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Results of 2005 Salmon Research Cruise of the ***Oshoro maru***

by

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ABSTRACT

In order to continue to collect oceanographic and biological data included for salmonids, oceanographic observations and mainly gillnet surveys were conducted along 155 ° E, 165 ° E, and 165 ° W in the northern North Pacific Ocean. Each survey was conducted during Cruise #157 (May), Cruise #158 (June), and Cruise #159 (June-Aug.), 2005.

In May along 155 ° E, the Polar Front occurred near at 43 ° N and the Subarctic Boundary occurred near at 40 ° N where was more northern area than that in 2002, 2003, and 2004.

In June along 155 ° E, oceanographic structure could not be analyzed because the number of observation was only three owing to the bad weather.

In early July along 165 ° E, the Polar Front occurred near at 45.3 ° N but it did not appear clearly.

In late July along 165 ° W, the vertical 4℃ isotherm which indicates the Polar Front occurred from 200m to 300m depth near at 47.7 ° N, but it did not reach 100m depth.

Gillnet survey was conducted at four stations during Cruise #157, at two station during Cruise #158, and at four station in early and late June during Cruise #159.

In May along 155 ° E, salmonids were dominant species at 41 ° N and 42.5 ° N in the Transition Domain but no salmonids were collected at 38 ° N and 36.5 ° N in the Subtropical Water. Chum salmon was more abundant at 41 ° N than at 42.5 ° N. but pink salmon was more abundant at 42.5 ° N than at 41 ° N. This distribution pattern about chum salmon and pink salmon was also observed in 2002, 2003, and 2004.

In June along 155 ° E, chum salmon and pink salmon were increasing to the north. This distributional change by latitude was also observed in 2000-2004.

In early July along 165 ° E, the drift gillnet survey was conducted only one time at 47 ° N

owing to the bad weather. Seven sockeye , 36 chum, 77 pink, 12 coho, and one chinook salmon were collected.

In late July along 165 ° W, sockeye and salmon was collected only at 48.5 ° N in the Subarctic region. Chum salmon and coho salmon were collected at 48.5 ° N and 47 ° N, and chum salmon were more abundant at 47 ° N, but coho salmon were more abundant at 48.5 ° N. Only two pink salmon were collected at 47 ° N. Steelhead salmon was collected in a small number at every station.

Sockeye salmon collected in a small number at 47 ° N, 165 ° E in early July divided into three size groups, and immature fish were dominant. On the other hand, mature fish were dominant than immature fish at 48.5 ° N, 165 ° W in late July. This result was different from that of 2003's survey.

Almost all chum salmon collected in May and June along 155 ° E were mature fish ranged between 500-640mm F.L.. Chum salmon collected at 47 ° N, 165 ° E in early July consisted of various age fish almost at the similar rate. Chum salmon collected at 165 ° W line in late July were all immature fish ranged between 340-580mm F.L.. These different biological characteristics by season and survey area were also observed in 2003's survey.

Fork length frequency distributions of pink salmon were different among three surveys as sampling season advances.

INTRODUCTION

The *Oshoro maru* has conducted pelagic nekton research and studied the oceanic structure and marine biology in the North Pacific Ocean, Bering Sea and/or Chukuchi Sea every summer since 1953. Collected data has been published annually since 1957 (Hokkaido University, 1957-2005).

Since 1978, several transects have been repeatedly sampled to study long-term changes in the North Pacific Ocean ecosystem.

These researches included for salmonids have been conducted along three transects during three summer cruises in the North Pacific in 2005:

Cruise #157, in May along 155 ° E,

Cruise #158, in June along 155 ° E ,

Cruise #159, in early July along 165 ° E, and in late July along 165 ° W.

The primary objects of these cruises are to continue several years and collecting oceanographic and biological data along these transects.

This document reports the preliminary results of the 2005 research cruises of the *Oshoro maru* in the North Pacific Ocean.

METHODS

1.Survey Area and Cruise Schedule

Oceanographic, gillnet, surface long-line, and hook-and-line research were conducted along the 155 ° E, 165 ° E and 165 ° W in the northern North Pacific during three cruises: #157 (10-23 May), #158 (3-16 June), and #159 (27 June - 25 Aug.). (Fig. 1)

2.Oceanographic Observation

For salmon research during each cruise, oceanographic observations were conducted at 45 nautical mile intervals. They were occupied from 36.5 ° N to 44 ° N along 155 ° E in Cruise #157, from 42.5 ° N to 44 ° N along 155 ° E in Cruise #158, from 44 ° N to 48.5 ° N along 165 ° E, and from 44 ° N to 50 ° N along 165 ° W in Cruise #159 (Fig. 1, Table 1).

Data collected by CTD or XCTD instruments were used to plot the temperature and salinity.

3.Drift Gillnet Sampling

A drift gillnet was used to catch salmonids and the other organisms at 10 stations (Fig. 1, Table 2). The gillnet configurations is shown in Table 3. The net comprised of 30 tans of C-Gear gillnet (non-selective varied research mesh, Takagi, 1975), 12 tans of A-Gear gillnet (commercial mesh), and 7 tans of F-Gear gillnet (special mesh). Each tan was 50m long.

Gillnet gear was set in the evening, allowed to soak overnight, and retrieved the following morning.

The number of organisms caught was counted by species for each mesh size.

Fork length (F.L.), body weight, and gonad weight by sex of a maximum 60 fishes for each salmon species of each mesh size were measured, and scale samples were collected from the International North Pacific Fisheries Commission (INPFC) preferred body area and placed on gummed cards for verification of species identification, and for age, growth and stock origin studies.

Sockeye salmon (*Oncorhynchus nerka*), and chum salmon (*Oncorhynchus keta*) were classified as mature or immature based on gonad weight (Takagi, 1961).

By prior arrangement with the FAJ, snouts were collected from each salmonid lacking an adipose fin. These snouts were labeled with catch and biological information and frozen. Snout samples were sent to the FRA (Japan), Hokkaido National Fisheries Research Institute, where they will be examined for coded-wire tags.

4. Surface Longline Sampling and Tagging

Three surface longline samplings were operated to tag and release viable salmonids along 165 °E and 165 °W in Cruise #159 (Fig.1, Table 4). Ten hachi (baskets) were used at each station.

One hachi; mainline: 127m long; 34 branch lines/hachi; 3m between branch lines;
Fishing depth: 2m ; Bait: Salted anchovies.

All viable salmonids were double-tagged with FAJ (red and white, 1.6 cm in diameter) and FRI Petersen (red and white, 2.0 cm in diameter) disk tags.

Data on species, length and tag number of each fish were recorded on data forms. The scale collection method and data recorded on length, species and tag number were the same as those in standard methods.

5. Additional Biological Sampling

To collect blood samples from viable salmonids, hook-and-line gear was used at three stations (Fig. 1, Table 8).

Additional research activities included collection of salmonids stomachs, muscle tissues, blood samples, and egg samples for studies of food habits, growth, stock identification, and female-specific serum proteins.

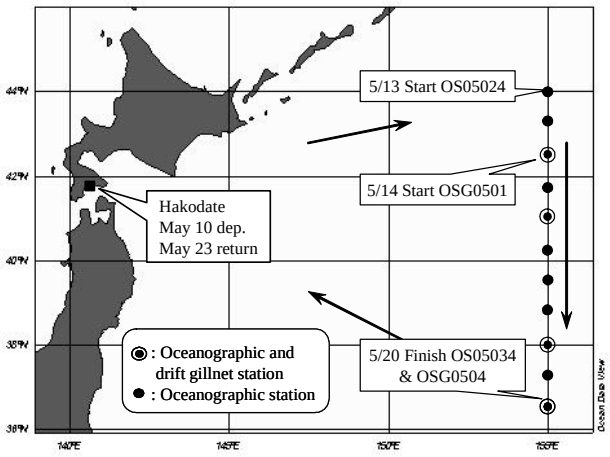

Fig.1-(1) Cruise #157 (May 10 – 23)

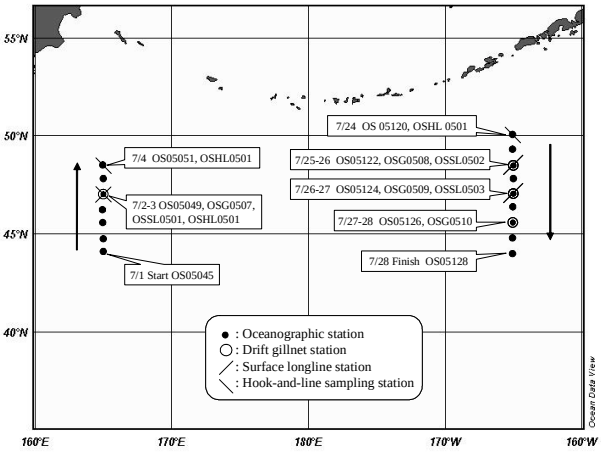

Fig.1-(3) Cruise #159 (July 27 – Aug. 25)

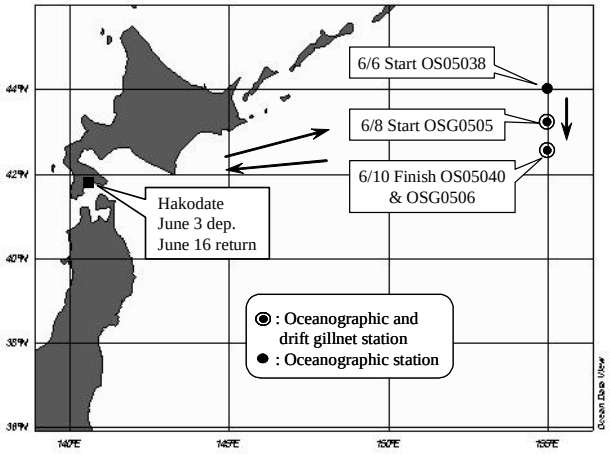

Fig.1-(2) Cruise #158 (June 3 – 16)

Fig. 1 Location of oceanographic, drift gillnet, surface longline, and hook-and-line sampling stations during each cruise. Details for station names are shown in Table 1, 2, 4, and 8.

RESULTS AND DISCUSSION

Final oceanographic data and biological data collected during the cruises will be published in the "*DATA RECORDE OF OCEANOGRAPHIC OBSERVATIONS AND EXPLORATORY FISHING* NO. 49" of Hokkaido University no later than March 2006.

1.Oceanographic Conditions

Temperature and salinity sections (0-500db) on Cruise #157 and #159 are shown in Figure 2.

Those sections on Cruise #158 could not be drawn a figure, because no more than three oceanographic data were collected owing to the bad weather.

The geographic positions of the Polar Front and the Subarctic Boundary (Dodimead et al., 1963, Favorite et al., 1976, Roden, 1991) were as follows.

[155 ° E line]

In May, the Polar Front which is indicated by the vertical 4℃ isotherm at 100m depth occurred near at 43 ° N and the Subarctic Boundary that is indicated by the vertical 34.0 psu isohaline occurred near at 40 ° N. In May 2005, the Subarctic Boundary occurred more northern area than that in 2002, 2003, and 2004 (Meguro et al., 2003, 2004, 2005). It is considered that the warm core ring was created by the Kuroshio extension's meander south from 40 ° N in surrounding area.

[165 ° E line]

The Polar Front occurred near at 45.3 ° N but it did not appear clearly. The thermocline was distributed 30-50db.

[165 ° W line]

The vertical 4℃ isotherm which indicates the Polar Front occurred from 200m to 300m depth near at 47.7 ° N, but it did not reach 100m depth. The thermocline was distributed 30-60db in the survey area.

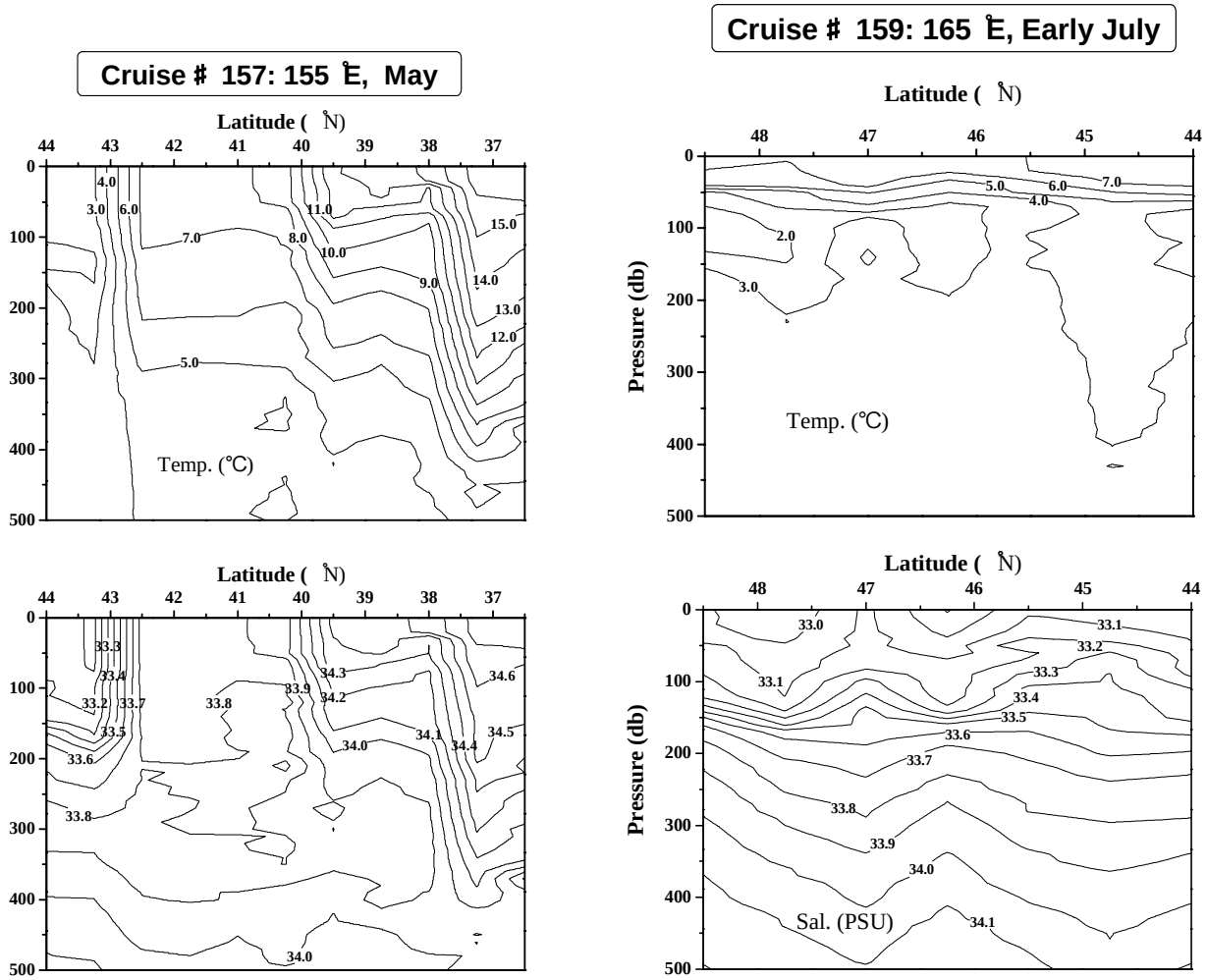

Fig. 2-(1) Temperature and Salinity from surface to 500db pressure along the 155° E and 165° E

transect in the Oshoro maru Cruise #157 and #159 , 2005

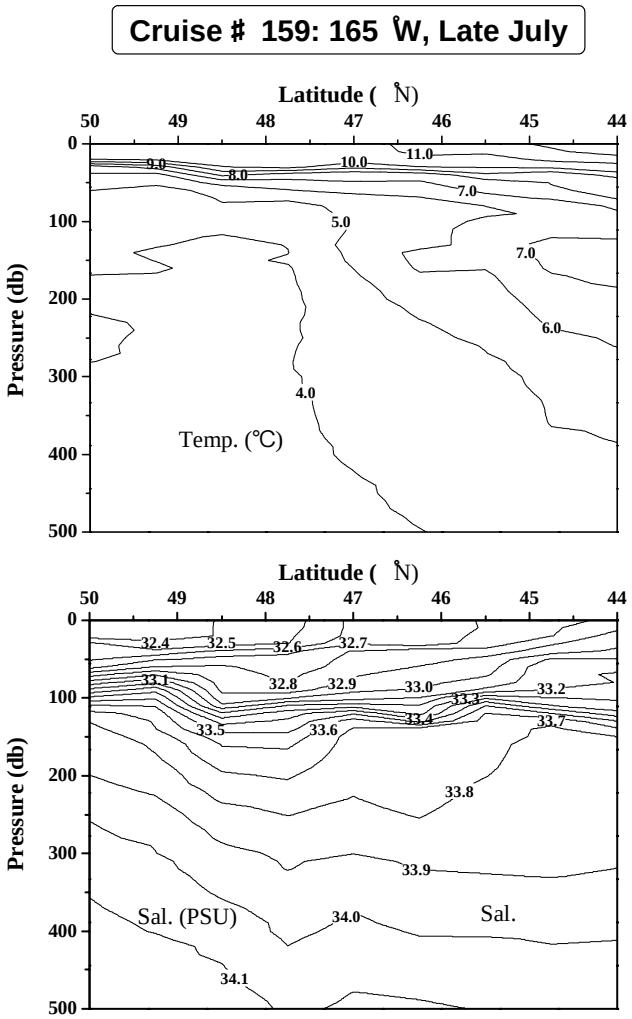

Fig. 2-(2) Temperature and Salinity from surface to 500db pressure along the 165˚ W transect in the Oshoro maru Cruise #159 , 2005

2.Distribution and abundance of organisms caught by drift gillnet

The number of organisms caught by the drift gillnet at each station are shown in Table 5-(1) (Cruise #157), 5-(2) (Cruise #158), and 5-(3) (Cruise #159).

[155 ˚E line: May]

A total of 54 chum (*Oncorhynchus keta*) and 241 pink salmon (*O. gorbuscha*) were collected at 41 ˚N and 42.5 ˚N.

Chum salmon was more abundant at 41 ˚N than at 42.5 ˚N. On the other hand, pink salmon

was more abundant at 42.5 ˚ N than at 41 ˚ N. This distribution pattern about chum salmon and pink salmon in May along 155 ˚ E line was also observed in 2002, 2003, and 2004 (Meguro et al., 2003, 2004, 2005).

The 92.2% of organisms caught by C-gear gillnet were salmonids at 41 ˚ N and 42.5 ˚ N in the Transition Domain but no salmonids were collected at 38 ˚ N and 36.5 ˚ N in the Subtropical Water. Pacific pomfret (*Brama japonica*) was abundant at 38 ˚ N (90.7% of C-gear). Pacific pomfret (36.0% of C-gear) and blue mackerel (*Scomber australasicus*) (38.0% of C-gear) were collected in high ratio, but no more than 68 organisms were collected at 36.5 ˚ N.

[155 ˚ E line: June]

A total of 195 chum salmon , 983 pink salmon, three coho salmon (*Oncorhynchus kisutch*), and two chinook salmon (*O. tshawytscha)* were collected in this cruise.

Both for chum salmon and pink salmon, they were more abundant at 43 ˚ -15'N than at 42.5 ˚ N. This distributional change by latitude in June at 155 ˚ E line (increasing to the north) was also observed in 2000-2004 (Meguro et al., 2000-2005).

Other organisms except salmonids were account for under 1% of the total catch by C-gear gillnet at 43 ˚ -15'N, and 65 Pacific pomfret (12.5% of C-gear) were collected at 42.5 ˚ N.

[165 ˚ E line : early-July]

Along 165 ˚ E in Cruise #159, the drift gillnet survey was conducted only one time at 47 ˚ N owing to the bad weather. A total of 133 salmonids were collected at this station (7 sockeye salmon (*Oncorhynchus nerka*), 36 chum, 77 pink, 12 coho, and 1 chinook salmon). The most dominant salmonid was pink salmon which accounts for 63.6% of all the organisms caught by C-gear gillnet. The only species except salmonids collected at this station was eight-armed squid (*Gonatopsis borealis*) (N=6, 6.5% of C-gear).

[165 ˚ W line : late-July]

A total of 159 salmonids were collected in this research line (31 sockeye, 101 chum, 2 pink,

15 coho, and 10 steelhead salmon (*Oncorhynchus mykiss*)).

Sockeye and salmon were collected only at 48.5 ° N in the Subarctic region. Chum salmon were collected at 48.5 ° N and 47 ° N, and they were more abundant at 47 ° N. Only two pink salmon were collected at 47 ° N. Coho salmon were collected at 48.5 ° N and 47 ° N, and they were more abundant at 48.5 ° N. Steelhead salmon were collected in a small number at every station.

The most dominant species at 48.5 ° N was smalleye squaretale (*Teragonurus cuvieri*) which accounts for 63.6% of all the organisms caught by C-gear gillnet. Pacific pomfret were collected in high ratios at 47 ° N (61.9 % of C-gear) and 45.5 ° N (62.9 % of C-gear). Neon flying squid (*Ommastrephes bartramii*) were collected at 45.5 ° N which accounts for 19.4% (N=59) of all the organisms caught by C-gear gillnet.

3.Biological characteristics of salmonids

Fork length frequency and maturity ratio (except pink salmon) of sockeye, chum, and pink salmon caught by C-gear gillnet at each longitude line in Cruise #157, #158, and #159 are shown in Figure 3.[Sockeye salmon]

Fork length frequency at 47 ° N, 165 ° E was divided into following three ranges:

300-340mm F.L.: N=3, 440-460mm F.L.: N=2, 560-580mm F.L.: N=1.

Only one fish was mature.

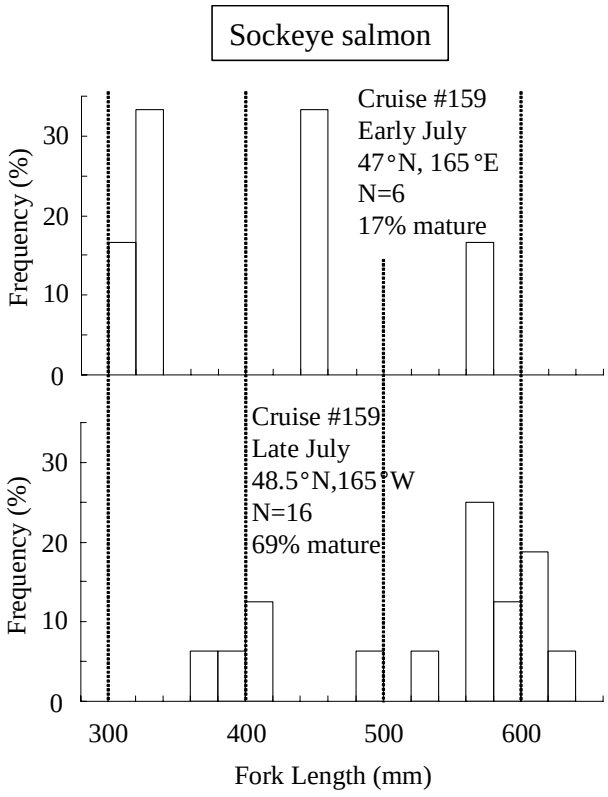

Fig. 3-(1) Fork length frequency and maturity ratio of sockeye salmon caught by C-gear gillnet at 165° E and 165° W in the *Oshoro Maru* Cruise #159.

From these results and catch data (Table 5-(3)), sockeye salmon near at this sampling station in early July occur in a small number, and immature fish (ocean age .1 and .2) are dominant rather than mature fish (ocean age .2 or .3) (Meguro et. al., 2004).

A total of 75% of sockeye salmon ranged between 480-640mm F.L. and 25% of them ranged between 360-420mm F.L. at 48.5 ° N, 165 ° W. A total of 69% were mature fish.

These results indicate that mature fish (ocean age .3) may be dominant than immature fish (ocean age .1 and .2) near at this sampling station in late July. But almost all sockeye salmon collected by C-gear gillnet were immature and ocean age .1 or .2 fish at 50 ° N, 165 ° W in late July 2003 (Meguro et. al., 2004).

[Chum salmon]

Over 95% of chum salmon collected by C-gear gillnet ranged between 500-640mm F.L. along 155 ° E both in May (Cruise #157) and in June (Cruise #158). Their mean±STD, mode, and median of fork lengths were as follows:

155 ° E, in May: mean±STD =551.9±70.04mm, mode=576mm, median=565mm F.L.

155 ° E, in June: mean±STD =561.2±31.78mm, mode=530mm, median=561mm F.L.

Almost all of them were mature fish that were thought to be over ocean age .3 (Meguro et. al., 2004).

A total of 13 chum salmon were collected by C-gear gillnet at 47 ° N, 165 ° E. Their fork lengths dispersed extensively between 320-640mm. A total of 31% fish were mature.

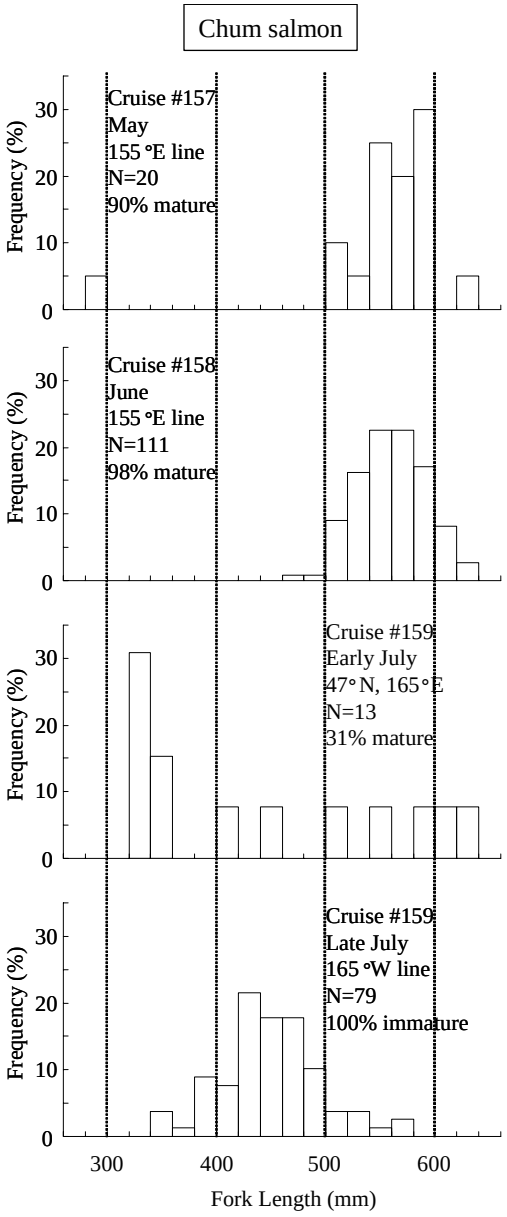

Fig. 3-(2) Fork length frequency and maturity ratio of chum salmon caught by C-gear gillnet at 155° E, 165° E, and 165° W line in the *Oshoro Maru* Cruise #157, #158, and #159.

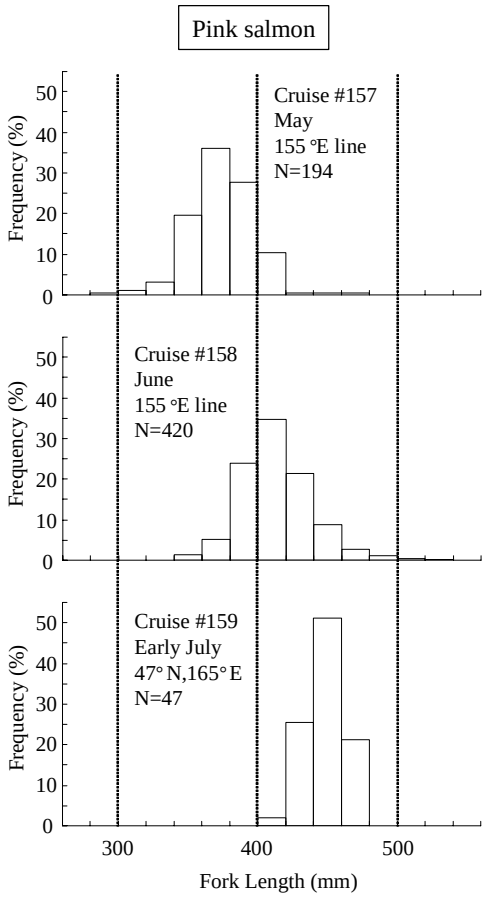

Fig. 3-(3) Fork length frequency of pink salmon caught by C-gear gillnet at 155° E, 165° E line in the *Oshoro Maru* Cruise #157, #158, and #159.
* Only one 530mm F.L. female was caught at 165° W line.

From these results, chum salmon near at this sampling station in early July consists of various age fish almost at the similar rate.

Fork length frequency distribution of chum salmon collected at 165 ° W line in late July shows like a single-peaked pattern. Its statistical data were as follows:

Mean±STD=450.3±45.22mm, mode=426mm, median=448mm F.L.

They were all immature.

These results indicate in late July, chum salmon occurs in this survey area are almost all immature fish without relation to their ocean age.

These different biological characteristics of chum salmon by season and survey area were also observed in 2003's survey.

[Pink salmon]

Statistical data for fork length frequency distributions of pink salmon were as follows:

155 ° E, in May: mean±STD=375.5±23.23mm, mode=378mm, median=378mm F.L.

155 ° E, in June: mean±STD=414.1±25.9mm, mode=404mm, median=412mm F.L.

165 ° E, in early July: mean±STD=448.6±14.1mm, mode=442mm, median=450mm F.L.

It is considered that sampling seasons caused size differences among three surveys.

4. Fish lacking adipose fins

Snouts were collected from 6 steelhead salmons lacking adipose fins for coded-wire tag detection by gillnet samplings during three cruises (Table 6).

5. Surface long-line sampling and tagging

Three viable chum salmon and one viable pink salmon were caught at Station "OSSL0501" in 46 ° -54'N, 165 ° -04'E. They were double-tagged with FAJ and FRI Petersen disk tags.

No salmonids were caught at two other surface long-line stations (Tables 4, 7).

ACKNOWLEDGMENTS

The *Oshoro Maru* belongs to the Ministry of Education, Science, Sports and Culture, National University Corporation of Japan, and is a training vessel for students and fisheries technicians. We thank the INPFC, NPAFC and their affiliated scientists who have helped us to conduct salmon-research in the North Pacific Ocean over many years. Your cooperation has helped us to train and teach many scientists and leaders in the fishing industry through our

salmon research program.

Also we thanks the other officers, crew, guest scientists, graduate students, and cadets of the *Oshoro Maru* for their outstanding assistance and cooperation in sampling and data collection under sometimes severe conditions.

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Table 1. List of oceanographic station along the 155°E 165°E and 165°W

Cruise #157

Station	Lat.	Long.	Date	S.M.T.*1	T.D.*2	Remark
OS 05024	44-00.0N	155-00.2E	5/13	21:12	+10	CTD
OS 05025	43-14.7N	155-00.6E	5/14	09:38	+10	CTD
OS 05026	42-30.1N	155-00.1E	5/14	15:05	+10	CTD
OS 05027	41-45.0N	155-00.4E	5/15	10:07	+10	CTD
OS 05028	41-00.3N	155-00.8E	5/15	15:14	+10	CTD
OS 05029	40-14.7N	155-00.0E	5/16	09:51	+10	CTD
OS 05030	39-30.0N	155-00.1E	5/16	14:52	+10	CTD
OS 05031	38-45.0N	155-00.0E	5/17	22:05	+10	CTD
OS 05032	37-59.9N	155-00.0E	5/18	15:00	+10	CTD
OS 05033	37-15.0N	155-00.3E	5/19	10:30	+10	CTD
OS 05034	36-30.1N	154-59.8E	5/19	15:21	+10	CTD

Cruise #158

Station	Lat.	Long.	Date	S.M.T.	T.D.	Remark
OS 05038	44-00.0N	155-00.0E	6/6	10:00	+10	CTD
OS 05039	43-15.0N	155-00.0E	6/8	15:04	+10	CTD
OS 05040	42-30.0N	155-00.0E	6/9	16:16	+10	CTD

Cruise #159

Station	Lat.	Long.	Date	S.M.T.	T.D.	Remark
OS 05045	44-00.1N	164-59.8E	7/1	19:20	-11	XCTD
OS 05046	44-47.8N	165-00.0E	7/2	01:46	-11	XCTD
OS 05047	45-30.3N	165-00.0E	7/2	05:52	-11	XCTD
OS 05048	46-14.8N	164-59.9E	7/2	10:32	-11	XCTD
OS 05049	46-59.1N	165-08.0E	7/3	07:15	-11	CTD
OS 05050	47-45.0N	165-00.4E	7/3	16:15	-11	XCTD
OS 05051	48-30.0N	165-00.1E	7/4	00:00	-11	CTD
OS 05120	50-00.0N	164-59.9W	7/24	19:35	-10	CTD
OS 05121	49-15.0N	164-59.9W	7/25	08:45	-10	XCTD
OS 05122	48-28.5N	164-52.4W	7/25	23:46	-10	CTD
OS 05123	47-45.4N	164-59.3W	7/26	11:58	-10	XCTD
OS 05124	46-57.1N	164-53.7W	7/26	23:16	-10	CTD
OS 05125	46-15.0N	164-59.9W	7/27	11:15	-10	XCTD
OS 05126	45-30.4N	164-57.3W	7/27	23:08	-10	CTD
OS 05127	44-45.0N	164-00.2W	7/28	11:22	-10	XCTD
OS 05128	44-00.1N	165-00.0W	7/28	14:53	-10	CTD

*1 S.M.T.: Ship's Mean Time

*2 T.D.: Time Difference between Greenwich Mean Time (G.M.T.) and S.M.T.

Table 2 Position and research conditions of drift gillnet at each station in the *Oshoro maru* Cruise #157, #158, and #159

Station	Date and Time (S.M.T.)		T.D.	Set Position		D.S.	Bottom depth (m)	Wr	Wind (Force)	Oceanographic station No.
	Net set	Net haul		Lat. (N)	Long. (E)					
Cruise #157										
OSG 0501	May 14 1753-1819	May 15 0427-0533	+10:00	42-30.0	155-00.0	210	5166	o	NNE-6	OS 05026
OSG 0502	15 1751-1818	16 0421-0521	+10:00	40-59.9	154-59.9	200	5505	o	North-5	OS 05028
OSG 0503	18 1747-1810	19 0424-0536	+10:00	37-59.8	155-00.8	290	5995	bc	East-5	OS 05032
OSG 0504	19 1755-1820	20 0424-0530	+10:00	36-30.2	155-00.0	050	5709	c	SSW-4	OS 05034
Cruise #158										
OSG 0505	June 8 1749-1816	June 9 0424-0545	+10:00	43-15.8	155-01.6	250	5496	o	West-3	OS 05039
OSG 0506	9 1755-1823	10 0425-0540	+10:00	42-30.1	155-00.0	060	5191	f	SW-2	OS 05040
Cruise #159										
OSG 0507	July 2 1755-1823	July 3 0425-0535	+11:00	47-00.1	165-00.5E	135	5874	o	WNW-5	OS 05049
OSG 0508	25 1850-1925	26 0522-0640	-10:00	48-29.3	164-57.5W	150	5183	o	West-4	OS 05122
OSG 0509	26 1852-1918	27 0519-0635	-10:00	46-59.3	164-56.7W	140	5318	o	West-3	OS 05124
OSG 0510	27 1850-1916	28 0530-0636	-10:00	45-29.5	164-59.5W	130	5397	o	West-1	OS 05126

T.D. : Time Difference between Greenwich Mean Time (G.M.T.) and Ship's Mean Time (S.M.T.)
D.S. : Direction in which net was set
Wr : Weather (bc: 25-75% clouded, c: over 75-99% clouded, o: 100% clouded, f: fog)

Table 3 Gillnet configurations used in the *Oshoro maru* Cruise #157, #158, and #159

Cruise No.	Station	Number of tan for each mesh size (mm)																				Total
		A-Gear				C-Gear										F-Gear						
		112	115	118	121	48	55	63	72	82	93	106	121	138	157	19	22	25	29	33	37	42	
#157	OSG 0501	6	-	6	-	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
	OSG 0502	6	-	6	-	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
	OSG 0503	6	-	6	-	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
	OSG 0504	6	-	6	-	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
#158	OSG 0505	6	-	6	-	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
	OSG 0506	6	-	6	-	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
#159	OSG 0507	-	6	-	6	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
	OSG 0508	-	6	-	6	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
	OSG 0509	-	6	-	6	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49
	OSG 0510	-	6	-	6	3	3	3	3	3	3	3	3	3	3	1	1	1	1	1	1	1	49

Table 4 List of surface longline station during the *Oshoro maru* Cruise #159

Station	Date and Time (S.M.T.)				Set Position		D.S.	No. of hooks	Wr	Wind (Force)	Oceanographic Station No.	Gillnet Station No.
	Line set		Line haul		Lat.	Long.						
OSSL 0501	July 3	0354-0410	July 3	0607-0630	46-54.2N	165-04.4E	300	340	o	WNW-5	OS 05049	OSG 0507
OSSL 0502	26	0450-0510	26	0718-0745	48-27.2N	164-53.0W	290	340	o	West-4	OS 05122	OSG 0508
OSSL 0503	27	0448-0505	27	0657-0718	46-57.2N	164-54.4W	275	340	o	West-2	OS 05124	OSG 0509

S.M.T. : Ship's Mean Time D.S. : Direction in which line was set Wr : Weather (o: 100% clouded)

Table 5-(1) Data on number of organisms caught by drift gillnet during the *Oshoro maru* Cruise # 157

Common name	Scientific name	Station	OSG 0501					OSG 0502					OSG 0503					OSG 0504				
		Gear	A	C	(%)	F	Total	A	C	(%)	F	Total	A	C	(%)	F	Total	A	C	(%)	F	Total
Sockeye salmon	*Oncorhynchus nerka*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
Chum salmon	*Oncorhynchus keta*		13	6	(3.9)	0	19	20	15	(11.6)	0	35	0	0	-	0	0	0	0	-	0	0
Pink salmon	*Oncorhynchus gorbuscha*		1	137	(89.0)	0	138	0	103	(79.8)	0	103	0	0	-	0	0	0	0	-	0	0
Coho salmon	*Oncorhynchus kisutch*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
Chinook salmon	*Oncorhynchus tshawytscha*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
Steelhead	*Oncorhynchus mykiss*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
Boreal clubhook squid	*Onychoteuthis borealijaponicus*		0	10	(6.5)	1	11	0	8	(6.2)	0	8	0	11	(5.4)	7	18	0	1	(2.0)	7	8
Eight-armed squid	*Gonatopsis borealis*		0	0	-	0	0	0	3	(2.3)	0	3	0	0	-	0	0	0	0	-	0	0
Neon flying squid	*Ommastrephes bartramii*		0	0	-	0	0	0	0	-	0	0	1	1	(0.5)	0	2	3	5	(10.0)	0	8
Blue shark	*Prionace glauca*		0	0	-	0	0	0	0	-	0	0	1	3	(1.5)	0	4	1	4	(8.0)	0	5
Spiny dogfish	*Squalus acanthias*		0	0	-	0	0	4	0	-	0	4	0	0	-	0	0	0	0	-	0	0
Japanese anchovy	*Engraulis japonicus*		0	0	-	0	0	0	0	-	0	0	0	0	-	1	1	0	0	-	0	0
Lanternfishes	Myctophidae		0	0	-	5	5	0	0	-	1	1	0	0	-	5	5	0	0	-	0	0
Longnose lancetfish	*Alepisaurus ferox*		0	0	-	0	0	1	0	-	0	1	0	0	-	0	0	0	0	-	0	0
Pacific saury	*Cololabis saira*		0	0	-	0	0	0	0	-	0	0	0	0	-	51	51	0	0	-	1	1
Flyingfishes	Exocoetidae		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	1	(2.0)	1	2
Barracudas	Sphyraenidae		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	1	1
Pacific pomfret	*Brama japonica*		0	0	-	0	0	0	0	-	0	0	97	186	(90.7)	6	289	1	18	(36.0)	0	19
Blue mackerel	*Scomber australasicus*		0	0	-	0	0	0	0	-	0	0	0	4	(2.0)	0	4	0	19	(38.0)	1	20
Albacore	*Thunnus alalunga*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	1	(2.0)	0	1
Medusafish	*Icichthys lockingtoni*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	1	(2.0)	0	1
Japanese butterfish	*Hyperoglyphe japonica*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	1	1
Short-tailed Shearwater	*Puffinus tenuirostris*		0	1	(0.6)	0	1	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
Tufted puffin	*Fratercula cirrhata*		1	0	-	0	1	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
Common dolphin	*Delphinus delphis*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	1	0	-	0	1

(%) indicates % of total numeric catch by C-gear gillnet in each station.

Table 5-(2) Data on number of organisms caught by drift gillnet during the *Oshoro maru* Cruise # 158

Common name	Scientific name	Station	OSG 0505					OSG 0506				
		Gear	A	C	(%)	F	Total	A	C	(%)	F	Total
Sockeye salmon	*Oncorhynchus nerka*		0	0	-	0	0	0	0	-	0	0
Chum salmon	*Oncorhynchus keta*		74	50	(6.8)	0	124	48	23	(6.1)	0	71
Pink salmon	*Oncorhynchus gorbuscha*		26	671	(91.4)	0	697	12	274	(72.7)	0	286
Coho salmon	*Oncorhynchus kisutch*		1	1	(0.1)	0	2	0	1	(0.3)	0	1
Chinook salmon	*Oncorhynchus tshawytscha*		1	1	(0.1)	0	2	0	0	-	0	0
Steelhead	*Oncorhynchus mykiss*		0	0	-	0	0	0	0	-	0	0
Boreal clubhook squid	*Onychoteuthis borealijaponicus*		0	7	(1.0)	0	7	0	15	(4.0)	0	15
Eight-armed squid	*Gonatopsis borealis*		0	1	(0.1)	0	1	0	5	(1.3)	0	5
Spiny dogfish	*Squalus acanthias*		1	2	(0.3)	0	3	0	0	-	0	0
Lanternfishes	Myctophidae		0	0	-	1	1	0	0	-	4	4
Pacific pomfret	*Brama japonica*		0	0	-	0	0	18	47	(12.5)	0	65
Northern Fulmar	*Fulmarus glacialis*		0	0	-	0	0	0	1	(0.3)	0	1
Short-tailed shearwater	*Puffinus tenuirostris*		0	0	-	0	0	9	10	(2.7)	0	19
Horned puffin	*Fratercula corniculata*		0	0	-	0	0	0	1	(0.3)	0	1
Tufted puffin	*Fratercula cirrhata*		0	1	(0.1)	0	1	0	0	-	0	0

(%) indicates % of total numeric catch by C-gear gillnet in each station.

Table 5-(3) Data on number of organisms caught by drift gillnet during the *Oshoro maru* Cruise # 159

Common name	Scientific name	Station	OSG 0507					OSG 0508					OSG 0509					OSG 0510				
		Gear	A	C	(%)	F	Total	A	C	(%)	F	Total	A	C	(%)	F	Total	A	C	(%)	F	Total
Sockeye salmon	*Oncorhynchus nerka*		1	6	(7.8)	0	7	14	16	(7.2)	1	31	0	0	-	0	0	0	0	-	0	0
Chum salmon	*Oncorhynchus keta*		23	13	(16.9)	0	36	9	32	(14.5)	0	41	7	53	(18.5)	0	60	0	0	-	0	0
Pink salmon	*Oncorhynchus gorbuscha*		28	49	(63.6)	0	77	0	0	-	0	0	1	1	(0.3)	0	2	0	0	-	0	0
Coho salmon	*Oncorhynchus kisutch*		9	3	(3.9)	0	12	7	4	(1.8)	1	12	2	1	(0.3)	0	3	0	0	-	0	0
Chinook salmon	*Oncorhynchus tshawytscha*		0	1	(1.3)	0	1	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0
Steelhead	*Oncorhynchus mykiss*		0	0	-	0	0	2	3	(1.4)	0	5	4	0	-	0	4	0	1	(0.6)	0	1
Boreal clubhook squid	*Onychoteuthis borealijaponicus*		0	0	-	0	0	0	15	(6.8)	0	15	0	25	(8.7)	1	26	0	18	(10.3)	0	18
Eight-armed squid	*Gonatopsis borealis*		0	5	(6.5)	1	6	0	0	-	0	0	0	3	(1.0)	0	3	0	7	(4.0)	0	7
Neon flying squid	*Ommastrephes bartramii*		0	0	-	0	0	0	0	-	0	0	0	0	(0.0)	0	0	25	34	(19.4)	0	59
Salmon shark	*Lamna ditropis*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	2	1	(0.6)	0	3
Spiny dogfish	*Squalus acanthias*		0	0	-	0	0	0	1	(0.5)	0	1	0	0	-	0	0	0	0	-	0	0
Lanternfishes	Myctophidae		0	0	-	0	0	0	0	-	2	2	0	0	-	0	0	0	0	-	0	0
Longnose lancetfish	*Alepisaurus ferox*		0	0	-	0	0	0	0	-	0	0	0	1	(0.3)	0	1	0	0	-	0	0
Pacific saury	*Cololabis saira*		0	0	-	0	0	0	0	-	0	0	0	3	(1.0)	10	13	0	0	-	32	32
Pacific pomfret	*Brama japonica*		0	0	-	0	0	4	11	(5.0)	0	15	95	177	(61.9)	3	275	46	110	(62.9)	9	165
Rough pomfret	*Taractes asper*		0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	1	0	-	0	1
Pelagic armorhead	*Pseudopentaceros richardsoni*		0	0	-	0	0	0	0	-	0	0	12	4	(1.4)	4	20	2	4	(2.3)	0	6
Smalleye squaretail	*Tetragonurus cuvieri*		0	0	-	0	0	0	139	(62.9)	1	140	0	18	(6.3)	1	19	0	0	-	0	0

(%) indicates % of total numeric catch by C-gear gillnet in each station.

Table 6. Data on salmonids lacking an adipose fin in the *Oshoro maru* Cruise #157, #158, and #159

Station	Species	Fork Length (mm)	Body Weight (g)	Sex	Gonad Weight (g)
OSG 0508	Steelhead	696	4030	F	85
OSG 0508	Steelhead	740	4515	F	18
OSG 0508	Steelhead	668	3100	F	20
OSG 0509	Steelhead	562	2361	F	9
OSG 0509	Steelhead	568	2637	F	9
OSG 0510	Steelhead	589	2410	M	5

Station: Details are shown in Table 2.
Sex - "F": Female Sex - "M": Male

Table 7 Data on tagged salmonids caught by surface longline during the Oshoro maru Cruise #159

Station	Species	F.L. (mm)	Tag No.	
			FAJ	FRI
OSSL 0501	Pink	434	AA1331	LL4731
	Chum	580	AA1332	LL4732
	Chum	622	AA1333	LL4733
	Chum	570	AA1334	LL4734

Station: Details are shown in Table 4.
F.L.: Fork Length
FAJ: Petersen tag designed by Fisheries Agency, Japan
FRI: Petersen tag designed by Fisheries Research Institute, U.S

Table 8 Data on hook-and-line samplings during the *Oshoro maru* Cruise #159

Station	Sampling Date	Set Position		Oceanographic Station No.	Gillnet Station No.	Catch number of salmonids				
		Lat.	Long.			Sockeye	Chum	Pink	Coho	Total
OSHL 0501	July 3	47-00N	165-00E	OS 05049	OSG 0507	0	2	28	6	36
OSHL 0502	July 4	48-30N	165-00E	OS 05051	-	3	3	23	4	33
OSHL 0503	July 25	50-00N	165-00W	OS 05120	-	5	9	0	0	14