

ANADROMOUS AND CATADROMOUS
FISH COMMITTEE

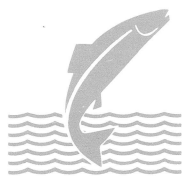
Report of Activities

ICELAND

(Árni Ísaksson)

1989

VMST-R/89007



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Eintak bókasafns.

Veiðimálastofnunin í Reykjavík.

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Iceland

(Arni Isaksson)

Atlantic salmon (Salmo salar)

The salmon fishery

According to preliminary statistics the total catch of salmon in Iceland in 1988 was 134.000 fish, with 47.000 from sport fisheries, 23.000 from riverine net fisheries and approximately 64.000 from commercial salmon ranching. There was a 60% increase in the sport and net fisheries compared with 1987, primarily due to high grilse abundance. The grilse runs were strong both in the southwestern area where they usually dominate the catch and on the north and east coasts where 2SW salmon usually make up bulk of the catch.

Salmon ranching stations recorded over 10% returns in grilse runs and the ranching contribution to catches was four times higher than in 1987, partly due to higher return rates, but primarily due to increased releases in 1987.

New management measures

The growth of the aquaculture industry in Iceland in recent years has aroused concern regarding the effects of cage rearing and ranching on wild stocks. Cage rearing is carried out in the vicinity of Reykjavik, but ranching is increasing rapidly in various areas on the west coast. In late 1988 two regulatory measures were enacted to minimize the effects of aquaculture on wild stocks.

In 1988 a regulatory measure was enacted, which limits the distance of sea-cages and salmon-ranching stations to 15 km from the estuaries of salmon streams with an average annual catch exceeding 500 salmon. For streams with a catch of 100-500 salmon this distance must be at least 5 km, although respective parties are permitted to settle for a smaller distance if local stocks are being reared.

There was further enacted a regulation which limits the use of Norwegian origin salmon stocks to land based rearing operations. Norwegian salmon eggs have been imported 3 times to Iceland under severe inspection and quarantine conditions. The progeny from those eggs are now becoming sexually mature and eggs are available to the aquaculture industry. Being of foreign origin those stocks are considered potentially harmful if released into the wild.

Investigations

1. Estuarine feeding of smolts

Initial information from this project indicated that hatchery smolts, which usually were over 30 grams in weight, were feeding on fish, primarily sticklebacks and sandeel, whereas the smaller wild smolts were rather feeding on insects and copepods. It is difficult to evaluate, if this variance is due to the size difference in the smolts or to different feeding habits, where hatchery smolts are more used to pelagic feeding of pellets in hatchery tanks.

2. Juvenile studies

The strengths of juvenile year-classes are determined annually in most major salmon streams. These surveys are performed by the staff of Institute of Freshwater Fisheries on a service contract basis for the river owners. These studies give fairly good ground to foresee downward fluctuations in salmon catches and bring in enhancement measures if the need arises.

The Miðfjarðará project was continued by the north coast district office. Smolt and adult traps were operated on the Núpsá tributary in 1988. About 1700 wild smolts were caught and microtagged on their seaward migration. The effectiveness of the smolt trap needs improving as it performs poorly under flood conditions, when many of the smolts migrate. In addition 1200 wild smolts were captured and microtagged in a tributary of the river Vatnsdalsá, another north coast salmon stream.

The return rates as grilse of wild smolts tagged in 1987 varied from 1 to 8% depending on the time of seaward migration. Comparable returns of hatchery smolts were 5.4 and 8.3%, being highest for estuarine releases.

Considerable quantities of one summer old fry have been released above impassable waterfalls in the Miðfjarðará district. These are contributing considerably to the sport fishery in the area, up to 40% of the total run in some tributaries. The total returns from those juvenile releases are estimated to be 2-4%.

3. Rearing and ranching

There are numerous research programs being performed concerning salmon rearing and ranching. At Kollafjörður Experimental Fish Farm the first batches of tagged smolts from selected families in the selective breeding program for ranching will be released in 1989. Results from the selective breeding program have already demonstrated considerable genetic variation in hatchery survival and freshwater growth between families. The Kollafjörður ranching strain has also been shown to be far superior to wild stock in those traits.

Experimental production of 500 gram one-year supersmolts are still ongoing with the intent of being subsequently able to rear these fish to market size in 6 months in sea cages. The primary problem encountered is untimely sexual maturity. Various methods are being tried to control this, such as induced triploidy, salinity control and starvation at certain times.

The economic viability of ranching is largely dependent on the production cost of smolts. Wild smolts in Iceland tend to be 15-20 grams, whereas most hatchery smolts are 25-40 grams at release. Experiments have been started to study the viability of small hatchery smolts. This has also bearing on the production of 6 month zero smolts, which seems to be a possibility by enhancing initial feeding of fry.

4. Stock assessment

The monitoring of upstream migrants was continued on the Blanda river system in 1988. The run size of salmon was comparable to 1987. The return rates from hatchery smolt released in 1987 were approximately 1%.

A new research project was initiated on the Elliðaár river in south-western Iceland in 1988. This river was extensively studied in the late 1970's and provided very good data for wild smolt survival and comparison with hatchery smolts. There are good facilities on the river to monitor downstream as well as upstream migrants.

The new research program is expected to become a long term program, which will provide information on fluctuation in wild smolt survival, spawner-recruit relationships as well as egg to smolt survival. An important part of the program will be the monitoring of fish farm escapees in the sport fishery as cage culture has been growing in the vicinity of Elliðaár.

5. Tagging and marking

Total releases of microtagged smolts in 1988 amounted to 235 thousand smolts. Over 229 thousand of these were of reared origin and 6 thousand were wild smolts. Over 185 thousand smolts were released on the west coast of Iceland, but almost 50 thousand on the north coast. Several hundred upstream migrants were tagged with numbered spaghetti tags in the Blanda and Miófjarðará river systems.

Other species

Investigations

1. Arctic char (Salvelinus alpinus)

Sea-run arctic char were studied in the Blanda stock assessment project and many were tagged with external tags. These studies continue to give important information on the homing of arctic char.

The interaction of arctic char and brown trout in the veiðivötn complex continued to be studied. The arctic char populations continue to expand in many of the lakes with resulting reduction in brown trout populations. Gill infections are common on brown trout in those lakes shared with the arctic char. The brown trout populations need running water to spawn and have thus lower recruitment rate than the char. Releases of brown trout fry into the lakes have proven effective in improving this situation.

Arctic char are being reared in several experimental projects in Iceland. They have turned out to be easy to rear and fast growing at relatively low temperatures (7-9°C). Char is at the present time considered one of the more promising new species for aquaculture.

Sea-run brown trout (Salmo trutta)

Sea-run brown trout are a dominant species in parts of southern Iceland. These population are being monitored with electric fishing in the streams and by tagging migrants. No new information is available for 1988.

Salmon and trout farming

1. Production

By the end of 1988 109 fish farms were in operation in Iceland, whereof 63 were engaged in smolt production, 42 were rearing salmon in land-based units, 37 were operating sea-cages and 26 involved in salmon ranching. A lot fewer fish farms were, however, responsible for the bulk of the production as seen in the following tables:

Salmon production

Salmo salar

Type of production	Number of sites involved in production	Production in 1988
Smolts	41	9.5 million
Land-based	17	425 tonnes
Sea-cages	15	629 tonnes
Ocean ranching	16	160 tonnes

Trout production

Rainbow trout(Salmo gairdneri)

Smolts(numbers)	477 thousand
Market size	136 tonnes

Brown trout(Salmo trutta)

Fry(numbers)	200 thousand
Smolts(numbers)	200 thousand
Market size	10 tonnes

Char(Salvelinus alpinus)

Fry(numbers)	34 thousand
Smolts(numbers)	53 thousand
Market size	10 tonnes

2. Fish diseases

Kidney disease (*Renibacterium salmoninarum*) and a mild variety of furunculosis (*Aeromonas salmonicida* var. *achrom.*) continue to be the major diseases of concern in Icelandic fish farms. Kidney disease tends to be associated with ranching stations, but recent investigations indicate that the disease can be kept at a low level by destroying eggs from infected females. Furunculosis tends to appear in stations using salt or brackish water but is of minor concern in smolt stations using sterile ground water. *Vibrio anguillarum* has recently appeared in sea-water farms.

CONTRIBUTING INSTITUTION

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