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Description of the 1999 Oceanographic Conditions on the Northeast Continental Shelf

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract

A summary of hydrographic observations for 25 surveys on the northeast continental shelf during 1999 is presented. Distributions of station position, surface and bottom temperature, salinity, and anomalies are portrayed. The average surface and bottom temperatures and salinities have been calculated 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).

The temperature distributions for all five regions show a fairly typical seasonal pattern. In general, the northeast shelf in 1999 exhibited warmer temperatures than the reference period (1977-1987) used in these reports. The salinity anomaly distributions indicate that conditions were fresher during the first half of the year. However, salinity values were slightly above the expected conditions toward the end of summer and into the fall season.

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 and during some of the Ecosystem Monitoring cruises. Included in this report are hydrographic distributions from the six GLOBEC Broad-Scale surveys of Georges Bank that provided good coverage from January through June. This was the final year of field work for the GLOBEC Georges Bank study. Further information on the U.S. GLOBEC field program may be obtained in the individual cruise

reports available through the GLOBEC program office. Station coverage on other cruises throughout the year varies.

Temperature and salinity observations from 25 NEFSC surveys conducted during 1999 are summarized and presented in this report. Cruise operation summaries are presented for all cruises. Distribution plots of surface and bottom temperature, salinity, and anomalies 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 model 19 profiling CTD (Profiler), which 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 (sensors facing up), and a double oblique tow was made. Upcast data are used as the primary data when the Profiler is deployed with bongo nets. The turbulence generated by the bongo nets during the downcast adversely affects the temperature and conductivity data quality. If no plankton haul was done, the Profiler was deployed vertically (sensors facing down) through the water column and the downcasts are processed as the primary data. Salinity samples are taken from the bottom of a vertical profile cast, generally once per day, 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, FILTER, 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 were 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 if coverage was sufficient. 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. No salinity correction was applied to the cruise data if the mean salinity offset was less than +/- 0.01 psu.

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. Cruise data were combined for some cruises shown in Tables 2 and 3. This was done when there were more than

one cruise occurring at the same time and in the same region(s) and when the individual cruises did not have sufficient coverage to generate a true areal average. For most cruises, the areal averages and anomalies could not be calculated for all regions due to limited station coverage. In many 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 - 3 present the time series of surface and bottom average temperature/salinity and temperature/salinity anomaly for each region. Cruises having less than 10 observations were not included in the time series figures. Station positions and distributions of surface and bottom temperature, salinity, and anomalies for the different cruises are presented in figures 4 - 95. Contour distribution figures were not prepared for some of the cruises because of poor station coverage. We were not able to resolve small scale, localized events because of the regional averaging method used in this report.

Discussion

The trend of fresher salinity conditions on the northeast continental shelf that has been reported during the last few years (Taylor and Bascuñán, 1999) continued during the first half of the year. The observed pattern in the time series for all 5 regions is of a gradual increase in the areal average salinity. The fall anomalies indicate slightly higher salinities relative to the MARMAP reference. Warmer surface temperatures occurred throughout the year in all regions.

The southern MAB showed the highest bottom temperature anomalies while the western Gulf of Maine exhibited bottom temperatures only slightly above the expected values. The largest surface temperature anomaly occurred on Georges Bank during the Scallop survey. Gulf Stream warm core rings were observed along the shelf edge of Georges Bank and the MAB regions during the summer and fall. However, the anomalies do not clearly show a temperature/salinity relationship consistent with the passage of these rings. Bottom salinity figures for the fall bottom trawl (ALB9910) and the Ecosystem Monitoring survey (NP9901/ALB9911) show that the shelf/slope front had encroached onto the Shelf during the fall. The movement of the front higher on the shelf may be the cause of both the warmer and saltier anomalies observed during the latter part of the year.

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

Taylor, M. H. and C. Bascuñán 1998. Description of the 1997 oceanographic conditions on the northeast continental shelf. Woods Hole, MA: Northeast Fisheries Science Center. Reference Document 98-01. Available from: Information Services Section, NMFS/ Northeast Fisheries Science Center, Woods Hole, MA; 02543.

Taylor, M. H. and C. Bascuñán 1999. Description of the 1998 oceanographic conditions on the northeast continental shelf. Woods Hole, MA: Northeast Fisheries Science Center. Reference Document 99-01. Available from: Information Services Section, NMFS/ Northeast Fisheries Science Center, Woods Hole, MA; 02543

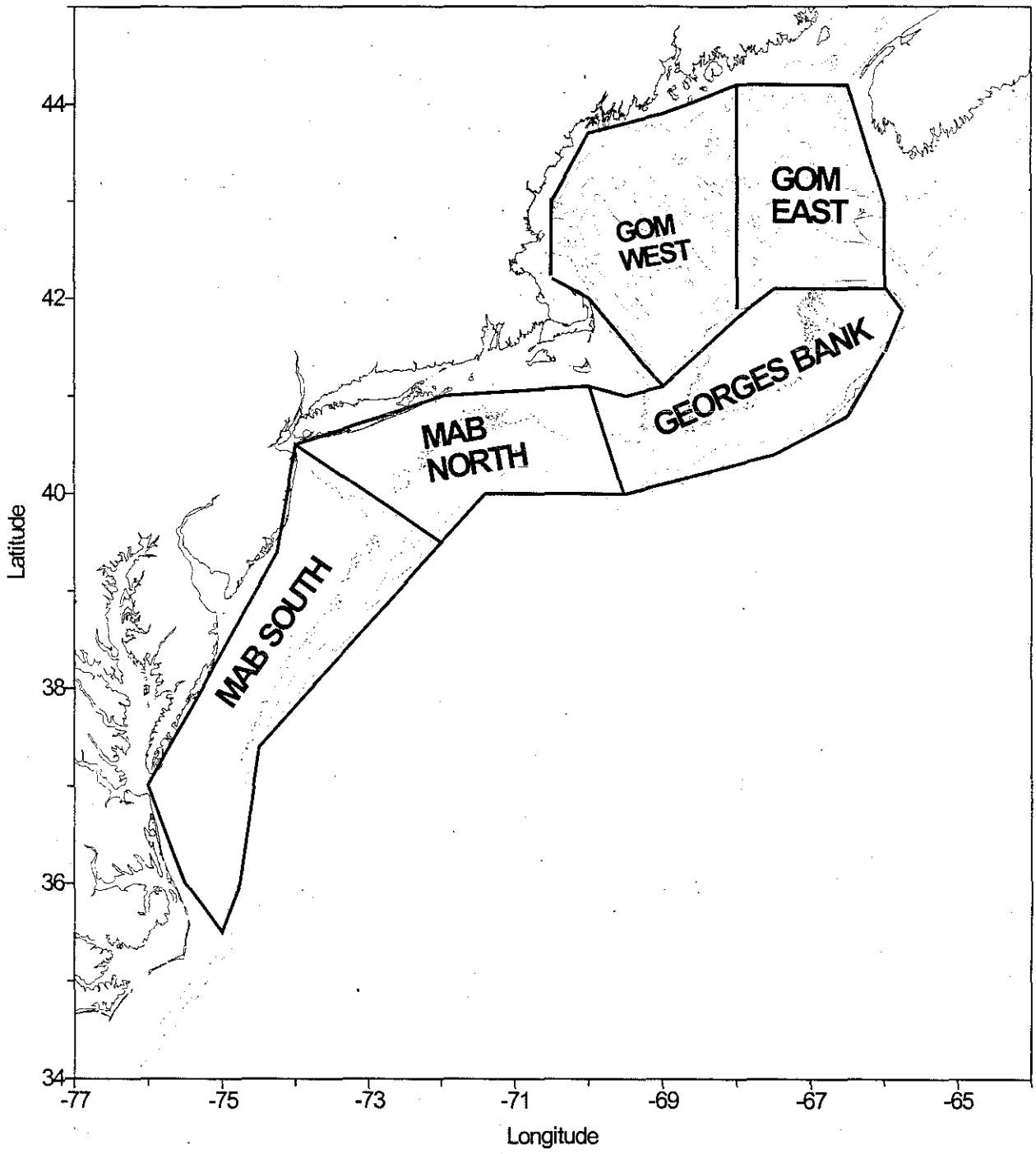


Figure 1. The regions of the northeast continental shelf covered by the Northeast Fisheries Science Center cruises during 1999.

Table 1. Summary of 1999 Cruises.

Cruise	Program	Dates	Regions[1]
ALB9901	GLOBEC Broadscale #1	13 - 23 January	GB
DEL9901	Ecosystem Monitoring	21 - 27 January	GOM
ALB9902	Winter Bottom Trawl	2 - 24 February	MAB, GB
OCE9936	GLOBEC Broadscale #2	11 - 23 February	GB
DEL9903	Marine Mammal Habitat	23 Feb - 10 March	GOM
ALB9903	Spring Bottom Trawl	2 March - 22 April	MAB, GB
END9920	GLOBEC Broadscale #3	11 - 22 March	GB
DEL9905	Gear Comparison Study	30 March – 8 April	GB
EDL9904	GLOBEC Process #1	16 - 23 April	GB
OCE9941	GLOBEC Broadscale #4	16 - 26 April	GB
DEL9906	Marine Mammal Survey	26 - 29 April	MAB
EDL9905	GLOBEC Process #2	11 - 27 May	GB
ALB9904	GLOBEC Broadscale #5	20 - 27 May	GB
ALB9905	Habitat Study	2 - 10 June	GB
AJ9901	Ecosystem Monitoring	3 - 11 June	GB, GOM
ALB9906	GLOBEC Broadscale #6	15 - 23 June	GB
ALB9907	Closed Area Study	29 June - 1 July	GOM
DEL9907	Clam Survey	1 June - 23 July	MAB
ALB9908	Habitat Study	7 - 10 July	GB
ALB9909	Scallop Survey	17 July - 5 Aug	MAB, GB
AJ9902	Marine Mammal Survey	29 July - 27 Aug	GOM
IS9901	Ecosystem Monitoring	21 Aug - 2 Sept	GOM, GB
ALB9910	Fall Bottom Trawl	20 Sept – 10 Nov	GOM, GB, MAB
NP9901	Ecosystem Monitoring	6 – 11 November	MAB
ALB9910	Ecosystem Monitoring	13 – 22 November	GOM, GB

[1] Regional Abbreviations:

GOM = Gulf of Maine
MAB = Mid-Atlantic Bight
GB = Georges Bank

Table 2. Areal average surface and bottom temperature and temperature anomalies for the 1999 NEFSC cruises in the five regions of the northeast continental shelf as shown in Figure 1

		SURFACE					BOTTOM				
CRUISE (**)	CD	#obs	Temp	Anomaly	SDV1	SDV2	#obs	Temp	Anomaly	SDV1	SDV2
Gulf of Maine West											
DE9901	23	12	5.56	-0.30	0.32	0.56	12	6.31	0.24	0.24	0.68
DE9903	61	18	4.13	0.19	0.31	.53*	18	5.41	0.56	0.26	0.76*
AL9903	109	40	5.88	1.08	0.19	0.75	40	5.41	0.31	0.14	0.65
ALB/ABJ	160	13	13.35	2.32	0.30	1.23	12	5.93	0.24	0.24	1.44
AL9907	181	12	17.92	2.65	0.37	0.91*	12	5.45	0.12	0.31	0.60*
IS/ABJ	242	21	18.39	2.00	0.26	1.34	21	7.21	0.50	0.20	2.12
AL9910	310	53	11.58	0.67	0.17	0.70	53	7.99	0.81	0.14	1.56
NP/ALB	325	10	10.06	0.45	0.33	0.50	10	7.73	0.61	0.23	1.11
Gulf of Maine East											
AL9901	18	14	5.70	-0.14	0.24	0.65*	13	6.50	0.07	0.24	0.57*
DE9901	23	8	4.87	-0.41	0.39	0.53*	7	6.55	-0.37	0.33	0.89*
OC336	47	12	4.97	0.20	0.26	0.96*	11	6.52	1.12	0.26	1.19*
EN320	76	15	4.69	0.32	0.23	0.56*	14	5.52	0.18	0.23	0.82*
AL9903	105	33	4.96	0.28	0.22	0.67	31	7.29	0.60	0.23	1.09
EDL/OC	110	13	6.04	0.57	0.26	0.70*	12	6.66	0.64	0.25	0.57*
AL9904	143	13	8.45	0.60	0.26	1.06*	12	7.80	0.70	0.25	1.24*
ALB/ABJ	158	17	10.86	2.35	0.26	1.09	14	7.23	0.26	0.30	0.96
AL9906	170	5	13.28	2.52	0.40	1.33*	5	8.30	-0.07	0.40	1.36*
IS/ABJ	239	32	16.65	2.48	0.21	1.95	29	9.77	1.37	0.26	1.19
AL9910	299	36	12.18	0.47	0.19	0.71	29	10.28	1.53	0.21	1.06
NP/ALB	323	11	10.22	0.30	0.29	0.77	11	10.19	1.55	0.35	1.01
Georges Bank											
AL9901	18	70	6.73	-0.01	0.18	0.63	67	7.79	0.48	0.21	1.20
OC336	47	68	5.82	0.71	0.18	1.02	64	6.82	1.19	0.22	1.30
AL9902	52	34	5.86	0.94	0.24	1.15*	26	6.23	0.72	0.25	.64*
EN320	76	15	4.69	0.32	0.23	0.56*	14	5.52	0.18	0.23	.82*
DE9905	93	23	5.59	0.87	0.25	0.57	22	5.70	0.75	0.32	0.64
AL9903	98	60	5.80	0.85	0.18	0.67	54	5.71	0.68	0.23	0.92
EDL/OC	110	111	6.00	0.60	0.17	0.51	106	6.07	0.67	0.19	0.76
EL9905	133	72	8.84	1.60	0.13	0.98*	72	7.71	1.06	0.16	1.71*
AL9904	143	72	10.26	2.08	0.17	2.61	69	8.54	1.41	0.19	1.58
ALB/ABJ	156	80	11.93	2.24	0.21	1.29	78	9.51	1.63	0.24	1.42
AL9906	170	34	13.40	2.38	0.24	2.19	34	9.84	1.21	0.28	1.61
AL9908	189	21	14.12	2.14	0.23	1.05*	21	10.94	1.71	0.22	1.86*
AL9909	214	29	19.83	4.53	0.25	1.89	28	12.53	2.12	0.26	2.05
IS/ABJ	237	39	19.49	3.06	0.25	1.57	32	13.34	1.38	0.31	1.99

AL9910	291	47	16.24	2.00	0.18	1.63	42	14.81	2.23	0.23	1.50
NP/ALB	321	29	13.35	1.50	0.23	1.41	26	13.67	2.07	0.27	1.88
						MAB North					
AL9902	41	36	6.64	1.28	0.29	1.24	28	8.02	2.26	0.34	1.45
AL9903	87	56	5.53	1.15	0.26	0.77	49	6.54	1.30	0.32	1.47
DE9905	93	8	5.23	0.90	0.54	.62*	7	5.69	-0.04	0.67	2.02*
AL9909	208	27	23.55	3.44	0.27	1.61*	27	8.66	0.47	0.28	1.89*
IS/ABJ	234	19	22.17	2.17	0.36	1.69	16	11.38	1.32	0.43	2.13
AL9910	281	61	18.12	1.47	0.25	1.20	56	14.24	1.44	0.31	1.82
NP/ALB	315	22	14.80	1.28	0.37	0.94	21	14.95	1.92	0.41	1.19
						MAB South					
AL9902	36	61	8.45	1.73	0.25	1.64	50	8.92	2.22	0.29	1.37
AL9903	72	89	7.63	1.97	0.23	1.58	79	8.67	2.94	0.29	1.81
AL9909	201	56	23.79	0.37	0.23	1.33*	56	11.30	3.53	0.27	2.17*
AL9910	270	84	21.42	0.99	0.24	1.08	77	16.89	2.10	0.28	1.97
NP/ALB	312	28	17.04	1.96	0.37	1.71	26	16.22	1.80	0.42	0.88

(1) "CRUISE", the code name for a cruise: "CD", the calendar mid-data 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.

(**) ALB/ABJ = ALB9905 + AJ9901
IS/ABJ = IS9901 + AJ9902
NP/ALB = NP9901 + ALB9911
EDL/OC = EDL9904 + OCE9941

Table 3. Areal average surface and bottom Salinity and Salinity anomalies for the 1999 NEFSC cruises in the five regions of the northeast continental shelf as shown in Figure 1

		SURFACE					BOTTOM				
CRUISE	CD (**)	#obs	Salt	Anomaly	SDV1	SDV2	#obs	Salt	Anomaly	SDV1	SDV2
Gulf of Maine West											
DE9901	23	12	32.57	-0.40	0.14	0.27	12	33.48	-0.06	0.11	0.40
DE9903	61	18	32.56	-0.12	0.13	0.24*	18	33.17	-0.20	0.07	0.24*
AL9903	109	40	32.22	-0.30	0.08	0.50	40	33.19	-0.25	0.05	0.29
ALB/ABJ	160	13	31.93	-0.24	0.13	0.27	13	33.18	-0.46	0.09	0.54
AL9907	181	12	31.66	0.14	0.16	0.29*	12	32.91	-0.19	0.09	0.20*
IS/ABJ	242	21	32.12	-0.01	0.11	0.30	21	33.54	-0.04	0.08	0.33
AL9910	310	53	32.70	0.06	0.07	0.30	53	33.78	0.17	0.05	0.29
NP/ALB	325	10	32.87	0.08	0.14	0.26	10	33.78	0.13	0.10	0.23
Gulf of Maine East											
AL9901	18	14	32.37	-0.56	0.10	0.22*	14	33.29	-0.27	0.08	0.34*
DE9901	23	8	32.32	-0.26	0.22	0.48*	8	33.81	-0.10	0.13	0.40*
OC336	47	12	32.47	-0.53	0.10	0.40*	12	33.41	-0.12	0.09	0.37*
EN320	76	15	32.62	-0.34	0.09	0.20*	15	33.23	-0.46	0.08	0.40*
AL9903	105	33	32.13	-0.36	0.11	0.26	33	34.07	0.02	0.09	0.42
EDL/OC	110	13	32.29	-0.60	0.10	0.37*	13	33.56	-0.13	0.09	0.38*
AL9904	143	13	32.27	-0.49	0.10	0.43*	13	33.52	-0.19	0.09	0.46*
ALB/ABJ	158	17	32.05	-0.26	0.14	0.24	17	33.54	-0.21	0.11	0.57
AL9906	170	5	32.30	-0.35	0.16	0.12*	5	33.47	-0.02	0.15	0.34*
IS/ABJ	239	32	32.53	0.11	0.12	0.38	32	34.39	0.22	0.08	0.56
AL9910	299	36	33.25	0.65	0.11	0.47	36	34.52	0.35	0.08	0.37
NP/ALB	323	11	33.41	0.68	0.16	0.51	11	34.40	0.53	0.12	0.38
Georges Bank											
AL9901	18	70	32.27	-0.58	0.07	0.19	67	32.69	-0.40	0.07	0.53
OC336	47	68	32.42	-0.49	0.06	0.40	64	32.87	-0.26	0.08	0.52
AL9902	52	34	32.54	-0.37	0.09	0.37*	26	32.70	-0.39	0.08	0.34*
EN320	76	66	32.54	-0.36	0.06	0.21	64	32.78	-0.35	0.08	0.38
DE9905	93	23	32.53	-0.39	0.10	0.23	22	32.72	-0.39	0.11	0.25
AL9903	98	60	32.58	-0.31	0.07	0.24	54	32.71	-0.42	0.08	0.35
EDL/OC	110	111	32.49	-0.40	0.06	0.27	106	32.70	-0.40	0.07	0.31
EL9905	133	72	32.28	-0.54	0.04	0.36*	72	32.99	-0.11	0.05	0.57*
AL9904	143	72	32.87	0.03	0.06	0.84	69	33.03	-0.04	0.07	0.57
ALB/ABJ	156	80	32.61	-0.19	0.08	0.34	78	33.10	0.07	0.09	0.44
AL9906	170	34	32.80	0.06	0.09	0.55	34	33.00	-0.01	0.10	0.36
AL9908	189	21	32.64	0.11	0.08	0.29*	21	32.88	0.23	0.06	0.28*
AL9909	214	29	32.82	0.13	0.09	0.75	28	33.21	0.20	0.09	0.65
IS/ABJ	237	39	32.67	-0.05	0.09	0.47	32	32.99	-0.09	0.10	0.34

AL9910	291	47	33.23	0.51	0.07	0.55	42	33.51	0.55	0.08	0.52
NP/ALB	321	29	33.24	0.48	0.09	0.50	26	33.59	0.61	0.10	0.54
						MAB North					
AL9902	41	36	32.35	-0.75	0.14	0.46	28	32.85	-0.62	0.12	0.47
AL9903	87	56	32.12	-0.72	0.13	0.38	49	32.78	-0.60	0.11	0.52
DE9905	93	8	32.32	-0.55	0.24	0.20*	7	32.71	-0.69	0.22	0.46*
AL9909	208	27	31.24	-0.42	0.14	0.58*	27	32.84	-0.03	0.10	0.50*
IS/ABJ	234	19	32.52	0.05	0.18	0.68	16	33.43	0.24	0.15	0.48
AL9910	281	61	32.95	0.28	0.12	0.57	56	33.80	0.41	0.11	0.83
NP/ALB	315	22	33.26	0.27	0.17	0.62	21	34.32	0.72	0.15	0.45
						MAB South					
AL9902	36	61	32.56	-1.07	0.15	0.51	50	32.79	-0.94	0.11	0.45
AL9903	72	89	32.36	-0.76	0.13	0.94	79	33.04	-0.40	0.10	1.19
AL9909	201	56	32.25	0.37	0.11	0.85*	56	34.10	0.75	0.09	0.77*
AL9910	270	84	32.66	0.37	0.15	1.39	77	33.44	0.35	0.11	1.25
NP/ALB	312	28	33.60	0.42	0.22	0.81	26	34.19	0.69	0.15	0.61

(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: "Salt", the areal average Salinity: "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.

(**) ALB/ABJ = ALB9905 + AJ9901
IS/ABJ = IS9901 + AJ9902
NP/ALB = NP9901 + ALB9911
EDL/OC = EDL9904 + OCE9941

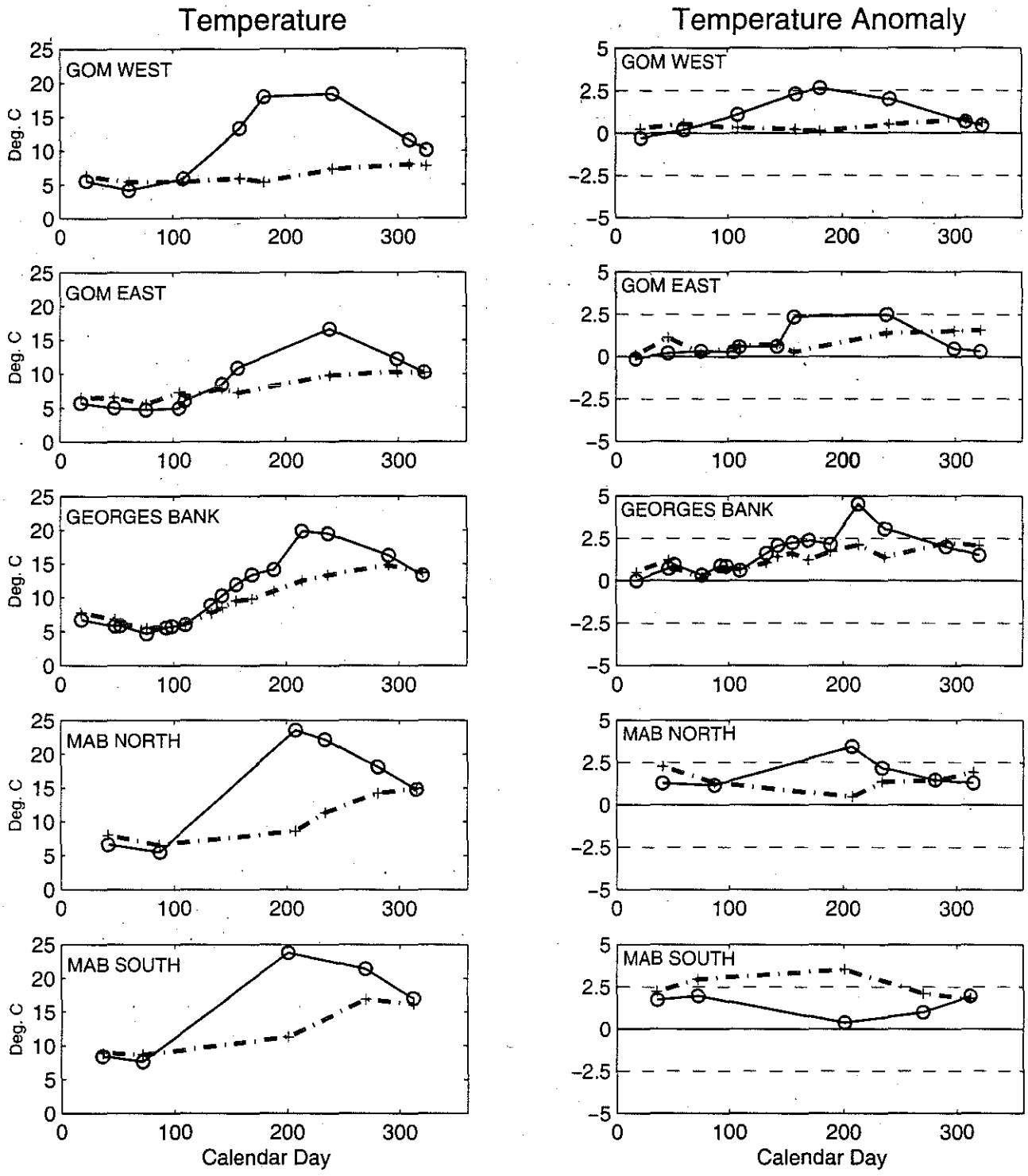


Figure 2. The 1999 areal average surface (-) and bottom (- -) temperatures (left) and anomalies (right) from Table 2.

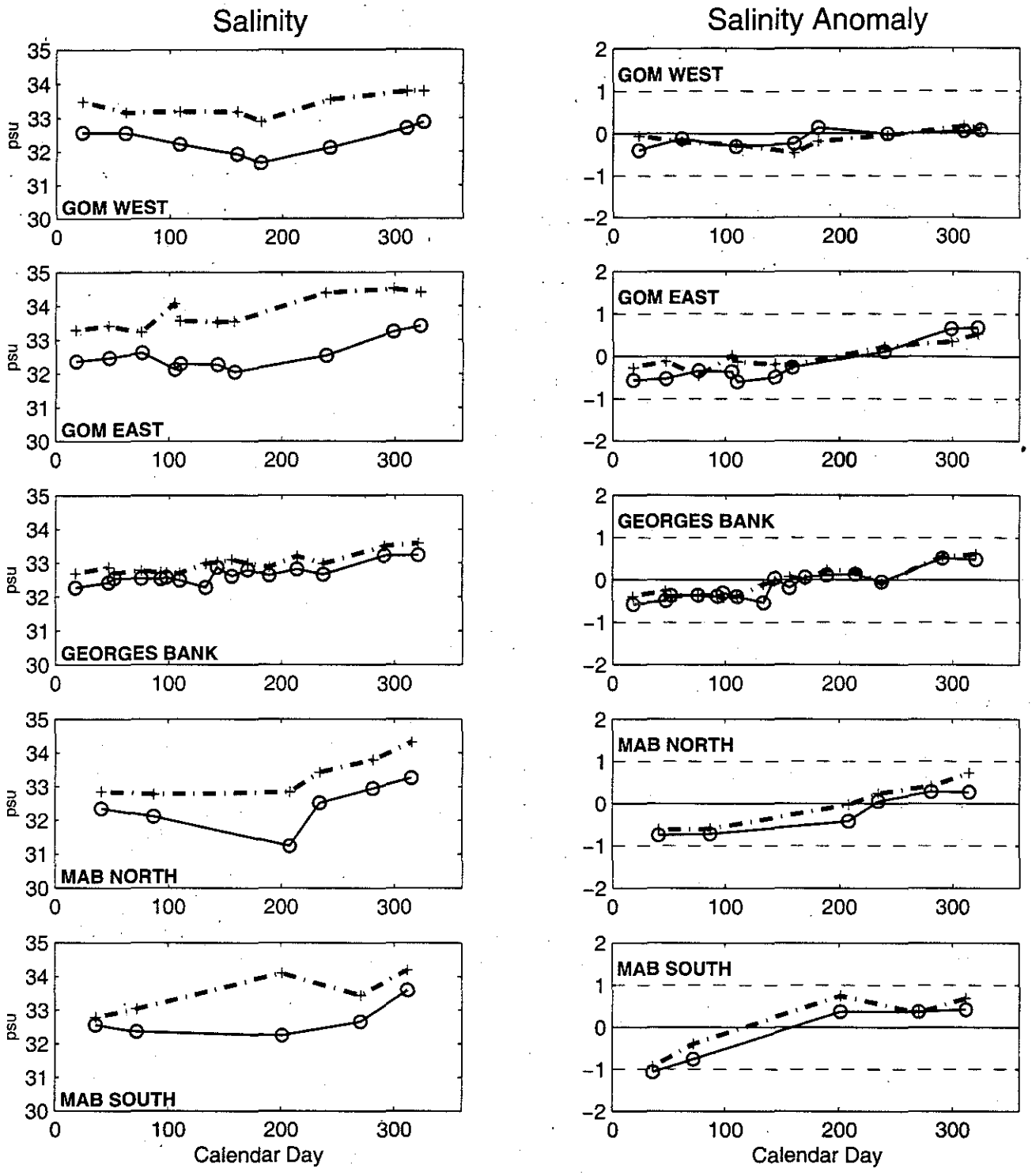


Figure 3. The 1999 areal average surface (-) and bottom (- -) salinities (left) and anomalies (right) from Table 2.

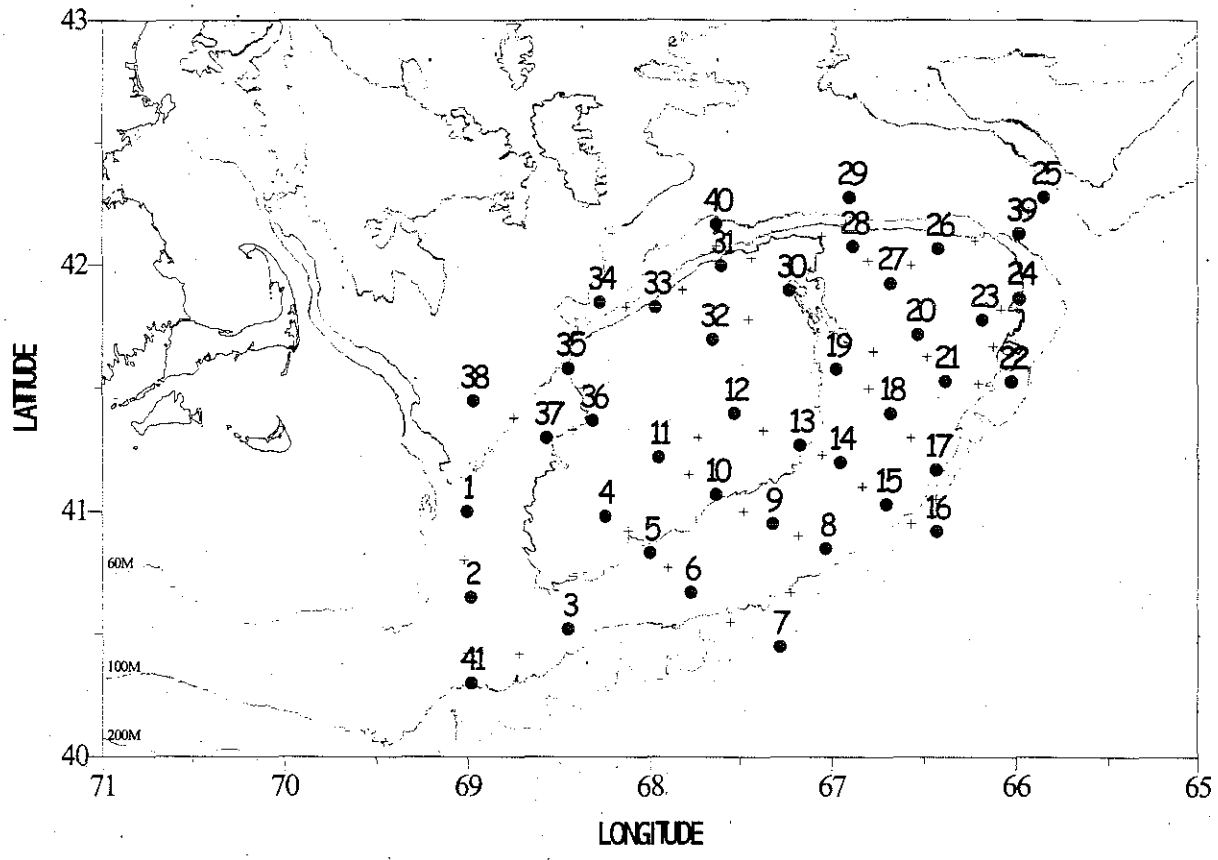


Figure 4. Standard station locations (●) and intermediate bongo stations (+) occupied during GLOBEC Broadscale survey ALB9901.

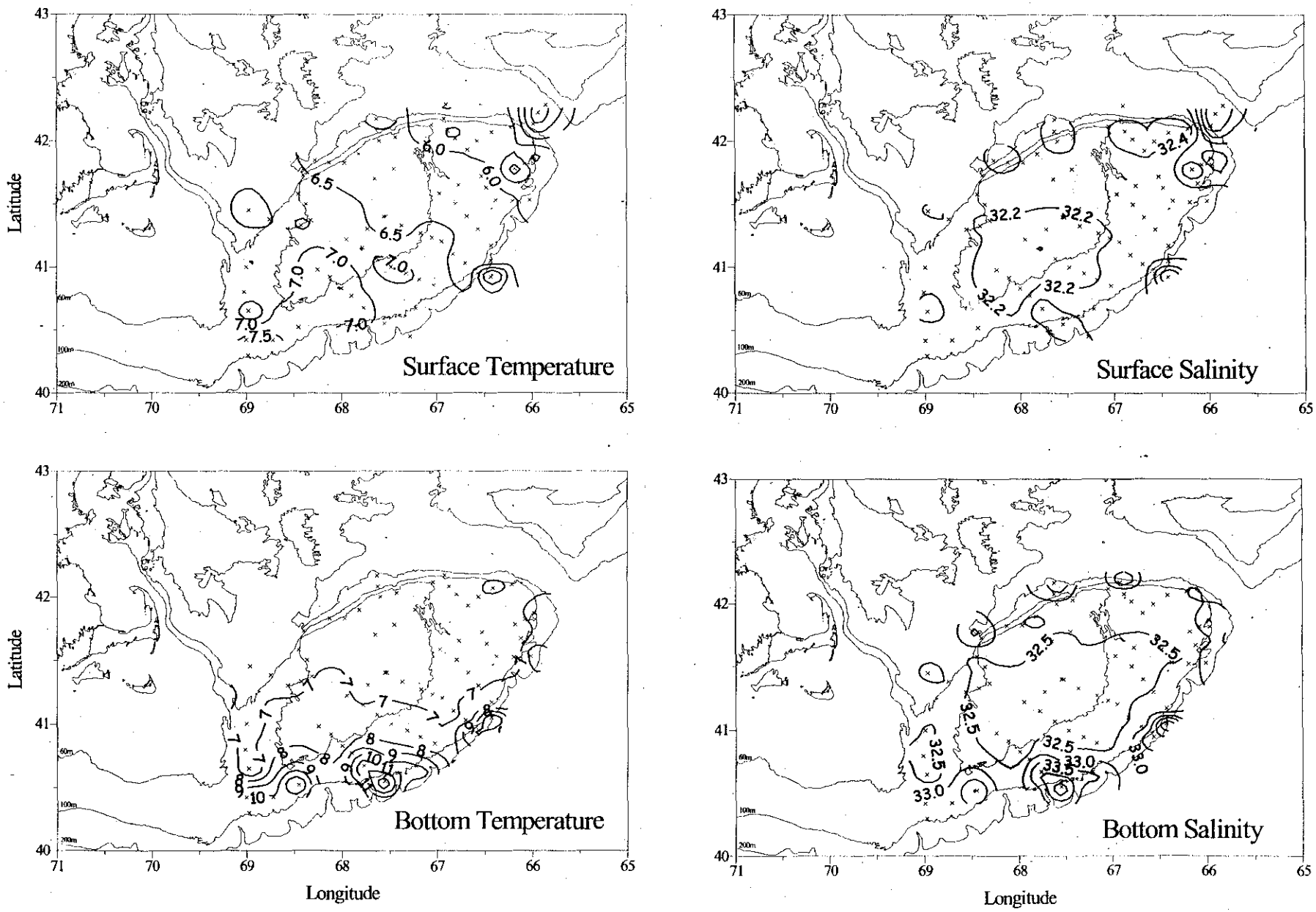


Figure 5. Temperature and salinity distributions for GLOBEC Broadscale survey ALB9901.

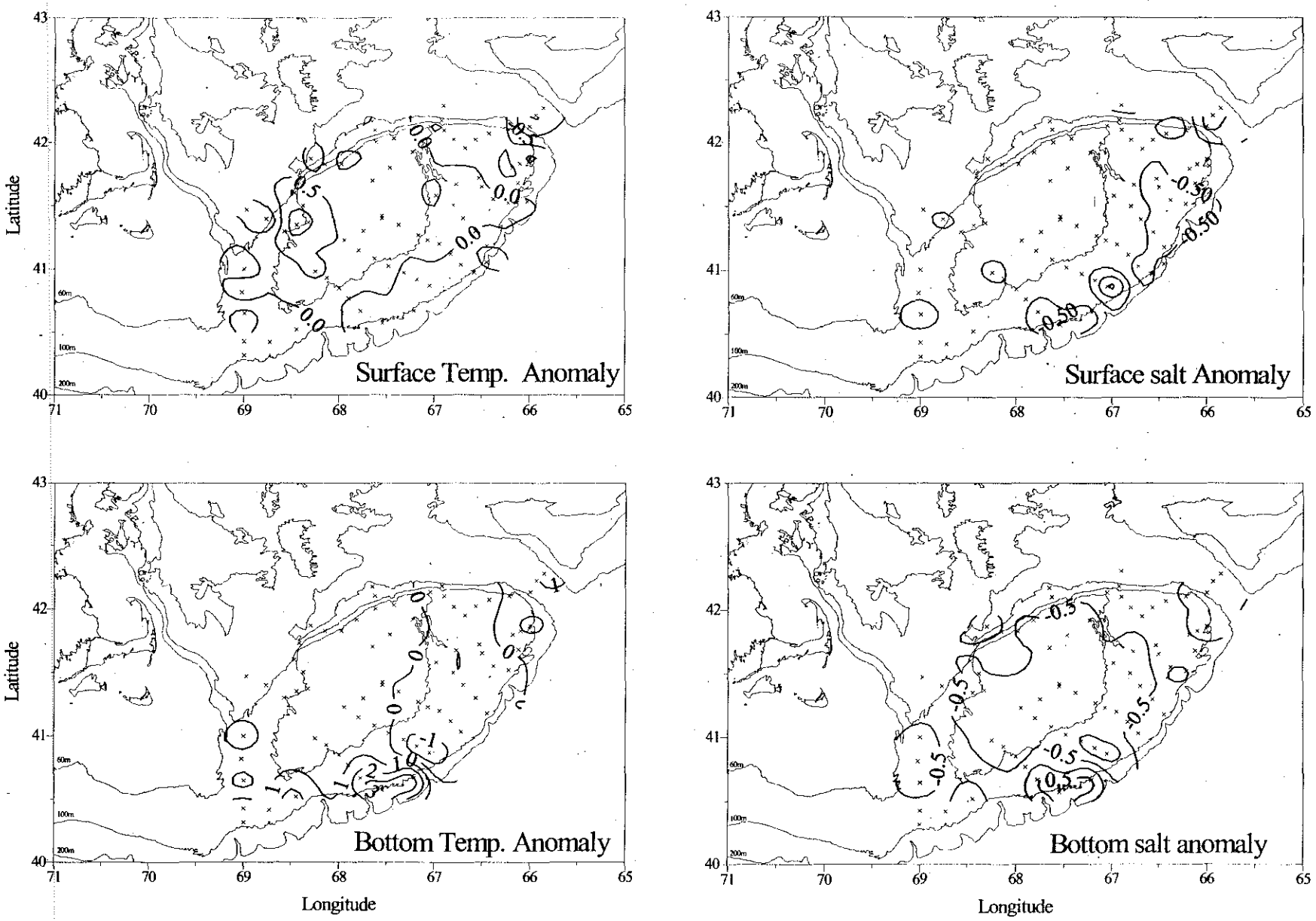


Figure 6. Temperature and salinity anomaly distributions for GLOBEC Broadscale survey ALB9901.

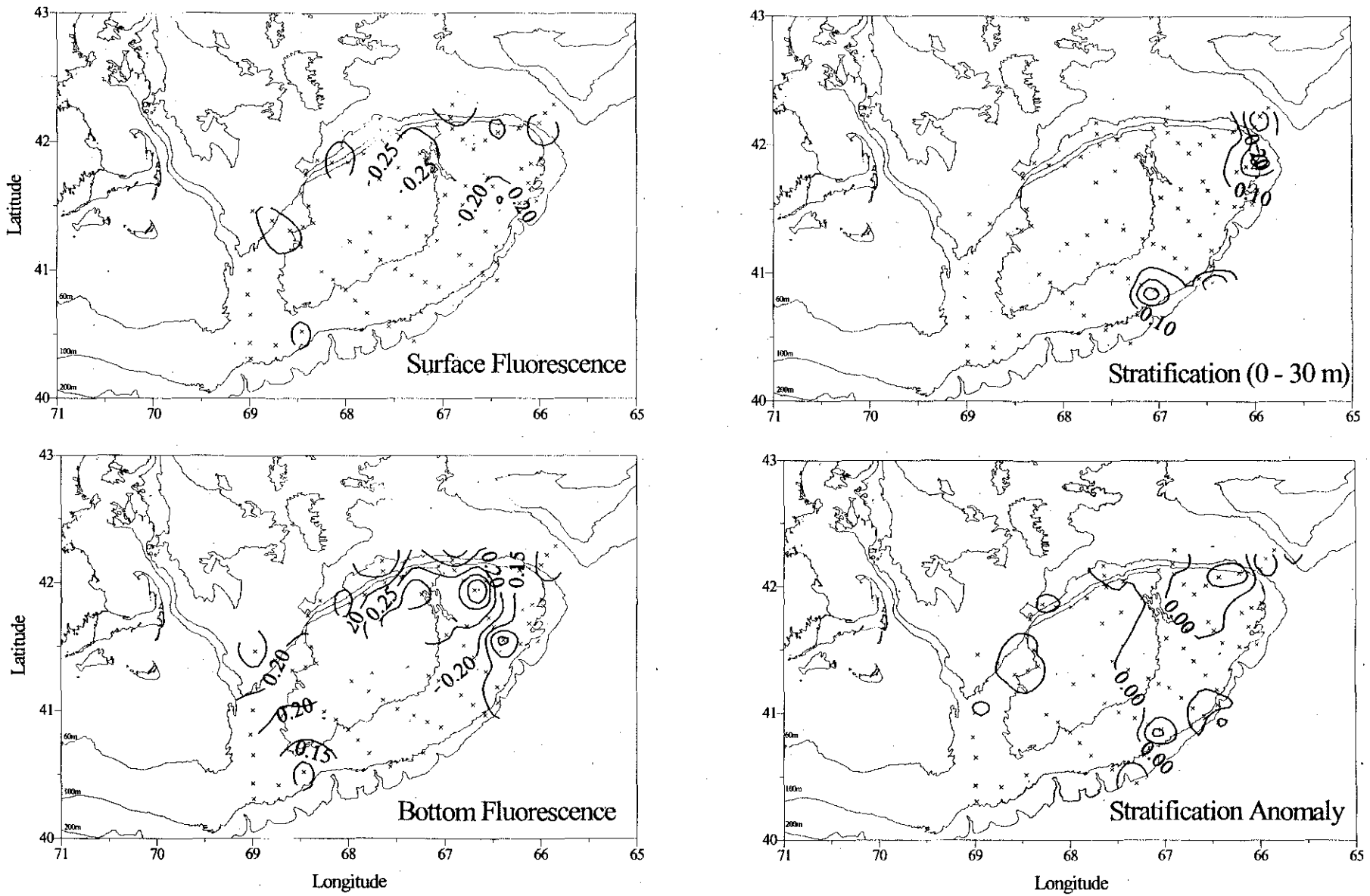


Figure 7. Fluorescence (left) and stratification (right) distributions during GLOBEC Broadscale survey AL9901. (NOTE: The SeaCat profiler is not equipped with a fluorometer)

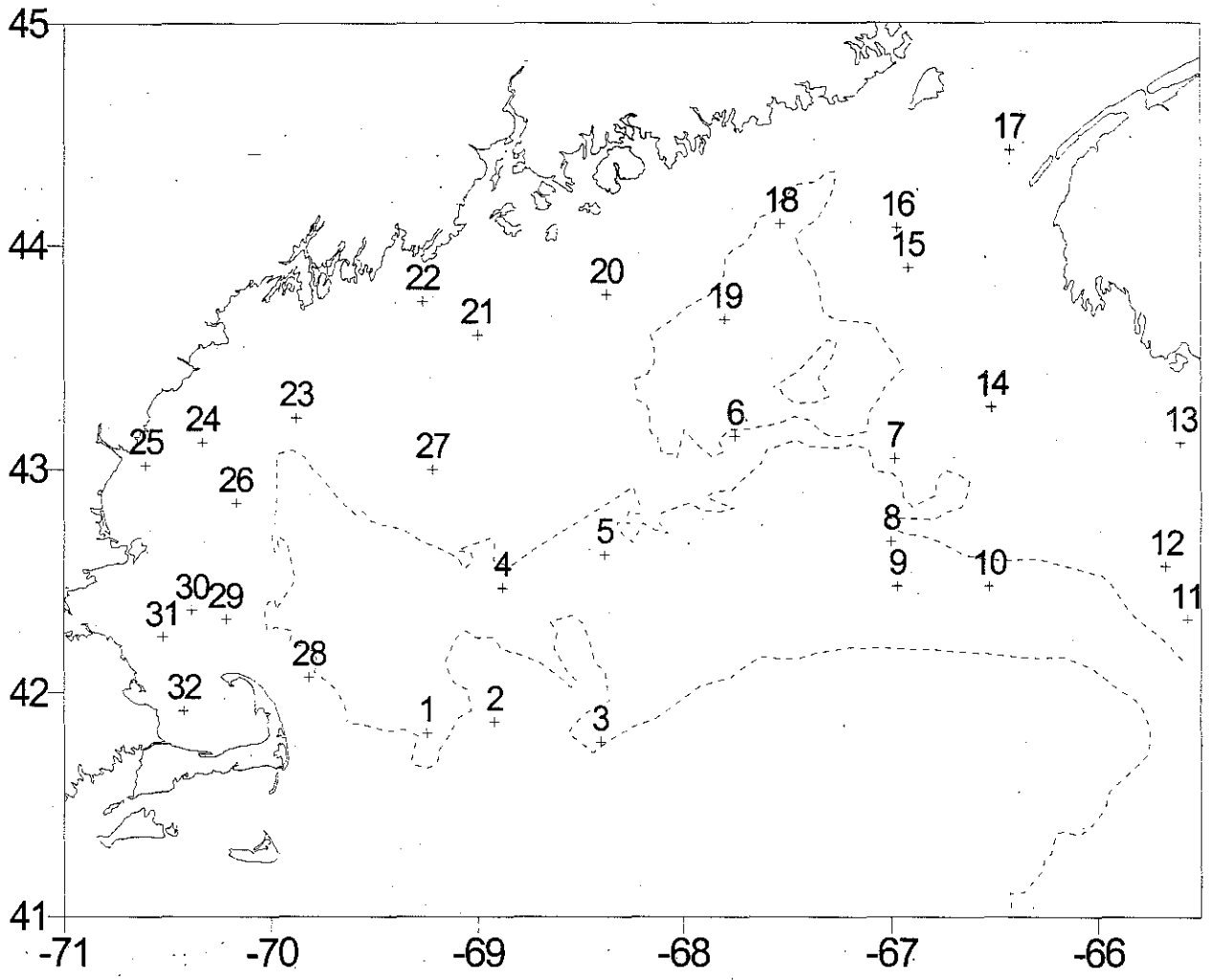


Figure 8. Stations occupied during Ecosystem Monitoring survey DEL9901.

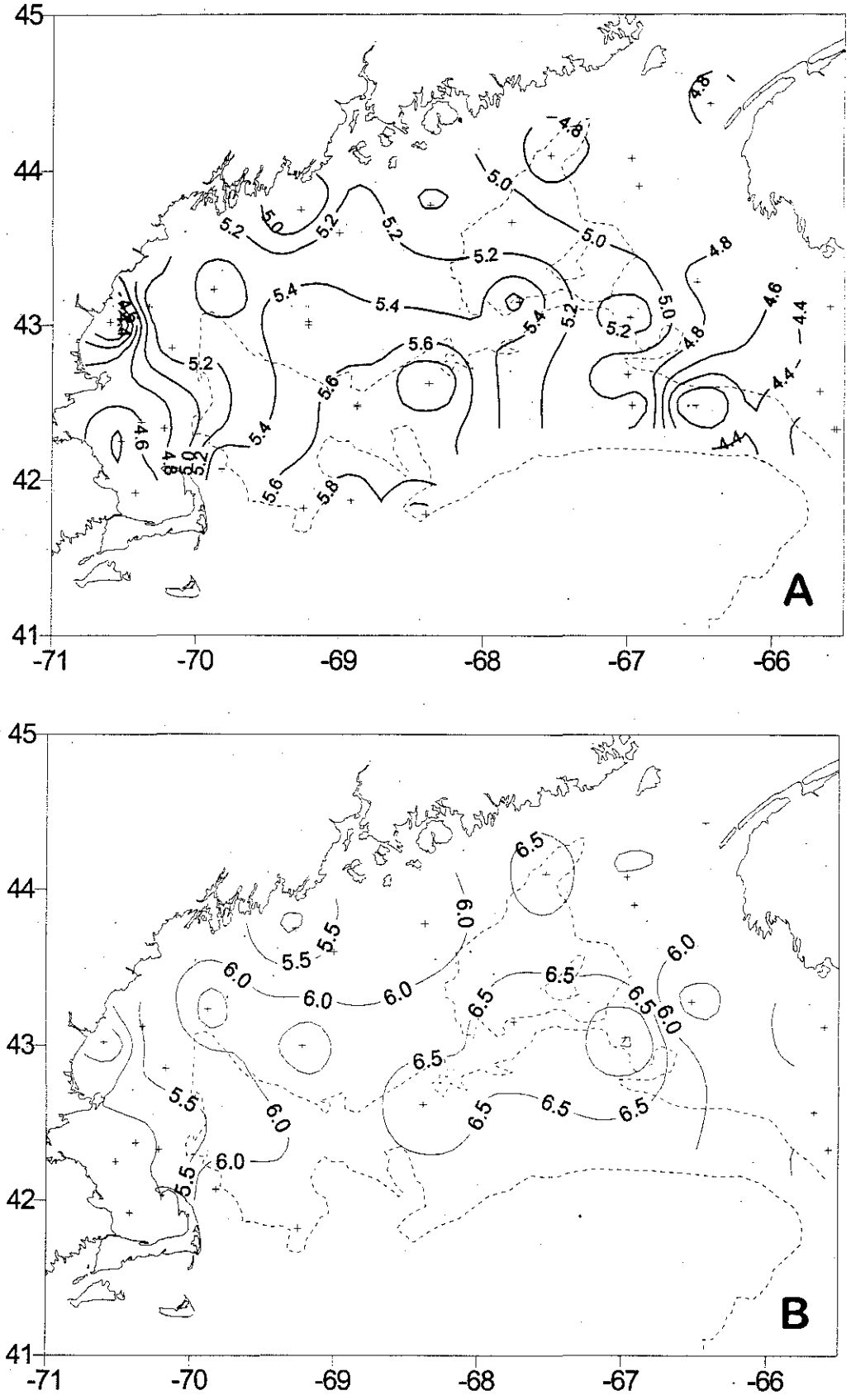


Figure 9. Surface (A) and bottom (B) temperature distributions for Ecosystem Monitoring survey DEL9901.

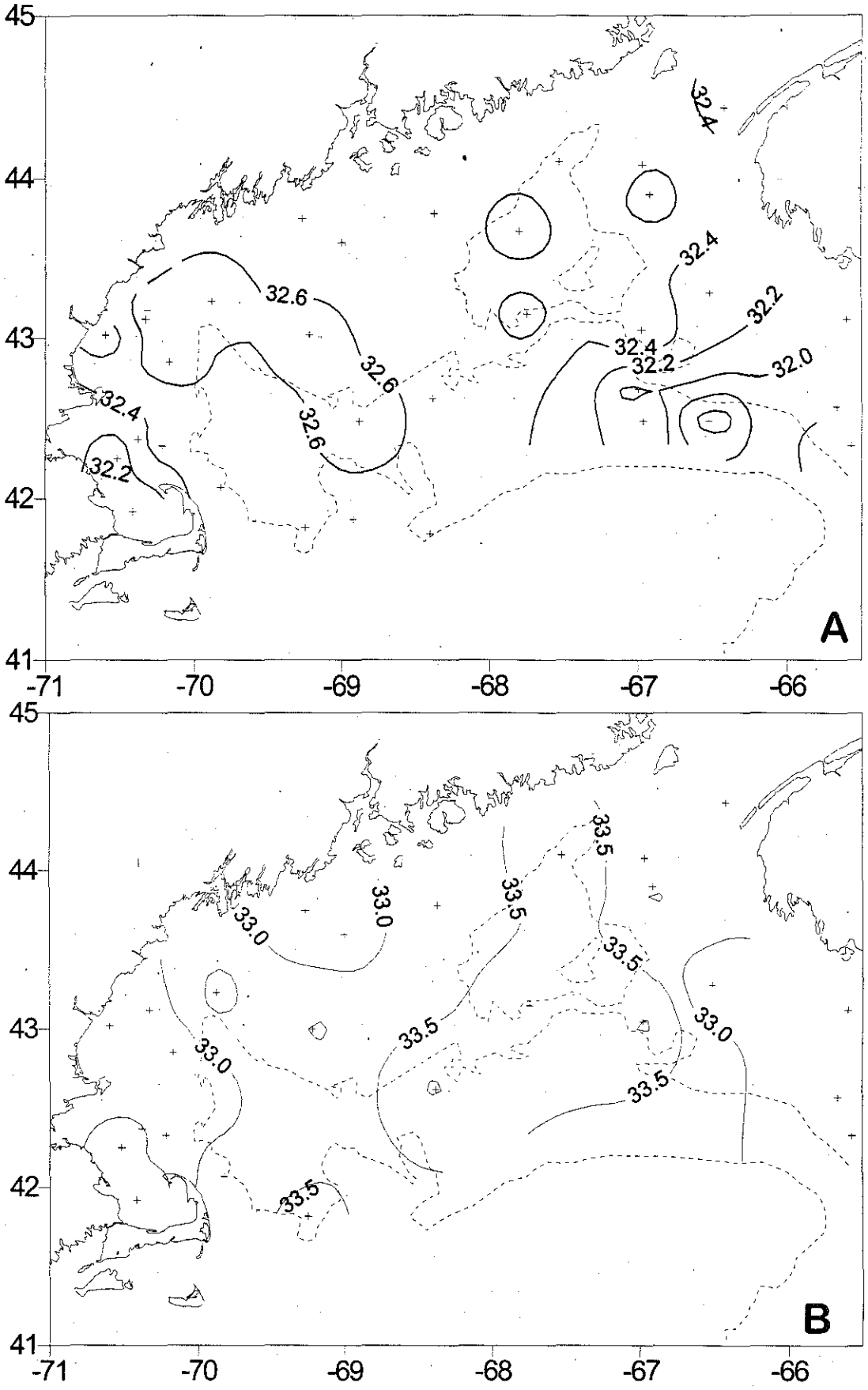


Figure 10. Surface (A) and bottom (B) salinity distributions for Ecosystem Monitoring survey DEL9901.

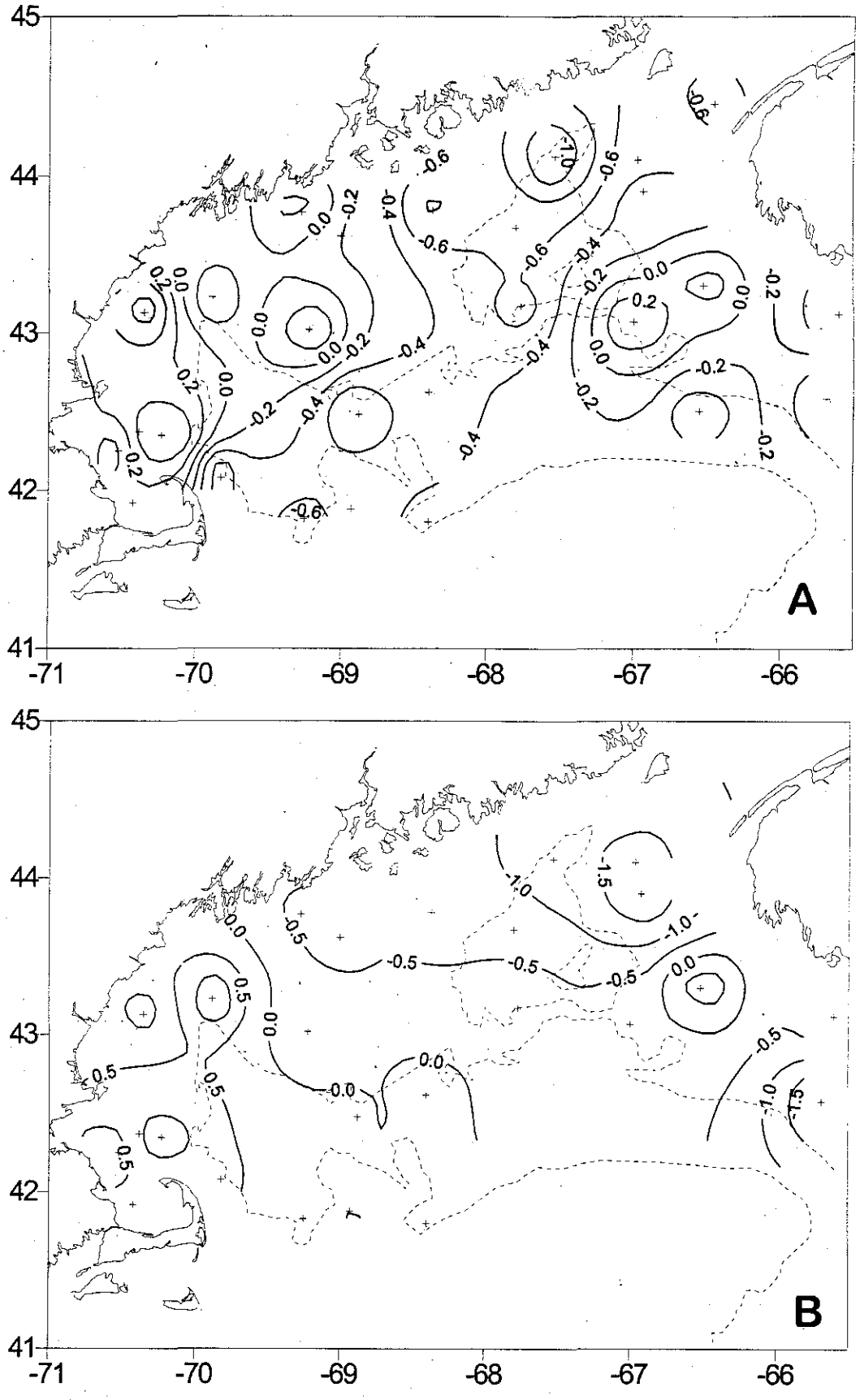


Figure 11. Surface (A) and bottom (B) temperature anomaly distributions for Ecosystem Monitoring survey DEL9901.

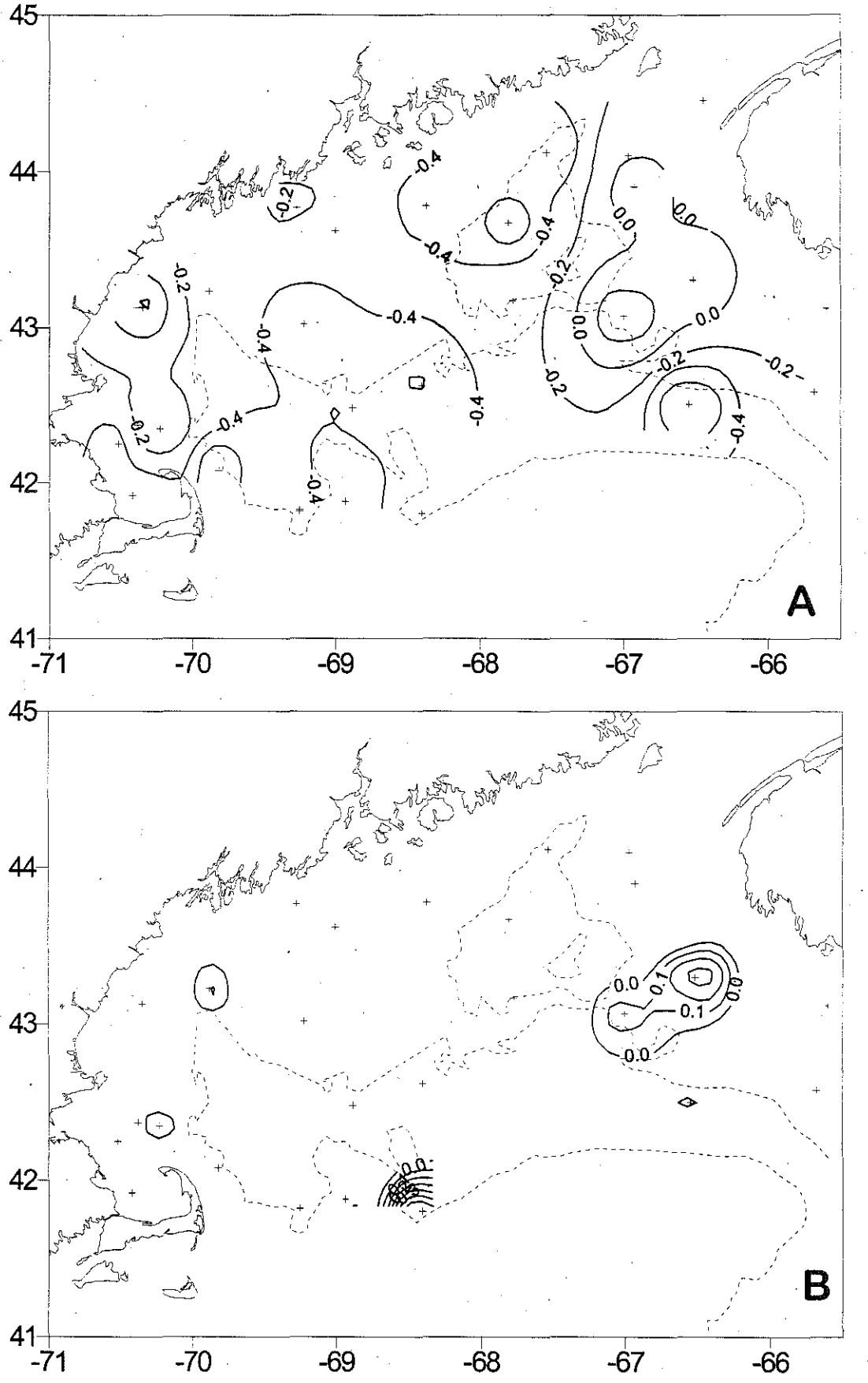


Figure 12. Surface (A) and bottom (B) salinity anomaly distributions for Ecosystem Monitoring survey DEL9901.

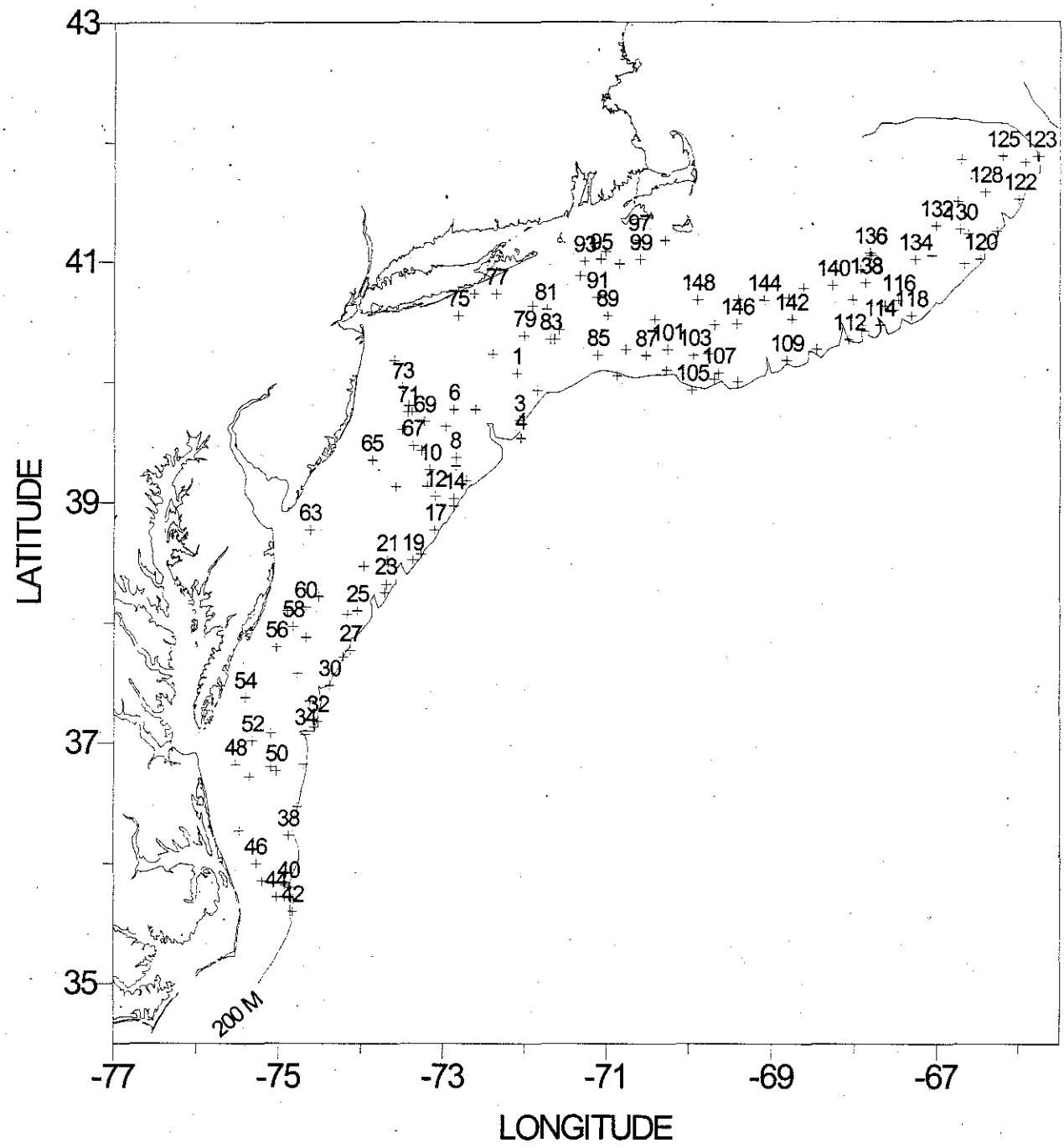


Figure 13. Stations occupied during Winter Bottom Trawl ALB9902.

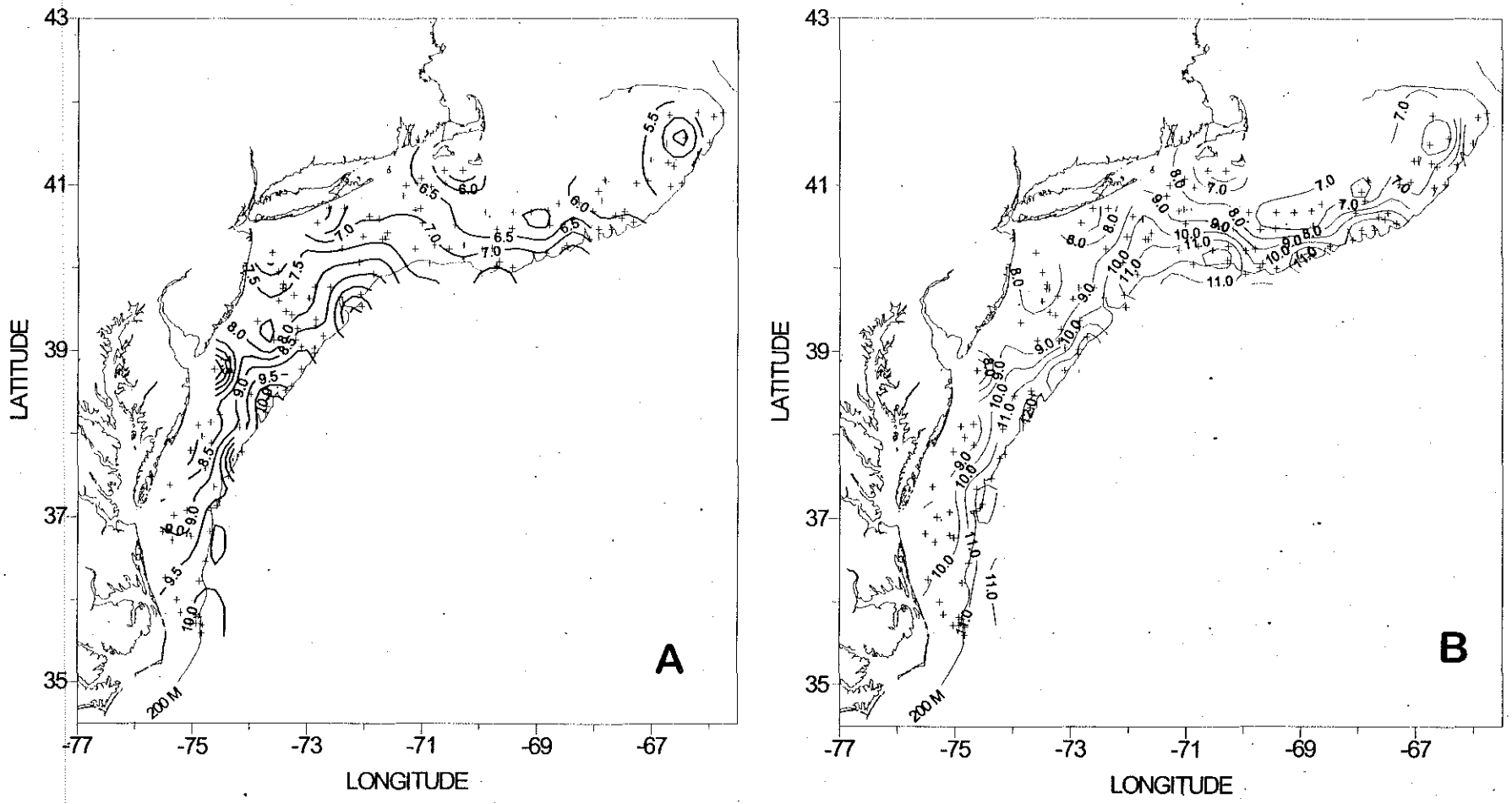


Figure 14. Surface (A) and bottom (B) temperature distributions for Winter Bottom Trawl survey ALB9902.

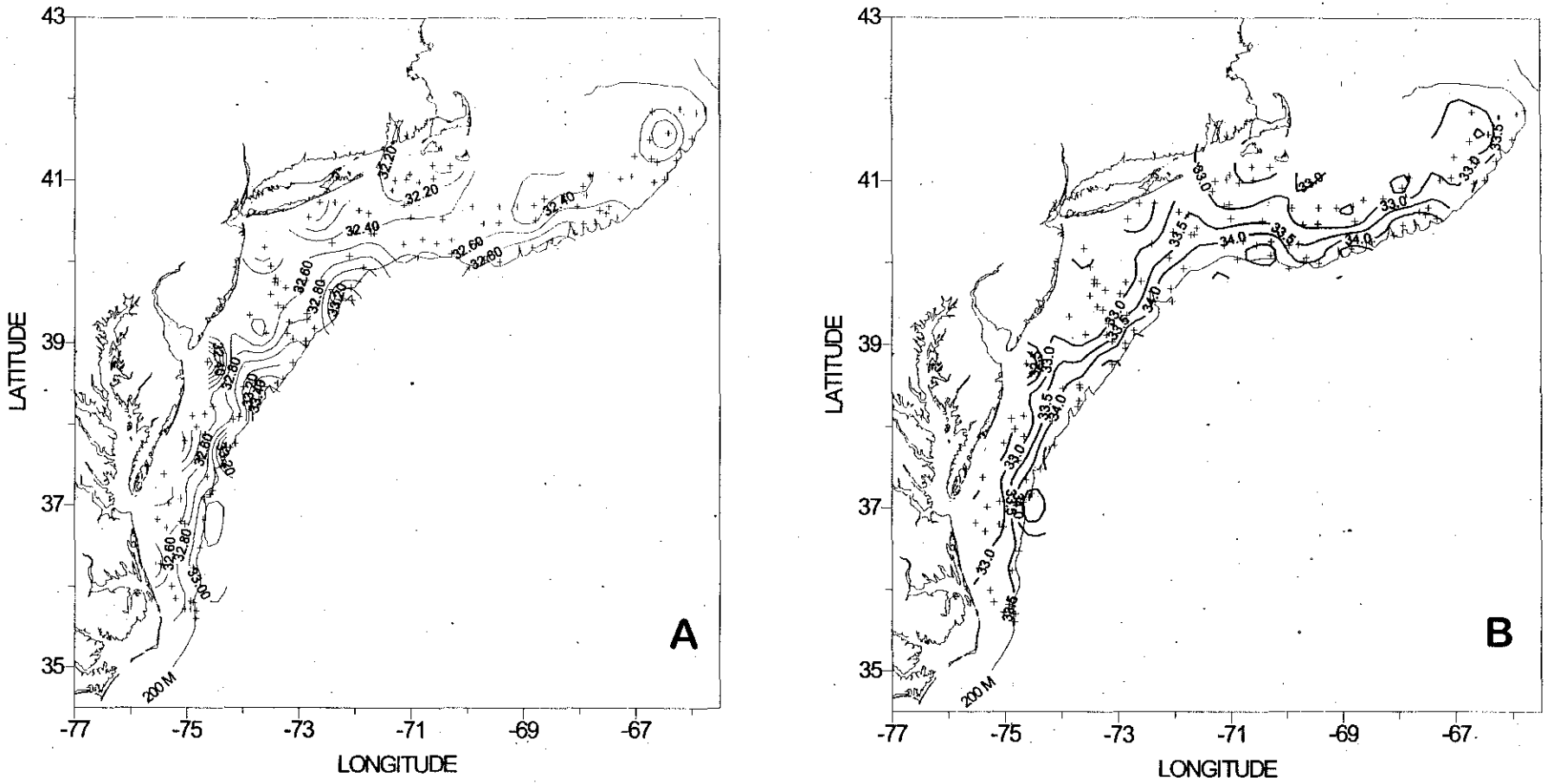
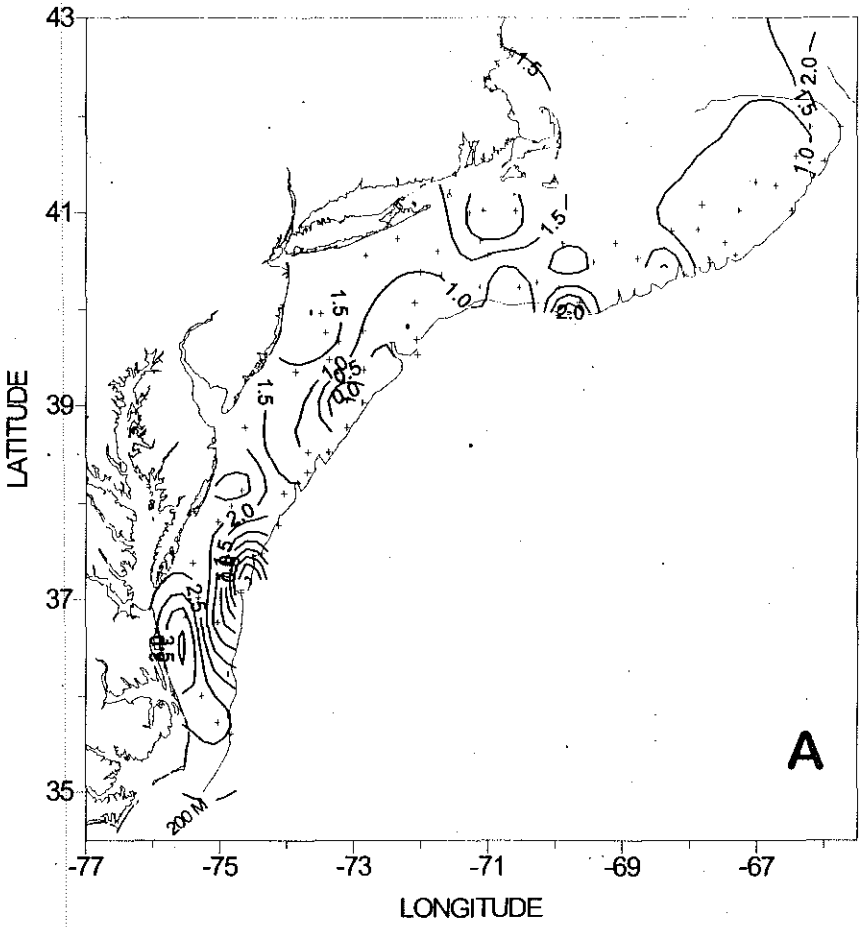


Figure 15. Surface (A) and bottom (B) salinity distributions for Winter Bottom Trawl Survey ALB9902.



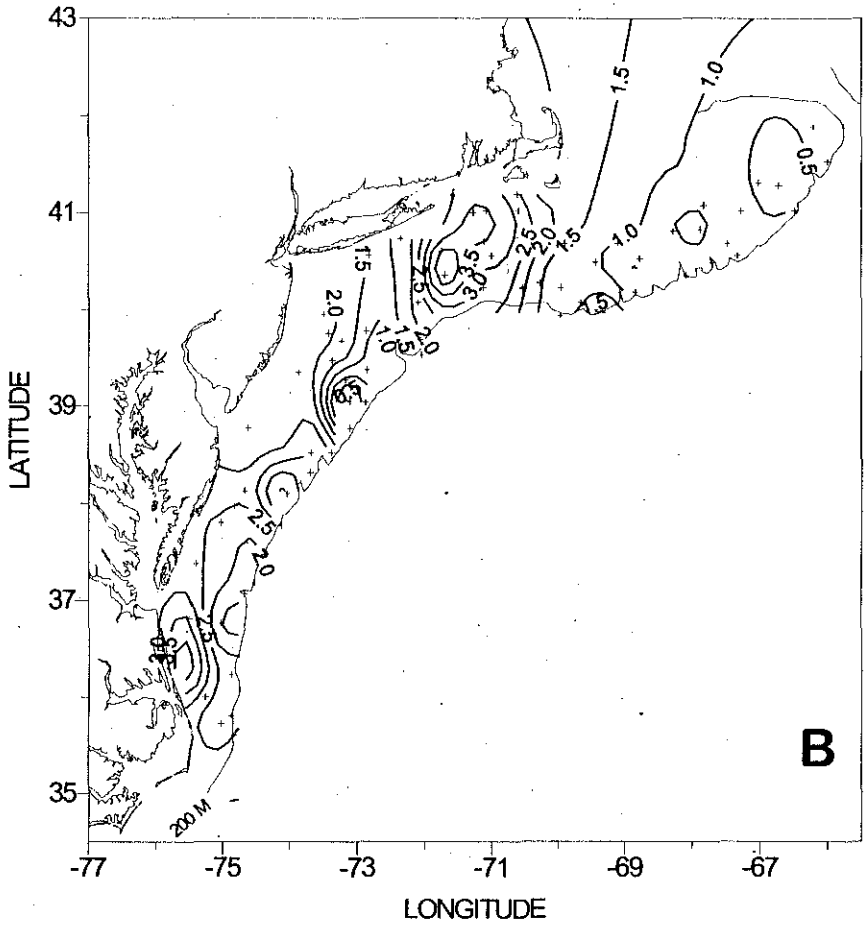
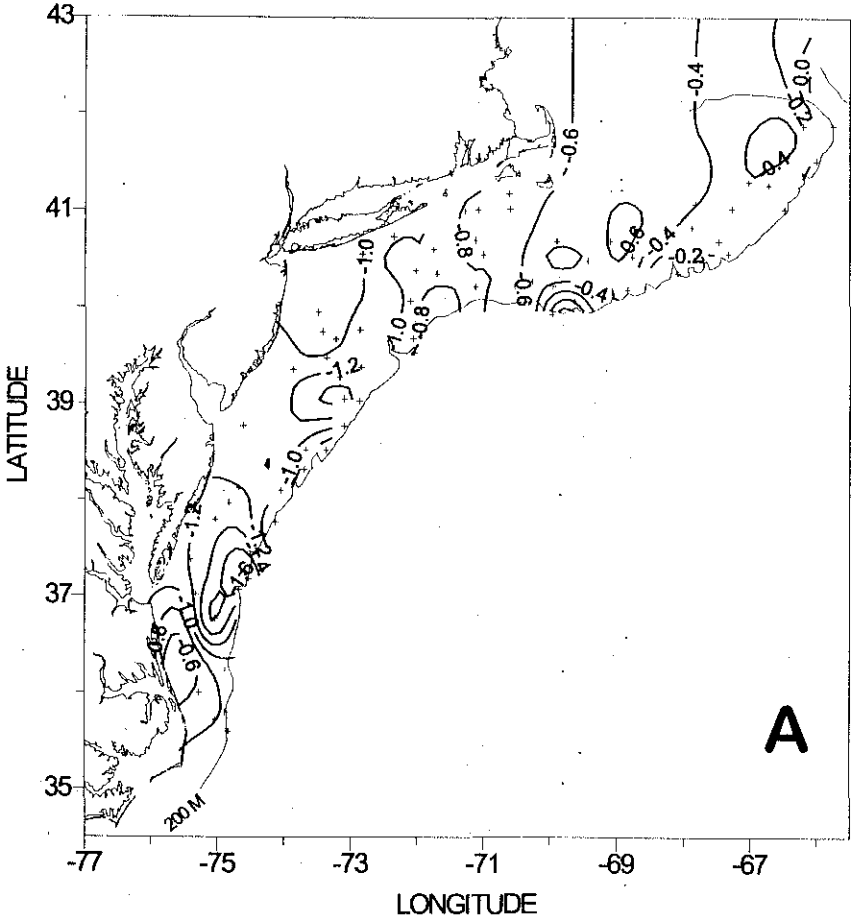


Figure 16. Surface (A) and bottom (B) temperature anomaly distributions for Winter Bottom Trawl survey ALB9902.



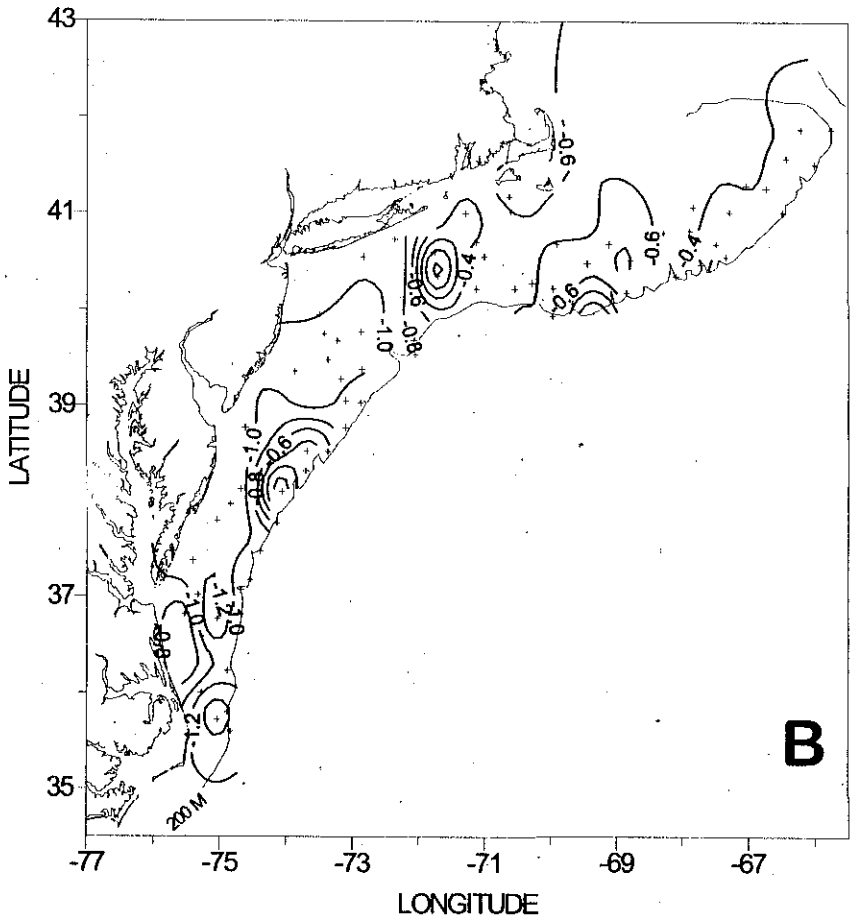


Figure 17. Surface (A) and bottom (B) salinity anomaly distributions for Winter Bottom Trawl survey ALB9902

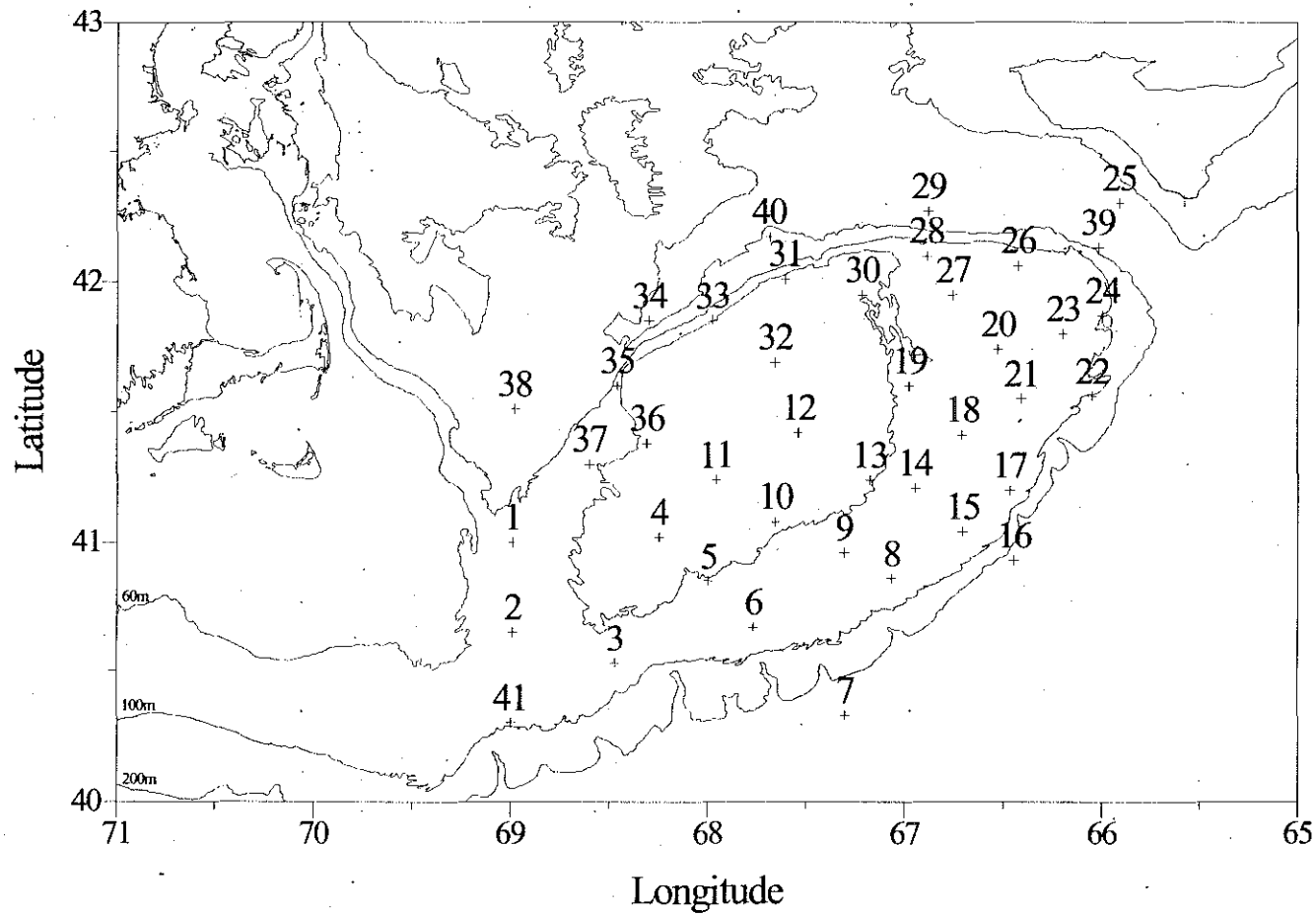


Figure 18. Standard stations occupied during GLOBEC BroadScale survey OCE9936.

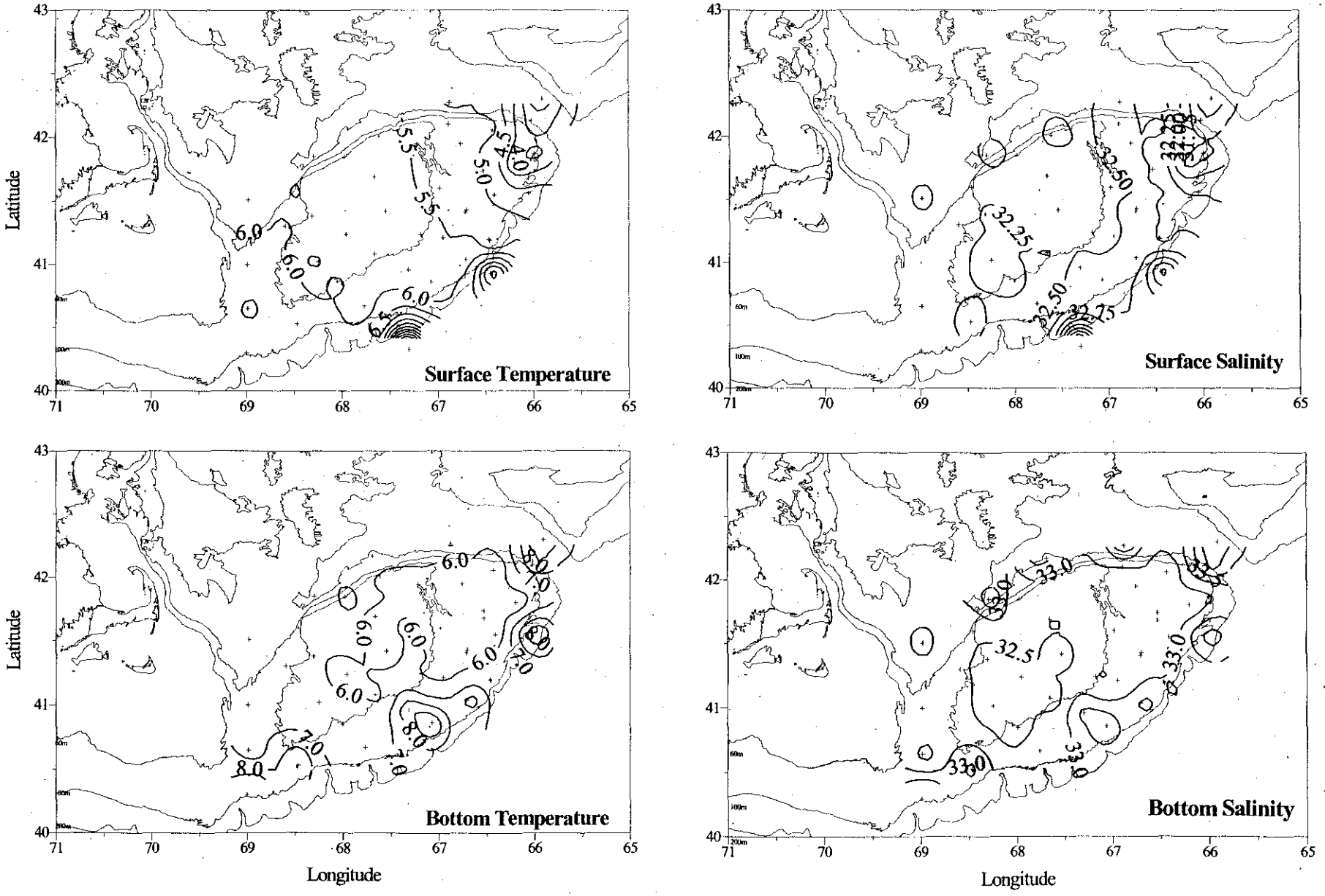


Figure 19. Temperature and salinity distributions during the GLOBEC Broadscale survey OCE9936. Note: Contour intervals are not the same.

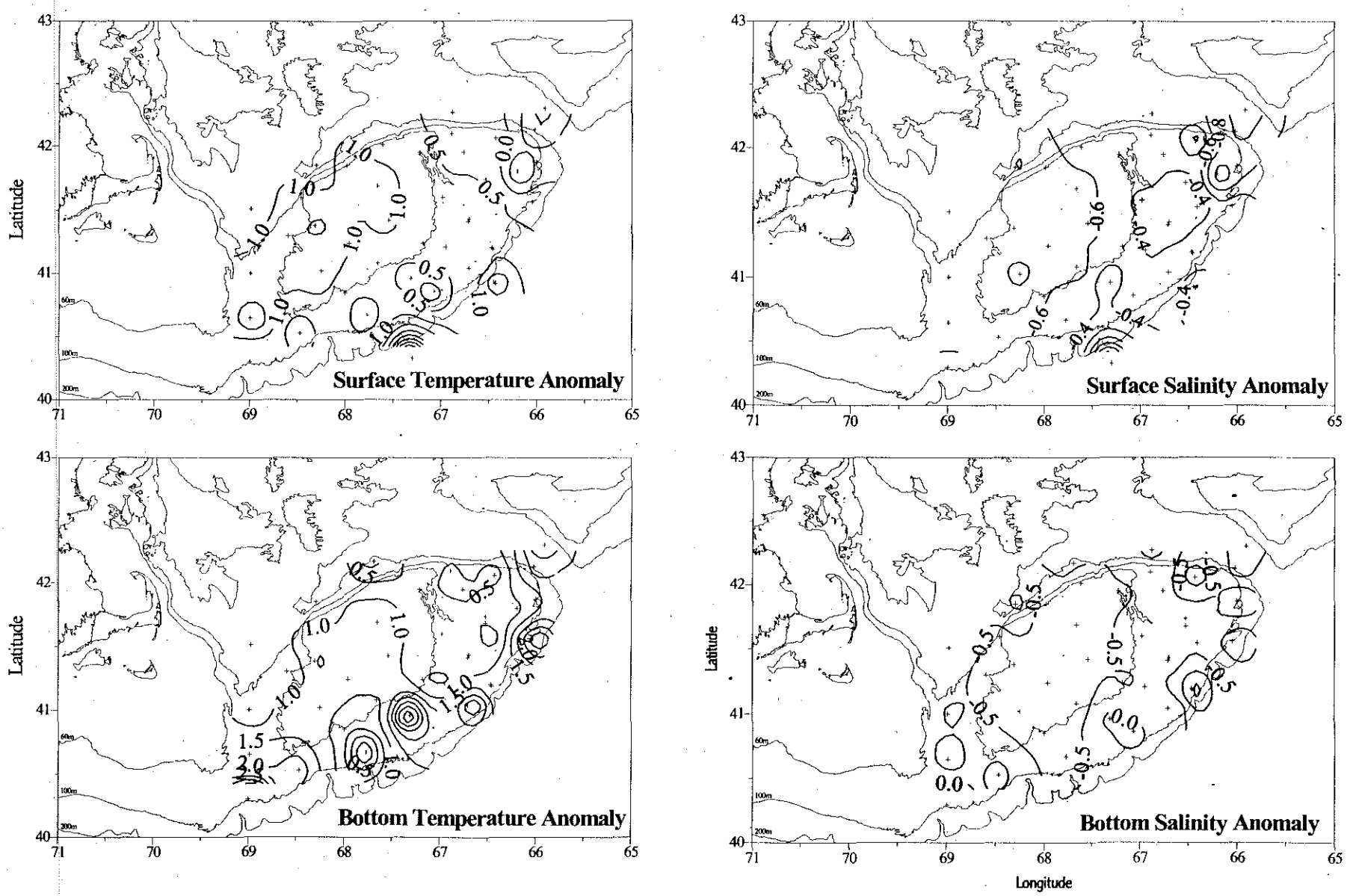


Figure 20. Temperature and salinity anomaly distributions during GLOBEC Broadscale survey OCE9936.

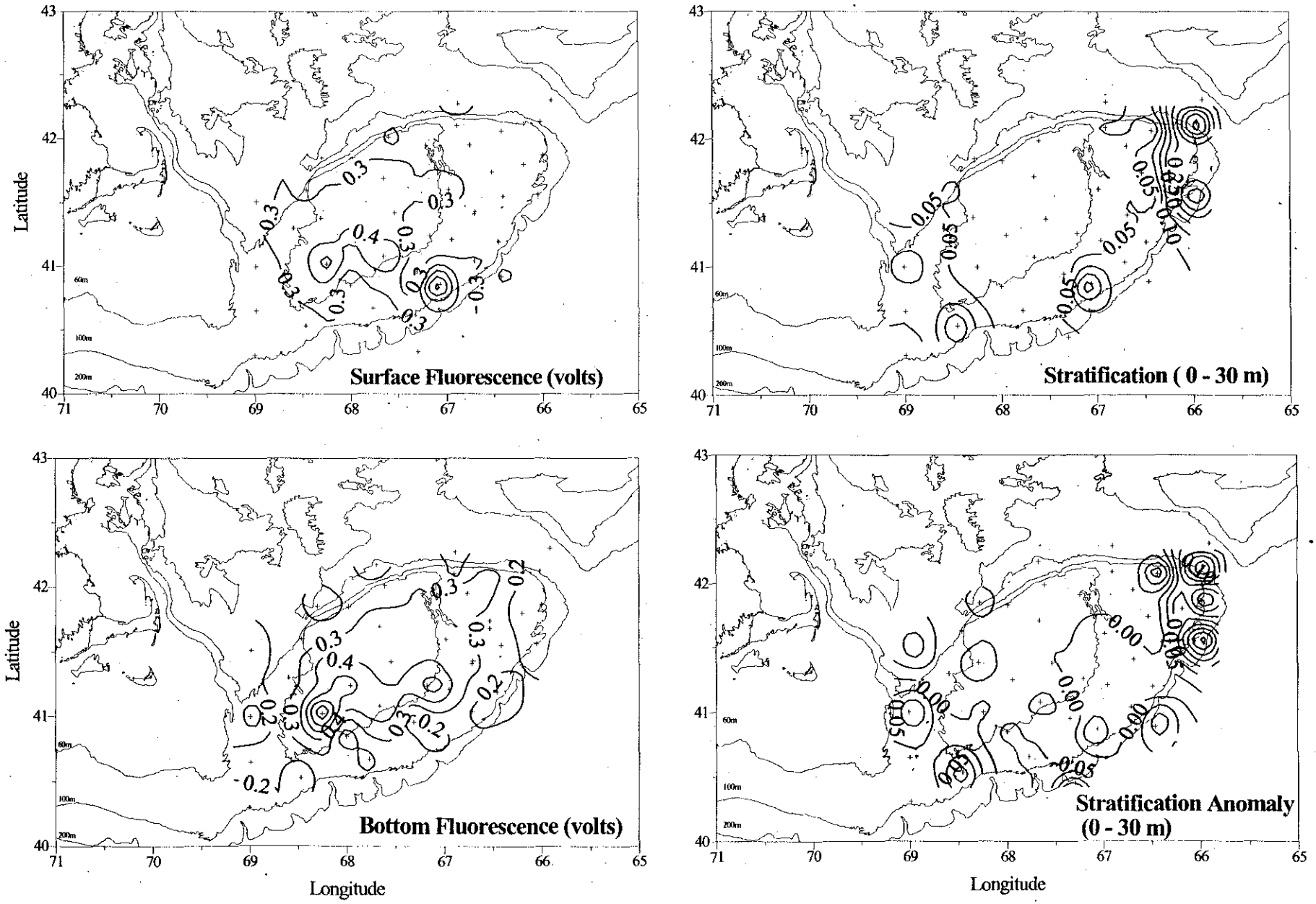


Figure 21. Surface and bottom fluorescence distributions (left). Surface - 30 metre stratification (sigma-t units) and stratification anomaly (right) for GLOBEC Broadscale survey OCE9936.

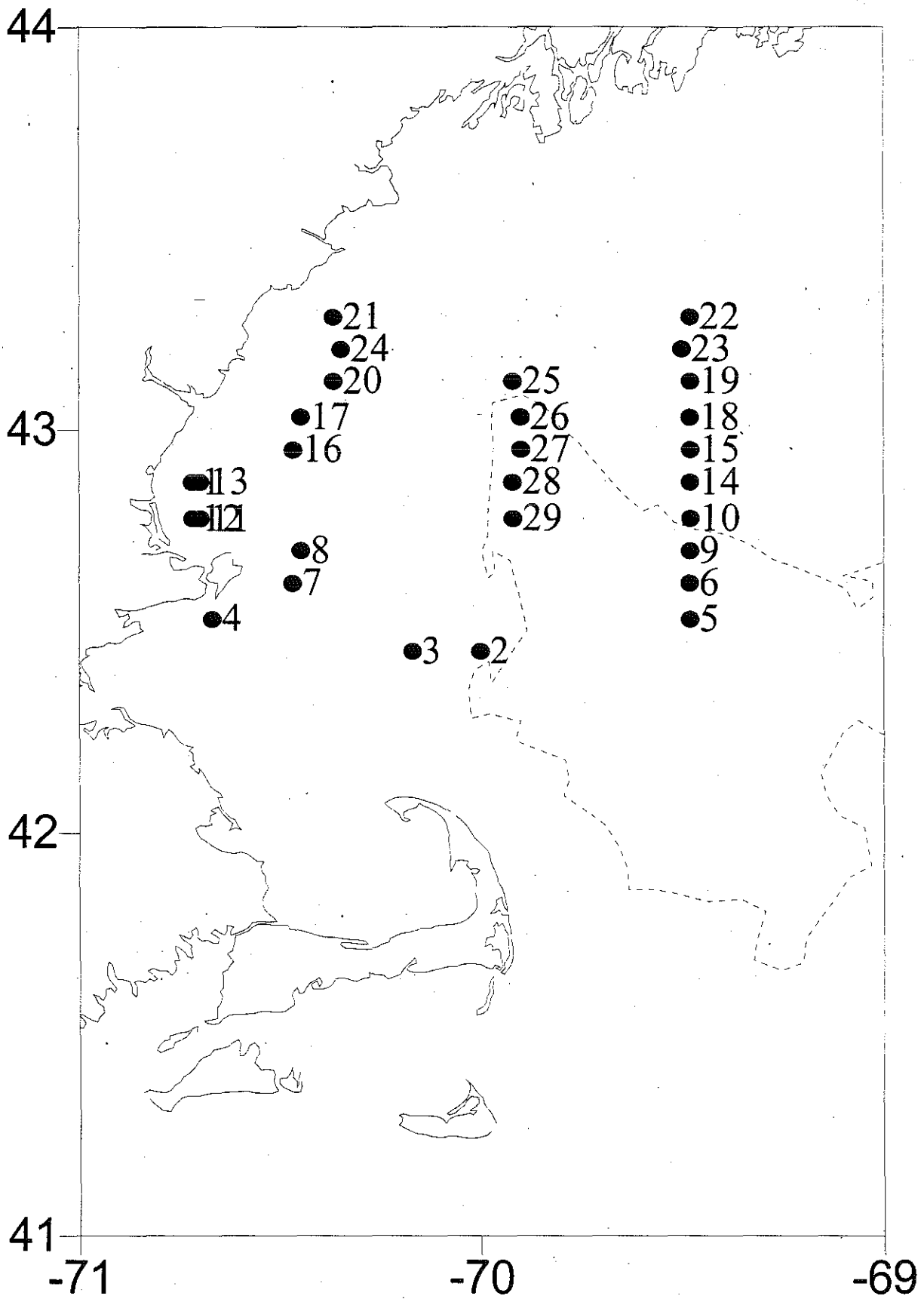


Figure 22. CTD stations occupied during Marine Mammal Survey DEL9903.

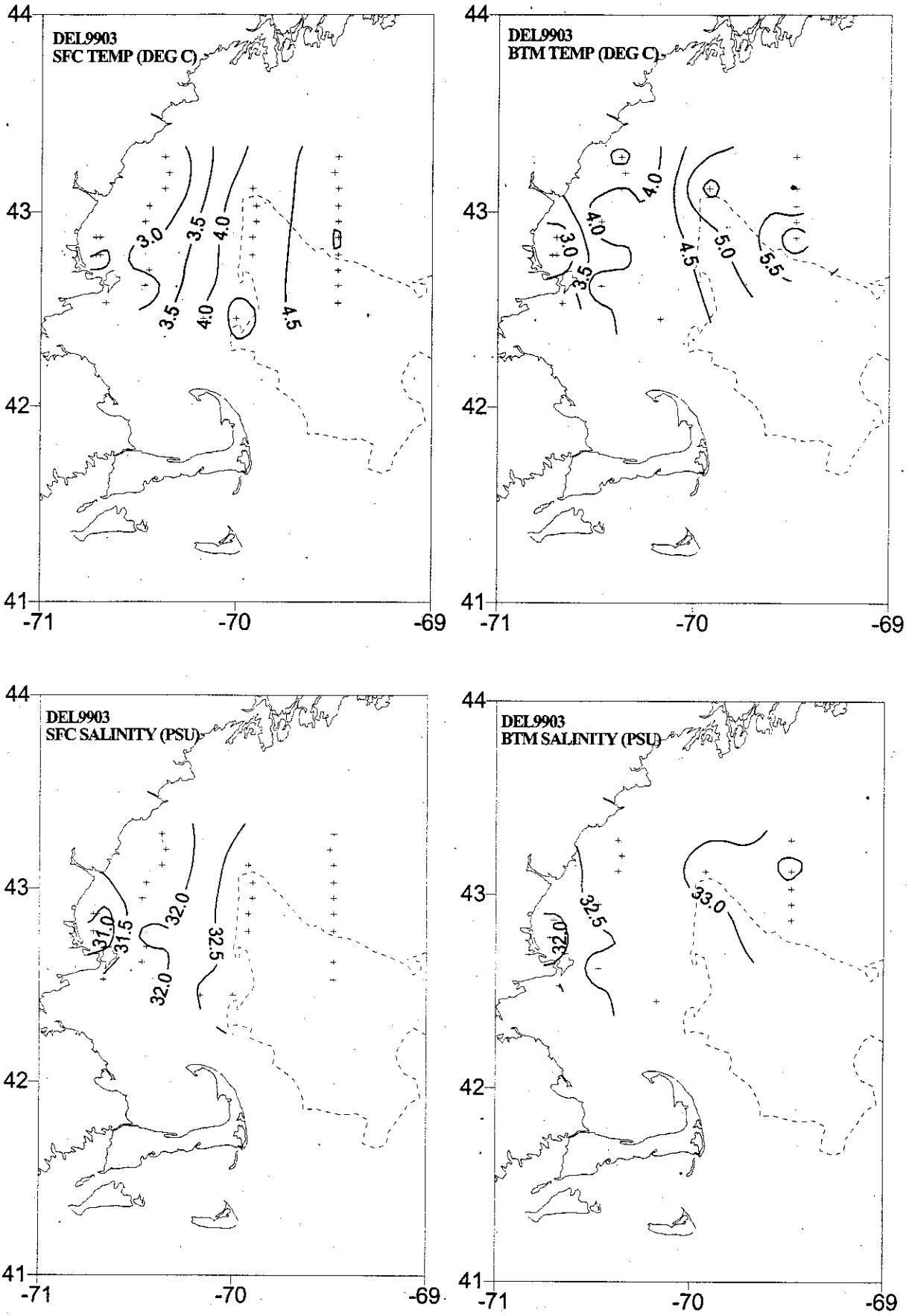


Figure 23. Temperature and salinity distributions during Marine Mammal Survey DEL9903.

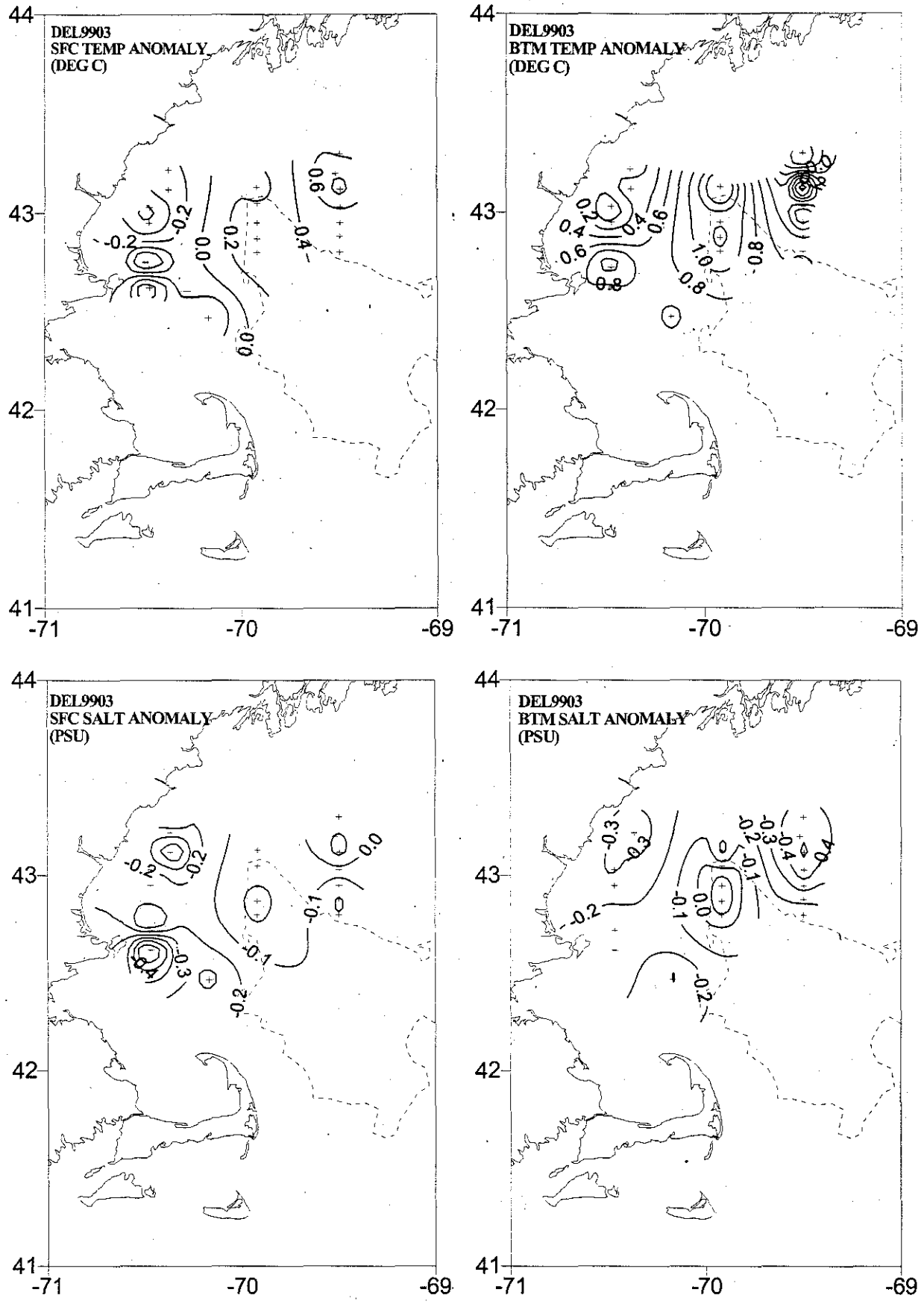


Figure 24. Temperature and salinity anomaly distributions for Marine Mammal Survey DEL9903.

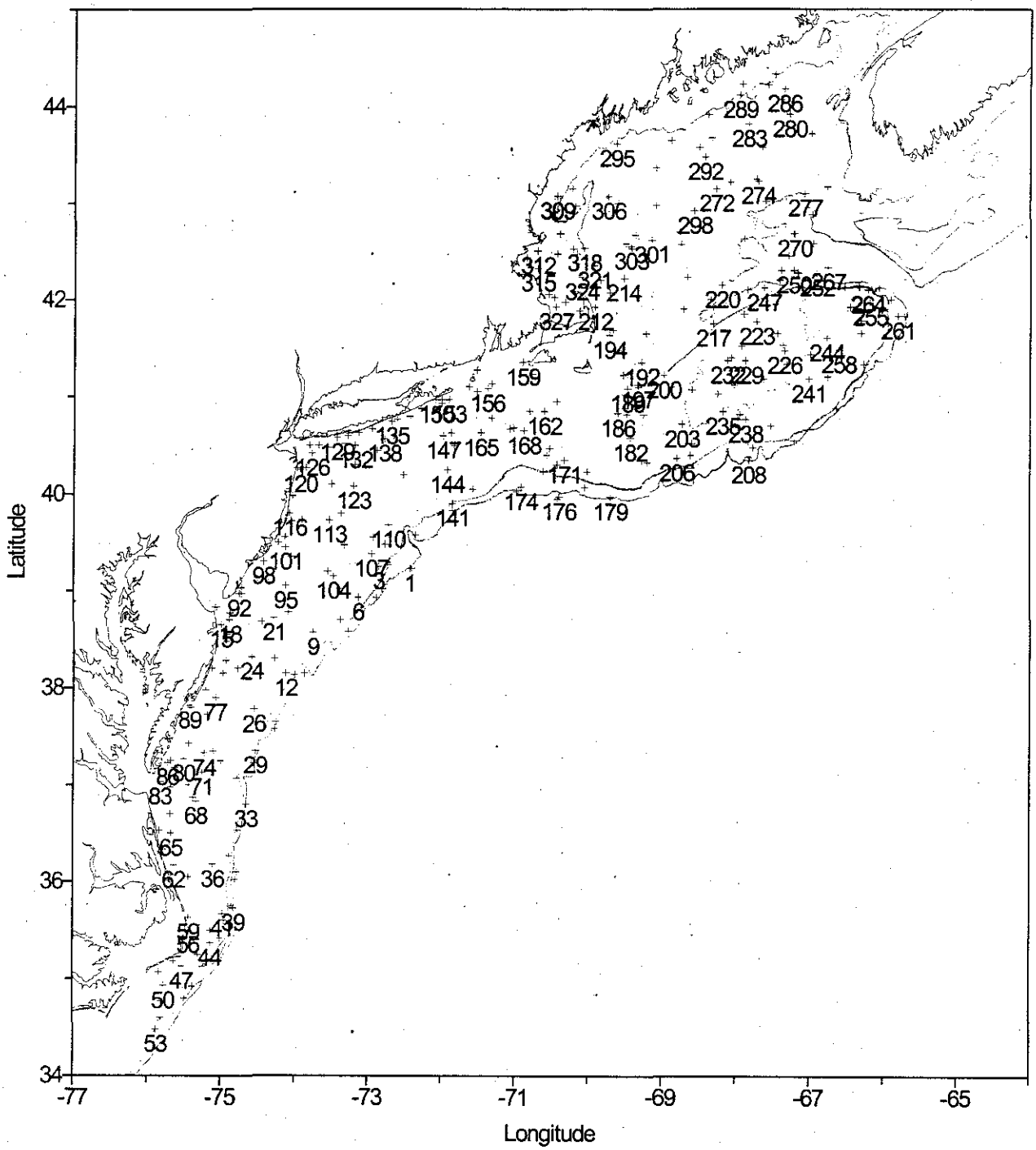
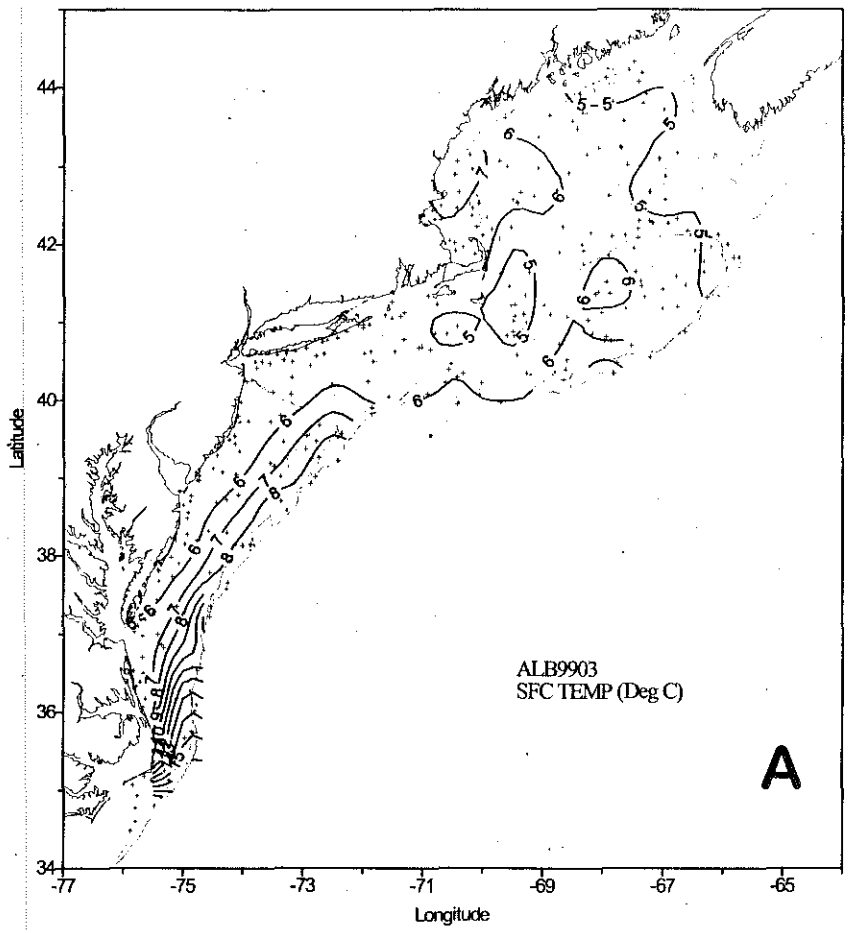


Figure 25. CTD stations occupied during Spring Bottom Trawl Survey ALB9903.



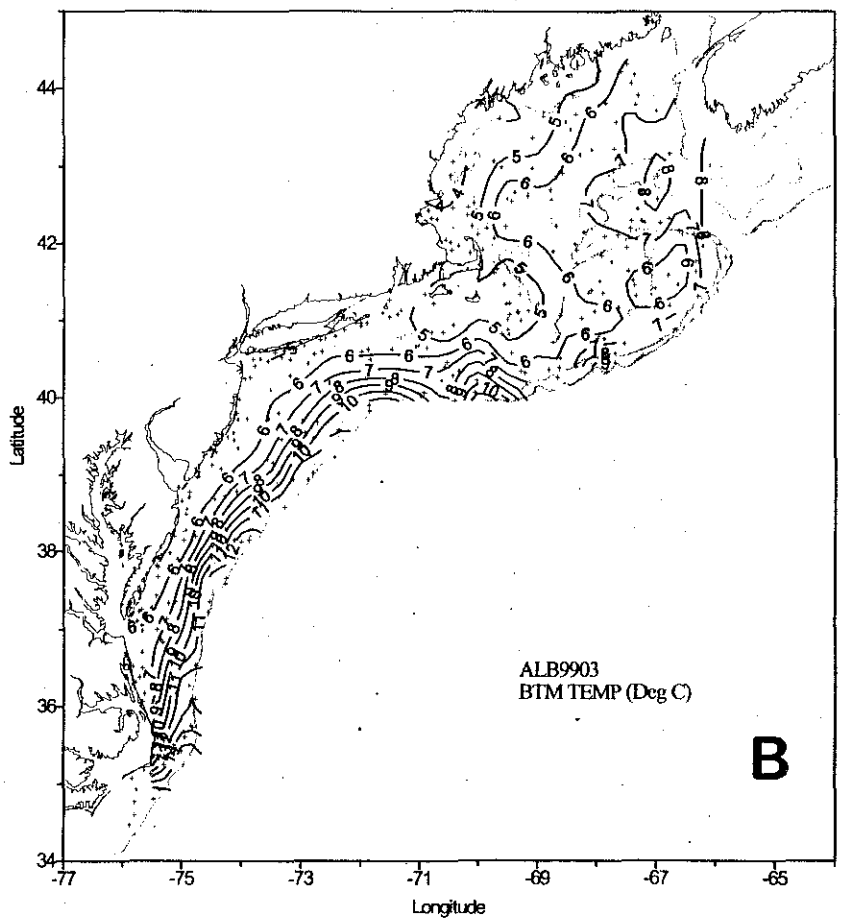
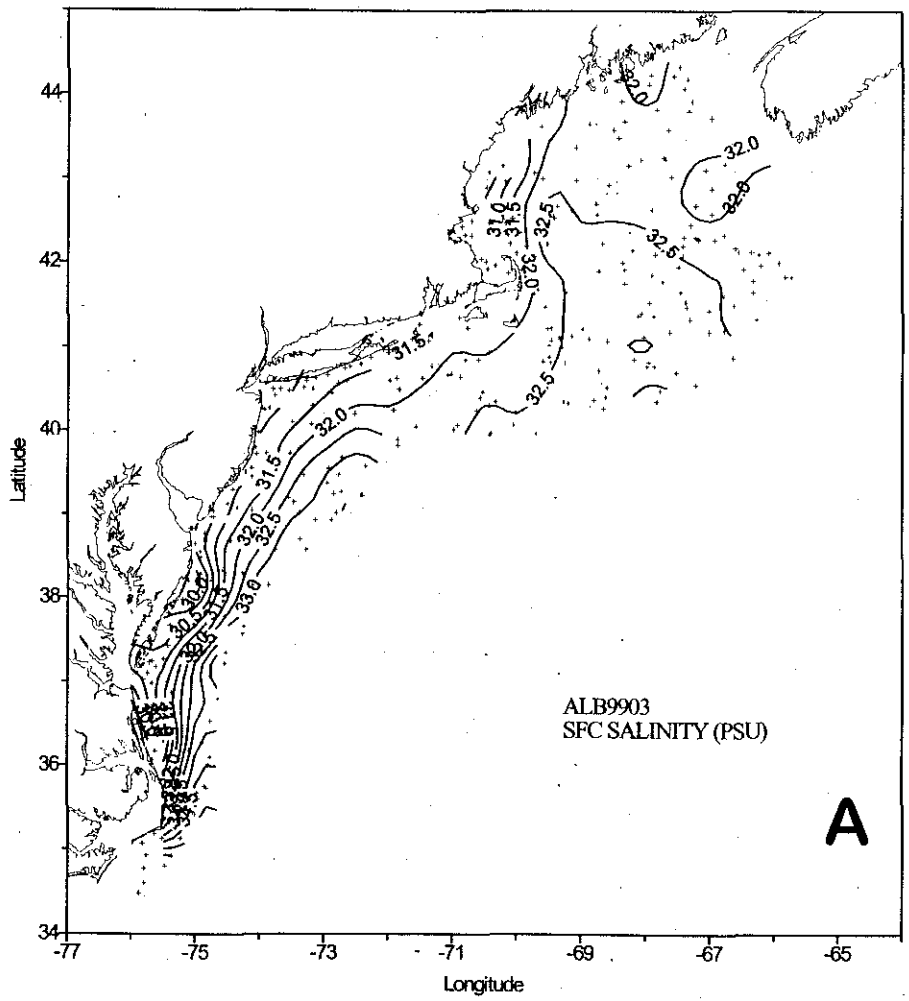


Figure 26. Surface (A) and bottom (B) temperature distributions for Spring Bottom Trawl Survey ALB9903.



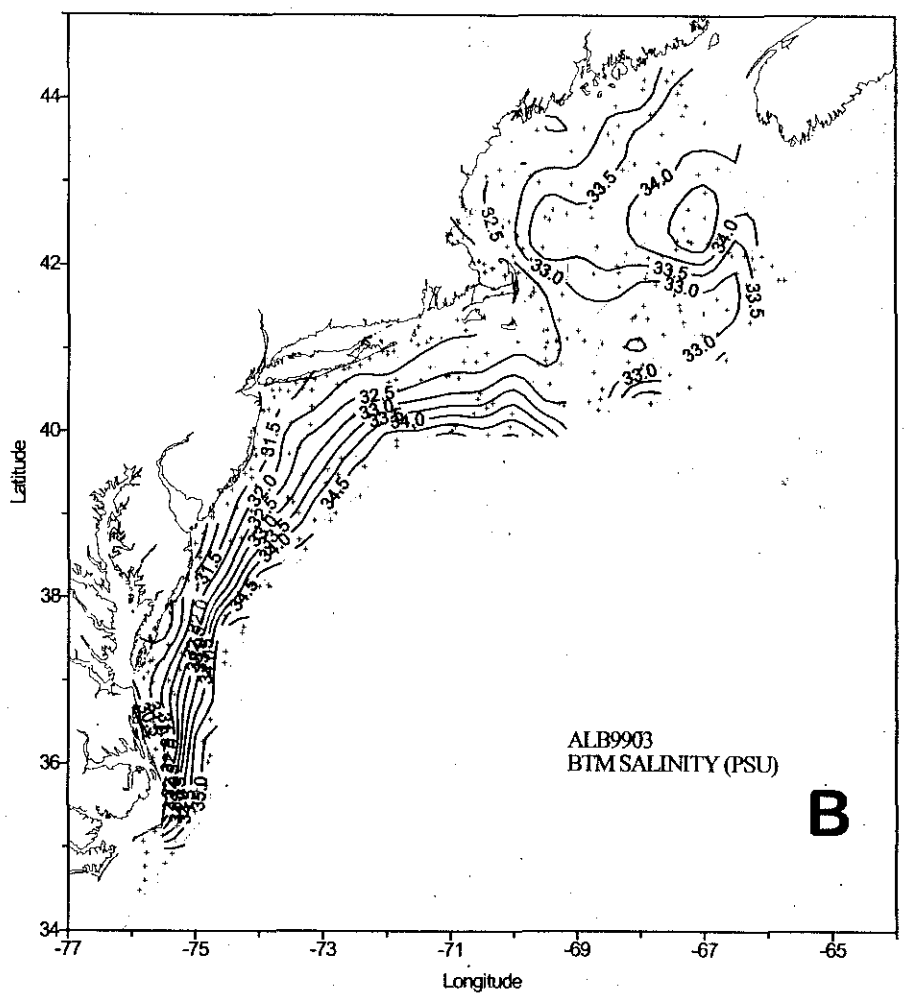


Figure 27. Surface (A) and bottom (B) salinity distributions for Spring Bottom Trawl Survey ALB9903.

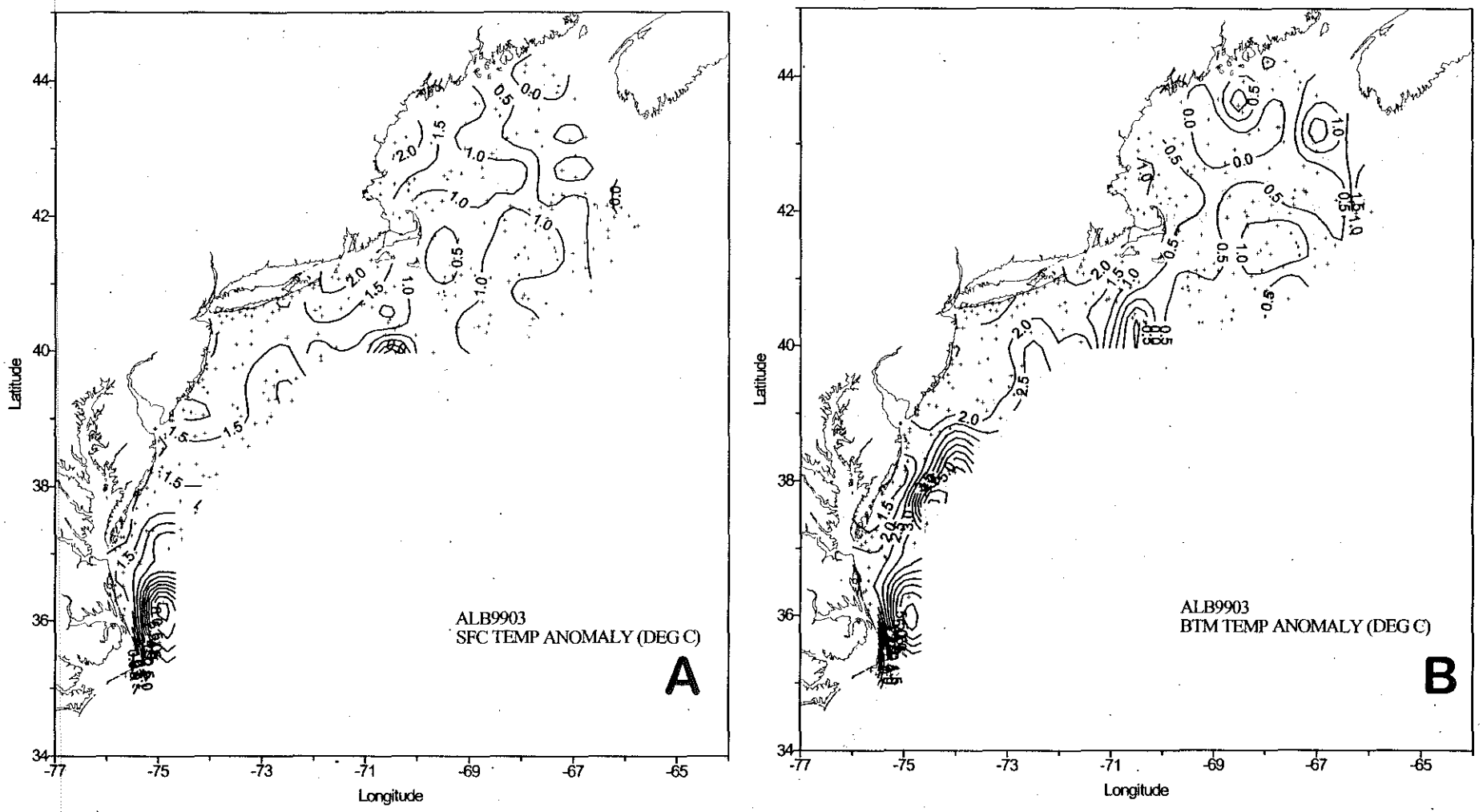
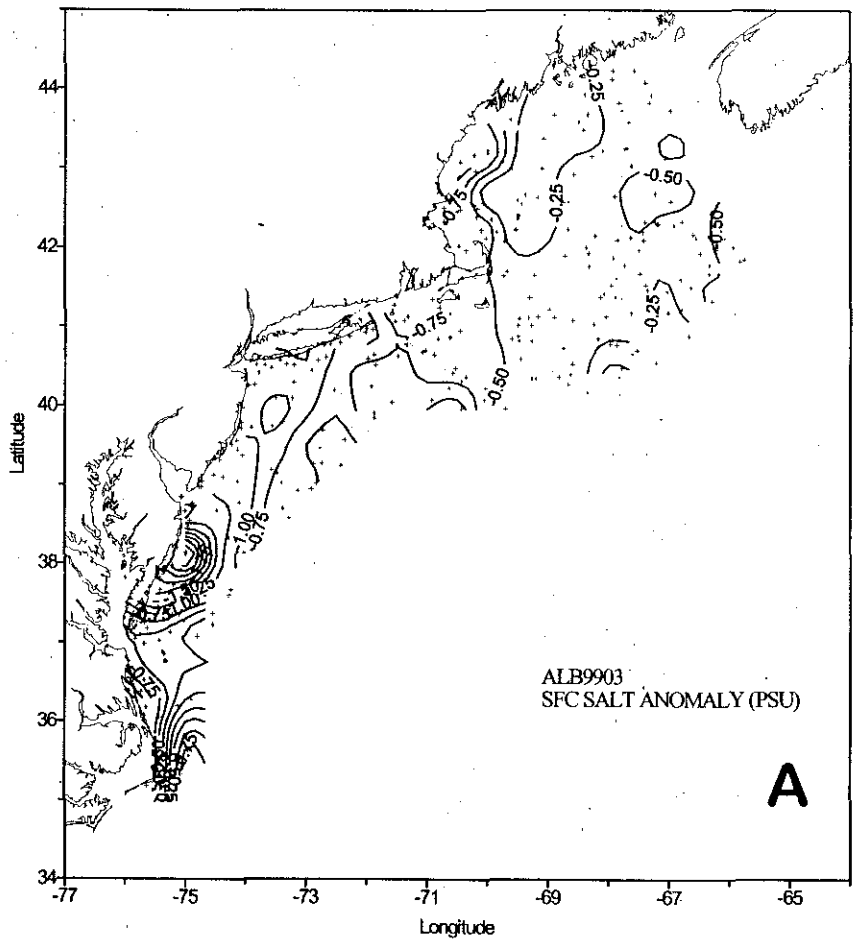


Figure 28. Surface (A) and bottom (B) temperature anomaly distributions for Spring Bottom Trawl ALB9903.



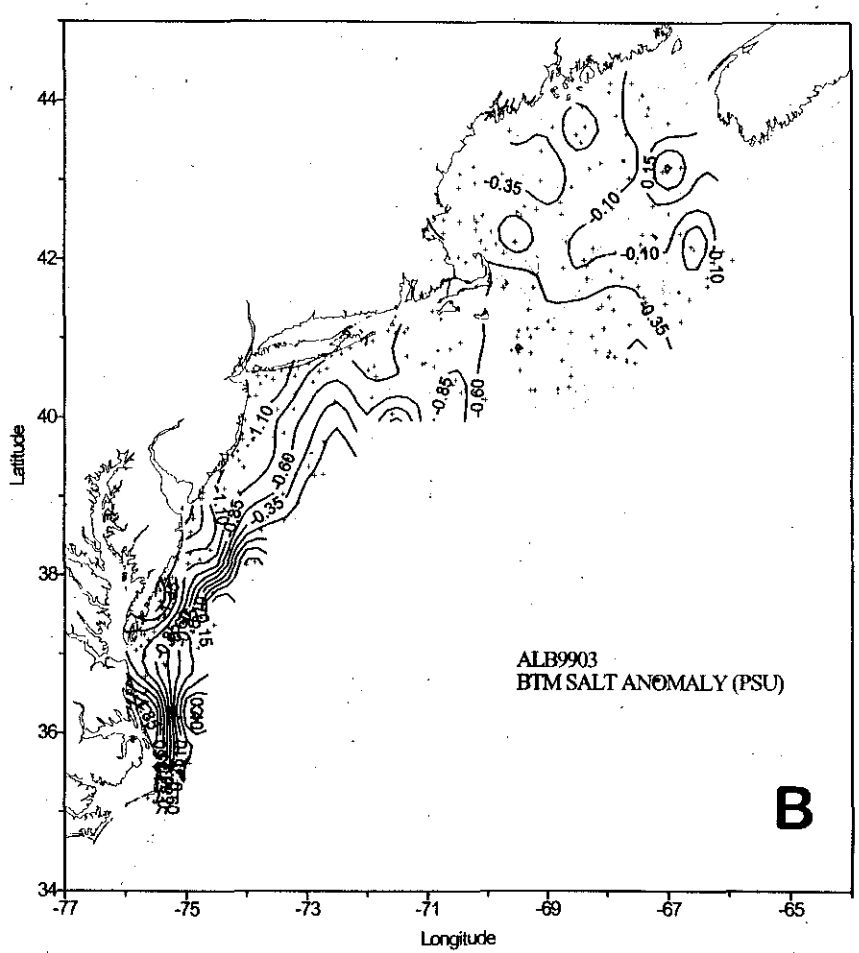


Figure 29. Surface (A) and bottom (B) salinity anomaly distributions for Spring Bottom Trawl Survey ALB9903.

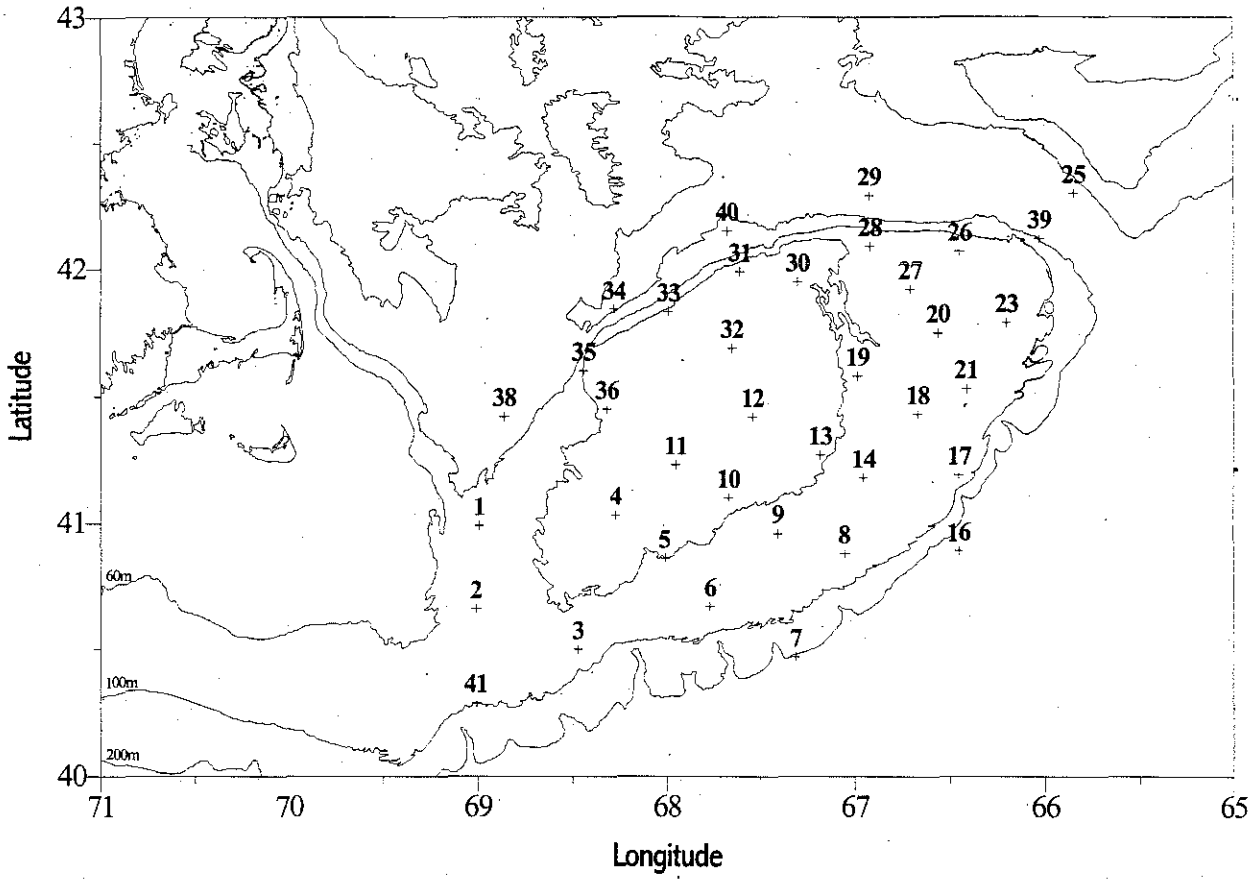


Figure 30. Hydrographic stations occupied during GLOBEC Broadscale survey EN9920.

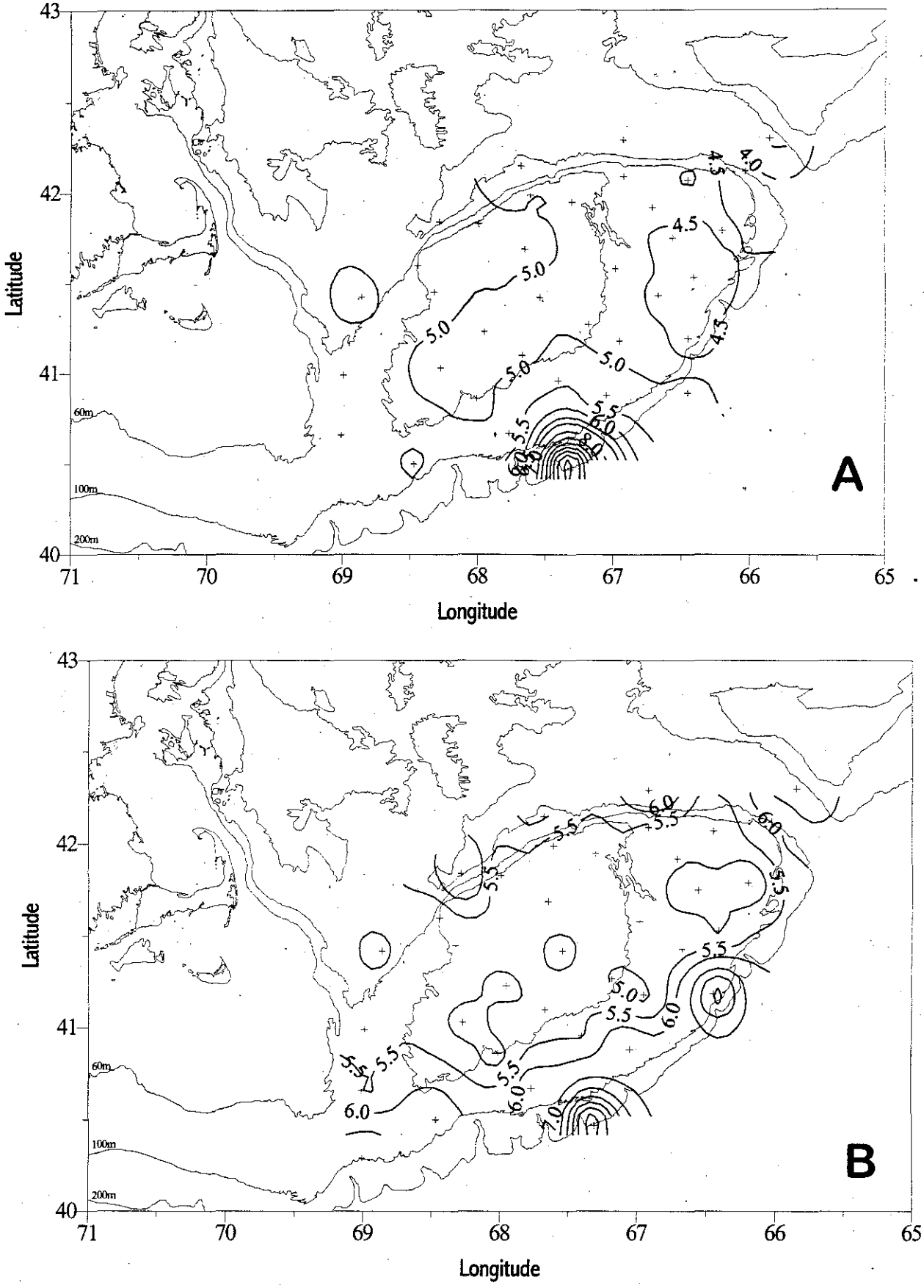


Figure 31. Surface (A) and bottom (B) temperature distributions for GLOBEC Broadscale survey EN9920.

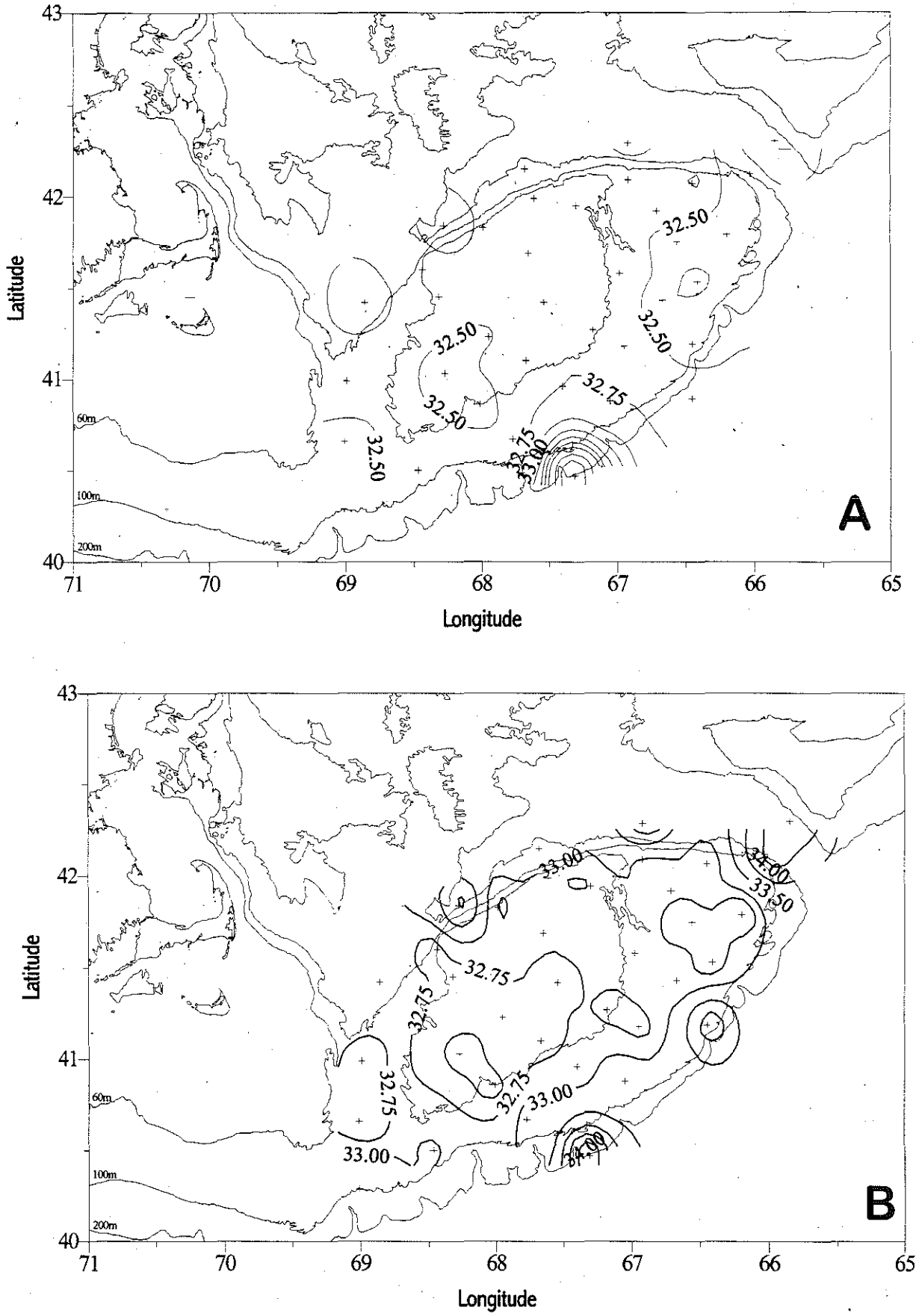


Figure 32. Surface (A) and bottom (B) salinity distributions for GLOBEC Broadscale survey EN9920.

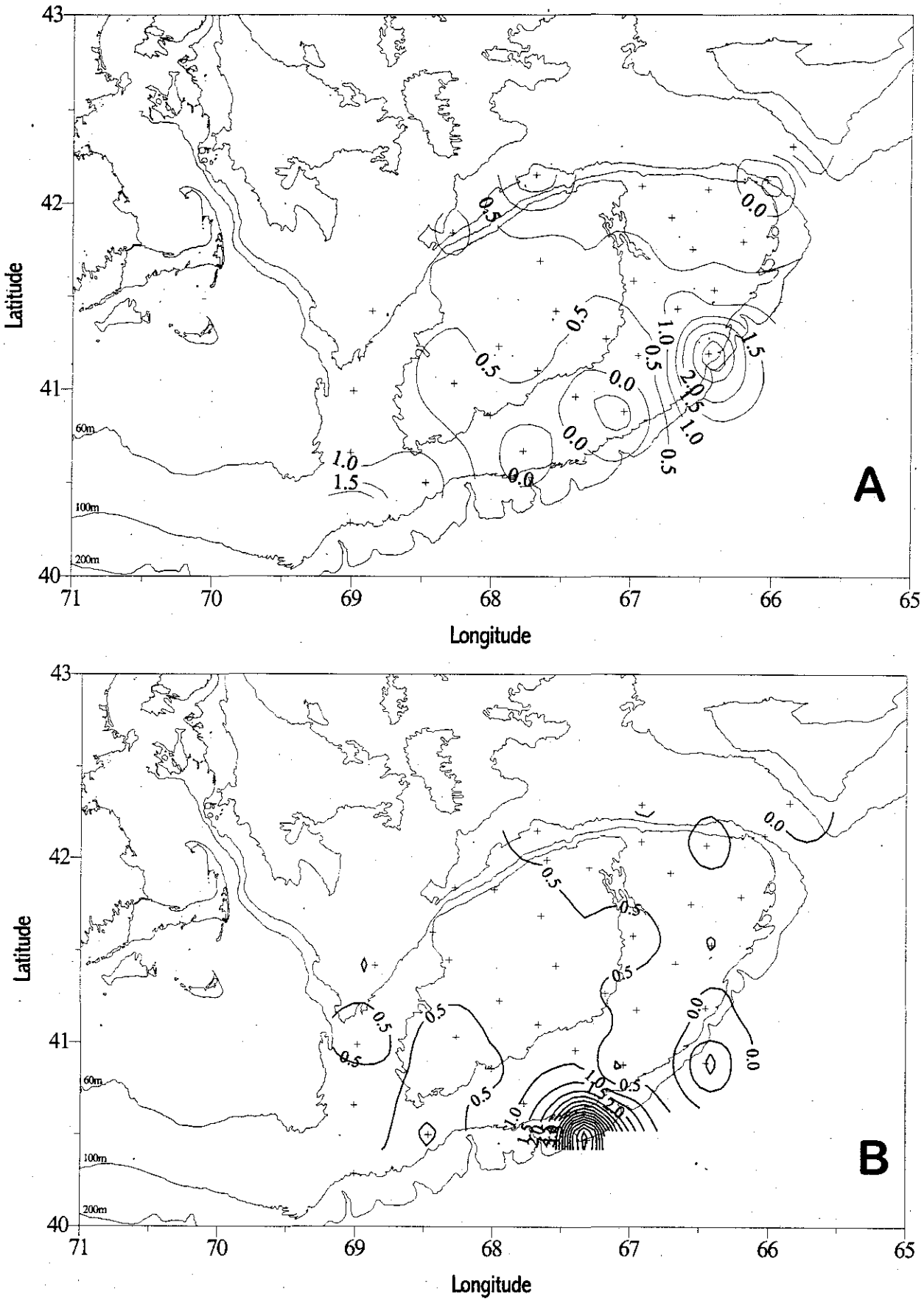


Figure 33. Surface (A) and bottom (B) temperature anomaly distributions for GLOBEC Broadscale survey EN9920.

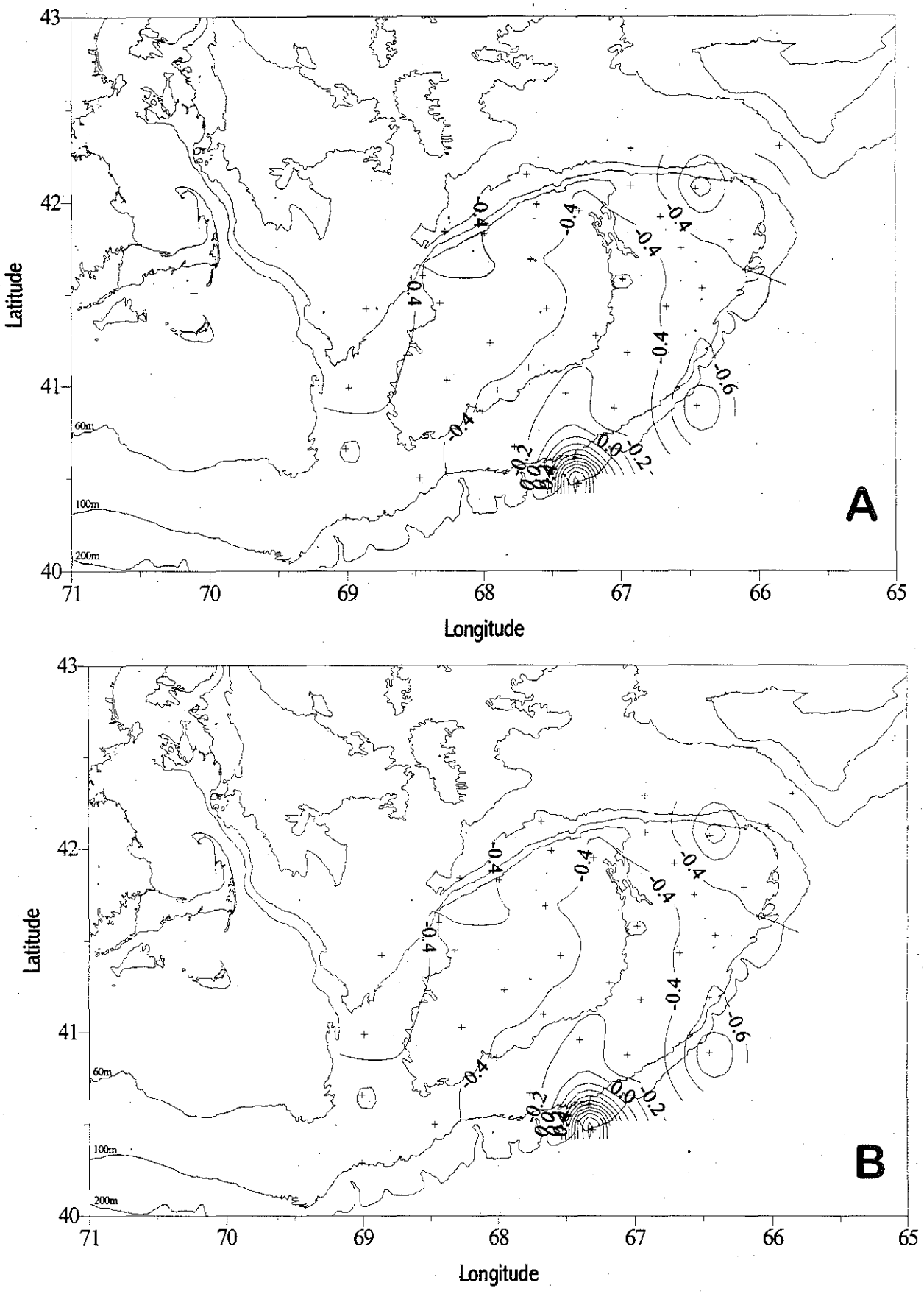


Figure 34. Surface (A) and bottom (B) salinity anomaly distributions for GLOBEC Broadscale survey EN9920.

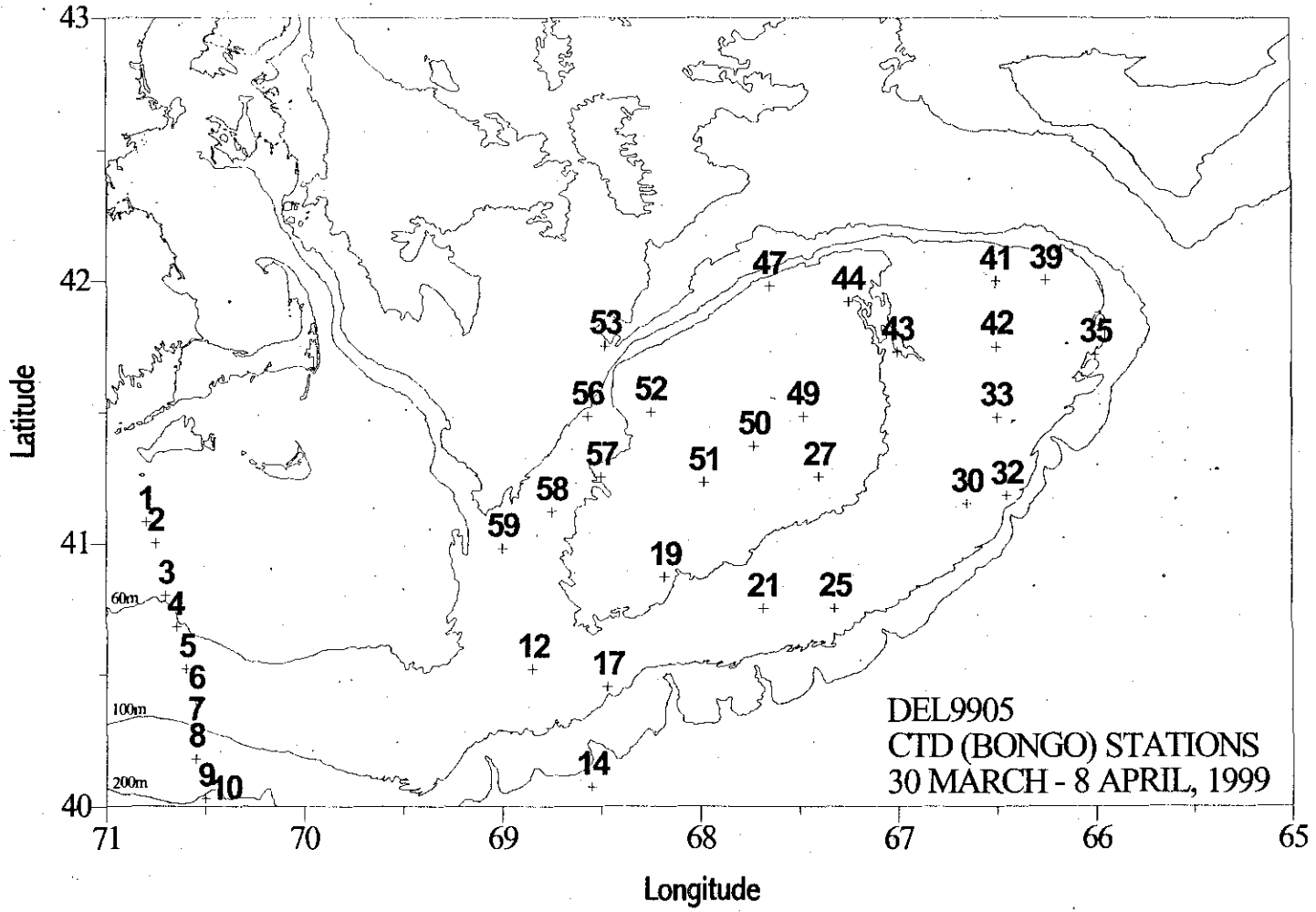


Figure 35. Stations occupied during Gear Comparison Study DEL9905.

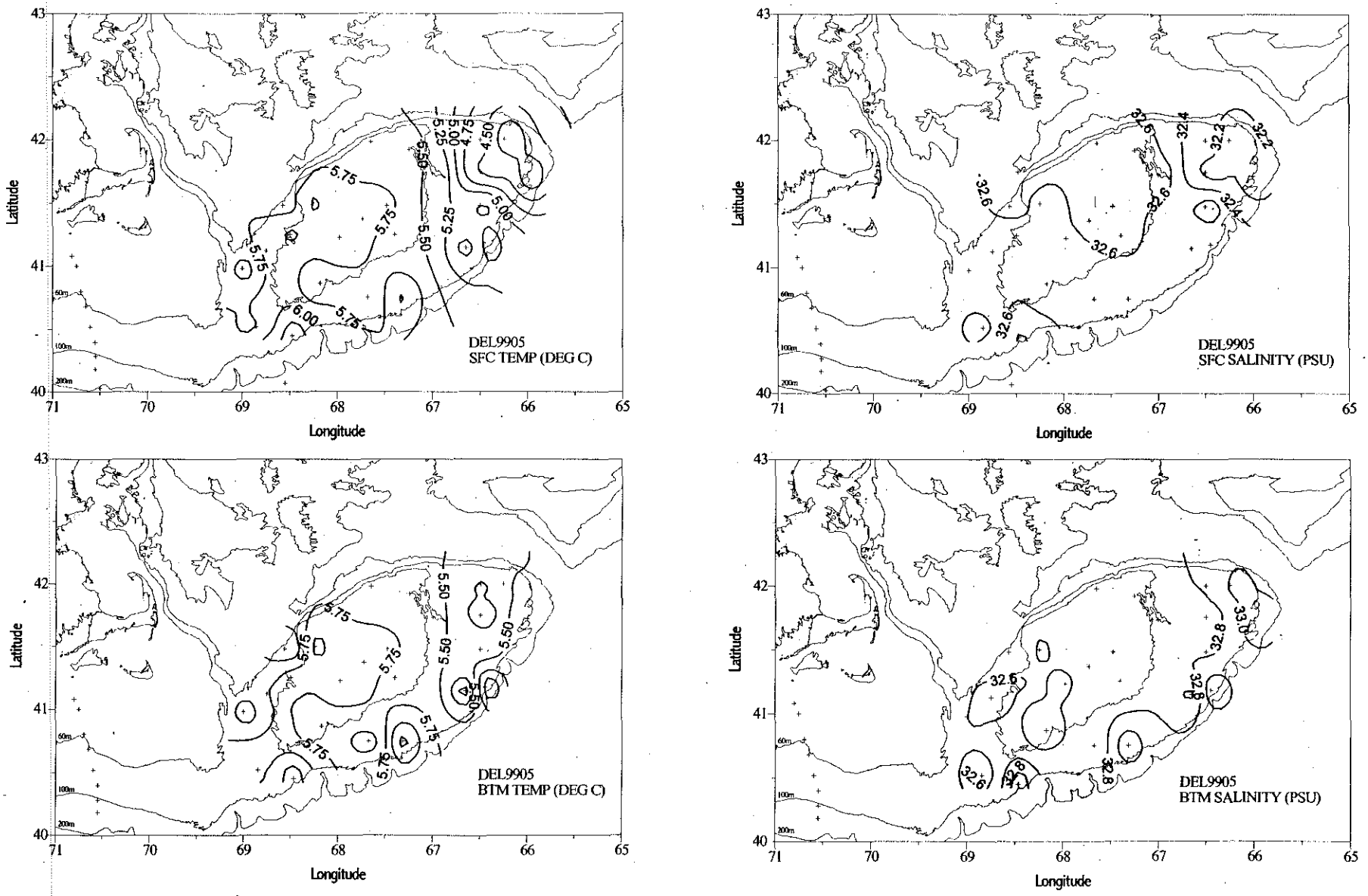


Figure 36. Temperature and salinity distributions for Gear Comparison Study DEL9905.

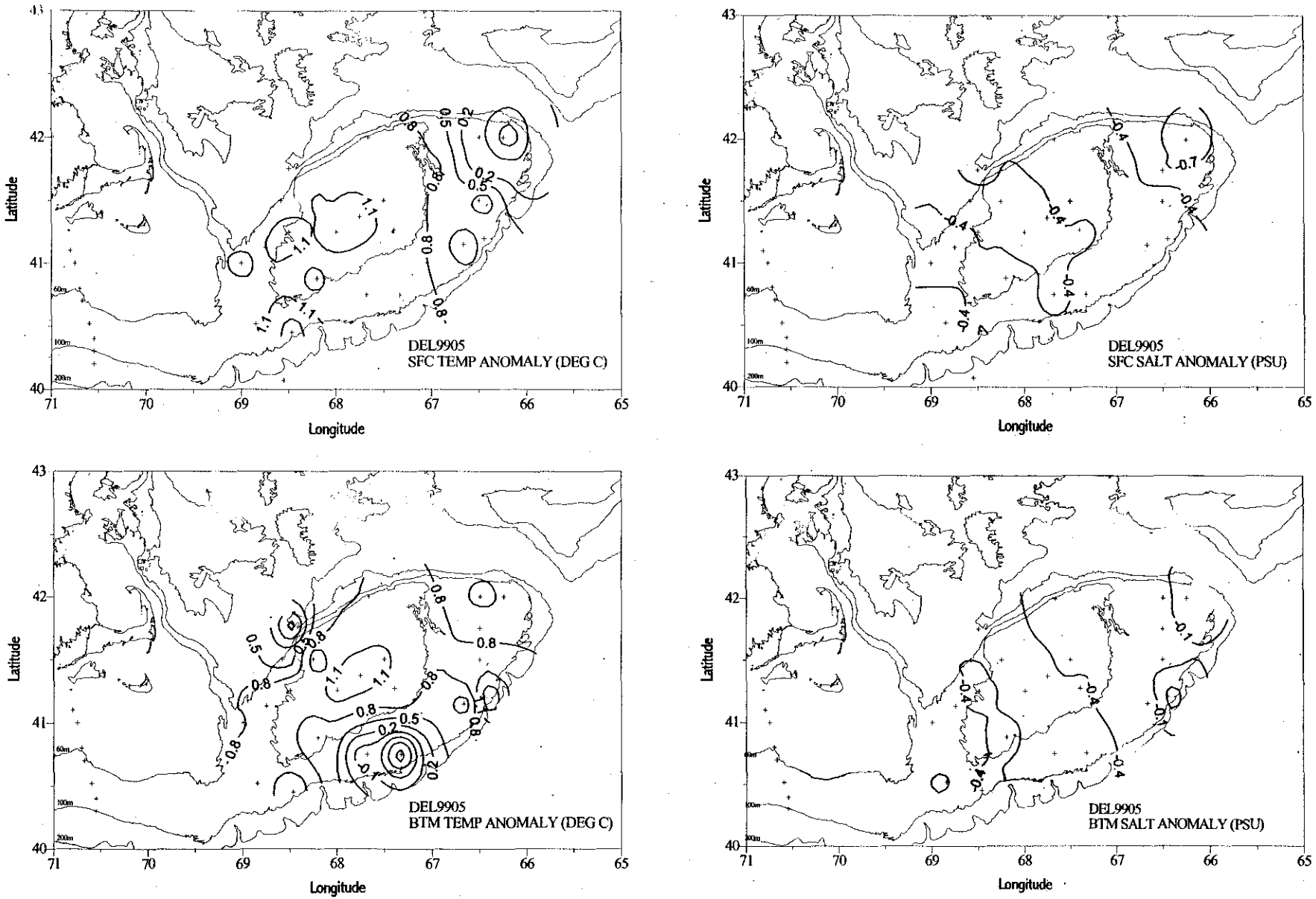


Figure 37. Temperature and salinity anomaly distributions for Gear Comparison Study DEL9905.

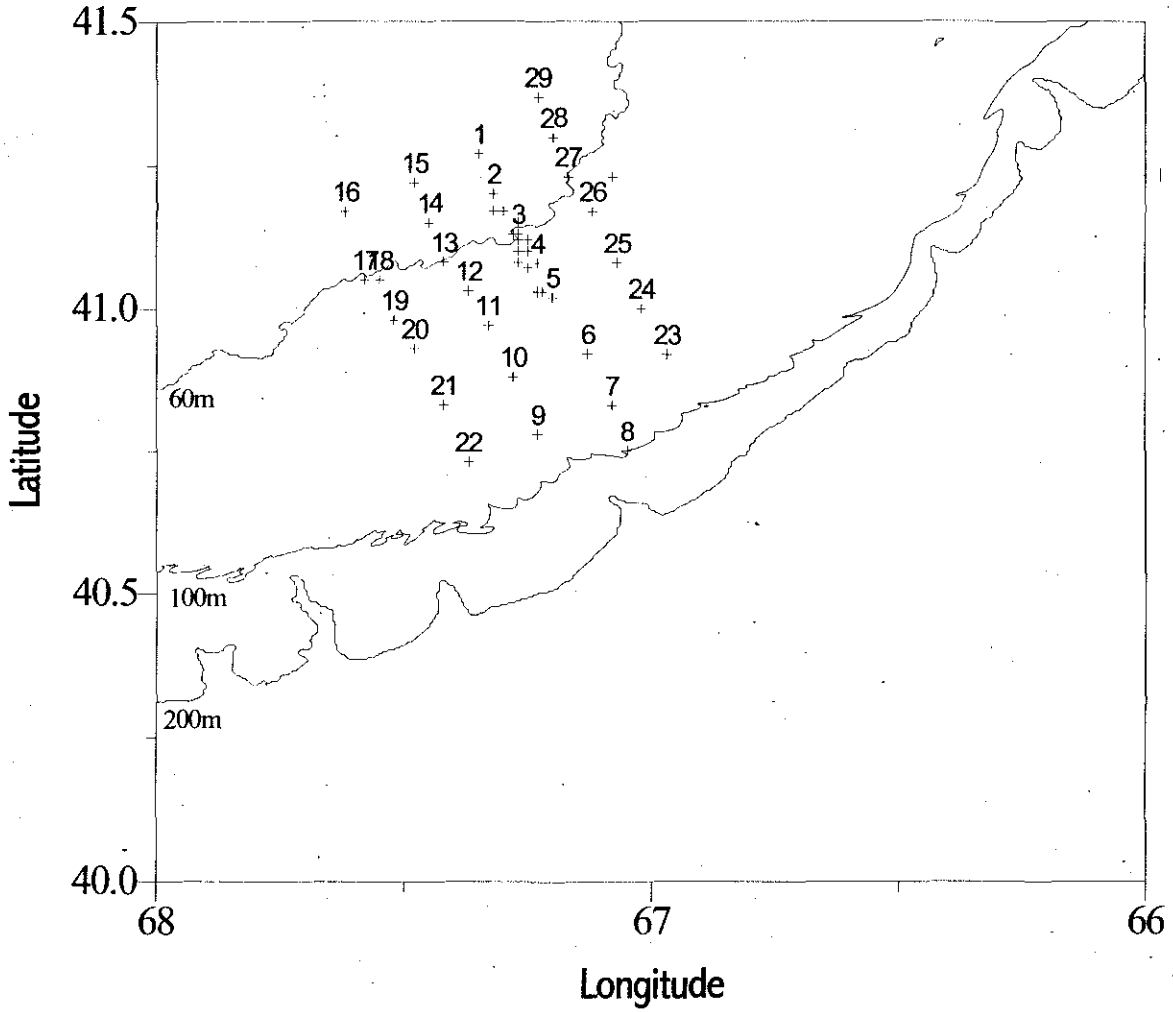


Figure 38. CTD stations occupied during GLOBEC Process survey EDL9904.

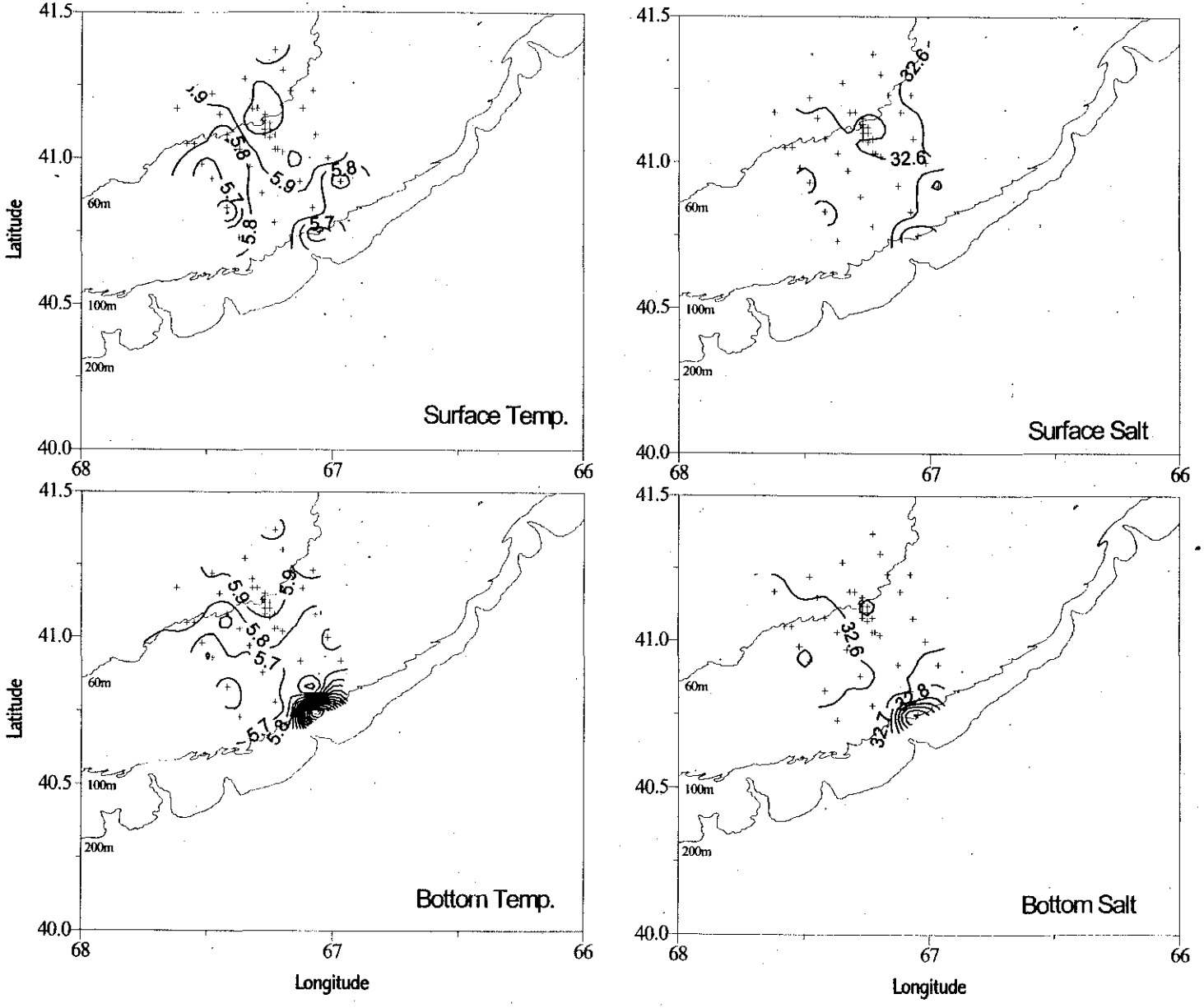


Figure 39. Temperature and salinity distributions during GLOBEC Process survey EDL9904.

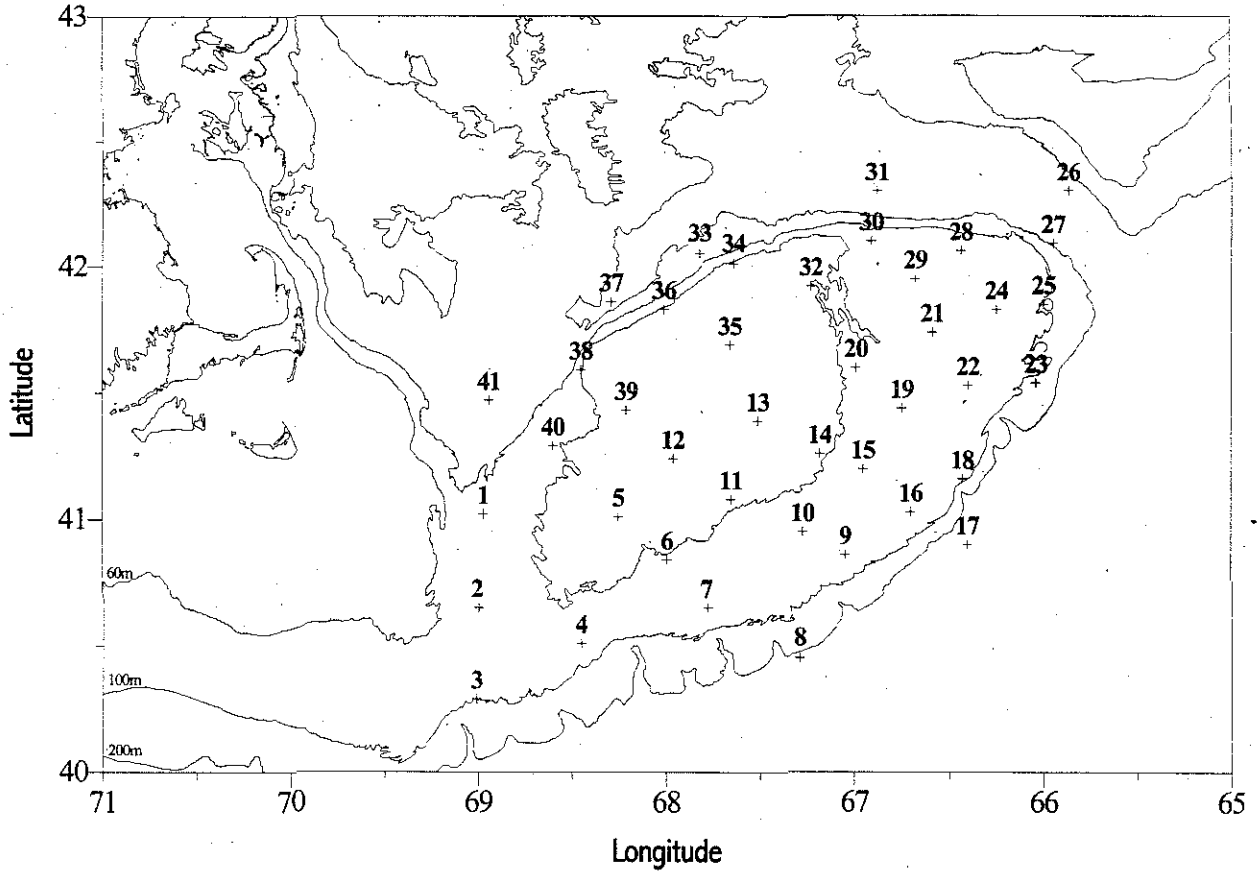


Figure 40. Location of SBE911 CTD casts, with cast number, for GLOBEC Broadscale survey OC9941.

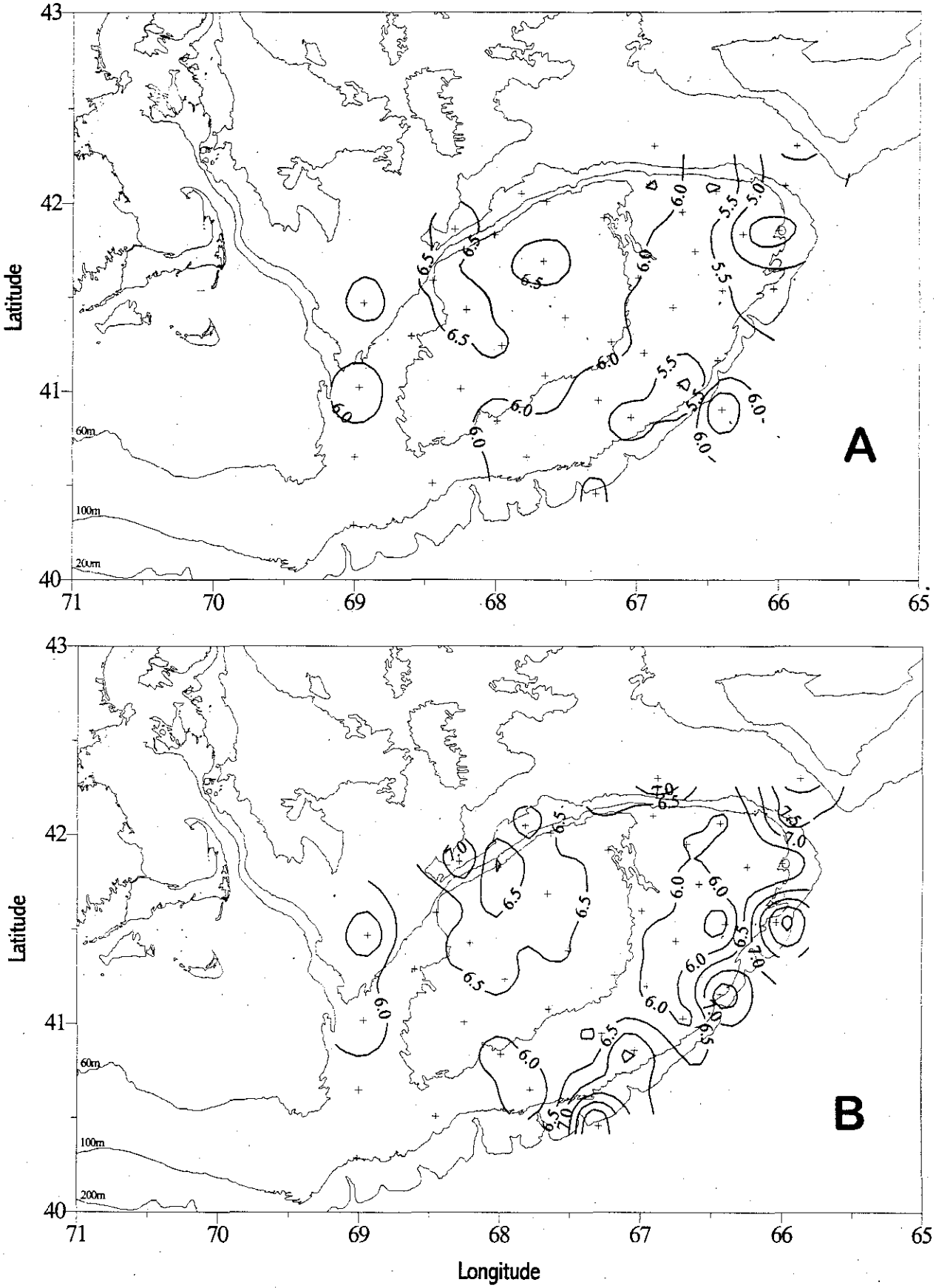


Figure 41. Surface (A) and bottom (B) temperature distributions for GLOBEC Broadscale survey OC9941.

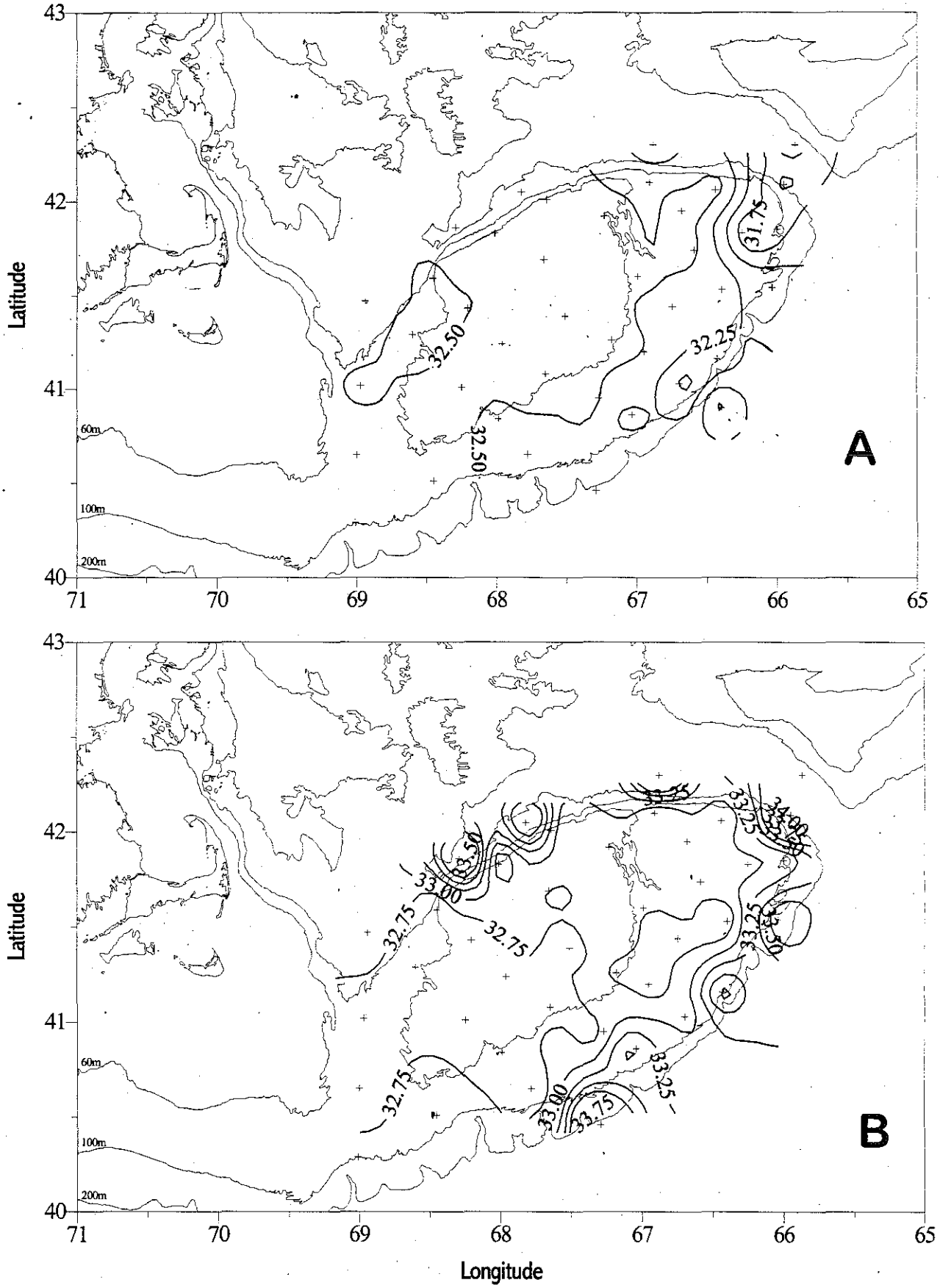


Figure 42. Surface (A) and bottom (B) salinity distributions for the GLOBEC Broadscale survey OC9941.

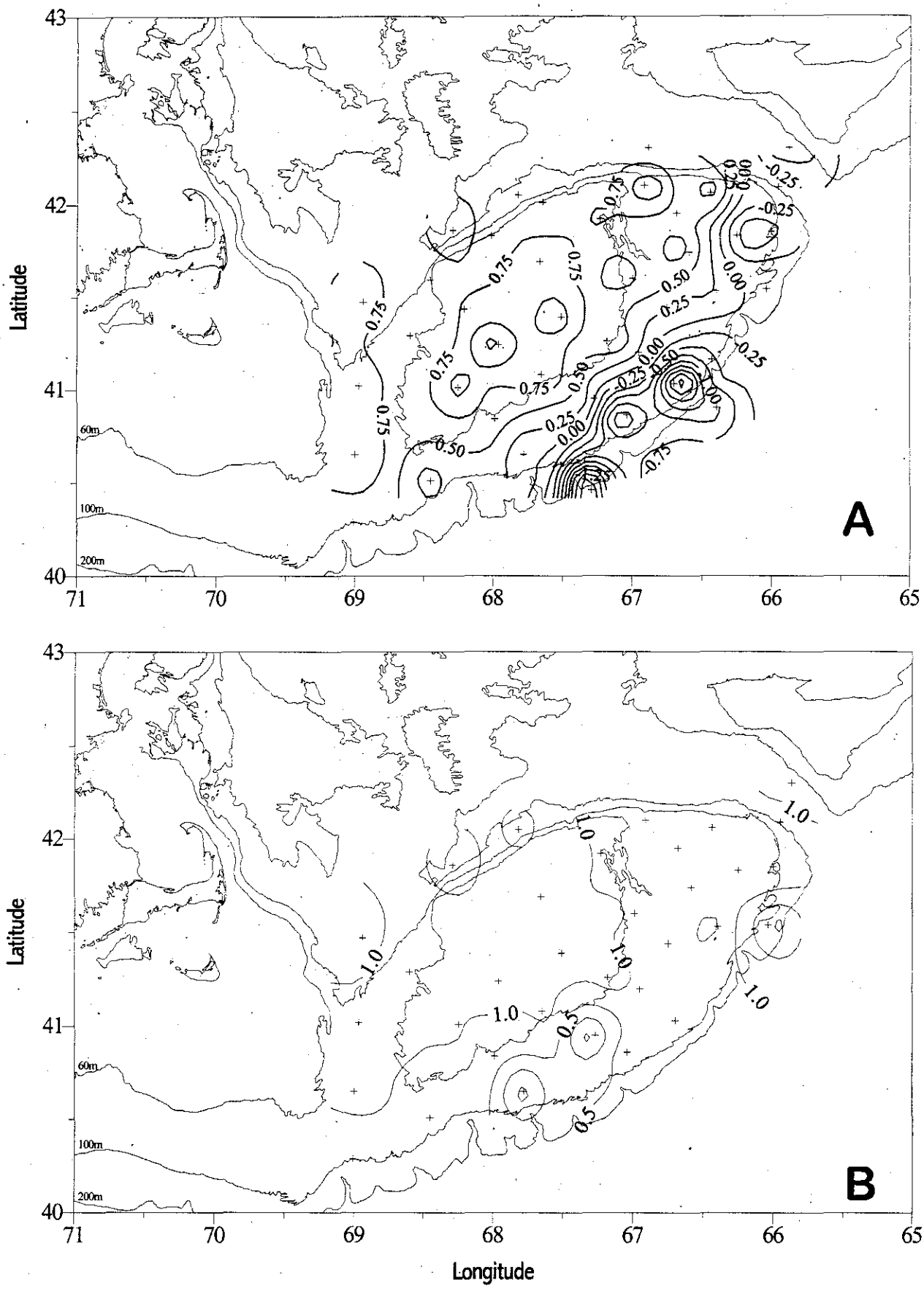


Figure 43. Surface (A) and bottom (B) temperature anomaly distributions for GLOBEC Broadscale survey OC9941.

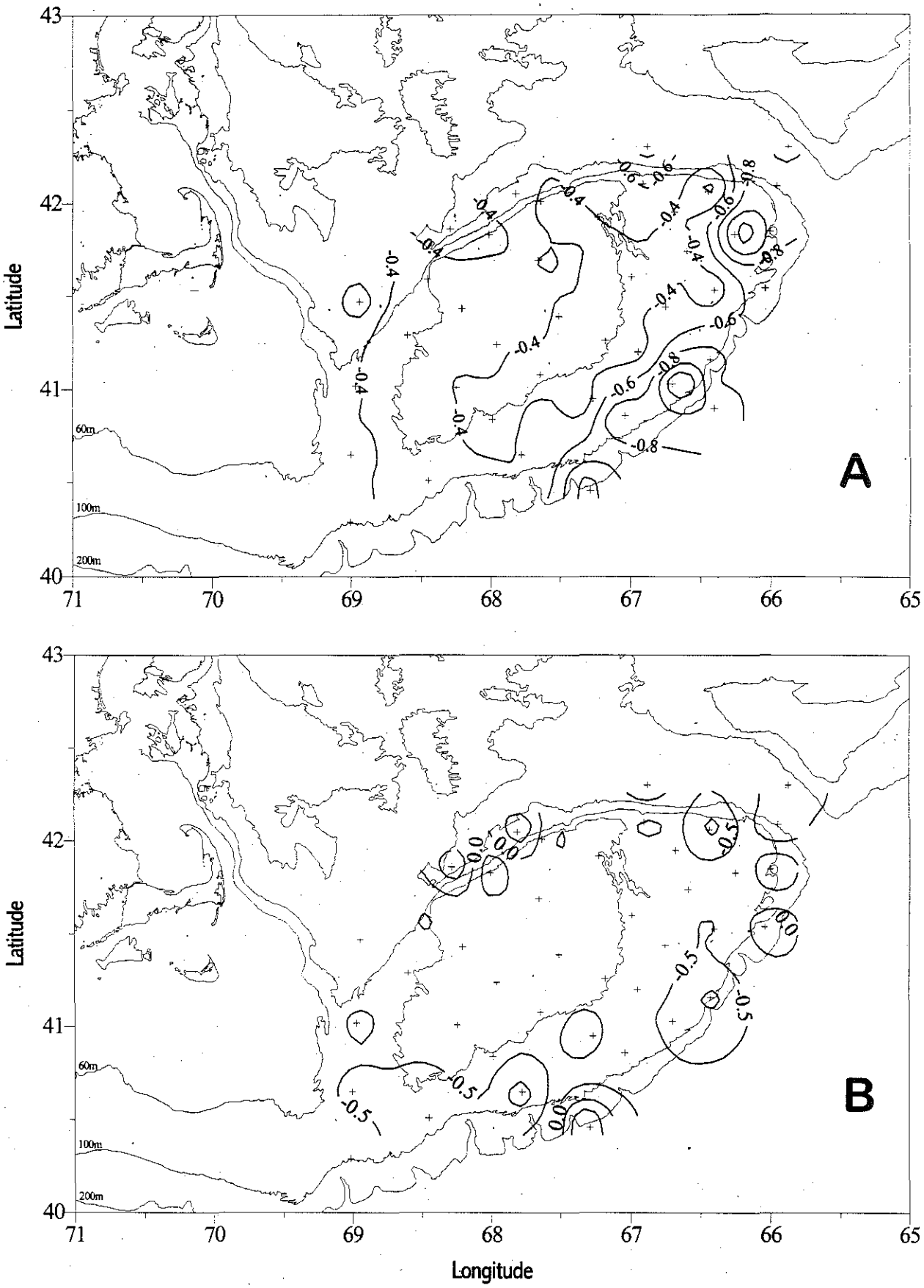


Figure 44. Surface (A) and bottom (B) salinity anomaly distributions for GLOBEC Broadscale survey OC9941.

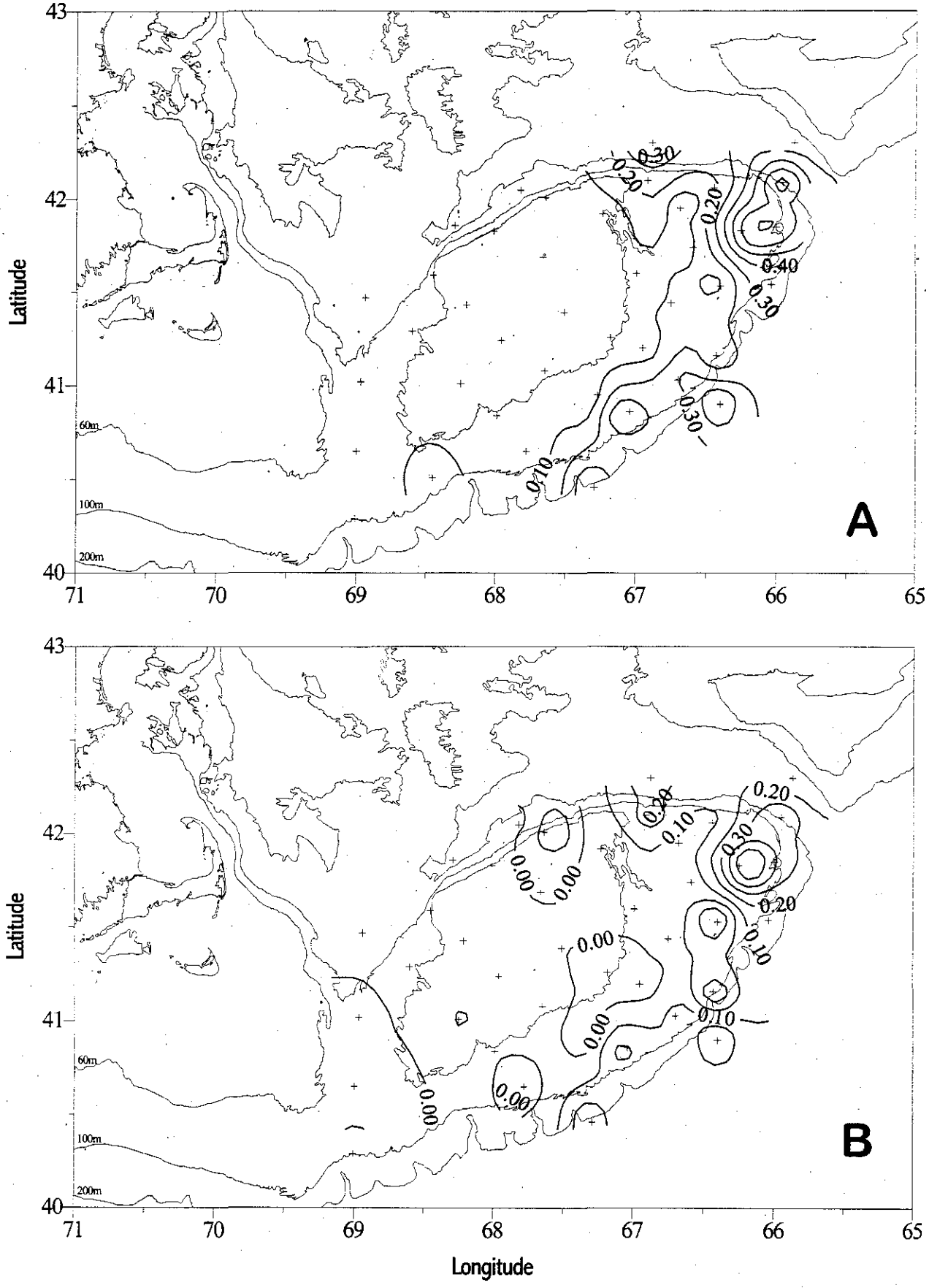


Figure 45. Stratification (A) and stratification anomaly (B) over the upper 30m of the water column during GLOBEC Broadscale survey OC9941.

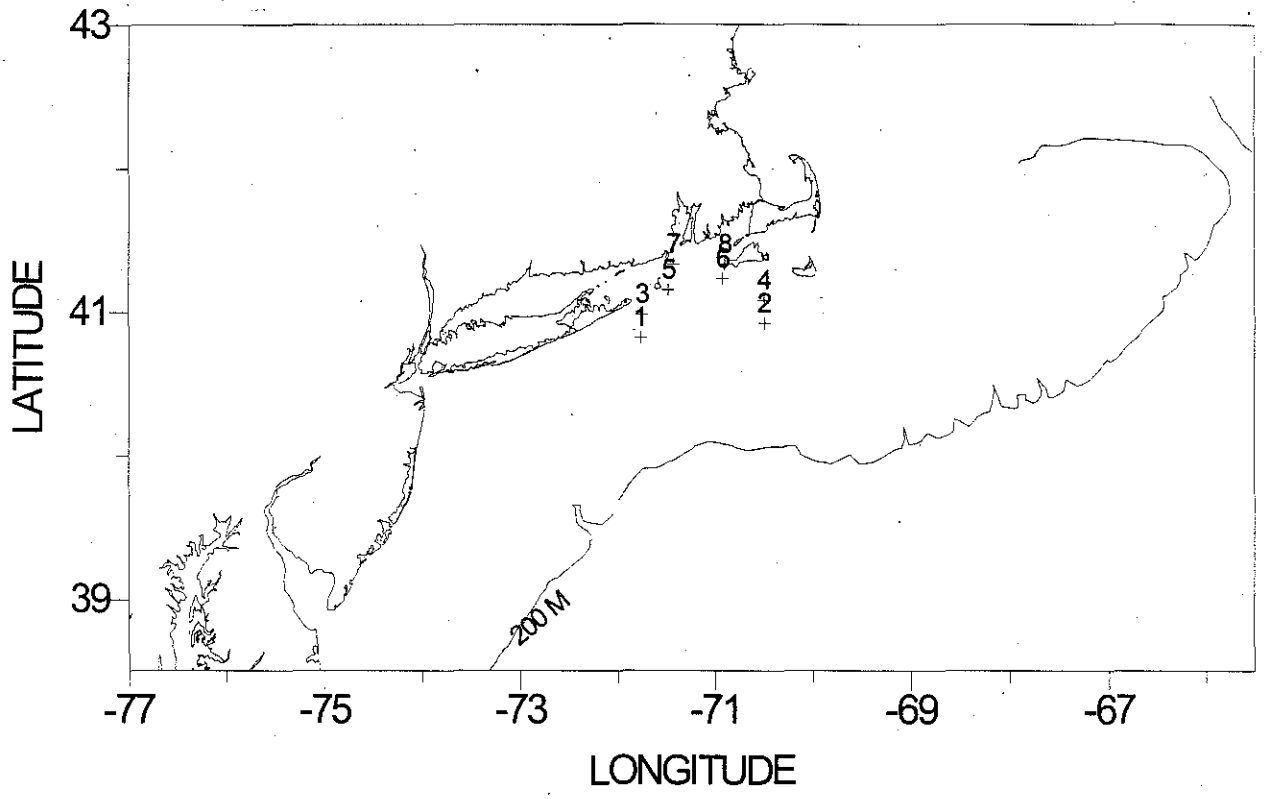


Figure 46. Stations occupied during Marine Mammal Survey DEL9906.

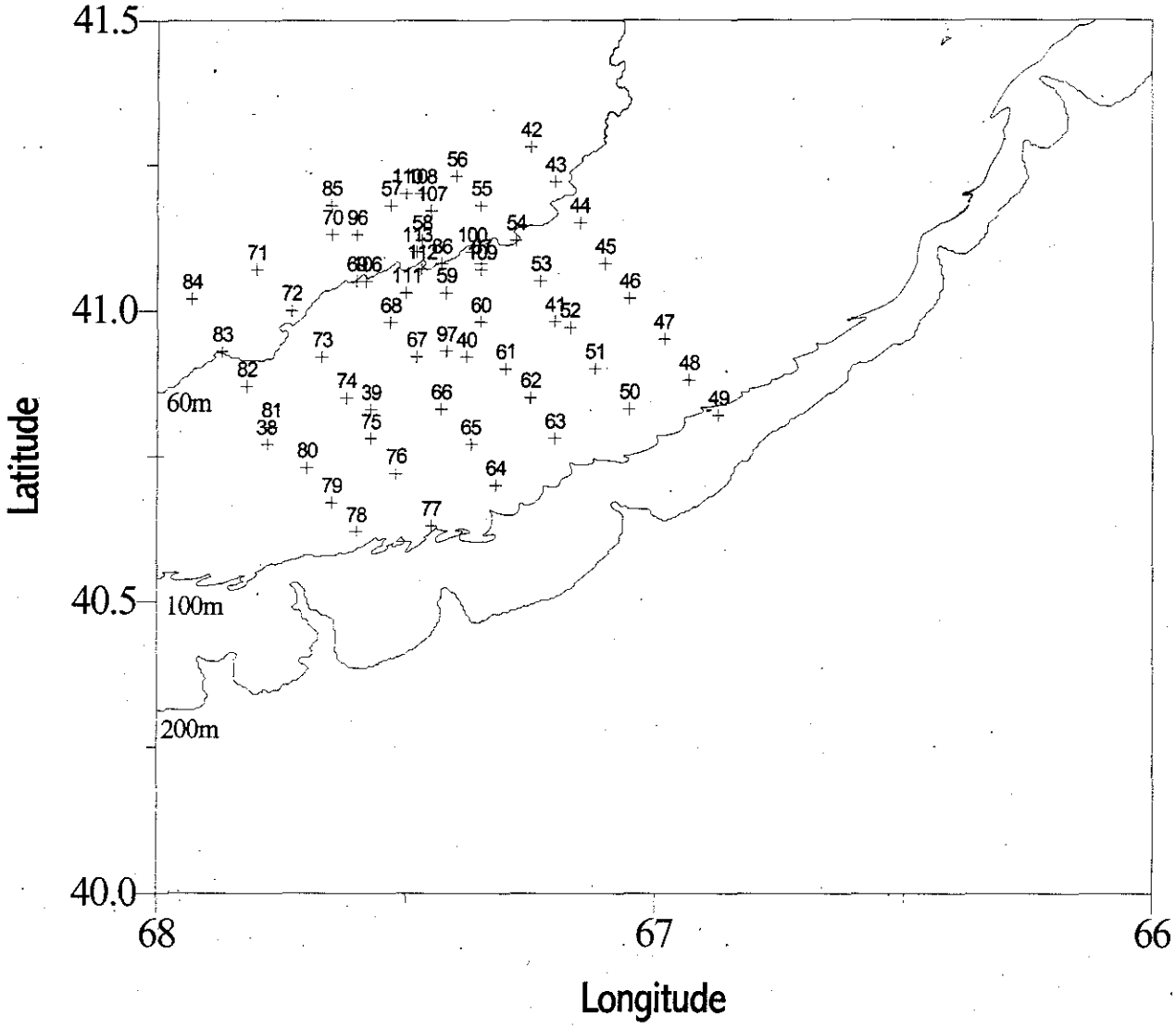


Figure 47. Hydrographic stations occupied during GLOBEC Process survey EDL9905.

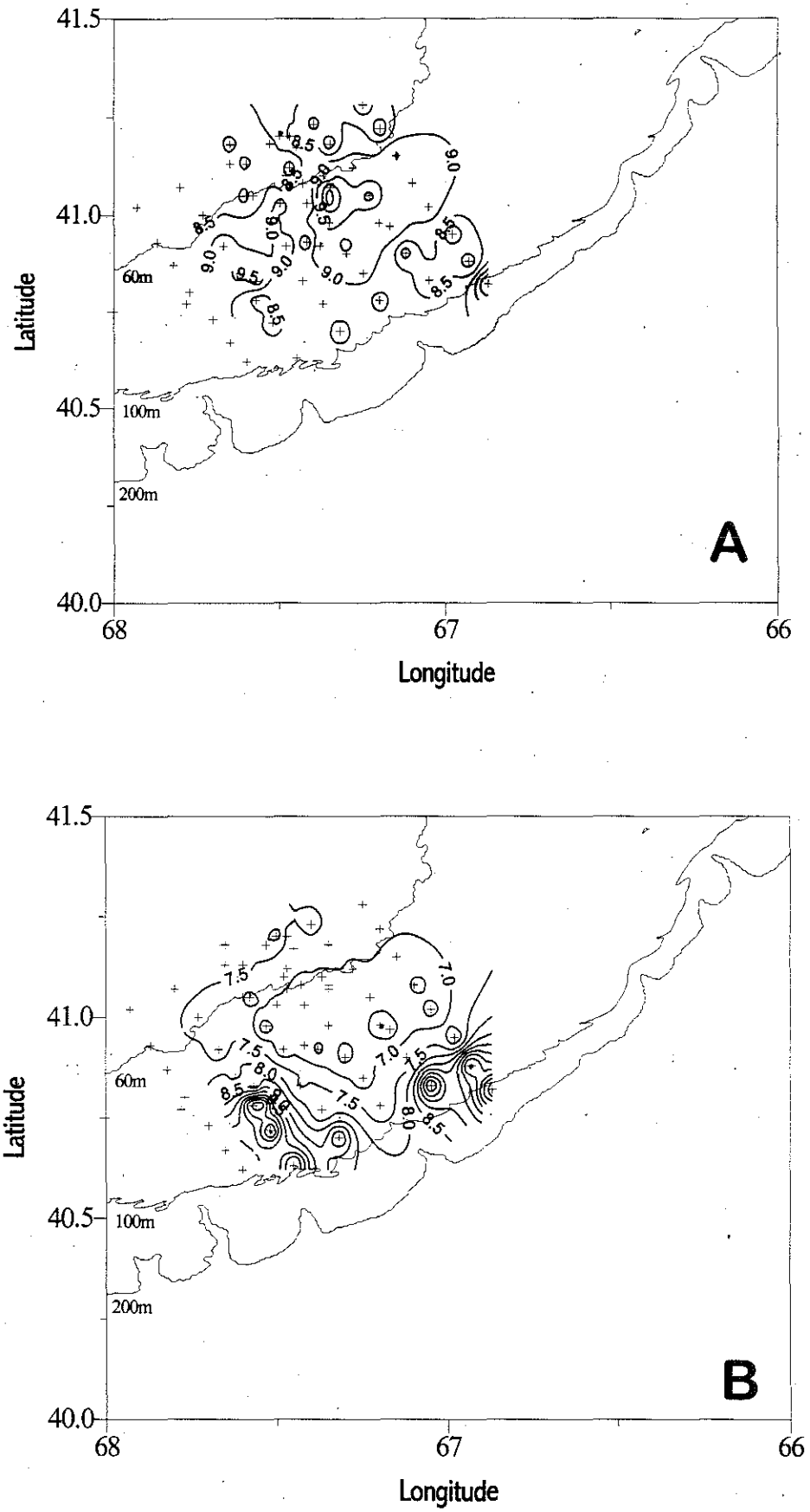
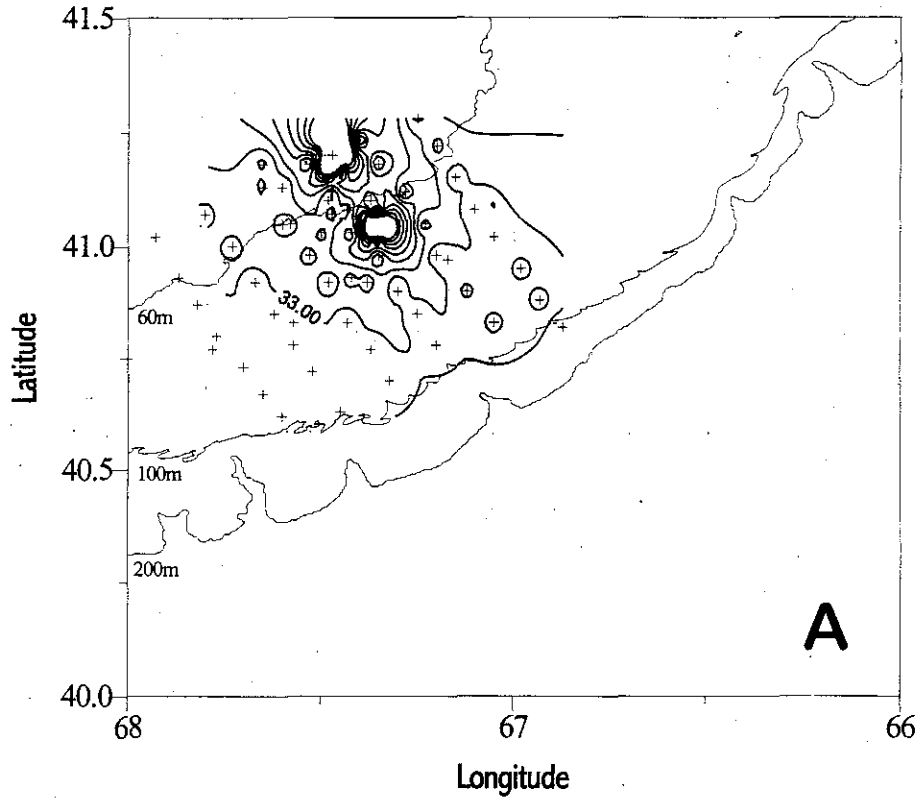


Figure 48. Surface (A) and bottom (B) temperature distributions for GLOBEC Process survey EDL9905.



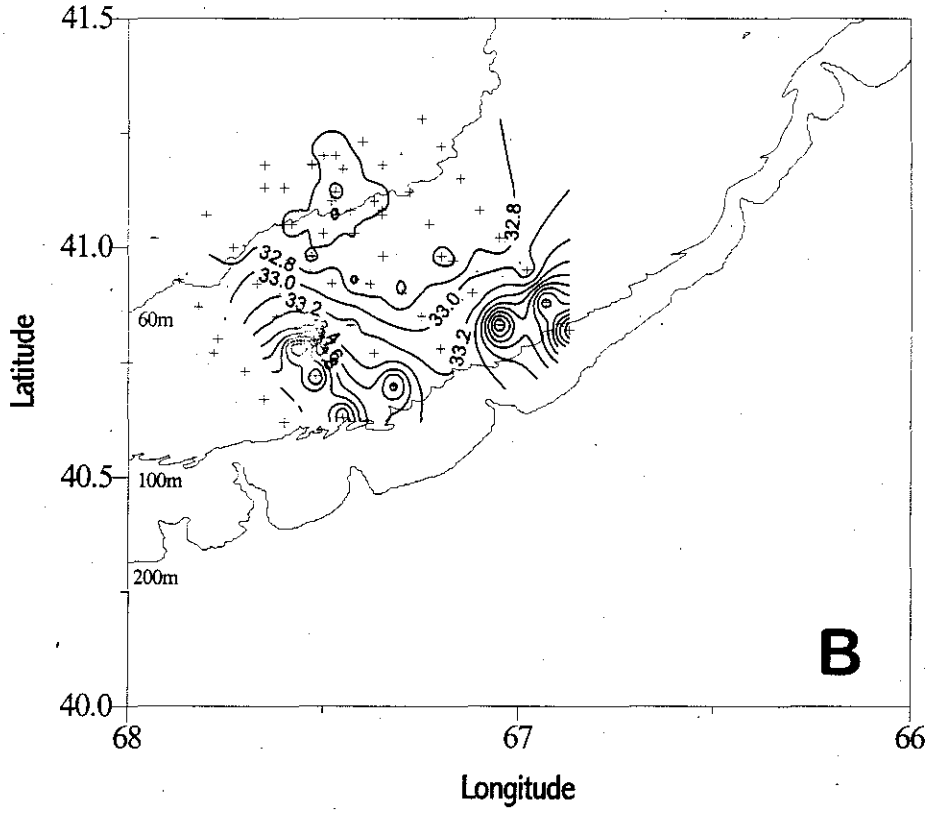


Figure 49. Surface (A) and bottom (B) salinity distributions for GLOBEC Process survey EDL9905.

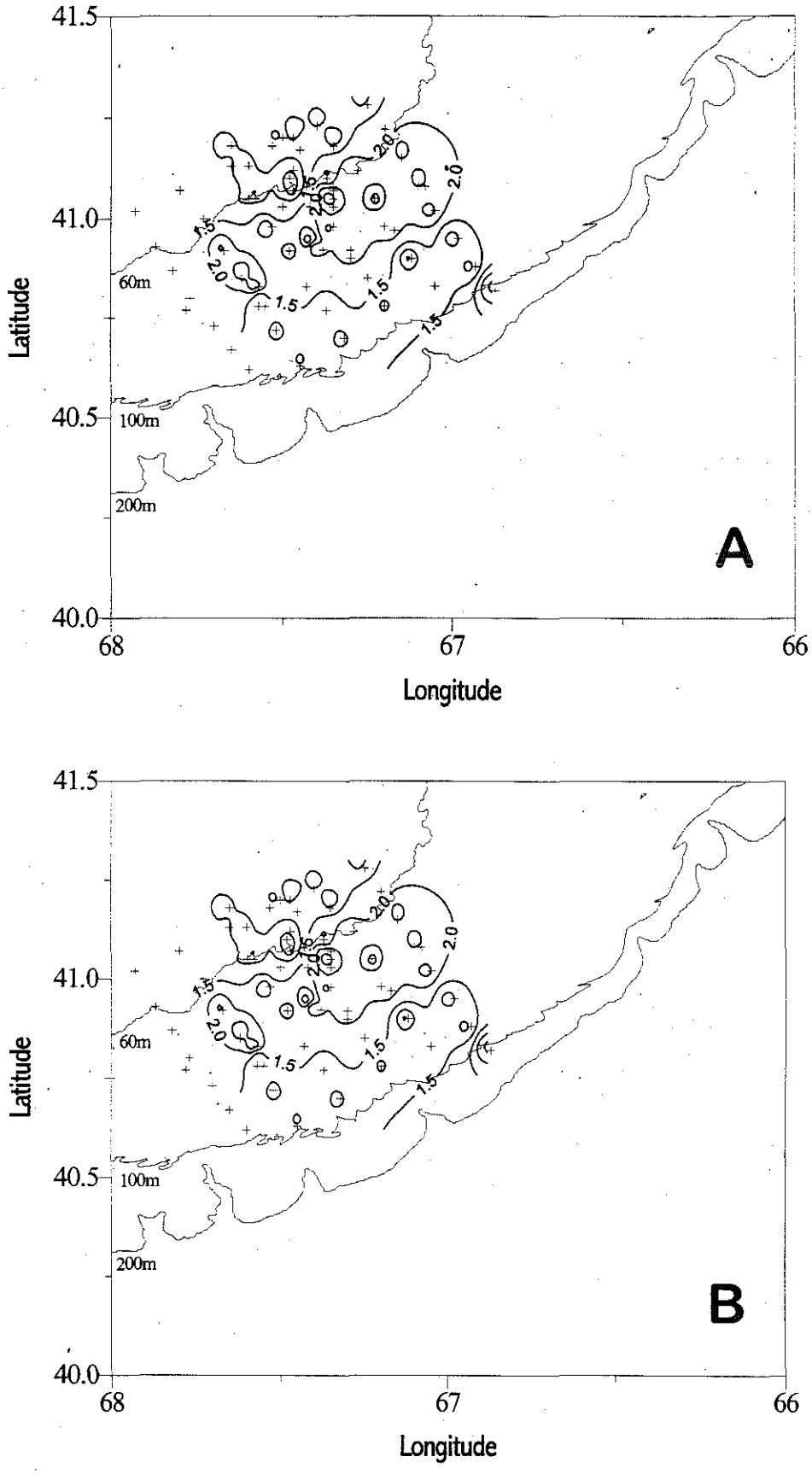


Figure 50. Surface (A) and bottom (B) temperature anomaly distributions for GLOBEC Process survey EDL9905.

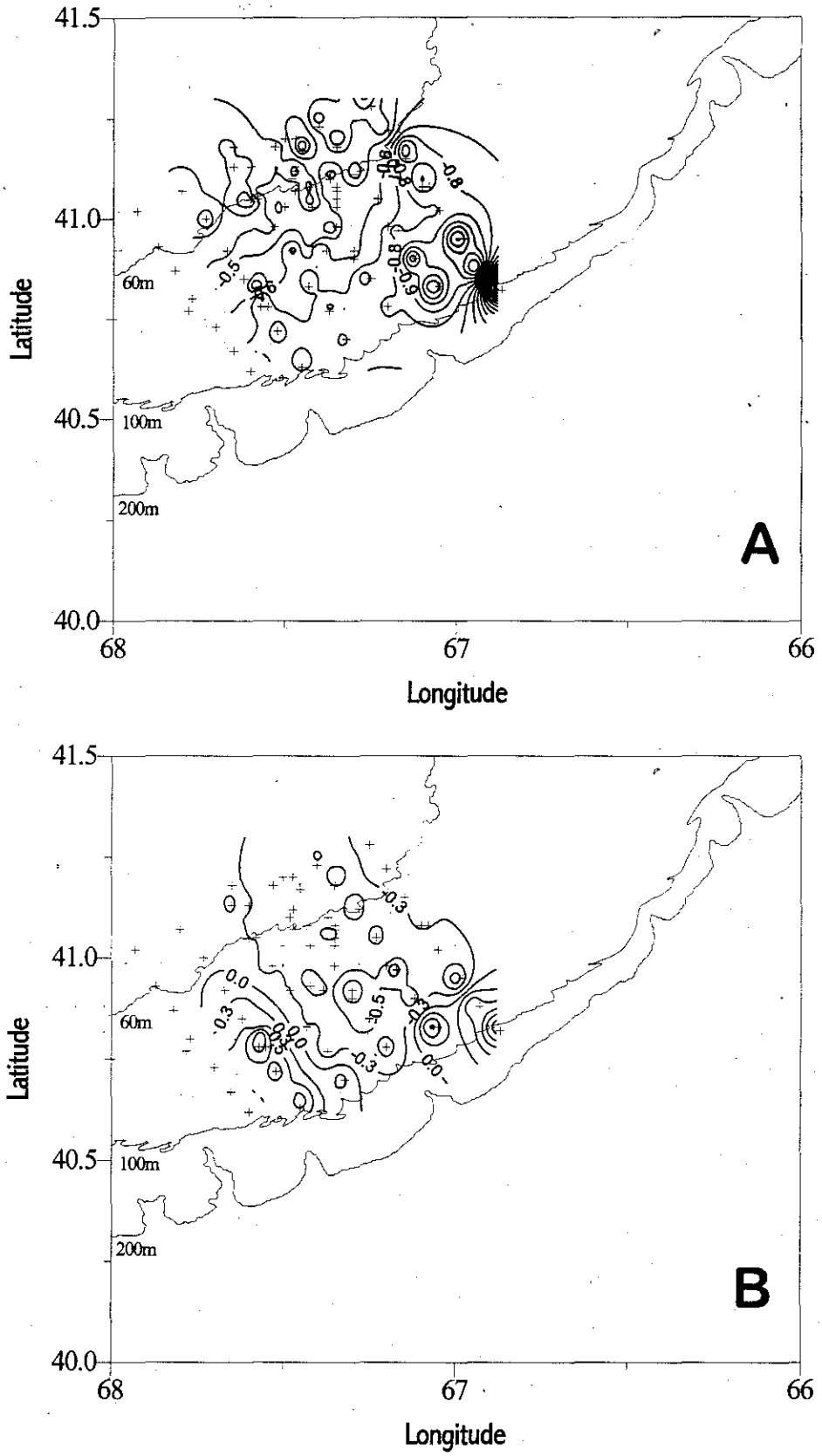


Figure 51. Surface (A) and bottom (B) salinity anomaly distributions for GLOBEC Process survey EDL9905.

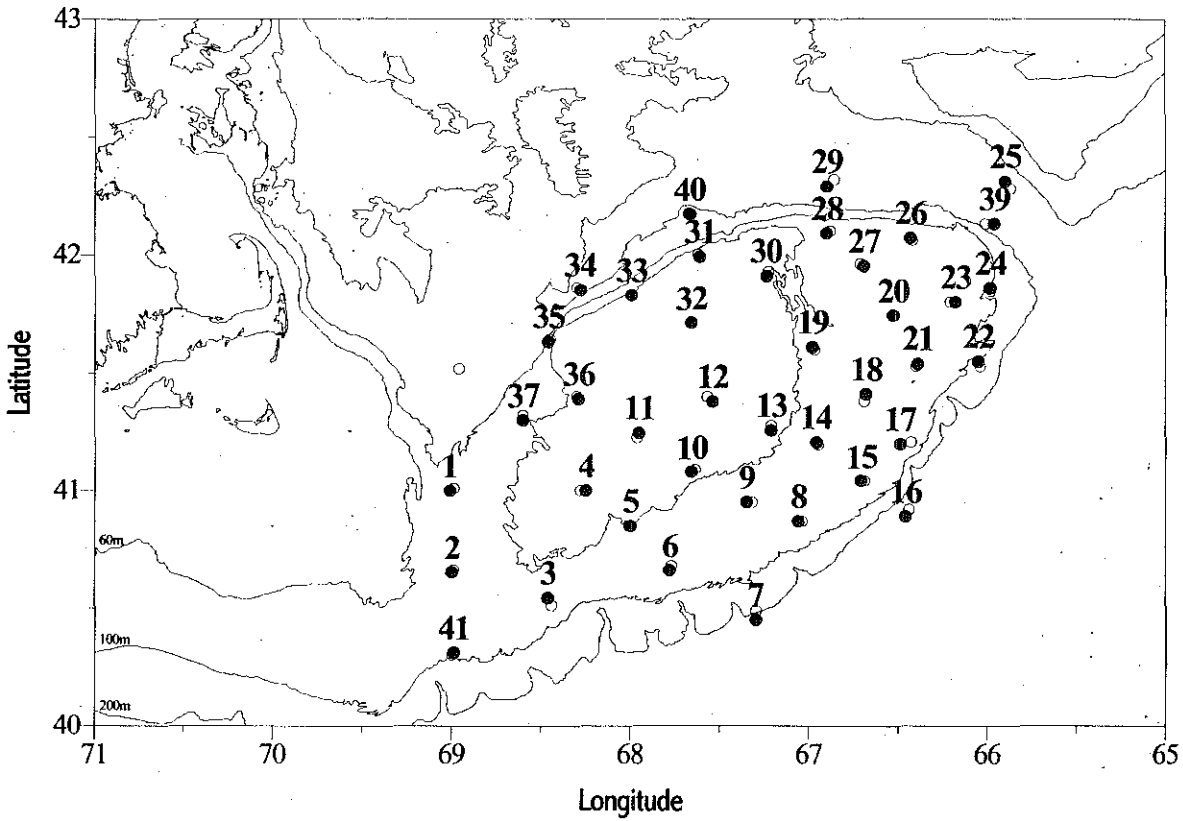


Figure 52. Standard stations (●) and intermediate bongo sites (o) occupied during GLOBEC Broadscale survey ALB9904.

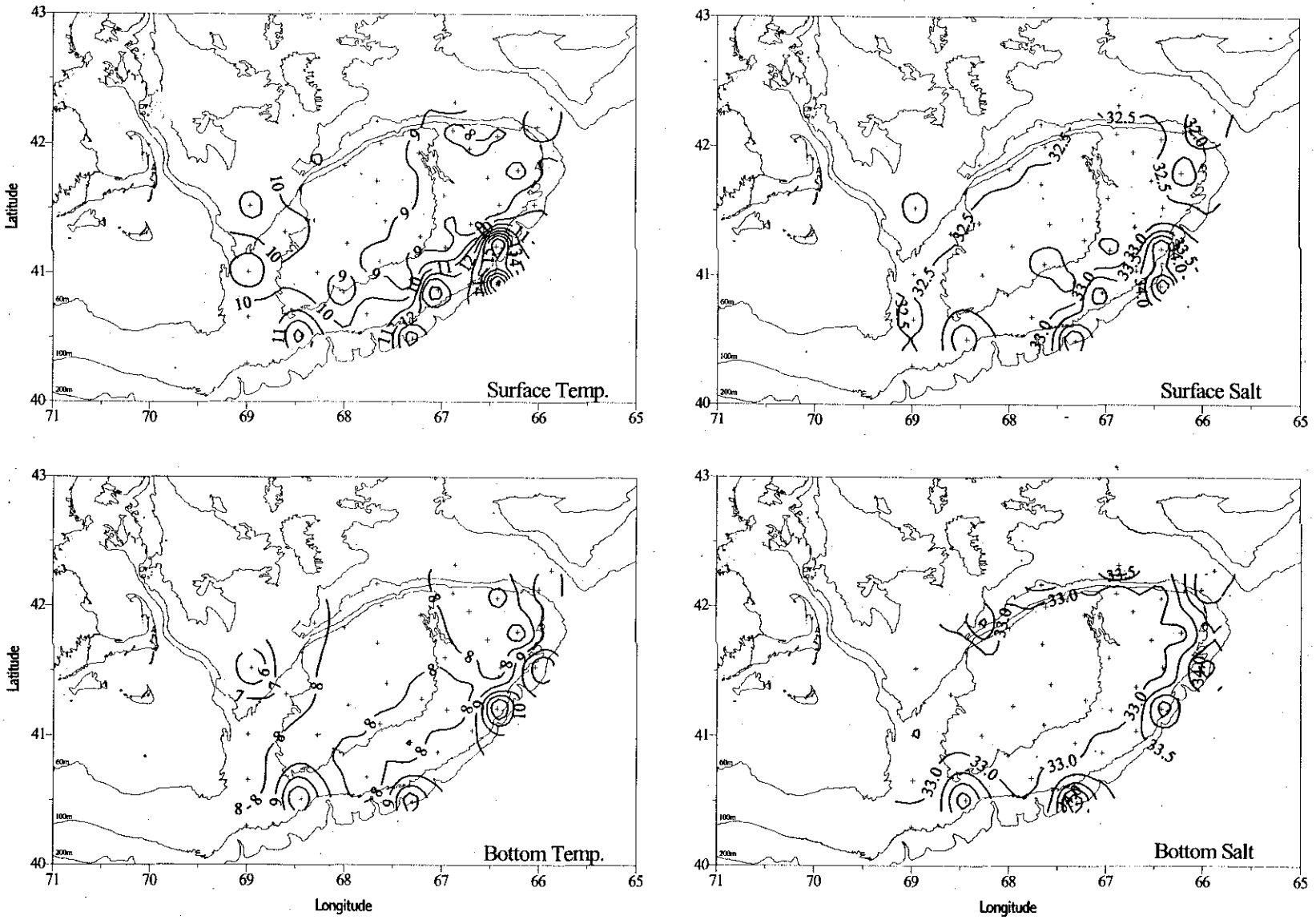


Figure 53. Temperature and salinity distributions during GLOBEC Broadscale survey ALB9904.

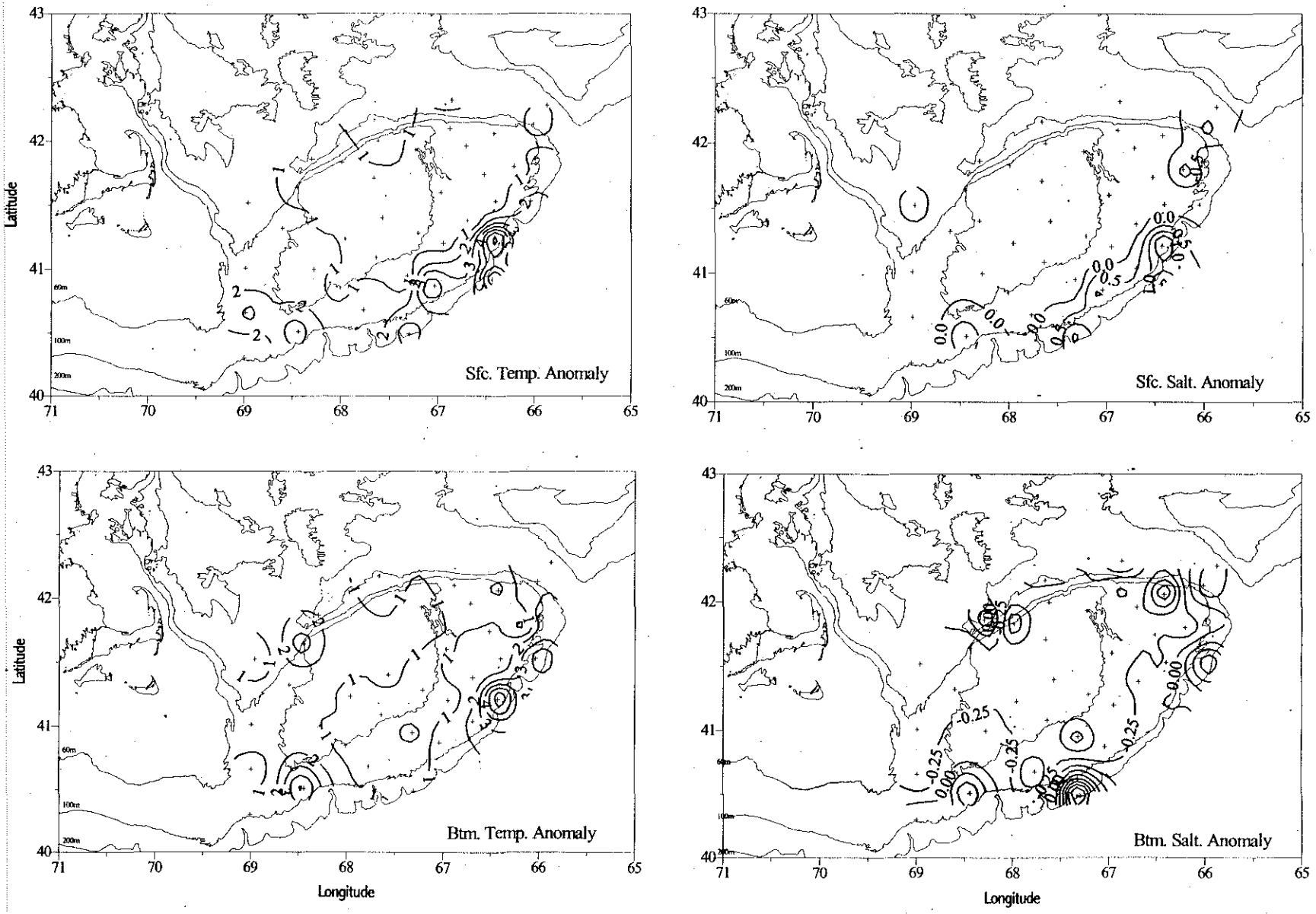


Figure 54. Temperature and salinity anomaly distributions during GLOBEC Broadscale survey ALB9904.

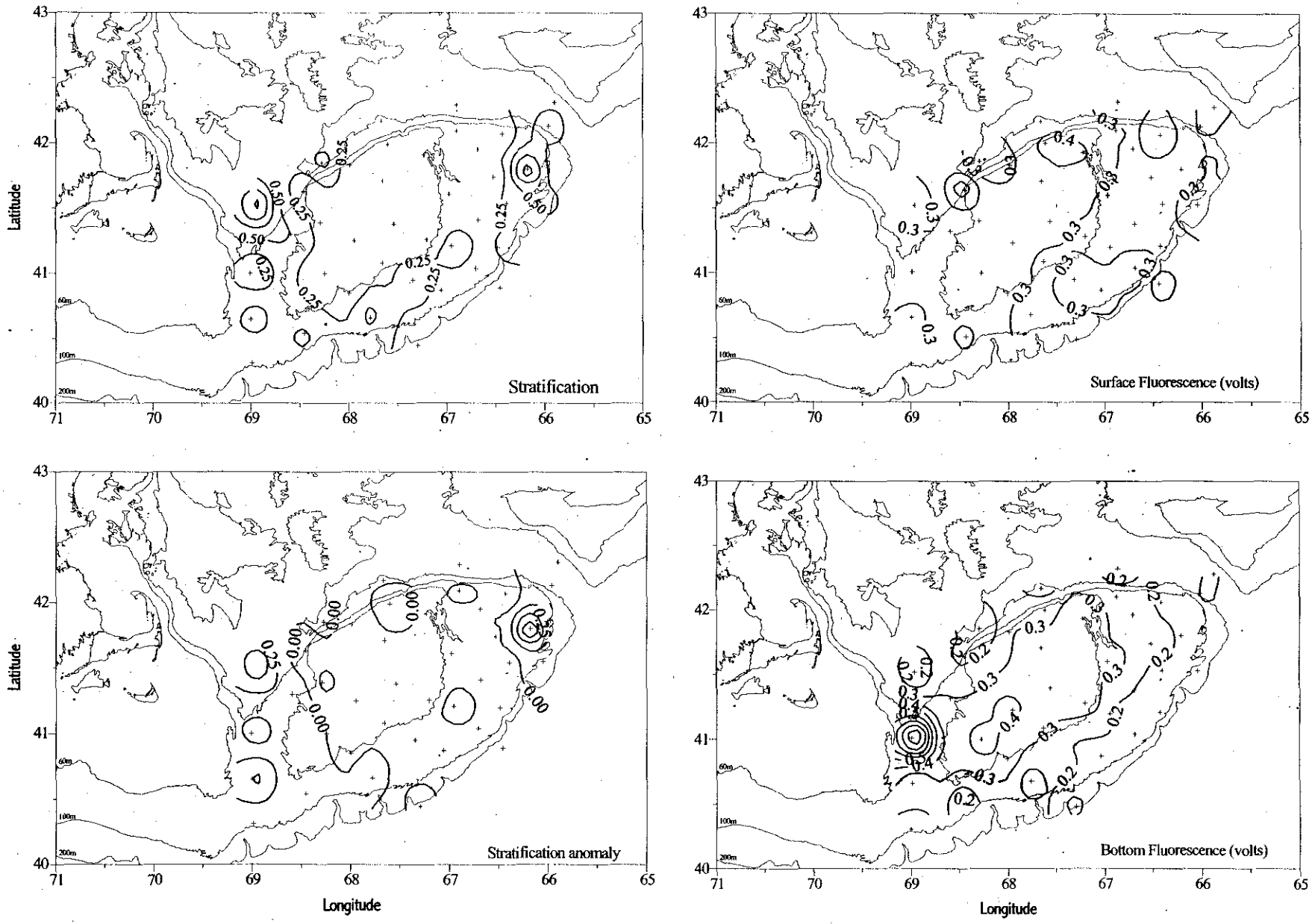


Figure 55. Left: Stratification and stratification anomaly (sigma-t units) of the top 30 metres. Right: Surface and bottom fluorescence distributions for GLOBEC Broadscale survey ALB9904.

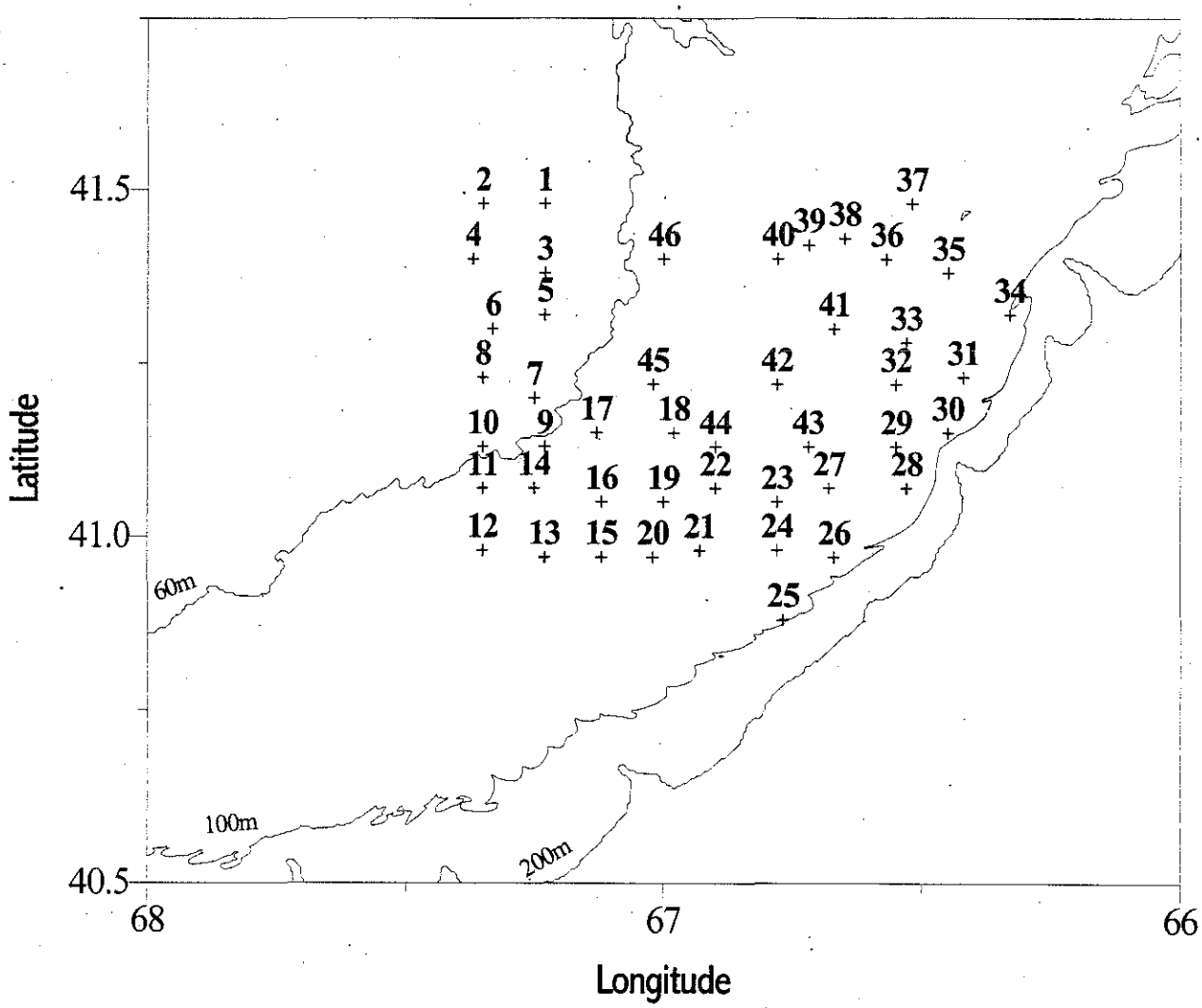


Figure 56. Stations occupied during Habitat Study ALB9905.

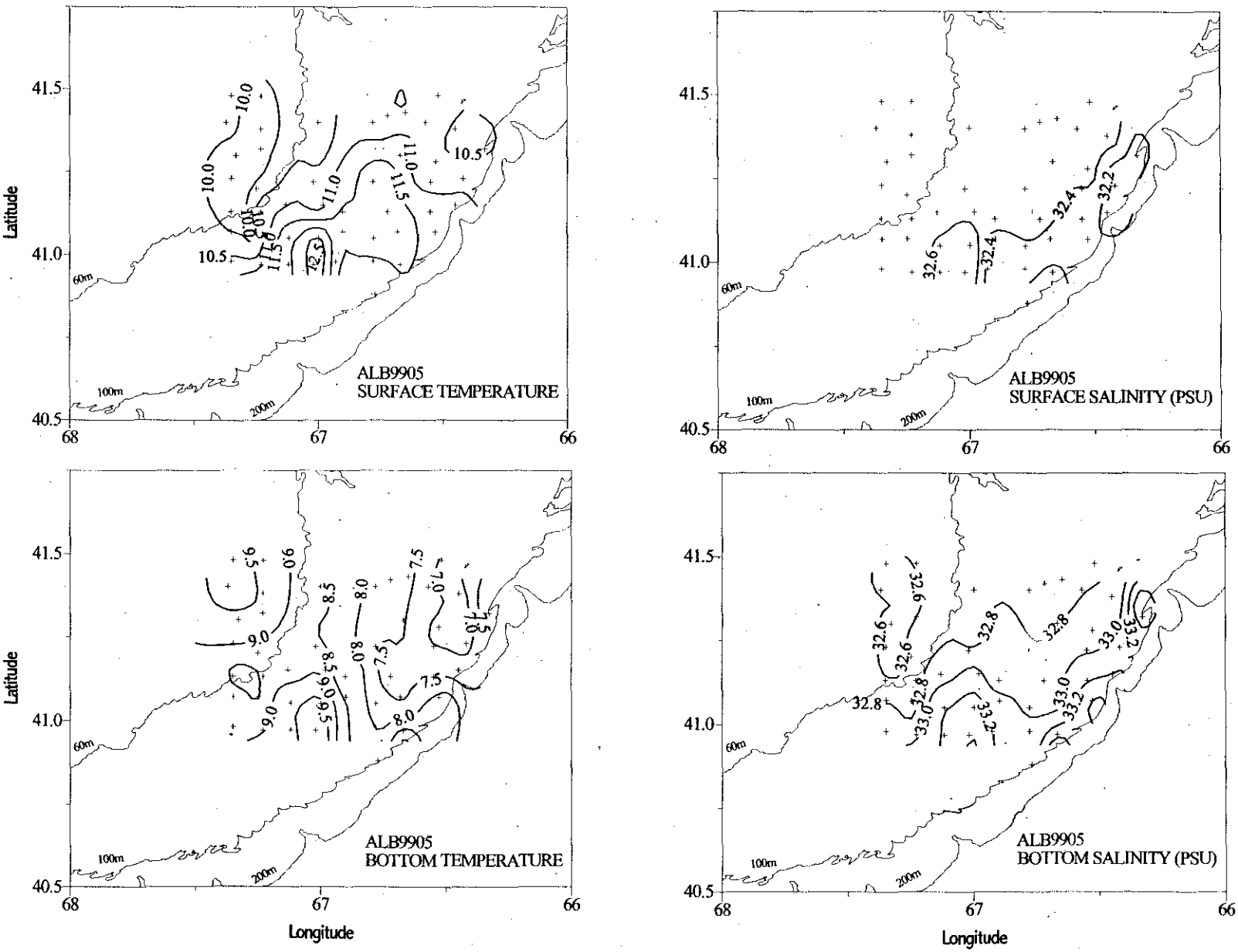


Figure 57. Temperature and salinity distributions for Habitat Study ALB9905.

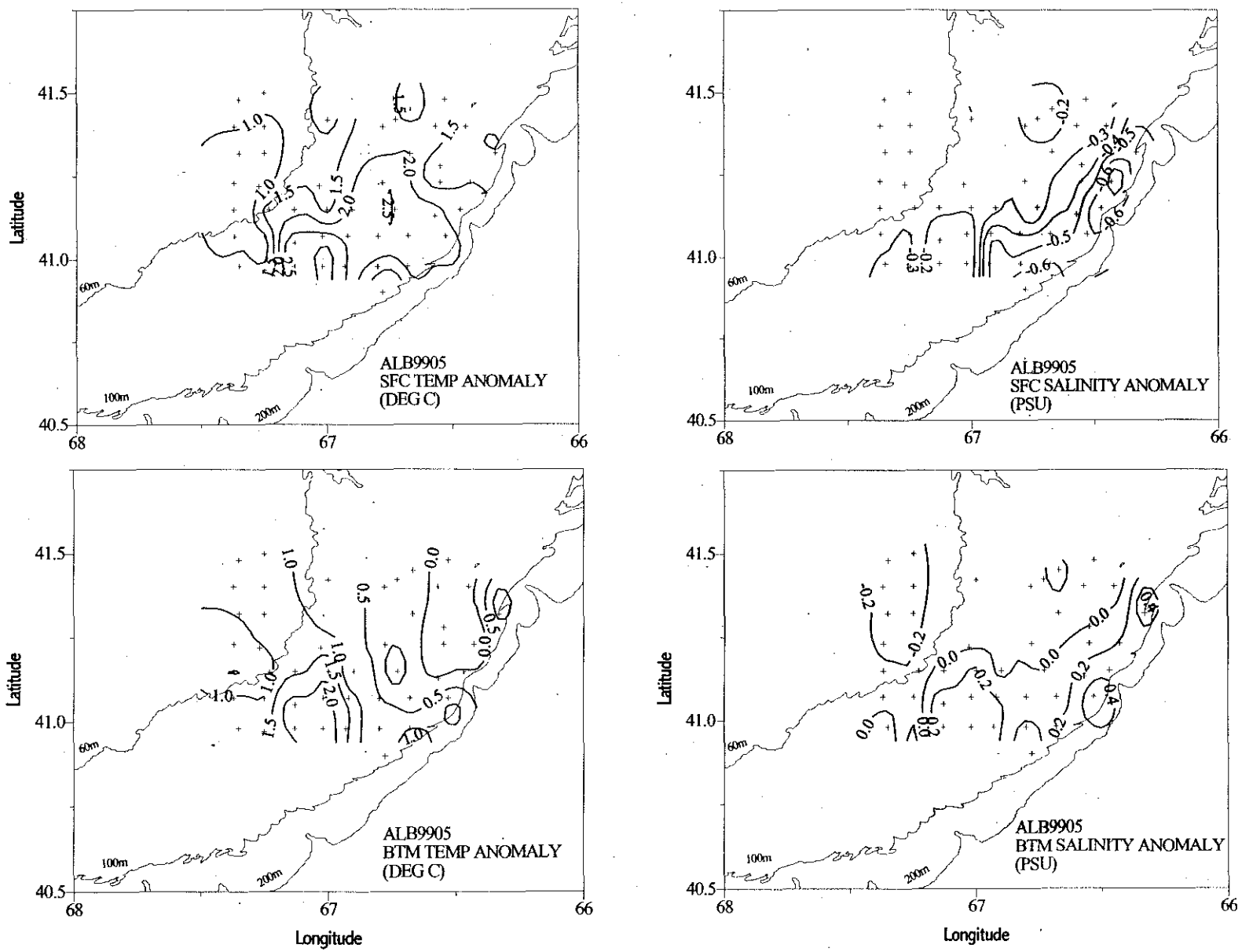


Figure 58. Temperature and salinity anomaly distributions for Habitat Study ALB9905.

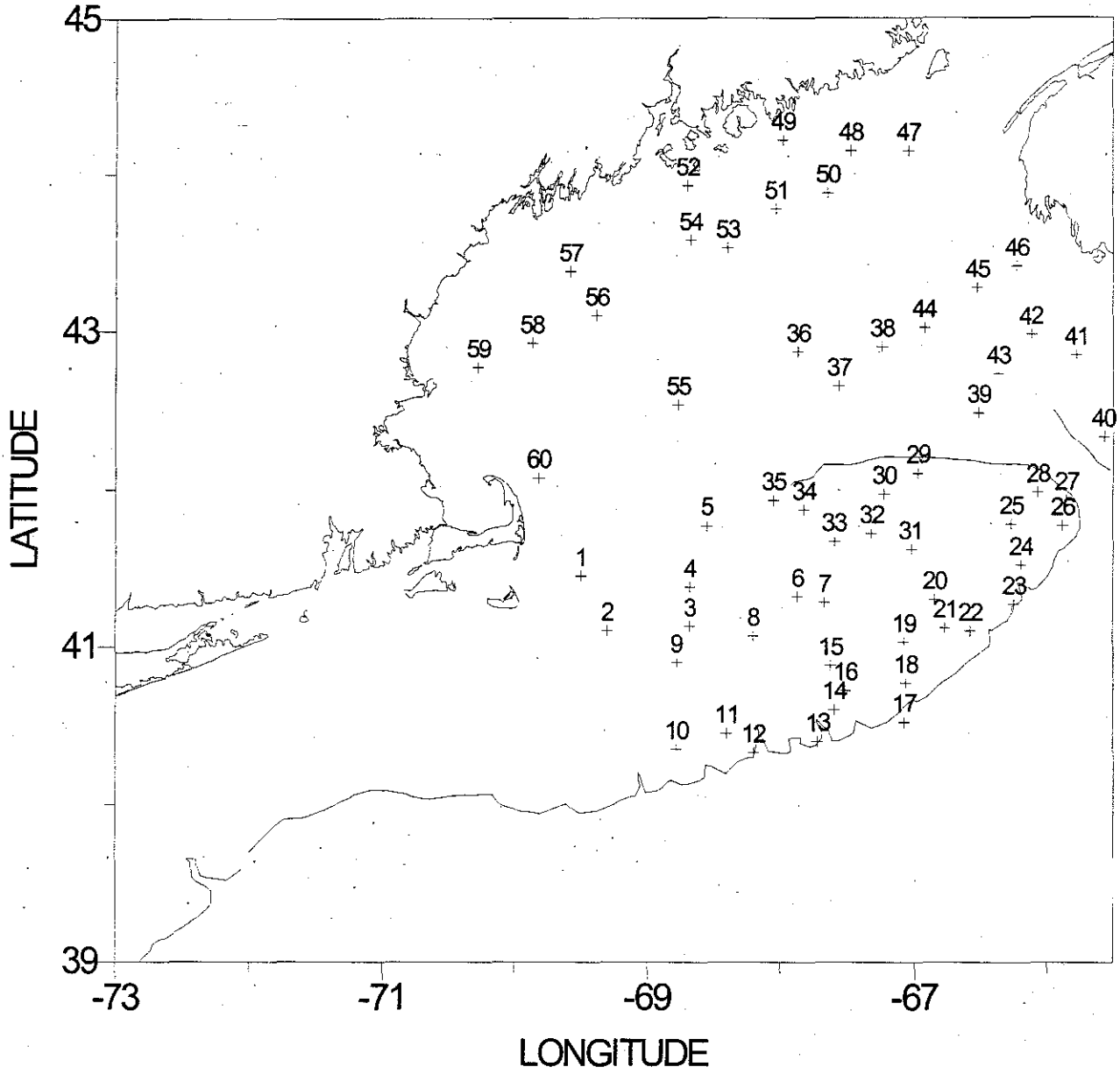


Figure 59. Stations occupied during Ecosystem Monitoring survey AJ9901.

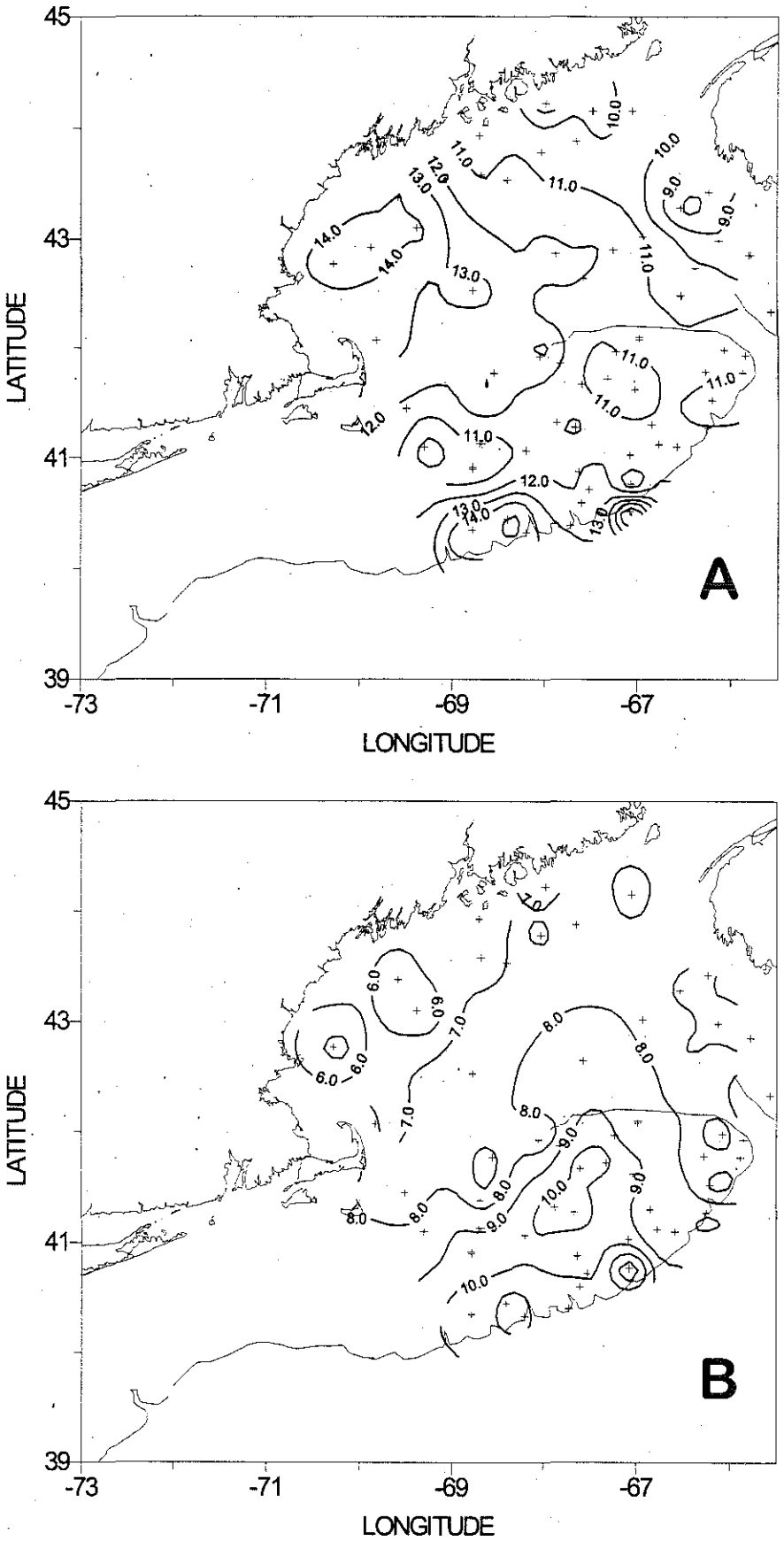


Figure 60. Surface (A) and bottom (B) temperature distributions during Ecosystem Monitoring survey AJ9901.

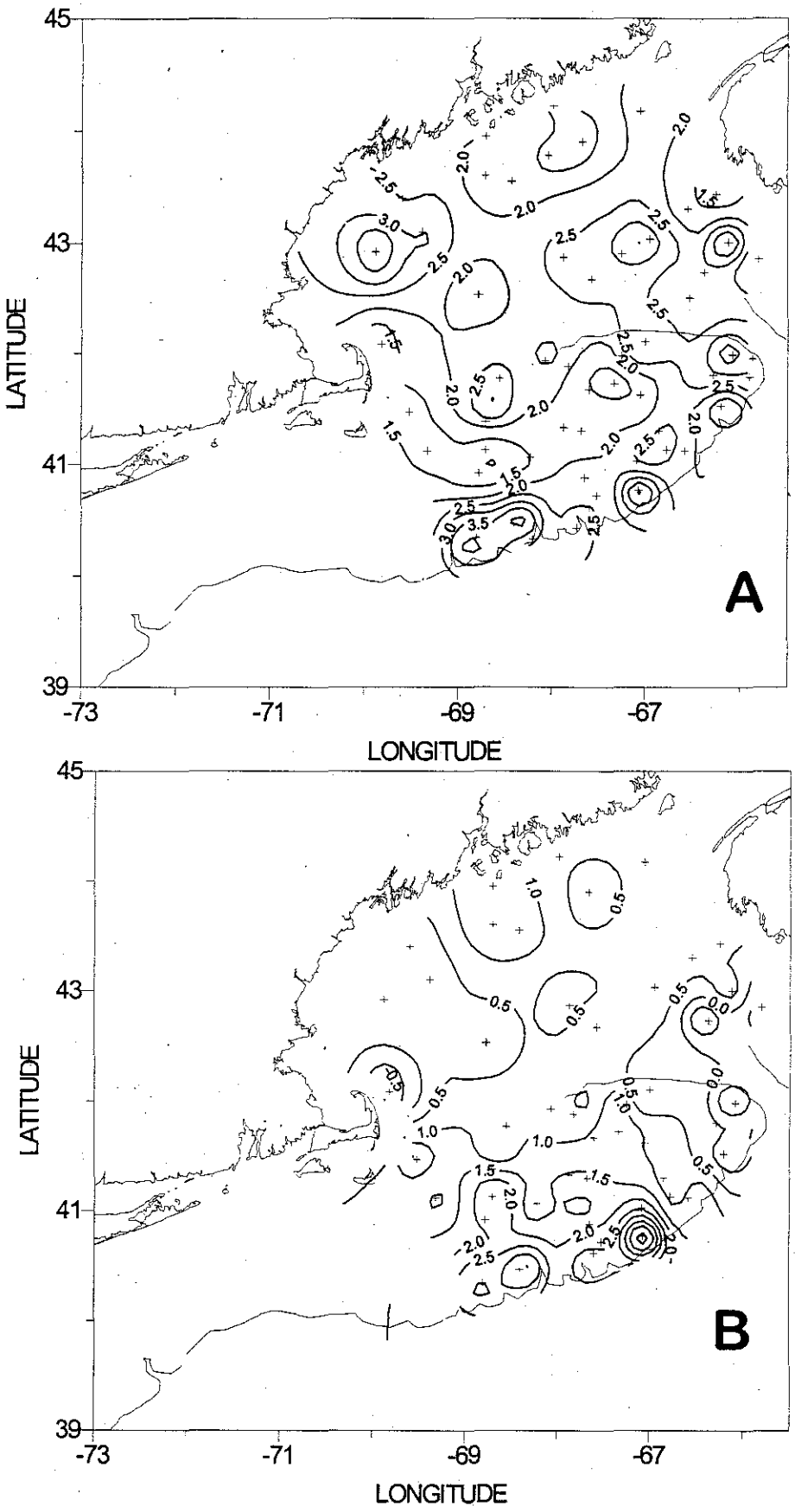


Figure 61. Surface (A) and bottom (B) temperature anomaly distributions during Ecosystem Monitoring survey AJ9901.

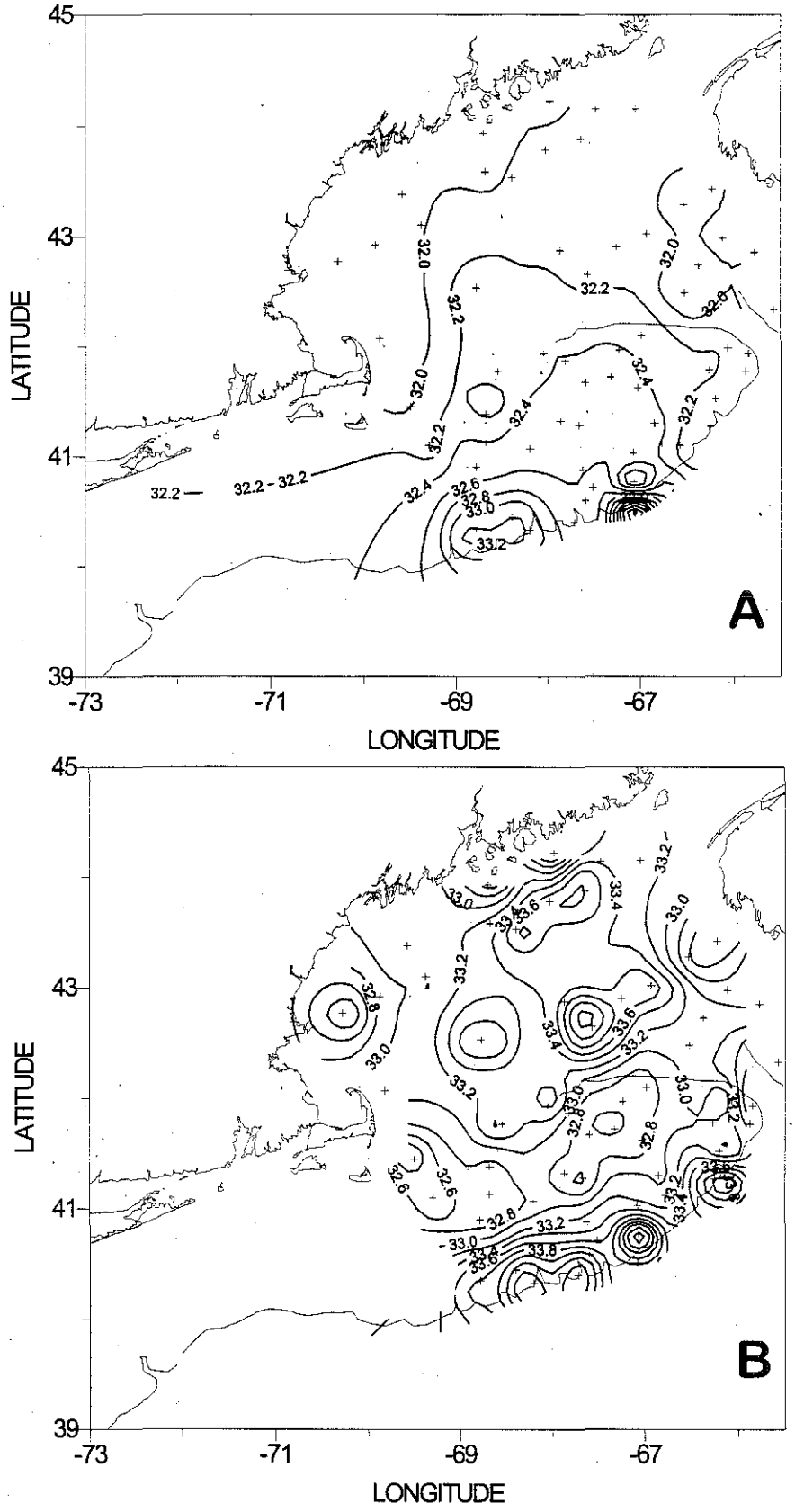


Figure 62. Surface (A) and bottom (B) salinity distributions during Ecosystems Monitoring survey AJ9901.

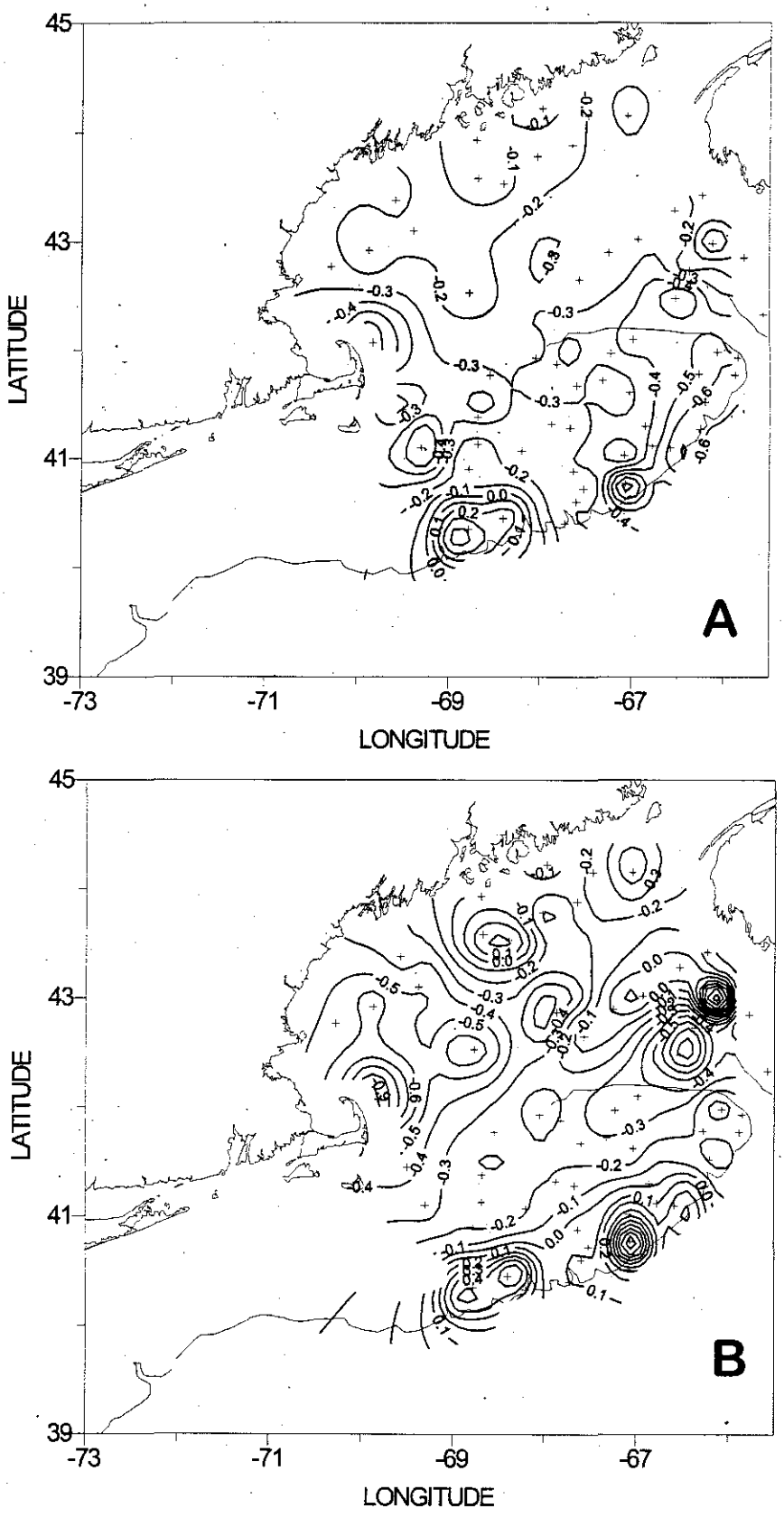


Figure 63. Surface (A) and bottom (B) salinity anomaly distributions during Ecosystem Monitoring survey AJ9901.

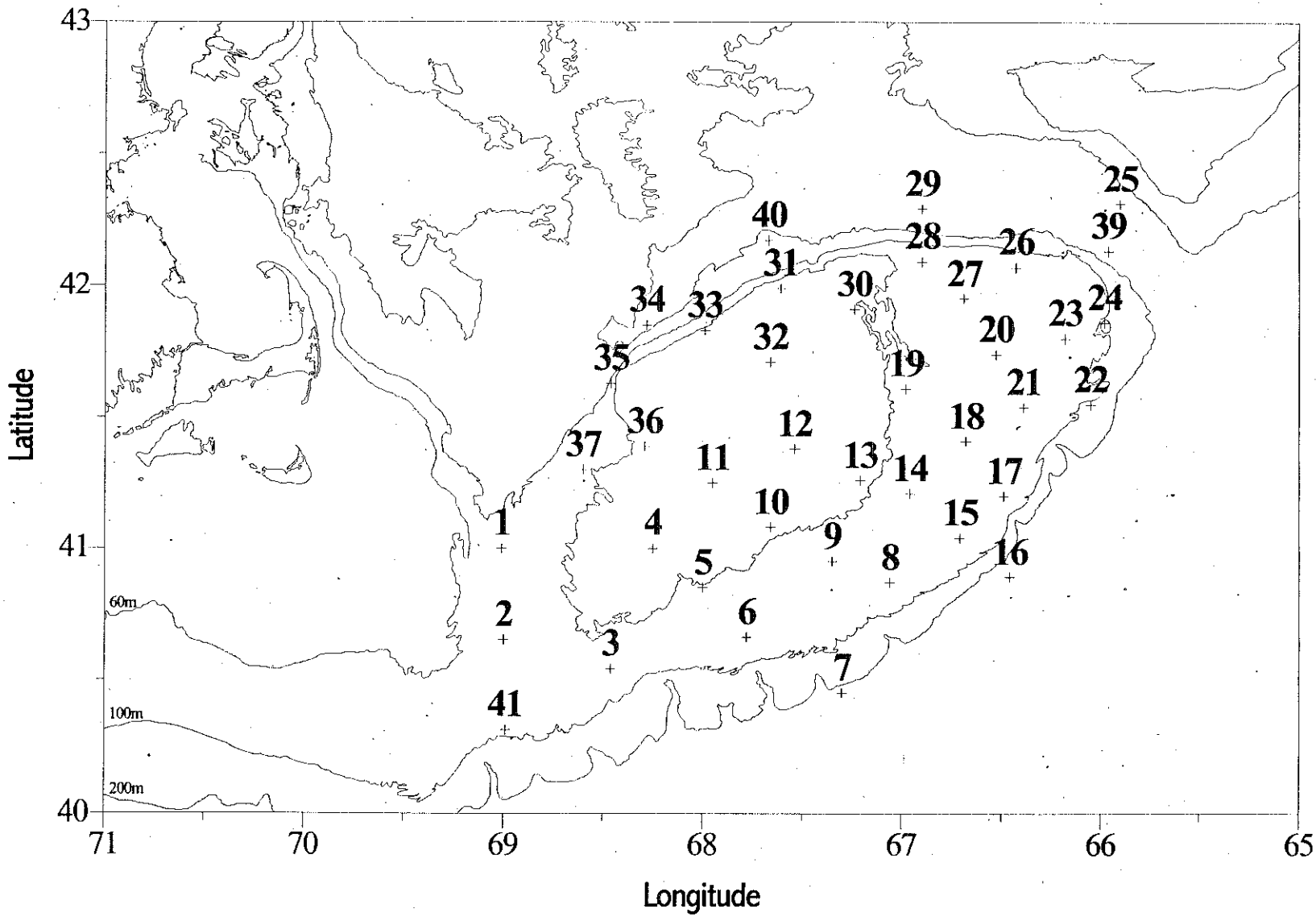


Figure 64. Hydrographic stations occupied during GLOBEC Broadscale survey ALB9906.

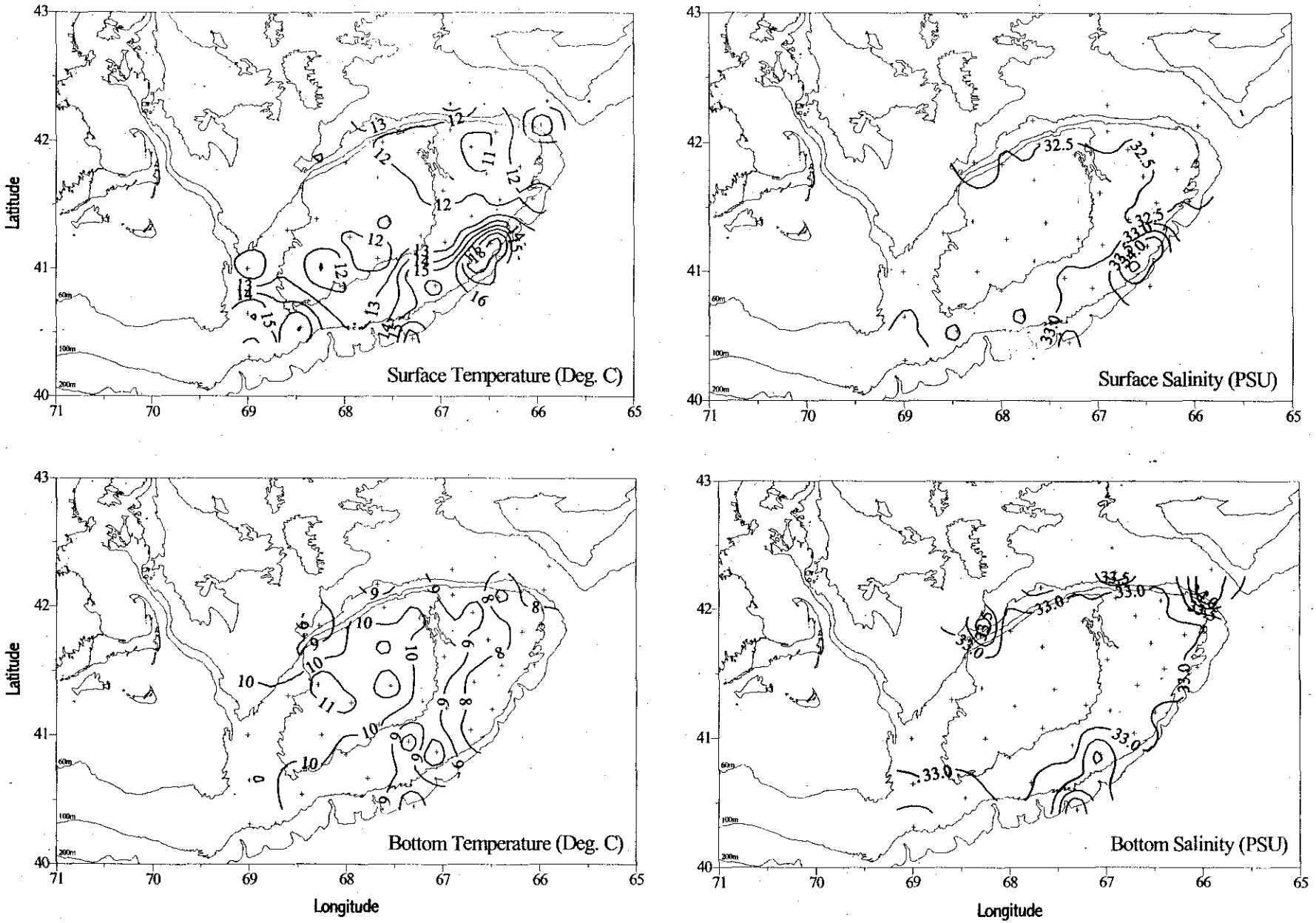


Figure 65. Temperature and salinity distributions during GLOBEC Broadscale survey ALB9906.

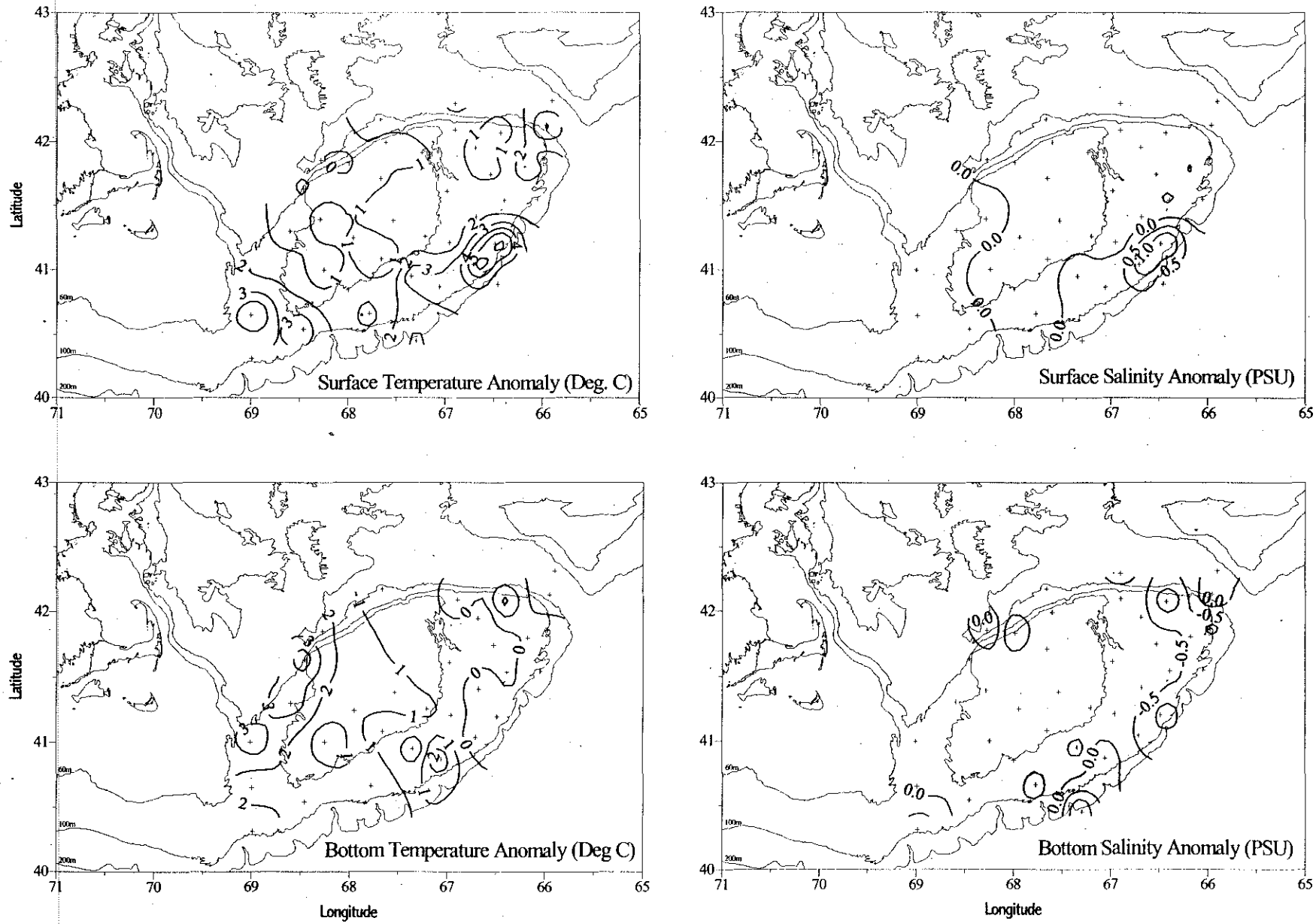


Figure 66. Temperature and salinity anomaly distributions during GLOBEC Broadscale survey ALB9906.

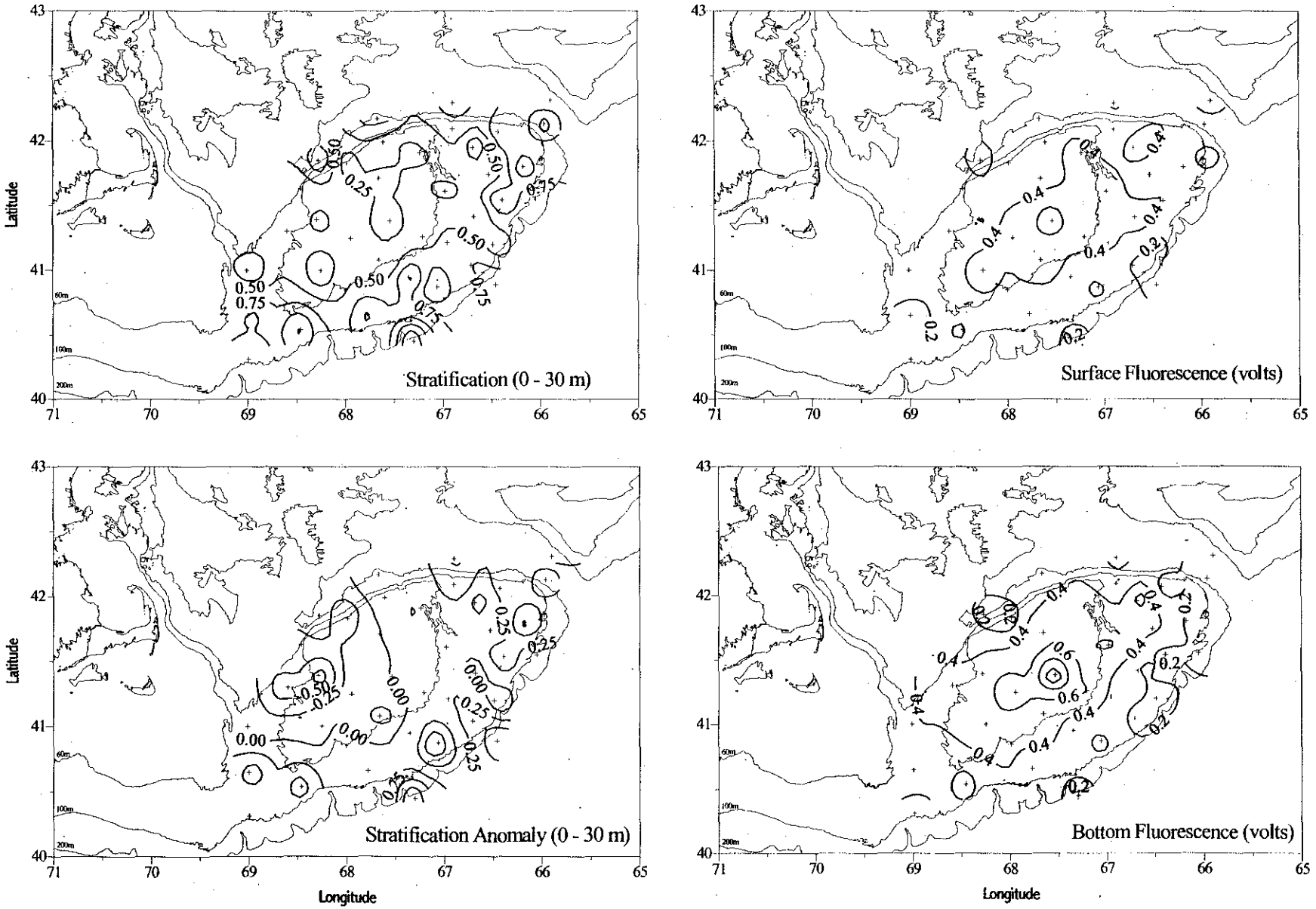


Figure 67. Left: Stratification and stratification anomaly (sigma-t units) of the top 30 metres. Right: Surface and bottom fluorescence distributions during GLOBEC Broadscale survey ALB9906.

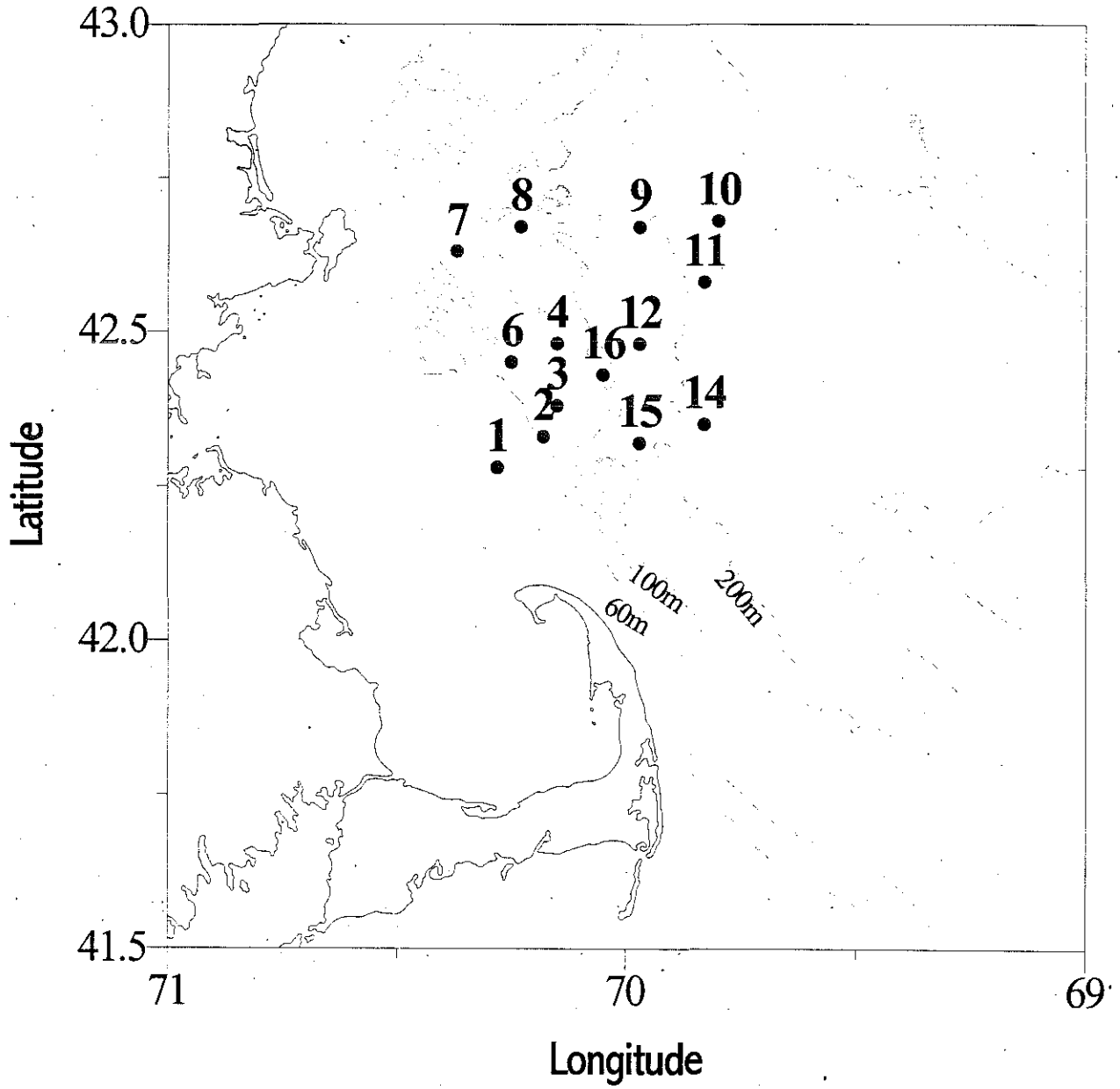


Figure 68. Stations occupied during Closed Area Study ALB9907.

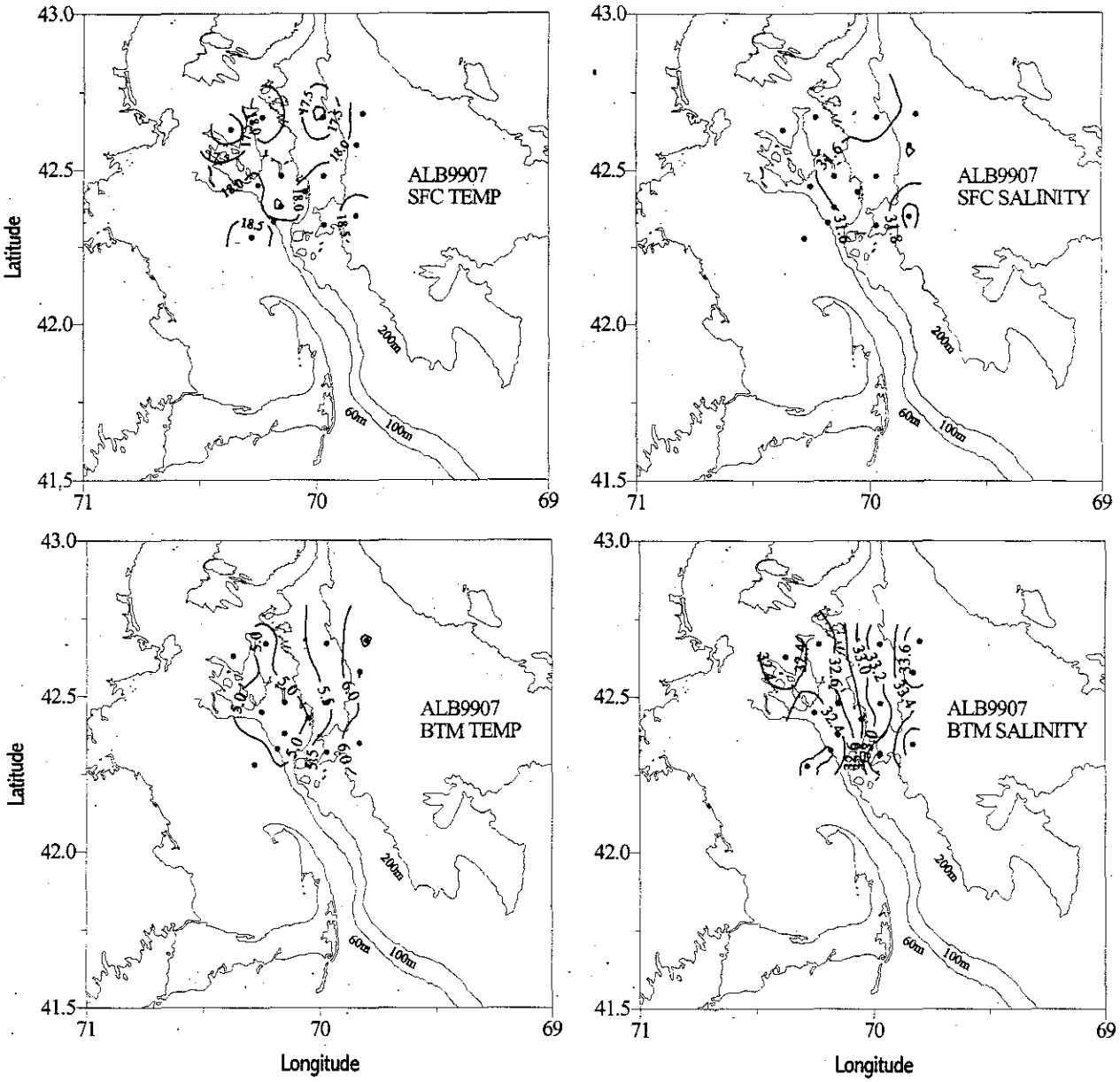


Figure 69. Temperature and salinity distributions for Closed Area Study ALB9907.

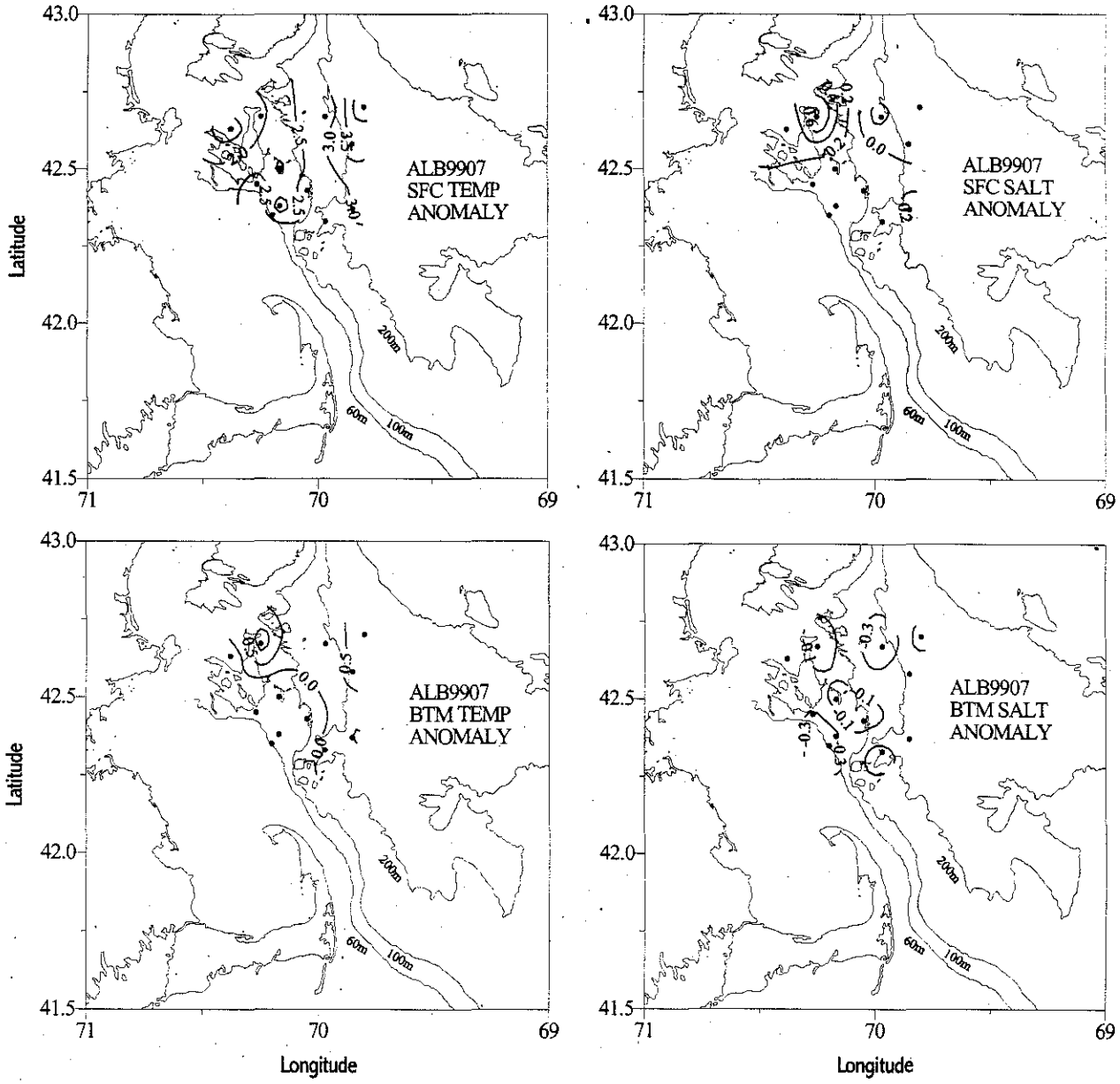


Figure 70. Temperature and salinity anomaly distributions for Closed Area Study ALB9907.

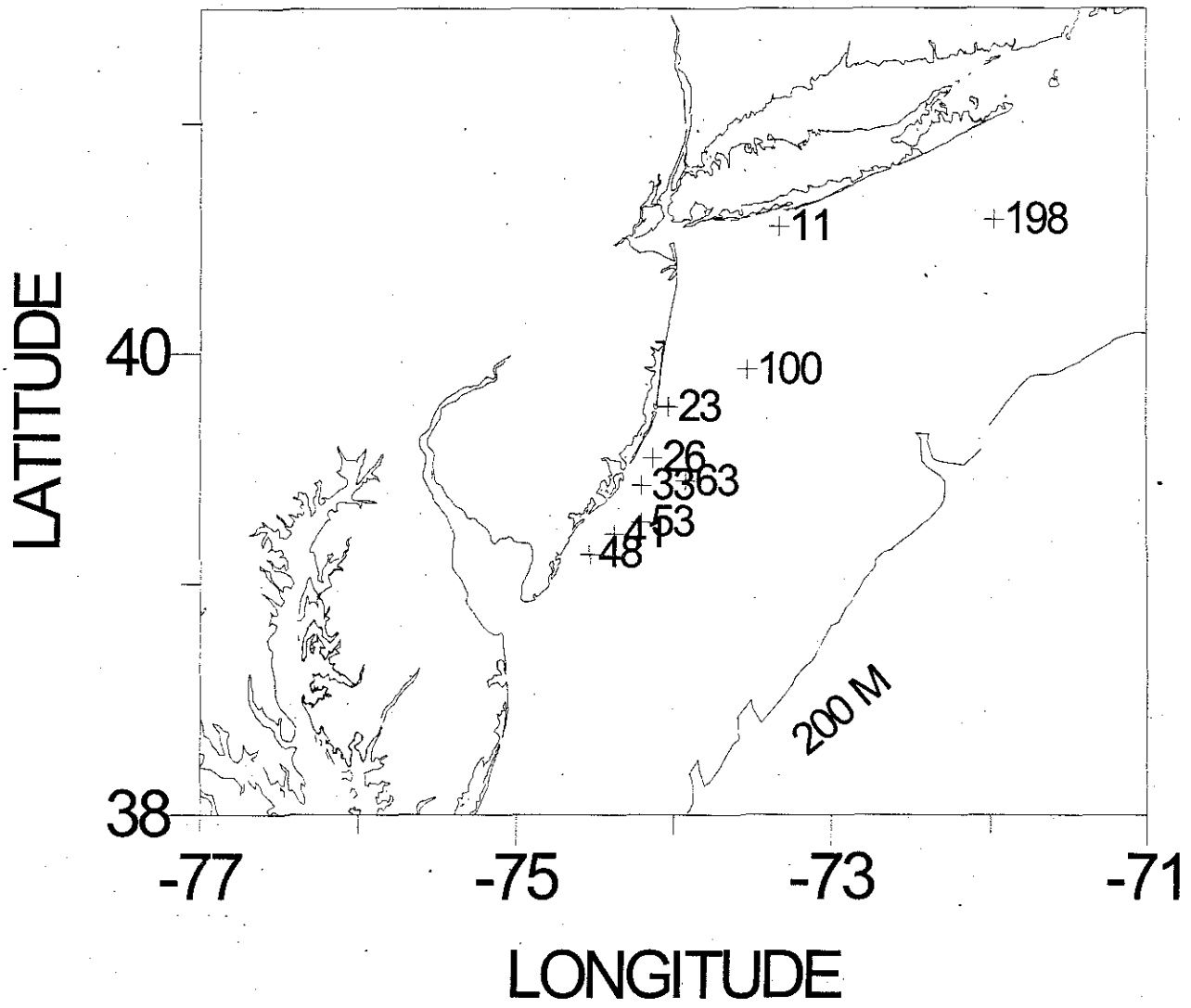


Figure 71. CTD stations occupied during Clam Survey DEL9907.

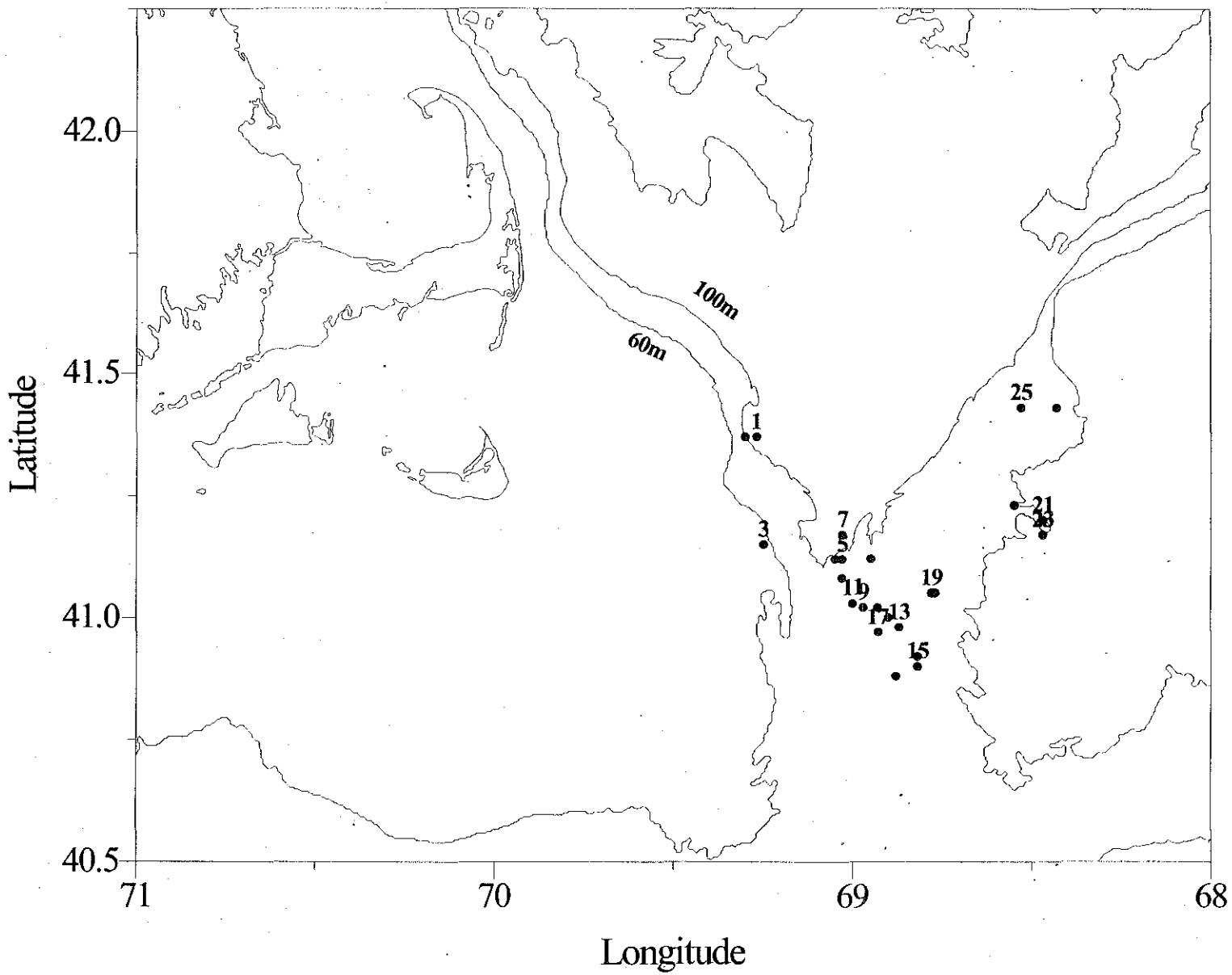


Figure 72. CTD stations occupied during Closed Area Study ALB9908.

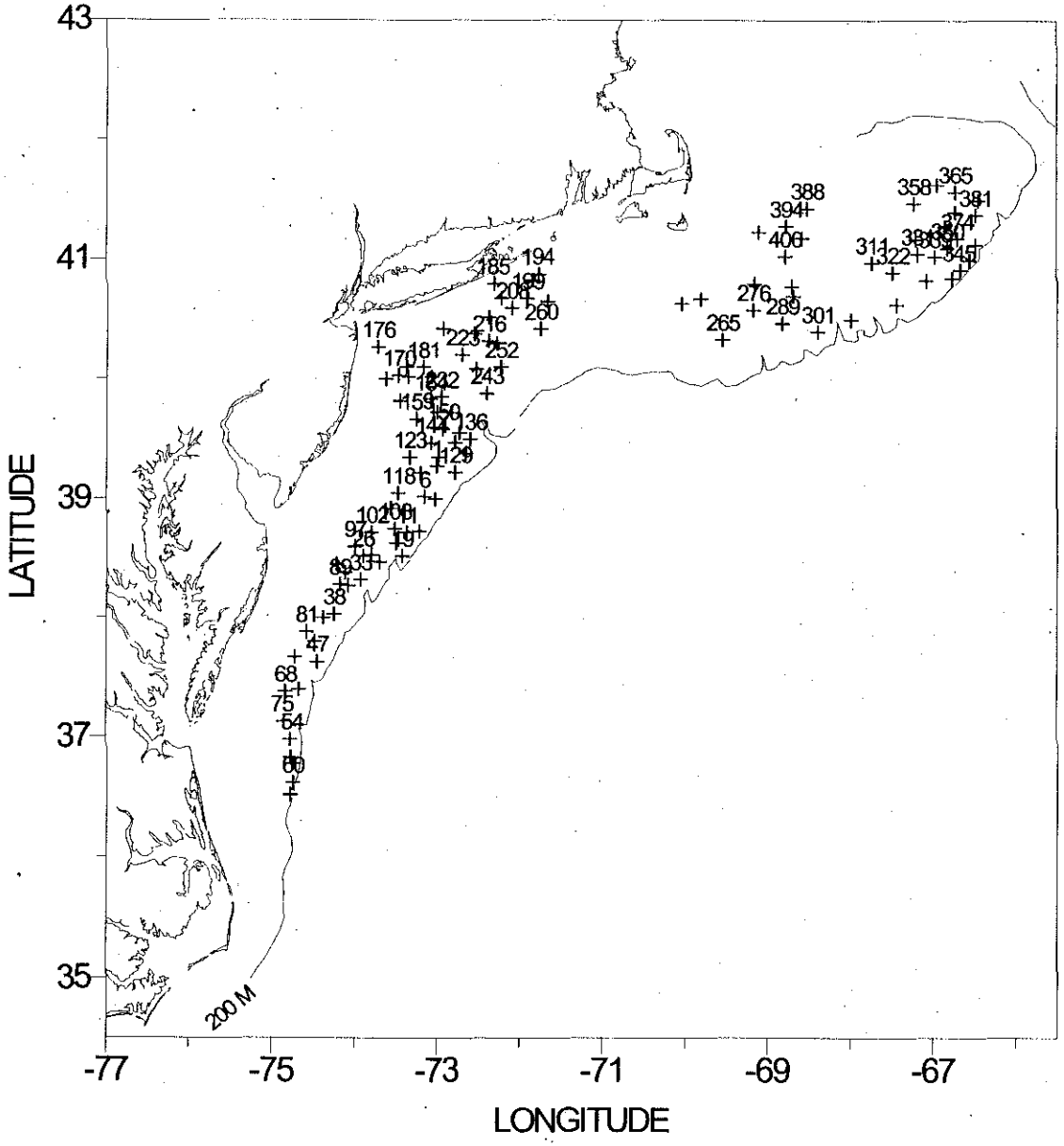
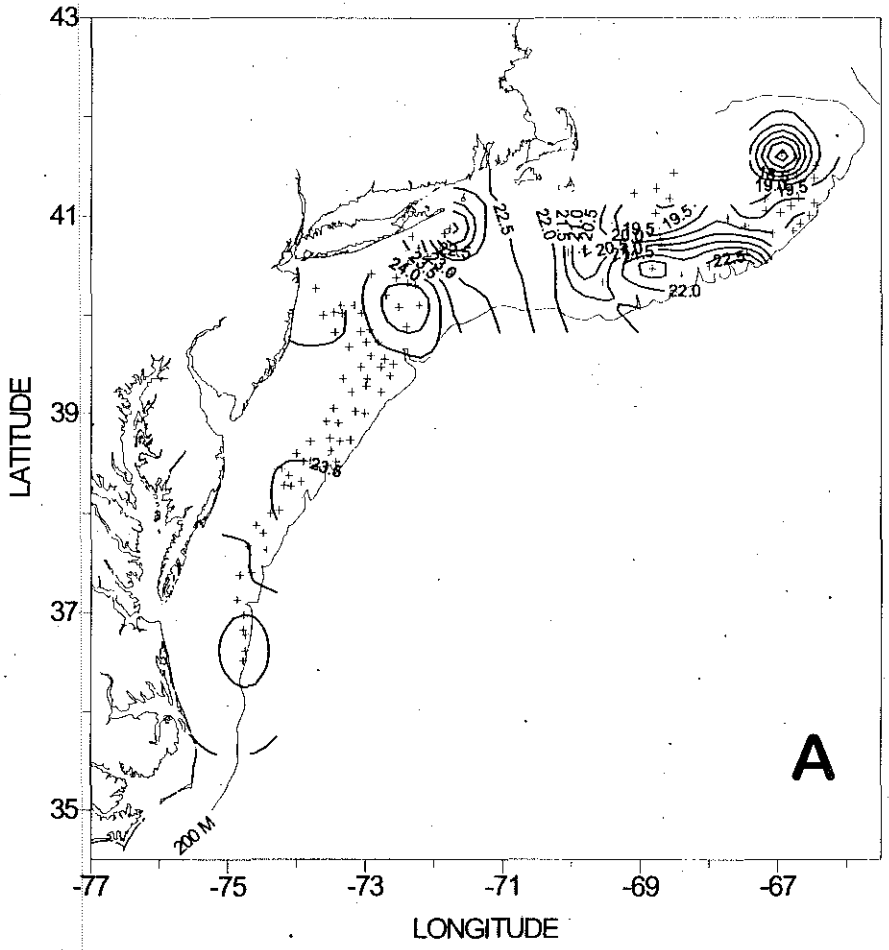


Figure 73. Stations occupied during Scallop Survey ALB9909.



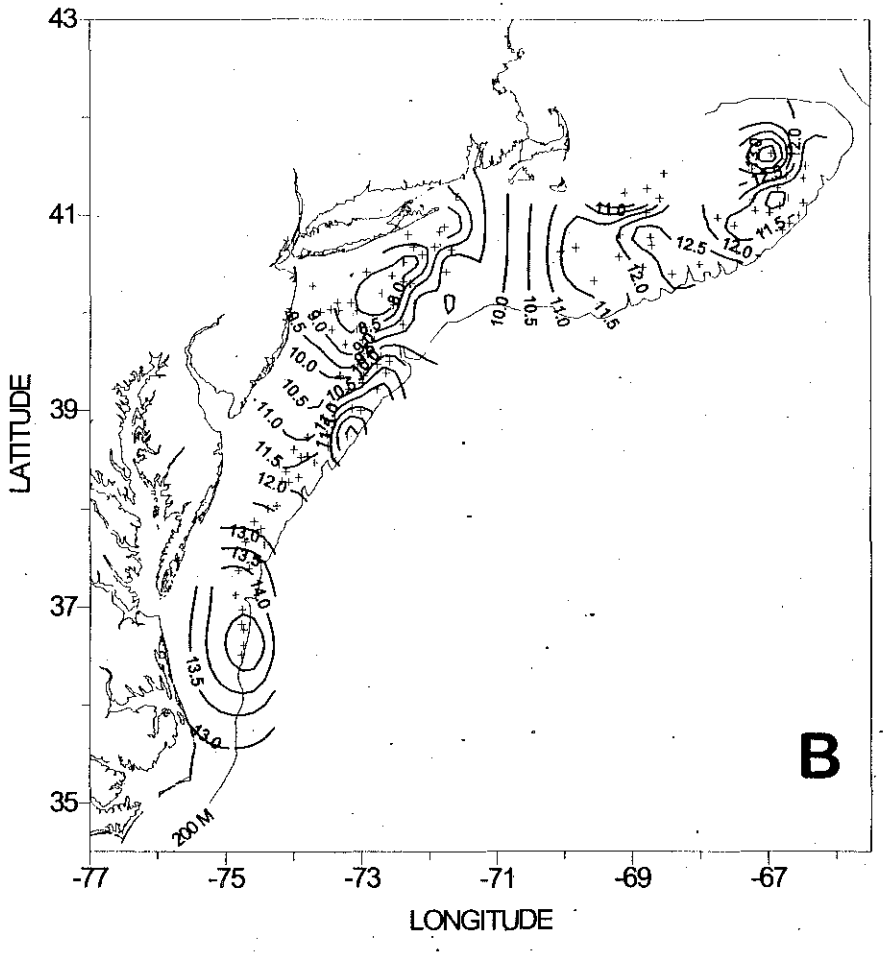


Figure 74. Surface (A) and bottom (B) temperature distributions for Scallop Survey ALB9909.

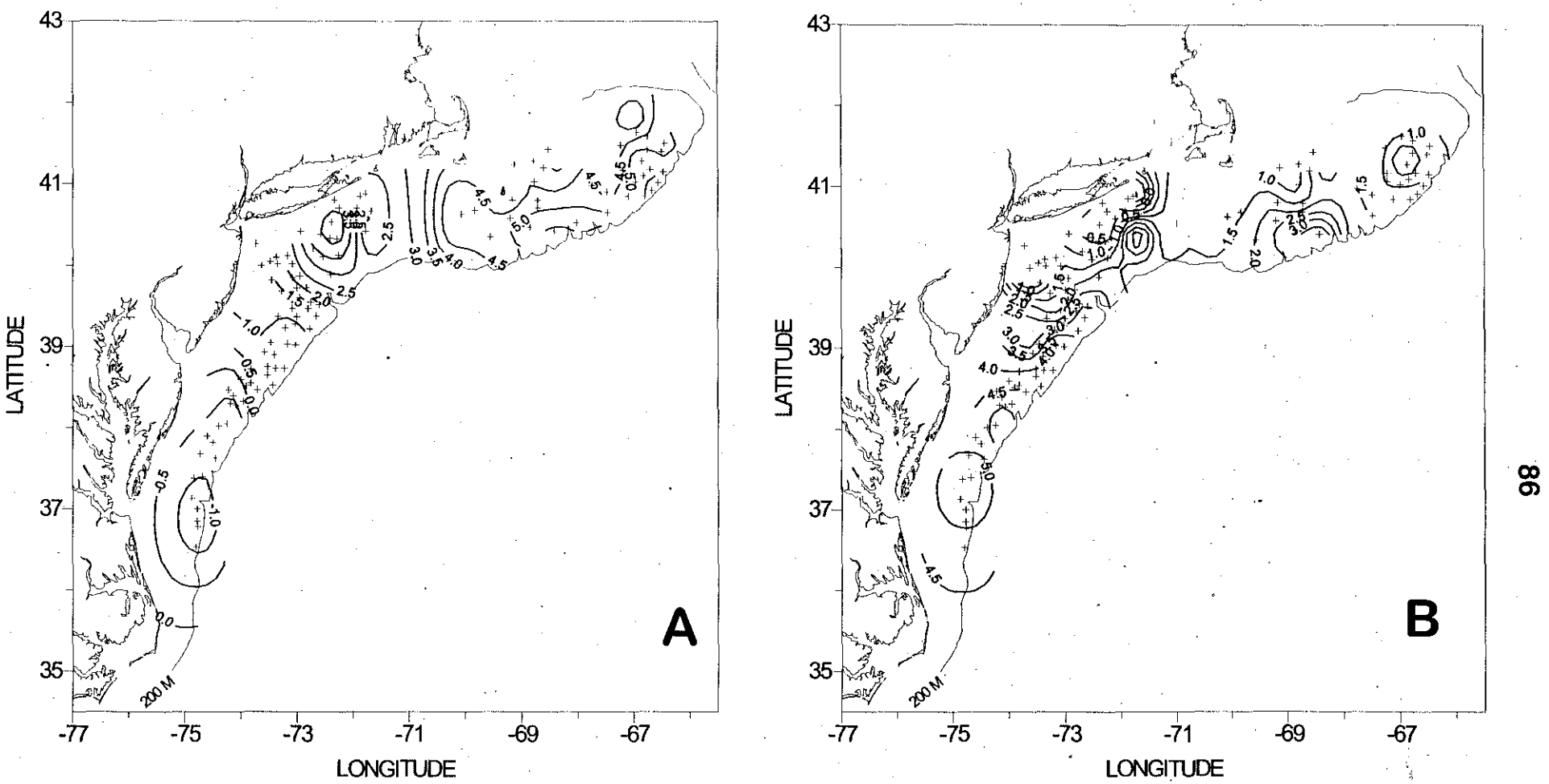


Figure 75. Surface (A) and bottom (B) temperature anomaly distributions for Scallop Survey ALB9909.

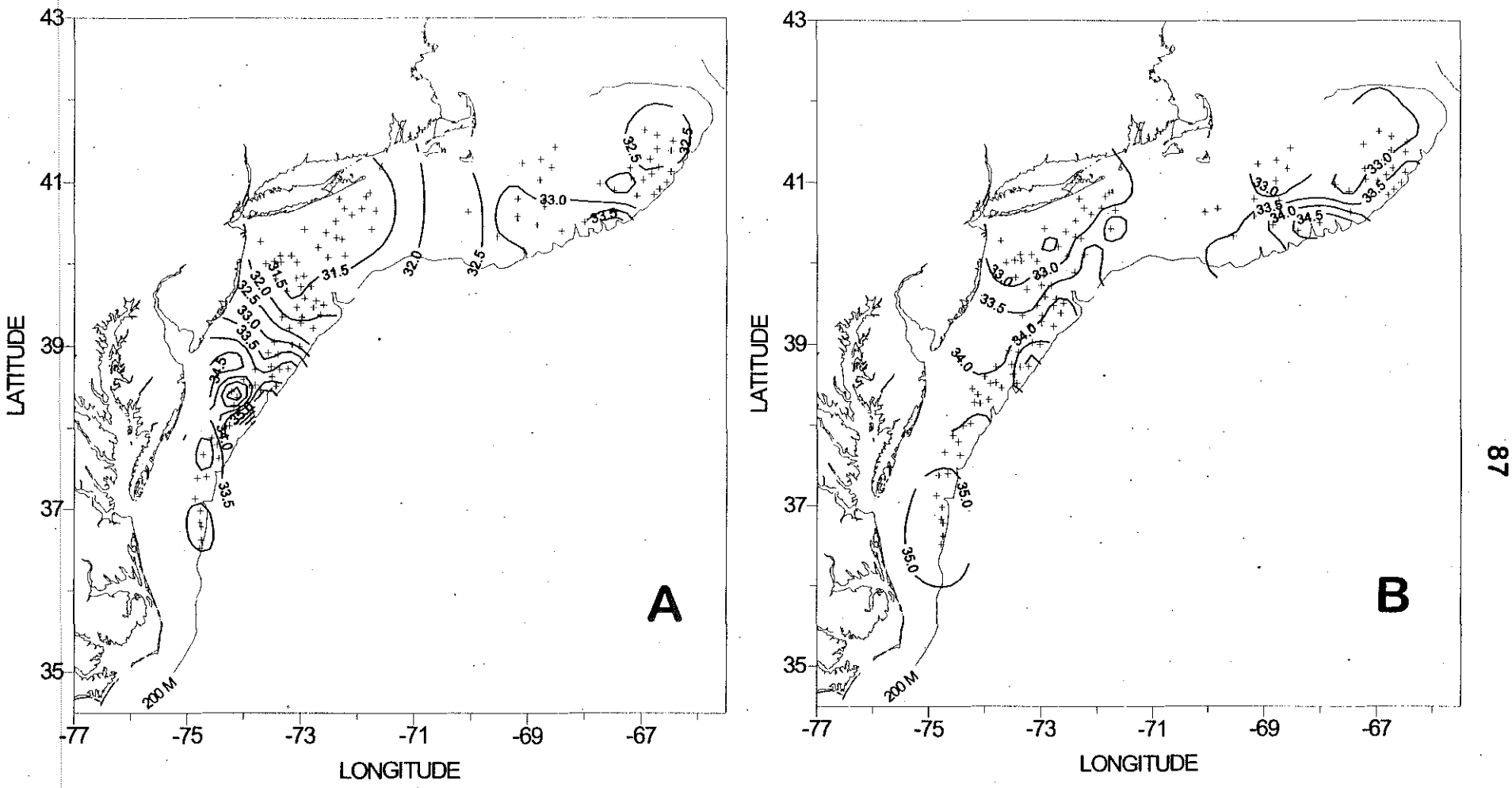


Figure 76. Surface (A) and bottom (B) salinity distributions for Scallop Survey ALB9909.

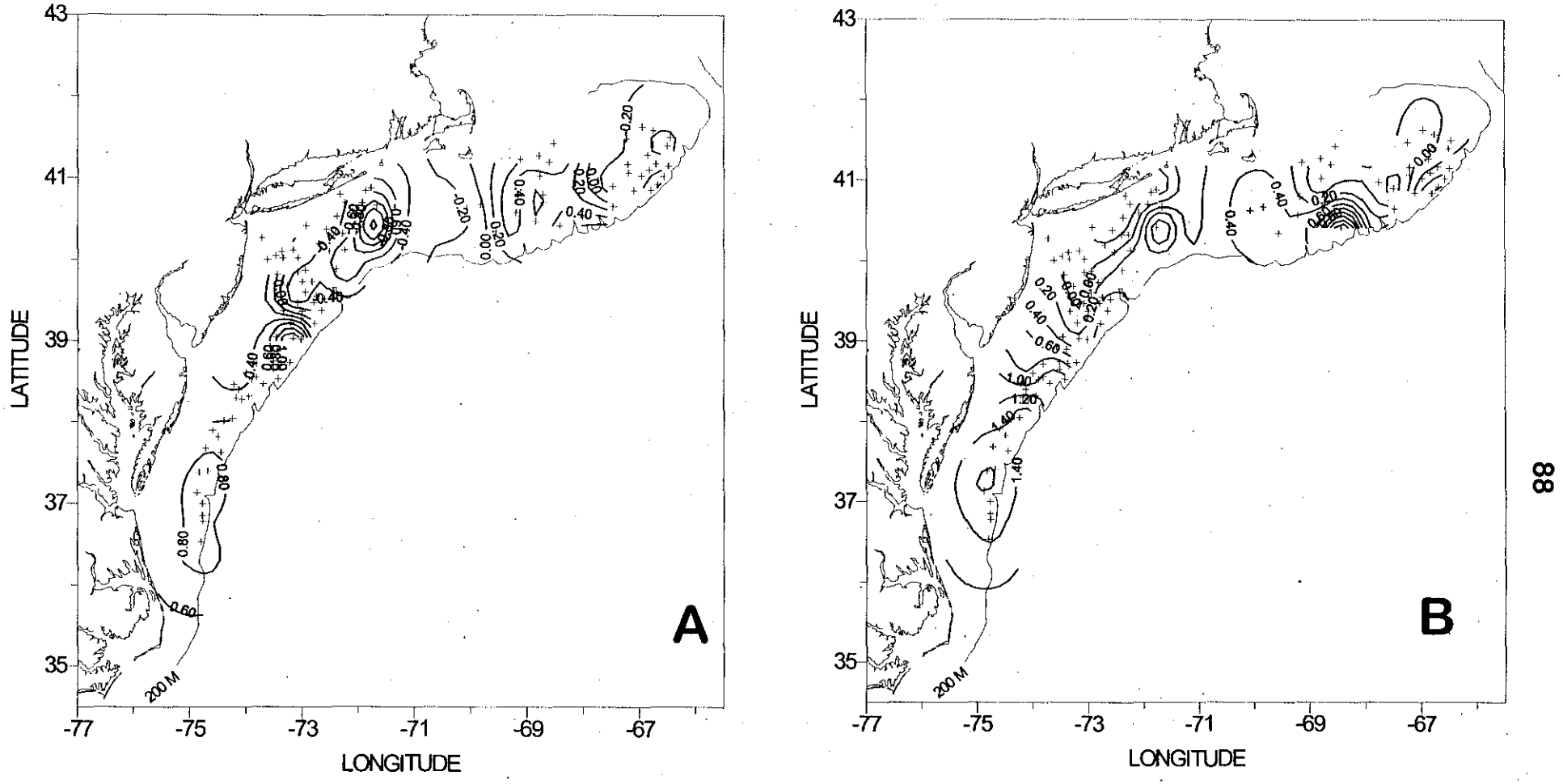


Figure 77. Surface (A) and bottom (B) salinity anomaly distributions for Scallop Survey ALB9909.

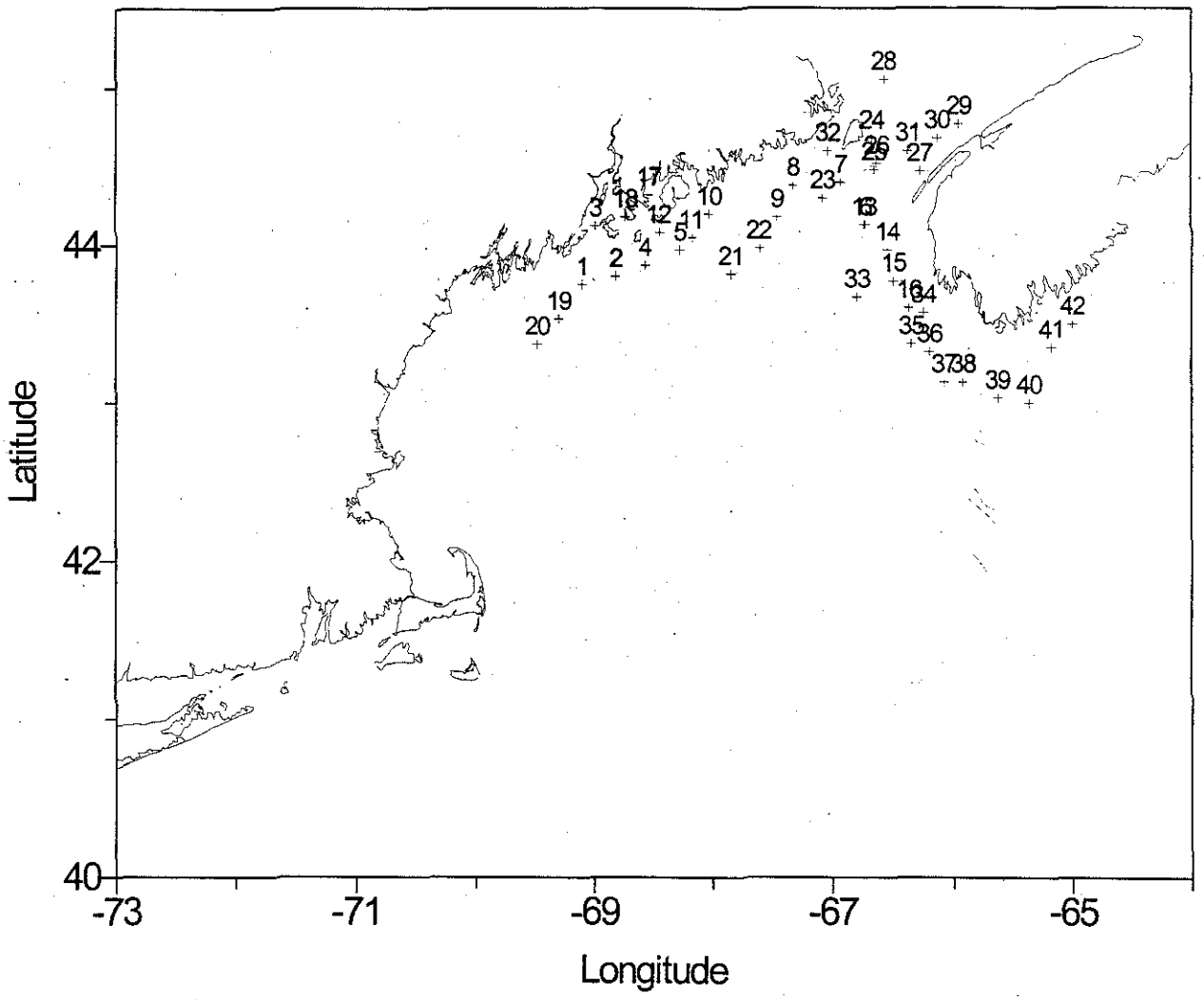


Figure 78. Stations occupied during Marine Mammal Survey AJ9902.

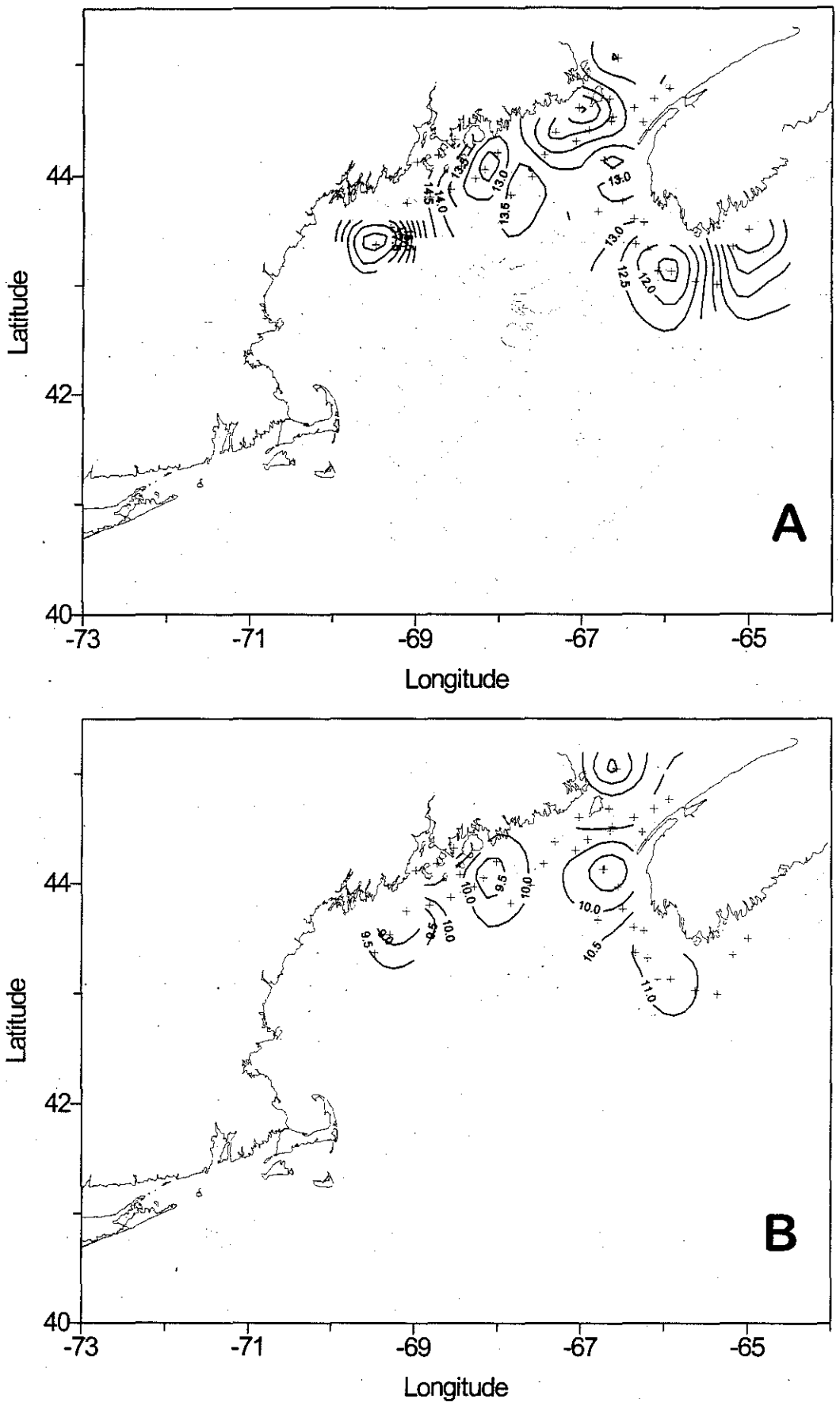


Figure 79. Surface (A) and bottom (B) temperature distributions during Marine Mammal Survey AJ9902.

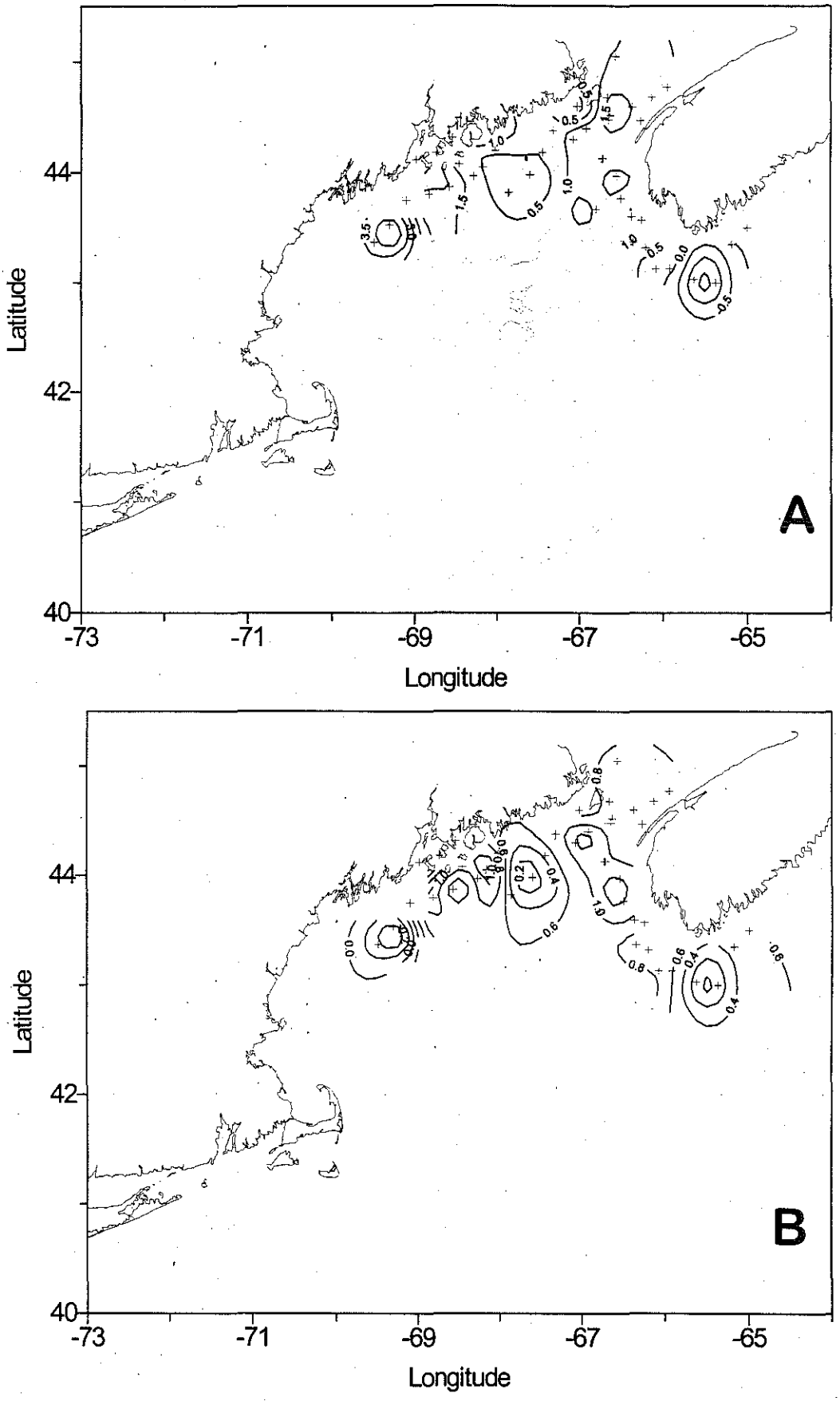


Figure 80. Surface (A) and bottom (B) temperature anomaly distributions during Marine Mammal Survey AJ9902.

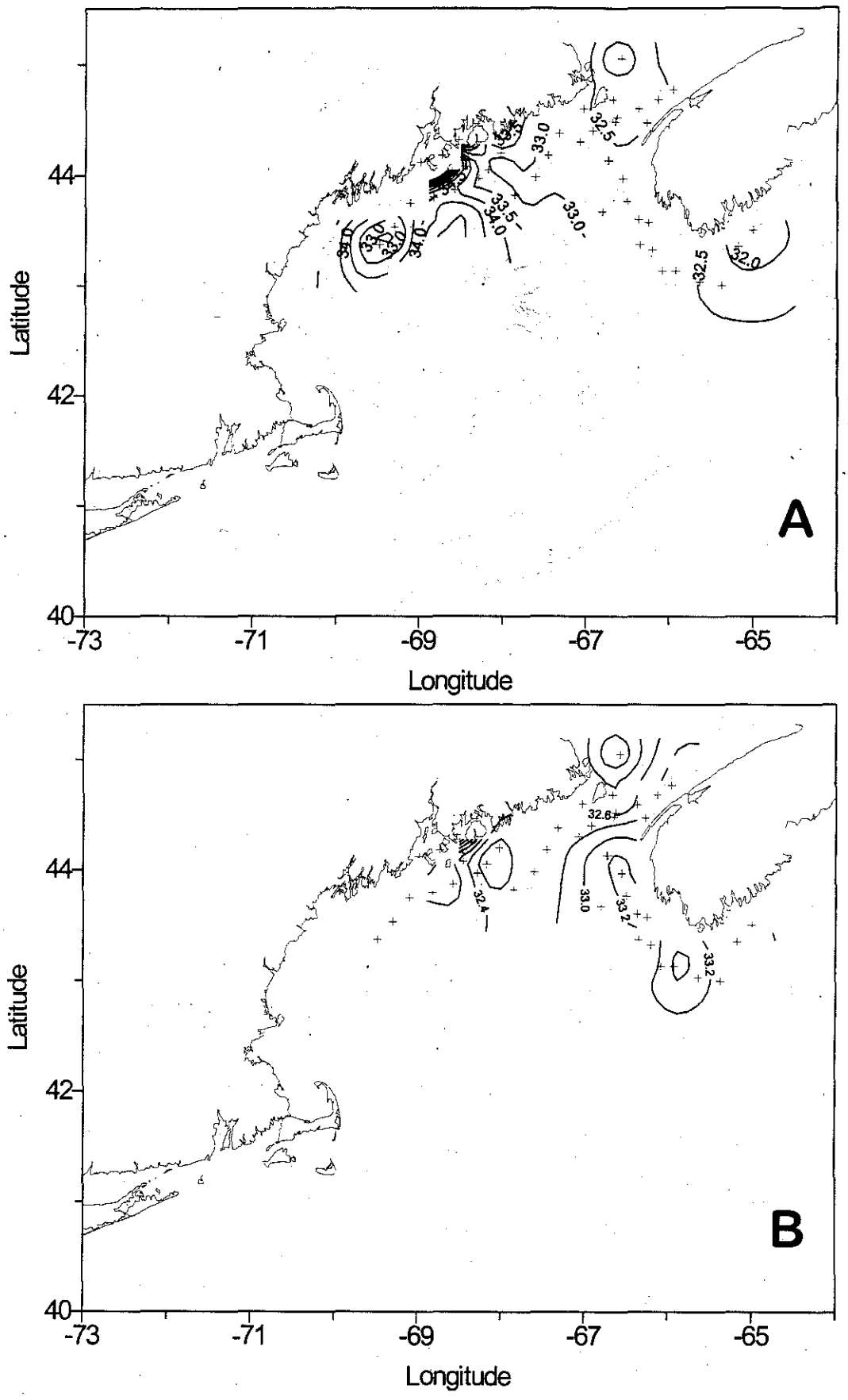


Figure 81. Surface (A) and bottom (B) salinity distributions during Marine Mammal Survey AJ9902.

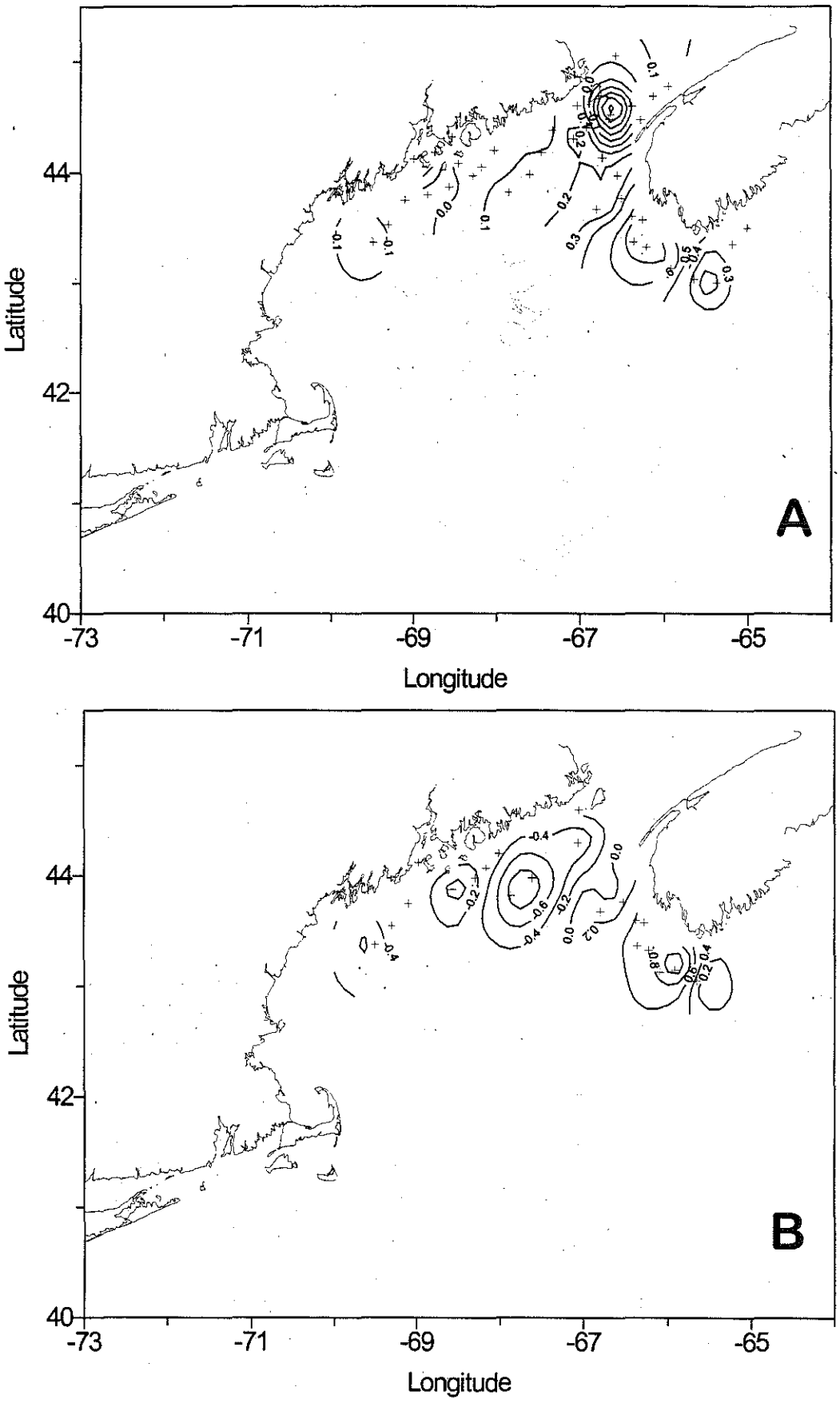


Figure 82. Surface (A) and bottom (B) salinity anomaly distributions during Marine Mammal Survey AJ9902.

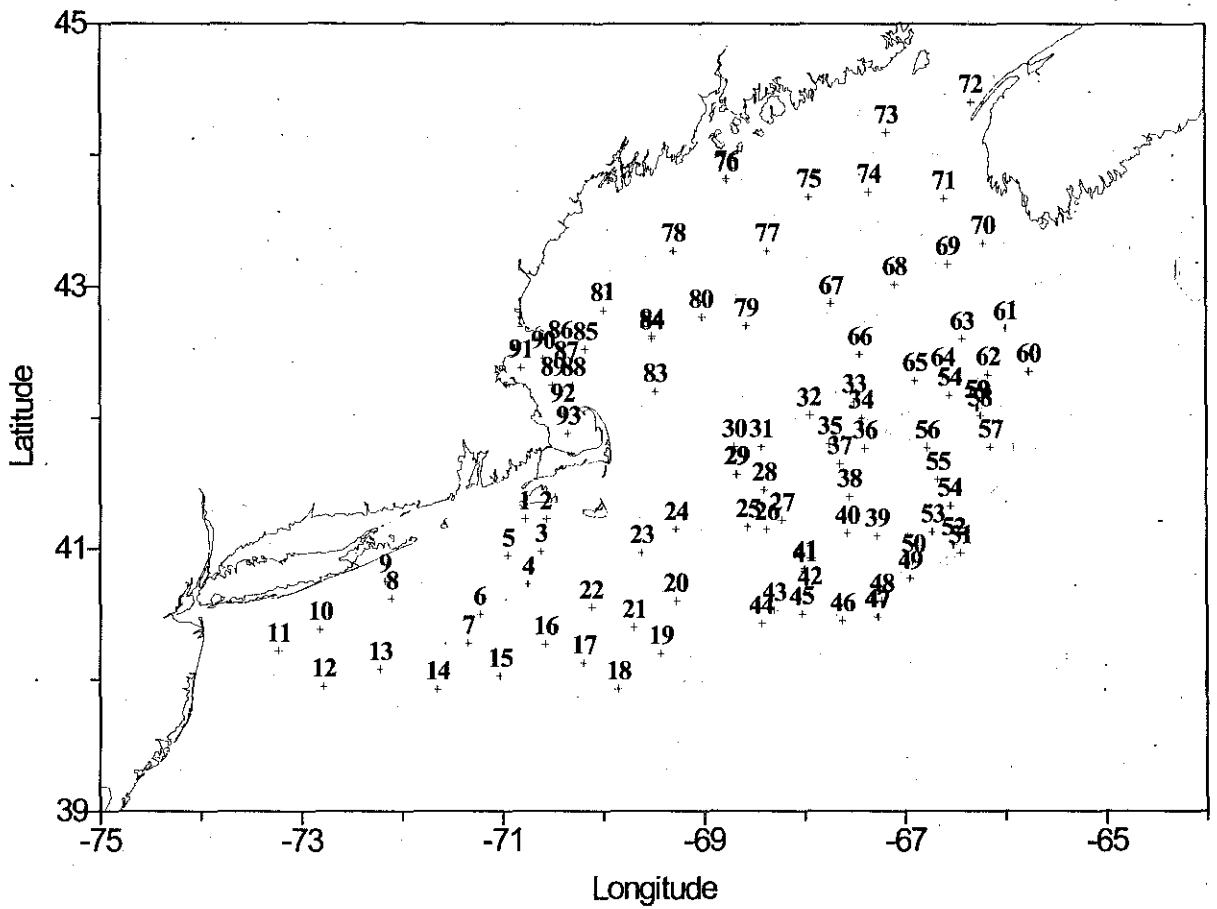


Figure 83. CTD stations occupied during Ecosystem Monitoring survey IS9901.

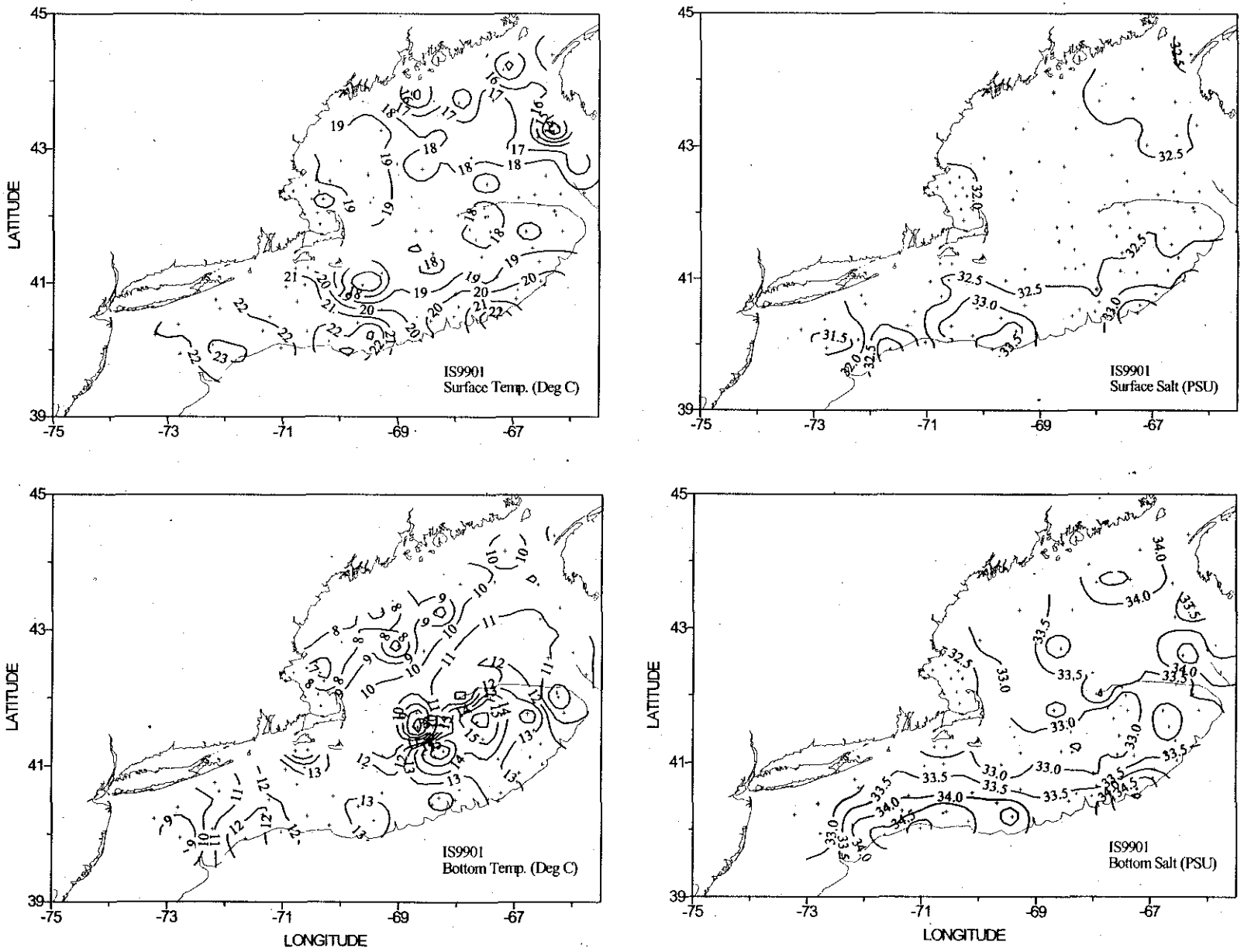


Figure 84. Temperature and salinity distributions for Ecosystem Monitoring survey IS9901.

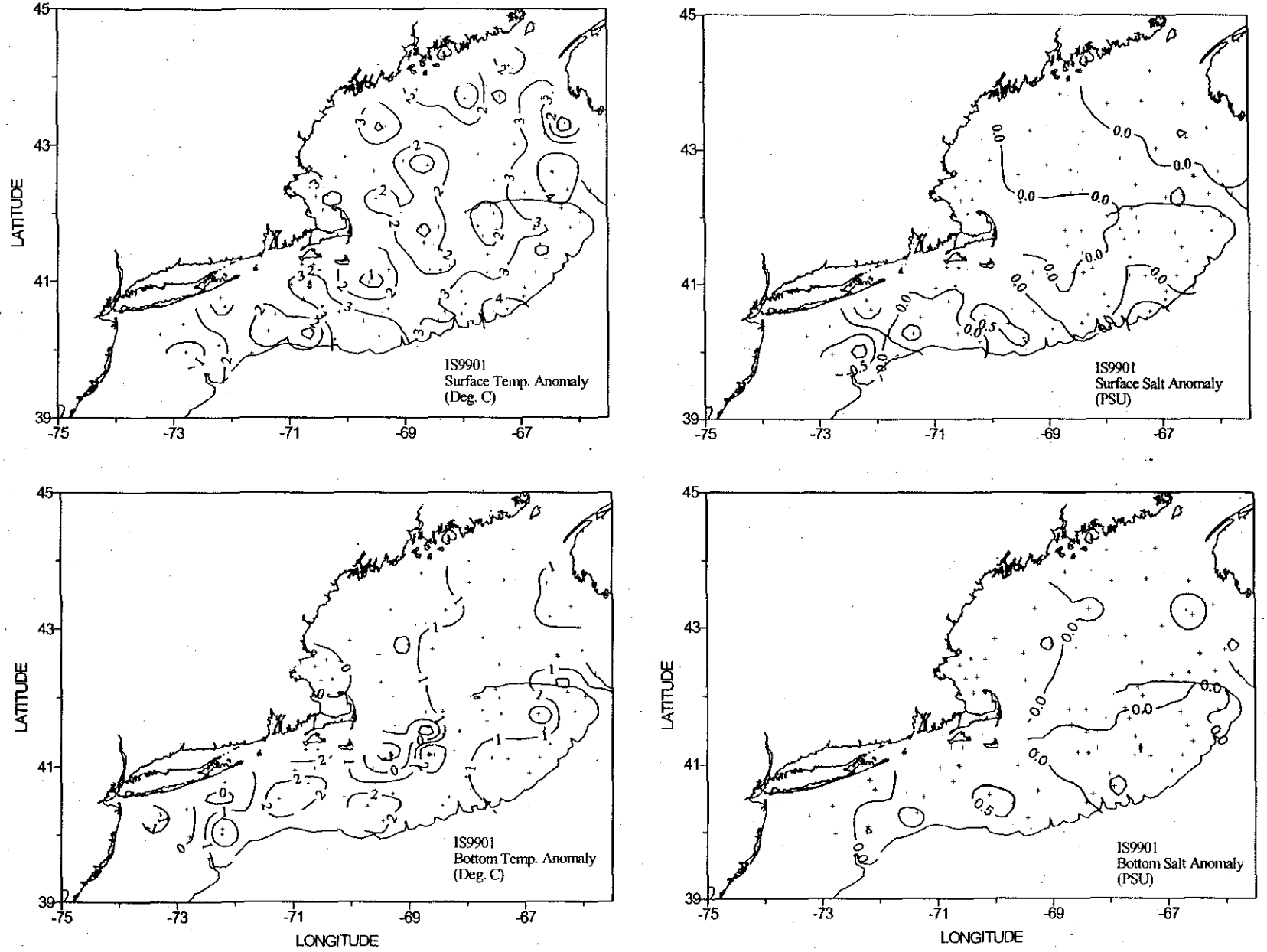


Figure 85. Temperature and salinity anomaly distributions for Ecosystem Monitoring survey IS9901.

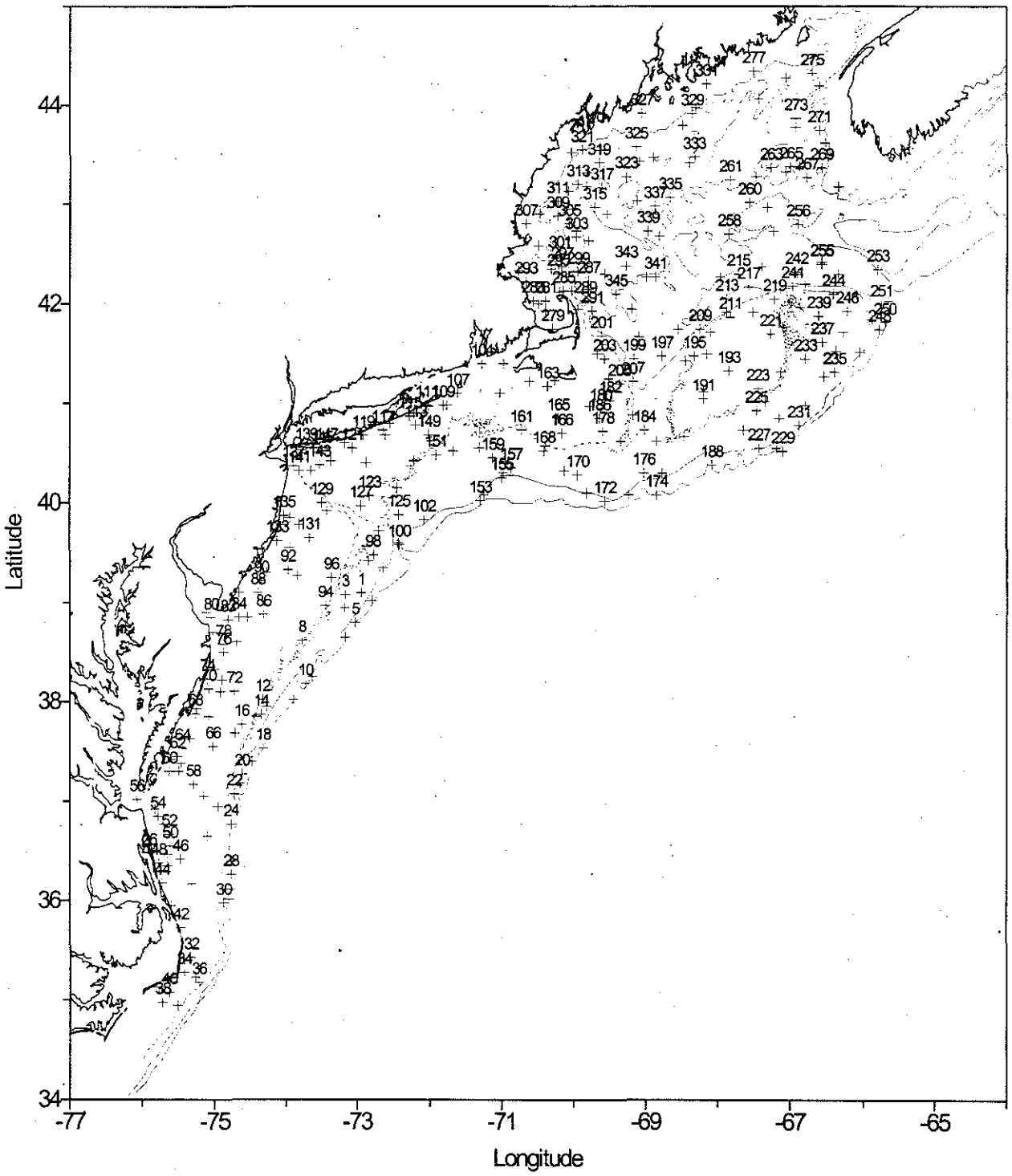


Figure 86. Stations occupied during Fall Groundfish Survey AL9910.

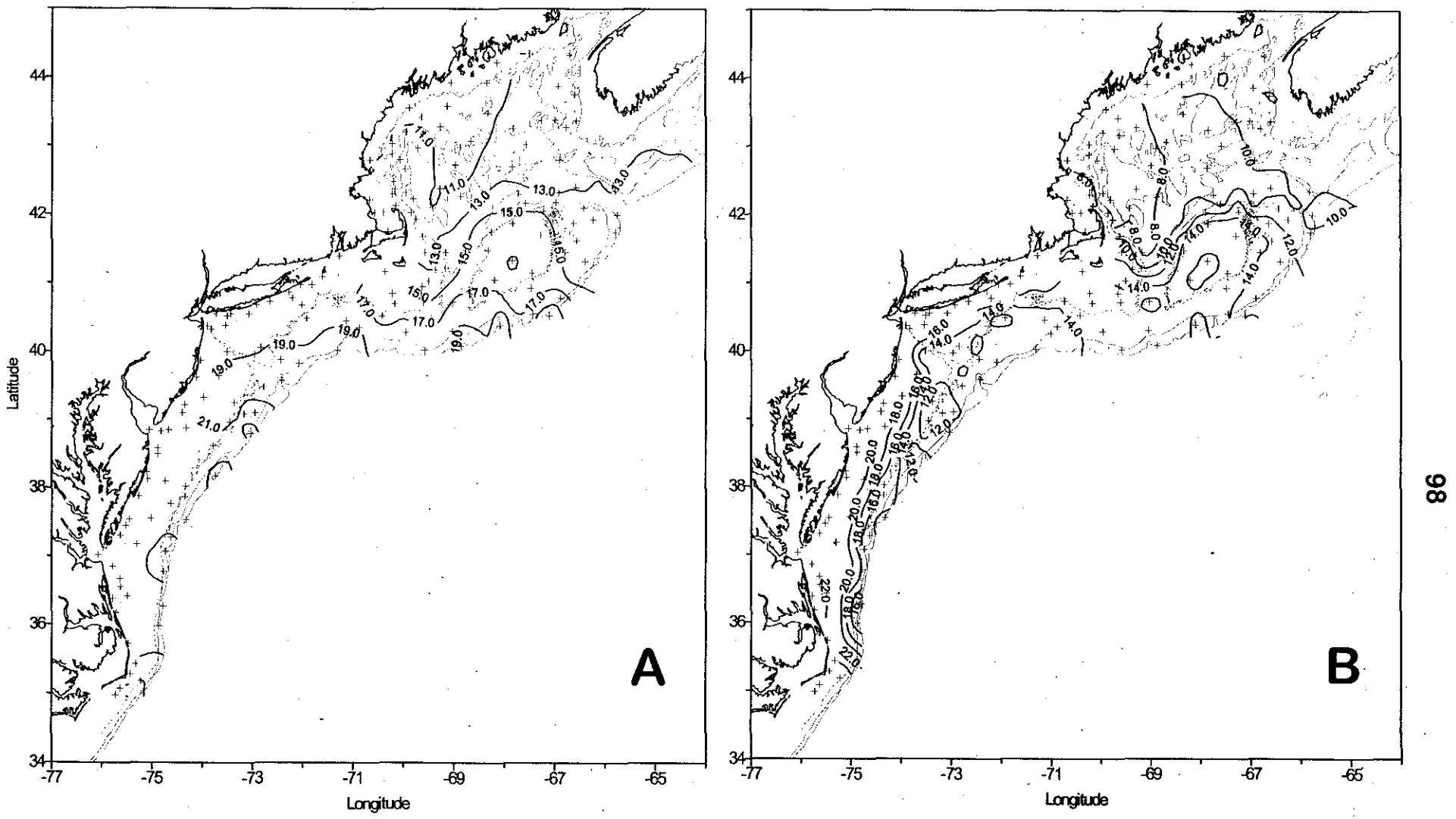


Figure 87. Surface (A) and bottom (B) temperature distributions for Fall Groundfish Survey AL9910.

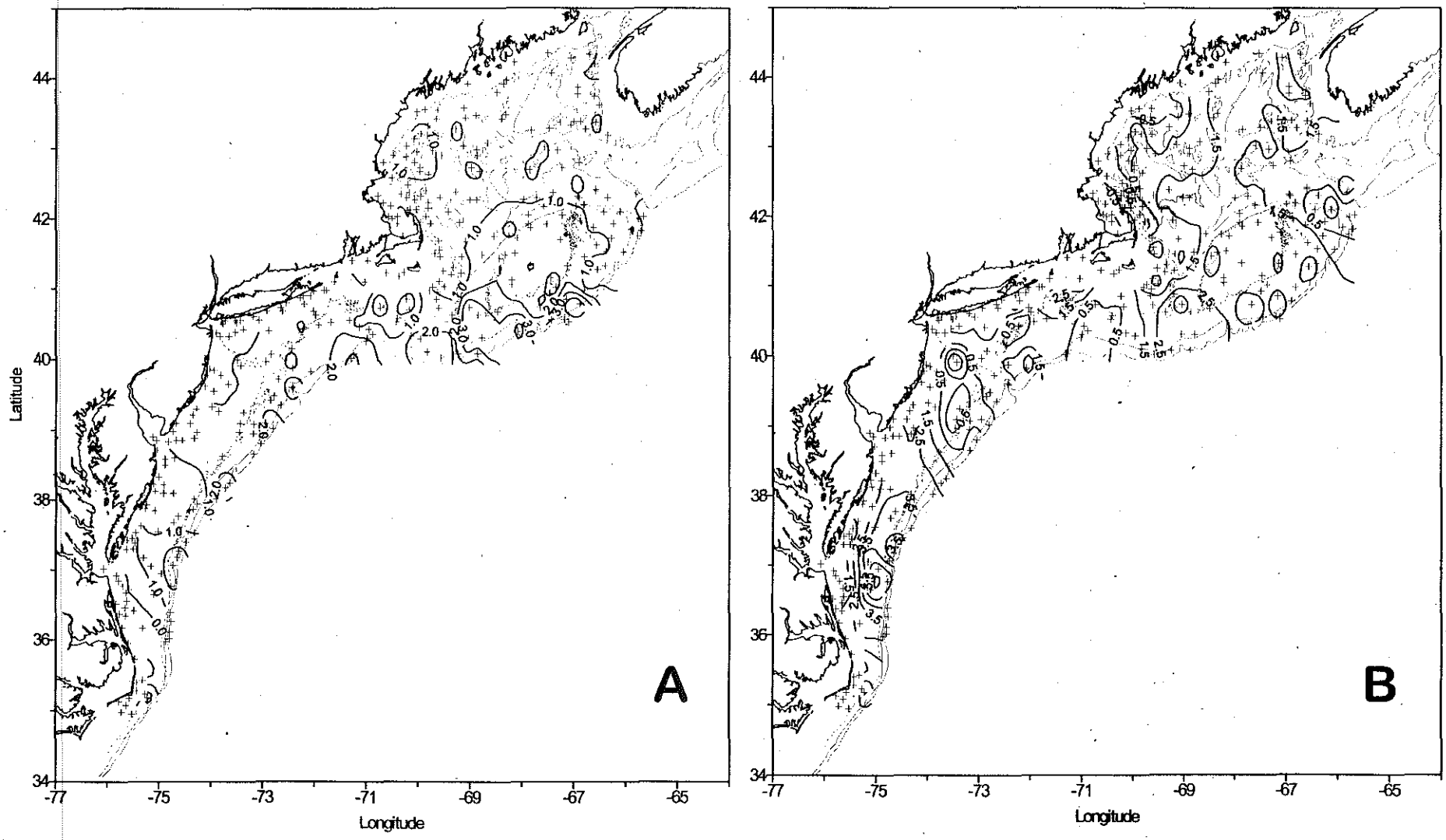


Figure 88. Surface (A) and bottom (B)temperature anomaly distributions for Fall Groundfish Survey AL9910.

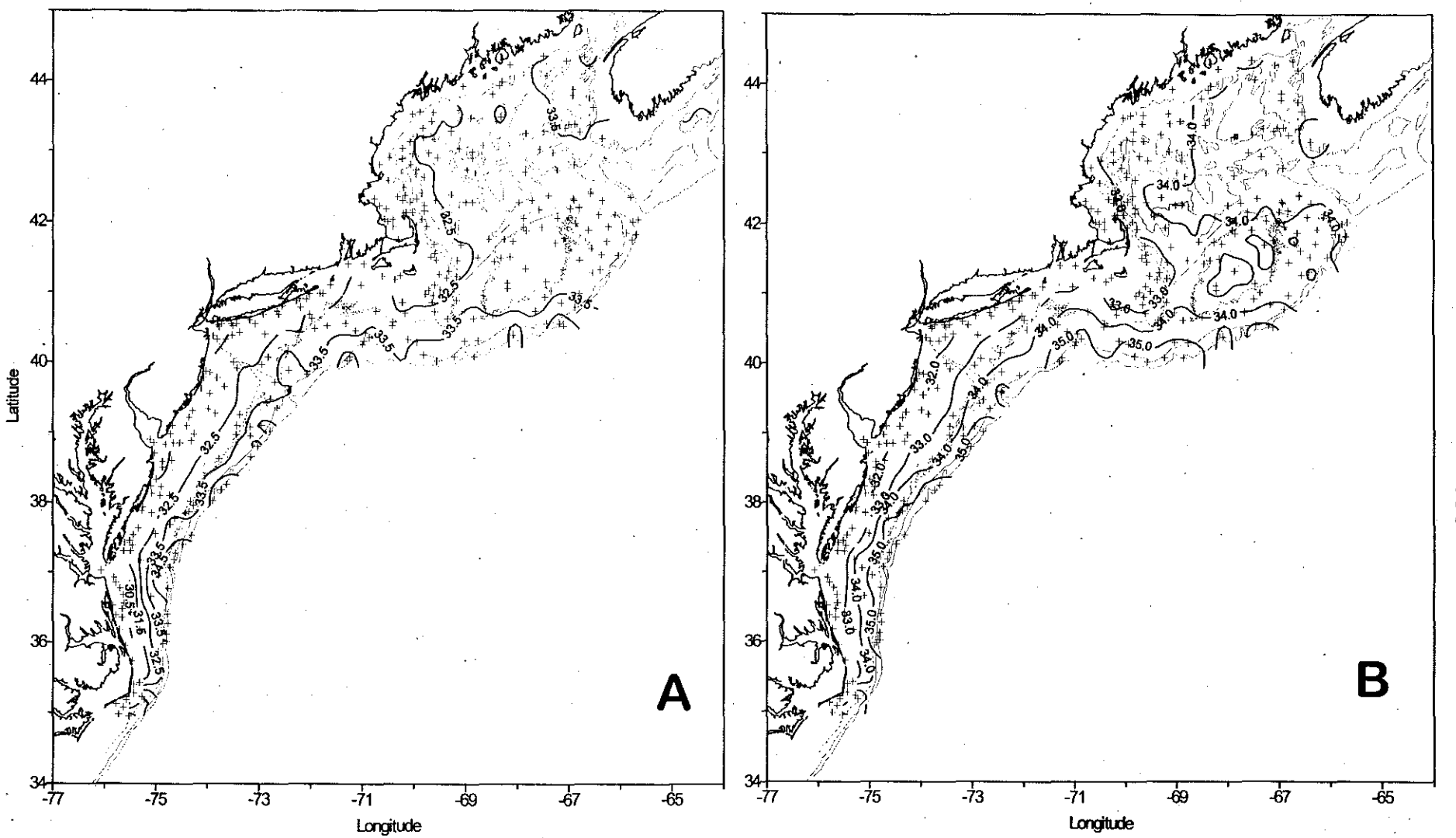


Figure 89. Surface (A) and bottom (B) salinity distributions for Fall Groundfish Survey AL9910.

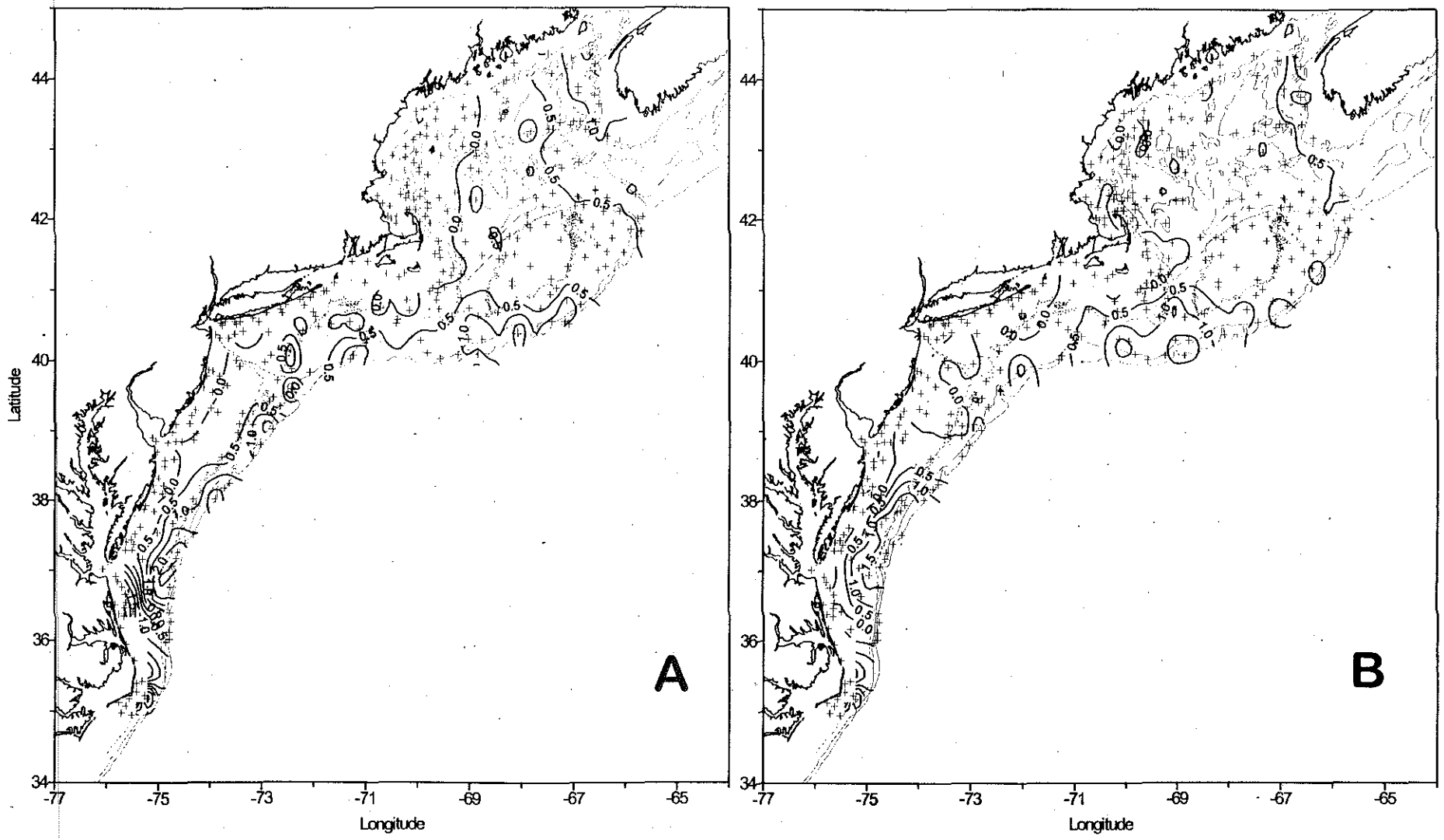


Figure 90. Surface (A) and bottom (B)salinity anomaly distributions for Fall Groundfish Survey AL9910.

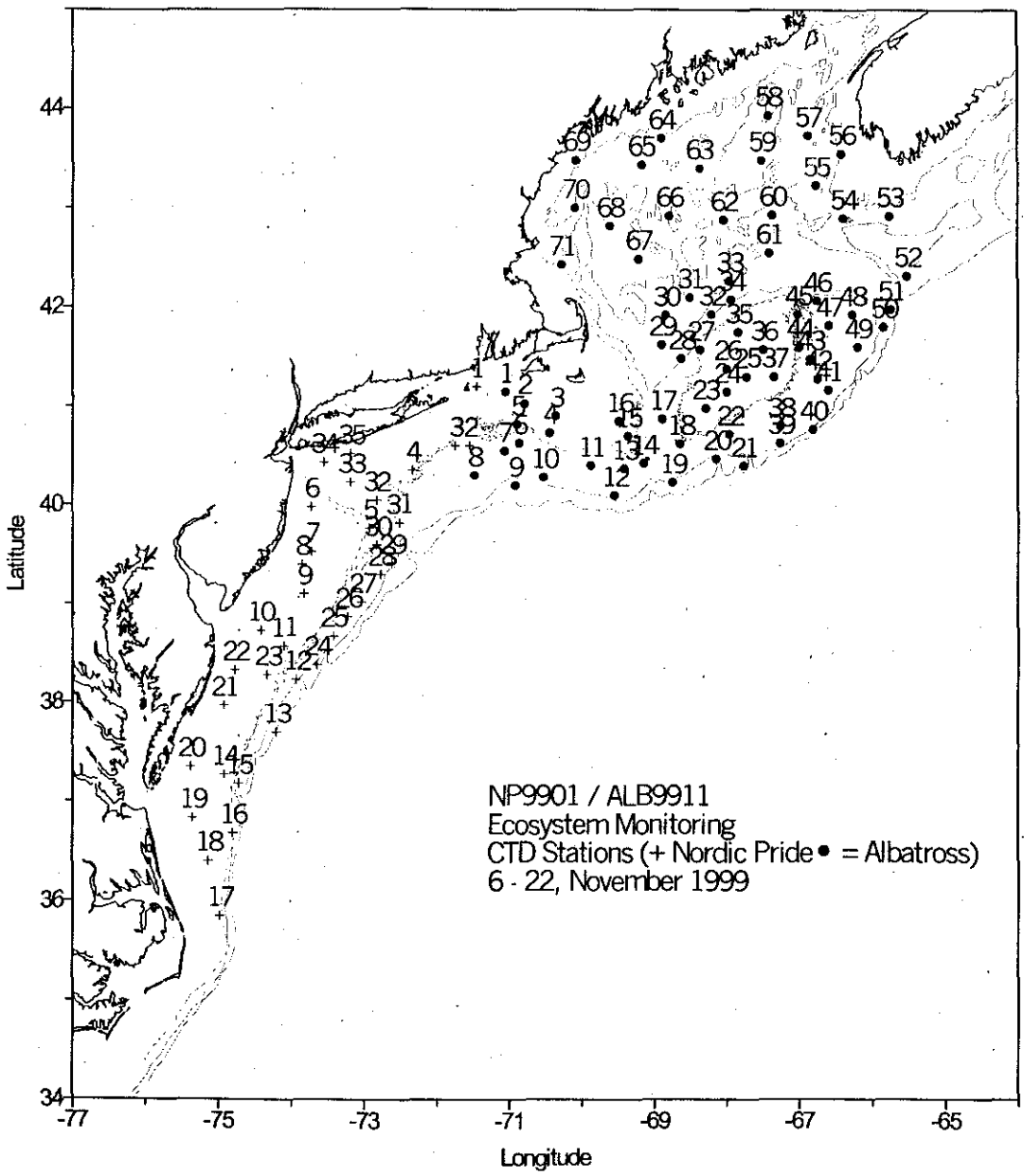
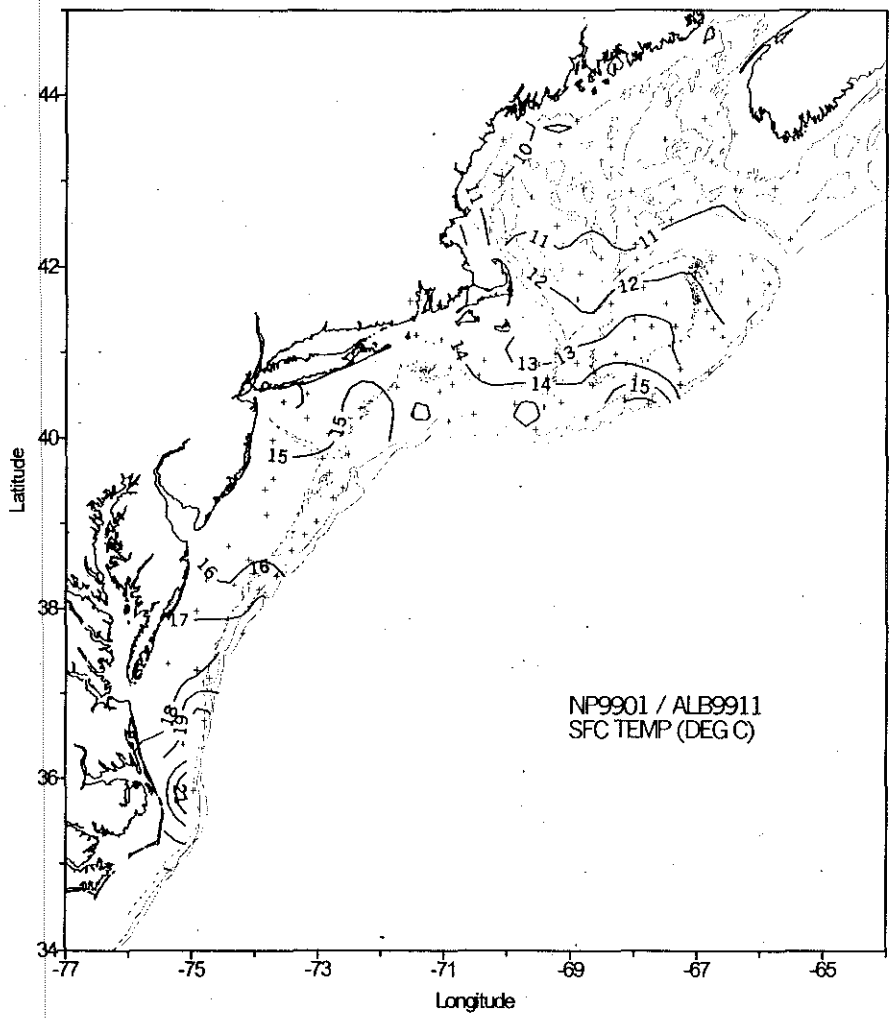


Figure 91. Stations occupied during Ecosystems Monitoring cruises NP9901 and ALB9911.



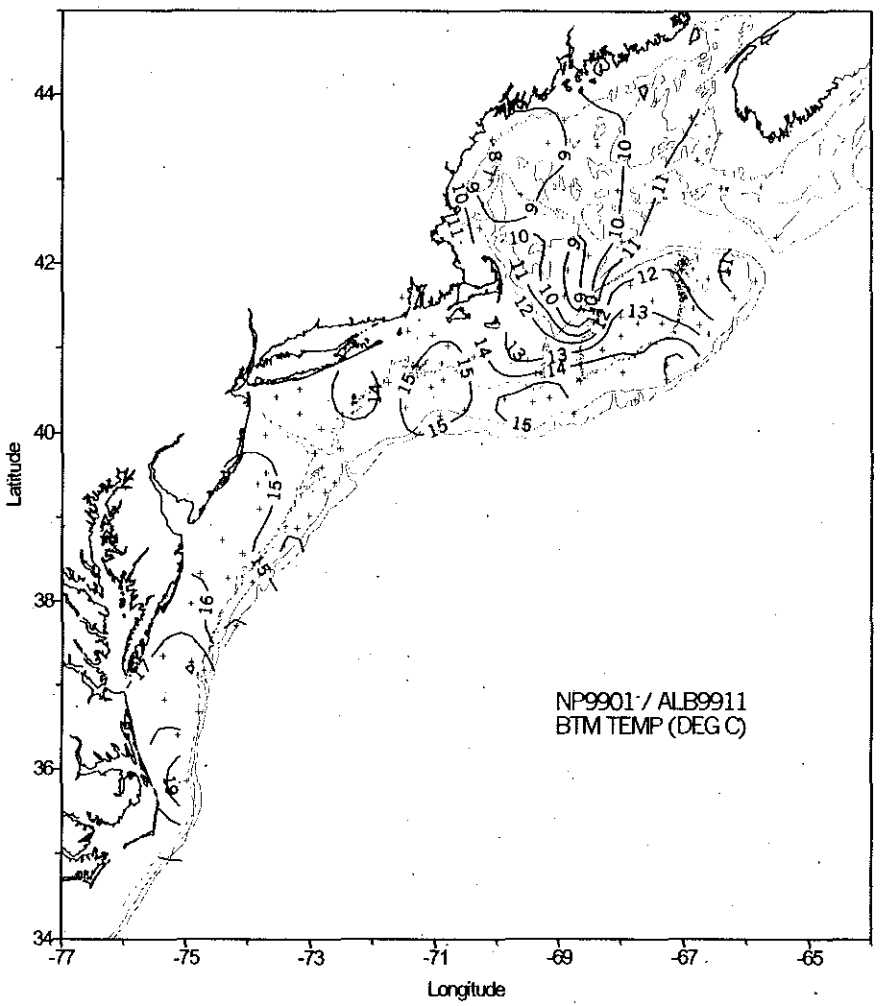
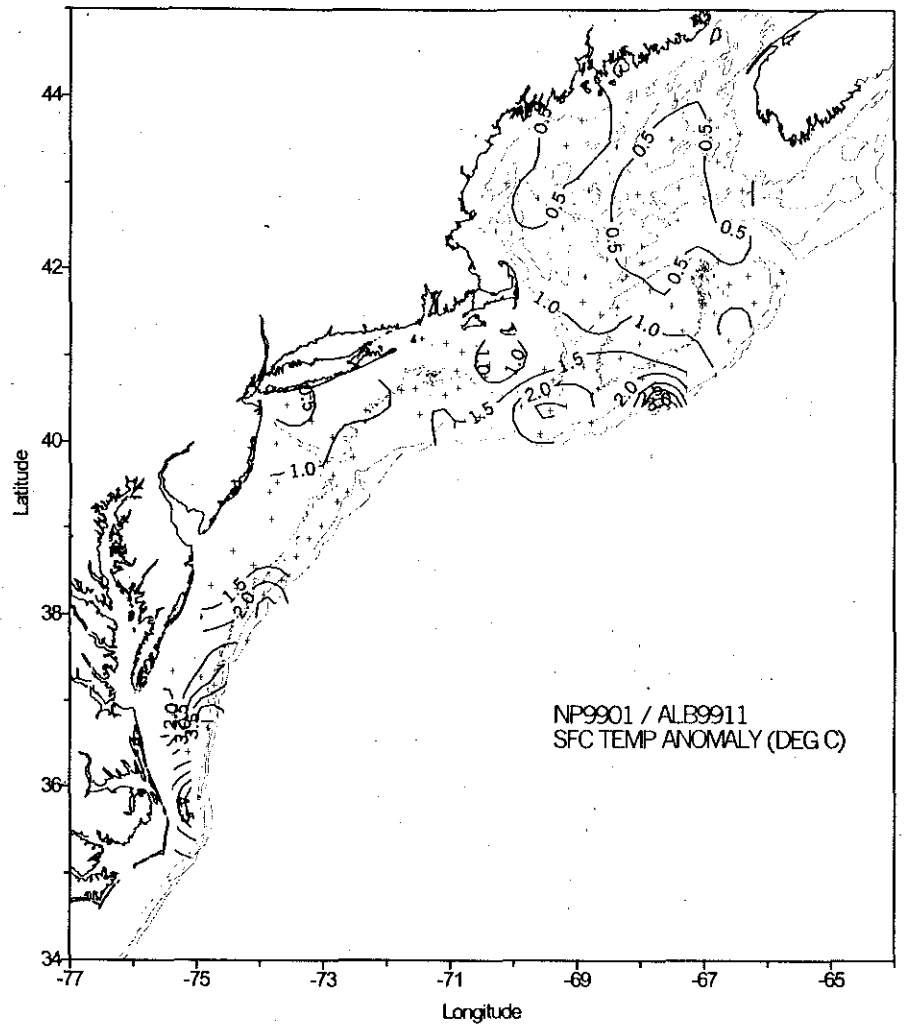


Figure 92. Surface (left) and bottom (right) temperature distributions for Ecosystem Monitoring cruises NP9901 and ALB9911.



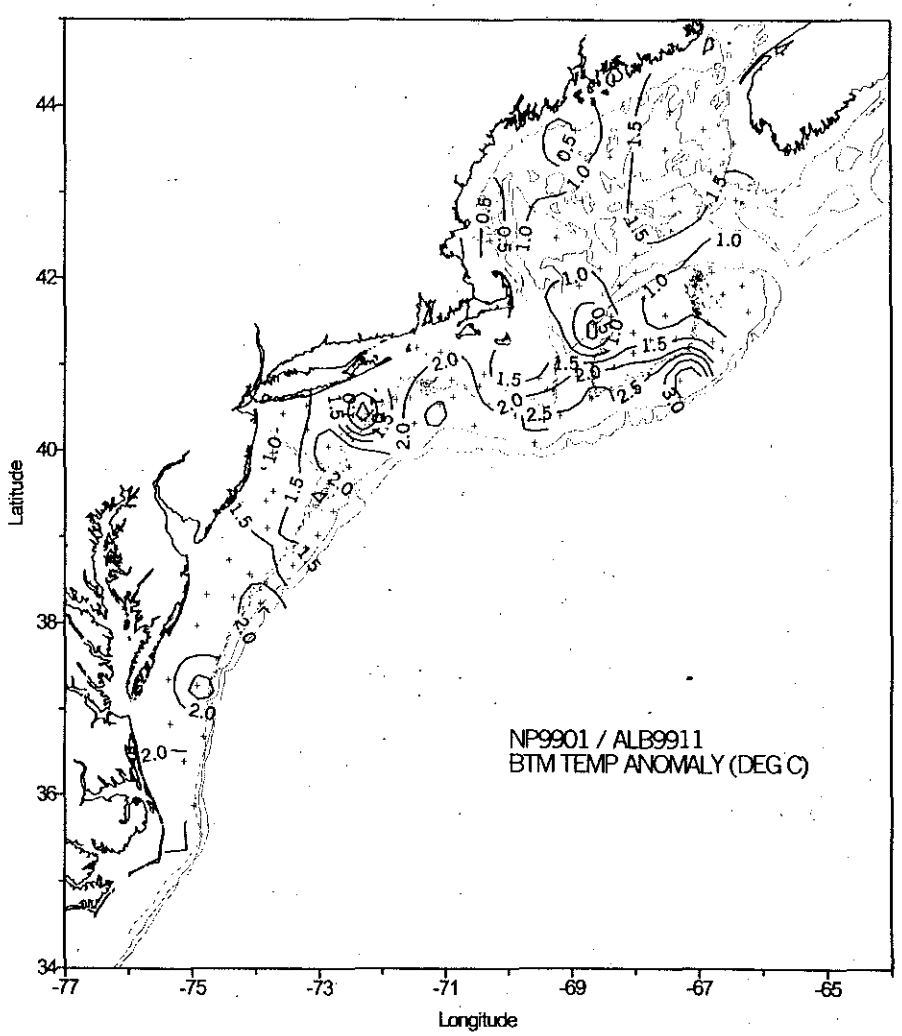
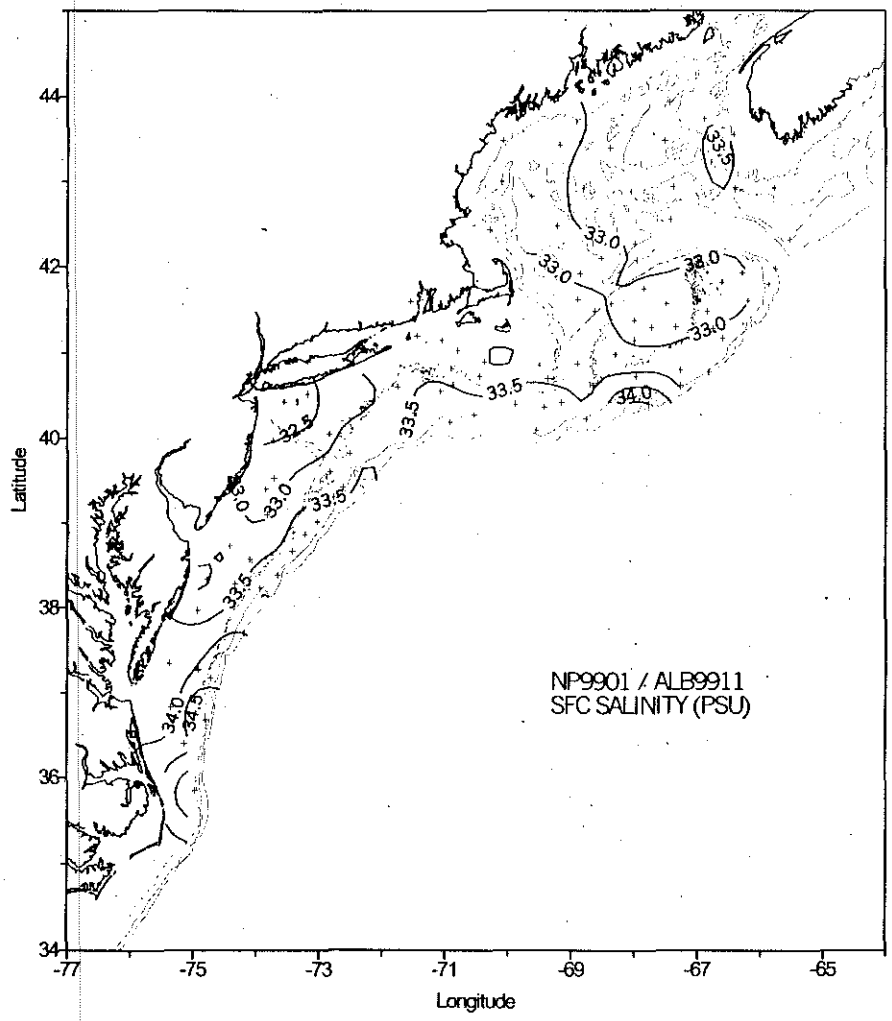


Figure 93. Surface (left) and bottom (right) temperature anomaly distributions for Ecosystem Monitoring cruises NP9901 and ALB9911.



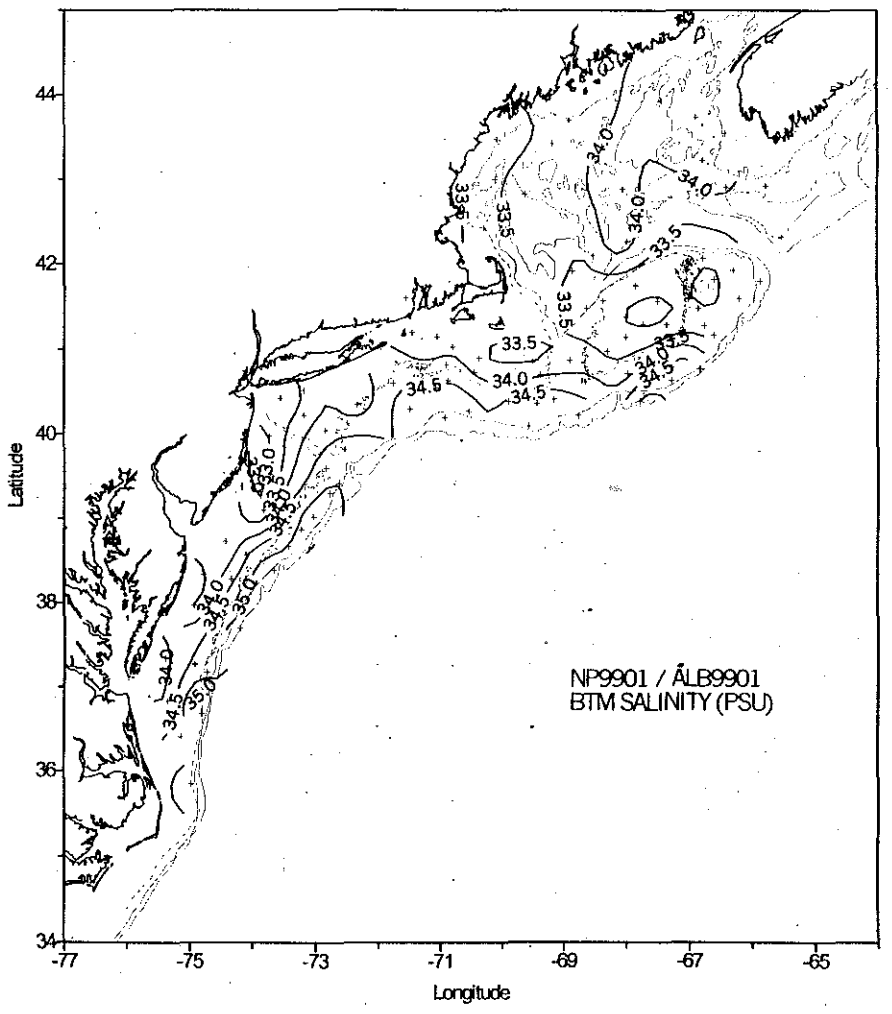
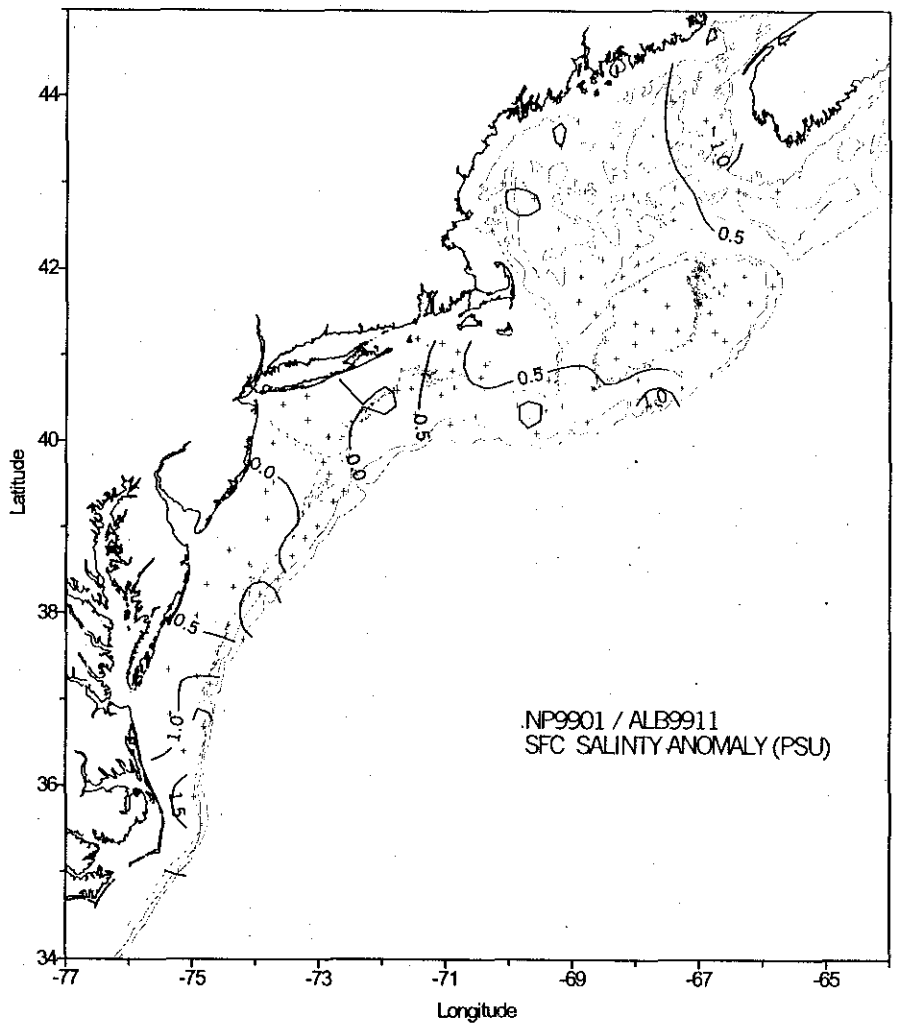


Figure 94. Surface (left) and bottom (right) salinity distributions for Ecosystem Monitoring cruises NP9901 and ALB9911.



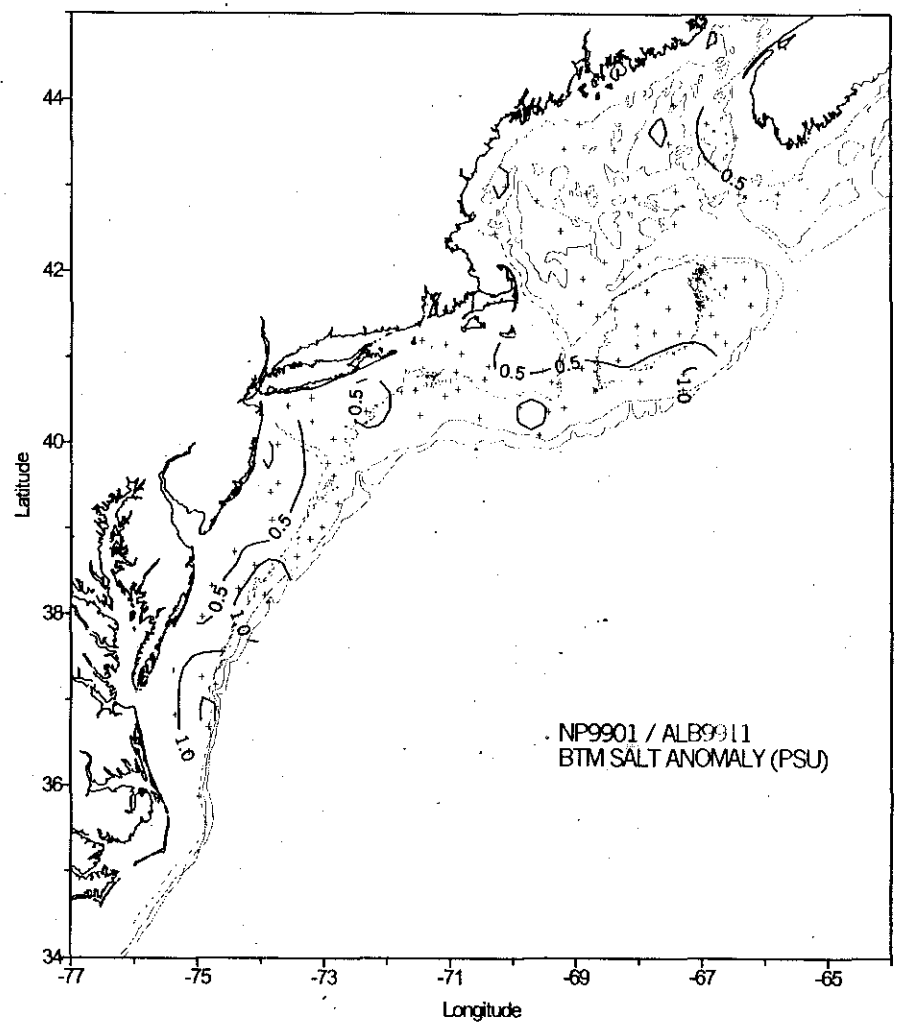


Figure 95. Surface (left) and bottom (right) salinity anomaly distributions for Ecosystem Monitoring cruises NP9901 and ALB9911.

GLOBEC Broadscale Survey #1

Cruise: ALB9901
Vessel: R/V Albatross IV
Program: GLOBEC Broadscale Survey #1
Dates: 13 – 23 January
Sea Days: 11
Instrument(s): 1468
Total # of stations: 79
# of vertical CTD/Profiler casts: 18
# of double oblique Profiler casts: 80
 # Salinity samples: 18
Salt correction: +0.003

Cruise Objectives: To (1) determine the distribution and abundance of target species of ichthyoplankton (eggs, larvae, and juveniles of cod and haddock); zooplankton (all stages of copepods, *Calanus finmarchicus* and *Pseudocalanus spp.*) and their predators and prey on Georges Bank and the adjacent Gulf of Maine and slope waters; (2) provide systematic collections of larval and juvenile cod and haddock for age and growth estimates; (3) conduct a hydrographic survey of the Bank; (4) map the Bank wide velocity field using an Acoustic Doppler Current Profiler; (5) deploy Lagrangian-type drifters to make current measurements.

Special Notes: Primary hydrographic data on this cruise was collected with an SBE911+ CTD.

Ecosystem Monitoring

Cruise: DEL9901
Vessel: Delaware II
Program: Ecosystem Monitoring
Dates: 21 – 27 January
Sea Days: 7
Instrument(s): 0851, 0853
Total # of stations: 41
# of vertical CTD/Profiler casts: 9

# of double oblique Profiler casts: 41
 # Salinity samples: 9
Salt correction: 0851= +0.005; 0853= -0.002

Cruise Objectives: To asses the impact of changing biological and physical properties of the Northeast Continental Shelf ecosystem which influence the sustainable productivity of the living marine resources.

Winter Bottom Trawl Survey

Cruise: ALB9902
Vessel: R/V Albatross IV
Dates: 2 – 24 February
Sea Days: 23
Instrument(s): 1495, 1496
Total # of stations: 146
# of vertical CTD/Profiler casts: 77
# of double oblique Profiler casts: 69
 # Salinity samples: 22
Salt correction: 1495 = +0.017, 1496 = +0.013

Cruise Objectives: To (1) determine the winter 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; (3) collect hydrographic and meteorological data; (4) collect samples of ichthyoplankton and zooplankton; (5) make data and sample collections for cooperative researchers and programs.

GLOBEC Broadscale Survey #2

Cruise: OCE9936
Vessel: R/V Oceanus
Dates: 11 – 23 February
Sea Days: 13

Instrument(s): 1468
Total # of stations: 85
# of vertical CTD/Profiler casts: 10
# of double oblique Profiler casts: 79
 # Salinity samples: 10
Salt correction: +0.012

Cruise Objectives: To (1) determine the distribution and abundance of target species of ichthyoplankton (eggs, larvae, and juveniles of cod and haddock); zooplankton (all stages of copepods, *Calanus finmarchicus* and *Pseudocalanus spp.*) and their predators and prey on Georges Bank and the adjacent Gulf of Maine and slope waters; (2) provide systematic collections of larval and juvenile cod and haddock for age and growth estimates; (3) conduct a hydrographic survey of the Bank; (4) map the Bank wide velocity field using an Acoustic Doppler Current Profiler; (5) deploy Lagrangian-type drifters to make current measurements.

Special Notes: Primary hydrographic data on this cruise was collected with an SBE911+ CTD.

Marine Mammal Habitat

Cruise: DEL9903
Vessel: R/V Delaware II
Dates: 23 February – 10 March
Sea Days: 9
Instrument(s): 0853
Total # of stations: 19
# of vertical CTD/Profiler casts: 19
# of double oblique Profiler casts: 0
 # Salinity samples: 3
Salt correction: +0.002

Cruise Objectives: To (1) collect data on fish biomass in areas with and without pinger deployment through a hydroacoustic-midwater trawl survey; (2) record

marine mammals and fisheries gear observed during fishery survey transects; and (3) record sound levels surrounding commercial gill nets with pingers attached.

Spring Bottom Trawl Survey

Cruise:	ALB9903
Vessel:	R/V Albatross IV
Dates:	2 March – 22 April
Sea Days:	40
Instrument(s):	0360, 1495, 1496
Total # of stations:	329
# of vertical CTD/Profiler casts:	243
# of double oblique Profiler casts:	93
# Salinity samples:	42
Salt correction:	0360= +0.008; 1495= +0.014, 1496= +0.012

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.

GLOBEC Broadscale Survey #3

Cruise:	END9920
Vessel:	R/V Endeavor
Dates:	11 – 22 March
Sea Days:	12
Instrument(s):	1468
Total # of stations:	68
# of vertical CTD/Profiler casts:	8
# of double oblique Profiler casts:	78
# Salinity samples:	8
Salt correction:	+0.006

Cruise Objectives: To (1) determine the distribution and abundance of target species of ichthyoplankton (eggs, larvae, and juveniles of cod and haddock); zooplankton (all stages of copepods, *Calanus finmarchicus* and *Pseudocalanus spp.*) and their predators and prey on Georges Bank and the adjacent Gulf of Maine and slope waters; (2) provide systematic collections of larval and juvenile cod and haddock for age and growth estimates; (3) conduct a hydrographic survey of the Bank; (4) map the Bank wide velocity field using an Acoustic Doppler Current Profiler; (5) deploy Lagrangian-type drifters to make current measurements.

Special Notes: Primary hydrographic data on this cruise was collected with an SBE911+ CTD.

Gear Comparison Study

Cruise:	DEL9905
Vessel:	R/V Delaware II
Dates:	30 March – 8 April
Sea Days:	10
Instrument(s):	0853, 0851
Total # of stations:	59
# of vertical CTD/Profiler casts:	0
# of double oblique Profiler casts:	39
# Salinity samples:	0
Salt correction:	No Salts Taken

Cruise Objectives: The purpose of this cruise is to assess the comparative efficiency and bias among different plankton sampling gear used since the early 1900s coupled with a synoptic survey of limited chemical, physical and meteorological parameters of the region. Explicit parameters to be measured are ichthyoplankton and phytoplankton composition, abundance and distribution; water column temperatures, salinity, current velocities, nitrates, phosphates and fluorescence.

GLOBEC Process #1

Cruise: EDL9904
Vessel: R/V Edwin Link
Dates: 16 – 23 April
Sea Days: 8
Instrument(s): 2277
Total # of stations: 46
# of vertical CTD/Profiler casts: 0
# of double oblique Profiler casts: 46
 # Salinity samples: 0
Salt correction: No Salts Taken

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.

GLOBEC Broadscale Survey #4

Cruise: OCE9941
Vessel: R/V Oceanus
Dates: 16 – 26 April
Sea Days: 11
Instrument(s): 1468
Total # of stations: 81
# of vertical CTD/Profiler casts: 9
# of double oblique Profiler casts: 82
 # Salinity samples: 9
Salt correction: +0.008

Cruise Objectives: To (1) determine the distribution and abundance of target species of ichthyoplankton (eggs, larvae, and juveniles of cod and haddock); zooplankton (all stages of copepods, *Calanus finmarchicus* and *Pseudocalanus spp.*) and their predators and prey on Georges Bank and the adjacent Gulf of Maine and slope waters; (2) provide systematic collections of larval and juvenile

cod and haddock for age and growth estimates; (3) conduct a hydrographic survey of the Bank; (4) map the Bank wide velocity field using an Acoustic Doppler Current Profiler; (5) deploy Lagrangian-type drifters to make current measurements.

Special Notes: Primary hydrographic data on this cruise was collected with an SBE911+ CTD.

Marine Mammal Survey

Cruise:	DEL9906
Vessel:	R/V Delaware II
Dates:	12-30 April
Sea Days:	4
Instrument(s):	0853
Total # of stations:	8
# of vertical CTD/Profiler casts:	8
# of double oblique Profiler casts:	0
# Salinity samples:	0
Salt correction:	No Salts Taken

Cruise Objectives: The primary objectives of the cruise are to: (1) Locate sperm whales using standard marine mammal survey techniques, attach Timed Depth Recorders to them, and track them for up to 24 hours each. 2) To collect data on fish biomass in areas with and without pinger deployment through a hydroacoustic survey; the recording of marine mammals and gill net gear observed during survey transects; and 3) recording of sound levels surrounding commercial gill nets with pingers attached.

GLOBEC Process #2

Cruise:	EDL9905
Vessel:	R/V Edwin Link
Dates:	11 – 27 May
Sea Days:	17
Instrument(s):	2277
Total # of stations:	63
# of vertical CTD/Profiler casts:	20
# of double oblique Profiler casts:	50

 # Salinity samples: 6
Salt correction: +0.016 *

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 vertical distribution, diel variability, predator-prey relations and biochemical content.

*Special Note: There was an insufficient number of salinity samples, therefore no salt correction was applied.

GLOBEC Broadscale Survey #5

Cruise: ALB9904
Vessel: R/V Albatross IV
Dates: 20-27 May
Sea Days: 8
Instrument(s): 1468
Total # of stations: 82
# of vertical CTD/Profiler casts: 7
# of double oblique Profiler casts: 83
 # Salinity samples: 7
Salt correction: +0.004

Cruise Objectives: To (1) determine the distribution and abundance of target species of ichthyoplankton (eggs, larvae, and juveniles of cod and haddock); zooplankton (all stages of copepods, *Calanus finmarchicus* and *Pseudocalanus spp.*) and their predators and prey on Georges Bank and the adjacent Gulf of Maine and slope waters; (2) provide systematic collections of larval and juvenile cod and haddock for age and growth estimates; (3) conduct a hydrographic survey of the Bank; (4) map the Bank wide velocity field using an Acoustic Doppler Current Profiler; (5) deploy Lagrangian-type drifters to make current measurements.

Special Notes: Primary hydrographic data on this cruise was collected with an SBE911+ CTD.

Habitat Study

Cruise:	ALB9905
Vessel:	R/V Albatross IV
Dates:	2-10 June
Sea Days:	9
Instrument(s):	1495
Total # of stations:	51
# of vertical CTD/Profiler casts:	46
# of double oblique Profiler casts:	0
# Salinity samples:	10
Salt correction:	+0.006

Cruise Objectives: The objectives of this cruise are to monitor the recovery of the benthic habitat in Closed Area II after four years of continual closure prior to the southern portion of the area being opened to scallop fishing on or about 15 June 1999.

Ecosystem Monitoring

Cruise:	AJ9901
Vessel:	R/V Abel J
Dates:	3-11 June
Sea Days:	9
Instrument(s):	0360
Total # of stations :	60
# of vertical CTD/Profiler casts:	15
# of double oblique Profiler casts:	60
# Salinity samples:	415
Salt correction:	0.015

Cruise Objectives: To asses the impact of changing biological and physical properties of the Northeast Continental Shelf ecosystem which influence the sustainable productivity of the living marine resources.

GLOBEC Broadscale Survey #6

Cruise:	ALB9906
Vessel:	R/V Albatross IV
Dates:	15-23 June
Sea Days:	9
Instrument(s):	1468
Total # of stations:	41
# of vertical CTD/Profiler casts:	7
# of double oblique Profiler casts:	41
# Salinity samples:	7
Salt correction:	+0.003

Cruise Objectives: To (1) determine the distribution and abundance of target species of ichthyoplankton (eggs, larvae, and juveniles of cod and haddock); zooplankton (all stages of copepods, *Calanus finmarchicus* and *Pseudocalanus spp.*) and their predators and prey on Georges Bank and the adjacent Gulf of Maine and slope waters; (2) provide systematic collections of larval and juvenile cod and haddock for age and growth estimates; (3) conduct a hydrographic survey of the Bank; (4) map the Bank wide velocity field using an Acoustic Doppler Current Profiler; (5) deploy Lagrangian-type drifters to make current measurements.

Special Notes: Primary hydrographic data on this cruise was collected with an SBE911+ CTD.

Closed Area Study

Cruise:	ALB9907
Vessel:	R/V Albatross IV
Dates:	29 June – 1 July
Sea Days:	3
Instrument(s):	1495
Total # of stations:	16
# of vertical CTD/Profiler casts:	14
# of double oblique Profiler casts:	0
# Salinity samples:	4
Salt correction:	.018

Cruise Objectives: The objectives of the cruise were to investigate the distribution and relative abundance of fish (particularly Atlantic cod) within and around the Gulf of Maine Cod Closed Area.

Clam Survey

Cruise:	DEL9907
Vessel:	R/V Delaware II
Dates:	1 June – 23 July
Sea Days:	42
Instrument(s):	0851
Total # of stations:	10
# of vertical CTD/Profiler casts:	10
# of double oblique Profiler casts:	0
# Salinity samples:	4
Salt correction:	+0.012 *

Cruise Objectives: The objectives of the survey are to (1) determine the distribution and relative abundance, and (2) to collect biological data for surfclams and ocean quahogs.

*Special Note: There was an insufficient number of salinity samples, therefore no salt correction was applied.

Habitat Study

Cruise:	ALB9908
Vessel:	R/V Albatross IV
Dates:	7-10 July
Sea Days:	4
Instrument(s):	1495
Total # of stations:	25
# of vertical CTD/Profiler casts:	25
# of double oblique Profiler casts:	0

 # Salinity samples: 6
Salt correction: +0.020

Cruise Objectives: To monitor the recovery of the benthic habitat in Closed Area I after four years of continual closure.

Scallop Survey

Cruise: ALB9909
Vessel: R/V Albatross IV
Dates: 17 July – 5 August
Sea Days: 18
Instrument(s): 1495
Total # of stations: 404
# of vertical CTD/Profiler casts: 110
# of double oblique Profiler casts: 0
 # Salinity samples: 30
Salt correction: +0.006

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 for interested scientists at other institutions and laboratories.

Marine Mammal Survey

Cruise: AJ9902
Vessel: R/V Abel J
Dates: 29 July – 27 August
Sea Days: 30
Instrument(s): 0360
Total # of stations: 42
# of vertical CTD/Profiler casts: 42
# of double oblique Profiler casts: 0
 # Salinity samples: 0

Salt correction: No Salts Taken

Cruise Objectives: To (1) determine the spatial distribution and abundance of harbor porpoises; (2) to determine the spatial distribution and abundance of other strategic species, such as white-sided dolphins, minke whales, fin whales, humpback whales, and right whales.

Ecosystem Monitoring

Cruise: IS9901
Vessel: R/V Isabel S
Dates: 21 August- 2 September
Sea Days: 13
Instrument(s): 1496
Total # of stations: 93
# of vertical CTD/Profiler casts: 17
# of double oblique Profiler casts: 94
 # Salinity samples: 15
Salt correction: +0.013

Cruise Objectives: To asses the impact of changing biological and physical properties of the Northeast Continental Shelf ecosystem which influence the sustainable productivity of the living marine resources.

Fall Bottom Trawl Survey

Cruise: AL9910
Vessel: R/V Albatross IV
Dates: 21 September – 10 November
Sea Days: 39
Instrument(s): 1496, 1495
Total # of stations: 348
# of vertical CTD/Profiler casts: 219
# of double oblique Profiler casts: 119
 # Salinity samples: 44
Salt correction: 1496= +0.007; 1495=+0 .016

Cruise Objectives: To (1) determine the autumn 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.

Ecosystem Monitoring

Cruise:	NP9901/ALB9911
Vessel:	F/V Nordic Pride; R/V Albatross IV
Dates:	6 – 22 November
Sea Days:	16
Instrument(s):	0360, 1495
Total # of stations:	107
# of vertical CTD/Profiler casts:	16
# of double oblique Profiler casts:	107
# Salinity samples:	16
Salt correction:	1495= +0.026

Cruise Objectives: To asses the impact of changing biological and physical properties of the Northeast Continental Shelf ecosystem which influence the sustainable productivity of the living marine resources.