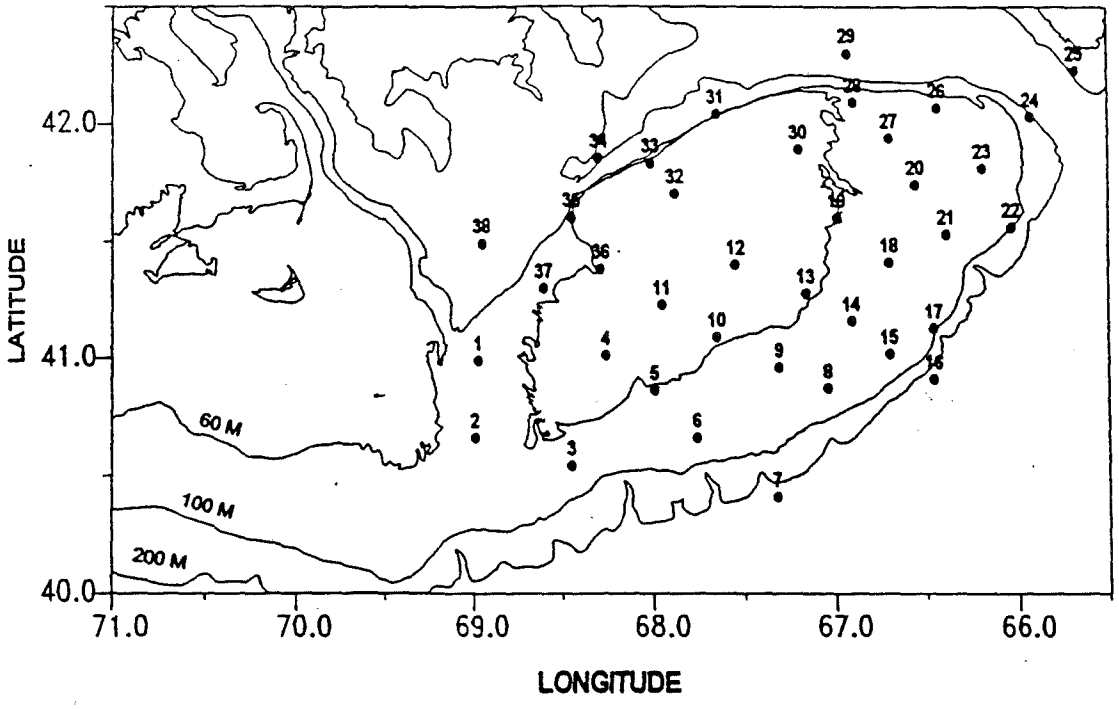

Figure 39. Hydrographic stations occupied during the U.S. GLOBEC Broad Scale Survey END9565.

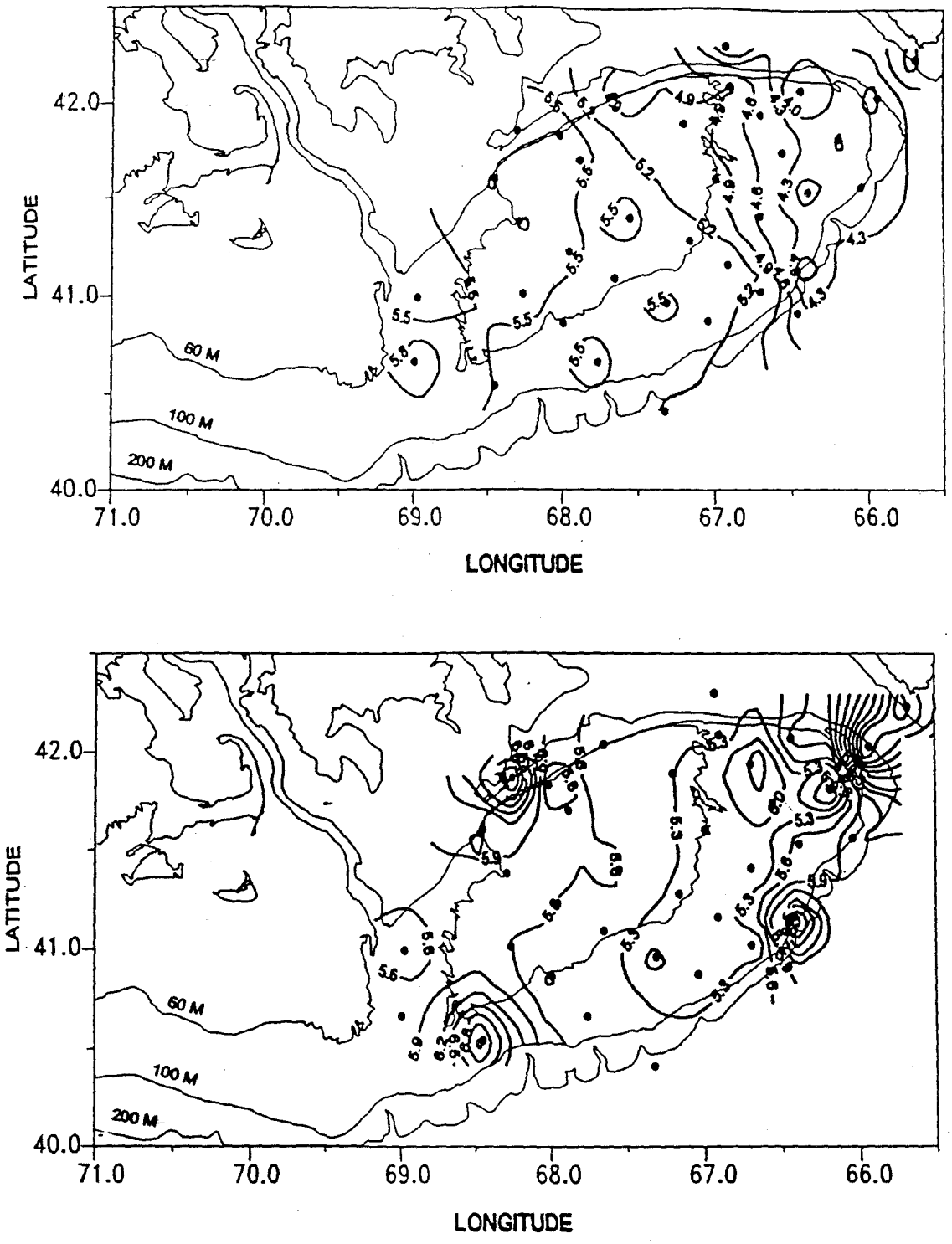

Figure 40. The surface and bottom temperature distribution for the U.S. GLOBEC Broad Scale Survey END9565.

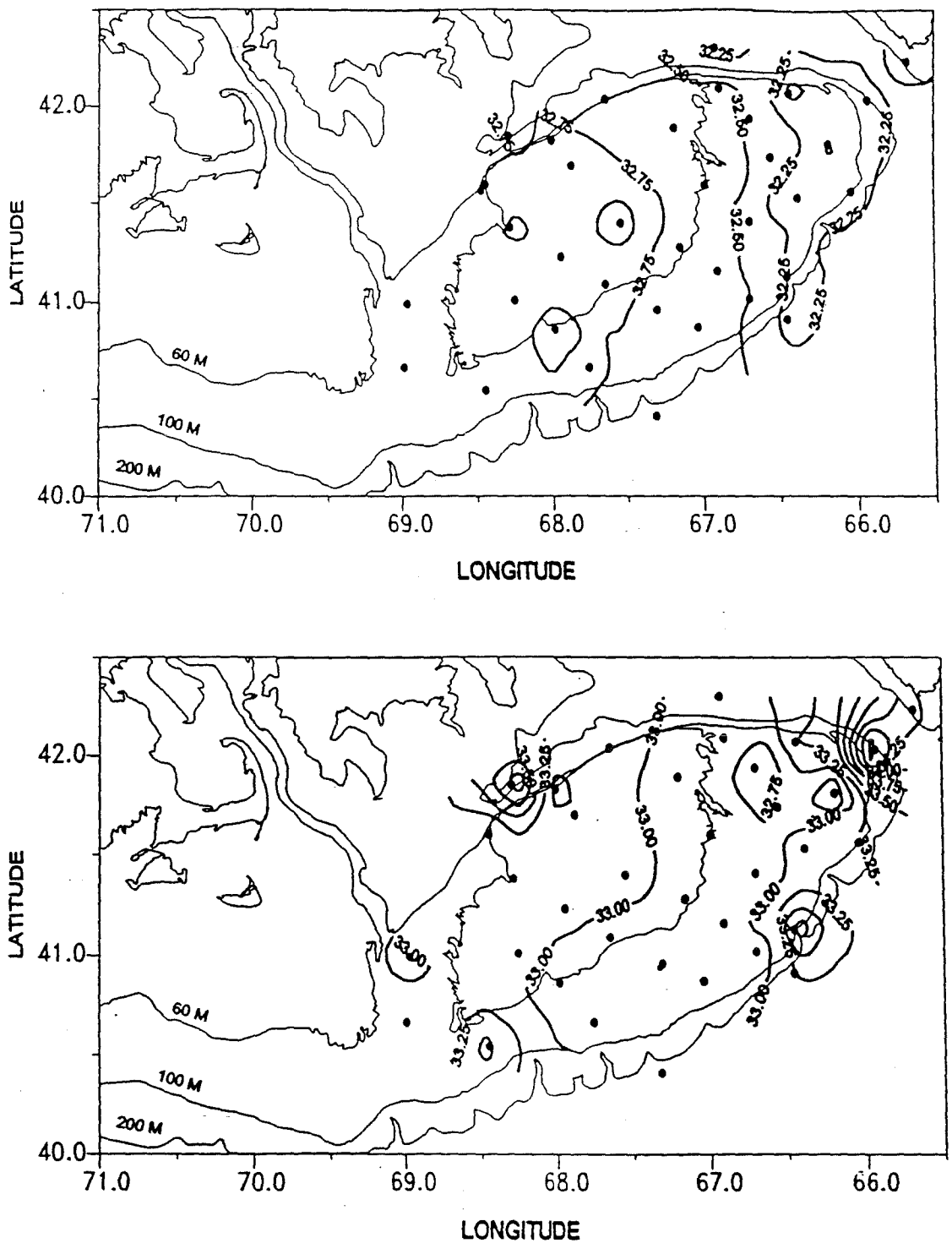

Figure 41. The surface and bottom salinity distribution for the U.S. GLOBEC Broad Scale Survey END9565.

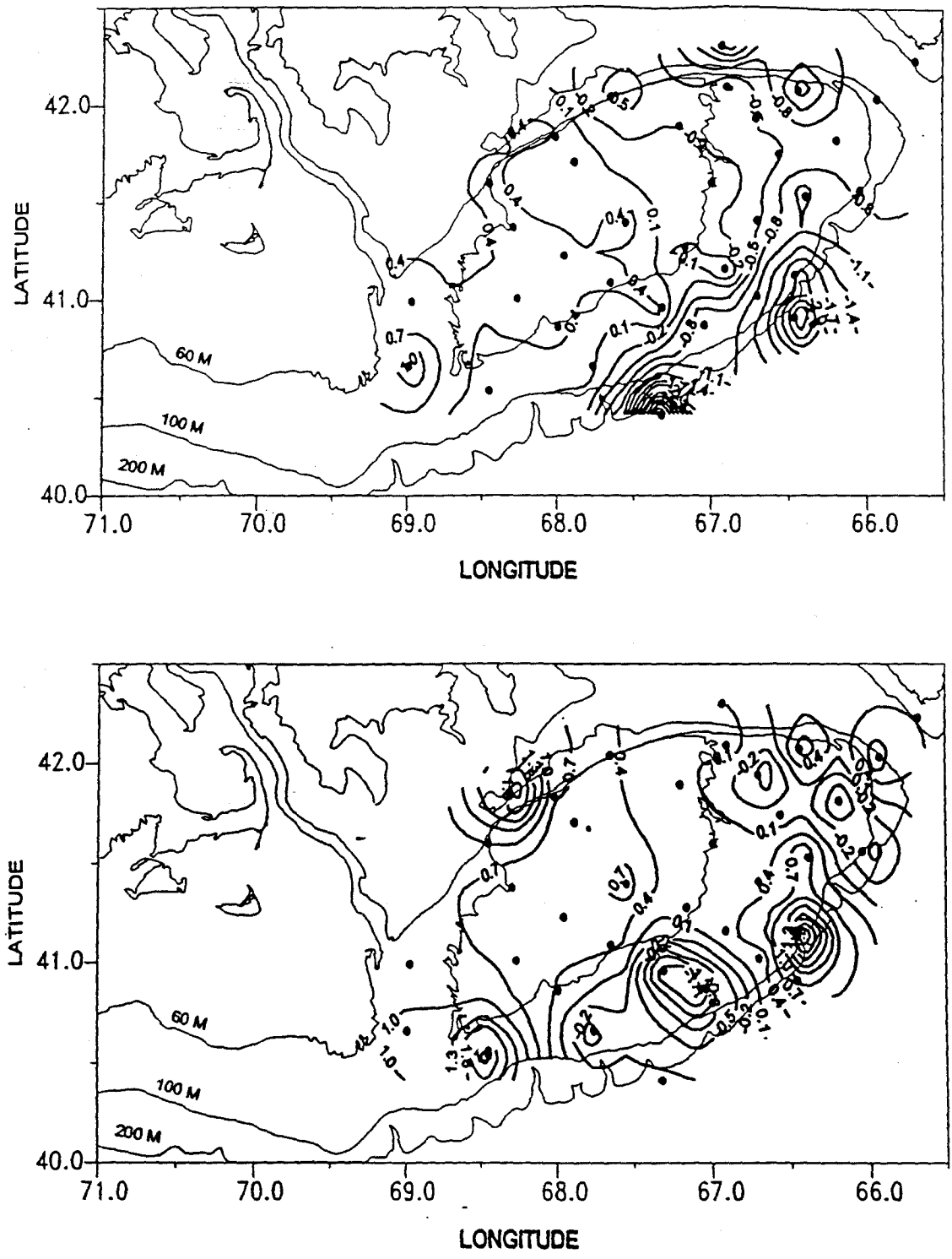

Figure 42. The surface and bottom temperature anomaly distribution for the U.S. GLOBEC Broad Scale Survey END9565.

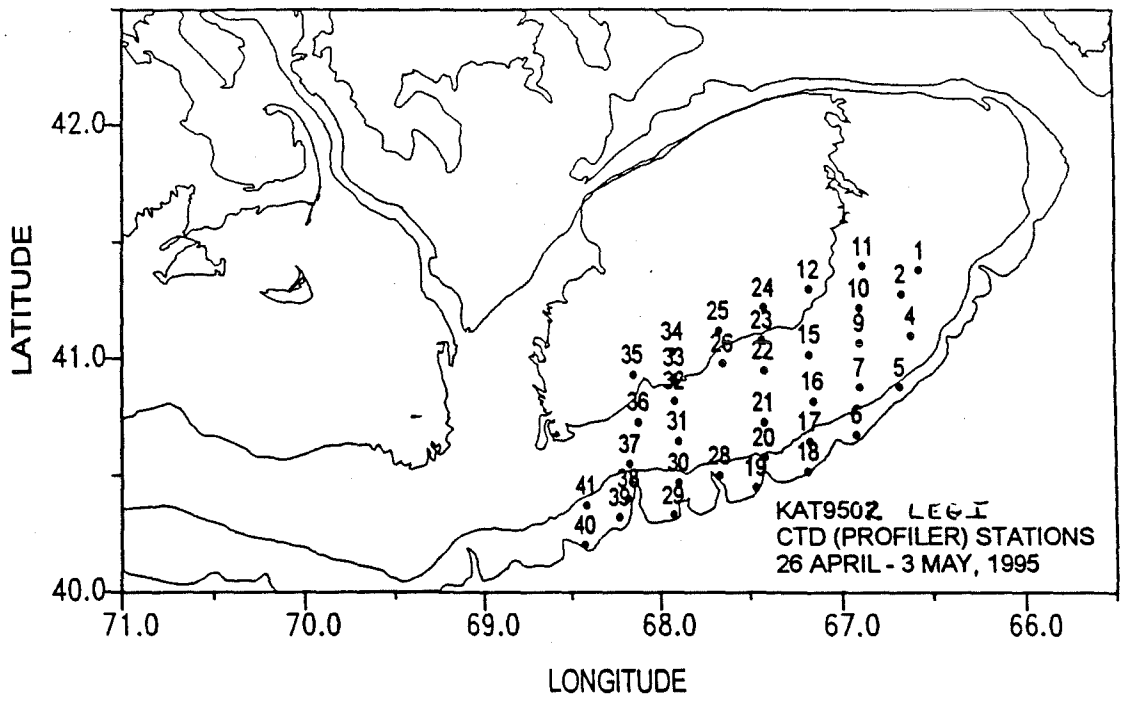

Figure 43. Hydrographic stations occupied during the Predator/Prey Study KAT9502, leg I.

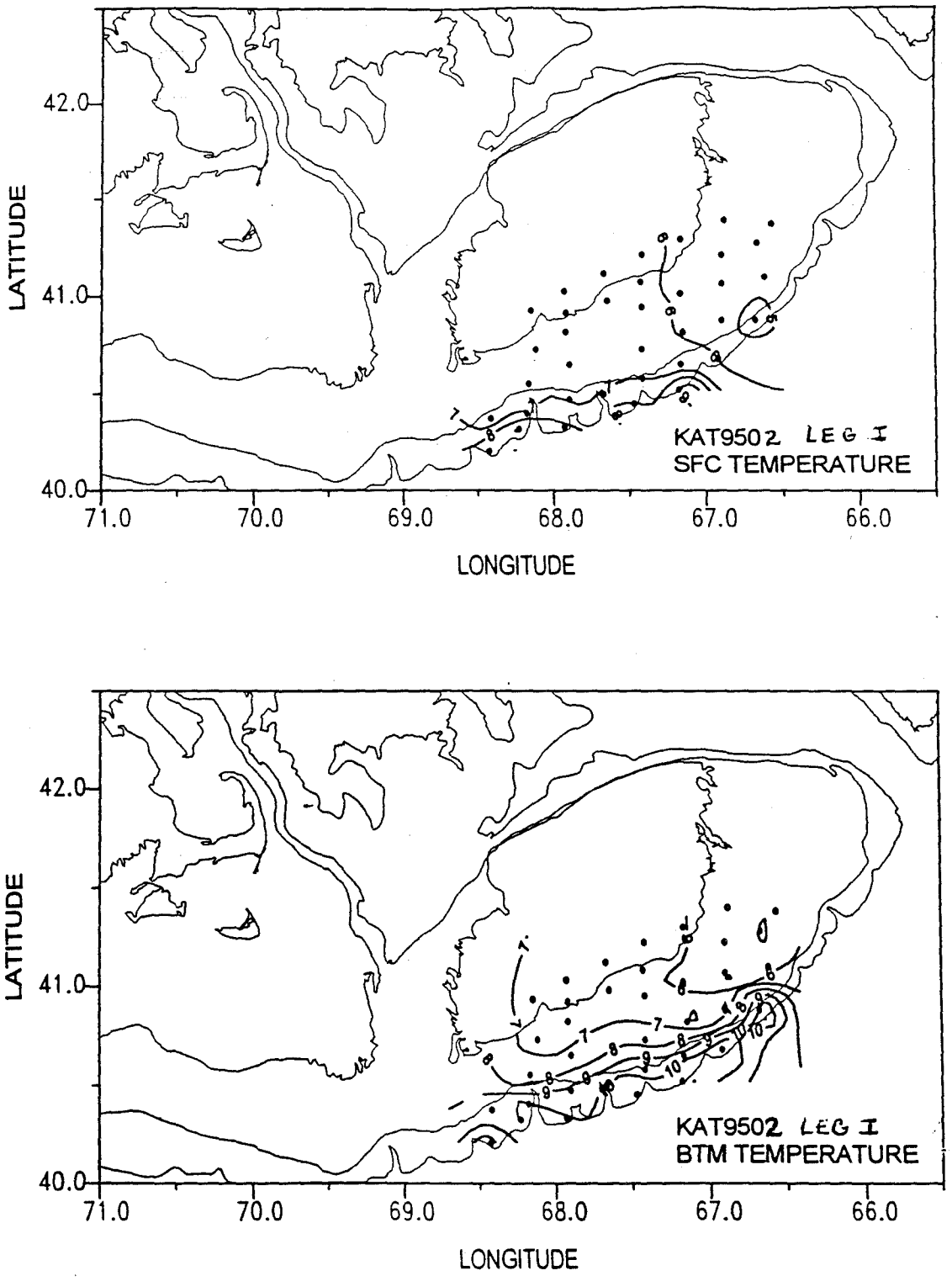

Figure 44. The surface and bottom temperature distribution for the Predator/Prey Study KAT9502, leg I.

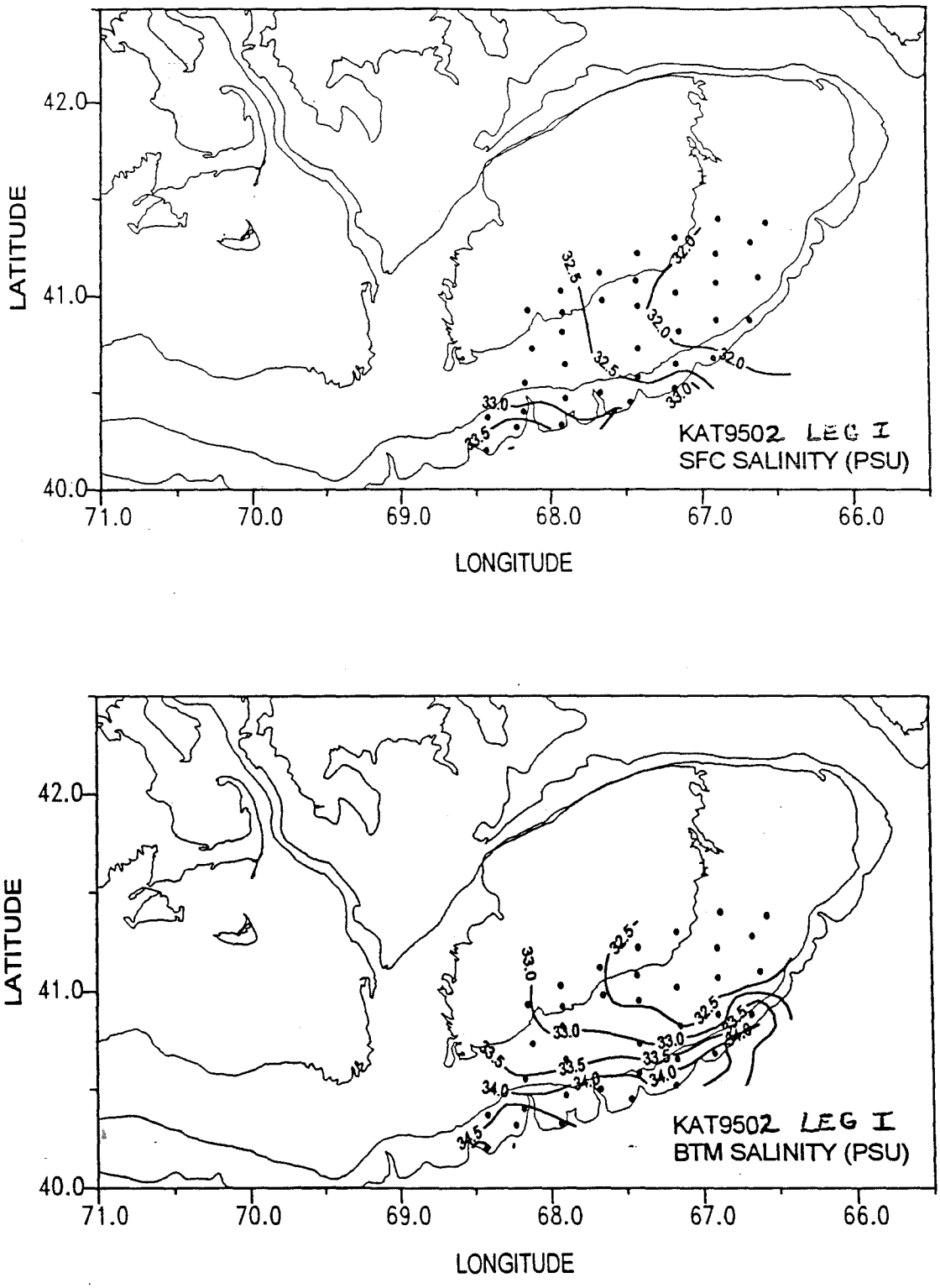

Figure 45. The surface and bottom salinity distribution for the Predator/Prey Study KAT9502, leg I.

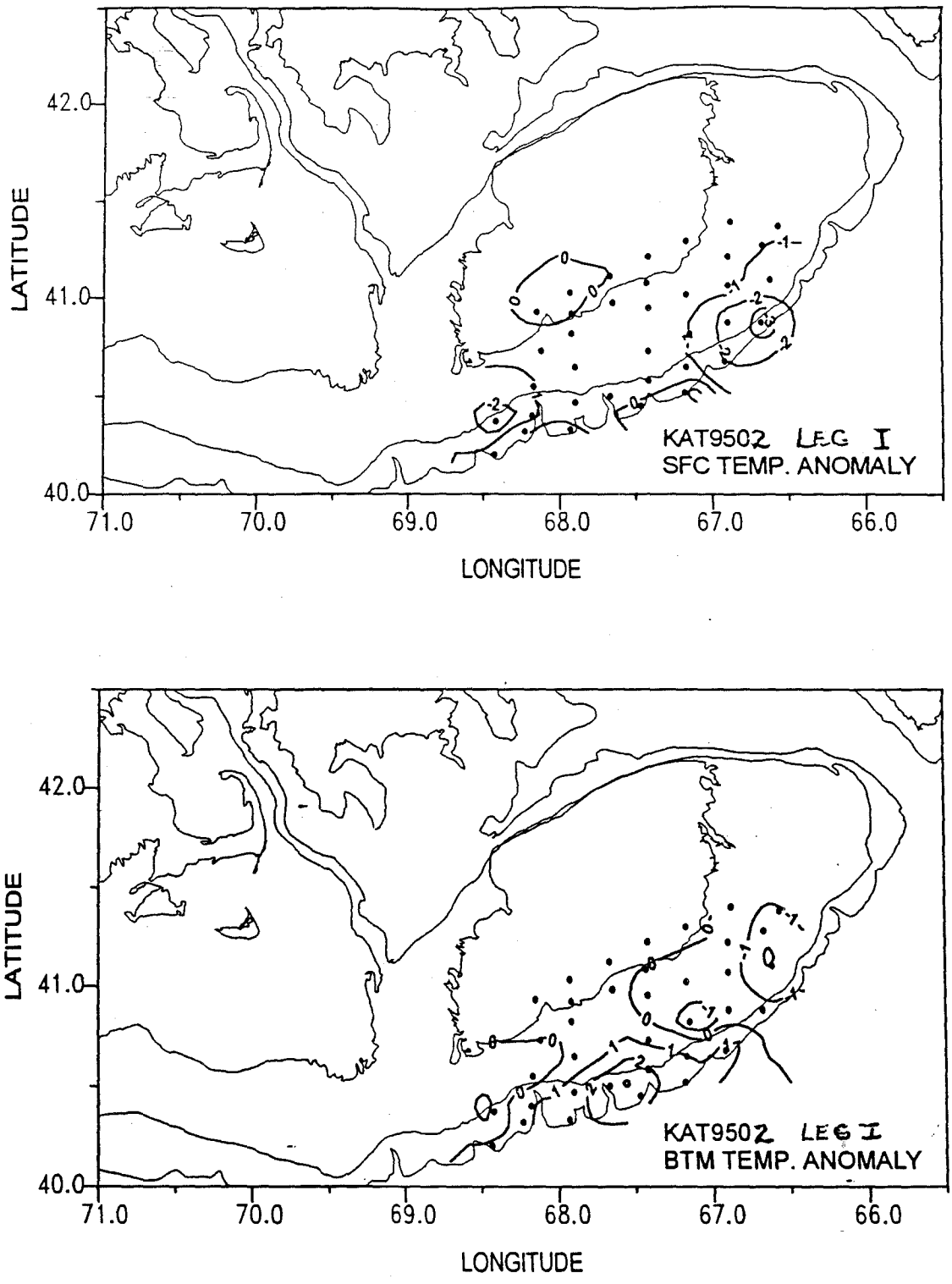

Figure 46. The surface and bottom temperature anomaly distribution for the Predator/Prey Study KAT9502, leg I.

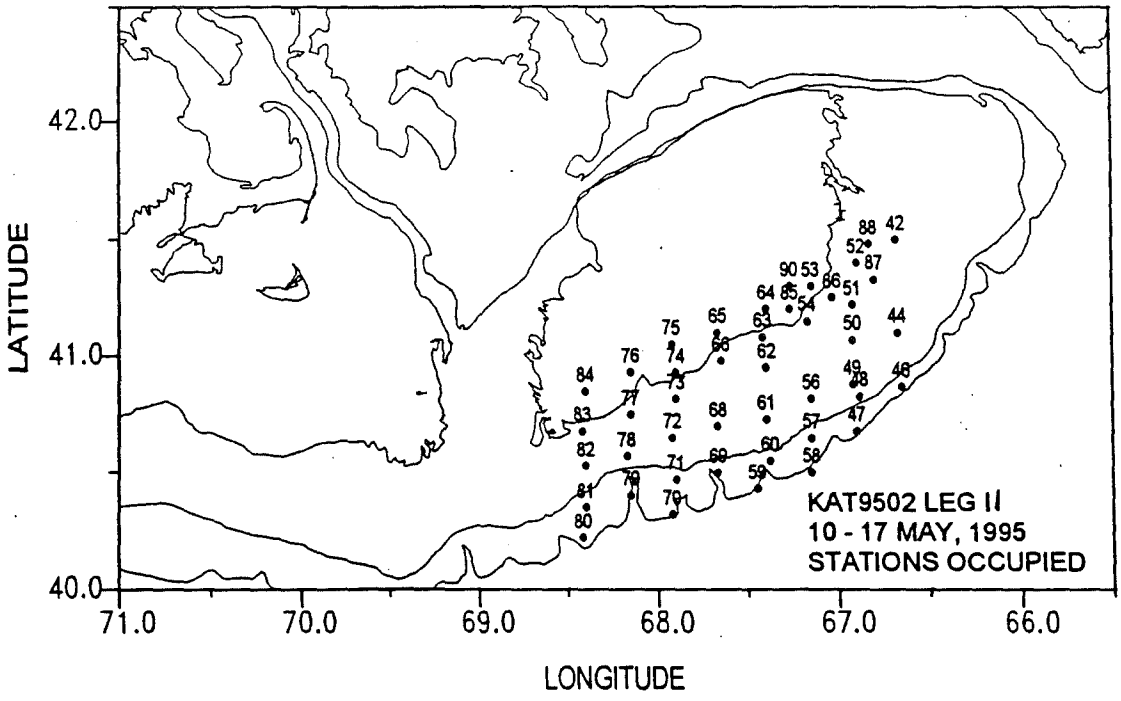

Figure 47. Hydrographic stations occupied during the Predator/Prey Study KAT9502, leg II.

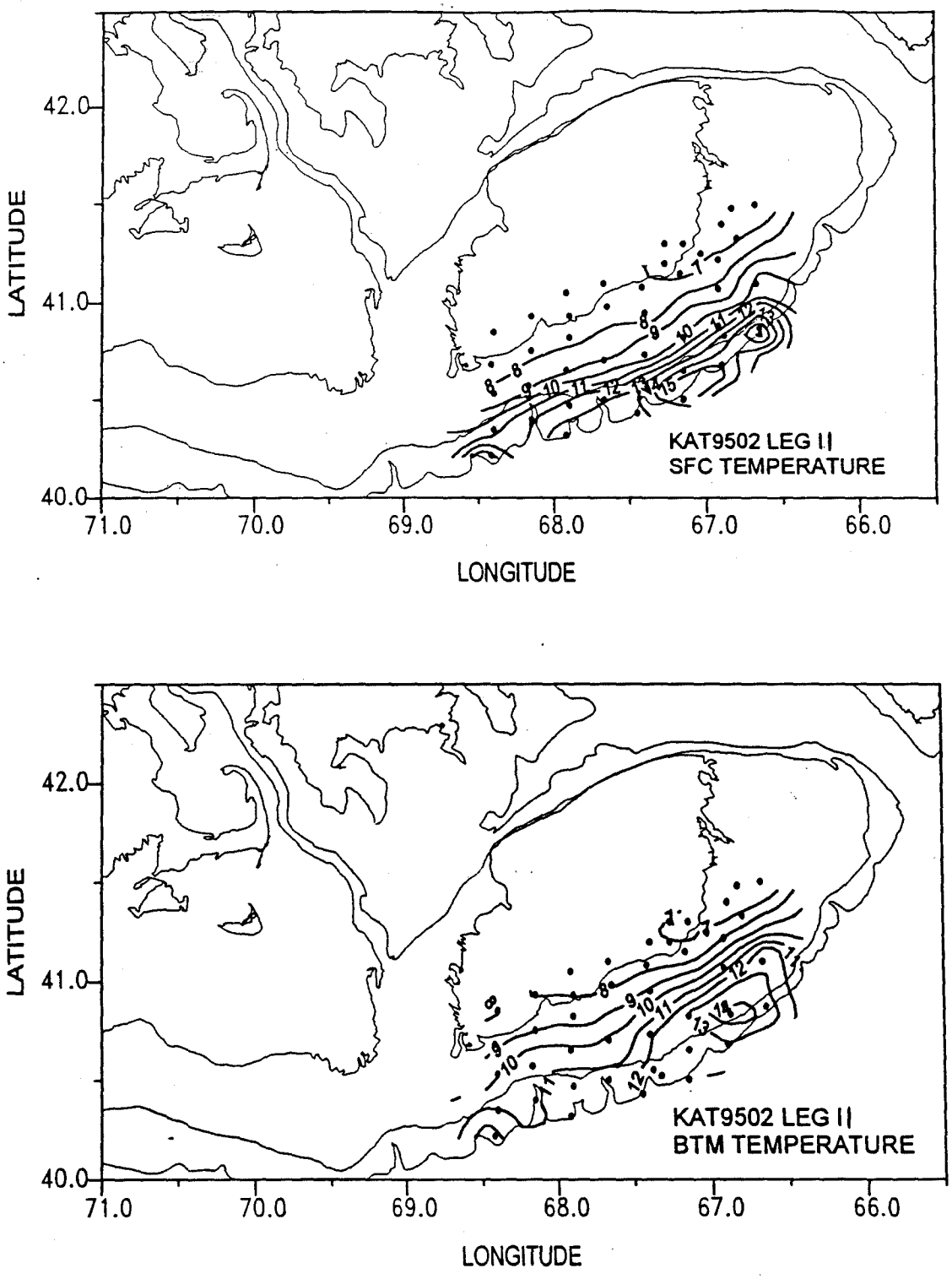

Figure 48. The surface and bottom temperature distribution for the Predator/Prey Study KAT9502, leg II.

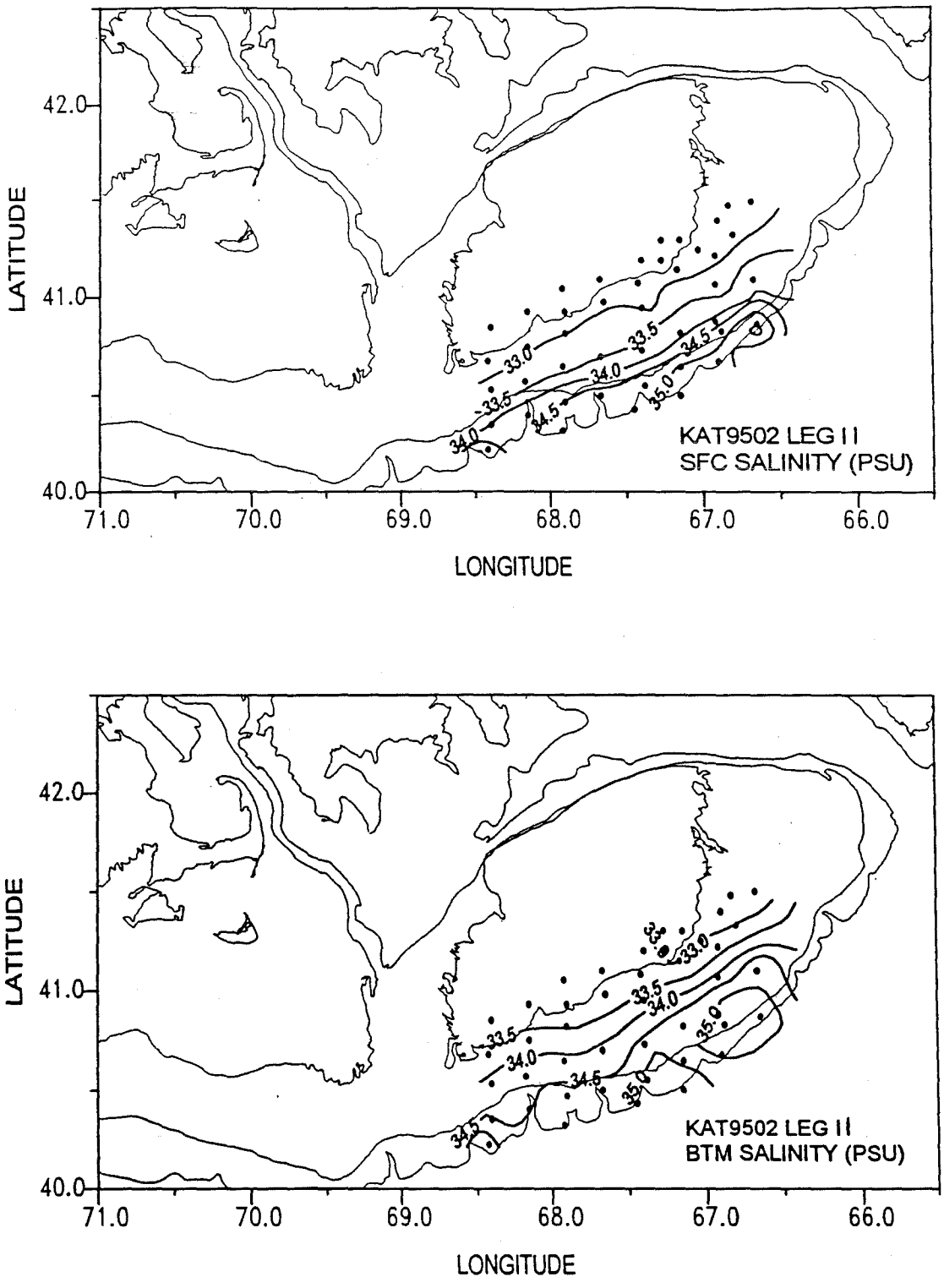

Figure 49. The surface and bottom salinity distribution for the Predator/Prey Study KAT9502, leg II.

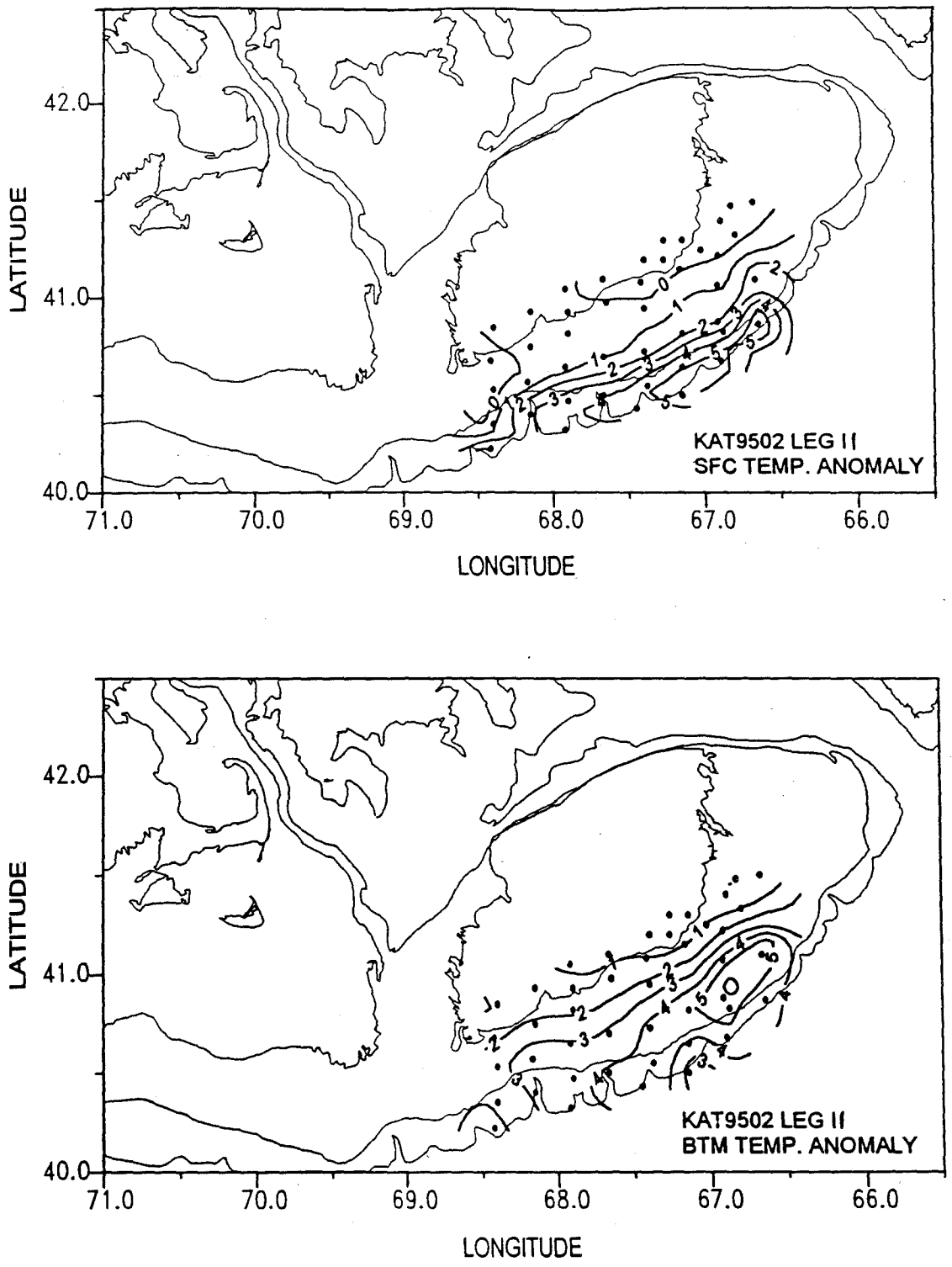

Figure 50. The surface and bottom temperature anomaly distribution for the Predator/Prey Study KAT9502, leg II.

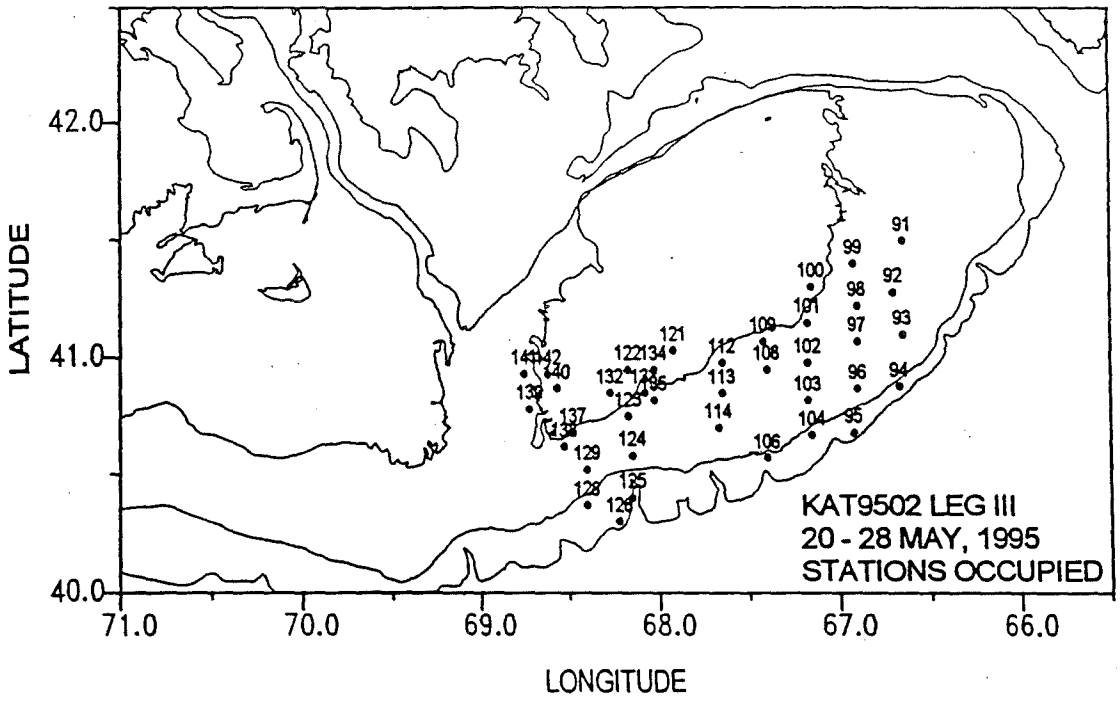

Figure 51. Hydrographic stations occupied during the Predator/Prey Study KAT9502, leg III.

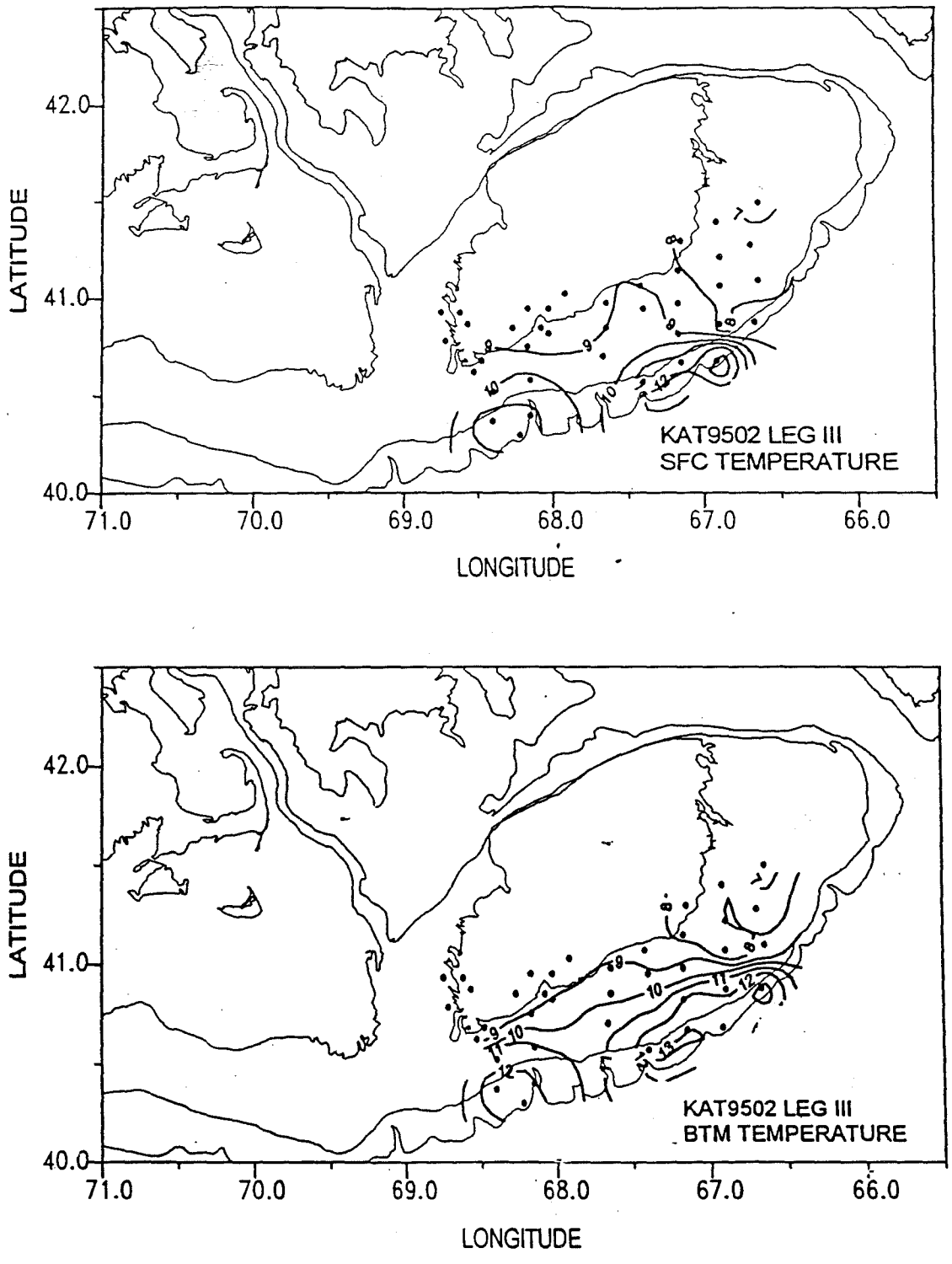

Figure 52. The surface and bottom temperature distribution for the Predator/Prey Study KAT9502, leg III.

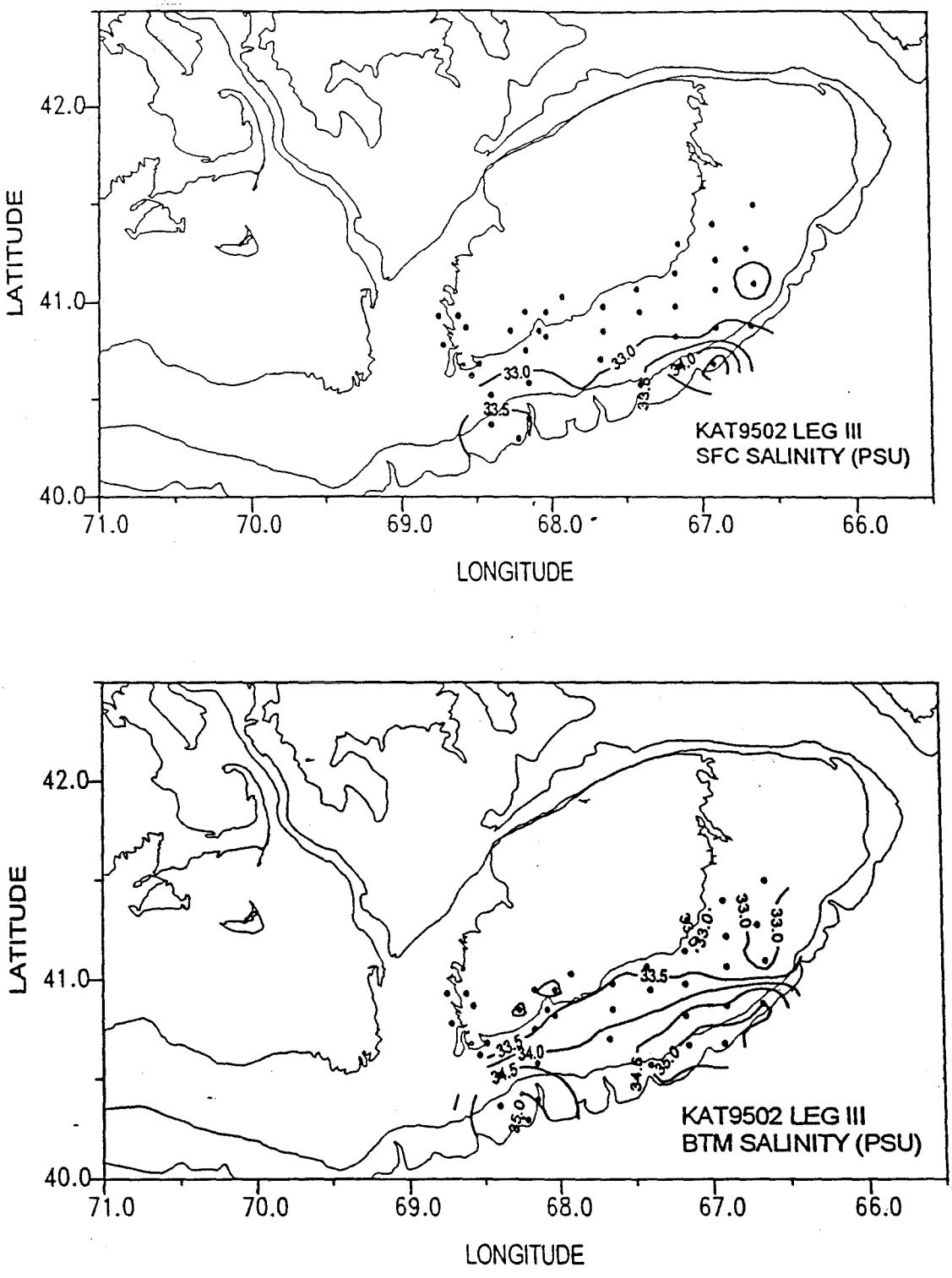

Figure 53. The surface and bottom salinity distribution for the Predator/Prey Study KAT9502, leg III.

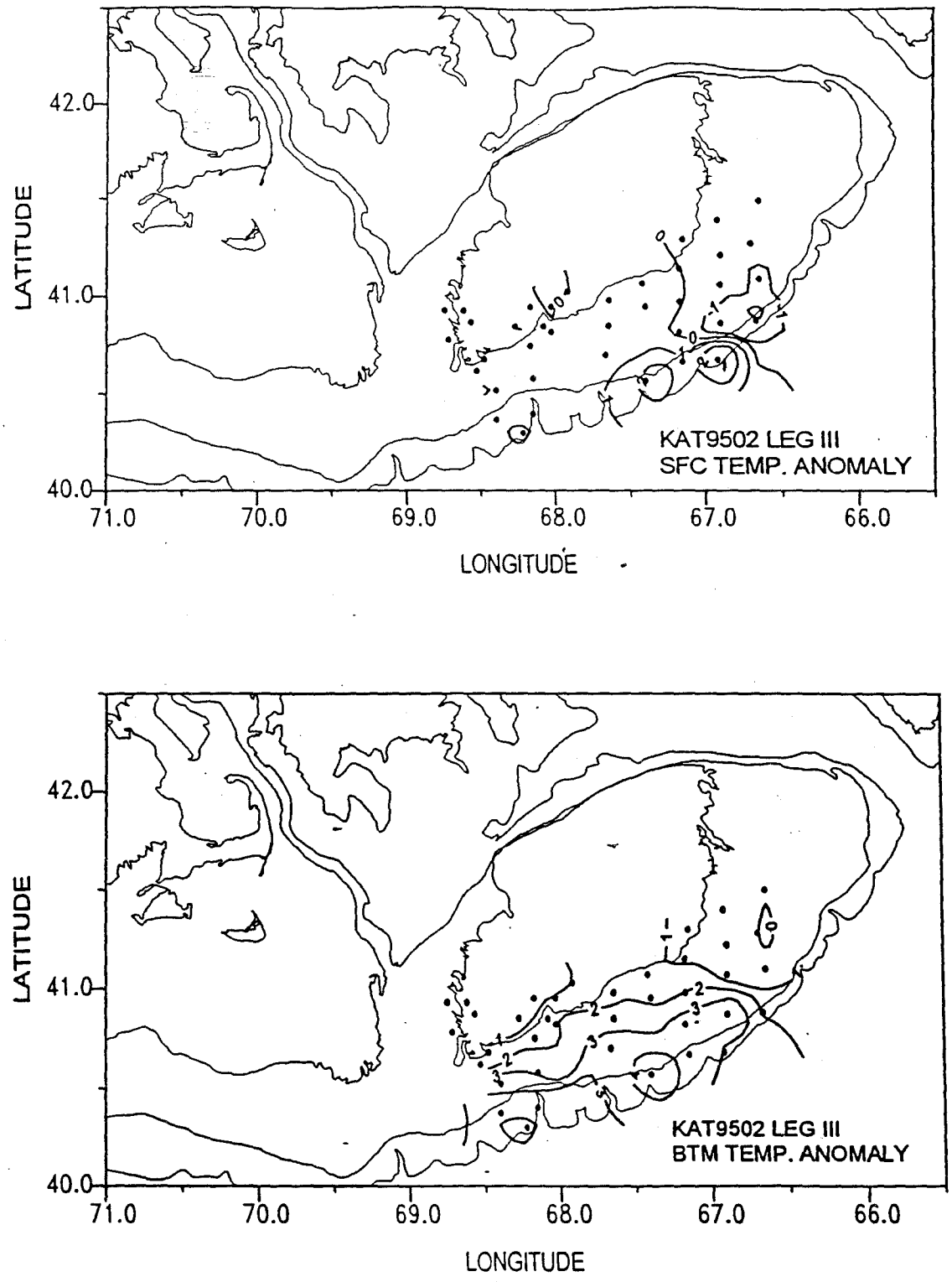

Figure 54. The surface and bottom temperature anomaly distribution for the Predator/Prey Study KAT9502, leg III.

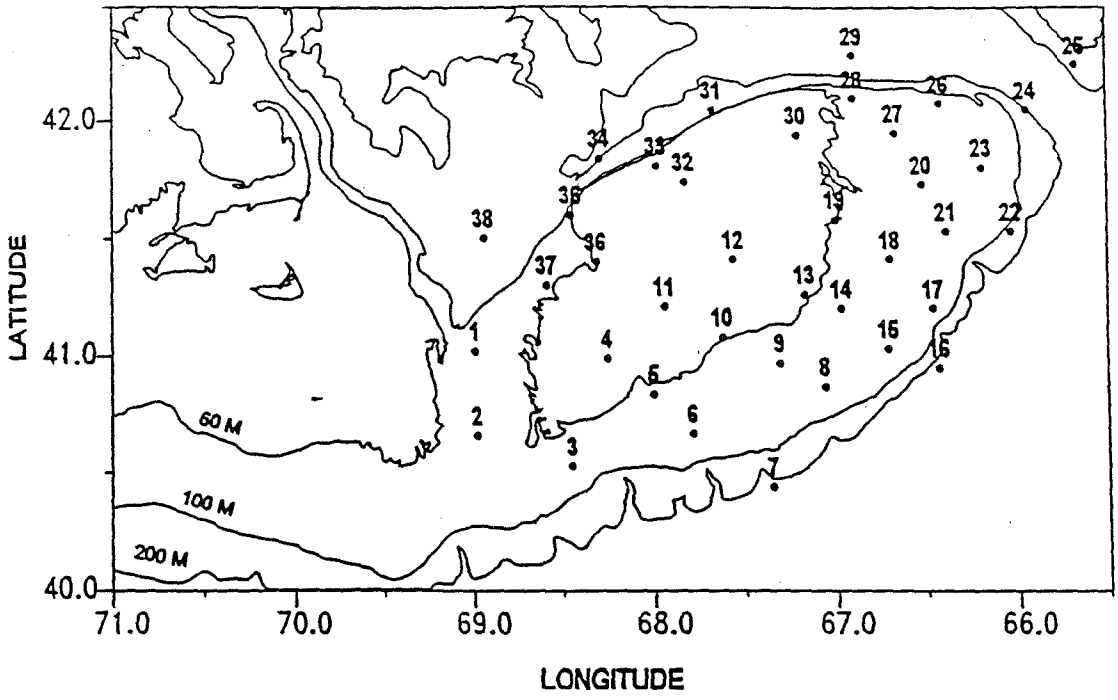

Figure 55. Hydrographic stations occupied during the U.S. GLOBEC Broad Scale Survey ALB9505.

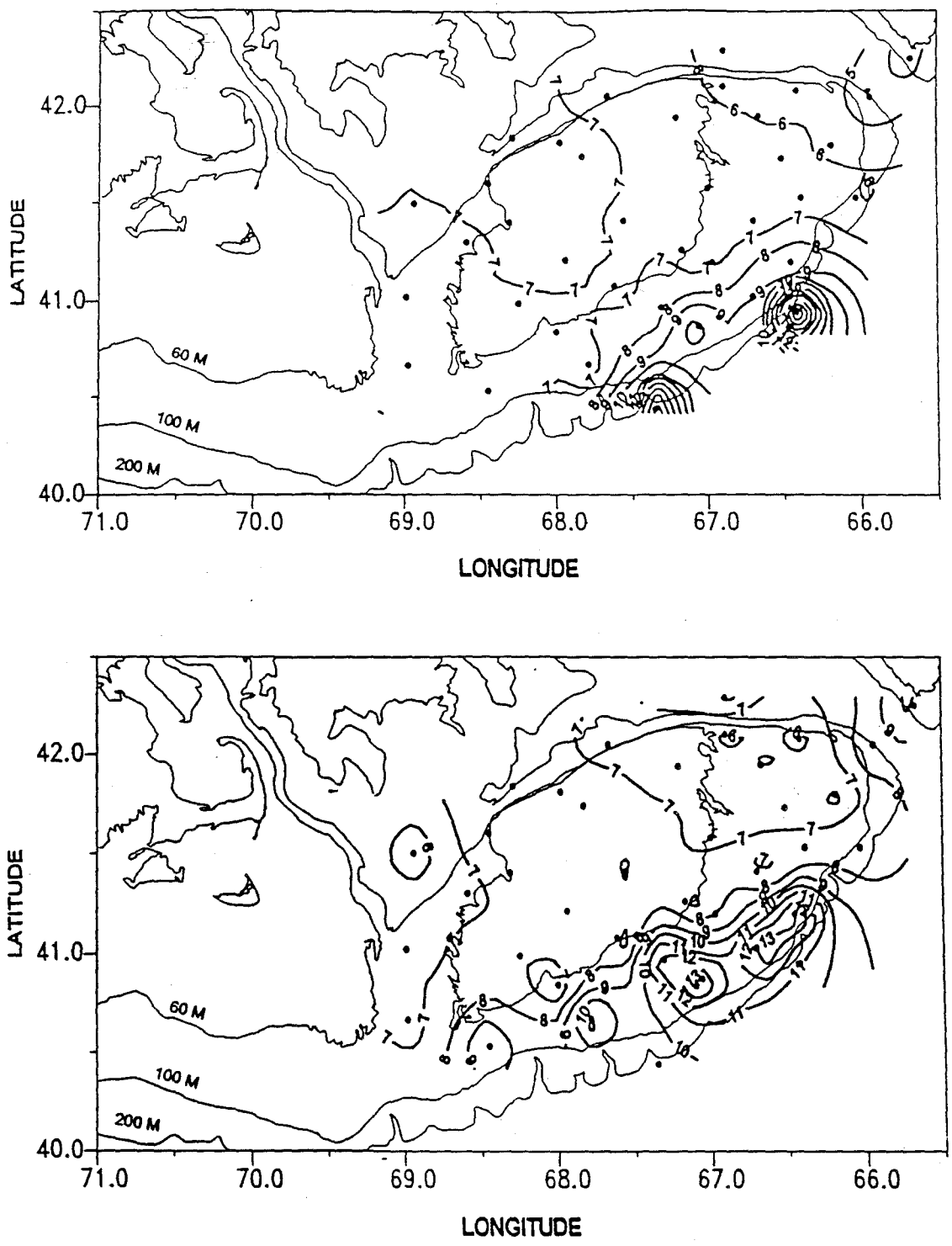

Figure 56. The surface and bottom temperature distribution for the U.S. GLOBEC Broad Scale Survey ALB9505.

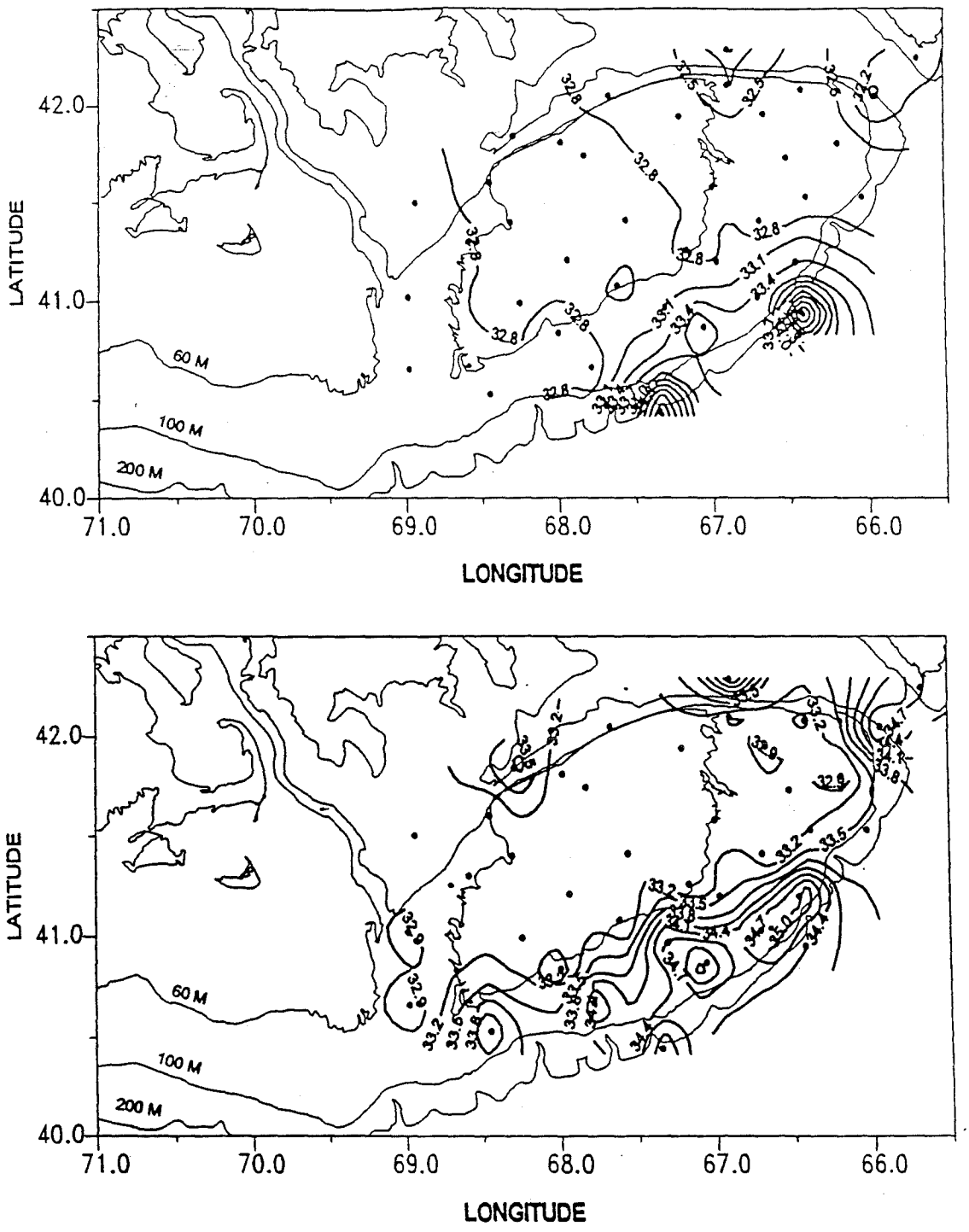

Figure 57. The surface and bottom salinity distribution for the U.S. GLOBEC Broad Scale Survey ALB9505.

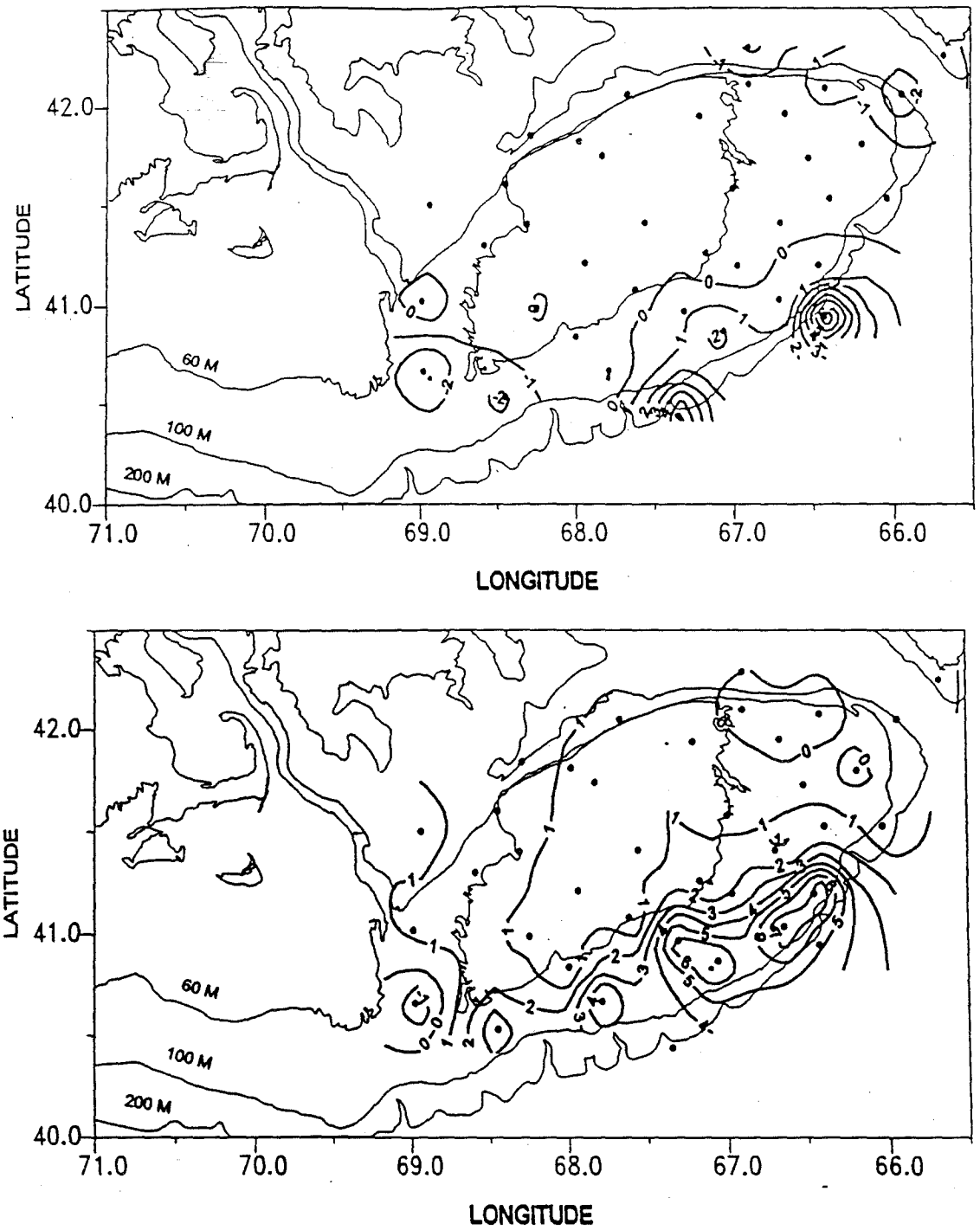

Figure 58. The surface and bottom temperature anomaly distribution during the U.S. GLOBEC Broad Scale Survey ALB9505.

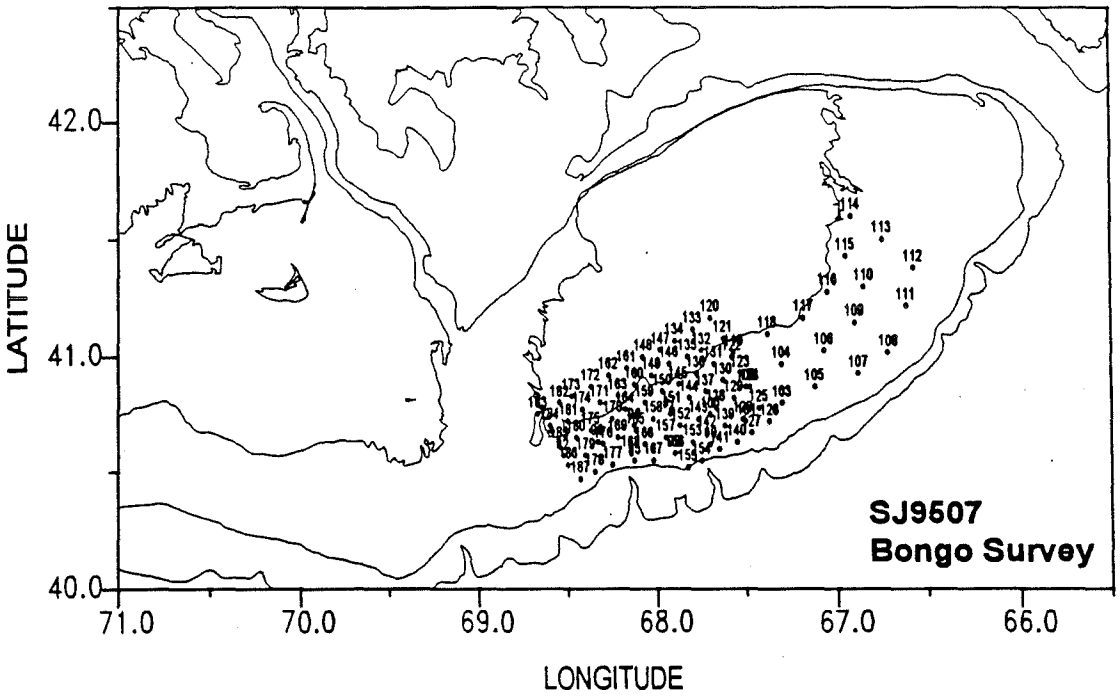

Figure 59. Hydrographic stations occupied during the U.S. GLOBEC Process Cruise SJ9507.

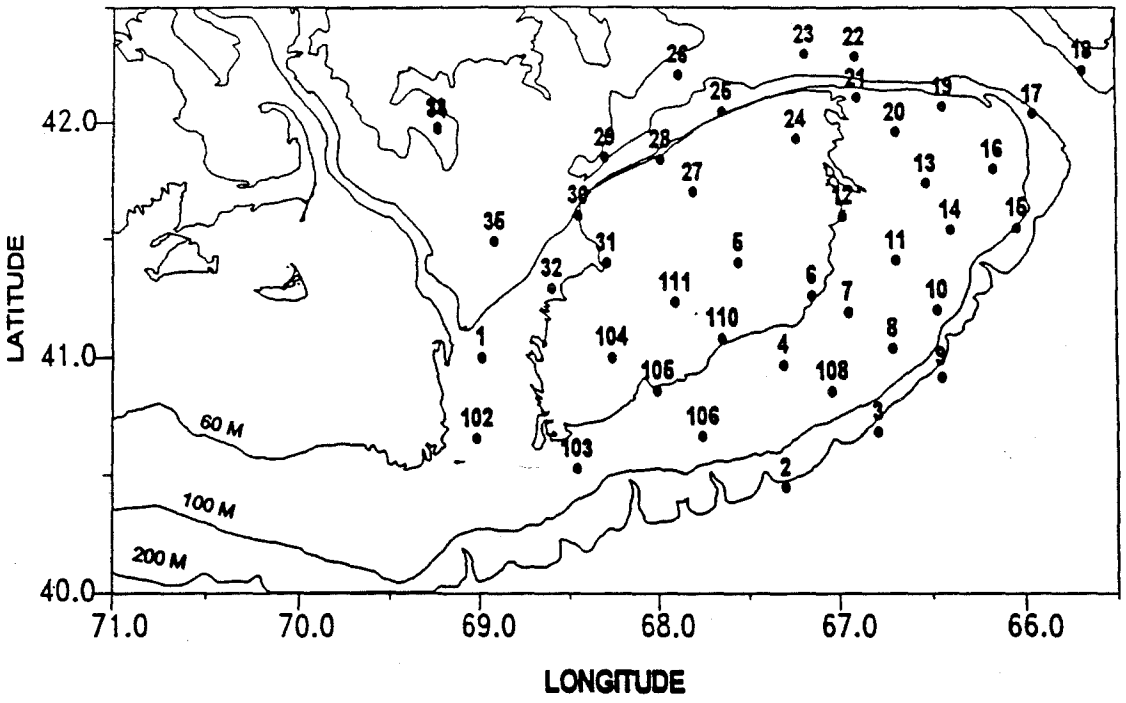

Figure 60. Hydrographic stations occupied during the U.S. GLOBEC Broad Scale Survey ALB9506.

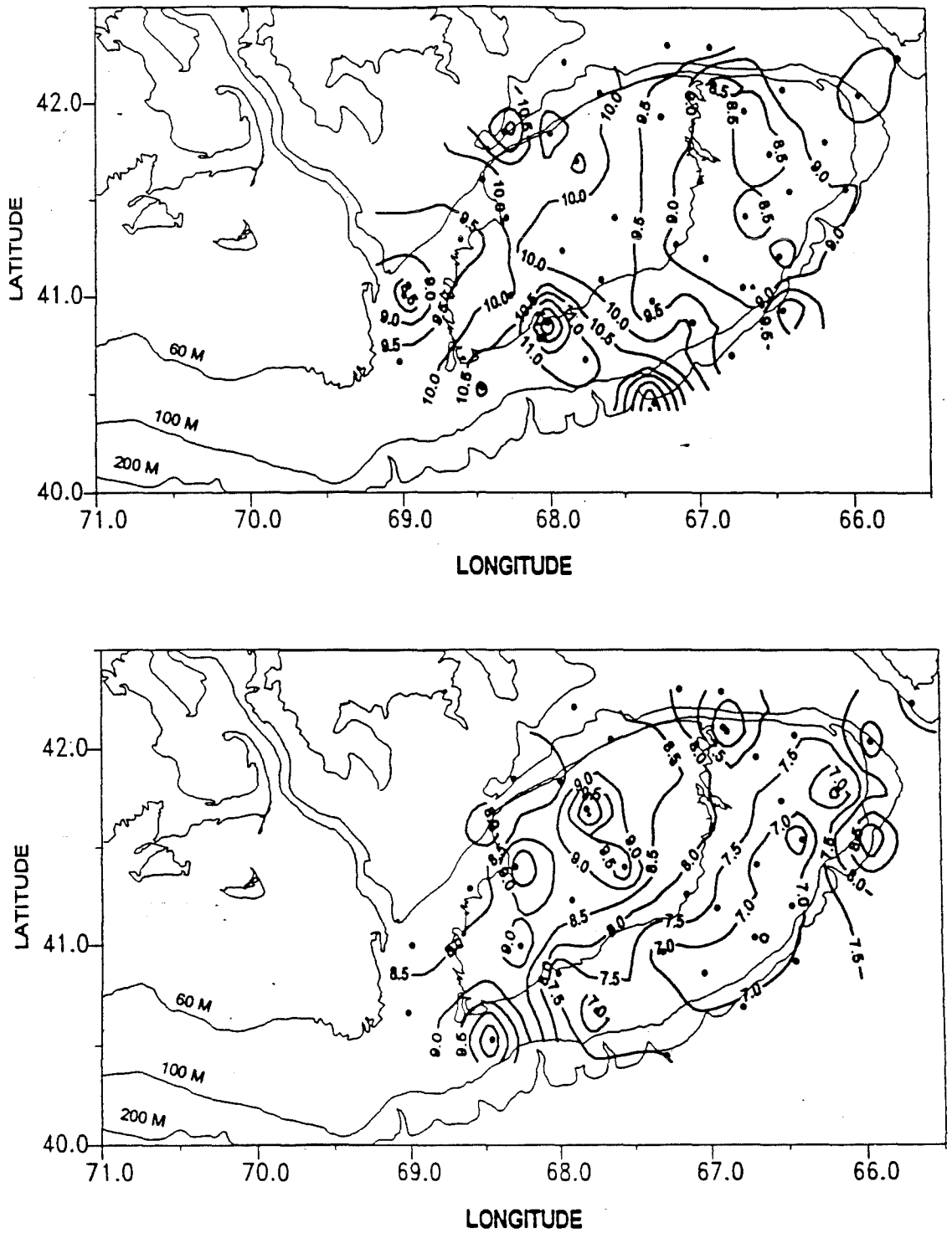

Figure 61. The surface and bottom temperature distribution for the U.S. GLOBEC Broad Scale Survey ALB9506.

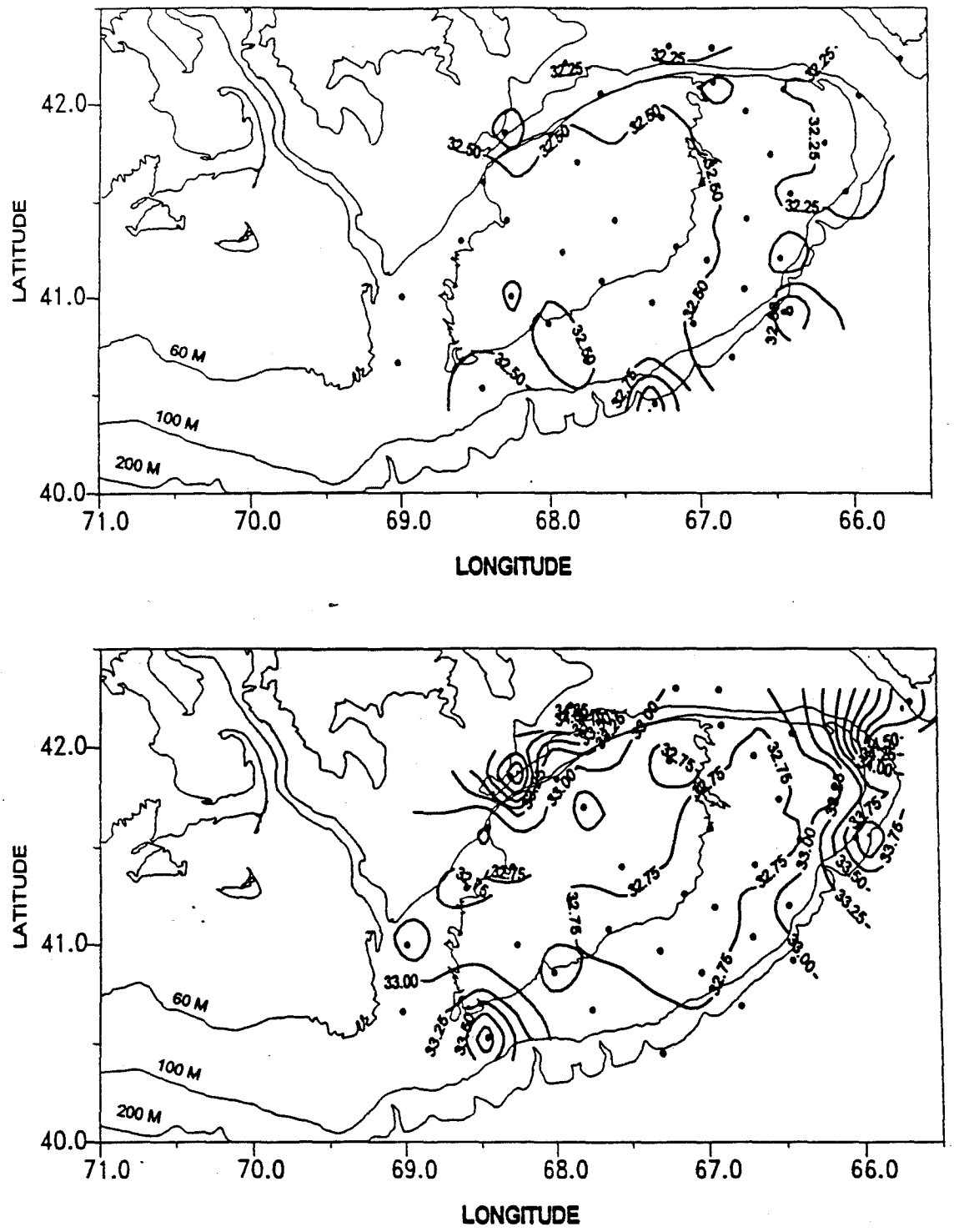

Figure 62. The surface and bottom salinity distribution for the U.S. GLOBEC Broad Scale Survey ALB9506.

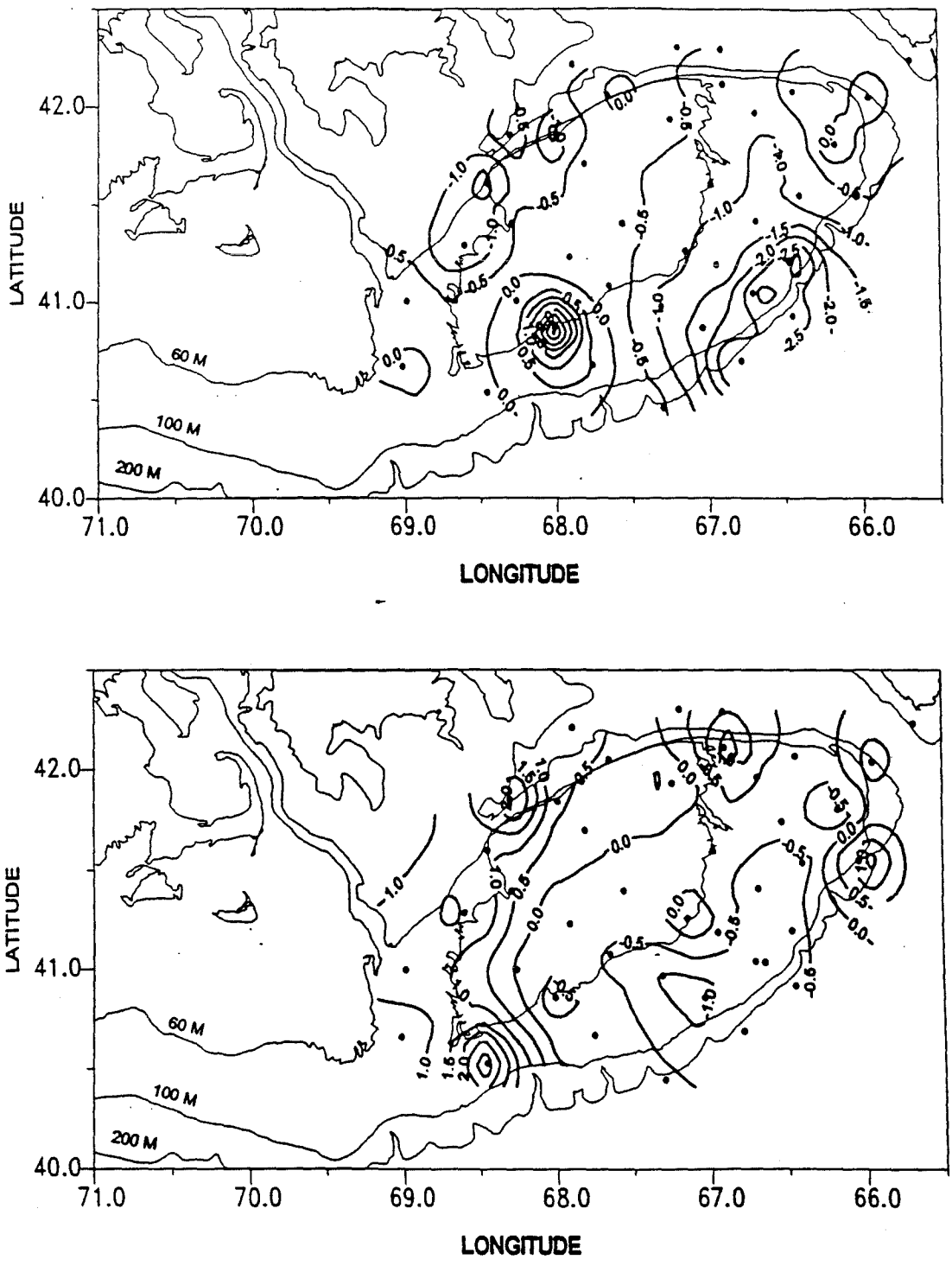

Figure 63. The surface and bottom temperature anomaly distribution for the U.S. GLOBEC Broad Scale Survey ALB9506.

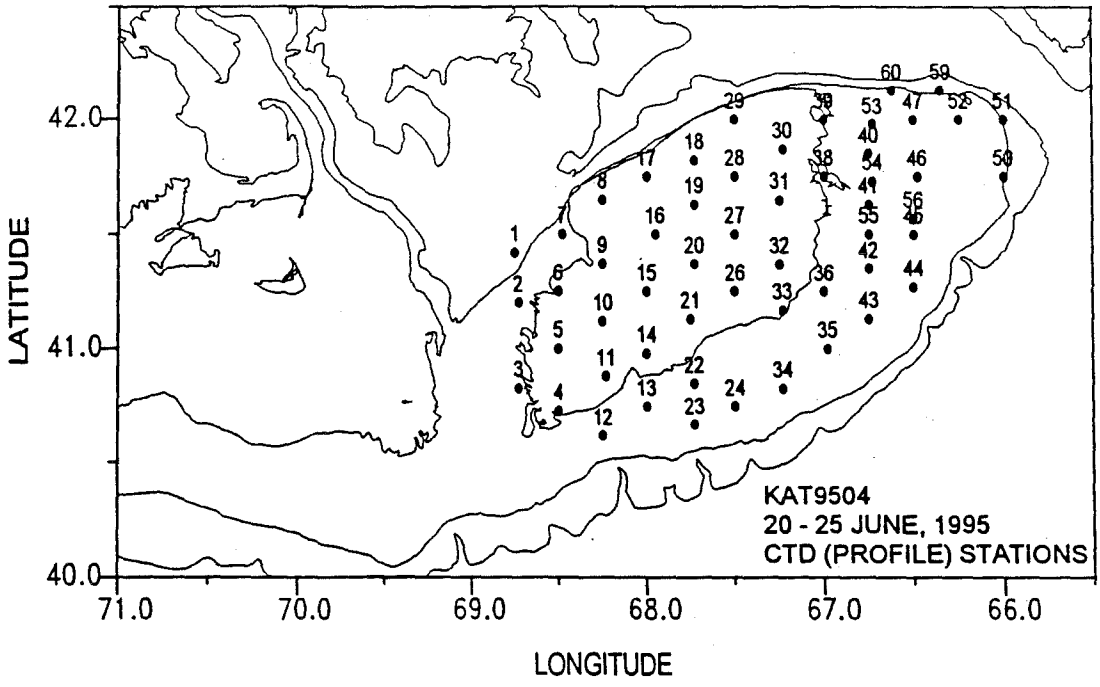

Figure 64. Hydrographic stations occupied during Predator/Prey Study KAT9504.

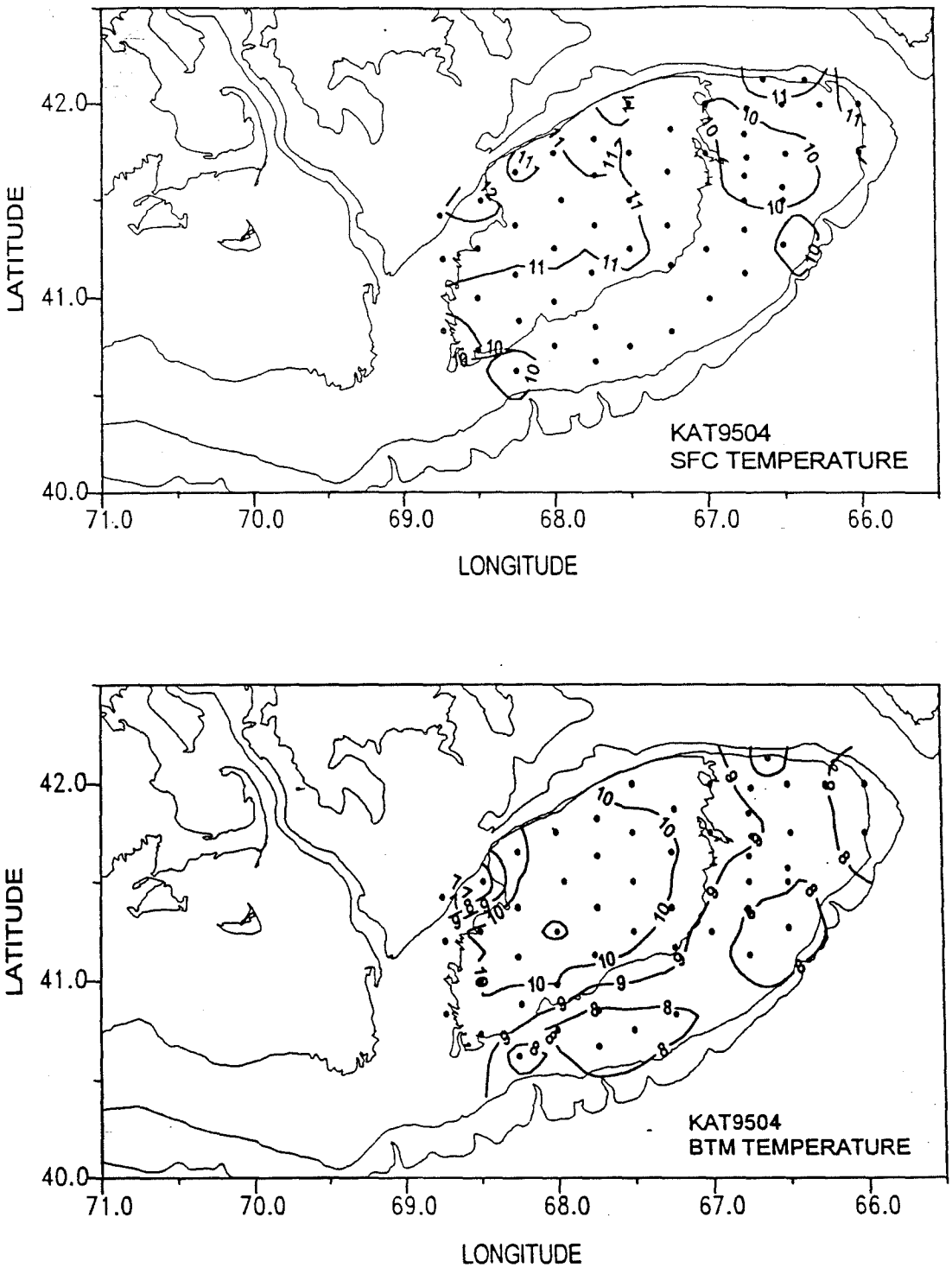

Figure 65. The surface and bottom temperature distribution for the Predator/Prey Study KAT9504.

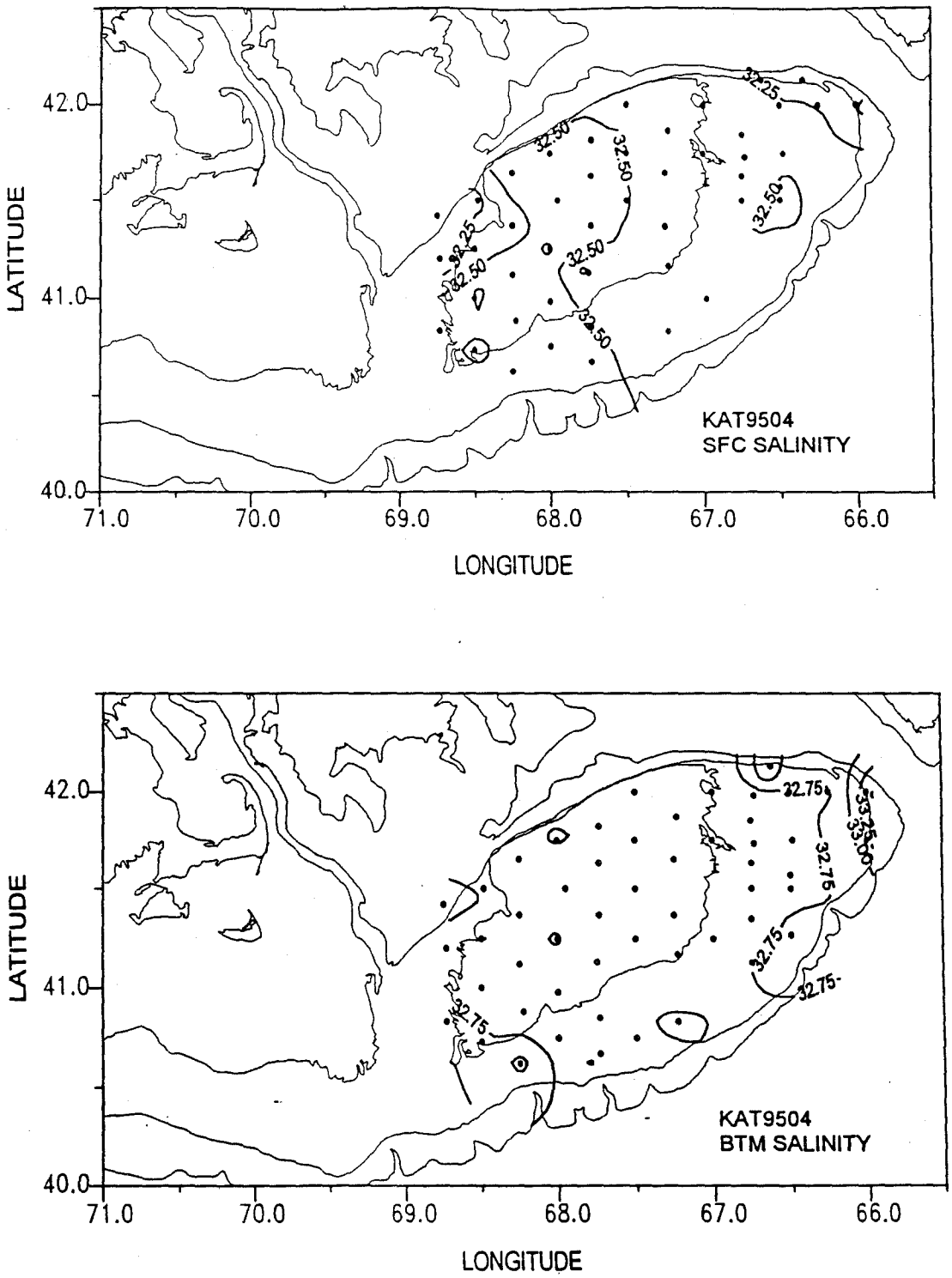

Figure 66. The surface and bottom salinity distribution for the Predator/Prey Study KAT9504.

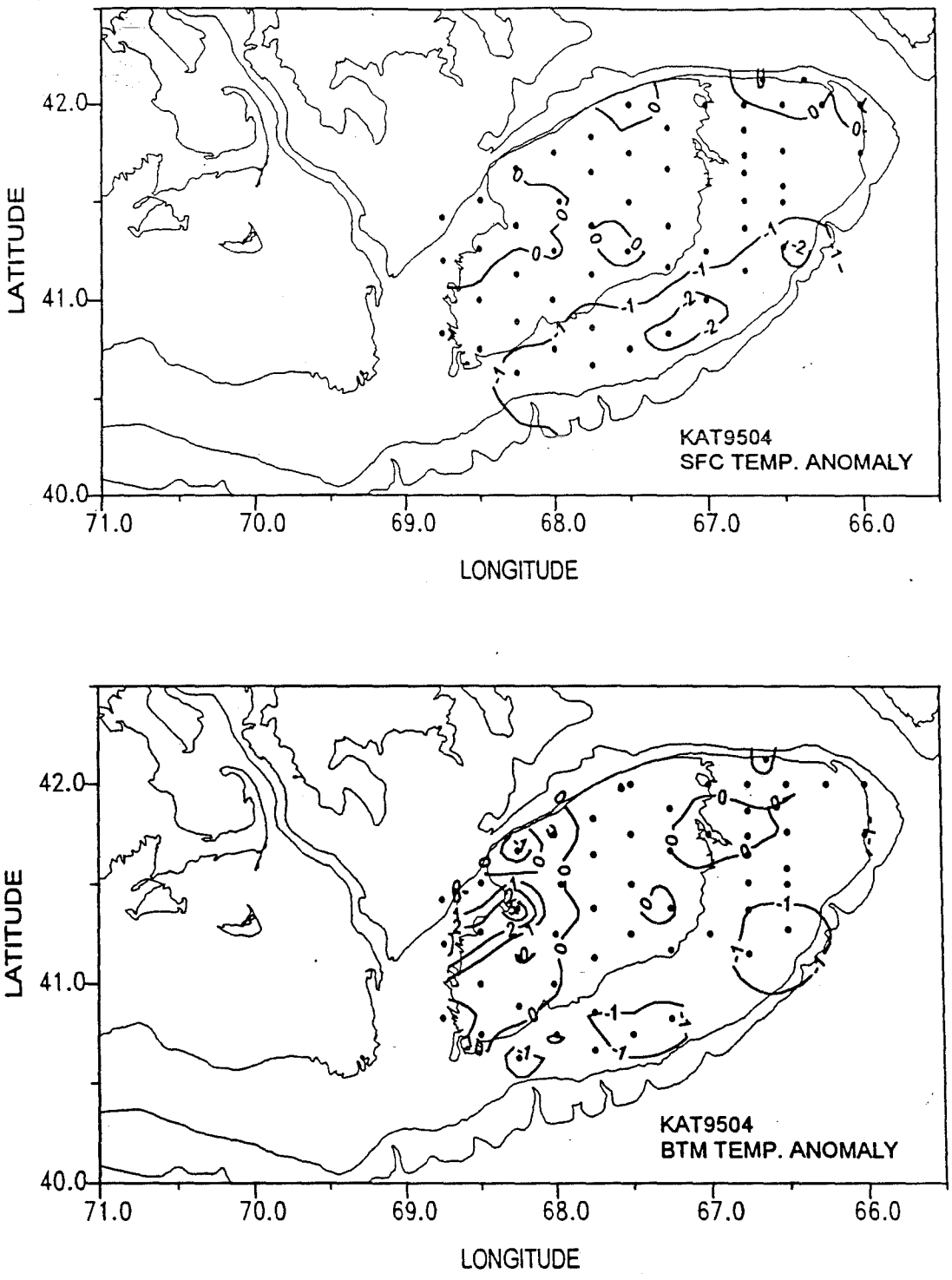

Figure 67. The surface and bottom temperature anomaly distribution for the Predator/Prey Study KAT9504.

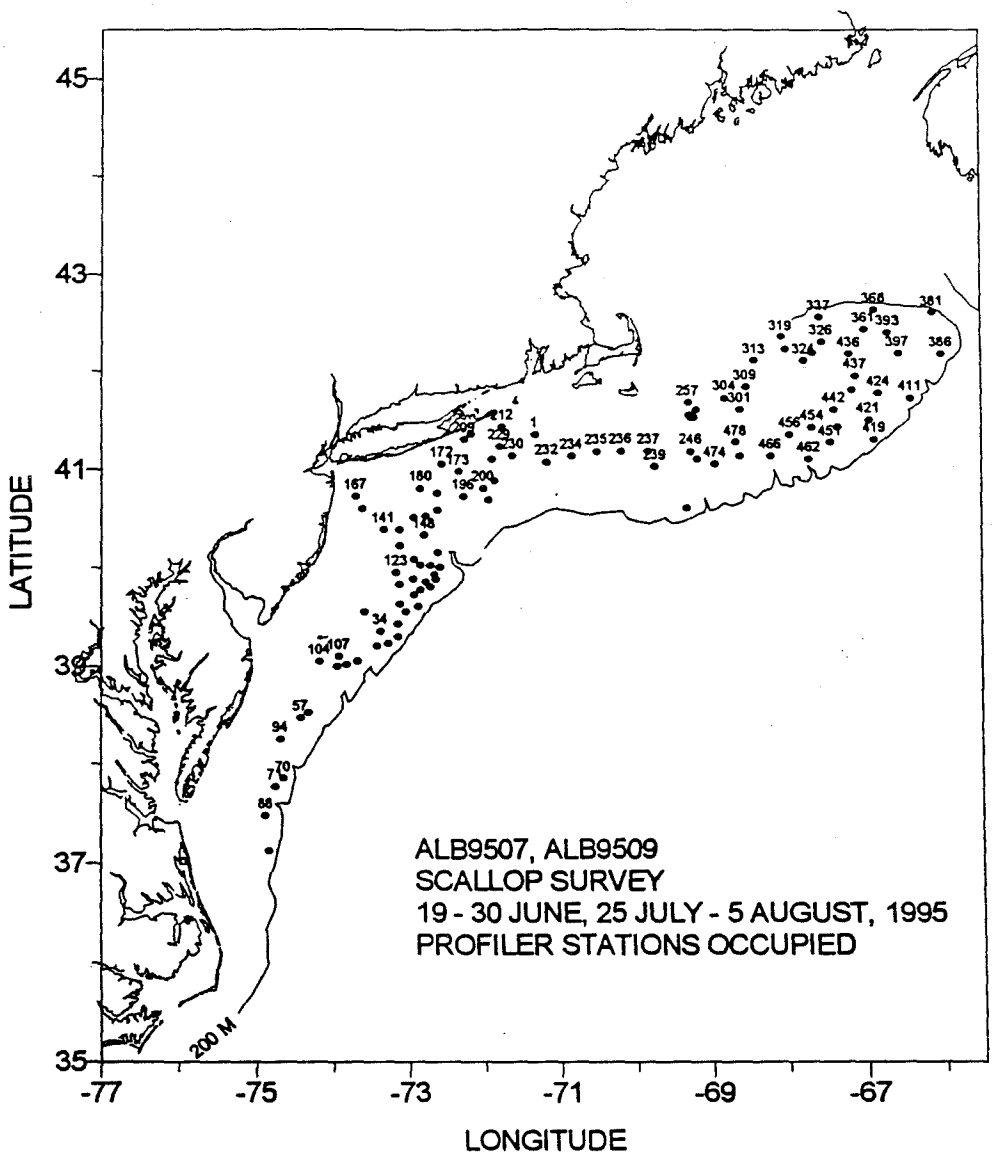

Figure 68. Hydrographic stations occupied during the Sea Scallop Surveys ALB9507 and ALB9509.

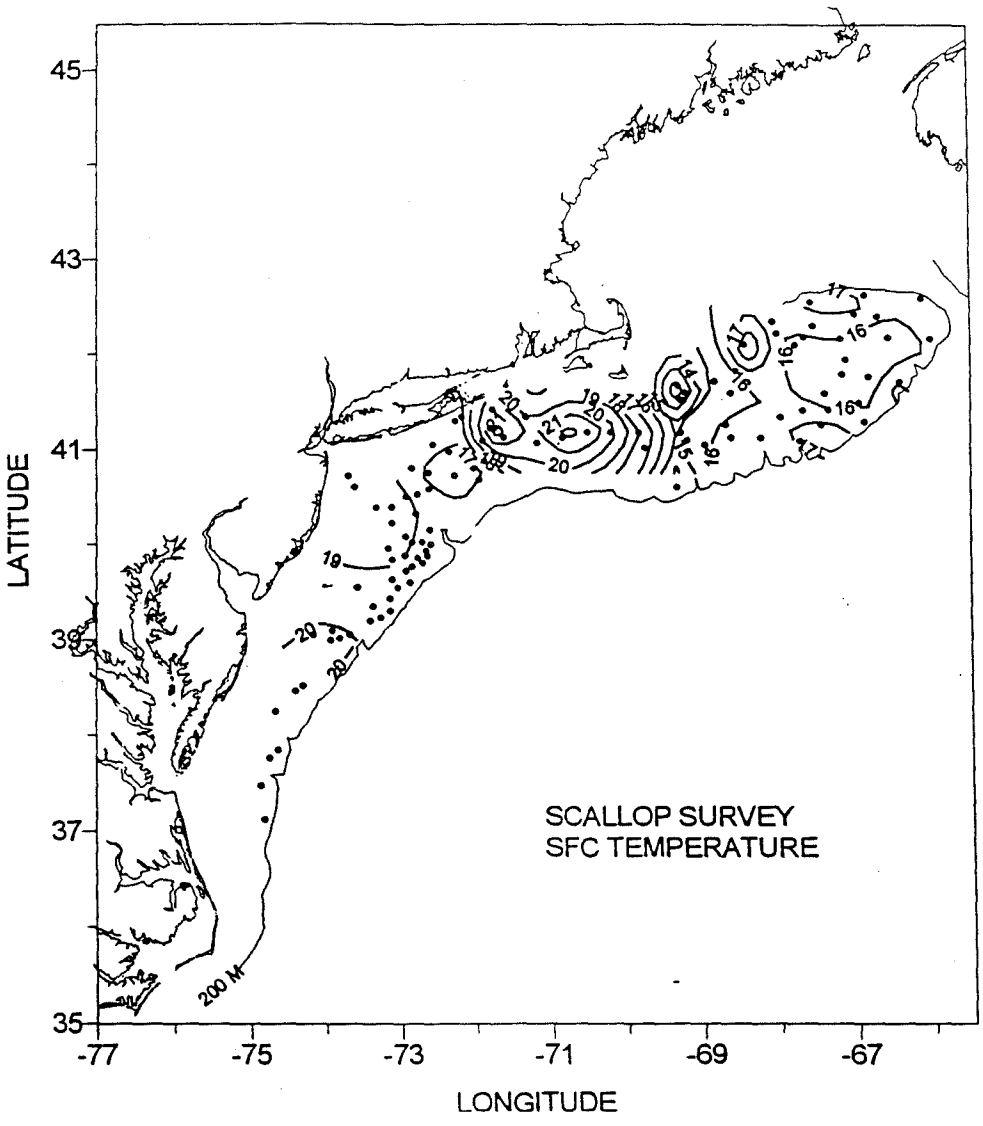

Figure 69. The surface temperature distribution for the Sea Scallop Surveys ALB9507 and ALB9509.

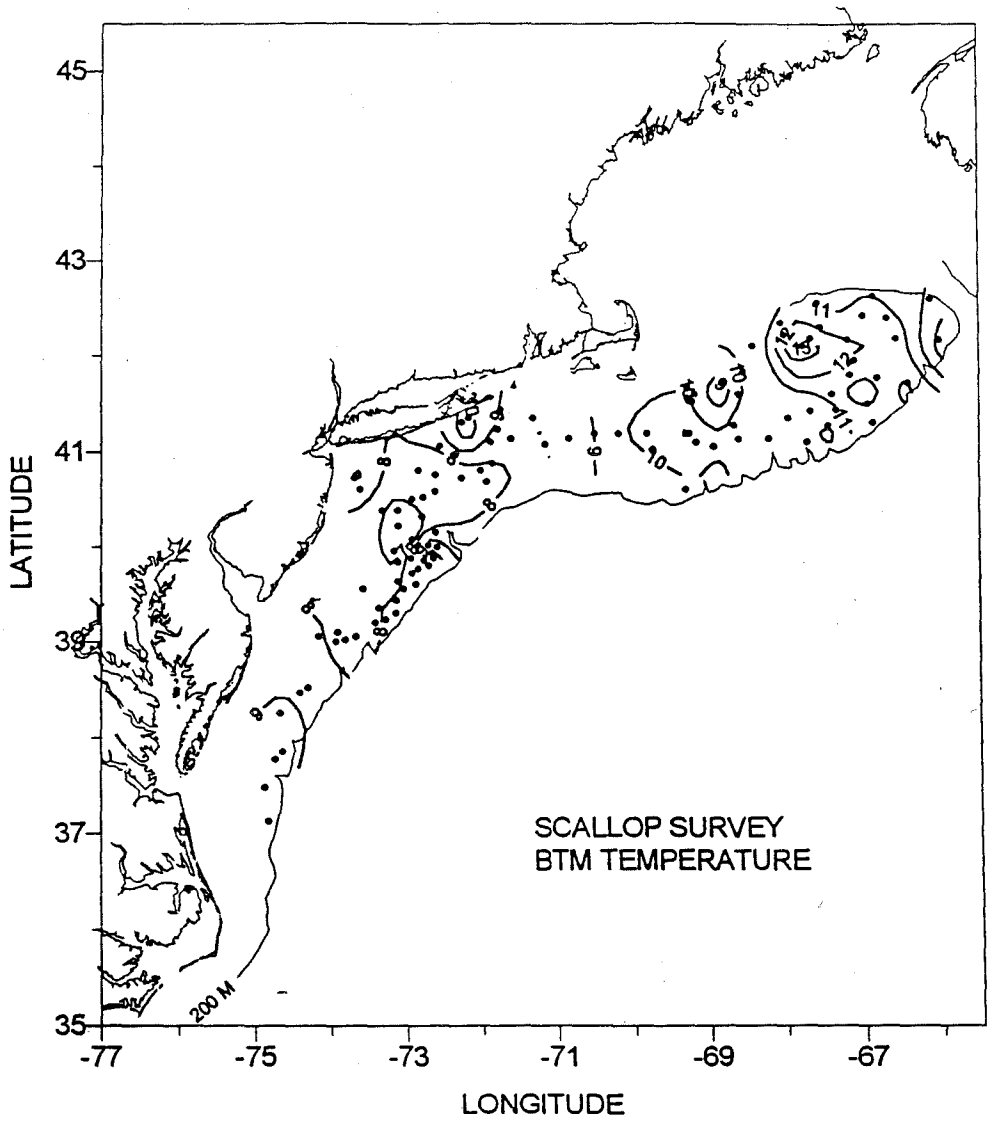

Figure 70. The bottom temperature distribution for the Sea Scallop Surveys ALB9507 and ALB9509.

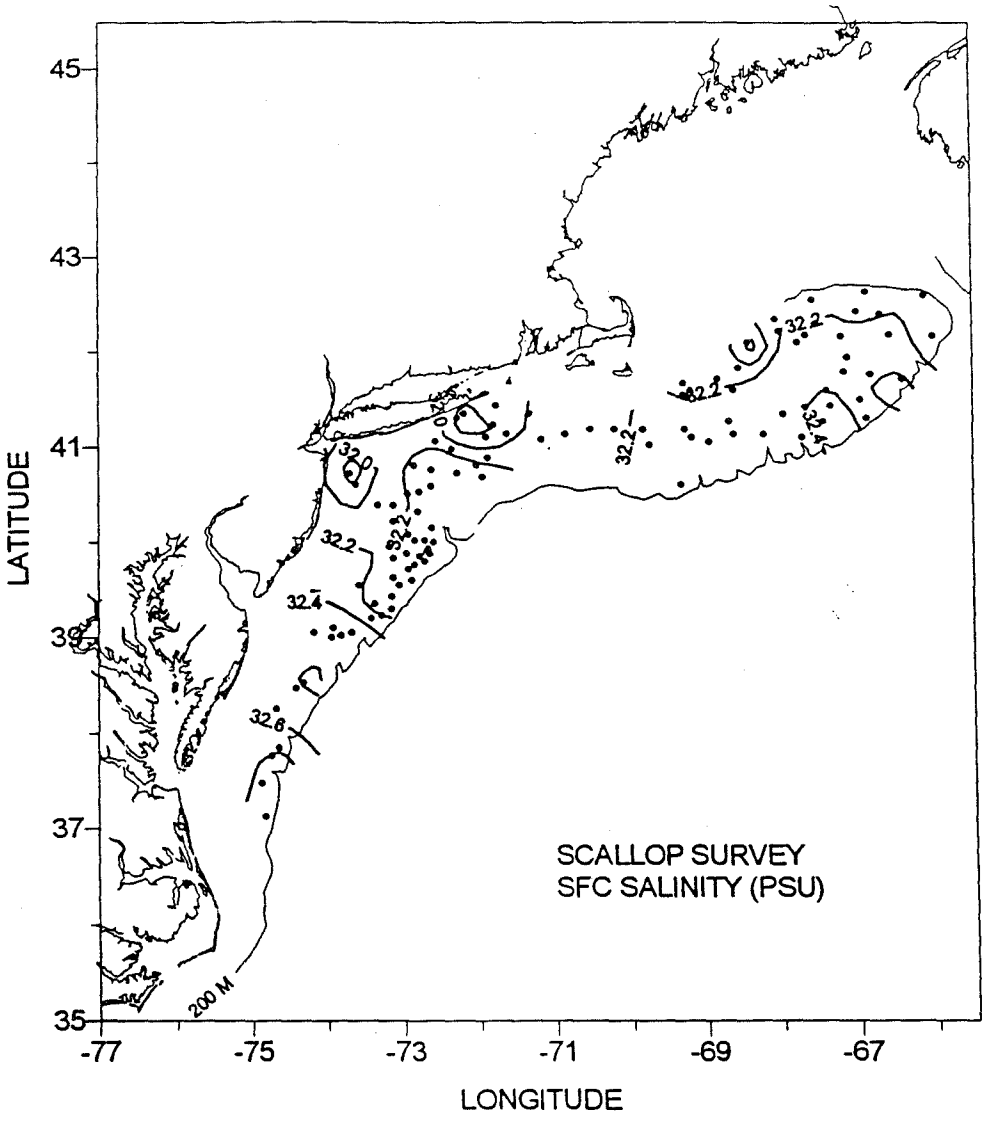

Figure 71. The surface salinity distribution for the Sea Scallop Surveys ALB9507 and ALB9509.

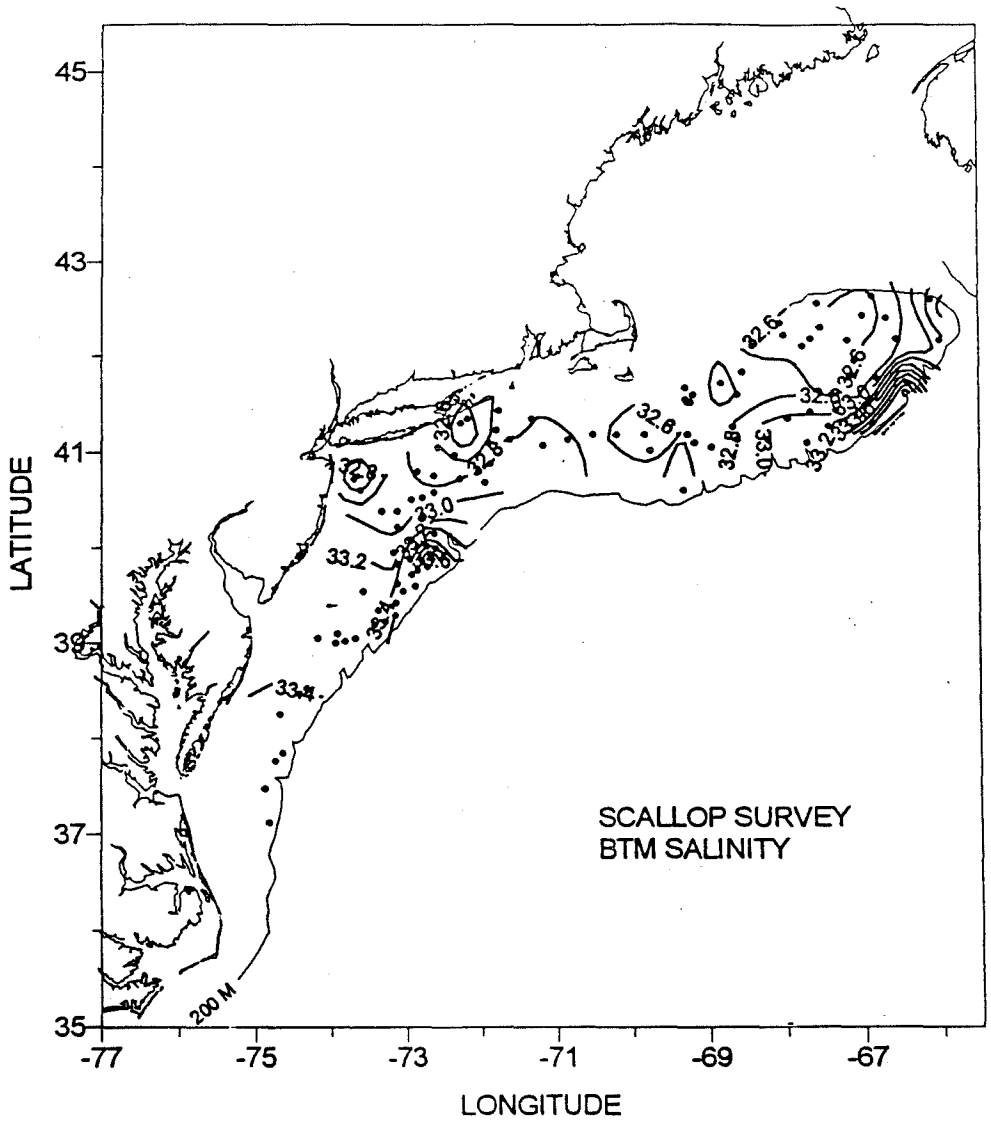

Figure 72. The bottom salinity distribution for the Sea Scallop Surveys ALB9507 and ALB9509.

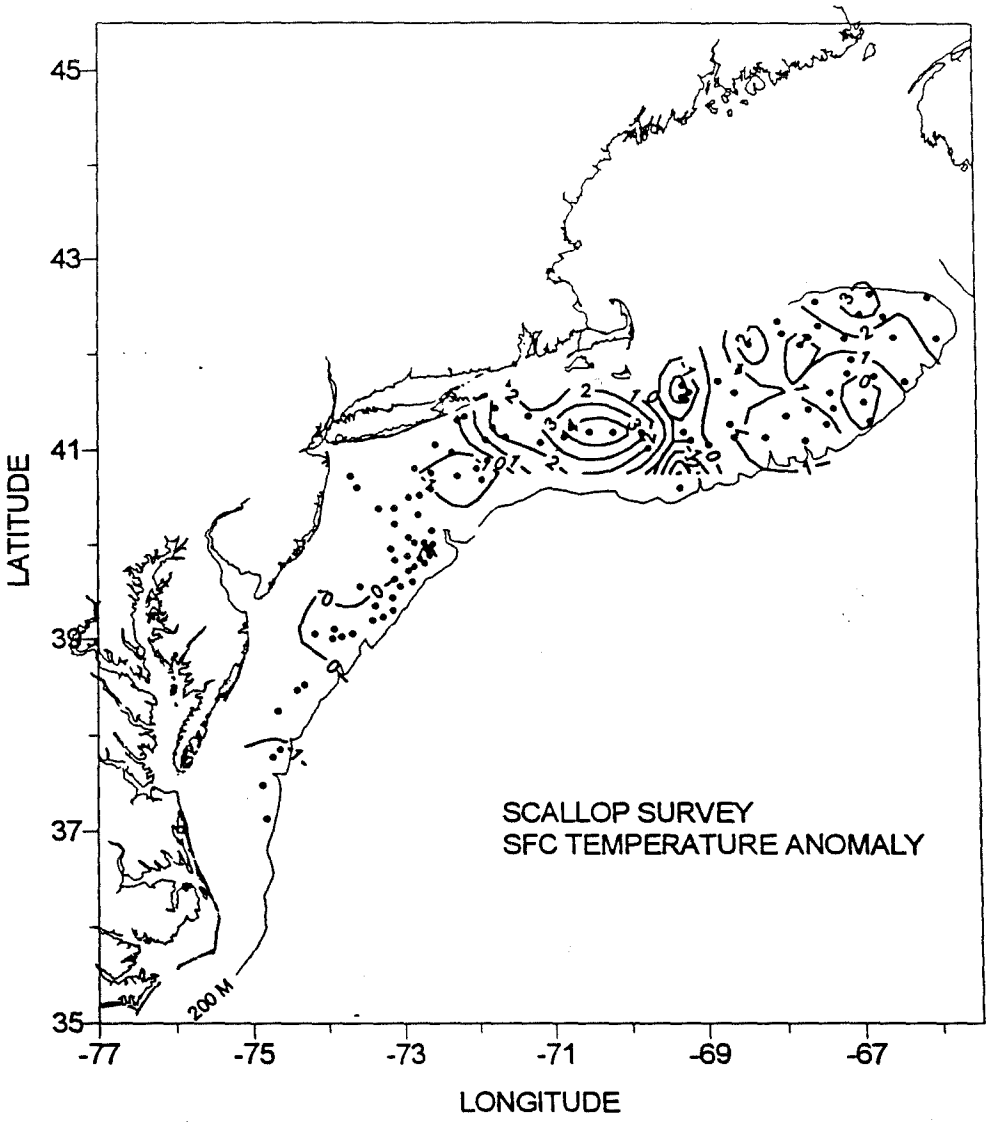

Figure 73. The surface temperature anomaly distribution for the Sea Scallop Surveys ALB9507 and ALB9509.

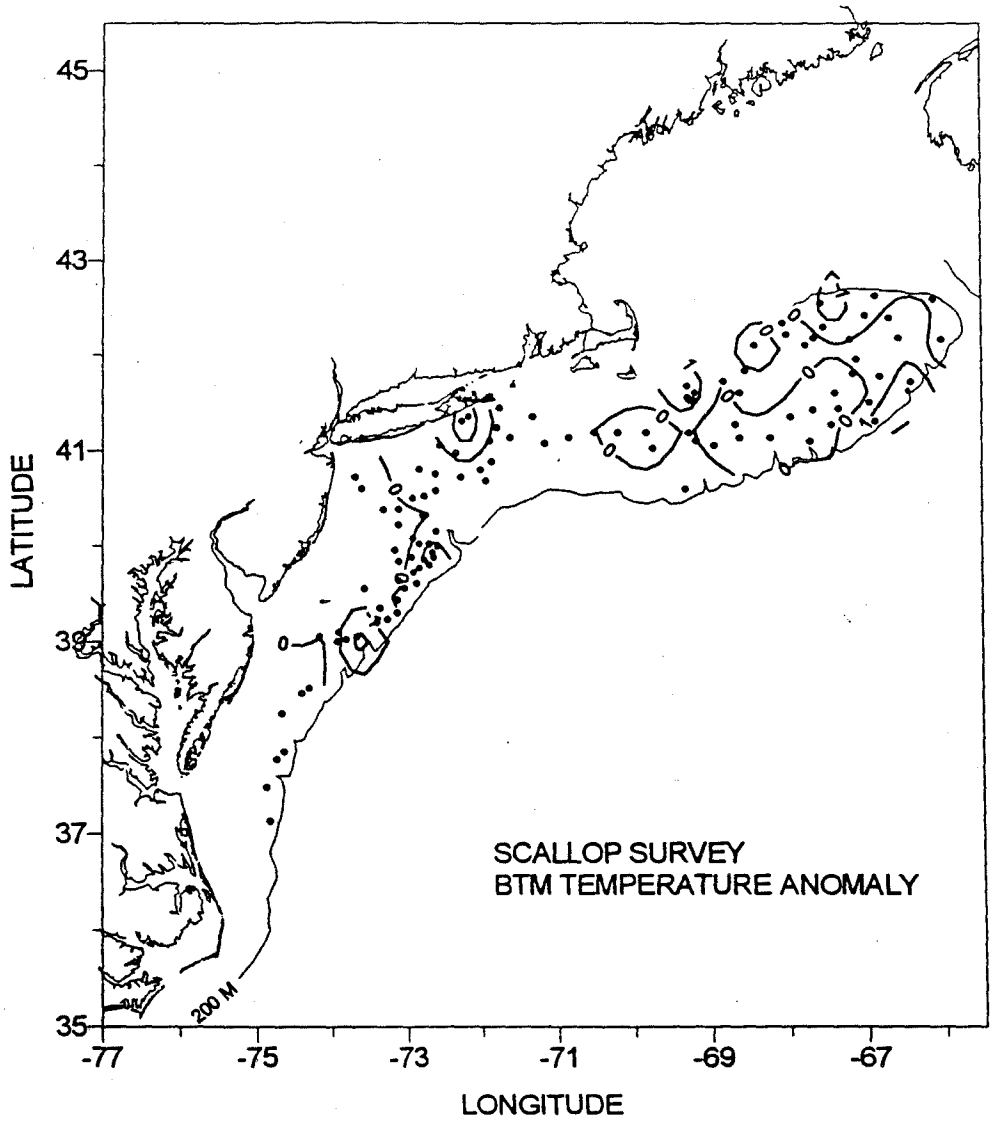

Figure 74. The bottom temperature anomaly distribution for the Sea Scallop Surveys ALB9507 and ALB9509.

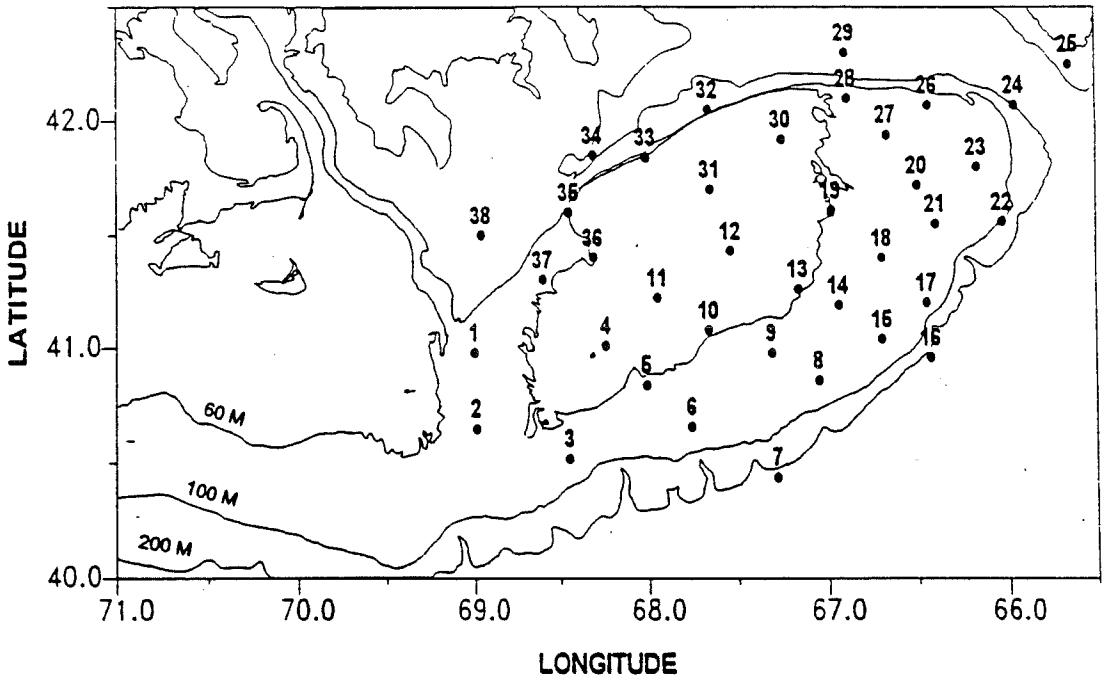

Figure 75. Hydrographic stations occupied during U.S. GLOBEC Broad Scale Survey ALB9508.

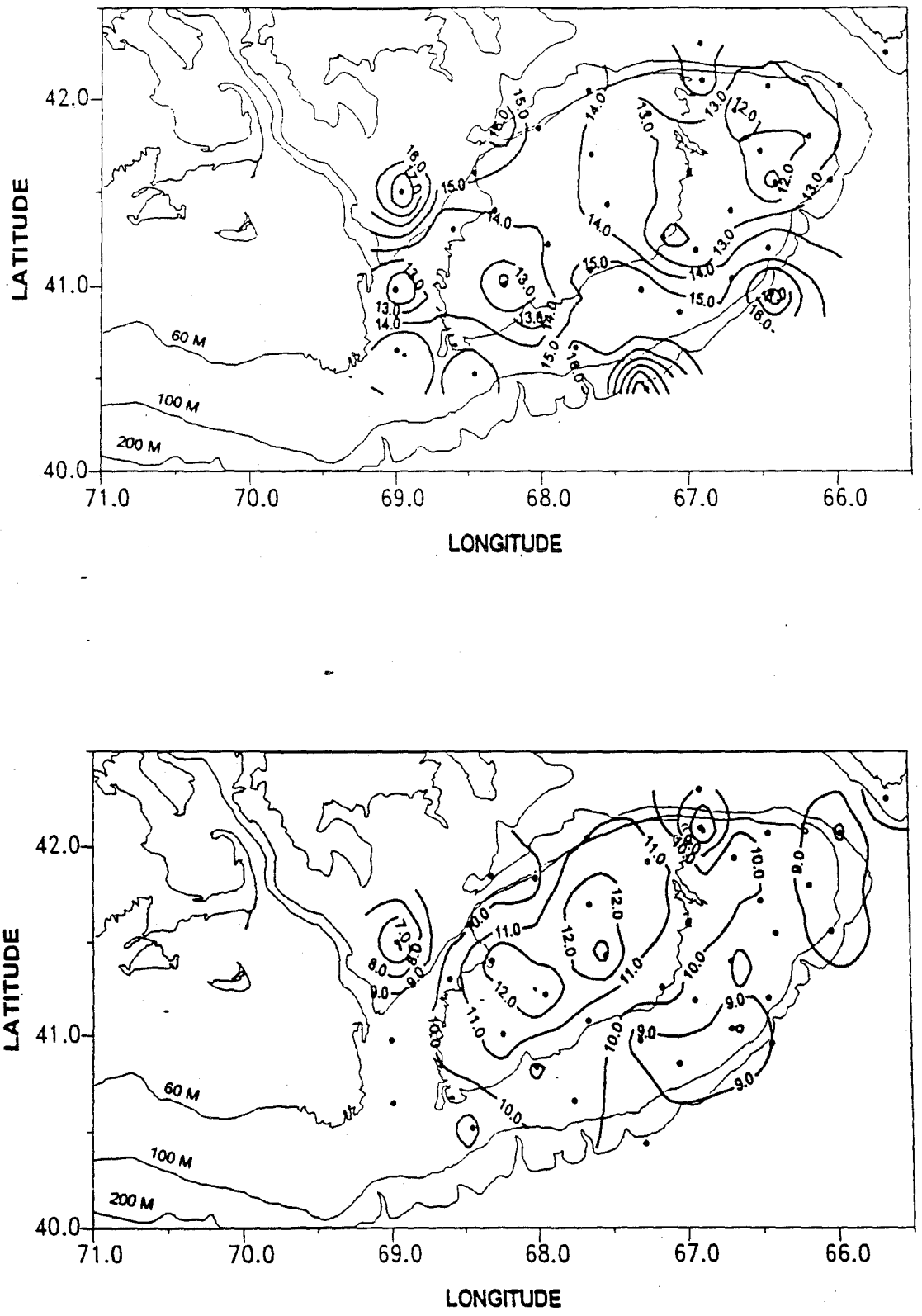

Figure 76. Surface and bottom temperature distribution for the U.S. GLOBEC Broad Scale Survey ALB9508.

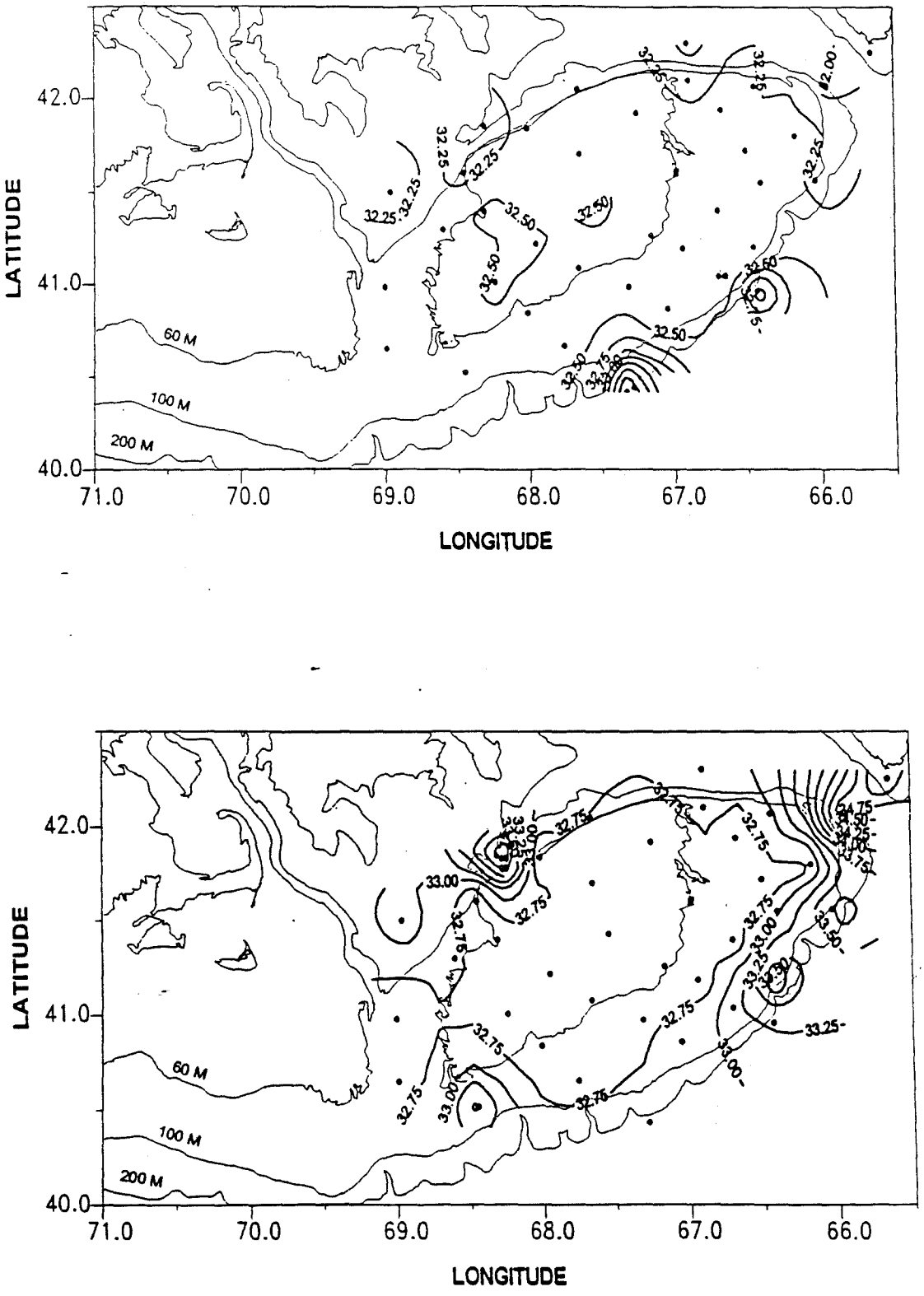

Figure 77. Surface and bottom salinity distribution for the U.S. GLOBEC Broad Scale Survey ALB9508.

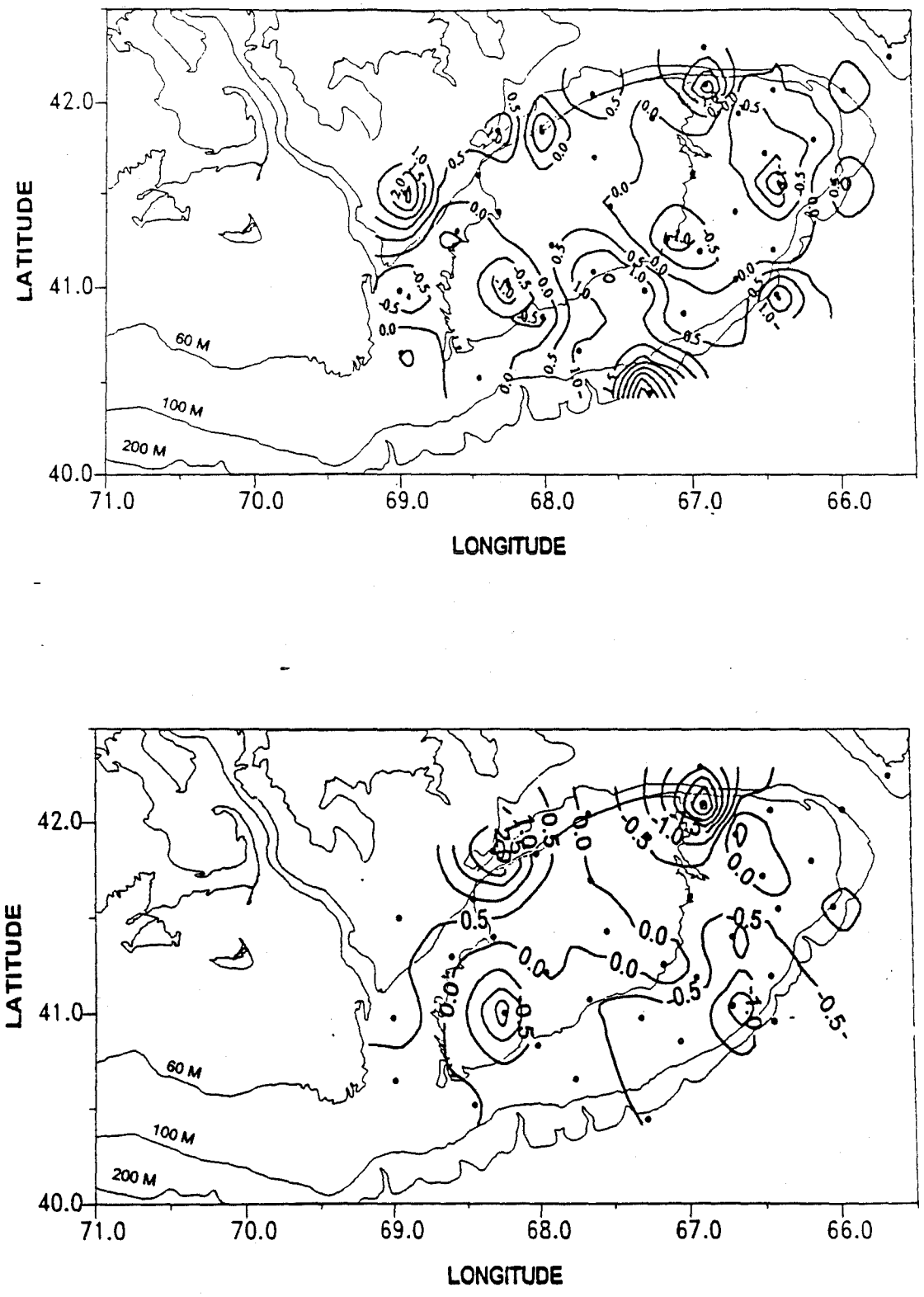

Figure 78. Surface and bottom temperature anomaly distribution for the U.S. GLOBEC Broad Scale Survey ALB9508.

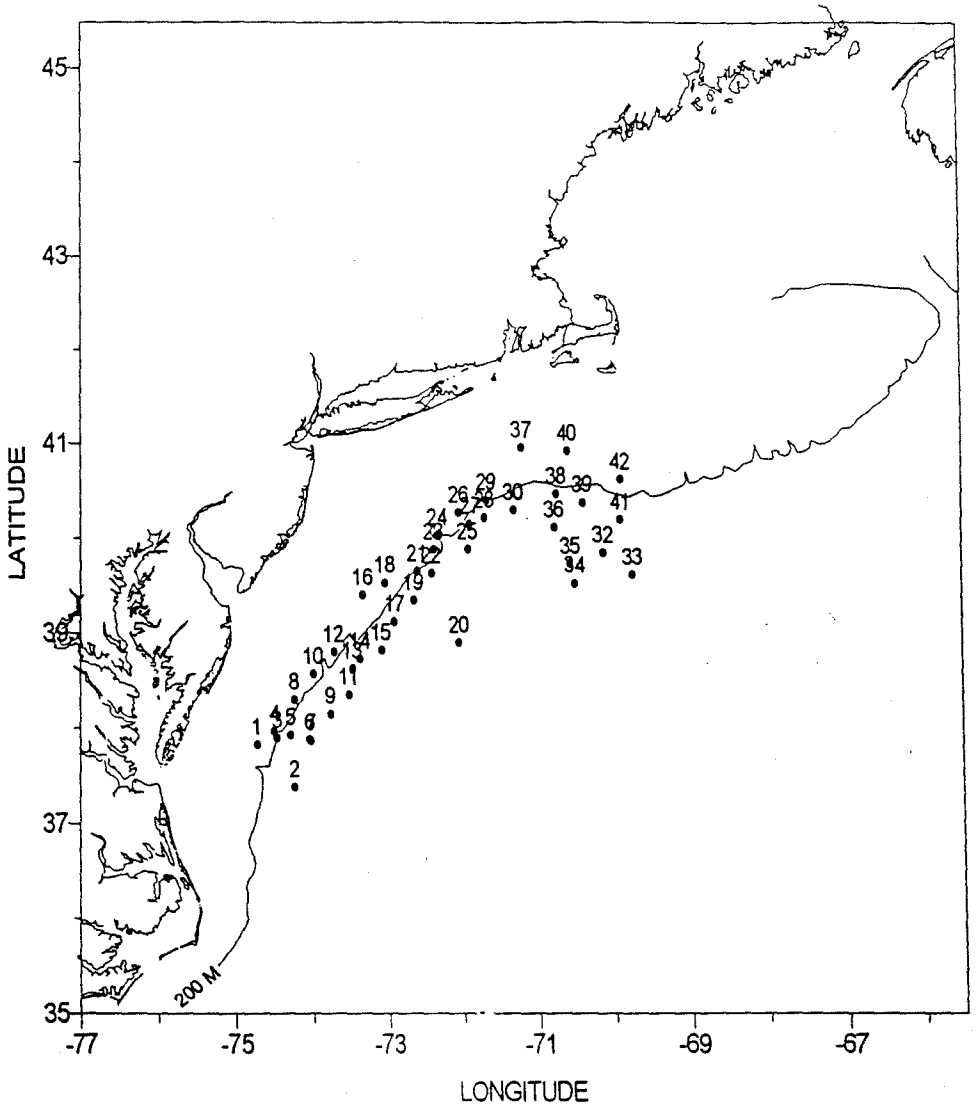

Figure 79. Hydrographic stations occupied during Marine Mammal Survey Cruise PE9501.

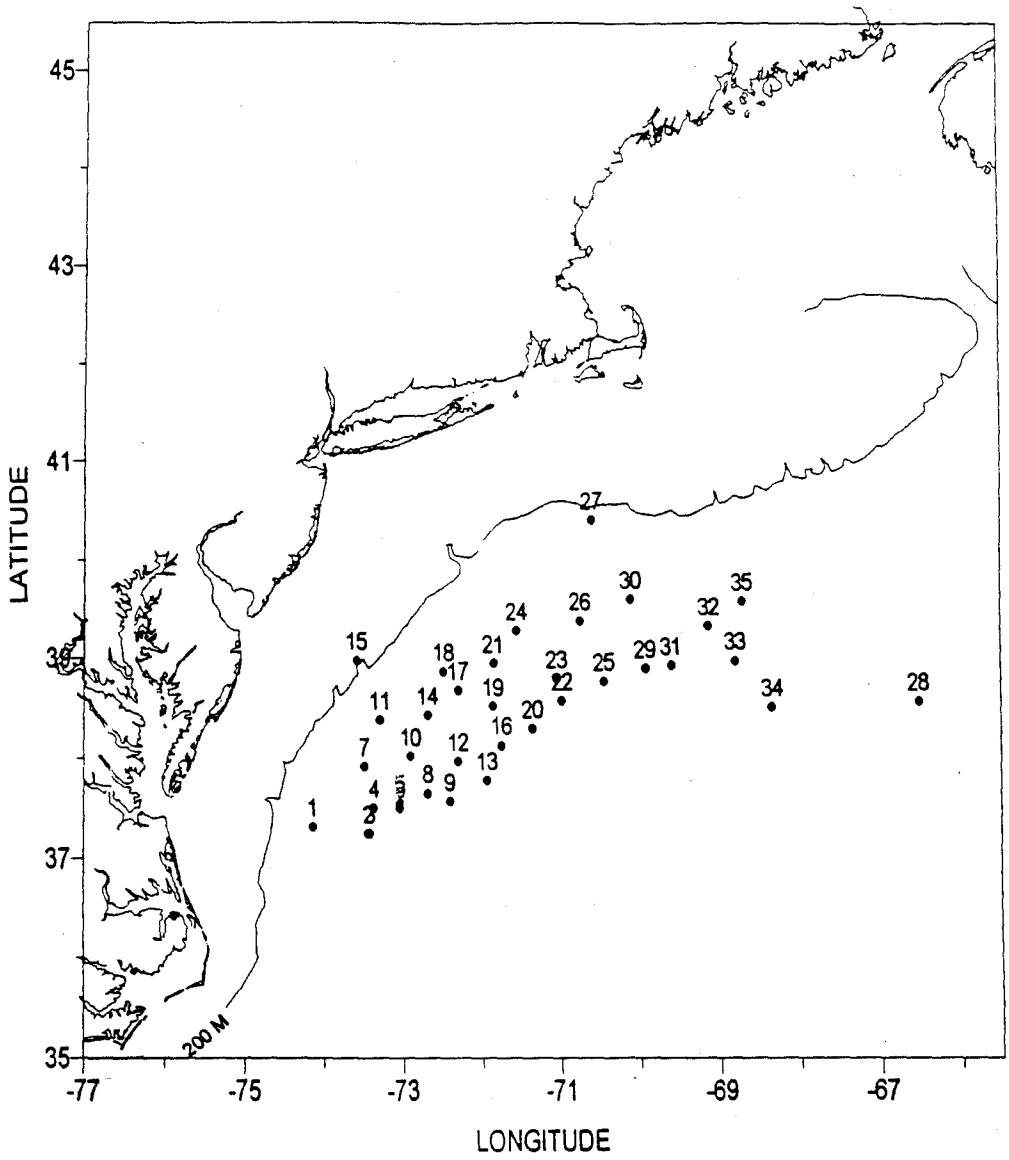

Figure 80. Hydrographic stations occupied during Marine Mammal Survey Cruise AJ9501.

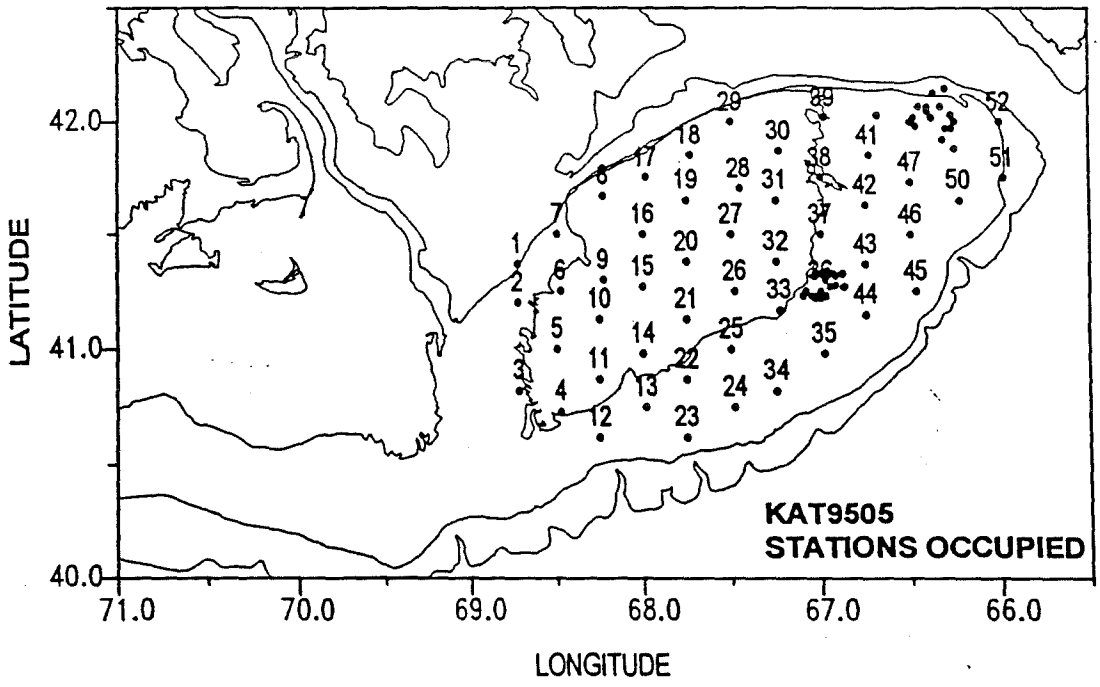

Figure 81. Hydrographic stations occupied during the Predator/Prey Study KAT9505.

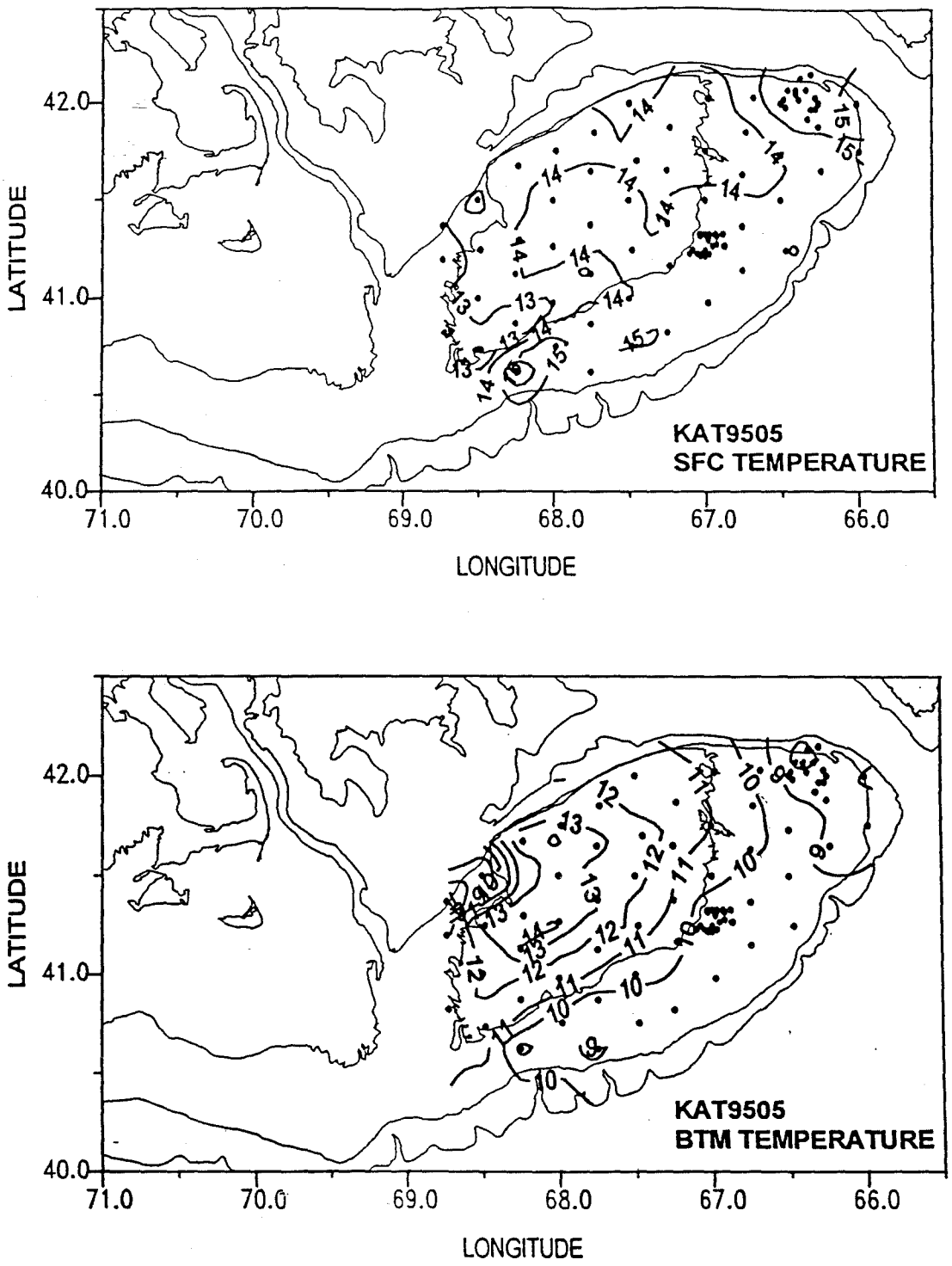

Figure 82. The surface and bottom temperature distribution for the Predator/Prey Study KAT9505.

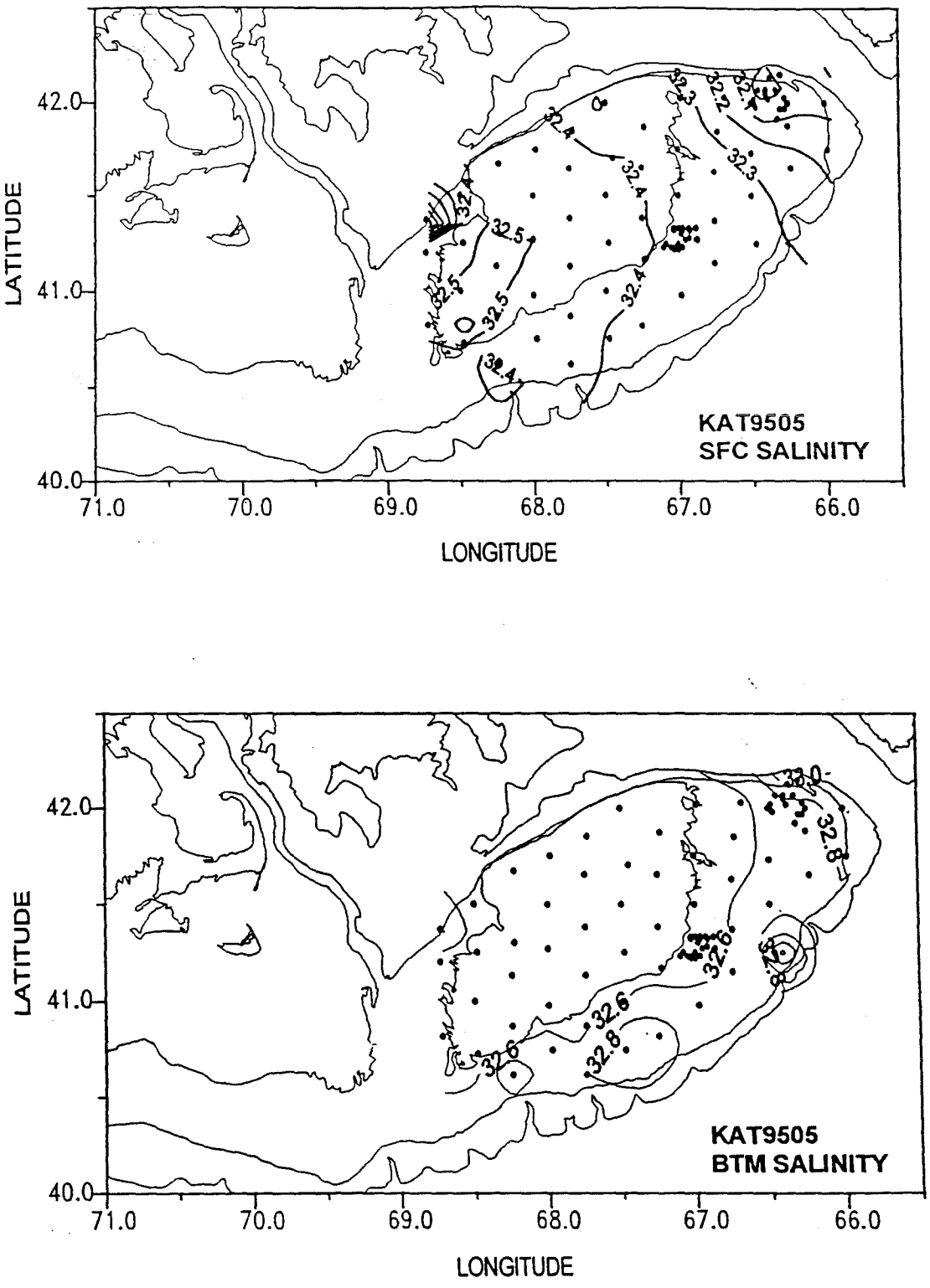

Figure 83. The surface and bottom salinity distribution for the Predator/Prey Study KAT9505.

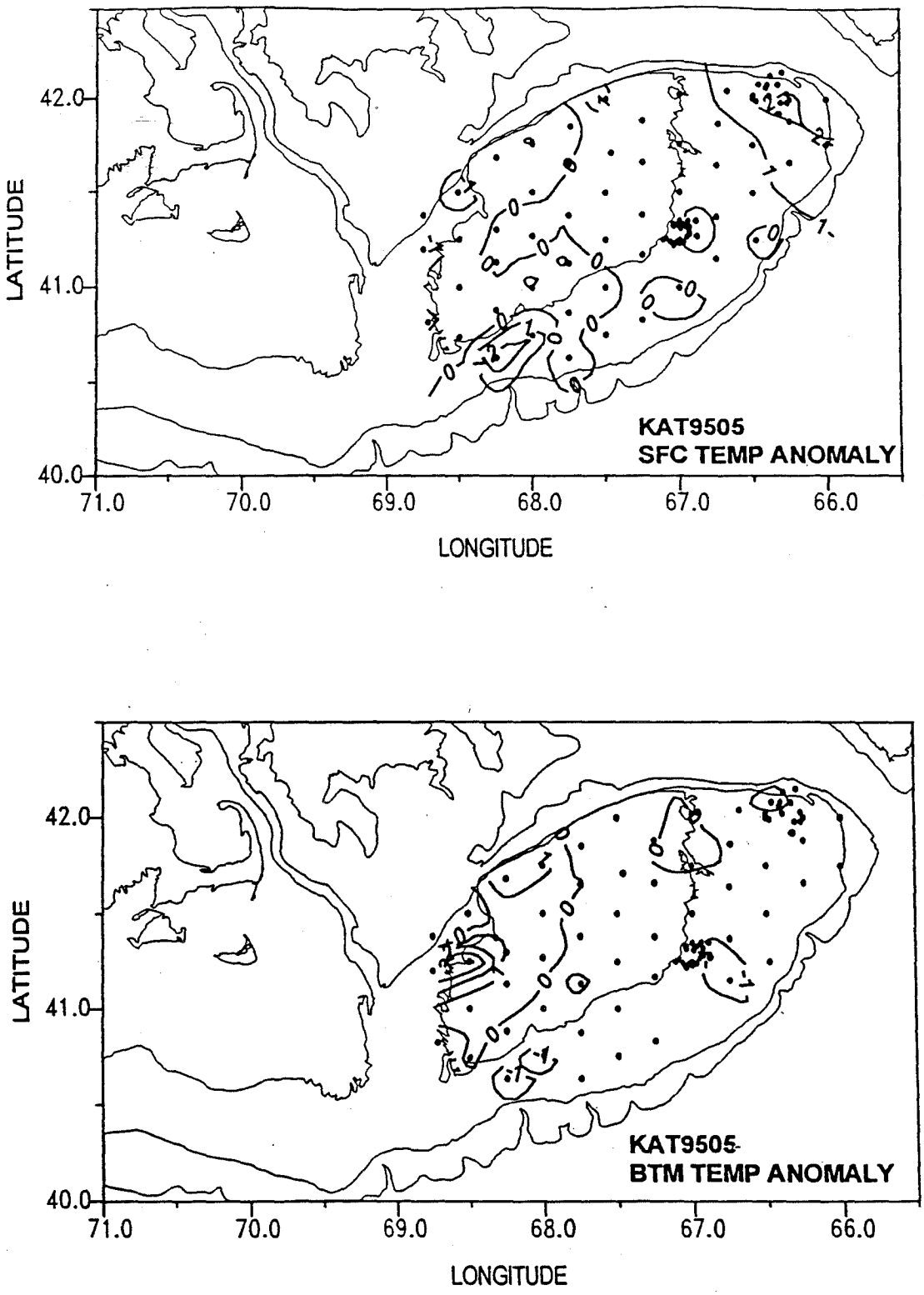

Figure 84. The surface and bottom temperature anomaly distribution for the Predator/Prey Study KAT9505.

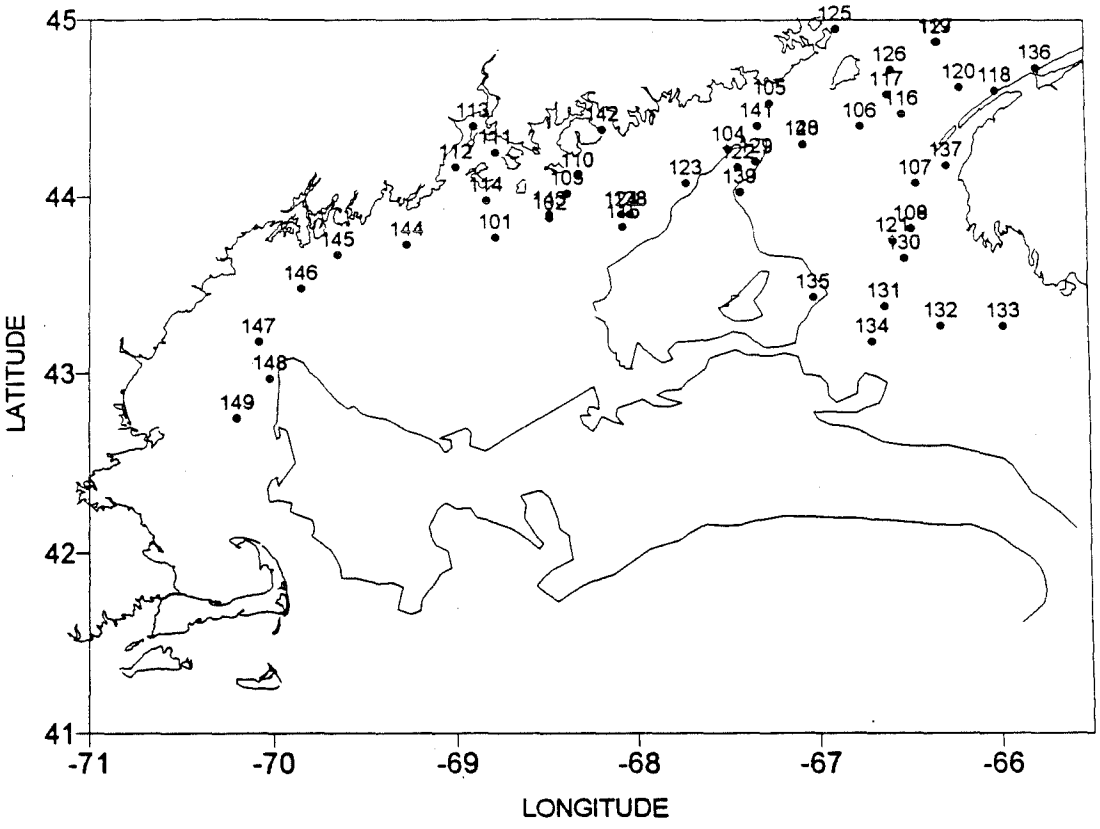

Figure 85. Hydrographic stations occupied during the Marine Mammal Mammal Survey Cruise AJ9502.

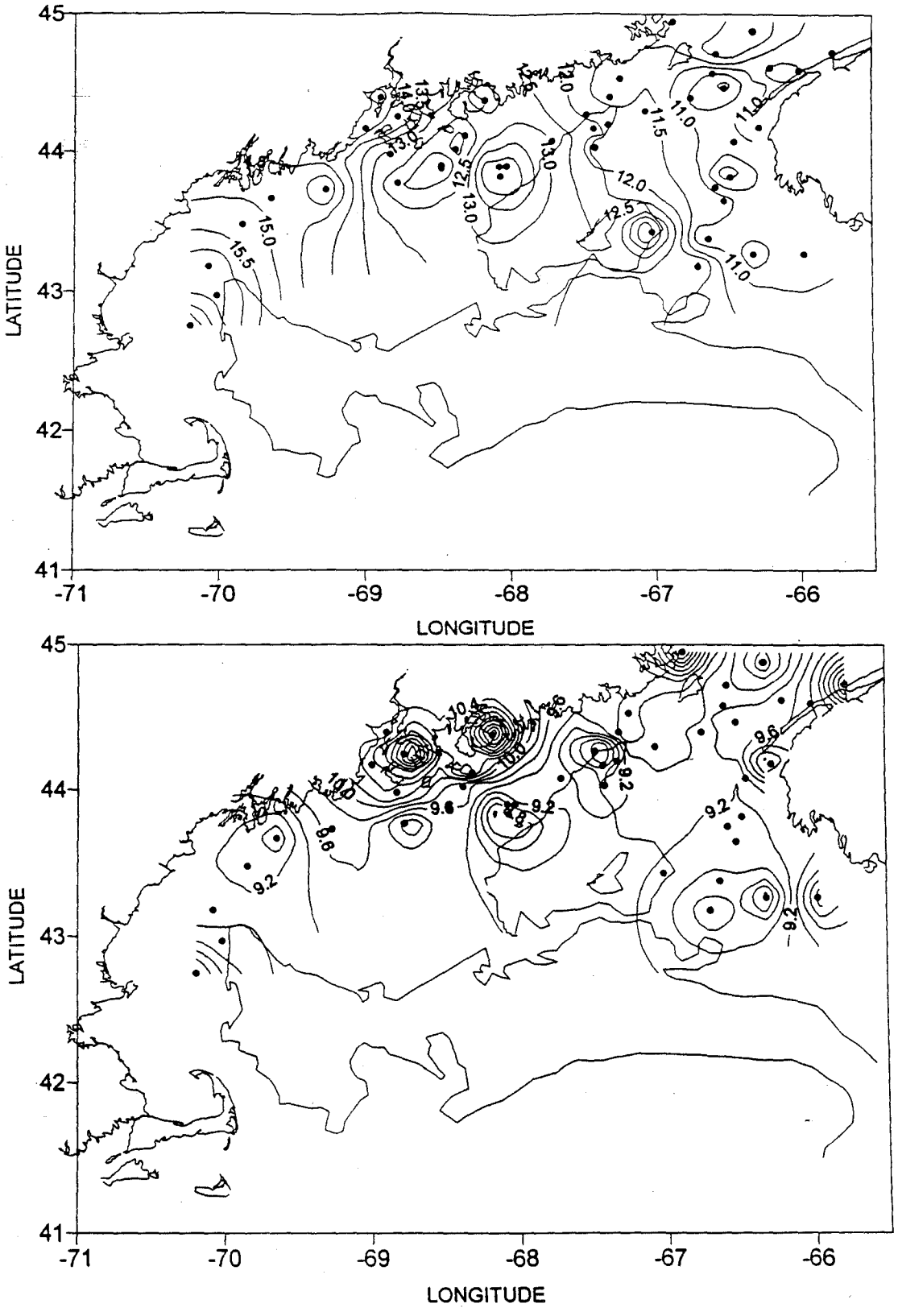

Figure 86. The surface and bottom temperature distribution for the Marine Mammal Survey Cruise AJ9502.

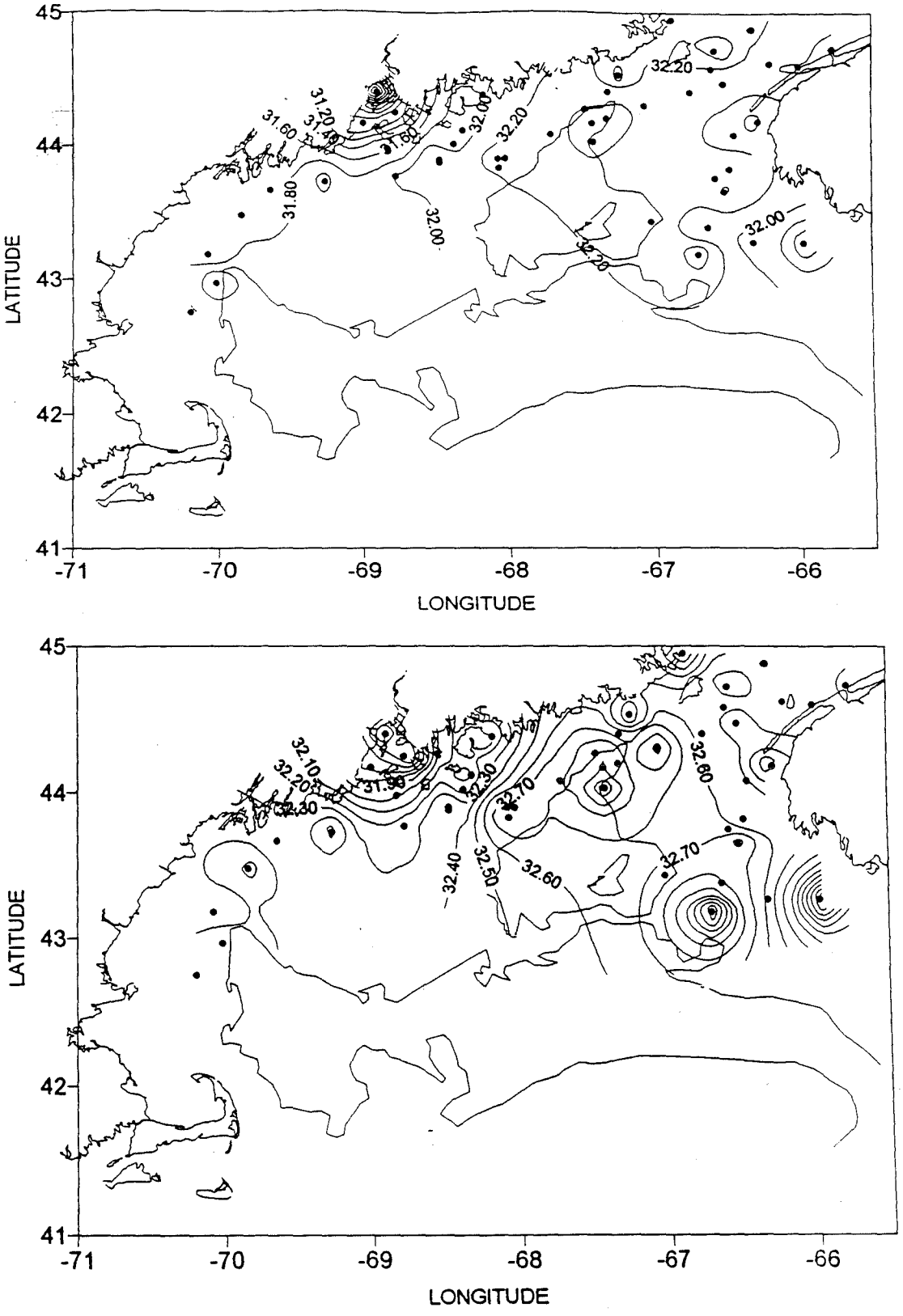

Figure 87. The surface and bottom salinity distribution for the Marine Mammal Survey Cruise AJ9502.

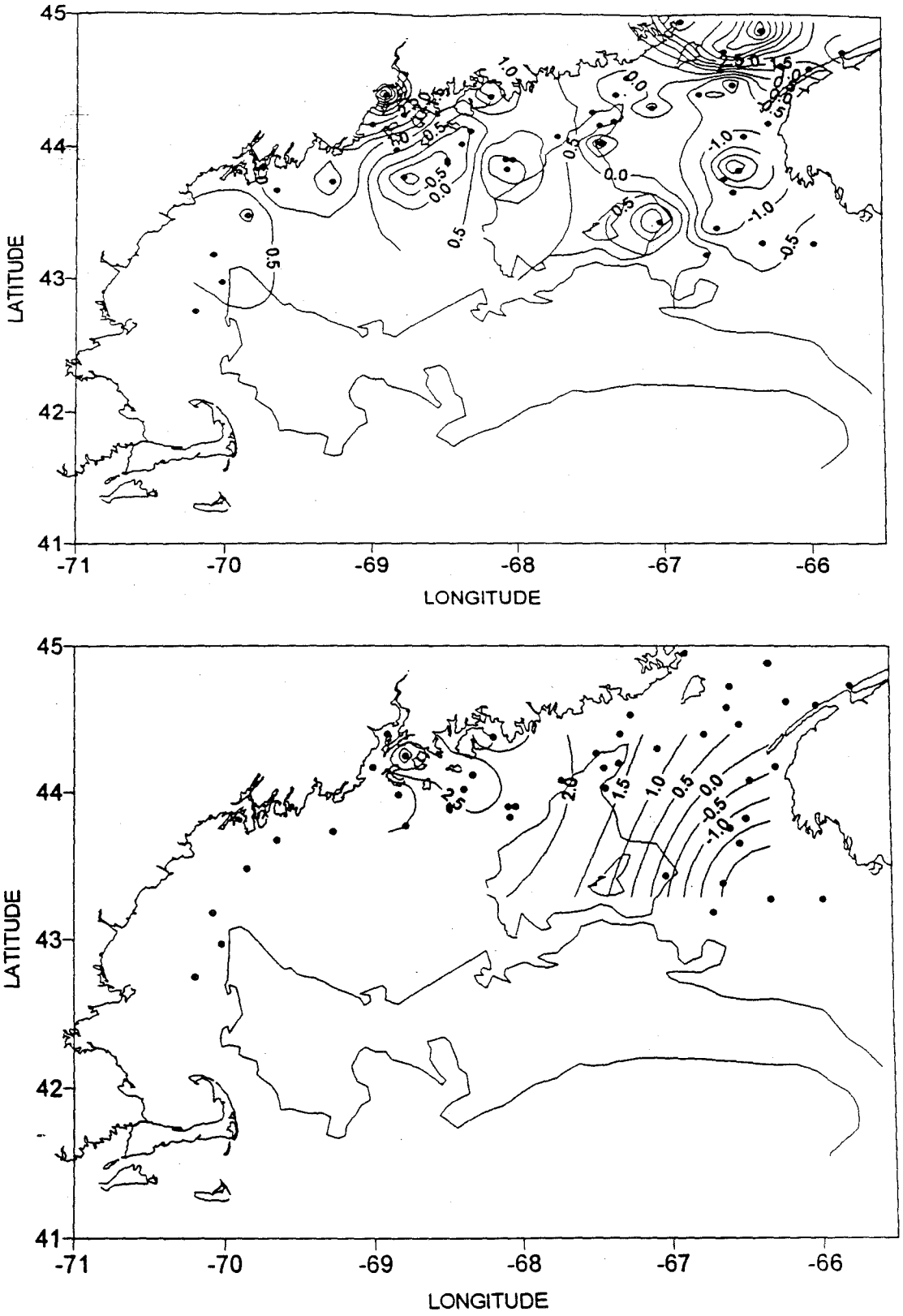

Figure 88. The surface and bottom temperature anomaly distribution for the Marine Mammal Survey Cruise AJ9502.

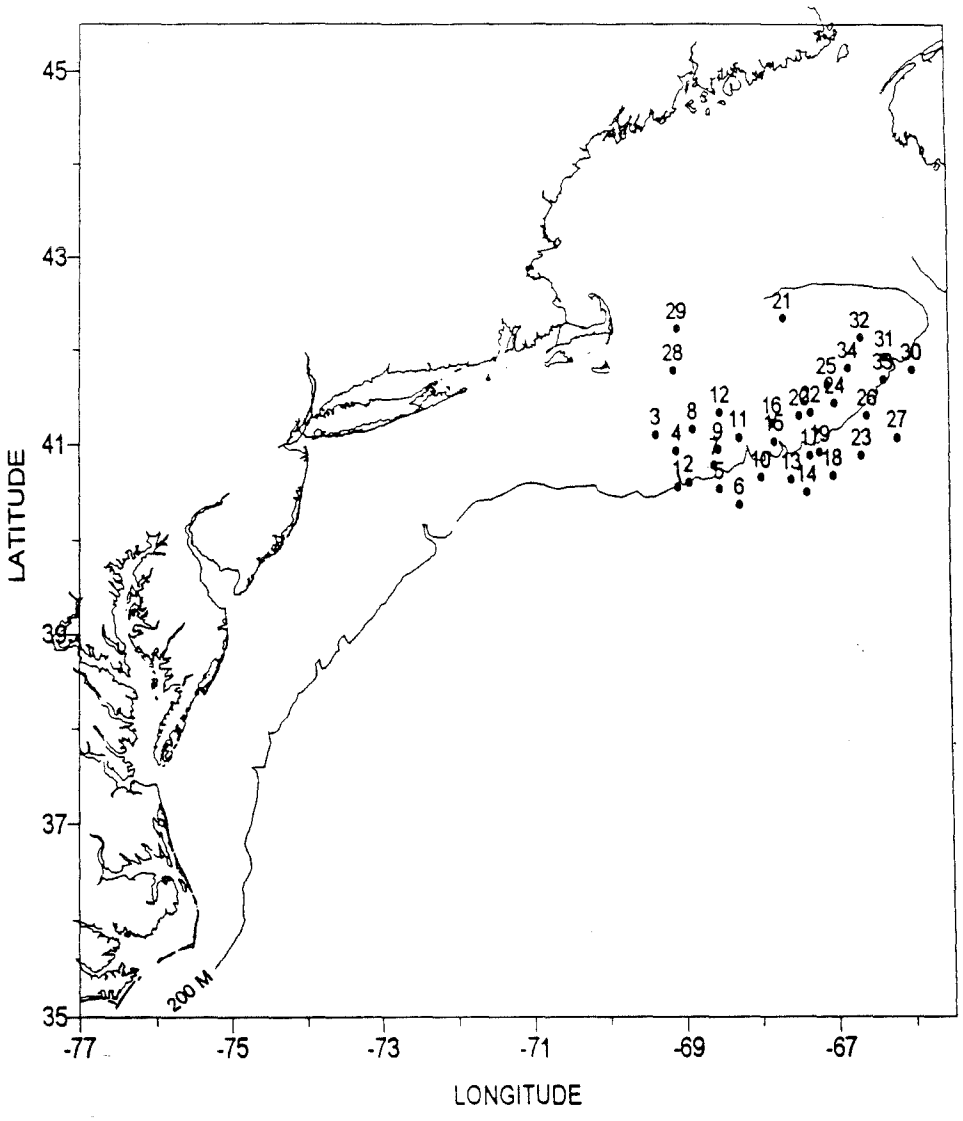

Figure 89. Hydrographic stations occupied during Marine Mammal Survey Cruise PE9502.

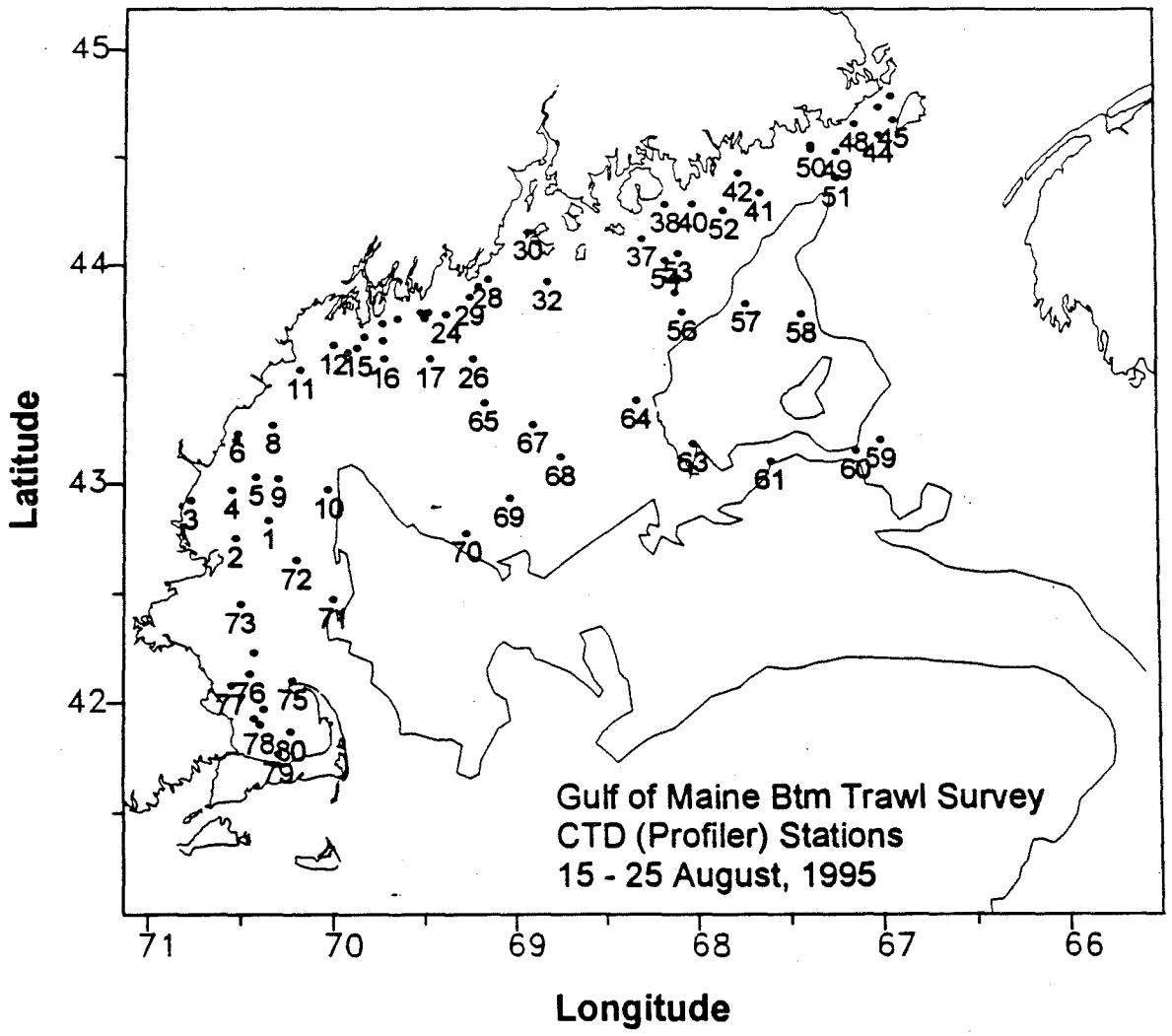

Figure 90. Hydrographic stations occupied during the Gulf of Maine Bottom Trawl Survey ALB9510.

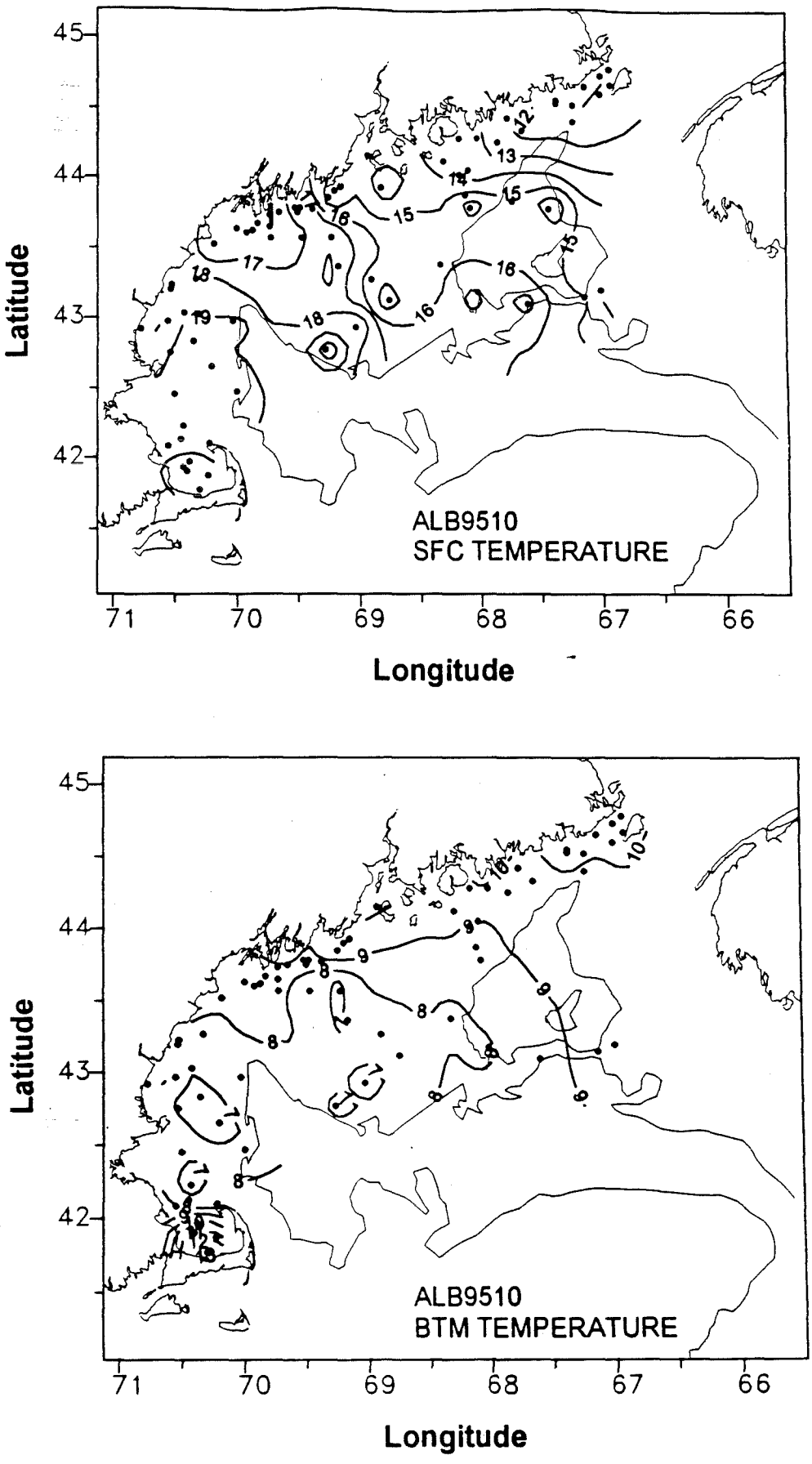

Figure 91. The surface and bottom temperature distribution for the Gulf of Maine Bottom Trawl Survey ALB9510.

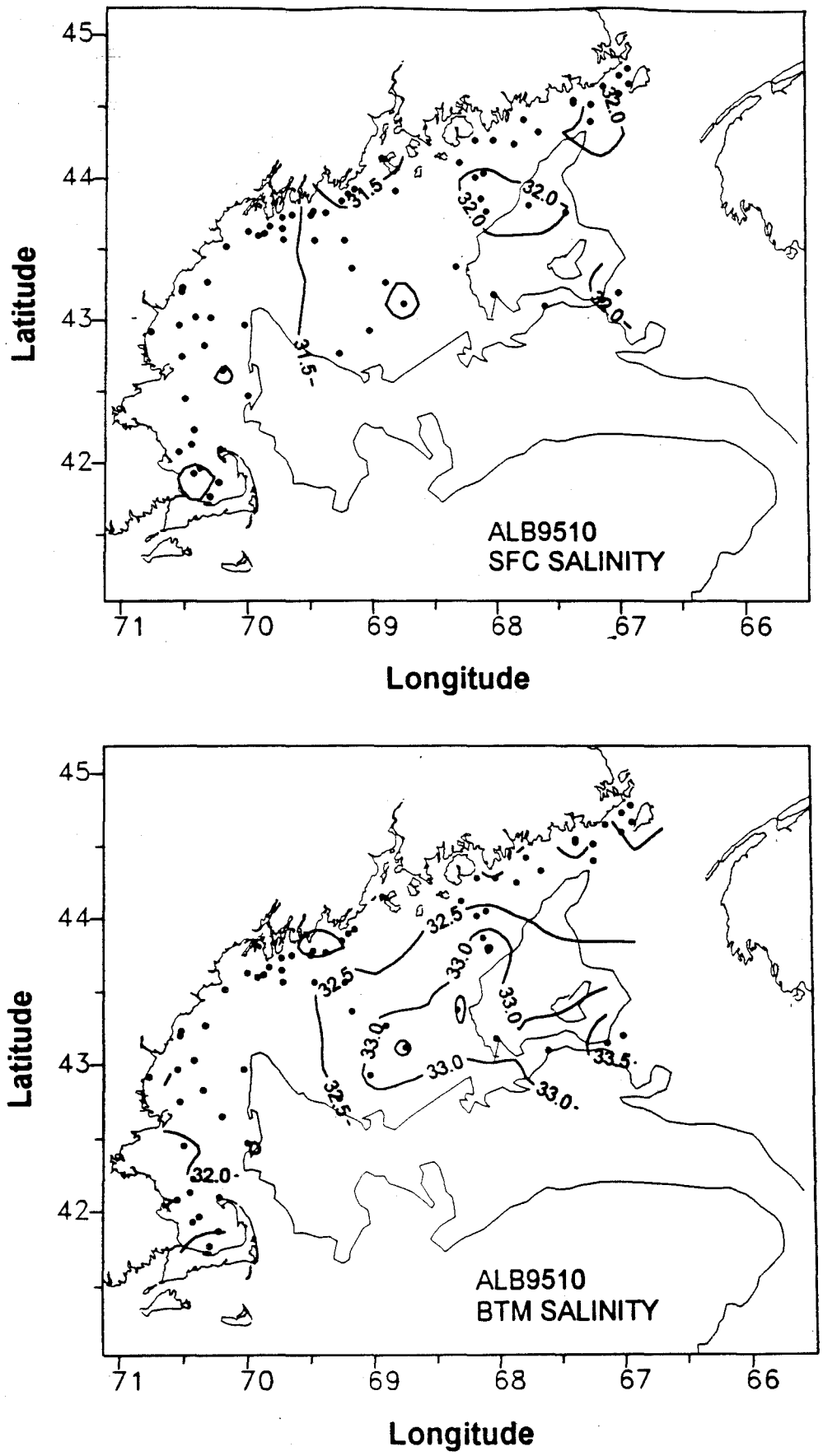

Figure 92. The surface and bottom salinity distribution for the Gulf of Maine Bottom Trawl Survey ALB9510.

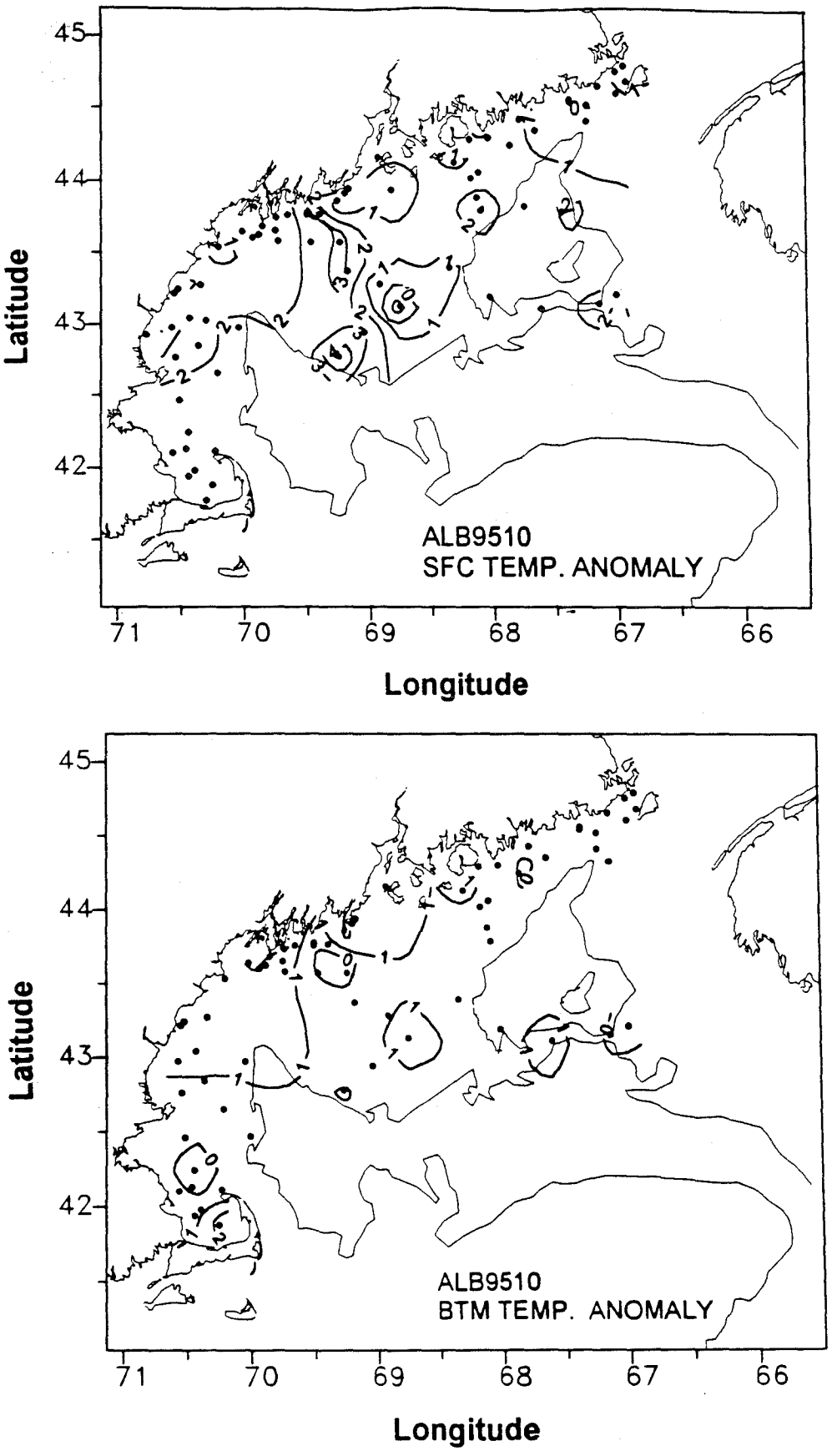

Figure 93. The surface and bottom temperature anomaly distribution for the Gulf of Maine Bottom Trawl Survey ALB9510.

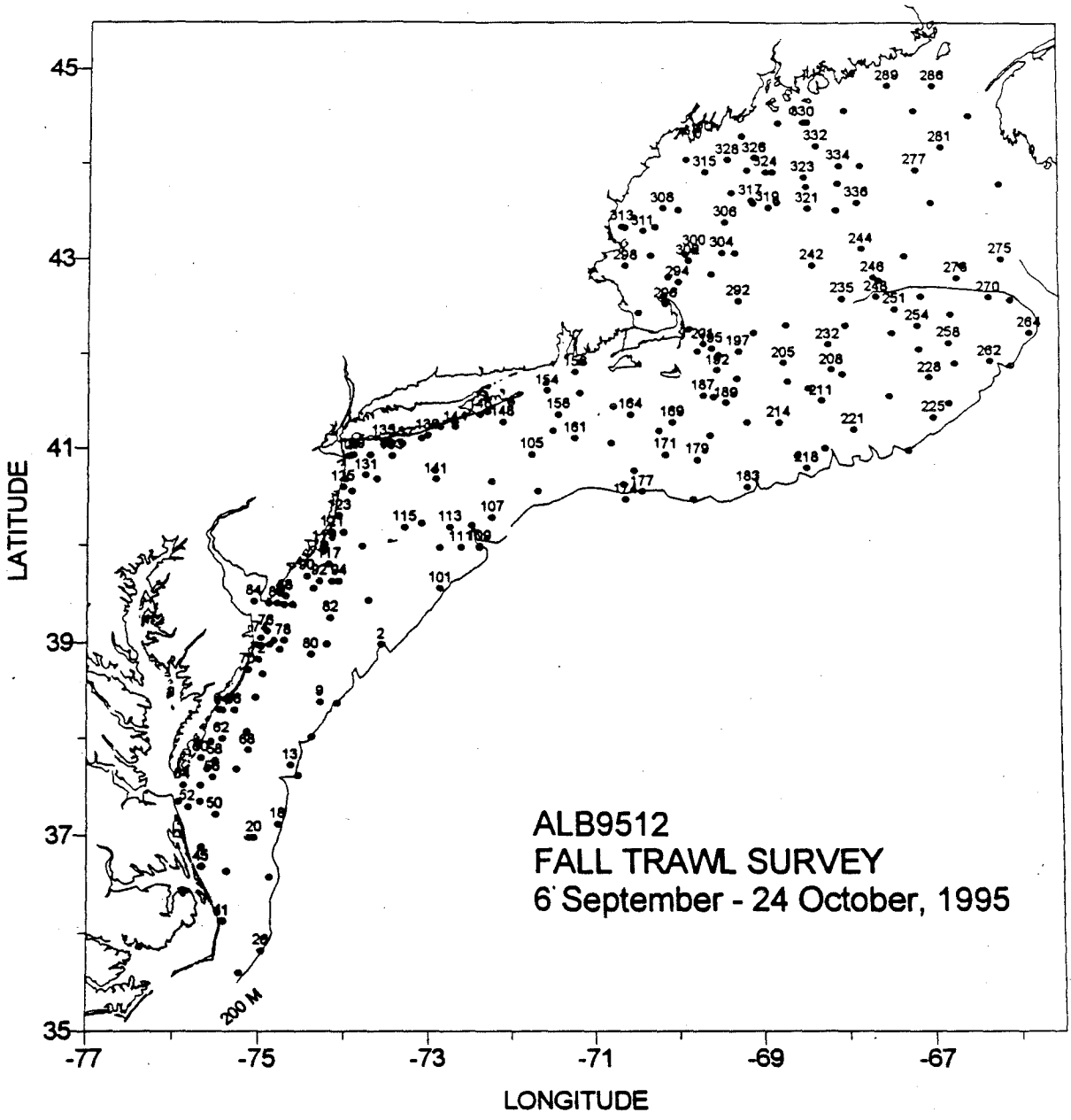

Figure 94. Hydrographic stations occupied during the Fall Bottom Trawl Survey ALB9512.

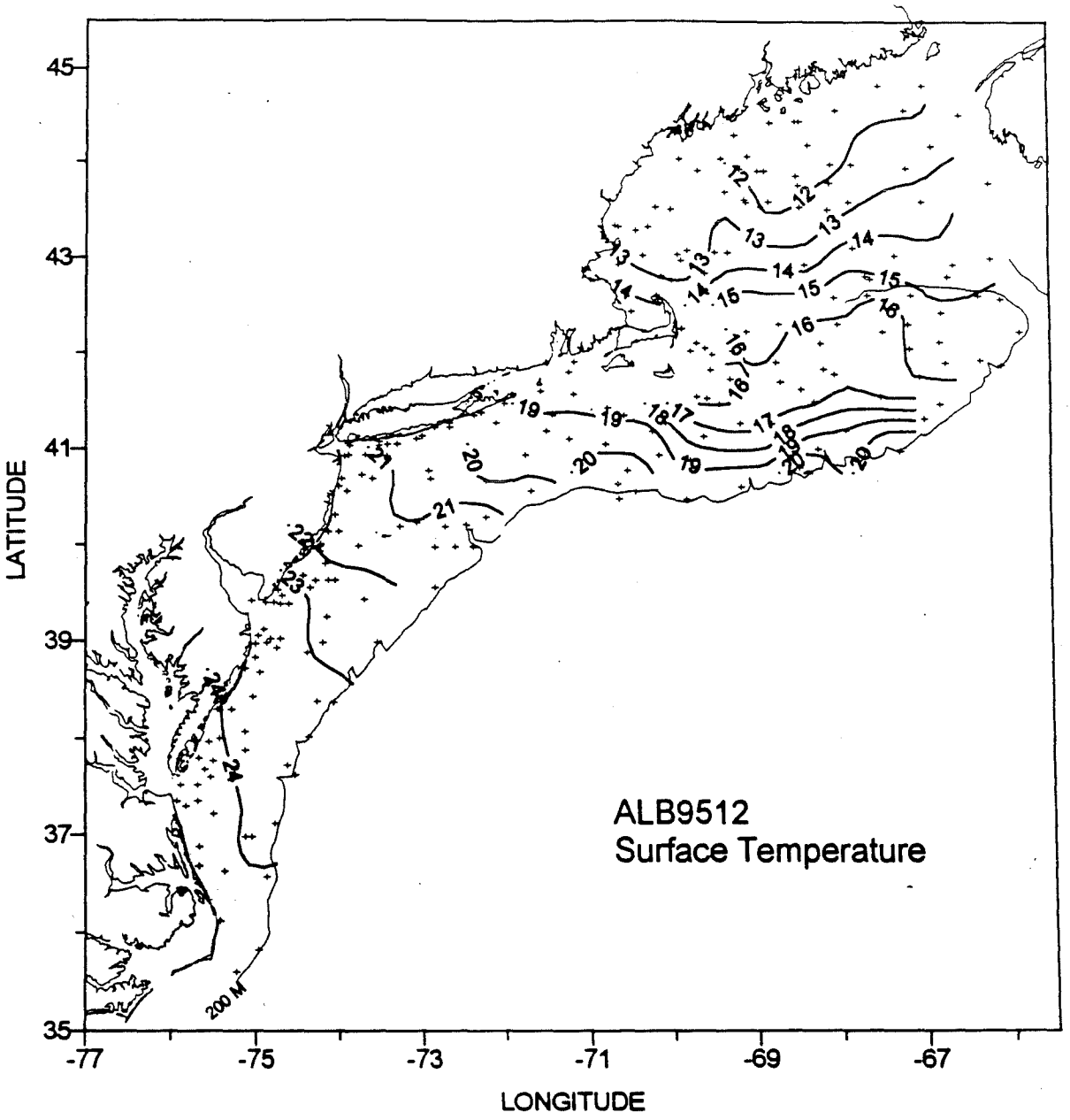

Figure 95. The surface temperature distribution for the Fall Bottom Trawl Survey ALB9512.

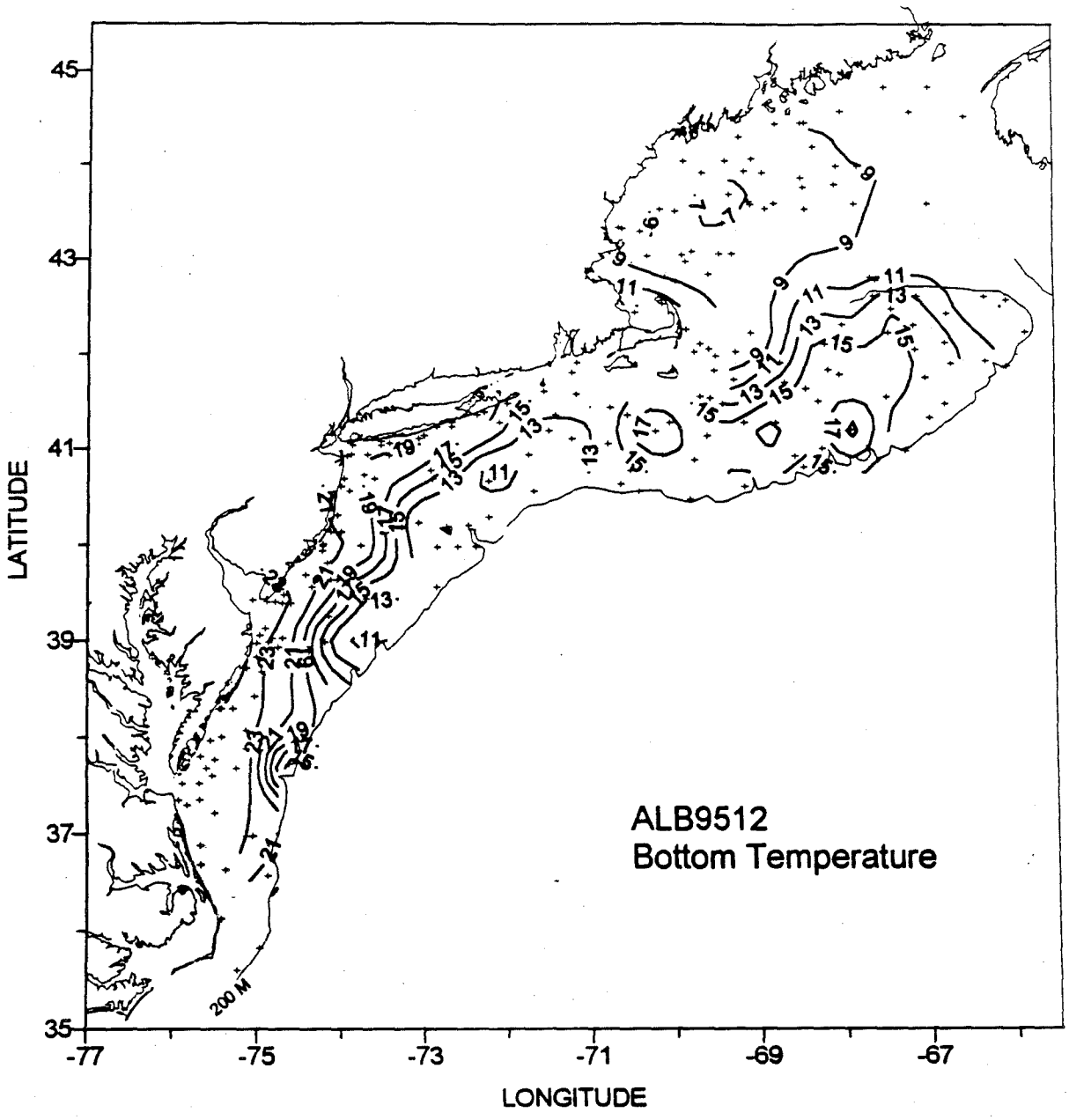

Figure 96. The bottom temperature distribution for the Fall Bottom Trawl Survey ALB9512.

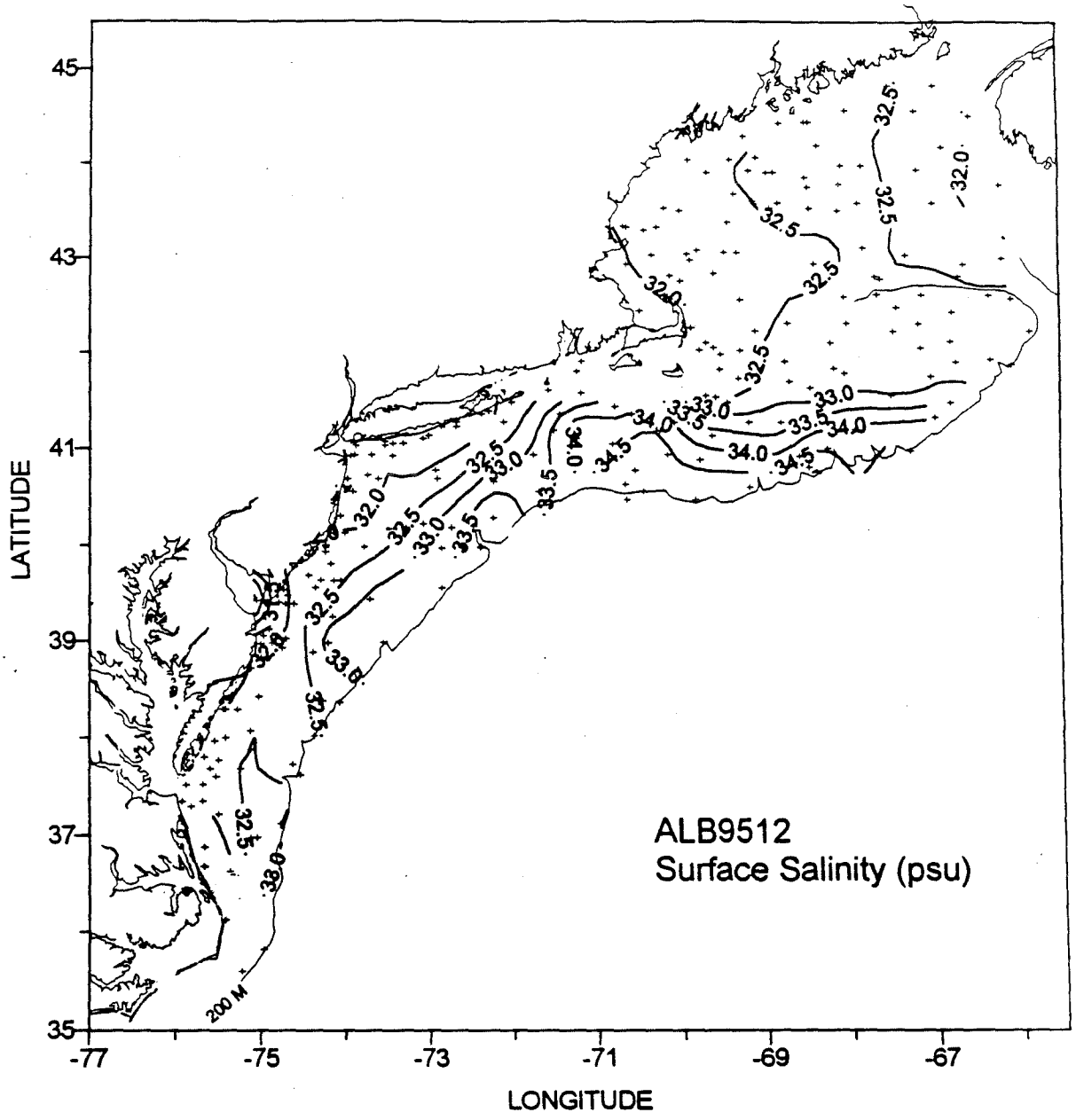

Figure 97. The surface salinity distribution for the Fall Bottom Trawl Survey ALB9512.

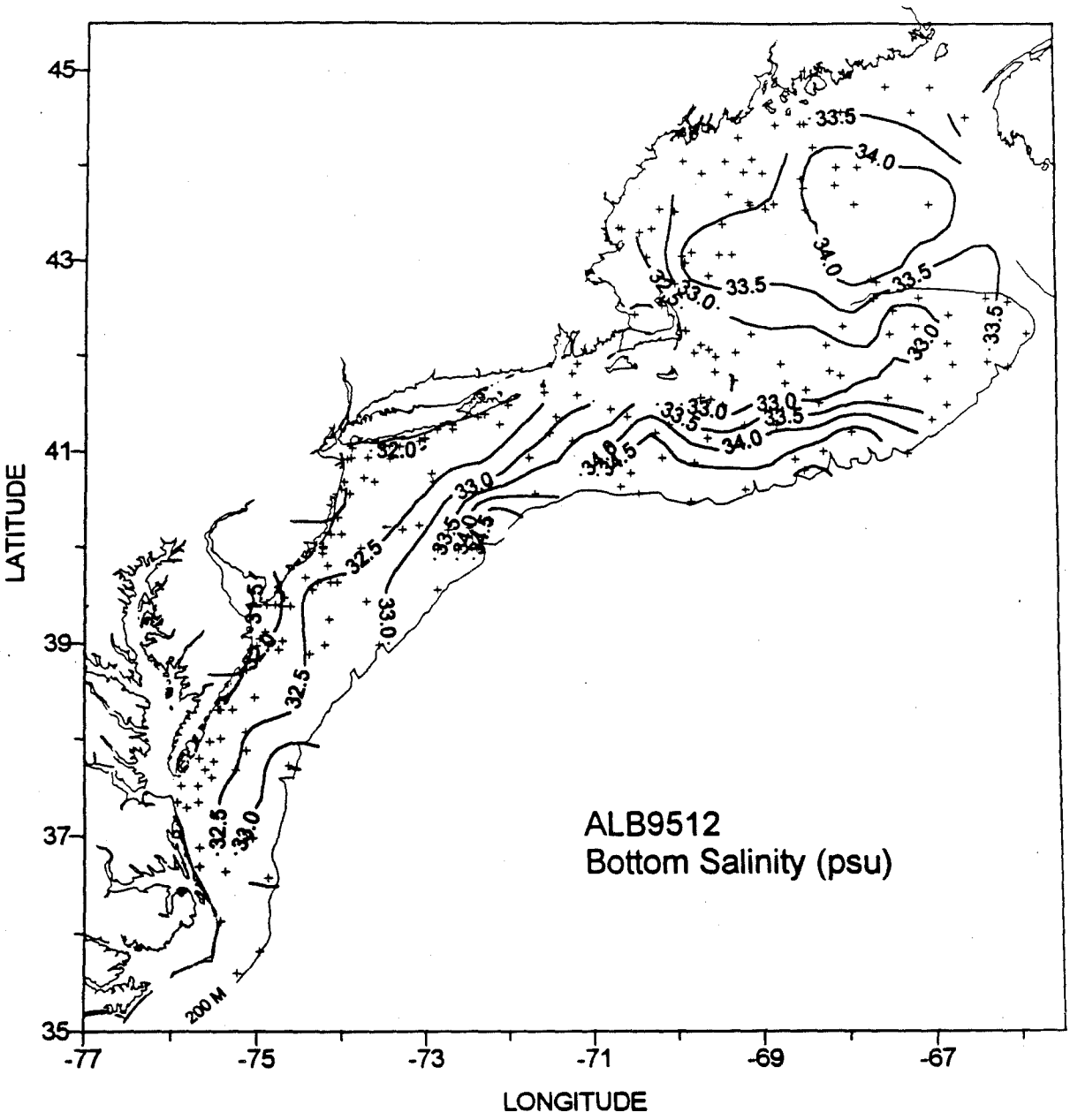

Figure 98. The bottom salinity distribution for the Fall Bottom Trawl Survey ALB9512.

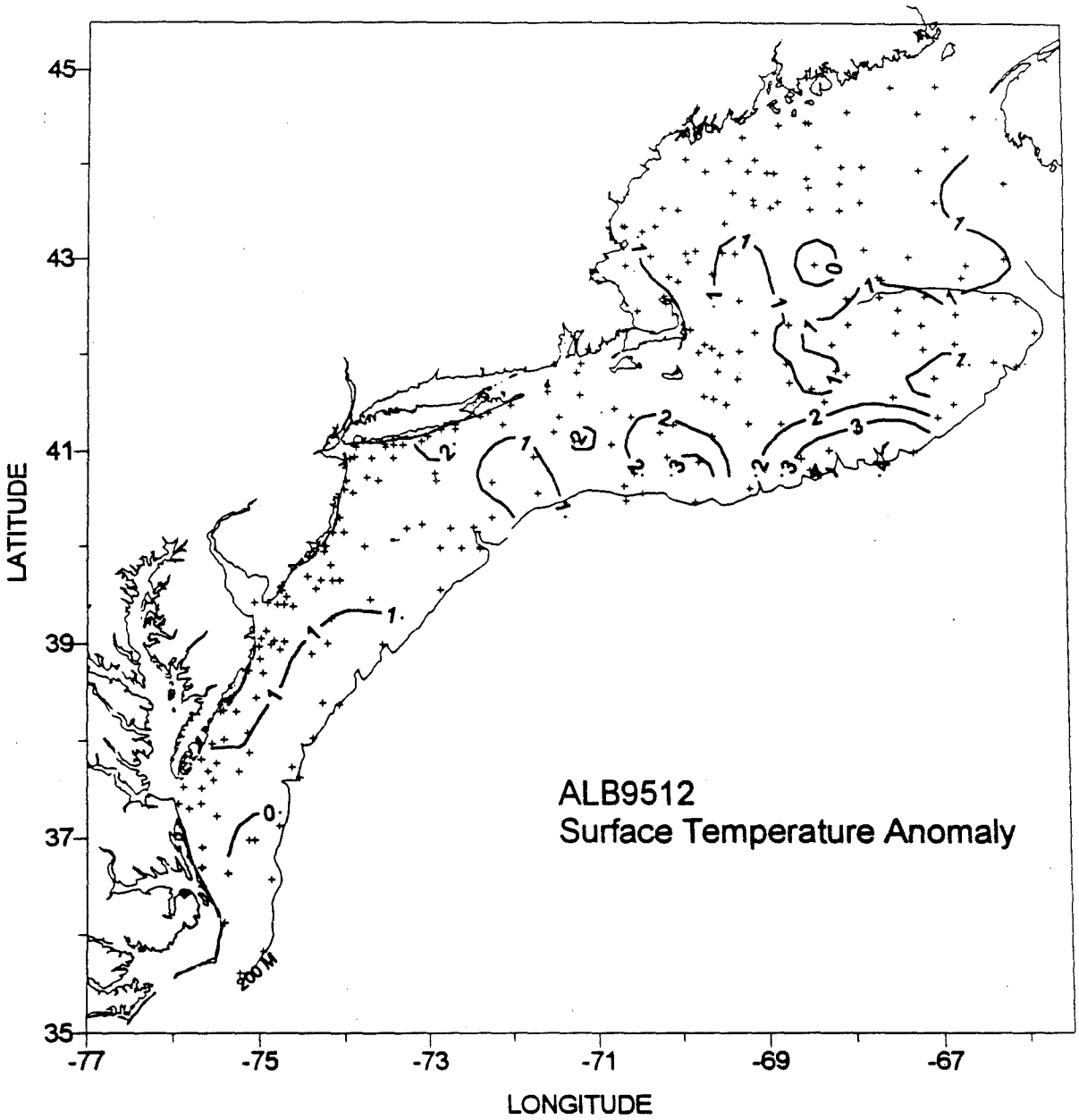

Figure 99. The surface temperature anomaly distribution for the Fall Bottom Trawl Survey ALB9512.

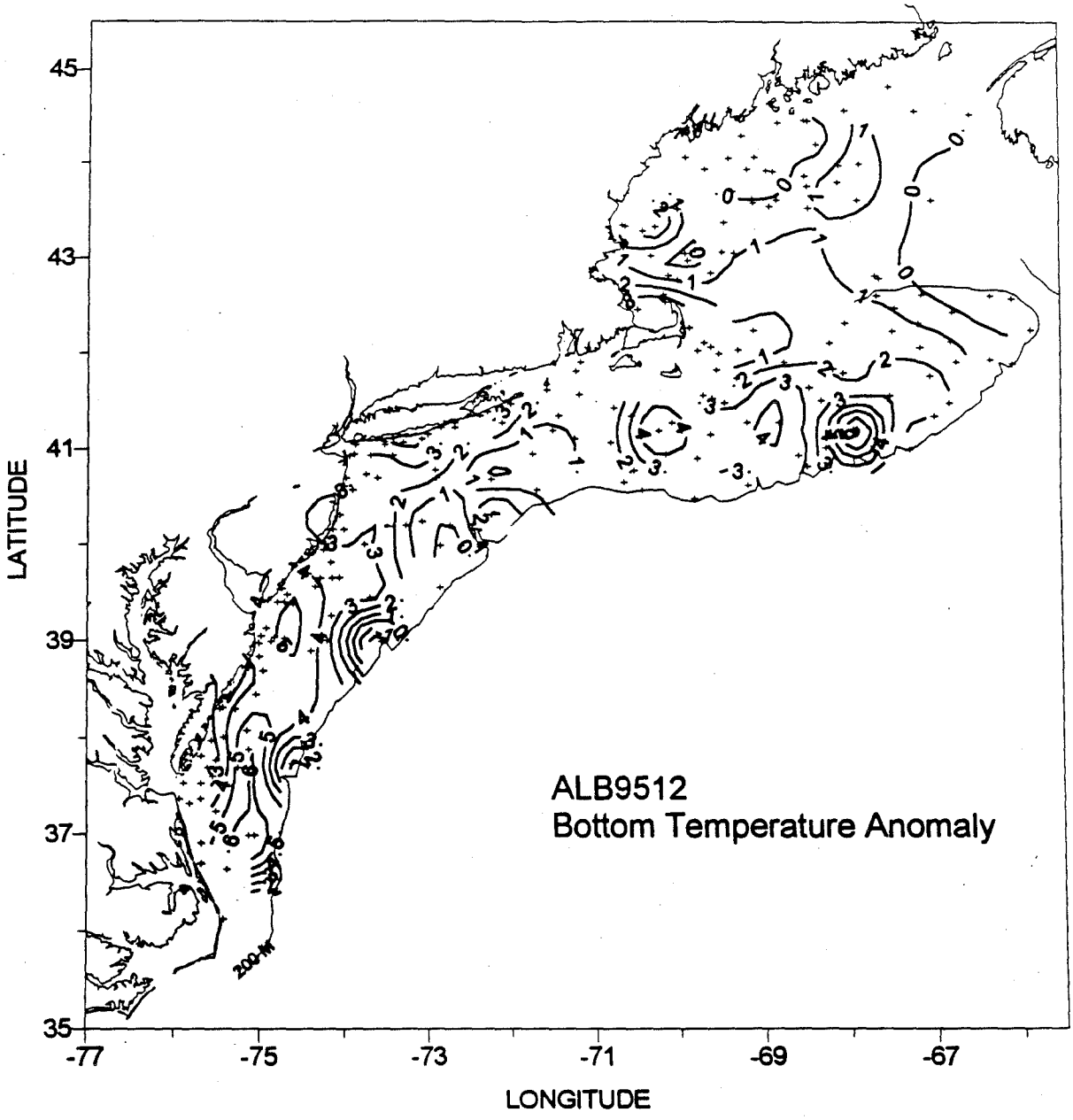

Figure 100. The bottom temperature anomaly distribution for the Fall Bottom Trawl Survey ALB9512.

APPENDIX A. Summary of cruise information and hydrographic work completed.

Appendix A. Summary of 1995 cruise information and hydrographic work completed.

Vessel: R/V Albatross IV **Cruise:** 9502

Program: Gear Testing
Dates: 24 January - 2 February
Sea day: 10
Instrument(s): Profiler 0360

Cruise Objectives: To (1) measure and collect data on survey otter trawl and ship performance parameters and (2) to test two separate methods of electronic survey data entry.

Total # of stations: 103
# of vertical CTD/Profiler casts: 43
# of double oblique profiler casts: 0
 # salinity samples: 11
salt correction: 0

****

Vessel: R/V Endeavor **Cruise:** 261

Program: GLOBEC Broad Scale Survey #1
Dates: 10 - 20 February
Sea days: 9
Instrument(s): Profiler 1468

Cruise Objectives: To (1) conduct a broad-scale survey of U.S. GLOBEC Georges Bank Program target fish and copepod species with their predators and prey to determine their distribution and abundance, (2) conduct a hydrographic survey of the Bank, (3) conduct acoustic mapping of the plankton along the tracklines between stations using a high frequency echo sounder deployed in a towed body, (4) map the Bank-wide velocity field using an Acoustic Doppler Current Profiler, (5) collect individuals of *Calanus* and the euphausiid *Meganyctiphanes norvegica* for population genetics studies and (6) deploy drifting buoys to make Lagrangian measurements of the region's currents.

Total # of stations: 37
# of vertical CTD/Profiler casts: 6
# of double oblique profiler casts: 38
 # salinity samples: 6
salt correction: +0.017

Special Notes: Primary hydrographic data on this cruise was collected using a Neil Brown Mark 5 CTD.

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Vessel: R/V Albatross IV **Cruise:** 9503

Program: Winter Bottom Trawl Survey
Dates: 8 February - 2 March
Sea days: 19
Instrument(s): Profiler 0360

Cruise Objectives: To (1) determine the winter distribution and relative abundance of fish and invertebrate species; (2) collect biological samples for studies of age and growth relationships, fecundity, maturity and food habits, (3) collect hydrographic and meteorological data, and (4) make collections of data and samples for cooperative researchers and programs.

Total # of stations: 155
# of vertical CTD/Profiler casts: 24
# of double oblique profiler casts: 75
 # salinity samples: 17
salt correction: +0.032

****

Vessel: R/V Relentless **Cruise:** 9501

Program: Spring Harbor Porpoise Survey
Dates: 11 - 28 March
Sea days: 18
Instrument(s): Profiler 1496

Cruise Objectives: To (1) determine the distribution and habitat preferences of harbor porpoises in Mid-Atlantic waters during March, a time when harbor porpoises have stranded on beaches from North Carolina to Massachusetts, (2) determine the distribution and habitat preferences of other marine mammals, (3) field test and improve a computerized data entry system, (4) evaluate the *R/V Relentless* as a sighting platform for future marine mammals sighting surveys.

Total # of stations: 43
# of vertical CTD/Profiler casts: 14
# of double oblique profiler casts: 29
 # salinity samples: 10
salt correction: 0

Special Notes: No salt correction was applied to the data because of the uncertainty about the accuracy of the AUTOSAL readings.

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Vessel: R/V Endeavor **Cruise:** 263

Program: GLOBEC Broad Scale Survey #2
Dates: 13 - 23 March
Sea days: 11
Instrument(s): Profiler 1468

Cruise Objectives: To (1) conduct a broad-scale survey of U.S. GLOBEC Georges Bank Program target fish and copepod species with their predators and prey to determine their distribution and abundance, (2) conduct a hydrographic survey of the Bank, (3) collect individuals of *Calanus* and the euphausiid *Meganyctiphanes norvegica* for population genetics studies, (4) deploy drifting buoys to make Lagrangian measurement of the currents and (5) gather acoustic doppler current profiler data.

Total # of stations: 50
# of vertical CTD/Profiler casts: 5
# of double oblique profiler casts: 56
 # salinity samples: 5
salt correction: +0.035

Special Notes: Primary hydrographic data on this cruise was collected using a Neil Brown Mark 5 CTD.

****

Vessel: R/V Seward Johnson **Cruise:** 9503

Program: GLOBEC Process #1
Dates: 15 - 17 March
Sea days: 3
Instrument(s): Profiler 0360\Profiler 0456

Cruise Objectives: To (1) determine the distribution and abundance of larval and juvenile cod and haddock on the eastern flank of Georges Bank in relation to water column conditions, and (2) conduct site studies to determine juvenile fish vertical distribution, diel variability, predator-prey relations and biochemical content and (3) conduct scuba diving operations to collect gelatinous organisms and record their distribution and behavior.

Total # of stations: 18
# of vertical CTD/Profiler casts: 2
# of double oblique profiler casts: 7\11
 # salinity samples: 2\0
salt correction: 0\0

Special Notes: Primary hydrographic data on this cruise was collected using a Neil Brown Mark 3 CTD. The conductivity cell on Profiler 0360 was damaged during the cruise. Profiler 0456 was used for the remainder of the cruise.

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Vessel: R/V Albatross IV **Cruise:** 9504

Program: Spring Bottom Trawl Survey
Dates: 7 March - 27 April
Sea days: 44
Instrument(s): Profiler 0851

Cruise Objectives: To (1) determine the spring distribution and relative abundance of fish and invertebrate species; (2) collect biological samples for studies of age and growth relationships, fecundity, maturity and food habits, (3) collect hydrographic and meteorological data, (4) make collections of data and samples for cooperative researchers and programs.

Total # of stations: 332
# of vertical CTD/Profiler casts: 49
# of double oblique profiler casts: 122
 # salinity samples: 26
salt correction: +0.034

****

Vessel: R/V Seward Johnson **Cruise:** 9505

Program: GLOBEC Process #2
Dates: 8 - 12 April
Sea days: 5
Instrument(s): Profiler 0456

Cruise Objectives: To (1) determine the distribution and abundance of larval and juvenile cod and haddock on the eastern flank of Georges Bank in relation to water column conditions, (2) conduct site studies to determine their vertical distribution, diel variability, predator-prey relations, and biochemical content, and (3) conduct scuba diving operations to collect gelatinous organisms and record their distribution and behavior.

Total # of stations: 70
# of vertical CTD/Profiler casts: 7
# of double oblique profiler casts: 72
 # salinity samples: 7
salt correction: -0.020

****

Vessel: R/V Endeavor **Cruise:** 265

Program: GLOBEC Broad Scale Survey #3
Dates: 11 - 23 April
Sea days: 13

Instrument(s): Profiler 1468\Profiler 1447

Cruise Objectives: To (1) determine the distribution and abundance of the ichthyoplankton and zooplankton community on Georges Bank and in adjacent Gulf of Maine and slope waters, (2) provide systematic collections of larval and juvenile cod and haddock for age and growth estimates and feeding habits, (3) collect individuals of *Calanus* and the euphausiid, *Meganyctiphanes norvegica*, for population genetics studies, (4) conduct a hydrographic survey of the Bank, (5) map the Bank-wide velocity field using an Acoustic Doppler Current Profiler and (6) deploy drifting buoys to make Lagrangian measurements of currents.

Total # of stations: 72
# of vertical CTD/Profiler casts: 4\1
# of double oblique profiler casts: 25\47
 # salinity samples: 4\1
salt correction: +0.025\0

****

Vessel: Katahdin **Cruise:** 9502

Program: Predator/Prey Study I-III
Dates: 26 April - 28 May
Sea days: 25
Instrument(s): Profiler 1447\Profiler 1468

Cruise Objectives: To (1) investigate the impact of predation on the survival of age-zero fish (primarily *Gadus morhua* and *Melanogrammus aeglefinus*) by pelagic fish (*Scomber scombrus* and *Clupea harengus*) and (2) collect biological samples for use in the development of polyclonal immunoassays and DNA probes for identification of well-digested fish larvae in stomach contents.

Total # of stations: 142
# of vertical CTD/Profiler casts: 7\7
# of double oblique profiler casts: 76\45
 # salinity samples: 5\7
salt correction: 0\+0.031

Special Notes: There was some uncertainty about the accuracy of the AUTOSAL numbers for this cruise because values from several recently-calibrated instruments were significantly different from those of the AUTOSAL. Also, intermittent spiking in the data occurred during several casts.

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Vessel: R/V Albatross IV **Cruise:** 9505

Program: GLOBEC Broad Scale Survey #4

Dates: 9 - 18 May
Sea days: 10
Instrument(s): Profiler 0851

Cruise Objectives: To (1) determine the distribution and abundance of the ichthyoplankton and zooplankton community on Georges Bank and in adjacent Gulf of Maine and slope waters, (2) provide systematic collections of larval and juvenile cod and haddock for age and growth estimates and feeding estimates, (3) collect individuals of *Calanus* and the euphausiid, *Meganyctiphanes norvegica* for population genetic studies, (4) conduct a hydrographic survey of the Bank, and (5) map the Bank-wide velocity field using an Acoustic Doppler Current Profiler.

Total # of stations: 61
# of vertical CTD/Profiler casts: 7
# of double oblique profiler casts: 61
 # salinity samples: 6
salt correction: +0.023

Special Notes: Primary hydrographic data for this cruise was collected using a Neil Brown Mark 5 CTD.

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Vessel: R/V Seward Johnson **Cruise:** 9507

Program: GLOBEC Process #3
Dates: 10 - 14 May
Sea days: 5
Instrument(s): Profiler 0456\Profiler 1496

Cruise Objectives: To (1) determine the distribution and abundance of larval and juvenile cod and haddock on the southern flank of Georges Bank in relation to water column conditions, (2) conduct site studies to determine larval fish distribution, diel variability, predator-prey relations, and biochemical content, (3) document the abundance, distribution, and behavior of hydroids and other gelatinous predators in the same area, and (4) measure the horizontal shear and vorticity of water parcels through small scale drifter deployments.

Total # of stations: 95
# of vertical CTD/Profiler casts: 9\0
# of double oblique profiler casts: 77\9
 # salinity samples: 7\0
salt correction: -0.020\0

Special Notes: Some of the salt samples were inadvertently mixed-up in the salt case and could not be used in the post processing.

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Vessel: R/V Albatross IV **Cruise:** 9506

Program: GLOBEC Broad Scale Survey #5
Dates: 6 - 15 June
Sea days: 10
Instrument(s): Profiler 0851

Cruise Objectives: To (1) conduct a broadscale survey of the distribution and abundance of GLOBEC target species on Georges Bank including larvae and juveniles of cod and haddock, *Calanus finmarchicus*, *Pseudocalanus* spp, and their predators and prey, (2) conduct a hydrographic survey of the Bank, (3) collect Calanus finmarchicus and the euphausiid, *Meganyctiphanes norvegica* for population genetic studies, (5) map the Bank-wide velocity field using an Acoustic Doppler Current Profiler and (6) deploy drifter buoys for circulation studies of the Bank.

Total # of stations: 45
# of vertical CTD/Profiler casts: 5
# of double oblique profiler casts: 48
 # salinity samples: 5
salt correction: +0.025

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Vessel: R/V Albatross IV **Cruise:** 9507, 9509

Program: Sea Scallop Survey I, II
Dates: 19 - 30 June, 25 July - 5 August
Sea days: 24
Instrument(s): Profiler 0851

Cruise Objectives: To (1) determine the distribution and relative abundance of the sea scallop Placopecten magellanicus and Iceland scallop Chlamys islandica, (2) collect biological samples and data relative to assessment needs, (3) monitor hydrographic and meteorological conditions, and (4) make collections of specimens for interested scientists at other institutions and laboratories.

Total # of stations: 483
# of vertical CTD/Profiler casts: 49
# of double oblique profiler casts: 76
 # salinity samples: 25
salt correction: +0.024

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Vessel: Katahdin **Cruise:** 9504

Program: Predator/Prey Study
Dates: 20 - 25 June

Sea days: 6
Instrument(s): Profiler 1447

Cruise Objectives: To (1) investigate the impact of predation on the survival of age-zero cod *Gadus morhua* and haddock *Melanogrammus aeglefinus*.

Total # of stations: 110
# of vertical CTD/Profiler casts: 56
# of double oblique profiler casts: 0
 # salinity samples: 6
salt correction: 0

****

Vessel: R/V Albatross IV **Cruise:** 9508

Program: GLOBEC Broad Scale Survey #6
Dates: 10 - 20 July
Sea days: 11
Instrument(s): Profiler 0851

Cruise Objectives: To (1) conduct a broad scale survey of the U.S. GLOBEC Georges Bank Program of target fish (larval and juvenile cod and haddock) and copepod species (*Calanus finmarchicus* and *Pseudocalanus* sp.) and their predators and prey to determine their distribution and abundance, (2) conduct a hydrographic survey of the Bank, (3) conduct acoustic mapping of plankton using a high frequency echo sounder deployed in a towed body, (4) map the Bank
wide velocity field using an acoustic doppler current profiler, (5) collect individuals of *Calanus finmarchicus*, *Pseudocalanus* sp, and the euphausiid, *Meganyctiphanes norvegica*, for population genetics studies, and (6) deploy drifting buoys to make Lagrangian measurements of current.

Total # of stations: 40
# of vertical CTD/Profiler casts: 7
# of double oblique profiler casts: 38
 # salinity samples: 6
salt correction: +0.024

****

Vessel: R/V Pelican **Cruise:** 9501

Program: Marine Mammal Survey
Dates: 10 July - 2 August
Sea days: 21
Instrument(s): Profiler 1496

Cruise Objectives: To (1) determine the spatial distribution and estimate the abundance of marine mammals found in the study area and (2) determine if spatial distribution patterns of marine mammals are correlated with hydrographic features or with biological features.

Total # of stations: 42
# of vertical CTD/Profiler casts: 41
# of double oblique profiler casts: 4
 # salinity samples: 14
salt correction: +0.018

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Vessel: R/V Abel J **Cruise:** 9501

Program: Summer Marine Mammal Survey
Dates: 11 July - 1 August
Sea days: 17
Instrument(s): Profiler 1495

Cruise Objectives: To (1) conduct line-transect population surveys within the study area, (2) investigate cetacean distribution along the Gulf Stream, (3) determine if the distribution of cetaceans is continuous in Gulf Stream and slope water habitats, (4) collect information on the relationship between cetaceans and oceanographic features, (5) collect CTD data, (6) conduct marine mammal photographic and video identification methodology studies and (7) collect biopsy samples for stock identification and contaminant studies.

Total # of stations: 35
# of vertical CTD/Profiler casts: 35
# of double oblique profiler casts: 0
 # salinity samples: 0
salt correction: 0

Special Notes: no salt samples were collected during this cruise.

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Vessel: Katahdin **Cruise:** 9505

Program: Predator/Prey Study
Dates: 17 - 28 July
Sea days: 11
Instrument(s): Profiler 1447

Cruise Objectives: To (1) investigate fish predation on age-zero fish, particularly on Atlantic cod and haddock.

Total # of stations: 126
# of vertical CTD/Profiler casts: 86
# of double oblique profiler casts: 0
 # salinity samples: 22
salt correction: +0.047

****

Vessel: R/V Abel J **Cruise:** 9502

Program: Marine Mammal Survey
Dates: 8 August - 4 September
Sea days: 22
Instrument(s): Profiler 1496

Cruise Objectives: To (1) estimate the abundance of harbor porpoises in the Gulf of Maine\Bay of Fundy Scotian shelf area using two different field collection and analysis methods, (2) determine the spatial distribution and estimate the abundance of other cetaceans in the above area, (3) conduct a comparison between sighting rates and spatial distribution of harbor porpoises as seen by two different types of sighting platforms, (4) determine spatial distribution patterns of harbor porpoises and investigate if the patterns are correlated with hydrographic or biological features, (5) compare the abundance estimate and spatial distribution of harbor porpoises as seen this year with that seen in previous years.

Total # of stations: 50
# of vertical CTD/Profiler casts: 50
# of double oblique profiler casts: 0
 # salinity samples: 0
salt correction: 0

Special Notes: no salt samples were collected during this cruise.

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Vessel: R/V Pelican **Cruise:** 9502

Program: Marine Mammal Survey
Dates: 9 August - 4 September
Sea days: 15
Instrument(s): Profiler 1495

Cruise Objectives: To (1) conduct line-transect population surveys within the study area, (2) investigate cetacean distribution on the southern portion of Georges Bank, (3) collect information on the relationship between cetaceans and oceanographic features, (4) collect CTD and zooplankton data, (5) conduct marine mammal photographic

identification studies using an inflatable boat, and (6) collect biopsy samples for stock identification and contaminant studies.

Total # of stations: 34
# of vertical CTD/Profiler casts: 25
# of double oblique profiler casts: 9
 # salinity samples: 0
salt correction: 0

****

Vessel: R/V Albatross IV **Cruise:** 9510

Program: Gulf of Maine Bottom Trawl Survey
Dates: 15 - 25 August
Sea days: 11
Instrument(s): Profiler 0851\Profiler 0853\Profiler 1468

Cruise Objectives: To (1) determine the seasonal distribution and relative abundance of fish and invertebrate species found in the Gulf of Maine, (2) collect biological specimens and data relating to the structure of Gulf stocks and feeding interrelationships among those species, and (3) study the feasibility of conducting a routine bottom trawl survey time series in coastal, western Gulf of Maine waters.

Total # of stations: 82
# of vertical CTD/Profiler casts: 19\12\25
# of double oblique profiler casts: 5\3\19
 # salinity samples: 3\0\3
salt correction: 0

Special Notes: There were many casts during this cruise where data "spikes" was a problem. Profilers 0851 and 0853 had to be repaired on return to port. There was an insufficient number of good salt samples collected and as a result, no salt correction was applied.

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Vessel: R/V Albatross IV **Cruise:** 9512

Program: Fall Bottom Trawl Survey
Dates: 6 September - 24 October
Sea days: 27
Instrument(s): Profiler 1468\Profiler 0360

Cruise Objectives: To (1) determine the autumn distribution and relative abundance of fish and selected invertebrate species, (2) collect biological samples for studies of age and growth relationships, fecundity, maturity and food habits, and (3) collect hydrographic and meteorological data, (4) collect samples of ichthyoplankton and zooplankton, (5) make data and sample collections for cooperative researchers and programs, (6) collect catch data in and near Closed Area

II on Georges Bank.

Total # of stations: 360
# of vertical CTD/Profiler casts: 17\118
# of double oblique profiler casts: 14\107
 # salinity samples: 4\30
salt correction: 0\+0.018

Special Notes: Profiler 1468 malfunctioned early in the cruise and was replaced with 0360 which operated with few problems.

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