

**Releases of Otolith Marked Salmon from Alaska in 2011**

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## **Abstract**

In Alaska, mass-marking of salmon using otolith thermal marking is an effective research and management tool for a variety of situations. This document reports the otolith mark patterns applied to hatchery-raised salmon stocks released in Alaska during 2011. It includes five species of salmon from brood years 2009 through 2011. Release numbers, mark patterns, and release locations are summarized.

## **Summary of Alaska Thermal Marking Programs**

In Alaska, thermal marking of otoliths is primarily 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. In addition, several on-going programs use this information to aid in the in-season management of mixed stock fisheries. Hatcheries use mark recovery data to evaluate the success of various release strategies. In research applications, thermal marks have been used to answer questions regarding lake survival and straying rates of returning adults. The presence of otolith thermal marks is also being used to determine the origin of juvenile and immature salmon collected during biotic surveys in the Gulf of Alaska and the Bering Sea. In many instances, thermal marks are being applied by hatcheries in the absence of a directed sampling program. This applies primarily to coho and Chinook salmon, but it includes some sockeye releases as well. The reasons for this vary, but it primarily occurs in situations where the marks cost little to apply, and there is anticipation that a thermal mark recovery program will be implemented by the time the fish return.

Thermal mark patterns are assigned annually by the Alaska Department of Fish and Game with consideration based on the constraints of the hatchery, the need to identify specific stocks, and the existence of a program to recover and identify the thermal patterns. It has become increasingly difficult to create and apply unique patterns as the hatchery marking programs have expanded. Consequently, alternative marking strategies, such as the use of strontium chloride and calcein, are currently being explored.

In 2011, hatcheries in Alaska released the following numbers of otolith marked salmon: 5.4 million Chinook, 540 million chum, 7.4 million coho, 736 million pink, and 51 million sockeye. A list of otolith marks applied to hatchery-reared salmon released in 2011 is provided in Table 1. Thermal mark patterns are presented in the Uniform Hatch Code notation (Johnson et al. 2006).

The information presented in this report is based on release year, which is defined as when the fish is removed from artificial culture and released into the natural environment. The data includes fish from brood years 2009, 2010, and, 2011. In some instances, fish from the same thermal mark group will be released over several years, so this list may not be comprehensive for each NPAFC number (e.g. a single NPAFC number may appear during multiple release years). Further information regarding thermal mark patterns and numbers of released fish in Alaska is available from the Alaska Department of Fish and

Game, Mark, Tag and Age Laboratory database (<http://taglab.org>) and from the NPAFC Working Group on Salmon Marking's Website (<http://npafc.taglab.org>).

## **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

Table 1. Releases of otolith marked salmon from Alaska in 2011.

NPAFC ID	BROOD YEAR	SPECIES	STATE/ PROVINCE	REGION	FACILITY	RELEASE SITE	DATE RELEASED	MARK TYPE	MARK ID	HATCH CODE	STAGE	NUMBER RELEASED
AK09-53	2009	CHINOOK	ALASKA	SOUTHCENTRAL	FORT RICHARDSON	CROOKED CR, DECEPTION CR, EKLUTNA, HALIBUT CV, HOMER SPIT, NINLCHIK R, SELDOVIA, SHIP CR	7/8/2011	THERMAL	COOKINLET09CHIN	2,3H	SMOLT	1,131,969
AK09-58	2009	CHINOOK	ALASKA	SOUTHEAST	MEDVEJIE	BEAR COVE	5/15/2011	THERMAL	GREENLAKE09CHIN	3,4H	SMOLT	849,796
AK09-60	2009	CHINOOK	ALASKA	SOUTHEAST	HIDDEN FALLS	KASNYKU BAY	5/16/2011	THERMAL	HIDDENFALLS09CHIN	4,2H	SMOLT	598,284
AK09-59	2009	CHINOOK	ALASKA	SOUTHEAST	MEDVEJIE	BEAR COVE	4/6/2011	THERMAL	MEDVEJIE09CHIN	3n,3H	SMOLT	124,904
AK09-54	2009	CHINOOK	ALASKA	SOUTHEAST	MEDVEJIE	BEAR COVE	4/21/2011	THERMAL	MEDVEJIE09CHINZ	2,3nH	SMOLT	721,644
AK09-55	2009	CHINOOK	ALASKA	SOUTHCENTRAL	FORT RICHARDSON	FLEMING SPIT, VALDEZ OLD TOWN, WHITTIER HBR	7/29/2011	THERMAL	PWS09CHIN	2,4H	SMOLT	300,304
AK09-56	2009	CHINOOK	ALASKA	SOUTHCENTRAL	FORT RICHARDSON	SEWARD LAGOON	6/27/2011	THERMAL	RESURRECTION09CHIN	2,5H	SMOLT	223,881
AK09-52	2009	CHINOOK	ALASKA	SOUTHEAST	CRYSTAL LK, NEETS BAY, WHITMAN LAKE	NEETS BAY, HERRING COVE	5/31/2011	THERMAL	WHITMAN09CHIN	1,5H	SMOLT	1,447,000
AK09-46	2009	COHO	ALASKA	SOUTHCENTRAL	FORT RICHARDSON	BIRD CR, CAMPBELL CR, EKLUTNA TAILRACE, HOMER SPIT, SHIP CR	7/20/2011	THERMAL	COOKINLET09COHO	1,5H	SMOLT	688,892
AK09-64	2009	COHO	ALASKA	SOUTHEAST	MACAULAY	GASTINEAU CH	6/15/2011	THERMAL	DIPAC09COHO	3,2H	SMOLT	349,277
AK09-47	2009	COHO	ALASKA	SOUTHCENTRAL	FORT RICHARDSON	SEWARD LAGOON	7/18/2011	THERMAL	RESURRECTION09COHO	2,4H	SMOLT	255,252
AK09-51	2009	COHO	ALASKA	SOUTHCENTRAL	SOLOMON GULCH	BOULDER BAY, SOLOMON GULCH	6/30/2011	THERMAL	SGH09COHO	6H	SMOLT	2,111,389
AK09-49	2009	COHO	ALASKA	SOUTHCENTRAL	WALLY NOERENBERG	CHENEGA BAY, FLEMING SPIT, LAKE BAY, WHITTIER HBR	6/1/2011	THERMAL	WNH09COHO	3H	SMOLT	3,480,000
AK09-04	2009	SOCKEYE	ALASKA	SOUTHCENTRAL	TRAIL LAKES	TUTKA BAY	6/9/2011	THERMAL	ENGLISHBAY09	2,4H	SMOLT	58,200
AK09-08	2009	SOCKEYE	ALASKA	SOUTHCENTRAL	MAIN BAY	MAIN BAY	5/25/2011	THERMAL	MAINBAY09	3,2H2,2	SMOLT	8,680,000
AK09-11	2009	SOCKEYE	ALASKA	SOUTHEAST	BURNETT INLET	MCDONALD LK	5/6/2011	THERMAL	MCDONALD09	3,5nH	SMOLT	322,700
AK09-09	2009	SOCKEYE	ALASKA	SOUTHEAST	SNETTISHAM	SPEEL ARM	6/8/2011	THERMAL	SPEELARM09A	3,2nH	SMOLT	7,140,000
AK09-13	2009	SOCKEYE	ALASKA	SOUTHEAST	SNETTISHAM	SPEEL ARM	6/3/2011	THERMAL	SPEELARM09B	7H	SMOLT	1,220,000
AK09-02	2009	SOCKEYE	ALASKA	SOUTHCENTRAL	TRAIL LAKES	TUTKA BAY	6/9/2011	THERMAL	TUTKA09	3,3H	SMOLT	223,700
AK10-37	2010	CHUM	ALASKA	SOUTHEAST	ANITA BAY	ANITA BAY	5/4/2011	THERMAL	ANITABAY10	5,1,2H	FINGERLING	22,949,000
AK10-52	2010	CHUM	ALASKA	SOUTHEAST	MEDVEJIE	BEAR COVE	5/10/2011	THERMAL	BEARCOVE10	3n,4H	FED FRY	9,948,913
AK10-70	2010	CHUM	ALASKA	SOUTHEAST	17 MI STREAM INCUB	17 MI (CHILKAT)	5/1/2011	THERMAL	CHILKAT10	4H	EMERGENT FRY	1,108,358
AK10-30	2010	CHUM	ALASKA	SOUTHEAST	MEDVEJIE	DEEP INLET	5/9/2011	THERMAL	DEEPINLETHF10	5,2nH	FED FRY	21,804,394
AK10-28	2010	CHUM	ALASKA	SOUTHEAST	MEDVEJIE	DEEP INLET	5/12/2011	THERMAL	DEEPINLETMV10	1,3,2H	FED FRY	28,937,139
AK10-34	2010	CHUM	ALASKA	SOUTHEAST	MACAULAY	AMALGA, BOAT HARBOR, GASTINEAU, LIMESTONE	6/8/2011	THERMAL	DIPAC10	1,6H	FED FRY	100,572,000
AK10-31	2010	CHUM	ALASKA	SOUTHEAST	HIDDEN FALLS	KASNYKU BAY	5/27/2011	THERMAL	HIDDENFALLS10	4n,3H	FED FRY	37,630,694
AK10-26	2010	CHUM	ALASKA	SOUTHEAST	GUNNUK CREEK	KAKE, SE COVE	5/31/2011	THERMAL	KAKE10	3,2nH	FED FRY	15,004,476
AK10-72	2010	CHUM	ALASKA	SOUTHEAST	KENDRICK BAY	KENDRICK BAY	4/24/2011	THERMAL	KENDRICK10	3,5H	FED FRY	17,994,000
AK10-71	2010	CHUM	ALASKA	SOUTHEAST	KENDRICK BAY	KENDRICK BAY	5/18/2011	THERMAL	KENDRICKLL10	4n,2n,2H	FED FRY	2,159,000
AK10-41	2010	CHUM	ALASKA	SOUTHEAST	NAKAT INLET	NAKAT INLET	5/16/2011	THERMAL	NAKATINLET10SUM	4,1,3H	FED FRY	8,429,000

Continued

Table 1 (continued). Releases of otolith marked salmon from Alaska in 2011.

NPAFC ID	BROOD YEAR	SPECIES	STATE/ PROVINCE	REGION	FACILITY	RELEASE SITE	DATE RELEASED	MARK TYPE	MARK ID	HATCH CODE	STAGE	NUMBER RELEASED
AK10-40	2010	CHUM	ALASKA	SOUTHEAST	NEETS BAY	NEETS BAY	5/12/2011	THERMAL	NEETSBA Y10FALL	4,2,2H3,2	FINGERLING	10,325,000
AK10-39	2010	CHUM	ALASKA	SOUTHEAST	NEETS BAY	NEETS BAY	4/25/2011	THERMAL	NEETSBA Y10SUM	4,4H3,2	FINGERLING	51,759,000
AK10-27	2010	CHUM	ALASKA	SOUTHEAST	PORT ARMSTRONG	PORT ARMSTRONG	5/7/2011	THERMAL	PORTARMSTRONG10CHUM	1,2,2H	FED FRY	28,444,881
AK10-35	2010	CHUM	ALASKA	SOUTHCENTRAL	WALLY NOERENBERG	PORT CHALMERS	5/25/2011	THERMAL	PORTCHALMERS10	1,3,3H	FED FRY	40,000,000
AK10-25	2010	CHUM	ALASKA	SOUTHEAST	SHELDON JACKSON	CRESCENT BAY	5/24/2011	THERMAL	SJ10CHUM	1,3H	FED FRY	724,312
AK10-36	2010	CHUM	ALASKA	SOUTHEAST	HIDDEN FALLS	TAKATZ BAY	6/13/2011	THERMAL	TAKATZ10	1,2,1,3H	FED FRY	38,807,328
AK10-29	2010	CHUM	ALASKA	SOUTHCENTRAL	WALLY NOERENBERG	LAKE BAY	5/26/2011	THERMAL	WNH10	3,4nH	FED FRY	69,000,000
AK10-33	2010	CHUM	ALASKA	SOUTHCENTRAL	A F KOERNIG	SA WMILL BAY	5/29/2011	THERMAL	WNH-AFK10	1,2,3H	FED FRY	30,500,000
AK10-47	2010	COHO	ALASKA	SOUTHCENTRAL	TRAIL LAKES	BEAR LK	6/21/2011	THERMAL	TRAILLAKES10SMCOHO	2,2H	FED FRY	437,000
AK10-18	2010	PINK	ALASKA	SOUTHCENTRAL	A F KOERNIG	SA WMILL BAY	5/10/2011	THERMAL	AFK10	4H	FED FRY	74,000,000
AK10-73	2010	PINK	ALASKA	SOUTHCENTRAL	A F KOERNIG	SA WMILL BAY	5/20/2011	THERMAL	AFK10B	4H3	FED FRY	74,000,000
AK10-23	2010	PINK	ALASKA	SOUTHCENTRAL	CANNERY CREEK	CANNERY CR	5/31/2011	THERMAL	CCH10	3,3H	FED FRY	135,000,000
AK10-19	2010	PINK	ALASKA	SOUTHEAST	GUNNUK CREEK	GUNNUK CR, KAKE	5/31/2011	THERMAL	KAKE10PINK	1,2,1H	FED FRY	18,239,275
AK10-21	2010	PINK	ALASKA	SOUTHEAST	PORT ARMSTRONG	PORT ARMSTRONG	5/7/2011	THERMAL	PORTARMSTRONG10	3H	FED FRY	75,506,078
AK10-22	2010	PINK	ALASKA	SOUTHCENTRAL	SOLOMON GULCH	SOLOMON GULCH	5/20/2011	THERMAL	SGH10	6H	FED FRY	222,603,439
AK10-20	2010	PINK	ALASKA	SOUTHEAST	SHELDON JACKSON	CRESCENT BAY	5/24/2011	THERMAL	SJ10PINK	4,1H	FED FRY	701,431
AK10-24	2010	PINK	ALASKA	SOUTHCENTRAL	WALLY NOERENBERG	LAKE BAY	5/6/2011	THERMAL	WNH10PINK	8H	FED FRY	68,000,000
AK10-74	2010	PINK	ALASKA	SOUTHCENTRAL	WALLY NOERENBERG	LAKE BAY	5/20/2011	THERMAL	WNH10PINKB	8H3	FED FRY	68,000,000
AK10-55	2010	SOCKEYE	ALASKA	SOUTHCENTRAL	TRAIL LAKES	ENGLISH BAY	10/27/2011	THERMAL	ENGLISH BA Y10	5H	PRESMOLT	203,300
AK10-75	2010	SOCKEYE	ALASKA	SOUTHCENTRAL	TRAIL LAKES	KIRSCHNER LK	7/3/2011	THERMAL	ENGLISHBA Y10SMOLTA	1,5,1H	FED FRY	160,000
AK10-51	2010	SOCKEYE	ALASKA	SOUTHCENTRAL	GULKANA	CROSSWIND LK, PAXSON LK, SUMMIT LK	6/6/2011	STRONTIUM	GULKANA10	HS1	FED FRY	21,980,000
AK10-10	2010	SOCKEYE	ALASKA	SOUTHCENTRAL	TRAIL LAKES	HIDDEN LK	5/24/2011	THERMAL	HIDDENLAKE10	2,2,2H	EMERGENT FRY	1,044,000
AK10-04	2010	SOCKEYE	ALASKA	SOUTHCENTRAL	TRAIL LAKES	HAZEL LK, LEISURE LK	6/30/2011	THERMAL	PENINSULA10SOCKEYE	1,3H	FED FRY	2,659,000
AK10-16	2010	SOCKEYE	ALASKA	SOUTHEAST	SNETTISHAM	SWEETHEART LK	6/10/2011	THERMAL	SWEETHEART10	5,3nH	EMERGENT FRY	544,000
AK10-13	2010	SOCKEYE	ALASKA	SOUTHEAST	SNETTISHAM	R-TAHLTAN LK	5/26/2011	THERMAL	TAHLTAN10	4,3H	EMERGENT FRY	1,230,000
AK10-48	2010	SOCKEYE	ALASKA	SOUTHEAST	SNETTISHAM	R-TATSAMENIE LK	5/29/2011	THERMAL	TATSAMENIE10	2,1,2H	EMERGENT FRY	1,400,000
AK10-15	2010	SOCKEYE	ALASKA	SOUTHEAST	SNETTISHAM	R-TATSAMENIE LK	6/7/2011	THERMAL	TATSAMENIE10ER	2,2,3H	FED FRY	199,000
AK10-44	2010	SOCKEYE	ALASKA	SOUTHCENTRAL	TRAIL LAKES	BEAR LK	6/22/2011	THERMAL	TRAILLAKES10A	4H	FED FRY	2,488,000
AK10-07	2010	SOCKEYE	ALASKA	SOUTHEAST	SNETTISHAM	R-TUYA LK	6/12/2011	THERMAL	TUYA10	3n,3H	EMERGENT FRY	1,240,000
AK11-01	2011	CHUM	ALASKA	WESTER	NORTON SOUND	SOLOMON R	9/23/2011	THERMAL	NORTON11CHUMA	1,4H	ZYGOTE	59,920
AK11-02	2011	CHUM	ALASKA	WESTERN	NORTON SOUND	SNAKE R	9/27/2011	THERMAL	NORTON11CHUMB	3H	ZYGOTE	32,577
AK11-81	2011	CHUM	ALASKA	SOUTHEAST	NEETS BAY	ANITA BAY 107-30		THERMAL	ANITABA Y11A	5H	FED FRY	3,303,058
AK11-03	2011	COHO	ALASKA	WESTWARD	NORTON SOUND HATCHERY	ANVIL CR	11/22/2011	THERMAL	NORTON11COHO	2,3H	ZYGOTE	52,547