

TCDS 8802

June 1988

**PACIFIC SALMON COMMISSION
TECHNICAL COMMITTEE ON DATA SHARING**

REPORT TCDS (88)-2

**REPORT OF THE DATA SHARING COMMITTEE TO THE
STANDING COMMITTEE ON RESEARCH AND STATISTICS
CONCERNING COASTWIDE SALMON CATCH AND
ESCAPEMENT DATA BASES**

June 14, 1988

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EXECUTIVE SUMMARY

During its February 1988 meeting, the Standing Committee on Research and Statistics directed the Data Sharing Committee to investigate and report on the feasibility of establishing coastwide data bases for salmon catch and escapement information. The following materials are reports prepared by the Data Sharing Committee. They identify the various places where catch and escapement information is kept and describe the types of information now available and highlight some obstacles to establishment of coastwide catch and escapement data bases. To summarize:

COASTWIDE CATCH DATA BASE

- o Coastwide catch information for the years 1975-1988, in the form of the catch sample file, is an integral part of the PSC Mark-Recovery data set and will be available to interested persons as readily as the mark-recovery information itself. However, the level of geographic resolution at which that catch information is provided may not be as specific as would be required for determining in- and post-season annex compliance.
- o It appears to be technically feasible to establish a more detailed coastwide catch data system. Commercial and recreational catch information is maintained by all management entities. Subsistence/personal use catch information is not consistently available.
- o The organization and reliability of data collection systems for the U.S. and Canada are readily comparable within categories between nations. However, catch categories show sharp differences. Commercial catch reporting is the best developed, with allocation of catches to areas and times of harvest being one of its most serious shortcomings. Sports catch reporting uses the same methods, with minor exceptions, in both countries, but is considerably less rigorous than commercial catch reporting. Subsistence/personal use catch reporting procedures are the least reliable in both countries, relying, in many cases, on the most casual of observations.
- o If the decision is made to establish a coastwide catch data system, a selection will also have to be made of the years of catch information to be included. The key advantage of a longer time-frame is the insight it could provide into questions of productivity. The key disadvantage is that older data may have been collected in different manners than contemporary data and will usually be less reliable and less comprehensive.

COASTWIDE ESCAPEMENT DATA SYSTEM

- o Because of data problems, it does not appear feasible to establish a coastwide escapement data system. Escapement information is collected and analyzed in a large number of different, sometimes incompatible ways. As a result, escapement information generally is not comparable between regions or countries.
- o The technical community has expressed a great deal of interest in standardizing escapement methodologies. Development of common standards is an important, badly needed undertaking.
- o It would appear to be advisable to establish a common data set of reliable escapement information.

GENERAL COMMENT

- o The Data Sharing Committee is prepared to begin work in either area (catch or escapement). However, due to personnel and other resource limitations, the committee will be able to undertake work in only one area at a time. The easiest system to start on would be the catch data system.

Report of the
Data Sharing Committee
to the
Standing Committee on Research and Statistics
concerning
Salmon Catch Information

June 14, 1988

Canadian Section
Data Sharing Committee
Report on Salmon Catch Information

I. COMMERCIAL CATCH STATISTICS

Methodology Used

The data collection instrument is the sales slip. The methodology used is the census. That is, each time commercial catch is sold, a catch report or sales slip is supposed to be made out and a copy sent to DFO.

Data Collected

For each sales slip (or catch report) received, Canadians record sales slip number, gear used to catch the fish, date of sale, company purchasing the fish, days fished, statistical area of catch, herring location code (for herring slips only), processing plant, processing region, and the Canadian Fishing Vessel (CFV) number of the packer (if any) buying the fish. In addition, for each detail line on the sales slip, Canadians record the CFV number of the catching vessel, species, form (round, dressed head on, etc.), number of fish, weight, and price. Sales slip data are available from 1987 on, and summary data are available in summary form since 1951.

Problems

The principal problems with the data base are the following:

1. The allocation of catch to area is imperfect when the boatload has been obtained from more than one area. It is also incorrect when a vessel has fished in a closed area and the skipper attributes his catch to some open area.
2. The area resolution is not fine enough for stock abundance estimation and other uses.
3. Date of sale is recorded instead of date of catch, which may be different.
4. The days fished statistic is sometimes contaminated when vessels make more than one delivery on the same day.
5. Days fished is the only effort variable collected and, in some fisheries, other variables such as number of traps, or number of diving hours are of greater interest.
6. Sometimes fishers give buyers an incorrect CFV number.

7. Buyers have little direct interest in some variables such as days fished, pieces, gear, and area, and often do not take much care in recording them.
8. The data base is incomplete because sales slips are not always made out.
9. Enforcing compliance with our statistical data needs is difficult because the relevant statute, Section 48 of the Fisheries Act, is weak, and judges are often more sympathetic with the violators than with DFO.
10. The data base is not timely enough for in-season management.

II. RECREATIONAL FISHERY STATISTICS

Methodology Used

1. Mail Surveys

Catch and effort data are collected from a sample of adult licensed B.C. anglers through a continuing mail survey. A diary covering a month of fishing activity is sent to a different group of anglers every half month. A questionnaire covering the previous licence year is sent to a sample of licensed anglers visiting B.C. There is a follow up survey to look at non-compliance.

2. Creel Surveys

Catch, catch per unit effort and biological data are collected during dock or river side interviews with anglers. Effort information is collected during aerial, ground or telephone surveys. A statistically bounded estimate is provided.

3. Patrols

Patrols of the native, recreational and commercial fisheries are conducted by Fishery Officers, Patrolmen and Fishery Guardians periodically. Haphazard samples of recreational catch and effort information may be collected during these patrols. These are unbounded estimates.

4. Head Recovery Program

Salmon implanted with coded wire tags (CWT's) have the adipose fin clipped to indicate the presence of the tag. Anglers are asked to deliver the heads of adipose fin-clipped salmon to head recovery depots along the B.C. coast. The CWT's are extracted and deciphered.

Data Collected

1. Catch

The following data are usually collected: species, number of fish retained, time period that catch occurred, statistical area or location of catch. The following information may also be collected: the number of fish released and the number of marked fish observed.

2. Effort

The following data are usually collected: time period, statistical area or location, the amount of effort (angler days, boat days, rods). The following information may also be collected: type of fishing effort (from boats, shore, pier, bar or diving), use of guides, target species, angler information (residence, demographics), trip duration.

3. Biological Data

The following information may be collected: length, sex, age (from scales or bones), stock (from CWT).

Problems

The principal problems with the Recreational Fishery statistics are as follows:

1. The small amount of catch and effort data in some time-area blocks results in estimates with very large confidence intervals.
2. Biases may be associated with some of the surveys that result in over or underestimating the catch and effort. The effect of these biases can be difficult to measure.
3. Self-administered surveys (mail questionnaires, logbooks) may be filled out inaccurately and incompletely.
4. Little freshwater recreational salmon fishery information is collected.
5. There is no organized data collection system in some areas of the coast. The resultant estimates of catch and effort may be inaccurate.

III. INDIAN FOOD FISHERY STATISTICS

Methodology Used

Estimates of Indian food fishery catch are based on data collected by Fishery Officers or supplied by band members. Catch and effort data are collected during interviews or through direct observation of a fishery. The sampling intensity varies from complete coverage of a limited fishery to no coverage. Generally, there is no organized data collection system with the exception of the Fraser River system and the Somass River fisheries. Catch and catch per unit effort data from these fisheries are collected by Department or contract personnel from a sample of nets and interviews (Fraser) or unloading boats (Somass). Total effort information is collected during ground, boat or aerial surveys.

Data Collected

1. Catch

When gathered, the species, number of fish and statistical area of catch are recorded. The following information may also be collected: band catching the fish, time period that catch occurred and location of catch. Biological data including species, number, sex, length, marks, and scales are collected during the Somass River fishery.

2. Effort

The type of gear and statistical area is usually collected. The following information may also be collected: amount of gear used, band using the gear, time period that gear was used, location.

Problems

The principal problems with the Indian Food Fishery statistics are as follows:

1. There is no organized data collection system in many areas of the coast. The resultant estimates of catch and effort may be inaccurate.
2. Data are often missing. Generally species and number of fish are collected but for some years and areas there is no information available.
3. The estimates are subject to bias.

IV. IN-SEASON TROLL CATCH MONITORING PROGRAM

The In-Season Catch Monitoring Program is designed to provide accurate and reliable estimates of troll caught salmonids on a weekly basis during the fishing season. These estimates of catch by species and catch region are provided to fisheries managers. This allows them to assess catches vis a vis quotas and consequently, appropriate management actions can be taken.

The basic components of the program rely on the accurate acquisition of vital fisheries information. The two necessary data components are: daily catch per unit of effort (CPUE), and daily total effort. These two estimates are used to derive the Independent Catch Estimate by species and catch region. The to-date sales slip totals are used later in the season to adjust the independent estimate. This adjustment is done to reduce the inherent bias of the Independent Catch Estimate and is called the Combined Catch Estimate. After the season closes, only the Sales Slip Catch Estimate is reported. This estimate is calculated by converting the total landed weight to-date into "pieces", using sampled average weights by species and catch region.

Daily CPUE estimates are derived from interviews of fishermen as they land their catch. Overflights by both Department of National Defence and chartered aircraft are used to count boats fishing. This overflight information is used to generate estimates of total effort. To augment this procedure, radar is used in some areas (SW Vancouver Island for example) to also count vessels. This allows calibration of total effort estimates derived solely from the overflight information.

All data are entered into computers. Estimates and adjustments are made according to prescribed algorithms. Interpolation techniques are used to estimate missing information for those dates that do not have sampled information.

The catch estimate is published weekly (see attachments 1 and 2) and distributed to all troll fishery management biologists and other interested parties. The local responsible managers have the option to modify these catch estimates based on additional information that they may have. These modified estimates are then published and distributed as a "Notice to Industry". When the catch estimate is approaching the quota, daily estimates are produced and distributed to staff and the fishing industry.

Attachment 1
PRELIMINARY CATCH ESTIMATES (ISCMP)

(SALMON SERVICES UNIT)
V. Palermo (666-6592)
JULY 29, 1987

BULLETIN #3

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ALL CATCH STATISTICS UP TO THE WEEK ENDING JULY 25 (STAT WEEK 7-4).
TOTALS ARE ROUNDED TO NEAREST 100 FISH. THESE ESTIMATES ARE MADE
FROM TOTAL GEAR COUNTS AND SAMPLED CPUE FROM DOCKSIDE. NO SALES SLIP
INFORMATION IS INCLUDED.

	WEEK 7-1	WEEK 7-2	WEEK 7-3	WEEK 7-4	TOTAL
CHINOOK					
NORTH (1)	6000	14000	11100	15500	46600
CENTRAL (2)	8200	5000	5500	4500	23200
TOTAL NTH	14200	19000	16600	20000	69800
SWVI (3)	109400	52600	23000	31000	216000
NWVI (4)	9500	12500	8300	13600	43900
TOTAL WCVI	118900	65100	31300	44600	259900
GEO ST (5)	11600	5000	3700	3500	23800
TOTAL BC	144700	89100	51600	68100	353500
COHO					
NORTH (1)	43400	114400	66600	87400	311800
CENTRAL (2)	35600	17100	15300	13000	81000
TOTAL NTH	79000	131500	81900	100400	392800
SWVI (3)	241900	188100	67800	89700	587500
NWVI (4)	24600	42500	40400	101300	208800
TOTAL WCVI	266500	230600	108200	191000	796300
GEO ST (5)	28100	20400	29400	26700	104600
TOTAL BC	373600	382500	219500	318100	1293700
PINK					
NORTH (1)	91900	260800	228100	130600	711400
CENTRAL (2)	2200	1800	5200	8300	17500
TOTAL NTH	94100	262600	233300	138900	728900
SCKEYE					
NORTH (1)	1800	6600	4600	2400	15400
CENTRAL (2)	0	0	600	1700	2300
TOTAL NTH	1800	6600	5200	4100	17700
CHUM					
NORTH (1)	1000	2700	2800	2200	8700
CENTRAL (2)	100	100	200	600	1000
TOTAL NTH	1100	2800	3000	2800	9700
NWVI (4)	800	1400	700	600	3500
TOTAL	3000	7000	6700	6200	22900

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NOTES (1): STAT AREAS 1 TO 5 (2): STAT AREAS 6 TO 11 AND 30
(3): STAT AREAS 21 TO 24 (4): STAT AREAS 25 TO 27
(5): STAT AREAS 13 TO 18 AND 29

*****NOTE***** THIS BULLETIN IS NOT FOR GENERAL DISTRIBUTION

AUG 7/87

☒ SALMON☐ ROE HERRING☐ FOOD HERRING☐ GROUND FISH☐ SHELL FISH☐ OTHER

TROLL NOTICE TO INDUSTRY

TROLL SALMON CATCHES (BASED ON ESTIMATES ONLY)

W.C.V.I. TO W/E AUG 1/87

CHINOOK TOTAL CATCH TO DATE IS 304,000. THE COMPARABLE CATCH IN 1986 WAS 211,300. CHINOOK CATCHES CONTINUE ABOVE THE RED LINE VALUE FOR THIS PERIOD OF 264,600. ALL CLOSURES REMAIN IN EFFECT.

COHO TOTAL CATCH TO DATE IS 1,056,900 WHICH IS NEAR RECENT YEARS AVERAGE CATCH FOR THIS PERIOD.

CHUM CATCH TO DATE IS LOW AND ESTIMATED TO BE 4,300 PIECES.

STRAIT OF GEORGIA TO W/E AUG 1/87

CHINOOK TOTAL CATCH TO DATE IS 26,500. THE COMPARABLE CATCH IN 1986 WAS 41,800.

COHO TOTAL CATCH TO DATE IS 118,100. THE COMPARABLE CATCH IN 1986 WAS 114,300.

NORTH COAST TO AUG 4/87

CHINOOK TOTAL CATCH TO DATE IS 115,000. THIS CATCH IS ABOVE THE IDEAL CATCH OF 90,000 FOR THIS DATE, BUT BELOW THE REDLINE VALUE OF 139,000.

COHO TOTAL CATCH TO DATE IS 450,000.

PINK TOTAL CATCH TO DATE IN THE TREATY AREA IS 340,000. AN ANNOUNCEMENT WAS MADE JULY 29 OF TROLL PINK NON-RETENTION IN SUB-AREAS 101-4, 101-8 AND THOSE PORTIONS OF 101-3 AND 103 NORTH OF 54 DEGREES, 37' NORTH LATITUDE EFFECTIVE MIDNIGHT FRI JULY 31. THE PINK TROLL CATCH TAKEN SOUTH OF LANGARA ISLAND ON THE WEST COAST IS NOT INCLUDED IN THE AREA 1 PINK CATCH CEILINGS (THIS CATCH TOTALS 812,000 TO AUG 4).

DFO OPRNS CNTR OC 253

AUG 7/87

V. ESTIMATED WEEKLY NET CATCHES

Over the years, a variety of procedures have been developed to obtain daily and weekly catch and effort data for management of B.C. net fisheries.

In general, they involve a combination of counting the number of boats fishing per statistical area and estimating the average catch per boat day or per boat week. Fishery officers have the lead responsibility for this in most areas, but are assisted or replaced by biological staff in a few fisheries. The major biological input is in fisheries where Fraser River sockeye and pink salmon are harvested.

The procedure used by fishery officers involves a gear count by chartered aircraft and patrol vessels at the start of each fishery, followed by daily interviews with fishermen on the grounds to get CPUE information. In some areas, where most of the catch is sold each day or at the end of a two or three day fishery, officers are able to get sales slip information immediately and it is used in the weekly estimate. In other areas, where vessels are coming and going constantly, sales slip data are impossible to retrieve quickly and fisheries managers have to rely more on the "hail" figures, or on verbal information collected by weekly telephone calls to the major fish buying companies.

Since the Pacific Salmon Treaty was signed in 1985, international and domestic catch allocation has increased the responsibilities of salmon management staff, and more effort has been necessary to meet the allocation targets. Pacific Salmon Commission staff had a satisfactory system in place when working for the International Pacific Salmon Fisheries Commission and they have continued to use it. It involves regular telephone calls to the major buyers to get sockeye and pink landings in Convention waters. These figures are then expanded to allow for the landings not covered by the telephone survey.

In Johnstone Strait, D.F.O. biological staff administer a project to get timely catch statistics from the net fisheries targeting on Fraser River pinks and sockeye. Sales slips are collected from landing sites in Port Hardy, Alert Bay, and Campbell River, and an estimate of fish delivered to Vancouver is added. This is all done during the same week as the fish are caught, and the information is available at each in-season Friday meeting of the Fraser Panel.

At the end of each fishing week, the estimated catch figures are transferred from micro computers in the field to the Regional VAX computer in Vancouver, where a printed summary of the catch for the week and total to date is produced (see attachment 3).

Attachment 3

24-SEP-87 10:08:26

FISHERIES SERVICE, PACIFIC REGION
OPERATIONS CENTREEstimated Weekly Net Catches Based on Available
Deliveries as Reported by Fisheries Officers
For Week Ending AUG 15, 1987ABBREVIATIONS:
GN Gillnets
SN Seines
TFW Total for Week

STATISTICAL AREAS:

1. Masset	2E. E. Queen Charlottes	2W. W. Queen Charlottes	3. Nass River	4. Skeena River	5. Grenville/Principe
6. Butedale	7. Bella Bella	8. Bella Coola	9. Rivers Inlet	10. Smith Inlet	11. Seymour/Belize
12. Alert Bay	13. Quathiasi	14. Comox	15. Westview	16. Pender Harbour	17. Nanaimo Harbour
18. Cowichan	20. Victoria	21. Swiftsure	22. Nitinat	23. Barkley Sound	24. Clayoquot
25. Nootka Sound	26. Kyuquot	27. Quatsino	29. Fraser River		

AREA	GEAR COUNT	1987	SOCKEYE 1983	1982	COHO 1987	1984	PINK 1987	1985	CHUM 1987	1983	CHINOOK 1987 (JACKS*)	1983
01 GN - TFW 1D + 2D	0	-	53	-	-	7	-	-	-	50	-(-)	-
- TTD 8D		-	1069	620	-	172	-	4	-	356	-(-)	26
SN - TFW 1D + 2D	3	3750	6596	-	1090	1528	25450	22154	410	125	510(-)	319
- TTD 8D		38468	24988	58092	10626	5488	101831	217939	1527	1750	3008(-)	1290
TTD ALL GEAR		38468	26057	58712	10626	5660	101831	217943	1527	2106	3008(-)	1316
2W GN - TTD 3D		-	5	660	-	7	-	-	-	34	-(-)	3
SN - TTD 3D		1081	200672	9304	725	6115	851	17550	401	6396	1456(-)	3705
TTD ALL GEAR		1081	200677	9964	725	6122	851	17550	401	6430	1456(-)	3708
03 GN - TFW 2D + 1D	46	8271	14851	7820	1620	5430	25816	11159	2353	6429	93(-)	112
- TTD 15D		42291	100247	250033	3467	15547	156111	169520	7128	39040	515 240	1318
SN - TFW 2D + 1D	70	18674	35515	17550	3486	6007	449503	672966	25170	8163	982(-)	1461
- TTD 14D		204145	331306	388013	16827	38256	3385183	2409576	112654	105565	15745(-)	13359
TTD ALL GEAR		246436	431553	638046	20294	53803	3541294	2579096	119782	144605	16260 240	14677
04 GN - TFW 2D + 1D	255	36577	49889	61231	2368	8579	280527	293447	2619	4349	212 41	399
- TTD 13D		438751	269677	1311358	10186	29068	1462219	812655	15123	19397	3892 1534	3431
SN - TFW 2D + 1D	5	8505	-	-	635	-	150355	156987	2052	-	295(-)	-
- TTD 5D		47945	-	379051	1617	9638	326545	748790	3506	-	1490 1150	-
TTD ALL GEAR		486696	269677	1690409	11803	38706	1788764	1561445	18629	19397	5382 2684	3431
05 GN - TFW 2D + 1D	14	565	814	1076	122	2128	1865	1633	591	1889	- 2	16
- TTD 11D		9113	8335	33073	1382	5841	11794	13642	4175	13096	67 10	204
SN - TFW 2D + 1D	19	5852	43	-	910	3293	275237	104112	2600	51	57(-)	24
- TTD 10D		26283	3248	35675	2721	9703	480346	282916	6815	1286	323 2	120
TTD ALL GEAR		35396	11583	68748	4103	15544	492140	296558	10990	14382	390 12	324

AREA	GEAR COUNT	SCKEYE			COHO		PINK		CHUM		CHINOOK		
		1987	1983	1982	1987	1984	1987	1985	1987	1983	1987(JACKS*)	1983	
06 GN - TFW 2D	44	1677	1183	3410	1295	1198	8092	7476	8693	2139	68	5	36
- TTD 8D		6431	5711	5302	2505	1198	22031	16016	16227	5826	83	11	91
SN - TFW 2D	40	5393	9845	8335	7474	7330	144044	510708	16259	11367	300	516	1346
- TTD 8D		57648	54693	62740	35796	7346	909984	1118397	110740	47107	1857	1755	7495
TTD ALL GEAR		64079	60404	68042	38301	8544	932015	1134413	126967	52933	1940	1766	7586
07 GN - TFW 2D	11	75	-	1107	264	984	422	3941	3201	-	4(-)	-
- TTD 10D		2612	1811	9414	1027	1074	6897	10033	9718	4063	13(-)	117
SN - TFW 2D	32	1855	-	14465	2407	3572	45322	176734	28133	-	107(-)	-
- TTD 9D		12323	12881	118384	10551	4046	176895	220750	116097	7310	380	3	2535
TTD ALL GEAR		14935	14692	127798	11578	5120	183792	230783	125815	11373	393	3	2652
08 GN - TFW 2D	144	1268	1113	3214	998	1622	8732	21793	30230	45396	118	16	258
- TTD 17D		89885	43461	21183	5290	5997	65275	97066	240256	164478	1750	139	2701
SN - TFW 2D	13	432	547	-	333	1043	11296	398202	8573	8214	12	2	349
- TTD 12D		132440	39016	12993	14131	3929	274859	963164	248250	56161	1722	952	5915
TTD ALL GEAR		222325	82477	34176	19421	9926	340134	1060230	488506	220639	3472	1091	8616
09 GN - TFW 2D	47	4872	1284	1461	269	1638	12418	18234	2866	265	44	7	47
- TTD 14D		410788	35135	38469	3583	5831	97749	53239	25179	4464	1818	698	767
10 GN - TTD 11D		162005	131193	292417	2648	1494	5260	6323	2631	2481	1116	310	1563
11 GN - TFW 2D/14H	68	23076	1698	2231	1046	488	8264	906	1304	134	144	5	36
- TTD 5D/ 4H		57124	39061	15147	2199	1027	18468	11352	2810	4463	390	14	367
12 GN - TFW 1D/14H + 1D/14H	428	87481	36565	48139	5123	5605	30290	26117	1917	1255	575	20	656
- TTD 5D/ 4H		162971	101641	93519	7289	14331	61324	47451	3338	3564	1273	53	1615
SN - TFW 1D + 1D	135	328182	382074	357406	3198	17538	187847	377412	5897	3953	1436	165	5133
- TTD 3D		418209	763423	498113	6537	46794	273843	650574	6867	10760	2697	307	14523
TTD ALL GEAR		581180	865064	591632	13826	61125	335167	698025	10205	14324	3970	360	16138
13 GN - TFW 1D/14H + 1D/14H	14	6986	5027	5645	155	767	1099	635	37	34	66(-)	63
- TTD 5D/ 4H		10239	15124	10348	227	1709	2388	1043	60	74	92	5	479
SN - TFW 1D + 1D	43	110927	127240	129796	765	2582	69836	80252	346	553	419(-)	1142
- TTD 3D		157407	302918	180519	1474	9348	120108	105715	720	1188	981	16	6027
TTD ALL GEAR		167646	318042	190867	1701	11057	122496	106758	780	1262	1073	21	6506
16 GN - TFW 1D + 1D	41	4129	11353	3026	621	10	352	1210	-	1031	9(-)	140
- TTD 2D		4129	16211	3200	621	221	352	1367	-	1032	9(-)	251
SN - TFW 1D + 1D	18	23478	98680	4910	1844	330	2863	3540	-	23	262	326	1469
- TTD 2D		23478	125957	7226	1844	3360	2863	4209	-	54	262	326	2362

AREA	GEAR COUNT	1987	SCKEYE		COHO		PINK		CHUM		CHINOOK	
			1983	1982	1987	1984	1987	1985	1987	1983	1987(JACKS*)	1983
20 GN - TFW 0D/12H + 0D/12H	95	26350	541	50740	7120	1754	7258	9053	-	2	123(-)	37
- TTD 1D		26350	10522	69734	7120	4614	7258	13116	-	10	123(-)	280
SN - TFW 0D/12H + 0D/12H	123	187880	-	354235	85400	9926	158840	105339	-	-	212	4000
- TTD 1D		187880	-	354235	85400	26032	158840	139834	-	-	212	4000
TTD ALL GEAR		214230	10522	423969	92520	30646	166098	152950	-	10	335	4000
23 GN - TFW 0D/12H	79	9580	-	-	-	229	-	25	-	-	-(-)	-
- TTD 1D/12H		15523	313901	222852	-	6427	-	279	-	4	-(-)	2892
SN - TTD 0D/ 8H		234000	603827	246673	-	859	-	187	-	277	-(-)	2923
TTD ALL GEAR		249523	917728	469525	-	7286	-	466	-	281	-(-)	5815
29 GN - TFW 1D	627	163137	1646	108156	87	505	1438	236	-	1	2094	39
- TTD 2D		290748	168186	135292	267	1148	2436	912	21	11	3616	96
TOTAL TO DATE GILLNETS		1728960	1261290	2512621	47811	95706	1919562	1254018	326666	262393	14757	3110
TOTAL TO DATE SEINES		1541307	2462929	2351018	188249	170914	6212148	6879601	607577	237854	30133	8511
TOTAL TO DATE ALL GEAR		3270267	3724219	4863639	236060	266620	8131710	8133619	934243	500247	44890	11621

*Jacks not included in Chinook catches

United States Section
Data Sharing Committee
Report on Salmon Catch Information

I. INTRODUCTION

A. Commercial Catch Data

There are three primary authoritative sources of commercial salmon catch information north of California; the states of Alaska, Washington and Oregon, and two secondary authoritative sources; the Northwest Indian Fish Commission, and the Pacific Marine Fisheries Commission. Additional knowledgeable sources of commercial catch data are the Pacific Fisheries Management Council, and the Columbia River Inter-Tribal Fish Commission (see References for names and addresses).

In all cases, the basis for the commercial catch data consists of some form of first buyer's sales slip (fish ticket) which contains the basic information on statistical area (port) of landing, gear, species, pounds, numbers, unit price per species or total amount paid (landed value), and in some cases grade or size. The original observation on the quantity of each species landed is the weight, since this is the basic unit of commerce. The numbers of each species landed may, or may not, be an original observation, depending on the fishery and the buyer. In the most common case, the number of each species is derived by dividing the weight landed by the average weight of an individual fish of that species. The average weight of the individual may be derived from professionally designed dock sampling programs, or from some less formal procedure.

Final catch data are available within two to six months after the close of the fisheries. For the major salmon fisheries, the schedules of availability of final catch data vary from late fall of the catch year (Alaska, except winter troll) to June of the following year (Washington and Oregon). During the season, each agency keeps a running tally of catch by species and area for harvest management purposes with that of Washington State being the most thorough and readily accessible.

B. Sports Catch Data

Sports catch data are obtained from information supplied by the harvesters. These are supplemented by direct observations collected by the agency during dock sampling (creel census). The harvesters mail in tallies of the number chinook and coho by area at the end of the year (punch cards), or post-season mail surveys of a portion of the state licensed sports harvesters are conducted. In the case of Alaska, an unbiased, statistically bounded estimate of sports harvest by species is produced. In Washington and Oregon, the precision of each estimate of sports harvest is not known; however, the biased estimates produced from punch cards are corrected to improve accuracy.

C. Subsistence, Ceremonial and Personal Use Catch Data

Non-commercial, non-sports harvests are reported by the harvesters in statements which are filed prior to the harvests in order to obtain permits, collected by government observers during the harvest, and reported by the harvesters after the season. All areas have harvests of this type, and each jurisdiction has a different means of attempting to measure the harvests.

In the text which follows, the methods of collection of the three types of catch data - commercial, sports, and subsistence, are discussed by source, working from north to south.

II. COMMERCIAL CATCH DATA

A. Commercial Catches in Southeast Alaska

First buyers report to the Alaska Department of Fish and Game by means of state designed fish tickets. The basic observation is the weight landed; however, the processor may also count the fish or calculate the number based on average weight, depending on the volume processed. The Department of Fish and Game editor of the fish tickets resides in the local area office where data entry occurs. In addition to weight and numbers landed, the fish ticket contains the fishery (species-gear-locality), the permit number, the processors code, the delivery date, the statistical area in which the catch occurred, and for each species, the unit price, and the total amount paid.

The means of independent verification of the catch data varies according to the fishery. In the troll fisheries, trained observers work aboard selected vessels, and the catches are also subject to port sampling. In the net fisheries, port samplers collect information on the age and size of chinook, coho, sockeye, and chum salmon. For all commercial fisheries, the local staff reviews the fish ticket information prior to, during and after data entry. Unusual observations are challenged, investigated, and corrected if necessary.

The catch records are available in 5.25" MS-DOS format. There are about 110,000 fish tickets each year, and the annual storage requirement is 12.5M. The information available to the public includes the species, gear, locality, number caught, weight landed, and the value of the ticket. Information on the harvest histories of individual harvesters is restricted.

B. Metlakatla Indian Reservation Catches

The Metlakatlas conduct their own fisheries separate from those of the State of Alaska in the waters adjacent to Annette Island, south of Ketchikan, Alaska. The tribe keeps catch records and fish ticket information is provided to ADF&G, generally after the fishing season is over.

C. Commercial Catches in Washington

Two systems of commercial catch recording are used, one for in-season harvest management based on aggregated catch by a gear type for a date and area (the auxiliary system), and a historical data base containing the catch of individuals within a gear type. Sales receipts executed by the state licensed processor at the point of landing are the basis for Washington's historical commercial catch data base. Processors pay according to weight (round or dressed) for each species; however, the number caught, the price per pound, the gear, area, date landed and fisherman's identification number are also recorded. Processors are required by law to record the number of fish landed. Separate tickets with the same type of information are filled out for treaty and non-treaty fishermen. Tickets are mailed to Olympia, or to the Northwest Indian Fisheries Commission, where they are edited, with errors in coding the area, species and number often being detectable.

Washington has the means for independent verification of catch reporting. Errors in catch reporting are detectable by the port samplers who work with the commercial processors during the course of sampling for coded wire tags and genetic stock identification; however, no programs now exist to cross check landings sampled by port samplers against their respective fish tickets.

The in-season management data system is based on reports from port samplers who collect and total fish ticket information at the point of landing from the land based processors and floating tenders, and then telephone or fax aggregated catch information to Olympia. The information gives numbers of each species caught by gear type, area, tribe, or non-treaty. The data are updated one to three times a day August through November and may be accessed through the University of Washington computer system.

After preliminary editing, the commercial catch data are prepared for publication by running checks for outsize fish, and proper species by time and area. Most recent finalized reports are 1985 for commercial, and 1986 for sports.

Two historical computer data bases exist for treaty and non-treaty catches. The Tribal Fish Ticket (TFT) data base covers 1972 to present. Tapes are available for each year with approximately 100,000 records per year, at 119 bytes/record. The Historical Catch and Landing System (HCLS) data base provides daily catch by species back to 1952 in two editions, 1952 - present, and 1975 - present. Catch data for Washington State are summarized in a convenient format for retrieval on the CIRS, the Computer Information Retrieval System.

D. Washington Treaty Indian Commercial Catches

All Treaty Indian fish tickets, except for the Quinaults, are edited at the Northwest Indian Fish Commission by tribal representatives prior to being sent to the Washington Department of Fisheries for entry

into a unified data base. After data entry, WDF sends NWIFC a reconciliation report to provide for a final check on the data.

E. Oregon Commercial Catches

Commercial salmon catches in Oregon are reported and recorded in a manner similar to, and closely coordinated with, the State of Washington. More information is available under the Pacific Marine Fisheries Commission and the Pacific Fisheries Management Council.

F. Pacific Marine Fisheries Commission

Under the Pacific Fisheries Information Network (PacFIN), the PMFC has been working to establish a southern United States coastwide commercial salmon catch data base with limited success. The process does not produce data which are applicable to in-season management, and the post-season compilations have been slow to occur. No technical impediments exist; however, substantial administrative problems remain. There are also design issues such as correspondence between areas of catch for sports and commercial harvests.

The process at PMFC consists of receiving commercial salmon data from Oregon, Washington and California by Treaty and non-Treaty on the port, gear, area, species, pounds, and numbers. The value and grade or size are also reported, if available. There is a regular schedule of updates, coinciding with the groundfish schedule for PacFIN. California has submitted catches for 1981-85 but a problem exists with the algorithm which converts pounds to numbers of fish. Washington has submitted 1981-1987 but 1987 is still preliminary. The Washington data feed for each calendar year occurs in the following January; however, the data are not finalized until the following June. In Washington, some Treaty Indian records do not contain ex-vessel value. The catches of Oregon for 1981-1986 are on file.

G. Pacific Fishery Management Council

Under frameworked management plans for the ocean salmon fisheries (3-200 nautical miles) off Washington, Oregon and California, the Council compiles and publishes both commercial and recreational catch and effort estimates originating in the management entities.

III. SPORTS CATCH DATA

A. Sports Catches in Southeast Alaska

Sports catch data are collected by two methods, mail survey and creel census. The creel censuses are conducted in marine and freshwater. The freshwater surveys are conducted during the summer season in the Haines, Yakutat, Juneau Road System, Ketchikan, and Sitka. The marine area surveys in the Haines, Wrangell and Petersburg Areas focus on the spring season of April through early July, and the more populous areas of Juneau, Sitka, and Ketchikan receive marine survey effort in both spring and summer, April through August. Samples are taken for estimation of total sports catch, and snouts of adipose clipped fish are taken.

The mail survey is based on a random sample of 12,000 individuals (for the entire state) from the computerized sports fish license data. The surveys are tailored prior to mailing to the general geographic localities of the recipients, Yakutat, Haines-Skagway, Juneau, Sitka, Petersburg-Wrangell, and Ketchikan-Prince of Wales Island, so that finer scale locality information can be solicited. For example, the Sitka area recipient would be asked specifically if he or she fished Sitka Sound, Silver Bay, or other specific locations, and then the recipient would also be asked to specify other areas fished. The basic responses on catch and effort by species and locality are expanded to produce statistically bounded estimates of the total harvest for an area. The rate of response to the surveys is quite high due to a vigorous follow-up program which periodically reminds people who are slow to respond. The program has the capability to produce very fine geographic scale estimates; however, in practice estimates are limited to those areas which contain a sample size sufficient to produce a harvest estimate for a species which is within an arbitrary level of precision.

The sports catch reporting areas are different from the commercial catch reporting areas in southeastern Alaska. However, the estimates of sports catch are made for small enough areas that commercial and sports catches could be combined with little or no loss of spatial resolution. Commercial catch areas need to be more finely subdivided than those of sports fisheries, since sports fisheries are closely tied to a few widely scattered population centers, whereas commercial fisheries operate throughout southeastern Alaska.

B. Washington Sports Catch Reporting

From the late 1930's to 1964, there was a survey of "boat houses", rental facilities for boats and motors for sports salmon fishing on Puget Sound. During the 1950's, the number of privately owned boats and motors increased and the boat house survey was replaced with the punch card in 1964. The Washington Department of Fisheries considers there to be a "20% operational bias" in the estimates from the punch cards, since it is hypothesized that the better harvesters are more likely to turn in

their cards than are the harvesters who strike out so that sports catch per unit effort is overestimated. A study is jointly being conducted by WDF and the Northwest Indian Fisheries Commission to estimate the bias in punch card catch estimates.

The historical sport catch data base is electronically available from Dave Pratt, WDF, Olympia. Salt and freshwater catches are recorded by the punch card system. In addition, there are samplers in all areas, except that there are fewer in freshwater due to the greater dispersal of harvesters relative to the marine areas. Harvesters are more concentrated in marine areas, so that a larger number of fish can be sampled by a smaller number of people. At Buoy 10 (Ilwaco area) on the Columbia River, there is a special program set up to augment the punchcard data by sampling the catch and estimating the total sports harvest by species. The annual Washington State Sport Catch Report summarizes the information by area, river, residence, and distribution.

Ocean sports catch reporting areas have exactly the same boundaries as the commercial fishery. The regulation of the PFMC agreed quota on the ocean sports fishery requires managing the quota by port to take away the incentive for misreporting by area which would otherwise exist. In the case of ocean catches, a port of landing is functionally equivalent to a statistical area of catch. The sport catches from the Strait of Juan de Fuca and interior Puget Sound can be referred to major commercial catch areas such as Sekiu (area 5) and Hood Canal (area 12); however, there is a loss of spatial resolution, since these Puget Sound commercial catch areas are more finely subdivided than are the sports areas.

In both the ocean sports and troll fisheries, samplers interview vessels, count the fish, and sample for coded wire tags, CWT. Only the poundages may be considered absolutely accurate in the case of commercial harvests, although legislation does exist to penalize those processors whose fish tickets have an obvious lack of correspondence between poundage and numbers by species. There is not any manpower available to cross check the vessel interview information with the fish tickets from the vessels, but this does present the opportunity for such a validation study if resources became available.

C. Oregon Sports Catch Reporting

Sports salmon catches in Oregon are reported and recorded in a manner similar to, and closely coordinated with, the State of Washington. More information is available under the Pacific Marine Fisheries Commission and the Pacific Fisheries Management Council.

IV. UNRECORDED SALES

Where fisheries lie in close proximity to urban areas, opportunities exist for the commercial harvester not to report cash sales as required by law. There may also be instances where fish harvested by recreational harvesters are sold, and there are no records

of these illegal transactions. Law enforcement programs are vigilant for such violations; however, when violators are apprehended, the data may not enter the catch reporting system. Survey techniques have been applied in other, less well documented commercial fisheries, e.g. Maryland blue crab, to estimate the magnitude of these removals. No one among the parties to the Pacific Salmon Treaty is currently doing anything to estimate this kind of removal.

V. NON-COMMERCIAL, NON-SPORT CATCHES

Salmon harvests are taken for the purposes of human consumption, food for domestic animals, religious ceremonies, and barter. In some cases there are records of this harvest; however, the percent of the harvest retained by members of the commercial fleets for personal use, for gifts and for barter is unknown. As a class, the subsistence, ceremonial and personal use fisheries appear to be the most poorly documented of salmon fisheries, although sports fisheries in some areas would be very strong competitors for this distinction.

A. Alaskan Subsistence Catches

Both native and non-native residents can harvest salmon under a subsistence permit. The permit is the mechanism to record the harvests, since the permit is issued for a specific number of fish of each species, as specified by the applicant. The data commonly available would be the number of fish by species and the location of harvest. Harvests are generally in or near terminal areas outside of urban areas, so that subsistence data could be combined with commercial catch data without loss of spatial resolution. The advisability of combining subsistence catch data with commercial catch data is a matter for a technical committee to consider. Means of verification of these harvest levels are unknown. Subsistence laws are hotly contested in Alaska, so that any generalization which could be made here would soon be outdated.

B. Puget Sound and Coastal Ceremonial and Subsistence Catches

By provision of federal law, each Washington Treaty tribe informs the State of Washington of the number of each species of salmon and steelhead that it intends to harvest each season. Totals of these subsistence and ceremonial harvest levels are maintained by the Washington Department of Fisheries. Localities of harvest could be very broad, so that some loss of spatial resolution could occur when combining subsistence data with commercial catch data. The advisability of combining subsistence catch data with commercial catch data is a matter for a technical committee to consider. Means of verification of these harvest levels vary.

C. Washington State Personal Use

Commercial harvesters who are fishing under state license who retain a portion of the catch for personal use are required by law to

report the number of each species so used. Programs to systematically determine compliance are not in place.

D. Columbia River Treaty Ceremonial and Subsistence

The overall number of each species in the Columbia River subsistence harvest is set by the terms of the Columbia River Fish Management Plan to be proportional to run strength above some minimum number. This entitlement is apportioned among the tribal governments for distribution to tribal members. Actual levels of catches are surveyed in the field by tribal fisheries programs, and by the Oregon Department of Fish and Wildlife and the Washington Department of Fisheries. The Technical Advisory Committee, composed of states and tribes, has provided statistically designed programs for the verification of levels of harvest in selected areas which were thought to warrant special attention; however, no systematic program of verification exists. Loss of spatial resolution is probable when combining this category with sports and commercial harvest data, since localities are only approximate. The advisability of combining subsistence catch data with commercial catch data is a matter for a technical committee to consider.

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ALASKA

Mike Bethers, Area Management Biologist
Creel census supervisor
Sports Fish Division, Region I
Alaska Department of Fish and Game
P.O. Box 20
Douglas, AK 99824
907-465-4270

Alan Bingham, Biometrician II
Creel census statistician
Alaska Department of Fish and Game
Sports Fish Division Region II
333 Raspberry Road
Anchorage, AK 99502
907-267-2327

Carmine DiCostanzo, Head
Computer Services
Division of Commercial Fisheries
Alaska Department of Fish and Game
P.O. Box 3-2000
Juneau AK 99802
907-465-4210

Mike Mills, Biometrician III
Chief of research
Alaska Department of Fish and Game
Sports Fish Division, Region II
333 Raspberry Road
Anchorage, AK 99502
907-267-2369

Gary Morishima
3010 - 77th S.E., Suite 104
Mercer Island, WA 98040
206-236-1406

Gary Sanders, Regional Research Supervisor
Division of Sports Fisheries
Alaska Department of Fish and Game
P.O. Box 20
Douglas, AK 99824
907-465-4270

Paul Suchanek, Fisheries Biologist II
Creel census project leader
Sports Fish Division, Region I
P.O. Box 20
Douglas, AK 99824
907-465-4270

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WASHINGTON

Dennis Austin, Head
Harvest Management
Washington Department of Fisheries
Olympia, WA 98504
206-753-6614

Theresa Clocksin
Puget Sound Net Harvest Management
Washington Department of Fisheries
Olympia, WA 98504

Lonnie Crumley
Project Leader for Salmon Sampling Puget Sound
Washington Department of Fisheries
Olympia, WA 98504
753-6592

Dick Geist
Puget Sound Sports Harvests
Washington Department of Fisheries
Olympia, WA 98504
206-753-6628

Lee Hoines and Dale Ward
Washington State Sport Report
Washington Department of Fisheries
Olympia, WA 98504

Lt. Larry Johnson, Fisheries Patrol Officer
Washington Department of Fisheries
Olympia, WA 98504
206-753-4852

Susan Markey, Research analyst
Auxiliary Fisheries Catch Reporting System
Washington Department of Fisheries
Olympia, WA 98504
206-753-6637

Mike Messenger
Data Processing
Northwest Indian Fish Commission
6730 Martin Way East
Olympia, WA 98506

Dick O'Connor
Data Processing
Washington Department of Fisheries
Tumwater, WA 98504
206-586-2130

Bonnie Ponwith
Ocean Sampling Project Leader
Harvest Management Division
Washington Department of Fisheries
Olympia, WA 98504

Mike Sackett and Peter Sweet
Data processing correspondents for PMFC
Washington Department of Fisheries
Olympia, WA 98504
206-753-2540

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WASHINGTON-OREGON

Will Daspit
Pacific Marine Fisheries Commission
C/O National Marine Fisheries Service
F/NWC(OFIS)
7600 Sand Point WAY NE
Seattle, WA 98115
206-526-4072

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OREGON

Dave Judkins
Data processing correspondent for PMFC
Oregon Department of Fish and Wildlife
500 SW Mill St
Portland, OR
503-229-5505

Burnie Bohn
Oregon Department of Fish and Wildlife
17330 SE Evelyn St.
Clackamas, OR 97015
503-657-2038

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SUMMARY OUTLINE

Pacific Salmon Catch Recording & Reporting

Determining the Feasibility of Establishing a Bilateral Catch Data Base

I. COMMERCIAL CATCHES

A. Similarities

1. Origin of data is hard copy of first sales transaction.
2. Data on transaction record:

	<u>Canada</u>	<u>U.S.</u>
Sequence #	Yes	Yes
Gear	Yes	Yes
Date of Transaction	Yes	Yes
Days Fished	Yes	No (available elsewhere)
Stat. Area Fished	Yes	Yes
Processing Plant	Yes	Yes (Processor's code)
Processing Region	Yes	No
CFV # Tender Packer	Yes	No
CFV # Catcher	Yes	Yes (AK or WA regist. Entry permit #)
Species	Yes	Yes
Product Type ¹	Yes	Yes (Troll, otherwise round, AK not always recorded)
# Fish	Yes	Yes
Weight	Yes	Yes
Price ²	Yes	Yes (AK not always recorded)
Treaty Status	No	Yes (WA, OR)

¹ Round, troll dressed, head off, #1, #2.

² Price per unit weight by species, except in Alaska where total price per landing is recorded.

SUMMARY OUTLINE (Cont'd.)

B. Problems

1. Determining locality of catch
2. Determining magnitude of effort
3. Determining identity of harvester
4. Determining numbers harvested
5. Evasion of transaction record
6. Timeliness of data
7. Time of harvest

C. Sources of Problems

1. Accumulation of catch prior to landing problems (1, 2 and 6 above)
2. Lack of observers and port samplers (1-7 above)
3. Law breaking (1-7 above)

D. Areas Which Need to be Investigated for Congruity (not necessarily mutually exclusive)

1. Means of determining number and weight landed by processors (type of product)
2. Port sampling and observer programs (% harvest covered)
3. Date of transaction - what does it mean?
4. Stat. area designation - where taken, where landed or where transferred from harvester to processor?
5. Unrecorded catch.

SUMMARY OUTLINE (Cont'd.)

II. SPORTS HARVESTS

A. Similarities - Harvester's report followed up by sampling

	<u>Canada</u>	<u>U.S.</u>
1. Mail surveys of licencees	Yes	Yes (AK)
2. Creel surveys/catch sampling	Yes	Yes (AK WA OR)
3. Dockside interviews - charters	No	Yes
4. Law enforce patrol	Yes	Yes
5. Punch cards	No	Yes (WA OR)

B. Problems

1. Small sample sizes require combining areas to achieve desirable level of precision in estimates.
2. Biases in methods of unknown magnitude.
3. Compliance of harvesters.
4. Distribution of survey effort not proportional to distribution of recreational effort. No surveys in some areas.
5. Lack of comparability of sports statistics to commercial statistics.

C. Sources of Problems

1. Reliance on anglers for information (2 & 3 above).
2. Dispersion of harvesters often very great (1 & 4 above).

SUMMARY OUTLINE (Cont'd.)

D. Areas Which Need Investigation for Congruity

1. Accuracy and precision of estimates of recreational harvests - bias in data collection methods
2. Distribution of creel census and port sampling in relation to harvest
3. Estimation of the number of harvesters

III. SUBSISTENCE, PERSONAL USE

- A. **Similarities** - Information collected from harvesters and by direct observation during surveys, but no geographically or methodologically systematic data collection procedures.

	<u>Canada</u>	<u>U.S.</u>
Numbers	Yes	Yes
Species	Yes	Yes
Effort	Yes	Yes (Columbia R., spotty elsewhere)

B. Problems

1. Lack of organized data collection
2. Estimates subject to bias.

C. Sources of Problems

1. Reliance on harvesters for information
2. Dispersion of effort
3. Political games

Report of the
Data Sharing Committee
to the
Standing Committee on Research & Statistics
concerning
Salmon Escapement Information

June 14, 1988

Canadian Section
Data Sharing Committee
Report on Salmon Escapement Information

I. RESPONSIBILITY

Salmon management and stock assessment is a Federal Government responsibility in British Columbia. Historically, Department of Fisheries and Oceans fishery officers have been responsible for spawning ground enumerations on approximately 2000 rivers and tributaries, with a few major exceptions such as the Fraser River, where pink and sockeye salmon were counted by International Pacific Salmon Fisheries Commission technical staff until 1985.

Fishery officers have a variety of other fisheries management and enforcement duties which at times take priority over spawning assessments. Seasonal guardians, patrolmen and vessel crews assist the officers to enumerate salmon escapements in their subdistricts. Although most enumerations are done by officers and support staff, a number of the most important large systems are enumerated by biological staff from Fisheries Management, Science, and Enhancement Branches of D.F.O. Occasionally public volunteer groups, contracted organizations and Indian bands, look after the enhancement and spawner enumeration of small systems.

II. METHODOLOGY

Fishery officers and biologists use a variety of methods to enumerate salmon escapements, the basic ones being visual counts on the spawning grounds, fence counts, and mark recapture techniques.

The enumeration methods used by fishery officers and their support staff are all visual, and include walking, drifting, snorkeling, and flying by helicopter and fixed-wing aircraft. Staff receive no formal training or detailed instructions on how to estimate spawner abundance, and consequently different procedures are common between areas and between individuals. The amount of resources allocated for, and priority placed on spawner enumeration is decided at the District level rather than at Regional Headquarters, and this results in significant differences in effort between Districts.

Over the years, management biology staff have taken on the responsibility of enumerating escapements for a number of the most abundant sockeye stocks. Usually the biological staff involvement was in response to a need for in-season escapement information to help fisheries management. Test fisheries were developed in the Nass and Skeena Rivers, and escapement indices compared to fishway or fence counts done closer to the spawning grounds. Visual counts on the spawning grounds are also done later. In Rivers Inlet, an echo sounder is used to

estimate sockeye escapement into the sanctuary at the head of the inlet and in Smith Inlet a counting fence is used for in-season management as sockeye move through the fishery into Long Lake. No further effort is made in Long Lake to measure spawning success or distribution, but Rivers Inlet sockeye are counted on the spawning grounds, mostly by walking the various streams. Management biologists have been involved intermittently with fence and tower counts for large pink runs to the Yakoun River (Queen Charlotte Islands) and Atnarko River (Bella Coola). They are also responsible for the chinook keystream program, funded from the resources allocated to Pacific Salmon Treaty activities. Mark recovery techniques, fishway, and fence counts are used to enumerate chinook escapements to five keystreams.

Salmon Enhancement biological staff have taken on the responsibility for enumerating escapements to many of the systems where an enhancement facility (large or small) is located. The methods used most frequently are fence counts, and walking the streams.

A few small systems are fenced and enumerated by Science Branch staff when a research project is being conducted on the stream.

The most thorough and consistent spawning enumeration program in B.C. is the one for Fraser River sockeye and pink salmon. This was developed by, and implemented for decades by the International Pacific Salmon Fisheries Commission before being taken over by D.F.O. in 1985. Within the Fraser River watershed there are approximately 120 sockeye spawning streams with 20 rearing lakes and 70 pink spawning streams. The sockeye populations are enumerated annually while the pink populations are covered only every second year on the odd year. There is no even year pink run. Although the sockeye populations are enumerated annually, intensity varies depending on the cycle run size.

The basic methods of enumeration are the same for both species. The three main methods employed are:

1. Fence counts
2. Live count and dead recovery multiplied by index
3. Petersen mark recapture

Very few counting fences are used in the Fraser watershed. The fence locations are at Cultus Lake, on the Eagle River, Deadman River, Maria Slough, and in some years on the Bowron River. The second method listed above is generally used on small runs of less than 20,000 fish. However, in some remote areas where it is too costly and/or logistically impractical, larger runs may be enumerated in this manner. The procedure used in this case is to make a series of live counts and dead recoveries. The live counts are actual counts and not estimates of spawner numbers. They are made either from shore, boat and/or aerial (fixed-wing/helicopter). The peak live count is added to the accumulated dead recovered to the day of peak live count and then multiplied

by an index. The index varies between species, but is generally 1.8 for sockeye and 2.6 for pinks. The indices were determined by the I.P.S.F.C. using years of data by comparing the various methods of enumeration.

Generally speaking, the Petersen mark recapture method is used to estimate the abundance of larger runs, or in locations where it is impossible to make live counts, for example, in very turbid water. This method first was employed by the I.P.S.F.C. in 1938 and has been carried on since. Numerous variations of the type of mark have been tried, i.e. plastic disc, floy, spaghetti, branding and dye, but generally the plastic disc is used for spawning ground enumeration.

Spawning ground escapement records have been kept since 1947 on forms, commonly referred to as "B.C. 16s". Although a numerical estimate (usually a range) was recorded by species for each stream, there was usually no description of how the estimate was made. As the years went by, it became increasingly unsatisfactory to compare the annual estimates due to the uncertainty of how they were made. Until recently, there was no way of telling from most records whether the numbers documented were estimates of total escapement or just of fish observed. Hatchery escapements were sometimes lumped with natural spawning escapements. In 1985, fishery officers and biological staff agreed to a standardized reporting system that documents how the enumerator determines the total escapement. Hatchery and natural spawning escapements are recorded separately, but there is no information describing the disposition of fish escaping to the hatchery. This reporting system is now used by fishery officers throughout B.C. (Appendix 1, 2 and 3).

A computerized salmon escapement data system (S.E.D.S.) is near completion at the Pacific Biological Station in Nanaimo. It will be the regional data base for salmon escapement information, collected and corrected by staff in the three geographic Divisions, i.e. North Coast, South Coast and Fraser River.

III. ACCURACY

In general, escapement estimates for most B.C. salmon streams are not accurate. They are indices of abundance, useful for determining long term trends or large differences between years. Very few systems other than the major sockeye ones, Fraser River pink and sockeye, chinook keystreams, and some enhanced systems are monitored intensely enough to be able to use the data for stock recruitment analyses. There is a feeling though, amongst staff responsible for enumerating escapements, that they are getting more accurate estimates now on a few systems, compared to five or ten years ago, due to more systematic procedures. However, there are less dollars and people available to do the job, so fewer rivers are assessed, and the frequency of assessments is lower.

APPENDIX 1: THE STREAM INSPECTION LOG

THE STREAM INSPECTION LOG INSTRUCTIONS

1. A separate record is to be completed for each inspection on each stream.
2. The record is to be completed at the time of inspection. Blank forms are issued in a bound pad, or "log-book" which is to be kept in the vehicle or vessel used to travel to the stream. Each blank form is to be removed from the pad for use and filing by tearing it along the perforated edge.
3. Describe under "Section Inspected" which portions of the stream were visited. Sketch this section on the reverse of the sheet (see "Comments"). If several stretches of the system are enumerated (for example, a lake, and estuary, and an upstream spawning area), use a separate sheet of paper for each section.
4. Under "Time", indicate the hours at which you began and ended the inspection.
5. Your evaluation of "Water Level" should be based on a comparison with normal conditions for this stream at this time of year.
6. You may check several conditions for "Sky".
7. "Fish Countability" is used to indicate your assessment of the confidence with which fish could be counted, regardless of the water and weather conditions during the period of inspection. Even in a very clear system under ideal weather conditions, countability might be low, for example, because the fish were densely schooled or moving rapidly.
8. Add "No. Live" and "No. Dead" to determine the total fish counted that day.
9. Under "% New" indicate what percentage of the fish counted today have not previously been counted; your estimate may include carcasses.
10. Under "% Paired", indicate whether fish are schooled or spawning.
11. If no adults of a given species are observed, enter "Yes" or "No" for "Juveniles Present".
12. For "Estimated Total", enter your estimate for the day of inspection. Normally, it is not possible to separate jacks from this total.
13. Enter an estimate for jacks only if their number is significant.
14. Your assessment of "Reliability" should be based on a comparison with ideal enumeration conditions. Note that "Reliability" may be different for each species.
15. Your Sub-district Officer may wish to complete the estimate of "Total to Date" himself. Ask for his instructions on this point.
16. Under "Active Spawning", check the month and date on which you think the activity occurred. It may be necessary to estimate these dates.
17. Under "Density", describe generally the distribution of fish on the spawning area. Use terms such as "light", "medium", and "heavy".
18. Under "Comments", indicate whether "Number Counted" is an actual count of individual fish or an estimate of the number visible.
Use this space also to indicate if your estimate is based on a count of redds.
Comment on unusual male/female ratios, particularly for chinook.
On the last inspection Record of the season for any given stream, indicate under "Comments" an estimate of the number of spawners you believe may appear after your visit.

STREAM INSPECTION LOG

STREAM NAME _____ OBSERVER _____

DATE

TIME

NOTE - * Means
comment on reverse side

SECTION INSPECTED _____

METHOD	WATER CONDITIONS	WATER LEVEL	WATER CLARITY	WIND MPH	SKY	FISH COUNTABILITY
<input type="checkbox"/> Walk <input type="checkbox"/> Strip Counts <input type="checkbox"/> Float <input type="checkbox"/> Dead Pitch <input type="checkbox"/> Plane <input type="checkbox"/> Tag Recovery <input type="checkbox"/> Helicopter <input type="checkbox"/> Other * <input type="checkbox"/> Redd counts <input type="checkbox"/> Spot Check	<input type="checkbox"/> Clear <input type="checkbox"/> Tea <input type="checkbox"/> Glacial Silt <input type="checkbox"/> Muddy <input type="checkbox"/> Slightly Turbid <input type="checkbox"/> Iced <input type="checkbox"/> Other *	<input type="checkbox"/> Extremely low <input type="checkbox"/> Below normal <input type="checkbox"/> Normal <input type="checkbox"/> Above Normal <input type="checkbox"/> Flood	<input type="checkbox"/> 6" <input type="checkbox"/> 6"-2' <input type="checkbox"/> 2'-5' <input type="checkbox"/> 5'	<input type="checkbox"/> 0-5 <input type="checkbox"/> 5-10 <input type="checkbox"/> 10-20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30	<input type="checkbox"/> Sunny <input type="checkbox"/> Partly cloudy <input type="checkbox"/> Cloudy <input type="checkbox"/> Overcast <input type="checkbox"/> Rain <input type="checkbox"/> Heavy	Nil Poor Fair Good Excellent

	SOCKEYE	COHO	PINK	CHUM	CHINOOK
NUMBER COUNTED					
NO. LIVE	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
NO. DEAD	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
TOTAL	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
% NEW	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
% PAIRED	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
(Y/N) JUV. PRES.	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>

<u>Estimated</u>	ADULTS	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
<u>total fish</u>	TTD	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
<u>in stream</u>	JACKS	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
	RELIABILITY	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
	LOW 1 2 3 4 5 HIGH					

	Start	Peak	end		
ACTIVE SPAWNING	<input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>	<input style="width: 20px;" type="text"/>
	MM	DD			

Distribution of fish _____

PRE-SPAWNING DEATHS:

Number of fish:

Cause of mortality: _____

SILTING * 	EROSION * 	OBSTRUCTIONS *
---	---	--

REV. DEC 85

OBSTRUCTIONS (especially previously unreported or changing ones:)

Type: _____

Locations: _____

Beverly: _____

Recommended action: _____

SILTING, EROSION: _____

COMMENTS AND MAP (To update information): (e.g., fry abundance, predators, habitat information, size of fish, air temperature, water temperature, etc.)

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

INSTRUCTIONS FOR SPAWNING RUN TIMING AND ESTIMATED NUMBER

- 1 Provision is made for two spawning runs per species. If only one run exists, use Line 1.
- 2 Date entry: a) Month: enter first three letters (Aug) or (Oct)
- 3 b) Day: enter date (12) or (04)
or enter letter codes as follows — (A) 1 - 10th (B) 11 - 20th (C) 21 - 31st
- 4 Number of times each species is present in stream during inspection.
- 5 Inspection method used. Enter up to 4 methods per species.

<input type="checkbox"/> Walk	<input type="checkbox"/> Helicopter	<input type="checkbox"/> Strip Counts
<input type="checkbox"/> Float	<input type="checkbox"/> Redd counts	<input type="checkbox"/> Dead Pitch <input type="checkbox"/> Other
<input type="checkbox"/> Plane	<input type="checkbox"/> Spot Check	<input type="checkbox"/> Tag Recovery
- 6 Reliability of spawning population estimate (based on conditions and number of stream visits).

Low	1	2	3	4	5	High
-----	---	---	---	---	---	------
- 7
 - a) If the stream has been inspected, enter best estimate of total annual escapement.
 - b) If the stream has been inspected, but no fish were seen even though water conditions would permit enumeration, enter N.O. (None Observed).
 - c) If juvenile fish only were observed, enter J.P. (Juveniles Present).
 - d) If the enumerator(s) observed indications that an inspected stream was frequented by fish, but were unable to make an estimate because of water conditions, enter U.K. (Unknown).
 - e) If the stream was not inspected, for whatever reason, enter N.I. (Not Inspected).
- 8 Enter if available.

United States Section
Data Sharing Committee
Report on Salmon Escapement Information

I. **ALASKA**

Annual escapement data by district or lake/river system are recorded for all five species of salmon back to at least the mid 1970's. The extent of the data base varies with species. The data are at present kept on computer files on a PC, but near future plans are to put it on our VAX system using Ingres Data Base. Contact ADF&G, Regional Office in Douglas, Alaska.

Escapement data are taken in the form of weir counts, foot, aerial and boat survey counts, tagging studies and, for one stock, scale pattern analysis. The number of streams surveyed varies from year to year depending on funding and project support. In general, the number of surveys has increased from 1981 to present, except weir counts. In 1983, the number of weirs was greatest with funding from the U.S./Canada funds. Budget cuts are causing a decrease in the number of weirs put in since then. Weir counts provide the best estimate of escapement, although it should be noted that weirs are generally species-specific. That is, they are located, both in space and time, to best count one species. Counts of other species at these weirs may not cover the entire run or spawning area of those species.

A. Sockeye salmon. Well over 100 systems are presently surveyed; records are kept for those in which 25 or more sockeye salmon are seen. Daily counts of escapement to 16 systems, 11 systems in S.E. Alaska and 5 in the Canadian portion of transboundary rivers (Taku and Stikine), are made at weir sites. Weirs are placed in most major sockeye producing systems. Indices of escapement are made for other systems with foot, aerial and boat surveys, tagging estimates, and scale pattern analysis. Aerial, foot and boat surveys provide indices of abundance, but the proportion of the runs observed is not known so they cannot be transformed into a production estimate. In addition to yearly estimates kept on the computer data base, more detailed results of these counts and surveys and estimation techniques from 1981 to the present are reported in the ADF&G Technical Data Report/Technical Fisheries Report series.

B. Pink salmon. Estimates of pink salmon escapement are done by foot or from aircraft. Selected streams are counted during the period of maximum return of pink salmon. In the past 30 years, about 2100 streams have been counted at one time or another. About one fifth of these are routinely surveyed each year. The counts are indices, only, of actual numbers of pink salmon spawning. Studies conducted during the past two years using weir counts of total escapement from three systems

have shown that index surveys generally count about half the actual escapement. However, there is much variability between years, streams and counters. A data base of pink salmon escapements by fisheries district from 1960 to the present is maintained by ADF&G (907-465-4250). The escapement estimates represent the entire districts, being adjusted for the percentage of streams not surveyed, but do not represent total escapement as they have not been adjusted for percentage of total run counted by the survey method. More study is needed to convert the index counts to total escapement. The stream life project of the past two years will continue in 1988 with one pink salmon weir in place on Admiralty Island.

C. Chum salmon. Chum salmon spawn in hundreds of streams and rivers in Southeast Alaska. Escapement counts and indices of escapement are made in nearly 400 streams. About half are aerial surveys and half foot surveys. Daily counts are available from around 10 to 15 weirs, although most of these weirs are set up for other species and do not cover the entire chum run. Records are kept for systems in which over 25 chum salmon were seen and results from 1981 to the present are reported in the ADF&G Technical Data Report/Technical Fisheries Report series.

D. Chinook salmon. Weir counts are made for five to seven natural runs and three hatchery runs. Aerial and foot surveys are made on about 60 other streams, but as the proportion of the run observed in these surveys is not known, this data should be viewed with caution. Eleven of these systems are designated as index systems and are used in estimating the entire S.E. Alaska region production for chinook salmon. All results from 1981 to the present are reported in detail in the ADF&G Technical Data Report/Technical Fisheries Report series.

E. Coho salmon. About 80 to 100 of the over 2,000 coho producing systems in the region are surveyed. Sixteen of these surveys are weir counts (about half of these are set up as coho weirs); the majority are foot surveys and some are aerial surveys. Tagging studies are being conducted in six to eight systems to determine production. Results since 1981 are published in the ADF&G Technical Data Report/Technical Fisheries Report series. No attempt has been made to convert these counts into a total coho production estimate for the area, however, a research project is now under way to determine indicator stocks and methods of estimating total production.

II. WASHINGTON

Escapement surveys of all five species of salmon are administered by the various regional staffs under the Washington Department of Fisheries (WDF) (coastal stocks by the Montesano office (206-249-4628), Puget Sound and Lake Washington stocks by the Olympia office (206-753-6600), and Columbia River stocks by the Battle Ground office (206-696-6261)), and by the various tribes and Northwest Indian Fisheries Commission (206-438-1180).

A. Puget Sound and Lake Washington stocks. Index surveys, foot, aerial, boat, raft, etc., and some fish passage-way counts are made for all five species. Methods and data from the individual survey counts have not been published in any form as yet. Estimates of total escapement are made from the survey data and are kept on a computer data base by species, year, and major management area. As well as estimates for wild stock escapement, the data base includes returns from hatchery and other artificial production systems.

The data for wild sockeye stocks from Lake Washington go back to 1967. Pink salmon escapement data are made for odd years only and go back to 1959. Even year runs are very small, in the hundreds, and are not considered worth the effort to survey. Many of the pink salmon surveys are carcass counts done in conjunction with tagging studies. Chum escapement data go back to 1968. There are three races of chum in this area; an early or summer run, a normal or fall run, and a late or winter run. Jim Ames at the Olympia office of WDF is responsible for the coordination of data of these three species.

Data on chinook and coho stocks go back to 1965. Chinook stocks are surveyed mainly from the air using redd counts. Coho indices of escapement are mostly made from foot surveys. Tim Flint at the Olympia WDF office is responsible for these two species.

B. Coastal stocks. Coastal stocks of interest include chinook, chum and coho. In addition, there is one small sockeye stock that spawns in the Quinault Indian reservation and is assessed by the Quinault tribe using hydroacoustic methods.

Aerial and foot surveys are used to assess chinook, chum and coho stocks along the coast. Fairly reliable data are available from the late 1970's to present. Summary data are published by the Pacific Fisheries Management Council. Tribal data are published in annual reports. Chinook surveys are by aerial counts of redds and foot and float surveys. Coho surveys are mostly redd counts done by foot. Chum surveys are mostly counts of live adults done by foot. Studies are being conducted to relate coho redd counts to counts of fish at weirs.

III. COLUMBIA RIVER

Management of Columbia River salmon stocks come under the jurisdiction of three states: Washington, Oregon, and Idaho, and the Treaty Indian tribes. Chinook is the main salmon species of interest to U.S./Canada interception fisheries.

Counts of all anadromous fish are made at all dams on the river having fish passage ways by either the Army Corps of Engineers or the Public Utilities Department (PUD). The Corps is responsible for two districts: Portland which administers the Bonneville, Dalles and John Day Dams and Walla Walla which administers the McNary, Ice Harbor, Lower Monumental and Lower Granite Dams. Their counts are published in the Annual Fish Passage Report and may be obtained from: The District

Engineer, U.S. Army Corps of Engineers, District Portland, P.O. Box 2946, Portland OR, 97208.

PUD in Grant County (509-754-3451) is responsible for counts at Priest Rapids and Wanapum Dams; in Chelan County (509-663-8121), for Rock Island and Rocky Reach Dams; and in Douglas County (509-884-7191), for Wells Dam, the last dam on the Columbia River that has a fish passage.

In addition, the Fish Passage Center in Portland (503-230-4286) assembles a good deal of information about fish passage past the dams. The first dam on the Columbia River was built in 1933 and the last dam was built in 1975, so counts available depend on the dam in question. The Columbia River Inter-Tribal Fish Commission (CRITFC) has compiled all dam count information from 1960 to present in a computer data base system (R-Base). These data are available through Paul Lumley (503-238-0667).

Dam counts give an estimate of the number of fish reaching a particular dam on the river. By subtracting counts between successive dams, an estimation of the number of fish spawning between those two dams may be made.

CRITFC is involved in stock assessment on the Columbia River. They support several spawning ground surveys in the Columbia River basin and this information, from 1960-1984, has been published in their Technical Report series (No. 86-1). The spawning ground survey data consist of adult, carcass, and redd counts. Studies are being done to standardize the methods and to determine conversion factors for redd counts to spawning adult numbers; these studies are going into their third field season this year.

Although most data on Columbia stocks are summarized by CRITFC, additional information on Washington stocks is available from Don McIsaac, WDF (206-696-6221) and on Oregon stocks from Steve King, ODF&W (503-657-2030).

IV. OREGON

Surveys of Oregon coastal stocks of chinook, coho, and chum salmon go back 37 years with irregular consistency. Since 1981, coho surveys have increased in numbers and improved in design. Improvement in chinook surveys began in 1986. Survey data from 1981 to present are available from a computer data base system. The data are also published in the Annual Spawning Survey reports.

The main species of interest from the Oregon coast is chinook salmon. Chinook stocks include spring, summer, fall, and hatchery populations. There is not at present much information available on escapement for chinook salmon. Surveys began to increase and improve in design in 1986 with the financial support from PSC. Ten of twenty chinook producing streams are surveyed by foot. Live adult, carcass,

and redd counts are made. No total production or escapement estimates are attempted as yet for the coast of Oregon. For chinook salmon, the 1984 spawning report is out, the 1985 report is in draft form, and the 1986 is in memorandum form only as yet. The contact person for these data and other Oregon stock escapement data is Steve Jacobs, ODF&W, Corvallis, OR (503-754-4431).

**APPENDIX 2: STANDARD FORMAT FOR
A SUB-DISTRICT STREAM ESCAPEMENT LOG**

This log should be compiled from data contained on Stream Inspection reports. It is intended for use as a convenient escapement summary during the season. The data it presents is essential when completing the Annual Report of Salmon Streams and Spawning Populations (BC 16).

The format of the log may vary according to the requirements of each Sub-district. For example, it may be necessary to provide columns for more than three species, or to add headings at the bottom for special observations. It is important only that a log of this general format be maintained and kept for future reference.

A separate page should be used annually for each stream. During the season, these pages should be kept in a three-ring binder for ready reference. Each page should be removed from the binder and placed in the appropriate stream file at the end of the season.

APPENDIX 2:

FORMAT OF THE STREAM ESCAPEMENT LOG

[illegible]

**APPENDIX 3:
FORMAT OF ANNUAL REPORT OF SALMON STREAMS AND SPAWNING POPULATIONS**

**DEPARTMENT OF FISHERIES AND OCEANS
ANNUAL REPORT OF SALMON STREAMS AND SPAWNING POPULATIONS**

STREAM IDENTIFICATION <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Watershed name</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Detailed name (optional)</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">First local name</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Second local name</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Flowing into</div>	<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Year</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">District No.</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Subdistrict No.</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Streamed Area</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Subdistrict Name</div> <div style="border: 1px solid black; padding: 2px;"> DATES OF INSPECTION <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th>Month</th><th>Day</th><th>Month</th><th>Day</th></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </table> </div>	Month	Day	Month	Day																												
Month	Day	Month	Day																														

SPAWNING RUN TIMING AND ESTIMATED NUMBER (Instructions on flip side)										
1 SPECIES	2 ARRIVAL IN STREAM	3 DATES OF DURATION OF SPAWNING START PEAK END				4 NO. OF COOPER	5 METHODS	6 RELI- ABILITY	7 EST. TOT. NO. ON GROUND	8 OPTIMUM ESCAPEMENT
	Month Day	Month Day	Month Day	Month Day	Month Day					
SOCKEYE 1										
SOCKEYE 2										
COHO 1										
COHO 2										
PINK 1										
PINK 2										
CHUM 1										
CHUM 2										
CHINOOK 1										
CHINOOK 2										

UNUSUAL CONDITIONS	
MARK BOX FOR UNUSUAL CONDITIONS <input type="checkbox"/> (A) Enhancement or intense biological activities. <input type="checkbox"/> (B) Unusual mortalities. <input type="checkbox"/> (C) Obstructions or changes in habitat with recommendations. <input type="checkbox"/> (D) Large variations in sea rate or unusual number of jacks. <input type="checkbox"/> (E) Unusually high or low water flow level during spawning period.	

ADDITIONAL COMMENTS	
PHYSICAL CONDITION OF SPAWNING GROUNDS (A) Evidence of erosion and silting. Give extent or percent of stream bed affected (B) Particulars of scouring of spawning beds or change in course of stream (C) Water levels flow, normal, high, abnormal. If abnormal, details should be given 	

BIOLOGICAL CONDITIONS	
(D) Particulars of distribution of spawning salmon over the stream bed (E) Comments on predators (F) Evidence of digging up eggs by later spawning fish (G) New obstructions (nature and recommendations) 	

COMMENTS ON ANY OTHER CONDITIONS AFFECTING THIS STREAM	
(H) 	

Signature

Fisher Officer / Person Preparing Report