Preliminary Report
of
The Hakuho Maru Cruise KH-94-2
(Leg 3)

June 16, 1994 — July 7, 1994
(Eel Cruise VI)

KH-94-2

EEL CRUISE
1994

OCEAN
RESEARCH
INSTITUTE
UNIVERSITY OF TOKYO

Ocean Research Institute
University of Tokyo
1995

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By
The Scientific Members of the Expedition

Edited by
Tadashi Inagaki and Katsumi Tsukamoto

Contents

I. Preface

Interest and speculation about the spawning area of the Japanese eel, *Anguilla japonica*, began in the 1930s, however surveys of the spawning area have only recently been carried out starting in about 1970. Initially the spawning area was considered to be located in the eddy region of the Kuroshio countercurrent, east of Taiwan and the Ryukyu islands, and south of the Daito islands. Based on the collection data of several investigations, the hypothesized spawning area was then thought to be located further south and then to the east. This progression of hypotheses about the location of the spawning area was based on the catches of smaller eel larvae, or leptocephali, in the south and then catches of even smaller leptocephali further to the east. At last, in July 1991 during a cruise of Hakuho Maru that surveyed a large area between 10° -22° N and 131° -155° E, a large number of small leptocephali about 10 mm TL were collected, and the spawning area was identified as being at 15° N and 140° E, which is in the northern edge of the North Equatorial Current. This discovery ended the more than half a century period of speculation and searching for the general spawning area of the Japanese eel. However, it remained to be determined if there were other spawning areas, if eels spawn at that location every year, at what depths do the adults migrate and at what depths does spawning occur?

Since 1973 the Hakuho Maru conducted five cruises in search of the spawning area of the Japanese eel. Accordingly, this cruise is the sixth survey of this series and was conducted in the Philippine Sea as the third leg of the KH-94-2 cruise. There were two objectives of this leg of the cruise. The first was to confirm the location of the spawning area that was determined during the 1991 cruise, and the second was to know the spawning depth by determining the patterns of vertical distribution of eggs and small larvae at the spawning site.

We collected 1,110 *A. japonica* leptocephali of 11-31 mm TL, and this doubled the total number of specimens of this species that have been collected. The collections during this cruise verified the location of the spawning area. The abundance of leptocephali collected during this cruise enabled physiologists, neurobiologists and population geneticists to start new lines of research not previously possible due lack of material. We also succeeded in observing the daily vertical migration pattern of *A. japonica* leptocephali using MTD net tows. This success together with the trial use of deep tows expands our research horizons to the bottom of the deep sea and changed the flow of our research efforts from analyzing horizontal distributions to a more 3-dimensional approach. Furthermore, we found from otolith analyses that eels may not spawn continuously, but may spawn periodically and that their distributions and size ranges of leptocephali suggest strongly that they have very patchy distributions. This information is essential for the planning of the next cruise. We believe that such results and the various discussions held during the cruise may not only contribute to the clarification of the reproductive ecology and early life history of eels, but will also provide valuable information for the development of techniques for artificial maturation of adult eels, egg production and rearing of larvae for aquaculture.

A total of 27 scientists participated in this cruise, including four foreign eel biologists from Korea, Taiwan, United States and Hong Kong, and there was a great diversity in the research specialties of the participants, such as ecology, fisheries, reproductive physiology, neurophysiology, morphology, taxonomy, hydroacoustics and physical oceanography. This team also included scientists who engaged in the artificial maturation of adult eels on board the ship. This cruise was very busy and dynamic because more than 50 % of the scientists were graduate students with ongoing research during the cruise, which created an energetic and stimulating atmosphere beyond that of previous eel cruises. All participants took part in towing nets, water sampling, CTD observations, sorting samples and data analysis, as well as discussions about the determination of the sampling strategy for the final stage of the cruise. As in previous eel cruises we had a "Seminar at Sea Series" of research presentations on board the ship, and 13 presentations were given, which included active discussions in English as well as Japanese.

In spite of a lot of night sampling during this eel cruise, Captain Y. Jinno and his crew helped us in nautical management, deployment of research gear and in the activities of daily life on board Hakuho Maru. Conversations with the officers on the bridge in the morning also provided many insights on important aspects of our research activities that helped us reach our goals. Dr. Hiroshi Inada, Tokyo University of Fisheries, made the eel traps used during the cruise. The staff of the Ocean Research Institute, University of Tokyo, helped us in various aspects of planning and conducting the cruise. Our cruise was also

supported in part by Noboritei Company Limited, Kashima Construction Company Limited and Kenko Mayonnaise Company Limited. The success of our cruise in obtaining fruitful results with no accidents or difficulties are due to the encouragement and assistance of the people and organizations mentioned above. On behalf of all the scientists aboard, I express our sincere thanks to those who made this cruise a success.

Katsumi TSUKAMOTO

The Chief Scientists Cabin, 6 July 1994
The evening before reaching Tokyo Harbor

Scientists aboard on the Hakuho Maru cruise, KH-94-2 Leg. 3.

II. Outline of the cruise

K. Tsukamoto, T. Otake, H. Hasumoto, T. Inagaki and M. Oya

Although the R/V Hakuho Maru surveyed a large area between 10° - 22° N and 131° -155° E in the previous cruise in 1991, the effort of this cruise was concentrated in a comparatively narrow area between 13° -17° N and 134° -141° E (Fig. 1) since we have only limited days for survey and have already known the outline of the spawning area of *A. japonica*. This sixth eel expedition was a 22 day cruise starting on 16 June 1994 from Yokohama and ending in Tokyo on 7 July 1994, covering 4060 nautical miles (7520 km: Fig. 2). We were blessed with good weather and we were able to accomplish all the scheduled activities. Four transects including fifteen routine stations were set in the survey area (Fig. 2) and optional stations, S1-S5, were added. At st.4 an intensive observation was made to determine the diel vertical migration of the eel larvae. During the cruise we made 79 IKMT tows, 31 ORI oblique tows, 16 ORI surface tows, 6 MTD tows and 72 NORPAC tows, for a total of 204 tows. We also made 28 CTD casts including one cast to a depth of 5,000 m. ADCP observation was also made to estimate the surface flow at each station. Also noteworthy, was the testing of new sampling strategies of fishing with the IKMT to depths of 4,000 m and the deployment of eel traps both on the bottom and from the surface to 1,000 m.

Scientists aboard was listed in Table 1. This team consisted of four foreign biologists from Korea, Taiwan, United States and Hong Kong, and 23 Japanese scientists.

EEL CRUISE

OCEAN RESEARCH INSTITUTE
UNIVERSITY OF TOKYO

Table 1 Scientists aboard

* TSUKAMOTO Katsumi	Ocean Res. Inst., Univ. of Tokyo
SUZUKI Yuzuru	Fac. Agr., Univ. of Tokyo
NISHIDA Shuhei	Ocean Res. Inst., Univ. of Tokyo
OTAKE Tsuguo	Ocean Res. Inst., Univ. of Tokyo
HASUMOTO Hiroshi	Ocean Res. Inst., Univ. of Tokyo
INAGAKI Tadashi	Ocean Res. Inst., Univ. of Tokyo
OYA Machiko	Ocean Res. Inst., Univ. of Tokyo
CHAE Zinho	Ocean Res. Inst., Univ. of Tokyo
SAKAKURA Yoshitaka	Ocean Res. Inst., Univ. of Tokyo
AOYAMA Jun	Ocean Res. Inst., Univ. of Tokyo
YAMAGUCHI Motoomi	Ocean Res. Inst., Univ. of Tokyo
NAGAE Masaki	Fac. Fish., Hokkaido Univ.
IJIRI Shigeho	Fac. Fish., Hokkaido Univ.
OKUMURA Hiromi	Fac. Fish., Hokkaido Univ.
UEMATSU Kazumasa	Fac. Appl. Biol. Sci., Hiroshima Univ.
YOSHIDA Masayuki	Fac. Appl. Biol. Sci., Hiroshima Univ.
TOMODA Hidekazu	Fac. Appl. Biol. Sci., Hiroshima Univ.
MOCHIOKA Noritaka	Fac. Fish., Kyushyu Univ.
KAWAKAMI Yutaka	Fac. Fish., Kyushyu Univ.
OKI Daiju	Fac. Fish., Nagasaki Univ.
UCHIDA Takashi	Fac. Fish., Kagoshima Univ.
WATANABE Shun	Fac. Fish., Kagoshima Univ.
Kawamura Nobuko	Fac. Sci., Kagoshima Univ.
LEE Tae-Won	Dept. Oceanogr., Chungnam Nat. Univ.
KUO Chin-Lau	Taiwan Fish. Res. Inst.
MILLER J. Michael	Dept. Oceanogr., Univ. of Main
CHAN Kwok-Kuen	Dept. Zool., Univ. of Hong-Kong

*Chief Scientist

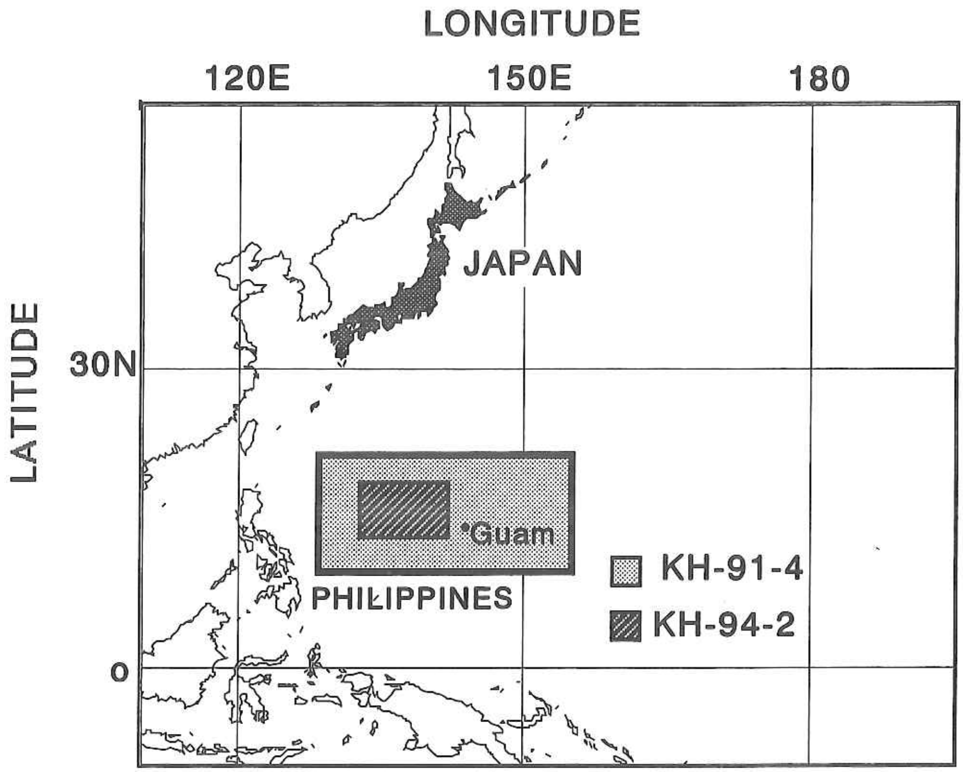


Fig. 1 Survey areas in KH-91-4 and KH-94-2.

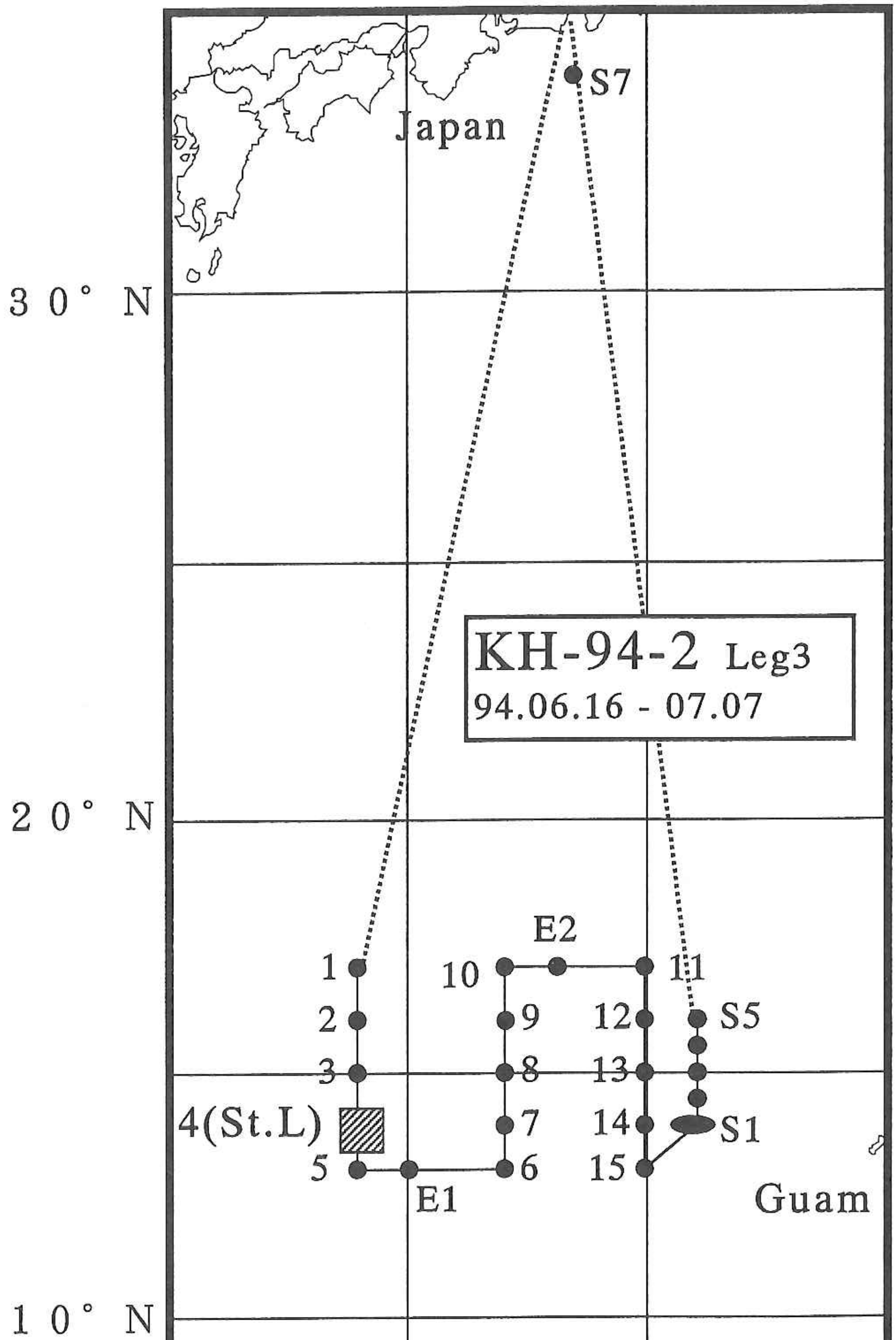


Fig. 2 Track chart and observation stations of the KH-94-2 cruise.

Ⅲ. Hydrographic structure of the spawning area of Japanese eel *Anguilla japonica*

Hiroshi Hasumoto and Tadashi Inagaki

During the cruise (KH-94-2) of the research vessel Hakuho-maru of the Ocean Research Institute, 1000m depth hydrographic observations consisting of conductivity, temperature and depth measurements were carried out at 21 stations to use CTDO (Sea-Bird's 911 plus), and measurements of current were carried out to use Acoustic Doppler Current Profiler (Furuno Electric Co.,LTD), for analysis hydrographic structure in the spawning area of Japanese eel. The large number of leptocephalus of Japanese eel were collected at station 4, and CTDO observations were carried out six times to upper 500m depth. The data were collected along four transects to locate every 1° latitude running in a north - south direction from 13°-17°N, between 134°-141°E in the North Equatorial Current(NEC). The original data is summarized in table as appendix and these figures are shown in Figure 1 (a)-(d).

Temperature and salinity of surface layer in the study area were commonly higher than 29°C and lower than 34.3 p.s.u. respectively, and the thickness of surface mixing layer was ca. 50m(Fig.1). Low salinity water of surface layer are created to dilute by precipitation. The salinity front on the sea surface were observed between station 1(17°N) and station 2(16°N) in the transect 1(134°E). According to the former cruise(KH-91-4 Cruise Report 1994), the salinity front were observed at 16°N along 137° E, and the large number of leptocephali were collected the location of south of the salinity front. In this cruise, the large number of leptocephali were collected the south of the salinity front at station 4(14°N) in the transect 1. Results of the former and this cruise, we can consider that the location of south of this salinity front has significant for the correction of younger leptocephali. In another transects, the salinity front were not observed. However, we can consider that those are the existence of the more northern part of research area.

Under the surface layer, from 150m to 200m depth, there are the high salinity (>34.8 practical salinity units(p.s.u.)) water which are created by resulting from high evaporation, and its water mass are called the tropical water. Below the tropical water (deeper than 300m depth), there are low salinity (34.2-34.4 p.s.u.) water, and its water mass are called the North Pacific intermediate water.

The geostrophic current velocities were calculated from the temperature and salinity data, taking the 1000m depth as the reference level of no motion. According to the geostrophic current velocity (Fig.2(a)-(d)), the current velocity was the greatest eastward flow (>24cm/s) at station 1 (17° N) in the transect 1, although the result of ADCP showed a swift flow of north-eastward. The other transects of current velocities of eastward were showed less than 2cm/s in deeper 500m depth except for the station S5(>18cm/s). The current velocities in this research area were almost westward current and a conspicuous the westward current are showed at station 5 (>24cm/s), 6 (>18cm/s), 10 (>18cm/s), 11 (>20cm/s) and 15 (>24cm/s).

These rapid current of westward are better condition for the transport of the Japanese eel larvae in the spawning area.

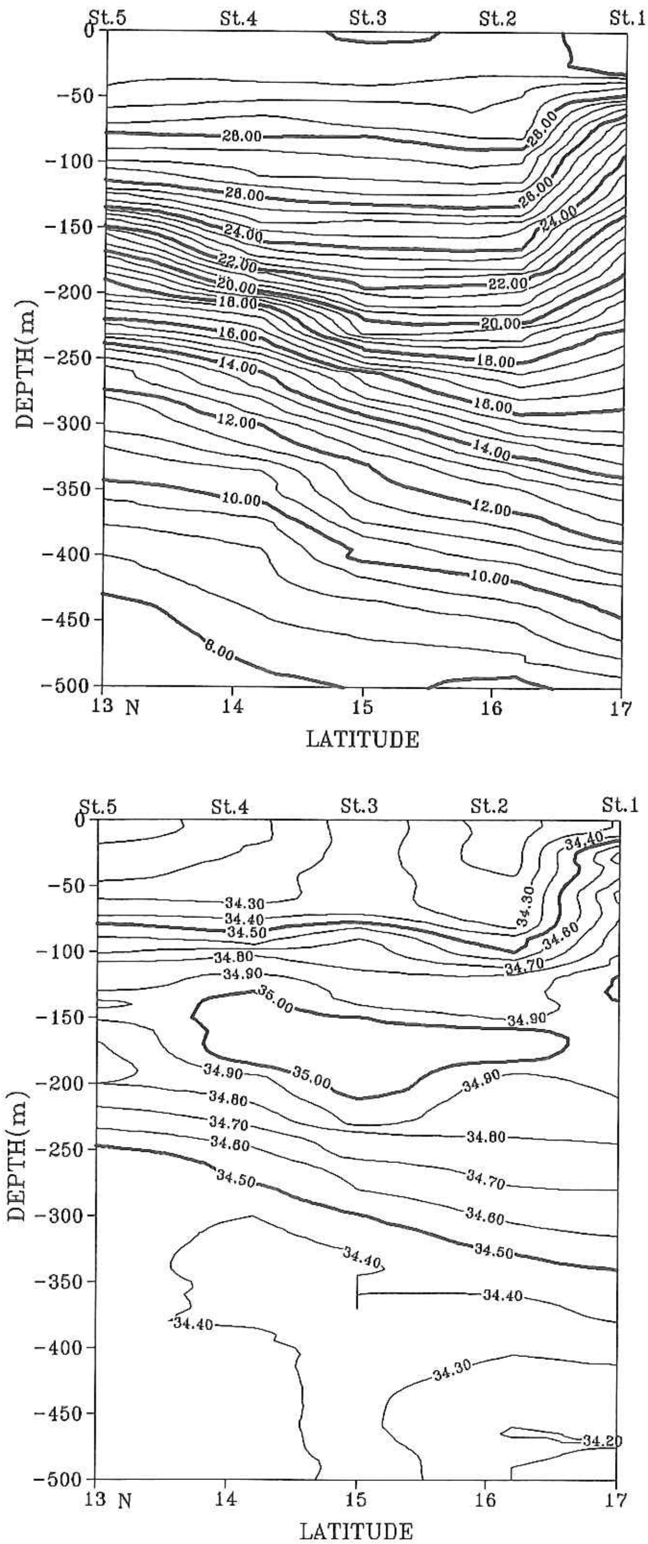


Fig. 1 (a) Temperature and salinity sections along 134° E.

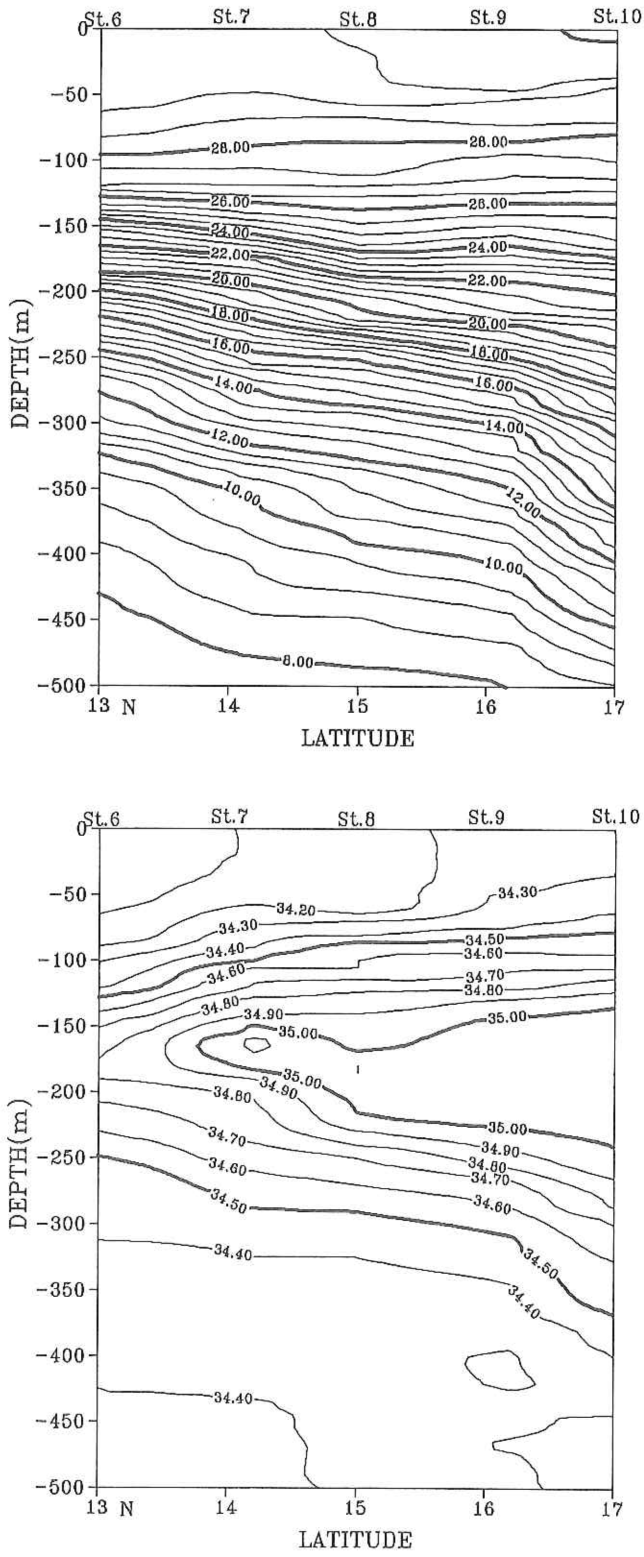
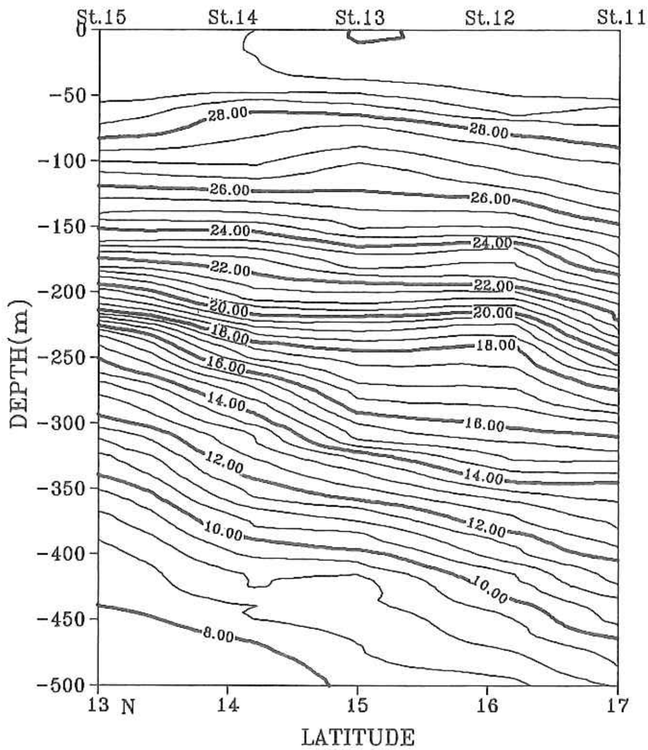


Fig. 1 (b) Temperature and salinity sections along 137° E.



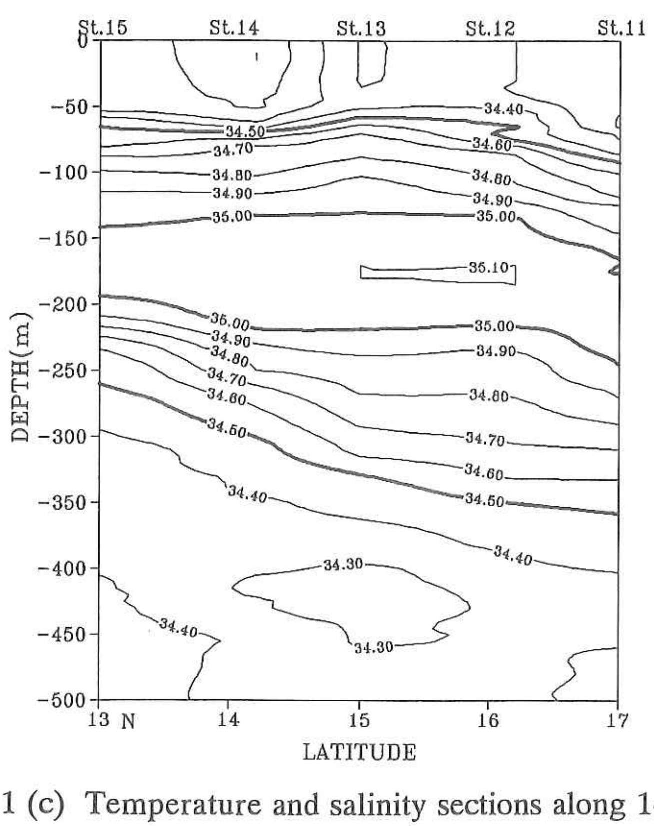
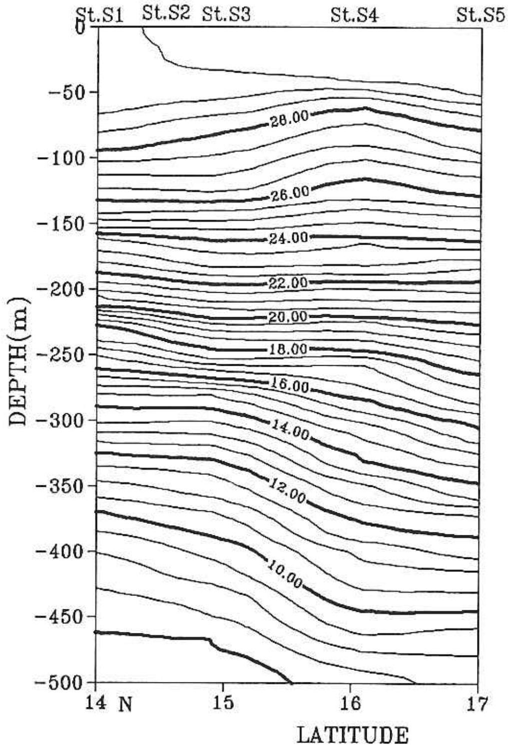


Fig. 1 (c) Temperature and salinity sections along 140° E.



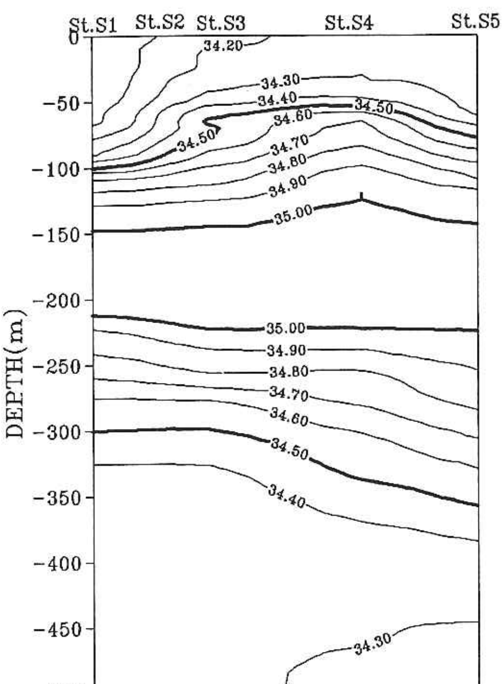


Fig. 1 (d) Temperature and salinity sections along 141° E.

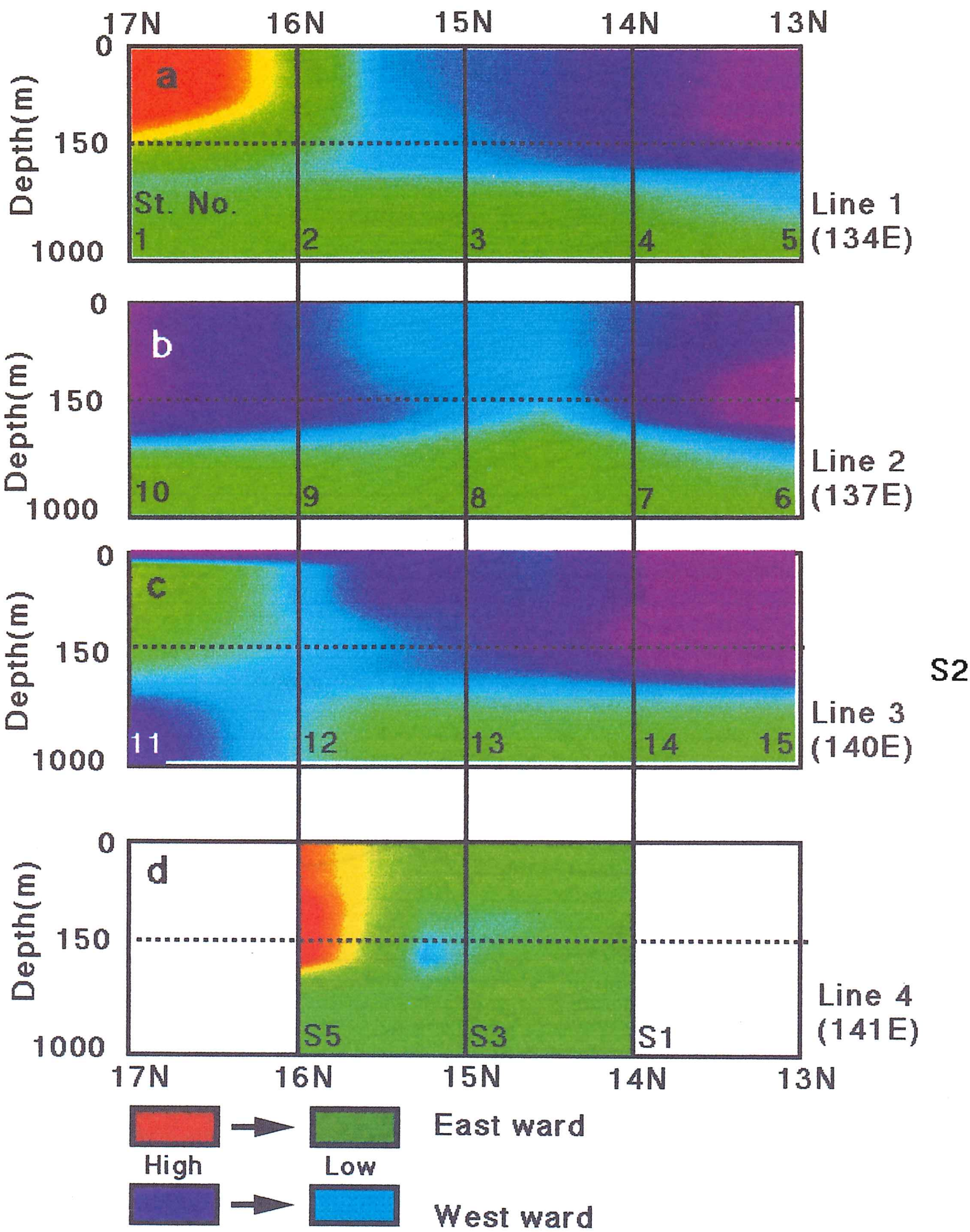


Fig. 2 (a)-(d) Geostrophic current velocities.

IV. Leptocephalus Biology

Anguilla japonica leptocephali collected during KH-94-2

K. Tsukamoto

A. total of 1110 leptocephali of *Anguilla japonica* were collected by 41 tows at 11 stations. These larvae ranged from 10.6 mm to 31.1 mm in total length and the mean ± SD was 20.7 ± 1.92 mm (Fig. 1). About 70 % of the larvae was 19-23 mm size classes. At St. 4 (14°N 134°E; Fig. 2 of II) where an intensive survey was made, 1071 leptocephali (96.5 %of total catch) were collected at high CPUE value (396 leptocephali per night horizontal tow, whereas only one or two leptocephali occurred at the neighboring stations (St. 3; 13°N 134°E and St. 5; 15°N 134°E). This strongly suggested that leptocephali of about 20 mm TL had very patchy distributions. At St. 13 (15°N 140°E) which was estimated as the spawning area of *A. japonica* in the previous cruise in 1991, two small larvae of 11.3 and 12.0 mm in TL occurred. All these data apparently showed that the Japanese eel spawned at the same place in the Philippine Sea in 1994 as well as in 1991. Thus, we could confirm the location of the spawning area that was determined during the 1991 cruise. However, we could not collect any eel eggs during the cruise.

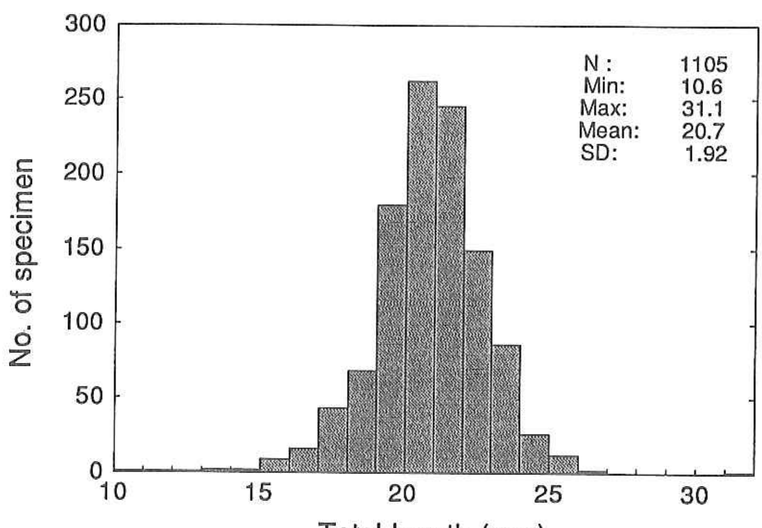


Fig. 1 Frequency distribution of total length of *A. Japonica* collected in KH-94-2.

Morphology and taxonomy of *Anguilla japonica* leptocephali

Noritaka Mochioka, Tsuguo Otake and Katsumi Tsukamoto

A total of 1,110 *Anguilla japonica* leptocephali, ranging from 11.3 to 31.1 mm in total length, were collected during the cruise. Catalogue number, collection data, and body size of the leptocephali are shown in Table 1.

These leptocephali are characterized by having an oliveleaf shape, normal eye, head and jaw suspension, simple straight gut without thickenings, loops or arches, absence of melanophores except eye and at the tip of tail, anus near three-quarters body length. These characters fit only the Anguillidae (Smith 1989). According to Matsui (1972), five Anguilla species found in the North Pacific, and they have the following vertebral number: *Anguilla japonica*, 112-119; *A. marmorata*, 100-110; *A. celebecensis*, 101-107; *A. bicolor pacifica*, 103-110; *A. obscura*, 101-107. The present leptocephali have 112-118 total myomeres, and last vertical blood vessel usually lying at about 44-46th myomere. These characteristics fit only *Anguilla japonica* Temminck et Schlegel in the western North Pacific (Jespersen, 1942; Castle, 1963; Tabeta and Takai, 1975; Tabeta and Mochioka, 1988).

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Jespersen, P. 1942. Dana Rep. 22, 1-128.
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Tabeta, O. and T. Takai. 1975. Nippon Suisan Gakkaishi, 41, 137-145.
Tabeta, O. and N. Mochioka. 1988. Nippon Suisan Gakkaishi, 54, 935-940.

Table 1. Catalogue number, collection data, and total length of body of *Anguilla japonica* leptocephali.

TL, total length; Pres., method of preservation, 1: in 5 % formalin, 2: others.

* IKPT: An IKMT (Isaacs-Kidd Mid Water Trawl) for zooplankton sampling, with 0.5 mm or 1.0 mm mesh aperture.

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pros.
1	1994/6/20	3D	IKPT-O	1	18.6	1
2	1994/6/20	3N	IKPT-O-1	1	19.1	1
3	1994/6/21	4N	IKPT-O	1	21.3	1
4	1994/6/21	4N	IKPT-O	2	19.3	1
5	1994/6/21	4N	IKPT-O	3	18.4	1
6	1994/6/21	4N	IKPT-O	4	19.2	1
7	1994/6/21	4N	IKPT-O	5	20.5	1
8	1994/6/21	4N	IKPT-O	6	23.0	1
9	1994/6/21	4N	IKPT-O	7	20.3	1
10	1994/6/21	4N	IKPT-O	8	16.2	1
11	1994/6/21	4N	IKPT-O	9	20.1	1
12	1994/6/21	4N	IKPT-O	10	18.1	1
13	1994/6/21	4N	IKPT-O	11	14.0+	1
14	1994/6/21	4N	IKPT-O	12	19.2	1
15	1994/6/21	4N	IKPT-O	13	20.1	1
16	1994/6/21	4N	IKPT-O	14	20.3	1
17	1994/6/21	4N	IKPT-O	15	17.5	1
18	1994/6/21	4N	IKPT-O	16	19.2	2
19	1994/6/21	4N	IKPT-O	17	16.5	2
20	1994/6/21	4N	IKPT-O	18	23.5	2
21	1994/6/21	4N	IKPT-O	19	21.3	2
22	1994/6/21	4N	IKPT-O	20	21.8	2
23	1994/6/21	4N	IKPT-O	21	20.5	2
24	1994/6/21	4N	IKPT-O	22	20.0	2
25	1994/6/21	4N	IKPT-O	23	19.5	2
26	1994/6/21	4N	IKPT-O	24	20.8	2
27	1994/6/21	4N	IKPT-O	25	19.8	2
28	1994/6/21	4N	IKPT-O	26	19.8	2
29	1994/6/21	4N	IKPT-O	27	17.0	2
30	1994/6/21	4N	IKPT-O	28	19.3	1
31	1994/6/21	4N	IKPT-H-1	1	20.5	2
32	1994/6/21	4N	IKPT-H-1	2	16.7	2
33	1994/6/21	4N	IKPT-H-1	3	21.8	2
34	1994/6/21	4N	IKPT-H-1	4	20.5	2
35	1994/6/21	4N	IKPT-H-1	5	19.8	2
36	1994/6/21	4N	IKPT-H-1	6	20.3	2
37	1994/6/21	4N	IKPT-H-1	7	19.5	2
38	1994/6/21	4N	IKPT-H-1	8	20.2	2
39	1994/6/21	4N	IKPT-H-1	9	21.5	2
40	1994/6/21	4N	IKPT-H-1	10	20.0	2
41	1994/6/21	4N	IKPT-H-1	11	19.8	2
42	1994/6/21	4N	IKPT-H-1	12	20.3	2
43	1994/6/21	4N	IKPT-H-1	13	18.2	2
44	1994/6/21	4N	IKPT-H-1	14	20.2	2
45	1994/6/21	4N	IKPT-H-1	15	20.5	2
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48	1994/6/21	4N	IKPT-H-1	18	21.5	2
49	1994/6/21	4N	IKPT-H-1	19	21.2	2
50	1994/6/21	4N	IKPT-H-1	20	19.3	2
51	1994/6/21	4N	IKPT-H-1	21	22.2	2
52	1994/6/21	4N	IKPT-H-1	22	21.2	2
53	1994/6/21	4N	IKPT-H-1	23	19.4	2
54	1994/6/21	4N	IKPT-H-1	24	19.3	2
55	1994/6/21	4N	IKPT-H-1	25	20.5	2
56	1994/6/21	4N	IKPT-H-1	26	20.0	2
57	1994/6/21	4N	IKPT-H-1	27	19.4	2
58	1994/6/21	4N	IKPT-H-1	28	19.3	2
59	1994/6/21	4N	IKPT-H-1	29	19.7	2
60	1994/6/21	4N	IKPT-H-1	30	20.0	2
61	1994/6/21	4N	IKPT-H-1	31	20.2	2
62	1994/6/21	4N	IKPT-H-1	32	19.0	2
63	1994/6/21	4N	IKPT-H-1	33	19.4	2
64	1994/6/21	4N	IKPT-H-1	34	19.4	2
65	1994/6/21	4N	IKPT-H-1	35	19.3	2
66	1994/6/21	4N	IKPT-H-1	36	20.0	2
67	1994/6/21	4N	IKPT-H-1	37	20.4	2
68	1994/6/21	4N	IKPT-H-1	38	21.2	2
69	1994/6/21	4N	IKPT-H-1	39	18.5	2
70	1994/6/21	4N	IKPT-H-1	40	20.0	2
71	1994/6/21	4N	IKPT-H-1	41	21.3	2
72	1994/6/21	4N	IKPT-H-1	42	18.3	2
73	1994/6/21	4N	IKPT-H-1	43	19.3	2
74	1994/6/21	4N	IKPT-H-1	44	21.6	1
75	1994/6/21	4N	IKPT-H-1	45	21.6	1
76	1994/6/21	4N	IKPT-H-1	46	23.8	1
77	1994/6/21	4N	IKPT-H-1	47	22.5	1
78	1994/6/21	4N	IKPT-H-1	48	23.2	1
79	1994/6/21	4N	IKPT-H-1	49	23.7	1
80	1994/6/21	4N	IKPT-H-1	50	22.1	1
81	1994/6/21	4N	IKPT-H-1	51	22.5	1
82	1994/6/21	4N	IKPT-H-1	52	20.6	1
83	1994/6/21	4N	IKPT-H-1	53	22.1	1
84	1994/6/21	4N	IKPT-H-1	54	20.5	1
85	1994/6/21	4N	IKPT-H-1	55	21.2	1
86	1994/6/21	4N	IKPT-H-1	56	21.6	1
87	1994/6/21	4N	IKPT-H-1	57	19.3	1
88	1994/6/21	4N	IKPT-H-1	58	21.9	1
89	1994/6/21	4N	IKPT-H-1	59	22.0	1
90	1994/6/21	4N	IKPT-H-1	60	21.7	1
91	1994/6/21	4N	IKPT-H-1	61	21.6	1
92	1994/6/21	4N	IKPT-H-1	62	22.5	1
93	1994/6/21	4N	IKPT-H-1	63	22.5	1
94	1994/6/21	4N	IKPT-H-1	64	22.8	1
95	1994/6/21	4N	IKPT-H-1	65	22.0	1
96	1994/6/21	4N	IKPT-H-1	66	23.1	1
97	1994/6/21	4N	IKPT-H-1	67	20.7	1
98	1994/6/21	4N	IKPT-H-1	68	22.1	1
99	1994/6/21	4N	IKPT-H-1	69	23.7	1
100	1994/6/21	4N	IKPT-H-1	70	21.3	1
101	1994/6/21	4N	IKPT-H-1	71	20.4	1
102	1994/6/21	4N	IKPT-H-1	72	22.8	1
103	1994/6/21	4N	IKPT-H-1	73	20.9	1
104	1994/6/21	4N	IKPT-H-1	74	21.6	1
105	1994/6/21	4N	IKPT-H-1	75	21.7	1
106	1994/6/21	4N	IKPT-H-1	76	20.6	1
107	1994/6/21	4N	IKPT-H-1	77	17.3	1
108	1994/6/21	4N	IKPT-H-1	78	21.6	1
109	1994/6/21	4N	IKPT-H-1	79	21.5	1
110	1994/6/21	4N	IKPT-H-1	80	17.4	1
111	1994/6/21	4N	IKPT-H-1	81	20.1	1
112	1994/6/21	4N	IKPT-H-1	82	22.2	1
113	1994/6/21	4N	IKPT-H-1	83	21.6	1
114	1994/6/21	4N	IKPT-H-1	84	21.0	1
115	1994/6/21	4N	IKPT-H-1	85	20.4	1
116	1994/6/21	4N	IKPT-H-1	86	21.8	1
117	1994/6/21	4N	IKPT-H-1	87	20.6	1
118	1994/6/21	4N	IKPT-H-1	88	23.2	1
119	1994/6/21	4N	IKPT-H-1	89	21.5	1
120	1994/6/21	4N	IKPT-H-1	90	21.6	1
121	1994/6/21	4N	IKPT-H-1	91	19.5	1
122	1994/6/21	4N	IKPT-H-1	92	22.8	1
123	1994/6/21	4N	IKPT-H-1	93	20.5	1
124	1994/6/21	4N	IKPT-H-1	94	19.0	1
125	1994/6/21	4N	IKPT-H-1	95	21.4	1
126	1994/6/21	4N	IKPT-H-1	96	22.5	1
127	1994/6/21	4N	IKPT-H-1	97	20.0	1
128	1994/6/21	4N	IKPT-H-1	98	23.0	1
129	1994/6/21	4N	IKPT-H-1	99	21.3	1
130	1994/6/21	4N	IKPT-H-1	100	22.4	1
131	1994/6/21	4N	IKPT-H-1	101	21.3	1
132	1994/6/21	4N	IKPT-H-1	102	22.5	1
133	1994/6/21	4N	IKPT-H-1	103	21.2	1
134	1994/6/21	4N	IKPT-H-1	104	23.0	1
135	1994/6/21	4N	IKPT-H-1	105	20.5	1
136	1994/6/21	4N	IKPT-H-1	106	20.7	1
137	1994/6/21	4N	IKPT-H-1	107	17.8	1
138	1994/6/21	4N	IKPT-H-1	108	24.4	1
139	1994/6/21	4N	IKPT-H-1	109	21.6	1
140	1994/6/21	4N	IKPT-H-1	110	22.6	1
141	1994/6/21	4N	IKPT-H-1	111	23.1	1
142	1994/6/21	4N	IKPT-H-1	112	21.4	1
143	1994/6/21	4N	IKPT-H-1	113	17.3	1
144	1994/6/21	4N	IKPT-H-1	114	20.4	1
145	1994/6/21	4N	IKPT-H-1	115	20.7	1
146	1994/6/21	4N	IKPT-H-1	116	21.8	1
147	1994/6/21	4N	IKPT-H-1	117	21.8	1
148	1994/6/21	4N	IKPT-H-1	118	18.7	1
149	1994/6/21	4N	IKPT-H-1	119	22.2	1
150	1994/6/21	4N	IKPT-H-1	120	20.5	1
151	1994/6/21	4N	IKPT-H-1	121	23.5	1
152	1994/6/21	4N	IKPT-H-1	122	22.1	1
153	1994/6/21	4N	IKPT-H-1	123	20.6	1
154	1994/6/21	4N	IKPT-H-1	124	19.1	1
155	1994/6/21	4N	IKPT-H-1	125	21.4	1
156	1994/6/21	4N	IKPT-H-1	126	20.4	1
157	1994/6/21	4N	IKPT-H-1	127	23.8	1
158	1994/6/21	4N	IKPT-H-1	128	21.7	1
159	1994/6/21	4N	IKPT-H-1	129	20.7	1
160	1994/6/21	4N	IKPT-H-1	130	21.9	1
161	1994/6/21	4N	IKPT-H-1	131	21.5	1
162	1994/6/21	4N	IKPT-H-1	132	21.4	1

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
163	1994/6/21	4N	IKPT-H-1	133	22.3	1
164	1994/6/21	4N	IKPT-H-1	134	23.6	1
165	1994/6/21	4N	IKPT-H-1	135	22.7	1
166	1994/6/21	4N	IKPT-H-1	136	22.2	1
167	1994/6/21	4N	IKPT-H-1	137	23.0	1
168	1994/6/21	4N	IKPT-H-1	138	20.7	1
169	1994/6/21	4N	IKPT-H-1	139	23.7	1
170	1994/6/21	4N	IKPT-H-1	140	21.3	1
171	1994/6/21	4N	IKPT-H-1	141	22.6	1
172	1994/6/21	4N	IKPT-H-1	142	20.9	1
173	1994/6/21	4N	IKPT-H-1	143	21.0	1
174	1994/6/21	4N	IKPT-H-1	144	21.4	1
175	1994/6/21	4N	IKPT-H-1	145	21.6	1
176	1994/6/21	4N	IKPT-H-1	146	20.9	1
177	1994/6/21	4N	IKPT-H-1	147	22.6	1
178	1994/6/21	4N	IKPT-H-1	148	21.4	1
179	1994/6/21	4N	IKPT-H-1	149	22.4	1
180	1994/6/21	4N	IKPT-H-1	150	23.0	1
181	1994/6/21	4N	IKPT-H-1	151	22.0	1
182	1994/6/21	4N	IKPT-H-1	152	24.1	1
183	1994/6/21	4N	IKPT-H-1	153	21.3	1
184	1994/6/21	4N	IKPT-H-1	154	22.4	1
185	1994/6/21	4N	IKPT-H-1	155	20.0	1
186	1994/6/21	4N	IKPT-H-1	156	21.4	1
187	1994/6/21	4N	IKPT-H-1	157	22.7	1
188	1994/6/21	4N	IKPT-H-1	158	23.0	1
189	1994/6/21	4N	IKPT-H-1	159	20.7	1
190	1994/6/21	4N	IKPT-H-1	160	20.0	1
191	1994/6/21	4N	IKPT-H-1	161	21.5	1
192	1994/6/21	4N	IKPT-H-1	162	21.9	1
193	1994/6/21	4N	IKPT-H-1	163	17.0	1
194	1994/6/21	4N	IKPT-H-1	164	20.8	1
195	1994/6/21	4N	IKPT-H-1	165	22.0	1
196	1994/6/21	4N	IKPT-H-1	166	22.6	1
197	1994/6/21	4N	IKPT-H-1	167	21.5	1
198	1994/6/21	4N	IKPT-H-1	168	19.7	1
199	1994/6/21	4N	IKPT-H-1	169	23.0	1
200	1994/6/21	4N	IKPT-H-1	170	21.0	1
201	1994/6/21	4N	IKPT-H-1	171	20.7	1
202	1994/6/21	4N	IKPT-H-1	172	21.6	1
203	1994/6/21	4N	IKPT-H-1	173	21.5	1
204	1994/6/21	4N	IKPT-H-1	174	22.7	1
205	1994/6/21	4N	IKPT-H-1	175	21.4	1
206	1994/6/21	4N	IKPT-H-1	176	21.7	1
207	1994/6/21	4N	IKPT-H-1	177	22.4	1
208	1994/6/21	4N	IKPT-H-1	178	21.4	1
209	1994/6/21	4N	IKPT-H-1	179	18.3	1
210	1994/6/21	4N	IKPT-H-1	180	19.3	1
211	1994/6/21	4N	IKPT-H-1	181	20.2	1
212	1994/6/21	4N	IKPT-H-1	182	20.3	1
213	1994/6/21	4N	IKPT-H-1	183	19.6	1
214	1994/6/21	4N	IKPT-H-1	184	18.5	1
215	1994/6/21	4N	IKPT-H-1	185	13.4	1
216	1994/6/21	4N	IKPT-H-1	186	20.0	1
217	1994/6/21	4N	IKPT-H-1	187	17.0	1
218	1994/6/21	4N	IKPT-H-1	188	16.0	1
219	1994/6/21	4N	IKPT-H-1	189	20.9	1
220	1994/6/21	4N	IKPT-H-1	190	19.7	1
221	1994/6/21	4N	IKPT-H-1	191	21.3	1
222	1994/6/21	4N	IKPT-H-1	192	21.9	1
223	1994/6/21	4N	IKPT-H-1	193	21.0	1
224	1994/6/21	4N	IKPT-H-1	194	20.8	1
225	1994/6/21	4N	IKPT-H-1	195	21.5	1
226	1994/6/21	4N	IKPT-H-1	196	19.5	1
227	1994/6/21	4N	IKPT-H-1	197	20.7	1
228	1994/6/21	4N	IKPT-H-1	198	19.7	1
229	1994/6/21	4N	IKPT-H-1	199	20.0	1
230	1994/6/21	4N	IKPT-H-1	200	19.6	1
231	1994/6/21	4N	IKPT-H-1	201	18.3	1
232	1994/6/21	4N	IKPT-H-1	202	21.2	1
233	1994/6/21	4N	IKPT-H-1	203	21.6	1
234	1994/6/21	4N	IKPT-H-1	204	20.9	1
235	1994/6/21	4N	IKPT-H-1	205	21.0	1
236	1994/6/21	4N	IKPT-H-1	206	20.3	1
237	1994/6/21	4N	IKPT-H-1	207	21.0	1
238	1994/6/21	4N	IKPT-H-1	208	20.7	1
239	1994/6/21	4N	IKPT-H-1	209	17.5	1
240	1994/6/21	4N	IKPT-H-1	210	21.3	1
241	1994/6/21	4N	IKPT-H-1	211	21.8	1
242	1994/6/21	4N	IKPT-H-1	212	21.0	1
243	1994/6/21	4N	IKPT-H-1	213	20.7	1

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
244	1994/6/21	4N	IKPT-H-1	214	19.6+	1
245	1994/6/21	4N	IKPT-H-1	215	19.3	1
246	1994/6/21	4N	IKPT-H-1	216	17.4+	1
247	1994/6/21	4N	IKPT-H-1	217	20.3	1
248	1994/6/21	4N	IKPT-H-1	218	21.0	1
249	1994/6/21	4N	IKPT-H-1	219	19.7	1
250	1994/6/21	4N	IKPT-H-1	220	20.6	1
251	1994/6/21	4N	IKPT-H-1	221	21.6	1
252	1994/6/21	4N	IKPT-H-1	222	20.4	1
253	1994/6/21	4N	IKPT-H-1	223	18.7	1
254	1994/6/21	4N	IKPT-H-1	224	21.3	1
255	1994/6/21	4N	IKPT-H-1	225	20.6	1
256	1994/6/21	4N	IKPT-H-1	226	20.7	1
257	1994/6/21	4N	IKPT-H-1	227	21.2	1
258	1994/6/21	4N	IKPT-H-1	228	19.2	1
259	1994/6/21	4N	IKPT-H-1	229	21.0	1
260	1994/6/21	4N	IKPT-H-1	230	20.0	1
261	1994/6/21	4N	IKPT-H-1	231	21.3	1
262	1994/6/21	4N	IKPT-H-1	232	18.4	1
263	1994/6/21	4N	IKPT-H-1	233	20.5	1
264	1994/6/21	4N	IKPT-H-1	234	19.8	1
265	1994/6/21	4N	IKPT-H-1	235	20.6	1
266	1994/6/21	4N	IKPT-H-1	236	21.2	1
267	1994/6/21	4N	IKPT-H-1	237	20.9	1
268	1994/6/21	4N	IKPT-H-1	238	20.3	1
269	1994/6/21	4N	IKPT-H-1	239	19.0	1
270	1994/6/21	4N	IKPT-H-1	240	20.8	1
271	1994/6/21	4N	IKPT-H-1	241	20.5	1
272	1994/6/21	4N	IKPT-H-1	242	19.9	1
273	1994/6/21	4N	IKPT-H-1	243	21.2	1
274	1994/6/21	4N	IKPT-H-1	244	19.0	1
275	1994/6/21	4N	IKPT-H-1	245	18.0	1
276	1994/6/21	4N	IKPT-H-1	246	21.1	1
277	1994/6/21	4N	IKPT-H-1	247	19.8	1
278	1994/6/21	4N	IKPT-H-1	248	21.0	1
279	1994/6/21	4N	IKPT-H-1	249	22.0	1
280	1994/6/21	4N	IKPT-H-1	250	19.9	1
281	1994/6/21	4N	IKPT-H-1	251	20.9	1
282	1994/6/21	4N	IKPT-H-1	252	21.8	1
283	1994/6/21	4N	IKPT-H-1	253	21.3	1
284	1994/6/21	4N	IKPT-H-1	254	20.7	1
285	1994/6/21	4N	IKPT-H-1	255	19.9	1
286	1994/6/21	4N	IKPT-H-1	256	21.2	1
287	1994/6/21	4N	IKPT-H-1	257	19.8	1
288	1994/6/21	4N	IKPT-H-1	258	18.8	1
289	1994/6/21	4N	IKPT-H-1	259	21.1	1
290	1994/6/21	4N	IKPT-H-1	260	20.8	1
291	1994/6/21	4N	IKPT-H-1	261	21.0	1
292	1994/6/21	4N	IKPT-H-1	262	22.6	1
293	1994/6/21	4N	IKPT-H-1	263	21.6	1
294	1994/6/21	4N	IKPT-H-1	264	21.0	1
295	1994/6/21	4N	IKPT-H-1	265	20.7	1
296	1994/6/21	4N	IKPT-H-1	266	20.5	1
297	1994/6/21	4N	IKPT-H-1	267	21.1	1
298	1994/6/21	4N	IKPT-H-1	268	19.4	1
299	1994/6/21	4N	IKPT-H-1	269	21.0	1
300	1994/6/21	4N	IKPT-H-1	270	20.0	1
301	1994/6/21	4N	IKPT-H-1	271	18.9	1
302	1994/6/21	4N	IKPT-H-1	272	20.6	1
303	1994/6/21	4N	IKPT-H-1	273	22.6	1
304	1994/6/21	4N	IKPT-H-1	274	21.5	1
305	1994/6/21	4N	IKPT-H-1	275	20.0	1
306	1994/6/21	4N	IKPT-H-1	276	20.7	1
307	1994/6/21	4N	IKPT-H-1	277	20.3	1
308	1994/6/21	4N	IKPT-H-1	278	20.6	1
309	1994/6/21	4N	IKPT-H-1	279	21.0	1
310	1994/6/21	4N	IKPT-H-1	280	20.5	1
311	1994/6/21	4N	IKPT-H-1	281	19.3	1
312	1994/6/21	4N	IKPT-H-1	282	22.1	1
313	1994/6/21	4N	IKPT-H-1	283	19.0	1
314	1994/6/21	4N	IKPT-H-1	284	21.1	1
315	1994/6/21	4N	IKPT-H-1	285	17.5	1
316	1994/6/21	4N	IKPT-H-1	286	21.9	1
317	1994/6/21	4N	IKPT-H-1	287	19.2	1
318	1994/6/21	4N	IKPT-H-1	288	20.0	1
319	1994/6/21	4N	IKPT-H-1	289	17.9	1
320	1994/6/21	4N	IKPT-H-1	290	20.2	1
321	1994/6/21	4N	IKPT-H-1	291	20.0	1
322	1994/6/21	4N	IKPT-H-1	292	21.4	1
323	1994/6/21	4N	IKPT-H-1	293	19.0	1
324	1994/6/21	4N	IKPT-H-1	294	15.1	1

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
325	1994/6/21	4N	IKPT-H-1	295	21.1	1
326	1994/6/21	4N	IKPT-H-1	296	19.3+	1
327	1994/6/21	4N	IKPT-H-1	297	17.4	1
328	1994/6/21	4N	IKPT-H-1	298	17.5	1
329	1994/6/21	4N	IKPT-H-1	299	20.3	1
330	1994/6/21	4N	IKPT-H-1	300	19.5	1
331	1994/6/21	4N	IKPT-H-1	301	23.3	1
332	1994/6/21	4N	IKPT-H-1	302	20.0	1
333	1994/6/21	4N	IKPT-H-1	303	20.0+	1
334	1994/6/21	4N	IKPT-H-1	304	21.5	1
335	1994/6/21	4N	IKPT-H-1	305	16.4	1
336	1994/6/21	4N	IKPT-H-1	306	19.0	1
337	1994/6/21	4N	IKPT-H-1	307	19.9	1
338	1994/6/21	4N	IKPT-H-1	308	20.0	1
339	1994/6/21	4N	IKPT-H-1	309	20.6	1
340	1994/6/21	4N	IKPT-H-1	310	20.8+	1
341	1994/6/21	4N	IKPT-H-1	311	20.4	1
342	1994/6/21	4N	IKPT-H-1	312	19.0	1
343	1994/6/21	4N	IKPT-H-1	313	17.3	1
344	1994/6/21	4N	IKPT-H-1	314	21.5	1
345	1994/6/21	4N	IKPT-H-1	315	19.6	1
346	1994/6/21	4N	IKPT-H-1	316	21.8	1
347	1994/6/21	4N	IKPT-H-1	317	21.3	1
348	1994/6/21	4N	IKPT-H-1	318	22.4	1
349	1994/6/21	4N	IKPT-H-1	319	22.5	1
350	1994/6/21	4N	IKPT-H-1	320	21.1	1
351	1994/6/21	4N	IKPT-H-1	321	22.6	1
352	1994/6/21	4N	IKPT-H-1	322	21.8	1
353	1994/6/21	4N	IKPT-H-1	323	21.7	1
354	1994/6/21	4N	IKPT-H-1	324	18.4	1
355	1994/6/21	4N	IKPT-H-1	325	21.7	1
356	1994/6/21	4N	IKPT-H-1	326	21.1	1
357	1994/6/21	4N	IKPT-H-1	327	21.6	1
358	1994/6/21	4N	IKPT-H-1	328	21.2	1
359	1994/6/21	4N	IKPT-H-1	329	22.8	1
360	1994/6/21	4N	IKPT-H-1	330	22.8	1
361	1994/6/21	4N	IKPT-H-1	331	20.3	1
362	1994/6/21	4N	IKPT-H-1	332	22.2	1
363	1994/6/21	4N	IKPT-H-1	333	20.8	1
364	1994/6/21	4N	IKPT-H-1	334	21.0	1
365	1994/6/21	4N	IKPT-H-1	335	22.4	1
366	1994/6/21	4N	IKPT-H-1	336	22.6	1
367	1994/6/21	4N	IKPT-H-1	337	21.7	1
368	1994/6/21	4N	IKPT-H-1	338	21.3	1
369	1994/6/21	4N	IKPT-H-1	339	23.5	1
370	1994/6/21	4N	IKPT-H-1	340	20.0	1
371	1994/6/21	4N	IKPT-H-1	341	20.9	1
372	1994/6/21	4N	IKPT-H-1	342	22.0	1
373	1994/6/21	4N	IKPT-H-1	343	21.3	1
374	1994/6/21	4N	IKPT-H-1	344	17.1	1
375	1994/6/21	4N	IKPT-H-1	345	22.1	1
376	1994/6/21	4N	IKPT-H-1	346	21.8	1
377	1994/6/21	4N	IKPT-H-1	347	19.4	1
378	1994/6/21	4N	IKPT-H-1	348	21.8	1
379	1994/6/21	4N	IKPT-H-1	349	20.5	1
380	1994/6/21	4N	IKPT-H-1	350	20.0	1
381	1994/6/21	4N	IKPT-H-1	351	21.3	1
382	1994/6/21	4N	IKPT-H-1	352	18.8	1
383	1994/6/21	4N	IKPT-H-1	353	18.4	1
384	1994/6/21	4N	IKPT-H-1	354	22.3	1
385	1994/6/21	4N	IKPT-H-1	355	21.6	1
386	1994/6/21	4N	IKPT-H-1	356	19.6	1
387	1994/6/21	4N	IKPT-H-1	357	18.3	1
388	1994/6/21	4N	IKPT-H-1	358	21.4	1
389	1994/6/21	4N	IKPT-H-1	359	21.9	1
390	1994/6/21	4N	IKPT-H-1	360	20.9	1
391	1994/6/21	4N	IKPT-H-1	361	22.0	1
392	1994/6/21	4N	IKPT-H-1	362	21.9	1
393	1994/6/21	4N	IKPT-H-1	363	21.7	1
394	1994/6/21	4N	IKPT-H-1	364	22.5	1
395	1994/6/21	4N	IKPT-H-1	365	22.1	1
396	1994/6/21	4N	IKPT-H-1	366	20.1	1
397	1994/6/21	4N	IKPT-H-1	367	20.1	1
398	1994/6/21	4N	IKPT-H-1	368	22.3	1
399	1994/6/21	4N	IKPT-H-1	369	21.3	1
400	1994/6/21	4N	IKPT-H-1	370	20.8	1
401	1994/6/21	4N	IKPT-H-1	371	21.5	1
402	1994/6/21	4N	IKPT-H-1	372	19.4	1
403	1994/6/21	4N	IKPT-H-1	373	20.0	1
404	1994/6/21	4N	IKPT-H-1	374	21.0	1
405	1994/6/21	4N	IKPT-H-1	375	22.1	1

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
406	1994/6/21	4N	IKPT-H-1	376	19.9	1
407	1994/6/21	4N	IKPT-H-1	377	21.6	1
408	1994/6/21	4N	IKPT-H-1	378	20.1	1
409	1994/6/21	4N	IKPT-H-1	379	22.3	1
410	1994/6/21	4N	IKPT-H-1	380	21.3	1
411	1994/6/21	4N	IKPT-H-1	381	19.7	1
412	1994/6/21	4N	IKPT-H-1	382	23.7	1
413	1994/6/21	4N	IKPT-H-1	383	20.2	1
414	1994/6/21	4N	IKPT-H-1	384	22.5	1
415	1994/6/21	4N	IKPT-H-1	385	22.3	1
416	1994/6/21	4N	IKPT-H-1	386	21.6	1
417	1994/6/21	4N	IKPT-H-1	387	21.4	1
418	1994/6/21	4N	IKPT-H-1	388	21.1	1
419	1994/6/21	4N	IKPT-H-1	389	21.5	1
420	1994/6/21	4N	IKPT-H-1	390	21.7	1
421	1994/6/21	4N	IKPT-H-1	391	10.6	1
422	1994/6/21	4N	IKPT-H-1	392	21.6	1
423	1994/6/21	4N	IKPT-H-1	393	20.0	1
424	1994/6/21	4N	IKPT-H-1	394	21.0	1
425	1994/6/21	4N	IKPT-H-1	395	16.7	1
426	1994/6/21	4N	IKPT-H-1	396	22.0	1
427	1994/6/21	4N	IKPT-H-1	397	21.1	1
428	1994/6/21	4N	IKPT-H-1	398	20.1	1
429	1994/6/21	4N	IKPT-H-1	399	21.0	1
430	1994/6/21	4N	IKPT-H-1	400	18.2	1
431	1994/6/21	4N	IKPT-H-1	401	20.7	1
432	1994/6/21	4N	IKPT-H-1	402	21.3	1
433	1994/6/21	4N	IKPT-H-1	403	20.5	1
434	1994/6/21	4N	IKPT-H-1	404	21.8	1
435	1994/6/21	4N	IKPT-H-1	405	22.6	1
436	1994/6/21	4N	IKPT-H-1	406	20.0	1
437	1994/6/21	4N	IKPT-H-1	407	19.5	1
438	1994/6/21	4N	IKPT-H-1	408	20.5	1
439	1994/6/21	4N	IKPT-H-1	409	21.1	1
440	1994/6/21	4N	IKPT-H-1	410	19.0	1
441	1994/6/21	4N	IKPT-H-1	411	21.0	1
442	1994/6/21	4N	IKPT-H-1	412	23.2	1
443	1994/6/21	4N	IKPT-H-1	413	20.2	1
444	1994/6/21	4N	IKPT-H-1	414	20.0	1
445	1994/6/21	4N	IKPT-H-1	415	19.0	1
446	1994/6/21	4N	IKPT-H-1	416	19.5	1
447	1994/6/21	4N	IKPT-H-1	417	18.3	1
448	1994/6/21	4N	IKPT-H-1	418	20.5	1
449	1994/6/21	4N	IKPT-H-1	419	21.1	1
450	1994/6/21	4N	IKPT-H-1	420	19.5	1
451	1994/6/21	4N	IKPT-H-1	421	21.4	1
452	1994/6/21	4N	IKPT-H-1	422	21.8	1
453	1994/6/21	4N	IKPT-H-1	423	19.7	1
454	1994/6/21	4N	IKPT-H-1	424	21.0	1
455	1994/6/21	4N	IKPT-H-1	425	20.9	1
456	1994/6/21	4N	IKPT-H-1	426	21.6	1
457	1994/6/21	4N	IKPT-H-1	427	20.0	1
458	1994/6/21	4N	IKPT-H-1	428	22.0	1
459	1994/6/21	4N	IKPT-H-1	429	19.8	1
460	1994/6/21	4N	IKPT-H-1	430	20.9	1
461	1994/6/21	4N	IKPT-H-1	431	22.8	1
462	1994/6/21	4N	IKPT-H-1	432	22.6	1
463	1994/6/21	4N	IKPT-H-1	433	21.8	1
464	1994/6/21	4N	IKPT-H-1	434	21.7	1
465	1994/6/21	4N	IKPT-H-1	435	20.5	1
466	1994/6/21	4N	IKPT-H-1	436	20.6	1
467	1994/6/21	4N	IKPT-H-1	437	21.1	1
468	1994/6/21	4N	IKPT-H-1	438	20.0	1
469	1994/6/21	4N	IKPT-H-1	439	20.6	1
470	1994/6/21	4N	IKPT-H-1	440	22.7	1
471	1994/6/21	4N	IKPT-H-1	441	20.0	1
472	1994/6/21	4N	IKPT-H-1	442	19.7	1
473	1994/6/21	4N	IKPT-H-1	443	20.0	1
474	1994/6/21	4N	IKPT-H-1	444	18.4	1
475	1994/6/21	4N	IKPT-H-1	445	18.3	1
476	1994/6/21	4N	IKPT-H-1	446	18.5	1
477	1994/6/21	4N	IKPT-H-1	447	19.0	1
478	1994/6/21	4N	IKPT-H-1	448	21.5	1
479	1994/6/21	4N	IKPT-H-1	449	19.4	1
480	1994/6/21	4N	IKPT-H-1	450	20.0	1
481	1994/6/21	4N	IKPT-H-1	451	19.8	1
482	1994/6/21	4N	IKPT-H-1	452	21.9	1
483	1994/6/21	4N	IKPT-H-1	453	20.1	1
484	1994/6/21	4N	IKPT-H-1	454	18.7	1
485	1994/6/21	4N	IKPT-H-1	455	19.6	1
486	1994/6/21	4N	IKPT-H-1	456	21.5	1

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pros.
487	1994/6/21	4N	IKPT-H-1	457	20.0	1
488	1994/6/21	4N	IKPT-H-1	458	19.6	1
489	1994/6/21	4N	IKPT-H-1	459	17.5	1
490	1994/6/21	4N	IKPT-H-1	460	18.5	1
491	1994/6/21	4N	IKPT-H-1	461	19.7	1
492	1994/6/21	4N	IKPT-H-1	462	20.3	1
493	1994/6/21	4N	IKPT-H-1	463	18.6	1
494	1994/6/21	4N	IKPT-H-1	464	18.8	1
495	1994/6/21	4N	IKPT-H-1	465	21.0	1
496	1994/6/21	4N	IKPT-H-1	466	20.3	1
497	1994/6/21	4N	IKPT-H-1	467	17.5	1
498	1994/6/21	4N	IKPT-H-1	468	19.5	1
499	1994/6/21	4N	IKPT-H-1	469	19.3	1
500	1994/6/21	4N	IKPT-H-1	470	22.3	1
501	1994/6/21	4N	IKPT-H-1	471	20.0	1
502	1994/6/21	4N	IKPT-H-1	472	19.5	1
503	1994/6/21	4N	IKPT-H-1	473	20.0	1
504	1994/6/21	4N	IKPT-H-1	474	20.2	1
505	1994/6/21	4N	IKPT-H-1	475	21.4	1
506	1994/6/21	4N	IKPT-H-1	476	19.5	1
507	1994/6/21	4N	IKPT-H-1	477	22.0	1
508	1994/6/21	4N	IKPT-H-1	478	19.9	1
509	1994/6/21	4N	IKPT-H-1	479	20.2	1
510	1994/6/21	4N	IKPT-H-1	480	15.9	1
511	1994/6/21	4N	IKPT-H-1	481	18.7	1
512	1994/6/21	4N	IKPT-H-1	482	20.0	1
513	1994/6/21	4N	IKPT-H-1	483	20.3	1
514	1994/6/21	4N	IKPT-H-1	484	17.7	1
515	1994/6/21	4N	IKPT-H-1	485	22.4	1
516	1994/6/21	4N	ORI-69	1	21.3	1
517	1994/6/21	4N	ORI-69	2	21.1	1
518	1994/6/21	4N	ORI-69	3	20.7	1
519	1994/6/21	4N	ORI-69	4	16.0+	1
520	1994/6/21	4N	ORI-69	5	20.2	1
521	1994/6/21	4N	ORI-69	6	20.7	1
522	1994/6/21	4N	ORI-69	7	18.4	1
523	1994/6/21	4N	IKPT-H-2	1	20.6	2
524	1994/6/21	4N	IKPT-H-2	2	22.5	2
525	1994/6/21	4N	IKPT-H-2	3	18.5	2
526	1994/6/21	4N	IKPT-H-2	4	20.0	2
527	1994/6/21	4N	IKPT-H-2	5	17.5	2
528	1994/6/21	4N	IKPT-H-2	6	22.3	2
529	1994/6/21	4N	IKPT-H-2	7	20.0	2
530	1994/6/21	4N	IKPT-H-2	8	21.0	2
531	1994/6/21	4N	IKPT-H-2	9	20.0	2
532	1994/6/21	4N	IKPT-H-2	10	16.6	2
533	1994/6/21	4N	IKPT-H-2	11	22.8	2
534	1994/6/21	4N	IKPT-H-2	12	23.4	2
535	1994/6/21	4N	IKPT-H-2	13	20.5	2
536	1994/6/21	4N	IKPT-H-2	14	22.8	2
537	1994/6/21	4N	IKPT-H-2	15	23.2	2
538	1994/6/21	4N	IKPT-H-2	16	23.7	2
539	1994/6/21	4N	IKPT-H-2	17	19.0	2
540	1994/6/21	4N	IKPT-H-2	18	18.0	2
541	1994/6/21	4N	IKPT-H-2	19	24.1	2
542	1994/6/21	4N	IKPT-H-2	20	19.6	2
543	1994/6/21	4N	IKPT-H-2	21	22.9	2
544	1994/6/21	4N	IKPT-H-2	22	22.1	2
545	1994/6/21	4N	IKPT-H-2	23	21.6	2
546	1994/6/21	4N	IKPT-H-2	24	20.0	2
547	1994/6/21	4N	IKPT-H-2	25	19.5	2
548	1994/6/21	4N	IKPT-H-2	26	18.5	2
549	1994/6/21	4N	IKPT-H-2	27	24.6	2
550	1994/6/21	4N	IKPT-H-2	28	20.0	2
551	1994/6/21	4N	IKPT-H-2	29	19.5	2
552	1994/6/21	4N	IKPT-H-2	30	18.3	2
553	1994/6/21	4N	IKPT-H-2	31	21.2	2
554	1994/6/21	4N	IKPT-H-2	32	19.2	2
555	1994/6/21	4N	IKPT-H-2	33	20.3	2
556	1994/6/21	4N	IKPT-H-2	34	20.5	2
557	1994/6/21	4N	IKPT-H-2	35	24.8	2
558	1994/6/21	4N	IKPT-H-2	36	19.3	2
559	1994/6/21	4N	IKPT-H-2	37	18.2	2
560	1994/6/21	4N	IKPT-H-2	38	20.0	2
561	1994/6/21	4N	IKPT-H-2	39	21.3	2
562	1994/6/21	4N	IKPT-H-2	40	19.6	2
563	1994/6/21	4N	IKPT-H-2	41	22.2	2
564	1994/6/21	4N	IKPT-H-2	42	21.3	2
565	1994/6/21	4N	IKPT-H-2	43	20.0	2
566	1994/6/21	4N	IKPT-H-2	44	19.5	2
567	1994/6/21	4N	IKPT-H-2	45	21.6	2

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pros.
568	1994/6/21	4N	IKPT-H-2	46	21.0	2
569	1994/6/21	4N	IKPT-H-2	47	19.0	2
570	1994/6/21	4N	IKPT-H-2	48	19.8	2
571	1994/6/21	4N	IKPT-H-2	49	19.0	2
572	1994/6/21	4N	IKPT-H-2	50	20.0	2
573	1994/6/21	4N	IKPT-H-2	51	20.3	2
574	1994/6/21	4N	IKPT-H-2	52	20.3	2
575	1994/6/21	4N	IKPT-H-2	53	21.3	2
576	1994/6/21	4N	IKPT-H-2	54	19.8	2
577	1994/6/21	4N	IKPT-H-2	55	21.2	2
578	1994/6/21	4N	IKPT-H-2	56	19.5	2
579	1994/6/21	4N	IKPT-H-2	57	22.0	2
580	1994/6/21	4N	IKPT-H-2	58	21.0	2
581	1994/6/21	4N	IKPT-H-2	59	19.2	2
582	1994/6/21	4N	IKPT-H-2	60	20.8	2
583	1994/6/21	4N	IKPT-H-2	61	20.0	2
584	1994/6/21	4N	IKPT-H-2	62	20.3	2
585	1994/6/21	4N	IKPT-H-2	63	23.6	2
586	1994/6/21	4N	IKPT-H-2	64	20.3	2
587	1994/6/21	4N	IKPT-H-2	65	19.5	2
588	1994/6/21	4N	IKPT-H-2	66	19.5	2
589	1994/6/21	4N	IKPT-H-2	67	22.3	2
590	1994/6/21	4N	IKPT-H-2	68	21.2	2
591	1994/6/21	4N	IKPT-H-2	69	17.3	2
592	1994/6/21	4N	IKPT-H-2	70	20.2	2
593	1994/6/21	4N	IKPT-H-2	71	21.2	2
594	1994/6/21	4N	IKPT-H-2	72	20.2	2
595	1994/6/21	4N	IKPT-H-2	73	20.0	2
596	1994/6/21	4N	IKPT-H-2	74	18.3	2
597	1994/6/21	4N	IKPT-H-2	75	22.3	2
598	1994/6/21	4N	IKPT-H-2	76	21.2	2
599	1994/6/21	4N	IKPT-H-2	77	20.6	2
600	1994/6/21	4N	IKPT-H-2	78	21.6	2
601	1994/6/21	4N	IKPT-H-2	79	19.8	2
602	1994/6/21	4N	IKPT-H-2	80	20.3	2
603	1994/6/21	4N	IKPT-H-2	81	18.5	2
604	1994/6/21	4N	IKPT-H-2	82	22.2	2
605	1994/6/21	4N	IKPT-H-2	83	23.2	2
606	1994/6/21	4N	IKPT-H-2	84	23.0	2
607	1994/6/21	4N	IKPT-H-2	85	19.8	2
608	1994/6/21	4N	IKPT-H-2	86	20.2	2
609	1994/6/21	4N	IKPT-H-2	87	19.8	2
610	1994/6/21	4N	IKPT-H-2	88	19.2	2
611	1994/6/21	4N	IKPT-H-2	89	20.2	2
612	1994/6/21	4N	IKPT-H-2	90	18.7	2
613	1994/6/21	4N	IKPT-H-2	91	18.4	2
614	1994/6/21	4N	IKPT-H-2	92	18.9	2
615	1994/6/21	4N	IKPT-H-2	93	18.7	2
616	1994/6/21	4N	IKPT-H-2	94	19.4	2
617	1994/6/21	4N	IKPT-H-2	95	20.7	2
618	1994/6/21	4N	IKPT-H-2	96	19.8	2
619	1994/6/21	4N	IKPT-H-2	97	19.2	2
620	1994/6/21	4N	IKPT-H-2	98	18.7	2
621	1994/6/21	4N	IKPT-H-2	99	18.0	2
622	1994/6/21	4N	IKPT-H-2	100	18.0	2
623	1994/6/21	4N	IKPT-H-2	101	21.0	2
624	1994/6/21	4N	IKPT-H-2	102	21.1	2
625	1994/6/21	4N	IKPT-H-2	103	16.5	2
626	1994/6/21	4N	IKPT-H-2	104	18.7	2
627	1994/6/21	4N	IKPT-H-2	105	19.4	2
628	1994/6/21	4N	IKPT-H-2	106	20.3	2
629	1994/6/21	4N	IKPT-H-2	107	19.8	2
630	1994/6/21	4N	IKPT-H-2	108	20.0	2
631	1994/6/21	4N	IKPT-H-2	109	21.2	2
632	1994/6/21	4N	IKPT-H-2	110	18.7	2
633	1994/6/21	4N	IKPT-H-2	111	17.5	2
634	1994/6/21	4N	IKPT-H-2	112	21.0	2
635	1994/6/21	4N	IKPT-H-2	113	19.8	2
636	1994/6/21	4N	IKPT-H-2	114	20.0	2
637	1994/6/21	4N	IKPT-H-2	115	20.3	2
638	1994/6/21	4N	IKPT-H-2	116	20.4	2
639	1994/6/21	4N	IKPT-H-2	117	19.3	2
640	1994/6/21	4N	IKPT-H-2	118	19.1	2
641	1994/6/21	4N	IKPT-H-2	119	18.1	2
642	1994/6/21	4N	IKPT-H-2	120	19.3	2
643	1994/6/21	4N	IKPT-H-2	121	20.9	2
644	1994/6/21	4N	IKPT-H-2	122	19.4	2
645	1994/6/21	4N	IKPT-H-2	123	18.0	2
646	1994/6/21	4N	IKPT-H-2	124	19.7	2
647	1994/6/21	4N	IKPT-H-2	125	19.8	2
648	1994/6/21	4N	IKPT-H-2	126	21.3	2

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
649	1994/6/21	4N	IKPT-H-2	127	20.0	2
650	1994/6/21	4N	IKPT-H-2	128	19.8	2
651	1994/6/21	4N	IKPT-H-2	129	19.3	2
652	1994/6/21	4N	IKPT-H-2	130	20.6	2
653	1994/6/21	4N	IKPT-H-2	131	19.1	2
654	1994/6/21	4N	IKPT-H-2	132	19.8	2
655	1994/6/21	4N	IKPT-H-2	133	21.0	2
656	1994/6/21	4N	IKPT-H-2	134	19.8	2
657	1994/6/21	4N	IKPT-H-2	135	20.8	2
658	1994/6/21	4N	IKPT-H-2	136	19.7	2
659	1994/6/21	4N	IKPT-H-2	137	19.8	2
660	1994/6/21	4N	IKPT-H-2	138	23.3	2
661	1994/6/21	4N	IKPT-H-2	139	22.5	2
662	1994/6/21	4N	IKPT-H-2	140	21.3	2
663	1994/6/21	4N	IKPT-H-2	141	21.2	2
664	1994/6/21	4N	IKPT-H-2	142	22.7	2
665	1994/6/21	4N	IKPT-H-2	143	20.3	2
666	1994/6/21	4N	IKPT-H-2	144	19.0	2
667	1994/6/21	4N	IKPT-H-2	145	19.1	2
668	1994/6/21	4N	IKPT-H-2	146	19.5	2
669	1994/6/21	4N	IKPT-H-2	147	17.8	2
670	1994/6/21	4N	IKPT-H-2	148	18.3	2
671	1994/6/21	4N	IKPT-H-2	149	18.9	2
672	1994/6/21	4N	IKPT-H-2	150	18.8	2
673	1994/6/21	4N	IKPT-H-2	151	15.9	2
674	1994/6/21	4N	IKPT-H-2	152	17.0	2
675	1994/6/21	4N	IKPT-H-2	153	15.3	2
676	1994/6/21	4N	IKPT-H-2	154	17.7	2
677	1994/6/21	4N	IKPT-H-2	155	17.5	2
678	1994/6/21	4N	IKPT-H-2	156	17.3	2
679	1994/6/21	4N	IKPT-H-2	157	17.3	2
680	1994/6/21	4N	IKPT-H-2	158	20.6	2
681	1994/6/21	4N	IKPT-H-2	159	20.0	2
682	1994/6/21	4N	IKPT-H-2	160	20.0	2
683	1994/6/21	4N	IKPT-H-2	161	20.0	2
684	1994/6/21	4N	IKPT-H-2	162	20.1	2
685	1994/6/21	4N	IKPT-H-2	163	17.2	2
686	1994/6/21	4N	IKPT-H-2	164	20.9	2
687	1994/6/21	4N	IKPT-H-2	165	17.5	2
688	1994/6/21	4N	IKPT-H-2	166	18.2	2
689	1994/6/21	4N	IKPT-H-2	167	19.0	2
690	1994/6/21	4N	IKPT-H-2	168	19.4	2
691	1994/6/21	4N	IKPT-H-2	169	17.3	2
692	1994/6/21	4N	IKPT-H-2	170	20.3	2
693	1994/6/21	4N	IKPT-H-2	171	17.1	2
694	1994/6/21	4N	IKPT-H-2	172	17.4	2
695	1994/6/21	4N	IKPT-H-2	173		2
696	1994/6/21	4N	IKPT-H-2	174		2
697	1994/6/21	4N	IKPT-H-2	175		2
698	1994/6/21	4N	IKPT-H-2	176		2
699	1994/6/21	4N	IKPT-H-2	177		2
700	1994/6/21	4N	IKPT-H-2	178	19.5	2
701	1994/6/21	4N	IKPT-H-2	179	20.2	2
702	1994/6/21	4N	IKPT-H-2	180	20.4	2
703	1994/6/21	4N	IKPT-H-2	181	21.0	2
704	1994/6/21	4N	IKPT-H-2	182	20.5	2
705	1994/6/21	4N	IKPT-H-2	183	20.6	2
706	1994/6/21	4N	IKPT-H-2	184	19.3	2
707	1994/6/21	4N	IKPT-H-2	185	20.2	2
708	1994/6/21	4N	IKPT-H-2	186	20.5	2
709	1994/6/21	4N	IKPT-H-2	187	19.5	2
710	1994/6/21	4N	IKPT-H-2	188	19.0	2
711	1994/6/21	4N	IKPT-H-2	189	23.2	2
712	1994/6/21	4N	IKPT-H-2	190	23.0	1
713	1994/6/21	4N	IKPT-H-2	191	22.0	1
714	1994/6/21	4N	IKPT-H-2	192	22.7	1
715	1994/6/21	4N	IKPT-H-2	193	19.5	1
716	1994/6/21	4N	IKPT-H-2	194	20.1	1
717	1994/6/21	4N	IKPT-H-2	195	17.2	1
718	1994/6/21	4N	IKPT-H-2	196	23.1	1
719	1994/6/21	4N	IKPT-H-2	197	23.3	1
720	1994/6/21	4N	IKPT-H-2	198	21.3	1
721	1994/6/21	4N	IKPT-H-2	199	22.6	1
722	1994/6/21	4N	IKPT-H-2	200	20.6	1
723	1994/6/21	4N	IKPT-H-2	201	23.6	1
724	1994/6/21	4N	IKPT-H-2	202	21.5	1
725	1994/6/21	4N	IKPT-H-2	203	21.3	1
726	1994/6/21	4N	IKPT-H-2	204	21.0	1
727	1994/6/21	4N	IKPT-H-2	205	21.5	1
728	1994/6/21	4N	IKPT-H-2	206	25.1	1
729	1994/6/21	4N	IKPT-H-2	207	24.0	1

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
730	1994/6/21	4N	IKPT-H-2	208	21.5	1
731	1994/6/21	4N	IKPT-H-2	209	25.3	1
732	1994/6/21	4N	IKPT-H-2	210	22.8	1
733	1994/6/21	4N	IKPT-H-2	211	21.0	1
734	1994/6/21	4N	IKPT-H-2	212	21.5	1
735	1994/6/21	4N	IKPT-H-2	213	21.5	1
736	1994/6/21	4N	IKPT-H-2	214	19.5	1
737	1994/6/21	4N	IKPT-H-2	215	21.0	1
738	1994/6/21	4N	IKPT-H-2	216	20.1	1
739	1994/6/21	4N	IKPT-H-2	217	20.0	1
740	1994/6/21	4N	IKPT-H-2	218	19.0	1
741	1994/6/21	4N	IKPT-H-2	219	19.0	1
742	1994/6/21	4N	IKPT-H-2	220	22.0	1
743	1994/6/21	4N	IKPT-H-2	221	23.4	1
744	1994/6/21	4N	IKPT-H-2	222	21.0	1
745	1994/6/21	4N	IKPT-H-2	223	23.1	1
746	1994/6/21	4N	IKPT-H-2	224	17.7	1
747	1994/6/21	4N	IKPT-H-2	225	19.8	1
748	1994/6/21	4N	IKPT-H-2	226	22.0	1
749	1994/6/21	4N	IKPT-H-2	227	23.0	1
750	1994/6/21	4N	IKPT-H-2	228	22.1	1
751	1994/6/21	4N	IKPT-H-2	229	21.8	1
752	1994/6/21	4N	IKPT-H-2	230	21.4	1
753	1994/6/21	4N	IKPT-H-2	231	22.6	1
754	1994/6/21	4N	IKPT-H-2	232	22.4	1
755	1994/6/21	4N	IKPT-H-2	233	22.2	1
756	1994/6/21	4N	IKPT-H-2	234	22.9	1
757	1994/6/21	4N	IKPT-H-2	235	21.8	1
758	1994/6/21	4N	IKPT-H-2	236	20.5	1
759	1994/6/21	4N	IKPT-H-2	237	22.5	1
760	1994/6/21	4N	IKPT-H-2	238	19.3+	1
761	1994/6/21	4N	IKPT-H-2	239	22.2	1
762	1994/6/21	4N	IKPT-H-2	240	21.8	1
763	1994/6/21	4N	IKPT-H-2	241	20.1	1
764	1994/6/21	4N	IKPT-H-2	242	21.2	1
765	1994/6/21	4N	IKPT-H-2	243	22.3	1
766	1994/6/21	4N	IKPT-H-2	244	21.9	1
767	1994/6/21	4N	IKPT-H-2	245	21.1	1
768	1994/6/21	4N	IKPT-H-2	246	24.3	1
769	1994/6/21	4N	IKPT-H-2	247	20.3	1
770	1994/6/21	4N	IKPT-H-2	248	20.8	1
771	1994/6/21	4N	IKPT-H-2	249	24.0	1
772	1994/6/21	4N	IKPT-H-2	250	17.0+	1
773	1994/6/21	4N	IKPT-H-2	251	20.3	1
774	1994/6/21	4N	IKPT-H-2	252	21.5+	1
775	1994/6/21	4N	IKPT-H-2	253	22.3	1
776	1994/6/21	4N	IKPT-H-2	254	20.0	1
777	1994/6/21	4N	IKPT-H-2	255	19.0+	1
778	1994/6/21	4N	IKPT-H-2	256	22.3	1
779	1994/6/21	4N	IKPT-H-2	257	23.6	1
780	1994/6/21	4N	IKPT-H-2	258	23.5	1
781	1994/6/21	4N	IKPT-H-2	259	20.5	1
782	1994/6/21	4N	IKPT-H-2	260	21.9	1
783	1994/6/21	4N	IKPT-H-2	261	20.6	1
784	1994/6/21	4N	IKPT-H-2	262	20.8	1
785	1994/6/21	4N	IKPT-H-2	263	20.1	1
786	1994/6/21	4N	IKPT-H-2	264	20.5	1
787	1994/6/21	4N	IKPT-H-2	265	20.1	1
788	1994/6/21	4N	IKPT-H-2	266	20.1	1
789	1994/6/21	4N	IKPT-H-2	267	21.0	1
790	1994/6/21	4N	IKPT-H-2	268	22.2	1
791	1994/6/21	4N	IKPT-H-2	269	22.7	1
792	1994/6/21	4N	IKPT-H-2	270	21.3	1
793	1994/6/21	4N	IKPT-H-2	271	20.0	1
794	1994/6/21	4N	IKPT-H-2	272	20.6	1
795	1994/6/21	4N	IKPT-H-2	273	19.4	1
796	1994/6/21	4N	IKPT-H-2	274	20.1	1
797	1994/6/21	4N	IKPT-H-2	275	20.5	1
798	1994/6/21	4N	IKPT-H-2	276	21.5	1
799	1994/6/21	4N	IKPT-H-2	277	22.1+	1
800	1994/6/21	4N	IKPT-H-2	278	20.0	1
801	1994/6/21	4N	IKPT-H-2	279	22.1	1
802	1994/6/21	4N	IKPT-H-2	280	21.3	1
803	1994/6/21	4N	IKPT-H-2	281	20.2	1
804	1994/6/21	4N	IKPT-H-2	282	19.0	1
805	1994/6/21	4N	IKPT-H-2	283	22.2	1
806	1994/6/21	4N	IKPT-H-2	284	22.5	1
807	1994/6/21	4N	IKPT-H-2	285	18.7	1
808	1994/6/21	4N	IKPT-H-2	286	22.3	1
809	1994/6/21	4N	IKPT-H-2	287	20.3	1
810	1994/6/21	4N	IKPT-H-2	288	23.2	1

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
811	1994/6/21	4N	IKPT-H-2	289	20.3	1
812	1994/6/21	4N	IKPT-H-2	290	20.1	1
813	1994/6/21	4N	IKPT-H-2	291	22.6	1
814	1994/6/21	4N	IKPT-H-2	292	24.3	1
815	1994/6/21	4N	IKPT-H-2	293	21.8	1
816	1994/6/21	4N	IKPT-H-2	294	20.2+	1
817	1994/6/21	4N	IKPT-H-2	295	20.7	1
818	1994/6/21	4N	IKPT-H-2	296	22.6	1
819	1994/6/21	4N	IKPT-H-2	297	20.5	1
820	1994/6/21	4N	IKPT-H-2	298	20.1	1
821	1994/6/21	4N	IKPT-H-2	299	22.5+	1
822	1994/6/21	4N	IKPT-H-2	300	23.2	1
823	1994/6/21	4N	IKPT-H-2	301	19.4	1
824	1994/6/21	4N	IKPT-H-2	302	19.4	1
825	1994/6/21	4N	IKPT-H-2	303	23.2	1
826	1994/6/21	4N	IKPT-H-2	304	20.1	1
827	1994/6/21	4N	IKPT-H-2	305	21.1	1
828	1994/6/21	4N	IKPT-H-2	306	21.0	1
829	1994/6/21	4N	IKPT-H-2	307	23.0+	1
830	1994/6/21	4N	IKPT-H-2	308	15.0+	1
831	1994/6/21	4N	IKPT-H-3	1	19.1	2
832	1994/6/21	4N	IKPT-H-3	2	21.0	2
833	1994/6/21	4N	IKPT-H-3	3	23.5	2
834	1994/6/21	4N	IKPT-H-3	4	21.0	2
835	1994/6/21	4N	IKPT-H-3	5	24.1	2
836	1994/6/21	4N	IKPT-H-3	6	22.4	2
837	1994/6/21	4N	IKPT-H-3	7	19.6	2
838	1994/6/21	4N	IKPT-H-3	8	18.2	2
839	1994/6/21	4N	IKPT-H-3	9	19.5	2
840	1994/6/21	4N	IKPT-H-3	10	20.0	2
841	1994/6/21	4N	IKPT-H-3	11	24.3	2
842	1994/6/21	4N	IKPT-H-3	12	19.5	2
843	1994/6/21	4N	IKPT-H-3	13	19.0	2
844	1994/6/21	4N	IKPT-H-3	14	22.3	2
845	1994/6/21	4N	IKPT-H-3	15	20.5	2
846	1994/6/21	4N	IKPT-H-3	16	20.8	1
847	1994/6/21	4N	IKPT-H-3	17	22.0	1
848	1994/6/21	4N	IKPT-H-3	18	21.7	1
849	1994/6/21	4N	IKPT-H-3	19	21.3	1
850	1994/6/21	4N	IKPT-H-3	20	21.8	1
851	1994/6/21	4N	IKPT-H-3	21	21.4+	1
852	1994/6/21	4N	IKPT-H-3	22	19.5+	1
853	1994/6/21	4N	IKPT-H-3	23	16.2	1
854	1994/6/21	L1	MTD-200	1	19.9	1
855	1994/6/21	L1	MTD-200	2	20.5	1
856	1994/6/21	L3	MTD-25	1	19.2	1
857	1994/6/21	L3	MTD-25	2	20.2	1
858	1994/6/21	L3	MTD-50	1	15.3	1
859	1994/6/21	L3	MTD-50	2	20.5	1
860	1994/6/21	L3	MTD-50	3	21.3	1
861	1994/6/21	L3	MTD-50	4	19.6	1
862	1994/6/21	L3	MTD-50	5	20.5	1
863	1994/6/21	L3	MTD-50	6	21.5	1
864	1994/6/21	L3	MTD-50	7	21.4	1
865	1994/6/21	L3	MTD-50	8	20.0	1
866	1994/6/21	L3	MTD-50	9	20.2	1
867	1994/6/21	L3	MTD-50	10	20.2	1
868	1994/6/21	L3	MTD-50	11	19.3	1
869	1994/6/21	L3	MTD-50	12	19.5	1
870	1994/6/21	L3	MTD-50	13	20.6	1
871	1994/6/21	L3	MTD-50	14	18.7	1
872	1994/6/21	L3	MTD-50	15	21.0	1
873	1994/6/21	L3	MTD-50	16	20.8	1
874	1994/6/21	L3	MTD-75	1	14.3	1
875	1994/6/21	L3	MTD-75	2	16.0	1
876	1994/6/21	L3	MTD-75	3	19.0	1
877	1994/6/21	L3	MTD-75	4	16.1	1
878	1994/6/21	L3	MTD-75	5	19.9	1
879	1994/6/21	L3	MTD-100	1	19.1	1
880	1994/6/21	L3	MTD-100	2	18.5	1
881	1994/6/21	L3	IKPT-H	1	21.0	2
882	1994/6/21	L3	IKPT-H	2	20.5	2
883	1994/6/21	L3	IKPT-H	3	24.6	2
884	1994/6/21	L3	IKPT-H	4	22.0	2
885	1994/6/21	L3	IKPT-H	5	21.8	2
886	1994/6/21	L3	IKPT-H	6	23.2	2
887	1994/6/21	L3	IKPT-H	7	22.6	2
888	1994/6/21	L3	IKPT-H	8	21.8	2
889	1994/6/21	L3	IKPT-H	9	23.2	2
890	1994/6/21	L3	IKPT-H	10	24.2	2
891	1994/6/21	L3	IKPT-H	11	23.2	2

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
892	1994/6/21	L3	IKPT-H	12	23.0	2
893	1994/6/21	L3	IKPT-H	13	21.5	2
894	1994/6/21	L3	IKPT-H	14	21.2	2
895	1994/6/21	L3	IKPT-H	15	24.2	2
896	1994/6/21	L3	IKPT-H	16	21.7	2
897	1994/6/21	L3	IKPT-H	17	23.3	2
898	1994/6/21	L3	IKPT-H	18	22.6	2
899	1994/6/21	L3	IKPT-H	19	20.7	2
900	1994/6/21	L3	IKPT-H	20	22.0	1
901	1994/6/21	L3	IKPT-H	21	22.5	1
902	1994/6/21	L3	IKPT-H	22	23.5	1
903	1994/6/21	L3	IKPT-H	23	22.5	1
904	1994/6/21	L3	IKPT-H	24	21.3	1
905	1994/6/21	L3	IKPT-H	25	20.7	1
906	1994/6/21	L3	IKPT-H	26	19.1	1
907	1994/6/21	L3	IKPT-H	27	22.3	1
908	1994/6/21	L3	IKPT-H	28	18.0	1
909	1994/6/21	L3	IKPT-H	29	19.0	1
910	1994/6/21	L3	IKPT-H	30	20.4	1
911	1994/6/21	L3	IKPT-O	1	19.0	2
912	1994/6/21	L3	IKPT-O	2	18.7	2
913	1994/6/21	L3	IKPT-O	3	18.3	2
914	1994/6/21	L3	IKPT-O	4	23.8	2
915	1994/6/21	L3	IKPT-O	5	21.0	2
916	1994/6/21	L3	IKPT-O	6	23.5	2
917	1994/6/21	L3	IKPT-O	7	21.2	2
918	1994/6/21	L3	IKPT-O	8	22.8	2
919	1994/6/21	L3	IKPT-O	9	24.6	2
920	1994/6/21	L3	IKPT-O	10	23.8	2
921	1994/6/21	L3	IKPT-O	11	24.0	2
922	1994/6/21	L3	IKPT-O	12	22.0	2
923	1994/6/21	L3	IKPT-O	13	22.2	2
924	1994/6/21	L3	IKPT-O	14	23.5	2
925	1994/6/21	L3	IKPT-O	15	22.0	2
926	1994/6/21	L3	IKPT-O	16	25.2	2
927	1994/6/21	L3	IKPT-O	17	20.8	2
928	1994/6/21	L3	IKPT-O	18	21.3	2
929	1994/6/21	L3	IKPT-O	19	19.8	2
930	1994/6/21	L3	IKPT-O	20	22.5	2
931	1994/6/21	L3	IKPT-O	21	20.6	2
932	1994/6/21	L3	IKPT-O	22	21.6	2
933	1994/6/21	L3	IKPT-O	23	21.4	2
934	1994/6/21	L3	IKPT-O	24	22.7	2
935	1994/6/21	L3	IKPT-O	25	21.4	2
936	1994/6/21	L3	IKPT-O	26	20.7	2
937	1994/6/21	L3	IKPT-O	27	20.2	2
938	1994/6/21	L3	IKPT-O	28	20.8	2
939	1994/6/21	L3	IKPT-O	29	21.6	2
940	1994/6/21	L3	IKPT-O	30	18.5	2
941	1994/6/21	L4	MTD-25	1	21.6	1
942	1994/6/21	L4	MTD-25	2	23.5	1
943	1994/6/21	L4	MTD-50	1	21.5	1
944	1994/6/21	L4	MTD-50	2	21.3	1
945	1994/6/21	L4	MTD-50	3	22.6	1
946	1994/6/21	L4	MTD-50	4	24.0	1
947	1994/6/21	L4	MTD-75	1	25.0	1
948	1994/6/21	L4	MTD-75	2	19.5	1
949	1994/6/21	L4	MTD-75	3	22.0	1
950	1994/6/21	L4	MTD-75	4	23.1	1
951	1994/6/21	L4	MTD-75	5	23.5	1
952	1994/6/21	L4	MTD-75	6	20.0	1
953	1994/6/21	L4	MTD-75	7	24.0	1
954	1994/6/22	L4	IKPT-H-1	1	17.5	2
955	1994/6/22	L4	IKPT-H-1	2	15.6	2
956	1994/6/22	L4	IKPT-H-1	3	20.7	2
957	1994/6/22	L4	IKPT-H-1	4	21.5	2
958	1994/6/22	L4	IKPT-H-1	5	17.5	2
959	1994/6/22	L4	IKPT-H-1	6	16.6	2
960	1994/6/22	L4	IKPT-H-1	7	15.3	2
961	1994/6/22	L4	IKPT-H-1	8	23.2	2
962	1994/6/22	L4	IKPT-H-1	9	17.0	2
963	1994/6/22	L4	IKPT-H-1	10	23.8	2
964	1994/6/22	L4	IKPT-H-1	11	24.3	2
965	1994/6/22	L4	IKPT-H-1	12	23.7	2
966	1994/6/22	L4	IKPT-H-1	13	23.0	2
967	1994/6/22	L4	IKPT-H-1	14	22.6	2
968	1994/6/22	L4	IKPT-H-1	15	23.2	2
969	1994/6/22	L4	IKPT-H-1	16	22.3	2
970	1994/6/22	L4	IKPT-H-1	17	25.3	2
971	1994/6/22	L4	IKPT-H-1	18	23.0	2
972	1994/6/22	L4	IKPT-H-1	19	22.1	2

		Catalogue No.				
Fish No.	Date	St.No.	Gear	No.	TL(mm)	Pres.
973	1994/6/22	L4	IKPT-H-1	20	22.6	2
974	1994/6/22	L4	IKPT-H-1	21	19.2	2
975	1994/6/22	L4	IKPT-H-1	22	22.7	2
976	1994/6/22	L4	IKPT-H-1	23	20.5	2
977	1994/6/22	L4	IKPT-H-1	24	22.3	2
978	1994/6/22	L4	IKPT-H-1	25	21.2	2
979	1994/6/22	L4	IKPT-H-1	26	22.0	2
980	1994/6/22	L4	IKPT-H-1	27	22.4	2
981	1994/6/22	L4	IKPT-H-1	28	24.5	2
982	1994/6/22	L4	IKPT-H-1	29	19.5	2
983	1994/6/22	L4	IKPT-H-1	30	20.0	2
984	1994/6/22	L4	IKPT-H-1	31	21.3	2
985	1994/6/22	L4	IKPT-H-1	32	18.2	2
986	1994/6/22	L4	IKPT-H-1	33	25.2	2
987	1994/6/22	L4	IKPT-H-1	34	17.8	2
988	1994/6/22	L4	IKPT-H-1	35	18.2	2
989	1994/6/22	L4	IKPT-H-1	36	22.0	2
990	1994/6/22	L4	IKPT-H-1	37	19.8	2
991	1994/6/22	L4	IKPT-H-1	38	21.2	2
992	1994/6/22	L4	IKPT-H-1	39	21.3	2
993	1994/6/22	L4	IKPT-H-1	40	24.4	2
994	1994/6/22	L4	IKPT-H-1	41	20.8	2
995	1994/6/22	L4	IKPT-H-1	42	23.0	2
996	1994/6/22	L4	IKPT-H-1	43	22.4	2
997	1994/6/22	L4	IKPT-H-1	44	23.0	2
998	1994/6/22	L4	IKPT-H-1	45	21.3	2
999	1994/6/22	L4	IKPT-H-1	46	22.0	2
1000	1994/6/22	L4	IKPT-H-1	47	23.0	2
1001	1994/6/22	L4	IKPT-H-1	48	21.8	2
1002	1994/6/22	L4	IKPT-H-1	49	21.2	2
1003	1994/6/22	L4	IKPT-H-1	50	23.3	2
1004	1994/6/22	L4	IKPT-H-1	51	23.0	2
1005	1994/6/22	L4	IKPT-H-1	52	21.7	2
1006	1994/6/22	L4	IKPT-H-1	53	22.2	2
1007	1994/6/22	L4	IKPT-H-1	54	21.2	2
1008	1994/6/22	L4	IKPT-H-1	55	23.0	2
1009	1994/6/22	L4	IKPT-H-1	56	20.5	2
1010	1994/6/22	L4	IKPT-H-1	57	22.5	2
1011	1994/6/22	L4	IKPT-H-1	58	19.8	2
1012	1994/6/22	L4	IKPT-H-1	59	22.8	2
1013	1994/6/22	L4	IKPT-H-1	60	22.0	2
1014	1994/6/22	L4	IKPT-H-1	61	22.3	2
1015	1994/6/22	L4	IKPT-H-1	62	26.0	2
1016	1994/6/22	L4	IKPT-H-1	63	19.6	1
1017	1994/6/22	L4	IKPT-H-1	64	19.4	1
1018	1994/6/22	L4	IKPT-H-1	65	19.0	1
1019	1994/6/22	L4	IKPT-H-1	66	21.7	1
1020	1994/6/22	L4	IKPT-H-1	67	17.7	1
1021	1994/6/22	L4	IKPT-H-1	68	22.5	1
1022	1994/6/22	L4	IKPT-H-1	69	18.5+	1
1023	1994/6/22	L4	IKPT-H-1	70	19.5	1
1024	1994/6/22	L4	IKPT-H-1	71	21.3	1
1025	1994/6/22	L4	IKPT-H-1	72	21.5	1
1026	1994/6/22	L4	IKPT-H-1	73	19.9	1
1027	1994/6/22	L4	IKPT-H-1	74	19.3	1
1028	1994/6/22	L4	IKPT-H-1	75	20.4	1
1029	1994/6/22	L4	IKPT-H-1	76	17.6	1
1030	1994/6/22	L4	IKPT-H-1	77	21.8	1
1031	1994/6/22	L4	IKPT-H-1	78	20.3+	1
1032	1994/6/22	L4	IKPT-H-1	79	18.4	1
1033	1994/6/22	L4	IKPT-H-1	80	18.2+	1
1034	1994/6/22	L4	IKPT-H-1	81	21.6	1
1035	1994/6/22	L4	IKPT-H-1	82	20.0	1
1036	1994/6/22	L4	IKPT-H-1	83	23.0	1
1037	1994/6/22	L4	IKPT-H-1	84	19.2	1
1038	1994/6/22	L4	IKPT-H-2	1	23.0	2
1039	1994/6/22	L4	IKPT-H-2	2	24.5	2
1040	1994/6/22	L4	IKPT-H-2	3	23.3	2
1041	1994/6/22	L4	IKPT-H-2	4	24.2	2
1042	1994/6/22	L4	IKPT-H-2	5	22.6	2
1043	1994/6/22	L4	IKPT-H-2	6	23.6	2
1044	1994/6/22	L4	IKPT-H-2	7	22.0	2
1045	1994/6/22	L4	IKPT-H-2	8	23.5	2
1046	1994/6/22	L4	IKPT-H-2	9	23.3	2
1047	1994/6/22	L4	IKPT-H-2	10	22.6	1
1048	1994/6/22	L4	IKPT-H-2	11	20.2	1
1049	1994/6/22	L4	IKPT-H-2	12	20.0	1
1050	1994/6/22	L4	IKPT-H-2	13	21.2	1
1051	1994/6/22	L4	IKPT-H-2	14	20.3	1
1052	1994/6/22	L4	IKPT-H-2	15	20.3+	1
1053	1994/6/22	L4	IKPT-H-2	16	13.0+	1
1054	1994/6/22	L5	MTD-25	1	22.5	1
1055	1994/6/22	L5	MTD-75	1	18.0	1
1056	1994/6/22	L5	MTD-75	2	20.3	1
1057	1994/6/22	L5	MTD-100	1	16.0	1
1058	1994/6/22	L5	MTD-100	2	18.0	1
1059	1994/6/22	L5	MTD-100	3	19.3	1
1060	1994/6/22	L5	MTD-100	4	20.3	1
1061	1994/6/22	L5	MTD-125	1	18.6	1
1062	1994/6/22	L5	MTD-125	2	19.1	1
1063	1994/6/22	L5	MTD-200	1	22.1	1
1064	1994/6/22	L5	IKPT-O	1	15.8	2
1065	1994/6/22	L5	IKPT-O	2	22.0	2
1066	1994/6/22	L5	IKPT-O	3	19.0	2
1067	1994/6/22	L5	IKPT-O	4	20.5	2
1068	1994/6/22	L5	IKPT-O	5	19.8	2
1069	1994/6/22	L5	IKPT-O	6	20.0	2
1070	1994/6/22	L5	IKPT-O	7	23.2	2
1071	1994/6/22	L5	IKPT-O	8	25.0	1
1072	1994/6/22	L6	MTD-100	1	23.0	1
1073	1994/6/22	5D	IKPT-O	1	17.8	1
1074	1994/6/22	5N	ORI-69	1	19.6	1
1075	1994/6/25	9N	IKPT-H	1	21.2	2
1076	1994/6/25	9N	IKPT-H	2	22.8	2
1077	1994/6/25	9N	IKPT-H	3	22.6	1
1078	1994/6/25	10N	IKPT-O	1	23.5	1
1079	1994/6/25	10N	IKPT-O	2	21.6	1
1080	1994/6/25	10N	IKPT-O	3	21.6	1
1081	1994/6/25	10N	IKPT-H	1	22.5	1
1082	1994/6/25	10N	IKPT-H	2	21.6	1
1083	1994/6/25	10N	IKPT-H	3	20.2	1
1084	1994/6/25	10N	IKPT-H	4	20.5	1
1085	1994/6/25	10N	IKPT-H	5	19.5	1
1086	1994/6/25	10N	IKPT-H	6	20.1	1
1087	1994/6/25	10N	IKPT-H	7	19.6	1
1088	1994/6/26	E2	IKPT-O	1	19.5	2
1089	1994/6/26	E2	IKPT-O	2	16.8	2
1090	1994/6/26	E2	IKPT-O	3	16.6	1
1091	1994/6/26	11N	IKPT-H	1	25.3	1
1092	1994/6/26	11N	IKPT-H	2	25.0	2
1093	1994/6/26	11N	IKPT-H	3	23.3	2
1094	1994/6/27	12N	IKPT-O	1	24.0	1
1095	1994/6/27	13N	IKPT-H	1	12.0	1
1096	1994/6/27	13N	IKPT-H	2	11.3	1
1097	1994/6/27	13N	IKPT-H	3	25.0	1
1098	1994/7/1	S3	IKPT-D-1	1	24.0	1
1099	1994/7/2	S4	IKPT-D-1	1	23.8	2
1100	1994/7/2	S4	IKPT-D-2	1	31.1	2
1101	1994/7/2	S4	IKPT-D-2	2	25.9	2
1102	1994/7/2	S4	IKPT-O	1	23.6	1
1103	1994/7/2	S4	IKPT-O	2	23.9	1
1104	1994/7/2	S4	IKPT-H-1	1	23.7	2
1105	1994/7/2	S4	IKPT-H-1	2	22.8	2
1106	1994/7/2	S4	IKPT-H-1	3	24.0	1
1107	1994/7/3	S4	IKPT-H-2	1	26.4	2
1108	1994/7/3	S4	IKPT-H-2	2	25.2	2
1109	1994/7/3	S4	IKPT-H-2	3	23.0	1
1110	1994/7/3	S4	IKPT-D-3	1	23.3	1

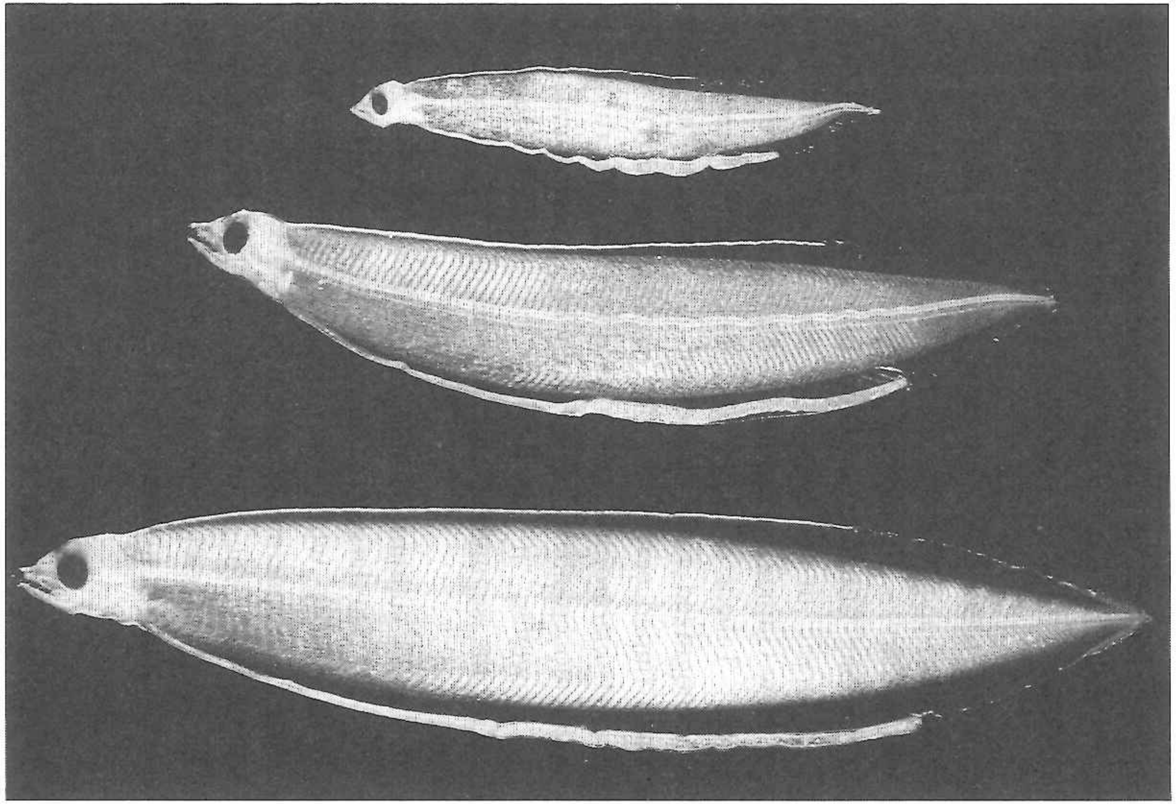

Fig. 1 *Anguilla japonica* leptocephali.
Top: Cat. ORI KH-94-2, No. 13N-IKPT-H-1, 12.0 mm TL.
Middle: Cat. ORI KH-94-2, No. L3-MTD-100-2, 18.5 mm TL.
Bottom: Cat. ORI KH-94-2, No. S3-IKPT-D-1-1, 24.0 mm TL.

Morphology, taxonomy and distribution of *Anguilla* sp. leptocephali

Noritaka Mochioka, Tsuguo Otake and Katsumi Tsukamoto

A total of 20 specimens of Anguilla leptocephali, except *A. japonica*, were collected during the cruise. Catalogue number, collection data, body size (mm TL), total number of myomeres of the leptocephali are shown in Table 1.

Total myomeres (100 - 106) indicated that these *Anguilla* sp. larvae were both subtropical and tropical eels. Twelve larvae (over 25mm TL in Table 1) which has 9 - 13 ano-dorsal myomeres. This indicates that they belong to the long finned eels. According to Jespersen (1942), long-finned anguillid larvae in the waters of eastern Indo-Malaya and the waters north of New Guinea, including the Philippines, have 8.5 - 13 ano-dorsal myomeres. Tabeta et al. (1976), Tzeng (1982) and Tzeng and Tabeta (1983) recognized four species of eels in the Philippines and Taiwan; one short finned eel, *A. bicolor pacifica*, and three long finned eels, *A. japonica*, *A. marmorata*, and *A. celebesensis*. Therefore, there is a possibility that leptocephali in Table 1 may be *A. marmorata* and/or *A. celebesensis*. However, it is difficult to identify further these leptocephali, since the segmental character of the two species overlap much each other.

Eight of the 23 stations sampled were positive for *Anguilla* sp. leptocephali (Fig. 2). The largest catch of specimens was taken at Station 4 (lat. 14N, long. 134E), where *A. japonica* leptocephali collected in maximum abundance. Specimens belonging to the smaller size range (15.0 mm TL) was only found at Station 12 (lat. 16N, long. 140E). Specimens in the larger size class were taken from the most south-eastern and north-western locations in survey area.

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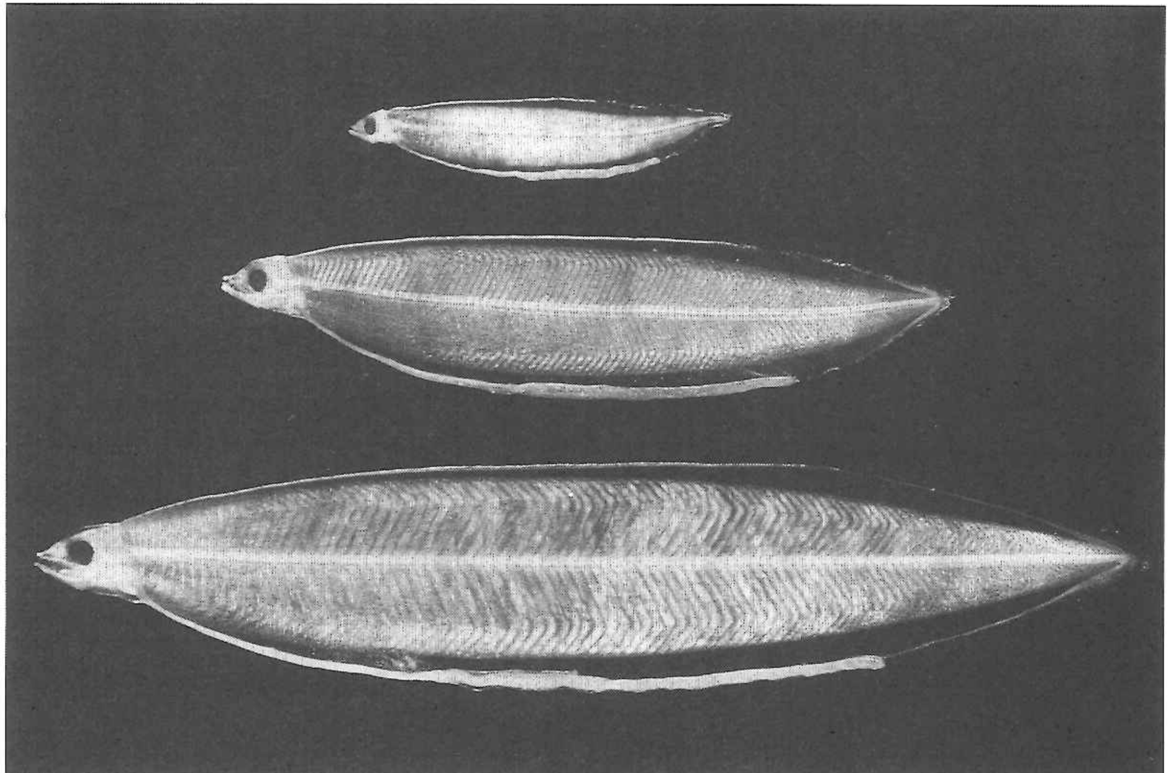

Fig. 1 *Anguilla* sp. leptocephali.
Top: Cat. ORI KH-94-2, No. 12N-IKPT-H-2, 12.2 mm TL.
Middle: Cat. ORI KH-94-2, No. L3-IKPT-H-1, 24.5 mm TL.
Bottom: Cat. ORI KH-94-2, No. S5-IKPT-D-1, 35.1 mm TL.

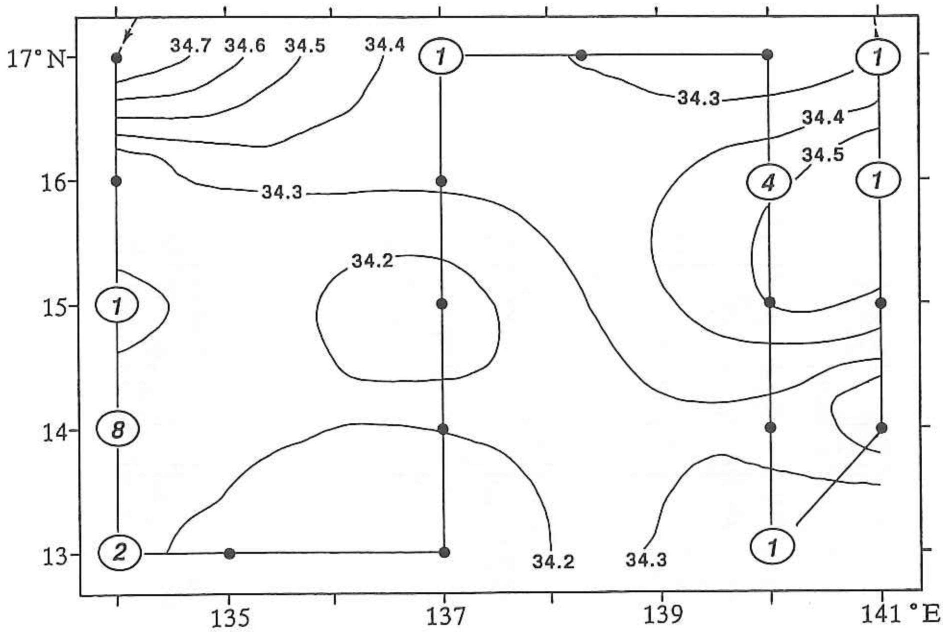

Fig. 2 Station location and the number of specimens of *Anguilla* sp. leptocephali collected in each station. Open circles with numerals indicate the stations where the *Anguilla* sp. leptocephali were collected and the number of specimens collected. Solid circles indicate the negative station. The horizontal distribution of salinity at depth of 60 m is shown.

Table 1. Catalogue number, collection data, total length of body, and number of myomeres of *Anguilla* sp. leptocephali.

TL, total length; TM, total number of myomeres.

		Catalogue No.				
Fish No.	Date	St. No.	Gear	No.	TL (mm)	TM
1	1994/6/21	3N	IKPT-H-1	1	19.1	102
2	1994/6/21	4N	IKPT-H-1	1	30.6	105
3	1994/6/21	4N	IKPT-H-1	2	33.0	105
4	1994/6/21	4N	IKPT-H-2	1	43.3	106
5	1994/6/21	4N	IKPT-H-2	2	20.4	101
6	1994/6/21	4N	IKPT-H-2	3	27.4	102
7	1994/6/21	L3	IKPT-H	1	24.5	100
8	1994/6/21	L3	IKPT-O	1	22.6	105
9	1994/6/22	L4	IKPT-H-1	1	21.3	105
10	1994/6/22	5N	IKPT-O	1	32.9	103
11	1994/6/22	5N	IKPT-H	1	33.6	103
12	1994/6/25	10N	IKPT-O	1	26.4	105
13	1994/6/27	12N	IKPT-H	1	10.5	101
14	1994/6/27	12N	IKPT-H	2	12.2	105
15	1994/6/27	12N	IKPT-H	3	26.5	103
16	1994/6/27	12N	IKPT-H	4	19.5	---
17	1994/6/28	15N	IKPT-H	1	30.6	101
18	1994/7/3	S4	IKPT-D-3	1	28.4	102
19	1994/7/3	S5	IKPT-D	1	35.1	102
20	1994/7/3	S6	IKPT-O	1	25.6	102

* IKPT: An IKMT (Isaacs-Kidd Mid Water Trawl) for zooplankton sampling, with 0.5 mm or 1.0 mm mesh aperture.

Anguilliform and notacanthiform leptocephali

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A total of 1,345 leptocephali of various taxa were collected with gear types, including IKMT, ORI, and MTD nets, at 27 stations. The leptocephali were taken in 88 net sets during the cruise. The results are summarized in Table 1.

All leptocephali belonged to the order Anguilliformes, except one specimen of the Notacanthiformes. The dominant families were Anguillidae (1,130 specimens, 84.0 %), Congridae (104 specimens, 7.7 %), Serrivomeridae (37 specimens, 2.8 %), Nemichthyidae (25 specimens, 1.9 %), Muraenidae (21 specimens, 1.6 %). The dominant families by standardized IKMT oblique tows (towing from the surface to 300 m deep) at 15 stations were Anguillidae (34 specimens, 35.8 % of total catch), Congridae (24 specimens, 25.3 %), Nemichthyidae (12 specimens, 12.6 %), Serrivomeridae (9 specimens, 9.5 %), and Derichthyidae (7 specimens, 7.4 %). Significant in the present cruise was that Anguillid leptocephali were the first dominant family.

Table 1. Leptocephali collected at each station. Negative nets are omitted.

A.j., *Anguilla japonica*; A.sp., *Anguilla* sp.; CH, Chlopsidae; MR, Muraenidae; NM, Nemichthyidae; SY, Synaphobrabchidae; OP, Ophichthidae; NT, Nettastomatidae; CG, Congridae; DR, Derichthyidae; SR, Serrivomeridae; NC, Notacanthiformes.

* IKPT: An IKMT (Isaacs-Kidd Mid Water Trawl) for zooplankton sampling, with 0.5 mm or 1.0 mm mesh aperture.

St. No.	Date	Gear	A. j.	A. sp.	CH	MR	NM	SY	OP	NT	CG	DR	SR	NC	Total
1D	1994/6/19	IKPT-O			1		3				1				5
1D	1994/6/19	IKPT-H					2								2
1N	1994/6/19	ORI-69			1							1			2
1N	1994/6/19	IKPT-O					6	1			5	1			13
1N	1994/6/19	IKPT-H					8				8	1			17
2N	1994/6/20	IKPT-O					1				2				3
3D	1994/6/20	IKPT-O	1												1
3N	1994/6/20	ORI-69								1					1
3N	1994/6/20	IKPT-O-1	1	1		1									2
3N	1994/6/20	IKPT-O-2			1										1
4N	1994/6/21	IKPT-O	28								2		1		30
4N	1994/6/21	IKPT-H-1	485	2	1	1				1	3		1		492
4N	1994/6/21	ORI-69	7												7
4N	1994/6/21	IKPT-H-2	308	3		2					3		4		321
4N	1994/6/21	IKPT-H-3	23			1									24
L1	1994/6/21	MTD-200	2												2
L3	1994/6/21	MTD-25	2												2
L3	1994/6/21	MTD-50	16												16
L3	1994/6/21	MTD-75	5												5
L3	1994/6/21	MTD-100	2												2
L3	1994/6/21	IKPT-H	30	1								1	1		33
L3	1994/6/21	IKPT-O	30	1		1									32
L4	1994/6/21	MTD-25	2												2
L4	1994/6/21	MTD-50	4												4
L4	1994/6/21	MTD-75	7								1				8
L4	1994/6/22	IKPT-H-1	84	1									2		87
L4	1994/6/22	IKPT-H-2	16								2		1		19
L5	1994/6/22	MTD-25	1												1
L5	1994/6/22	MTD-75	2			1									3
L5	1994/6/22	MTD-100	4												4
L5	1994/6/22	MTD-125	2												2
L5	1994/6/22	MTD-200	1												1
L5	1994/6/22	IKPT-O	8												7
L6	1994/6/22	MTD-100	1												1
5D	1994/6/22	IKPT-O	1												1
5N	1994/6/22	ORI-69	1												1
5N	1994/6/22	IKPT-O		1	1						1				3
5N	1994/6/22	IKPT-H		1	2	2					1				6
6D	1994/6/23	IKPT-O											1		1
6D	1994/6/23	ORI-69											1		1
6N	1994/6/23	IKPT-O			1	1					1				3
6N	1994/6/23	IKPT-H									1				1
7N	1994/6/24	IKPT-O											2		2
7N	1994/6/24	IKPT-H									4		3		7
7N	1994/6/24	ORI-69											1		1

St. No.	Date	Gear	A. j.	A. sp.	CH	MR	NM	SY	OP	NT	CG	DR	SR	NC	Total
8D	1994/6/24	IKPT-O										1			1
8N	1994/6/24	ORI-69											1		1
8N	1994/6/24	IKPT-O									3				3
9N	1994/6/25	IKPT-O					1								1
9N	1994/6/25	IKPT-H	3				1								4
10D	1994/6/25	IKPT-O													1
10N	1994/6/25	IKPT-O	3	1			1				3	2	1		11
10N	1994/6/25	IKPT-H	7								5	1	2		15
E2	1994/6/26	IKPT-O	3			1							1		5
11N	1994/6/26	IKPT-H	3												3
12N	1994/6/27	IKPT-O	1									1			2
12N	1994/6/27	IKPT-H		4							5				9
12D	1994/6/27	IKPT-O									1	1			2
13N	1994/6/27	ORI-side									1				1
13N	1994/6/27	IKPT-O								1	1				2
13N	1994/6/27	IKPT-H	3								5	2	2		12
14N	1994/6/28	IKPT-H-1				1	1				3		4		9
14N	1994/6/28	IKPT-H-2									1		2		3
14N	1994/6/28	ORI-69									1				1
15D	1994/6/28	IKPT-O											1		1
15N	1994/6/28	ORI-69									1				1
15N	1994/6/28	IKPT-O										1			1
15N	1994/6/28	IKPT-H		1											1
S1	1994/6/29	IKPT-O-1				1			1						2
S1	1994/6/29	IKPT-D-2											2		2
S1	1994/6/30	IKPT-D-3									1		1		2
S2	1994/6/30	IKPT-D-1													0
S2	1994/6/30	IKPT-O-1									1				1
S2	1994/7/1	IKPT-O-3				1					1				2
S2	1994/7/1	IKPT-D-2				1					2				3
S3	1994/7/1	IKPT-D-1	1			2									3
S3	1994/7/1	IKPT-D-2									3				3
S3	1994/7/1	IKPT-H-1							1		3				4
S3	1994/7/2	IKPT-H-2							1		1				2
S3	1994/7/2	IKPT-D-3				2					5		1		8
S4	1994/7/2	IKPT-D-1	1					1					1		3
S4	1994/7/2	IKPT-D-2	2											1	3
S4	1994/7/2	IKPT-O	2								3				5
S4	1994/7/2	IKPT-H-1	3			2					7				12
S4	1994/7/3	IKPT-H-2	3				1				7				11
S4	1994/7/3	IKPT-D-3	1	1	1						4				7
S5	1994/7/3	IKPT-D-1		1											1
S6	1994/7/3	IKPT-O		1							1				2
Total			1110	20	9	21	25	2	3	3	104	13	37	1	1345

Horizontal distribution of *Anguilla japonica* leptocephali

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Eleven of the 32 stations sampled were positive for *Anguilla japonica* leptocephali in this cruise(Fig.1). The positive stations were located south of lat. 15° N in long. 134° E transect line, and north of lat. 15° N in long. 137, 140, 141° E lines. Two negative stations in long. 134° E line were located in the salinity front. The largest catches of the leptocephali by various nets were taken at around lat. 14° and long. 134° E (96.4% of total catch). Maximum catch per haul (28 specimens) by the standardized IKMT oblique tow (towing from the surface to 300m deep) also occurred at St. 4 (lat. 14° N, long. 134° E) in the night-time.

Specimens belonging to the smaller size range (<15.0mm TL) were only found at St. 13 (15° N, 140° E), whereas specimens in the large size class (>25mm TL) were taken at St. 14 (14° N, 134° E) (Fig.2). The largest specimen (31.1mm TL) was collected at St. S4, where located just northeast of St. 13. Such a northerly and easterly dispersal of leptocephali from the spawning area may be driven by eddies which were found in the study area.

The Congridae (*Ariosoma* spp.), Serrivomeridae, and Muraenidae were found at St. 4 where *Anguilla japonica* leptocephali occurred in most abundance.

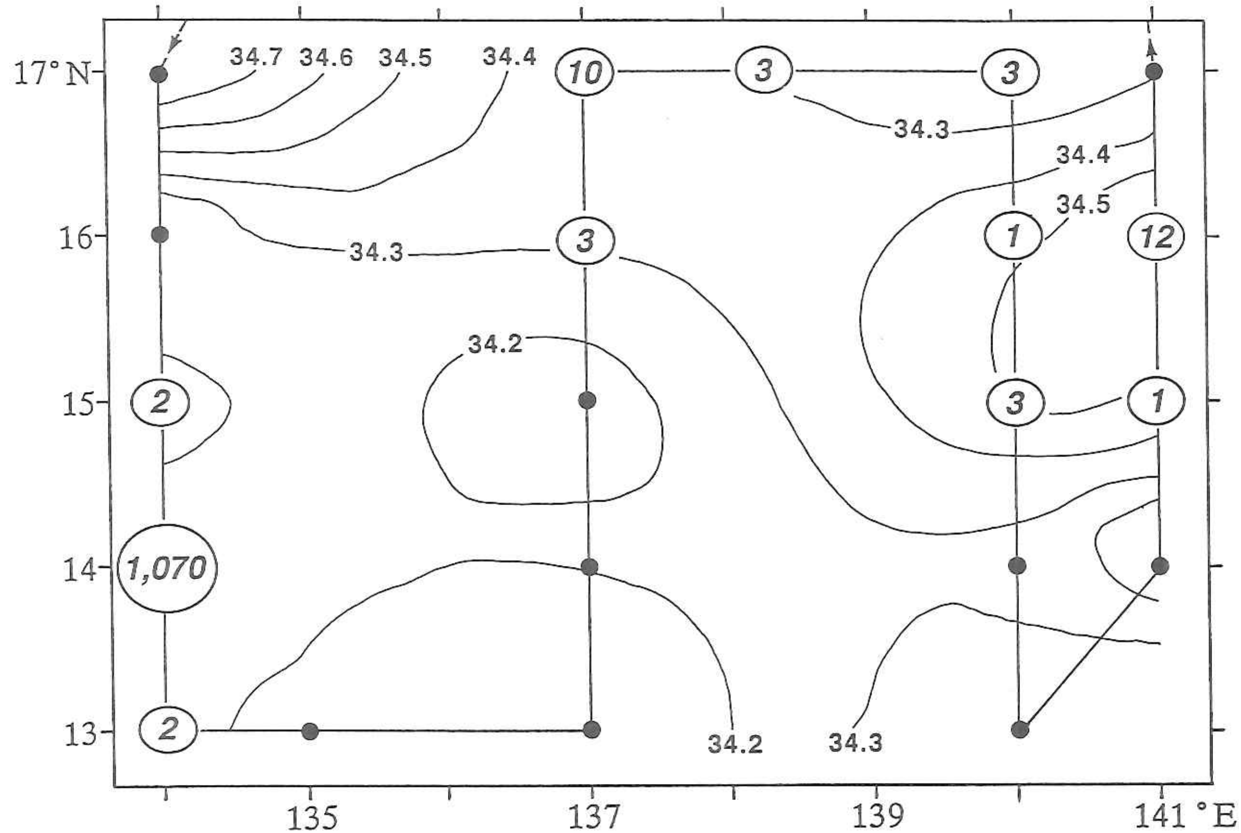

Fig. 1 Station location and the number of specimens of *Anguilla japonica* leptocephali collected in each station. Open circles withnumerals indicate the stations where the *A. japonica* leptocephali were collected and the number of specimenscollected. Solid circles indicate the negative station. Thehorizontal distribution of salinity at depth of 60 m is shown.

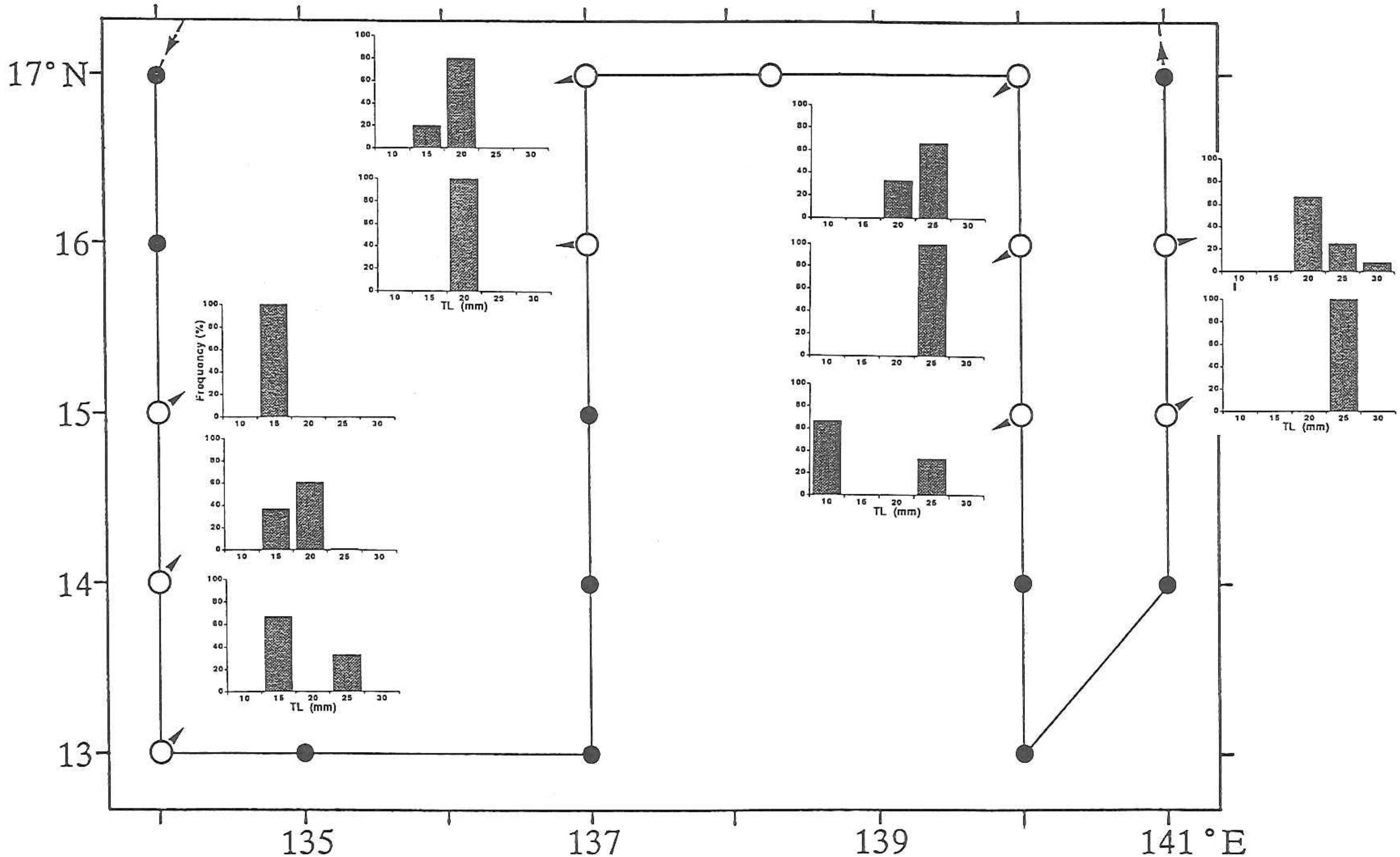

Fig. 2 The size frequency distribution of *Anguilla japonica* leptocephali collected at 10 positive stations on four transects (n=508).

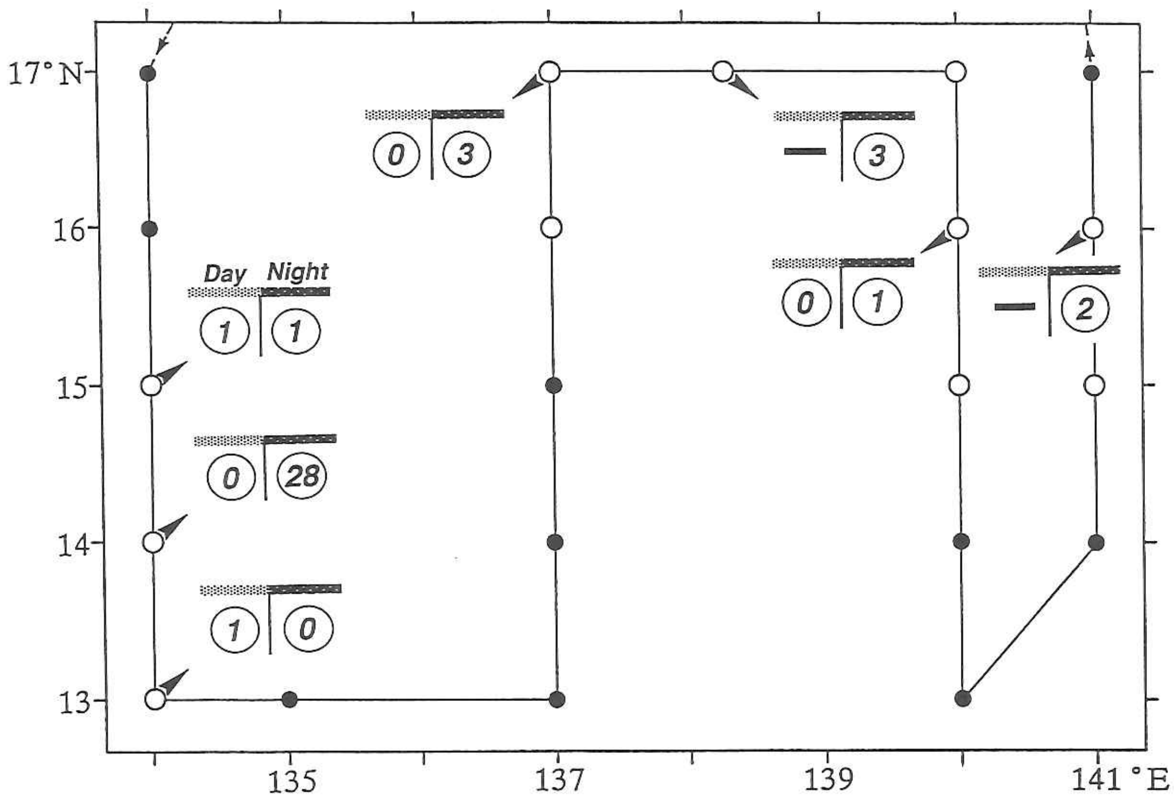

Fig. 3 The sampling stations at which *Anguilla japonica* leptocephali were collected with the standardized IKMT oblique tows by night and day. Open circles with arrow are positive stations for the standardized tows. Solid circles are negative stations. Numerals in circle indicate the number of *Anguilla japonica* leptocephali collected.

Diel vertical distribution of *Anguilla japonica* leptocephali

Tsuguo Otake, Tadashi Inagaki, Hiroshi Hasumoto, Noritaka Mochioka and Katsumi Tsukamoto

In order to determine the diel vertical distribution of *Anguilla japonica* leptocephali, six horizontal tows using a MTD horizontal closing net system (mouth opening: 0.5 m^2, mesh aperture: 0.5 mm) were conducted by day and night at St. L (14° N, 134° E) in 21 - 22 July 1994. The sampling strata were 0, 25, 50, 75, 100, 125, 150, 175, 200, 300, 400 m. A memory depth meter (Rigosha Co., Ltd.) was attached to the deepest net, which allowed an estimate of the actual depth strata of each net tow. The amount of the water filtered by each net was estimated with a calibrated flow meter (Rigosha Co., Ltd.) instrumented at the mouth of each net. The time towing started were 12:08, 15:40, 19:13, 22:53, 02:46, 06:10.

A total of 51 eel leptocephali (averaged total length: 20.2 mm ± 2.24 S.D.) was sampled by the MTD net towings. 48 specimens were caught by night from depth strata between 25 and 120 m deep. They were concentrated between 60 and 100 m deep with the most abundance at 60 m deep (16 specimens per haul, 18.3 specimens per 1000 m^3 filtered water) (Fig.1). In the daytime only three specimens (averaged total length: 21.1mm ± 1.34 S.D.) were caught at 120 and 220 m deep strata.

The present sampling data suggest that *Anguilla japonica* leptocephali exhibit a diel vertical migration, although daytime catch was very small. In the sampling area a strong halocline was occurred at 75 - 100 m deep (Fig.1). And sound scattering layers were formed at 0 - 50 m deep and at about 100 m deep, just below the halocline, by night (Inagaki et al. in press). The night distribution of eel leptocephali was included in the halocline, locating between upper and lower scattering layers.

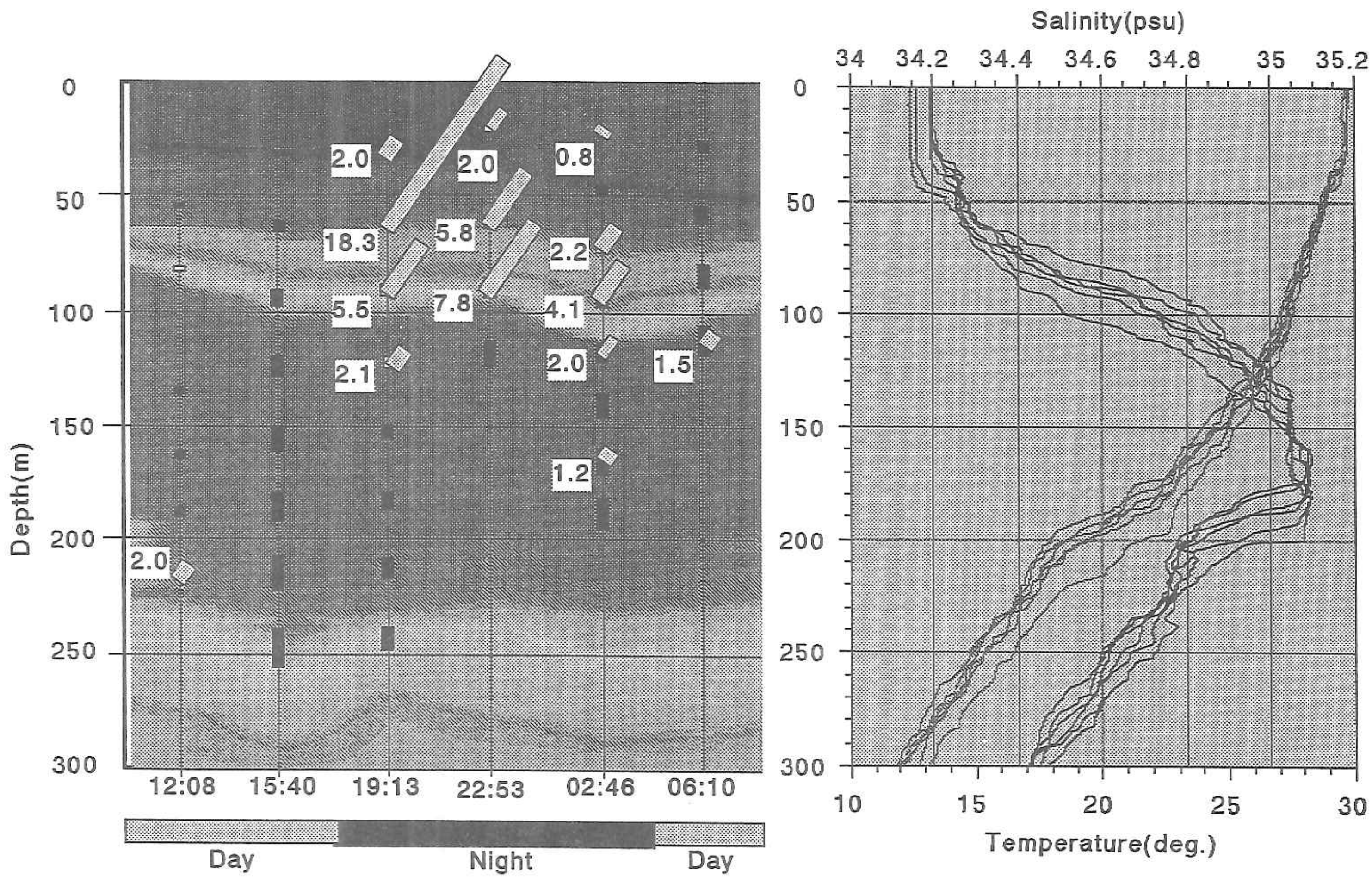

Fig.1 Vertical distribution of dencity (catch/103m³water filterd) of Anguilla japonica leptocephali sampled by a MTD net towings and vertical profile of salinity and temperature between the sea surface and 300 m deep at St. L. Vertical bars show actual depth strata of each net tow.

The spinal nerves of the eel leptocephali *Anguilla japonica* run in a mucous substance occupying most of the trunk

Kazumasa Uematsu, Hidekazu Tomoda and Masayuki Yoshida

As in other vertebrates, teleost's peripheral tissues in the trunk regions are innervated by nerves arising from parachordal neural structures, including the spinal cord, dorsal root ganglia and sympathetic ganglia. These nerves arrive in the skeletal muscles and skin through common paths, spinal nerves, after leaving the parachordal structures. Spinal nerve in ordinary animals including usual fish larvae run in space among muscles and other peripheral tissues. In contrast, situation is very different in the eel leptocephalus larvae, since peripheral tissues are far apart from the parachordal structures by a large amount of a transparent mucous substance occupying most internal space (Hulet, 1978).

Development of the nervous systems in the eel larvae have not been studied in detail (Hulet, 1978, Tomoda and Uematsu 1995). In the present study, the parachordal neural structures of leptocephali of the Japanese eel *Anguilla japonica* (total length around 20 mm) were examined in the light microscopic level.

Leptocephali (total length about 20mm) captured at the station 4N were threw into a fixative (2% paraformaldehyde and 2% glutaraldehyde in 0.1M pH 7.4 phosphate buffer) immediately after identification as the Japanese eel and were preserved in it until further treatment. They were pinned down on a Sylgard (Dow Corning) lined small dish and dissected with a forceps with finer tips and finer tungsten needles to expose the parachordal structures. Some specimens were embedded in Quetol 812 (Nisshin EM, Tokyo) and were cut to make 2 μm serial transversal sections of the region.

Paraxial structures such as the notochord and spinal cord with the spinal nerves appeared to be suspended in the mucous substance (Fig.1). These structures could be observed through the mucous substance after removal of the skin and muscles (Fig.1). Each spinal segment, which corresponded basically to each myotome, sprouted out the two spinal nerves nearly horizontally at right angles to the body axis toward the axial muscles of the both sides at the level (Fig.2). The spinal nerves entered into the muscles at the horizontal septum. The base of the nerve was situated near the ventral root of the cord just above the notochord (Fig.2). The dorsal root ran ventrally on the lateral surface of the cord and joined in the spinal nerve at the base (Fig.2). A basal region of the nerves was swollen to 100-120 μm in diameter. The swelling contained many cells presumed to be neurons that innervate the axial muscles and the skin (Fig.3), since these cells and fibers in the spinal nerves were retrogradely labeled with DiI applied to the myotome (Yoshida et al. 1995).

In vertebrates, information from the skin and muscles relayed to the spinal cord by sensory neurons located in the dorsal root ganglia that lie within the vertebral column immediately adjacent to the spinal cord (Kandel et al. 1991). Although neuronal accumulations found in the spinal nerves of the leptocephali were not next to the cord but were suspended in the mucus material, they are surely the dorsal root ganglia that involved in conveyance of somatosensory information. The existence of the well-developed ganglia may further suggest that the leptocephali are capable of perceiving mechanical stimuli provided from water current or food materials touching the body surface. The ability must be indispensable for navigation and foraging during the migration of the eel toward lands. However, it is not so far evident there are any nerve endings or special sensory organs in the skin since the epidermis on the sides of leptocephali is easily damaged and detached during catch and handling of specimen (Hulet, 1978).

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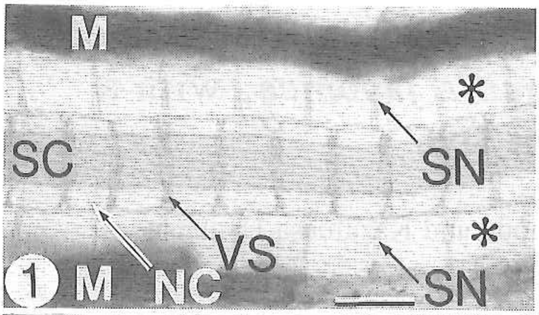

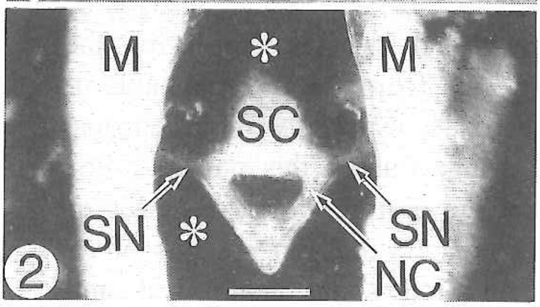

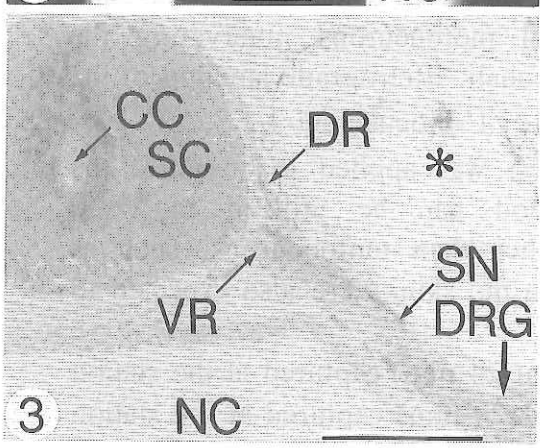

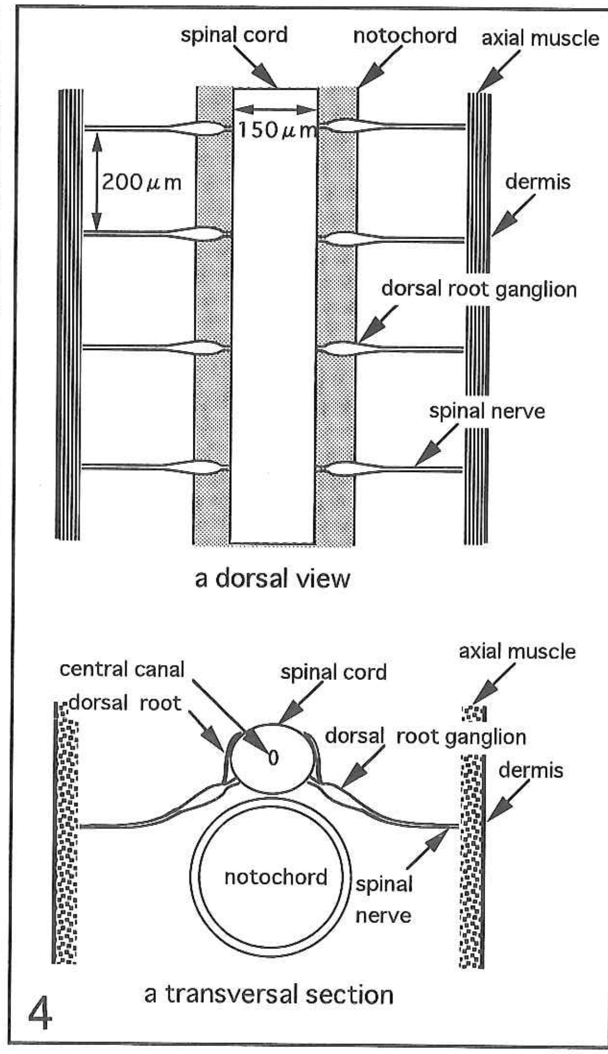

Fig. 1 Anatomy of the spinal cord and spinal nerves of the eel leptocephalus (length 20 mm). A dorsal view of the spinal cord (SC), notochord (NC) and spinal nerves (SN) through a mucous substance (asterisks) surrounding them. In this specimen the dorsal and ventral muscles were removed. Swollen portions of the spinal nerves are the dorsal root ganglia. The spinal nerves contact with the axial muscles (M). The notochord is divided by vertical septa (VS). Scale bar= 200 μm.

Fig. 2 Anatomy of the spinal cord and spinal nerves of the eel leptocephalus (length 20 mm). A thick transverse section of the trunk shows the spinal cord (SC), notochord (NC) and spinal nerves suspended in a mucous substance (asterisk). The axial muscles (M). Scale bar = 200 μm.

Fig. 3 A transverse section showing paraxial structures including the spinal cord (SC) notochord (VC) and spinal nerves (SN). The dorsal and ventral roots of the spinal cord join together and become the spinal nerve. Note that many cells, most of which are presumably neurons, are seen in the dorsal root ganglion (DGR). The central canal (CC). A mucous material surrounding the structure (asterisks). Scale bar = 50 μm.

Fig .4 Schematic drawings of parachordal neural structures of the eel leptocephalus.

Labeling of the Spinal and Parachordal Neurons of the Eel Leptocephali, *Anguilla japonica*, with a Fluorescent Dye

Masayuki Yoshida, Hidekazu Tomoda and Kazumasa Uematsu

The Japanese eel, *Anguilla japonica*, undergoes dramatic changes of the somatic structures, including the myotomal muscles subserving the swimming activity, during the metamorphosis from the leptocephalus to the glass eel. The spinal neuronal substrates, especially motoneurons, underlying swimming activity possibly change during this period. For clarifying this issue, it is needed to reveal the morphological features of spinal motoneurons innervating the trunk muscles in leptocephalus of *A. japonica*. In the present study, we revealed some anatomical and morphological characteristics of spinal motoneurons innervating the trunk muscles of the *A. japonica* leptocephali. Retrograde labeling of the neurons by fluorescent dye DiI (1, 1'-dioctadecyl-3, 3, 3', 3'-tetramethylindocarbocyanine perchlorate) was applied to visualize the spinal motoneurons, since this method can be utilized in fixed preparations. Neuronal structures other than motoneurons, such as sensory neurons having their neurites in the skin, were also expected to be labeled.

Three leptocephali (total length about 24 mm) captured at the station L3 and 4 leptocephali (total length about 20 mm) captured at the station 4N were fixed with 4% paraformaldehyde in 0.1 M phosphate buffer (pH 7.4) immediately after identification as *A. japonica*. In each animal, several regions of the skin were carefully removed and small incisions in the myotomal muscles were made. DiI crystals were deposited on the incised sites and then the removed skins were put back and glued to prevent diffusion of the die. The preparations were incubated in the fixative at 37 °C for 2-3 weeks. After the incubation, the spinal cords of the preparations were partially exposed and viewed with a fluorescent microscope. Labeled neurons were photographed or drawn using camera lucida. In some fixed animals, several regions not used for the labeling were sliced transversally with a razor for observing parachordal structures.

Fig. 1 shows the frontal view of a razor-sliced specimen. Notochord itself and the parachordal structures such as the spinal cord and spinal ganglia have been found to be suspended in the mucous substance occupying most of the trunk (Uematsu et al. 1995). We found, in addition, that the parachordal structures appeared to be suspended by means of fibrous structures that connected the parachordal structures with basal surface of the axial muscle (Fig. 1). We also observed the fibrous structures that connected the right and left body walls each other (Fig. 1). Each spinal nerve, after exiting the dorsal root ganglion (Uematsu et al. 1995), branched out three main bundles and then entered the axial muscles (Fig. 1).

Retrogradely labeled axons, including motor and sensory axons, in the spinal nerve were firstly traced to the dorsal root ganglia that were located ventrolaterally to the spinal cord (Fig. 2). The motor axons were then traced to the spinal cord via the ventral root. Motoneuronal axons within the spinal cord were not well visible and, in most case, could not be traced to the cell body. Cell bodies of the motoneurons were located in the medioventral part (motor column) of the spinal cord (Fig. 2), while the number of labeled motoneurons were varied between preparations. Most motoneuronal cell bodies had spherical or ovoid shape with variations. Fig. 3 shows the relationships between soma size and position of the labeled motoneurons. The motoneurons appeared to be divided into two populations from their soma size and position in the lateral view of the spinal cord. Motoneurons having relatively large soma, about 70 μm^2 in lateral view, were mainly located in the dorsal and medial part of the motor column (Fig. 3). Motoneurons having smaller soma, about 35 μm^2 in lateral view, were widely distributed in the motor column (Fig. 3). Distribution of the motoneurons on mediolateral axis was not clear from the present experiments.

A number of sensory neurons located in the dorsal root ganglion were retrogradely labeled (Fig. 2B, Fig. 4). Sensory collaterals, which probably originated from the dorsal root ganglionic sensory neurons, ran in the dorsal root and enter the dorsal part of the spinal cord (Fig. 2B). After entering the spinal cord, the sensory collaterals ran longitudinally just below the dorsolateral margin of the cord (Fig. 2B).

Presumable post ganglionic sympathetic neurons were labeled in the parachordal ganglia (Fig. 2B, Fig. 4). The sympathetic fibers ran dorsally along the lateral surface of the notochord and joined the spinal nerves (Fig. 2B, Fig. 4). Some fibers appeared to pass through the nerves (Fig. 2B, Fig. 4). Some fibers appeared to pass through the ganglia and ran either rostrally or caudally within a tract, which was located ventrally to the notochord and extended longitudinally (Fig. 2B, Fig. 4). The observed ganglia and tract must be the sympathetic ganglia and the sympathetic tract, respectively.

From the present study, the leptocephali of *A. japonica* were found to have well-developed sensory, motor and autonomic systems. This finding suggests that the leptocephali are highly capable for perceiving and processing the sensory information from outside, for controlling their movement, and for regulating the internal conditions.

Reference

Uematsu, K., Tomoda, H. and Yoshida, M. (1995) The spinal nerves of the eel leptocephali *Anguilla japonica* run in a mucous substance occupying most of the trunk. Preliminary Report of the Hakuho Maru Cruise KH-94-2, Ocean Research Institute, University of Tokyo (ed. by T.Otake and K.Tsukamoto).

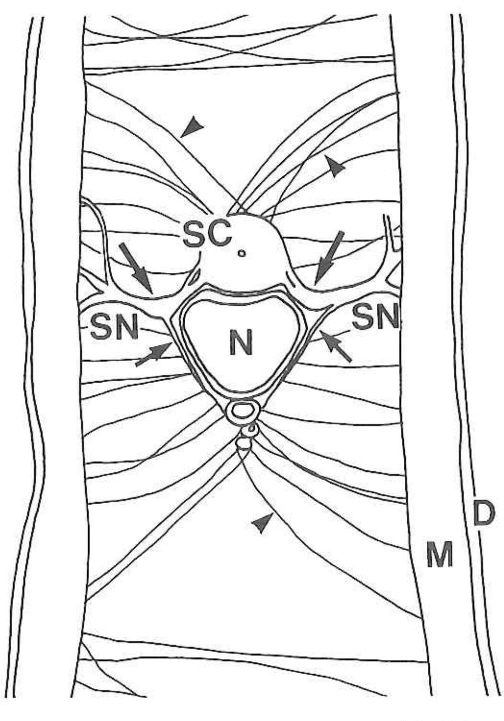

Fig.1 A camera lucida drawing of the frontal view of a transverse section of the *A. japonica* leptocephalus. Parachordal structures including the spinal cord (SC), dorsal root ganglia (large arrows) and sympathetic nerves (small arrows) are suspended by fibrous structures (arrowheads). D, dermis; M, axial muscle; N, notochord; SN, spinal nerve. Scale bar, 100 mm.

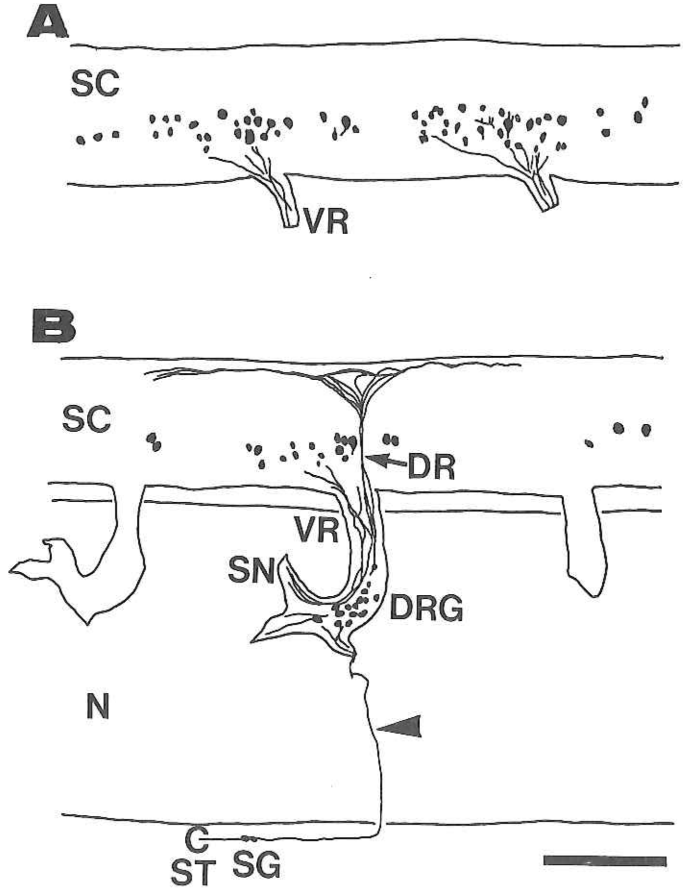

Fig.2 Lateral views of the spinal and parachordal neurons labeled with DiI. (A) Labeled motoneurons and its axons. Sensory collaterals were also labeled but not shown. (B) A typical labeling with DiI. DR, dorsal root; DRG, dorsal root ganglion; N, notochord; SC, spinal cord; SG, sympathetic ganglion; SN, spinal nerve; ST, sympathetic tract; VR, ventral root. Arrowhead indicates a sympathetic fiber. Scale bar, 100 mm.

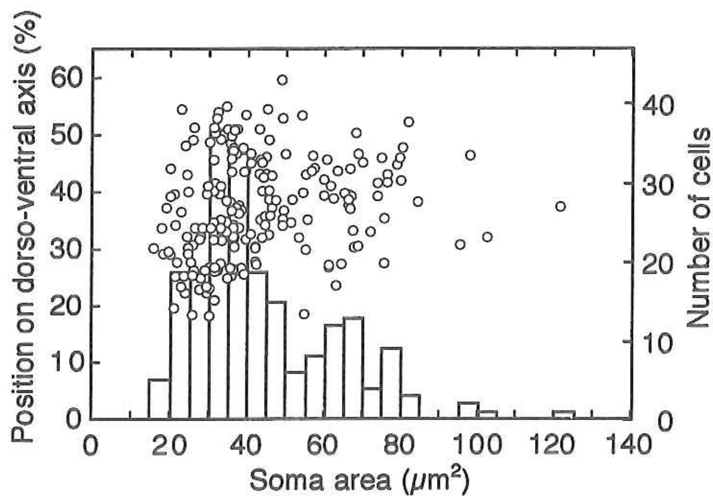

Fig.3 Relationships between soma area and position of labeled motoneurons (open circles). Ordinate; 0%=ventral margin of the spinal cord, 100%=dorsal margin of the cord. Relationships between soma area and number of labeled neurons are also shown (bars). Data from 7 preparations are shown.

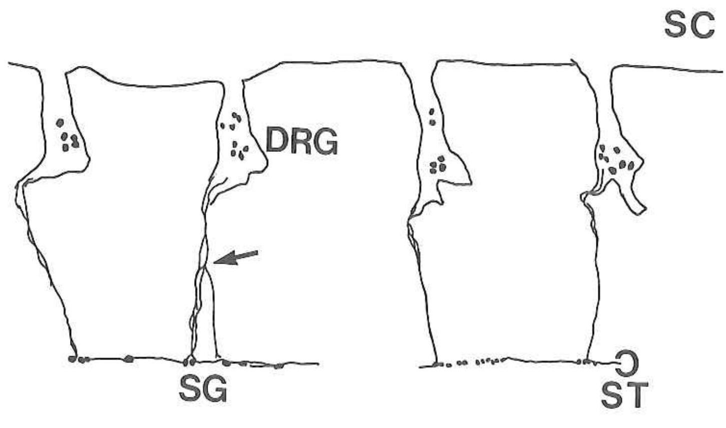

Fig.4 A lateral view of the sympathetic neurons labeled with DiI. Sensory neurons in the dorsal root ganglia (DRG) are also shown. Arrow indicates sympathetic fibers. SC, spinal cord; SG, sympathetic ganglion; ST, sympathetic tract. Scale bar, 100 mm.

Ontogeny of the self defense mechanisms in Japanese eel

Yuzuru Suzuki

Immune response, characterized by antigen specificity and memory, is the most advanced form of self defense mechanisms common in vertebrates. However, the immune system of fish, the most primitive vertebrates, is yet remained underdeveloped level comparing higher vertebrates especially mammals. Mechanisms other than immune system have significant meanings in fish. In particular, fish larvae are supposed to have characteristic defense mechanisms, since they are the most underdeveloped vertebrates, ontogenically as well as phylogenically.

Among many fish species, eels have unique self defense mechanisms; highly heat-stable complement, serum lectin specific for human O type red blood cells, serum poison which cause severe and sometimes lethal gastroenteric disorder, and lectin and hemolysin in the skin mucus. In addition, larval development of eel is quite unique, with leptocephalus and subsequent metamorphosis to adult form. Therefore it is of great interest to clarify how these systems are developed during the larval stage.

Eel is one of the most important fish species which is cultured in Japan. Much effort has been made relating to its breeding in captivity. Such that fertilized eggs and preleptocephalus larvae can be obtained fairly constantly. However, these have not yet been success in cultivating the larval fish to adults; it has not even been possible to culture to the leptocephalus stage. More knowledge concerning systems of defense mechanisms as the early stages seems to be one prerequisite in obtaining successful aquaculture.

For the analysis of the defense mechanisms of eel leptocephali using the samples collected by the expedition KH94-2 of Hakuho-maru, we focused our attention on lectin in the skin mucus. leptocephalus larvae likely with adult eel had found to have lectin activity in the skin mucus (Suzuki and Otake, 1994). This skin lectin is known to be secreted from the club cells in the skin (Suzuki and Kaneko, 1986). We therefore examined whether the lectin is contained in the club cells of the larval skin, by immunocytochemical technique. We used in addition preleptocephalus larvae obtained via artificial spawning for purposes of comparisons with leptocephali.

Lectin was detected by immunofluorescence technique. From the antisera raised against skin lectin of eel, IgG was purified using protein A affinity chromatography. Thereafter, the IgG was coupled with the fluorescein isothiocyanate (FITC).

The whole bodies of leptocephali were fixed with 4% paraformaldehyde, washed by phosphate buffered saline (PBS), and reacted with FITC labeled IgG. The leptocephali were then washed with PBS, dehydrated with ethanol, cleared with xylen and mounted with Permount on slide glasses. The skin was observed with confocal laser scan microscope (CLSM; Leica Co.).

The positive reaction was detected on the body surface of the preleptocephalus larvae (Fig.1). Some round spots of fluorescein with diameter of 5 m scattered, showing existence of lectin secretin cells. The round spots were secretory vacuoles of the club cells.

On the other hand, no positive reaction has never been observed on the skin surface of the leptocephali, collected by this expedition, KH94-2. As observed by light microscopy, almost all epithelial tissues were already absent when the fish were caught. The epithelial cell layers of the larvae are extremely thin and delicate with no desmosomal junction (Suzuki and Otake, 1994). Therefore the tissue may have been rubbed off during the sampling process due to handling and contact with many other planktonic animals caught together with the larvae in the sampling net. We are now carrying out further observations to find samples obtained in good condition.

In the previous study, leptocephali were found to have club cells, although the shape is different from that of adult eel; oval instead of elongated club form (Suzuki and Otake, 1994). The present study clearly show that the club cells of preleptocehalous larvae contain the lectin, likely with adult eel. The lectin might be of great importance in the selfdefense mechanisms at the skin, during the larval stages of eel.

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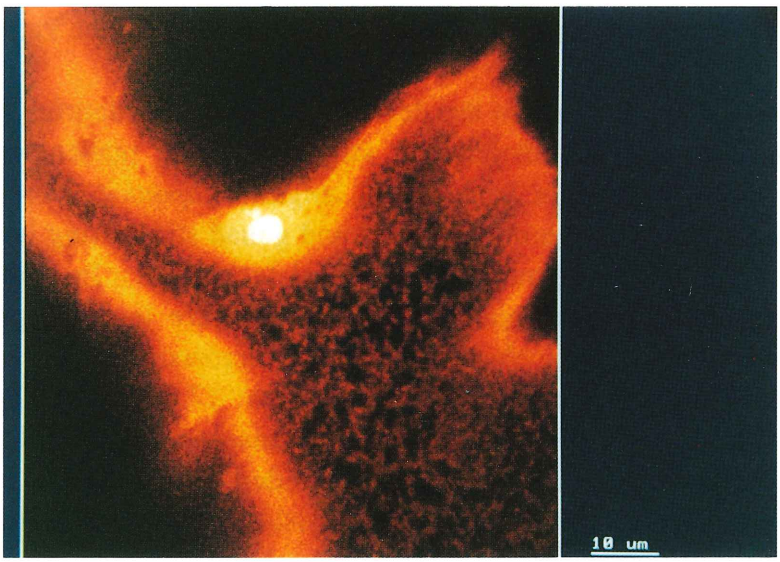

Fig. 1 The club cell in the epithelium of preleptocephalus. The secretory vacuole of the cell shows positive reaction against FITC labeled anti-skin lectin rabbit IgG. Confocal laser scan microscopy.

Immunohistochemical search for thyroid stimulating hormone and gonad stimulating hormone II cells in the pituitary, and formation of gonad and thyroid gland of the Japanese eel leptocephali

Masaki Nagae, Hiromi Okumura, Sigeho Ijiri and Kohei Yamauchi

There are few studies on the development of the endocrine organs of the eel at the early developmental stages. the present study, the pituitary of leptocephali of Japanese eel, *Anguilla japonica* were searched for thyroid stimulating hormone (TSH) and gonad stimulating hormone II (GTH II) cells using immunohistochemical technique. In addition, the morphogenesis of thyroid gland and gonad that are target organ of the above two hormones were observed by light microscopy

Leptocephali of Japanese eel (total length: 17.2-23.0 mm) collected during the Hakuho Maru KH-94-2 cruise were fixed in 4% paraformaldehyde, dehydrated through a graded ethanol series, embedded in paraffin, and sectioned sagittaly or crossly. These 4 μm thick serial sections were then de-waxed, stained with specific antisera against Japanese eel TSH β-subunit and GTH IIβ-subunit (Ikeuchi *et al.*, in preparation) for the observation of TSH and GTH II cells, and stained with Delafield's hematoxylin and 1% eosin for the observation of thyroid gland and gonad.

TSH immunoreactive cell was not observed in the present study, although GH and PRL immunoreactive cells were detected in this stage (Arakawa *et al.*, 1992). However, thyroid gland was already formed in them (Fig 1). These results suggest that pituitary-thyroid system is not involved in the metamorphosis from pre-leptocephalus to leptocephalus. Thyroid hormone contained in yolk may relate to this metamorphosis.

GTH II immunoreactive cell was not observed. Furthermore, gonad and germ cell seemed to be not observed in the leptocephali used in the present study. Since Chiba *et al.* (in preparation) observed gonad, which is not differentiated to ovary or testis, in the glass eel, more developed leptocephali than them used in the present study are needed to examine the formation of gonad and GTH II cell.

Reference

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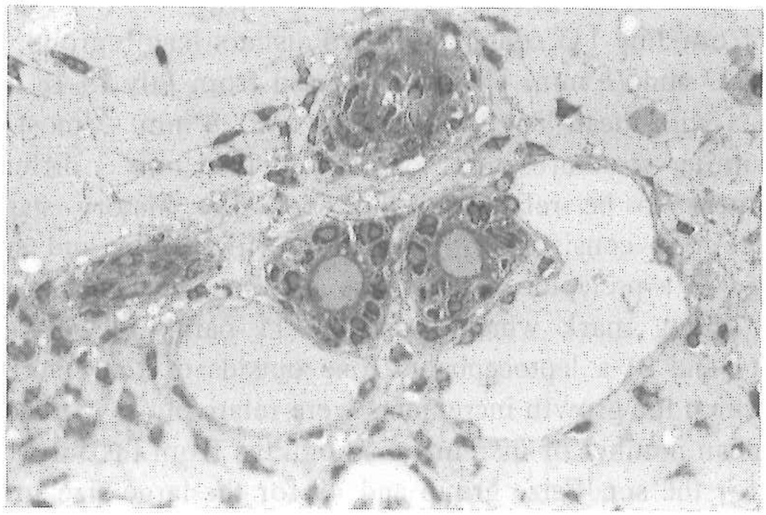

Fig. 1 Thyroid gland in Japanese eel leptocephalus.

Lunar periodicity of Japanese eel (*Anguilla japonica*) spawning as indicated by daily growth increments in otoliths of leptocephali

Tae Won LEE, Noritaka Mochioka and Katsumi Tsukamoto

Seventy six *Anguilla japonica* leptocephali, representative of the entire size range collected, were subsampled for age determination from collections made near the spawning ground in July 1991. The leptocephali collected from July 1-3 consisted of two distinct length groups with mean lengths of 13 and 23 mm. The fish collected from July 15-18 also showed two groups with mean lengths of 18 mm and 28 mm. Almost all otoliths showed similar structures that could be divided into 3 different zones, which appear to be related to the early life history stages: 1) an embryonic zone consisting of a central primordium and surrounding thick ring, 2) a preleptocephalus zone between the hatch mark and the external feeding mark which showed 9-11 barely discernible growth increments and 3) a leptocephalus zone outside of the external feeding mark in which the growth increments were relatively easy to count.

The mean number of increments in otoliths from the July 1-3 samples were 21 for the small-size group and 49 for the large-size group. From the July 15-18 samples, there were 36 and 64 growth increments for the two groups. The back-calculated spawning dates for these groups were May 13-16 and June 9-11 regardless of sampling dates. These dates correspond to the dates of the new moon, suggesting that *A. japonica* may spawn periodically during the new moon. For future attempts to collect eggs and preleptocepalus it will be advantageous to choose the sampling dates based on the lunar phase.

V. Biological environment

Biological characteristics of the spawning ground of the Japanese eel, *Anguilla japonica*

Shuhei Nishida and Hiroshi Hasumoto

The biological characteristics of the eel spawning ground may be examined from two major viewpoints. One is to understand the spawning ground biogeographically, and to examine the situation of the spawning ground with reference to the biogeographic regions in the western North Pacific. The other is to understand the spawning ground as a real habitat of the eel eggs and larvae, and to examine their relationships with other organisms, which are realized in such phenomena as feeding, predation, and competition.

An observation during the former KH-91-4 Cruise, based on the above viewpoints, indicated hat (1) the spawning ground was located near the boundary of the Central and the Equatorial Water Masses of the western North Pacific, and the zooplankton biomass (wet weight) was higher in the area north of the salinity front than in the southern area, and (2) the zooplankton maximum layer at 75m depth at night coincided with the layer of maximum abundance of the leptocephali. On the basis of the above findings, the following observations on plankton distribution were made in the present cruise.

(1) Distribution of chlorophyll

Water samples were taken from 12 strata in 0-300m at 18 stations with a CTD-Rosette sampler. 500-ml sea water was filtered through a glass-fiber filter (Whatmann GF/F). Phytoplankton pigments were extracted with dimethylformamide at 7℃ in darkness for two days. Chlorophyll a concentration was measured with a fluorometer (Turner Design). The profiles of chlorophyll a concentration along Line 1-3 is shown in Fig. 1 (a)-(c). At all the stations the deep chlorophyll maximum was observed at 125m depth and the layer of high concentration was relatively deeper in the northern than in the southern stations.

(2) Zooplankton biomass

Surface zooplankton samples were taken at 15 stations by vertical tows of NORPAC-twin nets (mesh aperture: 0.1 and 0.3mm) from 200m depth to the surface. Two sets of tows were made at each station, generally both day and night. The samples from one set were immediately fixed in 10% formalin/seawater for an examination of species composition. Zooplankton from the other sets were fractionated into two size classes (0.33mm, 0.1-0.33mm), rinsed with distilled water and 0.1N HCl, and dried at 60℃ for 24hrs for measurement of dry weight, C/N ratio, and carbon and nitrogen stable-isotope ratios. Analyses of these samples are now in progress.

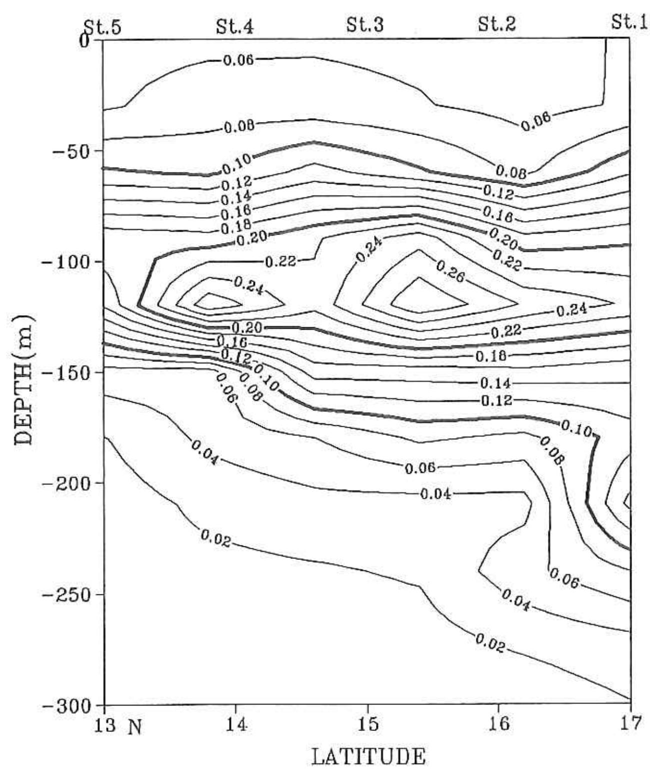

Fig. 1 (a) Chlorophyll A ($\mu g / \ell$) section along 134° E.

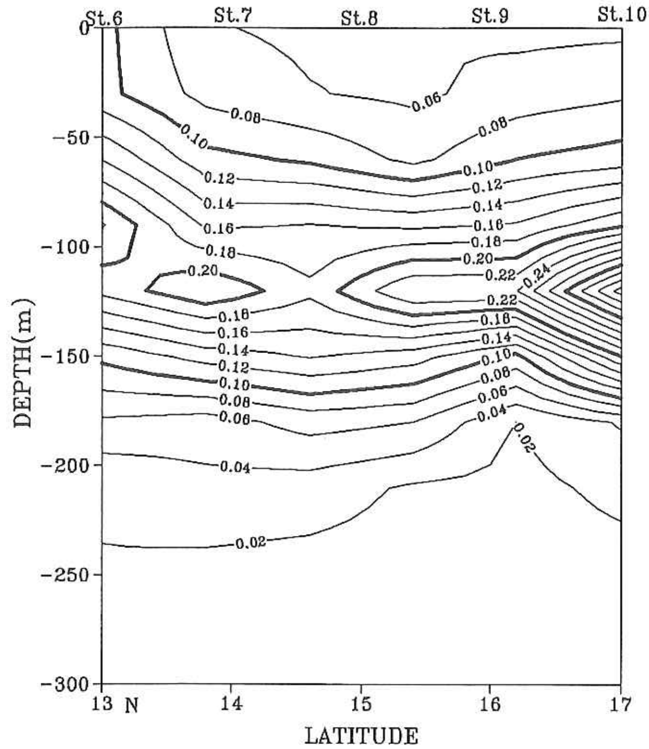

Fig. 1 (b) Chlorophyll A ($\mu g / \ell$) section along 137° E.

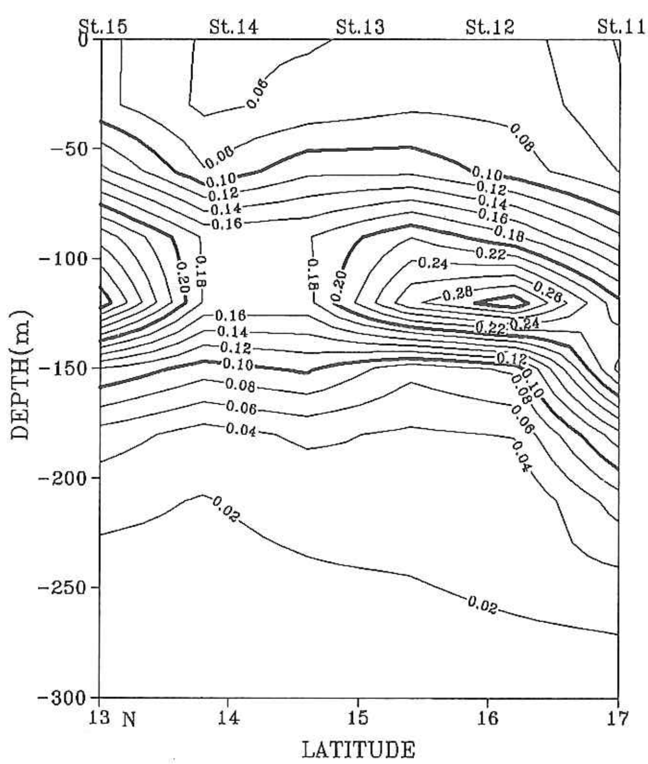

Fig. 1 (c) Chlorophyll A ($\mu g / \ell$) section along 140° E.

Stable-isotopic and immunochemical analyses on the pelagic food-web and food habits of the eel leptocephali

Shuhei Nishida, Yuzuru Suzuki and Tsuguo Otake

Pelagic ecosystems involve diverse organisms with diverse food habits. An examination of the food-web structure based on such prey-predator relationships is essential in understanding the mechanisms of biological production and of maintenance of biodiversity. Previous studies on the pelagic food-web have generally been based on morphological examination of gut contents of predators. Recent observations suggest the importance of gelatinous plankters such as ctenophores and salps in the pelagic food-web. However, the detection of these organisms is difficult solely by conventional methods, which are also ineffective in examining other potentially important feeding strategies, such as detritivory and parasitism. Under such a circumstance, an attempt was made in the present cruise to examine the pelagic food-web by sing stable-isotopic and immunochemical methods.

(1) Stable-isotope ratio

Various species of plankton and micronekton were sorted from the samples taken by IKMT tows at St. L and adjacent areas, rinsed in distilled water and 0.1N HCl, and frozen at -80℃. These organisms include: copepods, salps, euphausiids, siphonophores, caridean and penaeid shrimps, and fishes (including eel leptocephali). Organic particles from water samples of -200m layer and from sediment traps were concentrated on silica filteres. Measurements of carbon and nitrogen stable-isotope ratios on these samples, by using combustion method and mass spectrometry, is now in progress.

(2) Immunochemical analysis

Immunochemical analysis has been made focusing on gelatinous plankters as potential prey organisms. Before the Cruise one species of salp and three species of jellyfishes were collected and their extracts were used to immunize rabbits, thus obtaining three sets of antibodies. Various species of zooplankton and micronekton were sorted from the IKMT samples collected as above, rinsed with filtered seawater (Whatmann GF/F), and frozen at -80℃. An examination of specificity of the antibodies, and identification of gelatinous plankters in the gut contents of pelagic animals is now in progress.

Food habits and photobehavior in the pelagic copepods of the family Sapphirinidae

Jinho Chae and Shuhei Nishida

The males of the sapphirinid copepods are highly iridescent with specific color patterns, while he females are almost transparent and posses well developed eyes with lenses. Some species are known to be parasitic on salps. These observations necessitate further studies on their food habits and photobehavior, which were attempted in the present cruise.

Specimens of the genera Sapphirina and Copilia were sorted from the samples collected with n ORI net. To examine if phytoplankton are major food for the sapphirinids, chloropohyll a and paeopigment in the gut were measured with a fluorometer (Turner Design). Chlorophyll a measured 0.05-0.35 pg/indiv., and it was concluded that phytoplankton is negligible as a food source. Gut content analysis with an SEM indicated that most of the contents are amorphous or fibrous material.

The swimming behavior and photoresponsses were examined for *S. gastrica* and *S. opalina*. In both the species the males showed much higher frequency and speed of spiral swimming than the femlaes. *S. gastrica* showed a broad range of high spectral sensitivity from 430nm to 580nm, while *S. opalina* showed a narrow sensitivity with a peak at 430nm.

Distribution of the Ocean-skaters *Halobates* spp. from the Hakuho Maru cruise KH-94-2, Leg 3

Terumi Ikawa, Yuzuru Susuki, Lanna Cheng, Sugihiko Hoshizaki, Hidehiko Okabe and Katsumi Tsukamoto

The ocean skater genus *Halobates* (Heteroptera: Gerridae) is represented by five species of insects which live in the open ocean(e. g., Cheng, 1985, 1989). These insects are totally wingless and their life is confined to the ocean surface. Their distribution ranges are quite vast, several thousand km wide, in the tropical and subtropical region in the three major oceans.

During the Hakuho Maru KH-94-2 cruise, the ocean skaters were collected with various types of nets. The samples were identified and stored at -80°C or -20°C for the future DNA analysis to study the inter- and intra-specific divergence. Here, we report the results of species identification and the distribution.

Table 1 shows the types of nets used, the number of tows, the number of positive tows and the number of *Halobates* collected. The types of nets with no positive tows were omitted from the table. Except for MTD 0m tows(100% positive) and ORI 1.0 Surf.(37.5% positive) which were designed for surface survey, many tows in this cruise were aimed for the collection of Leptocephali and not effective for collecting *Halobates*.

A total of 86 ocean skaters were captured; 80 belonging to *H. micans* and 6 to *H. sericeus* (Table 2). More than 50% of the total individuals captured were adults. This was also observed by Cheng and Schulenberger(1980) in the eastern tropical Pacific Ocean where an extensive sampling of *Halobates* was conducted during the EASTROPAC survey.

In Table 3, we listed the results of the station location, date of sampling, type of net used, species and developmental stage of each sample. *H. micans* was found in 14 out of 23 stations whereas *H. sericeus* was captured at only three northern stations(St. 11 at 17°N 138°E, St. 12 and St. 13 at 16°N 140°E; see Fig. 1). This agrees with the distribution of ocean skaters given by Cheng (1985, 1989). *H. sericeus* has amphi-tropical distribution pattern, occupying areas roughly between latitudes 40°N to 15°N, and 10°S to 40°N, and *H. micans* is found between these two habitat zones Thus, in the Northern Hemisphere, *H. sericeus* occupies the northern area of *H. micans*.

The ranges of distribution of five pelagic *Halobates* species do not usually overlap. Three species, *H. micans*, *H. sericeus* and *H. germanus*, however, have been reported in the region from ca. 10°N to 30°N and from 130°E to 140°E which covers the sampling area of our cruise (13°N-17°N and 134°E - 141°E), (see Fig. 2 in Cheng, 1985). However, we did not collect *H. germanus* during this cruise. *H. germanus* tends to follow the coasts of islands(Cheng, 1985). Our sampling area might have been too far away from islands.

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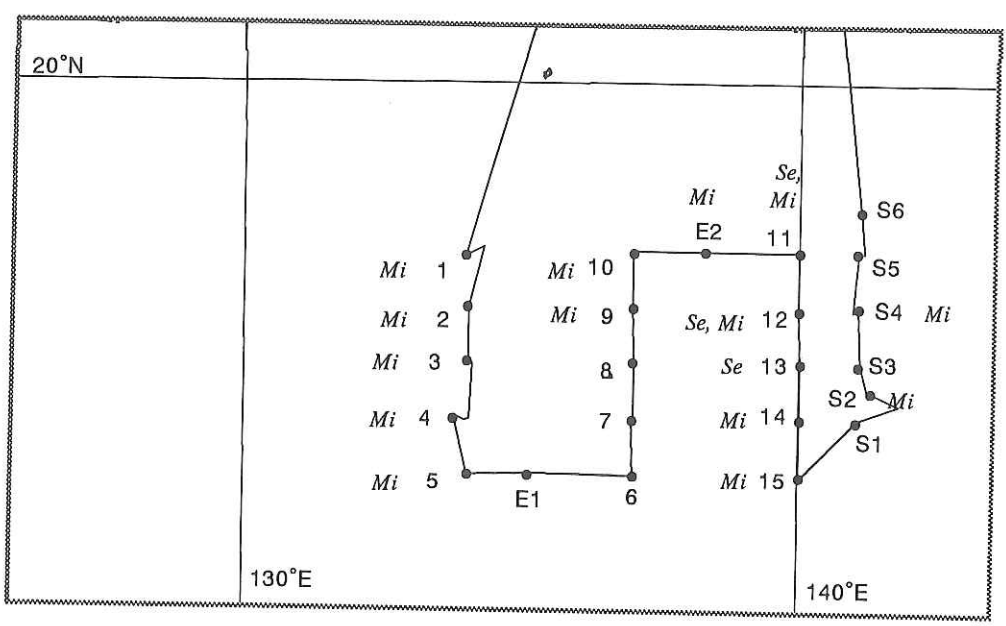

Fig. 1 Station location and species of *Halobates* collected during the Hakuho Maru KH-94-2, Leg. 3 cruise.

Table 1. Type of nets used, total number of tows and number of positive tows.

Net Type	Total Number of Tows	Number of Positive Tows	Number of *Halobates* collected
IKMT 1.0 Hor.	22	2	2
IKMT 1.0 Obl.	52	8	13
IKMT 0.5 Obl.	2	1	1
MTD 0 m	6	6	45
ORI 0.33 Obl.	2	1	1
ORI 0.69 Obl.	30	1	1
ORI 1.0 Surf.	16	9	23

Table 2. Number and developmental stage of *Halobates* species captured.

Species	Total	Adults	Nymphs	Adults		Developmental stage				
				males	females	V	IV	III	II	I
H. micans	80	46	34	20	26	15	9	9	1	0
H. sericeus	6	4	2	3	1	2	0	0	0	0

Table 3-1. *Halobates* collected at each station. Negative nets are omitted. MI: *Halobates micans*. SE: *Halobates sericeus*. A: adults. V, IV, III and II: fifth, fourth, third and second instar larvae.

date	latitude	longitude	Point	Net type	species	sex	stage	Note
940619	17N	134E	St. 1D	ORI 33	Mi	f	V	
940619	17N	134E	St. 1N	IKMT-obl	Mi	m	A	
940619	17N	134E	St. 1N	ORI Side	Mi	m	V	
940619	17N	134E	St. 1N	ORI Side	Mi	m	A	
940619	17N	134E	St. 1N	ORI Side	Mi		IV	
940619	17N	134E	St. 1N	ORI Side	Mi	m	A	
940619	17N	134E	St. 1N	IKMT Hor	Mi	f	A	
940620	16N	134E	St. 2N	ORI Side	Mi		III	
940620	16N	134E	St. 2N	ORI Side	Mi	f	A	
940620	16N	134E	St. 3D	IKMT-obl	Mi	m	A	
940620	15N	134E	St. 3N	IKMT-obl-1	Mi	f	V	
940620	15N	134E	St. 3N	IKMT-obl-1	Mi	f	V	
940620	15N	134E	St. 3N	IKMT-obl-1	Mi	f	A	
940620	15N	134E	St. 3N	ORI Side	Mi	f	V	
940620	15N	134E	St. 3N	ORI Side	Mi	f	A	
940620	15N	134E	St. 3N	ORI Side	Mi		IV	
940620	15N	134E	St. 3N	ORI Side	Mi	m	A	
940620	15N	134E	St. 3N	ORI Side	Mi	f	A	
940620	15N	134E	St. 3N	ORI Side	Mi	m	A	
940620	15N	134E	St. 3N	ORI Side	Mi	m	A	
940621	14N	134E	St. L1	MTD 0m	Mi	f	A	
940621	14N	134E	St. L1	MTD 0m	Mi	m	V	
940621	14N	134E	St. L1	MTD 0m	Mi	m	A	
940621	14N	134E	St. L2	MTD 0m	Mi	f	V	
940621	14N	134E	St. L2	MTD 0m	Mi	f	A	
940621	14N	134E	St. L2	MTD 0m	Mi	f	A	
940621	14N	134E	St. L2	MTD 0m	Mi		IV	exuviae
940621	14N	134E	St. L2	MTD 0m	Mi		III	
940621	14N	134E	St. L3	MTD 0m	Mi	m	A	
940621	14N	134E	St. L3	MTD 0m	Mi	m	A	
940621	14N	134E	St. L3	MTD 0m	Mi	m	A	
940621	14N	134E	St. L3	MTD 0m	Mi	m	A	
940621	14N	134E	St. L3	MTD 0m	Mi	m	A	
940621	14N	134E	St. L3	MTD 0m	Mi	m	A	
940621	14N	134E	St. L3	MTD 0m	Mi		IV	
940621	14N	134E	St. L3	MTD 0m	Mi		IV	
940621	14N	134E	St. L3	MTD 0m	Mi	m	V	
940621	14N	134E	St. L3	MTD 0m	Mi	f	A	
940621	14N	134E	St. L3	MTD 0m	Mi	f	A	
940621	14N	134E	St. L3	MTD 0m	Mi	f	V	
940621	14N	134E	St. L3	MTD 0m	Mi		IV	
940621	14N	134E	St. L3	MTD 0m	Mi		III	
940621	14N	134E	St. L3	MTD 0m	Mi	f	A	
940621	14N	134E	St. L3	MTD 0m	Mi	f	A	
940621	14N	134E	St. L3	MTD 0m	Mi	f	V	

Table 3-2. *Halobates* collected at each station. Negative nets are omitted. MI: *Halobates micans.* SE: *Halobates sericeus.* A: adults. V, IV, III and II: fifth, fourth, third and second instar larvae.

date	latitude	longitude	Point	Net type	species	sex	stage	Note
940621	14N	134E	St. L3	MTD 0m	Mi		III	
940621	14N	134E	St. L3	MTD 0m	Mi		III	
940621	14N	134E	St. L3	MTD 0m	Mi	f	A	
940621	14N	134E	St. L3	MTD 0m	Mi	f	V	
940621	14N	134E	St. L3	MTD 0m	Mi	f	V	
940621	14N	134E	St. L3	MTD 0m	Mi		III	
940621	14N	134E	St. L3	MTD 0m	Mi		IV	
940621	14N	134E	St. L3	MTD 0m	Mi	f	A	
940621	14N	134E	St. L3	MTD 0m	Mi	f	V	
940621	14N	134E	St. L3	MTD 0m	Mi	f	A	
940621	14N	134E	St. L3	MTD 0m	Mi		III	
940621	14N	134E	St. L3	MTD 0m	Mi	m	V	
940621	14N	134E	St. L4	MTD 0m	Mi		II	
940622	13N	134E	St. L5	MTD 0m	Mi	m	A	
940622	13N	134E	St. L5	MTD 0m	Mi	m	A	
940622	13N	134E	St. L5	MTD 0m	Mi	m	A	
940622	13N	134E	St. L5	MTD 0m	Mi	f	A	
940622	13N	134E	St. L5	MTD 0m	Mi		IV	
940622	13N	134E	St. L5	MTD 0m	Mi	f	V	
940622	13N	134E	St. L5	MTD 0m	Mi	f	A	
940622	13N	134E	St. L5	IKMT0.5 obl	Mi	f	A	
940622	13N	134E	St. L6	MTD 0m	Mi	f	A	
940622	13N	134E	St. 5N	IKMT obl	Mi	m	A	
940622	13N	134E	St. 5N	IKMT obl	Mi	f	A	
940625	16N	137E	St. 9N	ORI Side	Mi	f	A	
940625	16N	137E	St. 10N	ORI Side	Mi	f	A	
940625	16N	137E	St. 10N	ORI Side	Mi		III	
940626	17N	138E	St. E2	IKMT obl	Mi		IV	
940626	17N	138E	St. 11N	ORI obl	Mi	f	A	
940626	17N	138E	St. 11N	ORI Side	Se	m	V	
940627	16N	140E	St. 12N	IKMT obl	Mi	f	A	
940627	16N	140E	St. 12N	IKMT obl	Se	m	A	
940627	16N	140E	St. 13N	ORI Side	Se	m	A	
940627	16N	140E	St. 13N	ORI Side	Se	m	A	
940627	16N	140E	St. 13N	ORI Side	Se	f	A	
940627	16N	140E	St. 13N	ORI Side	Se	f	V	
940619	14N	140E	St. 14N	ORI Side	Mi	m	A	
940619	14N	140E	St. 15N	ORI Side	Mi	f	A	
940619	14N	141E	St. S2	IKMT obl-2	Mi	f	A	
940701	14N	141E	St. S2	IKMT obl-3	Mi	m	A	
940702	16N	141E	St. S4	IKMT Hor1	Mi		III	

Distribution and food habits of the phyllosoma larvae of the palinurid lobsters

Shuhei Nishida

The palinurid lobsters, after hatching and drifting in offshore waters as a planktonic larva, the phyllosoma, molt to an adult-like puerulus, swim back to the coast and settle. The phyllosoma as an extremely depressed body, and the metamorphosis from the phyllosoma to the puerulus is known as one of the most drastic morphological changes within the Crustacea. Phyllosomas have occasionally been found in plankton-net samples, but still little is known on their distribution and food habits.

This study aims to examine the distribution and food habits of the phyllosoma larvae. Specimens of palinurid phyllosomas were sorted from the samples collected with an IKMT and an ORI net. A part of the specimens were rinsed with filtered seawater and frozen at -80℃ for further analyses by stable-isotopic and immunochemical methods. The other specimens were fixed and preserved in 10% formalin/seawater for the identification of species and gut-contents analysis.

Meso-bathypelagic fishes collected during the 6th EEL CRUISE (KH94-2),with some note on their taxonomy and distribution

Motoomi Yamaguchi

I . Sampling and general procedures

The collection records of meso-bathypelagic fishes are reported here. Sampling methods are as follow.

Most samples were collected by a Isaacs-Kidd midwater trawl (IKMT) with mesh size of 1 mm. IKMT net was used by oblique and horizontal tows. A ORI net was also used for sampling with mesh size of 0.69 mm for oblique, and of 1.00 mm for surface tows, respectively. Although trawls were employed at both day and night, almost samples utilized in this report were picked out from night tow samples. Further details of sampling data are presented elsewhere in this volume.

Only meso-bathypelagic fish samples needed for my study were picked out from total collected samples. Although some larval stage individuals were included in these samples, most are adult stage individuals. Individuals belonging to the genus *Cyclothone* (family gonostomatidae) and the subfamily sternoptychinae were not picked up. All samples were fixed immediately after collecting in 99.0 % ethyl alcohol (ethanol) that was kept cold in refrigerator. During cruise those fixed samples kept in refrigerator, later those samples transferred to 70% ethanol. These samples were identified to species level if possible, and measured or counted for some characters. In future, these samples are utilized for phylogenetic studies based on mtDNA sequencing data.

Results and Considerations

Due to time limitation, identification of meso-bathypelagic fishes has not been completed. However, some interesting findings appeared as described below.

1. Family Myctophidae (Table. 1)

In the family Myctophidae, a total 34 species of 15 genus were collected (Table. 1). Nearly half species (16 spp.) among them were of a single genus, *Diaphus* . All the 16 *Diaphus* species are already reported from this area (Kawaguchi and Shimizu, 1978) and almost all the species were reported from Indian Ocean (Nafpaktitis, 1978), but from Atlantic Ocean only 9 species (*D. brachycepharus*, *D. frabilis*, *D. luetkeni*, *D. metopoclampus*, *D. mollis*, *D. parri*, *D. perspicillatus*, *D. problematicus*, and *D. splendidus*) were reported (Hulley, 1981). In the Atlantic, 8 of 9 species distribute relatively common in tropical and subtropical water area. *Diaphus parri* is rare and its distribution is strong restricted in eastern South region of the Atlantic that suggests this species appear to the Atlantic as expatriates, in warm Agulhas Water pockets, which round the Cape of Good Hope (Hulley, 1981). A single specimen of *Diaphus suborbitalis* was collected from St.S-4. This species is known as "pseudoceanic species (sensu Hulley, 1981)", because occurs abundantly in the water around continental slopes or islands while very rare in the open water (Kawaguchi and Shimizu, 1978). *D. suborbitalis* recorded here, collected from open water, is probably expatriate from the area around Mariana Islands or some sea mounts in the north equatorial current directing to eastward.

Tropical and subtropical abundant species, *Ceratoscopelus warmingii*, was also taken abundantly during this cruise. Badcock and Araújo (1988) reported two forms of this species from North Atlantic frontal area, Azores front. The recognizing characters of two formes they employed are number and location of infracaudal luminescent scales, and others. All of *Ceratoscopelus* specimens collected during this cruise were the form A of Badcock and Araújo (1988). *Ceratoscopelus warmingii* are also collected abundantly from the warm water area around Japan, mainly Kuroshio Current region. However, which forms occurring around Japan are not clearly. At least, a single individual of form B was collected from Kumano Nada, off central Japan. Hence, two forms of *Ceratoscopelus warmingii* also distributed in the Western North Pacific, although do not clear whether is it similar to form A and B recognized in the Atlantic or not.

Species of the genus *Lampanyctus* can be separated roughly into two groups. One group has long pectoral fins and other group has very short, or no, pectoral fins. Species included the later group, known as "*Lampanyctus ater*-complex" (Nafpaktitis and Nafpaktitis, 1969; Hulley, 1981) or "*Lampanyctus niger*" (Clarke, 1973), are problematic about their taxonomy. Their morphorogical characters are very similar, and most individuals collected by some midwater trawls are usually broken; hence identification of these forms of *Lampanyctus* is difficult. Zahuranec (1980) recognized 17 species in this species group, applied genus name "*Nannobrachium*" to them, and reported 12 species from North Pacific Ocean. A total of 8 specimens of "*Nannobrachium*" were collected during this cruise. At least two species were recognized by using some characters, but could not be identified exactly.

Centrobranchus choerocephalus was known only from the tropical region of Pacific Ocean (Bekker, 1967). In the eastern and central Pacific, this species is most collected among genus *Centrobranchus* (Clarke, 1973; Wianer, 1976). In the sea around Japan, The occurrence of this species in the sea around Japan is thought to be expatriated by the Kuroshio Current from the tropical region of western North Pacific. However, Gago and Lavenberg (1992) has concluded that *Centrobranchus choerocepharus* and *C. brevirostris* are junior synonyms of *C. nigroocellatus*. They showed that morphometric characters utilized to idenfication of these three species of *Centrobranchus* are great overlap in its score. Furthermore, Moser et al. (1984) has recognized only two formes of larval *Centrobranchus* correspond to *C. choerocephalus-C. brevirostris-C. nigroocellatus* group and *C. andreae*, respectively. Consequently, recent nominal species of *Centrobranchus* are two, *C. nigroocellatus* and *C. andreae*.

2. Family Gonostomatidae

Three species of genus *Gonostoma*, *G. gracile*, *G. elongatum*, and *G. atlanticum*, were collected. These species were already reported from the western North Pacific (Kawaguchi, 1971). *Gonostoma gracile* exhibit restricted distribution in the western North Pacific between 20° N and 50° N, and most abundantly in the Kuroshio Current (Kawaguchi, 1973). The two specimens of *G. gracile* collected from St.S-4 (16° N:141° E) are nearly south most record of this species. *G. elongatum* and *G. atlanticum* are both found throughout in the oceans of tropical and subtropical regions (Badcock, 1984). *G. gracile* is abundant in the Kuroshio Current, while *G. elongatum* and *G. atlanticum* are few in this region. However, the area around in this cruise, *G. elongatum* and *G. atlanticum* are common (Gjøsæter and Kawaguchi, 1980), while *G. gracile* is few or rare.

3. Others

A single specimen of the rare alepocephalid fish *Photostylus pycnopterus* was taken from St.S-3 (15° N:141° E). This specimen is probably 30th individuals of the world, and second record from the western North Pacific. The first specimen from the western North Pacific was taken from the Kuroshio area off Cape Muroto, Shikoku in Japan (Tsukamoto et al., 1992). According to the previously records (Markle and Quéro, 1984; Tsukamoto et al., 1992), this species inhabit near the outer limit of the continental slopes, bathypelagic zone, in the warm water area throughout Atlantic, Indian and Pacific Ocean.

Except species described above, the meso-bathypelagic fishes collected during this cruise were typical occurring tropical area of western North Pacific.

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Table 1. Species of myctophid fishes collected during KH-94-2 Cruise.

Benthosema suborbitale	*Diaphus aliciae*	*Diogenichthys atlanticus*
Bolinichthys longipes	*Diaphus brachycepharus*	*Hygophum proximum*
Centrobranchus nigroocellatus	*Diaphus fragilis*	*Lampadena luminosa*
Ceratoscopelus warmingii	*Diaphus fulgens*	*Lampadena urophaos*
	Diaphus luetkeni	*Lampanyctus alatus*
	Diaphus malayanus	*Lampanyctus niger spp.*
	Diaphus megalops	*Lampanyctus nobilis*
	Diaphus metopoclampus	*Lampanyctus steinbecki*
	Diaphus mollis	*Lobianchia gemellarii*
	Diaphus parri	*Myctophum spinosum*
	Diaphus perspicillatus	*Notolycnus valdiviae*
	Diaphus phillipsi	*Symbolophorus evermanni*
	Diaphus problematicus	*Taaningichthys bathyphilus*
	Diaphus schmidti	*Triphoturus microchir*
	Diaphus splendidus	
	Diaphus suborbitalis	

Vertical distribution of scattering layers in relation to Japanese eel Larvae revealed by acoustic survey

Tadashi Inagaki, Tsuguo Otake, Syuhei Nishida
and Katsumi Tsukamoto

In order to determine the interaction between the sound scattering layers(SL) and the distribution of eel larvae(leptocephalus), acoustic surveys were carried out at the breeding area of Japanese eel *Anguilla japonica* using the echo sounder (Acoustic Biomass Investigation System: FURUNO) equipped with 4 different frequencies(200,120,50 and 38kHz).

In this cruise, we tried to measure a relationship between vertical distribution of scattering layers and of eel larvae. Diel vertical migration of eel larvae was suggested by the observation of MTD-net at night;larvae distributed in the upper layer of the halocline formed at about 75-125m depth and was most abundant at 75-100m just in the halocline. In the daytime, however, only small number of eel larvae occurred only at the layer deeper(ca. 200m) than the halocline.

Fig.1 shows the vertical profiles of SV by 50kHz corresponded to each MTD operation at St.4. It was clear that many scatterers consisted of small organisms also performed diel vertical migration. In daytime, SV in almost layers were indicated lower than -75dB, minimum in the layer of 150m(about between -85dB and -90dB). Whereas in nighttime, SV in almost layers were indicated higher than -75dB. And peak of SL distributions were recognized in surface region and in the layer of 150m. Surface region was located in the low salinity and the layer of 150m was located just beneath the halocline. In this way, dense SL was distributed in the surface and beneath the halocline. Whereas Japanese eel larvae was distributed among two dense SL. Size distributions of organisms beneath the halocline(second layer) were estimated relatively large by the acoustic remote sensing. It is considered that the distribution layer of Japanese eel larvae located upper than second layer. It is considered that the halocline plays an important role in concentration of organic matter. This shows that eel larvae like other SL animals can penetrate the halocline to migrate up to the shallower layer, although they were not distributed near the surface layer. Diel migration of SL community may provide the eel larvae with the concentrated particular organic matters as their possible food, and vertical migration of eel larvae being linked with halocline may have some advantage in their feeding habit.

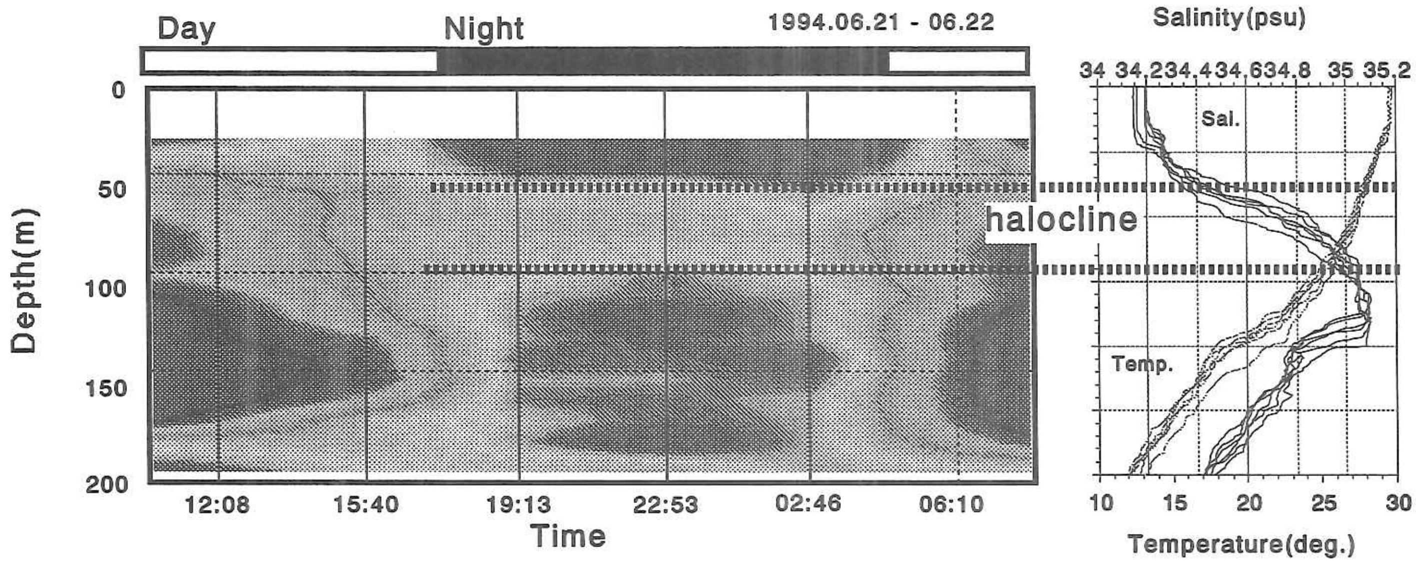


Fig. 1 Vertical profiles of SV by 50 kHz in night and day at St. 4 (St. L).
Left side: Diel vertical migration of scattering layers. Black color showes high intensity of SV.
Right side: Vertical profiles of salinity and temperature.

VI. Others

Trap for adult eel in the open ocean

Hiroshi Inada, Hiroshi Hasumoto, Jun Aoyama
and Katsumi Tsukamoto

There has been no record of catch of adult eel near the breeding place in the open ocean. Although trawl and long line have been operated to sample adult eels in the Sargasso Sea, the results were unsuccessful. We had an idea to apply a trap of conger eel for sampling adult eel. We report here an eel trap as a new type of sampling gear for adult eels in the open ocean.

We modified the design of the conger eel trap which was used for a commercial fishing in the Tokyo Bay (Fig. 1). A gray plastic pipe (polyvinyl chloride, 1000 mm or 800 mm long, 140 mm in diameter) was used as a body of eel pot to enable collecting adult eels (60-80 cm in length and 10 cm in diameter or more) which was larger than conger eel in the Tokyo Bay. Small holes (8 mm in diameter) were made at the half portion of eel pot to accelerate water of going in and out of the pot. Both ends of the pipe was covered with two funnels of black thin plastic, which was splitted into several pieces at the top to act as a non-return valve. A funnel was fixed with small bolts at one end while the other was removable being set with hooks and rubber straps.

Eel pots were used in the two types of operations: bottom trap and floating trap systems. In the former system, a special iron frame was designed to fix eel pots horizontally at the sea bottom (Fig. 2). This frame was 1660 x 1000 mm at the basement and 1500 mm in height with three steps. A total of 24 eel pots of 1000 mm in length could be set at one operation. In the latter system, an eel pot of 800 mm was set in a cage for crab trap gear (Fig. 3), which was attached to a rope and hung down from the sea surface. Photographs of the frame in the bottom eel trap system and the cage with eel pot for the floating trap were shown in Fig. 4 and Fig. 5, respectively.

We thank Mr. T. Izu for his cooperation in designing and manufacturing the eel trap. Dr. N. Sakurai of Fisheries Research Laboratory of Kashima Construction Company supported with great interests by providing materials of plastic pipe for eel pot.

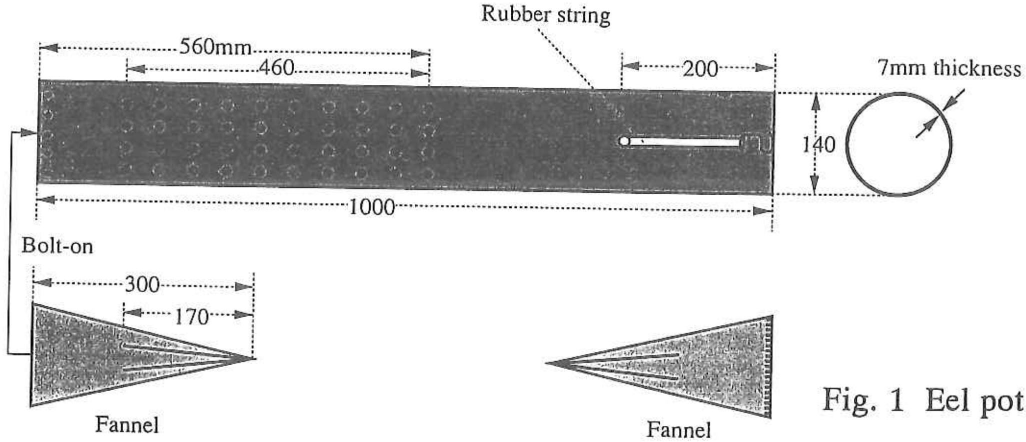
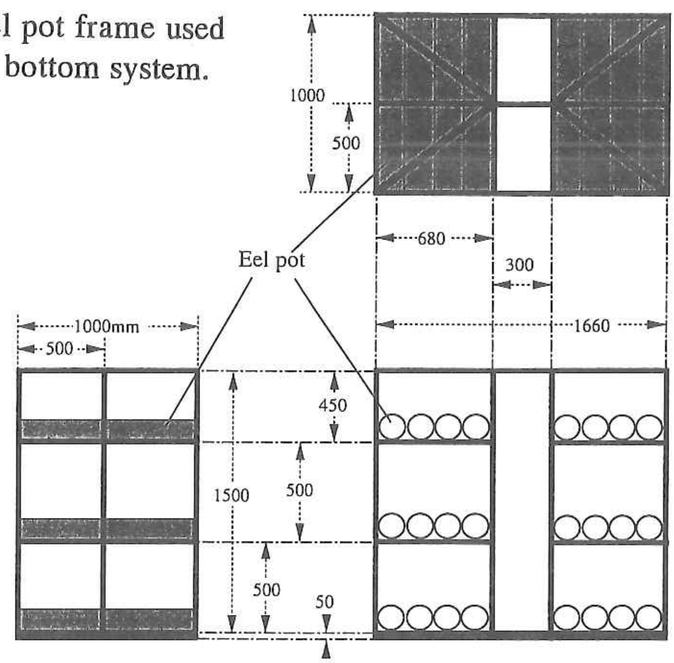


Fig. 1 Eel pot.

Fig. 2 Eel pot frame used in bottom system.



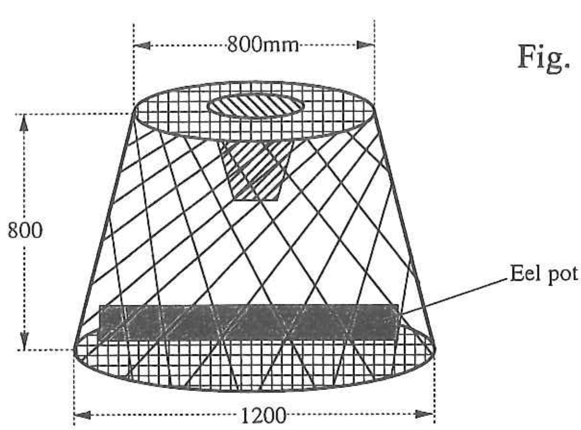


Fig. 3 Eel pot cage used in the folating system.

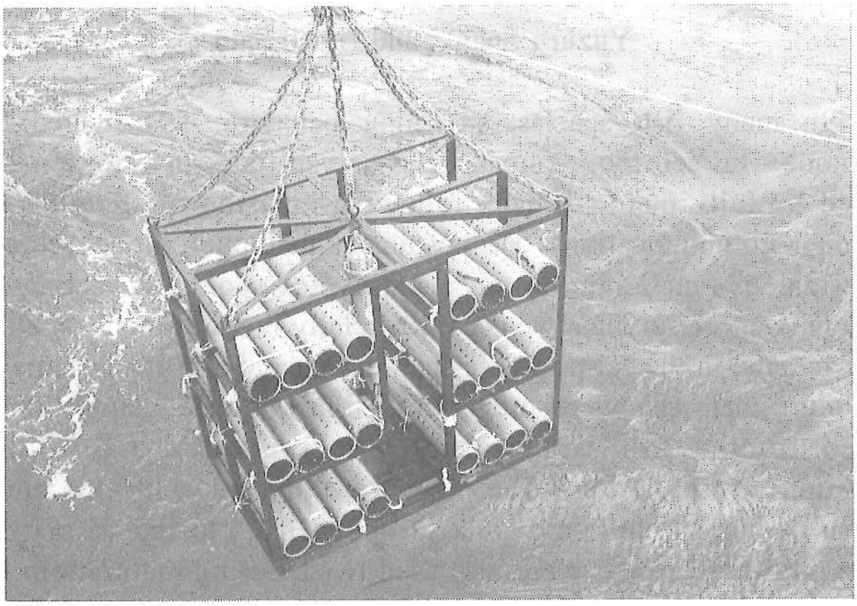


Fig. 4 Bottom trap.

Fig. 5 Floating trap.

Preparation of mature male eel used for trap

Yuzuru Suzuki and Hideo Sato

In many fish species, spawning behavior is mediated by sex pheromone. In eel too, Yamauchi observed that mature female was attracted by fully matured male, following injection of steroid hormone (personnel communication). He postulated that pheromone secreted by mature male is functioning to make a spawning spot by attracting mature female in open ocean. thus we used artificially matured male as attractant against female, in the eel trap described in Inada et al. (this volume).

Mature male eels were prepared as follows. Eels weight 300g were obtained from a fish farmer, and were kept in a 3.4m^3 following acclimation to sea water. The fish were treated with intramuscular injection of human chorionic gonadotropin (HGC) to induce maturation. Salmon pituitary extracts were also used twice during maturation. Finally 17α20β-dihydroxy-4-pregnene-3-one (17α20β-P) was treated to induce spermiation.

The schedule of treatment was as follows. HGC treatment, 200U/fish, was started at May 11, and repeated at May 18 and 25. The dose was increased to 300U/fish at June 1 and 6. At June 11 and 15, fish were injected with sP (20mg of pituitary/fish). After that, the fish were brought to Hakuho maru, and kept in 500m^3 plastic tank with running sea water. Water temperature was kept at 20 to 25 ℃. HGC treatment of 300U/fish were repeated at June 20, 25 and 28. At June 28, twelve fish were injected with 17α20β-P (1mg/fish), to induce final maturation. Thereafter, each six fish were treated with 17α20β-P, at June 29 and 30, and at July 1. One day after the final treatment, fish were supplied to eel trap as described in Hasumoto et al. (this volume). Finally thirty fish out of forty six fish spermiated and could be used for the trap (see Fig.1).

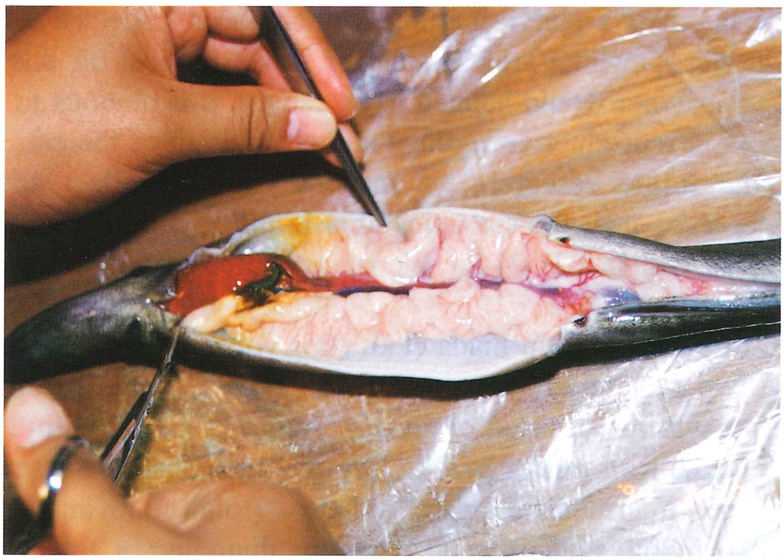


Fig. 1 Matured male eel with well developed testis.

A trial for sampling adult eel in the open ocean

Hiroshi Hasumoto, Jun Aoyama, Hiroshi Inada, Tsuguo Otake,
Yuzuru Suzuki, Tadashi Inagaki, Yoshitaka Sakakura
and Katsumi Tsukamoto

Spawning of catadromous eels has been hidden in the dead darkness of deep seas. Not a single matured eel has been collected in the open ocean near the spawning area in spite of active interest on this problem. If only one spawner would happen to be caught, it is obvious to provide a big progress in reproductive ecology and physiology of the eel. As a first step for the future research, we made a trial to collect adult eel of *Anguilla japonica* near the spawning area in the Philippine Sea during the Hakuho Maru Cruise KH-94-2. We report here the outline of the result of operation.

Eel trap described in Inada et al. (this volume) were operated in the following two systems: bottom trap (Fig. 1) and floating trap (Fig. 2). Bottom trap system consisted of an iron frame (120 kg) with 24 eel pots connected to the iron rail of 375 kg through an acoustic release (Nichiyu, L type), 16 intermediate glass spheres (total buoyancy, 400 kg: BENTHOS), nylon cloth rope (14 mm in diameter; a total of 130 m, strength 3.8 ton), and a pole with a flasher, a radio transmitter and two glass spheres (buoyancy, 50 kg). Beside the 24 pots in the frame on the bottom, two cage trap with an eel pot each were attached at 32 and 82 m above the sea bottom.

Floating trap system consisted of a surface main buoy (buoyancy, 200 kg), a radar buoy, a pole with a flasher, a flag and a float, polypropylene rope (500 m x 2; strength 2.54 ton) with 6 eel pots in cage (50, 100, 200, 300, 500, and 1000 m from the surface), and a weight (100 kg).

We used mussel and a fillet of horse mackerel as a bait for eel pots. Besides, artificially matured male (see the details in Suzuki et al., this volume) was used to attract female eels in the field.

These two systems were operated four times at 14°N 141°E, 14° 30'N 141°E, 15°N 141°E and 16°N 141°E during 29 June - 3 July 1994. Both systems were released at 14:00 - 16:00 in each trial and were kept for one night. The acoustic release was operated at 6:00 in the next morning by an ultrasonic signal and the system was recovered. The floating system was also recovered in the next morning.

No adult eel was caught at any sampling stations (Table 1). Large amphipods were collected by the bottom trap. Most amphipod collection occurred in the eel pots with horse mackerel fillet as a bait. There was no collection in the floating trap.

Our sampling effort might be too small to collect adult eel in the open ocean. If we could determine the spawning point exactly in the breeding area, the present sampling gear and methods would be effective. However, even a depth where spawning occur has never been understood, yet. Exact determination of the spawning point might be a prerequisite for sampling adult eel.

Table 1. Number of amphipods collected by eel trap. Each eel pot contained different type of atractants: matured male eel, horse mackerel and mussel.

Station		Attractants in Floating Trap		Attractants in Bottom Trap			
No.	Locality	male eel*	horse mackerel and mussel	male eel*	horse mackerel	mussel	?
S-1	14° N・141° E	0	0	3	0	0	—
S-2	14° 30N・141° E	0	0	0	3	0	—
S-3	15° N・141° E	0	0	0	16	0	—
S-4	16° N・141° E	0	0	0	3	7	5

* artificially matured fish

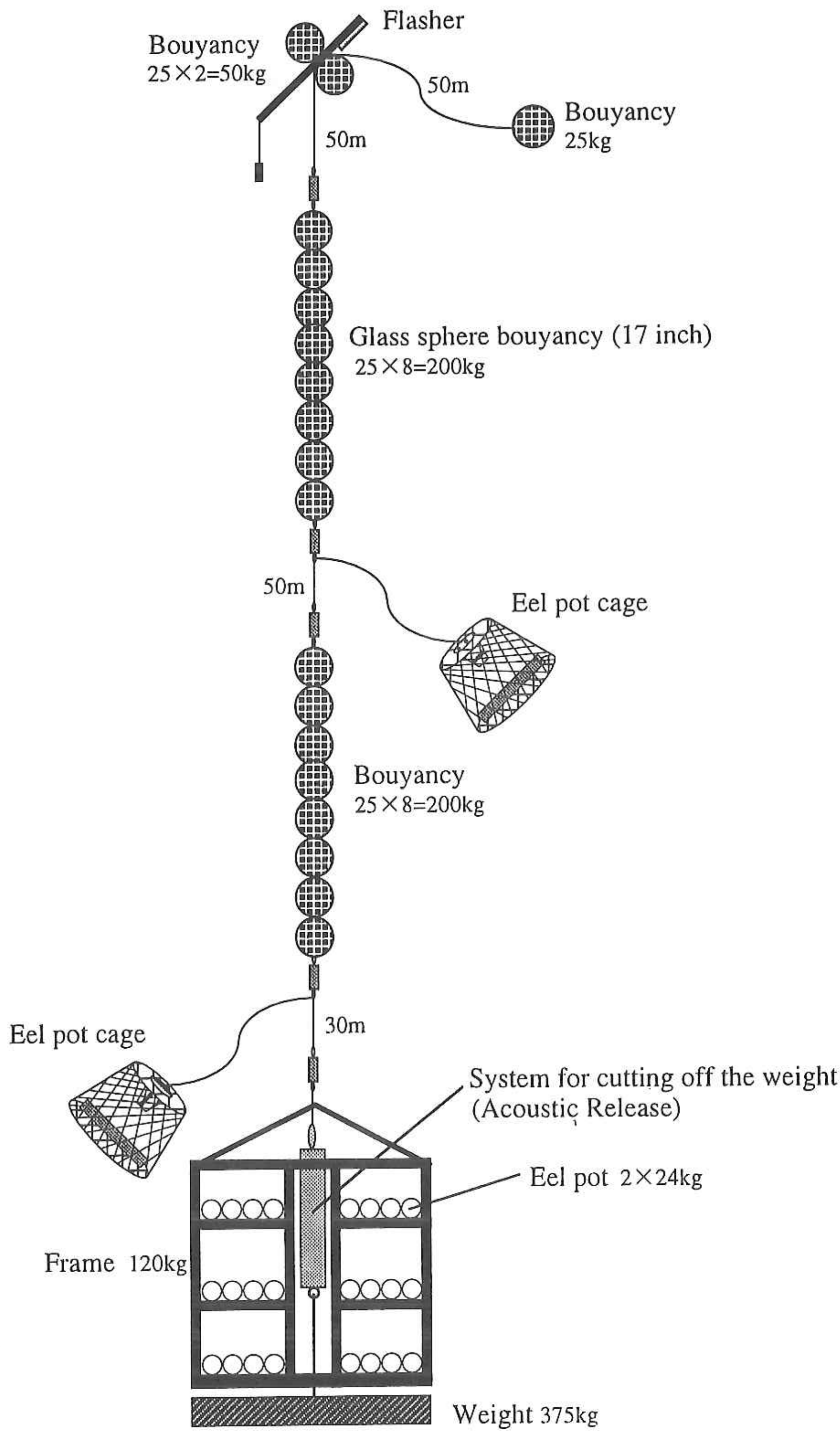


Fig. 1 Bottom trap.

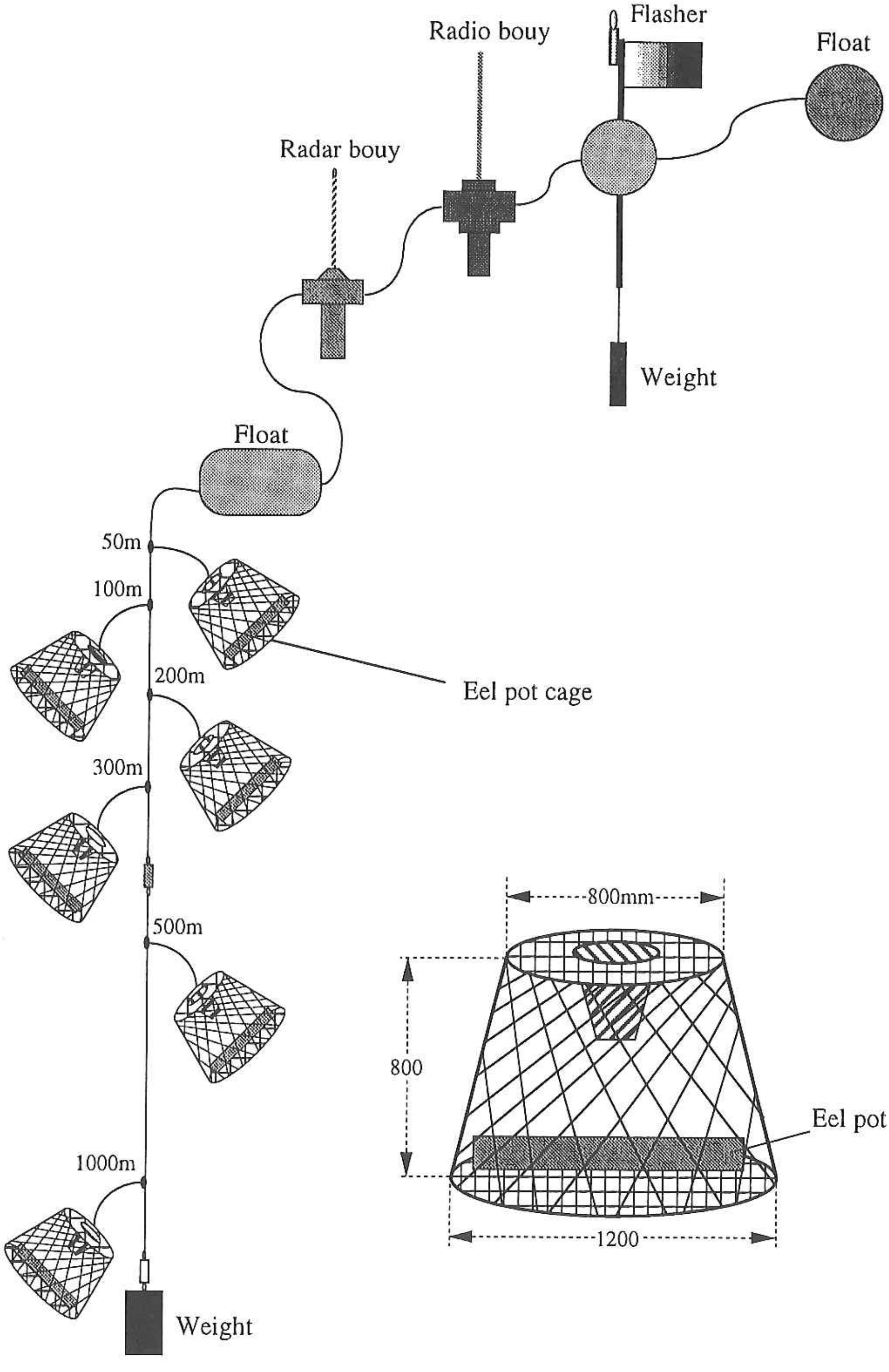


Fig. 2 Floating trap.

Ⅶ. Net record

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m^3)
1-D	17-00.1	17-00.1	940619	14:07	14:16	NORPAC	XX13	Vert.	183	0-150	1		34
	134-00.3	134-00.3											
1-D	17-00.1	17-00.1	940619	14:07	14:16	NORPAC	GG54	Vert.	183	0-150	1		35
	134-00.3	134-00.3											
1-D	17-00.1	17-00.1	940619	14:23	14:34	NORPAC	XX13	Vert.	216	0-200	1		35
	134-00.3	134-00.3											
1-D	17-00.1	17-00.1	940619	14:23	14:34	NORPAC	GG54	Vert.	216	0-200	1		39
	134-00.3	134-00.3											
1-D	17-01.1	17-01.1	940619	14:43	14:53	NORPAC	XX13	Vert.	200	0-200	1		29
	134-00.6	134-00.6											
1-D	17-01.1	17-00.9	940619	15:25	16:21	IKPT	1	Obl.	1088	0-321	1	2	32884
	134-01.3	134-03.6									0.5	2	
1-D	17-01.1	17-01.0	940619	15:43	16:03	ORI	1	Surf.		0		2	
	134-02.0	134-02.9											
1-D	17-00.9	17-00.8	940619	16:30	17:00	IKPT	1	Hor.		0-40	1	2	16263
	134-03.9	134-05.3									0.5	2	
1-D	17-00.9	17-00.8	940619	17:13	17:25	ORI	0.69	Obl.	300	0-123	1	2	1599
	134-05.7	134-06.2									1	2	
1-D	17-00.9	17-01.1	940619	17:30	17:47	ORI	0.33	Obl.	300	0- 98	1	2	2051
	134-06.3	134-07.1									0.5	2	
1-N	17-03.0	17-03.1	940619	19:45	19.59	ORI	0.69	Obl.	300	0-100	1	2	1985
	134-08.4	134-09.3									1	2	
1-N	17-03.1	17-04.4	940619	20:06	21:15	IKPT	1	Obl.	1286	0-301	1	2	49569
	134-09.6	134-13.5									0.5	2	
1-N	17-03.2	17-03.5	940619	20:14	20:34	ORI	1	Surf.		0		2	23
	134-10.1	134-11.3											
1-N	17-04.6	17-06.0	940619	21:24	22:12	IKPT	1	Hor.	425	0-101	1	2	30890
	134-13.9	134-16.7									0.5	2	

* IKPT: An IKMT (Isaacs-Kidd Mid Water Trawl) for zooplankton sampling, with 0.5 mm or 1.0 mm mesh aperture.

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
1-N	17-06.2	17-06.5	940619	22:24	22:35	NORPAC	XX13	Vert.	211	0-200	1		34
	134-17.0	134-17.2											
1-N	17-06.2	17-06.5	940619	22:24	22:35	NORPAC	GG54	Vert.	211	0-200	1		37
	134-17.0	134-17.2											
1-N	17-06.5	17-06.6	940619	22:40	22:49	NORPAC	XX13	Vert.	203	0-200	1		29
	134-17.3	134-17.5											
2-N	16-00.4	16-03.3	940620	3:46	4:45	IKPT	1	Obl.	1001	0-305	1	2	37818
	134-00.1	134-00.2									0.5	2	
2-N	16-00.7	16-01.7	940620	3:54	4:14	ORI	1	Surf.		0		2	2319
	134-00.0	134-00.1											
2-N	16-03.4	16-02.5	940620	4:59	5:39	IKPT	1	Hor.	228	0-101	1	2	15665
	134-00.2	134-00.5									0.5	2	
2-N	16-02.3	16-02.0	940620	5:45	5:56	ORI	0.69	Obl.	300	0-163	1	2	1414
	134-00.5	134-00.5									1	2	
2-D	16-02.2	16-02.1	940620	7:24	7:32	NORPAC	XX13	Vert.	155	0-150	1		29
	134-00.6	134-00.6											
2-D	16-02.2	16-02.1	940620	7:24	7:32	NORPAC	GG54	Vert.	155	0-150	1		27
	134-00.6	134-00.6											
2-D	16-02.1	16-01.9	940620	7:37	7:49	NORPAC	XX13	Vert.	218	0-200	1		36
	134-00.7	134-00.7											
2-D	16-02.1	16-01.9	940620	7:37	7:49	NORPAC	GG54	Vert.	218	0-200	1		39
	134-00.7	134-00.7											
2-D	16-01.9	16-01.7	940620	7:53	8:05	NORPAC	XX13	Vert.	219	0-200	1		35
	134-00.7	134-00.7											
2-D	16-02.1	16-03.3	940620	8:23	9:17	IKPT	1	Obl.	855	0-311	1	2	18156
	134-00.6	134-00.1									0.5	2	
2-D	16-03.6	16-04.0	940620	9:29	9:39	ORI	0.69	Obl.	300	0-148	1	2	1507
	133-59.7	133-59.5									1	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
3-D	15-00.2	15-00.2	940620	14:05	14:13	NORPAC	XX13	Vert.	161	0-150	1		28
	133-59.9	133-59.9											
3-D	15-00.2	15-00.2	940620	14:05	14:13	NORPAC	GG54	Vert.	161	0-150	1		30
	133-59.9	133-59.9											
3-D	15-00.5	15-00.7	940620	14:20	14:30	NORPAC	XX13	Vert.	227	0-200	1		43
	133-59.7	133-59.6											
3-D	15-00.5	15-00.5	940620	14:20	14:30	NORPAC	GG54	Vert.	227	0-200	1		43
	133-59.7	133-59.6											
3-D	15-00.8	15-01.1	940620	14:34	14:44	NORPAC	XX13	Vert.	223	0-200	1		40
	133-59.6	133-59.4											
3-D	15-01.2	15-02.3	940620	14:55	15:43	IKPT	1	Obl.	834	0-311	1	2	22575
	133-59.5	134-00.7									0.5	2	
3-D	15-02.4	15-02.2	940620	15:50	16:02	ORI	0.69	Obl.	300	0-150	1	1	1523
	134-00.6	134-01.0									1	1	
3-N	14-59.6	14-59.4	940620	19:06	19:18	ORI	0.69	Obl.	300	0-148	1	1	1530
	133-59.7	134-00.1									1	1	
3-N	14-59.4	14-58.9	940620	19:24	20:23	IKPT-	1	Obl.	900	0-380	1	2	33559
	134-00.3	134-02.1				O-1					0.5	2	
3-N	14-59.3	14-59.2	940620	19:32	19:52	ORI	1	Surf.		0		2	2508
	134-00.5	134-01.2											
3-N	14-58.7	14-58.3	940620	20:32	21:20	IKPT-	1	Obl.	900	0-356	1	2	22489
	134-02.2	134-03.7				O-2					0.5	2	
3-N	14-58.3	14-58.4	940620	21:36	21:47	NORPAC	XX13	Vert.	207	0-200	1		32
	134-13.5	134-13.4											
3-N	14-58.3	14-58.4	940620	21:36	21:47	NORPAC	GG54	Vert.	207	0-200	1		34
	134-13.5	134-13.4											
3-N	14-58.4	14-58.5	940620	21:53	22:03	NORPAC	XX13	Vert.	211	0-200	1		33
	134-03.3	134-03.2											

Net Record

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing Method	Wire out (m)	Sampl. layer (m)	Reel. Speed (m/s)	Ship Speed (kt)	Filt. Volume (m³)
4-N	13-59.9	14-00.9	940621	2:07	2:53	IKPT	1	Obl.	767	0-308	1	2	11103
	133-59.9	134-00.5									0.5	2	
4-N	14-00.0	14-00.5	940621	2:12	2:32	ORI	1	Surf.		0		2	2050
	134-00.0	134-00.3											
4-N	14-01.2	14-02.1	940621	3:03	3:42	IKPT-	1	Hor.	291	0-95	1	2	20124
	134-00.7	134-01.1				H-1					0.5	2	
4-N	14-02.1	14-01.7	940621	3:51	4:05	ORI	0.69	Obl.	300	0-145	1	1	1777
	134-01.0	134-00.4									1	1	
4-N	14-01.3	14-00.1	940621	4:20	5:10	IKPT-	1	Hor.	295	0- 88	1	2	25970
	133-59.0	133-57.7				H-2					0.5	2	
4-N	14-00.0	13-59.3	940621	5:22	6:49	IKPT-	1	Hor.	414	0-124	1	2	36185
	133-57.2	133-53.3				H-3					0.5	2	
L-1	14-00.2	13-59.7	940621	12:08	13:46	MTD	0.5	Hor.		400			882
	133-58.3	133-58.8								300			928
										200			1168
										175			697
										150			976
										125			803
										100			934
										75			782
										50			332
										25			991
										0			867
L-1	13-59.9	14-00.0	940621	14:44	14:57	NORPAC	XX13	Ver.	255	0-150	1		57
	133-58.1	133-57.6											
L-1	13-59.9	14-00.0	940621	14:44	14:57	NORPAC	GG54	Ver.	255	0-150	1		58
	133-58.1	133-57.6											
L-1	14-00.0	14-00.0	940621	15:00	15:09	NORPAC	XX13	Ver.	207	0-200	1		39
	133-57.5	133-57.5											

Net Record

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing Method	Wire out (m)	Sampl. layer (m)	Reel. Speed (m/s)	Ship Speed (kt)	Filt. Volume (m³)
L-1	14-00.0	14-00.0	940621	15:00	15:09	NORPAC	GG54	Ver.	207	0-200	1		40
	133-57.5	133-57.5											
L-1	13-59.9	13-59.8	940621	15:14	15:23	NORPAC	XX13	Ver.	254	0-200	1		49
	133-57.1	133-56.7											
L-2	13-59.3	13-58.8	940621	15:40	17:21	MTD	0.5	Hor.	575	400			307
	133-56.7	133-56.7							531	300			481
									495	200			672
									460	175			3043?
									427	125			18?
									391	100			1033
									322	75			957
									285	50			914
									145	25			1079
										0			769
L-3	13-59.5	13-59.0	940621	19:13	21:05	MTD	0.5	Hor.	575	400			807
	133-54.6	133-54.6							531	300			1116
									495	200			597
									460	175			496
									424	150			735
									389	125			795
									354	100			966
									319	75			909
									283	50			876
									142	25			1022
										0			812
L-3	13-59.4	13-59.7	940621	21:55	22:16	IKPT	0.5	Hor.	118	0- 53	0.3	2	14887
	133-54.1	133-54.3										2	
L-3	13-59.9	13-59.6	940621	22:25	22:45	IKPT	0.5	Obl.	162	0- 69	0.3	2	12640
	133-54.3	133-54.4									0.5	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m^3)
L-4	13-00.0	13-00.0	940621	22:53	24:29	MTD	0.5	Hor.	-	400		2	93
	133-00.0	133-00.0							-	300			67
									-	200			76
									-	175			72
									-	150			71
									-	125			58
									-	100			32?
									-	75			893
									-	50			691
									-	25			984
										0			537
L-4	13-58.9	13-59.0	940622	0:56	1:07	NORPAC	XX13	Ver.	200	0-200	1		19
	133-54.5	133-54.5											
L-4	13-00.0	13-00.0	940622	0:56	1:07	NORPAC	GG54	Ver.	200	0-200	1		20
	133-00.0	133-00.0											
L-4	13-59.0	13-59.0	940622	1:28	1:58	IKPT-	0.5	Hor.	184	0- 82	1	2	13047
	133-54.7	133-54.8				H-1					0.5	2	
L-4	13-59.0	13-58.8	940622	2:10	2:33	IKPT-	0.5	Hor.	188	0- 71	1	2	18842
	133-55.1	133-55.6				H-2					0.5	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
L-5	13-58.8	13-56.9	940622	2:46	4:26	MTD	0.5	Hor.	-	400			980
	133-55.7	133-54.8							-	300			926
									-	200			824
									-	175			782
									-	150			1356
									-	125			1009
									-	100			966
									-	75			924
									-	50			1003
									-	25			1226
										0			976
L-5	13-56.8	13-55.8	940622	5:10	6:00	IKPT	0.5	Obl.	550	0-255	1	2	18099
	133-54.4	133-54.8									0.5	2	
L-6	13-55.7	13-54.6	940622	6:10	7:30	MTD	0.5	Hor.	575	400		2	122
	133-54.8	133-54.7							531	300			89
									495	200			104
									460	175			96
									405	150			97
									389	125			94
									354	100			676
									319	75			788
									283	50			1115
									142	25			1332
										0			759
5-D	13-00.0	12-59.1	940622	14:38	15:25	IKPT	1	Obl.	671	0-298	0.7	2	17527
	134-00.0	134-00.9									0.5	2	
5-D	12-59.0	12-58.6	940622	15:33	15:45	ORI	0.69	Obl.	300	0-166	0.7	2	1547
	134-00.9	134-00.9									1	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m^3)
5-D	12-58.4	12-58.1	940622	15:55	16:15	ORI	0.33	Obl.	300	0-196	0.5	2	1404
	134-00.8	134-00.9									0.5	2	
5-D	12-58.2	12-58.4	940622	16:30	16:40	NORPAC	XX13	Ver.	151	0-150	1		30
	134-00.8	134-00.8											
5-D	12-58.4	12-58.1	940622	16:30	16:40	NORPAC	GG54	Ver.	151	0-150	1		29
	134-00.8	134-00.8											
5-D	12-58.5	12-58.7	940622	16:46	17:00	NORPAC	XX13	Ver.	223	0-200	1		59
	134-00.8	134-00.8											
5-D	12-58.5	12-58.7	940622	16:46	17:00	NORPAC	GG54	Ver.	223	0-200	1		48
	134-00.8	134-00.8											
5-D	12-58.5	12-58.8	940622	17:06	17:17	NORPAC	XX13	Ver.	203	0-200	1		37
	134-00.8	134-00.7											
5-N	12-59.6	12-59.4	940622	18:58	19:13	ORI	0.69	Obl.	300	0-114	1	2	1825
	134-01.2	134-01.7									1	2	
5-N	12-59.5	12-59.6	940622	19:19	19:34	NORPAC	XX13	Ver.	200	0-200	1		34
	134-01.8	134-01.8											
5-N	12-59.5	12-59.6	940622	19:19	19:34	NORPAC	GG54	Ver.	200	0-200	1		36
	134-00.0	134-01.8											
5-N	12-59.6	12-59.6	940622	19:37	19:48	NORPAC	XX13	Ver.	200	0-200	1		34
	134-01.8	134-01.8											
5-N	12-59.5	12-58.2	940622	20:02	21:09	IKPT	1	Obl.	1070	0-302	1	2	34451
	134-02.2	134-03.9									0.5	2	
5-N	13-00.0	13-00.0	940622	20:09	20:29	ORI	1	Surf.		0			2664
	134-00.0	134-00.0											
5-N	12-58.0	12-57.1	940622	21:17	22:00	IKPT	1	Hor.	250	0-70	1	1	22128
	134-04.1	134-05.4									0.5	2	
E-1	12-59.9	12-59.1	940623	2:08	3:00	IKPT	1	Obl.	832	0-310	1	2	24023
	135-07.0	135-08.3									0.5	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
6-D	13-00.1	13-02.1	940623	12:06	12:59	IKPT	1	Obl.	893	0-302	1	2	26886
	136-59.9	136-59.1									0.5	2	
6-D	13-02.3	13-02.3	940623	13:10	13:17	NORPAC	XX13	Ver.	152	0-150	1		29
	136-58.9	136-58.9											
6-D	13-02.3	13-02.3	940623	13:10	13:17	NORPAC	GG54	Ver.	152	0-150	1		28
	136-58.9	136-58.9											
6-D	13-02.4	13-02.4	940623	13:21	13:30	NORPAC	XX13	Ver.	210	0-200	1		40
	136-58.6	136-58.6											
6-D	13-02.4	13-02.4	940623	13:21	13:30	NORPAC	GG54	Ver.	210	0-200	1		40
	136-58.6	136-58.6											
6-D	13-02.6	13-02.8	940623	13:33	13:43	NORPAC	XX13	Ver.	229	0-200	1		47
	136-58.3	136-58.0											
6-D	13-02.9	13-02.8	940623	13:55	14:08	ORI	0.69	Obl.	300	0-140	1	2	1580
	136-58.0	136-58.2									1	2	
6-N	13-00.0	13-00.2	940623	19:02	19:15	ORI	0.69	Obl.	300	0-171	1	2	1719
	137-00.3	137-00.6									1	2	
6-N	13-00.2	13-00.3	940623	19:28	19:40	NORPAC	XX13	Ver.	244	0-200	1		51
	137-00.4	134-00.1											
6-N	13-00.2	13-00.3	940623	19:28	19:40	NORPAC	GG54	Ver.	244	0-200	1		51
	137-00.4	134-00.1											
6-N	13-00.3	13-00.2	940623	19:46	19:59	NORPAC	XX13	Ver.	236	0-200	1		48
	137-00.0	136-59.7											
6-N	13-00.3	13-00.5	940623	20:15	20:56	IKPT	1	Obl.	650 ·	0-327	1	2	17912
	136-59.9	136-59.1									0.5	2	
6-N	13-00.3	13-00.4	940623	20:21	20:41	ORI	1	Surf.		0		2	2395
	136-59.8	137-00.3											
6-N	13-00.6	13-00.8	940623	21:05	21:41	IKPT	1	Hor.	105	0-60	1	2	16464
	137-00.8	137-01.8									0.5	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
7-N	14-01.9	14-02.5	940624	1:40	2:37	IKPT	1	Obl.	885	0-304	1	2	29793
	137-00.0	137-01.3									0.5	2	
7-N	14-00.3	14-00.9	940624	1:50	2:10	ORI	1	Surf.		0		2	2229
	137-00.3	137-00.7											
7-N	14-01.9	14-02.5	940624	2:47	3:21	IKPT	1	Hor.		0-52	1	2	18519
	137-01.7	137-02.6									0.5	2	
7-N	14-02.6	14-02.9	940624	3:29	3:43	ORI	0.69	Obl.	300	0-112	1	2	2237
	137-02.9	137-03.3									1	2	
7-N	14-03.1	14-03.2	940624	3:57	4:10	NORPAC	XX13	Ver.	219	0-200	1		46
	137-03.4	137-03.1											
7-N	14-03.1	14-03.2	940624	3:57	4:10	NORPAC	GG54	Ver.	219	0-200	1		45
	137-03.4	137-03.1											
7-N	14-03.2	14-03.4	940624	4:15	4:30	NORPAC	XX13	Ver.	219	0-200	1		44
	137-03.0	137-02.7											
7-D	14-00.4	14-00.5	940624	7:22	7:30	NORPAC	XX13	Ver.	160	0-150	1		32
	137-00.0	137-00.0											
7-D	14-00.4	14-00.5	940624	7:22	7:30	NORPAC	GG54	Ver.	160	0-150	1		31
	137-00.0	137-00.0											
7-D	14-00.5	14-00.6	940624	7:35	7:45	NORPAC	XX13	Ver.	244	0-200	1		44
	137-00.0	137-00.1											
7-D	14-00.5	14-00.6	940624	7:35	7:45	NORPAC	GG54	Ver.	244	0-200	1		45
	137-00.0	137-00.1											
7-D	14-00.7	14-00.8	940624	7:49	7:58	NORPAC	XX13	Ver.	216	0-200	1		36
	137-00.1	137-00.1											
7-D	14-00.9	14-00.9	940624	8:10	8:21	ORI	0.69	Obl.	300	0-140	1	2	1647
	137-00.3	137-00.5									1	2	
7-D	14-00.9	14-01.0	940624	8:29	9:17	IKPT	1	Obl.	940	0-321	1	2	25705
	137-01.1	137-02.7									0.5	2	

Net Record

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing Method	Wire out (m)	Sampl. layer (m)	Reel. Speed (m/s)	Ship Speed (kt)	Filt. Volume (m³)
8-D	15-00.1	14-59.9	940624	13:14	14:08	IKPT	1	Obl.	849	0-306	1	2	23906
	137-00.0	137-01.4									0.5	2	
8-D	14-59.8	14-59.7	940624	14:14	14:27	ORI	0.69	Obl.	300	0-135	1	2	1899
	137-01.5	137-01.9									1	2	
8-D	15-00.1	15-00.1	940624	14:49	14:58	NORPAC	XX13	Ver.	171	0-150	1		34
	137-01.6	137-01.6											
8-D	15-00.1	15-00.1	940624	14:49	14:58	NORPAC	GG54	Ver.	171	0-150	1		35
	137-01.6	137-01.6											
8-D	15-00.3	15-00.3	940624	15:03	15:13	NORPAC	XX13	Ver.	227	0-200	1		42
	137-01.3	137-01.3											
8-D	15-00.3	15-00.3	940624	15:03	15:13	NORPAC	GG54	Ver.	227	0-200	1		43
	137-01.3	137-01.3											
8-D	15-00.8	15-01.1	940624	15:25	15:37	NORPAC	XX13	Ver.	244	0-200	1		49
	137-00.9	137-00.6											
8-N	14-59.8	14-59.9	940624	19:04	19:16	ORI	0.69	Obl.	300	0-146	1	2	1536
	137-00.5	137-00.9									1	2	
8-N	15-00.1	15-00.3	940624	19:27	19:36	NORPAC	XX13	Ver.	214	0-200	1		37
	137-00.8	137-00.6											
8-N	15-00.1	15-00.3	940624	19:27	19:36	NORPAC	GG54	Ver.	214	0-200	1		37
	137-00.8	137-00.6											
8-N	15-00.3	15-00.4	940624	19:41	19:50	NORPAC	XX13	Ver.	207	0-200	1	0	33
	137-00.6	137-00.5											
8-N	15-00.6	·15-00.7	940624	20:04	20:49	IKPT	1	Obl.	872	0-315	1	2	21058
	137-00.4	137-01.7									0.5	2	
8-N	15-00.6	15-00.7	940624	20:11	20:31	ORI	1	Surf.		0		2	2270
	137-00.6	137-01.2											
8-N	15-00.8	15-00.9	940624	20:59	21:49	IKPT	1	Hor.		0-161	1	2	23270
	137-01.9	137-03.5									0.5	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
9-N	16-00.0	16-00.4	940625	1:52	2:35	IKPT	1	Obl.	687	0-298	1	2	18016
	137-00.1	137-01.5									0.5	2	
9-N	16-00.1	16-00.3	940625	1:58	2:18	ORI	1	Surf.		0		2	2063
	137-00.3	137-00.9											
9-N	16-00.5	16-00.8	940625	2:45	3:24	IKPT	1	Hor.		0-152	1	2	17747
	137-01.8	137-03.0									0.5	2	
9-N	16-00.9	16-01.0	940625	3:30	3:44	ORI	0.69	Obl.	300	0-121	1	2	1857
	137-03.2	137-03.7									1	2	
9-N	16-01.1	16-01.1	940625	3:56	4:09	NORPAC	XX13	Ver.	219	0-200	1		39
	137-03.7	137-03.4											
9-N	16-01.1	16-01.1	940625	3:56	4:09	NORPAC	GG54	Ver.	219	0-200	1		40
	137-03.7	137-03.4											
9-N	16-01.2	16-01.2	940625	4:14	4:25	NORPAC	XX13	Ver.	219	0-200	1		36
	137-03.4	137-03.1											
9-D	16-00.7	16-00.7	940625	7:48	7:55	NORPAC	XX13	Ver.	162	0-150	1		28
	136-59.5	136-59.4											
9-D	16-00.7	16-00.7	940625	7:48	7:55	NORPAC	GG54	Ver.	162	0-150	1		30
	136-59.5	136-59.4											
9-D	16-00.8	16-00.9	940625	8:01	8:10	NORPAC	XX13	Ver.	227	0-200	1		38
	136-59.3	136-59.1											
9-D	16-00.8	16-00.9	940625	8:01	8:10	NORPAC	GG54	Ver.	227	0-200	1		43
	136-59.3	136-59.1											
9-D	16-00.9	16-01.0	940625	8:14	8:24	NORPAC	XX13	Ver.	219	0-200	1		34
	136-59.1	136-59.0											
9-D	16-01.2	16-01.6	940625	8:35	8:46	ORI	0.69	Obl.	300	0-175	1	2	1378
	136-58.8	136-58.9									1	2	
9-D	16-02.0	16-03.1	940625	8:56	9:31	IKPT	1	Obl.	669	0-317	1	2	15016
	136-58.9	136-59.1									0.5	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m^3)
10-D	17-00.2	17-00.9	940625	13:15	14:03	IKPT	1	Obl.	907	0-312	1	2	23413
	137-00.1	137-01.7									0.5	2	
10-D	17-01.0	17-01.*	940625	14:08	14:22	ORI	0.69	Obl.	300	0-127	1	2	3828
	137-01.8	137-02.*									1	2	
10-D	17-01.6	17-01.6	940625	14:31	14:38	NORPAC	XX13	Ver.	164	0-150	1		30
	137-02.2	137-02.2											
10-D	17-01.6	17-01.6	940625	14:31	14:38	NORPAC	GG54	Ver.	164	0-150	1		30
	137-02.2	137-02.2											
10-D	17-01.8	17-01.8	940625	14:43	14:53	NORPAC	XX13	Ver.	223	0-200	1		39
	137-02.1	137-02.1											
10-D	17-01.8	17-01.8	940625	14:43	14:53	NORPAC	GG54	Ver.	223	0-200	1		41
	137-02.1	137-02.1											
10-D	17-02.0	17-02.1	940625	14:57	15:06	NORPAC	XX13	Ver.	225	0-200	1		37
	137-01.9	137-01.7											
10-N	17-00.0	17-00.2	940625	19:00	19:13	ORI	0.69	Obl.	300	0-117	1	2	3700
	137-00.3	137-00.8									1	2	
10-N	17-00.4	17-00.6	940625	19:22	19:32	NORPAC	XX13	Ver.	229	0-200	1		38
	137-00.9	137-00.9											
10-N	17-00.4	17-00.6	940625	19:22	9:32	NORPAC	GG54	Ver.	229	0-200	1		41
	137-00.9	137-00.9											
10-N	17-00.7	17-00.9	940625	19:38	9:47	NORPAC	XX13	Ver.	219	0-200	1		35
	137-00.9	137-00.9											
10-N	17-01.1	17-02.8	940625	20:00	0:57	IKPT	1	Obl.	1082	0-303	1	2	32861
	137-01.0	137-03.1									0.5	2	
10-N	17-01.2	17-01.8	940625	20:03	0:23	ORI	1	Surf.	0			2	2452
	137-01.1	137-20.0											
10-N	17-03.0	17-03.7	940625	21:07	21:38	IKPT	1	Hor.	183	0-52	1	2	14867
	137-03.3	137-04.4									0.5	2	

Net Record

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing Method	Wire out (m)	Sampl. layer (m)	Reel. Speed (m/s)	Ship Speed (kt)	Filt. Volume (m³)
E-2	16-59.8	17-00.8	940626	2:11	2:59	IKPT	1	Obl.		0-295	1	2	26868
	138-16.2	138-18.2									0.5	2	
11-D	16-59.9	16-59.9	940626	12:03	12:41	IKPT	1	Obl.	680	0-303	1	2	16169
	140-00.2	140-01.7									0.5	2	
11-D	16-59.9	16-59.8	940626	12:47	13:00	ORI	0.69	Obl.	300	0-153	1	2	1549
	140-01.9	140-02.5									1	2	
11-D	16-59.9	16-59.9	940626	13:16	13:20	NORPAC	XX13	Ver.	156	0-150			25
	140-02.4	140-02.4											
11-D	16-59.9	16-59.9	940626	13:16	13:20	NORPAC	GG54	Ver.	156	0-150			26
	140-02.4	140-02.4											
11-D	17-00.0	17-00.0	940626	13:30	13:41	NORPAC	XX13	Ver.	216	0-200			35
	140-02.3	140-02.3											
11-D	17-00.0	17-00.0	940626	13:30	13:41	NORPAC	GG54	Ver.	216	0-200			37
	140-02.3	140-02.3											
11-D	17-00.0	17-00.1	940626	13:45	13:56	NORPAC	XX13	Ver.	216	0-200			32
	140-02.1	140-01.9											
11-N	17-00.0	17-00.1	940626	16:01	19:13	ORI	0.69	Obl.	300	0-139	1	2	1454
	140-01.9	140-02.5									1	2	
11-N	17-00.2	17-00.3	940626	19:23	19:31	NORPAC	XX13	Ver.	208	0-200	1		31
	140-00.7	140-00.5											
11-N	17-00.2	17-00.3	940626	19:23	9:31	NORPAC	GG54	Ver.	208	0-200	1		34
	140-00.7	140-00.5											
11-N	17-00.3	17-00.3	940626	19:35	19:43	NORPAC	XX13	Ver.	210	0-200			·32
	140-00.5	140-00.4											
11-N	17-00.4	17-00.7	940626	19:55	20:32	IKPT	1	Obl.	700	0-300	1	2	16297
	140-00.5	140-01.8									0.5	2	
11-N	17-00.4	17-00.6	940626	19:58	20:18	ORI	1	Surf.	0			2	2326
	140-00.7	140-01.4											

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m^3)
11-N	17-00.7	17-00.9	940626	20:39	21:14	IKPT	1	Hor.	257	0-99	1	2	14507
	140-02.1	140-03.4									0.5	2	
12-N	16-00.1	16-01.8	940627	1:24	2:17	IKPT	1	Obl.		0-300	1	2	29817
	140-00.0	140-01.0									0.5	2	
12-N	16-00.3	16-01.0	940627	1:28	1:49	ORI	1	Surf.	0		2	0	2738
	140-00.1	140-00.5											
12-N	16-02.1	16-02.5	940627	2:28	3:00	IKPT	1	Hor.		0-90	1	2	16207
	140-01.3	140-02.4									0.5	2	
12-N	16-02.6	16-02.7	940627	3:07	3:20	ORI	0.69	Obl.	300	0-131	1	2	1752
	140-02.6	140-03.7									1	2	
12-N	16-02.8	16-02.8	940627	3:30	3:39	NORPAC	XX13	Ver.	206	0-200	1		31
	140-03.0	140-03.0											
12-N	16-02.8	16-02.8	940627	3:30	3:39	NORPAC	GG54	Ver.	206	0-200	1		29
	140-03.0	140-03.0											
12-N	16-02.7	16-02.7	940627	3:44	3:53	NORPAC	XX13	Ver.	206	0-200	1		31
	140-02.8	140-02.7											
12-D	15-59.8	15-59.8	940627	7:18	7:25	NORPAC	XX13	Ver.	157	0-150	1		23
	139-58.2	139-58.1											
12-D	25-59.8	15-59.8	940627	7:18	7:25	NORPAC	GG54	Ver.	157	0-150	1		26
	139-58.2	139-58.1											
12-D	15-59.8	15-59.9	940627	7:31	7:42	NORPAC	XX13	Ver.	213	0-200	1		32
	139-57.9	139-57.7											
12-D	15-59.8	15-59.9	940627	7:31	7:42	NORPAC	GG54	Ver.	213	0-200	1		37
	139-57.9	139-57.7											
12-D	15-59.9	15-59.9	940627	7:48	7:58	NORPAC	XX13	Ver.	220	0-200	1		34
	139-57.6	139-57.4											
12-D	16-00.0	16-00.4	940627	8:08	8:20	ORI	0.69	Obl.	300	0-150	1	2	1513
	139-57.2	139-57.1									1	2	

Net Record

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing Method	Wire out (m)	Sampl. layer (m)	Reel. Speed (m/s)	Ship Speed (kt)	Filt. Volume (m³)
12-D	16-00.7	16-02.0	940627	8:27	9:06	IKPT	1	Obl.	725	0-302	1	2	21124
	139-56.9	139-56.3									0.5	2	
13-D	14-59.9	15-01.1	940627	14:00	14:45	IKPT	1	Obl.	849	0-301	1	2	22280
	139-59.5	140-00.5									0.5	2	
13-D	15-01.2	15-01.2	940627	14:52	15:03	ORI	0.69	Obl.	300	0-141	1	2	1471
	140-00.5	140-00.9									1	2	
13-D	15-01.4	15-01.4	940627	15:19	15:27	NORPAC	XX13	Ver.	167	0-150	1		27
	140-00.7	140-00.7											
13-D	15-01.4	15-01.4	940627	15:19	15:27	NORPAC	GG54	Ver.	167	0-150	1		32
	140-00.7	140-00.7											
13-D	15-01.6	15-01.6	940627	15:30	15:43	NORPAC	XX13	Ver.	247	0-200	1		43
	140-00.5	140-00.5											
13-D	15-01.6	15-01.6	940627	15:30	15:43	NORPAC	GG54	Ver.	247	0-200	1		51
	140-00.5	140-00.5											
13-D	15-01.8	15-02.0	940627	15:48	16:02	NORPAC	XX13	Ver.	250	0-200	1		48
	140-00.2	139-59.9											
13-N	14-59.8	14-59.6	940627	19:01	19:13	ORI	0.69	Obl.	300	0-156	1	2	1416
	140-00.1	140-00.5									1	2	
13-N	14-59.6	14-59.7	940627	19:24	19:32	NORPAC	XX13	Ver.	227	0-200	1		30
	140-00.4	140-00.3											
13-N	14-59.6	15-59.7	940627	19:24	19:32	NORPAC	GG54	Ver.	227	0-200	1		36
	140-00.4	140-00.3											
13-N	14-59.6	14-59.7	940627	19:36	19:45	NORPAC	XX13	Ver.	227	0-200	1	2	29
	140-00.3	140-00.2											
13-N	14-59.6	14-59.0	940627	19:55	20:34	IKPT	1	Obl.	778	0-296	1	2	20391
	140-00.2	140-01.5									0.5	2	
13-N	14-59.8	14-59.3	940627	19:57	20:17	ORI	1	Surf.	0		0	2	
	140-00.2	140-00.9											

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m^3)
13-N	14-59.0	14-58.5	940627	20:41	21:17	IKPT	1	Hor.	0-80	0-80	0	2	15016
	140-01.5	140-02.6									0.5	2	
14-N	14-00.1	14-00.9	940628	1:17	2:08	IKPT	1	Obl.	913	0-300	1	2	26480
	140-00.1	140-00.2									0.5	2	
14-N	14-00.1	14-00.5	940628	1:20	1:40	ORI	1	Surf.			0	2	2829
	140-00.2	140-00.7											
14-N	14-01.1	14-02.1	940628	2:20	3:23	IKPT	1	Hor.	347	0-90	0	2	33805
	140-01.7	140-03.2									0.5	2	
14-N	14-02.2	14-02.9	940628	3:35	4:09	IKPT	1	Hor.	209	0-60	1	2	18192
	140-03.6	140-04.5									0.5	2	
14-N	14-03.0	14-03.1	940628	4:16	4:28	ORI	0.69	Obl.	300	0-130	1	2	1648
	140-04.7	140-04.9									1	2	
14-N	14-03.2	14-03.4	940628	4:36	4:45	NORPAC	XX13	Ver.	229	0-200	1		39
	140-05.0	140-04.7											
14-N	14-03.2	14-03.0	940628	4:36	4:45	NORPAC	GG54	Ver.	229	0-200	1		42
	140-05.0	140-04.7											
14-N	14-03.4	14-03.5	940628	4:49	4:58	NORPAC	XX13	Ver.	229	0-200	1		34
	140-04.6	140-04.4											
14-D	14-00.2	14-00.2	940628	7:14	7:21	NORPAC	XX13	Ver.	157	0-150	1		22
	139-58.9	139-58.7											
14-D	14-00.2	14-00.2	940628	7:14	7:21	NORPAC	GG54	Ver.	157	0-150	1		27
	139-58.9	139-58.7											
14-D	14-00.2	14-00.2	940628	7:26	7:34	NORPAC	XX13	Ver.	209	0-200	1		28
	139-58.6	139-58.4											
14-D	14-00.2	14-00.2	940628	7:26	7:34	NORPAC	GG54	Ver.	209	0-200	1		34
	139-58.6	139-58.4											
14-D	14-00.2	14-00.3	940628	7:40	7:49	NORPAC	XX13	Ver.	209	0-200	1		28
	139-58.3	139-58.1											

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
14-D	14-00.3	14-00.3	940628	7:59	8:10	ORI	0.69	Obl.	300	0-126	1	2	1543
	139-57.9	139-58.2									1	2	
14-D	14-00.3	14-00.4	940628	8:18	9:04	IKPT	1	Obl.	885	0-307	1	2	20588
	139-58.5	139-59.3									0.5	2	
15-D	13-00.2	13-00.2	940628	14:13	14:22	XX13	XX13	Ver.	154	0-150	1.0		22
	139-59.8	139-59.8											
15-D	13-00.2	13-00.2	940628	14:13	14:22	NORPAC	GG54	Ver.	154	0-150	1.0		26
	139-59.8	139-59.8											
15-D	13-00.3	13-00.3	940628	14:27	14:38	NORPAC	XX13	Ver.	210	0-200	1.0		35
	139-59.7	139-59.7											
15-D	13-00.3	13-00.3	940628	14:27	14:38	NORPAC	GG54	Ver.	210	0-200	1.0		39
	139-59.7	139-59.7											
15-D	13-00.4	13-00.5	940628	14:43	14:55	NORPAC	XX13	Ver.	217	0-200	1.0		34
	139-59.5	139-59.5											
15-D	13-00.8	13-00.1	940628	15:47	16:35	IKPT	1	Obl.	791	0-303	1	2	23569
	139-59.6	140-01.1									0.5	2	
15-D	13-00.0	12-59.8	940628	16:42	16:56	ORI	0.69	Obl.	300	0-143	1	2	1662
	140-01.2	140-01.7									1	2	
15-N	12-59.8	12-59.7	940628	19:00	19:14	ORI	0.69	Obl.	300	0-132	1	2	1679
	139-59.9	140-00.3									1	2	
15-N	12-59.7	12-59.7	940628	19:23	19:32	NORPAC	XX13	Ver.	247	0-200	1		39
	140-00.3	140-00.1											
15-N	12-59.7	12-59.7	940628	19:23	19:32	NORPAC	GG54	Ver.	247	0-200	1		43
	140-00.3	140-00.1											
15-N	12-59.7	12-59.8	940628	19:37	19:46	NORPAC	XX13	Ver.	234	0-200	1		36
	140-00.1	139-59.8											
15-N	12-59.9	12-59.4	940628	19:56	20:04	IKPT	1	Obl.	828	0-300	1	2	22115
	139-59.8	140-01.2									0.5	2	

Net Record

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing Method	Wire out (m)	Sampl. layer (m)	Reel. Speed (m/s)	Ship Speed (kt)	Filt. Volume (m³)
15-N	12-59.8	12-59.6	940628	19:58	20:18	ORI	1	Surf.		0		2	2576
	139-59.9	140-00.5											
15-N	12-59.4	12-59.0	940628	20:48	21:36	IKPT	1	Hor.	363	0-126	1	2	19989
	140-01.3	140-02.5									0.5	2	
S-1	13-59.7	13-59.5	940629	13:00	8:15	Trap		Bottom	4800				
	140-59.8	141.03.5											
S-1	13-59.7	14-01.8	940629	13:00	9:12	Trap		Float	50, 100, 200				
	140-59.8	140-57.0							300, 500, 1000				
S-1	13-59.7	13-59.5 9	940629	14:27	18:31	IKPT-	1	Obl.	4810		1	2	149920
	140-59.8	141-03.5				D-1					1	2	
S-1	13-59.6	13-59.7 9	940629	18:51	19:36	IKPT-	1	Obl.	765	0-305	0.7	2	21274
	141-03.7	141-04.9				O-1					0.5	2	
S-1	13-59.8	13-57.8 9	940629	19:51	23:25	IKPT-	1	Obl.	5000		1	2	178120
	141-05.1	141-13.1				D-2					2	0	
S-1	13-57.7	13-57.2 9	940629	23:30	24:17	IKPT-	1	Obl.	790	0-299	1	2	18727
	141-13.2	141-14.3				O-2					0.5	2	
S-1	13-57.3	13-58.4 9	940630	0:34	3:44	IKPT	1	Obl.	5000		1	2	158834
	141-14.1	141-09.0				D-3					0	2	
S-2	14-30.2	14-30.4	940630	15:57	8:26	Trap		Bottom	4800				
	141-14.3	141-14.1											
S-2	14-30.2	14-31.5	940630	16:05	9:38	Trap		Float	50, 100, 150, 200				
	141-15.1	141.11.3							300, 500, 1000				
S-2	14-30.4	14-29.7 9	940630	19:10	22:06	IKPT-	1	Obl.	5000		1	3	171650
	141-13.9	141-20.6				D-1					0	2.2	
S-2	14-29.7	14-28.7 9	940630	22:25	23:06	IKPT-	1	Obl.	736	0-311	1	2	17224
	141-20.5	141-21.2				0-1					0.5	2.2	
S-2	14-28.7	14-27.9 9	940630	23:14	23:52	IKPT-	1	Obl.	715	0-318	1	2	14284
	141-21.2	141-21.7				O-2				0	0.5	2	

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
S-2	14-27.8	14-25.8	940701	0:02	1:29	IKPT-	1	Obl.	767	0-304	0.7	2	37457
	141-21.7	141-23.3				O-3					0.5	2.1	
S-2	14-25.8	14-28.3 9	940701	1:41	4:51	IKPT-	1	Obl.	5000		1	1.5	158864
	141-23.1	141-17.6				D-2					1	1	
S-3	15-00.0	15-00.4	940701	13:01	8:25	Trap		Bottom	4800				
	141-00.0	140-59.3											
S-3	15-00.0	15-00.5	940701	13:30	9:31	Trap		Float	50, 100, 200				
	141-00.7	140-58.3							300, 500, 1000				
S-3	15-00.6	15-01.7 9	940701	15:44	18:40	IKPT-	1	Obl.	5000		1	2.8	168467
	140-59.6	141-07.0				D-1					1	2.2	
S-3	15-01.7	15-02.1 9	940701	18:55	21:50	IKPT-	1	Obl.	5000		1	3	175046
	141-07.0	141-11.7				D-2					1	3	
S-3	15-02.8	15-03.1 9	940701	22:16	23:01	IKPT-	1	Obl.	817	0-298	1	2	20690
	141-14.2	141-15.6				0-1					0.5	2	
S-3	15-03.1	15-03.3 9	940701	23:09	23:53	IKPT-	1	Hor.	370	0-116	1	2	21361
	141-15.6	141-17.2				H-1					0.5	2	
S-3	15-03.3	15-03.5 9	940702	0:01	0:49	IKPT-	1	Hor.	280	0-198	1	2	23159
	141-17.1	141-15.2				H-2					0.5	2	
S-3	15-03.6	15-04.0 9	940702	1:00	4:15	IKPT-	1	Obl.	5000		1	3	160335
	141-14.9	141-08.2				D-3					1	3	
S-4	16-00.0	16-00.2	940702	13:37	8:25	Trap		Bottom	4800				
	140-59.9	140-59.4											
S-4	15-59.8	15-59.7	940702	13:44	9:38	Trap		Float	50, 100, 200				
	141-00.1	140-55.8							300, 500, 1000				
S-4	16-01.2	16-00.1	940702	15:47	18:04	IKPT-	1	Obl.	5000		1	2	171635
	141-00.0	141-07.1				D-1							
S-4	16-00.1	15-58.1	940702	18:52	21:46	IKPT-	1	Obl.	5000		2	1	175475
	141-07.3	141-14.6				D-2							

Net Record

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampl.	Reel.	Ship	Filt.
	Net in	Net out		Net in	Net out	Type	size (mm)	Method	out (m)	layer (m)	Speed (m/s)	Speed (kt)	Volume (m³)
S-4	15-58.2	15-58.9	940702	22:04	23:01	IKPT	1	Obl.	1160	0-306	2	3	30934
	141-14.5	141-12.1											
S-4	15-59.0	15-59.5 9	940702	23:10	23:53	IKPT-	1	Hor.	265	0-63		2	22489
	141-11.7	141-10.0				H-1						2	
S-4	15-59.6	16-00.3 9	940703	0:04	1:03	IKPT	1	Hor.	301	0-118	0.7	2	24111
	141-09.5	141-07.5				H-2						0	
S-4	16-00.4	16-02.2 9	940703	1:15	4:13	IKPT-	1	Obl	4500		1	2.2	159364
	141-07.0	141-00.1				D-3					1	2.2	
S-5	16-59.8	17-00.4 9	940703	13:48	16:40	IKPT-	1	Obl.	4500		1	2.9	168919
	140-59.9	141-07.4				D-1					1	2.9	
S-6	17-41.9	17-43.2 9	940703	20:07	20:48	IKPT	1	Obl.	784	0-305	1	2	19054
	141-01.9	141-01.4									0.5	2	
S-7	33-37.7	33-38.1	940706	8:14	8:30	ORI	0.69	Obl.	300		1	2	
	139-13.5	139-14.1									0.5	2	

Ⅷ. CTDO data

CTDO data of KH94-2 Leg.3

Station	1		DEPTH	5458 m	
Date	940619		Lat.	17-00.00N	
Time	18:11		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	30.268	34.308	21.119	0.067	0.001
10	30.279	34.336	21.135	0.060	0.019
20	30.209	34.617	21.370	0.071	0.014
30	30.134	34.755	21.499	0.054	0.014
50	27.761	34.751	22.287	0.081	0.015
75	24.847	34.803	23.241	0.150	0.054
100	23.834	34.884	23.604	0.195	0.069
125	22.932	35.009	23.962	0.237	0.319
150	21.342	34.958	24.370	0.147	0.172
175	20.158	34.953	24.685		
200	19.287	34.929	24.894	0.147	0.172
300	15.730	34.664	25.551	0.019	0.030
400	11.337	34.325	26.189		
500	8.238	34.165	26.583		
600	6.347	34.218	26.890		
700	5.645	34.351	27.084		
800	5.007	34.407	27.204		
900	4.244	34.468	27.338		
1000	3.891	34.507	27.405		

Station	2		DEPTH	5352 m	
Date	940620		Lat.	16-00.00N	
Time	6:11		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.779	34.164	21.177	0.047	0.012
10	29.781	34.164	21.176	0.048	0.013
20	29.785	34.164	21.175	0.048	0.015
30	29.780	34.164	21.177	0.057	0.015
50	28.992	34.214	21.479	0.060	0.016
75	28.676	34.255	21.614	0.090	0.038
100	27.494	34.502	22.187	0.186	0.087
125	26.245	34.823	22.825	0.258	0.176
150	24.496	34.876	23.401	0.156	0.248
175	23.291	35.043	23.883	0.075	0.207
200	21.349	34.847	24.283	0.033	0.058
300	15.357	34.618	25.599	0.004	0.019
400	10.755	34.307	26.280		
500	7.825	34.200	26.672		
600	6.429	34.294	26.940		
700	5.581	34.391	27.124		
800	4.965	34.454	27.247		
900	4.581	34.489	27.318		
1000	4.102	34.521	27.394		

Station	3		DEPTH	4785 m	
Date	940620		Lat.	15-00.00N	
Time	16:30		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	30.190	34.346	21.174	0.051	0.009
10	29.856	34.346	21.287	0.060	0.007
20	29.773	34.343	21.313	0.060	0.005
30	29.760	34.344	21.318	0.063	0.010
50	29.145	34.348	21.529	0.081	0.015
75	28.356	34.448	21.865	0.126	0.041
100	27.342	34.738	22.413	0.252	0.094
125	26.432	34.841	22.780	0.300	0.222
150	24.756	35.006	23.422	0.150	0.248
175	23.419	35.065	23.863	0.084	0.153
200	21.488	35.056	24.404	0.032	0.098
300	13.416	34.491	25.915	0.001	0.011
400	10.233	34.379	26.427		
500	8.041	34.361	26.766		
600	6.666	34.410	27.000		
700	5.970	34.456	27.127		
800	5.432	34.479	27.212		
900	4.892	34.509	27.298		
1000	4.431	34.530	27.367		

Station	4		DEPTH	5208 m	
Date	940621		Lat.	14-00.00N	
Time	6:57		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.673	34.174	21.220	0.053	0.012
10	29.672	34.174	21.221	0.058	0.011
20	29.642	34.209	21.257	0.068	0.011
30	29.617	34.220	21.274	0.071	0.014
50	29.047	34.259	21.495	0.076	0.018
75	28.210	34.387	21.867	0.117	0.053
100	27.111	34.751	22.497	0.189	0.093
125	26.059	34.980	23.002	0.276	0.386
150	24.719	35.054	23.469	0.051	0.222
175	22.646	35.091	24.106	0.045	0.115
200	19.733	34.854	24.722	0.025	0.055
300	11.973	34.403	26.131	0.001	0.007
400	8.905	34.415	26.675		
500	7.732	34.439	26.873		
600	6.538	34.413	27.019		
700	6.029	34.475	27.134		
800	5.411	34.479	27.214		
900	4.884	34.503	27.295		
1000	4.506	34.527	27.356		

Station	L1		DEPTH	4943 m	
Date	940621		Lat.	14-00.00N	
Time	13:58		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.752	31.449	19.152		
10	29.669	34.404	21.395		
20	29.662	34.197	21.241		
30	29.646	34.220	21.264		
50	28.863	34.279	21.571		
75	27.783	34.511	22.099		
100	26.986	34.851	22.612		
125	25.924	34.996	23.056		
150	24.809	35.036	23.428		
175	22.334	35.071	24.179		
200	18.632	34.810	24.970		
300	12.673	34.445	26.028		
400	9.494	34.381	26.553		
500	7.649	34.384	26.842		

Station	L2		DEPTH	4785 m	
Date	940621		Lat.	14-00.00N	
Time	21:16		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.678	34.194	21.234		
10	29.680	34.194	21.233		
20	29.685	34.198	21.234		
30	29.647	34.215	21.260		
50	28.976	34.264	21.522		
75	28.127	34.413	21.914		
100	27.297	34.738	22.428		
125	26.366	34.938	22.874		
150	25.380	35.036	23.254		
175	23.708	35.067	23.780		
200	22.487	35.071	24.136		
300	13.211	34.486	25.953		
400	9.451	34.377	26.558		
500	7.978	34.443	26.840		

CTDO data of KH94-2 Leg.3

Station	L3		DEPTH	5224 m	
Date	940621		Lat.	14-00.00N	
Time	21:16		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.601	33.114	20.450		
10	29.519	28.904	17.326		
20	29.630	34.207	21.260		
30	29.534	34.216	21.299		
50	28.692	34.280	21.628		
75	27.944	34.441	21.995		
100	27.349	34.742	22.414		
125	26.332	34.944	22.889		
150	24.837	35.037	23.420		
175	22.917	35.085	24.023		
200	19.224	34.826	24.832		
300	12.125	34.423	26.117		
400	9.237	34.403	26.613		
500	7.868	34.443	26.856		

Station	L4		DEPTH	5222 m	
Date	940622		Lat.	14-00.00N	
Time	0:39		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.557	34.194	21.274		
10	29.564	34.194	21.272		
20	29.569	34.193	21.270		
30	29.566	34.195	21.272		
50	28.667	34.285	21.640		
75	28.088	34.408	21.923		
100	27.131	34.825	22.546		
125	25.916	34.990	23.054		
150	23.999	35.046	23.678		
175	21.870	35.031	24.279		
200	18.000	34.777	25.102		
300	12.136	34.426	26.118		
400	8.985	34.346	26.608		
500	7.984	34.450	26.845		

Station	L5		DEPTH	5140 m	
Date	940622		Lat.	14-00.00N	
Time	4:35		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.525	34.159	21.259		
10	29.535	34.159	21.256		
20	29.542	34.158	21.253		
30	29.544	34.159	21.253		
50	28.977	34.253	21.514		
75	28.322	34.341	21.796		
100	27.593	34.525	22.172		
125	27.006	34.848	22.603		
150	25.141	35.042	23.332		
175	23.338	35.083	23.900		
200	20.676	34.906	24.511		
300	12.058	34.430	26.136		
400	8.653	34.322	26.642		
500	7.463	34.423	26.900		

Station	L6		DEPTH	5131 m	
Date	940622		Lat.	14-00.00N	
Time	7:43		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.53	34.146	21.248		
10	29.54	34.146	21.244		
20	29.542	34.145	21.243		
30	29.533	34.148	21.248		
50	28.901	34.229	21.521		
75	28.241	34.378	21.85		
100	27.385	34.725	22.39		
125	26.244	34.956	22.926		
150	24.346	35.053	23.581		
175	22.713	35.089	24.085		
200	19.612	34.796	24.709		
300	11.992	34.429	26.148		
400	8.72	34.33	26.638		
500	7.445	34.422	26.901		

Station	5		DEPTH	5135 m	
Date	940622		Lat.	13-00.00N	
Time	17:36		Long.	134-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.792	34.03	21.072	0.063	0.016
10	29.719	34.047	21.109	0.045	0.015
20	29.564	34.108	21.207	0.056	0.014
30	29.532	34.122	21.229	0.059	0.015
50	29.435	34.222	21.337	0.093	0.032
75	28.194	34.444	21.916	0.114	0.059
100	26.983	34.668	22.475	0.195	0.115
125	24.802	34.806	23.256	0.162	0.303
150	21.92	34.937	24.194	0.051	0.164
175	19.217	34.775	24.795	0.019	0.070
200	17.581	34.803	25.224	0.009	0.018
300	11.07	34.46	26.342	0.001	0.012
400	8.505	34.407	26.732		
500	6.925	34.41	26.965		
600	6.061	34.439	27.102		
700	5.436	34.476	27.209		
800	5.048	34.513	27.284		
900	4.683	34.531	27.34		
1000	4.292	34.546	27.394		

Station	E1		DEPTH	5139 m	
Date	940623		Lat.	13-00.00N	
Time	3:14		Long.	135-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.508	34.057	21.189		
10	29.525	34.062	21.186		
20	29.507	34.057	21.189		
30	29.503	34.065	21.196		
50	29.131	34.083	21.334		
75	28.508	34.225	21.648		
100	26.694	34.445	22.399		
125	24.700	34.719	23.221		
150	22.163	34.826	24.042		
175	18.037	34.767	25.085		
200	15.542	34.633	25.570		
300	10.574	34.332	26.332		
400	9.289	34.459	26.648		
500	7.552	34.428	26.890		

CTDO data of KH94-2 Leg.3

Station	6		DEPTH	4956	m
Date	940623		Lat.	13-00.00N	
Time	14:15		Long.	137-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.422	34.013	21.184	0.105	0.026
10	29.429	34.013	21.182	0.108	0.027
20	29.452	34.023	21.182	0.105	0.038
30	29.457	34.037	21.190	0.108	0.038
50	29.386	34.057	21.229	0.129	0.053
75	28.731	34.107	21.485	0.189	0.075
100	27.795	34.286	21.926	0.222	0.109
125	26.195	34.472	22.576	0.186	0.267
150	23.476	34.695	23.566	0.105	0.235
175	20.908	34.801	24.369	0.057	0.116
200	17.847	34.737	25.109	0.022	0.058
300	11.401	34.448	26.273	0.002	0.011
400	8.374	34.363	26.718		
500	7.129	34.429	26.951		
600	6.307	34.463	27.089		
700	5.767	34.482	27.173		
800	5.284	34.512	27.255		
900	4.820	34.525	27.320		
1000	4.319	34.536	27.384		

Station	7		DEPTH	6124	m
Date	940624		Lat.	14-00.00N	
Time	5:55		Long.	137-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.318	34.115	21.296	0.078	0.018
10	29.324	34.114	21.293	0.045	0.050
20	29.328	34.114	21.292	0.084	0.015
30	29.332	34.117	21.293	0.062	0.037
50	28.833	34.175	21.503	0.096	0.032
75	28.270	34.333	21.807	0.117	0.047
100	27.716	34.499	22.113	0.156	0.069
125	26.728	34.753	22.620	0.219	0.127
150	24.561	35.007	23.481	0.129	0.229
175	21.584	35.056	24.378	0.051	0.156
200	19.450	34.816	24.766	0.034	0.106
300	12.826	34.460	26.010	0.003	0.016
400	9.129	34.364	26.599		
500	7.749	34.419	26.855		
600	6.763	34.443	27.012		
700	6.022	34.470	27.132		
800	5.478	34.487	27.212		
900	4.940	34.512	27.295		
1000	4.512	34.529	27.357		

Station	8		DEPTH	5402	m
Date	940624		Lat.	15-00.00N	
Time	15:46		Long.	137-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.601	34.138	21.218	0.048	0.005
10	29.536	34.139	21.240	0.072	0.000
20	29.474	34.141	21.263	0.057	0.003
30	29.466	34.141	21.266	0.055	0.012
50	29.443	34.141	21.273	0.064	0.008
75	28.296	34.352	21.813	0.086	0.015
100	27.708	34.597	22.189	0.156	0.072
125	26.572	34.805	22.709	0.240	0.191
150	25.378	34.930	23.175	0.129	0.403
175	23.449	35.067	23.856	0.060	0.162
200	20.747	35.047	24.600	0.017	0.033
300	13.201	34.467	25.940	0.001	0.013
400	9.602	34.338	26.502		
500	7.674	34.389	26.842		
600	6.668	34.437	27.020		
700	5.870	34.467	27.148		
800	5.361	34.487	27.226		
900	4.891	34.511	27.300		
1000	4.492	34.530	27.360		

Station	9		DEPTH	5288	m
Date	940625		Lat.	16-00.00N	
Time	6:00		Long.	137-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.780	34.240	21.234	0.055	0.010
10	29.779	34.263	21.252		
20	29.777	34.263	21.252	0.071	0.009
30	29.766	34.263	21.256	0.066	0.009
50	29.118	34.329	21.523	0.096	0.032
75	28.389	34.401	21.819	0.105	0.056
100	27.412	34.638	22.315	0.162	0.087
125	26.486	34.861	22.778	0.239	0.209
150	24.941	35.036	23.388	0.093	0.278
175	23.333	35.079	23.898	0.020	0.073
200	21.615	35.080	24.387	0.014	0.043
300	14.206	34.532	25.782	0.004	0.017
400	10.263	34.292	26.354		
500	8.008	34.348	26.760		
600	6.733	34.396	26.980		
700	6.068	34.453	27.112		
800	5.499	34.477	27.202		
900	4.955	34.498	27.282		
1000	4.478	34.508	27.344		

Station	10		DEPTH	5025	m
Date	940625		Lat.	17-00.00N	
Time	15:20		Long.	137-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	30.179	34.303	21.145	0.051	0.009
10	29.924	34.304	21.233	0.060	0.010
20	29.889	34.303	21.244	0.067	0.011
30	29.876	34.303	21.248	0.087	0.013
50	28.839	34.339	21.624	0.102	0.023
75	28.244	34.449	21.903	0.117	0.047
100	27.518	34.612	22.262	0.198	0.063
125	26.242	34.921	22.900	0.369	0.190
150	25.268	35.035	23.288	0.198	0.173
175	23.938	35.067	23.712	0.042	0.143
200	22.040	35.093	24.279	0.025	0.056
300	16.320	34.696	25.441	0.006	0.020
400	12.182	34.402	26.090		
500	8.440	34.207	26.585		
600	6.614	34.242	26.874		
700	5.837	34.354	27.063		
800	5.071	34.411	27.200		
900	4.513	34.468	27.308		
1000	4.054	34.500	27.383		

Station	E2		DEPTH	4648	m
Date	940626		Lat.	17-00.00N	
Time	3:11		Long.	138-20.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.958	34.328	21.239		
10	29.963	34.329	21.238		
20	29.937	34.340	21.255		
30	29.916	34.346	21.267		
50	29.196	34.386	21.540		
75	27.805	34.598	22.158		
100	27.021	34.783	22.550		
125	26.304	34.919	22.880		
150	25.133	35.024	23.321		
175	24.039	35.051	23.670		
200	22.722	35.065	24.064		
300	15.599	34.657	25.575		
400	11.097	34.350	26.252		
500	8.334	34.267	26.648		

CTDO data of KH94-2 Leg.3

Station	11		DEPTH	4613	m
Date	940626		Lat.	17-00.00N	
Time	14:05		Long.	140-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	30.006	34.234	21.152	0.038	0.007
10	29.842	34.235	21.209	0.038	0.009
20	29.763	34.235	21.236	0.042	0.008
30	29.734	34.236	21.246	0.045	0.019
50	29.642	34.234	21.276	0.063	0.010
75	28.413	34.296	21.732	0.056	0.031
100	27.541	34.585	22.234	0.123	0.471
125	26.991	34.797	22.569	0.207	0.109
150	25.856	34.953	23.045	0.246	0.307
175	24.960	34.995	23.351	0.132	0.196
200	23.046	35.062	23.969	0.069	0.125
300	16.444	34.743	25.448	0.008	0.008
400	12.232	34.406	26.084		
500	9.044	34.270	26.540		
600	6.652	34.226	26.856		
700	5.811	34.344	27.058		
800	5.224	34.450	27.213		
900	4.779	34.485	27.292		
1000	4.354	34.513	27.362		

Station	12		DEPTH	5119	m
Date	940627		Lat.	16-00.00N	
Time	6:00		Long.	137-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.752	34.303	21.290	0.069	0.005
10	29.788	34.302	21.278	0.070	0.004
20	29.753	34.302	21.289	0.071	0.007
30	29.757	34.303	21.288	0.078	0.004
50	29.513	34.382	21.430	0.088	0.011
75	28.196	34.495	21.953	0.092	0.015
100	27.289	34.759	22.446	0.183	0.063
125	26.226	34.941	22.920	0.315	0.144
150	25.031	35.041	23.365	0.084	0.183
175	23.029	35.104	24.006	0.041	0.095
200	21.455	35.076	24.428	0.020	0.056
300	16.111	34.715	25.504		
400	11.382	34.379	26.223		
500	8.360	34.326	26.690		
600	7.300	34.374	26.884		
700	6.356	34.430	27.056		
800	5.721	34.471	27.170		
900	5.071	34.488	27.261		
1000	4.576	34.515	27.339		

Station	13		DEPTH	4953	m
Date	940627		Lat.	15-00.00N	
Time	16:13		Long.	140-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	30.059	34.413	21.269	0.066	0.006
10	29.985	34.412	21.293	0.064	0.008
20	29.793	34.409	21.356	0.073	0.007
30	29.760	34.409	21.367	0.079	0.004
50	28.952	34.384	21.620	0.093	0.014
75	27.362	34.755	22.419	0.135	0.038
100	26.561	34.884	22.772	0.219	0.085
125	25.930	34.980	23.042	0.276	0.240
150	25.070	35.036	23.349	0.066	0.180
175	23.291	35.098	23.925		
200	21.509	35.074	24.412	0.039	0.086
300	15.520	34.663	25.597	0.001	0.007
400	9.625	34.264	26.440		
500	8.243	34.366	26.740		
600	6.857	34.416	26.979		
700	6.149	34.462	27.109		
800	5.556	34.480	27.197		
900	5.069	34.498	27.269		
1000	4.653	34.523	27.336		

CTDO data of KH94-2 Leg.3

Station	14		DEPTH	5030	m
Date	940628		Lat.	14-00.00N	
Time	5:59		Long.	140-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.502	34.107	21.228	0.057	0.012
10	29.506	34.102	21.223	0.057	0.012
20	29.504	34.124	21.240	0.051	0.012
30	29.458	34.142	21.269	0.060	0.010
50	28.783	34.185	21.527	0.061	0.014
75	27.682	34.604	22.202	0.102	0.032
100	27.098	34.777	22.520	0.177	0.069
125	25.943	34.953	23.018	0.177	0.324
150	24.209	35.036	23.609	0.090	0.177
175	22.449	35.072	24.148	0.031	0.080
200	21.357	35.062	24.445	0.019	0.059
300	13.643	34.504	25.879	0.000	0.006
400	9.653	34.327	26.485		
500	7.332	34.360	26.868		
600	6.380	34.409	27.037		
700	5.910	34.482	27.155		
800	5.321	34.504	27.244		
900	4.888	34.518	27.306		
1000	4.541	34.528	27.353		

Station	15		DEPTH	4789	m
Date	940628		Lat.	13-00.00N	
Time	13:58		Long.	140-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.418	34.288	21.392	0.086	0.012
10	29.418	34.286	21.391	0.085	0.012
20	29.425	34.286	21.388	0.086	0.011
30	29.422	34.285	21.389	0.085	0.012
50	29.387	34.283	21.399	0.111	0.038
75	28.403	34.561	21.934	0.180	0.057
100	27.016	34.808	22.570	0.252	0.128
125	25.757	34.948	23.072	0.315	0.165
150	24.037	35.073	23.687	0.120	0.199
175	21.883	35.080	24.313	0.051	0.116
200	19.194	34.950	24.935	0.025	0.061
300	11.692	34.393	26.176	0.001	0.010
400	8.316	34.397	26.753		
500	7.087	34.450	26.974		
600	6.179	34.471	27.112		
700	5.551	34.499	27.213		
800	5.191	34.511	27.265		
900	4.818	34.530	27.323		
1000	4.431	34.538	27.373		

Station	S1		DEPTH	4851	m
Date	940629		Lat.	14-00.00N	
Time	8:32		Long.	141-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
2	29.424	34.036	21.201		
10	29.413	34.036	21.204		
20	29.398	34.035	21.209		
30	29.395	34.035	21.210		
50	29.373	34.039	21.220		
75	28.694	34.173	21.547		
100	27.692	34.503	22.123		
125	26.432	34.850	22.787		
150	24.761	35.013	23.425		
175	22.791	35.087	24.062		
200	21.127	35.043	24.493		
300	13.720	34.504	25.863		
400	9.010	34.308	26.575		
500	7.606	34.391	26.853		
600	6.802	34.446	27.010		
700	5.986	34.482	27.145		
800	5.526	34.495	27.212		
900	4.932	34.514	27.298		
1000	4.451	34.536	27.369		
1750	2.448	34.612	27.624		
2000	2.134	34.632	27.666		
2250	1.916	34.645	27.694		
2500	1.758	34.657	27.715		
2750	1.692	34.664	27.726		
3000	1.619	34.672	27.738		
3250	1.571	34.677	27.746		
3500	1.547	34.681	27.751		
3750	1.516	34.685	27.756		
4000	1.498	34.688	27.760		
4250	1.490	34.691	27.763		
4500	1.499	34.692	27.763		
4750	1.518	34.693	27.762		

CTDO data of KH94-2 Leg.3

Station	S2		DEPTH	4786	m
Date	940630		Lat.	14-30.00N	
Time	17:45		Long.	141-15.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.594	34.107	21.197	0.046	0.013
10	29.535	34.123	21.229	0.045	0.010
20	29.534	34.129	21.234	0.050	0.010
30	29.534	34.139	21.241	0.065	0.013
50	29.528	34.241	21.320	0.093	0.035
75	28.281	34.432	21.878	0.111	0.041
100	27.461	34.676	22.328	0.165	0.057
125	26.854	34.877	22.674	0.234	0.115
150	25.132	34.986	23.293	0.153	0.218
175	23.567	35.068	23.822	0.105	0.144
200	21.555	35.064	24.392	0.031	0.061
300	13.050	34.457	25.963	0.002	0.012
400	9.722	34.321	26.469		
500	7.603	34.415	26.873		
600	6.685	34.457	27.034		
700	5.994	34.477	27.141		
800	5.386	34.497	27.231		
900	4.870	34.513	27.304		
1000	4.399	34.532	27.372		

Station	S3		DEPTH	4779	m
Date	940701		Lat.	15-00.00N	
Time	14:23		Long.	141-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.774	34.290	21.273	0.051	0.006
10	29.754	34.290	21.280	0.053	0.006
20	29.635	34.297	21.325	0.069	0.005
30	29.624	34.338	21.360	0.094	0.010
50	28.860	34.442	21.694	0.111	0.029
75	28.114	34.552	22.023	0.135	0.041
100	27.433	34.742	22.386	0.198	0.109
125	26.272	34.914	22.885	0.207	0.270
150	24.539	35.058	23.526	0.081	0.201
175	23.196	35.088	23.945	0.026	0.056
200	21.744	35.088	24.358	0.013	0.036
300	13.979	34.526	25.825	0.001	0.007
400	9.551	34.301	26.481		
500	7.605	34.313	26.792		
600	6.369	34.381	27.016		
700	5.778	34.443	27.141		
800	5.189	34.475	27.237		
900	4.748	34.499	27.307		
1000	4.349	34.520	27.368		

Station	S4		DEPTH	4723	m
Date	940702		Lat.	16-00.00N	
Time	14:30		Long.	141-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
2	29.721	34.284	21.287	0.100	0.029
10	29.723	34.284	21.286	0.102	0.026
20	29.721	34.286	21.288	0.100	0.029
30	29.713	34.299	21.300	0.117	0.032
50	28.897	34.420	21.665	0.147	0.044
75	27.435	34.741	22.385	0.291	0.092
100	26.527	34.909	22.801	0.267	0.167
125	25.711	35.003	23.127	0.132	0.208
150	24.413	35.055	23.561	0.054	0.134
175	23.382	35.090	23.893	0.027	0.074
200	21.473	35.081	24.428	0.014	0.035
300	15.093	34.614	25.655	0.000	0.008
400	11.099	34.321	26.229		
500	8.347	34.239	26.625		
600	6.629	34.301	26.919		
700	5.665	34.406	27.125		
800	5.139	34.459	27.230		
900	4.699	34.494	27.309		
1000	4.276	34.515	27.371		

Station	S5		DEPTH	4708	m
Date	940703		Lat.	17-00.00N	
Time	16:50		Long.	141-00.00E	
D	T	S	Sigma t	Chl.a	Pheo.
m	°C				
0	29.642	34.265	21.299		
10	29.647	34.265	21.298		
20	29.647	34.269	21.301		
30	29.639	34.277	21.309		
50	29.612	34.277	21.319		
75	28.105	34.470	21.964		
100	27.115	34.755	22.499		
125	26.181	34.925	22.922		
150	24.755	35.023	23.435		
175	23.122	35.075	23.957		
200	21.702	35.071	24.356		
300	16.114	34.720	25.507		
400	11.714	34.384	26.165		
500	8.618	34.238	26.582		

Ⅸ. Station and working log of KH-94-2, Leg 3

St.	Time	Lat.	Long.	Depth	Coment
	----- 19 JUNE94 (GMT) -----GMT+9h=JST-----				
1D	04:55	17°00.150N	134°00.300E	5500m	NORPAC NET START
1D	05:22	17°00.730N	134°00.620E	5495m	CHANGED PROPULSION TO ELECTRIC MOTO
1D	05:57	17°01.120N	134°00.640E	5486m	NORPAC NET FINISH
1D	06:23	17°01.320N	134°01.230E	5483m	IKPT NET START
1D	06:43	17°01.180N	134°02.040E	5479m	ORI SIDE NET START
1D	06:47	17°01.130N	134°02.320E	5479m	IKPT NET DEEPEST (1088M)
1D	07:03	17°01.080N	134°02.910E	5488m	ORI SIDE NET FINISH
1D	07:22	17°00.950N	134°03.690E	5478m	IKPT NET FINISH
1D	07:28	17°00.930N	134°03.880E	5478m	IKPT NET START
1D	07:33	17°00.910N	134°04.130E	5475m	IKPT NET DEEPEST
1D	08:01	17°00.860N	134°05.380E	5454m	IKPT NET FINISH
1D	08:12	17°00.910N	134°05.700E	5454m	ORI NET START
1D	08:19	17°00.830N	134°06.020E	5455m	ORI NET DEEPEST
1D	08:25	17°00.850N	134°06.230E	5458m	ORI NET FINISH
1D	08:30	17°00.940N	134°06.400E	5454m	ORI NET START (2)
1D	08:37	17°01.040N	134°06.790E	5454m	ORI NET DEEPEST (2)
1D	08:49	17°01.160N	134°07.150E	5453m	ORI NET FINISH (2)
1D	09:17	17°01.820N	134°07.330E	5458m	CTD-RMS START
1D	09:39	17°02.230N	134°07.540E	5446m	SUNSET & PUT ON REGULATION LIGHTS
1D	09:46	17°02.310N	134°07.610E	5432m	CTD-RMS DEEPEST
1D	10:38	17°02.940N	134°08.240E	5408m	CTD-RMS FINISH
1N	10:44	17°03.030N	134°08.480E	5398m	ORI NET START (300M)
1N	10:53	17°03.060N	134°09.010E	5408m	ORI NET DEEPEST (300M)
1N	11:00	17°03.130N	134°09.360E	5437m	ORI NET FINISH (300M)
1N	11:06	17°03.180N	134°09.660E	5414m	IKPT NET START
1N	11:14	17°03.250N	134°10.120E	5397m	ORI SIDE NET START
1N	11:31	17°03.460N	134°11.140E	5391m	IKPT NET DEEPEST
1N	11:34	17°03.510N	134°11.320E	5399m	ORI SIDE NET FINISH
1N	12:16	17°04.490N	134°13.600E	5428m	IKPT NET FINISH
1N	12:24	17°04.640N	134°13.950E	5422m	IKPT NET START (400M)
1N	12:35	17°04.951N	134°14.645E	5403m	IKPT NET DEEPEST
1N	13:12	17°06.020N	134°16.800E	5373m	IKPT NET FINISH (400M)
1N	13:24	17°06.290N	134°17.050E	5354m	NORPAC NET START (1)
1N	13:37	17°06.500N	134°17.230E	5365m	NORPAC NET FINISH
1N	13:40	17°06.510N	134°17.300E	5369m	NORPAC NET START (2)
1N	13:50	17°06.640N	134°17.450E	5396m	NORPAC NET FINISH
2N	18:44	16°00.290N	134°00.070E	5190m	IKPT NET START
2N	18:54	16°00.780N	134°00.090E	5185m	ORI SIDE NET START
2N	19:09	16°01.540N	134°00.120E	5257m	IKPT NET DEEPEST (W.O.1001M)
2N	19:14	16°01.790N	134°00.190E	5312m	ORI SIDE NET FINISH
2N	19:48	16°03.500N	134°00.290E	5996m	IKPT NET FINISH
2N	19:57	16°03.510N	134°00.280E	6239m	IKPT NET START
2N	20:09	16°03.270N	134°00.420E	6452m	IKPT NET DEEPEST (W.O.228M)
2N	20:36	16°02.600N	134°00.470E	6798m	SUNRISE & PUT OFF REGULAION LIGHTS
2N	20:40	16°02.530N	134°00.540E	6615m	IKPT NET FINISH
2N	20:44	16°02.370N	134°00.500E	6250m	ORI NET START (300M)

* IKPT: An IKMT (Isaacs-Kidd Mid Water Trawl) for zooplankton sampling, with 0.5 mm or 1.0 mm mesh aperture.

2N	20:58	16°02.040N	134°00.540E	5347m	ORI NET FINISH (300M)
2N	21:09	16°02.060N	134°00.600E	5350m	CTD-RMS START
2N	21:35	16°02.310N	134°00.610E	5361m	CTD-RMS DEEPEST
2N	22:16	16°02.280N	134°00.640E	5362m	CTD-RMS FINISH
2N	22:23	16°02.250N	134°00.640E	5362m	NORPAC NET START
2N	22:33	16°02.160N	134°00.690E	5359m	NORPAC NET FINISH
2N	22:36	16°02.130N	134°00.730E	5358m	NORPAC NET START (2)
2N	22:49	16°01.980N	134°00.740E	5358m	NORPAC NET FINISH (2)
2N	22:51	16°01.950N	134°00.760E	5353m	NORPAC NET START (3)
2N	23:03	16°01.790N	134°00.780E	5346m	NORPAC NET FINISH (3)
2D	23:21	16°02.070N	134°00.630E	5355m	IKPT NET START
2D	23:43	16°02.940N	134°00.300E	5272m	IKPT NET DEEPEST
----- 20 JUNE94 (GMT) -----					
2D	00:18	16°03.360N	134°00.060E	5340m	IKPT NET FINISH
2D	00:28	16°03.670N	133°59.790E	5460m	ORI NET START
2D	00:33	16°03.860N	133°59.660E	5475m	ORI NET DEEPEST
2D	00:39	16°04.010N	133°59.490E	5520m	ORI NET FINISH
3D	04:58	15°00.160N	134°00.040E	6131m	CHANGED PROPULSION TO ELECTRIC MOTO
3D	05:04	15°00.260N	133°59.970E	6175m	NORPAC NET START
3D	05:20	15°00.570N	133°59.770E	6287m	NORPAC NET START (2)
3D	05:30	15°00.780N	133°59.670E	6143m	NORPAC NET FINISH (2)
3D	05:33	15°00.820N	133°59.650E	6124m	NORPAC NET START (3)
3D	05:47	15°01.100N	133°59.470E	6161m	NORPAC NET FINISH (3)
3D	05:54	15°01.230N	133°59.500E	6361m	IKPT NET START
3D	06:13	15°01.400N	134°00.130E	6098m	IKMT NET DEEPEST (1200M)
3D	06:43	15°02.370N	134°00.700E	6119m	IKPT NET FINISH
3D	06:48	15°02.430N	134°00.650E	5856m	ORI NET START
3D	06:55	15°02.320N	134°00.870E	4753m	ORI NET DEEPEST (300M)
3D	07:01	15°02.280N	134°01.040E	4753m	ORI NET FINISH
3D	07:29	15°00.010N	134°00.100E	4785m	CTD-RMS START
3D	07:56	15°00.150N	134°00.120E	4784m	CTD-RMS DEEPEST
3D	08:33	15°00.280N	134°00.230E	4784m	CTD-RMS FINISH
3N	10:04	14°59.630N	133°59.670E	4780m	ORI NET START (300M)
3N	10:13	14°59.530N	134°00.000E	4783m	ORI NET DEEPEST (300M)
3N	10:19	14°59.530N	134°00.190E	4791m	ORI NET FINISH (300M)
3N	10:24	14°59.420N	134°00.290E	4849m	IKPT NET START
3N	10:32	14°59.340N	134°00.550E	4783m	ORI SIDE NET START
3N	10:52	14°59.230N	134°01.200E	4676m	ORI SIDE NET FINISH
3N	10:52	14°59.230N	134°01.210E	4675m	IKPT NET DEEPEST (W.O.900M)
3N	11:23	14°58.920N	134°02.170E	4626m	IKPT NET FINISH
3N	11:32	14°58.750N	134°02.200E	4659m	IKPT NET START (2)
3N	11:51	14°58.640N	134°02.890E	4697m	IKPT NET DEEPEST
3N	12:21	14°58.290N	134°03.770E	4389m	IKPT NET FINISH
3N	12:36	14°58.390N	134°03.580E	4386m	NORPAC NET START
3N	12:49	14°58.430N	134°03.440E	4394m	NORPAC NET FINISH
3N	12:52	14°58.450N	134°03.390E	4398m	NORPAC NET START (2)
3N	13:04	14°58.510N	134°03.220E	4427m	NORPAC NET FINISH (2)

4N	17:00	13°59.930N	133°59.890E	4980m	CHANGED PROPULSION TO ELECTRIC MOTO
4N	17:06	13°59.950N	133°59.890E	4980m	IKPT NET START
4N	17:12	14°00.080N	133°59.990E	4990m	ORI SIDE NET START
4N	17:25	14°00.340N	134°00.220E	4995m	IKPT NET DEEPEST (767M)
4N	17:32	14°00.510N	134°00.300E	5012m	ORI SIDE NET FINISH
4N	17:52	14°00.970N	134°00.540E	4998m	IKPT NET FINISH
4N	18:03	14°01.220N	134°00.700E	4997m	IKPT NET START
4N	18:14	14°01.480N	134°00.820E	5019m	IKPT NET DEEPEST (HOR 400M)
4N	18:44	14°02.230N	134°01.130E	5017m	IKPT NET FINISH
4N	18:50	14°02.170N	134°01.050E	5003m	ORI NET START
4N	18:59	14°01.880N	134°00.700E	5016m	ORI NET DEEPEST
4N	19:05	14°01.740N	134°00.420E	5019m	ORI NET FINISH
4N	19:13	14°01.530N	134°00.120E	4989m	IKPT NET START
4N	20:12	14°00.140N	133°57.670E	5006m	IKPT NET FINISH
4N	20:20	14°00.050N	133°57.270E	5154m	IKPT NET START
4N	20:37	13°59.930N	133°56.410E	5247m	SUNRISE & PUT OFF REGULAION LIGHTS
4N	21:46	13°59.310N	133°52.850E	5216m	IKPT NET FINISH
4D	22:01	13°59.270N	133°52.410E	5210m	CTD-RMS START
4D	22:28	13°59.030N	133°51.860E	5209m	CTD-RMS DEEPEST
4D	23:09	13°58.890N	133°51.500E	5231m	CTD-RMS FINISH
	----- 21 JUNE94 (GMT) -----				
L	01:28	14°00.080N	133°59.780E	4975m	SED TRAP START TO LAUNCH (L)
L	01:44	14°00.180N	133°59.790E	4977m	SED TRAP FINISH TO LAUNCH (L)
L	02:07	14°00.140N	133°59.320E	4962m	PHOTON METER START
L	02:38	14°00.230N	133°58.580E	4997m	PHOTON METER FINISH
L	03:03	14°00.170N	133°58.410E	5019m	MTD START (L1)
L	03:47	14°00.080N	133°58.290E	5023m	MTD START TO TOWING
L	04:17	13°59.820N	133°58.770E	4954m	MTD MESS CAST
L	04:47	13°59.680N	133°58.800E	4951m	MTD FINISH (L1)
L	04:54	13°59.650N	133°58.760E	4939m	CTD START (L1)
L	05:16	13°59.710N	133°58.510E	4899m	CTD DEEPEST
L	05:34	13°59.800N	133°58.290E	4911m	CTD FINISH (L1)
L	05:41	13°59.930N	133°58.120E	4932m	NORPAC NET START (1)
L	05:56	14°00.040N	133°57.630E	5026m	NORPAC NET FINISH (1)
L	05:58	14°00.010N	133°57.550E	5033m	NORPAC NET START (2)
L	06:12	13°59.910N	133°57.130E	5148m	NORPAC NET START (3)
L	06:23	13°59.880N	133°56.750E	5231m	NORPAC NET FINISH (3)
L	06:37	13°59.730N	133°56.380E	5224m	MTD START (L2)
L	07:18	13°59.410N	133°56.450E	5202m	MTD START TO TOWING (L2)
L	07:49	13°59.080N	133°56.830E	5167m	MTD MESS CAST (L2)
L	08:21	13°58.820N	133°56.690E	5169m	MTD FINISH (L2)
L	08:31	13°58.820N	133°56.550E	5162m	CTD START (L2)
L	08:48	13°58.920N	133°56.220E	5163m	CTD DEEPEST (L2)
L	09:00	13°58.930N	133°56.010E	5156m	CTD FINISH (L2)
L	09:07	13°58.980N	133°55.910E	5163m	VAN DORN SAMPLING START
L	09:43	13°59.260N	133°55.140E	5267m	SUNSET & PUT ON REGULATION LIGHTS
L	09:47	13°59.270N	133°55.070E	5267m	VAN DORN SAMPLING FINISH

L	10:11	13°59.490N	133°54.720E	5228m	MTD START (L3)
L	10:53	13°59.420N	133°54.370E	5227m	MTD START TO TOWING (L3)
L	11:23	13°58.970N	133°54.660E	5224m	MTD MESS CAST (L3)
L	12:05	13°59.040N	133°54.660E	5223m	MTD FINISH (L3)
L	12:13	13°59.110N	133°54.600E	5223m	CTD START (L3)
L	12:48	13°59.410N	133°54.050E	5218m	CTD FINISH (L3)
L	12:55	13°59.480N	133°54.100E	5222m	IKPT NET START
L	13:08	13°59.530N	133°54.300E	5226m	IKPT NET DEEPEST
L	13:17	13°59.740N	133°54.370E	5233m	IKPT NET FINISH
L	13:24	13°59.900N	133°54.330E	5232m	IKPT NET START (2)
L	13:36	13°59.730N	133°54.400E	5231m	IKPT NET DEEPEST (2)
L	13:45	13°59.640N	133°54.440E	5231m	IKPT NET FINISH (2)
L	13:51	13°59.620N	133°54.390E	5231m	MTD START (L4)
L	14:25	13°59.390N	133°54.290E	5227m	MTD START TO TOWING
L	14:56	13°59.140N	133°54.680E	5224m	MTD MESS CAST (L4)
L	15:31	13°58.950N	133°54.720E	5223m	MTD FINISH (L4)
L	15:44	13°58.900N	133°54.670E	5221m	CTD START (L4)
L	15:53	13°58.940N	133°54.570E	5242m	NORPAC NET START (1)
L	16:03	13°58.990N	133°54.520E	5320m	CTD DEEPEST
L	16:08	13°59.040N	133°54.510E	5220m	NORPAC NET FINISH (1)
L	16:18	13°59.110N	133°54.430E	5219m	CTD FINISH
L	16:26	13°59.130N	133°54.490E	5224m	IKPT NET START (L1)
L	16:39	13°59.050N	133°54.710E	5223m	IKPT NET DEEPEST
L	16:56	13°58.950N	133°55.010E	5246m	IKPT NET FINISH (L1)
L	17:07	13°58.970N	133°55.080E	5157m	IKPT NET START (L1-2)
L	17:20	13°58.940N	133°55.360E	5158m	IKPT NET DEEPEST
L	17:36	13°58.860N	133°55.630E	5156m	IKPT NET FINISH (L1-2)
L	17:42	13°58.870N	133°55.700E	5155m	MTD START (L-5)
L	18:27	13°58.220N	133°55.230E	5125m	MTD START TO TOWING
L	18:58	13°57.380N	133°55.120E	5139m	MTD MESS CAST (L5)
L	19:27	13°56.970N	133°54.800E	5166m	MTD FINISH (L5)
L	19:35	13°56.910N	133°54.760E	5139m	CTD START (L5)
L	19:47	13°56.900N	133°54.590E	5133m	CTD DEEPEST (L5)
L	20:01	13°56.920N	133°54.460E	5127m	CTD FINISH (L5)
L	20:08	13°56.830N	133°54.470E	5127m	IKPT NET START (L2)
L	20:37	13°56.350N	133°54.700E	5131m	SUNRISE & PUT OFF REGULAION LIGHTS
L	20:41	13°56.240N	133°54.740E	5130m	IKPT NET DEEPEST (L2)
L	21:02	13°55.840N	133°54.900E	5130m	IKPT NET FINISH (L2)
L	21:08	13°55.790N	133°54.870E	5104m	MTD START (L6)
L	21:43	13°55.530N	133°54.800E	5094m	MTD START TO TOWING (L6)
L	22:13	13°55.050N	133°55.020E	5090m	MTD MESS CAST (L6)
L	22:39	13°54.640N	133°54.770E	5130m	MTD FINISH (L6)
L	22:46	13°54.540N	133°54.660E	5125m	CTD START (L6)
L	23:02	13°54.510N	133°54.540E	5112m	CTD DEEPEST (L6)
L	23:13	13°54.460N	133°54.510E	5107m	CTD FINISH (L6)
	----- 22 JUNE94 (GMT) -----				
L	00:42	14°01.760N	133°45.370E	5403m	SED TRAP START TO RETRIEVE

L	01:05	14°02.150N	133°44.880E	5414m	SED TRAP FINISH
5D	05:33	13°00.010N	134°00.070E	5324m	CHANGED PROPULSION TO ELECTRIC MOTO
5D	05:37	13°00.020N	134°00.080E	5395m	IKPT NET START (1200M)
5D	05:58	12°59.640N	134°00.500E	5193m	IKPT NET DEEPEST
5D	06:25	12°59.100N	134°00.920E	5143m	IKPT NET FINISH
5D	06:31	12°59.060N	134°00.900E	5130m	ORI NET START (69)
5D	06:40	12°58.780N	134°00.920E	5129m	ORI NET DEEPEST (300M)
5D	06:46	12°58.640N	134°00.910E	5399m	ORI NET FINISH
5D	06:51	12°58.560N	134°00.920E	5070m	ORI NET START (33) (300M)
5D	07:04	12°58.270N	134°00.940E	5028m	ORI NET DEEPEST
5D	07:16	12°58.170N	134°00.890E	5020m	ORI NET FINISH (#33)
5D	07:29	12°58.290N	134°00.870E	5040m	NORPAC NET START (1)
5D	07:40	12°58.410N	134°00.870E	5063m	NORPAC NET FINISH (1)
5D	07:46	12°58.510N	134°00.880E	5071m	NORPAC NET START (2)
5D	08:01	12°58.780N	134°00.810E	5134m	NORPAC NET FINISH (2)
5D	08:05	12°58.850N	134°00.770E	5171m	NORPAC NET START (3)
5D	08:19	12°58.850N	134°00.770E	5171m	NORPAC NET FINISH (3)
5D	08:37	12°59.160N	134°00.660E	5218m	CTD-RMS START
5D	09:02	12°59.450N	134°00.720E	5153m	CTD-RMS DEEPEST
5D	09:32	12°59.580N	134°00.930E	5155m	SUNSET & PUT ON REGULATION LIGHTS
5D	09:45	12°59.690N	134°01.060E	5151m	CTD-RMS FINISH
5N	09:56	12°59.720N	134°01.160E	5171m	ORI NET START
5N	10:00	12°59.650N	134°01.290E	5155m	
5N	10:06	12°59.570N	134°01.550E	5165m	ORI NET DEEPEST
5N	10:13	12°59.470N	134°01.800E	5147m	ORI NET FINISH
5N	10:23	12°59.530N	134°01.840E	5168m	NORPAC NET START (1)
5N	10:34	12°59.630N	134°01.830E	5170m	NORPAC NET FINISH (1)
5N	10:37	12°59.600N	134°01.840E	5155m	NORPAC NET START (2)
5N	10:48	12°59.680N	134°01.810E	5157m	NORPAC NET FINISH (2)
5N	11:01	12°59.730N	134°01.880E	5176m	IKPT NET START
5N	11:08	12°59.540N	134°02.150E	5168m	ORI SIDE NET START
5N	11:29	12°59.040N	134°02.840E	5079m	ORI SIDE NET FINISH
5N	11:30	12°58.990N	134°02.900E	5062m	ORI NET DEEPEST
5N	12:09	12°58.190N	134°04.000E	4992m	IKPT NET FINISH
5N	12:16	12°58.070N	134°04.030E	4989m	IKPT NET START
5N	12:26	12°57.870N	134°04.380E	4987m	IKPT NET DEEPEST
5N	12:59	12°57.120N	134°05.440E	4944m	IKPT NET FINISH
E-1	17:05	12°59.970N	135°07.030E	4046m	CHANGED PROPULSION TO ELECTRIC MOTO
E-1	17:07	12°59.940N	135°07.090E	4070m	IKPT NET START (1200M)
E-1	17:30	12°59.550N	135°07.660E	5240m	IKPT NET DEEPEST
E-1	18:00	12°59.090N	135°08.320E	5148m	IKPT NET FINISH
E-1	18:14	12°59.080N	135°08.370E	5150m	CTD START
E-1	18:31	12°59.050N	135°08.110E	5310m	CTD DEEPEST
E-1	19:00	12°58.910N	135°07.820E	5323m	CTD FINISH

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6D	03:04	13°00.080N	136°59.910E	4925m	IKPT NET START
6D	03:27	13°01.080N	136°59.800E	4916m	IKPT NET DEEPEST (894M)

6D	03:59	13°02.180N	136°59.140E	4765m	IKPT NET FINISH
6D	04:09	13°02.370N	136°58.910E	4762m	NORPAC NET FINISH (1)
6D	04:20	13°02.490N	136°58.680E	4780m	NORPAC NET START (2)
6D	04:32	13°02.650N	136°58.380E	4804m	NORPAC NET START (3)
6D	04:45	13°02.820N	136°58.050E	4965m	NORPAC NET FINISH
6D	04:53	13°02.910N	136°57.920E	4977m	ORI NET START
6D	05:01	13°02.850N	136°58.130E	4946m	ORI NET DEEPEST
6D	05:07	13°02.820N	136°58.300E	4831m	ORI NET FINISH
6D	05:14	13°02.820N	136°58.260E	4955m	CTD-RMS START
6D	05:45	13°03.070N	136°58.020E	4922m	CTD-RMS DEEPEST
6D	06:20	13°03.350N	136°57.780E	5108m	CTD-RMS FINISH
6N	10:02	13°00.070N	137°00.320E	4922m	ORI NET START
6N	10:10	13°00.150N	137°00.510E	4893m	ORI NET DEEPEST (300M)
6N	10:16	13°00.210N	137°00.630E	4917m	ORI NET FINISH
6N	10:27	13°00.270N	137°00.450E	4936m	NORPAC NET START (1)
6N	10:40	13°00.300N	137°00.160E	4928m	NORPAC NET FINISH (1)
6N	10:45	13°00.300N	137°00.030E	4927m	NORPAC NET START (2)
6N	11:00	13°00.260N	136°59.700E	4922m	NORPAC NET FINISH (2)
6N	11:13	13°00.330N	136°59.610E	4922m	IKPT NET START
6N	11:20	13°00.350N	136°59.820E	4924m	ORI SIDE NET START
6N	11:30	13°00.430N	137°00.120E	4954m	IKPT NET DEEPEST
6N	11:41	13°00.470N	137°00.350E	4895m	ORI SIDE NET FINISH
6N	11:56	13°00.540N	137°00.800E	4882m	IKPT NET FINISH
6N	12:04	13°00.610N	137°00.790E	4886m	IKPT NET START (2)
6N	12:35	13°00.800N	137°01.650E	4578m	IKPT NET DEEPEST
6N	12:42	13°00.820N	137°01.810E	4566m	IKPT NET FINISH
7N	16:33	14°00.020N	136°59.970E	9412m	CHANGED PROPULSION TO ELECTRIC MOTO
7N	16:38	14°00.150N	137°00.010E	9541m	IKPT NET START
7N	16:50	14°00.370N	137°00.300E	4748m	ORI SIDE NET START
7N	17:03	14°00.800N	137°00.630E	4965m	IKPT NET DEEPEST (885M)
7N	17:10	14°00.970N	137°00.710E	5618m	ORI SIDE NET FINISH
7N	17:37	14°01.670N	137°01.400E	5321m	IKPT NET FINISH
7N	17:45	14°01.900N	137°01.690E	5303m	IKPT NET START (HOR)
7N	17:54	14°02.060N	137°01.910E	5278m	IKPT NET DEEPEST
7N	18:21	14°02.540N	137°02.690E	5020m	IKPT NET FINISH
7N	18:27	14°02.640N	137°02.880E	4925m	ORI NET START
7N	18:35	14°02.800N	137°03.140E	4940m	ORI NET DEEPEST
7N	18:43	14°02.940N	137°03.410E	4821m	ORI NET FINISH
7N	18:56	14°03.100N	137°03.420E	4783m	NORPAC NET START (1)
7N	19:10	14°03.240N	137°03.110E	4800m	NORPAC NET FINISH (1)
7N	19:14	14°03.270N	137°03.020E	4805m	NORPAC NET START(2)
7N	19:31	14°03.430N	137°02.700E	4852m	NORPAC NET FINISH (2)
7D	21:02	14°00.050N	137°00.110E	6221m	CTD-RMS START
7D	21:32	14°00.260N	137°00.150E	4701m	CTD-RMS DEEPEST
7D	22:12	14°00.390N	136°59.980E	4701m	CTD-RMS FINISH
7D	22:20	14°00.420N	137°00.010E	4607m	NORPAC NET START (1)
7D	22:29	14°00.530N	137°00.060E	4716m	NORPAC NET FINISH (1)

7D	22:33	14°00.550N	137°00.090E	4717m	NORPAC NET START (2)
7D	22:44	14°00.690N	137°00.130E	4710m	NORPAC NET FINISH (2)
7D	22:47	14°00.720N	137°00.140E	4712m	NORPAC NET START (3)
7D	22:58	14°00.830N	137°00.190E	5662m	NORPAC NET FINISH (3)
7D	23:08	14°00.890N	137°00.330E	4747m	ORI NET START
7D	23:14	14°00.920N	137°00.530E	4179m	ORI NET DEEPEST
7D	23:20	14°00.920N	137°00.780E	5925m	ORI NET FINISH
7D	23:27	14°00.970N	137°01.040E	5327m	IKPT NET START
7D	23:47	14°01.040N	137°01.780E	5342m	MEMO
	----- 24 JUNE94 (GMT) -----				
7D	00:19	14°01.080N	137°02.740E	5013m	IKPT NET FINISH
8D	04:09	15°00.030N	136°59.980E	5205m	CHANGED PROPULSION TO ELECTRIC MOTO
8D	04:12	15°00.100N	137°00.010E	5216m	IKPT NET START
8D	04:34	15°00.170N	137°00.710E	5346m	IKPT NET DEEPEST (849M)
8D	05:07	14°59.900N	137°01.470E	6165m	IKPT NET FINISH
8D	05:12	14°59.900N	137°01.520E	6309m	ORI NET START (69)
8D	05:20	14°59.810N	137°01.750E	6132m	ORI NET DEEPEST
8D	05:26	14°59.740N	137°01.920E	6134m	ORI NET FINISH
8D	05:34	14°59.840N	137°01.840E	6209m	
8D	05:47	15°00.130N	137°01.610E	6144m	NORPAC NET START (1)
8D	06:01	15°00.380N	137°01.350E	6007m	NORPAC NET START (2)
8D	06:23	15°00.800N	137°00.940E	6125m	NORPAC NET START (3)
8D	06:39	15°01.110N	137°00.640E	5420m	NORPAC NET FINISH
8D	06:44	15°01.210N	137°00.570E	5408m	CTD-RMS START
8D	07:15	15°01.690N	137°00.150E	5417m	CTD-RMS DEEPEST
8D	07:53	15°02.250N	136°59.810E	5598m	CTD-RMS FINISH
8N	10:03	14°59.870N	137°00.580E	5415m	ORI NET START
8N	10:10	14°59.890N	137°00.770E	5281m	ORI NET DEEPEST
8N	10:16	14°59.930N	137°00.950E	5276m	ORI NET FINISH
8N	10:26	15°00.100N	137°00.870E	5300m	NORPAC NET START (1)
8N	10:40	15°00.340N	137°00.670E	5272m	NORPAC NET FINISH (1)
8N	10:41	15°00.350N	137°00.670E	5354m	NORPAC NET START (2)
8N	10:51	15°00.430N	137°00.500E	5207m	NORPAC NET FINISH (2)
8N	11:04	15°00.610N	137°00.400E	5287m	IKPT NET START
8N	11:11	15°00.620N	137°00.660E	5381m	ORI SIDE NET START
8N	11:21	15°00.670N	137°00.990E	5368m	IKPT NET DEEPEST
8N	11:31	15°00.730N	137°01.260E	5322m	ORI SIDE NET FINISH
8N	11:50	15°00.810N	137°01.780E	5347m	IKPT NET FINISH
8N	11:59	15°00.850N	137°01.870E	5358m	IKPT NET START
8N	12:08	15°00.870N	137°02.190E	5375m	IKPT NET DEEPEST (20 MIN)
8N	12:50	15°00.940N	137°03.540E	4603m	IKPT NET FINISH
9N	16:51	16°00.050N	137°00.090E	5561m	CHANGED PROPULSION TO ELECTRIC MOTO
9N	16:51	16°00.060N	137°00.100E	5561m	IKPT NET START
9N	16:58	16°00.120N	137°00.340E	5400m	ORI SIDE NET START
9N	17:11	16°00.250N	137°00.800E	5334m	IKPT NET DEEPEST (687M)
9N	17:18	16°00.300N	137°00.990E	5335m	ORI SIDE NET FINISH
9N	17:35	16°00.450N	137°01.520E	5399m	IKPT NET FINISH

9N	17:44	16°00.520N	137°01.840E	5139m	IKPT NET START (HOR)
9N	17:55	16°00.660N	137°02.210E	5764m	IKPT NET DEEPEST
9N	18:23	16°00.870N	137°03.050E	5542m	IKPT NET FINISH
9N	18:29	16°00.910N	137°03.290E	5517m	ORI NET START
9N	18:37	16°01.000N	137°03.520E	5513m	ORI NET DEEPEST
9N	18:44	16°01.060N	137°03.710E	5518m	IKPT NET FINISH
9N	18:55	16°01.160N	137°03.720E	5516m	NORPAC NET START (1)
9N	19:09	16°01.160N	137°03.480E	5561m	NORPAC NET FINISH (1)
9N	19:13	16°01.220N	137°03.450E	5577m	NORPAC NET START (2)
9N	19:27	16°01.260N	137°03.190E	6154m	NORPAC NET FINISH (2)
9D	21:03	15°59.930N	136°59.870E	5273m	CTD-RMS START
9D	21:28	16°00.120N	136°59.800E	5217m	CTD-RMS DEEPEST
9D	22:12	16°00.420N	136°59.960E	5317m	CTD-RMS FINISH
9D	22:47	16°00.700N	136°59.510E	5229m	NORPAC NET START (1)
9D	22:55	16°00.780N	136°59.410E	5202m	NORPAC NET FINISH (1)
9D	22:59	16°00.820N	136°59.340E	5198m	NORPAC NET START (2)
9D	23:09	16°00.900N	136°59.180E	5057m	NORPAC NET FINISH (2)
9D	23:13	16°00.950N	136°59.130E	5194m	NORPAC NET START (3)
9D	23:23	16°01.070N	136°59.000E	5001m	NORPAC NET FINISH (3)
9D	23:34	16°01.200N	136°58.880E	4980m	ORI NET START (OBL)
9D	23:41	16°01.455N	136°58.922E	4973m	ORI NET DEEPEST
9D	23:46	16°01.640N	136°58.940E	4980m	ORI NET FINISH
9D	23:55	16°02.000N	136°58.960E	4976m	IKPT NET START

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9D	00:31	16°03.210N	136°59.100E	5097m	IKPT NET FINISH
10D	04:10	17°00.150N	137°00.020E	4798m	CHANGED PROPULSION TO ELECTRIC MOTO
10D	04:13	17°00.190N	137°00.070E	4818m	IKPT NET START
10D	04:33	17°00.500N	137°00.850E	4916m	IKPT NET DEEPEST (907M)
10D	05:02	17°00.970N	137°01.800E	4967m	IKPT NET FINISH
10D	05:07	17°01.060N	137°01.840E	4974m	ORI NET START
10D	05:14	17°01.250N	137°02.100E	5104m	ORI NET DEEPEST
10D	05:20	17°01.440N	137°02.250E	5090m	ORI NET FINISH
10D	05:29	17°01.640N	137°02.270E	5100m	NORPAC NET START (1)
10D	05:41	17°01.830N	137°02.130E	5067m	NORPAC NET START (2)
10D	05:55	17°02.060N	137°01.940E	5017m	NORPAC NET START (3)
10D	06:05	17°02.190N	137°01.740E	5013m	NORPAC NET FINISH
10D	06:17	17°02.350N	137°01.580E	5030m	CTD-RMS START
10D	06:45	17°02.660N	137°01.200E	5019m	CTD-RMS DEEPEST
10D	07:23	17°03.170N	137°01.070E	5005m	CTD-RMS FINISH
10N	10:00	17°00.010N	137°00.290E	4833m	ORI NET START
10N	10:07	17°00.150N	137°00.600E	4923m	ORI NET DEEPEST
10N	10:14	17°00.260N	137°00.880E	4915m	ORI NET FINISH
10N	10:22	17°00.460N	137°00.940E	4928m	NORPAC NET START (1)
10N	10:34	17°00.680N	137°00.940E	4925m	NORPAC NET FINISH (1)
10N	10:37	17°00.740N	137°00.940E	4913m	NORPAC NET START (2)
10N	10:48	17°00.920N	137°00.930E	4916m	NORPAC NET FINISH (2)
10N	10:59	17°01.110N	137°00.980E	4930m	IKPT NET START

10N	11:04	17°01.280N	137°01.190E	4980m	ORI SIDE NET START
10N	11:20	17°01.780N	137°01.890E	5021m	IKPT NET DEEPEST
10N	11:23	17°01.870N	137°02.040E	5030m	ORI SIDE NET FINISH
10N	11:58	17°02.850N	137°03.160E	5122m	IKPT NET FINISH
10N	12:07	17°03.030N	137°03.340E	5198m	IKPT NET START (20 M)
10N	12:11	17°03.130N	137°03.490E	5256m	IKPT NET DEEPEST (20 M)
10N	12:39	17°03.810N	137°04.470E	5114m	IKPT NET FINISH
E-2	17:09	16°59.880N	138°16.260E	4732m	CHANGED PROPULSION TO ELECTRIC MOTO
E-2	17:10	16°59.880N	138°16.270E	4685m	IKPT NET START
E-2	17:30	17°00.270N	138°17.160E	4531m	IKPT NET DEEPEST (882M)
E-2	17:59	17°00.820N	138°18.280E	4657m	IKPT NET FINISH
E-2	18:13	17°01.010N	138°18.550E	4675m	CTD START
E-2	18:30	17°01.150N	138°18.650E	4638m	CTD DEEPEST
E-2	18:44	17°01.110N	138°18.640E	4585m	CTD FINISH
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11D	03:00	16°59.930N	140°00.130E	4549m	IKPT NET START
11D	03:24	16°59.940N	140°01.170E	4598m	IKPT NET DEEPEST
11D	03:40	16°59.910N	140°01.810E	4604m	IKPT NET FINISH
11D	03:45	16°59.910N	140°01.950E	4614m	ORI NET START
11D	03:53	16°59.910N	140°02.300E	4613m	ORI NET DEEPEST
11D	04:00	16°59.880N	140°02.530E	5032m	ORI NET FINISH
11D	04:14	16°59.980N	140°02.490E	4600m	NORPAC NET START (1)
11D	04:29	17°00.040N	140°02.350E	4607m	NORPAC NET START (2)
11D	04:45	17°00.090N	140°02.120E	4610m	NORPAC NET START (3)
11D	04:59	17°00.120N	140°01.960E	4607m	NORPAC NET FINISH
11D	05:08	17°00.150N	140°01.900E	4610m	CTD-RMS START
11D	05:34	17°00.290N	140°01.810E	4610m	CTD-RMS DEEPEST
11D	06:11	17°00.580N	140°01.630E	4562m	CTD-RMS FINISH
11N	10:00	17°00.000N	140°00.160E	4546m	ORI NET START
11N	10:07	17°00.100N	140°00.420E	4544m	ORI NET DEEPEST
11N	10:13	17°00.180N	140°00.630E	4531m	ORI NET FINISH
11N	10:22	17°00.260N	140°00.710E	4521m	NORPAC NET START (1)
11N	10:31	17°00.310N	140°00.590E	4512m	NORPAC NET FINISH (1)
11N	10:34	17°00.360N	140°00.550E	4544m	NORPAC NET START (2)
11N	10:43	17°00.390N	140°00.490E	4504m	NORPAC NET FINISH (2)
11N	10:52	17°00.470N	140°00.460E	4500m	IKPT NET START
11N	10:56	17°00.410N	140°00.700E	4506m	ORI SIDE NET START
11N	11:07	17°00.550N	140°01.070E	4529m	IKPT NET DEEPEST
11N	11:18	17°00.640N	140°01.450E	4538m	ORI SIDE NET FINISH
11N	11:31	17°00.750N	140°01.890E	4570m	IKPT NET FINISH
11N	11:38	17°00.730N	140°02.050E	4562m	IKPT NET START
11N	11:49	17°00.810N	140°02.590E	4586m	IKPT NET DEEPEST (20M)
11N	11:55	17°00.850N	140°02.780E	4676m	IKPT NET DEEPEST (10 M)
11N	12:14	17°00.930N	140°03.460E	4762m	IKPT NET FINISH
12N	16:18	16°00.060N	140°00.020E	9103m	CHANGED PROPULSION TO ELECTRIC MOTO
12N	16:21	16°00.140N	140°00.020E	9665m	IKPT NET START
12N	16:26	16°00.290N	140°00.100E	9604m	ORI SIDE NET START

12N	16:44	16°00.890N	140°00.500E	5176m	IKPT NET DEEPEST (978M)
12N	16:46	16°00.970N	140°00.520E	5176m	ORI SIDE NET FINISH
12N	17:17	16°01.910N	140°01.090E	5119m	IKPT NET FINISH
12N	17:25	16°02.100N	140°01.330E	5095m	IKPT NET START (HOR)
12N	17:34	16°02.290N	140°01.620E	5125m	IKPT NET DEEPEST
12N	18:01	16°02.590N	140°02.430E	5215m	IKPT NET FINISH
12N	18:05	16°02.630N	140°02.570E	5343m	ORI NET START
12N	18:14	16°02.710N	140°02.910E	5217m	ORI NET DEEPEST
12N	18:19	16°02.750N	140°03.080E	5354m	ORI NET FINISH
12N	18:28	16°02.800N	140°03.040E	5218m	NORPAC NET START (1)
12N	18:42	16°02.770N	140°02.840E	5410m	NORPAC NET START (2)
12N	18:52	16°02.770N	140°02.700E	5218m	NORPAC NET FINISH
12D	21:04	15°59.900N	139°59.770E	5125m	CTD-RMS START
12D	21:29	15°59.890N	139°59.290E	5021m	CTD-RMS DEEPEST
12D	22:03	15°59.850N	139°58.480E	5118m	CTD-RMS FINISH
12D	22:16	15°59.840N	139°58.250E	5120m	NORPAC NET START (1)
12D	22:26	15°59.830N	139°58.110E	5121m	NORPAC NET FINISH (1)
12D	22:31	15°59.860N	139°57.970E	5127m	NORPAC NET START (2)
12D	22:42	15°59.920N	139°57.780E	5546m	NORPAC NET FINISH (2)
12D	22:48	15°59.900N	139°57.670E	5185m	NORPAC NET START (3)
12D	22:59	15°59.970N	139°57.460E	4681m	NORPAC NET FINISH (3)
12D	23:09	16°00.100N	139°57.280E	5110m	ORI NET START
12D	23:14	16°00.310N	139°57.200E	5109m	ORI NET DEEPEST
12D	23:21	16°00.520N	139°57.070E	5054m	ORI NET FINISH
12D	23:27	16°00.710N	139°56.990E	5035m	IKPT NET START
12D	23:41	16°01.140N	139°56.750E	4986m	IKPT NET DEEPEST

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12D	00:08	16°02.070N	139°56.350E	4940m	IKPT NET FINISH
13D	04:59	14°59.920N	139°59.540E	4954m	IKPT NET START
13D	05:18	15°00.370N	140°00.080E	4961m	IKPT NET DEEPEST (849M)
13D	05:45	15°01.140N	140°00.490E	4984m	IKPT NET FINISH
13D	05:51	15°01.210N	140°00.500E	4987m	ORI NET START
13D	05:58	15°01.230N	140°00.780E	4990m	ORI NET DEEPEST (300M)
13D	06:04	15°01.250N	140°00.910E	4989m	ORI NET FINISH
13D	06:17	15°01.430N	140°00.780E	4988m	NORPAC NET START (1)
13D	06:30	15°01.610N	140°00.550E	4986m	NORPAC NET START (2)
13D	06:47	15°01.850N	140°00.200E	5001m	NORPAC NET START (3)
13D	07:02	15°02.060N	139°59.910E	4959m	NORPAC NET FINISH (3)
13D	07:15	15°02.200N	139°59.750E	4954m	CTD-RMS START
13D	07:42	15°02.310N	139°59.640E	4992m	CTD-RMS DEEPEST
13D	08:15	15°02.390N	139°59.550E	5113m	CTD-RMS FINISH
13N	09:58	14°59.850N	140°00.140E	4918m	ORI NET START
13N	10:06	14°59.740N	140°00.380E	4914m	ORI NET DEEPEST
13N	10:13	14°59.700N	140°00.520E	4916m	ORI NET FINISH
13N	10:22	14°59.670N	140°00.490E	4916m	NORPAC NET START (1)
13N	10:32	14°59.700N	140°00.350E	4912m	NORPAC NET FINISH (1)
13N	10:35	14°59.690N	140°00.310E	4911m	NORPAC NET START (2)

13N	10:44	14°59.730N	140°00.230E	4911m	NORPAC NET FINISH (2)
13N	10:53	14°59.710N	140°00.200E	4909m	IKPT NET START
13N	10:56	14°59.660N	140°00.290E	4908m	ORI SIDE NET START
13N	11:09	14°59.460N	140°00.730E	4913m	IKPT NET DEEPEST
13N	11:17	14°59.340N	140°00.960E	4926m	ORI SIDE NET FINISH
13N	11:34	14°59.030N	140°01.560E	4943m	IKPT NET FINISH
13N	11:40	14°59.050N	140°01.560E	4937m	IKPT NET START
13N	12:02	14°58.760N	140°02.220E	4966m	IKPT NET DEEPEST
13N	12:17	14°58.520N	140°02.610E	4971m	IKPT NET FINISH
14N	16:13	14°00.100N	140°00.000E	5025m	CHANGED PROPULSION TO ELECTRIC MOTO
14N	16:15	14°00.120N	140°00.080E	5027m	IKPT NET START
14N	16:20	14°00.170N	140°00.180E	5025m	ORI SIDE NET START
14N	16:37	14°00.500N	140°00.680E	5031m	IKPT NET DEEPEST (914M)
14N	16:40	14°00.560N	140°00.740E	5031m	ORI SIDE NET FINISH
14N	17:08	14°00.970N	140°01.340E	5011m	IKPT NET FINISH
14N	17:17	14°01.100N	140°01.650E	4992m	IKPT NET START (HOR)
14N	17:24	14°01.250N	140°01.850E	4979m	IKPT NET DEEPEST
14N	18:23	14°02.130N	140°03.290E	4951m	IKPT NET FINISH
14N	18:33	14°02.270N	140°03.600E	4944m	IKPT NET START (HOR-2)
14N	18:40	14°02.360N	140°03.810E	4930m	IKPT NET DEEPEST
14N	19:11	14°02.940N	140°04.580E	4905m	IKPT NET FINISH
14N	19:14	14°02.970N	140°04.710E	4912m	ORI NET START
14N	19:21	14°03.090N	140°04.870E	4879m	ORI NET DEEPEST
14N	19:28	14°03.190N	140°05.000E	4744m	ORI NET FINISH
14N	19:34	14°03.270N	140°05.020E	4718m	NORPAC NET START (1)
14N	19:44	14°03.420N	140°04.740E	4780m	NORPAC NET FINISH (1)
14N	19:47	14°03.430N	140°04.670E	4786m	NORPAC NET START (2)
14N	19:57	14°03.540N	140°04.420E	4897m	NORPAC NET FINISH (2)
14D	21:00	14°00.030N	139°59.790E	5030m	CTD-RMS START
14D	21:24	14°00.250N	139°59.540E	5029m	CTD-RMS DEEPEST
14D	21:59	14°00.150N	139°59.160E	5028m	CTD-RMS FINISH
14D	22:14	14°00.210N	139°58.920E	5027m	NORPAC NET START (1)
14D	22:22	14°00.230N	139°58.730E	5028m	NORPAC NET FINISH (1)
14D	22:25	14°00.250N	139°58.670E	5027m	NORPAC NET START (2)
14D	22:35	14°00.270N	139°58.440E	5026m	NORPAC NET FINISH (2)
14D	22:38	14°00.290N	139°58.370E	5026m	NORPAC NET START (3)
14D	22:49	14°00.340N	139°58.130E	5005m	NORPAC NET FINISH (3)
14D	22:59	14°00.340N	139°57.980E	4994m	ORI NET START
14D	23:12	14°00.380N	139°58.340E	5025m	ORI NET FINISH
14D	23:18	14°00.360N	139°58.500E	5026m	IKPT NET START
14D	23:35	14°00.410N	139°58.960E	2222m	IKPT NET DEEPEST
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14D	00:06	14°00.410N	139°59.430E	5028m	IKPT NET FINISH
15D	05:04	13°00.180N	139°59.950E	4790m	CTD-RMS START
15D	05:13	13°00.220N	139°59.820E	4802m	NORPAC NET START (1)
15D	05:26	13°00.310N	139°59.740E	4826m	NORPAC NET START (2)
15D	05:30	13°00.310N	139°59.710E	4826m	CTD-RMS DEEPEST

15D	05:42	13°00.410N	139°59.580E	4867m	NORPAC NET START (3)
15D	05:55	13°00.530N	139°59.530E	4864m	NORPAC NET FINISH
15D	06:29	13°00.720N	139°59.600E	4965m	CTD-RMS FINISH
15D	06:46	13°00.810N	139°59.570E	4869m	IKPT NET START
15D	07:35	13°00.140N	140°01.180E	4812m	IKPT NET FINISH
15D	07:41	13°00.080N	140°01.230E	4808m	ORI NET START
15D	07:50	12°59.930N	140°01.550E	4799m	ORI NET DEEPEST
15D	07:56	12°59.850N	140°01.740E	4797m	ORI NET FINISH
15N	10:00	12°59.870N	139°59.890E	4860m	ORI NET START
15N	10:08	12°59.750N	140°00.150E	4933m	ORI NET DEEPEST
15N	10:15	12°59.710N	140°00.330E	4890m	ORI NET FINISH
15N	10:21	12°59.740N	140°00.320E	4925m	NORPAC NET START (1)
15N	10:34	12°59.780N	140°00.110E	4858m	NORPAC NET FINISH (1)
15N	10:35	12°59.780N	140°00.110E	4859m	NORPAC NET START (2)
15N	10:45	12°59.830N	139°59.840E	4861m	NORPAC NET FINISH (2)
15N	10:56	12°59.900N	139°59.800E	4863m	IKPT NET START
15N	10:57	12°59.860N	139°59.870E	4888m	ORI SIDE NET START
15N	11:12	12°59.720N	140°00.390E	4806m	IKPT NET DEEPEST
15N	11:18	12°59.650N	140°00.550E	4970m	ORI SIDE NET FINISH
15N	11:40	12°59.430N	140°01.220E	4808m	IKPT NET FINISH
15N	11:46	12°59.430N	140°01.260E	4806m	IKPT NET START
15N	12:08	12°59.270N	140°01.810E	4648m	IKPT NET DEEPEST
15N	12:36	12°59.030N	140°02.580E	4516m	IKPT NET FINISH
S-1	23:08	14°00.000N	140°59.830E	4848m	TEST OF RELEASE
S-1	23:28	13°59.910N	140°59.750E	4849m	F/W IT
S-1	23:36	13°59.840N	140°59.740E	4852m	CTD-RMS START
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S-1	00:28	13°59.710N	140°59.730E	4847m	CTD-RMS START
S-1	01:57	13°59.790N	141°00.040E	4851m	CTD-RMS DEEPEST
S-1	03:18	13°59.950N	141°00.170E	4852m	CTD-RMS FINISH
S-1	03:54	14°00.080N	141°00.240E	4851m	LAUNCH OF TRAP 1
S-1	04:02	14°00.110N	141°00.230E	4852m	FINISH TO LAUNCH OF TRAP 1
S-1	04:15	14°00.070N	141°00.440E	4855m	LAUNCH OF TRAP 2
S-1	04:44	13°59.960N	141°00.890E	4870m	FINISH TO LAUNCH OF TRAP 2
S-1	05:27	13°59.810N	140°59.850E	4847m	IKPT NET START (D-1)
S-1	07:03	13°58.770N	141°00.890E	4849m	IKPT NET DEEPEST (D-1)
S-1	08:05	13°59.310N	141°02.040E	4856m	IKPT NET DEEPEST (D-1)
S-1	09:11	13°59.520N	141°03.010E	4846m	SUNSET & PUT ON REGULATION LIGHTS
S-1	09:32	13°59.600N	141°03.540E	4878m	IKPT NET FINISH (D-1)
S-1	09:49	13°59.660N	141°03.650E	4881m	IKPT NET START (1)
S-1	10:11	13°59.660N	141°04.310E	4996m	IKPT NET DEEPEST (1)
S-1	10:36	13°59.780N	141°04.990E	4839m	IKPT NET FINISH (1)
S-1	10:50	13°59.860N	141°05.110E	4843m	IKPT NET START (D-2)
S-1	12:49	13°58.790N	141°10.240E	4823m	IKPT NET DEEPEST (D-2)
S-1	14:25	13°57.870N	141°13.180E	4814m	IKPT NET FINISH (D-2)
S-1	14:37	13°57.780N	141°13.240E	4811m	IKPT NET START (2)
S-1	15:21	13°57.270N	141°14.370E	4806m	IKPT NET DEEPEST (2)

S-1	15:29	13°57.310N	141°14.370E	4807m	IKPT NET START (D-3)
S-1	17:21	13°57.970N	141°11.600E	4822m	IKPT NET DEEPEST (D-3)
S-1	18:45	13°58.500N	141°08.900E	4823m	IKPT NET FINISH (D-3)
S-1	20:09	14°00.030N	141°00.270E	4851m	SUNRISE & PUT OFF REGULAION LIGHTS
S-1	21:05	13°59.910N	141°00.090E	4850m	RELEASE FOR TRAP 1
S-1	22:18	14°00.020N	141°00.230E	4851m	POPPING UP OF TRAP 1
S-1	23:14	14°00.350N	140°59.790E	4852m	START TO RETREIVE OF TRAP 1
S-1	23:33	14°00.450N	140°59.430E	4878m	FINISH TO RETREIVE OF TRA 1
	----- 30 JUNE94 (GMT) -----				
S-1	00:11	14°01.840N	140°57.050E	4862m	START TO RETREIVE OF TRAP 2
S-1	00:55	14°02.010N	140°56.420E	4863m	FINISH TO RETREIVE OF TRAP-2
S-2	06:42	14°30.050N	141°14.830E	4782m	CHANGED PROPULSION TO ELECTRIC MOTO
S-2	06:47	14°30.070N	141°14.800E	4786m	LAUNCH OF TRAP 1
S-2	06:55	14°30.160N	141°14.800E	4786m	FINISH TO LAUNCH OF TRAP 1
S-2	07:02	14°30.240N	141°15.070E	4782m	LAUNCH OF TRAP 2
S-2	07:35	14°30.830N	141°15.300E	4808m	FINISH TO LAUNCH OF TRAP 2
S-2	08:42	14°30.030N	141°14.680E	4788m	MOORING ON BOTTOM OF TRAP 1
S-2	08:49	14°30.070N	141°14.600E	4788m	CTD-RMS START
S-2	09:08	14°30.150N	141°14.360E	4796m	SUNSET & PUT ON REGULATION LIGHTS
S-2	09:17	14°30.190N	141°14.360E	4796m	CTD-RMS DEEPEST
S-2	09:49	14°30.320N	141°14.250E	4795m	CTD-RMS FINISH
S-2	10:08	14°30.420N	141°13.920E	4799m	IKPT NET START (D-1)
S-2	11:42	14°30.790N	141°18.060E	4767m	IKPT NET DEEPEST (D-1)
S-2	13:07	14°29.750N	141°20.600E	4764m	IKPT NET FINISH (D-1)
S-2	13:24	14°29.750N	141°20.510E	4773m	IKPT NET START (1)
S-2	13:44	14°29.310N	141°20.830E	4756m	IKPT NET DEEPEST (1)
S-2	14:07	14°28.780N	141°21.270E	4773m	IKPT NET FINISH (1)
S-2	14:14	14°28.700N	141°21.260E	4774m	IKPT NET START (2)
S-2	14:29	14°28.370N	141°21.530E	4803m	IKPT NET DEEPEST (2)
S-2	14:53	14°27.900N	141°21.760E	4808m	IKPT NET FINISH (2)
S-2	15:02	14°27.880N	141°21.720E	4806m	IKPT NET START (3)
S-2	15:23	14°27.370N	141°22.130E	4823m	IKPT NET DEEPEST (3)
S-2	16:29	14°25.810N	141°23.340E	4859m	IKPT NET FINISH (3)
S-2	16:40	14°25.790N	141°23.130E	4857m	IKPT NET START (D-2)
S-2	18:26	14°26.940N	141°20.220E	4765m	IKPT NET DEEPEST (D-2)
S-2	19:53	14°28.380N	141°17.520E	4802m	IKPT NET FINISH (D-2)
S-2	20:08	14°29.670N	141°16.310E	4854m	SUNRISE & PUT OFF REGULAION LIGHTS
S-2	21:04	14°30.110N	141°15.000E	4781m	RELEASE FOR TRAP 1
S-2	22:10	14°30.090N	141°14.920E	4782m	POPPING UP OF TRAP 1
S-2	23:09	14°30.400N	141°14.380E	4793m	START TO RETREIVE OF TRAP 1
S-2	23:26	14°30.470N	141°14.090E	4800m	FINISH TO RETREIVE OF TRAP 1
	----- 01 JULY94 (GMT) -----				
S-2	00:01	14°31.490N	141°12.430E	4824m	START TO RETREIVE OF TRAP 2
S-2	00:37	14°31.550N	141°11.870E	4826m	FINISH TO RETREIVE OF TRAP 2
S-3	03:44	15°00.040N	140°59.960E	4781m	CHANGED PROPULSION TO ELECTRIC MOTO
S-3	04:01	15°00.090N	141°00.000E	4778m	LAUNCH OF TRAP 1
S-3	04:07	15°00.040N	141°00.090E	4778m	FINISH TO LAUNCH OF TRAP 1

S-3	04:30	15°00.000N	141°00.790E	4772m	LAUNCH OF TRAP 2
S-3	04:54	14°59.870N	141°01.540E	4771m	FINISH TO LAUNCH OF TRAP 2
S-3	05:23	14°59.980N	140°59.750E	4782m	CTD-RMS START
S-3	05:54	15°00.180N	140°59.640E	4779m	CTD-RMS DEEPEST
S-3	06:24	15°00.460N	140°59.440E	4786m	CTD-RMS FINISH
S-3	06:43	15°00.630N	140°59.620E	4781m	IKPT NET START (D-1)
S-3	08:16	15°01.280N	141°04.010E	4767m	IKPT NET DEEPEST (D-1)
S-3	09:40	15°01.710N	141°07.070E	4825m	IKPT NET FINISH (D-1)
S-3	09:53	15°01.750N	141°06.960E	4826m	IKPT NET START (D-2)
S-3	11:27	15°02.090N	141°11.390E	4812m	IKPT NET DEEPEST (D-2)
S-3	12:51	15°02.630N	141°14.340E	4798m	IKPT NET FINISH (D-2)
S-3	13:15	15°02.840N	141°14.130E	4801m	IKPT NET START -1 (OBL)
S-3	13:34	15°02.960N	141°14.780E	4790m	IKPT NET DEEPEST -1(OBL)
S-3	14:01	15°03.130N	141°15.640E	4759m	IKPT NET FINISH -1(OBL)
S-3	14:08	15°03.160N	141°15.660E	4758m	IKPT NET START -2 (HOR)
S-3	14:18	15°03.190N	141°16.040E	4759m	IKPT NET DEEPEST -2
S-3	14:24	15°03.230N	141°16.240E	4728m	TOWING (10 MIN)
S-3	14:52	15°03.350N	141°17.230E	4699m	IKPT NET FINISH -2 (HOR)
S-3	14:59	15°03.350N	141°17.210E	4698m	IKPT NET START -3
S-3	15:13	15°03.420N	141°16.500E	4713m	IKPT NET DEEPEST -3
S-3	15:50	15°03.590N	141°15.210E	4780m	IKPT NET FINISH -3
S-3	15:57	15°03.620N	141°14.990E	4784m	IKPT NET START (D-3)
S-3	17:52	15°04.110N	141°11.210E	4810m	IKPT NET DEEPEST (D-3)
S-3	19:16	15°04.060N	141°08.240E	4819m	IKPT NET FINISH (D-3)
S-3	20:17	15°00.230N	141°01.030E	4768m	SUNRISE & PUT OFF REGULAION LIGHTS
S-3	21:12	15°00.050N	141°00.020E	4779m	RELEASE FOR TRAP 1 (AT 21:02 GMT)
S-3	22:09	15°00.010N	141°00.160E	4774m	POPPING UP OF TRAP 1
S-3	23:09	15°00.420N	140°59.600E	4780m	START TO RETREIVE OF TRAP 1
S-3	23:26	15°00.490N	140°59.320E	4816m	FINISH TO RETREIVE OF TRAP-1
S-3	23:43	15°00.280N	140°58.890E	4742m	START TO RETREIVE OF TRAP-2
----- 02 JULY94 (GMT) -----					
S-3	00:31	15°00.540N	140°58.360E	4822m	FINISH TO RETREIVE OF TRAP-2
S-4	04:23	16°00.040N	140°59.960E	4715m	CHANGED PROPULSION TO ELECTRIC MOTO
S-4	04:31	16°00.090N	140°59.910E	4715m	LAUNCH OF TRAP 1
S-4	04:36	16°00.050N	140°59.950E	4713m	FINISH TO LAUNCH OF TRAP 1
S-4	04:40	15°59.920N	141°00.080E	4711m	LAUNCH OF TRAP 2
S-4	05:03	15°59.440N	141°00.510E	4699m	FINISH TO LAUNCH OF TRAP 2
S-4	05:32	16°00.600N	141°00.100E	4723m	CTD-RMS START
S-4	06:00	16°00.990N	140°59.980E	4730m	CTD-RMS DEEPEST
S-4	06:40	16°01.300N	140°59.890E	4740m	CTD-RMS FINISH
S-4	06:46	16°01.310N	140°59.960E	4739m	IKPT NET START (D-1)
S-4	08:17	16°00.680N	141°04.210E	4666m	IKPT NET DEEPEST (D-1)
S-4	09:32	16°00.240N	141°06.850E	4687m	SUNSET & PUT ON REGULATION LIGHTS A
S-4	09:43	16°00.170N	141°07.180E	4706m	IKPT NET FINISH (D-1)
S-4	09:50	16°00.190N	141°07.210E	4706m	IKPT NET START (D-2)
S-4	11:22	15°59.110N	141°11.800E	4729m	IKPT NET DEEPEST (D-2)
S-4	12:47	15°58.140N	141°14.620E	4710m	IKPT NET FINISH (D-2)

S-4	12:56	15°58.130N	141°14.540E	4712m	IKPT NET START -1(OBL)
S-4	13:25	15°58.510N	141°13.430E	4738m	IKPT NET DEEPEST -1(OBL)
S-4	14:01	15°58.920N	141°12.090E	4730m	IKPT NET FINISH -1(OBL)
S-4	14:09	15°59.010N	141°11.740E	4729m	IKPT NET START -2(HOR)
S-4	14:18	15°59.110N	141°11.320E	4730m	IKPT NET DEEPEST -2(HOR)
S-4	14:54	15°59.610N	141°09.970E	4734m	IKPT NET FINISH -2 (HOR)
S-4	15:03	15°59.670N	141°09.560E	4734m	IKPT NET START -3(HOR)
S-4	15:13	15°59.790N	141°09.110E	4739m	IKPT NET DEEPEST (3)
S-4	16:04	16°00.380N	141°07.460E	4699m	IKPT NET FINISH (3)
S-4	16:13	16°00.470N	141°07.080E	4689m	IKPT NET START (D-3)
S-4	17:57	16°01.640N	141°02.950E	4609m	IKPT NET DEEPEST (D-3)
S-4	19:13	16°02.250N	141°00.090E	4752m	IKPT NET FINISH (D-3)
S-4	19:28	16°02.260N	140°59.660E	4757m	COM'CED FLOW-METER CALIBRATION
S-4	20:11	16°02.150N	140°59.400E	4757m	SUNRISE & PUT OFF REGULAION LIGHTS
S-4	20:11	16°02.150N	140°59.400E	4758m	FINISHED FLOW-METER CALIBRATION
S-4	21:01	16°00.040N	140°59.890E	4715m	RELEASE FOR TRAP 1
S-4	22:07	16°00.070N	141°00.020E	4716m	POPPING UP OF TRAP 1
S-4	23:08	16°00.260N	140°59.670E	4720m	START TO RETREIVE OF TRAP 1
S-4	23:25	16°00.250N	140°59.430E	4722m	FINISH TO RETREIVE OF TRAP-1
----- 03 JULY94 (GMT) -----					
S-4	00:00	15°59.510N	140°56.270E	4742m	START TO RETREIVE OF TRAP-2
S-4	00:37	15°59.720N	140°55.840E	4751m	FINISH TO RETREIVE OF TRAP-2
S-5	04:41	16°59.900N	140°59.920E	4790m	CHANGED PROPULSION TO ELECTRIC MOTO
S-5	04:47	16°59.890N	140°59.920E	4790m	IKPT NET START (D-1)
S-5	06:24	17°00.370N	141°04.560E	4761m	IKPT NET DEEPEST (D-1)
S-5	07:40	17°00.450N	141°07.510E	4708m	IKPT NET FINISH (D-1)
S-5	07:51	17°00.420N	141°07.530E	4709m	CTD START
S-5	07:51	17°00.420N	141°07.520E	4710m	CTD-RMS START
S-5	08:08	17°00.450N	141°07.490E	4710m	CTD DEEPEST
S-5	08:17	17°00.450N	141°07.480E	4709m	CTD FINISH
S-6	11:07	17°41.950N	141°01.960E	4683m	IKPT NET START
S-6	11:22	17°42.440N	141°01.850E	4682m	IKPT NET DEEPEST (OBL)
S-6	11:48	17°43.280N	141°01.480E	4677m	IKPT NET FINISH (OBL)
----- 05 JULY94 (GMT) -----					
S-7	23:14	33°37.770N	139°13.530E	1485m	ORI NET START
S-7	23:19	33°37.910N	139°13.730E	1444m	ORI NET DEEPEST
S-7	23:30	33°38.100N	139°14.200E	1353m	ORI NET FINISH