



DFO Tag Placement Study

Gayle Brown

Preliminary Results (!)

Presentation to Regional Mark Committee

Apr 4, 2013

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Tag Placement Study Project

- **Recovery of Historical Records of Tag Placement and Tag Damage from Canadian Commercial and Sport Fishery CWT Samples, 1988-1997**
- **Development of an Escapement Tag Placement and Damage Database and Recovery of Historical Records of Tag Placement and Tag Damage from Canadian Escapement CWT Samples, 1988-2010**
- **Integrate historical data with fishery and escapement data to provide database with results from 1988-2010**
- **Analysis / Investigation**





#CWTs decoded

Table 1. Simple table showing number of CWTs decoded from Canadian **fishery** (commercial and recreational) and **escapement** samples.

Table 1. Numbers of successfully decoded CWTs from Canadian commercial fishery samples (C), recreational fishery samples (R) and escapement samples (E), 1989-2010. Counts are organized by species and a total count by sample type is given in the three right-most columns. Dash marks indicate that no CWTs were obtained from samples for the species and sample type combination or are currently unavailable in MRP (see footnote 2 below table). The totals for fishery samples and escapement samples for species other than Chinook and Coho were extracted from the CDFO Mark Recovery Program (MRP) database. Totals for escapement CWTs for Chinook and Coho were extracted from the CDFO ENPRO database.

Year ¹	Chinook			Coho			Chum			Pink			Sockeye			Steelhead			Total		
	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E
1989	6293	1500	4627	19379	5357	11042	317	4	840	--	--	--	4	0	--	164	203	--	26157	7064	16509
1990	8299	1678	5065	19038	4954	10258	437	--	--	--	--	--	--	--	--	158	112	--	27932	6744	15323
1991	6427	2731	5662	22749	1583	11559	533	--	--	52	4	--	--	--	--	115	40	--	29876	4358	17221
1992	6779	3167	5213	19383	4494	8870	1255	--	--	109	1	--	--	--	--	68	13	--	27594	7675	14083
1993	6466	3433	5613	11834	4555	5689	1382	--	--	80	1	--	2	2	--	14	3	--	19778	7994	11302
1994	3986	2154	3952	15710	2246	6332	2364	--	341	--	--	--	4	1	682	14	--	--	22078	4401	11307
1995	2363	1864	3708	10462	914	7864	1018	--	691	--	--	--	1	--	11	1	--	--	13845	2778	12274
1996	824	1729	4012	9415	947	4149	134	--	559	--	--	--	1	--	47	1	2	--	10375	2678	8767
1997	1604	1535	3077	1324	642	6326	258	2	661	--	--	--	4	--	14	2	1	--	3192	2180	10078
1998	1169	1238	3595	502	118	6155	384	1	1100	--	--	--	--	--	--	--	--	--	2055	1357	10850
1999	1562	1605	2895	143	186	7701	169	1	833	--	--	--	--	--	--	--	--	--	1874	1792	11429
2000	1534	1158	3599	82	250	9073	339	--	305	--	--	--	--	--	--	--	--	--	1955	1408	12977
2001	3250	1276	5483	192	224	6912	364	--	1417	--	--	--	--	--	--	--	--	--	3806	1500	13812
2002	7908	1363	4726	126	194	5745	71	1	852	--	--	--	--	--	--	--	--	--	8105	1558	11323
2003	4214	1279	3137	429	306	3965	34	--	--	--	--	--	--	--	--	--	--	--	4677	1585	7102
2004	8097	1328	3727	382	231	3962	50	--	--	--	--	--	--	--	--	1	--	--	8530	1559	7689
2005	6314	1387	2846	259	371	2958	29	--	--	--	--	--	--	--	--	--	--	--	6602	1758	5804
2006	4203	1314	3337	133	130	1122	--	--	--	--	--	--	--	--	--	--	1	--	4336	1445	4459
2007	4626	1402	3166	460	251	1645	--	--	--	--	--	--	--	--	--	--	1	--	5086	1654	4811
2008	3405	1174	2838	232	145	1529	--	--	--	--	--	--	--	--	--	--	--	--	3637	1319	4367
2009	2871	1642	3072	445	495	2511	--	--	--	--	--	--	--	--	--	--	1	--	3316	2138	5583
2010	3706	2218	4562	389	261	1814	--	--	--	--	--	--	--	--	--	--	--	--	4095	2479	6376
Total	95900	38175	87912	133068	28854	127181	9138	9	7599	241	6	0	16	3	754	538	377	0	238901	67424	223446

1. The counts of CWTs from commercial samples in 1989 may contain a small number obtained from test fisheries and other types of non-commercial fisheries employing commercial gear. Starting in 1990, unique codes assigned to each type of fishery in the MRP database allow exclusion of CWTs from non-commercial fisheries using commercial gear.



Non-Standard Placement (NSP)

Tables 2 – Shows numbers of CWTs dissected with CWT located in a non-standard placement (found in a location other than the tip of the nose). There are a lot of CWTs found in a non-standard placement! The frequency of CWTs in NSPs is increasing .

Table 2. Numbers of CWTs dissected from a non-standard placement in Canadian commercial fishery samples (C columns), recreational fishery samples (R columns) and escapement samples (E columns) by species for years from 1989 to 2010. The total for each sample type is given in the three right-most columns.

Year	Chinook			Coho			Chum			Pink			Sockeye			Steelhead			Total for Sample Type		
	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E
1989	814	145	201	1953	480	632	116	1	286	--	--	--	2	--	--	21	29	2	2906	655	1121
1990	1136	151	666	2507	445	853	196	--	419	--	--	--	--	--	--	17	9	11	3856	605	1949
1991	976	229	711	3347	153	654	179	1	449	24	1	83	--	--	--	12	3	4	4538	387	1901
1992	1561	415	483	3682	680	782	495	--	417	67	--	--	2	--	--	10	3	--	5817	1098	1682
1993	1726	611	1187	2084	702	1487	812	1	234	42	--	242	1	1	--	6	--	--	4671	1315	3150
1994	862	40	1197	2332	60	1346	850	--	806	2	--	--	2	--	130	4	--	--	4052	100	3479
1995	598	275	992	2571	140	1285	1428	--	616	--	--	--	1	--	371	--	--	--	4598	415	3264
1996	172	400	917	1730	208	1390	103	--	488	--	--	1	--	--	1	1	--	--	2006	608	2797
1997	338	199	618	550	131	374	165	1	397	--	--	--	1	--	14	--	2	--	1054	333	1403
1998	266	189	359	79	34	466	256	1	328	--	--	--	--	--	5	--	--	--	601	224	1158
1999	428	368	523	36	34	1576	84	1	1266	--	--	--	--	--	--	1	--	--	549	403	3365
2000	349	224	818	20	54	2179	180	--	832	--	--	--	--	--	--	--	--	1	549	278	3830
2001	687	220	1012	24	39	1592	180	--	293	--	--	--	--	--	--	--	--	--	891	259	2897
2002	1827	282	1029	40	50	1772	40	1	469	--	--	--	--	--	--	--	--	--	1907	333	3270
2003	1120	314	1237	125	57	1569	20	--	532	--	--	--	--	--	--	--	--	--	1265	371	3338
2004	2502	322	529	117	55	815	14	--	464	--	--	--	--	--	--	--	--	--	2633	377	1808
2005	1981	339	1093	62	68	586	8	--	179	--	--	--	--	--	--	--	--	--	2051	407	1858
2006	1345	325	691	34	24	199	--	--	33	--	--	--	--	--	--	--	1	--	1379	350	923
2007	1346	419	1239	142	48	152	--	--	2	--	--	--	--	--	--	--	--	--	1488	467	1393
2008	1093	379	1036	46	34	126	--	--	--	--	--	--	--	--	--	--	--	--	1139	413	1162
2009	1119	410	846	155	140	285	--	--	--	--	--	--	--	--	--	--	--	--	1274	550	1131
2010	1287	695	1478	107	55	547	--	--	--	--	--	--	--	--	--	--	--	--	1394	750	2025



% of NSP in **CN** by Country – **Fishery Sampling**

Table 5 and Figure 1 – Show the % (and number) of CWTs from Chinook in Canadian fishery samples found in a non-standard placement, shown by country of origin.

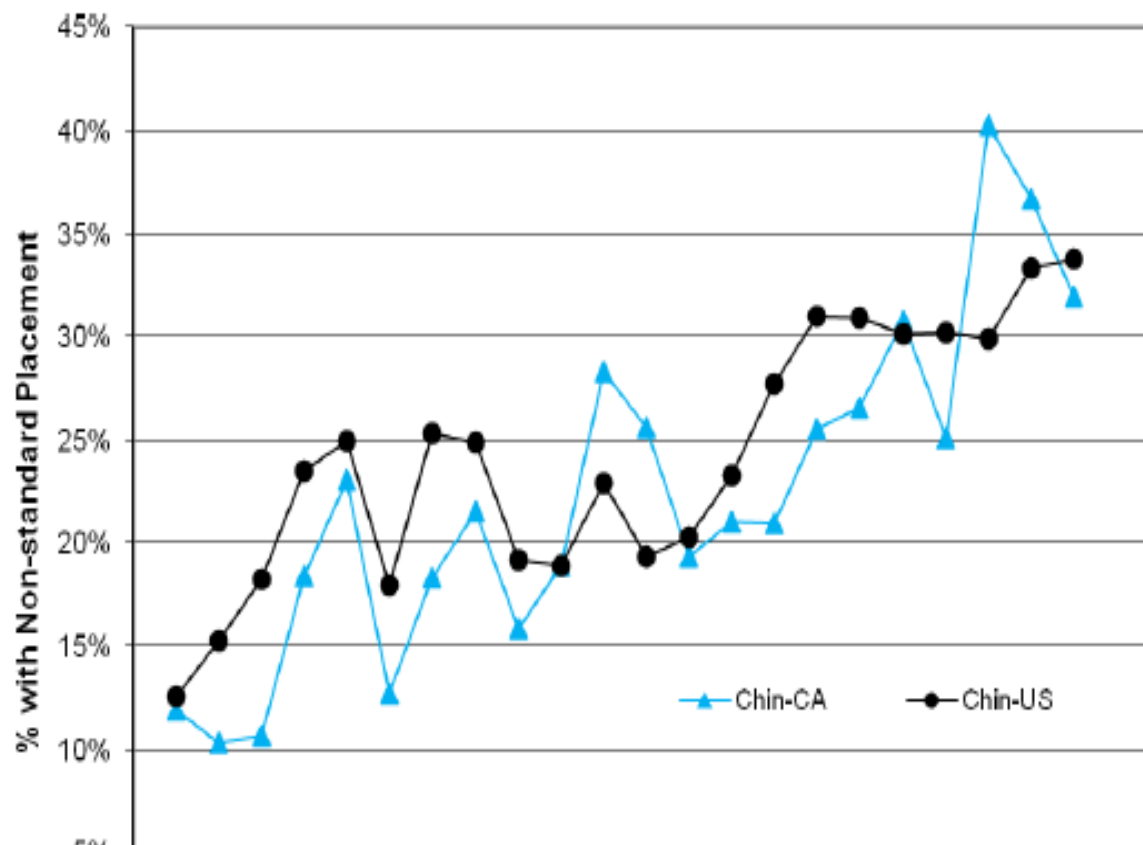
- The % is roughly similar between the countries though has been on an increasing trend in both countries, starting around 2000.
- The recent % is around 30%-35% reaching a high of 40% for Canadian-origin CWTs in 2008.
- These percentages are high in recent years!





% of NSP in **CN** by Country – Fishery Sampling

Figure 1. Percentage of CWTs from Chinook salmon with a non-standard placement by country of origin of the releasing facility (Canada or U.S.A.) in Canadian fishery samples, 1989-2010.





% of NSP in **Coho** by Country – **Fishery Sampling**

Table 6 and Figure 2 – Show the % (and number) of CWTs from Coho in Canadian fishery samples found in a non-standard placement, shown by country of origin.

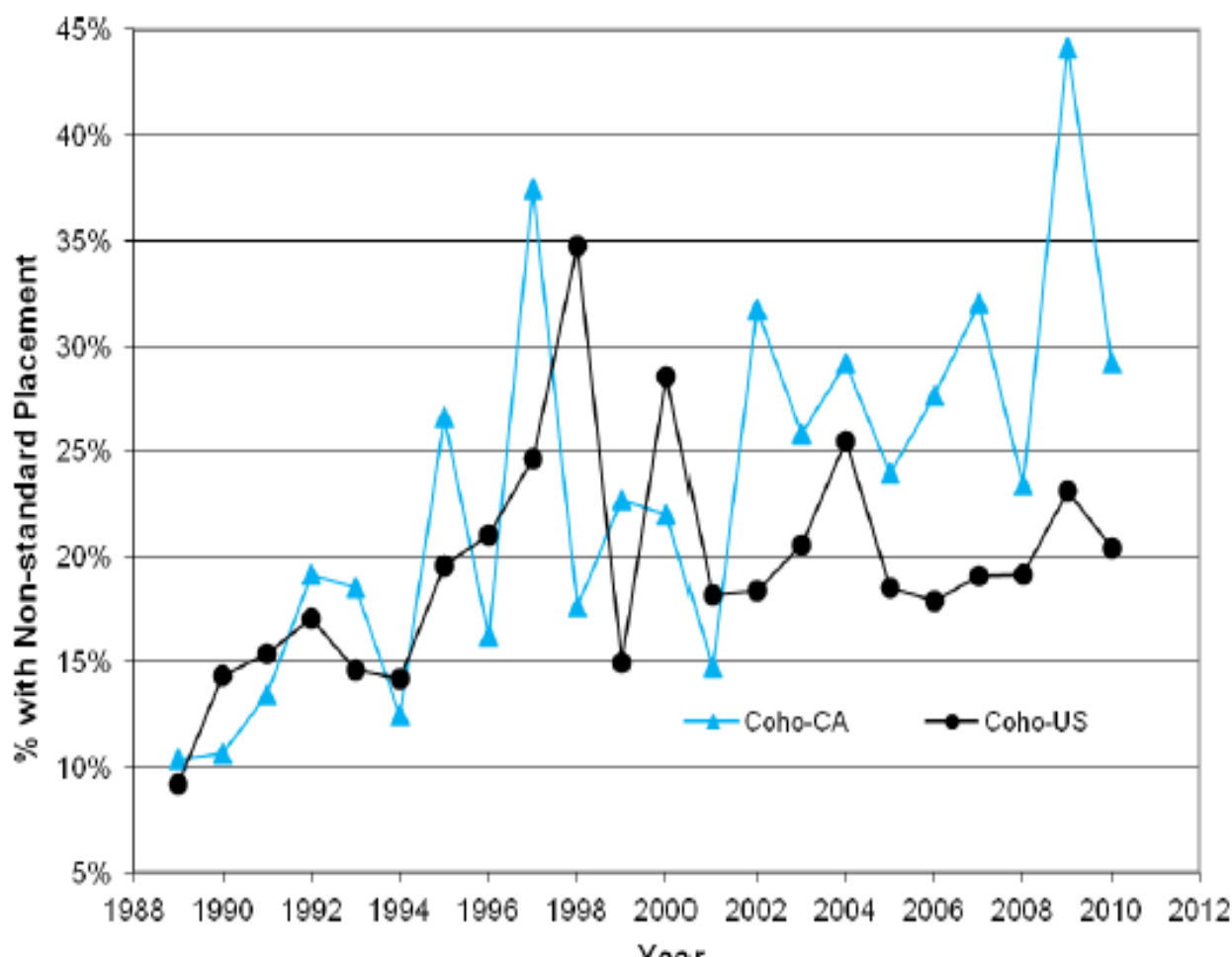
- The % increased from around 10% at the start of the time series to around 30% around 1998.
- It then decreased for US-origin CWTs to around 20% and has remained around this level.
- The % from Canadian-origin Coho has fluctuated but has averaged around 30% (reaching a high of 45% in 2009) since 1998, and has been consistently higher than US-origin CWTs.
- The total number of CWTs obtained from Coho has decreased dramatically over the time period reflecting huge reductions in catch and lower submission rates of heads from recreational fishers.





% of NSP in Coho Country – Fishery Sampling

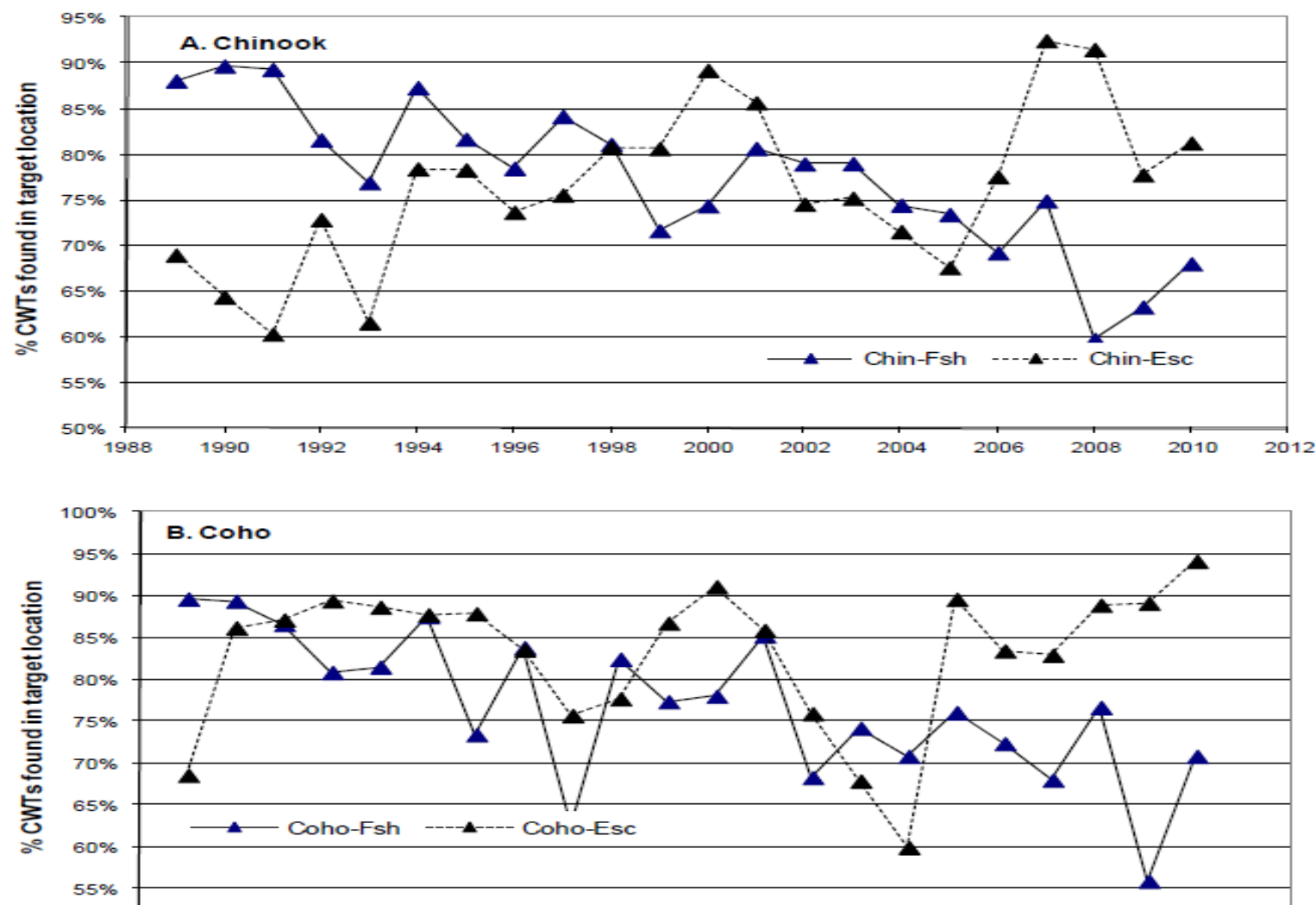
Figure 2. Percentage of CWTs from Coho salmon with a non-standard placement by country of origin of the releasing facility (Canada or U.S.A.) in Canadian fishery samples, 1989-2010.





CWTs in SP in Fishery Sampling vs Escapement

Figure 3. Correspondence between Canadian fishery samples and escapement samples in the annual percent of total CWTs dissected from Canadian-origin Chinook salmon (panel A) and Coho salmon (panel B) in the expected (i.e. target placement) location.





Breakdown of Locations for NSPs in CN & CO

Figure X – Shows a breakdown in numbers of the actual locations where CWTs in non-standard placements were found in Chinook and Coho in fisheries sampling programs.

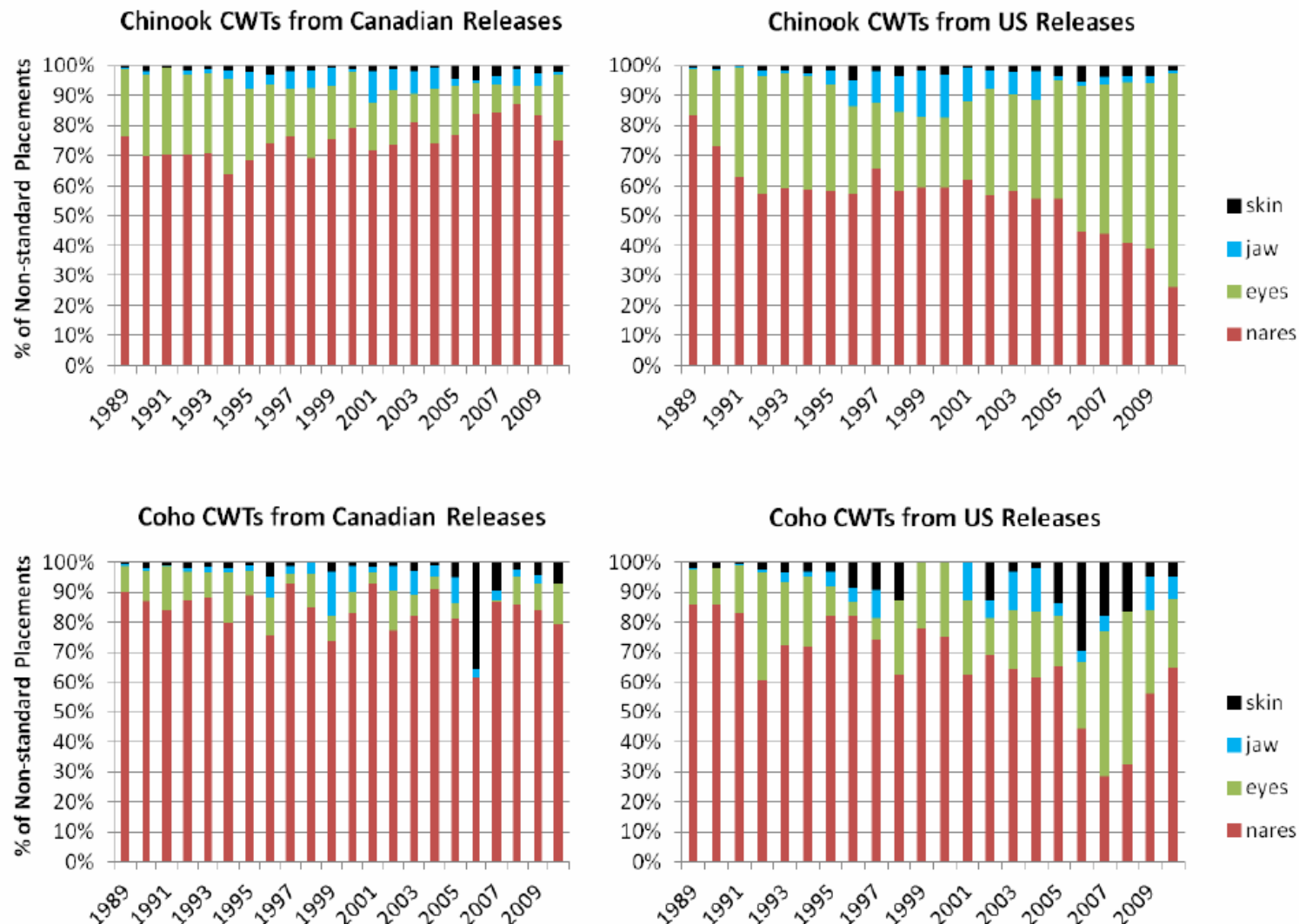
- The nares (nostril area) and eyes are the two most common sites in both species.
- The frequency among the four general non-placement site categories (nares, eyes, jaw and skin) has varied over time, species and country as is shown in the four panels of Figure X. % occurrence in the jaw was greater in US Chinook CWTs in the late 90s and early 2000s. Same pattern in Canadian Coho CWTs.





Breakdown of Locations for NSPs – Fishery Sampling

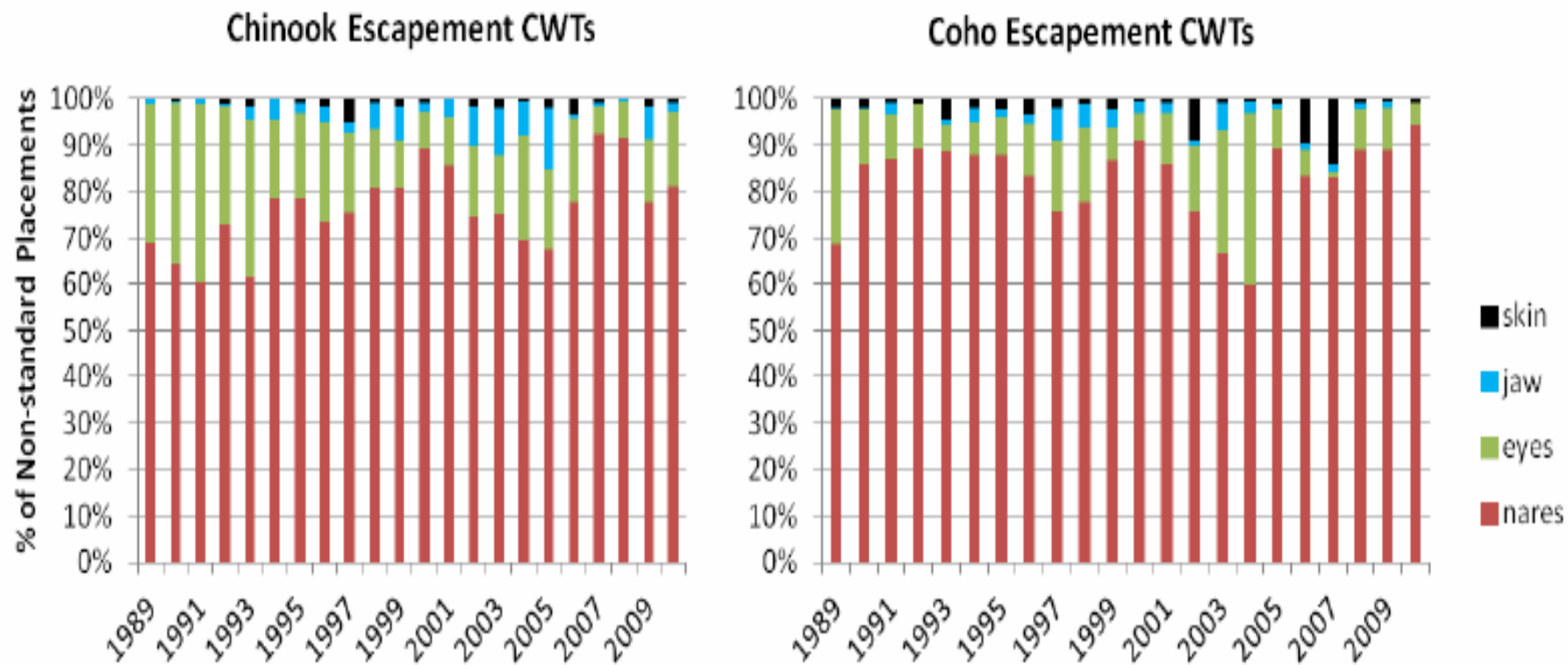
Figure X. Percent occurrence of CWTs in the four most common non-standard placements for Chinook (top row of panels) and Coho (bottom row of panels) sampled in Canadian fisheries, 1989-2010, by releasing country (Canada in the left column of panels; U.S.A. in the right column of panels). The placement categories total to 100% in each panel. Occurrence in other non-standard placements is minor.





Breakdown of Locations for NSPs - **Escapement**

Figure X. Percent occurrence of CWTs in the four most common non-standard placements for Chinook and Coho sampled in escapement programs in British Columbia, 1989-2010. Those few CWTs originating from U.S. releases are not included. The placement categories total to 100% in each panel. Occurrence in the only other non-standard placement (the tongue) is minor.





Scratch Marks (SM)

Table 3 – Shows numbers of CWTs dissected bearing physical scratches. The scratch marks really extend the reading process but overall the frequency is low.

Table 3. Numbers of CWTs observed with scratch marks in Canadian commercial fishery samples (C columns), recreational fishery samples (R columns) and escapement samples (E columns) by species for years from 1989 to 2010. The total for each sample type is given in the three right-most columns.

Year	Chinook			Coho			Chum			Pink			Sockeye			Steelhead			Total for Sample Type		
	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E
1989	189	36	23	540	149	154	9	--	25	--	--	--	--	--	--	6	2	2	744	187	204
1990	412	48	72	1214	252	93	10	--	16	--	--	--	--	--	--	4	4	22	1640	304	203
1991	190	94	59	923	40	173	17	--	3	5	--	11	--	--	--	9	--	2	1144	134	248
1992	193	59	55	518	59	45	19	--	7	17	--	--	--	--	--	--	1	--	747	119	107
1993	156	41	44	277	39	21	70	--	--	3	--	31	--	--	--	1	--	--	507	80	96
1994	52	4	83	90	4	48	35	--	22	--	--	--	--	--	5	1	--	--	178	8	158
1995	79	55	28	434	18	25	45	--	9	--	--	--	--	--	3	--	--	--	558	73	65
1996	3	6	31	86	11	17	2	--	11	--	--	--	--	--	--	--	--	--	91	17	59
1997	17	7	34	8	6	11	--	--	7	--	--	--	--	--	--	1	--	--	26	13	52
1998	4	3	6	1	--	15	3	--	4	--	--	--	--	--	--	--	--	--	8	3	25
1999	15	11	26	--	--	11	1	--	9	--	--	--	--	--	--	--	--	--	16	11	46
2000	10	10	16	--	1	18	3	--	16	--	--	--	--	--	--	--	--	--	13	11	50
2001	15	20	60	3	3	51	4	--	5	--	--	--	--	--	--	--	--	--	22	23	116
2002	44	13	33	10	5	60	1	--	6	--	--	--	--	--	--	--	--	--	55	18	99
2003	35	14	33	2	4	91	1	--	4	--	--	--	--	--	--	--	--	--	38	18	128
2004	23	7	18	1	1	41	2	--	3	--	--	--	--	--	--	--	--	--	26	8	62
2005	8	3	12	1	2	25	--	--	--	--	--	--	--	--	--	--	--	--	9	5	37
2006	5	2	11	--	3	19	--	--	2	--	--	--	--	--	--	--	--	--	5	5	32
2007	5	2	9	3	6	19	--	--	--	--	--	--	--	--	--	--	--	--	8	8	28
2008	1	1	23	--	--	33	--	--	--	--	--	--	--	--	--	--	--	--	1	1	56
2009	6	4	49	2	5	5	--	--	--	--	--	--	--	--	--	--	--	--	8	9	54
2010	24	14	63	19	2	52	--	--	--	--	--	--	--	--	--	--	--	--	43	16	115



% of SM CWTs in **CN** by Country – Fishery Sampling

Table 9. Frequency of CWTs with scratch marks from Chinook in Canadian fishery samples, 1989-2010, by releasing country (Canada and the USA).

Year	CA-origin CWTs			US-origin CWTs			Total Fishery CWTs		
	Damaged	Total	% with Damage	Damaged	Total	% with Damage	Damaged	Total	% with Damage
1989	70	3162	2.2%	155	4631	3.3%	225	7793	2.9%
1990	134	4748	2.8%	326	5229	6.2%	460	9977	4.6%
1991	141	6159	2.3%	143	2999	4.8%	284	9158	3.1%
1992	138	7070	2.0%	114	2876	4.0%	252	9946	2.5%
1993	92	7093	1.3%	105	2806	3.7%	197	9899	2.0%
1994	22	3802	0.6%	34	2338	1.5%	56	6140	0.9%
1995	79	2817	2.8%	55	1410	3.9%	134	4227	3.2%
1996	2	1869	0.1%	7	684	1.0%	9	2553	0.4%
1997	12	1941	0.6%	12	1198	1.0%	24	3139	0.8%
1998	3	1276	0.2%	4	1131	0.4%	7	2407	0.3%
1999	6	1295	0.5%	20	1872	1.1%	26	3167	0.8%
2000	3	839	0.4%	17	1853	0.9%	20	2692	0.7%
2001	17	1159	1.5%	18	3367	0.5%	35	4526	0.8%
2002	10	2070	0.5%	47	7201	0.7%	57	9271	0.6%
2003	8	1306	0.6%	41	4187	1.0%	49	5493	0.9%
2004	7	1774	0.4%	23	7651	0.3%	30	9425	0.3%
2005	2	1378	0.1%	9	6323	0.1%	11	7701	0.1%
2006	1	1421	0.1%	6	4096	0.1%	7	5517	0.1%
2007	3	1109	0.3%	4	4919	0.1%	7	6028	0.1%
2008	2	984	0.2%	0	3595	0.0%	2	4579	0.0%
2009	3	695	0.4%	7	3818	0.2%	10	4512	0.2%
2010	2	939	0.2%	36	4985	0.7%	38	5924	0.6%



% of SM CWTs in Coho by Country - Fishery Sampling

Table 10. Frequency of CWTs with scratch marks from Coho in Canadian fishery samples, 1989-2010, by releasing country (Canada and the USA).

Year	CA-origin CWTs			US-origin CWTs			Total Fishery CWTs		
	Damaged	Total	% with Damage	Damaged	Total	% with Damage	Damaged	Total	% with Damage
1989	300	13449	2.2%	389	11287	3.4%	689	24736	2.8%
1990	448	13261	3.4%	1018	10731	9.5%	1466	23992	6.1%
1991	272	12487	2.2%	691	11845	5.8%	963	24332	4.0%
1992	224	13582	1.6%	353	10295	3.4%	577	23877	2.4%
1993	119	9957	1.2%	197	6432	3.1%	316	16389	1.9%
1994	35	9406	0.4%	59	8550	0.7%	94	17956	0.5%
1995	233	6889	3.4%	219	4487	4.9%	452	11376	4.0%
1996	36	5041	0.7%	61	5321	1.1%	97	10362	0.9%
1997	12	1528	0.8%	2	438	0.5%	14	1966	0.7%
1998	1	597	0.2%	0	23	0.0%	1	620	0.2%
1999	0	269	0.0%	0	60	0.0%	0	329	0.0%
2000	1	318	0.3%	0	14	0.0%	1	332	0.3%
2001	6	372	1.6%	0	44	0.0%	6	416	1.4%
2002	8	233	3.4%	7	87	8.0%	15	320	4.7%
2003	3	584	0.5%	3	151	2.0%	6	735	0.8%
2004	2	421	0.5%	0	192	0.0%	2	613	0.3%
2005	3	242	1.2%	0	388	0.0%	3	630	0.5%
2006	1	112	0.9%	2	151	1.3%	3	263	1.1%
2007	7	418	1.7%	2	293	0.7%	9	711	1.3%
2008	0	184	0.0%	0	193	0.0%	0	377	0.0%
2009	0	369	0.0%	7	571	1.2%	7	940	0.7%
2010	15	332	4.5%	6	318	1.9%	21	650	3.2%
Total	1726	90051	1.9%	3016	71871	4.2%	4742	161922	2.9%



Current Status & Next Steps

- December 2012 – preliminary results discussed at various PSC meetings led by Gayle Brown
- January 2012 - Gayle Brown provided results from stocks and tagcodes released by the particular agency and enlisted help from others involved in coordinating tagging for various agencies.
- Update with 2012 results
- Associate results to where and when auto-trailers were used in different programs to try to relate their usage to the pattern of the increasing frequency of the misplaced tags.
- People are thinking the increase may have started right around the time that a certain type of head mold (?) was introduced into the process. The hypothesis is that if the head of a fish didn't fit the mold as required, the injected tag could be misplaced.
- Other Considerations?