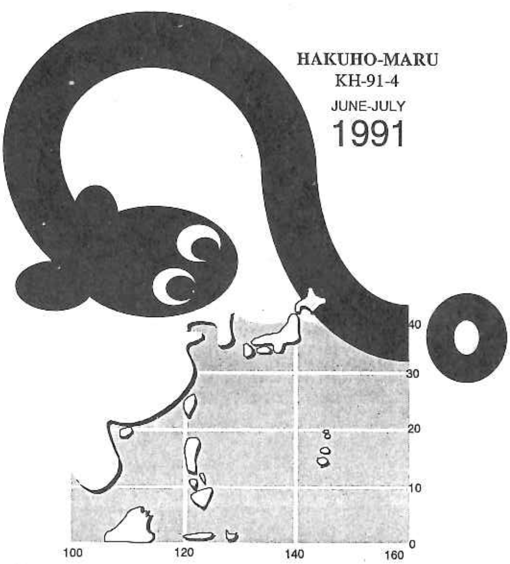
Preliminary Report of The Hakuho Maru Cruise KH-91-4

June 14, 1991 — July 22, 1991



EEL CRUISE
OCEAN RESEARCH INSTITUTE
UNIVERSITY OF TOKYO

Ocean Research Institute
University of Tokyo
1994

Preliminary Report of The Hakuho Maru Cruise KH-91-4

June 14, 1991 — July 22, 1991
(Eel Cruise V)

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by
The Scientific Members of the Expedition

Edited by
Tsuguo Otake and Katsumi Tsukamoto

Photo by Noritaka MOCHIOKA and Seiro KIMURA

Contents

I. A New Era of Eel Biology Has Begun

During this century there has been increasing interest in the ocean. The resulting increase in interdisciplinary research has produced many discoveries in the various fields of oceanography. These oceanographic discoveries have helped to reduce the historical fear of strange phenomenon in the ocean. The once seemingly distant ocean now seems closer and more familiar. However, the migration and reproductive ecology of the Japanese eel *Anguilla japonica* has remained hidden in the mist of the open ocean. Accordingly, the search for the spawning area of the eel has remained one of the most romantic problems in biological oceanography.

The research vessel Hakuho Maru of the Ocean Research Institute, University of Tokyo, has made four expeditions in search of the spawning ground of the eel. In the 1950's it was thought that the spawning ground was in the waters south of the Ryukyu Islands and north of 22°N latitude, but in the 1970's, attention shifted to the eastern waters of the Philippine Islands between 15° and 20°N. In the 1980's, the spawning ground was thought to be located in waters farther east, between 130° and 140°E longitude. So as a result of information accumulated over the years, the hypothesized location of the spawning ground has moved southward and then eastward.

This cruise of the Hakuho Maru, KH-91-4, is the fifth expedition to search for the spawning location of the Japanese eel. The results of the fourth expedition in 1986 suggested the approximate region of the spawning ground and laid the foundation for this cruise. The objectives of this cruise were to determine the exact location of the spawning area by collecting large numbers of small leptocephali and to study the oceanographic conditions of the region.

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There were 958 *A. japonica* leptocephali collected during this expedition. Considering that only 110 leptocephali of this species have ever been collected, this number is very significant. The smallest *A. japonica* leptocephalus, 7.7 mm in total length, was also caught on this cruise, while the record ever caught prior to this cruise was 19.5 mm. The collection of so many small leptocephali, approximately 10 mm, on this cruise indicates that the predictions made based on the collections of the 1986 Hakuho Maru cruise and two collections made by the Keiten Maru of Kagoshima University were correct.

Although, during the second leg from Naha to Tokyo, we met Typhoon # 7 and had to eliminate some stations, we were blessed with good weather almost every day and we were able to accomplish more than we expected. We were able to cover a distance of 16,000 km and make 262 tows during this expedition. Such a large sampling grid, the collection of a wide range of oceanographic data, and its real time analysis would not have been possible in any ship other than the Hakuho Maru, which is one of the newest and best equipped high technology research vessels in the world. Regardless of the advanced hardware of the Hakuho Maru, it would not function as well without such an excellent crew which can quickly and accurately respond to our frequent and sometimes sudden changes in observation schedules that result from our catches of leptocephali. We sincerely acknowledge the valuable contribution that the crew of the Hakuho Maru made to the success of this expedition. The support staff at the Ocean Research Institute also played an invaluable role in the development and coordination of this cruise.

A total of 25 scientists from various universities and institutes in Japan, as well as visiting scientists from Korea and the United States participated in this expedition. Foreign students from Korea, China and Mexico were also part of this group. The specialties of the scientific members included ecology, taxonomy, physiology, morphology, behavior and physical oceanography. In the previous cruises the only objectives were to catch more and smaller leptocephali, but now as a result of the wide range of specialists which participated in this cruise many new types of research on the biology of eels have been initiated. The many new research directions that are now possible, represent the beginning of a new era in eel biology.

All scientists worked together in discussing the sampling design, operating the nets, sorting samples and analyzing the catch data and oceanographic information. We will never forget the excitement throughout the night when we suddenly collected more than 800 leptocephali, just four days before the end of the first leg and after 19 days of patient sampling on the grid lines of 155°, 149° and 143°E. The people who experienced the euphoria of this historic discovery will always talk about "The Longest Night"

Chief Scientist's Cabin
July 21, 1991 Katsumi Tsukamoto

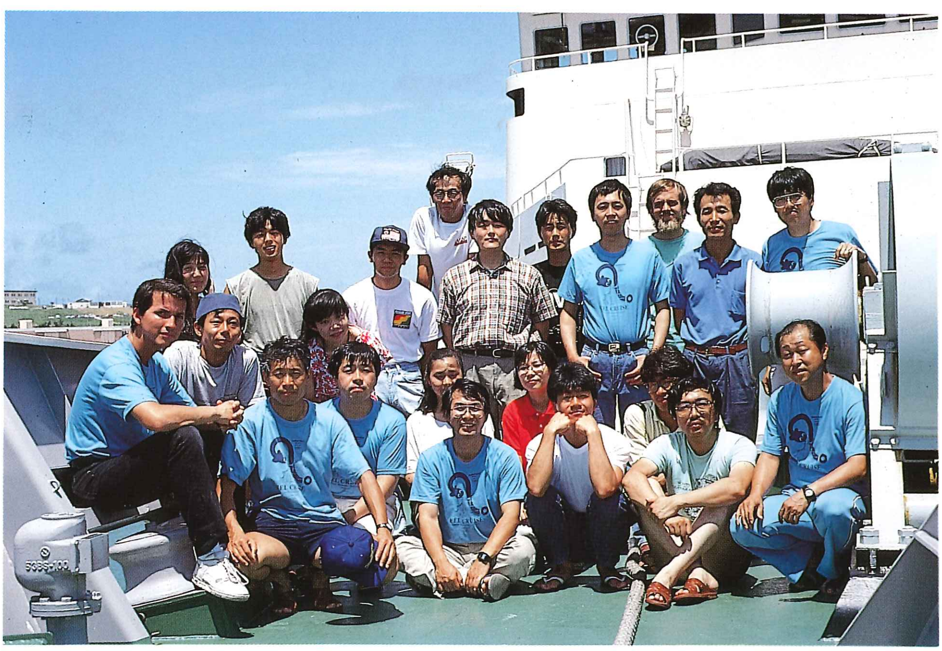


Photo. Scientists aboard on the Hakuho Maru cruise, KH-91-4 Leg. 1

II. Outline of the cruise

Tsuguo Otake and Hiroshi Hasumoto

The cruise consisted of two legs: leg.1, from 14 June (Tokyo) to 6 July (Naha); leg.2, from 12 July (Naha) to 22 July 1991 (Tokyo) (Table 1). R/V Hakuho-maru was ported at Naha harbor, Okinawa, for seven days between the two legs.

Under the overall objective of "Studies on the spawning area of the Japanese eel and the marine pelagic ecosystem surrounding it", the following research items were investigated: (1) distribution and transportation of leptocephali of the Japanese eel and other Anguilliform fishes, (2) hydrographic observations in the spawning area, (3) organic development, growth, metamorphosis and feeding of the leptocephali, (4) taxonomy and assessment of abundance of ichthyoplankton, micronekton and fish egg, (5) taxonomy and ecology of phyto- and zooplankton, (6) distribution and functional morphology of cephalopods, and (7) characteristics of scientific echo-sounder and biomass.

During the cruise both net sampling and conductivity, temperature, depth and dissolved oxygen (CTDO) measurements were taken at a total of 34 main stations (St.A in Net record; Fig.1). Net sampling involved a 60 min oblique tow using a 3 m Issacs Kidd Midwater Trawl (IKMT) net with 8.7 m^2 mouth opening and 1mm mesh, from the surface to a depth of 300 m. CTDO measurements involved a cast to a depth of 1000 m. In addition to the main stations, night samples were taken at 47 sites (St.B in Net record; Fig.1) between the main stations using 45 min oblique tows to a depth of 150 m. Even more intensive sampling was undertaken once the first leptocephalus was collected. At 56 sites (St.C in Net record; Fig.1) near the stations bordering 15°N 131°E, 14-16°N 134°E and 14-17°N 137°E, additional net sampling was done. Horizontal step tows were made at night in three depth strata with a 0.5 or 1.0 mm mesh IKMT net. The depth strata were selected on the basis of the location of the greatest zooplankton biomass as observed using sonar. The towing depth was adjusted using a pressure-sensitive ultrasonic transmitter. The vertical distribution of leptocephali was determined at two stations using 10 Motoda-type multiple layer closing nets of 80cm diameter and 0.5mm mesh operated from the surface to a depth of 500m. The location of observation sites and track chart are shown in Fig.1.

The names of the 25 scientists participated in the cruise are listed in Table 2.

Table 1. Cruise itinerary

	Arrival	Departure
Tokyo	———	June 14 1991
Naha	July 6 1991	July 12 1991
Tokyo	July 22 1991	———

Table 2. Scientists aboard

*TSUKAMOTO Katsumi	Ocean Res. Inst., Univ. Tokyo
**KONISHI Yoshinobu *1	Seikai Nat. Fish. Res. Inst.
***SUZUKI Yuzuru *2	Fac. Agr., Univ. Tokyo
NISHIDA Shuhei	Ocean Res. Inst., Univ. Tokyo
OTAKE Tsuguo	Ocean Res. Inst., Univ. Tokyo
KIMURA Shingo *1	Ocean Res. Inst., Univ. Tokyo
HASUMOTO Hiroshi	Ocean Res. Inst., Univ. Tokyo
INAGAKI Tadashi	Ocean Res. Inst., Univ. Tokyo
OYA Machiko *1	Ocean Res. Inst., Univ. Tokyo
CHAE Jin-ho	Ocean Res. Inst., Univ. Tokyo
MASUDA Reiji	Ocean Res. Inst., Univ. Tokyo
ARAKAWA Emi *1	Ocean Res. Inst., Univ. Tokyo
SAKAKURA Yoshitaka	Ocean Res. Inst., Univ. Tokyo
TAKAHASHI Kazutaka	Ocean Res. Inst., Univ. Tokyo
KOBAYASHI Harumi	Ocean Res. Inst., Univ. Tokyo
NEZU Yoshika *1	Ocean Res. Inst., Univ. Tokyo
RODRIGUEZ M. Medina *1	Ocean Res. Inst., Univ. Tokyo
TATENO-SEINO Satoko *1	Ocean Res. Inst., Univ. Tokyo
GE Xiao Wei	Tokyo Univ. Fish.
UEMATSU Kazumasa	Fac. Appl. Biol. Sci., Hiroshima Univ.
MOCHIOKA Noritaka	Fac. Fish., Univ. Kyushu
MITSUI Youichiro	Fac. Fish., Kagoshima Univ.
KOBAYASHI Masato *2	Yokohama Col. Commerce
LEE Tae Won *3	Dept. of Oceanogr., Chungnam Univ.
MILLER J. Michael	Dept. Zool., Univ. Main

* Chief Scientist (Director of the cruise)
** Vice director of Leg.1
*** Vice director of Leg.2
*1 Participating Leg.1
*2 Participating Leg.2
*3 WESTPAC scientist

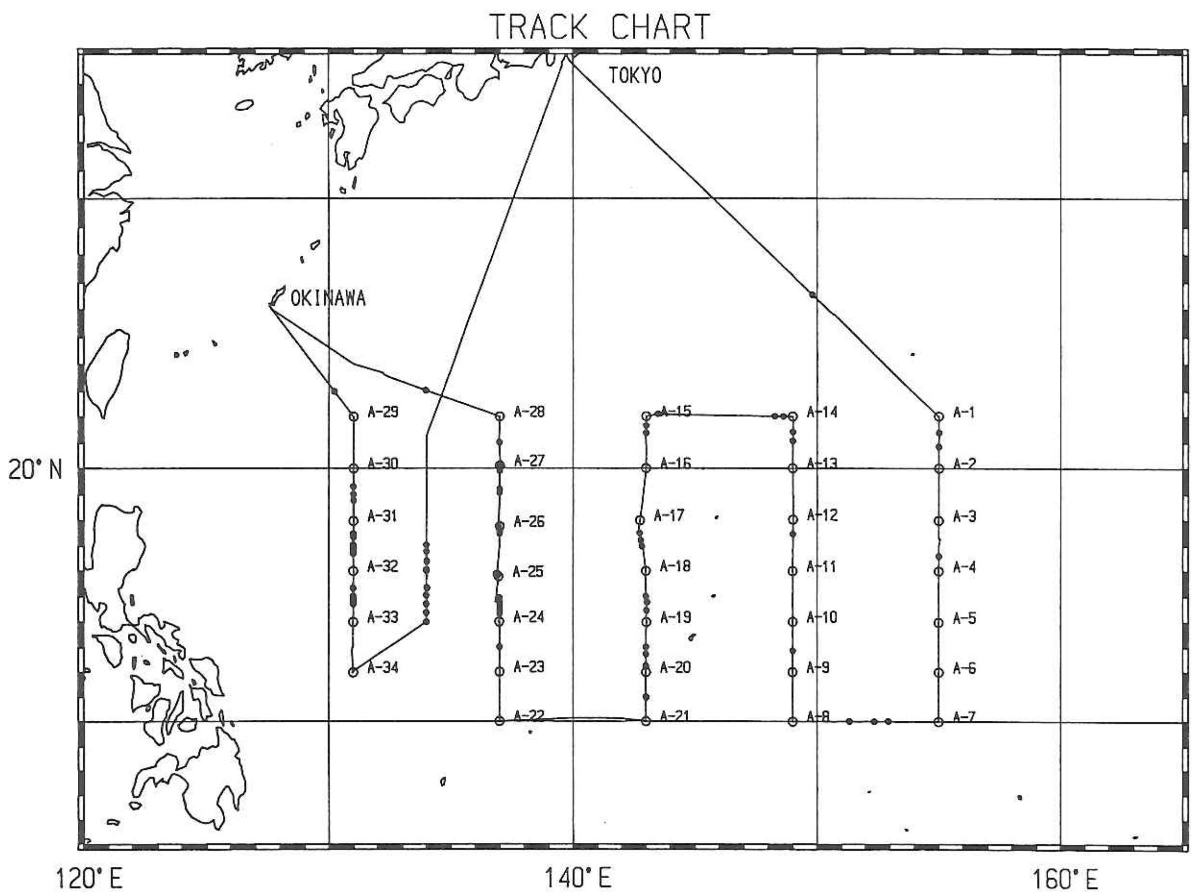


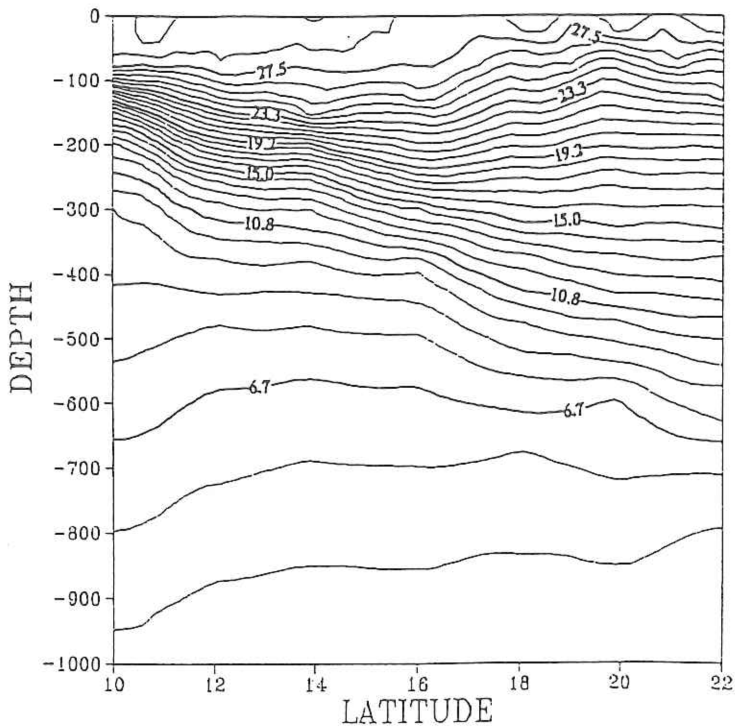
Fig. 1 Track chart and observation stations of the KH-91-4 cruise of the Hakuho Maru

III. Hydrographic structure of the North Equatorial Current

Shingo KIMURA, Hiroshi HASUMOTO,
Masato KOBAYASHI and Tadashi INAGAKI

During the expedition of the research vessel Hakuho-maru of the Ocean Research Institute, 1000 m depth hydrographic observations consisting of conductivity, temperature, and depth measurements were conducted for analysis of hydrographic structure in the North Equatorial Current (NEC) which distribute Japanese eel larvae to growth habitats. The data were collected along six sections running in a north-south direction from 10-22 °N, between 131-155 °E in the NEC. The main observing stations were located every 2° latitude on each section and more intensive sampling was undertaken once the first leptocephalus was collected. The original data is summarized in tables as appendix and these figures are shown in Figure 1 (a)-(f).

The NEC is composed of three water masses: the southern low salinity water (< 34.2 p.s.u.) diluted by precipitation, the northern high salinity water (> 34.8 p.s.u.) resulting from high evaporation and the North Pacific intermediate water (34.2-34.4 p.s.u.). Figure 2 shows the salinity structure along the 155°E section. The salinity fronts on the sea surface, 34.5 p.s.u., are located at 15-17°N, and the sites of the highly concentrated smallest larvae are located just south of the salinity front at the 137°E section. Figure 3 shows the horizontal salinity distribution at depths of 50 m and 200 m. This figure indicates that the salinity gradient is significantly large and the front is parallel to the mean direction of the NEC. Although there is no significant front in the temperature section, the geostrophic velocity is largest at depths shallower than 150 m south of the salinity front. The geostrophic current velocity was calculated from the temperature and salinity data, taking the 1000 m depth as the reference level of no motion and Figure 4 shows the result at depths upper 400 m. According to the geostrophic current velocity, the current velocities are much greater to the south of the salinity front (greater than 20 cm s^{-1}) than to the north (less than 10 cm s^{-1}) on each section. It indicates that the southern part of the NEC has better conditions for rapid transport of the Japanese eel larvae.



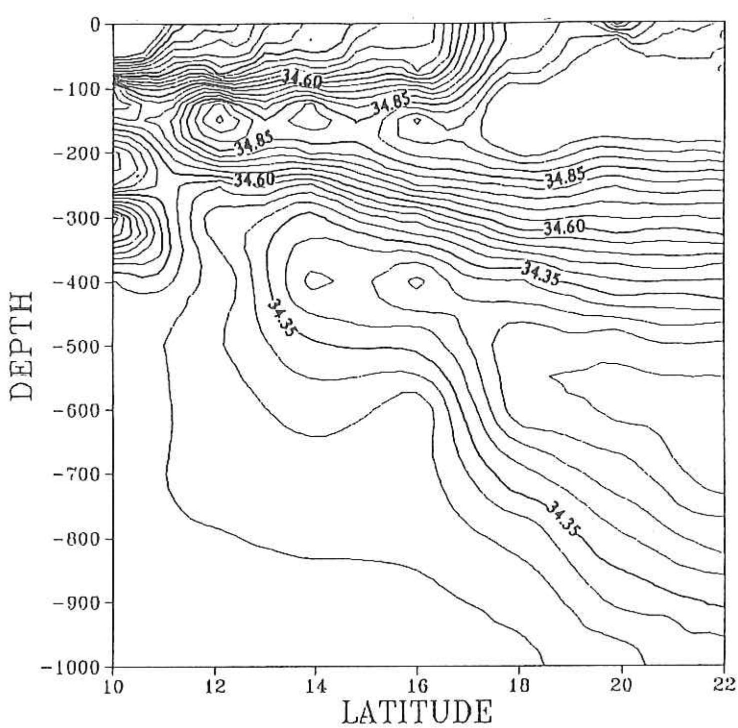
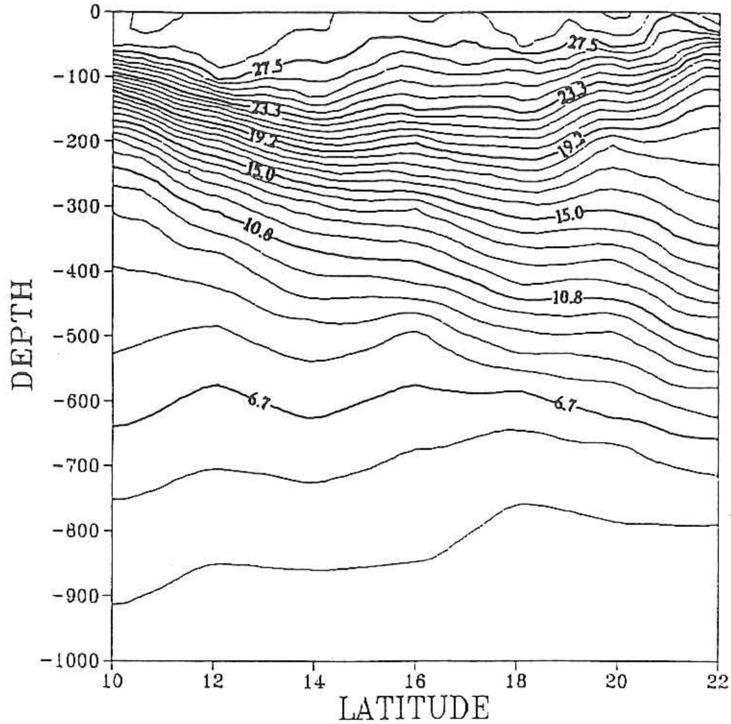


Figure 1(a) Temperature and salinity sections along 155°E.



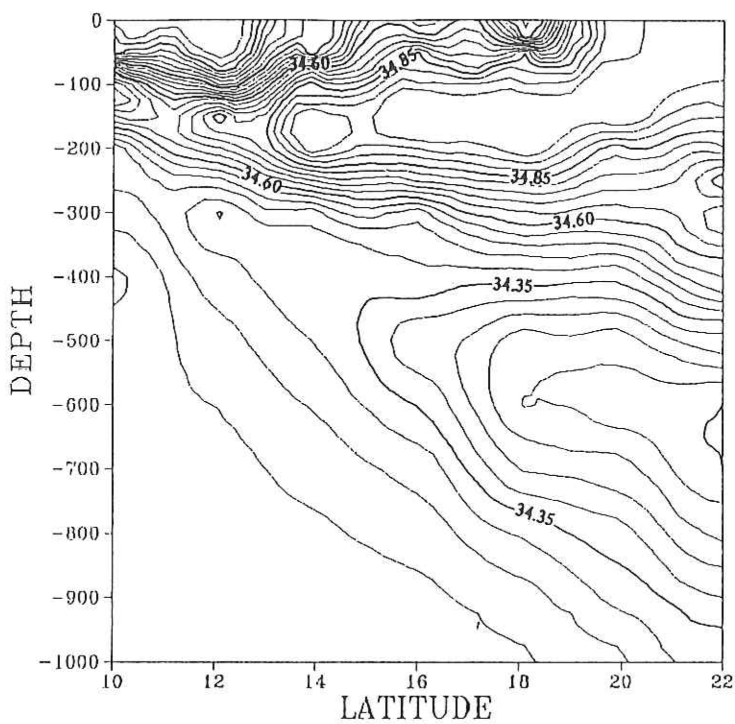
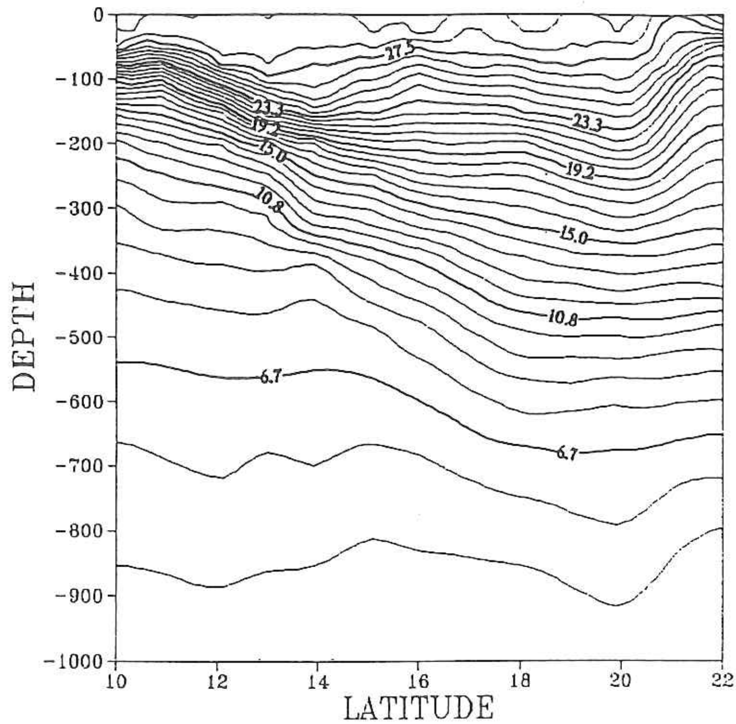


Figure 1(b) Temperature and salinity sections along 149°E.



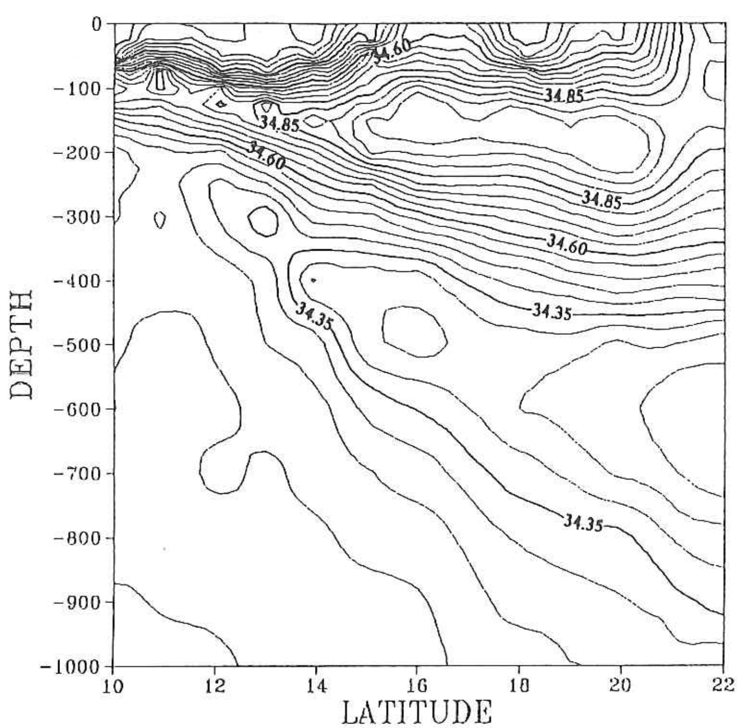


Figure 1(c) Temperature and salinity sections along 143°E.

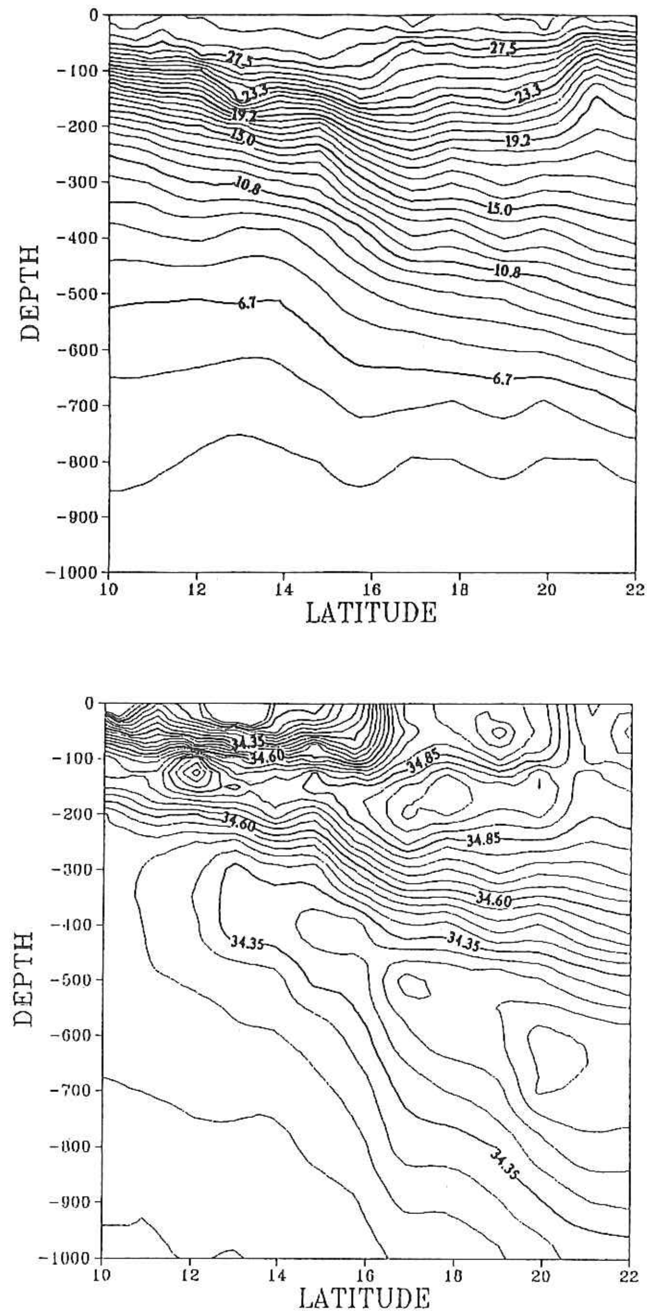


Figure 1(d) Temperature and salinity sections along 137°E.

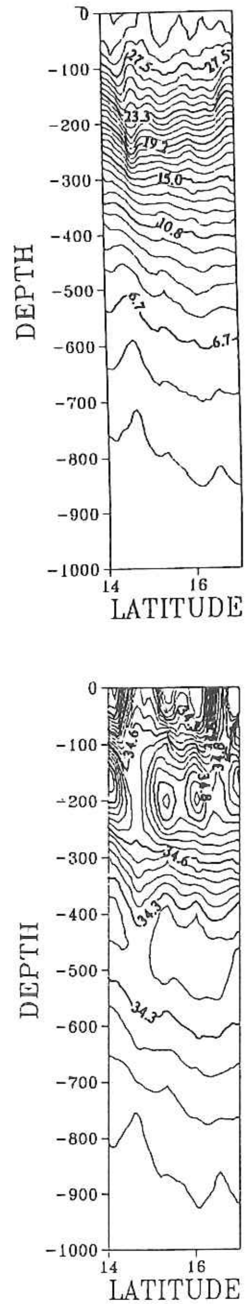


Figure 1(e) Temperature and salinity sections along 134°E.

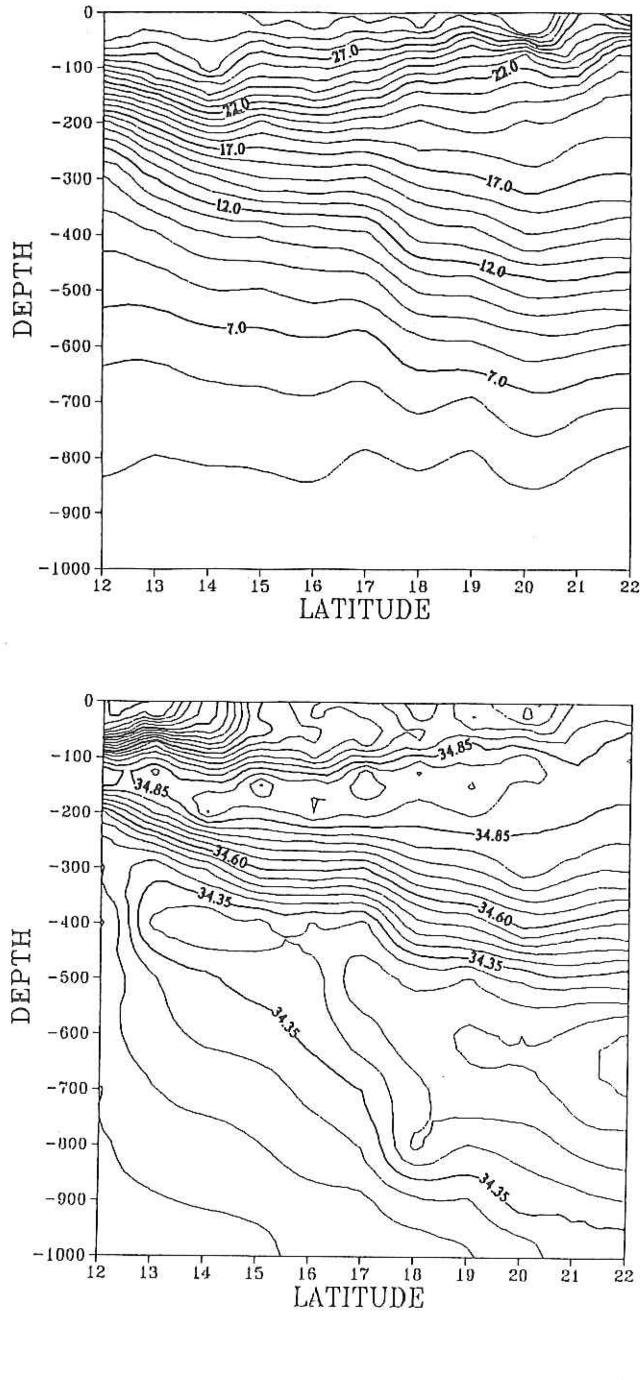


Figure 1(f) Temperature and salinity sections along 131°E.

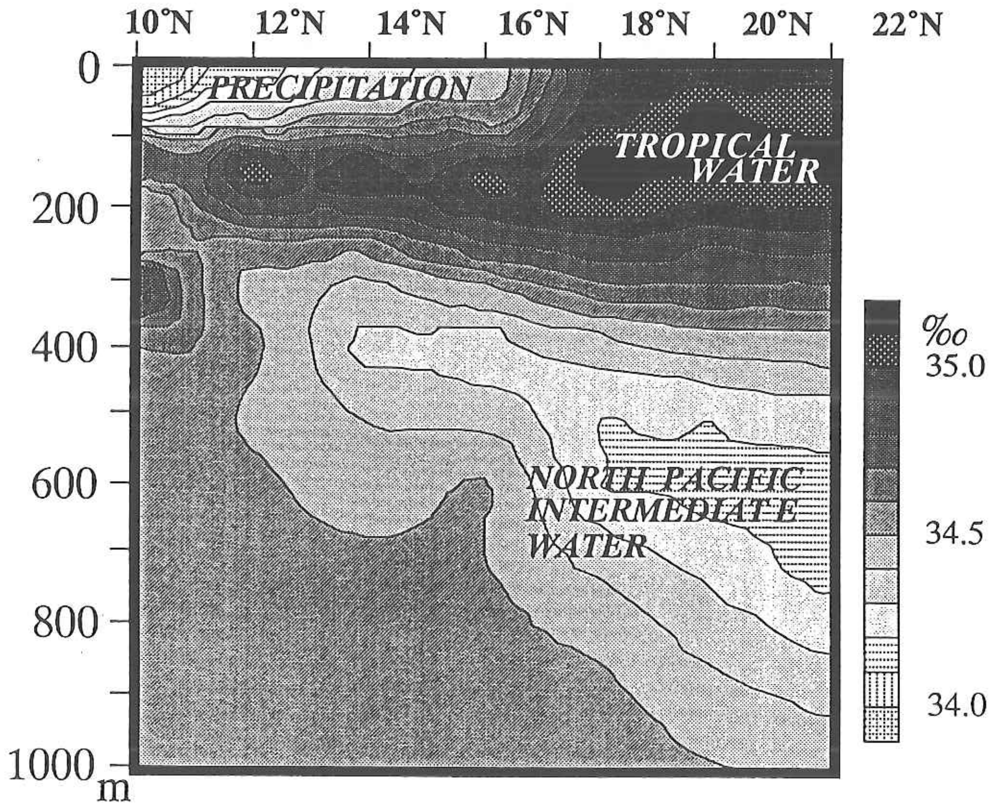


Figure 2 Water masses in the North Equatorial Current.

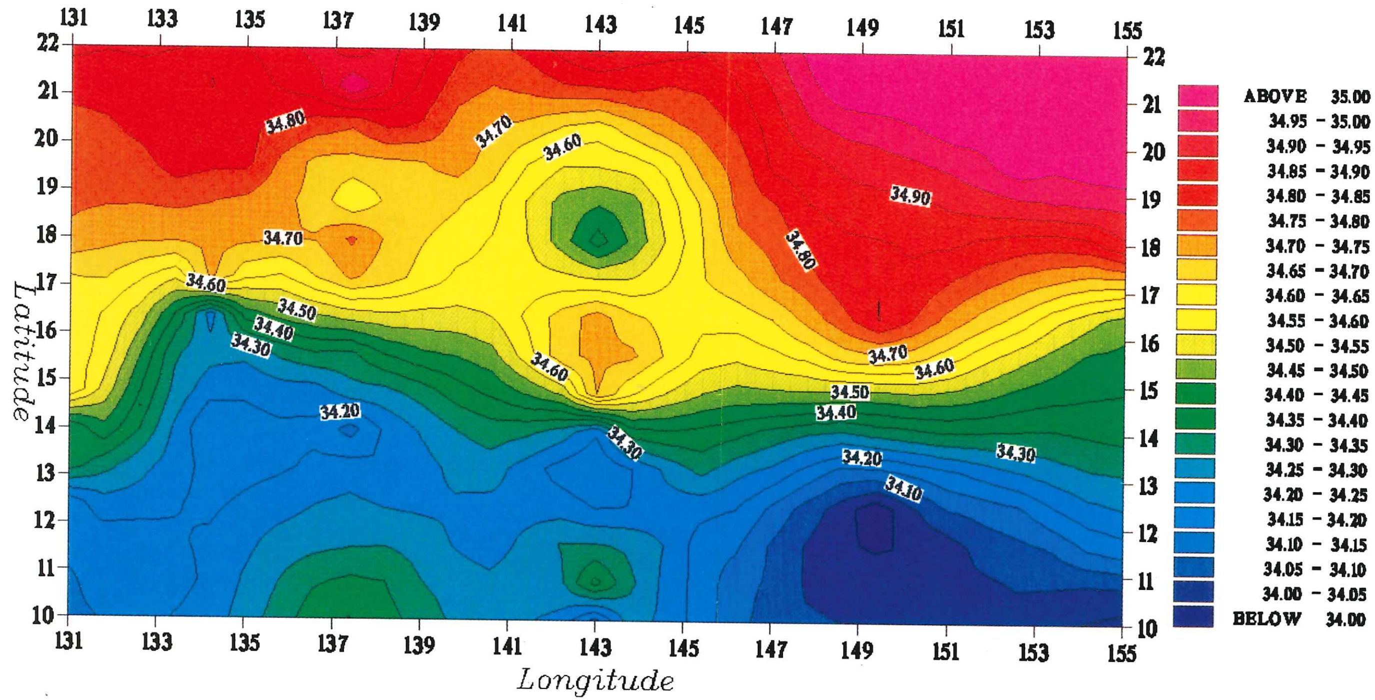


Figure 3-1. Horizontal distribution of salinity at depth of 50 m

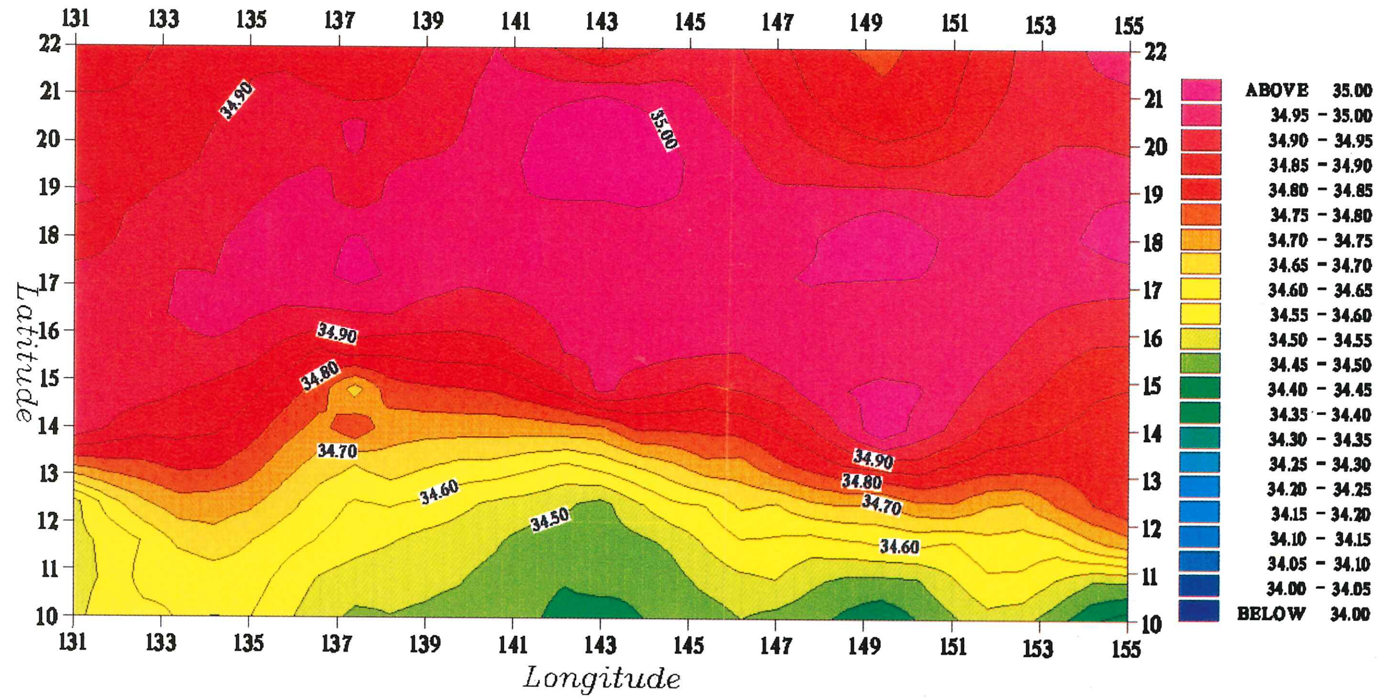


Figure 3-2. Horizontal distribution of salinity at depth of 200 m

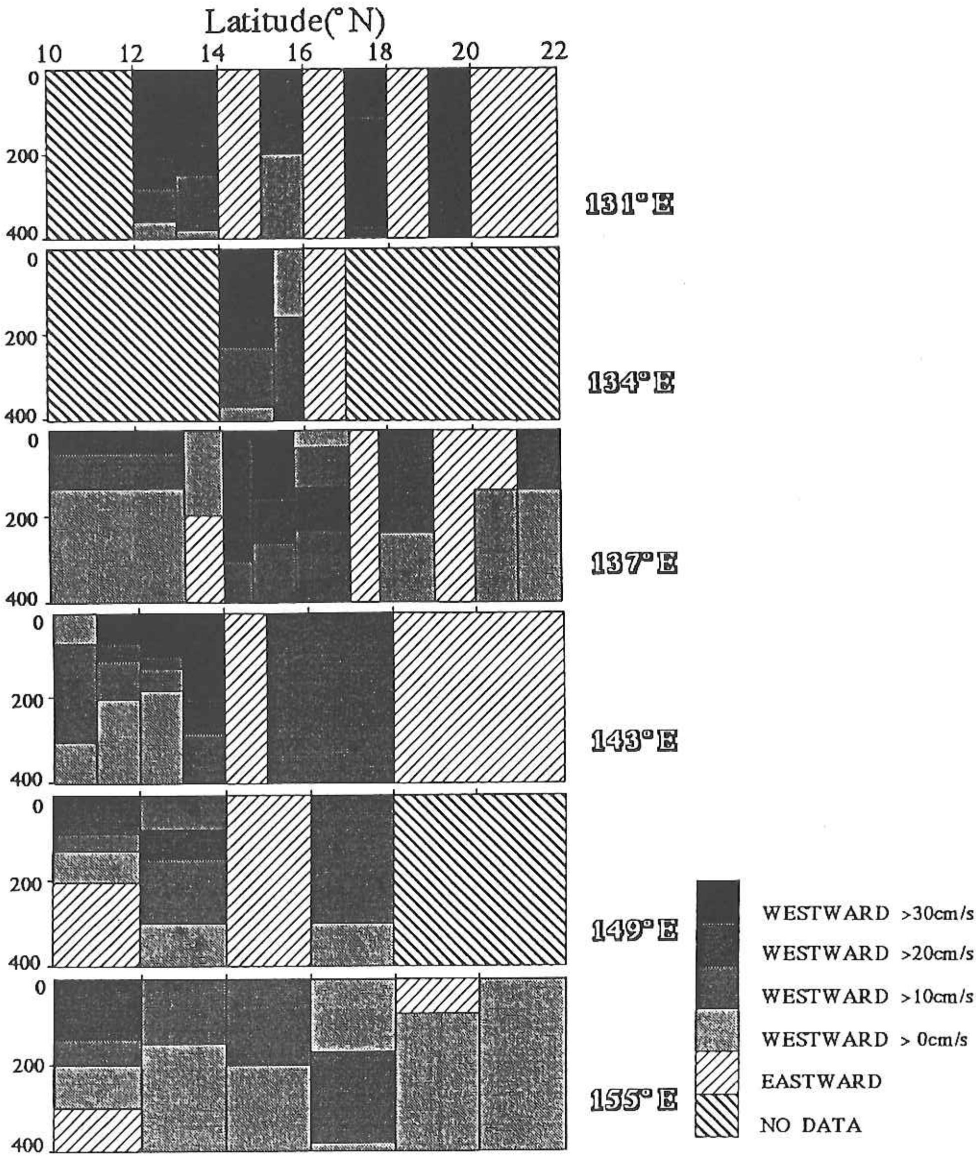


Figure 4　Geostrophic current velocity along each sections.

IV. Leptocephalus biology

Discovery of the spawning area for Japanese eel

The Scientific Members of the Expedition

AT the beginning of this century, the Danish oceanographer Johannes Schmidt outlined the spawning area of Atlantic eels *Anguilla* spp. in the Sargasso Sea [1,2]. However, the spawning location of the Japanese eel *A. japonica* in the Pacific Ocean has eluded researchers for over sixty years. We now report that the 1991 expedition by the research vessel Hakuho-maru of the Ocean Research Institute, University of Tokyo has discovered their spawning location. By measuring oceanographic conditions and collecting the transparent leaf-like eel larvae, termed leptocephali (see Fig. 1), we determined the Japanese eel spawning area to be in the North Equatorial Current west of the Mariana Islands, at a salinity front near 15°N, 140°E. This discovery shows that the key similarity between the spawning sites of Atlantic and Pacific eels is the placement of leptocephali into the major ocean currents that will return them to their juvenile rearing habitats.

After growing in fresh water habitats, adult eels migrate thousands of kilometers to breed in the ocean. This exceptional migratory pattern, termed diadromy [3], plus the economic importance of eels has attracted much research effort toward locating their oceanic breeding site. In the Atlantic Ocean, collections of small leptocephali [1,2,4-10] have identified that both the European, *A. anguilla*, and American eel, *A. rostrata* spawn in the Sargasso Sea. However, prior to our 1991 expedition the catch of leptocephali of the Japanese eel was too small to determine the spawning site. A previous collection of 110 leptocephali [11-16], plus the information gained from four previous expeditions [11-14] since 1973, suggested that the 1991 expedition of the Hakuho-Maru should establish a wide sampling grid between the Marshall and Philippine Islands.

The results were a remarkable collection of 958 leptocephali, located from 12-19°N latitude and 131-137°E longitude (Fig. 2). Most were within the margins of the North Equatorial Current, flowing westerly at about 12°N, while others were in complex eddies lying at the edge of this current but well south of the Subtropical Countercurrent flowing easterly at about 22°N. The leptocephali were found at 50-100 m depth with greatest abundance at 75 m. The leptocephali averaged 15.5±3.5 mm SD in TL, and ranged from 7.7 to 34.2 mm (Fig. 3). Smaller and thus younger leptocephali tended to be at the more southern and eastern stations.

At hatch, about 36 hrs after fertilization, eels are 3 mm TL [17,18]. Since leptocephali grow at 0.56 mm/day [19,20], the smallest leptocephali at the two most south-eastern locations (average TL=12.8 ± 2.8 mm SD, range=7.9~24.5 mm, n=239) would be about 19 days old after fertilization (range=10~40 days). The westerly current in which these leptocephali were found was flowing about 20 cm/sec (17.3 km/day). Therefore, these leptocephali probably traveled 328 kms (range=173~691 kms) from the spawning location of their parents. This identifies the geographic location of the spawning adults at roughly 15°N, 140°E (range=139~143°E). To test this calculation, the estimated spawning location for leptocephali collected 131°E (average TL=27.6 mm) would be about 138°E. This does not differ greatly from the above estimate, 140°E.

This spawning location corresponds to a salinity front, separating the less saline water mass of the North Equatorial Current from the typically high salinity of Tropical Water (Fig. 4). The reduced salinity in the frontal zone, or some associated features such as odor [20], may provide eel adults approaching from a northerly direction near the surface [22,23] with a cue to trigger cessation of migration and initiation of spawning [21]. The reproductive season of the eels is lengthy, from April-November [24], thus the precise spawning site may change with the location of salinity front. In addition, since adults will arrive along a broad east-west longitude depending on their Asian origin, the spawning region may span several longitudinal degrees. However, the salinity front provides an important hydrographic cue for spawning because it marks the North Equatorial Current which leads to the Kuroshio Current [25]. These major currents provide a means for returning the leptocephali to the coastal waters in Eastern Asia [24] from which the adults originated (Fig. 2).

Two important differences exist between the Atlantic and Pacific Ocean spawning sites. The northern limit of spawning in the Sargasso Sea is marked by a thermal front [26,27], while in the Pacific Ocean it is marked by a salinity front. This suggests that the physical trigger for eel spawning may differ. Comparing latitudes, eels breed at 25-30°N in the Atlantic Ocean [21], while in the Pacific Ocean it is much farther south, about 15°N. Thus latitude does not itself constrain spawning. Instead, the key similarity in both oceans is the position of the spawning areas relative to major currents, the Gulf Stream of the Atlantic Ocean [28] and the Kuroshio Current of the Pacific Ocean, that can return the offspring and thus complete the recruitment of the eels [24]. Natural selection has apparently favored a spawning location for eels in both oceans that enhances the transportation of leptocephali to their respective growth habitat.

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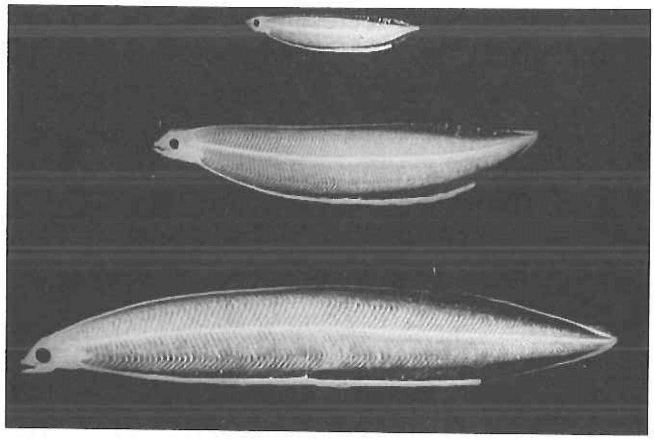

Fig. 1 Representative leptocephali of *Anguilla japonica* collected during the Hakuho-maru expedition in June-July 1991. Total lengths are 9.8, 21.6 and 33.5 mm.

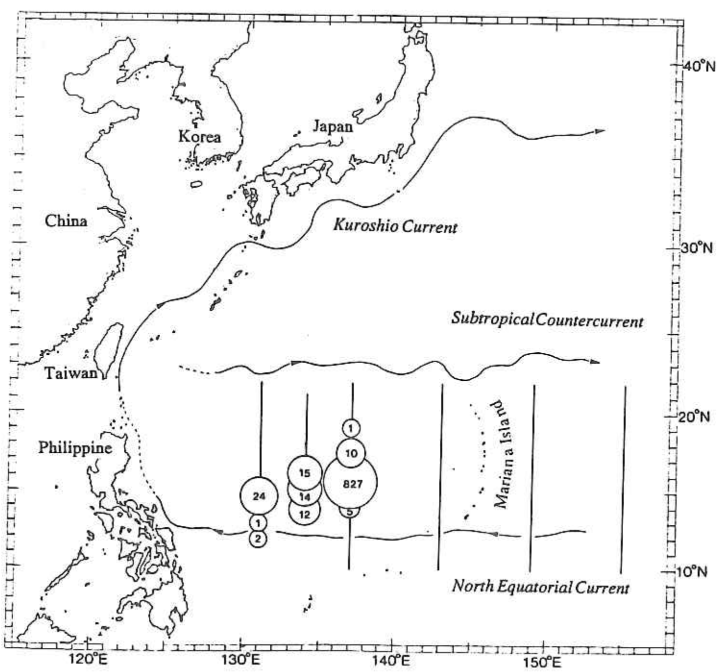

Fig. 2 The sampling stations at which Japanese eel leptocephali were found in June-July 1991. Six transects running north-south from 10-22° N, and between 131-155° E, were set as shown. Details of the sampling stations, gears, and methods were described in "Outline of the cruise".

Leptocephali were identified by counting myomers [29] and measured for total length. The specimens collected within 1° latitude were pooled for the sample sizes shown in circles on the map.

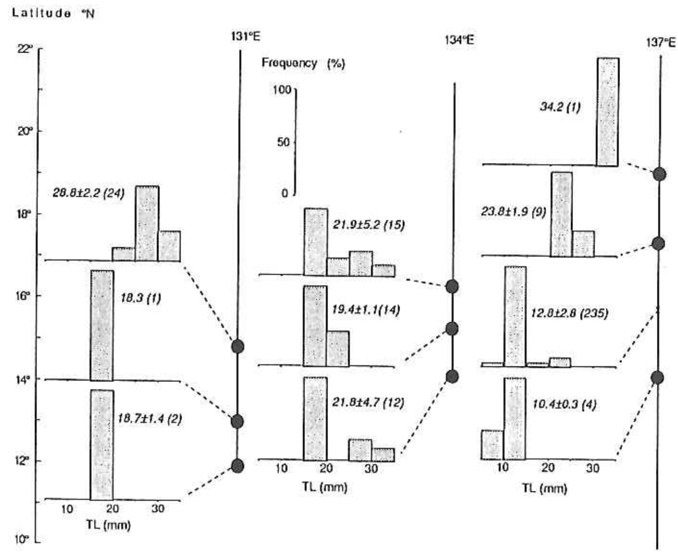

Fig. 3 The size frequency distribution and mean total length (±SD, mm) of leptocephali collected at the 10 successful stations on three transects (n = 317). Individual sample sizes are given in parentheses.

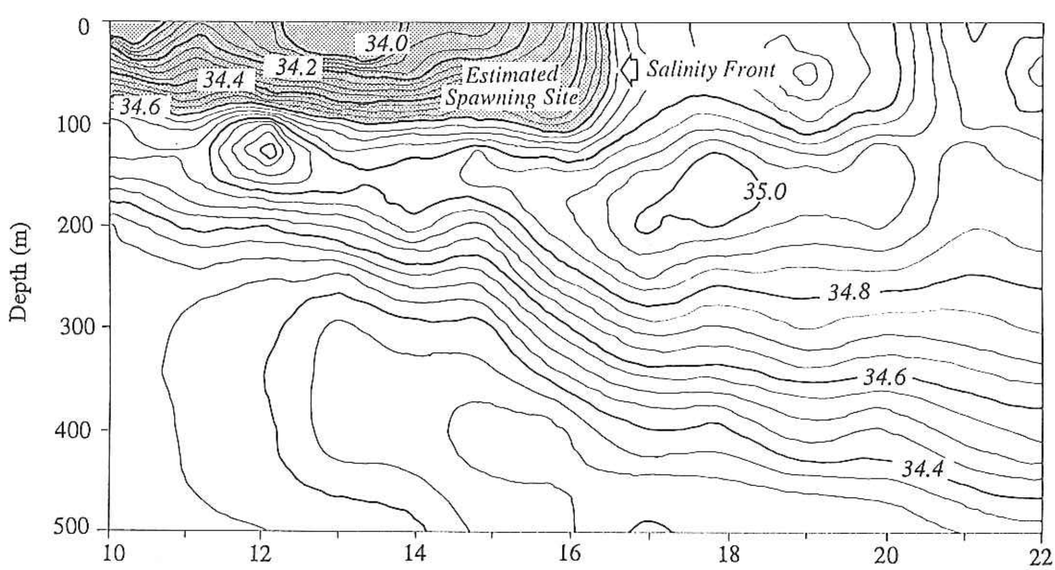

Fig. 4 The depth profile for salinity at the 137°E transect. Latitudinally, there is a discernible salinity front (arrow) at 16°N. Vertically, there is a halocline at 75-100 m deep. The low salinity surface water mass is shaded. In contrast to this major salinity gradient, there was very little change in water temperature. The estimated spawning site of the Japanese eel is shown.

Anguilla japonica leptocephali

Noritaka Mochioka, Tsuguo Otake and Katsumi Tsukamoto

A total of 958 specimens of *Anguilla japonica* leptocephali were collected during the cruise. Catalogue number, collection data, body size (mm TL), and total number of myomeres of the leptocephali are shown in Table 1.

These Anguilla leptocephali are characterized by having 112 - 120 total myomeres, with the exception of three small specimen. This characteristic fits only *Anguilla japonica* (Temminck et Schlegel) in the western North Pacific (Jespersen, 1942; Castle, 1963; Tabeta and Takai, 1975; Tabeta and Mochioka, 1988a). Although three small specimens in our collection, 7.7, 8.8 and 9.6 mm TL have 103, 106 and 109 myomeres, respectively, we concluded that myomere at the tip of tail in these larvae was in the process of formation. Small larvae less than ca. 20 mm TL has relatively deep bodies about 17 - 30 % in total length, and has 0-11 minute melanophores at the tip of tail. The number of the melanophores decreased with growth. Furthermore, larvae less than ca. 20 mm TL has the following features: 4 or 5 needle-like teeth on each jaw, median fin not yet differentiating, and nasal capsule and hypurals not forming. From these characteristics, we concluded that larvae less than ca. 20 mm in size were of the pre-leptocephalus (engyodontic) stage (Leiby, 1979; Tabeta and Mochioka, 1988b).

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

TL, total length in mm; TM, total myomeres; M, specimen condition at measurement, 1: fresh, 2: in 5% formalin; Pres, method of preservation, 1: in 5% formalin, 2: in 90% alcohol, 3:others.

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
1	A-24- 1	1991/6/30	A-24	IKPT	8.7	106	2	1
2	B-30- 1	1991/6/30	B-30	IKPT	9.6	115	2	1
3	B-32- 1	1991/7/1	B-32	IKPT	10.8	112	2	1
4	B-32- 2	1991/7/1	B-32	IKPT	11.8	119	2	1
5	B-34- 1	1991/7/1	B-34	IKPT	10.6	118	2	1
6	B-35- 1	1991/7/1	B-35	IKPT	8.6	115	2	1
7	C-1- 1	1991/7/1	C-1	IKPT	10.0	115	2	1
8	C-3- 1	1991/7/1	C-3	IKPT	10.5	115	2	1
9	A-25- 1	1991/7/1	A-25	IKPT	24.0	116	2	1
10	B-36- 1	1991/7/1	B-36	IKPT	11.6	112	1	3
11	B-36- 2	1991/7/1	B-36	IKPT	12.0		1	3
12	B-36- 3	1991/7/1	B-36	IKPT	23.9	117	1	3
13	B-36- 4	1991/7/1	B-36	IKPT	21.6		1	3
14	B-36- 5	1991/7/1	B-36	IKPT	22.6	114	2	1
15	B-36- 6	1991/7/1	B-36	IKPT	21.2	116	2	1
16	B-36- 7	1991/7/1	B-36	IKPT	20.3	113	2	1
17	B-36- 8	1991/7/1	B-36	IKPT	11.1	114	2	1
18	B-36- 9	1991/7/1	B-36	IKPT	11.9	115	2	1
19	B-36- 10	1991/7/1	B-36	IKPT	21.6	116	2	1
20	B-36- 11	1991/7/1	B-36	IKPT	11.7	117	2	1
21	B-36- 12	1991/7/1	B-36	IKPT	11.0	115	2	1
22	B-36- 13	1991/7/1	B-36	IKPT	9.5	116	2	1
23	B-36- 14	1991/7/1	B-36	IKPT	11.1	114	2	1
24	B-36- 15	1991/7/1	B-36	IKPT	10.0	113	2	1
25	B-36- 16	1991/7/1	B-36	IKPT	11.0	115	2	1
26	B-36- 17	1991/7/1	B-36	IKPT	10.6	114	2	1
27	B-36- 18	1991/7/1	B-36	IKPT	11.4	115	2	1
28	B-36- 19	1991/7/1	B-36	IKPT	11.0	114	2	1
29	B-36- 20	1991/7/1	B-36	IKPT	11.3	113	2	1
30	B-36- 21	1991/7/1	B-36	IKPT	11.6	113	2	1
31	B-36- 22	1991/7/1	B-36	IKPT	12.1	114	2	1
32	B-36- 23	1991/7/1	B-36	IKPT	11.7	117	2	1
33	B-36- 24	1991/7/1	B-36	IKPT	11.2	115	2	1
34	B-36- 25	1991/7/1	B-36	IKPT	11.4	112	2	1
35	B-36- 26	1991/7/1	B-36	IKPT	11.4	114	2	1
36	B-36- 27	1991/7/1	B-36	IKPT	11.6	112	2	1
37	B-36- 28	1991/7/1	B-36	IKPT	11.0	113	2	1
38	B-36- 29	1991/7/1	B-36	IKPT	10.9	114	2	1
39	B-36- 30	1991/7/1	B-36	IKPT	12.3	115	2	1
40	B-36- 31	1991/7/1	B-36	IKPT	10.5	114	2	1
41	B-36- 32	1991/7/1	B-36	IKPT	10.4	112	2	1
42	B-36- 33	1991/7/1	B-36	IKPT	10.0	113	2	1
43	B-36- 34	1991/7/1	B-36	IKPT	10.8	116	2	1
44	B-36- 35	1991/7/1	B-36	IKPT	11.9	112	2	1
45	B-36- 36	1991/7/1	B-36	IKPT	10.5	112	2	1
46	B-36- 37	1991/7/1	B-36	IKPT	11.0	117	2	1
47	B-36- 38	1991/7/1	B-36	IKPT	10.6	112	2	1
48	B-36- 39	1991/7/1	B-36	IKPT	11.6	113	2	1
49	B-36- 40	1991/7/1	B-36	IKPT	11.0	113	2	1
50	C-6- 1	1991/7/1	C-6	IKPT	7.7	103	2	1
51	C-6- 2	1991/7/1	C-6	IKPT	12.0	112	2	1
52	C-6- 3	1991/7/1	C-6	IKPT	12.9	117	2	1
53	C-6- 4	1991/7/1	C-6	IKPT	11.4	114	2	1
54	C-6- 5	1991/7/1	C-6	IKPT	10.5	114	2	1
55	C-6- 6	1991/7/1	C-6	IKPT	11.0	114	2	1
56	C-6- 7	1991/7/1	C-6	IKPT	10.3	115	2	1
57	C-6- 8	1991/7/1	C-6	IKPT	13.0		1	3
58	C-6- 9	1991/7/1	C-6	IKPT	14.0		1	3
59	C-6- 10	1991/7/1	C-6	IKPT	13.5		1	3
60	C-6- 11	1991/7/1	C-6	IKPT	13.3		1	3
61	C-6- 12	1991/7/1	C-6	IKPT	14.0		1	3
62	C-6- 13	1991/7/1	C-6	IKPT	13.8		1	3
63	C-6- 14	1991/7/1	C-6	IKPT	14.3		1	3
64	C-6- 15	1991/7/1	C-6	IKPT	14.6		1	3
65	C-6- 16	1991/7/1	C-6	IKPT	13.0		1	3
66	C-6- 17	1991/7/1	C-6	IKPT	11.5		1	3
67	C-6- 18	1991/7/1	C-6	IKPT	12.0		1	3
68	C-6- 19	1991/7/1	C-6	IKPT	12.2		1	3
69	C-6- 20	1991/7/1	C-6	IKPT	13.0		1	3
70	C-6- 21	1991/7/1	C-6	IKPT	13.0		1	3
71	C-6- 22	1991/7/1	C-6	IKPT	14.0		1	3
72	C-6- 23	1991/7/1	C-6	IKPT	13.5		1	3
73	C-6- 24	1991/7/1	C-6	IKPT	14.2		1	3
74	C-6- 25	1991/7/1	C-6	IKPT	12.3		1	3
75	C-6- 26	1991/7/1	C-6	IKPT	14.0		1	3
76	C-6- 27	1991/7/1	C-6	IKPT	14.0		1	3
77	C-6- 28	1991/7/1	C-6	IKPT	13.5		1	3
78	C-6- 29	1991/7/1	C-6	IKPT	14.0		1	3
79	C-6- 30	1991/7/1	C-6	IKPT	12.5		1	3
80	C-6- 31	1991/7/1	C-6	IKPT	12.5		1	3
81	C-6- 32	1991/7/1	C-6	IKPT	13.5		1	3
82	C-6- 33	1991/7/1	C-6	IKPT	13.0		1	3
83	C-6- 34	1991/7/1	C-6	IKPT	13.0		1	3
84	C-6- 35	1991/7/1	C-6	IKPT	11.0		1	3
85	C-6- 36	1991/7/1	C-6	IKPT	11.5		1	3
86	C-6- 37	1991/7/1	C-6	IKPT	12.5		1	3
87	C-6- 38	1991/7/1	C-6	IKPT	11.5		1	3
88	C-6- 39	1991/7/1	C-6	IKPT	11.0		1	3

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
89	C-7- 1	1991/7/1	C-7	IKPT	11.6	112	2	1
90	C-7- 2	1991/7/1	C-7	IKPT	12.5	114	2	1
91	C-7- 3	1991/7/1	C-7	IKPT	11.8	115	2	1
92	C-7- 4	1991/7/1	C-7	IKPT	13.6	114	2	1
93	C-7- 5	1991/7/1	C-7	IKPT	24.5	112	1	3
94	C-7- 6	1991/7/1	C-7	IKPT	20.6	112	1	3
95	C-7- 7	1991/7/1	C-7	IKPT	12.3	113	1	3
96	C-7- 8	1991/7/1	C-7	IKPT	10.6	112	1	3
97	C-7- 9	1991/7/1	C-7	IKPT	10.0	116	1	3
98	C-7- 10	1991/7/1	C-7	IKPT	12.9	114	1	3
99	C-7- 11	1991/7/1	C-7	IKPT	13.1	118	1	3
100	C-7- 12	1991/7/1	C-7	IKPT	13.0	112	1	3
101	C-7- 13	1991/7/1	C-7	IKPT	11.8	113	1	3
102	C-7- 14	1991/7/1	C-7	IKPT	11.6	116	1	3
103	C-7- 15	1991/7/1	C-7	IKPT	13.0	117	1	3
104	C-7- 16	1991/7/1	C-7	IKPT	12.0	115	1	3
105	C-7- 17	1991/7/1	C-7	IKPT	12.2	114	1	3
106	C-7- 18	1991/7/1	C-7	IKPT	11.8	112	1	3
107	C-7- 19	1991/7/1	C-7	IKPT	11.6		1	3
108	C-7- 20	1991/7/1	C-7	IKPT	14.5		1	3
109	C-7- 21	1991/7/1	C-7	IKPT	14.7		1	3
110	C-7- 22	1991/7/1	C-7	IKPT	13.7		1	3
111	C-7- 23	1991/7/1	C-7	IKPT	13.7		1	3
112	C-7- 24	1991/7/1	C-7	IKPT	14.2		1	3
113	C-7- 25	1991/7/1	C-7	IKPT	14.2		1	3
114	C-7- 26	1991/7/1	C-7	IKPT	14.7		1	3
115	C-7- 27	1991/7/1	C-7	IKPT	14.0		1	3
116	C-7- 28	1991/7/1	C-7	IKPT	15.0		1	3
117	C-7- 29	1991/7/1	C-7	IKPT	14.2		1	3
118	C-7- 30	1991/7/1	C-7	IKPT	12.5		1	2
119	C-7- 31	1991/7/1	C-7	IKPT	13.8		1	2
120	C-7- 32	1991/7/1	C-7	IKPT	14.0		1	2
121	C-7- 33	1991/7/1	C-7	IKPT	14.0		1	2
122	C-7- 34	1991/7/1	C-7	IKPT	15.0		1	2
123	C-7- 35	1991/7/1	C-7	IKPT	14.7		1	2
124	C-7- 36	1991/7/1	C-7	IKPT	16.0		1	2
125	C-8- 1	1991/7/1	C-8	IKPT	9.6	109	2	1
126	C-8- 2	1991/7/1	C-8	IKPT	10.6	115	2	1
127	C-8- 3	1991/7/1	C-8	IKPT	11.0		1	3
128	C-8- 4	1991/7/1	C-8	IKPT	12.0		1	3
129	C-8- 5	1991/7/1	C-8	IKPT	10.5		1	3
130	C-8- 6	1991/7/1	C-8	IKPT	12.0		1	3
131	C-8- 7	1991/7/1	C-8	IKPT	12.3		1	3
132	C-8- 8	1991/7/1	C-8	IKPT	12.6		1	3
133	C-8- 9	1991/7/1	C-8	IKPT	13.0		1	3
134	C-8- 10	1991/7/1	C-8	IKPT	10.5		1	3
135	C-8- 11	1991/7/1	C-8	IKPT	12.0		1	3
136	C-8- 12	1991/7/1	C-8	IKPT	11.3		1	3
137	C-8- 13	1991/7/1	C-8	IKPT	11.5		1	3
138	C-8- 14	1991/7/1	C-8	IKPT	13.0		1	3
139	C-8- 15	1991/7/1	C-8	IKPT	12.0		1	3
140	C-8- 16	1991/7/1	C-8	IKPT	13.0		1	3
141	C-8- 17	1991/7/1	C-8	IKPT	12.0		1	3
142	C-8- 18	1991/7/1	C-8	IKPT	11.2		1	3
143	C-8- 19	1991/7/1	C-8	IKPT	12.3		1	3
144	C-8- 20	1991/7/1	C-8	IKPT	12.0		1	3
145	C-8- 21	1991/7/1	C-8	IKPT	11.0		1	3
146	C-9- 1	1991/7/1	C-9	IKPT	10.5	115	2	2
147	C-9- 2	1991/7/1	C-9	IKPT	11.0		1	3
148	C-9- 3	1991/7/1	C-9	IKPT	12.0		1	3
149	C-9- 4	1991/7/1	C-9	IKPT	12.2		1	3
150	C-9- 5	1991/7/1	C-9	IKPT	11.0		1	3
151	C-9- 6	1991/7/1	C-9	IKPT	11.0		1	3
152	C-9- 7	1991/7/1	C-9	IKPT	11.3		1	3
153	C-9- 8	1991/7/1	C-9	IKPT	12.0		1	3
154	C-9- 9	1991/7/1	C-9	IKPT	10.5		1	3
155	C-9- 10	1991/7/1	C-9	IKPT	11.7		1	3
156	C-9- 11	1991/7/1	C-9	IKPT	12.2		1	3
157	C-9- 12	1991/7/1	C-9	IKPT	11.7		1	3
158	C-9- 13	1991/7/1	C-9	IKPT	11.0		1	3
159	C-9- 14	1991/7/1	C-9	IKPT	12.0		1	3
160	C-9- 15	1991/7/1	C-9	IKPT	12.2		1	3
161	C-9- 16	1991/7/1	C-9	IKPT	21.0		1	3
162	C-10-50- 1	1991/7/2	C-10	MTD(50m)	11.2	112	2	1
163	C-10-50- 2	1991/7/2	C-10	MTD(50m)	10.5	114	2	1
164	C-10-50- 3	1991/7/2	C-10	MTD(50m)	21.7	116	2	1
165	C-10-75- 1	1991/7/2	C-10	MTD(75m)	12.2	112	2	1
166	C-10-75- 2	1991/7/2	C-10	MTD(75m)	10.5	112	2	1
167	C-10-75- 3	1991/7/2	C-10	MTD(75m)	11.6	116	2	1
168	C-10-75- 4	1991/7/2	C-10	MTD(75m)	11.2	115	2	1
169	C-10-75- 5	1991/7/2	C-10	MTD(75m)	11.3	113	2	1
170	C-10-75- 6	1991/7/2	C-10	MTD(75m)	11.1	114	2	1
171	C-10-75- 7	1991/7/2	C-10	MTD(75m)	11.6	114	2	1
172	C-10-75- 8	1991/7/2	C-10	MTD(75m)	11.7	115	2	1
173	C-10-75- 9	1991/7/2	C-10	MTD(75m)	11.0	114	2	1
174	C-10-75- 10	1991/7/2	C-10	MTD(75m)	11.2	116	2	1
175	C-10-75- 11	1991/7/2	C-10	MTD(75m)	11.0	112	2	1
176	C-10-75- 12	1991/7/2	C-10	MTD(75m)	10.0	117	2	1

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
177	C-10-75- 13	1991/7/2	C-10	MTD(75m)	10.8	113	2	1
178	C-10-75- 14	1991/7/2	C-10	MTD(75m)	11.0	115	2	1
179	C-10-75- 15	1991/7/2	C-10	MTD(75m)	12.3	115	2	1
180	C-10-75- 16	1991/7/2	C-10	MTD(75m)	11.7	113	2	1
181	C-10-100- 1	1991/7/2	C-10	MTD(100m)	11.2	114	2	1
182	C-10-100- 2	1991/7/2	C-10	MTD(100m)	11.0	116	2	1
183	C-11- 1	1991/7/2	C-11	IKPT	11.8	117	2	1
184	C-11- 2	1991/7/2	C-11	IKPT	11.7	115	2	1
185	C-11- 3	1991/7/2	C-11	IKPT	10.8	118	2	1
186	C-11- 4	1991/7/2	C-11	IKPT	11.9	119	2	1
187	C-11- 5	1991/7/2	C-11	IKPT	11.7	120	2	1
188	C-11- 6	1991/7/2	C-11	IKPT	11.8	114	2	1
189	C-11- 7	1991/7/2	C-11	IKPT	13.5	116	2	1
190	C-11- 8	1991/7/2	C-11	IKPT	10.3	117	2	1
191	C-11- 9	1991/7/2	C-11	IKPT	13.5	113	2	1
192	C-11- 10	1991/7/2	C-11	IKPT	12.7	115	2	1
193	C-11- 11	1991/7/2	C-11	IKPT	12.6	118	2	1
194	C-11- 12	1991/7/2	C-11	IKPT	10.3	115	2	1
195	C-11- 13	1991/7/2	C-11	IKPT	11.5	115	2	1
196	C-11- 14	1991/7/2	C-11	IKPT	13.0	116	2	1
197	C-11- 15	1991/7/2	C-11	IKPT	11.5	112	2	1
198	C-11- 16	1991/7/2	C-11	IKPT	10.0	112	2	1
199	C-11- 17	1991/7/2	C-11	IKPT	12.5	117	2	1
200	C-11- 18	1991/7/2	C-11	IKPT	12.7	115	2	1
201	C-11- 19	1991/7/2	C-11	IKPT	11.9	117	2	1
202	C-11- 20	1991/7/2	C-11	IKPT	12.3	112	2	1
203	C-11- 21	1991/7/2	C-11	IKPT	10.3	117	2	1
204	C-11- 22	1991/7/2	C-11	IKPT	12.1	115	2	1
205	C-11- 23	1991/7/2	C-11	IKPT	9.9	117	2	1
206	C-11- 24	1991/7/2	C-11	IKPT	11.0	115	2	1
207	C-11- 25	1991/7/2	C-11	IKPT	10.5	112	2	1
208	C-11- 26	1991/7/2	C-11	IKPT	10.1	114	2	1
209	C-11- 27	1991/7/2	C-11	IKPT	11.0	112	2	1
210	C-11- 28	1991/7/2	C-11	IKPT	10.2	114	2	1
211	C-11- 29	1991/7/2	C-11	IKPT	10.3	116	2	1
212	C-11- 30	1991/7/2	C-11	IKPT	11.5	119	2	1
213	C-11- 31	1991/7/2	C-11	IKPT	11.3		2	1
214	C-11- 32	1991/7/2	C-11	IKPT	11.3	112	2	1
215	C-11- 33	1991/7/2	C-11	IKPT	9.6	112	2	1
216	C-11- 34	1991/7/2	C-11	IKPT	11.1	114	2	1
217	C-11- 35	1991/7/2	C-11	IKPT	10.9	116	2	1
218	C-11- 36	1991/7/2	C-11	IKPT	11.1		2	1
219	C-11- 37	1991/7/2	C-11	IKPT	11.0	117	2	1
220	C-11- 38	1991/7/2	C-11	IKPT	12.0	117	2	1
221	C-11- 39	1991/7/2	C-11	IKPT	9.3	112	2	1
222	C-11- 40	1991/7/2	C-11	IKPT	11.5	116	2	1
223	C-11- 41	1991/7/2	C-11	IKPT	11.6	113	2	1
224	C-11- 42	1991/7/2	C-11	IKPT	13.3	113	2	1
225	C-11- 43	1991/7/2	C-11	IKPT	11.6	117	2	1
226	C-11- 44	1991/7/2	C-11	IKPT	11.6	120	2	1
227	C-11- 45	1991/7/2	C-11	IKPT	11.3	119	2	1
228	C-11- 46	1991/7/2	C-11	IKPT	10.0	118	2	1
229	C-11- 47	1991/7/2	C-11	IKPT	13.8	115	2	1
230	C-11- 48	1991/7/2	C-11	IKPT	13.3	115	2	1
231	C-11- 49	1991/7/2	C-11	IKPT	13.3	120	2	1
232	C-11- 50	1991/7/2	C-11	IKPT	10.0	112	2	1
233	C-11- 51	1991/7/2	C-11	IKPT	7.7		2	1
234	C-11- 52	1991/7/2	C-11	IKPT	23.0		1	3
235	C-11- 53	1991/7/2	C-11	IKPT	12.2		1	3
236	C-11- 54	1991/7/2	C-11	IKPT	20.5		1	3
237	C-11- 55	1991/7/2	C-11	IKPT	11.5		1	3
238	C-11- 56	1991/7/2	C-11	IKPT	11.4		1	3
239	C-11- 57	1991/7/2	C-11	IKPT	10.7		1	3
240	C-11- 58	1991/7/2	C-11	IKPT	13.0		1	3
241	C-11- 59	1991/7/2	C-11	IKPT	12.0		1	3
242	C-11- 60	1991/7/2	C-11	IKPT	12.8		1	3
243	C-11- 61	1991/7/2	C-11	IKPT	12.5		1	3
244	C-11- 62	1991/7/2	C-11	IKPT	12.3		1	3
245	C-11- 63	1991/7/2	C-11	IKPT	11.3		1	3
246	C-11- 64	1991/7/2	C-11	IKPT	10.5		1	3
247	C-11- 65	1991/7/2	C-11	IKPT	13.2		1	3
248	C-11- 66	1991/7/2	C-11	IKPT	12.0		1	3
249	C-11- 67	1991/7/2	C-11	IKPT	10.2		1	3
250	C-11- 68	1991/7/2	C-11	IKPT	12.0		1	3
251	C-11- 69	1991/7/2	C-11	IKPT	12.0		1	3
252	C-11- 70	1991/7/2	C-11	IKPT	10.2		1	3
253	C-11- 71	1991/7/2	C-11	IKPT	11.0		1	3
254	C-11- 72	1991/7/2	C-11	IKPT	10.7		1	3
255	C-11- 73	1991/7/2	C-11	IKPT	10.1		1	3
256	C-11- 74	1991/7/2	C-11	IKPT	14.0		1	3
257	C-11- 75	1991/7/2	C-11	IKPT	11.0		1	3
258	C-11- 76	1991/7/2	C-11	IKPT	12.2		1	3
259	C-11- 77	1991/7/2	C-11	IKPT	13.0		1	3
260	C-11- 78	1991/7/2	C-11	IKPT	22.2		1	3
261	C-11- 79	1991/7/2	C-11	IKPT	13.7		1	2
262	C-12- 1	1991/7/2	C-12	IKPT	21.5	112	2	1
263	C-12- 2	1991/7/2	C-12	IKPT	10.6	118	2	1
264	C-12- 3	1991/7/2	C-12	IKPT	14.0	116	2	1

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
265	C-12- 4	1991/7/2	C-12	IKPT	12.0	118	2	1
266	C-12- 5	1991/7/2	C-12	IKPT	10.6	118	2	1
267	C-12- 6	1991/7/2	C-12	IKPT	10.8	117	2	1
268	C-12- 7	1991/7/2	C-12	IKPT	11.0	115	2	1
269	C-12- 8	1991/7/2	C-12	IKPT	10.2	118	2	1
270	C-12- 9	1991/7/2	C-12	IKPT	10.7	113	2	1
271	C-12- 10	1991/7/2	C-12	IKPT	11.9	118	2	1
272	C-12- 11	1991/7/2	C-12	IKPT	10.8	118	2	1
273	C-12- 12	1991/7/2	C-12	IKPT	12.0	113	2	1
274	C-12- 13	1991/7/2	C-12	IKPT	11.0	119	2	1
275	C-12- 14	1991/7/2	C-12	IKPT	10.9	116	2	1
276	C-12- 15	1991/7/2	C-12	IKPT	11.0	115	2	1
277	C-12- 16	1991/7/2	C-12	IKPT	12.7	113	2	1
278	C-12- 17	1991/7/2	C-12	IKPT	10.5	112	2	1
279	C-12- 18	1991/7/2	C-12	IKPT	10.7	116	2	1
280	C-12- 19	1991/7/2	C-12	IKPT	10.1	112	2	1
281	C-12- 20	1991/7/2	C-12	IKPT	11.5	112	2	1
282	C-12- 21	1991/7/2	C-12	IKPT	11.1	116	2	1
283	C-12- 22	1991/7/2	C-12	IKPT	11.5	114	2	1
284	C-12- 23	1991/7/2	C-12	IKPT	11.3	118	2	1
285	C-12- 24	1991/7/2	C-12	IKPT	11.5	114	2	1
286	C-12- 25	1991/7/2	C-12	IKPT	11.5	117	2	1
287	C-12- 26	1991/7/2	C-12	IKPT	11.5	112	2	1
288	C-12- 27	1991/7/2	C-12	IKPT	10.5	112	2	1
289	C-12- 28	1991/7/2	C-12	IKPT	10.3	112	2	1
290	C-12- 29	1991/7/2	C-12	IKPT	9.9	112	2	1
291	C-12- 30	1991/7/2	C-12	IKPT	12.1	120	2	1
292	C-12- 31	1991/7/2	C-12	IKPT	11.3	112	2	1
293	C-12- 32	1991/7/2	C-12	IKPT	13.2	115	2	1
294	C-12- 33	1991/7/2	C-12	IKPT	11.7	112	2	1
295	C-12- 34	1991/7/2	C-12	IKPT	12.1	113	2	1
296	C-12- 35	1991/7/2	C-12	IKPT	12.5	112	2	1
297	C-12- 36	1991/7/2	C-12	IKPT	11.6	114	2	1
298	C-12- 37	1991/7/2	C-12	IKPT	12.5	116	2	1
299	C-12- 38	1991/7/2	C-12	IKPT	11.0	116	2	1
300	C-12- 39	1991/7/2	C-12	IKPT	11.1	114	2	1
301	C-12- 40	1991/7/2	C-12	IKPT	11.1	117	2	1
302	C-12- 41	1991/7/2	C-12	IKPT	10.6	116	2	1
303	C-12- 42	1991/7/2	C-12	IKPT	11.5	113	2	1
304	C-12- 43	1991/7/2	C-12	IKPT	10.5	116	2	1
305	C-12- 44	1991/7/2	C-12	IKPT	10.2	118	2	1
306	C-12- 45	1991/7/2	C-12	IKPT	10.2	116	2	1
307	C-12- 46	1991/7/2	C-12	IKPT	12.8	112	2	1
308	C-12- 47	1991/7/2	C-12	IKPT	10.1	119	2	1
309	C-12- 48	1991/7/2	C-12	IKPT	13.2	117	2	1
310	C-12- 49	1991/7/2	C-12	IKPT	10.3	118	2	1
311	C-12- 50	1991/7/2	C-12	IKPT	11.4	112	2	1
312	C-12- 51	1991/7/2	C-12	IKPT	10.2		2	1
313	C-12- 52	1991/7/2	C-12	IKPT	10.1		2	1
314	C-12- 53	1991/7/2	C-12	IKPT	10.9		2	1
315	C-12- 54	1991/7/2	C-12	IKPT	11.2		2	1
316	C-12- 55	1991/7/2	C-12	IKPT	11.0		2	1
317	C-12- 56	1991/7/2	C-12	IKPT	10.5		2	1
318	C-12- 57	1991/7/2	C-12	IKPT	10.4		2	1
319	C-12- 58	1991/7/2	C-12	IKPT	9.4		2	1
320	C-12- 59	1991/7/2	C-12	IKPT	10.7		2	1
321	C-12- 60	1991/7/2	C-12	IKPT	10.2		2	1
322	C-12- 61	1991/7/2	C-12	IKPT	10.3		2	1
323	C-12- 62	1991/7/2	C-12	IKPT	10.4		2	1
324	C-12- 63	1991/7/2	C-12	IKPT	11.1		2	1
325	C-12- 64	1991/7/2	C-12	IKPT	10.4		2	1
326	C-12- 65	1991/7/2	C-12	IKPT	10.4		2	1
327	C-12- 66	1991/7/2	C-12	IKPT	12.0		2	1
328	C-12- 67	1991/7/2	C-12	IKPT	10.0		2	1
329	C-12- 68	1991/7/2	C-12	IKPT	10.2		2	1
330	C-12- 69	1991/7/2	C-12	IKPT	10.0		2	1
331	C-12- 70	1991/7/2	C-12	IKPT	11.1		2	1
332	C-12- 71	1991/7/2	C-12	IKPT	10.8		2	1
333	C-12- 72	1991/7/2	C-12	IKPT	10.7		2	1
334	C-12- 73	1991/7/2	C-12	IKPT	10.6		2	1
335	C-12- 74	1991/7/2	C-12	IKPT	10.2		2	1
336	C-12- 75	1991/7/2	C-12	IKPT	10.5		2	1
337	C-12- 76	1991/7/2	C-12	IKPT	11.1		2	1
338	C-12- 77	1991/7/2	C-12	IKPT	9.7		2	1
339	C-12- 78	1991/7/2	C-12	IKPT	10.5		2	1
340	C-12- 79	1991/7/2	C-12	IKPT	10.3		2	1
341	C-12- 80	1991/7/2	C-12	IKPT	10.5		2	1
342	C-12- 81	1991/7/2	C-12	IKPT	10.2		2	1
343	C-12- 82	1991/7/2	C-12	IKPT	11.2		2	1
344	C-12- 83	1991/7/2	C-12	IKPT	11.3		2	1
345	C-12- 84	1991/7/2	C-12	IKPT	11.1		2	1
346	C-12- 85	1991/7/2	C-12	IKPT	10.7		2	1
347	C-12- 86	1991/7/2	C-12	IKPT	10.7		2	1
348	C-12- 87	1991/7/2	C-12	IKPT	11.1		2	1
349	C-12- 88	1991/7/2	C-12	IKPT	10.3		2	1
350	C-12- 89	1991/7/2	C-12	IKPT	11.7		2	1
351	C-12- 90	1991/7/2	C-12	IKPT	11.0		2	1
352	C-12- 91	1991/7/2	C-12	IKPT	11.2		2	1

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
353	C-12- 92	1991/7/2	C-12	IKPT	10.0		2	1
354	C-12- 93	1991/7/2	C-12	IKPT	11.4		2	1
355	C-12- 94	1991/7/2	C-12	IKPT	10.5		2	1
356	C-12- 95	1991/7/2	C-12	IKPT	10.5		2	1
357	C-12- 96	1991/7/2	C-12	IKPT	11.0		2	1
358	C-12- 97	1991/7/2	C-12	IKPT	10.9		2	1
359	C-12- 98	1991/7/2	C-12	IKPT	11.1		2	1
360	C-12- 99	1991/7/2	C-12	IKPT	10.9		2	1
361	C-12- 100	1991/7/2	C-12	IKPT	11.2		2	1
362	C-12- 101	1991/7/2	C-12	IKPT	11.5		2	1
363	C-12- 102	1991/7/2	C-12	IKPT	10.5		2	1
364	C-12- 103	1991/7/2	C-12	IKPT	10.2		2	1
365	C-12- 104	1991/7/2	C-12	IKPT	10.5		2	1
366	C-12- 105	1991/7/2	C-12	IKPT	10.3		2	1
367	C-12- 106	1991/7/2	C-12	IKPT	11.0		2	1
368	C-12- 107	1991/7/2	C-12	IKPT	10.0		2	1
369	C-12- 108	1991/7/2	C-12	IKPT	9.9		2	1
370	C-12- 109	1991/7/2	C-12	IKPT	9.5		2	1
371	C-12- 110	1991/7/2	C-12	IKPT	9.0		2	1
372	C-12- 111	1991/7/2	C-12	IKPT	10.0		2	1
373	C-12- 112	1991/7/2	C-12	IKPT	10.2		2	1
374	C-12- 113	1991/7/2	C-12	IKPT	10.7		2	1
375	C-12- 114	1991/7/2	C-12	IKPT	10.8		2	1
376	C-12- 115	1991/7/2	C-12	IKPT	10.5		2	1
377	C-12- 116	1991/7/2	C-12	IKPT	11.2		2	1
378	C-12- 117	1991/7/2	C-12	IKPT	11.2		2	1
379	C-12- 118	1991/7/2	C-12	IKPT	10.0		2	1
380	C-12- 119	1991/7/2	C-12	IKPT	12.0		2	1
381	C-12- 120	1991/7/2	C-12	IKPT	12.8		2	1
382	C-12- 121	1991/7/2	C-12	IKPT	11.5		2	1
383	C-12- 122	1991/7/2	C-12	IKPT	10.5		2	1
384	C-12- 123	1991/7/2	C-12	IKPT	11.1		2	1
385	C-12- 124	1991/7/2	C-12	IKPT	10.6		2	1
386	C-12- 125	1991/7/2	C-12	IKPT	9.5		2	1
387	C-12- 126	1991/7/2	C-12	IKPT	10.5		2	1
388	C-12- 127	1991/7/2	C-12	IKPT	10.2		2	1
389	C-12- 128	1991/7/2	C-12	IKPT	11.5		2	1
390	C-12- 129	1991/7/2	C-12	IKPT	11.1		2	1
391	C-12- 130	1991/7/2	C-12	IKPT	11.8		2	1
392	C-12- 131	1991/7/2	C-12	IKPT	10.9		2	1
393	C-12- 132	1991/7/2	C-12	IKPT	11.3		2	1
394	C-12- 133	1991/7/2	C-12	IKPT	11.1		2	1
395	C-12- 134	1991/7/2	C-12	IKPT	10.8		2	1
396	C-12- 135	1991/7/2	C-12	IKPT	10.6		2	1
397	C-12- 136	1991/7/2	C-12	IKPT	10.8		2	1
398	C-12- 137	1991/7/2	C-12	IKPT	10.8		2	1
399	C-12- 138	1991/7/2	C-12	IKPT	11.3		2	1
400	C-12- 139	1991/7/2	C-12	IKPT	11.2		2	1
401	C-12- 140	1991/7/2	C-12	IKPT	10.6		2	1
402	C-12- 141	1991/7/2	C-12	IKPT	10.5		2	1
403	C-12- 142	1991/7/2	C-12	IKPT	10.2		2	1
404	C-12- 143	1991/7/2	C-12	IKPT	9.7		2	1
405	C-12- 144	1991/7/2	C-12	IKPT	9.7		2	1
406	C-12- 145	1991/7/2	C-12	IKPT	11.5		2	1
407	C-12- 146	1991/7/2	C-12	IKPT	10.3		2	1
408	C-12- 147	1991/7/2	C-12	IKPT	10.1		2	1
409	C-12- 148	1991/7/2	C-12	IKPT	10.2		2	1
410	C-12- 149	1991/7/2	C-12	IKPT	10.7		2	1
411	C-12- 150	1991/7/2	C-12	IKPT	11.7		2	1
412	C-12- 151	1991/7/2	C-12	IKPT	11.3		2	1
413	C-12- 152	1991/7/2	C-12	IKPT	10.2		2	1
414	C-12- 153	1991/7/2	C-12	IKPT	10.8		2	1
415	C-12- 154	1991/7/2	C-12	IKPT	10.0		2	1
416	C-12- 155	1991/7/2	C-12	IKPT	9.8		2	1
417	C-12- 156	1991/7/2	C-12	IKPT	11.5		2	1
418	C-12- 157	1991/7/2	C-12	IKPT	10.2		2	1
419	C-12- 158	1991/7/2	C-12	IKPT	10.6		2	1
420	C-12- 159	1991/7/2	C-12	IKPT	10.4		2	1
421	C-12- 160	1991/7/2	C-12	IKPT	9.3		2	1
422	C-12- 161	1991/7/2	C-12	IKPT	9.9		2	1
423	C-12- 162	1991/7/2	C-12	IKPT	9.5	118	2	1
424	C-12- 163	1991/7/2	C-12	IKPT	12.2		2	1
425	C-12- 164	1991/7/2	C-12	IKPT	11.5		2	1
426	C-12- 165	1991/7/2	C-12	IKPT	13.0		2	1
427	C-12- 166	1991/7/2	C-12	IKPT	11.8		2	1
428	C-12- 167	1991/7/2	C-12	IKPT	11.0		2	1
429	C-12- 168	1991/7/2	C-12	IKPT	11.0		2	1
430	C-12- 169	1991/7/2	C-12	IKPT	10.4		2	1
431	C-12- 170	1991/7/2	C-12	IKPT	13.3		2	1
432	C-12- 171	1991/7/2	C-12	IKPT	11.0		2	1
433	C-12- 172	1991/7/2	C-12	IKPT	11.3		2	1
434	C-12- 173	1991/7/2	C-12	IKPT	10.5		2	1
435	C-12- 174	1991/7/2	C-12	IKPT	10.6		2	1
436	C-12- 175	1991/7/2	C-12	IKPT	10.3		2	1
437	C-12- 176	1991/7/2	C-12	IKPT	10.5	116	2	3
438	C-12- 177	1991/7/2	C-12	IKPT	12.3	119	2	1
439	C-12- 178	1991/7/2	C-12	IKPT	11.8	118	2	3
440	C-12- 179	1991/7/2	C-12	IKPT	12.2	117	2	3
441	C-12- 180	1991/7/2	C-12	IKPT	10.8	114	2	3
442	C-12- 181	1991/7/2	C-12	IKPT	13.0	117	2	1
443	C-12- 182	1991/7/2	C-12	IKPT	11.3		2	1
444	C-12- 183	1991/7/2	C-12	IKPT	23.5		1	3
445	C-12- 184	1991/7/2	C-12	IKPT	11.3		1	3
446	C-12- 185	1991/7/2	C-12	IKPT	13.0		1	3
447	C-12- 186	1991/7/2	C-12	IKPT	12.0		1	3
448	C-12- 187	1991/7/2	C-12	IKPT	11.5		1	3
449	C-12- 188	1991/7/2	C-12	IKPT	11.5		1	3
450	C-12- 189	1991/7/2	C-12	IKPT	11.5		1	3
451	C-12- 190	1991/7/2	C-12	IKPT	10.2		1	3
452	C-12- 191	1991/7/2	C-12	IKPT	11.5		1	3
453	C-12- 192	1991/7/2	C-12	IKPT	11.5		1	3
454	C-12- 193	1991/7/2	C-12	IKPT	11.0		1	3
455	C-12- 194	1991/7/2	C-12	IKPT	12.0		1	3
456	C-12- 195	1991/7/2	C-12	IKPT	11.5		1	3
457	C-12- 196	1991/7/2	C-12	IKPT	11.3		1	3
458	C-12- 197	1991/7/2	C-12	IKPT	12.0		1	3
459	C-12- 198	1991/7/2	C-12	IKPT	11.3		1	3
460	C-12- 199	1991/7/2	C-12	IKPT	12.2		1	3
461	C-12- 200	1991/7/2	C-12	IKPT	12.0		1	3
462	C-12- 201	1991/7/2	C-12	IKPT	11.5		1	3
463	C-12- 202	1991/7/2	C-12	IKPT	11.5		1	3
464	C-12- 203	1991/7/2	C-12	IKPT	11.0		1	3
465	C-12- 204	1991/7/2	C-12	IKPT	12.2		1	3
466	C-12- 205	1991/7/2	C-12	IKPT	11.5		1	3
467	C-12- 206	1991/7/2	C-12	IKPT	10.0		1	3
468	C-12- 207	1991/7/2	C-12	IKPT	13.5		1	3
469	C-12- 208	1991/7/2	C-12	IKPT	11.2		1	3
470	C-12- 209	1991/7/2	C-12	IKPT	12.3		1	3
471	C-12- 210	1991/7/2	C-12	IKPT	10.0		1	3
472	C-12- 211	1991/7/2	C-12	IKPT	12.0	115	1	3
473	C-12- 212	1991/7/2	C-12	IKPT	11.1	116	1	3
474	C-12- 213	1991/7/2	C-12	IKPT	11.5	113	1	3
475	C-12- 214	1991/7/2	C-12	IKPT	11.2	116	1	3
476	C-12- 215	1991/7/2	C-12	IKPT	11.2	117	1	3
477	C-13- 1	1991/7/2	C-13	IKPT	13.6	113	2	1
478	C-13- 2	1991/7/2	C-13	IKPT	14.2	116	2	1
479	C-13- 3	1991/7/2	C-13	IKPT	14.1	117	2	1
480	C-13- 4	1991/7/2	C-13	IKPT	11.5	118	2	1
481	C-13- 5	1991/7/2	C-13	IKPT	13.0	118	2	1
482	C-13- 6	1991/7/2	C-13	IKPT	14.2	113	2	1
483	C-13- 7	1991/7/2	C-13	IKPT	12.2	115	2	1
484	C-13- 8	1991/7/2	C-13	IKPT	13.1	116	2	1
485	C-13- 9	1991/7/2	C-13	IKPT	12.3	112	2	1
486	C-13- 10	1991/7/2	C-13	IKPT	10.8	117	2	1
487	C-13- 11	1991/7/2	C-13	IKPT	13.0	113	2	1
488	C-13- 12	1991/7/2	C-13	IKPT	14.0	117	2	1
489	C-13- 13	1991/7/2	C-13	IKPT	12.1	119	2	1
490	C-13- 14	1991/7/2	C-13	IKPT	12.7	115	2	1
491	C-13- 15	1991/7/2	C-13	IKPT	11.8	120	2	1
492	C-13- 16	1991/7/2	C-13	IKPT	11.7	120	2	1
493	C-13- 17	1991/7/2	C-13	IKPT	12.6	118	2	1
494	C-13- 18	1991/7/2	C-13	IKPT	13.3	112	2	1
495	C-13- 19	1991/7/2	C-13	IKPT	13.2	117	2	1
496	C-13- 20	1991/7/2	C-13	IKPT	12.9	117	2	1
497	C-13- 21	1991/7/2	C-13	IKPT	13.5	115	2	1
498	C-13- 22	1991/7/2	C-13	IKPT	12.2	116	2	1
499	C-13- 23	1991/7/2	C-13	IKPT	11.9	114	2	1
500	C-13- 24	1991/7/2	C-13	IKPT	13.5	115	2	1
501	C-13- 25	1991/7/2	C-13	IKPT	12.2+		2	1
502	C-13- 26	1991/7/2	C-13	IKPT	14.8	117	2	1
503	C-13- 27	1991/7/2	C-13	IKPT	12.1	115	2	1
504	C-13- 28	1991/7/2	C-13	IKPT	10.7	115	2	1
505	C-13- 29	1991/7/2	C-13	IKPT	11.5	116	2	1
506	C-13- 30	1991/7/2	C-13	IKPT	13.3	112	2	1
507	C-13- 31	1991/7/2	C-13	IKPT	11.3	117	2	1
508	C-13- 32	1991/7/2	C-13	IKPT	11.7	117	2	1
509	C-13- 33	1991/7/2	C-13	IKPT	11.7	118	2	1
510	C-13- 34	1991/7/2	C-13	IKPT	12.3	118	2	1
511	C-13- 35	1991/7/2	C-13	IKPT	12.8	113	2	1
512	C-13- 36	1991/7/2	C-13	IKPT	13.8	116	2	1
513	C-13- 37	1991/7/2	C-13	IKPT	12.0	117	2	1
514	C-13- 38	1991/7/2	C-13	IKPT	12.2	115	2	1
515	C-13- 39	1991/7/2	C-13	IKPT	11.2	119	2	1
516	C-13- 40	1991/7/2	C-13	IKPT	12.9	120	2	1
517	C-13- 41	1991/7/2	C-13	IKPT	10.5	115	2	1
518	C-13- 42	1991/7/2	C-13	IKPT	12.7	118	2	1
519	C-13- 43	1991/7/2	C-13	IKPT	11.6	112	2	1
520	C-13- 44	1991/7/2	C-13	IKPT	13.4	117	2	1
521	C-13- 45	1991/7/2	C-13	IKPT	11.1	114	2	1
522	C-13- 46	1991/7/2	C-13	IKPT	12.2	115	2	1
523	C-13- 47	1991/7/2	C-13	IKPT	13.8		2	1
524	C-13- 48	1991/7/2	C-13	IKPT	12.5	116	2	1
525	C-13- 49	1991/7/2	C-13	IKPT	13.7	120	2	1
526	C-13- 50	1991/7/2	C-13	IKPT	12.1	116	2	1
527	C-13- 51	1991/7/2	C-13	IKPT	12.9	117	2	1
528	C-13- 52	1991/7/2	C-13	IKPT	11.4	116	2	1

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
529	C-13- 53	1991/7/2	C-13	IKPT	10.7	113	2	1
530	C-13- 54	1991/7/2	C-13	IKPT	13.0	115	2	1
531	C-13- 55	1991/7/2	C-13	IKPT	11.6	115	2	1
532	C-13- 56	1991/7/2	C-13	IKPT	12.7	117	2	1
533	C-13- 57	1991/7/2	C-13	IKPT	13.1	116	2	1
534	C-13- 58	1991/7/2	C-13	IKPT	11.5	114	2	1
535	C-13- 59	1991/7/2	C-13	IKPT	12.6	114	2	1
536	C-13- 60	1991/7/2	C-13	IKPT	14.8	113	2	1
537	C-13- 61	1991/7/2	C-13	IKPT	12.4	114	2	1
538	C-13- 62	1991/7/2	C-13	IKPT	12.5	120	2	1
539	C-13- 63	1991/7/2	C-13	IKPT	12.4	117	2	1
540	C-13- 64	1991/7/2	C-13	IKPT	13.0	114	2	1
541	C-13- 65	1991/7/2	C-13	IKPT	12.0	117	2	1
542	C-13- 66	1991/7/2	C-13	IKPT	12.5	114	2	1
543	C-13- 67	1991/7/2	C-13	IKPT	11.6	115	2	1
544	C-13- 68	1991/7/2	C-13	IKPT	12.1	114	2	1
545	C-13- 69	1991/7/2	C-13	IKPT	12.6	115	2	1
546	C-13- 70	1991/7/2	C-13	IKPT	11.7	114	2	1
547	C-13- 71	1991/7/2	C-13	IKPT	11.6	119	2	1
548	C-13- 72	1991/7/2	C-13	IKPT	12.0	115	2	1
549	C-13- 73	1991/7/2	C-13	IKPT	11.2	114	2	1
550	C-13- 74	1991/7/2	C-13	IKPT	12.1	112	2	1
551	C-13- 75	1991/7/2	C-13	IKPT	14.9	114	2	1
552	C-13- 76	1991/7/2	C-13	IKPT	13.2	114	2	1
553	C-13- 77	1991/7/2	C-13	IKPT	13.8	117	2	1
554	C-13- 78	1991/7/2	C-13	IKPT	11.4	120	2	1
555	C-13- 79	1991/7/2	C-13	IKPT	11.5	115	2	1
556	C-13- 80	1991/7/2	C-13	IKPT	13.7	120	2	1
557	C-13- 81	1991/7/2	C-13	IKPT	14.4	116	2	1
558	C-13- 82	1991/7/2	C-13	IKPT	12.5	115	2	1
559	C-13- 83	1991/7/2	C-13	IKPT	11.6	115	2	1
560	C-13- 84	1991/7/2	C-13	IKPT	12.1	117	2	1
561	C-13- 85	1991/7/2	C-13	IKPT	12.4	114	2	1
562	C-13- 86	1991/7/2	C-13	IKPT	13.0	114	2	1
563	C-13- 87	1991/7/2	C-13	IKPT	11.5		2	1
564	C-13- 88	1991/7/2	C-13	IKPT	12.7	112	2	1
565	C-13- 89	1991/7/2	C-13	IKPT	11.5	115	2	1
566	C-13- 90	1991/7/2	C-13	IKPT	11.6	116	2	1
567	C-13- 91	1991/7/2	C-13	IKPT	11.4	115	2	1
568	C-13- 92	1991/7/2	C-13	IKPT	12.4	112	2	1
569	C-13- 93	1991/7/2	C-13	IKPT	12.1	117	2	1
570	C-13- 94	1991/7/2	C-13	IKPT	14.0	119	2	1
571	C-13- 95	1991/7/2	C-13	IKPT	13.3	118	2	1
572	C-13- 96	1991/7/2	C-13	IKPT	13.0	119	2	1
573	C-13- 97	1991/7/2	C-13	IKPT	11.6	116	2	1
574	C-13- 98	1991/7/2	C-13	IKPT	13.5	116	2	1
575	C-13- 99	1991/7/2	C-13	IKPT	12.3	119	2	1
576	C-13- 100	1991/7/2	C-13	IKPT	11.9	115	2	1
577	C-13- 101	1991/7/2	C-13	IKPT	12.1	116	2	1
578	C-13- 102	1991/7/2	C-13	IKPT	11.8	117	2	1
579	C-13- 103	1991/7/2	C-13	IKPT	11.1	112	2	1
580	C-13- 104	1991/7/2	C-13	IKPT	11.1	114	2	1
581	C-13- 105	1991/7/2	C-13	IKPT	12.1	117	2	1
582	C-13- 106	1991/7/2	C-13	IKPT	12.3	118	2	1
583	C-13- 107	1991/7/2	C-13	IKPT	11.6	118	2	1
584	C-13- 108	1991/7/2	C-13	IKPT	13.9	119	2	1
585	C-13- 109	1991/7/2	C-13	IKPT	12.1	113	2	1
586	C-13- 110	1991/7/2	C-13	IKPT	12.6	112	2	1
587	C-13- 111	1991/7/2	C-13	IKPT	13.2	119	2	1
588	C-13- 112	1991/7/2	C-13	IKPT	12.6	114	2	1
589	C-13- 113	1991/7/2	C-13	IKPT	13.1	119	2	1
590	C-13- 114	1991/7/2	C-13	IKPT	13.0+		2	1
591	C-13- 115	1991/7/2	C-13	IKPT	14.7	117	2	1
592	C-13- 116	1991/7/2	C-13	IKPT	12.1	116	2	1
593	C-13- 117	1991/7/2	C-13	IKPT	13.1	115	2	1
594	C-13- 118	1991/7/2	C-13	IKPT	12.1	118	2	1
595	C-13- 119	1991/7/2	C-13	IKPT	12.6	117	2	1
596	C-13- 120	1991/7/2	C-13	IKPT	11.8	115	2	1
597	C-13- 121	1991/7/2	C-13	IKPT	11.2	118	2	1
598	C-13- 122	1991/7/2	C-13	IKPT	12.4	119	2	1
599	C-13- 123	1991/7/2	C-13	IKPT	11.8	115	2	1
600	C-13- 124	1991/7/2	C-13	IKPT	13.0	114	2	1
601	C-13- 125	1991/7/2	C-13	IKPT	12.1		2	1
602	C-13- 126	1991/7/2	C-13	IKPT	11.4	116	2	1
603	C-13- 127	1991/7/2	C-13	IKPT	12.2	119	2	1
604	C-13- 128	1991/7/2	C-13	IKPT	13.0	116	2	1
605	C-13- 129	1991/7/2	C-13	IKPT	13.1	116	2	1
606	C-13- 130	1991/7/2	C-13	IKPT	10.4	118	2	1
607	C-13- 131	1991/7/2	C-13	IKPT	11.2	118	2	1
608	C-13- 132	1991/7/2	C-13	IKPT	12.4	119	2	1
609	C-13- 133	1991/7/2	C-13	IKPT	11.1	118	2	1
610	C-13- 134	1991/7/2	C-13	IKPT	11.1	113	2	1
611	C-13- 135	1991/7/2	C-13	IKPT	11.9	117	2	1
612	C-13- 136	1991/7/2	C-13	IKPT	12.3	120	2	1
613	C-13- 137	1991/7/2	C-13	IKPT	14.1	118	2	1
614	C-13- 138	1991/7/2	C-13	IKPT	12.8	117	2	1
615	C-13- 139	1991/7/2	C-13	IKPT	11.5	117	2	1
616	C-13- 140	1991/7/2	C-13	IKPT	12.1	115	2	1

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
617	C-13- 141	1991/7/2	C-13	IKPT	11.4	114	2	1
618	C-13- 142	1991/7/2	C-13	IKPT	12.2	118	2	1
619	C-13- 143	1991/7/2	C-13	IKPT	11.9	116	2	1
620	C-13- 144	1991/7/2	C-13	IKPT	11.4	120	2	1
621	C-13- 145	1991/7/2	C-13	IKPT	14.2	114	2	1
622	C-13- 146	1991/7/2	C-13	IKPT	13.3	120	2	1
623	C-13- 147	1991/7/2	C-13	IKPT	11.2	119	2	1
624	C-13- 148	1991/7/2	C-13	IKPT	12.3	118	2	1
625	C-13- 149	1991/7/2	C-13	IKPT	13.5	118	2	1
626	C-13- 150	1991/7/2	C-13	IKPT	12.0		2	1
627	C-13- 151	1991/7/2	C-13	IKPT	12.2	118	2	1
628	C-13- 152	1991/7/2	C-13	IKPT	13.5	119	2	1
629	C-13- 153	1991/7/2	C-13	IKPT	11.0	116	2	1
630	C-13- 154	1991/7/2	C-13	IKPT	13.1	115	2	1
631	C-13- 155	1991/7/2	C-13	IKPT	13.0	120	2	1
632	C-13- 156	1991/7/2	C-13	IKPT	12.5	118	2	1
633	C-13- 157	1991/7/2	C-13	IKPT	12.1	116	2	1
634	C-13- 158	1991/7/2	C-13	IKPT	12.0	117	2	1
635	C-13- 159	1991/7/2	C-13	IKPT	11.7	117	2	1
636	C-13- 160	1991/7/2	C-13	IKPT	13.3	116	2	1
637	C-13- 161	1991/7/2	C-13	IKPT	12.2	117	2	1
638	C-13- 162	1991/7/2	C-13	IKPT	11.4	114	2	1
639	C-13- 163	1991/7/2	C-13	IKPT	14.7	118	2	1
640	C-13- 164	1991/7/2	C-13	IKPT	11.6	117	2	1
641	C-13- 165	1991/7/2	C-13	IKPT	11.1	119	2	1
642	C-13- 166	1991/7/2	C-13	IKPT	12.8		2	1
643	C-13- 167	1991/7/2	C-13	IKPT	12.9	117	2	1
644	C-13- 168	1991/7/2	C-13	IKPT	11.6	116	2	1
645	C-13- 169	1991/7/2	C-13	IKPT	11.6	117	2	1
646	C-13- 170	1991/7/2	C-13	IKPT	13.1	119	2	1
647	C-13- 171	1991/7/2	C-13	IKPT	13.4	116	2	1
648	C-13- 172	1991/7/2	C-13	IKPT	11.1	117	2	1
649	C-13- 173	1991/7/2	C-13	IKPT	12.0	120	2	1
650	C-13- 174	1991/7/2	C-13	IKPT	12.6	117	2	1
651	C-13- 175	1991/7/2	C-13	IKPT	11.3	117	2	1
652	C-13- 176	1991/7/2	C-13	IKPT	11.5		2	1
653	C-13- 177	1991/7/2	C-13	IKPT	12.8		2	1
654	C-13- 178	1991/7/2	C-13	IKPT	12.2		2	1
655	C-13- 179	1991/7/2	C-13	IKPT	12.2		2	1
656	C-13- 180	1991/7/2	C-13	IKPT	12.0		2	1
657	C-13- 181	1991/7/2	C-13	IKPT	13.9		2	1
658	C-13- 182	1991/7/2	C-13	IKPT	11.2		2	1
659	C-13- 183	1991/7/2	C-13	IKPT	11.4		2	1
660	C-13- 184	1991/7/2	C-13	IKPT	13.5		2	1
661	C-13- 185	1991/7/2	C-13	IKPT	13.2		2	1
662	C-13- 186	1991/7/2	C-13	IKPT	11.8		2	1
663	C-13- 187	1991/7/2	C-13	IKPT	13.2		2	1
664	C-13- 188	1991/7/2	C-13	IKPT	12.2		2	1
665	C-13- 189	1991/7/2	C-13	IKPT	11.0		2	1
666	C-13- 190	1991/7/2	C-13	IKPT	11.1		2	1
667	C-13- 191	1991/7/2	C-13	IKPT	11.2		2	1
668	C-13- 192	1991/7/2	C-13	IKPT	10.5		2	1
669	C-13- 193	1991/7/2	C-13	IKPT	11.7		2	1
670	C-13- 194	1991/7/2	C-13	IKPT	13.6		2	1
671	C-13- 195	1991/7/2	C-13	IKPT	13.3		2	1
672	C-13- 196	1991/7/2	C-13	IKPT	11.9		2	1
673	C-13- 197	1991/7/2	C-13	IKPT	11.1		2	1
674	C-13- 198	1991/7/2	C-13	IKPT	11.6		2	1
675	C-13- 199	1991/7/2	C-13	IKPT	11.2		2	1
676	C-13- 200	1991/7/2	C-13	IKPT	10.5		2	1
677	C-13- 201	1991/7/2	C-13	IKPT	13.1		2	1
678	C-13- 202	1991/7/2	C-13	IKPT	11.8		2	1
679	C-13- 203	1991/7/2	C-13	IKPT	11.3		2	1
680	C-13- 204	1991/7/2	C-13	IKPT	11.1		2	1
681	C-13- 205	1991/7/2	C-13	IKPT	10.8		2	1
682	C-13- 206	1991/7/2	C-13	IKPT	11.1		2	1
683	C-13- 207	1991/7/2	C-13	IKPT	11.8		2	1
684	C-13- 208	1991/7/2	C-13	IKPT	12.0		2	1
685	C-13- 209	1991/7/2	C-13	IKPT	12.5		2	1
686	C-13- 210	1991/7/2	C-13	IKPT	12.0		2	1
687	C-13- 211	1991/7/2	C-13	IKPT	11.7		2	1
688	C-13- 212	1991/7/2	C-13	IKPT	11.3		2	1
689	C-13- 213	1991/7/2	C-13	IKPT	11.5		2	1
690	C-13- 214	1991/7/2	C-13	IKPT	11.5		2	1
691	C-13- 215	1991/7/2	C-13	IKPT	15.0		2	1
692	C-13- 216	1991/7/2	C-13	IKPT	12.2		2	1
693	C-13- 217	1991/7/2	C-13	IKPT	12.3		2	1
694	C-13- 218	1991/7/2	C-13	IKPT	13.4		2	1
695	C-13- 219	1991/7/2	C-13	IKPT	12.5		2	1
696	C-13- 220	1991/7/2	C-13	IKPT	12.2		2	1
697	C-13- 221	1991/7/2	C-13	IKPT	11.2		2	1
698	C-13- 222	1991/7/2	C-13	IKPT	13.5		2	1
699	C-13- 223	1991/7/2	C-13	IKPT	11.5		2	1
700	C-13- 224	1991/7/2	C-13	IKPT	12.3		2	1
701	C-13- 225	1991/7/2	C-13	IKPT	14.3		2	1
702	C-13- 226	1991/7/2	C-13	IKPT	12.3		2	1
703	C-13- 227	1991/7/2	C-13	IKPT	10.1		2	1
704	C-13- 228	1991/7/2	C-13	IKPT	12.1		2	1

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
705	C-13- 229	1991/7/2	C-13	IKPT	11.1		2	1
706	C-13- 230	1991/7/2	C-13	IKPT	11.0		2	1
707	C-13- 231	1991/7/2	C-13	IKPT	11.7		2	1
708	C-13- 232	1991/7/2	C-13	IKPT	12.3		2	1
709	C-13- 233	1991/7/2	C-13	IKPT	11.1		2	1
710	C-13- 234	1991/7/2	C-13	IKPT	10.2+		2	1
711	C-13- 235	1991/7/2	C-13	IKPT	10.3		2	1
712	C-13- 236	1991/7/2	C-13	IKPT	14.2		2	1
713	C-13- 237	1991/7/2	C-13	IKPT	11.6		2	1
714	C-13- 238	1991/7/2	C-13	IKPT	13.0		2	1
715	C-13- 239	1991/7/2	C-13	IKPT	12.7		2	1
716	C-13- 240	1991/7/2	C-13	IKPT	10.7		2	1
717	C-13- 241	1991/7/2	C-13	IKPT	10.3		2	1
718	C-13- 242	1991/7/2	C-13	IKPT	10.3		2	1
719	C-13- 243	1991/7/2	C-13	IKPT	12.0		2	1
720	C-13- 244	1991/7/2	C-13	IKPT	12.7		2	1
721	C-13- 245	1991/7/2	C-13	IKPT	11.0		2	1
722	C-13- 246	1991/7/2	C-13	IKPT	12.3		2	1
723	C-13- 247	1991/7/2	C-13	IKPT	13.1		2	1
724	C-13- 248	1991/7/2	C-13	IKPT	20.8		1	2
725	C-13- 249	1991/7/2	C-13	IKPT	23.3		1	2
726	C-13- 250	1991/7/2	C-13	IKPT	11.0		1	2
727	C-13- 251	1991/7/2	C-13	IKPT	12.5		1	2
728	C-13- 252	1991/7/2	C-13	IKPT	11.0		1	2
729	C-13- 253	1991/7/2	C-13	IKPT	11.1		1	2
730	C-13- 254	1991/7/2	C-13	IKPT	9.0		1	2
731	C-13- 255	1991/7/2	C-13	IKPT	12.7		1	2
732	C-13- 256	1991/7/2	C-13	IKPT	11.3		1	2
733	C-13- 257	1991/7/2	C-13	IKPT	11.0		1	2
734	C-13- 258	1991/7/2	C-13	IKPT	13.0		1	2
735	C-13- 259	1991/7/2	C-13	IKPT	14.0		1	2
736	C-13- 260	1991/7/2	C-13	IKPT	11.1		1	2
737	C-13- 261	1991/7/2	C-13	IKPT	12.3		1	2
738	C-13- 262	1991/7/2	C-13	IKPT	11.5		1	2
739	C-13- 263	1991/7/2	C-13	IKPT	9.3		1	2
740	C-13- 264	1991/7/2	C-13	IKPT	10.2		1	2
741	C-13- 265	1991/7/2	C-13	IKPT	11.2		1	2
742	C-13- 266	1991/7/2	C-13	IKPT	13.0		1	2
743	C-13- 267	1991/7/2	C-13	IKPT	11.6		1	2
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745	C-13- 269	1991/7/2	C-13	IKPT	11.0		1	3
746	C-13- 270	1991/7/2	C-13	IKPT	12.0		1	3
747	C-13- 271	1991/7/2	C-13	IKPT	12.0		1	3
748	C-13- 272	1991/7/2	C-13	IKPT	11.2		1	3
749	C-13- 273	1991/7/2	C-13	IKPT	11.5		1	3
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751	C-13- 275	1991/7/2	C-13	IKPT	11.3		1	3
752	C-13- 276	1991/7/2	C-13	IKPT	12.0		1	3
753	C-13- 277	1991/7/2	C-13	IKPT	13.0		1	3
754	C-13- 278	1991/7/2	C-13	IKPT	11.7		1	3
755	C-13- 279	1991/7/2	C-13	IKPT	12.0		1	3
756	C-13- 280	1991/7/2	C-13	IKPT	11.5		1	3
757	C-13- 281	1991/7/2	C-13	IKPT	12.5		1	3
758	C-13- 282	1991/7/2	C-13	IKPT	11.0		1	3
759	C-13- 283	1991/7/2	C-13	IKPT	12.0		1	3
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761	C-13- 285	1991/7/2	C-13	IKPT	12.0		1	3
762	C-13- 286	1991/7/2	C-13	IKPT	11.8		1	3
763	C-13- 287	1991/7/2	C-13	IKPT	10.5		1	3
764	C-13- 288	1991/7/2	C-13	IKPT	11.0		1	3
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768	C-13- 292	1991/7/2	C-13	IKPT	12.0		1	3
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771	C-13- 295	1991/7/2	C-13	IKPT	12.0		1	3
772	C-13- 296	1991/7/2	C-13	IKPT	12.0		1	3
773	C-13- 297	1991/7/2	C-13	IKPT	13.0		1	3
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776	C-14- 3	1991/7/2	C-14	IKPT	11.1		2	1
777	C-14- 4	1991/7/2	C-14	IKPT	11.3		2	1
778	C-14- 5	1991/7/2	C-14	IKPT	11.5		2	1
779	C-14- 6	1991/7/2	C-14	IKPT	11.1		2	1
780	C-14- 7	1991/7/2	C-14	IKPT	14.0		2	1
781	C-14- 8	1991/7/2	C-14	IKPT	11.6		2	1
782	C-14- 9	1991/7/2	C-14	IKPT	13.3		2	1
783	C-14- 10	1991/7/2	C-14	IKPT	12.3		2	1
784	C-14- 11	1991/7/2	C-14	IKPT	11.6		2	1
785	C-14- 12	1991/7/2	C-14	IKPT	13.0		2	1
786	C-14- 13	1991/7/2	C-14	IKPT	12.5		2	1
787	C-14- 14	1991/7/2	C-14	IKPT	11.0		2	1
788	C-14- 15	1991/7/2	C-14	IKPT	12.5		2	1
789	C-14- 16	1991/7/2	C-14	IKPT	12.4		2	1
790	C-14- 17	1991/7/2	C-14	IKPT	12.2		2	1
791	C-14- 18	1991/7/2	C-14	IKPT	11.2		2	1
792	C-14- 19	1991/7/2	C-14	IKPT	13.1		2	1

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
793	C-14- 20	1991/7/2	C-14	IKPT	12.2		2	1
794	C-14- 21	1991/7/2	C-14	IKPT	13.8		2	1
795	C-14- 22	1991/7/2	C-14	IKPT	12.1		2	1
796	C-14- 23	1991/7/2	C-14	IKPT	13.8		2	1
797	C-14- 24	1991/7/2	C-14	IKPT	11.3		2	1
798	C-14- 25	1991/7/2	C-14	IKPT	12.1		2	1
799	C-14- 26	1991/7/2	C-14	IKPT	11.1		2	1
800	C-14- 27	1991/7/2	C-14	IKPT	12.5		2	1
801	C-14- 28	1991/7/2	C-14	IKPT	11.4		2	1
802	C-14- 29	1991/7/2	C-14	IKPT	14.8		2	1
803	C-14- 30	1991/7/2	C-14	IKPT	11.9		2	1
804	C-14- 31	1991/7/2	C-14	IKPT	12.9		2	1
805	C-14- 32	1991/7/2	C-14	IKPT	11.2		2	1
806	C-14- 33	1991/7/2	C-14	IKPT	11.5		2	1
807	C-14- 34	1991/7/2	C-14	IKPT	12.0		2	1
808	C-14- 35	1991/7/2	C-14	IKPT	12.1		2	1
809	C-14- 36	1991/7/2	C-14	IKPT	11.2		2	1
810	C-14- 37	1991/7/2	C-14	IKPT	12.1		2	1
811	C-14- 38	1991/7/2	C-14	IKPT	12.1		2	1
812	C-14- 39	1991/7/2	C-14	IKPT	11.7		2	1
813	C-14- 40	1991/7/2	C-14	IKPT	11.4		2	1
814	C-14- 41	1991/7/2	C-14	IKPT	12.6		2	1
815	C-14- 42	1991/7/2	C-14	IKPT	12.2		2	1
816	C-14- 43	1991/7/2	C-14	IKPT	10.6		2	1
817	C-14- 44	1991/7/2	C-14	IKPT	13.1		2	1
818	C-14- 45	1991/7/2	C-14	IKPT	11.9		2	1
819	C-14- 46	1991/7/2	C-14	IKPT	12.5		2	1
820	C-14- 47	1991/7/2	C-14	IKPT	11.8		2	1
821	C-14- 48	1991/7/2	C-14	IKPT	14.8		2	1
822	C-14- 49	1991/7/2	C-14	IKPT	11.6		2	1
823	C-14- 50	1991/7/2	C-14	IKPT	11.5		2	1
824	C-14- 51	1991/7/2	C-14	IKPT	12.5		2	1
825	C-14- 52	1991/7/2	C-14	IKPT	11.6		2	1
826	C-14- 53	1991/7/2	C-14	IKPT	12.9		2	1
827	C-14- 54	1991/7/2	C-14	IKPT	11.8		2	1
828	C-14- 55	1991/7/2	C-14	IKPT	12.0		2	1
829	C-14- 56	1991/7/2	C-14	IKPT	11.4		2	1
830	C-14- 57	1991/7/2	C-14	IKPT	12.5		2	1
831	C-14- 58	1991/7/2	C-14	IKPT	13.6		2	1
832	C-14- 59	1991/7/2	C-14	IKPT	11.5		2	1
833	C-14- 60	1991/7/2	C-14	IKPT	12.0		2	1
834	C-14- 61	1991/7/2	C-14	IKPT	11.6		2	1
835	C-14- 62	1991/7/2	C-14	IKPT	12.5		2	1
836	C-14- 63	1991/7/2	C-14	IKPT	10.6		2	1
837	C-14- 64	1991/7/2	C-14	IKPT	23.5		1	2
838	C-14- 65	1991/7/2	C-14	IKPT	22.6		1	2
839	C-14- 66	1991/7/2	C-14	IKPT	22.1		1	2
840	C-14- 67	1991/7/2	C-14	IKPT	10.7		1	2
841	C-14- 68	1991/7/2	C-14	IKPT	14.1		1	2
842	C-14- 69	1991/7/2	C-14	IKPT	12.0		1	2
843	C-14- 70	1991/7/2	C-14	IKPT	14.0		1	2
844	C-14- 71	1991/7/2	C-14	IKPT	12.5		1	2
845	C-14- 72	1991/7/2	C-14	IKPT	12.0		1	2
846	C-14- 73	1991/7/2	C-14	IKPT	13.5		1	2
847	C-14- 74	1991/7/2	C-14	IKPT	10.8		1	2
848	C-14- 75	1991/7/2	C-14	IKPT	12.5		1	2
849	C-14- 76	1991/7/2	C-14	IKPT	13.5		1	2
850	C-14- 77	1991/7/2	C-14	IKPT	12.0		1	2
851	C-14- 78	1991/7/2	C-14	IKPT	13.0		1	2
852	C-14- 79	1991/7/2	C-14	IKPT	11.5		1	2
853	C-14- 80	1991/7/2	C-14	IKPT	10.2		1	2
854	C-14- 81	1991/7/2	C-14	IKPT	11.0		1	3
855	C-14- 82	1991/7/2	C-14	IKPT	11.8		1	3
856	C-14- 83	1991/7/2	C-14	IKPT	10.3		1	3
857	C-14- 84	1991/7/2	C-14	IKPT	12.2		1	3
858	C-14- 85	1991/7/2	C-14	IKPT	11.8		1	3
859	C-14- 86	1991/7/2	C-14	IKPT	11.0		1	3
860	C-14- 87	1991/7/2	C-14	IKPT	11.0		1	3
861	C-14- 88	1991/7/2	C-14	IKPT	11.5		1	3
862	C-14- 89	1991/7/2	C-14	IKPT	14.0		1	3
863	C-14- 90	1991/7/2	C-14	IKPT	11.0		1	3
864	C-14- 91	1991/7/2	C-14	IKPT	11.5		1	3
865	C-14- 92	1991/7/2	C-14	IKPT	10.8		1	3
866	C-14- 93	1991/7/2	C-14	IKPT	11.5		1	3
867	C-14- 94	1991/7/2	C-14	IKPT	11.5		1	3
868	C-15- 1	1991/7/2	C-15	IKPT	14.0		1	2
869	C-15- 2	1991/7/2	C-15	IKPT	10.3		1	2
870	C-15- 3	1991/7/2	C-15	IKPT	14.7		1	2
871	C-15- 4	1991/7/2	C-15	IKPT	13.6		1	2
872	C-15- 5	1991/7/2	C-15	IKPT	12.6		1	2
873	C-15- 6	1991/7/2	C-15	IKPT	14.3		1	2
874	C-15- 7	1991/7/2	C-15	IKPT	14.9	114	2	1
875	C-15- 8	1991/7/2	C-15	IKPT	11.3	117	2	3
876	C-16-150- 1	1991/7/2	C-16	MTD(150m)	16.6	113	2	2
877	B-37- 1	1991/7/2	B-37	IKPT	22.2	116	2	1
878	B-37- 2	1991/7/2	B-37	IKPT	25.6	113	2	1
879	B-37- 3	1991/7/2	B-37	IKPT	22.0	115	1	3
880	C-17- 1	1991/7/2	C-17	IKPT	21.0	117	1	3

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres
881	C-17- 2	1991/7/2	C-17	IKPT	26.3	114	2	1
882	C-18- 1	1991/7/2	C-18	IKPT	12.9	113	2	1
883	C-20- 1	1991/7/3	C-20	IKPT	23.5	115	2	1
884	C-20- 2	1991/7/3	C-20	IKPT	23.9	113	2	1
885	C-20- 3	1991/7/3	C-20	IKPT	23.5	114	1	3
886	C-20- 4	1991/7/3	C-20	IKPT	24.2	114	1	3
887	B-39- 1	1991/7/3	B-39	IKPT	33.4	113	2	1
888	C'-35- 1	1991/7/15	C'-35	IKPT	24.2	115	1	3
889	C'-35- 2	1991/7/15	C'-35	IKPT	23.5	114	1	3
890	C'-35- 3	1991/7/15	C'-35	IKPT	27.6	115	1	3
891	C'-35- 4	1991/7/15	C'-35	IKPT	28.6	117	1	3
892	C'-35- 5	1991/7/15	C'-35	IKPT	26.2	115	2	1
893	C'-36- 1	1991/7/15	C'-36	IKPT	29.8	118	1	3
894	C'-36- 2	1991/7/15	C'-36	IKPT	32.7	114	1	3
895	C'-36- 3	1991/7/15	C'-36	IKPT	31.5	113	2	1
896	C'-37- 1	1991/7/16	C'-37	IKPT	31.0	114	1	3
897	C'-37- 2	1991/7/16	C'-37	IKPT	29.0	115	2	1
898	C'-38- 1	1991/7/16	C'-38	IKPT	28.7	112	1	3
899	C'-38- 2	1991/7/16	C'-38	IKPT	28.5	116	1	3
900	C'-38- 3	1991/7/16	C'-38	IKPT	29.2	115	1	3
901	C'-39- 1	1991/7/16	C'-39	IKPT	30.0	115	1	3
902	C'-39- 2	1991/7/16	C'-39	IKPT	30.0	117	1	3
903	C'-39- 3	1991/7/16	C'-39	IKPT	26.8	112	1	3
904	C'-39- 4	1991/7/16	C'-39	IKPT	28.0	117	1	3
905	C'-39- 5	1991/7/16	C'-39	IKPT	27.0	114	1	2
906	C'-39- 6	1991/7/16	C'-39	IKPT	28.8	117	2	1
907	C'-39- 7	1991/7/16	C'-39	IKPT	26.7	113	2	1
908	C'-39- 8	1991/7/16	C'-39	IKPT	31.2	112	2	1
909	C'-39- 9	1991/7/16	C'-39	IKPT	27.1	115	1	2
910	C'-40- 1	1991/7/16	C'-40	IKPT	30.5	115	1	3
911	C'-40- 2	1991/7/16	C'-40	IKPT	28.2	113	1	3
912	B-47- 1	1991/7/16	B-47	IKPT	18.3	115	1	3
913	A-34- 1	1991/7/17	A-34	IKPT	16.8	116	2	1
914	A-34- 2	1991/7/17	A-34	IKPT	20.0	117	1	3
915	C'-42- 1	1991/7/17	C'-42	IKPT	27.9	113	2	1
916	C'-42- 2	1991/7/17	C'-42	IKPT	30.3	113	1	2
917	C'-42- 3	1991/7/17	C'-42	IKPT	27.0	113	2	1
918	C'-42- 4	1991/7/17	C'-42	IKPT	17.2	114	1	2
919	C'-43- 1	1991/7/17	C'-43	IKPT	19.3	115	1	2
920	C'-43- 2	1991/7/17	C'-43	IKPT	19.6	115	1	3
921	C'-43- 3	1991/7/17	C'-43	IKPT	18.7	115	2	1
922	C'-43- 4	1991/7/17	C'-43	IKPT	18.6	115	1	2
923	C'-43- 5	1991/7/17	C'-43	IKPT	17.0	119	2	1
924	C'-43- 6	1991/7/17	C'-43	IKPT	20.0	117	1	3
925	C'-43- 7	1991/7/17	C'-43	IKPT	20.0	114	1	3
926	C'-43- 8	1991/7/17	C'-43	IKPT	19.5	115	1	3
927	C'-44- 1	1991/7/17	C'-44	IKPT	16.8	116	2	1
928	C'-44- 2	1991/7/17	C'-44	IKPT	18.3	114	1	3
929	C'-44- 3	1991/7/17	C'-44	IKPT	18.5	115	2	1
930	C'-46- 1	1991/7/18	C'-46	IKPT	20.0	118	2	1
931	C'-46- 2	1991/7/18	C'-46	IKPT	18.5	114	1	2
932	C'-46- 3	1991/7/18	C'-46	IKPT	20.0	116	1	3
933	C'-46- 4	1991/7/18	C'-46	IKPT	20.0	112	1	3
934	C'-48- 1	1991/7/18	C'-48	IKPT	20.0	112	1	2
935	C'-48- 2	1991/7/18	C'-48	IKPT	20.2	113	1	2
936	C'-48- 3	1991/7/18	C'-48	IKPT	18.5	114	1	2
937	C'-48- 4	1991/7/18	C'-48	IKPT	17.7	114	1	2
938	C'-48- 5	1991/7/18	C'-48	IKPT	18.2	114	1	2
939	C'-48- 6	1991/7/18	C'-48	IKPT	18.5	116	1	3
940	C'-48- 7	1991/7/18	C'-48	IKPT	21.2	112	1	3
941	C'-48- 8	1991/7/18	C'-48	IKPT	19.5	116	1	3
942	C'-48- 9	1991/7/18	C'-48	IKPT	17.8	112	1	3
943	C'-49- 1	1991/7/18	C'-49	IKPT	20.1	116	2	1
944	C'-50- 1	1991/7/18	C'-50	IKPT	33.2	116	2	1
945	C'-50- 2	1991/7/18	C'-50	IKPT	28.7	115	1	2
946	C'-50- 3	1991/7/18	C'-50	IKPT	28.6	115	2	1
947	C'-50- 4	1991/7/18	C'-50	IKPT	20.0	114	1	3
948	C'-51- 1	1991/7/18	C'-51	IKPT	20.2	115	1	3
949	C'-52- 1	1991/7/18	C'-52	IKPT	28.5	116	1	2
950	C'-52- 2	1991/7/18	C'-52	IKPT	18.5	115	1	2
951	C'-52- 3	1991/7/18	C'-52	IKPT	16.8	112	1	2
952	C'-52- 4	1991/7/18	C'-52	IKPT	17.0	113	1	2
953	C'-52- 5	1991/7/18	C'-52	IKPT	18.6	115	2	1
954	C'-52- 6	1991/7/18	C'-52	IKPT	17.5	113	1	3
955	C'-52- 7	1991/7/18	C'-52	IKPT	19.7	113	1	3
956	C'-52- 8	1991/7/18	C'-52	IKPT	18.0	114	1	3
957	C'-52- 9	1991/7/18	C'-52	IKPT	19.7	118	1	3
958	C'-54- 1	1991/7/19	C'-54	IKPT	21.4	115	2	1

Fish No.	Cat. No.	Date	St. No.	Gear	TL	TM	M	Pres

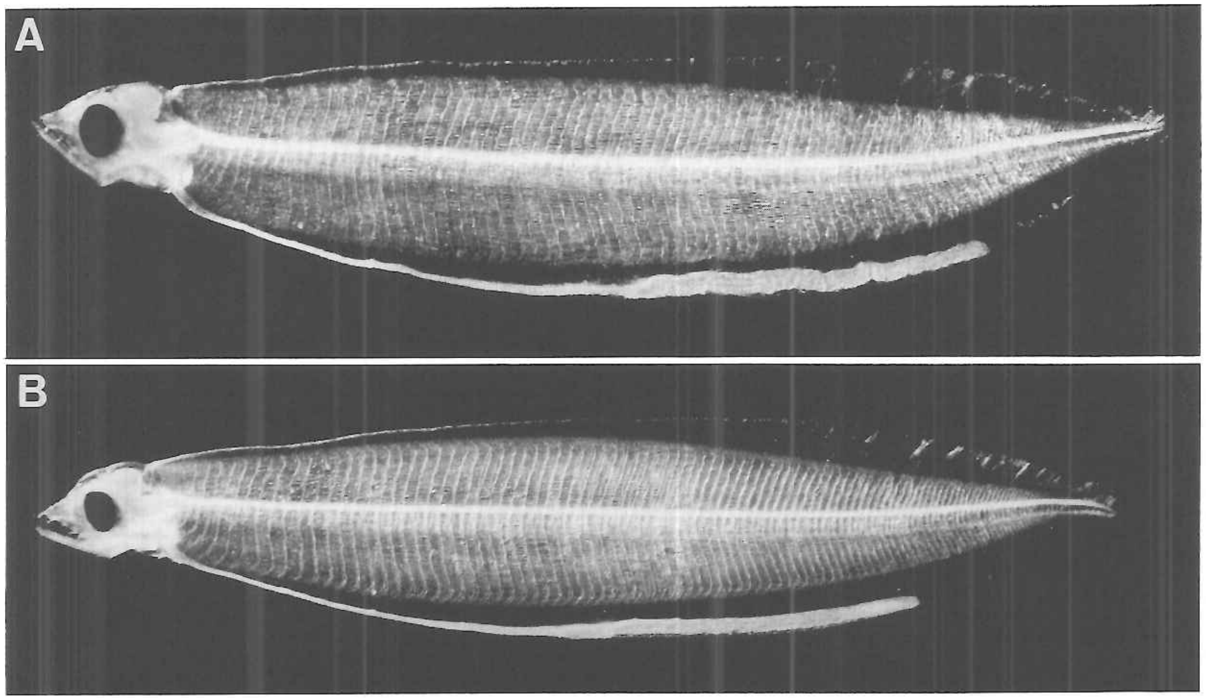

Fig. 1. *Anguilla japonica* leptocephali
A: Cat. ORI KH-91-4, No. C-1-1, 10.0 mm TL
B: Cat. ORI KH-91-4, No. C-10-75-15, 12.3 mm TL

Other *Anguilla* leptocephali

Noritaka Mochioka, Tsuguo Otake and Katsumi Tsukamoto

A total of 35 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 Tables 2 and 3.

Total myomeres (100 - 108) indicated that these *Anguilla* spp. larvae were both subtropical and tropical eels. Seven larvae (Table 2) which has 2 - 4 ano-dorsal myomeres were of the short finned eel, and seven larvae (over 20mm TL in Table 3) which has 8 - 11 ano-dorsal myomeres were of the long-finned eel. According to Jespersen (1942), the short- and long-finned *anguillid* larvae in the waters of eastern Indo-Malaya and the waters north of New Guinea, including the Philippines, have 2 - 6 and 8.5 - 13 ano-dorsal myomeres, respectively. 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, the leptocephali in Table 2 were identified as *A. bicolor pacifica*. There is a possibility that leptocephali in Table 3 may be *A. marmorata* and/or A. celebesensis. Since the segmental character of the two species overlaped, it is difficult to identify these high body larvae further. Fig. 2 shows *A. bicolor pacifica* and *A. sp.* leptocephali.

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Table 2. Catalogue number, collection data, total length of body, and number of myomeres of *Anguilla bicolor pacifica* leptocephali.

Fish No.	Cat.	No.	Date	St. No.	Gear	TL(mm)	PAM	TM	M	Pres.
1	B-5-	1	1991/6/19	B-5	IKPT	45.9	75	108	2	1
2	A-6-	1	1991/6/20	A-6	IKPT	47.1	71	107	2	1
3	B-7-	1	1991/6/20	B-7	IKPT	42.9	75	108	2	1
4	B-9-	1	1991/6/21	B-9	IKPT	41.5	73	106	2	1
5	B-27-	1	1991/6/27	B-27	IKPT	45.5	72	106	2	1
6	G-2-N-	1	1991/6/28	G-2-N	IKPT	44.3	74	108	2	1
7	C'-48-	1	1991/7/18	C'-48	IKPT	48	73	106	2	1

TL, total length in mm; PAM, preanal myomeres; TM, total myomeres; M, specimen condition of measurement, 1: fresh, 2: in 5% formalin; Pres, method of preservation, 1: in 5% formalin, 2: in 90% alcohol, 3:others. Abbreviation in table 3 are same as those in this table.

Table 3. Catalogue number, collection data, total length of body, and number of myomeres of *Anguilla sp.* leptocephali.

No.	Date	St. No.	Gear	TL(mm)	PAM	TM	M	Pres.
1	1991/7/4	C-24	IKPT	34.7	72	104	2	1
1	1991/7/14	C-25	IKPT	52.5	70	101	2	1
1	1991/7/14	C'-28	IKPT	41.6	70	102	2	1
2	1991/7/14	C'-28	IKPT	51.7	70	102	2	1
1	1991/7/15	C'-34	IKPT	56	70	102	2	1
1	1991/7/15	C'-35	IKPT	12.7	70	104	2	1
2	1991/7/15	C'-35	IKPT	16.7	70	104	2	1
1	1991/7/15	C'-36	IKPT	17.3	71	104	2	1
1	1991/7/16	C'-38	IKPT	17.8	68	102	2	1
1	1991/7/16	C'-40	IKPT	12	70	102	2	1
2	1991/7/16	C'-40	IKPT	14.2	69	102	2	1
1	1991/7/16	C'-41	IKPT	9.6	74	103	2	1
1	1991/7/16	A-33	IKPT	15	67	102	2	1
1	1991/7/16	B-47	IKPT	17.4	68	104	2	1
1	1991/7/17	C'-44	IKPT	29.3	73	104	2	1
1	1991/7/18	C'-45	IKPT	30.3	70	103	2	1
2	1991/7/18	C'-46	IKPT	14.7	70	105	2	1
1	1991/7/18	C'-47	IKPT	17.5	71	101	2	1
1	1991/7/18	C'-48	IKPT	17.1	77	108	1	1
1	1991/7/18	C'-50	IKPT	13.5	70	105	1	1
1	1991/7/18	C'-51	IKPT	16	71	100	1	1
2	1991/7/18	C'-51	IKPT	18.6	70	103	1	1
3	1991/7/18	C'-51	IKPT	15	71	105	2	1
4	1991/7/18	C'-51	IKPT	17.3	71	104	1	1
5	1991/7/18	C'-51	IKPT	16	72	103	2	1
1	1991/7/18	C'-52	IKPT	17.1	70	103	2	1
2	1991/7/19	C'-52	IKPT	17	69	106	2	1
1	1991/7/18	C'-53	IKPT	13.7	67	106	2	1

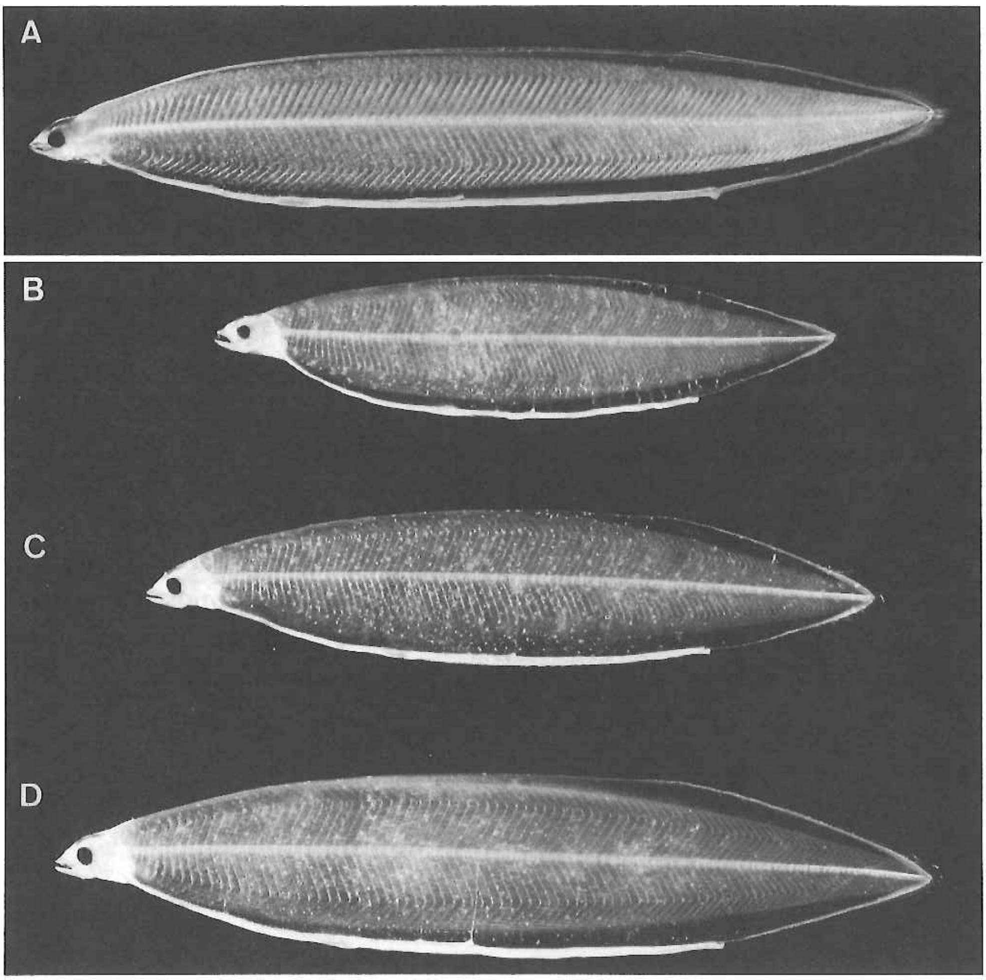

Fig. 2. A: *Anguilla bicolor pacificca* leptocephalus.
Cat. ORI KH-91-4, No. C'-48-1, 48.0 mm TL.
B - D: *Anguilla* sp. leptocephali.
B: Cat. ORI KH-91-4, No. C'-52-2, 17.0 mm TL
C: Cat. ORI KH-91-4, No. C'-44-1, 29.3 mm TL
D: Cat. ORI KH-91-4, No. C' 24-1, 34.7 mm TL

Anguilliform, Saccopharyngiform, and Notacantiform leptocephali

Noritaka Mochioka, Michael J. Miller, Tsuguo Otake, and Katsumi Tsukamoto

A total of 2,451 leptocephali of various taxa were collected with gear types, including IKMT, ORI, and MTD nets, at 136 stations. The leptocephali were taken in 159 net sets during the cruise. The results are summarized in Table 4.

Most leptocephali belonged to the order Anguilliformes, the remnants are referable to Saccopharyngiformes (1 specimen) and Notacantiformes (1 specimen). The dominant families were Anguillidae (958 specimens, 39.1 %), Congridae (600 specimens, 24.5 %), Serrivomeridae (440 specimens, 18.0 %), Nemichthyidae (164 specimens, 6.7 %), Muraenidae (012 specimens, 4.2 %). The dominant families at stations A and B (n=929 leptocephali) were Serrivomeridae (343 specimens, 36.8 % of total catch), Congridae (295 specimens, 31.8 %), Nemichthyidae (83 specimens, 8.9 %), Muraenidae (64 specimens, 6.9 %), and Anguillidae (61 specimens, 6.6 %). Significant in the present cruise was that Anguillid leptocephali were the fifth dominant family, whereas they comprised less than 0.02 % of the total catch in 1st - 4th cruises of this series in 1973, 1975, and 1986.

The Chlopsidae, Muranidae, Nemichthyidae, Congridae (*Ariosoma spp.*), Derichthyidae, and Serrivomeridae were found commonly in almost the whole study area. Small specimens less than 20 mm TL of Congridae, Serrivomeridae and Derichtyidae were found with *Anguilla japonica* pre-leptocephalus at the 137E line .

Table 4-1. Leptocephali collected at each station. Negative nets are omitted.
A.j., *Anguilla japonica*; A.spp., *Anguilla bicolor pacifica* and *A. sp.*; MG, Moringuidae ; CH, Chlopsidae; MR, Muraenidae; NM, Nemichthyidae; CY, Cyematidae; SY, Synaphobrabchidae; OP, Ophichthidae; NT, Nettastomatidae; CG, Congridae; DR, Derichthyidae; SR, Serrivomeridae; SP, Saccopharyngiformes; NC, Notacanthiformes; UI, Unidentified.

ST. No.	Gear	A.j.	A.spp.	MG	CH	MR	NM	CY	SY	OP	NT	CG	DR	SR	SP	NC	UI	Total
T-1	IKPT						1											1
T-2	IKPT					1	4					7						12
A-1	IKPT						2						2	1				5
B-1	ORI						1											1
B-1	IKPT						2						1	1				4
B-2	IKPT				1		8					2	3	1				15
A-2	IKPT						1											1
A-3	IKPT						2						6	1				9
B-3	IKPT				1		6					8	1	2				18
B-4	ORI											4						4
B-4	IKPT						6					6	5	4				21
A-4	IKPT							1				1						2
A-5	IKPT													1				1
B-5	IKPT		1									1		3				5
B-6	IKPT											1	1	3				5
A-6	IKPT		1				1		1			1	3					7
A-7	IKPT											1						1
B-7	IKPT		1			2								13				16
B-8	ORI									1								1
B-8	IKPT					2								15			1	18
B-9	IKPT		1			2								28				31
B-10	IKPT					3						1		18			1	23
A-8	IKPT													6				6
B-11	IKPT					1								17				18
A-9	ORI											1						1
A-9	IKPT							1						23				24
B-12	IKPT												1	20				21
A-10	IKPT						1						1					2
A-11	IKPT												1					1
B-13	IKPT						2						3	1				6
B-14	IKPT																	0
A-12	IKPT					1	1					2		1				5
B-15	IKPT					1	2							3				6
A-14	IKPT						1											1
B-16	IKPT						1					1						2
B-17	IKPT						3		1			3						7
B-18	IKPT						1					1						2
B-19	IKPT						1		1			2	1	1				6
B-20	IKPT					2	5					5		1				13
A-16	IKPT													1				1
B-12	IKPT					2	1						1					4
B-22	IKPT						2			1		1	2	1				7
B-23	ORI					2												2
B-23	IKPT					3	2											5
B-24	IKPT				1	2	2					1	2	1				9
A-18	IKPT											2						2
G-1-D	IKPT				1	1												2
G-1-D	ORI-(200m)												1					1
G-1-D	ORI-(100m)					1												1
G-1-N	IKPT					5	1					4		1				11
B-25	IKPT					1	1					1		1				4
B-26	IKPT					4				2		2						8
A-19	IKPT												1	12				13
B-27	IKPT		1		2	1				1				13				18
B-28	IKPT												1	18			1	20
B-29	IKPT				1	1						3	1	35			1	42
A-20	IKPT					1								30				31

Table 4-2. Leptocephali collected at each station. Negative nets are omitted. A.j., *Anguilla japonica*; A.spp., *Anguilla bicolor pacifica* and *A. sp.*; MG, Moringuidae ; CH, Chlopsidae; MR, Muraenidae; NM, Nemichthyidae; CY, Cyematidae; SY, Synaphobrabchidae; OP, Ophichthidae; NT, Nettastomatidae; CG, Congridae; DR, Derichthyidae; SR, Serrivomeridae; SP, Saccopharyngiformes; NC, Notacanthiformes; UI, Unidentified.

ST. No.	Gear	A.j.	A.spp.	MG	CH	MR	NM	CY	SY	OP	NT	CG	DR	SR	SP	NC	UI	Total
G-2-D	IKPT					1	2							3				6
G-2-N	IKPT					1						1		4	1			7
G-2-N	ORI-(160m)													2				2
G-2-N	ORI-(80m)		1											10				11
A-21	IKPT													4				4
A-22	IKPT				1	2						1						4
A-24	ORI											1						1
A-24	IKPT	1				3						3		7				14
B-30	ORI											1						1
B-30	IKPT	1										1						2
B-30	IKPT												1	3				4
B-31	IKPT					2						1		8				11
B-32	IKPT	2										2		8				12
B-33	IKPT				1	2						1	1	15				20
B-34	IKPT	1												10			1	12
B-35	IKPT	1											1					2
C-1	IKPT	1				1												2
C-2	IKPT								1									1
C-3	IKPT	1																1
C-4	IKPT																1	1
A-25	ORI											1						1
A-25	IKPT	1										1						2
B-36	IKPT	40					2					4	1	3				50
C-6	IKPT	39				1	1					1		3				45
C-7	ORI									1								1
C-7	IKPT	36										4		1				41
C-8	IKPT	21												1				22
C-9	IKPT	16					2					1	2					21
C-10	MTD-(50m)	3																3
C-10	MTD-(75m)	16																16
C-10	MTD-(100m)	2																2
C-11	IKPT	79			1							2		2				84
C-12	IKPT	215										2	1					218
C-13	IKPT	297				3	1					6		1				308
C-14	IKPT	94		1		1				1		3	1	3			1	105
C-15	IKPT	8																8
C-16	MTD-(150m)	1																1
B-37	IKPT	3					4					6						13
C-17	IKPT	2				1	2					16	4					25
C-18	IKPT	1				1	2					6						10
C-19	IKPT						1					1						2
C-19	MTD-(50m)											1						1
C-20	IKPT	4					4					3						11
A-26	IKPT								1			1		1				3
B-38	IKPT						1				1	2						4
C-22	IKPT						4					3		3				10
B-39	ORI											1						1
B-39	IKPT	1					2				2	3						8
C-23	IKPT				1		7					4						12
C-24	IKPT		1			1	7					1						10
B-40	IKPT						5					2	1			1		9
A-27	IKPT						1		1									2
A-28	IKPT								3									3
B-41	IKPT				1		3					10						14
B-42	IKPT						2			1		11						14
A-29	IKPT											1						1
A-30	IKPT					1			1									2

Table 4-3. Leptocephali collected at each station. Negative nets are omitted. A.j., *Anguilla japonica*; A.spp., *Anguilla bicolor pacifica* and *A. sp.*; MG, Moringuidae ; CH, Chlopsidae; MR, Muraenidae; NM, Nemichthyidae; CY, Cyematidae; SY, Synaphobrabchidae; OP, Ophichthidae; NT, Nettastomatidae; CG, Congridae; DR, Derichthyidae; SR, Serrivomeridae; SP, Saccopharyngiformes; NC, Notacanthiformes; UI, Unidentified.

ST. No.	Gear	A.j.	A.spp.	MG	CH	MR	NM	CY	SY	OP	NT	CG	DR	SR	SP	NC	UI	Total
B-43	ORI											12						12
B-43	IKPT					17	2			1	3	27						50
B-44	ORI											4						4
B-44	IKPT					2	1					8						11
C-25	IKPT		1		5	5	9			1	1	21	1	1				45
A-31	ORI											98						98
A-31	IKPT					2	3			1		1						7
C'-26	IKPT						3					18	2					23
C'-27	IKPT						5					20						25
C'-28	IKPT		2				1					13						16
C'-29	IKPT						2					15						17
B-45	ORI											2						2
B-45	IKPT						1			1		15		1				18
C'-30	IKPT						4				1	11	1					17
C'-31	IKPT						3					9						12
C'-32	IKPT						2					5						7
C'-33	IKPT												1					1
C'-34	IKPT		1									4	1	2				8
B-46	IKPT						1					16						17
C'-35	IKPT	5	2			1	2				1	8	3					22
C'-36	IKPT	3	1				1					8	2					15
C'-37	IKPT	2					2					5						9
C'-38	IKPT	3	1					1				15	4					24
C'-39	IKPT	9			1		1					12	2	1				26
C'-40	IKPT	2	2		1	1						11	3	1				21
C'-41	IKPT		1									8	1	1				11
A-33	IKPT		1															1
B-47	IKPT	1	1	1								3		2				8
A-34	IKPT											2						2
A-34	IKPT	2				2						2		4				10
C'-42	IKPT	4				1						1		15				21
C'-43	IKPT	8			2					1		3		8				22
C'-44	IKPT	3	1		1	1						4		8				18
C'-45	IKPT		1		2	2						5		8				18
C'-46	IKPT	4	1									1		1				7
C'-47	IKPT		1			1						1		3			1	7
C'-48	IKPT	9	2			1						4						16
C'-49	IKPT	1										1		2				4
C'-50	IKPT	4	1		1	2						7	1	3				19
C'-51	IKPT	1	5			2						4		7			1	20
C'-52	IKPT	9	2			1						5		3				20
C'-53	IKPT		1			1						2	2					6
C'-54	IKPT	1					1					1						3
C'-55	IKPT						5					15	4					24
C'-56	IKPT						1					2						3
Total		958	35	2	25	102	164	3	10	13	9	600	79	440	1	1	9	2451

The distribution and relative abundance of anguilliform leptocephali (in B-Stations)

Michael J. Miller, N. Mochioka and T. Otake

The catch data of more than 430 leptocephali collected during 46 standardized night tows (B-stations) were used to make a preliminary comparison of the distributions and relative abundances of the leptocephali of the most common eel families other than Anguillidae. These B-Station tows were made using an IKPT in upper 150 m at more than 17 general locations throughout most of the sampling grid (Fig. 1). Although some specimens were not identified to species, a comparison of the number of species or taxa collected in different areas ranging over 12° of latitude and 24° of longitude suggested some general trends in the distributions of certain taxa.

The diversity and abundance of leptocephali of the Congridae Chlopsidae (Xenocongridae), Moringuidae, Muraenidae and Ophichthidae, was generally lower in the two eastern lines of the sampling grid (Table 1). Line 1 (155°E), had one of the lowest average number of taxa of these families par tow (1.3), and all but two of the 18 leptocephali caught there were of four different species of *Ariosoma*. Eleven of these 18 specimens were *Ariosoma* sp. 7 that were caught in the two tows that were located within the salinity front. Line 2 (149°E) had the same low average number of taxa per tow, but only had an average of 1.4 individuals per tow, which was the lowest of all the lines. The diversity and abundance of leptocephali of these five families was also relatively low in line 4 (137°E) which had an average of 1.9 individuals per tow. Only *Ariosoma* and *Conger* leptocephali were collected north of the salinity front in this line, but south of the front, three taxa muraenids, a xenocongrid, two species of *Ariosoma* and two specimens of *Heterocongridae* were caught.

The greatest diversity and abundance of leptocephali was found in lines 3 and 5 (Table 1). Line 3 (143°E) had the greatest total number of taxa (12) because of greater catches of muraenids, ophichthids and chlopsids in tows B21-B29, which were all just west of the Marianas Islands. Line 5 (131°E) had the greatest average number of taxa (4) and individuals per tow (17.8) and B43, the northernmost tow in line 5, had the largest catch of any B-station. A total of 86 leptocephali of eight shelf taxa, including 17 muraenids, 16 *Gnathophis* and nine specimens of four species of *Ariosoma* were caught in this tow.

There were variety of distribution patterns of individuals taxa within the sampling grid. The four species of exterillium *Ariosoma* (n=19) were caught at B-stations scattered throughout most of the grid, as was *Ariosoma* sp. 7. However *Ariosoma* sp. 5 and sp. 6 were caught only in the two northern tows of line 5. Only one *Ariosoma* was caught in the southern locations of line 1 and 2 and in the four southernmost tows (line 1A) between lines 1 and 2 at

10°N (just north of the Caroline Islands). Line 1A also had a relatively low average number of taxa (1.5) and nine of the 11 leptocephali caught there were muraenids of at least three species. Although muraenid leptocephali were also relatively abundant in line 3 just west of Marianas Islands (caught in eight of 11 tows, N=14) and in the northern two tows of line 5 (n=19), they were absent in 21 of the 26 other tows of line 1, 2, 4 and 5.

The leptocephali of the Ophichthidae (8 tows, n=9), Chlopsidae (6 tows, n=6) and Moringuidae (n=1) were rare, as were the congrid taxa *Gnathophis* (3 tows, n=18) and *Heterocongridae* (4 tows, n=4). Congrids of the genus *Conger* were rare or absent throughout most of the grid, with a total of six caught in the northern tows of line 3 and 4. These and one specimen from the westernmost tow of line 1A at 10°N were all relatively large (40-68 mm TL) in comparison to the 26 *Conger* leptocephali (10-32 mm TL) that were caught in tows in the middle of line 5. The only moringuid leptocephalus caught was in the southernmost tow of line 5.

The oceanic taxa *Nemichthyes* and *Serrivomer* had two very different distributions throughout the sampling grid. The *Nemichthyes* were all quite large and were caught one or two per tow north of the salinity front in lines 3, 4 and 5. Only three specimens were found in the other lines. In contrast, *Serrivomer* leptocephali were present in almost all the tows south of the front and in low abundances north of the front in lines 1, 2 and 3. Of the nine specimens caught north of the front, all but three were larger than 34 mm TL. South of the front, a large proportion of the 219 specimens (11-66 mm TL) were of the smaller size range.

In general, the north-south segregation seen in *Nemichthyes* and *Serrivomer* , whose adults are mesopelagic, was not characteristic of the other taxa of leptocephali. The adults of the "shelf" families, Chlopsidae, Congridae, Muraenidae, Moringuidae and Ophichtidiae live on the continental shelf and around islands, and the distributions of their leptocephali appears, in some cases, to be related to the proximity to shelf areas. This and a westward current direction may account for the greater diversity line 3 (just west of the Marianas Islands) relative to line 1 and 2. The greater diversity and abundance and the different species composition in the northern tows of line 5 may be related to the close proximity of three tows to the complex eddy region of the Kuroshio Current. The leptocephali i line 5 may have been transported from regions closer to shelf areas in the south or west.

Table 1 The distribution of tows and numbers and average number families, taxa and specimens of leptocephali of the *Chlopsidae* , *Moringuidae* , *Muraenidae* , and *Ophichthidae* in each line. (only 5 shelf families in table)

	Line 5	Line 4	Line 3	Line 2	Line 1A	Line 1
# of tows B-tows	5 43-77	10 30-40	11 18-29	7 11-17	4 7-10	6 1-6
# of families mean fam. / tow	4 2 (.63)	3 1 (.89)	4 1.9 (.95)	3 1 (.92)	3 1.5 (.5)	2 1 (.58)
# of taxa mean taxa / tow	10 4 (2.28)	9 1.5 (1.28)	12 2.2 (1.21)	5 1.3 (1.28)	4 1.5 (.5)	6 1.3 (.94)
# of specimens mean spec. / tow	86 17.8 (13.96)	19 1.9 (1.87)	30 2.7 (2.09)	8 1.4 (1.40)	9 2.2 (1.09)	18 3 (2.94)

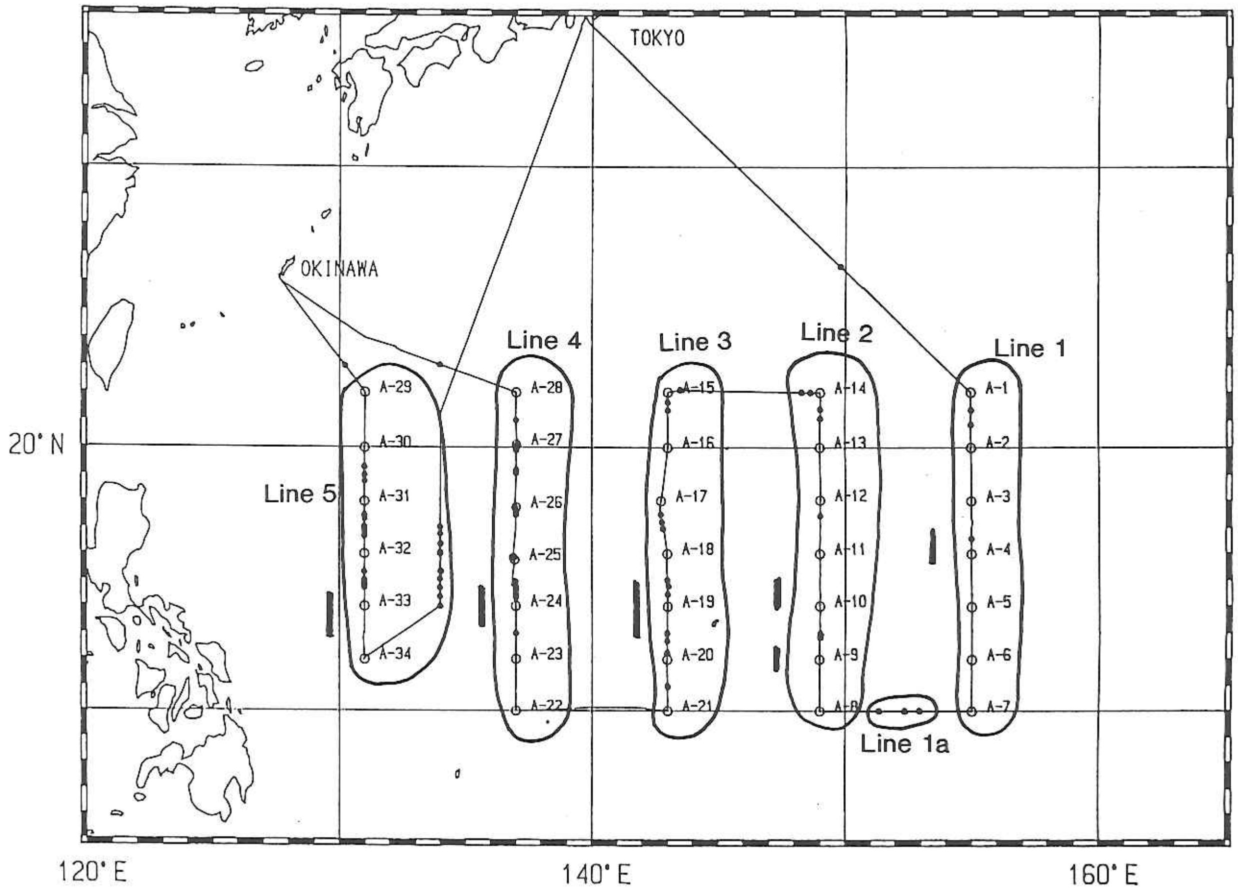

Fig. 1 Track cahrt of the KH-91-4 cruise. Dark bar represents the location of the surface salinity front.

Vertical distribution of *Anguilla japonica* leptocephalus

Tsuguo Otake, Noritaka Mochioka and Katsumi Tsukamoto

In order to determine diel vertical migration of *Anguilla japonica* leptocephali, horizontal tows using a MTD horizontal closing net system (mouth opening: 0.5 m^2, mesh aperture: 0.5 mm) were conducted in the night-time at Stations of C-10 (15 50'N, 136 55'E) and C-19 (17 37'N, 137 00'E), and in the day-time at Stations of C-5 (14 47'N, 136 52'E), C-16 (15 51'N, 136 53'E) and C-21 (17 45'N, C-136 57'E). Sampling depths were 0, 25, 50, 75, 100, 150, 200, 250, 300, 400, 500 m.

Anguilla japonica leptocephali were taken at stations of C-10 and C-16. The leptocephali were taken at layers of 50, 75, 100 m deep by night (Fig.1). Maximum catch (16 specimens per haul) occurred in the sample of 75 m deep layer. In the day-time only one leptocephalus was taken at 150 m deep layer (Fig.1). Total length of leptocephali collected with the MTD net system ranged from 10.7 to 22.1 mm. Since vertical profiles of temperature and salinity at those stations presented changes at 100 m deep (Fig.2), *Anguilla* leptocephali seemed to be mostly distributed just up to a thermocline in the night-time.

Castonguay et al. (1987) reported that *Anguilla* of the length range 5.0 - 19.9 mm mostly occurred between 100 m and 150 m by day and between 50 and 100 m by night. Kajihara et al. (1988) suggested that *Anguilla japonica* leptocephali were collected most efficiently by a horizontal night tow at layer just up to a thermocline, which was ascertained further in the research of this cruise. The sampling data of the MTD net night tow agree with those suggestion. Castonguay et al. (1987) also reported that visual avoidance by day is not important in *Anguilla* leptocephali of less than 20 mm in total length. Therefore, only one sample collected at 150 m deep layer by day-time tow might suggest that *Anguilla* leptocephali disperse in deeper stratum and their density possibly decreases by day.

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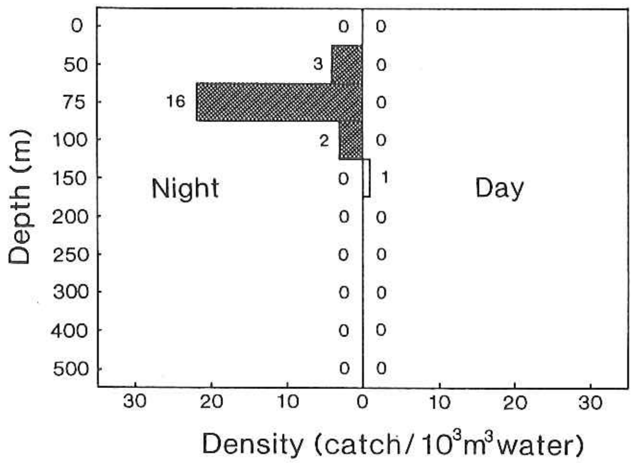

Fig.1 Vertical distribution of density (catch 10^{-3} m^3 water filtered) of *Anguilla japonica*. Actual catches are also shown.

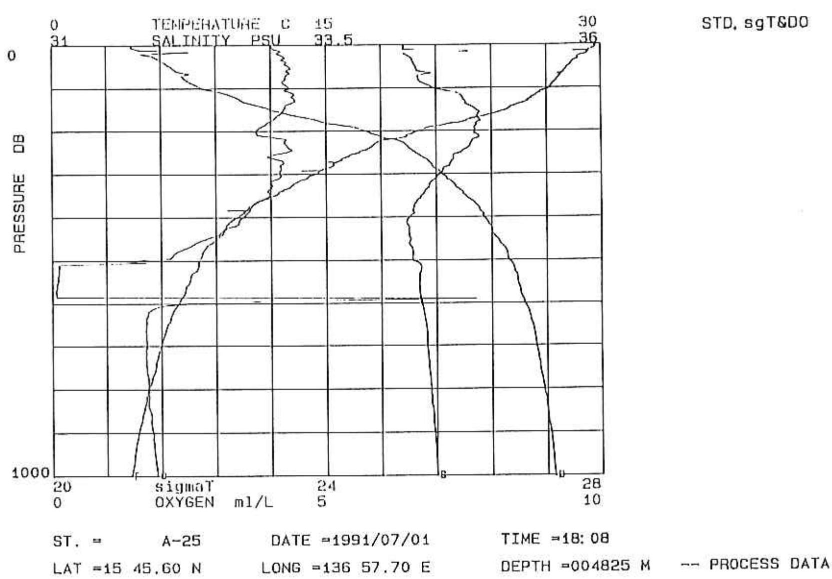

Fig.2 Vertical profile of temperature, salinity, dissolved oxygen and density (sigma-t) from the sea surface and 1000 m from a CTD profile of Station A25 (15 45.6'N, 136 57.7'E).

Age and growth of Japanese eel leptocephali

Katsumi Tsukamoto, Tae-Won Lee and Noritaka Mochioka

By counting otolith daily increment, age and growth of *Anguilla japonica* leptocephali caught during the cruise were estimated. A total of 76 leptocephali were aged after Tsukamoto et al. (1989). Fifty four individuals ranging from 10.2 to 30.5 mm in TL (mean±SD: 17.0±5.9 mm) had clear otolith increments and their aging data were used for the following analysis.

Age of the leptocephali ranged from 10 to 55 d and the mean±SD was 24±13 d with the mode between 10 and 15 d (Fig.1). Birthdate ranged from 22 May to 24 June (Fig.2). Leptocephali examined here were divided into two groups, May-born and June-born fish. Leptocephali collected at the more western locations had the older age (Fig. 3), suggesting the westward transport of leptocephali by North Equatorial Current. At 131°E, the westernmost transect, May-born fish was dominant whereas the June-born exceeded at 134° and 137°E (Fig.4). There was a linear relationship between age and total length (Fig.5).

Birthdate distributions of leptocephali collected in different cruises were compared with that of the glass eels obtained at various rivermouth in Japan (Fig.6). Birthdate of this cruise (KH91-4) was included in the early spawning season of the glass eels. Narrow range of birthdate distribution of leptocephali collected offshore might be derived from the restricted sampling period of a cruise.

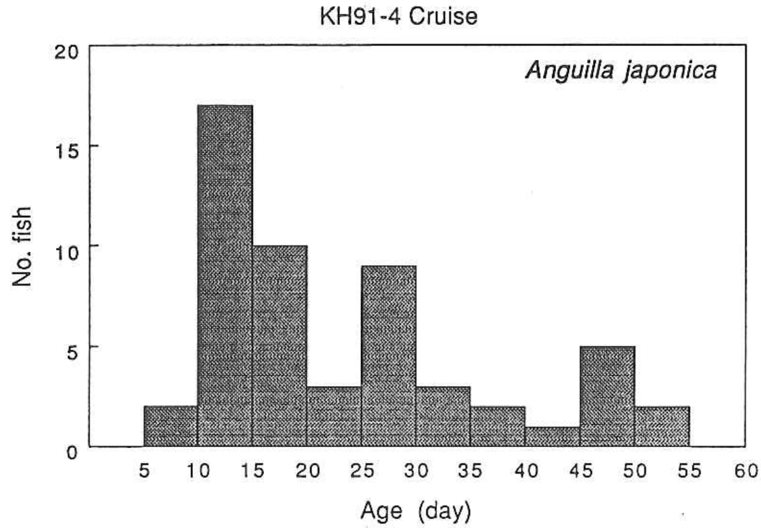

Fig.1 Age of *Anguilla japonica* leptocephali collected during the Hakuho-maru expedition in June-July 1991.

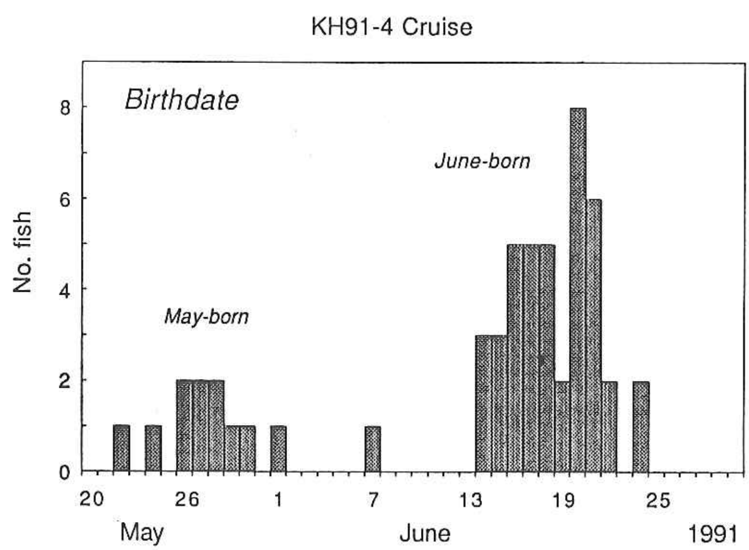

Fig.2 Birthdate distribution of *Anguilla japonica* leptocephali collected during the Hakuho-maru expedition in June-July 1991.

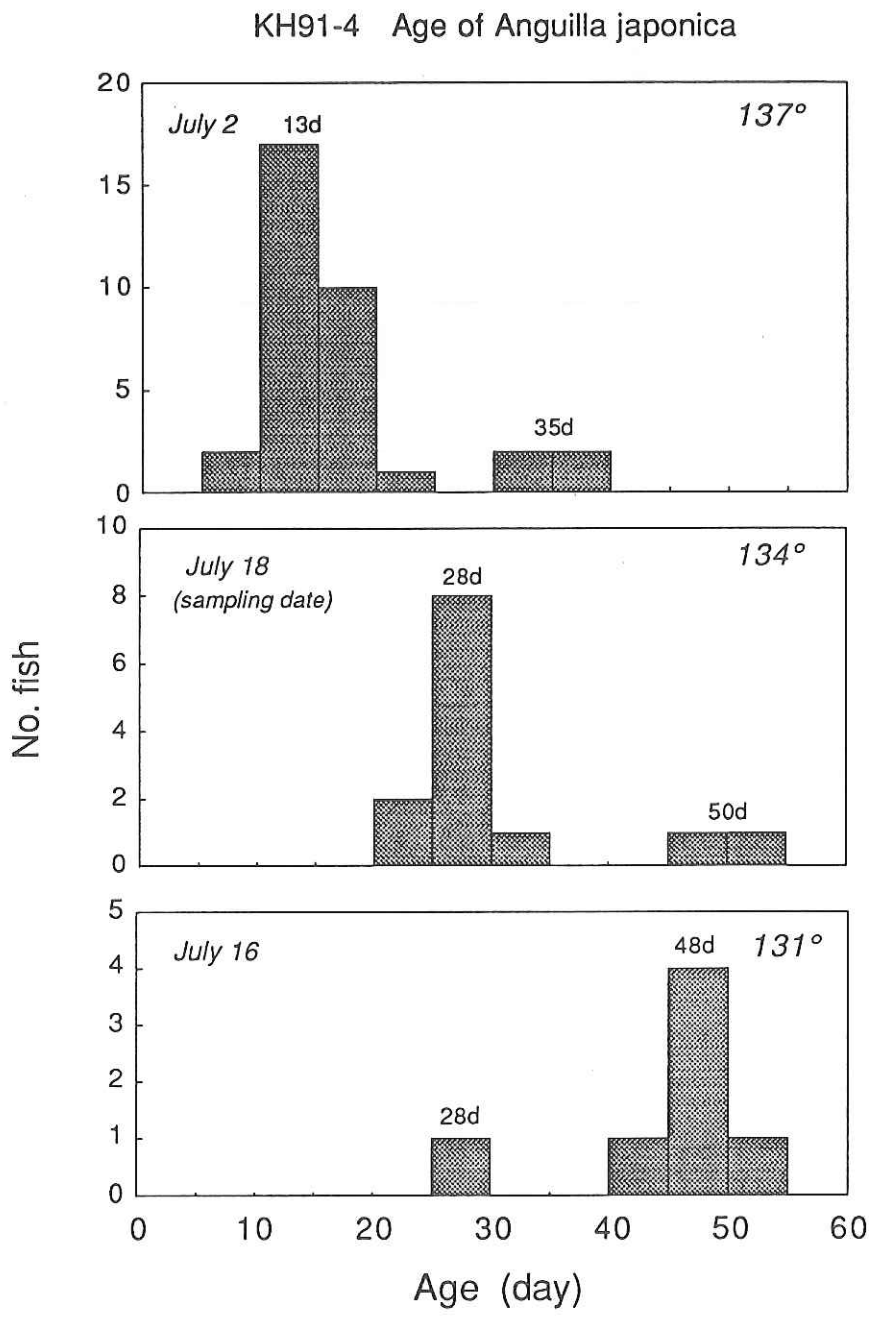

Fig.3 Age of *Anguilla japonica* leptocephali collected at different longitudinal transects, 131°, 134° and 137°E.

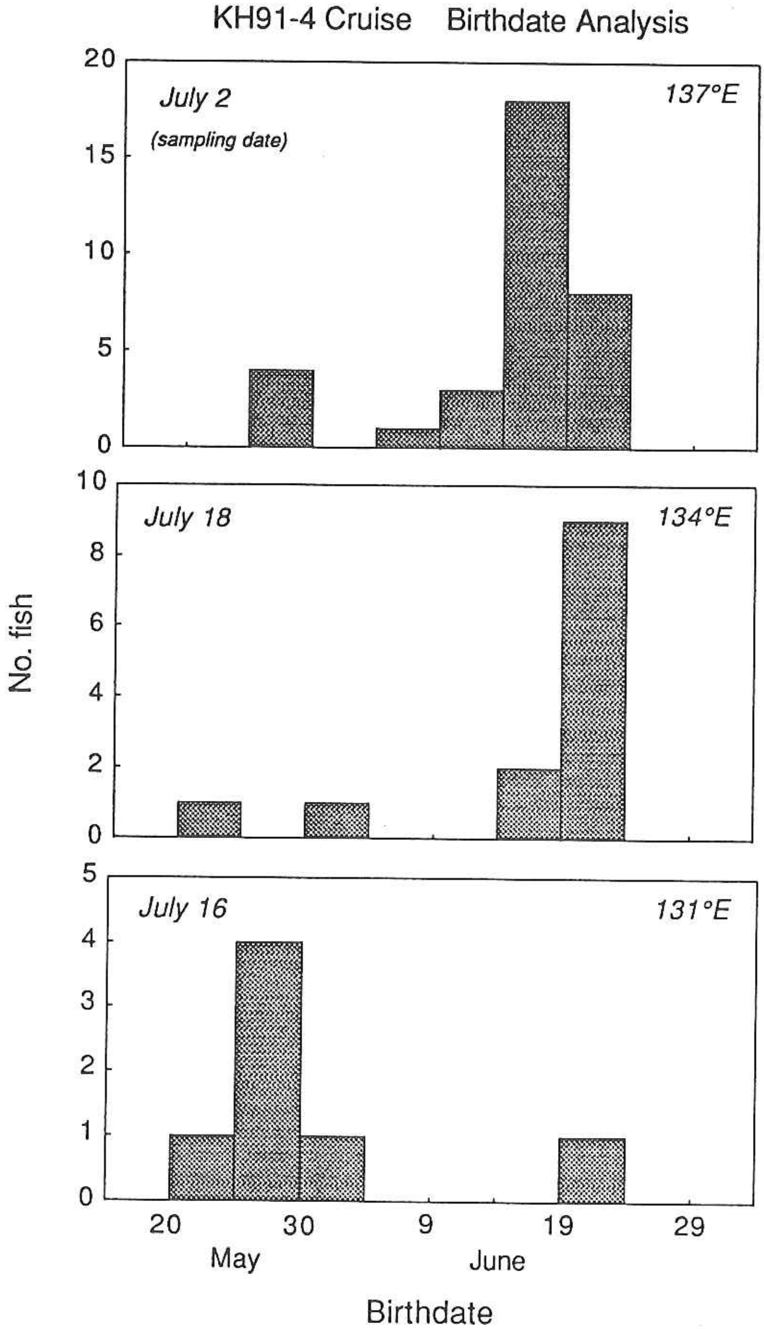

Fig.4 Birthdate distribution of *Anguilla japonica* leptocephali collected at different longitudinal transects, 131°, 134° and 137°E.

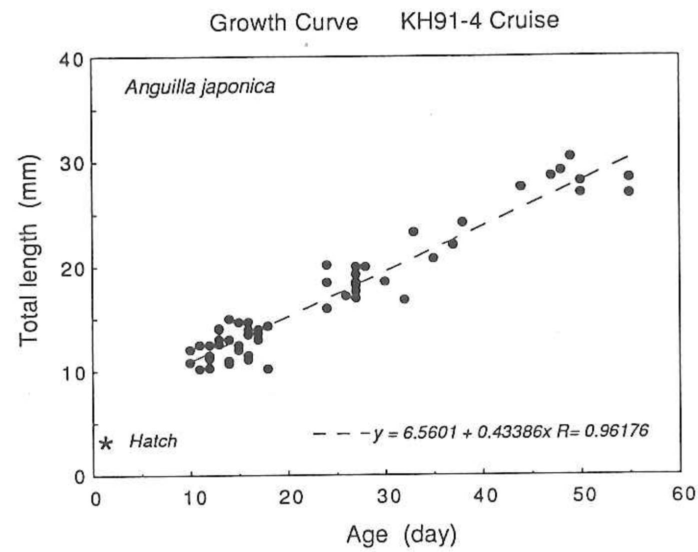

Fig.5 Growth of *Anguilla japonica* leptocephali collected during the Hakuho-maru expedition in June-July 1991.

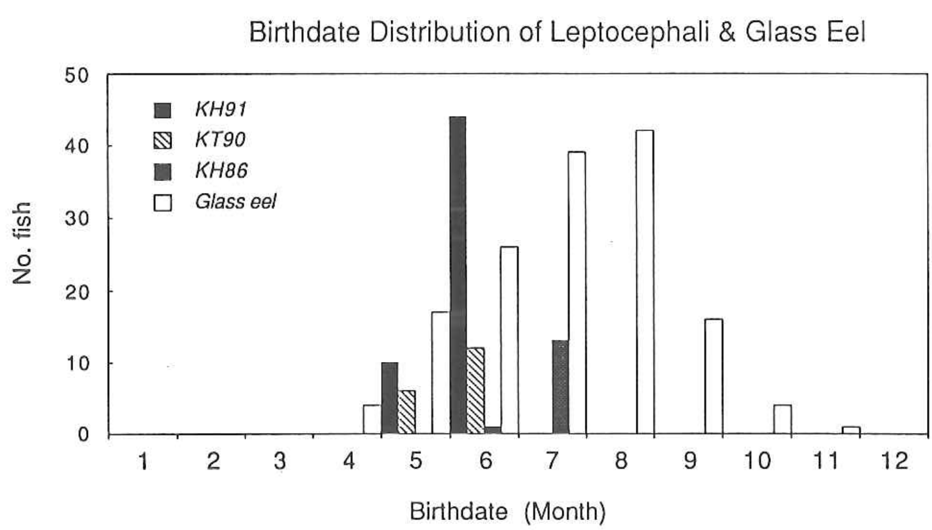

Fig.6 Birthdate distributions of leptocephali collected in different cruises and that of the glass eels obtained at various rivermouth in Japan. (KH91: this cruise, KH86: Hakuho Maru cruise in 1986, KT90: Keiten Maru cruise in 1990, Kagoshima University)

Possible food sources of Japanese eel leptocephali

Tsuguo Otake and Noritaka Mochioka

The nutrition of eel leptocephali is still enigmatic since no food has ever found in their guts. Our research purpose is therefore to obtain information on food sources of eel leptocephali. We examined on the gut contents, gut pigment content, ultrastructure of gut epithelial cell and stable nitrogen isotopic composition in *Anguilla japonica* leptocephali collected during the research cruise of KH-91-4.

Gut contents: All *Anguilla japonica* leptocephali collected were examined on gut contents under binocular dissecting microscope. 40 specimens (10.5-32.7 mm TL), fixed in 2 % glutaraldehyde - 2 % paraformaldehyde in 0.1 M cacodyrate buffer, were examined further on gut contents using scanning (SEM) and transmission electron microscopes (TEM).

Small particles (Fig.1) were observed in esophagi and guts of 10 leptocephali (10.3-17.5 mm TL). SEM examination showed that the particle was an aggregation composed of smaller particles of less than 5 μm diameter (Fig.2). Each particles were found to lack an obvious internal structure in TEM (Fig.3,4), suggesting that they were detrital matter.

Gut pigment contents: A total of 16 specimens (11.6-30.3 mm TL) were used for examination of gut pigment contents. Gut pigment content was extracted by dimethylformamid and measured after Strickland & Parsons (1972).

Total pigment content was only 0.12-0.33 ng/ind. (Table 1). The Chlorophyll-a / Phaeopigment ratio was also low (0.18-1.47), indicating that the pigment stayed in the gut for a long time or that it originated from detrital matter such as fecal pellets of herbivorous zooplankton. Those facts suggest that eel leptocephali do not feed on phytoplankton as a major food item.

Ultrastructure of gut epithelial cell: A total of 27 specimens (11.0-32.7 mm TL), fixed in 2 % glutaraldehyde - 2 % paraformaldehyde in 0.1 M cacodyrate buffer, were used for examination of ultrastructure of gut epithelial cell.

The gut epithelium of the eel leptocephali (10.2-28.2 mm TL) was composed of a typical absorptive cell with developed microvilli (Fig.5a) and a small number of ciliated cell. The absorptive cell contained numerous vacuoles including fine particles in the upper half of the cytoplasm (Fig.5b), which suggests pinocytotic ingestion to be active in the cell. In longitudinal sections, the vacuoles often appeared as long flattered sacs arranged parallel to the longer axis of the cell (Fig.5c). The most striking feature was the extremely developed membranous lamellar structure closely associated with large mitochondria occupying the basal half of the cytoplasm (Fig.5d). Each membrane was found to be connected with basal plasmamembrane, which indicates that the lamellar structure is infolding of basal membrane. The membranous structure is similar to those reported in the digestive system of fishes involved in water and ion transport. Seawater seems to be ingested by the gut epithelium. Eel leptocephalus might obtain nutrition from dissolved organic matter.

Stable nitrogen isotopic composition: A total of 108 specimens (10.1-14.6 mm TL) was used for examination of stable nitrogen isotopic composition. Isotopic composition of eel leptocephalus was measured after Minagawa & Wada (1984) and was compared with POM, zooplanktons, fish and other leptocephali.

The nitrogen heavy isotopic composition (δ15N) in the eel leptocephali was 5.9 (Table 2), which was higher than those in other leptocephali such as Ariosoma sp.(1.5), Serrivomeridae sp. (4.3) and Ophichthidae sp. (3.9). The value was lower than those in Copepod (Pleuromama xiphias; 6.7), Euphausiids (6.3), Amphipods (7.1) and Squid (Sthenoteuthis oualaniensis; 6.0). It suggests that eel leptocephali did not feed on those animals or their derivatives, since the nitrogen heavy isotope is enriched by 3-4 ‰ per trophic level. The value in Salps (2.6) and Pyrosoma (2.6) were lower than the eel leptocephali by about three and they might be one of food sources of eel leptocephalus. However, there is a possibility that the high value of A. japonica was caused by the young age of the specimens (10-14 days old; Tsukamoto et al. 1992) whose isotopic composition seemed to be still affected by that of maternal fish. POM showed a quite high value (7.2) in this study. The primary productivity of the surveyed area is known to be quite low (Berger 1989). In addition, the piscivore zooplanktons were relatively abundant in the plankton samples collected there (Nishida et al. 1992). Therefore, the POM seems to include relatively high content of detritus originated from animals of high trophic level, which results the high isotopic composition of the POM.

Our results suggest that eel leptocephalus possibly obtain the nutrition from dissolved organic matter and detritus originated from animals of low trophic level.

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Table 1. Chlorophyll a (Chl. a) and Phaeopigment (Phaeo.) contents (ng/ind.) in guts of *Anuguilla japonica* leptocephali

No. of fish	TL (mm)	Chl. a	Phaeo.	Total pigments	Chl. a/Phaeo.
10	11.6*	0.02	0.11	0.13	0.18
1	18.3	0.07	0.10	0.17	0.66
2	20.0*	0.03	0.09	0.12	0.36
1	28.7	0.20	0.14	0.33	1.47
2	30.3*	0.03	0.17	0.21	0.18

* values are means for individuals examined.

Pigment contents are for composite samples.

Table 2. Stable nitrogen isotopic composition of *Anuguilla japonica* and other leptocephali, POM (particule organic matter) and zooplanktons collected in the spawning ground.

	$\delta^{15}N$
Leptocephali:	
Anguilla japonica (10.1 ~ 14.6 mm)	5.9
Ariosoma sp. (213.0 mm)	1.5
Serrivomerdae sp. (38.0 mm)	4.3
Ophichthidae sp. (57.0 mm)	3.9
POM (0, 25, 50, 100, 150 m)**	7.2
Invertebrates:	
Copepods (*Pleuromammma xiphias*)*	6.7
Euphausiids*	6.3
-- (*Thysanopoda fricuspidata*)	3.3
Sergestids*	4.7
Amphipods*	7.1
Pteropods (*Cavolinia longrirostris*)	3.6
-- (*Atlsnts* spp.)*	5.0
Squid (*Sthenoteuthis oualaniensis*)*	6.0
Sagitta spp.*	4.9
Salps*	2.6
Pyrosoma	2.6
Fish:	
Myctophidae sp.*	4.9

* δ values are for composite samples

** δ value is mean for sample of each depth

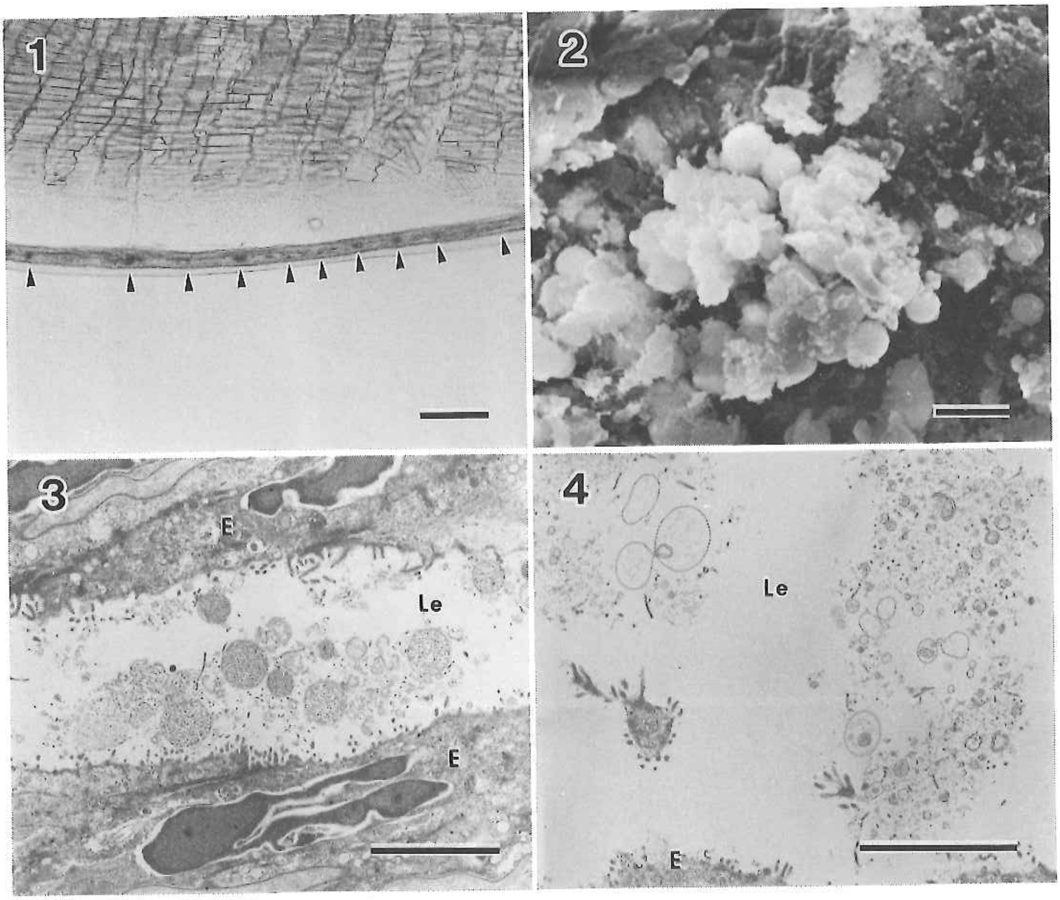
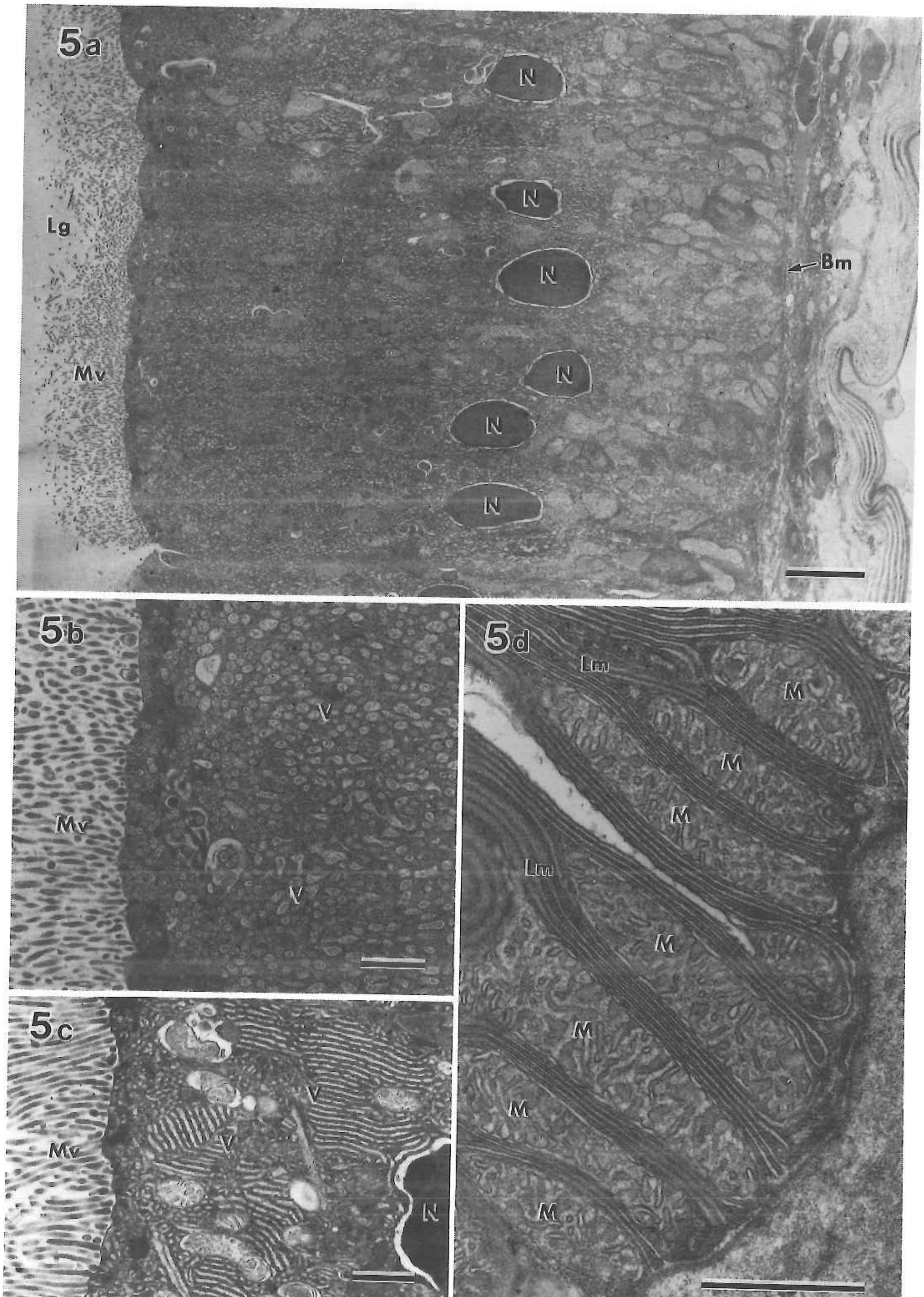


Fig. 1 Small particles (arrow heads) in the esophagus of *A. japonica* leptocephalus (12.0 mm TL). Scale bar = 0.2 mm

Fig. 2 SEM micrograph of a small particle found in the gut of *A. japonica* leptocephalus (12.0 mm TL). Scale bar = 5 μm

Fig. 3 & 4 TEM micrographs of detrital matter in the esophagus of *A. japonica* leptocephalus (29.8 mm TL). Scale bar = 5 μm. E-epithelium of esophagus, Le-lumen of esophagus.

Fig. 5 TEM micrographs of the gut epithelial cell of *A. japonica* leptocephalus (27.5 mm TL). (a) Over view of gut epithelial cells. Scale bar = 5 mm. (b) Apical portion of the cytoplasm. Scale bar = 1 μm. (c) Longitudinal section of the apical portion of the cell. Scale bar = 1 μm. Lg-lumen of gut, Mv-microvilli, V-vacuole, N-nucleus, M-mitochondria, Lm-lamellar membranoous structure, Bm-basal membrane.


5a
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The Brains of *Anguilla japonica* Leptocephali and Elvers

Kazumasa Uematsu and Hidekazu Tomoda

There are few studies on morphogenesis of the brain of teleost fishes. However, even in fishes, such as the red sea bream *Pagrus major*, that does not exhibit the so-called metamorphosis during the larval development like eels, we have found distinct morphological changes in many brain regions in an appropriate timing of the development. We expect that remarkable changes would occur in the brain morphology in the metamorphosing eels larvae. Hence, we examined the brain external characteristics and volume in *Anguilla japonica* leptocephali and elvers.

We have analyzed the brains of 12 leptocephali of *A. japonica* collected during the Hakuho Maru KH-91-4 cruise and identified by Dr. T. Otake (Table), and 5 elvers collected at the Western coast of the Tanegashima Island on November 12, 1991 (approximately 60 mm in total length). Specimens were fixed in the Karnovski fixative buffered by cacodylate and stored at 4 ℃ in the same fixative until embedding. After tracing and photographing contours of the brain observed through the skull, the heads and brains were postfixed in 1 or 2 % OsO4 and embedded in Quetol 812. Serial semithin sections were cut transversely or sagittally and were stained with a toluidine blue solution. Outlines of selected sections of a brain were computerized and analyzed by using a software for 3D-reconstruction (Nikon Cosmozone-2S). We reconstructed external shapes of the brain and measured the volume of the whole brain.

Every brain region measured in the present study was already present in the 10 mm leptocephali (Figs.1 and 2). They were the telencephalon including the olfactory bulb, and the optic tectum, the cerebellum, and the medulla oblongata (Fig.3). The length of the telencephalon became nearly threefold during a period between the 10 mm and 30 mm stages, while the growth in the lateral and dorsoventral dimensions was slower. In contrast, the lateral growth was most rapid in the optic tectum during the period. Growth rates of the optic tectum in the three dimensions were less than two fold. The cerebellum grew parallelly in the three dimensions by twofold from the 10 mm to 30 mm stages. The growth of the medulla was very slow and the rates were between 1 - 1.5 in every dimension. By the biassed growth and a gradual elongation of a folding in the medulla, the brain shape changed to a depressed and elongated one.

By comparing the sizes of the brains of the 30 mm stage leptocephali and the elvers, most distinct changes in dimensions are seen in the optic tectum and cerebellum (Fig.3). The length and width of the former increased 2.0-2.5 times, and the width of the latter did by nearly twofold during the period.

However, growth in the other dimensions of the regions remained to be 1.0-1.5 times. No remarkable biassed growth were seen in the telencephalon and medulla in every dimension.

The dimensional growth of the brain was represented in changes of the external views (Fig.4). The lateral views of the brain showed no remarkable changes in lepthcephali of 10-30mm total length, while the width of the dorsal views relative to the length appeared to increase during the growth. The retarding tectal growth during methamophosis was possibly reflected onto the relatively smaller optic tectum of elvers (Fig.4). The larger corpus cerebelli and eminensia granularis in elvers might have been produced during metamorphosis. In addition to them, a longitudinal extension of the brain might occur during the stage, resulting in making the depressed brain shape of elvers.

The volumes of the whole brain of leptocephali were measured 0.05-0.06 mm3 in the 10 mm stage, 0.13-0.22 mm3 in the 20 mm stage and 0.32-0.35 mm3 in the 30 mm stage (Fig.5). The volume of elvers was approximately 1.2 mm3 (Fig.5).

In the present study, we found that the brain shapes of the *Anguilla japonica* elvers are distinctively different even from those of the largest leptocephali analyzed. These results suggest that the brain morphology may exhibit a remarkable change in parallel with changes occurred in other organs during the later larval phases or a period of the metamorphosis of the fish.

Table 1. Leptocephali analyzed in this study

Station	Date	Total length (mm)	Body height (mm)	Total myotomes
C-6	910701	11.5	2.2	112
C-6	910701	12.5	2.5	112
C-11	910702	20.5	4.3	114
C-11	910702	10.5	2.4	115
C-11	910702	11.5	2.4	117
C-11	910702	10.2	2.2	115
C-12	910702	23.5	4.3	113
C-20	910713	23.5	-	-
C'-37	910713	31.0	4.8	115
C'-39	910713	30.0	-	115
C'-43	910717	19.5	-	115
C'-43	910717	20.0	3.6	112

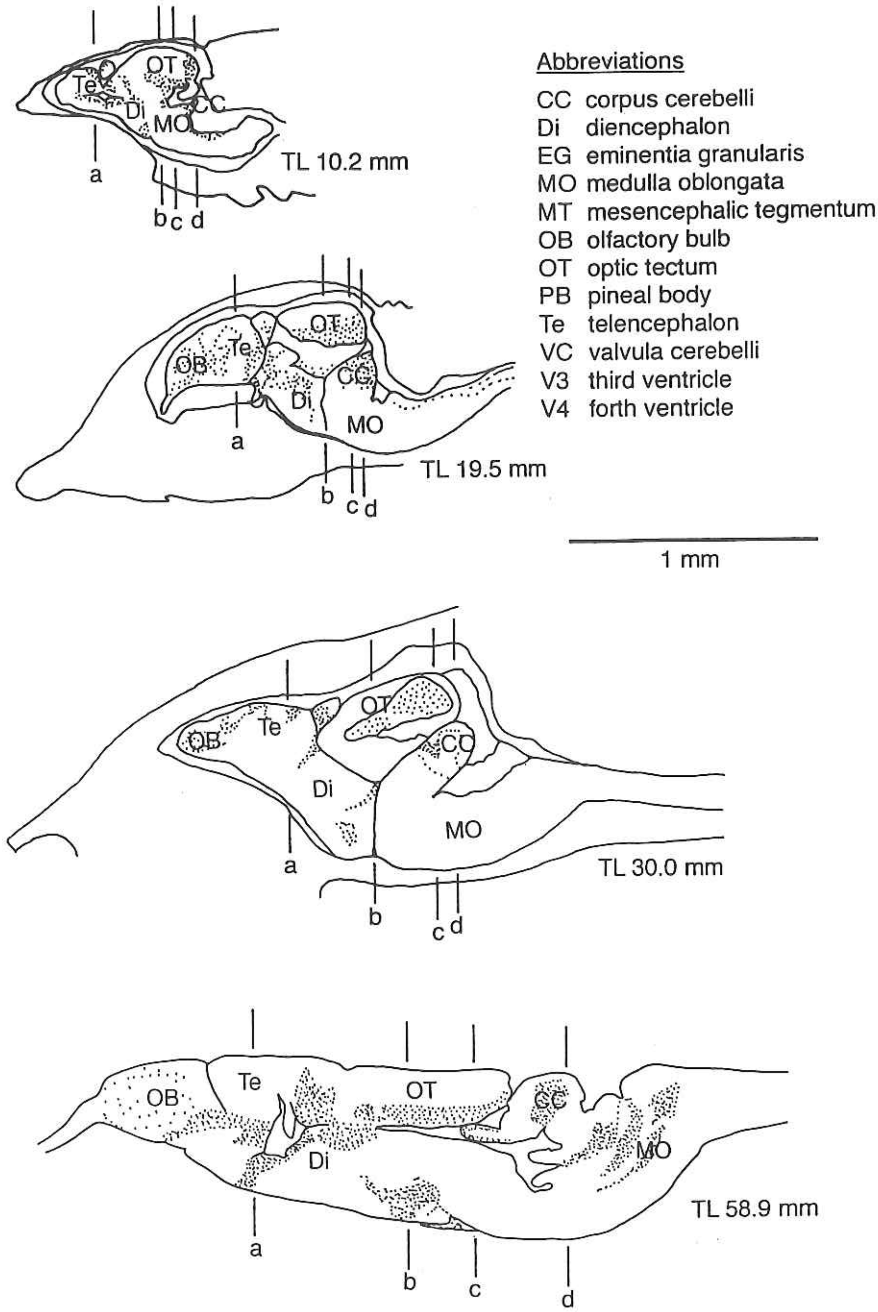

Fig. 1 Drawings showing parasagittal sections of the brain of Anguilla japonica leptocephali (A, 10.2 mm; B, 19.5 mm, C, 30.0 mm in total length) and elvers (D, 58.9 mm in total length).

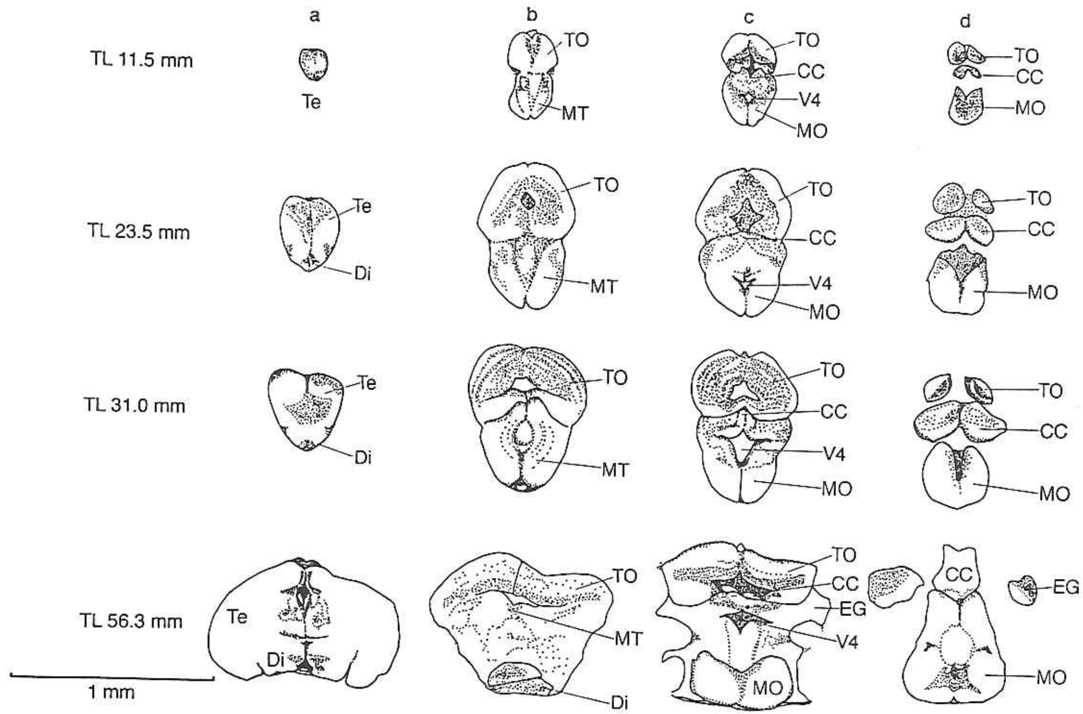

Fig. 2 Drawings showing transverse sections of the brain of Anguilla japonica leptocephali (A, 11.5 mm; B, 23.5 mm; C, 31.0 mm in total length) and elvers (D, 56.3 mm in total length). Levels of the sections (a-d in each row) correspond with lines on the brain sections in Fig. 1. Abbreviations, see Fig. 1.

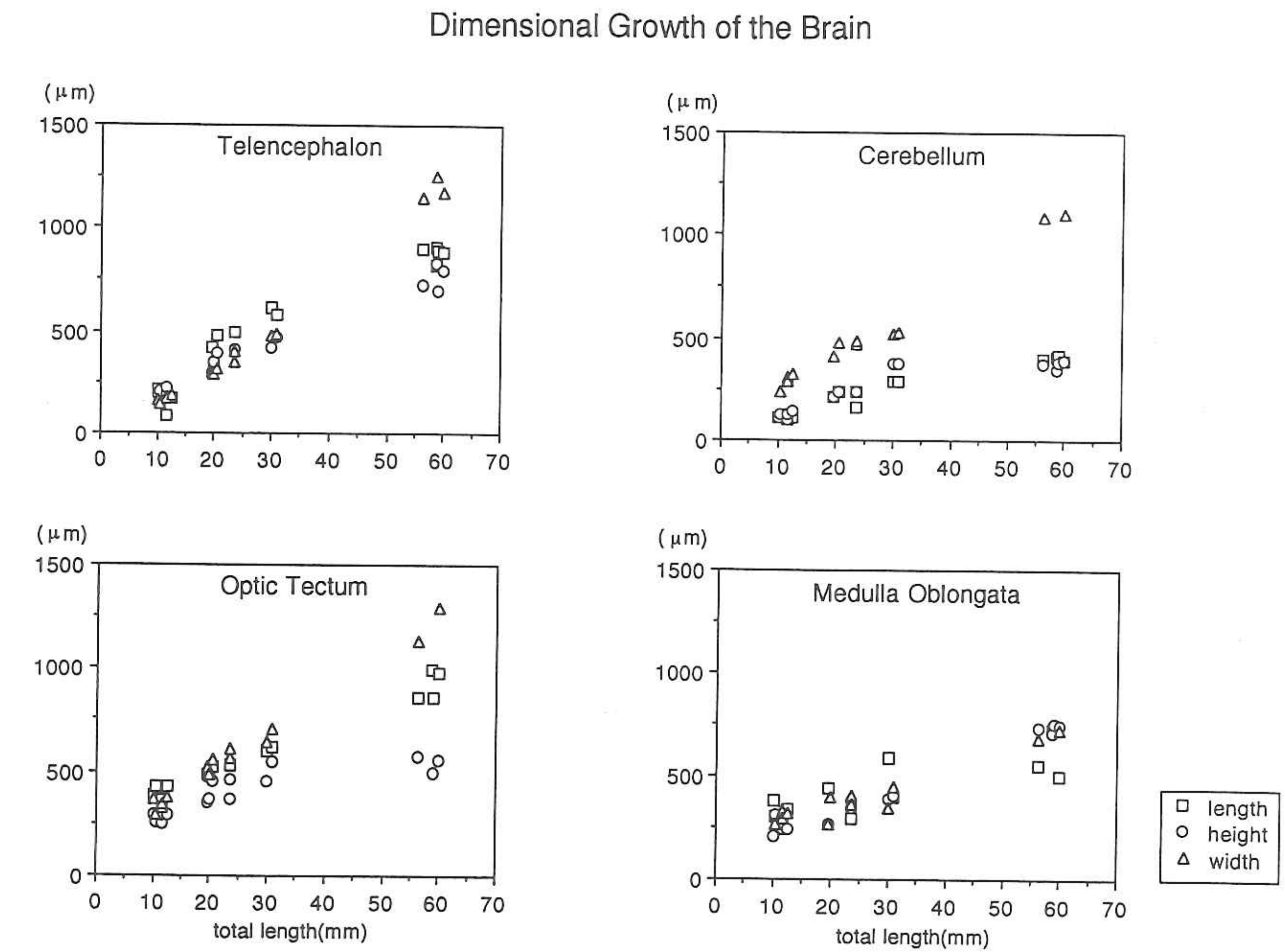

Fig. 3 Dimensional growth of the brain of the Anguilla japonica leptocephali (n=10) and elvers (n=25).

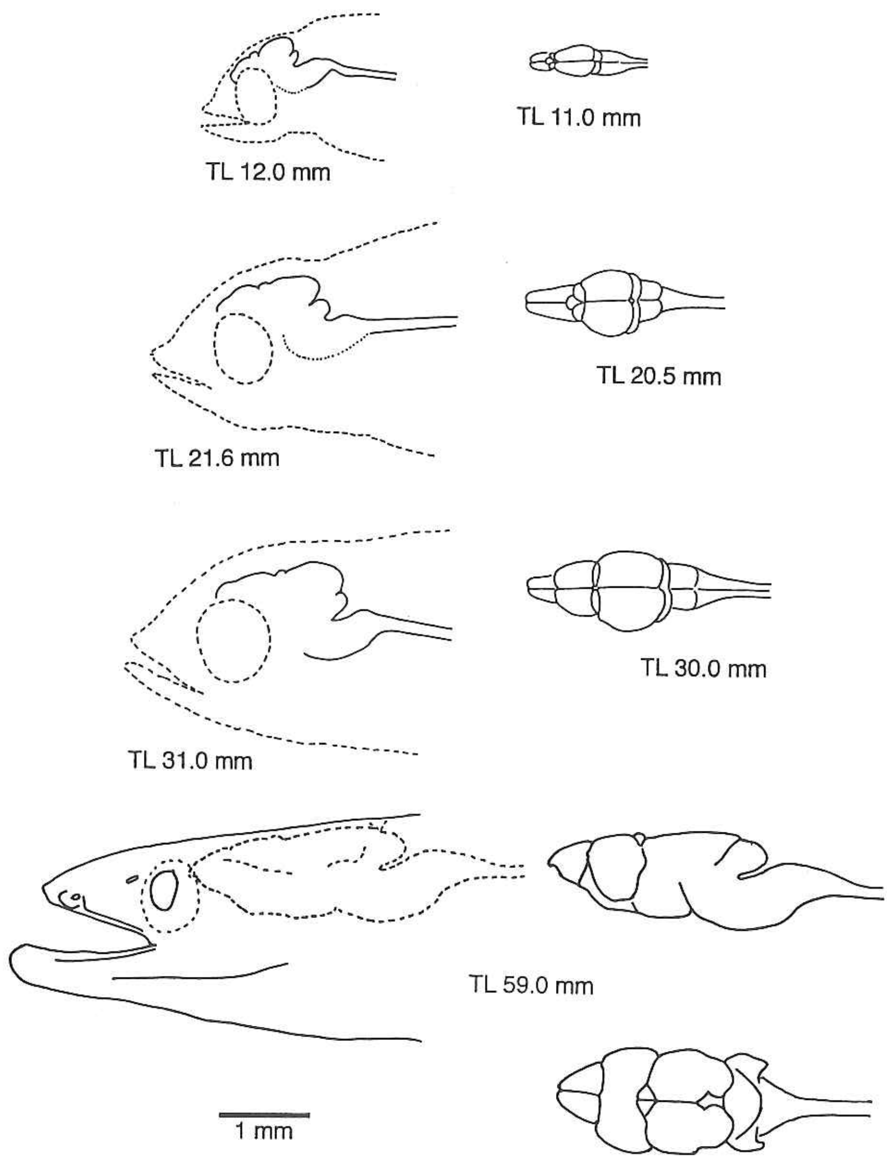

Fig. 4 External views of the brains of the leptocephali (upper three drawings) and elver (bottom) of Anguilla japonica. Numbers attached to drawings indicate the toltal length (TL) of the specimens.

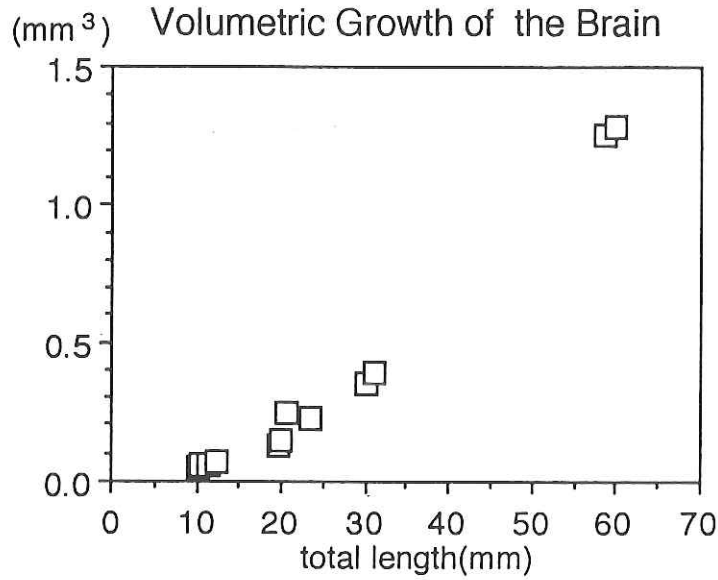

Fig.5 Volumetric growth of the brain of the Anguilla japonica leptocephali (n=10) and elvers (n=2).

Immunocytochemical Demonstration of Prolactin and Growth Hormone Cells in the Pituitary of the Japanese Eel Leptocephalus

Emi Arakawa, Toyoji Kaneko, and Tetsuya Hirano

The eel, a typical catadromous fish, experiences a considerable range of salinities during the life-long migration. Prolactin (PRL) is established as a freshwater-adapting hormone in many euryhaline teleosts. On the other hand, growth hormone (GH) is suggested to play an important role in seawater adaptation. In early developmental stages of the eel, however, hormonal control of osmoregulation has hardly been studied, because of very limited availability of eggs and leptocephali.

In the present study, the occurrence of PRL and GH cells in the pituitary of leptocephali of the Japanese eel, *Anguilla japonica* (total length: 10.3-30.0 mm) was investigated by means of immunocytochemistry.

Samples were collected at Stations between B-36 and C-52. Head portions of the leptocephali were fixed in Bouin's solution for 24 h and preserved in 70% ethanol. Later, they were embedded in paraplast. To identify PRL and GH cells in the pituitary, sagittal sections were immunocytochemically stained according to the ABC method (Hsu et al. 1981) with specific antisera against eel PRL (Suzuki and Hirano, 1991) and eel GH (Kishida and Hirano, 1988).

The pituitary appeared as a cell cluster or mass, located beneath the hypothalamus. Both PRL and GH cells were detected in all specimens of the leptocephali, even in the smallest of 10.3 mm long. PRL cells occurred in the rostral pars distalis in the pituitary (Fig. 1), separated from the location of GH cells in the proximal pars distalis (Fig. 2). The median section contained less than 5 PRL cells and 10-20 GH cells. The PRL cells did not form a follicular structure, as typically seen in the pituitary of adult eel.

This is the first report that describes PRL and GH cells in the pituitary in the leptocephalus of the Japanese eel.

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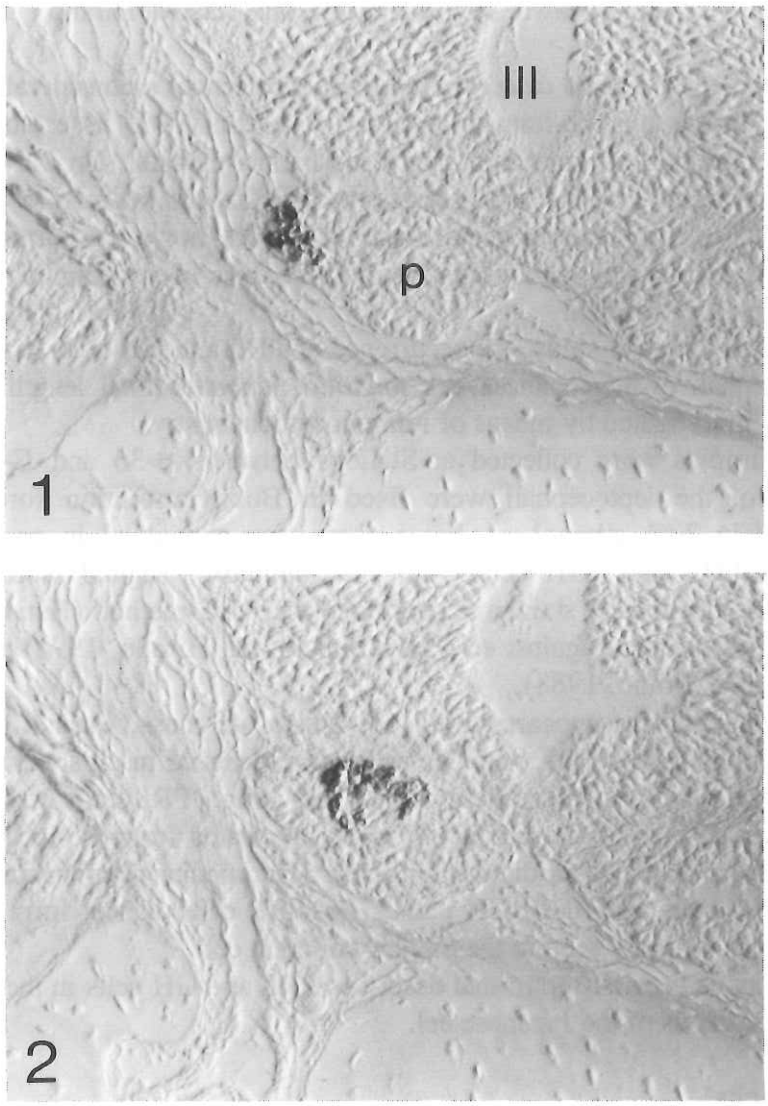

Figs. 1 and 2. Immunoreactive PRL (Fig. 1) and GH (Fig. 2) cells in the pituitary of the leptocephalus. P, pituitary; III, third ventricle. x490.

Skin Lectin in the Leptocephali

Yuzuru Suzuki and Tsuguo Otake

Fish skin is much more fragile than that of other higher vertebrates, since the surface epithelial cells are not keratinized. However, the surface is covered with mucus, which protect the skin by softening physical shock and by washing away pathogens. More over mucus contains many bio-active substances that are considered to be involved in defence mechanisms. One of such bio-active substances is lectin, which can be recognized by its hemmagglutinating activity.

The skin of eel is covered with thick mucous layer. The mucus contains extremely active lectin and hemolysin that lyse red blood cells. These two bio-active substances are both proteins, the molecular weight of which are estimated to be 290k for the lectin and 370k for the hemolysin. The lectin secreting cell was identified to be club cell in the epidermis, by immunocytochemical analysis, using anti-lectin antibody (Fig.1). The lectin is recognized in the secretory vacuole of the cell. The club cell in the eel is the only one cell, that is identified to be lectin secreting cell in fish.

The mucus lectin and the secreting cells, i.e., club cells, are recognized as early as the stage of elver eel. Then next, how about the skin of leptocephali ? The subject of my investigation on the KH91-4 eel cruise has been to answer the question.

Activities of skin lectin and hemolysin

Activities of lectin and hemolysin were measured by microtiter technique. Skin mucus of leptocephalus was diluted serially on a microtiter plate, then add the same volume of 2.5% (v/v) rabbit red blood cells suspension. The activity is expressed as reciprocal of maximum dilution that showed the hemagglutinic or hemolytic reaction. The mucus was gathered directly to a diluter, since it was extremely difficult to take enough volume of mucus from small specimen of leptocephalus. The resulting value of titer in some specimen, especially in *Anguilla japonica*, might be underestimated due to the insufficiency of the mucus.

The activities in *Anguilla japonica*, were measured in ten individuals of 17.7 to 33.0 mm in body length. Among them, no activities were recognized in five individuals, while other five showed hemagglutinic activities (Table 1). There may be relationship between the body length and the lectin activity, since the highest titer, 1024, was seen in a large specimen, although the relationship is not clear. No hemolytic activity was seen in any fish.

The activities of lectin and hemolysin were investigated in the leptocephali of other ten species, 36 individuals (Table 2). High hemagglutinic activities, more than 512, were recognized in one fish of *Ariosoma*. sp.4, two of *A*. sp.5, one of *A*. sp.7, two of *Muramidae* sp., and one of *Nemichthys scolpaceus*. Almost all other individuals showed the activity in some extent. Hemolytic activity was also recognized in *Anguilla marmorata*, *Ariosoma* sp.,*Muramidae* sp., and *Nemichthys scolpaceuus*, especially in *A.marmorata* showed extremely high titer, more than 4092.

These activities were related with the condition of specimens. All the mucus samples taken from live fish showed high titers. On the other hand, low titer shown in other many fish may be caused by the loss of skin epidermis during the net sampling, as described later. Therefore, the higher titer is probably nomal. It can be concluded that the leptocephali in many species have extremely high hemagglutinic activity in the skin mucus. The possibility that the mucus of *A. japonica* contains hemolysin cannot be denied, although no hemolytic activity has been observed. This is because the hemolysin in eel mucus is unstable and more easily degenerated than the lectin.

Club cells in the leptocephali

Skin lectin in the eel is known to be secreted from the club cells in the epidermis. Therefore the development of the cells in the epidermis of the leptocephali is important for understanding the early development of the defence mechanisms in the skin.

In the leptocephali skin, the epidermis was almost lost during the net sampling, especially at the trunk. This may be the reason of the low lectin activities in many specimens. On the other hand, in some specimens of the head, the epidermis is well conserved. The club cells can be observed even in a small specimen, BL 11mm. This suggests the lectin may be produced in early developmental stage of leptocephalus.

Fine structure of the club cell could be observed in a large specemen, BL 32.7mm. The club cells in adult eel are characterized by large elongated shape, the lectin containing secretory vacuole, and numerous helical filaments in the cyteplasm (Fig.2,3). The club cell in the leptocephalus is not so large, and the shape is oval (Fig.4). The cell has a secretory vacuole, suggesting the accumulation of the lectin in the vacuole.

Conclusion

The results of these observations show that the leptocephalus begins to produce the skin lectin in early developmental stage. My preliminary observations show that the lymphatic systems in the leptocephali are not necessarily functional. Therefore the lectin may have important roles in the defence mechanisms of the leptocephali.

Table 1. Lectin activity in *Anguilla japonica* leptocephali.

BL	HA
17.7	0
18.3	0
20.0	2
27.0	0
27.1	0
27.6	+
28.5	0
30.0	2
32.7	1024
33.0	8

BL, body length; HA, hemagglutination titer.

Table 2. Hemagglutinic and hemolytic activities in the skin of leptocephali.

Fish species	No.	HA	HL
Anguilla japonica	10	0-1024	0
Anguilla marmorata	3	8-4092<	0-4092
Ariosoma sp.4	3	4-2048	0-16
Ariosoma sp.5	6	0-4092<	0-128
Ariosoma sp.6	2	32-64	2-64
Ariosoma sp.7	7	0-64	0-512
Derichthys sp.	1	32	0
Muraenidae sp.	5	8-4092<	0-512
Nemichthys scolpaceus	3	32-2048	0-8
Serrivomeridae sp.	5	0	0
Xenocongridae sp.4	1	2	0

HA, hemagglutination titer; HL, hemolysis titer.

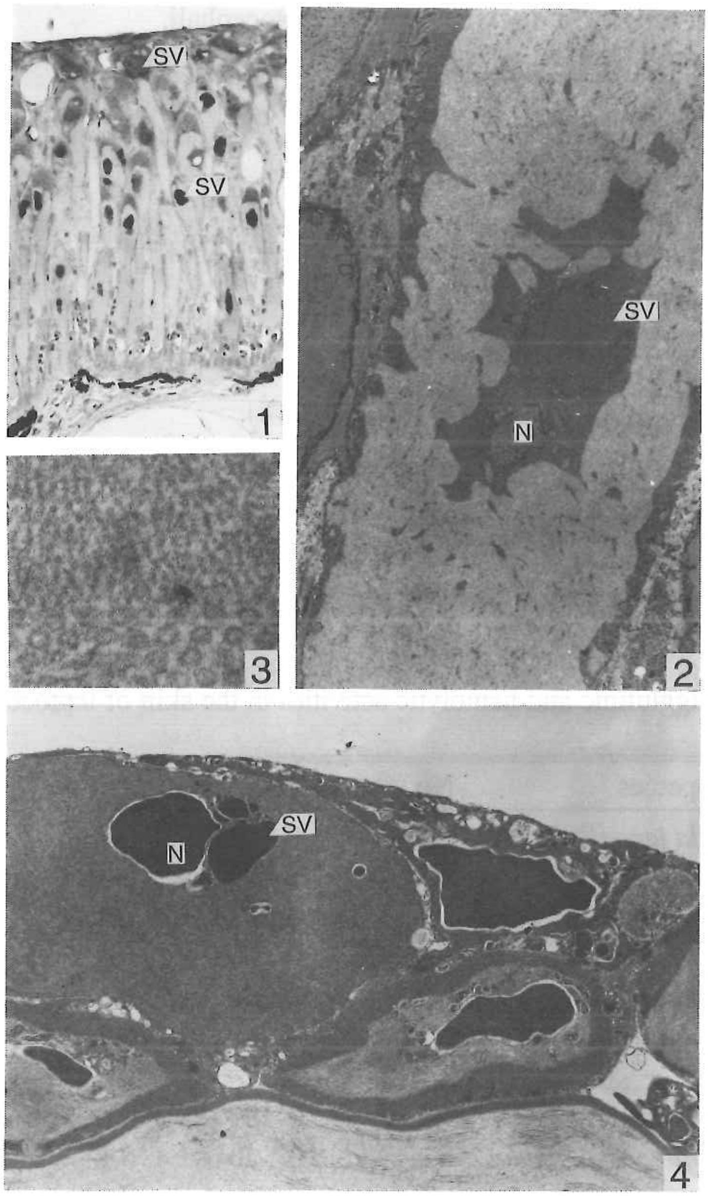

Fig. 1 Immunocytochemical staining of the eel epidermis for the lectin. Clear and accurate reaction against the anti-lectin antibody is recognized in the secretory vacuoles (SV) of the club cells.

Fig. 2 Ultrastructure of the club cell in adult eel. Secretory vacuole (SV) near the nucleus (N) can be seen. The cytoplasm is filled with helical filaments.

Fig. 3 Helical filaments in the cytoplasm of the club cell.

Fig. 4 The club cell in leptocephalus. Secretory vacuole is visible.

Larval migration of Japanese eel

Shingo Kimura and Takashige Sugimoto

A discovery of the spawning area for Japanese eel (*A.japonica*) in 1991[1] gave biological oceanographers a first step for the research on mysterious eel migration. The spawning area was found to be located in the North Equatorial Current (NEC) west of the Mariana Islands at a salinity front near 15°N, 140°E, 3000 kilometers south from the growth habitat in the East Asia. Through analyses of hydrographic observation and tracking of satellite drifter-buoys released at the discovered spawning area, we suggested importance of physical factors for the long-distance mysterious migration of the Japanese eel and presented a hypothetical model of the larval migration. In the model, the northward Ekman transport by the trade wind plays an important role to explain the wind-induced northward shift of the larvae together with the onset of diel vertical migration. Without the shift, the larvae should be entrained into the Mindanao Current flowing southward along the Philippine Islands where *A.japonica* juveniles are scarcely distributed. Assuming that leptocephali greater than 20 mm initiate the vertical migration, a westward wind velocity of greater than 5-10 m s^{-1} should be effective diminishing the southward current velocity. When the physical and geophysical conditions - such as the salinity front for spawning activity, the water tunnel for westward larval transport, the Ekman transport by the trade wind for transfer of the larvae from the NEC to the Kuroshio, and the strong velocity of the Kuroshio for rapid transport to growth habitats, - are well matched with the timing of the onset of vertical migration, large-scale eel migration could result.

In the 1991 expedition of the research vessel Hakuho-maru of the Ocean Research Institute, University of Tokyo, we released two systems of satellite-tracking drifter buoys at the site (15°52'N, 136°53'E) where a large number of *A.japonica* leptocephali were collected on July 2, 1991. The drifter buoys with underwater drogue were deployed to flow along surface water (15 m depth) and mid-depth water (150 m depth) and were tracked about for 3 months.

The mid-depth buoy flowed westward in the N.E.C. for the first 50 days after release at a mean velocity of 20-30 cm s^{-1}, whereas the surface buoy flowed northeastward against the N.E.C. (Fig.1, from Kimura et al.[2]). This large difference in the drifting pattern of these two buoys can be attributed to the considerably large effect of the trade wind. Generally, the wind causes Ekman transport at the surface: planktonic particles existing in the Ekman layer would be transported to the right side perpendicular to the wind direction in the northern hemisphere. The southeast trade wind with 0.1 N m^{-2} which is dominant in this region until late summer [3-5] causes northward 20 cm s^{-1} current velocity on the surface and northeastward volume transport in the

Ekman layer (0-70m). Throughout this cruise, wind velocity which can generate 0.1 N m^{-2} wind stress was observed around the buoy releasing point. The wind-induced current velocities on the surface are sufficiently large to move the buoy north compared with the westward geostrophic current velocity about 20 cm s^{-1}. Some previous surface drifting buoy observations on adjacent region by the Maritime Safety Agency of Japan (6-10) show drifting patterns similar to that of our surface buoy and support the idea that the surface buoy reflects the usual trajectory of particles at the surface.

The mid-depth buoy flowed almost westward between 137°E and 131°E at about 20 cm s^{-1} in about 40 days. The age of the larvae as estimated by otolith daily rings tended to be greater at the more western section in parallel with the trajectory of the mid-depth buoy. The growth rate, 0.46 mm d^{-1}, is slightly less than the previous estimate (11). The difference in age between 13 mm fish at 137°E and 29 mm fish at 131°E was about 35 days. This corresponded well to the drifting period of the mid-depth buoy from 137°E to 131°E. Thus, it can be concluded that the mid-depth buoy roughly represents a major migration route of the leptocephali spatially and temporally in the longitudes. It also indicates that the leptocephali reside at layers deeper than 70 m where the Ekman transport effect does not occur significantly and the larval transport is entirely subject to the mid-depth water of N.E.C. In fact, the leptocephali collected in the section 137°E were found deeper than 50 m depth with their greatest abundance at 75 m depth at night.

In the Atlantic Ocean, it is well known that spawning by Atlantic eels (*A. rostrata* and *A. anguilla*) is related to the thermal front (12). In this cruise, a highly concentrated site of the smallest larvae is located just south of the 34.5 salinity front, but not at the thermal front. We also found that sampling locations of *A.japonica* leptocephali in recent two surveys in adjacent regions of section 137°E(13-14) were located south of the 34.5 salinity front. Furthermore, the layer of low salinity 34.5 between 70 m and 150 m depth corresponds to salinocline or salinity maximum (1-2). These facts strongly suggest that the low salinity restricts residence of small leptocephali both vertically and horizontally. Moreover, the salinity front may act as a cue to trigger cessation of adult migration of *A.japonica* and initiation of spawning. A high geostrophic velocity (greater than 20 cm s^{-1}) is dominant in the upper 150 m and is distributed at the southern region of the 34.5 salinity front(2). However, at the northern side of the 34.5 salinity front, the velocity (5-10 cm s^{-1})(2) is too low for eel larvae to arrive in time at the coastal waters of their growth habitat in autumn-winter at appropriate age of 4-6 months old(15). Therefore, it is appropriate for eel leptocephali to be transported westward using "water tunnel" flowing on southern side of the 34.5 salinity front at depths between 70 m and 150 m.

However, trajectories of the mid-depth buoy and leptocephali have a tendency to shift southward on the way to the west, and finally the mid-depth buoy was taken into the Mindanao Current where the Japanese eel is seldom found. If the larvae were being continuously transported passively in the mid-depth "water tunnel" of N.E.C., they would be unable to complete successful migration to their growth habitat in Taiwan, China, Korea and Japan. Because, the station with the largest numbers of the leptocephali collection along each observational sections is always located south of the mid-depth buoy trajectory. Thus, a more delicate mechanism than passive transport by the current has to be considered to the leptocephali migration.

Atlantic eels show diel vertical migration from deeper waters during the day to shallower waters at night(12,16-20). Diel vertical migration of Japanese eel leptocephali was also suggested(21). The amplitude of the migrating depth increases as the body length increases(19). Larger larvae tend to be distributed in shallower layers. Leptocephali larger than 20 mm migrate between 30 m and 70 m at night(20). Therefore, as they grow, the larvae in the water tunnel of N.E.C. receive greater northward Ekman transport when they migrate upward at night to enter the Ekman layer (0-70 m). Buoy trajectories show that the westward component of the current velocity is smaller west of 129°E than the southward component. The wind-induced transport effect should be applied before the leptocephali reach the 129°E line to compensate for the southward transport. The southward velocity observed by the mid-depth buoy is about 8 cm s^{-1} between 129°E and 131°E. Supposing that the leptocephali greater than 20 mm body lengths are subject to the wind-induced transport effect for a half of day after the initiation of large vertical migration, a westward wind velocity greater than 5-10 m s^{-1} which is usually recognized in the survey area would be sufficient to diminish the southward current velocity at the surface.

Adults of the Japanese eel detect their spawning site using a seamark of salinity front in the N.E.C. (Fig.2, from Kimura et al.(2)). Hatched larvae are passively transported westward in the mid-depth "water tunnel" of N.E.C. located just south of the salinity front at a depth between 70 m and 150 m. But the continuous entrainment in the N.E.C. would result in a death migration, the leptocephali being carried southward far from their growth habitat. After the development of vertical migration of the larvae, the trade wind aids the successful transfer of migrating larvae from N.E.C. to a north-going broad highway, the Kuroshio Current, which distributes larvae to east Asia. Arrangement of the two major currents and the action of the trade wind in transferring leptocephali between them form a well-designed, but a delicate system for the transportation of larvae of the Japanese eel; as a consequence, their spawning must be confined to a strictly defined site.

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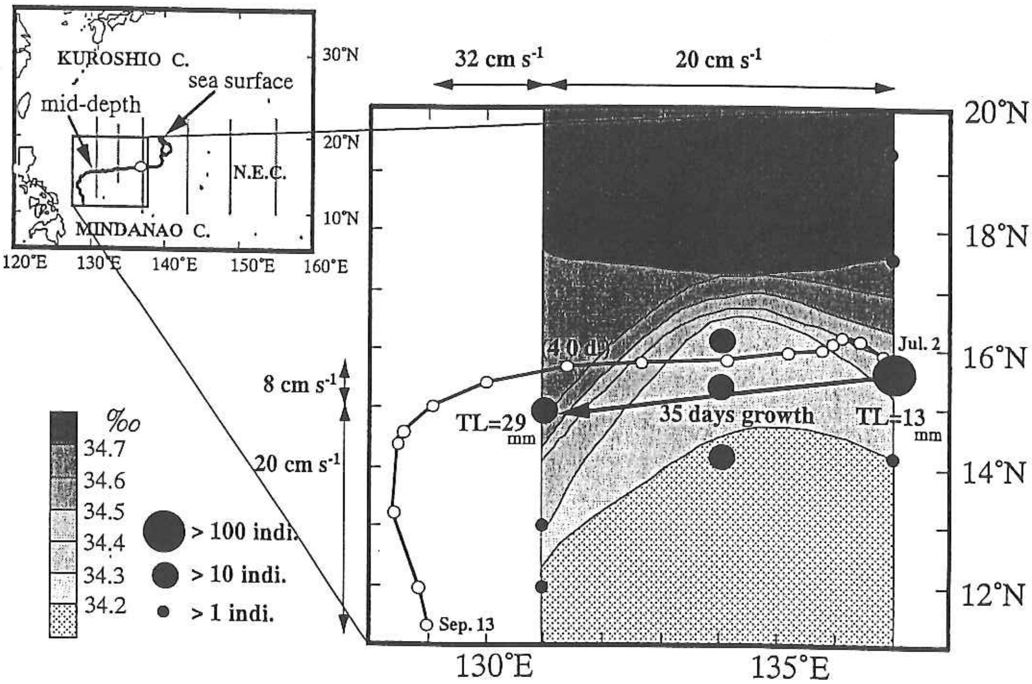


Fig.1 Trajectories of the surface and mid-depth drifting buoys (from Kimura et al.[(2)]). Open circle in reduced figure indicates the position of deployment of the buoys. The detailed trajectory of the mid-depth buoy indicated every 5 days by open circles is shown in an enlarged figure with horizontal salinity distribution at the depth of 50 m. The buoy was deployed on July 2 at the station where large numbers of the leptocephali were collected. The tracking was completed on September 13 owing to a drop in battery power. Average velocities of the buoy are indicated numerals with arrows. In the western region of 129°E, the southward velocity is greater than the westward and the buoy was taken into the Mindanao Current region. Large, middle and small solid circles indicate the leptocephali collecting stations and the numbers of collections, >100 indi., >10 indi. and >1 indi., correspond to size of the solid circle. TL means averaged total length of larvae in each transect.

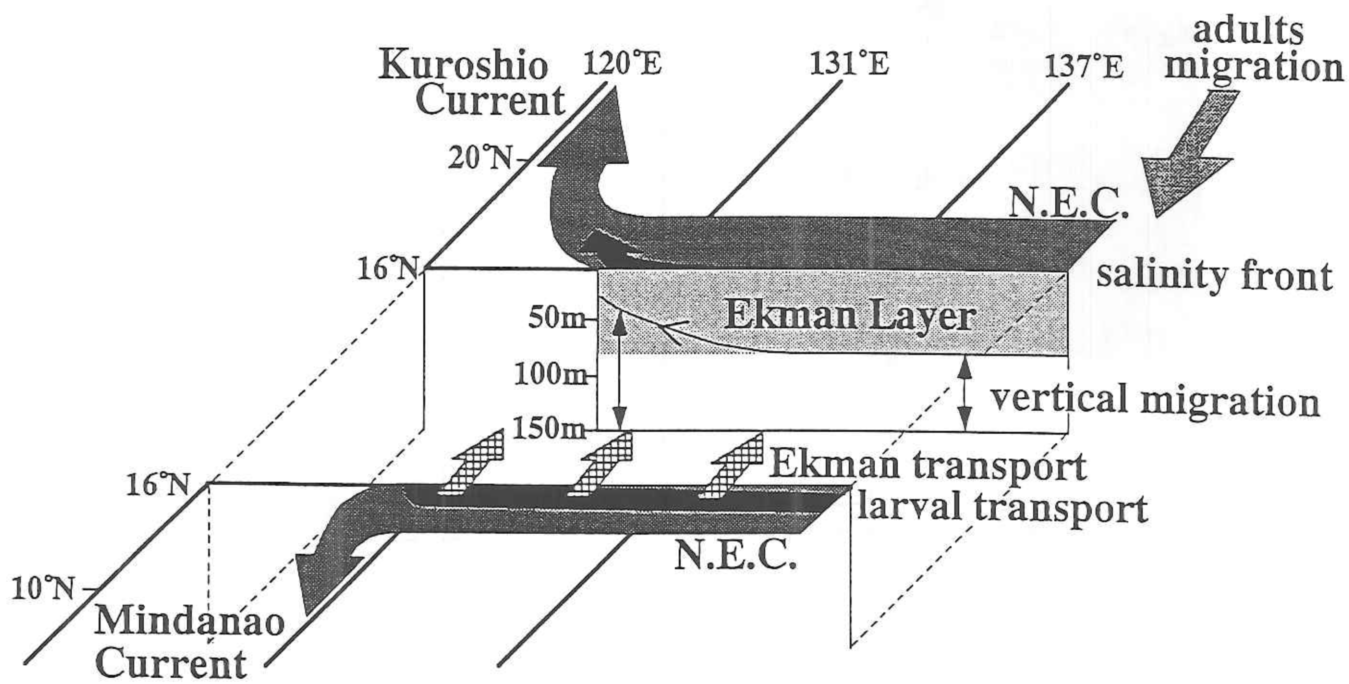


Fig.2 Schematic diagram of larval transport in N.E.C. (from Kimura et al.[(2)]). Larvae spawned in east of 137°E transport westward by 70-150 m depth water of N.E.C. As the larvae grow, they undergo a large vertical migration to the Ekman Layer. Northward Ekman transport by the trade wind aids larval transport to the Kuroshio region.

V. Biological environment

Studies on zooplankton in the subtropical and tropical waters of the Western North Pacific

Shuhei Nishida, Jin-Ho Chae, Harumi Kobayasi and Kazutaka Takahashi

1. Sampling and general procedures

The distribution, taxonomy, ecology and other biological aspects of zooplankton were studied on different taxonomic groups. The samples for each topics described below were collected by the following methods.

The samples for the study of horizontal distributions of macroplankton and micronekton were collected by oblique tows of a 10-ft Isaacs-Kidd midwater trawl (IKMT) with mesh size of either 1 mm or 2 mm. Along with the IKMT tows, surface zooplankton were collected at night by surface tows of an ORI net with mesh size of 0.69 mm. Smaller, epipelagic plankton were collected by vertical tows of a NORPAC-twin net (mesh size: 0.10 and 0.33 mm) from 200 m depth to the surface. For studying the vertical distributions of zooplankton, samples were collected by multi-layered simultaneous tows in the upper 500 m of Motoda horizontal nets (MTD nets) with mesh size of 0.50 mm. For all net samples, the volume of water filtered was estimated with a Tsurumi flow meter attached to the mouth the nets. Sampling depth was measured with either a Rigosha depth meter (RMT) or a real-time depth sensing system (SCANMAR), the latter occasionally being used only in IKMT tows.

The samples were generally fixed and preserved in 4 % formaldehyde/seawater solution buffed with sodium tetraborate. Live specimens were occasionally sorted from the original samples and were used for experimental and/or histological studies.

2. Composition and biomass of zooplankton

The zooplankton communities in the oceanic, subtropical and tropical waters are essentially different from those of the temperate and higher-latitude waters and coastal waters. In the former regions gelatinous plankton such as jellyfishes, salps, doliolids and pteropods are known to be relatively more common and abundant than in the other regions. However, information on the biomass and composition of zooplankton is scarce and scattered for the tropical and subtropical waters of the western North Pacific. This study examines the distribution and biomass of the major taxonomic groups in the surveyed area. The ecological role of gelatinous plankton and their relationships with other plankton will also be discussed.

Samples were collected with an IKMT and a NORPAC nets. The specimens were sorted into major taxonomic groups and their wet weights and individual number were measured.

The wet weights of the NORPAC-net samples (200-0 m, mesh size: 0.10 mm) are summarized in Table 1. The daytime values were significantly higher at the stations north of the salinity front (salinity: 34.4-34.6, latitude 15-16°N) than at the southern stations (Mann-Whitney *U* test, $p< 0.05$), while no significant difference was found in the nighttime values between the northern and southern stations. At the southern stations, the nighttime values were significantly higher than the daytime values, while at the northern stations no significant difference was found between the day and night values. The composition of zooplankton was examined for the NORPAC-net samples (mesh size: 0.33 mm) collected near the station where eel leptocephali occurred in significant numbers (Stns. C'-40, 41). Copepods accounted for about 70 % of the total zooplankton numbers. The next abundant taxa were appendicularians, siphonophores, chaetognaths, ostracods, and euphausiids in this order, followed by salps and doliolids, molluscus and other hydromedusae. The vertical distributions of the major taxa were examined near the station with the maximum abundance of eel leptocephali (Stns. C-10, 16). The maximal zooplankton density was at 100 m depth in the daytime, while two maxima at 0 and 75 m depths, respectively, were observed at night.

3. Distribution of the phyllosoma and puerulus larvae of the palinurid lobsters

The palinurid lobster, after hatching, drifts in offshore water for several months as a pelagic larva, the phyllosoma. After metamorphosing to the puerulus stage, it returns to the coast, settles on the seafloor, and then molts into the postpuerulus juvenile.These larval stages are important in the whole life histories of the palinurids, but little is known on their distribution and ecology. This study examines the geographical distribution of the palinurid lobsters in the surveyed area.

Samples were collected with an IKMT and an ORI net. Phyllosoma and puerulus larvae were sorted from the original samples. The identification and counting of the specimens are now in progress.

4. Taxonomy, morphology and ecology of the copepods of the family Sapphirinidae

The copepods of the family Sapphirinidae are distributed widely in warm waters of the world ocean, but little is known on their ecology. This study examines the taxonomy,morphology, geographical and vertical distributions and feeding habits of the genera *Sapphirina* and *Copilia*.

Samples were collected with an IKMT, an ORI net, a NORPAC net and MTD nets. Sapphirinids were sorted from the samples, identified to species and counted. A part of the specimens were fixed with glutaraldehyde/formaldehyde for the examination of ultrastructure and gut contents with SEM and TEM.

From the NORPAC-net samples a total of 12 species of *Sapphirina* and

5 species of *Copilia* were identified (Table 2). The total abundance of *Sapphirina* and *Copilia* combined were highest at Stn. 3 (1.08 inds./m^3) and lowest at Stn. 33 (0.08 inds./m^3). The most abundant species were *Copilia mirabilis, C. quadrata* and *Sapphirina nigromarculata* in this order.

5. Distribution and ecology of pelagic molluscus, especially pteropods

The geographical and vertical distributions, feeding habits and behavior of the pteropods and other pelagic molluscs were studied.

Samples were collected with an IKMT, an ORI net, MTD nets and a NORPAC net. Pteropods, heteropods and pelagic nudibranchs were sorted from these samples, identified to species and their numbers counted. A part of the specimens were fixed with glutaraldehyde/formaldehyde for the examination of gut contents with SEM and TEM. For the examination of morphology and behavior, live specimens were reared in aquaria and their shape, color and swimming behavior were recorded with a video camera.

A total of 23 species of euthecosomatous pteropods were identified (Table 3). The most abundant species were *Limacina inflata*, which was distributed widely in the whole surveyed area. Some species such as *Cavolinia globulosa* and *C. tridentata* were more abundant in the area north of the salinity front (salinity: 34.4-34.6; Latitude: 15-16°N) than in the southern area, while some other species such as *C.uncinata* and *Diacria quadridentata* were more abundant in the southern than the northern area. The gut contents of *Cavolinia globulosa* examined with an SEM were dominated by coccolithophorids, diatoms, foraminiferans and small crustaceans.

6. Taxonomy and zoogeography of pelagic mysids

The mysids (Crustacea: Mysidacea) are distributed widely and abundantly in the aquatic environments in the world, and play important roles particularly in the marine food webs. Many species are essentially benthopelagic, and have close connection with the sea bottom. However, in the oceanic waters there exists a group of purely pelagic mysids, which have no direct connection with the bottom. This study examines the distribution and taxonomy of the pelagic mysids in the surveyed area.

Samples were collected with an IKMT and an ORI net. Pelagic mysids were sorted from the original samples, identified and counted. Specimens of meso- and bathypelagic species have occasionally been collected. These species are quite different from the epipelagic species in their morphology and ecology, and interesting in elucidating the phylogeny of Peracarida. A comparison of external morphology and foregut structure will also be made on the epi-, meso- and bathypelagic species.

Table 1. Summary of wet weights of NORPAC-net samples (mesh size: 0.10 mm).

Samples	North		South		Front		North:South ratio
	No. of samples	mg/m³	No. of samples	mg/m³	No. of samples	mg/m³	
All samples	17	40.7	13	30.4	3	30.9	1.3
Daytime samples	10	43.6	6	21.6	0	-	2.0*
Nighttime samples	4	40.2	6	39.9	0	-	1
Dawn/dusk samples	3	31.3	1	26.7	3	30.9	1.2
Night:Day ratio		0.92		1.85*		-	

* Difference significant (Mann-Whitney *U*-test, $p < 0.05$)

Table 2. Species of *Sapphirina* and *Copilia* collected by NORPAC-net tows.

Sapphirina angusta	*Sapphirina. nigromarculata*	*Copilia longistylis*
S. auronitens	*S. opalina*	*C. mirabilis*
S. gastrica	*S. ovatolanceolata*	*C. quadrata*
S. gemma	*S. scalata*	*C. recta*
S. intestinata	*S. sinuicauda*	*C. vitrea*
S. metalina	*S. stellata*	

Table 3. Species of euthecosomatous pteropods collected during KH-91-4 Cruise.

Family Limacinidae

Limacina inflata	*L. trochiformis*
L. lesueure	*L. bulimoides*

Family Cavolinidae

Creseis acicula forma *acicula*	*Cuvierina columnella*	*Cavolinia gibbosa* forma *gibbosa*
C. acicula forma *clava*	*Diacria trispinosa*	*C. gibbosa* forma *plana*
C. virgula forma *virgula*	*D. danae*	*C. globulosa*
C. virgula forma *conica*	*D. quadridentata*	*C. inflexa*
Styliola subula	*D.* sp.	*Diacavolinia longirostris*
Hyalocylis striata	*Cavolinia tridentata* forma *occidentalis*	*D. angulosa*
Clio pyramidata forma *lanceolata*	*C. uncinata* subsp.*uncinata* forma *plusata*	*D. limbata*
C. cuspidata		

Distribution of epipelagic plankton

Hiroshi Hasumoto, Shuhei Nishida, Jin-Ho Chae,
Harumi Kobayasi and Kazutaka Takahashi

A series of net sampling was made to study the taxonomy and distribution of epipelagic phytoplankton and zooplankton in the western North Pacific.

Samples were collected at 34 stations by vertical tows of a NORPAC-twin net (mesh aperture of each net: 0.33 and 0.10 mm) from 150 m depth to the surface at a speed of 1.0 m/sec. Samples were fixed and preserved in 4 % formaldehyde/seawater solution buffered with sodium tetraborate. For the both mesh apertures the settling volume measured on board (Table 1) was highest at Stn. 22 and lowest at Stn. 6.

Table 1. Summary of wet weights of NORPAC-net samples (mesh size: 0.10 mm).

Samples	North		South		Front		North:South ratio
	No. of samples	mg/m^3	No. of samples	mg/m^3	No. of samples	mg/m^3	
All samples	17	40.7	13	30.4	3	30.9	1.3
Daytime samples	10	43.6	6	21.6	0	-	2.0*
Nighttime samples	4	40.2	6	39.9	0	-	1
Dawn/dusk samples	3	31.3	1	26.7	3	30.9	1.2
Night:Day ratio		0.92		1.85*		-	

* Difference significant (Mann-Whitney *U*-test, $p < 0.05$)

Fish larvae collected during the Hakuho Maru cruise KH-91-4

Yoichiro Mitsui and Takakazu Ozawa

Fish larvae were collected with different types of larva nets. Due to time limitation all samples could not be examined. The larvae collected by IKPT-net from stations of group 'A' were examined and reported in Tables 1.1-1.3, in which leptocephali and some percoid larvae are not included but reported by other scientists in this report. In these tables, the arrangement of systematics follows that of "The fish of the Japanese Archipelago" (Masuda et al., 1984) and is separated mainly at the level of family with dotted lines, and further, species names are not written with Italic due to typing difficulty.

Table 1.1 Fish larvae collected by IKPT-net from stations (Sts. 1-12) of group 'A'.

Species / Station	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12
Stolephorus buccaneeri								9				
Bathylagidae sp.												
Bathylagus longirostris							1		6			
Gonostomatidae spp.						4						
Diplophos taenia	1	3	1									
Pollichthys mauli												
Vinciguerria sp.												
Vinciguerria nimbaria	259	137	249	23	7		2	11	8	1	10	106
Vinciguerria poweriae	3	5	9						2			
Vinciguerria attenuata	1							2	3			
Ichthyococcus elongatus									2			
Gonostoma spp.			2			2					2	
Gonostoma gracile	1	1	5	3		2					1	5
Gonostoma ebelingi				1	1	6	24	7	51	2	3	1
Gonostoma atlanticum	8	8	11	4	2	4	24	12	86	4		6
Gonostoma elongatum	5	6	11	2	1	5			3	7	3	9
Cyclothone spp.	31	20	7	2	1		4	3	7	3		1
Cyclothone alba	424	123	157	40	66	20	32	10	8	29	12	363
Cyclothone pallida							1	1		2		
Cyclothone pseudopallida	56	35	25	5	8	5	14	3	4	5	7	6
Cyclothone atraria			1	2		2	1					
Cyclothone acclinidens	1				1				1			
Margrethia obtusirostra			1									
Valenciennellus tripunctulatus	1		1	4		3	8	3	13		2	5
Sternoptychidae spp.	8	6	3	6	6	14	5	16	22	9	4	3
Chauliodus sp.		2	2					1	1			1
Stomias nebulosus					1							1
Macrostomias pacificus												
Astronesthidae spp.			1									
Astronesthes cyaneus							2	2	4			
Astronesthidae sp. 1												
Astronesthidae sp. 2	1	1		1		1			1		1	5
Astronesthidae sp. 3												
Astronesthidae sp. 4												
Melanostomiatidae spp.	2	1	2						2			
Flagellostomias boureei												
Leptostomias sp.												
Echiostoma barbatum									4			
Photonectes margarita				1								
Photonectes albipennis								1				
Eustomias spp.	1											
Eustomias sp. 1												2
Eustomias sp. 2					1							
Eustomias sp. 3											1	
Eustomias sp. 4				2	1		1	1	5		1	
Eustomias sp. 5			1									
Malacosteidae spp.												
Photostomias guernei												2
Aristostomias sp.		1										
Idiacanthus sp.	6		6	9	2	2		1	2	2	8	4
Synodus spp.												
Synodus variegatus												
Scopelarchidae spp.			4		4		1	4	34	6		5
Benthalbella spp.	7		4					1	3			
Scopelarchus spp.	6	10	12	6	8	25	15	23	75	4	4	3
Scopelarchus analis	2		3	1					2	2	1	3
Scopelarchus guentheri							2		2			1
Scopelarchus michaelsarsi				2					1		1	
Rosenblattichthys hubbsi		1										
Scopelosaurus spp.			1									
Scopelosaurus harryi												
Scopelosaurus hoedti			1	4		4				1		5
Scopelosaurus mauli	1											
Ahliesaurus brevis			1									1

Table 1.1 Continued.

Species / Station	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12
Myctophidae spp.	30	13	30	20		12	7	5	6	4		27
Hygophum proximum				1		2	2	1	2	4	1	2
Hygophum reinhardti	30	3	20									12
Benthosema spp.												
Benthosema fibulatum	69	5	34	14	2	12	1		29	4	2	25
Benthosema suborbitale	5	9	5				1					
Diogenichthys atlanticus	9		2				3		10			
Diogenichthys laternatus							2	5	3			
Myctophum spp.	4	1	9	4	1							9
Myctophum nitidulum												
Myctophum spinosum									1			
Myctophum asperum												
Myctophum obtusirostre	7	6	6	5	5	9	2	2	25	3	1	17
Myctophum orientale	5		8								1	
Symbolophorus evermanni	65	12	119	15	5	20	3	7	15	7	8	55
Centrobranchus andreae			3	2	2	4						1
Centrobranchus nigroocellatus	5	3	1		1			2	7	1	1	2
Notolychnus valdiviae	19	6	26									
Lampadena spp.										1		
Lampadena luminosa	13	5	12	3	2	9	1		1	11	1	19
Lampadena sp. 1												1
Lampadena sp. 2		2		1	1						1	
Lampadena sp. 3				1						1	4	1
Bolinichthys sp. 1	16	9	1	19	2	16	4	2	3	3	2	2
Bolinichthys sp. 2	1		3							1		
Ceratoscopelus warmingi	48	22	65	66	11	234	17	2	67	16	25	159
Lampanyctus spp.	3			3	1	1			75	5		1
Lampanyctus sp. 2	18	3	4				5	11	3			
Lampanyctus sp. 3	34	14	71	18	19	28	10	1	27	8		95
Lampanyctus sp. 4	3	2	1									
Lampanyctus sp. 5	2	2	2	1					2	1		1
Lampanyctus sp. 8												
Lampanyctus sp. 10	6		1	2					4	1		5
Lampanyctus sp. 11												
Triphoturus microchir					2	2	1					1
Idiolychnus urolampus	12	17	14									
Diaphus A group	34	19	46	11	10	24	8	6	27	4	3	59
Diaphus B group	52	22	112	2	1	9	8	12	39	17	1	103
Paralepididae spp.	1	3	1	1	1	2	4	2	1	2	2	4
Sudis atrox	4	4	4	4	1	2				5		3
Paralepis spp.												
Paralepis atlantica atlantica	4											
Lestidium spp.		3					1	2	11		1	3
Lestidium atlanticum	1		2									
Lestidiops spp.												2
Lestidiops jayakari jayakari	2		3	2		4	5		9	3		3
Lestidiops indopacifica	1		1									6
Lestidiops mirabilis					1							
Lestrolepis spp.								2	13			
Stemonosudis rothschildi												
Stemonosudis macrura	3	1	4								1	
Stemonosudis elegans				1								1
Uncisudis advena	2											
Omosudis lowei												
Alepisaurus ferox	1	2										
Coccorella atlantica	3	2		6	1		1				4	4
Evermannella indica			3		1							1
Exocoetidae spp.												
Fistulariidae spp.												
Syngnathidae sp.												
Bregmaceros spp.		3									1	2
Bregmaceros atlanticus	5	6	13					3	6		2	6
Bregmaceros macclellandi										2	2	2
Bregmaceros nectabanus												
Carapodidae spp.		5										
Ophidiidae spp.					1	1		1				1
Antennariidae spp.												
Ceratioidei sp.									1			
Caulophryne sp.	1											
Himantolophus groenlandicus gr.	1							1				

Table 1.1 Continued.

Species / Station	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12
Oneirodidae spp.												
Oneirodes eschrichtii gr.												
Oneirodes melanocauda type.	1											
Microlophichthys microlophus			1									
Pentherichthys sp.												
Lophodolus acanthognathus type.									1			
Chaenophryne sp.												
Chaenophryne draco-gr.			1									
Thaumanichthys spp.												
Gigantactis type. A	1	1	1								1	
Ceratias holbelli gr.									1			
Cryptopsaras spp.		1					1					
Cryptopsaras couesi												
Linophryne sp.												
Hyaloceratias spp.												
Melanocetus johnsoni type.		2	1								1	
Lampridae spp.		1	1	1						2	1	
Trachipteridae spp.				1					1			
Carangidae spp.												1
Decapterus spp.												
Decapterus macarellus						1			1			
Labridae sp.												
Scaridae spp.						1	1	1				
Echeneididae spp.												
Tetrapturus audax												
Makaira mazara	1			2		1	1		1	2		1
Xiphias gladius					1							
Scombrolabrax heterolepis						3	3		1	8	2	12
Scombridae spp.												
Acanthocybium solandri		2	4	1						6		1
Auxis sp.												
Katsuwonus pelamis	7	11	39	4	3	7	4	3	6	2		3
Thunnus albacares												
Thunnus alalunga	2	3	2	1			2			1	1	
Promethichthys prometheus	1									4		
Nesiarchus nasutus		1			1		1	2		5	1	1
Gempylus serpens				1		1	4	3	1	1		1
Diplospinus multistriatus	4	3						1	3			
Ruvettus pretiosus												
Lepidocybium flavobrunneum										1		
Benthodesmus elongatus pacificus												
Assurger anzac												
Acanthuridae spp.												11
Naso spp.												
Acanthurus spp.												
Ctenochaetus spp.												
Siganidae spp.												
Tetragonurus pacificus												1
Psenes cyanophrys	1	2					1		2	1	1	7
Psenes arafurensis												
Cubiceps baxteri				1		1						
Cubiceps pauciradiatus	1	3	10				6	4	12	12	1	6
Gobiidae spp.												1
Blenniidae spp.									1			
Scorpaenidae spp.		1									1	7
Dactylopteridae sp.												
Bothidae spp.												
Crossorhombus kobensis												
Engyprosopon spp.												
Engyprosopon grandisquama												
Engyprosopon sp. 2												
Bothus myriaster												
Bothus mancus								1				
Bothus pantherinus												
Asterorhombus sp. 1												
Chascanopsetta lugubris												
Cynoglossidae spp.												
Balistoidei spp.	6										1	2
Ostraciidae sp.												
Diodontidae spp.						1					1	1
Masturus lanceolatus	1	1	1		1						1	
Ranzania laevis	7	6	38									
Unidentified	26	26	18	14	7	9	18	19	25	20	8	30
Broken	5	2	3	5	8	5	14	14	5	3	21	29
Total	1408	630	1267	351	202	520	279	226	800	249	167	1288

Table 1.2 Fish larvae collected by IKPT-net from stations (Sts. 13-24) of group 'A'.

Species / Station	A-13	A-14	A-15	A-16	A-17	A-18	A-19	A-20	A-21	A-22	A-23	A-24
Stolephorus buccaneeri								2	1328	183	61	26
Bathylagidae sp.												
Bathylagus longirostris			1					2		1		
Gonostomatidae spp.		2				1		1				1
Diplophos taenia	2	3	5			1					1	
Pollichthys mauli				1		1	2					1
Vinciguerria sp.									1			
Vinciguerria nimbaria	23	1542	235	27	8	18	22	31	8	22	5	14
Vinciguerria poweriae	4	3	9		1			2	2			
Vinciguerria attenuata		10	17					12	22	2	2	
Ichthyococcus elongatus								1		1		
Gonostoma spp.					2		2					
Gonostoma gracile	1	10		2	2	2		3	7	3		1
Gonostoma ebelingi					1		11	18	5		2	15
Gonostoma atlanticum	2	2	5	4	9	5	3	9	26	3	5	6
Gonostoma elongatum	7	3	21	11	9	2	7			2		7
Cyclothone spp.	4	37	19	8	2	2	4	4			1	5
Cyclothone alba	44	907	313	97	34	11	31	7	5		10	15
Cyclothone pallida							1	2				3
Cyclothone pseudopallida	5	75	33	5	2	1	2					1
Cyclothone atraria		1			1		2					
Cyclothone acclinidens		1	3						1		2	
Margrethia obtusirostra	3											
Valenciennellus tripunctulatus		6	1	1			1	2	9	2	2	
Sternoptychidae spp.	7	14	8	8	25	3	2		9	7	7	3
Chauliodus sp.	1	2	4			1	1	1		1		
Stomias nebulosus										1		
Macrostomias pacificus				1		1						
Astronesthidae spp.			1						1			2
Astronesthes cyaneus	1				1		3					
Astronesthidae sp. 1										1		
Astronesthidae sp. 2	2			3	1	1		1				
Astronesthidae sp. 3									1			
Astronesthidae sp. 4												
Melanostomiatidae spp.					1							
Flagellostomias boureei		1										
Leptostomias sp.		3					1	1		1		
Echiostoma barbatum												
Photonectes margarita												
Photonectes albipennis												
Eustomias spp.												
Eustomias sp. 1		1	1									
Eustomias sp. 2					1						1	1
Eustomias sp. 3				1			1					
Eustomias sp. 4		1										
Eustomias sp. 5												
Malacosteidae spp.			1									
Photostomias guernei												
Aristostomias sp.												
Idiacanthus sp.	4	2	2	5	8	3	3				1	2
Synodus spp.							3					
Synodus variegatus								1	1			
Scopelarchidae spp.	4	4	1			1	3	2	3	1	7	7
Benthalbella spp.									2			
Scopelarchus spp.	7	16	17	4	7	1	5	12	31	4	16	8
Scopelarchus analis	1	5	5	1	1	1	1		2	2	1	1
Scopelarchus guentheri							2	1	1			
Scopelarchus michaelsarsi					1			1	7			
Rosenblattichthys hubbsi												
Scopelosaurus spp.												
Scopelosaurus harryi												
Scopelosaurus hoedti	5			2	2		1					1
Scopelosaurus mauli												
Ahliesaurus brevis												

Table 1.2 Continued.

Species / Station	A-13	A-14	A-15	A-16	A-17	A-18	A-19	A-20	A-21	A-22	A-23	A-24
Myctophidae spp.	2	3	9	3	7	13	8	6	4	2	4	1
Hygophum proximum	2	3	4	3	4	10	23	6	9	6	3	16
Hygophum reinhardti		27	29		1	2	1					3
Benthosema spp.				1	1	1				1		
Benthosema fibulatum	1	2	1		4	1	18	6	5	5	1	34
Benthosema suborbitale	10	34	11			2						
Diogenichthys atlanticus		62	79				1	1	11	9		1
Diogenichthys laternatus		6	5					7		12	1	
Myctophum spp.				2	1			1			1	
Myctophum nitidulum											1	
Myctophum spinosum										5	9	4
Myctophum asperum												
Myctophum obtusirostre			1		6	2	9	9	5	7	4	6
Myctophum orientale	1											
Symbolophorus evermanni	9	18	42	14	9	16	17	18	55	7	19	19
Centrobranchus andreae					1						2	
Centrobranchus nigroocellatus			2			1	2	2	2		1	1
Notolychnus valdiviae	5	24	30		2							
Lampadena spp.												
Lampadena luminosa		12	33	5	3	3	2	1	1	1		1
Lampadena sp. 1												
Lampadena sp. 2												
Lampadena sp. 3	2	4	1			1					1	
Bolinichthys sp. 1	1	14	12		1	6	1	2			3	2
Bolinichthys sp. 2				1								
Ceratoscopelus warmingi	2	18	8	3	16	9	41	8	21	4	7	19
Lampanyctus spp.	1	4	2	1	3	1	22	32	10	14	7	14
Lampanyctus sp. 2		1	3				1	3	4	2		
Lampanyctus sp. 3	2	2	4	18	17	8	9	1	15	1	8	69
Lampanyctus sp. 4		3	1									
Lampanyctus sp. 5							2	3	2			1
Lampanyctus sp. 8								2		1		
Lampanyctus sp. 10					1	2	3	7	3	5		2
Lampanyctus sp. 11								1				
Triphoturus microchir							2	3		1		13
Idiolychnus urolampus	12							1	1	1		
Diaphus A group	4	35	9	6	8	9	11	7	10	1	7	21
Diaphus B group	12	9	14	11	35	25	26	38	31	15	23	41
Paralepididae spp.				1	5	4	5		10	6		2
Sudis atrox	3	5	1		3		2					
Paralepis spp.			2		1							
Paralepis atlantica atlantica												
Lestidium spp.			1	3	11	5	5	5		1	1	4
Lestidium atlanticum												
Lestidiops spp.							1					
Lestidiops jayakari jayakari				1	3	2	5	4			2	7
Lestidiops indopacifica			1									
Lestidiops mirabilis												
Lestrolepis spp.			1				4	5		7		
Stemonosudis rothschildi												
Stemonosudis macrura	4	1	2					2				
Stemonosudis elegans					1							
Uncisudis advena												
Omosudis lowei												
Alepisaurus ferox			3		1							
Coccorella atlantica	1		2		2	2						
Evermannella indica			1									
Exocoetidae spp.			1									
Fistulariidae spp.								2				
Syngnathidae sp.									1			
Bregmaceros spp.	1			2	1	3	2			2	2	2
Bregmaceros atlanticus	2	1			2	1	2		3	1	1	1
Bregmaceros macclellandi					5	5	3		1		2	2
Bregmaceros nectabanus								1				
Carapodidae spp.			1									
Ophidiidae spp.							1					
Antennariidae spp.								2				2
Ceratioidei sp.												
Caulophryne sp.												
Himantolophus groenlandicus gr.												

Table 1.2 Continued.

Species / Station	A-13	A-14	A-15	A-16	A-17	A-18	A-19	A-20	A-21	A-22	A-23	A-24
Oneirodidae spp.				4								
Oneirodes eschrichtii gr.												
Oneirodes melanocauda type.												
Microlophichthys microlophus		1										
Pentherichthys sp.			1									
Lophodolus acanthognathus type.								1				
Chaenophryne sp.												
Chaenophryne draco-gr.								3				
Thaumanichthys spp.									2			
Gigantactis type. A	1	2		1								
Ceratias holbelli gr.												
Cryptopsaras spp.												
Cryptopsaras couesi		1										
Linophryne sp.												1
Hyaloceratias spp.									1			
Melanocetus johnsoni type.	1											
Lampridae spp.	1				2							
Trachipteridae spp.					1							
Carangidae spp.												
Decapterus spp.							4			1		
Decapterus macarellus												
Labridae sp.					1							
Scaridae spp.						2		2	1		1	2
Echeneididae spp.		1										
Tetrapturus audax		2			1	1						
Makaira mazara	3	1	1									
Xiphias gladius									1			
Scombrolabrax heterolepis				1		1						4
Scombridae spp.				2					11		2	
Acanthocybium solandri	1		3			1	1					
Auxis sp.										12		
Katsuwonus pelamis	4		7	9	2	6	8	45	2	19	8	10
Thunnus albacares									4	10	1	
Thunnus alalunga		6	7	1	2		1			11	1	2
Promethichthys prometheus												
Nesiarchus nasutus			1	5			2				1	1
Gempylus serpens			1	2		2	1	4		3	3	2
Diplospinus multistriatus	2	3	6	1			16	18	6	1	7	8
Ruvettus pretiosus			3	1								
Lepidocybium flavobrunneum												50
Benthodesmus elongatus pacificus												
Assurger anzac												
Acanthuridae spp.							2			5		
Naso spp.				1	4	1		13	1			2
Acanthurus spp.				5				2				
Ctenochaetus spp.					2							
Siganidae spp.										32	1	
Tetragonurus pacificus												
Psenes cyanophrys				4	2	1	1	1	1			
Psenes arafurensis								1	1			
Cubiceps baxteri							2					
Cubiceps pauciradiatus	4	1	1	18	5	5	3	6	1	1	2	
Gobiidae spp.								1	1			4
Blenniidae spp.						1						
Scorpaenidae spp.			2	5	3		2	1		13	2	1
Dactylopteridae sp.												
Bothidae spp.				1				1				
Crossorhombus kobensis												
Engyprosopon spp.										1		
Engyprosopon grandisquama										1		
Engyprosopon sp. 2												
Bothus myriaster								2			1	
Bothus mancus												
Bothus pantherinus												
Asterorhombus sp. 1												
Chascanopsetta lugubris												
Cynoglossidae spp.												
Balistoidei spp.	1		1	3	2							2
Ostraciidae sp.							1					
Diodontidae spp.	3	1						1		1		
Masturus lanceolatus												
Ranzania laevis	8											
Unidentified	10	11	15	13	15	6	29	14	14	31	18	9
Broken	14	15	9	6	6	5	11	21	27	13	33	21
Total	257	2984	1076	339	322	222	427	439	1750	509	315	527

Table 1.3 Fish larvae collected by IKPT-net from stations (Sts. 25-34) of group 'A'.

Species / Station	A-25	A-26	A-27	A-28	A-29	A-30	A-31	A-32	A-33	A-34	Total
Stolephorus buccaneeri	2	2	1							10	1624
Bathylagidae sp.							1				1
Bathylagus longirostris					5	1	1			1	19
Gonostomatidae spp.											9
Diplophos taenia	1	1	11	3	2	3	9	1		1	49
Pollichthys mauli		1									6
Vinciguerria sp.											1
Vinciguerria nimbaria	37	26	151	51	142	40	549	31		28	3823
Vinciguerria poweriae	1										41
Vinciguerria attenuata				1	2		1			2	77
Ichthyococcus elongatus									1		5
Gonostoma spp.				1		1		1			13
Gonostoma gracile	1	1			1			3			55
Gonostoma ebelingi	12	1							1	25	187
Gonostoma atlanticum	4	5	4			1	6	3	2	24	297
Gonostoma elongatum	8	6	5	6	4	6	9	5		2	172
Cyclothone spp.	1	2	21	6	3	8	47	2	6	2	263
Cyclothone alba	56	45	159	71	158	65	688	95	18	13	4126
Cyclothone pallida								1	1	3	15
Cyclothone pseudopallida	3	2	20	3	5		28	8	5		371
Cyclothone atraria	2										12
Cyclothone acclinidens					4				2	1	17
Margrethia obtusirostra											4
Valenciennellus tripunctulatus	3		2	4		3	3			13	92
Sternoptychidae spp.	6	9	8	23	15	12	9	14	5	4	300
Chauliodus sp.	1		1					1		1	22
Stomias nebulosus							2				5
Macrostomias pacificus		1			1						4
Astronesthidae spp.										3	8
Astronesthes cyaneus											13
Astronesthidae sp.1											1
Astronesthidae sp.2	4										23
Astronesthidae sp.3											1
Astronesthidae sp.4								1			1
Melanostomiatidae spp.				1						3	12
Flagellostomias boureei											1
Leptostomias sp.											6
Echiostoma barbatum										1	5
Photonectes margarita											1
Photonectes albipennis											1
Eustomias spp.											1
Eustomias sp.1											4
Eustomias sp.2	3	1	1			1	1		1		12
Eustomias sp.3											3
Eustomias sp.4											12
Eustomias sp.5											1
Malacosteidae spp.		1									2
Photostomias guernei											2
Aristostomias sp.	1										2
Idiacanthus sp.	2	3	6	1		1	2	4		2	93
Synodus spp.											3
Synodus variegatus											2
Scopelarchidae spp.	4			1		3			1	4	104
Benthalbella spp.	1					1					19
Scopelarchus spp.	15	8	5	5	2	6	10	8	2	23	403
Scopelarchus analis	2	2	7	2	2	1	2	1		4	58
Scopelarchus guentheri	1		1							3	14
Scopelarchus michaelsarsi	2									2	17
Rosenblattichthys hubbsi							1				2
Scopelosaurus spp.			1			4					6
Scopelosaurus harryi							1				1
Scopelosaurus hoedti	2	5	1							3	37
Scopelosaurus mauli											1
Ahliesaurus brevis											2

Table 1.3 Continued.

Species / Station	A-25	A-26	A-27	A-28	A-29	A-30	A-31	A-32	A-33	A-34	Total
Myctophidae spp.	14	8	16	4	6	5	27	1	3	12	312
Hygophum proximum		2	6		1		1			2	116
Hygophum reinhardti	1	11	20	6	14	7	15		2	5	209
Benthosema spp.											4
Benthosema fibulatum	28	7	10	1	1	2	3		3	35	365
Benthosema suborbitale			1	5	14	6	21				124
Diogenichthys atlanticus	4		4	5	17	2	31				251
Diogenichthys laternatus											41
Myctophum spp.	2		5				1				41
Myctophum nitidulum					3						4
Myctophum spinosum	1								1	2	23
Myctophum asperum					1						1
Myctophum obtusirostre	3	1	1	1				4		6	153
Myctophum orientale		2	1			3	1				22
Symbolophorus evermanni	46	34	60	1	4	5	18	4	6	40	792
Centrobranchus andreae	2	3	1								21
Centrobranchus nigroocellatus		1	1			1	1		1		39
Notolychnus valdiviae		1	2	3	5	2	16	1			142
Lampadena spp.											1
Lampadena luminosa	16	5	13	3	4	4	23	2	2		211
Lampadena sp.1											1
Lampadena sp.2											5
Lampadena sp.3	1						4				21
Bolinichthys sp.1	1	4	12	7	7	4	21	1	3	3	184
Bolinichthys sp.2								3		1	10
Ceratoscopelus warmingi	55	38	8		2		34	21	24	45	1115
Lampanyctus spp.		1			1	3	1	1		4	211
Lampanyctus sp.2					17	2	5				82
Lampanyctus sp.3	29	13	5	1			15	8	4	9	563
Lampanyctus sp.4			1		2	1	2				16
Lampanyctus sp.5	1	1	2		1		1			2	27
Lampanyctus sp.8											3
Lampanyctus sp.10	3	1	1							1	48
Lampanyctus sp.11											1
Triphoturus microchir	3								1		29
Idiolychnus urolampus		2	2	1	15	7	7	4	2		98
Diaphus A group	17	17	14	7	17	11	20	5	3	22	512
Diaphus B group	78	22	52	3	16	37	8	3	4	39	920
Paralepididae spp.	7	5	5	2	2		4		1	8	91
Sudis atrox	5	4	1	1	1	2	5	2	1	3	66
Paralepis spp.											3
Paralepis atlantica atlantica											4
Lestidium spp.	1		2	1	2	1	6			1	71
Lestidium atlanticum											3
Lestidiops spp.							1	1			5
Lestidiops jayakari jayakari	6	8	8				1	2	4	13	97
Lestidiops indopacifica		1	2				5	1	1		19
Lestidiops mirabilis								1			2
Lestrolepis spp.	2										34
Stemonosudis rothschildi	1										1
Stemonosudis macrura			4	7	1	1	3				34
Stemonosudis elegans		1									4
Uncisudis advena											2
Omosudis lowei				1							1
Alepisaurus ferox				1							8
Coccorella atlantica	3	6	3		1	2	2	1		1	47
Evermannella indica		1	1					1			9
Exocoetidae spp.		3									4
Fistulariidae spp.											2
Syngnathidae sp.											1
Bregmaceros spp.	6	9	7	1	1						45
Bregmaceros atlanticus	4	8		1	2	3			1		74
Bregmaceros macclellandi	5	3	2			6					40
Bregmaceros nectabanus											1
Carapodidae spp.			1		1			1			9
Ophidiidae spp.			1								6
Antennariidae spp.		1				1					6
Ceratioidei sp.											1
Caulophryne sp.											1
Himantolophus groenlandicus gr.											2

Table 1.3 Continued.

Species / Station	A-25	A-26	A-27	A-28	A-29	A-30	A-31	A-32	A-33	A-34	Total
Oneirodidae spp.											4
Oneirodes eschrichtii gr.		1	1								2
Oneirodes melanocauda type.											1
Microlophichthys microlophus			1								3
Pentherichthys sp.											1
Lophodolus acanthognathus type.											2
Chaenophryne sp.			1								1
Chaenophryne draco-gr.											4
Thaumanichthys spp.											2
Gigantactis type.A			1					1			10
Ceratias holbelli gr.											1
Cryptopsaras spp.							1	1			4
Cryptopsaras couesi											1
Linophryne sp.											1
Hyaloceratias spp.		2		1							4
Melanocetus johnsoni type.											5
Lampridae spp.								1			10
Trachipteridae spp.			1		2			2			8
Carangidae spp.											1
Decapterus spp.		3								1	9
Decapterus macarellus											2
Labridae sp.											1
Scaridae spp.							2				13
Echeneididae spp.			1	1							3
Tetrapturus audax		1									5
Makaira mazara	1						1				16
Xiphias gladius											2
Scombrolabrax heterolepis	2										37
Scombridae spp.							4				19
Acanthocybium solandri			2	2			4			1	29
Auxis sp.											12
Katsuwonus pelamis	11	12	23	1	13	16	9	4	2		300
Thunnus albacares						1	1				17
Thunnus alalunga		14	6	3	5	3	14			3	91
Promethichthys prometheus											5
Nesiarchus nasutus	4	3	6			1	2	3		4	45
Gempylus serpens	2	2				2	2			2	40
Diplospinus multistriatus	1			6	1	9	4				100
Ruvettus pretiosus											4
Lepidocybium flavobrunneum	132	2	1							1	187
Benthodesmus elongatus pacificus					1						1
Assurger anzac			1								1
Acanthuridae spp.											18
Naso spp.	4					1					27
Acanthurus spp.											7
Ctenochaetus spp.						1					3
Siganidae spp.											33
Tetragonurus pacificus											1
Psenes cyanophrys	1	1	1	1		2	1	2	7		41
Psenes arafurensis										1	3
Cubiceps baxteri											4
Cubiceps pauciradiatus	1	17	43		3	61	15	1	3		246
Gobiidae spp.											7
Blenniidae spp.											2
Scorpaenidae spp.			2		2	3	1				46
Dactylopteridae sp.					1						1
Bothidae spp.						1					3
Crossorhombus kobensis					1	1	10				12
Engyprosopon spp.						2					3
Engyprosopon grandisquama											1
Engyprosopon sp.2							1			1	2
Bothus myriaster						1					4
Bothus mancus											1
Bothus pantherinus						1					1
Asterorhombus sp.1							1				1
Chascanopsetta lugubris						1					1
Cynoglossidae spp.					1	5	1				7
Balistoidei spp.			3	3	3	6	2	1			36
Ostraciidae sp.											1
Diodontidae spp.			2	1		7	1				20
Masturus lanceolatus											5
Ranzania laevis											59
Unidentified	8	33	16	11	8	15	25	8	6	14	549
Broken	4	30	11	18	26	3	45	3	6	44	485
Total	691	467	803	290	572	418	1820	274	136	504	22529

Studies on the identification, systematics and spatial distributions of beryciform, cetomimiform and percoid larvae and juveniles

Yoshinobu Konishi

To collect the larval and juvenile fishes, the various gears were used in KH-91-4 Cruise of the Hakuho-maru. Present report is based on the specimens collected by a IKPT Net with the 10-feet wing length and 1-mm mesh size. A oblique tow of this net was carried out with about 1,200-m wire length in eachA station at day time or night time, and 400- to 600-m wire length in each B station only at night time. Of 80 total hauls, 16 hauls were at day time, 64 ones at night time.

2,571 specimens of the beryciform, cetomimiform and percoid larvae and juveniles were collected from 17th June to 17th July in this cruise. All specimens except for the 9 species, *Rondeletia loricata?*, *Eutaeniophorus festivus*, *Pseudogramma polyacantha*, *Sphyraenops bairdianus*, *Malacanthus brevirostris*, *Naucrates ductor*, *Coryphaena equiselis*, *C. hippurus* and *Taractes asper?*, were identified in a familial, sub-familial or generic levels.

The spatial distributions of the main taxa of larvae and juveniles occured in the relatively expansive sea area and collected with the large or moderate numbers of individuals in total samples were characterized in 4 groups mainly. First group composed of Melamphaidae, *Howella*, Bramidae and Mullidae, were occured in the nearly entire sea water surveyed. 2nd group, *Champsodon* and Chiasmodontidae, and 3rd one, *Decapterus*, Labridae and Scaridae, were collected with a extremely low density of individuals in the mostsouthernpart and in the mosteastern part respectively, although both groups also had a relatively expanded distributions. Last group including Holocentridae, *Synagrops*, Anthiinae, *Symphysanodon*, *Pseudogramma polyacantha* and *Hoplolatilus*, which live in a coral reef or shore water in adult stage, was distributed only to the west water of the Mariana Islands.

Table 1-1. List of beryciform, cetomimiform, percoid larvae and juveniles collected during Hakuho Maru Cruise KH-91-4.

Species / Station / Date / Locality (N) (E)	A-1 17 June 22°00.7′ 155°00.1′	B-1 17 June 21°23.8′ 155°00.3′	B-2 18 June 20°51.6′ 155°00.0′	A-2 18 June 20°01.0′ 154°59.8′	A-3 18 June 18°00.2′ 154°59.7′	B-3 18 June 17°16.8′ 155°00.5′	B-4 19 June 16°36.6′ 155°00.2′
Berycidae							
Beryx sp.							
Trachichthyidae							
Hoplostethus sp.			1				
Paratrachichthys sp.							
Diretmidae							
Diretmoides sp.			1				
Melamphaidae	12	11	8	2	4	10	20
Melamphaes sp.							
Holocentridae							
Myripristinae							
Holocentrinae							
Polimixiidae							
Polimixia sp.							
Rondeletiidae							
Rondeletia loricata ?							
Eutaeniophoridae							
Eutaeniophorus festivus							
Percichthyidae							
Synagrops sp.							
Howella sp./spp.	5	7	7	2	2	2	9
Serranidae							
Liopropoma sp.							
Anthiinae							
Grammatonotus sp.							
Symphysanodontidae							
Symphysanodon sp.							
Grammistidae							
Pseudogrammidae							
Pseudogramma polyacantha							
Priacanthidae							
Apogonidae							
Sphyraenops bairdianus							
Malacanthidae							
Malacanthus brevirostris							
Hoplolatilus sp. 1							
Hoplolatilus sp. 2							
Carangidae							
Naucrates ductor							
Decapterus sp.							
Coryphaenidae							
Coryphaena equiselis							
C. hippurus							
C. equiselis /*hippurus*							
Emmelichthyidae							
Erythrocles sp.							
Bramidae	3	2	8	2	6	6	11
Taractes asper?					1		1
Mullidae	3	5				9	8
Lutjanidae							
Lutjanus sp.							
Caesioninae							
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae							
Chaetodontidae							
Forcipiger sp.							
Pomacanthidae							
Cirrhitidae							
Labridae							
Scaridae			1				
Champsodontidae							
Champsodon sp.	9	2	3	14	14		4
Chiasmodontidae	5	1	8	2	3	2	10
Pseudoscopelus sp.							
Chiasmodon sp.							
Kali ? sp.							
Unidentified		1		1			
Total	37	29	37	23	30	29	63

Table 1-2. Continued.

Species	Station / Date / Locality(N) (E)	A-4 19 June 16°01.5' 154°60.0'	A-5 19 June 14°00.0' 154°59.9'	B-5 19 June 13°09.1' 155°00.0'	B-6 19 June 12°33.0' 155°00.0'	A-6 20 June 11°58.9' 154°59.8'	A-7 20 June 09°59.4' 154°59.3'	B-7 20 June 10°00.0' 152°59.2'
Berycidae								
Beryx sp.								
Trachichthyidae								
Hoplostethus sp.								
Paratrachichthys sp.								
Diretmidae								
Diretmoides sp.								
Melamphaidae				2		1	3	4
Melamphaes sp.						2		
Holocentridae								
Myripristinae								
Holocentrinae								
Polimixiidae								
Polimixia sp.								
Rondeletiidae								
Rondeletia loricata ?								
Eutaeniophoridae								
Eutaeniophorus festivus					1			
Percichthyidae								
Synagrops sp.								
Howella sp./spp.		7	1	2				1
Serranidae								
Liopropoma sp.								
Anthiinae							1	2
Grammatonotus sp.								2
Symphysanodontidae								
Symphysanodon sp.								
Grammistidae								1
Pseudogrammidae								
Pseudogramma polyacantha							1	1
Priacanthidae								
Apogonidae								
Sphyraenops bairdianus								
Malacanthidae								
Malacanthus brevirostris								
Hoplolatilus sp. 1								
Hoplolatilus sp. 2								
Carangidae								
Naucrates ductor								
Decapterus sp.							4	2
Coryphaenidae								
Coryphaena equiselis								
C. hippurus								
C. equiselis /*hippurus*		1		2				
Emmelichthyidae								
Erythrocles sp.								
Bramidae			3	3			1	
Taractes asper?								
Mullidae		11	9	7	45	4		2
Lutjanidae								
Lutjanus sp.								
Caesioninae								
Pomadasyidae								
Hapalogenys sp.								
Lethrinidae								
Chaetodontidae								
Forcipiger sp.								
Pomacanthidae								
Cirrhitidae								
Labridae							4	3
Scaridae							1	5
Champsodontidae								
Champsodon sp.		2						
Chiasmodontidae		1	3			1		
Pseudoscopelus sp.								
Chiasmodon sp.								
Kali ? sp.				1				
Unidentified								
Total		22	16	17	46	8	15	23

Table 1-3. Continued.

Species / Station / Date / Locality (N) (E)	B-8 20 June 10°00.0' 152°21.0'	B-9 21 June 10°00.0' 151°40.0'	B-10 21 June 10°00.0' 151°02.5'	A-8 21 June 10°00.2' 148°59.8'	B-11 21 June 11°21.2' 149°00.0'	A-9 21 June 11°59.6' 148°59.6'	B-12 22 June 12°51.2' 149°00.0'
Berycidae							
Beryx sp.							
Trachichthyidae							
Hoplostethus sp.							
Paratrachichthys sp.							
Diretmidae							
Diretmoides sp.							
Melamphaidae	7	15	18	1		1	
Melamphaes sp.						1	
Holocentridae							
Myripristinae							
Holocentrinae			5				
Polimixiidae							
Polimixia sp.							
Rondeletiidae							
Rondeletia loricata ?							
Eutaeniophoridae							
Eutaeniophorus festivus							
Percichthyidae							
Synagrops sp.							
Howella sp./spp.		2	2		1	1	5
Serranidae							
Liopropoma sp.							
Anthiinae	1		3				
Grammatonotus sp.		1	2				
Symphysanodontidae							
Symphysanodon sp.							
Grammistidae							
Pseudogrammidae							
Pseudogramma polyacantha	1		2		2		
Priacanthidae							
Apogonidae							
Sphyraenops bairdianus							
Malacanthidae							
Malacanthus brevirostris							
Hoplolatilus sp. 1							
Hoplolatilus sp. 2							
Carangidae							
Naucrates ductor							
Decapterus sp.					3	2	
Coryphaenidae							
Coryphaena equiselis							
C. hippurus	2					1	
C. equiselis /*hippurus*						1	
Emmelichthyidae							
Erythrocles sp.							
Bramidae		1		1			
Taractes asper?							
Mullidae	7	15	3	1	6	2	4
Lutjanidae							
Lutjanus sp.							
Caesioninae			1				
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae							
Chaetodontidae							
Forcipiger sp.							
Pomacanthidae							
Cirrhitidae							
Labridae	6	3	12	1	2	3	
Scaridae	3	3	5				
Champsodontidae							
Champsodon sp.							
Chiasmodontidae	1			1		4	
Pseudoscopelus sp.							
Chiasmodon sp.							
Kali ? sp.			1		1	3	
Unidentified	2	1	1	1			
Total	30	41	55	6	15	19	9

Table 1-4. Continued.

Species / Station / Date / Locality(N) (E)	A-10 22 June 14°00.2′ 148°59.6′	A-11 22 June 15°59.3′ 148°59.3′	B-13 22 June 16°39.3′ 149°00.0′	B-14 22 June 17°25.5′ 149°00.0′	A-12 23 June 17°59.3′ 149°00.1′	A-13 23 June 20°00.3′ 148°59.5′	B-15 23 June 21°21.4′ 149°00.0′
Berycidae							
Beryx sp.							
Trachichthyidae							
Hoplostethus sp.							
Paratrachichthys sp.							
Diretmidae							
Diretmoides sp.							
Melamphaidae		1	1		9	3	8
Melamphaes sp.					1		
Holocentridae							
Myripristinae					1		
Holocentrinae							
Polimixiidae							
Polimixia sp.							
Rondeletiidae							
Rondeletia loricata ?							
Eutaeniophoridae							
Eutaeniophorus festivus		1					
Percichthyidae							
Synagrops sp.							
Howella sp./spp.	6	1	5	8	3	1	8
Serranidae							
Liopropoma sp.							
Anthiinae					29	1	
Grammatonotus sp.							
Symphysanodontidae							
Symphysanodon sp.							
Grammistidae							
Pseudogrammidae							
Pseudogramma polyacantha							
Priacanthidae							
Apogonidae							
Sphyraenops bairdianus							
Malacanthidae							
Malacanthus brevirostris							
Hoplolatilus sp.1					1		
Hoplolatilus sp.2							
Carangidae							
Naucrates ductor							
Decapterus sp.	1		2			1	
Coryphaenidae							
Coryphaena equiselis							
C. hippurus							
C. equiselis /*hippurus*							
Emmelichthyidae							
Erythrocles sp.					2		
Bramidae	1		1	7	5	1	6
Taractes asper?							
Mullidae	2		2	10	2	1	4
Lutjanidae					1		
Lutjanus sp.							
Caesioninae							
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae					4		
Chaetodontidae							
Forcipiger sp.							
Pomacanthidae					1		
Cirrhitidae							
Labridae				2	4		
Scaridae				2		1	
Champsodontidae							
Champsodon sp.					1	3	50
Chiasmodontidae	1	1	1	1	10	1	4
Pseudoscopelus sp.							
Chiasmodon sp.							
Kali ? sp.			1		1		
Unidentified			1				
Total	11	4	14	30	75	13	80

Table 1-5. Continued.

Species / Station / Date / Locality (N) (E)	A-14 23 June 21°59.7′ 148°59.5′	B-16 24 June 22°00.3′ 148°37.9′	B-17 24 June 22°00.4′ 148°16.9′	B-18 24 June 22°05.0′ 143°31.8′	A-15 24 June 22°00.0′ 143°00.3′	B-19 25 June 21°38.6′ 143°00.0′	B-20 25 June 21°21.6′ 142°59.7′
Berycidae							
Beryx sp.		1				1	
Trachichthyidae							
Hoplostethus sp.							
Paratrachichthys sp.							
Diretmidae							
Diretmoides sp.							
Melamphaidae	3	10	8	19	2	15	2
Melamphaes sp.	1				2		
Holocentridae							
Myripristinae							
Holocentrinae							1
Polimixiidae							
Polimixia sp.							
Rondeletiidae							
Rondeletia loricata ?							
Eutaeniophoridae							
Eutaeniophorus festivus							
Percichthyidae							
Synagrops sp.							
Howella sp./spp.			6	6	1	6	3
Serranidae							
Liopropoma sp.							1
Anthiinae					1		
Grammatonotus sp.							
Symphysanodontidae							
Symphysanodon sp.						1	
Grammistidae							
Pseudogrammidae							
Pseudogramma polyacantha							
Priacanthidae					1		
Apogonidae							
Sphyraenops bairdianus							1
Malacanthidae							
Malacanthus brevirostris							
Hoplolatilus sp. 1							
Hoplolatilus sp. 2							
Carangidae							2
Naucrates ductor							
Decapterus sp.							3
Coryphaenidae							
Coryphaena equiselis							
C. hippurus							
C. equiselis /*hippurus*							
Emmelichthyidae							
Erythrocles sp.							
Bramidae			4	1		1	
Taractes asper?							
Mullidae	3	4	14	1	2	10	4
Lutjanidae							1
Lutjanus sp.							
Caesioninae							
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae							
Chaetodontidae				1			
Forcipiger sp.							
Pomacanthidae				1			1
Cirrhitidae							
Labridae		1		2		1	
Scaridae							
Champsodontidae							
Champsodon sp.	2	1	4	6	2	7	7
Chiasmodontidae			1	5		6	9
Pseudoscopelus sp.							
Chiasmodon sp.			1		1		
Kali ? sp.		1	1			1	
Unidentified							
Total	9	18	39	42	12	49	35

Table 1-6. Continued.

Station / Date / Locality(N) / (E) / Species	A-16 25 June 19°59.7′ 142°59.9′	A-17 25 June 18°00.3′ 142°44.7′	B-21 25 June 17°47.7′ 142°42.7′	B-22 25 June 17°30.2′ 142°44.0′	B-23 26 June 17°13.3′ 142°46.8′	B-22, B-23 25, 26 June (Mixed)	B-24 26 June 16°58.3′ 142°50.0′
Berycidae							
Beryx sp.							
Trachichthyidae							
Hoplostethus sp.							
Paratrachichthys sp.			1			1	
Diretmidae							
Diretmoides sp.							
Melamphaidae			3	4	1	3	1
Melamphaes sp.					14	2	2
Holocentridae			1				
Myripristinae		1				2	2
Holocentrinae		2				2	
Polimixiidae							
Polimixia sp.					1		1
Rondeletiidae							
Rondeletia loricata ?							
Eutaeniophoridae							
Eutaeniophorus festivus							1
Percichthyidae							
Synagrops sp.						1	2
Howella sp./spp.		2	6	8	1	2	8
Serranidae							
Liopropoma sp.							
Anthiinae		1	5	4	1	4	11
Grammatonotus sp.							
Symphysanodontidae							
Symphysanodon sp.		1	8	3		6	1
Grammistidae				1		1	4
Pseudogrammidae							
Pseudogramma polyacantha	3				1	2	3
Priacanthidae	1						
Apogonidae					2		
Sphyraenops bairdianus				1		1	
Malacanthidae							
Malacanthus brevirostris					1		
Hoplolatilus sp.1		1	2	1	1	1	5
Hoplolatilus sp.2							1
Carangidae							
Naucrates ductor							
Decapterus sp.					1		
Coryphaenidae							
Coryphaena equiselis							
C. hippurus							
C. equiselis /hippurus					1		1
Emmelichthyidae							
Erythrocles sp.					1		1
Bramidae	7	3		5	3	2	3
Taractes asper?							
Mullidae	1	6	4	2	6	1	4
Lutjanidae	1	1	1	3		1	
Lutjanus sp.							
Caesioninae						1	
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae		1				1	1
Chaetodontidae							
Forcipiger sp.							
Pomacanthidae		1	4			1	1
Cirrhitidae				1			1
Labridae	2	4	5	6	15	23	16
Scaridae			2	4	8	1	3
Champsodontidae							
Champsodon sp.	4						
Chiasmodontidae	1	1		1	1	1	5
Pseudoscopelus sp.							
Chiasmodon sp.							
Kali ? sp.	2						1
Unidentified			2		1	1	1
Total	22	25	44	44	60	61	80

Table 1-7. Continued.

Species / Station, Date, Locality (N) (E)	A-18 26 June 15°59.9' 142°59.8'	B-25 26 June 14°46.2' 143°02.8'	B-26 27 June 14°27.2' 143°01.0'	A-19 27 June 13°59.1' 143°00.2'	B-27 27 June 12°59.8' 142°59.6'	B-28 27 June 12°42.9' 142°59.9'	B-29 27 June 12°16.4' 143°00.0'
Berycidae							
Beryx sp.							
Trachichthyidae							
Hoplostethus sp.							
Paratrachichthys sp.							
Diretmidae							
Diretmoides sp.							
Melamphaidae		12	3			1	23
Melamphaes sp.							
Holocentridae							
Myripristinae		1	1				3
Holocentrinae		1	1	1	3	2	1
Polimixiidae							
Polimixia sp.							
Rondeletiidae							
Rondeletia loricata ?							
Eutaeniophoridae							
Eutaeniophorus festivus							
Percichthyidae							
Synagrops sp.			2				
Howella sp./spp.	3	9	8	2	2		3
Serranidae							
Liopropoma sp.							
Anthiinae		2	2	1			4
Grammatonotus sp.						1	2
Symphysanodontidae							
Symphysanodon sp.				1			
Grammistidae		1	4				
Pseudogrammidae							
Pseudogramma polyacantha			2	1		1	1
Priacanthidae							
Apogonidae			1				
Sphyraenops bairdianus							
Malacanthidae							
Malacanthus brevirostris							
Hoplolatilus sp. 1		1	2				4
Hoplolatilus sp. 2							
Carangidae		12	2				
Naucrates ductor							
Decapterus sp.		1		5			
Coryphaenidae							
Coryphaena equiselis							
C. hippurus							
C. equiselis /*hippurus*			1				
Emmelichthyidae							
Erythrocles sp.							
Bramidae			2	5	1		1
Taractes asper?							
Mullidae	1	19	2	2			
Lutjanidae			3				1
Lutjanus sp.							
Caesioninae							
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae				2			
Chaetodontidae							
Forcipiger sp.							
Pomacanthidae	1					1	2
Cirrhitidae							
Labridae		5	7	7	5	8	5
Scaridae		4	28	1			3
Champsodontidae							
Champsodon sp.	1						
Chiasmodontidae		1	2		1		2
Pseudoscopelus sp.							
Chiasmodon sp.							
Kali ? sp.				1			
Unidentified		1	2				
Total	6	70	75	29	12	14	55

Table 1-8. Continued.

Species / Station / Date / Locality (N) (E)	A-20 28 June 12°01.1' 143°00.0'	A-21 29 June 10°00.3' 142°59.9'	A-22 29 June 10°00.7' 137°00.2'	A-23 30 June 12°00.1' 137°00.1'	A-24 30 June 13°59.9' 136°59.1'	B-30 30 June 14°09.2' 137°00.3'	B-31 30 June 14°18.7' 137°00.1'
Berycidae							
Beryx sp.							
Trachichthyidae							
Hoplostethus sp.							
Paratrachichthys sp.							
Diretmidae							
Diretmoides sp.							
Melamphaidae	3	1			2	3	
Melamphaes sp.	1				1	2	
Holocentridae							
Myripristinae			18			2	
Holocentrinae	1		4	1		2	1
Polimixiidae							
Polimixia sp.							
Rondeletiidae							
Rondeletia loricata ?							
Eutaeniophoridae							
Eutaeniophorus festivus							
Percichthyidae							
Synagrops sp.							
Howella sp./spp.	2	1	1	3	4	8	1
Serranidae							
Liopropoma sp.							1
Anthiinae					2		1
Grammatonotus sp.	3		1				
Symphysanodontidae							
Symphysanodon sp.					2	1	
Grammistidae							
Pseudogrammidae							
Pseudogramma polyacantha							
Priacanthidae							
Apogonidae							
Sphyraenops bairdianus							
Malacanthidae							
Malacanthus brevirostris							
Hoplolatilus sp. 1	2				1		1
Hoplolatilus sp. 2							
Carangidae			2				
Naucrates ductor							
Decapterus sp.			4			1	2
Coryphaenidae							
Coryphaena equiselis							
C. hippurus						1	
C. equiselis /*hippurus*							1
Emmelichthyidae							
Erythrocles sp.							
Bramidae				1	2	2	
Taractes asper?							
Mullidae			6		2	11	1
Lutjanidae						1	1
Lutjanus sp.	2						
Caesioninae	1						
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae			1				
Chaetodontidae			1			1	
Forcipiger sp.	1						
Pomacanthidae							
Cirrhitidae							
Labridae	6		21	2	11	2	
Scaridae	3	1	1	1	5	3	4
Champsodontidae							
Champsodon sp.					2		
Chiasmodontidae						1	
Pseudoscopelus sp.							
Chiasmodon sp.							
Kali ? sp.			1				
Unidentified							
Total	25	3	61	8	34	41	14

Table 1-9. Continued.

Species / Station / Date / Locality (N) (E)	B-32 01 July 14°28.1' 137°00.2'	B-33 01 July 14°36.1' 137°00.4'	B-34 01 July 14°45.4' 137°00.1'	B-35 01 July 14°58.5' 137°00.0'	A-25 01 July 15°48.8' 136°57.5'	B-36 01 July 15°48.7' 136°56.5'	B-37 02 July 17°26.4' 136°59.9'
Berycidae							
Beryx sp.							
Trachichthyidae							
Hoplostethus sp.							
Paratrachichthys sp.							
Diretmidae							
Diretmoides sp.							
Melamphaidae						6	4
Melamphaes sp.					5	9	
Holocentridae							
Myripristinae	1					2	1
Holocentrinae						1	
Polimixiidae							
Polimixia sp.							
Rondeletiidae							
Rondeletia loricata ?							
Eutaeniophoridae							
Eutaeniophorus festivus							
Percichthyidae							
Synagrops sp.	1				1	6	
Howella sp./spp.	3	1	1	1	1	8	4
Serranidae							
Liopropoma sp.							
Anthiinae							
Grammatonotus sp.							
Symphysanodontidae							
Symphysanodon sp.					1	3	
Grammistidae			2	1			
Pseudogrammidae							
Pseudogramma polyacantha		1				1	
Priacanthidae							
Apogonidae			1				
Sphyraenops bairdianus							
Malacanthidae							
Malacanthus brevirostris							
Hoplolatilus sp.1	1				1	1	
Hoplolatilus sp.2							
Carangidae							
Naucrates ductor							
Decapterus sp.	2			1	1	8	4
Coryphaenidae							
Coryphaena equiselis							
C. hippurus							
C. equiselis /hippurus						2	
Emmelichthyidae							
Erythrocles sp.							
Bramidae		1	1		4	4	3
Taractes asper?							
Mullidae		4	1		7	6	2
Lutjanidae							
Lutjanus sp.							
Caesioninae							
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae							
Chaetodontidae							
Forcipiger sp.							
Pomacanthidae					1		
Cirrhitidae							
Labridae	1	6	19	2	3	9	1
Scaridae		1	3		2	3	
Champsodontidae							
Champsodon sp.					1	1	2
Chiasmodontidae		1				4	3
Pseudoscopelus sp.							
Chiasmodon sp.							
Kali ? sp.	1						
Unidentified	1						2
Total	11	15	28	5	28	74	26

Table 1-10. Continued.

Station	A-26	B-38	B-39	B-40	A-27	A-28	B-41
Date	03 July	03 July	03 July	04 July	04 July	04 July	05 July
Locality(N)	17°44.0′	19°00.5′	19°08.4′	20°01.2′	20°04.4′	21°59.7′	23°00.8′
Species (E)	137°00.3′	136°59.4′	136°59.5′	137°00.4′	137°00.9′	138°00.0′	133°57.8′
Berycidae							
Beryx sp.							
Trachichthyidae							
Hoplostethus sp.							
Paratrachichthys sp.							
Diretmidae							
Diretmoides sp.							
Melamphaidae	3	4	2	12	9	1	6
Melamphaes sp.	1		5		3		
Holocentridae							
Myripristinae							
Holocentrinae							
Polimixiidae							
Polimixia sp.							
Rondeletiidae							
Rondeletia loricata ?					1		
Eutaeniophoridae							
Eutaeniophorus festivus							
Percichthyidae							
Synagrops sp.		1		1			
Howella sp./spp.		12	1	7	4		6
Serranidae							
Liopropoma sp.							
Anthiinae			1				
Grammatonotus sp.							
Symphysanodontidae							
Symphysanodon sp.	1					1	1
Grammistidae							
Pseudogrammidae							
Pseudogramma polyacantha							
Priacanthidae							
Apogonidae							
Sphyraenops bairdianus							
Malacanthidae							
Malacanthus brevirostris							
Hoplolatilus sp. 1							
Hoplolatilus sp. 2							
Carangidae							2
Naucrates ductor							
Decapterus sp.	3						
Coryphaenidae							
Coryphaena equiselis							
C. hippurus						1	
C. equiselis /*hippurus*							
Emmelichthyidae							
Erythrocles sp.							
Bramidae		10	2	4	4		1
Taractes asper?							
Mullidae	2	9	1	2	3		7
Lutjanidae							
Lutjanus sp.							
Caesioninae							
Pomadasyidae							
Hapalogenys sp.							
Lethrinidae							
Chaetodontidae							
Forcipiger sp.							
Pomacanthidae							
Cirrhitidae							
Labridae							1
Scaridae							
Champsodontidae							
Champsodon sp.		6	3	2	1	1	10
Chiasmodontidae	1	3		1	2		1
Pseudoscopelus sp.							
Chiasmodon sp.							
Kali ? sp.		3		3		2	1
Unidentified		1					
Total	11	49	15	32	27	6	36

Table 1-11. Continued.

Species / Station / Date / Locality (N) (E)	B-42 13 July 22°59.9' 131°12.1'	A-29 13 July 22°00.5' 131°00.4'	A-30 13 July 19°58.8' 130°59.9'	B-43 13 July 19°21.2' 131°00.0'	B-44 13 July 18°46.2' 131°00.1'	A-31 14 July 18°00.3' 131°00.2'	B-45 15 July 16°59.9' 130°59.5'
Berycidae							
<u>Beryx</u> sp.							
Trachichthyidae							
<u>Hoplostethus</u> sp.							
<u>Paratrachichthys</u> sp.							
Diretmidae							
<u>Diretmoides</u> sp.							
Melamphaidae	1	2	2	3		2	5
<u>Melamphaes</u> sp.	1					1	
Holocentridae							
Myripristinae							
Holocentrinae							
Polimixiidae							
<u>Polimixia</u> sp.							
Rondeletiidae							
<u>Rondeletia loricata</u> ?							
Eutaeniophoridae							
<u>Eutaeniophorus festivus</u>	1						
Percichthyidae							
<u>Synagrops</u> sp.			3				
<u>Howella</u> sp./spp.	3	1	1	2		2	2
Serranidae							
<u>Liopropoma</u> sp.							
Anthiinae			1	4			
<u>Grammatonotus</u> sp.							
Symphysanodontidae							
<u>Symphysanodon</u> sp.				3			
Grammistidae				1			
Pseudogrammidae							
<u>Pseudogramma polyacantha</u>				3		2	
Priacanthidae		1					
Apogonidae			1				
<u>Sphyraenops bairdianus</u>							
Malacanthidae							
<u>Malacanthus brevirostris</u>							
<u>Hoplolatilus</u> sp.1			2	9			
<u>Hoplolatilus</u> sp.2							
Carangidae							
<u>Naucrates ductor</u>				1			
<u>Decapterus</u> sp.							
Coryphaenidae							
<u>Coryphaena equiselis</u>							
<u>C. hippurus</u>							
<u>C. equiselis</u> /<u>hippurus</u>							
Emmelichthyidae							
<u>Erythrocles</u> sp.							
Bramidae			1	2		1	9
<u>Taractes asper</u>?						2	1
Mullidae	17		2	9		7	23
Lutjanidae							
<u>Lutjanus</u> sp.							
Caesioninae							
Pomadasyidae							
<u>Hapalogenys</u> sp.			1				1
Lethrinidae							
Chaetodontidae				1			
<u>Forcipiger</u> sp.							
Pomacanthidae							
Cirrhitidae				5			
Labridae	1		9	53		6	
Scaridae			2	3			
Champsodontidae							
<u>Champsodon</u> sp.	1	1	4	4		2	5
Chiasmodontidae				3		2	2
<u>Pseudoscopelus</u> sp.							
<u>Chiasmodon</u> sp.							
Kali ? sp.	2						1
Unidentified				5			
Total	27	5	29	111		27	49

Table 1-12. Continued.

Species / Station / Date / Locality (N) (E)	A-32 15 July 15°59.2' 131°00.3'	B-46 15 July 15°02.5' 131°00.0'	A-33 16 July 13°59.8' 131°00.0'	B-47 16 July 13°01.6' 130°59.5'	A-34 17 July 11°59.4' 130°59.7'	Total
Berycidae						
Beryx sp.						2
Trachichthyidae						
Hoplostethus sp.						1
Paratrachichthys sp.						2
Diretmidae						
Diretmoides sp.						1
Melamphaidae	3	22		3	5	355
Melamphaes sp.					3	57
Holocentridae						1
Myripristinae					5	40
Holocentrinae						29
Polimixiidae						
Polimixia sp.						2
Rondeletiidae						
Rondeletia loricata ?						1
Eutaeniophoridae						
Eutaeniophorus festivus						4
Percichthyidae						
Synagrops sp.	1	2	1	6	1	29
Howella sp./spp.	1	6			1	252
Serranidae						
Liopropoma sp.						2
Anthiinae						82
Grammatonotus sp.						12
Symphysanodontidae						
Symphysanodon sp.						34
Grammistidae				4		20
Pseudogrammidae						
Pseudogramma polyacantha						28
Priacanthidae						3
Apogonidae						5
Sphyraenops bairdianus						3
Malacanthidae						
Malacanthus brevirostris						1
Hoplolatilus sp.1				1		38
Hoplolatilus sp.2						1
Carangidae						20
Naucrates ductor						1
Decapterus sp.			12		1	64
Coryphaenidae						
Coryphaena equiselis				1		1
C. hippurus						5
C. equiselis /hippurus				1		11
Emmelichthyidae						
Erythrocles sp.						4
Bramidae		2	1	2		163
Taractes asper?						5
Mullidae	1	54	3	2	6	436
Lutjanidae						15
Lutjanus sp.						2
Caesioninae						3
Pomadasyidae						
Hapalogenys sp.						2
Lethrinidae						10
Chaetodontidae				1		5
Forcipiger sp.						1
Pomacanthidae						15
Cirrhitidae						7
Labridae		1		2	8	316
Scaridae		1		1		109
Champsodontidae						
Champsodon sp.		2				184
Chiasmodontidae	2	1	1		1	127
Pseudoscopelus sp.	1					1
Chiasmodon sp.						2
Kali ? sp.		1	1			31
Unidentified				1		26
Total	9	92	19	25	31	2571

Acoustic observations of the scattering layers in the spawning grounds of Japanese eel

Tadashi Inagaki

In order to study the abundance and distribution of the scattering layers consisting of small organisms including eel larvae, acoustic data were collected. Acoustic surveys were carried out throughout the cruise using the ABIS (Acoustic Biomass Investigation System)which has 4 different frequency (200, 120, 50 and 38 kHz). Fig. 1 shows an example of the distribution of scattering layers in salinity front area at night time. Left side is low salinity area (upper about 100 m depth) and right side, high salinity area. Front zones showed higher SV (Volume Back Scattering Strength) values than those of other areas where acoustic surveys were made, suggesting the concentration of small organisms at front zone. Occurrence of small eel larvae corresponded to such front zones.

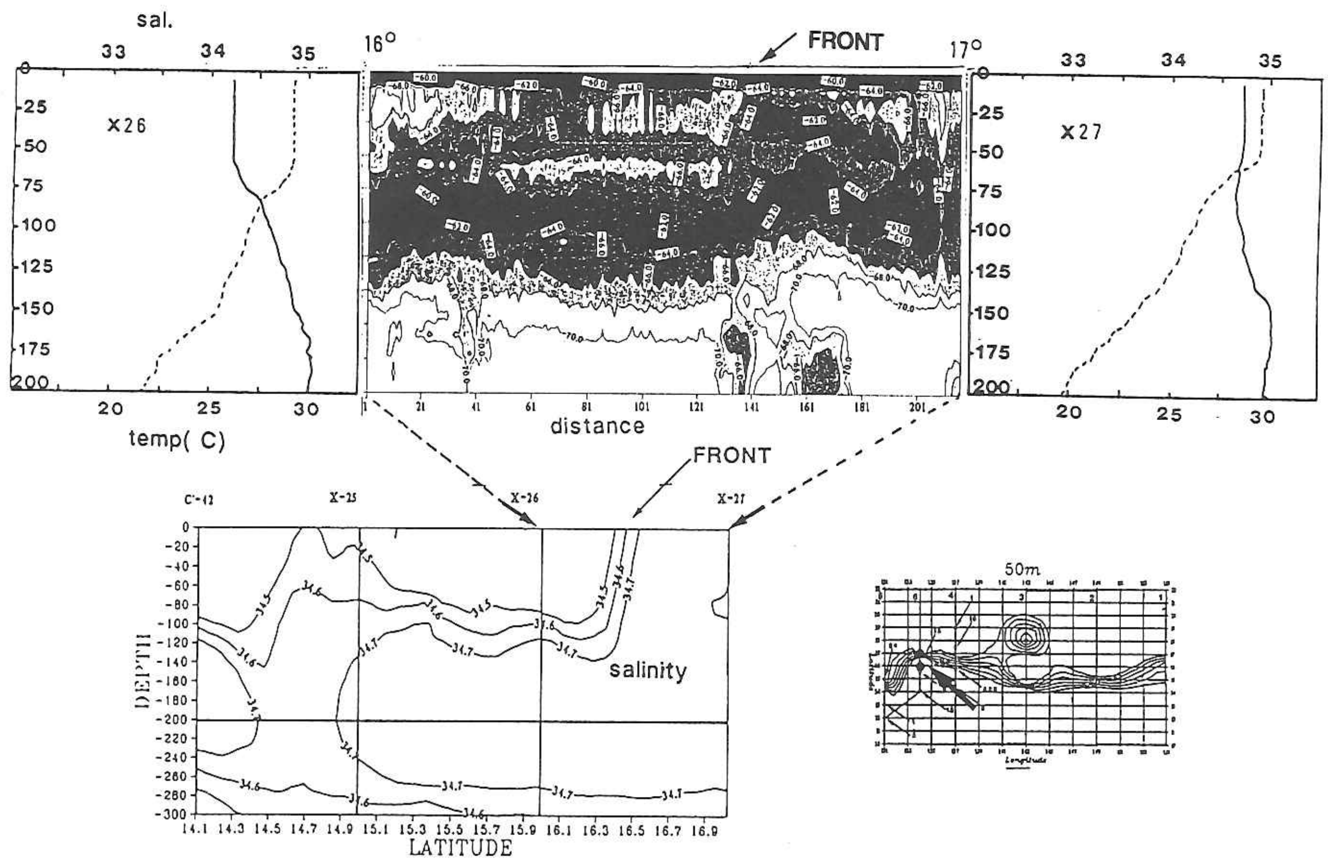


Fig. 1 Night distribution of scattering layer near a salinity front (upper middle figure). Salinity and temperature profiles at both ends of acoustic record (middle figure) were also show (upper right and left). Vertical distribution of salinity was presented below. A clear salinity front was observes at 16.2 °N.

VI. Others

Ultrasonographic recordings for swimming analysis of oceanic squid *Stenoteuthis oualaniensis* and visualization of water flow

Satoko TATENO-SEINO

Ultrasonographic recordings of oceanic squid were produced with a linear scanning ultrasonographic imaging device (Toshiba Sonolayer-L SAL-32B). The aim was to analyse the swimming mode and to visualize the water flow to clarify locomotive features.

Experimental squid were collected by fishing aboard R/V Hakuho-Maru. All squid collected were of the oceanic species, *Stenoteuthis oualaniensis*. The animal were put in a tank filled with sea water and the probe was placed in contact with the water surface. During the measurements, squid were gently held by hand at the corner of the tank.

While the squid were swimming, the motion of several organs such as fins, mantle, funnel and some inner parts were recorded in both transverse and sagittal planes. Visualization of flows generated by jet propulsion was successful because small bulbs in the water were good targets.

This work is supervised by Dr. Naoki Suzuki, Tokyo Jikeikai University of Medicine.

Table 1. Sampling data of *Stenoteuthis oualaniensis* for ultrasonographic recording experiment.

Spl.no.	Date	Location	St. no.	TL(cm)	ML(cm)	BW(g)
1	June 19	12°00'N 155°00'E	A-6	30.0	18.0	260
2	June 19	12°00'N 155°00'E	A-6	36.0	20.5	370
3	June 23	22°00'N 149°00'E	A-14	33.5	17.8	260
4	June 23	22°00'N 149°00'E	A-14	39.2	21.5	4

Fig. 1-a. closing

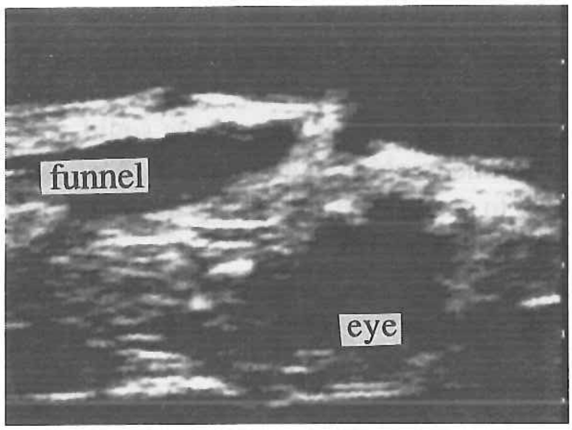


Fig. 1-b. opening

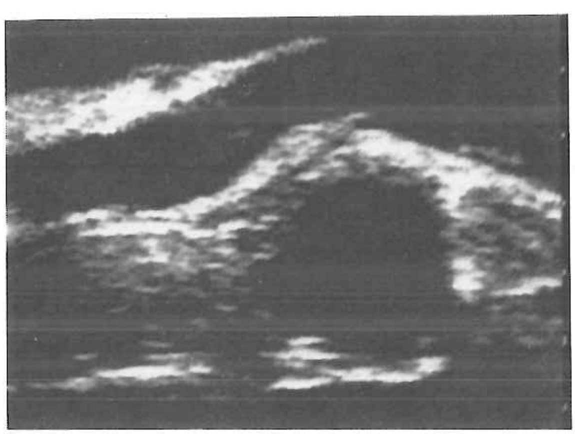


Fig.1. opening and closing of the funnel in a saggital plane.

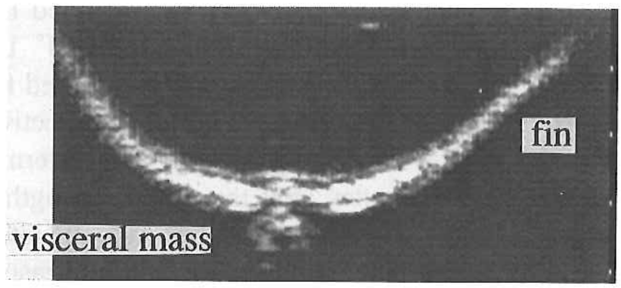


Fig. 2. Transverse section of fin

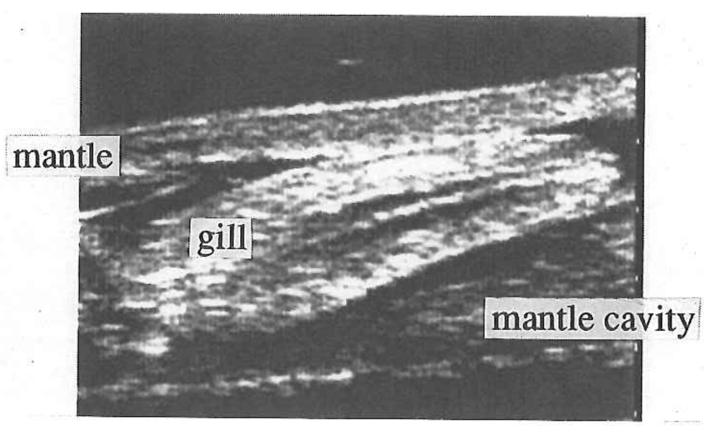


Fig. 3. Sagittal sections of mantle cavity
(Right of the figure is forward of the squid. Upper is dorsal.)

Net Depth and Wire-Out Length Relationship

Yoshitaka Sakakura, Machiko Oya, Reiji Masuda and Katsumi Tsukamoto

In order to estimate the sampling layer of IKMT net from the wire-out length, we calculated a regression between wire-out length and net depth.

Using RMD (RIGOUSHA Co.,LTD.) , a memory depth recorder, attached to a depressor of IKMT net (8.7 m^2 mouth opening, 0.5- or 1.0- mm mesh), we obtained all towing tracks of IKMT net operated by oblique or 3 layered horizontal step tows at C stations (56 sites at 15N° 131°E, 14-16°N 134°E and 14-17°N 137°E) . The reeling speed and ship speed for towing were 1.0 m/s, 3.0 kt at net-in and 0.5 m/s, 1.5 kt at net-out, respectively. Wire-out length ranged from 100 to 600 m. The net depth was determined from the towing track of the net 10~20 minutes after the wire-out length was fixed and the net depth became stable. At the same time, we operated SCANMAR (SCANMAR Co.,LTD.), a real time depth sensor using ultrasonic transmitter, to compare the estimated values between RMD and SCANMAR. We also mounted RMT (RIGOUSHA Co.,LTD.), a memory temperature recorder, to IKMT net to obtain the vertical profile of water temperature.

Net depth estimated by RMD ranged from 25~130 m. The differences in estimated depths by RMD and SCANMAR were within 5 m. Water temperatures obtained from RMT were 28~30 °C at surface and 23~26 °C at 130 m layer (Fig. 1). Relationship between wire-out length and net depth was fitted to the following linear regression, $y=0.2343x+4.4924$ ($r=0.95$), (Fig. 2). The equation obtained here was useful for the quick estimation of net depth during the cruise. By accumulating such data in different waters, we will have a simple and more reliable key without using any compound apparatus.

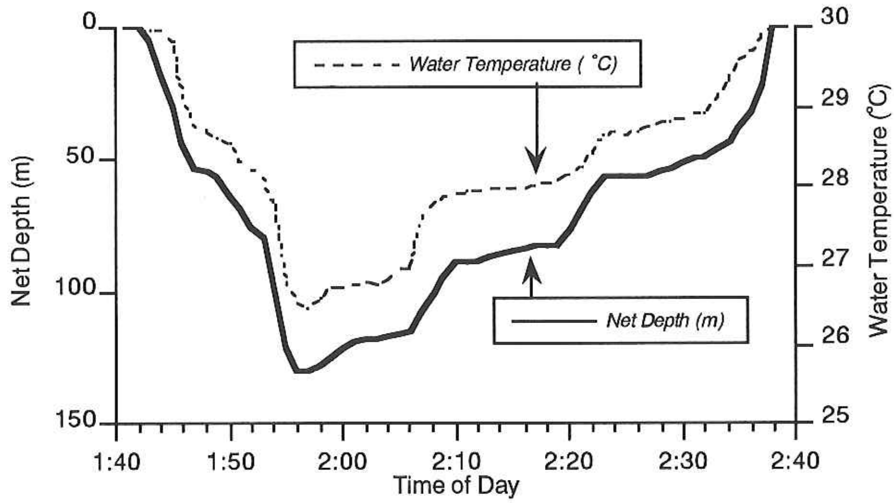


Fig. 1. Typical towing track of IKMT net (0.5 mm-mesh) estimated by RMD and vertical water temperature profile estimated by RMT at Station C-11.

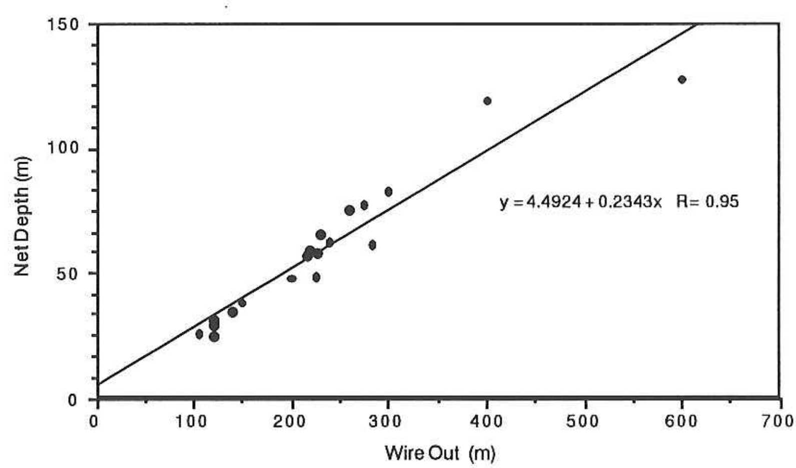


Fig. 2. Relationship between wire-out length and net depth estimated by RMD (memory depth recorder)

Observation of Portuguese Man-of-war by the R/V Hakuho-Maru Crew during Three Cruises in 1991

Satoko TATENO-SEINO

Introduction

The Portuguese man-of-war, *physalia physalis*, is a famous epi-pelagic organism, known for its specifial for its floating air bulb and its toxic physiology. It is regarded as a good indicator to the warm Kuroshio Current.

However, little is known about its ecology, such as its distribution, growth, population and migratory route in the Pacific Ocean. This lack of biological, ecological and biogeographical data can be explained by the following reasons.

1. Information of witnesses usually remains casual for lack of organization and much latent biological information is lost.
2. As an oceanic animal, observation of *Physalia* in the open sea is only by chance even thougj it was known that it is often seen as drifts near the front between two water masses and occasionally some stranded individuals are seen on the shore once in a while.
3. *Physalia* is neither a game animal nor an exciting creature in the usual life of people.

As it is almost impossible to understand the distribution of an organism over the ocean by usual oceanographic research techniques, assembly of casual reports may be one of the best methods for the collection of large scale biogeographical data. Fortunately, *Physalia* is easily recognized by ever casual witnesses who are unfamiliar with epi-pelagic oceanic organisms, because its deep blue color and helmet-shaped buoy are extremely characteristic, and give it the name, Portuguese Man-of-War. The genus *Physalia* in the Pacific Ocean is described as monospecific, (*i.e. P. physalis*) and, therefore information from witnesses is likely to be trustworthy.

Methods

When I was on board of KH-91-4, I systematically record reports of the Hakuho-maru crew who had witnessed *Physalia* during the previous KH-91-3 cruise. Personal memories of sightings, dates, times, and locations were correlated with the log book and log data. Locations and current conditions were also traced from log data.

In the KH-91-4 cruise, the MTD plankton net (mesh size 0.69mm) was towed at the surface at 1.5 - 3 kt to collect epi-pelagic organisms.

In trans-Pacific KH-91-5 cruise, observations were made on the matter by the crew.

Results

Physalia was seen in 13 locations as indicated by stars (see Table and Fig.1-3). Local drifts are presented in charts where an arrow represents the direction and velocity per hour.

Consideration

Collection of eye-witness reports is not a widely used monitoring method in the field of marine biology. However, such "non-systematic biological information" is significant in the field of ornithology where the confirmation of distribution of migratory birds is usually based by the information provided by some trained observers including many amateurs.

This preliminary study shows the determination of distribution of *Physalia* is possible using to some extent based on witnesses.

Acknowledgements

It is grateful to the Hakuho-Maru crew for informations. The logging data of currents were recorded, analyzed and graphically displayed by them. The base charts of figures were provided by three directors of the cruises, Dr. Isawo Koike (KH-91-3), Dr. Katsumi Tsukamoto (KH-91-4) and Dr. Keisuke Taira(KH-91-5) of Ocean Research Institute, University of Tokyo, .

Table Witness to *Physalia* in three cruises. The locations were indicated by stars. Drift charts presented here are by courtesy of the R/V Hakuho-maru (*vide* figures).

	KH-91-3	**KH-91-4**	**KH-91-5**
location /date	36°N, 143°E/May 10 25°N, 165°E/May 19 27°36'N, 162°28'E /May 21	13°01'N, 142°59'E /Jun.17	33°00'N, 166°00'E° /Aug.21 31°05'N, 165°00'E° /Aug.22 29°00'N, 166°00'E° /Aug.23 28°59'N, 165°01'E° /Aug.23 28°00'N, 165°00'E° /Aug.24 25°00'N, 165°00'E° /Aug.27 21°00'N, 166°00'E° /Aug.28 21°53'S, 155°53'E° /Sep.14 21°19'S, 156°11'E° /Sep.14
observer	Y. Jinno T. Seino A. Suzuki	S. Tateno	Y. Tanaka A. Suzuki
method	watching	surface net	watching
drift chart	Fig.1	Fig.2	Fig.3

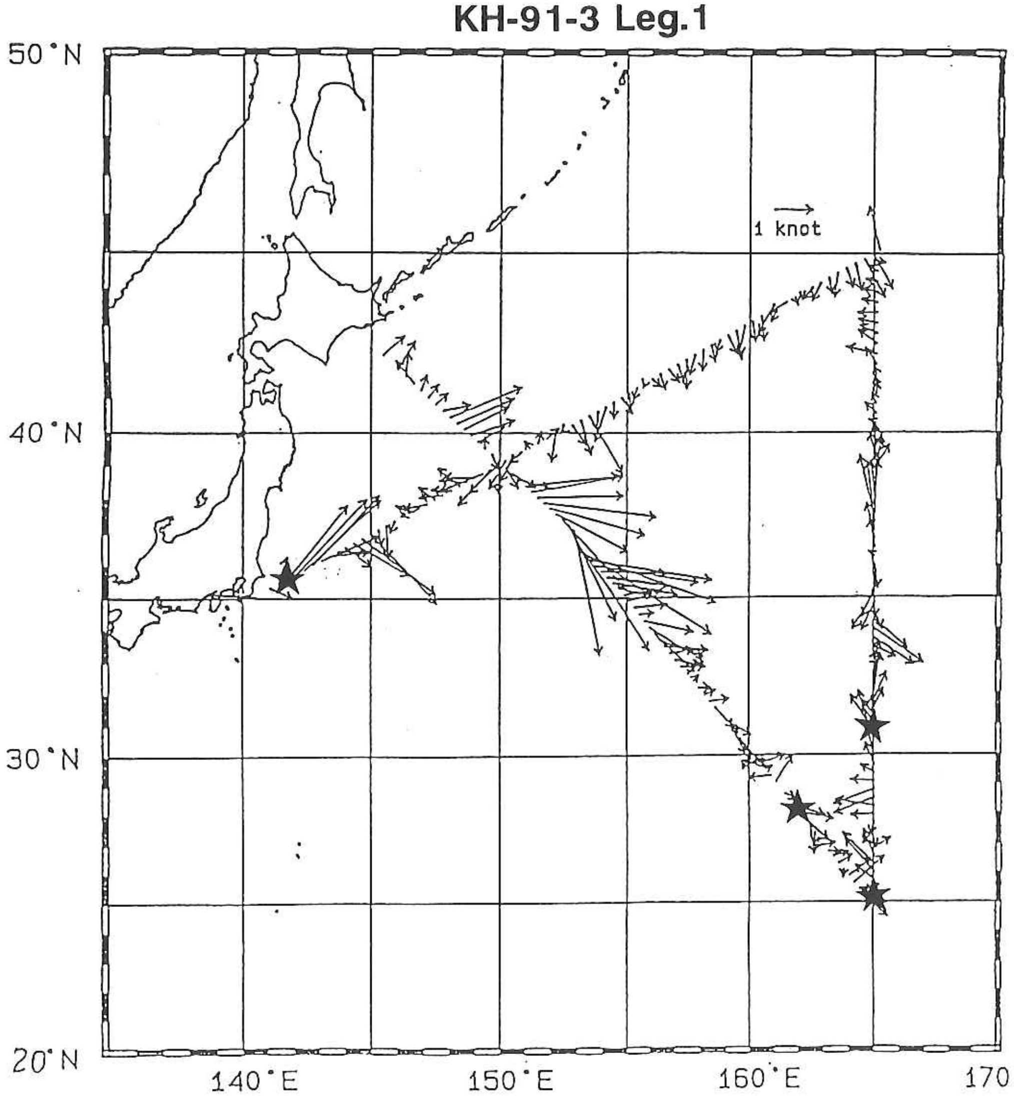


Fig. 1 Drift chart of KH-91-3 Leg.1

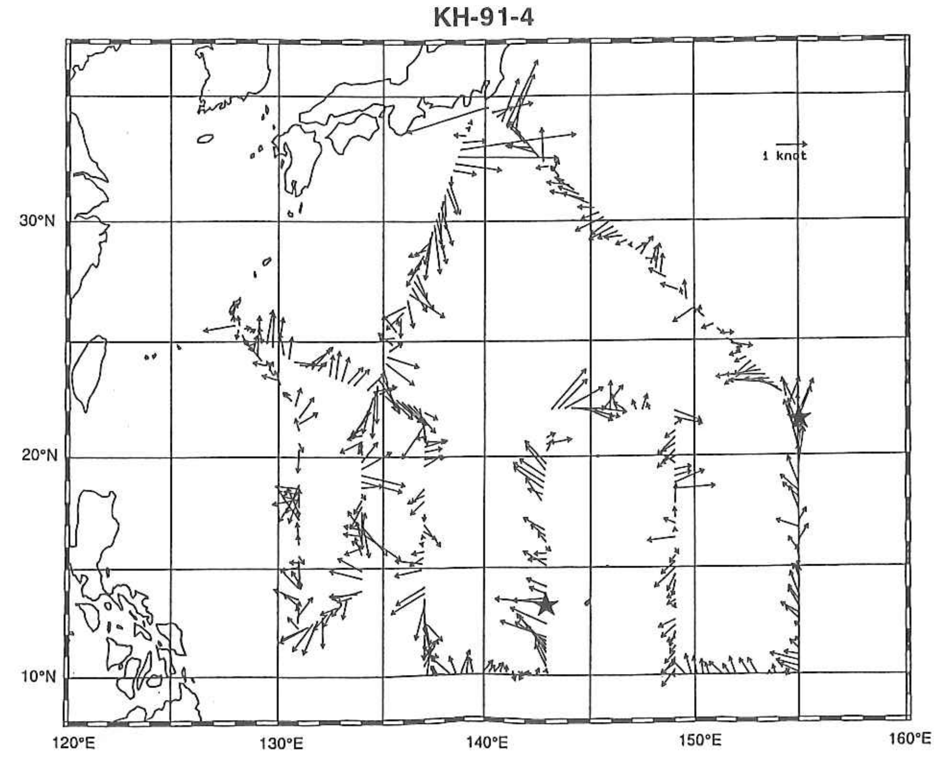


Fig. 2 Drift chart of KH-91-4

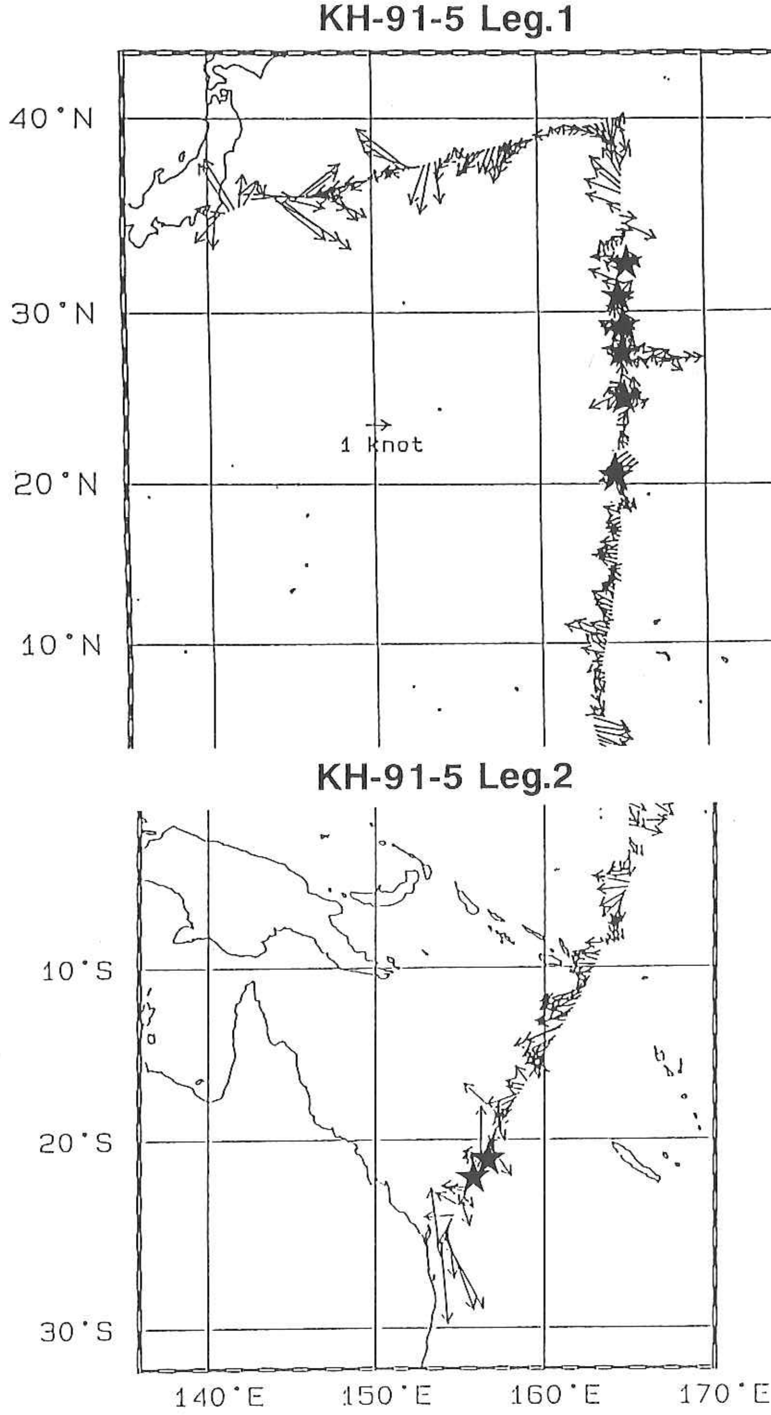


Fig. 3 Drift chart of KH-91-5 Leg.2

VII. Net record

Net Record - 1

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
T-1	26-32.8 149-47.8		910616	16:17	16:35	NORPAC	XX13	VERT.	209	200	30.5
T-1	26-32.8N 149-47.8E		910616	16:17	16:35	NORPAC	GG54	VERT.	209	200	34.3
T-1-1	26-32.8N 149-48.0E	26-32.0N 149-49.1E	910616	16:57	17:20	IKPT	1.0	OBL.	400	69	19469
T-1-1	26-32.3N 149-48.7E	26-31.8N 149-49.3E	910616	17:08	17:23	ORI	1.0	SURF.			2666
T-1-2	16-31.3N 149-50.0E	26-30.4N 149-51.1E	910616	17:38	17:59	IKPT	1.0	OBL.	400	66	18367
T-1-2	26-30.9N 149-50.6E	26-30.3N 149-51.2E	910616	17:47	18:03	ORI	1.0	SURF.			2371
T-2	25-48.7N 150-39.6E	25-50.0N 150-41.0E	910616	22:06	22:48	IKPT	1.0	OBL.	400	108	11955
A-1	22-00.2N 155-00.1E	22-00.4N 155-00.1E	910617	19:05	19:14	NORPAC	GG54	VERT.	152	150	25.6
A-1	22-00.2N 155-00.1E	22-00.4N 155-00.1E	910617	19:05	19:14	NORPAC	XX13	VERT.	152	150	24.6
A-1	22-00.4N 155-00.1E	22-00.6N 155-00.1E	910617	19:21	19:31	NORPAC	GG54	VERT.	202	200	34.8
A-1	22-00.4N 155-00.1E	22-00.6N 155-00.1E	910617	19:21	19:31	NORPAC	XX13	VERT.	202	200	30.3
A-1	22-00.7N 155-00.1E	21-58.2N 155-00.4E	910617	20:12	21:14	IKPT	1.0	OBL.	1200	285	39805
A-1	21-59.2N 155-00.2E	21-58.7N 155-00.3E	910617	20:33	20:53	ORI	1.0	SURF.			2628
B-1	21-23.8N 155-00.3E	21-22.4N 155-01.3E	910617	23:39	00:23	IKPT	1.0	OBL.	500	108	30545
B-1	21-23.2N 155-00.6E	21-22.9N 155-00.9E	910617	23:50	00:05	ORI	1.0	SURF.			2328

Net Record - 2

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
B-2	20-51.6N 155-00.0E	20-50.2N 154-59.9E	910618	02:34	03:18	IKPT	1.0	OBL.	500	112	6759
B-2	20-51.0N 155-01.0E	20-50.6N 154-60.0E	910618	02:45	03:00	ORI	1.0	SURF.			
A-2	22-00.3N 155-00.0E	22-00.5N 154-59.9E	910618	06:52	07:01	NORPAC	GG54	VERT.			
A-2	22-00.3N 155-00.0E	22-00.5N 154-59.9E	910618	06:52	07:01	NORPAC	XX13	VERT.	158	150	24.1
A-2	20-00.5N 154-59.9E	20-00.6N 154-59.9E	910618	07:07	07:19	NORPAC	GG54	VERT.	207	200	32.5
A-2	20-00.5N 154-59.9E	20-00.6N 154-59.9E	910618	07:07	07:19	NORPAC	XX13	VERT.	207	200	29.0
A-2	20-01.0N 154-59.8E	19-59.1N 154-59.5E	910618	07:37	08:39	IKPT	1.0	OBL.	1200	310	36920
A-2	19-59.7N 154-59.6E	19-59.4N 154-59.5E	910618	08:01	08:21	ORI	1.0	SURF.			2506
A-3	18-00.2N 154-59.9E	18-00.2N 154-59.8E	910618	16:45	16:53	NORPAC	GG54	VERT.	150	150	24.2
A-3	18-00.2N 154-59.9E	18-00.2N 154-59.8E	910618	16:45	16:53	NORPAC	XX13	VERT.	150	150	27.2
A-3	18-00.2N 154-59.8E	18-00.2N 154-59.7E	910618	16:57	17:06	NORPAC	XX13	VERT.	200	200	30.5
A-3	18-00.2N 154-59.8E	18-00.2N 154-59.7E	910618	16:57	17:06	NORPAC	GG54	VERT.	200	200	35.5
A-3	18-00.2N 154-59.7E	17-57.1N 154-59.6E	910618	17:12	18:18	IKPT	1.0	OBL.	1200	277	42246
A-3	17-58.4N 154-59.6E	17-57.8N 154-59.6E	910618	17:37	17:57	ORI	1.0	SURF.			2602
B-3	17-16.8N 155-00.5E	17-17.2N 155-03.4E	910618	21:06	21:50	IKPT	1.0	OBL.	500	97	31916

Net Record - 3

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
B-3	17-16.9N 155-01.5E	17-17.1N 155-02.3E	910618	21:16	21:31	ORI	1.0	SURF.			2224
B-4	16-36.6N 155-00.2E	16-34.7N 155-00.4E	910619	00:34	01:18	IKPT	1.0	OBL.	500	102	28243
B-4	16-35.9N 155-00.2E	16-35.2N 155-00.3E	910619	00:45	01:00	ORI	1.0	SURF.			2345
A-4	15-58.4N 155-00.0E	15-58.5N 155-00.0E	910619	04:53	05:02	NORPAC	GG54	VERT.	156	150	30.5
A-4	15-58.4N 155-00.0E	15-58.5N 155-00.0E	910619	04:53	05:02	NORPAC	XX13	VERT.	156	150	27.9
A-4	15-58.4N 155-00.0E	15-58.5N 155-00.0E	910619	05:08	05:24	NORPAC	GG54	VERT.	215	200	47.6
A-4	15-58.4N 155-00.0E	15-58.5N 155-00.0E	910619	05:08	05:24	NORPAC	XX13	VERT.	215	200	
A-4	16-01.5N 154-60.0E	15-58.5N 154-59.9E	910619	03:31	04:38	IKPT	1.0	OBL.	1200	271	42352
A-4	15-59.7N 155-00.0E	15-59.2N 154-59.9E	910619	03:59	04:19	ORI	1.0	SURF.			2520
A-5	14-00.1N 155-00.3E	14-00.1N 155-00.3E	910619	13:11	13:20	NORPAC	GG54	VERT.	150	150	26.8
A-5	14-00.1N 155-00.3E	14-00.1N 155-00.3E	910619	13:11	13:20	NORPAC	XX13	VERT.	150	150	23.8
A-5	14-00.2N 155-00.0E	14-00.2N 154-59.9E	910619	13:22	13:33	NORPAC	GG54	VERT.	200	200	34.9
A-5	14-00.2N 155-00.0E	14-00.2N 154-59.9E	910619	13:22	13:33	NORPAC	XX13	VERT.	200	200	30.6
A-5	14-00.0N 154-59.9E	13-57.4N 154-59.8E	910619	13:49	14:51	IKPT	1.0	OBL.	1200	318	37687
A-5	13-58.2N 154-59.9E	13-57.7N 154-59.8E	910619	14:13	14:33	ORI	1.0	SURF.			2270

Net Record - 4

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
B-5	13-09.1N 155-00.0E	13-07.1N 154-59.9E	910619	18:08	18:52	IKPT	1.0	OBL.	500	103	29903
B-5	13-08.3N 155-00.0E	13-07.7N 154-59.9E	910619	18:19	18:34	ORI	1.0	SURF.			2559
B-6	12-33.0N 155-00.0E	12-30.9N 155-00.0E	910619	21:04	21:48	IKPT	1.0	OBL.	500	100	30621
B-6	12-32.2N 155-00.0E	12-31.6N 155-00.0E	910619	21:14	21:29	ORI	1.0	SURF.			2326
A-6	12-00.0N 155-00.1E	12-00.0N 155-00.1E	910619	23:54	00:02	NORPAC	GG54	VERT.	152	150	29.3
A-6	12-00.0N 155-00.1E	12-00.0N 155-00.1E	910619	23:54	00:02	NORPAC	XX13	VERT.	152	150	27.8
A-6	12-00.0N 155-00.1E	11-59.8N 155-00.0E	910620	00:06	00:18	NORPAC	GG54	VERT.	201	200	32.3
A-6	12-00.0N 155-00.1E	11-59.8N 155-00.0E	910620	00:06	00:18	NORPAC	XX13	VERT.	201	200	34.9
A-6	11-58.9N 154-59.8E	11-55.7N 154-59.6E	910620	01:08	02:10	IKPT	1.0	OBL.	1200	249	42671
A-6	11-57.0N 154-59.7E	11-56.3N 154-59.6E	910620	01:32	01:52	ORI	1.0	SURF.			2635
A-7	09-59.8N 154-59.8E	09-59.8N 154-59.7E	910620	09:26	09:33	NORPAC	GG54	VERT.	156	150	29.0
A-7	09-59.8N 154-59.8E	09-59.8N 154-59.7E	910620	09:26	09:33	NORPAC	XX13	VERT.	156	150	26.0
A-7	09-59.7N 154-59.6E	09-59.6N 154-59.5	910620	09:37	09:46	NORPAC	GG54	VERT.	204	200	36.7
A-7	09-59.7N 154-59.6E	09-59.6N 154-59.5	910620	09:37	09:46	NORPAC	XX13	VERT.	204	200	32.1
A-7	09-59.4N 154-59.3E	09-59.2N 154-55.7E	910620	10:10	11:10	IKPT	1.0	OBL.	1200	259	59102

Net Record - 5

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
A-7	09-59.3N 154-57.5E	09-59.3N 154-56.6E	910620	10:32	10:52	ORI	1.0	SURF.			2590
B-7	10-00.0N 152-59.2E	10-00.6N 152-56.9E	910620	18:06	18:52	IKPT	1.0	OBL.	500	146	27559
B-7	10-00.0N 152-58.9E	10-00.3 152-58.2E	910620	18:11	18:26	ORI	1.0	SURF.			2196
B-8	10-00.0 152-21.0E	10-00.1N 152-18.5E	910620	21:03	21:48	IKPT	1.0	OBL.	500	115	29897
B-8	10-00.0N 152-21.0E	10-00.1N 152-19.7E	910620	21:13	21:28	ORI	1.0	SURF.			2257
B-9	10-00.0N 151-40.0E	09-59.9N 151-37.3E	910621	00:08	00:54	IKPT	1.0	OBL.	500	104	40618
B-9	10-00.0N 151-39.3E	09-59.9N 151-38.4E	910621	00:19	00:34	ORI	1.0	SURF.			2428
B-10	10-00.0N 151-02.5E	10-00.1N 151-00.1E	910621	03:03	03:45	IKPT	1.0	OBL.	500	114	28530
B-10	10-00.0N 151-01.9E	10-00.1N 151-01.0E	910621	03:14	03:29	ORI	1.0	SURF.			2466
A-8	09-59.8N 148-59.8E	10-00.0N 148-59.8E	910621	11:03	11:14	NORPAC	GG54	VERT.	152	150	28.1
A-8	09-59.8N 148-59.8E	10-00.0N 148-59.8E	910621	11:03	11:14	NORPAC	XX13	VERT.	152	150	25.3
A-8	10-00.0N 148-59.8E	10-00.0N 148-59.8E	910621	11:15	11:26	NORPAC	GG54	VERT.	203	200	34.9
A-8	10-00.0N 148-59.8E	10-00.0N 148-59.8E	910621	11:15	11:26	NORPAC	XX13	VERT.	203	200	30.9
A-8	10-00.2N 148-59.8E	10-02.2N 149-00.4E	910621	11:53	12:56	IKPT	1.0	OBL.	1200		31724
A-8	10-01.1N 149-00.1E	10-01.6N 149-00.2E	910621	12:16	12:36	ORI	1.0	SURF.			2806

Net Record - 6

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
B-11	11-21.2N 149-00.0E	11-23.0N 148-59.7E	910621	18:05	18:40	IKPT	1.0	OBL.	400		25569
B-11	11-22.0N 148-59.9E	11-22.6E 148-59.8E	910621	18:15	18:30	ORI	1.0	SURF.			2455
A-9	11-59.9N 148-59.9E	11-59.8N 148-59.8E	910621	21:12	21:21	NORPAC	GG54	VERT.	157	150	25.5
A-9	11-59.9N 148-59.9E	11-59.8N 148-59.8E	910621	21:12	21:21	NORPAC	XX13	VERT.	157	150	23.6
A-9	11-59.8N 148-59.8E	11-59.6N 148-59.8E	910621	21:26	21:38	NORPAC	GG54	VERT	250	200	43.4
A-9	11-59.8N 148-59.8E	11-59.6N 148-59.8E	910621	21:26	21:38	NORPAC	XX13	VERT	250	200	38.7
A-9	11-59.6N 148-59.6E	12-02.0N 148-59.9E	910621	21:58	22:48	IKPT	1.0	OBL.	1000		37778
A-9	12-01.0N 148-59.9E	12-01.6N 148-59.9E	910621	22:17	22:37	ORI	1.0	SURF.			4536
B-12	12-51.2N 149-00.0E	12-53.1N 148-59.7E	910622	02:03	02:40	IKPT	1.0	OBL.	400	95	23750
B-12	12-52.2N 148-59.9E	12-52.7N 148-59.8E	910622	02:12	02:27	ORI	1.0	SURF.			1968
A-10	14-00.3N 148-59.8E	14-00.2N 148-59.8E	910622	07:01	07:10	NORPAC	GG54	VERT.	150	150	24.7
A-10	14-00.3N 148-59.8E	14-00.2N 148-59.8E	910622	07:01	07:10	NORPAC	XX13	VERT.	150	150	21.75
A-10	14-00.2N 148-59.7E	14-00.2N 148-59.7E	910622	07:15	07:27	NORPAC	GG54	VERT.	201	200	33.5
A-10	14-00.2N 148-59.7E	14-00.2N 148-59.7E	910622	07:15	07:27	NORPAC	XX13	VERT.	201	200	28.7
A-10	14-00.2N 148-59.6E	14-02.9N 148-59.3E	910622	17:42	08:33	IKPT	1.0	OBL.	1000	210	41095

Net Record - 7

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
A-10	14-01.8N 148-59.5E	14-02.5N 148-59.4E	910622	08:01	08:21	ORI	1.0	SURF.			2657
A-11	15-59.5N 148-59.7E	15-59.5N 148-59.6E	910622	15:52	16:01	NORPAC	GG54	VERT.	154	150	25.8
A-11	15-59.5N 148-59.7E	15-59.5N 148-59.6E	910622	15:52	16:01	NORPAC	XX13	VERT.	154	150	22.4
A-11	15-59.5N 148-59.5E	15-59.4N 148-59.5E	910622	16:06	16:17	NORPAC	GG54	VERT.	213	200	38.0
A-11	15-59.5N 148-59.5E	15-59.4N 148-59.5E	910622	16:06	16:17	NORPAC	XX13	VERT.	213	200	34.1
A-11	15-59.3N 148-59.3E	16-01.9N 148-58.8E	910622	16:35	17:38	IKPT	1.0	OBL.	1200	391	3355
A-11	16-00.4N 148-59.1E	16-01.2N 148-59.0E	910622	16:58	17:18	ORI	1.0	SURF.			2835
B-13	16-39.3N 149-00.0E	16-42.2N 148-59.9E	910622	20:04	20:55	IKPT	1.0	OBL.	600	136	37471
B-13	16-39.0N 149-00.0E	16-40.1N 148-59.9E	910622	20:16	20:31	ORI	1.0	SURF.			2235
B-14	17-25.5N 149-00.0E	17-28.5N 148-59.9E	910622	23:30	00:22	IKPT	1.0	OBL.	600	140	43415
B-14	17-26.2N 149-00.0E	17-27.1N 148-59.9E	910622	23:41	23:56	ORI	1.0	SURF.			2220
A-12	18-03.5N 149-00.3E	18-03.5N 149-00.3E	910623	03:37	03:45	NORPAC	GG54	VERT.	153	150	25.6
A-12	18-03.5N 149-00.3E	18-03.5N 149-00.3E	910623	03:37	03:45	NORPAC	XX13	VERT.	153	150	22.3
A-12	18-03.8N 149-00.3E	18-03.8N 149-00.3E	910623	03:50	04:00	NORPAC	GG54	VERT.	207	200	35.6
A-12	18-03.8N 149-00.3E	18-03.8N 149-00.3E	910623	03:50	04:00	NORPAC	XX13	VERT.	207	200	32.0

Net Record - 8

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
A-12	17-59.3N 149-00.1E	18-03.0N 149-00.2E	910623	02:18	03:21	IKPT	1.0	OBL.	1200	276	44999
A-12	18-00.9N 149-00.1E	18-02.0N 149-00.2E	910623	02:42	03:02	ORI	1.0	SURF.			2640
A-13	20-00.0N 149-00.0E	20-00.1N 149-00.0E	910623	11:22	11:30	NORPAC	GG54	VERT.	152	150	24.7
A-13	20-00.0N 149-00.0E	20-00.1N 149-00.0E	910623	11:22	11:30	NORPAC	XX13	VERT.	152	150	19.7
A-13	20-00.1N 149-00.0E	20-00.1N 148-59.5E	910623	11:46	11:57	NORPAC	GG54	VERT.	200	200	31.1
A-13	20-00.1N 149-00.0E	20-00.1N 148-59.5E	910623	11:46	11:57	NORPAC	XX13	VERT.	200	200	24.6
A-13	20-00.3N 148-59.5E	20-02.9N 148-59.7E	910623	12:04	13:05	IKPT	1.0	OBL.	1200	311	38063
A-13	20-01.6N 148-59.7E	20-02.2N 148-59.7E	910623	12:27	12:47	ORI	1.0	SURF.			2431
B-15	21-21.4N 149-00.0E	21-23.8N 149-00.2E	910623	18:09	19:00	IKPT	1.0	OBL.	600	151	31803
B-15	21-22.1N 149-00.0E	21-22.7N 149-00.1E	910623	18:21	18:30	ORI	1.0	SURF.			2341
A-14	21-59.8N 148-59.8E	21-59.8N 148-59.8E	910623	21:32	21:40	NORPAC	GG54	VERT.	153	150	25.6
A-14	21-59.8N 148-59.8E	21-59.8N 148-59.8E	910623	21:32	21:40	NORPAC	XX13	VERT.	153	150	21.5
A-14	21-59.8N 148-59.8E	21-59.8N 148-59.8E	910623	21:45	21:54	NORPAC	GG54	VERT.	200	200	32.4
A-14	21-59.8N 148-59.8E	21-59.8N 148-59.8E	910623	21:45	21:54	NORPAC	XX13	VERT.	200	200	26.7
A-14	21-59.7N 148-59.5E	22-00.0N 148-56.7E	910623	22:15	23:17	IKPT	1.0	OBL.	1200	368	34207

Net Record - 9

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
A-14	21-59.8N 148-58.2E	21-59.9N 148-57.5E	910623	22:40	23:00	ORI	1.0	SURF.			2302
B-16	22-00.3N 148-37.9E	21-59.9N 148-35.2E	910624	00:33	01:23	IKPT	1.0	OBL.	600	160	30474
B-16	22-00.2N 148-37.2E	22-00.1N 148-36.4E	910624	00:44	00:59	ORI	1.0	SURF.			2254
B-17	22-00.4N 148-16.9E	22-00.5N 148-14.5E	910624	02:34	03:25	IKPT	1.0	OBL.	600	173	38285
B-17	22-00.4N 148-16.3E	22-00.5N 148-15.7E	910624	02:45	03:00	ORI	1.0	SURF.			2259
B-18	22-05.0N 143-31.8E	22-05.6N 143-29.7E	910624	19:05	19:57	IKPT	1.0	OBL.	600	145	33146
B-18	22-05.2N 143-31.2E	22-05.4N 143-30.6E	910624	19:17	19:32	ORI	1.0	SURF.			4241
A-15	22-00.1N 143-00.1E	22-00.2N 143-00.2E	910624	21:59	22:06	NORPAC	GG54	VERT.	150	150	25.3
A-15	22-00.1N 143-00.1E	22-00.2N 143-00.2E	910624	21:59	22:06	NORPAC	XX13	VERT.	150	150	21.0
A-15	22-00.2N 143-00.2E	22-00.2N 143-00.3E	910624	22:10	22:19	NORPAC	GG54	VERT.	200	200	32.0
A-15	22-00.2N 143-00.2E	22-00.2N 143-00.3E	910624	22:10	22:19	NORPAC	XX13	VERT.	200	200	25.8
A-15	22-00.0N 143-00.3E	21-58.4N 143-00.1E	910624	22:36	23:35	IKPT	1.0	OBL.	1200	434	25404
A-15	21-59.2N 143-00.2E	21-58.8N 143-00.1E	910624	22:58	23:18	ORI	1.0	SURF.			2697
B-19	21-38.6N 143-00.0E	21-36.7N 143-00.2E	910625	01:02	01:55	IKPT	1.0	OBL.	600	148	31514
B-19	21-38.1N 143-00.1E	21-37.5N 143-00.2E	910625	01:15	01:30	ORI	1.0	SURF.			2365

Net Record - 10

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
B-20	21-21.7N 142-59.7E	21-10.1N 142-57.7E	910625	03:04	03:55	IKPT	1.0	OBL.	600	155	30580
B-20	21-21.5N 142-59.1E	21-21.4N 142-58.6E	910625	03:15	03:30	ORI	1.0	SURF.			2306
A-16	20-01.1N 142-59.9E	20-00.1N 142-59.9E	910625	09:03	09:12	NORPAC	GG54	VERT.	167	150	29.1
A-16	20-01.1N 142-59.9E	20-00.1N 142-59.9E	910625	09:03	09:12	NORPAC	XX13	VERT.	167	150	25.1
A-16	20-00.1N 143-00.0E	20-00.1N 142-59.9E	910625	09:16	09:28	NORPAC	GG54	VERT.	221	200	38.2
	20-00.1N 143-00.0E	20-00.1N 142-59.9E	910625	09:16	09:28	NORPAC	XX13	VERT.	221	200	32.2
A-16	19-59.7N 142-59.9E	19-57.6N 142-59.8E	910625	09:47	10:47	IKPT	1.0	OBL.	1200	329	32917
A-16	19-58.7N 142-59.9E	19-58.1N 142-59.9E	910625	10:09	10:29	ORI	1.0	SURF.			2546
A-17	18-00.2N 142-45.0E	18-00.2N 142-44.9E	910625	18:19	18:27	NORPAC	GG54	VERT.	153	150	27.3
A-17	18-00.2N 142-45.0E	18-00.2N 142-44.9E	910625	18:19	18:27	NORPAC	XX13	VERT.	153	150	23.8
A-17	18-00.2N 142-44.9E	18-00.2N 142-44.8E	910625	18:32	18:42	NORPAC	GG54	VERT.	204	200	34.1
A-17	18-00.2N 142-44.9E	18-00.2N 142-44.8E	910625	18:32	18:42	NORPAC	XX13	VERT.	204	200	28.3
A-17	18-00.3N 142-44.7E	17-58.8N 142-44.0E	910625	19:02	20:05	IKPT	1.0	OBL.	1200	468	24925
A-17	17-59.5N 142-44.5E	17-59.1N 142-44.3E	910625	19:26	19:46	ORI	1.0	SURF.			2560
B-21	17-47.7N 142-42.7E	17-46.3N 142-41.9E	910625	20:59	21:51	IKPT	1.0	OBL.	600	172	33458

Net Record - 11

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
B-21	17-47.3N 142-42.5E	17-46.9N 142-41.3E	910625	21:11	21:26	ORI	1.0	SURF.			1980
B-22	17-30.2N 142-44.0E	17-28.6N 142-43.7E	910625	23:00	23:52	IKPT	1.0	OBL.	600	157	21375
B-22	17-29.7N 142-44.0E	17-29.3N 142-43.9E	910625	23:11	23:26	ORI	1.0	SURF.			2249
B-23	17-13.3N 142-46.8E	17-12.0N 142-47.3E	910626	01:02	01:54	IKPT	1.0	OBL.	600	193	25380
B-23	17-12.8N 142-46.7E	17-12.5N 142-46.9E	910626	01:14	01:29	ORI	1.0	SURF.			2404
B-24	16-58.3N 142-50.0E	16-59.2N 142-51.6E	910626	03:00	03:53	IKPT	1.0	OBL.	600	143	33473
B-24	16-58.5N 142-50.4E	16-58.7N 142-50.9E	910626	03:11	03:26	ORI	1.0	SURF.			2488
A-18	15-59.9N 143-00.0E	15-59.9N 143-00.0E	910626	07:45	07:53	NORPAC	GG54	VERT.	160	150	29.1
A-18	15-59.9N 143-00.0E	15-59.9N 143-00.0E	910626	07:45	07:53	NORPAC	XX13	VERT.	160	150	24.8
A-18	15-59.9N 143-00.0E	15-59.9N 143-00.0E	910626	07:58	08:12	NORPAC	GG54	VERT.	227	200	39.2
A-18	15-59.9N 143-00.0E	15-59.9N 143-00.0E	910626	07:58	08:12	NORPAC	XX13	VERT.	227	200	32.8
A-18	15-59.9N 142-59.8E	16-00.2N 142-58.0E	910626	08:29	09:29	IKPT	1.0	OBL.	1200	385	28277
A-18	16-00.1N 142-58.9E	16-00.2N 142-58.4E	910626	08:51	09:11	ORI	1.0	SURF.			2643
G-1-D	15-00.0N 142-59.7E	15-01.0N 143-01.5E	910626	14:48	15:40	IKPT	1.0	OBL.	600	146	32662
G-1-D	15-00.2N 143-00.2E	15-00.5N 143-00.7E	910626	15:00	15:15	ORI	1.0	SURF.			2376

Net Record - 12

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
G-1-D	15-01.1N 143-01.7E	15-01.6N 143-02.7E	910626	15:46	16:18	ORI	0.69	HOR.	200		3694
G-1-D	15-01.6N 143-02.8E	15-02.0N 143-03.6E	910626	16:24	16:48	ORI	0.69	HOR.	100		2872
G-1-N	15-00.2N 142-59.5E	15-00.8N 143-00.4E	910626	18:47	19:16	ORI	0.69	HOR.	200		3760
G-1-N	15-00.8N 143.00.5E	15-01.5N 143-01.3E	910626	19:21	19:47	ORI	0.69	HOR.	100		3237
G-1-N	15-01.8N 143-01.6E	15-03.2N 143-03.6E	910626	19:55	20:46	IKPT	1.0	OBL.	600		36919
G-1-N	15-02.1N 143-02.1E	15-02.6N 143-02.7E	910626	20:07	20:22	ORI	1.0	SURF.			2435
B-25	14-46.2N 143-02.8E	14-44.0N 143-02.1E	910626	22:01	22:53	IKPT	1.0	OBL.	600	183	28440
B-25	14-45.6N 143-02.6E	14-45.1N 143-02.4E	910626	22:13	22:28	ORI	1.0	SURF.			2266
B-26	14-27.2N 143-01.0E	14-24.8N 143-00.5E	910627	00:02	00:53	IKPT	1.0	OBL.	600	141	31090
B-26	14-26.5N 143-00.9E	14-25.9N 143-00.8E	910627	00:14	00:29	ORI	1.0	SURF.			2339
A-19	13-59.1N 143-00.2E	14-00.6N 143-02.1E	910627	02:43	03:45	IKPT	1.0	OBL.	1200	331	33794
A-19	13-59.7N 143-01.1E	14-00.0N 143-01.6E	910627	03:06	03:26	ORI	1.0	SURF.			2656
A-19	14-00.6N 143-02.0E	14-00.7N 143-01.9E	910627	03:58	04:06	NORPAC	GG54	VERT.	158	150	27.5
A-19	14-00.6N 143-02.0E	14-00.7N 143-01.9E	910627	03:58	04:06	NORPAC	XX13	VERT.	158	150	25.5
A-19	14-00.7N 143-01.8E	14-00.6N 143-01.8E	910627	04:12	04:23	NORPAC	GG54	VERT.	203	200	32.3

Net Record - 13

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
A-19	14-00.7N 143-01.8E	14-00.6N 143-01.8E	910627	04:12	04:23	NORPAC	XX13	VERT.	203	200	30.0
B-27	12-59.8N 142-59.6E	13-00.8N 143-01.3E	910627	18:47	19:38	IKPT	1.0	OBL.	600	148	42556
B-27	13-00.0N 143-00.1E	13-00.3N 143-00.5E	910627	18:59	19:14	ORI	1.0	SURF.			2449
B-28	12-42.9N 142-59.9E	12-41.1N 142-59.5E	910627	20:59	21:50	IKPT	1.0	OBL.	600	193	27228
B-28	12-42.4N 142-59.8E	12-41.9N 142-59.5E	910627	21:11	21:26	ORI	1.0	SURF.			2389
B-29	12-16.4N 143-00.0E	12-14.4N 142-59.1E	910627	23:30	00:22	IKPT	1.0	OBL.	600	183	30624
B-29	12-15.9N 142-59.8E	12-15.3N 142-59.5E	910627	23:41	23:56	ORI	1.0	SURF.			2467
A-20	12-01.1N 143-00.0E	11-59.1N 143-00.0E	910628	01:27	02:29	IKPT	1.0	OBL.	1200	387	29435
A-20	12-00.1N 143-00.1E	11-59.6N 143-00.0E	910628	01:51	02:11	ORI	1.0	SURF.			2870
A-20	11-59.1N 142-59.7E	11-59.1N 142-59.6E	910628	02:42	02:52	NORPAC	GG54	VERT.	159	150	29.6
A-20	11-59.1N 142-59.7E	11-59.1N 142-59.6E	910628	02:42	02:52	NORPAC	XX13	VERT.	159	150	26.0
A-20	11-59.2N 142-59.4E	11-59.2N 142-59.3E	910628	02:59	03:10	NORPAC	GG54	VERT.	207	200	35.4
A-20	11-59.2N 142-59.4E	11-59.2N 142-59.3E	910628	02:59	03:10	NORPAC	XX13	VERT.	207	200	30.0
G-2-D	11-00.7N 142-59.1E	11-00.9N 142-59.8E	910628	11:40	12:06	ORI	0.69	HOR.	160	124	2367
G-2-D	11-00.9N 142-59.9E	11-01.0N 143-00.4E	910628	12:11	12:33	ORI	0.69	HOR.	80	38	2991

Net Record - 14

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
G-2-D	11-01.0N 143-00.8E	11-01.4N 143-07.1E	910628	12:45	16:03	IKPT	1.0	OBL.	4000		90633
G-2-N	10-59.7N 143-00.1E	10-58.0N 143-00.7E	910628	18:02	18:54	IKPT	1.0	OBL.	600	166	30081
G-2-N	10-59.2N 143-00.3E	10-58.8N 143-00.5E	910628	18:15	18:30	ORI	1.0	SURF.			2394
G-2-N	10-57.9N 143-00.7E	10-57.1N 143-00.4E	910628	19:01	19:29	ORI	0.69	HOR.	160	89	3546
G-2-N	10-56.9N 143-00.3E	10-56.3N 143-00.1E	910628	19:34	19:58	ORI	0.69	HOR.	80	47	2790
A-21	10-00.1N 143-00.2E	10-00.1N 143-00.2E	910628	23:40	23:47	NORPAC	GG54	VERT.	152	150	25.5
A-21	10-00.1N 143-00.2E	10-00.1N 143-00.2E	910628	23:40	23:47	NORPAC	XX13	VERT.	152	150	21.9
A-21	10-00.1N 143-00.2E	10-00.2N 143-00.1E	910628	23:51	00:01	NORPAC	GG54	VERT.	203	200	33.1
A-21	10-00.1N 143-00.2E	10-00.2N 143-00.1E	910628	23:51	00:01	NORPAC	XX13	VERT.	203	200	29.3
A-21	10-00.3N 142-59.9E	10-00.8N 142-57.4E	910629	00:23	01:20	IKPT	1.0	OBL.	1200	303	39734
A-21	10-00.5N 142-58.8E	10-00.6N 142-58.1E	910629	00:41	01:01	ORI	1.0	SURF.			2548
A-22	10-00.2N 137-00.1E	10-00.3N 137-00.1E	910629	22:43	22:50	NORPAC	GG54	VERT.	151	150	23.2
A-22	10-00.2N 137-00.1E	10-00.3N 137-00.1E	910629	22:43	22:50	NORPAC	XX13	VERT.	151	150	18.1
A-22	10-00.3N 137-00.1E	10-00.4N 137-00.2E	910629	22:53	23:03	NORPAC	GG54	VERT.	203	200	32.9
A-22	10-00.3N 137-00.1E	10-00.4N 137-00.2E	910629	22:53	23:03	NORPAC	XX13	VERT.	203	200	26.4

Net Record - 15

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
A-22	10-00.7N 137-00.2E	10-03.5N 137-00.1E	910629	23:22	00:24	IKPT	1.0	OBL.	1200	347	34868
A-22	10-01.9N 137-00.3E	10-02.7N 137-00.2E	910629	23:44	00:04	ORI	1.0	SURF.			2618
A-23	12-00.3N 137-00.0E	12-00.2N 137-00.0E	910630	07:38	07:46	NORPAC	GG54	VERT.	151	150	23.7
A-23	12-00.3N 137-00.0E	12-00.2N 137-00.0E	910630	07:38	07:46	NORPAC	XX13	VERT.	151	150	20.2
A-23	12-00.2N 137-00.0E	12-00.1N 137-00.1E	910630	07:50	08:00	NORPAC	GG54	VERT.	203	200	34.5
A-23	12-00.2N 137-00.0E	12-00.1N 137-00.1E	910630	07:50	08:00	NORPAC	XX13	VERT.	203	200	28.7
A-23	12-00.1N 137-00.1E	12-02.4N 137-00.1E	910630	08:20	09:20	IKPT	1.0	OBL.	1200	321	37290
A-23	12-01.2N 137-00.1E	12-01.8N 137-00.0E	910630	08:42	09:02	ORI	1.0	SURF.			2538
A-24	14-00.2N 136-59.8E	14-00.1N 136-59.6E	910630	18:40	18:48	NORPAC	GG54	VERT.	151	150	23.8
A-24	14-00.2N 136-59.8E	14-00.1N 136-59.6E	910630	18:40	18:48	NORPAC	XX13	VERT.	151	150	20.3
A-24	14-00.1N 136-59.6E	13-59.9N 136-59.4E	910630	18:53	19:04	NORPAC	GG54	VERT.	202	200	33.4
A-24	14-00.1N 136-59.6E	13-59.9N 136-59.4E	910630	18:53	19:04	NORPAC	XX13	VERT.	202	200	29.1
A-24	13-59.9N 136-59.1E	14-02.0N 136-57.8E	910630	19:22	20:24	IKPT	1.0	OBL.	1200	373	33684
A-24	14-00.9N 136-58.6E	14-01.5N 136-58.2E	910630	19:45	20:05	ORI	1.0	SURF.			2709
B-30	14-09.2N 137-00.3E	14-11.1N 137-00.1E	910630	21:06	21:58	IKPT	1.0	OBL.	600	166	31504

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
B-30	14-09.6N 137-00.3E	14-10.1N 137-00.2E	910630	21:18	21:33	ORI	1.0	SURF.			2453
B-31	14-18.7N 137-00.1E	14-20.2N 137-00.0E	910630	22:35	23:26	IKPT	1.0	STEP	400	138	26090
B-31	14-19.0N 137-00.2E	14-19.4N 137-00.1E	910630	22:44	22:59	ORI	1.0	SURF.			1884
B-32	14-28.1N 137-00.2E	14-29.6N 137-00.2E	910701	00:07	00:57	IKPT	1.0	OBL.	600	137	33620
B-32	14-28.6N 137-00.2E	14-29.2N 137-00.2E	910701	00:19	00:34	ORI	1.0	SURF.			2330
B-33	14-36.1N 137-00.4E	14-37.8N 136-59.9E	910701	01:32	02:24	IKPT	1.0	STEP	400	104	29758
B-33	14-36.6N 137-00.4E	14-37.0N 137-00.2E	910701	01:41	01:56	ORI	1.0	SURF.			1981
B-34	14-45.4N 137-00.1E	14-47.8N 136-59.9E	910702	03:02	03:55	IKPT	1.0	OBL.	600	130	37762
B-34	14-46.0N 137-00.1E	14-46.9N 137-00.1E	910701	03:14	03:34	ORI	1.0	SURF.			3179
B-35	14-58.5N 137-00.0E	14-56.3N 136-50.1E	910701	05:01	05:53	IKPT	1.0	OBL.	600	176	27223
C-1	14-55.9N 136-58.9E	14-53.6N 136-57.7E	910701	06:08	07:12	IKPT	1.0	OBL.	1200	370	33964
C-2	14-53.1N 136-57.4E	14-51.3N 136-56.3E	910701	07:56	08:57	IKPT	0.5	OBL.	1200	441	22624
C-3	14-51.1N 136-56.1E	14-49.1N 136-55.0E	910701	09:05	10:08	IKPT	0.5	OBL.	1260	437	25055
C-4	14-48.9N 136-54.8E	14-46.6N 136-53.6E	910701	10:16	11:18	IKPT	0.5	OBL.	1200	386	28622

Net Record - 17

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
C-5	14-46.5N 136-53.2E	14-46.5N 136-50.6E	910701	11:37	13:22	MTD	0.5	HOR.	0	0	982.5
									35	25	779.6 (2)
									71	50	658.8
									106	75	706.2 (3)
									141	100	676.3
									212	150	633.5
									283	200 (1)	869.6
									354	250	571 (2)
									424	300	1240
									566	400	1102
									707	500	1102
A-25	15-45.6N 136-57.9E	15-45.7N 136-57.8E	910701	18:12	18:22	NORPAC	GG54	VERT.	153	150	23.2
A-25	15-45.6N 136-57.9E	15-45.7N 136-57.8E	910701	18:12	18:22	NORPAC	XX13	VERT.	153	150	20.0
A-25	15-45.7N 136-57.8E	15-45.7N 136-57.7E	910701	18:25	18:35	NORPAC	GG54	VERT.	200	200	31.0
A-25	15-45.7N 136-57.8E	15-45.7N 136-57.7E	910701	18:25	18:35	NORPAC	XX13	VERT.	200	200	25.2
A-25	15-48.8N 136-57.5E	15-48.4N 136-56.6E	910701	18:57	19:58	IKPT	1.0	OBL.	1200		35075
A-25	15-47.1N 136-57.2E	15-47.8N 136-56.9E	910701	19:20	19:40	ORI	1.0	SURF.			2147
B-36	15-48.7N 136-56.5E	15-51.3N 136-55.8E	910701	20:07	20:57	IKPT	1.0	OBL.	600		35855
B-36	15-49.4N 136-56.3E	15-50.1N 136-56.1E	910701	20:18	20:33	ORI	1.0	SURF.			2434
C-6	15-51.8N 136-55.7E	15-53.0N 136-55.3E	910701	21:10	21:42	IKPT	0.5	OBL.	600	133	17428

(1)RMD: 196.8m; (2)bucket mesh size: 0.6mm; (3)messenger trouble

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
C-6	15-52.5N 136-55.6E	15-52.9N 136-55.4E	910701	21:22	21:37	ORI	1.0	SURF.			1040
C-7	15-53.1N 136-55.6E	15-52.2N 136-55.7E	910701	21:51	22:23	IKPT	0.5	OBL.	600	169	14608
C-7	15-52.7N 136-55.6E	15-52.4N 136-52.7E	910701	22:02	22:17	ORI	1.0	SURF.			1331
C-8	15-51.9N 136-55.8E	15-51.0N 136-55.9E	910701	22:31	23:04	IKPT	0.5	OBL.	600	169	13755
C-8	15-51.4N 136-56.0E	15-51.1N 136-56.0E	910701	22:43	22:58	ORI	1.0	SURF.			1365
C-9	15-50.8N 136-56.0E	15-50.1N 136-55.2E	910701	23:10	23:41	IKPT	0.5	OBL.	600	189	12818
C-9	15-50.4N 136-55.5E	15-50.2N 136-55.3E	910701	23:21	23:36	ORI	1.0	SURF.			1444
C-10	15-50.2N 136-54.9E	15-50.7N 136-53.9E	910702	00:05	01:26	MTD	0.5	HOR.	0	0	610.5
									35	25	835.6
									71	50	754 (2)
									106	75	743.8
									141	100	750
									212	150	750.3
									283	200 (1)	568.5
									354	250	724.4 (2)
									424	300	722.1 (2)
									566	400	681.5
									707	500	636.2
C-11	15-50.7N 136-53.1E	15-49.5N 136-55.7E	910702	01:41	02:38	IKPT	0.5	STEP	400	130	36805
C-12	15-50.6N 136-54.4E	15-51.2N 136-53.0E	910702	03:08	03:43	IKPT	0.5	STEP	250	65	24418

(1)RMD: 224.5m; (2)bucket mesh size: 0.6mm

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
C-13	15-51.3N 136-52.7E	15-52.1N 136-51.0E	910702	03:49	04:33	IKPT	0.5	STEP	240	64	21025
C-14	15-52.2N 136-51.0E	15-51.6N 136-52.2E	910702	04:42	05:26	IKPT	0.5	STEP	284	62	29694
C-15	15-51.5N 136-52.4E	15-51.0N 136-53.5E	910702	05:33	06:18	IKPT	0.5	STEP	276	81	19732
C-16	15-51.1N 136-52.8E	15-51.4N 136-53.6E	910702	07:37	09:21	MTD	0.5	HOR.	0	0	568.3
									35	25	818.7
									71	50	1601
									106	75	868.5
									141	100	1209
						212	150	(1)	813.8		
									283	200	1601 (2)
									354	250	745.9 (2)
									424	300	675.7
									566	400	689.8
									707	500	689.8
B-37	17-26.4N 136-59.9E	17-28.7N 136-59.8E	910702	21:12	22:03	IKPT	1.0	OBL.	600	133	33523
B-37	17-27.1N 136-59.9E	17-27.7N 136-59.8E	910702	21:25	21:40	ORI	1.0	SURF.			2276
C-17	17-33.8N 137-00.1E	17-35.6N 137-00.0E	910702	22:40	23:33	IKPT	0.5	STEP	600	134	24862
C-18	17-35.9N 137-00.0E	17-37.0N 136-59.9E	910702	23:40	00:12	IKPT	0.5	STEP	228	63	15013
C-19	17-37.1N 137-00.4E	17-38.7N 137-01.1E	910703	00:24	02:04	MTD	0.5	HOR.	0	0	388.7
									35	25	653.4
									71	50	679.9 (2)
									106	75	700.1

(1)RMD: 171.0m; (2)bucket mesh size: 0.6mm

Net Record - 20

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
C-19	17-37.1N 137-00.4E	17-38.7N 137-01.1E	910703	00:24	02:04	MTD	0.5	HOR.	141	100	792.6 (2)
									212	150	685.7
									283	200 (1)	2259
									354	250	776.8
									424	300	776.8
									566	400	509.8
									707	500	614.7
C-20	17-38.0N 137-01.0E	17-38.9N 137-00.8E	910703	02:15	02:43	IKPT	0.5	STEP	150	40	21486
A-26	17-44.0N 137-00.3E	17-46.1N 137-00.1E	910703	03:22	04:23	IKPT	1.0	OBL.	1200	348	33158
A-26	17-45.0N 137-00.2E	17-45.6N 137-00.0E	910703	03:44	04:05	ORI	1.0	SURF.			2576
A-26	17-46.2N 137-00.0E	17-46.1N 136-59.9E	910703	04:38	04:46	NORPAC	GG54	VERT.	150	150	24.1
A-26	17-46.2N 137-00.0E	17-46.1N 136-59.9E	910703	04:38	04:46	NORPAC	XX13	VERT.	150	150	20.5
A-26	17-46.1N 136-59.9E	17-46.0N 136-59.8E	910703	04:52	05:02	NORPAC	GG54	VERT.	200	200	32.6
A-26	17-46.1N 136-59.9E	17-46.0N 136-59.8E	910703	04:52	05:02	NORPAC	XX13	VERT.	200	200	26.3
C-21	17-45.1N 136-58.0E	17-45.3N 136-57.5E	910703	08:14	09:53	MTD	0.5	HOR.	0	0	688.8
									35	25	976.5 (2)
									71	50	785.5
									106	75	764.1
									141	100	644.1
									212	150	518.6
									283	200 (3)	209.1
									354	250	511 (2)

(1)RMD: 294.7m; (2)bucket mesh size: 0.6mm; (3)RMD: 253.4m

Net Record - 21

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
C-21	17-45.1N 136-58.0E	17-45.3N 136-57.5E	910703	08:14	09:53	MTD	0.5	HOR.	424	300	447.9
									566	400	447.9
									707	500	447.9
B-38	19-00.5N 136-59.4E	19-03.3N 135-59.2E	910703	18:07	18:57	IKPT	1.0	OBL.	600	144	34613
B-38	19-01.3N 136-59.3E	19-02.0N 136-59.2E	910703	18:19	18:34	ORI	1.0	SURF.			2166
C-22	19-03.8N 136-59.2E	19-05.1N 136-59.1E	910703	19:09	19:33	IKPT	0.5	STEP	120	31	13681
B-39	19-08.4N 136-59.5E	19-10.9N 136-59.8E	910703	20:03	20:54	IKPT	1.0	OBL.	600	146	28859
B-39	19-09.1N 136-59.5E	19-09.7N 136-59.6E	910703	20:14	20:29	ORI	1.0	SURF.			1760
C-23	19-11.5N 136-59.9E	19-12.7N 136-59.9E	910703	21:05	21:32	IKPT	0.5	STEP	120	31	14078
C-24	20-00.2N 137-00.0E	20-01.4N 137-00.3E	910704	00:49	01:18	IKPT	0.5	STEP	140	37	14757
B-40	20-01.2N 137-00.4E	20-03.9N 137-00.9E	910704	01:27	02:18	IKPT	1.0	OBL.	600	163	29282
B-40	20-02.3N 137-00.5E	20-03.0N 137-00.7E	910704	01:39	01:54	ORI	1.0	SURF.			2141
A-27	20-04.4N 137-00.9E	20-06.8N 137-00.8E	910704	02:27	03:30	IKPT	1.0	OBL.	1200	349	32874
A-27	20-05.5N 137-00.8E	20-06.1N 137-00.8E	910704	02:51	03:11	ORI	1.0	SURF.			2452
A-27	20-06.9N 137-00.9E	20-06.9N 137-00.9E	910704	03:45	03:55	NORPAC	GG54	VERT.	151	150	22.5
A-27	20-06.9N 137-00.9E	20-06.9N 137-00.9E	910704	03:45	03:55	NORPAC	XX13	VERT.	151	150	19.4

Net Record - 22

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
A-27	20-06.9N 137-00.9E	20-07.0N 137-01.0E	910704	03:59	04:09	NORPAC	GG54	VERT.	202	200	30.7
A-27	20-06.9N 137-00.9E	20-07.0N 137-01.0E	910704	03:59	04:09	NORPAC	XX13	VERT.	202	200	26.3
X-19	20-59.5N 136-59.2E	21-01.1N 136-58.4E	910704	09:28	10:28	IKPT	1.0	OBL.	1200	425	28054
A-28	21-59.9N 137-00.0E	21-59.7N 137-00.2E	910704	14:27	14:35	NORPAC	GG54	VERT.	151	150	24.5
A-28	21-59.9N 137-00.0E	21-59.7N 137-00.2E	910704	14:27	14:35	NORPAC	XX13	VERT.	151	150	20.3
A-28	21-59.7N 137-00.1E	21-59.7N 137-00.2E	910704	14:41	14:50	NORPAC	GG54	VERT.	203	200	30.5
A-28	21-59.7N 137-00.1E	21-59.7N 137-00.2E	910704	14:41	14:50	NORPAC	XX13	VERT.	203	200	25.1
A-28	21-59.7N 138-00.0E	22-00.1N 136-57.5E	910704	15:05	16:07	IKPT	1.0	OBL.	1200	337	35533
A-28	21-59.9N 137-58.8E	22-00.0N 136-58.2E	910704	15:28	15:48	ORI	1.0	SURF.			2656
B-41	23-00.8N 133-57.8E	23-01.6N 133-55.1E	910705	03:04	03:56	IKPT	1.0	OBL.	600	141	35312
B-41	23-00.9N 133-57.1E	23-01.1N 133-56.4E	910705	03:16	03:31	ORI	1.0	SURF.			2403
B-42	23-01.6N 130-59.5E	23-00.3N 130-57.7E	910713	19:02	19:57	IKPT	1.0	OBL.	600	159	29621
B-42	22-59.9N 130-12.1E	22-58.2N 130-13.5E	910713	01:37	02:29	IKPT	1.0	OBL.	600		30657
B-42	22-59.4N 130-12.5E	22-58.9N 130-12.9E	910713	01:51	02:06	ORI	1.0	SURF.			2342
A-29	22-00.5N 131-00.4E	21-58.6N 131-00.9E	910713	07:50	08:52	IKPT	1.0	OBL.	1200	450	28418

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
A-29	21-59.6N 131-00.6E	21-59.1N 131-00.7E	910713	08:13	08:33	ORI	1.0	SURF.			2456
A-29	22-00.3N 131-00.1E	22-00.4N 131-00.2E	910713	07:11	07:19	NORPAC	GG54	VERT.	150	150	24.3
A-29	22-00.3N 131-00.1E	22-00.4N 131-00.2E	910713	07:11	07:19	NORPAC	XX13	VERT.	150	150	20.4
A-29	22-00.4N 131-00.2E	22-00.4N 131-00.3E	910713	07:24	07:33	NORPAC	GG54	VERT.	200	200	31.8
A-29	22-00.4N 131-00.2E	22-00.4N 131-00.3E	910713	07:24	07:33	NORPAC	XX13	VERT.	200	200	26.6
A-30	19-59.8N 130-59.9E	19-59.5N 130-59.9E	910713	16:09	16:19	NORPAC	GG54	VERT.	154	150	28.0
A-30	19-59.8N 130-59.9E	19-59.5N 130-59.9E	910713	16:09	16:19	NORPAC	XX13	VERT.	154	150	22.5
A-30	19-59.5N 130-59.9E	19-59.2N 130-59.9E	910713	16:24	16:35	NORPAC	GG54	VERT.	200	200	34.6
A-30	19-59.5N 130-59.9E	19-59.2N 130-59.9E	910713	16:24	16:35	NORPAC	XX13	VERT.	200	200	28.3
A-30	19-58.8N 130-59.9E	19-54.8N 130-59.5E	910713	16:54	17:57	IKPT	1.0	OBL.	1200	314	39927
A-30	19-57.2N 130-59.8E	19-56.1N 130-59.6E	910713	17:16	17:36	ORI	1.0	SURF.			2561
B-43	19-21.2N 131-00.0E	19-17.7N 130-59.6E	910713	20:07	21:00	IKPT	1.0	OBL.	600	121	39390
B-43	19-20.4N 130-59.9E	19-19.5N 130-59.8E	910713	20:20	20:35	ORI	1.0	SURF.			2447
B-44	18-46.2N 131-00.1E	18-42.6N 131-00.2E	910713	22:59	23:58	IKPT	1.0	OBL.	600	139	38664
B-44	18-45.1N 131-00.2E	18-44.2N 131-00.2E	910713	23:17	23:32	ORI	1.0	SURF.			2384

Net Record - 24

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
C-25	18-26.5N 130-59.9E	18-23.7N 130-59.6E	910714	01:04	01:54	IKPT	0.5	STEP	240	61	27127
A-31	18-00.3N 131-00.2E	17-58.0N 131-00.4E	910714	03:33	04:35	IKPT	1.0	OBL.	1200	425	26913
A-31	17-59.3N 131-00.3E	17-58.7N 131-00.3E	910714	03:55	04:15	ORI	1.0	SURF.			2414
A-31	17-57.8N 131-00.4E	17-57.8N 131-00.4E	910714	04:54	05:02	NORPAC	GG54	VERT.	150	150	24.0
A-31	17-57.8N 131-00.4E	17-57.8N 131-00.4E	910714	04:54	05:02	NORPAC	XX13	VERT.	150	150	20.0
A-31	17-57.8N 131-00.4E	17-57.8N 131-00.4E	910714	05:08	05:18	NORPAC	GG54	VERT.	201	200	34.3
A-31	17-57.8N 131-00.4E	17-57.8N 131-00.4E	910714	05:08	05:18	NORPAC	XX13	VERT.	201	200	29.3
C'-26	17-29.7N 131-00.0E	17-28.3N 130-59.8E	910714	20:33	21:15	IKPT	1.0	STEP	400	97	26956
C'-27	17-20.5N 131-00.0E	17-19.1N 130-59.9E	910714	21:54	22:38	IKPT	1.0	OBL.	401	94	29897
C'-28	17-11.9N 130-59.9E	17-10.9N 130-59.6E	910714	23:15	23:50	IKPT	1.0	OBL.	344	96	21792
C'-29	17-03.5N 130-59.7E	17-02.0N 130-59.3E	910715	00:31	01:14	IKPT	1.0	OBL.	455	104	28980
B-45	16-59.9N 130-59.5E	16-58.2N 130-59.3E	910715	01:34	02:26	IKPT	1.0	OBL.	600	159	37071
B-45	16-59.4N 130-59.5E	16-58.9N 130-59.4E	910715	01:46	02:01	ORI	1.0	SURF.			2559
C'-30	16-52.1N 131-00.1E	16-50.7N 131-00.3E	910715	03:01	03:44	IKPT	1.0	OBL.	437	122	25951
C'-31	16-45.2N 131-00.3E	16-43.5N 131-00.2E	910715	04:15	05:00	IKPT	1.0	OBL.	452	117	34701

Net Record - 25

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
C'-32	16-43.2N 131-00.2E	16-41.6N 130-59.9E	910715	05:10	05:51	IKPT	1.0	OBL.	406	103	25478
A-32	15-59.9N 131-00.1E	15-59.8N 131-00.2E	910715	08:42	08:50	NORPAC	GG54	VERT.	155	150	24.3
A-32	15-59.9N 131-00.1E	15-59.8N 131-00.2E	910715	08:42	08:50	NORPAC	XX13	VERT.	155	150	21.9
A-32	15-59.8N 131-00.2E	15-59.7N 131-00.2E	910715	08:54	09:05	NORPAC	GG54	VERT.	202	200	31.3
A-32	15-59.8N 131-00.2E	15-59.7N 131-00.2E	910715	08:54	09:05	NORPAC	XX13	VERT.	202	200	27.9
A-32	15-59.2N 131-00.3E	15-56.5N 131-00.7E	910715	09:28	10:30	IKPT	1.0	OBL.	1200	314	43059
A-32	15-58.0N 131-00.5E	15-57.3N 131-00.6E	910715	09:51	10:11	ORI	1.0	SURF.			1618
C'-33	15-28.8N 130-59.6E	15-27.7N 130-59.5E	910715	18:31	18:57	IKPT	1.0	OBL.	260	65	15900
C'-34	15-20.7N 130-59.8E	15-18.9N 130-59.7E	910715	19:30	20:06	IKPT	1.0	OBL.	340	85	29280
B-46	15-02.5N 131-00.0E	14-59.9N 130-59.8E	910715	21:11	22:03	IKPT	1.0	OBL.	600	144	32218
B-46	15-01.7N 131-00.0E	15-01.1N 130-59.9E	910715	21:24	21:39	ORI	1.0	SURF.			2365
C'-35	14-51.9N 131-00.0E	14-50.3N 131-00.0E	910715	22:40	23:17	IKPT	1.0	OBL.	366	81	30187
C'-36	14-45.5N 131-00.0E	14-43.3N 131-00.0E	910715	23:46	00:37	IKPT	1.0	STEP	268	82	27747
C'-37	14-42.8N 131-00.0E	14-42.2N 130-59.9E	910716	00:51	01:28	IKPT	1.0	STEP	327	79	29117
C'-38	14-50.4N 131-00.1E	14-51.6N 131-59.3E	910716	02:49	03:28	IKPT	1.0	STEP	356	86	26897

Net Record - 26

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
C'-39	14-51.6N 130-59.4E	14-51.5N 131-000.8E	910716	03:36	04:16	IKPT	1.0	STEP	264	67	19872
C'-40	14-51.3N 131-00.8E	14-49.9N 130-59.9E	910716	04:26	05:03	IKPT	1.0	STEP	318	68	18453
C'-40	14-49.6N 130-59.8E	14-49.5N 130-59.8E	910716	05:17	05:28	NORPAC	GG54	VERT.	201	200	32.2
C'-40	14-49.6N 130-59.8E	14-49.5N 130-59.8E	910716	05:17	05:28	NORPAC	XX13	VERT.	201	200	27.7
C'-41	14-49.4N 130-59.8E	14-50.4N 130-59.7E	910716	05:40	06:26	IKPT	1.0	STEP	296	86	22099
C'-41	14-51.6N 131-00.0E	14-51.6N 130-59.9E	910716	06:55	07:06	NORPAC	GG54	VERT.	205	200	31.6
C'-41	14-51.6N 131-00.0E	14-51.6N 130-59.9E	910716	06:55	07:06	NORPAC	XX13	VERT.	205	200	26.7
A-33	13-59.9N 131-00.0E	14-00.0N 131-00.0E	910716	10:37	10:49	NORPAC	GG54	VERT.	193	150	38.3
A-33	13-59.9N 131-00.0E	14-00.0N 131-00.0E	910716	10:37	10:49	NORPAC	XX13	VERT.	193	150	33.3
A-33	14-00.0N 131-00.0E	14-00.0N 131-00.0E	910716	10:51	11:03	NORPAC	GG54	VERT.	234	200	43.6
A-33	14-00.0N 131-00.0E	14-00.0N 131-00.0E	910716	10:51	11:03	NORPAC	XX13	VERT.	234	200	37.8
A-33	13-59.8N 131-00.0E	13-57.6N 130-59.6E	910716	11:19	12:29	IKPT	1.0	OBL.	1200	360	33670
A-33	13-58.7N 130-59.9E	13-58.2N 130-59.9E	910716	11:42	12:02	ORI	1.0	SURF.			2003
B-47	13-01.6N 130-59.5E	13-00.3N 130-57.7E	910716	19:02	19:57	IKPT	1.0	OBL.	600	198	29621
B-47	13-01.4N 130-58.8E	13-00.9N 130-58.5E	910716	19:17	19:32	ORI	1.0	SURF.			2319

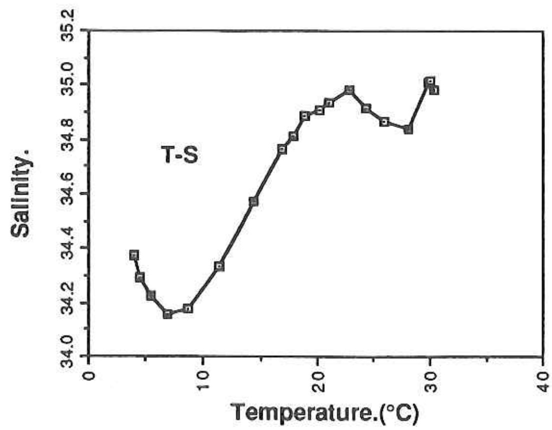
Net Record - 27

St.	Location Net in	Location Net out	Date	Time Net in	Time Net out	Net Type	Mesh size (mm)	Towing method	Wire out (m)	Sampling layer (m)	Water vol. filtered (m^3)
A-34	11-59.6N 131-00.0E	11-59.5N 131-00.1E	910717	00:18	00:33	NORPAC	GG54	VERT.	185	150	49.8
A-34	11-59.6N 131-00.0E	11-59.5N 131-00.1E	910717	00:18	00:33	NORPAC	XX13	VERT.	185	150	44.0
A-34	11-59.5N 131-00.1E	11-59.5N 131-00.1E	910717	00:39	00:56	NORPAC	GG54	VERT.	221	200	65.4
A-34	11-59.5N 131-00.1E	11-59.5N 131-00.1E	910717	00:39	00:56	NORPAC	XX13	VERT.	221	200	56.7
A-34	11-59.4N 130-59.7E	11-59.9N 130-56.4E	910717	01:09	02:29	IKPT	1.0	OBL.	1200	327	24703
A-34	11-58.8N 130-58.2E	11-58.9N 130-57.3E	910717	01:36	01:56	ORI	1.0	SURF.			3299
C'-42	14-00.2N 133-59.8E	14-01.6N 133-59.7E	910717	18:48	19:21	IKPT	1.0	OBL.	314	69	23079
C'-43	14-20.1N 133-59.9E	14-21.8N 133-59.5E	910717	20:37	21:13	IKPT	1.0	OBL.	367	84	23766
C'-44	14-40.1N 133-59.9E	14-42.4N 133-59.2E	910717	22:28	23:10	IKPT	1.0	OBL.	446	91	22877
C'-45	15-00.2N 133-59.8E	15-02.9N 133-59.0E	910718	00:29	01:15	IKPT	1.0	OBL.	491	96	30731
C'-46	15-20.2N 134-00.2E	15-19.5N 134-01.0E	910718	02:32	03:10	IKPT	1.0	OBL.	450	138	18410
C'-47	15-19.4N 134-01.0E	15-18.2N 134-02.1E	910718	03:32	04:15	IKPT	1.0	HOR.	382	100	39325
C'-48	15-18.2N 134-02.0E	15-19.8N 134-00.8E	910718	04:24	05:01	IKPT	1.0	STEP	219	55	22099
C'-49	15-40.2N 133-59.9E	15-41.5N 133-59.8E	910718	19:03	19:31	IKPT	1.0	OBL.	316	71	34375
C'-50	15-59.7N 134-00.0E	16-01.4N 134-00.1E	910718	20:53	21:34	IKPT	1.0	OBL.	447	107	27161

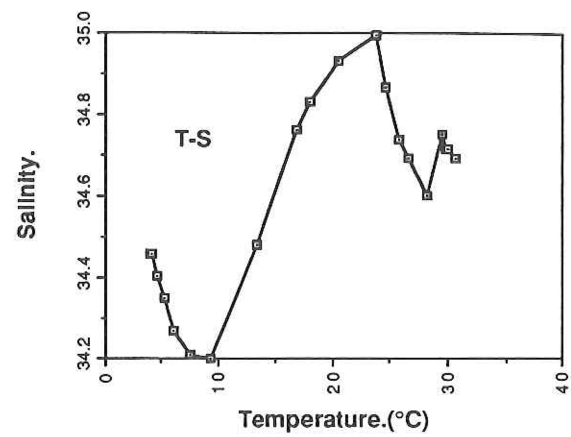
Net Record - 28

St.	Location		Date	Time		Net	Mesh	Towing	Wire	Sampling	Water vol.
	Net in	Net out		Net in	Net out	Type	size (mm)	method	out (m)	layer (m)	filtered (m^3)
C'-51	16-02.6N 134-00.1E	16-04.1N 134-00.1E	910718	21:51	22:26	IKPT	1.0	STEP	303	80	17457
C'-52	16-19.6N 134-00.0E	16-21.3N 134-00.4E	910718	23:29	00:08	IKPT	1.0	OBL.	384	91	30715
C'-53	16-21.7N 134-00.7E	16-22.9N 134-00.8E	910719	00:27	01:00	IKPT	1.0	STEP	317	87	17928
C'-54	16-40.0N 133-59.9E	16-41.1N 133-59.8E	910719	02:15	02:54	IKPT	1.0	OBL.	448	117	19436
C'-55	17-00.0N 134-00.0E	17-01.5N 133-59.8E	910719	04:17	05:00	IKPT	1.0	OBL.	542	125	20808
C'-56	21-41.3N 134-00.0E	21-16.0N 134-00.1E	910719	20:04	20:39	IKPT	1.0	OBL.	594	141	24268

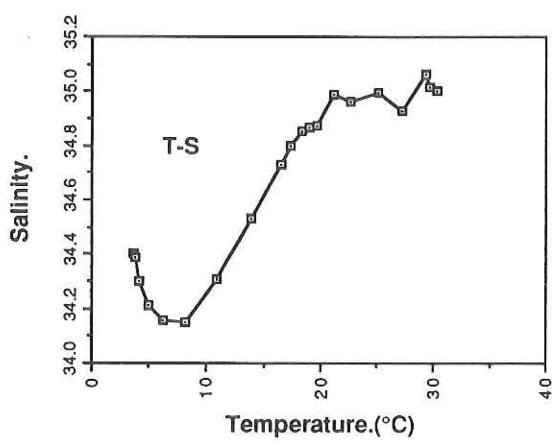
VIII. T-S diagram



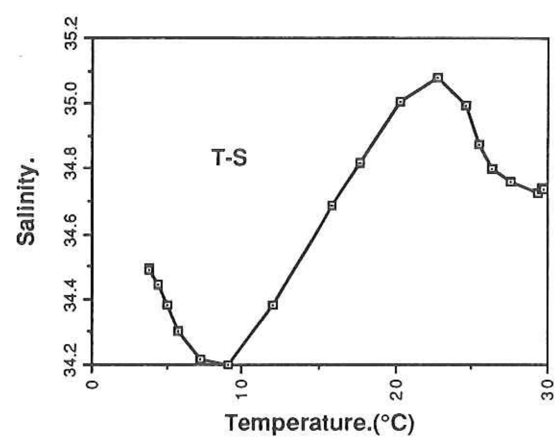
St.A-28.(22°N)



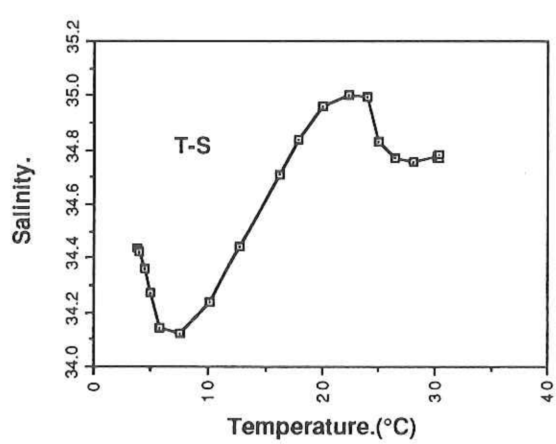
St.X-18.(19°N)



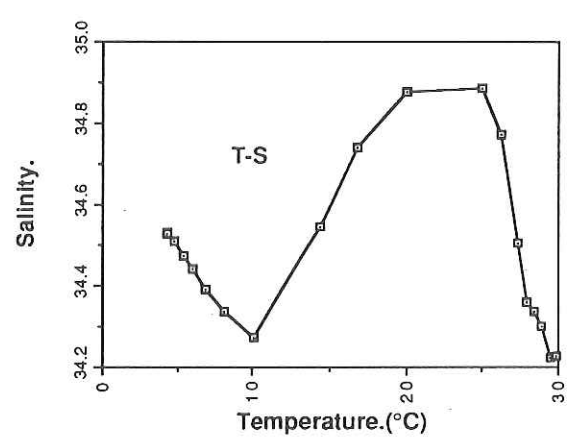
St.X-19.(21°N)



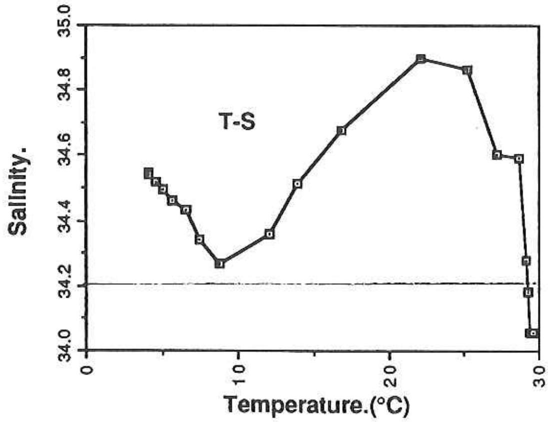
St.A-26.(17°46'N)



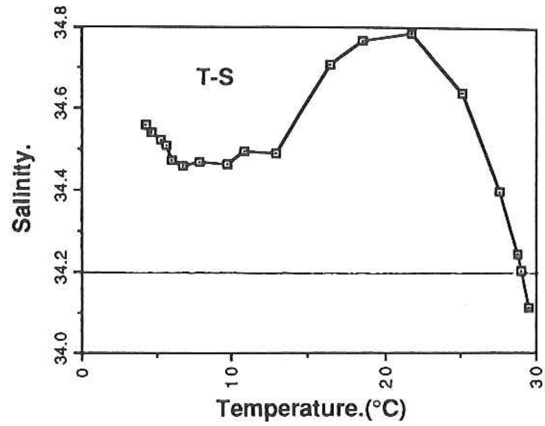
St.A-27.(20°N)



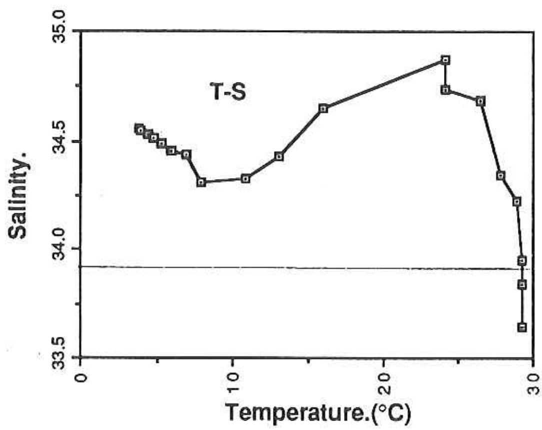
St.A-25.(15°46'N)



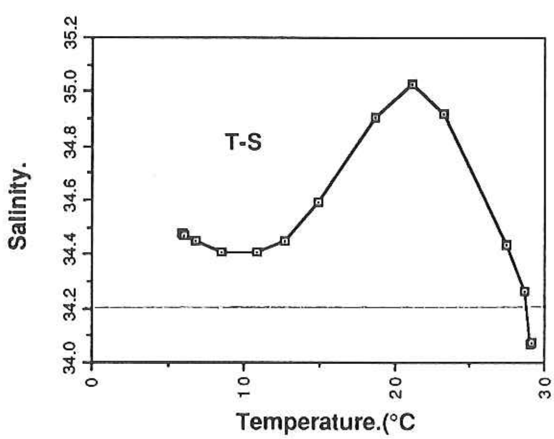
St.C-5.(14°47')



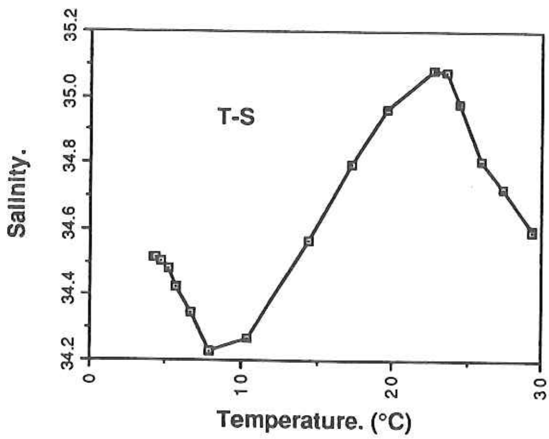
St.A-22.(10°N)



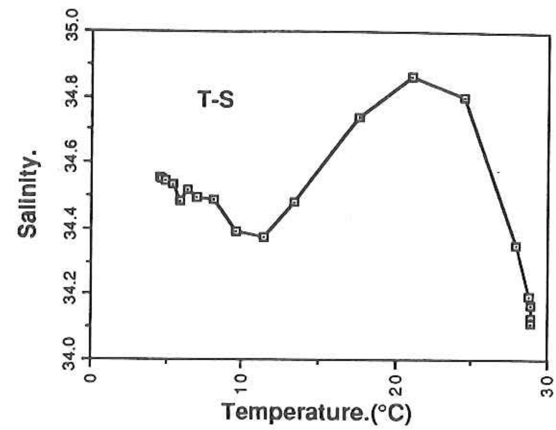
St.X-16.(13°N)



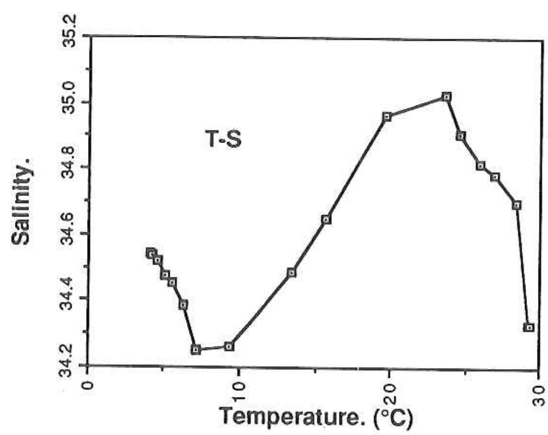
St.A-23.(12°C)



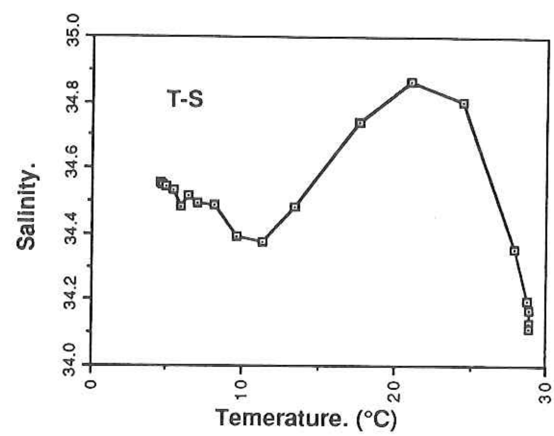
St. A-18. (16°N)



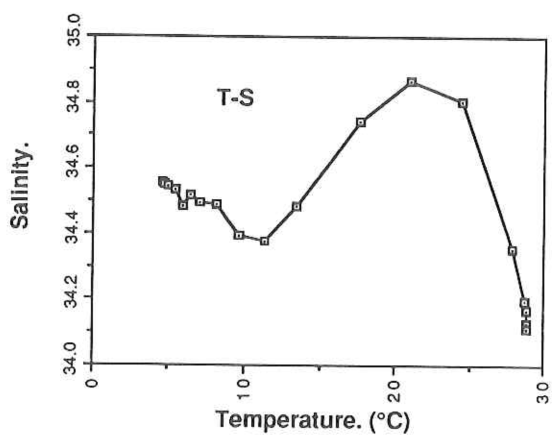
St. B-27. (13°N)



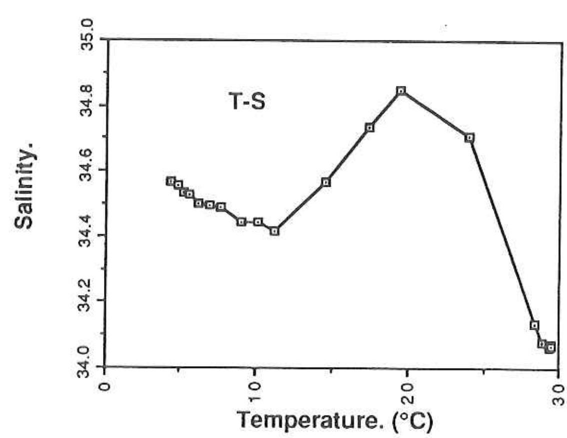
St. G1N. (15°N)



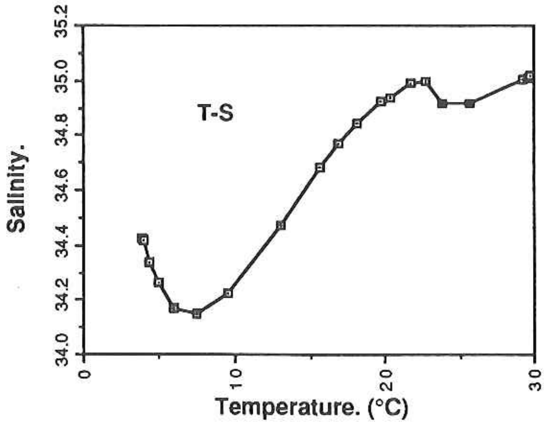
St. A-20.(12°N)



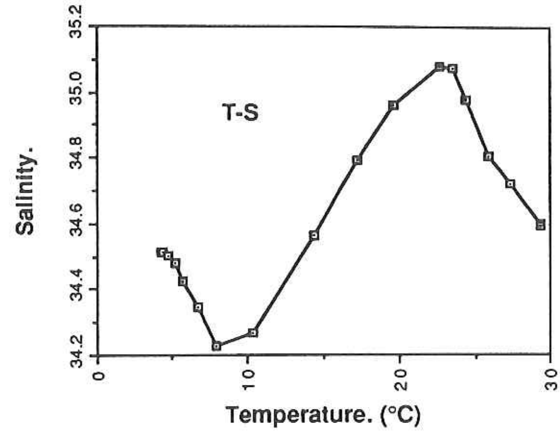
St. A-19.(14°N)



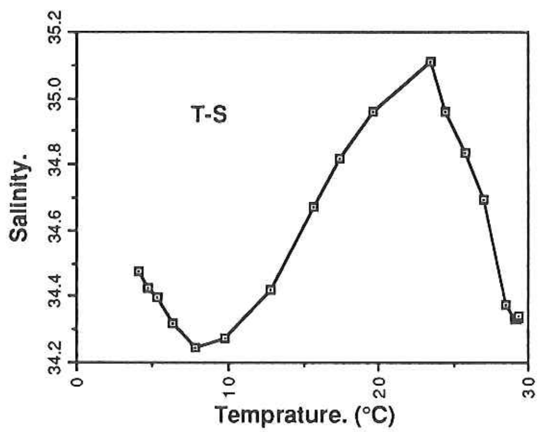
St. A-21. (10°N)



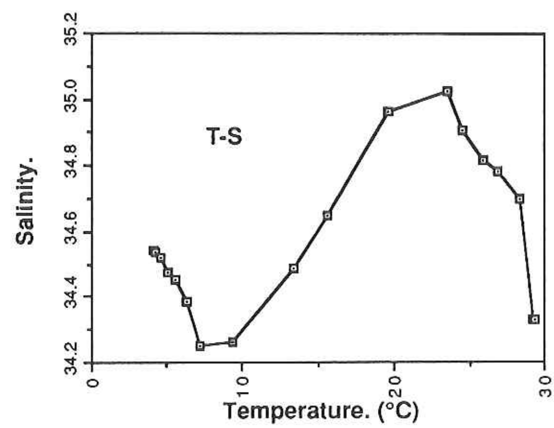
St.A-15. (22°N)



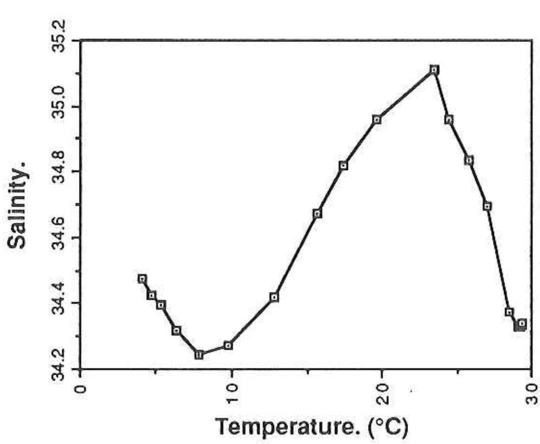
St. A-18. (16°N)



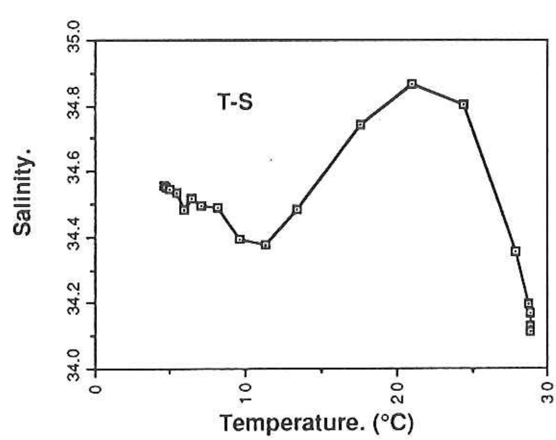
St. A-16. (20°N)



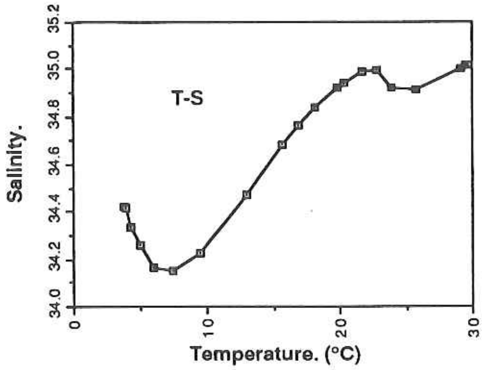
St. G1N. (15°N)



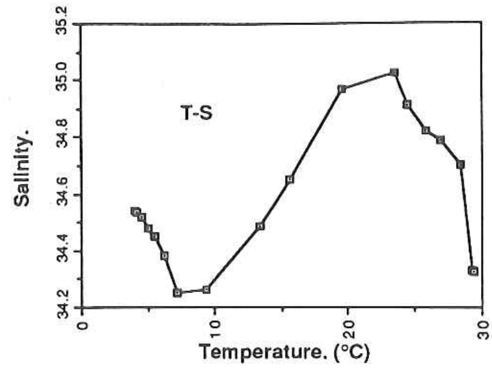
St. A-17. (18°C)



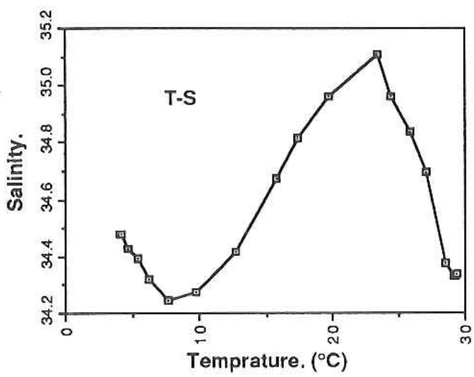
St. A-19.(14°N)



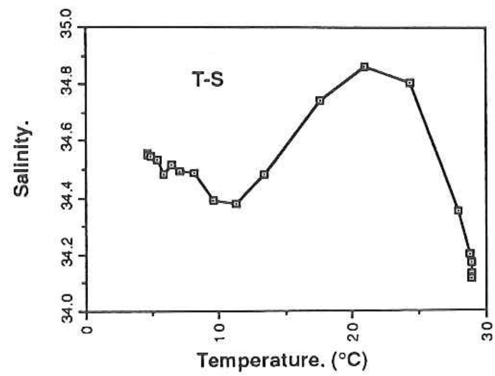
St.A-15. (22°N)



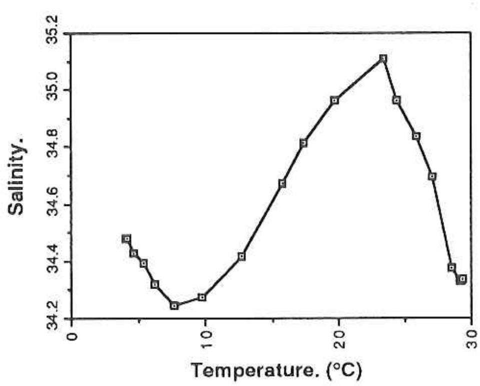
St. G1N. (15°N)



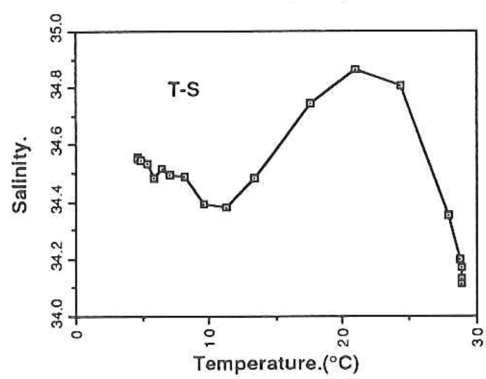
St. A-16. (20°N)



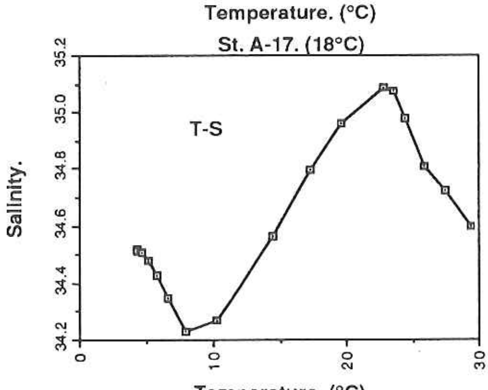
St. A-19.(14°N)



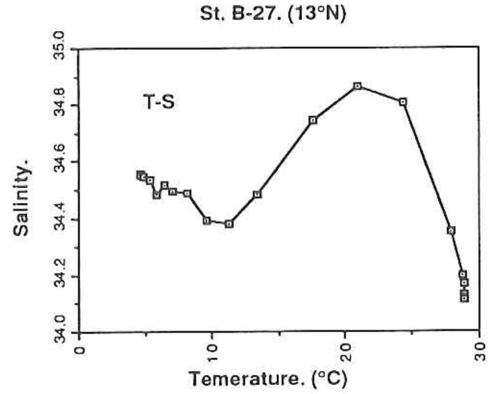
St. A-17. (18°C)



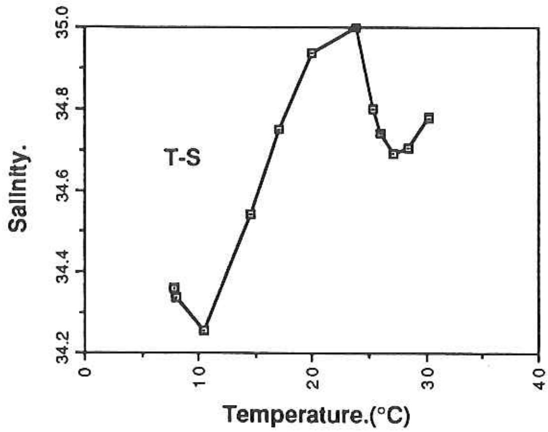
St. B-27. (13°N)



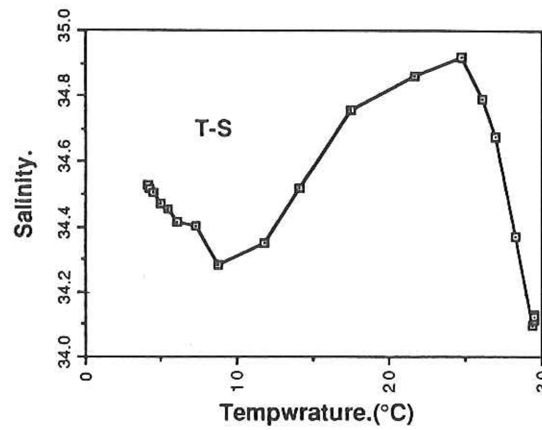
St. A-18. (16°N)



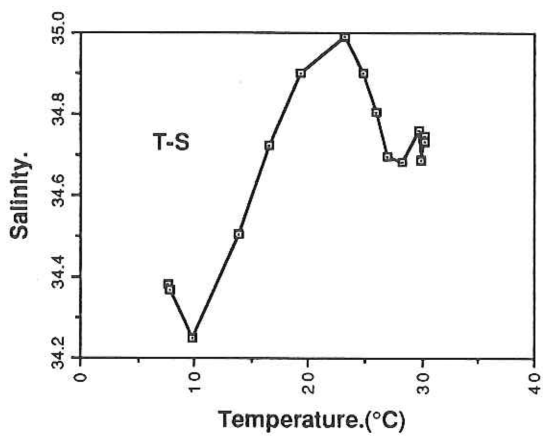
St. A-20.(12°N)



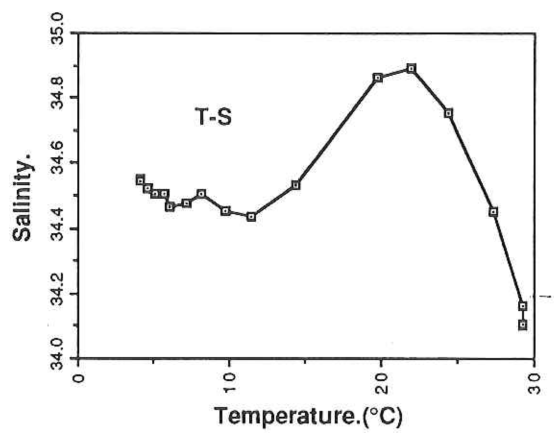
St.C-41.(14°51.6'N)



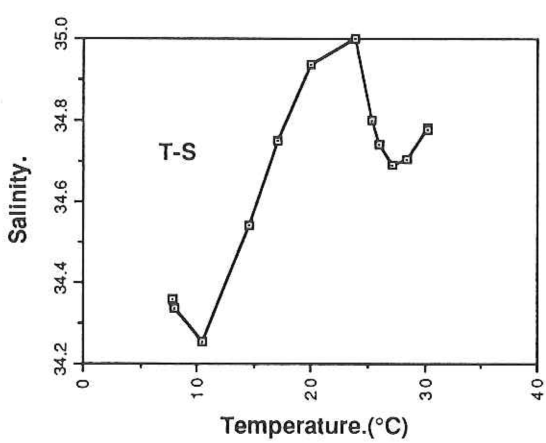
St.X-24.(13°00.0'N)



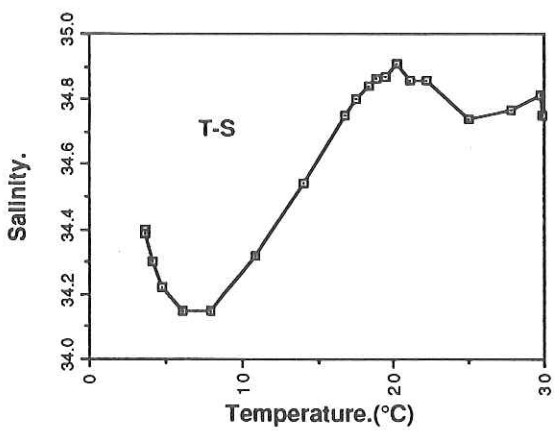
St.C-40.(14°49.6'N)



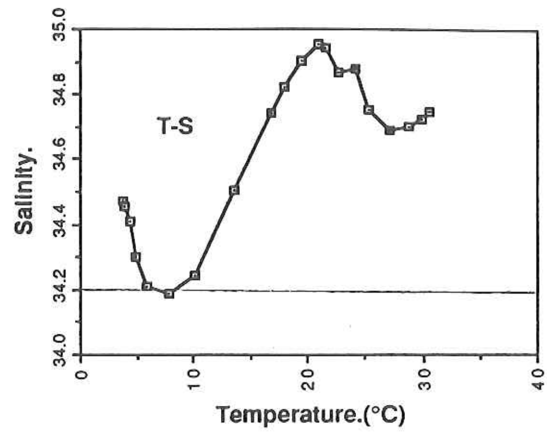
St.A-34.(12°00.0'N)



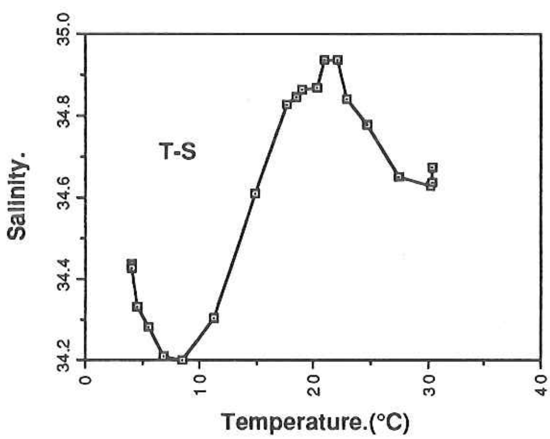
St.A-33.(14°00.2'N)



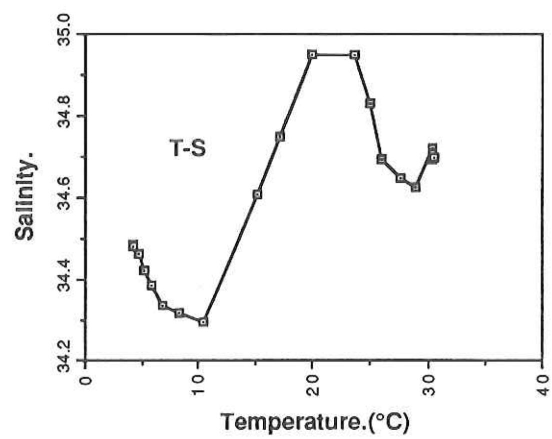
St.A-29.(22°N)



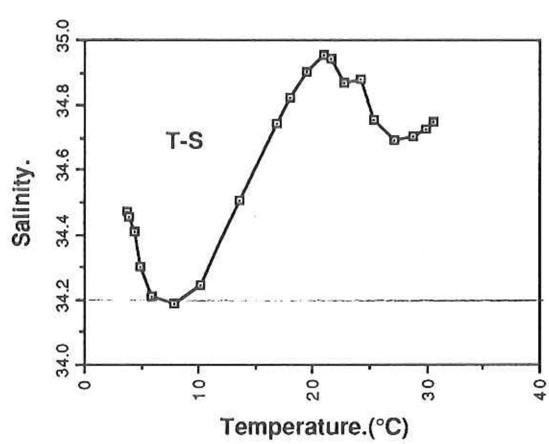
St.A-31.(18°N)



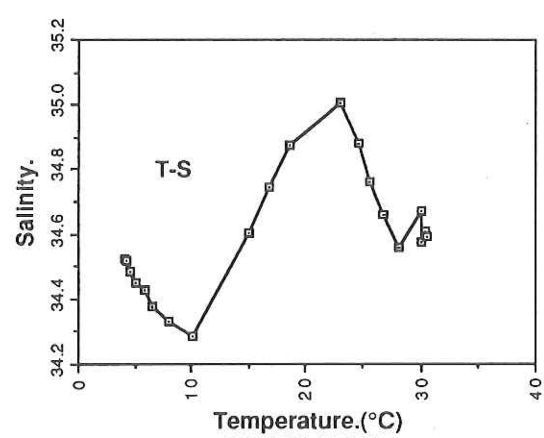
St.A-30.(20°N)



St.A-32.(16°N)



St.X-21.(19°N)



St.X-23.(15°N)

IX. CTDO data

Station	A-1		Depth	5505m	
Date	1991	JUN.17	Lat.	22° 00.0N	
Time	18:44		Long.	155° 00.0E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.309	34.977	4.41	21.946	0.00000
10	28.884	34.940	4.39	22.060	0.05828
20	28.591	34.952	4.39	22.166	0.11521
30	28.401	34.932	4.34	22.214	0.17166
50	27.074	35.038	4.73	22.725	0.27854
75	25.447	34.981	4.77	23.193	0.39965
100	24.556	35.045	4.67	23.511	0.51396
125	23.732	35.206	4.80	23.878	0.62048
150	21.867	35.105	4.33	24.337	0.71781
200	19.392	34.966	4.40	24.896	0.88645
250	17.311	34.780	-	25.272	1.03299
300	15.746	34.658	-	25.543	1.16512
400	12.743	34.399	-	25.979	1.39923
500	10.020	34.192	-	26.318	1.59614
600	7.888	34.121	-	26.600	1.76301
700	5.910	34.117	-	26.867	1.90314
800	4.947	34.226	-	27.068	2.02263
900	4.414	34.343	-	27.220	2.12271
1000	4.045	34.427	-	27.326	2.21091
1021	4.007	34.432	-	27.334	2.22252

Station	A-2		Depth	5680m	
Date	1991	JUN.18	Lat.	20° 00.0'N	
Time	6:43		Long.	155° 00.0'N	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	28.598	34.430	3.67	21.772	0.00000
10	28.603	34.977	4.12	22.181	0.05720
20	28.500	34.982	4.23	22.219	0.11347
30	28.402	35.023	4.22	22.283	0.16933
50	26.327	35.084	4.69	22.997	0.27574
75	24.584	35.055	4.52	23.511	0.39131
100	23.339	35.152	4.73	23.952	0.49497
125	22.375	35.151	4.81	24.228	0.59152
150	21.362	35.091	4.79	24.466	0.68245
200	19.306	34.933	4.41	24.893	0.84707
250	17.044	34.756	4.69	25.318	0.99210
300	15.748	34.656	4.63	25.541	1.12334
400	12.563	34.396	4.65	26.012	1.35556
500	9.306	34.158	-	26.410	1.54347
600	6.547	34.136	-	26.800	1.69503
700	5.935	34.222	-	26.946	1.82169
800	5.323	34.307	-	27.088	1.93493
900	4.709	34.392	-	27.226	2.03495
1000	4.096	34.476	-	27.359	2.12193
1015	4.018	34.485	-	27.375	2.13423

Station	A-3		Depth	5630	
Date	1991	JUN.18	Lat.	18° 00.1'N	
Time	16:24		Long.	155° 00.1'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	28.994	34.887	3.74	21.984	0.00000
10	28.905	34.883	4.09	22.011	0.05833
20	28.468	34.870	4.20	22.146	0.11523
30	28.368	34.880	4.26	22.186	0.17194
50	26.881	34.892	4.51	22.677	0.27927
75	25.996	34.936	4.56	22.988	0.40461
100	25.075	35.016	4.52	23.333	0.52300
125	23.738	35.118	4.51	23.810	0.63152
150	22.507	35.151	4.71	24.191	0.73064
200	20.170	35.034	4.46	24.744	0.90549
250	17.583	34.814	4.65	25.233	1.05632
300	15.725	34.665	4.74	25.553	1.18941
400	11.480	34.297	4.60	26.141	1.41369
500	8.683	34.154	-	26.506	1.59007
600	6.807	34.162	-	26.785	1.73940
700	5.613	34.310	1.45	27.005	1.86253
800	5.218	34.435	1.52	27.202	1.86253
900	4.474	34.486	1.64	27.297	1.96392
1000	4.234	34.509	1.77	27.371	2.13725
1008	4.216	34.512	1.76	27.376	2.14394

ST.A-4-6

Station	A-4		Depth		
Date	1991	19-Jun	Lat.	16° 00.0'N	
Time	4:45		Long.	155° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	28.257	34.398	3.96	21.860	0.00000
10	28.268	34.418	4.05	21.872	0.05347
20	28.259	34.429	4.15	21.883	0.11283
30	28.260	34.438	4.15	21.889	0.17213
50	28.023	34.469	4.06	21.990	0.29000
75	27.536	34.498	4.23	22.169	0.44016
100	27.005	34.731	4.41	22.516	0.57856
125	26.345	34.863	4.23	22.824	0.70969
150	24.211	35.013	4.24	23.590	0.82905
200	21.458	34.921	3.99	24.309	1.03228
250	18.068	34.756	-	25.070	1.19391
300	14.038	34.467	-	25.768	1.32416
400	9.083	34.185	-	26.467	1.51886
500	7.422	34.341	-	26.841	1.66261
600	6.472	34.482	-	27.040	1.78225
700	5.825	34.465	-	27.152	1.88740
800	5.284	34.492	-	27.239	1.98364
900	4.797	34.509	-	27.310	2.07207
1000	4.343	34.528	-	27.374	2.15491
1015	4.299	34.528	-	27.379	2.16710

Station	A-5		Depth	6020	
Date	1991	19-Jun	Lat.	14° 00.0'N	
Time	13:04		Long.	155° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	30.268	34.327	3.82	21.113	0.00000
10	28.589	34.291	4.38	21.671	0.05743
20	28.520	34.264	4.26	21.673	0.11878
30	28.478	34.335	4.20	21.741	0.17964
50	28.414	34.365	4.26	21.784	0.30079
75	27.661	34.485	4.13	22.120	0.45014
100	26.845	34.706	4.34	22.548	0.58877
125	26.197	34.914	4.36	22.909	0.72278
150	25.314	34.934	4.39	23.197	0.84459
200	18.624	34.813	3.90	24.974	1.03960
250	14.367	34.487	-	25.714	1.17367
300	11.626	34.324	-	26.135	1.28024
400	8.698	34.237	-	26.569	1.45409
500	7.283	34.359	-	26.874	1.59168
600	6.324	34.430	-	27.061	1.70743
700	5.780	34.473	-	27.164	1.81093
800	5.274	34.494	-	27.242	1.90643
900	4.720	34.515	-	27.323	1.99463
1000	4.391	34.526	-	27.368	2.07661
1015	4.291	34.531	-	27.382	2.08885

Station	A-6		Depth	5860	
Date	1991	20-Jun	Lat.	12° 00.0'N	
Time	0:20		Long.	155 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	28.918	34.091	3.78	21.411	0.00000
10	28.611	34.107	4.23	21.525	0.05718
20	28.493	34.179	4.27	21.618	0.11957
30	28.504	34.236	4.16	21.657	0.18128
50	28.438	34.248	4.25	21.688	0.30403
75	28.306	34.326	4.15	21.790	0.45646
100	26.889	34.677	4.01	22.512	0.60082
125	25.175	34.973	4.08	23.269	0.73140
150	22.834	35.012	4.09	23.992	0.84011
200	18.077	34.838	3.83	25.130	1.00731
250	13.698	34.503	-	25.867	1.13255
300	11.155	34.421	-	26.297	1.23094
400	8.768	34.482	-	26.750	1.38666
500	7.263	34.452	-	26.951	1.51268
600	6.534	34.479	-	27.072	1.62524
700	5.939	34.485	-	27.154	1.72935
800	5.393	34.502	-	27.234	1.82551
900	4.881	34.510	-	27.300	1.91544
1000	4.414	34.527	-	27.366	1.99890
1015	4.347	34.528	-	27.374	2.01138

Station	A-7		Depth	5488	
Date	1991	JUN.20	Lat.	10° 00.0'N	
Time	9:17		Long.	155° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.00	33.856	4.07	21.210	0.00000
10	29.09	33.875	4.13	21.191	0.05912
20	28.80	33.881	4.21	21.292	0.12463
30	28.68	33.920	4.27	21.361	0.18928
50	28.61	33.980	4.21	21.429	0.31755
75	27.91	34.286	4.32	21.889	0.47354
100	24.49	34.763	4.44	23.319	0.61281
125	19.76	34.781	4.01	24.659	0.71639
150	16.45	34.670	3.97	25.392	0.78961
200	12.19	34.374	3.71	26.067	0.90446
250	10.54	34.449	1.91	26.430	0.99493
300	9.13	34.989	-	27.088	1.07214
400	8.41	34.545	1.36	26.855	1.20695
500	7.68	34.532	1.48	26.953	1.32954
600	7.11	34.529	1.54	27.033	1.44323
700	6.34	34.504	1.63	27.118	1.55180
800	5.82	34.514	1.66	27.191	1.65257
900	5.27	34.518	1.75	27.261	1.74709
1000	4.80	34.527	1.80	27.323	1.83544
1006	4.77	34.526	1.78	27.325	1.84120

Station	A-8		Depth	5470	
Date	1991	JUN.21	Lat.	10° 00.0'N	
Time			Long.	149° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	28.98	33.900	3.71	21.248	0.00000
10	28.92	34.049	4.08	21.381	0.05804
20	28.78	34.056	4.12	21.430	0.12195
30	28.76	34.059	4.14	21.441	0.18558
50	28.71	34.051	4.07	21.452	0.31273
75	25.66	34.566	4.28	22.813	0.46229
100	22.30	34.788	4.14	23.975	0.57657
125	18.62	34.854	3.83	25.006	0.66618
150	16.35	34.690	4.24	25.431	0.73532
200	12.21	34.411	-	26.093	0.84636
250	10.41	34.435	-	26.441	0.93377
300	10.02	34.451	-	26.520	1.01370
400	9.24	34.478	-	26.671	1.16529
500	8.46	34.501	-	26.813	1.30420
600	7.68	34.521	-	26.945	1.42984
700	6.91	34.536	-	27.067	1.54536
800	6.13	34.546	-	27.178	1.65010
900	5.35	34.551	-	27.279	1.74472
1000	4.56	34.550	-	27.368	1.82995
1015	4.48	34.550	-	27.378	1.84178

Station	A-9		Depth		
Date	1991	JUN.21	Lat.	12° 00.0'N	
Time			Long.	149° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	28.886	33.930	3.69	21.301	0.00000
10	28.851	33.950	4.10	21.328	0.05825
20	28.663	33.956	4.19	21.394	0.12245
30	28.643	33.959	4.16	21.340	0.18642
50	28.631	33.963	4.06	21.411	0.31431
75	28.729	34.057	4.08	21.449	0.47395
100	27.815	34.291	4.33	21.924	0.63023
125	24.807	34.654	4.09	23.140	0.76528
150	21.273	34.891	4.04	24.338	0.87288
200	16.562	34.695	3.51	25.384	1.02697
250	13.308	34.481	-	25.929	1.14586
300	10.991	34.344	-	26.267	1.24371
400	8.591	34.426	-	26.733	1.40424
500	7.339	34.468	-	26.953	1.53080
600	6.475	34.499	-	27.095	1.64164
700	5.856	34.517	-	27.189	1.74234
800	5.253	34.523	-	27.268	1.83537
900	4.755	34.533	-	27.334	1.92165
1000	4.392	34.548	-	27.385	2.00266
1015	4.317	34.551	-	27.396	2.01431

Station	A-10		Depth	5860	
Date	1991	JUN.22	Lat.	14° 00.0'N	
Time	6:50		Long.	149° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	28.457	34.311	4.55	21.729	0.00000
10	28.436	34.318	4.75	21.741	0.05460
20	28.405	34.320	4.57	21.753	0.11521
30	28.259	34.310	4.50	21.793	0.17558
50	28.244	34.314	4.43	21.801	0.29597
75	27.435	34.720	4.53	22.369	0.44119
100	26.862	34.875	4.34	22.670	0.57937
125	26.220	34.909	4.36	22.898	0.70730
150	24.554	35.081	4.21	23.540	0.82580
200	20.169	35.040	4.15	24.749	1.01701
250	15.957	34.689	-	25.519	1.15698
300	12.829	34.412	-	25.972	1.27328
400	10.060	34.354	-	26.438	1.46016
500	7.952	34.400	-	26.810	1.60747
600	6.863	34.448	-	27.003	1.72951
700	5.995	34.485	-	27.147	1.83663
800	5.293	34.509	-	27.252	1.93238
900	4.832	34.523	-	27.316	2.02014
1000	4.395	34.538	-	27.377	2.10251
1015	4.341	34.539	-	27.384	2.11429

Station	A-11		Depth	5972	
Date	1991	JUN.22	Lat.	16° 00.0'N	
Time	15:40		Long.	149° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	28.835	34.526	3.50	21.765	0.00000
10	28.219	34.492	4.19	21.944	0.05371
20	28.154	34.530	4.23	21.993	0.11217
30	28.139	34.715	4.30	22.137	0.16984
50	27.148	34.852	4.44	22.561	0.28485
75	26.19	34.889	4.50	22.893	0.41349
100	25.304	34.956	4.34	23.217	0.53470
125	24.398	35.084	4.20	23.588	0.64732
150	23.347	35.140	4.01	23.941	0.75292
200	29.205	34.950	3.98	24.932	0.93212
250	16.847	34.755	-	25.363	1.07578
300	13.385	34.458	-	25.896	1.19694
400	10.456	34.389	-	26.397	1.38803
500	7.302	34.260	-	26.794	1.53989
600	6.483	34.349	-	26.976	1.66603
700	5.673	34.435	-	27.147	1.77389
800	5.274	34.483	-	27.233	1.87002
900	4.707	34.513	-	27.323	1.95837
1000	4.321	34.532	-	27.38	2.04026
1014	4.251	34.536	-	27.391	2.05176

Station	A-12		Depth		
Date	1991	JUN.23	Lat.	18 00.0'N	
Time	3:25		Long.	149 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.030	34.275	3.51	21.512	0.00000
10	28.948	34.297	4.01	21.556	0.05647
20	28.497	34.301	4.10	21.708	0.11781
30	28.489	34.323	4.05	21.727	0.17876
50	28.630	34.846	4.09	22.074	0.29840
75	26.437	34.889	4.41	22.815	0.44048
100	25.402	34.951	4.43	23.183	0.56242
125	24.638	35.043	4.27	23.486	0.67743
150	23.626	35.122	3.99	23.845	0.78405
200	20.487	35.057	3.92	24.677	0.96880
250	18.057	34.821	3.78	25.122	1.12744
300	15.461	34.639	-	25.592	1.26007
400	12.217	34.373	-	26.061	1.48795
500	8.947	34.171	-	26.478	1.67327
600	6.361	34.147	-	26.833	1.81952
700	5.217	34.245	-	27.052	1.93745
800	4.859	34.395	-	27.212	2.03873
900	4.373	34.470	-	27.326	2.12694
1000	3.999	34.506	-	27.393	2.20680
1015	3.931	34.512	-	27.405	2.21811

Station	A-13		Depth	2794	
Date	1991	JUN.23	Lat.	20° 00.0'N	
Time	11:05		Long.	149° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.604	34.964	4.20	21.836	0.00000
10	29.359	34.997	4.31	21.944	0.05915
20	28.783	34.987	4.29	22.129	0.11671
30	28.658	34.993	4.14	22.175	0.17347
50	27.806	34.971	4.31	22.438	0.28563
75	25.272	35.035	4.71	23.286	0.40897
100	23.947	35.085	4.52	23.723	0.51840
125	22.269	35.122	4.65	24.237	0.61653
150	20.957	35.070	4.48	24.560	0.70589
200	17.586	34.817	4.56	25.234	0.85900
250	16.377	34.732	4.60	25.455	0.99419
300	15.079	34.621	4.59	25.663	1.11991
400	11.947	34.354	-	26.098	1.34428
500	9.004	34.165	-	26.464	1.52794
600	7.665	34.172	-	26.673	1.68248
700	5.347	34.218	-	27.015	-
800	4.941	34.317	-	27.141	-
900	4.416	34.390	-	27.257	-
1000	3.998	34.466	-	27.362	-
1015	3.840	34.465	-	37.362	2.14845

Station	A-14		Depth	5570	
Date	1991	JUN.23	Lat.	22° 00.0'N	
Time	21:19		Long.	149° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.493	35.053	3.56	21.941	0.00000
10	29.168	35.067	4.28	22.061	0.05830
20	28.860	35.063	4.15	22.160	0.11533
30	26.993	35.025	4.54	22.741	0.16972
50	24.134	35.104	5.02	23.682	0.26350
75	22.366	35.040	5.20	24.146	0.36550
100	20.507	34.985	5.12	24.617	0.45525
125	19.779	34.982	4.95	24.807	0.53657
150	18.827	34.903	4.94	24.992	0.61389
200	17.924	34.830	-	25.161	0.76057
250	17.311	34.795	-	25.283	0.90072
300	16.546	34.743	-	25.424	1.03816
400	14.120	34.552	-	25.817	1.28576
500	10.985	34.281	-	26.219	-
600	7.914	34.097	-	26.578	-
700	5.960	34.099	-	26.768	-
800	4.893	34.191	-	27.047	-
900	4.319	34.305	-	27.200	-
1000	3.837	34.388	-	27.316	-
1011	3.814	34.396	-	27.325	2.16500

Station	A-15		Depth	3877	
Date	1991	JUN.24	Lat.	22° 00.0'N	
Time			Long.	143° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.764	35.018	0.00	21.823	0.00000
10	29.570	35.013	4.71	21.885	0.05981
20	29.204	35.003	4.53	22.000	0.11886
30	25.701	34.915	5.19	23.064	0.17145
50	23.855	34.919	5.10	23.625	0.26269
75	22.768	34.996	4.84	23.999	0.36379
100	21.679	34.989	4.94	24.300	0.45796
125	20.311	34.940	5.06	24.635	0.54602
150	19.812	34.923	4.86	24.754	0.62897
200	18.103	34.841	-	25.126	0.78086
250	16.910	34.767	-	25.358	0.92026
300	15.714	34.679	-	25.567	1.05230
400	13.035	34.469	-	25.975	1.28527
500	9.495	34.222	-	26.430	1.47726
600	7.468	34.151	-	26.685	1.63230
700	5.974	34.166	-	26.897	1.76796
800	4.974	34.262	-	27.093	1.88286
900	4.311	34.336	-	27.226	1.98135
1000	3.907	34.417	-	27.332	2.06880
1009	3.822	34.426	-	27.348	2.07684

Station	A-16		Depth	2580	
Date	1991	JUN.25	Lat.	20° 00.0'N	
Time	8:56		Long.	143° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.293	34.493	3.94	21.588	0.00000
10	29.255	34.491	4.39	21.599	0.05585
20	29.227	34.488	4.41	21.606	0.11781
30	29.222	34.488	4.26	21.608	0.17979
50	27.948	34.629	4.47	22.135	0.30148
75	27.339	34.726	4.49	22.405	0.44589
100	26.723	34.819	4.57	22.671	0.57910
125	25.633	34.934	4.56	23.099	0.70402
150	24.506	35.022	4.45	23.509	0.81855
200	22.322	35.102	-	24.206	1.02336
250	19.245	34.947	-	24.919	1.19385
300	17.110	34.785	-	25.324	1.33856
400	13.408	34.495	-	25.920	1.58680
500	9.977	34.239	-	26.362	-
600	7.555	34.204	-	26.714	-
700	6.459	34.243	-	26.896	-
800	5.798	34.365	-	27.078	-
900	5.105	34.405	-	27.191	-
1000	4.461	34.447	-	27.297	-
1017	4.387	34.455	-	27.312	2.45966

Station	A-17		Depth	3190	
Date	1991	JUN.25	Lat.	18° 00.10N	
Time	18:14		Long.	143° 00.0E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.263	34.329	3.95	21.475	0.00000
10	29.328	34.335	4.40	21.457	0.05693
20	29.339	34.338	4.33	21.456	0.12030
30	29.103	34.329	4.31	21.528	0.18339
50	28.519	34.375	4.45	21.757	0.30709
75	27.090	34.694	4.40	22.461	0.45035
100	25.818	34.834	4.36	22.966	0.58314
125	24.392	34.960	4.29	23.496	0.69916
150	23.435	35.111	4.14	23.894	0.80376
200	19.668	34.961	4.35	24.820	0.98924
250	17.444	34.816	4.61	25.267	1.13671
300	15.735	34.673	4.68	25.557	1.26840
400	12.779	34.418	-	25.987	1.50148
500	9.796	34.275	-	26.421	1.68971
600	7.735	34.246	-	26.721	1.84619
700	6.296	34.319	1.73	26.977	1.97483
800	5.370	34.394	1.68	27.151	2.08392
900	4.677	34.426	1.72	27.257	2.17988
1000	4.111	34.478	1.80	27.360	2.26592
1011	4.076	34.478	1.77	27.365	2.27459

Station	A-18		Depth	2784	
Date	1991	JUN.26	Lat.	16° 0.00'N	
Time	7:36		Long.	143° 0.00'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.427	34.596	4.00	21.620	0.0,0000
10	29.426	34.599	4.11	21.622	0.05558
20	29.424	34.598	4.04	21.623	0.11738
30	29.422	34.599	4.04	21.624	0.17920
50	27.410	34.725	4.55	22.381	0.29715
75	25.895	34.809	4.52	22.924	0.43278
100	24.424	34.979	4.46	23.501	0.55008
125	23.527	35.074	4.53	23.838	0.65586
150	22.759	35.084	4.52	24.068	0.75582
200	19.590	34.963	4.25	24.842	-
250	17.253	34.798	-	25.300	-
300	14.496	34.563	-	25.745	-
400	10.314	34.269	-	26.328	-
500	7.924	34.228	-	26.679	-
600	6.631	34.348	-	26.956	-
700	5.702	34.426	-	27.137	-
800	5.144	34.480	-	27.246	-
900	4.642	34.504	-	27.323	-
1000	4.309	34.512	-	27.366	-
1015	4.239	34.516	-	27.376	2.29949

Station	G-1-N		Depth	2355	
Date	1991	JUN.26	Lat.	15° 00.0'N	
Time	17:58		Long.	143 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.323	34.329	3.88	21.455	0.00000
10	29.339	34.327	4.07	21.448	0.05706
20	29.236	34.332	4.10	21.486	0.12045
30	29.221	34.332	4.15	21.491	0.18357
50	28.427	34.702	4.41	22.033	0.30670
75	26.884	34.785	4.58	22.595	0.44598
100	25.890	34.819	4.36	22.933	0.57907
125	24.534	34.910	4.34	23.416	0.69644
150	23.519	35.024	4.25	23.803	0.80516
200	19.638	34.966	4.25	24.832	0.98617
250	15.666	34.651	4.63	25.557	1.12817
300	13.453	34.484	4.48	25.902	1.24091
400	9.391	34.262	3.32	26.478	1.42935
500	7.216	34.250	-	26.798	1.57240
600	6.302	34.384	1.64	27.027	1.69316
700	5.556	34.451	1.63	27.174	1.80124
800	5.034	34.478	1.73	27.258	1.89472
900	4.525	34.519	1.79	27.348	1.98028
1000	4.166	34.538	1.85	27.401	2.05733
1014	4.030	34.543	1.84	27.420	2.06842

Station	A-19		Depth	4250	
Date	1991	JUN.27	Lat.	14° 00.0'N	
Time	3:50		Long.	143° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	28.839	34.119		21.459	0.00000
10	28.847	34.119		21.456	0.05700
20	28.846	34.119		21.456	0.12038
30	28.797	34.120		21.473	0.18375
50	28.448	34.208		21.655	0.30915
75	27.508	24.537		22.208	0.45696
100	27.030	34.681		22.470	0.59442
125	26.354	34.828		22.795	0.73334
150	24.590	34.941		23.422	0.85408
200	17.382	34.734		25.220	1.03953
250	14.917	34.581		25.667	1.16937
300	12.862	34.469		26.010	1.27930
400	7.749	34.245		26.718	1.45305
500	6.949	34.432		26.979	1.61779
600	6.366	34.475		27.091	1.72768
700	5.831	34.482		27.165	1.83369
800	5.255	34.512		27.259	1.92776
900	4.825	34.528		27.321	2.01493
1000	4.490	34.544		27.371	2.09742
1014	4.441	34.546		27.378	2.10905

Station	B-27		Depth	3291	
Date	1991	JUN.27	Lat.	13° 00.0'N	
Time	17:59		Long.	143° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.314	34.192		21.355	0.00000
10	29.161	34.194		21.408	0.05780
20	29.000	34.181		21.452	0.12139
30	28.908	34.181		21.482	0.18470
50	28.576	34.154		21.572	0.31031
75	28.384	34.286		21.735	0.46520
100	27.273	34.631		22.354	0.61129
125	24.533	34.936		23.436	0.73839
150	22.949	34.865		23.848	0.85047
200	15.246	34.616		25.622	1.00116
250	12.291	34.441		26.099	1.11000
300	10.118	34.301		26.387	1.20392
400	8.274	34.438		26.791	1.35223
500	7.211	34.450		26.956	1.47674
600	6.362	34.482		27.097	1.58690
700	5.688	34.512		27.206	1.68514
800	5.311	34.516		27.255	1.78112
900	4.794	34.532		27.328	1.86913
1000	4.385	34.547		27.385	1.94966
1010	4.351	34.550		27.391	1.95783

ST.A20.G-2-D.A-21

Station	A-20		Depth	4210	
Date	1991	JUN.28	Lat.	12° 00.0N	
Time	2:47		Long.	143° 00.0E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	28.935	34.113		21.422	0.00000
10	28.933	34.114		21.424	0.05731
20	28.885	34.129		21.451	0.12093
30	28.880	34.169		21.483	0.18429
50	28.816	34.197		21.525	0.31039
75	27.941	34.355		21.931	0.46427
100	24.424	34.805		23.369	0.59837
125	20.978	34.864		24.398	0.70270
150	17.621	34.742		25.168	0.77631
200	13.410	34.483		25.910	0.89838
250	11.399	34.379		26.220	0.99804
300	9.615	34.394		26.544	1.08247
400	8.153	34.489		26.850	1.22268
500	7.067	34.496		27.012	1.36084
600	6.447	34.515		27.112	1.45332
700	5.917	34.482		27.154	1.56580
800	5.444	34.534		27.253	1.65974
900	4.951	34.546		27.321	1.74253
1000	4.637	34.553		27.362	1.82636
1016	4.607	34.554		27.366	1.83606

Station	G-2-D		Depth	6256	
Date	1991	JUN.28	Lat.	11° 00.0N	
Time	10:47		Long.	143° 00.0E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.030	34.166		21.430	0.00000
10	28.984	34.164		21.444	0.05727
20	28.875	34.199		21.507	0.12050
30	28.805	34.198		21.529	0.18332
50	27.219	34.419		22.212	0.30635
75	22.944	34.882		23.862	0.42689
100	19.154	34.864		24.879	0.51548
125	16.809	34.706		25.335	0.58672
150	15.248	34.627		25.630	0.65056
200	12.379	34.475		26.109	0.75740
250	10.668	34.464		26.418	0.84589
300	9.795	34.510		26.605	0.92627
400	7.942	34.487		26.880	1.06334
500	6.906	34.517		27.051	1.17616
600	6.359	34.519		27.127	1.29637
700	5.776	34.530		27.209	1.39464
800	5.346	34.538		27.268	1.48734
900	4.839	34.548		27.335	1.57391
1000	4.437	34.556		27.387	1.65450
1030	4.343	34.561		27.401	1.67826

Station	A-21		Depth	4750	
Date	1991	JUN.28	Lat.	10° 00.0'N	
Time	23:36		Long.	143° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.531	34.07		21.19	0.00000
10	29.509	34.072		21.199	0.05929
20	29.364	34.062		21.241	0.12501
30	28.875	34.077		21.416	0.18934
50	28.452	34.134		21.598	0.31569
75	23.896	34.709		23.453	0.45717
100	19.422	34.847		24.797	0.55486
125	17.351	34.736		25.229	0.62851
150	14.512	34.565		25.743	0.69124
200	11.286	34.416		26.269	0.79409
250	10.081	34.445		26.505	0.87705
300	9.034	34.443		26.677	0.95220
400	7.594	34.488		26.932	1.08058
500	6.896	34.495		27.035	1.19542
600	6.203	34.499		27.131	1.29808
700	5.597	34.526		27.228	1.39533
800	5.225	34.532		27.278	1.48597
900	4.762	34.557		27.352	1.57099
1000	4.338	34.566		27.405	1.65035
1014	4.322	34.566		27.407	1.66159

ST.A22.A23.X-16

Station	A-22		Depth	5009	
Date	1991	JUN.29	Lat.	10° 00.0'N	
Time	22:34		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.481	33.209		20.562	0.00000
10	29.454	34.115		21.250	0.05986
20	29.074	34.206		21.446	0.12457
30	28.757	34.246		21.581	0.18736
50	27.543	34.402		22.096	0.30884
75	25.130	34.640		23.031	0.44262
100	21.815	34.786		24.109	0.55642
125	18.519	34.766		24.965	0.64348
150	16.440	34.708		25.423	0.71386
200	12.940	34.491		26.011	0.82948
250	10.828	34.496		26.414	0.92140
300	9.727	34.464		26.580	1.00000
400	7.909	34.468		26.870	1.13777
500	6.792	34.459		27.012	1.25927
600	6.041	34.471		27.129	1.37758
700	5.633	34.507		27.209	1.48870
800	5.309	34.524		27.262	1.57848
900	4.725	34.543		27.344	1.66330
1000	4.360	34.558		27.396	1.74269
1018	4.299	34.557		27.403	1.75642

Station	A-23		Depth	5255 m	
Date	1991	JUN.29	Lat.	12° 00.0'N	
Time	9:24		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.192	34.076		21.309	0.00000
10	29.185	34.076		21.311	0.05832
20	29.178	34.076		21.314	0.12418
30	28.970	34.071		21.379	0.18955
50	28.597	34.264		21.648	0.18955
75	27.453	34.439		22.153	0.47043
100	23.285	34.922		23.794	0.59062
125	21.133	35.027		24.480	0.69009
150	18.717	34.910		25.025	0.77054
200	14.870	34.595		25.689	0.90091
250	12.605	34.448		26.044	1.00890
300	10.819	34.409		26.348	1.10296
400	8.434	34.406		26.742	1.22673
500	6.734	34.447		27.019	1.34880
600	5.964	34.469		27.138	1.45325
608	5.892	34.479		27.155	1.46219

Station	X-16		Depth	4920 m	
Date	1991	JUN.30	Lat.	13° 00.0'N	
Time	13:43		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.660	32.726	3.96	20.139	0.00000
10	29.298	33.642	3.97	20.948	0.06466
20	29.265	33.839	4.08	21.107	0.13220
30	29.229	33.953	4.10	21.204	0.19864
50	28.897	34.224	4.01	21.519	0.32642
75	27.772	34.342	4.18	21.976	0.47634
100	26.443	34.681	4.20	22.656	0.61633
125	24.124	34.732	4.11	23.403	0.74022
150	24.043	34.872	3.71	24.386	0.84526
200	16.027	34.650	3.76	25.473	0.99778
250	13.033	34.425	4.05	25.962	1.11481
300	10.816	34.323	3.45	26.282	1.20718
400	7.870	34.312	-	26.753	1.36034
500	6.827	34.436	1.61	26.999	1.48586
600	5.913	34.453	1.76	27.132	1.60243
700	5.231	34.486	1.85	27.241	1.71140
800	4.748	34.511	1.92	27.316	1.79757
900	4.367	34.532	1.98	27.375	1.87715
1000	3.919	34.552	2.02	27.438	1.96196
1014	3.842	34.553	1.98	27.447	1.97256

St.A-24.C-5.A-25

Station	A-24		Depth	4700 m	
Date	1991	JUN.30	Lat.	14° 00.0'N	
Time	14:00		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.398	34.059	3.77	21.227	0.00000
10	29.381	34.060	4.05	21.233	0.05896
20	29.303	34.100	4.18	21.290	0.12433
30	29.044	34.101	4.04	21.377	0.18918
50	28.760	34.130	4.14	21.493	0.31632
75	28.037	34.368	4.25	21.909	0.47187
100	26.305	34.658	4.30	22.682	0.61165
125	23.875	34.785	4.18	23.517	0.73776
150	21.161	34.840	3.87	24.330	0.83768
200	17.810	34.790	3.72	25.159	0.99739
250	14.365	34.539	3.84	25.755	1.12488
300	11.605	34.369	3.63	26.174	1.22928
400	7.944	34.323	2.25	26.750	1.38940
500	6.728	34.421	-	27.000	1.51236
600	5.919	34.454	1.74	27.132	1.61883
700	5.390	34.494	1.88	27.228	1.71552
800	4.901	34.514	1.95	27.302	1.80445
900	4.337	34.530	2.00	27.378	1.88716
1000	3.978	34.548	2.02	27.429	1.96295
1014	3.932	34.550	1.96	27.435	1.97363

Station	C-5		Depth	5240 m	
Date	1991	JUL.1	Lat.	14° 47.5'N	
Time	13:35		Long.	136° 50.5'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.647	34.059	3.12	21.143	0.00000
10	29.529	34.058	3.91	21.182	0.05965
20	29.446	34.056	3.86	21.208	0.12561
30	29.320	34.182	3.95	21.345	0.19101
50	29.080	34.281	3.81	21.500	0.31825
75	28.685	34.591	4.14	21.864	0.47410
100	27.143	34.601	4.13	22.374	0.61702
125	25.158	34.864	4.18	23.193	0.74736
150	22.103	34.896	3.77	24.111	0.85864
200	16.859	34.676	3.67	25.300	1.01845
250	13.841	34.512	4.38	25.844	1.13927
300	12.008	34.359	4.32	26.091	1.24523
400	8.728	34.266	2.94	26.587	1.42358
500	7.374	34.341	-	26.847	1.56147
600	6.497	34.434	1.61	27.041	1.67998
700	5.644	34.462	1.77	27.172	1.78451
800	5.012	34.492	1.84	27.272	1.87797
900	4.533	34.518	1.90	27.346	1.96387
1000	4.104	34.54	1.95	27.409	2.04249
1014	4.057	34.543	1.93	27.417	2.05439

Station	A-25		Depth	4825 m	
Date	1991	JUL.1	Lat.	15° 45.6'N	
Time	18:09		Long.	136° 58.7'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.898	34.228	4.05	21.185	0.00000
10	29.564	34.225	4.09	21.296	0.05927
20	29.447	34.223	4.14	21.334	0.12339
30	28.914	34.299	4.30	21.569	0.18686
50	28.361	34.338	4.37	21.781	0.30986
75	27.861	34.357	4.30	21.959	0.45865
100	27.312	34.505	4.39	22.247	0.60287
125	26.224	34.772	4.47	22.793	0.74096
150	24.986	34.888	4.26	23.263	0.86308
200	20.070	34.878	3.75	24.652	1.06222
250	16.864	34.740	4.33	25.348	1.21008
300	14.416	34.546	4.21	25.749	1.33318
400	10.141	34.271	3.53	26.359	1.53573
500	8.100	34.335	-	26.737	1.69114
600	6.942	34.390	-	26.946	1.81984
700	5.992	34.440	1.75	27.111	1.93045
800	5.356	34.473	1.76	27.216	2.02977
900	4.742	34.507	1.87	27.314	2.11938
1000	4.358	34.525	1.94	27.371	2.20186
1015	4.291	34.530	1.91	27.382	2.21808

ST.A26.X-18.A-27

Station	A-26		Depth	5167 m	
Date	1991	JUL.3	Lat.	17° 46.0'N	
Time	11:33		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.797	34.748	3.05	21.609	0.00000
10	29.814	34.738	3.95	21.596	0.05579
20	29.684	34.745	4.05	21.645	0.11767
30	29.386	34.728	4.07	21.733	0.17921
50	27.545	34.760	4.44	22.364	0.29394
75	26.362	34.804	4.37	22.775	0.43124
100	25.408	34.878	4.30	23.126	0.55501
125	24.603	34.994	4.20	23.459	0.67086
150	22.759	35.082	4.03	24.067	0.77663
200	20.283	35.004	4.12	24.691	0.95766
250	17.680	34.817	4.43	25.212	1.10953
300	15.900	34.691	4.44	25.534	1.24311
400	12.046	34.379	4.31	26.099	1.47231
500	9.156	34.202	3.77	26.468	1.65337
600	7.315	34.217	-	26.758	1.80553
700	5.745	34.300	1.68	27.032	1.92975
800	4.984	34.383	1.64	27.188	2.03330
900	4.420	34.444	1.76	27.300	2.12419
1000	3.816	34.490	1.78	27.399	2.20453
1016	3.758	34.497	1.78	27.411	2.21650

Station	X-18		Depth	4728 m	
Date	1991	JUL.3	Lat.	19° 00.0'N	
Time	15:11		Long.	137° 00.0'E	
	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	30.588	34.696	3.53	21.299	0.00000
10	29.953	34.716	4.12	21.532	0.05781
20	29.778	34.718	4.13	21.593	0.12025
30	29.453	34.753	4.17	21.729	0.18184
50	28.133	34.603	4.44	22.055	0.30063
75	26.549	34.694	4.53	22.630	0.44419
100	25.700	34.742	4.44	22.934	0.57172
125	24.619	34.867	4.33	23.358	0.69165
150	23.771	34.997	4.41	23.708	0.80161
200	20.434	34.933	4.49	24.596	0.99317
250	17.977	34.831	4.56	25.150	1.14891
300	16.886	34.764	-	25.361	1.28807
400	13.418	34.482	-	25.908	1.53490
500	9.337	34.202	4.03	26.440	1.72815
600	7.554	34.210	2.49	26.719	1.88437
700	6.063	34.267	1.81	26.965	2.01495
800	5.214	34.351	1.56	27.136	2.12456
900	4.638	34.406	1.52	27.245	2.22113
1000	4.124	34.460	1.66	27.344	2.30769
1008	4.015	34.461	1.62	27.356	2.31423

Station	A-27		Depth	4380 m	
Date	1991	JUL.04	Lat.	20° 00.0'N	
Time	3:37		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	30.271	34.782	2.85	21.472	0.00000
10	30.260	34.770	3.89	21.467	0.05719
20	30.168	34.773	3.83	21.501	0.12031
30	30.135	34.776	3.79	21.515	0.18324
50	28.018	34.759	4.32	22.210	0.30630
75	26.356	34.771	4.56	22.751	0.44453
100	24.970	34.834	4.45	23.227	0.56664
125	23.855	34.998	4.52	23.685	0.67891
150	22.353	35.003	4.61	24.122	0.78030
200	19.998	34.962	4.08	24.734	0.95757
250	17.913	34.836	4.34	25.169	1.11115
300	16.178	34.711	4.43	25.485	1.24705
400	12.867	34.441	4.49	25.987	1.48279
500	10.132	34.240	-	26.336	1.67778
600	7.608	34.126	-	26.645	1.84221
700	5.729	34.144	2.23	26.910	1.97868
800	4.958	34.270	1.52	27.102	2.09359
900	4.357	34.358	1.38	27.238	2.19158
1000	3.853	34.425	1.41	27.344	2.27833
1025	3.699	34.435	1.41	27.368	2.29830

ST.K-1.K-3.X-17

Station	K-1		Depth	5151 m	
Date	1991	JUL.2	Lat.	15° 50.0'N	
Time	11:33		Long.	136° 52.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.856	34.224	3.91	21.196	0.00000
10	29.622	34.224	4.25	21:276	0.05900
20	29.594	34.225	4.25	21.286	0.12407
30	29.521	34.219	4.21	21.305	0.18909
50	28.525	34.326	4.47	21.718	0.31554
75	27.793	34.360	4.51	21.983	0.46463
100	27.160	34.568	4.45	22.344	0.60723
125	26.383	34.762	4.61	22.736	0.74716
150	24.717	34.857	4.29	23.32	0.87014
200	19.528	34.859	3.77	24.779	1.06412
250	16.098	34.671	4.33	25.473	1.20851
300	13.404	34.451	4.19	25.887	1.32634
400	9.873	34.269	3.64	26.403	1.52041
500	7.982	34.347	-	26.764	1.67083
518	7.852	34.355	-	26.79	1.68654

Station	K-3		Depth	4728 m	
Date	1991	JUL.2	Lat.	15° 53.0'N	
Time	12:47		Long.	136° 54.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.390	34.225	3.53	21.253	0.00000
10	29.774	34.225	4.16	21.225	0.05889
20	29.601	34.216	4.23	21.277	0.12433
30	29.545	34.215	4.14	21.295	0.18946
50	28.305	34.347	4.39	21.806	0.31555
75	27.670	34.422	4.41	22.069	0.46359
100	27.237	34.621	4.41	22.359	0.60466
125	26.169	34.778	4.35	22.815	0.74144
150	24.419	34.851	4.19	23.405	0.86287
200	19.505	34.874	3.71	24.796	1.05317
250	15.891	34.670	4.17	25.520	1.19453
300	12.857	34.435	4.14	25.984	1.30942
400	9.480	34.274	3.10	26.473	1.49786
500	7.995	34.351	-	26.765	1.64548
518	7.596	34.340	-	26.815	1.67071

Station	X-17		Depth	4695 m	
Date	1991	JUL.2	Lat.	17° 00.0'N	
Time	17:10		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.218	34.774	3.11	21.485	0.00000
10	31.019	34.766	4.01	21.547	0.05661
20	29.888	34.774	4.13	21.598	0.11901
30	29.913	34.775	3.93	21.589	0.18109
50	27.041	34.709	4.57	22.488	0.29709
75	26.169	34.761	4.52	22.802	0.43284
100	25.715	34.795	4.45	22.969	0.55780
125	24.855	34.868	4.22	23.287	0.67751
150	24.100	34.968	4.12	23.590	0.78856
200	21.327	35.018	4.24	24.419	0.98503
250	18.806	34.914	4.30	25.006	1.15069
300	16.443	34.728	4.57	25.437	1.28993
400	12.450	34.395	4.32	26.033	1.52455
500	8.769	34.175	3.78	26.509	1.70735
600	7.058	34.260	-	26.828	1.85374
700	5.892	34.336	1.69	27.042	1.97386
800	4.955	34.378	1.63	27.187	2.07776
900	4.368	34.440	1.73	27.302	2.16861
1000	3.900	34.494	1.92	27.394	2.24974
1014	3.838	34.499	1.92	27.404	2.26072

St.A-30.31.X-21

Station	A-30		Depth	5855	
Date	1991	JUL.14	Lat.	20° 00.7'N	
Time	15:57		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.444	34.635	3.47	21.303	0.00000
10	30.292	34.675	3.70	21.385	0.05819
20	30.125	34.626	3.92	21.405	0.12221
30	27.453	34.648	4.14	22.310	0.18326
50	24.644	34.776	4.44	23.282	0.28797
75	22.868	34.840	4.46	23.852	0.39692
100	21.970	34.937	4.10	24.180	0.49399
125	20.948	34.935	4.30	24.460	0.58504
150	20.244	34.870	4.44	24.600	0.67173
200	18.870	34.862	4.53	24.950	0.83052
250	18.440	34.844	4.60	25.044	0.98180
300	17.583	34.826	4.77	25.242	1.12591
400	14.938	34.611	-	25.687	1.39194
500	11.272	34.304	-	26.184	1.61069
600	8.427	34.200	-	26.581	1.78294
700	6.776	34.209	-	26.826	1.92729
800	5.605	34.281	1.63	27.034	2.04944
900	4.607	34.334	1.41	27.191	2.15329
1000	4.088	34.426	1.48	27.321	2.24251
1014	4.053	34.435	1.48	27.331	2.25463

Station	A-31		Depth	6032	
Date	1991	JUL.14	Lat.	18° 00.0'N	
Time	4:42		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.470	34.814	2.96	21.428	0.00000
10	30.456	34.845	3.54	21.456	0.05719
20	30.435	34.848	3.59	21.466	0.12054
30	29.958	34.794	3.76	21.589	0.18361
50	27.468	34.735	4.12	22.370	0.30061
75	25.396	34.758	4.16	23.039	0.43690
100	23.668	34.892	4.16	23.659	0.55046
125	21.747	34.956	4.10	24.256	0.64968
150	20.503	34.921	4.21	24.569	0.73873
200	18.751	34.861	4.52	24.979	0.89699
250	17.985	34.822	4.52	25.140	1.04635
300	16.343	34.715	4.29	25.450	1.18474
400	13.358	34.486	3.89	25.923	1.42583
500	10.091	34.260	-	26.359	1.62216
600	7.678	34.213	2.73	26.703	1.78207
700	6.234	34.262	1.80	26.940	1.91328
800	5.172	34.248	1.54	27.139	2.02562
900	4.371	34.411	1.53	27.279	2.11986
1000	3.947	34.476	1.68	27.375	2.20295
1017	3.889	34.481	1.70	27.385	2.21651

Station	X-21		Depth	6005	
Date	1991	JUN.14	Lat.	19° 00.0'N	
Time	9:51		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.535	34.748	3.31	21.356	0.00000
10	29.949	34.730	3.86	21.544	0.05756
20	28.672	34.702	4.05	21.951	0.11869
30	27.136	34.691	4.25	22.444	0.17595
50	25.320	34.758	4.31	23.062	0.28325
75	24.176	34.878	4.12	23.499	0.39865
100	22.699	34.869	4.13	23.922	0.50399
125	21.580	34.943	4.04	24.293	0.59939
150	20.864	34.954	4.18	24.497	0.68864
200	19.460	34.906	4.17	24.832	0.85447
250	18.009	34.822	-	25.135	1.00550
300	16.778	34.747	-	25.374	1.14485
400	13.574	34.507	-	25.895	1.39213
500	10.167	34.242	4.03	26.332	1.59213
600	7.797	34.190	2.60	26.668	1.75246
700	5.828	34.208	1.76	26.949	1.88486
800	4.849	34.303	1.39	27.140	1.99449
900	4.415	34.407	1.46	27.271	2.08858
1000	3.892	34.457	1.56	27.366	2.17246
1030	3.694	34.470	1.58	27.396	2.19619

Station	X-19		Depth	4823 m	
Date	1991	JUL.4	Lat.	21° 00.0'N	
Time	8:42		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	30.384	35.005	4.00	21.601	0.00000
10	29.604	35.017	4.67	21.876	0.05490
20	29.401	35.067	4.63	21.982	0.11964
30	27.228	34.930	5.04	22.594	0.17562
50	25.052	34.996	5.31	23.324	0.27320
75	22.685	34.960	5.34	23.995	0.37883
100	21.154	34.988	5.15	24.444	0.47184
125	19.718	34.871	5.17	24.738	0.55614
150	18.987	34.867	4.97	24.924	0.63460
200	18.400	34.852	4.91	25.060	0.78482
250	17.365	34.796	-	25.271	0.92699
300	16.514	34.728	-	25.421	1.06254
400	13.996	34.532	4.52	25.827	1.31107
500	10.983	34.304	4.41	26.237	1.52158
600	8.256	34.151	3.83	26.569	1.69424
700	6.275	34.159	2.29	26.853	1.83593
800	4.980	34.211	1.64	27.052	1.95537
900	4.174	34.302	1.40	27.213	2.05586
1000	3.767	34.386	1.26	27.321	2.14426
1021	3.688	34.399	1.27	27.340	2.16050

Station	A-28		Depth	4449 m	
Date	1991	JUL.4	Lat.	22° 00.0'N	
Time	14:16		Long.	137° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	30.316	34.980	3.44	21.606	0.00000
10	30.075	35.013	3.99	21.712	0.06106
20	29.867	35.006	4.01	21.779	0.12157
30	27.987	34.839	4.37	22.280	0.18062
50	25.944	34.869	4.51	22.954	0.28469
75	24.257	34.917	4.42	23.504	0.40061
100	22.735	34.981	4.62	23.997	0.50466
125	20.997	34.937	4.72	24.448	0.59756
150	20.121	34.904	4.54	24.658	0.68289
200	18.913	34.888	4.55	24.954	0.84180
250	17.822	34.814	4.69	25.174	0.99035
300	16.852	34.761	4.64	25.367	1.12905
400	14.478	34.574	4.52	25.757	1.38218
500	11.404	34.331	-	26.182	1.59956
600	8.740	34.178	-	26.516	1.77611
700	6.804	34.160	2.51	26.784	1.92777
800	5.385	34.225	1.66	27.016	2.05335
900	4.397	34.294	1.37	27.183	2.15832
1000	3.891	34.373	1.27	27.299	2.24936
1019	3.888	34.377	1.26	27.302	2.25605

Station	A-29		Depth	4450 m	
Date	1991	JUL.13	Lat.	22° 00.0'N	
Time	14:16		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.934	34.751	3.45	21.565	0.00000
10	29.720	34.810	3.88	21.682	0.05516
20	27.749	34.769	4.18	22.305	0.12128
30	24.940	34.738	4.56	23.163	0.17274
50	22.184	34.858	4.87	24.060	0.25769
75	21.044	34.860	4.68	24.377	0.34987
100	20.145	34.908	4.25	24.654	0.43567
125	19.474	34.867	4.52	24.799	0.51703
150	18.829	34.863	4.52	24.961	0.59447
200	18.397	34.841	4.56	25.053	0.74463
250	17.487	34.801	4.56	25.246	0.88861
300	16.824	34.751	4.38	25.365	1.02852
400	14.074	34.542	-	25.818	1.27654
500	10.903	34.317	-	26.261	1.48623
600	7.910	34.145	-	26.616	1.65293
700	6.079	34.146	2.59	26.868	1.79186
800	4.781	34.219	1.71	27.081	1.90772
900	4.149	34.302	1.37	27.215	2.00723
1000	3.692	34.388	1.30	27.331	2.09480
1015	3.648	34.396	1.31	27.341	2.10773

St.X-22.A-32.X-23

Station	X-22		Depth	5540	
Date	1991	JUL.14	Lat.	17° 00.0'N	
Time	17:57		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.882	34.762	3.42	21.247	0.00000
10	30.464	34.742	4.02	21.376	0.05824
20	30.273	34.743	4.01	21.443	0.12216
30	28.966	34.673	4.43	21.833	0.18398
50	27.544	34.651	4.3	22.282	0.29933
75	26.565	34.687	4.24	22.623	0.43967
100	25.161	34.819	4.24	23.157	0.56635
125	24.093	34.974	3.93	23.596	0.68061
150	22.185	34.980	4.09	24.152	0.78338
200	19.321	34.917	4.04	24.877	0.95874
250	17.007	34.767	4.23	25.335	1.10474
300	14.840	34.590	4.15	25.692	1.23238
400	10.749	34.284	-	26.263	1.44496
500	8.236	34.206	2.93	26.615	1.61050
600	6.502	34.270	1.98	26.911	1.74692
700	5.635	34.350	1.72	27.085	1.86027
800	4.870	34.398	1.74	27.213	1.95906
900	4.354	34.463	1.84	27.322	2.04788
1000	3.944	34.486	1.93	27.383	2.12812
1012	3.911	34.495	1.93	27.393	2.13793

Station	A-32		Depth	5212	
Date	1991	JUL.15	Lat.	16° 00.0'N	
Time	8:38		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.462	34.698	3.63	21.344	0.00000
10	30.401	34.694	3.71	21.362	0.05789
20	30.332	34.708	3.86	21.397	0.12207
30	30.318	34.723	3.85	21.412	0.18600
50	28.923	34.629	4.20	21.813	0.31199
75	27.556	34.651	4.30	22.279	0.45641
100	25.901	34.695	4.25	22.836	0.59455
125	24.929	34.833	4.01	23.238	0.71637
150	23.718	34.948	4.01	23.687	0.82677
200	19.847	34.951	3.86	24.766	1.01022
250	17.190	34.751	4.31	25.279	1.15876
300	15.109	34.607	4.36	25.646	1.28775
400	10.419	34.296	3.39	26.330	1.49401
500	8.327	34.319	-	26.690	1.65488
600	6.827	34.337	1.74	26.920	1.78857
700	5.934	34.388	1.70	27.078	1.90360
800	5.273	34.424	1.79	27.187	2.00555
900	4.731	34.463	1.87	27.280	2.09823
1000	4.326	34.484	1.94	27.342	2.18363
1012	4.232	34.488	1.92	27.355	2.19396

Station	X-23		Depth	5408	
Date	1991	JUL.15	Lat.	15° 00.0'N	
Time	14:00		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.496	34.592	3.24	21.253	0.00000
10	30.343	34.608	3.84	21.318	0.05905
20	30.001	34.576	3.84	21.411	0.12333
30	29.982	34.671	3.71	21.488	0.18693
50	28.054	34.559	4.23	22.048	0.31028
75	26.807	34.660	4.26	22.525	0.44967
100	25.681	34.763	4.29	22.955	0.58311
125	24.636	34.884	3.99	23.366	0.70295
150	22.970	35.007	3.91	23.949	0.81027
200	18.690	34.875	4.05	25.006	0.98588
250	16.738	34.745	4.18	25.382	1.12731
300	14.939	34.602	4.22	25.679	1.25324
400	10.071	34.283	-	26.381	1.46102
500	7.945	34.328	1.99	26.755	1.61081
600	6.595	34.376	1.60	26.982	1.73672
700	5.830	34.426	1.71	27.121	1.84637
800	5.097	34.452	1.79	27.230	1.94502
900	4.571	34.486	1.81	27.316	2.03384
1000	4.193	34.519	1.92	27.383	2.11566
1021	4.015	34.524	1.89	27.396	2.13187

St.C-40.C-41.A-33

Station	C-40		Depth		
Date	1991	JUL.16	Lat.	14° 49.6'N	
Time	5:11		Long.	130° 59.8'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.166	34.745	3.50	21.481	0.00000
10	30.195	34.733	3.84	21.462	0.05690
20	29.948	34.687	3.89	21.512	0.12008
30	29.788	34.760	3.95	21.621	0.18272
50	28.317	34.683	4.27	22.055	0.30349
75	26.958	34.696	4.43	22.504	0.44306
100	25.951	34.806	4.19	22.904	0.57622
125	24.886	34.899	4.04	23.302	0.69610
150	23.192	34.989	3.98	23.871	0.80545
200	19.319	34.901	3.97	24.865	0.98621
250	16.456	34.724	4.33	25.431	1.12798
300	13.918	34.505	4.23	25.823	1.24984
400	9.762	34.251	3.54	26.408	1.44815
500	7.804	34.367	-	26.806	1.59879
512	7.681	34.384	-	26.837	1.61550

Station	C-41		Depth		
Date	1991	JUL.16	Lat.	14° 51.6'N	
Time	6:49		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	30.187	34.783	3.01	21.502	0.00000
10	30.228	34.776	3.76	21.483	0.05676
20	30.209	34.782	3.65	21.494	0.11988
30	30.199	34.779	3.68	21.495	0.18292
50	28.470	34.705	4.08	22.021	0.30709
75	27.038	34.690	4.17	22.475	0.44818
100	25.902	34.739	4.13	22.869	0.58297
125	25.239	34.802	4.08	23.121	0.70565
150	23.769	34.999	3.72	23.711	0.81813
200	19.891	34.938	3.76	24.744	1.00820
250	16.979	34.751	4.24	25.329	1.15687
300	14.595	34.542	4.22	35.707	1.28425
400	10.433	34.255	3.71	26.296	1.49323
500	7.995	34.335	-	26.753	1.65050
512	7.901	34.357	-	26.784	1.66738

Station	A-33		Depth		
Date	1991	JUL.16	Lat.	14° 00.2'N	
Time	10:31		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.898	34.324	3.80	21.257	0.00000
10	29.898	34.323	3.79	21.256	0.05878
20	29.901	34.326	3.80	21.257	0.12408
30	29.902	34.330	3.79	21.260	0.18938
50	29.128	34.364	3.95	21.546	0.31886
75	28.199	34.486	4.13	21.946	0.46973
100	26.921	34.645	4.18	22.478	0.61130
125	26.042	34.767	4.04	22.846	0.74232
150	25.036	34.882	3.95	23.243	0.86898
200	20.489	34.954	3.59	24.598	1.06946
250	16.608	34.675	3.73	25.358	1.21996
300	13.717	34.456	4.10	25.826	1.34281
400	9.899	34.250	3.07	26.384	1.54246
500	7.993	34.360	-	26.773	1.69408
600	6.605	34.391	-	26.993	1.81870
700	5.729	34.432	1.69	27.138	1.92654
800	5.069	34.470	1.76	27.247	2.02264
900	4.509	34.496	1.90	27.331	2.10982
1000	3.991	34.526	1.92	27.410	2.18896
1015	3.944	34.527	1.89	27.416	2.19924

St.x-24A-34.C-42.

Station	X-24		Depth	5926	
Date	1991	JUL.16	Lat.	13° 00.0'N	
Time	16:16		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.413	34.095	4.10	21.249	0.00000
10	29.453	34.113	4.05	21.249	0.05880
20	29.466	34.123	3.96	21.252	0.12417
30	29.456	34.130	3.98	21.260	0.18956
50	28.286	34.377	4.22	21.835	0.31584
75	26.982	34.683	4.35	22.487	0.45850
100	26.084	34.794	4.19	22.854	0.58923
125	24.733	34.919	4.09	23.362	0.71443
150	21.617	34.865	3.76	24.223	0.81906
200	17.520	34.763	3.66	25.208	0.98204
250	14.186	34.521	4.21	25.779	1.10718
300	11.922	34.355	4.10	26.104	1.21361
400	8.856	34.285	2.47	26.581	1.38962
500	7.335	34.405	-	26.904	1.52432
600	6.136	34.413	1.85	27.071	1.63881
700	5.523	34.452	1.91	27.179	1.74077
800	4.974	34.472	1.94	27.260	1.83449
900	4.575	34.504	2.01	27.330	1.92090
1000	4.231	34.518	2.02	27.379	2.00187
1014	4.179	34.527	1.94	27.391	2.01316

Station	A-34		Depth	5734	
Date	1991	JUL.17	Lat.	12° 00.0'N	
Time	00.19		Long.	131° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.248	34.109	3.54	21.315	0.00000
10	29.258	34.106	3.74	21.309	0.05826
20	29.265	34.105	3.80	21.306	0.12306
30	29.273	34.106	3.68	21.304	0.18792
50	29.209	34.167	3.79	21.372	0.31769
75	27.299	34.453	3.98	22.212	0.47022
100	24.397	34.753	3.92	23.338	0.60106
125	21.928	34.890	3.66	24.156	0.70887
150	19.761	34.863	3.59	24.721	0.79807
200	14.510	34.533	3.73	25.719	0.93596
250	11.569	34.435	2.92	26.232	1.03730
300	9.822	34.454	2.00	26.556	1.12055
400	8.191	34.507	-	26.858	1.25764
500	7.274	34.480	-	26.971	1.37856
600	6.157	34.464	-	27.109	1.48707
700	5.695	34.503	1.99	27.198	1.58715
800	5.173	34.505	1.88	27.263	1.68025
900	4.615	34.520	1.92	27.338	1.76637
1000	4.202	34.544	1.94	27.403	1.84599
1014	4.140	34.551	1.90	27.414	1.85714

Station	C-42		Depth	4987	
Date	1991	JUL.17	Lat.	13° 59.9'N	
Time	17:59		Long.	134° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	℃		ml/l		
0	29.376	34.039	3.46	21.220	0.00000
10	29.452	34.031	3.79	21.188	0.05929
20	29.458	34.030	3.78	21.185	0.12526
30	29.398	34.010	3.82	21.190	0.19126
50	29.181	34.146	3.89	21.365	0.32242
75	28.032	34.376	3.95	21.917	0.47772
100	27.008	34.635	4.01	22.442	0.61931
125	24.651	34.830	3.94	23.320	0.74450
150	22.442	34.947	3.73	24.055	0.85641
200	18.602	34.862	3.67	25.018	1.02737
250	14.704	34.569	3.78	25.705	1.15978
300	12.174	34.388	-	26.081	1.26932
400	8.554	34.276	-	26.621	1.44052
500	6.908	34.344	-	26.915	1.57276
600	6.078	34.429	1.74	27.092	1.68515
700	5.322	34.468	1.79	27.216	1.78401
800	4.795	34.499	1.87	27.302	1.87343
900	4.299	34.526	1.94	27.377	1.95501
1000	3.922	34.546	2.00	27.433	2.03065
1014	3.863	34.548	1.97	27.441	2.04066

St.X-25.X-26.X-27.

Station	X-25		Depth	4393	
Date	1991	JUL.18	Lat.	15° 20.0'N	
Time	5:11		Long.	134° 00.7'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.373	34.188	3.75	21.332	0.00000
10	29.395	34.189	3.85	21.326	0.05810
20	29.400	34.188	3.89	21.323	0.12274
30	29.401	34.190	3.88	21.324	0.18743
50	29.399	34.265	3.88	21.381	0.31667
75	28.977	34.597	3.97	21.772	0.47454
100	27.721	34.709	4.26	22.269	0.62046
125	26.785	34.711	4.11	22.571	0.75777
150	25.964	34.804	4.07	22.899	0.89126
200	22.637	34.930	3.83	23.986	1.12047
250	18.086	34.807	3.62	25.104	1.29279
300	14.107	34.508	3.89	25.785	1.42066
400	10.082	34.275	3.30	26.372	1.61927
500	7.506	34.290	2.01	26.788	1.76956
600	6.301	34.370	-	27.016	1.89324
700	5.592	34.449	1.81	27.169	1.99847
800	4.948	34.482	1.88	27.271	2.09162
900	4.575	34.509	1.87	27.334	2.17687
1000	4.136	34.536	1.98	27.403	2.25616
1015	4.079	34.540	1.96	27.412	2.26746

Station	X-26		Depth	5215	
Date	1991	JUL.18	Lat.	15° 59.8'N	
Time	8:23		Long.	134° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.224	34.235	3.86	21.418	0.00000
10	29.217	34.229	4.08	21.415	0.05737
20	29.210	34.229	4.00	21.417	0.12114
30	29.211	34.229	4.02	21.417	0.18493
50	29.218	34.228	3.85	21.415	0.31266
75	28.599	34.343	3.96	21.707	0.47102
100	27.112	34.601	4.02	22.384	0.61500
125	26.408	34.753	3.99	22.721	0.75378
150	25.495	34.851	3.94	23.079	0.87814
200	21.702	34.990	3.80	24.295	1.08660
250	17.465	34.780	3.76	25.235	1.24413
300	15.003	34.600	3.88	25.664	1.37408
400	10.654	34.300	-	26.292	1.58507
500	8.397	34.259	-	26.632	1.74906
600	6.542	34.341	1.69	26.962	1.88243
700	5.794	34.413	1.55	27.115	1.99365
800	5.224	34.466	1.61	27.226	2.09252
900	4.784	34.496	1.70	27.300	2.18228
1000	4.336	34.520	1.78	27.369	2.26571
1013	4.291	34.523	1.74	27.377	2.27635

Station	X-27		Depth	5500	
Date	1991	JUL.18	Lat.	17° 00.0'N	
Time	12:48		Long.	134° 00.0'E	
D	T	S	D.O.	Sigma.T	Del-D
m	°C		ml/l		
0	29.638	34.723	3.56	21.644	0.00000
10	29.642	34.727	3.74	21.645	0.05539
20	29.552	34.721	3.73	21.671	0.11686
30	29.528	37.720	3.76	21.679	0.17818
50	29.489	34.712	3.76	21.686	0.30082
75	27.200	34.654	4.24	22.395	0.44703
100	26.036	34.722	4.09	22.815	0.58363
125	25.011	34.843	3.85	23.221	0.70601
150	23.370	35.024	3.66	23.846	0.81627
200	19.680	34.946	3.86	24.806	0.99574
250	16.911	34.766	4.27	25.357	1.14011
300	15.091	34.623	4.20	25.662	1.26795
400	10.916	34.308	3.58	26.252	1.48102
500	8.127	34.305	-	26.709	1.64115
600	6.546	34.351	1.58	26.969	1.77100
700	5.763	34.418	1.52	27.122	1.88186
800	5.257	34.465	1.57	27.221	1.97996
900	4.748	34.497	1.67	27.305	2.06966
1000	4.299	34.522	1.75	27.374	2.15209
1015	4.195	34.522	1.80	27.386	2.16448

X. Station and working log of KH-91-4

Station and working Log. KH-91-4

Sta.	Time	Lat.	Long.	Depth	Coment
	----- 16 JUNE91 (GMT) -----				
T-1	05:44	26°32.640N	149°47.950E	5796m	FINISHED FLOE METRE CALIBRATION
T-1	06:01	26°32.620N	149°47.900E	5921m	CTD START
T-1	06:23	26°32.570N	149°47.840E	5915m	CTDO DEEPEST
T-1	06:40	26°32.620N	149°47.780E	5920m	CTDO FINISH
T-1	07:09	26°32.760N	149°47.790E	5923m	STARTED MEASUREMENT PHOTOMETER AT 1
T-1	07:12	26°32.760N	149°47.790E	5924m	FINISHED PHOTOMETER
T-1	07:16	26°32.770N	149°47.810E	5925m	NORPAC NET START
T-1	07:35	26°32.840N	149°47.840E	5928m	NORPAC NET FINISH
T-1	07:56	26°32.860N	149°47.980E	5930m	IKPT NET START
T-1	08:06	26°32.360N	149°48.610E	5942m	IKPT NET DEEPEST
T-1	08:07	26°32.310N	149°48.660E	5944m	ORI SIDE NET START
T-1	08:22	26°31.870N	149°49.230E	5939m	IKPT NET FINISH
T-1	08:24	26°31.820N	149°49.290E	5939m	ORI NET FINISH
T-1	08:37	26°31.340N	149°49.920E	5925m	IKPT NET START
T-1	08:46	26°30.900N	149°50.520E	5928m	IKPT NET DEEPEST
T-1	08:48	26°30.840N	149°50.600E	5933m	ORI SIDE NET START
T-1	08:56	26°30.590N	149°50.900E	5948m	SUNSET & PUT ON REGULATION LIGHTS
T-1	09:02	26°30.360N	149°51.150E	5947m	IKPT NET FINISH
T-1	09:03	26°30.340N	149°51.180E	5949m	ORI SIDE NET FINISH
T-2	13:05	25°48.700N	150°39.570E	5661m	IKPT NET START
T-2	13:16	25°49.250N	150°40.100E	5697m	IKPT NET DEEPEST
T-2	13:16	25°49.270N	150°40.120E	5699m	ORI SIDE NET START
T-2	13:32	25°49.660N	150°40.570E	5715m	ORI SIDE NET FINISH
T-2	13:49	25°50.040N	150°40.990E	5733m	IKPT NET FINISH
	----- 17 JUNE91 (GMT) -----				
A-1	10:47	22°00.710N	155°00.039E	5503m	NORPAC NET START
A-1	11:00	22°00.880N	154°59.989E	5504m	NORPAC NET FINISH
A-1	11:09	22°00.780N	155°00.069E	5503m	IKPT NET START
A-1	11:30	21°59.315N	155°00.149E	5515m	IKPT NET DEEPEST
A-1	11:33	21°59.230N	155°00.159E	5516m	ORI SIDE NET START
A-1	11:53	21°58.730N	155°00.249E	5516m	ORI SIDE NET FINISH
A-1	12:13	21°58.250N	155°00.339E	5524m	IKPT NET FINISH
B-1	14:36	21°23.930N	155°00.139E	4892m	IKPT NET START
B-1	14:50	21°23.190N	155°00.569E	4877m	ORI SIDE NET START
B-1	14:51	21°23.170N	155°00.599E	4881m	IKPT NET DEEPEST
B-1	15:06	21°22.830N	155°00.909E	4821m	ORI SIDE NET FINISH
B-1	15:24	21°22.400N	155°01.269E	4791m	IKPT NET FINISH
X-1	16:57	20°59.910N	155°00.039E	2051m	XBT
B-2	17:30	20°51.790N	155°00.039E	1825m	USED COURSE VARIOUSLY USED ENGINES
B-2	17:33	20°51.650N	155°00.029E	1825m	IKPT NET START
B-2	17:42	20°51.030N	155°00.069E	2040m	IKPT NET DEEPEST WIRE OUT 500 M
B-2	17:45	20°50.960N	155°00.059E	2139m	ORI NET START
B-2	18:00	20°50.590N	154°59.999E	2240m	ORI NET FINISH

B-2	18:20	20°50.170N	154°59.869E	2084m	IKPT NET FINISH
A-2	21:44	20°00.110N	154°59.979E	5668m	CTDO START
A-2	21:47	20°00.190N	154°59.979E	5668m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-2	21:51	20°00.270N	154°59.969E	5670m	NORPAC NET START
A-2	22:03	20°00.490N	154°59.939E	5678m	NORPAC NET FINISH & NORPAC NET STAR
A-2	22:07	20°00.500N	154°59.949E	5676m	CTDO DEEPEST
A-2	22:19	20°00.610N	154°59.879E	5678m	NORPAC NET FINISH
A-2	22:27	20°00.780N	154°59.809E	5678m	CTDO FINISH
A-2	22:36	20°01.020N	154°59.759E	5678m	IKPT NET START
A-2	23:00	19°59.690N	154°59.619E	5668m	IKPT NET DEEPEST WIRE OUT 1200M
A-2	23:00	19°59.690N	154°59.619E	5669m	ORI SIDE NET START
A-2	23:21	19°59.340N	154°59.539E	5668m	ORI SIDE NET FINISH
A-2	23:41	19°59.030N	154°59.459E	5668m	IKPT NET FINISH
	----- 18 JUNE91 (GMT) -----				
X-2	03:39	18°59.850N	154°59.999E	5545m	XBT
A-3	07:24	18°00.080N	155°00.059E	5626m	CTDO START
A-3	07:28	18°00.100N	155°00.039E	5625m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-3	07:30	18°00.110N	155°00.019E	5622m	NORPAC NET START
A-3	07:46	18°00.180N	154°59.879E	5626m	CTDO DEEPEST
A-3	07:54	18°00.170N	154°59.819E	5624m	NORPAC NET FINISH
A-3	07:56	18°00.170N	154°59.799E	5623m	NORPAC NET START
A-3	08:06	18°00.150N	154°59.699E	5622m	CTDO FINISH
A-3	08:08	18°00.140N	154°59.699E	5622m	NORPAC NET FINISH
A-3	08:15	18°00.070N	154°59.679E	5621m	IKPT NET START
A-3	08:20	17°59.620N	154°59.669E	5613m	SUNSET & PUT ON REGULATION LIGHTS
A-3	08:36	17°58.460N	154°59.629E	5572m	IKPT NET DEEPEST WIRE OUT 1200M
A-3	08:38	17°58.400N	154°59.629E	5569m	ORI SIDE NET START
A-3	08:58	17°57.780N	154°59.589E	5605m	ORI SIDE NET FINISH
A-3	09:19	17°57.130N	154°59.599E	5615m	IKPT NET FINISH
B-3	12:05	17°16.800N	155°00.399E	5599m	IKPT NET START
B-3	12:16	17°16.870N	155°01.429E	5609m	IKPT NET DEEPEST ORI SIDE NET START
B-3	12:31	17°17.050N	155°02.339E	5618m	ORI SIDE NET FINISH
B-3	12:51	17°17.150N	155°03.469E	5620m	IKPT NET FINISH
X-3	14:02	17°00.150N	155°00.039E	5645m	XBT
B-4	15:32	16°36.680N	155°00.149E	5784m	IKPT NET START
B-4	15:43	16°35.930N	155°00.229E	5792m	IKPT NET DEEPEST WIRE OUT 500 M
B-4	15:44	16°35.860N	155°00.229E	5795m	ORI NET START
B-4	16:00	16°35.300N	155°00.299E	5820m	ORI NET FINISH
B-4	16:18	16°34.690N	155°00.379E	5830m	IKPT NET FINISH
A-4	18:32	16°01.700N	154°59.999E	4939m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-4	18:34	16°01.660N	154°59.999E	4942m	IKPT NET START
A-4	18:57	15°59.810N	154°59.959E	4926m	IKPT NET DEEPEST WIRE OUT 1200 M
A-4	18:59	15°59.750N	154°59.959E	4923m	ORI NET START
A-4	19:12	15°59.360N	154°59.919E	4903m	SUNRISE & PUT OFF REGULAION LIGHTS
A-4	19:20	15°59.130N	154°59.909E	4884m	ORI SIDE NET FINISH
A-4	19:41	15°58.430N	154°59.879E	4800m	IKPT NET FINISH
A-4	19:47	15°58.420N	154°59.929E	4804m	CTDO START
A-4	19:53	15°58.440N	154°59.959E	4800m	NORPAC NET START

A-4	20:07	15°58.520N	155°00.009E	4823m	NORPAC NET FINISH
A-4	20:08	15°58.530N	155°00.019E	4819m	NORPAC NET START
A-4	20:12	15°58.550N	155°00.039E	4826m	CTDO DEEPEST
A-4	20:29	15°58.640N	155°00.119E	4829m	NORPAC NET FINISH
A-4	20:31	15°58.660N	155°00.129E	4834m	CTDO FINISH
----- 19 JUNE91 (GMT) -----					
X-4	00:17	14°59.980N	155°00.029E	5573m	XBT
A-5	04:05	14°00.070N	155°00.049E	6018m	CTDO START
A-5	04:05	14°00.070N	155°00.049E	6018m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-5	04:10	14°00.110N	155°00.039E	6018m	NORPAC NET START
A-5	04:22	14°00.200N	154°59.979E	6019m	NORPAC NET FINISH
A-5	04:22	14°00.200N	154°59.979E	6021m	NORPAC NET START
A-5	04:25	14°00.220N	154°59.969E	6018m	CTDO DEEPEST WIRE OUT 1000M
A-5	04:36	14°00.220N	154°59.919E	6020m	NORPAC NET FINISH
A-5	04:39	14°00.230N	154°59.909E	6020m	CTDO FINISH
A-5	04:48	14°00.030N	154°59.909E	6021m	IKPT NET START
A-5	05:11	13°58.270N	154°59.879E	6021m	IKPT NET DEEPEST WIRE OUT 1200 M
A-5	05:13	13°58.200N	154°59.879E	6023m	ORI NET START
A-5	05:33	13°57.870N	154°59.829E	6022m	ORI NET FINISH
A-5	05:53	13°57.380N	154°59.779E	6017m	IKPT NET FINISH & STOP ENGINES
A-5	05:57	13°57.360N	154°59.769E	6020m	CHANGED PROPULSION TO DIESEL ENGINE
A-5	05:57	13°57.360N	154°59.769E	6020m	SLOW AHEAD ENGINES
A-5	06:06	13°56.500N	154°59.779E	6023m	s/co on 180° AT 1502
A-5	06:06	13°56.490N	154°59.779E	6022m	FULL AHEAD ENGINES
A-5	06:14	13°54.700N	154°59.819E	6017m	RUNG UP ENGINES
B-5	09:07	13°09.040N	154°59.989E	6001m	IKPT NET START
B-5	09:18	13°08.360N	154°59.959E	5998m	IKPT NET DEEPEST WIRE OUT 500M
B-5	09:19	13°08.320N	154°59.959E	5997m	ORI SIDE NET START
B-5	09:35	13°07.670N	154°59.919E	6005m	ORI SIDE NET FINISH
B-5	09:54	13°07.010N	154°59.899E	5996m	IKPT NET FINISH
X-5	10:23	13°00.040N	154°59.979E	5989m	XBT
B-6	12:04	12°32.990N	155°00.009E	5941m	IKPT NET START
B-6	12:14	12°32.240N	154°59.999E	5933m	IKPT NET DEEPEST
B-6	12:14	12°32.220N	154°59.999E	5938m	ORI SIDE NET START
B-6	12:30	12°31.600N	154°59.969E	5934m	ORI SIDE NET FINISH
B-6	12:48	12°30.820N	154°59.949E	5934m	IKPT NET FINISH
A-6	14:52	11°59.980N	155°00.109E	5860m	CTDO START
A-6	14:53	11°59.980N	155°00.099E	5860m	NORPAC NET START
A-6	15:04	11°59.950N	155°00.059E	5862m	NORPAC NET FINISH
A-6	15:04	11°59.950N	155°00.059E	5862m	NORPAC NET START
A-6	15:12	11°59.900N	155°00.029E	5860m	CTDO DEEPEST WIRE OUT 534 M
A-6	15:20	11°59.840N	155°00.029E	5857m	CTDO FINISH 1 ST
A-6	15:20	11°59.840N	155°00.029E	5859m	CTDO START AGAIN
A-6	15:34	11°59.720N	155°00.029E	5858m	NORPAC NET FINISH
A-6	15:42	11°59.660N	155°00.009E	5862m	CTDO DEEPEST
A-6	15:59	11°59.460N	154°59.969E	5857m	CTDO FINISH
A-6	16:08	11°58.990N	154°59.839E	5860m	IKPT NET START
A-6	16:29	11°57.200N	154°59.729E	5853m	IKPT NET DEEPEST WIRE OUT 1200 M

A-6	16:31	11°57.080N	154°59.719E	5853m	ORI NET START
A-6	16:52	11°56.340N	154°59.639E	5853m	
A-6	17:12	11°55.640N	154°59.589E	5858m	IKPT NET FINISH & STOP ENGINES
X-6	20:39	10°59.900N	154°59.999E	5712m	XBT

----- 20 JUNE91 (GMT) -----

A-7	00:20	09°59.850N	154°59.809E	5490m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-7	00:20	09°59.850N	154°59.809E	5490m	CTDO START
A-7	00:24	09°59.820N	154°59.759E	5490m	NORPAC NET START
A-7	00:37	09°59.700N	154°59.609E	5490m	NORPAC NET FINISH
A-7	00:37	09°59.700N	154°59.609E	5492m	NORPAC NET START
A-7	00:43	09°59.620N	154°59.549E	5494m	CTDO DEEPEST
A-7	00:46	09°59.590N	154°59.549E	5492m	NORPAC NET FINISH
A-7	01:03	09°59.420N	154°59.639E	5489m	CTDO FINISH
A-7	01:09	09°59.380N	154°59.499E	5491m	IKPT NET START
A-7	01:30	09°59.350N	154°57.609E	5508m	IKPT NET DEEPEST
A-7	01:32	09°59.340N	154°57.499E	5509m	ORI SIDE NET START
A-7	01:52	09°59.260N	154°56.569E	5511m	ORI SIDE NET FINISH
A-7	02:10	09°59.210N	154°55.699E	5515m	IKPT NET FINISH
B-7	09:06	10°00.020N	152°59.189E	5534m	IKPT NET START
B-7	09:11	10°00.050N	152°58.879E	5532m	ORI SIDE NET START
B-7	09:18	10°00.140N	152°58.539E	5527m	IKPT NET DEEPEST
B-7	09:27	10°00.270N	152°58.119E	5536m	ORI SIDE NET FINISH
B-7	09:54	10°00.620N	152°56.759E	5541m	IKPT NET FINISH
B-8	12:02	10°00.000N	152°21.069E	5411m	IKPT NET START
B-8	12:13	10°00.040N	152°20.429E	5406m	IKPT NET DEEPEST
B-8	12:13	10°00.040N	152°20.419E	5405m	ORI SIDE NET START
B-8	12:28	10°00.070N	152°19.609E	5401m	ORI SIDE NET FINISH
B-8	12:49	10°00.090N	152°18.499E	5393m	IKPT NET FINISH
B-8	12:53	10°00.060N	152°18.039E	5384m	HALF AHEAD ENGINES
B-9	15:04	09°59.980N	151°40.380E	5382m	USED ENGINES VARIOUSLY USED COURSE
B-9	15:06	09°59.990N	151°40.220E	5378m	IKPT NET START
B-9	15:18	09°59.970N	151°39.400E	5373m	IKPT NET DEEPEST WIRE OUT 500 M
B-9	15:19	09°59.960N	151°39.340E	5368m	ORI SIDE NET START
B-9	15:34	09°59.940N	151°38.400E	5382m	ORI NET FINISH
B-9	15:56	09°59.950N	151°37.190E	5386m	IKPT NET FINISH & SLOW AHEAD ENGINE
B-9	15:58	09°59.950N	151°37.060E	5393m	s/co on 270°
B-10	17:58	10°00.000N	151°02.940E	5628m	USED COURSE VARIOUSLY USED ENGINES
B-10	18:02	10°00.010N	151°02.640E	5623m	IKPT NET START
B-10	18:12	10°00.020N	151°01.980E	5631m	IKPT NET DEEPEST
B-10	18:14	10°00.020N	151°01.870E	5633m	ORI NET START
B-10	18:29	10°00.060N	151°01.030E	5639m	ORI NET FINISH
B-10	18:48	10°00.080N	151°00.020E	5642m	IKPT NET FINISH & SLOW AHEAD ENGINE

----- 21 JUNE91 (GMT) -----

A-8	01:55	09°59.890N	148°59.870E	5468m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-8	01:56	09°59.880N	148°59.870E	5468m	CTDO START
A-8	02:03	09°59.810N	148°59.830E	5468m	NORPAC NET START
A-8	02:16	09°59.850N	148°59.820E	5467m	CTDO DEEPEST
A-8	02:30	09°59.850N	148°59.830E	5468m	NORPAC NET FINISH

A-8	02:35	09°59.840N	148°59.830E	5468m	CTDO FINISH
A-8	02:51	10°00.030N	148°59.750E	5470m	IKPT NET START
A-8	03:15	10°01.080N	149°00.080E	5477m	IKPT NET DEEPEST WIRE OUT 1200 M
A-8	03:17	10°01.110N	149°00.090E	5476m	ORI SIDE NET START
A-8	03:36	10°01.620N	149°00.240E	5483m	ORI SIDE NET FINISH
A-8	03:58	10°02.190N	149°00.370E	5489m	IKPT NET FINISH & STOP ENGINES
X-7	07:45	11°00.180N	148°59.990E	5784m	XBT
B-11	09:04	11°21.170N	148°59.970E	5757m	IKPT NET START
B-11	09:13	11°21.870N	148°59.910E	5758m	IKPT NET DEEPEST
B-11	09:15	11°21.940N	148°59.900E	5758m	ORI SIDE NET START
B-11	09:31	11°22.580N	148°59.760E	5754m	ORI SIDE NET FINISH
B-11	09:43	11°23.080N	148°59.640E	5757m	IKPT NET FINISH
A-9	12:05	11°59.950N	148°59.980E	5776m	CTDO START
A-9	12:12	11°59.930N	148°59.920E	5775m	NORPAC NET START
A-9	12:25	11°59.780N	148°59.790E	5774m	NORPAC NET FINISH
A-9	12:25	11°59.780N	148°59.790E	5774m	NORPAC NET START
A-9	12:27	11°59.740N	148°59.790E	5774m	IKPT NET DEEPEST
A-9	12:38	11°59.560N	148°59.760E	5772m	NORPAC NET FINISH
A-9	12:41	11°59.530N	148°59.740E	5774m	NORPAC NET START
A-9	12:46	11°59.480N	148°59.700E	5774m	CTDO FINISH
A-9	12:48	11°59.450N	148°59.680E	5774m	NORPAC NET FINISH
A-9	12:57	11°59.550N	148°59.620E	5773m	IKPT NET START
A-9	13:16	12°00.980N	148°59.850E	5785m	IKPT NET DEEPEST
A-9	13:18	12°01.050N	148°59.850E	5790m	ORI SIDE NET START
A-9	13:37	12°01.620N	148°59.890E	5794m	ORI SIDE NET FINISH
A-9	13:50	12°01.990N	148°59.910E	5800m	IKPT NET FINISH
B-12	17:00	12°51.160N	149°00.010E	5798m	USED ENGINES VARIOUSLY
B-12	17:02	12°51.340N	149°00.000E	5797m	IKPT NET START
B-12	17:11	12°52.130N	148°59.930E	5788m	IKMT NET DEEPEST
B-12	17:12	12°52.170N	148°59.920E	5789m	ORI SIDE NET START
B-12	17:27	12°52.720N	148°59.760E	5791m	ORI SIDE NET FINISH
B-12	17:41	12°53.170N	148°59.630E	5792m	IKPT NET FINISH & SLOW AHEAD ENGINE
X-8	18:13	13°00.130N	148°59.980E	5830m	XBT
A-10	21:52	14°00.260N	148°59.970E	5875m	CTDO START
A-10	21:56	14°00.260N	148°59.880E	5876m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-10	21:58	14°00.250N	148°59.850E	5878m	NORPAC NET START
A-10	22:12	14°00.220N	148°59.750E	5878m	NORPAC NET FINISH
A-10	22:14	14°00.220N	148°59.740E	5876m	NORPAC NET START
A-10	22:15	14°00.210N	148°59.740E	5880m	CTDO DEEPEST
A-10	22:30	14°00.200N	148°59.710E	5878m	NORPAC NET FINISH
A-10	22:35	14°00.200N	148°59.700E	5877m	CTDO FINISH
A-10	22:40	14°00.160N	148°59.630E	5879m	IKPT NET START
A-10	23:00	14°01.690N	148°59.490E	5876m	IKPT NET DEEPEST
A-10	23:01	14°01.750N	148°59.480E	5880m	ORI SIDE NET START
A-10	23:21	14°02.480N	148°59.350E	5878m	ORI SIDE NET FINISH
A-10	23:34	14°02.930N	148°59.300E	5880m	IKPT NET FINISH
A-10	23:37	14°02.990N	148°59.280E	5881m	CHANGED PROPULSION TO DIESEL ENGINE
A-10	23:38	14°03.010N	148°59.280E	5880m	SLOW AHEAD ENGINES a/co to 360°

A-10	23:51	14°05.120N	148°59.550E	5604m	RUNG UP ENGINES
	----- 22 JUNE91 (GMT) -----				
X-9	03:09	14°59.930N	148°59.990E	5677m	XBT
A-11	06:48	15°59.550N	148°59.780E	4171m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-11	06:49	15°59.540N	148°59.750E	4170m	CTDO START
A-11	06:51	15°59.530N	148°59.720E	4143m	NORPAC NET START
A-11	07:04	15°59.460N	148°59.500E	4059m	NORPAC NET FINISH
A-11	07:10	15°59.420N	148°59.450E	4032m	NORPAC NET START
A-11	07:11	15°59.410N	148°59.450E	4013m	CTDO DEEPEST
A-11	07:19	15°59.360N	148°59.450E	3969m	NORPAC NET FINISH
A-11	07:29	15°59.260N	148°59.400E	3871m	CTDO FINISH
A-11	09:35	16°00.200N	148°59.400E		IKPT START
A-11	07:58	16°00.420N	148°59.120E	4294m	IKPT NET DEEPEST
A-11	07:58	16°00.420N	148°59.120E	4294m	ORI SIDE NET START
A-11	08:18	16°01.160N	148°58.960E	4444m	ORI SIDE NET FINISH
A-11	08:40	16°01.900N	148°58.800E	4155m	SUNSET & PUT ON REGULATION LIGHTS
A-11	08:40	16°01.900N	148°58.800E	4157m	IKPT NET FINISH
B-13	11:17	16°40.020N	148°59.950E	5036m	IKPT NET DEEPEST ORI SIDE NET START
B-13	11:31	16°40.790N	148°59.900E	5092m	ORI SIDE NET FINISH
B-13	11:56	16°42.240N	148°59.910E	5129m	IKPT NET FINISH
X-10	13:01	16°59.910N	149°00.000E	5429m	XBT
B-14	14:29	17°25.400N	148°59.990E	5469m	IKPT NET START
B-14	14:40	17°26.180N	148°59.960E	5459m	IKPT NET DEEPEST
B-14	14:41	17°26.190N	148°59.950E	5462m	ORI SIDE NET START
B-14	14:56	17°27.070N	148°59.890E	5495m	ORI SIDE NET FINISH
B-14	15:24	17°28.620N	148°59.830E	5518m	IKPT NET FINISH & SLOW AHEAD ENGINE
A-12	17:17	17°59.180N	149°00.100E	5598m	IKPT NET START
A-12	17:40	18°00.810N	149°00.120E	5613m	IKPT NET DEEPEST WIRE OUT 1200 M
A-12	17:42	18°00.880N	149°00.120E	5610m	ORI SIDE NET START
A-12	18:02	18°01.980N	149°00.170E	5603m	ORI SIDE NET FINISH
A-12	18:22	18°03.080N	149°00.240E	5638m	IKPT NET FINISH & STOP ENGINES
A-12	18:27	18°03.270N	149°00.240E	5631m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-12	18:32	18°03.380N	149°00.260E	5628m	CTDO START
A-12	18:35	18°03.460N	149°00.280E	5629m	NORPAC NET START
A-12	18:54	18°03.770N	149°00.280E	5630m	CTDO DEEPEST
A-12	19:04	18°03.900N	149°00.250E	5626m	NORPAC NET FINISH
A-12	19:04	18°03.910N	149°00.250E	5627m	NORPAC NET START
A-12	19:11	18°04.010N	149°00.220E	5627m	NORPAC NET FINISH
A-12	19:15	18°04.060N	149°00.210E	5629m	CTDO FINISH
X-11	22:42	19°00.680N	148°59.980E	5109m	XBT
	----- 23 JUNE91 (GMT) -----				
A-13	02:11	19°59.960N	148°59.870E	2794m	STOP ENGINES
A-13	02:11	19°59.970N	148°59.860E	2795m	CTDO START
A-13	02:15	20°00.000N	148°59.840E	2792m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-13	02:20	20°00.040N	148°59.740E	2778m	NORPAC NET START
A-13	02:32	20°00.070N	148°59.610E	2753m	CTDO DEEPEST
A-13	02:46	20°00.110N	148°59.560E	2733m	NORPAC NET START
A-13	02:51	20°00.110N	148°59.530E	2729m	CTDO FINISH

A-13	02:59	20°00.110N	148°59.460E	2709m	NORPAC NET FINISH
A-13	03:02	20°00.180N	148°59.490E	2703m	IKPT NET START
A-13	03:26	20°01.500N	148°59.730E	2668m	IKPT NET DEEPEST
A-13	03:27	20°01.550N	148°59.730E	2682m	ORI SIDE NET START
A-13	03:47	20°02.210N	148°59.710E	2595m	ORI SIDE NET FINISH
A-13	04:07	20°02.870N	148°59.660E	2419m	IKPT NET FINISH & STOP ENGINES
X-12	07:48	21°00.130N	149°00.010E	5101m	XBT
B-15	09:05	21°21.110N	149°00.000E	5342m	IKPT NET START
B-15	09:20	21°22.040N	149°00.020E	5348m	IKPT NET DEEPEST WIRE OUT 600M
B-15	09:21	21°22.070N	149°00.020E	5349m	ORI SIDE NET START
B-15	09:37	21°22.780N	149°00.080E	5355m	ORI SIDE NET FINISH
B-15	10:02	21°23.920N	149°00.190E	5361m	IKPT NET FINISH & SLOW AHEAD ENGINE
A-14	12:20	21°59.920N	148°59.760E	5571m	CTDO START
A-14	12:23	21°59.900N	148°59.760E	5569m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-14	12:31	21°59.840N	148°59.770E	5569m	NORPAC NET START
A-14	12:40	21°59.800N	148°59.770E	5569m	CTDO DEEPEST
A-14	12:40	21°59.800N	148°59.770E	5567m	NORPAC NET FINISH
A-14	12:44	21°59.780N	148°59.770E	5570m	NORPAC NET START
A-14	12:55	21°59.790N	148°59.760E	5568m	NORPAC NET FINISH
A-14	12:57	21°59.800N	148°59.750E	5568m	CTDO FINISH
A-14	13:00	21°59.800N	148°59.750E	5568m	NORPAC NET START
A-14	13:07	21°59.790N	148°59.750E	5568m	NORPAC NET FINISH
A-14	13:14	21°59.690N	148°59.600E	5572m	IKPT NET START
A-14	13:39	21°59.850N	148°58.260E	5559m	ORI SIDE NET START
A-14	13:40	21°59.840N	148°58.240E	5559m	IKPT NET DEEPEST
A-14	14:00	21°59.890N	148°57.460E	5555m	ORI SIDE NET FINISH
A-14	14:18	21°59.960N	148°56.740E	5558m	IKPT NET FINISH
A-14	14:22	21°59.970N	148°56.640E	5558m	CHANGED PROPULSION TO DIESEL ENGINE
B-16	15:30	22°00.320N	148°38.000E	5435m	USED COURSE VARIOUSLY USED ENGINES
B-16	15:32	22°00.300N	148°37.920E	5434m	IKPT NET START
B-16	15:43	22°00.240N	148°37.250E	5390m	IKPT NET DEEPEST
B-16	15:44	22°00.230N	148°37.210E	5378m	ORI SIDE NET START
B-16	15:59	22°00.120N	148°36.430E	5350m	ORI SIDE NET FINISH
B-16	16:25	21°59.900N	148°35.110E	5319m	IKPT NET FINISH & SLOW AHEAD ENGINE
B-17	17:32	22°00.370N	148°17.040E	5529m	IKPT NET START
B-17	17:44	22°00.430N	148°16.370E	5512m	IKPT NET DEEPEST
B-17	17:48	22°00.460N	148°16.170E	5524m	ORI SIDE NET START
B-17	18:00	22°00.490N	148°15.650E	5531m	ORI SIDE NET FINISH
B-17	18:27	22°00.480N	148°14.460E	5524m	IKPT NET FINISH & SLOW AHEAD ENGINE
----- 24 JUNE91 (GMT) -----					
B-18	10:05	22°05.010N	143°31.780E	2484m	IKPT NET START
B-18	10:17	22°05.210N	143°31.190E	2436m	IKPT NET DEEPEST WIRE OUT 600M
B-18	10:17	22°05.210N	143°31.190E	2441m	ORI SIDE NET START
B-18	10:33	22°05.360N	143°30.560E	2251m	ORI SIDE NET FINISH
B-18	10:58	22°05.580N	143°29.630E	1852m	a/co to 259°
B-18	10:59	22°05.580N	143°29.600E	1868m	IKPT NET FINISH & SLOW AHEAD ENGINE
A-15	12:49	22°00.090N	143°00.060E	3865m	STOP ENGINES
A-15	12:50	22°00.090N	143°00.070E	3856m	CTDO START

A-15	12:54	22°00.110N	143°00.090E	3869m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-15	12:58	22°00.130N	143°00.120E	3867m	NORPAC NET START
A-15	13:06	22°00.160N	143°00.180E	3878m	NORPAC NET FINISH
A-15	13:09	22°00.160N	143°00.190E	3881m	NORPAC NET START
A-15	13:11	22°00.170N	143°00.210E	3879m	CTDO DEEPEST
A-15	13:19	22°00.170N	143°00.270E	3888m	NORPAC NET FINISH
A-15	13:28	22°00.180N	143°00.320E	3901m	CTDO FINISH
A-15	13:34	22°00.070N	143°00.320E	3896m	IKPT NET START
A-15	13:56	21°59.200N	143°00.200E	3881m	IKPT NET DEEPEST
A-15	13:57	21°59.170N	143°00.190E	3877m	ORI SIDE NET START
A-15	14:18	21°58.780N	143°00.070E	3866m	ORI SIDE NET FINISH
A-15	14:36	21°58.380N	143°00.060E	3855m	IKPT NET FINISH
B-19	16:01	21°38.650N	143°00.020E	2857m	IKPT NET START
B-19	16:13	21°38.110N	143°00.110E	3038m	IKPT NET DEEPEST
B-19	16:15	21°38.060N	143°00.120E	3043m	ORI SIDE NET START
B-19	16:30	21°37.500N	143°00.230E	3152m	ORI SIDE NET FINISH
B-19	16:56	21°36.620N	143°00.230E	3119m	IKPT NET FINISH & SLOW AHEAD ENGINE
B-20	18:02	21°21.670N	142°59.730E	3009m	IKPT NET START
B-20	18:16	21°21.500N	142°59.110E	3049m	IKPT NET DEEPEST
B-20	18:16	21°21.500N	142°59.100E	3052m	ORI SIDE NET START
B-20	18:30	21°21.370N	142°58.590E	3203m	ORI SIDE NET FINISH
B-20	18:57	21°21.090N	142°57.700E	3411m	IKPT NET FINISH & SLOW AHEAD ENGINE
X-13	20:22	20°58.850N	143°00.010E	3833m	XBT
A-16	23:57	20°00.150N	142°59.860E	2580m	CTDO START
A-16	23:58	20°00.150N	142°59.860E	2575m	CHANGED PROPULSION TO ELCTRIC MOTOR

----- 25 JUNE91 (GMT) -----

A-16	00:03	20°00.140N	142°59.860E	2574m	NORPAC NET START
A-16	00:12	20°00.110N	142°59.940E	2558m	NORPAC NET FINISH
A-16	00:15	20°00.110N	142°59.960E	2558m	NORPAC NET START
A-16	00:19	20°00.110N	142°59.960E	2552m	CTDO DEEPEST
A-16	00:30	20°00.110N	142°59.920E	2556m	NORPAC NET FINISH
A-16	00:36	20°00.100N	142°59.940E	2559m	CTDO FINISH
A-16	00:46	19°59.750N	142°59.940E	2590m	IKPT NET START
A-16	01:08	19°58.710N	142°59.910E	2633m	IKPT NET DEEPEST
A-16	01:09	19°58.680N	142°59.910E	2630m	ORI SIDE NET START
A-16	01:30	19°58.090N	142°59.850E	2644m	ORI SIDE NET FINISH
A-16	01:48	19°57.610N	142°59.760E	2717m	IKPT NET FINISH
X-14	05:30	19°00.160N	142°52.730E	4068m	XBT
A-17	09:15	18°00.150N	142°45.010E	3217m	CTDO START
A-17	09:16	18°00.160N	142°44.990E	3225m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-17	09:19	18°00.190N	142°44.960E	3232m	NORPAC NET START
A-17	09:29	18°00.230N	142°44.870E	3239m	NORPAC NET FINISH
A-17	09:31	18°00.230N	142°44.860E	3237m	NORPAC NET START
A-17	09:38	18°00.240N	142°44.830E	3241m	CTDO DEEPEST
A-17	09:43	18°00.240N	142°44.810E	3239m	NORPAC NET FINISH
A-17	09:57	18°00.270N	142°44.740E	3277m	CTDO FINISH
A-17	10:01	18°00.320N	142°44.700E	3293m	IKPT NET START
A-17	10:25	17°59.500N	142°44.550E	3311m	IKPT NET DEEPEST WIRE OUT 1200M

A-17	10:25	17°59.480N	142°44.540E	3316m	ORI SIDE NET START
A-17	10:47	17°59.100N	142°44.270E	3322m	ORI SIDE NET FINISH
A-17	11:06	17°58.750N	142°44.030E	3256m	IKPT NET FINISH
B-21	11:59	17°47.740N	142°42.660E	3551m	IKPT NET START
B-21	12:10	17°47.310N	142°42.530E	3536m	IKPT NET DEEPEST
B-21	12:11	17°47.260N	142°42.510E	3537m	ORI SIDE NET START
B-21	12:26	17°46.930N	142°42.310E	3593m	ORI SIDE NET FINISH
B-21	12:51	17°46.300N	142°41.930E	3646m	IKPT NET FINISH
B-22	13:58	17°30.270N	142°44.020E	3640m	IKPT NET START
B-22	14:11	17°29.740N	142°43.980E	3693m	IKPT NET DEEPEST
B-22	14:11	17°29.730N	142°43.980E	3696m	ORI SIDE NET START
B-22	14:27	17°29.280N	142°43.860E	3717m	ORI SIDE NET FINISH
B-22	14:53	17°28.550N	142°43.720E	3702m	IKPT NET FINISH
B-23	16:00	17°13.350N	142°46.760E	2714m	IKPT NET START
B-23	16:13	17°12.840N	142°46.740E	2828m	IKPT NET DEEPEST
B-23	16:14	17°12.810N	142°46.730E	2837m	ORI SIDE NET START
B-23	16:29	17°12.510N	142°46.940E	2934m	ORI SIDE NET FINISH
B-23	16:55	17°12.020N	142°47.290E	3042m	IKPT NET FINISH & SLOW AHEAD ENGINE
X-15	17:47	17°00.220N	142°49.450E	2769m	XBT
B-24	17:58	16°58.240N	142°49.940E	2560m	IKPT NET START
B-24	18:11	16°58.470N	142°50.410E	2455m	IKPT NET DEEPEST
B-24	18:11	16°58.470N	142°50.420E	2448m	ORI SIDE NET START
B-24	18:26	16°58.740N	142°50.900E	2351m	ORI SIDE NET FINISH
B-24	18:53	16°59.220N	142°51.600E	2246m	IKPT NET FINISH & SLOW AHEAD ENGINE
A-18	22:40	15°59.880N	143°00.000E	2538m	CTDO START
A-18	22:43	15°59.890N	142°59.990E	2542m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-18	22:44	15°59.900N	142°59.990E	2542m	NORPAC NET START
A-18	22:58	15°59.940N	142°59.970E	2546m	NORPAC NET FINISH & NORPAC NET STAR
A-18	23:02	15°59.960N	142°59.950E	2548m	CTDO DEEPEST
A-18	23:13	15°59.920N	142°59.970E	2547m	NORPAC NET FINISH
A-18	23:22	15°59.870N	142°59.980E	2541m	CTDO FINISH
A-18	23:30	15°59.920N	142°59.730E	2583m	IKPT NET START
A-18	23:50	16°00.060N	142°58.880E	2637m	IKPT NET DEEPEST
A-18	23:50	16°00.060N	142°58.880E	2637m	ORI SIDE NET START
----- 26 JUNE91 (GMT) -----					
A-18	00:11	16°00.170N	142°58.400E	2737m	ORI SIDE NET FINISH
A-18	00:30	16°00.250N	142°57.990E	2705m	IKPT NET FINISH
G 1-D	04:16	15°00.465N	142°59.970E	2405m	HALF AHEAD ENGINES
G 1-D	04:20	15°00.130N	143°00.050E	2361m	STOP ENGINES
G 1-D	04:24	15°00.180N	142°59.970E	2371m	CHANGED PROPULSION TO ELCTRIC MOTOR
G 1-D	04:26	15°00.210N	142°59.910E	2379m	CTDO START
G-1-D	04:48	15°00.160N	142°59.730E	2395m	CTDO DEEPEST
G-1-D	05:03	15°00.090N	142°59.690E	2389m	CTDO FINISH
G-1-D	05:04	15°00.090N	142°59.680E	2386m	CTDO START AGAIN 2 ND TIME
G-1-D	05:26	14°59.980N	142°59.550E	2387m	CTDO DEEPEST
G-1-D	05:41	14°59.890N	142°59.500E	2372m	CTDO FINISH
G-1-D	05:47	15°00.000N	142°59.560E	2385m	IKPT NET START
G-1-D	05:59	15°00.170N	143°00.180E	2351m	IKPT NET DEEPEST

G-1-D	06:00	15°00.180N	143°00.210E	2344m	ORI SIDE NET START
G-1-D	06:15	15°00.530N	143°00.710E	2327m	ORI SIDE NET FINISH
G-1-D	06:41	15°00.990N	143°01.540E	1948m	IKPT NET FINISH
G-1-D	06:46	15°01.060N	143°01.670E	1972m	ORI NET START
G-1-D	06:54	15°01.170N	143°01.890E	1829m	ORI NET DEEPEST WIRE OUT 200M
G-1-D	07:19	15°01.550N	143°02.680E	1714m	ORI NET FINISH
G-1-D	07:22	15°01.580N	143°02.750E	1701m	ORI NET START
G-1-D	07:26	15°01.650N	143°02.900E	1674m	ORI NET DEEPEST WIRE OUT 100M
G-1-D	07:48	15°01.960N	143°03.590E	1721m	ORI NET FINISH
G-1-N	09:00	15°00.190N	142°59.930E	2374m	CTDO START
G-1-N	09:10	15°00.190N	142°59.800E	2387m	SUNSET & PUT ON REGULATION LIGHTS
G-1-N	09:22	15°00.130N	142°59.750E	2387m	CTDO DEEPEST
G-1-N	09:42	15°00.160N	142°59.550E	2417m	CTDO FINISH
G-1-N	09:47	15°00.170N	142°59.520E	2425m	ORI NET START (200M)
G-1-N	09:53	15°00.280N	142°59.640E	2426m	ORI NET DEEPEST WIRE OUT 200M
G-1-N	10:17	15°00.840N	143°00.370E	2379m	ORI NET FINISH
G-1-N	10:21	15°00.920N	143°00.480E	2344m	ORI NET START (100M)
G-1-N	10:24	15°01.010N	143°00.590E	2297m	ORI NET DEEPEST WIRE OUT 100M
G-1-N	10:47	15°01.530N	143°01.300E	2042m	ORI NET FINISH
G-1-N	10:53	15°01.670N	143°01.490E	1954m	IKPT NET START
G-1-N	11:06	15°02.100N	143°02.100E	1864m	IKPT NET DEEPEST
G-1-N	11:07	15°02.120N	143°02.130E	1864m	ORI NET START
G-1-N	11:23	15°02.560N	143°02.710E	1759m	ORI SIDE NET FINISH
G-1-N	11:46	15°03.220N	143°03.620E	1767m	IKPT NET FINISH
B-25	13:00	14°46.280N	143°02.750E	2750m	IKPT NET START
B-25	13:12	14°45.680N	143°02.620E	2775m	IKPT NET DEEPEST
B-25	13:12	14°45.670N	143°02.620E	2777m	ORI SIDE NET START
B-25	13:28	14°45.040N	143°02.370E	2738m	ORI SIDE NET FINISH
B-25	13:55	14°43.990N	143°02.030E	2753m	IKPT NET FINISH
B-25	13:55	14°43.990N	143°02.030E	2753m	SLOW AHEAD ENGINES
B-26	15:02	14°27.220N	143°00.990E	1957m	IKPT NET START
B-26	15:13	14°26.580N	143°00.950E	1904m	IKPT NET DEEPEST
B-26	15:14	14°26.540N	143°00.950E	1899m	ORI SIDE NET START
B-26	15:29	14°25.870N	143°00.790E	1894m	ORI SIDE NET FINISH
B-26	15:55	14°24.780N	143°00.520E	1854m	IKPT NET FINISH & SLOW AHEAD ENGINE
A-19	17:40	13°59.040N	143°00.050E	4311m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-19	17:41	13°59.040N	143°00.050E	4312m	USED COURSE VARIOUSLY USED ENGINES
A-19	17:42	13°59.080N	143°00.140E	4304m	IKPT NET START
A-19	18:04	13°59.700N	143°01.070E	4297m	IKPT NET DEEPEST WIRE OUT 1200 M
A-19	18:05	13°59.730N	143°01.100E	4296m	ORI SIDE NET START
A-19	18:26	14°00.150N	143°01.620E	4280m	ORI SIDE NET FINISH
A-19	18:45	14°00.550N	143°02.100E	4237m	IKPT NET FINISH
A-19	18:53	14°00.640N	143°02.040E	4250m	CTDO START
A-19	18:55	14°00.640N	143°02.010E	4252m	NORPAC NET START
A-19	19:07	14°00.660N	143°01.870E	4259m	NORPAC NET FINISH
A-19	19:10	14°00.650N	143°01.840E	4264m	NORPAC NET START
A-19	19:15	14°00.640N	143°01.820E	4267m	CTDO DEEPEST
A-19	19:24	14°00.620N	143°01.780E	4268m	NORPAC NET FINISH

A-19	19:33	14°00.590N	143°01.720E	4273m	CTDO FINISH
	----- 27 JUNE91 (GMT) -----				
D-1	01:25	13°01.140N	142°59.500E	3339m	MTD NET START
D-1	01:51	13°00.510N	142°59.360E	3331m	MTD NET (SURFACE) FINISH
D-1	02:08	13°00.090N	142°59.770E	3334m	CTDO START
D-1	02:30	12°59.980N	142°59.310E	3301m	CTDO DEEPEST
D-1	02:48	12°59.800N	142°59.100E	3316m	CTDO FINISH
D-1	02:55	12°59.860N	142°59.110E	3309m	IKPT NET START
D-1	04:06	13°00.220N	143°01.750E	3253m	IKPT NET DEEPEST
D-1	04:09	13°00.230N	143°01.830E	3250m	MTD SURFACE NET START
D-1	04:40	13°00.360N	143°02.470E	3233m	MTD SURFACE NET FINISH
D-1	04:43	13°00.370N	143°02.530E	3231m	MTD SURFACE NET START
D-1	05:16	13°00.490N	143°03.260E	3222m	MTD SURFACE NET FINISH
D-1	05:19	13°00.500N	143°03.330E	3221m	MTD SURFACE NET START
D-1	06:07	13°00.660N	143°04.500E	3276m	MTD SURFACE NET FINISH
D-1	06:17	13°00.690N	143°04.720E	3293m	IKPT NET FINISH
B-27	09:00	13°00.000N	142°59.950E	3296m	CTDO START
B-27	09:21	12°59.900N	142°59.750E	3332m	CTDO DEEPEST
B-27	09:39	12°59.740N	142°59.630E	3327m	CTDO FINISH
B-27	09:46	12°59.770N	142°59.560E	3325m	IKPT NET START
B-27	09:58	13°00.020N	143°00.030E	3285m	IKPT NET DEEPEST WIRE OUT 600M
B-27	09:59	13°00.020N	143°00.030E	3284m	ORI SIDE NET START
B-27	10:15	13°00.340N	143°00.550E	3263m	ORI SIDE NET FINISH
B-27	10:40	13°00.820N	143°01.350E	3268m	IKPT NET FINISH
B-28	11:59	12°42.890N	142°59.870E	3040m	IKPT NET START
B-28	12:11	12°42.420N	142°59.830E	3101m	IKPT NET DEEPEST
B-28	12:11	12°42.410N	142°59.830E	3099m	ORI SIDE NET START
B-28	12:26	12°41.930N	142°59.640E	2975m	ORI SIDE NET FINISH
B-28	12:53	12°41.020N	142°59.430E	3074m	IKPT NET FINISH
B-29	14:29	12°16.440N	143°00.010E	3799m	IKPT NET START
B-29	14:40	12°15.920N	142°59.830E	3799m	IKPT NET DEEPEST
B-29	14:41	12°15.910N	142°59.820E	3805m	ORI SIDE NET START
B-29	14:56	12°15.340N	142°59.500E	3816m	ORI SIDE NET FINISH
B-29	15:23	12°14.340N	142°59.060E	3885m	IKPT NET FINISH
A-20	16:19	12°01.340N	142°59.960E	3973m	STOP ENGINES
A-20	16:23	12°01.240N	142°59.970E	4048m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-20	16:25	12°01.180N	143°00.000E	4063m	IKPT NET START
A-20	16:49	12°00.150N	143°00.120E	4217m	IKPT NET DEEPEST WIRE OUT 1200 M
A-20	16:51	12°00.100N	143°00.120E	4216m	ORI SIDE NET START
A-20	17:11	11°59.550N	143°00.030E	4177m	ORI SIDE NET FINISH
A-20	17:30	11°59.040N	142°59.940E	4166m	IKPT NET FINISH
A-20	17:38	11°59.060N	142°59.800E	4151m	CTDO START
A-20	17:41	11°59.090N	142°59.720E	4137m	NORPAC NET START
A-20	17:47	11°59.120N	142°59.590E	4123m	CTDO START AGAIN
A-20	18:10	11°59.160N	142°59.270E	4141m	NORPAC NET FINISH
A-20	18:10	11°59.160N	142°59.270E	4141m	CTDO DEEPEST
A-20	18:25	11°59.170N	142°59.130E	4139m	CTDO FINISH
	----- 28 JUNE91 (GMT) -----				

G-2-D	01:31	11°00.060N	143°00.020E	6268m	CTDO START
G-2-D	02:10	11°00.510N	142°59.500E	6292m	CTDO DEEPEST
G-2-D	02:30	11°00.600N	142°59.160E	6323m	CTDO FINISH
G-2-D	02:39	11°00.730N	142°59.110E	6367m	ORI NET START (160M)
G-2-D	02:48	11°00.780N	142°59.330E	6348m	ORI NET DEEPEST
G-2-D	03:06	11°00.870N	142°59.760E	6329m	ORI NET FINISH WIRE OUT 160 M
G-2-D	03:13	11°00.900N	142°59.920E	6326m	ORI NET START WIRE OUT 80
G-2-D	03:35	11°00.980N	143°00.420E	6321m	ORI NET FINISH
G-2-D	03:44	11°00.980N	143°00.730E	6312m	IKPT NET START WIRE OUT 4000 M
G-2-D	04:07	11°01.010N	143°01.750E	6339m	MTD SURFACE NET START
G-2-D	04:28	11°01.010N	143°02.550E	6359m	PICKED UP DRIFTING BOTTOLE
G-2-D	04:55	11°01.090N	143°03.620E	6350m	IKPT NET DEEPEST
G-2-D	05:22	11°01.240N	143°04.240E	6337m	MTD SURFACE NET FINISH
G-2-D	05:26	11°01.260N	143°04.340E	6336m	MTD SURFACE NET START
G-2-D	05:39	11°01.260N	143°04.660E	6341m	PICKED UP DRIFTING BUOY
G-2-D	06:48	11°01.380N	143°06.690E	6210m	MTD SURFACE NET FINISH
G-2-D	07:05	11°01.420N	143°07.100E	6131m	IKPT NET FINISH
G-2-N	09:01	10°59.670N	143°00.070E	6249m	IKPT NET START
G-2-N	09:14	10°59.240N	143°00.270E	6230m	IKPT NET DEEPEST
G-2-N	09:15	10°59.210N	143°00.280E	6227m	ORI SIDE NET START
G-2-N	09:30	10°58.740N	143°00.480E	6198m	ORI SIDE NET FINISH
G-2-N	09:56	10°57.930N	143°00.760E	6093m	IKPT NET FINISH
G-2-N	10:01	10°57.850N	143°00.720E	6102m	ORI NET START (160M)
G-2-N	10:06	10°57.730N	143°00.670E	6103m	ORI NET DEEPEST & COM'CED TOWING
G-2-N	10:30	10°57.050N	143°00.390E	6060m	ORI NET FINISH
G-2-N	10:33	10°56.940N	143°00.350E	6055m	ORI NET START (80M)
G-2-N	10:37	10°56.850N	143°00.310E	6053m	ORI NET DEEPEST & COM'CED TOWING
G-2-N	11:00	10°56.280N	143°00.050E	6006m	ORI NET FINISH
A-21	14:37	10°00.120N	143°00.190E	4741m	STOP ENGINES
A-21	14:37	10°00.120N	143°00.190E	4740m	CTDO START
A-21	14:40	10°00.130N	143°00.190E	4740m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-21	14:40	10°00.130N	143°00.190E	4739m	NORPAC NET START
A-21	14:51	10°00.140N	143°00.160E	4740m	NORPAC NET FINISH
A-21	14:51	10°00.140N	143°00.160E	4740m	NORPAC NET START
A-21	14:57	10°00.150N	143°00.150E	4740m	CTDO DEEPEST
A-21	15:04	10°00.170N	143°00.130E	4742m	NORPAC NET FINISH
A-21	15:12	10°00.210N	143°00.120E	4740m	CTDO FINISH
A-21	15:18	10°00.300N	142°59.930E	4740m	IKPT NET START WIRE OUT 1200 M
A-21	15:40	10°00.440N	142°58.820E	4741m	IKPT NET DEEPEST
A-21	15:41	10°00.450N	142°58.780E	4741m	ORI SIDE NET START
A-21	16:01	10°00.590N	142°58.080E	4734m	ORI SIDE NET FINISH
A-21	16:21	10°00.750N	142°57.370E	4731m	IKPT NET FINISH & STOP ENGINES

----- 29 JUNE91 (GMT) -----

A-22	13:35	10°00.200N	137°00.100E	4914m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-22	13:36	10°00.200N	137°00.100E	4909m	CTDO START
A-22	13:42	10°00.240N	137°00.120E	4876m	NORPAC NET START
A-22	13:51	10°00.310N	137°00.140E	4825m	NORPAC NET FINISH
A-22	13:53	10°00.320N	137°00.140E	4810m	NORPAC NET START

A-22	13:58	10°00.360N	137°00.150E	4796m	CTDO DEEPEST
A-22	14:04	10°00.400N	137°00.170E	4785m	NORPAC NET FINISH
A-22	14:15	10°00.470N	137°00.190E	4757m	CTDO FINISH
A-22	14:21	10°00.640N	137°00.200E	4730m	IKPT NET START
A-22	14:43	10°01.880N	137°00.280E	4800m	IKPT NET DEEPEST
A-22	14:43	10°01.890N	137°00.280E	4798m	ORI SIDE NET START
A-22	15:04	10°02.690N	137°00.230E	4876m	ORI SIDE NET FINISH
A-22	15:25	10°03.500N	137°00.120E	4838m	IKPT NET FINISH & STOP ENGINES
A-23	22:31	12°00.280N	137°00.080E	5287m	CTDO START
A-23	22:34	12°00.280N	137°00.050E	5284m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-23	22:35	12°00.280N	137°00.040E	5290m	NORPAC NET START
A-23	22:48	12°00.240N	136°59.990E	5288m	NORPAC NET FINISH
A-23	22:50	12°00.230N	136°59.990E	5287m	NORPAC NET START
A-23	23:00	12°00.140N	137°00.050E	5282m	NORPAC NET FINISH
A-23	23:09	12°00.070N	137°00.070E	5278m	CTDO FINISH (FAILURE)
A-23	23:18	12°00.070N	137°00.050E	5274m	IKPT NET START
A-23	23:40	12°01.130N	137°00.050E	5313m	IKPT NET DEEPEST
A-23	23:41	12°01.160N	137°00.050E	5313m	ORI SIDE NET START
	----- 30 JUNE91 (GMT) -----				
A-23	00:02	12°01.800N	137°00.040E	5307m	ORI SIDE NET FINISH
A-23	00:21	12°02.410N	137°00.060E	5183m	IKPT NET FINISH
A-23	00:32	12°02.410N	137°00.060E	5185m	CTDO START
A-23	00:46	12°02.440N	137°00.070E	5180m	CTDO DEEPEST
A-23	00:57	12°02.460N	137°00.090E	5177m	CTDO FINISH
A-23	01:02	12°02.470N	137°00.110E	5181m	CHANGED PROPULSION TO DIESEL ENGINE
A-23	01:03	12°02.470N	137°00.120E	5180m	SLOW AHEAD ENGINES s/co on 360°
A-23	01:16	12°04.660N	137°00.150E	4877m	RUNG UP ENGINES
X-16	04:45	12°59.920N	136°59.980E	4923m	CTDO START
X-16	04:47	12°59.920N	136°59.970E	4924m	CHANGED PROPULSION TO ELCTRIC MOTOR
X-16	05:09	12°59.780N	136°59.800E	4923m	CTDO DEEPEST WIRE OUT 1000 M
X-16	05:30	12°59.740N	136°59.740E	4922m	CTDO FINISH
A-24	09:34	14°00.220N	136°59.920E	4703m	CTDO START
A-24	09:37	14°00.190N	136°59.840E	4732m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-24	09:39	14°00.180N	136°59.770E	4749m	NORPAC NET START
A-24	09:48	14°00.100N	136°59.620E	4816m	NORPAC NET FINISH
A-24	09:51	14°00.050N	136°59.580E	4843m	NORPAC NET START
A-24	09:56	14°00.000N	136°59.530E	4874m	CTDO DEEPEST
A-24	10:07	13°59.870N	136°59.400E	4937m	NORPAC NET FINISH
A-24	10:16	13°59.770N	136°59.270E	4980m	CTDO FINISH
A-24	10:21	13°59.850N	136°59.150E	5002m	IKPT NET START
A-24	10:45	14°00.860N	136°58.650E	5036m	IKPT NET DEEPEST WIRE OUT 1200M
A-24	10:45	14°00.870N	136°58.650E	5036m	ORI SIDE NET START
A-24	11:05	14°01.470N	136°58.200E	4955m	ORI SIDE NET FINISH
A-24	11:25	14°02.010N	136°57.790E	4529m	IKPT NET FINISH
A-24	11:28	14°02.030N	136°57.730E	4498m	CHANGED PROPULSION TO DIESEL ENGINE
A-24	11:28	14°02.030N	136°57.720E	4502m	SLOW AHEAD ENGINES s/co on 15°
B-30	12:03	14°08.980N	137°00.280E	5130m	IKPT NET START

B-30 12:17 14°09.550N 137°00.310E 5088m IKPT NET DEEPEST
B-30 12:17 14°09.560N 137°00.310E 5088m ORI SIDE NET START
B-30 12:33 14°10.130N 137°00.210E 5009m ORI SIDE NET FINISH
B-30 12:59 14°11.100N 137°00.110E 5027m IKPT NET FINISH
B-31 13:34 14°18.640N 137°00.140E 5011m IKPT NET START
B-31 13:43 14°18.960N 137°00.170E 5017m IKPT NET DEEPEST
B-31 13:44 14°19.000N 137°00.170E 5012m ORI SIDE NET START
B-31 13:59 14°19.430N 137°00.130E 5051m IKPT NET (250M)
B-31 14:00 14°19.450N 137°00.130E 5051m ORI SIDE NET FINISH
B-31 14:13 14°19.800N 137°00.060E 5077m IKPT NET (100M)
B-31 14:27 14°20.190N 137°00.030E 5060m IKPT NET FINISH
B-32 15:01 14°27.570N 137°00.080E 4691m HALF AHEAD ENGINES
B-32 15:03 14°27.900N 137°00.100E 4621m USED ENGINES VARIOUSLY USED COURSE
B-32 15:05 14°28.020N 137°00.140E 4621m IKPT NET START
B-32 15:18 14°28.580N 137°00.220E 4611m IKPT NET DEEPEST
B-32 15:19 14°28.600N 137°00.220E 4611m ORI SIDE NET START
B-32 15:34 14°29.170N 137°00.220E 4545m ORI SIDE NET FINISH
B-32 15:59 14°30.100N 137°00.250E 4462m IKPT NET FINISH
B-33 16:31 14°36.050N 137°00.440E 4356m IKPT NET START
B-33 16:40 14°36.500N 137°00.380E 4396m IKPT NET DEEPEST WIRE OUT 400 M
B-33 16:41 14°36.520N 137°00.370E 4405m ORI SIDE NET START
B-33 16:56 14°37.010N 137°00.170E 4458m ORI SIDE NET FINISH
B-33 17:25 14°37.840N 136°59.870E 4598m IKPT NET FINISH
B-34 18:01 14°45.370N 137°00.130E 5195m IKPT NET START
B-34 18:13 14°45.980N 137°00.120E 5224m IKPT NET DEEPEST
B-34 18:34 14°46.870N 137°00.050E 5247m ORI SIDE NET FINISH
B-34 18:56 14°47.790N 136°59.860E 5256m IKPT NET FINISH & SLOW AHEAD ENGINE
B-35 20:01 14°58.520N 137°00.050E 5231m IKPT NET START
B-35 20:14 14°57.890N 136°59.840E 5283m IKPT NET DEEPEST
B-35 20:28 14°57.300N 136°59.590E 5306m SUNRISE & PUT OFF REGULAION LIGHTS
B-35 20:56 14°56.240N 136°59.080E 5327m IKPT NET FINISH
C-1 21:08 14°55.950N 136°58.890E 5326m IKPT NET START
C-1 21:31 14°54.810N 136°58.470E 5140m IKPT NET DEEPEST WIRE OUT 1200M
C-1 22:16 14°53.470N 136°57.600E 4953m IKPT NET FINISH
C-2 22:54 14°53.200N 136°57.410E 4986m IKPT NET START
C-2 23:17 14°52.130N 136°57.040E 4857m IKPT NET DEEPEST WIRE OUT 1200M
C-2 23:58 14°51.260N 136°56.240E 4914m IKPT NET FINISH
----- 01 JULY91 (GMT) -----
C-3 00:04 14°51.130N 136°56.140E 4917m IKPT NET START
C-3 00:27 14°50.070N 136°55.730E 5148m IKPT NET DEEPEST (1200M)
C-3 01:09 14°49.100N 136°54.950E 4953m IKPT NET FINISH
C-4 01:14 14°48.950N 136°54.850E 4928m IKPT NET START
C-4 01:39 14°47.770N 136°54.410E 4848m IKPT NET DEEPEST (1200M)
C-4 02:20 14°46.630N 136°53.570E 5402m IKPT NET FINISH
C-5 02:24 14°46.590N 136°53.490E 5395m CHANGED PROPULSION TO ELCTRIC MOTOR
C-5 02:38 14°46.540N 136°53.170E 5370m MTD NET START
C-5 03:24 14°46.490N 136°52.250E 5288m MTD NET START TO TOWING
C-5 03:55 14°46.570N 136°51.030E 5323m MTD NET MESS CAST

C-5	04:26	14°46.500N	136°50.530E	5259m	MTD NET FINISH
C-6	04:39	14°46.500N	136°50.250E	5211m	CTDO START
C-6	05:03	14°46.420N	136°49.860E	5066m	CTDO DEEPEST
C-6	05:17	14°46.350N	136°49.740E	5073m	CTDO FINISH
A-25	09:05	15°45.590N	136°58.000E	4824m	CTDO START
A-25	09:08	15°45.620N	136°57.940E	4821m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-25	09:10	15°45.640N	136°57.910E	4822m	NORPAC NET START
A-25	09:22	15°45.680N	136°57.770E	4830m	NORPAC NET FINISH
A-25	09:24	15°45.680N	136°57.760E	4827m	NORPAC NET START
A-25	09:29	15°45.680N	136°57.720E	4831m	SUNSET & PUT ON REGULATION LIGHTS
A-25	09:30	15°45.680N	136°57.720E	4827m	CTDO DEEPEST
A-25	09:35	15°45.650N	136°57.670E	4810m	NORPAC NET FINISH
A-25	09:50	15°45.650N	136°57.560E	4794m	CTDO FINISH
A-25	09:57	15°45.760N	136°57.470E	4804m	IKPT NET START
A-25	10:19	15°47.050N	136°57.250E	5002m	IKPT NET DEEPEST
A-25	10:20	15°47.080N	136°57.240E	4994m	ORI SIDE NET START
A-25	10:41	15°47.810N	136°56.910E	5070m	ORI SIDE NET FINISH
A-25	11:00	15°48.490N	136°56.580E	5166m	IKPT NET FINISH
B-36	11:05	15°48.650N	136°56.490E	5173m	IKPT NET START
B-36	11:17	15°49.320N	136°56.300E	5188m	IKPT NET DEEPEST (600M)
B-36	11:18	15°49.360N	136°56.300E	5190m	ORI SIDE NET START
B-36	11:33	15°50.100N	136°56.110E	5203m	ORI SIDE NET FINISH
B-36	11:58	15°51.330N	136°55.790E	5121m	IKPT NET FINISH
C-6	12:09	15°51.800N	136°55.670E	5173m	IKPT NET START
C-6	12:22	15°52.520N	136°55.540E	5229m	IKPT NET DEEPEST (600M)
C-6	12:23	15°52.530N	136°55.540E	5228m	ORI SIDE NET START
C-6	12:41	15°53.000N	136°55.340E	5165m	ORI SIDE NET FINISH
C-6	12:43	15°53.050N	136°55.330E	5155m	IKPT NET FINISH
C-7	12:51	15°53.150N	136°55.560E	5227m	IKPT NET START
C-7	13:02	15°52.650N	136°55.690E	5232m	IKPT NET DEEPEST (600M)
C-7	13:02	15°52.650N	136°55.690E	5235m	ORI SIDE NET START
C-7	13:18	15°52.330N	136°55.680E	5235m	ORI SIDE NET FINISH
C-7	13:24	15°52.200N	136°55.680E	5227m	IKPT NET FINISH
C-8	13:30	15°51.950N	136°55.760E	5197m	IKPT NET START
C-8	13:42	15°51.430N	136°55.940E	5142m	IKPT NET DEEPEST (600M)
C-8	13:43	15°51.410N	136°55.950E	5142m	ORI SIDE NET START
C-8	13:58	15°51.080N	136°55.950E	5170m	ORI SIDE NET FINISH
C-8	14:04	15°50.940N	136°55.940E	5194m	IKPT NET FINISH
C-9	14:09	15°50.750N	136°55.840E	5192m	IKPT NET START
C-9	14:21	15°50.360N	136°55.530E	5174m	IKPT NET DEEPEST (600)
C-9	14:21	15°50.360N	136°55.530E	5173m	ORI SIDE NET START
C-9	14:36	15°50.170N	136°55.250E	5101m	ORI SIDE NET FINISH
C-9	14:42	15°50.110N	136°55.160E	5105m	IKPT NET FINISH
C-10	14:57	15°50.140N	136°55.000E	5104m	MTD NET START
C-10	15:32	15°50.440N	136°54.684E	5054m	MTD NET START TO TOWING
C-10	16:01	15°50.660N	136°53.870E	4820m	MTD NET MESS CAST
C-10	16:29	15°50.760N	136°53.750E	4862m	MTD NET FINISH
C-11	16:41	15°50.680N	136°54.070E	4759m	IKPT NET START

C-11	16:48	15°50.490N	136°54.390E	4829m	IKPT NET DEEPEST W.O. 300M & TOWING
C-11	16:56	15°50.350N	136°54.590E	5007m	W.O. 400M & TOWING 10'
C-11	17:09	15°50.080N	136°54.960E	5107m	W.O. 300M & TOWING 10'
C-11	17:22	15°49.820N	136°55.310E	5105m	W.O. 200M & TOWING 10'
C-11	17:39	15°49.530N	136°55.660E	5165m	IKPT NET FINISH
C-12	18:06	15°50.600N	136°54.560E	4936m	IKPT NET START
C-12	18:15	15°50.800N	136°54.030E	4755m	IKPT W.O. 250 M & TOWING 20'
C-12	18:43	15°51.240N	136°52.970E	5026m	IKPT NET FINISH
C-13	18:48	15°51.310N	136°52.780E	5060m	IKPT NET START
C-13	18:55	15°51.460N	136°52.390E	5081m	IKPT NET DEEPEST
C-13	19:14	15°51.790N	136°51.620E	4974m	WIRE OUT 215M
C-13	19:35	15°52.120N	136°50.920E	5085m	IKPT NET FINISH
C-14	19:42	15°52.190N	136°50.970E	5082m	IKPT NET START
C-14	19:49	15°52.100N	136°51.280E	5023m	IKPT NET DEEPEST WIRE OUT 284M
C-14	19:56	15°52.000N	136°51.440E	4984m	WIRE OUT 226M
C-14	20:23	15°51.610N	136°52.160E	5058m	SUNRISE & PUT OFF REGULAION LIGHTS
C-14	20:28	15°51.580N	136°52.210E	5058m	IKPT NET FINISH
C-15	20:33	15°51.530N	136°52.340E	5063m	IKPT NET START
C-15	20:39	15°51.430N	136°52.600E	5099m	IKPT NET DEEPEST WIRE OUT 260M
C-15	20:55	15°51.240N	136°52.980E	5018m	WIRE OUT 276M
C-15	21:20	15°50.960N	136°53.490E	4919m	IKPT NET FINISH
C-15	21:34	15°51.040N	136°53.460E	4955m	VAN DORN SAMPLING START
C-15	22:23	15°51.070N	136°53.070E	5028m	VANDORN SAMPLING FINISH
C-16	22:32	15°51.090N	136°52.880E	5038m	MTD NET START
C-16	23:22	15°51.240N	136°53.000E	5010m	MTD NET START TO TOWING
C-16	23:24	15°51.240N	136°53.070E	4994m	MTD SURFACE NET START
C-16	23:51	15°51.320N	136°53.530E	4889m	MTD NET MESS CAST
	----- 02 JULY91 (GMT) -----				
C-16	00:23	15°51.410N	136°53.570E	4871m	MTD NET FINISH
K-1	02:34	15°50.080N	136°51.860E	5153m	CTDO START
K-1	02:46	15°50.230N	136°51.670E	5150m	CTDO DEEPEST 500M
K-1	02:55	15°50.200N	136°51.550E	5146m	CTDO FINISH
K-2	03:26	15°51.570N	136°52.970E	4986m	RELEASE OF ARGOS BUOY SHORT
K-2	03:34	15°51.840N	136°52.950E	4930m	RELEASE OF ARGOS BUOY LONG
K-3	03:48	15°53.060N	136°54.000E	4593m	CTDO START
K-3	04:01	15°53.160N	136°53.820E	4711m	CTDO DEEPEST WIRE OUT 500 M
K-3	04:04	15°53.140N	136°53.830E	4694m	CORRECT CTDO WIRE OUT 500 M
K-3	04:08	15°53.160N	136°53.780E	4729m	CTDO FINISH
X-17	08:12	16°59.960N	136°59.940E	4809m	CTDO START
X-17	08:14	16°59.960N	136°59.920E	4810m	CHANGED PROPULSION TO ELCTRIC MOTOR
X-17	08:31	16°59.930N	136°59.830E	4786m	CTDO DEEPEST
X-17	08:51	16°59.800N	136°59.770E	4704m	CTDO FINISH
B-37	12:04	17°26.260N	137°00.040E	4972m	STOP ENGINES
B-37	12:08	17°26.280N	136°59.980E	4966m	CHANGED PROPULSION TO ELCTRIC MOTOR
B-37	12:12	17°26.380N	136°59.860E	4976m	IKPT NET START
B-37	12:24	17°26.990N	136°59.860E	4979m	IKPT NET DEEPEST (600M)
B-37	12:25	17°27.040N	136°59.860E	4981m	ORI SIDE NET START
B-37	12:40	17°27.710N	136°59.810E	4919m	ORI NET FINISH

B-37	13:05	17°28.740N	136°59.790E	4957m	IKPT NET FINISH
C-17	13:39	17°33.800N	137°00.080E	4814m	IKPT NET START
C-17	13:51	17°34.370N	137°00.070E	4877m	IKPT NET DEEPEST (600M)
C-17	14:04	17°34.650N	136°59.910E	4888m	IKPT NET (230M)
C-17	14:34	17°35.620N	136°59.960E	4960m	IKPT NET FINISH
C-18	14:39	17°35.880N	136°59.970E	4925m	IKPT NET START
C-18	14:45	17°36.150N	137°00.000E	4958m	IKPT NET (228M)
C-18	15:13	17°37.000N	136°59.990E	4912m	IKPT NET FINISH
C-19	15:21	17°37.070N	137°00.070E	4955m	MTD NET START
C-19	16:05	17°37.120N	137°00.390E	4992m	MTD NET START TO TOWING
C-19	16:09	17°37.200N	137°00.530E	4998m	MTD SURFACE NET START
C-19	16:35	17°37.580N	137°01.000E	5010m	MTD SURFACE NET FINISH
C-19	16:37	17°37.620N	137°01.030E	5015m	MTD NET MESS CAST
C-19	17:07	17°37.680N	137°01.000E	5014m	MTD NET FINISH
C-20	17:14	17°37.960N	137°00.980E	5026m	IKPT NET START
C-20	17:17	17°38.130N	137°00.960E	5040m	MTD SURFACE NET START
C-20	17:18	17°38.180N	137°00.960E	5041m	IKPT NET DEEPEST W.O. 150 M
C-20	17:42	17°38.870N	137°00.800E	4804m	MTD SURFACE NET FINISH
C-20	17:57	17°40.430N	137°00.570E	4971m	IKPT NET FINISH AT 0245
A-26	18:20	17°43.940N	137°00.320E	5022m	IKPT NET START
A-26	18:43	17°44.970N	137°00.170E	5184m	IKPT NET DEEPEST W.O. 1200 M
A-26	18:44	17°45.010N	137°00.160E	5188m	ORI SIDE NET START
A-26	19:05	17°45.620N	137°00.030E	5175m	ORI SIDE NET FINISH
A-26	19:25	17°46.150N	137°00.050E	5162m	IKPT NET FINISH
A-26	19:33	17°46.180N	136°59.990E	5165m	CTDO START
A-26	19:37	17°46.160N	136°59.970E	5170m	NORPAC NET START
A-26	19:46	17°46.120N	136°59.910E	5180m	NORPAC NET FINISH
A-26	19:51	17°46.090N	136°59.870E	5187m	NORPAC NET START
A-26	19:54	17°46.080N	136°59.850E	5186m	CTDO DEEPEST
A-26	20:03	17°46.040N	136°59.770E	5182m	NORPAC NET FINISH
A-26	20:14	17°45.990N	136°59.640E	5189m	CTDO FINISH
C-21	23:13	17°45.140N	136°57.010E	4926m	MTD NET START
C-21	23:53	17°45.240N	136°56.920E	4871m	MTD NET START TO TOWING
----- 03 JULY91 (GMT) -----					
C-21	00:22	17°45.490N	136°57.350E	4770m	MTD NET MESS CAST
C-21	00:55	17°45.300N	136°57.500E	4965m	MTD NET FINISH
X-18	06:12	18°59.920N	136°59.830E	4744m	CTDO START
X-18	06:13	18°59.930N	136°59.800E	4760m	CHANGED PROPULSION TO ELCTRIC MOTOR
X-18	06:33	19°00.020N	136°59.600E	4767m	CTDO DEEPEST
X-18	06:48	19°00.010N	136°59.600E	4769m	CTDO FINISH
B-38	09:06	19°00.490N	136°59.380E	4742m	IKPT NET START
B-38	09:18	19°01.230N	136°59.310E	4700m	IKPT NET DEEPEST WIRE OUT 600M
B-38	09:19	19°01.270N	136°59.300E	4708m	ORI SIDE NET START
B-38	09:35	19°02.100N	136°59.230E	4764m	ORI SIDE NET FINISH
B-38	09:35	19°02.110N	136°59.230E	4764m	SUNSET & PUT ON REGULATION LIGHTS
B-38	10:00	19°03.400N	136°59.210E	4756m	IKPT NET FINISH
C-22	10:09	19°03.720N	136°59.160E	4770m	IKPT NET START
C-22	10:13	19°03.990N	136°59.170E	4773m	IKPT NET DEEPEST WIRE OUT 120M

C-22	10:33	19°04.980N	136°59.110E	4673m	COM'CED HEAVING UP
C-22	10:39	19°05.190N	136°59.080E	4652m	IKPT NET FINISH
C-22	10:43	19°05.320N	136°59.050E	4690m	CHANGED PROPULSION TO DIESEL ENGINE
B-39	11:02	19°08.300N	136°59.450E	4635m	IKPT NET START
B-39	11:14	19°09.030N	136°59.510E	4635m	IKPT NET DEEPEST WIRE OUT 600M
B-39	11:15	19°09.080N	136°59.520E	4635m	ORI SIDE NET START
B-39	11:30	19°09.750N	136°59.600E	4651m	ORI SIDE NET FINISH
B-39	11:56	19°10.900N	136°59.840E	4521m	IKPT NET FINISH
C-23	12:04	19°11.350N	136°59.940E	4495m	IKPT NET START
C-23	12:07	19°11.560N	136°59.940E	4501m	MTD SURFACE NET START
C-23	12:07	19°11.600N	136°59.940E	4494m	IKPT NET DEEPEST (120M)
C-23	12:18	19°12.090N	136°59.940E	4472m	IKPT NET (105M)
C-23	12:30	19°12.610N	136°59.940E	4420m	MTD SURFACE NET FINISH
C-23	12:33	19°12.720N	136°59.940E	4484m	IKPT NET FINISH
C-24	15:47	20°00.040N	137°00.020E	4763m	IKPT NET START
C-24	15:52	20°00.320N	137°00.050E	4755m	IKPT NET DEEPEST W.O. 140 M
C-24	16:19	20°01.380N	137°00.250E	4612m	IKPT NET FINISH
B-40	16:26	20°01.680N	137°00.330E	4627m	IKPT NET START
B-40	16:38	20°02.290N	137°00.460E	4666m	IKPT NET DEEPEST W.O. 600 M
B-40	16:39	20°02.330N	137°00.470E	4668m	ORI SIDE NET START
B-40	16:54	20°02.960N	137°00.650E	4694m	ORI SIDE NET FINISH
B-40	17:19	20°03.960N	137°00.920E	4642m	IKPT NET FINISH
A-27	17:26	20°04.270N	137°00.940E	4632m	IKPT NET START
A-27	17:49	20°05.450N	137°00.820E	4648m	IKPT NET DEEPEST W.O. 1200 M
A-27	17:51	20°05.490N	137°00.820E	4642m	ORI SIDE NET START
A-27	18:11	20°06.150N	137°00.820E	4509m	ORI SIDE NET FINISH
A-27	18:31	20°06.800N	137°00.800E	4376m	IKPT NET FINISH
A-27	18:42	20°06.850N	137°00.840E	4407m	CTDO START
A-27	18:44	20°06.850N	137°00.850E	4409m	NORPAC NET START
A-27	18:57	20°06.880N	137°00.940E	4443m	NORPAC NET FINISH
A-27	18:58	20°06.880N	137°00.940E	4434m	NORPAC NET START
A-27	19:04	20°06.940N	137°00.980E	4470m	CTDO DEEPEST
A-27	19:12	20°06.970N	137°01.040E	4484m	NORPAC NET FINISH
A-27	19:24	20°07.000N	137°01.110E	4504m	CTDO FINISH
X-19	23:44	20°59.760N	136°59.800E	4851m	CTDO START
X-19	23:47	20°59.740N	136°59.700E	4837m	CHANGED PROPULSION TO ELCTRIC MOTOR
	----- 04 JULY91 (GMT) -----				
X-19	00:03	20°59.540N	136°59.460E	4803m	CTDO DEEPEST
X-19	00:20	20°59.310N	136°59.300E	4816m	CTDO FINISH
X-19	00:25	20°59.370N	136°59.220E	4836m	IKPT NET START
X-19	00:26	20°59.390N	136°59.210E	4855m	MTD SURFACE NET START
X-19	00:49	21°00.270N	136°58.950E	4813m	IKPT NET DEEPEST
X-19	01:28	21°01.070N	136°58.430E	4751m	MTD SURFACE NET FINISH
X-19	01:28	21°01.080N	136°58.430E	4753m	IKPT NET FINISH
A-28	05:21	21°59.930N	136°59.980E	4473m	CTDO START
A-28	05:23	21°59.920N	136°59.990E	4465m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-28	05:27	21°59.880N	137°00.010E	4461m	NORPAC NET START
A-28	05:43	21°59.710N	137°00.100E	4449m	CTDO DEEPEST

A-28	05:54	21°59.710N	137°00.160E	4455m	NORPAC NET FINISH
A-28	05:58	21°59.670N	137°00.200E	4468m	CTDO FINISH
A-28	06:05	21°59.680N	137°00.000E	4447m	IKPT NET START
A-28	06:26	21°59.910N	136°58.880E	4380m	IKPT NET DEEPEST
A-28	06:27	21°59.920N	136°58.830E	4364m	ORI SIDE NET START
A-28	06:48	22°00.000N	136°58.150E	4140m	ORI SIDE NET FINISH
A-28	07:09	22°00.090N	136°57.390E	4079m	IKPT NET FINISH
B-41	18:03	23°00.810N	133°57.890E	4295m	IKPT NET START
B-41	18:15	23°00.900N	133°57.160E	4280m	IKPT NET DEEPEST W.O. 600 M
B-41	18:16	23°00.900N	133°57.160E	4278m	ORI SIDE NET START
B-41	18:31	23°01.110N	133°56.390E	4273m	ORI SIDE NET FINISH
B-41	18:58	23°01.590N	133°55.040E	4264m	IKPT NET FINISH & SLOW AHEAD ENGINE
	----- 12 JULY91 (GMT) -----				
B-42	16:37	22°59.940N	130°12.020E	5399m	IKPT NET START
B-42	16:49	22°59.460N	130°12.440E	5505m	IKPT NET DEEPEST
B-42	16:51	22°59.400N	130°12.500E	5523m	ORI SIDE NET START
B-42	17:06	22°58.930N	130°12.930E	5566m	ORI SIDE NET FINISH
B-42	17:31	22°58.170N	130°13.490E	5610m	IKPT NET FINISH & SLOW AHEAD ENGINE
A-29	22:03	22°00.200N	131°00.060E	5879m	CTDO START
A-29	22:07	22°00.250N	131°00.080E	5873m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-29	22:08	22°00.270N	131°00.080E	5874m	NORPAC NET START
A-29	22:23	22°00.400N	131°00.160E	5873m	NORPAC NET FINISH
A-29	22:23	22°00.400N	131°00.160E	5875m	NORPAC NET START
A-29	22:26	22°00.410N	131°00.180E	5875m	CTDO DEEPEST
A-29	22:37	22°00.440N	131°00.270E	5876m	NORPAC NET FINISH
A-29	22:44	22°00.460N	131°00.320E	5879m	CTDO FINISH
A-29	22:49	22°00.500N	131°00.360E	5877m	IKPT NET START
A-29	23:13	21°59.580N	131°00.590E	5878m	IKPT NET DEEPEST WIRE OUT 1200M
A-29	23:14	21°59.550N	131°00.610E	5875m	ORI SIDE NET START
A-29	23:34	21°59.050N	131°00.730E	5853m	ORI SIDE NET FINISH
A-29	23:54	21°58.540N	131°00.880E	5844m	IKPT NET FINISH
	----- 13 JULY91 (GMT) -----				
X-20	03:33	21°00.000N	131°00.010E	5852m	XBT
A-30	06:57	20°00.040N	130°59.990E	5855m	STOP ENGINES
A-30	07:01	19°59.930N	130°59.960E	5856m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-30	07:02	19°59.910N	130°59.950E	5854m	CTDO START
A-30	07:09	19°59.750N	130°59.890E	5820m	NORPAC NET START
A-30	07:22	19°59.480N	130°59.860E	5751m	NORPAC NET FINISH
A-30	07:24	19°59.450N	130°59.860E	5754m	NORPAC NET START
A-30	07:28	19°59.380N	130°59.870E	5777m	CTDO DEEPEST
A-30	07:37	19°59.190N	130°59.900E	5786m	NORPAC NET FINISH
A-30	07:48	19°58.960N	130°59.900E	5785m	CTDO FINISH
A-30	07:54	19°58.810N	130°59.870E	5797m	IKPT NET START
A-30	08:16	19°57.220N	130°59.760E	5888m	IKPT NET DEEPEST WIRE OUT 1200M
A-30	08:16	19°57.210N	130°59.760E	5888m	ORI SIDE NET START
A-30	08:36	19°56.090N	130°59.560E	5799m	ORI SIDE NET FINISH
A-30	08:59	19°54.760N	130°59.460E	5785m	IKPT NET FINISH
A-30	09:02	19°54.660N	130°59.450E	5783m	CHANGED PROPULSION TO DIESEL ENGINE

A-30	09:02	19°54.650N	130°59.450E	5780m	SLOW AHEAD ENGINES
A-30	09:07	19°54.110N	130°59.470E	5741m	s/co on 180°
B-43	11:06	19°21.280N	130°59.980E	5529m	IKPT NET START
B-43	11:19	19°20.380N	130°59.920E	5566m	IKPT NET DEEPEST (600M)
B-43	11:19	19°20.370N	130°59.920E	5568m	ORI SIDE NET START
B-43	11:35	19°19.480N	130°59.810E	5601m	ORI SIDE NET FINISH
B-43	12:01	19°17.620N	130°59.590E	5605m	IKPT NET FINISH
B-44	13:59	18°46.230N	131°00.040E	6067m	IKPT NET START
B-44	14:16	18°45.110N	131°00.150E	6055m	IKPT NET DEEPEST (600M)
B-44	14:16	18°45.100N	131°00.150E	6055m	ORI SIDE NET START
B-44	14:33	18°44.100N	131°00.160E	5881m	ORI SIDE NET FINISH
B-44	14:58	18°42.600N	131°00.160E	6012m	IKPT NET FINISH
C-23	16:03	18°26.590N	130°59.930E	6115m	IKPT NET START
C-23	16:11	18°25.990N	130°59.880E	6108m	IKPT NET DEEPEST WIRE OUT 164 M
C-23	16:17	18°25.650N	130°59.860E	6106m	WIRE OUT 180 M
C-23	16:55	18°23.690N	130°59.630E	5935m	IKPT NET FINISH
A-31	18:29	18°00.480N	131°00.100E	6034m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-31	18:33	18°00.370N	131°00.150E	6024m	IKPT NET START
A-31	18:55	17°59.290N	131°00.290E	6051m	IKPT NET DEEPEST WIRE OUT 1200 M
A-31	18:55	17°59.290N	131°00.290E	6052m	ORI SIDE NET START
A-31	19:16	17°58.670N	131°00.340E	6043m	ORI SIDE NET FINISH
A-31	19:38	17°57.940N	131°00.460E	6036m	IKPT NET FINISH
A-31	19:45	17°57.860N	131°00.430E	6034m	CTDO START
A-31	19:52	17°57.820N	131°00.410E	6029m	NORPAC NET START
A-31	20:02	17°57.820N	131°00.420E	6030m	NORPAC NET FINISH
A-31	20:07	17°57.840N	131°00.430E	6032m	NORPAC NET START
A-31	20:11	17°57.860N	131°00.420E	6032m	CTDO DEEPEST
A-31	20:19	17°57.790N	131°00.430E	6033m	NORPAC NET FINISH
A-31	20:29	17°57.730N	131°00.440E	6033m	CTDO FINISH
----- 14 JULY91 (GMT) -----					
X-21	00:56	18°59.720N	130°59.850E	6001m	CTDO START
X-21	01:17	18°59.590N	130°59.790E	5984m	CTDO DEEPEST
X-21	01:35	18°59.460N	130°59.840E	5979m	CTDO FINISH
X-22	08:58	17°00.190N	130°59.990E	5540m	CTDO START
X-22	09:20	17°00.410N	130°59.740E	5534m	CTDO DEEPEST
X-22	09:38	17°00.490N	130°59.740E	5533m	CTDO FINISH
C'-26	11:32	17°29.750N	131°00.010E	5815m	IKPT NET START
C'-26	11:40	17°29.380N	130°59.980E	5830m	IKPT NET DEEPEST (360M)
C'-26	12:16	17°28.230N	130°59.800E	5832m	IKPT NET FINISH
C'-26	12:17	17°28.200N	130°59.790E	5831m	SLOW AHEAD ENGINES s/co on 180°
C'-27	12:54	17°20.550N	131°00.010E	5937m	IKPT NET START
C'-27	13:04	17°20.150N	131°00.010E	5925m	IKPT NET DEEPEST (400M)
C'-27	13:39	17°19.050N	130°59.920E	5680m	IKPT NET FINISH
C'-28	14:14	17°11.940N	130°59.940E	5470m	IKPT NET START
C'-28	14:22	17°11.670N	130°59.880E	5443m	IKPT NET DEEPEST (345M)
C'-28	14:51	17°10.850N	130°59.600E	5369m	IKPT NET FINISH
C'-28	14:53	17°10.810N	130°59.570E	5366m	SLOW AHEAD ENGINES s/co on 180°
C'-29	15:30	17°03.570N	130°59.750E	5674m	IKPT NET START

C'-29	15:42	17°03.030N	130°59.650E	5381m	IKPT NET DEEPEST
C'-29	16:16	17°01.950N	130°59.340E	5422m	IKPT NET FINISH
B-45	16:34	16°59.890N	130°59.530E	5684m	IKPT NET START
B-45	16:44	16°59.440N	130°59.500E	5729m	IKPT NET DEEPEST
B-45	16:45	16°59.410N	130°59.490E	5727m	ORI SIDE NET START
B-45	17:01	16°58.910N	130°59.410E	5711m	ORI SIDE NET FINISH
B-45	17:27	16°58.170N	130°59.260E	5726m	IKPT NET FINISH
C'-30	18:00	16°52.140N	131°00.050E	6149m	IKPT NET START
C'-30	18:11	16°51.700N	131°00.130E	6128m	IKPT NET DEEPEST
C'-30	18:45	16°50.680N	131°00.270E	6225m	IKPT NET FINISH & COMMENCED SHIFTIN
C'-31	19:15	16°45.170N	131°00.330E	5952m	IKPT NET START
C'-31	19:24	16°44.790N	131°00.300E	5815m	IKPT NET DEEPEST
C'-31	20:03	16°43.380N	131°00.170E	5101m	IKPT NET FINISH
C'-32	20:10	16°43.220N	131°00.160E	4981m	IKPT NET START
C'-32	20:18	16°42.850N	131°00.130E	4776m	IKPT NET DEEPEST
C'-32	20:55	16°41.490N	130°59.940E	5100m	IKPT NET FINISH
C'-32	20:55	16°41.490N	130°59.940E	5100m	SLOW AHEAD ENGINES
C'-32	21:03	16°40.340N	130°59.930E	5283m	SUNRISE & PUT OFF REGULAION LIGHTS
C'-32	21:07	16°39.430N	130°59.930E	5629m	RUNG UP ENGINES
A-32	23:31	15°59.990N	131°00.050E	5274m	CTDO START
A-32	23:36	15°59.970N	131°00.060E	5279m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-32	23:43	15°59.930N	131°00.080E	5277m	NORPAC NET START
	----- 15 JULY91 (GMT) -----				
A-32	00:01	15°59.740N	131°00.160E	5307m	CTDO DEEPEST
A-32	00:08	15°59.680N	131°00.190E	5326m	NORPAC NET FINISH
A-32	00:19	15°59.580N	131°00.250E	5348m	CTDO FINISH
A-32	00:26	15°59.360N	131°00.250E	5431m	IKPT NET START
A-32	00:50	15°58.000N	131°00.450E	6040m	IKPT NET DEEPEST
A-32	00:51	15°57.970N	131°00.460E	6071m	ORI NET START
A-32	01:11	15°57.310N	131°00.600E	6271m	ORI SIDE NET FINISH
A-32	01:30	15°56.460N	131°00.680E	6268m	IKPT NET FINISH
X-23	05:00	15°00.010N	130°59.860E	5431m	CHANGED PROPULSION TO ELCTRIC MOTOR
X-23	05:04	14°59.970N	130°59.830E	5429m	CTDO START
X-23	05:28	14°59.830N	130°59.780E	5431m	CTDO DEEPEST
X-23	05:47	14°59.720N	130°59.700E	5432m	CTDO FINISH
C'-33	09:30	15°29.140N	130°59.650E	4939m	IKPT NET START
C'-33	09:36	15°28.800N	130°59.620E	5018m	IKPT NET DEEPEST
C'-33	09:52	15°27.990N	130°59.520E	4954m	CHANGED ENG. TO T/M
C'-33	09:55	15°27.870N	130°59.500E	4919m	SUNSET & PUT ON REGULATION LIGHTS
C'-33	09:59	15°27.640N	130°59.470E	4865m	IKPT NET FINISH
C'-34	10:29	15°20.700N	130°59.800E	4903m	IKPT NET START
C'-34	10:37	15°20.260N	130°59.800E	5060m	IKPT NET DEEPEST
C'-34	11:06	15°18.840N	130°59.710E	5374m	IKPT NET FINISH
B-46	12:09	15°02.530N	131°00.000E	5548m	IKPT NET START
B-46	12:22	15°01.800N	130°59.970E	5286m	IKPT NET DEEPEST (600M)
B-46	12:24	15°01.740N	130°59.960E	5315m	ORI SIDE NET START
B-46	12:39	15°01.040N	130°59.880E	5549m	ORI SIDE NET FINISH
B-46	13:04	14°59.910N	130°59.810E	5434m	IKPT NET FINISH

C'-35 13:39 14°51.960N 130°59.980E 5594m IKPT NET START
C'-35 13:47 14°51.530N 130°59.980E 5614m IKPT NET DEEPEST (366M)
C'-35 14:19 14°50.240N 131°00.040E 5622m IKPT NET FINISH
C'-36 14:45 14°45.550N 131°00.020E 5485m IKPT NET START
C'-36 14:52 14°45.160N 131°00.010E 5538m IKPT NET DEEPEST (295M)
C'-36 14:54 14°45.090N 131°00.010E 5556m IKPT NET DEEPEST (307M)
C'-36 15:39 14°43.200N 130°59.980E 5720m IKPT NET FINISH & STOP ENGINES
C'-37 15:49 14°42.900N 130°59.970E 5758m IKPT NET START
C'-37 16:00 14°42.320N 130°59.960E 5783m IKPT NET DEEPEST WIRE OUT 327 M
C'-37 16:29 14°41.220N 130°59.910E 5738m IKPT NET FINISH
C'-38 17:48 14°50.410N 131°00.060E 5630m IKPT NET START
C'-38 17:58 14°50.800N 130°59.820E 5654m IKPT NET DEEPEST WIRE OUT 356 M
C'-38 18:29 14°51.650N 130°59.270E 5661m IKPT NET FINISH
C'-39 18:35 14°51.640N 130°59.370E 5656m IKPT NET START
C'-39 18:43 14°51.620N 130°59.750E 5617m IKPT NET DEEPEST WIRE OUT 265 M
C'-39 19:19 14°51.470N 131°00.810E 5556m IKPT NET FINISH
C'-40 19:25 14°51.360N 131°00.850E 5563m IKPT NET START
C'-40 19:32 14°51.010N 131°00.640E 5609m IKPT NET DEEPEST
C'-40 20:05 14°49.840N 130°59.830E 5628m IKPT NET FINISH
C'-40 20:10 14°49.700N 130°59.820E 5602m CTDO START
C'-40 20:17 14°49.580N 130°59.830E 5575m NORPAC NET START
C'-40 20:26 14°49.540N 130°59.820E 5572m CTDO DEEPEST
C'-40 20:29 14°49.540N 130°59.810E 5568m NORPAC NET FINISH
C'-40 20:36 14°49.550N 130°59.780E 5577m CTDO FINISH
C'-41 20:39 14°49.510N 130°59.750E 5578m IKPT NET START
C'-41 20:54 14°49.640N 130°59.630E 5595m IKPT NET DEEPEST
C'-41 20:54 14°49.640N 130°59.630E 5595m SUNRISE & PUT OFF REGULAION LIGHTS
C'-41 21:30 14°50.480N 130°59.680E 5637m IKPT NET FINISH
C'-41 21:52 14°51.610N 131°00.020E 5611m CTDO START
C'-41 21:54 14°51.590N 131°00.010E 5611m NORPAC NET START
C'-41 22:06 14°51.550N 130°59.910E 5615m NORPAC NET FINISH
C'-41 22:06 14°51.550N 130°59.900E 5613m CTDO DEEPEST
C'-41 22:17 14°51.500N 130°59.840E 5619m CTDO FINISH
----- 16 JULY91 (GMT) -----
A-33 01:29 14°00.010N 130°59.950E 6178m STOP ENGINES
A-33 01:30 14°00.010N 130°59.950E 6178m CTDO START
A-33 01:33 13°59.970N 130°59.950E 6182m CHANGED PROPULSION TO ELCTRIC MOTOR
A-33 01:36 13°59.940N 130°59.950E 6183m NORPAC NET START
A-33 01:49 13°59.990N 130°59.980E 6174m NORPAC NET FINISH
A-33 01:51 13°59.990N 130°59.980E 6177m NORPAC NET START
A-33 01:54 13°59.990N 130°59.980E 6176m CTDO DEEPEST
A-33 02:04 13°59.990N 130°59.970E 6179m NORPAC NET FINISH
A-33 02:12 13°59.990N 130°59.960E 6173m CTDO FINISH
A-33 02:18 13°59.830N 130°59.960E 6192m IKPT NET START
A-33 02:42 13°58.750N 130°59.850E 6219m IKPT NET DEEPEST
A-33 02:43 13°58.730N 130°59.850E 6221m ORI SIDE NET START
A-33 03:01 13°58.230N 130°59.890E 6208m ORI SIDE NET FINISH
A-33 03:30 13°57.570N 130°59.620E 6170m IKPT NET FINISH & STOP ENGINES

X-24	07:16	12°59.930N	130°59.990E	5919m	CTDO START
X-24	07:17	12°59.910N	131°00.020E	5926m	CHANGED PROPULSION TO ELCTRIC MOTOR
X-24	07:41	13°00.020N	131°00.020E	5918m	CTDO DEEPEST
X-24	07:57	13°00.110N	130°59.980E	5902m	CTDO FINISH
B-47	10:02	13°01.570N	130°59.530E	5768m	IKPT NET START
B-47	10:16	13°01.460N	130°58.850E	5790m	IKPT NET DEEPEST
B-47	10:18	13°01.410N	130°58.800E	5792m	ORI SIDE NET START
B-47	10:33	13°00.870N	130°58.490E	5845m	ORI SIDE NET FINISH
B-47	10:59	13°00.260N	130°57.580E	6000m	IKPT NET FINISH
A-34	15:06	11°59.700N	130°59.930E	5739m	CHANGED PROPULSION TO ELCTRIC MOTOR
A-34	15:12	11°59.600N	131°00.010E	5758m	CTDO START
A-34	15:16	11°59.550N	131°00.040E	5761m	NORPAC NET START
A-34	15:19	11°59.530N	131°00.060E	5760m	CTDO START AGAIN
A-34	15:33	11°59.460N	131°00.130E	5766m	NORPAC NET FINISH
A-34	15:34	11°59.470N	131°00.130E	5764m	NORPAC NET START
A-34	15:40	11°59.480N	131°00.100E	5769m	CTDO DEEPEST
A-34	15:56	11°59.540N	131°00.080E	5765m	NORPAC NET FINISH
A-34	16:00	11°59.540N	131°00.080E	5757m	CTDO FINISH
A-34	16:08	11°59.420N	130°59.820E	5775m	IKPT NET START
A-34	16:33	11°58.870N	130°58.310E	5666m	IKPT NET DEEPEST
A-34	16:57	11°58.930N	130°57.300E	5719m	ORI SIDE NET START
A-34	17:31	11°59.940N	130°56.330E	5815m	IKPT NET FINISH
A-34	17:31	11°59.940N	130°56.330E	5815m	STOP ENGINES
----- 17 JULY91 (GMT) -----					
C'-42	09:00	13°59.930N	134°00.090E	4994m	CTDO START
C'-42	09:22	13°59.970N	133°59.900E	4986m	PUT ON REGULATION LIGHTS
C'-42	09:23	13°59.970N	133°59.890E	4988m	CTDO DEEPEST
C'-42	09:40	13°59.990N	133°59.840E	4984m	CTDO FINISH
C'-42	09:40	13°59.990N	133°59.840E	4986m	SUNSET
C'-42	09:41	14°00.000N	133°59.850E	4986m	CHANGED PROPULSION TO DIESEL ENGINE
C'-42	09:47	14°00.130N	133°59.810E	4982m	IKPT NET START
C'-42	09:55	14°00.520N	133°59.800E	4996m	IKPT NET DEEPEST
C'-42	10:23	14°01.670N	133°59.710E	4984m	IKPT NET FINISH & SLOW AHEAD ENGINE
C'-43	11:36	14°20.020N	133°59.920E	4705m	IKPT NET START
C'-43	11:46	14°20.590N	133°59.800E	4675m	IKPT NET DEEPEST (365M)
C'-43	12:13	14°21.850N	133°59.490E	4734m	IKPT NET FINISH
C'-43	12:14	14°21.880N	133°59.480E	4733m	SLOW AHEAD ENGINES s/co on 360°
C'-44	13:27	14°39.980N	133°59.920E	4403m	IKPT NET START
C'-44	13:37	14°40.600N	133°59.760E	4466m	IKPT NET DEEPEST (448M)
C'-44	14:10	14°42.370N	133°59.170E	4561m	IKPT NET FINISH
C'-44	14:23	14°43.310N	133°59.280E	4541m	HALF AHEAD ENGINES s/co on 360°
C'-45	15:26	15°00.020N	133°59.840E	4786m	USED ENGINES VARIOUSLY USED COURSE
C'-45	15:26	15°00.030N	133°59.840E	4786m	IKPT NET START
C'-45	15:41	15°01.040N	133°59.530E	4793m	IKPT NET DEEPEST WIRE OUT 490 M
C'-45	16:16	15°02.980N	133°58.970E	4773m	IKPT NET FINISH
C'-46	17:31	15°20.240N	134°00.140E	4282m	IKPT NET START
C'-46	18:11	15°19.450N	134°00.980E	4429m	IKPT NET FINISH
C'-47	18:31	15°19.440N	134°00.950E	4412m	IKPT NET START AGAIN FROM ST.C'-49

C'-47	18:42	15°19.080N	134°01.240E	4562m	IKPT NET DEEPEST WIRE OUT 382 M
C'-47	19:17	15°18.130N	134°02.120E	4957m	IKPT NET FINISH
C'-48	19:23	15°18.210N	134°01.970E	4915m	IKPT NET START
C'-48	19:31	15°18.600N	134°01.700E	4798m	IKPT NET DEEPEST
C'-48	20:03	15°19.900N	134°00.750E	4415m	IKPT NET FINISH
X-25	20:12	15°20.120N	134°00.680E	4405m	CTDO START
X-25	20:34	15°20.200N	134°00.560E	4348m	CTDO DEEPEST
X-25	20:43	15°20.190N	134°00.510E	4342m	SUNRISE
X-25	20:49	15°20.210N	134°00.480E	4326m	CTDO FINISH
X-26	23:21	15°59.820N	134°00.010E	5215m	STOP ENGINES
X-26	23:25	15°59.880N	133°59.930E	5209m	CTDO START
X-26	23:50	16°00.090N	133°59.430E	5184m	CTDO DEEPEST
----- 18 JULY91 (GMT) -----					
X-26	00:08	16°00.320N	133°59.110E	5188m	CTDO FINISH
X-27	03:55	16°59.930N	133°59.900E	5485m	CHANGED PROPULSION TO ELCTRIC MOTOR
X-27	03:56	16°59.950N	133°59.890E	5483m	CTDO START
X-27	04:16	17°00.030N	133°59.610E	5476m	CTDO DEEPEST
X-27	04:35	17°00.070N	133°59.470E	5476m	CTDO FINISH
C'-49	10:02	15°40.140N	133°59.900E	4702m	IKPT NET START
C'-49	10:11	15°40.670N	133°59.870E	4691m	IKPT NET DEEPEST
C'-49	10:34	15°41.660N	133°59.790E	4553m	IKPT NET FINISH
C'-50	11:51	15°59.610N	133°59.970E	5238m	IKPT NET START
C'-50	12:02	16°00.140N	133°59.970E	5203m	IKPT NET DEEPEST (447M)
C'-50	12:35	16°01.470N	134°00.070E	5269m	IKPT NET FINISH
CX-50	12:40	16°01.820N	134°00.140E	5328m	XBT
C'-51	12:50	16°02.520N	134°00.130E	5300m	IKPT NET START
C'-51	12:57	16°02.870N	134°00.110E	5302m	IKPT NET DEEPEST (303M)
C'-51	13:26	16°04.070N	134°00.140E	5476m	IKPT NET FINISH
C'-52	14:29	16°19.620N	134°00.020E	5584m	IKPT NET START
C'-52	14:38	16°20.080N	134°00.140E	5608m	IKPT NET DEEPEST (384M)
C'-52	15:08	16°21.300N	134°00.410E	5598m	IKPT NET FINISH
CX-52	15:11	16°21.370N	134°00.440E	5597m	XBT
C'-53	15:26	16°21.680N	134°00.690E	5596m	IKPT NET START
C'-53	15:36	16°22.120N	134°00.680E	5593m	IKPT NET DEEPEST
C'-53	16:01	16°22.920N	134°00.830E	5578m	IKPT NET FINISH
C'-54	17:14	16°39.940N	133°59.930E	5394m	IKPT NET START
C'-54	17:26	16°40.390N	133°59.880E	5389m	IKPT NET DEEPEST
C'-54	17:55	16°41.100N	133°59.800E	5395m	IKPT NET FINISH
CX-54	17:56	16°41.110N	133°59.800E	5394m	XBT
C'-55	19:16	16°59.970N	133°59.960E	5490m	IKPT NET START
C'-55	19:28	17°00.450N	133°59.940E	5481m	IKPT NET DEEPEST
C'-55	20:01	17°01.540N	133°59.790E	5469m	IKPT NET FINISH
CX-55	20:03	17°01.700N	133°59.790E	5470m	XBT
----- 19 JULY91 (GMT) -----					
C'-56	11:03	21°14.250N	133°59.980E	5790m	IKPT NET START
C'-56	11:15	21°14.870N	134°00.070E	5787m	IKPT NET DEEPEST (594M)
C'-56	11:40	21°15.950N	134°00.260E	5779m	IKPT NET FINISH
CX-56	11:40	21°15.960N	134°00.260E	5779m	XBT

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