Agenda Item 7.2
For Information

Council

CNL(06)26

Draft Implementation Plan for Iceland

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I. Introduction

The salmon resource

There are close to 250 rivers, large and small, in Iceland and they have been classified according to origin into glacial, direct run-off and spring fed rivers. The productivity of the rivers varies greatly according to their location, water source, volume of flow, topography and temperature, especially during the summer months. About 60 rivers produce exclusively Atlantic salmon but minor runs of salmon are found in many sea trout and char rivers.

The Atlantic salmon ascends about 80 rivers, many of which are located in the western part (figure 1). Other major sports fishing areas are located in lowland areas of the northwestern and northeastern coasts as well as the productive agricultural area of the south coast. The best salmon rivers originate in lakes, which secures stable water flow and favourable temperature during the summer. A river suitable for salmon usually maintains a water temperature in excess of 10° C for a period of three months during the summer. Salmon are thus primarily found in lake-fed and run-off rivers but some glacial streams have harboured salmon, where they have traditionally been harvested with set nets.

The management system

One characteristic of the Icelandic freshwater system is the fact that the right to harvest salmon and trout in rivers and lakes is privately owned and follows the ownership of the land that adjoins the river and can not be separated from that ownership. The fishable sections of the rivers are usually in agricultural areas, where the land is most often owned by farmers. The river owners are by law obliged to form an association to share expenses and income from the river. Share of each owner, which is based upon length of his river bank, catches and salmonid nursery areas is estimated by an appointed committee of experts. These associations are responsible for management of the local fishery in accordance with the Salmonid Fisheries Act, but they often also attend to local conservation, hire wardens, build and run fishing lodges, build fish ladders and undertake various enhancement activities in order to improve fishing under the supervision of the official management authorities.

It has been of major importance for the Icelandic salmon resource that mixed stock fishing for salmon in the sea has been forbidden since the early 1930s. Exempted originally were 12 coastal farms with heritable rights to fish for salmon in gill nets but these were soon phased out through buy-out and lease arrangements. The last remaining coastal net fisheries were bought and phased out in the mid 1990s. Since that time there have been no legal coastal salmon fisheries. Severely regulated char fisheries are, however, permitted in a few areas on the north coast.

The salmon fisheries

Icelandic salmon were traditionally caught in fixed riverine set nets, but the importance of angling started increasing early in the 20th century. The contribution of sports caught salmon has gradually been increasing and is now over 90 % of the total catch. This change both reflects the increased value of the sports fishery as the price of commercially caught salmon has dropped as a result of the great supply of salmon from aquaculture. In some glacial rivers this has led to the buy-outs and leases of the nets by the owners of up-river tributaries.Where gill-netting still occurs it is limited to half the week from Tuesday morning through Friday night. The largest remaining net-fishery occurs on the "Ölfusa" river close to Selfoss.

There is great enthusiasm for salmon angling among Icelanders and a great number of foreign anglers visit Iceland each summer. The fishing season starts in early June and extends through September, but each stream can only be fished for 3 months. There has been some increase in "catch and release" in salmon angling, which is currently about 17 % of the total angling catch.

Atlantic salmon are of great economic value with respect to sports fishing. It has been estimated that the direct and indirect revenue from salmon angling corresponds to thousands of US dollars per angled salmon.

The management strategy

The main objective of the Icelandic management regime is to secure the sustainability of the salmon resource through rational utilization and management. The river associations have the responsibility to manage the resource towards that goal within the framework of the Salmonid Fisheries Act, which is enforced by the salmonid division of the Agricultural Authority of Iceland. The official authorities specify the number of rods permitted on a river but daily and monthly fishing periods are specified by law. The river associations often have additional rules restricting tackle and the number of salmon retained per day of fishing. All salmon fishing is thus restricted with respect to annual, weekly and daily fishing time and with respect to the number of set nets and rods used on any river.

Habitat protection

The prime responsibility for environmental protection rests with the Icelandic Environment and Food Agency. According to the Salmonid Fisheries Act, however, the responsibility to protect rivers and river beds is the task of the salmonid division of the Agricultural Authority of Iceland although flood control is within the auspices of the Icelandic Soil Service. The most important activities within river areas, which need to be supervised and monitored, are gravel mining, river diversions, improvement of fishing holes, river-bank repairs and construction of fishways. These are all subject to licensing by the Agricultural Authority.

II. Status of stocks

Rod fishery is by far the most common fishing method in the salmon fishery in rivers in Iceland. Since the early 1970´s fishing effort and the fishing season in the rod fisheries have remained stable. The rod catch is recorded, by the fishermen, in logbooks with individual recordings on date of catch, weight, length, sex, location (pool) and bait. In the net fishery the catch is usually recorded as total daily catch. Comparison of the number of salmon in the yearly run, measured with fish counters and the rod catch show that the exploitation rate remains relatively stable over time and the catch reflects the run size (Gudjonsson et al. 1996). The rod catch statistics can therefore be used, to large extent, as a measure for status of stocks, number of returning adults, as a basis for calculating the spawning stock and the annual number of eggs spawned. For the past 10 years the catch landed in salmon fisheries has been 84% of the total reported catch compared to 16% in net fisheries. Since 1997 all harvest of salmon in Iceland is in freshwater. With the exception of the remaining net fisheries, mainly in two glacier rivers with salmon producing tributaries, salmon fisheries are based on a single stock. The catch statistics can be regarded as a measure of salmon abundance in Icelandic salmon rivers (Figure 1). From 1996 the proportion of catch and release have been recorded separately in the rod fisheries (Figure 2). The glacial in-river netting effort also remains relatively stable (Figure 3).

Juvenile abundance is estimated each year in several Icelandic rivers in electrofishing surveys (Arnason et al. 2005). Juvenile growth rate is higher in Southern and Western Iceland than in the North and East reflecting the difference in climatic conditions in these regions (Antonsson et al. 2005). Difference in climatic conditions is also reflected in higher smolt age and later smolt run in north and eastern Iceland (Antonsson and Gudjonsson 2002). In recent years increased juvenile growth rate has been observed in Icelandic salmon stocks followed by a lowering smolt age. The increased growth rate can possibly be related to elevated annual river temperatures in recent years.

Estimates of smolt production are made for Ellidaar and Vesturdalsa. Smolts from part of the run are microtagged and numbers of out-migrating smolts are estimated from the proportion of tagged/untagged fish, when the smolts are returning as adults. Fluctuations in smolt production have been observed as well as in sea survival as reported to the NASWG (Anon 2006).

The 2SW salmon in Icelandic salmon rivers have been declining in numbers and in the catch since the mid 1980s. No such decline is evident for the 1SW salmon (Figure 4). The lowering number of 2SW salmon is believed to reflect higher mortality during the second year at sea (Gudbergsson and Gudjonsson 2003). Before the 2002 fishing season the Institute of Freshwater Fisheries, the Federation of River Owners and Association of Icelandic Angling Clubs encouraged anglers to release 2SW salmon. This was mostly done through voluntary releasing of 2SW salmon caught on a fly. This request has subsequently been continued.

Setting of river based conservation limits for Icelandic salmon rivers continues. This will take some years with the estimate of wetted areas and in river habitat assessment as the most time consuming factor. Until the in river conservation limits have been established the NEAC-PFA model will be used for Icelandic stocks (Anon 2006).

No Icelandic salmon stocks are listed as endangered or threatened. However, with low abundance of the 2SW stock component, and high exploitation rate observed in Icelandic rivers, river owners and the competent management authorities should be aware that some stocks might suffer from reduced reproductive capacity.

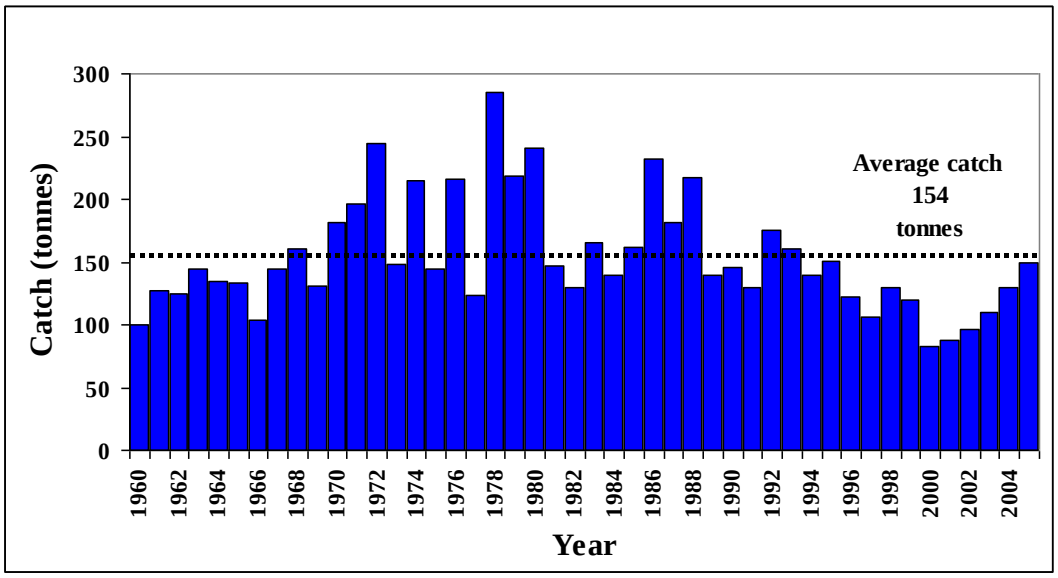


Figure 1. Rod and net catch of Atlantic salmon in Iceland 1960-2005.

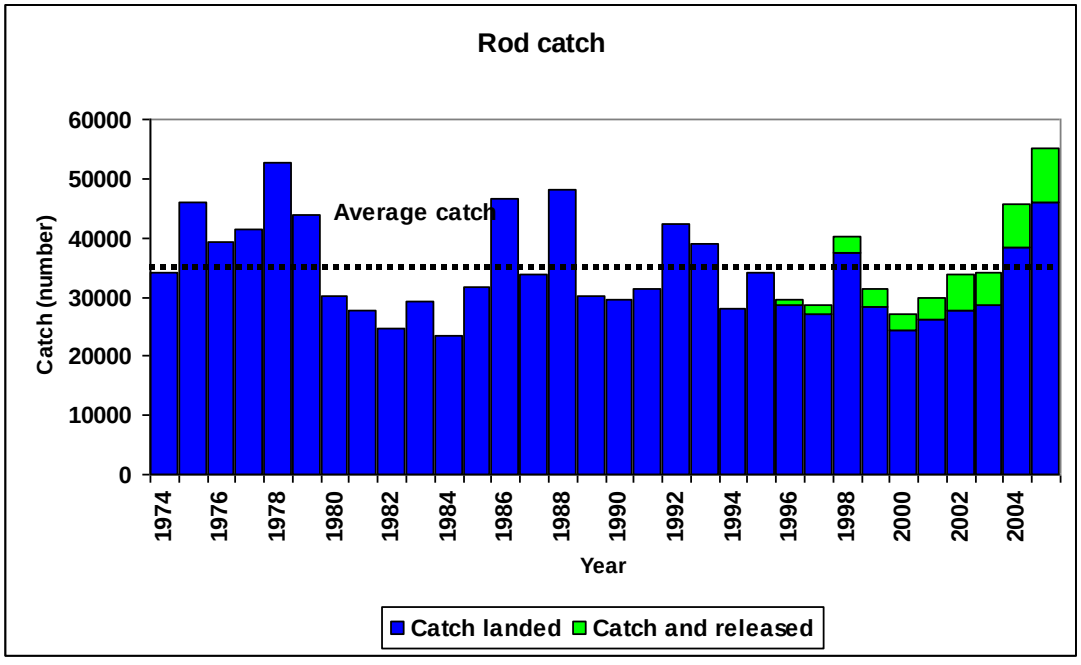
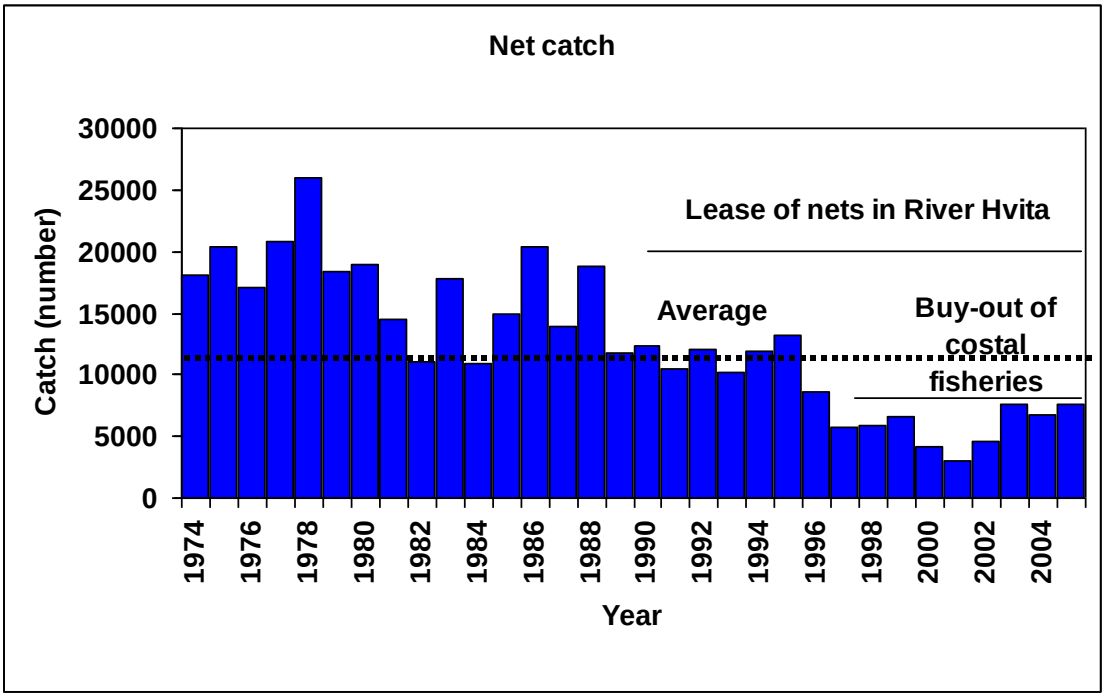


Figure 2. Number of salmon retained vs. those released in Icelandic salmon angling1974-2005.



Figur 3. Catch of Atlantic salmon in gill-nets in Iceland 1974-2005.

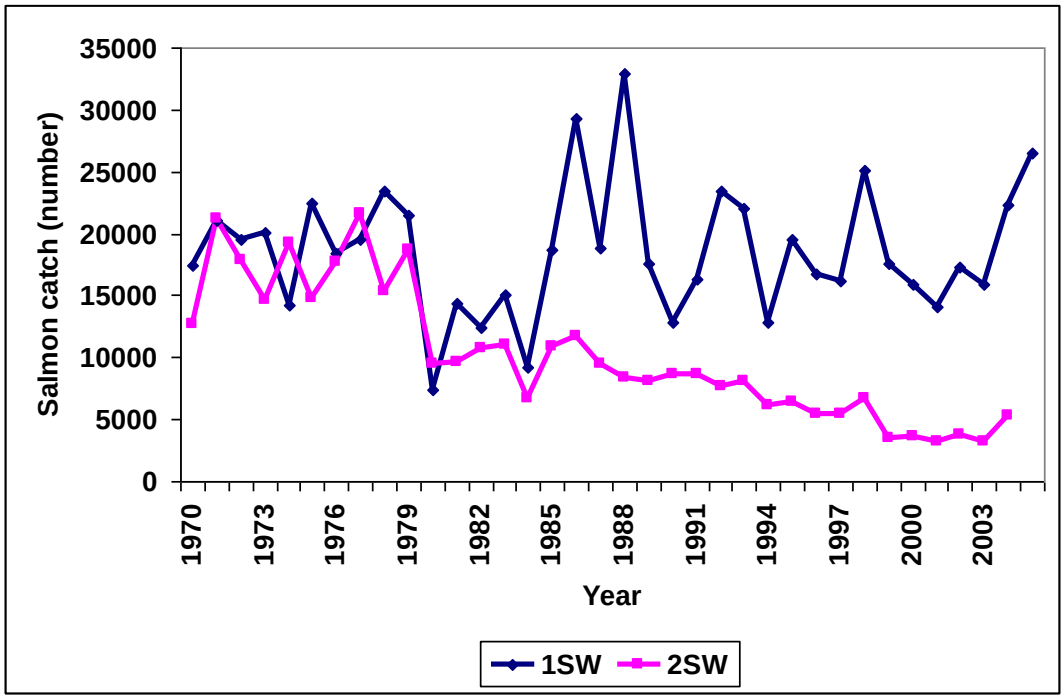


Figure 4. The catch of 1SW and 2SW salmon, by smolt cohort, caught in Icelandic rivers having continuous catch records since 1970.

III. Threats to stocks and current management measures

There are a number of human and environmental factors, which have the potential to harm salmon stocks. The most important ones are overexploitation, by-catch of salmon in marine fisheries, factors affecting freshwater or marine habitat as well as impact of aquaculture and transfers of salmonids. Each factor will now be discussed separately

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1. Effects of salmon fisheries

Angling is currently the predominant method for harvesting Atlantic salmon in Iceland. Out of a landed catch of 53.500 salmon in 2005 only 14 % (7.500) were harvested in nets primarily in two glacial rivers on the south coast (Guðbergsson 2006). There has been a dramatic decrease in this netting activity during the last 5 years and there is no legal netting activity in estuarine or coastal areas. The harvest is thus truly in terminal fisheries.

The angling catch in 2005 was almost 55.200 , which is the highest since 1978, whereof 9.200 salmon (16,7 %) were released. Anglers are encouraged to release larger (2SW) salmon due to an obvious decline in that stock component during the last 15 years, especially in northern areas.

The exploitation effort in angling has historically been controlled through a limitation of rods being used in each river. Thus only about 350 salmon rods harvested a total of 55.000 salmon in 2005, which corresponds to about 157 salmon per rod over the salmon season, which last about 100 days. This catch per unit effort is about 50 % higher than the goal set by managers, which corresponds to approximately 100 salmon per permitted rod over the length of the season in the best rivers. The average catch per utilized rod per season during the last 30 years is close to 85 salmon for all Icelandic salmon rivers but highly variable between rivers and much higher for the most productive ones. The average angler can thus expect to catch about one salmon per day of fishing.

Current management measures include:

- No legal salmon fishery in marine or coastal areas.
- Limited salmon netting in glacial rivers
- Limited angling effort through rod control.
- Limited daily as well as seasonal fishing period.
- Voluntary release programs.
- Limitation of retained salmon
- Bait limitation in some rivers

Considering limited effort both in net fisheries and angling, considerable release of larger salmon and a daily salmon quota set in many rivers there is little ground to suspect that conventional salmon fisheries in Iceland are overexploiting the salmon stocks. This, however,may not be without exception and needs to be monitored carefully by managers due to the current decline in 2SW salmon stocks, which are predominantly females and have contributed significantly to spawning especially in northern and eastern areas.

2. Effects of by-catch

The information on by-catch of salmon in other types of fisheries has tended to be anecdotal in nature. It is known that some salmon have been taken in legal coastal fisheries for char, especially on Iceland´s west and north coasts. Recent regulations, which ban char fishing during the peak migration of salmon have considerably reduced the seriousness of this problem.

Incidental by-catches of salmon have at various times been reported in conjunction with seining and pelagic trawling for herring (CNL(03)27). Subsequently the Institute of Freshwater Fisheries and the Federation of Icelandic River owners in 2004 and 2005 made a contract with IMG-Gallup in Iceland to include two questions regarding by-catch of salmon in an annual fisheries questionaire to commercial fishermen (Anon 2006). Over 20 % of those responding reported some

by-catch of salmon in fisheries targeting marine species. Based on data from these two surveys it was estimated that over 5000 salmon might have been caught as by-catch in 2005 mostly by large vessels using pelagic trawls and purse seines. Although a sizeable catch it is only fractional compared to the 1,7 million tonnes of all marine species landed by the Icelandic fishing fleet in 2005 (0,001%), which will make by-catch regulation very difficult.

Current management measures:

Little is currently being done to control by-catch in marine fisheries but the following regulations have recently been set to control legal char fisheries:

- Regulation no. 261/1996 controlling identification, length and mesh-size used in coastal char fisheries (In Icelandic).
- Regulation no. 300/1998 banning net fishing for char in Hvalfjörður (In Icelandic).
- Regulation no. 372/2004 banning net fishing for char in Faxaflói, Skjálfandaflói and Þistilfjörður annually from June 10th through August 10th (In Icelandic).
- Regulation no. 373/2004 banning net fishing for char in Eyjafjörður annually between May 15th and August 15th (In Icelandic).

Numerours other regulations on net fishing for char have been set for more local areas through the past 60 decades.

3. Factors affecting freshwater salmon habitat

The main factors which frequently affect the riverine habitat of salmonids and their relevance to the Icelandic situation are shown in figure 5. The factors are listed clockwise in the order of decreasing importance (see CNL (03)15). The main relevant points are the following:

Figure 5. Main factors which can affect the freshwater habitat of salmonids

Soil erosion

Soil erosion has been a serious problem in Iceland for centuries. At the time of the settlement in the 9th century a large part of Iceland was presumably covered with vegetation. The settlers used any available wood for fire and grazing of animals affected the lowland areas. Increased sheep herding during the latter part of last century created erosion problems even in the interior of Iceland. Human activity, wind, water and frost have thus acted in combination to enhance soil erosion and increase flash flooding and siltation in rivers. This is currently being restored to some extent through fertilization and seeding of inland areas.

Land drainage

During the latter part of the 20th century many wetlands in Iceland were dried up through canalization to create fields for farmers. This changed the habitat of various wetland birds and reduced the capacity of the lowland areas to act as a water reservoir for rivers.

Gravel mining

Rivers carry a great deal of gravel downstream especially in high velocity mountain areas. Gravel can be mined without environmental problems in certain rivers and areas. Caution should, however, be exercised in highly productive salmon rivers and gravel mining carried out under the supervision of experts.

New predators

Mink was introduced to Iceland for culture in the 1930s and again in the 1970s. This new predator is now observed around most rivers in Iceland and is likely to cause considerable problems on small rivers, especially for smolt and trout size fish. Sea gull populations have also increased around populated areas and are a known menace for migrating smolts.

Agricultural pollution

Agricultural pollution is due to agricultural waste from farms and the run-off from fertilized fields. This is not a problem on most rivers.

Sewage pollution

Poorly treated sewage only flows into few major main-stem glacial rivers. Mostly applies to a few municipalities on Iceland´s south coast.

Fish farm runoff

Some smolt and char farms in Iceland are located on rivers. Very few fish farms are, however, located on salmon rivers. There are possible pollution and escapee problems, which must be solved through appropriate filtering techniques such as rotating filter screens.

Sea-cage escapees and ranching

Rearing in sea-cages is limited to non-salmon areas and commercial ranching is non-existent. Escapees from sea-cages are currently not a problem in Iceland (see section 4).

Hydroelectric projects

Hydroelectric projects are mostly located on glacial rivers in Iceland´s interior areas. Such developments are currently not a threat to salmonids. Can create a better environment for salmon through removal of glacial debris.

Acid rain

Acid rain has not been observed in Iceland. The Icelandic basalt is an alkaline rock, which tends to neutralize acid. Acid rain is currently not a problem for salmonid populations in Iceland.

Current management measures:

- Building of fish ladders and fishing holes as well as the reinforcement of river banks must be permitted and approved by the Agricultural Authority of Iceland. These activities are normally permitted upon the recommendation of the relevant river association and the project must be designed by an expert. Fish ladders have opened up large new spawning and nursing areas for salmon above impassable waterfalls.
- Gravel mining in or close to rivers needs the approval of the Agricultural Authority of Iceland. There are efforts underway to reduce gravel mining, control site selection as well as the quantity taken and introduce river improvement technology.
- Road culverts can be a problem with respect to salmonid migration and are under observation through environmental impact statements.
- Construction of channels to drain wetlands, which is controlled by the Environmental and Planning Agencies, has been greatly reduced but limited measures have been introduced to bring the wetlands back.
- Fish farms need a license both from the Environmental Agency and the Agricultural Authority of Iceland and through that process there are efforts underway to introduce rotating screen filters on all farms with outflow into rivers.
- Relatively few small towns on Iceland´s south coast spill sewage into large mainstem rivers. Some effort is underway to put in sewage treatment facilities.
- Most hydroelectric projects are harnessing glacial rivers in Iceland´s interior, which has proven benign for the salmon populations. There are no plans to put hydroelectric projects on major salmon rivers.

4. Impact of aquaculture

This section only deals with the effects of sea-cage culture of salmon and trout on wild Atlantic salmon. The Icelandic coastline is mostly open and rugged with high tidal exchange and limited shelter to conduct cage rearing of fish in the sea. Experimental cage farming conducted in the late 1980s more or less confirmed this and no sea-cages were operating in Iceland after 1990.

In the year 2000 there was a renewed interest in sea-cage farming of salmon, mostly in deep sheltered fjords in eastern Iceland. Although satisfactory with respect to shelter and depth many of these fjords had been judged too cold for commercial salmon farming in the 1980s. In 2001 commercial operations started in Seyðisfjörður, Mjóifjörður and Berufjörður. The salmon farm at Seyðisförður was only operational for a couple of years and in 2005 the largest operation at Mjóifjörður, which already had a production exceeding 1000 tonnes of salmon announced that it would fade out its production at Mjóifjörður within 2 years. The only remaining sea-cage facility in Iceland after that period will be the one at Berufjörður with a current production of less than 500 tonnes.

Since the sea-cage operations in eastern Iceland started in 2001 they have been required to tag 10 % of the smolts released into cages with coded wire tags (CWTs). Since that time over 600 thousand smolts have been tagged and released into cages. Out of those only 1 tagged adult has been recovered in an east coast river.

No significant accidental releases from the east coast fish farms have been observed or reported, but in late August 2003 an accidental release of 3000 farmed salmon from a holding cage at a slaughtering facility in Neskaupstaður on the east coast occurred. The cause of the accident was a minor collision with a boat. Subsequently 9 fish farm escapees, 8 of which were mature males,

were reported from angling in 3 salmon rivers on the east coast. Three retrieved microtags indicate that these were from the previously mentioned accident. No escapees were reported from rivers in other areas.

Current management measures:

In spite of a relatively small production of reared Atlantic salmon, the Icelandic authorities have been active in introdcuing new laws and regulations relating to aquaculture and thereby implementing NASCO resolutions and guidelines. The provisions relating to salmonid aquaculture were revised in 2001 and are currently being assembled in a specific Act. The most important regulations with respect to salmon farming are the following:

a) Regulatory measure (no. 460/2004) prohibiting the rearing of salmonids of reared origin in sea-cages in fjords and bays close to major salmon rivers. This ban, which is set in the light of the "Precautionary Approach", replaces a regulation set in 2001 (nr. 226/2001), which prohibited rearing of fertile salmon in these same areas. An English translation of the regulations is attached in Appendix 1. With this regulation in force no farming of salmonids (fam. Salmonidae), i.e. salmon, brown trout, char or rainbow trout or related species can be carried out in sea-cages in the designated areas. The setting of this regulation limits farming of salmonids in sea-cages in Iceland to limited north coast areas in addition to the Western and Eastern fjords.

b) Regulatory measure (no. 1011/2003) regarding equipment and internal inspection on Icelandic Fish Farms" which took effect in December 2003. An English abstract is presented in Appendix 2.

5. Introductions, transfers and transgenics

Iceland has operated national legislation specifically designed for the control of fish diseases for over fifty years. The rapid expansion of aquaculture in most countries during the last decades has brought a changing pattern of fish disease and a corresponding increase in the risk of disease importation and spread. The Competent Authorities in Iceland responded to these changing risks by bringing in *The Salmon, Trout and Char Fishing Act* in 1970, the law about the *Veterinary Officer for Fish Diseases* in 1985, the law about the *Official Fish Disease Laboratory* in 1986, the regulation concerning *Measures to Prevent and Control Diseases in Fish and Health Inspection of Fish Farms* in 1986 and the regulation on *Transport and Release of Salmonids and Protection against Diseases and Genetic Mixing of Salmon Stocks* in 1988. Together, these pieces of legislation, including recent amendments, provide Iceland with a comprehensive set of rules to protect its fish farming industry and wild fish stocks from the introduction and spread of diseases from other countries.

However, the changing nature of European politics, and the general trend towards liberalisation of trade throughout the world, has meant that many of these long standing national strongholds are being challenged. New international rules, established by such organisations as the EU, OIE and WTO, are intended not only to encourage international trade in live fish and their products, but should also provide an adequate level of protection against the introduction of diseases into individual countries (or defined zones) from elsewhere via such trade. Since importation is usually restricted from a high risk zone to a low risk one, it must be assumed that Iceland, which is relatively disease free with respect to the most pathogenic fish diseases e.g. of viral origin should be adequately protected.

There is a ban on the importation and release of transgenic organisms into Icelandic ecosystems, which falls under the jurisdiction of the Ministry of the Environment.

Current Management measures

The following regulatory measures are being enforced by the Agricultural Authority of Iceland and the Chief veterinarian:

a) Regulation no. 105/2000 on Transfer and Release of Salmonids

and Prevention of Disease and Genetic interaction. (In Icelandic) An English abstract is presented in Appendix 3.

b) Regulation no. 446/2005 on Conditions to be set regarding animal health, which may affect the marketing of reared animals and their produce (In Icelandic).
c) Regulation no. 447/2005 on minimum measures to be taken within the EEA Area in relation to specified fish diseases (In Icelandic).
d) Regulation no. 448/2005 on the health surveillance of reared animals and their produce in commercial trading within the EEA area (In Icelandic).
e) Regulation no. 449/2005 on the health surveillance of reared animals, which are traded from third party States into the EEA area (in Icelandic).

6. Enhancement of salmon stocks

In the Salmonid Fisheries Act enhancement is defined as any measure, which has the objective to augment the stocks of salmonids in rivers or lakes. This may included building of fish passing facilities, planting of eggs, releases of parr and smolts and even appointment of wardens and a protection regime on a watershed. To carry out some form of enhancement has basically been a legal duty of Icelandic river associations for decades.

The most common form of enhancement has been the construction of fish ladders and it has been estimated that over 50 fishways constructed in the last 50 years have opened up over 500 km of fishing, spawning and nursery areas for salmon. Frequently the up-river areas have been planted with fry or parr of local origin to speed up the enhancement process. Salmon smolts have to some extent been released into the lower reaches of salmon rivers and have exclusively been of wild parentage and from the local stock as specified by law.

There have, however, been additional release programs in non-salmon rivers, where the sole purpose is to build up a fishable population of salmon through large scale smolt releases, which here will be referred to as "sustenance of angling through smolt releases". The most prominent program has been carried out on the Rangá rivers, which have been built up as salmon rivers through smolt releases since 1989. The rivers, which are called West-Rangá and East Rangá are located on Iceland´s south coast and are actually tributaries of the mainstem river Hólsá.

Figure 6 shows the releases of smolts and the combined angling catch in the Rangá rivers from 1990 through 2005. Releases have ranged from 50-100 thousand smolts in the early years to 400 thousand smolts in the last 5 years. Angling catches in the early years averaged 1000 salmon but have risen to 5000-7000 salmon in recent years, making the Rangá rivers some of the best angling rivers in Iceland.

The project on the Rangá rivers is unique as the rivers did not produce salmon naturally to any extent prior to the start of the project. The project thus represents a minor ranching project, where the returning salmon are exclusively harvested by angling. All the smolts are released from release ponds, which improves return rates and controls to some extent the fishing beats as the returning salmon tend to congregate close to the release site.

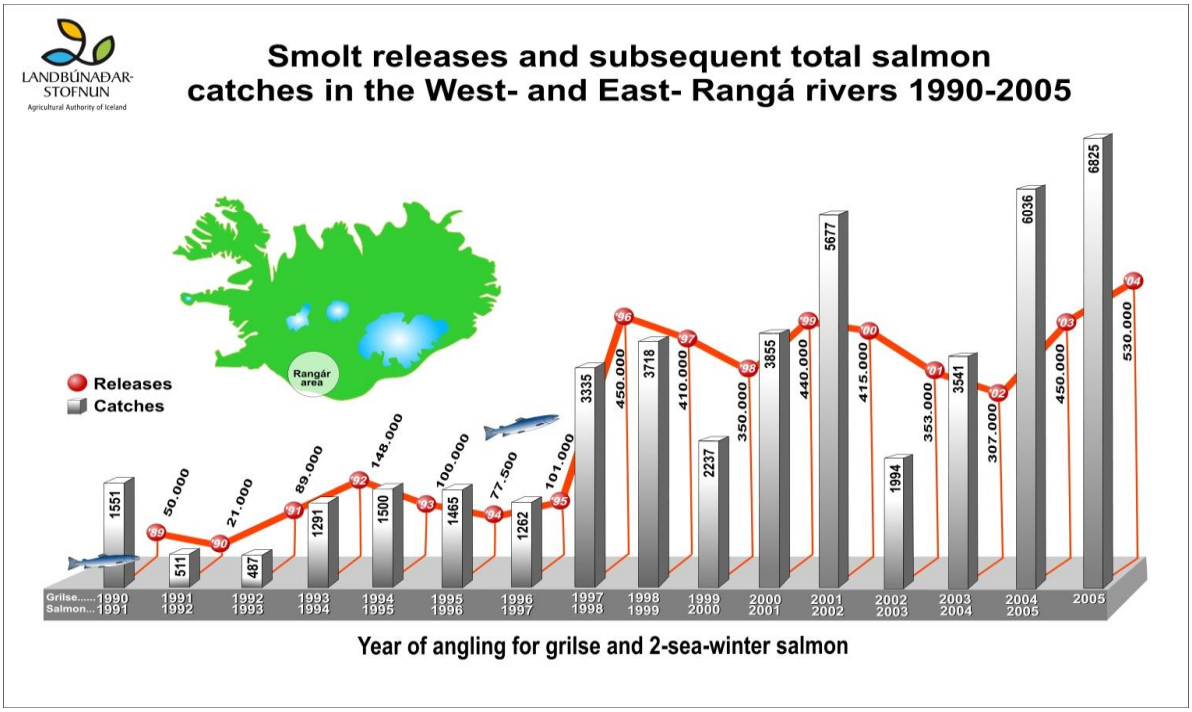

Figure 6. Smolt releases and the resulting salmon catches in the Rangá rivers´ enhancement program.

Current provisions and management measures:

- A five year enhancement plan must be presented and approved.
- A local stock must be used in salmon and trout rivers.
- Exceptions can be granted in streams with small stocks.
- Use of ranching stock in such streams is subject to a special exemption.
- Release of catchable salmon or trout ("put and take") into natural rivers or lakes is prohibitted.
- An exception can be granted for such releases after an environmental impact evaluation.

IV. A five year management plan

This section presents the future vision of Icelandic management authorities with respect to future progress in the management of Atlantic salmon, protection of its habitat, the management of Atlantic salmon aquaculture and issues related to introductions and transfers of Atlantic salmon. The current state of these issues has already been presented in section III and thus mostly new aspects will be discussed in this section. It should be pointed out that in the instances where current management measures seem to be satisfactory there may not be a need for any further measures in a five year plan. Such a plan must also be kept within a realistic frame both with respect to ways and means. The scientific advice on which management is based must also be sound and up to date.

1. Management of fisheries

Since the enactment of the Salmonid Fisheries Act in the early 1930s the Icelandic Management Authorities have aimed at sustainable utilization of the salmonid resources. These were initially based on net fisheries but angling is currently the dominant method of harvest. Salmon are currently only harvested in terminal fisheries with considerable effort limitation as pointed out in section III.

Although the Icelandic management system must be considered efficient and beneficial for the sustainable use of anadromous salmonids it is rather rigid and does not provide for in-season management measures from management authorities, even when runs are low. This is due to the private utilization of the resource by the river owners or angling clubs and the booking of angling up to a year in advance of the salmon season. The rod number is thus fairly fixed from one year to the next although the river owners themselves might decide to reduce effort in the light of poor

fishing prospects. The owners also have the possibility to reduce the bag limit, reduce allowable bait and encourage catch and release.

The competent authorities can thus only act in the case of an emergency, which is often difficult to demonstrate and prove in a satisfactory manner. Conservation limits need to be set on each river, which has sofar not been possible. The Icelandic management authorities support the efforts currently under way to establish conservation limits for all major salmon rivers in Iceland and the North Atlantic area. When this information becomes available and seems credible it will be a breakthrough in current management practices. In the meantime the competent authorities will continue to manage Atlantic salmon populations through conventional methods which include:

- Uphold a ban on salmon fishing in the marine environment .
- Limit mixed stock net-fishing in glacial rivers even further.
- Limit by-catches of salmon in char fisheries.
- Maintain the current number of rods on salmon rivers.
- Encourage releases of large salmon.
- Encourage bait limitation where practical and desirable.
- Encourage further restriction in the number of retained salmon in angling

The need and urgency for these measures will be estimated from the prefishery abundance of grilse and salmon as estimated by the WGNAS and the observed quantity of salmon in Icelandic rivers in the previous year.

2. Protection and restoration of salmon habitat

As most of the lowland areas of Iceland are privately owned, the Icelandic salmon management authorities have neither the means nor the legal authority to restore salmon habitat. Fortunately little habitat has been lost although changes have occurred in the flow pattern of many rivers due to land drainage in farming areas, which occurred in the early and mid- 1900s. The river owners are, furthermore obliged to treat the rivers with respect and must apply to the Agricultural Authority for a permission to mine gravel, create fishing holes and carry out any construction in or near rivers.

Environmental awareness has increased greatly in recent years and fishermen increasingly object to any disturbing activities on expensive salmon rivers while they are fishing. Erosion, however, is still a difficult proplem in many areas with resulting siltation in the river beds. Mink and other predators of salmon smolts are an increasing problem in many areas.

In the light of the current situation and the legal environment the Icelandic management authorities will emphasize the following management measures during the next five years:

- Strengthen the provisions regarding gravel mining and other activities on salmon rivers in the Salmonid Fisheries Act.
- Cooperate with other Ministries to reduce gravel mining in and around salmon and trout rivers.
- Explore how gravel mining can harmonize with river improvement activity.
- Explore the possibility of bringing back wetlands close to salmon streams.
- Support the extermination of mink and sea-gulls close to salmon rivers.
- Reduce erosion and stop siltation processes wherever possible.
- Prevent hydroelectric development on salmon rivers.
- Continue to evaluate the production capacity of freshwater salmon habitat

3. Management of aquaculture

As mentioned in section III (4) all provisions on salmonid aquaculture are being revised and assembled in a separate aquaculture Act, which probably will take effect in 2006. Considering the low profile of salmonid aquaculture in Iceland it is expected that this Act will remain unchanged at least for the next five years. The same is basically true for the regulatory measures in force, most of

which have been set within the last 5 years. The current framework with respect to aquaculture must be considered satisfactory and future efforts must emphasize enforcement of existing laws and regulations. The main objectives of these management activities for the next five years must be the following:

- No escapees from aquaculture in Icelandic salmon rivers.
- Representative tagging of smolts placed in marine sea-pens.
- Good health status in freshwater and marine fish farms.

4. Management of introductions and transfers

Considering the presence of Iceland within the European Economic Area it seems likely that Icelandic policy with respect to introductions and transfers will be shaped by Council Directives and Regulations issued by the European Commission. Iceland has in general had a very conservative policy with respect to introductions and enjoys a positive status as a zone with relatively few diseases, which is not obliged to accept importation from zones with higher disease incidence. The main objectives in this area for the next five years must be the following:

- Maintain a low level disease status.
- Protect wild and reared populations from existing and new exotic diseases.
- Keep incidence of existing diseases low.
- Keep Icelandic freshwater habitat free of exotic fish species.
- Maintain a separation between wild and aquaculture salmonids.
- Ban the use of genetically modified organisms.

5. Management of enhancement

There will be little change in the Icelandic policy regarding enhancement, which will be specified in a new Act on Enhancement. The following items will be emphasized during the next five years:

- A Five year enhancement plan required for all rivers where enhancement is carried out.
- Use of local stocks of wild parentage in all major salmon rivers.
- Use of a suitable enhancement stock in large scale smolt releases.

V. Evaluation

This section deals with the quantitative as well as qualitative methods selected to monitor and evaluate the status of Atlantic salmon stocks and the efficiency of any management measures taken. This will be discussed under the same 5 sub-headings as in section IV.

1. Management of fisheries

The status of Icelandic salmon stocks will be monitored through the following activities:

- Accurate counting of returning salmon in key rivers.
- Evaluation of spawning stock in key rivers.
- Evaluation of conservation limits (CL) in key rivers.
- Exact documentation of catch in all major salmon rivers.
- Monitoring of sea-age distribution in all major salmon rivers.

The overall management objectives of maintaining sustainable and healthy salmon stocks in all rivers will be evaluated on an annual basis.

2. Protection and restoration of habitat

The habitat in Icelandic salmon rivers is currently being monitored through a licensing system as all major implementations on rivers are subject to an Environmental Impact Assessment (EIA) and minor activities such as gravel extraction, fish ladders and river improvement projects are subject to a license from the Agricultural Authority. The river associations, which enjoy the profit from angling on the rivers, also discourage any harmful practices on their rivers and hire

wardens to look after their interests. Increasing number of predators may, however, pose a problem and rivers close to urban areas may be threatened.

The status of salmon habitat can thus be monitored through the following activities.

- Monitoring licenses for implementation on rivers.
- Monitoring of mink and sea-gulls on salmon rivers.
- Evaluation of mink and/or sea-gull extermination programs.
- Monitor the recovery of wetlands.
- Encourage evaluation of the the productive capacity of salmon rivers (mapping of habitat).

3. Management of aquaculture

The efficiency of management measures set to prevent negative impact of aquaculture will be monitored through the following processes:

- Monitoring of escapees from aquaculture in salmon rivers.
- Monitoring of representative micro-tagging of smolts planted into sea-pens.
- Monitoring of escapes from landbased salmon and char facilities.
- Monitoring and enforcement of equipment used to prevent escapes.

4. Introductions and transfers

Since all internal transfers from fish farms to unrelated watersheds as well as between watersheds are subject to a licensing system the frequency can be monitored through the management authorities. International transfers are on the other hand monitored by the Chief Veterinarian at the Agricultural Authority of Iceland. No importations of live salmonids should escape the attention of these authorities.

5. Enhancement

Enhancement of salmon rivers through smolt releases is only subject to a licensing system if a non-local stock is to be used but all such projects are subject to an enhancement plan. All river association submit an annual report on their activities to the Agricultural Authority, which specifies enhancement practices. The enhancement activity can be evaluated through those reports.

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Appendix 1

Nr. 460 27th of May 2004

Notification
on protection areas, where rearing of salmonids
(fam. salmonidae) in sea-cages is prohibited

Article 1

In order to protect wild salmon stocks it is prohibited to rear salmonid species of reared origin in sea-cages in the following areas along the Icelandic coast:

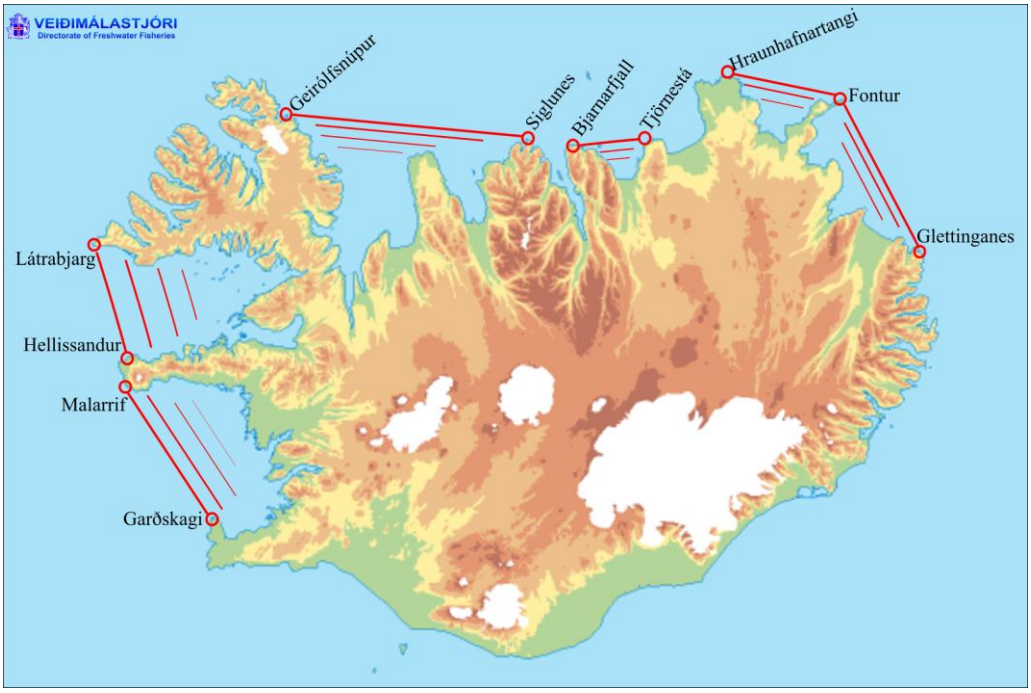
1. In Faxaflói inside a line drawn from Garðskagi to Malarrif on Snæfellsnes.
2. In Breiðafjörður inside a line drawn from Hellissandur to Látrabjarg.
3. In Húnaflói and Skagafjörður inside a line drawn from Geirólfsgnúpur to Siglunes.
4. In Skjálfandaflói inside a line drawn from Bjarnarfjall to Tjörnestá.
5. In northeastern Iceland inside a line drawn from Hraunhafnartangi to Fontur on Langanes and from Fontur to Glettinganes.

Article 2

This notification, which enters immediately into force, is set according to an authorization in article 77 in the Salmonid Fisheries Act nr. 76/1970 with subsequent amendments. It replaces notification nr. 226/2001 on protection areas where the rearing of fertile salmon (Salmo salar) in sea-cages is prohibited.

Ministry of Agriculture 27th of May 2004

Guðni Ágústsson
(Minister of Agriculture)



Appendix 2

Regulatory measure no. 1011/2003 regarding equipment and internal inspection on Icelandic Fish Farms

English abstract

Provisions

- The regulatory measure is composed of 9 chapters and 8 annexes.
- Chapter 1 (articles 1-2) defines the scope of the measure and technical words.
- Chapter 2(article 3) contains provisions regarding a production log and its accessability by inspectors.
- Chapter 3 (article 4) contains provisions regarding accidental releases from fish farms and how these should be dealt with through emergency measures.
- Chapter 4 (articles 5-9) defines the integrity of equipment used on fish farms as well as maintenance.
- Chapter 5 (articles 10-12) defines the inner inspection and risk analysis, which shall be performed on fish farms and approved by the Directorate of Freshwater Fisheries.
- Chapter 6 (article 13) contains provisions for the runoff from landbased farms, which shall be fish proof.
- Chapter 7 (article 14-15) specifies methods used for the transport of life salmonids between fish farms, especially if well boats are used. Towing of cages outside jurisdiction of the fish farms is prohibitted as well as the cotainment of salmonids in cages, which are not part of a licensed unit.
- Chapter 8 (article 16) contains provisions regarding official inspection of the fish farms by the Directorate of Freshwater Fisheries.
- Chapter 9 (article 17-18) specifies penalties and validation of the regulatory measure.

Annexes

- Annex 1 specifies the contents and the processing of the log book kept on the fish farm, which shall be available for inspection at any time.
- Annex 2 specifies procedures regarding accidental releases both with respect to reporting and emergency procedures.
- Annex 3 specifies how a fish farm shall be designed and constructed. It defines environmental variables that shall be withstood by different classes of sea-cages. Necessary anchors for each class are also specified.
- Annex 4 contains provisions regarding the inspection of netting used on sea-cages both above and below the sea-surface.
- Annex 5 specifies monitoring of the vicinity of the fish farm through netting series.
- Annex 6 outlines procedures to be devised by the fish farm management in order to to minimize accidental releases from sea-cages.
- Annex 7 specifies necessary training of personnel working in fish farms.
- Annex 8 contains provisions for an official verification of the effectiveness of the internal ispection as performed by the fish farm management at least once a year.

Appendix 3.

Measures to Minimize Genetic, Parasitic and Disease Interactions

(Regulation no 105/2000 on Transfer and Release of Salmonids and Prevention of Disease and Genetic interaction)

Transfer and Release of Salmon of Wild Origin

- Transfer of wild salmonids and their eggs between watersheds is subject to approval by the Directorate of Freshwater Fisheries *. Wild broodfish must be slaughtered and monitored for disease according to specifications from the Fish Disease Committee.
- The Directorate can grant a permission for the use of non-local stocks in rivers with none or small stocks of salmon provided that the effects on nearby rivers are considered negligible.
- The Directorate can also permit transfer of wild salmonids into sea cages and landbased rearing stations with the approval of the Fish Disease Committee.

Transfer and Release of Salmon of Reared and Ranched Origin

- Ranching stations can use ranching stocks from approved facilities.
- Reared brood fish, disinfected eggs and juveniles of reared origin can be transferred freely between rearing facilities as long as it conforms to disease regulations.
- Transfer to stations with runoff into rivers must, however, be confined to the species found in the watershed and the approval of the Directorate is needed for the introduction of other species.
- The release of salmonids of foreign origin for enhancement or ranching is prohibited. The Directorate can, however, grant an exemption to a research organization for a period of two years with the approval of the Fish Disease Committee and subject to the tagging of all fish released.

Reciprocal Distance between Aquaculture Units and their Distance from Salmon Rivers

- Minimum distance from sea-cages to rivers with an annual catch exceeding 100 salmon is 5 km.
- Minimum distance from sea-cages to rivers with an annual catch exceeding 500 salmon is 15 km. The distance can be shortened to 5 km. if sterile salmon are being used.
- Minimum distance between sea-cages and from those to land-based operations or ranching stations shall be 2 km.
- A conditional 2 year exemption can be granted by the Directorate with the approval of the Fish Disease Committee.

* Agricultural Authority of Iceland