

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

by

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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

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ABSTRACT

During 2002, twenty-seven tagged chum salmon were recovered along the Japanese coast and one tagged chum salmon was recovered in Russia from releases of tagged fish in the Bering Sea and the central North Pacific. In addition, one tagged pink salmon was recovered in July 2001 in Russia. Recoveries included three chum salmon double-tagged with LTD and IB tags, and twenty-six fish with only disk tags. The tag recovery rate for chum salmon released in the Bering Sea in 2002 (2.7%) was similar to recovery rates since 1995 (1.4-3.3%) except for 1998 (9.7%) and 2001 (7.6%). From September 2002 to July 2003, three Japanese research vessels, *Kaiyo maru*, *Wakatake maru* and *Oshoro maru*, conducted 32 longline (900 hachi) and 2 hook-and-line operations to attach archival and disk tags to salmonids. In September 2002, 17 salmonids (1 sockeye, 14 chum, and 2 chinook salmon) were tagged with an IB temperature tag or a LTD temperature-depth tag and released in the Bering Sea. In June and July 2003, 3 salmonids (2 pink and 1 coho) in the western North Pacific, 145 salmonids (7 sockeye, 31 chum, 74 pink, 28 coho salmon, 1 chinook, and 4 steelhead trout) in the central North Pacific, 689 salmonids (19 sockeye, 135 chum, 505 pink, 2 coho, and 28 chinook salmon) in the Bering Sea, and 2 chum salmon in the eastern North Pacific were tagged and released. Of these fish, 140 salmonids with IB tags or LTD tags were released in the central North Pacific and Bering Sea. During research surveys in summer of 2003, Japanese salmon research vessels recovered seven salmonids lacking the adipose fin.

INTRODUCTION

Japanese and U.S. cooperative high-seas tagging experiments were conducted in 2002 and 2003. In this report, we summarize tags recovered from salmon that returned to Japanese and Russian coastal areas in 2002, and one previously unreported tag recovered in 2001. In addition, fall 2002 and summer 2003 releases of high seas tags and collection of fin-clipped salmonids during Japanese salmon research vessel operations in the North Pacific Ocean are summarized.

MATERIALS AND METHODS

Recovery of high seas tags in 2002

In June and July 2002, 39 salmonids (2 sockeye, 18 chum, 2 pink, 15 coho salmon, and 2 steelhead trout) in the central North Pacific, 1,003 salmon (26 sockeye, 956 chum, and 21 chinook salmon) in the Bering Sea, and 2 salmon (1 chum and 1 pink salmon) in the eastern North Pacific were tagged and released by two Japanese research vessels, the *Wakatake maru*, and *Oshoro maru* (Fukuwaka et al. 2002). Of these fish, 25 salmonids with temperature tags (IB tag), 25 salmonids with temperature-depth tags (LTD tag), and six chum salmon double-tagged with both IB and LTD tags were released in the central, eastern North Pacific and the Bering Sea. In addition, 30 chum salmon were released in the Bering Sea with swimming-speed recording tags (PDT tag).

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. Three types of externally-attached archival tags were used (Tanaka et al. 2002, Walker et al. 2002). One tag, used by UW, is manufactured by Lotek Marine Technologies (model LTD_1100-300) and records temperature and depth data. Another tag used by UW, is a Thermonchron iButton data storage device manufactured by Dallas Semiconductor, Inc., and repackaged for fish tagging by AlphaMach, Inc. (model iB4). These tags record temperature data only. Both UW tags were attached externally in the dorsal musculature of the fish anterior to the dorsal fin. A third type of archival tag manufactured by the Little Leonard Ltd., Tokyo, Japan (model W190L-PDT), records the seawater temperature, swimming speed, and depth (Tanaka et al. 2001).

The National Salmon Resources Center 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 2002.

We compared tag recovery rates (number of recovered fish / number of released fish) from 1995 to 2002 using data from tagging experiments conducted by the *Wakatake 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. 1999-2002).

Releases of high seas tags in fall of 2002 and summer of 2003

From September 2002 to July 2003, three Japanese research vessels, *Kaiyo maru*, *Wakatake maru* and *Oshoro maru*, conducted 32 longline (900 hachi) and 2 hook-and-line operations to attach archival and disk tags on salmonids. The disk tags used in 2003 were the same types used in 2002. Two archival tag types were used in 2003, namely the temperature and depth recording LTD 1100-300 and the temperature recording iBLite (Walker et al. 2003, Fukuwaka et al. 2003). 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 2003

Three salmon research vessels, the *Wakatake maru*, *Oshoro maru*, and *Kaiun maru* caught 15,274 salmonids in the central North Pacific, the Bering Sea, and the Gulf of Alaska from June through August, 2003. Salmon and steelhead trout lacking the adipose fin were recovered during biological measurements. Snout samples were collected from these fish for potential recovery of coded-wire tags (CWT).

RESULTS

Recovery of high seas tags in 2002

Twenty-seven tagged chum salmon were recovered from areas along the coast of Japan during fall 2002, and one tagged chum salmon was recovered along the coast of Russia in June, 2002 (Table 1). In addition, one pink salmon was recovered from the Russian Coast in summer of 2001. Twenty-six recoveries were from salmon tagged only with disk tags. Recoveries included three fish double-tagged with LTD and IB tags. The tag recovery rate for chum salmon released and recovered in 2002 (2.7%) was similar to the recovery rate since 1995 (1.6-3.2%), except for 1998 (8.8%) and 2001 (6.9%; Table 2).

Releases of high seas tags

In September 2002, 17 salmonids (1 sockeye, 14 chum, and 2 chinook) were tagged with an IB temperature tag or an LTD temperature-depth tag and released by the Japanese research vessel, *Kaiyo maru* in the Bering Sea (Table 3). In June and July 2003, 3 salmonids (2 pink and 1 coho) in the western North Pacific, 145 salmonids (7 sockeye, 31 chum, 74 pink, 28 coho salmon, 1 chinook, and 4 steelhead trout) in the central North Pacific, 689 salmonids (19 sockeye, 135 chum, 505 pink, 2 coho, and 28 chinook salmon) in the Bering Sea, and 2 chum salmon in the eastern North Pacific, were tagged and released by two Japanese research vessels, *Oshoro maru* and *Wakatake maru* (Tables 3 and 4). Of these fish, 140 salmonids with IB tags or LTD tags were released in the central North Pacific and Bering Sea.

Collection of snouts from adipose fin-clipped salmonids in 2003

Seven fin-clipped steelhead trout were recovered by Japanese salmon research vessels (Table 5). Six snout samples were collected from these fish and provided to the U.S. for inspection to determine whether the snouts contained CWTs.

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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.
- 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.

- Tanaka, H., Y. Takagi, and Y. Naito. 2001. Swimming speeds and buoyancy compensation of migration adult chum salmon *Oncorhynchus keta* revealed by speed-depth acceleration data logger. *J. Exp. Biol.* 204: 3895-3904.
- Tanaka, H, N. Davis, T. Onuma, M. Yamada, Y. Yamamoto, and S. Tsuchiya. 2002. International salmon research aboard the R/V *Wakatake maru* in the central North Pacific Ocean and Bering Sea during summer of 2002. (NPAFC Doc. 622) 21 p. Hokkaido National Fisheries Research Institute, Fisheries Research Agency, 116 Katsurakoi, Kushiro 085-0802, Japan.
- 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. 2002. Recoveries of high seas salmon tags in North America and releases of U.S. salmon data storage tags in the North Pacific Ocean and Bering Sea, 2002. (NPAFC Doc. 608) Fisheries Research Institute, University of Washington. 7 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.) 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 2002, and tag numbers LL3661 and LL4661, which were recovered in summer 2001. A hyphen indicates the information is not available. 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).

Janan tag #	U.S. tag #	Archival tag #	Release						Recovery							
			Date	Lat	Long	Species	FL	Age	Date	Lat	Long	Gear	Sex	FL	BW	Location
LL3273	LL4273		7/1/01	55°30N	180°00	Chum	571	0.4	6/6/02	50°15N	160°44E	Gillnet	F	615	2620	Pacific C., Russia
LL3432	LL4432		7/5/01	57°30N	179°00W	Chum	582	0.3	9/30/02	44°21N	141°41E	Setnet	F	560	3100	Japan Sea C., Hokkaido
LL3661	LL4661		7/12/01	57°30N	177°00E	Pink	508	0.1	7/28/01	58°32N	162°18E	-	-	510	1700	Bering Sea C., Russia
Y1805	LL5005		7/9/02	56°30N	179°06E	Chum	594	0.4	9/19/02	43°21N	145°34E	Setnet	-	-	-	Nemuro St., Hokkaido
Y1887	-		7/11/02	56°32N	177°04E	Chum	536	0.2	10/17/02	44°08N	145°06E	Setnet	M	570	2100	Okhotsk Sea C., Hokkaido
Y1896	-		7/11/02	56°32N	177°04E	Chum	512	0.3	10/25/02	43°45N	145°04E	Setnet	M	520	1400	Nemuro St., Hokkaido
Y9316	LL5316		7/1/02	55°30N	179°56W	Chum	538	0.3	9/27/02	43°37N	145°12E	Setnet	F	570	2150	Nemuro St., Hokkaido
Y9380	LL5380		7/1/02	55°30N	179°56W	Chum	580	0.3	10/5/02	44°08N	143°59E	Setnet	-	620	2700	Okhotsk Sea C., Hokkaido
Y9382	LL5382		7/1/02	55°30N	179°56W	Chum	552	0.4	10/24/02	44°07N	145°03E	Setnet	F	600	2400	Okhotsk Sea C., Hokkaido
Y9418	LL5418		7/2/02	56°30N	179°54W	Chum	670	0.4	9/19/02	42°25N	143°25E	Setnet	-	-	-	Pacific C., Hokkaido
Y9442	LL5442		7/3/02	57°29N	179°58W	Chum	668	0.4	10/10/02	43°55N	144°36E	Setnet	F	700	3300	Okhotsk Sea C., Hokkaido
Y9447	LL5447	IB20, LTD1334	7/3/02	57°29N	179°58W	Chum	691	0.4	9/20/02	44°06N	144°12E	Setnet	F	700	3260	Okhotsk Sea C., Hokkaido
Y9456	LL5456		7/4/02	58°30N	179°55W	Chum	652	0.3	9/19/02	44°36N	142°56E	Setnet	M	750	4200	Okhotsk Sea C., Hokkaido
Y9461	LL5461		7/4/02	58°30N	179°55W	Chum	624	0.4	9/12/02	43°36N	145°18E	Setnet	-	-	-	Nemuro St., Hokkaido
Y9462	LL5462		7/4/02	58°30N	179°55W	Chum	690	0.4	9/30/02	43°24N	145°16E	Setnet	M	750	4430	Nemuro St., Hokkaido
Y9472	LL5472		7/4/02	58°30N	179°55W	Chum	562	0.3	10/12/02	44°00N	145°10E	Gillnet	-	-	-	Nemuro St., Hokkaido
Y9489	LL5489		7/5/02	57°30N	178°55W	Chum	628	0.4	9/11/02	42°16N	143°19E	Setnet	-	-	-	Pacific C., Hokkaido
Y9562	LL5562	IB26, LTD1373	7/5/02	57°30N	178°55W	Chum	615	0.4	9/27/02	44°08N	145°06E	Setnet	M	650	2900	Okhotsk Sea C., Hokkaido
Y9570	LL5570		7/6/02	57°32N	177°48W	Chum	580	0.4	10/1/02	41°55N	143°14E	Setnet	-	-	-	Pacific C., Hokkaido
Y9602	LL5602		7/6/02	57°32N	177°48W	Chum	560	0.3	11/25/02	42°56N	144°35E	-	M	590	1700	Pacific C., Hokkaido
Y9608	LL5608		7/6/02	57°32N	177°48W	Chum	607	0.3	9/16/02	44°13N	143°36E	Setnet	F	650	2800	Okhotsk Sea C., Hokkaido
Y9632	LL5632		7/6/02	57°32N	177°48W	Chum	613	0.4	10/12/02	44°17N	145°17E	Setnet	M	760	2300	Okhotsk Sea C., Hokkaido
Y9746	LL5746		7/7/02	56°30N	177°58W	Chum	594	0.3	11/6/02	40°06N	141°50E	Setnet	-	-	-	Pacific C., Honshu
Y9760	LL5760		7/7/02	56°30N	177°58W	Chum	630	0.3	9/26/02	44°13N	143°36E	Setnet	M	700	3700	Okhotsk Sea C., Hokkaido
Y9863	LL5863		7/8/02	56°32N	178°53W	Chum	595	0.3	9/27/02	44°08N	145°06E	Setnet	F	-	2900	Okhotsk Sea C., Hokkaido
Y9936	LL5936		7/9/02	56°30N	179°06E	Chum	579	0.3	10/10/02	41°59N	143°09E	Setnet	-	635	2800	Pacific C., Hokkaido
Y9937	LL5937		7/9/02	56°30N	179°06E	Chum	588	0.3	9/20/02	44°07N	144°06E	Setnet	-	640	4500	Okhotsk Sea C., Hokkaido
Y9951	LL5951		7/9/02	56°30N	179°06E	Chum	593	0.3	9/16/02	44°36N	142°56E	Setnet	F	620	3000	Okhotsk Sea C., Hokkaido
Y9999	LL5999	IB29, LTD1565	7/9/02	56°30N	179°06E	Chum	618	0.3	9/24/02	43°33N	145°21E	Setnet	F	655	3400	Nemuro St., Hokkaido

Table 2. Number of tagged chum salmon released in the Bering Sea and the central North Pacific by the research vessel *Wakatake maru*, and recovered along the Japanese coast and in Russia in 1995-2002. 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)

Table 3. Number of salmon caught by longline and hook-and-line operations, and number of fish tagged and released by the research vessels, *Kaiyo maru*, *Wakatake maru*, and *Oshoro maru* from September 2002 to July 2003. H&L: hook-and-line operation, BS: Bering Sea, WNP: Western North Pacific, CNP: Central North Pacific, ENP: Eastern North Pacific.

Region/ Vessel	Date	Latitude	Longitude	Hachi	Number of fish caught						Number of fish released						
					Sock	Chum	Pink	Coho	Chin	Steel	Sock	Chum	Pink	Coho	Chin	Steel	
BS	9/08/02	58°30'	179°30'W	H&L	0	1	0	0	1	0	0	0	1	0	0	1	0
<i>Kaiyo maru</i>	9/18/02	53°54'	172°27'E	H&L	1	13	0	0	1	0	1	13	0	0	1	0	
	Total				1	14	0	0	2	0	1	14	0	0	2	0	
WNP	7/07/03	44°57'	164°55'E	10	0	0	5	6	0	0	0	0	2	1	0	0	
<i>Oshoro maru</i>	7/09/03	49°26'	164°56'E	10	0	0	0	0	0	0	0	0	0	0	0	0	
	Total			20	0	0	5	6	0	0	0	0	2	1	0	0	
CNP	6/14/03	40°57'	180°00'	30	0	0	0	0	0	0	0	0	0	0	0	0	
<i>Wakatake maru</i>	6/15/03	42°03'	179°57'W	30	0	5	0	2	0	0	0	5	0	2	0	0	
	6/16/03	43°01'	179°58'W	30	0	3	0	25	0	3	0	2	0	16	0	3	
	6/17/03	44°00'	179°59'W	30	0	1	0	12	0	0	0	1	0	9	0	0	
	6/18/03	44°59'	179°55'W	30	0	1	0	1	0	0	0	1	0	1	0	0	
	6/19/03	46°01'	179°54'W	30	0	5	3	0	0	1	0	4	1	0	0	1	
	6/20/03	46°57'	179°58'E	30	1	11	4	0	1	0	1	9	4	0	1	0	
	6/21/03	47°30'	179°57'E	30	0	2	5	0	0	0	0	2	4	0	0	0	
	6/22/03	48°30'	180°00'	30	1	0	18	0	0	0	1	0	13	0	0	0	
	6/23/03	49°30'	180°00'	30	3	3	12	0	0	0	3	3	8	0	0	0	
	6/24/03	50°30'	180°00'	30	1	2	8	0	0	0	0	2	6	0	0	0	
	6/25/03	51°30'	180°00'	30	2	6	54	0	0	0	2	2	38	0	0	0	
	Total			360	8	39	104	40	1	4	7	31	74	28	1	4	
BS	6/26/03	52°30'	180°00'	30	2	4	113	0	0	0	1	1	94	0	0	0	
<i>Wakatake maru</i>	6/27/03	53°30'	180°00'	30	2	32	45	0	0	0	2	18	36	0	0	0	
	6/28/03	54°30'	180°00'	30	3	55	77	0	0	0	2	29	49	0	0	0	
	6/29/03	55°31'	179°57'E	30	4	36	52	0	0	0	4	15	42	0	0	0	
	6/30/03	56°30'	179°58'E	30	1	18	23	0	1	0	1	8	15	0	1	0	
	7/01/03	57°28'	179°55'E	30	1	14	43	1	4	0	1	1	29	0	4	0	
	7/02/03	58°35'	179°54'W	30	2	13	64	0	16	0	2	3	42	0	11	0	
	7/03/03	57°33'	178°55'W	30	0	4	14	0	3	0	0	0	13	0	1	0	
	7/04/03	57°31'	177°53'W	30	1	14	17	1	8	0	1	1	13	1	8	0	
	7/05/03	56°30'	178°01'W	30	2	48	26	0	0	0	1	20	19	0	0	0	
	7/06/03	56°31'	178°54'W	30	0	31	27	0	0	0	0	20	19	0	0	0	
	7/07/03	56°32'	178°59'E	30	1	21	40	0	0	0	0	2	33	0	0	0	
	7/08/03	56°31'	177°54'E	30	2	30	29	1	0	0	2	8	23	1	0	0	
	7/09/03	56°29'	177°02'E	30	0	9	3	0	0	0	0	3	3	0	0	0	
	7/10/03	57°31'	177°06'E	30	1	15	44	0	5	0	1	4	31	0	3	0	
	7/11/03	57°31'	176°02'E	30	0	10	49	0	0	0	0	2	40	0	0	0	
	7/12/03	56°29'	175°58'E	30	1	8	5	0	0	0	1	0	4	0	0	0	
	Total			510	23	362	671	3	37	0	19	135	505	2	28	0	
ENP	7/30/03	50°01'	164°54'W	10	2	3	0	1	0	0	0	2	0	0	0	0	
<i>Oshoro maru</i>																	
Total					900	34	418	780	50	40	4	27	182	581	31	31	4

Table 4. Tag numbers of disk tags and archival tags released in fall of 2002 and summer of 2003. BS: Bering Sea, WNP: western North Pacific, CNP: central North Pacific, ENP: eastern North Pacific.

Region	Date	Location		Disk tag			Archival tag	
				FAJ tag	FRI tag	No. fish	Tag No.	No. fish
BS	9/08/02	58°30N	179°30W	LL3700, 3702	LL1833, 1824	2	IB G11, G04	2
	9/18/02	53°54N	172°27E	LL3701, 3703-3716	LL1805-1807, 1816, 1833-1834, 1837-1838, 1843, 1856, 1860, 1863, 1890, 1895, 1896	15	LTD1826, 1828, 1830, 1837, 1839, 1853, 1855, 1871, 1913, 1914, 1932, 1940, 1951, 2004, 2010	15
Total				LL3700-3716		17		17
WNP	7/7/03	44°57N	164°55E	AA1301-1303	-	3		
CNP	6/15/03	42°00N	180°00	Z5401-5407	LL6001-6007	7		
	6/16/03	43°00N	180°00	Z5408-5428	LL6008-6028	21		
	6/17/03	44°00N	180°00	Z5429-5438	LL6029-6038	10		
	6/18/03	46°00N	180°00	Z5439-5440	LL6039-6040	2		
	6/19/03	46°00N	180°00	Z5441-5446	LL6041-6046	6		
	6/20/03	47°00N	180°00	Z5447-5461	LL6047-6061	15	LTD1607	1
	6/21/03	47°30N	180°00	Z5462-5467	LL6062-6067	6		
	6/22/03	48°30N	180°00	Z5468-5481	LL6068-6081	14	LTD1635	1
	6/23/03	49°30N	180°00	Z5482-5495	LL6082-6095	14	LTD1651, 1658, 1666	3
	6/24/03	50°30N	180°00	Z5496-5503	LL6096-6103	8		
	6/25/03	51°30N	180°00	Z5504-5545	LL6104-6145	42	LTD1668	1
Total				Z5401-5545	LL6001-6145	145		6
BS	6/26/03	52°30N	180°00	Z5546-5600 ¹ , Z7101-7142	LL6146-6242 ¹	96	IB1, 2, 4, 7, LTD1672, 1674	6
	6/27/03	53°30N	180°00	Z7143-7199 ²	LL6243-6299 ²	56	IB8, 12, 20, 22, 60-63, LTD1680	9
	6/28/03	54°30N	180°00	Z7200-7279	LL6300-6379	80	IB13, 23, 64-67, LTD1685	7
	6/29/03	55°30N	180°00	Z7280-7340	LL6380-6440	61	IB9, 17, 68, 69, 72, 76, LTD1688, 1689	8
	6/30/03	56°30N	180°00	Z7341-7365	LL6441-6465	25	IB3, 5, 6, 24, 29, 70, 73, 74, 77, LTD1692	10
	7/1/03	57°30N	180°00	Z7366-7400	LL6466-6500	35	IB10, 11, 14, 19, 25, 71, 75, 78-80, LTD1695	11
	7/2/03	58°30N	180°00	Z7401-7458	LL6501-6558	58	IB15, 16, 21, 26, 28, 31, 33, 82-86, LTD1697	13
	7/3/03	57°30N	179°00W	Z7459-7472	LL6559-6572	14	IB34, 87-91	6
	7/4/03	57°30N	178°00W	Z7473-7496	LL6573-6596	24	IB35-40, 92-96, LTD1702	12
	7/5/03	56°30N	178°00W	Z7497-7536	LL6597-6636	40	IB41-45, 97-100, LTD1707	10
	7/6/03	56°30N	179°00W	Z7537-7575	LL6637-6675	39	IB30, 32, 46-48, 101-104	9
	7/7/03	56°30N	179°00E	Z7576-7610	LL6676-6710	35	IB106-109, LTD1709, 1714	6
	7/8/03	56°30N	178°00E	Z7611-7644	LL6711-6744	34	IB50, 52, 53, 110-113, LTD0034, 0054, 0132, 1923, 1958	12
	7/9/03	56°30N	177°00E	Z7645-7650	LL6745-6750	6	IB114, 115, LTD0188, 941, 1603	5
7/10/03	57°30N	177°00E	Z7651-7689	LL6751-6789	39	IB54-59, 116, 117, LTD1348, 1396	10	
7/11/03	57°30N	176°00E	Z7690-7731	LL6790-6831	42			
7/12/03	56°30N	176°00E	Z7732-7736	LL6832-6836	5			
Total				Z5546-7736	LL6146-6836	689		134
ENP	7/30/03	50°01N	164°54W	AA1304-1305	-	2		
Total				AA1301-1305, Z5401-5600, Z7101-7736	LL6001-6836	856		157

¹ Z5592, LL6192 not used.

² Z7157, LL6257 not used.

Table 5. Location and biological data for recovered fin-clipped salmonids caught by Japanese salmon research vessels in summer of 2003.

Research vessel	Date	Location		Mesh (mm)	Species	Fork length (mm)	Body weight (g)	Sex	Gonad weight (g)	Clipped fin
<i>Wakatake maru</i>	Jun 17	43°00N	180°00	121	steelhead	565	1900	Female	5	Adipose
	Jun 18	44°00N	180°00	115	steelhead	734	4200	Female	23	Adipose
	Jun 20	46°00N	180°00	138	steelhead	712	3850	Female	30	Adipose
<i>Oshoro maru</i>	Jul 30	50°00N	165°00W	121	steelhead	621	2780	Male	52	Adipose *
	Jul 30	50°00N	165°00W	106	steelhead	641	3000	Female	32	Adipose
	Jul 30	50°00N	165°00W	121	steelhead	616	2760	Male	15	Adipose
	Jul 30	50°00N	165°00W	138	steelhead	659	3050	Female	7	Adipose

* snout missing.