

Releases of Thermally Marked Salmon from Japan in 2001

by

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Abstract

From February to June 2001, approximately 19.0 million chum and 2.8 million pink salmon (2000 brood year) with one of fourteen thermal mark patterns were released from five hatcheries in Hokkaido. All chum salmon released from Shizunai Hatchery were thermally marked. The initial aim of thermal mark programs is to provide information for the ocean migration and survival of each regional salmon stock in Japan. Computer-based water temperature control systems were used to produce thermal marks in the otoliths of chum and pink salmon. Two rings as base mark were adopted to distinguish Japanese salmon from other stocks except for two marking groups by power failure. To increase available thermal mark patterns, we employed narrow rings, which were formed at 12 h intervals. To establish the international database of thermal mark releases, this document provided information of Japanese thermal marks releases, including release site, date, number, and mark patterns with images.

Introduction

Mass marking of hatchery salmon using otolith thermal 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) and coastal waters (Hagen et al., 1995; Farley and Munk, 1997; Farley et al., 1999).

In Japan, the initial aim of thermal 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 of chum and pink salmon. The systems were installed at Chitose, Shizunai, Ichani, and Tokushibetsu Hatchery. Shikiu River stocks were marked at Chitose Hatchery.

Few 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 by computer-based water temperature control systems. The RBr and Hatch code notation is used to describe thermal patterns (Munk and Geiger, 1998; Hagen et al., 2000). Two rings as base mark were adopted to distinguish Japanese salmon from other stocks.

Releases of 2000 Brood Year Stocks

From February to June 2001, approximately 19.0 million chum and 2.8 million pink salmon (2000 brood year) with one of fourteen thermal mark patterns were released from five hatcheries in Hokkaido (Table 1). All chum salmon released from Shizunai Hatchery were thermally marked. The qualities of these thermal marks were good except for four poor marks: Shizunai00chum-tr, Shizunai00chum-v, Shikiu00chum-s, and Tokushibetsu00pink.

Shizunai00chum-tr and Shizunai00chum-v were marked at the same time by the same water temperature control system. After the marking of first thermal ring, power failure was occurred and programmed schedule was stopped automatically. Because of the next marking groups were standing by, enough spacing was not applied between base mark and second band. These marks could not be decoded in RBr or Hatch code notation.

Shikiu00chum-s included only first four rings of planned eight rings (Shikiu00chum). We stopped marking because of outbreak of soft shell egg disease.

Tokushibetsu00pink had insufficient patterns in 12 h narrow ring band. Third ring of second band was faint. Although water temperature was changed same as planned schedule and qualities of four kind of chum salmon marks employed by the same controller were good. Thus we changed thermal mark plan for brood year 2001 pink salmon at Tokushibetsu Hatchery to 24 h marking (Kawana et al., 2001).

Acknowledgments

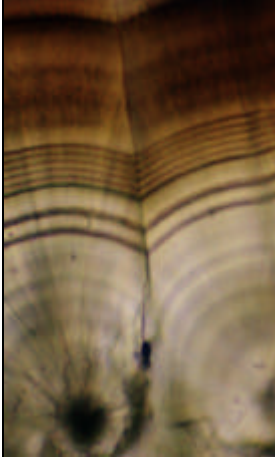
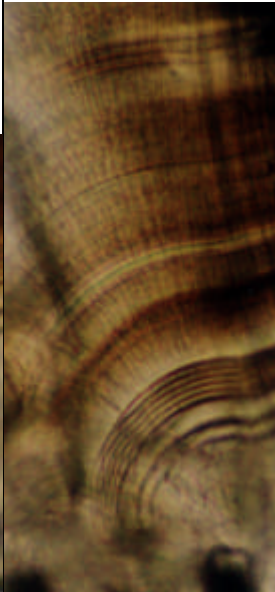
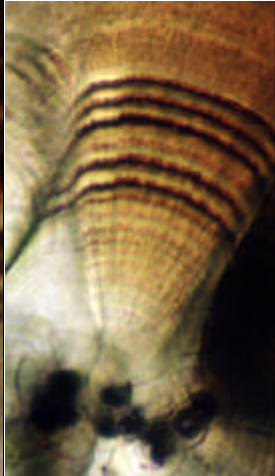
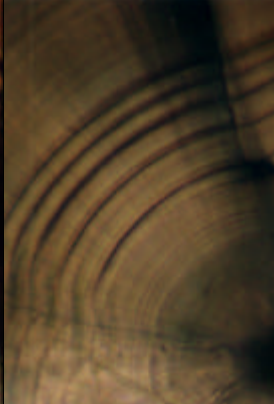

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in 1999 and 2000 with a thermal mark plan for 2000 brood year stocks. (NPAFC Doc. 461)
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p.

Table 1. Otolith thermal mark releases of chum and pink salmon from Japan in 2001.

No	J00-01	J00-02	J00-03	J00-04	J00-05
BROOD YEAR	2000	2000	2000	2000	2000
DATE OF RELEASE	2/9/01-4/20/01	3/8/01	3/13/01-5/31/01	5/22/01	3/13/01-4/13/01
SPECIES	CHUM	CHUM	CHUM	CHUM	CHUM
COUNTRY	JAPAN	JAPAN	JAPAN	JAPAN	JAPAN
STATE/PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO
REGION	Japan Sea coast	Japan Sea coast	West Pacific coast	West Pacific coast	West Pacific coast
AGENCY	NASREC	NASREC	NASREC	NASREC	NASREC
FACILITY	Chitose Hatchery	Chitose Hatchery	Shizunai Hatchery	Shizunai Hatchery	Shizunai Hatchery
STOCK	Ishikari River	Ishikari River	Shizunai River	Shizunai River	Shizunai River
FINAL RELEASE SITE	Ishikari River	Ishikari River	Shizunai River	Shizunai River	Shizunai River
OM ID	Chitose00chum	Chitose00chum-hp	Shizunai00chum	Shizunai00chum-tr	Shizunai00chum-v
RB_r	1:1,2,2,6n	1:1,2,2,6n+3,3	1:1,2-2,3	n.a.(1:5rings)	n.a.(1:5rings)
Hatch Code	2,6nH	2,6nH3	2-3H	n.a.(5ringsH)	n.a.(5ringsH)
PREHATCH GRAPHIC	IIIII	IIIII			
POSTHATCH GRAFIC					
OTOLITH MARK SCHEDULE	(1X)24C:24H,(1X)24C:48H,(6X)12C:12H	(1X)24C:24H,(1X)24C:48H,(5X)12C:12H ,(1X)12C:828H,(3X)24C:24H	(1X)24C:24H,(1X)24C:72H,(3X)24C:24H	(1X)24H:24C,(1X)53H:24C,(1X)43H:24C ,(2X)24H:24C	(1X)24C:53H,(1X)24C:43H,(3X)24C:24H
MARKING SYSTEM	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER
TEMP SHIFT DIRECTION	down (8-4C)	down (8-4C)	down (10-6C)	up (7-11C)	down (11-7C)
REARING TREATMENT	fed	fed	fed	fed	fed
STAGE	fry	fry	fry	fry	fry
MEAN SIZE AT RELEASE (mm)	43	40	62	63	58
MEAN SIZE AT RELEASE (g)	0.66	0.45	1.99	1.97	1.69
ACTUAL NUMBER OF OM RELEASED	4,153,000	7,500	4,950,000	315,000	1,127,000
MARK QUALITY	good	good	good	poor	poor
COMMENTS	include TM+Finclips (146 thousand)	hatch pipe		power failure, looks like WWNN	variation of J00-03 power failure, looks like WWNN
DIGITAL PHOTO IMAGE					

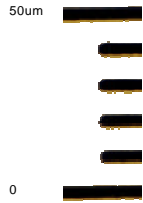


Table 1. Continued.

No	J00-06	J00-07	J00-08	J00-09	J00-10
BROOD YEAR	2000	2000	2000	2000	2000
DATE OF RELEASE	6/1/01	6/1/01	5/7/01-5/31/01	5/15/01	5/31/01
SPECIES	CHUM	CHUM	CHUM	CHUM	CHUM
COUNTRY	JAPAN	JAPAN	JAPAN	JAPAN	JAPAN
STATE/PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO
REGION	West Pacific coast	West Pacific coast	Nemuro Strait coast	Okhotsk Sea coast	Okhotsk Sea coast
AGENCY	NASREC	NASREC	NASREC	NASREC	NASREC
FACILITY	Shikiu Hatchery	Shikiu Hatchery	Ichani Hatchery	Tokushibetsu Hatchery	Tokushibetsu Hatchery
STOCK	Shikiu River	Shikiu River	Ichani River	Tokushibetsu River	Tokushibetsu River
FINAL RELEASE SITE	Shikiu River	Shikiu River	Ichani River	Tokushibetsu River	Tokushibetsu River
OM ID	Shikiu00chum	Shikiu00chum-s	Ichani00chum	Tokushibetsu00chum (early)	Tokushibetsu00chum (mid)
RB_r	1:1.2.2.3n-3.3n	1:1.2.2.2n	1:1.2.2.8n	1:1.2.2.1n-3.4n	1:1.2.2.2n-3.3n
Hatch Code	2,3n-3nH	2,2nH	2,8nH	2,1n-4nH	2,2n-3nH
PREHATCH GRAPHIC	11 III III	11 II	11 IIIIII	11 I IIII	11 II III
POSTHATCH GRAFIC					
OTOLITH MARK SCHEDULE	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H ,(1X)12C:36H,(3X)12C:12H	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H	(1X)24C:24H,(1X)24C:48H,(8X)12C:12H	(1X)24C:24H,(1X)24C:48H,(1X)12C:36H ,(4X)12C:12H	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H ,(1X)12C:36H,(3X)12C:12H
MARKING SYSTEM	CHILLER	CHILLER	CHILLER	CHILLER	CHILLER
TEMP SHIFT DIRECTION	down (8-4C)	down (8-4C)	down (8-4C)	down (9-5C)	down (9-5C)
REARING TREATMENT	fed	fed	fed	fed	fed
STAGE	fry	fry	fry	fry	fry
MEAN SIZE AT RELEASE (mm)	60	60	56	52	53
MEAN SIZE AT RELEASE (g)	1.69	1.87	1.28	1.17	1.23
ACTUAL NUMBER OF OM RELEASED	447,000	412,000	5,027,000	628,000	651,000
MARK QUALITY	good	poor	good	good	good
COMMENTS		stopped planed pattern by outbreak of soft shell egg diseases			
DIGITAL PHOTO IMAGE					

Table 1. Continued.

No	J00-11	J00-12	J00-13	J00-14
BROOD YEAR	2000	2000	2000	2000
DATE OF RELEASE	5/31/01	4/27/01	4/27/01	4/27/01
SPECIES	CHUM	CHUM	PINK	PINK
COUNTRY	JAPAN	JAPAN	JAPAN	JAPAN
STATE/PROVINCE	HOKKAIDO	HOKKAIDO	HOKKAIDO	HOKKAIDO
REGION	Okhotsk Sea coast	Okhotsk Sea coast	Nemuro Strait coast	Okhotsk Sea coast
AGENCY	NASREC	NASREC	NASREC	NASREC
FACILITY	Tokushibetsu Hatchery	Tokushibetsu Hatchery	Ichani Hatchery	Tokushibetsu Hatchery
STOCK	Tokushibetsu River	Tokushibetsu River	Ichani River	Tokushibetsu River
FINAL RELEASE SITE	Tokushibetsu River	Tokushibetsu River	Ichani River	Tokushibetsu River
OM ID	Tokushibetsu00chum (late)	Tokushibetsu00chum (late-tr)	Ichani00pink	Tokushibetsu00pink
RB_r	1:1.2.2.3n	1:1.2.2.3n-3.2n	1:1.2.2.6n	1:1.2.2.4n
Hatch Code	2,3nH	2,3n-2nH	2,6nH	2,4nH (2,2n,1nH)
PREHATCH GRAPHIC	I I III	I I III II	I I IIIIII	I I III (I I II I)
POSTHATCH GRAFIC				
OTOLITH MARK SCHEDULE	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H ,(1X)12C:36H,(2X)12C:12H	(1X)24C:24H,(1X)24C:48H,(6X)12C:12H	(1X)24C:24H,(1X)24C:48H,(4X)12C:12H
MARKING SYSTEM	CHILLER	CHILLER	CHILLER	CHILLER
TEMP SHIFT DIRECTION	down (9-5C)	down (9-5C)	down (8-4C)	down (10-6C)
REARING TREATMENT	fed	fed	fed	fed
STAGE	fry	fry	fry	fry
MEAN SIZE AT RELEASE (mm)	53	49	52	41
MEAN SIZE AT RELEASE (g)	1.23	0.90	0.82	0.48
ACTUAL NUMBER OF OM RELEASED	653,000	659,000	2,066,000	754,000
MARK QUALITY	good	good	good	poor
COMMENTS			include TM+Finclips (164 thousand)	3rd ring of band 2 is faint (I I II I)
DIGITAL PHOTO IMAGE				