



The effects of the West Greenland
Salmon fishery on Irish stocks

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The mean weight of salmon in the Galway fishery (Ireland) in 1980 was 5.3 kg (S.D. 1.1). This was taken as the most recent estimate for the mean weight of Irish salmon. The weight increase for salmon of Irish origin between West Greenland and homewaters is 1.67kg, therefore:

$$\Delta \bar{W}_1 = 0.46$$

Then the potential loss to homewater stocks Y_{IHS} and homewater fisheries Y_{IHF} for every 100 tonnes of salmon taken at West Greenland is given by:

$$Y_{IHS} = N_{IH} \cdot \bar{W}_{IG} (1 + \Delta \bar{W})$$

$$Y_{IHF} = N_{IHF} \cdot \bar{W}_{IG} (1 + \Delta \bar{W})$$

which give values of 24 tonnes and 21 tonnes respectively for every 100 tonnes caught at West Greenland. If a West Greenland quota of 1191 tonnes is filled this would result in a potential loss to homewater stocks of 286 tonnes. On the basis of these figures the loss to Irish stocks for each tonne taken at West Greenland is 1.33 tonnes.

Conclusions

Salmon of Irish origin contribute in the region of 18 tonnes to every 100 tonnes caught in the West Greenland fishery. The potential loss to homewater stocks is in the region of 24 tonnes and in the region of 21 tonnes to homewater fisheries for every 100 tonnes taken at West Greenland. A quota therefore of 1191 tonnes would result in a potential loss of 286 tonnes to Irish homewater stocks. Each tonne of salmon of Irish origin taken at West Greenland results in a potential loss to homewater stocks of somewhere in the region of 1.3 tonnes.

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The effects of the West Greenland Salmon
fishery on Irish stocks

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Abstract: Salmon of Irish origin contribute in the region of 18 tonnes to every 100 tonnes caught in the West Greenland fishery. The potential loss to home-water stocks is in the region of 43 tonnes for every 100 tonnes taken at West Greenland. Each tonne of salmon of Irish origin taken at West Greenland results in a potential loss to homewater stocks of just over 2 tonnes.

Introduction

It was suggested by Ritter et al (1980) that their model to assess the effects of the West Greenland fishery on North American stocks and catches could be used to derive comparable estimates for salmon of European origin caught at West Greenland. This paper uses the proposed model with the necessary parameters for salmon of Irish origin to assess the effects of the catch at West Greenland on Irish stocks and the contribution of salmon of Irish origin to the Greenland fishery.

Theoretical growth and survival figures for the salmon caught at West Greenland have been projected to homewater fisheries under the proposition that the fish were not taken at West Greenland and therefore returned to homewaters. This approach has been used to quantify the effects of the West Greenland salmon fishery on homewater stocks and catches by ICES/ICNAF joint working parties (Anon 1967, 1969, 1971, 1973, 1974 and 1979).

In this assessment the estimates are based on values for each 100 tonnes caught at West Greenland.

Procedure

The steps followed were according to the model of Ritter et al (1980).

Estimate the number of salmon of Irish origin N_I taken by the fishery at West Greenland

Each 100 tonnes of landed catch by the West Greenland fishery is converted to numbers of fish by dividing by the mean weight of all the salmon in the fishery. The proportion of the stock harvested at West Greenland of European origin was estimated on the basis of discriminant function analysis of characteristics of scales from the Greenland fishery (Reddin and Burfitt, 1979) as averaging 41% for the North American component of the stock. Based on this estimate a value of 59% was used in the present assessment as the European component of the stock.

To estimate the proportion of salmon of Irish origin in the European component of the West Greenland stock the results of the 1972 international tagging programme in West Greenland (Møller Jensen, 1980) were used. Of the salmon tagged in 1972 which were recaptured in Europe 16% were taken in Irish waters. The proportion of Irish fish in the West Greenland conglomerate (P_{IG}) was estimated by

$$P_{IG} = P_{EG} \cdot P_{IE}$$

where

P_{EG} = The proportion of salmon of European origin at West Greenland

P_{IE} = The proportion of salmon of Irish origin in the European component of the Greenland

The value obtained (11%) was regarded as the best estimate available for the proportion of salmon of Irish origin in the West Greenland stock.

The other parameters required to estimate the number of salmon of Irish origin taken at West Greenland are a value for non-catch fishing mortality at West Greenland and a mean weight for West Greenland salmon. A range of 22-42% was suggested by Ritter et al (1979) as being appropriate for non catch fishing mortality at West Greenland. The mean of these values, 32%, was used in this assessment. A mean weight of 3.34 kg was derived from sampling the Canadian research vessels catch at West Greenland in 1978 (Reddin and Burfitt, 1979).

Then the number (N) of fish of Irish origin (I) taken by the fishery at West Greenland (G) is estimated by

$$N_{IG} = \frac{Y_G}{\bar{W}} \cdot P_{IG} \cdot \left(\frac{1}{1-M_G} \right) = 4843 \text{ fish}$$

where

- Y_G = a 100 tonnes of landed catch.
- P_{IG} = The proportion of the stock at West Greenland of Irish origin
- \bar{W} = Mean weight of salmon at West Greenland.
- M_G = The rate of non-catch fishing mortality in West Greenland.

II Estimate the weight \bar{W}_I of salmon of Irish origin in each 100 tonnes caught by the fishery at West Greenland.

The average weight of European salmon at West Greenland over the period 1969-1976 was 3.63 kg (Roddin and Burfitt, 1979). It was assumed for the purposes of this present assessment that salmon of Irish origin in the European component of the stock at West Greenland would have a similar average weight. Then the weight of salmon of Irish origin Y_{IG} in each 100 tonnes caught by the fishery at West Greenland is estimated by

$$Y_{IG} = N_{IG} \cdot W_{IG} = 18 \text{ tonnes}$$

where

W_{IG} = The average weight of European/Irish salmon at West Greenland

III Estimate the number of salmon of Irish origin (N_I) for each 100 tonnes caught at West Greenland that did not survive to reach homewaters (H) because they were caught in West Greenland.

The survival rate between West Greenland and the River Bush (Northern Ireland) was estimated by the inverse weight-at-age method for the 10 months period between sea-age 14 and 24 months, Doubleday et al, 1979). The Working Party on Atlantic Salmon in April 1980 assumed survival rates of between 90-95% for European salmon based on this work (Anon 1980). A mean value of 92.5 has been assumed in the present assessment. Then:

$$N_{IH} = N_{GI} \cdot S = 4480 \text{ fish}$$

where

S = The survival rate between West Greenland and homewaters.

IV Estimate the potential loss to Irish homewater stocks Y_{IHS} and homewater fisheries Y_{IHF} for each 100 tonnes taken at West Greenland.

The number of fish not available for harvesting in homewaters because of the West Greenland fishery can be calculated on the assumption that homewater catches will equal returns to homewaters from West Greenland reduced only by the associated losses to non-catch fishing mortality in the homewater fisheries (Ritter et al, 1980).

$$N_{IHF} = N_{IH} \cdot (1 - M_H) = 4032 \text{ fish}$$

where M_H = A value for non catch fishing mortality in homewaters

The weight increase for salmon of Irish origin between West Greenland and homewaters $\Delta \bar{W}_I$ is given by

$$\Delta \bar{W}_I = \bar{W}_I - \bar{W}_{IG}$$

where

\bar{W}_I = The mean weight of Irish salmon in homewaters

\bar{W}_{IG} = The mean weight of Irish salmon in West Greenland

The mean weight of salmon in the Galway fishery (Ireland) in 1980 was 5.3 kg (S.D. 1.1). This was taken as the most recent estimate for the mean weight of Irish salmon. The weight increase for salmon of Irish origin between West Greenland and homewaters is therefore

$$\Delta \bar{W}_I = 1.67 \text{kg}$$

Then the potential loss to homewater stocks Y_{IHS} and homewater fisheries for every 100 tonnes of salmon taken at West Greenland is given by

$$Y_{IHS} = N_{IH} \cdot \bar{W}_{IG} \cdot (1 + \Delta \bar{W})$$

and

$$Y_{IH'} = N_{IHF} \cdot \bar{W}_{IG} \cdot (1 + \Delta \bar{W})$$

which give values of 43 tonnes and 39 tonnes respectively for every 100 tonnes caught at West Greenland. If a West Greenland quota of 1191 tonnes is filled this would result in a potential loss to Irish homewater stocks of 512 tonnes. On the basis of these figures the loss to Irish stocks for each tonne taken at West Greenland is just over 2 tonnes.

Conclusions

Salmon of Irish origin contribute in the region of 18 tonnes to every 100 tonnes caught in the West Greenland fishery. The potential loss to homewater stocks is in the region of 43 tonnes for to homewater fisheries is 39 tonnes for every 100 tonnes taken at West Greenland. A quota therefore of 1191 tonnes would result in a potential loss of 512 tonnes

to Irish homewater stocks. Each tonne of salmon of Irish origin taken at West Greenland results in a potential loss to homewater stocks in the region of 2 tonnes.

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