

Proposed Thermal Marks for Brood Year 2006 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 2006, approximately 53 million sockeye, 7 million chinook, 505 million chum, 9 million coho, and 730 million pink salmon will be marked at 23 different hatcheries using 78 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 2006 brood year stocks

The proposed thermal marks for brood year 2006 salmon are listed in Table 1. We plan to mark approximately 53 million sockeye, 7 million chinook, 505 million chum, 9 million coho, and 730 million pink salmon will be marked at 23 different hatcheries using 78 thermal marks. The proposed otolith plan shows how some marks are scheduled to change in future years. 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), with the modification by Hagen (1999) to include narrow ring bands; as well as in the Hatch Code notation (Hagen et al, 2000).

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.
- Hagen, P., H.J. Geiger, E.C. Volk, and J.J. Grimm. 2000. Preliminary Thermal Marks applied to Salmon from Alaska, Washington and Oregon for Brood Year 2000 and some proposed marks for BY 2001. 6 p. Alaska Dept. Fish and Game, Juneau Alaska. 99801-5526
- 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 2006.

SPECIES: CHINOOK

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK06-01	TM	2006	2007	Chinook	Alaska	Southcentral	ASLC	Alaska Sealife Center	Ressurrection Bay
AK06-02	TM	2006	2008	Chinook	Alaska	Southcentral	ASLC	Alaska Sealife Center	Ressurrection Bay
AK06-03	TM	2006	2007	Chinook	Alaska	Southcentral	ASLC	Alaska Sealife Center	Ressurrection Bay
AK06-04	TM	2006	2008	Chinook	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Cook Inlet
AK06-05	TM	2006	2008	Chinook	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Ship Creek
AK06-06	TM	2006	2008	Chinook	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK06-07	TM	2006	2007	Chinook	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK06-08	TM	2006	2007	Chinook	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK06-09	TM	2006	2008	Chinook	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK06-10	TM	2006	2008	Chinook	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie

ID#	MARK NAME	STAGE	WEIGHT	LENGTH	ESIMATED RELEASE	RBr CODE	HATCH CODE	Pre-Hatch Graphic	Post-Hatch Graphic	COMMENTS
AK06-01	SEALIFE06CHINA	Smolt			65,000	1:1.1,2.5,3.1	1,5,1H			Repeats each year
AK06-02	SEALIFE06CHINC	Smolt			20,000	1:1.3,2.2,3.2	3,2,2H			Repeats each year
AK06-03	SEALIFE06CHINB	Smolt			15,000	1:1.4,2.2,3.1	4,2,1H			Repeats each year
AK06-04	COOKINLET06CHIN	Smolt			990,000	1:1.2,2.3	2,3H			Repeats each year
AK06-05	PWS06CHIN	Smolt			210,000	1:1.2,2.4	2,4H			Repeats each year
AK06-06	HIDDENFALLS06CHIN	Smolt			1,500,000	1:1.4,2.2	4,2H			Repeats each year
AK06-07	MEDVEJIE06CHINZ	Smolt			1,000,000	1:1.1,2.5	1,5H			Medvejie Zero Age
AK06-08	DEEPINLET06CHINZ	Smolt			1,000,000	1:1.2,2.3,3.1	2,3,1H			Deep Inlet Zero Age
AK06-09	GREENLAKE06CHIN	Smolt			1,000,000	1:1.3,2.3	3,3H			Green Lake Full Term
AK06-10	MEDVEJIE06CHIN	Smolt			1,000,000	1:1.4,2.3	4,3H			Medvejie Full Term

SPECIES: COHO

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK06-11	TM	2006	2008	Coho	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	Burnett Inlet
AK06-12	TM	2006	2008	Coho	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	Burnett Inlet
AK06-13	TM	2006	2008	Coho	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Ship Creek
AK06-14	TM	2006	2008	Coho	Alaska	Southcentral	ADFG	Fort Richardson Hatchery	Bear Lake
AK06-15	TM	2006	2007	Coho	Alaska	Western	NFA	Hobson Creek	Nome River
AK06-16	TM	2006	2008	Coho	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK06-17	TM	2006	2007	Coho	Alaska	Western	NSED	Nome Incubation	Snake River
AK06-18	TM	2006	2008	Coho	Alaska	Southcentral	VFDA	Solomon Gulch Hatchery	Solomon Gulch
AK06-19	TM	2006	2007	Coho	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK06-20	TM	2006	2007	Coho	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK06-21	TM	2006	2007	Coho	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK06-22	TM	2006	2008	Coho	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
AK06-11	NECKLAKE06COHO	Smolt			1,650,000	1:1.1,2.4	1,4H			Repeats each year
AK06-12	BURNETTINLET06COHO	Smolt			200,000	1:1.2,2.1,3.2	2,1,2H			Repeats each year
AK06-13	COOKINLET06COHO	Smolt			655,000	1:1.1,2.5	1,5H			Repeats each year
AK06-14	RESURRECTION06COHO	Smolt			240,000	1:1.2,2.4	2,4H			Repeats each year
AK06-15	NOME06COHO	Fry			100,000	1:1.1,2.3	1,3H			
AK06-16	MEDVEJIE06COHO	Smolt			2,500,000	1:1.4,2.2	4,2H			Repeats each year
AK06-17	NORTON06COHO	Egg			120,000	1:1.3,2.2n	3,2nH			
AK06-18	SGH06COHO	Smolt			1,500,000	1:1.6	6H			Repeats each year
AK06-19	TRAILLAKES06ACOHO	Fry			100,000	2:1.1,2.4	H1,4			
AK06-20	TRAILLAKES06SMCOHO	Fry			450,000	2:1.2,2.2,3.2	H2,2,2			Repeats each year
AK06-21	TRAILLAKES06LGCOHO	Smolt			150,000	2:1.5,2.1	H5,1			Repeats each year
AK06-22	WHN06COHO	Smolt			1,000,000	1:1.3	3H			Repeats each year

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2006.

SPECIES: CHUM

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK06-23	TM	2006	2007	Chum	Alaska	Southeast	KAKE	Gunnuk Creek	Gunnuk Cr
AK06-24	TM	2006	2007	Chum	Alaska	Southeast	NSRAA	Herman Creek	Chilkat
AK06-25	TM	2006	2007	Chum	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK06-26	TM	2006	2007	Chum	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK06-27	TM	2006	2007	Chum	Alaska	Southeast	NSRAA	Hidden Falls Hatchery	Hidden Falls
AK06-28	TM	2006	2007	Chum	Alaska	Western	NFA	Hobson Creek	Nome River
AK06-29	TM	2006	2007	Chum	Alaska	Southeast	DIPAC	Macaulay Hatchery	Macaulay
AK06-30	TM	2006	2007	Chum	Alaska	Southeast	NSRAA	Medvejie Hatchery	Medvejie
AK06-31	TM	2006	2007	Chum	Alaska	Southeast	NSRAA	Medvejie Hatchery	Hidden Falls
AK06-32	TM	2006	2007	Chum	Alaska	Southeast	NSRAA	Medvejie Hatchery	Hidden Falls
AK06-33	TM	2006	2007	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK06-34	TM	2006	2007	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK06-35	TM	2006	2007	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK06-36	TM	2006	2007	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK06-37	TM	2006	2007	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK06-38	TM	2006	2007	Chum	Alaska	Southeast	SSRAA	Neets Bay Hatchery	Neets Bay
AK06-39	TM	2006	2007	Chum	Alaska	Western	NSED	Nome Incubation	Nome River
AK06-40	TM	2006	2007	Chum	Alaska	Western	NSED	Nome Incubation	Snake River
AK06-41	TM	2006	2007	Chum	Alaska	Southeast	AKI	Port Armstrong Hatchery	Hidden Falls
AK06-42	TM	2006	2007	Chum	Alaska	Southeast	SJ	Sheldon Jackson	Sheldon Jackson
AK06-43	TM	2006	2007	Chum	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg
AK06-44	TM	2006	2007	Chum	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg
AK06-45	TM	2006	2007	Chum	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
AK06-23	KAKE06	Fed Fry			10,000,000	1:1.4,2.2	4,2H			
AK06-24	17MILE06	Fed Fry			500,000	1:1.4	4H			
AK06-25	TAKATZ06	Fed Fry			45,000,000	1:1.1,2.2,3.1,4.3	1,2,1,3H			
AK06-26	HIDDENFALLS06	Fed Fry			38,000,000	1:1.1,2.2,3.2,4.2	1,2,2,2H			
AK06-27	HIDDENFALLS06LL	Fed Fry			15,000,000	1:1.3,2.3n,3.1	3,3n,1H			Late Large
AK06-28	NOME06CHUM	Fry			170,000	1:1.1,2.3	1,3H			
AK06-29	DIPAC06	Fed Fry			100,000,000	1:1.4,2.1	4,1H			Three year rotation
AK06-30	DEEPINLETM06L/LG	Fed Fry			9,000,000	1:1.1,2.3,3.1,4.2	1,3,1,2H			Late Large
AK06-31	DEEPINLETHF06L/LG	Fed Fry			7,000,000	1:1.3,2.2,3.2	3,2,2H			Late Large
AK06-32	DEEPINLETHF06	Fed Fry			15,000,000	1:1.4,2.2n,3.1	4,2n,1H			
AK06-33	NAKATINLET06FALL	Fed Fry			8,000,000	1:1.1,2.6,3.1	1,6,1H			Three year rotation Fall Run
AK06-34	NAKATINLET06SUM	Fed Fry			8,000,000	1:1.3,2.1,3.4	3,1,4H			Three year rotation Summer Run
AK06-35	ANITABAY06	Fed Fry			14,000,000	1:1.3,2.4,3.1	3,4,1H			Three year rotation
AK06-36	NEETSBA06FALL	Fed Fry			20,000,000	1:1.4,2.2,3.2	4,2,2H			Three year rotation Fall Run
AK06-37	NEETSBA06SUM	Fed Fry			47,000,000	1:1.4,2.4	4,4H			Three year rotation Summer Run
AK06-38	KENDRICK06	Fed Fry			18,000,000	1:1.4n,2.4	4n,4H			Three year rotation
AK06-39	NORTON06CHUMB	Egg			360,000	1:1.3,2.2n	3,2nH			
AK06-40	NORTON06CHUMA	Egg			360,000	1:1.3n,2.2	3n,2H			
AK06-41	PORTARMSTRONG06CHUM	Fed Fry			20,000,000	2:1.3	H3			
AK06-42	SJ06	Fed Fry			100,000	1:1.1,2.5	1,5H			
AK06-43	WHN06B	Fed Fry			15,000,000	1:1.1,2.2,3.2,4.1	1,2,2,1H			
AK06-44	WHN06	Fed Fry			75,000,000	1:1.1,2.2,3.3	1,2,3H			
AK06-45	PORTCHALMERS06	Fed Fry			40,000,000	1:1.3,2.2n,3.1	3,2n,1H			

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2006.

SPECIES: SOCKEYE

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK06-46	TM	2006	2008	Sockeye	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	McDonald Lake
AK06-47	TM	2006	2008	Sockeye	Alaska	Southeast	SSRAA	Burnett Inlet Hatchery	McDonald Lake
AK06-48	TM	2006	2007	Sockeye	Alaska	Southcentral	PWSAC	Gulkana	Gulkana
AK06-49	TM	2006	2007	Sockeye	Alaska	Southcentral	PWSAC	Main Bay Hatchery	Main Bay
AK06-50	TM	2006	2008	Sockeye	Alaska	Southcentral	PWSAC	Main Bay Hatchery	Main Bay
AK06-51	TM	2006	2007	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tatsamenie Lake
AK06-52	TM	2006	2007	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tatsamenie Lake
AK06-53	TM	2006	2007	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK06-54	TM	2006	2007	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tahltan Lake
AK06-55	TM	2006	2007	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Tahltan Lake
AK06-56	TM	2006	2008	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Snettisham
AK06-57	TM	2006	2007	Sockeye	Alaska	Southeast	DIPAC	Snettisham Hatchery	Little Trapper
AK06-58	TM	2006	2007	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK06-59	TM	2006	2008	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK06-60	TM	2006	2008	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Big Lake
AK06-61	TM	2006	2007	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Hidden Lake
AK06-62	TM	2006	2007	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Hidden Lake
AK06-63	TM	2006	2007	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Hidden Lake
AK06-64	TM	2006	2007	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Big Lake
AK06-65	TM	2006	2007	Sockeye	Alaska	Southcentral	CIAA	Trail Lakes Hatchery	Bear Lake
AK06-66	TM	2006	2007	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
AK06-46	NECKLAKE06	Smolt			500,000	1:1.2,2.4n	2,4nH			Three year rotation
AK06-47	BURNETTINLET06	Smolt			40,000	1:1.3,2.5	3,5H			Three year rotation
AK06-48	GULKANA06	Fry			8,000,000	2:1.S1	HS1			
AK06-49	SOLFLAKE06	Fry			8,000,000	1:1.3,2.2+3.1,4.3	3,2H1,3			
AK06-50	MAINBAY06	Smolt			8,000,000	1:1.3,2.2+3.2,4.2	3,2H2,2			Three year rotation
AK06-51	TATSAMENIE06S	Fry			1,000,000	1:1.2,2.1,3.2	2,1,2H			
AK06-52	TATSAMENIE06N	Fry			1,000,000	1:1.2,2.2,3.1	2,2,1H			
AK06-53	SWEETHEART06	Fry			500,000	1:1.3,2.2n	3,2nH			
AK06-54	TUYA06	Fry			3,000,000	1:1.3,2.3	3,3H			
AK06-55	TAHLTAN06	Fry			1,500,000	1:1.3n,2.2	3n,2H			
AK06-56	SPEELARM06	Smolt			7,500,000	1:1.4n,2.3	4n,3H			
AK06-57	TRAPPER06	Fry			1,000,000	1:1.6	6H			
AK06-58	TRAILLAKES06B	Pre-smolt			800,000	1:1.1,2.3	1,3H			
AK06-59	TRAILLAKES06C	Smolt			250,000	1:1.1,2.4	1,4H			
AK06-60	BIGLAKE06SMOLT	Smolt			1,000,000	1:1.1,2.5	1,5H			
AK06-61	HIDDENLAKE06	Fry			530,000	1:1.2,2.2,3.2	2,2,2H			
AK06-62	PENINSULA06SOCKEYE	Fry			3,500,000	1:1.2,2.2	2,2H			
AK06-63	TUTKA06	Fry			530,000	1:1.2,2.2n	2,2nH			
AK06-64	BIGLAKE06FRY	Fry			3,000,000	1:1.2,2.3	2,3H			
AK06-65	TRAILLAKES06A	Fry			2,400,000	1:1.4,2.2	4,2H			
AK06-66	BLODGET06	Fry			1,000,000	1:1.6,2.1	6,1H			

Table 1 (continued). Summary of thermal mark codes to be applied to Alaska hatchery salmon in brood year 2006.

SPECIES: PINK

ID#	MARK TYPE	BROOD YEAR	RELEASE YEAR	SPECIES	STATE/ PROVINCE	REGION RELEASE	AGENCY	FACILITY	STOCK
AK06-67	TM	2006	2007	Pink	Alaska	Southcentral	PWSAC	Armin F. Koernig Hatchery	Armin F. Koernig
AK06-68	TM	2006	2007	Pink	Alaska	Southcentral	PWSAC	Armin F. Koernig Hatchery	Armin F. Koernig
AK06-69	TM	2006	2007	Pink	Alaska	Southcentral	PWSAC	Armin F. Koernig Hatchery	Armin F. Koernig
AK06-70	TM	2006	2007	Pink	Alaska	Southcentral	PWSAC	Cannery Creek Hatchery	Cannery Creek
AK06-71	TM	2006	2007	Pink	Alaska	Southeast	AKI	Port Armstrong Hatchery	Port Armstrong
AK06-72	TM	2006	2007	Pink	Alaska	Southeast	AKI	Port Armstrong Hatchery	Port Armstrong
AK06-73	TM	2006	2007	Pink	Alaska	Southcentral	PGHC	Port Graham	Port Graham
AK06-74	TM	2006	2007	Pink	Alaska	Southeast	SJ	Sheldon Jackson	Sheldon Jackson
AK06-75	TM	2006	2007	Pink	Alaska	Southcentral	VFDA	Solomon Gulch Hatchery	Solomon Gulch
AK06-76	TM	2006	2007	Pink	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg
AK06-77	TM	2006	2007	Pink	Alaska	Southcentral	PWSAC	Wally H. Noerenberg Hatchery	Wally H. Noerenberg
AK06-78	TM	2006	2007	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
AK06-67	AFK06A	Fed Fry			50,000,000	1:1.4	4H			Repeats each year
AK06-68	AFK06B	Fed Fry			50,000,000	1:1.4+2.3	4H3			Repeats each year
AK06-69	AFK06C	Fed Fry			50,000,000	1:1.4+2.5	4H5			Repeats each year
AK06-70	CCH06	Fed Fry			140,000,000	1:1.3,2,3	3,3H			Repeats each year
AK06-71	PORTARMSTRONG06E	Fed Fry			65,000,000	1:1.3	3H			Repeats each year Early
AK06-72	PORTARMSTRONG06L	Fed Fry			20,000,000	1:1.3+2.3	3H3			Repeats each year Late
AK06-73	PORTGRAHAM06	Fed Fry			35,000,000	1:1.4,2,2	4,2H			
AK06-74	SJ06	Fed Fry			100,000	1:1.4,2,1	4,1H			
AK06-75	SGH06	Fed Fry			200,000,000	1:1.6	6H			Repeats each year
AK06-76	WHN06PINKA	Fed Fry			40,000,000	1:1.8	8H			Repeats each year
AK06-77	WHN06PINKB	Fed Fry			40,000,000	1:1.8+2.3	8H3			Repeats each year
AK06-78	WHN06PINKC	Fed Fry			40,000,000	1:1.8+2.5	8H5			Repeats each year