

# **Recoveries of High-Seas Tags in 2006-2007, and Tag Releases and Recoveries of Fin-Clipped Salmon in 2007 from Japanese Research Vessel Surveys in the North Pacific Ocean**

by

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# **Recoveries of High-Seas Tags in 2006-2007, and Tag Releases and Recoveries of Fin-Clipped Salmon in 2007 from Japanese Research Vessel Surveys in the North Pacific Ocean**

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## **ABSTRACT**

High seas tags from 6 salmon in Japan, from 11 salmon in the United States, and from 23 salmon in Russia were recovered in 2003-2007. Recoveries included 10 LTD and 1 CTD archival tags. The tag recovery rate for chum salmon released and recovered in 2006 (0.9%) was much lower than recovery rates since 1995 (1.6-8.8%). From June to July 2007, a Japanese research vessel, *Wakatake maru*, conducted 29 longline (870 hachi) operations to attach archival and disk tags on salmonids. A total of 211 salmonids (9 sockeye, 143 chum, 19 pink, 30 coho, and 2 chinook salmon and 8 steelhead trout) in the central North Pacific and 849 salmonids (51 sockeye, 339 chum, 449 pink, and 10 chinook salmon) in the Bering Sea were tagged and released. These releases include four steelhead trout released in the central North Pacific and two chinook salmon released in the Bering Sea with a LTD. Eighteen fin-clipped steelhead trout and one fin-clipped chum salmon were recaptured by Japanese salmon research vessels.

## **INTRODUCTION**

Japanese and U.S. cooperative high-seas tagging experiments were conducted

in 2007. In this report, we summarize recoveries of tags that were released from Japanese research vessels. In addition, releases of high seas tags and collection of fin-clipped salmonids during Japanese salmon research vessel operations in the North Pacific Ocean in 2007 are summarized.

## MATERIALS AND METHODS

### Recovery of high seas tags in 2006 and 2007

From January to July in 2006, eight salmonids (1 sockeye and 7 pink salmon) in the western North Pacific, 336 salmonids (32 sockeye, 166 chum, 7 pink, 124 coho, 3 chinook salmon, and 4 steelhead trout) in the central North Pacific, 492 salmonids (75 sockeye, 385 chum, 14 pink, 1 coho, 11 chinook salmon, and 6 Dolly Varden) in the Bering Sea, and 69 salmonids (27 sockeye, 23 chum, 18 pink, and 1 coho salmon) in the eastern North Pacific, were tagged and released by two Japanese research vessels, *Kaiyo maru* and *Wakatake maru*. Of these fish, 24 salmonids with LTD or CTD tags were released in the eastern North Pacific and Bering Sea.

Fish were tagged with two disk tags: one issued by the Fisheries Agency of Japan (FAJ) and a second disk tag issued by the School of Aquatic and Fishery Sciences, University of Washington (UW). Both disk tags were placed on one plastic cinch strap and applied to the fish anterior to the dorsal fin. A few of the disk-tagged fish were selected for tagging with archival tags. Two types of externally-attached archival tags were used by UW (Walker et al. 2005). Two types of archival tag were used in 2006, namely the temperature and depth recording LTD 1100-500 manufactured by Lotek Marine Technologies, and the salinity, temperature and depth recording DST CTD manufactured by Star-Oddi, Reykjavik, Iceland (Walker et al. 2003, 2004). These archival tags were attached externally in the dorsal musculature of the fish anterior to the dorsal fin.

The National Salmon Resources Center, Fisheries Research Agency, collected archival tags, disk tags, and data on recovery locations from salmon hatcheries, private fishermen, fishing cooperative unions, and prefectural governments along the coast of northern Japan from chum salmon that returned to Japan coastal areas in fall of 2006. Recovery information from Russia was obtained at the Japan-Russia bilateral meetings or personal communications. In the United States, UW and Auke Bay Laboratory collected recovery information.

We compared tag recovery rates (number of recovered fish / number of released fish) from 1995 to 2006 using the data from tagging experiments conducted by

the *Wakatake maru* and *Kaiyo maru* in the central North Pacific and Bering Sea (Ito 1995, Myers et al. 1995-1998, Ito and Ishida 1996, 1998, Walker et al. 1998, Ueno and Ishida 1999, Fukuwaka et al. 1999-2003, 2005-2006, Nagasawa et al. 2004).

### **Releases of high seas tags in 2007**

From June to July 2007, a Japanese research vessel, *Wakatake maru*, conducted 29 longline (870 hachi) operations to attach archival and disk tags on salmonids. The FAJ disk tag used in 2007 was the same type used in 2006. On the other hand, three different types of UW disk tag were used in 2007; one was the same type used in 2006, red tag with addresses of UW and Japanese and Russian institute, others were the same types used in past high-seas tagging experiments, one was red with the address of UW, and another was red and white with the address of UW. One type of archival tag was used in 2007, namely the temperature and depth recording LTD 1100-500 (Walker et al. 2003, 2004). Archival tags were placed externally in the dorsal musculature of the fish anterior to the dorsal fin.

### **Collection of snouts from adipose fin-clipped salmonids in 2007**

Four salmon research vessels, the *Hokko maru*, *Wakatake maru*, *Oshoro maru*, and *Kaiun maru* caught 22,830 salmonids in the western and central North Pacific, and the Bering Sea from May through August, 2007. Salmonids were examined for missing fins and snouts were collected from adipose-clipped fish for potential recovery of coded-wire tags (CWT).

## **RESULTS**

### **Recovery of high seas tags**

High seas tags from 6 salmon in Japan, from 11 salmon in US, and from 23 salmon in Russia were recovered in 2003-2007 (Tables 1, 2, and 3). Recoveries included 10 LTD and 1 CTD archival tags. These archival tags were sent to UW to retrieve environmental data during migration. The tag recovery rate for chum salmon released and recovered in 2006 (0.9%) was much lower than recovery rates since 1995 (1.6-8.8%) (Table 4).

### **Releases of high seas tags in 2007**

From June to July in 2007, 340 salmonids (10 sockeye, 225 chum, 36 pink, 58 coho, and 2 chinook salmon and 9 steelhead trout) in the central North Pacific and

1,181 salmonids (57 sockeye, 489 chum, 625 pink, and 10 chinook salmon) in the Bering Sea were caught during 29 longline operations by the *Wakatake maru* (Table 5). Of these fish, 211 salmonids (9 sockeye, 143 chum, 19 pink, 30 coho, and 2 chinook salmon and 8 steelhead trout) in the central North Pacific and 849 salmonids (51 sockeye, 339 chum, 449 pink, and 10 chinook salmon) in the Bering Sea were tagged and released (Tables 5 and 6). These releases include four steelhead trout released in the central North Pacific and two chinook salmon released in the Bering Sea with a LTD.

### **Catch of salmonids with missing fins**

Eighteen adipose fin-clipped steelhead trout and one left ventral fin-clipped chum salmon were recaptured by Japanese salmon research vessels (Table 7). Of these fin-clipped steelhead trout, snouts were collected from 14 fish, one fish with a LTD tag, and three fish with double disk tags were released. Snouts were retained and later sent to the Auke Bay Laboratory for collection and reading of the coded-wire tags.

## **ACKNOWLEDGMENTS**

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## **REFERENCES**

- Fukuwaka, M., S. Urawa, I. Ono, K. Umeda, M. Kawana, and R. V. Walker. 1999. Recoveries of high-seas tags in Japan, 1998, and 1999 tag releases and recoveries of fin-clipped salmon collected by Japanese salmon research vessels in the North Pacific Ocean. (NPAFC Doc. 416). Hokkaido National Fisheries Research Institute, Fisheries Agency of Japan, 116 Katsurakoi, Kushiro 085-0802. 11 p.
- Fukuwaka, M., S. Urawa, I. Ono, H. Tanaka, N. Davis, and R. V. Walker. 2000. Recoveries of high-seas tags in Japan in 1999, and tag releases and recoveries of fin-clipped salmon from Japanese research vessel surveys in the North Pacific Ocean in 2000. (NPAFC Doc. 482). Hokkaido National Fisheries Research Institute, Fisheries Research Agency, 116 Katsurakoi, Kushiro 085-0802. 12 p.
- Fukuwaka, M., S. Urawa, I. Ono, N. Davis, and R. V. Walker. 2001. Recoveries of

- high-seas tags in Japan in 2000, and tag releases and recoveries of fin-clipped salmon from Japanese research vessel surveys in the North Pacific Ocean in 2001. (NPAFC Doc. 545). Hokkaido National Fisheries Research Institute, Fisheries Research Agency, 116 Katsurakoi, Kushiro 085-0802. 12 p.
- Fukuwaka, M., S. Urawa, K. Hirasawa, H. Tanaka, N. Davis, and R. V. Walker. 2002. Recoveries of high-seas tags in Japan in 2001, and tag releases and recoveries of fin-clipped salmon from Japanese research vessel surveys in the North Pacific Ocean in summer of 2002. (NPAFC Doc. 621). Hokkaido National Fisheries Research Institute, Fisheries Research Agency, 116 Katsurakoi, Kushiro 085-0802. 11 p.
- Fukuwaka, M., S. Urawa, K. Hirasawa, N. Davis, and R. V. Walker. 2003. Recoveries of high-seas tags in Japan in 2002, and tag releases and recoveries of fin-clipped salmon from Japanese research vessel surveys in the North Pacific Ocean in fall of 2002 and summer of 2003. (NPAFC Doc. 715). Hokkaido National Fisheries Research Institute, Fisheries Research Agency, 116 Katsurakoi, Kushiro 085-0802. 11 p.
- Fukuwaka, M, S. Urawa, S. Yoshimitsu, N.D. Davis, and R.V. Walker. 2005. Recoveries of high-seas tags in Japan in 2004, and tag releases and recoveries of fin-clipped salmon from Japanese research vessel surveys in the North Pacific Ocean in 2006. (NPAFC Doc. 889). 12 p. Hokkaido National Fisheries Research Institute, Fisheries Research Agency, 116 Katsurakoi, Kushiro 085-0802, Japan.
- Fukuwaka, M, S. Urawa, S. Yoshimitsu, N.D. Davis, and R.V. Walker. 2006. Recoveries of high-seas tags in Japan in 2005, and tag releases and recoveries of fin-clipped salmon from Japanese research vessel surveys in the North Pacific Ocean in 2006. (NPAFC Doc. 961). 12 p. Hokkaido National Fisheries Research Institute, Fisheries Research Agency, 116 Katsurakoi, Kushiro 085-0802, Japan.
- Ito, S. 1995. Salmon tagging experiments and recovery of salmon lacking adipose fin collected by Japanese salmon research vessels in the North Pacific Ocean, 1995. Salmon Report Series 41:49-53. National Research Institute of Far Seas Fisheries, Shimizu, Shizuoka.
- Ito, S. and Y. Ishida 1996. Salmon tagging experiments and recovery of salmon lacking adipose fin collected by Japanese salmon research vessels in the North Pacific Ocean, 1996. Salmon Report Series 42: 30-37. National Research Institute of Far Seas Fisheries, Shimizu, Shizuoka.
- Ito, S. and Y. Ishida. 1998. Salmon tagging experiments and recovery of salmon lacking adipose fin collected by Japanese salmon research vessels in the North Pacific Ocean, 1997. Salmon Report Series 45:49-57. National Research Institute of Far

- Seas Fisheries, Shimizu, Shizuoka.
- Myers, K. W., R. V. Walker, N. D. Davis, W. S. Patton, K. Y. Aydin, E. K. Pikitch, and R. L. Burgner. 1995. Migrations, abundance, and origins of salmonids in offshore waters of the North Pacific – 1995. (NPAFC Doc. 152) FRI-UW-9506. University of Washington, Fisheries Research Institute, Box 357980, Seattle. 84 p.
- Myers, K. W., and R. V. Walker. 1996. Tag returns in 1996 – international high-seas salmon tagging. (NPAFC Doc. 193) FRI-UW-9618. University of Washington, Fisheries Research Institute, Box 357980, Seattle, WA 98195-7980. 5 p.
- Myers, K. W., N. D. Davis, R. V. Walker, M. Kaeriyama, and A. B. Dekshstein. 1997. Tag returns in 1997 – international high-seas salmon tagging. (NPAFC Doc. 255) FRI-UW-9707. University of Washington, Fisheries Research Institute, Box 357980, Seattle, WA 98195-7980. 7 p.
- Myers, K. W., N. D. Davis, R. V. Walker, and M. Fukuwaka. 1998. Tag returns in 1998 – international high-seas salmon tagging. (NPAFC Doc. 347.) FRI-UW-9809. Fisheries Research Institute, University of Washington, Seattle. 6 p.
- Nagasawa, T., M. Fukuwaka, S. Urawa, K. Hirasawa, N. Davis, and R. V. Walker. 2004. Recoveries of high-seas tags in Japan in 2003, and tag releases and recoveries of fin-clipped salmon from Japanese research vessel surveys in the North Pacific Ocean in fall of 2003 and summer of 2004. (NPAFC Doc. 786). Hokkaido National Fisheries Research Institute, Fisheries Research Agency, 116 Katsurakoi, Kushiro 085-0802. 13 p.
- Ueno, Y. and Y. Ishida. 1999. Salmon tagging experiments and recovery of salmon lacking adipose fin collected by Japanese salmon research vessels in the North Pacific Ocean, 1998. Salmon Report Series 47: 35-42. National Research Institute of Far Seas Fisheries, Shimizu, Shizuoka.
- Walker, R. V., K. W. Myers, N. D. Davis, K. Y. Aydin, H. R. Carlson, K. D. Friedland, G. W. Boehlert, S. Urawa, Y. Ueno, and G. Anma. 1998. Thermal habitat of migrating salmonids in the North Pacific Ocean and Bering Sea as recorded by temperature data tags in 1998. (NPAFC Doc. 350) FRI-UW-9813. Fisheries Research Institute, University of Washington, Seattle, WA, 28 p.
- Walker, R.V., N.D. Davis, K.W. Myers, and M. Fukuwaka. 2003. Releases and recoveries of U.S. salmonid data storage tags, and recoveries of high seas tags in North America, 2003. (NPAFC Doc. 722) School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA.
- Walker, R.V., N.D. Davis, K.W. Myers, S. Urawa, and K Hirasawa. 2004. Releases and recoveries of U.S. and NPRB salmonid data storage tags, and recoveries of high seas tags in North America, 2004. (NPAFC Doc. 806) SAFS-UW-0406.

School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA.  
23 p.

Walker, R., N. Davis, K. Myers, J. Helle, M. Fukuwaka, S. Urawa, V. Karpenko, A. Dekshtein, S. Zolotukhin, and S. Kovalenko. 2005. Releases and Recoveries of U.S. and NPRB Salmonid Data Storage Tags, and Recoveries of High Seas Tags in North America and Russia, 2005. (NPAFC Doc. 904) 20 p. SAFS-UW-0504. School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA.



Table 1. Recoveries of high-seas tagged salmon returning to Japan and Russia in 2006 and 2007. Age designation is the European method, where the first number is the number of freshwater annuli and the second number is the number of ocean annuli. FL: fork length (mm), BW: body weight (g), -: no data.

Japan tag #	U.S. tag #	Archival				Release				Recovery						
		tag #	Date	Lat	Long	Sp	FL	Age	Date	Lat	Long	Gear	Sex	FL	BW	Location
MM2669	NN0669	-	7/10/04	56°30'N	178°00'E	chum	466	0.3	9/-/06	59°20'N	143°04'E	-	-	-	-	Okhota River, west coast Okhotsk Sea, Russia
Z7923	NN0742	-	2/18/06	48°00'N	145°00'W	chum	555	0.4	10/20/06	42°16'N	143°19'E	setnet	-	-	-	Hiroo, Pacific coast, Hokkaido
Z7924	NN0743	-	2/18/06	48°00'N	145°00'W	chum	464	0.3	10/20/06	42°16'N	143°19'E	setnet	-	-	-	Hiroo, Pacific coast, Hokkaido
Z7867	NN0811	-	6/4/06	50°08'N	170°00'W	chum	500	0.3	/06	-	-	-	-	-	-	Kamchatka, Russia
Z7879	NN0828	LTD10645	6/7/06	54°00'N	175°01'W	chum	570	0.4	11/1/06	42°30'N	142°01'E	setnet	F	660	2500	Monbetsu, Pacific coast, Hokkaido
MM4147	LL7047	-	6/20/06	47°00'N	180°00'	coho	520	2.1	9/12/06	52°45'N	156°11'E	river	M	570	3042	Bolshaya R., West Kamchatka, Russia
MM4199	LL7099	-	6/22/06	48°30'N	180°00'	coho	500	2.1	Fall/06	56°15'N	162°30'E	river	M	-	3000	Kamchatka R., East Kamchatka, Russia
MM4528	LL7428	-	7/10/06	57°30'N	180°00'	chum	530	0.3	10/12/06	45°05'N	141°38'E	setnet	-	-	-	Wakkanai, Japan Sea coast, Hokkaido
MM4481	LL7381	-	7/10/06	57°30'N	180°00'	chum	528	x.x	12/13/06	41°12'N	140°59'E	river	-	540	1150	Kawauchi R., Mutsu Bay, Aomori, Honshu
MM4593	LL7493	-	7/11/06	56°30'N	180°00'	sockeye	639	1.3	8/15/06	58°15'N	162°02'E	river	-	-	-	Rusakoba R., East Kamchatka, Russia
MM4731	LL8631	-	7/13/06	56°30'N	179°00'E	chum	591	0.5	10/3/06	42°58'N	144°22'E	setnet	F	620	2200	Shari, Okhotsk Sea coast, Hokkaido
LL5510	LL8935	-	7/1/07	58°29'N	180°00'	pink	449	0.1	7/24/07	57°56'N	162°32'E	seine	M	460	1200	Cape Nachikinsky, East Kamchatka, Russia
LL5526	LL8951	-	7/1/07	58°29'N	180°00'	pink	544	0.1	7/25/07	57°56'N	162°32'E	seine	M	500	1800	Cape Nachikinsky, East Kamchatka, Russia
LL5832	LL1778	-	7/5/07	56°33'N	178°59'W	pink	458	0.1	7/28/07	57°56'N	162°32'E	seine	F	475	1300	Cape Nachikinsky, East Kamchatka, Russia
LL5926	LL1886	-	7/8/07	56°28'N	177°04'E	pink	507	0.1	7/25/07	57°56'N	162°32'E	seine	M	530	2000	Cape Nachikinsky, East Kamchatka, Russia

Table 2. Preliminary release and recovery information for high-seas salmon tags recovered in North America and returned from 1 October 2005 to 31 August 2007. A blank indicates the information is not available. HL=hook and line, LL=longline, T=trawl, GN=gillnet. Age designation is the European method, first number is the number of freshwater annuli, second number is the number of ocean annuli. FL=fork length and BW=body weight. Data storage tags: LTD=Lotek LTD\_1100-500 (records temperature and depth); CTD=StarOddi DST CTD (records salinity, temperature, and depth).

Japan Tag No.	U.S. Tag No.	Release						Recovery											
		Date	Lat. (°N)	Long.	2°X5° Area	Gear	FL (mm)	Age	Date	Lat. (°N)	Long.	Area Code	Gear	Sex	FL (mm)	BW (g)	Gonad (g)	Age	Location
<b>A. Sockeye Salmon</b>																			
Z7849	NN0793	31-May-06	53°37'	164°48'W	W6552	T	470	1.2	9-Jul-06	58°43'	157°03'W	47-0	GN	-	-	-	-	-	Naknek, Bristol Bay, Alaska, USA
Z7858	NN0802 LTD 7467	2-Jun-06	54°00'	170°18'W	W7554	HL	580	1.3	14-Jul-06	57°00'	160°00'W	50-3	GN	M	635	2325	-	1.3	Bear River, N. Alaska Peninsula, Alaska, USA
Z7886	NN0830 LTD 10640	7-Jun-06	54°00'	175°01'W	W8054	HL	550	1.2	17-Jul-06	57°37'	157°41'W	49-0	GN	-	-	-	-	-	Ugashik, Bristol Bay, Alaska, USA
Z7891	NN0835 LTD 10650	8-Jun-06	54°50'	175°08'W	W8054	HL	600	1.3	5-Jul-06	58°13'	157°31'W	48-0	GN	-	-	-	-	-	Egegik, Bristol Bay, Alaska, USA
Z7892	NN0836 LTD 10638	8-Jun-06	54°50'	175°08'W	W8054	HL	580	1.3	5-Jul-06	58°48'	158°35'W	46-0	GN	-	-	-	-	-	Nushagak, Bristol Bay, Alaska, USA
-	NN0852	8-Jun-06	54°50'	175°08'W	W8054	HL	590	1.2	6-Jul-06	57°30'	157°23'W	49-0	GN	-	-	-	-	-	Ugashik, Bristol Bay, Alaska, USA
MM4694	LL8594	13-Jul-06	56°30'	179°00'E	E7556	LL	474	X.2	1-Jul-07	58°48'	158°34'W	46-0	GN	M	-	3600	-	-	Nushagak, Bristol Bay, Alaska, USA
MM4699	LL8599	13-Jul-06	56°30'	179°00'E	E7556	LL	451	1.2	17-Jul-07	58°43'	157°00'W	47-0	GN	-	-	-	-	-	Naknek, Bristol Bay, Alaska, USA
MM4712	LL8612	13-Jul-06	56°30'	179°00'E	E7556	LL	454	1.2	30-Jun-07	58°43'	158°34'W	46-0	GN	-	-	-	-	-	Nushagak, Bristol Bay, Alaska, USA
LL5312	LL8737	26-Jun-07	53°30'	180°00'	W8052	LL	632	1.3	23-Jul-07	58°56'	160°19'W	45-0	GN	-	-	3180	-	-	Togiak, Bristol Bay, Alaska, USA
<b>E. Chinook Salmon</b>																			
-	CTD 1899	8-Jun-06	54°50'	175°08'W	W8054	T	850	X.3	30-Jun-06	62°05'	163°44'W	42-1	-	-	-	-	-	-	Mountain Village, Yukon R., western Alaska, USA

Table 3. Preliminary release and recovery information for previously unreported cooperative Japan-U.S. or Russian disk tags recovered in Russia and returned in 2003-2005. A blank indicates the information is not available. HL=hook and line; LL=longline; T=trawl; BS=beach seine. Age designation is the European method, first number is the number of freshwater annuli, second number is the number of ocean annuli. FL=fork length and BW=body weight. Data storage tags: LTD=Lotek LTD\_1100-500 (records temperature and depth).

Japan Tag No.	U.S. or Russian Tag No.	Release						Recovery											
		Date	Lat. (°N)	Long.	2°X5° Area	Gear	FL (mm)	Age	Date	Lat. (°N)	Long.	Area Code	Gear	Sex	FL (mm)	BW (g)	Gonad (g)	Age	Location
<b>A. Chum Salmon</b>																			
BB1892	LL7658	30-Jun-04	54°58'	175°05'W	W8054	HL	530	0.3											
BB1873	LL7639 LTD 7517	30-Jun-04	55°00'	175°03'W	W8054	T	590	0.3											
-	MM0243	6-Jul-05	58°59'	173°58'E	E7058	T	560	-											
<b>B. Pink Salmon</b>																			
Z5443	LL6043	19-Jun-03	46°00'	180°00'	W8046	LL	470	0.1											
Z5516	LL6116	25-Jun-03	51°30'	180°00'	W8050	LL	494	0.1											
Z7236	LL6336	28-Jun-03	54°30'	180°00'	W8054	LL	496	0.1											
Z7412	LL6512	2-Jul-03	58°30'	180°00'	W8058	LL	468	0.1											
Z7657	LL6757	10-Jul-03	57°30'	177°00'E	E7556	LL	475	0.1											
MM3278	LL8378 LTD 9476	7-Jul-05	58°30'	180°00'	W8058	LL	492	0.1											
MM3292	LL8392	7-Jul-05	58°30'	180°00'	W8058	LL	545	0.1											
MM3337	LL8437	9-Jul-05	57°30'	178°00'W	W8056	LL	496	0.1											

Table 3. continued

Japan Tag. No.	U.S. or Russian Tag No.	Release										Recovery											
		Date	Lat. (°N)	Long.	2°X5° Area	Gear	FL (mm)	Age	Date	Lat. (°N)	Long.	Area Code	Gear	Sex	FL (mm)	BW (g)	Gonad (g)	Age	Location				
<b>C. Coho Salmon</b>																							
MM3007	LL8107 LTD 8116	16-Jun-05	42°00	180°00	W8042	LL	482	1.1					5-Sep-05	55°14	155°33E	09-0	BS	M	630	-	-	-	Oblukovina Kamchatka, Russia
MM3104	LL8204 LTD 9427	23-Jun-05	48°30	180°00	W8048	LL	568	2.1					14-Aug-05	51°00	157°55E	09-0	-	M	630	2830	-	-	N. Kurils, Russia
<b>E. Chinook Salmon</b>																							
MM2400	NN0400 LTD 7457	7-Jul-04	56°30	178°00W	W8056	LL	593	1.2					May-05	56°14	162°30W	11-1	-	M	700	-	-	-	Kamchatka R., Russia

Table 4. Number of tagged chum salmon released in the Bering Sea and the central North Pacific by the research vessels *Wakatake maru* and *Kaiyo maru*, and recovered along the Japanese coast and in Russia in summer of 1995-2006. In 1995, fish were not tagged and released in the central North Pacific. Numbers in parentheses indicate number or recovery rate of archival-tagged fish.

Year	Region	Number of releases	Number of recoveries	Recovery rate (%)
1995	Bering Sea	128	4	3.1
1996	Bering Sea	619	9	1.4
	Central North Pacific	36	2	5.6
	Total	655	11	1.6
1997	Bering Sea	399	13	3.3
	Central North Pacific	5	0	0
	Total	404	13	3.2
1998	Bering Sea	734 (48)	71 (8)	9.7 (16.7)
	Central North Pacific	75	0	0
	Total	809 (48)	71 (8)	8.8 (16.7)
1999	Bering Sea	226 (31)	6 (3)	2.7 (9.7)
	Central North Pacific	15	0	0
	Total	241 (31)	6 (3)	2.5 (9.7)
2000	Bering Sea	575 (48)	15 (2)	2.6 (4.2)
	Central North Pacific	52 (2)	0	0
	Total	627 (50)	15 (2)	2.4 (4.0)
2001	Bering Sea	406 (7)	31 (1)	7.6 (14.3)
	Central North Pacific	72	2	2.8
	Total	478 (7)	33 (1)	6.9 (14.3)
2002	Bering Sea	956 (45)	26 (3)	2.7 (6.7)
	Central North Pacific	18 (3)	0	0
	Total	974 (48)	26 (3)	2.7 (6.3)
2003	Bering Sea	135 (40)	6 (2)	4.4 (5.0)
	Central North Pacific	31 (0)	0	0
	Total	166(40)	6 (2)	3.6 (5.0)
2004	Bering Sea	782 (337)	43 (19)	5.5 (5.6)
	Central North Pacific	71 (28)	0	0
	Total	853 (365)	43 (19)	5.0 (5.2)
2005	Bering Sea	79 (18)	3 (0)	3.8 (0)
	Central North Pacific	68 (6)	1 (1)	1.5 (16.7)
	Total	147 (24)	4 (1)	2.7 (4.2)
2006	Bering Sea	385 (3)	4 (1)	1.0 (33.3)
	Central North Pacific	166 (0)	1 (0)	0.6 (0)
	Total	551 (3)	5 (1)	0.9 (33.3)

Table 5. Number of salmon caught by longline operations to attach archival and disk tags, and number of fish tagged and released by the research vessel, *Wakatake maru* in 2007. LL, longline (30 hachi/operation), BS: Bering Sea, CNP: Central North Pacific.

Region/ Vessel	Date	Latitude	Longitude	Gear	Number of fish caught					Number of fish released						
					Sock	Chum	Pink Coho	Chin	Steel	Sock	Chum	Pink Coho	Chin	Steel		
CNP	6/13	41°03N	179°57W	LL	0	12	0	2	0	0	0	7	0	2	0	0
<i>Wakatake maru</i>	6/14	42°00N	179°59W	LL	0	9	1	5	0	0	0	8	1	2	0	0
	6/15	42°56N	179°58E	LL	0	25	0	14	0	0	0	18	0	9	0	0
	6/16	44°00N	179°58E	LL	0	60	1	22	1	3	0	30	1	10	1	2
	6/17	45°00N	179°59E	LL	0	35	0	10	0	1	0	21	0	5	0	1
	6/18	46°02N	179°58W	LL	0	14	1	4	0	3	0	8	1	2	0	3
	6/19	47°01N	179°59E	LL	0	3	3	0	0	1	0	2	2	0	0	1
	6/20	47°32N	179°59E	LL	1	11	0	0	0	0	1	8	0	0	0	0
	6/21	48°30N	180°00	LL	0	5	10	0	0	1	0	4	6	0	0	1
	6/22	49°30N	180°00	LL	2	21	11	0	0	0	2	17	4	0	0	0
	6/23	50°30N	180°00	LL	7	30	9	1	1	0	6	20	4	0	1	0
	Total					10	225	36	58	2	9	9	143	19	30	2
BS	6/24	51°30N	180°00	LL	1	37	27	0	0	0	1	22	21	0	0	0
<i>Wakatake maru</i>	6/25	52°30N	180°00	LL	4	18	14	0	1	0	4	15	6	0	1	0
	6/26	53°30N	180°00	LL	3	33	15	0	1	0	3	20	12	0	1	0
	6/27	54°30N	180°00	LL	1	57	16	0	0	0	1	37	11	0	0	0
	6/28	55°28N	179°56W	LL	0	6	2	0	0	0	0	5	0	0	0	0
	6/29	56°29N	179°58W	LL	2	23	67	0	0	0	2	18	54	0	0	0
	6/30	57°30N	179°56W	LL	3	8	21	0	0	0	3	4	15	0	0	0
	7/01	58°29N	180°00	LL	4	10	115	0	4	0	4	7	85	0	4	0
	7/02	57°32N	179°04W	LL	7	16	60	0	0	0	7	15	44	0	0	0
	7/03	57°35N	177°59W	LL	9	27	128	0	1	0	9	19	90	0	1	0
	7/04	56°34N	178°00W	LL	2	55	13	0	0	0	2	44	11	0	0	0
	7/05	56°33N	178°59W	LL	0	26	20	0	0	0	0	15	14	0	0	0
	7/06	56°31N	178°55E	LL	5	25	28	0	0	0	3	16	19	0	0	0
	7/07	56°29N	177°58E	LL	2	6	27	0	0	0	1	5	16	0	0	0
	7/08	56°28N	177°04E	LL	3	47	24	0	1	0	2	31	14	0	1	0
	7/09	57°32N	177°02E	LL	2	24	27	0	2	0	2	18	22	0	2	0
	7/10	57°28N	176°03E	LL	2	53	16	0	0	0	2	35	11	0	0	0
	7/11	56°29N	176°00E	LL	7	18	5	0	0	0	5	13	4	0	0	0
Total					57	489	625	0	10	0	51	339	449	0	10	0
Total					67	714	661	58	12	9	60	482	468	30	12	8

Table 6. Tag numbers of disk tags and archival tags released in 2007. BS: Bering Sea, CNP: central North Pacific. \* LL5738, GG0163, GG1813, GG1816, GG1824, LL1813, LL1816, LL1824, LL1833-1834, LL1837-1838, LL1843, LL1860, LL1863, LL1890, LL1895-1896 not used.

Region	Date	Location		Disk tag			Archival tag		
				FAJ tag	FRI tag	No. fish	Tag No.	No. fish	
CNP	6/13	41°03N	179°57W	LL5001-5009	LL8295, NN0526, NN0045, LL6000, LL8487-8491	9		0	
	6/14	42°00N	179°59W	LL5010-5020	LL8492-8499, LL8080, LL8011, 8082	11		0	
	6/15	42°56N	179°58E	LL5021-5047	LL8083-8099, LL6838-6847	27		0	
	6/16	44°00N	179°58E	LL5048-5090	LL6848-6890	43	LTD13167, 13168	2	
	6/17	45°01N	179°59E	LL5091-5117	LL6891-6900, LL8660-8676	27	LTD13169	1	
	6/18	46°02N	179°58W	LL5118-5131	LL8677-8690	14	LTD13170	1	
	6/19	47°01N	179°59E	LL5132-5136	LL8691-8695	5		0	
	6/20	47°32N	179°59E	LL5137-5145	LL8696-8699, NN0866-0870	9		0	
	6/21	48°30N	180°00	LL5146-5156	NN0871-0881	11		0	
	6/22	49°30N	180°00	LL5157-5179	NN0882-0904	23		0	
	6/23	50°30N	180°00	LL5180-5210	NN0905-0935	31		0	
	Total						210		4
	BS	6/24	51°30N	180°00	LL5211-5254	NN0936-0979	44		0
6/25		52°30N	180°00	LL5255-5280	NN0980-0999, LL8700-8705	26	LTD13171	1	
6/26		53°30N	180°00	LL5281-5316	LL8706-8741	36	LTD13172	1	
6/27		54°30N	180°00	LL5317-5365	LL8742-8790	49		0	
6/28		55°28N	179°56W	LL5366-5370	LL8791-8795	5		0	
6/29		56°29N	179°58W	LL5371-5444	LL8796-8869	74		0	
6/30		57°30N	179°56W	LL5445-5466	LL8870-8891	22		0	
7/01		58°29N	180°00	LL5467-5566	LL8892-8991	100		0	
7/02		57°32N	179°04W	LL5567-5632	LL8992-8999, EE0200-0257	66		0	
7/03		57°35N	177°59W	LL5633-5752*	EE0258-0299, GG0100-0177*	119		0	
7/04		56°34N	178°00W	LL5753-5809	GG0178-0199, LL1721-1755	57		0	
7/05		56°33N	178°59W	LL5810-5838	LL1756-1784	29		0	
7/06		56°31N	178°55E	LL5839-5876	LL1785-1804, LL1808-1828*	38		0	
7/07		56°29N	177°58E	LL5877-5898	LL1829-1855*	22		0	
7/08		56°28N	177°04E	LL5899-5946	LL1857-1909*	48		0	
7/09		57°32N	177°02E	LL5947-5990	LL1910-1953	44		0	
7/10	57°28N	176°03E	LL5991-6000	LL1954-1999, LL4901-4938, EE0400-0401	48		0		
7/11	56°29N	176°00E	LL4939-4960	EE0402-0423	22		0		
Total						849		2	
Total						1059		6	

Table 7. Location and biological data for fin-clipped salmonids caught by Japanese salmon research vessels in 2007. LL longline, - not available, Ad adipose fin, RP right pectoral fin, LP left pectoral fin, RV right ventral fin, LV left ventral fin, D dorsal fin.

Research vessel	Date	Location		Mesh (mm)	Species	Fork length (mm)	Body weight (g)	Sex	Gonad weight (g)	Clipped fin
<i>Wakatake</i>	6/15/07	42°00'N	180°00'	115	steelhead	580	2050	F	3	Ad
<i>maru</i>	6/15/07	42°00'N	180°00'	115	steelhead	596	1870	F	3	Ad
	6/16/07	43°00'N	180°00'	115	steelhead	569	1800	M	3	Ad
	6/16/07	44°00'N	179°58'E	LL	steelhead	753	4200	M	7	Ad
	6/17/07	44°00'N	180°00'	115	steelhead	593	2040	M	1	Ad
	6/17/07	44°00'N	180°00'	115	steelhead	539	1800	F	5	Ad
	6/17/07	44°00'N	180°00'	115	steelhead	540	1780	F	2	Ad, RP, LP
	6/18/07	45°00'N	180°00'	121	steelhead	590	2030	M	1	Ad
	6/19/07	46°00'N	180°00'	106	steelhead	590	2030	M	6	Ad, RV
	6/19/07	46°00'N	180°00'	115	steelhead	615	3730	M	2	Ad
	6/20/07	47°00'N	180°00'	115	steelhead	572	1900	M	7	Ad
	6/20/07	47°00'N	180°00'	115	steelhead	647	2900	F	16	Ad, D
	7/01/07	57°30'N	180°00'	82	chum	593	2830	M	130	LV
	6/16/07	44°00'N	179°58'E	LL	steelhead	722	- <sup>1</sup>	-	-	Ad
	6/18/07	46°02'N	179°58'W	LL	steelhead	760	- <sup>2</sup>	-	-	Ad, D
	6/18/07	46°02'N	179°58'W	LL	steelhead	628	- <sup>2</sup>	-	-	Ad
	6/21/07	48°30'N	180°00'	LL	steelhead	474	- <sup>2</sup>	-	-	Ad
<i>Kaiun</i>	7/18/07	46°00'N	175°30'E	121	steelhead	598	2500	M	1	Ad
<i>maru</i>	7/18/07	46°00'N	175°30'E	115	steelhead	574	2310	M	1	Ad

<sup>1</sup> released with a LTD, <sup>2</sup> released with double disk tags.