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## **Proposed Thermal Marks for Brood Year 2003 Salmon in Alaska**

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## **Proposed Thermal Marks for Brood Year 2003 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 2003, we plan to mark approximately 30.8 million sockeye, 6.5 million Chinook, 434 million chum, 6.7 million coho, and 695 million pink salmon. Salmon will be marked at 16 different hatcheries using approximately 41 unique thermal marks. The proposed otolith plan is similar to the 2002 brood year program.

### **Introduction**

In Alaska, the primary use of thermal marking is 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. Several on-going programs use this mark-recovery information as an aid to the in-season management of mixed stock fisheries, and hatcheries use the information to evaluate the success of various rearing and release strategies. In addition, thermal marks are being used to determine the origin of juvenile and immature salmon collected during biotic 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 2003 brood year stocks**

The proposed thermal marks for brood year 2003 salmon are listed in Table 1. We plan to mark approximately 30.8 million sockeye, 6.5 million Chinook, 434 million chum, 6.7 million coho, and 695 million pink salmon. Salmon will be marked at 16 different hatcheries using 41 unique thermal mark patterns. The proposed otolith plan is similar to the 2002 brood year program. We marked chum salmon at Neets Bay Hatchery for the first time in 2002 and plan to continue that in 2003. Thermal mark patterns are presented in both the RBr notation (Munk and Geiger 1998), with the modification by Hagen (1999) to include narrow ring bands, as well as in the Hatch Code notation.

## 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. Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2003.

SPECIES: CHINOOK

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	DATE LAST RELEASED	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK03-01	TM	2003	2005		CHINOOK	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Cook Inlet
AK03-02	TM	2003	2004		CHINOOK	Alaska	Southcentral	ADFG	Elmendorf Hatchery	Cook Inlet
AK03-03	TM	2003	2005		CHINOOK	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Crooked Creek
AK03-04	TM	2003	2004		CHINOOK	Alaska	Southcentral	ADFG	Elmendorf Hatchery	Crooked Creek
AK03-05	TM	2003	2005		CHINOOK	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Ressurrection Bay
AK03-06	TM	2003	2004		CHINOOK	Alaska	Southcentral	ADFG	Elmendorf Hatchery	Ressurrection Bay
AK03-07	TM	2003	2005		CHINOOK	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK03-08	TM	2003	2005		CHINOOK	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK03-09	TM	2003	2005		CHINOOK	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK03-10	TM	2003	2005		CHINOOK	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay

ID#	MARK NAME	STAGE	WEIGHT	LENGTH	ESIMATED RELEASE	RBr CODE	HATCH CODE	Pre-Hatch Graphic	Post-Hatch Graphic	COMMENTS
AK03-01	FORTRICHARDSON03ACHIN				1,085,000	1:1.2,2.3	2,3H	II III		Repeats each year
AK03-02	ELMENDORF03ACHIN				315,000	1:1.2,2.3	2,3H	II III		Repeats each year
AK03-03	FORTRICHARDSON03BCHIN				315,000	1:1.2,2.4	2,4H	II IIII		Repeats each year
AK03-04	ELMENDORF03BCHIN				105,000	1:1.2,2.4	2,4H	II IIII		Repeats each year
AK03-05	FORTRICHARDSON03CCHIN				210,000	1:1.2,2.5	2,5H	II IIIII		Repeats each year
AK03-06	ELMENDORF03CCHIN				105,000	1:1.2,2.5	2,5H	II IIIII		Repeats each year
AK03-07	GREENLAKE03CHIN				1,000,000	1:1.3,2.3	3,3H	III III		Repeats each year
AK03-08	HIDDENFALLS03CHIN				1,500,000	1:1.4,2.2	4,2H	IIII II		Repeats each year
AK03-09	MEDVEJIE03				1,300,000	1:1.4,2.3	4,3H	IIII III		Repeats each year
AK03-10	DIPAC03CHIN				600,000	No Mark	No Mark			Alternates years

SPECIES: COHO

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	DATE LAST RELEASED	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK03-30	TM	2003	2004		COHO	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Bear Lake
AK03-31	TM	2003	2005		COHO	Alaska	Southeast	AKI	Port Armstrong Hatchery	Port Armstrong
AK03-32	TM	2003	2004		COHO	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Ship & Jim Creek
AK03-33	TM	2003	2004		COHO	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK03-34	TM	2003	2004		COHO	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK03-35	TM	2003	2005		COHO	Alaska	Southcentral	PWSAC	Wally H.Noerenberg Hatchery	Wally H.Noerenberg
AK03-36	TM	2003	2005		COHO	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK03-37	TM	2003	2005		COHO	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay

ID#	MARK NAME	STAGE	WEIGHT	LENGTH	ESIMATED RELEASE	RBr CODE	HATCH CODE	Pre-Hatch Graphic	Post-Hatch Graphic	COMMENTS
AK03-30	FORTRICHARDSON03ACOH				240,000	1:1.4	4H	IIII		Repeats each year
AK03-31	PORTARMSTRONG03COHO				1,600,000	1:1.5	5H	IIII		
AK03-32	FORTRICHARDSON03BCOH				640,000	1:1.6	6H	IIIIII		Repeats each year
AK03-33	TRAILLAKES03SMCOHO				450,000	1:1.3,2.3	3,3H	III III		Repeats each year
AK03-34	TRAILLAKES03LGCOHO				150,000	1:1.3,2.3+3.2	3,3H2	III III	II	Repeats each year
AK03-35	WHN03COHO				300,000	1:1.3	3H	III		Repeats each year
AK03-36	MEDVEJIE03COHO				2,500,000	1:1.4,2.2	4,2H	IIII II		Repeats each year
AK03-37	DIPAC03COHO				800,000	1:1.4	4H	IIII		Alternates years

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2003.

SPECIES: CHUM

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	DATE LAST RELEASED	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK03-11	TM	2003	2004		CHUM	Alaska	Southcentral	PWSAC	Wally H.Noerenberg Hatchery	Wally H.Noerenberg
AK03-12	TM	2003	2004		CHUM	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK03-13	TM	2003	2004		CHUM	Alaska	Southcentral	PWSAC	Wally H.Noerenberg Hatchery	Wally H.Noerenberg
AK03-14	TM	2003	2004		CHUM	Alaska	Southcentral	PWSAC	Wally H.Noerenberg Hatchery	Wally H.Noerenberg
AK03-15	TM	2003	2004		CHUM	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK03-16	TM	2003	2004		CHUM	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK03-17	TM	2003	2004		CHUM	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK03-18	TM	2003	2004		CHUM	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK03-19	TM	2003	2004		CHUM	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK03-20	TM	2003	2004		CHUM	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK03-21	TM	2003	2004		CHUM	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK03-22	TM	2003	2004		CHUM	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK03-23	TM	2003	2004		CHUM	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK03-24	TM	2003	2004		CHUM	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK03-25	TM	2003	2004		CHUM	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK03-26	TM	2003	2004		CHUM	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK03-27	TM	2003	2004		CHUM	Alaska	Southeast	NSRAA	Medveje Hatchery	Medveje
AK03-28	TM	2003	2004		CHUM	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK03-29	TM	2003	2004		CHUM	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay

ID#	MARK NAME	STAGE	WEIGHT	LENGTH	ESIMATED RELEASE	RBr CODE	HATCH CODE	Pre-Hatch Graphic	Post-Hatch Graphic	COMMENTS
AK03-11	WHN03A				75,000,000	1:1.5	5H			
AK03-12	HIDDENFALLS03				38,000,000	1:1.3,2.3	3,3H			Repeats each year
AK03-13	PORTCHALMERS03				25,000,000	1:1.3	3H			Repeats each year
AK03-14	WHN03B					1:1.3+2.3	3H3			
AK03-15	TAKATZ03				42,000,000	1:1.4	4H			
AK03-16	DEEPINLET03B				14,000,000	1:1.4,2.2	4,2H			
AK03-17	NAKATINLET03FALL	Fall			8,000,000	1:1.4n+2.3	4nH3			
AK03-18	NEETSBAY03FALL	Fall			20,000,000	1:1.4n+2.4	4nH4			
AK03-19	AMALGA03A				40,000,000	1:1.5	5H			three year rotation
AK03-20	GASTINEAU03A				20,000,000	1:1.5+2.3	5H3			three year rotation
AK03-21	GASTINEAU03B				7,000,000	1:1.5+2.3,3.3	5H3,3			three year rotation
AK03-22	BOATHARBOR03				15,000,000	1:1.5+2.4	5H4			three year rotation
AK03-23	LIMESTONE03				15,000,000	1:1.5+2.5	5H5			three year rotation
AK03-24	AMALGA03B				8,000,000	1:1.5+2.6	5H6			three year rotation
AK03-25	NEETSBAY03SUM	Summer			47,000,000	1:1.5n+2.3	5nH3			
AK03-26	ANITABAY03				14,000,000	1:1.5n+2.4	5nH4			
AK03-27	DEEPINLET03A				20,000,000	1:1.6	6H			
AK03-28	KENDRICKBAY03				18,000,000	1:1.6n	6nH			
AK03-29	NAKATINLET03SUM	Summer			8,000,000	1:1.8n	8nH			

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2003.

SPECIES: SOCKEYE

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	DATE LAST RELEASED	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK03-49	TM	2003	2004		SOCKEYE	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	McDonald Lake
AK03-50	TM	2003	2004		SOCKEYE	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Hidden Lake
AK03-51	TM	2003	2004		SOCKEYE	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	Hugh Smith Lake
AK03-52	TM	2003	2004		SOCKEYE	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	Hugh Smith Lake
AK03-53	TM	2003	2004		SOCKEYE	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Tutsumena Lake
AK03-54	TM	2003	2004		SOCKEYE	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK03-55	TM	2003	2004		SOCKEYE	Alaska	Southeast	POWHA	Klawock River Hatchery	Klawock Lake
AK03-56	TM	2003	2004		SOCKEYE	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK03-57	TM	2003	2004		SOCKEYE	Alaska	Southcentral	PWSAC	Main Bay Hatchery	Main Bay
AK03-58	TM	2003	2005		SOCKEYE	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK03-59	TM	2003	2005		SOCKEYE	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK03-60	TM	2003	2005		SOCKEYE	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK03-61	TM	2003	2005		SOCKEYE	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK03-62	TM	2003	2005		SOCKEYE	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK03-63	TM	2003	2004		SOCKEYE	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tahltan Lake
AK03-64	TM	2003	2004		SOCKEYE	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	McDonald Lake
AK03-65	TM	2003	2004		SOCKEYE	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tatsamenie Lake
AK03-66	TM	2003	2004		SOCKEYE	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK03-67	TM	2003	2004		SOCKEYE	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tahltan Lake
AK03-68	TM	2003	2004		SOCKEYE	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Big Lake

ID#	MARK NAME	STAGE	WEIGHT	LENGTH	ESIMATED RELEASE	RBr CODE	HATCH CODE	Pre-Hatch Graphic	Post-Hatch Graphic	COMMENTS
AK03-49	NECKCREEK03				500,000	1:1.2,2.1,3.2	2,1,2H			
AK03-50	HIDDENLAKE03				1,100,000	1:1.2,2.2,3.2	2,2,2H			
AK03-51	HUGHSMITH03LG	L/L			225,000	1:1.2,2.3,3.2	2,3,2H			
AK03-52	HUGHSMITH03SM	E/S			225,000	1:1.2,2.3,3.3	2,3,3H			
AK03-53	TUTSUMENA03				6,000,000	1:1.2,2.3	2,3H			
AK03-54	BEARLAKE03A	Presmolt			700,000	1:1.2,2.4	2,4H			
AK03-55	KLAWOCK03				365,000	1:1.3,2.2	3,2H			
AK03-56	BEARLAKE03B	Fry			1,000,000	1:1.3,2.2	3,2H			
AK03-57	MAINBAY03				8,000,000	1:1.3,2.2+3.2	3,2H2			
AK03-58	SPEELARM03E/LG	EL			1,500,000	1:1.3,2.3	3,3H			
AK03-59	SPEELARM03L/LG	LL			1,500,000	1:1.3,2.4n	3,4nH			
AK03-60	BEARLAKE03C	Smolts			250,000	1:1.4,2.2	4,2H			
AK03-61	SPEELARM03L/SM	LS			1,500,000	1:1.4,2.3n	4,3nH			
AK03-62	SPEELARM03E/SM	ES			1,500,000	1:1.4,2.4	4,4H			
AK03-63	TUYA03				1,100,000	1:1.4	4H			
AK03-64	BURNETTINLET03	Smolts			40,000	1:1.5,2.2	5,2H			
AK03-65	TATSAMENIE03	Early Fed			1,000,000	1:1.5	5H			
AK03-66	SWEETHEART03				526,000	1:1.5n,2.3	5n3H			
AK03-67	TAHLTAN03				2,300,000	1:1.6	6H			
AK03-68	BIGLAKE03				1,500,000	2:1.4	H4			

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2003.

SPECIES: PINK

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	DATE LAST RELEASED	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK03-38	TM	2003	2004		PINK	Alaska	Southcentral	PWSAC	Cannery Creek Hatchery	Cannery Creek
AK03-39	TM	2003	2004		PINK	Alaska	Southeast	AKI	Port Armstrong Hatchery	Port Armstrong
AK03-40	TM	2003	2004		PINK	Alaska	Southeast	AKI	Port Armstrong Hatchery	Port Armstrong
AK03-41	TM	2003	2004		PINK	Alaska	Southeast	AKI	Port Armstrong Hatchery	Port Armstrong
AK03-42	TM	2003	2004		PINK	Alaska	Southcentral	PWSAC	Armin F. Koernig Hatchery	Armin F. Koernig
AK03-43	TM	2003	2004		PINK	Alaska	Southcentral	PWSAC	Armin F. Koernig Hatchery	Armin F. Koernig
AK03-44	TM	2003	2004		PINK	Alaska	Southcentral	PWSAC	Armin F. Koernig Hatchery	Armin F. Koernig
AK03-45	TM	2003	2004		PINK	Alaska	Southcentral	VFDA	Solomon Gulch Hatchery	Solomon Gulch
AK03-46	TM	2003	2004		PINK	Alaska	Southcentral	PWSAC	Wally H.Noerenberg Hatchery	Wally H.Noerenberg
AK03-47	TM	2003	2004		PINK	Alaska	Southcentral	PWSAC	Wally H.Noerenberg Hatchery	Wally H.Noerenberg
AK03-48	TM	2003	2004		PINK	Alaska	Southcentral	PWSAC	Wally H.Noerenberg Hatchery	Wally H.Noerenberg

ID#	MARK NAME	STAGE	WEIGHT	LENGTH	ESIMATED RELEASE	RBr CODE	HATCH CODE	Pre-Hatch Graphic	Post-Hatch Graphic	COMMENTS
AK03-38	CCH03				140,000,000	1:1.3,2.3	3,3H			Repeats each year
AK03-39	PORTARMSTRONG03E	E			35,000,000	1:1.3	3H			Repeats each year
AK03-40	PORTARMSTRONG03M	M			35,000,000	1:1.3+2.3	3H3			Repeats each year
AK03-41	PORTARMSTRONG03L	L			15,000,000	1:1.3+2.4	3H4			Repeats each year
AK03-42	AFK03E				50,000,000	1:1.4	4H			Repeats each year
AK03-43	AFK03L1				50,000,000	1:1.4+2.3	4H3			Repeats each year
AK03-44	AFK03L2				50,000,000	1:1.4+2.5	4H5			Repeats each year
AK03-45	SGH03				200,000,000	1:1.6	6H			Repeats each year
AK03-46	WHN03EPINK				40,000,000	1:1.8	8H			Repeats each year
AK03-47	WHN03L1PINK				40,000,000	1:1.8+2.3	8H3			Repeats each year
AK03-48	WHN0L2PINK				40,000,000	1:1.8+2.5	8H5			Repeats each year