

## **Marked Salmon Production by the Hatcheries of Russia in 2016**

by

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## Abstract

In Russia, the main aim of the hatcheries salmon marking, as in the preceding years, is to evaluate numbers of hatchery-reared salmon returns. In recent years, the basic part of salmon juveniles have been reared and marked at Sakhalin. Two methods were used for hatcheries marking: thermal and “dry”. In 2016, the percentage of marked salmon juveniles in Sakhalin region was 81.7%. This has happened because the majority of hatcheries (38) are located at Sakhalin and only 19 hatcheries in other regions of the Russian Far East.

**Keywords:** otolith marks, Russia, juvenile salmon, hatcheries.

### Marked salmon production at the hatcheries of Russia in 2016

Russian hatcheries released 301.9 million marked salmon juveniles in 2016. The major part of the marked juveniles salmon was formed by chum salmon – 258,6 million (85.7 %) and pink salmon – 35.6 million (11.8 %) of the total number of marked salmon. The proportion of the other species (sockeye, chinook, and coho) did not exceed 2.5 %: 4.5 million marked sockeye, 2.3 million coho, and 1 million marked Chinook were released (Table 1).

**Table 1**

Release of marked Pacific salmon at the hatcheries of the Far East of Russia in 2016

Species/ province	Number of released, million					
	Magadan	Kamchatka	Sakhalin	Khabarovsk	Total	Share,%
Chum	9,74	20,07	221,56	7,18	258,55	85,7
Pink	10,48	0	25,08	0	35,56	11,8
Coho	1,10	1,16	0	0	2,26	0,7
Sockeye	0	4,54	0	0	4,54	1,5
Chinook	0	0,99	0	0	0,99	0,3
Total	21,32	26,76	246,64	7,18	301,90	100

The majority of marked juveniles were released from the Sakhalin hatcheries (246.6 million). In Magadan region a total of 21.3 million juvenile salmon were released, in Kamchatka region – 26.8 million, and in Khabarovsk region – 7.2 million. In Magadan region, the juveniles were marked at three hatcheries, in Kamchatka at five hatcheries, in Khabarovsk region at one hatchery, and in Sakhalin region at twelve hatcheries.

In total, 30 different mark patterns were used for marking. Of them, 21 marks were used for chum salmon: 5 – in Magadan region, 3 – in Kamchatka region, 2 – in Khabarovsk region, and 11 – in Sakhalin region. For pink salmon marking, a total of six marks were used, of them, three in Magadan and three in Sakhalin.

Coho juveniles were marked in Magadan and Kamchatka regions. Coho juveniles were released at the age of fingerlings and one-yearlings. Three marks were used for fingerlings and two for one-yearlings, which were marked in 2015.

Sockeye and chinook were marked at Kamchatka hatcheries. Two marks were used for sockeye and one mark – for Chinook salmon.

As in the preceding years, most juveniles (63.6 %) were marked using a “dry” method before embryos hatching.

The data on marked salmon release are presented in Table 2.

**Table 2. Marked salmon production by the Hatcheries of Russia in 2016**

ID#	MARK TYPE	BROOD YEAR	YEAR OF RELEASE	SPECIES	COUNTRY	STATE/ PROVINCE	AGENCY	FACILITY	STOCK	FINAL RELEASE SITE
1	2	3	4	5	6	7	8	9	10	11
RU15-01	DM+TM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	ADO-TYMOVSKY HATCHERY	TYM' RIVER	TYM' RIVER
RU15-02	DM+TM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	ADO-TYMOVSKY HATCHERY	PORONAY RIVER	TYM' RIVER
RU15-03	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	POBEDINSKY HATCHERY	PORONAY RIVER	PORONAY RIVER
RU15-04	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	BUYUKLOVSKY HATCHERY	BUYUKLINKA RIVER	BUYUKLINKA RIVER
RU15-05	TM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	SOKOLOVSKY HATCHERY	NAYBA RIVER	NAYBA RIVER
RU15-06	TM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	SOKOLOVSKY HATCHERY	BUYUKLINKA RIVER	NAYBA RIVER
RU15-07	TM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	SOKOLOVSKY HATCHERY	TYM' RIVER	NAYBA RIVER
RU15-08	TM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	BEREZNYAKOVSKY HATCHERY	TARANAY RIVER	BOL`SHOY TAKOY RIVER
RU15-09	TM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	BEREZNYAKOVSKY HATCHERY	BOL`SHOY TAKOY RIVER	BOL`SHOY TAKOY RIVER
RU15-10	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	TARANAYSKY HATCHERY	TARANAY RIVER	TARANAY RIVER
RU15-11	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	YASNOMORSKY HATCHERY	YASNOMORKA RIVER	YASNOMORKA RIVER
RU15-12	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	YASNOMORSKY HATCHERY	KALINKA RIVER	YASNOMORKA RIVER
RU15-13	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	SOKOL`NIKOVSKY HATCHERY	ZAVETINKA RIVER	ZAVETINKA RIVER
RU15-14	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	KALININSKY HATCHERY	KALINKA RIVER	KALINKA RIVER
RU15-15	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	KALININSKY HATCHERY	YASNOMORKA RIVER	KALINKA RIVER
RU15-16	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	SAKHALINRYBVOD	UROZHAYNYY HATCHERY	KALINKA RIVER	CHERNAYA RIVER
RU15-17	DM	2015	2016	CHUM	RUSSIA	SAKHALIN	OOO "DELTA"	BAKHURA HATCHERY	BAKHURA RIVER	BAKHURA RIVER
RU15-18	DM	2015	2016	CHUM	RUSSIA	KAMCHATKA	FGU DIREKCIA LRZ	KETKINSKY HATCHERY	AVACHA RIVER	AVACHA RIVER
RU15-19	DM	2015	2016	CHUM	RUSSIA	KAMCHATKA	FGU DIREKCIA LRZ	OZERKOVSKY HATCHERY	BOL`SHAYA RIVER	BOL`SHAYA RIVER
RU15-20	TM	2015	2016	CHUM	RUSSIA	KAMCHATKA	FGU DIREKCIA LRZ	PARATUNSKY HATCHERY	PARATUNKA RIVER	PARATUNKA RIVER
RU15-21	DM	2015	2016	CHUM	RUSSIA	KHABAROVSK	AMURRYBVOD	ANYUYSKY HATCHERY	ANYUY RIVER	ANYUY RIVER
RU15-22	DM	2015	2016	CHUM	RUSSIA	KHABAROVSK	AMURRYBVOD	ANYUYSKY HATCHERY	ANYUY RIVER	ANYUY RIVER
RU15-23	DM	2015	2016	CHUM	RUSSIA	MAGADAN	OKHOTSKRYBVOD	ARMANSKY HATCHERY	ARMAN RIVER	ARMAN RIVER
RU15-24	DM	2015	2016	CHUM	RUSSIA	MAGADAN	OKHOTSKRYBVOD	ARMANSKY HATCHERY	YAMA RIVER	ARMAN RIVER
RU15-25	DM	2015	2016	CHUM	RUSSIA	MAGADAN	MAGADANNIRO	OL`SKY HATCHERY	OLYA RIVER	UGLIKANKA RIVER
RU15-26	DM	2015	2016	CHUM	RUSSIA	MAGADAN	MAGADANNIRO	OL`SKY HATCHERY	YAMA RIVER	UGLIKANKA RIVER
RU15-27	DM	2015	2016	CHUM	RUSSIA	MAGADAN	MAGADANNIRO	OL`SKY HATCHERY	KUL`KUTY RIVER	KUL`KUTY RIVER
RU15-28	DM	2015	2016	CHUM	RUSSIA	MAGADAN	OKHOTSKRYBVOD	YANSKY HATCHERY	YANA RIVER	YANA RIVER
RU15-29	DM	2015	2016	PINK	RUSSIA	SAKHALIN	SAKHALINRYBVOD	TARANAYSKY HATCHERY	TARANAY RIVER	TARANAY RIVER
RU15-30	DM	2015	2016	PINK	RUSSIA	SAKHALIN	OOO "DELTA"	BAKHURA HATCHERY	BAKHURA RIVER	BAKHURA RIVER
RU15-31	DM	2015	2016	PINK	RUSSIA	MAGADAN	OKHOTSKRYBVOD	ARMANSKY HATCHERY	ARMAN RIVER	ARMAN RIVER

**Table 2 (Continued). Marked salmon production by the Hatcheries of Russia in 2016**

ID#	NUMBER OF RELEASED	HATCH CODE	RBr	GRAPHIC IMAGE		MARK SCHEDULE
				PREHATCH	POSTHATCH	
1	12	13	14	15	16	17
RU15-01	10928800	3H5	1:1.3+2.3,3.2	III	IIIII	(3X)24D:24W+(5X)24C:24H
RU15-02	22664997	3H5	1:1.3+2.3,3.2	III	IIIII	(3X)24D:24W+(5X)24C:24H
RU15-03	17461429	3,4H	1:1.3,2.4	III IIII		(2X)24D:24W,(1X)24D:48W,(4X)24D:24W
RU15-04	35136800	5,2nH	1:1.5,2.2n	IIIII II		(4X)24D:24W,(1X)24D:48W,(2X)12D:12W
RU15-05	13526504	H3,4	2:1.3,2.4		III IIII	(2X)24C:24H,(1X)24C:48H,(4X)24C:24H
RU15-06	3657996	H3,4	2:1.3,2.4		III IIII	(2X)24C:24H,(1X)24C:48H,(4X)24C:24H
RU15-07	1805500	H3,4	2:1.3,2.4		III IIII	(2X)24C:24H,(1X)24C:48H,(4X)24C:24H
RU15-08	2643800	H3,3	2:1.3,2.3		III III	(2X)24C:24H,(1X)24C:48H,(3X)24C:24H
RU15-09	16308200	H3,3	2:1.3,2.3		III III	(2X)24C:24H,(1X)24C:48H,(3X)24C:24H
RU15-10	16186400	3-3H	1:1.3-2.3	III III		(2X)24D:24W,(1X)24D:72W,(3X)24D:24W
RU15-11	8827000	3,2H	1:1.3,2.2	III II		(2X)24D:24W,(1X)24D:48W,(2X)24D:24W
RU15-12	1758000	3,2H	1:1.3,2.2	III II		(2X)24D:24W,(1X)24D:48W,(2X)24D:24W
RU15-13	16854000	4,2nH	1:1.4,2.2n	IIIII II		(3X)24D:24W,(1X)24D:48W,(2X)12D:12W
RU15-14	37216000	1,5nH	1:1.1,2.5n	I IIIII		(1X)24D:48W,(5X)12D:12W
RU15-15	750000	3,2H	1:1.3,2.2	III II		(2X)24D:24W,(1X)24D:48W,(2X)24D:24W
RU15-16	13515300	4n,2H	1:1.4n,2.2	IIIII II		(3X)12D:12W,(1X)12D:48W,(2X)24D:24W
RU15-17	2316900	3n,1,2H	1:1.3n,2.1,3.2	III I II		(2X)12D:12W,(1X)12D:48W,(1X)24D:48W,(2X)24D:24W
RU15-18	3516773	5H	1:1.5	IIIII		(5X)24D:24W
RU15-19	2006960	4,3H	1:1.4,2.3	IIIII III		(3X)24D:24W,(1X)24D:48W,(3X)24D:24W
RU15-20	14548500	H6	2:1.6		IIIII I	(6X)24C:24H
RU15-21	2822817	4,2H	1:1.4,2.2	IIIII II		(3X)24D:24W,(1X)24D:48W,(2X)24D:24W
RU15-22	4356015	5nH	1:1.5n	IIIII		(5X)12D:12W
RU15-23	1593078	1,5H	1:1.1,2:5	I IIIII		(1X)24D:48W,(5X)24D:24W
RU15-24	1053807	4,3nH	1:1.4,2.3n	IIIII III		(3X)24D:24W,(1X)24D:48W,(3X)12D:12W
RU15-25	895170	1,2,1H	1:1.1,2.2,3:1	I II I		(1X)24D:48W,(1X)24D:24W,(2X)24D:48W
RU15-26	2088730	4,3nH	1:1.4,2.3n	IIIII III		(3X)24D:24W,(1X)24D:48W,(3X)12D:12W
RU15-27	2586850	3,3H	1:1.3,2.3	III III		(2X)24D:24W,(1X)24D:48W,(3X)24D:24W
RU15-28	1525041	3,2n,2H	1:1.3,2.2n,3.2	III II II		(2X)24D:24W,(1X)24D:48W,(1X)12D:12W,(1X)12D:48W,(2X)24D:24W
RU15-29	4363100	3,4nH	1:1.3,2.4n	III IIII		(2X)24D:24W,(1X)24D:48W,(4X)12D:12W
RU15-30	10763600	3n,3H	1:1.3n,2.4	III III		(2X)12D:12W,(1X)12D:48W,(3X)24D:24W
RU15-31	4539210	3n,4H	1:1.3n,2.4	III IIII		(2X)12D:12W,(1X)12D:48W,(4X)24D:24W

**Table 2 (Continued). Marked salmon production by the Hatcheries of Russia in 2016**

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1	2	3	4	5	6	7	8	9	10	11
RU15-32	DM	2015	2016	PINK	RUSSIA	MAGADAN	MAGADANNIRO	OL`SKY HATCHERY	OLYA RIVER	UGLIKANKA RIVER
RU15-33	DM	2015	2016	PINK	RUSSIA	MAGADAN	OKHOTSKRYBVOD	YANSKY HATCHERY	YANA RIVER	YANA RIVER
RU15-34	DM	2015	2016	PINK	RUSSIA	SAKHALIN	SAKHALINRYBVOD	ANIVSKY HATCHERY	BYSTRAYA RIVER	BYSTRAYA RIVER
RU15-35	TM	2015	2016	COHO	RUSSIA	KAMCHATKA	FGU DIREKCIA LRZ	PARATUNSKY HATCHERY	PARATUNKA RIVER	PARATUNKA RIVER
RU15-36	DM	2015	2016	COHO	RUSSIA	MAGADAN	MAGADANNIRO	OL`SKY HATCHERY	TANON RIVER	UGLIKANKA RIVER
RU15-37	DM	2015	2016	COHO	RUSSIA	MAGADAN	OKHOTSKRYBVOD	YANSKY HATCHERY	YANA RIVER	YANA RIVER
RU15-38	DM	2015	2016	COHO	RUSSIA	MAGADAN	OKHOTSKRYBVOD	ARMANSKY HATCHERY	ARMAN RIVER	ARMAN RIVER
RU15-39	DM	2015	2016	SOCKEYE	RUSSIA	KAMCHATKA	FGU DIREKCIA LRZ	OZERKOVSKY HATCHERY	BOL`SHAYA RIVER	BOL`SHAYA RIVER
RU15-40	TM	2015	2016	SOCKEYE	RUSSIA	KAMCHATKA	FGU DIREKCIA LRZ	MALKINSKY HATCHERY	BOL`SHAYA RIVER	BOL`SHAYA RIVER
RU15-41	TM	2015	2016	CHINOOK	RUSSIA	KAMCHATKA	FGU DIREKCIA LRZ	MALKINSKY HATCHERY	BOL`SHAYA RIVER	BOL`SHAYA RIVER
RU14-57	DM	2014	2016	COHO	RUSSIA	KAMCHATKA	FGU DIREKCIA LRZ	VILYUYSKY HATCHERY	BOL`SHOY VILYUY LAKE	BOL`SHOY VILYUY LAKE

**Table 2 (Continued). Marked salmon production by the Hatcheries of Russia in 2016**

ID#	NUMBER OF RELEASED	HATCH CODE	RBr	GRAPHIC IMAGE		MARK SCHEDULE
				PREHATCH	POSTHATCH	
1	12	13	14	15	16	17
RU15-32	2500000	3,2H	1:1.3,2.2	III II		(2X)24D:24W,(1X)24D:48W,(2X)24D:24W
RU15-33	3444226	4,2nH	1:1.4,2.2n	IIIII II		(3X)24D:24W,(1X)24D:48W,(2X)12D:12W
RU15-34	9951800	5,1H	1:1.5,2.1	IIIII I		(4X)24D:24W,(2X)24D:48W
RU15-35	676400	H7	2:1.7		IIIIIII	(7X)24C:24H
RU15-36	11200	4,1H	1:1.4,2.1	IIIII I		(3X)24D:24W,(2X)24D:48W
RU15-37	484201	5,1H	1:1.5,2.1	IIIII I		(4X)24D:24W,(2X)24D:48W
RU15-38	603000	5H	1:1.5	IIIII		(5X)24D:24W
RU15-39	3916480	3,1,3H	1:1.3,2.1,3.3	III I III		(2X)24D:24W,(2X)24D:48W,(3X)24C:24H
RU15-40	619512	3H	1:1.3	III		(3X)24C:24H
RU15-41	988073	H3	2:1.3		III	(3X)24C:24H
RU14-57	492310	5,1H	1:1.5,2.1	IIIII I		(4X)24D:24W,(2X)24D:48W