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Otolith Thermal Mark for Brood Year 2019 and Proposed Thermal Marks for Brood Year 2020 Chum Salmon in Korea

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Abstract

Korea released 2.7 million and 1.5 million thermal marked chum salmon in March 2019 and 2020, respectively. The marks were 3,1,2H(2.5million) and 4n,2,3H(0.2million) for 2019(2018BY) and 3,3,4H(1.3million), 4n,4,2H(0.1million) and 5,3,2H(0.1million) for 2020(2019BY). We marked approximately 1.5 million chum salmon in BY 2020, which covers about 10% ~20% of release of BY 2019 chum salmon at Namdae-cheon, Wangpi-cheon and Taewa-river (river). Chum salmon is marked at 3 different hatcheries (Yangyang Hatchery, Uljin Hatchery and Ulju Hatchery) using 3 thermal mark.

Introduction

Tagging is an old tool in biology, and is economically valuable for aquaculture, stock assessment and fisheries management. Traditionally, tagging experiments consisting of clipping, punching of fins, attaching plastic cards, inserting coded wire tags and micro data loggers have been used to distinguish fish stocks, to determine the optimum period of release of juveniles, and to check growth condition of fishes. However, labor-intensive tagging experiment requires high costs. Furthermore, in many cases, researchers experienced difficulties in getting enough specimens of recovery to find the alternative methods.

Otolith thermal marking is one of the alternatives, which makes distinct and recognizable patterns in the otolith structures by exposing the fish to different temperature regimes. Due to advantages of mass-marking and good mark retention, all NPAFC countries have been released juvenile salmon with otolith marking. Korea released 2.2 million thermal marked chum salmon in March 2006 and 5.0 million in March 2007 and 5.0 million in March 2008. The marks were Gangwon province is 3,3nH for 2005 Brood Year(BY), 3,1,2H for 2006 BY, and 3,2,1H for 2007 BY And Gyeongbuk province is 3,4,2H for 2013 BY, 3,1,4nH for 2014 BY, and 4n,2,3H for 2015 BY. We will continue the otolith thermal marking on 2019 BY chum salmon to get the growth conditions and survival during the early ocean life stage, and to distinguish hatchery origins to classify the two different provinces.

Thermal mark for BY 2019 stock

Korea released 1.5 million thermal marked chum salmon in March 2020. The mark was a 3,3,4H (1:1.3,2.3,3.4) 1.3 million, 4n,4,2H(1:1.4n,2.4,3.2) 0.1 million, and 5,3,2H(1:1.5,2.3,3.2) 0.1 million.

Plan for 2020 BY stock

Based on success of thermal mark experiment for BY 2005 - BY 2012 and BY 2013 stocks, we will continue this experiment for the BY 2019 salmon. We will mark approximately 5.5 million chum salmon at 3 different hatcheries with 3 pattern, which covers about 50%~60% of release of BY 2020 chum salmon at Namdae-cheon, Wangpi-cheon and Taewa-river (river) (Table 1). Proposed thermal mark schedule for BY 2019 stock of Korean chum salmon is shown in Table 2. Thermal mark pattern is presented in both the RBr notation (Munk and Geiger 1998), with the modification by Hagen (1999).

References

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 Dept. Fish and Game, Juneau Alaska.

Munk, K.M. and Geiger, H.J. 1998. Thermal marking of otoliths: the “RBr” coding structure of thermal marks. (NPAFC Doc. 367). 19 p. Alaska Dept. of Fish and Game, Juneau Alaska.

Table 1. Proposed thermal mark releases from Korea for 2020 brood year stocks of chum salmon.

No	BROOD YEAR	YEAR OF RELEASE	SPECIES	STATE/ PROVINCE	REGION	AGENCY	FACILITY	STOCK	FINAL RELEASE SITE
K20-1	2020	2021	CHUM	GANGWON	EAST/JAPAN SEA COAST	YSS	Yangyang Hatchery	Namdae-river	Namdae-river
K20-2	2020	2021	CHUM	GYEONGBUK	EAST/JAPAN SEA COAST	GRCFF	Uljin Hatchery	Wangpi-river	Wangpi-river
K20-3	2020	2021	CHUM	ULJU	EAST/JAPAN SEA COAST	TREC	Ulju Hatchery	Taehwa-river	Taehwa-river

No	REARING TREATMENT	STAGE	ESTIMATED RELEASE	RBr CODE	HATCH CODE	GRAPHIC IMAGE PREHATCH	GRAPHIC IMAGE POSTHATCH	MARKING SYSTEM
K20-1	Jan - Mar	fry	5,000,000	1:1.3,2.3,3.1	3,2,1H	I I I I I I I		CHILLER
K20-2	Jan - Mar	fry	300,000	1:1.3,2.4,3.2	3,4,2H	I I I I I I I I I		CHILLER
K20-3	Jan - Mar	fry	200,000	Not confirm				CHILLER

Table 2. Proposed thermal mark schedule for 2019 brood year stocks of Korean chum salmon.

No	REARING TREATMENT	STAGE	ESTIMATED RELEASE	RBr CODE	HATCH CODE	GRAPHIC IMAGE PREHATCH	GRAPHIC IMAGE POSTHATCH	MARKING SYSTEM
K19-1	Jan - Mar	fry	1,300,000	1:1.3,2.3,3.4	3,3,4H	I I I I I I I I I I		CHILLER
K19-2	Jan - Mar	fry	100,000	1:1.4n,2.4,3.2	4n,4,2H	IIII I I I I I I		CHILLER
K19-3	Jan - Mar	fry	100,000	1:1.5,2.3,3.2	5, 3, 2H	I I I I I I I I I I		CHILLER

No	OTOLITH MARK SCHEDULE	TEMP SHIFT DIRECTION	COMMENTS
K19-1	(2x)8C:12H,(1x)8C:24H,(2x)8C:12H (1x)8C:24H, (4x)8C:12H	Down (12 to 8)	Spawning date: mid Oct.-late Nov.
K19-2	(3x)8C:8H,(1x)8C:24H,(1x)8C:12H, (1x)8C:24H, (3x)8C:8H,	Down (12 to 8)	Spawning date: mid Oct.-late Nov.
K19-3	(4x)8C:12H,(1x)8C:24H,(2x)8C:12H, (1x)8C:24H, (2x)8C:12H,	Down (12 to 8)	Spawning date: mid Oct.-late Nov