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EXPERIMENTAL FLYING SQUID FISHERY OFF BRITISH COLUMBIA, 1987

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INTRODUCTION

Experimental fishing for flying squid (Ommastrephes bartrami) in 1987 was conducted from both a Japanese and a Canadian vessel in northeastern Pacific waters. Fishing was primarily off the coast of British Columbia, and to a lesser extent off Oregon and Washington outside the American 200-mile (320 km) Extended Economic Zone (EEZ). Experimental fishing off Canada has been conducted since 1979 (Bernard 1980), with more extensive investigation of fishing performance and bycatch characteristics conducted during the 1980s (Robinson and Jamieson 1984, Sloan 1984, Jamieson and Heritage 1987). Results indicate that flying squid abundance in the outer portion of the Canadian 320 km EEZ and immediately beyond is sufficient to support commercial fishing, but because available data do not allow estimation of total squid abundance, full fishery potential remains to be determined. It is not clear how large the sustainable catch might be, and as a result, how many vessels might potentially participate.

Experimental fishing to date has used drift gillnets, although some limited jigging was conducted in 1987 by the TOMI MARU #88. This report presents the daily fishing results and a general analysis of the 1987 data for the third year of a study designed to document and evaluate the nature of the catch associated with limited fishing of a commercial nature. Harvest rates over the course of a season are established, with particular emphasis on the nature of the bycatch. This report does not include detailed biological information on the species caught nor an interpretive analysis of fishing in relation to observed oceanographic parameters. These will be discussed in later reports.

METHODS

The same procedures described by Jamieson and Heritage (1987) were used in monitoring the 1987 squid fishery. Vessels participating in 1987 were the TOMI MARU #88 and the OCEAN PEARL, previously described in Sloan (1984) and Jamieson and Heritage (1987), respectively. Fishing by the OCEAN PEARL began on June 13 and finished on August 5. The TOMI MARU #88 began fishing on June 15 and terminated fishing on August 24.

Fishing began off the coast of northern California outside the American EEZ and quickly moved north into Canadian waters as surface water temperatures increased (Figs. 1-2). A total of 66 and 49 sets were made by the TOMI MARU #88 and OCEAN PEARL, respectively, and average net lengths fished by each vessel were 46.7 km and 28.4 km, respectively.

for the TOMI MARU #88 but increased from 1.8% in 1986 to 9.9% in 1987 for the OCEAN PEARL. The net result was a decrease in 1987 in the percentage of the catch represented by squid: from 79% to 71% for the TOMI MARU #88, and from 85% to 73% for the OCEAN PEARL.

All remaining species combined accounted for 3.4% and 6.5% by weight of the catches of the TOMI MARU #88 and OCEAN PEARL, respectively. By weight, the third major bycatch species was salmon shark and jack mackerel for the TOMI MARU #88 and OCEAN PEARL, respectively, whereas by piece, it was jack mackerel for both vessels.

Daily driftnet catches by both vessels are given in Table 4. Marine mammal bycatch (Table 5) showed the basic pattern established in previous years, with the main species caught being Dall porpoise (58 animals). Pacific white-sided dolphins (16 animals) were the next most common marine mammal caught. Catch rate, expressed as average net length required to catch one marine mammal, was again higher (i.e., less net was required to catch a mammal) for the OCEAN PEARL than for the TOMI MARU #88, although this difference was less in 1987 than in previous years. The marine mammal catch rate of the OCEAN PEARL in 1987 was similar to its rate in 1986, whereas the mammal catch rate of the TOMI MARU #88 significantly increased in 1987 over that in previous years.

Catch per unit effort (CPUE), expressed as either pieces or weight (kg) per 10 km of net fished (Tables 7 and 8, respectively), is provided for each species fished. Average CPUE for squid (Table 7a) decreased by 8% for the OCEAN PEARL between 1986 and 1987, whereas for the TOMI MARU #88, it increased by 41%, and was the highest obtained by any of the vessels fishing off British Columbia over the past 3 years (Table 9).

The above results are averages for the full fishing season by each vessel, and it should be noted that considerable daily variation was observed over the approximately 2-month fishing period (Table 4a,c). In particular, there were significant differences (ANOVA) in CPUE of some species caught before and after July 24 (Table 10); surface water temperature was generally above 14°C in this latter time period. This was particularly evident for the bycatch of marine mammals by the TOMI MARU #88, with 42 mammals caught in the first 38 nights of fishing (June 15-July 24) and 4 mammals caught in the last 28 nights of fishing (July 25-August 24). For the TOMI MARU #88, squid CPUE was 31% higher after July 24. With other major bycatch species, average CPUE of pomfret, albacore, blue shark and salmon shark increased after August 24, while catches of jack mackerel, salmon and steelhead decreased. Pomfret CPUE was 34% greater. A similar pattern was observed for the OCEAN PEARL, but the relative change in CPUE of flying squid and pomfort, the two major species caught, before and after July 24 by this vessel was significant, in contrast to no significant differences in the catch rates of these species by the TOMI MARU #88.

The option, or combination of options, chosen to deal with possible future continuation of the driftnet squid fishery will be determined following consideration of factors relating to biology, economics, available research resources, and social concerns.

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Table 2. Estimated average weights and measured average weights (in kilograms) for all species caught and killed by the TOMI MARU No. 88 and the OCEAN PEARL in 1987.

Common name	Average weight (kg)			
	Estimated	TOMI MARU		Measured
		Net	Jig	OCEAN PEARL
Flying Squid	2.28	2.33	1.77	2.34
Pelagic Octopus	1.00	1.00	-	1.00
Unidentified Squid	1.00	1.00	-	-
Nail Squid	1.00	1.00	-	3.00
Pink Salmon	1.08	1.01	-	1.28
Chum Salmon	2.31	1.99	-	3.57
Coho Salmon	2.25	2.00	-	3.00
Sockeye Salmon	1.39	1.20	-	3.17
Steelhead	1.96	1.90	-	4.10
Bonito Shark	36.00	25.00	-	-
Blue Shark	4.99	5.49	-	4.18
Salmon Shark	24.88	28.78	-	22.71
Thresher Shark	260.00	122.50	-	196.67
Basking Shark	2500.00	-	-	2500.00
Soupfin Shark	1.00	-	-	20.00
Pelagic Stingray	1.00	2.00	-	-
Pomfret	2.34	2.34	-	1.08
Rough Pomfret	2.34	-	-	1.00
Albacore	5.74	4.90	-	6.62
Jack Mackerel	2.40	2.41	-	2.68
Chub Mackerel	0.30	-	-	2.00
Pacific Bonito	1.00	38.00	-	-
Yellowtail	4.00	2.29	-	2.00
Pelagic Armourhead	0.37	0.37	-	0.86
Skilfish	0.50	0.75	-	1.00
Pacific Saury	0.07	-	-	0.50
Long Nose Lancetfish	2.00	2.83	-	5.00
Ocean Sunfish	28.00	7.00	-	-
Unidentified Fish	1.00	1.00	-	-

Table 3a. Total catch by species and the proportion of the total catch represented by each species for the 1987 TOMI MARU NO.88 offshore squid cruise (* = estimated; 0.00 = rounded number <0.01).

Species	Kg	Percent	Pieces	Percent
Flying Squid	1 180 074	71.30	507 360*	79.84
Nail Squid	1*	0.00	1	0.00
Unidentified Squid	3*	0.00	3	0.00
Pelagic Octopus	5*	0.00	5	0.00
Pink Salmon	11*	0.00	11	0.00
Chum Salmon	201	0.01	101	0.02
Coho Salmon	14	0.00	7	0.00
Sockeye Salmon	57*	0.00	47	0.01
Steelhead	520*	0.03	273	0.04
Bonito Shark	100	0.01	4	0.00
Blue Shark	243 363	14.70	44 300	6.97
Salmon Shark	23 429	1.42	814	0.13
Thresher Shark	735*	0.04	6	0.00
Pelagic Stingray	2	0.00	1	0.00
Pomfret	175 438	10.60	74 943*	11.79
Albacore	5 021	0.30	1 025*	0.16
Jack Mackerel	14 558	0.88	6 048*	0.95
Pacific Bonito	76	0.00	2	0.00
Yellowtail	55*	0.00	24	0.00
Pelagic Armourhead	8*	0.00	21	0.00
Skilfish	3*	0.00	4	0.00
Long Nose Lancetfish	17*	0.00	6	0.00
Ocean Sunfish	7	0.00	1	0.00
Unidentified Fish	1*	0.00	1	0.00
Dall Porpoise	4 736*	0.29	32	0.01
Northern Right- Whale Dolphin	1 274*	0.08	7	0.00
Pacific White- Sided Dolphin	408*	0.02	3	0.00
Short-finned Pilot Whale	4 566*	0.28	2	0.00
Fur Seal	34*	0.00	1	0.00
Unidentified Mammal	1*	0.00	1	0.00

Table 3b. Total catch by species and the proportion of the total catch represented by each species for the 1987 OCEAN PEARL offshore squid cruise (*=estimated; 0.00=rounded number <0.01).

Species	Kg	Percent	Pieces	Percent
Flying Squid	347 402	72.95	148 243	70.10
Nail Squid	3	0.00	1	0.00
Pelagic Octopus	5*	0.00	5	0.00
Pomfret	50 721	10.65	46 913	22.18
Rough Pomfret	1	0.00	1	0.00
Pink Salmon	37	0.01	29	0.01
Chum Salmon	225	0.05	63	0.03
Coho Salmon	3	0.00	1	0.00
Sockeye Salmon	1 258	0.26	397	0.19
Steelhead	611	0.13	149	0.07
Blue Shark	47 254	9.92	11 295	5.34
Salmon Shark	5 677	1.19	250	0.12
Thresher Shark	590	0.12	3	0.00
Basking Shark	2 500*	0.52	1	0.00
Soupfin Shark	20	0.00	1	0.00
Albacore	1 052	0.22	159	0.08
Jack Mackerel	10 150	2.13	3 794	1.79
Chub Mackerel	8	0.00	4	0.00
Yellowtail	2	0.00	1	0.00
Pelagic Armourhead	6	0.00	7	0.00
Skilfish	1	0.00	1	0.00
Pacific Saury	1	0.00	2	0.00
Long Nose Lancetfish	10	0.00	2	0.00
Dall Porpoise	3 848*	0.81	26	0.01
Northern Right- Whale Dolphin	364*	0.08	2	0.00
Pacific White- Sided Dolphin	1 768*	0.37	13	0.01
Short-finned Pilot Whale	2 283*	0.48	1	0.00
Harbour Porpoise	50*	0.01	1	0.00
Stellar Sea Lion	300*	0.06	1	0.00

Table 4a. Bridge log and drift net catch information, in pieces, for each night's fishing by the TOMI MARU NO.88 in 1987. * = estimated, LST = Local Standard Time.

SET NO.	1	2	3	4	5	6
DATE	JUNE 15	JUNE 16	JUNE 17	JUNE 18	JUNE 19	JUNE 20
TIME START (LST)	1700	1825	1700	1700	1650	1745
DURATION(HR.MIN)	11.00	9.35	11.00	11.00	11.10	10.45
START N. LAT. (DEG)	42	41	42	43	44	44
(MIN)	22.0	36.7	57.0	32.0	33.0	59.0
W. LONG. (DEG)	131	131	132	130	129	129
(MIN)	54.0	1.5	2.0	45.0	51.0	54.0
DIRECTION (DEG.TRUE)	090	090	090	090	290	270
FINISH N. LAT. (DEG)	42	41	42	43	44	44
(MIN)	22.0	36.8	58.0	32.0	43.0	59.3
W.LONG. (DEG)	131	130	131	130	130	130
(MIN)	11.0	39.8	29.0	11.0	22.0	19.3
LENGTH OF SET KM.	56.0	28.0	42.0	42.0	42.0	28.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.0	14.4	14.2	13.8	13.5	13.2
END TEMP.(DEG.C)	14.0	14.6	14.9	14.6	13.4	12.5
NO. OF GROUPS.	8	4	6	6	6	4
TOTAL SQUID (KG)	1409	876	914	1066	1447	4609

Table 4a (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 21	JUNE 22	JUNE 23	JUNE 24	JUNE 25	JUNE 26
TIME START (LST)	1700	1655	1650	1700	1655	1945
DURATION(HR.MIN)	10.00	10.35	10.40	10.45	10.35	9.15
START N. LAT. (DEG)	45	45	45	45	45	46
(MIN)	10.0	14.1	17.0	31.7	15.3	1.7
W. LONG. (DEG)	130	130	130	130	130	130
(MIN)	21.0	51.9	38.8	24.0	35.7	31.1
DIRECTION (DEG.TRUE)	080	090	090	080	090	090
FINISH N. LAT. (DEG)	45	45	45	45	45	46
(MIN)	15.0	14.4	12.2	32.1	14.9	1.2
W.LONG. (DEG)	129	130	129	129	129	130
(MIN)	35.0	5.2	51.0	43.9	30.0	0.7
LENGTH OF SET KM.	56.0	56.0	56.0	49.0	56.0	35.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	12.3	12.7	12.6	13.8	13.3	13.8
END TEMP.(DEG.C)	13.1	12.9	13.2	14.0	13.5	13.3
NO. OF GROUPS.	8	8	8	7	8	5
TOTAL SQUID (KG)	13529	21561	13333	7886	11314	7010

Table 4a (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JUNE 27	JUNE 28	JUNE 29	JUNE 30	JULY 1	JULY 2
TIME START (LST)	1640	1705	1755	1755	1850	1705
DURATION(HR.MIN)	11.05	11.10	10.05	10.05	9.40	10.55
START N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	13.5	15.4	27.0	28.0	31.0	32.0
W. LONG. (DEG)	131	132	132	132	130	130
(MIN)	50.0	5.0	17.0	16.0	55.9	52.0
DIRECTION (DEG.TRUE)	090	090	100	095	090	095
FINISH N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	11.0	15.4	19.0	21.0	26.3	27.6
W.LONG. (DEG)	131	131	131	131	130	130
(MIN)	2.1	26.5	38.0	28.0	14.4	53.1
LENGTH OF SET KM.	56.0	49.0	49.0	56.0	49.0	56.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	13.0	12.9	12.8	12.7	13.2	13.5
END TEMP.(DEG.C)	13.0	12.8	12.4	12.7	12.9	13.3
NO. OF GROUPS.	8	7	7	8	7	8
TOTAL SQUID (KG)	14247	13940	14362	12076	27886	34819

Table 4a (cont'd)

SET NO.	19	20	21	22	23	24
DATE	JULY 3	JULY 4	JULY 5	JULY 6	JULY 7	JULY 8
TIME START (LST)	1835	1755	1830	1800	1915	1740
DURATION(HR.MIN)	10.15	10.35	10.00	10.00	9.45	10.50
START N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	36.0	34.7	32.6	31.6	46.9	32.0
W. LONG. (DEG)	130	130	130	130	130	130
(MIN)	38.0	35.6	22.0	19.5	15.7	33.0
DIRECTION (DEG.TRUE)	090	090	090	090	285	090
FINISH N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	36.3	34.5	32.6	31.5	53.7	32.0
W.LONG. (DEG)	129	129	129	129	130	129
(MIN)	55.9	54.2	40.2	43.4	55.7	49.0
LENGTH OF SET KM.	49.0	49.0	49.0	42.0	49.0	49.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	13.1	13.3	13.2	13.2	13.0	12.8
END TEMP.(DEG.C)	12.9	13.1	13.3	13.2	13.3	12.8
NO. OF GROUPS.	7	7	7	6	7	7
TOTAL SQUID (KG)	32723	35276	36495	5920	7542	14857

Table 4a (cont'd)

SET NO.	25	26	27	28	29	30
DATE	JULY 9	JULY 10	JULY 11	JULY 12	JULY 13	JULY 14
TIME START (LST)	1735	2110	1725	1730	2000	2030
DURATION(HR.MIN)	10.25	9.20	11.20	11.00	10.00	9.45
START N. LAT. (DEG)	47	47	47	47	47	47
(MIN)	21.6	19.1	17.0	27.0	30.8	36.1
W. LONG. (DEG)	130	130	129	130	130	130
(MIN)	14.8	35.0	53.0	5.0	0.0	23.6
DIRECTION (DEG.TRUE)	090	090	090	090	295	110
FINISH N. LAT. (DEG)	47	47	47	47	47	47
(MIN)	20.2	18.5	21.0	31.0	24.9	27.8
W.LONG. (DEG)	129	129	129	130	129	129
(MIN)	35.3	36.6	50.0	1.0	51.3	56.7
LENGTH OF SET KM.	56.0	42.0	42.0	49.0	42.0	35.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	13.1	14.0	14.2	13.5	13.6	13.5
END TEMP.(DEG.C)	13.3	13.7	13.7	13.4	13.5	13.3
NO. OF GROUPS.	8	6	6	7	6	5
TOTAL SQUID (KG)	36533	16685	14628	26274	30133	16152

Table 4a (cont'd)

SET NO.	31	32	33	34	35	36
DATE	JULY 15	JULY 18	JULY 19	JULY 20	JULY 21	JULY 22
TIME START (LST)	2030	1920	1645	1750	1910	1800
DURATION(HR.MIN)	9.00	9.40	11.15	11.10	9.50	11.00
START N. LAT. (DEG)	48	48	47	47	47	47
(MIN)	2.0	27.3	37.0	38.5	33.8	33.5
W. LONG. (DEG)	130	132	130	130	129	129
(MIN)	21.0	7.2	33.0	18.0	54.8	42.0
DIRECTION (DEG.TRUE)	110	110	110	100	100	100
FINISH N. LAT. (DEG)	47	48	47	47	47	47
(MIN)	58.0	21.9	29.0	32.4	28.0	31.4
W.LONG. (DEG)	130	131	129	129	129	129
(MIN)	10.0	53.1	44.0	35.7	14.8	0.8
LENGTH OF SET KM.	14.0	21.0	56.0	49.0	49.0	49.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	13.5	12.8	13.3	13.6	13.6	13.6
END TEMP.(DEG.C)	13.3	12.9	13.6	13.7	14.3	14.4
NO. OF GROUPS.	2	3	8	7	7	7
TOTAL SQUID (KG)	2991	2590	27542	26209	25867	13909

Table 4a (cont'd)

SET NO.	37	38	39	40	41	42
DATE	JULY 23	JULY 24	JULY 25	JULY 26	JULY 27	JULY 28
TIME START (LST)	1700	1755	1655	1930	1805	1730
DURATION(HR.MIN)	11.00	10.05	11.05	9.30	10.05	10.30
START N. LAT. (DEG)	47	48	48	48	48	48
(MIN)	42.6	21.7	25.9	32.4	37.9	14.1
W. LONG. (DEG)	129	129	130	129	129	130
(MIN)	30.6	35.5	48.6	50.8	25.0	2.9
DIRECTION (DEG.TRUE)	095	270	090	090	090	270
FINISH N. LAT. (DEG)	47	48	48	48	48	48
(MIN)	39.6	22.9	26.3	33.1	37.9	13.3
W. LONG. (DEG)	128	130	130	129	128	130
(MIN)	42.6	23.7	1.7	6.4	54.2	52.6
LENGTH OF SET KM.	56.0	56.0	56.0	49.0	56.0	56.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.0	13.6	14.5	14.1	14.1	14.3
END TEMP.(DEG.C)	14.6	14.0	14.6	14.3	14.2	14.1
NO. OF GROUPS.	8	8	8	7	8	8
TOTAL SQUID (KG)	8685	15542	9638	23542	12876	32266

Table 4a (cont'd)

SET NO.	43	44	45	46	47	48
DATE	JULY 29	JULY 30	JULY 31	AUG. 1	AUG. 2	AUG. 3
TIME START (LST)	1800	1815	1830	1840	1755	2230
DURATION(HR.MIN)	10.15	10.15	10.00	10.20	10.15	8.00
START N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	13.0	9.4	31.2	14.5	14.9	16.0
W. LONG. (DEG)	130	130	131	132	133	133
(MIN)	36.2	58.7	4.4	10.6	31.5	8.0
DIRECTION (DEG.TRUE)	090	280	090	270	090	090
FINISH N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	8.5	12.1	31.1	15.1	14.8	16.0
W.LONG. (DEG)	130	131	130	132	132	132
(MIN)	34.2	33.9	22.2	52.8	44.0	44.4
LENGTH OF SET KM.	56.0	49.0	49.0	49.0	49.0	28.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.4	14.4	15.1	15.0	14.8	14.6
END TEMP.(DEG.C)	14.4	14.3	14.9	14.5	15.0	14.8
NO. OF GROUPS.	8	7	7	7	7	4
TOTAL SQUID (KG)	20000	11162	14666	16762	33714	19581

Table 4a (cont'd)

SET NO.	49	50	51	52	53	54
DATE	AUG. 4	AUG. 5	AUG. 6	AUG. 7	AUG. 10	AUG. 11
TIME START (LST)	1700	1915	2035	1730	1730	1940
DURATION(HR.MIN)	11.00	10.15	7.25	10.30	10.40	9.30
START N. LAT. (DEG)	48	48	48	49	48	48
(MIN)	13.5	12.7	40.1	3.9	56.0	55.7
W. LONG. (DEG)	132	133	133	133	131	131
(MIN)	46.8	10.9	16.8	31.1	44.3	32.6
DIRECTION (DEG.TRUE)	095	095	110	110	110	100
FINISH N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	9.7	9.1	37.1	54.6	44.3	49.8
W.LONG. (DEG)	132	133	132	133	131	130
(MIN)	51.1	10.3	53.1	0.2	7.0	54.6
LENGTH OF SET KM.	49.0	42.0	28.0	42.0	56.0	49.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.8	14.7	14.0	14.0	13.9	13.8
END TEMP.(DEG.C)	14.6	14.8	14.4	14.4	14.4	14.4
NO. OF GROUPS.	7	6	4	6	8	7
TOTAL SQUID (KG)	30781	11428	8457	7886	27276	45695

Table 4a (cont'd)

SET NO.	55	56	57	58	59	60
DATE	AUG. 13	AUG. 14	AUG. 15	AUG. 16	AUG. 17	AUG. 18
TIME START (LST)	1830	1750	1845	1810	1855	1930
DURATION(HR.MIN)	10.00	10.40	10.15	10.40	10.35	10.00
START N. LAT. (DEG)	49	49	49	49	49	49
(MIN)	2.3	26.6	30.4	38.4	40.0	48.3
W. LONG. (DEG)	131	131	131	131	131	132
(MIN)	21.1	32.8	30.5	42.5	24.4	0.0
DIRECTION (DEG.TRUE)	110	110	115	105	285	100
FINISH N. LAT. (DEG)	48	49	49	49	49	49
(MIN)	56.0	17.1	21.8	31.7	44.6	44.3
W.LONG. (DEG)	131	130	130	131	131	131
(MIN)	0.0	58.0	52.5	2.6	56.8	26.8
LENGTH OF SET KM.	35.0	49.0	49.0	49.0	42.0	42.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.3	14.4	14.3	14.6	14.3	14.4
END TEMP.(DEG.C)	14.4	14.4	13.8	13.9	14.3	14.3
NO. OF GROUPS.	5	7	7	7	6	6
TOTAL SQUID (KG)	11238	28800	17828	34019	38209	36380

Table 4a (cont'd)

SET NO.	61	62	63	64	65	66
DATE	AUG. 19	AUG. 20	AUG. 21	AUG. 22	AUG. 23	AUG. 24
TIME START (LST)	1825	1735	1725	1725	1740	1725
DURATION(HR.MIN)	10.50	10.55	11.05	11.20	11.20	11.35
START N. LAT. (DEG)	49	49	49	50	50	50
(MIN)	49.3	52.0	54.6	1.9	17.8	20.9
W. LONG. (DEG)	131	132	132	132	132	132
(MIN)	32.6	12.9	1.3	31.3	33.4	25.7
DIRECTION (DEG.TRUE)	100	100	280	100	100	280
FINISH N. LAT. (DEG)	49	49	49	49	50	50
(MIN)	53.8	47.1	59.4	56.6	13.2	24.9
W.LONG. (DEG)	132	131	132	131	131	132
(MIN)	4.5	34.4	38.6	53.8	58.2	59.3
LENGTH OF SET KM.	42.0	49.0	49.0	49.0	49.0	49.0
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	1	1	1	1	1	1
START TEMP.(DEG.C)	14.5	14.6	14.7	14.9	15.1	15.3
END TEMP.(DEG.C)	14.3	14.5	14.6	15.2	15.0	14.4
NO. OF GROUPS.	6	7	7	7	7	7
TOTAL SQUID (KG)	17904	19314	27771	5295	8388	10361

Table 4b. Bridge log and jig catch information for each night's fishing by the TOMI MARU NO.88 in 1987.

SET NO.	1	2	3	4	5	6
DATE	JUNE 15	JUNE 16	JUNE 17	JUNE 18	JUNE 20	JUNE 21
TIME START (LST)	2130	2040	2220	2200	2330	2130
DURATION(HR.MIN)	4.00	3.00	3.40	3.50	1.15	4.30
START N. LAT. (DEG)	42	41	42	43	45	45
(MIN)	21.6	37.8	57.1	32.0	2.1	12.2
W. LONG. (DEG)	131	130	131	130	129	129
(MIN)	7.4	36.3	26.8	10.0	53.8	31.8
FINISH N. LAT. (DEG)	42	41	42	43	45	45
(MIN)	22.3	38.7	54.8	32.0	2.1	12.2
W. LONG. (DEG)	131	130	131	130	129	129
(MIN)	6.6	35.4	27.1	10.0	53.8	31.8
DEPTH (M)	100	100	100	100	100	100
SEE FIGURE NO.	2	2	2	2	2	2
START TEMP.(DEG.C)	14.0	14.4	14.0	14.6	13.0	13.1
END TEMP.(DEG.C)	14.0	14.3	14.0	14.6	13.0	13.1
NO. OF JIGS/LINE	26	26	26	26	26	26
NO. OF LINES	4	6	4	6	4	4
TOTAL SQUID (KG)	0	0	2	0	0	55

Table 4b (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 22	JUNE 23	JUNE 24	JUNE 25	JUNE 27	JULY 1
TIME START (LST)	2130	2320	2330	2300	2300	0000
DURATION(HR.MIN)	4.40	2.40	2.00	2.00	2.00	1.00
START N. LAT. (DEG)	45	45	45	45	46	46
(MIN)	13.3	15.8	35.0	14.0	10.0	18.0
W. LONG. (DEG)	130	129	129	129	131	131
(MIN)	1.9	48.2	43.0	49.0	2.0	27.0
FINISH N. LAT. (DEG)	45	45	45	45	46	46
(MIN)	13.3	15.8	35.0	14.0	10.0	18.0
W. LONG. (DEG)	130	129	129	129	131	131
(MIN)	1.9	48.2	43.0	49.0	2.0	27.0
DEPTH (M)	100	100	100	100	100	100
SEE FIGURE NO.	2	2	2	2	2	2
START TEMP.(DEG.C)	12.6	13.6	14.0	13.5	13.0	12.7
END TEMP.(DEG.C)	12.6	13.6	14.0	13.5	13.0	12.7
NO. OF JIGS/LINE	26	26	26	26	26	26
NO. OF LINES	2	2	4	4	2	2
TOTAL SQUID (KG)	3	0	0	0	0	0

Table 4b (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JULY 1	JULY 2	JULY 4	JULY 4	JULY 9	JULY 19
TIME START (LST)	2300	2300	2300	2300	2300	2230
DURATION(HR.MIN)	2.00	2.00	2.00	2.00	2.00	2.30
START N. LAT. (DEG)	46	46	46	46	47	47
(MIN)	26.0	28.0	34.0	34.0	20.0	29.0
W. LONG. (DEG)	130	130	129	129	129	129
(MIN)	14.0	0.2	53.0	53.0	24.0	42.0
FINISH N. LAT. (DEG)	46	46	46	46	47	47
(MIN)	26.0	28.0	34.0	34.0	20.0	29.0
W. LONG. (DEG)	130	130	129	129	129	129
(MIN)	14.0	0.2	53.0	53.0	24.0	42.0
DEPTH (M)	100	100	100	100	100	100
SEE FIGURE NO.	2	2	2	2	2	2
START TEMP.(DEG.C)	12.9	12.7	13.1	13.1	13.3	13.6
END TEMP.(DEG.C)	12.9	12.7	13.1	13.1	13.3	13.6
NO. OF JIGS/LINE	26	26	26	26	26	26
NO. OF LINES	3	3	3	2	3	2
TOTAL SQUID (KG)	0	10	0	0	0	0

Table 4b (cont'd)

SET NO.	19
DATE	JULY 23
TIME START (LST)	2200
DURATION(HR.MIN)	3.00
START N. LAT. (DEG)	47
(MIN)	39.0
W. LONG. (DEG)	128
(MIN)	41.0
FINISH N. LAT. (DEG)	47
(MIN)	39.0
W.LONG. (DEG)	128
(MIN)	41.0
DEPTH (M)	100
SEE FIGURE NO.	2
START TEMP.(DEG.C)	14.6
END TEMP.(DEG.C)	14.6
NO. OF JIGS/LINE	26
NO. OF LINES	2
TOTAL SQUID (KG)	1

Table 4c. Bridge log and drift net catch information, in pieces, for each night's fishing by the OCEAN PEARL in 1987. * = estimate, LST = Local Standard Time.

SET NO.	1	2	3	4	5	6
DATE	JUNE 13	JUNE 14	JUNE 15	JUNE 16	JUNE 17	JUNE 18
TIME START (LST)	2125	2030	1805	1910	1835	1820
DURATION(HR.MIN)	6.35	6.20	8.55	7.50	8.25	8.40
START N. LAT. (DEG)	43	41	41	41	41	41
(MIN)	48.5	57.1	3.9	6.7	45.5	51.8
W. LONG. (DEG)	129	129	130	130	130	129
(MIN)	25.5	29.1	27.6	9.2	6.7	15.7
DIRECTION (DEG.TRUE)	270	270	285	090	270	270
FINISH N. LAT. (DEG)	43	41	41	41	41	41
(MIN)	47.5	58.7	4.5	6.2	53.6	54.1
W.LONG. (DEG)	129	129	130	129	130	129
(MIN)	37.1	44.4	50.4	45.7	6.7	39.4
LENGTH OF SET KM.	16.0	21.5	32.5	32.5	27.0	32.5
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	14.0	14.3	14.8	15.4	15.4	15.5
END TEMP.(DEG.C)	13.7	14.6	15.1	15.4	15.0	15.7
NO. OF GROUPS.	3	4	6	6	5	6
TOTAL SQUID (KG)	680	820	980	420	40	620

Table 4c (cont'd)

SET NO.	7	8	9	10	11	12
DATE	JUNE 19	JUNE 20	JUNE 22	JUNE 22	JUNE 23	JUNE 24
TIME START (LST)	1805	1830	0005	1755	1805	1705
DURATION(HR.MIN)	7.55	8.20	2.55	9.05	8.50	10.50
START N. LAT. (DEG)	42	41	43	45	45	45
(MIN)	9.0	47.1	43.2	9.3	22.0	25.1
W. LONG. (DEG)	129	129	129	130	130	130
(MIN)	14.9	9.4	59.2	22.5	40.6	27.0
DIRECTION (DEG.TRUE)	270	345	090	270	090	090
FINISH N. LAT. (DEG)	42	42	43	45	45	45
(MIN)	15.0	4.1	42.9	9.5	22.7	25.6
W.LONG. (DEG)	129	129	130	130	130	130
(MIN)	29.9	12.3	3.1	46.0	16.0	1.6
LENGTH OF SET KM.	27.5	32.5	5.2	32.5	32.4	32.3
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	14.6	14.7	13.6	13.7	13.2	15.4
END TEMP.(DEG.C)	14.9	14.6	13.6	13.7	14.6	15.0
NO. OF GROUPS.	5	6	1	6	6	6
TOTAL SQUID (KG)	880	1400	15	8950	7530	7740

Table 4c (cont'd)

SET NO.	13	14	15	16	17	18
DATE	JUNE 25	JUNE 26	JUNE 27	JUNE 28	JUNE 29	JUNE 30
TIME START (LST)	1820	1900	1810	1850	1755	1730
DURATION(HR.MIN)	8.45	8.00	8.45	8.15	9.10	9.25
START N. LAT. (DEG)	45	46	46	46	46	46
(MIN)	40.4	41.8	51.1	49.4	42.6	34.7
W. LONG. (DEG)	130	130	130	130	130	130
(MIN)	30.3	58.8	57.8	35.5	54.5	57.7
DIRECTION (DEG.TRUE)	270	270	090	090	090	080
FINISH N. LAT. (DEG)	45	46	46	46	46	46
(MIN)	40.1	41.9	51.1	50.4	44.2	37.6
W. LONG. (DEG)	130	131	130	130	130	130
(MIN)	55.6	10.4	33.6	13.2	35.9	35.4
LENGTH OF SET KM.	32.1	15.6	32.1	29.1	24.2	30.9
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	14.0	13.5	13.1	13.2	13.4	13.6
END TEMP.(DEG.C)	13.8	13.4	13.6	13.0	13.2	13.3
NO. OF GROUPS.	6	3	6	6	5	6
TOTAL SQUID (KG)	5320	3060	3810	6590	7490	9410

Table 4c (cont'd)

SET NO.	19	20	21	22	23	24
DATE	JULY 1	JULY 2	JULY 3	JULY 4	JULY 5	JULY 6
TIME START (LST)	1810	1935	1800	1625	1905	2015
DURATION(HR.MIN)	8.50	6.30	7.30	10.35	7.55	6.45
START N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	36.8	40.3	47.1	39.1	37.2	36.5
W. LONG. (DEG)	130	130	130	130	130	130
(MIN)	43.3	38.3	30.2	36.2	26.2	21.1
DIRECTION (DEG.TRUE)	090	090	090	090	090	090
FINISH N. LAT. (DEG)	46	46	46	46	46	46
(MIN)	38.2	40.9	47.1	39.2	37.7	36.8
W.LONG. (DEG)	130	130	130	130	130	129
(MIN)	19.2	19.1	15.3	11.7	0.8	56.9
LENGTH OF SET KM.	29.0	23.8	20.0	29.3	29.3	29.2
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	13.3	13.7	13.3	13.5	13.7	13.6
END TEMP.(DEG.C)	13.2	13.6	13.2	13.4	13.7	13.6
NO. OF GROUPS.	6	5	4	6	6	6
TOTAL SQUID (KG)	20660	14610	15730	11145	14240	4015

Table 4c (cont'd)

SET NO.	25	26	27	28	29	30
DATE	JULY 7	JULY 8	JULY 9	JULY 11	JULY 14	JULY 15
TIME START (LST)	1840	1830	1805	1930	1710	2030
DURATION(HR.MIN)	8.20	8.30	8.55	7.30	9.50	6.30
START N. LAT. (DEG)	47	47	47	47	47	48
(MIN)	0.1	16.2	22.4	11.0	36.7	8.5
W. LONG. (DEG)	130	131	131	131	130	130
(MIN)	7.0	19.7	29.4	18.6	9.0	21.5
DIRECTION (DEG.TRUE)	270	090	090	270	090	270
FINISH N. LAT. (DEG)	46	47	47	47	47	48
(MIN)	58.5	17.0	18.7	10.5	36.2	8.2
W.LONG. (DEG)	130	130	131	131	129	130
(MIN)	32.1	53.1	3.3	34.1	44.7	6.5
LENGTH OF SET KM.	29.3	29.2	29.0	19.6	29.2	19.2
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	13.6	13.4	13.6	14.2	13.9	13.8
END TEMP.(DEG.C)	13.7	13.4	13.4	13.9	13.9	13.9
NO. OF GROUPS.	6	6	6	4	6	4
TOTAL SQUID (KG)	1820	7365	4350	5455	10020	2610

Table 4c (cont'd)

SET NO.	31	32	33	34	35	36
DATE	JULY 18	JULY 19	JULY 20	JULY 21	JULY 22	JULY 23
TIME START (LST)	1820	1905	1910	1850	1705	1935
DURATION(HR.MIN)	8.45	7.55	7.50	8.05	9.55	8.25
START N. LAT. (DEG)	49	48	48	47	47	47
(MIN)	7.2	44.1	28.9	26.3	28.6	25.5
W. LONG. (DEG)	130	131	130	130	129	129
(MIN)	45.8	26.1	16.9	14.4	33.2	44.2
DIRECTION (DEG.TRUE)	110	100	100	100	100	100
FINISH N. LAT. (DEG)	49	48	48	47	47	47
(MIN)	6.7	43.1	26.0	24.7	27.0	19.3
W.LONG. (DEG)	130	131	129	129	129	129
(MIN)	26.8	2.6	53.6	49.6	9.9	23.7
LENGTH OF SET KM.	24.2	29.0	28.7	28.7	28.6	28.3
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	13.2	13.7	14.4	14.0	14.4	14.5
END TEMP.(DEG.C)	13.5	13.8	14.6	14.1	14.7	14.8
NO. OF GROUPS.	5	6	6	6	6	6
TOTAL SQUID (KG)	105	450	2070	6810	8280	2525

Table 4c (cont'd)

SET NO.	37	38	39	40	41	42
DATE	JULY 24	JULY 25	JULY 26	JULY 27	JULY 28	JULY 29
TIME START (LST)	1815	1705	1900	1800	1750	1750
DURATION(HR.MIN)	8.50	10.05	8.00	9.00	9.10	9.10
START N. LAT. (DEG)	48	48	48	48	48	49
(MIN)	27.3	29.3	28.3	32.8	29.0	9.6
W. LONG. (DEG)	129	129	129	129	129	131
(MIN)	39.3	40.7	40.0	36.6	38.7	4.0
DIRECTION (DEG.TRUE)	100	095	090	090	090	110
FINISH N. LAT. (DEG)	48	48	48	48	48	49
(MIN)	26.0	29.1	28.2	32.6	29.8	6.8
W. LONG. (DEG)	129	129	129	129	139	130
(MIN)	15.0	18.7	16.4	13.2	15.9	39.8
LENGTH OF SET KM.	28.5	28.5	28.5	28.3	28.0	28.2
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	14.4	14.8	14.6	14.4	14.9	14.8
END TEMP.(DEG.C)	14.4	14.6	14.4	14.4	14.8	14.8
NO. OF GROUPS.	6	6	6	6	6	6
TOTAL SQUID (KG)	16190	9980	13820	4370	2855	3358

Table 4c (cont'd)

SET NO.	43	44	45	46	47	48
DATE	JULY 30	JULY 31	AUG. 1	AUG. 2	AUG. 3	AUG. 4
TIME START (LST)	1915	1900	1815	1805	1805	1905
DURATION(HR.MIN)	7.45	8.00	9.45	8.55	8.55	9.00
START N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	19.8	19.7	22.0	23.8	20.4	19.8
W. LONG. (DEG)	130	132	132	132	132	132
(MIN)	34.5	50.0	45.8	46.3	44.3	43.2
DIRECTION (DEG.TRUE)	285	280	270	275	270	270
FINISH N. LAT. (DEG)	48	48	48	48	48	48
(MIN)	23.7	20.5	21.8	24.9	20.7	19.3
W. LONG. (DEG)	130	133	133	133	133	133
(MIN)	55.7	12.5	7.2	8.3	5.4	3.2
LENGTH OF SET KM.	28.0	27.9	27.5	28.6	28.2	27.5
DEPTH (M)	0- 10	0- 10	0- 10	0- 10	0- 10	0- 10
SEE FIGURE NO.	3	3	3	3	3	3
START TEMP.(DEG.C)	15.0	15.2	15.2	15.4	15.4	15.4
END TEMP.(DEG.C)	15.0	15.6	15.2	15.4	15.2	15.2
NO. OF GROUPS.	6	6	6	6	6	6
TOTAL SQUID (KG)	5934	22265	21805	13365	22005	9570

Table 4c (cont'd)

SET NO.	49
DATE	AUG. 5
TIME START (LST)	1835
DURATION(HR.MIN)	8.55
START N. LAT. (DEG)	48
(MIN)	16.4
W. LONG. (DEG)	133
(MIN)	18.0
DIRECTION (DEG.TRUE)	090
FINISH N. LAT. (DEG)	48
(MIN)	16.3
W.LONG. (DEG)	132
(MIN)	57.9
LENGTH OF SET KM.	27.0
DEPTH (M)	0- 10
SEE FIGURE NO.	3
START TEMP.(DEG.C)	15.0
END TEMP.(DEG.C)	15.1
NO. OF GROUPS.	3
TOTAL SQUID (KG)	3495

Table 5. Percentage of total catch (in pieces) by species for each vessel in 1987.

Species	Vessel	
	TOMI MARU No. 88	OCEAN PEARL
Flying Squid	79.84	70.10
Nail Squid	0.00	0.00
Pink Salmon	0.00	0.01
Chum Salmon	0.02	0.03
Coho Salmon	0.00	0.00
Sockeye Salmon	0.01	0.19
Steelhead	0.04	0.07
Bonito Shark	0.00	-
Blue Shark	6.97	5.34
Salmon Shark	0.13	0.12
Thresher Shark	0.00	0.00
Basking Shark	-	0.00
Souppin Shark	-	0.00
Pelagic Stingray	0.00	-
Pomfret	11.79	22.18
Rough Pomfret	-	0.00
Albacore	0.16	0.08
Jack Mackerel	0.95	1.79
Chub Mackerel	-	0.00
Pacific Bonito	0.00	-
Yellowtail	0.00	0.00
Pelagic Armourhead	0.00	0.00
Skilfish	0.00	0.00
Pacific Saury	-	0.00
Longnose Lancetfish	-	0.00
Ocean Sunfish	0.00	-
Dall Porpoise	0.01	0.01
Northern Right-whale Dolphin	0.00	0.00
Pacific White-Sided Dolphin	0.00	0.01
Short-finned Pilot Whale	0.00	0.00
Harbour Porpoise	0.00	0.00
Fur Seal	0.00	-
Stellar Sea Lion	-	0.00

Table 6. Marine mammal bycatch in the offshore squid fishery during the years 1983, 1985, 1986 and 1987. T.M. = TOMI MARU #88, Sim. = SIMSTAR, O.P. = OCEAN PEARL, L.P. = LA PORSCHE

Species	Number of marine mammals							
	1983		1985	1986			1987	
	T.M.	Sim.	T.M.	T.M.	O.P.	L.P.	T.M.	O.P.
Dall porpoise	2	1	1	19	9	5	32	26
Short-finned Pilot whale	1	-	-	-	5	-	2	1
Pacific white-sided dolphin	-	-	1	-	3	-	3	13
Harbour porpoise	2	-	-	-	-	-	-	1
Northern right-whale dolphin	-	-	-	2	1	1	7	2
Killer whale	-	-	-	-	2	-	-	-
Cuvier's beaked whale	-	-	-	1	-	-	-	-
Fur seal	-	-	1	-	-	-	1	-
Stellar sea lion	-	-	-	-	-	-	-	1
Unidentified	-	-	-	-	2	-	1	-
TOTALS	5	1	3	22	22	6	46	44
Total net fished (km)	1376.4	97.3	2475.1	3204.5	750.5	352.5	3080.0	1337.0
Average net length (km) to catch 1 mammal	275.3	97.3	825.0	145.7	34.1	58.7	67.0	30.4
Average time (days) to catch 1 mammal =	9.0	25.0	18.7	3.2	1.6	4.7	1.4	1.1

Table 7a (cont'd)

Common name	CPUE (pieces 10km ⁻¹)	
	TOMI MARU NO.88	OCEAN PEARL
Harbour Porpoise	-	0.01
Fur Seal	0.00	-
Stellar Sea Lion	-	0.01
Unidentified mammal	0.00	-
Albatross	0.01	0.03
Sooty Shearwater	1.19	0.72
Slender-billed Shearwater	-	0.01
Storm Petrels	0.10	0.01
Cassin's Auklet	0.07	0.04
Rhinoceros Auklet	0.01	-
Common Murre	0.00	-
Murres, Murrelets, Auklets and Puffins	-	0.02
Terns	0.07	0.02

Table 7b (cont'd)

Common name	CPUE (pieces 10km ⁻¹ hr ⁻¹)	
	TOMI MARU NO.88	OCEAN PEARL
Harbour Porpoise	-	0.00
Fur Seal	0.00	-
Stellar Sea Lion	-	0.00
Unidentified mammal	0.00	-
Albatross	0.00	0.00
Sooty Shearwater	0.11	0.09
Slender-billed Shearwater	-	0.00
Storm Petrels	0.00	0.00
Cassin's Auklet	0.01	0.00
Rhinoceros Auklet	0.00	-
Common Murre	0.00	-
Murres, Murrelets, Auklets and Puffins	-	0.00
Terns	0.01	0.00

Table 8a (cont'd)

Common name	CPUE (kg 10km ⁻¹)	
	TOMI MARU NO.88	OCEAN PEARL
Fur Seal	0.11	-
Stellar Sea Lion	-	2.24
Unidentified mammal	0.00	-
Albatross	0.03	0.15
Sooty Shearwater	0.88	0.53
Slender-billed Shearwater	-	0.00
Storm Petrels	0.01	0.00
Cassin's Auklet	0.01	0.00
Rhinoceros Auklet	0.00	-
Common Murre	0.00	-
Murres, Murrelets, Auklets and Puffins	-	0.00
Terns	0.02	0.00

Table 8b (cont'd)

Common name	CPUE (kg 10km ⁻¹ hr ⁻¹)	
	TOMI MARU NO.88	OCEAN PEARL
Harbour Porpoise	-	0.05
Fur Seal	0.01	-
Stellar Sea Lion	-	0.27
Unidentified mammal	0.00	-
Albatross	0.00	0.02
Sooty Shearwater	0.08	0.10
Slender-billed Shearwater	-	0.00
Storm Petrels	0.00	0.00
Cassin's Auklet	0.00	0.00
Rhinoceros Auklet	0.00	-
Common Murre	0.00	-
Murres, Murrelets, Auklets and Puffins	-	0.00
Terns	0.00	0.00

Table 10. Mean daily CPUE (pieces 10km⁻¹) of the most commonly caught species (>1 piece 10km⁻¹) caught with driftnets by the two vessels fishing flying squid in 1987. Data provided are averaged for sets made before and after July 24, with surface water temperatures before and after this date generally <14°C, and >14°C, respectively. p < 0.5 = significant difference between the two average catch rates.

	TOMI MARU #88			OCEAN PEARL		
	June 15-July 24 (n=38)	July 25-August 24 (n=28)	p	June 13-July 24 (n=37)	July 25-August 5 (n=12)	p
Flying squid	1434.1	1875.4	.08	929.0	1638.2	.03
Pomfret	219.3	293.2	.41	177.7	879.2	<.01
Jack mackerel	34.2	8.3	.14	19.8	50.2	.07
Albacore	1.4	5.7	.01	0.9	1.9	.36
Salmon (all species)	0.7	0.4	.21	5.0	1.0	.60
Steelhead	1.2	0.6	.10	1.0	1.4	.47
Blue shark	71.8	247.3	<.01	62.7	136.3	<.01
Salmon shark	1.7	4.1	<.01	1.4	3.4	<.01
Sooty shearwater	1.1	1.6	.23	0.5	1.2	.04
Dall porpoise	0.2	0.02	.01	0.2	0.1	.40

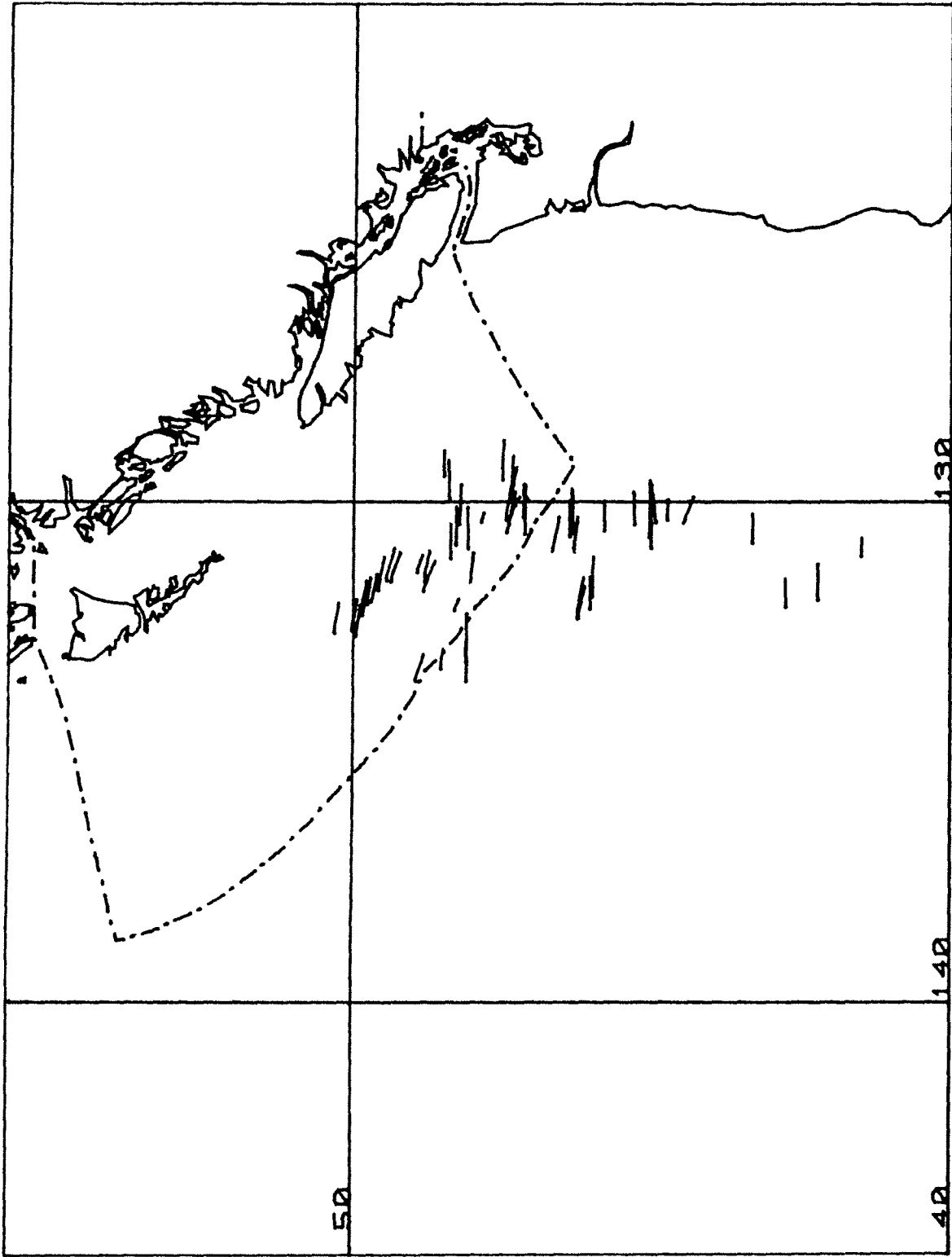


Fig. 1. 1987 driftnet set locations for TOMI MARU NO. 88.

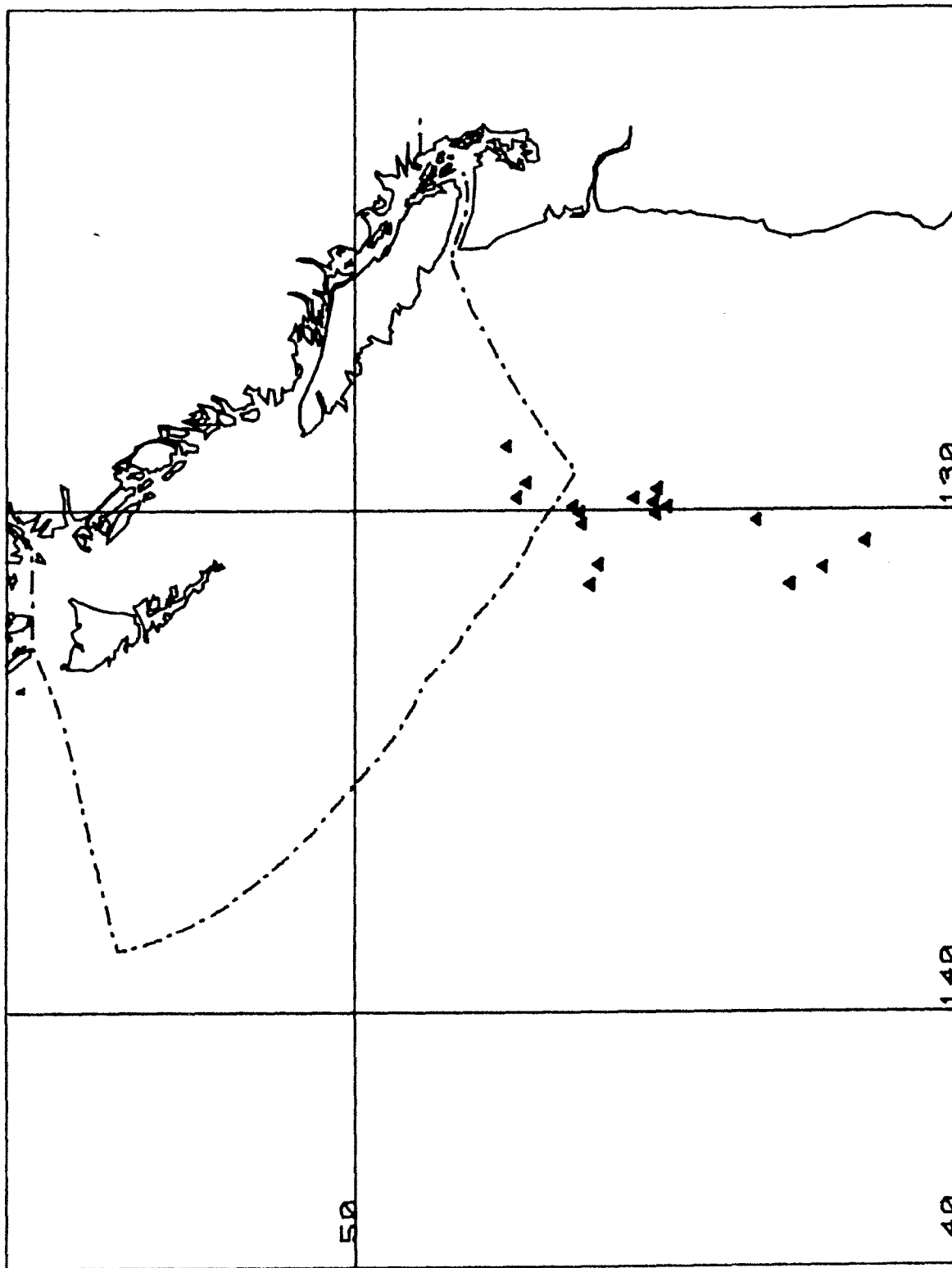


Fig. 3. 1987 jig sites for TOMI MARU NO. 88.