

Northwest and Alaska Fisheries Center Processed Report\*

REPORT OF U.S. OBSERVATIONS DURING THE CRUISE OF THE  
JAPANESE RESEARCH VESSEL RIASU MARU NO. 2 IN 1978

by

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Submitted to the

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION

by the

U.S. NATIONAL SECTION

U.S. DEPARTMENT OF COMMERCE  
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National Marine Fisheries Service  
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\* This report does not constitute a publication and is for information only. All data herein are to be considered provisional.

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## INTRODUCTION

The Agreed Minutes to the International Convention for the High Seas Fisheries of the North Pacific Ocean, signed 25 April 1978, provided for up to three observers from the United States and/or Canada to board Japanese research vessels and collect biological data during salmon research efforts. The National Marine Fisheries Service (NMFS) sponsored two observers aboard the cruise of the Riasu Maru #2 from 18 June to 31 July 1978. Scientific studies to be performed by American observers during this cruise in the Bering Sea (latitude 56° to 61° N. and longitude 175° E. to 175° W., Figure 1), in order of priority, included the following:

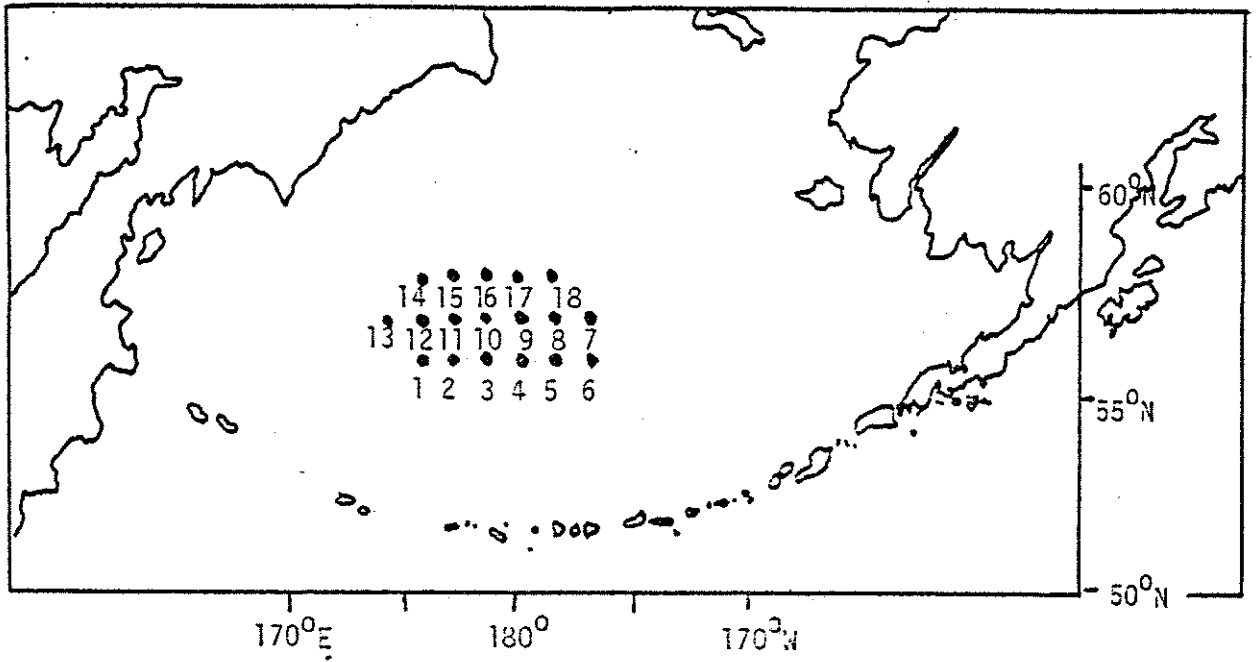
1. Collect samples, body length, body weight, gonad weight, and sex for aging studies of chinook (Oncorhynchus tshawytscha) and chum (O. keta) salmon from motherships operating in the study area;
2. Perform a tagging study aboard commercial catcher-boats to determine randomness of samples used by the Japanese to obtain average weight of pink (O. gorbuscha) salmon;
3. Collect tissue samples from chinook and chum salmon from the research vessel for use in electrophoretic studies to determine continent of origin.

Reports by American observers during a similar cruise on the same research vessel during 1976 covered the details of fishing techniques and described the gear used and Japanese sampling efforts. Although the Riasu Maru #2 fished in the North Pacific Ocean in 1976, enough parallels exist in gear and techniques to justify not collecting much of this information in 1978. Where significant differences were noticed in these aspects, they will be reported.

Gary Winter from Oregon State University and the author arrived in Tokyo on 13 June 1978. A meeting was held the following day at the Japanese Ministry of Agriculture, Forestry, and Fisheries to eliminate any possible misunderstanding on the part of all parties prior to the sailing of the Riasu Maru #2. Four motherships (Shinano Maru, Meiyo Maru, Nojima Maru, and Jinyo Maru), each with 43 catcher-boats, were to be operating in the North Pacific Ocean and Bering Sea gill-net fisheries during the current season.

Concern was expressed to the Japanese that a size bias might be introduced in salmon sampled aboard motherships if crewmen removed the sample from the bulk of the catch. Assurances were made that all selections would be random, although they would indeed be made by the crew and would be made prior to observers boarding the mothership. All other aspects of the mothership sampling were agreed upon.

Figure 1.--Fishing stations of the Riasu Maru #2, 25 June - 24 July 1978



Japanese officials and scientists did not understand the proposed catcher-boat tagging program. Because the observers were unable to explain the purpose of this program to the satisfaction of the Japanese, the observers were asked to consider dropping this phase of sampling. The objection to this program was the lack of working space on the commercial catcher-boats. The purpose of the tagging study was to test the statistical randomness of subsampling catches for biological measurements. Carcasses were to be tagged consecutively with numbered dart tags as they came aboard the catcher-boat. Later, when the catcher-boat delivered the tagged carcasses to the mothership, the catch would be subsampled according to a standard procedure. During subsampling, the sequence of the numbers of the tagged fish would be recorded in the order in which they were sampled along with the number of untagged fish. From this information statistical tests would have been used to examine the randomness of the sequence of fish in the subsample.

We left Tokyo by train on 16 June and arrived at the town of Miyako, on eastern Honshu Island, that evening. Two nights were spent in Miyako, from where the research vessel sailed on 18 June. After 7 days of running the Riasu Maru #2 arrived at the fishing area, where we sampled salmon for 28 days. After another 7 days of running time, the vessel returned to the port of Kushiro on Hokkaido Island. Observers returned to Tokyo via commercial airlines and from there to the U.S.

## RESEARCH ACTIVITIES

### Mothership Surveys

INPFC Treaty agreements allowed up to 18 observer visits to motherships operating in the Bering Sea; but because of a combination of factors, only one visit was made. No minimal number of visits was guaranteed by the Agreed Minutes. The Agreed Minutes did state, however, "such visits shall be timed in such a manner as to minimize adverse effects on the research activities of the above mentioned [Japanese] scientific research vessel." "Adverse effects" during the course of the cruise was found to include leaving the straight line course between research sample points in order to approach motherships. When the 18 planned research surveys were completed by the Riasu Maru #2 on 16 July, all motherships were reportedly operating in the North Pacific. The four motherships left the North Pacific fishing grounds for their ports between 20 and 23 July.

We boarded the mothership Meiyo Maru, one of two that fished in the Bering Sea in 1978, on 30 June 1978. Two hundred chinook and 80 chum salmon were sampled in a 4½-hour period. Sampling was performed below the upper deck, where the observers were asked to remain when all data were collected. Females were dominant in both chinook and chum samples, 61 and 65 percent, respectively. The average fork lengths of fish sampled were 617 mm for chum and 597 mm for chinook salmon.

The observers were informed that approximately 40 percent of the gillnets used by the commercial fleet in 1978 were 121-mm (stretched measure) net and the remainder were 130-mm nets.<sup>1</sup> It is not known what size mesh was used to catch those fish sampled aboard the Meiyo Maru.

### Research Surveys

Research activities aboard the Riasu Maru #2 began on 25 June 1978. One-hundred thirty tans<sup>2</sup> of gillnet, consisting of one net of 75 tans of 111-mm (stretched measure) net and a second variable-mesh net (five tans each of 48-, 93-, 157-, 106-, 63-, 121-, 72-, 138-, 82-, 55- and 111-mm stretched mesh) were fished at each station. Six, seven, and five planned sampling stations were located at latitudes 56°, 57°, and 58° N., respectively. After 16 July, when these 18 stations had been fished, an additional 8 days of fishing effort was devoted to stations one through eight (two located on the 57th parallel and six on the 56th).

Prior to making a set, a number of physical parameters were measured by the crew. A barometer reading (in mb of mercury) was taken as well as wind direction and force (Beaufort scale). Water transparency was measured using a 30-cm Secchi disk and color was determined by comparing the surface color of the sea to twelve colored fluids, ranging from cobalt blue to yellow green. The surface-water temperature was measured with a hand-held thermometer and a temperature profile (to a depth of 200 m) was obtained by the use of a bathythermograph (Tsurume-Seiki Company, Yokohama). Latitude and longitude were recorded, as well as the compass bearing that the line of the net followed.

Nets were typically set at 5:00 p.m., hauling beginning at 4:00 a.m.; sets one through four were made at 6:00 p.m. and hauled at 5:00 a.m. One-half hour was required to set the two nets and from 1 to 3 hours was needed to haul the nets. (For the purposes of this report, one fishing period is averaged at twelve hours.) Nets were set as the vessel moved at 9 knots; speed during hauling was from 2 to 4 knots, varying with size of catch.

As the nets were hauled, fish were segregated by species and mesh size, carried to the sampling area, and sampled (as described in Sanders, 1976). A crew of 25 (plus the two observers) was on deck during these operations and created very crowded conditions. Scales from 1,645 chums and 455 chinooks were taken by U.S. observers;

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<sup>1</sup> Commercial nets measured 7 m from float to lead lines; research nets were 6 m deep plus 1 ft of selvedge between bottom of net and lead line.

<sup>2</sup> One tan equals 50 m.



945 and 448 tissue samples (heart, liver, white muscle and eyeball) were also collected from chums and chinooks, respectively. These data--including fork length, body weight, gonad weight, and sex--were made available to the observers following sampling efforts.

A total of 15,283 salmon were gillnetted aboard the Riasu Maru #2 from 26 June to 24 July 1978 (Table 1). This total included 9,455 chums, 3,451 pinks, 1,893 sockeye (O. nerka), 467 chinooks and 17 cohos (O. kisutch). Daily totals ranged from 85 to 1,819 salmon, while the highest daily catch for chums was 1,367 and for chinooks, 112. Sockeye, chum, chinook and coho salmon were relatively more abundant toward the end of the cruise, while more pinks were caught early in the cruise.

Total catch of incidental species shows the following breakdown (Table 1): pollock (Theragra chalcogramma), 1,958; squid, 85; greenling (Pleurogrammus sp.), 24; salmon shark (Lamna ditropis), 4; Alaska fur seal (Callorhinus ursinus), 1; Dall's porpoise (Phocoenoides dalli), 2; thick-billed murre (Uria lomria), 15; fulmar (Fulmarus glacialis), 19.

Total catch and total catch-per-unit effort (CPUE) of salmon varied by species and mesh size (Table 2). The commercial net (111-mm stretched mesh) caught more fish because 16 times more net of this size was fished than any other mesh size. All mesh sizes caught similar numbers of fish, as shown by the CPUE values, but the most effective mesh sizes for catching the various salmon species were as follows: sockeye, 72 mm (CPUE 1.4); chum, 106 mm (CPUE 4.3); pink, 106 mm (CPUE 1.9); chinook, 121 mm (CPUE 0.4). Data are insufficient to similarly analyze coho salmon, where five mesh sizes showed CPUE values of 0.008. The reader should keep in mind that these values do not reflect commercial catcher-boat effort since 121- and 130-mm mesh nets were the only sizes employed.

Information on the drop-out rate of salmon from gillnets during net retrieval was not obtained. The observers were working in an area aboard the boat where this could not be consistently estimated. These data were collected by the crew and were not available to the observers.

Average length and average weight of salmon taken in 111-mm mesh net is presented in Table 3. These data were calculated by the data recorder. The average weight and average length of the first 60 sockeyes and first 30 of the other species--chums, pinks, chinooks, and cohos--were used to obtain these figures. Sex composition of salmon sampled by U.S. observers was found to be 46% females and 54% males for chums and 50% males and females for chinooks. Scales from these samples have not been aged at the time of this writing.

In addition to salmon research activities, the Riasu Maru #2 was involved in a porpoise-sighting survey. From 18-25 June and from

TABLE 1  
Daily catches aboard the Riasu Maru #2 in the Bering Sea  
26 June - 24 July 1978

Date	Sockeye	Chum	Pink	Chinook	Coho	Total		Pollock	Squid	Alka mackerel	Salmon shark	Mammals†	Birds†
						salmon							
6-26	20	20	281			321	25			1			2
6-27	26	57	468	1		552	16						3
6-28	17	37	275			329	13						5
6-30	25	63	200	2		290	9		2				
7-02	25	96	280	5		406	30			1			2
7-03	28	212	215	31	1	487	23		8		1	1	3
7-04	74	56	198	1		329	20		1				6
7-05	31	140	194	13		378	20						1
7-06	25	199	81	28		333	15		1			1	1
7-07	24	163	58			245	35						2
7-08	20	43	22			85	31		1	1			
7-09	19	231	28	3		281	23			3			
7-11	32	121	20			173	151			1			1
7-12	30	135	30			200	120						2
7-13	29	838	41	23		931	116		1				

Table 1. continued.

Date	Sockeye	Chum	Pink	Chinook	Coho	Total salmon	Pollock	Squid	Atka mackerel	Salmon shark	Mammals*	Birdst
7-14	40	1367	44	9		1460	201	1		1		2
7-15	48	162	23	85	4	322	195	3			1	
7-16	65	553	189	112	2	921	38		2			
7-17	85	1144	76	22		1327	60	3	4	1		
7-18	231	232	59	53	3	578	21	1				3
7-19	425	1004	364	25	1	1819	35	20	1			
7-20	120	739	113	28	2	1002	214	6	2			
7-21	84	735	80	8	2	909	130	3		1		1
7-22	57	468	73	5		603	115	25	3			
7-23§	175	424	25	5	1	630	195	2	2			
7-24¶	138	216	14	3	1	372	107	5	3			
Total	1893	9455	3451	467	17	15,283	1958	83	24	4	3	34

\* Includes two Dall's porpoises an one Alaska fur seal.

† Includes 15 thick-billed murre and 19 fulmar.

§ Day's catch included one rag fish.

¶ Day's catch included one Dolly Varden.

TABLE 2  
Catch and catch-per-unit effort of salmon aboard the Riasu Maru #2 in the Bering Sea  
26 June - 24 July 1978

Mesh* size	Tans/ day	Sockeye catch	CPUE§	Chum catch	CPUE	Pink catch	CPUE	Chinook catch	CPUE	Coho catch	CPUE
48	5	11	0.085	19	0.146	1	0.008	0	--	0	--
93	5	117	.900	450	3.462	204	1.569	15	0.115	1	0.008
157	5	17	.131	104	.800	27	.208	13	.100	0	--
106	5	118	.908	556	4.277	249	1.915	12	.092	1	.008
63	5	97	.746	256	1.969	11	.085	10	.077	1	.008
121	5	77	.592	484	3.723	148	1.138	32	.246	0	--
72	5	182	1.400	442	3.400	8	.062	19	.146	0	--
138	5	43	.331	452	3.477	111	.854	21	.162	1	.008
82	5	154	1.185	396	3.046	132	1.015	24	.185	1	.008
55	5	20	.154	6	.046	9	.069	0	--	0	--
111	80	1057	.508	6290	3.024	2551	1.226	321	.154	12	.006
Total	130	1893	.560	9455	2.797	3451	1.021	467	.138	17	.005

\* Stretched measure, in millimeters.

† Total catch for 26 days of fishing effort.

§ Catch per tan per 12-hour fishing period.

**TABLE 3**  
Average length (L), weight (W), and sample size (S)  
of salmon taken in 111-mm mesh net

Set No.	Set #	Date	Sockeye			Chum			Pink			Chinook			Coho		
			L (mm)	W (g)	S	L (mm)	W (g)	S	L (mm)	W (g)	S	L (mm)	W (g)	S	L (mm)	W (g)	S
1	6/26	554	2298	9	600	2851	11	475	1357	30							
2	6/27	536	2085	16	603	2878	30	431	1072	30	634	3200	1				
3	6/28	542	2214	8	606	2699	27	456	1157	30							
4	6/30	553	2258	13	580	2442	30	464	1205	30	668	4505	2				
5	7/02	559	2412	17	575	2327	30	469	1273	30	533	1970	5				
6	7/03	534	2162	15	582	2380	30	461	1236	30	549	2204	24	508	1530	1	
7	7/04	509	1760	44	579	5894	30	459	1211	30	416	870	1				
8	7/05	599	3100	19	590	2545	30	462	1248	30	556	2358	12				
9	7/06	538	2209	20	601	2648	30	470	1249	30	562	2418	19				
10	7/07	519	1831	14	576	2390	30	470	1332	30							
11	7/08	528	1973	18	571	2399	30	458	1225	19							
12	7/09	469	1409	19	563	2200	29	467	1237	21	510	1980	1				
13	7/11	528	1948	24	559	2209	30	465	1253	16							

Table 3. continued.

Sel No.	Sel #	Date	Sockeye			Chum			Pink			Chinook			Coho		
			L (mm)	W (g)	S	L (mm)	W (g)	S	L (mm)	W (g)	S	L (mm)	W (g)	S	L (mm)	W (g)	S
14	7/12	529	2038	16	572	2261	30	472	1276	19	545	2000	2				
15	7/13	517	1814	18	548	2002	30	472	1285	25	569	2506	11				
16	7/14	527	2003	25	538	1947	30	472	1355	30	561	2260	1				
17	7/15	501	1602	37	544	2135	30	472	1393	19	543	2205	30	554	2140	1	
18	7/16	500	1583	39	529	1938	30	476	1394	30	576	2633	30	518	1800	2	
19	7/17	495	1545	38	483	1318	30	476	1349	30	579	2491	16				
20	7/18	484	1386	60	528	1903	30	481	1423	30	548	2234	30	476	1450	2	
21	7/19	485	1375	60	476	1293	30	484	1403	30	579	2489	16	615	3300	1	
22	7/20	497	1454	60	502	1569	30	477	1335	30	570	2438	22	529	1890	2	
23	7/21	502	1492	60	488	1505	30	479	1401	30	564	2373	6	600	3000	1	
24	7/22	500	1453	36	491	1500	30	491	1508	30	620	2940	3				
25	7/23	491	1396	60	493	1567	30	480	1337	15	616	3410	4	528	2050	1	
26	7/24	497	1403	60	506	1637	30	478	1347	12	595	2850	2	468	1320	1	

24-31 July (non-fishing days), porpoise sightings were recorded from 9:00 a.m. to 3:00 p.m. During fishing days, observations were recorded only when the vessel was running between sample locations. Data collected included date, start/end location, distance traveled, time of sighting, time of last sighting, location of sighting, species, number sighted, direction from vessel, distance from vessel, weather, visibility, wind direction, wind force, and water temperature and air temperature. A total of 156 Dall's porpoises were reported during the study period.

#### RECOMMENDATIONS

1. Due to moist conditions encountered in collecting scales, scale cards were often in poor condition following sampling. The speed at which the Japanese sampling crew worked did not allow much time for thoroughly analyzing each scale for regeneration. Collecting a scale smear would probably enhance scale quality. Observers had more than sufficient time aboard to transfer scales thus collected to scale cards.
2. Waterproof field notebooks were found superior to the plastic pages supplied by NMFS for recording data. Felt-tip pens were found incompatible with the damp climate. The best alternative seems to have data forms printed on waterproof paper.
3. Sampling procedures should be established between NMFS and the Japanese Fishery Agency prior to the arrival of U.S. observers in Japan. The current observers were not aware that the proposed tagging had not been discussed at higher levels between the two governments. This sampling proposal caused consternation in Tokyo and could have resulted in a difficult cruise.
4. If sampling of the commercial catch remains the top priority, one of the following might prove helpful: a) station observers aboard mothership, or b) word the treaty to "require" rather than "allow" a specific number of visits by the observers.

