

# Changing Rules for Regulation of Icelandic Fisheries

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**Abstract:** The diplomatic corps of Iceland has used much of its time during the third quarter of the 20. century to convince other nations that Icelanders should control and utilise the resources of the waters within 12, then 50 and finally 200 nautical miles around the island. Icelandic politicians have used much of their time and effort during the fourth quarter of the 20. century to debate how to organise the utilisation of the resource and in what way one should distribute the rents from its harvesting. In the paper give a short account of the development of the regulatory reforms in four types of Icelandic fisheries. No one of the reformatory processes can be said to be a replica of the any of the other processes. It seems evident at the face of things that each reformatory process is unique and distinct from the other except for the final outcome, the rule of the ITQs. But that may seem to be to short sighted conclusion. It should be evident from the earliest history of regulatory reforms that the ITQ system was not the intentional outcome. It came to be, eventually. There is a common pattern for all the fisheries, however. First of all: The serious attempts to reform the management practise starts first when the fishery has collapsed or is close to a collapse. Secondly, the first thing that stake holders seem to get done is to close the club that has access to the given fishery. Thirdly, a variety of rules was used to allocate participation rights when the club of participants had been closed. Fourthly, prices were used to manage fisheries in Iceland prior to the invention of the ITQ system. Lastly, management of fisheries by ITQs rather than some form of taxes or fees may have historical rather than logical roots.

## 1. INTRODUCTION

Iceland is surrounded by waters that have potential for producing valuable fish-species in large quantities. The diplomatic corps of the country used much of its time during the third quarter of the 20. century to convince other nations that Icelanders should control and utilise the resources of the waters within 12, then 50 and finally 200 nautical miles around the island. Icelandic politicians have used much of their time and effort during the fourth quarter of the 20. century to debate how to organise the utilisation of the resource and in what way one should distribute the rents from its harvesting.

I will in the following paper give an short account of the development of the regulatory reforms of management of Icelandic fisheries.

## 2. REGULATORY REFORMS OF MANAGEMENT OF IMPORTANT ICELANDIC FISHERIES

### 2.1 Fjord shrimp

2.2 Jónsson (1990) describes in detail how the catch of fjord shrimp started out with by experimentation in Ísafjardardjúp in the mid twenties. Equipment and know-how was imported from Norway. These pioneering experiments were not successful. New equipment was bought and brought to use in Ísafjardardjúp in 1935. Shrimp processing was established in Ísafjordur in 1936, marking the beginning of economic utilisation of Icelandic fjord-shrimp. The industry experienced a slow start. For most of the period from 1935 until the early 1950s catch was conducted by

one to three vessels and processed by one plant. The removing of the shell (peeling) was done by hand, requiring considerable manpower and was thus labour demanding. A second plant, utilising quick freezing of the peeled shrimp was established in 1949.

The introduction of quick freezing enabled more vessels to enter the fishery and sell their catch. An automatic sheller was invented in Germany in 1958 and was introduced in a plant in Ísafjörður in 1959. The invention of automatic shellers reduced demand for labour. Hence, on-shore capacity was greatly expanded. The introduction of automatic shellers reduced considerably the cost of utilising small shrimp. Hence, shrimpers brought more juvenile shrimp ashore. This eventually resulted in more intensive use of the existing fishing-areas and consequently a drop in catch per unit of effort. In 1959 the shrimpers in Ísafjörður asked the Ministry of Fisheries for help with finding fresh fishing spots in order to expand the harvesting area, see Hoonard (1977), p. 263.

The Ministry choose to interpret the request as a request for regulation. The shrimp fishery collapsed in 1962. Catch per unit of effort decreased by as much as 50% between spring season in 1960 and the spring season in 1962. (See Hoonard (1992), p. 143). The fact that total catches of shrimp decreased clearly suggested that the known fishing spots were being over-fished<sup>1</sup>. The Ministry responded to the collapse of the fishery by introducing quotas. Vessels were restricted to bring no more than 600 kg of shrimp on shore per day and the total catch for the whole fleet was not to be more than 400 tons. Hence, the shrimp fishery became the first

fishery in Iceland to be regulated by a total allowable catch (TAC) quota.

Quantity of catch was not the only issue debated. The price of fresh shrimp was also debated. The shrimpers were rarely happy with prices they negotiated with the processors. The Official Fish Price Board (established by parliament in 1961) announced an ex-vessel price of shrimp for the first time in 1965. The board consisted of an equal number of representatives of “sellers” and “buyers” with a governmentally appointed chairman. Shrimpers suspected that the ex-vessel price established by processors and/or the Official Fish Price Board shifted an unreasonable share of total profits to processors. This sentiment is probably the main reason that shrimpers got directly involved in processing in the early seventies. Active shrimpers both bought existing processing plants and built new ones. The shrimpers obviously believed that this would raise the ex-vessel price of shrimp.

The shrimp fishers in Isafjordur organised in 1964 in an association, Huginn, in order to be better able to express their views regarding the management of the fishery. The Ministry had the formal right to manage the fishery, but did consult both the Marine Resource Institute (MRI for short) and the shrimpers association, Huginn. Right to enter the shrimp-fishery was restricted by permits. The shrimpers pushed for regulation that would restrict permits to members of Huginn. The Ministry was reluctant to do so, but experimented with the rule that a permit holder had to apply for membership in Huginn in order to keep his permit.<sup>iii</sup> The Ministry tried, nonetheless, to have as a guiding principle that permits should only be issued to local inhabitants. Those attempts to close the club of harvesters proved ineffective and the number of participants in the fishery increased.

The system of daily quotas introduced in 1962 was not popular among shrimpers as they maintained that it was too restrictive *vís-á-vís* the most effective fishers. A weekly quota system was introduced in 1967. The idea was to give the effective fishers more scope to enjoy their comparative advantage and gain their “rightful” share of the total quota. The processors experienced huge landings early in the week and had to increase the speed of the peelers resulting in increased waste. Hence, in 1970 a system of a three-day quota system was introduced with a maximum limit of catches for the first 3 days of the week and a maximum quota for the whole fleet through the week, see Hoonard (1992).

Legislation passed in 1975 empowered the Ministry to regulate the establishment of new capacity in processing as well as in fishing of shrimp. The act also empowered the Ministry to allocate quotas to individual vessels. The main concern of the Ministry was to develop

rules to restrict entry of new firms into the on-shore activity. Owners of shrimp vessels tried to guard their investment. Hence, in 1980 the owners of vessels in Ísafjörður initiated a system where the shrimp-TAC was allotted per vessel. Vessels were divided into three categories based on size. Vessel in each of the categories was allotted a quota of equal size. (Source: Kolbeinsson (1995)). Vessels of less than 12 GRT were allotted a quota of 75 tons per season, vessels of 12-18 GRT were allotted 83 tons and bigger vessels were allotted 90 tons. Daily quotas were abandoned, see Hoonard (1992).

The joint effort of the Ministry, the vessel owners and other stake holders to regulate the shrimp fishery predates most other attempts to regulate fisheries in Iceland.

Looking back one may wonder why the shrimp-fishery-management design was not extended to demersal fisheries when the fishery management experiments started for those fisheries in the mid seventies to the mid eighties. Note, for instance, that the shrimp quota was partly tied to on-shore facilities. Inhabitants of small towns dependent on on-shore activities and owners of on-shore facilities suggested numerous times that a similar rule should have been invoked in the case of regulating the demersal fisheries, i.e. that cod quote should have been allotted to processors. The proponents of this view did hardly at any time mention that a similar rule had been employed in the case of the shrimp fisheries. Furthermore, the shrimp-fishery rule of equal allotment of quotas to all vessels in a given category was not considered when the rudimentary ITQ system was initiated.<sup>iv</sup>

Why were the lessons from the shrimp fishery not brought to bear on the general debate later on? That question has not been seriously addressed to my knowledge. One probable cause is that the structure of the shrimp fishery was under considerable flux in the early 1980s when the ITQ system was in its infancy. New fishing grounds far off the coast had been discovered. The new grounds had to be harvested by bigger and better equipped vessels than the fjord shrimp grounds. Hence, new capital and vessel owners and skippers and crews with “fresh” experience were entering the industry. It was obvious that the industry could not be managed by unchanged management-rules. The sentiment may have been that management of the fjord-shrimp was already obsolete and could not serve as model for management systems in other fisheries.

One last thing about the fjord shrimp experience. The off shore shrimp fishery was developed in the 70's and took off in the 80's at the same time as the ITQ system was developed. It should have been obvious for any outside observer of the shrimp fishery

that grand-fathering the right to catch shrimp in Icelandic waters to those that already were in the industry would have been unfair and might have delayed the development of the shrimp fishery by several years. One would have expected, in hindsight, that the argument just mentioned would have been extended to the demersal fishery and the development of the overall ITQ system. That was not done.

## 2.2 Herring

The Icelandic herring fishery developed into a large scale industry during the first half of the 20<sup>th</sup> Century. The catches in Icelandic waters varied between 100,000 to 150,000 tons until 1958 when total catches in Icelandic waters grew to more than 200,000 tons. Catches grew every year after that and reach an all time peak of 625,000 tons in 1964 and 1965. Catch in 1966 was almost 500,000 tons, but declined to 100,000 tons in 1967. The catch in 1968 was only 30,000 tons or less than 1/20 of its peak value few years earlier. The fishery had collapsed.

The Icelandic herring fishery was based on two separate small local stocks (the spring spawning Icelandic herring and the summer spawning Icelandic herring) and one large stock (the Atlanto-Scandic herring) that spawns off the coast of Norway but feeds in the plancton-rich areas off the eastern coast of Iceland. The high-catch fishery of the 1950s and the 1960s were based on the feeding migration of the Atlanto-Scandic stock.

As catches from the Atlanto-Scandic stock increased during the 1960s a growing concern emerged that the catches were at a non-sustainable level. Hence, landings of small herring was banned in 1966. Partial moratorium was introduced in 1967. TAC on catch of herring was introduced in 1969 and a full moratorium in 1972 for all gear except drift-nets. Drift-nets had not been in use in Iceland since 1960 so the 1972 regulation amounted to full moratorium until vessels had been equipped with the appropriate gear.

The regulatory activity of Icelandic authorities was by and large only suited to reduce the effort to fish from the two local stocks. The regulatory measures were not effective. The large stock, the Atlanto-Scandic herring migrated through international, Icelandic, Norwegian and Russian waters. Large scale catches of juvenile herring was confined to Norwegian waters. Those catches were half a million tons in 1967. No effort was made to effectively manage the catches from the stock until 1971. The Atlanto-Scandic herring changed its migration-behaviour after the collapse of the stock in 1968 and became a local stock to Norwegian waters.

Hence, the Icelandic moratorium (1972-1975) affected only the fishing from local Icelandic stocks. The moratorium was successful with respect to the Icelandic summer spawners. Fishing from the summer spawners resumed in 1975 as the estimated size of the stock had grown from virtually zero to 50,000 tons and has since increased to about 500,000 tons. The drift-netters were allotted some 30-40% of the TAC and fished from a common quota, see Jakobsson (1980)<sup>v</sup> The Ministry for Fisheries decided in 1975 that "herring vessels" ("síldarbátar") had to apply for the right to participate in the herring fishery. The Ministry received 44 applications. The purse-seiners' quota was divided equally between vessels so that each vessel was allotted the right to catch 215 tons. (Source: E-mail exchange with Jakob Jakobsson in May 2000). Fishing with stationary-nets was open and unrestricted for any vessel below a given size limit (50 GRT). Vessel owners were allowed to concatenate two purse-seiners quotas effective from 1979. Some experimentation seems to have taken place in the year 1982 with respect to management of the catch of purse-seiners. Vessels that applied for licence in 1982 had to have participated in the herring fishery in one of the years 1980 or 1981. The applicants were divided into two equal groups. One group was allowed to participate in 1982, the rest was allowed to participate in 1983. Each vessel received a mixed value and volume quota. The reason for this complicated rule seems to have been that quotas were uneconomically small. Quotas are made partially transferable in 1983, when vessel owners were allowed to transfer 50% or 100% of allotted quota to other quota-holding vessels (Source: Útvegur 1982, 1983 and 1986). The transition from derby-fashion fishery for the drift-netters towards transferable quotas was as follows: Each drift-net vessel that was active in the fishery during 1983, 1984 or 1985 was allocated a fully transferable quota of 350 tons. Drift-netters that did catch more than 350 tons during the previous season were allotted cod-quotas at the favourable rate of 1 ton of cod for each 3 tons of herring. Many of the high catch drift-netters that were allotted cod quotas due to this rule originated from Hornafjörður. (Source: Benedikt Valsson and Grétar Mar Jónsson of the Skippers and Mates Union of Iceland, telephone conversation April 2000, Útvegur 1986). Vessel owners holding herring quota were allowed to permanently transfer their herring quota into demersal quotas. (Source: Útvegur 1986). Quotas in 1987 were allotted equally to 91 vessels. Vessels that had participated during the previous 3 years could transfer their quota freely to other quota-holding vessels.

Herring became part of the general ITQ system as all other regulated fisheries when The Fishery Management Act (Act 38/1990) became active in January 1990. Each vessel was allotted a share in the permanent

herring quota in accordance with its last allotted yearly share, according to the Fishery Management Act.

The relative success of successively quotas and transferable quotas in the herring fishery paved the way for use of quotas and transferable quotas in other types of fisheries.

## 2.4 Capelin

Large-scale utilization of capelin in Icelandic waters started in 1965. Initially, the fishery was based on the spawning stock migrating in coastal waters to the spawning grounds during late winter. The fishery was extended, first to the spawning migration in deep waters east of Iceland in winter in the early 1970s and to the feeding migration in the area between Iceland, Greenland and Jan Mayen in the mid-to-late 1970s.

The migration between feeding grounds and winter locations brings the capelin outside of the Icelandic exclusive economic zone (EEZ) and into Jan Mayen (Norwegian) and Greenland waters. Iceland and Norway reached an agreement in 1980 that distributed available TAC between vessels from the two nations. Iceland gained 85% of the TAC, Norway the rest. The EEC representing the interests of the Greenlanders was not ready for managing the stock. Hence, Danish and Faroese vessels could catch without limits on EEC licence. (Source: Vilhjálmsson (1994)). The fishery collapsed suddenly in 1982/1983. The stock was quickly rebuilt. Norway, Iceland and Greenland did reach an agreement on sharing of the TAC in June 1989. The Icelandic share was 78% and the share of each of the other nations was 11% of the available TAC. Detailed rules governing cross-over of vessels from one nation into another nations EEZ were contained in the agreement. (Source: Vilhjálmsson (1994)).

Icelandic capelin catches were small in the sixties until after the collapse of the herring fishery. The catch was 80,000 tons in 1968 and more than doubled in 1969. Catches increased dramatically in the first years of the seventies.

In the early seventies the main season for capelin fishing is during mid-winter and usually lasted only for a few weeks. Weather, distribution of catches relative to distribution of processor plants, transport capacity of vessels and processor-plant storage-capacity for fresh capelin were important parameters determining the overall catch during the season. The Official Icelandic Fish Price Board issued a uniform ex-vessel price. The price was differentiated according to intended use. Hence, price of fresh capelin intended for freezing was higher than price of fresh capelin intended for processing. Note however that only a small fraction of the catch was frozen. The pricing rule gave skippers and

vessel owners strong incentives to bring their catch to the closest harbour, thus minimising transport costs. The result, predictably, was that fully loaded vessels waited in lines in harbours close to the area of harvest at each time. Processor plants further away were idle. It was obvious, even to the most casual observer, that the overall economy of the fishery could be improved by giving some of the waiting vessels incentives to take their catch to an idle plant.

The representatives of vessel owners and fishermen aired their concern in a letter to the Ministry of Fisheries in April 1972. The Ministry appointed a committee to look into the matter. The committee returned a proposal for changes to existing legislation. The proposal was adopted as Act 102/1972 by the parliament with minor changes. According to the Act processing plants were forbidden to unload capelin vessels out-of-turn. A regulatory capelin committee was established to direct vessels away from over-supplied plants to under-supplied plants.

The Official Icelandic Fish Price Board announced the prices for fresh capelin in end of January in 1973. The Board decided that 0.05 krónur per kilo of capelin should be paid to a new fund, the Capelin Transport Fund. A few days later the fee was raised to 0.15 krónur per kilo. The Transport Fund divided the harvesting areas into 7 sub-areas. The coast was divided into 13 geographical locations each containing one or more processing plants. The Transport Fund announced transport support rates based on the transport distance and supply situation at different plants at each time. In effect the Transport Fund announced a 13x7 matrix of rates. A matrix could be effective for as long as 10 days and down to 24 hours. The Ministry and the Capelin Committee jointly engaged Professor Pall Jensson to write a computer simulation model of the capelin fishery. An account of the work by Jensson was published in the annual reports of the Capelin Committee for the years 1977 and 1978. The objective of Jensson's work was to find methods to maximise catch given fleet, plants and the movement of the spawning stock along the coast. One of the underlying assumptions for Jensson's work was that capelin was an unlimited resource. But that assumption did not hold as became evident when the MRI recommended a reduction in the 1979-winter catches late in 1978. Hence, the main assumption for the computer modelling work so far collapsed. The Capelin Transport Fund did obviously take notice of the changed sentiment and withdrew transport support. Thus, transport supports were given for the last time in 1978. See Anon. (1980).

The right to catch capelin was limited to 52 vessels by a Ministerial decree issued August 11, 1980 in the wake of the settlement with the Norwegian

government regarding catch in the EEZ of Jan Mayen. The vessels as well as a provisory quota per vessel were listed in the decree. Half of the provisional TAC was divided equally between the 52 vessels. The rest of the TAC was distributed according to the transport capacity of each of the 52 vessels. The vessel owners suggested in 1985 that the rule should be changed so that 2/3 of the TAC should be distributed equally and 1/3 according to transport capacity. The Ministry complied. (Source: Jónsson (1984), Vilhjálmsson (1994), Stjórnartíðindi B 1980; Ágúst Einarsson, personal communication; <http://www.althingi.is/altext/125/s/1155.html>) Arnason (1995). Fishing for capelin was prohibited in 1982. The only exception was that vessels that did not fish up their 1981 quota were allowed a quota identical to their left over 1981-quota. The catch in 1982 was thus only 13 000 tons. The fishing for capelin resumed in 1983. The Ministry used the 1980 model for allocating quotas to 51 vessels. Act 97/1985 on Management of Fisheries in 1986-1987 opens for transferability of capelin quotas (Source: Act 97/1985, Danielsson (1997), and Arnason (1993)). Management of the capelin fishery became a part of the general ITQ system in 1990.

## **2.5 Demersal fisheries**

The Marine Research Institute issued a report in October 1975 on the status of the cod stock. The report was quickly nicknamed "The Black Report". See Jónsson (1990) and Durrenberger (1987). The nick name reflects the message of the report, according to which the cod-stock was about to collapse. The severity of the situation can be envisioned by the fact that MRI recommended that total catch of cod in Icelandic territorial waters should not be in excess of 230,000 tons for 1976. Compare that to the fact that the yearly aggregated Icelandic and foreign catches in those waters had been 400,000 tons in previous years. With the fate of the Atlanto-Scandic herring fresh in mind most Icelanders at the time understood that new methods had to be introduced in order to manage the Icelandic cod fishery. The old methods of relying on making gear less effective or more selective by increasing mesh size and/or restricting use of the least selective gear did not do the job (Jónsson (1984), p. 247). The 230,000 tons of catch suggested by the MRI was grossly over-fished. It was obvious that new types of restrictions had to come into place. The Ministry introduced a decree on July 14, 1977 aimed at restricting effort supplied to the fishing of cod in particular. The basic measures were three: a) 30-codless-days for trawlers a year implying that trawlers were to keep clear of cod for the given length of time; b) an introduction of a cod-less week for all vessels; c) ban against increasing the carrying capacity of the fleet. The catchable cod-stock grew the following years partly due to good conditions in the sea and due to strong year

classes entering the fishable part of the stock (see Fig. 2 in Danielsson (1997)). The improved situation of the cod stock induced the politicians and the MRI to lower their guard. The consequence was that the effort capability of the fishing fleet continued to grow, in spite of the aim to keep catch-capability constant. The environmental conditions turn for the worse in the early 1980s. By 1983 it was evident that cod-less days and effort restrictions did not do the job of keeping the effort capability of the fleet in line with the yield capacity of the cod stock. The issue of enhanced management methods had been discussed among participants in the fishery at the annual meeting of Fiskifélag Íslands.

Fiskifélag Íslands was inaugurated in 1911. The main purpose is to work for the benefit of participants in the trade of fishery. Fiskifélag is governed by a Board that is elected by Fiskifling (The Fisheries Assembly). Members of the Fisheries Assembly represent local divisions of the Fiskifélag and trade unions, vessel owners and plant owners. (See Jónsson (1990)). Resolutions from the local division of East-Iceland suggested management of demersal fisheries by quotas as early as 1978. The members of the local division of the Westfjords voiced opposition, a sentiment that is clearly present up until this day. Management of demersal fisheries was debated at every annual meeting up and until 1983. The MRI had recommended catch of 450,000 tons of cod in 1982 but the catches were only 388,000 tons. The MRI recommended catch of 400,000 and then 350,000 tons in 1983. The fleet was only able to catch 300,000 tons. Thus, the MRI did not manage to reduce its recommendations fast enough to keep up with the reduction in actual catches! It was getting obvious that the cod stock was in serious state. In consequence, the MRI recommended a catch of 200,000 tons in 1984. (See Danielsson (1997)). That was 25-50% reduction as compared to recent experience and expectations few years back. The system of effort restrictions that had been in place was by now widely viewed as useless. (See Jónsson (1990)). Some form of a quota system was taken to be the obvious alternative. The Fisheries Assembly of 1983 suggested that management of the demersal fishery in 1984 should be by quotas and gave details for such a system. (See Jónsson (1990)).

The Fisheries Assembly did not and does not have constitutional powers to write the rules of fishery management. Hence, the Minister of Fisheries put a proposal for a new legislation to the Parliament December 12, 1983. The new law was to take effect January 1, 1984. The proposed Act gave few details of how the management was to be conducted and left much to be decided by Ministerial Decrees. Many MPs disliked that idea. But in the end the resulting Act 82/1983 and Decree 44/1984 were in the spirit of the resolutions from the Fisheries Assembly. The general

rule established by the Act was that vessels of 10 GRT or more were allotted a quota based on the catch history during a reference period. The reference period was defined as the previous 3 years. Vessel owners who owned a vessel with abnormal catch history or a new captain could choose a) quota equal to average quota for the vessel-category of the vessel in question or b) effort quota with maximum catch limit. The catch limit was 115% of the average quota for the given vessel category.

In 1985 the provisory system established by the 1983 Act was extended for one more year, but liberalising conditions under which vessel owners could choose effort quota with maximum catch limit. The quota system was extended for two years by Act 97/1985. Effort quotas were made more attractive and conversion of effort-quota based catch history into catch quotas was made possible. Vessel owners were also allowed to forward unused quotas to next year.

The hybrid effort-and-catch-quota system was prolonged for the 1988-1989 period by Act 3/1988. The only noticeable change in the text of the Act was inclusion of the following in §1 of the Act: “The fish stocks around Iceland are the property of the Icelandic people”.

The last substantial contribution of the Parliament came with Act 38/1990, The Fishery Management Act. The domain of quota-management was extended to cover pelagic species and crustaceans in addition to the demersal species. Quotas were made permanent and admission for owners of vessels over 6 GRT to choose effort quotas was eliminated. Quotas were made fully transferable temporarily as well as permanently with the restriction that a vessel was required to fish at least 50% of its permanent quota every other year. The quota system was furthermore extended to cover all vessels 6 GRT or bigger. Owners of vessels smaller than 6 GRT were allotted a TAC of cod that was a given percentage of the overall TAC for cod and each vessel was allotted a given number of sea-days. If the small-vessel TAC was over-fished next years number of sea-days was to be reduced accordingly. This rule represented a loophole that many small scale fishers were quick to utilise.

### 3. RULES FOR CHANGE OF MANAGEMENT OF A COMMONS

The development of the management regime in Icelandic fisheries from being free access (granted by code of law as far back as 12<sup>th</sup> century) to restricted access is monumental in all possible contexts. A lot of questions are raised. How did the process get started? Why did it start at different points in time in different fisheries?

What does characterise the process? Was the process similar from fishery to fishery or was every fishery unique in some sense?

It is not easy to find answers to those questions. In the language of Ostrom (1994) we are asking how rules of a game are formed. Ostrom et al. point out that rules apply to multiple levels of governance. At the lowest level, the operational level, day-to-day operation is governed. In an ITQ system a skipper is prohibited from taking a vessel to a fishing spot without quota. A middle level, the collective choice level governs how a particular vessel can acquire quota. The highest level, the constitutional choice level governs methods for changing “the fishery-constitution”. I.e. at the constitutional choice level rules are laid out for how a new “fishery-constitution” is established. Ostrom et al. identify seven types of rules that play a role at each level of governance. The following paragraphs relate the changes of fishery management in Iceland to those rules.

#### 3.1 Position rules

Ostrom et al. explain position rules as “rules [that] specify a set of *positions* and how many participants are to hold each position”. Hoonard (1992), page 97, reminds of “...the all pervasive cultural value in Iceland that the sea’s “raw products belong to all Icelanders.” This value was stressed particularly in the last major “cod war” with England (1972-1973). The nation as a whole was deemed to be “entitled” to its own resources.”<sup>vi</sup> Hoonard then observes that this “cultural value” implies that free fishing should be the guiding principle for fishery management in Iceland. That does not imply that position rules are simple or absent in the case of free fishing. Formally, free fishing means that anyone willing and able can participate in a free fishing fishery. Ostrom et al. and others have shown that norms and rules can evolve and take the form of position rules in a free fishing environment. Those norms and rules restrict access to a valuable resource and can even prevent over-utilisation. Ostrom et al. p. 80-81 describe examples of how a fisherman or a crew of a fishing vessel gain the right to position a net or a trap at a given fishing spot for a specific period of time.

The Official Icelandic Fish Price Board did have an influential position in the pre-quota management Icelandic fishery management system. This is very obvious in the case of capelin fisheries where the crude price setting rules of the Official Icelandic Fish Price Board were augmented in order to maximise volume of processed capelin. The capelin fishery example clearly shows that the Official Fish Price Board realised how influential its decisions could be. In the case of demersal fisheries the object of the Price Board was to determine a price path that did not undermine macro-economic

stability and did not cause to much discontent among fishers. It has been argued forcefully that the policy of successive governments was to keep fish prices low and the real exchange rate high. The Official Icelandic Fish Price Board was obviously important for anyone that wished to implement such a policy. This policy of low real price of fish helped to discourage investment in new fishing capacity. Discouraging investment in new capacity may not have been the intended consequence of the overall policy, but it may have been an important side effect, illustrating that indirect management by prices has been utilised in Icelandic fisheries with some success. {See Helgason (1990) and Matthiasson (1997)}.

The evolution of the fishery management system in Iceland involves a change of position rules in several steps. Fjord-shrimp fishers were required to hold a licence. Herring fishing in Icelandic waters was free until the banned by the moratorium of 1972. When the moratorium was lifted fishing was only open to vessels with licence from the Ministry of Fisheries. Capelin fishing in Icelandic waters was practically free until 1972. This changed in 1972 so that the day-to-day operation of capelin fishing during 1972 to 1980 was directed by the Capelin Committee. In 1980 capelin fishing was restricted to vessels listed in particular document signed by the Minister of Fisheries. Demersal fishing was restricted to vessels that had participated during the reference period. The evolution of the management effort from free fishing to limited access also involved the creation of new positions. The size and distribution of catch by species has to be confirmed by a trusted observer. A official record keeper is needed. Lastly, an institution with authority to restrict, arrest and punish an erratic fisher had to be established. It may be confusing that persons performing most of those duties were active before access to fishing was restricted. But those persons did perform their collection of data as part of a different *position* prior to restriction of access to the fishing grounds. The record-keeper kept records partly so that skippers knew who was the *catch-king* of the year. This was useful as skippers gained reputation in accordance with higher catch figures. A skipper of reputation enjoys a good supply able crewmembers, for details consult Pálsson (1991). With restricted access a high figure in the record keepers book could hurt the skipper economically. Hence, skippers might have had interest in inflating catch figures before the quota system was in place. This changed with the invention of the quota system in such a way that the skipper might be more interested in deflating the catch figures!

Notable is the changed position of the fisheries biologist. Under a free fishing regime a fisheries biologist has a role much like that of a commentator writing on the stock market for business pages of a newspaper. The stock market analysts collect data and explain the behaviour of the market and details why it went down

yesterday. The fisheries biologist had the role of measuring the size of the stocks, explaining the development of stock size and developing theories about behaviour of the prey. With the advent of TACs the fisheries biologist is forced to take the role that is much more like that of a pension fund manager. The pension fund manager must develop an investment strategy and convince the board that the suggested strategy is sound. The success of a fund manager is measured by the growth of his portfolio. Similarly with the fisheries biologist. He has to forecast the development of a given statistic and give advise on the size of the TAC and convince politicians and other stakeholders that his methods are sound and his measurements good enough. The success of the fisheries biologist is measured against the development of the size of stocks and the size of sustainable landings.

Introduction of any kind of a quota system implies that older, informal position rules are replaced by new, formal rules. The Westfjords are close to some of the very best fishing grounds. The stakeholders from that region may have reasoned that formal rules would be less favourable for them than the informal rules that they believed to be effective. Hence, one can speculate if the long standing negative sentiment towards the ITQ system in the Westfjords has to do with the “damage” that the introduction of the ITQ system did to the informal position system that was perceived to have been in place in pre-ITQ times.

### 3.2 Boundary rules

Ostrom et al. define boundary rules as rules that “...specify how *participants* enter or leave [...] positions”. The formal boundary rules in free fishing are simple as already alluded to. The informal rules may be complicated. With the advent of limited access all previous boundary rules, whether formal or informal, are removed. In the case of the fjord-shrimp fishing a participant had to have a permanent address in a given municipality and in addition he had to fulfil several other conditions. Access to the herring fishery was based on an application for a “herring” permit to the Ministry of Fisheries. In consequence, it seems that the ministry had discretionary power with regard to boundary rules in the case of the herring fishery. Access to the capelin fishery was governed by the listing of a vessel in a Ministerial Decree. Thus, boundary rules in the case of capelin fisheries were a ministerial affair. The boundary rules in the case of demersal fisheries are complicated and ever evolving. Any vessel owner that had participated in the fishery during the reference period was allotted a quota. If he was not satisfied with his lot in terms of quotas he could try to increase his lot by selecting the effort option. But there was a backdoor into the fishery that has been open for most of the time (er búi a loka og hvenær var

fla) gert?). Small vessel owners could enter the fishery and fish from “next-years” small-vessel-quota so to speak. They over fished their quota, almost every year, to such a degree that the politicians and the Ministry did not dare to reduce catches to the degree called for by the formally accepted rules!

### 3.3 Authority rules

According to Ostrom et al. authority rules specify which type of actions are assigned to each position and in which situations a given action is applicable. Authority rules of many of the players in Icelandic fisheries were changed dramatically. Fiskifélag that had had central function in collection and analysis of data, in being a forum of policy debate etc. lost many of those functions. This stands to reason. Changes in management implies that the flavour of data collection changes totally from being informative to being integral part of the fishery management system.

When the authority rules of the fishery management systems used in Iceland are considered it is hard not to notice the vast discretionary powers invested in the Ministry of Fisheries and various committees. Committees usually had members from the Ministry, Unions and vessel owners. Meetings as well as minutes from the meetings were usually closed to the public.

### 3.4 Aggregation rules

Aggregation rules specify how a action is mapped into intermediate or final outcomes. In the case of the Icelandic fishery management system one should note that the system could not evolve unless the Icelandic Parliament adjusted the code of law appropriately. The formal resolutions agreed on Fisheries Assembly in 1983 were worthless as rules of fishery management until the Parliament had passed it as legislation.

The implication of the fact that the ground rules of fishery management are useless unless written into the law-code of the country may not have been fully understood by vessel owners and policy makers.. The Fishery Management Act is only word on paper until the Parliament determines how much money and effort it is going to devote to enforcing the Act. That decision is a tricky one. Devoting resources to force fishers to comply the rules and regulation of the Fishery Management Act implies that resources are diverted from some other worthy causes. Politicians will presumably take into account how the well-being and the tax bill of their voters is affected by a given set of actions. A model is given in Matthiasson (1995).

### 3.5 Scope rules

Scope rules define set of outcomes that may be affected. The scope of the early reforms was restricted to one or two years at a time. There has been considerable confusion as to the permanency of some of the rights given to vessel owners. Some claim that harvesting cannot be taken from vessel owners without compensation. Others claim that the statement in §1 of the Fishery Management Act reduces the scope of the harvesting rights. The Supreme Court seems to subscribe to the latter conclusion in Supreme Court Ruling 12/2000, the so-called Vatneyrar-Ruling. The majority of the court states that §1 of the Fishery Management Act implies that a Act of Law is needed if distribution of quota rights is altered or if other substantial changes of fishery management are contemplated. The Court maintains in its ruling that such changes, if invoked by a Act of Law, will not invoke right to compensation by the present holders of ITQs.

### 3.6 Information rules

Information rules specify which information is available at each position. Management of fisheries by a TAC requires a huge amount of information and adequate modelling. Modelling and interpretation of data is in the hands of the fisheries biologists. Fishers must be informed of allowable catch, fishers must inform of transactions of quotas, enforcement officers must be informed of possible violators. Managing fisheries by an ITQ system requires that the accuracy of the information is verified. Verification is especially important when it comes to flow of information from vessel owners about size of catch. Hence, information rules change dramatically when fisheries are managed by a TAC and quotas as compared to free access.

One of the unproved assumption of modern fishery economics is that “prices”(landing fees, for example) are inferior to “quantities” (quotas) as instruments for management. See Weitzman (2000) who argues the opposite view. The view is shared by many stake-holders in the industry. Weitzman does find this peculiar and points out that this conclusion counters conventional wisdom in the economic literature at large. Why have fishery economists concluded differently from economists working in other fields? I think that the historical development in Iceland does cast some light on that. ITQs were not developed “from scratch”. ITQs were an evolutionary step that followed when the club of eligible stake holders in the fishery had been closed.

Assume that a fishery the previously was one of free access is closed due to over-fishing. Assume furthermore, that the number of vessel owners that are allowed to participate is fixed somehow. The typical situation is that the catch capacity of the fishing fleet is



two or three times that of allowed catches. Hence concatenating quotas of two or more vessels reduces costs as less gear and fewer crews are needed. In consequence, it will be economical for vessel owners to send out fewer vessels and share the savings in one way or another. The implication is that a rudimentary ITQ system will emerge quite naturally given the assumptions presented above. One should note, however, that the fact that a given system is a result of “natural evolution” does not imply that it is the best of all possible systems.

### 3.7 Payoff rules

Payoff rules specify how costs and benefits are required, permitted or forbidden in relation with outcomes. Discussions regarding payoff rules have been hard to bring to conclusion in the Icelandic debate. Should a holder of harvest rights be allowed to sell or rent-out that right? Óinsson (1997) documents how small-scale fishermen and other inhabitants in remote fishery villages dislike the idea that uncaught fish can be sold beforehand. But even if people agree that harvesting rights can be bought, sold and rented it remains to answer the question for whom should the rent accrue. Should some kind of a grandfathering rule be used? What kind of grandfathering? Or should the rent accrue to the public at large? How should “the public at large” be defined. Icelanders have debated those matter intensively since the early 1980s. See Matthiasson (1992) and Matthiasson (1999). The polls have shown that a large majority of the people (70-80%) are discontent with the fishery management system in its present form. There is a large body of evidence in support of the proposition that the discontent has to do with payoff rules.

The Central Bank of Iceland and the National Economic Institute have recently drawn attention to the fact that the market value of fishing firms traded on the Icelandic Stock Market is considerably lower than the net value of assets, including fishing right, of these firms. Table X shows that the net value of physical assets and fishing rights are 2.5 times higher than the value of the firms at the stock market. This fact begs the question: Why have professional corporate raiders not taken opportunity for easy money? There are no established answers. But it is quite obvious that buyers and sellers of stocks at the stock market indirectly value fishing rights at a much lower rate than do the buyers and sellers of fishing rights at the quota market.

In a perfect world the discrepancy between the two measures of quota values should disappear. A skilled investor would buy quotas in one market and sell in the other market. Note how constant the difference is. The difference in how the fishing right is valued in the two markets is not because some investor has made a

mistake in one trade. This is a permanent difference. It should be pointed out that any Icelander can buy stocks at the stock-market. To buy quotas you have to own a vessel. But this restriction on the trade in quotas can not possibly explain the discrepancy. Nonetheless, the buyers and sellers of stocks and the buyers and sellers of quotas are were different persons. The bulk of stocks is owned and bought by professional investors like pension funds. The quotas are bought and sold by small-scale fishers, owners of family firms specialising in fishing and professional managers of big fishing firms. It is possible that the sentiment about payoff rules to be advanced in the future are different among these two groups of people.

## 4. CONCLUSION

Above I have given an account of the regulation activity in four distinct types of fisheries in Iceland. It should be obvious by the evidence presented that no one of the reformatory processes can be said to be a replica of the any of the other processes. The shrimp fishery in Ísafjarðardjúp is very limited in terms of geographical area. The herring and the capelin fisheries are characterised by a short season and fishing in rather limited geographical area at each point in time. The demersal fishery is an all-year fishery involving large number of stake-holders and large sums of money.

It seems evident at the face of things that each reformatory process is unique and distinct from the other except for the final outcome, the rule of the ITQs. But that may seem to be to short sighted conclusion. It should be evident from the earliest history of regulatory reforms that the ITQ system was not the intentional outcome. It came to be, eventually. I will be the first to admit that people representing the Ministry of Fisheries and self-proclaimed spokespersons of the vessel-owners association have not been eager to stress this part of the story. But it is necessary nevertheless to pose and answer the question: How and why did the ITQ system come into being in the Icelandic fisheries. If an answer to that question is not supplied others trying to modernise regulatory regimes of fisheries will encounter avoidable problems.

There is a common pattern for all the fisheries. First of all: The serious attempts to reform the management practise starts first when the fishery has collapsed or is close to a collapse. Ostrom et al. p. 47 points out that changing rules is a public good that is costly to supply. The proponents of a changed fishery management system must argue their case and they must convince stakeholders and policymakers that a new rule of conduct is productive. Assume now that a fishery is about to collapse due to lack of management. Vessel owners, plant owners, fishers and others have sunk costs

that they are unlikely to recover if free fishing is to be continued. The probability that sunk costs are recoverable is much higher if the fishery is managed. Hence, the collapse of a fishery may well bring about the right incentive for stakeholders to supply the effort needed for providing the public good of rule renewal.

Secondly, the first thing that stake holders seem to get done is to close the club that has access to the given fishery. The shrimpers in Ísafjörður try time and again to restrict who can obtain a permit. The capelin case is rather clear cut: The club is closed by a Decree from the Ministry. The valuable multi-stakeholder demersal fishery is much harder to close. It has taken 15 years or more to do so.

When a fishery has been closed the stakeholders can speculate, without having to take outside opinion into account, how it is best to organise the fishery with respect to economy of fishing firms and sustainability of fish-stocks. It is at this stage that the ITQs are an obvious choice.

Thirdly, a variety of rules was used to allocate participation rights when the club of participants had been closed. Note in particular that the rules used in the shrimp, the herring and the capelin cases are egalitarian towards the members of the club.

Fourthly, prices were used to manage fisheries in Iceland prior to the invention of the ITQ system. The rulings of The Fish Price Board regarding ex-vessel prices of fish and the discretionary decisions of the Government and the Central Bank of Iceland concerning the exchange rate of the króna had vast implications for decisions taken by vessel owners. This mechanism was used, in a very round-about and clumsy way, to transfer fishery rent from the fishery to the people at large. See Matthíasson (1999) and Helgason (1990). Experiments of the Capelin Committee show that it would cost considerable tinkering to make the use of the price mechanism effective as management device. But those experiments also showed that the price mechanism works! That last conclusion was not emphasised in the public debate.

Lastly, management of fisheries by ITQs rather than some form of taxes or fees may have historical rather than logical roots. The historical development that lead up to ITQs should be the subject of further research. Fishing industry leaders did not like the idea of ITQs when it was first presented. Now, their pipe is playing a different tune. Understanding that transformation of attitude can help when one is to design management system that have other aims than just securing the financial health of the fishing sector.

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Table 1: Market value of Icelandic fishing firms listed on the Icelandic Stock Market and value of physical assets and fishing rights net of debt

Month	(A) Stock market value of listed fishing firms	(B) Value of physical assets and fishing rights net of debt	(C) =(B)/(A)
Jan.99	58.903.000 kr	147.887.452 kr	251%
Feb.99	59.462.000 kr	148.233.823 kr	249%
Mar.99	60.410.000 kr	147.541.082 kr	244%
Apr.99	58.910.000 kr	147.714.267 kr	251%
May.99	58.890.000 kr	147.021.526 kr	250%
Jun.99	58.791.000 kr	148.753.379 kr	253%
Jul.99	61.823.000 kr	157.066.274 kr	254%
Aug.99	61.960.000 kr	161.915.463 kr	261%
Sep.99	63.792.000 kr	146.501.970 kr	230%
Oct.99	65.138.000 kr	147.367.896 kr	226%
Nov.99	65.023.000 kr	161.395.907 kr	248%
Dec.99	66.759.000 kr	164.340.057 kr	246%

Source: Calculation prescribed by the author. Information from the Icelandic Stock Exchange and individual fishing firms.

#### END NOTES

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<sup>ii</sup> Shrimpers suggested that the decreased catches in 1962 could be explained by cod substituting shrimp for herring in its diet. The change in the eating habits of cod were to have come through due to increased catches of herring. Marine biologists do not subscribe to this theory. See Hoonard (1992), p. 117.

<sup>iii</sup> During the fall season in 1969 the Ministry did only grant permits to vessel owners that were full members of Huginn. That was challenged by vessel owners that were non-members and the Ministry did not try that again.

<sup>iv</sup> The spokespersons for the fish processors and the political leadership in fishing villages argued the case for “processor-plant quotas” quite strongly. In 1993 the so-called Bi-headed committee (named so as it had two chairmen) appointed by the two majority parties in Parliament with the mandate to evaluate the Fishery

Management Act almost recommended a “processor-plant quota”. The proposal was eliminated from the final draft of the committee’s report. Reference to the shrimp-management experience was not made to my knowledge during the public debate after the release of the report.

<sup>v</sup> It should be noted that the discussion in Arnason (1995) is not comprehensive when it comes to describing the rules of initial distribution of quotas in the herring fishery in Iceland.

<sup>vi</sup> One of the crown arguments of Icelandic politicians during the cod wars was that good governance of coastal resources required that coastal nations had unrestricted control over those resources.