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Summary of Catch and Effort Statistics in the Recreational and Commercial Labrador Atlantic Salmon, Salmo salar, Fishery, 1982

by

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Abstract

Catch and effort statistics for the Labrador commercial and recreational Atlantic salmon, Salmo salar, fisheries are summarized. Landings in the commercial fishery for 1982 decreased by 33% from 1981 and totalled 543 t. Recreational harvest dropped by 17% to 4725 fish although more large salmon were taken in the 1982 recreational fishery. There is some evidence to suggest that the river age of the Labrador multi-sea-winter catch has been declining with time.

Résumé

On résume les statistiques sur les prises et l'effort de pêche de saumons atlantiques (Salmo salar) dans les pêches commerciales et sportives du Labrador. Les débarquements de pêche commerciale en 1982 ont diminué de 33 % par rapport à 1981; ils se chiffraient au total à 543 t. Les prises de pêche sportive ont baissé à 4725 saumons, soit une diminution de 17 %, mais on a capturé un plus grand nombre de gros poissons en 1982. On a des raisons de penser qu'au Labrador les poissons qui ont passé plusieurs hivers en mer et qu'on capture dans les rivières sont de plus en plus jeunes.

Introduction

This paper summarizes catch and effort statistics for the Labrador commercial and recreational Atlantic salmon, Salmo salar, fisheries. Catch data and contributions of grilse and salmon to both fisheries are examined in comparison with trends in recent years. Commercial sampling data from the Labrador fishery were examined to detect changes in the proportion of 1-SW, multi-sea-winter and previous spawners of varying river age.

Catch and Effort Statistics

Commercial fishery

Catch statistics from the Labrador commercial salmon fishery have been available since 1952 (Table 1). Commercial salmon landings have undergone a gradual increase that peaked at 756 t in 1976 (Fig. 1). This was followed by a substantial decline during the next three years ending in 1979 with the lowest catch and catch per unit effort in twenty years (326 t). Both catch and catch per unit effort increased substantially in 1980. Landings of 853 t were the highest on record for the Labrador fishery. While the 1981 fishery declined slightly to 813 t, landings in 1982 decreased by 33% to 543 t. The 1982 catch was also 14% lower than the previous 5-year mean of 628 t. Effort increased slightly resulting in a decrease in catch per unit of effort by 35%.

Statistical sections 51 and 52 again contributed 76% of the total Labrador catch (Table 2). Landings, however, were 45% lower in section 52 while decreasing by 19% in section 51. Landings in sections 50 and 53 decreased by 13% and 43% respectively.

Recreational fishery

Reduced catches also occurred in the 1982 Labrador recreational fishery (Table 1, Fig. 2). A total of 4725 fish were reported caught which is down by 17% from 1981. Catch and catch per unit effort decreased in statistical sections 50, 51 and 52 (Table 3). In section 53, catch per unit effort declined but total catches increased by 34% to 1147 (Table 3). Catches in Pinware River (714) and Eagle River (1515) decreased by 42% and 41% respectively (Table 4).

In 1981 the Eagle River catch represented approximately 50% of the reported Labrador recreational salmon catch and together with the Pinware River, contributed 73% of the total catch. During 1982 only 35% of the angled catch came from Eagle River and the combined catch with the Pinware River decreased to 47% of the Labrador total.

Stock Composition

Data pertaining to the proportion of grilse and large salmon in the Labrador commercial fishery have been available since 1969. The large salmon component represented 81% of the catch by weight (64% by number) for the years

1969-78. Since then the abundance of large salmon in the catch has decreased to represent 71% of the catch by weight (51% by number). Proportion of large salmon in the catch in 1982 was virtually identical to that of 1981 (71% by weight, 51% by number). Direct comparisons of 1981-82 data with previous information may be inaccurate owing to changes and variations in size classifications used to grade salmon into small and large categories. Nevertheless, based on catch statistics, there appears to have been a decreased abundance of large salmon during the past several years resulting in lower commercial catches.

With respect to the recreational fishery the large salmon component increased from 9% of the total catch in 1981 (N = 520) to 13% in 1982 (N = 621). This was largely due to the increase in large salmon recreational catches by 21% on the Eagle River and the reported catch of 249 large salmon on the Hunt River (Table 4). This latter catch from the Hunt River represented 40% of the total reported large salmon recreational catch in Labrador and 59% of the total catch on that river. No information was available for the Hunt River in 1981.

Catches of large salmon decreased on the Forteau River and Pinware River by 39% and 66% respectively (Table 4). The large salmon catch on the Pinware River was the lowest recorded since 1962 (Table 4).

Commercial sampling information was examined to detect changes in the proportion of 1SW, multi-sea-winter and previous spawners of varying river age. These data are summarized by statistical section in Tables 5-7.

The percentage of multi-sea-winter salmon of river ages 2 and 3 range from 8 to 25% in statistical section 51; 4-43% in section 52; and 16-28% in section 53 (Table 5). For the past three years (1979-81) the proportion of river age 2 and 3 salmon caught in statistical section 53 has remained relatively constant while showing an increasing trend in section 52.

For 1SW salmon the percentage of salmon with river age 1, 2 and 3 has varied from 13-39% in section 53 (Table 6). A noticeable difference between 1SW and multi-sea-winter salmon is found in the contribution of river age 1 fish to the commercial catches of 1SW salmon in statistical section 53.

Trends were observed for a decrease in mean river age with time in multi-sea-winter salmon catches in Labrador. A statistically significant correlation for decreasing mean river age with year was obtained for statistical section 52 ($r = -0.805$, $P < 0.01$) and for section 51 ($r = -0.848$, $P < 0.05$) providing the 1969 data were omitted from the latter section. In section 53 mean river age has decreased from 1978-81 although owing to the few years of available data, the relationship was not statistically significant ($r = -0.865$, $P = 0.13$).

Pooling of data from all sections for multi-sea-winter salmon similarly gave statistically significant relationships for decreasing river age with time (1970-81, $r = -0.849$, $df = 6$, $P < 0.01$; 1969-81, $r = -0.702$, $df = 7$, $P < 0.05$).

Although it is possible that the apparent decline in river age was due to sampling bias, it is strongly suggested there has been a decline in the proportion of Labrador origin multi-sea-winter salmon being harvested in the Labrador fishery. This change in river age of commercial salmon catches warrants further examination in order to clarify the biological reasons for this phenomenon.

Station 27 temperature and salinity data (depth 5 m) were used as an index of general environmental conditions in the Labrador Sea area in order to determine whether there were any correlations with the data which might explain the large variation in annual commercial landings, particularly in the large salmon catch (Fig. 3). Since the large salmon component was the dominant catch in the Labrador commercial fishery, multiple regressions were performed using large salmon catch in year i+1 as the dependent variable. Grilse catch in year i, January temperature and salinity in year i+1, and June temperature and salinity in year i-1 were the independent variables. Using catch data from 1969-81, a statistically significant relationship was obtained. Salinity contributed very little to the relationships. Catch of 1SW salmon in year i explained 51% of the variation in 2SW salmon in year i+1. January temperatures in the same year as the forthcoming fishery explained 24% of the variation in 2SW catches. The biological significance of the January temperatures are not entirely clear. It is possible that the January temperature is an index of environmental conditions which influence the distribution and subsequent catchability of returning 2SW salmon. June temperatures lagged two years (year i-1) may act as an index of marine temperatures during a period of time when smolt class of the large salmon in year i+1 migrated to sea. June temperatures in year i-1 explained the remaining 7% of the variation.

Figure 3 illustrates the observed and predicted values for the Labrador large salmon catch using the following relationship:

$$\ln Y = 9.19478 + 0.34771\ (\ln X) - 0.29590\ (T_1) - 0.06060\ (T_2)$$

where Y is the large salmon catch in year i+1, X is the grilse catch in year i, T_1 is the mean January water temperature (5 m depth) at Station 27 in year i+1 and T_2 is the average June temperature (5 m depth) at Station 27 in year i-1 ($r^2 = 0.824$, $F = 14.00$, $P = 0.001$). In general, the predicted values follow the general trends in the large salmon catch reasonably well. A prediction for the 1982 large salmon catch of 404 t was only 4.7% different from the actual 1982 catch using data from 1969-81 in the relationship (Fig. 3).

No projections could be made for 1983 since there were no temperatures taken at Station 27 in January of that year. Nevertheless, there is no suggestion that the 1983 commercial fishery will be higher than in 1982. Owing to the apparent low spawning escapements in 1978 and 1979, as evidenced by the low catches in those years, there is some concern that there will be a lower stock abundance in 1984 and 1985.

Despite the problem of the validity of Station 27 data for the Labrador fishery, a further examination of these data and the biological explanation of the use of these temperatures would appear warranted.

Table 1. Summary of catch statistics for Labrador commercial and recreational fisheries.

Year	Commercial					Recreational				
	1	2	3	4	5	6	7	8	9	10
1952	328			30176	57267					
1953	307			28244	53601					
1954	415			38180	72457	754	167	4.51	476	278
1955	266			24472	46443	532	654	.81	280	252
1956	304			27968	53077	374	407	.92	177	197
1957	315			28980	54998	1587	686	2.31	1250	337
1958	306			28152	53462	1445	641	2.25	1375	70
1959	328	2165	152	30176	57267	1452	761	1.91	1320	132
1960	230	2184	105	21160	40157	1034	643	1.61	943	91
1961	449	2015	223	41308	78393	1418	1105	1.28	1180	238
1962	333	2062	162	30636	58140	1373	947	1.45	1250	123
1963	338	1457	232	31096	59013	1990	1303	1.53	1793	197
1964	466	2435	191	42872	81362	3206	2789	1.15	2570	456
1965	345	2367	146	31740	60236	2972	3422	.87	2345	627
1966	342	1798	190	31454	59712	4021	4619	.87	3315	706
1967	459	2262	203	42228	80139	2795	3337	.84	2206	589
1968	348	2430	143	32016	60759	4441	4054	1.10	3776	665
1969	461	2208	209	33104	74665	3270	3646	.90	2877	393
1970	458	3052	150	48191	77497	4575	5308	.86	4013	562
1971	641	2720	236	63903	109934	4420	4898	.90	3934	486
1972	537	2795	192	47850	94499	3371	5165	.65	2947	424
1973	653	2976	219	61693	113314	8501	8271	1.03	7492	1009
1974	714	2741	261	56104	128715	3304	5492	.60	2501	803
1975	705	3154	224	109261	104647	4299	4209	1.02	3972	327
1976	756	3558	213	83412	126302	6556	7155	.92	5726	830
1977	712	3408	209	70965	122137	5880	7234	.81	4594	1286
1978	435	3725	117	27829	81206	3458	6248	.55	2691	767
1979	326	3875	84	49526	48656	4727	5333	.89	4118	609
1980	853	3502	243	132699	156168	4689	4948	0.95	3800	889
1981	813	3450	236	116222	121549	5711	5198	1.10	5191	520
1982	543	3520	154	78854	80628	4725	6400	0.74	4104	621

1. Commercial landings (kg x 1000)
2. Effort in gear units (1 unit = 50 fathoms of net)
3. Catch per unit effort (kg)
*4. Estimated no. of grilse in commercial landings
*5. Estimated no. of salmon in commercial landings
6. Recreational catch in number of fish
7. Effort in rod days
8. Catch per unit effort
9. Estimated number of grilse in recreational catch
10. Estimated number of salmon in recreational catch

* Prior to 1969 number of grilse and salmon were estimated by applying the grilse:salmon ratio for 1969-73.

Table 2. Summary of Labrador Atlantic salmon commercial catch (kg x 1000) and effort (gear units) data by statistical section, 1969-80.

Year	Statistical section 50		51		52		53		Total	
	catch	effort	catch	effort	catch	effort	catch	efffort	catch	effort
1969	30	356	154	-	232	-	46	367	461	2208
1970	73	492	255	-	95	-	36	507	458	3052
1971	76	438	250	-	245	-	71	452	641	2720
1972	71	450	268	-	145	-	55	465	537	2795
1973	67	241	211	1320	217	821	158	594	653	2976
1974	96	240	452	-	119	-	47	415	714	2741
1975	100	434	303	1493	184	671	118	556	705	3154
1976	96	503	297	1595	195	823	169	549	756	3558*
1977	114	543	279	1344	197	909	123	612	712	3408
1978	63	557	189	1492	90	675	93	1001	435	3725
1979	32	613	92	1541	113	761	88	960	326	3875
1980	65	526	337	1501	297	457	153	1018	853	3502
1981	53	521	290	1470	327	478	143	981	813	3450
1982	46	536	235	1394	180	554	82	1036	543	3520

*Sections 50, 51, 52, and 53 do not equal the Labrador total because of the mobile fleet of 19 fishermen who fished generally along the coast and were not licenced for one specific area.

Table 3. Summary by statistical section of Labrador recreational Atlantic salmon catches, 1954-82.

Year	Section 50				Section 51				Section 52				Section 53			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1954	126	128	254	3.79					350	150	500	5.00				
1955	155	244	399	0.88	18	2	20	0.49	107	6	113	0.72				
1956	157	197	354	1.16	20	0	20	0.20	0	0	0	0				
1957	228	288	516	1.50	15	2	17	3.40	1007	47	1054	3.13				
1958	526	50	576	2.09	49	0	49	1.96	800	20	820	2.40				
1959	497	95	592	2.27	16	1	17	1.31	807	36	843	1.73				
1960	385	52	437	1.79	46	4	50	1.61	512	35	547	1.49				
1961	467	112	579	1.23	49	1	50	1.16	664	125	789	1.34				
1962	486	65	551	1.64	42	2	44	1.69	722	56	778	1.33				
1963	421	139	560	0.92	231	10	241	2.34	1141	48	1189	2.01				
1964	834	335	1169	0.97	202	32	234	1.34	1696	86	1782	1.31	18	3	21	0.48
1965	801	391	1192	0.75	140	29	169	0.61	1347	132	1479	1.16	57	75	132	0.47
1966	1337	344	1681	0.72	88	7	95	1.90	1523	103	1626	0.89	367	252	619	1.56
1967	1121	394	1515	0.80	78	0	78	1.63	888	89	977	1.06	119	106	225	0.48
1968	1645	356	2001	0.90	46	0	46	0.92	1893	87	1980	1.94	192	222	414	0.55
1969	1265	273	1538	0.76	0	0	0	0	1612	120	1732	1.07	0	0	0	0
1970	1566	321	1887	0.74	201	5	206	1.89	1971	107	2078	0.94	275	129	404	0.96
1971	927	247	1174	0.52	104	6	110	1.41	2732	151	2883	1.41	171	82	253	0.48
1972	423	80	503	0.21	58	2	60	1.15	2016	172	2188	1.06	450	170	620	0.90
1973	1431	432	1863	0.61	301	2	303	1.53	5227	447	5674	1.31	533	128	661	0.94
1974	740	291	1031	0.38	232	3	235	0.74	1428	241	1669	0.84	101	268	369	0.79
1975	1069	154	1223	0.56	91	9	100	0.48	2433	47	2480	1.58	379	117	496	2.02
1976	2498	310	2808	0.72	179	11	190	0.59	2158	141	2299	1.15	891	368	1259	1.36
1977	1662	593	2255	0.58	257	38	295	0.79	1987	122	2109	0.99	688	533	1221	1.51
1978	573	183	756	0.31	154	26	180	0.60	1089	126	1215	0.43	875	432	1307	1.88
1979	901	119	1020	0.47	299	18	317	0.90	2323	149	2472	1.43	595	323	918	0.83
1980	938	337	1275	0.51	198	45	243	1.01	1987	276	2263	1.49	677	231	908	1.28
1981	1698	220	1918	0.57	131	0	131	1.18	2702	105	2807	2.13	660	195	855	2.07
1982	1271	80	1351	0.41	114	11	125	0.47	1935	167	2102	1.00	784	363	1147	1.55

1 - Estimated number of grilse salmon
2 - Estimated number of large salmon
3 - Total estimated catch
4 - Catch per unit effort (number of fish per rod day)

Table 4. Summary of Labrador recreational Atlantic salmon catches in six selected rivers, 1954-82.

	Section 50								Section 51				Section 52								Section 53							
	Forteau R.				Pinware River				Trout River				Sand Hill River				Eagle River				Big River				Hunt River			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1954	126	128	254	3.79													350	150	500	5.00								
1955	139	242	381	0.97	16	2	18	0.29	18	2	20	0.49					107	6	113	0.72								
1956	157	197	354	1.16	0	0	0	0	20	0	20	0.20					0	0	0	0								
1957	184	287	471	1.45	44	1	45	2.25	15	2	17	3.40					1007	47	1054	3.13								
1958	502	50	552	2.17	24	0	24	1.14	49	0	49	1.96					800	20	820	2.40								
1959	497	95	592	2.27	0	0	0	0	16	1	17	1.31					802	35	837	1.73								
1960	385	52	437	1.79	0	0	0	0	46	4	50	1.61					502	20	522	1.54								
1961	455	110	565	1.31	12	2	14	0.34	49	1	50	1.16					664	125	789	1.34								
1962	401	63	464	1.54	85	2	87	2.49	42	2	44	1.69					722	56	778	1.33								
1963	271	64	335	1.02	150	75	225	0.80	205	10	215	2.26	6	0	6	2.00	1135	48	1183	2.01								
1964	391	129	520	0.97	443	206	649	0.97	161	32	193	1.21	44	0	44	0.51	1652	86	1738	1.36	5	0	5	0.42	13	3	16	0.50
1965	336	84	420	0.57	465	307	772	0.90	130	29	159	0.61	24	32	56	0.48	1323	100	1423	1.23	20	5	25	0.38	17	63	80	0.59
1966	466	137	603	0.57	871	207	1078	0.85	88	7	95	1.90	31	12	43	0.49	1473	89	1562	0.91	70	15	85	1.89	172	170	342	2.25
1967	459	153	612	0.65	662	241	903	0.94	78	0	78	1.63	14	5	19	0.21	869	77	946	1.17	10	28	38	0.27	87	74	161	0.93
1968	568	118	686	0.76	1077	238	1315	0.99	23	0	23	0.85	10	26	36	0.36	1882	59	1941	2.12	68	99	167	0.69	90	104	194	0.68
1969	525	83	608	0.70	740	190	930	0.81	0	0	0	0	0	0	0	0	1612	120	1732	1.07	0	0	0	0	0	0	0	0
1970	629	13	642	0.48	937	308	1245	1.03	201	5	206	1.89	111	2	113	0.98	1676	59	1735	0.98	73	32	105	1.11	173	97	270	1.04
1971	342	24	366	0.52	585	223	808	0.52	104	6	110	1.41	112	0	112	1.51	2241	95	2336	1.38	93	25	118	0.62	50	45	95	0.63
1972	178	5	183	0.21	245	75	320	0.22	58	2	60	1.15	219	10	229	1.55	1317	99	1416	0.96	263	57	320	1.66	98	91	189	1.67
1973	472	20	492	0.43	957	412	1369	0.79	170	0	170	3.95	519	0	519	1.91	4209	435	4644	1.29	325	0	325	1.63	132	46	178	1.05
1974	258	14	272	0.35	482	277	759	0.39	45	0	45	0.45	311	10	321	1.47	855	177	1032	0.73	54	3	57	0.76	0	254	254	2.27
1975	284	7	291	0.39	785	147	932	0.65	56	1	57	0.34	0	0	0	0	2433	47	2480	1.58	0	0	0	0	379	117	496	2.02
1976	818	19	837	0.56	1680	291	1971	0.82	81	11	92	0.50	165	7	172	2.61	1940	125	2064	1.09	199	75	274	2.12	655	285	940	1.34
1977	612	32	644	0.47	1050	561	1611	0.63	144	1	145	0.67	0	0	0	0	1904	81	1985	1.00	215	120	335	2.77	398	384	782	1.64
1978	164	19	183	0.20	409	164	573	0.39	74	0	74	0.47	100	29	129	1.02	955	83	1038	0.40	399	62	461	2.33	450	365	815	1.73
1979	394	27	421	0.42	507	92	599	0.52	206	0	206	0.89	650	5	655	1.87	1363	37	1400	1.26	274	49	323	1.10	180	200	380	0.95
1980	339	31	370	0.46	599	306	905	0.54	49	5	54	0.38	691	94	785	1.40	1269	181	1450	1.63	570	130	700	2.04	51	89	140	0.77
1981	540	23	563	0.49	1158	197	1355	0.62	0	0	0	0	0	0	0	0	2693	105	2798	2.13	571	188	759	2.52	0	0	0	0
1982	557	14	571	0.45	714	66	780	0.39	87	1	88	0.39	370	24	394	1.03	1515	127	1642	1.00	575	102	677	2.33	175	249	424	1.35

1 - Estimated number of grilse salmon
2 - Estimated number of large salmon
3 - Total estimated catch
4 - Catch per unit effort (number of fish per rod day)

Table 5. Summary of multi-sea-winter salmon of various river ages in the Labrador commercial fishery.

Year	River age (%) 1	2	3	4	5	6	7	8	Mean river age	N
					Section 51					
1969		5	20	46	29	1			4.01	162
1970		1	7	38	39	16			4.61	225
1971		2	16	33	39	10			4.39	198
1976		2	18	47	25	8	0.4		4.20	229
1977		1	13	34	46	6	0.3	0.1	4.44	731
1978		1	16	53	24	5	0.3		4.17	952
1981	1	1	20	59	13	6			3.99	66
1982	0.3	6	25	40	24	5			3.97	322
					Section 52					
1969			4	46	46	4			4.50	199
1970		2	9	38	34	18			4.56	101
1971		1	6	43	36	13	1		4.57	336
1976		2	15	56	18	8	-		4.15	130
1977		3	11	30	41	13	3		4.58	232
1978		1	10	53	30	6	1		4.33	341
1979		1	32	50	44	3	-		3.86	361
1980		2	29	59	10	-	-		3.77	291
1981		10	33	38	19	-	-		3.66	21
					Section 53					
1977		9	18	32	26	11	5		4.27	183
1978		2	14	27	40	14	2		4.57	799
1979	0.1	3	21	34	31	10	1		4.27	769
1980	0.5	4	24	40	23	6	2		4.08	606
1981		2	24	37	32	4	1		4.15	449

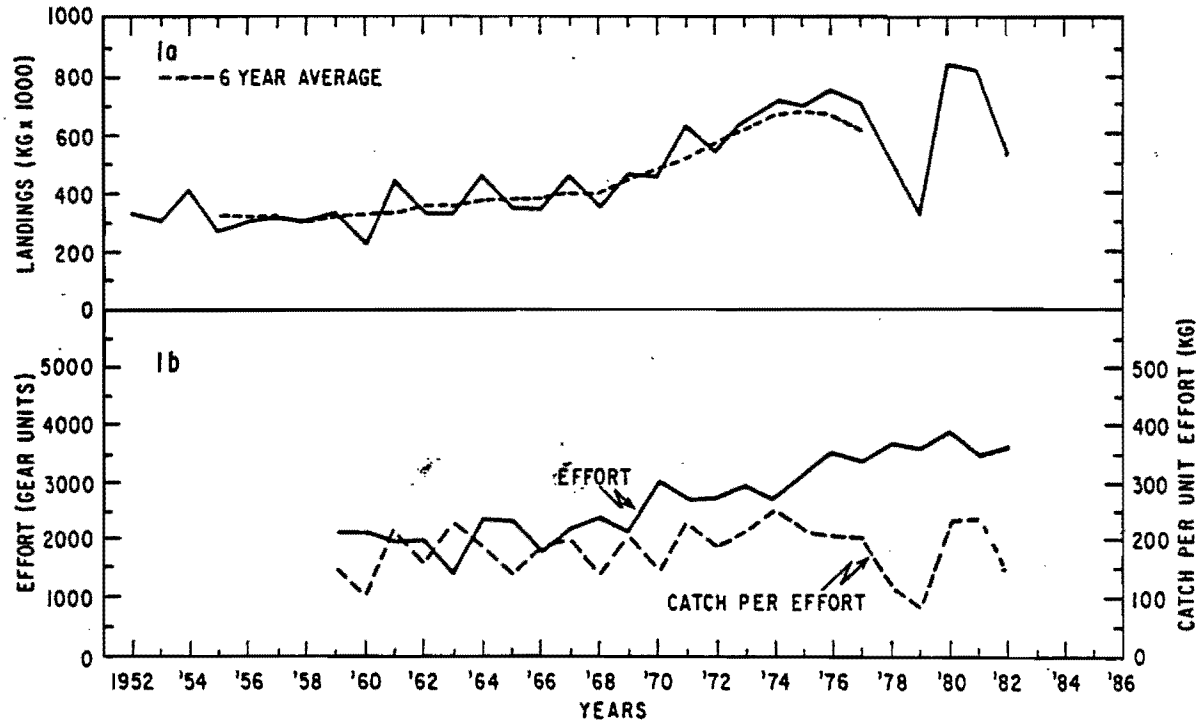
Table 6. Summary of 1-sea-winter salmon of various river ages in the Labrador commercial fishery.

Year	River age (%) 1	2	3	4	5	6	7	8	Mean river age	N
					Section 51					
1977		3	23	45	21	7	1		4.09	103
1978	1	1	37	33	19	9	1		3.98	154
1981	0.5	1	11	55	26	6	0.5		4.25	384
1982	1.5	23	44	28	3	0.5			4.09	1001
					Section 52					
1980	0.3	0.5	14	58	27	0.7			4.12	590
1981	2		6	67	25				4.13	49
					Section 53					
1977		2	18	26	35	17	3		4.55	200
1978	3	12	13	20	28	20	3		4.31	692
1979	2	10	18	42	22	5	1		3.91	372
1980	3	8	10	38	35	5		0.5	4.12	321
1981	3	3	7	35	38	13	1		4.45	412

Table 7. Summary of previous spawning salmon of various river ages in the Labrador commercial fishery.

Year	River age 1	2	3	4	5	6	7	8	Mean river age	N
					Section 51					
1969			22	45	33				4.11	18
1970			7	36	50	7			4.57	14
1971			11	56	33				4.22	9
1976				50	50				4.50	2
1977			11	48	30	11			4.41	44
1978			4	29	56	11			4.74	45
1981		13	49	29	9				3.34	45
					Section 52					
1969			36	41	23				3.87	22
1970					100				5.00	6
1971				62	38				4.38	8
1976			14	43	29	14			4.43	7
1977			14	57	29				4.15	14
1978				33	61	6			4.73	18
1979			32	46	18	4			3.94	28
1980			33	33	33				4.00	6
1981		17	50	17		17			3.50	6
					Section 53					
1977		8		25	34	25		8	5.00	12
1978		11	31	29	25	2	2		3.82	45
1979		6	24	26	36	8			4.16	53
1980	2	8	38	38	8	6			3.60	48
1981	2	6	56	25	10	1			3.38	63

Fig. 1a. Commercial landings (kg x 1000) of Atlantic salmon in Labrador, 1952-1982.
1b. Effort (gear units) and catch per unit effort (kg) for the Labrador salmon fishery, 1959-1982.



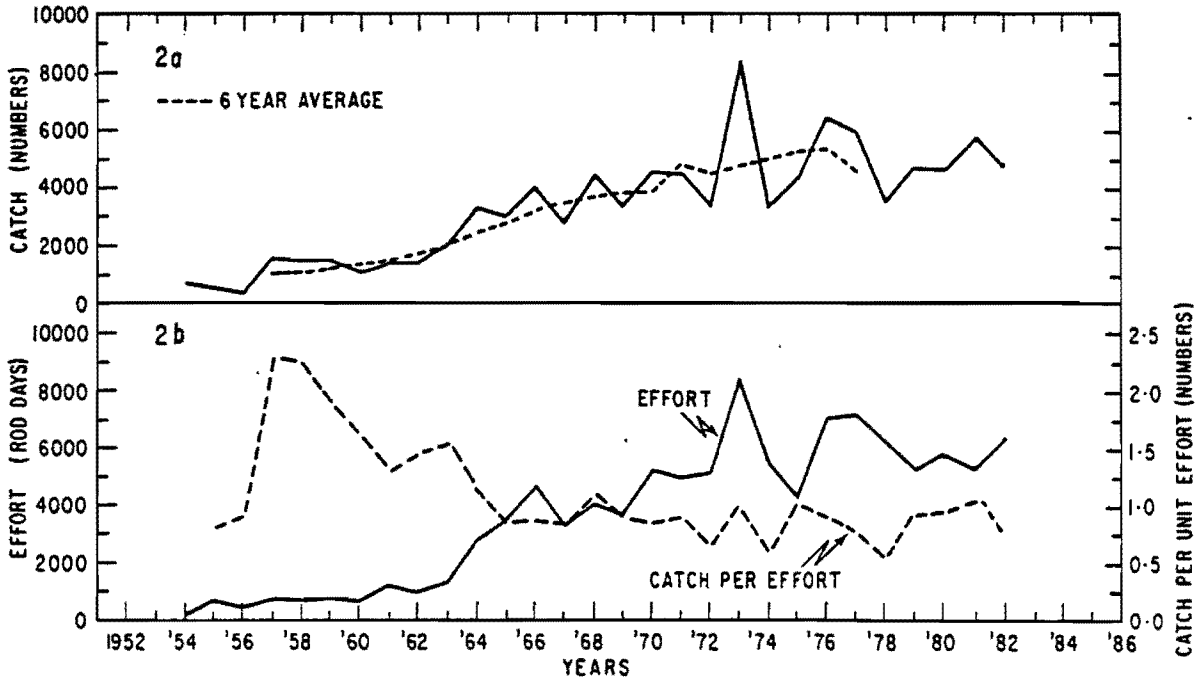


Fig. 2a. Recreational catch of Labrador Atlantic salmon, 1954-1982.
2b. Effort (rod days) and catch per unit effort for the recreational fishery.

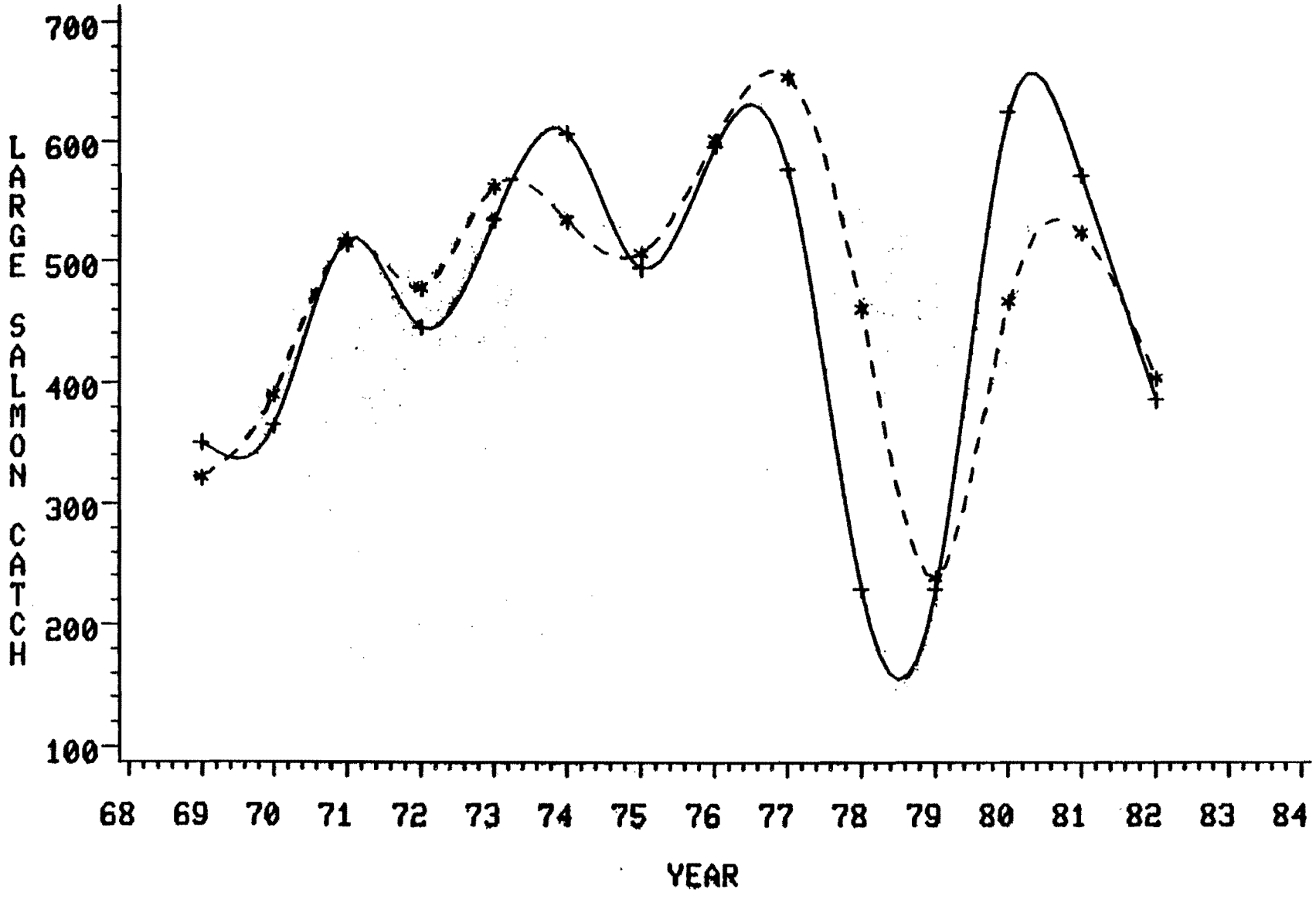


FIG. 3 OBSERVED (+) AND PREDICTED (*) LABRADOR LARGE SALMON CATCH (KG X 1000), 1969–1982