

**Proposed Thermal and Dry Marks for Brood Year  
2003 Salmon in Russia**

by

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## **Introduction**

Identification of marked fish in a mixture of stocks of salmon allows to evaluate the efficiency of hatcheries by their end product – return of artificially reproduced salmon. Apart from this, the data representing correlation between hatchery and naturally raised salmon during period of anadromous and catadromous migrations and foraging will make it possible to determine the impact of fish culture on wild salmon population. In the light of the most current views on the role of hatcheries, the monitoring of this correlation dynamics becomes important, since it allows to take efficient measures in the event of genetically unfavorable situation.

### **Plan for marking salmon stocks of 2003-year class**

In 2003, thirteen Russian hatcheries of four regions – Kamchatka, Magadan Oblast, Sakhalin Island and Khabarovsk Region are planning to conduct marking of Pacific salmon. All cultured salmon species will be marked with 16 different types of marks. Most of the Sakhalin hatcheries are unable to conduct thermal marking. Therefore, they are trying to introduce dry marking method which was successfully used by Magadan hatcheries. Sakhalin hatcheries are not always able to get a high quality mark applying dry method, so, in 2003, they will continue a pilot marking of small groups of fish. Based on results of marking conducted last year, we expect to get a good result using short cycle process (applying marking factor every 12 hours after 12 hours of maintaining primary incubation conditions).

In addition, the analysis of duplicating types of marks obtained during the last year showed that the short-cycle technique is not commonly used in the other regions. If marking conducted this year turns out to be successful, we will use this technique in Sakhalin, where most of the Russian salmon hatcheries are located. However, if marking is conducted in all hatcheries, it will be difficult to choose a necessary number of differing marks.

In 2003, marking of chum salmon will be conducted for the first time in Urakski Hatchery of Khabarovsk Region. Only dry marking method can be applied there, and we are also planning to use 12 by 12 hours technique.

Geographic origin of salmon will still be coded in the first block of marks. Three rings for Kamchatka; four rings on chum and three or four rings on pink salmon otoliths for Sakhalin (pink salmon is not cultured in Kamchatka). Salmon raised in Magadan and Khabarovsk hatcheries will have marks with not less than five rings in the first block. Both thermal (sequential increase and reduction of water temperature) and dry (Akinicheva et al., 1998; Safronkov et al., 1999) methods of marking will be used for experiment. The marking pattern will be presented as the RBr notation (Munk and Geiger 1998; Hagen 1999) and Hatch code notation (Hagen et al. 2000).

### **References**

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- Munk, K. M., and H. J. Geiger. 1998. Thermal marking of otoliths: the "RBr" coding structure of thermal marks. (NPAFC Doc. 367) 19 p. CWT & Otolith Processing Lab., Alaska Department of Fish and Game, Juneau, Alaska, USA.
- Hagen, P. 1999. A modeling approach to address the underlying structure and constraints of thermal mark codes and code notation. (NPAFC Doc. 395) 12 p. Alaska Department of Fish and Game, Juneau, Alaska 99801-5526, USA.

**Table 1. Proposed Otolith Marks for Brood Year 2003 Salmon in Russia**

?	ID#	BROOD YEAR	YEAR OF RELEASE	SPECIES	COUNTRY	STATE/ PROVINCE	AGENCY	FACILITY	FINAL RELEASE SITE
1	2	3	4	5	6	7	8	9	10
R03-1	DM	2003	2004	Chum	Russia	Kamchatka	KamchatRV	Ozerki	West Kam
R03-2	DM	2003	2004	Chum	Russia	Kamchatka	KamchatRV	Ketkinskiy	East Kam
R03-3	DM	2003	2004	Chum	Russia	Kamchatka	KamchatRV	Paratunskiy	East Kam
R03-4	DM	2003	2004	Chum	Russia	Kamchatka	KamchatRV	Viluyskiy	West Kam
R03-5	DM	2003	2004	Sockeye	Russia	Kamchatka	KamchatRV	Ozerki	West Kam
R03-6	TM	2003	2004	Sockeye	Russia	Kamchatka	KamchatRV	Malkinskiy	West Kam
R03-7	TM	2003	2004	Chinook	Russia	Kamchatka	KamchatRV	Malkinskiy	West Kam
R03-8	TM	2003	2004	Pink	Russia	Sahalin	SakhRV	Taranayskiy	r. Taranay
R03-9	TM	2003	2004	Pink	Russia	Sahalin	SakhRV	Sokolovsky	r. Naiba
R03-10	TM	2003	2004	Chum	Russia	Sahalin	SakhRV	Sokolnikovskiy	r. Naiba
R03-11	DM, TM	2003	2004	Chum	Russia	Magadan	OhotskRV	Armanskiy	Tauy Bay
R03-12	DM, TM	2003	2004	Sockeye	Russia	Magadan	OhotskRV	Armanskiy	Tauy Bay
R03-13	DM, TM	2003	2004	Chum	Russia	Magadan	OhotskRV	Yanskiy	Tauy Bay
R03-14	DM, TM	2003	2004	Sockeye	Russia	Magadan	OhotskRV	Yanskiy	Tauy Bay
R03-15	DM	2003	2004	Chum	Russia	Magadan	MagadanNIRO	Olskiy	Tauy Bay
R03-16	DM, TM	2003	2004	Chum	Russia	Magadan	OhotskRV	Olskiy	Tauy Bay
R03-17	DM, TM	2003	2004	Chum	Russia	Magadan	OhotskRV	Tauyskiy	Tauy Bay
R03-18	DM, TM	2003	2004	Coho	Russia	Magadan	OhotskRV	Tauyskiy	Tauy Bay
R03-19	DM	2003	2004	Chum	Russia	Habarovsk	AmurRV	Urakskiy	Okhotsk Sea

**Table 1.(continued).Proposed Otolith Marks for Brood Year 2003 Salmon in Russia**

1	REARING	STAGE	RBr	MARK SCHEDULE	HATCH CODE	GRAPHIC IMAGE	
	TREATMENT					PREHATCH	POSTHATCH
	11	12	13	14	15	16	17
R03-1	fed	fry	1:1.3,2.1,3.3	(2X)24D:24W,(2X)24D:48W,(3X)24D:24W	3,1,3?	I I I I I I I I	
R03-2	fed	fry	1:1.3,2.2	(2X)24D:24W,(1X)24D:48W,(2X)24D:24W	3,2?	I I I I I	
R03-3	fed	fry	1:1.3,2.1	(2X)24D:24W,(2X)24D:48W	3,1?	I I I I	
R03-4	fed	fry	1:1.3,2.2,3.1	(2X)24D:24W,(1X)24D:48W,(1X)24D:24W,(2X)24D:48W	3,2,1?	I I I I I I I	
R03-5	fed	fry	1:1.3,2.1,3.3	(2X)24D:24W,(2X)24D:48W,(3X)24D:24W	3,1,3?	I I I I I I I I	
R03-6	fed	fry	1:1.3,2.3	(2X)24H:24C,(1X)24H:48C,(3X)24H:24C	3,3?	I I I I I I I	
R03-7	fed	fry	1:1.3,2.3	(2X)24C:24H,(1X)24C:48H,(3X)24C:24H	? 3,3		I I I I I I I
R03-8	fed	fry	1:1.4n-2.2n	(3?)12H:12C,(1?)12H:72C,(2?)12H:12C	4n-2nH	IIII II	
R03-9	fed	fry	1:1.4n-2.4n	(3?)12H:12C,(1?)12H:72C,(4?)12H:12C	4n-4nH	IIII IIII	
R03-10	fed	fry	1:1.4n-2.3n	(3?)12C:12H,(1?)12C:72H,(3?)12C:12H	4n-3nH	IIII III	
R03-11	fed	fry	1:1.8	(8X)24D:24W	8H	IIIIIIIIII	
R03-12	fed	fry	1:1.8	(8X)24D:24W	8H	IIIIIIIIII	
R03-13	fed	fry	1:1.7	(7X)24D:24W	7H	IIIIIIII	
R03-14	fed	fry	1:1.7	(7X)24D:24W	7H	IIIIIIII	
R03-15	fed	fry	1:1.5n	(5X)12D:12W	5nH	IIII	
R03-16	fed	fry	1:1.6	(6X)24D:24W	6H	IIIIIIII	
R03-17	fed	fry	1:1.5	(5X)24D:24W	5H	IIIIII	
R03-18	fed	fry	1:1.5	(5X)24D:24W	5H	IIIIII	
R03-19	fed	fry	1:1.6n	(6X)12D:12W	6nH	IIIIII	