

Otolith-Marked Salmon released from Japan in the Fall of 2005 and Spring of 2006

by

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Abstract

This document provided information of Japanese otolith mark releases, including release site, date, number, and mark patterns with images to establish the international database of otolith mark releases. In the spring of 2006, approximately 146.4 million chum, 6.0 million pink, 1.8 million masu, and 24 thousand sockeye salmon fry (2005 brood year) with thermal marks or ALC (alizarin complexone) patterns were released from 19 hatcheries in Japan. In addition, 503 thousand masu salmon smolts (2004 brood year) were released in the spring of 2006 after thermally marked. In the fall of 2005, 637 thousand juveniles of otolith-marked masu salmon (2004 brood year) were also released. Two thermal rings as base mark were adopted to distinguish Japanese salmon from other stocks. ALC marks were used for chum and pink salmon surveys by the Hokkaido Fish Hatchery.

Introduction

Mass marking of hatchery salmon using otolith marks is an effective tool for stock identification of salmon in high seas (Ignell et al., 1997; Kawana et al., 1999; Urawa et al., 1999, 2005, 2006) and coastal waters (Hagen et al., 1995; Farley and Munk, 1997; Farley et al., 1999).

In Japan, the aim of otolith mark programs is to provide information for the ocean migration and survival of each regional salmon stocks, combining with coastal and high-seas salmon researches. Thus we are planning to increase the number of thermal mark releases from hatcheries (Urawa et al., 2000).

Methods

Computer-based water temperature control systems were used to produce thermal marks in the otoliths for salmon. The systems were installed at the Shiribetsu, Chitose, Tokushibetsu, Shari, Ichani, Nemuro, Nijibetsu, Tsurui, Tokachi, Shizunai, Yakumo, Teshio, Kitami and Katagishi hatcheries (Fig. 1). Masu salmon at the Chitose Hatchery and sockeye salmon at the Shizunai Hatchery were marked by transferring eggs between original and chilled waters alternately by hand. Pink salmon at the Aioi Hatchery and chum salmon at the Aioi, Mashike, Shunkarikotan, Tonbetsu and Uebetsu hatcheries were marked using ALC (alizarin complexone) staining method by the Hokkaido Fish Hatchery (Fig. 1).

Few thermal mark patterns are available when ring number is limited (Hagen, 1999). To increase available patterns, we employ narrow ring spacing, which is formed at 12 h intervals. At the Chitose, Tsurui, Teshio and Katagishi hatcheries, all thermal rings on chum salmon are formed at 12 h intervals.

The RBr and Hatch code notations were used to describe thermal patterns (Munk and Geiger, 1998; Hagen et al., 2000). We extend the RBr and Hatch code notation to describe a wide spaced band, which are opposite to a narrow spaced band. The letter 'w' following a ring number is used to indicate a wide spaced band. Two rings as base mark were adopted to distinguish Japanese salmon from other stocks.

Releases of 2005 Brood Year Stocks

From February to June 2006, approximately 146.4 million chum, 6.0 million pink, 1.8 million masu, and 24 thousand sockeye salmon fry (2005 brood year) with thermal mark patterns or ALC patterns were released from 19 hatcheries in Japan. (Table 1). Thermal marking rates for each hatchery stock were 100 % except for the Katagishi Hatchery. The qualities of these thermal marks were good except for three poor marks: Tokushibetsu05chum, Tokachi05chum-3, and Shizunai05chum-e.

Releases of 2004 Brood Year Stocks

From March to June 2006, approximately 503 thousand masu salmon smolts (2004 brood year) with thermal mark patterns were released from six hatcheries in Japan (Table 2). From July to October 2005, 637 thousand masu salmon juveniles with marks were also released. The mark patterns of the smolts and juveniles were same as fry released in the spring of 2005 in six marking groups (J04-39, J04-40, J04-41, J04-42, J04-44 and J04-45; Kawana et al., 2005). Other three marking groups were not released as fry.

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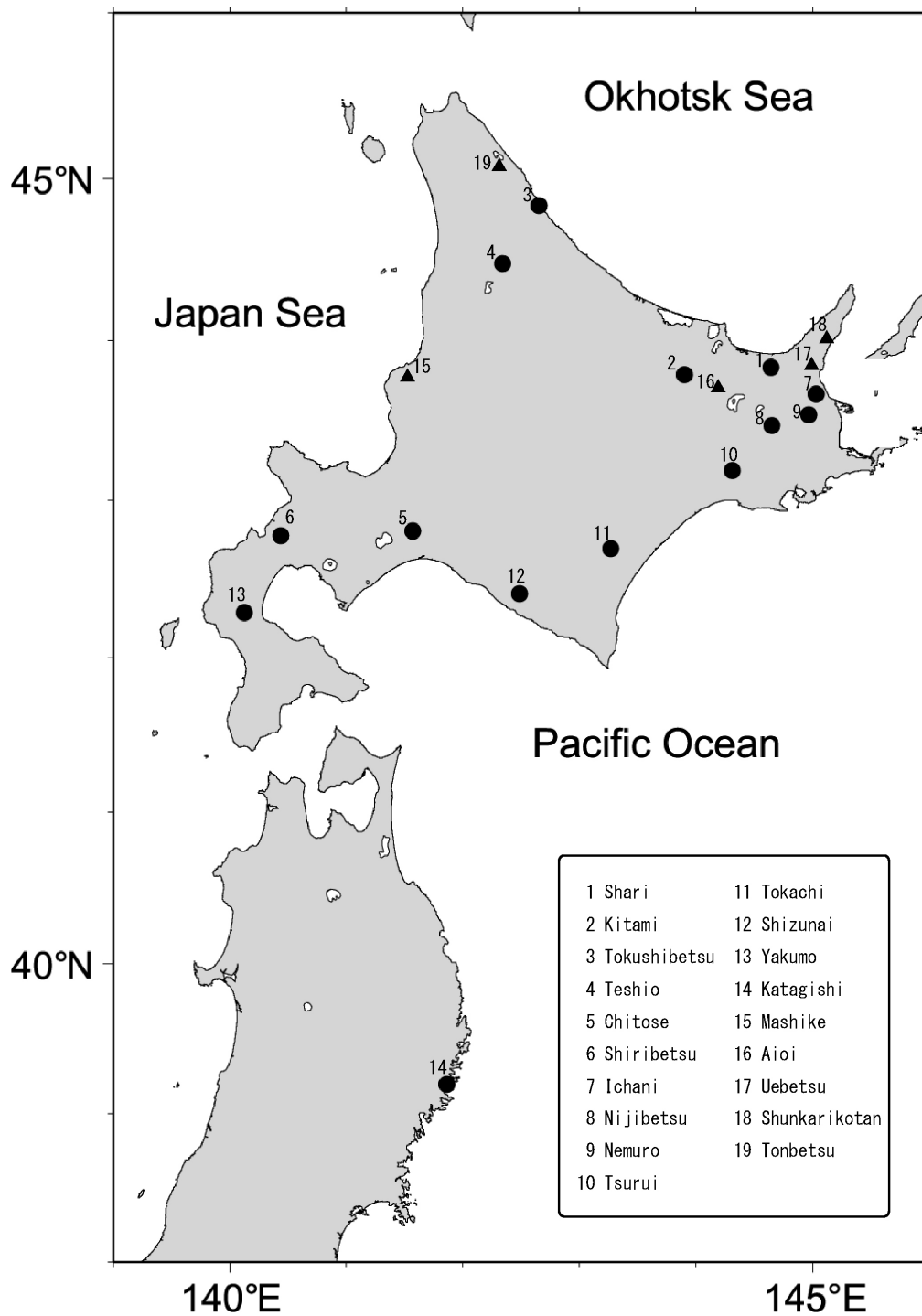


Fig. 1. Locations of hatcheries where salmon were thermally marked (closed circles) or marked with ALC (closed triangles) and released in the fall of 2005 and/or spring of 2006.

Table 1. Otolith Mark releases of chum, pink, sockeye, and masu salmon of 2005 brood year stocks from Japan in the spring of 2006.

No.	J05-01	J05-02	J05-03	J05-04	J05-05	J05-06	J05-07	J05-08	J05-09	J05-10	J05-11	J05-12	
BROOD YEAR	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	
SPECIES	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum	
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	
REGION	Japan Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Okhotsk Sea coast	Okhotsk Sea coast	Okhotsk Sea coast	
FACILITY	Chitose Hatchery	Chitose Hatchery	Chitose Hatchery	Chitose Hatchery	Chitose Hatchery	Chitose Hatchery	Chitose Hatchery	Chitose Hatchery	Teshio Hatchery	Tokushibetsu Hatchery	Shari Hatchery	Shari Hatchery	
STOCK	Chitose River	Chitose River	Chitose River	Chitose River	Chitose River	Chitose River	Chitose River	Chitose River	Teshio River	Tokushibetsu River	Shari River	Shari River	
FINAL RELEASE SITE	Chitose River	Chitose River	Chitose River	Chitose River	Chitose River	Chitose River	Chitose River	Chitose River	Teshio River	Tokushibetsu River	Shari River	Shari River	
SPAWNING DATE (year/month/day)	05/09/06-05/09/28	05/09/28	05/10/03	05/10/12-05/10/19	05/10/05-05/10/07	05/10/24-05/10/28	05/10/24	05/11/02-05/12/02	05/10/03-05/10/26	05/09/20-05/11/18	05/10/17	05/11/08	
DATE OF RELEASE (year/month/day)	06/03/14-06/03/22	06/03/22	06/03/22	06/03/22-06/04/11	06/03/22-06/03/28	06/03/22-06/04/20	06/03/22	06/04/11	06/02/15-06/04/25	06/04/20-06/05/30	06/05/01	06/05/17	
OM ID	Chitose05chum-1	Chitose05chum-2	Chitose05chum-3	Chitose05chum-4	Chitose05chum-5	Chitose05chum-6	Chitose05chum-7	Chitose05chum-8	Teshio05chum	Tokushibetsu05chum	Shari05chum-1	Shari05chum-2	
RBr CODE	1:1.2.2.3-3.2	1:1.2.2.3-3.3	1:1.2.2.3-3.4	1:1.2.2.3-3.5	1:1.2.2.3-3.2-4.2	1:1.2.2.3-3.6	1:1.2.2.3-3.2-4.3	1:1.2.2.3-3.3-4.2	1:1.2.2.1.3.3	1:1.2.2.3n	1:1.2/2.2w-3.3	1:1.2/2.2w,3.2-4.2	
HATCH CODE	2,3-2H	2,3-3H	2,3-4H	2,3-5H	2,3-2-2H	2,3-6H	2,3-2-3H	2,3-3-2H	2,1,3H	2,3nH	2/2w-3H	2/2w,2-2H	
PREHATCH													
POSTHATCH													
SYSTEM	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	
OTOLITH MARK SCHEDULE	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(4X)12C:12H	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(5X)12C:12H	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(6X)12C:12H	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	(1X)12C:12H,(2X)12C:12H,(1X)12C:24H,(3X)12C:12H	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	(1X)12C:12H,(1X)12C:48H,(1X)24C:24H,(1X)24C:72H,(3X)12C:12H	(1X)12C:12H,(1X)12C:48H,(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H
DIRECTION	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(12-8°C)	down(8-5°C)	down(8-4°C)	down(8-4°C)	
REARING TREATMENT STAGE	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	
MEAN SIZE AT RELEASE(mm)	44	47	42	44	44	43	42	40	52	52	64	59	
MEAN SIZE AT RELEASE(g)	0.63	0.86	0.54	0.64	0.61	0.61	0.49	0.44	1.19	1.09	2.22	1.63	
ACTUAL NUMBER OF OM RELEASED (thousand)	4,097	920	1,781	7,004	4,590	3,636	2,648	5,589	5,210	11,465	1,777	4,213	
MARK QUALITY	ok	ok	ok	ok	good	good	good	good	ok	ok/poor	ok	ok	
COMMENTS	Some otoliths show similar faint ring after the last ring.			Some otoliths show similar faint ring after the last ring.						Some otoliths show one confusing ring after the last ring, which may confuse as last band including four rings(2,4nH,). It may be difficult to distinguish this and J05-21.			
PHOTO IMAGE													

Table 1.Continued.

No.	J05-13	J05-14	J05-15	J05-16	J05-17	J05-18	J05-19	J05-20	J05-21	J05-22	J05-23	J05-24	
BROOD YEAR	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	
SPECIES	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum	
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	
REGION	Okhotsk Sea coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	East Pacific coast	East Pacific coast	East Pacific coast	East Pacific coast	East Pacific coast	East Pacific coast	West Pacific coast	
FACILITY	Shari Hatchery	Ichani Hatchery	Ichani Hatchery	Ichani Hatchery	Nijibetsu Hatchery	Tsurui Hatchery	Tsurui Hatchery	Tsurui Hatchery	Tokachi Hatchery	Tokachi Hatchery	Tokachi Hatchery	Shizunai Hatchery	
STOCK	Shari River	Ichani River	Ichani River	Ichani River	Nijibetsu River	Kushiro River	Kushiro River	Kushiro River	Tokachi River	Tokachi River	Tokachi River	Shizunai River	
FINAL RELEASE SITE	Shari River	Ichani River	Ichani River	Ichani River	Nijibetsu River	Kushiro River	Kushiro River	Kushiro River	Tokachi River	Tokachi River	Tokachi River	Shizunai River	
SPAWNING DATE (year/month/day)	05/11/17-05/12/21	05/09/27-05/10/14	05/10/25-05/11/04	05/11/14-05/11/25	05/09/27-05/12/02	05/09/20-05/10/06	05/10/26	05/11/24	05/09/14-05/10/12	05/10/21-05/11/09	05/11/11-05/11/30	05/10/24	
DATE OF RELEASE (year/month/day)	06/05/27	06/04/10-06/06/02	06/04/14-06/05/31	06/05/25-06/06/05	06/03/22-06/05/22	06/04/12-06/05/22	06/05/08-06/05/26	06/05/26	06/03/16-06/05/10	06/05/10-06/05/29	06/05/29	06/03/08-06/03/17	
OM ID	Shari05chum-3	Ichani05chum-1	Ichani05chum-2	Ichani05chum-3	Nijibetsu05chum	Kushiro05chum-1	Kushiro05chum-2	Kushiro05chum-3	Tokachi05chum-1	Tokachi05chum-2	Tokachi05chum-3	Shizunai05chum-1	
RBr CODE	1:1.2/2.2w-3.4	1:1.2,2.9n	1:1.2,2.7n	1:1.2-2.8n	1:1.2,2.5n	1:1.2,2.5-3.2	1:1.2,2.5-3.3	1:1.2,2.5-3.4	1:1.2,2.4n	1:1.2,2.4n-3.2n	1:1.2,2.4n-3.3n	1:1.2,2.2n,3.4n	
HATCH CODE	2/2w-4H	2,9nH	2,7nH	2-8nH	2,5nH	2,5-2H	2,5-3H	2,5-4H	2,4nH	2,4n-2nH	2,4n-3nH	2,2n,4nH	
PREHATCH													
POSTHATCH													
SYSTEM	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	
OTOLITH MARK SCHEDULE	(1X)12C:12H,(1X)12C:48H,(1X)24C:24H,(1X)24C:24C:72H,(4X)12C:12H	(1X)24C:24H,(1X)24C:48H,(9X)12C:12H	(1X)24C:24H,(1X)24C:48H,(7X)12C:12H	(1X)24C:24H,(1X)24C:72H,(8X)12C:12H	(1X)24C:24H,(1X)24C:48H,(5X)12C:12H	(1X)12C:12H,(1X)12C:36H,(4X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)12C:12H,(1X)12C:36H,(4X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)12C:12H,(1X)12C:36H,(4X)12C:12H,(1X)12C:36H,(4X)12C:12H	(1X)24C:24H,(1X)24C:48H,(4X)12C:12H	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:36H,(4X)12C:12H
DIRECTION	down(8-4°C)	down(9-5°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(9-5°C)	down(9-5°C)	down(9-5°C)	down(10-6°C)	
REARING TREATMENT STAGE	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	
MEAN SIZE AT RELEASE(mm)	54	55	58	56	59	59	61	60	54	58	54	65	
MEAN SIZE AT RELEASE(g)	1.34	1.44	1.53	1.33	1.8	2.04	2.17	1.9	1.53	1.69	1.33	2.22	
ACTUAL NUMBER OF OM RELEASED (thousand)	6,547	2,407	2,755	2,417	25,559	3,947	3,068	2,173	6,750	5,617	3,000	1,341	
MARK QUALITY	ok	ok	ok	ok	ok	good	good	good	ok	ok	ok/poor	ok	
COMMENTS											Some otoliths show confusing ring before the first ring.		
PHOTO IMAGE													

Table 1.Continued.

No.	J05-25	J05-26	J05-27	J05-28	J05-29	J05-30	J05-31	J05-32	J05-33	J05-34	J05-35	J05-36
BROOD YEAR	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
SPECIES	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum	chum
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HONSYU	HONSYU	HONSYU	HOKKAIDO	HOKKAIDO
REGION	West Pacific coast	West Pacific coast	West Pacific coast	West Pacific coast	West Pacific coast	West Pacific coast	West Pacific coast	Pacific coast	Pacific coast	Pacific coast	Okhotsk Sea coast	Okhotsk Sea coast
FACILITY	Shizunai Hatchery	Shizunai Hatchery	Shizunai Hatchery	Shizunai Hatchery	Yakumo Hatchery	Yakumo Hatchery	Yakumo Hatchery	Katagishi Hatchery	Katagishi Hatchery	Katagishi Hatchery	Aioi Hatchery	Tonbetsu Hatchery
STOCK	Shizunai River	Shizunai River	Shizunai River	Shizunai River	Yurappu River	Yurappu River	Yurappu River	Katagishi River	Katagishi River	Katagishi River	Abashiri River	Tonbetsu River
FINAL RELEASE SITE	Shizunai River	Shizunai River	Shizunai River	Shizunai River	Yurappu River	Yurappu River	Yurappu River	Katagishi River	Katagishi River	Katagishi River	Abashiri River	Tonbetsu River
SPAWNING DATE (year/month/day)	05/11/02	05/10/06	05/11/15	05/11/21-05/11/28	05/09/22-05/10/14	05/10/24-05/11/02	05/11/11-05/12/02	05/10/17-05/10/21	05/10/31-05/11/17	05/12/10-05/12/12	05/10/07	05/10/24
DATE OF RELEASE (year/month/day)	06/03/17-06/03/29	06/03/07-06/05/18	06/04/12	06/05/01-06/05/22	06/03/08-06/04/01	06/04/01-06/04/18	06/04/11-06/05/02	06/03/24	06/04/18-06/04/26	06/05/10	06/05/21-06/05/22	06/04/29
OM ID	Shizunai05chum-e	Shizunai05chum-2	Shizunai05chum-3	Shizunai05chum-4	Yurappu05chum-1	Yurappu05chum-2	Yurappu05chum-3	Katagishi05chum-1	Katagishi05chum-2	Katagishi05chum-3	Abashiri05chum-alc	Tonbetsu05chum-alc
RBr CODE	1:1.2.2.2	1:1.2-2.3	1:1.2.2.6n	1:1.2.2.1n-3.5n	1:1.2.2.2w-3.3	1:1.2.2.2w-3.2	1:1.2.2.2w	1:1.2.2.2	1:1.2.2.4	1:1.2.2.2,3.3	ALC Mark-single ring	ALC Mark-double rings
HATCH CODE	2,2H	2-3H	2,6nH	2,1n-5nH	2,2w-3H	2,2w-2H	2,2wH	2,2H	2,4H	2,2,3H		
PREHATCH												
POSTHATCH												
SYSTEM	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER		
OTOLITH MARK SCHEDULE	(1X)24C:24H,(1X)24C:48H,(1X)24C:24H,(1X)48C:48H	(2X)24H:24C,(1X)72H:24C,(2X)24H:24C	(1X)24C:24H,(1X)24C:48H,(6X)12C:12H	(1X)24C:24H,(1X)24C:48H,(1X)12C:36H,(5X)12C:12H	(1X)12C:12H,(1X)12C:24H,(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	(1X)12C:12H,(1X)12C:24H,(1X)24C:24H,(1X)24C:48H,(2X)12C:12H	(1X)12C:12H,(1X)12C:24H,(2X)24C:24H	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(3X)12C:12H		
DIRECTION	down(10-6°C)	up(6-10°C)	down(10-6°C)	down(10-6°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(12-8°C)	down(12-8°C)	down(12-8°C)		
REARING TREATMENT STAGE	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry
MEAN SIZE AT RELEASE(mm)	63	72	62	75	51	47	51	60	55	50	46	54
MEAN SIZE AT RELEASE(g)	1.95	2.8	1.93	3.12	1.05	0.84	0.95	1.44	1.3	1.02	0.8	1.19
ACTUAL NUMBER OF OM RELEASED (thousand)	1,555	708	1,454	1,342	2,826	2,123	3,103	2,340	5,920	650	872	500
MARK QUALITY	poor	ok	ok	ok	ok	ok	ok	good	good	good		
COMMENTS	It didn't become a planned schedule (2.2n.4nH) because of a set mistake of the water temperature control system.Though this is the same pattern as J05-32, both can be distinguished by the difference of the width at ring and space.										872 thousand: Finclips(AD)	All:Finclips(AD)
PHOTO IMAGE											No Image	No Image

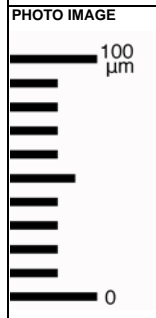


Table 1.Continued.

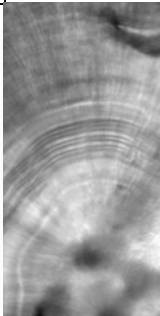
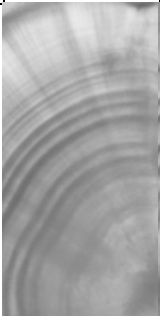
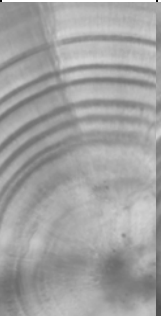
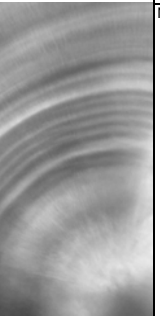
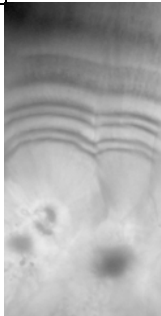
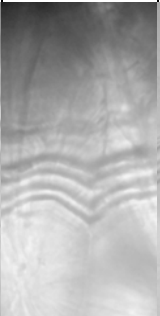
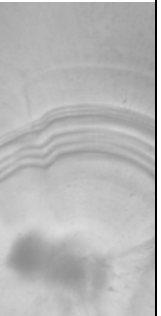
No.	J05-37	J05-38	J05-39	J05-40	J05-41	J05-42	J05-43	J05-44	J05-45	J05-46	J05-47	J05-48
BROOD YEAR	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
SPECIES	chum	chum	chum	chum	chum	pink	pink	pink	pink	masu	masu	masu
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO
REGION	Japan Sea coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Okhotsk Sea coast	Okhotsk Sea coast	Nemuro Strait coast	Okhotsk Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast
FACILITY	Mashike Hatchery	Uebetsu Hatchery	Shunkarikotan Hatchery	Uebetsu Hatchery	Uebetsu Hatchery	Tokushibetsu Hatchery	Kitami Hatchery	Ichani Hatchery	Aioi Hatchery	Shiribetsu Hatchery	Shiribetsu Hatchery	Chitose Hatchery
STOCK	Shokanbetsu River	Shibetsu/ Shunkarikotan River	Shibetsu River	Shunkarikotan River	Shibetsu/Rausu River	Tokushibetsu River	Tokoro River	Ichani River	Abashiri River	Shiribetsu Hatchery	Shiribetsu Hatchery	Shiribetsu Hatchery
FINAL RELEASE SITE	Shokanbetsu River	Uebetsu River	Uebetsu River	Shunkarikotan River	Minehama Port	Tokushibetsu River	Tokoro River	Ichani River	Abashiri River	Shubuto River	Shiribetsu Hatchery	Shiribetsu Hatchery
SPAWNING DATE (year/month/day)	05/10/11	05/10/28-05/11/07	05/09/27	05/11/07	05/11/07	05/08/31-05/09/02	05/09/20	05/09/09-05/09/16	05/09/10	05/09/26	05/09/15-05/09/26	05/09/26
DATE OF RELEASE (year/month/day)	06/04/27	06/05/03-06/05/08	06/05/26	06/05/27	06/05/27	06/04/12	06/04/05-06/04/27	06/03/26	06/04/23-06/05/06	2006.4.6	06/05/23-06/05/24	06/04/26
OM ID	Shokanbetsu05chum-alc	Uebetsu05chum-alc-1	Uebetsu05chum-alc-2	Shunkarikotan05chum-alc	Minehama05chum-alc	Tokushibetsu05pink	Tokoro05pink	Ichani05pink	Abashiri05pink-alc	Shubuto05masu-f	Shiribetsu05masu-r-f	Shiribetsu05masu-c-f
RBr CODE	ALC Mark-single ring	ALC Mark-single ring	ALC Mark-single ring	ALC Mark-single ring	ALC Mark-single ring	1:1.2-2.3	1:1.2,2.2w,3.2w	1:1.2,2.5	ALC Mark-single ring	1:1.2,2.2	1:1.2,2.2	1:1.3,2.3n
HATCH CODE						2-3H	2,2w,2wH	2,5H	ALC Mark-single ring	2,2H	2,2H	3,3nH
PREHATCH									ALC Mark single ring			
POSTHATCH												
SYSTEM						CHILLER	CHILLER	CHILLER		CHILLER	CHILLER	CHILLER
OTOLITH MARK SCHEDULE						(1X)24C:24H,(1X)24C:72H,(3X)24C:24H	(1X)12C:12H,(1X)12C:24H,(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(1X)24C:24H,(1X)24C:48H,(5X)24C:24H		(1X)24H:24C,(1X)24H:48C,(2X)24H:24C	(1X)24H:24C,(1X)24H:48C,(2X)24H:24C	(2X)24C:24H,(1X)24C:48H,(3X)12C:12H
DIRECTION						down(7-4°C)	down(12-8°C)	down(8-4°C)		up(6-10°C)	up(6-10°C)	down(8-4°C)
REARING TREATMENT STAGE	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	fed fry	unfed fry	fed fry	fed fry
MEAN SIZE AT RELEASE(mm)	49	53	51	55	58	48	-	44	36	35	53	60
MEAN SIZE AT RELEASE(g)	1.08	1.21	1.06	1.35	1.59	0.73	0.86	0.48	0.28	0.31	1.6	2.14
ACTUAL NUMBER OF OM RELEASED (thousand)	497	1,856	957	544	638	1,928	1,018	530	2,508	560	546	135
MARK QUALITY						ok	ok	ok		ok	ok	ok
COMMENTS	All:Finclips(AD)											
PHOTO IMAGE		No Image	No Image	No Image	No Image				No Image			

Table 1.Continued.

No.	J05-49	J05-50	J05-51	J05-52	J05-53	J05-54
BROOD YEAR	2005	2005	2005	2005	2005	2005
SPECIES	masu	masu	masu	masu	masu	sockeye
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO
REGION	Japan Sea coast	Okhotsk Sea coast	West Pacific coast	Nemuro Strait coast	Nemuro Strait coast	West Pacific coast
FACILITY	Chitose Hatchery	Tokushibetsu Hatchery	Yakumo Hatchery	Nemuro Hatchery	Nemuro Hatchery	Shizunai Hatchery
STOCK	Chitose River	Tokushibetsu River	Yurappu River	Ichani/Shibetsu River	Ichani/Shibetsu River	Abira/Shizunai River
FINAL RELEASE SITE	Chitose River	Tokushibetsu River	Yurappu River	Ichani River	Shibetsu River	Shizunai River
SPAWNING DATE (year/month/day)	05/09/12-05/09/28	05/08/29-05/09/02	05/09/15-05/09/26	05/09/02-05/09/16	05/09/02-05/09/16	05/09/27-05/10/12
DATE OF RELEASE (year/month/day)	06/04/21	06/05/31	06/05/31	06/05/30	06/05/23	06/05/29
OM ID	Chitose05masu-f	Tokushibetsu05masu-f	Yurappu05masu-f	Ichani05masu-f	Shibetsu05masu-f	Shizunai05sockeye
RBr CODE	1:1.3,2.3n	1:1.5-2.1w	1:1.5	1:1.2,2.4	1:1.2,2.4	1:1.2,2.9
HATCH CODE	3,3nH	5-1wH	5H	2,4H	2,4H	2,9H
PREHATCH						
POSTHATCH						
SYSTEM	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER
OTOLITH MARK SCHEDULE	(2X)24C:24H,(1X)24C:48H,(3X)12C:12H	(4X)12C:12H,(1X)12C:36H,(1X)24C:24H	(5X)24C:24H	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	(1X)24C:24H,(1X)24C:48H,(9X)24C:24H
DIRECTION	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(10-6°C)
REARING TREATMENT	fed	fed	fed	fed	fed	fed
STAGE	fry	fry	fry	fry	fry	smolt
MEAN SIZE AT RELEASE(mm)	58	63	45	64	57	77
MEAN SIZE AT RELEASE(g)	2.09	2.49	0.95	2.92	2.09	4.27
ACTUAL NUMBER OF OM RELEASED (thousand)	12	160	208	40	115	24
MARK QUALITY	ok	poor	ok	ok	ok	ok
COMMENTS		Operator of the hatchery stopped planned thermal mark schedule(5-3w,) after the first ring of second band, because hatching had approached in the near future.				
PHOTO IMAGE						

Table 2. Otolith thermal Mark releases of masu salmon of 2004 brood year stocks from Japan from the fall of 2005 to the summer of 2006.

No.	J04-39		J04-40		J04-41		J04-42		J04-44		J04-45		J04-46(new)									
BROOD YEAR	2004		2004		2004		2004		2004		2004		2004									
SPECIES	masu		masu		masu		masu		masu		masu		masu									
STATE/ PROVINCE	HOKKAIDO		HOKKAIDO		HOKKAIDO		HOKKAIDO		HOKKAIDO		HOKKAIDO		HOKKAIDO									
REGION	Japan Sea coast		Japan Sea coast		Okhotsk Sea coast		Okhotsk Sea coast		Nemuro strait coast		West Pacific coast		Japan Sea coast									
FACILITY	Shiribetsu/Chitose Hatchery		Chitose Hatchery		Tokushibetsu Hatchery		Shari Hatchery		Ichani/Nemuro Hatchery		Yakumo Hatchery		Yakumo Hatchery									
STOCK	Shiribetsu River		Chitose River		Tokushibetsu River		Shari River		Ichani/Shibetsu River		Shiribetsu River		Shiribetsu River									
FINAL RELEASE SITE	Shiribetsu River		Chitose River		Tokushibetsu River		Shari River		Shibetsu River		Yurappu River		Shiribetsu River									
RBr CODE	1:1.2,2.2		1:1.3,2.3n		1:1.5-2.3w		1:1.6		1:1.2,2.1n		1:1.5		1:1.2,2.2									
HATCH CODE	2,2H		3,3nH		5-3wH		6H		2,1nH		5H		2,2H									
PREHATCH																						
POSTHATCH																						
SYSTEM	CHILLER		CHILLER		CHILLER		CHILLER		CHILLER		CHILLER		CHILLER									
OTOLITH MARK SCHEDULE	(1X)24H:24C,(1X)24H:48C,(2X)24:24C		(2X)24C:24H,(1X)24C:48H,(3X)12C:12H		(4X)12C:12H,(1X)12C:36H,(3X)24C:24H		(6X)24C:24H		(1X)24C:24H,(1X)11C		(5X)24C:24H		(1X)24H:24C,(1X)24H:48C,(2X)24:24C									
DIRECTION	up(6-10°C)		down(8-4°C)		down(8-4°C)		down(8-4°C)		down(8-4°C)		down(8-4°C)		up(6-10°C)									
REARING TREATMENT	fed		fed		fed		fed		fed		fed		fed									
DATE OF RELEASE (year/month/day)	05/07/20-05/10/19		06/03/16-06/05/11		05/09/01		06/05/08		05/10/12-05/10/13		05/10/25		06/06/14-06/06/15		05/10/11-05/10/17		06/05/10		05/10/06		06/04/27	
OM ID	Shiribetsu04masu-j		Shiribetsu04masu-s		Chitose04masu-j		Chitose04masu-s		Tokushibetsu04masu-j		Shari04masu-j		Shari04masu-s		Shibetsu04masu-j-1		Yurappu04masu-s		Shiribetsu04masu-y-j		Shiribetsu04masu-y-s	
STAGE	juvenile		smolt		juvenile		smolt		juvenile		smolt		juvenile		smolt		juvenile		smolt		smolt	
MEAN SIZE AT RELEASE(mm)	97		137		78		130		104		100		139		89		142		108		137	
MEAN SIZE AT RELEASE(g)	10.07		24.72		5.08		24.06		12.21		10.29		26.04		7.6		30.59		15		26.6	
ACTUAL NUMBER OF OM RELEASED (thousand)	131		189		32		27		118		119		127		89		64		70		30	
MARK QUALITY	ok		ok		ok		ok		ok		ok		ok		ok		ok		ok		ok	
COMMENTS	90 thousand: Finclips(LV)		186 thousand: Finclips(RV)		31 thousand: Finclips(LV)		26 thousand: Finclips(RV)		115 thousand: Finclips(LV)		116 thousand: Finclips(LV)		125 thousand: Finclips(RV)		All:Finclips(LV)		61 thousand: Finclips(RV)		65 thousand: Finclips(LV)		28 thousand: Finclips(RV)	
PHOTO IMAGE																						

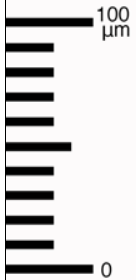


Table 2.Continued.

No.	J04-47(new)		J04-48(new)
BROOD YEAR	2004		2004
SPECIES	masu		masu
STATE/ PROVINCE	HOKKAIDO		HOKKAIDO
REGION	Nemuro strait coast		Nemuro strait coast
FACILITY	Ichani/Nemuro Hatchery		Ichani/Nemuro Hatchery
STOCK	Ichani/Shibetsu River		Ichani/Shibetsu River
FINAL RELEASE SITE	Shibetsu River		Ichani River
RBr CODE	1:1,2,2,4		1:1,2,2,4
HATCH CODE	2,4H		2,4H
PREHATCH			
POSTHATCH			
SYSTEM	CHILLER		CHILLER
OTOLITH MARK SCHEDULE	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H		(1X)24C:24H,(1X)24C:48H,(4X)24C:24H
DIRECTION	down(8-4°C)		down(8-4°C)
REARING TREATMENT	fed		fed
DATE OF RELEASE (year/month/day)	05/09/15-05/10/17	06/05/29-06/05/30	06/06/12
OM ID	Shibetsu04masu-j-2	Shibetsu04masu-s	Ichani04masu-s
STAGE	juvenile	smolt	smolt
MEAN SIZE AT RELEASE(mm)	92	124	128
MEAN SIZE AT RELEASE(g)	8.69	18.31	20.91
ACTUAL NUMBER OF OM RELEASED (thousand)	79	35	30
MARK QUALITY	ok	ok	ok
COMMENTS	All:Finclips(LV)	30 thousand: Finclips(RV)	
PHOTO IMAGE			