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Otolith-Marked Salmon released from Japan in the Fall of 2006 and Spring of 2007

by

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Saho Kitatsuji⁵, Mitsuharu Fukuhara⁶, Hiroshi Tokuda⁷, and Katsuaki Hirasawa⁸

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Releases of Otolith Marked Salmon from Japan in the Fall of 2006 and Spring of 2007

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Abstract

This document provided information of Japanese otolith mark releases, including release site, date, number, and mark patterns with images. In the spring of 2007, approximately 149.7 million chum, 15.0 million pink, 2.5 million masu, and 180 thousand sockeye salmon fry (2006 brood year) with thermal marks or ALC (alizarin complexone) patterns were released from 21 hatcheries in Japan. In addition, 379 thousand masu salmon smolts (2005 brood year) were released in the spring of 2007 after thermally marked. In the fall of 2006, 486 thousand juveniles of otolith-marked masu salmon (2005 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. These data are uploaded to the database on the website of NPAFC Working Group on Salmon Marking (<http://npafc.taglab.org>).

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. Since 1998, the number of thermal mark releases has been increased steadily (in Japan), and now we are able to produce annually 140 million salmon with thermal marks.

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 Abashiri and Touhoro Hatchery and chum salmon at the Aioi, Uebetsu, Shibetsu, Okunisibetsu and Makubetsu 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, Shari, Ichani, Nijibetsu, Tsurui, Tokachi, Shizunai, Yakumo and Katagishi hatcheries, all thermal rings on chum salmon are formed at 12 h intervals.

The Hatch code notations were used to describe thermal patterns (Hagen et al., 2000; Josephson et al. 2006). Two rings as base mark were adopted to distinguish Japanese salmon from other stocks.

Releases of 2006 Brood Year Stocks

From February to June 2006, approximately 149.7 million chum, 15.0 million pink, 2.5 million masu, and 180 thousand sockeye salmon fry (2006 brood year) with thermal mark patterns or ALC patterns were released from 21 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 five poor marks: Tokachi06chum-1,2,3, Katagishi06chum-1, and Tokoro06pink.

Releases of 2005 Brood Year Stocks

From March to June 2007, approximately 379 thousand masu salmon smolts (2005 brood year) with thermal mark patterns were released from four hatcheries in Japan (Table 2). From August to November 2006, 486 thousand masu salmon juveniles with marks were also released. The ten marking groups of the smolts and juveniles (J05-55,56,57,58,59,60,63,64,65 and 66) were same as fry released in the spring of 2006 in five marking groups (J05-47,48,50,52 and 53; Takahashi et al., 2006). Other two marking groups (J05-61 and 62) were not released as fry.

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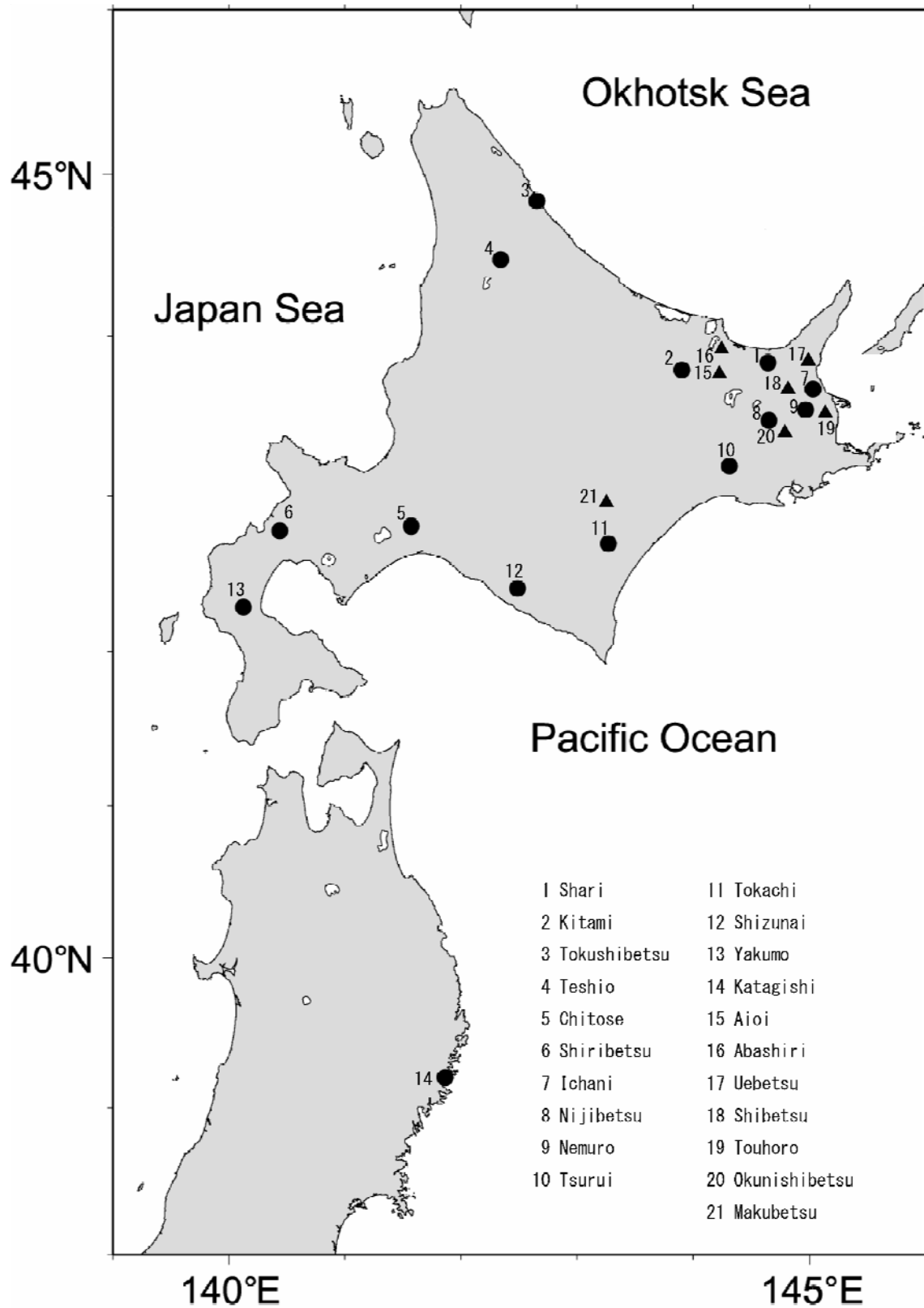


Fig. 1. Locations of hatcheries where salmon were thermally marked (closed circles) or marked with ALC (closed triangles) and released in the fall of 2006 and/or spring of 2007.

Table 1. Otolith Mark releases of chum, pink, sockeye, and masu salmon of 2006 brood year stocks from Japan in the spring of 2007.

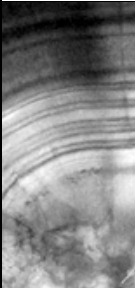
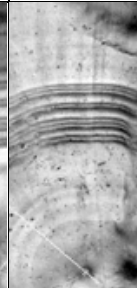
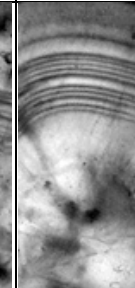
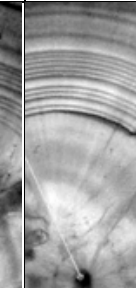
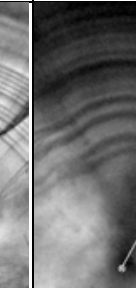
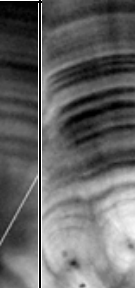
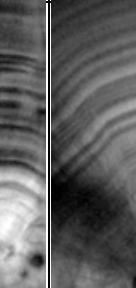
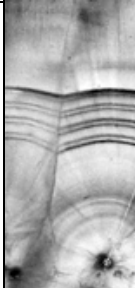
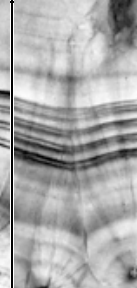
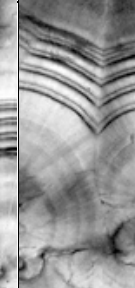
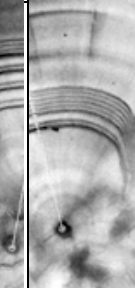
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BROOD YEAR	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
SPECIES	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO
REGION	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	Okhotsk Sea coast	Okhotsk Sea coast	Okhotsk Sea coast	Okhotsk Sea coast
FACILITY	Chitose Hatchery	Chitose Hatchery	Chitose Hatchery	Chitose Hatchery	Teshio Hatchery	Teshio Hatchery	Tokushibetsu Hatchery	Aioi Hatchery	Shari Hatchery	Shari Hatchery	Shari Hatchery	Shari Hatchery	Shari Hatchery
STOCK	Ishikari River	Ishikari River	Ishikari River	Ishikari River	Teshio River	Teshio River	Tokushibetsu River	Abashiri River	Shari River	Shari River	Shari River	Shari River	Shari River
FINAL RELEASE SITE	Ishikari River	Ishikari River	Ishikari River	Ishikari River	Teshio River	Teshio River	Tokushibetsu River	Abashiri River	Shari River	Shari River	Shari River	Shari River	Shari River
DATE LAST RELEASED	2007.4.20	2007.3.1	2007.3.31	2007.4.20	2007.4.20	2007.4.1	2007.6.7	2007.5.21	2007.5.1	2007.5.15	2007.5.31	2007.5.31	2007.5.31
OM ID	Ishikari06chum-1	Ishikari06chum-2	Ishikari06chum-3	Ishikari06chum-4	Teshio06chum-1	Teshio06chum-2	Tokushibetsu06chum	Abashiri06chum-alc	Shari06chum-1	Shari06chum-2	Shari06chum-3	Shari06chum-4	Shari06chum-5
HATCH CODE	2,3-2-2H	2,3-2-3H	2,3-5H	2,3-6H	2,2H	2,3nH	2,4nH	ALC Mark-single ring	2-2-2-2H	2-2-2-3H	2-2-2-4H	2-6H	2-6-2H
PREHATCH													
POSTHATCH													
OTOLITH MARK SCHEDULE	(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,(1X)12C:12H,(1X)12C:36H,(3X)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,(6X)12C:12H	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	(1X)24C:24H,(1X)24C:48H,(4X)12C:12H		(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(4X)12C:12H	(1X)12C:12H,(1X)12C:36H,(6X)12C:12H	(1X)12C:12H,(1X)12C:36H,(5X)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(12-8°C)	down(12-8°C)	down(8-5°C)		down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)
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	Fed Fry
MEAN SIZE AT RELEASE(mm)	44	40	49	51	52	53	53	51	64	61	65	57	52
MEAN SIZE AT RELEASE(g)	0.65	0.45	0.95	1.09	1.11	1.13	1.16	1.3	2.38	1.7	2.17	1.47	1.07
ACTUAL NUMBER OF OM RELEASED (thousand)	28,105	1,220	1,202	1,191	2,635	2,569	11,713	505	1,411	4,022	1,303	2,656	1,826
MARK QUALITY	ok	good	good	ok	ok	ok	ok		good	good	good	good	good
COMMENTS								ALL : Finclips (AD)					
PHOTO IMAGE								No Image					

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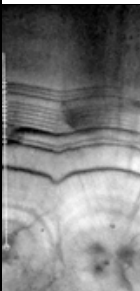
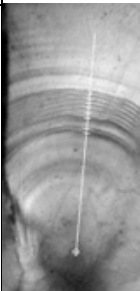
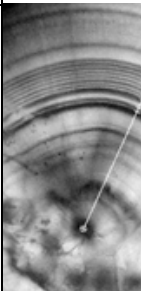
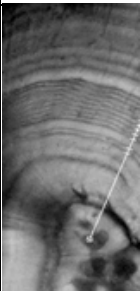
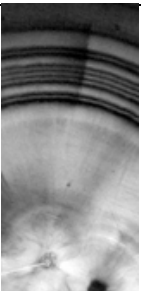
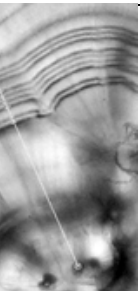
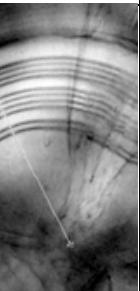
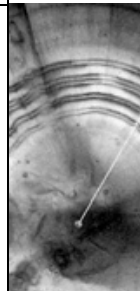
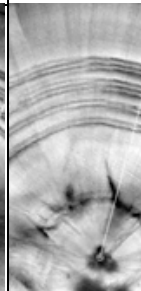
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BROOD YEAR	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	
SPECIES	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	
REGION	Okhotsk Sea coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	East Pacific coast	East Pacific coast	
FACILITY	Shari Hatchery	Uebetsu Hatchery	Shibetsu Hatchery	Ichani Hatchery	Ichani Hatchery	Ichani Hatchery	Nishibetsu Hatchery	Nishibetsu Hatchery	Nishibetsu Hatchery	Okunisibetsu Hatchery	Okunisibetsu Hatchery	Tsurui Hatchery	Tsurui Hatchery	
STOCK	Shari River	Uebetsu River	Shibetsu River	Ichani River	Ichani River	Ichani River	Nishibetsu River	Nishibetsu River	Nishibetsu River	Nishibetsu River	Nishibetsu River	Kushiro River	Kushiro River	
FINAL RELEASE SITE	Shari River	Uebetsu River	Shibetsu River	Ichani River	Ichani River	Ichani River	Nishibetsu River	Nishibetsu River	Nishibetsu River	Nishibetsu River	Nishibetsu River	Kushiro River	Kushiro River	
DATE LAST RELEASED	2007.5.31	2007.5.14	2007.5.7	2007.5.21	2007.5.25	2007.5.14	2007.4.27	2007.5.24	2007.5.18	2007.4.20	2007.5.10	2007.5.25	2007.4.3	
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HATCH CODE	2-6-3H	ALC Mark-single ring	ALC Mark-double ring	2-7H	2-8H	2-9H	2-4-2H	2-4-3H	2-4-4H	ALC Mark-single ring	ALC Mark-double ring	2-2-3-2H	2-2-3-3H	
PREHATCH														
POSTHATCH														
OTOLITH MARK SCHEDULE	(1X)12C:12H,(1X)12C:36H,(5X)12C:12H,(1X)12C:36H,(3X)12C:12H			(1X)12C:12H,(1X)12C:36H,(7X)12C:12H	(1X)12C:12H,(1X)12C:36H,(8X)12C:12H	(1X)12C:12H,(1X)12C:36H,(9X)12C:12H	(1X)12C:12H,(1X)12C:36H,(3X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)12C:12H,(1X)12C:36H,(3X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)12C:12H,(1X)12C:36H,(3X)12C:12H,(1X)12C:36H,(4X)12C:12H				(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H,(1X)12C:36H,(3X)12C:12H
DIRECTION	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(8-4°C)	down(8-4°C)	
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	Fed Fry	
MEAN SIZE AT RELEASE(mm)	53	57	49	56	54	62	59	61	59	53	55	59	61	
MEAN SIZE AT RELEASE(g)	1.13	1.63	1.04	1.46	1.19	1.87	1.77	1.88	1.99	1.42	1.39	1.73	1.81	
ACTUAL NUMBER OF OM RELEASED (thousand)	555	2,047	506	2,751	2,237	2,314	8,858	6,593	9,765	2,119	987	8,222	1,306	
MARK QUALITY	good			good	good	good	ok	ok	ok			ok	good	
COMMENTS			ALL : Finclips (AD)											
PHOTO IMAGE		No Image	No Image							No Image	No Image			

Table 1. Continued.

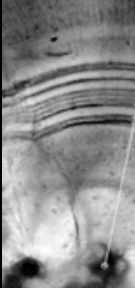
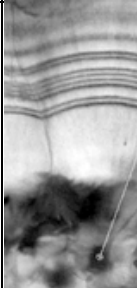
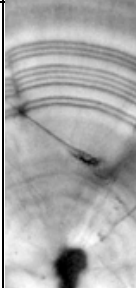
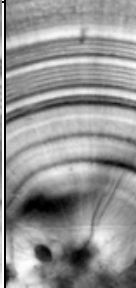

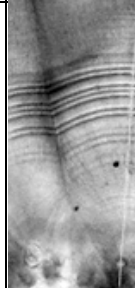
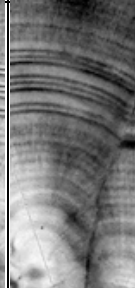
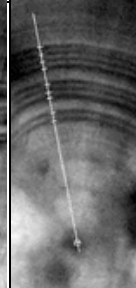
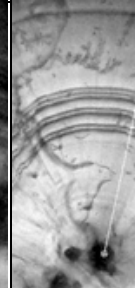
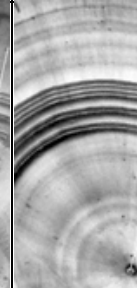
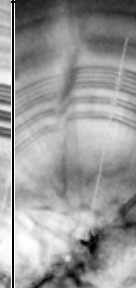
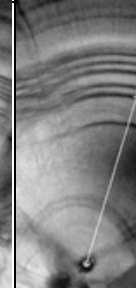
No.	J06-27	J06-28	J06-29	J06-30	J06-31	J06-32	J06-33	J06-34	J06-35	J06-36	J06-37	J06-38	J06-39
BROOD YEAR	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
SPECIES	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM	CHUM
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HONSHU	HONSHU
REGION	East Pacific coast	East Pacific coast	East Pacific coast	East Pacific coast	East Pacific coast	West Pacific coast	West Pacific coast	West Pacific coast	West Pacific coast	West Pacific coast	West Pacific coast	Pacific coast	Pacific coast
FACILITY	Tokachi Hatchery	Tokachi Hatchery	Tokachi Hatchery	Tokachi Hatchery	Makubetsu Hatchery	Shizunai Hatchery	Shizunai Hatchery	Shizunai Hatchery	Yakumo Hatchery	Yakumo Hatchery	Yakumo Hatchery	Katagishi Hatchery	Katagishi Hatchery
STOCK	Tokachi River	Tokachi River	Tokachi River	Tokachi River	Tokachi River	Shizunai River	Shizunai River	Shizunai River	Yurappu River	Yurappu River	Yurappu River	Katagishi River	Katagishi River
FINAL RELEASE SITE	Tokachi River	Tokachi River	Tokachi River	Tokachi River	Tokachi River	Shizunai River	Shizunai River	Shizunai River	Yurappu River	Yurappu River	Yurappu River	Katagishi River	Katagishi River
DATE LAST RELEASED	2007.5.5	2007.5.7	2007.5.19	2007.5.24	2007.4.17	2007.5.25	2007.3.20	2007.5.15	2007.4.1	2007.4.16	2007.5.1	2007.3.6	2007.3.30
OM ID	Tokachi06chum-1	Tokachi06chum-2	Tokachi06chum-3	Tokachi06chum-4	Tokachi06chum-alc	Shizunai06chum-1	Shizunai06chum-2	Shizunai06chum-3	Yurappu06chum-1	Yurappu06chum-2	Yurappu06chum-3	Katagishi06chum-1	Katagishi06chum-2
HATCH CODE	2-4-1-2H	2-4-2H	2-4-3H	2-5-4H	ALC Mark-single ring	2-3-2H	2-3-3H	2-3-4H	2-2-3H	2-2-4H	2-2-5H	2,3H	2,4H
PREHATCH													
POSTHATCH													
OTOLITH MARK SCHEDULE	(1X)12C:12H,(1X)12C:36H,(3X)12C:12H,(2X)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,(3X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)12C:12H,(1X)12C:36H,(4X)12C:12H,(1X)12C:36H,(4X)12C:12H		(1X)12C:12H,(1X)12C:36H,(2X)12C:12H,(1X)12C:36H,(2X)12C:12H	(1X)12C:12H,(1X)12C:36H,(2X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)12C:12H,(1X)12C:36H,(2X)12C:12H,(1X)12C:36H,(4X)12C:12H	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(3X)12C:12H	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(4X)12C:12H	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(5X)12C:12H	(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H
DIRECTION	down(9-5°C)	down(9-5°C)	down(9-5°C)	down(9-5°C)		down(10-6°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)
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	Fed Fry
MEAN SIZE AT RELEASE(mm)	63	59	59	53	51	65	56	75	49	48	50	60	59
MEAN SIZE AT RELEASE(g)	2.15	1.74	1.72	1.37	1.3	2.23	1.34	2.96	0.92	0.83	0.93	1.48	1.55
ACTUAL NUMBER OF OM RELEASED (thousand)	4,717	2,089	5,612	3,030	498	3,643	1,666	1,384	2,374	2,175	3,201	3,089	4,796
MARK QUALITY	poor	poor	poor	ok		ok	ok	ok	ok	ok	ok	ok / poor	ok
COMMENTS	It didn't become a planned schedule (2-5-2H) because of a set mistake of the water temperature control system.	It didn't become a planned schedule (2-5-2H) because of a set mistake of the water temperature control system. This is the same pattern as J06-20, and it is difficult to distinguish both.	It didn't become a planned schedule (2-5-3H) because of a set mistake of the water temperature control system. This is the same pattern as J06-21, and it is difficult to distinguish both.		ALL : Finclips (AD)							As for some otoliths, the last ring is not clear. These might look like a different pattern (2,2H).	
PHOTO IMAGE					No Image								

Table 1. Continued.

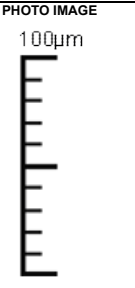
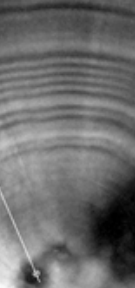
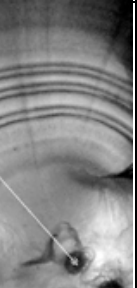
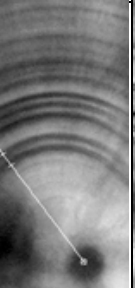
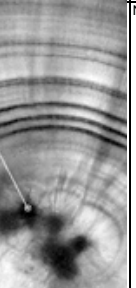

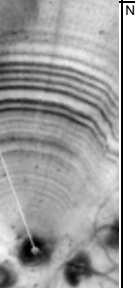

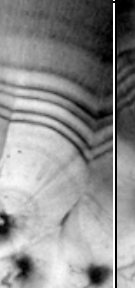
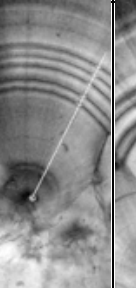
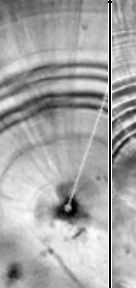
No.	J06-40	J06-41	J06-42	J06-43	J06-44	J06-45	J06-46	J06-47	J06-48	J06-49	J06-50	J06-51	J06-52
BROOD YEAR	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
SPECIES	CHUM	CHUM	PINK	PINK	PINK	PINK	PINK	MASU	MASU	MASU	MASU	MASU	MASU
STATE/ PROVINCE	HONSHU	HONSHU	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO
REGION	Pacific coast	Pacific coast	Okhotsk Sea coast	Okhotsk Sea coast	Okhotsk Sea coast	Nemuro Strait coast	Nemuro Strait coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Japan Sea coast	Okhotsk Sea coast
FACILITY	Katagishi Hatchery	Katagishi Hatchery	Tokushibetsu Hatchery	Kitami Hatchery	Abashiri Hatchery	Ichani Hatchery	Touhoro Hatchery	Shiribetsu Hatchery	Chitose Hatchery	Shiribetsu Hatchery	Yakumo Hatchery	Chitose Hatchery	Tokushibetsu Hatchery
STOCK	Katagishi River	Katagishi River	Tokushibetsu River	Tokoro River	Abashiri River	Ichani River	Touhoro River	Shiribetsu River	Shiribetsu River	Shiribetsu River	Shiribetsu River	Ishikari River	Tokushibetsu River
FINAL RELEASE SITE	Katagishi River	Katagishi River	Tokushibetsu River	Tokoro River	Abashiri River	Ichani River	Touhoro River	Shubuto River	Shubuto River	Shiribetsu River	Shiribetsu River	Ishikari River	Tokushibetsu River
DATE LAST RELEASED	2007.4.25	2007.4.27	2007.4.12	2007.4.26	2007.5.4	2007.4.18	2007.4.2	2007.4.2	2007.3.26	2007.5.23	2007.5.31	2007.4.16	2007.5.30
OM ID	Katagishi06chum-3	Katagishi06chum-4	Tokushibetsu06pink	Tokoro06pink	Abashiri06pink-alc	Ichani06pink	Touhoro06pink-alc	Shubuto06masu-s-f	Shubuto06masu-c-f	Shiribetsu06masu-s-f	Shiribetsu06masu-y-f	Ishikari06masu-f	Tokushibetsu06masu-f
HATCH CODE	2,5H	2-2,2H	2-3H	2,1-2nH	ALC Mark-single ring	2,4H	ALC Mark-single ring	2,2H	2,3H	2,2H	2,2,2H	2,3H	2,3nH
PREHATCH													
POSTHATCH													
OTOLITH MARK SCHEDULE	(1X)12C:12H,(1X)12C:24H,(5X)12C:12H	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:24H,(2X)12C:12H	(1X)24C:24H,(1X)924C:72H,(3X)24C:24H	(1X)24C:24H,(1X)24C:48H,(1X)12C:96H,(2X)12C:12H		(1X)24C:24H,(1X)24C:48H,(4X)24C:24H		(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(1X)24C:24H,(1X)24C:48H,(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H
DIRECTION	down(12-8°C)	down(12-8°C)	down(7-4°C)	down(12-8°C)		down(8-4°C)		down(10-6°C)	down(8-4°C)	down(10-6°C)	down(8-4°C)	down(8-4°C)	down(8-4°C)
STAGE	Fed Fry	Fed Fry	Fed Fry	Fed Fry	Fed Fry	Fed Fry	Fed Fry	Unfed Fry	Unfed Fry	Fed Fry	Fed Fry	Fed Fry	Fed Fry
MEAN SIZE AT RELEASE(mm)	53	58	41	49	33	49	34	35	33	50	49	42	53
MEAN SIZE AT RELEASE(g)	1.19	1.93	0.49	0.75	0.25	0.76	0.25	0.29	0.28	1.22	1.21	0.67	1.4
ACTUAL NUMBER OF OM RELEASED (thousand)	1,829	1,023	1,802	1,102	2,537	4,730	4,798	480	140	587	120	50	400
MARK QUALITY	ok	ok	good	poor		good		ok	good		ok	ok	good
COMMENTS	As for some otoliths, the interval between the forth and fifth ring of 2nd band is a little wide.			It didn't become a planned schedule (2,3n-2nH) because of an operation mistake of the water temperature control system. The interval of the 2nd and 3rd band is wider than that usually.								Some otoliths show confusing ring before a first ring.	
PHOTO IMAGE					No Image		No Image						

Table 1. Continued.

No.	J06-53	J06-54	J06-55	J06-56	J06-57
BROOD YEAR	2006	2006	2006	2006	2006
SPECIES	MASU	MASU	MASU	SOCKEYE	SOCKEYE
STATE/ PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO
REGION	Okhotsk Sea coast	Okhotsk Sea coast	Nemuro Strait coast	West Pacific coast	West Pacific coast
FACILITY	Shari Hatchery	Shari Hatchery	Nemuro Hatchery	Shizunai Hatchery	Shizunai Hatchery
STOCK	Shari River	Shari River	Ichani River	Abira/Shizunai River	Abira/Shizunai River
FINAL RELEASE SITE	Shari River	Shari River	Ichani River	Abira River	Shizunai River
DATE LAST RELEASED	2007.5.9	2006.10.25	2007.5.21	2007.6.13	2007.6.14
OM ID	Shari06masu-f	Shari06masu-e	Ichani06masu-f	Abira06sockeye	Shizunai06sockeye
HATCH CODE	6H	4H	2,4H	2,7H	2,7H
PREHATCH					
POSTHATCH					
OTOLITH MARK SCHEDULE	(6X)24C:24H	(4X)24C:24H	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	(1X)24C:24H,(1X)24C:48H,(7X)24C:24H	(1X)24C:24H,(1X)24C:48H,(7X)24C:24H
DIRECTION	down(8-4°C)	down(8-4°C)	down(8-4°C)	down(10-6°C)	down(10-6°C)
STAGE	Fed Fry	Unfed Egg	Fed Fry	Fed Smolt	Fed Smolt
MEAN SIZE AT RELEASE(mm)	53	-	57	86	86
MEAN SIZE AT RELEASE(g)	1.51	-	1.93	5.79	5.79
ACTUAL NUMBER OF OM RELEASED (thousand)	529	510	150	73	107
MARK QUALITY	good	good	good	ok	ok
COMMENTS				Some otoliths show confusing ring after the last ring.	Some otoliths show confusing ring after the last ring.
PHOTO IMAGE					

Table 2. Otolith Mark releases of masu salmon of 2005 brood year stocks from Japan in the fall of 2006 and spring of 2007.

No.	J05-55	J05-56	J05-57	J05-58	J05-59	J05-60	J05-61	J05-62	J05-63	J05-64	J05-65	J05-66
BROOD YEAR	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005	2005
SPECIES	MASU	MASU	MASU	MASU	MASU	MASU	MASU	MASU	MASU	MASU	MASU	MASU
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	Okhotsk Sea coast	Okhotsk Sea coast	Okhotsk Sea coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast	Nemuro Strait coast
FACILITY	Shiribetsu Hatchery	Shiribetsu Hatchery	Yakumo Hatchery	Yakumo Hatchery	Chitose Hatchery	Tokushibetsu Hatchery	Shari Hatchery	Shari Hatchery	Nemuro Hatchery	Nemuro Hatchery	Nemuro Hatchery	Nemuro Hatchery
STOCK	Shiribetsu River	Shiribetsu River	Shiribetsu River	Shiribetsu River	Shiribetsu River	Tokushibetsu River	Shari River	Shari River	Ichani/Shibetsu River	Ichani/Shibetsu River	Ichani/Shibetsu River	Ichani/Shibetsu River
FINAL RELEASE SITE	Shiribetsu River	Shiribetsu River	Shiribetsu River	Shiribetsu River	Shiribetsu River	Tokushibetsu River	Shari River	Shari River	Ichani River	Ichani River	Shibetsu River	Shibetsu River
DATE LAST RELEASED	2006.10.10	2007.5.11	2006.9.20	2007.5.10	2006.8.29	2006.8.3	2006.11.1	2007.6.13	2006.9.21	2007.6.4	2006.9.21	2007.5.30
OM ID	Shiribetsu05masu-s-j	Shiribetsu05masu-s-s	Shiribetsu05masu-y-j	Shiribetsu05masu-y-s	Shiribetsu05masu-c-j	Tokushibetsu05masu-j	Shari05masu-j	Shari05masu-s	Ichani05masu-j	Ichani05masu-s	Shibetsu05masu-j	Shibetsu05masu-s
HATCH CODE	2,2H	2,2H	2,2H	2,2H	3,3nH	5-1H	6H	6H	2,4H	2,4H	2,4H	2,4H
PREHATCH												
POSTHATCH												
OTOLITH MARK SCHEDULE	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	(2X)24C:24H,(1X)24C:48H,(3X)12C:12H	(4X)12C:12H,(1X)12C:36H,(1X)24C:24H	(6X)24C:24H	(6X)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,(4X)24C:24H	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H
DIRECTION	down(10-6°C)	down(10-6°C)	down(10-6°C)	down(10-6°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(8-4°C)
STAGE	Fed Juvenile	Fed Smolt	Fed Juvenile	Fed Smolt	Fed Juvenile	Fed Juvenile	Fed Juvenile	Fed Smolt	Fed Juvenile	Fed Smolt	Fed Juvenile	Fed Smolt
MEAN SIZE AT RELEASE(mm)	102	138	102	130	97	79	101.8	139	96	133	96	13
MEAN SIZE AT RELEASE(g)	10.76	25.62	11.55	22.59	10.11	5.01	10.93	26.25	9.58	23.54	9.58	22.1
ACTUAL NUMBER OF OM RELEASED (thousand)	103	142	85	83	80	110	35	105	24	24	50	27
MARK QUALITY	ok	ok	ok	ok	ok	poor	ok	ok	ok	ok	ok	ok
COMMENTS	ALL : Finclips (LV)	103 thousand : Finclips (RV)	ALL : Finclips (LV)	220 thousand : Finclips (RV), 61 thousand : Finclips (LV + RV)		All: Finclips (LV) 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.	ALL : Finclips (LV)	ALL : Finclips (RV)				
PHOTO IMAGE												