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**Proposed Thermal Marks for Brood Year 2009 Salmon in Alaska**

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# **Proposed Thermal Marks for Brood Year 2009 Salmon in Alaska**

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## **Abstract**

In Alaska, mass-marking of salmon using otolith thermal marking is an effective research and management tool applicable to a variety of situations. For brood year 2009, approximately 57 million sockeye, 700 million pink salmon, 591 million chum, 4 million coho, and 8 million Chinook salmon will be marked at 21 different hatcheries using 62 thermal marks.

## **Introduction**

In Alaska, thermal marking is used to provide information about the contribution of hatchery fish, primarily pink, chum and sockeye salmon, to commercial and cost-recovery fisheries during the summer fishing season. Because most fisheries are managed on the basis of wild stocks, fishery managers subtract the estimated hatchery catch from total catch and use that information to structure the fisheries. Hatchery operators are most interested in their own production and use thermal marking to estimate how their fish contribute to traditional fisheries and to terminal harvests. In addition, thermal marks are being used to determine the origin of juvenile and immature salmon collected during surveys in the Gulf of Alaska by the National Marine Fisheries Service and as part of the Bering Sea and Aleutian Island Salmon Investigative Study (BASIS) program.

## **Plan for 2009 brood year stocks**

The proposed thermal marks for brood year 2009 salmon are listed in Table 1. We plan to mark approximately 57 million sockeye, 700 million pink salmon, 591 million chum, 4 million coho, and 8 million Chinook salmon at 21 different hatcheries using 62 thermal marks.

The proposed otolith plan includes scheduled changes. Some marks are on an every other year cycle, while others rotate on a three-year cycle. Thermal mark patterns are presented in both the RBr notation (Munk and Geiger 1998), as well as well as in the Uniform Hatch Code notation (Johnson et al. 2006).

## References

- Johnson, W.F., R.P. Josephson, T.R. Frawley, and D.S. Oxman 2006. Revised web-based North Pacific salmon otolith mark directory. (NPAFC Doc. 971). 39p. 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. Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2009.

SPECIES: SOCKEYE

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK09-01	TM	2009	2010	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tatsamenie Lake
AK09-02	TM	2009	2010	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Hidden Lake
AK09-03	TM	2009	2011	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	English Bay Lakes
AK09-04	TM	2009	2010	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	English Bay Lakes
AK09-05	TM	2009	2010	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK09-06	TM	2009	2011	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK09-07	TM	2009	2010	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Hidden Lake
AK09-08	TM	2009	2011	Sockeye	Alaska	Southcentral	PWSAC	Main Bay Hatchery	Main Bay
AK09-09	TM	2009	2011	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK09-10	TM	2009	2010	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tahltan Lake
AK09-11	TM	2009	2011	Sockeye	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	McDonald Lake
AK09-12	TM	2009	2010	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tahltan Lake
AK09-13	TM	2009	2011	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK09-14	TM	2009	2010	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tatsamenie Lake
AK09-15	TM	2009	2010	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Little Trapper
AK09-16	TM	2009	2010	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Hidden Lake
AK09-17	TM	2009	2010	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK09-18	SM	2009	2010	Sockeye	Alaska	Southcentral	PWSAC	Gulkana Hatchery	Gulkana

ID#	MARK NAME	STAGE	ESIMATED RELEASE	HATCH CODE	RBr CODE	Pre-Hatch Graphic	Post-Hatch Graphic	MARKING SYSTEM	TEMP SHIFT DIRECTION
AK09-01	TATSAMENIE09	Fry	4,000,000	2,2,2H	1:1.2,2.2,3.2			Chiller	Down
AK09-02	TUTKA09	Fry	530,000	3,3H	1:1.3,2.3			Boiler	Up
AK09-03	ENGLISH BAY09SMOLT	Smolt	300,000	2,3,2H	1:1.2,2.3,3.2			Boiler	Up
AK09-04	ENGLISH BAY09	Pre-smolt	150,000	2,4H	1:1.2,2.4			Boiler	Up
AK09-05	SWEETHEART09	Fry	500,000	2,5H	1:1.2,2.5			Chiller	Down
AK09-06	TRAILLAKES09B	Smolt	2,000,000	3,1,2H	1:1.3,2.1,3.2			Boiler	Up
AK09-07	HIDDENLAKE09	Fry	530,000	3,2,1H	1:1.3,2.2,3.1			Boiler	Up
AK09-08	MAINBAY09	Smolt	8,000,000	5,1H	1:1.5,2.1				
AK09-09	SPEELARM09A	Smolt	8,000,000	3,2nH	1:1.3,2.2n			Chiller	Down
AK09-10	TUYA09	Fry	1,000,000	3,4H	1:1.3,2.4			Chiller	Down
AK09-11	MCDONALD09	Smolt	400,000	3,5nH	1:1.3,2.5n			Chiller	Down
AK09-12	TAHLTAN09	Fry	1,500,000	5,2H	1:1.5,2.2			Chiller	Down
AK09-13	SPEELARM09B	Smolt	1,000,000	7H	1:1.7			Chiller	Down
AK09-14	TATSAMENIE09ER	Fry	100,000	3n,2H	1:1.3n,2.2			Chiller	Down
AK09-15	TRAPPER09	Fry	700,000	4,3nH	1:1.4,2.3n			Chiller	Down
AK09-16	PENINSULA09SOCKEYE	Fry	3,500,000	2,2H	1:1.2,2.2			Boiler	Up
AK09-17	TRAILLAKES09A	Fry	2,400,000	4,2H	1:1.4,2.2			Boiler	Up
AK09-18	GULKANA09	Fry	22,000,000	HS1	2:1.S1			Immersion	

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2009.

SPECIES: PINK

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK09-19	TM	2009	2010	Pink	Alaska	Southeast	KAKE	Gunnuk Creek	Gunnuk Cr
AK09-20	TM	2009	2010	Pink	Alaska	Southeast	AKI	Port Armstrong Hatchery	Port Armstrong
AK09-21	TM	2009	2010	Pink	Alaska	Southcentral	PWSAC	Cannery Creek Hatchery	Cannery Creek
AK09-22	TM	2009	2010	Pink	Alaska	Southeast	SJ	Sheldon Jackson	Sheldon Jackson
AK09-23	TM	2009	2010	Pink	Alaska	Southcentral	PWSAC	Armin F. Koernig Hatchery	Armin F. Koernig
AK09-24	TM	2009	2010	Pink	Alaska	Southcentral	VFDA	Solomon Gulch Hatchery	Solomon Gulch
AK09-25	TM	2009	2010	Pink	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg

ID#	MARK NAME	STAGE	ESIMATED RELEASE	HATCH CODE	RBr CODE	Pre-Hatch Graphic	Post-Hatch Graphic	MARKING SYSTEM	TEMP SHIFT DIRECTION
AK09-19	KAKE09PINK	Fed Fry	5,000,000	1,2,1H	1:1.1,2,2,3,1			Chiller	Down
AK09-20	PORTARMSTRONG09	Fed Fry	85,000,000	2,2H	1:1.2,2,2			Ambient and Load Bank	Up
AK09-21	CCH09	Fed Fry	140,000,000	3,3H	1:1.3,2,3				
AK09-22	SJ09PINK	Fed Fry	100,000	4,1H	1:1.4,2,1			Chiller	Down
AK09-23	AFK09	Fed Fry	150,000,000	4H	1:1.4				
AK09-24	SGH09	Fed Fry	200,000,000	6H	1:1.6				
AK09-25	WHN09PINK	Fed Fry	120,000,000	8H	1:1.8				

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2009.

SPECIES: CHUM

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK09-26	TM	2009	2010	Chum	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK09-27	TM	2009	2010	Chum	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg
AK09-28	TM	2009	2010	Chum	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK09-29	TM	2009	2010	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK09-30	TM	2009	2010	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK09-31	TM	2009	2010	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK09-32	TM	2009	2010	Chum	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK09-33	TM	2009	2010	Chum	Alaska	Southeast	NSRAA	Medvejie Hatchery	Hidden Falls
AK09-34	TM	2009	2010	Chum	Alaska	Southeast	KAKE	Gunnuk Creek	Gunnuk Cr
AK09-35	TM	2009	2010	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK09-36	TM	2009	2010	Chum	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg
AK09-37	TM	2009	2010	Chum	Alaska	Southeast	SJ	Sheldon Jackson	Sheldon Jackson
AK09-38	TM	2009	2010	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK09-39	TM	2009	2010	Chum	Alaska	Southeast	NSRAA	17 Mile Incubation Site	Chilkat
AK09-40	TM	2009	2010	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK09-41	TM	2009	2010	Chum	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg
AK09-42	TM	2009	2010	Chum	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK09-43	TM	2009	2010	Chum	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK09-44	TM	2009	2010	Chum	Alaska	Southeast	AKI	Port Armstrong Hatchery	Port Armstrong
AK09-45	TM	2009	2010	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay

ID#	MARK NAME	STAGE	ESIMATED RELEASE	HATCH CODE	RBr CODE	Pre-Hatch Graphic	Post-Hatch Graphic	MARKING SYSTEM	TEMP SHIFT DIRECTION
AK09-26	TAKATZ09	Fed Fry	45,000,000	5n,2H	1:1.5n,2.2			Lake Intakes	Up
AK09-27	PORTCHALMERS09	Fed Fry	40,000,000	1,2,2H	1:1.1,2.2,3.2				
AK09-28	BEARCOVE09	Fed Fry	9,000,000	1,5,1H	1:1.1,2.5,3.1			Heater	Up(5-9)
AK09-29	NAKATINLET09FALL	Fed Fry	8,000,000	3,4,1H	1:1.3,2.4,3.1			Boiler	Up
AK09-30	NAKATINLET09SUM	Fed Fry	8,000,000	3,1,4H	1:1.3,2.1,3.4			Boiler	Up
AK09-31	ANITABAY09	Fed Fry	22,000,000	1,6,1H	1:1.1,2.6,3.1			Boiler	Up
AK09-32	DEEPINLETMV09	Fed Fry	49,000,000	1,3,3H	1:1.1,2.3,3.3				
AK09-33	DEEPINLETHF09	Fed Fry	22,000,000	3,4nH	1:1.3,2.4n			Lake Intakes	Up
AK09-34	KAKE09	Fed Fry	25,000,000	4,1H	1:1.4,2.1			Chiller	Down
AK09-35	NEETSBAY09FALL	Fed Fry	20,000,000	4,2,2H	1:1.4,2.2,3.2			Boiler	Up
AK09-36	WHN-AFK09	Fed Fry	15,000,000	3n,2H	1:1.3n,2.2				
AK09-37	SJ09CHUM	Fed Fry	100,000	4H	1:1.4			Heater	Up
AK09-38	NEETSBAY09SUM	Fed Fry	49,000,000	4,4H	1:1.4,2.4			Boiler	Up
AK09-39	17MILE09	Fed Fry	800,000	4H	1:1.4			Heater	Up
AK09-40	KENDRICK09	Fed Fry	18,000,000	4n,4H	1:1.4n,2.4			Boiler	Up
AK09-41	WHN09	Fed Fry	75,000,000	6H	1:1.6				
AK09-42	DIPAC09	Fed Fry	100,000,000	1,3H	1:1.1,2.3			Boiler	Up
AK09-43	HIDDENFALLS09	Fed Fry	53,000,000	1,2,3H	1:1.1,2.2,3.3			Lake Intakes	Up
AK09-44	PORTARMSTRONG09CHUM	Fed Fry	30,000,000	1,4H	1:1.1,2.4			Ambient and Load Bank	Up
AK09-45	KENDRICKLL09	Fed Fry	2,000,000	5,3H	1:1.5,2.3			Boiler	Up

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2009.

SPECIES: COHO

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK09-46	TM	2009	2011	Coho	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Ship Creek
AK09-47	TM	2009	2011	Coho	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Bear Lake
AK09-48	TM	2009	2011	Coho	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK09-49	TM	2009	2011	Coho	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg
AK09-50	TM	2009	2010	Coho	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK09-51	TM	2009	2011	Coho	Alaska	Southcentral	VFDA	Solomon Gulch Hatchery	Solomon Gulch

ID#	MARK NAME	STAGE	ESIMATED RELEASE	HATCH CODE	RBr CODE	Pre-Hatch Graphic	Post-Hatch Graphic	MARKING SYSTEM	TEMP SHIFT DIRECTION
AK09-46	COOKINLET09COHO	Smolt	800,000	1,5H	1:1.1,2.5			Boiler	Up
AK09-47	RESURRECTION09COHO	Smolt	240,000	2,4H	1:1.2,2.4			Boiler	Up
AK09-48	DIPAC09COHO	Smolt	300,000	3,2H	1:1.3,2.2			Boiler	Up
AK09-49	WHN09COHO	Smolt	1,000,000	3H	1:1.3				
AK09-50	TRAILLAKES09SMCOHO	Fry	555,000	4H3	1:1.4+2.3			Boiler	Up
AK09-51	SGH09COHO	Smolt	1,500,000	6H	1:1.6				

SPECIES: CHINOOK

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK09-52	TM	2009	2011	Chinook	Alaska	Southeast	SSRAA	Whitman Lake Hatchery	Whitman Lake
AK09-53	TM	2009	2011	Chinook	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Cook Inlet
AK09-54	TM	2009	2010	Chinook	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK09-55	TM	2009	2011	Chinook	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Ship Creek
AK09-56	TM	2009	2011	Chinook	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Deception Cr
AK09-57	TM	2009	2010	Chinook	Alaska	Southcentral	CVEP	Chickaloon Incubation	Moose River
AK09-58	TM	2009	2011	Chinook	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK09-59	TM	2009	2011	Chinook	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK09-60	TM	2009	2011	Chinook	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK09-61	TM	2009	2010	Chinook	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK09-62	TM	2009	2011	Chinook	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Tahini

ID#	MARK NAME	STAGE	ESIMATED RELEASE	HATCH CODE	RBr CODE	Pre-Hatch Graphic	Post-Hatch Graphic	MARKING SYSTEM	TEMP SHIFT DIRECTION
AK09-52	WHITMAN09CHIN	Smolt	725,000	1,5H	1:1.1,2.5			Boiler	Up
AK09-53	COOKINLET09CHIN	Smolt	1,145,000	2,3H	1:1.2,2.3			Boiler	Up
AK09-54	MEDVEJIE09CHINZ	Smolt	1,000,000	2,3nH	1:1.2,2.3n				
AK09-55	PWS09CHIN	Smolt	315,000	2,4H	1:1.2,2.4			Boiler	Up
AK09-56	RESURRECTION09CHIN	Smolt	210,000	2,5H	1:1.2,2.5			Boiler	Up
AK09-57	CHICKALOON2009	Egg	100,000	3,2H	1:1.3,2.2			Moist Air	
AK09-58	GREENLAKE09CHIN	Smolt	850,000	3,4H	1:1.3,2.4				
AK09-59	MEDVEJIE09CHIN	Smolt	1,000,000	3n,3H	1:1.3n,2.3				
AK09-60	HIDDENFALLS09CHIN	Smolt	1,500,000	4,2H	1:1.4,2.2			Lake Intakes	Up
AK09-61	DEEPINLET09CHINZ	Smolt	1,000,000	4,3nH	1:1.4,2.3n				
AK09-62	LUTAK09CHIN	Smolt	150,000	3,3H	1:1.3,2.3			Lake Intakes	Up