NOAA Technical Memorandum NMFS

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THE NEARSHORE PHYSICAL OCEANOGRAPHY OFF THE CENTRAL CALIFORNIA COAST DURING APRIL-JUNE, 1988: A SUMMARY OF CTD DATA FROM JUVENILE ROCKFISH SURVEYS

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center

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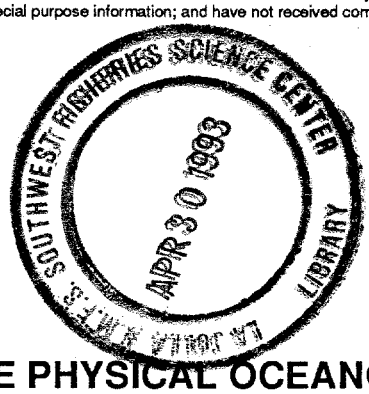

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ABSTRACT

Hydrographic conditions, during four periods of approximately 10 days each in April-June 1988 in the coastal ocean bounded by Cypress Pt. (36°35'N) and Pt. Reyes, California (38°10'N), and from the coast to about 75 km offshore, are summarized in a series of horizontal maps and vertical transects. A total of 75 conductivity-temperature-depth (CTD) casts were obtained during the *DAVID STARR JORDAN* cruise DS8804; 362 casts were taken during cruise DS8806 over the course of three consecutive sweeps of the region. Data products contained in this report include (1) a master list of all CTD stations during the cruise; (2) surface meteorological time series from the region's four National Data Buoy Center (NDBC) meteorological buoys and a coastal station; (3) horizontal maps of temperature, salinity, sigma-t (σ_t) and other hydrographic products at depths of 5 m, 30 m, 50 m, 100 m and 200 m; (4) temperature, salinity and σ_t along five cross-shelf vertical transects; and (5) temperature-salinity plots.

INTRODUCTION

In recent years, attempts have been made to integrate the studies of fisheries biologists investigating the recruitment problem (Sissenwine 1984; Rothschild 1986) with those of physical oceanographers studying coastal circulation patterns. This development is due to the widely held perception that spatial and temporal variations in hydrodynamics, on a wide range of scales, have a direct influence on the retention of young-of-the-year in areas favorable for their growth and survival (*e.g.*, Sinclair 1988). This realization has fostered the development of interdisciplinary studies in the area of recruitment fisheries oceanography (Wooster 1988; Office of Oceanic and Atmospheric Research 1989[1]).

Along the central California coast, rockfishes of the genus *Sebastes* are a major component of the west coast groundfish fishery (Gunderson and Sample 1980), with annual landings from 1981-88 averaging in excess of 45,000 Mt yr^{-1} (Pacific Fishery Management Council 1989). Current management of the rockfish fishery is based largely on analyses of catch-at-age data. Such models are usually poorly constrained in the absence of other information (Deriso et al. 1985). Auxiliary data, such as an independent recruitment index, have the potential to greatly assist in the management of this fishery.

Research conducted at the Southwest Fisheries Science Center's (SWFSC) Tiburon Laboratory since 1983 has attempted to develop a recruitment index for rockfish. Data obtained during annual midwater trawl surveys have provided information regarding distributional and abundance patterns of young-of-the-year pelagic juveniles in the area between Monterey and Bodega Bay (latitude 36°30'-38°10'N; Wyllie-Echeverria et al. 1990). Results of this research show a complex pattern in the spatial distribution of pre-recruits of a variety of commercially significant species (*e.g.*, widow rockfish, *S. entomelas*; chilipepper, *S. goodei*; yellowtail rockfish, *S. flavidus*; bocaccio, *S. paucispinis*; and shortbelly rockfish, *S. jordani*). Moreover, extreme interannual fluctuations in abundance have occurred, with combined stratified mean catches per haul ranging from 0.3-55.0 juvenile rockfish/tow (Adams 1992[2]).

Field studies have shown that the survey region is hydrodynamically complex. The California Current provides the backdrop for large-scale, seasonal circulation patterns (Hickey 1979). Coastal upwelling also occurs regionally for most of the year, especially from April to September (Huyer 1983). On the mesoscale (10-100 km), irregularities in the coastline interact with the wind stress field (Kelly 1985), resulting in turbulent jets, eddies and upwelling filaments, all of which are common features along the central

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[1]Office of Oceanic and Atmospheric Research. 1989. Program Development Plan for the NOAA Recruitment Fisheries Oceanography Program. National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Washington, D.C. 28 p.

[2]Adams, P. B. (editor). 1992. Progress in rockfish recruitment studies. SWFC Admin. Rep. T-92-01, 63 p., unpublished report.

California coast (Mooers and Robinson 1984; Flament et al. 1985; Njoku et al. 1985). Moreover, wind-driven fluctuations in coastal flow (Chelton et al. 1988) and freshwater discharge from the San Francisco Bay tidal plume (Applied Environmental Science Division[3]) add further complexity to the circulation regime.

Realizing that a basic description of the physical environment is necessary to better understand the distribution and abundance of young-of-the-year rockfish, collection of conductivity-temperature-depth (CTD) data was initiated in 1987 as part of the Tiburon Laboratory's annual midwater trawl surveys. In the spirit of Wooster (1988), staff of the SWFSC Pacific Fisheries Environmental Group subsequently developed an interest in analyzing the CTD data and were enlisted in this recruitment fisheries oceanography study. Ultimately, it is our goal to determine and forecast the manner in which rockfish year-class strength is affected by variations in the physical environment.

This report summarizes results obtained from the CTD data collected in 1988. Due to the large quantity of data analyzed and the extensive array of results presented herein, we make no attempt to provide detailed interpretations of our findings. The initial report covering the juvenile groundfish cruise of 1989 (DS8904) has been published (Schwing et al. 1990). A companion volume (Schwing and Ralston 1990[4]) contains individual traces of temperature, salinity, and sigma-t (σ_t, a representation of water density) plotted against depth for each CTD cast conducted in 1989. A similar document is planned for the 1988 data summarized here. Additional reports covering juvenile groundfish cruises during 1987, 1990, 1991, and 1992 are currently in preparation. Further scientific analysis of these data, and their linkages to fisheries recruitment, will be compiled in future peer-reviewed scientific publications (Schwing et al. 1991).

MATERIALS AND METHODS

Juvenile Rockfish Survey Design

Annual cruises aboard the NOAA Research Vessel (R/V) *DAVID STARR JORDAN* began in 1983 and have been conducted during late spring (April-June), a time when most pelagic-stage juvenile rockfishes are identifiable as to species, but prior to their settling to nearshore and benthic habitats. Throughout this time a standard haul consisted of a 15-minute nighttime tow of a large midwater trawl set to a depth of 30 m. Additional tows have been made

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[3]Applied Environmental Science Division. Final report California seabird ecology study. Volume II. Satellite data analysis. Science Applications International Corporation. Monterey, California.

[4]Schwing, F. B., and S. Ralston. 1990. Individual cast data for CTD stations conducted during cruise DSJ-89-04 (May 14-June 13, 1989). SWFSC Admin. Rep. PFEG-91-01, 7 p. + figs., unpublished report.

at other depths (*i.e.*, 10 and 100 m) as allowed by constraints imposed by time and bottom bathymetry.

In 1986, the sampling design was altered to permit three consecutive "sweeps" through a study area bounded by Cypress Pt. (36°35'N) and Pt. Reyes (38°10'N), California, and from the coast to about 75 km offshore. Trawls are now conducted at five or six stations along a transect each night; each sweep is composed of seven transects. Starting in 1987, a CTD cast was conducted at each trawl station occupied. In addition, daytime activities were restructured to permit sampling of a new grid of CTD stations (Table 1; Fig. 1). As an operational goal, 112 casts are planned for each of three sweeps during a cruise (Table 1). Although each sweep typically lasts approximately 10 days (7 nights of scheduled work plus 3 nights of additional discretionary sampling), adverse weather conditions can extend the completion date of a sweep. Logistical constraints can also restrict the number of casts completed. Discretionary sampling typically was focused on specific bathymetric features, such as Cordell Bank or Pioneer Canyon, or devoted to the intense study of oceanic features or processes that may be key to successful recruitment.

Collection of CTD Data at Sea

All CTD data obtained during the 1988 juvenile rockfish surveys were collected with a Sea-Bird Electronics SEACAT-SBE-19 profiler[5]. This particular unit is rated to a depth of 200 m and contains 64K of memory. Four data channels were used to record pressure (0.05% of full scale range [50-5,000 psia]), temperature (0.01 °C from -5 to +35 °C), and conductivity (0.001 S/m from 0 to 7 S/m) at a baud rate of 9,600. The profiler has been recalibrated annually by Sea-Bird Electronics, Inc., since its purchase in 1987. The CTD unit aboard the *JORDAN* was also intercalibrated *a posteriori* with three other CTD units, which were used by personnel from Monterey Bay Aquarium Research Institute, the Naval Postgraduate School, and the University of California at Santa Cruz, to collect data at selected mutually occupied stations during the same time period. This intercalibration revealed that differences in temperatures and salinities detected by these four CTD systems at the deepest common cast depths, where temporal variability is expected to be lowest, is less than the natural variability at these stations.

During deployment, the vessel was brought to a dead stop and the profiler was attached to a hydrographic winch cable. The profiler was then switched on and suspended underwater at the surface for a period of at least one minute to allow the conductivity and temperature sensors to equilibrate. The rate of descent was 60 m/minute to a depth 10 m off the bottom if water depths were less than 200 m. Otherwise the profiler was lowered to its maximum rated depth (200 m). Only data collected on the downcast were ultimately preserved for analysis. During the cast, certain collection information was recorded on data sheets, including (1) the date, (2) time, (3) geographical stratum, (4) a profiler-assigned cast number, (5) a cruise consecutive-index number, (6) the trawl station number (when appropriate),

[5]Sea-Bird Electronics, Inc., Bellevue, Washington. Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

(7) latitude, (8) longitude, and (9) bottom depth. Position fixes were obtained from the bridge using LORAN-C navigation.

Due to the limited storage capacity of the SEACAT-SBE-19 profiler (64K), data collected from a short series of casts (usually no more than five to seven) were periodically downloaded to a personal computer on board the vessel. During this step, each cast was stored as an individual file and named using a unique cruise consecutive-index number. After downloading, the profiler was reinitialized and the files on the personal computer were backed up on diskette.

An independent source of hydrographic data was also available. The *JORDAN* contains a thermosalinograph unit that provides a continuous data stream of surface temperature and salinity. These data were stored on diskette for further processing, analysis, and comparison with and verification of CTD observations. Position fixes for the thermosalinograph were based on the SATNAV navigation system.

Data Processing

The first step in data processing was to convert the downloaded binary data to ASCII format. This was accomplished using the SEASCII program supplied by Sea-Bird Electronics, Inc. The data were then analyzed with a FORTRAN program that performed the following functions (1) removal of the equilibration phase from the data stream, (2) removal of the upcast or retrieval phase from the data stream, (3) removal of extreme outliers (*i.e.*, spikes), (4) correcting phase differences in sensor response by reverse-lagging temperature data

$$(\text{i.e., } T_i = T_i + 0.9[T_{i+1} - T_i]),$$

(5) smoothing conductivity and temperature values using {1,4,6,4,1} weighting, (6) computing salinity and density for each scan using algorithms adapted from programs supplied by Sea-Bird Electronics, Inc. (SEASOFT, Version 2.5), (7) averaging temperature, salinity, and density values into 1-m depth bins, and (8) smoothing these using {1,2,3,2,1} weighting. A detailed discussion of the rationale behind these procedures may be found in the SEACAT-SBE-19 Conductivity, Temperature, Depth Recorder Operating and Repair Manual[6] (also see UNESCO 1988).

The bin-averaged data from each cast were then merged with the correct collection information (*e.g.*, date, time, position, etc.) and archived as

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[6]SEACAT-SBE-19 Conductivity, Temperature, Depth Recorder Operating and Repair Manual, Serial Number 24, 30 March 1987, Sea-Bird Electronics, Inc., 1405 132nd Avenue NE, Suite 3, Bellevue, Washington 98005, USA.

cast-specific dBase III files[7]. Prior to analysis, these were subsequently converted to ASCII format using a SAS macro[8] (SAS 1987).

Processed hydrographic data were summarized, by sweep, in a series of horizontal maps and vertical transects, and are presented in this report. All contouring of CTD data and products was done objectively using National Center for Atmospheric Research (NCAR) subroutines. The area containing data is triangulated, and a virtual grid is laid over the triangulated area. Values for the parameter being plotted are interpolated at each virtual grid point, using a smooth data interpolation scheme based on Lawson's C1 surface interpolation algorithm (Akima 1978). Computer graphic metafiles were then post-processed using the Adobe Illustrator 88 version 1.9.3 graphics software package[9]. Obviously bad CTD data values were excluded from the interpolation.

The thermosalinograph raw data stream was edited to provide a nearly continuous sampling track from each sweep. These data were contoured using the Surfer version 4.0 graphics software package[10], which computes estimates of temperature and salinity throughout a rectangular region, based on the thermosalinograph observations. Kriging was the optimal interpolation method used for the algorithm grid (*cf.*, Cressie 1991).

The calculation of potential temperature and the density parameter sigma-theta (σ_θ, based on potential temperature) was not necessary, since there is no significant difference between temperature and potential temperature at depths less than 200 m. To date, no attempt has been made to calculate geostrophic velocity because 1) the maximum cast depth of 200 m is much shallower than the reference depth of no motion (500 m) standard used by California Cooperative Oceanic Fisheries Investigations (CalCOFI), and 2) the large number of shallow stations during the survey necessitate the extrapolation of isopycnals into the shore, a procedure that is subject to great uncertainty. In addition, recent studies (Berryman 1989; Tisch 1990) suggest that geostrophic velocities calculated for stations spaced closer than the internal Rossby radius frequently feature alternating current bands of reversed flow, which are thought to be associated with inertial currents. The Rossby radius in the survey region is generally about 10-20 km, which is similar to the typical station spacing of the NMFS surveys. We are presently investigating the method that best determines dynamic heights based on closely spaced, shallow water stations, before attempting to calculate the geostrophic velocity field during these surveys.

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[7]Borland International, Scotts Valley, California. Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

[8]SAS Institutes Inc., Cary, North Carolina. Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

[9]Adobe Systems, Inc., Mountain View, California. Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

[10]Golden Software, Inc., Golden, Colorado. Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

Meteorological data were obtained for selected sites in the survey region. These sites include the region's four National Data Buoy Center (NDBC) moored buoys: 46013 (Bodega Bay; 38.2°N, 123.3°W), 46026 (Farallones; 37.8°N, 122.7°W), 46012 (Half Moon Bay; 37.4°N, 122.7°W) and 46042 (Monterey Bay; 36.8°N, 122.4°W), and a shore station at Monterey (Monterey Bay Aquarium; 36.6°N, 121.9°W). Daily averages of several surface meteorological parameters, including air and sea temperature, east and north wind components, and barometric pressure, were calculated for the time period that includes the 1988 *JORDAN* rockfish survey. Plots of several of these products are provided in this report, to aid in the interpretation of the hydrographic results and suggest possible atmospheric-oceanic interactions.

RESULTS

Below are a few brief comments on each of the data products contained in this report in the order that they appear.

Appendix 1: Master lists of CTD stations during *JORDAN* Cruises 8804 and 8806

The station lists include, from left to right; CTD station number, date (month, day, year), time (Pacific Daylight Time), latitude and longitude (degrees, minutes), and total station depth (in meters). Cruise DS8804 (April 16-22) includes stations 8804001-8804079 (75 acceptable casts). Cruise DS8806, sweep 1 (May 22-June 1) includes stations 0-143 (139 casts), sweep 2 (June 2-11) includes stations 144-276 (115 casts) and sweep 3 (June 11-18) includes stations 277-386 (108 casts).

Appendix 2: Bathymetric map of survey region

The bathymetry shown on the maps at the beginning of the figures for each survey was determined from CTD station depths. The locations of all acceptable casts are denoted with an "**x**". The close coincidence between many of the locations on cruise DS8806 reflects the repeated occupation of CTD station positions during the three sweeps.

Appendix 3: Atmospheric time series

Meteorological time series are presented for the four NDBC buoys and the land station at Monterey Bay Aquarium, as described above. The locations of these stations are shown on a map. The second figure in this section summarizes the daily average wind speed (m/s) and direction (relative to true north) at these stations, in stick vector form, for the period January through June, 1988. Vectors point in the direction toward which the wind was blowing; an arrow pointing toward the top of the page represents a northward-directed wind.

The following figures show scalar time series of sea surface temperature, or SST (°C); air temperature (°C); the north-south component of wind speed (m/s), a crude indicator of upwelling-favorable wind; and barometric pressure (millibars) at each meteorological station for the first 180 julian days of 1988. A positive wind value denotes a northward-directed wind

component. The survey periods for DS8804 and DS8806 (divided by sweep) are shaded in all time series plots.

Appendix 4: Horizontal maps of CTD station locations and hydrographic parameters, organized by sweep

a) Station location maps

Maps are presented at the beginning of each set of horizontal maps, showing the location of each CTD station by its last three digits. DS8804 or DS8806 in the upper right-hand corner of the station and all subsequent maps refer to the appropriate *JORDAN* cruise number; the number to the right of the cruise number DS8806 denotes the sweep number.

b) Maps of thermosalinograph surface temperature and salinity

Maps of surface temperature (°C) and salinity (ppt) obtained from the *JORDAN*'s thermosalinograph continuous profiling unit are presented for each sweep, except for sweep 3 of DS8806. The contour intervals are 0.5 °C for temperature and 0.2 ppt for salinity. They are included to provide some verification for the CTD observations. The gridding algorithm was set to extrapolate contours over the region set by the sampling array. The 5-m CTD and surface thermosalinograph maps display good quantitative agreement, despite the fact that 1) the data used to generate each were collected by different instrument packages, and 2) each set of maps was generated independently by two separate research groups utilizing different software systems, objective interpolation schemes and computer hardware.

c) Maps of CTD temperature, salinity and sigma-t (σ_t), by depth

Horizontal maps of temperature (°C), salinity (ppt) and sigma-t (σ_t) (kg/m^3) are presented at depths of 5 m, 30 m, 50 m, 100 m and 200 m. The 5-m surface was selected to represent near-surface conditions because 1) the quality of data in the first few meters below the surface was not acceptable at some stations, and 2) localized, ephemeral conditions, related to factors such as strong surface heating and low vertical mixing that did not reflect the realistic, longer-term conditions of the region, were generally confined to the upper 5 m (refer to footnote 4). The 30-m surface was contoured to coincide with the standard midwater trawl depth during the surveys. The contour intervals are 0.2 °C, 0.1 ppt and 0.1 kg/m^3, respectively. Bold contours at 1.0 °C, 0.5 ppt, and 0.5 kg/m^3 intervals have been included for clarity.

d) Maps of other hydrographic products

i) Mixed layer depths (m) were calculated as the shallowest depth below which the density increased by more than 0.15 kg/m^3 over a 5-m interval of depth. The contour interval is 5 m; bold contours are included every 20 m.

ii) The density difference between 30 m and 0 m is generally related to the mixed layer depth. The contour interval is 0.1 kg/m^3; bold contours are included every 0.4 kg/m^3. Positive values denote an increase in density with depth. Shaded areas denote a change of $\leq$ .1 kg/m^3 (denoting an unstable or well-mixed upper water column).

iii) The depths of the 11.0 °C isotherm (DS8804), 10.5 °C isotherm (DS8806) and 8.5 °C isotherm (both surveys) are included. These isothermal surfaces were selected to represent conditions above and below the thermocline, respectively, and to optimize the number of CTD stations whose data could be included in each map. The contour interval is 5 m; bold contours are included every 20 m. Shaded areas denote regions where the 11.0°C isotherm and 10.5 °C isotherm outcrop at the surface. The heavy line on the 8.5 °C map denotes the approximate position where that isotherm intersects with the bottom.

iv) The depth of, and temperature and salinity on the 25.8 σ_t surface (DS8804) and on the 26.0 σ_t surface (DS8806) are contoured in the final series of maps in this section. Again, these surfaces were selected to maximize the number of CTD casts that included the same σ_t value. The contour intervals are 5 m, 0.2 °C and 0.1 ppt, respectively. Bold contours at 20 m, 1.0 °C, and 0.5 ppt have been included. Shaded areas denote regions where the 25.8 σ_t surface and 26.0 σ_t surface outcrop at the surface. In the absence of geostrophic velocity calculations, these maps provide a crude estimate of the circulation (Leipper 1970; Moomy 1973). The flow is generally parallel to the topography of this surface. The surface shoals from right to left, looking downstream. Closer-spaced depth contours indicate areas of higher velocity.

Appendix 5: Vertical transects

Vertical transects of temperature, salinity and σ_t are contoured for five cross-shelf transects: Pt. Reyes (38.2°N), Farallones (37.8°N), Pescadero (37.3°N), Davenport (37.0°N), and Monterey (36.7°N). Data were not collected in the Pt. Reyes region during the DS8804 survey. Station maps denote the location of each transect and the stations used to generate the plots for each sweep. The large solid circles on the transect contour plots show the position of all CTD stations used to generate contours. The contour interval for these figures is 0.5 °C for temperature, 0.1 ppt for salinity, and 0.1 kg/m^3 for σ_t. Bold contours at 2.0 °C, 0.5 ppt, and 0.5 kg/m^3 intervals have been included.

Appendix 6: Temperature-salinity plots

Temperature-salinity (T-S) pairs are plotted, by sweep, at 1-m depth intervals for all CTD casts. Bad data pairs have been edited out. Selected subsets of T-S pairs have been plotted separately for northern, central, and southern portions of each sweep. The bold numbers are the cruise number. The numbers in parentheses refer to the stations represented in each plot.

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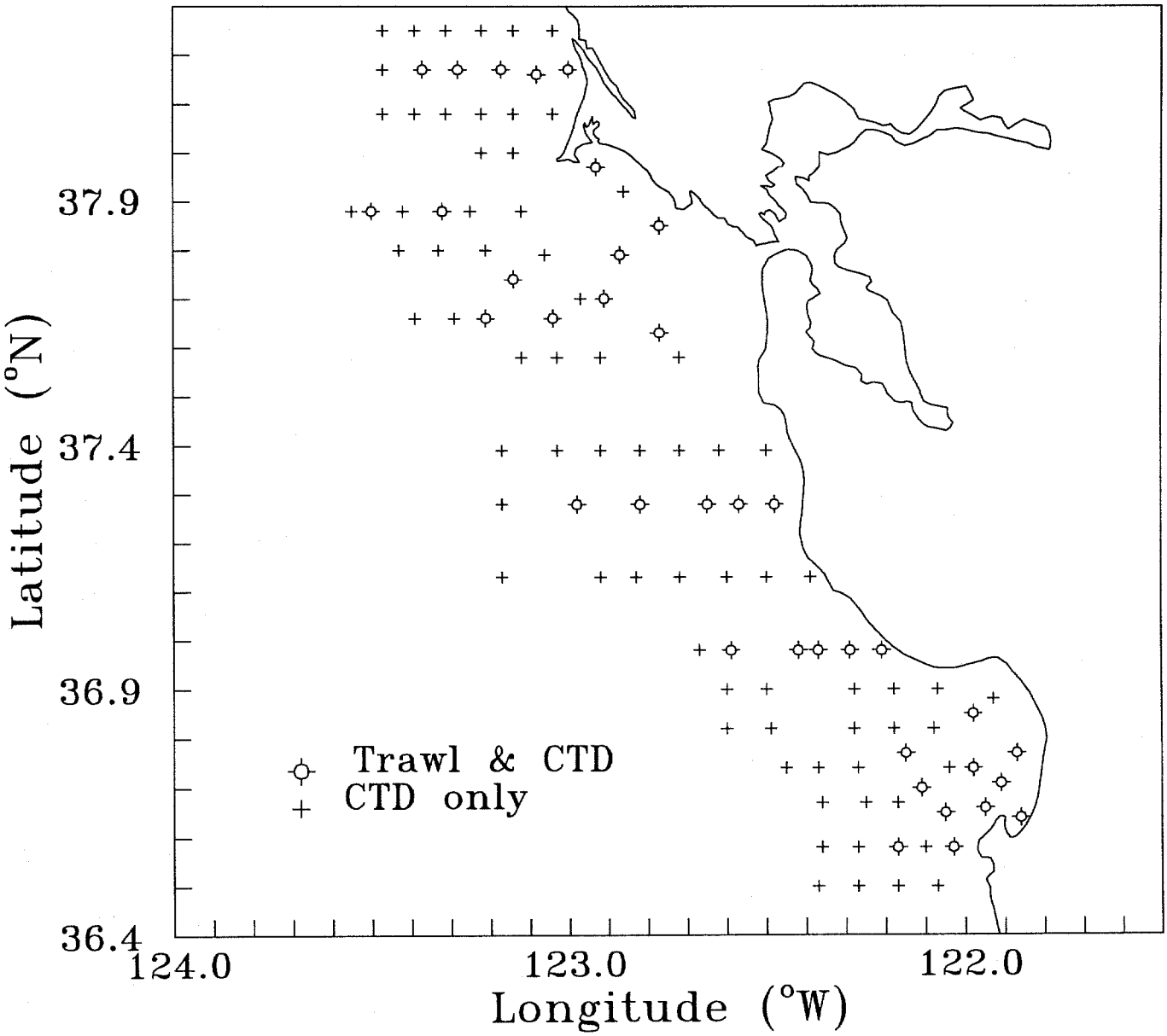
Table 1.--List of planned CTD stations conducted during cruises of the rockfish recruitment program at the Tiburon Laboratory.

Latitude	Longitude	Station Type
36 30.0	122 4.0	CTD Only
36 30.0	122 10.0	CTD Only
36 30.0	122 16.0	CTD Only
36 30.0	122 22.5	CTD Only
36 35.0	122 2.0	Trawl and CTD
36 35.0	122 6.0	CTD Only
36 35.0	122 10.5	Trawl and CTD
36 35.0	122 16.0	CTD Only
36 35.0	122 21.5	CTD Only
36 38.5	121 51.5	Trawl and CTD
36 38.8	122 3.0	Trawl and CTD
36 39.3	121 56.8	Trawl and CTD
36 40.0	122 10.0	CTD Only
36 40.0	122 15.0	CTD Only
36 40.0	122 21.5	CTD Only
36 42.0	122 6.5	Trawl and CTD
36 42.5	121 54.5	Trawl and CTD
36 44.4	121 58.6	Trawl and CTD
36 44.4	122 2.5	CTD Only
36 44.4	122 16.0	CTD Only
36 44.4	122 22.0	CTD Only
36 44.4	122 27.0	CTD Only
36 46.0	121 52.0	Trawl and CTD
36 46.4	122 9.0	Trawl and CTD
36 49.0	122 5.0	CTD Only
36 49.0	122 11.0	CTD Only
36 49.0	122 17.0	CTD Only
36 49.0	122 23.5	CTD Only
36 49.0	122 29.5	CTD Only
36 49.0	122 36.0	CTD Only
36 50.8	121 59.0	Trawl and CTD
36 54.0	122 4.5	CTD Only
36 54.0	122 11.0	CTD Only
36 54.0	122 17.0	CTD Only
36 54.0	122 23.0	CTD Only
36 54.0	122 30.0	CTD Only
36 54.0	122 36.0	CTD Only
36 59.0	122 12.5	Trawl and CTD
36 59.0	122 17.5	Trawl and CTD
36 59.0	122 22.5	Trawl and CTD
36 59.0	122 25.5	Trawl and CTD
36 59.0	122 35.5	Trawl and CTD
36 59.0	122 40.0	CTD Only
37 8.0	122 23.5	CTD Only
37 8.0	122 30.0	CTD Only
37 8.0	122 36.0	CTD Only
37 8.0	122 43.0	CTD Only
37 8.0	122 50.0	CTD Only
37 8.0	122 55.5	CTD Only
37 8.0	123 10.0	CTD Only
37 16.5	122 29.0	Trawl and CTD
37 16.5	122 34.0	Trawl and CTD

37 16.5	122 39.0	Trawl and CTD
37 16.5	122 49.0	Trawl and CTD
37 16.5	122 59.0	Trawl and CTD
37 16.5	123 10.0	CTD Only
37 23.5	122 30.0	CTD Only
37 23.5	122 37.5	CTD Only
37 23.5	122 43.0	CTD Only
37 23.5	122 49.0	CTD Only
37 23.5	122 55.0	CTD Only
37 23.5	123 1.5	CTD Only
37 23.5	123 10.0	CTD Only
37 35.0	122 43.0	CTD Only
37 35.0	122 55.0	CTD Only
37 35.0	123 1.5	CTD Only
37 35.0	123 7.5	CTD Only
37 38.0	122 46.0	Trawl and CTD
37 39.5	123 2.5	Trawl and CTD
37 39.5	123 12.5	Trawl and CTD
37 39.5	123 17.5	CTD Only
37 39.5	123 23.5	CTD Only
37 42.0	122 54.5	Trawl and CTD
37 42.0	122 58.0	CTD Only
37 45.0	123 8.0	Trawl and CTD
37 47.5	122 52.0	Trawl and CTD
37 47.5	123 3.5	CTD Only
37 48.0	123 12.5	CTD Only
37 48.0	123 20.0	CTD Only
37 48.0	123 26.0	CTD Only
37 51.0	122 46.0	Trawl and CTD
37 53.0	123 7.0	CTD Only
37 53.0	123 15.0	CTD Only
37 53.0	123 19.0	Trawl and CTD
37 53.0	123 25.0	CTD Only
37 53.0	123 30.0	Trawl and CTD
37 53.0	123 33.0	CTD Only
37 55.0	122 51.5	CTD Only
37 58.0	122 56.0	Trawl and CTD
38 0.0	123 8.5	CTD Only
38 0.0	123 13.5	CTD Only
38 5.0	123 2.5	CTD Only
38 5.0	123 8.5	CTD Only
38 5.0	123 13.5	CTD Only
38 5.0	123 18.5	CTD Only
38 5.0	123 23.5	CTD Only
38 5.0	123 28.5	CTD Only
38 9.5	123 5.0	Trawl and CTD
38 10.0	123 0.0	Trawl and CTD
38 10.0	123 10.0	Trawl and CTD
38 10.0	123 17.0	Trawl and CTD
38 10.0	123 22.0	Trawl and CTD
38 10.0	123 28.5	CTD Only
38 15.0	123 2.5	CTD Only
38 15.0	123 8.5	CTD Only
38 15.0	123 13.5	CTD Only
38 15.0	123 18.5	CTD Only
38 15.0	123 23.5	CTD Only
38 15.0	123 28.5	CTD Only

Figure 1.--Map of the juvenile rockfish recruitment study area.



APPENDIX 1.1: MASTER LIST OF CTD STATIONS- DS8804

STATION	DATE	TIME	LAT		LONG		DEPTH
8804001	041688	1252	36	44.3	122	2.4	604
8804003	041688	1345	36	49.0	122	4.9	102
8804004	041688	1445	36	48.9	122	11.0	483
8804005	041688	1530	36	49.0	122	17.0	801
8804006	041688	1626	36	49.0	122	23.3	1328
8804007	041688	1716	36	53.9	122	23.0	812
8804008	041688	1800	36	53.9	122	17.1	695
8804009	041688	1840	36	53.9	122	11.1	93
8804010	041688	1950	36	50.7	121	59.2	90
8804011	041688	2250	36	45.7	121	53.0	86
8804012	041688	2333	36	44.4	121	58.5	274
8804013	041788	204	36	44.0	121	55.8	101
8804014	041788	245	36	39.2	121	56.9	82
8804015	041788	559	36	38.9	121	53.8	71
8804016	041788	704	36	38.6	121	52.0	46
8804017	041788	1002	36	40.3	121	59.2	110
8804018	041788	1037	36	38.8	122	3.1	944
8804019	041788	1529	36	40.0	122	9.9	1130
8804020	041788	1639	36	40.0	122	14.9	1322
8804021	041788	1719	36	35.0	122	16.0	2355
8804022	041788	1825	36	34.9	122	6.0	1353
8804023	041788	1931	36	35.0	122	10.5	2359
8804024	041888	6	36	36.0	122	3.4	1271
8804025	041888	41	36	38.8	122	3.0	903
8804026	041888	238	36	42.2	122	8.3	1390
8804027	041888	325	36	46.5	122	9.0	909
8804028	041888	715	36	44.5	122	16.0	951
8804029	041888	759	36	44.5	122	22.0	1591
8804030	041888	839	36	44.4	122	27.1	2012
8804031	041888	924	36	49.0	122	29.5	2103
8804032	041888	1015	36	49.0	122	36.0	1829
8804033	041888	1110	36	54.0	122	30.0	1074
8804034	041888	1151	36	54.0	122	36.0	1474
8804035	041888	1248	36	59.2	122	40.0	561
8804036	041888	1355	37	8.1	122	35.9	110
8804039	041888	1955	36	59.0	122	12.6	40
8804040	041888	2218	36	58.0	122	16.8	90
8804041	041888	2258	36	59.1	122	22.4	119
8804042	041988	326	36	59.5	122	24.5	331
8804043	041988	531	36	58.6	122	36.5	463
8804044	041988	705	37	8.0	122	42.9	201
8804045	041988	752	37	8.0	122	50.0	457
8804046	041988	840	37	7.9	122	55.4	563
8804047	041988	1020	37	7.8	123	10.1	1829
8804048	041988	1130	37	16.6	123	9.9	1044
8804049	041988	1235	37	23.4	123	9.6	940
8804050	041988	1328	37	23.4	123	1.5	878
8804051	041988	1420	37	23.4	122	54.4	439
8804052	041988	1505	37	23.5	122	49.1	104
8804053	041988	1542	37	23.5	122	42.8	91
8804054	041988	1619	37	23.5	122	37.6	77
8804055	041988	1705	37	23.5	122	30.0	44
8804056	041988	1930	37	16.5	122	29.0	53
8804057	041988	2151	37	16.0	122	34.2	91
8804058	041988	2236	37	16.4	122	38.9	99
8804059	042088	229	37	15.4	122	49.4	214

STATION	DATE	TIME	LAT		LONG		DEPTH
8804060	042088	336	37	16.3	122	59.1	529
8804061	042088	655	37	35.0	122	55.0	101
8804062	042088	748	37	35.0	123	1.5	280
8804064	042088	839	37	35.0	123	7.5	1061
8804065	042088	945	37	39.4	123	17.3	1737
8804066	042088	1110	37	48.0	123	26.0	1434
8804067	042088	1158	37	48.0	123	19.5	563
8804068	042088	1252	37	48.0	123	12.4	80
8804069	042088	1520	37	47.4	123	3.5	73
8804070	042088	2003	37	39.4	123	2.5	108
8804071	042088	2226	37	40.9	123	12.7	1297
8804072	042088	2314	37	44.8	123	8.3	68
8804073	042188	207	37	53.8	123	20.6	112
8804074	042188	303	37	52.9	123	30.2	1406
8804075	042188	2005	37	57.9	122	56.0	53
8804076	042188	2242	37	51.8	122	47.0	46
8804077	042188	2332	37	47.3	122	52.4	59
8804078	042288	134	37	41.7	122	55.7	59
8804079	042288	236	37	38.1	122	45.8	55

APPENDIX 1.2: MASTER LIST OF CTD STATIONS- DS8806

SWEEP 1

STATION	DATE	TIME	LAT	LONG	DEPTH
8806000	052288	1213	36 41.0	121 58.0	104
8806001	052288	1254	36 41.1	122 4.0	1311
8806002	052288	1356	36 47.0	121 58.1	448
8806003	052288	1448	36 47.1	122 3.8	236
8806004	052288	1611	36 52.9	122 10.0	99
8806005	052288	1651	36 53.0	122 4.0	68
8806006	052288	2040	36 50.8	121 58.9	93
8806007	052288	2311	36 46.3	121 53.8	304
8806008	052288	2355	36 44.5	121 58.6	291
8806009	052388	207	36 42.6	121 56.1	101
8806010	052388	238	36 39.3	121 56.8	84
8806011	052388	455	36 38.5	121 51.5	44
8806012	052388	630	36 38.5	121 51.5	44
8806013	052388	830	36 39.3	121 56.9	86
8806014	052388	1005	36 35.1	122 6.0	1372
8806015	052388	1110	36 30.0	122 3.9	924
8806016	052388	1156	36 30.0	122 10.1	1280
8806017	052388	1310	36 35.0	122 16.0	2388
8806018	052388	1420	36 41.0	122 16.0	1298
8806019	052388	1518	36 40.9	122 10.1	1044
8806020	052388	2035	36 34.9	122 10.5	201
8806021	052488	640	36 47.0	122 28.0	2012
8806022	052488	726	36 47.0	122 22.0	1693
8806023	052488	812	36 47.0	122 15.9	785
8806024	052488	922	36 47.0	122 4.0	430
8806025	052488	1022	36 41.0	121 58.1	102
8806026	052488	1104	36 41.0	122 4.0	1189
8806027	052488	1152	36 41.0	122 10.0	1044
8806028	052488	1239	36 41.0	122 16.0	1300
8806029	052488	1331	36 35.0	122 16.0	2286
8806030	052488	1429	36 30.0	122 10.1	1189
8806031	052488	1522	36 30.1	122 4.0	931
8806032	052488	1612	36 35.0	122 6.0	1405
8806033	052488	2033	36 34.8	122 10.5	2012
8806034	052588	47	36 34.8	122 2.6	969
8806035	052588	129	36 38.8	122 3.0	850
8806036	052588	318	36 42.1	122 7.8	1372
8806037	052588	408	36 46.4	122 9.0	1020
8806038	052588	645	36 53.0	122 10.0	99
8806039	052588	722	36 53.0	122 16.0	622
8806040	052588	812	36 53.0	122 22.0	887
8806041	052588	900	36 53.0	122 28.0	1426
8806042	052588	946	36 53.0	122 34.0	1426
8806043	052588	1031	36 53.0	122 40.0	1829
8806044	052588	1133	36 59.0	122 40.1	576
8806045	052588	1217	36 59.0	122 46.0	1066
8806046	052588	1350	37 7.9	122 36.0	108
8806047	052588	1434	37 8.0	122 30.0	108
8806048	052588	1516	37 8.1	122 23.6	42
8806049	052588	2040	36 58.9	122 12.5	38
8806050	052588	2225	36 58.9	122 18.6	79
8806051	052588	2250	36 59.0	122 22.5	119
8806052	052688	35	36 59.1	122 25.5	454
8806053	052688	414	36 57.9	122 35.6	514

STATION	DATE	TIME	LAT		LONG		DEPTH
8806054	052688	610	37	8.2	122	42.9	188
8806055	052688	703	37	8.0	122	50.0	466
8806056	052688	812	37	8.0	123	0.1	653
8806057	052688	938	37	16.5	123	8.0	854
8806058	052688	1037	37	23.5	123	10.1	984
8806059	052688	1135	37	23.5	123	1.6	860
8806060	052688	1225	37	23.5	122	55.1	475
8806061	052688	1307	37	23.5	122	49.0	110
8806062	052688	1354	37	23.5	122	43.1	90
8806063	052688	1431	37	23.5	122	37.5	75
8806064	052688	1514	37	23.4	122	29.9	44
8806065	052688	2035	37	16.4	122	29.1	55
8806066	052688	2313	37	15.2	122	35.7	97
8806067	052688	2338	37	16.5	122	39.0	99
8806068	052788	305	37	15.9	122	50.4	225
8806069	052788	403	37	16.5	122	59.0	536
8806070	052788	645	37	35.0	122	55.0	101
8806071	052788	730	37	35.0	123	1.5	262
8806072	052788	816	37	35.0	123	7.5	1061
8806073	052788	928	37	39.6	123	17.4	1737
8806074	052788	1015	37	39.5	123	23.5	2377
8806075	052788	1145	37	48.0	123	12.5	80
8806076	052788	1248	37	48.0	123	17.4	137
8806077	052788	1346	37	47.9	123	26.0	1372
8806078	052788	1447	37	53.0	123	33.2	2213
8806079	052788	1540	37	52.9	123	25.0	208
8806080	052788	1646	37	53.0	123	15.0	101
8806081	052788	1822	37	47.5	123	3.5	77
8806082	052788	1913	37	42.0	122	58.0	55
8806083	052788	2038	37	39.5	123	2.5	110
8806084	052788	2258	37	39.0	123	14.0	1244
8806085	052788	2353	37	45.0	123	8.1	64
8806086	052888	216	37	53.8	123	19.8	106
8806087	052888	522	37	54.3	123	30.9	1463
8806088	052888	617	38	0.0	123	30.0	536
8806089	052888	710	38	5.0	123	28.5	143
8806090	052888	755	38	10.0	123	28.5	360
8806091	052888	843	38	15.0	123	28.4	316
8806092	052888	922	38	15.0	123	23.4	163
8806093	052888	958	38	15.0	123	18.6	124
8806094	052888	1032	38	15.0	123	13.6	101
8806095	052888	1105	38	15.1	123	8.9	90
8806096	052888	1155	38	15.0	123	2.6	53
8806097	052888	1306	38	5.1	123	2.4	64
8806101	052888	1630	38	0.0	123	16.0	115
8806102	052888	1930	38	5.0	123	23.5	163
8806103	052888	2038	38	10.0	123	22.0	194
8806104	052988	220	38	7.5	123	17.2	126
8806105	052988	316	38	10.2	123	10.0	93
8806106	052988	508	38	8.4	123	5.4	77
8806107	052988	1506	37	52.8	123	7.1	95
8806108	052988	1610	37	47.5	122	58.0	90
8806109	052988	1935	37	55.0	122	51.6	49
8806110	053088	852	37	42.0	122	58.0	51
8806111	053088	949	37	35.0	122	55.0	101
8806113	053088	2100	37	28.0	122	47.2	90

STATION	DATE	TIME	LAT	LONG	DEPTH
8806114	053088	2303	37 37.8	122 46.2	55
8806115	053188	521	37 57.3	122 54.3	49
8806116	053188	620	37 51.0	122 46.0	42
8806117	053188	705	37 47.5	122 52.0	57
8806118	053188	741	37 47.5	122 57.7	68
8806119	053188	825	37 42.0	122 54.7	57
8806120	053188	902	37 40.0	123 0.0	68
8806121	053188	957	37 40.0	123 10.0	951
8806122	053188	1104	37 40.0	123 20.0	2103
8806123	053188	1216	37 40.2	123 29.8	2743
8806124	053188	1359	37 40.0	123 45.0	3292
8806125	053188	1447	37 34.9	123 45.1	3292
8806126	053188	1557	37 35.0	123 55.1	3658
8806127	053188	1714	37 45.0	123 55.0	3475
8806128	053188	1821	37 45.0	123 45.0	3356
8806129	053188	1920	37 50.0	123 38.4	3072
8806130	053188	2100	37 41.8	123 38.4	3200
8806131	060188	36	37 38.7	123 44.4	3292
8806132	060188	255	37 40.3	123 43.2	3292
8806134	060188	347	37 36.8	123 47.4	3292
8806135	060188	550	37 38.4	123 49.3	3383
8806136	060188	957	37 43.5	123 24.0	1829
8806137	060188	1127	37 42.6	123 22.1	1829
8806138	060188	1206	37 39.8	123 21.2	2469
8806139	060188	1320	37 38.7	123 23.1	2469
8806140	060188	1415	37 40.2	123 22.5	2286
8806141	060188	1645	37 44.7	123 21.4	1554
8806142	060188	2047	37 51.0	123 40.8	3200
8806143	060188	2352	37 35.0	123 40.0	3475
		SWEEP 2			
8806144	060288	830	36 53.0	122 10.0	91
8806145	060288	910	36 53.0	122 3.9	64
8806146	060288	950	36 47.0	122 4.0	380
8806147	060288	1037	36 41.0	122 4.0	1253
8806148	060288	1121	36 41.0	121 58.0	101
8806149	060288	1233	36 47.0	121 58.0	439
8806151	060288	2051	36 50.8	121 59.0	86
8806152	060288	2315	36 46.6	121 53.4	274
8806153	060288	2355	36 44.5	121 58.6	287
8806154	060388	147	36 41.7	121 53.3	77
8806155	060388	215	36 38.5	121 51.4	37
8806156	060388	435	36 40.1	121 58.3	99
8806157	060388	542	36 41.0	122 10.0	1097
8806158	060388	626	36 41.0	122 16.0	1262
8806159	060388	710	36 41.0	122 22.0	1646
8806160	060388	759	36 35.0	122 22.0	2249
8806161	060388	854	36 35.0	122 16.0	2286
8806162	060388	940	36 30.0	122 16.0	1308
8806164	060388	1055	36 30.0	122 10.0	1280
8806165	060388	1218	36 30.0	122 4.0	896
8806166	060388	1314	36 34.8	122 6.1	1372
8806167	060388	1353	36 37.9	122 10.7	2286
8806168	060388	2050	36 35.0	122 10.5	2323
8806169	060488	54	36 34.5	122 0.6	311

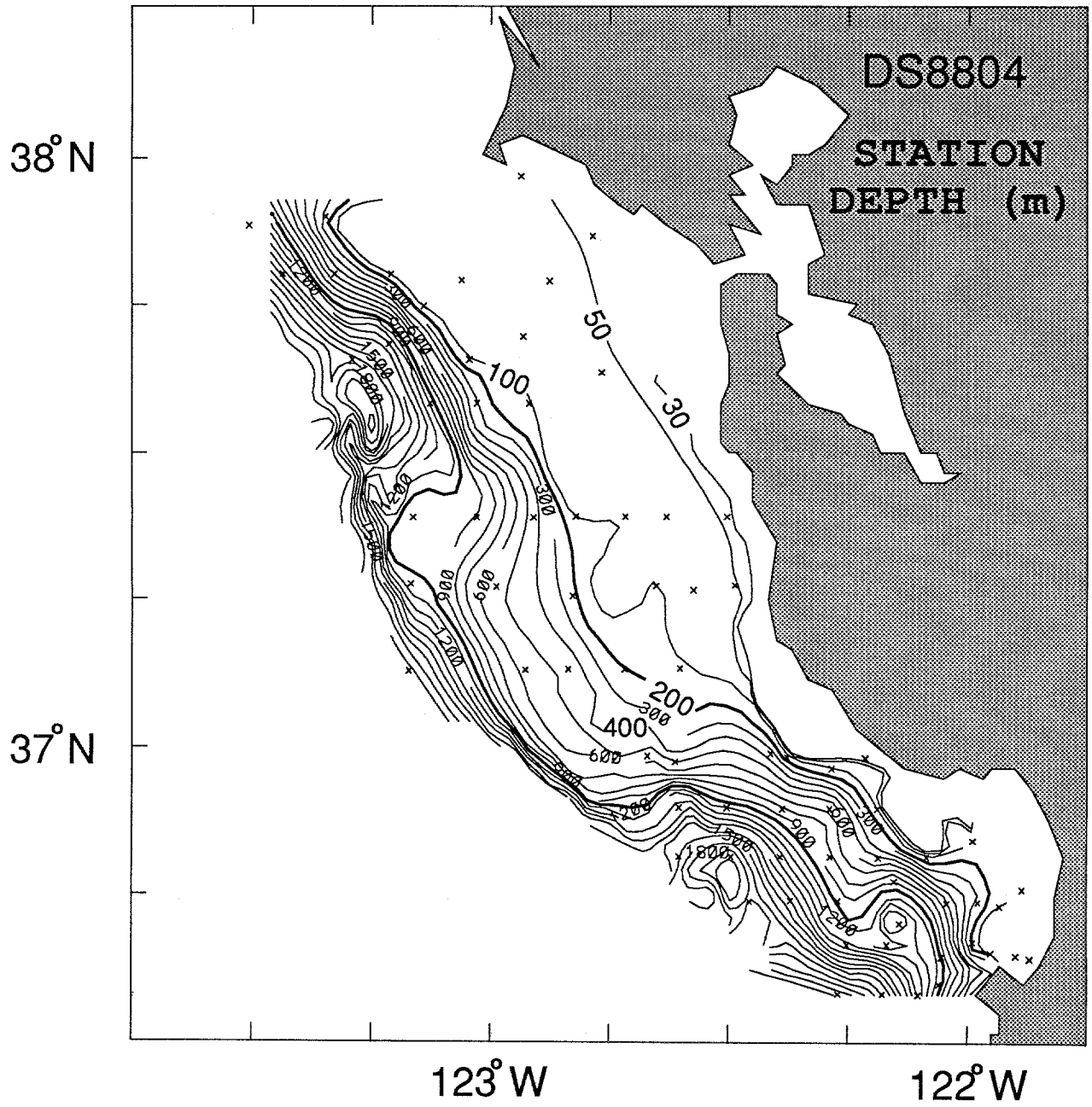
STATION	DATE	TIME	LAT		LONG		DEPTH
8806170	060488	142	36	38.7	122	3.2	914
8806171	060488	320	36	42.6	122	8.0	1920
8806172	060488	400	36	46.4	122	9.0	914
8806173	060488	530	36	47.0	122	16.0	810
8806174	060488	635	36	47.0	122	22.0	1664
8806175	060488	721	36	47.0	122	28.0	2030
8806176	060488	843	36	53.0	122	16.0	594
8806177	060488	928	36	53.0	122	22.0	823
8806178	060488	1014	36	53.0	122	28.0	1463
8806179	060488	1058	36	53.0	122	34.0	1536
8806180	060488	1200	36	59.0	122	40.0	604
8806181	060488	1249	36	59.1	122	46.0	1006
8806182	060488	1410	37	8.1	122	36.2	106
8806183	060488	1450	37	8.0	122	30.0	86
8806184	060488	1530	37	8.0	122	23.5	40
8806185	060488	2046	36	58.9	122	12.4	38
8806186	060488	2235	36	59.0	122	18.8	86
8806187	060488	2356	36	59.0	122	22.5	117
8806188	060588	258	36	58.3	122	26.1	457
8806189	060588	440	36	58.4	122	36.2	479
8806190	060588	607	37	8.0	122	43.0	219
8806191	060588	701	37	8.0	122	50.0	457
8806192	060588	814	37	8.0	123	0.2	695
8806193	060588	953	37	16.5	123	8.0	914
8806194	060588	1100	37	23.4	123	10.0	951
8806195	060588	1159	37	23.5	123	1.5	594
8806196	060588	1245	37	23.6	122	55.0	439
8806197	060588	1343	37	23.5	122	49.0	106
8806198	060588	1428	37	23.5	122	43.2	90
8806199	060588	1505	37	23.5	122	37.5	77
8806200	060588	1553	37	23.5	122	30.0	46
8806201	060588	2050	37	16.4	122	29.6	49
8806202	060588	2229	37	16.1	122	35.5	91
8806203	060588	2257	37	16.5	122	38.9	97
8806204	060688	222	37	16.7	122	50.9	243
8806205	060688	356	37	16.7	122	57.7	470
8806212	060688	1134	37	48.0	123	17.5	155
8806213	060688	1224	37	48.0	123	26.0	1359
8806214	060688	1335	37	53.0	123	33.4	2213
8806215	060688	1433	37	52.9	123	25.1	218
8806216	060688	1545	37	53.0	123	15.0	99
8806217	060688	1907	37	47.5	123	3.5	79
8806218	060688	2058	37	39.5	123	2.4	106
8806219	060688	2305	37	39.6	123	13.8	1244
8806220	060788	1	37	45.0	123	8.1	66
8806221	060788	222	37	53.2	123	20.6	110
8806222	060788	521	37	53.0	123	32.0	1463
8806223	060788	747	37	53.0	123	7.0	93
8806225	060788	2000	37	35.0	122	43.0	55
8806226	060788	2047	37	38.0	122	46.0	55
8806227	060788	2322	37	41.5	122	56.2	55
8806228	060788	2340	37	42.0	122	58.0	51
8806229	060888	32	37	47.6	122	51.9	59
8806230	060888	231	37	52.0	122	45.0	38
8806231	060888	312	37	54.9	122	51.5	49
8806232	060888	424	37	57.1	122	57.2	60

STATION	DATE	TIME	LAT	LONG	DEPTH
8806233	060888	530	38 0.0	123 8.0	82
8806234	060888	611	38 0.0	123 15.0	112
8806235	060888	700	38 5.0	123 19.0	139
8806236	060888	759	38 5.0	123 10.0	93
8806237	060888	835	38 5.0	123 2.5	64
8806238	060888	943	38 15.0	123 2.5	49
8806239	060888	1027	38 15.0	123 10.0	91
8806240	060888	1120	38 15.0	123 18.9	123
8806241	060888	1225	38 15.0	123 28.5	318
8806242	060888	1308	38 10.0	123 28.5	351
8806243	060888	1350	38 5.0	123 28.6	143
8806244	060888	1435	38 0.0	123 29.9	490
8806245	060888	2045	38 9.8	123 22.0	177
8806246	060988	6	38 8.5	123 15.9	119
8806247	060988	48	38 9.9	123 10.0	93
8806248	060988	222	38 10.3	123 3.7	73
8806249	060988	323	38 11.2	122 59.2	38
8806250	060988	715	37 53.0	123 33.0	2213
8806251	060988	825	37 53.0	123 25.0	183
8806252	060988	932	37 53.0	123 15.0	97
8806253	060988	1020	37 53.0	123 7.0	91
8806254	060988	1105	37 47.5	123 3.5	73
8806255	060988	1207	37 48.0	123 12.4	77
8806256	060988	1248	37 48.1	123 17.4	137
8806257	060988	1343	37 48.0	123 25.9	1361
8806258	060988	1447	37 39.5	123 23.5	2377
8806259	060988	2047	37 53.0	123 19.0	86
8806260	061088	42	37 52.2	123 31.9	1829
8806270	061088	1124	37 43.0	123 30.0	2355
8806271	061088	1229	37 43.0	123 20.1	3255
8806272	061088	1412	37 37.6	123 9.4	1554
8806273	061088	1515	37 37.5	122 59.9	115
8806274	061088	2019	37 42.5	123 55.0	3383
8806275	061088	2300	37 44.7	124 1.7	3566
8806276	061188	24	37 48.0	123 50.0	3658
		SWEEP 3			
8806277	061188	1210	36 52.8	122 9.6	99
8806278	061188	1250	36 53.0	122 4.0	68
8806279	061188	1330	36 47.0	122 4.0	452
8806280	061188	1422	36 41.0	122 4.0	1280
8806281	061188	1509	36 41.0	121 57.9	104
8806282	061188	1555	36 47.0	121 58.0	461
8806283	061188	2047	36 50.8	121 59.0	91
8806284	061188	2312	36 45.6	121 53.7	219
8806285	061188	2352	36 44.4	121 58.6	280
8806286	061288	139	36 41.4	121 54.9	90
8806287	061288	212	36 38.5	121 51.5	38
8806288	061288	445	36 38.8	121 58.4	68
8806289	061288	600	36 41.0	122 10.0	1061
8806290	061288	640	36 41.0	122 16.0	1262
8806291	061288	727	36 41.0	122 22.0	1646
8806292	061288	812	36 35.0	122 22.0	2249
8806293	061288	858	36 35.0	122 16.1	2286
8806294	061288	945	36 30.0	122 16.0	1372

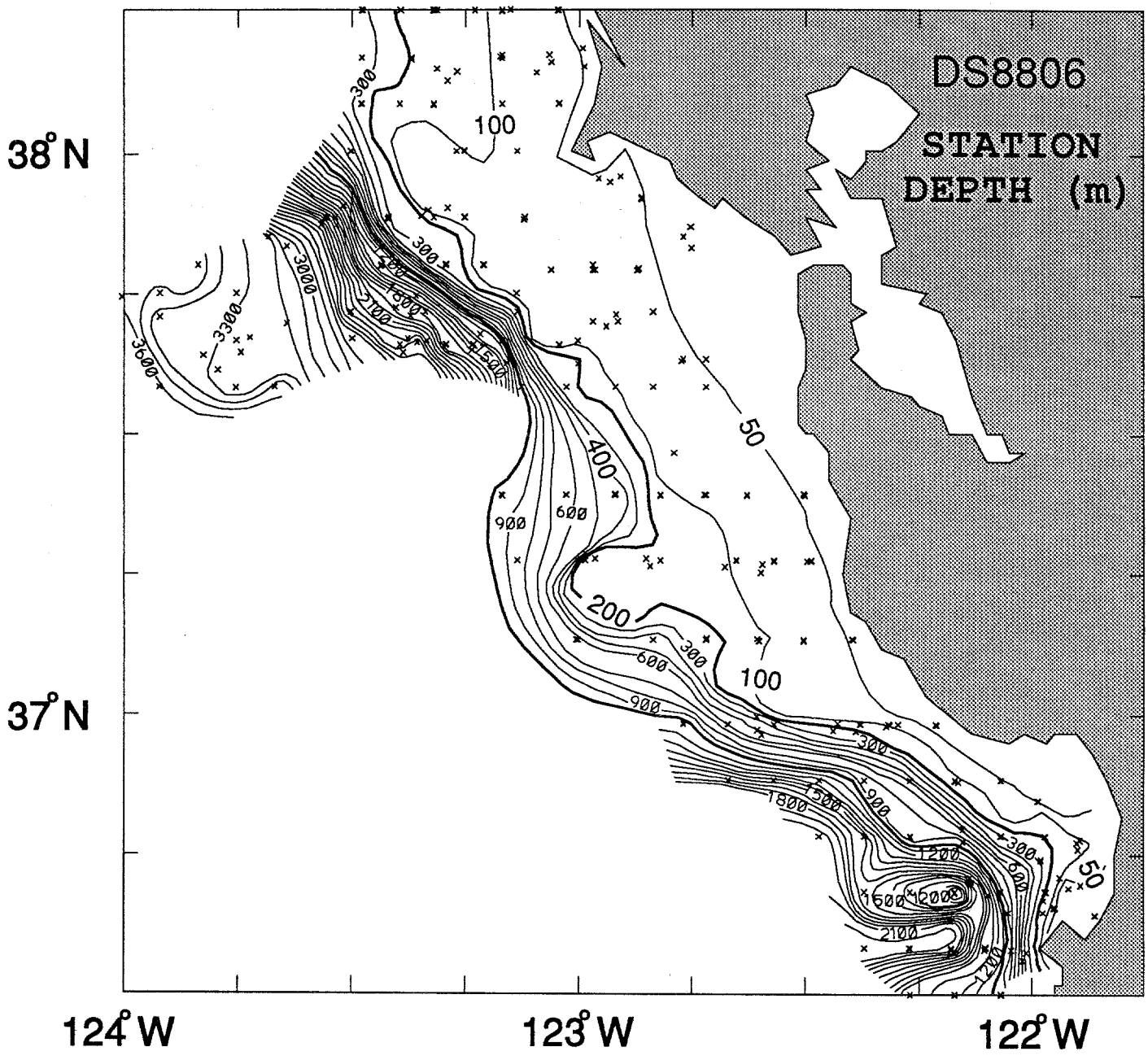
STATION	DATE	TIME	LAT		LONG		DEPTH
8806295	061288	1030	36	30.0	122	10.0	1280
8806296	061288	1115	36	30.0	122	4.0	935
8806297	061288	1200	36	35.0	122	6.0	1280
8806299	061288	2049	36	35.0	122	10.5	2286
8806300	061388	44	36	33.7	122	1.1	539
8806301	061388	132	36	38.8	122	3.0	913
8806302	061388	332	36	40.7	122	5.7	1920
8806303	061388	454	36	47.8	122	9.0	931
8806304	061388	645	36	47.0	122	28.0	2012
8806305	061388	712	36	47.0	122	22.0	1646
8806306	061388	810	36	47.0	122	16.0	794
8806307	061388	902	36	53.0	122	16.0	640
8806308	061388	945	36	53.0	122	22.0	823
8806309	061388	1030	36	53.0	122	28.0	1463
8806310	061388	1115	36	53.0	122	34.0	1536
8806311	061388	1225	36	59.0	122	34.0	574
8806312	061388	1335	37	7.9	122	35.9	110
8806313	061388	1415	37	7.9	122	30.0	91
8806314	061388	1455	37	8.0	122	23.5	44
8806315	061388	1600	36	59.0	122	17.5	82
8806316	061388	2049	36	59.0	122	12.5	37
8806317	061388	2231	36	58.8	122	19.1	97
8806318	061388	2255	36	59.0	122	22.6	121
8806319	061488	201	36	58.2	122	23.1	144
8806320	061488	351	36	59.8	122	36.3	351
8806321	061488	430	37	8.0	122	43.0	210
8806322	061488	555	37	8.0	122	50.0	454
8806323	061488	650	37	8.0	123	0.0	653
8806324	061488	813	37	16.5	123	8.0	845
8806325	061488	915	37	23.4	123	10.0	969
8806326	061488	1004	37	23.5	123	1.5	0
8806327	061488	1050	37	23.5	122	55.0	455
8806328	061488	1130	37	23.4	122	49.0	110
8806329	061488	1207	37	23.5	122	43.0	91
8806330	061488	1246	37	23.4	122	37.5	77
8806331	061488	1330	37	23.6	122	30.0	46
8806332	061488	1428	37	16.4	122	34.0	88
8806333	061488	2048	37	16.5	122	29.0	53
8806334	061488	2125	37	16.5	122	34.0	90
8806335	061488	2310	37	15.8	122	40.5	102
8806336	061588	1	37	16.5	122	49.0	181
8806337	061588	402	37	17.3	122	59.0	532
8806338	061588	605	37	35.0	122	55.0	101
8806339	061588	645	37	35.0	123	1.5	267
8806340	061588	728	37	35.0	123	7.5	1079
8806341	061588	840	37	39.5	123	17.5	1737
8806342	061588	933	37	39.5	123	23.5	2377
8806343	061588	1100	37	48.0	123	12.5	69
8806344	061588	1132	37	48.0	123	17.5	143
8806345	061588	1228	37	47.9	123	26.1	1372
8806346	061588	1322	37	53.0	123	33.0	2213
8806347	061588	1430	37	53.0	123	25.0	238
8806348	061588	1533	37	53.0	123	14.9	101
8806349	061588	1745	37	47.5	123	3.5	79
8806350	061588	1800	37	39.5	123	2.5	110
8806351	061588	2051	37	39.5	123	2.5	106

STATION	DATE	TIME	LAT		LONG		DEPTH
8806352	061588	2300	37	40.7	123	12.9	1244
8806353	061588	2345	37	43.0	123	8.0	64
8806354	061688	206	37	54.0	123	17.2	108
8806355	061688	520	37	52.3	123	33.8	1463
8806356	061688	625	38	0.0	123	30.0	494
8806357	061688	715	38	5.0	123	28.5	146
8806358	061688	800	38	10.0	123	28.5	349
8806359	061688	845	38	15.0	123	28.5	320
8806360	061688	945	38	15.0	123	19.1	128
8806361	061688	1035	38	14.9	123	10.0	91
8806363	061688	1240	38	5.0	123	2.5	64
8806364	061688	1322	38	5.0	123	10.0	93
8806365	061688	1415	38	4.9	123	19.0	143
8806366	061688	2050	38	10.0	123	22.0	183
8806367	061788	16	38	8.8	123	18.6	119
8806368	061788	113	38	10.1	123	10.2	97
8806369	061788	252	38	9.5	123	3.4	75
8806370	061788	356	38	9.0	122	59.1	46
8806371	061788	515	38	0.0	123	8.0	84
8806372	061788	545	38	0.1	123	15.0	108
8806373	061788	645	37	53.0	123	7.0	93
8806374	061788	745	37	48.0	122	58.0	69
8806375	061788	825	37	42.0	122	58.0	51
8806376	061788	910	37	43.0	122	50.0	59
8806377	061788	1006	37	35.0	122	50.0	80
8806378	061788	1050	37	35.0	122	43.0	55
8806379	061788	1117	37	38.0	122	43.0	49
8806380	061788	1220	37	38.0	122	46.0	55
8806381	061788	2050	37	38.0	122	46.0	55
8806382	061788	2315	37	42.7	122	54.9	57
8806383	061788	2357	37	47.4	122	52.1	60
8806384	061888	205	37	49.8	122	44.9	46
8806385	061888	258	37	55.1	122	51.5	49
8806386	061888	415	37	56.7	122	55.7	57

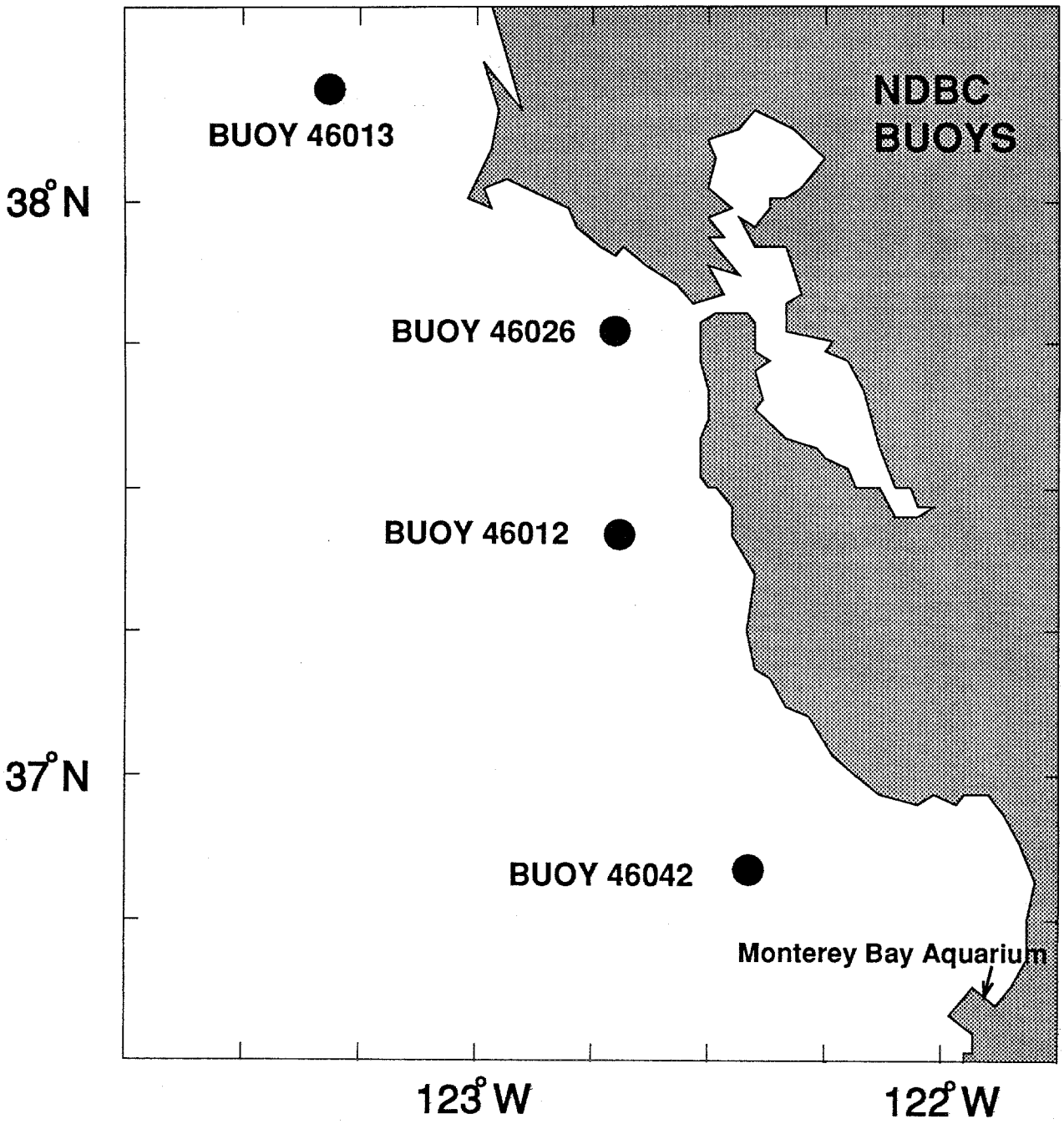
APPENDIX 2.1: BATHYMETRIC MAP OF SURVEY REGION-DS8804

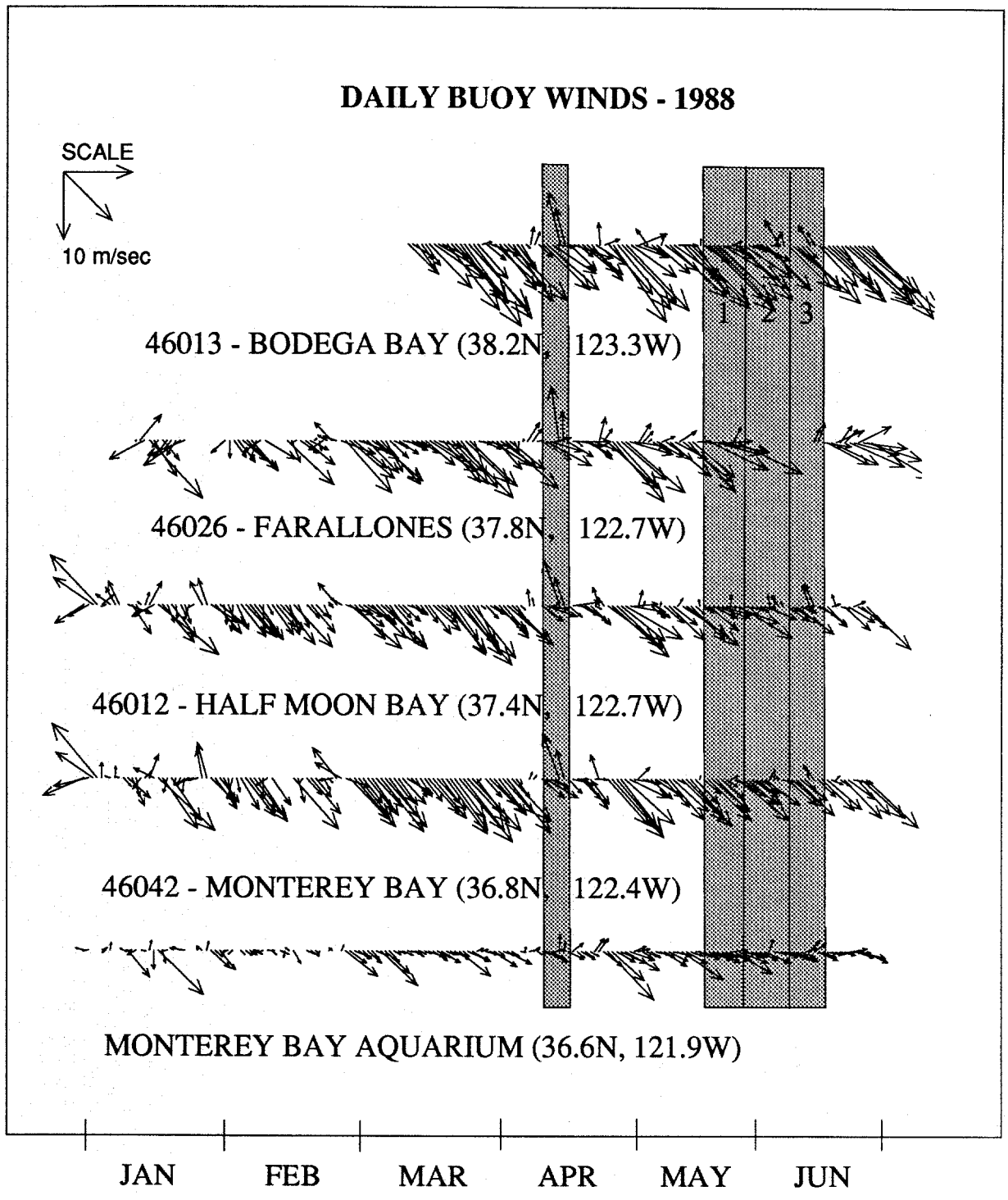

DS8804
STATION
DEPTH (m)
38°N
37°N
123°W
122°W
50
30
100
200
400
300
600
900
1200
1500
1800

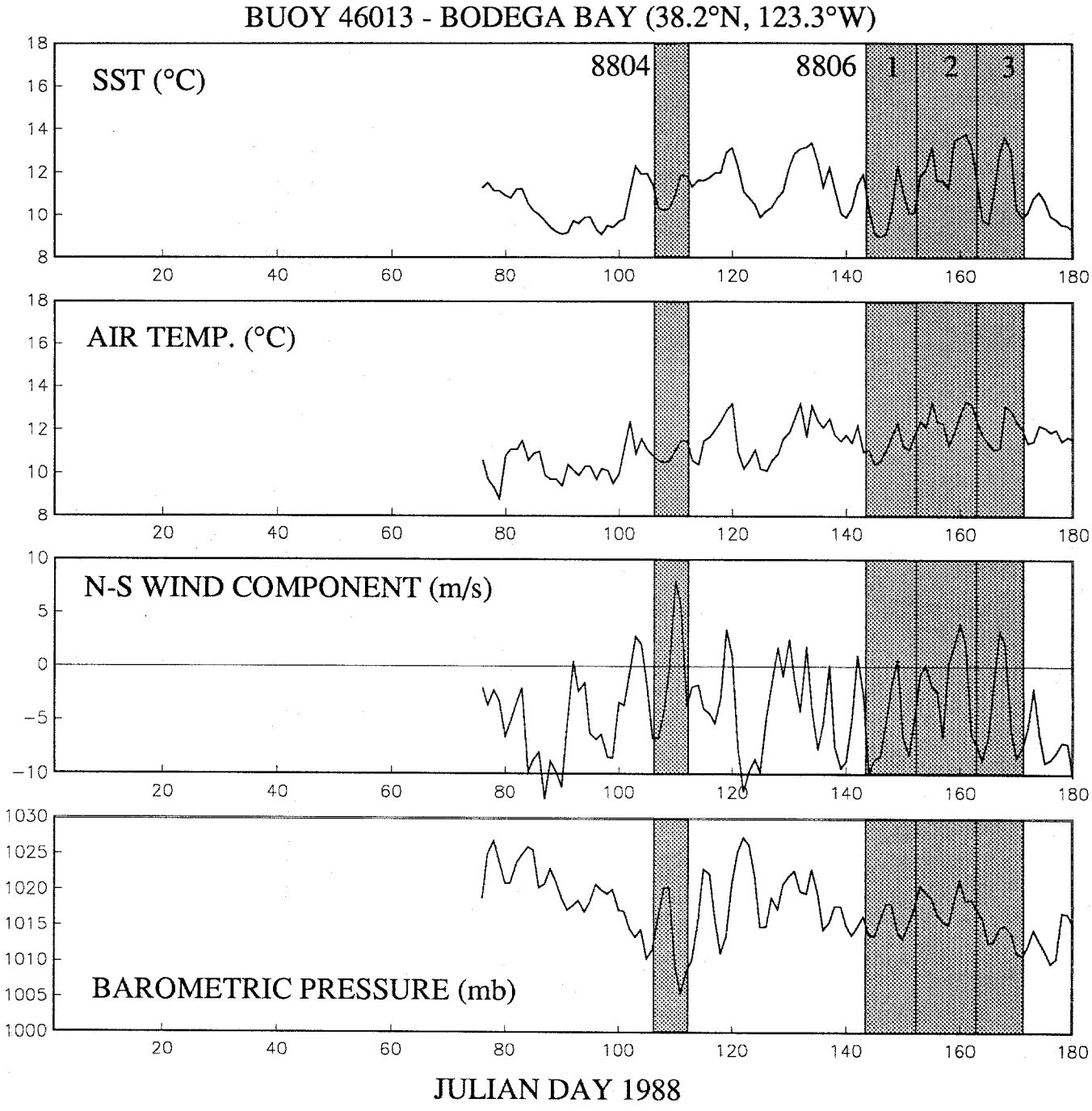
APPENDIX 2.2: BATHYMETRIC MAP OF SURVEY REGION-DS8806

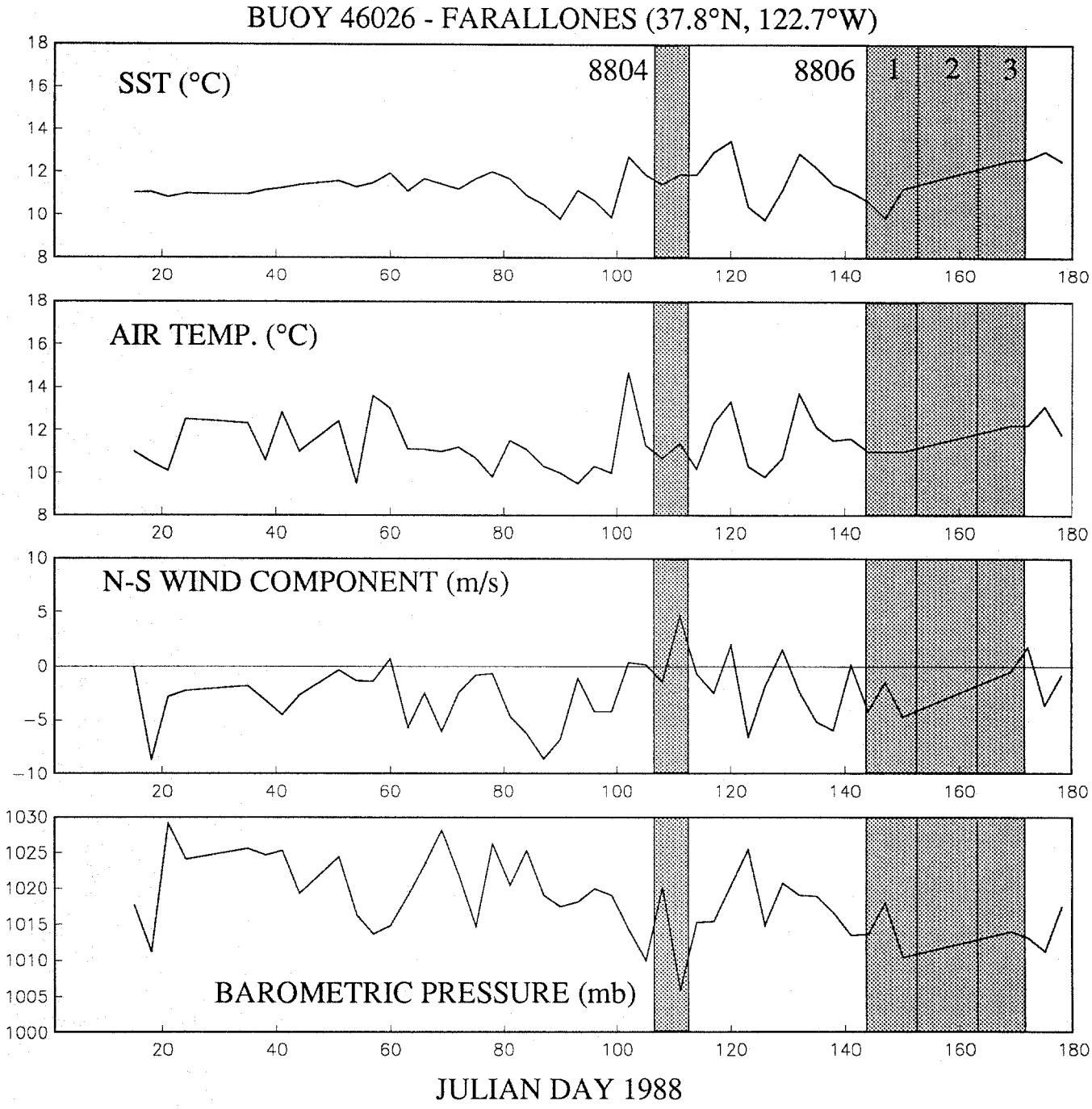

DS8806
STATION
DEPTH (m)
38°N
37°N
124°W
123°W
122°W
100
300
3000
3300
3600
1200
1500
2100
1800
400
600
900
200
50
1200
1500
2100

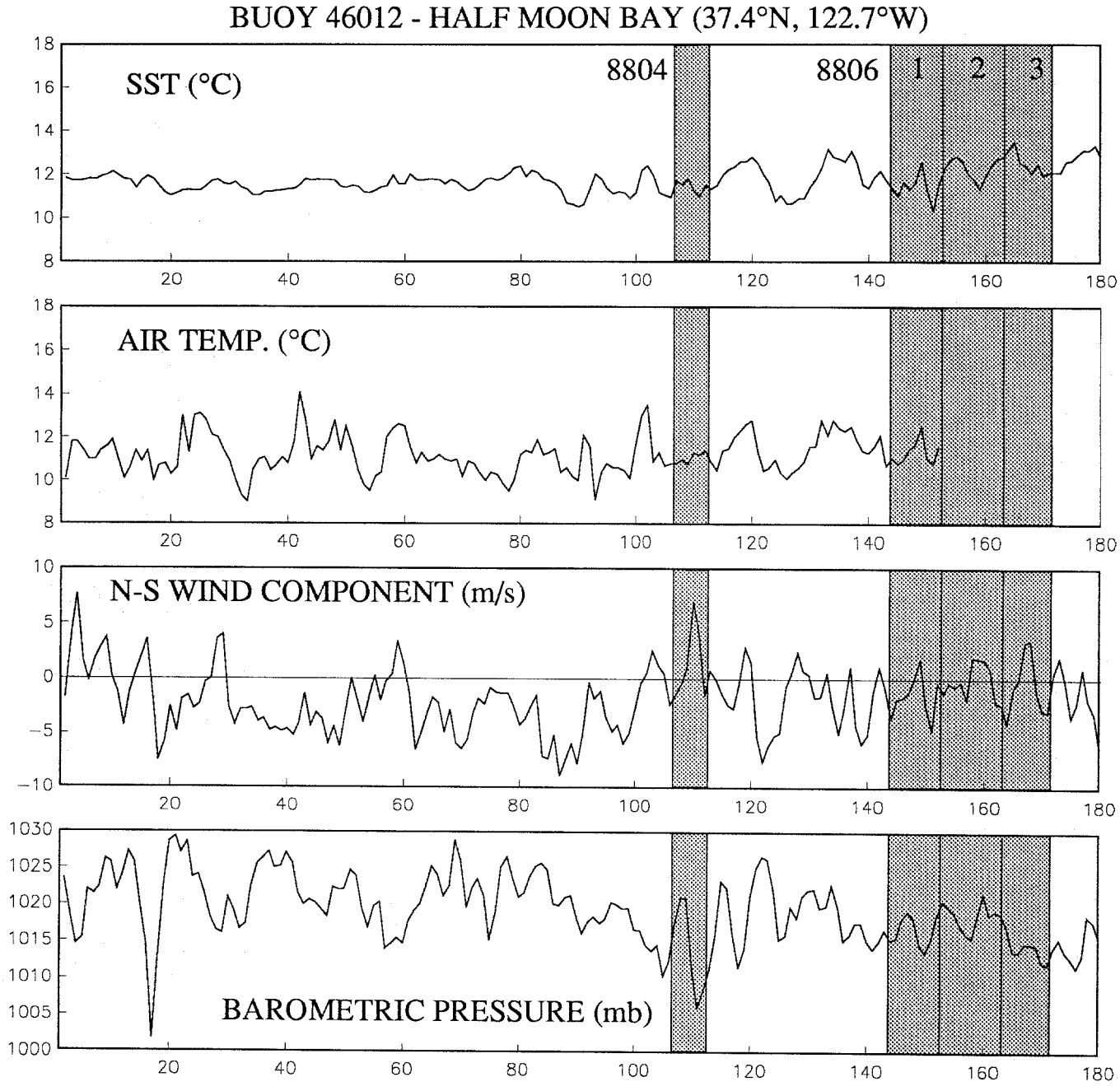
APPENDIX 3: ATMOSPHERIC TIME SERIES

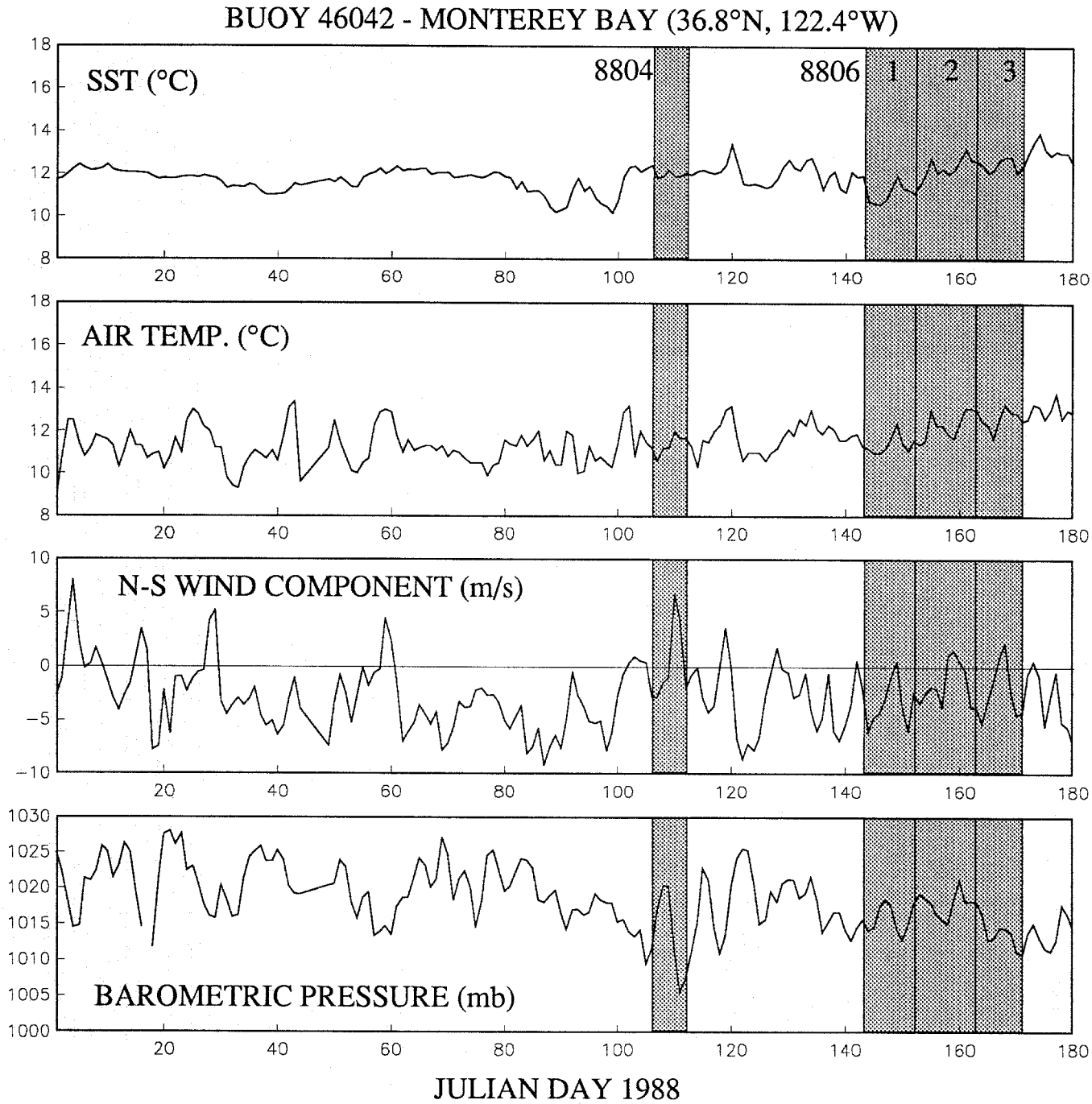

NDBC
BUOYS
BUOY 46013
BUOY 46026
BUOY 46012
BUOY 46042
Monterey Bay Aquarium
38°N
37°N
123°W
122°W

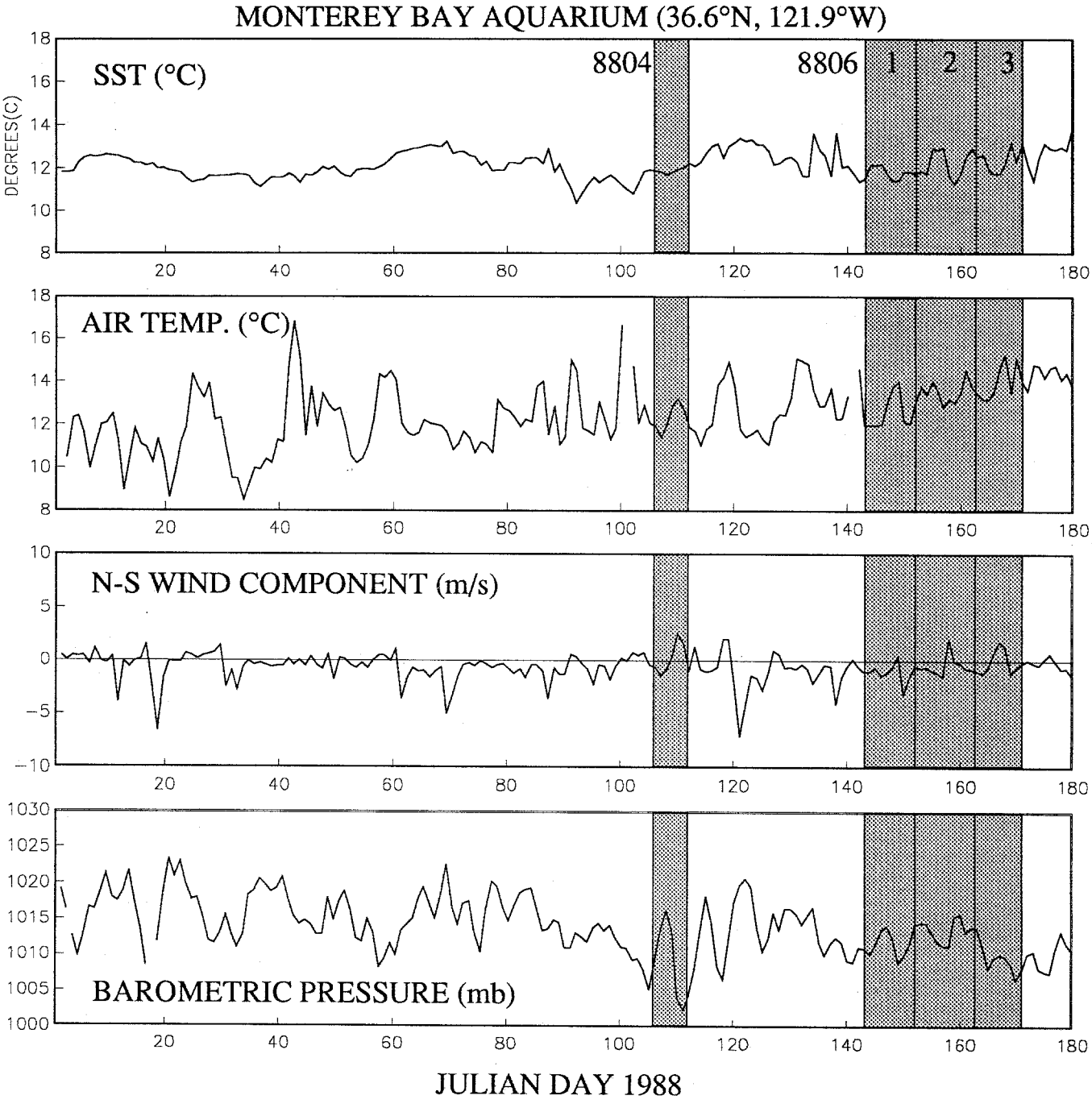

DAILY BUOY WINDS - 1988
SCALE
10 m/sec
1
2
3
46013 - BODEGA BAY (38.2N, 123.3W)
46026 - FARALLONES (37.8N, 122.7W)
46012 - HALF MOON BAY (37.4N, 122.7W)
46042 - MONTEREY BAY (36.8N, 122.4W)
MONTEREY BAY AQUARIUM (36.6N, 121.9W)
JAN
FEB
MAR
APR
MAY
JUN


BUOY 46013 - BODEGA BAY (38.2°N, 123.3°W)
SST (°C)
8804
8806
1
2
3
AIR TEMP. (°C)
N-S WIND COMPONENT (m/s)
BAROMETRIC PRESSURE (mb)
JULIAN DAY 1988

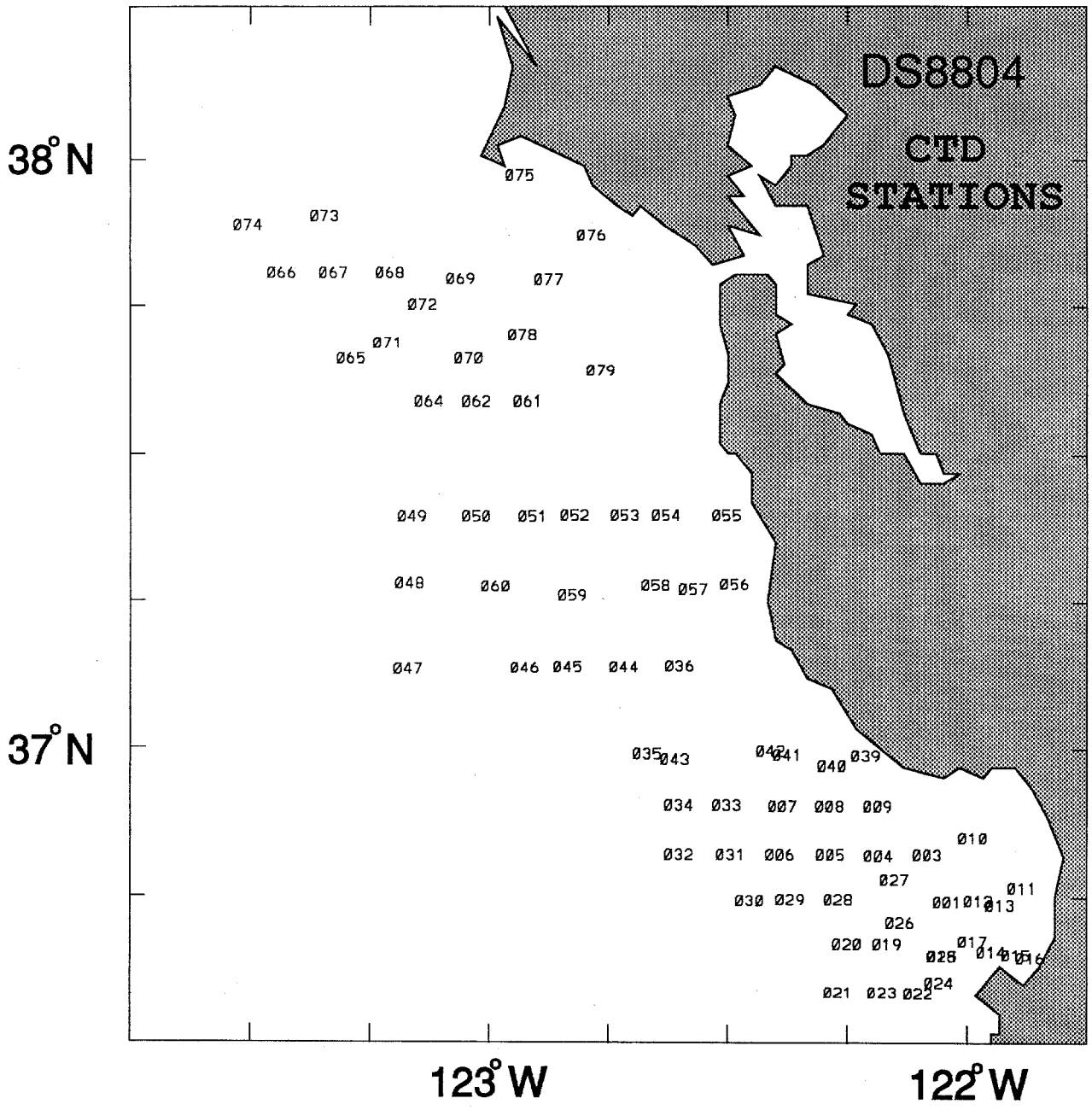

BUOY 46026 - FARALLONES (37.8°N, 122.7°W)
SST (°C)
8804
8806
1
2
3
AIR TEMP. (°C)
N-S WIND COMPONENT (m/s)
BAROMETRIC PRESSURE (mb)
JULIAN DAY 1988

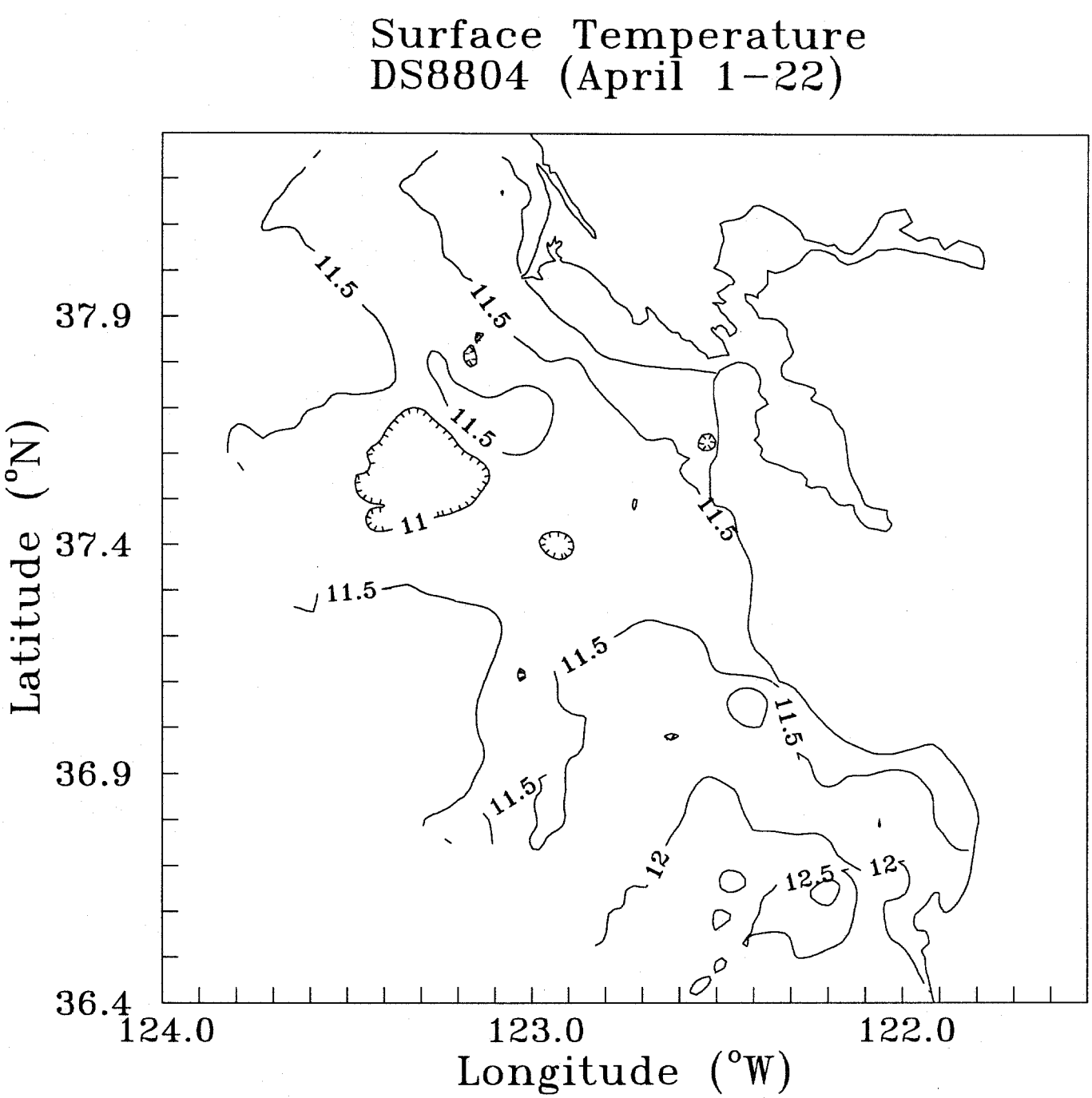

BUOY 46012 - HALF MOON BAY (37.4°N, 122.7°W)
SST (°C)
8804
8806
1
2
3
AIR TEMP. (°C)
N-S WIND COMPONENT (m/s)
BAROMETRIC PRESSURE (mb)
JULIAN DAY 1988

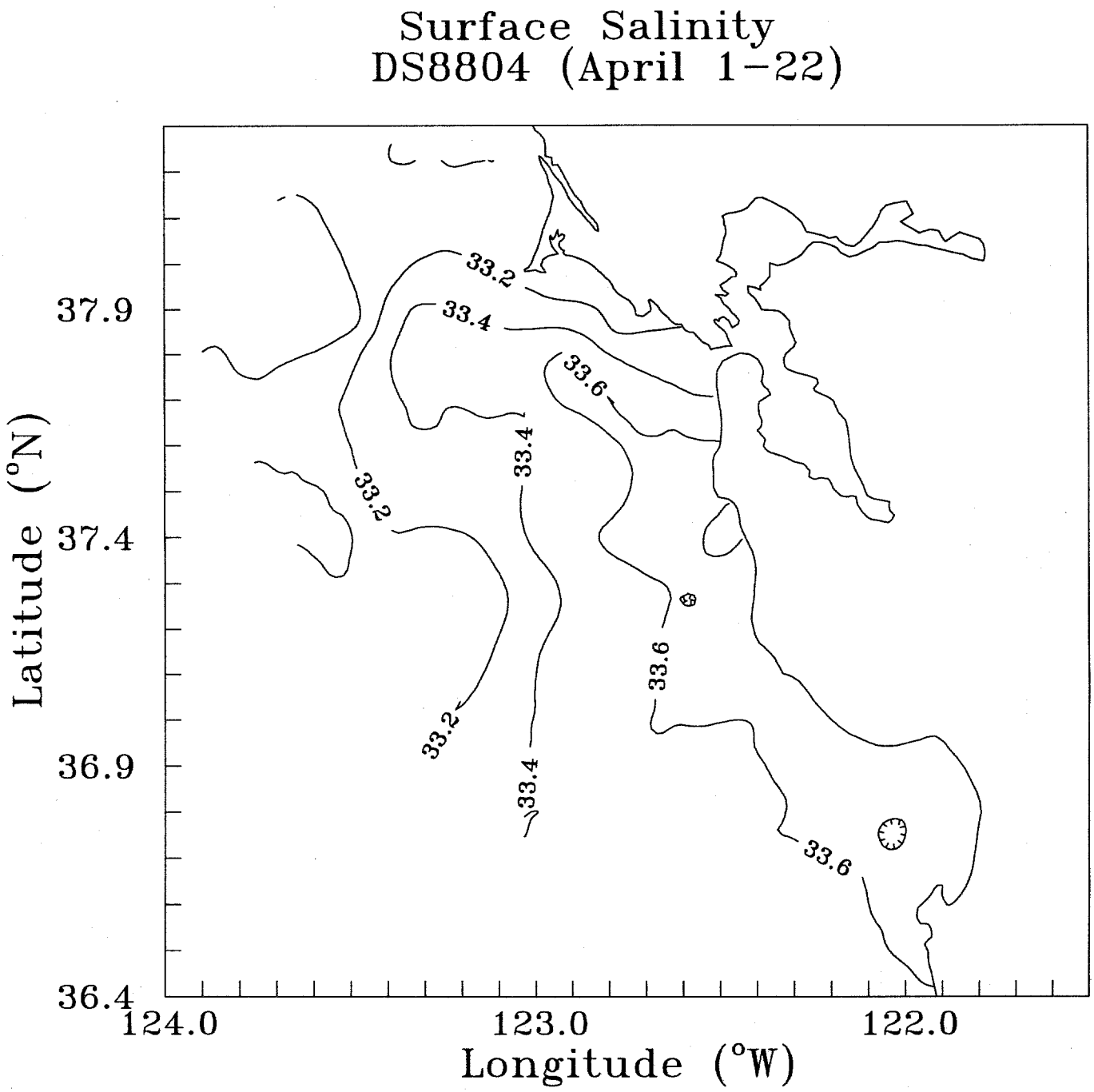

BUOY 46042 - MONTEREY BAY (36.8°N, 122.4°W)
SST (°C)
8804
8806
1
2
3
AIR TEMP. (°C)
N-S WIND COMPONENT (m/s)
BAROMETRIC PRESSURE (mb)
JULIAN DAY 1988

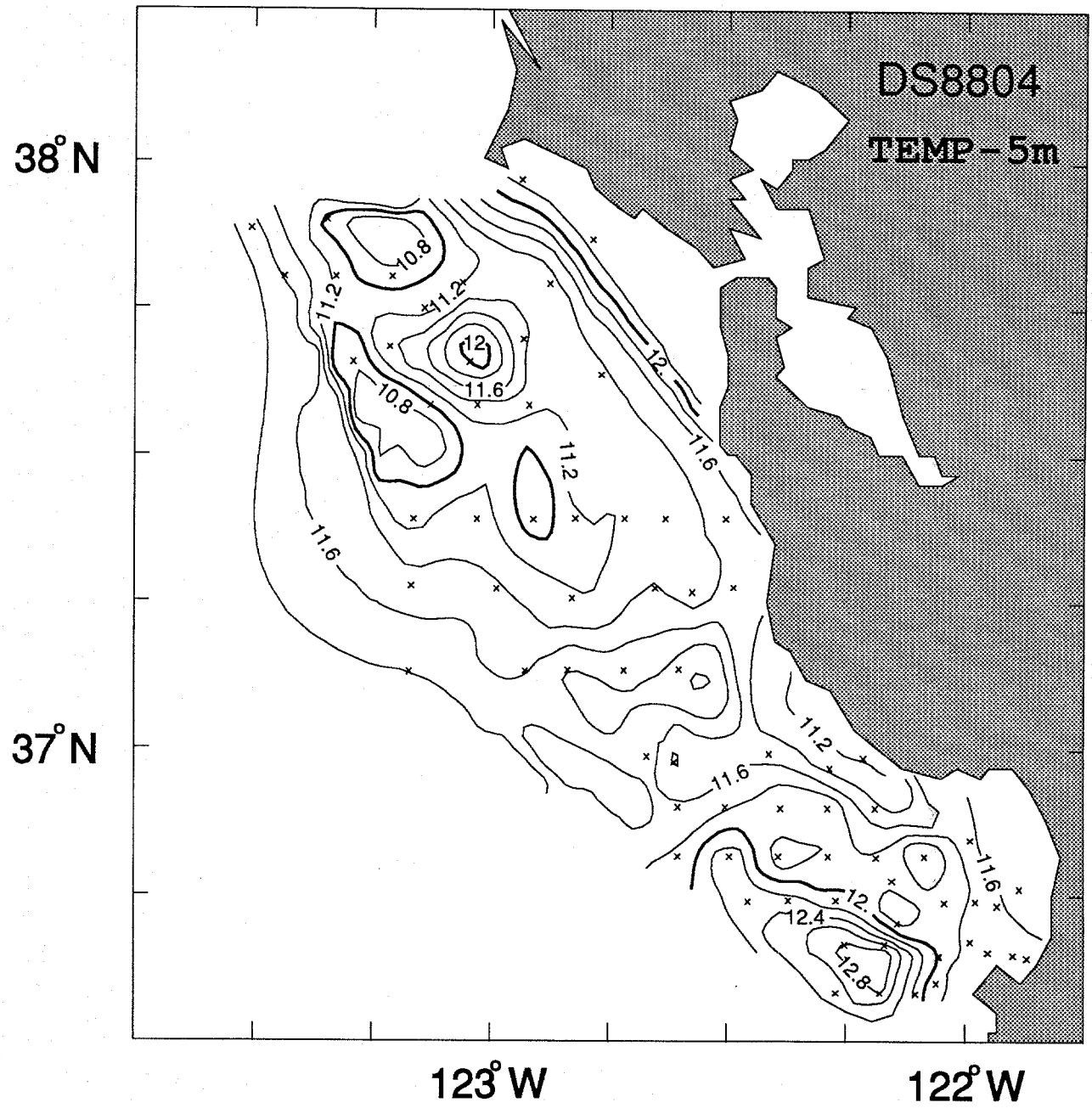

MONTEREY BAY AQUARIUM (36.6°N, 121.9°W)
SST (°C)
8804
8806
1
2
3
DEGREES(C)
AIR TEMP. (°C)
N-S WIND COMPONENT (m/s)
BAROMETRIC PRESSURE (mb)
JULIAN DAY 1988

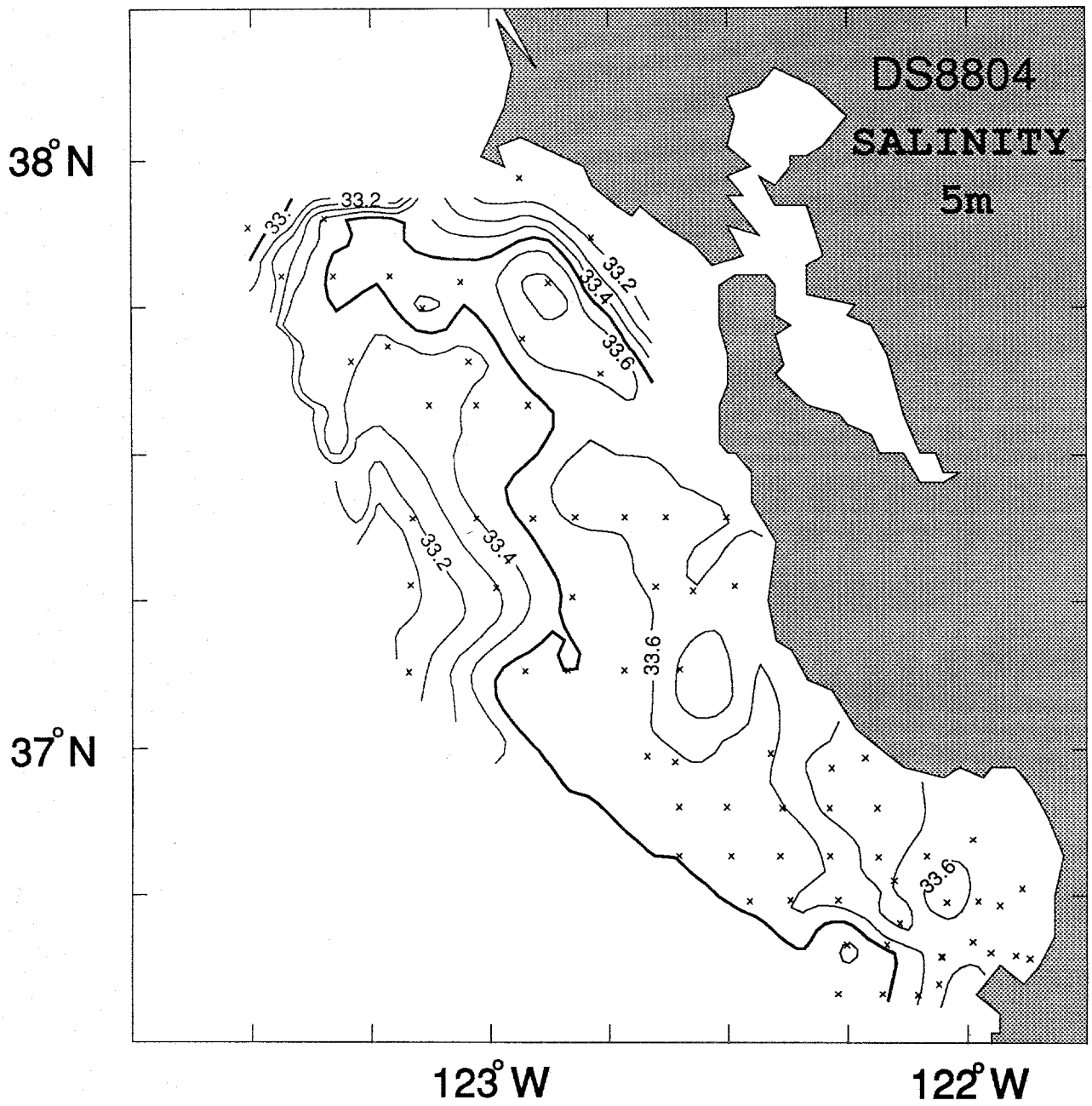
APPENDIX 4.1: HORIZONTAL MAPS- DS8804

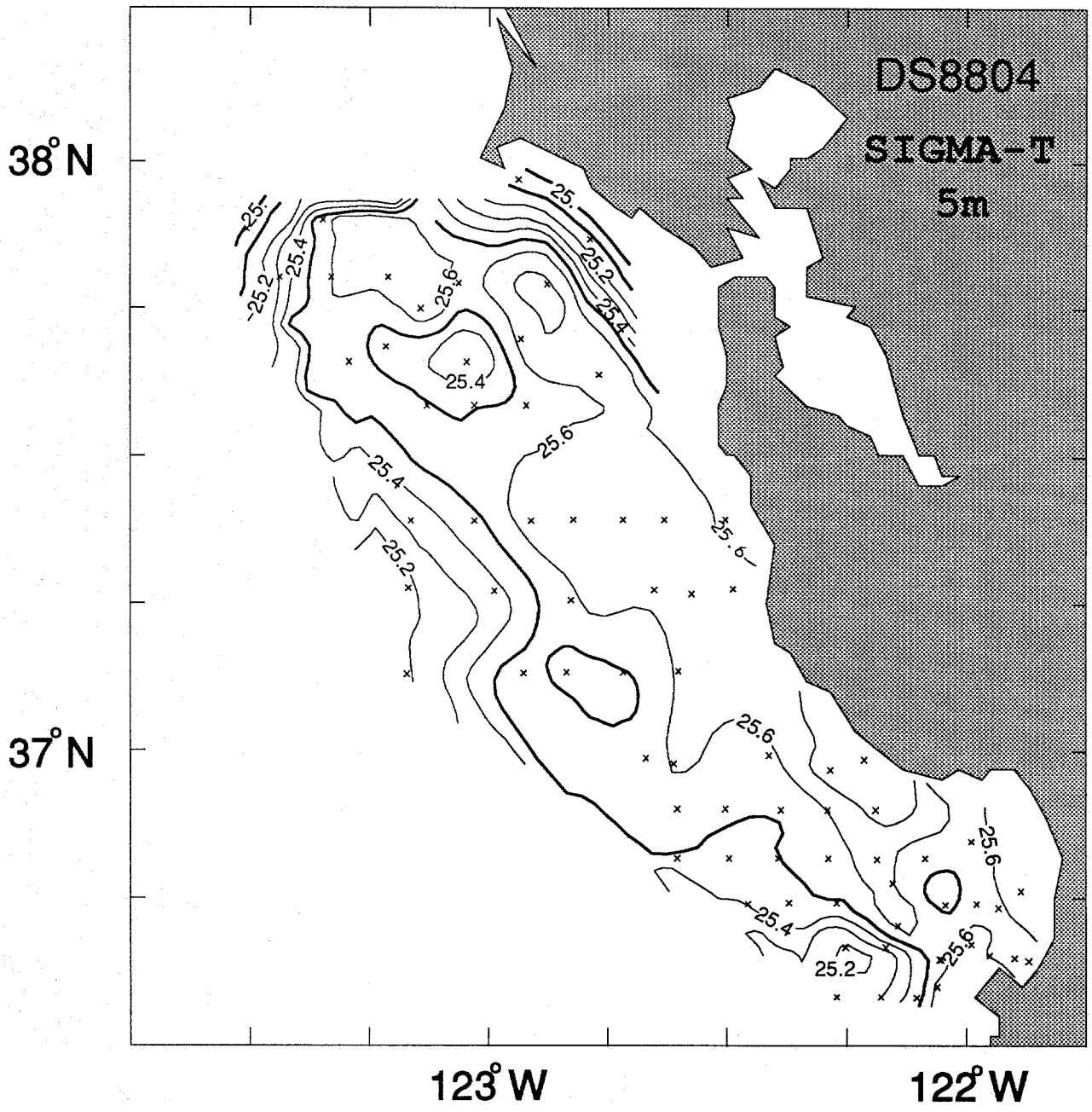

DS8804
CTD
STATIONS
38°N
37°N
123°W
122°W
075
074
073
076
066
067
068
069
077
072
078
071
065
070
079
064
062
061
049
050
051
052
053
054
055
048
060
059
058
057
056
047
046
045
044
036
035
043
042
041
040
039
034
033
007
008
009
010
032
031
006
005
004
003
027
011
030
029
028
001
012
013
026
020
019
017
025
014
015
016
021
023
022
024

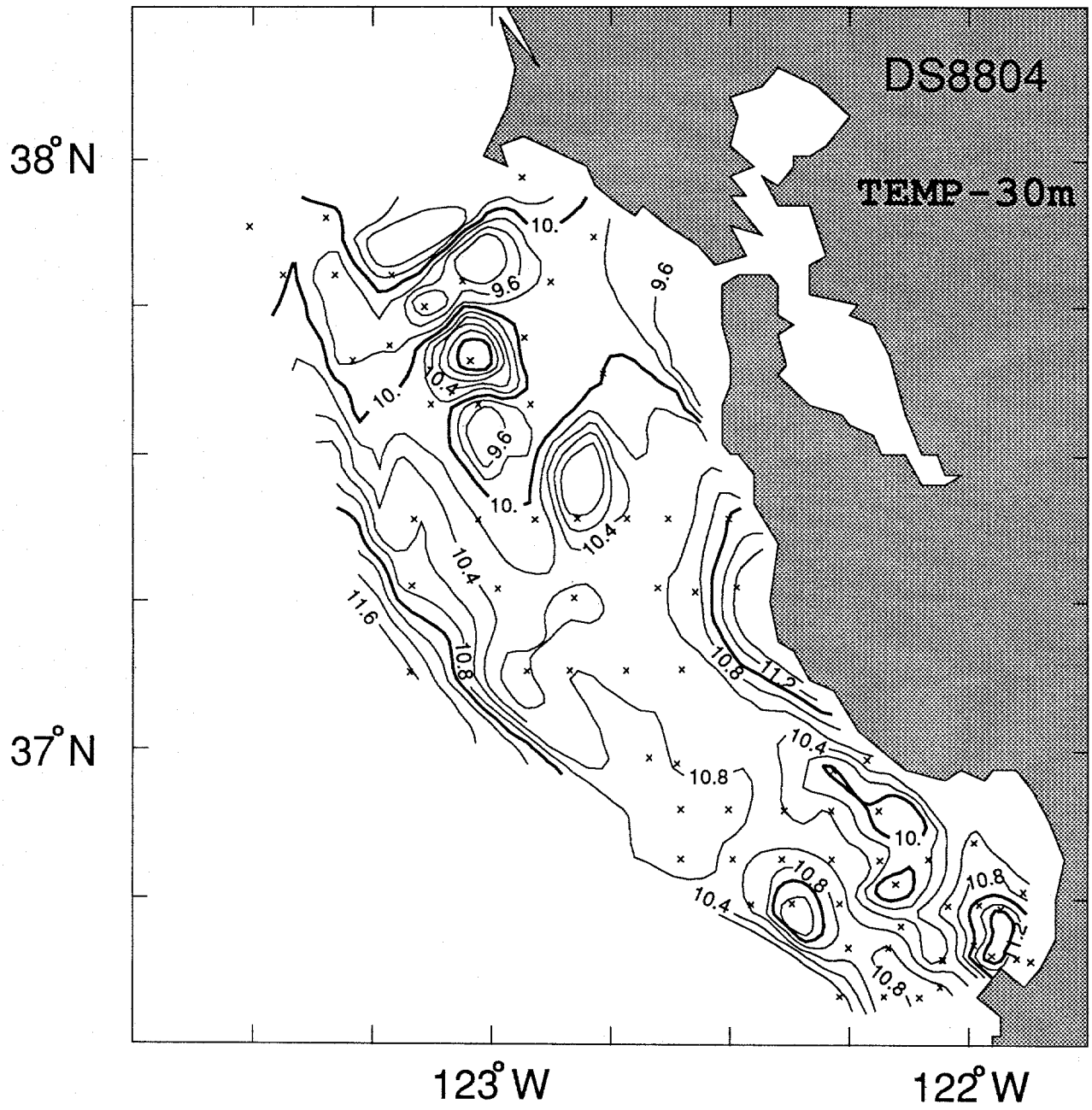

Surface Temperature
DS8804 (April 1-22)
Latitude (°N)
37.9
37.4
36.9
36.4
124.0
123.0
122.0
Longitude (°W)
11.5
11
12
12.5

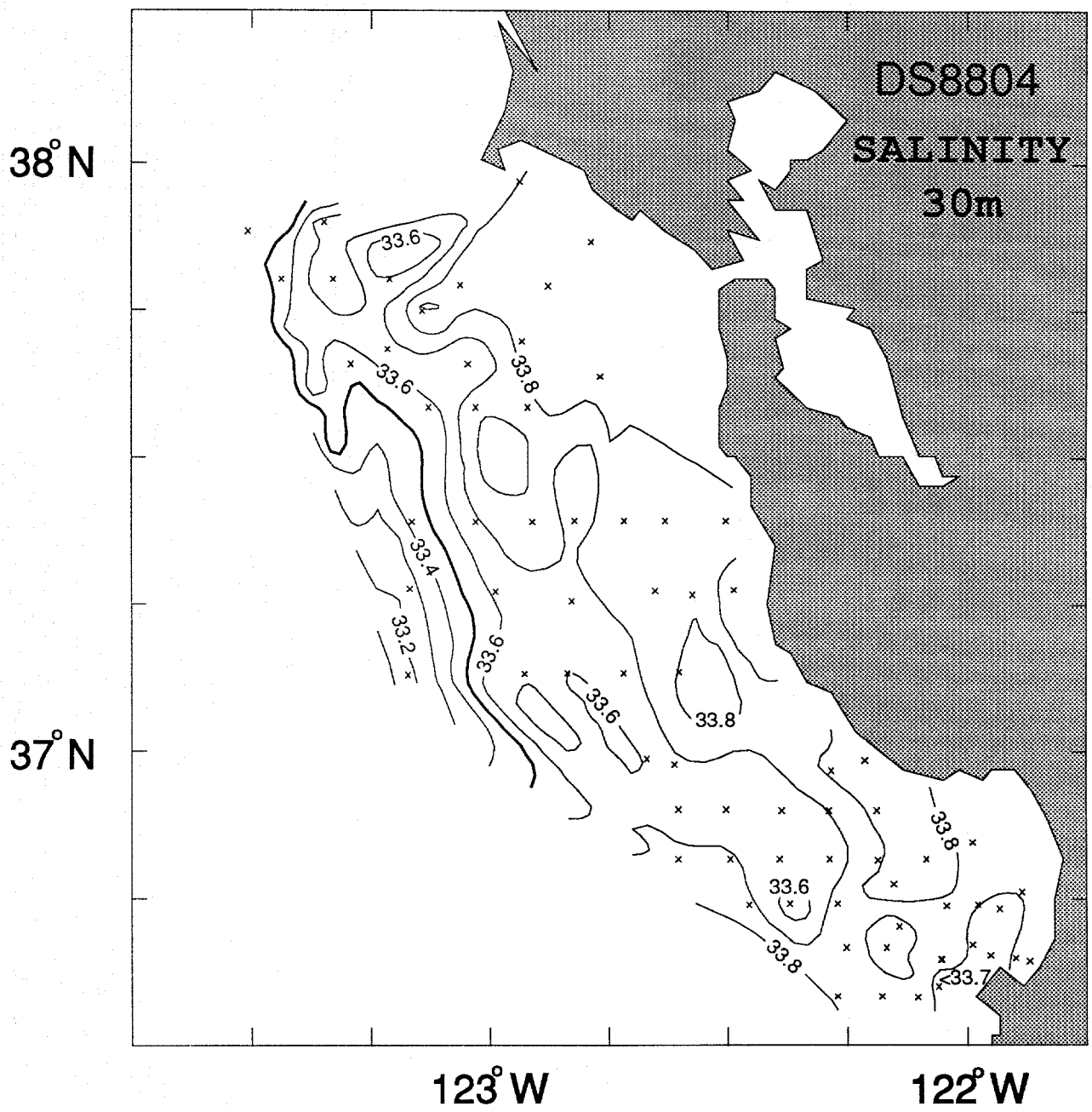

Surface Salinity
DS8804 (April 1-22)
37.9
37.4
36.9
36.4
Latitude (°N)
124.0
123.0
122.0
Longitude (°W)
33.2
33.4
33.6
33.2
33.4
33.6
33.2
33.4
33.6

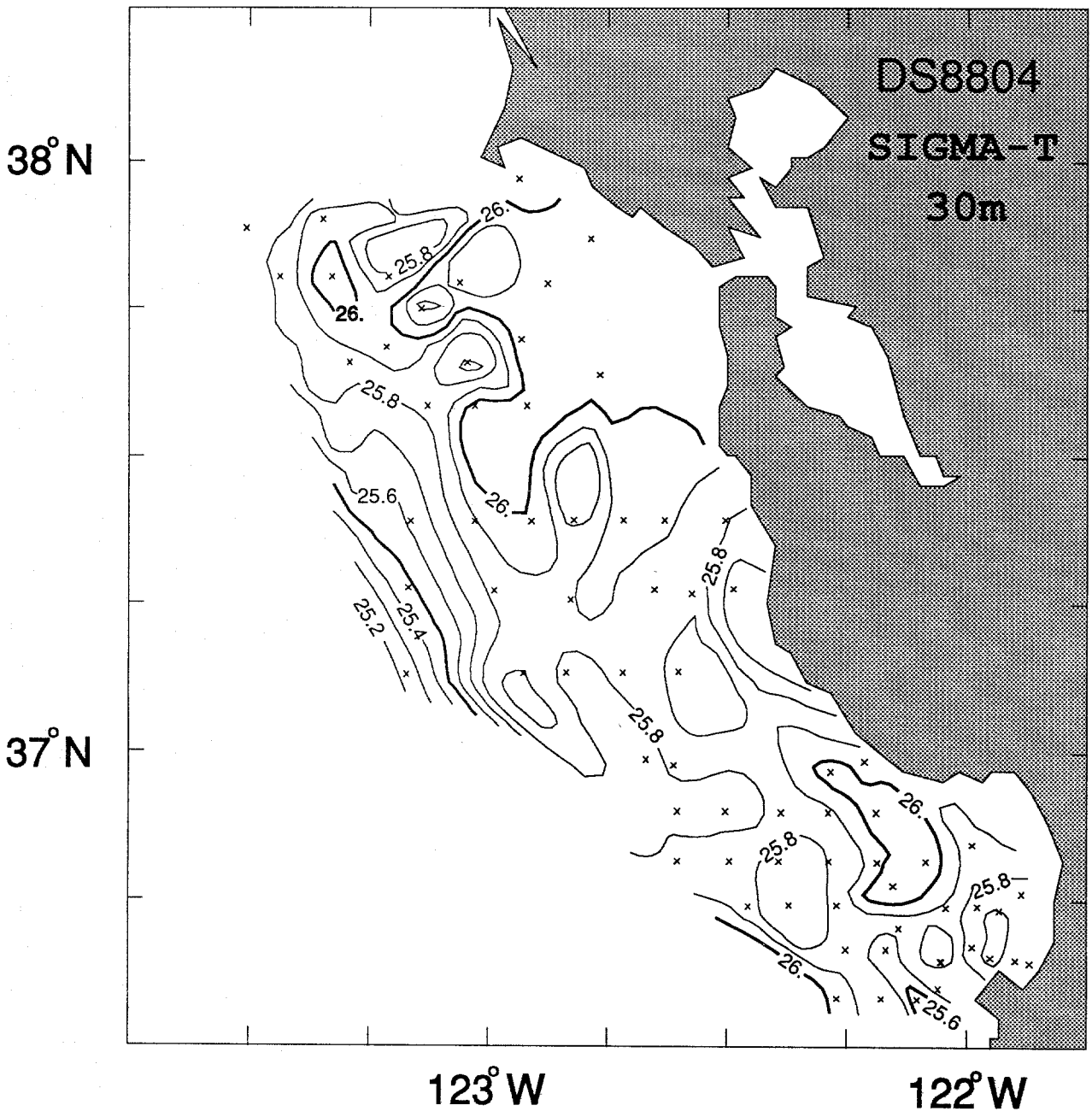

DS8804
TEMP - 5m
38°N
37°N
123°W
122°W
10.8
11.2
11.2
12
11.6
10.8
11.2
12
11.6
11.6
11.2
11.6
12
12.4
12.8
11.6

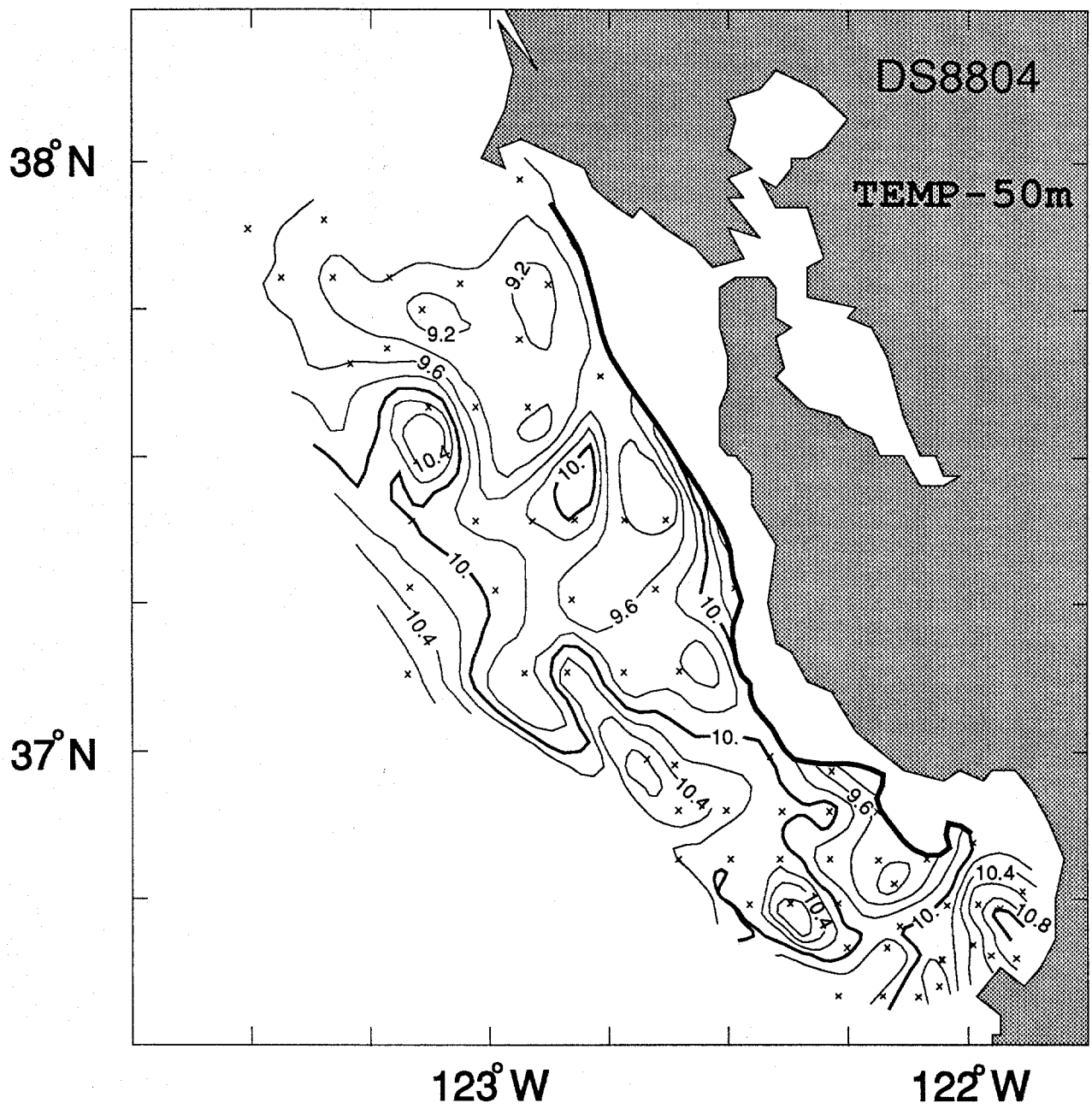

DS8804
SALINITY
5m
38°N
37°N
123°W
122°W
33.2
33.4
33.6

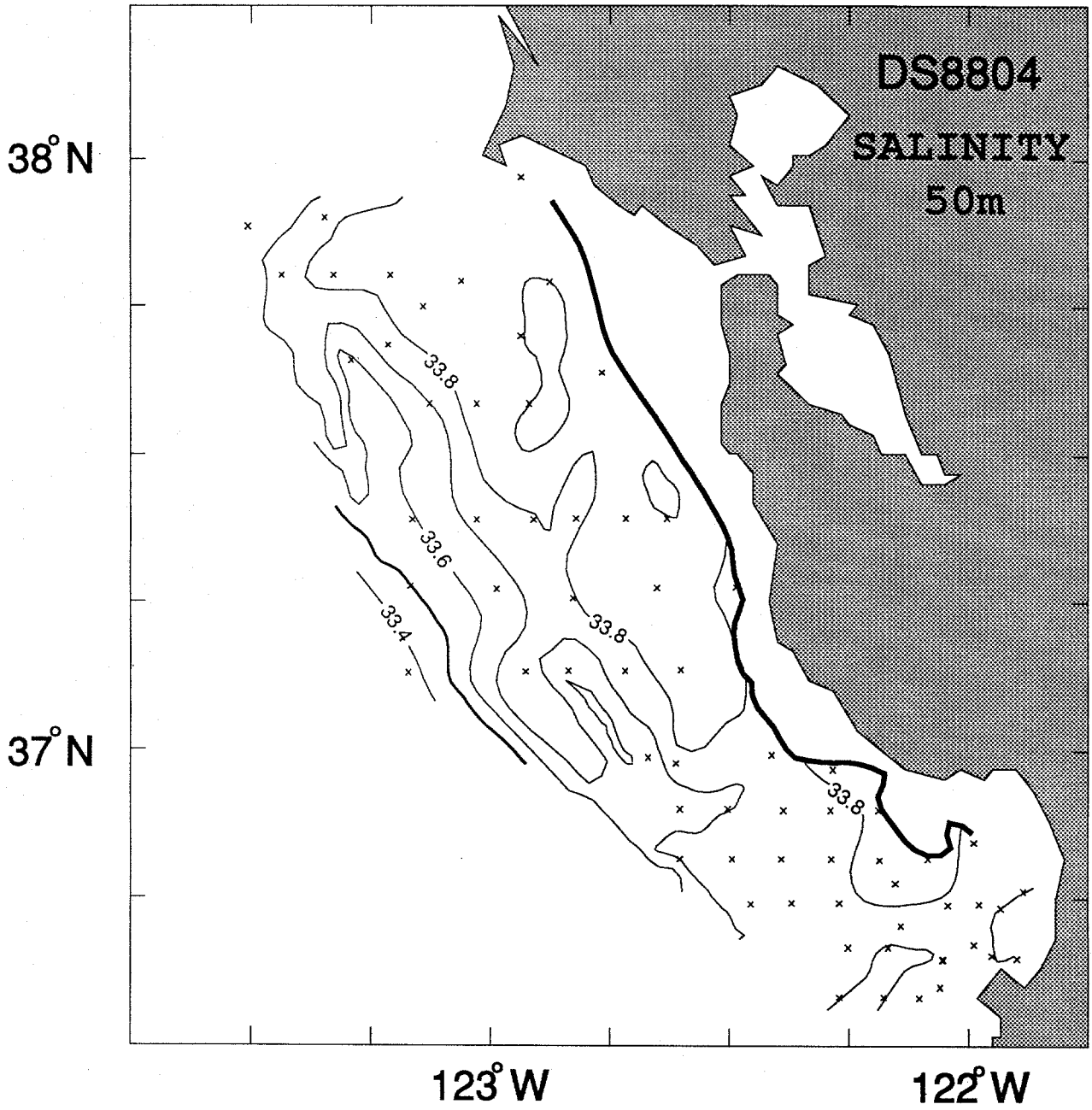

DS8804
SIGMA-T
5m
38°N
37°N
123°W
122°W
25.
25.2
25.4
25.6

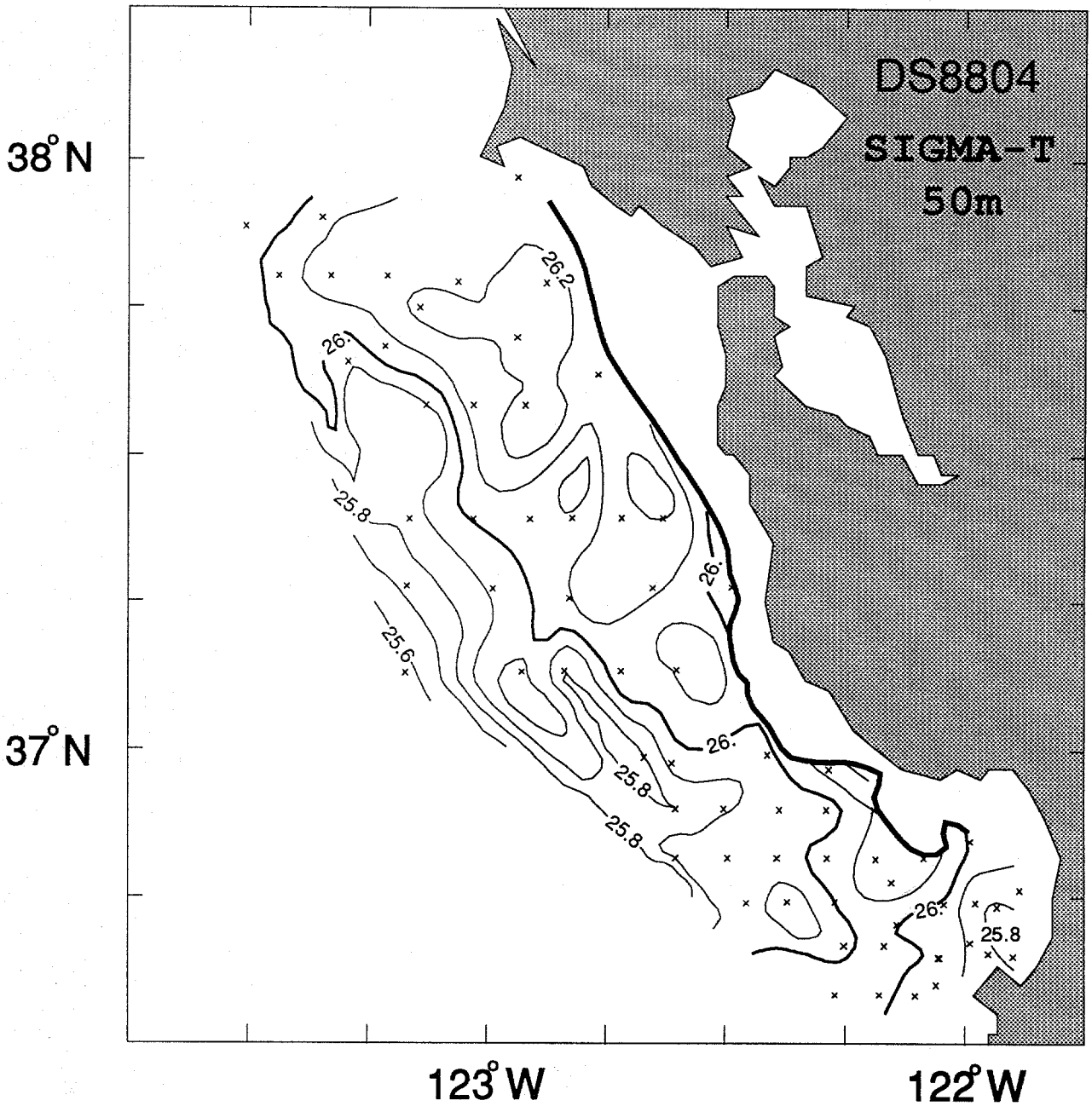

DS8804
TEMP -30m
38°N
37°N
123°W
122°W
10.
9.6
10.4
10.8
11.2
11.6

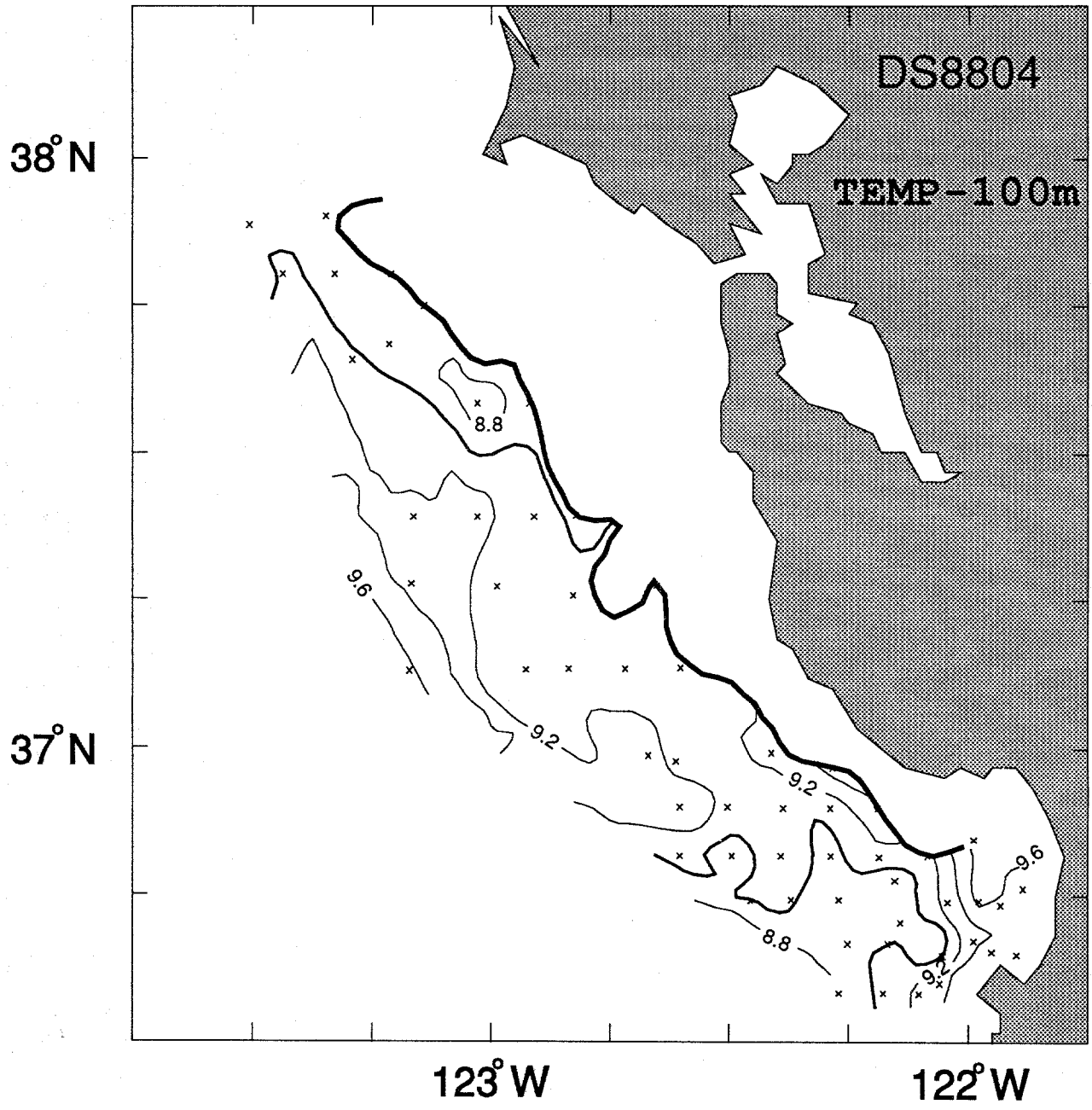

DS8804
SALINITY
30m
38° N
37° N
123° W
122° W
33.6
33.8
33.6
33.4
33.2
33.6
33.6
33.8
33.8
33.6
33.8
33.7

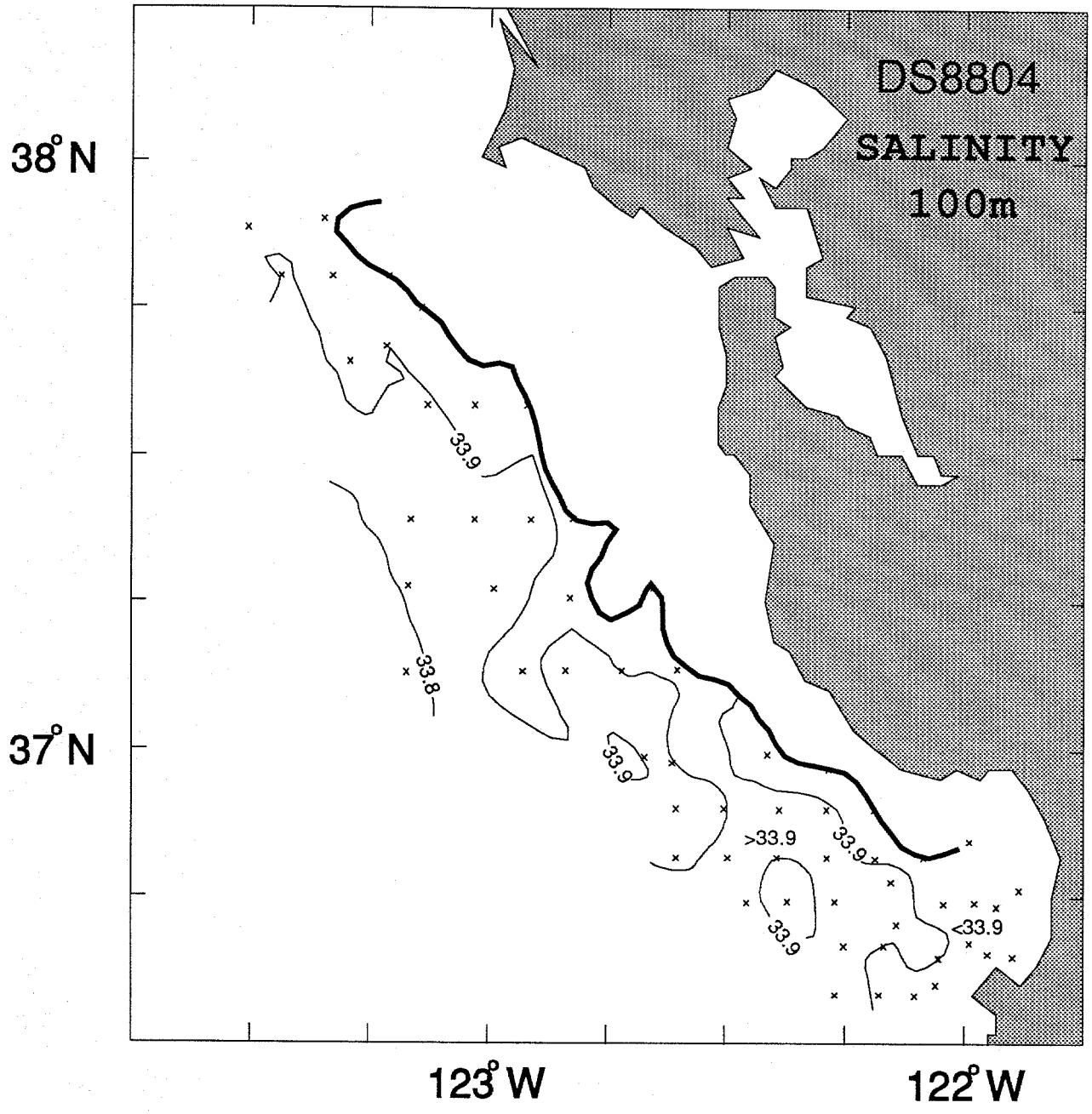

DS8804
SIGMA-T
30m
38°N
37°N
123°W
122°W
26.
25.8
25.6
25.4
25.2

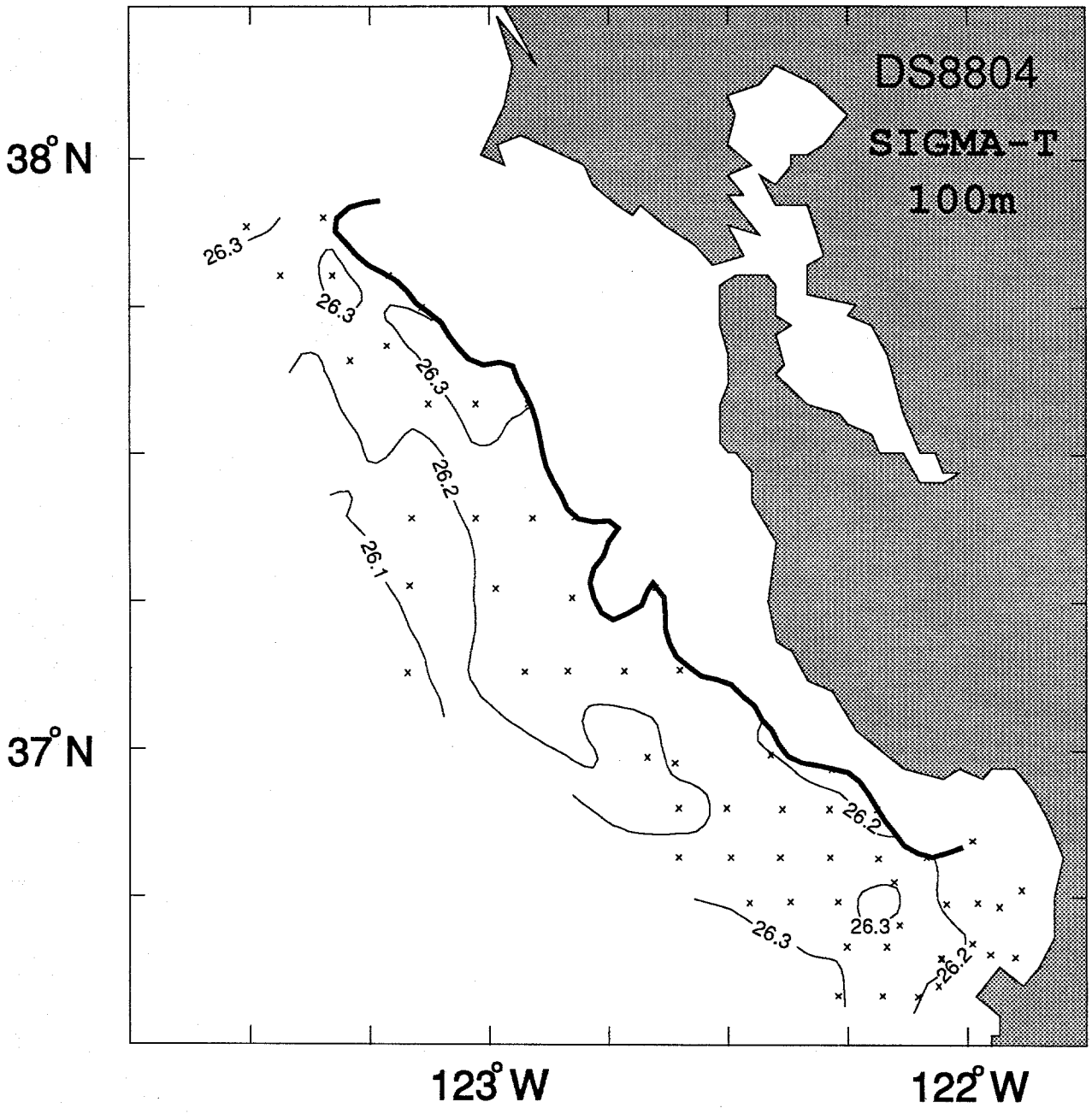

DS8804
TEMP-50m
38°N
37°N
123°W
122°W
9.2
9.2
9.6
10.4
10.
10.
10.4
9.6
10.
10.
10.4
9.6
10.4
10.4
10.
10.8

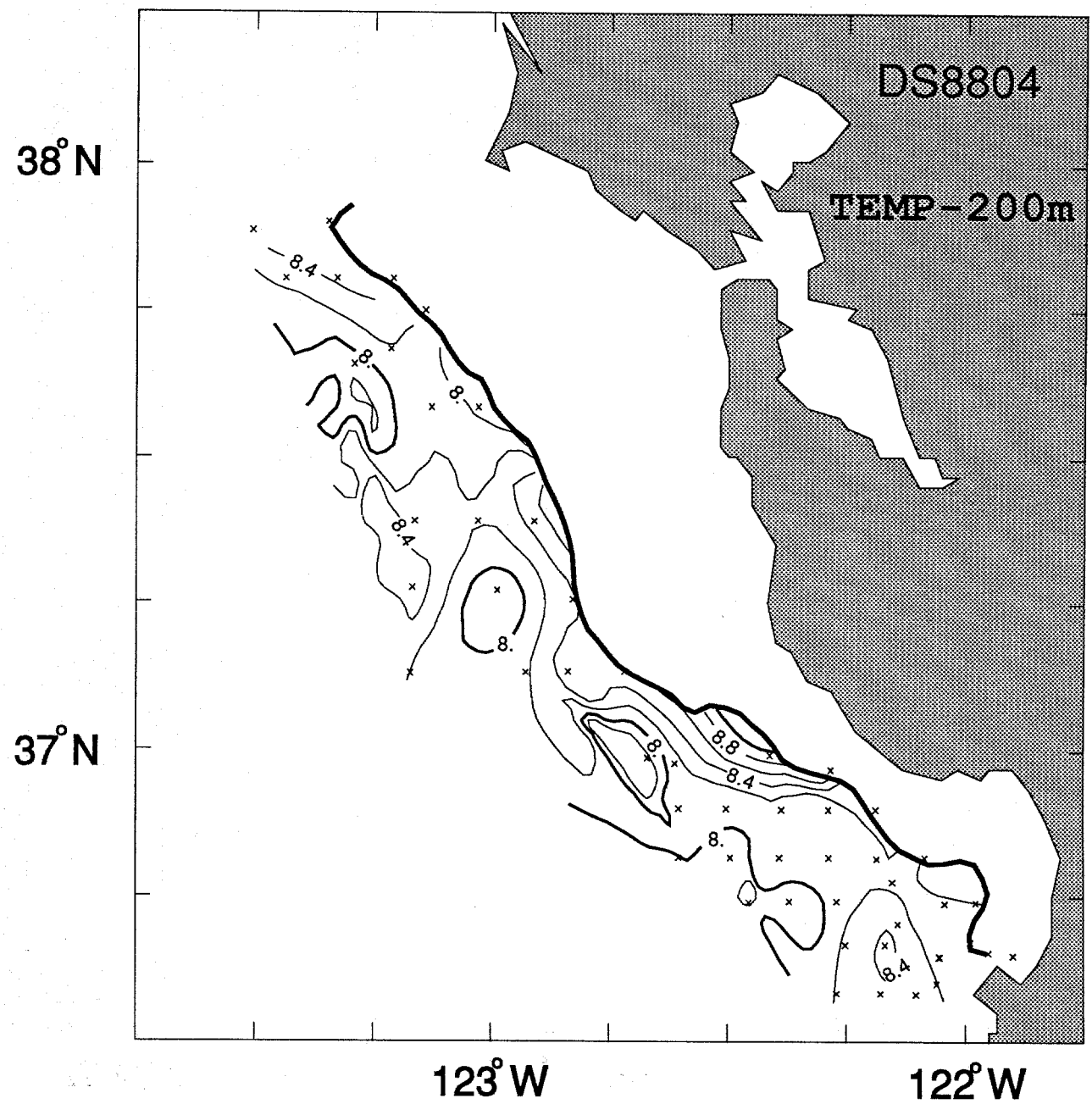

DS8804
SALINITY
50m
38°N
37°N
123°W
122°W
33.8
33.6
33.4
33.8
33.8

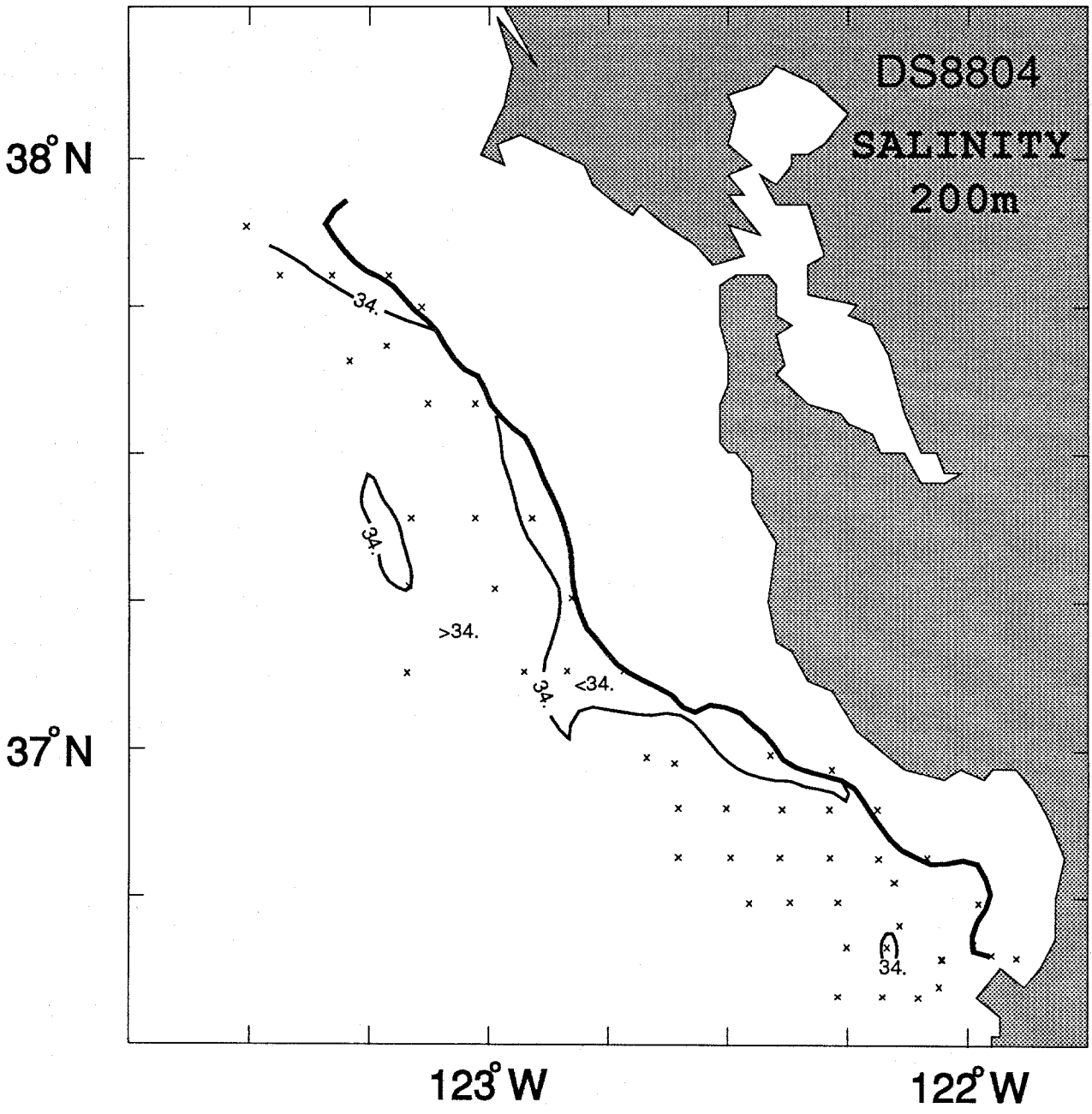

DS8804
SIGMA-T
50m
38°N
37°N
123°W
122°W
26.2
26.
25.8
25.6
26.
25.8
25.8
26.
25.8

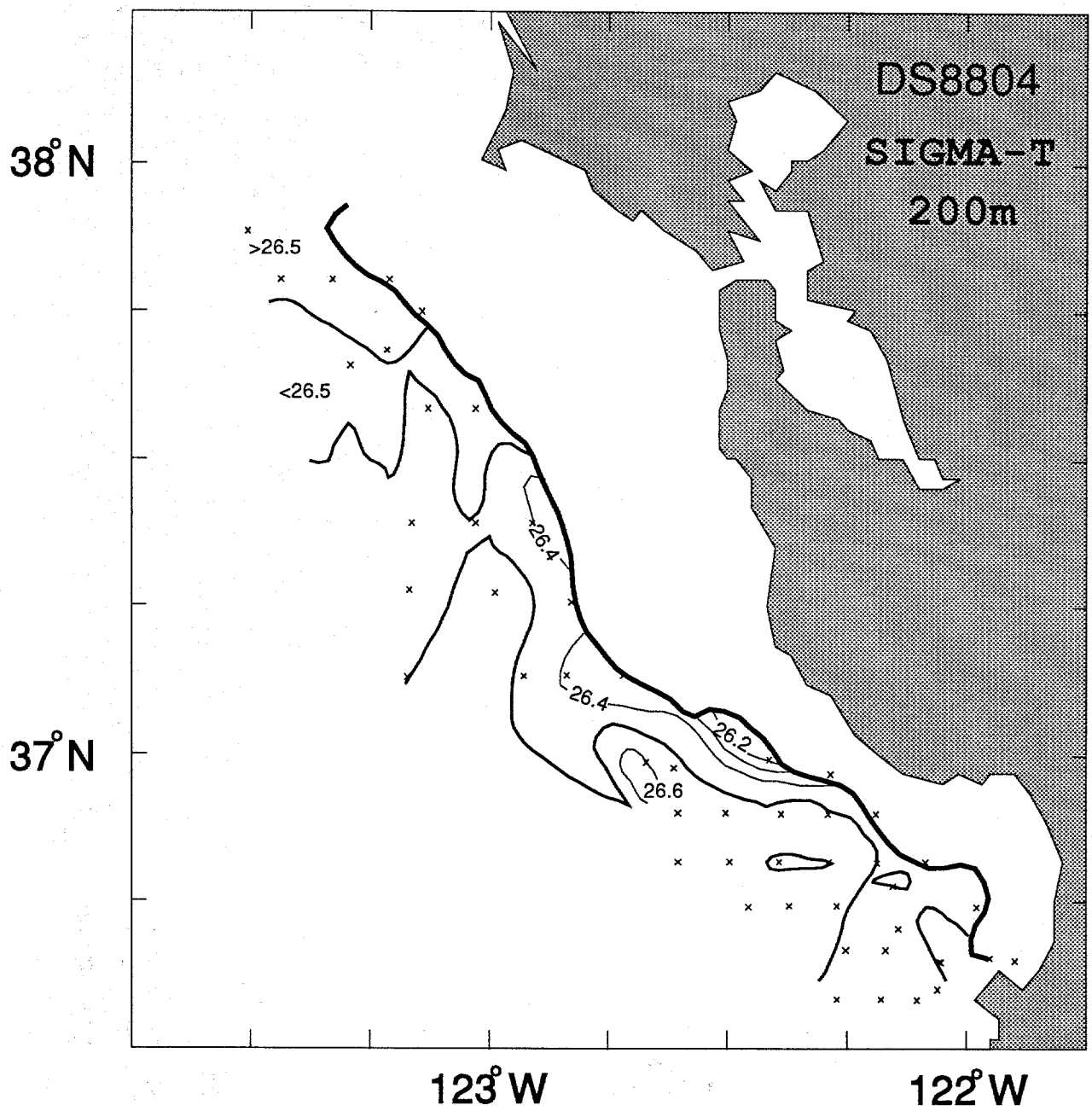

DS8804
TEMP-100m
38°N
37°N
123°W
122°W
8.8
9.6
9.2
9.2
9.6
8.8
9.2

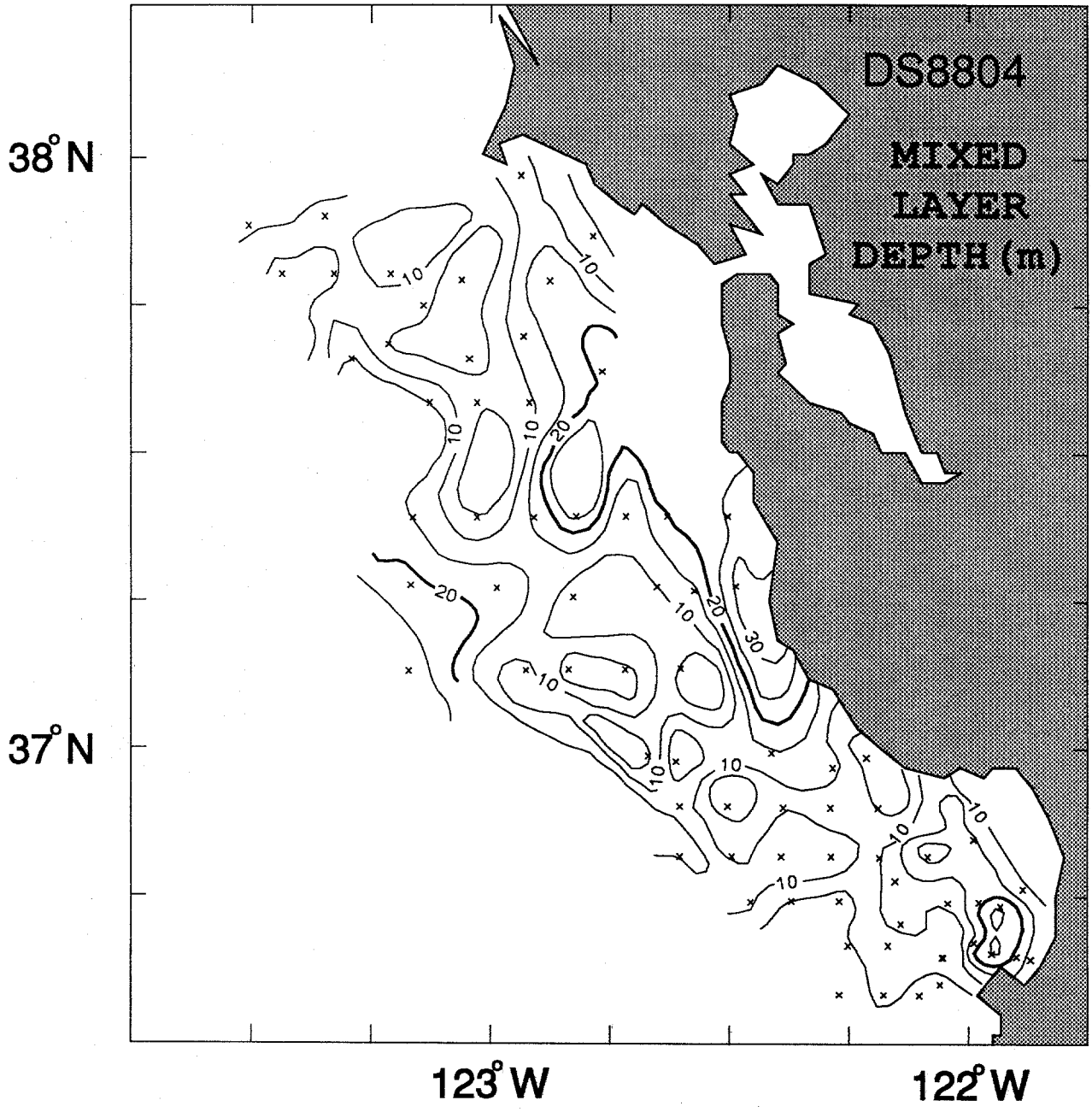

DS8804
SALINITY
100m
38°N
37°N
123°W
122°W
33.9
33.8
33.9
>33.9
33.9
33.9
<33.9

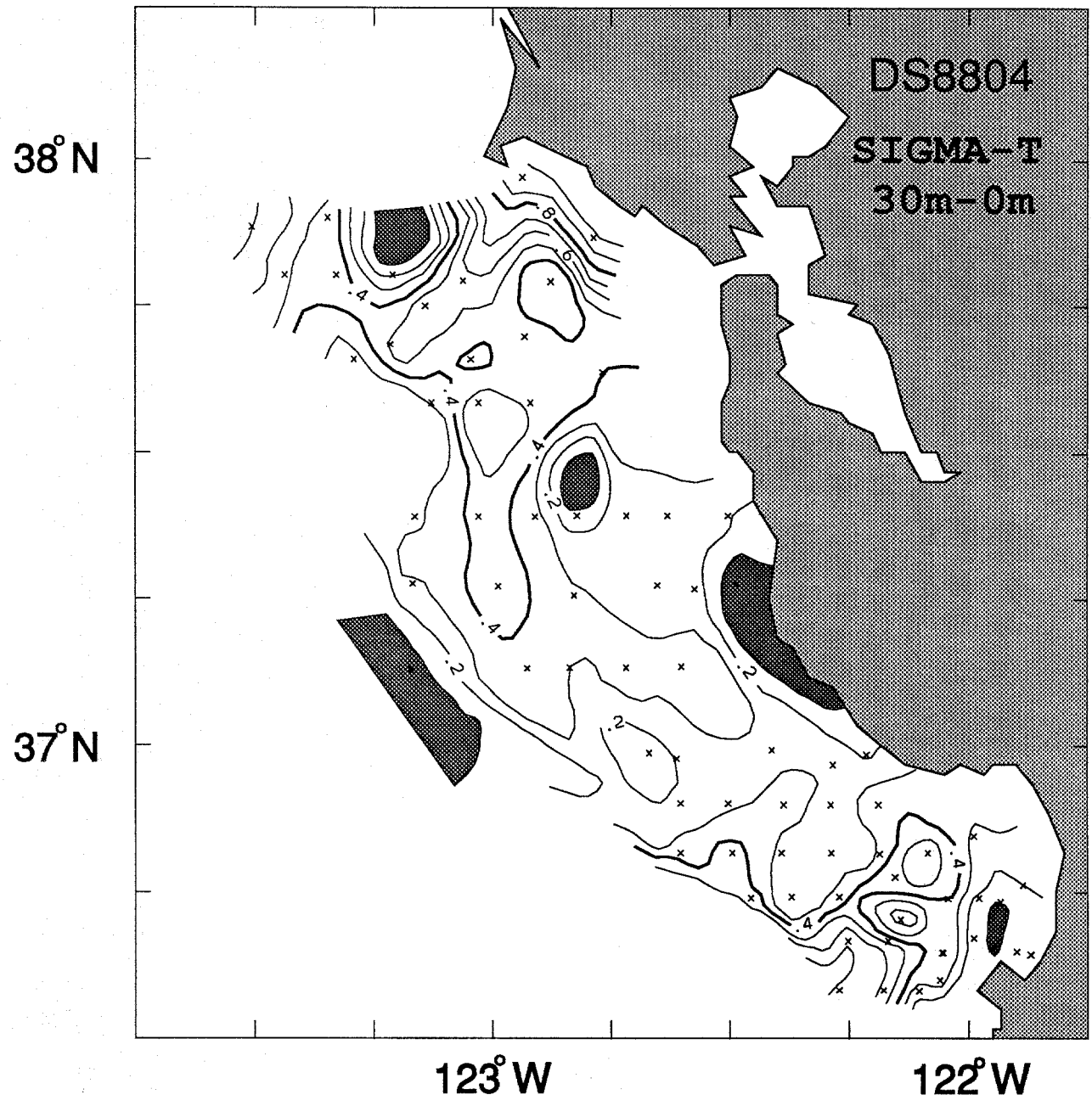

DS8804
SIGMA-T
100m
38°N
37°N
123°W
122°W
26.3
26.3
26.3
26.2
26.1
26.2
26.3
26.3
26.2

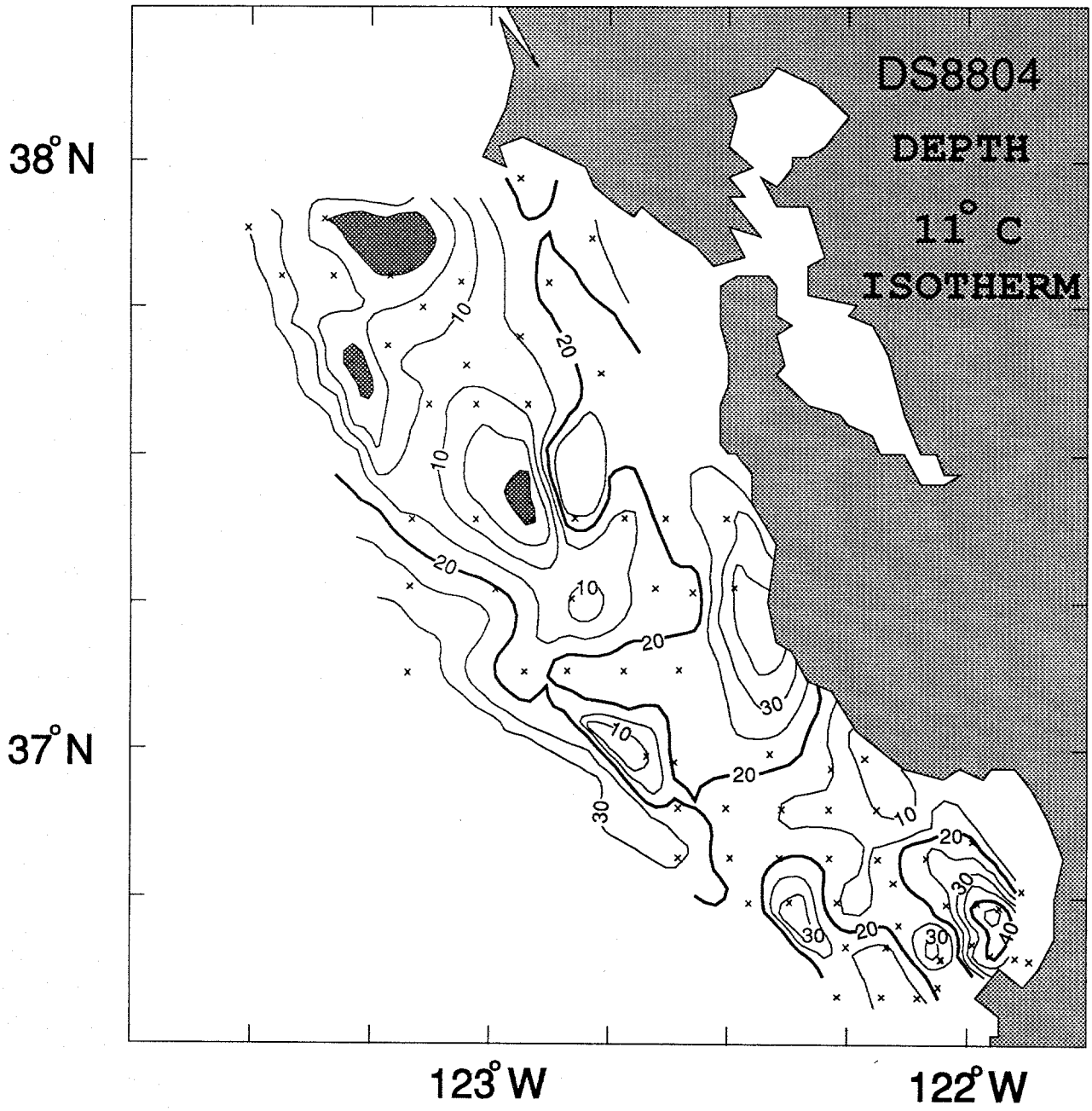

DS8804
TEMP-200m
38°N
37°N
123°W
122°W
8.4
8.
8.8

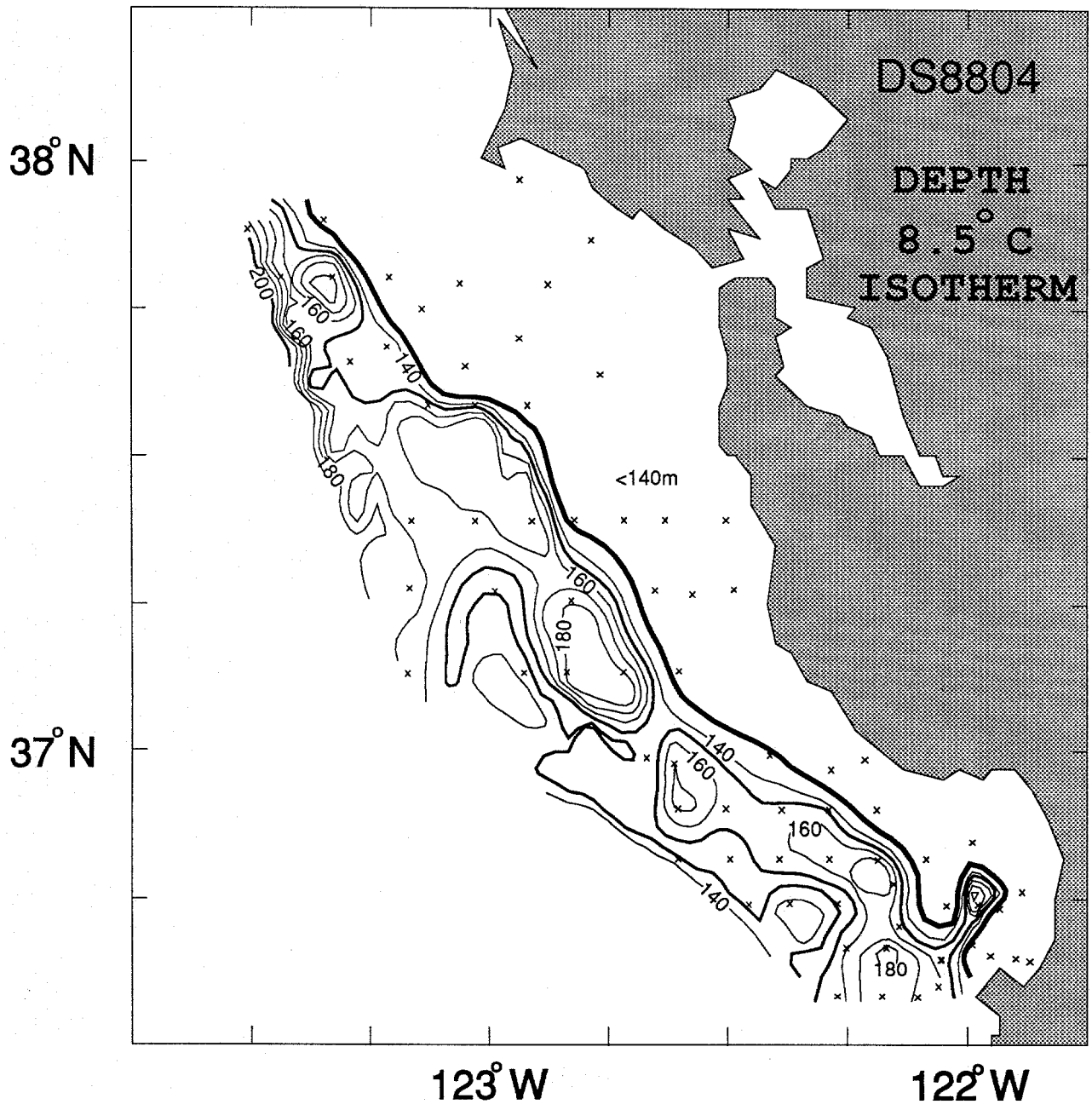

DS8804
SALINITY
200m
38°N
37°N
123°W
122°W
34.
34.
>34.
34.
<34.
34.

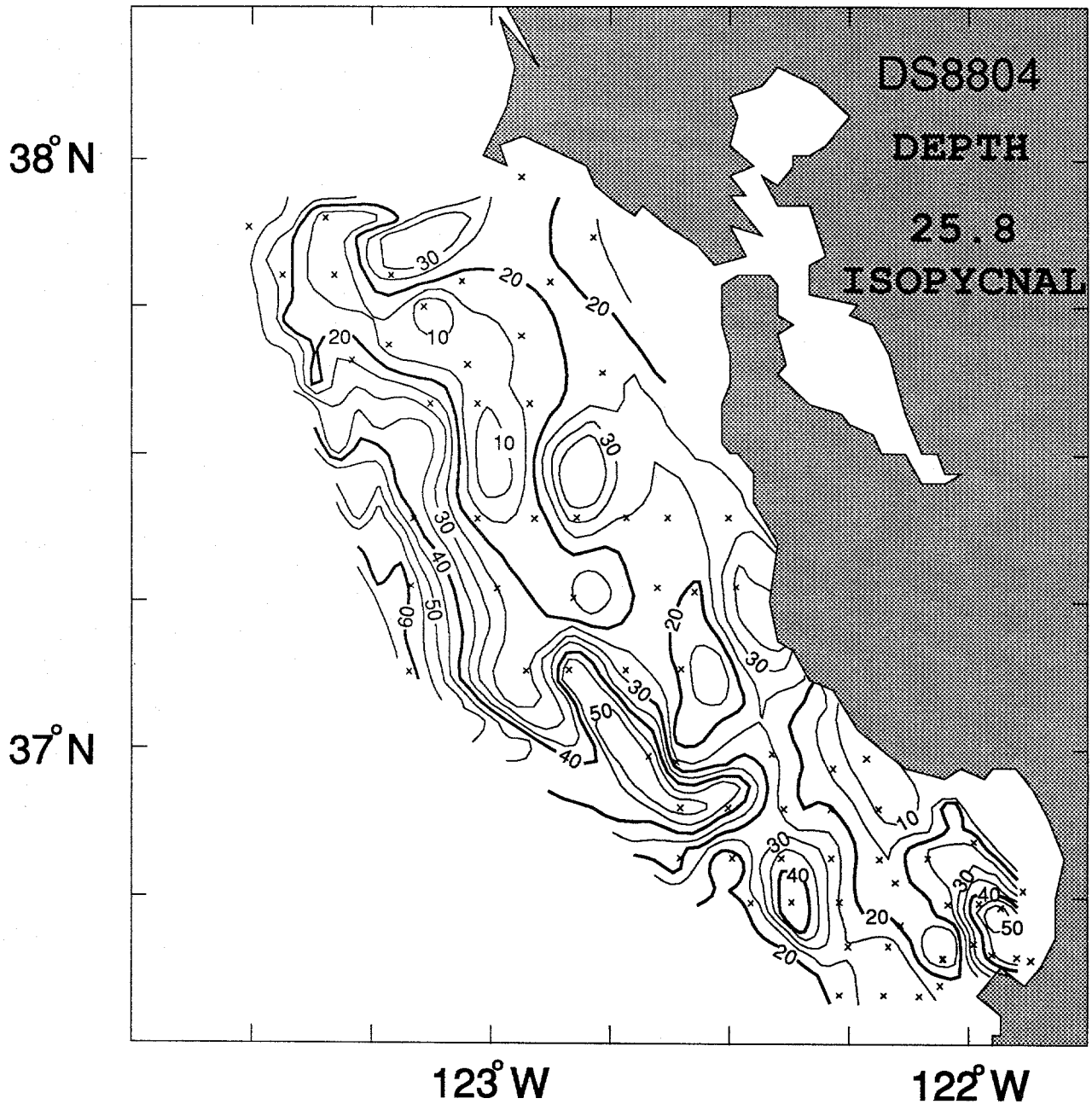

DS8804
SIGMA-T
200m
38°N
37°N
123°W
122°W
>26.5
<26.5
26.4
26.4
26.2
26.6

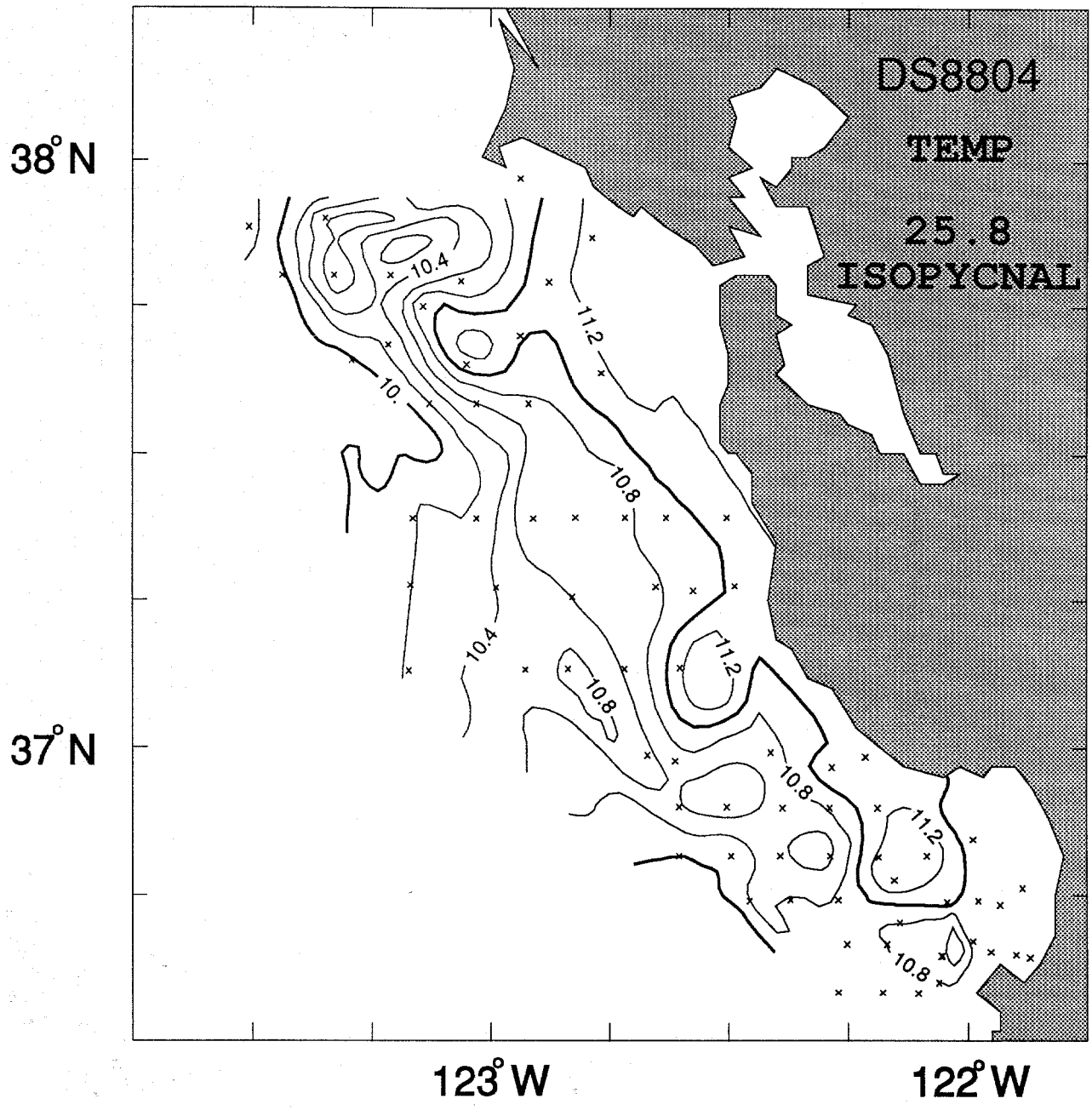

DS8804
MIXED
LAYER
DEPTH (m)
38°N
37°N
123°W
122°W
10
20
30

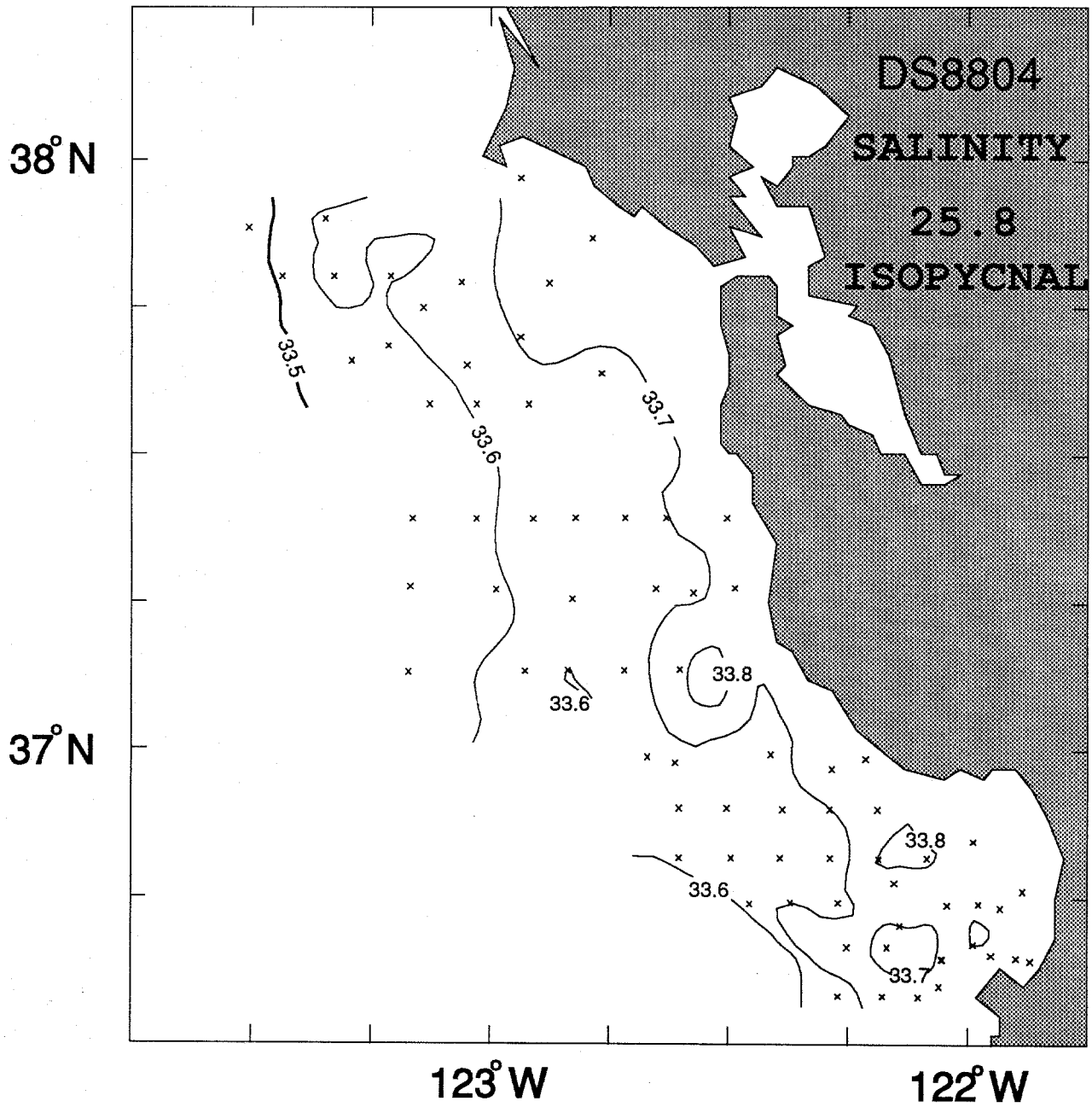

DS8804
SIGMA-T
30m-0m
38°N
37°N
123°W
122°W


DS8804
DEPTH
11° C
ISOTHERM
38° N
37° N
123° W
122° W
10
20
30
40

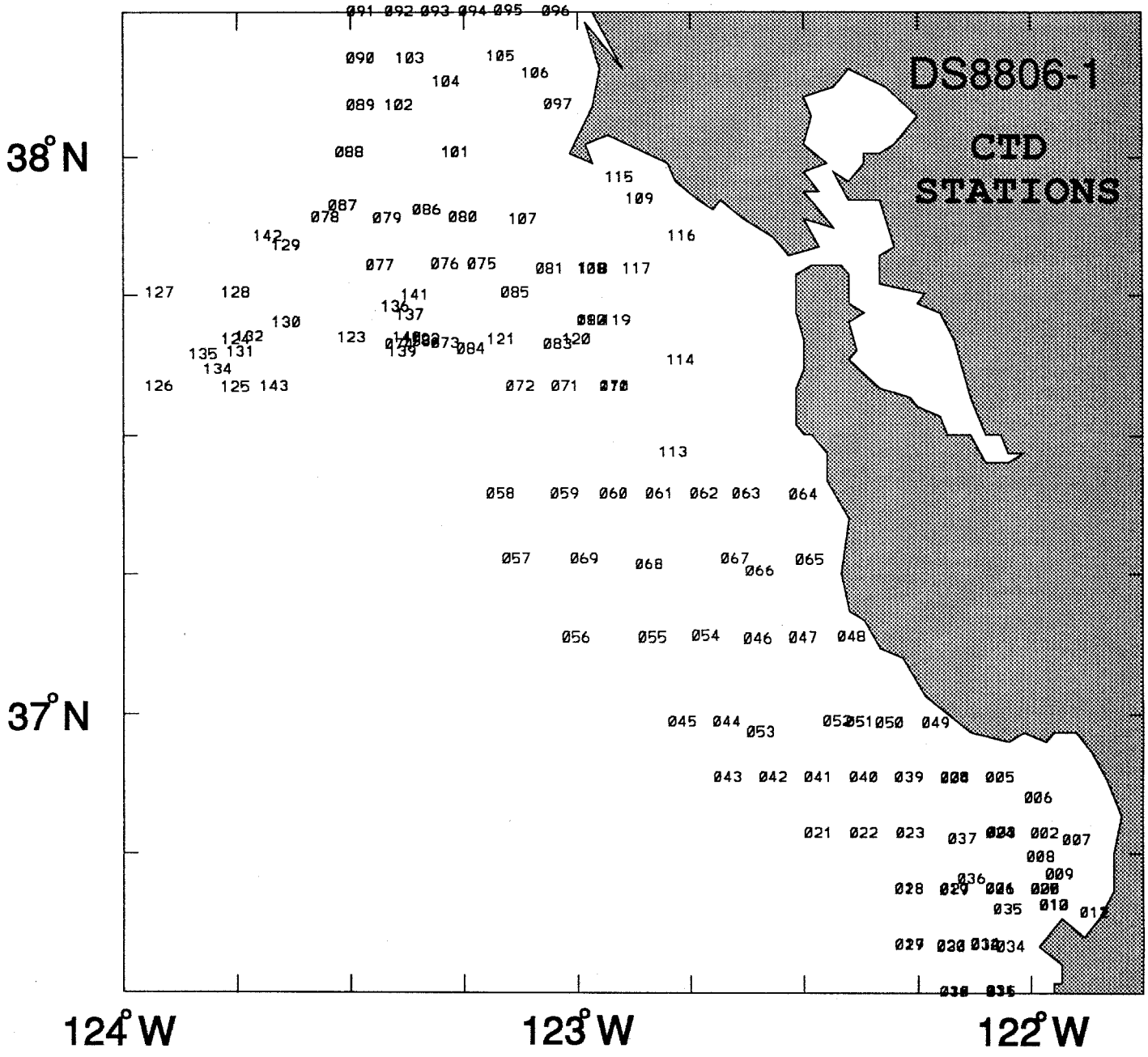

DS8804
DEPTH
8.5° C
ISOTHERM
38° N
37° N
123° W
122° W
<140m
200
160
140
180
160
180
140
160
160
140
180

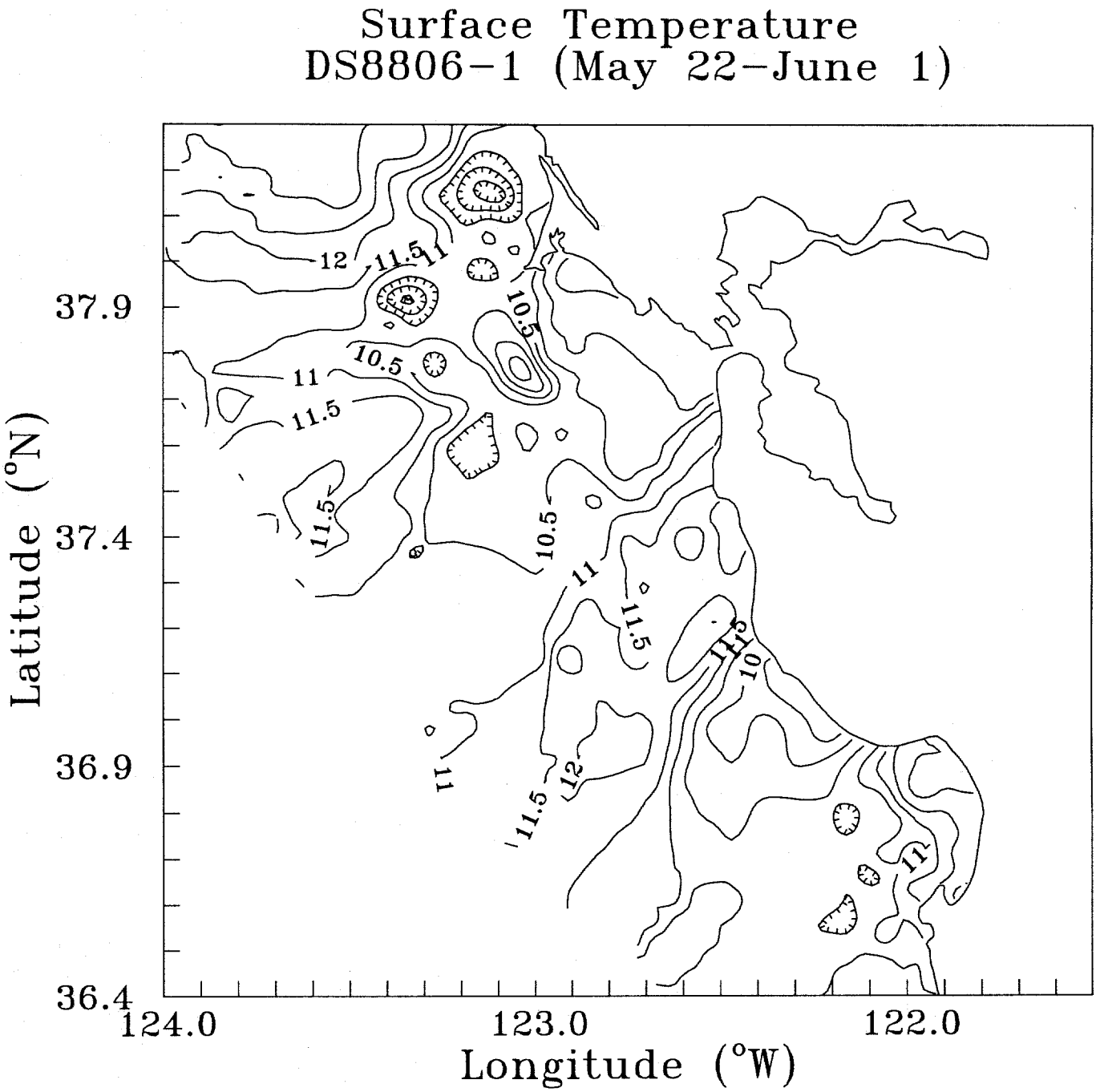

DS8804
DEPTH
25.8
ISOPYCNAL
38°N
37°N
123°W
122°W

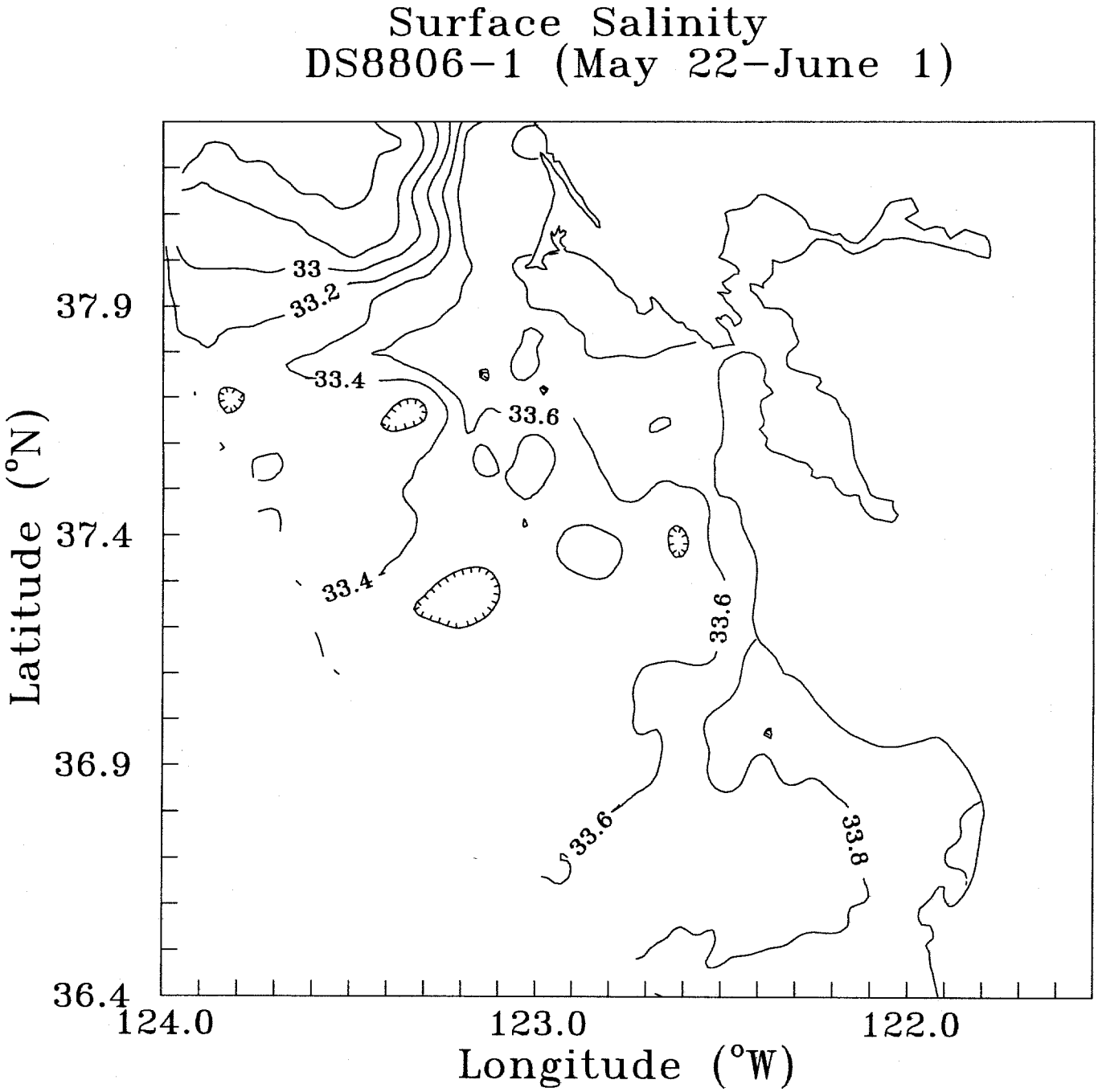

DS8804
TEMP
25.8
ISOPYCNAL
38°N
37°N
123°W
122°W
10.4
11.2
10.
10.8
10.4
10.8
11.2
10.8
11.2
10.8

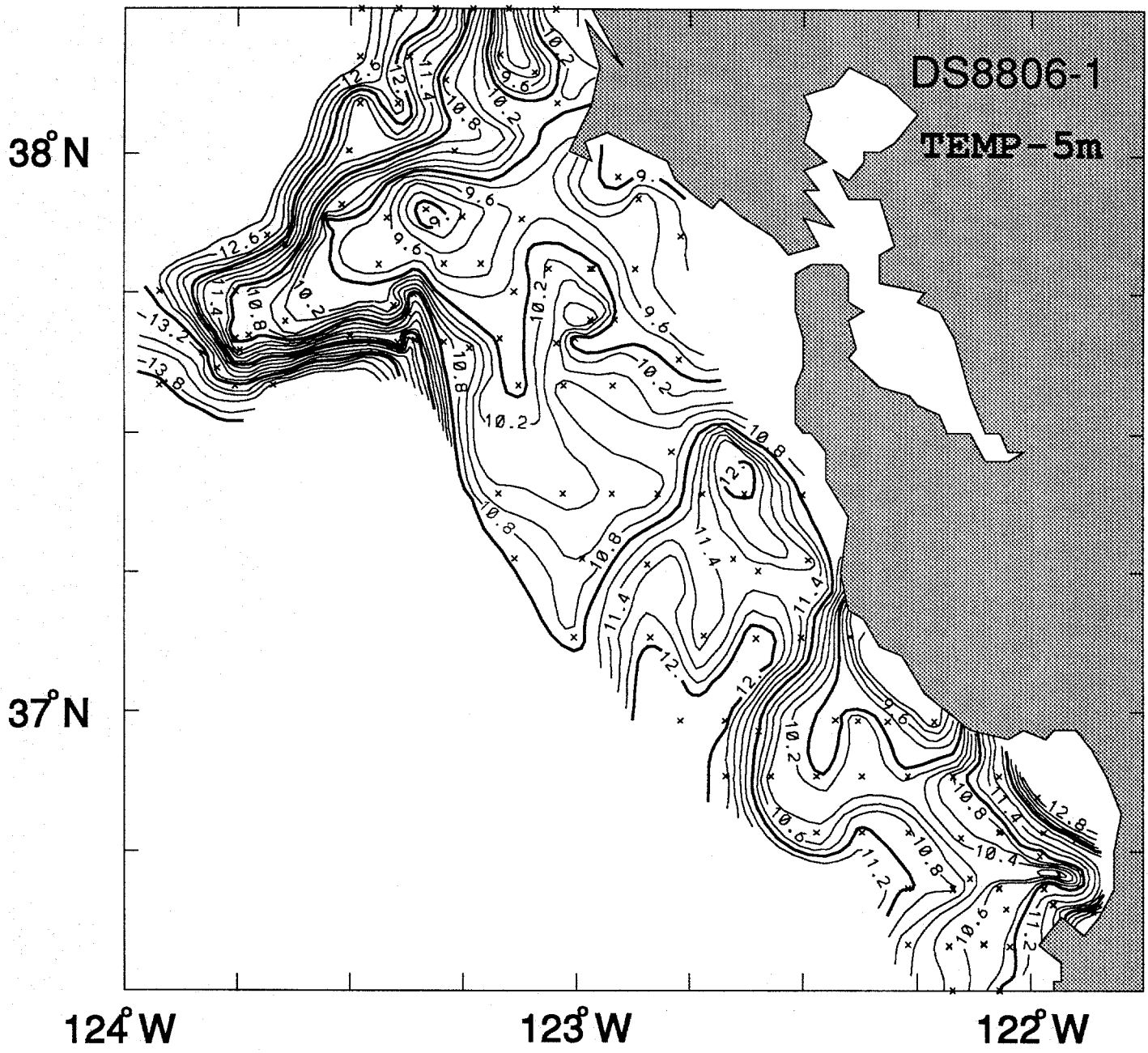

DS8804
SALINITY
25.8
ISOPYCNAL
38°N
37°N
123°W
122°W
33.5
33.6
33.7
33.8
33.6
33.8
33.6
33.7

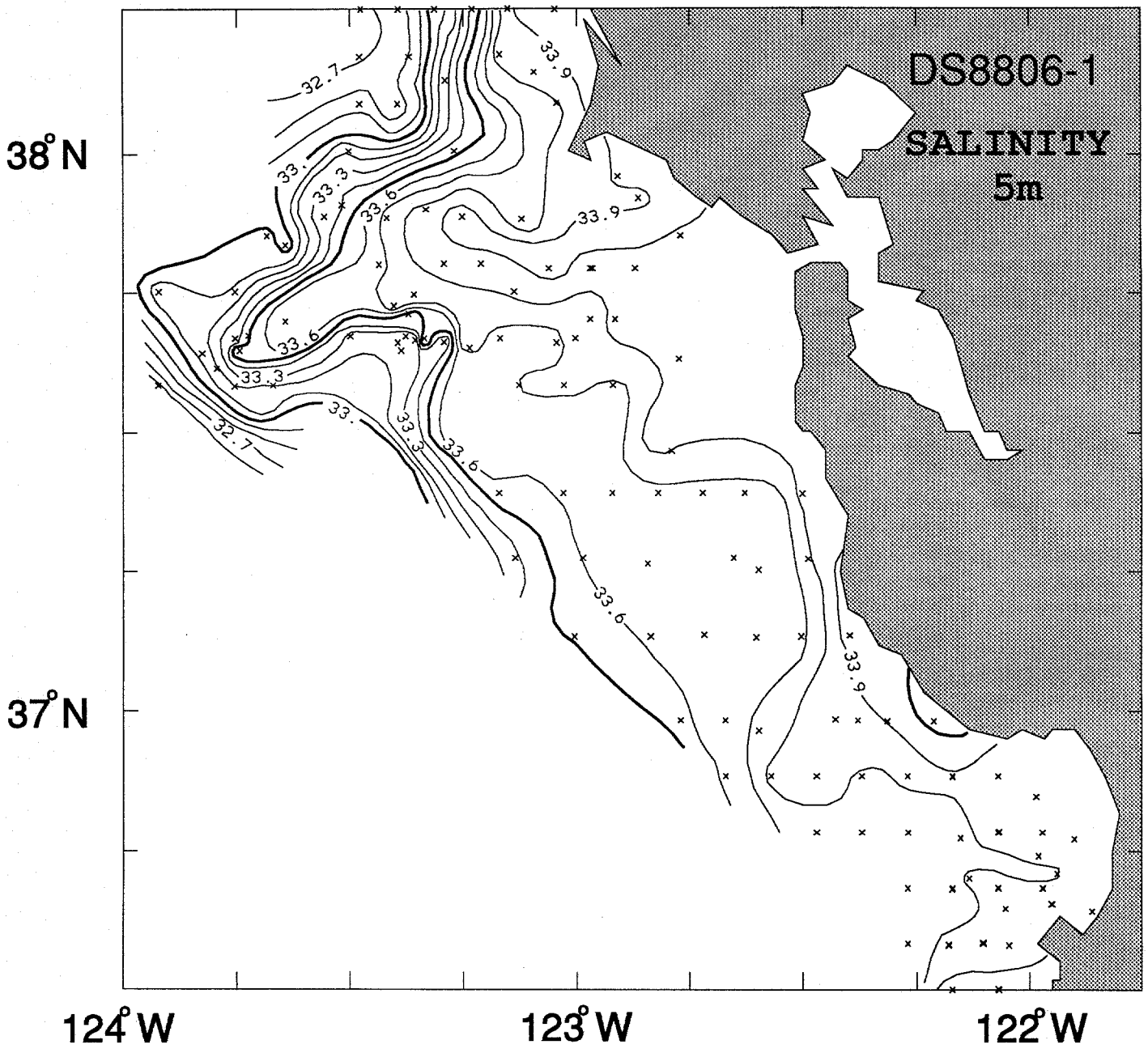
APPENDIX 4.2: HORIZONTAL MAPS- DS8806, SWEEP 1

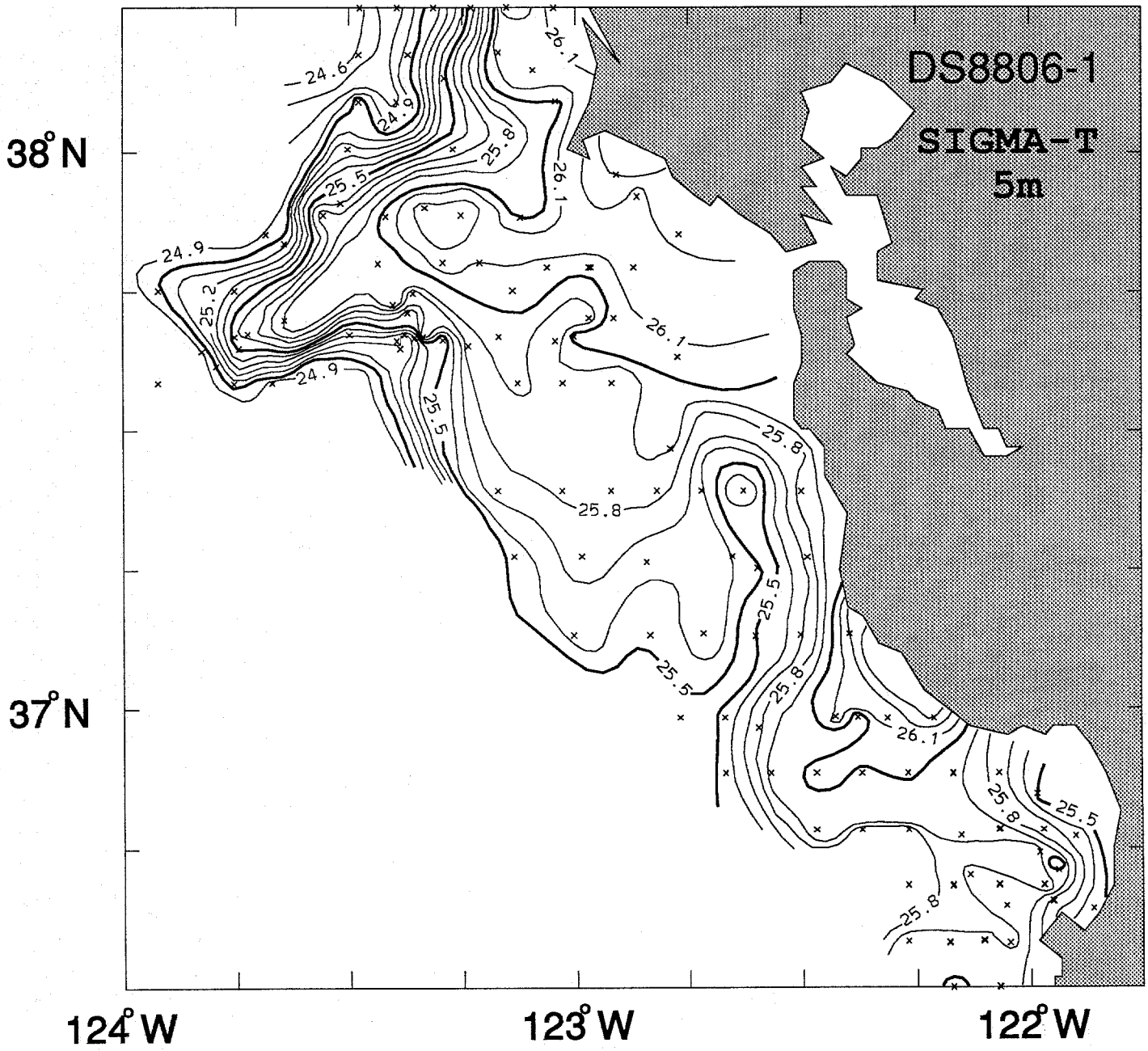

DS8806-1
CTD
STATIONS
38°N
37°N
124°W
123°W
122°W

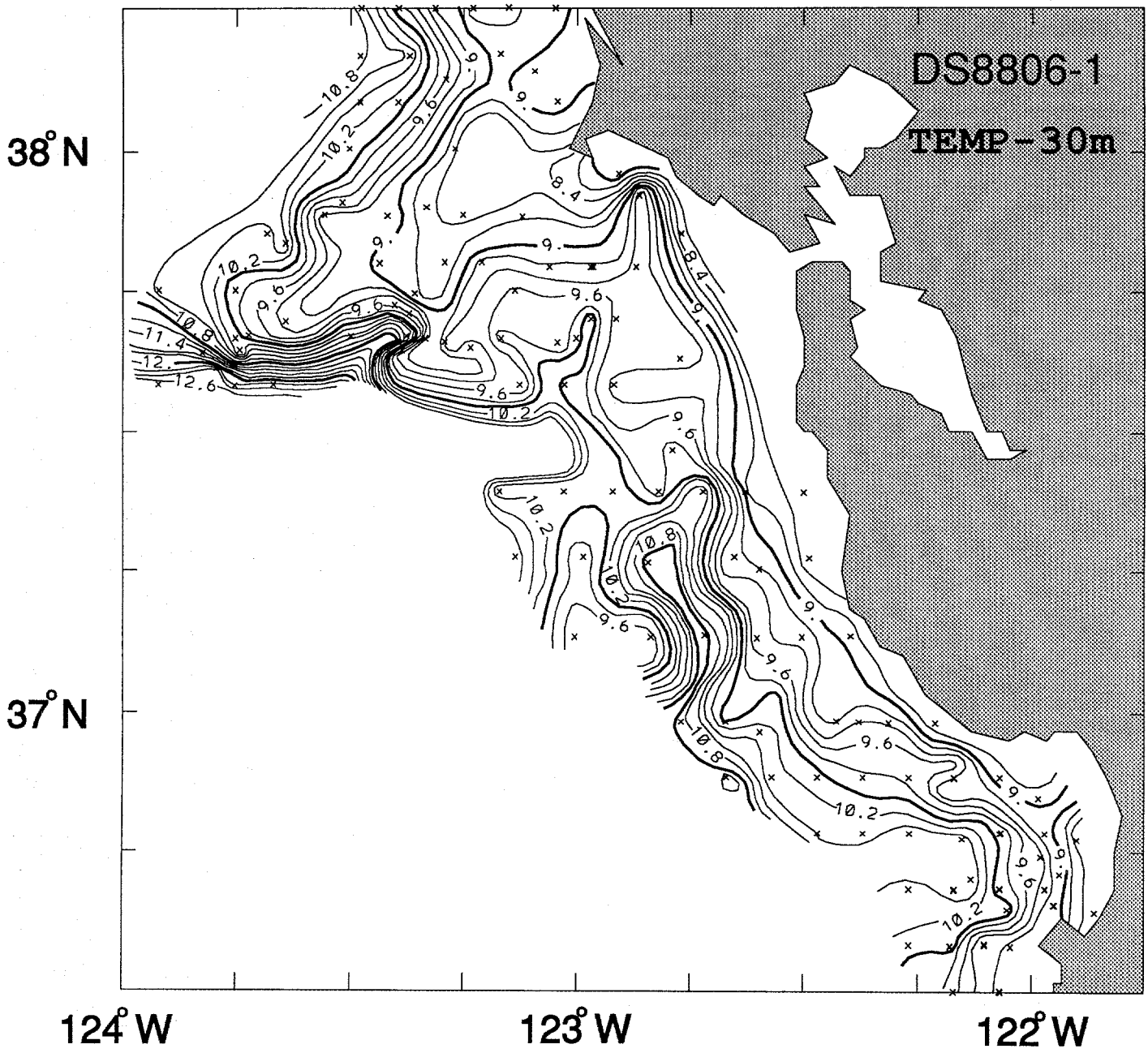

Surface Temperature
DS8806-1 (May 22-June 1)
Latitude (°N)
37.9
37.4
36.9
36.4
124.0
123.0
122.0
Longitude (°W)
12
11.5
11
10.5
11
11.5
10.5
11.5
10.5
11
11.5
11.5
10
11
11.5
12
11

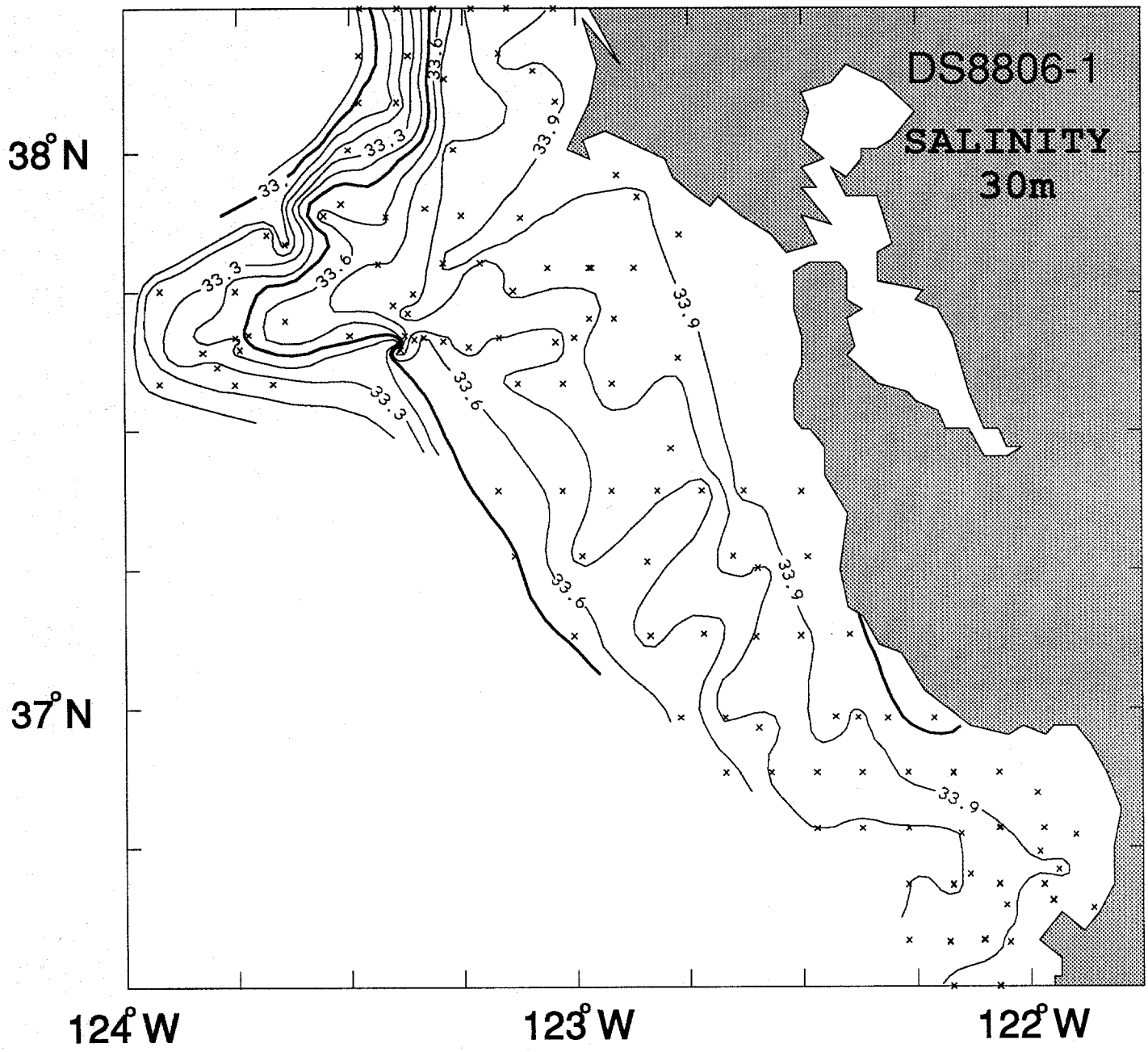

Surface Salinity
DS8806-1 (May 22-June 1)
33
33.2
33.4
33.6
33.4
33.6
33.6
33.8
37.9
37.4
36.9
36.4
Latitude (°N)
124.0
123.0
122.0
Longitude (°W)

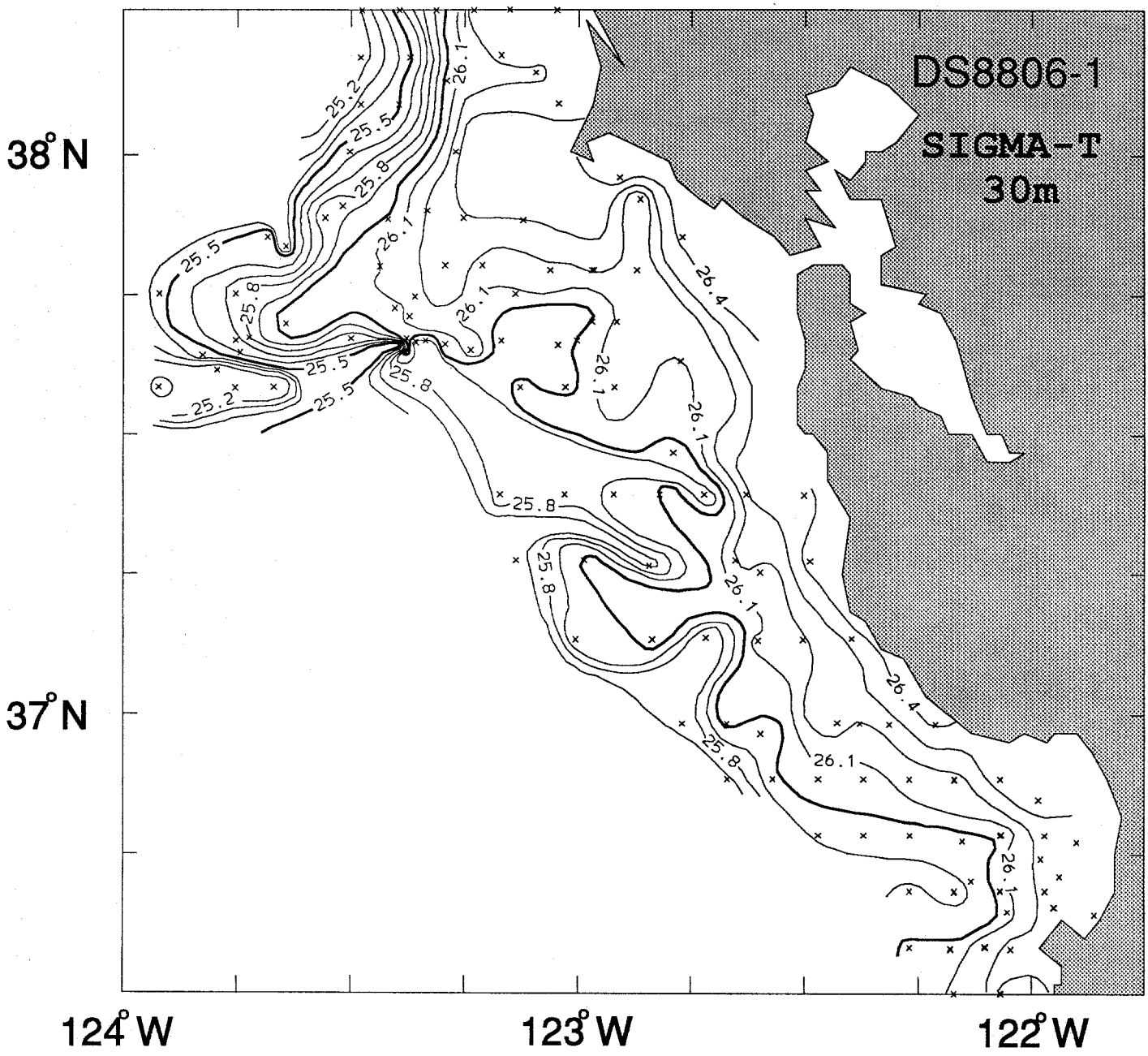

DS8806-1
TEMP – 5m
38°N
37°N
124°W
123°W
122°W

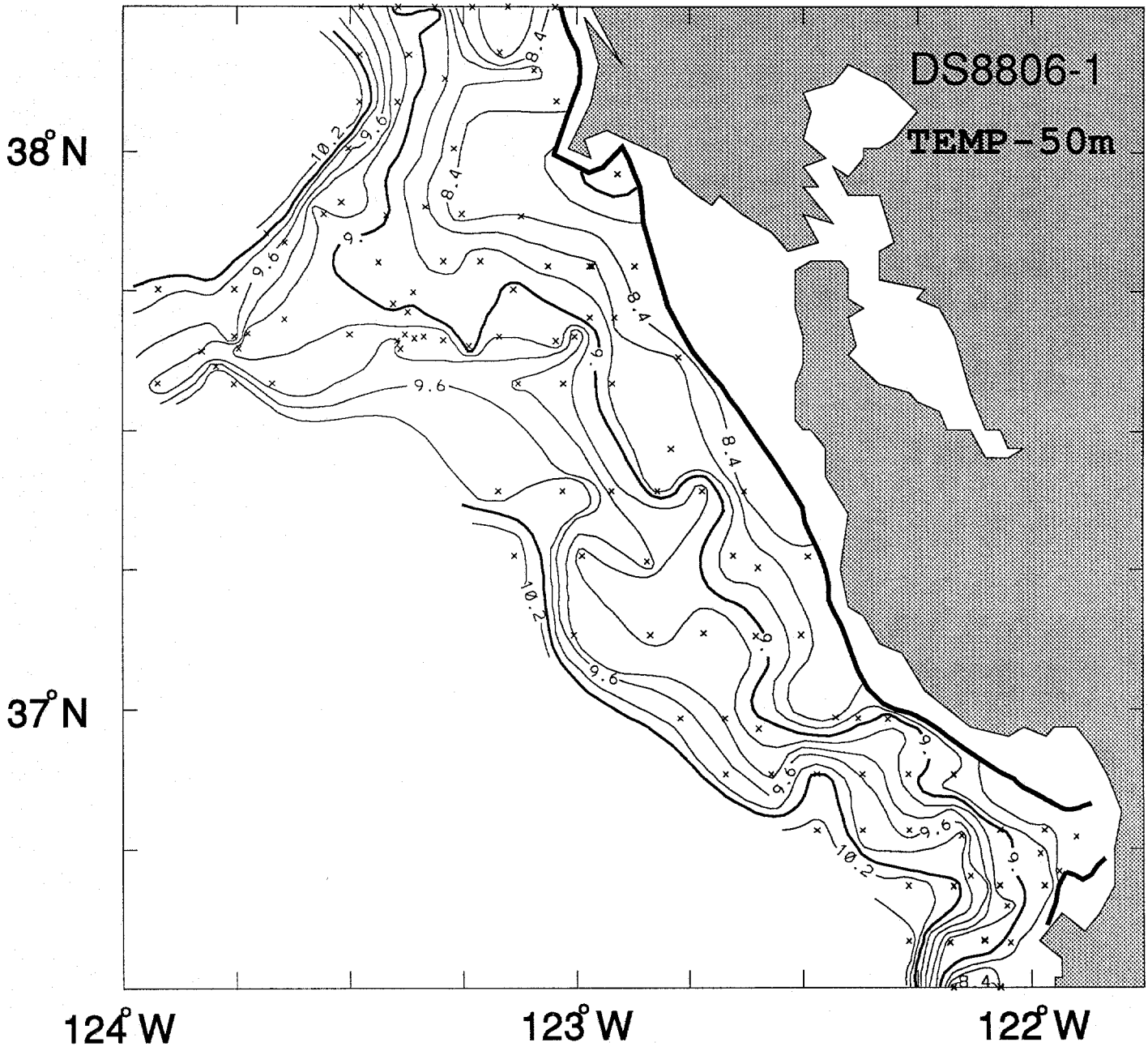

DS8806-1
SALINITY
5m
38°N
37°N
124°W
123°W
122°W
32.7
33.
33.3
33.6
33.9

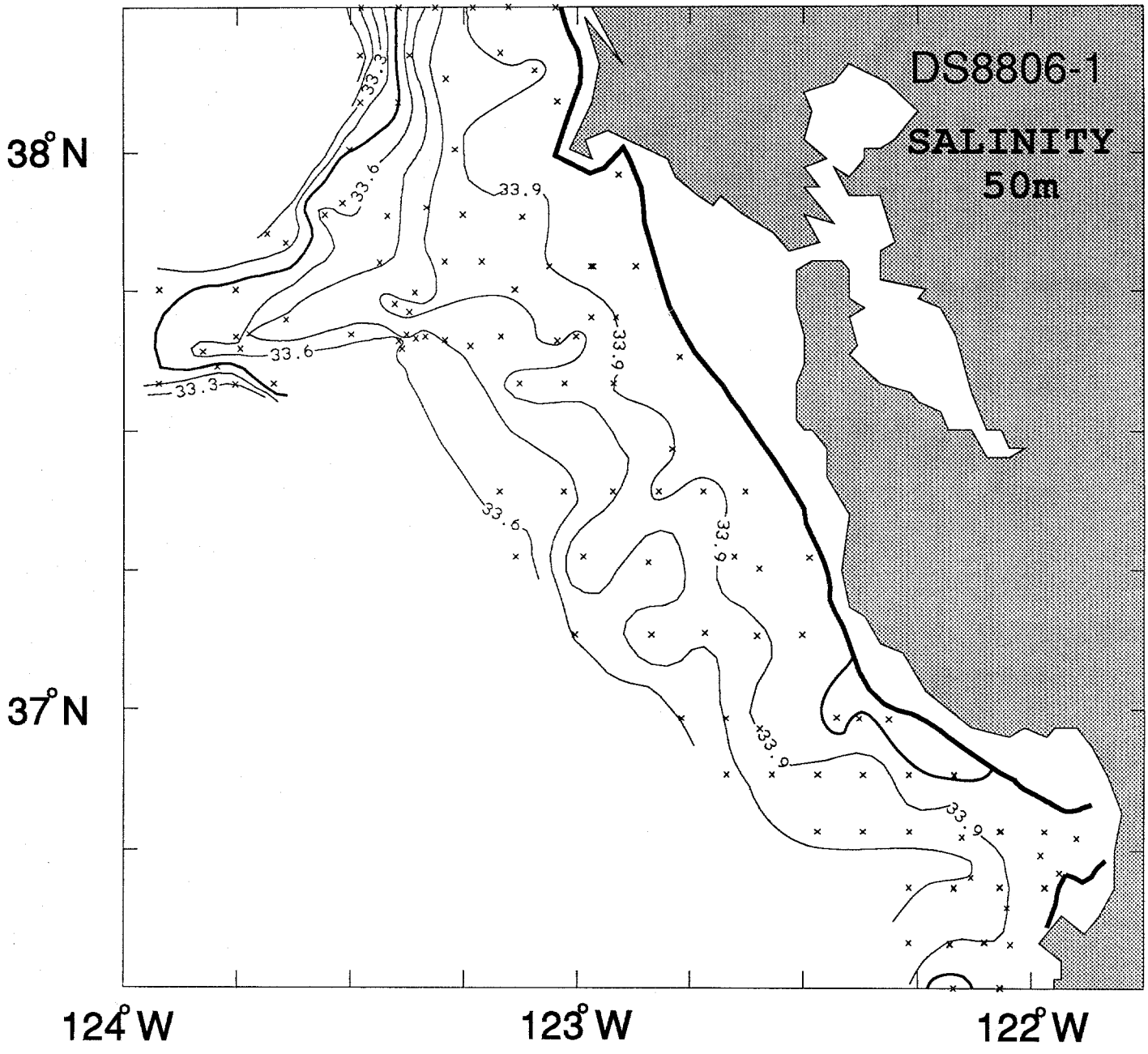

DS8806-1
SIGMA-T
5m
38°N
37°N
124°W
123°W
122°W
24.6
24.9
25.2
25.5
25.8
26.1

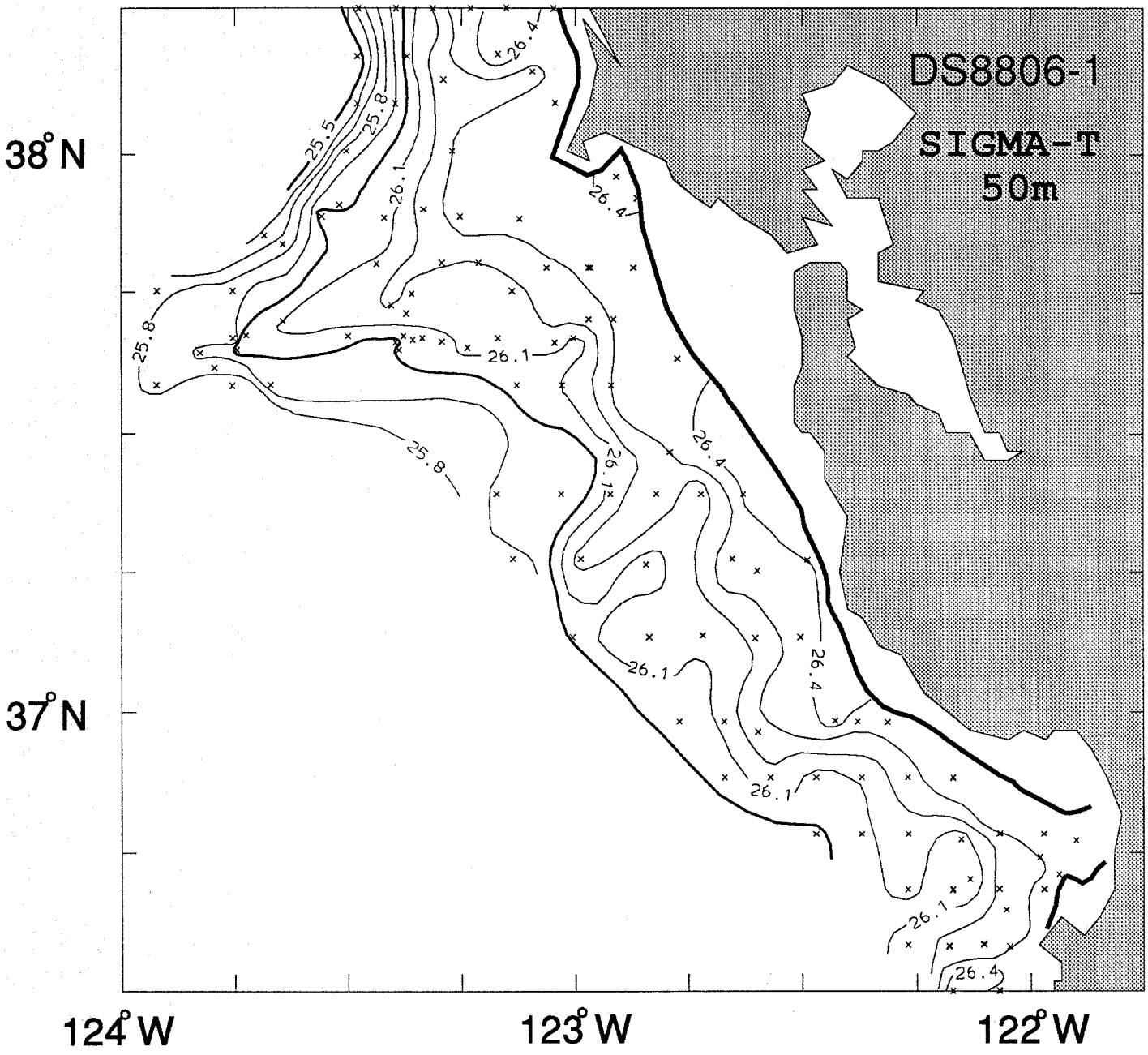

DS8806-1
TEMP - 30m
38° N
37° N
124° W
123° W
122° W

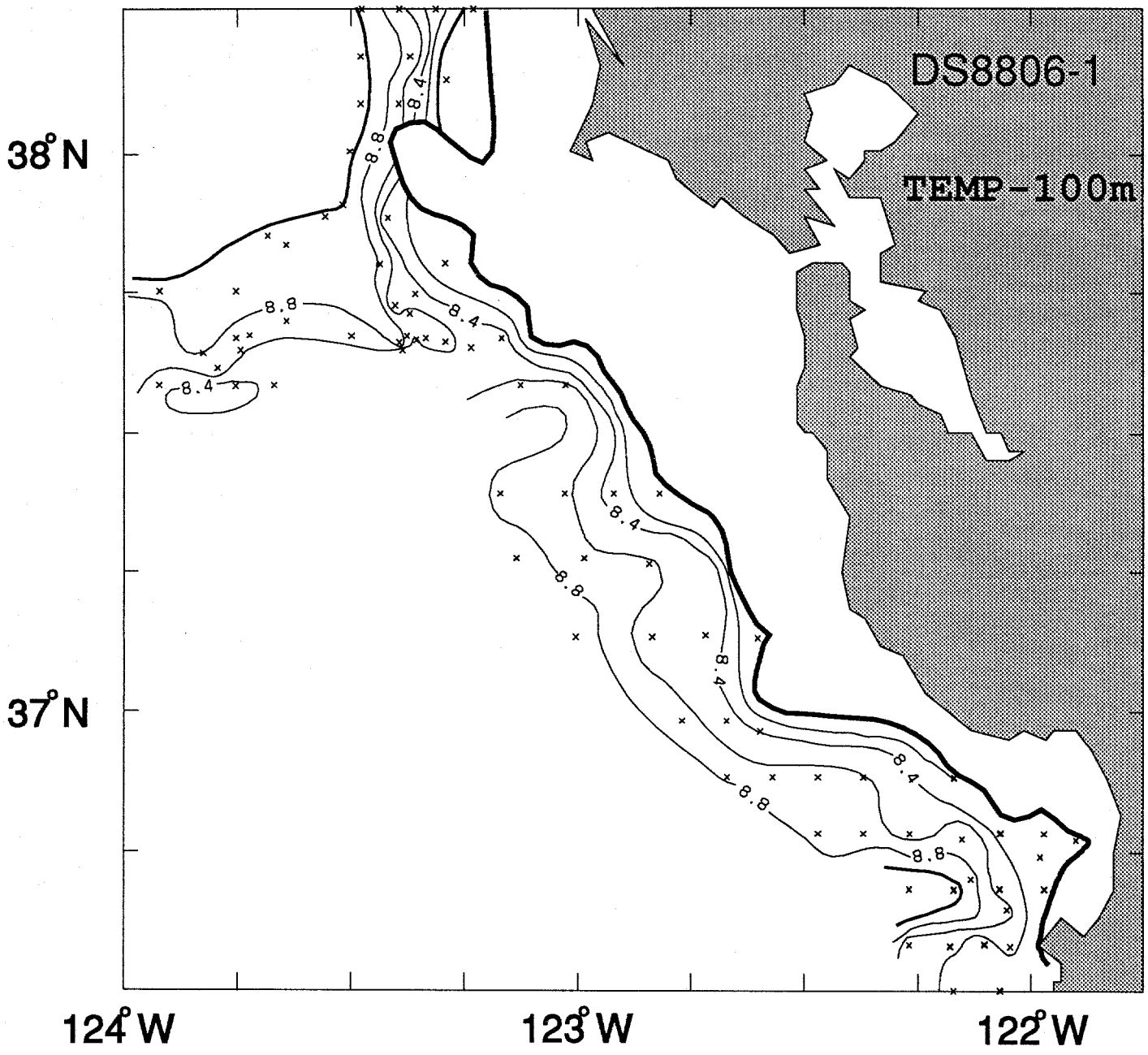

DS8806-1
SALINITY
30m
38°N
37°N
124°W
123°W
122°W
33.3
33.6
33.9

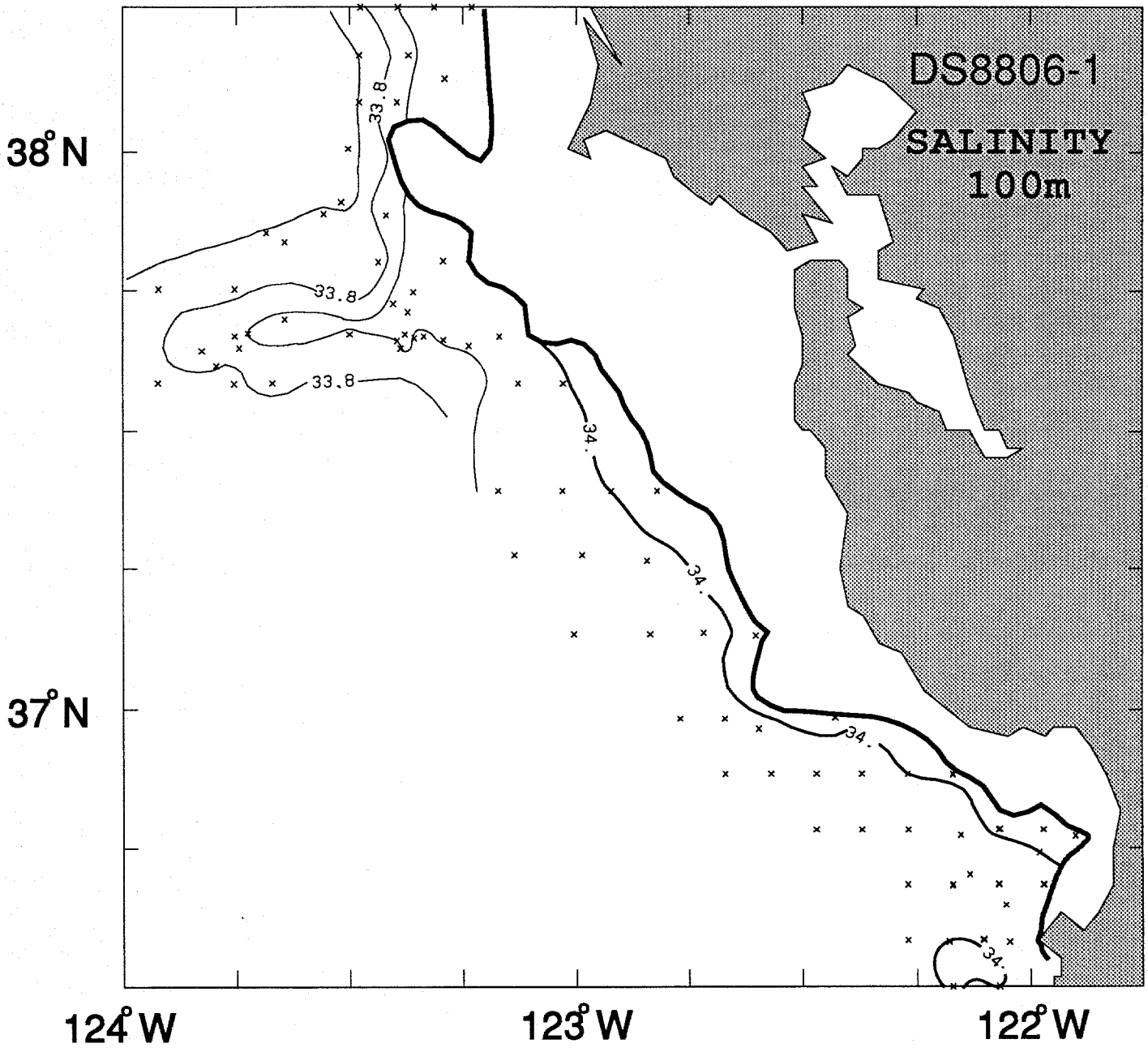

DS8806-1
SIGMA-T
30m
38°N
37°N
124°W
123°W
122°W
25.2
25.5
25.8
26.1
26.4

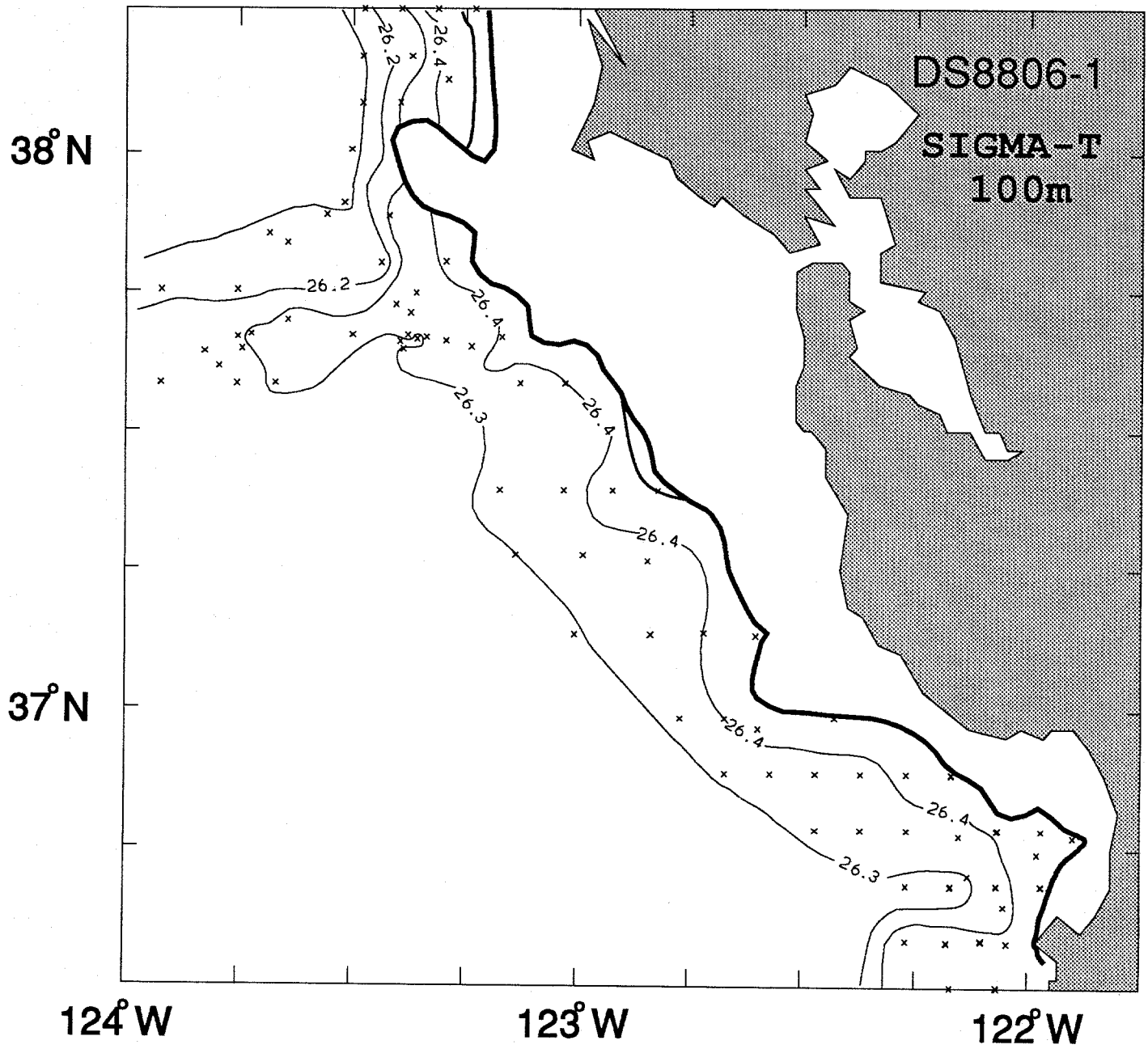

DS8806-1
TEMP - 50m
38°N
37°N
124°W
123°W
122°W
10.2
9.6
8.4

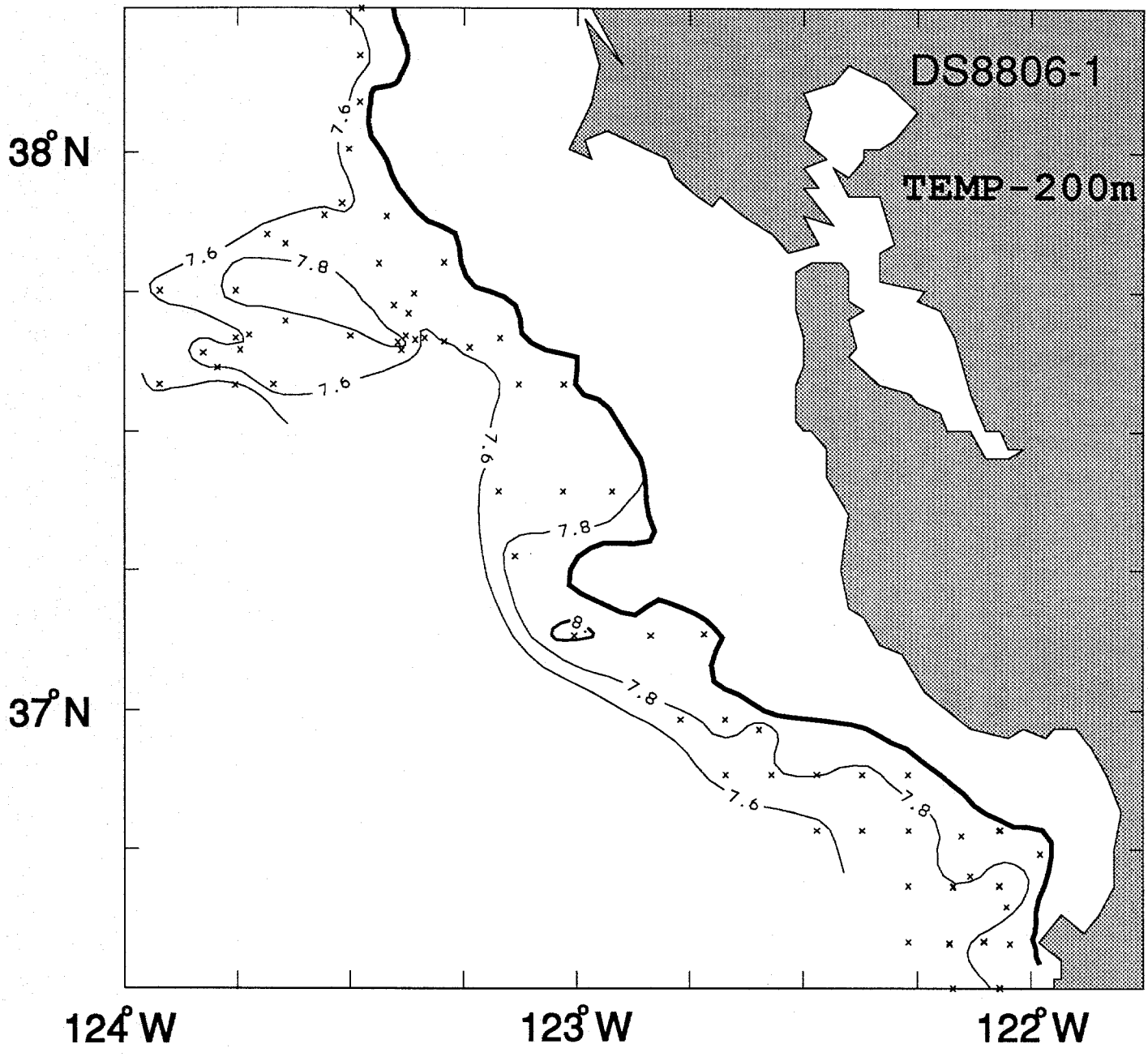

DS8806-1
SALINITY
50m
38°N
37°N
124°W
123°W
122°W
33.3
33.6
33.9

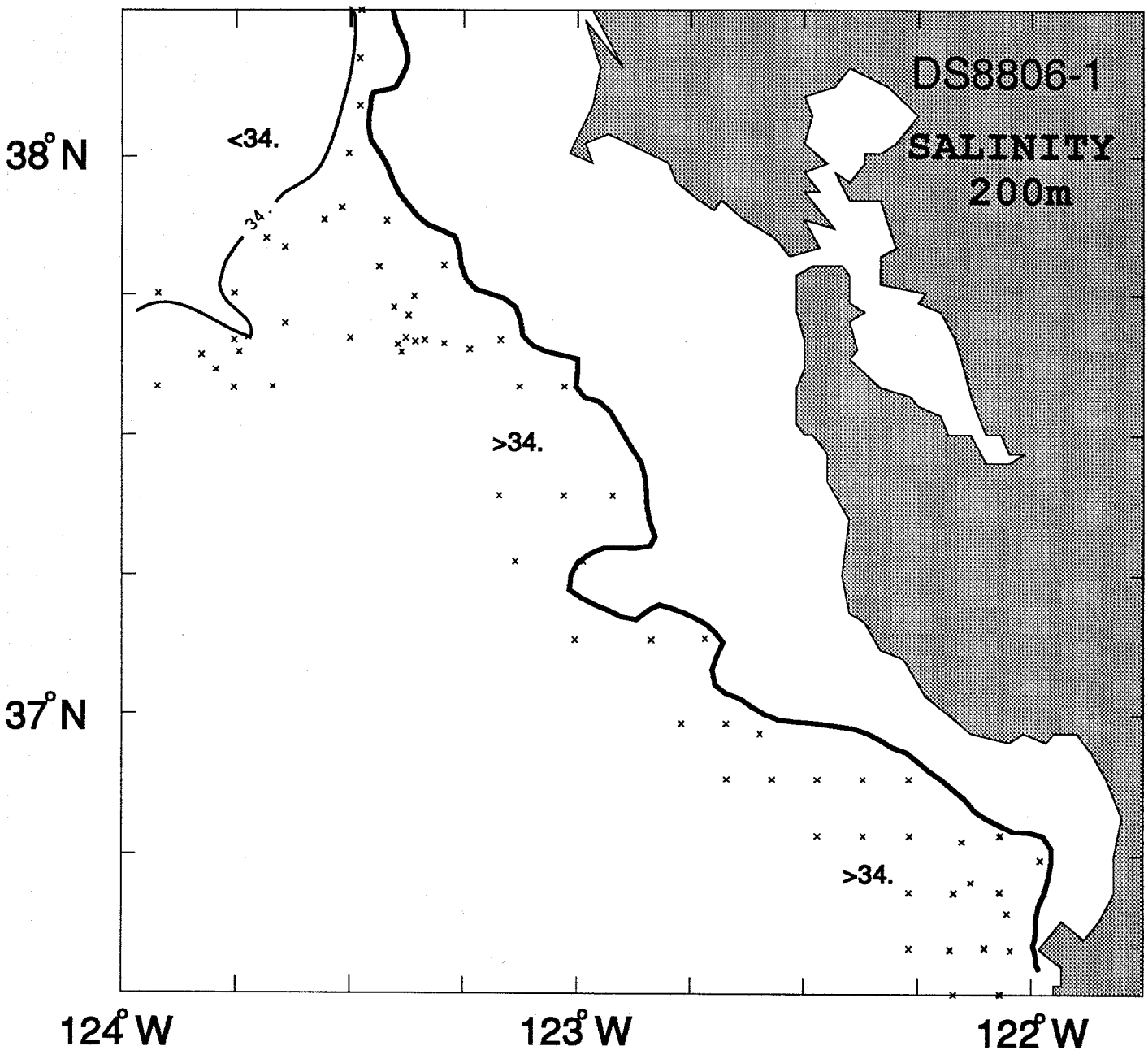

DS8806-1
SIGMA-T
50m
38°N
37°N
124°W
123°W
122°W
25.5
25.8
26.1
26.4

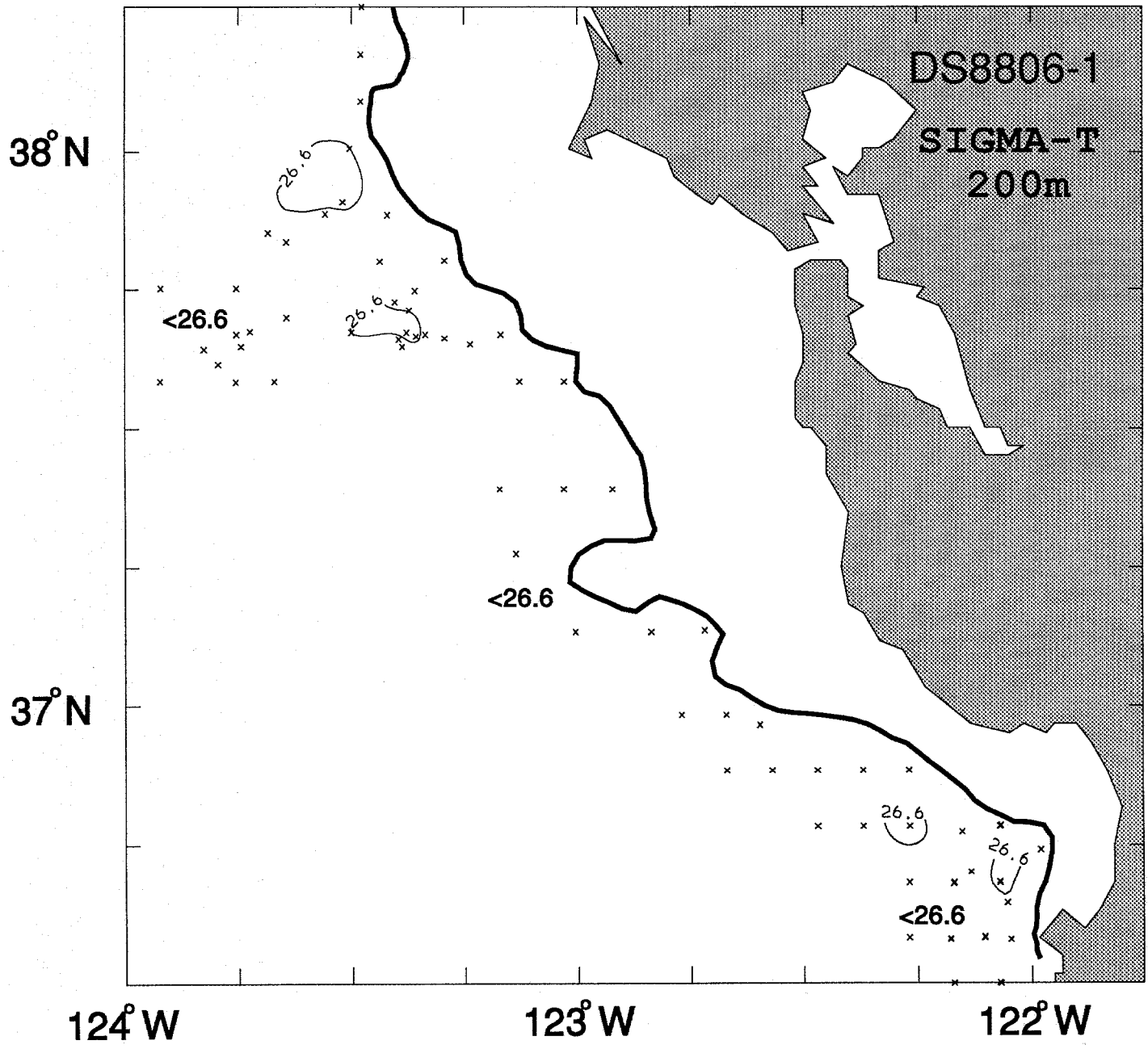

DS8806-1
TEMP-100m
38°N
37°N
124°W
123°W
122°W
8.4
8.8

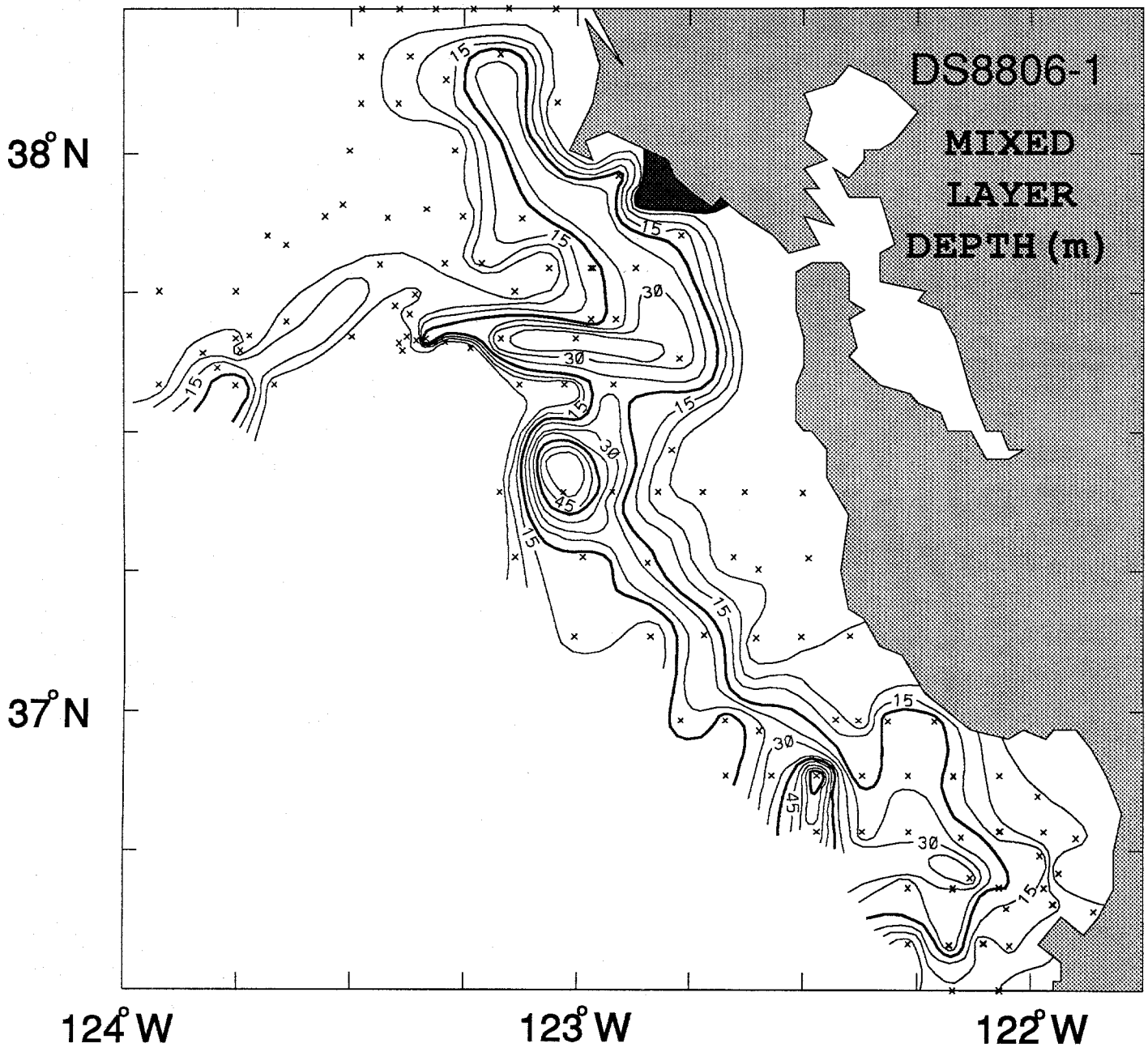

DS8806-1
SALINITY
100m
38°N
37°N
124°W
123°W
122°W
33.8
33.8
33.8
34.
34.
34.
34.

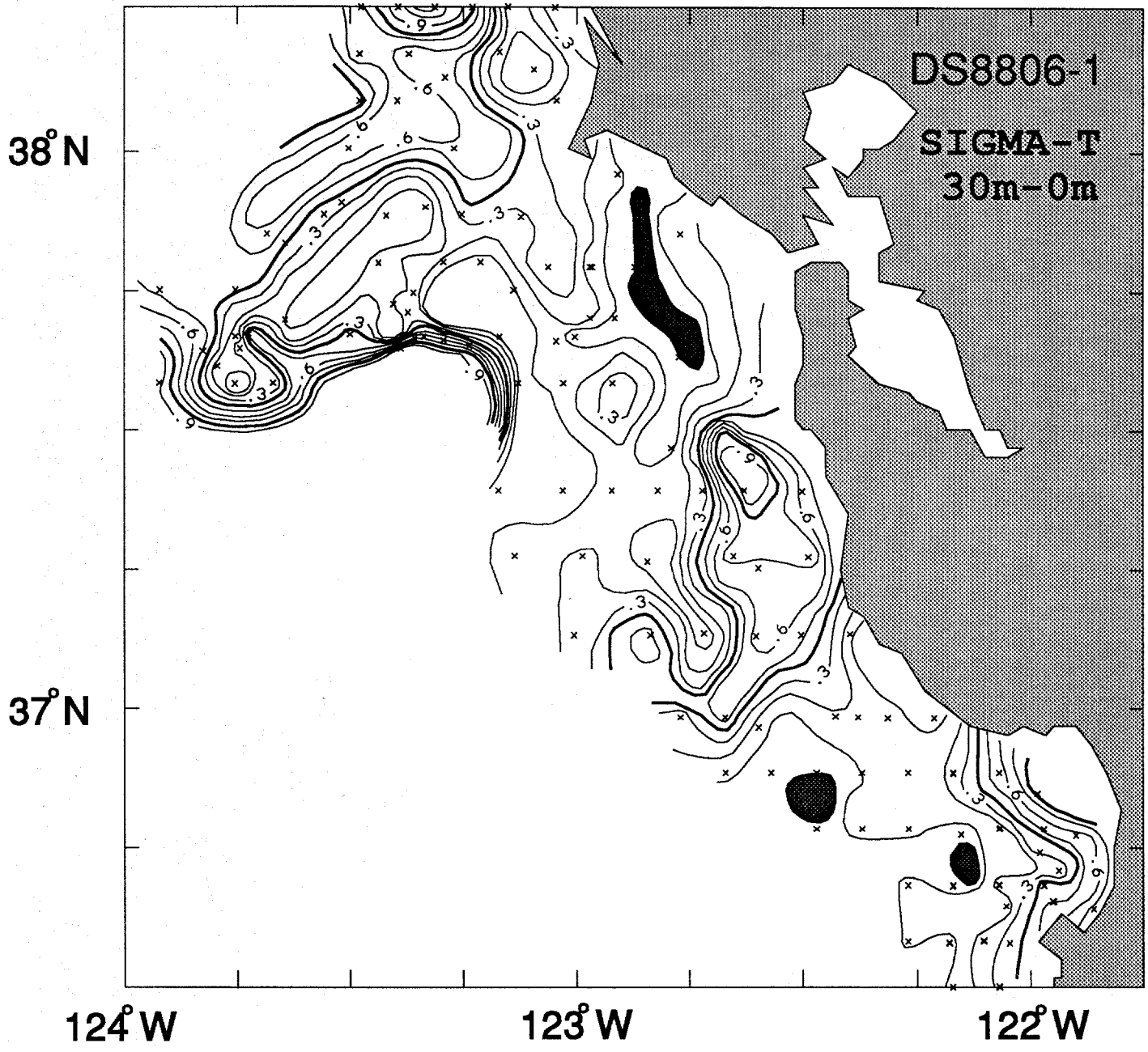

DS8806-1
SIGMA-T
100m
38°N
37°N
124°W
123°W
122°W
26.2
26.4
26.3

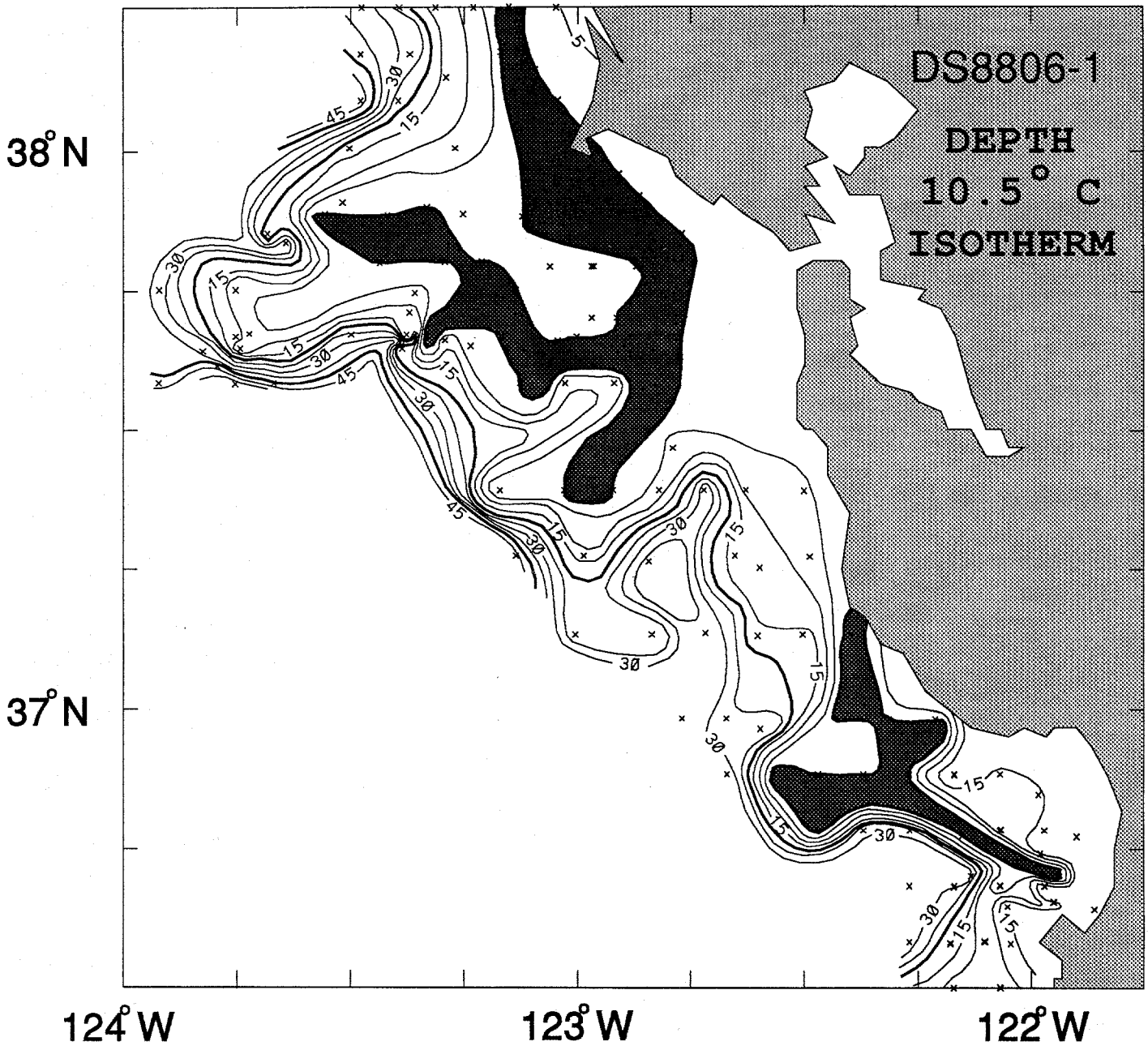

DS8806-1
TEMP-200m
38°N
37°N
124°W
123°W
122°W
7.6
7.8
8

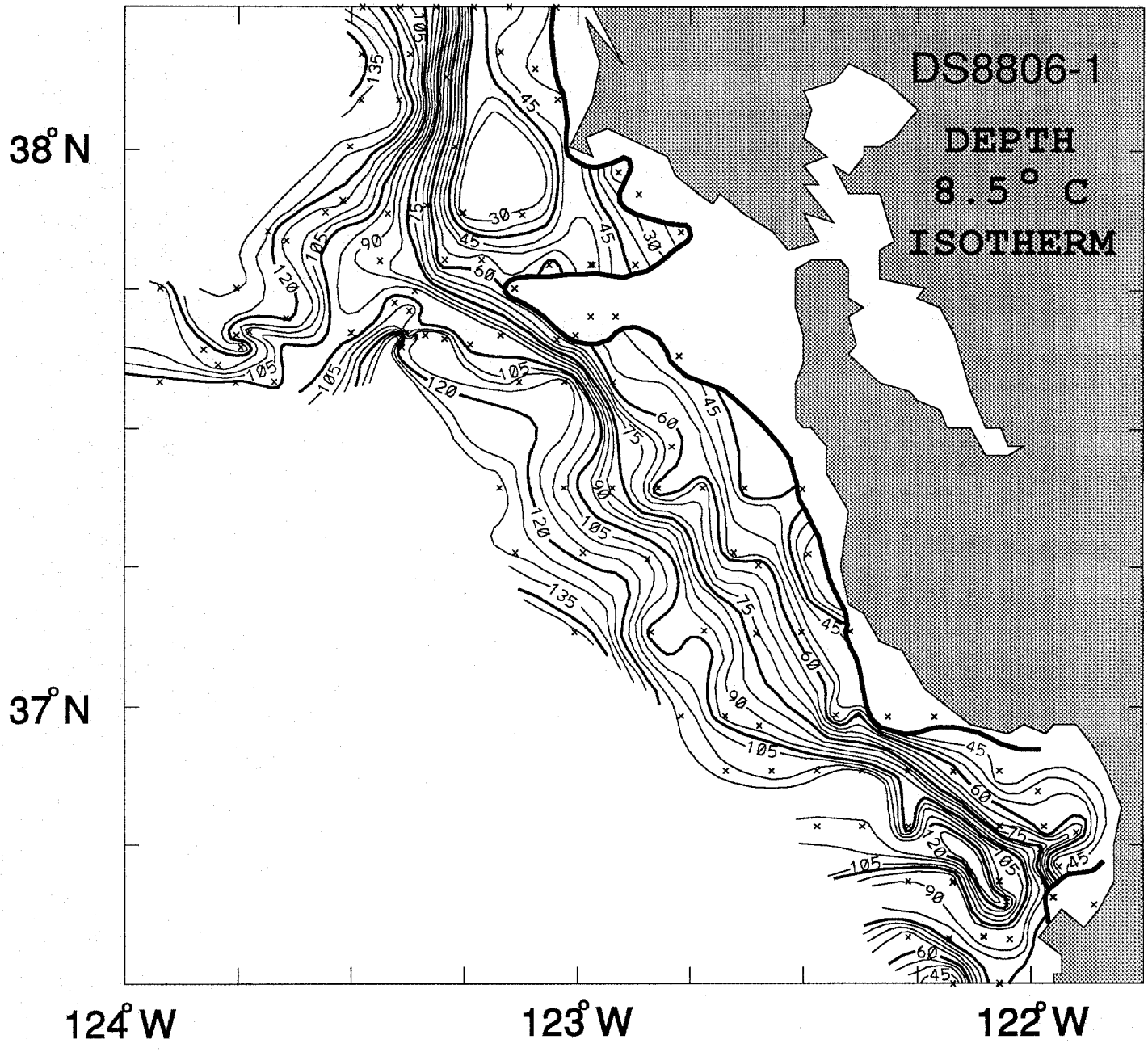

DS8806-1
SALINITY
200m
<34.
34.
>34.
>34.
38°N
37°N
124°W
123°W
122°W

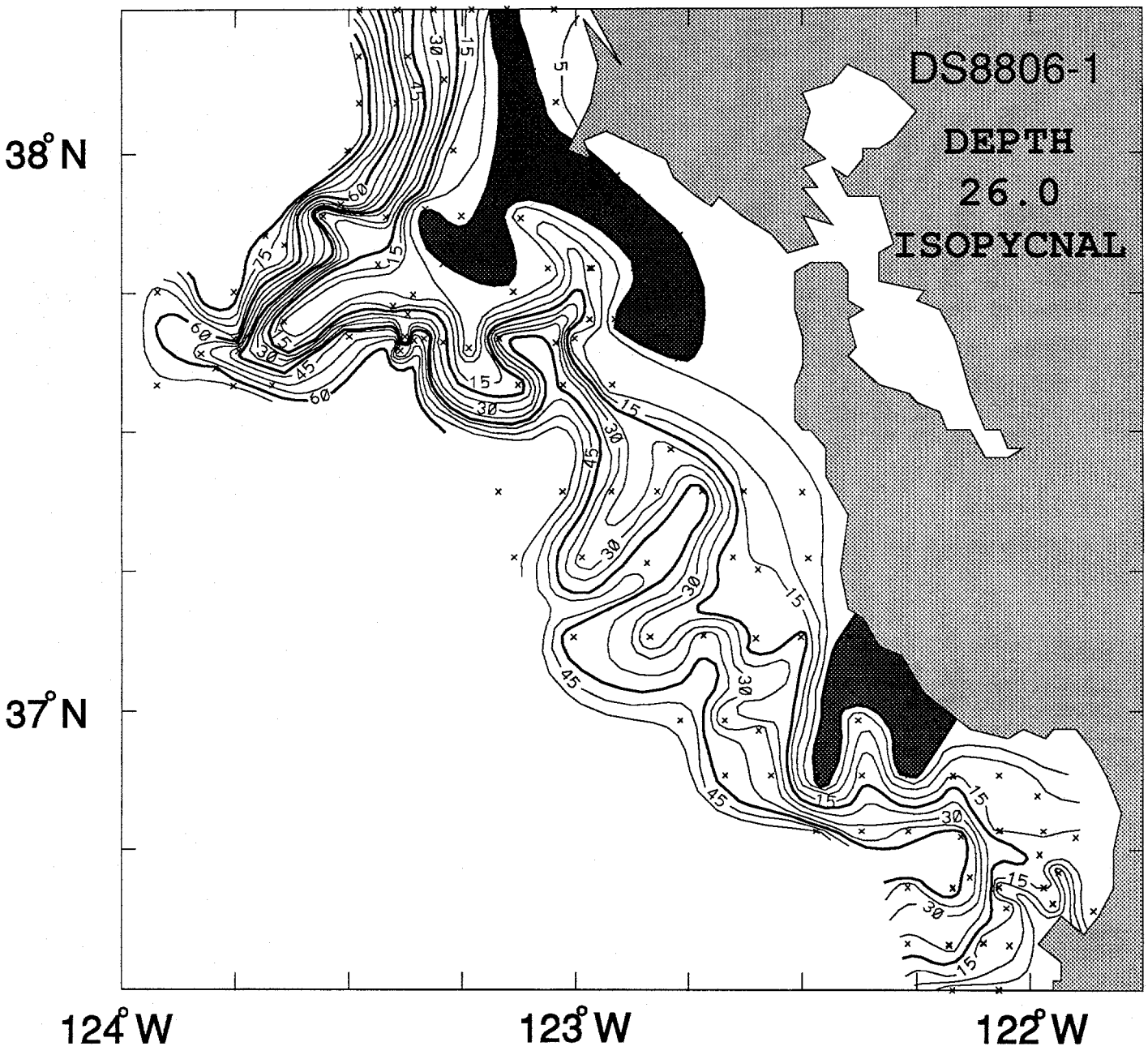

DS8806-1
SIGMA-T
200m
38°N
37°N
124°W
123°W
122°W
26.6
<26.6
26.6
<26.6
26.6
26.6
<26.6

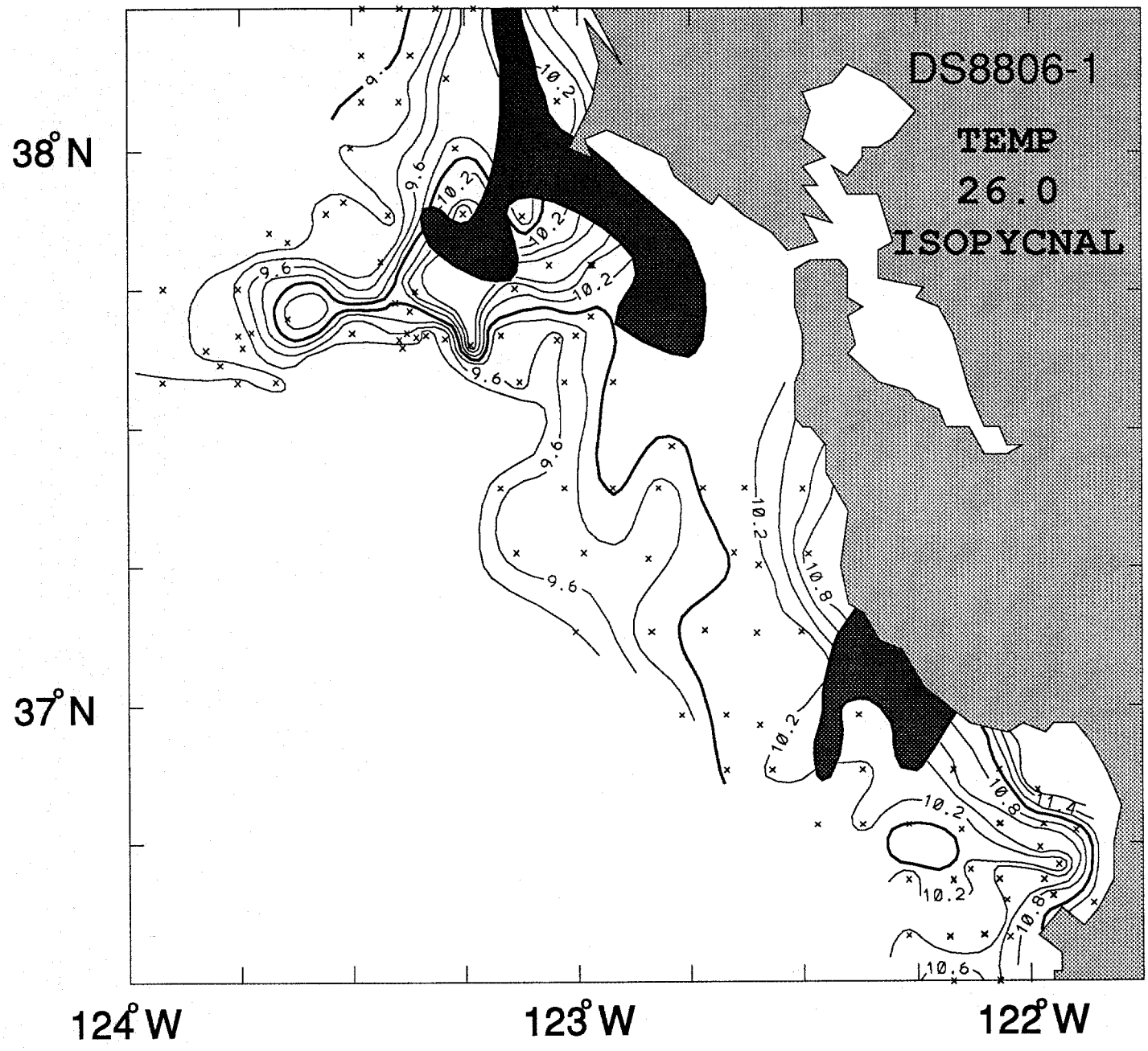

DS8806-1
MIXED
LAYER
DEPTH (m)
38°N
37°N
124°W
123°W
122°W
15
30
45

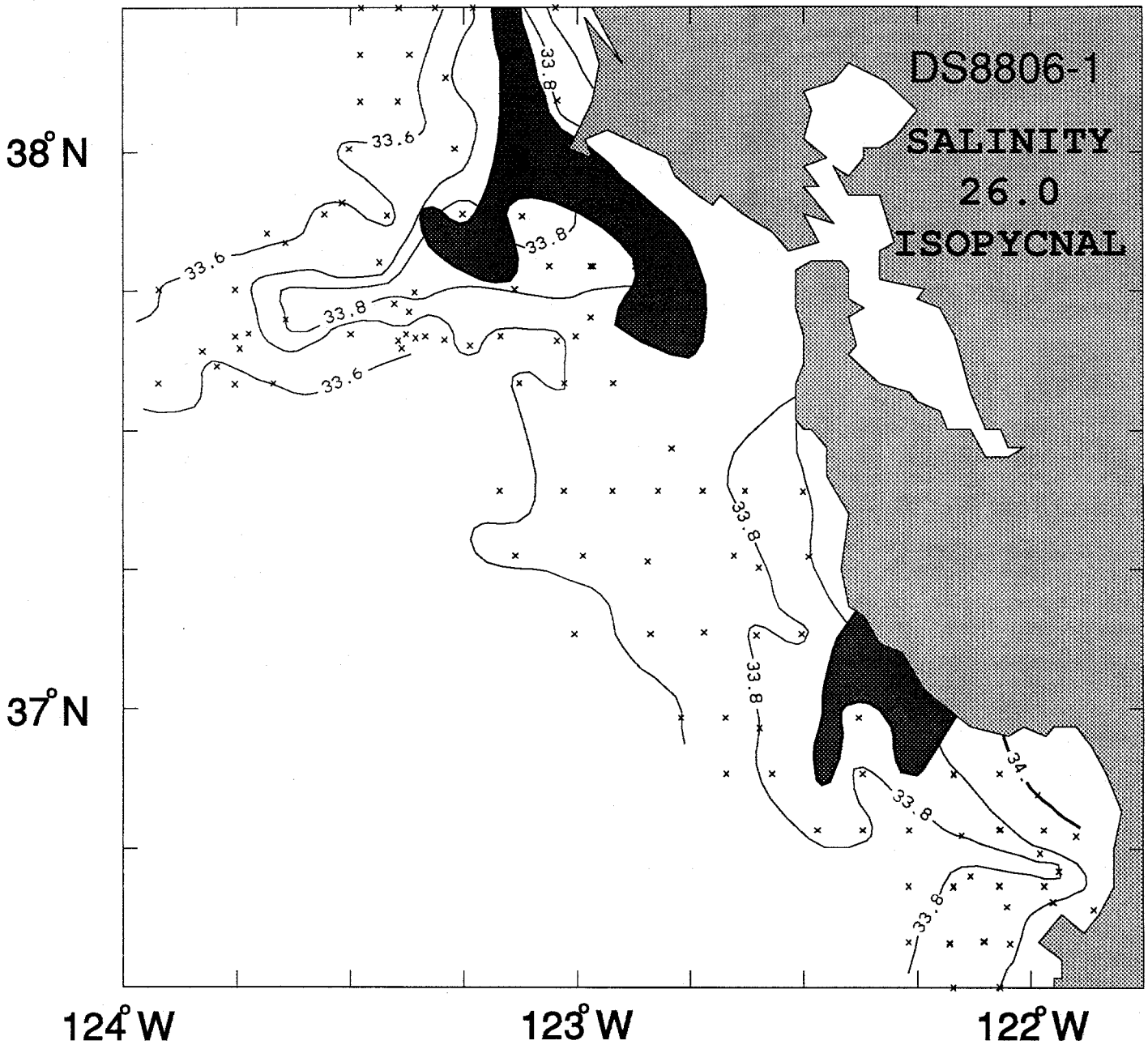

DS8806-1
SIGMA-T
30m-0m
38°N
37°N
124°W
123°W
122°W


DS8806-1
DEPTH
10.5° C
ISOTHERM
38° N
37° N
124° W
123° W
122° W

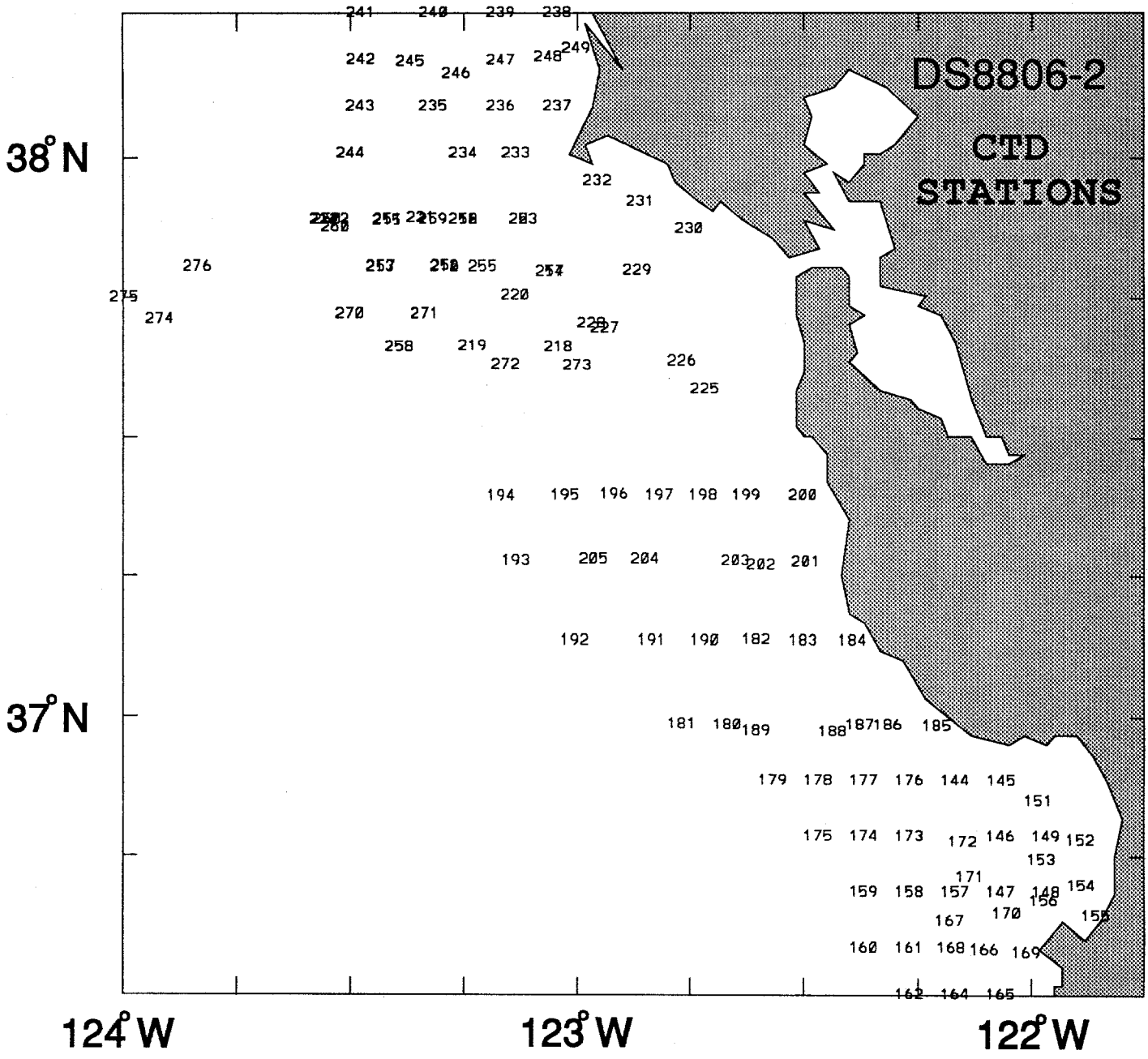

DS8806-1
DEPTH
8.5° C
ISOTHERM
38° N
37° N
124° W
123° W
122° W

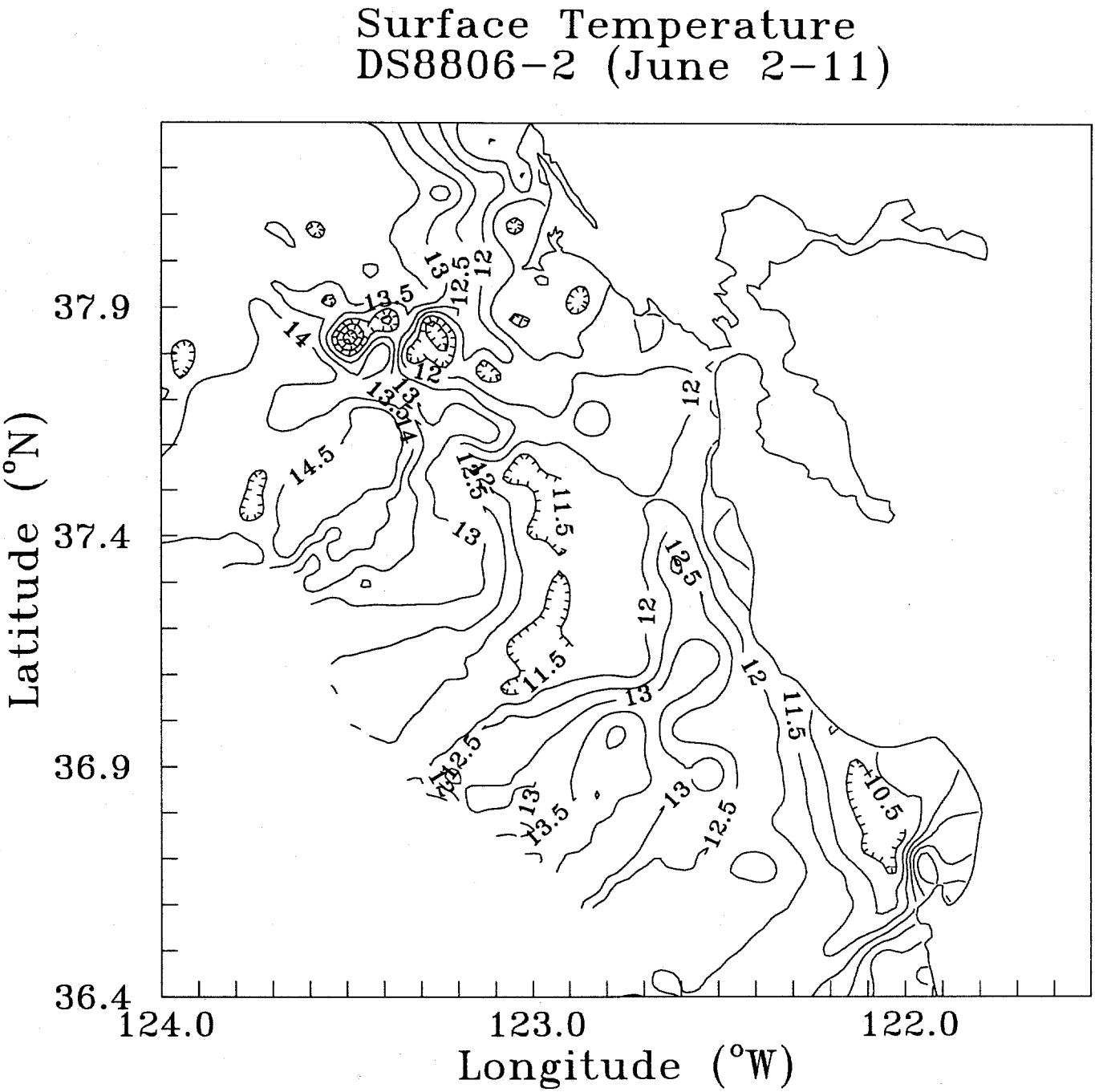

DS8806-1
DEPTH
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W

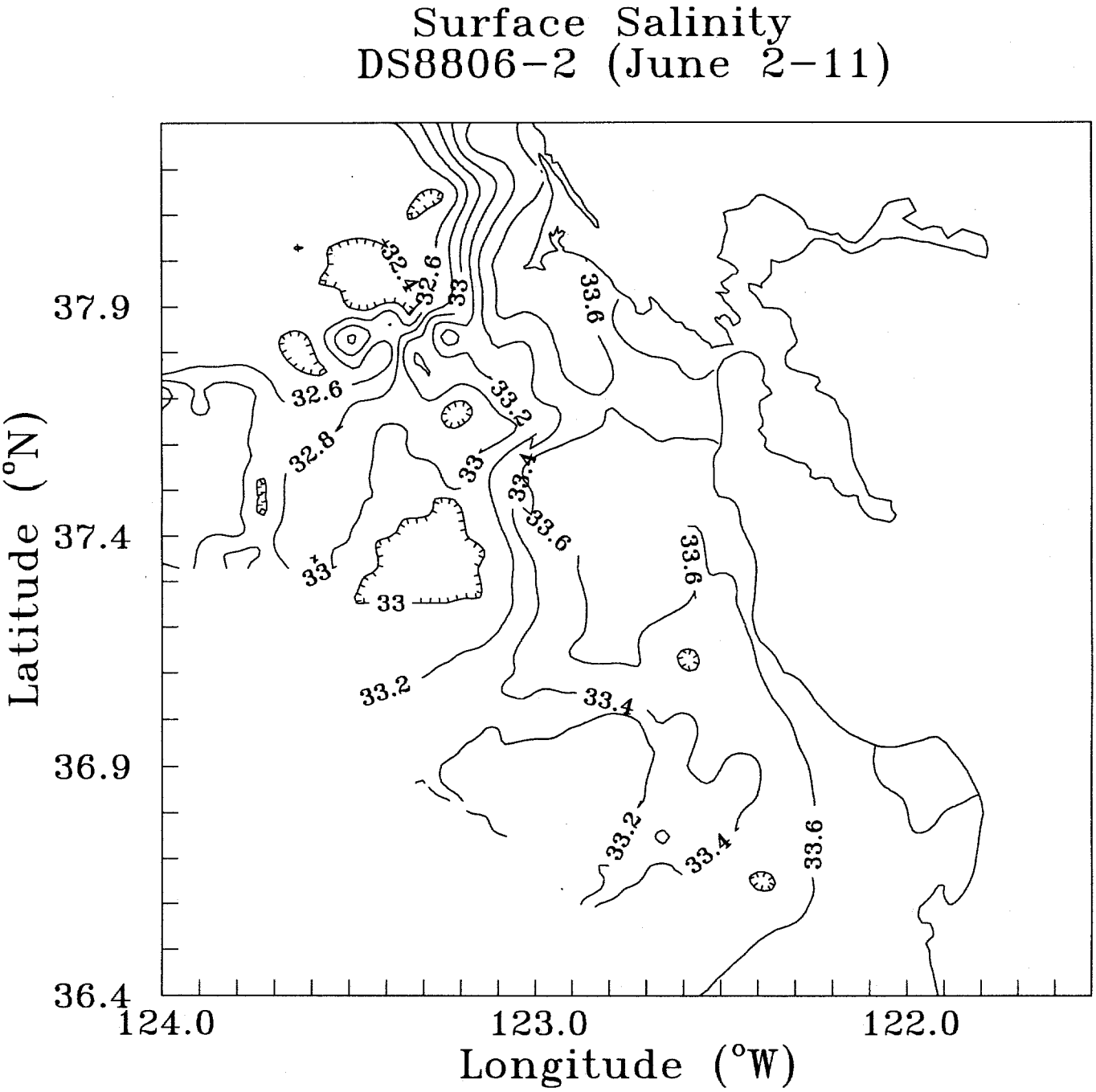

DS8806-1
TEMP
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W
9.6
10.2
10.8
11.4
10.6

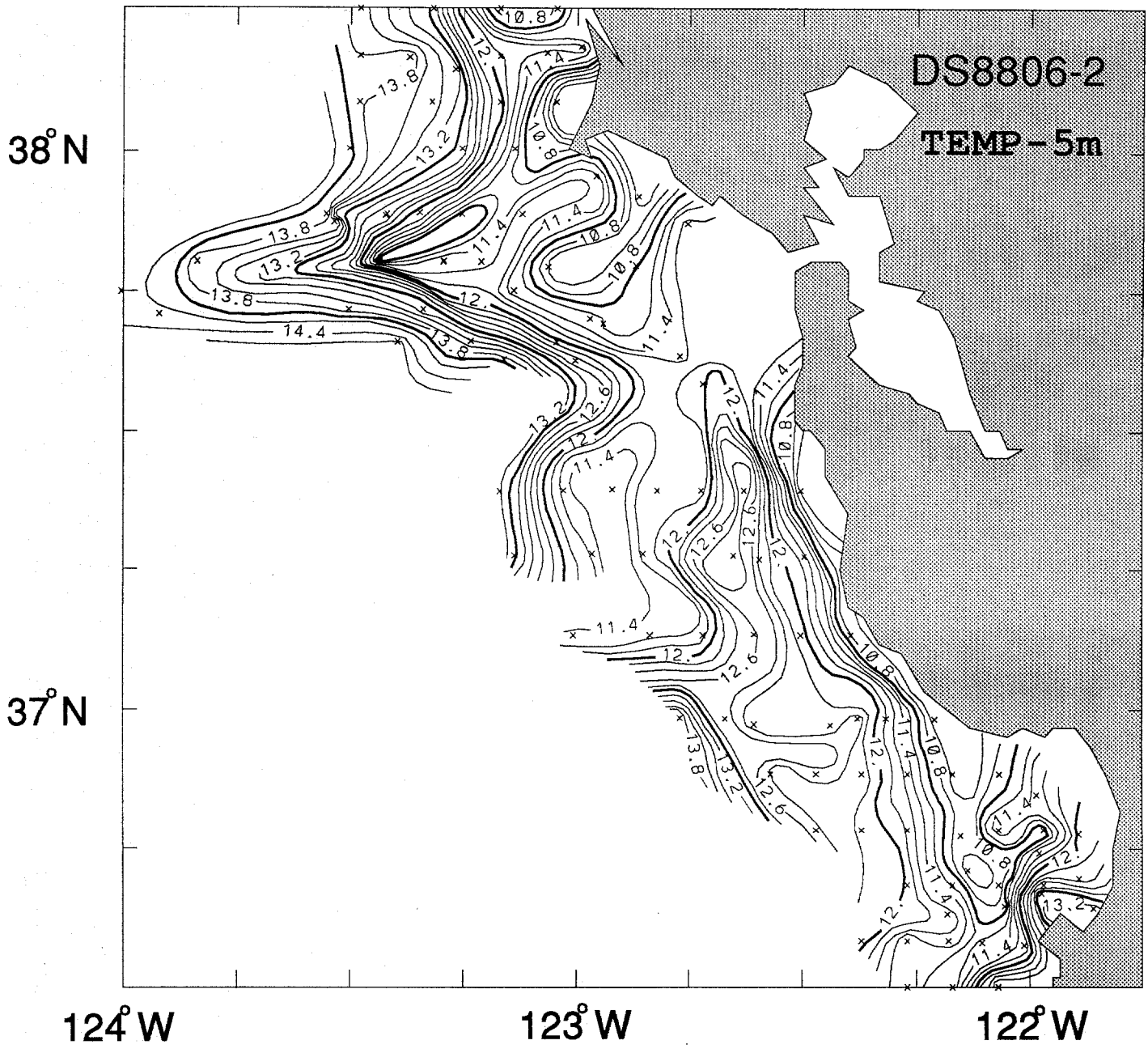

DS8806-1
SALINITY
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W
33.6
33.8
34.

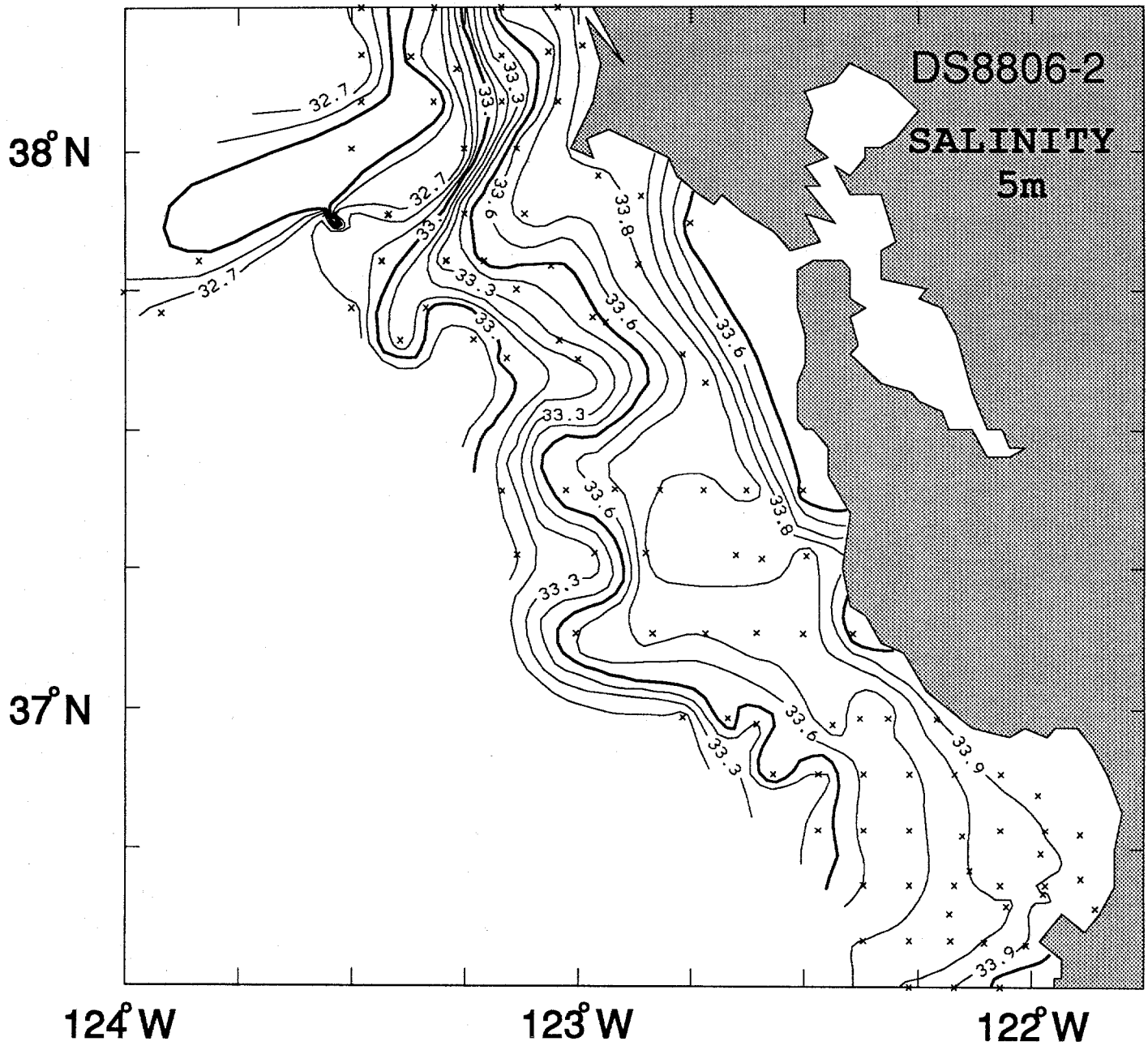
APPENDIX 4.3: HORIZONTAL MAPS- DS8806, SWEEP 2

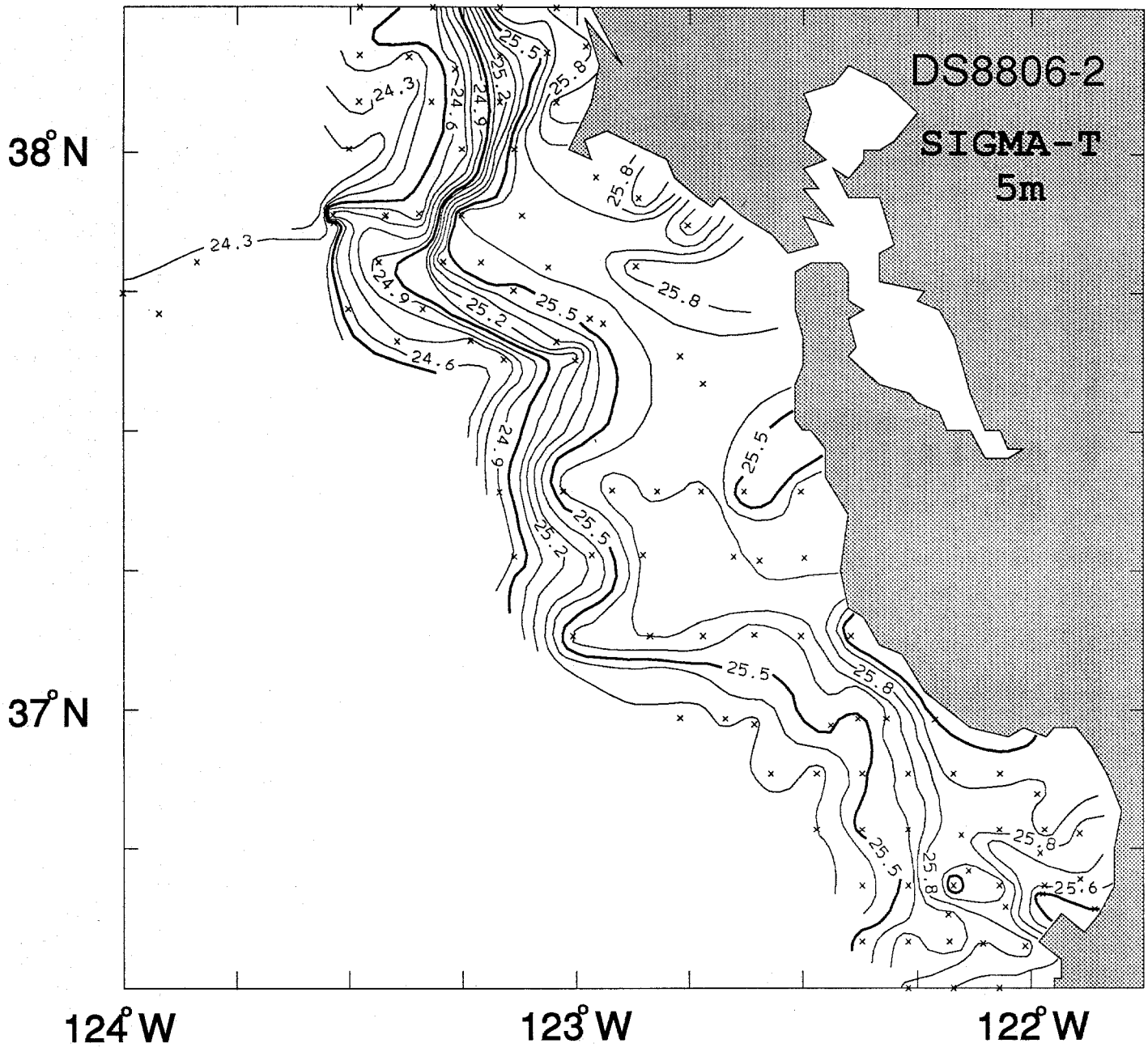

DS8806-2
CTD
STATIONS
38°N
37°N
124°W
123°W
122°W
241 240 239 238
242 245 246 247 248 249
243 235 236 237
244 234 233
232
231
230
276
275
274
270 271
220
229
258 219 218
272 273
226
225
194 195 196 197 198 199 200
193 205 204 203 202 201
192 191 190 182 183 184
181 180 189 188 187 186 185
179 178 177 176 144 145
151
175 174 173 172 146 149 152
153
171
159 158 157 147 148 154
156
167 170
160 161 168 166 169
162 164 165

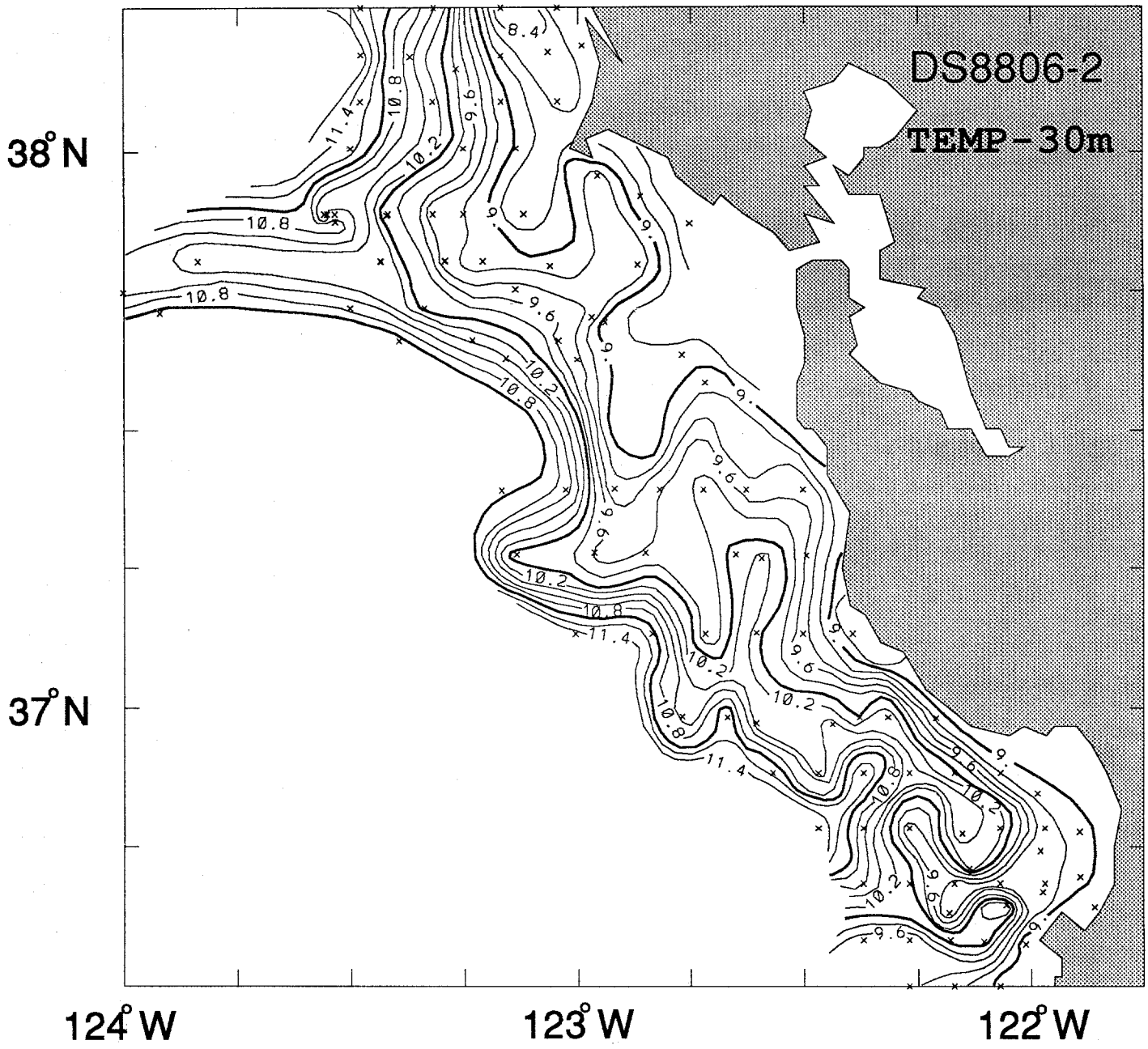

Surface Temperature
DS8806-2 (June 2-11)
37.9
37.4
36.9
36.4
Latitude (°N)
124.0
123.0
122.0
Longitude (°W)
14
13.5
13
12.5
12
14.5
11.5
10.5

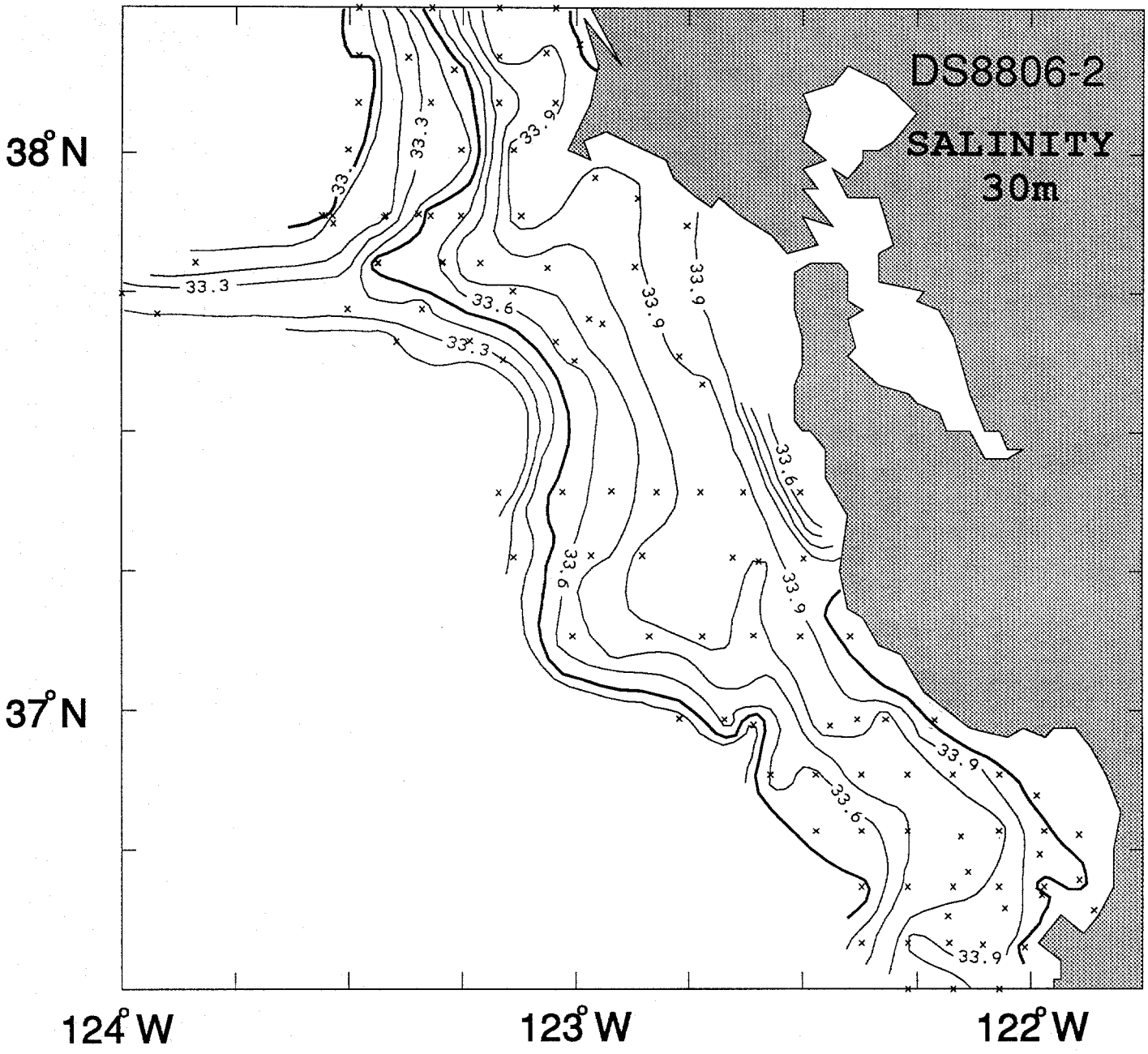

Surface Salinity
DS8806-2 (June 2-11)
37.9
37.4
36.9
36.4
Latitude (°N)
124.0
123.0
122.0
Longitude (°W)
32.4
32.6
33
33.6
32.6
32.8
33.2
33
33.4
33.6
33
33
33.2
33.4
33.6
33.2
33.4
33.6

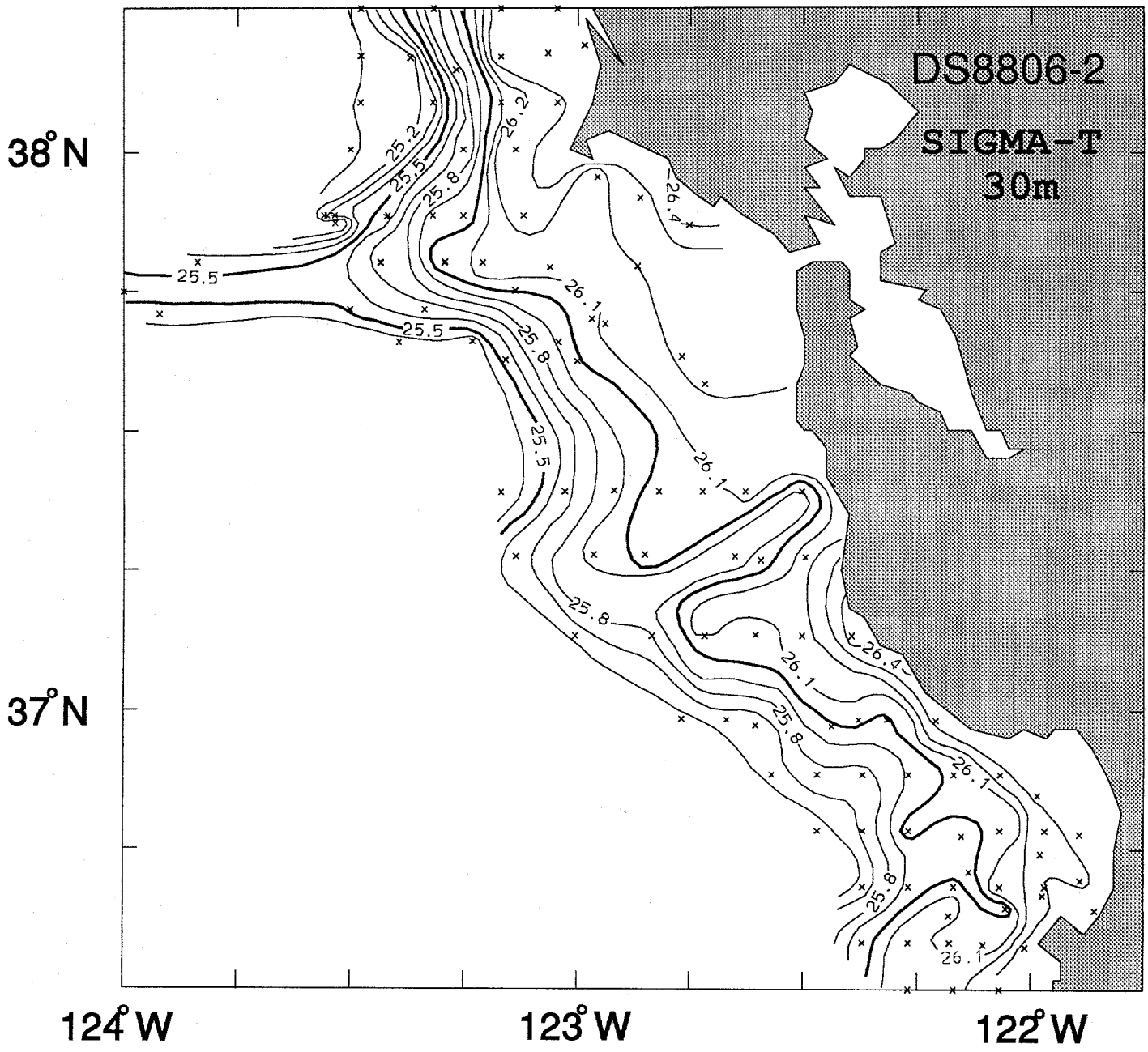

DS8806-2
TEMP-5m
38°N
37°N
124°W
123°W
122°W

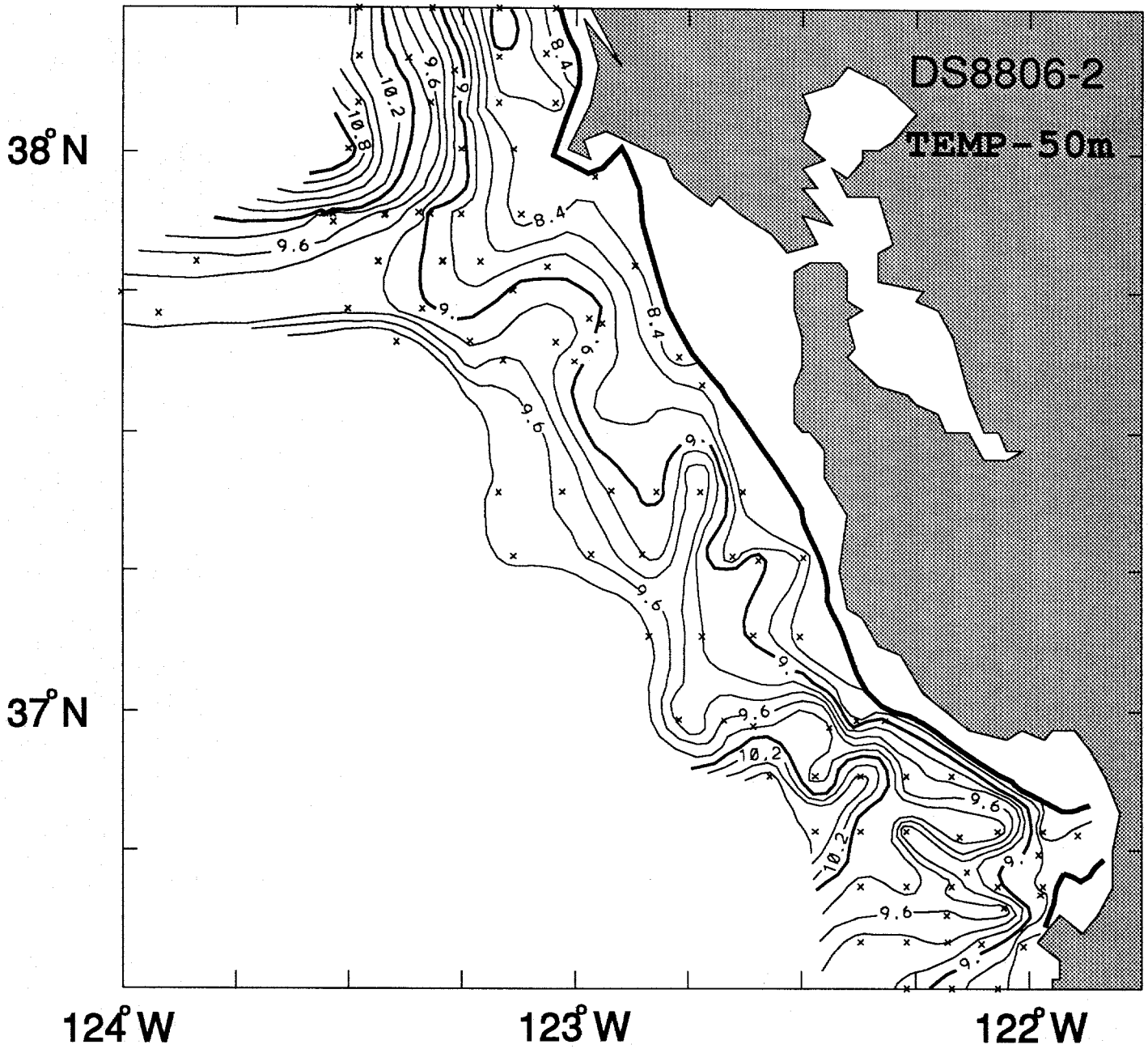

DS8806-2
SALINITY
5m
38°N
37°N
124°W
123°W
122°W
32.7
33.3
33.6
33.8
33.9

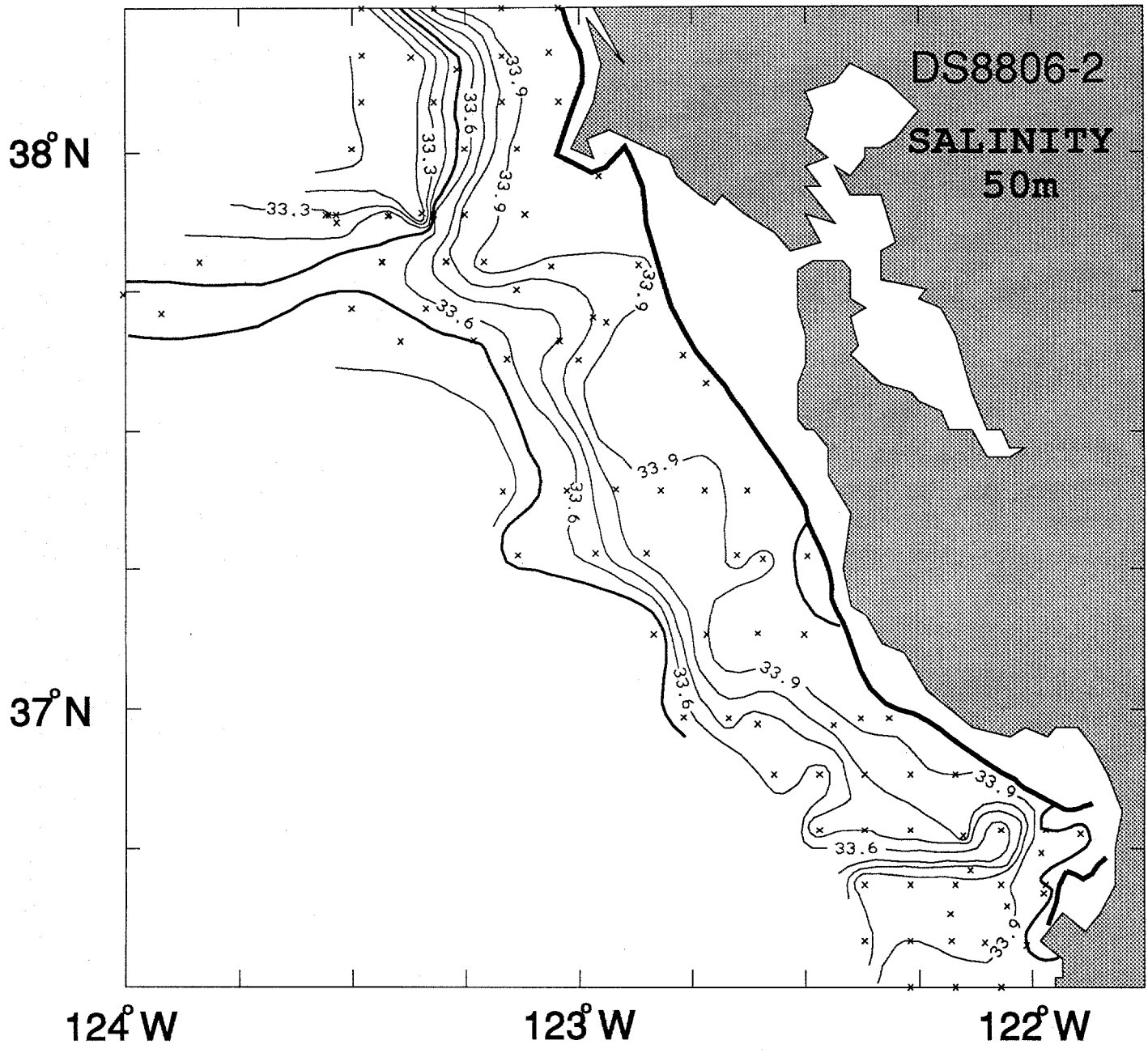

DS8806-2
SIGMA-T
5m
38°N
37°N
124°W
123°W
122°W
24.3
24.6
24.9
25.2
25.5
25.8
25.6

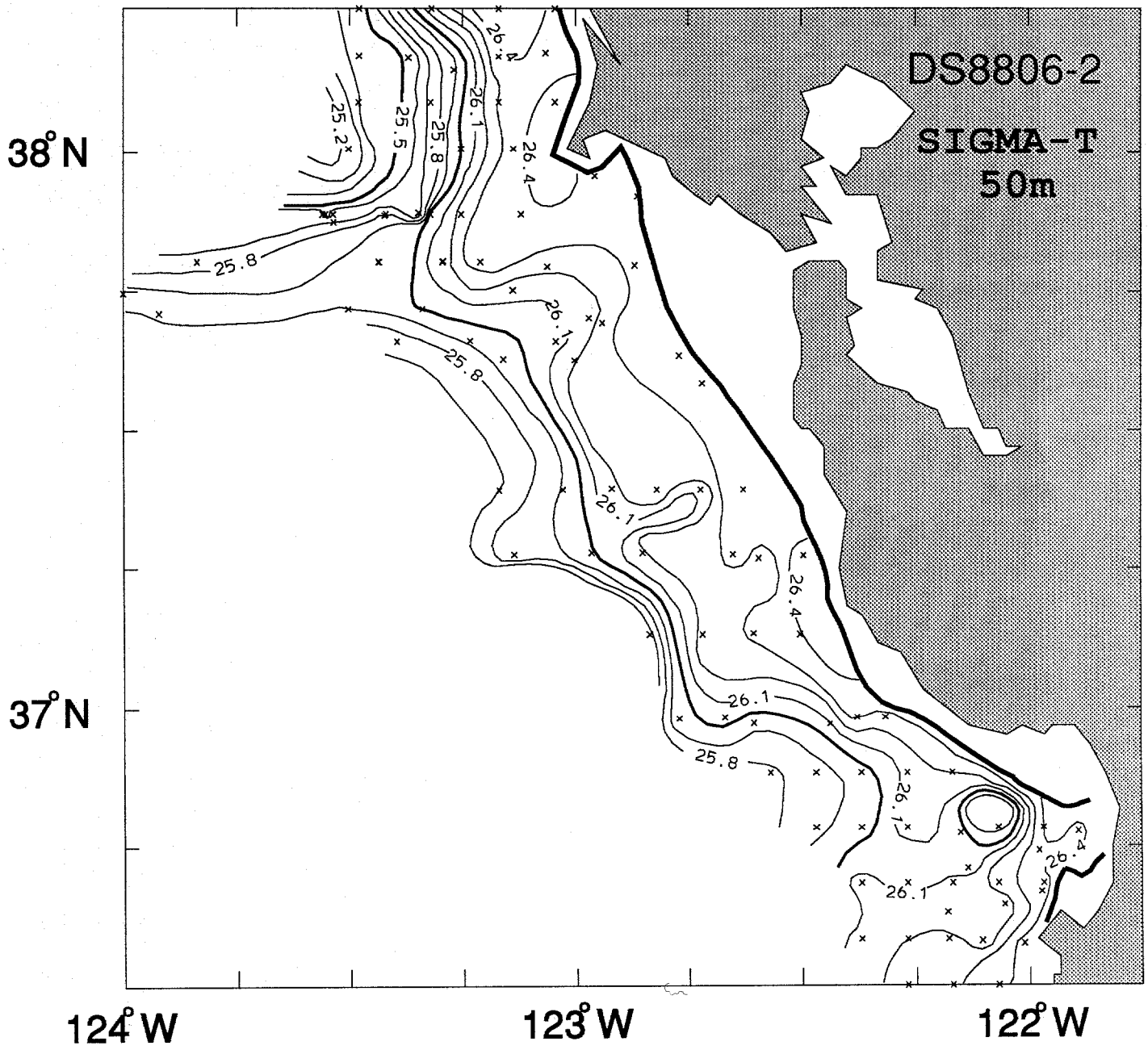

DS8806-2
TEMP-30m
38°N
37°N
124°W
123°W
122°W

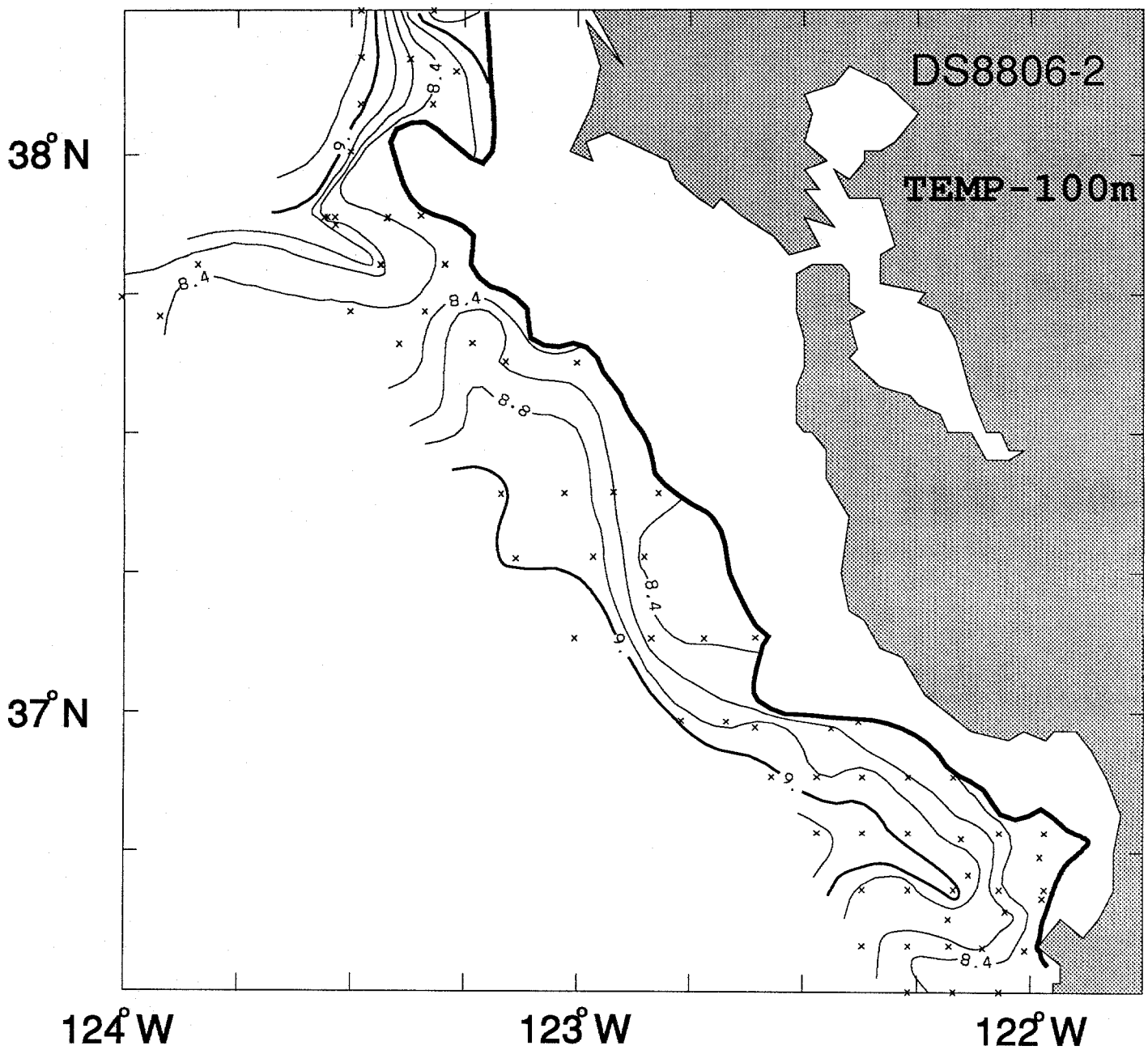

DS8806-2
SALINITY
30m
38°N
37°N
124°W
123°W
122°W
33.3
33.6
33.9

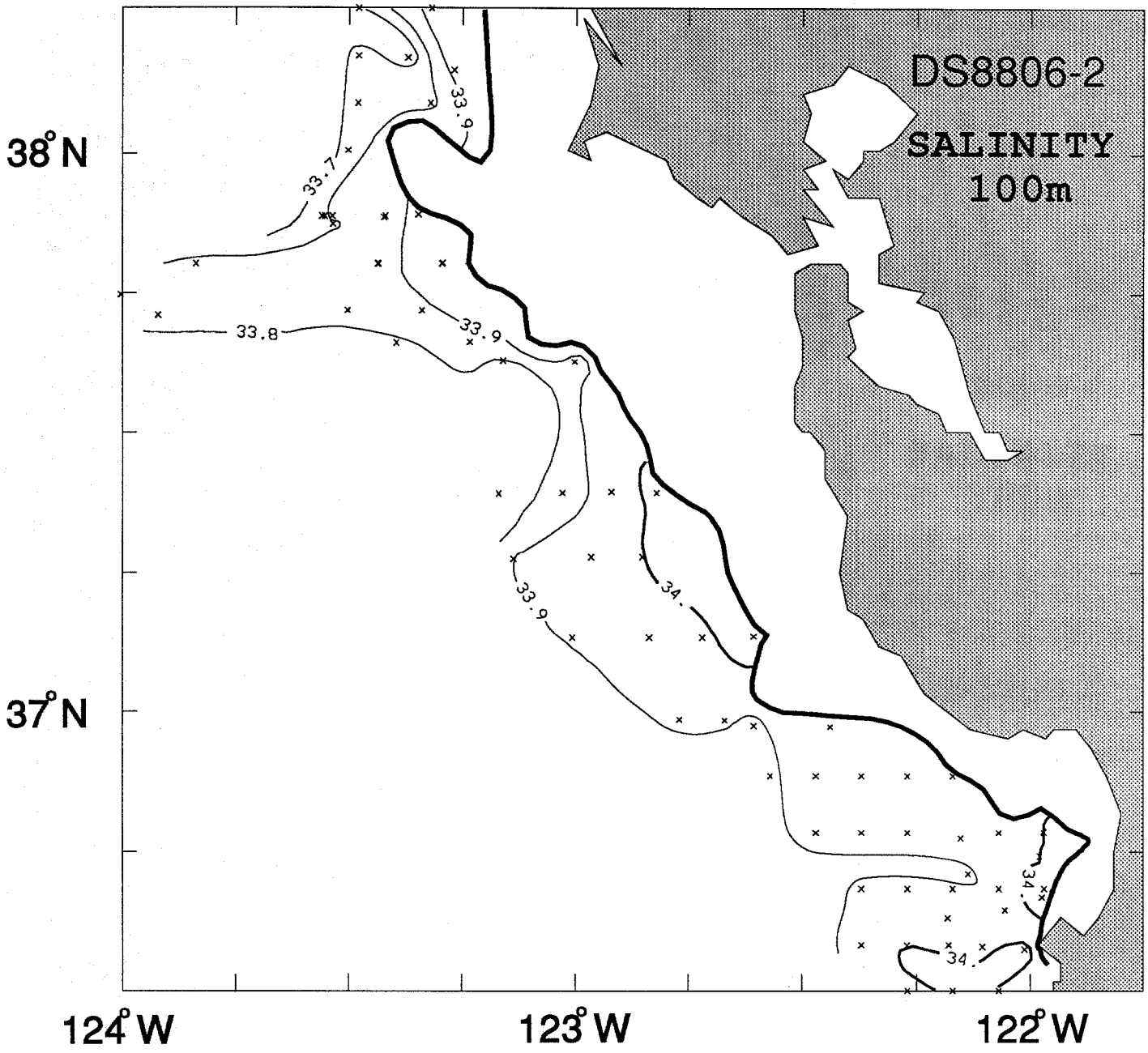

DS8806-2
SIGMA-T
30m
38°N
37°N
124°W
123°W
122°W
25.2
25.5
25.8
26.2
26.4
26.1

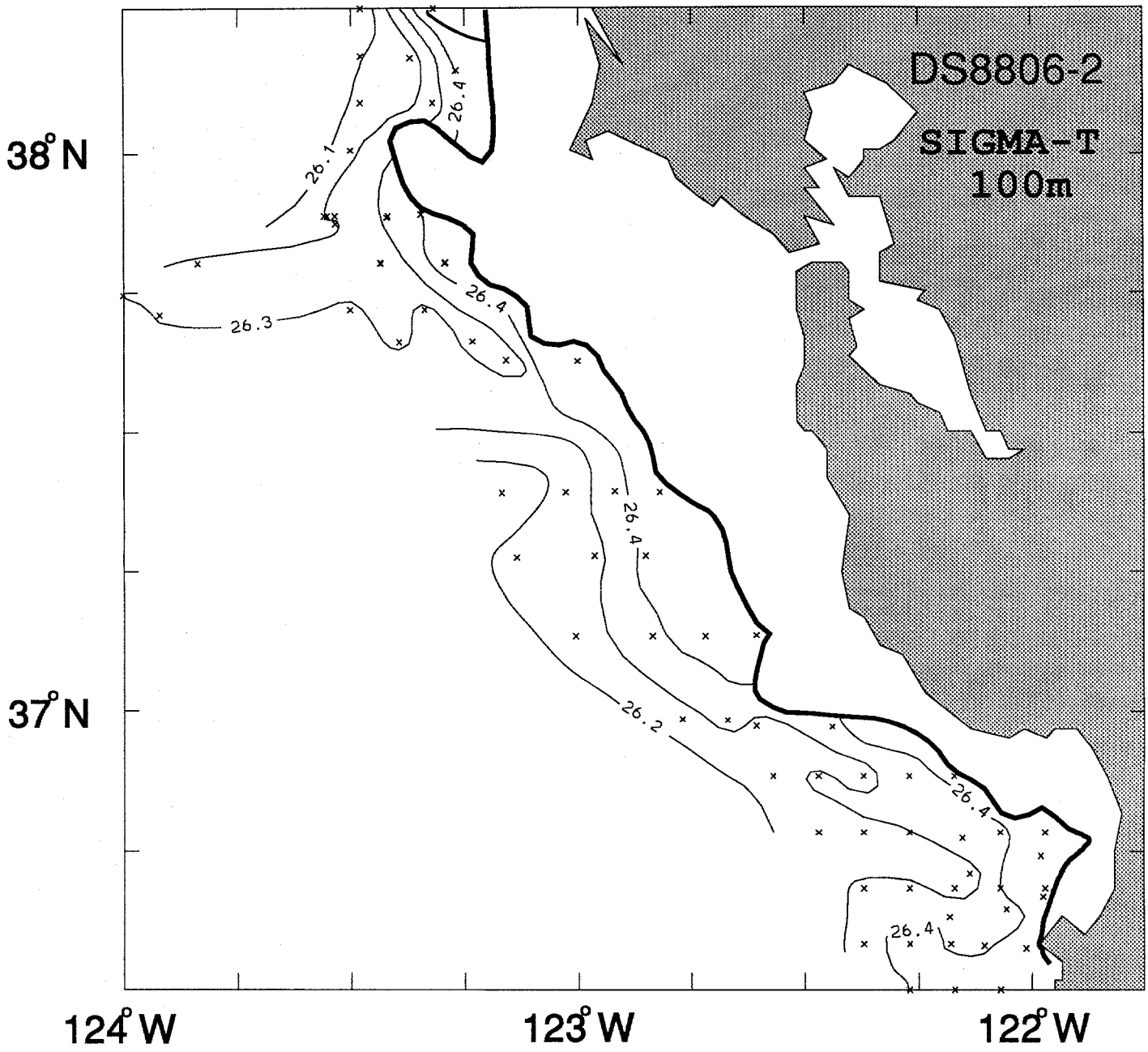

DS8806-2
TEMP-50m
38°N
37°N
124°W
123°W
122°W
10.8
10.2
9.6
8.4
9.

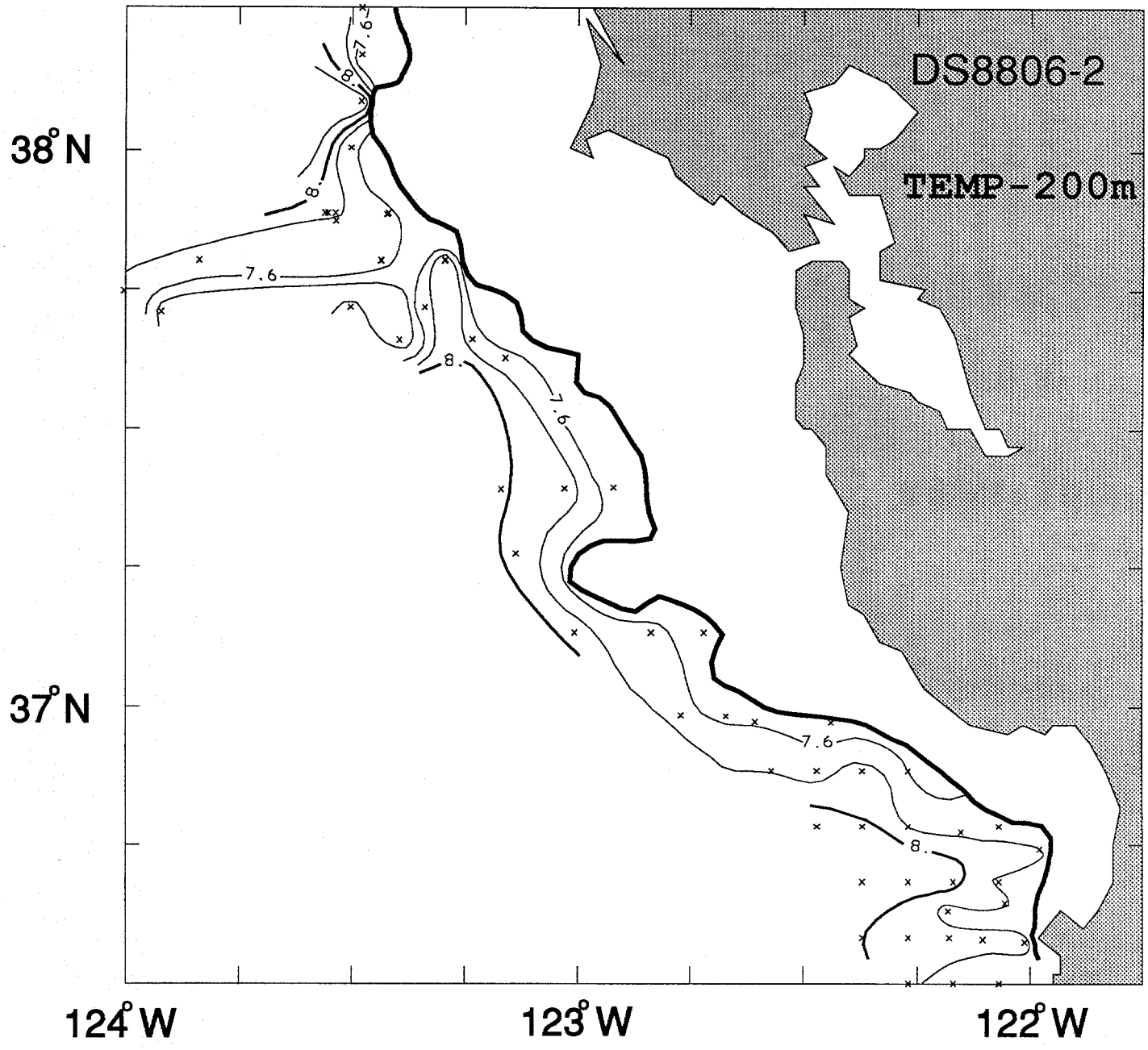

DS8806-2
SALINITY
50m
38°N
37°N
124°W
123°W
122°W
33.3
33.6
33.9

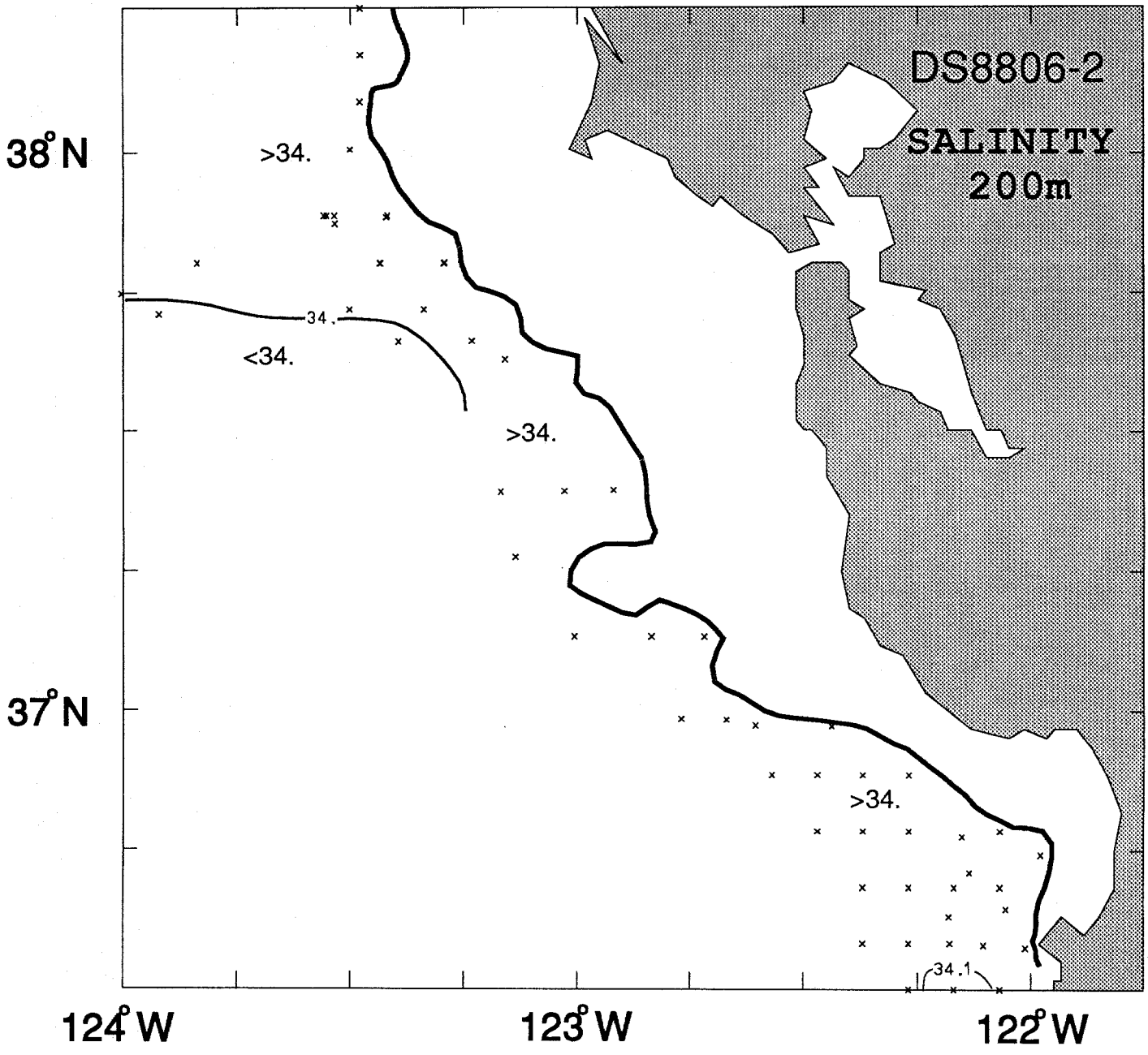

DS8806-2
SIGMA-T
50m
38°N
37°N
124°W
123°W
122°W
25.2
25.5
25.8
26.1
26.4

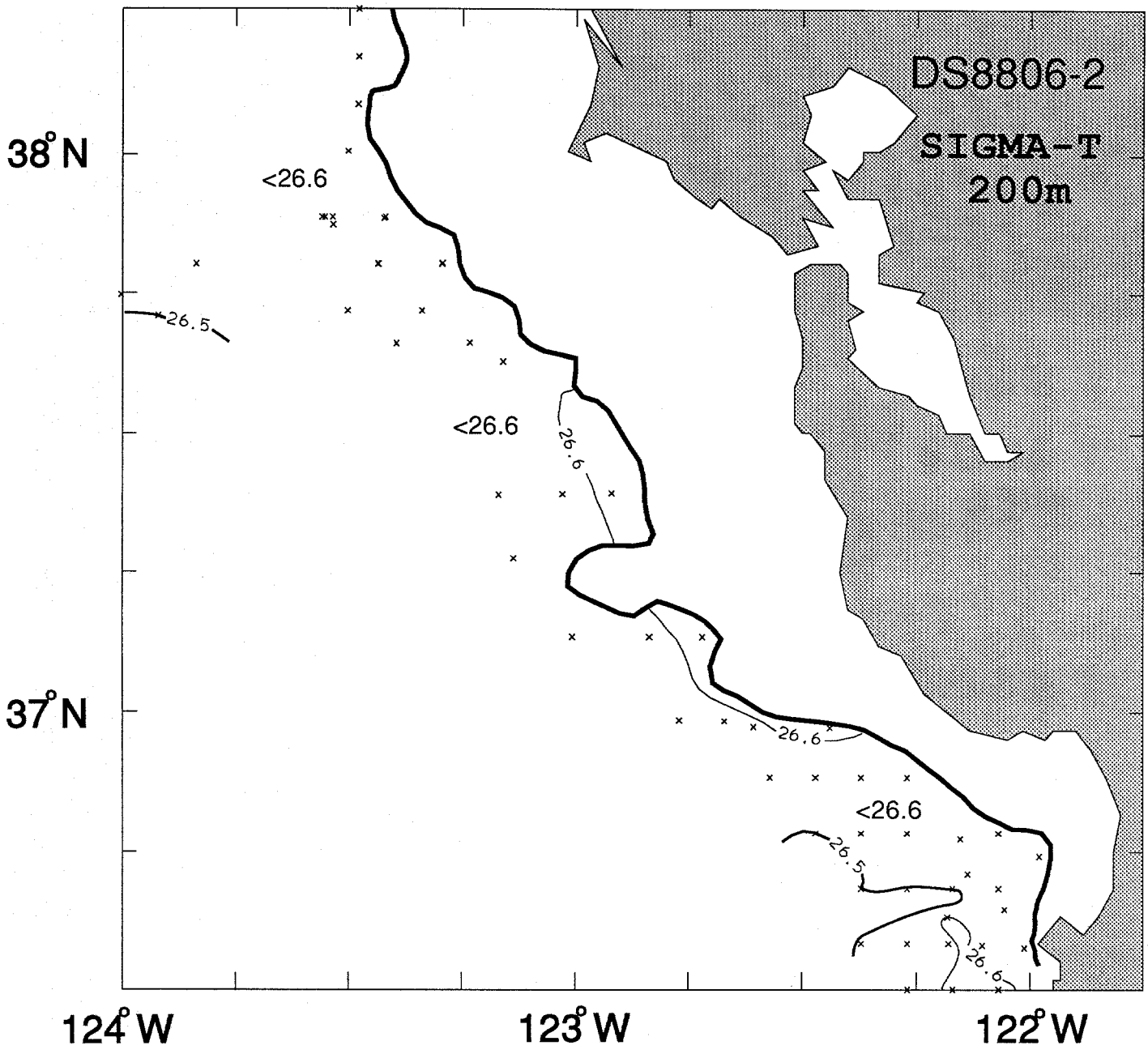

DS8806-2
TEMP-100m
38°N
37°N
124°W
123°W
122°W
8.4
8.8
9.

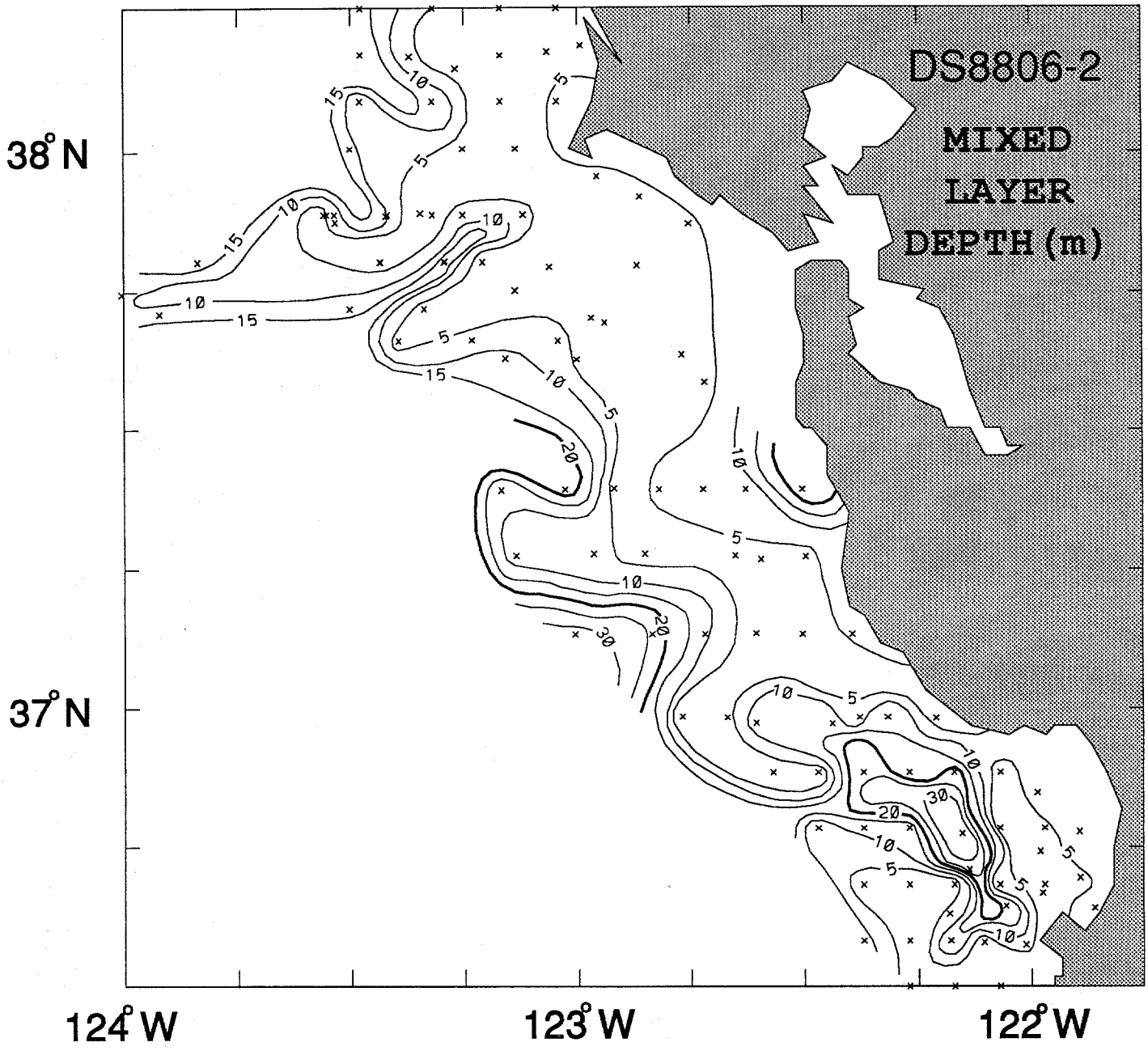

DS8806-2
SALINITY
100m
38°N
37°N
124°W
123°W
122°W
33.7
33.9
33.8
33.9
34.
33.9
34.
34.

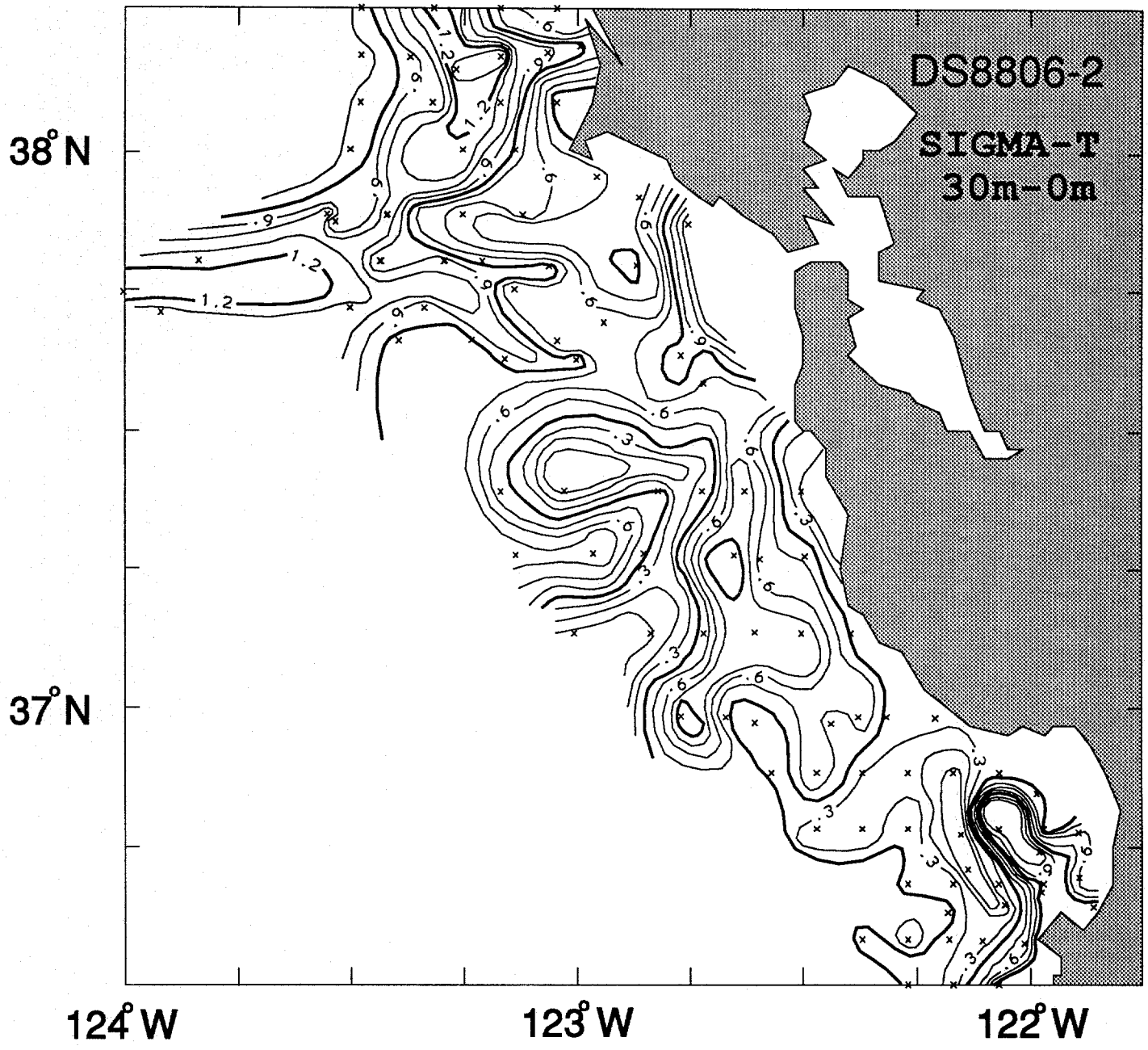

DS8806-2
SIGMA-T
100m
38°N
37°N
124°W
123°W
122°W
26.1
26.4
26.3
26.4
26.4
26.2
26.4
26.4

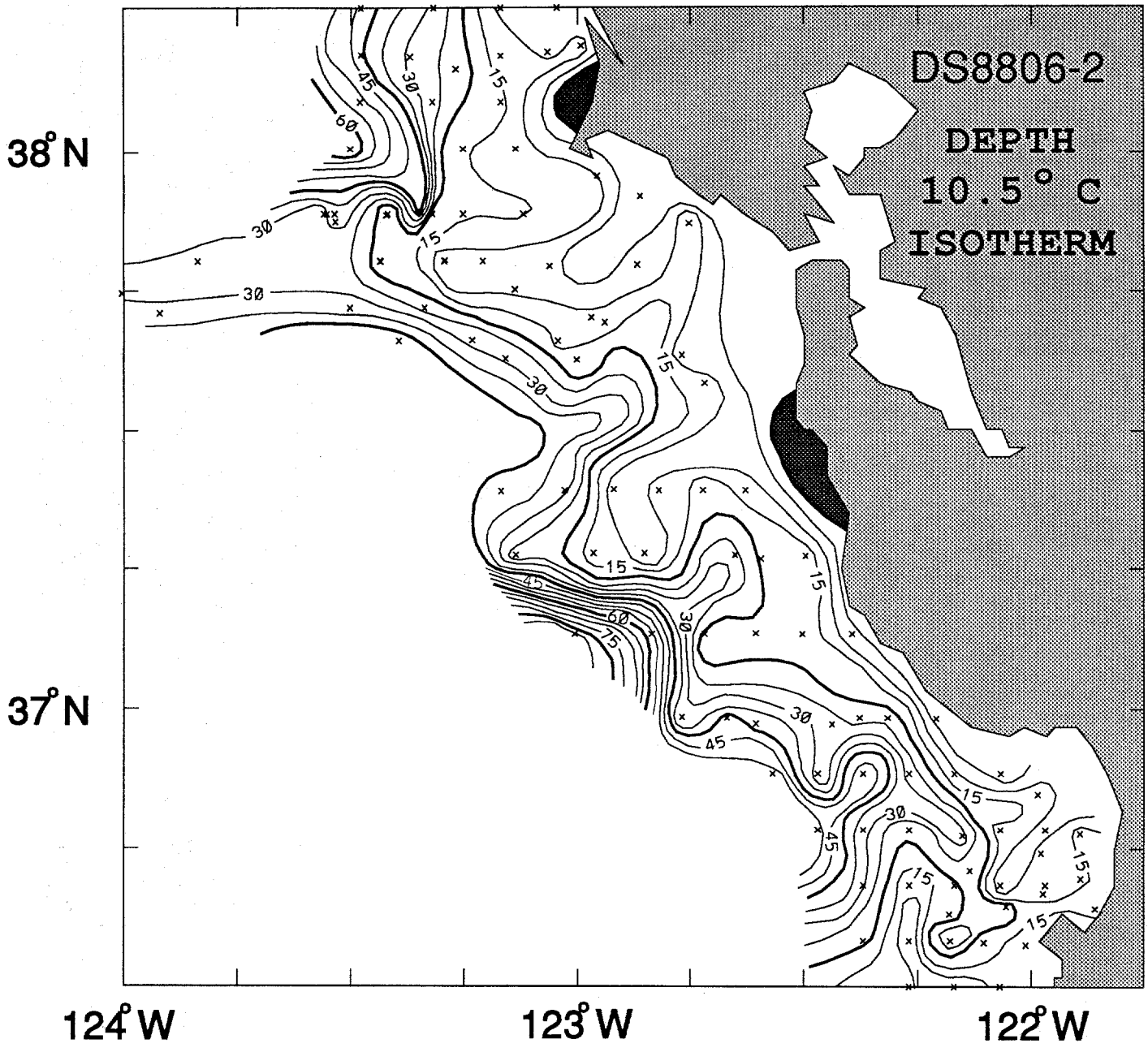

DS8806-2
TEMP-200m
38°N
37°N
124°W
123°W
122°W
7.6
8.
7.6
8.
7.6
8.
7.6
8.

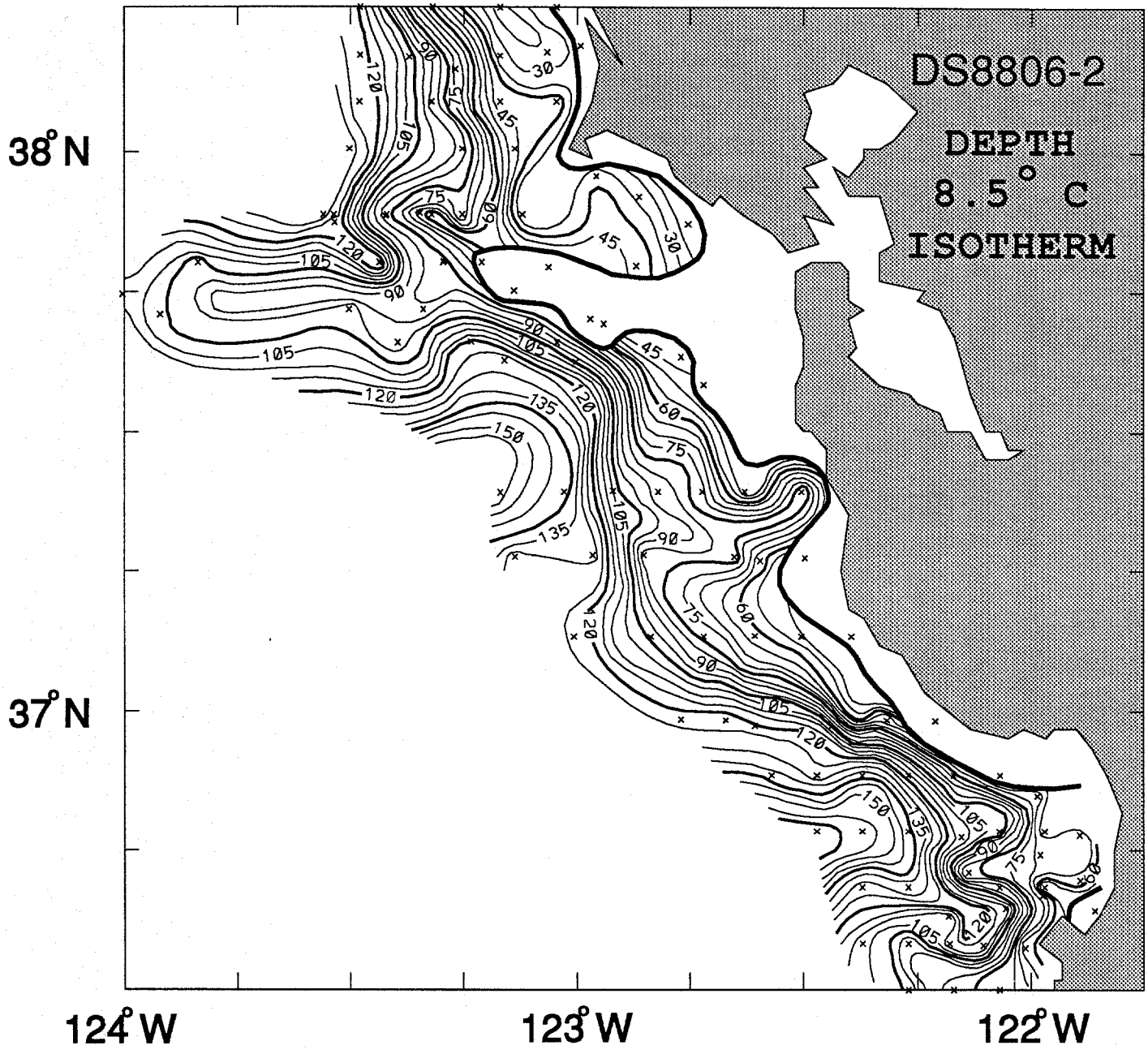

DS8806-2
SALINITY
200m
38°N
37°N
124°W
123°W
122°W
>34.
34.
<34.
>34.
>34.
34.1

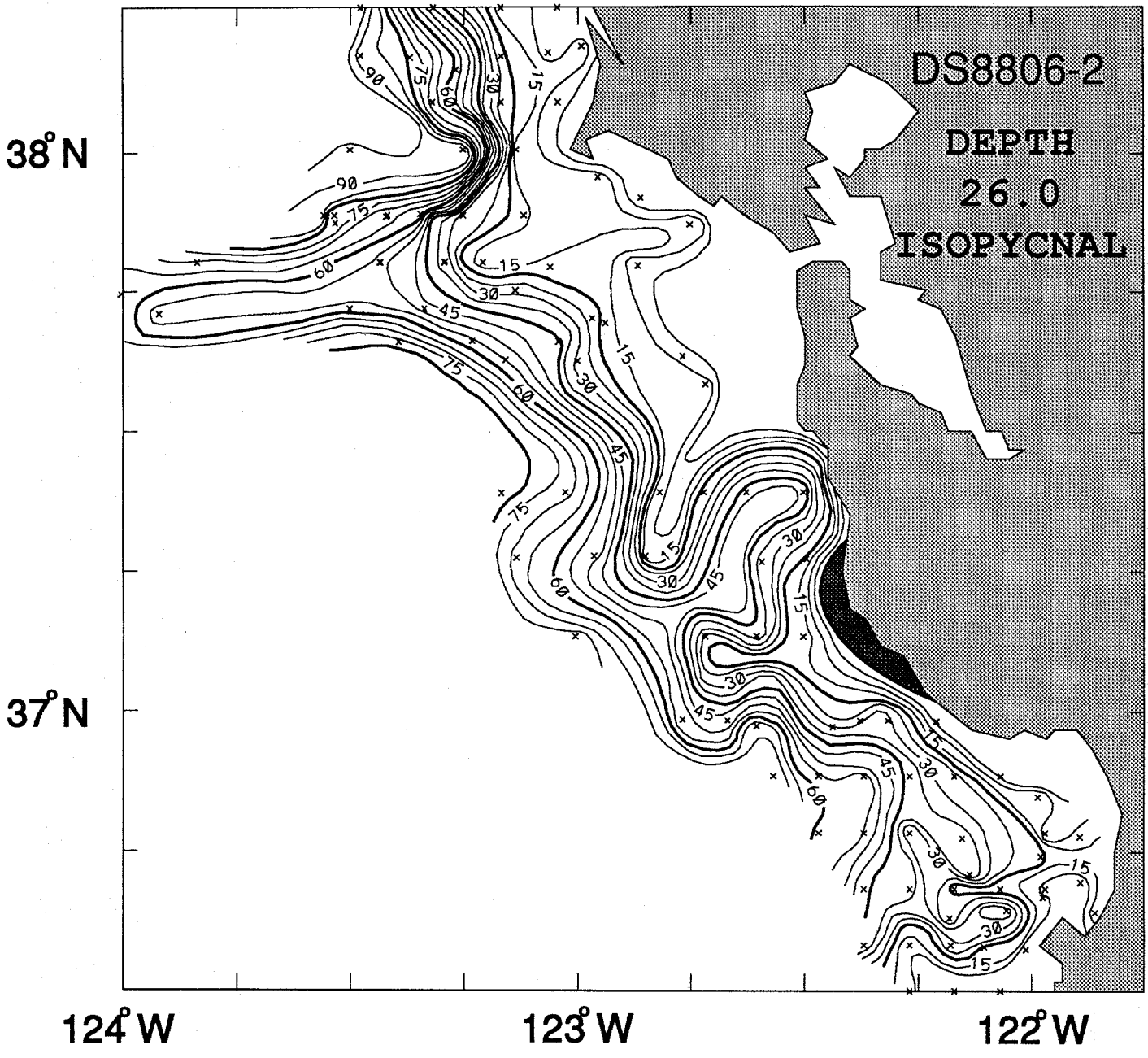

DS8806-2
SIGMA-T
200m
38°N
37°N
124°W
123°W
122°W
<26.6
26.5
<26.6
26.6
26.6
<26.6
26.5
26.6

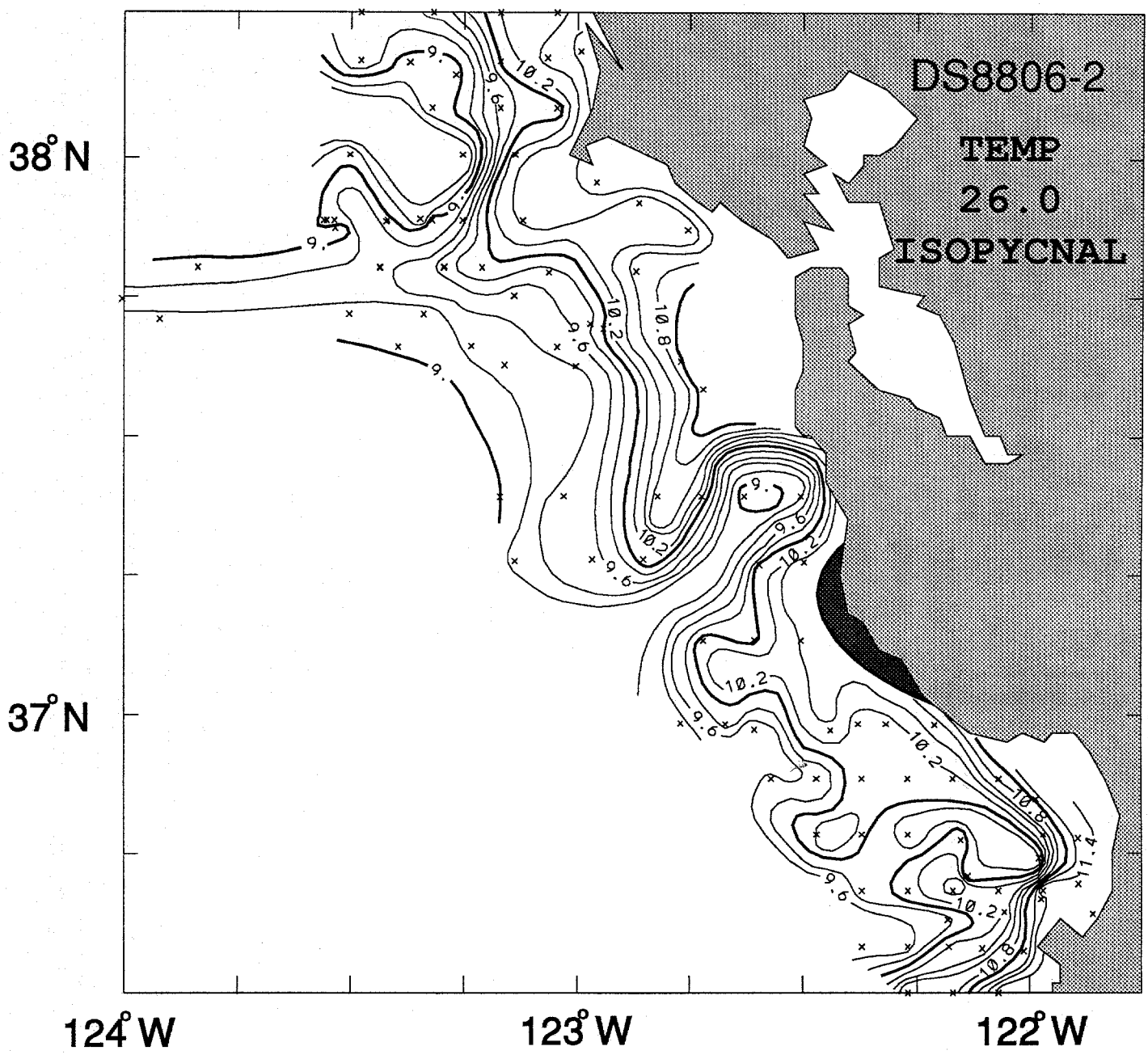

DS8806-2
MIXED
LAYER
DEPTH (m)
38°N
37°N
124°W
123°W
122°W

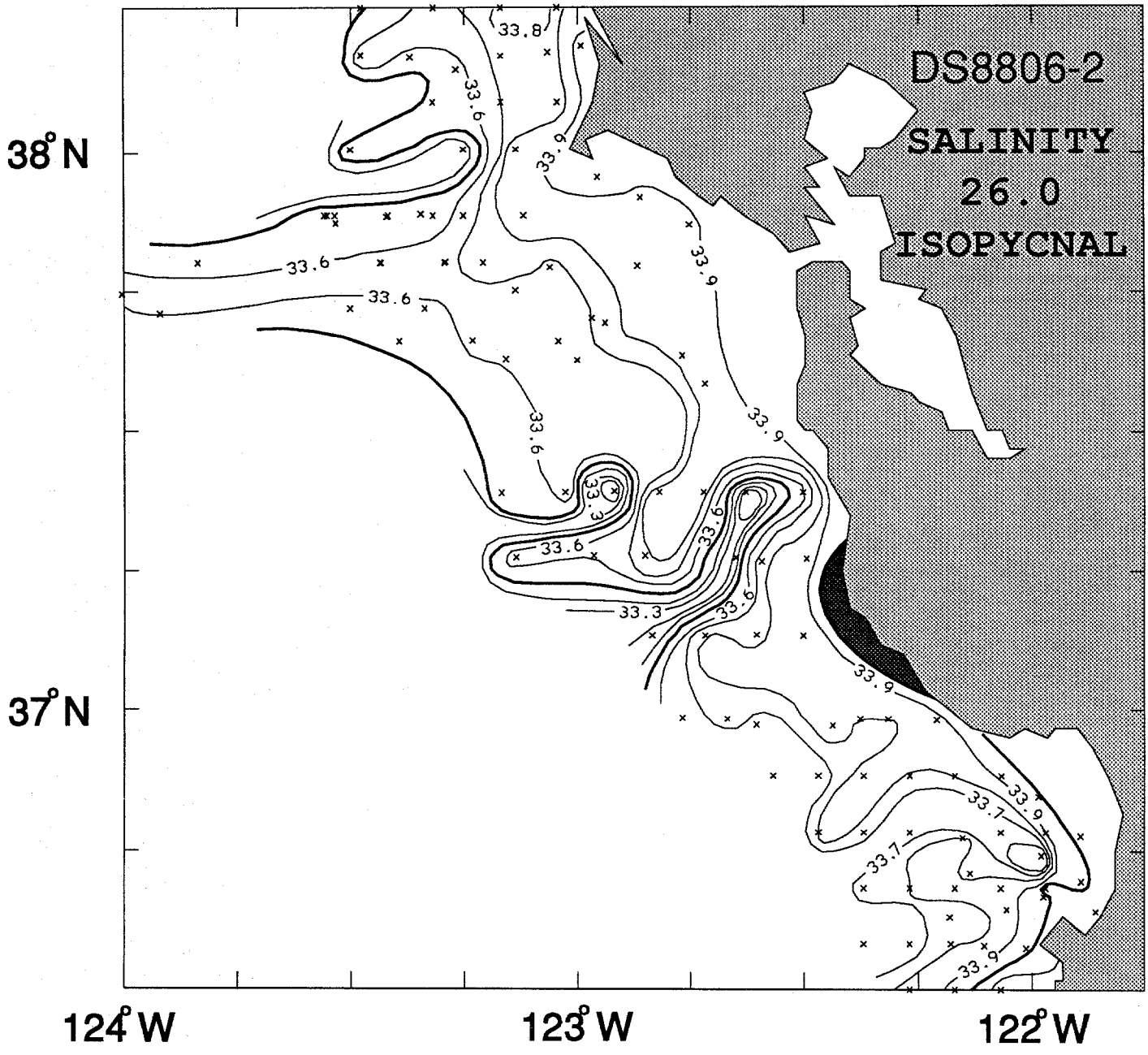

DS8806-2
SIGMA-T
30m-0m
38°N
37°N
124°W
123°W
122°W


DS8806-2
DEPTH
10.5° C
ISOTHERM
38° N
37° N
124° W
123° W
122° W

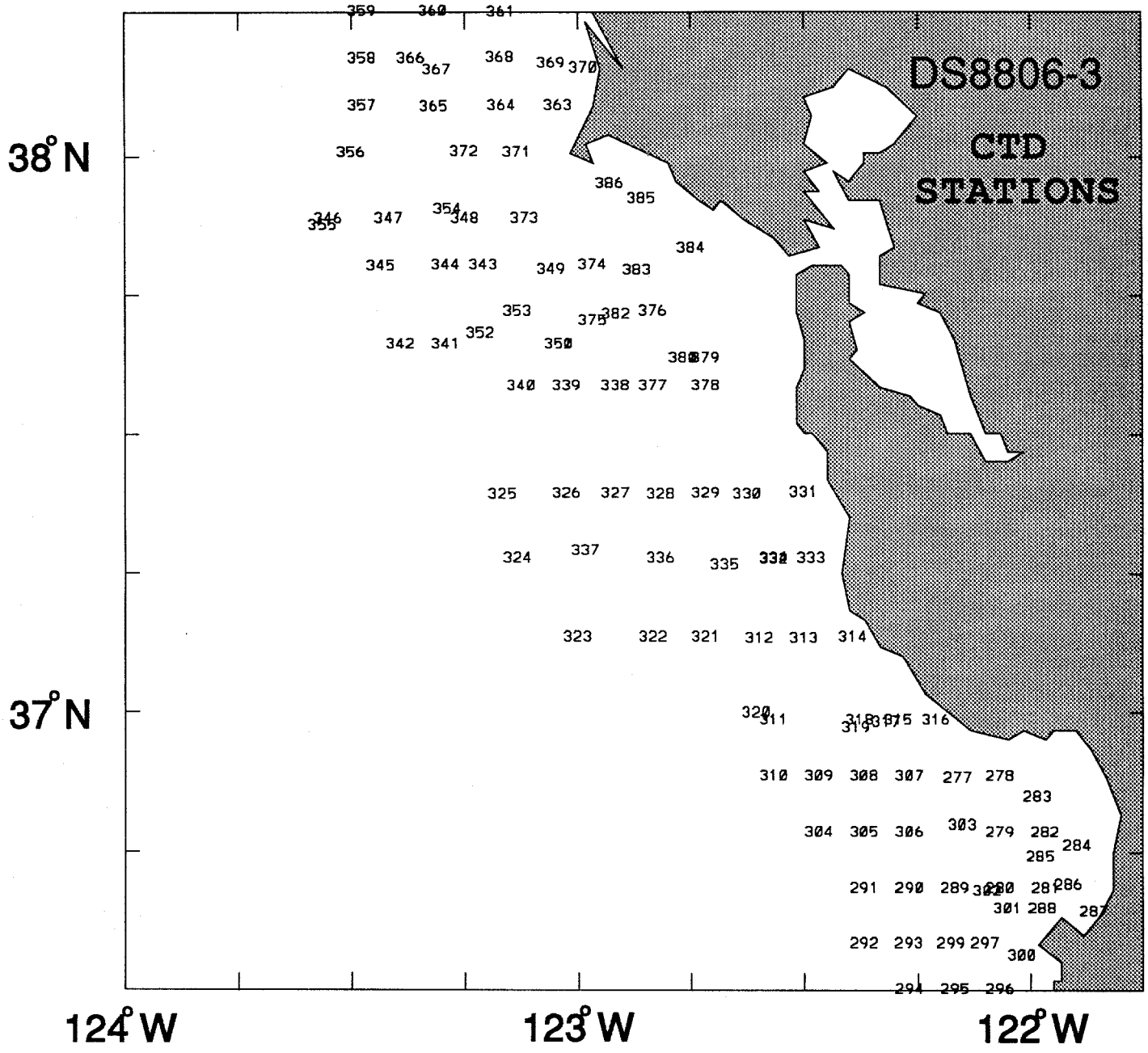

DS8806-2
DEPTH
8.5° C
ISOTHERM
38°N
37°N
124°W
123°W
122°W

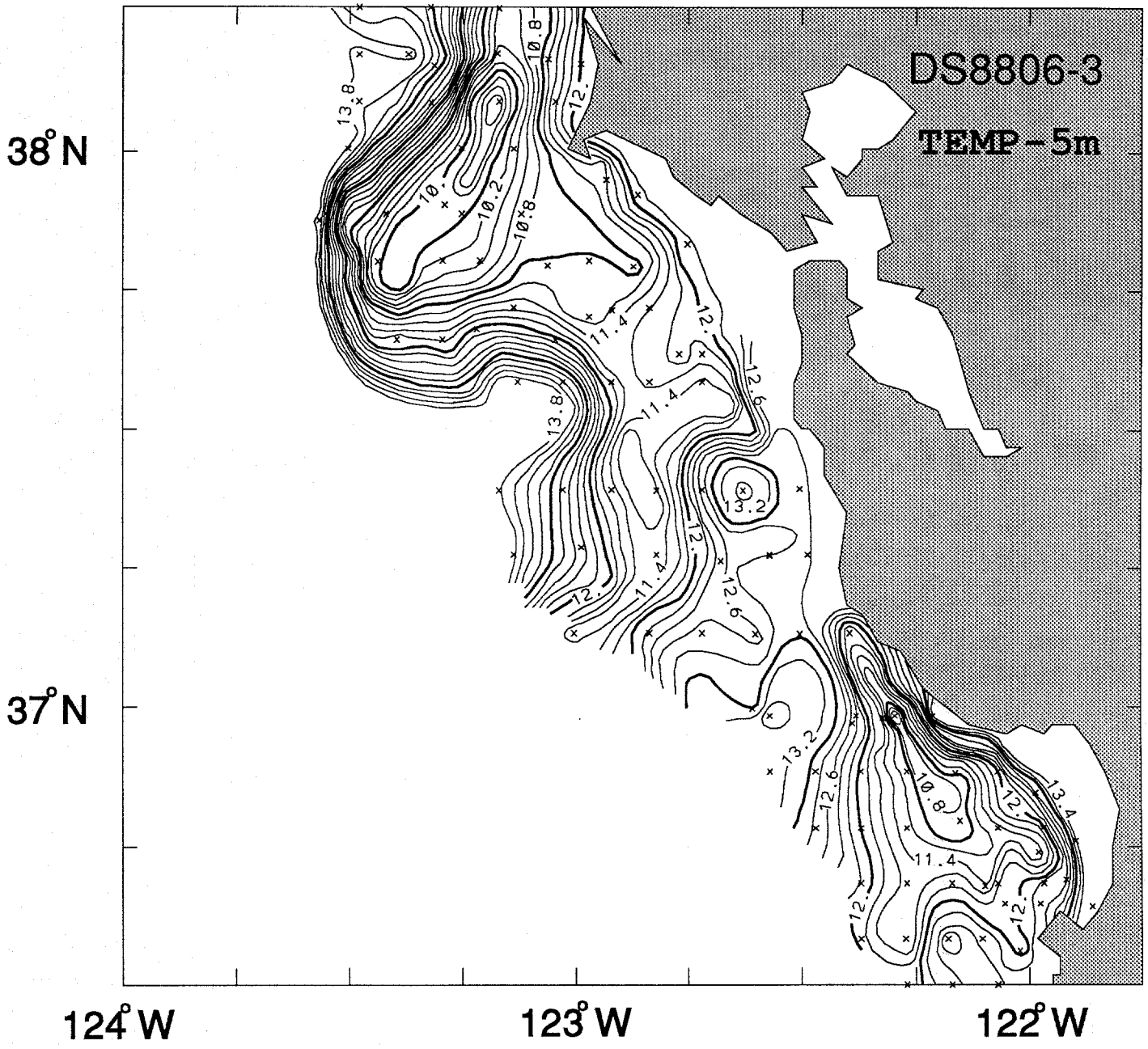

DS8806-2
DEPTH
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W

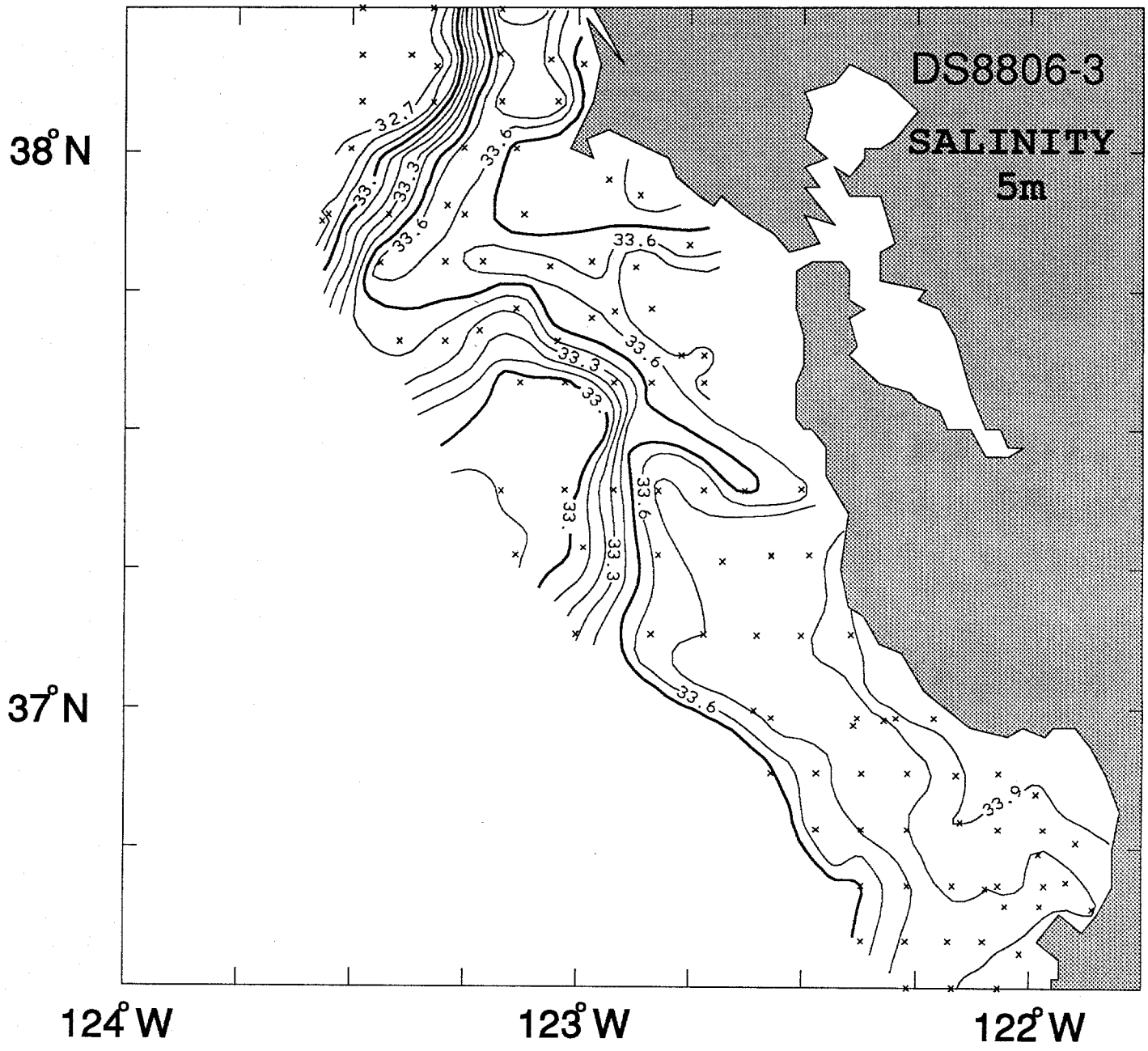

DS8806-2
TEMP
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W

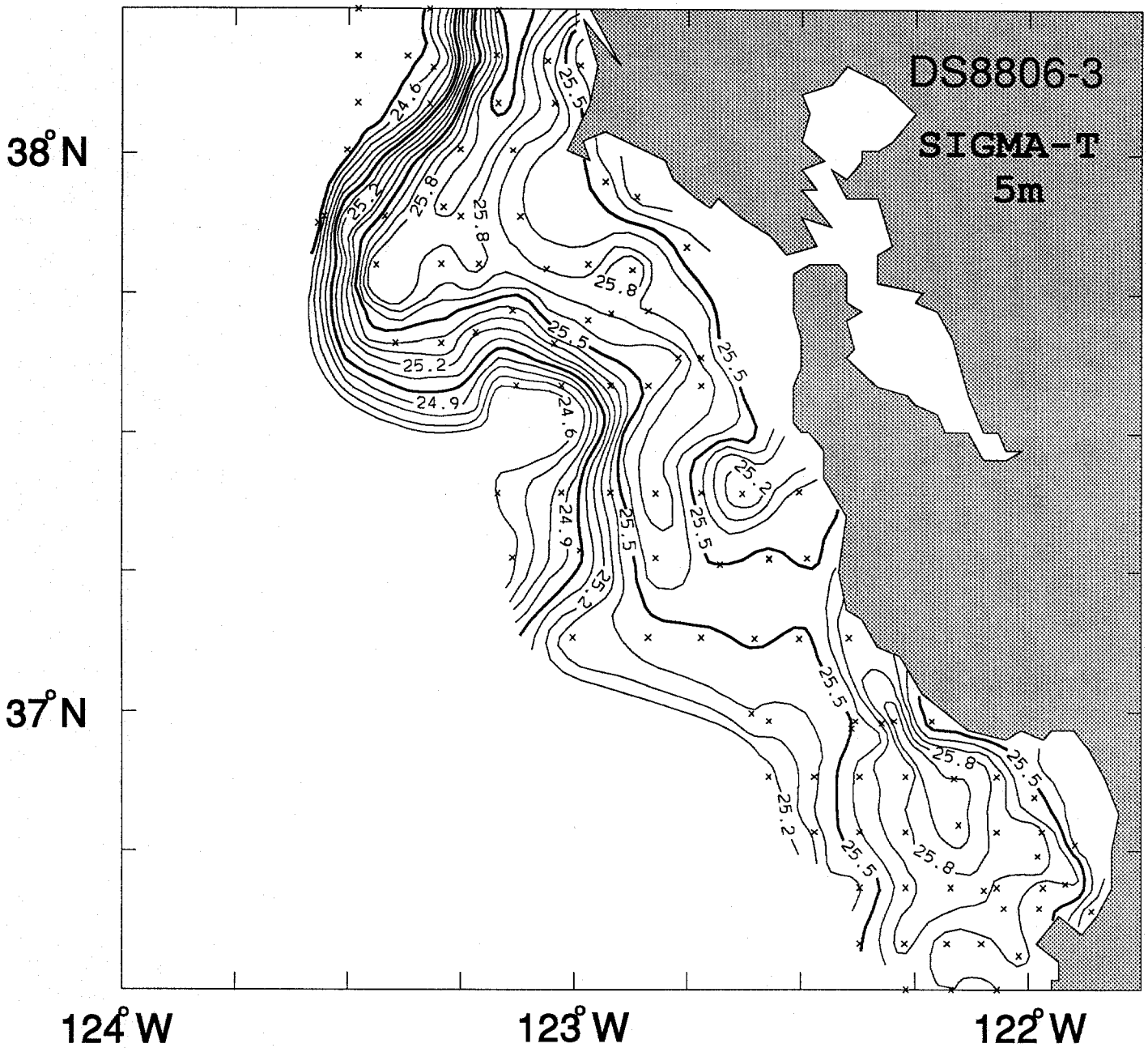

DS8806-2
SALINITY
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W
33.8
33.6
33.9
33.3
33.7

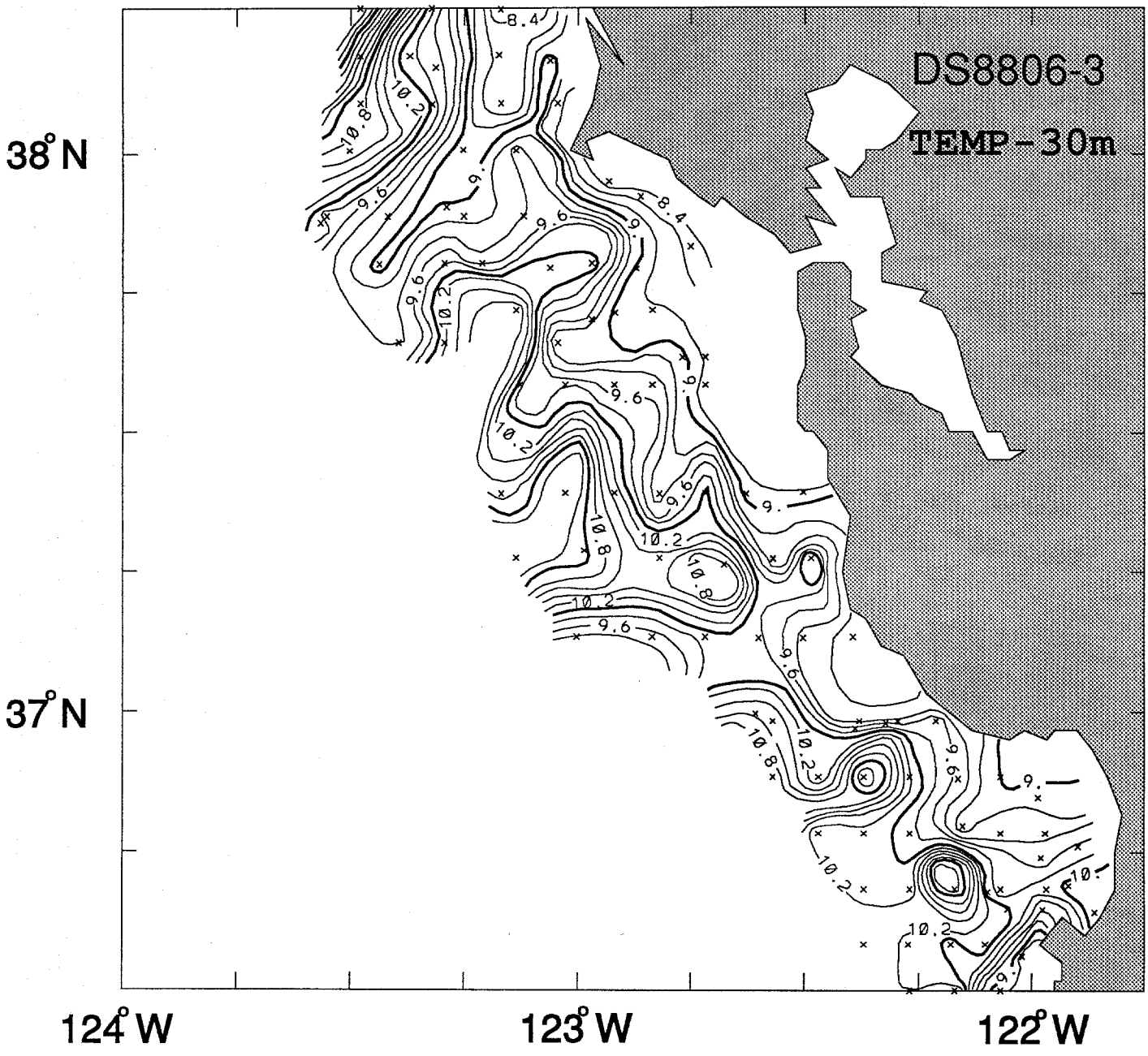
APPENDIX 4.4: HORIZONTAL MAPS- DS8806, SWEEP 3

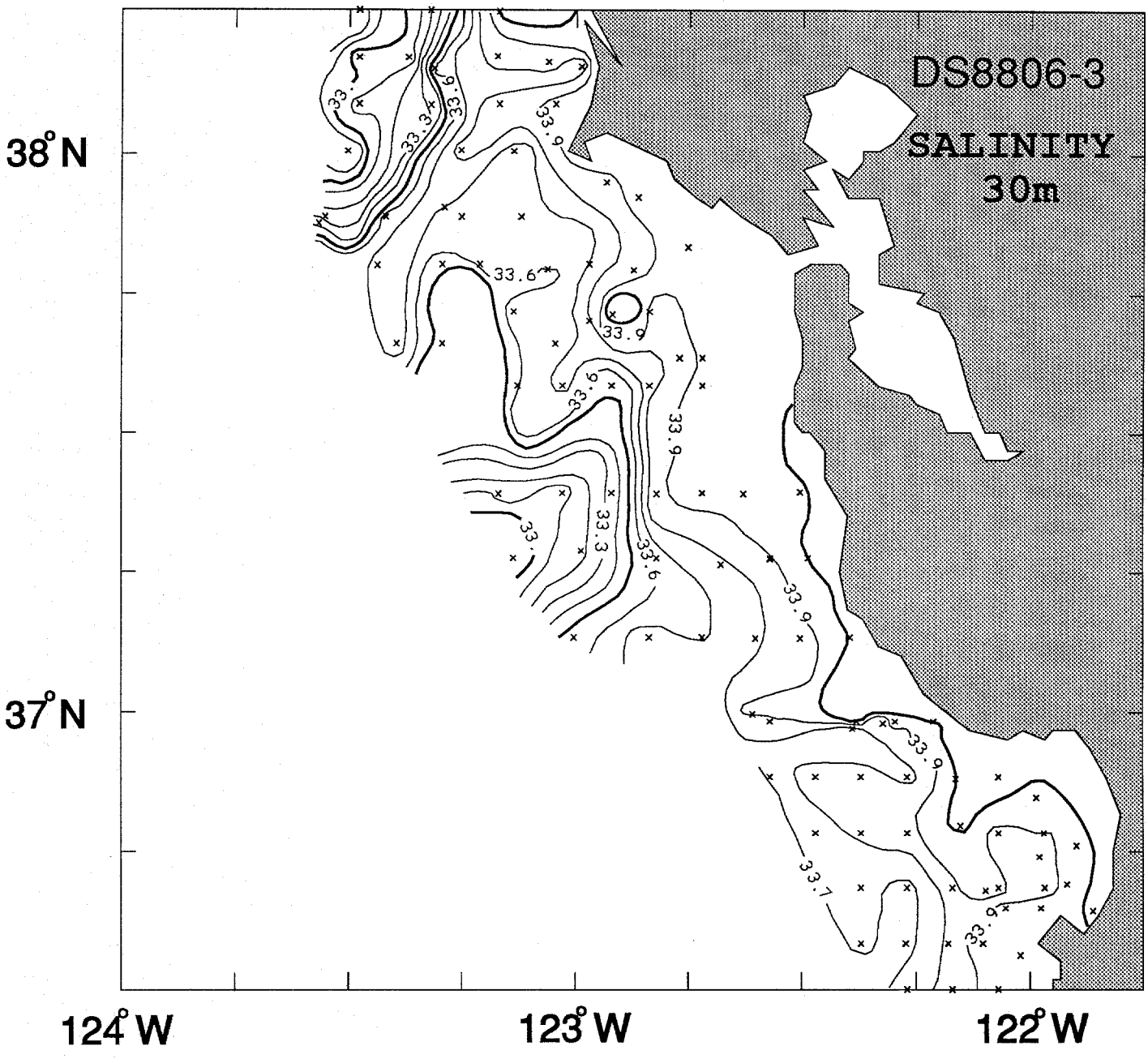

DS8806-3
CTD
STATIONS
38°N
37°N
124°W
123°W
122°W

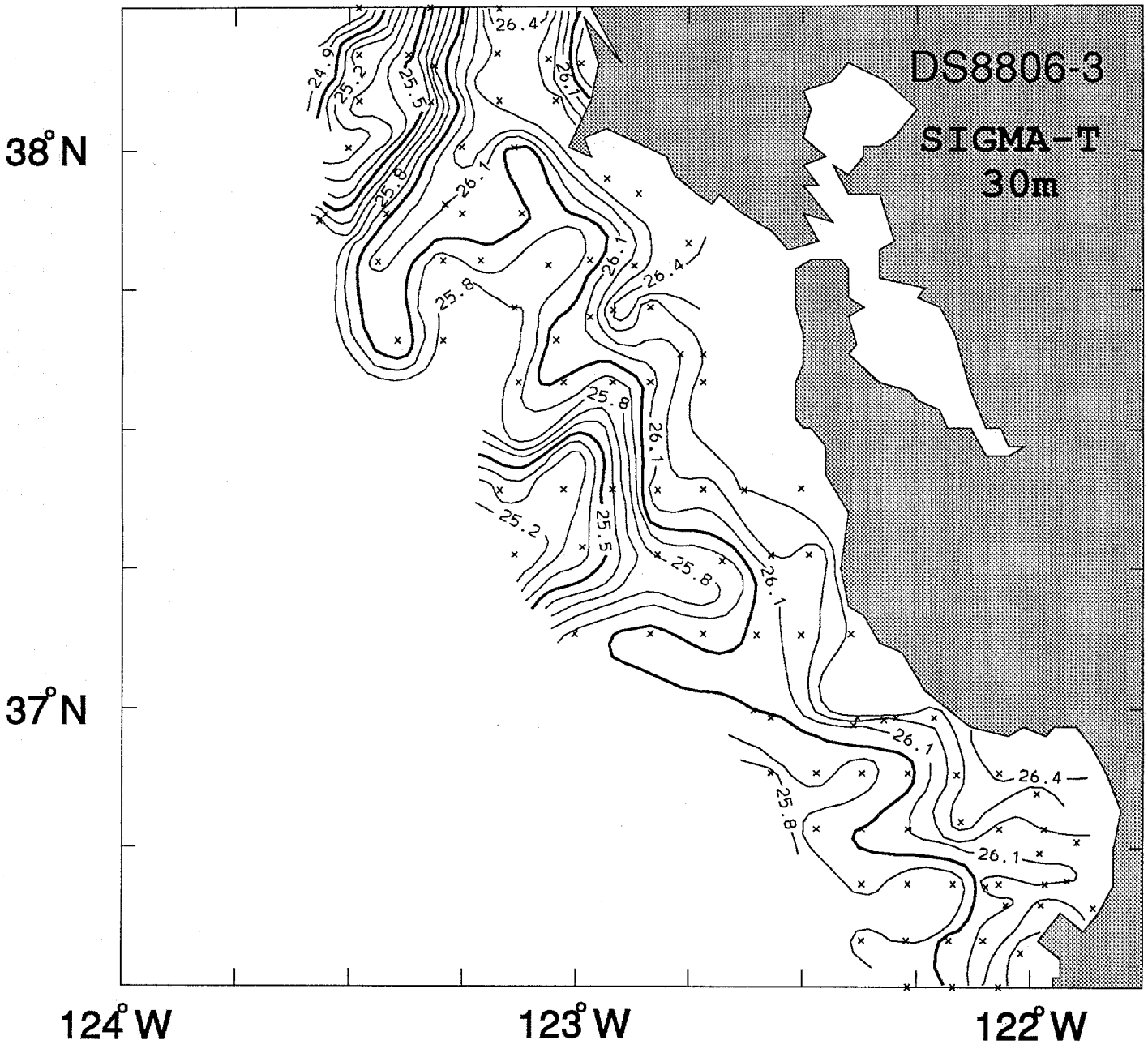

DS8806-3
TEMP - 5m
38°N
37°N
124°W
123°W
122°W

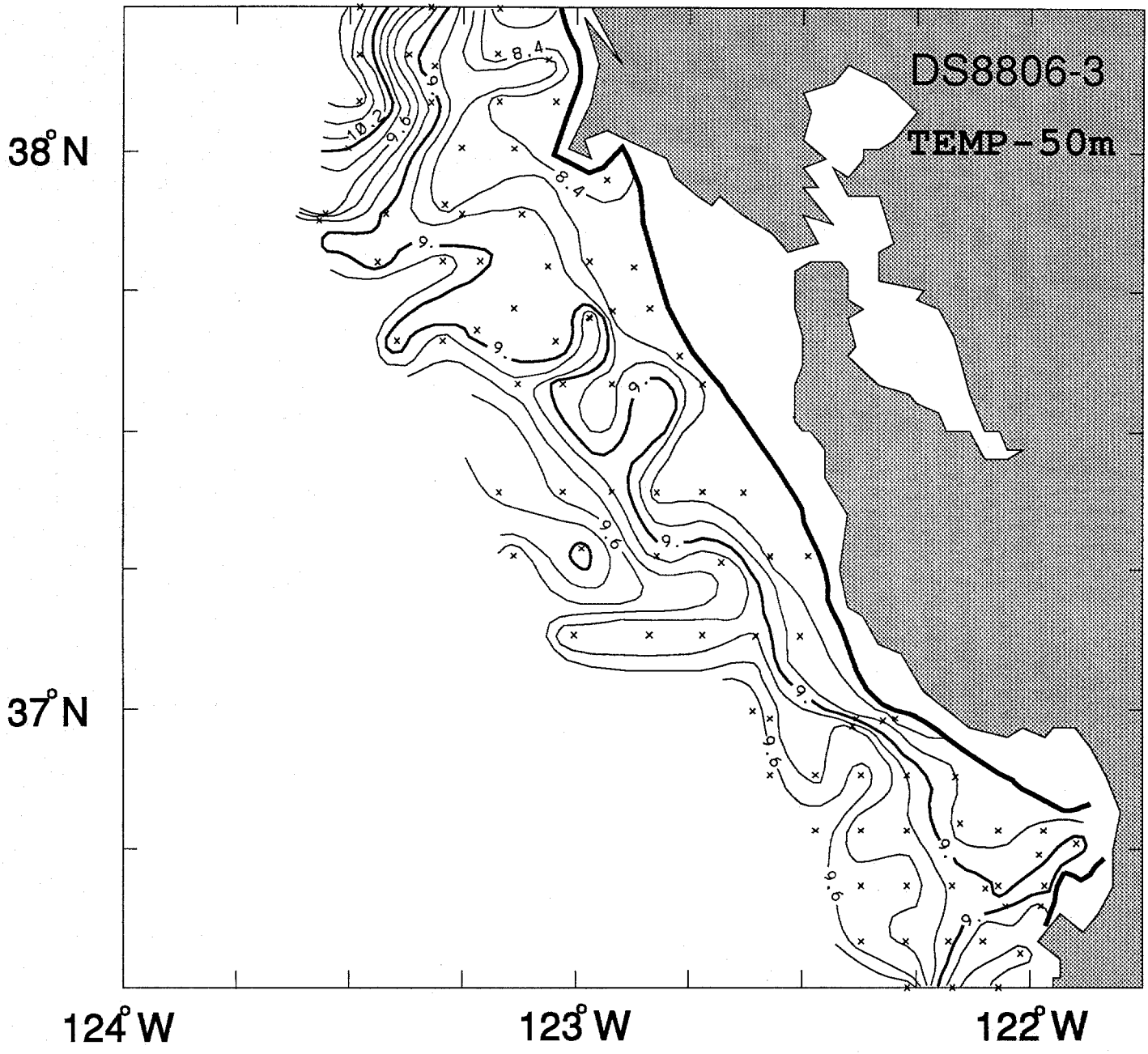

DS8806-3
SALINITY
5m
38°N
37°N
124°W
123°W
122°W
32.7
33.
33.3
33.6
33.6
33.6
33.3
33.
33.
33.6
33.3
33.6
33.9

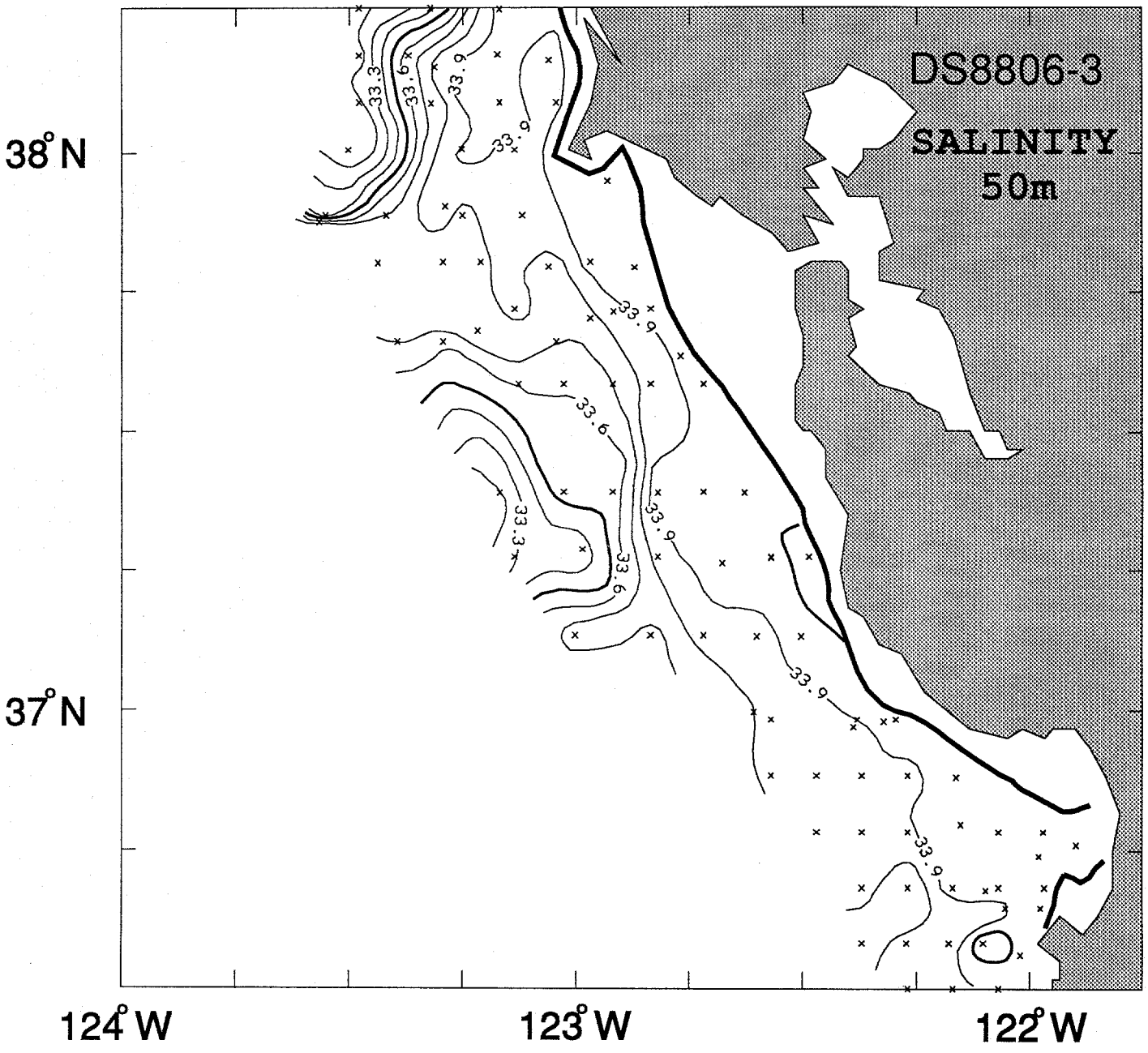

DS8806-3
SIGMA-T
5m
38°N
37°N
124°W
123°W
122°W
24.6
25.2
25.5
25.8
24.9

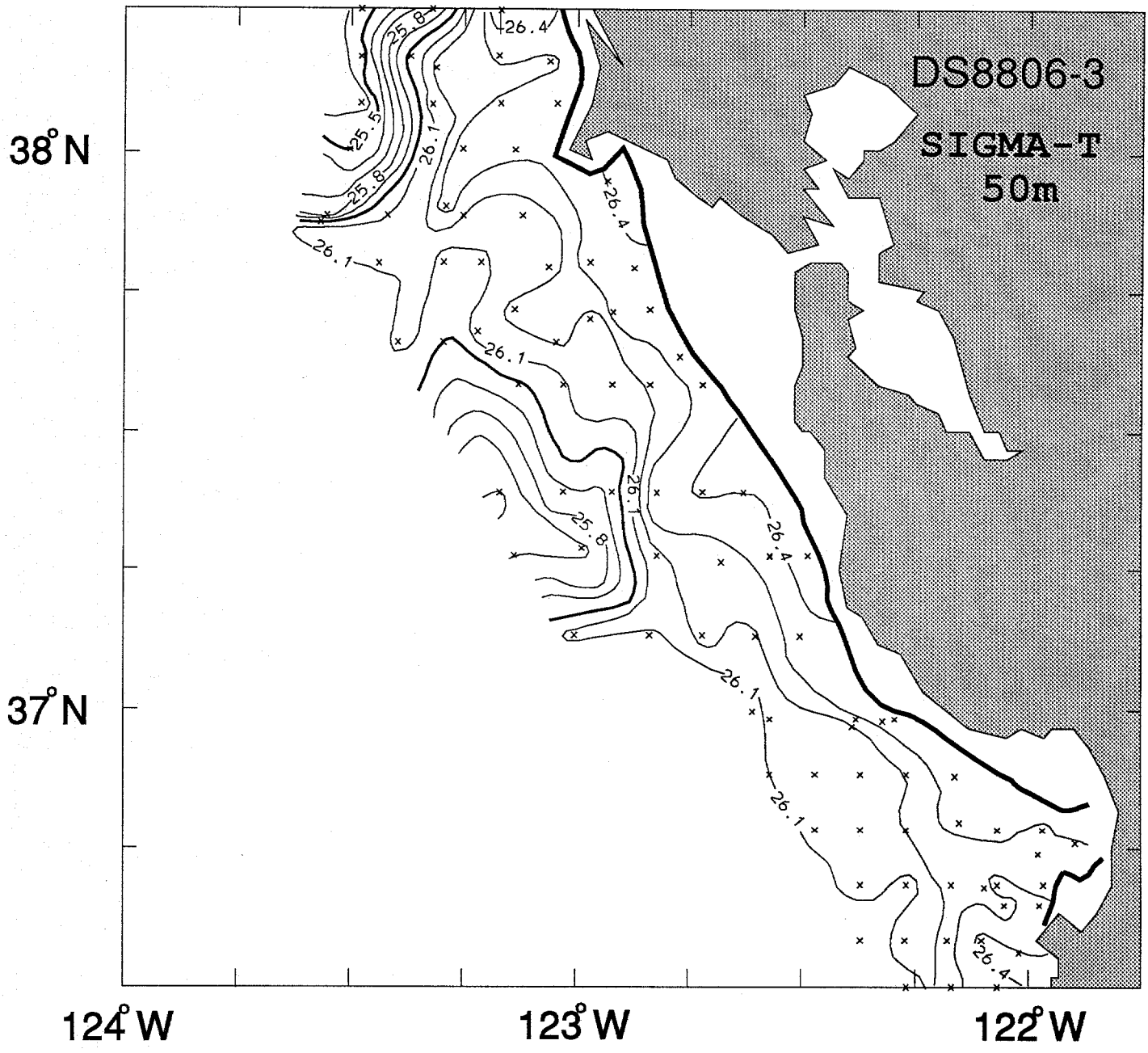

DS8806-3
TEMP-30m
38°N
37°N
124°W
123°W
122°W

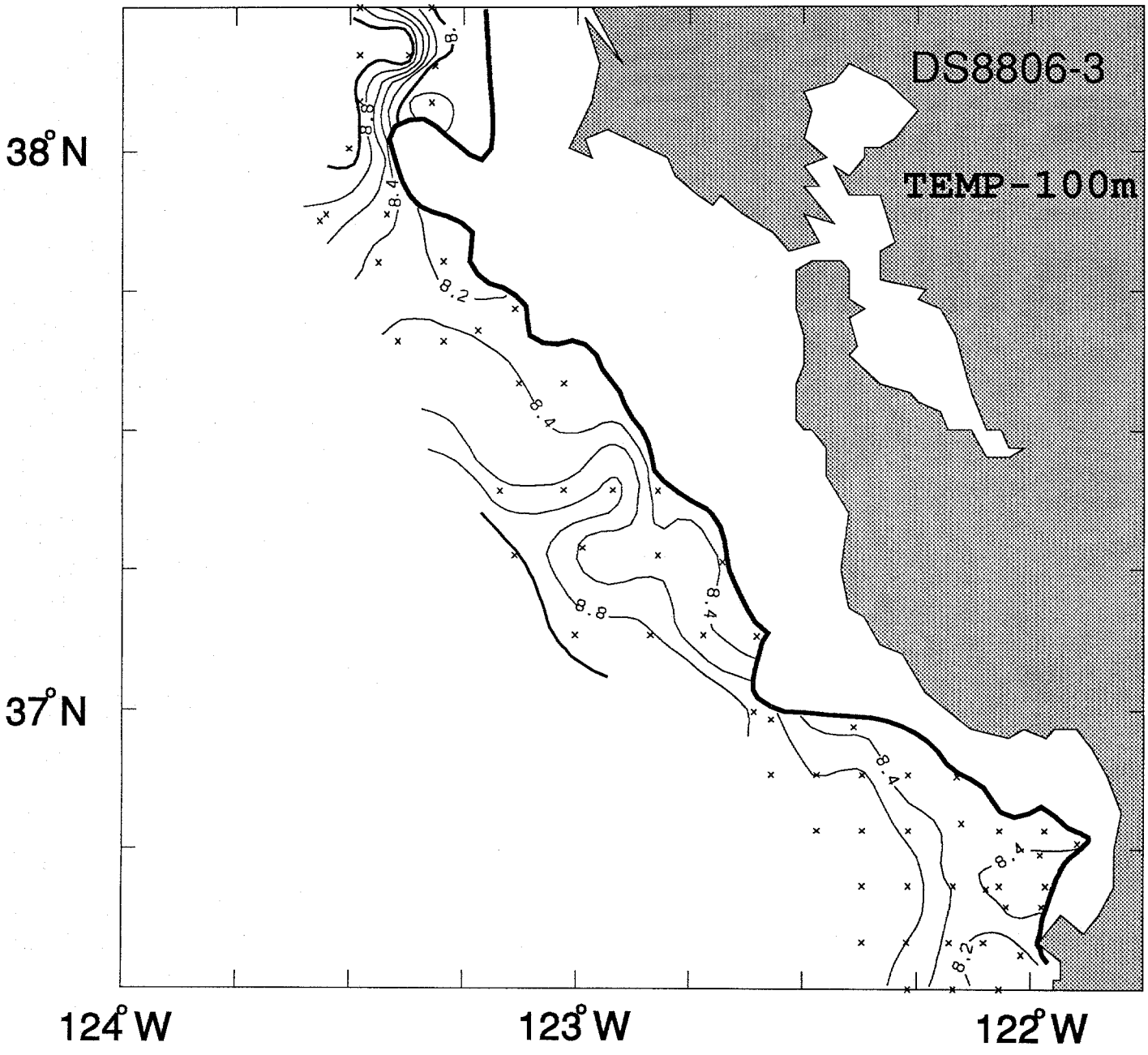

DS8806-3
SALINITY
30m
38°N
37°N
124°W
123°W
122°W
33.
33.3
33.6
33.9
33.6
33.9
33.
33.3
33.6
33.9
33.9
33.7
33.9

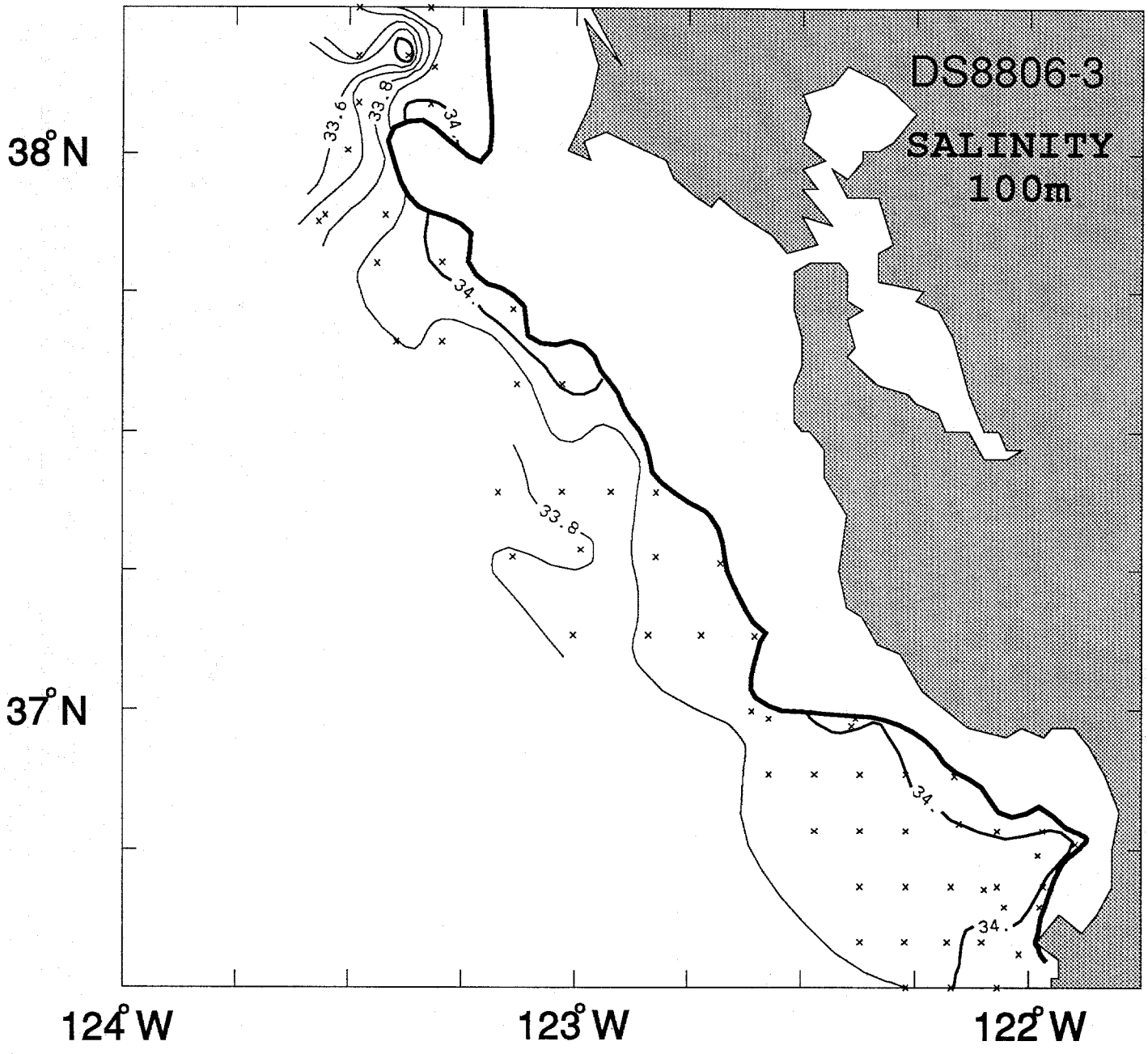

DS8806-3
SIGMA-T
30m
38°N
37°N
124°W
123°W
122°W
24.9
25.2
25.5
25.8
26.1
26.4

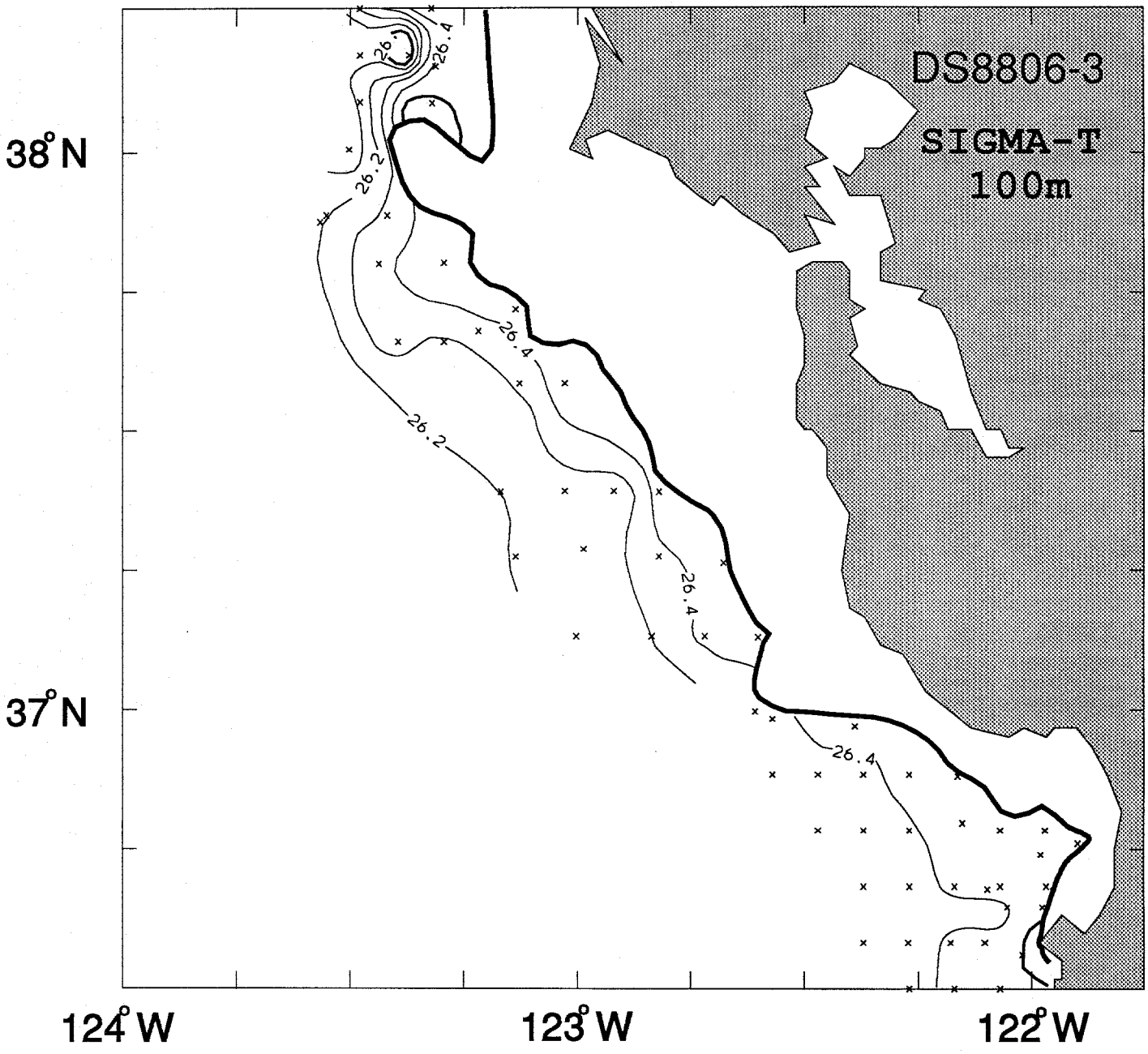

DS8806-3
TEMP - 50m
38°N
37°N
124°W
123°W
122°W
10.2
9.6
8.4
9.
9.6
9.
9.
9.6
9.
9.6
9.6
9.
9.6
9.
9.

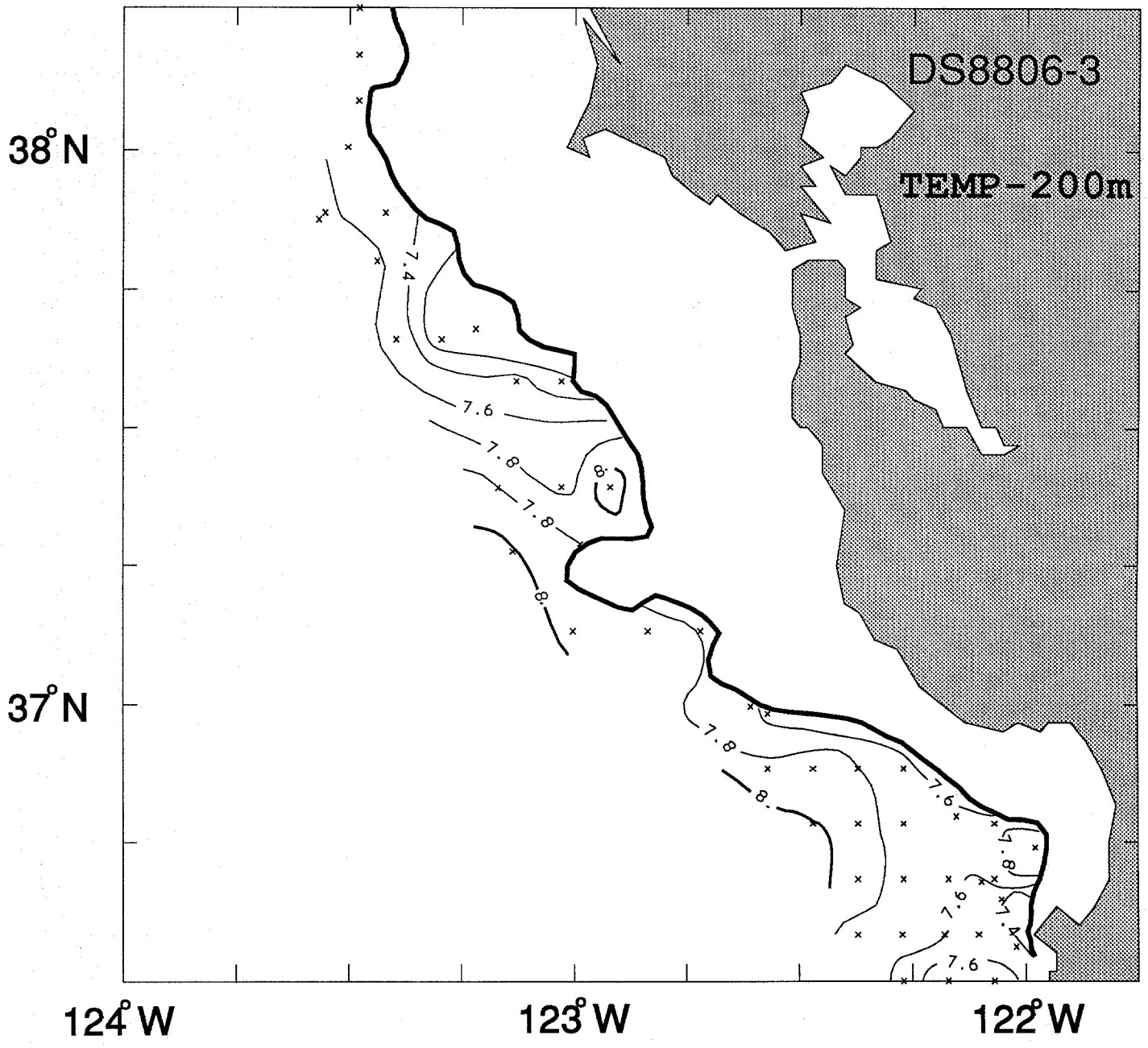

DS8806-3
SALINITY
50m
38°N
37°N
124°W
123°W
122°W
33.3
33.6
33.9

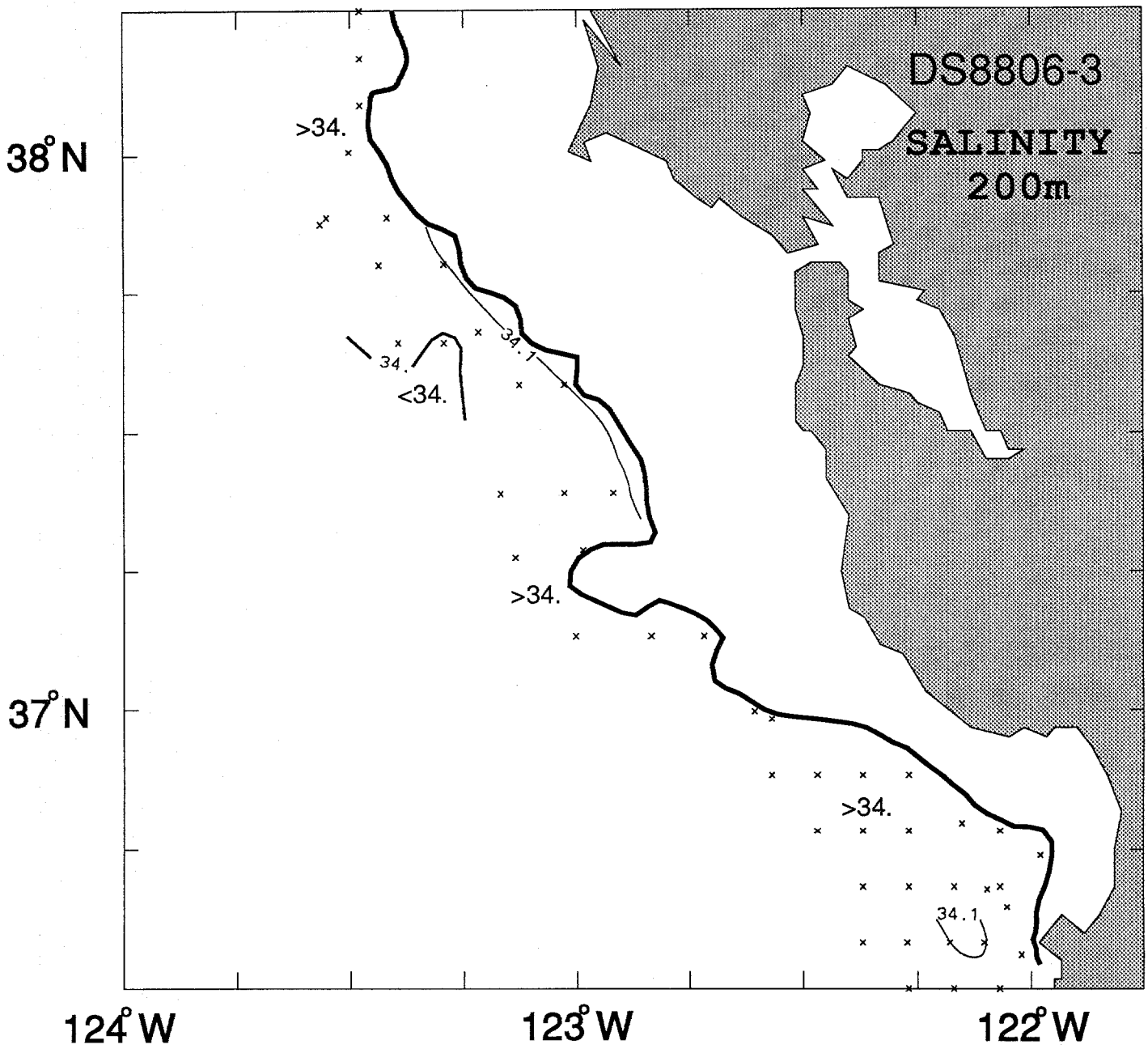

DS8806-3
SIGMA-T
50m
38°N
37°N
124°W
123°W
122°W
25.5
25.8
26.1
26.4

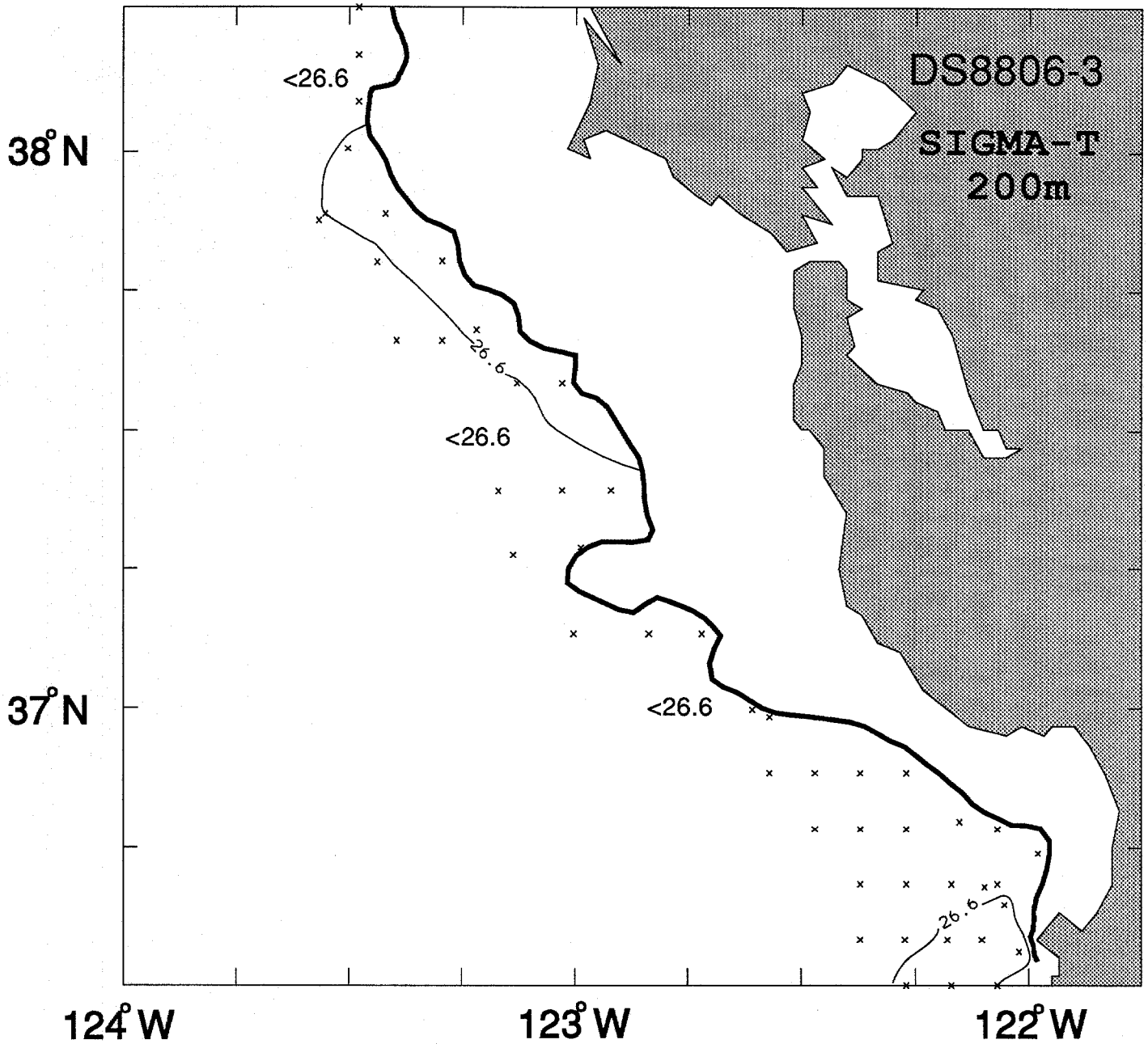

DS8806-3
TEMP-100m
38°N
37°N
124°W
123°W
122°W
8.8
8.8
8.4
8.2
8.4
8.8
8.4
8.4
8.4
8.2

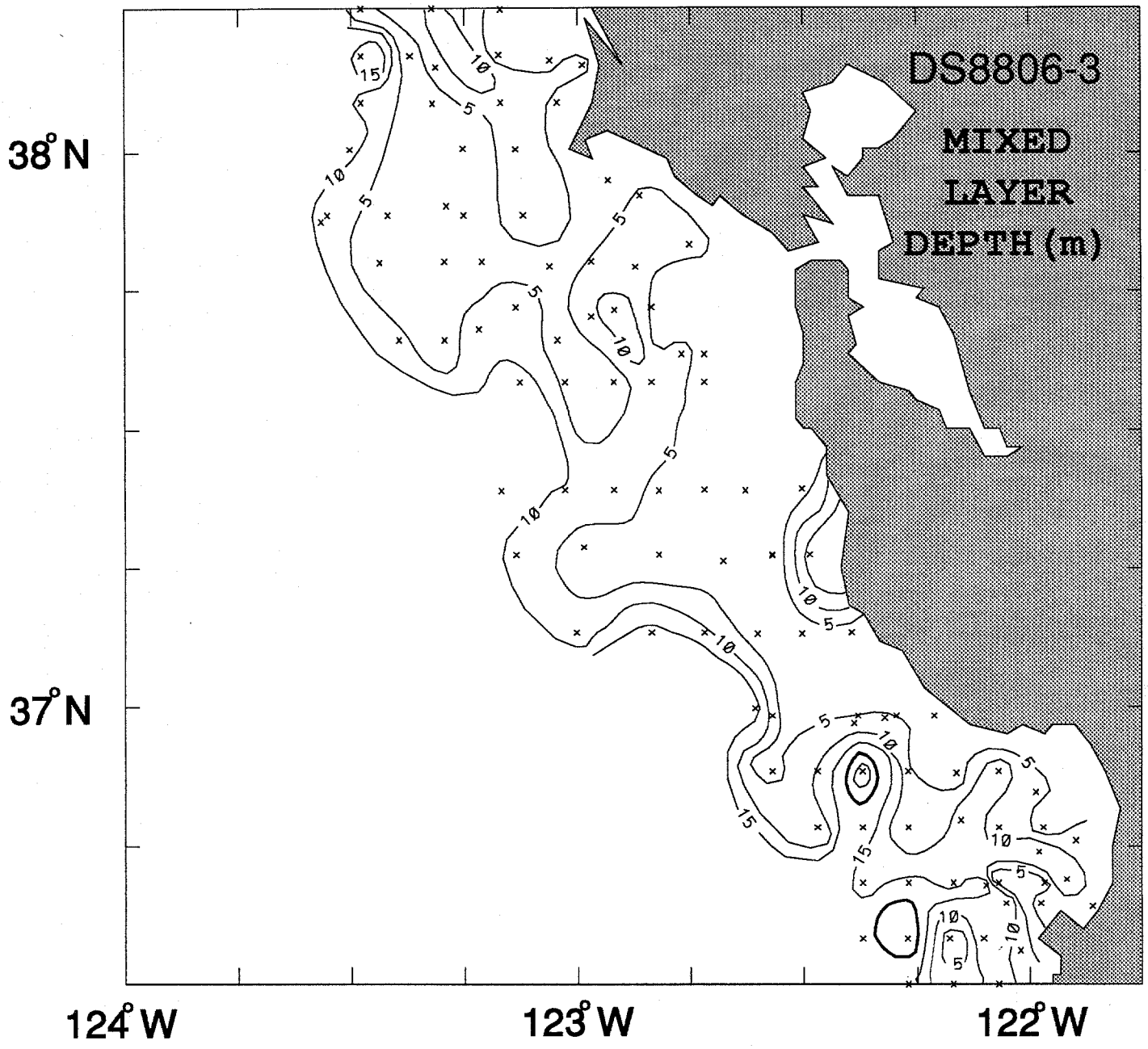

DS8806-3
SALINITY
100m
38°N
37°N
124°W
123°W
122°W
33.6
33.8
34.
34.
33.8
34.
34.

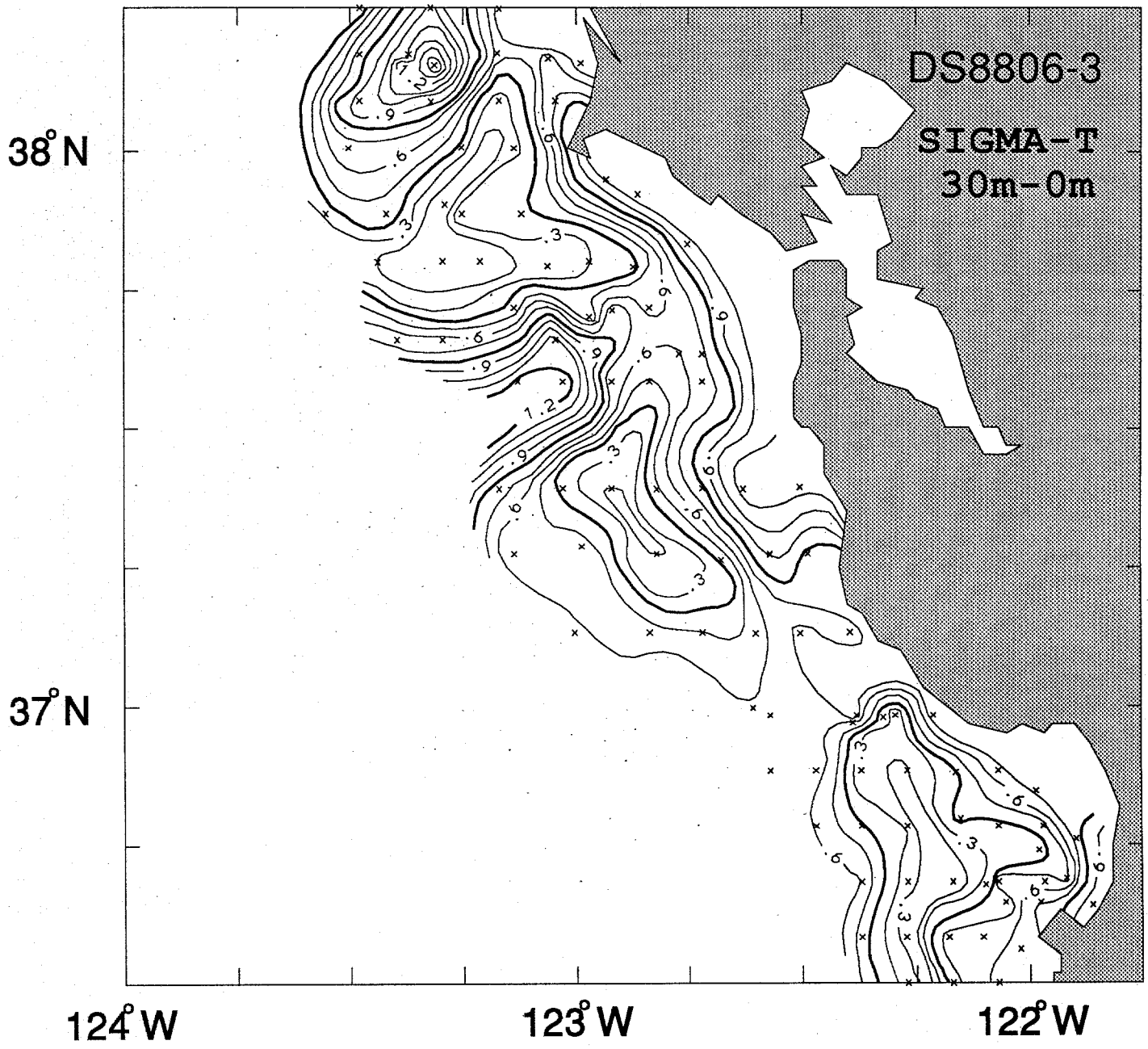

DS8806-3
SIGMA-T
100m
38°N
37°N
124°W
123°W
122°W
26.2
26.4

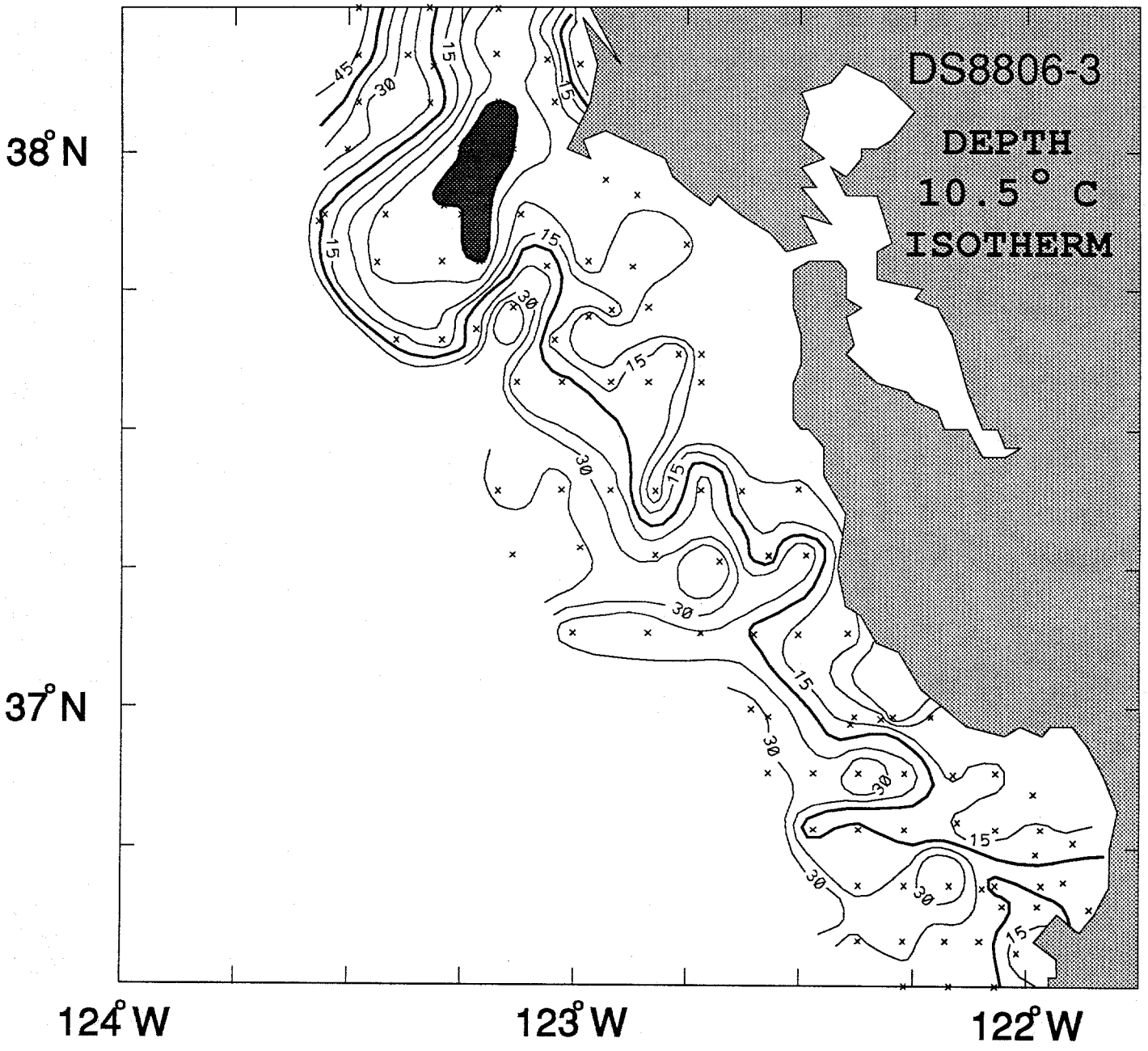

DS8806-3
TEMP-200m
38°N
37°N
124°W
123°W
122°W
7.4
7.6
7.8
8.
7.8
8.
7.8
8.
7.6
7.8
7.6
7.4
7.6

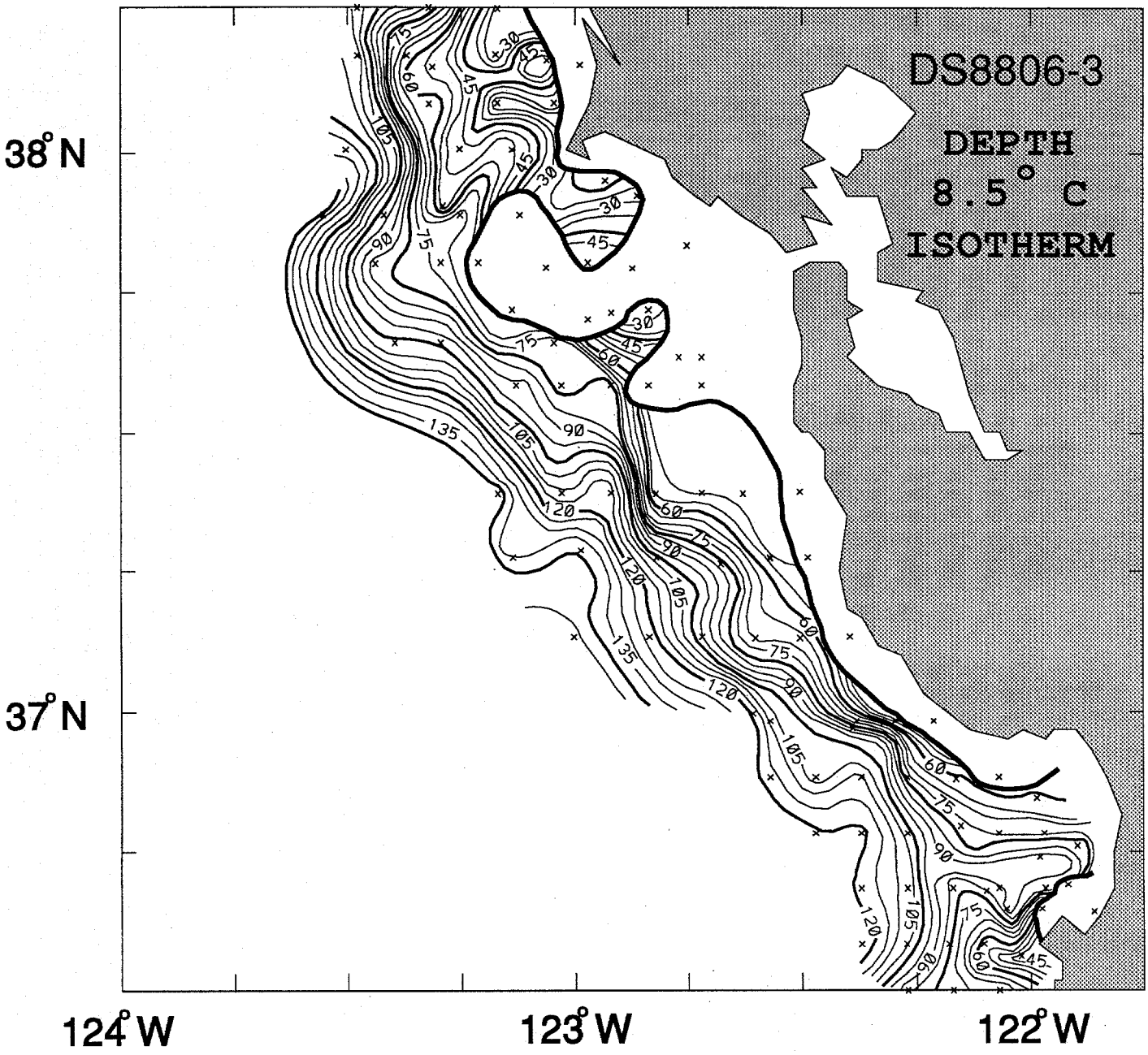

DS8806-3
SALINITY
200m
38°N
37°N
124°W
123°W
122°W
>34.
34.
<34.
34.1
>34.
>34.
34.1

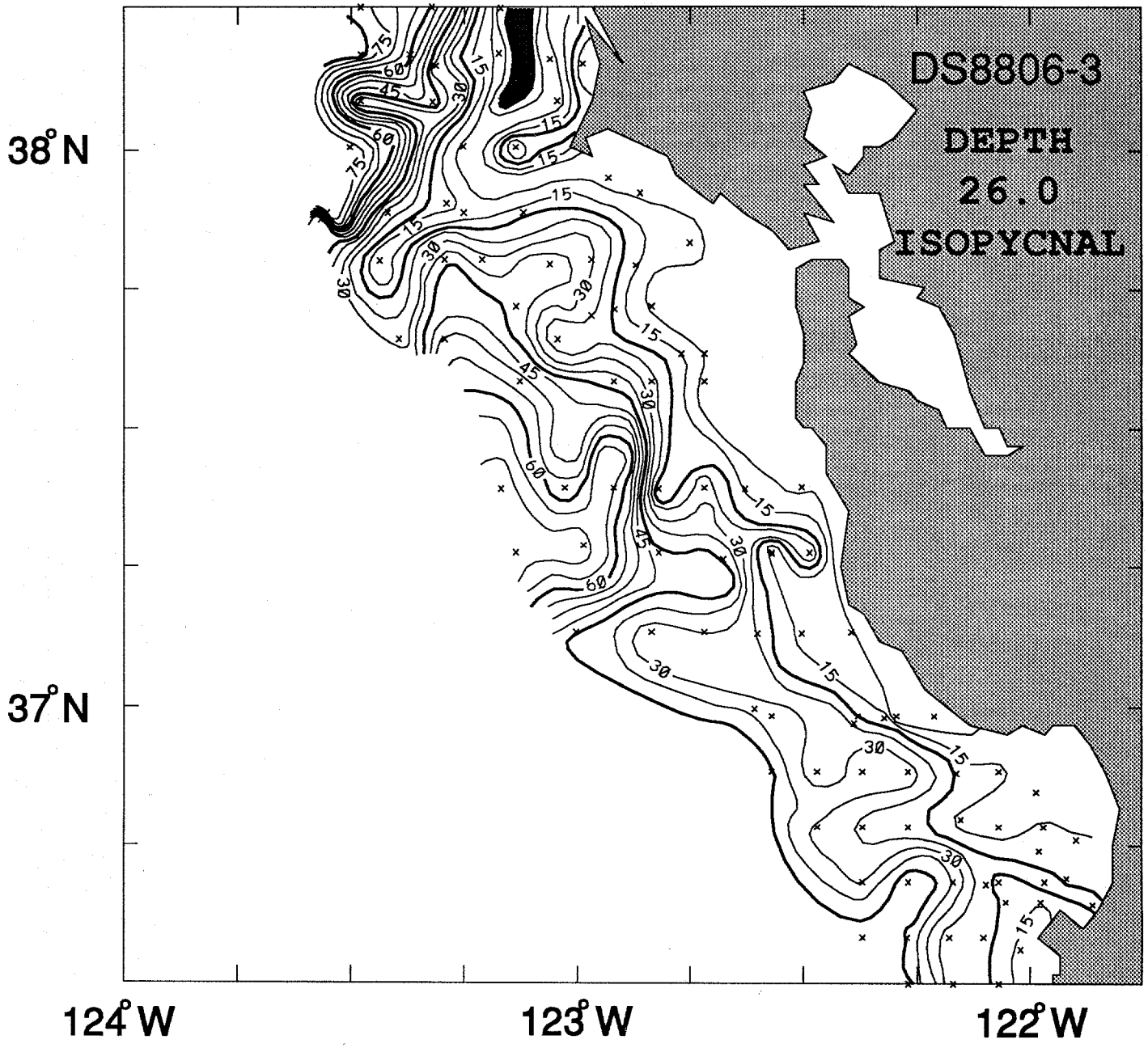

DS8806-3
SIGMA-T
200m
<26.6
26.6
<26.6
<26.6
26.6
38°N
37°N
124°W
123°W
122°W

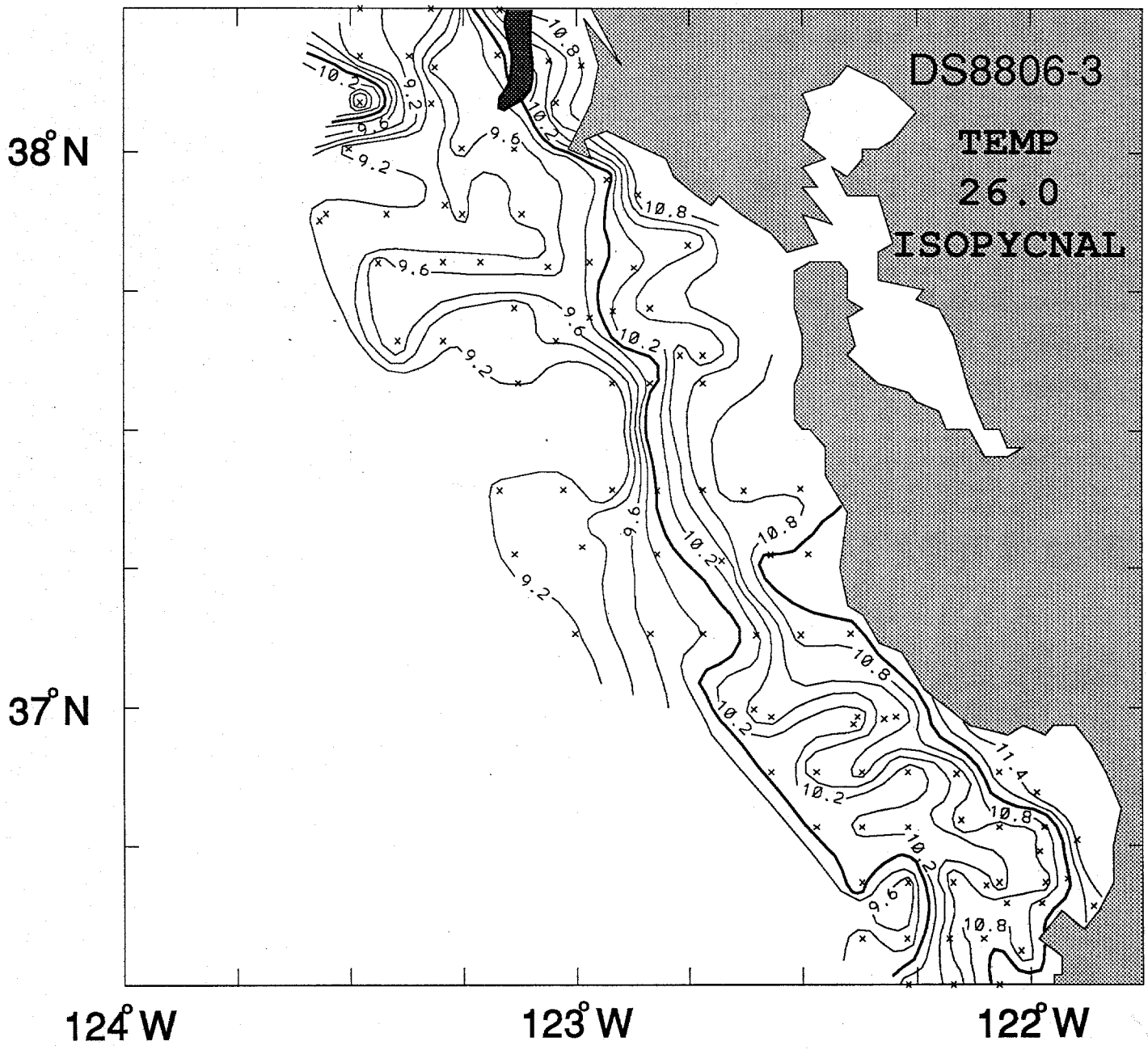

DS8806-3
MIXED
LAYER
DEPTH (m)
38°N
37°N
124°W
123°W
122°W

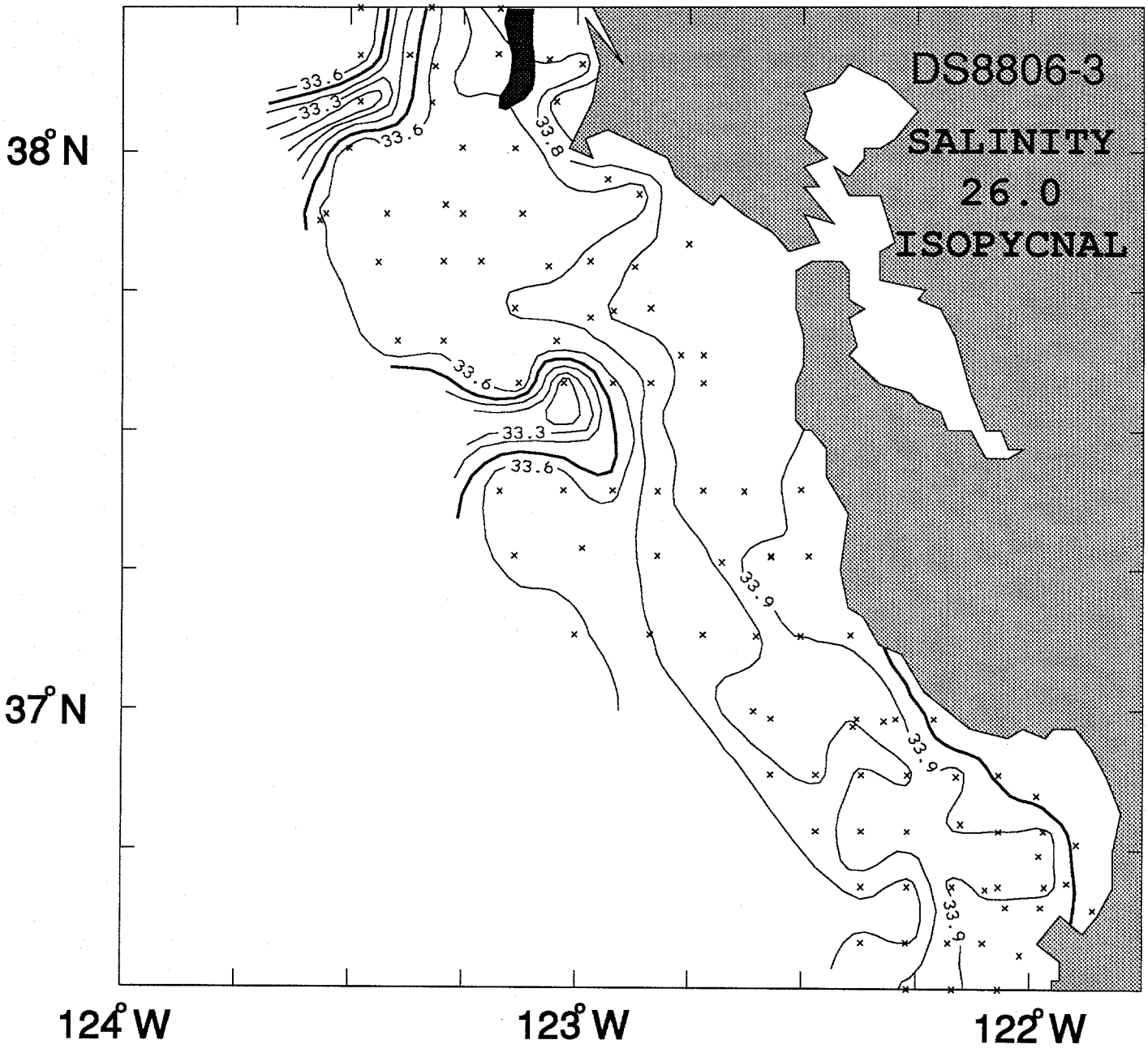

DS8806-3
SIGMA-T
30m-0m
38°N
37°N
124°W
123°W
122°W


DS8806-3
DEPTH
10.5 ° C
ISOTHERM
38° N
37° N
124° W
123° W
122° W
45
30
15
15
15
30
15
30
15
30
15
30
30
15
30
30
15

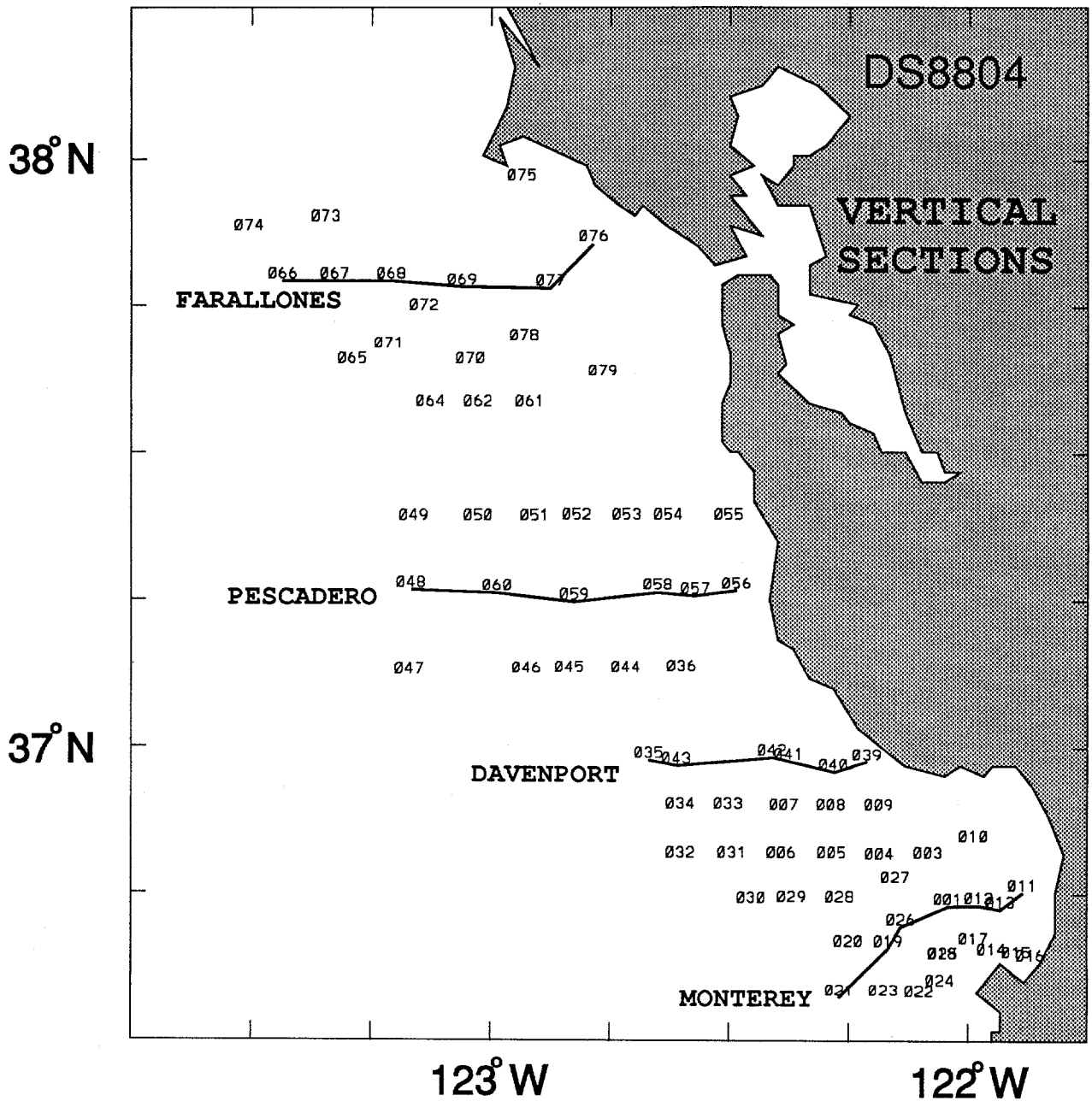

DS8806-3
DEPTH
8.5° C
ISOTHERM
38° N
37° N
124° W
123° W
122° W

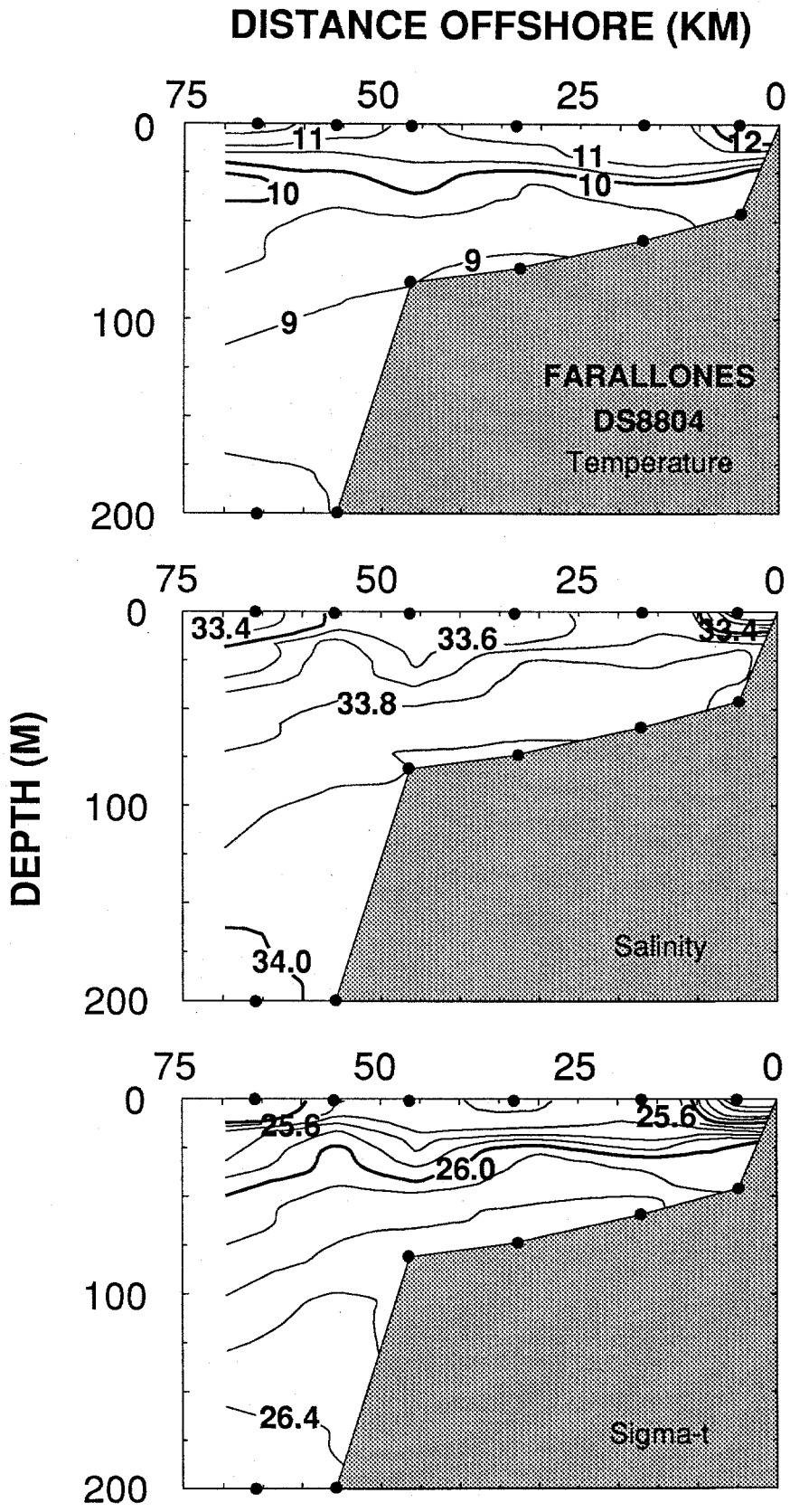

DS8806-3
DEPTH
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W

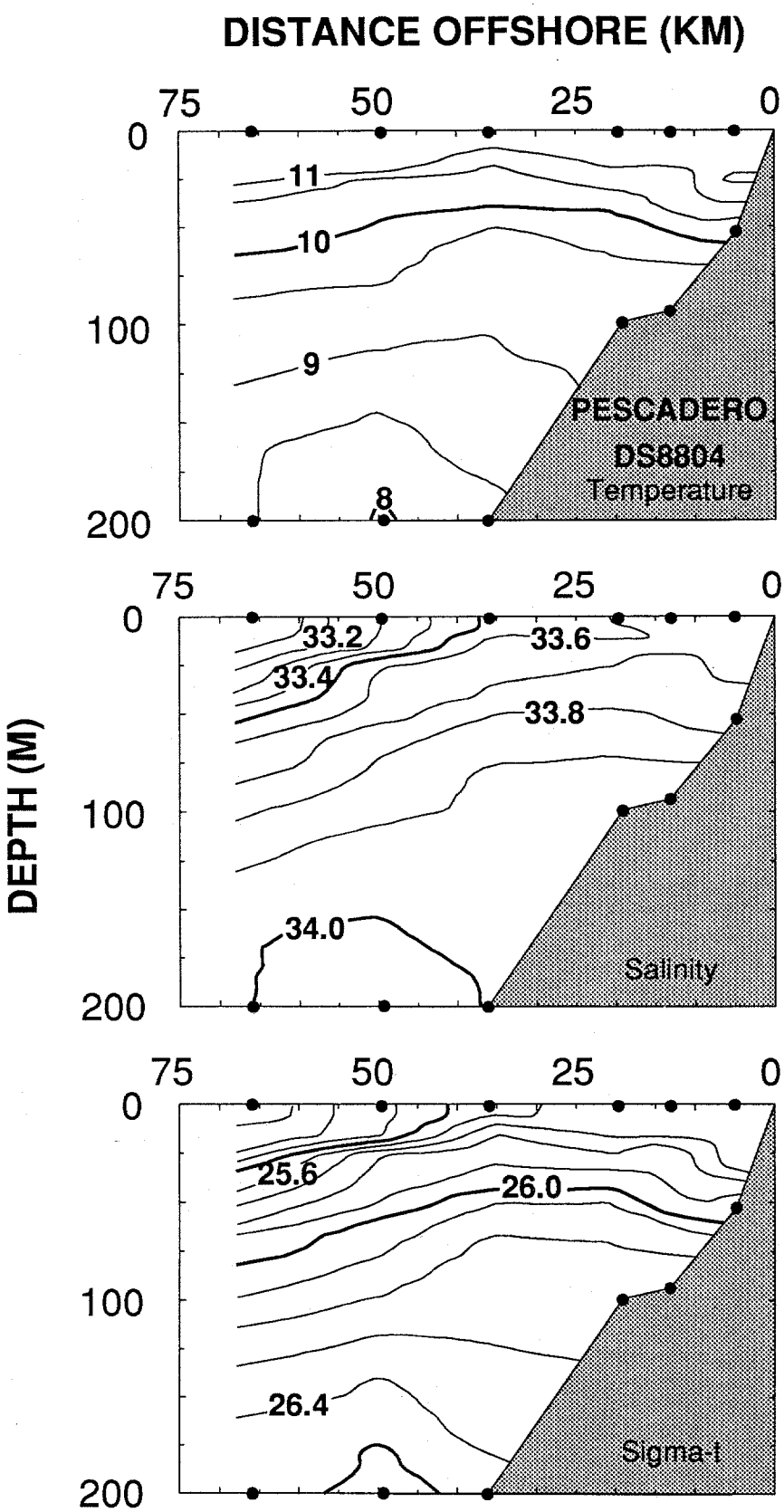

DS8806-3
TEMP
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W

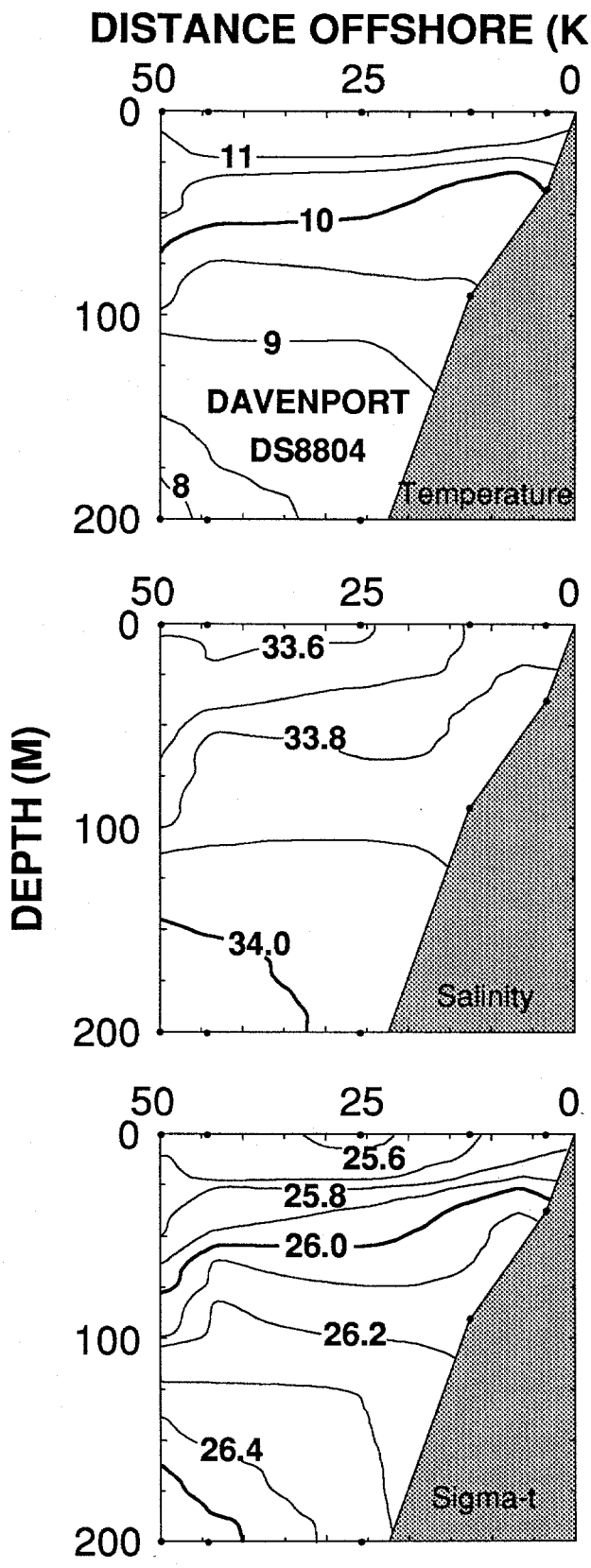

DS8806-3
SALINITY
26.0
ISOPYCNAL
38°N
37°N
124°W
123°W
122°W
33.6
33.3
33.6
33.8
33.6
33.3
33.6
33.9
33.9
33.9

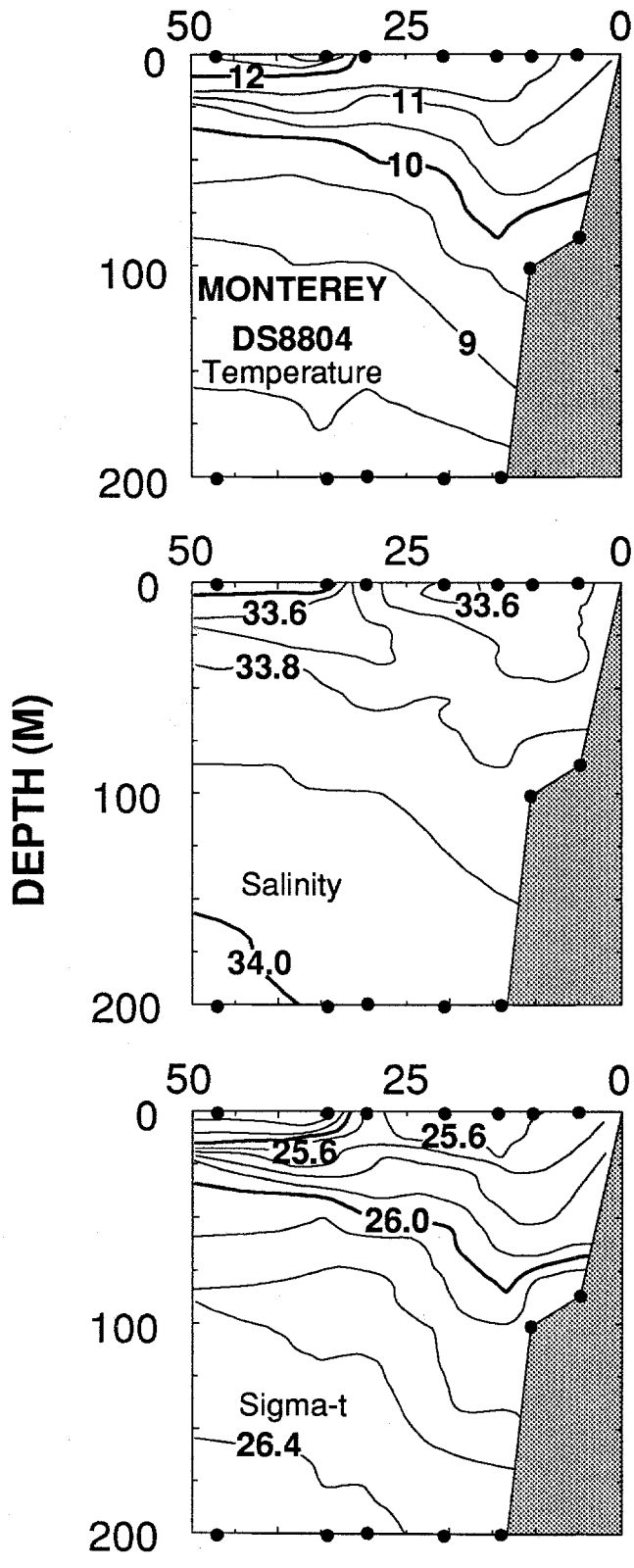
APPENDIX 5.1: VERTICAL TRANSECTS- DS8804


DS8804
VERTICAL SECTIONS
38°N
37°N
123°W
122°W
FARALLONES
PESCADERO
DAVENPORT
MONTEREY
075
074
073
076
066 067 068 069 077
072
071
078
065
070
079
064 062 061
049 050 051 052 053 054 055
048 060 059 058 057 056
047 046 045 044 036
035 043 042 041 040 039
034 033 007 008 009
010
032 031 006 005 004 003
027
011
030 029 028
001 012 013
026
020 019
017
028
014 015 016
024
031 023 022

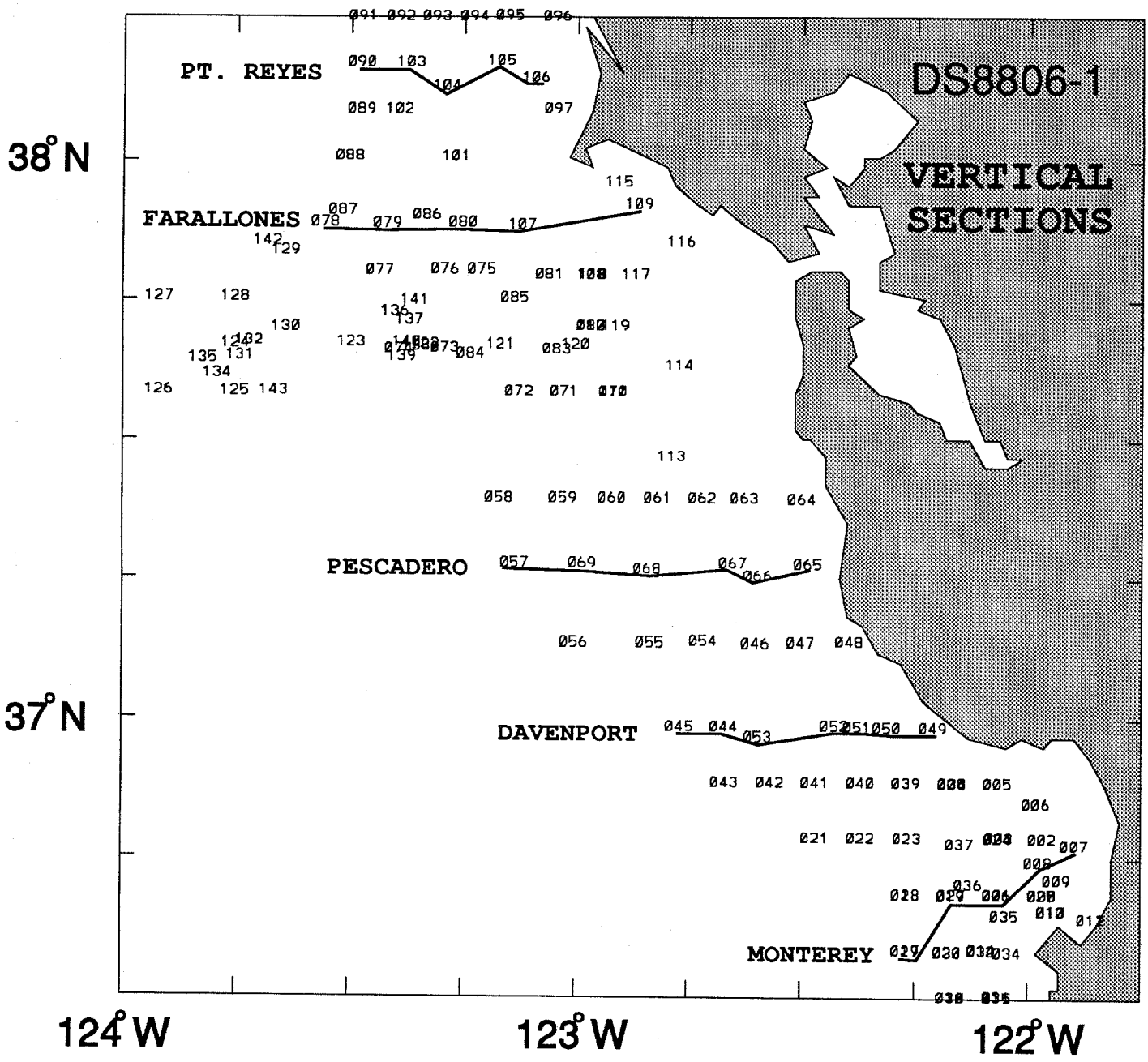

DISTANCE OFFSHORE (KM)
75
50
25
0
0
100
200
11
11
12
10
10
9
9
FARALLONES
DS8804
Temperature
DEPTH (M)
33.4
33.6
33.4
33.8
34.0
Salinity
25.6
25.6
26.0
26.4
Sigma-t

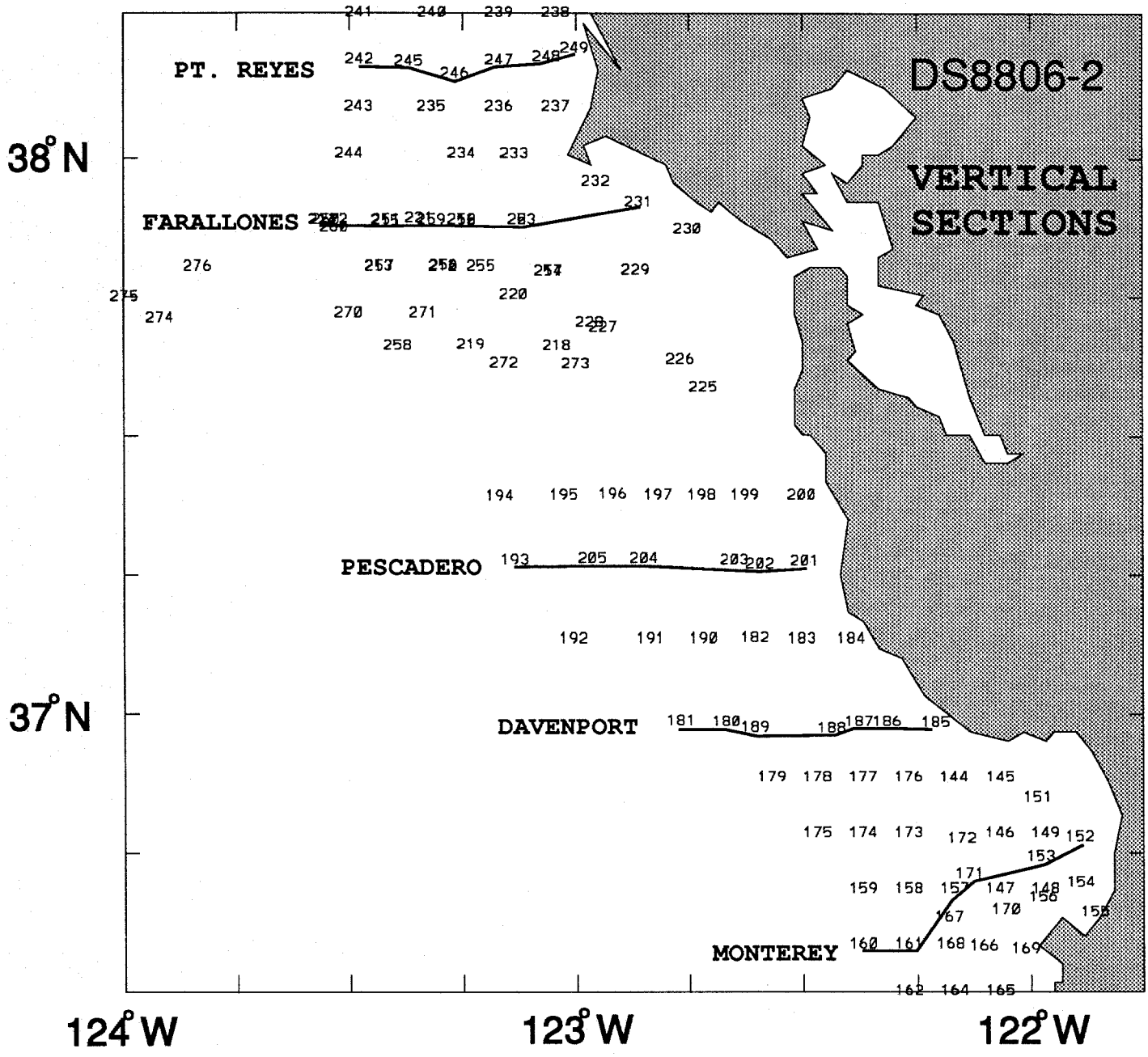

DISTANCE OFFSHORE (KM)
75
50
25
0
0
100
200
11
10
9
8
PESCADERO
DS8804
Temperature
33.2
33.4
33.6
33.8
34.0
Salinity
25.6
26.0
26.4
Sigma-t
DEPTH (M)

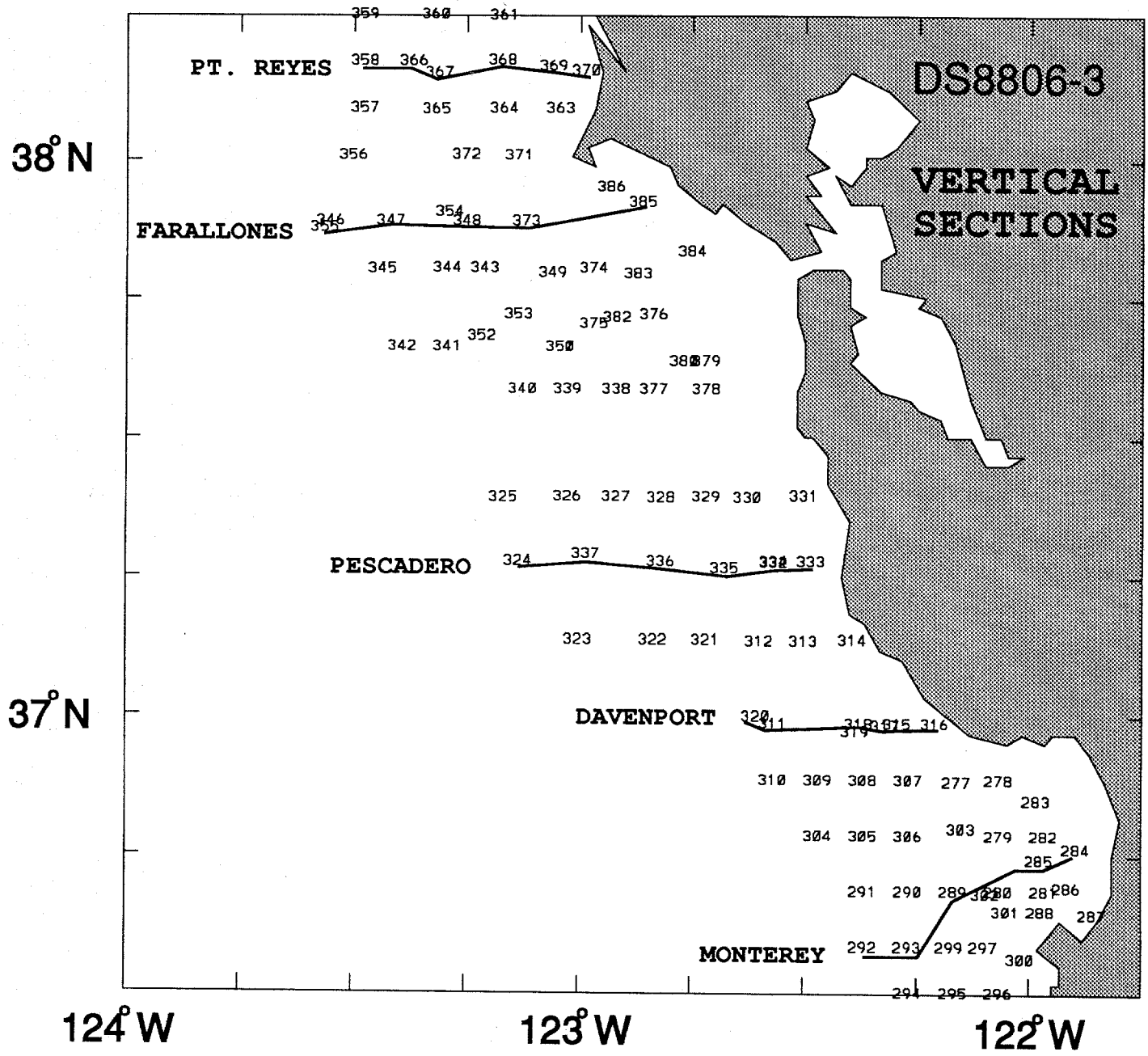

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
11
10
9
8
DAVENPORT
DS8804
Temperature
33.6
33.8
34.0
Salinity
DEPTH (M)
25.6
25.8
26.0
26.2
26.4
Sigma-t

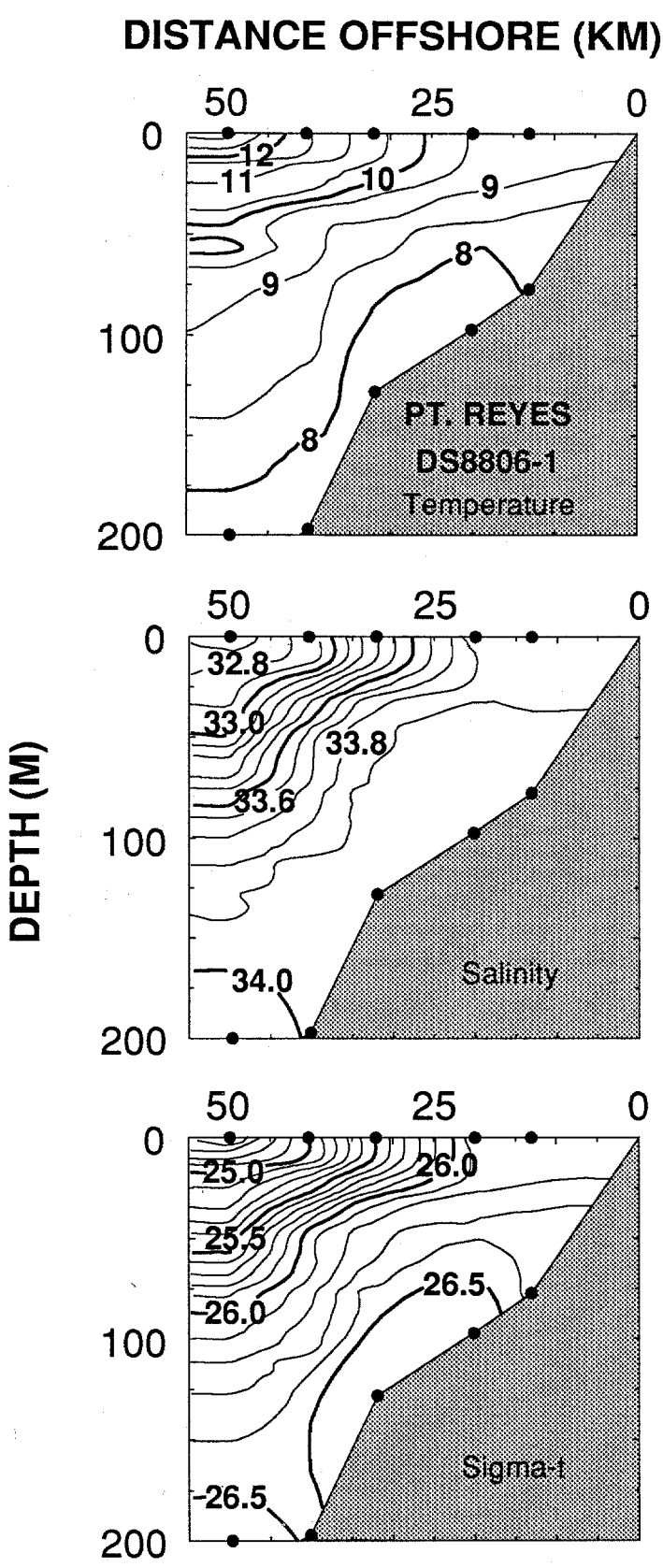

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
12
11
10
9
MONTEREY
DS8804
Temperature
33.6
33.6
33.8
Salinity
34.0
25.6
25.6
26.0
Sigma-t
26.4
DEPTH (M)

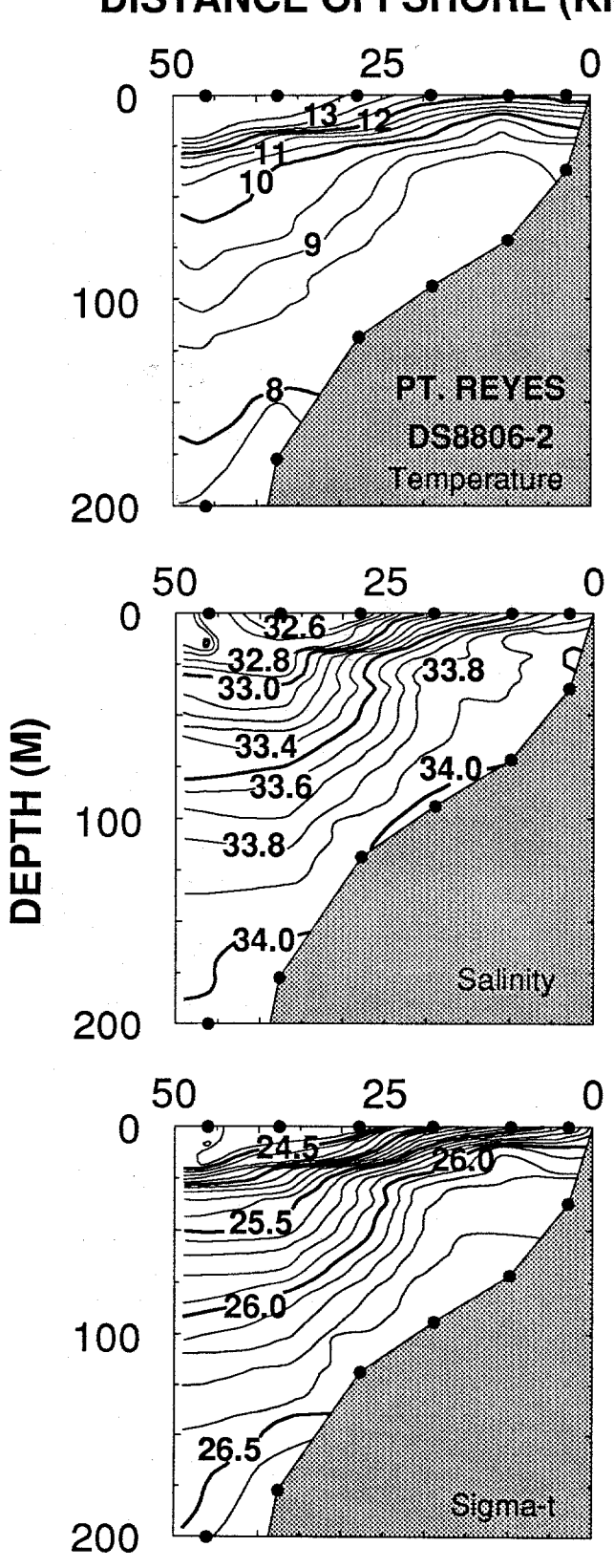
APPENDIX 5.2: VERTICAL TRANSECTS- DS8806

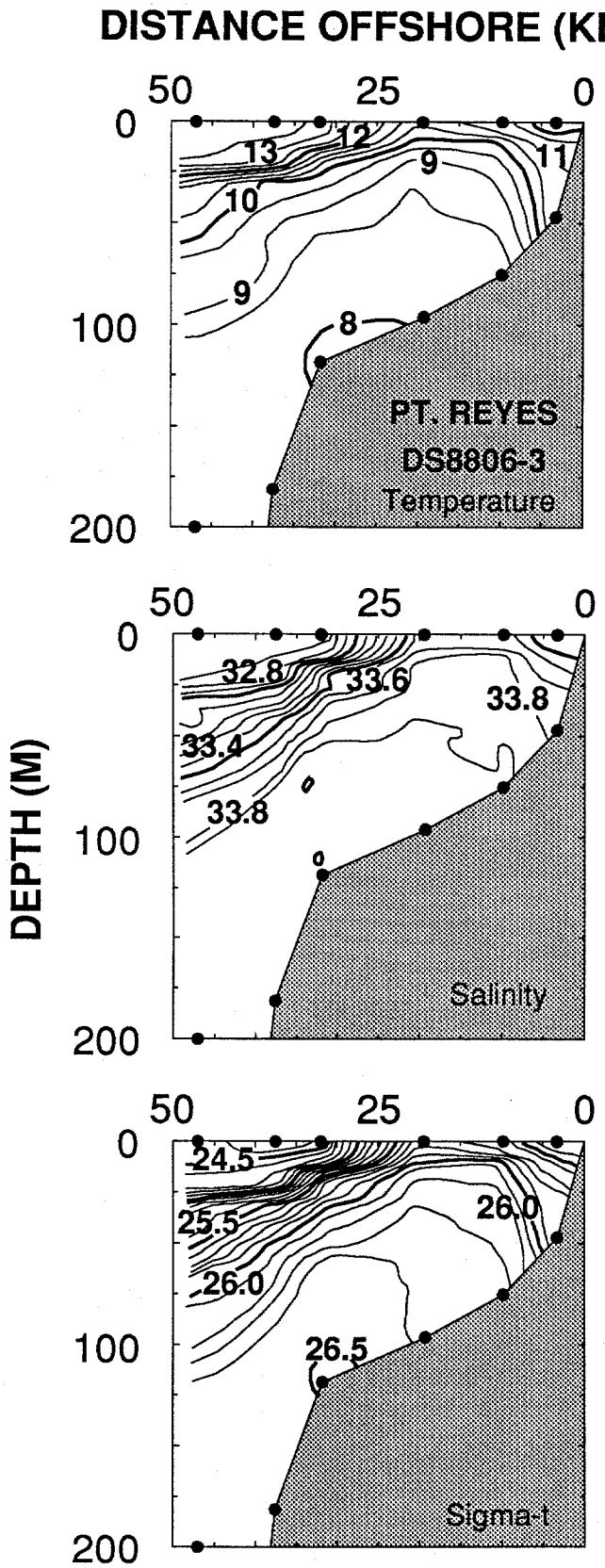

DS8806-1
VERTICAL SECTIONS
PT. REYES
FARALLONES
PESCADERO
DAVENPORT
MONTEREY
38°N
37°N
124°W
123°W
122°W

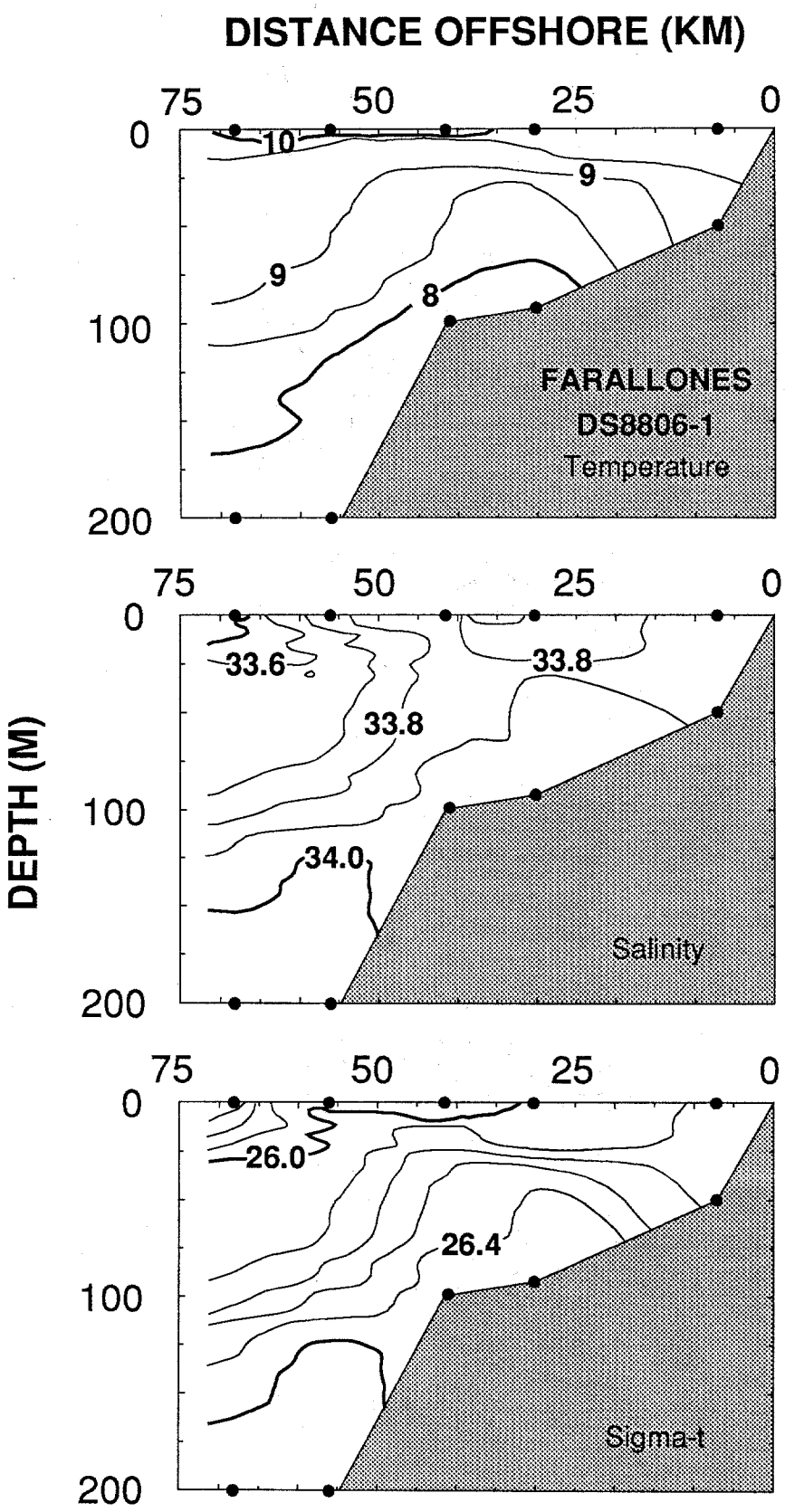

DS8806-2
VERTICAL SECTIONS
PT. REYES
FARALLONES
PESCADERO
DAVENPORT
MONTEREY
38°N
37°N
124°W
123°W
122°W

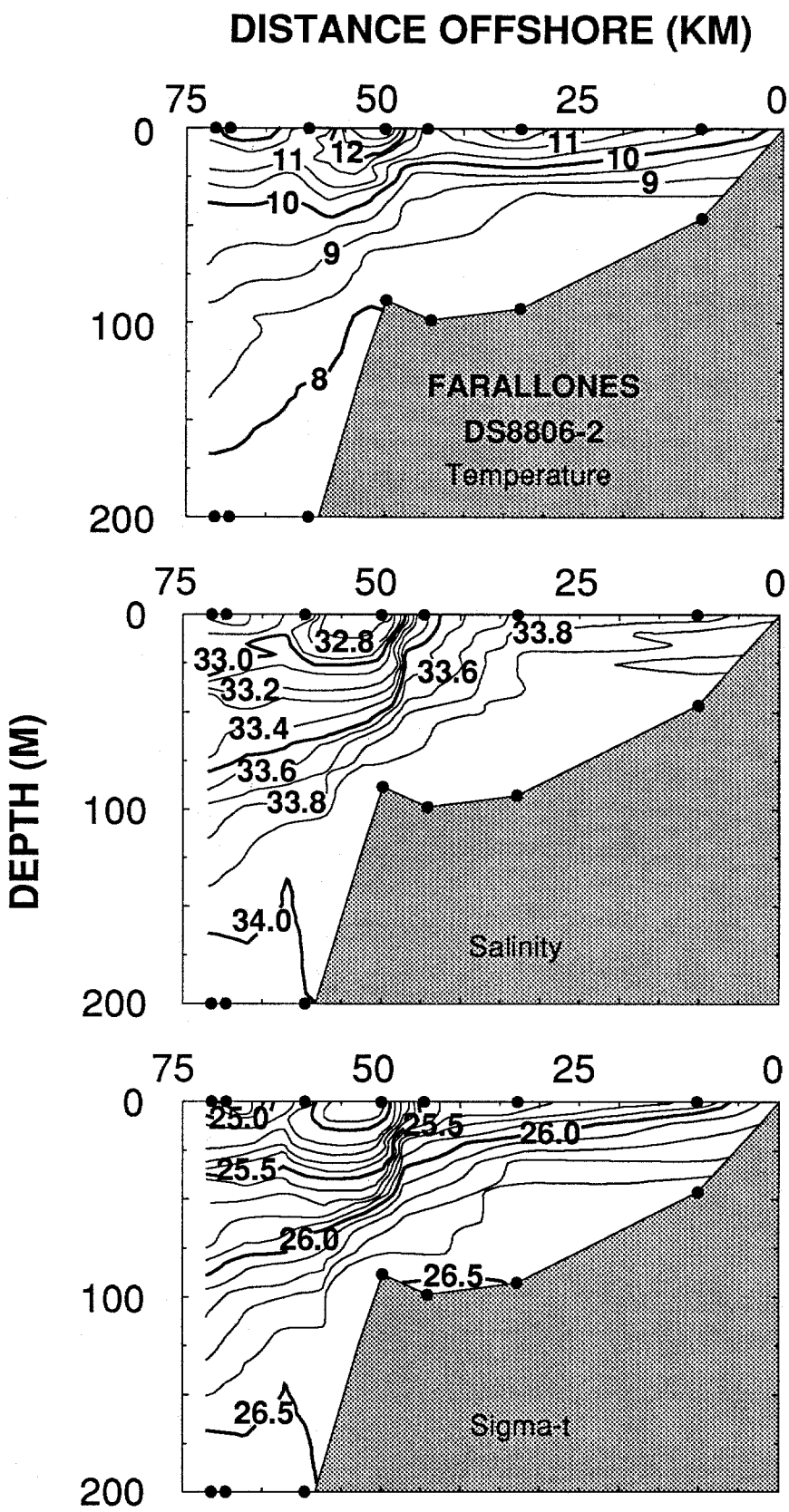

DS8806-3
VERTICAL SECTIONS
PT. REYES
FARALLONES
PESCADERO
DAVENPORT
MONTEREY
38°N
37°N
124°W
123°W
122°W

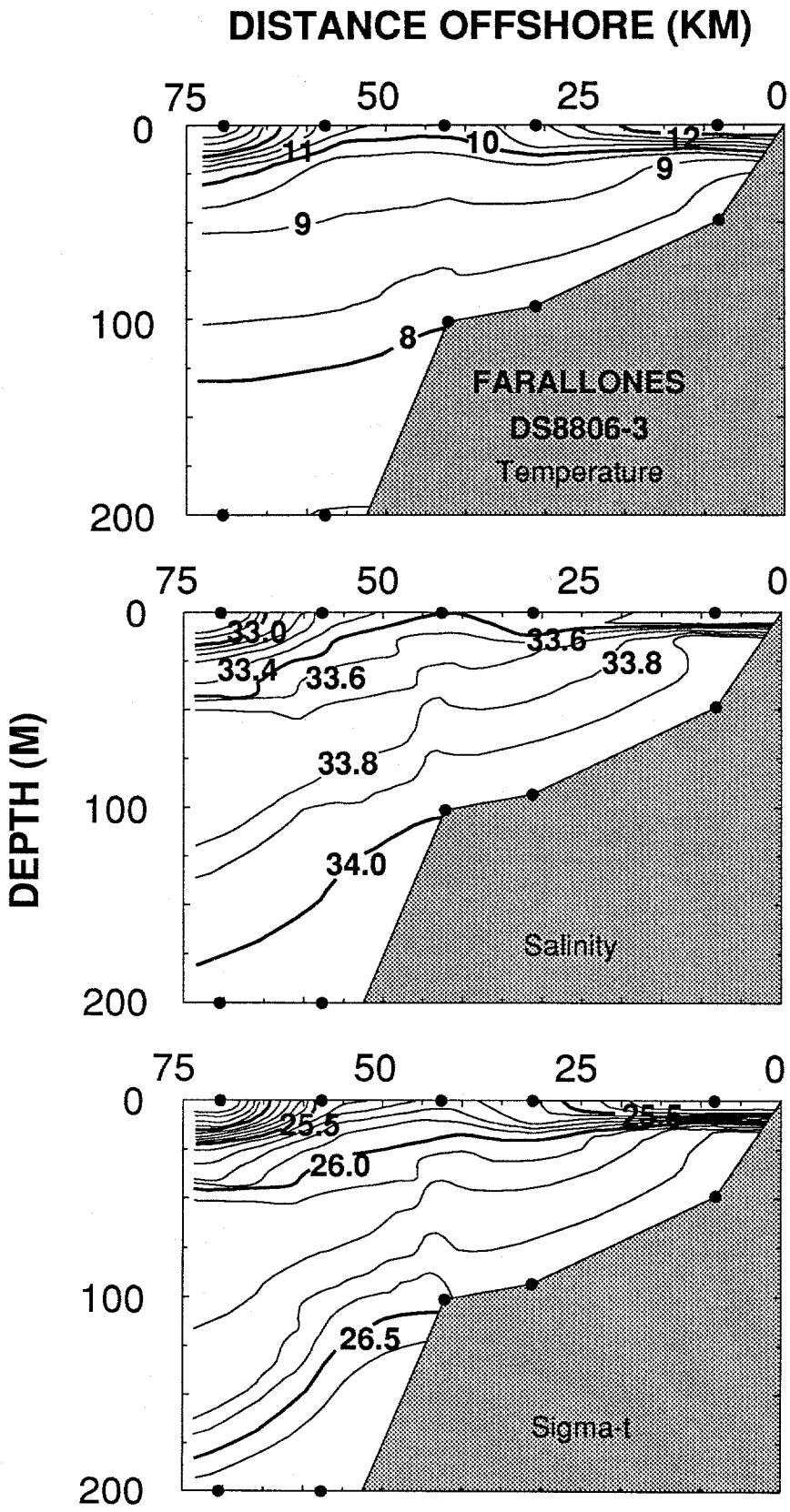

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
12
11
10
9
8
9
8
PT. REYES
DS8806-1
Temperature
DEPTH (M)
32.8
33.0
33.8
33.6
34.0
Salinity
25.0
26.0
25.5
26.0
26.5
26.5
Sigma-t

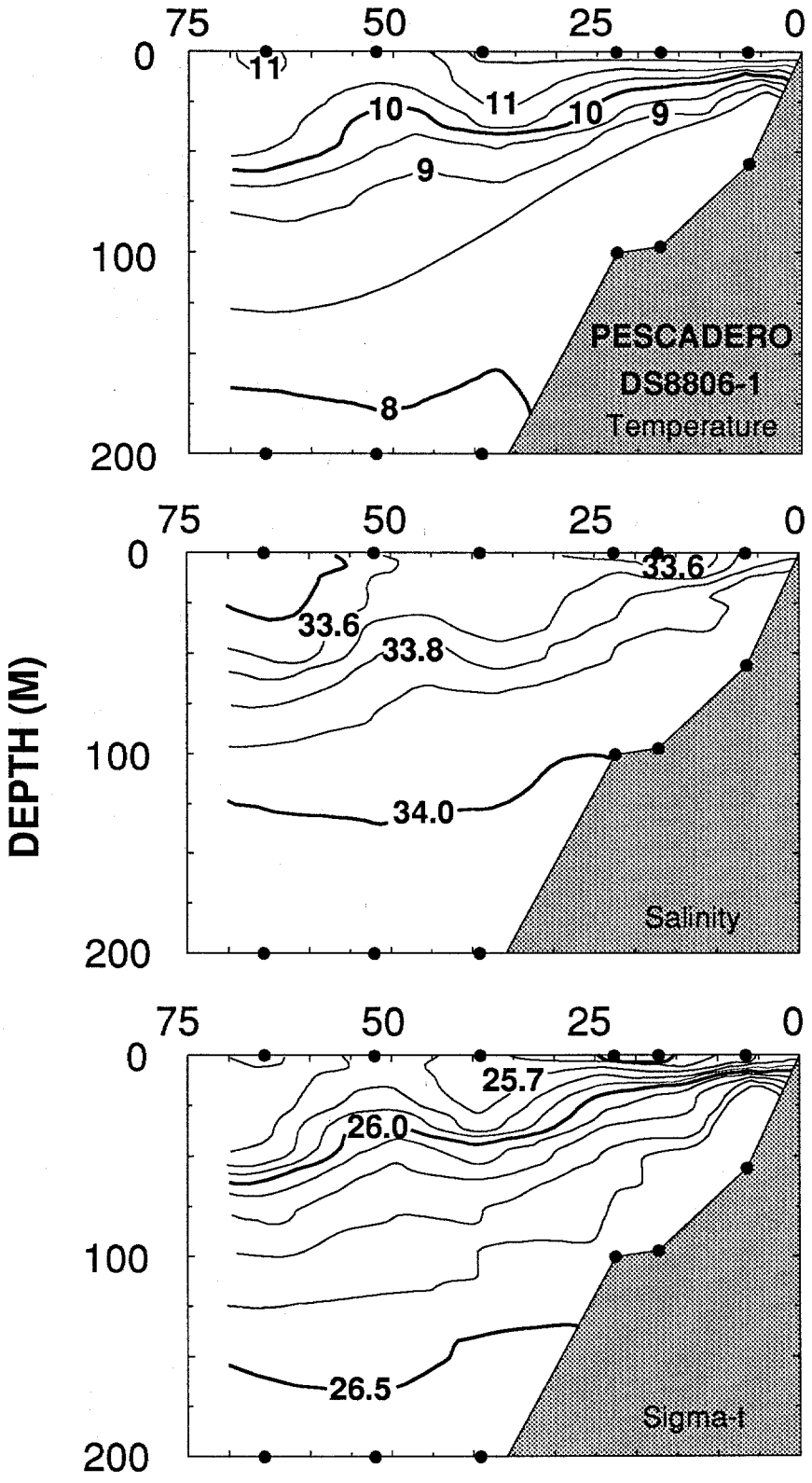

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
13
12
11
10
9
8
PT. REYES
DS8806-2
Temperature
DEPTH (M)
32.6
32.8
33.0
33.4
33.6
33.8
34.0
Salinity
24.5
25.5
26.0
26.5
Sigma-t

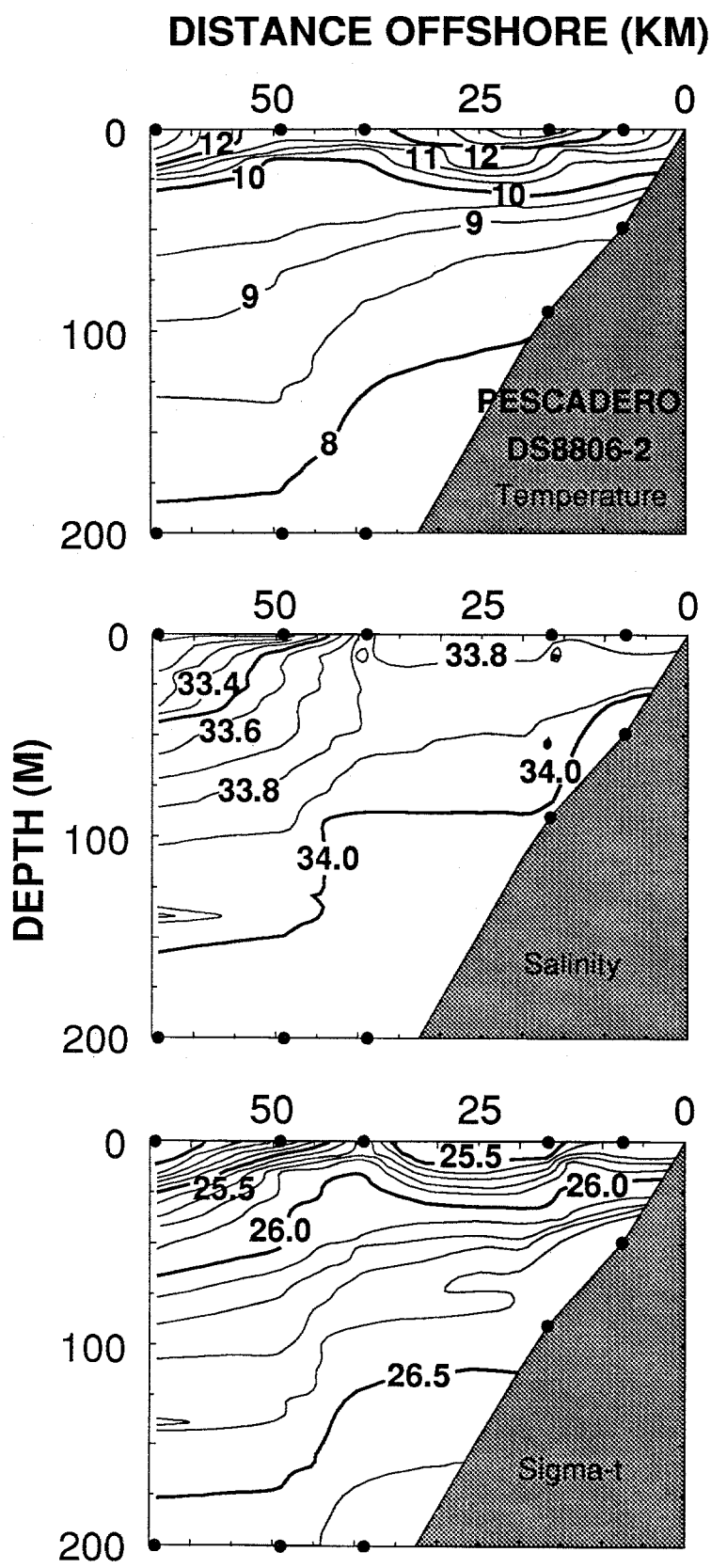

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
13
12
9
11
10
9
8
PT. REYES
DS8806-3
Temperature
DEPTH (M)
32.8
33.6
33.8
33.4
33.8
Salinity
24.5
25.5
26.0
26.0
26.5
Sigma-t

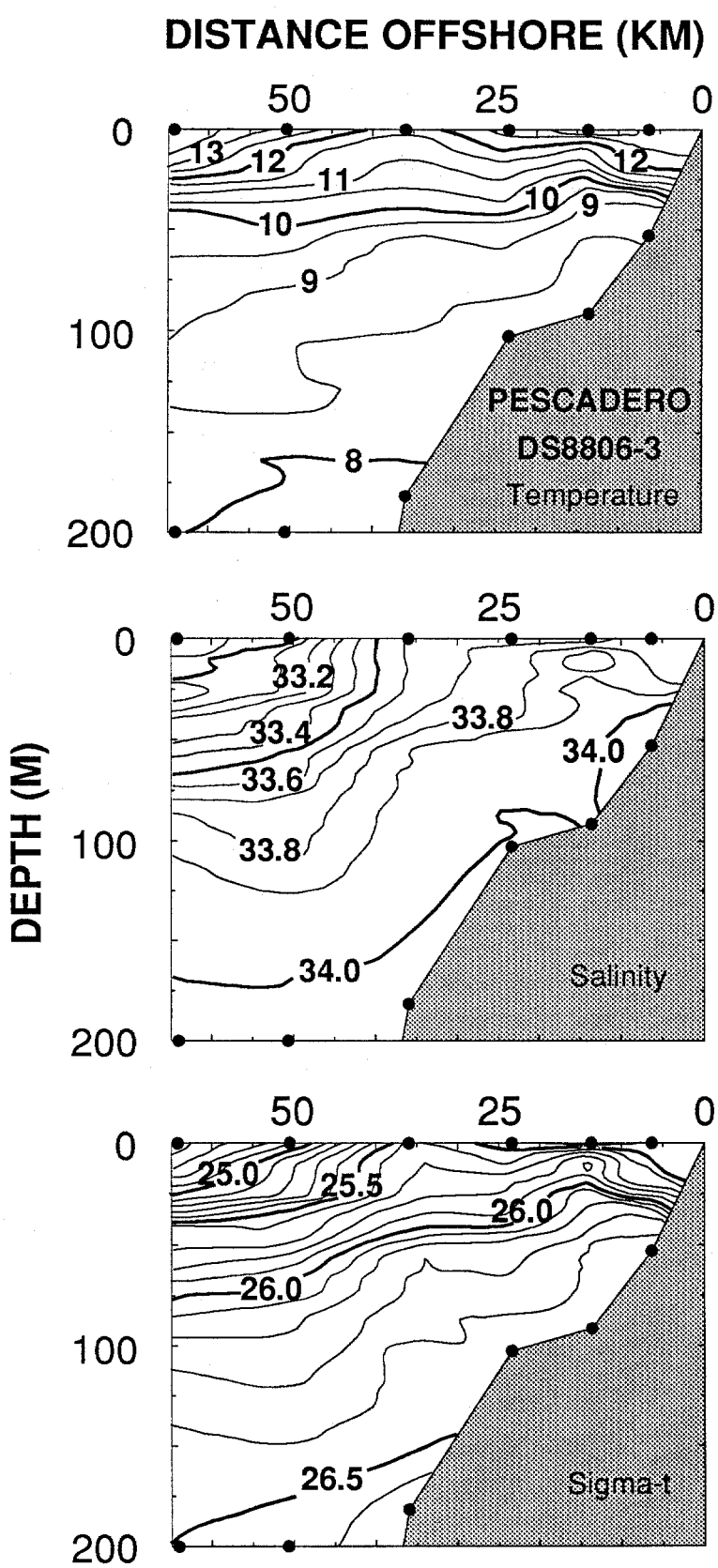

DISTANCE OFFSHORE (KM)
75
50
25
0
0
100
200
10
9
9
8
FARALLONES
DS8806-1
Temperature
33.6
33.8
33.8
34.0
Salinity
26.0
26.4
Sigma-t
DEPTH (M)

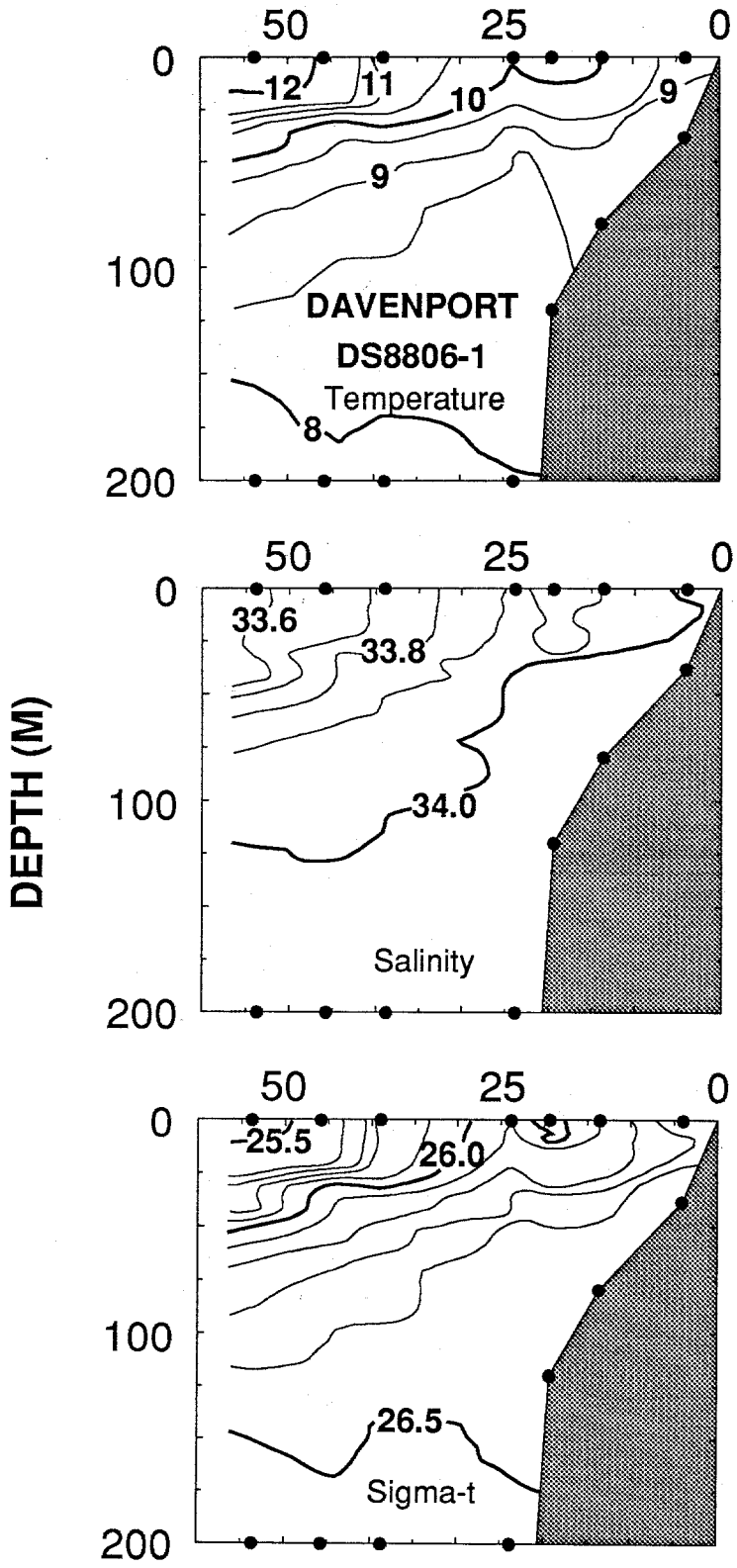

DISTANCE OFFSHORE (KM)
75
50
25
0
0
100
200
11
12
11
10
9
10
9
8
FARALLONES
DS8806-2
Temperature
DEPTH (M)
32.8
33.8
33.0
33.6
33.2
33.4
33.6
33.8
34.0
Salinity
25.0
25.5
26.0
25.5
26.0
26.5
26.5
Sigma-t

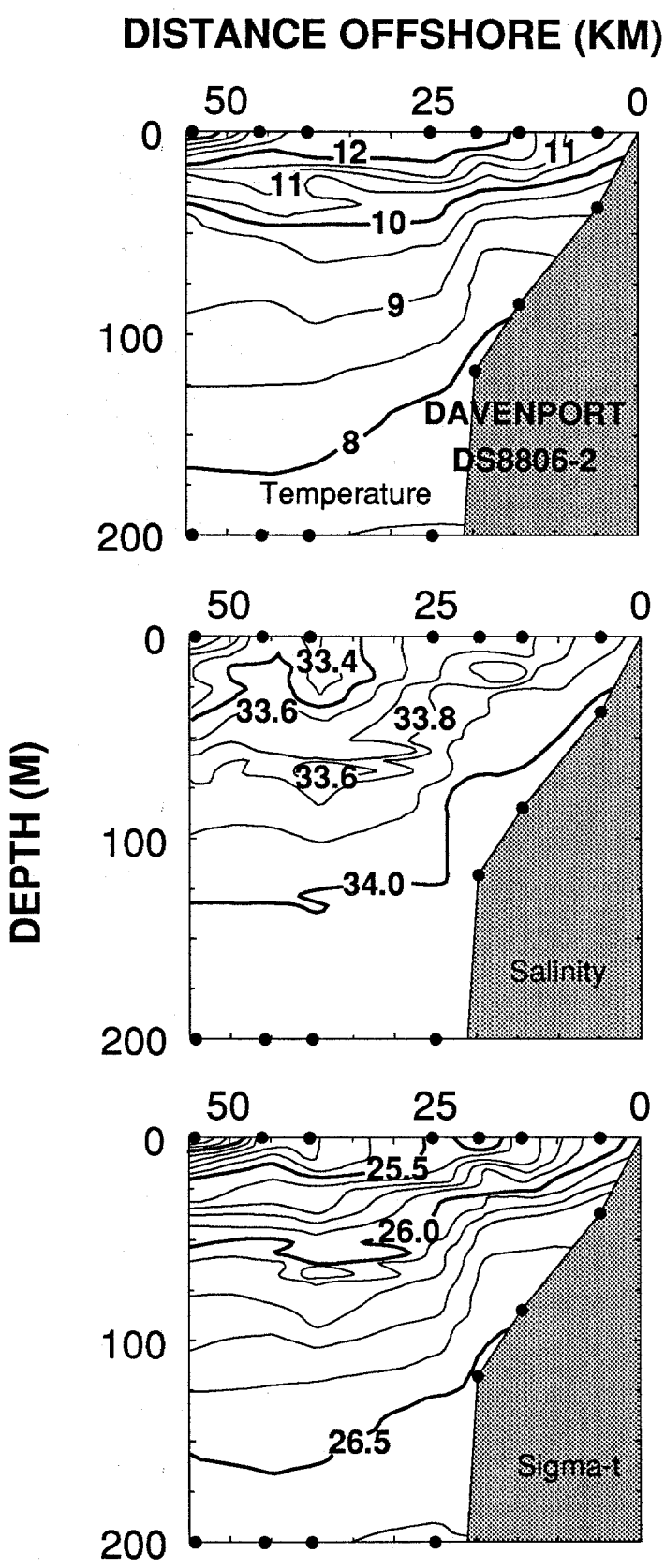

DISTANCE OFFSHORE (KM)
75
50
25
0
0
100
200
DEPTH (M)
11
10
12
9
9
8
FARALLONES
DS8806-3
Temperature
33.0
33.4
33.6
33.6
33.8
33.8
34.0
Salinity
25.5
25.5
26.0
26.5
Sigma-t

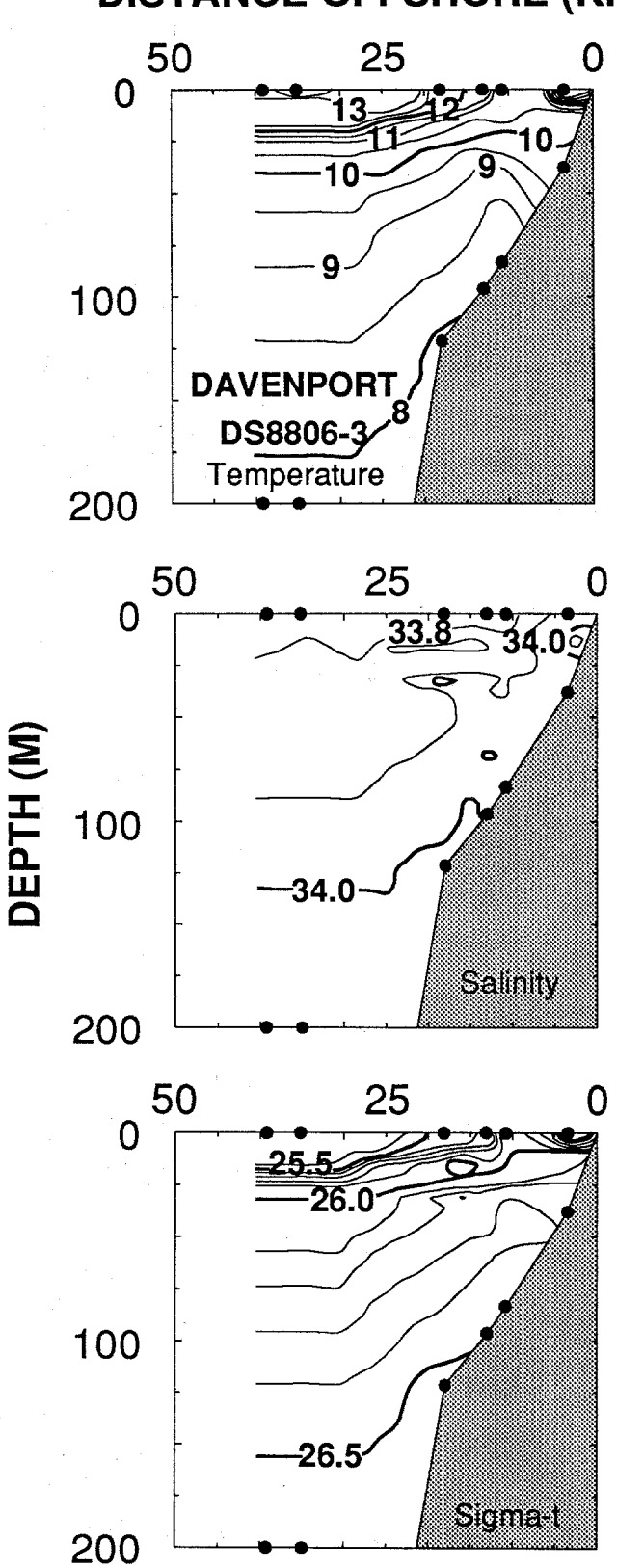

DISTANCE OFFSHORE (KM)
75
50
25
0
DEPTH (M)
0
100
200
11
10
11
10
9
9
8
PESCADERO
DS8806-1
Temperature
33.6
33.6
33.8
34.0
Salinity
25.7
26.0
26.5
Sigma-t

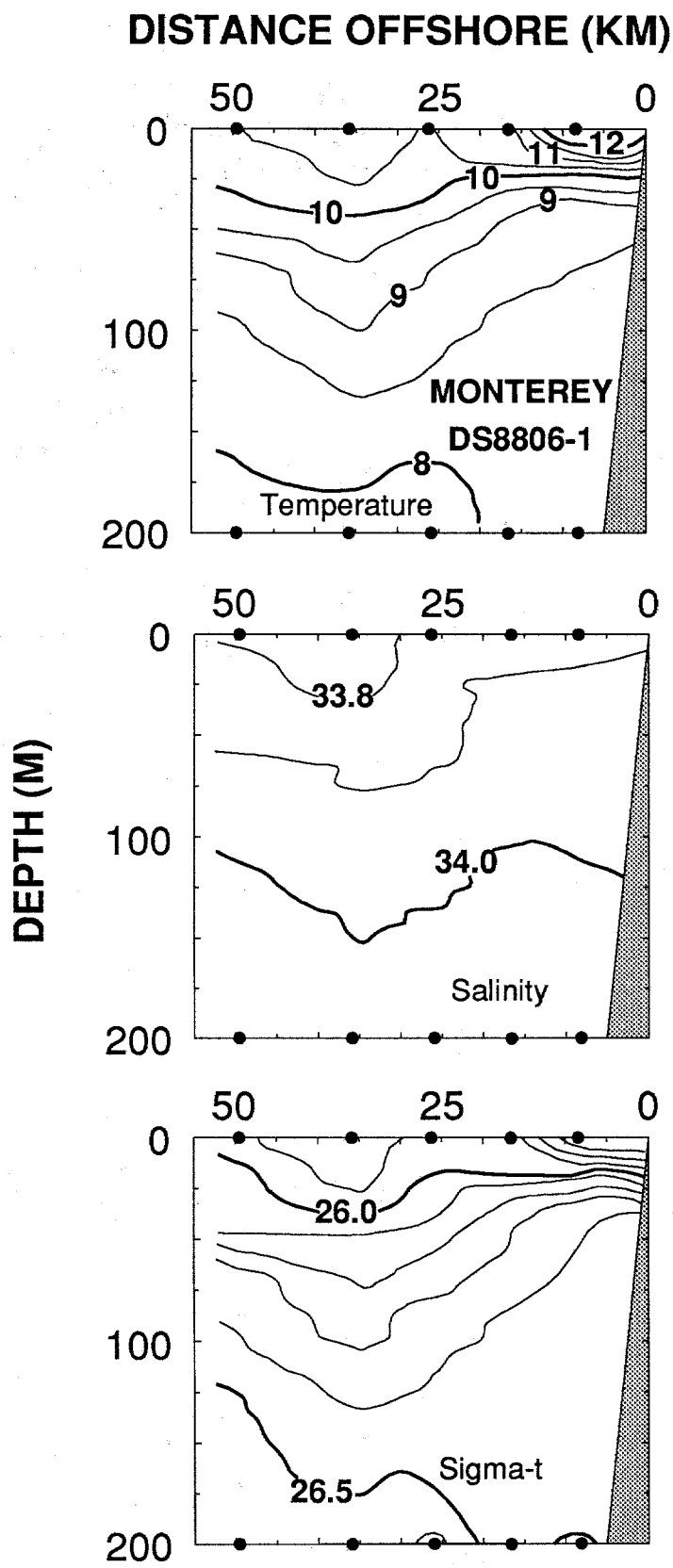

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
12
11
12
10
10
9
9
8
PESCADERO
DS8806-2
Temperature
DEPTH (M)
33.8
33.4
33.6
33.8
34.0
34.0
Salinity
25.5
25.5
26.0
26.0
26.5
Sigma-t

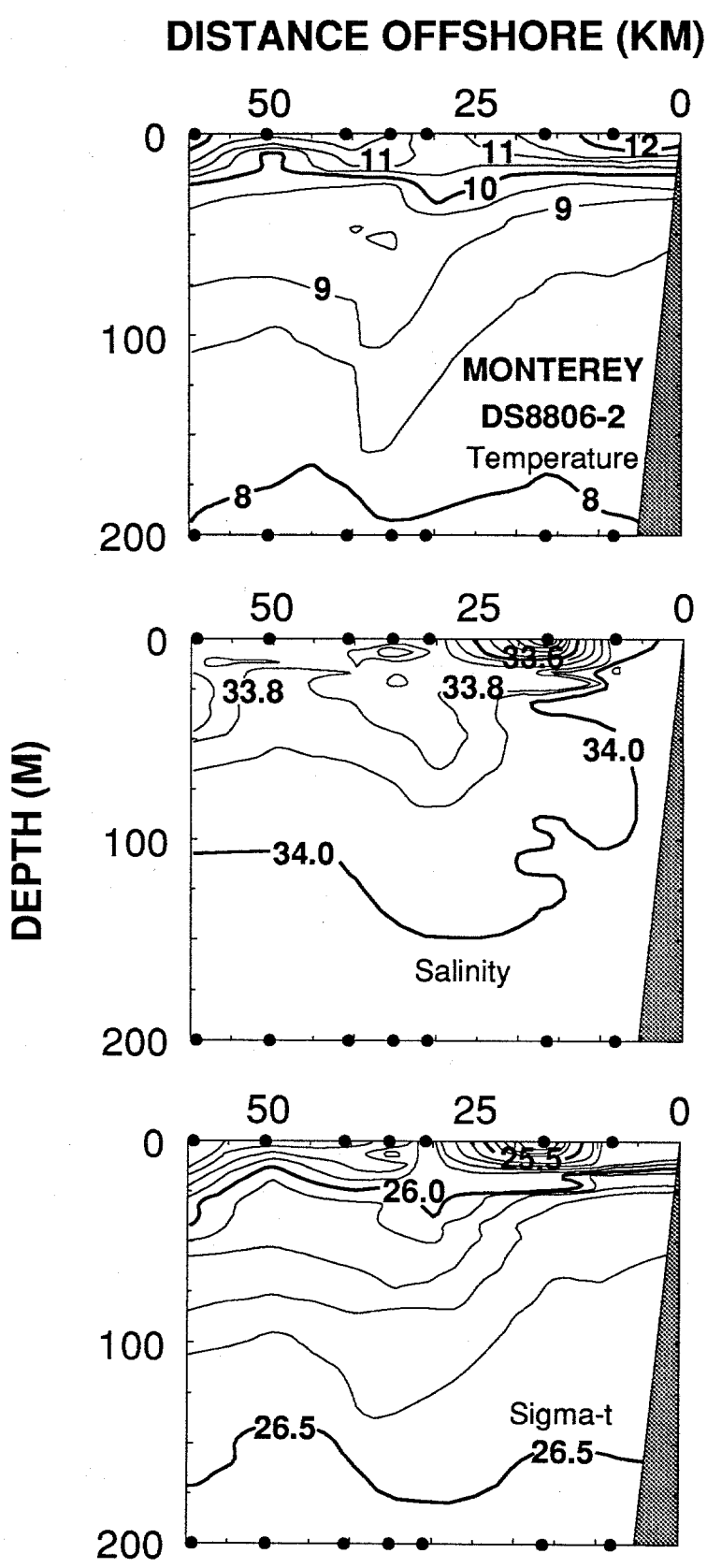

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
13
12
11
10
9
8
12
10
9
PESCADERO
DS8806-3
Temperature
DEPTH (M)
33.2
33.4
33.6
33.8
33.8
34.0
34.0
Salinity
25.0
25.5
26.0
26.0
26.5
Sigma-t

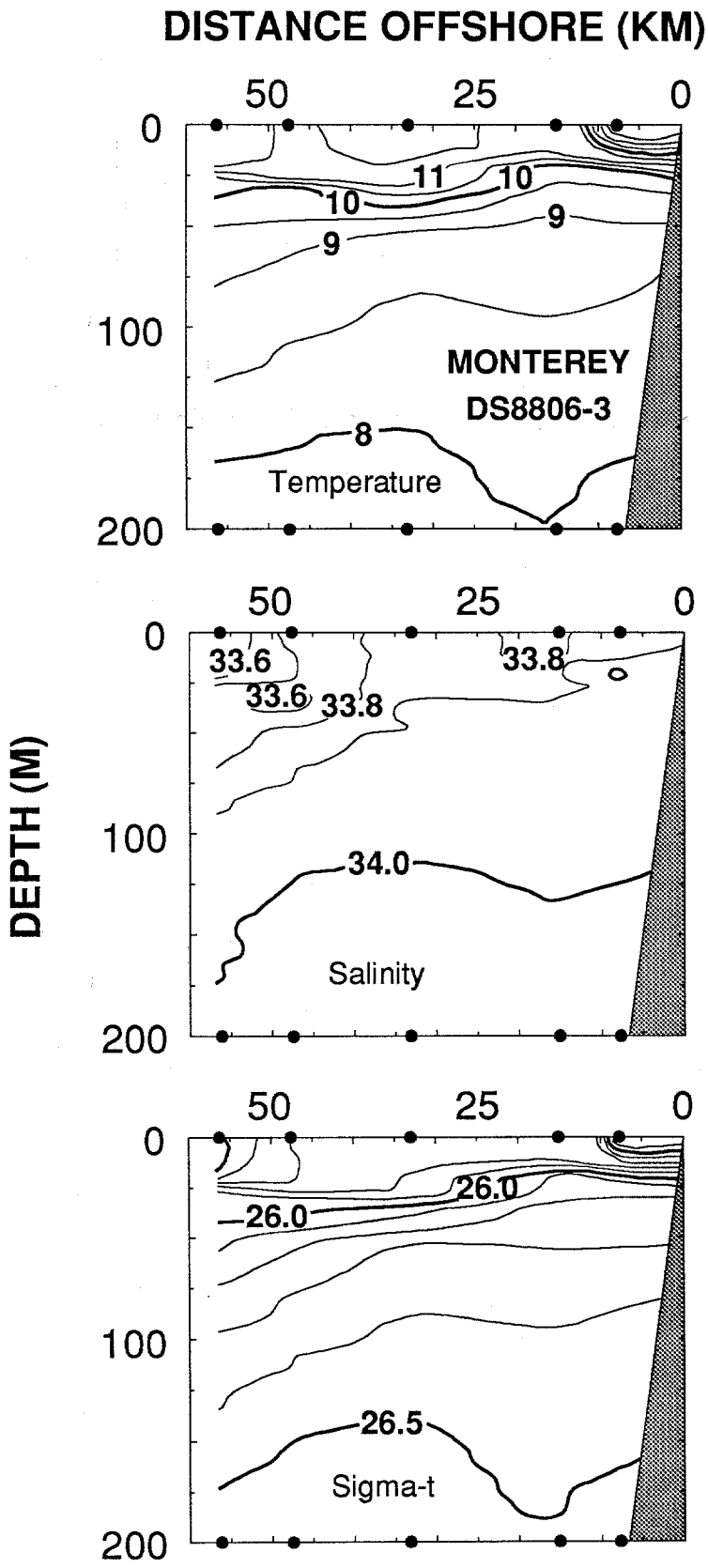

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
12
11
10
9
9
DAVENPORT
DS8806-1
Temperature
8
DEPTH (M)
33.6
33.8
34.0
Salinity
25.5
26.0
26.5
Sigma-t


DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
12
11
11
10
9
8
DAVENPORT
DS8806-2
Temperature
DEPTH (M)
33.4
33.6
33.8
33.6
34.0
Salinity
25.5
26.0
26.5
Sigma-t

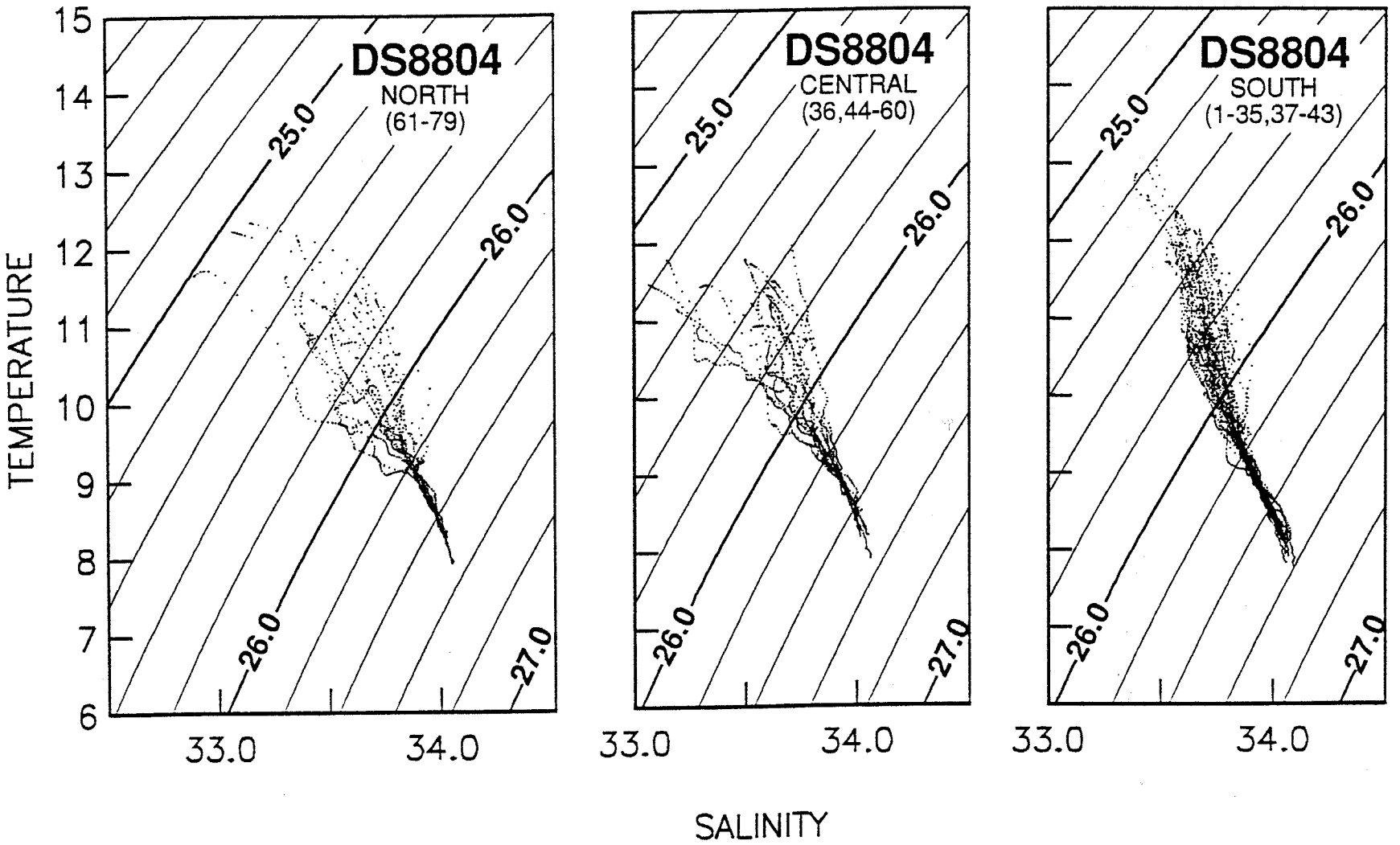

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
13
12
11
10
10
9
9
DAVENPORT
DS8806-3
8
Temperature
DEPTH (M)
33.8
34.0
34.0
Salinity
25.5
26.0
26.5
Sigma-t


DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
12
11
10
10
9
9
MONTEREY
DS8806-1
8
Temperature
DEPTH (M)
33.8
34.0
Salinity
26.0
26.5
Sigma-t

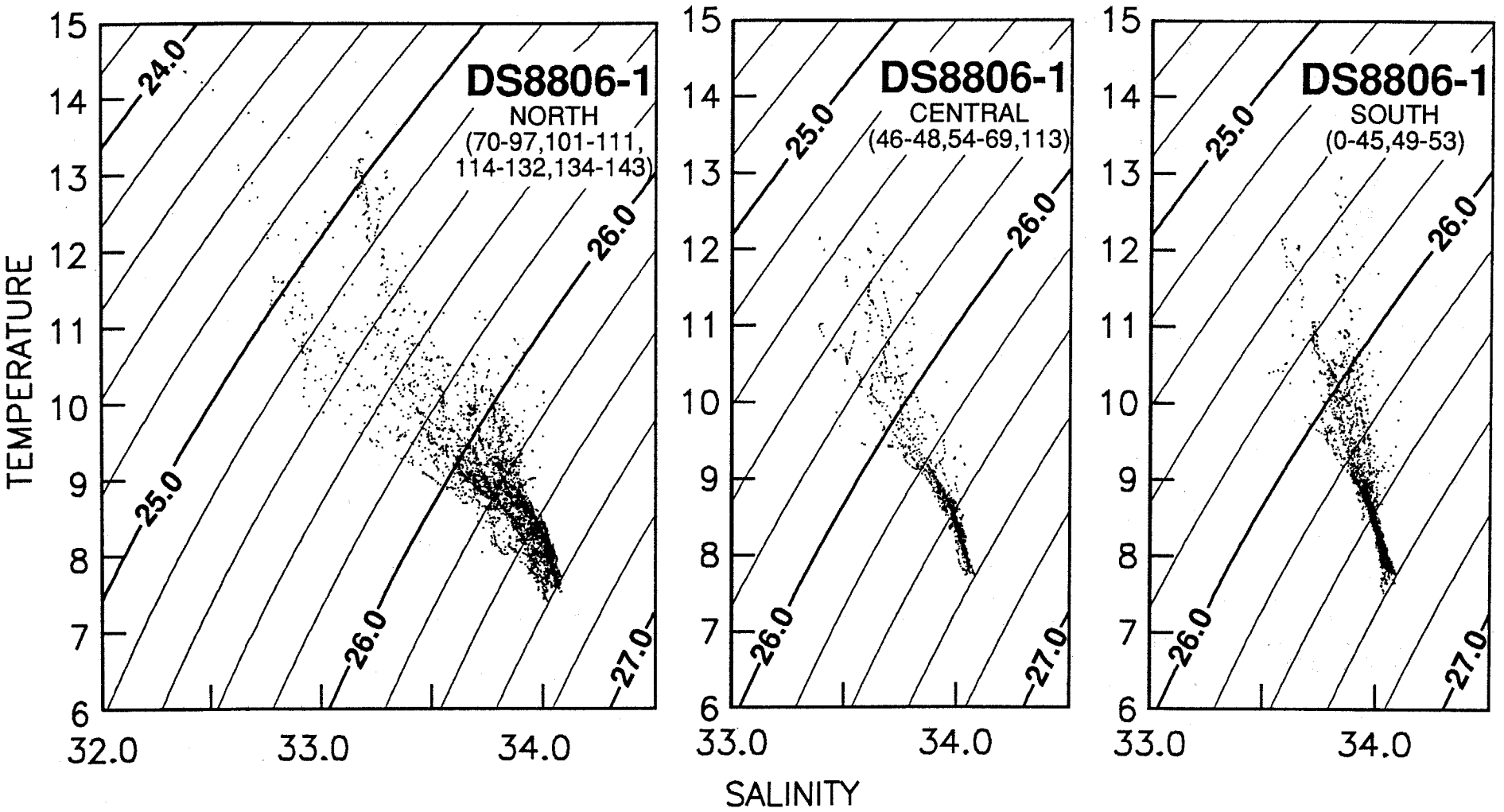

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
11
11
12
10
9
9
MONTEREY
DS8806-2
Temperature
8
8
DEPTH (M)
33.8
33.8
34.0
34.0
Salinity
25.5
26.0
Sigma-t
26.5
26.5

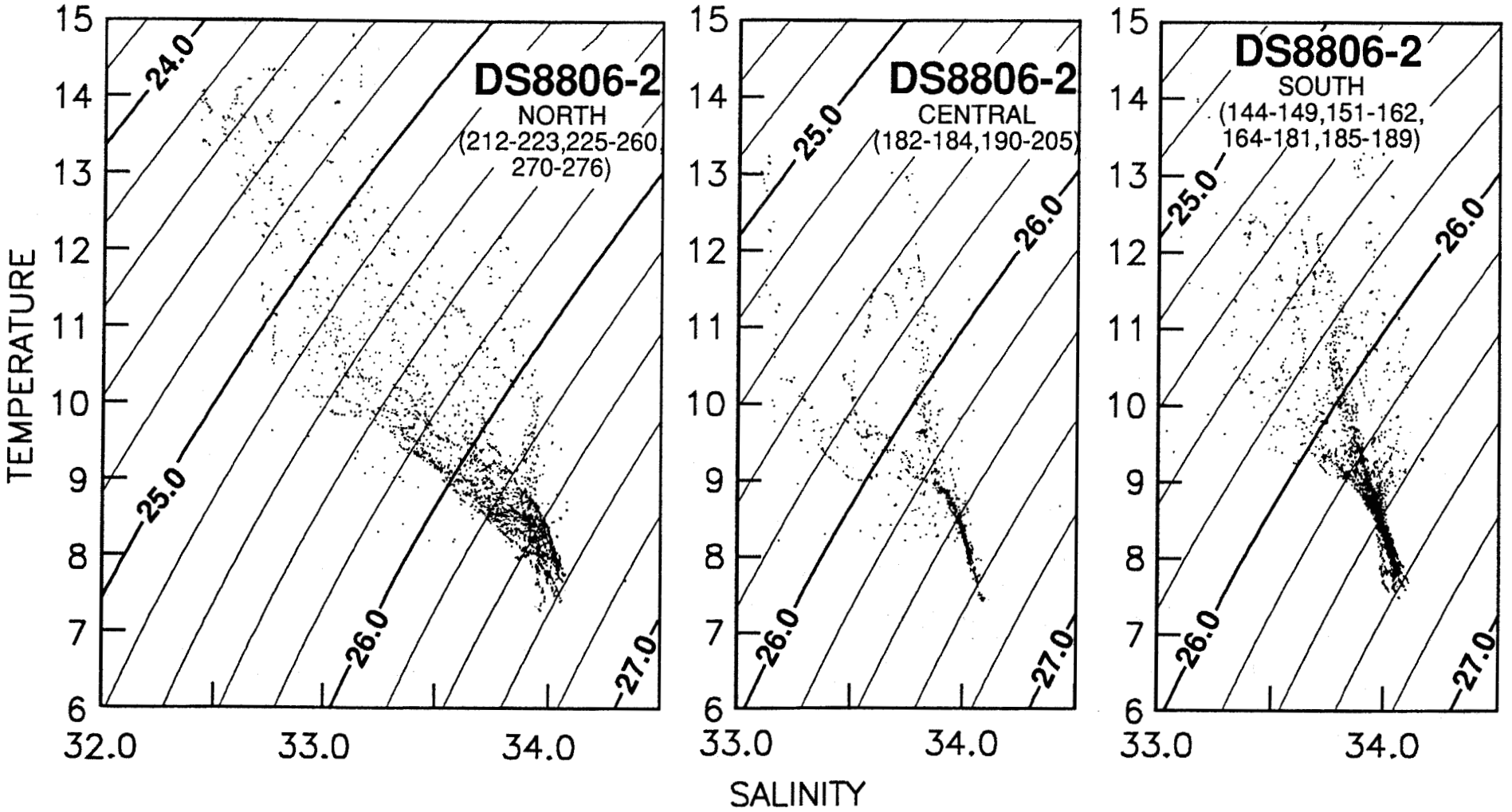

DISTANCE OFFSHORE (KM)
50
25
0
0
100
200
11
10
10
9
9
MONTEREY
DS8806-3
8
Temperature
DEPTH (M)
33.6
33.6
33.8
33.8
34.0
Salinity
26.0
26.0
26.5
Sigma-t

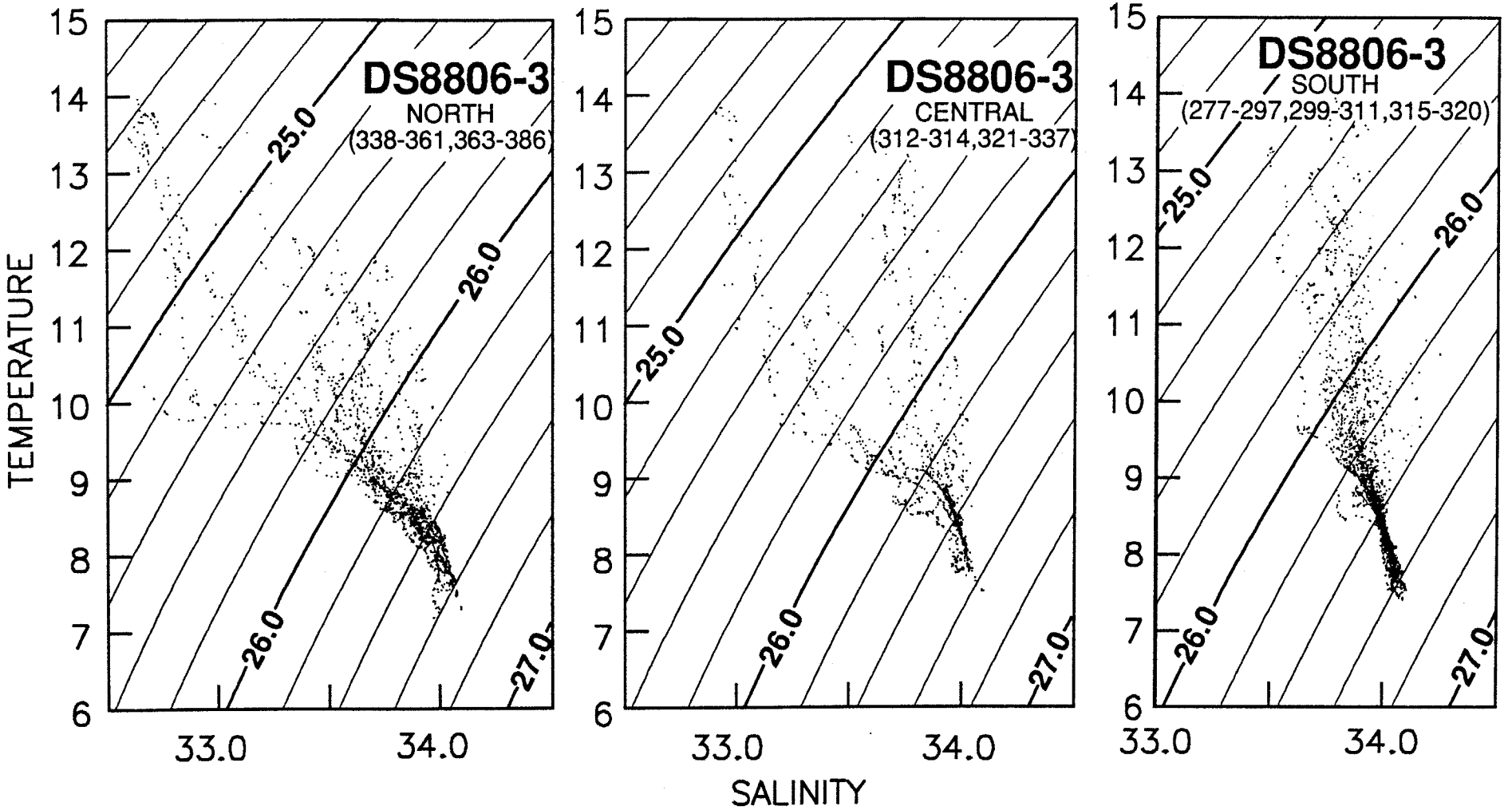
APPENDIX 6.1: TEMPERATURE-SALINITY PLOTS- DS8804


DS8804
NORTH
(61-79)
DS8804
CENTRAL
(36,44-60)
DS8804
SOUTH
(1-35,37-43)
25.0
26.0
27.0
TEMPERATURE
SALINITY
15
14
13
12
11
10
9
8
7
6
33.0
34.0

APPENDIX 6.2: TEMPERATURE-SALINITY PLOTS- DS8806


DS8806-1
NORTH
(70-97,101-111,
114-132,134-143)
DS8806-1
CENTRAL
(46-48,54-69,113)
DS8806-1
SOUTH
(0-45,49-53)
TEMPERATURE
SALINITY
24.0
25.0
26.0
27.0
15
14
13
12
11
10
9
8
7
6
32.0
33.0
34.0


DS8806-2
NORTH
(212-223,225-260,
270-276)
DS8806-2
CENTRAL
(182-184,190-205)
DS8806-2
SOUTH
(144-149,151-162,
164-181,185-189)
TEMPERATURE
SALINITY
24.0
25.0
26.0
27.0
15
14
13
12
11
10
9
8
7
6
32.0
33.0
34.0


DS8806-3
NORTH
(338-361,363-386)
DS8806-3
CENTRAL
(312-314,321-337)
DS8806-3
SOUTH
(277-297,299-311,315-320)
25.0
26.0
27.0
TEMPERATURE
SALINITY
15
14
13
12
11
10
9
8
7
6
33.0
34.0

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