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Proposed Otolith Marks for Brood Year 2016 Salmon in Japan

by

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Abstract
Japan plans to mark approximately 277 million salmon of the 2016 brood year (243.4 million chum, 25.5 million pink, 3.4 million masu, and 150 thousand sockeye salmon) using 110 discrete thermal patterns and four ALC (alizarin complexone) patterns at 49 hatcheries. Two rings in the first band are adopted as the base mark to distinguish Japanese chum and pink salmon from other stocks.

Keywords: Japan, otolith mark plan, 2016 brood year salmon

Background

In Japan, thermal otolith marks have been 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 (Kawana et al. 1999; Urawa et al. 2000a, 2004, 2006, 2009; Sato et al. 2009). In addition, otolith marking is expected as a tool to evaluate the accuracy of homing migration and abundance of hatchery and natural spawning stocks.

Mark Plan

The proposed otolith marks for the 2016 brood year salmon include 110 discrete thermal patterns and four ALC (alizarin complexone) patterns (Table 1). We plan to mark approximately 243.4 million chum, 25.5 million pink, 3.4 million masu, and 150 thousand sockeye salmon at 49 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. 2000b). All thermal rings are induced by cooler temperature exposures.

ALC marks are used for pink and masu salmon surveys by Hokkaido Research Organization and Yamagata Prefectural Inland Water Fisheries Experimental Station.

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Table 1. Proposed otolith mark releases from Japan for 2016 brood year stocks of chum, pink, masu and sockeye salmon. TM, otolith thermal marking; ALC, alizarin complexone; FRA, Fisheries Research Agency; YFPF, Yamagata Fisheries Promotion Foundation; IIFTC, Iwate Prefectural Inland Fisheries Technology Center; NPH, non-profit private hatchery. Red characters indicate items updated on August 31, 2016.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-01	TM	2016	2017	Chum	Hokkaido	Okhotsk Sea coast	NPH	Horonai Hatchery	Horonai River	Horonai River
JP16-02	TM	2016	2017	Chum	Hokkaido	Okhotsk Sea coast	NPH	Horonai Hatchery	Horonai River	Horonai River
JP16-03	TM	2016	2017	Chum	Hokkaido	Okhotsk Sea coast	FRA	Shari Hatchery	Shari River	Shari River
JP16-04	TM	2016	2017	Chum	Hokkaido	Okhotsk Sea coast	FRA	Tokushibetsu Hatchery	Tokushibetsu River	Tokushibetsu River
JP16-05	TM	2016	2017	Chum	Hokkaido	Okhotsk Sea coast	FRA	Tokushibetsu Hatchery	Tokushibetsu River	Tokushibetsu River
JP16-06	TM	2016	2017	Chum	Hokkaido	Okhotsk Sea coast	NPH	Shintonbetsu Hatchery	Tonbetsu River	Tonbetsu River
JP16-07	TM	2016	2017	Chum	Hokkaido	Okhotsk Sea coast	NPH	Shintonbetsu Hatchery	Tonbetsu River	Tonbetsu River
JP16-08	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Ichani Hatchery	Ichani River	Ichani River
JP16-09	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Ichani Hatchery	Ichani River	Ichani River
JP16-10	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Ichani Hatchery	Ichani River	Ichani River
JP16-11	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Ichani Hatchery	Ichani River	Ichani River
JP16-12	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Ichani Hatchery	Ichani River	Ichani River
JP16-13	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Nijibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP16-14	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Nijibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP16-15	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Nijibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP16-16	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Nijibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP16-17	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Nijibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP16-18	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Nijibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP16-19	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	FRA	Nijibetsu Hatchery	Nishibetsu River	Nishibetsu River
JP16-20	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	NPH	Shibetsu Hatchery	Shibetsu River	Shibetsu River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-01	fry	2,100,000	Horonai16chum1	2,5nH	I I IIIII		Down
JP16-02	fry	2,100,000	Horonai16chum2	2,8H	I I IIIIIIIII		Down
JP16-03	fry	11,600,000	Shari16chum	2-2-2-2H	II II II II		Down
JP16-04	fry	600,000	Tokushibetsu16chum1	2-2,2,3H	II II II III		Down
JP16-05	fry	10,500,000	Tokushibetsu16chum2	2,2,2,3H	I I II II III		Down
JP16-06	fry	2,100,000	Tonbetsu16chum1	2,5nH	I I IIIII		Down
JP16-07	fry	2,100,000	Tonbetsu16chum2	2,8H	I I IIIIIIIII		Down
JP16-08	fry	600,000	Ichani16chum1	2-3,5H	II III IIIII		Down
JP16-09	fry	600,000	Ichani16chum2	2-4-2H	II IIII II		Down
JP16-10	fry	1,300,000	Ichani16chum3	2-3,6H	II III IIIIII		Down
JP16-11	fry	3,000,000	Ichani16chum4	2-4-4H	II IIII IIII		Down
JP16-12	fry	2,500,000	Ichani16chum5	2-4-3H	II IIII III		Down
JP16-13	fry	3,400,000	Nishibetsu16chum1	2,1,2,6H	I I I II IIIIII		Down
JP16-14	fry	850,000	Nishibetsu16chum2	2,1,2,7H	I I I II IIIIIII		Down
JP16-15	fry	850,000	Nishibetsu16chum3	2,1-2-4H	III II IIII		Down
JP16-16	fry	8,500,000	Nishibetsu16chum4	2,1,2,5H	I I I II IIIII		Down
JP16-17	fry	850,000	Nishibetsu16chum5	2-1-6H	II I IIIIII		Down
JP16-18	fry	850,000	Nishibetsu16chum6	2,1,2,3H	I I I II III		Down
JP16-19	fry	9,700,000	Nishibetsu16chum7	2-1-5H	II I IIIII		Down
JP16-20	fry	2,100,000	Shibetsu16chum1	2,3,4H	I I III IIII		Up

No	Otolith Mark Schedule	Comments
JP16-01	(1X)24C:24H,(1X)24C:48H,(5X)12C:12H	
JP16-02	(1X)12C:12H,(1X)12C:24H,(8X)12C:12H	
JP16-03	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H	
JP16-04	(1X)12C:12H,(1X)12C:48H,(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-05	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-06	(1X)24C:24H,(1X)24C:48H,(5X)12C:12H	
JP16-07	(1X)12C:12H,(1X)12C:24H,(8X)12C:12H	
JP16-08	(1X)12C:12H,(1X)12C:48H,(2X)12C:12H,(1X)12C:24H,(5X)12C:12H	
JP16-09	(1X)12C:12H,(1X)12C:36H,(3X)12C:12H,(1X)12C:36H,(2X)12C:12H	
JP16-10	(1X)12C:12H,(1X)12C:48H,(2X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-11	(1X)12C:12H,(1X)12C:48H,(3X)12C:12H,(1X)12C:48H,(4X)12C:12H	
JP16-12	(1X)12C:12H,(1X)12C:48H,(3X)12C:12H,(1X)12C:48H,(3X)12C:12H	
JP16-13	(1X)12C:12H,(1X)12C:24H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-14	(1X)12C:12H,(1X)12C:24H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(7X)12C:12H	
JP16-15	(1X)12C:12H,(1X)12C:24H,(1X)12C:48H,(1X)12C:12H,(1X)12C:48H,(4X)12C:12H	
JP16-16	(1X)12C:12H,(1X)12C:24H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(5X)12C:12H	
JP16-17	(1X)12C:12H,(1X)12C:48H,(1X)12C:48H,(6X)12C:12H	
JP16-18	(1X)12C:12H,(1X)12C:24H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-19	(1X)12C:12H,(1X)12C:48H,(1X)12C:48H,(5X)12C:12H	
JP16-20	(1X)12H:12C,(1X)12H:24C,(2X)12H:12C,(1X)12H:24C,(4X)12H:12C	

Table1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-21	TM	2016	2017	Chum	Hokkaido	Nemuro Strait coast	NPH	Shibetsu Hatchery	Shibetsu River	Shibetsu River
JP16-22	TM	2016	2017	Chum	Hokkaido	East Pacific coast	NPH	Saruru Hatchery	Shizunai River	Erimo misaki Fish Port
JP16-23	TM	2016	2017	Chum	Hokkaido	East Pacific coast	NPH	Hiroo Hatchery	Hiroo River	Hiroo River
JP16-24	TM	2016	2017	Chum	Hokkaido	East Pacific coast	NPH	Hiroo Hatchery	Hiroo River	Hiroo River
JP16-25	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tsurui Hatchery	Kushiro River	Kushiro River
JP16-26	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tsurui Hatchery	Kushiro River	Kushiro River
JP16-27	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tsurui Hatchery	Kushiro River	Kushiro River
JP16-28	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tsurui Hatchery	Kushiro River	Kushiro River
JP16-29	TM	2016	2017	Chum	Hokkaido	East Pacific coast	NPH	Ashibetsu Hatchery	Kushiro River	Kushiro River
JP16-30	TM	2016	2017	Chum	Hokkaido	East Pacific coast	NPH	Ashibetsu Hatchery	Kushiro River	Kushiro River
JP16-31	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-32	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-33	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-34	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-35	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-36	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-37	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-38	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-39	TM	2016	2017	Chum	Hokkaido	East Pacific coast	FRA	Tokachi Hatchery	Tokachi River	Tokachi River
JP16-40	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Yakumo Hatchery	Ainumanai River	Ainumanai River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-21	fry	2,100,000	Shibetsu16chum2	2,3-4H	ıı ııı ıııı		Up
JP16-22	fry	2,000,000	Erimo16chum	2-3,1,2H	ıı ııı ı ıı		Down
JP16-23	fry	2,100,000	Hiroo16chum1	2n-4H	ıı ı ı ı ı		Down
JP16-24	fry	2,100,000	Hiroo16chum2	2,4,1,2H	ıı ıııı ı ıı		Down
JP16-25	fry	1,300,000	Kushiro16chum1	2-9H	ıı ııııııııı		Down
JP16-26	fry	1,600,000	Kushiro16chum2	2-2-3-3H	ıı ıı ııı ııı		Down
JP16-27	fry	3,000,000	Kushiro16chum3	2-8H	ıı ıııııııı		Down
JP16-28	fry	3,200,000	Kushiro16chum4	2-10H	ıı ıııııııııı		Down
JP16-29	fry	1,550,000	Kushiro16chum5	2n,2n-2H	ıı ıı ı ı		Down
JP16-30	fry	1,550,000	Kushiro16chum6	2n-2n,2H	ıı ıı ı ı		Down
JP16-31	fry	2,400,000	Tokachi16chum1	2-5-3H	ıı ııııı ııı		Down
JP16-32	fry	1,450,000	Tokachi16chum2	2-5,3H	ıı ııııı ııı		Down
JP16-33	fry	1,400,000	Tokachi16chum3	2,5-3H	ıı ııııı ııı		Down
JP16-34	fry	1,450,000	Tokachi16chum4	2,5,2H	ıı ııııı ıı		Down
JP16-35	fry	1,400,000	Tokachi16chum5	2-5-2H	ıı ııııı ıı		Down
JP16-36	fry	1,400,000	Tokachi16chum6	2,5,4H	ıı ııııı ıııı		Down
JP16-37	fry	1,450,000	Tokachi16chum7	2-5,2H	ıı ııııı ıı		Down
JP16-38	fry	1,450,000	Tokachi16chum8	2,5,3H	ıı ııııı ııı		Down
JP16-39	fry	2,900,000	Tokachi16chum9	2,5-2H	ıı ııııı ıı		Down
JP16-40	fry	2,200,000	Ainumanai16chum1	2-5H	ıı ııııı		Down

No	Otolith Mark Schedule	Comments
JP16-21	(1X)12H:12C,(1X)12H:24C,(2X)12H:12C,(1X)12H:48C,(4X)12H:12C	
JP16-22	(1X)12C:12H,(1X)12C:48H,(2X)12C:12H,(2X)12C:24H,(2X)12C:12H	
JP16-23	(1X)12C:12H,(1X)12C:48H,(4X)24C:24H	
JP16-24	(1X)12C:12H,(1X)12C:24H,(3X)12C:12H,(2X)12C:24H,(2X)12C:12H	
JP16-25	(1X)12C:12H,(1X)12C:48H,(9X)12C:12H	
JP16-26	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(2X)12C:12H,(1X)12C:36H,(3X)12C:12H	
JP16-27	(1X)12C:12H,(1X)12C:48H,(8X)12C:12H	
JP16-28	(1X)12C:12H,(1X)12C:48H,(10X)12C:12H	
JP16-29	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:48H,(2X)24C:24H	
JP16-30	(1X)12C:12H,(1X)12C:48H,(1X)12C:12H,(1X)12C:24H,(2X)24C:24H	
JP16-31	(1X)12C:12H,(1X)12C:48H,(4X)12C:12H,(1X)12C:48H,(3X)12C:12H	
JP16-32	(1X)12C:12H,(1X)12C:48H,(4X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-33	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,(1X)12C:48H,(3X)12C:12H	
JP16-34	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,(1X)12C:24H,(2X)12C:12H	
JP16-35	(1X)12C:12H,(1X)12C:48H,(4X)12C:12H,(1X)12C:48H,(2X)12C:12H	
JP16-36	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,(1X)12C:24H,(4X)12C:12H	
JP16-37	(1X)12C:12H,(1X)12C:48H,(4X)12C:12H,(1X)12C:24H,(2X)12C:12H	
JP16-38	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-39	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,(1X)12C:48H,(2X)12C:12H	
JP16-40	(1X)12C:12H,(1X)12C:48H,(5X)12C:12H	

Table1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-41	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Yakumo Hatchery	Ainumanai River	Ainumanai River
JP16-42	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Chitose Hatchery	Ishikari River	Ishikari River
JP16-43	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Chitose Hatchery	Ishikari River	Ishikari River
JP16-44	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Chitose Hatchery	Ishikari River	Ishikari River
JP16-45	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Chitose Hatchery	Ishikari River	Ishikari River
JP16-46	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Sapporo Salmon Museum	Ishikari River	Ishikari River
JP16-47	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Fukushima Hatchery	Oyobe River	Oyobe River
JP16-48	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Fukushima Hatchery	Oyobe River	Oyobe River
JP16-49	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Kyogoku Hatchery	Shiribetsu River	Shiribetsu River
JP16-50	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Kyogoku Hatchery	Shiribetsu River	Shiribetsu River
JP16-51	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Nakagawa Hatchery	Teshio River	Teshio River
JP16-52	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Nakagawa Hatchery	Teshio River	Teshio River
JP16-53	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Teshio Hatchery	Teshio River	Teshio River
JP16-54	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Teshio Hatchery	Teshio River	Teshio River
JP16-55	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Teshio Hatchery	Teshio River	Teshio River
JP16-56	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Teshio Hatchery	Teshio River	Teshio River
JP16-57	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	FRA	Teshio Hatchery	Teshio River	Teshio River
JP16-58	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Kyogoku Hatchery	Yoichi River	Yoichi River
JP16-59	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Kyogoku Hatchery	Yoichi River	Yoichi River
JP16-60	TM	2016	2017	Chum	Hokkaido	Japan Sea coast	NPH	Kyogoku Hatchery	Yoichi River	Yoichi River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-41	fry	2,200,000	Ainumanai16chum2	2,2,1,2H			Down
JP16-42	fry	1,400,000	Ishikari16chum1	2,2n,3H			Down
JP16-43	fry	1,400,000	Ishikari16chum2	2,4n,3H			Down
JP16-44	fry	2,800,000	Ishikari16chum3	2,6n,3H			Down
JP16-45	fry	24,400,000	Ishikari16chum4	2,3-3H			Down
JP16-46	fry	86,000	Ishikari16chum5	2-2H			Down
JP16-47	fry	900,000	Oyobe16chum1	2,3-2H			Down
JP16-48	fry	900,000	Oyobe16chum2	2-2,3H			Down
JP16-49	fry	2,100,000	Shiribetsu16chum1	2-5H			Down
JP16-50	fry	2,100,000	Shiribetsu16chum2	2,2,1,2H			Down
JP16-51	fry	2,100,000	Teshio16chum1	2-5H			Down
JP16-52	fry	2,100,000	Teshio16chum2	2,2,1,2H			Down
JP16-53	fry	700,000	Teshio16chum3	2,1-3H			Down
JP16-54	fry	700,000	Teshio16chum4	2-1,3H			Down
JP16-55	fry	1,200,000	Teshio16chum5	2n-3H			Down
JP16-56	fry	1,400,000	Teshio16chum6	2-1-2H			Down
JP16-57	fry	1,000,000	Teshio16chum7	2,3,2H			Down
JP16-58	fry	1,500,000	Yoichi16chum1	2,2,1,4H			Down
JP16-59	fry	1,500,000	Yoichi16chum2	2,2,1,5H			Down
JP16-60	fry	1,000,000	Yoichi16chum3	2-3,2H			Down

No	Otolith Mark Schedule	Comments
JP16-41	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(2X)12C:24H,(2X)12C:12H	
JP16-42	(1X)12C:12H,(1X)12C:24H,(1X)3C:9H,(1X)3C:21H,(3X)12C:12H	
JP16-43	(1X)12C:12H,(1X)12C:24H,(3X)3C:9H,(1X)3C:21H,(3X)12C:12H	
JP16-44	(1X)12C:12H,(1X)12C:24H,(5X)3C:9H,(1X)3C:21H,(3X)12C:12H	
JP16-45	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:36H,(3X)12C:12H	
JP16-46	(1X)24C:24H,(1X)24C:72H,(2X)24C:24H	
JP16-47	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:48H,(2X)12C:12H	
JP16-48	(1X)12C:12H,(1X)12C:48H,(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-49	(1X)12C:12H,(1X)12C:48H,(5X)12C:12H	
JP16-50	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(2X)12C:24H,(2X)12C:12H	
JP16-51	(1X)12C:12H,(1X)12C:48H,(5X)12C:12H	
JP16-52	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(2X)12C:24H,(2X)12C:12H	
JP16-53	(1X)12C:12H,(1X)12C:24H,(1X)12C:48H,(3X)12C:12H	
JP16-54	(1X)12C:12H,(1X)12C:48H,(1X)12C:24H,(3X)12C:12H	
JP16-55	(1X)12C:12H,(1X)12C:36H,(3X)24C:24H	
JP16-56	(1X)12C:12H,(2X)12C:48H,(2X)12C:12H	
JP16-57	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:24H,(2X)12C:12H	
JP16-58	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(2X)12C:24H,(4X)12C:12H	
JP16-59	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(2X)12C:24H,(5X)12C:12H	
JP16-60	(1X)12H:12C,(1X)12H:48C,(2X)12H:12C,(1X)12H:24C,(2X)12H:12C	

Table1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-61	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Shirikishinai Hatchery	Shirikishinai River	Shirikishinai River
JP16-62	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Shirikishinai Hatchery	Shirikishinai River	Shirikishinai River
JP16-63	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Hidakahorobetsu Hatchery	Hidakahorobetsu River	Hidakahorobetsu River
JP16-64	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Hidakahorobetsu Hatchery	Hidakahorobetsu River	Hidakahorobetsu River
JP16-65	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Shikiu Hatchery	Shikiu River	Shikiu River
JP16-66	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Shikiu Hatchery	Shikiu River	Shikiu River
JP16-67	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Shizunai Hatchery	Shizunai River	Shizunai River
JP16-68	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Shizunai Hatchery	Shizunai River	Shizunai River
JP16-69	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Shizunai Hatchery	Shizunai River	Shizunai River
JP16-70	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Shizunai Hatchery	Shizunai River	Shizunai River
JP16-71	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Shizunai Hatchery	Shizunai River	Shizunai River
JP16-72	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Shizunai Hatchery	Shizunai River	Shizunai River
JP16-73	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Toyohata Hatchery	Shizunai River	Shizunai River
JP16-74	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Toyohata Hatchery	Shizunai River	Shizunai River
JP16-75	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Toyohata Hatchery	Shizunai River	Shizunai River
JP16-76	TM	2016	2017	Chum	Hokkaido	West Pacific coast	NPH	Toyohata Hatchery	Shizunai River	Shizunai River
JP16-77	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Yakumo Hatchery	Yurappu River	Yurappu River
JP16-78	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Yakumo Hatchery	Yurappu River	Yurappu River
JP16-79	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Yakumo Hatchery	Yurappu River	Yurappu River
JP16-80	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Yakumo Hatchery	Yurappu River	Yurappu River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-61	fry	2,100,000	Shirikishinai16chum1	2-7H	▮▮ ▮▮▮▮▮▮▮		Down
JP16-62	fry	2,100,000	Shirikishinai16chum2	2,2n-2nH	▮ ▮ ▮▮ ▮▮		Down
JP16-63	fry	2,100,000	idakahorobetsu16chum	2-7H	▮▮ ▮▮▮▮▮▮▮		Down
JP16-64	fry	2,100,000	idakahorobetsu16chum	2,2n-2nH	▮ ▮ ▮▮ ▮▮		Down
JP16-65	fry	1,400,000	Shikiu16chum1	2-7H	▮▮ ▮▮▮▮▮▮▮		Down
JP16-66	fry	1,400,000	Shikiu16chum2	2,2n-2nH	▮ ▮ ▮▮ ▮▮		Down
JP16-67	fry	700,000	Shizunai16chum1	2,2,5H	▮▮ ▮▮ ▮▮▮▮▮		Down
JP16-68	fry	600,000	Shizunai16chum2	2,2,6H	▮▮ ▮▮ ▮▮▮▮▮▮		Down
JP16-69	fry	600,000	Shizunai16chum3	2,2-4H	▮▮ ▮▮ ▮▮▮▮		Down
JP16-70	fry	2,900,000	Shizunai16chum4	2,2-5H	▮▮ ▮▮ ▮▮▮▮▮		Down
JP16-71	fry	800,000	Shizunai16chum5	2-2,4H	▮▮ ▮▮ ▮▮▮▮		Down
JP16-72	fry	800,000	Shizunai16chum6	2-2,5H	▮▮ ▮▮ ▮▮▮▮▮		Down
JP16-73	fry	400,000	Shizunai16chum7	2,3,1,2H	▮▮ ▮▮▮ ▮ ▮▮		Down
JP16-74	fry	600,000	Shizunai16chum8	2,3,1,3H	▮▮ ▮▮▮ ▮ ▮▮▮		Down
JP16-75	fry	600,000	Shizunai16chum9	2,3,1,4H	▮▮ ▮▮▮ ▮ ▮▮▮▮		Down
JP16-76	fry	600,000	Shizunai16chum10	2-3,1,3H	▮▮ ▮▮▮ ▮ ▮▮▮		Down
JP16-77	fry	650,000	Yurappu16chum1	2,2n-4nH	▮ ▮ ▮▮ ▮▮▮▮		Down
JP16-78	fry	850,000	Yurappu16chum2	2,3n-2nH	▮ ▮ ▮▮▮ ▮▮		Down
JP16-79	fry	1,000,000	Yurappu16chum3	2,3n-3nH	▮ ▮ ▮▮▮ ▮▮▮		Down
JP16-80	fry	1,000,000	Yurappu16chum4	2,3n-4nH	▮ ▮ ▮▮▮ ▮▮▮▮		Down

No	Otolith Mark Schedule	Comments
JP16-61	(1X)12C:12H,(1X)12C:48H,(7X)12C:12H	
JP16-62	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:48H,(2X)12C:12H	
JP16-63	(1X)12C:12H,(1X)12C:48H,(7X)12C:12H	
JP16-64	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:48H,(2X)12C:12H	
JP16-65	(1X)12C:12H,(1X)12C:48H,(7X)12C:12H	
JP16-66	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:48H,(2X)12C:12H	
JP16-67	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(5X)12C:12H	
JP16-68	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-69	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:48H,(4X)12C:12H	
JP16-70	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:48H,(5X)12C:12H	
JP16-71	(1X)12C:12H,(1X)12C:48H,(1X)12C:12H,(1X)12C:24H,(4X)12C:12H	
JP16-72	(1X)12C:12H,(1X)12C:48H,(1X)12C:12H,(1X)12C:24H,(5X)12C:12H	
JP16-73	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(2X)12C:24H,(2X)12C:12H	
JP16-74	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(2X)12C:24H,(3X)12C:12H	
JP16-75	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(2X)12C:24H,(4X)12C:12H	
JP16-76	(1X)12C:12H,(1X)12C:48H,(2X)12C:12H,(2X)12C:24H,(3X)12C:12H	
JP16-77	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:48H,(4X)12C:12H	
JP16-78	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H,(1X)12C:48H,(2X)12C:12H	
JP16-79	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H,(1X)12C:48H,(3X)12C:12H	
JP16-80	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H,(1X)12C:48H,(4X)12C:12H	

Table1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-81	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Yakumo Hatchery	Yurappu River	Yurappu River
JP16-82	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Yakumo Hatchery	Yurappu River	Yurappu River
JP16-83	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Yakumo Hatchery	Yurappu River	Yurappu River
JP16-84	TM	2016	2017	Chum	Hokkaido	West Pacific coast	FRA	Yakumo Hatchery	Yurappu River	Yurappu River
JP16-85	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Masukawa Hatchery	Gakkou River	Gakkou River
JP16-86	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Masukawa Hatchery	Gakkou River	Gakkou River
JP16-87	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Jinzu Hatchery	Jinzu River	Jinzu River
JP16-88	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Jinzu Hatchery	Jinzu River	Jinzu River
JP16-89	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Kawabukuro Hatchery	Kawabukuro River	Kawabukuro River
JP16-90	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Kawabukuro Hatchery	Kawabukuro River	Kawabukuro River
JP16-91	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Miomote #3 Hatchery	Miomote River	Miomote River
JP16-92	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Miomote #3 Hatchery	Miomote River	Miomote River
JP16-93	ALC	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Miomote #3 Hatchery	Miomote River	Miomote River
JP16-94	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Oirase Hatchery (Jpn sea)	Niida River	Oirase River (Jpn Sea)
JP16-95	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Shougawa Hatchery	Shou River	Shou River
JP16-96	TM	2016	2017	Chum	Honshu	Japan Sea coast	NPH	Shougawa Hatchery	Shou River	Shou River
JP16-97	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Shimoakka Hatchery	Akka River	Akka River
JP16-98	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Shimoakka Hatchery	Akka River	Akka River
JP16-99	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Shimoakka Hatchery	Akka River	Akka River
JP16-100	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Akedo Hatchery	Akedo River	Akedo River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-81	fry	1,000,000	Yurappu16chum5	2,2n,3nH			Down
JP16-82	fry	1,000,000	Yurappu16chum6	2,2n,4nH			Down
JP16-83	fry	1,000,000	Yurappu16chum7	2,2n,5nH			Down
JP16-84	fry	1,000,000	Yurappu16chum8	2,2n,6nH			Down
JP16-85	fry	2,100,000	Gakkou16chum1	2,3nH			Down
JP16-86	fry	2,100,000	Gakkou16chum2	2,1-2H			Down
JP16-87	fry	300,000	Jinzu16chum1	2,1,2H			Down
JP16-88	fry	300,000	Jinzu16chum2	2,4nH			Down
JP16-89	fry	2,000,000	Kawabukuro16chum1	2,1,2,2H			Down
JP16-90	fry	2,000,000	Kawabukuro16chum2	2-1,2H			Down
JP16-91	fry	1,750,000	Miomote16chum1	2-3H			Down
JP16-92	fry	1,750,000	Miomote16chum2	2,7nH			Down
JP16-93	eyed egg	500,000	Miomote16chum3	A1H			
JP16-94	fry	1,500,000	Oirase-j16chum	2,3n,2H			Down
JP16-95	fry	1,000,000	Shou16chum1	2,1,2H			Down
JP16-96	fry	1,000,000	Shou16chum2	2,4nH			Down
JP16-97	fry	4,000,000	Akka16chum1	2,1,3H			Down
JP16-98	fry	4,000,000	Akka16chum2	2,1,4H			Down
JP16-99	fry	3,000,000	Akka16chum3	2,6H			Down
JP16-100	fry	1,000,000	Akedo16chum1	2,1,3H			Down

No	Otolith Mark Schedule	Comments
JP16-81	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-82	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:24H,(4X)12C:12H	
JP16-83	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:24H,(5X)12C:12H	
JP16-84	(1X)24C:24H,(1X)24C:48H,(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-85	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	
JP16-86	(1X)12C:12H,(1X)12C:24H,(1X)12C:48H,(2X)12C:12H	
JP16-87	(1X)12C:12H,(2X)12C:24H,(2X)12C:12H	
JP16-88	(1X)12C:12H,(1X)12C:24H,(4X)3C:9H	
JP16-89	(1X)12C:12H,(2X)12C:24H,(1X)12C:12H,(1X)12C:24H,(2X)12C:12H	
JP16-90	(1X)12C:12H,(1X)12C:48H,(1X)12C:24H,(2X)12C:12H	
JP16-91	(1X)12C:12H,(1X)12C:48H,(3X)12C:12H	
JP16-92	(1X)12C:12H,(1X)12C:24H,(7X)3C:9H	
JP16-93		large ring
JP16-94	(1X)12C:12H,(1X)12C:24H,(2X)3C:9H,(1X)3C:21H,(2X)12C:12H	
JP16-95	(1X)12C:12H,(2X)12C:24H,(2X)12C:12H	
JP16-96	(1X)12C:12H,(1X)12C:24H,(4X)3C:9H	
JP16-97	(1X)12C:12H,(2X)12C:24H,(3X)12C:12H	
JP16-98	(1X)12C:12H,(2X)12C:24H,(4X)12C:12H	
JP16-99	(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-100	(1X)12C:12H,(2X)12C:24H,(3X)12C:12H	

Table1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-101	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Akedo Hatchery	Akedo River	Akedo River
JP16-102	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Eai Hatchery	Kitakami River	Kitakami River
JP16-103	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Eai Hatchery	Kitakami River	Kitakami River
JP16-104	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-105	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-106	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-107	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-108	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-109	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-110	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-111	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-112	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-113	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-114	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-115	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kasshi Hatchery	Kasshi River	Kasshi River
JP16-116	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kesen Hatchery	Kesen River	Kesen River
JP16-117	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kesen Hatchery	Kesen River	Kesen River
JP16-118	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kumano Hatchery	Kumano River	Kumano River
JP16-119	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kumano Hatchery	Kumano River	Kumano River
JP16-120	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kumano Hatchery	Kumano River	Kumano River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-101	fry	1,000,000	Akedo16chum2	2,6H	I I IIIIII		Down
JP16-102	fry	1,600,000	Kitakami16chum1	2,3H	I I III		Down
JP16-103	fry	1,600,000	Kitakami16chum2	2,2H	I I I I		Down
JP16-104	fry	100,000	Kasshi16chum1	2,4,3H3	I I IIII III	I I I	Down
JP16-105	fry	100,000	Kasshi16chum2	2,4,3H2	I I IIII III	I I	Down
JP16-106	fry	100,000	Kasshi16chum3	2,2,4H3	I I I I IIII	I I I	Down
JP16-107	fry	100,000	Kasshi16chum4	2,4H3	I I IIII	I I I	Down
JP16-108	fry	100,000	Kasshi16chum5	2,2,3,2H3	I I I I III I I	I I I	Down
JP16-109	fry	100,000	Kasshi16chum6	2,2,3,2H2	I I I I III I I	I I	Down
JP16-110	fry	800,000	Kasshi16chum7	2,1,3H	I I I IIII		Down
JP16-111	fry	800,000	Kasshi16chum8	2,1,4H	I I I IIII		Down
JP16-112	fry	800,000	Kasshi16chum9	2,1,5H	I I I IIIII		Down
JP16-113	fry	800,000	Kasshi16chum10	2,6H	I I IIIIII		Down
JP16-114	fry	800,000	Kasshi16chum11	2-4H	I I IIII		Down
JP16-115	fry	1,000,000	Kasshi16chum12	2,7H	I I IIIIIII		Down
JP16-116	fry	1,200,000	Kesen16chum1	2,1,3H	I I I IIII		Down
JP16-117	fry	1,200,000	Kesen16chum2	2,6H	I I IIIIII		Down
JP16-118	fry	200,000	Kumano16chum1	2,2,3,2H	I I I I III I I		Down
JP16-119	fry	250,000	Kumano16chum2	2,4,3H	I I IIII III		Down
JP16-120	fry	250,000	Kumano16chum3	2,4H	I I IIII		Down

No	Otolith Mark Schedule	Comments
JP16-101	(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-102	(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-103	(1X)12C:12H,(1X)12C:24H,(2X)12C:12H	
JP16-104	(1X)12C:12H,(1X)12C:24H,(3X)12C:12H,(1X)12C:24H,(3X)12C:12H,HATCH,(3X)12C:12H	
JP16-105	(1X)12C:12H,(1X)12C:24H,(3X)12C:12H,(1X)12C:24H,(3X)12C:12H,HATCH,(2X)12C:12H	
JP16-106	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,HATCH,(3X)12C:12H	
JP16-107	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,HATCH,(3X)12C:12H	
JP16-108	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:24H,(2X)12C:12H,HATCH,(3X)12C:12H	
JP16-109	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:24H,(2X)12C:12H,HATCH,(2X)12C:12H	
JP16-110	(1X)12C:12H,(2X)12C:24H,(3X)12C:12H	
JP16-111	(1X)12C:12H,(2X)12C:24H,(4X)12C:12H	
JP16-112	(1X)12C:12H,(2X)12C:24H,(5X)12C:12H	
JP16-113	(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-114	(1X)12C:12H,(1X)12C:48H,(4X)12C:12H	
JP16-115	(1X)12C:12H,(1X)12C:24H,(7X)12C:12H	
JP16-116	(1X)12C:12H,(2X)12C:24H,(3X)12C:12H	
JP16-117	(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-118	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(2X)12C:12H,(1X)12C:24H,(2X)12C:12H	
JP16-119	(1X)12C:12H,(1X)12C:24H,(3X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-120	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H	

Table1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-121	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kumano Hatchery	Kumano River	Kumano River
JP16-122	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kumano Hatchery	Kumano River	Kumano River
JP16-123	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Kumano Hatchery	Kumano River	Kumano River
JP16-124	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Oirase Hatchery (Pacific)	Oirase River (Pacific)	Oirase River (Pacific)
JP16-125	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Oirase Hatchery (Pacific)	Oirase River (Pacific)	Oirase River (Pacific)
JP16-126	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Orikasa Hatchery	Orikasa River	Orikasa River
JP16-127	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Orikasa Hatchery	Orikasa River	Orikasa River
JP16-128	TM	2016	2017	Chum	Honshu	Pacific coast	FRA	FRA Miyako Lab.	Orikasa River	Orikasa River
JP16-129	TM	2016	2017	Chum	Honshu	Pacific coast	FRA	FRA Miyako Lab.	Orikasa River	Orikasa River
JP16-130	TM	2016	2017	Chum	Honshu	Pacific coast	FRA	FRA Miyako Lab.	Orikasa River	Orikasa River
JP16-131	TM	2016	2017	Chum	Honshu	Pacific coast	FRA	FRA Miyako Lab.	Orikasa River	Yamada Bay
JP16-132	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Sakari Hatchery	Sakari River	Sakari River
JP16-133	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Sakari Hatchery	Sakari River	Sakari River
JP16-134	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Sakari Hatchery	Sakari River	Sakari River
JP16-135	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Sakari Hatchery	Sakari River	Sakari River
JP16-136	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Tarou Hatchery	Tarou River	Tarou River
JP16-137	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Tarou Hatchery	Tarou River	Tarou River
JP16-138	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Tsugaruishi Hatchery	Tsugaruishi River	Tsugaruishi River
JP16-139	TM	2016	2017	Chum	Honshu	Pacific coast	NPH	Tsugaruishi Hatchery	Tsugaruishi River	Tsugaruishi River
JP16-140	ALC	2016	2017	Pink	Hokkaido	Okhotsk Sea coast	NPH	Aioi Hatchery	Abashiri River	Abashiri River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-121	fry	150,000	Kumano16chum4	2,2,4H	I I I I I I I		Down
JP16-122	fry	150,000	Kumano16chum5	2,4H2	I I I I I	I I	Down
JP16-123	fry	200,000	Kumano16chum6	2,2,4H2	I I I I I I I	I I	Down
JP16-124	fry	3,755,000	Oirase-p16chum1	2-6H	I I I I I I I		Down
JP16-125	fry	3,755,000	Oirase-p16chum2	2,2,3H	I I I I I I		Down
JP16-126	fry	800,000	Orikasa16chum1	2,1,3H	I I I I I		Down
JP16-127	fry	800,000	Orikasa16chum2	2,6H	I I I I I I I		Down
JP16-128	fry	400,000	Orikasa16chum3	2,5H	I I I I I I		Down
JP16-129	fry	400,000	Orikasa16chum4	2-2,2H	I I I I I		Down
JP16-130	fry	400,000	Orikasa16chum5	2n-2H	I I I I		Down
JP16-131	fry	400,000	Yamada16chum	2,2nH	I I I I		Down
JP16-132	fry	500,000	Sakari16chum1	2,1,3H	I I I I I		Down
JP16-133	fry	500,000	Sakari16chum2	2,1,4H	I I I I I I		Down
JP16-134	fry	500,000	Sakari16chum3	2,1,5H	I I I I I I I		Down
JP16-135	fry	500,000	Sakari16chum4	2,6H	I I I I I I I		Down
JP16-136	fry	1,000,000	Tarou16chum1	2,1,3H	I I I I I		Down
JP16-137	fry	1,000,000	Tarou16chum2	2,6H	I I I I I I I		Down
JP16-138	fry	3,000,000	Tsugaruishi16chum1	2-4H	I I I I I		Down
JP16-139	fry	1,000,000	Tsugaruishi16chum2	2,7H	I I I I I I I I		Down
JP16-140	fry	2,000,000	Abashiri16pink-alc	A2H			

No	Otolith Mark Schedule	Comments
JP16-121	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(4X)12C:12H	
JP16-122	(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,HATCH,(2X)12C:12H	
JP16-123	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(4X)12C:12H,HATCH,(2X)12C:12H	
JP16-124	(1X)12C:12H,(1X)12C:48H,(6X)12C:12H	
JP16-125	(1X)12C:12H,(1X)12C:24H,(1X)12C:12H,(1X)12C:24H,(3X)12C:12H	
JP16-126	(1X)12C:12H,(2X)12C:24H,(3X)12C:12H	
JP16-127	(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-128	(1X)12C:12H,(1X)12C:24H,(5X)12C:12H	
JP16-129	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:24H,(2X)12C:12H	
JP16-130	(1X)12C:12H,(1X)12C:36H,(2X)24C:24H	
JP16-131	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H	
JP16-132	(1X)12C:12H,(2X)12C:24H,(3X)12C:12H	
JP16-133	(1X)12C:12H,(2X)12C:24H,(4X)12C:12H	
JP16-134	(1X)12C:12H,(2X)12C:24H,(5X)12C:12H	
JP16-135	(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-136	(1X)12C:12H,(2X)12C:24H,(3X)12C:12H	
JP16-137	(1X)12C:12H,(1X)12C:24H,(6X)12C:12H	
JP16-138	(1X)12C:12H,(1X)12C:48H,(4X)12C:12H	
JP16-139	(1X)12C:12H,(1X)12C:24H,(7X)12C:12H	
JP16-140		large ring double

Table1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-141	TM	2016	2017	Pink	Hokkaido	Okhotsk Sea coast	FRA	Tokushibetsu Hatchery	Tokushibetsu River	Kitamihorobetsu River
JP16-142	TM	2016	2017	Pink	Hokkaido	Okhotsk Sea coast	FRA	Shari Hatchery	Onnebetsu River	Onnebetsu River
JP16-143	TM	2016	2017	Pink	Hokkaido	Okhotsk Sea coast	FRA	Shari Hatchery	Onnebetsu River	Onnebetsu River
JP16-144	TM	2016	2017	Pink	Hokkaido	Okhotsk Sea coast	FRA	Shari Hatchery	Shari River	Shari River
JP16-145	TM	2016	2017	Pink	Hokkaido	Okhotsk Sea coast	FRA	Shari Hatchery	Shari River	Tokoro River
JP16-146	ALC	2016	2017	Pink	Hokkaido	Okhotsk Sea coast	NPH	Oketo Hatchery	Tokoro River	Tokoro River
JP16-147	TM	2016	2017	Pink	Hokkaido	Okhotsk Sea coast	FRA	Tokushibetsu Hatchery	Tokushibetsu River	Tokushibetsu River
JP16-148	TM	2016	2017	Pink	Hokkaido	Nemuro Strait coast	FRA	Ichani Hatchery	Ichani River	Ichani River
JP16-149	TM	2016	2017	Pink	Hokkaido	Nemuro Strait coast	FRA	Ichani Hatchery	Ichani River	Ichani River
JP16-150	TM	2016	2017	Pink	Hokkaido	Nemuro Strait coast	FRA	Ichani Hatchery	Ichani River	Ichani River
JP16-151	TM	2016	2017	Pink	Hokkaido	Nemuro Strait coast	FRA	Nijibetsu Hatchery	Sashirui River etc	Shunkarikotan River etc
JP16-152	TM	2016	2017	Masu	Hokkaido	Okhotsk Sea coast	FRA	Shari Hatchery	Shari River	Shari River
JP16-153	TM	2016	2017	Masu	Hokkaido	Okhotsk Sea coast	FRA	Shari Hatchery	Shari River	Shari River
JP16-154	TM	2016	2018	Masu	Hokkaido	Okhotsk Sea coast	FRA	Shari Hatchery	Shari River	Shari River
JP16-155	TM	2016	2017	Masu	Hokkaido	Okhotsk Sea coast	FRA	Tokushibetsu Hatchery	Tokushibetsu River	Tokushibetsu River
JP16-156	TM	2016	2017	Masu	Hokkaido	Nemuro Strait coast	FRA	Nemuro Hatchery	Ichani River	Ichani River
JP16-157	TM	2016	2017	Masu	Hokkaido	Nemuro Strait coast	FRA	Nemuro Hatchery	Ichani River	Ichani River
JP16-158	TM	2016	2018	Masu	Hokkaido	Nemuro Strait coast	FRA	Nemuro Hatchery	Ichani River	Ichani River
JP16-159	TM	2016	2017	Masu	Hokkaido	Nemuro Strait coast	FRA	Nemuro Hatchery	Shibetsu River	Shibetsu River
JP16-160	TM	2016	2017	Masu	Hokkaido	Nemuro Strait coast	FRA	Nemuro Hatchery	Shibetsu River	Shibetsu River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-141	fry	1,300,000	Kitamihorobetsu16pink	2n-3H	II III		Down
JP16-142	fry	1,500,000	Onnebetsu 16pink1	2,6nH	II IIIIII		Down
JP16-143	fry	1,500,000	Onnebetsu 16pink2	2,5nH	II IIIII		Down
JP16-144	fry	4,700,000	Shari16pink	2,3nH	II III		Down
JP16-145	fry	1,000,000	Tokoro16pink	2,3n-2nH	II III II		Down
JP16-146	fry	2,000,000	Tokoro16pink-alc	A1H			
JP16-147	fry	1,700,000	Tokushibetsu16pink	2-3H	II III		Down
JP16-148	fry	1,500,000	Ichani16pink1	2,4H	II IIII		Down
JP16-149	fry	1,500,000	Ichani16pink2	2-2-4H	II II IIII		Down
JP16-150	fry	1,500,000	Ichani16pink3	2-5H	II IIIII		Down
JP16-151	fry	5,300,000	Shibetsu16pink	2,4nH	II IIII		Down
JP16-152	fry	500,000	Shari16masu-f	4H	IIII		Down
JP16-153	juvenile	50,000	Shari16masu-j	4H	IIII		Down
JP16-154	smolt	50,000	Shari16masu-s	4H	IIII		Down
JP16-155	fry	500,000	Tokushibetsu16masu-f	2,3nH	II III		Down
JP16-156	fry	100,000	Ichani16masu-f	2,5H	II IIIII		Down
JP16-157	juvenile	30,000	Ichani16masu-j	2,5H	II IIIII		Down
JP16-158	smolt	20,000	Ichani16masu-s	2,5H	II IIIII		Down
JP16-159	fry	120,000	Shibetsu16masu-f	2,4H	II IIII		Down
JP16-160	juvenile	60,000	Shibetsu16masu-j	2,4H	II IIII		Down

No	Otolith Mark Schedule	Comments
JP16-141	(1X)12C:12H,(1X)12C:36H,(3X)24C:24H	
JP16-142	(1X)24C:24H,(1X)24C:48H,(6X)12C:12H	
JP16-143	(1X)24C:24H,(1X)24C:48H,(5X)12C:12H	
JP16-144	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	
JP16-145	(1X)24C:24H,(1X)24C:48H,(2X)12C:12H,(1X)12C:36H,(2X)12C:12H	
JP16-146		large ring
JP16-147	(1X)24C:24H,(1X)24C:72H,(3X)24C:24H	
JP16-148	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	
JP16-149	(1X)12C:12H,(1X)12C:36H,(1X)12C:12H,(1X)12C:36H,(4X)12C:12H	
JP16-150	(1X)12C:12H,(1X)12C:36H,(5X)12C:12H	
JP16-151	(1X)24C:24H,(1X)24C:48H,(4X)12C:12H	
JP16-152	(4X)24C:24H	
JP16-153	(4X)24C:24H	
JP16-154	(4X)24C:24H	
JP16-155	(1X)24C:24H,(1X)24C:48H,(3X)12C:12H	
JP16-156	(1X)24C:24H,(1X)24C:48H,(5X)24C:24H	
JP16-157	(1X)24C:24H,(1X)24C:48H,(5X)24C:24H	
JP16-158	(1X)24C:24H,(1X)24C:48H,(5X)24C:24H	
JP16-159	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	
JP16-160	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	

Table 1. Continued.

No	Mark Type	Brood Year	Year of Release	Species	Prefecture	Region	Agency	Facility	Stock	Final Release Site
JP16-161	TM	2016	2018	Masu	Hokkaido	Nemuro Strait coast	FRA	Nemuro Hatchery	Shibetsu River	Shibetsu River
JP16-162	TM	2016	2017	Masu	Hokkaido	Japan Sea coast	FRA	Chitose Hatchery	Ishikari River	Ishikari River
JP16-163	TM	2016	2017	Masu	Hokkaido	Japan Sea coast	FRA	Chitose Hatchery	Ishikari River	Ishikari River
JP16-164	TM	2016	2018	Masu	Hokkaido	Japan Sea coast	FRA	Chitose Hatchery	Ishikari River	Ishikari River
JP16-165	TM	2016	2017	Masu	Hokkaido	Japan Sea coast	FRA	Shiribetsu Hatchery	Shiribetsu River	Shiribetsu River
JP16-166	TM	2016	2017	Masu	Hokkaido	Japan Sea coast	FRA	Shiribetsu Hatchery	Shiribetsu River	Shiribetsu River
JP16-167	TM	2016	2017	Masu	Hokkaido	Japan Sea coast	FRA	Shiribetsu Hatchery	Shiribetsu River	Shiribetsu River
JP16-168	TM	2016	2017	Masu	Hokkaido	Japan Sea coast	FRA	Shiribetsu Hatchery	Shiribetsu River	Shubuto River
JP16-169	ALC	2016	2016	Masu	Honshu	Japan Sea coast	YFPF	YFPF Freshw. Fish. Ctr.	Captive-brood	Ira River
JP16-170	TM	2016	2017	Masu	Honshu	Pacific coast	IIFTC	IIFTC	Akka River	Akka River
JP16-171	TM	2016	2017	Masu	Honshu	Pacific coast	IIFTC	IIFTC	Akka River	Akka River
JP16-172	TM	2016	2017	Masu	Honshu	Pacific coast	IIFTC	IIFTC	Akka River	Akka River
JP16-173	TM	2016	2017	Sockeye	Hokkaido	East Pacific coast	FRA	Shizunai Hatchery	Kushiro River	Kushiro River
JP16-174	TM	2016	2018	Sockeye	Hokkaido	West Pacific coast	FRA	Chitose Hatchery	Abira River	Abira River
JP16-175	TM	2016	2017	Sockeye	Hokkaido	West Pacific coast	FRA	Chitose Hatchery	Shizunai River	Shizunai River
JP16-176	TM	2016	2018	Sockeye	Hokkaido	West Pacific coast	FRA	Chitose Hatchery	Shizunai River	Shizunai River

No	Stage	Preliminary Number of OM Released	OM ID	Hatch Code	Prehatch Graphic Image	Posthatch Graphic Image	Temp Shift Direction
JP16-161	smolt	20,000	Shibetsu16masu-s	2,4H	I I I I I		Down
JP16-162	fry	30,000	Ishikari16masu-f	2,3H	I I I I I		Down
JP16-163	juvenile	40,000	Ishikari16masu-j	2,3H	I I I I I		Down
JP16-164	smolt	30,000	Ishikari16masu-s	2,3H	I I I I I		Down
JP16-165	fry	760,000	Shiribetsu16masu-f	5H	I I I I I		Down
JP16-166	juvenile	220,000	Shiribetsu16masu-j	5H	I I I I I		Down
JP16-167	smolt	220,000	Shiribetsu16masu-s	5H	I I I I I		Down
JP16-168	fry	500,000	Shubuto16masu-f	5H	I I I I I		Down
JP16-169	eyed egg	30,000	Ira16masu-e	A1H			
JP16-170	fry	50,000	Akka16masu2-f	2n-2H	I I I I		Down
JP16-171	fry	50,000	Akka16masu1-f	2n-3H	I I I I I		Down
JP16-172	fry	50,000	Akka16masu2-f	2n-4H	I I I I I I		Down
JP16-173	fry	50,000	Kushiro16sockeye-f	2,3H	I I I I I		Down
JP16-174	smolt	50,000	Abira16sockeye-s	2,8H	I I I I I I I I I		Down
JP16-175	juvenile	30,000	Shizunai16sockeye-j	2,8H	I I I I I I I I I		Down
JP16-176	smolt	20,000	Shizunai16sockeye-s	2,8H	I I I I I I I I I		Down

No	Otolith Mark Schedule	Comments
JP16-161	(1X)24C:24H,(1X)24C:48H,(4X)24C:24H	
JP16-162	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	
JP16-163	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	finclips (left ventral fin)
JP16-164	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	finclips (right ventral fin)
JP16-165	(5X)24C:24H	
JP16-166	(5X)24C:24H	finclips (left ventral fin)
JP16-167	(5X)24C:24H	finclips (right ventral fin)
JP16-168	(5X)24C:24H	
JP16-169		small ring
JP16-170	(1X)12C:12H,(1X)12C:36H,(2X)24C:24H	
JP16-171	(1X)12C:12H,(1X)12C:36H,(3X)24C:24H	
JP16-172	(1X)12C:12H,(1X)12C:36H,(4X)24C:24H	
JP16-173	(1X)24C:24H,(1X)24C:48H,(3X)24C:24H	
JP16-174	(1X)24C:24H,(1X)24C:48H,(8X)24C:24H	
JP16-175	(1X)24C:24H,(1X)24C:48H,(8X)24C:24H	
JP16-176	(1X)24C:24H,(1X)24C:48H,(8X)24C:24H	

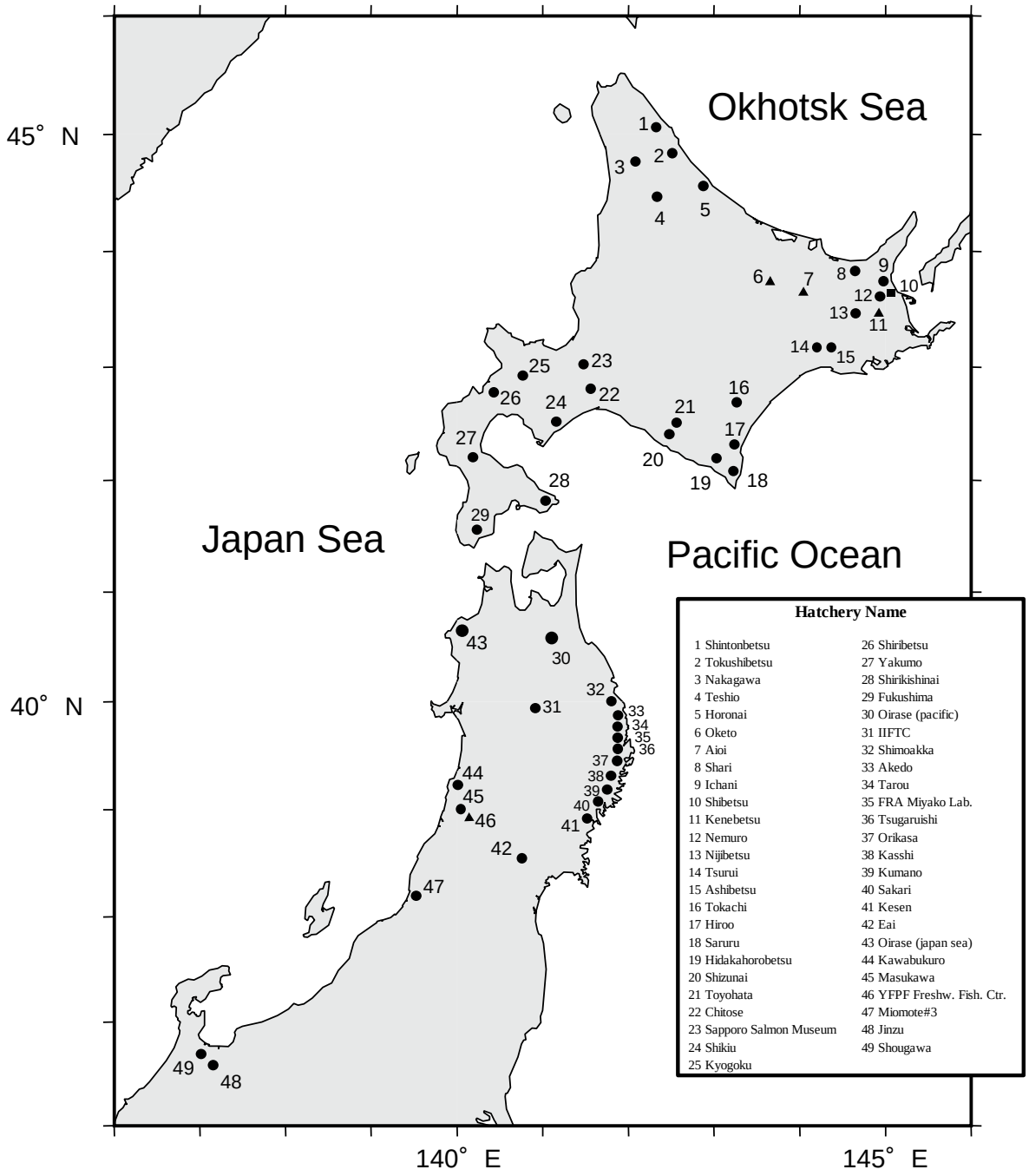

Fig. 1. Locations of hatcheries where brood year 2016 salmon will be otolith-marked. Forty-four (closed circles) and 4 (closed triangles) hatcheries conduct otolith thermal marking and ALC marking, respectively. One hatchery (closed rectangle) plans to mark using both thermal and ALC marking methods.