PRELIMINARY CRUISE REPORT, W0207A
R/V WECOMA, 9-15 July 2002
GLOBEC NEP Long-Term Observations off Oregon

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PURPOSE: To determine physical, plankton and nutrient/chemical conditions over the continental margin for climate change studies in NE Pacific. In particular, to make CTD and CTD/rosette and net tow stations along 5 lines (off Newport, Heceta Head, Coos Bay, the Rogue River, OR. and Crescent City, CA.), to make continuous bio-acoustic observations between the 50-500m. isobaths along the 5 lines, to deploy drifters at selected locations on the Newport line, and to make continuous observations of currents using ADCP and of surface-layer temperature, salinity and fluorescence by means of ship's thru-flo system. Figure 1 shows the location of the CTD stations. Table 1 shows the CTD station positions, and Table 2 shows the biochemical sampling depths.
SAMPLING PLAN:
1. Use ship's intake continuously for Temperature, Salinity, and Fluorescence
2. Continuous ADCP Profiling (150 kHz transducer) for water velocity and backscattering for bio-acoustics.
3. Standard CTD Stations using SBE 9/11 plus CTD system for Temperature, Salinity, Fluorescence, Light Transmission, Oxygen, PAR.
4. Rosette sampling: 5 liter bottles for nutrients, chlorophyll, microzooplankton
5. Deploy surface drifters at selected NH-line stations.
6. Vertical net tows: 1/2 meter nets 100 m to surface; Horizontal net tows with 1 $m^2$ MOCNESS.
7. Continuous bio-acoustic observations between the 50-500m isobath along 5 sections using a Hydroacoustics Technology, Inc., system towed alongside the ship.

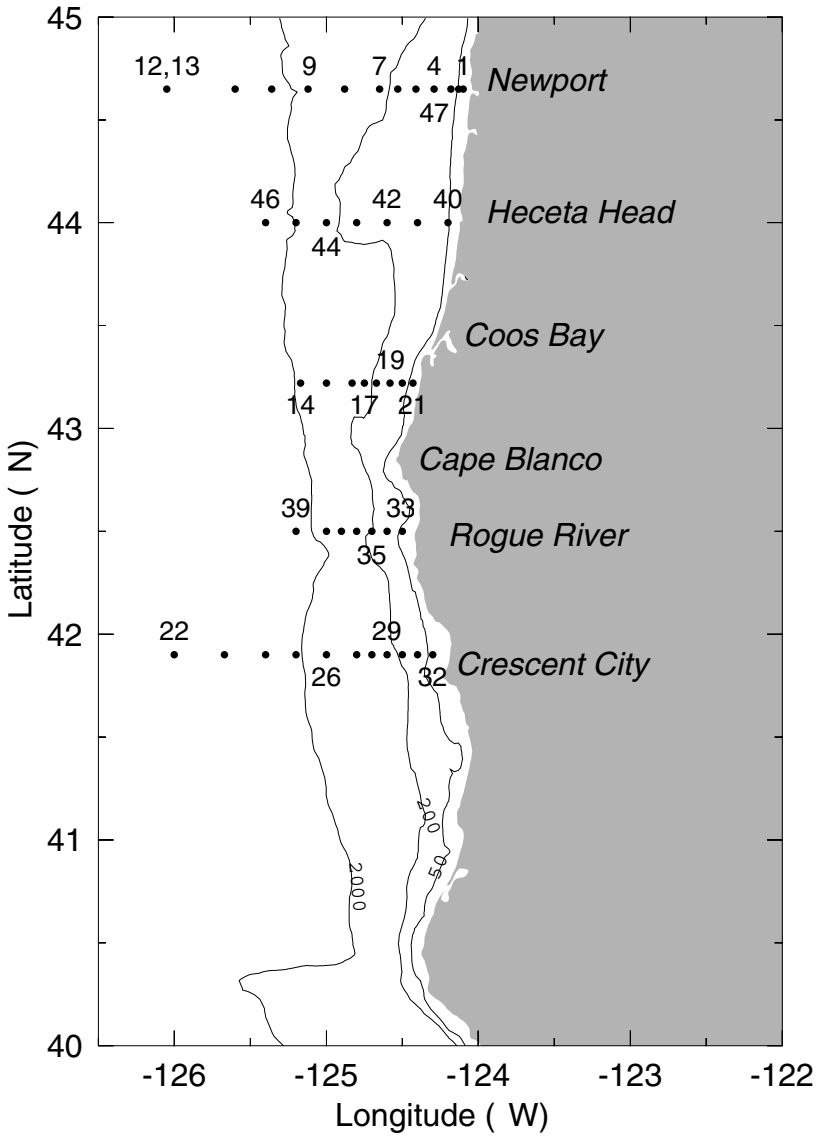
CRUISE NARRATIVE

A brief overview of W0207A is presented here. An event log is provided in Table 3, and participating personnel are listed in Table 4. Wecoma departed Newport at 2100 PDT on 9 July 2002. CTD sampling started at NH-1 and continued out to NH-85. A single vertical net tow was done at NH-1. The HTI (bio-acoustic system) was deployed at NH-3, and both MOCNESS and vertical net tows were started at NH-5. Working out, NH-15 was skipped and then returned to after the CTD at NH-20, so that the MOCNESS could be done in the dark at NH-15. Drifters were released at NH-10, 15, 25, 45 and 65. At NH-85, a shallow CTD cast was done prior to the usual cast to 1005 m., in order to collect surface water. The ship transited to the offshore end of the FM-line in order to be at the inshore end in daylight, and began sampling at FM-9 at 0304 PDT, 11 July. The HTI was de-

ployed at FM-8. The FM line was finished at 1234 PST, 12 July, and the ship transited to the offshore end of the Crescent City line.

The ship arrived at CR-11 at 0340 PDT, and hove to for bad weather. At daybreak, sampling began at CR-11 at 0518 PDT on 12 July, doing CTD's and vertical net tows while working towards shore. Following the CTD and vertical net tows at CR-6, the HTI was deployed, and Mocness tows were started at CR-4. The Crescent City line was finished at 0420 PDT on 13 July.

Figure 1. CTD stations during W0207A, along the Newport, Five Mile, Heceta Head, Rogue River and Crescent City Hydrographic Lines.



The ship arrived at the inshore end of the Rogue River line at 0805 PDT on 13 July, and the RR-line was completed at 1630 PDT doing both CTD's and the usual net tows in order. The ship transited to HH-1, arriving at 0550 PDT, 14 July. Vertical net tows were completed along with the CTD's from HH-1 to HH-5, and then only CTD's were done working out to HH-9 to allow most of the Mocness sampling to occur during the night. The CTD's were completed at 1600 PDT on 14 July, and the ship ran back to HH-5. The HTI was deployed near HH-5 at 1743 PDT, 14 July, and a Mocness tow was done during daylight at HH-5 at 1831 PDT. The ship remained on station to do another Mocness tow in the dark at 2203 PDT. Mocness tows were continued in along the Heceta Head line. Net tows and HTI sampling at HH-2 were completed at 0440 PDT, 15 July and the ship transited to Newport, arriving at the pier at 1200 PDT.

PRELIMINARY RESULTS

Shelf waters on all sections were surprisingly cool. Sea surface temperatures over the shelf were similar to those observed on other summer GLOBEC cruises, but subsurface shelf waters (i.e. at depths below 20-30 m) on most sections were even cooler than during the La Niña summer of 1999 and 2000. On the NH, HH, and FM lines (off Newport, Hecate Head and Coos Bay) the 8 C isotherm lay at a depth of about 20 m over the shelf, and at about 50-80 m offshore; on the RR and CR lines (off the Rogue River and Crescent City), the 8 C surfaced inshore and lay at about 100-150 m offshore (see page 20).

Temperature inversions were common in the upper ocean off Newport and Coos Bay, with typical values of 7.5 C or less at the relative minimum and values near 8 C at the relative maximum (see page 20). The temperature minimum lay in the upper portion of the permanent halocline (S< 33.4) and was associated with relatively high concentrations of dissolved oxygen. The structure of the temperature minimum is similar to that observed off Newport in 1972, and likely indicates strong southward advection of Subarctic Pacific waters by the equatorward coastal jet.

The temperature of halocline waters seemed to be appreciably warmer (by 0.5 to 1.0 C) at most stations on the two sections south of Cape Blanco (RR and CR) than on the three sections north of Cape Blanco (NH, FM and HH). Only at the two most offshore stations off Crescent City does the halocline temperature fall to values of 7.5 to 8C. This suggests a convergence of southward flowing subarctic waters and northward flowing southern waters compensated by net offshore near-surface flow near Cape Blanco. The ADCP sections (pages 26-30) seem to support the presence of alongshore convergence in the top 100 m. The inferred offshore transport is confirmed by the satellite drifter deployed at NH-10, which traveled 350 km alongshore and 150 km offshore in 15 days (page 31).

All sections show steep upwarping of the permanent halocline and pycnocline, indicative of strong coastal upwelling due to moderate-to-strong upwelling-favorable winds from the north that prevailed during our cruise (see pages 5, 21 and 22).

One station (18, at FM-5 off Coos Bay) shows evidence of high-salinity upwelled water being warmed to 11-12 C and being advected offshore over fresher water (see T-S diagram for FM-line on page 8).

On all sections, the inshore waters were very murky, and fluorescence values were high. Prior to this cruise, the sensitivity of the fluorometer had been reduced by a factor of three from its

setting on our previous GLOBEC LTOP cruises. Nevertheless, fluorescence voltage exceeded the full value of 5 volts at one or more stations on most lines (see page 23).

Concentrations of dissolved oxygen were surprisingly low (less than 1 m/l) at the bottom over the inner shelf off Newport (see page 25). Plots of the oxygen-salinity characteristics for the NH-Line (pages 6 and 7) shows that near-surface waters of inner-shelf stations are enriched in dissolved oxygen, and that near-bottom waters of inner-shelf stations are depleted in dissolved oxygen compared to waters of the same salinity farther from shore. This strongly suggests that the low-oxygen values are not only the result of simple vertical and onshore advection, but are also influenced by biological processes.

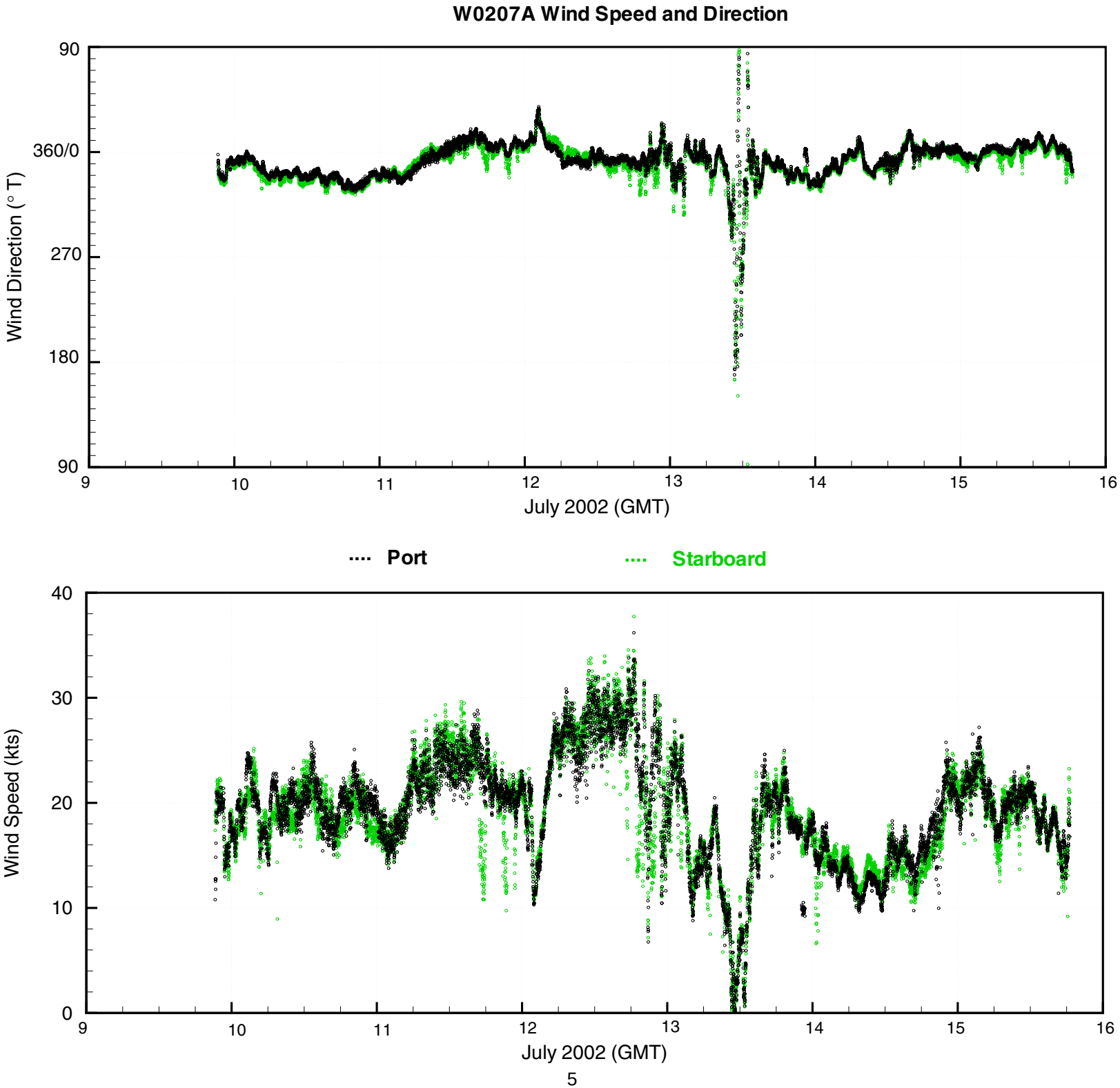
Comparison of the T-S characteristics at NH-25 on 9-10 July with prior data from this site (page 9) shows that the halocline (S between 32.4 and 33.8) observed off central Oregon on 9-10 July 2002 is nearly one degree Celsius this year than it has been in the three previous summers. It is at the lower limit of halocline temperatures in all of our previous observations including the cold years (1972 and 1973) of the Coastal Upwelling Experiments CUE-1 and CUE-2. In the salinity range of 33.0 to 33.6, the halocline is colder than we have ever observed at this location. This permanent halocline provides most or all of the water that upwells along the coast of central Oregon.

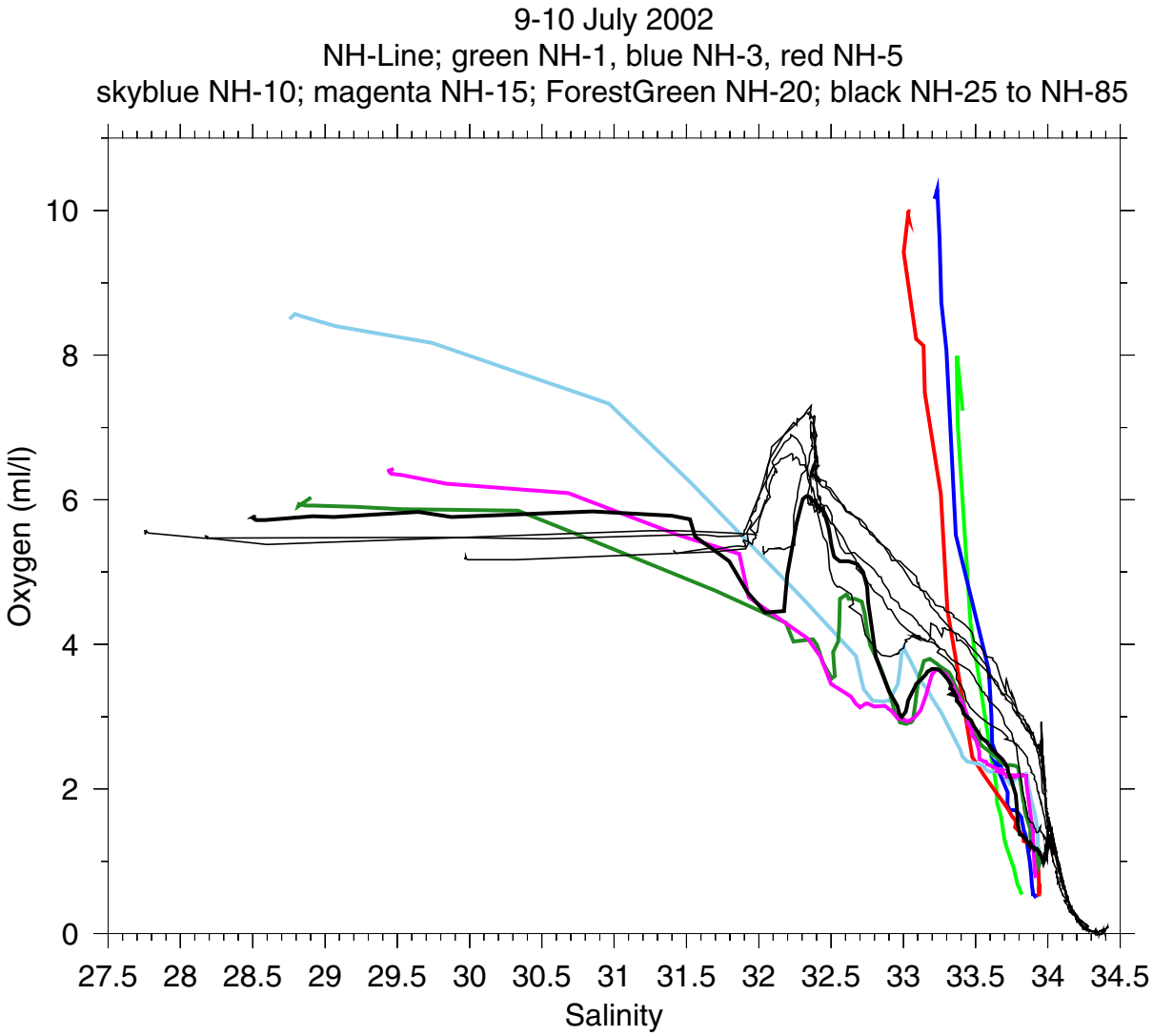
Sections of normalized temperature anomaly (i.e. the difference between present and the 1961-71 seasonal-average divided by seasonal-standard-deviation) show that the cold halocline extends offshore at least to NH-85, the most offshore of our standard stations, 157 km west of Newport. The sequence of normalized anomaly sections for the NH-line (page 10) suggests that halocline cooling had already begun in April 2002 and that it intensified between April and July. These T-S diagrams and temperature anomaly sections indicate stronger Subarctic influence than normal, suggesting either increased advection from the north, or that the Subarctic source was colder than normal.

The attached zooplankton report was provided by Dr. Wm. Peterson, and the attached microzooplankton report was provided by the Drs. Evelyn and Barry Sherr.

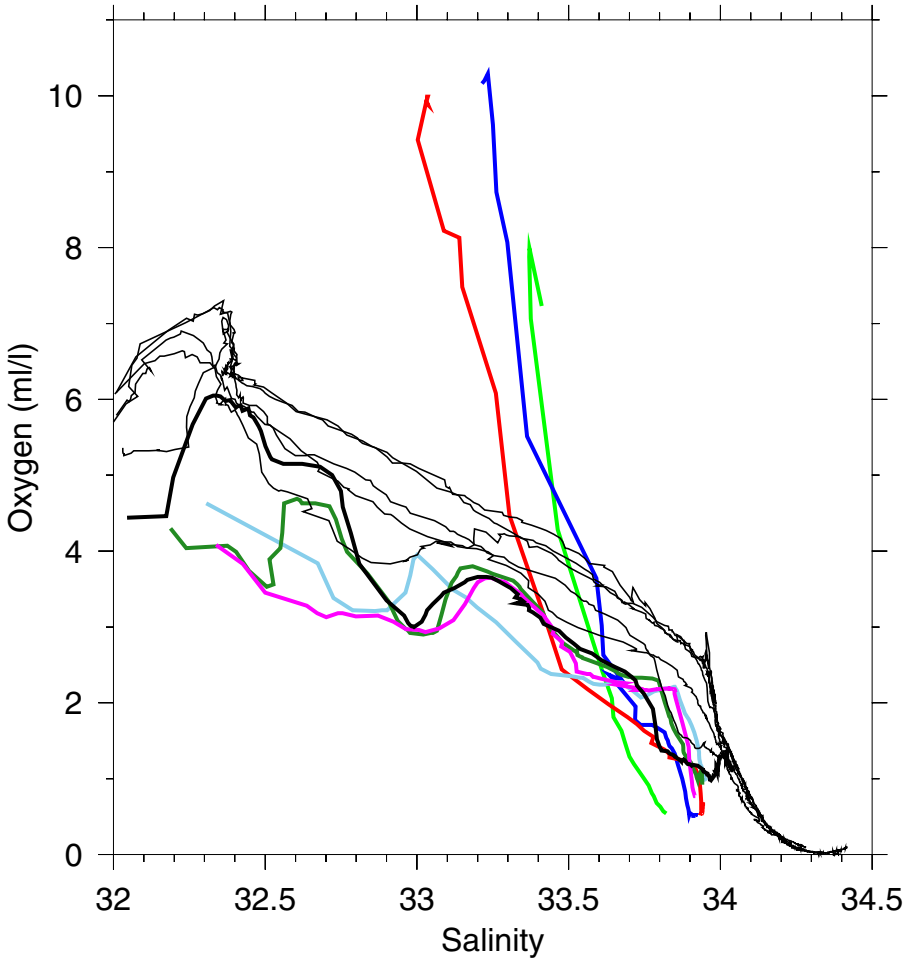
Table 4. Names, affiliations, and responsibilities of scientific personnel participating on W0207A.

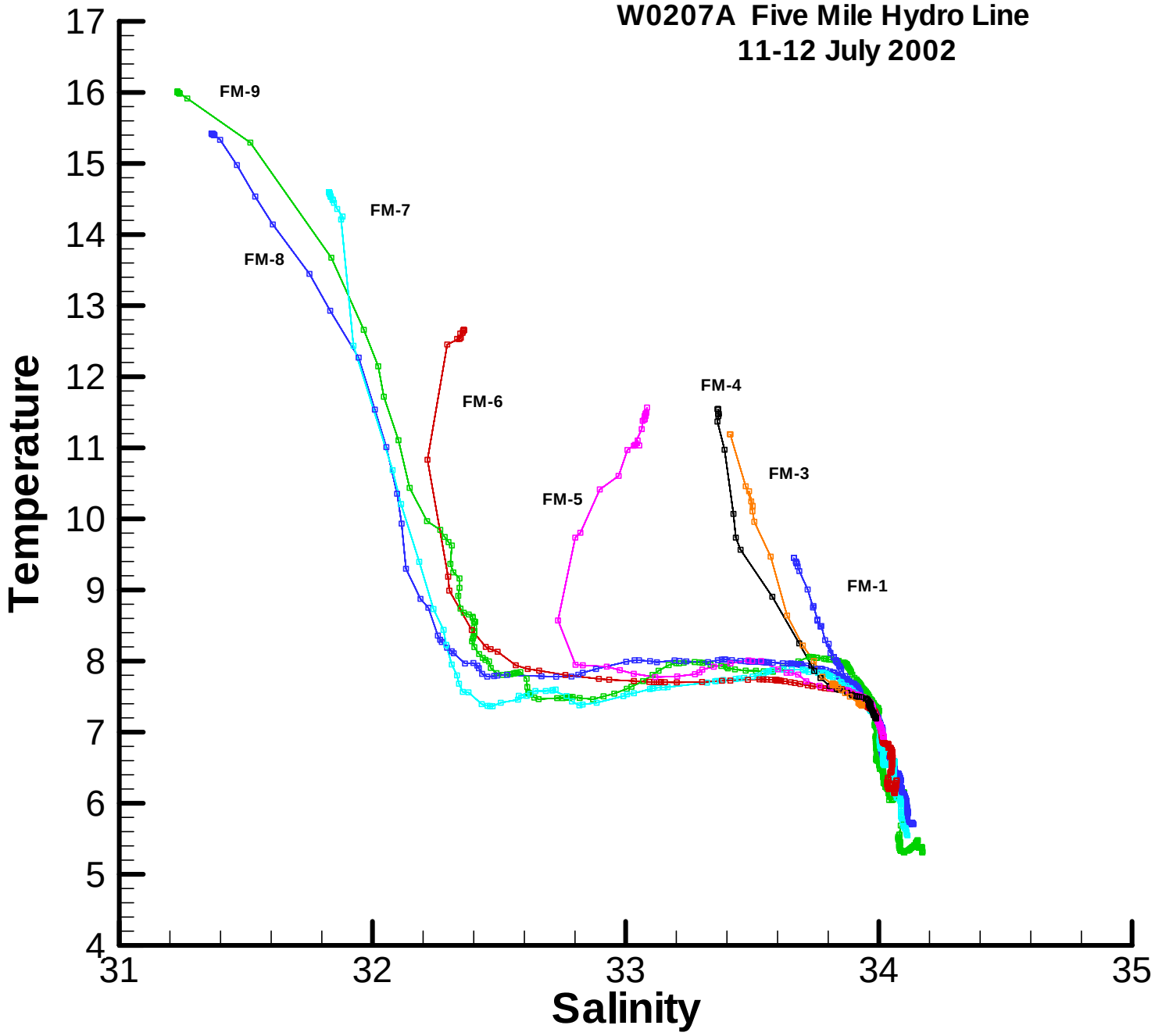
| | | | |
|---|---|---|---|
| Adriana Huyer | Chief Scientist | OSU | CTD |
| Jane Fleischbein | Technician | OSU | CTD |
| Margaret Sparrow | Technician | OSU | CTD |
| Joe Jennings | Technician | OSU | CTD, Oxygen |
| Chad Waluk | Technician | | CTD |
| Jennifer Jarrell-Wetz | Technician | OSU | nuts, chl |
| Julie Arrington | Technician | OSU | nuts, chl |
| Jennifer Harman | Technician | OSU | nuts, chl |
| Erin Clark | Technician | OSU | nuts, chl |
| Carlos López | Technician | OSU | microzooplankton |
| Anders Roestad | Technician | HMSC | zooplankton |
| Steve Romaine | Observer | UVic | zooplankton |
| Carolyn Tracy Shaw | Technician | HMSC | zooplankton |
| Mitch Vance | Technician | HMSC | zooplankton |
| Linda Fayler | Technician | OSU | martec |
| Daryl Swensen | Technician | OSU | martec |

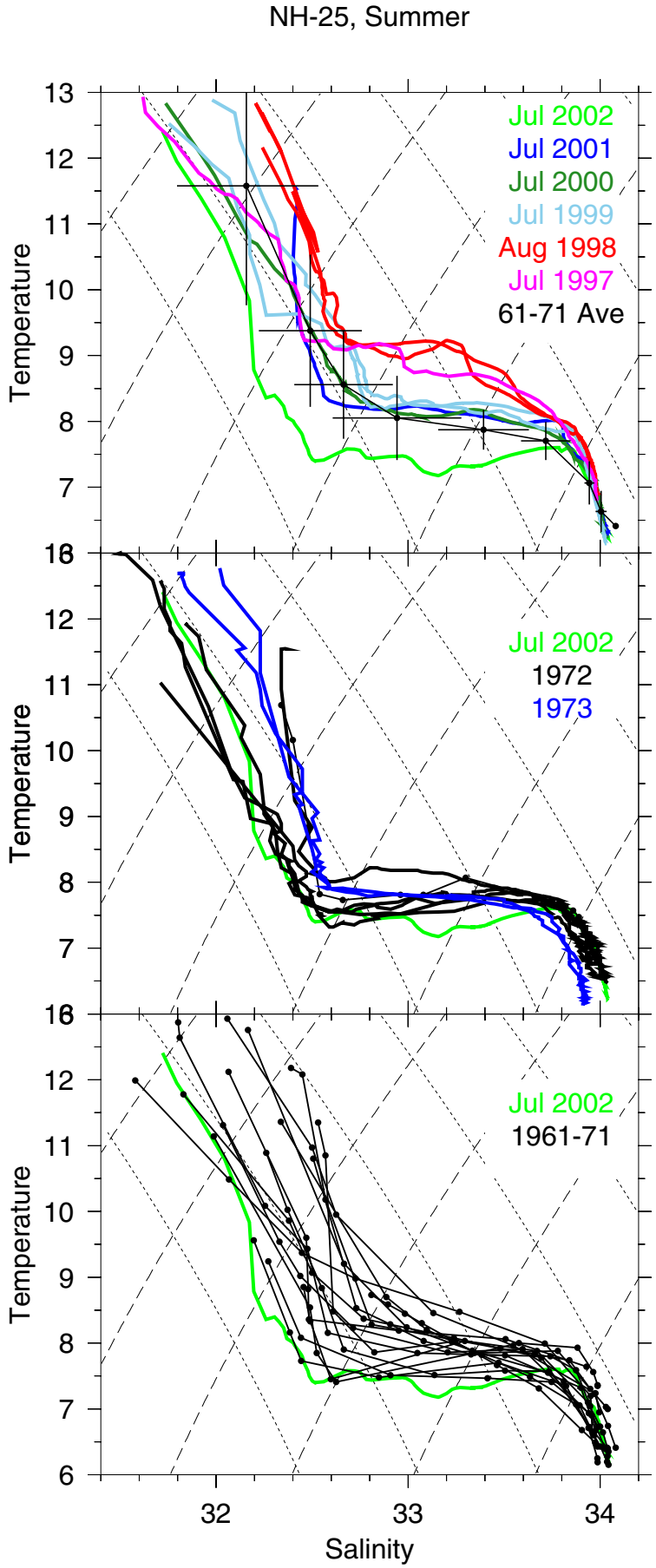

W0207A Wind Speed and Direction
Wind Direction (° T)
90
360/0
270
180
90
9
10
11
12
13
14
15
16
July 2002 (GMT)
Port
Starboard
Wind Speed (kts)
40
30
20
10
0
9
10
11
12
13
14
15
16
July 2002 (GMT)


9-10 July 2002
NH-Line; green NH-1, blue NH-3, red NH-5
skyblue NH-10; magenta NH-15; ForestGreen NH-20; black NH-25 to NH-85
Oxygen (ml/l)
0
2
4
6
8
10
27.5
28
28.5
29
29.5
30
30.5
31
31.5
32
32.5
33
33.5
34
34.5
Salinity

9-10 July 2002
NH-Line; green NH-1, blue NH-3, red NH-5
skyblue NH-10; magenta NH-15; ForestGreen NH-20; black NH-25 to NH-85




W0207A Five Mile Hydro Line
11-12 July 2002
FM-9
FM-7
FM-8
FM-6
FM-4
FM-5
FM-3
FM-1
Temperature
Salinity
17
16
15
14
13
12
11
10
9
8
7
6
5
4
31
32
33
34
35




GLOBEC LTOP
1997-2002

(SBE 9/11 CTD casts, with the 1961-1971 average plus & minus one standard deviation at standard depths)

CUE: 1972, 1973

(Geodyne CTD casts and one discrete bottle cast)

TENOC: 1961-71

(discrete bottle casts)

Figure 1. T-S characteristics at NH-25 (44.65 N, 124.65 W) in July 2002 compared with previous observations at the same site. For details on 1961 - 1973 data see Smith et al, 2001).

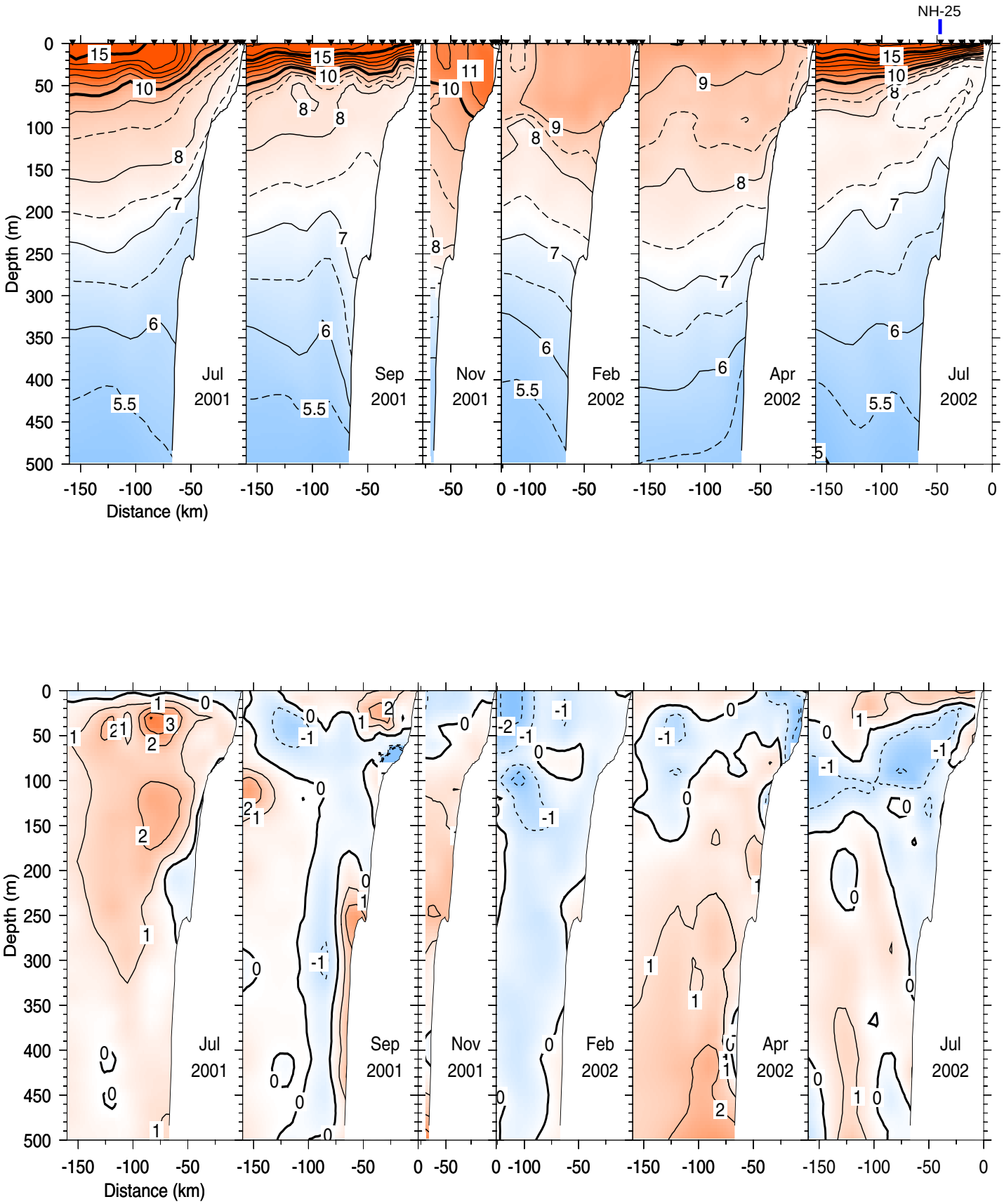



Figure 2. Temperature (top) and normalized temperature anomaly (bottom: difference from 1961-1971 seasonal average divided by the standard deviation at that depth).

Table 1. CTD station positions during W0207A, and sampling at each station (C: Bio/Chem bottle sampling, N:half-meter vertical net tows, M:Mocness, O:Oxygen samples, D:Drifter, Z:Microzooplankton bottle sampling).

| Station | | Distance | Lat. | Long. | Bottom | Cast | Sampling |
|---|---|---|---|---|---|---|---|
| Name | No. | from shore | °N | °W | Depth | Depth | Type |
| | | (km) | | | (m) | (db) | |
| NH-1 | 1 | 3 | 44.65 | -124.1 | 29 | 24 | N |
| NH-3 | 2 | 5.4 | 44.65 | -124.13 | 48 | 44 | |
| NH-5 | 3 | 9.3 | 44.65 | -124.18 | 60 | 55 | C,Z,N,M |
| NH-10 | 4 | 18.3 | 44.65 | -124.29 | 81 | 76 | N,D |
| NH-20 | 5 | 37 | 44.65 | -124.53 | 145 | 141 | N |
| NH-15 | 6 | 27.6 | 44.65 | -124.41 | 93 | 89 | C,Z,N,M,D |
| NH-25 | 7 | 46.7 | 44.65 | -124.65 | 292 | 286 | C,Z,N,M,D |
| NH-35 | 8 | 65 | 44.65 | -124.88 | 439 | 432 | C,Z,N,M |
| NH-45 | 9 | 83.3 | 44.65 | -125.12 | 703 | 696 | C,Z,N,M,D |
| NH-55 | 10 | 103 | 44.65 | -125.36 | 2865 | 1006 | O2 |
| NH-65 | 11 | 121.5 | 44.65 | -125.6 | 2860 | 1006 | C,Z,N,D |
| NH-85 | 12 | 157.2 | 44.65 | -126.05 | 2884 | 10 | C |
| NH-85 | 13 | 157.2 | 44.65 | -126.05 | 2884 | 1005 | |
| FM-9 | 14 | 62.8 | 43.22 | -125.17 | 1652 | 1006 | C,Z,N |
| FM-8 | 15 | 49.3 | 43.22 | -125 | 1079 | 1006 | C,Z,N |
| FM-7 | 16 | 35.7 | 43.22 | -124.83 | 342 | 334 | C,Z,N,M |
| FM-6 | 17 | 28.9 | 43.22 | -124.75 | 313 | 304 | O2 |
| FM-5 | 18 | 22.2 | 43.22 | -124.67 | 160 | 155 | C,N,M |
| FM-4 | 19 | 15.6 | 43.22 | -124.58 | 87 | 81 | C,Z,N,M |
| FM-3 | 20 | 8.7 | 43.22 | -124.5 | 66 | 61 | C,Z,N,M |
| FM-1 | 21 | 3.3 | 43.22 | -124.43 | 35 | 31 | N |
| CR-11 | 22 | 148.5 | 41.9 | -126 | 3330 | 1007 | C,Z,N |
| CR-10 | 23 | 120.9 | 41.9 | -125.67 | 2927 | 1006 | O2 |
| CR-9a | 24 | 98.9 | 41.9 | -125.4 | 3096 | 1005 | C,Z,N |
| CR-8 | 25 | 82.4 | 41.9 | -125.2 | 2766 | 1005 | |
| CR-7 | 26 | 65.9 | 41.9 | -125 | 842 | 833 | C,Z,N |
| CR-6 | 27 | 49.1 | 41.9 | -124.8 | 698 | 681 | C,N |
| CR-5 | 28 | 41.1 | 41.9 | -124.7 | 661 | 642 | C |
| CR-4 | 29 | 32.8 | 41.9 | -124.6 | 506 | 501 | C,Z,N,M |
| CR-3 | 30 | 24.4 | 41.9 | -124.5 | 139 | 134 | C,Z,N,M |
| CR-2 | 31 | 16.1 | 41.9 | -124.4 | 70 | 65 | N,M |
| CR-1 | 32 | 7.8 | 41.9 | -124.3 | 42 | 37 | C,N,M |
| RR-1 | 33 | 7.2 | 42.5 | -124.5 | 36 | 31 | C,Z,N |
| RR-2 | 34 | 15.6 | 42.5 | -124.6 | 86 | 82 | C,Z,N,M |
| RR-3 | 35 | 23.7 | 42.5 | -124.7 | 133 | 128 | C,Z,N,M |
| RR-4 | 36 | 31.9 | 42.5 | -124.8 | 599 | 594 | C,Z,N,M |
| RR-5 | 37 | 40 | 42.5 | -124.9 | 1168 | 1006 | O2 |
| RR-6 | 38 | 48.3 | 42.5 | -125 | 1774 | 1006 | C,Z,N |
| RR-7 | 39 | 64.4 | 42.5 | -125.2 | 2971 | 1006 | C,Z,N |
| HH-1 | 40 | 5 | 44 | -124.2 | 54 | 50 | C,Z,N |
| HH-2 | 41 | 20.9 | 44 | -124.4 | 120 | 115 | C,Z,N,M |
| HH-3 | 42 | 36.9 | 44 | -124.6 | 153 | 148 | C,Z,N,M |
| HH-4 | 43 | 53 | 44 | -124.8 | 110 | 105 | C,Z,N,M |
| HH-5 | 44 | 68.9 | 44 | -125 | 927 | 921 | C,Z,N,M |
| HH-7 | 45 | 84.8 | 44 | -125.2 | 1699 | 1006 | C,Z |
| HH-9 | 46 | 100.9 | 44 | -125.4 | 3020 | 1005 | C,Z |
| NH-10 | 47 | 18.3 | 44.65 | -124.29 | 80 | 75 | |

Table 2: Actual sample depths and types of sub samples for biological/chemical sampling during the July '02 LTOP GLOBEC cruise.

| **Station** | **Sample Collection Depths (m)** | **Type of Sample Collected** |
|---|---|---|
| NH-05 | 55, 50, 40, 30, 25, 20, 15, 10, 5, 1 | TOC (all depths), Nutrients, TN (all depths), Chl and POC/PON (all depths) |
| NH-15 | 85, 70, 60, 49, 40, 30, 20, 10, 4, 2 | TOC (all depths), Nutrients, TN (all depths), Chl and POC/PON (all depths) |
| NH-25 | 223, 200, 150, 100, 70, 50, 40, 30, 20, 17, 10, 2 | TOC (all depths), Nutrients, TN (all depths), Chl and POC/PON (all depths) (except 223, 200 and 150 m) |
| NH-35 | 430, 364, 149, 98, 69, 49, 40, 30, 27, 20, 9, 1 | TOC (surface), Nutrients, TN (surface), Chl and POC/PON (all depths) (except 430, 364 and 149 m) |
| NH-45 | 660, 499, 150, 100, 70, 50, 40, 37, 30, 20, 10, 1 | TOC (surface), Nutrients, TN (surface), Chl and POC/PON (all depths) (except 660, 499 and 150m) |
| NH-65 | 1005, 500, 150, 100, 70, 50, 40, 38, 30, 20, 10, 1 | TOC (surface), Nutrients, TN (surface), Chl and POC/PON (except 1005, 500 and 150m) |
| NH-85 | 1005, 639, 150, 100, 70, 50, 40, 36, 30, 20, 10, 3 | TOC (all depths), Nutrients, TN (all depths), Chl and POC/PON (except 1005, 639 and 150 m) |
| FM-3 | 60, 53, 50, 40, 35, 29, 25, 20, 15, 10, 5, 2 | TOC (all depths), Nutrients, TN (all depths), Chl and POC/PON (all depths) |
| FM-4 | 81, 70, 60, 50, 40, 30, 20, 10, 5, 1 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (all depths) |
| FM-5 | 150, 110, 100, 70, 60, 50, 40, 30, 20, 10, 1 | TOC (surface), Nutrients, TN (surface), Chl and POC/PON (all depths) |
| FM-7 | 300, 240, 149, 99, 70, 50, 40, 30, 22, 21, 10, 2 | TOC (all depths), Nutrients, TN (all depths), Chl and POC/PON (except 300, 240 and 150m) |
| FM-8 | 1006, 744, 151, 100, 70, 50, 40, 35, 30, 20, 10, 2 | TOC (surface), Nutrients, TN (surface), Chl and POC/PON (except 1006, 744, and 151m) |
| FM- | 1005, 822, 150, 99, 70, 50, 40, 35, 30, 20, 10, 2 | TOC (all depths), Nutrients, TN (all depths), Chl and POC/PON (except 1005, 822, and 150m) |

Table 2 cont.

| | | |
|---|---|---|
| CR-1 | 35, 30, 25, 20, 15, 10, 5, 2 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (all depths) |
| CR-3 | 120, 100, 70, 60, 50, 40, 30, 20, 15, 10, 5, 1 | TOC (surface), Nutrients, TN (all depths), both Chl and POC/PON (all depths) |
| CR-4 | 450, 180, 150, 100, 70, 49, 40, 29, 27, 19, 10, 2 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (except 450, 180, and 150m) |
| CR-5 | 500, 459, 150, 100, 69, 60, 49, 40, 30, 20, 10, 1 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (except 500, 459 and 150m) |
| CR-7 | 790, 499, 151, 100, 70, 50, 40, 29, 22, 20, 9, 2 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (except 799, 499 and 151m) |
| CR-9a | 1004, 795, 150, 100, 70, 50, 43, 40, 30, 20, 10, 2 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (except 1004, 795 and 150m) |
| CR-11 | 1005, 636, 150, 100, 70, 50, 40, 37, 30, 20, 10, 2 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (except 1005, 636 and 150m) |

| | | |
|---|---|---|
| RR-1 | 31, 25, 20, 15, 10, 5, 2 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (all depths) |
| RR-2 | 81, 71, 60, 49, 40, 30, 20, 10, 5, 1 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (all depths) |
| RR-3 | 120, 90, 70, 60, 50, 40, 30, 20, 15, 10, 5, 1 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (all depths) |
| RR-4 | 500, 320, 169, 150, 100, 70, 50, 40, 30, 20, 10, 1 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (except 500, 320, 169, and 150 m) |
| RR-6 | 1007, 869, 151, 100, 70, 60, 50, 40, 30, 20, 10, 2 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (except 1007, 869, and 151 m) |
| RR-7 | 1006, 700, 149, 100, 70, 49, 40, 30, 25, 20, 10, 1 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (except 1006, 700 and 149) |

Table 2 cont.

| | | |
|---|---|---|
| HH-1 | 50, 40, 35, 30, 25, 20, 15, 10, 5, 2 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (all depths) |
| HH-2 | 110, 100, 70, 60, 50, 40, 35, 30, 20, 10, 5, 2 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (all depths) |
| HH-3 | 145, 100, 70, 60, 50, 40, 30, 20, 10, 2 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (all depths) |
| HH-4 | 105, 89, 70, 60, 50, 40, 30, 20, 10, 7, 5, 2 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (all depths) |
| HH-5 | 500, 470, 375, 150, 100, 70, 50, 40, 30, 20, 9, 1 | TOC (all depths), Nutrients, TN (all depths), both Chl and POC/PON (except 500, 470, 375, and 150 m) |
| HH-7 | 1005, 643, 150, 100, 70, 50, 40, 30, 19, 14, 10, 2 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (except 1005, 643, and 150) |
| HH-9 | 1004, 690, 150, 100, 70, 50, 40, 30, 20, 18, 10, 2 | TOC (surface), Nutrients, TN (surface), both Chl and POC/PON (except 1004, 690, and 150) |

| **Subsample** | **Replicates** |
|---|---|
| TOC | 3 |
| Nutrients | 2 |
| TN | 3 |
| Chl | 2 |
| POC/PON | 1 |

Table 3. R/V WECOMA Cruise W0207A

| | Start | End | Sta. | Sta. | Latitude | | Longitude | | Bottom | Atmos | Wind | Wind | Event | Event ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (UT) | Time | Time | No. | Name | (deg) | (min) | (deg) | (min) | Depth | Press | Dir. | Speed | | |
| | (UT) | (UT) | | | | | | | (m) | (mbar) | (deg T) | (kts) | | |
| | | | | | | | | | | | | | | |
| 9-Jul | | | | | | | | | | | | | Start DAS | |
| | | | | | | | | | | | | | Start echosounder | |
| | 2037 | | | | | | | | | | | | air calibration of transmissometer | |
| | 2100 | | | | | | | | | | | | Depart Newport | |
| | | | | | | | | | | | | | Start ADCP | |
| | | | | | | | | | | | | | Start flo-thru | |
| | | | | | | | | | | | | | Start flo-thru fluorometer | |
| | 2217 | 2224 | 1 | NH-1 | 44 | 39.0 | -124 | 06.0 | 29 | 1015.5 | 335 | 22 | CTD | WE19002.1 |
| | 2230 | 2234 | | | 44 | 39.1 | -124 | 06.0 | | | | | vertical net tow, 20m | WE19002.2 |
| | 2237 | 2238 | | | 44 | 39.1 | -124 | 06.0 | | | | | Secchi disk | WE19002.3 |
| | 2255 | 1604 | 2 | NH-3 | 44 | 39.1 | -124 | 07.8 | 48 | 1016.8 | 345 | 15 | CTD | WE19002.4 |
| | 2305 | | | | 44 | 39.2 | -124 | 08.0 | | | | | HTI deployed | WE19002.5 |
| | 2331 | | | | | | | | | | | | HTI redeployed | WE19002.6 |
| | 2353 | 0003 | 3 | NH-5 | 44 | 39.1 | -124 | 10.7 | 60 | 1015.9 | 330 | 17 | CTD with biochem, mzp | WE19002.7 |
| 10-Jul | 0007 | 0011 | | | 44 | 39.1 | -124 | 10.6 | | | | | vertical net tow, 55 m | WE19102.1 |
| | 0019 | | | | 44 | 39.2 | -124 | 10.6 | | | | | Mocness deployed | WE19102.2 |
| | | 0037 | | | 44 | 39.8 | -124 | 10.6 | | | | | Mocness aboard | WE19102.3 |
| | 0132 | 0147 | 4 | NH-10 | 44 | 39.1 | -124 | 17.7 | 81 | 1015.1 | 345 | 18 | CTD | WE19102.4 |
| | 0153 | 0159 | | | 44 | 39.0 | -124 | 17.8 | | | | | vertical net tow, 55 m | WE19102.5 |
| | 0203 | | | | 44 | 39.05 | -124 | 17.94 | | | | | drifter 35899 deployed | WE19102.6 |
| | 0329 | 0345 | 5 | NH-20 | 44 | 39.1 | -124 | 31.8 | 145 | 1015.0 | 350 | 21 | CTD | WE19102.7 |
| | 0350 | 0357 | | | 44 | 39.1 | -124 | 31.8 | | | | | vertical net tow, 100 m | WE19102.8 |
| | 0401 | 0407 | | | 44 | 39.1 | -124 | 31.8 | | | | | 2nd vertical net tow, 100 m | WE19102.9 |
| | 0459 | 0514 | 6 | NH-15 | 44 | 39.1 | -124 | 24.7 | 93 | 1015.1 | 345 | 16 | CTD with biochem, mzp | WE19102.10 |
| | 0517 | 0524 | | | 44 | 39.1 | -124 | 24.7 | | | | | vertical net tow, 90 m | WE19102.11 |
| | 0534 | | | | 44 | 39.4 | -124 | 24.9 | | | | | Mocness deployed | WE19102.12 |
| | | 0603 | | | 44 | 40.4 | -124 | 25.3 | | | | | Mocness aboard | WE19102.13 |
| | 0603 | | | | 44 | 40.45 | -124 | 25.68 | | | | | drifter 35900 deployed | WE19102.14 |
| | 0740 | 0807 | 7 | NH-25 | 44 | 39.1 | -124 | 39.2 | 292 | 1015.1 | 340 | 20 | CTD with biochem, mzp | WE19102.15 |
| | 0811 | 0817 | | | 44 | 39.1 | -124 | 39.2 | | | | | vertical net tow, 100 m | WE19102.16 |
| | 0825 | | | | 44 | 39.3 | -125 | 39.4 | | | | | Mocness deployed | WE19102.17 |
| | | 0913 | | | 44 | 40.5 | -124 | 40.5 | | | | | Mocness aboard | WE19102.18 |
| | 0921 | | | | 44 | 40.65 | -124 | 40.68 | | | | | Drifter 35901 deployed | WE19102.19 |
| | 1045 | 1117 | 8 | NH-35 | 44 | 39.1 | -124 | 53.0 | 439 | 1015.9 | 340 | 18 | CTD with biochem, mzp | WE19102.20 |
| | 1122 | 1127 | | | 44 | 39.1 | -124 | 53.0 | | | | | vertical net tow, 100 m | WE19102.21 |
| | 1131 | 1139 | | | 44 | 39.0 | -124 | 53.1 | | | | | 2nd vertical net tow, 100 m | WE19102.22 |
| | 1152 | | | | 44 | 39.4 | -124 | 53.0 | | | | | Mocness deployed | WE19102.23 |

Table 3 cont.

| | Start | End | Sta. | Sta. | Latitude | | Longitude | | Bottom | Atmos | Wind | Wind | Event | Event ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (UT) | Time | Time | No. | Name | (deg) | (min) | (deg) | (min) | Depth | Press | Dir. | Speed | | |
| | (UT) | (UT) | | | | | | | (m) | (mbar) | (deg T) | (kts) | | |
| | | | | | | | | | | | | | | |
| 10-Jul | | 1303 | | | 44 | 42.0 | -124 | 53.2 | | | | | Mocness aboard | WE19102.24 |
| | 1349 | | | | | | | | | | | | cleaned flo-thru filters | |
| | 1355 | | | | | | | | | | | | cleaned underway fluorometer | |
| | 1453 | 1536 | 9 | NH-45 | 44 | 39.1 | -125 | 07.0 | 703 | 1018.2 | 335 | 16 | CTD with biochem, mzp | WE19102.25 |
| | 1541 | 1547 | | | 44 | 39.1 | -125 | 07.0 | | | | | vertical net tow, 100 m | WE19102.26 |
| | 1556 | | | | 44 | 39.4 | -125 | 07.0 | | | | | Mocness deployed | WE19102.27 |
| | | 1704 | | | 44 | 41.8 | -125 | 07.7 | | | | | Mocness aboard | WE19102.28 |
| | 1714 | | | | 44 | 41.87 | -125 | 08.15 | | | | | drifter 35902 deployed | WE19102.29 |
| | 1850 | | | NH-55 | 44 | 39.2 | -125 | 22.0 | | | | | HTI recovered | WE19102.30 |
| | 1859 | 1952 | 10 | NH-55 | 44 | 39.1 | -125 | 21.9 | 2865 | 1019.2 | 330 | 18 | CTD with oxygen | WE19102.31 |
| | 2108 | 2113 | | NH-65 | 44 | 39.1 | -125 | 36.0 | | | | | vertical net tow, 100 m | WE19102.32 |
| | 2122 | 2214 | 11 | NH-65 | 44 | 39.1 | -125 | 36.0 | 2860 | 1020.1 | 330 | 21 | CTD with biochem, mzp | WE19102.33 |
| | 2221 | | | | 44 | 39.10 | -125 | 36.05 | | | | | drifter 35903 deployed | WE19102.34 |
| 11-Jul | 0021 | 0026 | 12 | NH-85 | 44 | 39.1 | -126 | 03.0 | 2884 | 1020.9 | 335 | 17 | short CTD to catch surface water | WE19202.1 |
| | 0042 | 0131 | 13 | NH-85 | 44 | 39.1 | -126 | 03.0 | 2884 | | | | CTD with biochem | WE19202.2 |
| | | | | | | | | | | | | | begin transit to FM-Line | |
| | 1004 | 1102 | 14 | FM-9 | 43 | 13.0 | -125 | 10.1 | 1652 | 1020.4 | 355 | 26 | CTD with biochem, mzp | WE19202.3 |
| | 1108 | 1114 | | | 43 | 12.9 | -125 | 10.2 | | | | | vertical net tow, 100 m | WE19202.4 |
| | 1124 | 1312 | 15 | FM-8 | 43 | 13.0 | -125 | 00.1 | 1079 | 1020.0 | 000 | 26 | CTD with biochem, mzp | WE19202.5 |
| | 1314 | 1320 | | | 43 | 12.9 | -125 | 00.3 | | | | | vertical net tow, 100 m | WE19202.6 |
| | 1330 | | | | 43 | 12.8 | -125 | 00.6 | | | | | HTI deployed | WE19202.7 |
| | 1443 | 1512 | 16 | FM-7 | 43 | 13.0 | -124 | 50.0 | 342 | 1020.2 | 005 | 24 | CTD with biochem, mzp | WE19202.8 |
| | 1517 | 1522 | | | 43 | 13.0 | -124 | 50.0 | | | | | vertical net tow, 100 m | WE19202.9 |
| | 1524 | 1530 | | | 43 | 13.0 | -124 | 50.0 | | | | | 2nd vertical net tow, 100 m | WE19202.10 |
| | 1538 | | | | 43 | 13.1 | -124 | 50.2 | | | | | Mocness deployed | WE19202.11 |
| | 1556 | | | | | | | | | | | | cleaned flo-thru filters | |
| | 1602 | | | | | | | | | | | | cleaned flo-thru fluorometer | |
| | 1612 | | | | | | | | | | | | air calibration of transmissometer | |
| | | 1649 | | | 43 | 15.3 | -124 | 51.8 | | | | | Mocness aboard | WE19202.12 |
| | 1805 | 1833 | 17 | FM-6 | 43 | 13.0 | -124 | 45.0 | 313 | 1020.0 | 005 | 25 | CTD with oxygen | WE19202.13 |
| | 1917 | 1937 | 18 | FM-5 | 43 | 13.0 | -124 | 40.1 | 160 | 1019.3 | 000 | 23 | CTD with biochem | WE19202.14 |
| | 1940 | 1947 | | | 43 | 13.0 | -124 | 40.1 | | | | | vertical net tow, 100 m | WE19202.15 |
| | 1949 | 1954 | | | 43 | 13.0 | -124 | 40.1 | | | | | 2nd vertical net tow, 100 m | WE19202.16 |
| | 2002 | | | | 43 | 13.1 | -124 | 40.2 | | | | | Mocness deployed | WE19202.17 |
| | | 2038 | | | 43 | 14.5 | -124 | 40.5 | | | | | Mocness aboard | WE19202.18 |
| | 2144 | 2158 | 19 | FM-4 | 43 | 13.0 | -124 | 35.1 | 87 | 1019.1 | 000 | 20 | CTD with biochem, mzp | WE19202.19 |
| | 2202 | 2206 | | | 43 | 12.9 | -124 | 35.1 | | | | | vertical net tow, 82m | WE19202.20 |
| | 2213 | | | | 43 | 13.1 | -124 | 35.1 | | | | | Mocness deployed | WE19202.21 |
| | | 2236 | | | 43 | 13.8 | -124 | 35.4 | | | | | Mocness aboard | WE19202.22 |

Table 3 cont.

| | Start | End | Sta. | Sta. | Latitude | | Longitude | | Bottom | Atmos | Wind | Wind | Event | Event ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (UT) | Time | Time | No. | Name | (deg) | (min) | (deg) | (min) | Depth | Press | Dir. | Speed | | |
| | (UT) | (UT) | | | | | | | (m) | (mbar) | (deg T) | (kts) | | |
| | | | | | | | | | | | | | | |
| 11-Jul | 2337 | 2351 | 20 | FM-3 | 43 | 13.0 | -124 | 30.0 | 66 | 1018.0 | 000 | 21 | CTD with biochem, mzp | WE19202.23 |
| | 2353 | 2357 | | | 43 | 13.0 | -124 | 30.0 | | | | | vertical net tow, 60m | WE19202.24 |
| 12-Jul | 0005 | | | | 43 | 13.1 | -124 | 30.2 | | | | | Mocness deployed | WE19302.1 |
| | | 0022 | | | 43 | 13.5 | -124 | 30.7 | | | | | Mocness aboard | WE19302.2 |
| | | 0112 | | FM-1 | 43 | 13.1 | -124 | 25.9 | | | | | HTI recovered | WE19302.3 |
| | 0120 | 0126 | 21 | FM-1 | 43 | 13.0 | -124 | 26.0 | 35 | 1017.5 | 010 | 18 | CTD | WE19302.4 |
| | 0129 | 0132 | | | 43 | 13.0 | -124 | 26.0 | | | | | vertical net tow, 30 m | WE19302.5 |
| | 0130 | | | | | | | | | | | | cleaned flo-thru filters | |
| | 0134 | | | | | | | | | | | | begin transit to CR-11 | |
| | 0136 | | | | | | | | | | | | cleaned underway fluorometer | |
| | 0155 | | | | | | | | | | | | air calibration of transmissometer | |
| | 1040 | | | | | | | | | | | | arrive CR-11, hove to for weather | |
| | 1218 | 1307 | 22 | CR-11 | 41 | 54.1 | -126 | 00.0 | 3330 | 1015.9 | 355 | 28 | CTD with biochem, mzp | WE19302.6 |
| | 1314 | 1320 | | | 41 | 53.9 | -126 | 00.0 | | | | | vertical net tow,100m | WE19302.7 |
| | 1516 | 1609 | 23 | CR-10 | 41 | 54.0 | -125 | 40.0 | 2927 | 1015.2 | 355 | 29 | CTD with oxygen | WE19302.8 |
| | 1740 | 1830 | 24 | CR-9a | 41 | 54.0 | -125 | 24.0 | 3096 | 1013.9 | 355 | 31 | CTD with biochem, mzp | WE19302.9 |
| | 1835 | 1841 | | | 41 | 54.0 | -125 | 24.0 | | | | | vertical net tow, 100m | WE19302.10 |
| | 2012 | 2105 | 25 | CR-8 | 41 | 54.1 | -125 | 12.1 | 2766 | 1013.5 | 355 | 28 | CTD | WE19302.11 |
| | 2244 | 2337 | 26 | CR-7 | 41 | 53.9 | -125 | 00.1 | 842 | 1012.2 | 350 | 26 | CTD with biochem, mzp | WE19302.12 |
| | 2340 | 2346 | | | 41 | 54.0 | -125 | 00.0 | | | | | vertical net tow, 100 m | WE19302.13 |
| 13-Jul | 0101 | 0133 | 27 | CR-6 | 41 | 54.1 | -124 | 47.9 | 698 | 1013.0 | 340 | 22 | CTD | WE19402.1 |
| | 0036 | 0041 | | | 41 | 54.0 | 48 | 48.0 | | | | | vertical net tow, 100 m | WE19402.2 |
| | 0044 | 0049 | | | 41 | 53.8 | -124 | 47.9 | | | | | 2nd vertical net tow, 100 m | WE19402.3 |
| | 0058 | | | | 41 | 53.5 | -124 | 48.0 | | | | | HTI deployed | WE19402.4 |
| | 0242 | 0320 | 28 | CR-5 | 41 | 54.0 | -124 | 42.1 | 661 | 1012.8 | 000 | 20 | CTD with biochem | WE19402.5 |
| | 0418 | 0456 | 29 | CR-4 | 41 | 54.0 | -124 | 36.0 | 506 | 1014.0 | 000 | 9 | CTD with biochem, mzp | WE19402.6 |
| | 0500 | 0506 | | | 41 | 53.9 | -124 | 36.1 | | | | | vertical net tow, 100 m | WE19402.7 |
| | 0515 | | | | 41 | 54.1 | -124 | 36.2 | | | | | Mocness deployed | WE19402.8 |
| | | 0613 | | | 41 | 56.2 | -124 | 37.0 | | | | | Mocness aboard | WE19402.9 |
| | 0714 | 0728 | 30 | CR-3 | 41 | 54.0 | -124 | 30.1 | 139 | 1014.1 | 000 | 15 | CTD with biochem, mzp | WE19402.10 |
| | 0732 | 0738 | | | 41 | 54.0 | -124 | 30.0 | | | | | vertical net tow, 100m | WE19402.11 |
| | 0741 | 0746 | | | 41 | 54.0 | -124 | 30.0 | | | | | 2nd vertical net tow, 100m | WE19402.12 |
| | 0754 | | | | 41 | 54.0 | -124 | 30.1 | | | | | Mocness deployed | WE19402.13 |
| | | 0822 | | | 41 | 55.0 | -124 | 30.7 | | | | | Mocness recovered | WE19402.14 |
| | 0918 | 0923 | 31 | CR-2 | 41 | 54.0 | -124 | 24.0 | 70 | 1013.2 | 000 | 18 | CTD | WE19402.15 |
| | 0927 | 0930 | | | 41 | 54.1 | -124 | 23.9 | | | | | vertical net tow, 60m | WE19402.16 |
| | 0940 | | | | 41 | 54.1 | -124 | 24.0 | | | | | Mocness deployed | WE19402.17 |
| | | 0956 | | | 41 | 54.8 | -124 | 24.3 | | | | | Mocness aboard | WE19402.18 |
| | 1051 | | | CR-1 | 41 | 54.0 | -124 | 18.0 | | | | | HTI recovered | WE19402.19 |

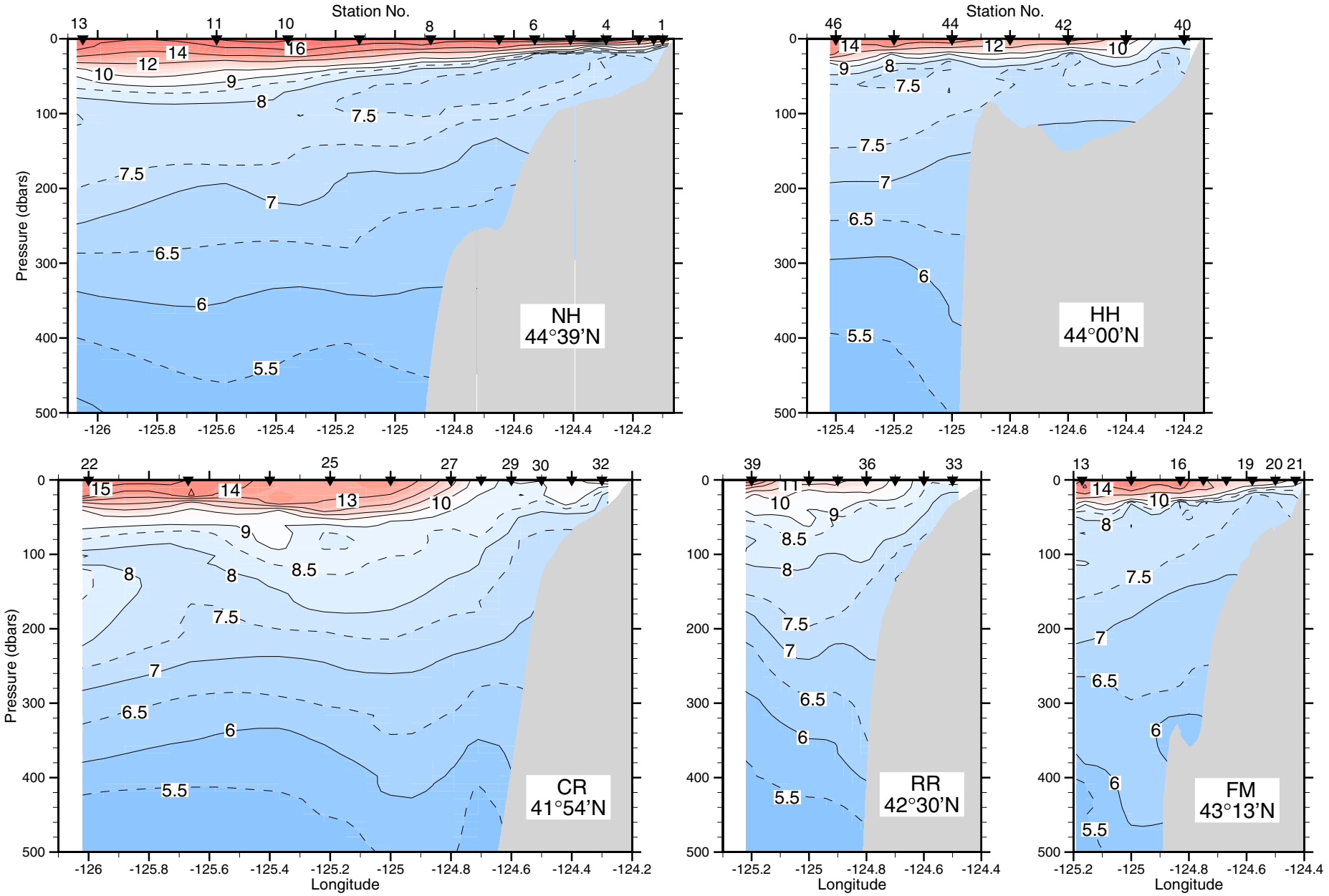
Table 3 cont.

| | Start | End | Sta. | Sta. | Latitude | | Longitude | | Bottom | Atmos | Wind | Wind | Event | Event ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (UT) | Time | Time | No. | Name | (deg) | (min) | (deg) | (min) | Depth | Press | Dir. | Speed | | |
| | (UT) | (UT) | | | | | | | (m) | (mbar) | (deg T) | (kts) | | |
| | | | | | | | | | | | | | | |
| 13-Jul | 1101 | 1110 | 32 | CR-1 | 41 | 54.0 | -124 | 18.0 | 42 | 1012.6 | 310 | 8 | CTD with biochem, mzp | WE19402.20 |
| | 1113 | 1116 | | | 41 | 54.0 | -124 | 18.0 | | | | | vertical net tow, 37 m | WE19402.21 |
| | 1120 | | | | | | | | | | | | begin transit to RR line | |
| | 1345 | | | | | | | | | | | | cleaned flo-thru filters | |
| | 1352 | | | | | | | | | | | | cleaned underway fluorometer | |
| | 1355 | | | | | | | | | | | | air calibration of transmissometer | |
| | 1505 | 1505 | 33 | RR-1 | 42 | 30.0 | -124 | 30.0 | 36 | 1013.7 | 330 | 16 | CTD with biochem, mzp | WE19402.22 |
| | 1520 | 1522 | | | 42 | 30.0 | -124 | 30.0 | | | | | vertical net tow, 30 m | WE19402.23 |
| | 1535 | | | | 42 | 30.0 | -124 | 30.0 | | | | | HTI deployed | WE19402.24 |
| | 1620 | 1633 | 34 | RR-2 | 42 | 30.0 | -124 | 36.0 | 86 | 1014.2 | 355 | 20 | CTD with biochem, mzp | WE19402.25 |
| | 1636 | 1641 | | | 42 | 30.0 | -124 | 36.1 | | | | | vertical net tow, 83 m | WE19402.26 |
| | 1649 | | | | 42 | 30.2 | -124 | 36.1 | | | | | Mocness deployed | WE19402.27 |
| | | 1709 | | | 42 | 30.8 | -124 | 36.2 | | | | | Mocness aboard | WE19402.28 |
| | 1800 | 1816 | 35 | RR-3 | 42 | 30.0 | -124 | 42.0 | 133 | 1014.2 | 350 | 19 | CTD with biochem, mzp | WE19402.29 |
| | 1821 | 1828 | | | 42 | 30.0 | -124 | 42.0 | | | | | vertical net tow, 100 m | WE19402.30 |
| | 1835 | | | | 42 | 30.2 | -124 | 42.0 | | | | | Mocness deployed | WE19402.31 |
| | | 1912 | | | 42 | 31.5 | -124 | 41.8 | | | | | Mocness aboard | WE19402.32 |
| | `2009 | 2047 | 36 | RR-4 | 42 | 30.0 | -124 | 48.0 | 599 | 1015.0 | 340 | 21 | CTD with biochem, mzp | WE19402.33 |
| | 2051 | 2057 | | | 42 | 30.0 | -124 | 48.0 | | | | | vertical net tow, 100 m | WE19402.34 |
| | 2106 | | | | 42 | 30.1 | -124 | 48.1 | | | | | Mocness deployed | WE19402.35 |
| | 2154 | | | | | | | | | | | | cleaned Met sensors (PSP,PIR,PAR) | |
| | | 2204 | | | 42 | 32.3 | -124 | 49.4 | | | | | Mocness aboard | WE19402.36 |
| | 2250 | | | RR-5 | 42 | 30.0 | -125 | 54.0 | | | | | HTI recovered | WE19402.37 |
| | 2258 | 2353 | 37 | RR-5 | 42 | 30.0 | -124 | 54.0 | 1168 | 1015.1 | 345 | 15 | CTD with oxygen | WE19402.38 |
| 14-Jul | 0032 | 0122 | 38 | RR-6 | 42 | 30.0 | -125 | 00.1 | 1774 | 1015.0 | 330 | 17 | CTD with biochem, mzp | WE19502.1 |
| | 0127 | 0133 | | | 42 | 30.2 | -124 | 00.3 | | | | | vertical net tow, 100 m | WE19502.2 |
| | 0225 | 0315 | 39 | RR-7 | 42 | 30.0 | -125 | 11.9 | | | | | CTD with biochem, mzp | WE19502.3 |
| | 0318 | 0325 | | | 42 | 30.0 | -125 | 12.0 | | | | | vertical net tow,100 m | WE19502.4 |
| | 0330 | | | | | | | | | | | | begin transit to HH-1 | |
| | 1250 | 1301 | 40 | HH-1 | 44 | 00.0 | -124 | 12.0 | 54 | 1018.0 | 355 | 15 | CTD with biochem, mzp | WE19502.5 |
| | 1305 | 1310 | | | 44 | 00.0 | -124 | 12.0 | | | | | vertical net tow, 50m | WE19502.6 |
| | 1354 | | | | | | | | | | | | cleaned flo-thru filter | |
| | 1406 | | | | | | | | | | | | cleaned underway fluorometer | |
| | 1404 | 1421 | 41 | HH-2 | 44 | 00.0 | -124 | 24.0 | 120 | 1018.6 | 355 | 15 | CTD with biochem, mzp | WE19502.7 |
| | 1425 | 1432 | | | 44 | 00.0 | -124 | 24.0 | | | | | vertical net tow, 100 m | WE19502.8 |
| | 1527 | 1543 | 42 | HH-3 | 44 | 00.0 | -124 | 36.0 | 153 | 1019.4 | 015 | 14 | CTD with biochem, mzp | WE19502.9 |
| | 1550 | 1556 | | | 44 | 00.0 | -124 | 36.0 | | | | | vertical net tow, 100 m | WE19502.10 |
| | 1650 | 1706 | 43 | HH-4 | 44 | 00.0 | -124 | 48.0 | 110 | 1019.9 | 000 | 11 | CTD with biochem, mzp | WE19502.11 |
| | 1709 | 1716 | | | 44 | 00.0 | -124 | 48.0 | | | | | vertical net tow, 100 m | WE19502.12 |

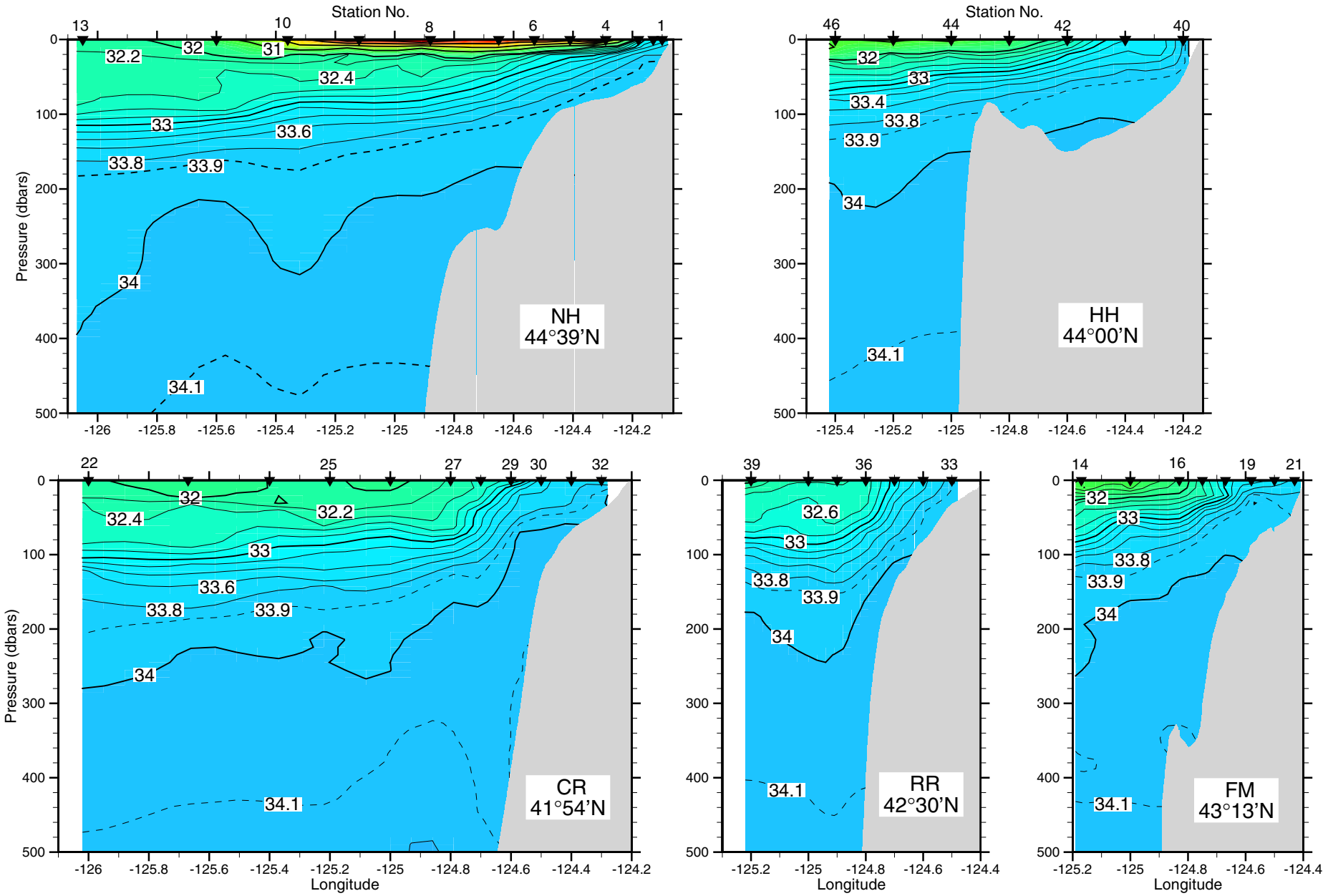
Table 3 cont.

| | Start | End | Sta. | Sta. | Latitude | | Longitude | | Bottom | Atmos | Wind | Wind | Event | Event ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (UT) | Time | Time | No. | Name | (deg) | (min) | (deg) | (min) | Depth | Press | Dir. | Speed | | |
| | (UT) | (UT) | | | | | | | (m) | (mbar) | (deg T) | (kts) | | |
| | | | | | | | | | | | | | | |
| 14-Jul | 1813 | 1859 | 44 | HH-5 | 44 | 00.0 | -125 | 00.0 | 927 | 1020.0 | 000 | 13 | CTD with biochem, mzp | WE19502.13 |
| | 1905 | 1911 | | | 44 | 00.0 | -125 | 00.0 | | | | | vertical net tow, 100 m | WE19502.14 |
| | 2011 | 2104 | 45 | HH-7 | 44 | 00.0 | -125 | 12.0 | 1699 | 1020.0 | 000 | 16 | CTD with biochem, mzp | WE19502.15 |
| | 2202 | 2255 | 46 | HH-9 | 44 | 00.0 | -125 | 24.0 | 3020 | 1019.7 | 000 | 21 | CTD with biochem, mzp | WE19502.16 |
| | 2300 | | | | | | | | | | | | begin transit toward HH-5 | |
| 15-Jul | 0003 | | | | | | | | | | | | air calibration of transmissometer | |
| | 0043 | 0043 | | | 44 | 00.0 | -124 | 05.5 | | 1018.2 | 355 | 19 | HTI deployed | WE19602.1 |
| | 0131 | | | HH-5 | 43 | 00.1 | -125 | 00.0 | | 1018.5 | 000 | 21 | Mocness deployed - light | WE19602.2 |
| | | 0222 | | | 44 | 02.0 | -124 | 00.0 | | | | | Mocness aboard | WE19602.3 |
| | 0503 | | | HH-5 | 43 | 00.1 | -125 | 00.0 | | 1018.7 | 000 | 20 | Mocness deployed - dark | WE19602.4 |
| | | 0558 | | | 44 | 02.1 | -125 | 00.2 | | | | | Mocness aboard | WE19602.5 |
| | 0724 | | | HH-4 | 44 | 00.0 | -124 | 48.0 | | 1018.2 | 000 | 17 | Mocness deployed | WE19602.6 |
| | | 0748 | | | 44 | 00.6 | -124 | 47.2 | | | | | Mocness aboard | WE19602.7 |
| | 0906 | | | HH-3 | 44 | 00.0 | -124 | 36.0 | | 1018.0 | 000 | 21 | Mocness deployed | WE19602.8 |
| | | 0940 | | | 44 | 01.3 | -124 | 36.1 | | | | | Mocness aboard | WE19602.9 |
| | 1106 | | | HH-2 | 44 | 00.0 | -124 | 24.0 | | 1017.0 | 000 | 22 | Mocness deployed | WE19602.10 |
| | | 1132 | | | 44 | 00.8 | -124 | 24.0 | | 1017.0 | 000 | 22 | Mocness aboard | WE19602.11 |
| | | 1138 | | | 44 | 00.8 | -124 | 24.0 | | | | | HTI recovered | WE19602.12 |
| | 1140 | | | | | | | | | | | | begin tranist to NH-10 | |
| | 1344 | | | | | | | | | | | | cleaned flo-thru filters | |
| | 1348 | | | | | | | | | | | | cleaned underway fluorometer | |
| | 1610 | | | | | | | | | | | | air calibration of transmissometer | |
| | 1649 | 1658 | 47 | NH-10 | 44 | 39.1 | -124 | 17.7 | 80 | 1017.9 | 000 | 16 | CTD with 50 m sample for M. Wetz | WE19602.13 |
| | 1700 | | | | | | | | | | | | begin transit to Newport | |
| | 1808 | | | | | | | | | | | | shut down echosounder | |
| | 1809 | | | | | | | | | | | | shut down flow through system | |
| | 1825 | | | | | | | | | | | | shut down ADCP | |
| | 1830 | | | | | | | | | | | | shut down DAS | |
| | 1900 | | | | | | | | | | | | arrive at pier in Newport | |

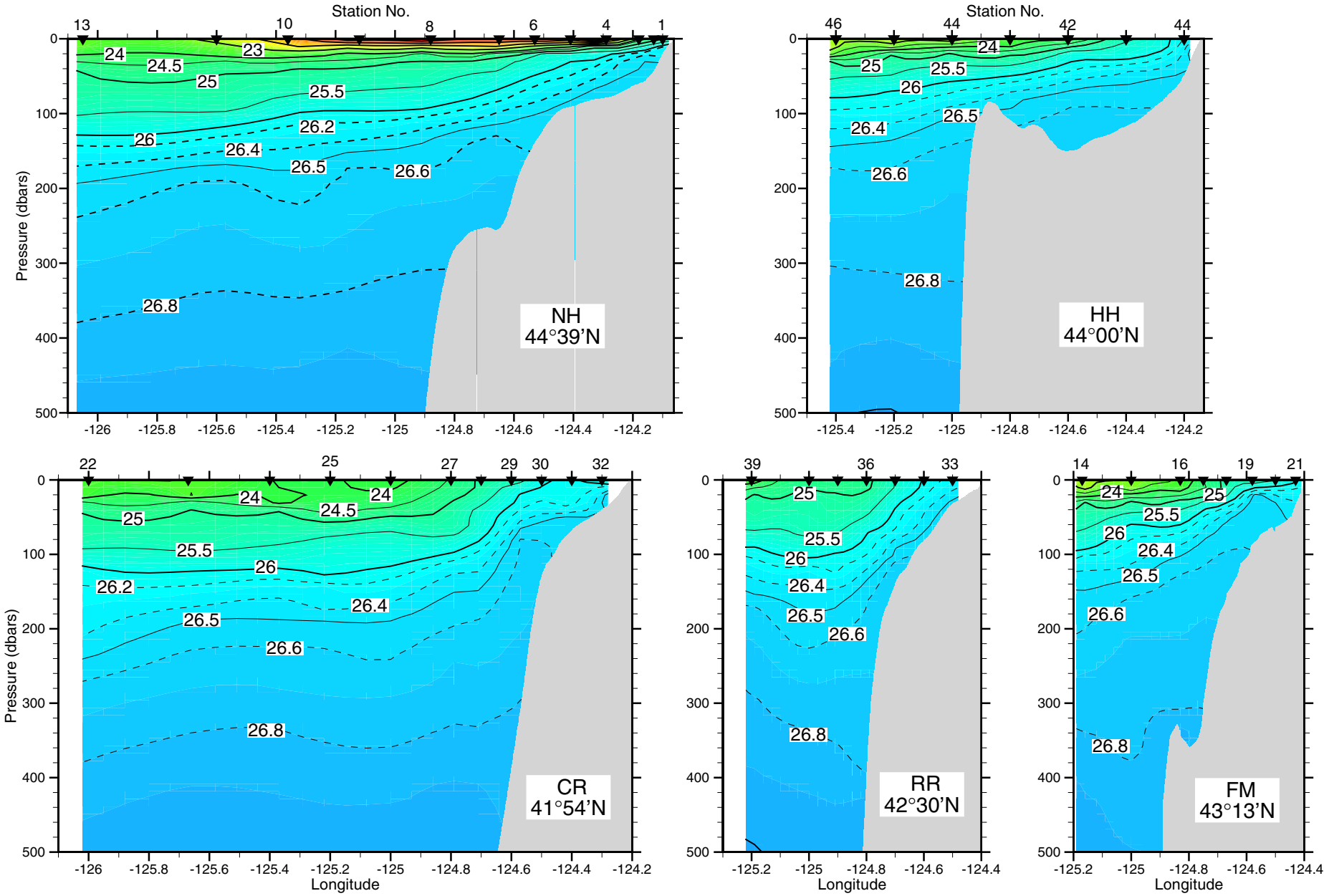
# Temperature, 9-14 July 2002



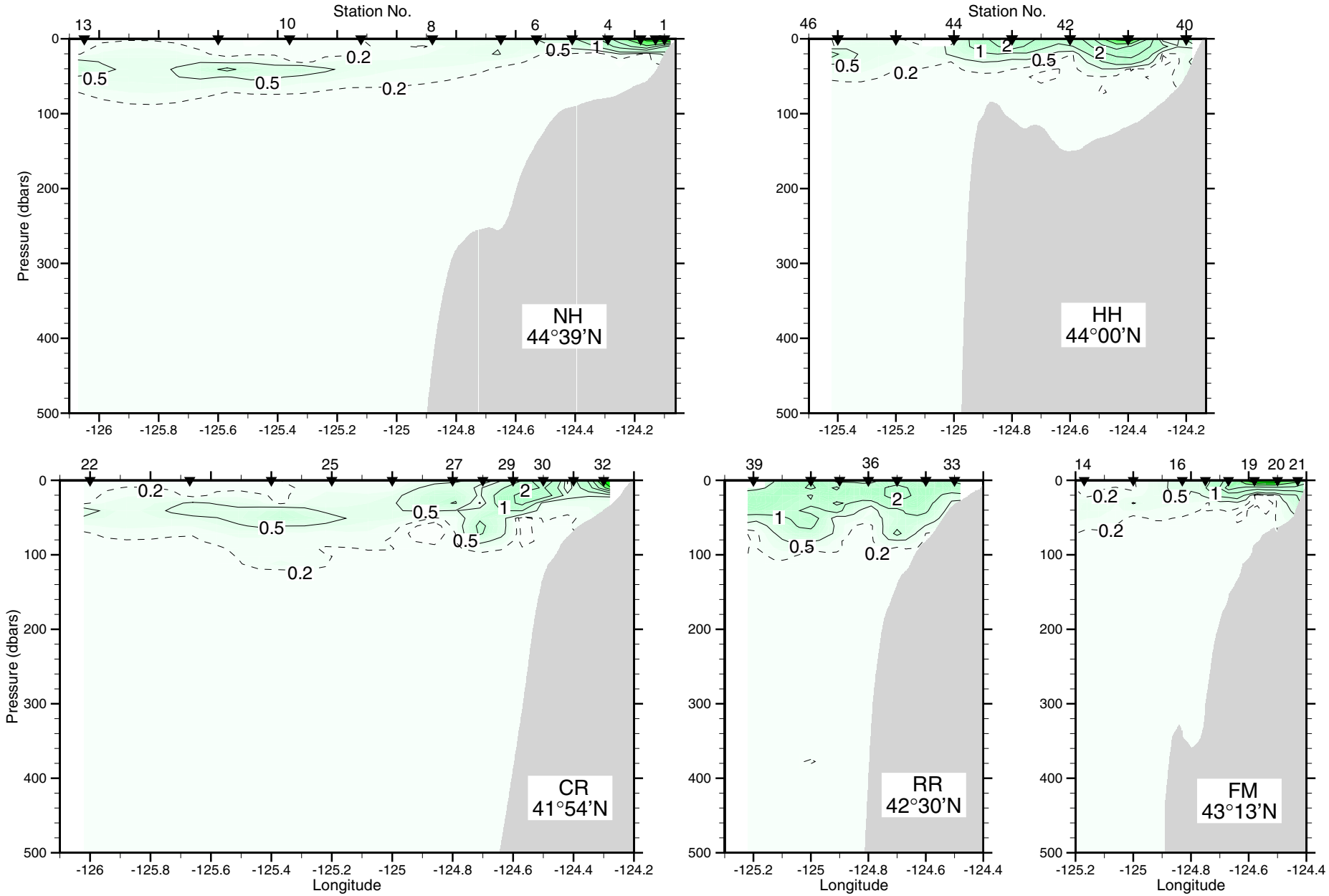
# Salinity, 9-14 July 2002



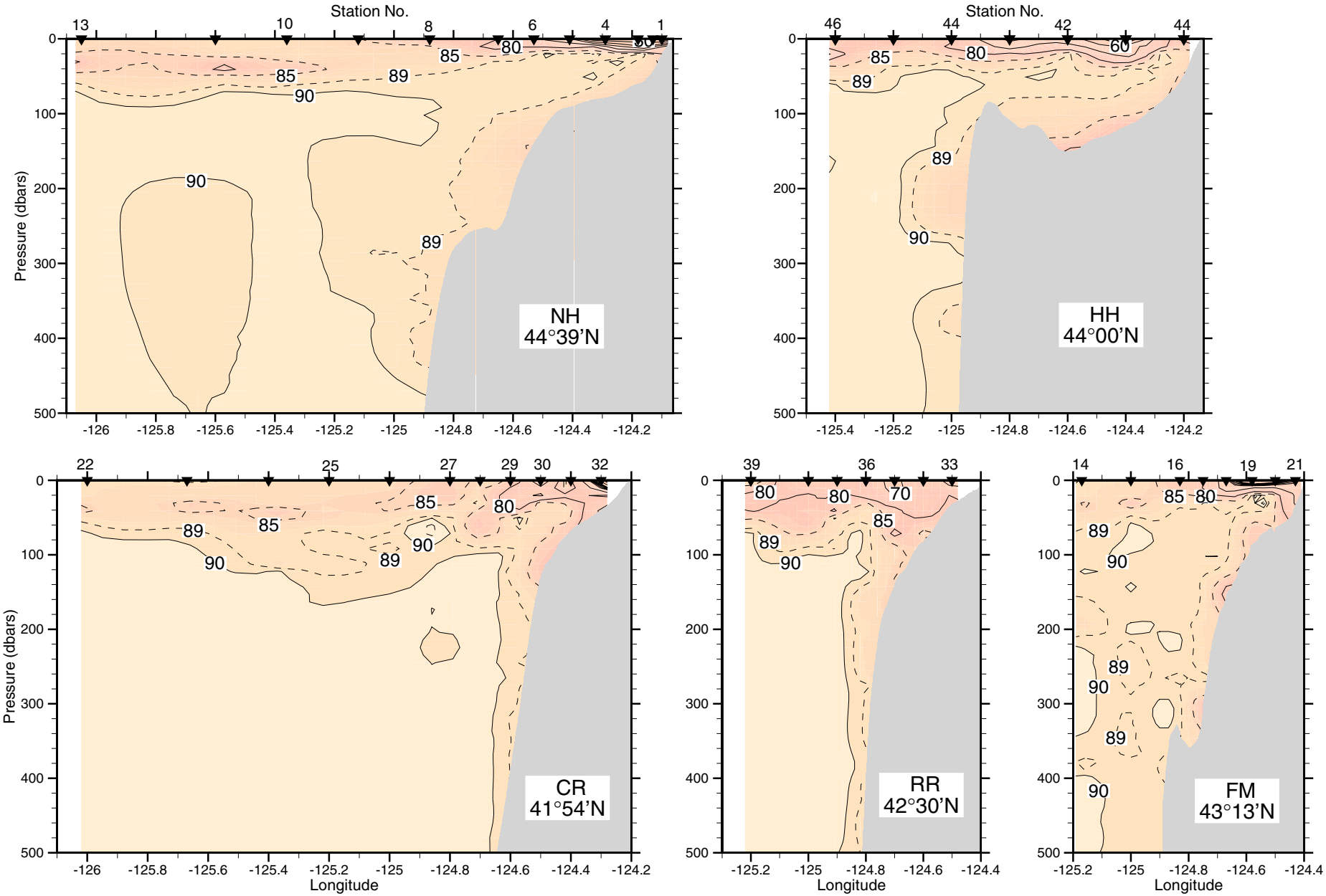
# Sigma-theta, 9-14 July 2002



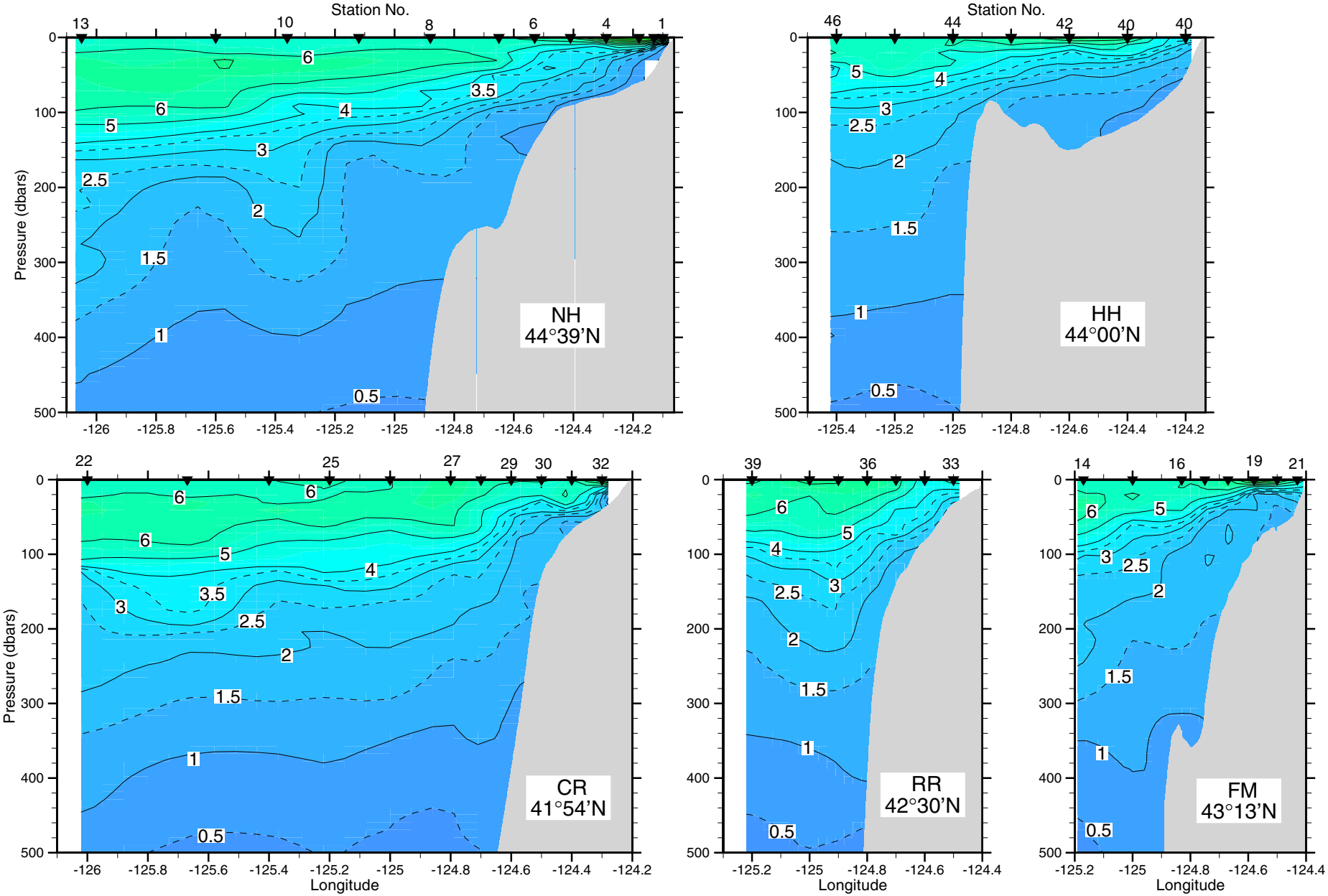
# Fluorescence Voltage, 9-14 July 2002



# % Light Transmission, 9-14 July 2002



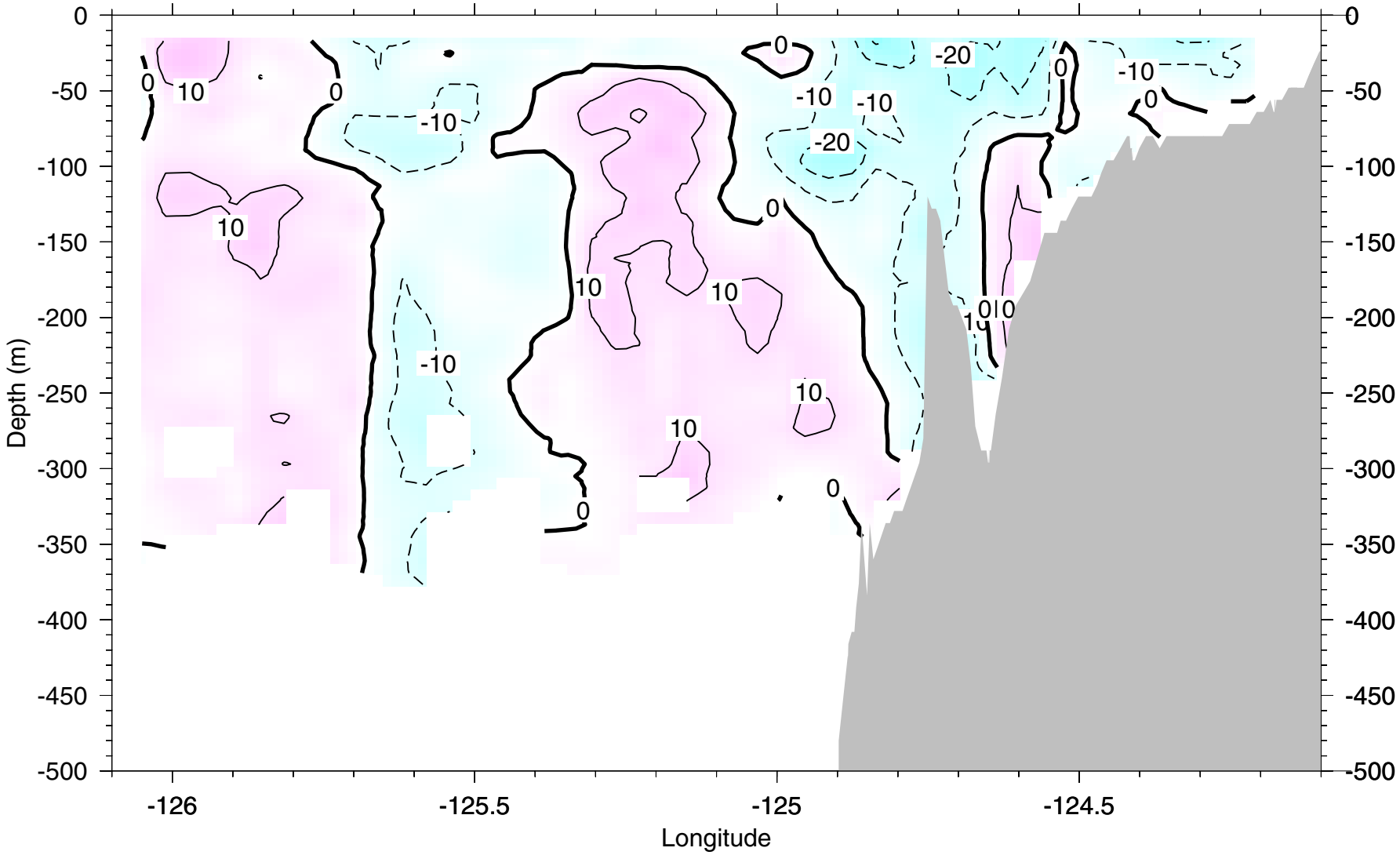
# Oxygen, 9-14 July 2002



Newport Hydrographic Line 44.6°N

9-11 July 2002

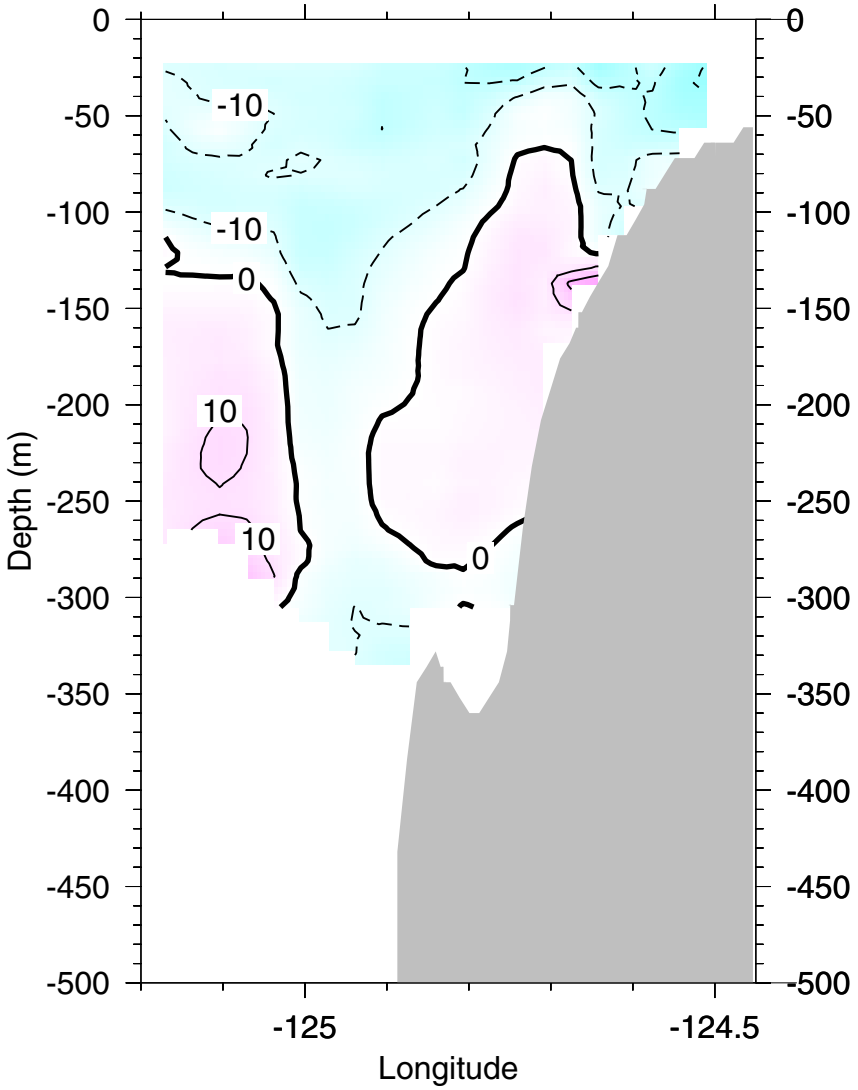
ADCP: Northward current (cm/s)



Five Mile Hydrographic Line 43.2°N

11-12 July 2002

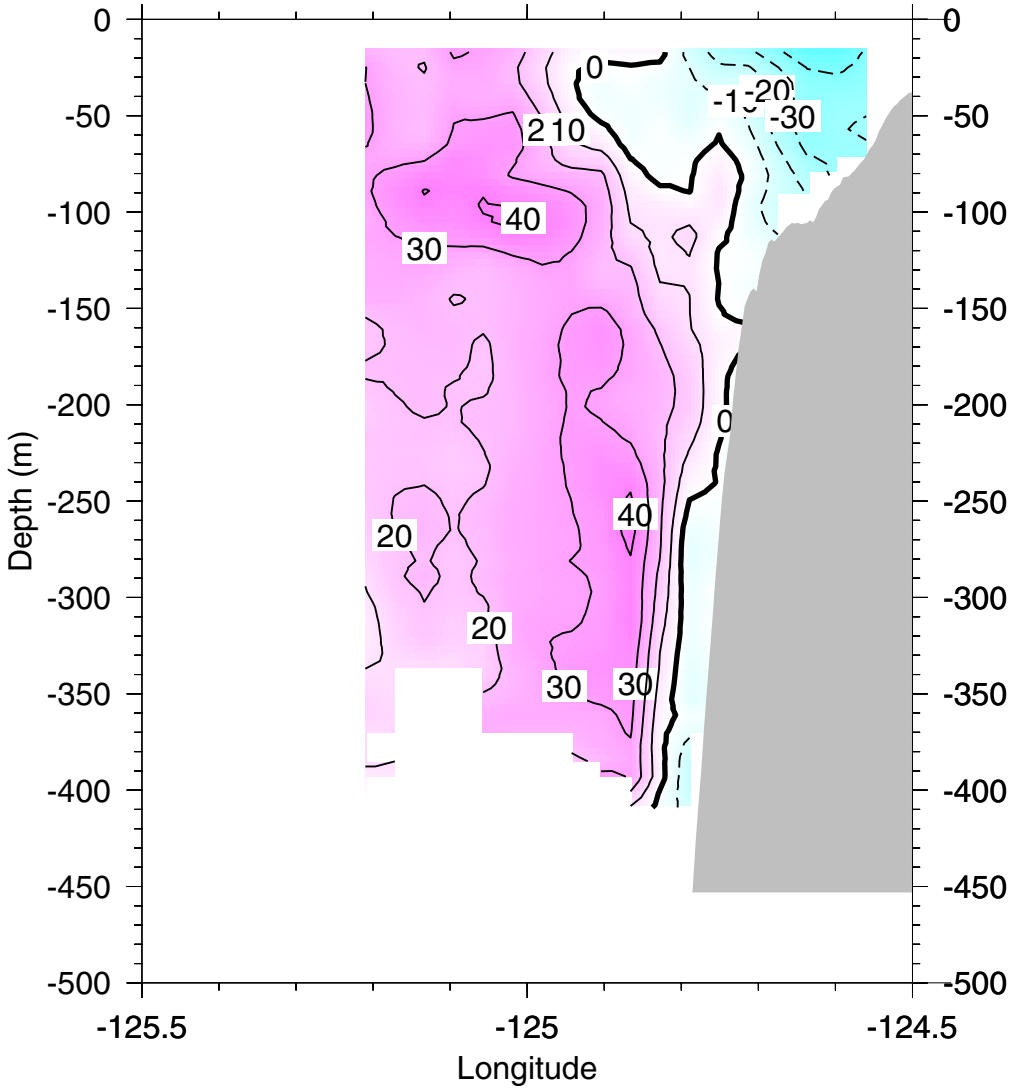
ADCP: Northward current (cm/s)




Rogue River Line 42.5°N

13-14 July 2002

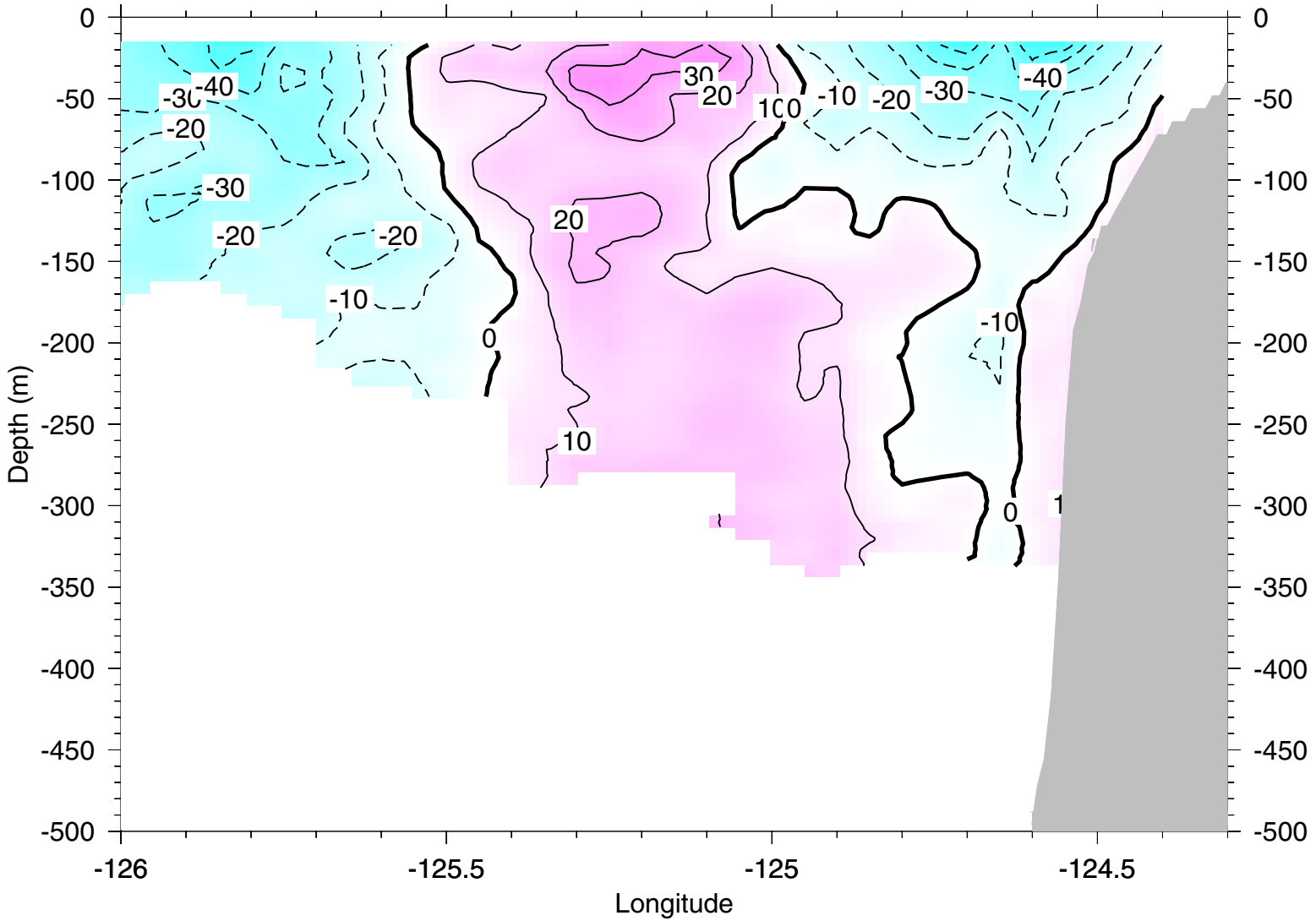
ADCP: Northward current (cm/s)



Crescent City Hydrographic Line 41.9°N

13 July 2002

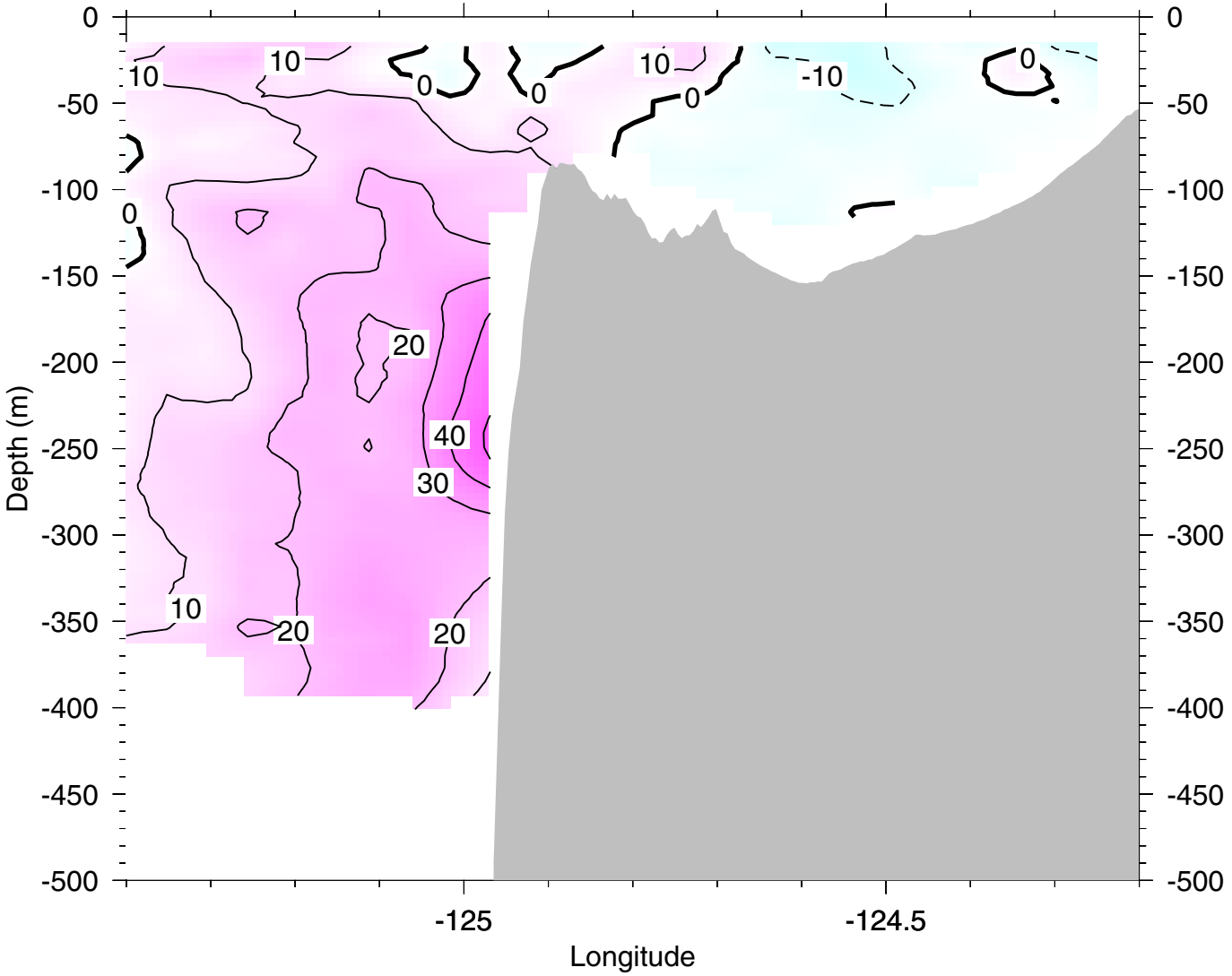
ADCP: Northward current (cm/s)



Heceta Head ADCP Line 44.0°N

14 July 2002

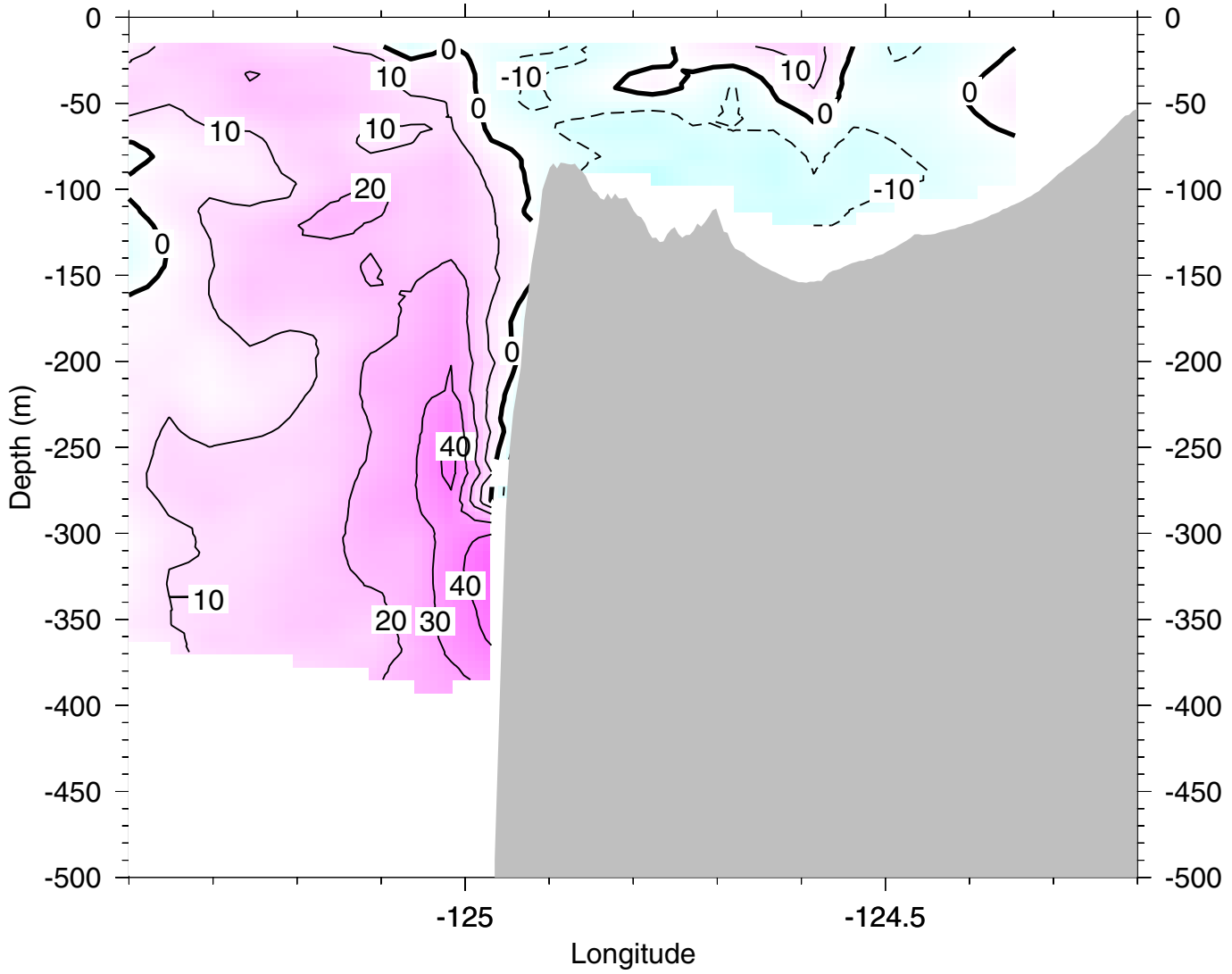
ADCP: Northward current (cm/s)

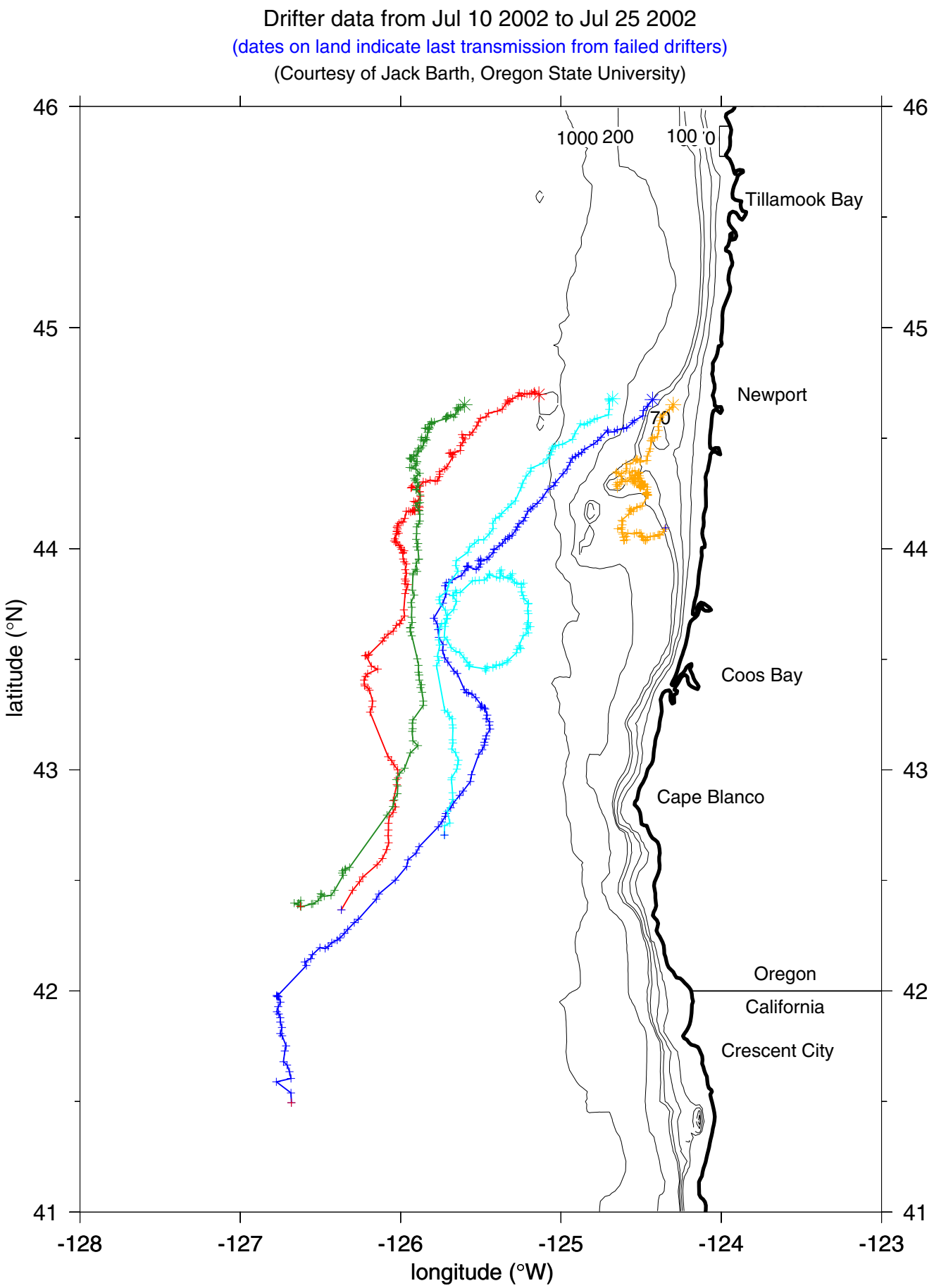


Heceta Head ADCP Line 44.0°N

14-15 July 2002

ADCP: Northward current (cm/s)




Drifter data from Jul 10 2002 to Jul 25 2002
(dates on land indicate last transmission from failed drifters)
(Courtesy of Jack Barth, Oregon State University)
1000
200
100
0
70
Tillamook Bay
Newport
Coos Bay
Cape Blanco
Oregon
California
Crescent City
46
45
44
43
42
41
-128
-127
-126
-125
-124
-123
latitude (°N)
longitude (°W)

## Zooplankton Report

(Submitted by Anders Roestad and Dr. Wm. Peterson, Oregon State University and NOAA)

MOCNESS DESCRIPTIONS (333 μm mesh)

**NH5** 17:18 h (local time) water depth= 60m

| | |
|---|---|
| 50-20 m | furcilia, juvenile euphausiids, copepods, chaetognaths |
| 20-10 m | copepods, furcilia, megalope |
| 10-0 m | copepods, heavy phytoplankton, amphipods |

**NH15** 22:33 h water depth=95m

| | |
|---|---|
| 90-50 m | euphausiids, amphipods, jellies, 4 fish larvae |
| 50-35 m | euphausiids, jellies |
| 35-20 m | euphausiids, jellies, furcilia |
| 20-10 m | furcilia, juvenile euphausiids, euphausiids, 200 Pleurobrachia, jellies |
| 10-0 m | euphausiids, furcilia, Pleurobrachia |

**NH25** 01:25 h water depth=300m

| | |
|---|---|
| 275-200 | jellies, copepods, chaetognaths, amphipods, sergestiids |
| 200-150 | jellies, Clione, juvenile euphausiids, chaetognaths, amphipods |
| 150-100 | jellies, juvenile euphausiids, copepods |
| 100-50 | jellies, ~50 euphausiids, squid, shrimp, |
| 50-35 | euphausiids, furcilia, copepods, chaetognaths, 1 sergestiid |
| 35-20 | euphausiids, crab megalope, Pleurobrachia, 1 squid |
| 20-10 | furcilia, crab megalope, euphausiids, copepods, ~80 Pleurobrachia |
| 10-0 | ~150 euphausiids, ~60 Pleurobrachia, copepods, crab megalope |

**NH35** 04:52 h water depth=450m

| | |
|---|---|
| 350-250 | copepods, jellies, 10 sergestiids, 6 fish larvae, 1 squid |
| 250-200 | euphausiids, chaetognaths, Muggiaea, copepods, 3 sergestiids |
| 200-150 | euphausiids, chaetognaths, Doliolids, copepods |
| 150-100 | 30 euphausiids, copepods, Limacina, amphipods |
| 100-50 | copepods, crab megalope, 2 squid, chaetognaths |
| 50-20 | copepods, crab megalope, jellies |
| 20-10 | Doliolids, copepods, ~10 fish larvae, 10 crab megalope |
| 10-0 | Pleurobrachia, fish larvae, copes |

**NH45** 08:55 h water depth=705 m

| | |
|---|---|
| 350-250 | 30 euphausiids, jellies, chaetognaths, copepods, 5 Myctophids |
| 250-200 | copepods, 20 euphausiids, chaetognaths, Siphonophores, Limacina |
| 200-150 | chaetognaths, copepods, euphausiids, amphipods |

| | |
|---|---|
| 150-100 | copepods, chaetognaths, Limacina |
| 100-50 | copepods, jellies, 10 euphausiids, 7 crab megalope |
| 50-20 | 3 large jellies, copepods, fish larvae, crab megalope, euphausiids, Limacina |
| 20-10 | Doliolids, 1 fish larvae |
| 10-0 | Doliolids, Pleurobrachia, 2 fish larvae |

**FM3** 17:05 h water depth=65m

| | |
|---|---|
| 55-50 | ~100 juvenile euphausiids, ~100 megalope, copepods, chaetognaths |
| 55-20 | jellies, copepods, phytoplankton, furcilia, chaetognaths, ~10 megalope |
| 20-10 | copepods, phytoplankton, ~20 Pleurobrachia, 5 megalope |
| 10-0 | phytoplankton, copepods, 1 Beroe |

**FM4** 15:13 h water depth=95m

| | |
|---|---|
| 91-80 | ~3000 juvenile euphausiids, ~20 adult euphausiids, 1 jelly |
| 80-50 | ~400 juvenile euphausiids, jellies, phytoplankton |
| 50-20 | copepods |
| 20-10 | copepods, juvenile euphausiids, chaetognaths, salps, amphipods |
| 10-0 | phytoplankton, jellies, copes |

**FM5** 13:02 h water depth=165m

| | |
|---|---|
| 155-100 | ~200 adult euphausiids, Pleurobrachia, amphipods, Limacina, fish |
| 100-50 | jellies, ~200 adult euphausiids, amphipods |
| 50-20 | Pleurobrachia, Beroe, furcilia, copepods |
| 20-10 | Pleurobrachia, jellies |
| 10-0 | ~100 Pleurobrachia, jellies, copepods |

**FM7** 08:37 h water depth=341m

| | |
|---|---|
| 325-250 | ~70 adult euphausiids, ~50 sergestiids, chaetognaths, copepods, 6 Myctophids, 2 jellies, 1 squid |
| 250-200 | ~100 adult euphausiids, chaetognaths, copepods, 1 fish larvae |
| 200-150 | ~50 adult euphausiids, chaetognaths, 10 megalope, 7 Clione, 3 squid |
| 150-100 | chaetognaths, copepods, ~10 Clione, 5 Pleurobrachia, 2 fish larvae |
| 100-50 | copepods, ~15 jellies, chaetognaths, Limacina, fish larvae, megalope |
| 50-20 | copepods, jellies, furcilia, 2 megalope, 2 fish larvae, 1 Beroe |
| 20-10 | ~100 Pleurobrachia, Doliolids, amphipods |
| 10-0 | Several types of eggs |

**CR2** 02:40 h water depth=70m

| | |
|---|---|
| 55-35 | ~400 adult euphausiids, ~80 Pleurobrachia, copepods, amphipods |
| 35-20 | Pleurobrachia, adult euphausiids, juvenile euphausiids, furcilia, copepods, amphipods, fish larvae, ~9 jellies |

| | |
|---|---|
| 20-10 | ~800 adult euphausiids, ~100 Pleurobrachia, ~10 fish larvae, 5 amphipods |
| 10-0 | not recorded |

**CR3** 00:55 h water depth=140m

| | |
|---|---|
| 125-100 | ~200 adult euphausiids, 20 Pleurobrachia, 5 jellies, chaetognaths, gas filled siphonophores, amphipods, |
| 100-50 | large jellies, amphipods, juvenile euphausiids, adult euphausiids, gas filled Siphonophores, furcilia, 1 Beroe |
| 50-35 | ~50 adult euphausiids, ~50 Pleurobrachia, gas filled siphonophores, jellies |
| 35-20 | jellies, ~300 Pleurobrachia, ~200 adult euphausiids |
| 20-10 | ~200 Pleurobrachia, ~50 adult euphausiids, jellies, gas filled siphonophores, Beroe |
| 10-0 | ~200 Pleurobrachia, ~100 adult euphausiids, ~100 gas filled siphonophores, 4 Beroe, 20 amphipods, 10 megalope, 1 squid |

**CR4** 14:30 h water depth=520m

| | |
|---|---|
| 350-250 | jellies, 1 squid, 2 shrimp, copepods |
| 250-200 | 30 adult euphausiids, chaetognaths, 5 shrimp, 1 Myctophid |
| 200-150 | ~200 adult euphausiids, chaetognaths, 1 Beroe |
| 150-100 | ~200 adult euphausiids, 5 Beroe, copepods, furcilia |
| 100-50 | ~200 Pleurobrachia, ~200 adult euphausiids, 4 Beroe, copepods |
| 50-35 | ~300 adult euphausiids, 20 Pleurobrachia, 5 megalope |
| 35-20 | ~400 adult euphausiids, 12 Pleurobrachia, 3 fish larvae |
| 20-10 | ~500 adult euphausiids, furcilia, chaetognaths, Pleurobrachia, copepods |
| 10-0 | ~3000 adult euphausiids, ~10 Beroe, Pleurobrachia, chaetognaths, Limacina, Salps, ~20 fish larvae |

**RR2** 09:50 h water depth=86m

| | |
|---|---|
| 70-50 | ~200 Pleurobrachia, ~100 jellies, ~50 adult euphausiids, copepods, Clione |
| 50-20 | Pleurobrachia, jellies, copepods, amphipods, adult euphausiids, Limacina |
| 20-10 | ~200 Pleurobrachia, ~50 jellies, ~20 adult euphausiids, |
| 10-0 | copepods, ~20 Pleurobrachia, 1 Beroe |

**RR3** 11:37 h water depth=160m

| | |
|---|---|
| 150-100 | Pleurobrachia, adult euphausiids, jellies, copepods, fish larvae |
| 100-50 | ~50 Beroe, Pleurobrachia, juvenile euphausiids |
| 50-35 | ~20 Beroe, ~100 adult euphausiids, ~30 Pleurobrachia, copes |
| 35 | ~80 Beroe, adult euphausiids, 2 fish larvae |
| 35-20 | ~50 Beroe, Pleurobrachia, adult euphausiids, fish larvae, shrimp |
| 20-10 | 12 Beroe, ~40 Pleurobrachia, ~100 adult euphausiids |
| 10-0 | ~150 Pleurobrachia, 20 Beroe, 20 adult euphausiids, fish larvae |

**RR4** 14:10 h water depth=684m

| | |
|---|---|
| 350-250 | Copepods, ~200 adult euphausiids, chaetognaths, ~50 Shrimp, 20 Clione, 12 Myctophids, crab megalope |
| 250-200 | jellies, shrimp, adult euphausiids, chaetognaths |
| 200-150 | 20 adult euphausiids, 15 jellies, chaetognaths, amphipods, 25 Clione |
| 150-100 | 20 Beroe, 30 Pleurobrachia, ~100 adult euphausiids, chaetognaths, Doliolids, Clione, amphipods, megalope |
| 100-50 | ~175 Pleurobrachia, ~50 adult euphausiids, 10 Beroe, ~20 jellies, ~20 fish larva, copepods, 1 squid |
| 50-20 | Doliolids, ~500 Pleurobrachia, furcilia, phytoplankton |
| 20-10 | phytoplankton, ~200 Pleurobrachia, furcilia, jellies |
| 10-0 | phytoplankton, 9 Pleurobrachia, adult euphausiids, amphipods |

**HH2** 04:07 h water depth=120m

| | |
|---|---|
| 105-50 | ~100 adult euphausiids, copepods, jellies, fish larvae |
| 50-35 | ~30 adult euphausiids, ~20 Pleurobrachia, 10 jellies, 4 Beroe, 2 fish |
| 35-20 | ~500 juvenile euphausiids, copepods, megalope, 5 Beroe |
| 20-10 | ~800 juvenile euphausiids, ~200 Pleurobrachia, ~75 adult euphausiids, 20 megalope, 5 fish larvae |
| 10-0 | juvenile euphausiids, adult euphausiids, furcilia, Pleurobrachia, megalope, 2 Beroe, copepods |

**HH3** 02:06 h water depth=155m

| | |
|---|---|
| 135-100 | jellies, ~100 adult euphausiids, copepods |
| 100-50 | ~200 adult euphausiids, furcilia, 4 Beroe, 2 fish larvae |
| 50-35 | ~150 adult euphausiids, euphausiid eggs, 2 Beroe |
| 35-20 | jellies, ~150 adult euphausiids, euphausiid eggs, megalope |
| 20-10 | jellies, copepods, ~20 adult euphausiids, Limacina |
| 10-0 | jellies, adult euphausiids, Pleurobrachia, furcilia |

**HH4** 00:25 h water depth=111m

| | |
|---|---|
| 100-50 | copepods, ~150 adult euphausiids, chaetognaths, 3 Pleurobrachia, 3 jellies |
| 50-35 | Amphipods, 20 jellies, 20 adult euphausiids, euphausiid eggs |
| 35-20 | copepods, 12 jellies, 20 Pleurobrachia, 12 adult euphausiids, amphipods |
| 20-10 | ~100 adult euphausiids, 30 Pleurobrachia, euphausiid eggs |
| 10-0 | ~200 adult euphausiids, Pleurobrachia, 12 megalope |

**HH5** 18:32 h water depth=943m

| | |
|---|---|
| 350-250 | ~50 shrimp, ~50 adult euphausiids, amphipods, 4 Myctophids, 2 squid |
| 250-200 | 20 shrimp, 15 adult euphausiids, copepods, chaetognaths, Muggiaea |
| 200-150 | copepods, ~50 adult euphausiids, 1 shrimp, chaetognaths, 1 squid |

| | |
|---|---|
| 150-100 | ~350 adult euphausiids, jellies, copepods, furcilia, chaetognaths, megalope |
| 100-50 | copepods, ~40 squid, 30 adult euphausiids |
| 50-20 | copepods, 30 adult euphausiids, jellies, juvenile euphausiids, 1 fish |
| 20-10 | copepods, phytoplankton, 40 Pleurobrachia |
| 10-0 | euphausiid eggs, copepods, 1 Pleurobrachia |

**HH5a** 22:04 h water depth=946m

| | |
|---|---|
| 350-250 | copepods, 12 sergestiids, chaetognaths, squid, 2 fish larvae |
| 250-200 | copepods, Sergestiids, salps, chaetognaths, jellies |
| 200-150 | ~100 Sergestiids, ~50 adult euphausiids, copepods, chaetognaths |
| 150-100 | ~100 Sergestiids, ~100 adult euphausiids, chaetognaths, 5 Pleurobrachia, 12 Muggiaea, 1 fish larvae |
| 100-50 | ~100 Sergestiids, jellies, copepods, juvenile euphausiids, 20 megalope |
| 50-35 | copepods, ~20 Sergestiids, ~30 adult euphausiids, 1 squid |
| 35-20 | ~100 Sergestiids, ~50 adult euphausiids, jellies, furcilia, copepods, 1 Myctophids |
| 20-10 | ~400 adult euphausiids, ~100 Sergestiids, 10 Pleurobrachia, copepods, 2 Beroe, 3 fish |
| 10-0 | copepods, 30 Pleurobrachia, Sergestiids, furcilia, adult euphausiids, 2 Beroe, amphipods |

**Other zooplankton sampling:**
Vertical net tows(200µm mesh) from 100 meters (or from just above bottom) to surface were completed at stations NH1, NH5, NH10, NH15, NH20, NH25, NH35, NH45, NH65, FM2, FM3, FM4, FM5, FM7, FM8, FM9, CR1, CR2, CR3, CR4, CR6, CR7, CR9, RR1, RR2, RR3, RR4, RR6, RR7, HH1, HH2, HH3, HH4 and HH5.

Molting rate, egg production and gut fluorescence experiments on euphausiids were conducted at CR4. We also did an egg production experiment at HH4 and a gut fluorescence experiment at NH25.

## Microzooplankton Sampling

(Submitted by Carlos López and Drs. E. and B. Sherr, Oregon State University)

**July 9-15, 2002 GLOBEC CRUISE W0207A:**

**Primary goal: MICROZOOPLANKTON ABUNDANCE, BIOMASS, AND GENERAL TAXONOMIC COMPOSITION:**

**MICROPROTIST (10 – 200 µm sized heterotrophic protists) BIOMASS -**

A) Epifluorescence samples: preserve with Lugol's +Na thiosulfate+ formalin, filter 100 ml subsamples onto 3 µm black filters, stain with DAPI, mount on labeled slide, freeze in slide box.

B) Settling samples: Add 23 ml acid Lugol solution to 240 ml (8 oz) labeled amber bottle, add 207 ml seawater sample, gently mix, cap tightly, store in boxes for later inspection via inverted light microscopy.

**Secondary goal: ABUNDANCE OF PHYTOPLANKTON AND BACTERIA**

Flow cytometry samples: pipette 3 ml of sample into 4 ml labeled cryovial, add 120 µl of unfrozen, 25% glutaraldehyde (0.5% final conc), cap & mix using vortex mixer, store in liquid nitrogen shipper for later analysis via flow cytometry.

**SAMPLING STRATEGY:**

Focus on upper 100 m, with emphasis on 0-50 m depth zone, including chlorophyll-a maximum.

Depths to sample: 6 depths per cast

- Depth of chlorophyll-a maximum (will vary from cast to cast)
- 70 m – 100 m depth
- 4 other depths in upper 50 m, more or less evenly spaced; may want to sample the depth nearest the chlorophyll maximum depth

**Table 5:** Actual sample depths for collection of microzooplankton samples for bacterial counts (Flow Cytometry), dinoflagellate counts (Epifluorescence Microscopy), and ciliate counts (Inverted Scope Microscopy) during the W0207A.

| Station | Sample Collection Depths (m) |
|---|---|
| NH-1 | 23.7, 1 |
| NH-3 | 44, 12, 1 |
| NH-5 | 50, 25, 15, 10, 5.4 |
| NH-10 | 40, 5, 3 |
| NH-15 | 85, 60, 30, 20, 10, 4 |
| NH-25 | 70, 40, 30, 17, 10, 2 |
| NH-35 | 69, 49, 27, 20, 9.1, 1 |
| NH-45 | 70, 50, 37, 30, 20, 10 |
| NH-65 | 70, 50, 38, 30, 20, 10 |
| NH-85 | 70, 50, 36, 30, 20, 10 |

No. of Samples = 48

| | |
|---|---|
| FM-1 | 25, 5.1 |
| FM-3 | 50, 29, 15, 9.7, 4.9, 2 |
| FM-4 | 70, 50, 30, 20, 10, 5 |
| FM-5 | 70, 50, 40, 30, 20, 10, 1 |
| FM-7 | 70, 50, 40, 30, 21, 9.9 |
| FM-8 | 70, 50, 35, 30, 19.6, 10 |
| FM-9 | 50, 40, 35, 30, 20, 10 |

No. of Samples = 39

| | |
|---|---|
| CR-1 | 30, 20, 15, 10, 5, 2 |
| CR-3 | 50, 30, 20, 15, 10, 5 |
| CR-4 | 70, 49, 40, 29, 19, 10, 2 |
| CR-5 | 100, 69, 49, 40, 30, 20, 10 |
| CR-7 | 100, 70, 50, 40, 29, 22, 9.4 |
| CR-9a | 150, 100, 70, 50, 43, 30, 20, 10 |
| CR-11 | 50, 37, 30, 20, 10, 2.4 |

No. of Samples = 47

| | |
|---|---|
| RR-1 | 31, 25, 20, 14.5, 10, 4.8, 1.9 |
| RR-2 | 81, 60, 40, 20, 10, 5, 1.2 |
| RR-3 | 90, 60, 50, 30, 20, 15, 5 |
| RR-4 | 70, 50, 40, 30, 20, 10, 1 |
| RR-6 | 100, 70, 60, 50, 40, 30, 20, 10 |
| RR-7 | 70, 49, 40, 30, 25, 20, 10, 1.2 |

No. of Samples = 44

Table 5 cont.

| | |
|---|---|
| HH-1 | 40, 20, 5.3 |
| HH-2 | 60, 30, 10, 1.5 |
| HH-3 | 70, 40, 20, 10, 2 |
| HH-4 | 60, 40, 20, 10, 2 |
| HH-5 | 70, 50, 40, 30, 20, 9, 1 |
| HH-7 | 70, 50, 40, 30, 20, 19, 10, 2 |
| HH-9 | 70, 50, 40, 30, 18, 10, 2 |

No. of Samples = 37