Canadian Atlantic Fisheries
Scientific Advisory Committee

CAFSAC
Advisory Document 81/2

Assessment of Anadromous Fish Stocks

At its February 26-27, 1981 meeting, the CAFSAC Steering Committee reviewed assessments of several anadromous stocks and provides the following advice:

Arctic Char Assessment

Labrador Stocks. Advice on the Labrador Arctic char stocks relates to the identification of quotas in those areas for which sufficient information is available. In 1980, landings of Arctic char decreased by 4% to 204 MT, partly due to a diversion of fishing effort into the improved salmon fishery. Char are normally fished in the bays, of which three had quotas in 1979 and 1980. These bays, with the 1979 and 1980 quotas, are: Anaktalik Bay, 21.5 MT; Tikkoatokak Bay, 39.5 MT; and Voisey Bay, 22.5 MT.

The assessment considered the catches and fishing effort for nine landing areas, all of which showed a decreased proportion of larger char over the 1977-80 fishing period. Based on yield-per-recruit models and assuming proportional relationships between fishing mortalities and catches in the 1978-80 period, TACs of 7 MT, 23 MT and 13 MT are recommended for Anaktalik, Tikkoatokak and Voisey bays, respectively, for 1981. These TACs assume that the biomass in 1981 will be similar to the average biomass during the 1978-80 period. In fact, declines in catch rates for these bays especially in 1980 suggest that biomass may have been declining. On the other hand, tag returns from the fishery suggest that local heavy ice conditions appear to have altered char distributions in 1980, effectively decreasing char availability in the inner bays. It is possible that catch rates and size distribution of landings would have been more in line with previous years if "normal" ice conditions had prevailed in 1980. This is further supported by the fact that, although catch rates in the inner bays declined in 1980 in some cases, those in the outer bays increased in many cases.

Therefore, although it is not possible at present to precisely define the extent of any decline by 1981, the TACs could be further reduced below those recommended above to account for the possibility of a decline in biomass. A new quota of 22 MT is recommended for Okak Bay.

Atlantic Salmon Assessments

Salmon Stocks of Labrador. Labrador salmon stocks were considered collectively and the general advice given refers to Labrador as a whole. Examination of the catch statistics indicates the salmon stocks are generally in a healthy state. The commercial catch in 1980 was the highest on record, which continued the increasing trend shown in the past two decades, a trend influenced by increased fishing effort. Recreational catches have also increased since 1959, but increased fishing effort has resulted in a generally reduced catch per unit effort in the recreational fishery.

The recreational catch, assumed to represent an index of spawning escapement, shows a significant correlation between grilse catches in one year with large salmon catches the following year. On this basis, the 1981 large salmon angling catch is expected to decrease from the 1980 level but should approximate the 1970-74 levels, in which years the average large salmon recreational catch was 657. Since recreational catch levels are being maintained, it appears that adequate spawning escapement is occurring.

The assessment did not show a need to change the level of present fisheries in Labrador for harvesting Labrador stocks. Some of the variability in Labrador commercial catches is due to the uneven annual appearance of non-Labrador stocks in the Labrador fishery and of varying components of Labrador stocks which are harvested in the Newfoundland commercial fishery.

Salmon Stocks of Insular Newfoundland. Only advice for the island as a whole can be given for these stocks since they were not considered individually, with one exception. Stocks were assessed by analyzing the level of commercial and recreational catches and their composition as well as fishway counts. Landings in both fisheries have increased since 1952 and 1953, and fishing effort also shows increasing correlation with time. Catches per unit effort have decreased in both fisheries with time. All Statistical Areas did not show the same trends over time as the total Newfoundland insular catches, though most did so. The percentage of grilse in the recreational fishery increased significantly over time in ten of the fourteen Areas.

In 1980, catches were above average in most Areas for both the recreational and commercial fisheries. Moreover, adult counts at eleven fishways were above average. The percentage of large salmon increased in all Statistical Areas, except Area C.

Table 1 indicates estimated spawning requirements by Area for insular Newfoundland. Because of the large number of stocks in the Newfoundland area and the lack of data being collected on representative rivers, CAFSAC could not provide meaningful figures on harvestable returns in 1981 for the island as a whole. Analysis of data collected at Western Arm Brook and in Area N, however, demonstrated correlations between smolt counts in one year and fisheries in Area N the following year. Thus, a large smolt run from Western Arm Brook in 1980 suggests an above-average run of grilse to Area N in 1981. Tables 2 and 3 show the most recent 10-year catches by Statistical Area in the commercial and recreational fisheries, respectively, of Newfoundland and Labrador.

It should be stressed that the increasing trend in the Newfoundland catches since the early 1950's does not have predictive capability for the catch in 1981.

Restigouche River, New Brunswick. The Restigouche River complex of salmon stocks is harvested locally by users in New Brunswick and Quebec. Angling and commercial catches before 1972 indicated that spawning escapements were declining and thus regulations in 1972 banned commercial fishing in Chaleur Bay and the Restigouche estuary and reduced angling. During the 10-year period (1961-70) prior to the commercial fishing ban, the recreational catch averaged 4500 fish/year but in 1968-71 the catch had declined to an average of 2800 fish/year. Since 1972 the recreational catch increased, reaching a high of over 11,000 fish in 1977. Commercial salmon catches before the ban averaged 19,800 large salmon in the 1967-71 period; however, the catch in 1971 just prior to the ban was 9900 large salmon. Unspecified catch estimates include harvests from the Indian food fisheries, by-catches and poaching; estimates in recent years range from 7000 to 11,000 large salmon and 2000 to 4000 grilse.

Angling statistics, whether federal or New Brunswick provincial, and in each case supported by Quebec provincial figures, show a significant correlation with fry levels observed in the river in the following year; thus the angling catches are an index of spawning escapement.

The 1981 angling catch if no commercial fishery operates in 1981 is predicted to approximate the mean catch of the past 9 years, though it may approach closer to the improved 1980 catch since contributing fry levels for the 2 years were similar. Present exploitation of the stock is believed to be at moderate levels although quantification of the removals with precision has not been possible. The present exploitation by the various components of the fishery approximates the harvestable surplus additional to the required spawning escapement (12,000 large salmon, 8000 grilse), which will be endangered if exploitation is increased. Consideration for re-allocation among present users of the resource is possible.

Miramichi River, New Brunswick. The Miramichi River has in the past supported the largest single complex of salmon stocks in Atlantic Canada. However, by 1968, it was demonstrated that spawning escapement was critically low and in 1971 the length of the fishing season was reduced, followed by a total commercial salmon fishing ban in 1972. Since 1972 the recreational fishery has averaged about 6000 large salmon and 10,000 grilse yearly. The average commercial catch over the 1951-71 period was about 40,000 large salmon/year. The 1971 catch immediately prior to the ban was 17,600 large salmon. Unspecified estimates include harvest from Indian food fisheries, by-catches and poaching which together have been estimated as 5000-23,000 large salmon and 7000-10,000 grilse in recent years.

The assessment presented here provides general advice on the salmon run expected in 1981. The strength of the assessment lies in the significant correlations observed between 1) the numbers of large salmon in one year and the numbers of grilse in the previous year at Millbank, 2) numbers of large salmon in the New Brunswick sport catch and numbers of large salmon at Millbank in the same year, and 3) numbers of large salmon in one year and numbers of grilse in previous year in the New Brunswick sport catch. Forecasts of stock strengths of grilse for 1981 were based on past catches. The assessment further relies on the use of an angling exploitation rate and a Millbank trap catch efficiency rate to complement each other. Quantified, though indirect, methods do show general agreement in the results by those two approaches.

Present exploitation of Miramichi salmon stocks is substantial, mainly as a by-catch in the groundfish fishery and in the recreational catch. This exploitation is endangering the attainment of a fully adequate spawning escapement. Thus, although the 1981 salmon run is expected to be slightly smaller than in 1980, available data with the range of parameters used indicates the present exploitation with present users approximates, at least, the harvestable surplus additional to a marginal spawning escapement (25,000 large salmon and 40,000 grilse) and thus no additional harvest should be considered for 1981. Re-allocation among present users of the resource is a possible consideration. No provision has been considered for the utilization of possible additional fish which might become available as a result of modifications in the Newfoundland commercial fishery in 1981.

Saint John River, New Brunswick. Advice on the Saint John River salmon stocks is the most specific of all those assessed. Though the salmon environment of the Saint John River has been most affected by man's activities compared to other major salmon rivers, the presence of the Mactaquac Dam provides a unique salmon counting opportunity.

In the 20-year period prior to 1969, commercial catches fluctuated between 6300 (1963) and 29,000 (1965) fish with average catches of 16,000 fish but reached low levels of slightly less than 4000 fish in 1969 and 1971. In 1972 commercial fishing was banned. Angling catches in the period prior to 1972 fluctuated from a low of 197 fish in 1968 to a high of 4070 fish in 1963, with an average of 2142 fish. Average catches since the commercial ban have been about 3200 fish/year.

Significant correlations appear in the relationship between grilse counts in one year and large salmon counts the following year, as measured at the Mactaquac fish collection facilities and these were used in the assessment to predict counts of wild fish in 1981 at Mactaquac. Counts of hatchery fish at Mactaquac were predicted from average return rates of smolts released in 1980 although no significant correlation existed between smolts released at Mactaquac and adult returns. A major difficulty with the data analysis is the uncertainty caused by the removal of unknown quantities of salmon and grilse before the run enters the fish collection facilities at Mactaquac. In addition, local harvest of wild and hatchery salmon and grilse were estimated from 1980 rates of local harvest.

The forecast for the 1981 run of grilse and large salmon to the Saint John River at Saint John using these values is similar to the 1980 level. Total returns are predicted to range between 33,000 and 50,000 fish, composed of 12,000-24,000 grilse and 21,000-26,000 large salmon. An alternate estimate attempting to provide a narrower range by using recent rather than long-term relationships suggests 19,500-22,000 grilse and 25,000-27,000 large salmon will appear. The spawning requirement of 6200 grilse and 8100 large salmon must be protected in this total return. Using this method previously, the expected returns calculated for 1980 were within 8% of the actual count at Mactaquac for 1980.

Table 1. Numbers of Atlantic salmon by Statistical Area required for spawning.

Statistical Area	Large salmon	Grilse
A	100	3,300
B	2,000	18,200
C	800	6,100
D-F Combined	100	1,600
G	300	6,700
H	300	3,000
I	200	5,600
J	600	15,300
K	3,300	17,400
L	1,600	10,200
M	800	5,400
N	200	4,900
O	12,900	63,400
	23,200	161,100

Table 2. Estimated numbers of Atlantic salmon harvested by the commercial salmon fishery of Newfoundland and Labrador, 1971-80.

Statistical Area	Year									
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980*
A	80,977	61,403	119,910	49,110	88,669	127,888	114,077	42,609	119,748	116,314
B	48,782	31,984	47,800	41,768	109,307	46,027	63,862	29,770	44,530	92,720
C	24,207	18,425	42,238	20,278	45,867	15,266	35,538	20,062	8,225	28,279
D	20,618	23,661	29,492	63,510	37,372	17,293	27,403	20,922	17,748	22,605
E	11,210	11,792	41,275	36,661	14,096	16,682	21,841	13,114	4,822	19,981
F	34,891	21,768	26,055	45,567	40,033	24,019	22,441	7,657	3,655	29,217
G	4,688	4,615	10,599	4,242	2,966	1,983	508	2,840	6,581	6,804
H	9,402	44,456	46,118	51,104	12,981	15,647	14,135	12,298	3,073	26,222
I	6,678	7,997	16,309	17,618	10,042	11,062	4,132	4,815	3,135	10,399
J	33,759	49,413	82,381	121,769	89,713	117,713	43,659	20,732	25,540	41,586
K	7,941	11,817	20,503	13,197	7,929	14,154	14,064	9,389	11,110	12,996
L	1,375	5,804	5,435	4,691	3,576	3,306	3,798	4,448	4,275	10,345
M	3,251	5,632	3,738	4,124	4,888	12,417	5,850	9,491	14,149	8,399
N	2,254	2,499	9,396	3,127	4,160	4,502	5,353	1,911	8,585	8,109
O	172,285	140,466	135,790	171,354	209,542	207,488	186,474	107,829	100,301	230,083
Newfoundland	290,033	301,266	501,249	476,766	471,599	427,959	376,661	200,058	275,176	433,976
Labrador	172,285	140,466	135,790	171,354	209,542	207,488	186,474	107,829	100,301	230,083
Total Province	462,318	441,732	637,039	648,120	681,141	635,447	563,135	307,887	375,477	664,059

*preliminary

Table 3. Numbers of Atlantic salmon harvested by the recreational fishery, Newfoundland and Labrador, 1971-80.

Statistical Area	Year									
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
A	776	520	1,220	874	1,153	1,040	1,677	850	2,166	1,856
B	3,841	3,468	6,759	5,455	6,109	6,871	9,482	9,276	8,353	9,921
C	1,718	1,915	2,124	1,658	2,011	1,963	4,660	2,886	1,351	2,731
D	56	119	250	304	95	249	420	303	246	334
E	40	61	131	135	40	30	79	100	125	103
F	34	28	98	51	87	80	81	44	100	120
G	1,639	1,147	2,180	1,503	1,878	1,635	1,089	1,320	1,719	2,440
H	945	571	1,827	1,226	436	740	1,102	1,637	857	1,551
I	1,779	1,800	1,592	1,462	979	1,250	1,441	1,441	915	2,008
J	2,816	4,139	3,970	3,723	4,092	3,258	3,279	2,959	3,265	3,954
K	5,999	5,089	7,450	5,066	6,527	5,675	5,349	2,924	2,656	4,886
L	4,568	4,415	4,210	3,039	6,362	5,334	2,412	3,220	3,466	4,020
M	1,939	1,166	2,828	1,398	2,130	4,341	3,605	1,859	3,217	2,164
N	2,141	1,366	2,796	1,804	2,732	3,048	2,431	1,363	3,294	1,683
O	4,420	3,371	8,501	3,304	4,299	6,556	5,880	3,458	4,727	4,689
Newfoundland	28,291	25,804	37,435	27,698	34,631	35,514	37,107	30,182	31,730	37,771
Labrador	4,420	3,371	8,501	3,304	4,299	6,556	5,880	3,458	4,727	4,689
Total Province	32,711	29,175	45,936	31,002	38,930	42,070	42,987	33,640	36,457	42,460