NPAFC
Doc. 1659
Rev.

Recoveries of High Seas Tags and Tag Releases from High Seas Research Vessel Surveys in 2015

by

The Working Group on Salmon Tagging (WGST)
The Committee on Scientific Research and Statistics (CSRS)

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Submitted to the

NORTH PACIFIC ANADROMOUS FISH COMMISSION

May 2016

THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER:
Working Group on Salmon Tagging (WGST). 2016. Recoveries of high seas tags and tag releases from high seas research vessel surveys in 2015. NPAFC Doc. 1659. 6 pp. WGST, Committee on Scientific Research and Statistics (Available at http://www.npafc.org).

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Keywords: high seas salmon, tag release, recovery

Abstract

In July and August 2015, tagging operations were conducted by the Japanese R/V *Hokko maru*, and 51 chum salmon, 10 Chinook salmon and 14 sockeye salmon were released with tags in the Bering Sea. Among them, five chum salmon were equipped with DST magnetic tag, and six Chinook salmon were carrying a pop-up satellite archival tag (PSAT). In November–December 2015, another tagging experiment was conducted on board the US F\V *Lucille,* and seven Chinook salmon were tagged with PSATs and released into Unalaska Bay along the eastern Aleutian Islands. A high-seas tag released on August 3rd, 2014 was reported from a chum salmon caught in the Okhotsk Sea coast, Hokkaido, Japan on October 7, 2015. In addition, archival tag data were retrieved with data communication through the Argos satellite system from 12 out of 13 PSATs that were attached to Chinook salmon. The recorded temperatures suggested that five tagged Chinook salmon were eaten by salmon shark and one tagged fish was eaten by an unidentified marine mammal during the winter as well as the summer/fall.

Introduction

The Working Group on Salmon Tagging (WGST) was established by the Committee on Scientific Research and Statistics (CSRS) at the 15th Annual Meeting in 2007 to manage the INPFC-NPAFC tagging database and to coordinate high seas tagging activities of the Parties. This document summarizes releases of tagged high-seas salmon in 2015 and reports recoveries of high-seas tags by the Parties, covering information updated since the previous report (WGST 2015).

Releases of High Seas Tags in 2015

The Japanese R/V *Hokko maru* conducted trawl and hook-and-line operations at 17 stations in the Bering Sea in the summer of 2015 (Sato et al. 2016). During the research cruise, 51 chum salmon (*Oncorhynchus keta*), 10 Chinook salmon (*O. tshawytscha*) and 14 sockeye salmon (*O. nerka*) were tagged with two (FAJ and NPAFC) disk tags and released into the Bering Sea (Table 1). Among them, five chum salmon were equipped with DST magnetic tags, and six Chinook salmon were equipped with pop-up satellite archival tags (PSAT).

In addition, a winter tagging experiment on board the US F/V *Lucille* was conducted in Unalaska Bay (53º55'N, 166º36'W) along the eastern Aleutian Islands in November–December 2015. Seven large Chinook salmon caught by hook and line were tagged with PSATs and released in the bay (Table 1).

The DST magnetic tag (manufactured by Star-Oddi, Gardabaer, Iceland, size, 15 × 46 mm; weight in air, 19 g; number of records, 4,000 per sensor) can record seawater temperature, depth, earth's magnetic field strength (in three directions), and tilt (in three directions) of maturing chum salmon. From the magnetic field strength measurements a relative magnetic field vector is calculated, which can be put into models to find longitude and latitude of the fish. It is also a useful tool for recording compass directions.

The PSAT (model X-Tag, manufactured by Microwave Telemetry, Inc., Columbia, Maryland) weighed 40 g in air, had an overall length of 30.5 cm (maximum diameter 3.2 cm, antenna length 18.5 cm) and was slightly positively buoyant. The tags contained a lithium composite battery, temperature gauge, pressure sensor, light sensor, and a satellite transmitter. The PSATs recorded seawater temperature, depth, and ambient light level data every two minutes. On a programmable date, the PSATs automatically released from the fish and the recorded data were transmitted through the Argos satellite system. In addition, the tags were programed to release and transmit data if they were at a constant depth (± 5 m) for more than 7 days.

Recovery of High Seas Tags in 2015 /2016

A male chum salmon which was tagged and released in the Bering Sea (58°30'N, 180°00') on August 3rd, 2014 was recovered by a set net along the Okhotsk Sea coast of Hokkaido, Japan (44°N, 144°E; the exact catching location was not identified) on October 7, 2015 (Table 2).

Archival data were retrieved from 12 out of 13 PSATs that were attached to Chinook salmon released in the central Bering Sea and Unalaska Bay (Table 2). The recorded temperatures suggested that five tagged Chinook salmon were eaten by salmon shark (*Lamna ditropis*) and one tagged fish was consumed by an unidentified marine mammal. It is noteworthy that tagged large Chinook salmon were fed by salmon shark even during the mid-winter (January and February). Data analyses on archived tag-data are currently being processed and are not available for this report.

Status of PSATs tagged on Chinook salmon

Tag 133397: The tagged fish was released in the central Bering Sea (58°00'N, 175°00'W) on August 5, 2015. The tag was scheduled to report to the satellites on January 1, 2016, but never reported and is considered missing.

Tag 142189: The tagged fish was released in the central Bering Sea (58°00'N, 175°00'W) on August 5, 2015, and the tag reported to the satellites on January 1, 2016 (57°51'N, 170° 45'W).

Tag 142190: The tagged fish was released in the central Bering Sea (58°00'N, 175°00'W) on August 5, 2015, and the tag reported to the satellites on August 24, 2015 (57°28'N, 175°19'W). The recorded temperature suggested the tagged salmon was eaten by a salmon shark.

Tag 142193: The tagged fish was released in the central Bering Sea (58°00'N, 175°00'W) on August 5, 2015, and the tag reported to the satellites on August 30, 2015 (58° 58'N, 177°24'W).

Tag 148493: The tagged fish was released in the central Bering Sea (58°00'N, 175°00'W) on August 5, 2015, and the tag reported satellites on August 19, 2015 (58° 58'N, 175°22'W).

Tag 142191: The tagged fish was released in the central Bering Sea (54°00'N, 175°00'W) on August 7, 2015, and the tag reported to the satellites on September 21, 2015 (57°47'N, 172° 2'W). The recorded temperature suggested the tagged salmon was eaten by a salmon shark.

Tag 142192: The tagged fish was released in Unalaska Bay (53º56'N, 166º37'W) near Dutch Harbor on November 20, 2015, and the tag reported to the satellites on February 2, 2016 (53°30'N, 167°11'W). The recorded temperature suggested the tagged salmon was eaten by a salmon shark.

Tag 142196: The tagged fish was released in Unalaska Bay (53º56'N, 166º37'W) near Dutch Harbor on November 20, 2015, and the tag reported to satellites on January 3, 2016 (54°59'N , 165° 32'W). The recorded temperature suggested the tagged salmon was eaten by a salmon shark.

Tag 142200: The tagged fish was released in Unalaska Bay (53º56'N, 166º37'W) near Dutch Harbor on November 21, 2015, and the tag reported to the satellites on December 1, 2016 (54°7'N, 166° 44'W). The recorded depth data suggested the tagged fish might die and sink to the sea bottom a few hours after release.

Tag 142194: The tagged fish was released in Unalaska Bay (53º56'N, 166º37'W) on November 22, 2015, and the tag reported to the satellites on January 3, 2015 (55°13'N , 164° 45'W). The recorded temperature suggested the tagged salmon was eaten by an unidentified marine mammal.

Tag 142197: The tagged fish was released in Unalaska Bay (53º56'N, 166º37'W) on November 22, 2015, and the tag reported to the satellites on February 1, 2016 (54°7'N , 164° 37'W).

Tag 142198: The tagged fish was released in Unalaska Bay (53º56'N, 166º37'W) on December 2, 2015, and the tag reported to the satellites on February 5, 2016 (52°41'N, 170° 51'W). The recorded temperature suggested the tagged salmon may have been eaten by a salmon shark.

Tag 142199: The tagged fish was released in Unalaska Bay (53º56'N, 166º37'W) on December 2, 2015, and the tag reported to the satellites on February 3, 2016 (54º13'N, 157º21'W).

References

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Table 1. Releases of high-seas tagged salmon in 2015. DS tag, data storage tag; PSAT, pop-up satellite archival tag; HL, hook and line; T, surface trawl; T/LB, surface trawl with live-box; FL, fork length (mm). Age designation is the European method, where the first number is the number of freshwater annuli and the second number is the number of ocean annuli.

No.	Japan tag #	NPAFC tag #	DS tag		Date	Lat	Long	Gear	Species	FL (mm)	Age
			#	Type							
1	C-0213	NA5729	J898	Magnetic	7/31/15	53º00'N	175º00'E	HL	Chum	613	0.3
2	C-0214	NA5731	J899	Magnetic	7/31/15	53º00'N	175º00'E	HL	Chum	590	0.3
3	E-0469	NA5735			7/31/15	53º00'N	175º00'E	HL	Chum	469	0.2
4	E-0470	NA5736			7/31/15	53º00'N	175º00'E	HL	Chum	488	0.3
5	C-0215	NA5732	J900	Magnetic	8/1/15	52º30'N	180º00'	HL	Chum	596	0.3
6	E-0471	NA5737			8/1/15	52º30'N	180º00'	HL	Chum	396	0.2
7	E-0478	NA5738			8/1/15	53º30'N	179º53'E	T/LB	Chum	457	0.2
8	E-0481	NA5739			8/1/15	53º30'N	179º53'E	T/LB	Chum	441	0.2
9	E-0479	NA5740			8/1/15	53º30'N	179º53'E	T/LB	Chum	450	0.2
10	E-0480	NA5741			8/1/15	53º30'N	179º53'E	T/LB	Chum	507	0.2
11	E-0482	NA5742			8/1/15	53º30'N	179º53'E	T/LB	Chum	338	0.1
12	E-0483	NA5743			8/1/15	53º30'N	179º53'E	T/LB	Chum	512	0.3
13	E-0484	NA5744			8/1/15	53º30'N	179º53'E	T/LB	Chum	360	0.1
14	E-0485	NA5745			8/3/15	56º30'N	180º00'	HL	Chum	519	0.2
15	E-0486	NA5746			8/3/15	57º25'N	179º56'W	T/LB	Chum	505	0.2
16	C-0216	NA5733	J901	Magnetic	8/3/15	57º30'N	180º00'	HL	Chum	600	0.3
17	E-0487	NA5747			8/3/15	57º30'N	180º00'	HL	Chum	431	0.2
18	E-0488	NA5748			8/4/15	58º30'N	180º00'	HL	Chum	318	0.1
19	E-0489	NA5749			8/4/15	58º30'N	180º00'	HL	Chum	341	0.1
20	E-0490	NA5750			8/4/15	58º30'N	180º00'	HL	Chum	344	0.1
21	E-0491	NA5751			8/4/15	58º30'N	180º00'	HL	Chum	397	0.1
22	E-0492	NA5752			8/4/15	58º30'N	180º00'	HL	Chum	428	0.2
23	E-0493	NA5753			8/4/15	58º30'N	180º00'	HL	Chum	351	0.1
24	E-0494	NA5754			8/4/15	58º30'N	180º00'	HL	Chum	459	0.2
25	E-0495	NA5755			8/4/15	58º30'N	180º00'	HL	Chum	454	0.2
26	E-0496	NA5756			8/4/15	58º30'N	180º00'	HL	Chum	468	0.2
27	E-0497	NA5757			8/4/15	58º30'N	180º00'	HL	Chum	487	0.2
28	E-0498	NA5758			8/4/15	58º30'N	180º00'	HL	Chum	510	0.3
29	E-0500	NA5759	142189	PSAT	8/5/15	58º00'N	175º00'W	HL	Chinook	640	1.2
30	E-0501	NA5760	142193	PSAT	8/5/15	58º00'N	175º00'W	HL	Chinook	665	2.2
31	E-0502	NA5761	133397	PSAT	8/5/15	58º00'N	175º00'W	HL	Chinook	590	2.1
32	E-0503	NA5762	148493	PSAT	8/5/15	58º00'N	175º00'W	HL	Chinook	575	1.2
33	E-0504	NA5763			8/5/15	58º00'N	175º00'W	HL	Chum	517	0.3
34	E-0505	NA5764			8/5/15	58º00'N	175º00'W	HL	Chinook	441	1.1
35	E-0506	NA5765			8/5/15	58º00'N	175º00'W	HL	Chinook	536	x.x
36	E-0507	NA5766			8/5/15	58º00'N	175º00'W	HL	Sockeye	505	2.2
37	E-0508	NA5767			8/5/15	58º00'N	175º00'W	HL	Chinook	533	1.2
38	E-0509	NA5768			8/5/15	58º00'N	175º00'W	HL	Chinook	465	1.1
39	E-0510	NA5769	142190	PSAT	8/5/15	58º00'N	175º00'W	T	Chinook	590	x.x
40	C-0217	NA5734	J902	Magnetic	8/5/15	57º03'N	175º05'W	T/LB	Chum	542	0.3

Table 1. Continued.

No.	Japan tag #	NPAFC tag #	DS tag		Date	Lat	Long	Gear	Species	FL (mm)	Age
			#	Type							
41	E-0511	NA5770			8/5/15	57º03'N	175º05'W	T/LB	Chum	435	0.2
42	E-0512	NA5771			8/5/15	57º03'N	175º05'W	T/LB	Chum	444	0.2
43	E-0513	NA5772			8/5/15	57º03'N	175º05'W	T/LB	Chum	375	0.1
44	E-0514	NA5773			8/5/15	57º03'N	175º05'W	T/LB	Chum	384	0.1
45	E-0515	NA5774			8/5/15	57º03'N	175º05'W	T/LB	Chum	321	x.x
46	E-0516	NA5775			8/5/15	57º03'N	175º05'W	T/LB	Chum	332	0.1
47	E-0517	NA5776			8/5/15	57º03'N	175º05'W	T/LB	Chum	488	0.1
48	E-0518	NA5777			8/5/15	57º03'N	175º05'W	T/LB	Chum	347	0.1
49	E-0519	NA5778			8/5/15	57º03'N	175º05'W	T/LB	Chum	424	0.2
50	E-0520	NA5779			8/5/15	57º03'N	175º05'W	T/LB	Chum	348	0.1
51	E-0521	NA5780			8/5/15	57º03'N	175º05'W	T/LB	Chum	551	0.1
52	E-0522	NA5781			8/5/15	57º03'N	175º05'W	T/LB	Chum	387	0.1
53	E-0523	NA5782			8/5/15	57º03'N	175º05'W	T/LB	Chum	498	x.x
54	E-0524	NA5783			8/5/15	57º03'N	175º05'W	T/LB	Chum	387	0.1
55	E-0525	NA5784			8/5/15	57º03'N	175º05'W	T/LB	Chum	384	0.1
56	E-0526	NA5785			8/5/15	57º03'N	175º05'W	T/LB	Chum	361	0.1
57	E-0527	NA5786			8/5/15	57º00N	175º00'W	HL	Sockeye	504	1.2
58	E-0528	NA5787			8/5/15	57º00N	175º00'W	HL	Sockeye	465	1.2
59	E-0529	NA5788			8/6/15	56º00'N	175º00'W	HL	Sockeye	482	2.2
60	E-0530	NA5789			8/6/15	56º00'N	175º00'W	HL	Chum	456	0.2
61	E-0531	NA5790			8/6/15	56º00'N	175º00'W	HL	Sockeye	464	1.2
62	E-0532	NA5791			8/6/15	56º00'N	175º00'W	HL	Sockeye	498	2.2
63	E-0533	NA5792			8/6/15	56º00'N	175º00'W	HL	Sockeye	494	2.2
64	E-0534	NA5793			8/6/15	56º00'N	175º00'W	HL	Sockeye	439	1.2
65	E-0535	NA5794			8/6/15	56º00'N	175º00'W	HL	Sockeye	387	1.1
66	E-0536	NA5795			8/6/15	56º00'N	175º00'W	HL	Sockeye	408	2.1
67	E-0537	NA5796			8/6/15	55º00'N	175º00'W	HL	Chum	574	0.3
68	E-0538	NA5797			8/6/15	55º00'N	175º00'W	HL	Chum	442	0.2
69	E-0539	NA5798	142191	PSAT	8/7/15	55º00'N	175º00'W	HL	Chinook	660	1.2
70	E-0540	NA5799			8/7/15	55º00'N	175º00'W	HL	Sockeye	500	2.2
71	E-0541	NA5817			8/7/15	55º00'N	175º00'W	HL	Sockeye	475	1.2
72	E-0542	NA5818			8/7/15	55º00'N	175º00'W	HL	Sockeye	464	1.2
73	E-0543	NA5819			8/7/15	55º00'N	175º00'W	HL	Pink	490	0.1
74	E-0544	NA5820			8/7/15	55º00'N	175º00'W	HL	Sockeye	533	1.2
75	E-0545	NA5821			8/7/15	53º13'N	17º16'W	T/LB	Chum	453	0.2
76	-	-	142192	PSAT	11/20/15	53º55'N	166º36'W	HL	Chinook	680	-
77	-	-	142196	PSAT	11/20/15	53º55'N	166º36'W	HL	Chinook	700	-
78	-	-	142200	PSAT	11/21/15	53º55'N	166º36'W	HL	Chinook	640	-
79	-	-	142194	PSAT	11/22/15	53º55'N	166º36'W	HL	Chinook	890	-
80	-	-	142197	PSAT	11/22/15	53º55'N	166º36'W	HL	Chinook	890	-
81	-	-	142198	PSAT	12/2/15	53º55'N	166º36'W	HL	Chinook	790	-
82	-	-	142199	PSAT	12/2/15	53º55'N	166º36'W	HL	Chinook	790	-

Table 2. Recoveries of high-seas tagged salmon in 2015-2016. Age designation is the European method, where the first number is the number of freshwater annuli and the second number is the number of ocean annuli. DS tag, data storage tag; PSAT, pop-up satellite tag; FL, fork length (mm); BW, body weight (g).

No.	Japan tag #	NPAFC tag #	DS tag # (type)	Releases						Recoveries							
				Date	Lat	Long	Species	FL (mm)	Age	Date	Lat	Long	Gear	Sex	FL (mm)	BW (g)	Location
1	G6821	NA5673	-	8/3/14	58°30'N	180°00'W	Chum	477	0.2	10/7/15	44°N	144°E	Trap net	M	605	2600	Abashiri, Okhotsk Sea coast, Hokkaido
2	E 0503	NA5762	148493 (PSAT)	8/5/15	58°00'N	175°00'W	Chinook	570	1.2	8/19/15	58° 58'N	175°22'W	Satellite	-	-	-	Central Bering Sea
3	E 0510	NA5769	142190 (PSAT)	8/5/15	58°00'N	175°00'W	Chinook	590	-	8/24/15	57°28'N	175°19'W	Satellite	-	-	-	Central Bering Sea
4	E 0501	NA5760	142193 (PSAT)	8/5/15	58°00'N	175°00'W	Chinook	680	2.2	8/30/15	58° 58'N	177°24'W	Satellite	-	-	-	Central Bering Sea
5	E 0539	NA5798	142191 (PSAT)	8/7/15	54°00'N	175°00'W	Chinook	660	1.2	9/2/15	51°46'N	172°2'W	Satellite	-	-	-	Pacific Ocean near the Aleutians
6	E 0500	NA5759	142189 (PSAT)	8/5/15	58°00'N	175°00'W	Chinook	650	1.2	1/1/16	57°51'N	170º45'W	Satellite	-	-	-	Central Bering Sea
7	-	-	142200 (PSAT)	11/21/15	53º55'N	166º36'W	Chinook	640	-	12/1/15	54°7'N	166º44'W	Satellite	-	-	-	Bering Sea near the Aleutians
8	-	-	142196 (PSAT)	11/20/15	53º55'N	166º36'W	Chinook	700	-	1/3/16	54°59'N	165º32'W	Satellite	-	-	-	Bering Sea near the Aleutians
9	-	-	142194 (PSAT)	11/22/15	53º55'N	166º36'W	Chinook	890	-	1/3/16	55°13'N	164º45'W	Satellite	-	-	-	Bering Sea near the Aleutians
10	-	-	142197 (PSAT)	11/22/15	53º55'N	166º36'W	Chinook	890	-	2/1/16	54°7'N	164º37'W	Satellite	-	-	-	Pacific Ocean near the Aleutians
11	-	-	142192 (PSAT)	11/20/15	53º55'N	166º36'W	Chinook	680	-	2/2/16	53°30'N	167º11'W	Satellite	-	-	-	Bering Sea near the Aleutians
12	-	-	142199 (PSAT)	12/2/15	53º55'N	166º36'W	Chinook	790	-	2/3/16	54°13'N	157º21'W	Satellite	-	-	-	North Pacific Ocean
13	-	-	142198 (PSAT)	12/2/15	53º55'N	166º36'W	Chinook	790	-	2/5/16	52°41'N	170º51'W	Satellite	-	-	-	Bering Sea near the Aleutians