

Project #: R0204

Title: NPAFC Salmon Tagging

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Contract Period and Amount of Funding: July 1, 2002 to October 31, 2003: \$190,800 (extension approved through October 31, 2005)

Report Period: June 30 to December 31, 2004

Report Date: January 15, 2005

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Project Summary: The goal of the NPAFC Salmon Tagging project is to gain a better understanding of the distribution patterns, habitat utilization, and movements of Asian and North American salmon migrating in the Bering Sea and North Pacific Ocean. The research is coordinated by NPAFC as a part of their international cooperative salmon research program, the Bering-Aleutian Salmon International Survey (BASIS). Funding from NPRB is used primarily to purchase tags that are deployed on salmon caught during BASIS research vessel cruises in the Bering Sea and Gulf of Alaska. Several types of tags, ranging from simple numbered plastic discs to complex electronic tags that record sea temperature, depth, salinity, and daily position estimates are used. The BASIS working group of NPAFC coordinates, implements, and reports the results of our salmon tagging research. The proposed work complements ecosystem research and monitoring activities of the North Pacific Marine Science Organization (PICES) and Global Ocean Ecosystem Dynamics (GLOBEC), as well as the electronic tagging research activities of the Pacific Ocean Salmon Tracking (POST) program of the Census of Marine Life.

Progress Summary:

In 2004 307 electronic data storage tags (DSTs) were release in the central North Pacific Ocean and Bering Sea during research cruises of two Japanese vessels in June and July. Three types of DSTs were used: CTD tags (recording conductivity (salinity), temperature, and depth), TD tags (temperature and depth) and iButton tags (temperature only). Releases by vessel are as follows (new tags received in 2004 and tags remaining from the 2003 field season):

*Data Tags Released in 2004:*

	<i>Wakatake</i>	<i>Kaiyo</i>	Total
CTD	15	5	20
Temperature-Depth	68	47	115
iButton	75	97	172
Total DST	158	149	307

In addition, 717 disk tags purchased with NPRB funds were used on the *Wakatake maru*.

In our last progress report, we reported recoveries of two DSTs in 2004 and presented a graph of the data from one of the tags. Subsequently we have received the other reported tag, and 23 other DSTs recovered in 2004. Graphs of data from some of the tags are presented in Figs. 1-4. These include the first recovery of a maturing sockeye from south central Alaska which had been tagged in the Bering Sea (Fig. 1) and the first DST from a salmon from the north coast of the Sea of Okhotsk (Fig. 4). The large number of recoveries is due to the large number of tags that NPRB funding allowed us to deploy in 2004. The

recovery rate for DSTs released in 2004 is 7.2%, despite the fact that a large proportion of the tags were placed on immature salmon in order to get valuable data on over-wintering behavior of fish.

Table 2. Recoveries of data storage tags in 2004, by tag type. Tagging location designated as NP (North Pacific Ocean) or BS (Bering Sea).

Tag Type	No.	Species	Tagging Location		Release Date	Recovery Date	Recovery Area
			Lat.	Long.			
CTD	1363	sockeye	NP	50°30' 180°	6/26/04	8/27/04	Kodiak, Alaska
CTD	1379	chum	BS	56°30' 178°W	7/7/04	9/21/04	Pacific coast, Hokkaido
CTD	1383	sockeye	BS	57°00' 175°W	6/29/04	8/4/04	Sand Point, Alaska
TD	1401	chinook	BS	56°30' 179°W	7/8/02	6/21/04	Yukon R., Alaska
TD	5980	chum	BS	54°30' 180°	7/13/04	10/11/04	Okhotsk coast, Hokkaido
TD	5991	chum	BS	56°30' 180°	7/2/04	9/16/04	Pacific coast, Hokkaido
TD	5996	sockeye	BS	56°30' 180°	7/2/04	7/24/04	Kanektok, Alaska
TD	7430	chum	BS	56°30' 180°	7/2/04	9/29/04	Pacific coast, Hokkaido
TD	7467	chum	BS	56°30' 179°W	7/8/04	10/22/04	Nemuro coast, Hokkaido
TD	7469	chum	BS	56°30' 179°E	7/9/04	9/27/04	Pacific coast, Hokkaido
TD	7473	chum	BS	56°30' 179°E	7/9/04	10/1/04	Pacific coast, Hokkaido
TD	7480	chum	BS	56°30' 178°E	7/10/04	9/24/04	Pacific coast, Hokkaido
TD	7491	sockeye	NP	52° 169°W	6/26/04	9/12/04	Sand Point, Alaska
TD	8106	chum	BS	55°30' 179°W	7/5/04	9/5/04	N. Okhotsk coast, Russia
iB	G-02	sockeye	NP	51° 160°W	8/2/03	7/2/04	Ketchikan, SE Alaska
iB	G-03	chinook	NP	51° 160°W	8/2/02	5/13/04	Columbia R., Wash.
iB	K-050	chum	BS	57° 175° W	6/29/04	10/11/04	Nemuro coast, Hokkaido
iB	K-052	chum	BS	55° 175°W	6/30/04	10/6/04	Nemuro coast, Hokkaido
iB	W-148	pink	BS	57°30' 178°W	7/6/04	7/7/04	Bering Sea
iB	W-149	chum	BS	57°30' 179°W	7/5/04	10/2/04	Nemuro coast, Hokkaido
iB	W-153	chum	BS	56°30' 177°E	7/11/04	9/21/04	Pacific coast, Hokkaido
iB	W-154	chum	BS	56°30' 177°E	7/11/04	9/29/04	Nemuro coast, Hokkaido
iB	W-179	chum	BS	57°30' 177°E	7/12/04	9/21/04	Pacific coast, Hokkaido
iB	W-185	chum	BS	57°30' 176°E	7/13/04	10/22/04	Nemuro coast, Hokkaido
iB	W-188	chum	BS	57°30' 176°E	7/13/04	9/2/04	Pacific coast, Hokkaido

One fish carrying a TD tag was caught but the tag was lost. Another TD tag has been reported but not yet returned. Eight tags (1 CTD, 3 TD, 4 iB) failed completely and have been returned to the manufacturers for evaluation. Four tags produced bad data for one of the sensors (2 CTD, salinity; 2 TD, depth) and have also been returned to the manufacturers. Because of manufacturing problems that caused the salinity sensors to read incorrectly, Star-Oddi is replacing all 20 CTD tags at no cost.

Additional information on NPAFC's tag recovery and reward program can be found on our web page (<http://www.npafc.org/>, see "Fish Tag Recovery Program").

#### Project Administration and Management:

The NPAFC Salmon Tagging project was approved in on June 20, 2002. A Memorandum of Understanding between NPRB and NPAFC was signed on January 29, 2003. Funds for the purchase of tags were transferred to NPAFC in mid-April 2003, but the transfer was too late for the manufacturer to provide tags before the start of the BASIS field season in May 2003. Due to delays in funding significant opportunities to tag and release salmon during BASIS research cruises in 2002 and 2003 were lost. An extension of the project through October 30, 2005 was requested by NPAFC and approved by NPRB on December 19, 2003.

No tags have been purchased during the reporting period, but final purchases will be made in 2005 (see below).

#### *Tag Drawing*

All tags returned in 2002, 2003, and 2004 were entered in a drawing at the NPAFC Annual Meeting in Sapporo on October 29, 2004. A total 63 eligible tags (44 from Japan, 9 from Russia, and 11 from the United States) were entered (eligible tags were those returned by non-agency personnel). All four prizes (1<sup>st</sup> prize \$5,000, 2<sup>nd</sup> - \$3,000, 3<sup>rd</sup> - \$1,500, and 4<sup>th</sup> - \$500) were won by Japanese fishermen, reflecting the fact that most tagging took place on research vessels operating at times and places likely to coincide with Japanese chum salmon migrations. The NPAFC Secretariat is in the process of disbursing the prizes to the winners.

#### Action planned for 2005:

In 2005 the final delivery of tags from NPRB funding will be used by BASIS research vessels that capture salmon suitable for tagging. There are 100 tags planned for delivery in 2005 (20 geolocation tags and 80 temperature-depth tags), plus 20 replacement CTD tags. There are also 10 DSTs (7 iButtons, 3 TD) remaining from the 2004 season. In addition, the remaining 283 disk tags will be used. Due to lower-than-anticipated costs of tags, there may be sufficient funds remaining to purchase additional iButton tags in 2005.

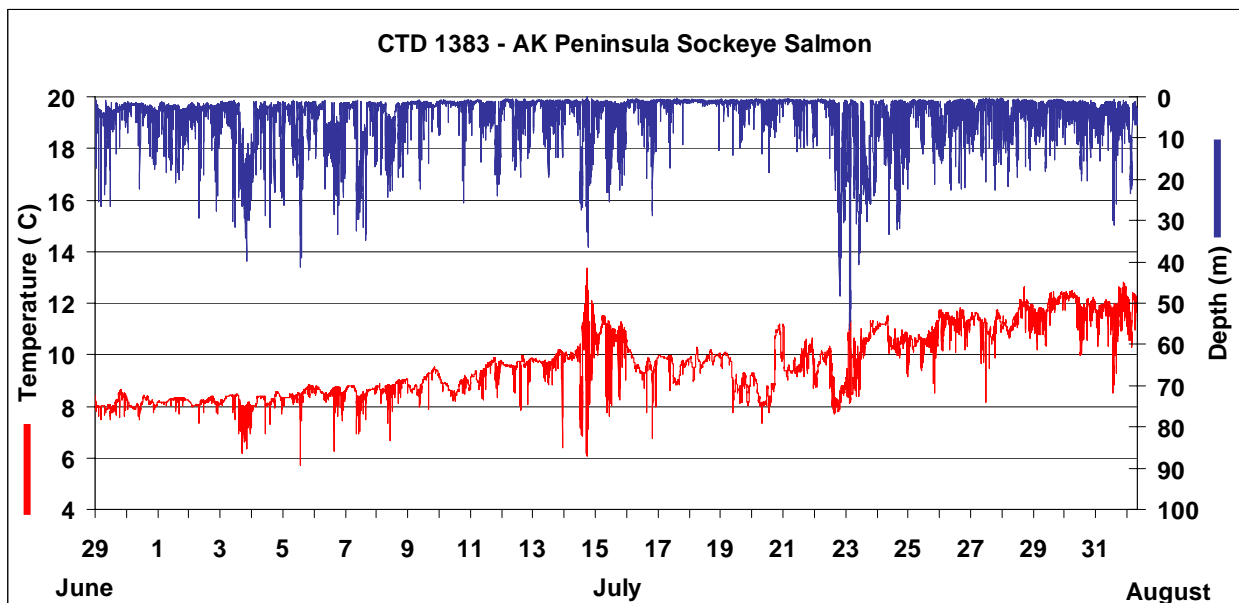


Fig. 1. Sea temperature (°C on left axis, red line) and depth (m on right axis, blue line) data from CTD 1383. Sockeye salmon released in the Bering Sea (175°00'W, 57°00'N) on 6/29/04 and recovered in Fox Bay, S. Alaska Peninsula, Alaska on 8/2/04.

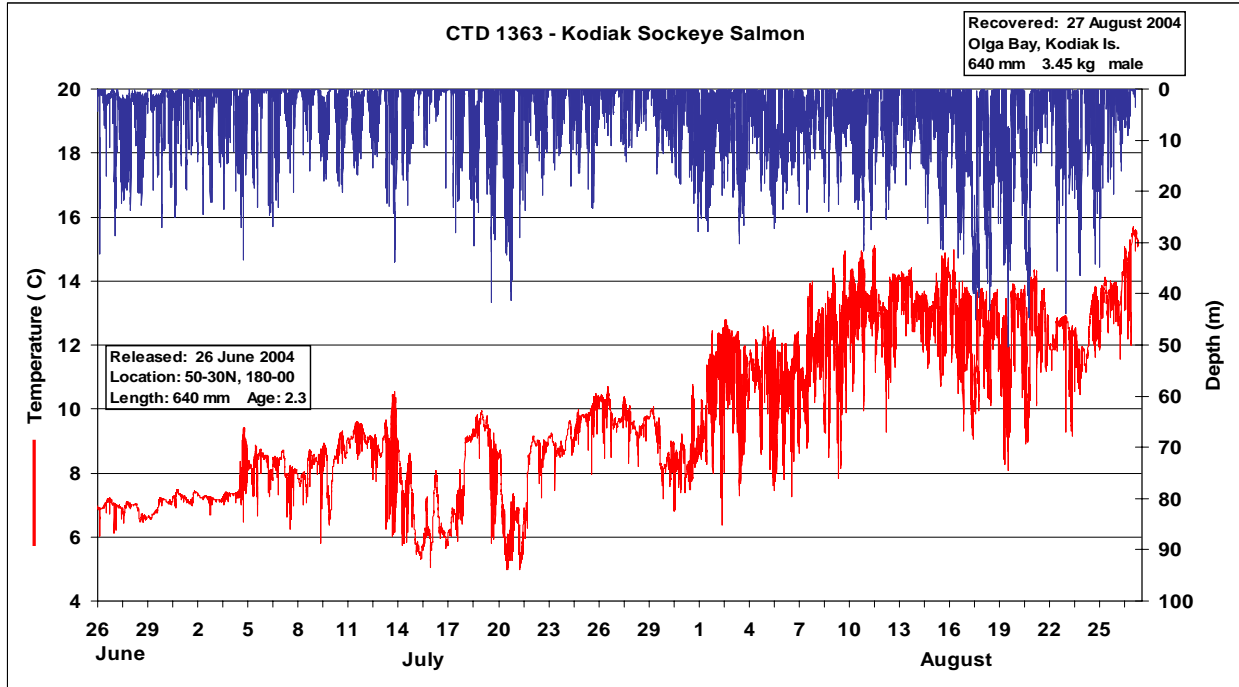


Fig. 2. Sea temperature ( $^{\circ}\text{C}$  on left axis, red line) and depth (m on right axis, blue line) data from CTD 1363. Sockeye salmon released in the central North Pacific Ocean ( $180^{\circ}00'$ ,  $50^{\circ}30'N$ ) on 6/26/04 and recovered in Olga Bay, Kodiak Island, Alaska on 8/27/04.

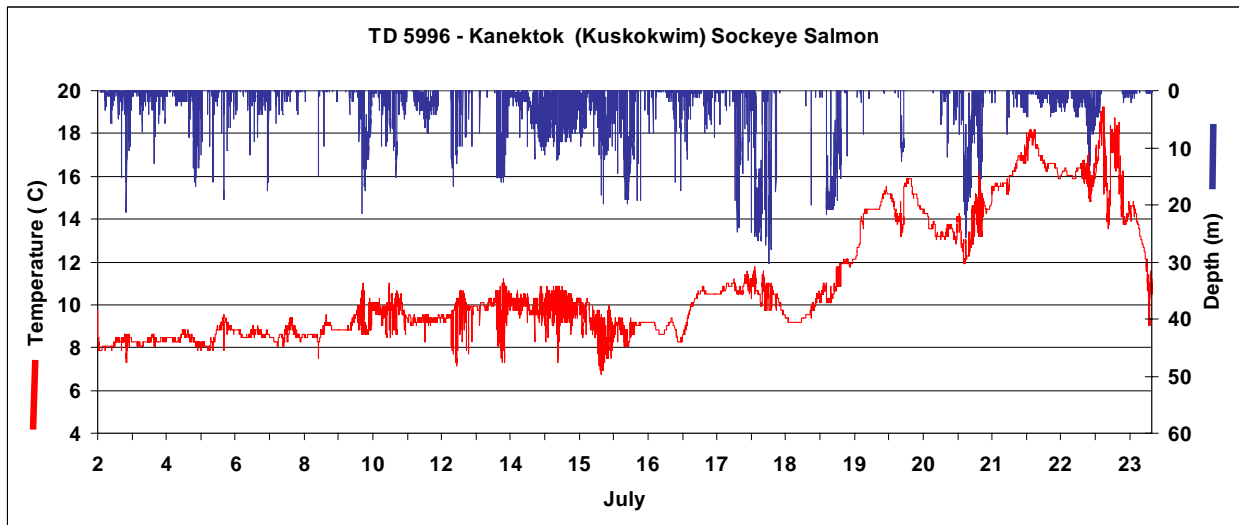


Fig. 3. Sea temperature ( $^{\circ}\text{C}$  on left axis, red line) and depth (m on right axis, blue line) data from TD 5996. Sockeye salmon released in the Bering Sea ( $180^{\circ}00'$ ,  $56^{\circ}30'N$ ) on 7/2/04 and recovered in the Kanektok River, Kuskokwim Bay, Alaska on 7/24/04.

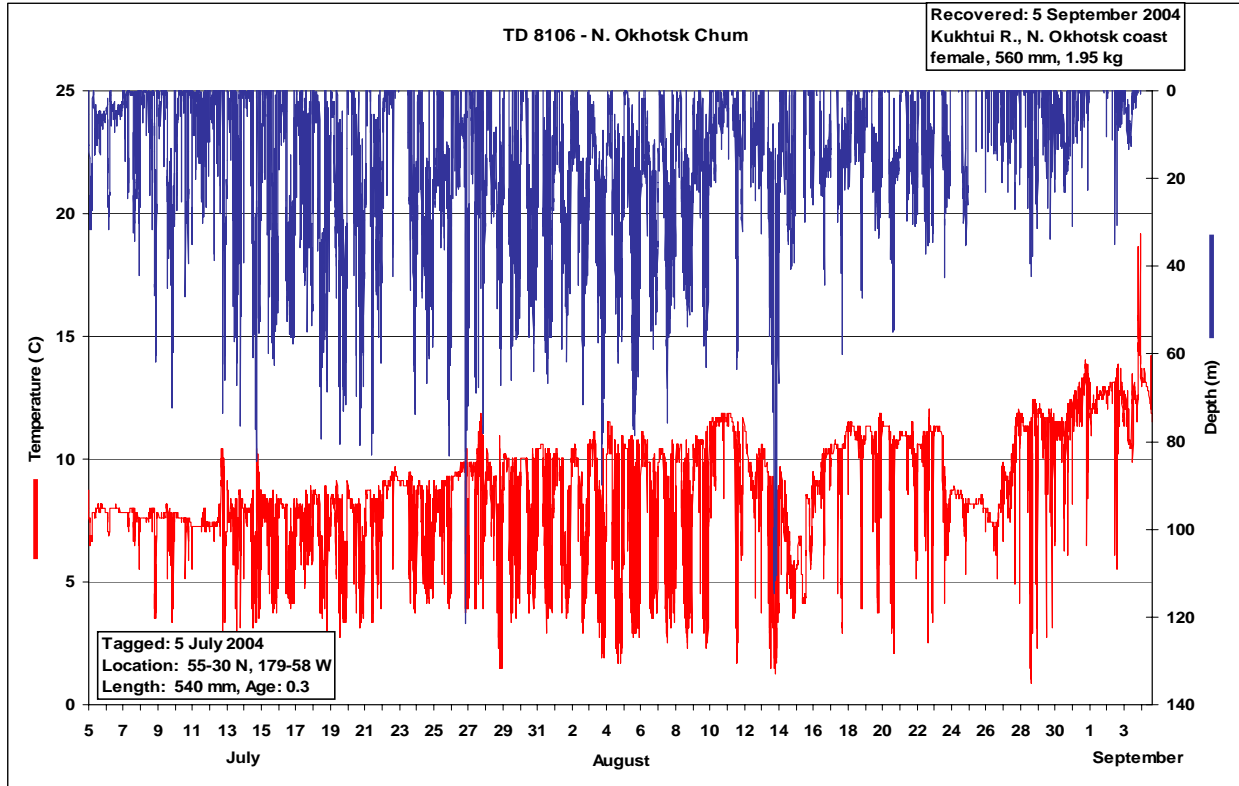


Fig. 4. Sea temperature (°C on left axis, red line) and depth (m on right axis, blue line) data from TD 8106. Chum salmon released in the Bering Sea (179°58'W, 55°30'N) on 7/5/04 and recovered in the Kukhtui River, north Okhotsk Sea coast, Russia on 9/5/04.