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Proposed Otolith Marks for Brood Year 2010 Salmon in Japan

by

Masaya Takahashi and Tetsuya Sakagami

*National Salmon Resources Center, Fisheries Research Agency
2-2 Nakanoshima, Toyohira-ku, Sapporo 062-0922, Japan*

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In Japan, otolith marks are used for migration, growth and survival surveys of juvenile salmon in the coastal waters, and for offshore migration surveys in the Okhotsk Sea, North Pacific Ocean, and Bering Sea. In addition, hatchery origins of maturing adults are determined using thermal marks to evaluate their homing migrations.

The proposed otolith marks for the 2010 brood year salmon include 50 discrete thermal patterns and two ALC (alizarin complexone) patterns (Table. 1). We plan to mark approximately 149 million chum, 26.7 million pink, 3.2 million masu, and 220 thousand sockeye salmon at 19 hatcheries (Fig. 1).

The thermal marking pattern is presented as the Hatch code notation (Hagen et al. 2000; Josephson et al. 2006). As the base mark, two rings in the first band have been adopted to distinguish Japanese chum and pink salmon from other stocks since 1999 brood year stock (Urawa et al. 2000). All thermal rings are induced by cooler temperature exposures.

The ALC marks will be used for chum salmon surveys by Hokkaido Fish Hatchery.

References

- Hagen, P., H.J. Geiger, E.C. Volk, and J.J. Grimm. 2000. Thermal mark patterns applied to salmon from Alaska, Washington and Oregon for brood year 1999 and some proposed marks for brood year 2000. (NPAFC Doc. 463 rev.1). 8p. Alaska Dept. Fish and Game, Juneau Alaska 99801-5526, USA.
- Josephson, R., B.A. Agler, K.F. Van Kirk, and D.S. Oxman 2006. A proposal to simplify the thermal mark code notation. (NPAFC Doc. 944). 4p. Alaska Dept. Fish and Game, Juneau Alaska. 99801-5526, USA.
- Urawa, S., M. Kawana, and T. Ishiguro. 2000. Releases of thermally marked salmon from Japan in 1999 and 2000 with a thermal mark plan for 2000 brood year stocks. (NPAFC Doc. 461) 7 p. National Salmon Resources Center, Fisheries Agency of Japan, Sapporo 062-0922, Japan.

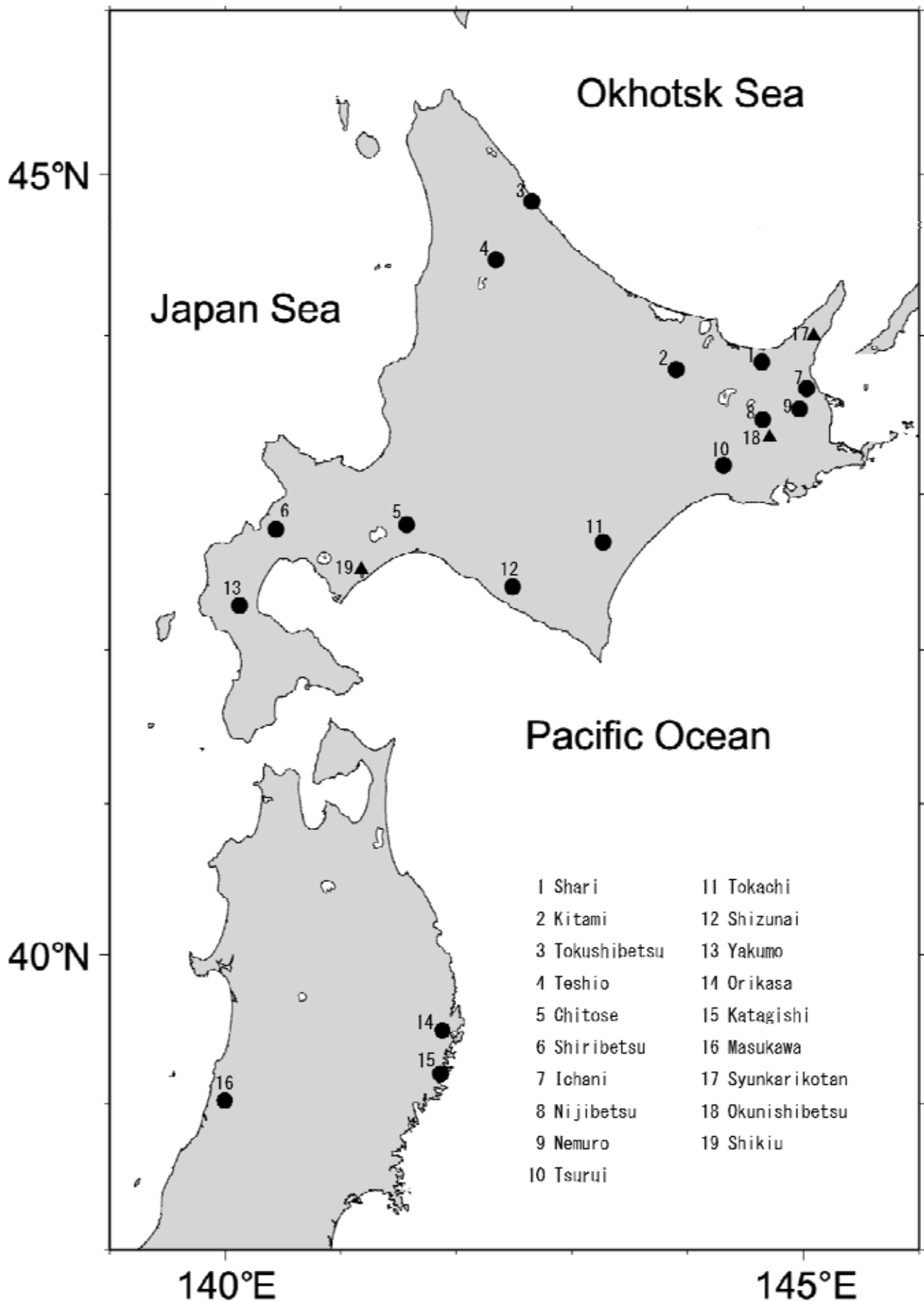


Fig. 1. Locations of hatcheries where brood year 2010 salmon will be thermally marked (solid circles) or marked with ALC (solid triangles).

Table 1. Proposed otolith mark releases from Japan for 2010 brood year stocks of chum, pink, masu and sockeye salmon.

No	Mark Type	Brood Year	Year of Release	Species	Country	State/Province	Region	Agency	Facility	Stock	Final Release Site
JP10-01	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Chitose Hatchery	Ishikari River	Ishikari River
JP10-02	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Chitose Hatchery	Ishikari River	Ishikari River
JP10-03	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Chitose Hatchery	Ishikari River	Ishikari River
JP10-04	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Chitose Hatchery	Ishikari River	Ishikari River
JP10-05	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Chitose Hatchery	Ishikari River	Ishikari River
JP10-06	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Teshio Hatchery	Teshio River	Teshio River
JP10-07	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Teshio Hatchery	Teshio River	Teshio River
JP10-08	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Teshio Hatchery	Teshio River	Teshio River
JP10-09	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Teshio Hatchery	Teshio River	Teshio River
JP10-10	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Tokushibetsu Hatchery	Tokushibetsu River	Tokushibetsu River
JP10-11	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-12	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-13	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-14	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-15	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-16	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-17	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-18	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River
JP10-19	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River
JP10-20	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River

No	Rearing Treatment	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Marking System
JP10-01	fed	fry	20,000,000	Ishikari10chum-1	2,3-2-2H			CHILLER
JP10-02	fed	fry	3,100,000	Ishikari10chum-2	2,3-2-3H			CHILLER
JP10-03	fed	fry	3,100,000	Ishikari10chum-3	2,3-5H			CHILLER
JP10-04	fed	fry	750,000	Ishikari10chum-4	2,3-6H			CHILLER
JP10-05	fed	fry	3,050,000	Ishikari10chum-5	2,3-3H			CHILLER
JP10-06	fed	fry	1,500,000	Teshio10chum-1	2,2H			CHILLER
JP10-07	fed	fry	2,000,000	Teshio10chum-2	2,3nH			CHILLER
JP10-08	fed	fry	750,000	Teshio10chum-3	2n-3H			CHILLER
JP10-09	fed	fry	750,000	Teshio10chum-4	2n-4H			CHILLER
JP10-10	fed	fry	11,100,000	Tokushibetsu10chum	2,4nH			CHILLER
JP10-11	fed	fry	2,000,000	Shari10chum-1	2-2-2-2H			CHILLER
JP10-12	fed	fry	1,300,000	Shari10chum-2	2-2-2-3H			CHILLER
JP10-13	fed	fry	2,600,000	Shari10chum-3	2-2-2-4H			CHILLER
JP10-14	fed	fry	1,300,000	Shari10chum-4	2-6H			CHILLER
JP10-15	fed	fry	1,800,000	Shari10chum-5	2-6-2H			CHILLER
JP10-16	fed	fry	1,800,000	Shari10chum-6	2-6-3H			CHILLER
JP10-17	fed	fry	800,000	Shari10chum-7	2-2-3-2H			CHILLER
JP10-18	fed	fry	600,000	Ichani10chum-1	2-7H			CHILLER
JP10-19	fed	fry	1,300,000	Ichani10chum-2	2-8H			CHILLER
JP10-20	fed	fry	600,000	Ichani10chum-3	2-9H			CHILLER

No	Otolith Mark Schedule	Temp Shift Direction	Comments
JP10-01	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H	down(8-4°C)	
JP10-02	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(3X)12C:12H	down(8-4°C)	
JP10-03	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(6X)12C:12H	down(8-4°C)	
JP10-04	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(6X)12C:12H	down(8-4°C)	
JP10-05	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(3X)12C:12H	down(8-4°C)	
JP10-06	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	down(12-8°C)	
JP10-07	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	down(12-8°C)	
JP10-08	(1X)12C:12H,(1X)12C:36H,(3X)24C:24H	down(12-8°C)	
JP10-09	(1X)12C:12H,(1X)12C:36H,(4X)24C:24H	down(12-8°C)	
JP10-10	(1X)24C:24H,(1X)24C:48H,(4X)12C:12H	down(8-4°C)	
JP10-11	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H	down(8-4°C)	
JP10-12	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(3X)12C:12H	down(8-4°C)	
JP10-13	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(4X)12C:12H	down(8-4°C)	
JP10-14	(1X)12C:12H,(1X)12C:36H,(6X)12C:12H	down(8-4°C)	
JP10-15	(1X)12C:12H,(1X)12C:36H,(5X)12C:12H,(1X)12C:36H,(2X)12C:12H	down(8-4°C)	
JP10-16	(1X)12C:12H,(1X)12C:36H,(5X)12C:12H,(1X)12C:36H,(3X)12C:12H	down(8-4°C)	
JP10-17	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H,(1X)12C:36H,(2X)12C:12H	down(8-4°C)	
JP10-18	(1X)12C:12H,(1X)12C:36H,(7X)12C:12H	down(8-4°C)	
JP10-19	(1X)12C:12H,(1X)12C:36H,(8X)12C:12H	down(8-4°C)	
JP10-20	(1X)12C:12H,(1X)12C:36H,(9X)12C:12H	down(8-4°C)	

Table 1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Country	State/Province	Region	Agency	Facility	Stock	Final Release Site
JP10-21	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River
JP10-22	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River
JP10-23	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River
JP10-24	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River
JP10-25	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nijibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP10-26	ALC	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	HFH	Okunishibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP10-27	ALC	2010	2011	CHUM	JAPAN	HOKKAIDO	Nemuro Strait coast	HFH	Okunishibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP10-28	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	East Pacific coast	NASREC	Tsurui Hatchery	Kushiro River	Kushiro River
JP10-29	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	East Pacific coast	NASREC	Tokachi Hatchery	Tokachi River	Tokachi River
JP10-30	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	West Pacific coast	NASREC	Shizunai Hatchery	Shizunai River	Shizunai River
JP10-31	ALC	2010	2011	CHUM	JAPAN	HOKKAIDO	West Pacific coast	HFH	Shikiu Hatchery	Shikiu River	Shikiu River
JP10-32	ALC	2010	2011	CHUM	JAPAN	HOKKAIDO	West Pacific coast	HFH	Shikiu Hatchery	Shikiu River	Shikiu River
JP10-33	TM	2010	2011	CHUM	JAPAN	HOKKAIDO	West Pacific coast	NASREC	Yakumo Hatchery	Yurappu River	Yurappu River
JP10-34	TM	2010	2011	CHUM	JAPAN	HONSHU	Pacific coast	NASREC	Katagishi Hatchery	Katagishi River	Katagishi River
JP10-35	TM	2010	2011	CHUM	JAPAN	HONSHU	Pacific coast	NASREC	Katagishi Hatchery	Katagishi River	Katagishi River
JP10-36	TM	2010	2011	CHUM	JAPAN	HONSHU	Pacific coast	NASREC	Katagishi Hatchery	Katagishi River	Katagishi River
JP10-37	TM	2010	2011	CHUM	JAPAN	HONSHU	Pacific coast	NASREC	Orikasa Hatchery	Orikasa River	Orikasa River
JP10-38	TM	2010	2011	CHUM	JAPAN	HONSHU	Pacific coast	NASREC	Orikasa Hatchery	Orikasa River	Yamada Bay
JP10-39	TM	2010	2011	CHUM	JAPAN	HONSHU	Pacific coast	NASREC	Orikasa Hatchery	Orikasa River	Yamada Bay
JP10-40	TM	2010	2011	CHUM	JAPAN	HONSHU	Japan Sea coast	NASREC	Masukawa Hatchery	Gakkou River	Gakkou River

No	Rearing Treatment	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Marking System
JP10-21	fed	fry	1,800,000	Ichani10chum-4	2-4-2H			CHILLER
JP10-22	fed	fry	1,200,000	Ichani10chum-5	2-4-3H			CHILLER
JP10-23	fed	fry	1,300,000	Ichani10chum-6	2-4-4H			CHILLER
JP10-24	fed	fry	1,200,000	Ichani10chum-7	2-5-2H			CHILLER
JP10-25	fed	fry	25,000,000	Nishibetsu10chum	2,6nH			CHILLER
JP10-26	fed	fry	2,000,000	Nishibetsu10chum-alc-s	A1H			
JP10-27	fed	fry	1,000,000	Nishibetsu10chum-alc-d	A2H			
JP10-28	fed	fry	9,100,000	Kushiro10chum	2-2-3-3H			CHILLER
JP10-29	fed	fry	15,300,000	Tokachi10chum-1	2-5-3H			CHILLER
JP10-30	fed	fry	6,400,000	Shizunai10chum	2-1-6H			CHILLER
JP10-31	fed	fry	1,600,000	Shikiu10chum-alc-s	A1H			
JP10-32	fed	fry	800,000	Shikiu10chum-alc-d	A2H			
JP10-33	fed	fry	7,500,000	Yurappu10chum-1	2-2-3H			CHILLER
JP10-34	fed	fry	2,000,000	Katagishi10chum-1	2,4H			CHILLER
JP10-35	fed	fry	2,000,000	Katagishi10chum-2	2,5H			CHILLER
JP10-36	fed	fry	2,000,000	Katagishi10chum-3	2-2,2H			CHILLER
JP10-37	fed	fry	1,000,000	Orikasa10chum-1	2,3H			CHILLER
JP10-38	fed	fry	1,000,000	Orikasa10chum-2	2,2nH			CHILLER
JP10-39	fed	fry	1,000,000	Orikasa10chum-3	2n-2H			CHILLER
JP10-40	fed	fry	3,500,000	Gakkou10chum-1	2-1-2H			CHILLER

No	Otolith Mark Schedule	Temp Shift Direction	Comments
JP10-21	(1X)12C:12H,(1X)12C:36H,(3X)12C:12H,(1X)12C:36H,(2X)12C:12H	down(8-4°C)	
JP10-22	(1X)12C:12H,(1X)12C:36H,(3X)12C:12H,(1X)12C:36H,(3X)12C:12H	down(8-4°C)	
JP10-23	(1X)12C:12H,(1X)12C:36H,(3X)12C:12H,(1X)12C:36H,(4X)12C:12H	down(8-4°C)	
JP10-24	(1X)12C:12H,(1X)12C:36H,(4X)12C:12H,(1X)12C:36H,(2X)12C:12H	down(8-4°C)	
JP10-25	(1X)24C:24H,(1X)24C:48H,(6X)12C:12H	down(9-5°C)	
JP10-26			
JP10-27			
JP10-28	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H,(1X)12C:36H,(3X)12C:12H	down(8-4°C)	
JP10-29	(1X)12C:12H,(1X)12C:36H,(4X)12C:12H,(1X)12C:36H,(3X)12C:12H	down(9-5°C)	
JP10-30	(1X)12C:12H,(2X)12C:36H,(6X)12C:12H	down(10-6°C)	
JP10-31			
JP10-32			
JP10-33	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(3X)12C:12H	down(8-4°C)	
JP10-34	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H	down(12-8°C)	
JP10-35	(1X)12C:12H,(1X)12C:24H,(5X)12C:12H	down(12-8°C)	
JP10-36	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:24H,(2X)12C:12H	down(12-8°C)	
JP10-37	(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	down(12-8°C)	
JP10-38	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H	down(12-8°C)	
JP10-39	(1X)12C:12H,(1X)12C:36H,(2X)24C:24H	down(12-8°C)	
JP10-40	(1X)12C:12H,(2X)12C:36H,(2X)12C:12H		

Table 1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Country	State/Province	Region	Agency	Facility	Stock	Final Release Site
JP10-41	TM	2010	2011	CHUM	JAPAN	HONSHU	Japan Sea coast	NASREC	Masukawa Hatchery	Gakkou River	Gakkou River
JP10-42	TM	2010	2011	CHUM	JAPAN	HONSHU	Japan Sea coast	NASREC	Masukawa Hatchery	Gakkou River	Gakkou River
JP10-43	TM	2010	2011	CHUM	JAPAN	HONSHU	Japan Sea coast	NASREC	Masukawa Hatchery	Gakkou River	Gakkou River
JP10-44	TM	2010	2011	PINK	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Tokushibetsu Hatchery	Tokushibetsu River	Tokushibetsu River
JP10-45	TM	2010	2011	PINK	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Tokushibetsu Hatchery	Tokushibetsu River	Kitamihorobetsu River
JP10-46	TM	2010	2011	PINK	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-47	TM	2010	2011	PINK	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Kitami Hatchery	Tokoro River	Tokoro River
JP10-48	TM	2010	2011	PINK	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nijibetsu Hatchery	Sashirui River	Kunbetsu River
JP10-49	TM	2010	2011	PINK	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nijibetsu Hatchery	Sashirui River	Shibetsu River
JP10-50	ALC	2010	2011	PINK	JAPAN	HOKKAIDO	Nemuro Strait coast	HFH	Shunkarikotan Hatchery	Shunkarikotan River	Shunkarikotan River
JP10-51	TM	2010	2011	PINK	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River
JP10-52	TM	2010	2011	PINK	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Ichani Hatchery	Ichani River	Ichani River
JP10-53	ALC	2010	2011	PINK	JAPAN	HOKKAIDO	Nemuro Strait coast	HFH	Okunishibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP10-54	ALC	2010	2011	PINK	JAPAN	HOKKAIDO	Nemuro Strait coast	HFH	Okunishibetsu Hatchery	Bettoga River	Bettoga River
JP10-55	TM	2010	2011	PINK	JAPAN	HOKKAIDO	East Pacific coast	NASREC	Tsurui Hatchery	Kushiro River	Kushiro River
JP10-56	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Shiribetsu Hatchery	Shiribetsu River	Shubuto River
JP10-57	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Shiribetsu Hatchery	Shiribetsu River	Shiribetsu River
JP10-58	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Yakumo Hatchery	Shiribetsu River	Shiribetsu River
JP10-59	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Chitose Hatchery	Ishikari River	Ishikari River
JP10-60	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Tokushibetsu Hatchery	Tokushibetsu River	Tokushibetsu River

No	Rearing Treatment	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Marking System
JP10-41	fed	fry	500,000	Gakkou10chum-2	2-1-3H			CHILLER
JP10-42	fed	fry	1,000,000	Gakkou10chum-3	2-1-4H			CHILLER
JP10-43	fed	fry	1,000,000	Gakkou10chum-4	2-1-5H			CHILLER
JP10-44	fed	fry	1,700,000	Tokushibetsu10pink	2-3H			CHILLER
JP10-45	fed	fry	1,500,000	Kitamihorobetsu10pink	2n-2H			CHILLER
JP10-46	fed	fry	5,000,000	Shari10pink	2,3nH			
JP10-47	fed	fry	1,000,000	Tokoro10pink	2,3n-2nH			CHILLER
JP10-48	fed	fry	2,000,000	Kunbetsu10pink	2,2nH			CHILLER
JP10-49	fed	fry	3,500,000	Shibetsu10pink	2,2nH			CHILLER
JP10-50	fed	fry	1,000,000	Shunkarikotan10pink-alc	A2H			
JP10-51	fed	fry	2,500,000	Ichani10pink-1	2,4H			CHILLER
JP10-52	fed	fry	2,000,000	Ichani10pink-2	2-2-4H			CHILLER
JP10-53	fed	fry	1,000,000	Nishibetsu10pink-alc	A1H			
JP10-54	fed	fry	1,000,000	Bettoga10pink-alc	A1H			
JP10-55	fed	fry	4,500,000	Kushiro10pink	2-5H			CHILLER
JP10-56	unfed	fry	500,000	Shubuto10masu-f	3H			CHILLER
JP10-57	fed	fry	630,000	Shiribetsu10masu-r-f	2,2H			CHILLER
JP10-58	fed	fry	100,000	Shiribetsu10masu-y-f	2,2H			CHILLER
JP10-59	fed	fry	100,000	Chitose10masu-f	2,3H			CHILLER
JP10-60	fed	fry	500,000	Tokushibetsu10masu-f	2,3nH			CHILLER

No	Otolith Mark Schedule	Temp Shift Direction	Comments
JP10-41	(1X)12C:12H,(2X)12C:36H,(3X)12C:12H		
JP10-42	(1X)12C:12H,(2X)12C:36H,(4X)12C:12H		
JP10-43	(1X)12C:12H,(2X)12C:36H,(5X)12C:12H		
JP10-44	(1X)24C:24H,(1X)24C:72H,(3X)24C:24H	down(8-4°C)	
JP10-45	(1X)12C:12H,(1X)12C:36H,(2X)24C:24H	down(8-4°C)	
JP10-46		down(8-4°C)	
JP10-47	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H,(1X)12C:36H,(2X)12C:12H	down(12-8°C)	
JP10-48	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H	down(9-5°C)	
JP10-49	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H	down(9-5°C)	
JP10-50			
JP10-51	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	down(8-4°C)	
JP10-52	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(4X)12C:12H	down(8-4°C)	
JP10-53			
JP10-54			
JP10-55	(1X)12C:12H,(1X)12C:36H,(5X)12C:12H	down(8-4°C)	
JP10-56	(3X)24C:24H	down(10-6°C)	
JP10-57	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	down(10-6°C)	
JP10-58	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	down(8-4°C)	
JP10-59	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	down(8-4°C)	
JP10-60	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	down(8-4°C)	

Table 1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Country	State/Province	Region	Agency	Facility	Stock	Final Release Site
JP10-61	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-62	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-63	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-64	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nemuro Hatchery	Ichani River	Ichani River
JP10-65	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nemuro Hatchery	Shibetsu River	Shibetsu River
JP10-66	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Shiribetsu Hatchery	Shiribetsu River	Shiribetsu River
JP10-67	TM	2010	2012	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Shiribetsu Hatchery	Shiribetsu River	Shiribetsu River
JP10-68	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Yakumo Hatchery	Shiribetsu River	Shiribetsu River
JP10-69	TM	2010	2012	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Yakumo Hatchery	Shiribetsu River	Shiribetsu River
JP10-70	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Chitose Hatchery	Ishikari River	Ishikari River
JP10-71	TM	2010	2012	MASU	JAPAN	HOKKAIDO	Japan Sea coast	NASREC	Chitose Hatchery	Ishikari River	Ishikari River
JP10-72	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-73	TM	2010	2012	MASU	JAPAN	HOKKAIDO	Okhotsk Sea coast	NASREC	Shari Hatchery	Shari River	Shari River
JP10-74	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nemuro Hatchery	Ichani River	Ichani River
JP10-75	TM	2010	2012	MASU	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nemuro Hatchery	Ichani River	Ichani River
JP10-76	TM	2010	2011	MASU	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nemuro Hatchery	Shibetsu River	Shibetsu River
JP10-77	TM	2010	2012	MASU	JAPAN	HOKKAIDO	Nemuro Strait coast	NASREC	Nemuro Hatchery	Shibetsu River	Shibetsu River
JP10-78	TM	2010	2012	SOCKEYE	JAPAN	HOKKAIDO	West Pacific coast	NASREC	Tsurui Hatchery	Kushiro River	Kushiro River
JP10-79	TM	2010	2011	SOCKEYE	JAPAN	HOKKAIDO	West Pacific coast	NASREC	Shizunai Hatchery	Shizunai River	Abira River
JP10-80	TM	2010	2012	SOCKEYE	JAPAN	HOKKAIDO	West Pacific coast	NASREC	Chitose Hatchery	Abira River	Abira River

No	Rearing Treatment	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Marking System
JP10-61	fed	fry	400,000	Shari10masu-f	6H			CHILLER
JP10-62	unfed	egg	-	Shari10masu-e-1	4H			CHILLER
JP10-63	unfed	egg	-	Shari10masu-e-2	3,2nH			CHILLER
JP10-64	fed	fry	40,000	Ichani10masu-f	2,5H			CHILLER
JP10-65	fed	fry	110,000	Shibetsu10masu-f	2,4H			CHILLER
JP10-66	fed	juvenile	80,000	Shiribetsu10masu-r-j	2,2H			CHILLER
JP10-67	fed	smolt	140,000	Shiribetsu10masu-r-s	2,2H			CHILLER
JP10-68	fed	juvenile	140,000	Shiribetsu10masu-y-j	2,2H			CHILLER
JP10-69	fed	smolt	80,000	Shiribetsu10masu-y-s	2,2H			CHILLER
JP10-70	fed	juvenile	40,000	Chitose10masu-j	2,3H			CHILLER
JP10-71	fed	smolt	30,000	Chitose10masu-s	2,3H			CHILLER
JP10-72	fed	juvenile	100,000	Shari10masu-j	6H			CHILLER
JP10-73	fed	smolt	100,000	Shari10masu-s	6H			CHILLER
JP10-74	fed	juvenile	30,000	Ichani10masu-j	2,5H			CHILLER
JP10-75	fed	smolt	30,000	Ichani10masu-s	2,5H			CHILLER
JP10-76	fed	juvenile	60,000	Shibetsu10masu-j	2,4H			CHILLER
JP10-77	fed	smolt	30,000	Shibetsu10masu-s	2,4H			CHILLER
JP10-78	fed	smolt	60,000	Kushiro10sockeye	2,9H			CHILLER
JP10-79	fed	smolt	30,000	Abira10sockeye-f	2,7H			CHILLER
JP10-80	fed	smolt	130,000	Abira10sockeye-s	2,6H			CHILLER

No	Otolith Mark Schedule	Temp Shift Direction	Comments
JP10-61	(6X)24C:24H	down(8-4°C)	
JP10-62	(4X)24C:24H	down(8-4°C)	
JP10-63	(2X)24C:24H,(1X)24C:48H,(2X)12C:12H	down(8-4°C)	
JP10-64	(1X)24C:24H,(1X)24C:48H,(5X)24C:24H	down(8-4°C)	
JP10-65	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	down(8-4°C)	
JP10-66	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	down(10-6°C)	TM + Finclips
JP10-67	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	down(10-6°C)	TM + Finclips
JP10-68	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	down(8-4°C)	TM + Finclips
JP10-69	(1X)24C:24H,(1X)24C:48H,(2X)24C:24H	down(8-4°C)	TM + Finclips
JP10-70	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	down(8-4°C)	TM + Finclips
JP10-71	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	down(8-4°C)	TM + Finclips
JP10-72	(6X)24C:24H	down(8-4°C)	TM + Finclips
JP10-73	(6X)24C:24H	down(8-4°C)	TM + Finclips
JP10-74	(1X)24C:24H,(1X)24C:48H,(5X)24C:24H	down(8-4°C)	TM + Finclips
JP10-75	(1X)24C:24H,(1X)24C:48H,(5X)24C:24H	down(8-4°C)	TM + Finclips
JP10-76	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	down(8-4°C)	TM + Finclips
JP10-77	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	down(8-4°C)	TM + Finclips
JP10-78	(1X)24C:24H,(1X)24C:48H,(9X)24C:24H	down(8-4°C)	
JP10-79	(1X)24C:24H,(1X)24C:48H,(7X)24C:24H	down(10-6°C)	
JP10-80	(1X)24C:24H,(1X)24C:48H,(6X)24C:24H	down(8-4°C)	