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U.S. RELEASES AND RECOVERIES OF SALMONID DATA STORAGE TAGS AND DISK TAGS IN THE NORTH PACIFIC OCEAN AND BERING SEA, 1999

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ABSTRACT

Information is reported on all high-seas salmon tags released from U.S. vessels, all high-seas salmon tags recovered in North America from 16 September 1998 through 30 September 1999, and all recoveries of U.S. data storage tags (DSTs). Twenty-eight disk tags and eighty-nine DSTs, which record temperature only or temperature and depth data, were placed on Pacific salmonids in the North Pacific Ocean and Bering Sea during three research cruises aboard one U.S. vessel and two Japanese vessels in 1999. In May, 24 sockeye, 8 chum, 1 coho, and 1 chinook salmon were tagged aboard a U.S. vessel in the Gulf of Alaska with DSTs; an additional 17 sockeye, 10 chum, and 1 chinook salmon were tagged with disk tags only. Three sockeye salmon were tagged with DSTs in June aboard a Japanese vessel in the central North Pacific, and seven chum salmon were tagged in July in the Bering Sea. Forty-five salmonids were tagged with DSTs aboard a Japanese vessel on transects along 165°W (1 steelhead) and 145°W (6 sockeye, 17 pink, and 21 coho) in late June and early July.

Fourteen tags from 1999 tagging operations have been returned to date; all but one are DSTs, all are from Gulf of Alaska releases, and all recoveries are from Alaska. Five sockeye salmon were recovered in various locations in Alaska (Copper River, Chignik Lagoon, Port Moller, and two in Taku Inlet). A chum salmon was recovered at Unimak Pass. Three pink salmon were recovered: one at Kodiak Island and two in southeast Alaska off Gravina and Dall Islands. Four coho salmon were recovered in central Alaska (Stepovak Bay, Kodiak Island, Cook Inlet, and Tsiu River). One chinook salmon was recovered in the Yentna River. This recovery is the first recovery of a central Alaska chinook salmon tagged in offshore waters. Four recoveries in Japan in 1998 of chum salmon carrying U.S. DSTs are also reported. Graphs of ambient temperature and pressure data from the DSTs are presented.

INTRODUCTION

Information is reported on all high-seas salmonid (*Oncorhynchus* spp.) tags released from U.S. vessels, all high-seas salmonid tags recovered in North America from 16 September 1998 through 30 September 1999, and all recoveries of U.S. data storage tags (DSTs). Four recoveries in Japan in 1998 of chum salmon carrying U.S. DSTs are also reported. The Fisheries Research Institute (FRI), School of Fisheries, University of Washington, serves as a processing center for all North American recoveries of Canadian, Japanese, Russian, and U.S. high-seas salmon tags, and recoveries of U.S. high-seas salmon tags and DSTs by all nations.

Releases and recoveries of all U.S. DSTs are reported, in order to have a complete record in one document. (Releases of U.S. DSTs from Japanese vessels and Japanese recoveries of U.S. DSTs are also reported in Fukuwaka et al. 1999.) Graphs of ambient temperature and pressure data from the DSTs are presented.

MATERIALS AND METHODS

Fish were captured by research trawl on a U.S. vessel, by research longline on one Japanese vessel, and by research longline and hook-and-line on another Japanese vessel. U.S. high-seas tags are 20 mm diameter plastic red-and-white Petersen disk tags. The DSTs are small circuit boards potted in a clear urethane manufactured by Conservation Devices, Inc. They weigh approximately 9.5 g, and are 40 x 23 x 8 mm in dimension. Tags were attached to fish just anterior to the dorsal fin using one 76 mm nickel pin for disk tags, or two pins for DSTs with labeled U.S. and Japanese or blank disk tags placed on the pins on the other side of the fish.

FRI's high-seas tag processing center activities include: (1) advertising for tag recoveries, (2) returning tags and original recovery information to the appropriate release agencies, (3) mailing information on tag recoveries and a tag reward to fishermen and processors, (4) maintaining a file of original correspondence, data, and tags of all recoveries of U.S., U.S.-Russia, and Japan-U.S. tags (1956-present), (5) maintaining and updating an all-agency tag release and computer database, and (6) reporting all recoveries of U.S., U.S.-Russia, and Japan-U.S. high-seas tags to the North Pacific Anadromous Fish Commission (NPAFC). In addition, FRI scientists periodically prepare reports and maps based on historical recoveries of high-seas tags that describe the know ocean ranges of major regional stocks of Asian and North American salmonids (for example, Myers et al. 1996). The complete all-agency (Canada, Japan, Russia, and United States) high-seas tag release and recovery computer database (1954-present) is available from FRI upon request from the parties of NPAFC so that all member nations can have access to a common database.

RESULTS AND DISCUSSION

Twenty-eight disk tags and eighty-nine DSTs, which record temperature only or temperature and depth data, were placed on Pacific salmonids in the North Pacific Ocean and Bering Sea during three research cruises aboard one U.S. vessel and two Japanese vessels in 1999 (Table 1). In May, 24 sockeye, 8 chum, 1 coho, and 1 chinook salmon were tagged aboard a U.S. vessel in the Gulf of Alaska with DSTs; an additional 17 sockeye, 10 chum, and 1 chinook salmon were tagged with disk tags only. Three sockeye salmon were tagged with DSTs in June aboard a Japanese vessel in the central North Pacific, and seven chum salmon were tagged in July in the Bering Sea. Forty-five salmonids were tagged with DSTs aboard a Japanese vessel on transects along 165°W (1 steelhead) and 145°W (6 sockeye, 17 pink, and 21 coho) in late June and early July.

Four chum salmon carrying U.S. DSTs were recovered in the autumn of 1998 in Japan (Table 2; Fig. 1). A fifth chum salmon with a U.S. DST was reported in Myers et al. 1998. Two of the chum salmon DSTs and three recoveries of DSTs in Alaska in 1998 were discussed in Walker et al. 1998.

From 16 September 1998 through 30 September 1999, fourteen high-seas salmon tags from recoveries in North America have been returned (Table 2). All but one are DSTs, all are from 1999 tagging operations in the Gulf of Alaska, and all recoveries are from Alaska. Five sockeye salmon were recovered in various locations in Alaska. Four of the sockeye were tagged with temperature-only DSTs in May and were recovered in the Copper River, Chignik Lagoon, Taku Inlet, and at Port Moller (Fig. 2). A fifth sockeye carrying a temperature-depth DST also was caught in Taku Inlet (Fig. 3). A chum salmon carrying a temperature DST was recovered at Unimak Pass (Fig. 4). Three pink salmon were recovered in Alaska. Two were caught in southeast Alaska: one, with a temperature-depth DST, off Gravina Island (Fig. 5), the other, tagged with disk tags only, off Dall Island. The third pink salmon, carrying a temperature-depth DST, was caught off Kodiak Island (Fig. 6). Four coho salmon with temperature-depth DSTs attached were recovered in central Alaska at Kodiak Island, Cook Inlet, Tsiu River, and Stepovak Bay (Figs. 7-10). One chinook salmon, tagged

with a temperature DST, was recovered in the Yentna River (Fig. 11). This recovery is the first recovery of a central Alaska chinook salmon tagged in offshore waters.

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Table 1. Disk tags released from U.S. vessels and all U.S. data storage tags placed on salmonids in the North Pacific Ocean and Bering Sea in 1999. T = temperature only; TD = temperature and depth. SST = sea surface temperature in °C (*Wakatake maru* and *Oshoro maru*); HT = headrope temperature approx. 1 m below surface (Gt. Pacific).LL = longline; H&L = hook and line. FRI = Fisheries Research Institute; FAJ = Fisheries Agency of Japan.

Vessel and Data Tag #	Tag Type	Species	Release Date	Location Latitude	Location Longitude	SST or HT	Gear	Fork Length	Age	Other tags FRI	Other tags FAJ
F/V Great Pacific											
320	T	Coho	05/17/99	47°07'N	144°59'W	6.6	Trawl	525	2.1	LL1200	
324	T	Chum	05/18/99	48°27'N	145°01'W	6.5	Trawl	532	X.3	LL1201	
325	T	Chum	05/18/99	48°27'N	145°01'W	6.5	Trawl	505	0.1	LL1202	
330	T	Sockeye	05/18/99	49°06'N	144° 58'W	5.4	Trawl	535	1.2	LL1203	
327	T	Chum	05/19/99	52°06'N	144° 59'W	4.8	Trawl	550	0.1	LL1204	
331	T	Sockeye	05/19/99	52°06'N	144° 59'W	4.8	Trawl	485	2.2	LL1205	
333	T	Chum	05/20/99	54°45'N	145°00'W	4.9	Trawl	580	0.1	LL1206	
336	T	Sockeye	05/20/99	54°45'N	145°00'W	4.9	Trawl	625	1.3	LL1207	
338	T	Sockeye	05/20/99	54°45'N	145°00'W	4.9	Trawl	590	1.2	LL1208	
339	T	Sockeye	05/20/99	54°45'N	145°00'W	4.9	Trawl	535	1.2	LL1209	
344	T	Sockeye	05/20/99	54°45'N	145°00'W	4.9	Trawl	615	2.2	LL1210	
351	T	Sockeye	05/20/99	54°45'N	145°00'W	4.9	Trawl	520	2.2	LL1211	
353	T	Sockeye	05/20/99	54°45'N	145°00'W	4.9	Trawl	490	X.2	LL1212	
354	T	Sockeye	05/20/99	54°45'N	145°00'W	4.9	Trawl	490	2.2	LL1213	
359	T	Chum	05/20/99	54°45'N	145°00'W	4.9	Trawl	590	X.X	LL1214	
362	T	Sockeye	05/20/99	54°45'N	145°00'W	4.9	Trawl	555	3.3	LL1215	
369	T	Chum	05/20/99	55°17'N	145°00'W	4.7	Trawl	560	0.3	LL1216	
379	T	Sockeye	05/20/99	55°37'N	145°00'W	5.0	Trawl	585	2.3	LL1217	
380	T	Sockeye	05/21/99	56°15'N	145°01'W	5.7	Trawl	600	1.3	LL1220	
410	T	Chum	05/21/99	56°15'N	145°01'W	5.7	Trawl	530	0.3	LL1221	
411	T	Sockeye	05/21/99	56°15'N	145°01'W	5.7	Trawl	580	1.3	LL1222	
439	T	Sockeye	05/21/99	56°15'N	145°01'W	5.7	Trawl	625	0.3	LL1224	
146	T	Chum	05/21/99	56°15'N	145°01'W	5.7	Trawl	625	0.3	LL1225	
147	T	Sockeye	05/21/99	56°15'N	145°01'W	5.7	Trawl	500	3.2	LL1226	
151	T	Sockeye	05/21/99	56°40'N	145°01'W	5.1	Trawl	555	2.3	LL1229	
168	T	Chinook	05/21/99	57°12'N	145°04'W	5.8	Trawl	645	1.3	LL1230	
144	T	Sockeye	05/21/99	57°12'N	145°04'W	5.8	Trawl	595	1.3	LL1231	
153	T	Sockeye	05/21/99	57°12'N	145°04'W	5.8	Trawl	500	2.2	LL1232	
148	T	Sockeye	05/21/99	57°37'N	145°00'W	6.9	Trawl	535	1.2	LL1233	
149	T	Sockeye	05/21/99	57°37'N	145°00'W	6.9	Trawl	575	2.2	LL1234	
155	T	Sockeye	05/21/99	57°37'N	145°00'W	6.9	Trawl	525	1.2	LL1235	
301	T	Sockeye	05/22/99	58°26'N	145°00'W	7.2	Trawl	640	1.3	LL1236	
310	T	Sockeye	05/22/99	58°26'N	145°00'W	7.2	Trawl	630	1.3	LL1237	
	Disk	Sockeye	05/22/99	58°26'N	145°00'W	7.2	Trawl	600	1.3	LL1239	
	Disk	Sockeye	05/22/99	58°26'N	145°00'W	7.2	Trawl	610	1.3	LL1238	
	Disk	Sockeye	05/22/99	58°26'N	145°00'W	7.2	Trawl	590	1.3	LL1240	
	Disk	Chum	05/22/99	58°26'N	145°00'W	7.2	Trawl	640	0.5	LL1249	
	Disk	Sockeye	05/22/99	58°26'N	145°00'W	7.2	Trawl	555	1.2	LL1272	
311	T	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	635	1.3	LL1248	
	Disk	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	635	2.3	LL1246	
	Disk	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	500	2.2	LL1247	
	Disk	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	630	0.3	LL1245	

continued

Table 1. Continued.

Vessel and Tag No.	Tag Type	Species	Release Date	Release Latitude	Release Longitude	SST or HT		Fork Length	Age	Other tags FRI	Other tags FAJ
	Disk	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	620	X.3	LL1244	
	Disk	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	620	2.3	LL1243	
	Disk	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	605	1.3	LL1242	
	Disk	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	555	1.2	LL1241	
	Disk	Sockeye	05/22/99	58°58'N	145°00'W	7.3	Trawl	585	1.3	LL1250	
	Disk	Chum	05/22/99	58°58'N	145°00'W	7.3	Trawl	630	0.3	LL1251	
	Disk	Chum	05/22/99	58°58'N	145°00'W	7.3	Trawl	595	0.3	LL1252	
	Disk	Sockeye	05/22/99	59°05'N	144°59'W	7.0	Trawl	550	3.2	LL1253	
	Disk	Sockeye	05/22/99	59°05'N	144°59'W	7.0	Trawl	545	1.3	LL1254	
	Disk	Sockeye	05/22/99	59°05'N	144°59'W	7.0	Trawl	610	2.2	LL1255	
	Disk	Sockeye	05/22/99	59°05'N	144°59'W	7.0	Trawl	650	1.3	LL1256	
	Disk	Chum	05/22/99	59°05'N	144°59'W	7.0	Trawl	660	X.3	LL1257	
	Disk	Chum	05/22/99	59°05'N	144°59'W	7.0	Trawl	600	0.3	LL1258	
	Disk	Chum	05/22/99	59°05'N	144°59'W	7.0	Trawl	570	0.2	LL1259	
	Disk	Chum	05/22/99	59°05'N	144°59'W	7.0	Trawl	650	0.4	LL1260	
	Disk	Chinook	05/22/99	59°30'N	145°08'W	7.2	Trawl	1000	1.4	LL1261	
	Disk	Chum	05/22/99	59°30'N	145°08'W	7.2	Trawl	655	0.4	LL1273	
	Disk	Chum	05/22/99	59°30'N	145°08'W	7.2	Trawl	660	0.3	LL1274	
	Disk	Sockeye	05/22/99	59°30'N	145°08'W	7.2	Trawl	565	2.2	LL1275	
	Disk	Chum	05/22/99	59°30'N	145°08'W	7.2	Trawl	680	0.5	LL1276	
R/V *Wakatake maru*											
225	T	Sockeye	06/25/99	47°00'N	180°00'	6.1	LL	583		LL2909	HH2138
231	T	Sockeye	06/28/99	49°30'N	180°00'	5.9	LL	550		LL2927	HH2156
239	T	Sockeye	06/28/99	50°30'N	180°00'	6.4	LL	543		LL2936	HH2165
236	T	Chum	07/02/99	53°30'N	180°00'	7.3	LL	614		LL2971	HH2200
247	T	Chum	07/02/99	53°30'N	180°00'	7.3	LL	601		LL2983	HH2212
253	T	Chum	07/04/99	55°30'N	180°00'	6.5	LL	572		LL2997	HH2226
256	T	Chum	07/04/99	55°30'N	180°00'	6.5	LL	608		LL2998	HH2227
263	T	Chum	07/06/99	57°30'N	180°00'	6.0	LL	590		LL3052	HH2281
270	T	Chum	07/10/99	56°30'N	178°00'W	6.8	LL	569		LL3117	HH2346
284	T	Chum	07/10/99	56°30'N	178°00'W	6.8	LL	499		LL3127	HH2356
T/S *Oshoro maru*											
752	TD	Steelhead	06/25/99	50°00'N	164° 56'W	6.4	LL	555	X.1	LL1320	BB2520
754	TD	Sockeye	07/08/99	49° 59'N	145° 00'W	8.6	LL	591	1.3	LL1329	BB2529
755	TD	Coho	07/08/99	49° 59'N	145° 00'W	8.6	LL	520	X.1	LL1330	BB2530
756	TD	Coho	07/08/99	50°30'N	145° 00'W	8.7	H&L	591	X.1	LL1331	BB2531
758	TD	Coho	07/08/99	50°30'N	145° 00'W	8.7	H&L	600	1.1	LL1332	BB2532
759	TD	Sockeye	07/08/99	51°00'N	145° 00'W	8.3	H&L	575	1.2	LL1333	BB2533
760	TD	Coho	07/08/99	51°00'N	145° 00'W	8.3	H&L	481	1.1	LL1334	BB2534
779	TD	Coho	07/09/99	51°02'N	144° 57'W	8.3	LL	635	2.1	LL1335	BB2535
781	TD	Pink	07/09/99	51°02'N	144° 57'W	8.3	LL	472		LL1336	BB2536
782	TD	Sockeye	07/09/99	51°02'N	144° 57'W	8.3	LL	551	1.2	LL1337	BB2537
783	TD	Coho	07/09/99	51°02'N	144° 57'W	8.3	LL	585	1.1	LL1339	BB2539
786	TD	Pink	07/09/99	51°02'N	144° 57'W	8.3	LL	455	0.1	LL1340	BB2540

continued

Table 1. Continued.

Vessel and Tag No.	Tag Type	Species	Release Date	Release Latitude	Release Longitude	SST or HT		Fork Length	Age	Other tags FRI	Other tags FAJ
785	TD	Pink	07/09/99	52°00'N	145° 00'W	8.49	H&L	448	0.1	LL1341	BB2541
787	TD	Pink	07/09/99	52°00'N	145° 00'W	8.49	H&L	434	0.1	LL1342	BB2542
788	TD	Pink	07/10/99	52°02'N	144° 58'W	8.5	LL	468	0.1	LL1345	BB2545
789	TD	Coho	07/10/99	52°02'N	144° 58'W	8.5	LL	551	X.1	LL1347	BB2547
790	TD	Sockeye	07/10/99	52°02'N	144° 58'W	8.5	LL	585	1.2	LL1350	BB2550
792	TD	Coho	07/10/99	52°02'N	144° 58'W	8.5	LL	585	2.1	LL1353	BB2553
757	TD	Coho	07/10/99	52°30'N	145° 00'W	8.35	H&L	620	1.1	LL1354	BB2554
795	TD	Coho	07/11/99	53°00'N	144° 58'W	8.8	LL	620	1.1	LL1357	BB2557
796	TD	Coho	07/11/99	53°00'N	144° 58'W	8.8	LL	633	1.1	LL1361	BB2561
775	TD	Coho	07/11/99	53°00'N	144° 58'W	8.8	LL	476	1.1	LL1359	BB2559
784	TD	Coho	07/11/99	53°00'N	144° 58'W	8.8	LL	620	2.1	LL1362	BB2562
794	TD	Coho	07/11/99	53°00'N	144° 58'W	8.8	LL	652	1.1	LL1367	BB2567
797	TD	Coho	07/12/99	54°00'N	144° 58'W	9.1	LL	710	1.1	LL1372	BB2572
791	TD	Pink	07/12/99	54°00'N	144° 58'W	9.1	LL	470	0.1	LL1368	BB2568
793	TD	Pink	07/12/99	54°00'N	144° 58'W	9.1	LL	475	0.1	LL1376	BB2576
773	TD	Coho	07/12/99	54°00'N	144° 58'W	9.1	LL	555	1.1	LL1378	BB2578
803	TD	Coho	07/12/99	54°30'N	145° 00'W	9.2	H&L	556	1.1	LL1379	BB2579
804	TD	Sockeye	07/12/99	55°00'N	145° 00'W	9.3	H&L	660	X.2	LL1380	BB2580
799	TD	Coho	07/13/99	55°04'N	144° 57'W	9.2	LL	600	1.1	LL1382	BB2582
802	TD	Coho	07/13/99	55°30'N	145° 00'W	9.6	H&L	520	2.1	LL1386	BB2586
806	TD	Pink	07/13/99	55°30'N	145° 00'W	9.6	H&L	485	0.1	LL1387	BB2587
764	TD	Pink	07/13/99	56°00'N	145° 00'W	10.2	H&L	468	0.1	LL1388	BB2588
768	TD	Coho	07/13/99	56°00'N	145° 00'W	10.2	H&L	576	X.1	LL1389	BB2589
704	TD	Pink	07/13/99	56°00'N	145° 00'W	10.2	H&L	492	0.1	LL1390	BB2590
771	TD	Pink	07/14/99	56°10'N	145° 04'W	10.2	LL	480	0.1	LL1394	BB2594
711	TD	Pink	07/14/99	56°10'N	145° 04'W	10.2	LL	474	0.1	LL1395	BB2595
714	TD	Pink	07/14/99	56°10'N	145° 04'W	10.2	LL	550	0.1	LL1400	BB2600
808	TD	Coho	07/14/99	56°10'N	145° 04'W	10.2	LL	591	X.1	LL1402	BB2602
809	TD	Sockeye	07/14/99	56°10'N	145° 04'W	10.2	LL	635	1.3	LL1403	BB2603
715	TD	Pink	07/14/99	56°10'N	145° 04'W	10.2	LL	434	0.1	LL1404	BB2604
720	TD	Pink	07/14/99	56°10'N	145° 04'W	10.2	LL	450	0.1	LL1406	BB2606
722	TD	Pink	07/14/99	56°10'N	145° 04'W	10.2	LL	518	0.1	LL1407	BB2607
723	TD	Pink	07/14/99	56°10'N	145° 04'W	10.2	LL	404	0.1	LL1410	BB2610

Table 2. Preliminary release and recovery information for U.S. tags and cooperative Japan-U.S. tags returned from 16 September 1998 to 30 September 1999. A blank indicates the information is not available. LL=longline, GN= gillnet, PS=purse seine, HL=hook and line. Age designation is the European method, first number is the number of freshwater annuli, second number is the number of ocean annuli. FL=fork length, TL=total length, and BW=body weight. Data storage tags: T = temperature only, TD = temperature and depth.

U.S. Tag. Nos.	Japan Tag No.	Release							Recovery									
		Date	Lat (°N)	Long	2°X5° Area	Gear	FL (mm)	Age	Date	Lat (°N)	Long	Area Code	Gear	Sex	FL (mm)	BW (g)	Gonad (g)	Age	Location
A. Sockeye Salmon																			
LL1213, T data tag no. 354		20-May-99	54°46	145°00W	W4554	trawl	490	2.2	11-Jul-99	56°31	159°53W	50-2	-	-	-	-	-	-	Three Hills, approx. 30 mi north of Port Moller, Bering Sea, western Alaska, USA
LL1229, T data tag no. 151		21-May-99	56°40	145°01W	W5056	trawl	555	2.3	09-Jul-99	61°29	144°27W	60-0	dipnet	male	-	-	-	-	Copper R. (near O'Brian Ck), central Alaska, USA
LL1236, T data tag no. 301		22-May-99	58°26	145°00W	W4558	trawl	640	1.3	16-Jun-99	56°20	158°29W	54-1	PS	-	-	-	-	1.3	Chignik Lagoon, Pacific coast of Alaska Peninsula, central Alaska, USA
LL1248, T data tag no. 311		22-May-99	58°58	145°00W	W4558	trawl	635	1.3	04-Jul-99	58°12	134°06W	63-2	GN	male	652	-	-	-	Taku Inlet, 10 mi south of Juneau, southeast Alaska, USA
LL1403, TD data tag no. 809	BB2603	14-Jul-99	56°10	145°04W	W5056	LL	635	1.3	03-Aug-99	58°07	134°04W	63-2	GN	-	-	-	-	-	Slocum Inlet, Taku Inlet, 15 miles southeast of Juneau, southeast Alaska, USA

Table 2. continued.

U.S. Tag. Nos.	Japan Tag No.	Release							Recovery									
		Date	Lat (°N)	Long	2°X5° Area	Gear	FL (mm)	Age	Date	Lat (°N)	Long	Area Code	Gear	Sex	FL (mm)	BW (g)	Gonad (g)	Age	Location
B. Chum Salmon																			
LL2222, T data tag no. 255	MM1274	04-Jul-98	53°30	179°30W	W8052	LL	560	0.3	10-Oct-98	44°13	143°40E	02-2	setnet	male	610	2110	-	0.3	Yubetsu, Okhotsk Sea coast Hokkaido, Japan
LL2348, T data tag no. 271	MM1400	06-Jul-98	55°30	179°30W	W8054	LL	592	0.3	31-Oct-98	36°47	137°05E	01-1	fish trap	male	610	1800	-	-	Sho R., Japan Sea coast, Toyama Prefecture, Japan
LL2403, T data tag no. 274	MM1455	07-Jul-98	56°30	179°30W	W8056	LL	680	0.4	24-Sep-98	44°19	145°21E	02-0	GN	male	716	-	-	-	2 miles off Akaiwa, Shiretoko Peninsula, Nokke St., Hokkaido, Japan
LL2772, T data tag no. 299	MM1824	12-Jul-98	56°30	177°30W	W8056	LL	577	0.3	05-Oct-98	43°41	145°09E	02-0	setnet	female	590	2400	-	0.3	Shibetsu, Nemuro Strait coast, Hokkaido, Japan
LL1225, T data tag no. 146		21-May-99	56°15	145°01W	W5056	trawl	625	0.3	19-Jun-99	54°20	164°50W	53-0	PS	-	-	-	-	0.3	South Unimak Is., Pacific coast of the Aleutian Islands, Alaska, USA
C. Pink salmon																			
LL1376, TD data tag no. 793	BB2576	12-Jul-99	54°00	144°58W	W4554	HL	475	0.1	26-Aug-99	55°15	131°55W	66	PS	male	510	1250	-	-	west side of Gravina Is., near Ketchikan, southeast Alaska, USA
LL1388, TD data tag no. 764	BB2588	13-Jul-99	56°00	145°00W	W4556	HL	468	0.1	05-Aug-99	57°38	152°09W	56-2	PS	-	-	-	-	-	off Cape Chiniak, north Kodiak Is., central Alaska, USA
LL1396, disk tag	BB2596	14-Jul-99	56°10	145°04W	W5056	LL	444	0.1	17-Aug-99	54°49	132°59W	65-2	PS	male	-	-	-	-	Port Bazan, west side of Dall Is., southeast Alaska, USA

Table 2. continued.

U.S. Tag. Nos.	Japan Tag No.	Release Date	Lat (°N)	Long	2°X5° Area	Gear	FL (mm)	Age	Recovery Date	Lat (°N)	Long	Area Code	Gear	Sex	FL (mm)	BW (g)	Gonad (g)	Age	Location
D. Coho salmon																			
LL1361, TD data tag no. 796	BB2561	11-Jul-99	53°00	144°58W	W4552	LL	633	1.1	07-Sep-99	55°45	159°40W	53-4	-	-	692	-	-	-	north of Pad Island, Stepovak Bay, south side of Alaska Peninsula, USA
LL1362, TD data tag no. 784	BB2562	11-Jul-99	53°00	144°58W	W4552	LL	620	2.1	27-Jul-99	56°57	154°21W	56-0	-	-	-	-	-	-	Dry Bay, (Sukhoi Bay, near Alitak Bay) south coast of Kodiak Is., central Alaska, USA
LL1372, TD data tag no.797	BB2572	12-Jul-99	54°00	144°58W	W4554	HL	710	1.1	16-Aug-99	60°04	143°08W	61-6	HL	-	736	4770	-	-	0.25 miles upstream from mouth of Tsiu R., central Alaska, USA
LL1386, TD data tag no. 802	BB2586	13-Jul-99	55°30	145°00W	W4554	HL	520	2.1	05-Aug-99	60°20	151°25W	57-3	GN	-	-	1550	-	-	4 miles southwest of Kasilof Pt., Cook Inlet, central Alaska, USA
E. Chinook salmon																			
LL1230, T data tag no. 168		21-May-99	57°12	145°03W	W5056	trawl	645	1.3	11-Jul-99	61°54	150°54W	57-6	HL	-	-	-	-	-	mouth of Lake Creek, Yentna R., central Alaska, USA

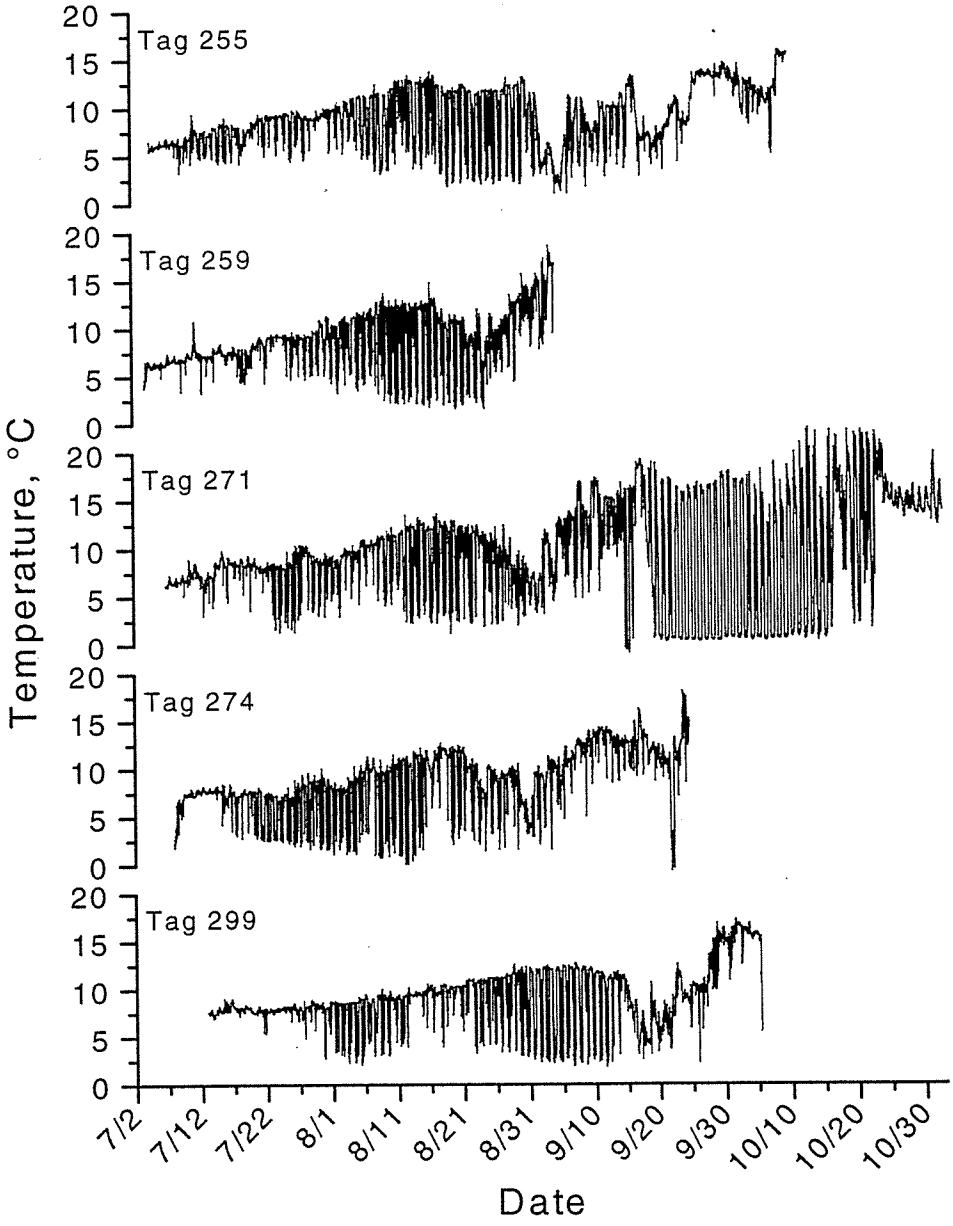

Figure 1. Ambient temperature data encountered by five chum salmon tagged in July 1998 in the Bering Sea and recovered in Hokkaido and Honshu, Japan. Tag 259 was previously reported and is included for comparison (Myers et al. 1998).

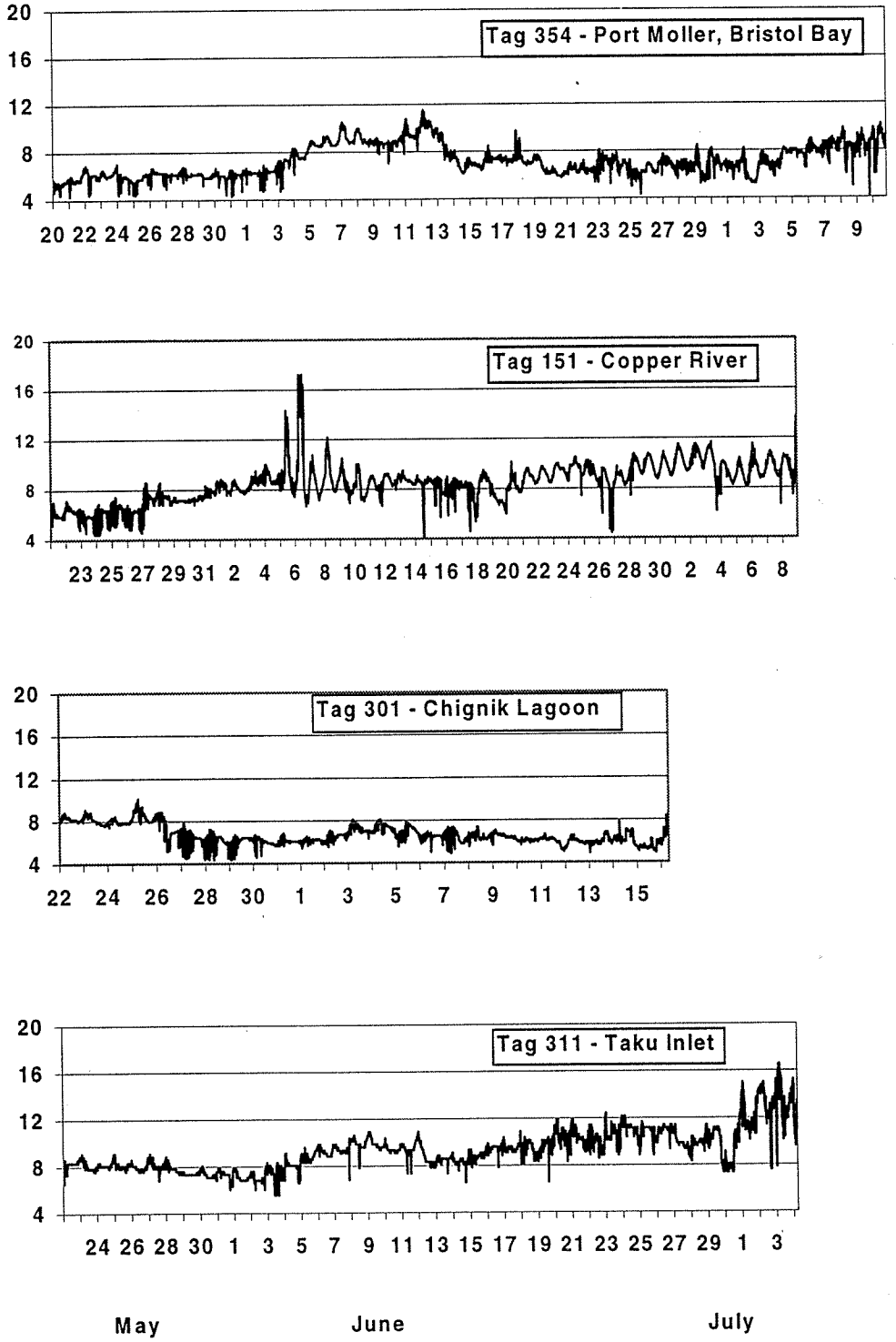

Figure 2. Ambient temperature data from data storage tags placed on four sockeye salmon in the Gulf of Alaska in May 1999 and recovered in Alaska.

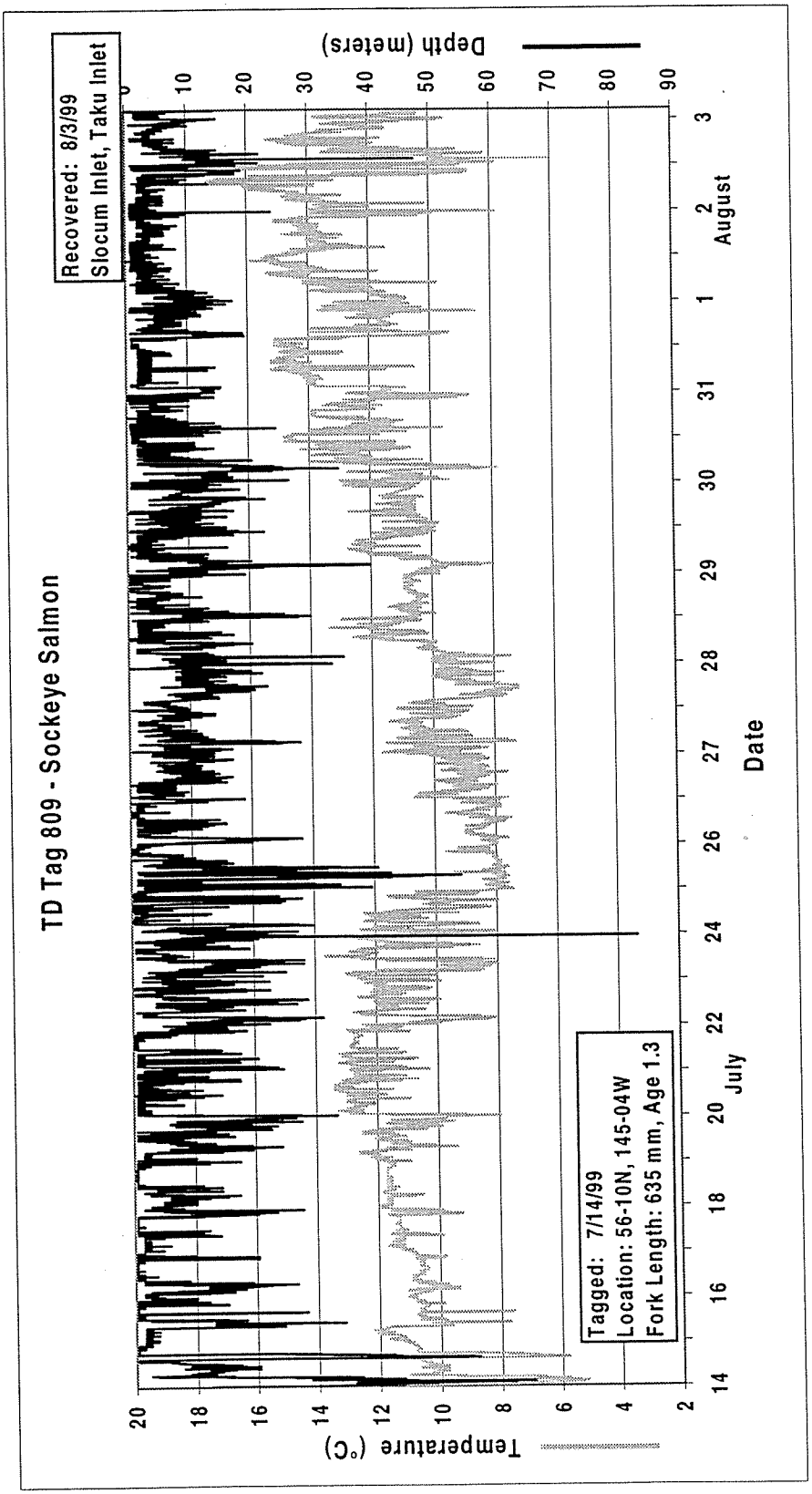

Figure 3. Temperature and depth data recorded on a data storage tag placed on a 635 mm sockeye salmon in the Gulf of Alaska on 14 July 1999 and recovered in Slocum Inlet,Taku Inlet, Alaska on 3 August 1999.

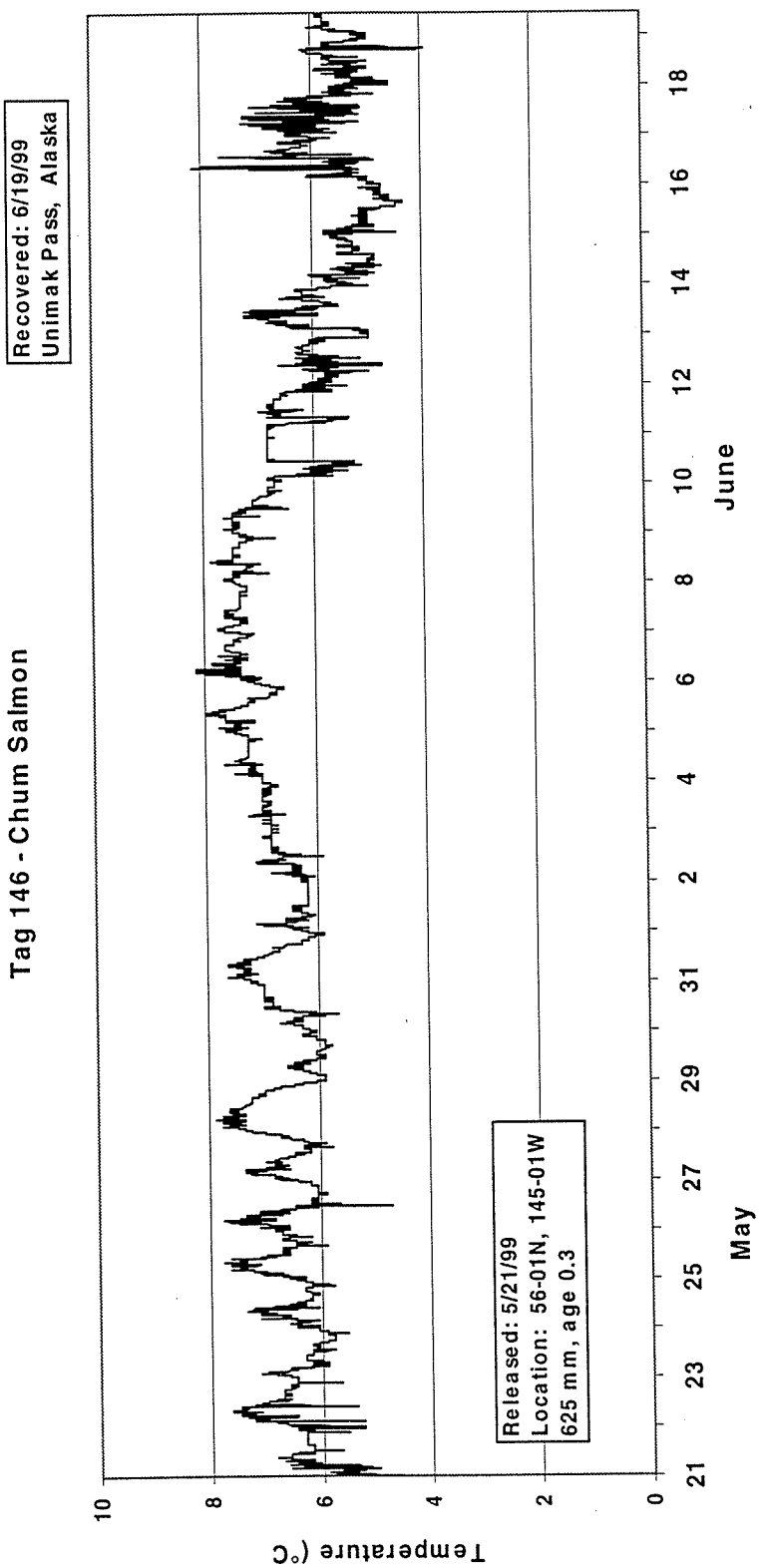

Figure 4. Temperature data recorded on a data storage tag placed on a 625 mm chum salmon in the Gulf of Alaska on 21 May 1999 and recovered in Unimak Pass, Alaska on 19 June 1999.

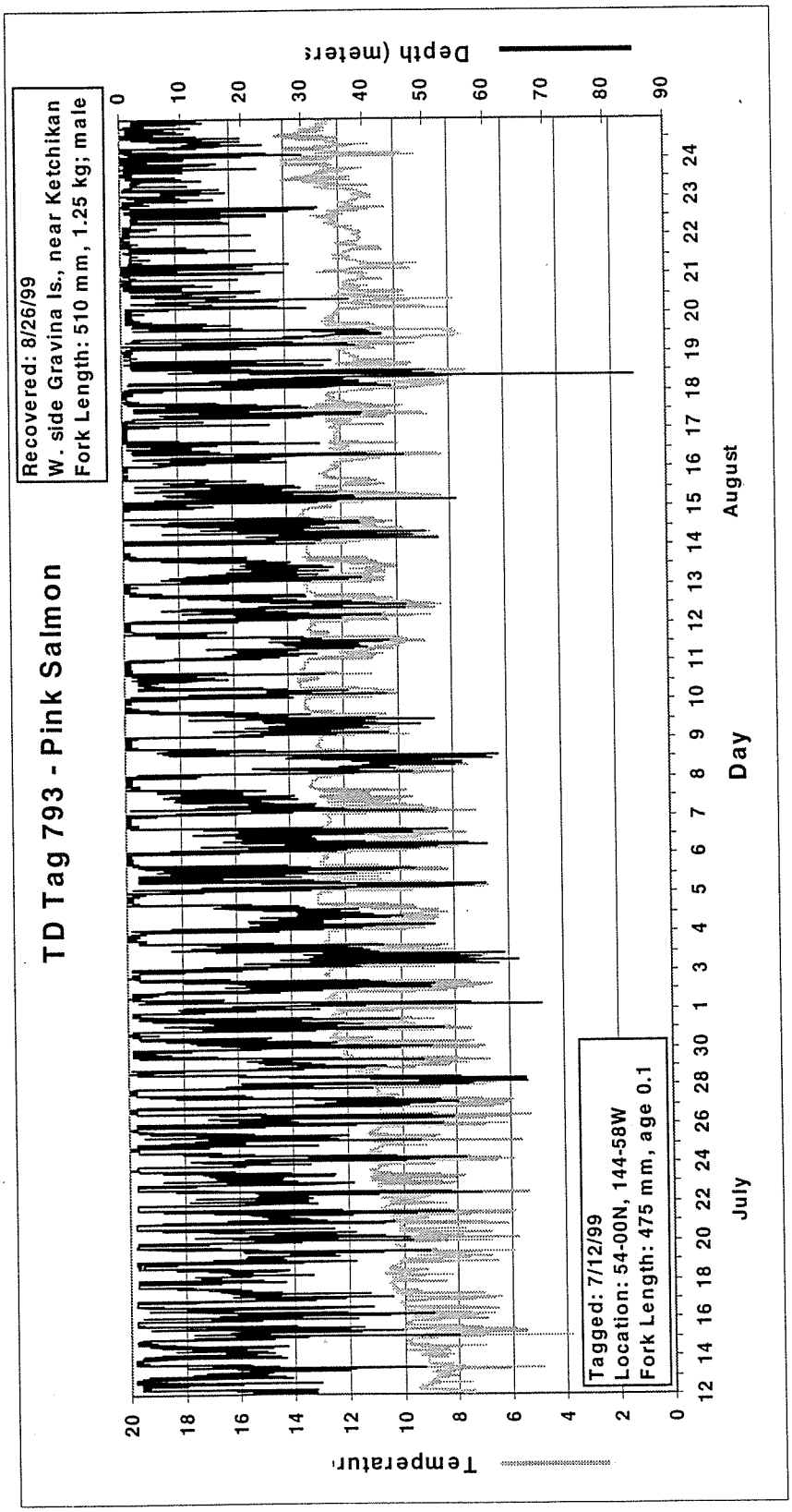

Figure 5. Temperature and depth data recorded on a data storage tag placed on a 475 mm pink salmon in the Gulf of Alaska on 12 July 1999 and recovered off the west coast of Gravina Island, southeast Alaska on 26 August 1999.

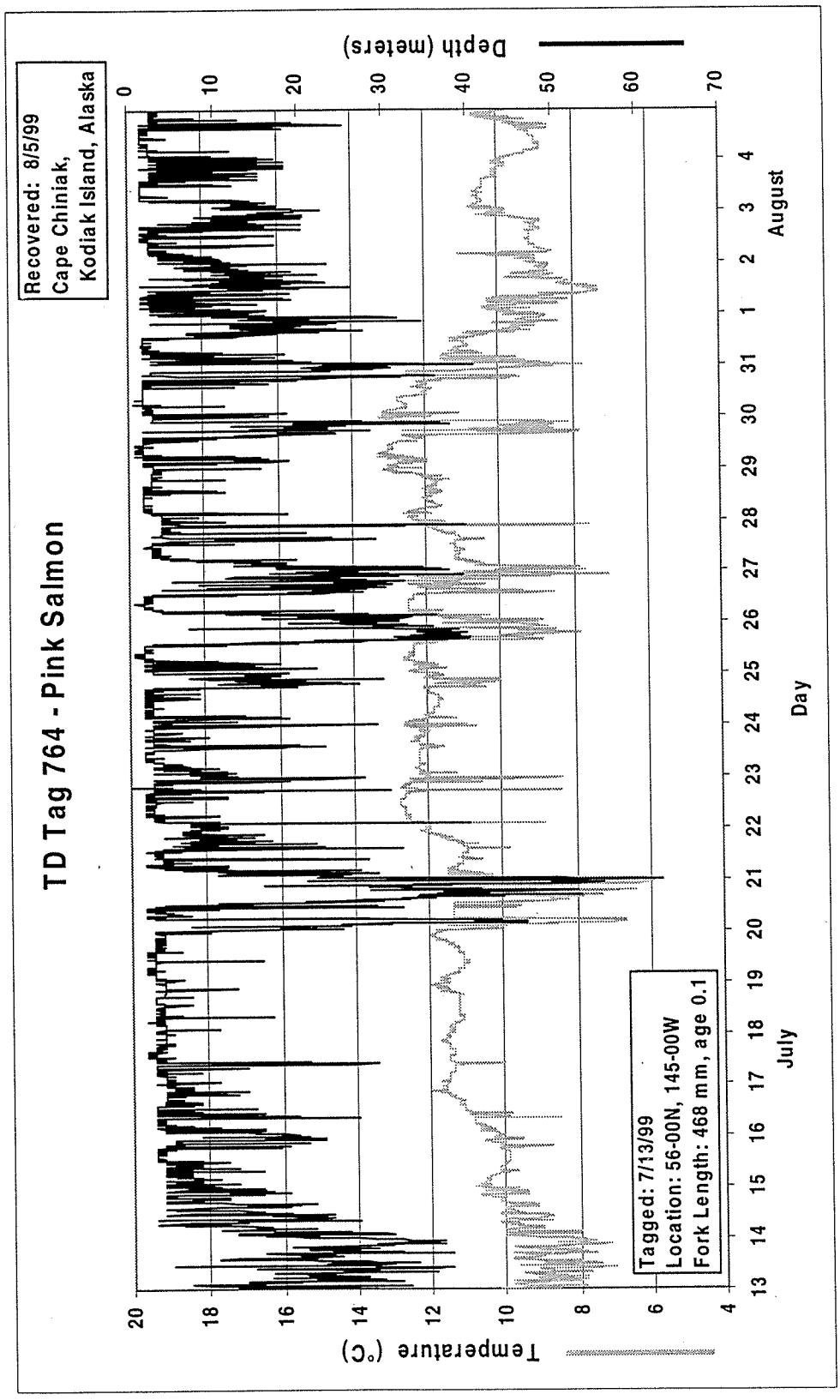

Figure 6. Temperature and depth data recorded on a data storage tag placed on a 468 mm pink salmon in the Gulf of Alaska on 13 July 1999 and recovered off Cape Chiniak, Kodiak Island, Alaska on 5 August 1999.

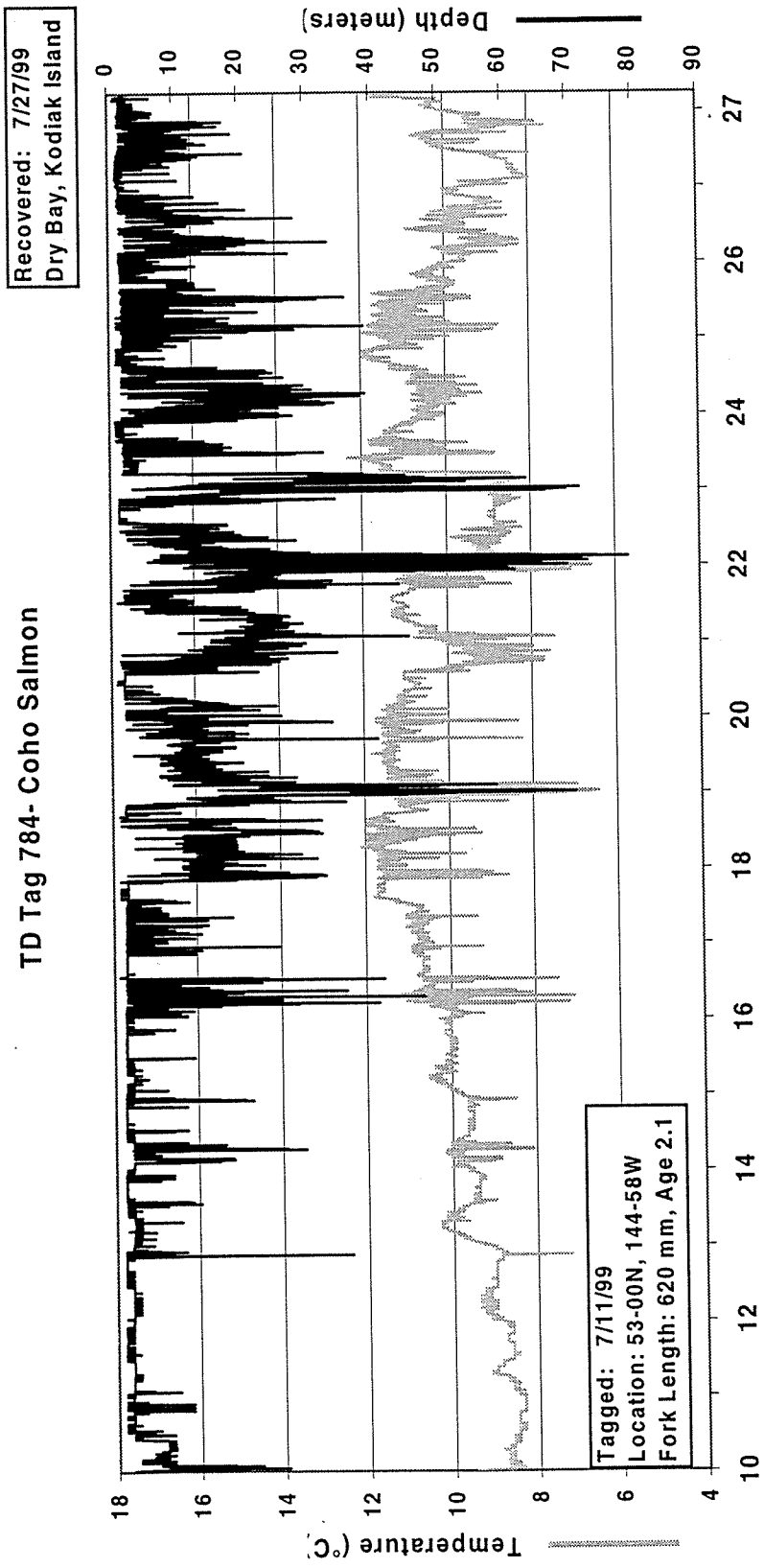

Figure 7. Temperature and depth data recorded on a data storage tag placed on a 620 mm coho salmon in the Gulf of Alaska on 11 July 1999 and recovered in Dry Bay (Sukhoi Bay), Kodiak Island, Alaska on 27 July 1999.

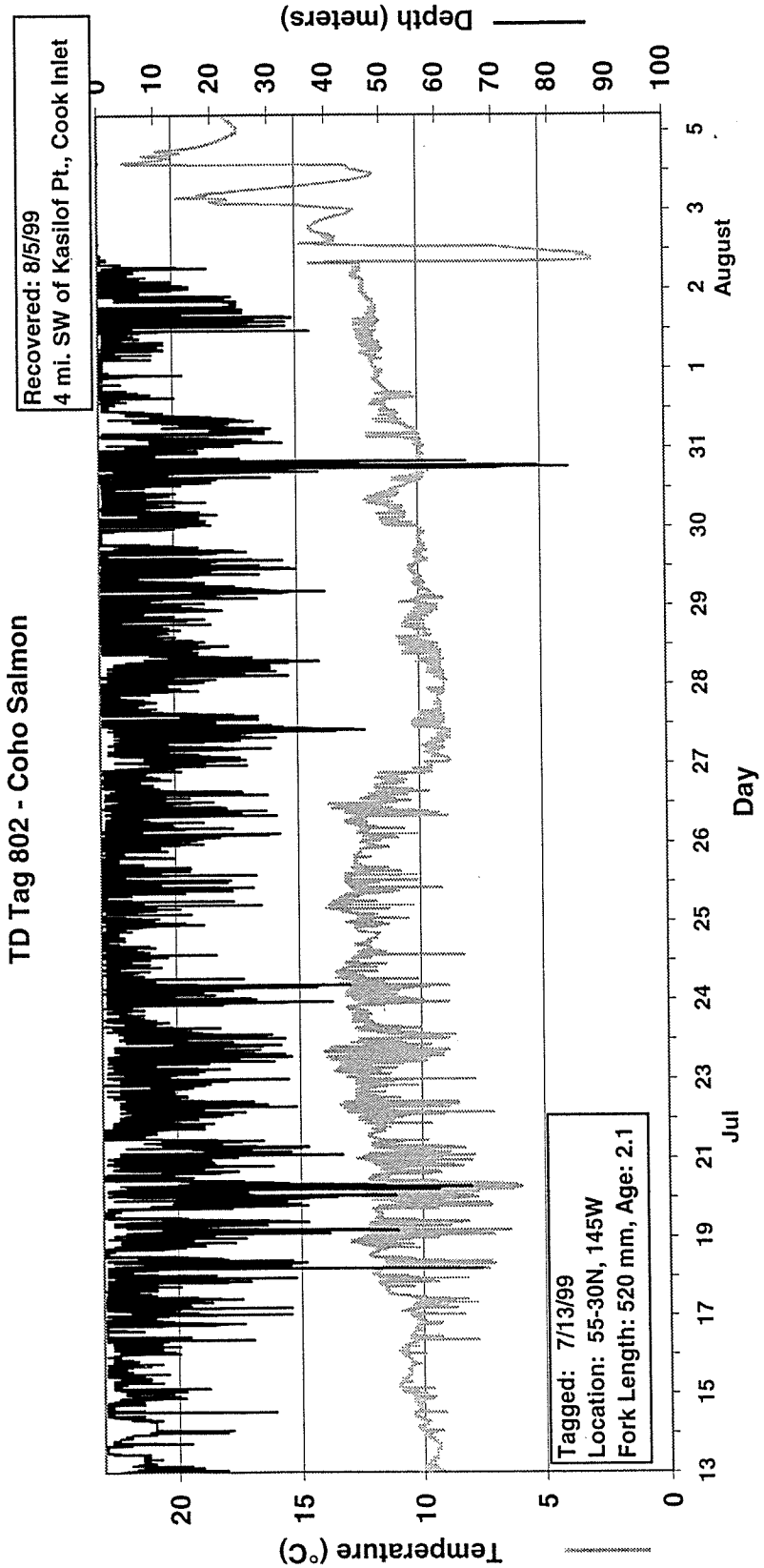

Figure 8. Temperature and depth data recorded on a data storage tag placed on a 520 mm coho salmon in the Gulf of Alaska on 13 July 1999 and recovered at Kasilof Point, Cook Inlet, Alaska on 5 August 1999.

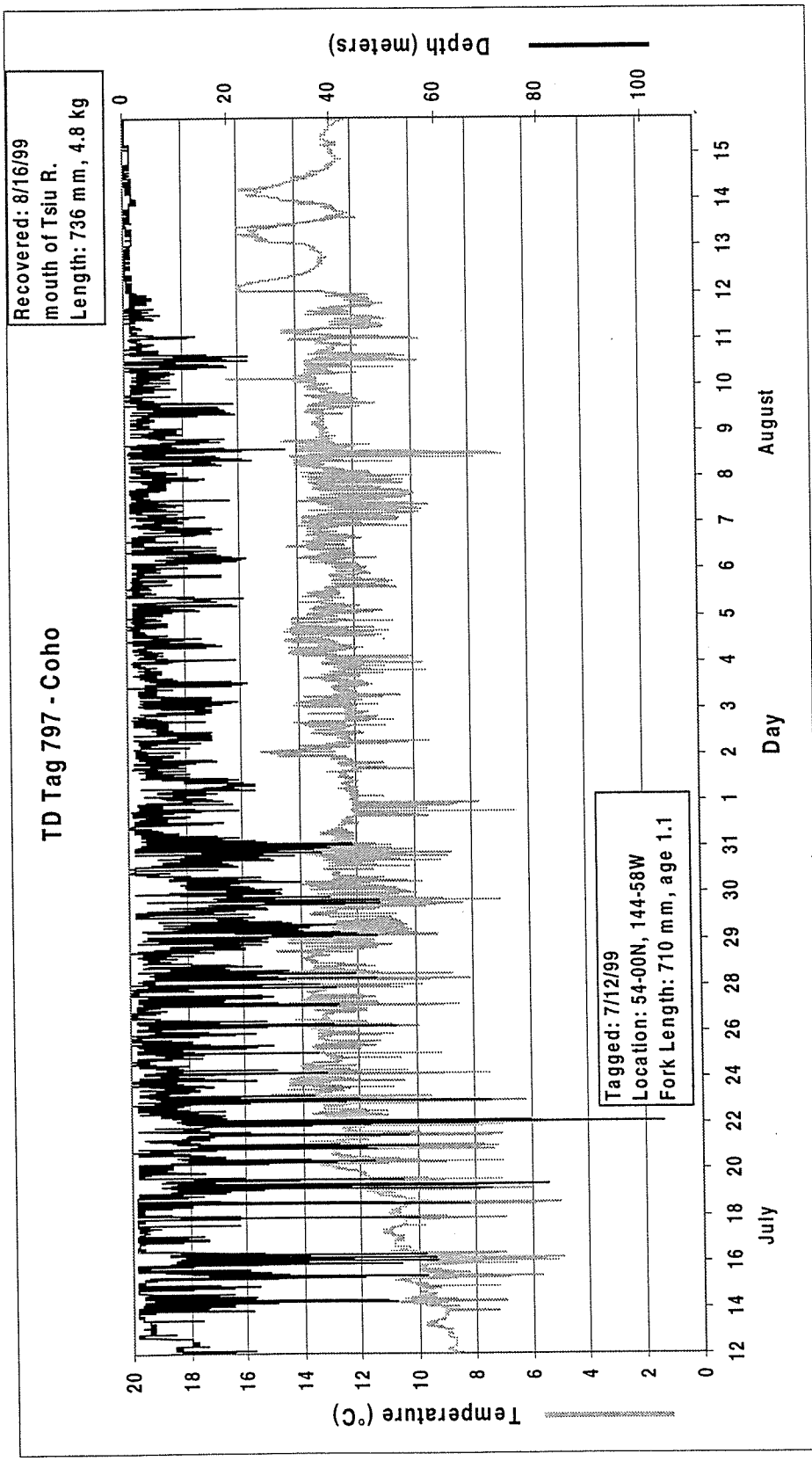

Figure 9. Temperature and depth data recorded on a data storage tag placed on a 710 mm coho salmon in the Gulf of Alaska on 12 July 1999 and recovered in the Tsiu River, Alaska on 16 August 1999.

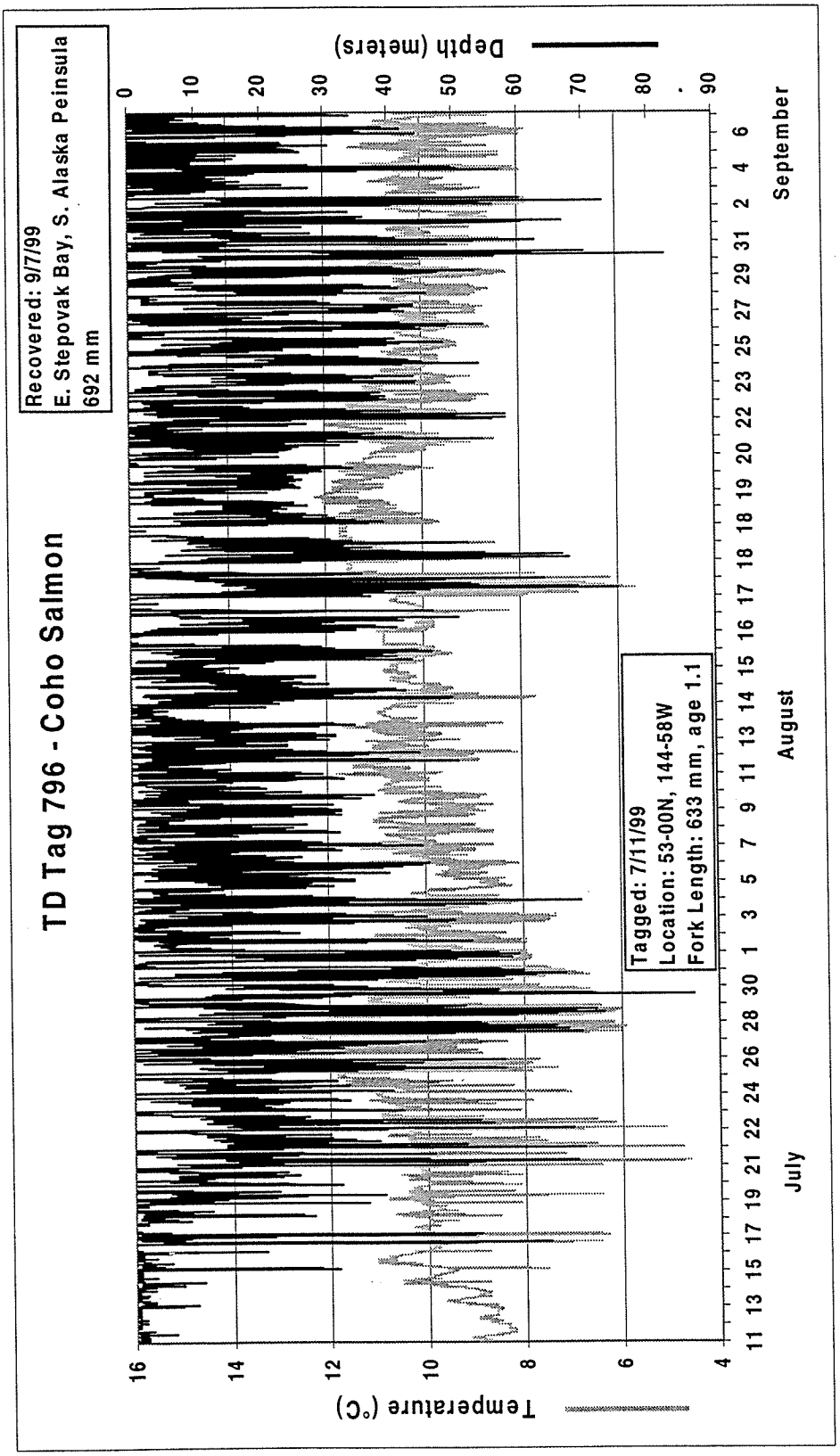

Figure 10. Temperature and depth data recorded on a data storage tag placed on a 633 mm coho salmon in the Gulf of Alaska on 11 July 1999 and recovered in Stepovak Bay, south side of Alaska Peninsula, Alaska on 7 September 1999.

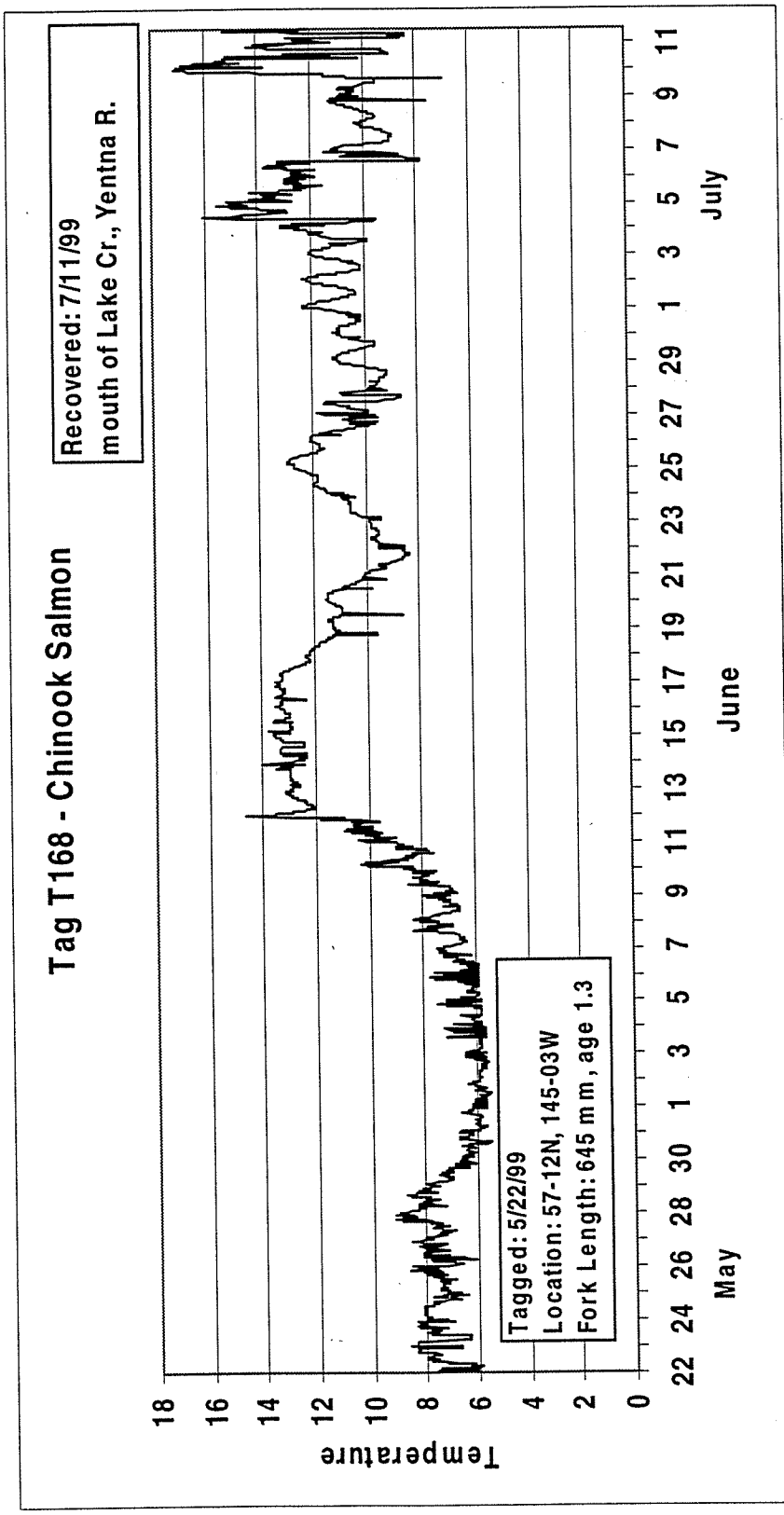

Figure 11. Temperature data recorded on a data storage tag placed on a 645 mm chinook salmon in the Gulf of Alaska on 22 May 1999 and recovered in Lake Creek, Yentna River, Alaska on 11 July 1999.