The Status of Arctic Charr Stocks in Labrador and Advice for their Management in 1984

At its meeting of February 20, 1984, CAFSAC considered the status of arctic charr stocks in various bays in the Nain area of northern Labrador (Fig. 1) and formulated advice on their management. In 1979, when TAC regulation was introduced to control fishing in the bays in the immediate vicinity of Nain, these bays (Tikkoatokak, Voisey and Anaktalik) yielded close to half the commercial landings from the Nain fishing region (Antons to Raman). Landings from these bays declined in relative importance until 1983 as management efforts to encourage fishery development in more northern areas proved successful. Catch controls were extended to Okak Bay in 1981 and to include Hebron Fiord in 1982. In 1982, landings from TAC regulated areas (94 t) accounted for 46% of the total (203 t) from the Nain fishing region. In 1983 landings from the Nain region declined to 150 t due to lower abundance of charr in inshore areas, lack of fishing in the Hebron-Saglek region, and reduced fishing effort due to coastal ice conditions. Advice is provided on the management in 1984 of the four fisheries presently controlled by TAC regulation.

Yield Per Recruit

Yield per recruit calculations carried out in 1983 were revised using historical mean weights at age from the 1970's, partial recruitment patterns from virtual population analyses and ages 6-15 to 20 depending on the availability of historical weight data for older ages. These led to values of $F_{0.1}$ of about 0.4 for Tikkoatokak Bay, Voisey Bay, Anaktalik Bay and Okak Bay, below the value 0.45 reported previously for a smaller age range. The yield per recruit at age 6 varied from 0.3 kg for Okak and Tikkoatokak bays to 1.1 kg per recruit for Voisey and Anaktalik bays. A value of $F_{0.1} = 0.4$ was adopted for further calculations. Recent mean weights at age differ from those historically observed, with younger fish being heavier and older fish lighter than during the 1970's. Should this prove to be a long-term change, further yield per recruit calculations will be required.

Tikkoatokak Bay

Landings of arctic charr from Tikkoatokak Bay increased steadily from 1974 to 1978 when 55 t were landed (Table 1). Catches have been regulated by TAC since 1979, the 1983 TAC being 35 t. The decline in catch rate from the 1977 peak of 420 kg/man-wk to 324 kg/man-wk in 1980 was reversed in 1981 and this reversal continued in 1982 when the catch rate returned to about the 1978 level. Fishing effort declined slightly, however, and as a result the 1982 catch remained at about the 1981 level of 28 t, below the level of the TAC. The 1983 catch was 16 t, well below the TAC of 35 t. Catch per unit effort declined by 39% in 1983 reflecting reduced abundance and a greater offshore movement of charr.

Tagging studies have shown that catches in the offshore area of Dog Island and Black Island consist largely of a mixture of charr originating in the Tikkoatokak-Nain Bay, Anaktalik Bay and Voisey Bay areas. Catches from these inshore areas were adjusted by adding part of the Dog Island-Black Island area catches with proportions estimated from tag returns.

Tikkoatokak Bay and Nain Bay were considered together as a single unit for stock assessment purposes. A cohort analysis using catches for 1977-83 and partial recruitment rates estimated from Fraser River counting fence data, was tuned using catch rate and effort information. The indicated fishing mortality rate of 0.30 in 1983 from this analysis was comparable to the value of 0.32 obtained by Paloheimo's method using inshore catch and effort data only and equalled an estimate derived from tag recaptures.

Projections of the 1984 catch at $F_{0.1} = 0.4$ give a value of 35 t for the total catch from the Tikkoatokak-Nain Bay stock. Historically about 3/4 of the total catch of this stock area has been taken inshore in the area regulated by catch quota. Therefore CAFSAC advises an $F_{0.1}$ catch of 26 t for the Tikkoatokak-Nain Bay areas.

Voisey Bay

Landings of arctic charr from Voisey Bay peaked at 34 t in 1978 but have been lower under TAC regulation since 1979. The catch of 3 t in 1983, from a TAC of 16 t, was the lowest since 1975. Catch rate and fishing effort also declined to the lowest levels since 1975. It is suspected that Voisey Bay charr moved offshore into the Antons area in 1983. Because of the low 1983 catch, CAFSAC had insufficient information to revise its previous advice that 16 t may approximate the long-term $F_{0.1}$ catch.

Anaktalik Bay

Landings from Anaktalik Bay peaked at 22 t in 1977. In 1979 and 1980, TACs of 21.5 t did not prove to be restrictive but TACs of 8.7 t in 1981 and 1982 were exceeded in both years. The 1983 landings were only 2.4 t (Table 1). Catch rates declined substantially in 1983. This decline is suspected to reflect decreased abundance and a movement into offshore areas. Catch at age for Anaktalik Bay was adjusted for catches on the Dog Island and Black Island area using tag recapture data. Fishing mortality is estimated to have been about 0.2 in 1983. Projected catches fishing at $F_{0.1}$ in 1984 are 8.2 t for the entire stock. Historically, about 3/4 of the catch from this stock has been taken inshore, corresponding to a catch of 6.1 t in 1984 in the quota regulated area.

Okak Bay

Landings from Okak Bay peaked at 36 t in 1978 and declined steadily thereafter, 1982 landings being 9 t. TACs of 27.3 imposed in 1981 and 1982 were not restrictive. In 1983, however, the catch 31 t exceeded the TAC of 21 t. The catch rate in 1983 was low, possibly due to ice conditions on the norther Labrador coast. The estimated 1983 fishing mortality was 0.5. The projected catch associated with $F_{0.1} = 0.4$ for 1984 is about 27 t.

Hebron Fiord

Since there was no fishery in Hebron Fiord in 1983, CAFSAC had no new information on the status of charr in this area.

Table 1. Arctic charr TACs and catches (t round), fishing effort (man-weeks) and catch rates (kg/man-wk) from regulated bays in the Nain area of Labrador, 1974-82.

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Tikkoatokak Bay										
TAC	-	-	-	-	-	39.5	39.5	28.5	35.0	35.0
Catch	10.0	27.7	31.6	39.5	55.0	37.9	42.1	28.1	28.3	16.2
Effort	28	76	81	94	147	108	130	80	75	65
Catch per effort	356	364	390	420	374	351	324	351	377	249
Voisey Bay										
TAC	-	-	-	-	-	22.5	22.5	16.1	16.1	16.0
Catch	20.0	0.2	12.2	22.5	33.6	21.9	11.6	16.3	7.7	3.0
Effort	64	2	45	56	85	59	52	53	38	17
Catch per effort	313	119	272	402	395	371	222	308	202	174
Anaktalik Bay										
TAC	-	-	-	-	-	21.5	21.5	8.7	8.7	11.0
Catch	7.8	2.5	14.7	21.6	13.1	14.9	8.0	9.2	10.8	2.4
Effort	28	10	45	63	55	76	53	32	27	24
Catch per effort	279	255	326	343	238	196	152	286	401	98
Okak Bay										
TAC	-	-	-	-	-	-	-	27.3	27.3	21.0
Catch	34.3	2.4	17.8	27.6	36.1	26.2	17.4	11.0	9.0	30.7
Effort	105	15	52	107	104	123	65	46	26	147
Catch per effort	326	157	343	258	347	213	268	240	347	209
Hebron Fiord										
TAC	-	-	-	-	-	-	-	-	29.1	20.0
Catch	-	-	-	6.0	-	-	2.9	39.9	37.8	-
Effort	-	-	-	37	-	-	-	106	98	-
Catch per effort	-	-	-	161	-	-	-	376	386	-
Nain Bay										
TAC	-	-	-	-	-	-	-	-	-	5.0
Catch	12.5	-	3.1	8.5	-	-	-	5.5[1]	-	0.5
Effort	37	-	10	28	-	-	-	29	-	8
Catch per effort	337	-	312	302	-	-	-	188	-	67

[1]Taken in immediate Nain area but outside restricted zone.

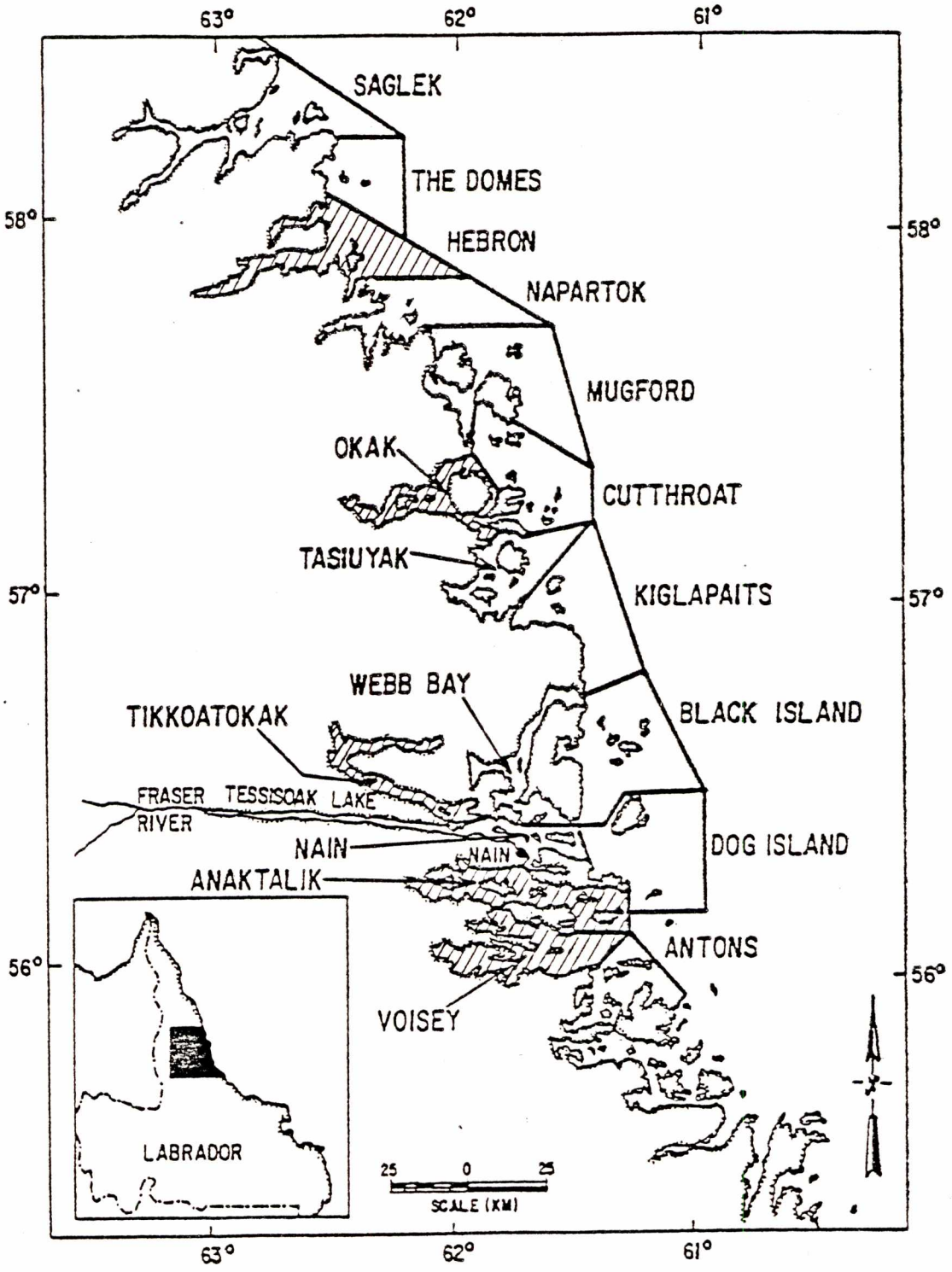

Fig. 1. Coastal breakdown of Nain commercial fishing areas for arctic char (Hatching indicates areas in which commercial fisheries were regulated by TAC in 1982.)