NPAFC
Doc. 135
Rev. ___

Salmon Stock Assessment in the North Pacific Ocean in 1995

by

Yukimasa Ishida and Soto-o Ito

National Research Institute of Far Seas Fisheries , Fisheries Agency of Japan
5-7-1 Orido, Shimizu, Shizuoka 424, Japan

Submitted to the
NORTH PACIFIC ANADROMOUS FISH COMMISSION
by
Japan
October 1995

THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER:
Ishida, Y. and S. Ito. 1995. Salmon stock assessment in the North Pacific Ocean in 1995. (NPAFC Doc.135). National Research Institute of Far Seas Fisheries. 5-7-1 Orido, Shimizu, Shizuoka, 424, Japan. 39p.

Salmon Stock Assessment in the North Pacific Ocean in 1995

Yukimasa Ishida and Soto-o Ito
National Research Institute of Far Seas Fisheries

ABSTRACT

Four Japanese salmon research vessels (*Oshoro maru*, *Hokusei maru*, *Hokko maru*, and *Wakatake maru*) conducted 80 gillnet operations (3,920 tans) and 41 longline operations (990 hachi) in the Western and Central North Pacific, Bering Sea, and Gulf of Alaska from June to August, 1995. A total of 2,101 sockeye, 4,763 chum, 9,990 pink, 1,295 coho , 245 chinook, and 167 steelhead trout were caught by these fishing operations. In the Western North Pacific (38° -50° N, 154° -177° E), pink and chum salmon were dominant, and a total CPUE was lower in 1995 than in 1994, but higher than in 1992 and 1993. Mean sea surface temperature (SST) decreased from 12.72° C in 1994 to 11.69° C in 1995. In the Bering Sea (55° -59° N, 175° E-175° W), pink, chum, and sockeye salmon were abundantly distributed, and a total CPUE (=CPUE of six salmonid species combined) was at the same level for the past 4 years, even if pink and chum salmon showed a clear two-year cycle dominance in odd and even years, respectively. Mean SST in the Bering Sea was higher in 1995 than in 1994. In the Central North Pacific (35° -48° N, 179° E-179° W), chum, pink and coho salmon were the predominant species and their CPUEs in 1995 were almost the same as those in 1994. In the Gulf of Alaska (50° -57° N, 144° -146° W), CPUEs of chum salmon and steelhead trout were higher than those in 1994. Mean SSTs in the Central North Pacific and Gulf of Alaska were lower in 1995 than in 1994. In age composition, sockeye salmon of ocean age 1 decreased in the Bering Sea, but chum salmon of ocean age 1 increased in the Western North Pacific and Bering Sea. Body sizes of sockeye, chum and pink salmon in the Bering Sea were larger in 1995 than in 1994. Especially, body size of pink salmon in 1995 was the largest in the Western North Pacific and Bering Sea in recent years. In maturity, percentages of immature sockeye and chum salmon were lower in 1995 than in the previous years, except for the Western North Pacific. The prominent features of stomach contents were higher percentage of euphausiids in the Bering Sea, copepods in the Western North Pacific, amphipods in the Western North Pacific and Bering Sea, and squids in all area especially in the Gulf of Alaska. Fishes were also dominant in stomach contents in the Western North Pacific, Central North Pacific and Bering Sea , but not in the Gulf of Alaska.

INTRODUCTION

According to the 1995 Workplan for the Committee on Scientific Research and Statistics (CSRS), it is expected that the results of salmon stock assessment research and the condition of salmon stocks should be reviewed by the CSRS. This report summarizes the results of salmon research

conducted by Japan in the North Pacific Ocean from June to August in 1995. In this report, the prominent features of salmon stock in the North Pacific in 1995 are described and compared with those in the past three years from 1992-1994.

MATERIALS AND METHODS

Four Japanese salmon research vessels (*Oshoro maru*, *Hokusei maru*, *Hokko maru*, and *Wakatake maru*) conducted 80 gillnet operations (3,920 tans) and 41 longline operations (990 hachi) in the Western and Central North Pacific, Bering Sea, and Gulf of Alaska from June to August, 1995. Stations are shown by research vessel in Figs. 1-4. The catch records of each research vessel are shown in Table 1 and Appendix Table 1-4. A total of 2,101 sockeye, 4,763 chum, 9,990 pink, 1,295 coho , 245 chinook, and 167 steelhead trout were caught by these fishing operations. Four major survey areas were used in this report as follows; the Western North Pacific (38° -50° N, 154° -177° E), the Central North Pacific (35° -48° N, 179° E-179° W), the Bering Sea (55° -59° N, 175° E-175° W), and the Gulf of Alaska (50° -57° N, 144° -146° W). In the Gulf of Alaska, data collected at stations along the outer edge of the U.S. 200 mile zone in 1992 and 1993 were also used, because survey along a south-to-north transect at 145° W in the Gulf of Alaska started in 1994. Catch-per-unit-effort (CPUE: fish per tan) was calculated as the number of fish caught by non-selective gillnets (Takagi 1975) and used as the index of stock abundance in each area. Age composition, mean fork length, and mean body weight were also calculated by area based on the data collected by non-selective gillnets. Salmonid stomach content sampling was done from morning gillnet operations in the western North Pacific and the Gulf of Alaska and sampling in the central North Pacific and Bering Sea was done from evening longline sets. The salmonid stomach content weight was measured and the percent prey composition by volume was visually estimated at the time the samples were collected. The index of stomach content weight (SCI: stomach content weight/body weight x 100) was calculated for all fish in the region including those with empty stomachs. To summarize the percent composition by prey category, the volume observed in each prey category was multiplied by the SCI for the individual fish. A mean proportion for each category was calculated from all fish in the region including those with empty stomachs. The mean proportion for each category was then divided by the mean SCI for the region to make the proportions in the individual prey categories a percentage of the total.

RESULTS

Stock Abundance (Table 2)

In the Western North Pacific, CPUE of pink salmon decreased from 3.65 fish per tan in 1994 to 1.94 fish per tan in 1995, but it was still higher than those in 1992 and 1993. CPUE of other salmon were almost the same as those recorded in the previous years. As a result, a total CPUE (=CPUE of six salmonid species combined) in the Western North Pacific was lower in 1995 than in 1994, but

higher than in 1992 and 1993. Mean sea surface temperature (SST) decrease from 12.72° C in 1994 to 11.69° C in 1995.

In the Bering Sea, CPUE of pink salmon showed a higher CPUE in 1995 than in 1994 and a two-year cycle dominance in odd years was clearly maintained. On the other hand, chum salmon showed a lower CPUE in 1995 than in 1994, indicating a two-year cycle dominance in even years in contrast with pink salmon. CPUEs of other salmon species were almost the same as those in the previous years. A total CPUE in the Bering Sea was maintained at the same level for the past 4 years, even if pink and chum salmon showed a clear two-year cycle dominance in odd and even years, respectively. Mean SST in the Bering Sea was higher in 1995 than in 1994.

In the Central North Pacific, chum, pink and coho salmon were the predominant species and their CPUEs in 1995 were almost the same in the last year. In the Gulf of Alaska, CPUEs of chum salmon and steelhead trout were higher than those in 1994. Mean SSTs in the Central North Pacific and Gulf of Alaska were lower in 1995 than in 1994.

Age Composition (Table 3)

For sockeye salmon, ocean age 2 and 3 in the Western North Pacific were dominant in 1995 like in the past four years. In the Bering Sea, usually sockeye salmon of ocean age 1 and 2 were dominant, but the proportion of ocean age 1 was very low in 1995. In the Gulf of Alaska, sockeye salmon of freshwater age 1 were dominant for all ocean age groups.

For chum salmon, ocean age variations were higher in the Western North Pacific and Bering Sea (ocean age 1, 2, 3, and 4) than in the Central North Pacific (ocean age 1, 2, and 3) and Gulf of Alaska (ocean age 1 and 2). For coho salmon, freshwater age 1 and 2 were dominant, and especially freshwater age 1 in the Gulf of Alaska. For chinook salmon, age 1.2 fish were dominant in the Western North Pacific and Bering Sea.

The prominent features in age composition were summarized as follows: 1) composition of ocean age 1 for sockeye salmon in the Bering Sea decreased, but slightly increased in the Gulf of Alaska, and 2) chum salmon of ocean age 1 increased in the Western North Pacific and Bering Sea , but decreased in the Central North Pacific and the Gulf of Alaska. These changes in composition of ocean age 1 fish may suggest changes in recruitment of sockeye and chum salmon in 1995.

Fish Size (Table 4 and 5)

For sockeye salmon, mean body size for each age group was larger in 1995 than in the previous three years in the Bering Sea. In the Western North Pacific and Gulf of Alaska, there is not consistent tendency in body size among age groups. For chum salmon, mean body sizes in most age groups were larger than those in 1994, but not necessarily larger than those in 1992 and 1993. Mean body size of pink salmon was the largest compared with those in the previous three years in the Western North Pacific and Bering Sea, but not in the Central North Pacific and Gulf of Alaska. Size of coho salmon in the western and Central North Pacific was the same as that of the last year, but smaller than

that in the Gulf of Alaska in 1994.

The prominent features for body size in 1995 was that the body sizes of sockeye, chum and pink salmon in the Bering Sea were larger than those in 1994. Especially, body size of pink salmon was the largest in the Western North Pacific and Bering Sea in recent years.

Maturity (Table 6)

Percentages of immature sockeye salmon were variable in the Western North Pacific, high in the Bering Sea, and low in the Gulf of Alaska. Those of chum salmon were lower in the Western North Pacific than in other areas. In 1995, percentages of immature sockeye and chum salmon were lower than in the previous years, except for the Western North Pacific.

Food Habit (Table 7)

Stomach content indices in the Central North Pacific and Bering Sea were higher than those in the Western North Pacific and the Gulf of Alaska, because the indices in the former areas were based on evening longline samples and those in the latter areas were based on morning gillnet samples. The prominent features of stomach contents were higher percentage of euphausiids in the Bering Sea, copepods in the Western North Pacific, amphipods in the Western North Pacific and Bering Sea, and squids in all area especially in the Gulf of Alaska. Fishes were also dominant in stomach contents in the Western North Pacific, Central North Pacific and Bering Sea , but not in the Gulf of Alaska.

DISCUSSION

Total salmon stock abundance were variable in the Western and Central North Pacific, and the Gulf of Alaska than in the Bering Sea. Possible reasons for this difference are as follows: 1) difference in total fish density, and 2) gillnet saturation, and 3) difference in sea surface temperature (SST).

Total CPUEs in the Western and Central North Pacific, and Gulf of Alaska were lower than in the Bering Sea. If there is an upper limit of fish density in each area, the present fish density in the Western and Central North Pacific, and Gulf of Alaska might be below the limit. Therefore, stock abundance of each salmon species reflects on CPUE, and then total CPUEs vary largely in the Western and Central North Pacific, and Gulf of Alaska. On the other hand, if fish density in the survey area of the Bering Sea is at the upper limit and regulated to be within this limit by changing fish distribution of each salmon species inside and outside of the survey area, changes in stock abundance in the Bering Sea do not necessarily reflect on CPUE in the survey area. A clear two-year cycle dominance in even years for chum salmon, which is opposite to a two-year cycle of pink salmon, might be the result of this regulation.

Another factor influencing CPUE is gillnet saturation. A total stock abundance in the Bering Sea was stable over the past four years. Pink and chum salmon showed a clear two-year cycle

dominance in odd and even years, respectively. Pink salmon have a two-year cycle dominance in odd years, therefore, there is a possibility that chum salmon are not caught due to gillnet saturation when pink salmon are caught abundantly in odd years. However, a total mean CPUE in the Bering Sea is about 10 fish per tan and only 0.29% of the theoretical maximum catch (Yatsu et al. 1995). Therefore, a two-year cycle of chum salmon may not be caused by gillnet saturation of pink salmon and the species interaction between pink and chum salmon is a possible factor for a two-year cycle of chum salmon. Interactions between chum and pink salmon are also reported in the feeding ecology that stomach contents of chum salmon varied depending upon pink salmon abundance (Ishida et al. 1992). It is possible that there is space capacity in which salmon can be distributed and graze in the North Pacific, especially in the Bering Sea.

The third possible reason for CPUE variations is difference in SST. SSTs in the Western and Central North Pacific, and Gulf of Alaska range from 9° C to 12 ° C, and that in the Bering Sea is lower than 8° C. The southern limit of salmon distribution is located in the former areas, and changes in SST might be affect the distribution of salmon and fish density. However, variations in SST (CV= 2-10%) were not so large compared with variations in CPUE (CV=4-40%) and there is no clear relationship between SST and CPUE in each area. Therefore, SST is not a possible reason for CPUE variations at least in the recent four years.

The prominent feature in age composition is a change in percentage of ocean age 1 for sockeye and chum salmon. It is expected that percentage of salmon of ocean age 1 reflects the recruitment of salmon. It is necessary to analyze data of stock abundance by age group and year class. Body sizes of sockeye, chum, and pink salmon were larger than in the previous year. This corresponds to the changes in maturity in which immature fish decreased and maturing fish increased in the Bering Sea. It is necessary in the future study to examine the relationship between year class strength, body size, and maturity.

About stomach content analysis, the standardized table was formulated and made easier for us to compare the results among different survey areas. In the future study, it is necessary to standardize sampling method for example using morning gillnet sampling, although it is preferable to continue evening longline sampling in the Central North Pacific and the Bering Sea.

ACKNOWLEDGMENTS

We thank Katherine W. Myers and Nancy D. Davis of the Fisheries Research Institute, University of Washington, for their contribution to stomach content analysis and standardization of reporting format. Capt. G. Anma of the *Oshoro maru*, Capt. T. Meguro of the *Hokusei maru*, Capt. K. Saito of the *Hokko maru*, Capt. Y. Hayasaka of the *Wakatake maru*, and other officers and crew are thanked for their careful collection of data and samples. M. Takahashi of Tokyo University of Fisheries and Kerim Aydin of the Fisheries Research Institute, University of Washington, were also acknowledged for their assistance for survey on the Wakatake maru and the Oshoro maru. M. Sano, K.

Harada, and H. Miyagishima were also thanked for their assistance for data analysis. Funding for the U.S. participants was provided by the Auke Bay Laboratory, Alaska Fisheries Science Center, U.S. National Marine Fisheries Service (NOAA Cont. No. 50ABNF400001).

REFERENCES

Takagi, K. 1975. A non-selective salmon gillnet for research operations. Int. North Pac. Fish. Comm. Bull. 32:13-41.

Yatsu, A., M. Dahlberg., and S. McKinnell. 1995. Effect of soaking time on catch-per-unit-effort of major species taken in the Japanese squid driftnet fisheries in 1990. Fisheries Research 23:23-35.

Ishida, Y., N. D. Davis, and K. Monaka. 1992. Japan-U.S. cooperative salmon research by the *Wakataka maru* in 1992. Salmon Report Series 36: 34-46.

Ishida, Y., and Y.Tamanaka. 1995. Salmon research aboard the *Hokko maru* in the western North Pacific in 1994. Salmon Report Series 39: 101-110.

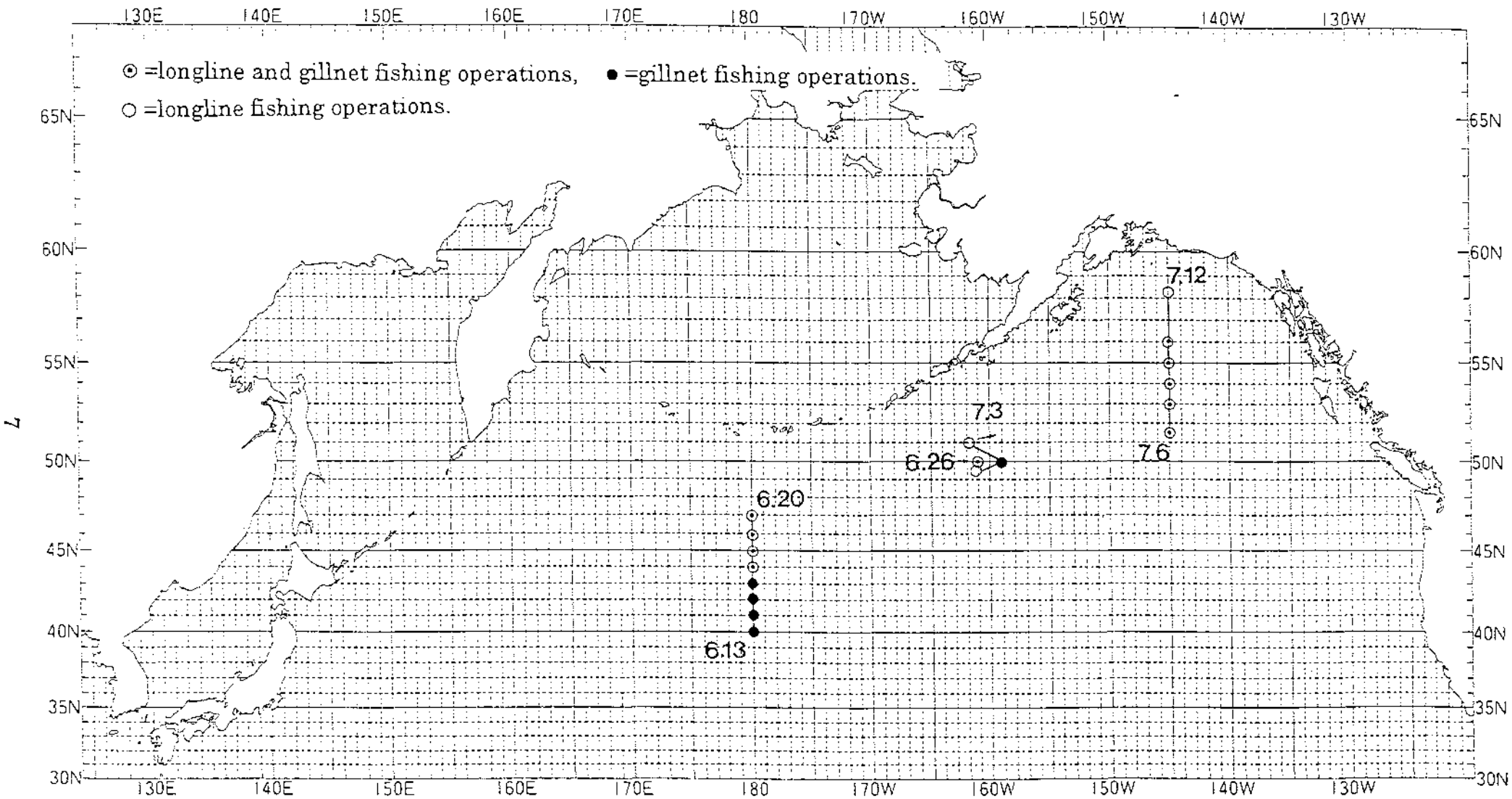

Fig. 1. Station locations for the summer 1995 salmon research cruise of the *Oshoro maru*.

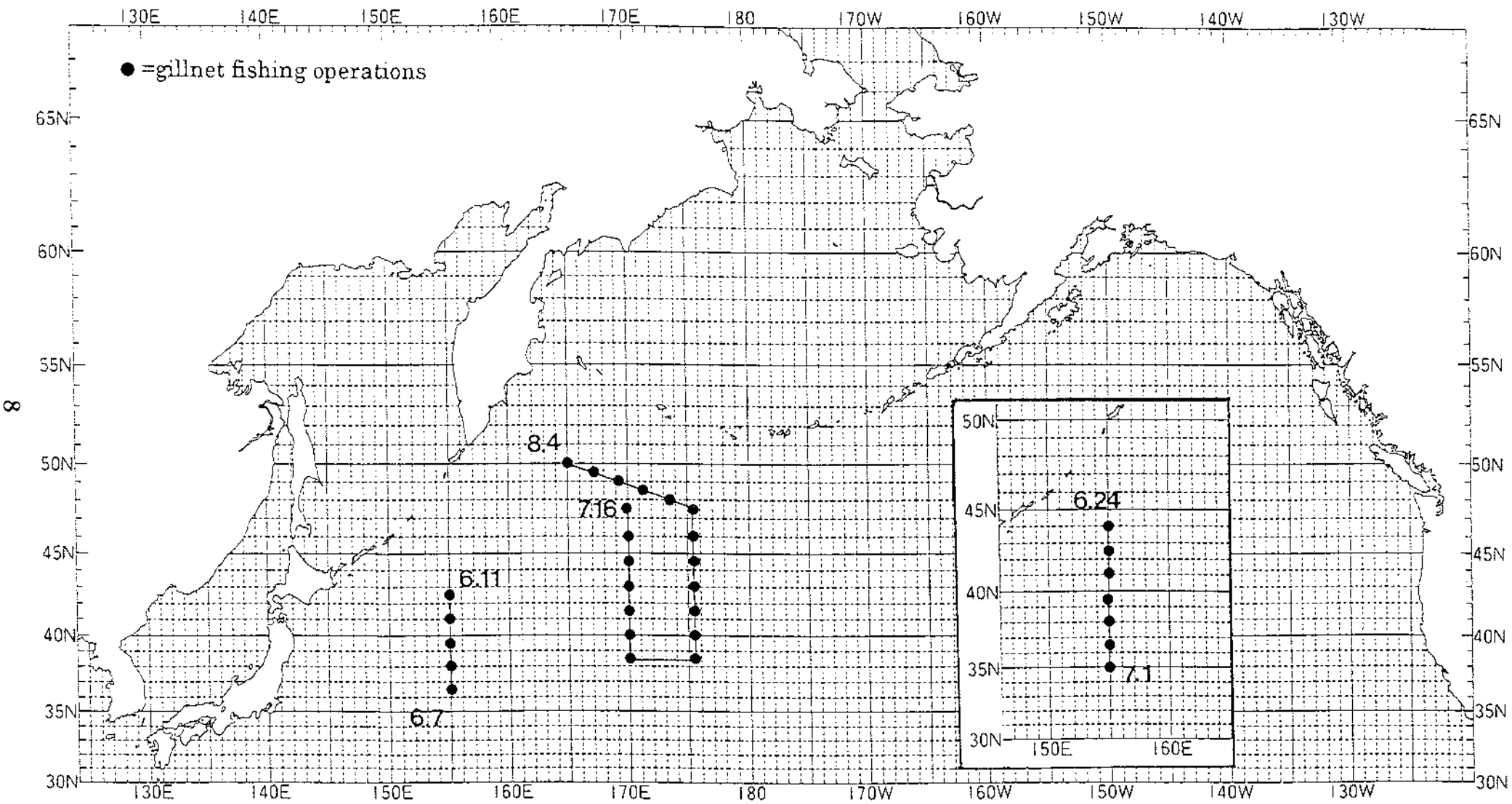

Fig. 2. Station locations for the summer 1995 salmon research cruise of the *Hokusei maru*.

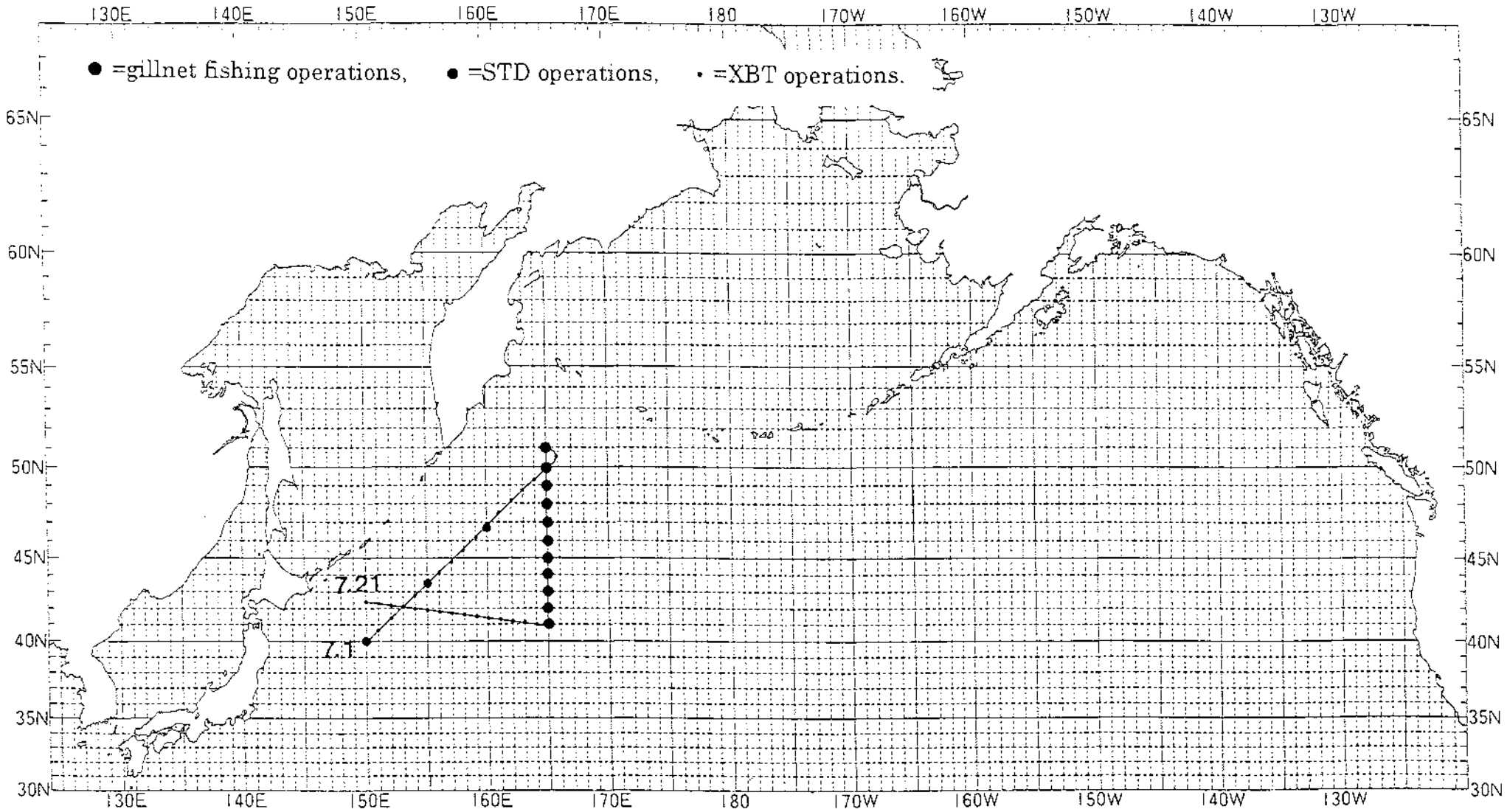

Fig. 3. Station locations for the summer 1995 salmon research cruise of the *Hokko maru*.

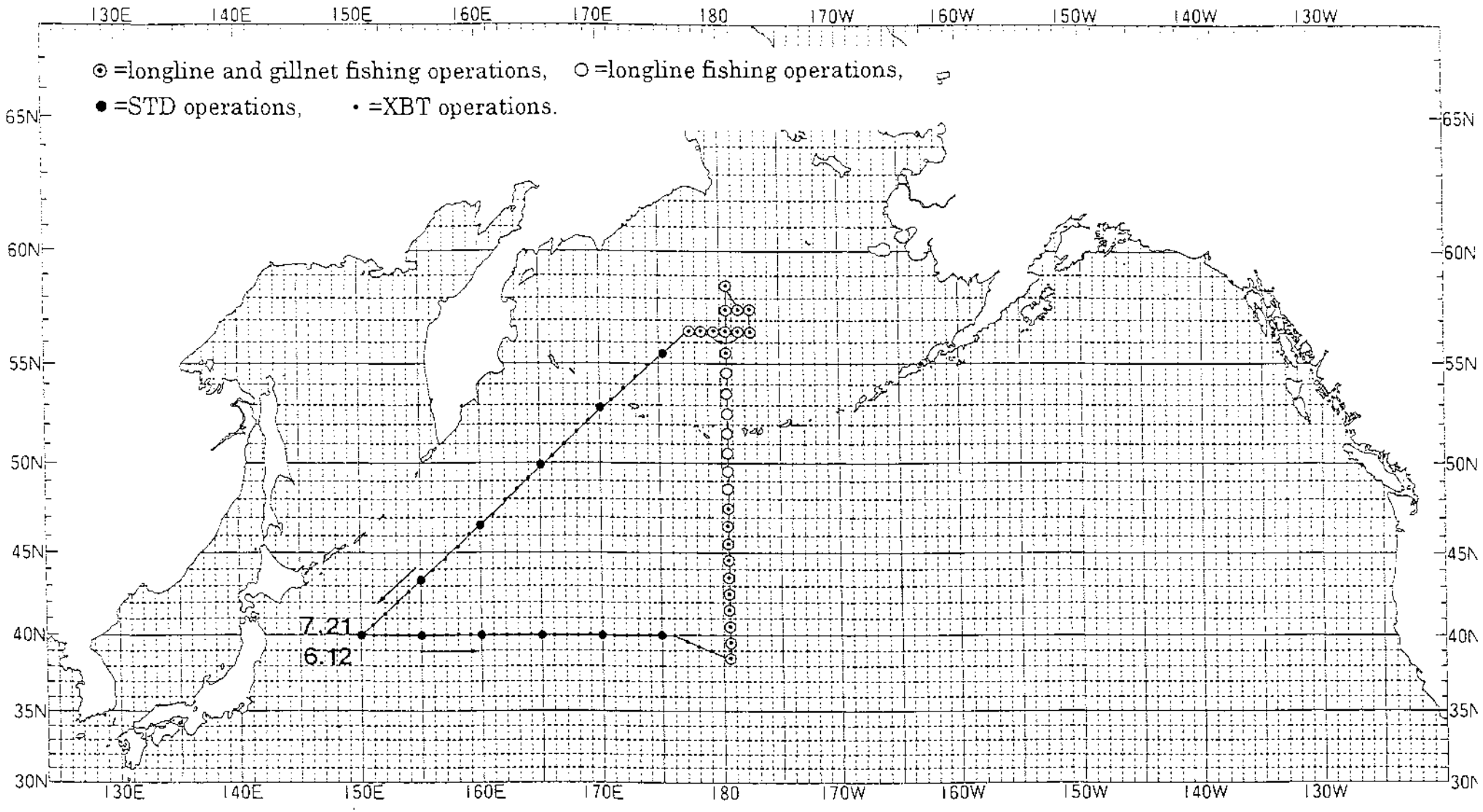

Fig. 4. Station locations for the summer 1995 salmon research cruise of the *Wakatake maru*.

Table 1. Number of fishing gear, number of salmonids, other fishes, squids, birds, and mammals caught by the Japanese salmon research vessel in 1995.
C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115mm), F:small-mesh gillnet (29-37mm), and B:longline.

Vessel Name / Code	Date	Major Survey Area	Operation No.	Gear	Tan/Hachi	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
Oshoro maru	6/13-7/12	Central North Pacific	No.1-No.28	C	450	246	510	264	153	3	37	0	19	100	14	0	0	5	0	1	2	0
R05		Gulf of Alaska		A	285	252	298	212	216	13	49	0	132	0	27	0	0	4	0	0	5	0
				B	150	5	71	127	37	1	6	0	0	0	0	0	0	0	0	0	0	0
				Total	885	503	879	603	406	17	92	0	151	100	41	0	0	9	0	1	7	0
Hokusei maru	6/7-6/11	Western North Pacific	No.1-No.31	C	930	6	438	1903	120	4	8	0	1901	351	343	5	0	83	632	325	55	0
R06	6/24-7/1			A	372	2	480	405	159	8	10	0	976	0	81	0	0	75	0	134	13	3
	7/16-8/4			F	217	0	0	3	1	0	0	0	259	333	12	106	0	1	11655	2092	0	0
				Total		8	918	2311	280	12	18	0	3136	684	436	111	0	159	12287	2551	68	3
Hokko maru	7/7-7/18	Western North Pacific	No.1-No.13	C	390	207	246	574	130	5	1	0	4	142	103	0	0	36	4	6	25	0
R08				A	221	277	243	1119	160	9	0	0	8	2	14	0	0	32	1	8	46	0
				F	26	2	0	0	0	0	0	0	0	2	0	0	0	0	14	0	0	0
				Total	637	486	489	1693	290	14	1	0	12	146	117	0	0	68	19	14	71	0
Nakatake maru	6/18-7/15	Central North Pacific	No.1-No.28	C	630	415	817	1945	109	73	24	2	65	118	119	2	10	13	207	35	47	0
R32		Bering Sea		A	385	486	884	2900	139	77	22	1	68	2	47	0	2	9	0	0	25	0
				F	14	0	0	0	0	0	0	0	0	0	0	0	0	0	134	1	0	0
				B	840	203	776	538	71	52	10	1	0	1	124	9	1	6	0	3	0	0
				Total		1104	2477	5383	319	202	56	4	133	121	290	11	13	28	341	39	72	0
Total				C	2400	874	2011	4686	512	85	70	2	1989	711	579	7	10	137	843	367	129	0
				A	1263	1017	1905	4636	674	107	81	1	1184	4	169	0	2	120	1	142	89	3
				F	257	2	0	3	1	0	0	0	259	335	12	106	0	1	11803	2093	0	0
				B	990	208	847	665	108	53	16	1	0	1	124	9	1	6	0	3	0	0
				Total		2101	4763	9990	1295	245	167	4	3432	1051	884	122	13	264	12647	2605	218	3

Table 2. Catch per unit effort (CPUE=number of fish per tan of research gillnet) by species in each major survey area from 1992 to 1995.

Western North Pacific (35°N-50°N, 154°E-177°E)

Year	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Total	SST
1992	1080	0.21	0.51	1.26	0.41	0.02	0.01	2.42	10.10
1993	1170	0.08	0.66	0.84	0.25	0.01	0.01	1.85	10.94
1994	1255	0.08	0.56	3.65	0.23	0.00	0.02	4.55	12.72
1995	1230	0.08	0.50	1.94	0.20	0.01	0.01	2.74	11.69
Mean		0.11	0.56	1.92	0.27	0.01	0.01	2.89	11.36
S.D.		0.07	0.07	1.24	0.09	0.01	0.01	1.16	1.11
CV(%)		57	13	64	34	74	45	40	10

Bering Sea (55°N-59°N, 175°E-175°W)

Year	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Total	SST
1992	330	0.75	8.60	0.30	0.01	0.18	0.00	9.84	6.61
1993	330	1.93	3.71	4.73	0.03	0.05	0.00	10.44	7.50
1994	330	1.68	7.46	0.44	0.00	0.17	0.00	9.75	7.08
1995	330	1.26	2.13	5.82	0.02	0.22	0.00	9.44	7.55
Mean		1.41	5.47	2.82	0.01	0.15		9.87	7.19
S.D.		0.52	3.06	2.87	0.01	0.07		0.42	0.44
C.V. (%)		37	56	102	86	49		4	6

Central North Pacific (35°N-48°N, 179°E-179°W)

Year	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Total	SST
1992	570	0.00	0.29	0.01	0.29	0.00	0.02	0.61	10.53
1993	540	0.00	0.65	0.01	0.15	0.00	0.03	0.84	11.89
1994	510	0.01	0.35	0.24	0.45	0.01	0.09	1.15	10.43
1995	540	0.01	0.27	0.13	0.34	0.00	0.05	0.81	10.13
Mean		0.01	0.39	0.10	0.31	0.00	0.05	0.86	10.74
S.D.		0.01	0.17	0.11	0.13	0.00	0.03	0.22	0.78
C.V. (%)		102	44	113	42	75	63	26	7

Alaska Bay

Year	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Total	SST
1992	270	2.32	0.70	0.59	0.33	0.01	0.10	4.04	9.56
1993	240	2.15	2.40	1.88	0.40	0.07	0.08	6.98	9.36
1994	210	1.26	0.77	1.02	0.41	0.00	0.08	3.54	11.03
1995	150	1.16	2.82	1.25	0.47	0.02	0.16	5.88	10.74
Mean		1.72	1.67	1.18	0.40	0.02	0.10	5.11	10.17
S.D.		0.60	1.10	0.54	0.05	0.03	0.04	1.60	0.83
C.V. (%)		35	66	46	14	116	38	31	8

Table 3-1. Age composition (%) of salmon caught in the western North Pacific.

		Age							
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Others	Total(N)
Sockeye	1992	5	7	19	34	9	21	6	194
	1993	2	1	28	46	4	17	2	90
	1994	2	4	13	19	29	27	4	89
	1995	0	5	14	51	11	17	3	111

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total(N)
Chum	1992	9	43	35	13	0	500
	1993	13	20	51	16	0	706
	1994	4	25	55	16	1	627
	1995	24	18	33	25	1	575

		Age	
	Year	0.1	Total(N)
Pink	1992	100	885
	1993	100	860
	1994	100	2362
	1995	100	1491

		Age			
	Year	1.1	2.1	3.1	Total(N)
Coho	1992	41	57	2	312
	1993	29	67	4	211
	1994	41	57	2	173
	1995	43	56	1	160

		Age					
	Year	1.1	1.2	1.3	1.4	other	Total(N)
Chinook	1992	5	79	11	0	5	19
	1993	0	82	9	0	9	11
	1994	0	100	0	0	0	2
	1995	0	100	0	0	0	6

Table 3-2. Age composition (%) of salmon caught in the Bering Sea.

		Age							
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Others	Total(N)
Sockeye	1992	23	14	23	29	4	4	4	220
	1993	10	42	22	19	4	1	2	529
	1994	12	23	26	30	5	1	1	346
	1995	6	1	35	37	10	8	4	367

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total(N)
Chum	1992	26	33	31	9	0	1699
	1993	7	51	33	8	1	1064
	1994	17	31	44	7	0	1869
	1995	24	17	40	18	1	639

		Age		
	Year	0.1		Total(N)
Pink	1992	100	99	
	1993	100	1434	
	1994	100	143	
	1995	100	1744	

		Age			
	Year	1.1	2.1	3.1	Total(N)
Coho	1992	67	33	0	3
	1993	17	67	17	6
	1994	0	0	0	0
	1995	0	100	0	4

		Age				
	Year	1.1	1.2	1.3	1.4	Total(N)
Chinook	1992	34	53	9	3	32
	1993	0	67	22	11	9
	1994	53	20	28	0	40
	1995	27	67	6	0	52

Table 3-3. Age composition (%) of salmon caught in the central North Pacific.

		Age							
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Others	Total(N)
Sockeye	1992	0	0	0	0	0	0	100	1
	1993	0	0	0	0	0	0	0	0
	1994	0	60	0	20	20	0	0	5
	1995	25	0	0	0	50	0	25	4

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total(N)
Chum	1992	34	54	10	2	0	145
	1993	22	67	12	0	0	293
	1994	28	56	16	1	0	161
	1995	12	24	55	9	0	128

		Age	
	Year	0.1	Total(N)
Pink	1992	100	4
	1993	100	8
	1994	100	121
	1995	100	67

		Age			
	Year	1.1	2.1	3.1	Total(N)
Coho	1992	48	49	3	108
	1993	28	72	0	39
	1994	48	51	1	156
	1995	28	68	4	124

		Age					
	Year	1.1	1.2	1.3	1.4	Others	Total(N)
Chinook	1992	0	0	0	0	0	0
	1993	0	0	0	0	0	0
	1994	0	100	0	0	0	1
	1995	0	0	0	0	100	1

Table 3-4. Age composition (%) of salmon caught in the Gulf of Alaska.

		Age							
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Others	Total(N)
Sockeye	1992	9	0	37	9	38	3	4	112
	1993	5	1	63	7	22	1	0	156
	1994	8	0	70	4	16	0	1	213
	1995	15	2	46	6	27	2	1	143

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total(N)
Chum	1992	0	94	6	0	0	35
	1993	68	31	1	0	0	152
	1994	51	43	6	0	0	141
	1995	9	80	11	0	0	377

		Age	
	Year	0.1	Total(N)
Pink	1992	100	61
	1993	100	213
	1994	100	214
	1995	100	188

		Age			
	Year	1.1	2.1	3.1	Total(N)
Coho	1992	72	28	0	29
	1993	49	49	3	37
	1994	70	28	2	61
	1995	60	38	2	50

		Age				
	Year	1.1	1.2	1.3	1.4	Total(N)
Chinook	1992	0	0	100	0	1
	1993	0	0	0	0	0
	1994	0	0	0	0	0
	1995	0	100	0	0	1

Table 4-1. Mean fork length (mm) of salmon caught in the western North Pacific.

		Age						
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Total
Sockeye	1992	324	368	463	491	556	578	493
	1993	327	280	470	477	550	585	491
	1994	368	375	491	478	563	587	529
	1995	0	361	474	483	584	575	503

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total
Chum	1992	355	445	553	615	718	497
	1993	360	464	550	600	652	515
	1994	336	462	533	577	621	516
	1995	356	479	539	580	583	496

		Age	
	Year	0.1	Total
Pink	1992	449	449
	1993	439	439
	1994	441	441
	1995	453	453

		Age			
	Year	1.1	2.1	3.1	Total
Coho	1992	537	553	533	546
	1993	556	562	561	560
	1994	553	567	538	561
	1995	549	558	529	554

		Age				
	Year	1.1	1.2	1.3	1.4	Total
Chinook	1992	394	606	719	0	607
	1993	0	616	824	0	633
	1994	0	631	0	0	631
	1995	0	622	0	0	622

Table 4-2. Mean fork length (mm) of salmon caught in the Bering Sea.

		Age						
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Total
Sockeye	1992	328	358	476	488	557	612	434
	1993	330	357	472	502	570	563	420
	1994	325	347	467	479	576	630	432
	1995	322	374	491	498	585	591	496

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total
Chum	1992	350	432	516	586	600	451
	1993	368	442	535	588	594	480
	1994	356	437	510	562	573	464
	1995	365	482	524	574	613	489

		Age	
	Year	0.1	Total
Pink	1992	450	450
	1993	449	449
	1994	444	444
	1995	469	469

		Age			
	Year	1.1	2.1	3.1	Total
Coho	1992	572	560	0	568
	1993	582	541	550	549
	1994	0	0	0	0
	1995	0	618	0	618

		Age				
	Year	1.1	1.2	1.3	1.4	Total
Chinook	1992	352	569	654	850	511
	1993	0	573	661	862	625
	1994	377	550	725	0	507
	1995	339	524	732	0	486

Table 4-3. Mean fork length (mm) of salmon caught in the central North Pacific.

		Age						
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Total
Sockeye	1992	0	0	0	0	0	0	416
	1993	0	0	0	0	0	0	0
	1994	0	347	0	452	615	0	422
	1995	288	0	0	0	606	0	486

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total
Chum	1992	309	421	484	576	0	393
	1993	336	420	485	494	0	410
	1994	326	414	472	488	0	399
	1995	324	466	494	526	0	470

		Age	
	Year	0.1	Total
Pink	1992	454	454
	1993	429	429
	1994	445	445
	1995	428	428

		Age			
	Year	1.1	2.1	3.1	Total
Coho	1992	494	520	521	507
	1993	523	514	0	517
	1994	516	530	501	523
	1995	514	532	518	526

		Age				
	Year	1.1	1.2	1.3	1.4	Total
Chinook	1992	0	0	0	0	0
	1993	0	0	0	0	0
	1994	0	633	0	0	633
	1995	0	0	0	0	562

Table 4-4. Mean fork length (mm) of salmon caught in the Gulf of Alaska.

		Age						
	Year	1.1	2.1	1.2	2.2	1.3	2.3 Others	Total
Sockeye	1992	348	0	564	566	601	617	560
	1993	362	404	557	603	599	567	559
	1994	348	0	554	550	605	0	546
	1995	352	346	544	555	602	671	528

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total
Chum	1992	0	445	594	0	0	453
	1993	371	444	522	0	0	395
	1994	390	464	488	0	0	428
	1995	421	486	526	528	0	485

		Age	
	Year	0.1	Total
Pink	1992	489	489
	1993	459	459
	1994	484	484
	1995	482	482

		Age			
	Year	1.1	2.1	3.1	Total
Coho	1992	591	593	0	592
	1993	577	582	660	582
	1994	601	596	660	600
	1995	574	580	520	575

		Age				
	Year	1.1	1.2	1.3	1.4	Total
Chinook	1992	0	0	590	0	590
	1993	0	0	0	0	0
	1994	0	0	0	0	0
	1995	0	652	0	0	652

Table 5-1. Mean body weight (g) of salmon caught in the western North Pacific.

		Age						
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Total
Sockeye	1992	390	586	1207	1510	2363	2622	1661
	1993	330	200	1254	1330	2155	2716	1539
	1994	550	605	1526	1422	2457	2820	2078
	1995	0	578	1312	1455	2623	2643	1726

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total
Chum	1992	515	1046	2141	2900	4600	1630
	1993	540	1281	2229	2972	3200	1932
	1994	416	1176	2000	2507	3210	1828
	1995	522	1409	2107	2678	2603	1755

		Age	
	Year	0.1	Total
Pink	1992	1142	1142
	1993	991	991
	1994	1038	1038
	1995	1161	1161

		Age			
	Year	1.1	2.1	3.1	Total
Coho	1992	2071	2207	1956	2147
	1993	2393	2530	2351	2483
	1994	2324	2537	2058	2438
	1995	2402	2436	2015	2416

		Age				
	Year	1.1	1.2	1.3	1.4	Total
Chinook	1992	760	2807	4475	0	2883
	1993	0	3157	6700	0	3459
	1994	0	3450	0	0	3450
	1995	0	3308	0	0	3308

Table 5-2. Mean body weight (g) of salmon caught in the Bering Sea.

		Age						
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Total
Sockeye	1992	361	465	1337	1389	2501	3356	1117
	1993	348	452	1202	1455	2366	2449	917
	1994	355	432	1140	1234	2496	3438	1000
	1995	366	610	1422	1464	2610	2646	1562

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total
Chum	1992	423	885	1660	2578	3017	1161
	1993	488	942	1835	2564	2617	1341
	1994	438	887	1484	2126	2330	1163
	1995	517	1280	1703	2312	2957	1471

		Age	
	Year	0.1	Total
Pink	1992	1147	1147
	1993	1106	1106
	1994	1055	1055
	1995	1296	1296

		Age			
	Year	1.1	2.1	3.1	Total
Coho	1992	2525	2300	0	2450
	1993	2500	1785	2050	1948
	1994	0	0	0	0
	1995	0	3163	0	3163

		Age				
	Year	1.1	1.2	1.3	1.4	Total
Chinook	1992	507	2350	3710	7650	2010
	1993	0	2338	3465	8600	3284
	1994	621	2253	4845	0	2109
	1995	437	1810	5000	0	1624

Table 5-3. Mean body weight (g) of salmon caught in the central North Pacific.

		Age						
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Total
Sockeye	1992	0	0	0	0	0	0	780
	1993	0	0	0	0	0	0	0
	1994	0	426	0	980	3200	0	1092
	1995	250	0	0	0	2950	0	1838

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total
Chum	1992	300	834	1296	2333	0	729
	1993	380	816	1322	1570	0	784
	1994	394	792	1155	1220	0	740
	1995	343	1200	1440	1814	0	1288

		Age	
	Year	0.1	Total
Pink	1992	943	943
	1993	738	738
	1994	956	956
	1995	864	864

		Age			
	Year	1.1	2.1	3.1	Total
Coho	1992	1444	1709	1570	1577
	1993	1732	1716	0	1721
	1994	1661	1857	1640	1762
	1995	1698	1865	1738	1813

		Age				
	Year	1.1	1.2	1.3	1.4	Total
Chinook	1992	0	0	0	0	0
	1993	0	0	0	0	0
	1994	0	3450	0	0	3450
	1995	0	0	0	0	2200

Table 5-4. Mean body weight (g) of salmon caught in the Gulf of Alaska.

		Age						
	Year	1.1	2.1	1.2	2.2	1.3	2.3	Total
Sockeye	1992	446	0	2401	2298	2788	2900	2371
	1993	543	740	2239	2568	2748	2590	2284
	1994	506	0	2271	1979	2805	0	2204
	1995	539	533	2112	2082	2827	3817	2054

		Age					
	Year	0.1	0.2	0.3	0.4	0.5	Total
Chum	1992	0	982	2995	0	0	1097
	1993	532	903	1470	0	0	659
	1994	695	1206	1463	0	0	962
	1995	798	1356	1704	1540	0	1341

		Age	
	Year	0.1	Total
Pink	1992	1419	1419
	1993	1079	1079
	1994	1502	1502
	1995	1336	1336

		Age			
	Year	1.1	2.1	3.1	Total
Coho	1992	2627	2865	0	2692
	1993	2363	2496	3600	2461
	1994	3012	3093	4300	3055
	1995	2543	2662	2100	2579

		Age				
	Year	1.1	1.2	1.3	1.4	Total
Chinook	1992	0	0	2750	0	2750
	1993	0	0	0	0	0
	1994	0	0	0	0	0
	1995	0	4100	0	0	4100

Table 6. Percentage of immature fish by species for each major survey area from 1992 to 1995.

Western North Pacific (35°N-50°N, 154°E-177°E)		
Year	Sockeye	Chum
1992	54	53
1993	75	40
1994	38	36
1995	45	52

Bering Sea (55°N-59°N, 175°E-175°W)		
Year	Sockeye	Chum
1992	85	80
1993	93	66
1994	94	79
1995	65	55

Central North Pacific (35°N-48°N, 179°E-179°W)		
Year	Sockeye	Chum
1992		83
1993		89
1994		86
1995		64

Alaska Bay		
Year	Sockeye	Chum
1992	18	68
1993	15	94
1994	23	78
1995	10	64

Table 7. Stomach contents of salmon in the Western North Pacific, Central North Pacific, Bering SEa, and Gulf of Alaska in 1995.
N:number of fish examined, E:% of stomach, SCI:stomach content index (100xstomach content weight/body weight) including empty stomachs.
EU:euphausiids, CO:copepods, AM:amphipods, SQ:squids, FI:fishes, PT:pteropods, PO:polychaetes, GEL:gelatinous zooplankton such as ctenophores and coelenteratus, other:decapods, mysiids, chaetognaths and cladocerans, UN:unidentified materials.

Western North Pacific

Species	N	E	SCI	EU	CO	AM	SQ	FI	PT	PO	GEL	Other	UN
Sockeye	33	33	0.23	10	19	21	25	16	5	0	0	0	3
Chum	70	33	0.30	1	1	5	0	4	50	2	4	0	32
Pink	81	28	0.43	3	37	12	28	15	3	0	0	0	0
Coho	54	43	0.49	8	0	8	41	43	0	0	0	0	0
Chinook	7	43	0.28	0	0	0	100	0	0	0	0	0	0

Central North Pacific

Species	N	E	SCI	EU	CO	AM	SQ	FI	PT	PO	GEL	Other	UN
Sockeye	0												
Chum	48	0	0.72	25	3	4	3	4	3	1	51	4	2
Pink	8	25	0.87	0	7	7	13	16	0	0	0	56	0
Coho	56	4	2.49	0	0	0	94	6	0	0	0	0	0
Chinook	1	100											
Steelhead	9	33	0.30	1	0	2	20	69	0	0	0	7	0

Bering Sea

Species	N	E	SCI	EU	CO	AM	SQ	FI	PT	PO	GEL	Other	UN
Sockeye	103	2	0.63	12	4	52	19	6	4	0	1	3	0
Chum	163	2	0.96	20	1	18	6	23	7	0	20	3	2
Pink	136	0	1.10	11	5	17	27	26	8	0	0	5	0
Coho	0												
Chinook	44	16	0.53	12	0	0	55	31	0	0	0	0	1

Gulf of Alaska

Species	N	E	SCI	EU	CO	AM	SQ	FI	PT	PO	GEL	Other	UN
Sockeye	75	52	0.53	1	0	2	92	1	3	0	0	0	1
Chum	80	45	0.33	9	0	1	0	1	5	4	5	0	74
Pink	78	50	0.28	28	7	4	34	1	19	0	0	2	5
Coho	84	51	0.49	4	0	0	94	2	0	0	0	0	0
Chinook	7	57	0.33	0	0	0	100	0	0	0	0	0	0
Steelhead	59	27	0.59	0	0	1	76	16	1	2	0	4	0

Appendix Table 1. Location, sea surface temperature (SST, °C), surface salimity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Oshoro maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115-121mm), and B:longline.

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
1	1995/6/13	40°00N 179°59E	12.1	C	30	0	0	0	0	0	0	0	1	1	5	0	0	0	0	0	0	0
			34.1	A	19	0	0	0	0	0	0	0	8	0	3	0	0	0	0	0	0	0
				Total		0	0	0	0	0	0	0	9	1	8	0	0	0	0	0	0	0
2	1995/6/14	41°00N 179°59E	11.6	C	30	0	0	0	0	0	0	0	10	0	3	0	0	1	0	0	0	0
			34.2	A	19	0	0	0	0	0	0	0	116	0	20	0	0	0	0	0	0	0
				Total		0	0	0	0	0	0	0	126	0	23	0	0	1	0	0	0	0
3	1995/6/15	42°00N 179°59W	10.5	C	30	0	0	0	1	0	0	0	7	14	6	0	0	0	0	0	0	0
			33.9	A	19	0	0	0	2	0	1	0	8	0	4	0	0	0	0	0	0	0
				Total		0	0	0	3	0	1	0	15	14	10	0	0	0	0	0	0	0
4	1995/6/16	42°59N 179°59W	9.5	C	30	0	1	0	2	0	0	0	1	11	0	0	0	1	0	0	0	0
			33.9	A	19	0	3	0	16	0	0	0	0	0	0	0	0	2	0	0	0	0
				Total		0	4	0	18	0	0	0	1	11	0	0	0	3	0	0	0	0
5	1995/6/17	43°59N 179°59W	9.6	C	30	0	0	0	4	0	1	0	0	24	0	0	0	0	0	0	0	0
			33.5	A	19	0	1	0	5	1	3	0	0	0	0	0	0	2	0	0	0	0
				Total		0	1	0	9	1	4	0	0	24	0	0	0	2	0	0	0	0
6	1995/6/17	44°00N 179°59W	9.6	B	10	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
			33.5																			
7	1995/6/18	44°59N 179°59W	8.3	C	30	0	20	6	66	0	3	0	0	6	0	0	0	1	0	0	0	0
			33.2	A	19	0	2	1	87	1	3	0	0	0	0	0	0	0	0	0	0	0
				Total		0	22	7	153	1	6	0	0	6	0	0	0	1	0	0	0	0
8	1995/6/18	45°00N 179°54W	8.3	B	10	0	1	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0
			33.2																			
9	1995/6/19	46°00N 179°59E	7.4	C	30	2	10	1	6	0	1	0	0	0	0	0	0	1	0	0	0	0
			33.0	A	19	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0
				Total		2	10	1	7	0	3	0	0	0	0	0	0	1	0	0	0	0
10	1995/6/19	46°00N 179°59W	7.4	B	10	0	2	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0
			33.0																			
11	1995/6/20	47°00N 179°59W	7.4	C	30	3	5	37	0	0	0	0	0	3	0	0	0	0	0	0	0	0
			32.9	A	19	1	2	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0
				Total		4	7	38	1	2	2	0	0	3	0	0	0	0	0	0	0	0
12	1995/6/20	47°02N 179°57W	7.4	B	10	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			32.9																			

Appendix Table 1. (Continued). Location, sea surface temperature (SST, °C), surface salinity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Oshoro maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115-121mm), and B:longline.

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
13	1995/6/26	50°00N 160°59W	7.4	C	30	28	9	4	0	0	6	0	0	0	0	0	0	0	0	0	0	0
				A	19	4	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
				Total		32	10	4	1	2	6	0	0	0	0	0	0	0	0	0	0	0
14	1995/6/27	49°58N 161°04W	7.0	B	10	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1995/6/28	49°35N 161°12W	7.0	B	10	1	7	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0
16	1995/6/28	50°00N 159°00W	7.2	C	30	39	42	28	5	0	2	0	0	3	0	0	0	0	0	0	1	0
				A	19	29	4	49	4	3	2	0	0	0	0	0	0	0	0	0	0	0
				Total		68	46	77	9	3	4	0	0	3	0	0	0	0	0	0	1	0
17	1995/7/3	51°00N 161°50W	7.2 32.5	B	12	0	22	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0
18	1995/7/6	51°29N 144°59W	9.9	C	30	29	68	18	15	1	8	0	0	7	0	0	0	0	0	1	0	0
			32.5	A	19	43	41	17	28	1	13	0	0	0	0	0	0	0	0	0	2	0
				Total		72	109	35	43	2	21	0	0	7	0	0	0	0	0	1	2	0
19	1995/7/7	51°30N 145°00W	9.9 32.5	B	13	1	0	13	4	0	5	0	0	0	0	0	0	0	0	0	0	0
20	1995/7/7	53°00N 145°00W	10.8	C	30	20	89	36	8	1	7	0	0	4	0	0	0	0	0	0	0	0
			32.5	A	19	34	52	19	16	3	9	0	0	0	0	0	0	0	0	0	1	0
				Total		54	141	55	24	4	16	0	0	4	0	0	0	0	0	0	1	0
21	1995/7/8	53°01N 144°56W	10.8 32.5	B	13	1	5	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0
22	1995/7/8	53°59N 145°00W	10.4	C	30	44	90	44	19	1	6	0	0	11	0	0	0	0	0	0	0	0
			32.3	A	19	47	124	40	14	0	6	0	0	0	0	0	0	0	0	0	2	0
				Total		91	214	84	33	1	12	0	0	11	0	0	0	0	0	0	2	0
23	1995/7/9	54°01N 144°58W	10.4 32.3	B	13	1	2	3	9	0	1	0	0	0	0	0	0	0	0	0	0	0
24	1995/7/9	54°59N 145°00W	11.1	C	30	32	93	41	12	0	2	0	0	12	0	0	0	0	0	0	1	0
			32.5	A	19	38	20	42	21	0	7	0	0	0	0	0	0	0	0	0	0	0
				Total		70	113	83	33	0	9	0	0	12	0	0	0	0	0	0	1	0
25	1995/7/10	54°59N 145°03W	11.1 32.5	B	13	0	12	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix Table 1. (Continued). Location, sea surface temperature (SST, °C), surface salinity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Oshoro maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115-121mm), and B:longline.

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
26	1995/7/11	56°00N 145°00W	11.5	C	30	49	83	49	15	0	1	0	0	4	0	0	0	1	0	0	0	0
			32.3	A	19	56	48	43	20	0	1	0	0	0	0	0	0	0	0	0	0	0
				Total		105	131	92	35	0	2	0	0	4	0	0	0	1	0	0	0	0
27	1995/7/11	55°55N 145°11W	11.5	B	13	0	4	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			32.3																			
28	1995/7/12	58°19N 144°59W	12.3	B	13	1	7	47	1	0	0	0	0	0	0	0	0	0	0	0	0	0
			32.2																			
	180° Line			C	240	5	36	44	79	0	5	0	19	59	14	0	0	4	0	0	0	0
	No.1-No.12			A	152	1	8	2	112	4	11	0	132	0	27	0	0	4	0	0	0	0
				B	40	0	3	3	18	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	432	6	47	49	209	4	16	0	151	59	41	0	0	8	0	0	0	0
	Other Line			C	60	67	51	32	5	0	8	0	0	3	0	0	0	0	0	0	1	0
	No.13-No.17			A	38	33	5	49	5	5	2	0	0	0	0	0	0	0	0	0	0	0
				B	32	1	38	9	1	1	0	0	0	0	0	0	0	0	0	0	0	0
				Total	130	101	94	90	11	6	10	0	0	3	0	0	0	0	0	0	1	0
	145°W Line			C	150	174	423	188	69	3	24	0	0	38	0	0	0	1	0	1	1	0
	No.18-No.28			A	95	218	285	161	99	4	36	0	0	0	0	0	0	0	0	0	5	0
				B	78	4	30	115	18	0	6	0	0	0	0	0	0	0	0	0	0	0
				Total	323	396	738	464	186	7	66	0	0	38	0	0	0	1	0	1	6	0
	Total			C	450	246	510	264	153	3	37	0	19	100	14	0	0	5	0	1	2	0
	No.1-No.28			A	285	252	298	212	216	13	49	0	132	0	27	0	0	4	0	0	5	0
				B	150	5	71	127	37	1	6	0	0	0	0	0	0	0	0	0	0	0
				Total	885	503	879	603	406	17	92	0	151	100	41	0	0	9	0	1	7	0

Appendix Table 2. Location, sea surface temperature (SST, °C), surface salinity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Hokusei maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (112-121mm), and F:small-mesh gillnet (19-42mm).

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
1	1995/6/7	36°30N 155°01E	19.3	C	30	0	0	0	0	0	0	0	50	0	0	0	0	3	0	59	0	0
			34.6	A	12	0	0	0	0	0	0	0	2	0	1	0	0	1	0	52	0	0
				F	7	0	0	0	0	0	0	0	34	1	1	0	0	0	1	15	0	0
				Total		0	0	0	0	0	0	0	86	1	2	0	0	4	1	126	0	0
2	1995/6/8	38°00N 155°00E	19.3	C	30	0	0	0	0	0	0	0	273	4	17	0	0	7	0	21	5	0
			34.5	A	12	0	0	0	0	0	0	0	2	0	1	0	0	3	0	3	0	0
				F	7	0	0	0	0	0	0	0	7	8	0	0	0	0	0	447	0	0
				Total		0	0	0	0	0	0	0	282	12	18	0	0	10	0	471	5	0
3	1995/6/9	39°31N 155°00E	10.6	C	30	0	18	111	0	0	0	0	8	3	6	0	0	0	69	0	1	0
			33.8	A	12	0	21	8	0	0	0	0	2	0	0	0	0	1	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	8	0	0	0	0	206	14	0	0
				Total		0	39	119	0	0	0	0	10	11	6	0	0	1	275	14	1	0
4	1995/6/10	41°00N 155°00E	11.0	C	30	0	9	420	0	0	0	0	0	31	0	0	0	0	0	1	5	0
			34.0	A	12	0	11	18	0	0	0	0	0	0	0	0	0	0	0	0	1	0
				F	7	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1145	0	0
				Total		0	20	438	0	0	0	0	0	32	0	0	0	0	0	1146	6	0
5	1995/6/11	42°30N 155°00E	9.1	C	30	0	55	428	0	0	0	0	0	3	0	0	0	0	0	0	4	0
			33.7	A	12	0	63	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0
				F	7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total		0	118	452	1	0	0	0	0	3	0	0	0	0	0	0	4	0
6	1995/6/24	44°00N 155°01E	7.4	C	30	0	42	278	0	0	0	0	0	3	0	0	0	0	0	1	0	0
			32.8	A	12	0	43	100	0	0	0	0	0	0	0	0	0	0	0	0	1	0
				F	7	0	0	2	0	0	0	0	0	8	0	0	0	0	0	0	0	0
				Total		0	85	380	0	0	0	0	0	11	0	0	0	0	0	1	1	0
7	1995/6/25	42°30N 155°01E	9.1	C	30	0	21	622	1	1	0	0	0	3	0	0	0	2	0	0	2	0
			33.6	A	12	0	34	220	0	0	0	0	0	0	1	0	0	1	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0
				Total		0	55	842	1	1	0	0	0	4	1	0	0	3	0	2	2	0
8	1995/6/26	41°00N 155°00E	14.1	C	30	0	0	18	1	0	0	0	113	4	26	0	0	1	0	19	5	0
			34.1	A	12	0	1	2	0	0	0	0	97	0	9	0	0	0	0	1	1	0
				F	7	0	0	0	0	0	0	0	0	1	0	0	0	0	13	1	0	0
				Total		0	1	20	1	0	0	0	210	5	35	0	0	1	13	21	6	0
9	1995/6/28	39°29N 154°55E	12.9	C	30	0	0	0	0	0	0	0	0	10	7	0	0	1	2	2	0	0
			33.8	A	12	0	0	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	71	1	0	0	0	2	91	0	0
				Total		0	0	0	0	0	0	0	1	81	9	0	0	3	4	93	0	0

Appendix Table 2. (Continued). Location, sea surface temperature (SST, °C), surface salimity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Hokusei maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (112-121mm), and F:small-mesh gillnet (19-42mm).

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
10	1995/6/29	38°01N 155°00E	18.3	C	30	0	0	0	0	0	0	0	171	0	4	0	0	2	0	17	0	0
			34.5	A	12	0	0	0	0	0	0	0	0	0	0	0	0	2	0	7	0	0
				F	7	0	0	0	0	0	0	0	37	7	0	0	0	0	0	1	0	0
				Total		0	0	0	0	0	0	0	208	7	4	0	0	4	0	25	0	0
11	1995/6/30	36°31N 155°01E	18.9	C	30	0	0	0	0	0	0	0	230	0	2	0	0	1	0	36	0	0
			34.3	A	12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	8	0	0
				F	7	0	0	0	0	0	0	0	105	1	0	0	0	0	0	3	0	0
				Total		0	0	0	0	0	0	0	335	1	2	0	0	2	0	47	0	0
12	1995/7/1	34°59N 155°01E	21.7	C	30	0	0	0	0	0	0	0	27	2	0	0	0	2	0	6	0	0
			34.6	A	12	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0
				F	7	0	0	0	0	0	0	0	33	3	0	0	0	0	0	7	0	0
				Total		0	0	0	0	0	0	0	62	5	0	0	0	2	0	14	0	0
13	1995/7/16	47°28N 169°47E	8.7	C	30	1	33	3	29	0	1	0	0	8	0	0	0	0	0	0	0	0
			32.7	A	12	0	50	6	46	0	0	0	0	0	0	0	0	1	0	0	0	0
				F	7	0	0	0	1	0	0	0	0	8	0	0	0	0	0	0	0	0
				Total		1	83	9	76	0	1	0	0	16	0	0	0	1	0	0	0	0
14	1995/7/17	46°00N 169°59E	8.5	C	30	0	87	16	10	0	2	0	0	84	0	0	0	0	186	0	0	0
			32.8	A	12	0	72	14	14	1	2	0	0	0	0	0	0	3	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	10	0	0	0	0	6080	0	0	0
				Total		0	159	30	24	1	4	0	0	94	0	0	0	3	6266	0	0	0
15	1995/7/18	44°30N 170°00E	11.3	C	30	0	1	4	9	0	0	0	128	2	22	0	0	0	1	8	0	0
			33.0	A	12	0	2	9	12	0	0	0	190	0	6	0	0	0	0	0	4	0
				F	7	0	0	0	0	0	0	0	0	0	1	0	0	0	391	9	0	0
				Total		0	3	13	21	0	0	0	318	2	29	0	0	0	392	17	4	0
16	1995/7/19	43°00N 170°00E	11.7	C	30	0	0	0	0	0	0	0	192	2	15	0	0	0	0	15	26	0
			32.8	A	12	0	0	0	0	0	0	0	253	0	1	0	0	0	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	0	0	0	0	0	1654	0	0	0
				Total		0	0	0	0	0	0	0	445	2	16	0	0	0	1654	15	26	0
17	1995/7/20	41°30N 170°00E	14.9	C	30	0	0	0	0	0	0	0	5	7	9	0	0	30	0	1	0	0
			34.1	A	12	0	0	0	0	0	0	0	11	0	0	0	0	41	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	12	0	0	0	0	5	84	0	0
				Total		0	0	0	0	0	0	0	16	19	9	0	0	71	5	85	0	0
18	1995/7/21	40°00N 170°00E	16.6	C	30	0	0	0	0	0	0	0	4	0	8	0	0	2	0	1	0	0
			34.2	A	12	0	0	0	0	0	0	0	3	0	1	0	0	3	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	4	0	0	0	1	0	1	0	0
				Total		0	0	0	0	0	0	0	7	4	9	0	0	6	0	2	0	0

Appendix Table 2. (Continued). Location, sea surface temperature (SST, °C), surface salimity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Hokusei maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (112-121mm), and F:small-mesh gillnet (19-42mm).

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
19	1995/7/22	38°30N 170°00E	17.1	C	30	0	0	0	0	0	0	0	170	0	1	0	0	2	0	60	0	0
			34.0	A	12	0	0	0	0	0	0	0	15	0	0	0	0	0	0	29	0	1
				F	7	0	0	0	0	0	0	0	42	0	0	0	0	0	0	25	0	0
				Total		0	0	0	0	0	0	0	227	0	1	0	0	2	0	114	0	1
20	1995/7/24	38°30N 175°30E	17.3	C	30	0	0	0	0	0	0	0	104	0	1	0	0	1	0	30	0	0
			34.1	A	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	0
				F	7	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
				Total		0	0	0	0	0	0	0	105	0	1	0	0	1	0	58	0	0
21	1995/7/25	40°00N 175°30E	15.8	C	30	0	0	0	0	0	0	0	27	1	0	0	0	1	0	6	0	0
			33.8	A	12	0	0	0	0	0	0	0	30	0	0	0	0	3	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	7	0	0	0	0	3	7	0	0
				Total		0	0	0	0	0	0	0	57	8	0	0	0	4	3	13	0	0
22	1995/7/26	41°30N 175°30E	14.2	C	30	0	0	0	0	0	0	0	109	36	11	0	0	17	0	15	0	0
			33.6	A	12	0	0	0	0	0	0	0	36	0	2	0	0	7	0	5	0	0
				F	7	0	0	0	0	0	0	0	0	117	0	0	0	0	1	11	0	0
				Total		0	0	0	0	0	0	0	205	153	13	0	0	24	1	31	0	0
23	1995/7/27	43°00N 175°30E	13.6	C	30	0	0	0	0	0	0	0	166	0	145	0	0	2	34	19	0	0
			33.5	A	12	0	0	0	0	0	0	0	156	0	19	0	0	3	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	8	5	0	0	0	21	18	0	0
				Total		0	0	0	0	0	0	0	322	8	169	0	0	5	55	37	0	0
24	1995/7/28	44°30N 175°30E	12.8	C	30	0	0	0	0	0	0	0	124	2	19	0	0	1	12	0	0	0
			33.7	A	12	0	0	0	0	0	0	0	115	0	12	0	0	0	0	0	1	0
				F	7	0	0	0	0	0	0	0	0	1	0	0	0	0	634	12	0	0
				Total		0	0	0	0	0	0	0	239	3	31	0	0	1	646	12	1	0
25	1995/7/29	46°00N 175°30E	11.3	C	30	0	3	0	15	0	0	0	0	47	50	0	0	2	62	2	1	0
			33.0	A	12	0	2	0	22	0	0	0	1	0	27	0	0	1	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	0	4	0	0	0	743	1	0	0
				Total		0	5	0	37	0	0	0	1	47	81	0	0	3	805	3	1	0
26	1995/7/30	47°30N 175°30E	9.8	C	30	0	0	0	5	0	0	0	0	48	0	0	0	0	42	1	0	0
			32.9	A	12	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	4	0	0	0	0	347	0	0	0
				Total		0	3	0	6	0	0	0	0	52	0	0	0	0	389	1	0	0
27	1995/7/31	48°00N 173°27E	9.4	C	30	0	77	0	11	0	2	0	0	9	0	0	0	1	2	1	3	0
			32.7	A	12	0	63	0	17	2	7	0	0	0	0	0	0	1	0	0	1	2
				F	7	0	0	0	0	0	0	0	0	10	0	0	0	0	11	0	0	0
				Total		0	140	0	28	2	9	0	0	19	0	0	0	2	13	1	4	2

Appendix Table 2. (Continued). Location, sea surface temperature (SST, °C), surface salimity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Hokusei maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (112-121mm), and F:small-mesh gillnet (19-42mm).

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
28	1995/8/1	48°30N 171°21E	9.3	C	30	1	16	0	9	0	1	0	0	10	0	0	0	2	1	0	0	0
			32.7	A	12	0	24	0	8	1	1	0	0	0	0	0	0	1	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	6	0	0	0	0	2	0	0	0
				Total		1	40	0	17	1	2	0	0	16	0	0	0	3	3	0	0	0
29	1995/8/2	49°00N 169°15E	9.0	C	30	4	23	1	4	2	1	0	0	7	0	0	0	0	0	0	0	0
			32.7	A	12	0	21	0	11	2	0	0	0	0	0	0	0	0	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0
				Total		4	44	1	15	4	1	0	0	14	0	0	0	0	0	0	0	0
30	1995/8/3	49°30N 167°08E	10.6	C	30	0	30	1	7	1	1	0	0	8	0	2	0	2	220	1	2	0
			32.9	A	12	2	33	2	12	1	0	0	0	0	0	0	0	0	0	0	0	0
				F	7	0	0	0	0	0	0	0	0	1	0	84	0	0	1513	51	0	0
				Total		2	63	3	19	2	1	0	0	9	0	86	0	2	1733	52	2	0
31	1995/8/4	50°00N 165°00E	10.4	C	30	0	23	1	19	0	0	0	0	17	0	3	0	1	1	3	1	0
			32.8	A	12	0	37	3	15	1	0	0	0	0	0	0	0	0	0	0	4	0
				F	7	0	0	0	0	0	0	0	0	28	0	22	0	0	26	147	0	0
				Total		0	60	4	34	1	0	0	0	45	0	25	0	1	27	150	5	0
	1st Cruise			C	150	0	82	959	0	0	0	0	331	41	23	0	0	10	69	81	15	0
	No.1-No.5			A	60	0	95	49	1	0	0	0	6	0	2	0	0	5	0	55	1	0
				F	35	0	0	1	0	0	0	0	41	18	1	0	0	0	207	1621	0	0
				Total		0	177	1009	1	0	0	0	378	59	26	0	0	15	276	1757	16	0
	2nd Cruise			C	210	0	63	918	2	1	0	0	541	22	39	0	0	9	2	81	7	0
	No.6-No.12			A	84	0	78	322	0	0	0	0	100	0	11	0	0	6	0	17	2	0
				F	49	0	0	2	0	0	0	0	175	92	1	0	0	0	17	105	0	0
				Total		0	141	1242	2	1	0	0	816	114	51	0	0	15	19	203	9	0
	3rd Cruise			C	570	6	293	26	118	3	8	0	1029	288	281	5	0	64	561	163	33	0
	No.13-No.31			A	228	2	307	34	158	8	10	0	870	0	68	0	0	64	0	62	10	3
				F	133	0	0	0	1	0	0	0	43	223	10	106	0	1	11431	366	0	0
				Total		8	600	60	277	11	18	0	1942	511	359	111	0	129	11992	591	43	3
	Total			C	930	6	438	1903	120	4	8	0	1901	351	343	5	0	83	632	325	55	0
	No.1-No.31			A	372	2	480	405	159	8	10	0	976	0	81	0	0	75	0	134	13	3
				F	217	0	0	3	1	0	0	0	259	333	12	106	0	1	11655	2092	0	0
				Total		8	918	2311	280	12	18	0	3136	684	436	111	0	159	12287	2551	68	3

Appendix Table 3. Location, sea surface temperature (SST, °C), surface salinity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Hokko maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115mm), and F:small-mesh gillnet (29-37mm).

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
1	1995/7/7	50°30N 165°00E	7.0	C	30	31	17	33	2	0	0	0	0	7	0	0	0	0	0	0	0	0
			32.3	A	17	47	28	100	0	0	0	0	0	0	0	0	0	0	0	0	6	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	78	45	133	2	0	0	0	0	7	0	0	0	0	0	0	6	0
2	1995/7/8	51°00N 165°00E	7.2	C	30	31	32	26	1	0	0	0	0	13	0	0	0	0	0	0	1	0
			32.8	A	17	46	28	46	0	2	0	0	0	0	0	0	0	0	0	0	1	0
				F	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	78	60	72	1	2	0	0	0	13	0	0	0	0	0	0	2	0
3	1995/7/9	51°00N 165°00E	7.5	C	30	54	14	30	1	1	0	0	0	2	0	0	0	0	0	0	2	0
			32.6	A	17	71	12	67	2	1	0	0	0	0	0	0	0	0	0	0	27	0
				F	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
				Total	49	125	26	97	3	2	0	0	0	3	0	0	0	0	0	0	29	0
4	1995/7/10	50°00N 165°00E	7.7	C	30	62	30	61	2	1	0	0	0	11	0	0	0	0	0	1	0	0
			32.8	A	17	85	7	27	2	1	0	0	0	0	0	0	0	0	0	0	4	0
				F	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	148	37	88	4	2	0	0	0	11	0	0	0	0	0	1	4	0
5	1995/7/11	49°00N 165°00E	8.1	C	30	18	30	31	8	1	0	0	0	18	0	0	0	0	0	0	3	0
			32.6	A	17	17	12	68	5	1	0	0	0	1	0	0	0	0	0	0	2	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	35	42	99	13	2	0	0	0	19	0	0	0	0	0	0	5	0
6	1995/7/12	48°00N 165°00E	7.8	C	30	11	18	34	4	0	1	0	0	8	0	0	0	0	0	0	0	0
			32.9	A	17	8	20	91	11	1	0	0	0	0	0	0	0	0	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
				Total	49	19	38	125	15	1	1	0	0	9	0	0	0	0	0	0	0	0
7	1995/7/13	47°00N 165°00E	8.4	C	30	0	34	42	24	2	0	0	0	2	0	0	0	0	0	1	1	0
			33	A	17	3	29	81	42	2	0	0	0	0	0	0	0	0	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	3	63	123	66	4	0	0	0	2	0	0	0	0	0	1	1	0
8	1995/7/14	46°00N 165°00E	9.7	C	30	0	36	120	60	0	0	0	0	13	0	0	0	0	0	0	0	0
			32.8	A	17	0	51	218	73	1	0	0	0	0	0	0	0	0	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	0	87	338	133	1	0	0	0	13	0	0	0	0	0	0	0	0
9	1995/7/15	45°00N 165°00E	11.4	C	30	0	7	46	14	0	0	0	0	17	0	0	0	1	1	0	0	0
			33	A	17	0	4	81	15	0	0	0	0	0	0	0	0	2	0	2	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
				Total	49	0	11	127	29	0	0	0	0	17	0	0	0	3	2	2	0	0

Appendix Table 3. (Continued). Location, sea surface temperature (SST, °C), surface salinity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the Hokko maru. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115mm), and F:small-mesh gillnet (29-37mm).

No.	Date	Location	SST Salinity	Gear	Tan	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
10	1995/7/16	44°00N 165°00E	10.5	C	30	0	20	102	7	0	0	0	0	27	33	0	0	1	2	0	0	0
			32.8	A	17	0	31	246	2	0	0	0	0	0	1	0	0	0	0	1	3	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0
				Total	49	0	51	348	9	0	0	0	0	27	34	0	0	1	15	1	3	0
11	1995/7/17	43°00N 165°00E	10.3	C	30	0	8	49	7	0	0	0	0	23	54	0	0	1	0	0	0	0
			32.7	A	17	0	21	94	8	0	0	0	0	1	10	0	0	0	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	0	29	143	15	0	0	0	0	24	64	0	0	1	0	0	0	0
12	1995/7/18	42°00N 165°00E	14.2	C	30	0	0	0	0	0	0	0	4	1	16	0	0	28	1	0	18	0
			33.1	A	17	0	0	0	0	0	0	0	8	0	3	0	0	25	1	0	3	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	0	0	0	0	0	0	0	12	1	19	0	0	53	2	0	21	0
13	1995/7/18	41°00N 165°00E	15.4	C*	30	0	0	0	0	0	0	0	0	0	0	0	0	5	0	4	0	0
			34.0	A*	17	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0
				F*	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total	49	0	0	0	0	0	0	0	0	0	0	0	0	10	0	9	0	0
	Subtotal			C	90	116	63	89	4	1	0	0	0	22	0	0	0	0	0	0	3	0
	No.1-No.3			A	51	164	68	213	2	3	0	0	0	0	0	0	0	0	0	0	34	0
				F	6	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
				Total	147	281	131	302	6	4	0	0	0	23	0	0	0	0	0	0	37	0
	Subtotal			C	300	91	183	485	126	4	1	0	4	120	103	0	0	36	4	6	22	0
	No.4-No.13			A	170	113	175	906	158	6	0	0	8	2	14	0	0	32	1	8	12	0
				F	20	1	0	0	0	0	0	0	0	1	0	0	0	0	14	0	0	0
				Total	490	205	358	1391	284	10	1	0	12	123	117	0	0	68	19	14	34	0
	Total			C	390	207	246	574	130	5	1	0	4	142	103	0	0	36	4	6	25	0
	No.1-No.13			A	221	277	243	1119	160	9	0	0	8	2	14	0	0	32	1	8	46	0
				F	26	2	0	0	0	0	0	0	0	2	0	0	0	0	14	0	0	0
				Total	637	486	489	1693	290	14	1	0	12	146	117	0	0	68	19	14	71	0

*:Daytime operation (12:00-17:00)

Appendix Table 4. Location, sea surface temperature (SST, °C), surface salinity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Wakatake maru*.
C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115mm), F:small-mesh gillnet (29-37mm), B:longline.

No.	Date	Location	SST Salinity	Gear	Tan/Hachi	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
1	1995/6/18	38°29N 179°31W	13.8	C	30	0	0	0	0	0	0	0	28	0	6	0	0	2	0	2	0	0
			34.0	A	17	0	0	0	0	0	0	0	10	0	2	0	0	4	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
				B	30	0	0	0	0	0	0	0	0	0	1	0	0	6	0	0	0	0
				Total		0	0	0	0	0	0	0	38	0	9	0	0	12	0	3	0	0
2	1995/6/19	39°32N 179°28W	13.3	C	30	0	0	0	0	0	0	0	18	4	4	0	0	3	132	7	0	0
			34.1	A	17	0	0	0	0	0	0	0	10	0	1	0	0	1	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	61	0	0	0
				B	30	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0
				Total		0	0	0	0	0	0	0	28	4	12	0	0	4	193	7	0	0
3	1995/6/20	40°32N 179°28W	12.6	C	30	0	0	0	0	0	0	0	4	4	18	0	0	3	0	1	0	0
			34.0	A	17	0	0	0	0	0	0	0	2	0	4	0	0	0	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0
				Total		0	0	0	0	0	0	0	6	4	44	0	0	3	0	1	0	0
4	1995/6/21	41°30N 179°26W	12.4	C	30	0	1	0	0	0	0	0	15	5	37	0	0	2	75	1	0	0
			34.1	A	17	0	0	0	0	0	0	0	46	0	21	0	0	0	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	73	0	0	0
				B	30	0	0	0	0	0	0	0	0	0	77	0	0	0	0	0	0	0
				Total		0	1	0	0	0	0	0	61	5	135	0	0	2	148	1	0	0
5	1995/6/22	42°29N 179°30W	10.8	C	30	0	1	0	0	0	0	0	0	7	5	0	0	0	0	8	0	0
			33.8	A	17	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	0	1	0	6	0	0	0	0	0	4	0	0	0	0	1	0	0
				Total		0	4	0	8	0	0	0	0	7	9	0	0	0	0	9	0	0
6	1995/6/23	43°31N 179°29W	11.1	C	30	0	4	1	14	0	0	0	0	2	49	0	0	1	0	1	0	0
			33.4	A	17	0	11	0	15	0	0	0	0	0	19	0	0	0	0	0	1	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	0	4	2	7	0	1	0	0	0	13	0	0	0	0	0	0	0
				Total		0	19	3	36	0	1	0	0	2	81	0	0	1	0	1	1	0
7	1995/6/24	44°31N 179°26W	9.8	C	30	0	7	5	12	0	1	0	0	8	0	0	0	1	0	0	3	0
			33.8	A	17	0	6	1	17	0	2	0	0	0	0	0	0	0	0	0	0	0
				F	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	0	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total		0	15	7	31	0	3	0	0	8	0	0	0	1	0	0	3	0

Appendix Table 4. (Continued). Location, sea surface temperature (SST, °C), surface salimity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Wakatake maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115mm), F:small-mesh gillnet (29-37mm), and B:longline.

No.	Date	Location	SST Salinity	Gear	Tan/Hachi	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
8	1995/6/25	45°33N 179°28W	8.3	C	30	0	6	3	51	0	12	0	0	22	0	0	0	0	0	14	1	0
			33.1	A	19	0	8	2	57	0	7	0	0	0	0	0	0	4	0	0	0	0
				B	30	0	20	0	27	0	2	0	0	0	0	0	0	0	0	0	0	0
				Total		0	34	5	135	0	21	0	0	22	0	0	0	4	0	14	1	0
9	1995/6/26	46°33N 179°27W	7.9	C	30	0	4	4	21	0	2	0	0	22	0	0	0	0	0	0	0	0
			32.8	A	19	2	5	4	32	0	6	0	0	2	0	0	0	0	0	0	0	0
				B	30	0	3	2	23	0	3	0	0	0	0	0	0	0	0	0	0	0
				Total		2	12	10	76	0	11	0	0	24	0	0	0	0	0	0	0	0
10	1995/6/27	47°33N 179°30W	7.1	C	30	2	89	13	5	2	9	0	0	1	0	0	0	1	0	0	0	0
			33.0	A	19	1	136	4	9	9	7	0	0	0	0	0	0	0	0	0	0	0
				B	30	1	149	3	1	1	3	0	0	0	0	0	0	0	0	0	0	0
				Total		4	374	20	15	12	19	0	0	1	0	0	0	1	0	0	0	0
11	1995/6/28	48°30N 179°30W	7.2	B	30	3	22	5	3	2	1	0	0	1	0	0	0	0	0	0	0	0
			32.9																			
12	1995/6/29	49°30N 179°30W	6.4	B	30	5	40	17	1	0	0	0	0	0	0	0	0	0	0	0	0	0
			32.9																			
13	1995/6/30	50°30N 179°30W	6.4	B	30	7	35	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0
			32.8																			
14	1995/7/1	51°30N 179°30W	6.4	B	30	14	8	11	0	0	0	0	0	0	0	0	0	0	0	2	0	0
			32.7																			
15	1995/7/2	52°30N 179°30W	5.9	B	30	32	24	26	0	0	0	0	0	0	0	9	0	0	0	0	0	0
			33.2																			
16	1995/7/3	53°33N 179°30W	6.7	B	30	9	55	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			33.1																			
17	1995/7/4	54°30N 179°30W	6.5	B	30	14	90	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			33.0																			
18	1995/7/5	55°30N 179°32W	6.5	C	30	26	101	305	0	0	0	0	0	0	0	0	0	0	0	0	3	0
			32.9	A	19	29	73	524	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	2	26	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
				Total		57	200	839	0	0	0	0	0	0	0	0	0	0	0	0	3	0

Appendix Table 4. (Continued). Location, sea surface temperature (SST, °C), surface salimity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Wakatake maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115mm), F:small-mesh gillnet (29-37mm), and B:longline.

No.	Date	Location	SST Salinity	Gear	Tan/Hachi	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
19	1995/7/6	56°31N 179°33W	6.6	C	30	20	33	233	2	2	0	0	0	0	0	0	0	0	0	0	0	0
			33.0	A	19	26	51	366	1	3	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	6	19	15	0	1	0	0	0	0	0	0	0	0	0	0	0	0
				Total		52	103	614	3	6	0	0	0	0	0	0	0	0	0	0	0	0
20	1995/7/7	57°31N 179°33W	6.4	C	30	13	18	281	0	0	0	0	0	1	0	1	1	0	0	0	3	0
			33.0	A	19	17	28	367	0	1	0	1	0	0	0	0	0	0	0	0	1	0
				B	30	7	2	99	0	1	0	0	0	0	0	0	0	0	0	0	0	0
				Total		37	48	747	0	2	0	1	0	1	0	1	1	0	0	0	4	0
21	1995/7/8	58°31N 179°27W	7.9	C	30	30	24	197	0	18	0	2	0	0	0	0	0	0	0	0	1	0
			32.7	A	19	33	35	414	0	4	0	0	0	0	0	0	0	0	0	0	2	0
				B	30	8	34	75	0	5	0	1	0	0	0	0	0	0	0	0	0	0
				Total		71	93	686	0	27	0	3	0	0	0	0	0	0	0	0	3	0
22	1995/7/9	57°30N 178°29W	7.5	C	30	46	75	120	0	11	0	0	0	6	0	0	0	0	0	0	3	0
			32.9	A	19	52	98	141	0	5	0	0	0	0	0	0	2	0	0	0	5	0
				B	30	34	64	84	0	4	0	0	0	0	0	0	0	0	0	0	0	0
				Total		132	237	345	0	20	0	0	0	6	0	0	2	0	0	0	8	0
23	1995/7/10	57°32N 177°29W	7.6	C	30	59	23	217	1	2	0	0	0	0	0	0	0	0	0	1	17	0
			32.9	A	19	78	38	291	1	0	0	0	0	0	0	0	0	0	0	0	2	0
				B	30	14	40	14	0	1	0	0	0	0	0	0	0	0	0	0	0	0
				Total		151	101	522	2	3	0	0	0	0	0	0	0	0	0	1	19	0
24	1995/7/11	56°30N 177°32W	8.0	C	30	38	103	132	0	10	0	0	0	1	0	0	0	0	0	0	1	0
			33.0	A	19	35	86	147	1	18	0	0	0	0	0	0	0	0	0	0	1	0
				B	30	10	33	28	0	6	0	0	0	0	0	0	1	0	0	0	0	0
				Total		83	222	307	1	34	0	0	0	1	0	0	1	0	0	0	2	0
25	1995/7/12	56°31N 178°24W	8.3	C	30	53	86	59	1	3	0	0	0	1	0	0	0	0	0	0	12	0
			33.0	A	19	57	77	108	1	6	0	0	0	0	0	0	0	0	0	0	13	0
				B	30	14	39	22	0	1	0	0	0	0	0	0	0	0	0	0	0	0
				Total		124	202	189	2	10	0	0	0	1	0	0	0	0	0	0	25	0
26	1995/7/13	56°31N 179°29E	7.9	C	30	62	86	141	0	12	0	0	0	9	0	0	7	0	0	0	3	0
			33.0	A	19	59	81	219	1	12	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	8	12	16	0	19	0	0	0	0	0	0	0	0	0	0	0	0
				Total		129	179	376	1	43	0	0	0	9	0	0	7	0	0	0	3	0
27	1995/7/14	56°32N 178°31E	8.2	C	30	27	80	139	0	5	0	0	0	14	0	1	0	0	0	0	0	0
			32.9	A	19	44	97	144	1	10	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	9	34	27	0	8	0	0	0	0	0	0	0	0	0	0	0	0
				Total		80	211	310	1	23	0	0	0	14	0	1	0	0	0	0	0	0

Appendix Table 4. (Continued). Location, sea surface temperature (SST, °C), surface salinity (psu), number of salmonids, other fishes, squids, birds, and mammals caught by the *Wakatake maru*. C:salmon research-mesh gillnet (48-157mm), A:commercial-mesh gillnet (115mm), F:small-mesh gillnet (29-37mm), and B:longline.

No.	Date	Location	SST Salinity	Gear	Tan/Hachi	Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Dolly Varden	Flying Squid	Other Squids	Pacific Pomfret	Atka Mackerel	Walleye Pollock	Sharks	Pacific Saury	Other Fishes	Sea Birds	Marine Mammals
28	1995/7/15	56°29N 177°29E	8.1	C	30	39	76	95	2	8	0	0	0	11	0	0	2	0	0	0	0	0
			32.9	A	19	53	52	168	1	9	0	0	0	0	0	0	0	0	0	0	0	0
				B	30	6	20	11	0	2	0	0	0	0	0	0	0	0	0	0	0	0
				Total		98	148	274	3	19	0	0	0	11	0	0	2	0	0	0	0	0
	Central North Pacific			C	300	2	112	26	103	2	24	0	65	75	119	0	0	13	207	34	4	0
	No.1-No.10			A	176	3	168	11	132	9	22	0	68	2	47	0	0	9	0	0	1	0
				F	14	0	0	0	0	0	0	0	0	0	0	0	0	0	134	1	0	0
				B	300	1	179	8	66	1	9	0	0	0	124	0	0	6	0	1	0	0
				Total		6	459	45	301	12	55	0	133	77	290	0	0	28	341	36	5	0
	U.S. 200 mile zone			B	210	84	274	129	5	3	1	0	0	1	0	9	0	0	0	2	0	0
	No.11-No.17																					
	Bering Sea			C	330	413	705	1919	6	71	0	2	0	43	0	2	10	0	0	1	43	0
	No.18-No.28			A	209	483	716	2889	7	68	0	1	0	0	0	0	2	0	0	0	24	0
				B	330	118	323	401	0	48	0	1	0	0	0	0	1	0	0	0	0	0
				Total		1014	1744	5209	13	187	0	4	0	43	0	2	13	0	0	1	67	0
	Total			C	630	415	817	1945	109	73	24	2	65	118	119	2	10	13	207	35	47	0
	No.1-No.28			A	385	486	884	2900	139	77	22	1	68	2	47	0	2	9	0	0	25	0
				F	14	0	0	0	0	0	0	0	0	0	0	0	0	0	134	1	0	0
				B	840	203	776	538	71	52	10	1	0	1	124	9	1	6	0	3	0	0
				Total		1104	2477	5383	319	202	56	4	133	121	290	11	13	28	341	39	72	0