Conference in Runavik, Faeroe islands, 1. September 2016

Presentation by Jon Kristjansson fisheries scientist Iceland

Post
Web

This presentation is about the result of fishery managment using empirical data. The governmental orthodox scientists have long maintained that by reducing the catch of small fish they would grow bigger and give more catch later. In most cases this has not been the case, and we are still waiting for the later to come. Examples are shown.

Management of the fishery

Can be applied in full after introduction of 200 mile fishery limits.

Goal: To improve fish yield; increase the catch.

Method:

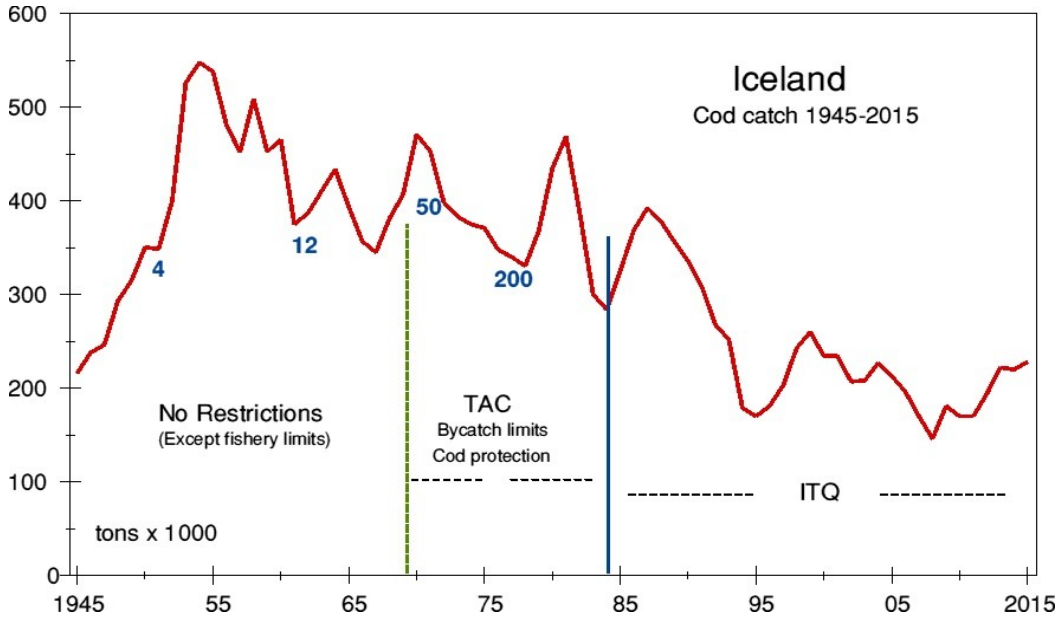
1. Catch less small fish so they can grow bigger and give more catches later.
2. Increase the size of the spawning stock in order to get more recruits.

- Fish less now and more later-

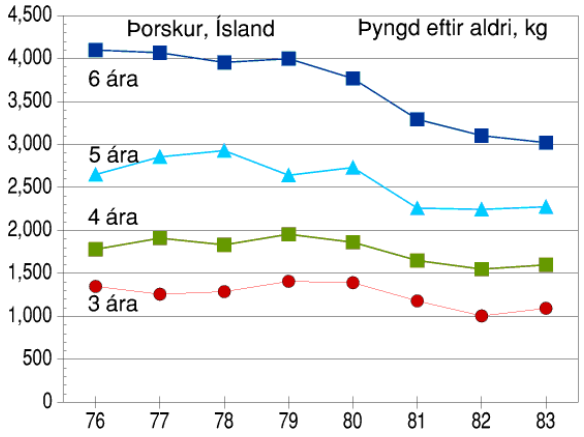
Implemented by:

A. Increase mesh size in towed gears
B. Reduction of fleets
C. Catch quotas

Iceland



Total catch of Cod at Icelandic grounds after WW 2. Blue numbers represent the fishery limits at any one time. Foreign fleets disappeared from the ground in 1976 and then active management was started. Mesh size in trawl was increased from 120 to 155 mm and that nearly eliminated catch of 3 year old Cod. Soon growth started to slow down due to food shortage, probably the result of overcrowding of small fish.



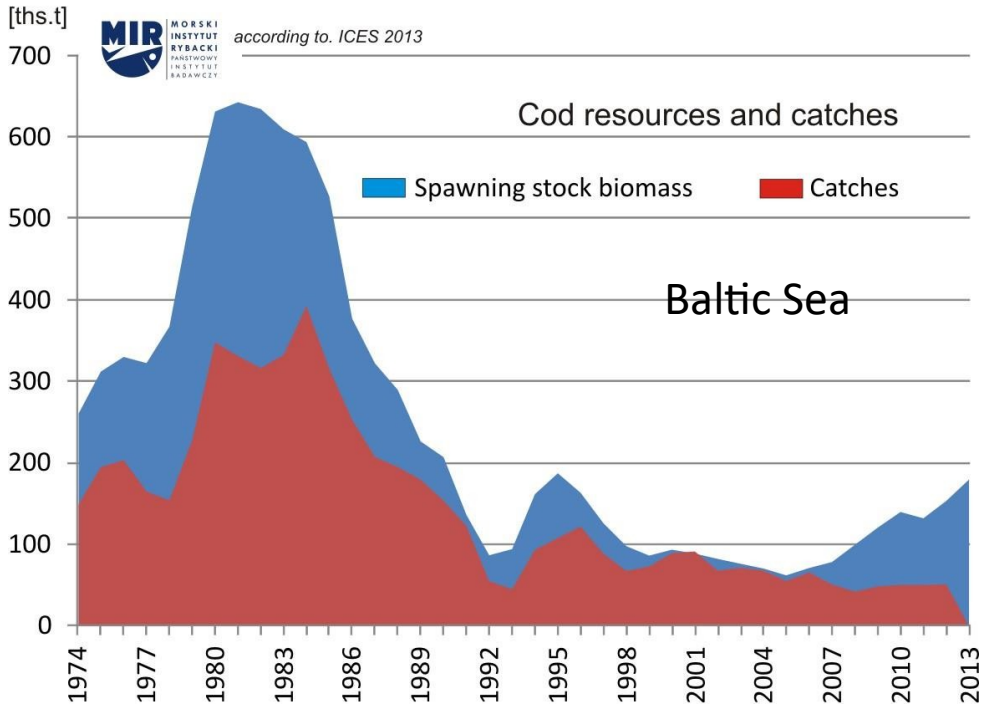
Weight by age of 3-6 years old Cod 1976 - 2083

Growth slows down soon after cautious management is implemented; selective fishing protecting small fish, closing of juvenile areas and general decrease of effort in the Cod fishery

More info:
http://jonkr.mmedia.is/english/waterford2011.pdf

Baltic sea

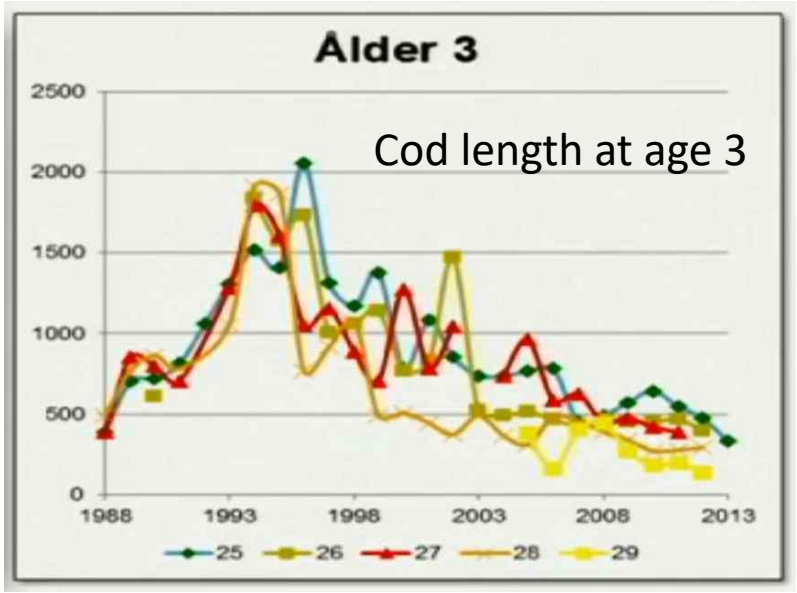
Effort has been reduced, quota system implemented, selective fishing by introducing larger meshes, scrapping of boats.



Growth of Cod in the Baltc Sea 2011

My comment on the fisheries policy 2010:
Mesh sizes in fishing gear have been increased in recent years to increase selectivity that is let more small fish escape from he fishery and increase pressure, relatively of big fish. If the results from the age reading are near to be correct, this is wrong management policy that will lead to less catch and poor state of the stock in the long run. This will (as history shows) lead to further restrictions in the fishery.
See: http://jonkr.mmedia.is/english/BalticAge1.pdf and jonkr.mmedia.is/english/BalticCodAge14.pdf and more at: ://jonkr.mmedia.is/english/eindex.html

The Polish program that should make all better in the Baltic Sea see: https://tinyurl.com/y7cs7umm and BenYamis comment: http://www.worldfishing.net/news101/Comment/ben-yami/poland-and-the-eus-fisheries-policy

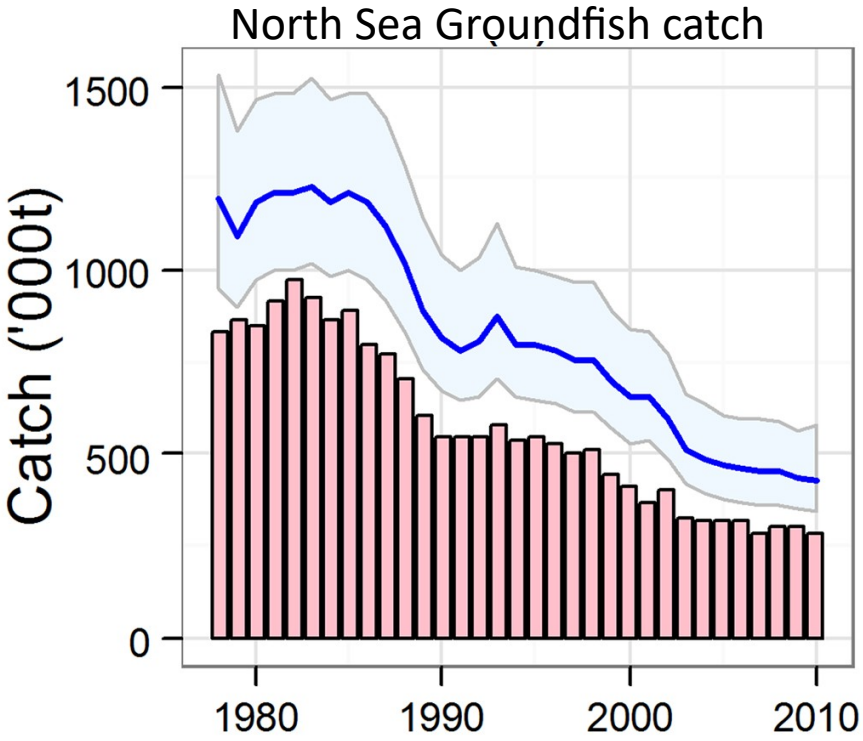


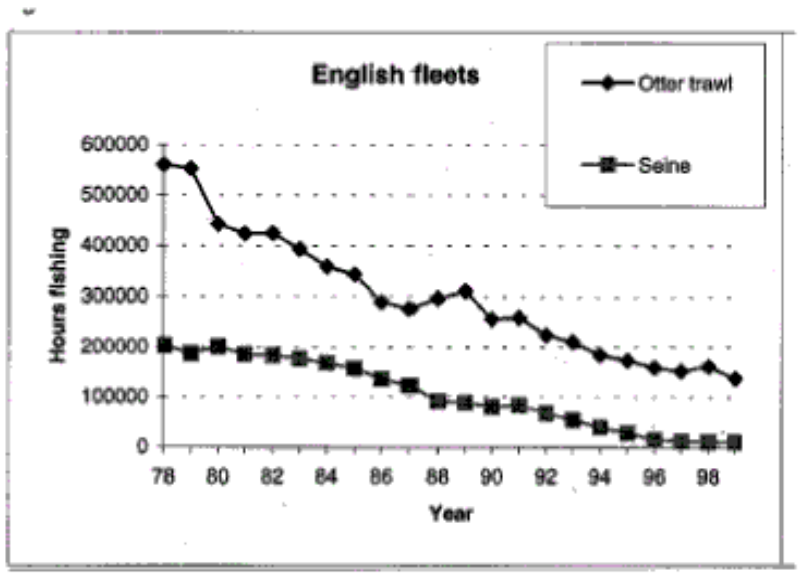
Growt of Cod is vastly reduced in recent years

The Cod stock in the Baltic sea is now in a very bad shape, the result of selective fishing and reduced effort. Now, a ban is suggested to rectify the situation, which is completely wrong decision when Cod is dying from hunger

North Sea

The ground fish catch in the North Sea has declined at a constant rate from a peak in the eighties when active management started, to prevent "over fishing". Reduction of effort was recommended, quotas decreased steadily and boats and trawlers were decommissioned. The British fleet is now a fraction of what it was. The outcome of this experiment is that catches are record low and the fishing industry is in great difficulties. And strangely, the North Sea is still regarded over fished by the fisheries scientists in charge.





Fishing pressure is vastly reduced as can be seen in the graph above.

The Scotish fleet has almost been wiped out:

There where **590** Scottish whitfish wessels in 1991 but only **207** wessels in 2011

Fish were starving in the North Sea 2003

http://jonkr.mmedia.is/english/skotla/fnews.html

27 cm mature 4 years old Haddock from the North Sea in 2003.

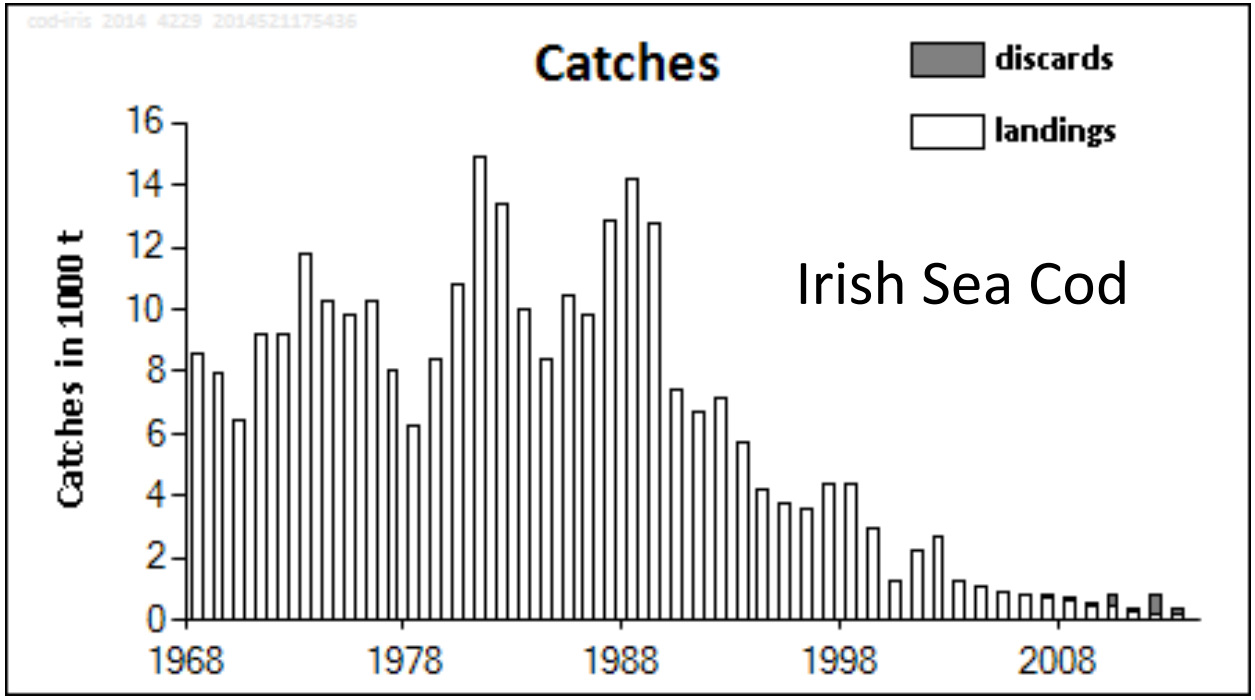
Cod of same size was also thin. There is a food competition between cod and haddock of the same size

In 2006 CEFAS scientist Richard Stafford reported on an investigation into the eating habits of whiting:
Do Whitings eat cod? …"The stomachs each given haul were either predominantly empty, or contained a large number of crustaceans. Whiting caught over hard ground were largely empty. A few soft sediment sites also resulted in predominantly empty stomachs." And further:
"It was noted by the scientist on board and the crew that the fish caught over areas of hard ground with empty stomachs during the August survey were very thin and of poor condition. Furthermore the livers of the fish were frequently black and contained many parasites."

This describes a hunger situation but the scientists in situation did not recognize the importance of their findings, i.e. hunger and lack of food explained low recruitment of cod, not predation by whiting.
More on the management of the North Sea: http://jonkr.mmedia.is/english/swfp.pdf

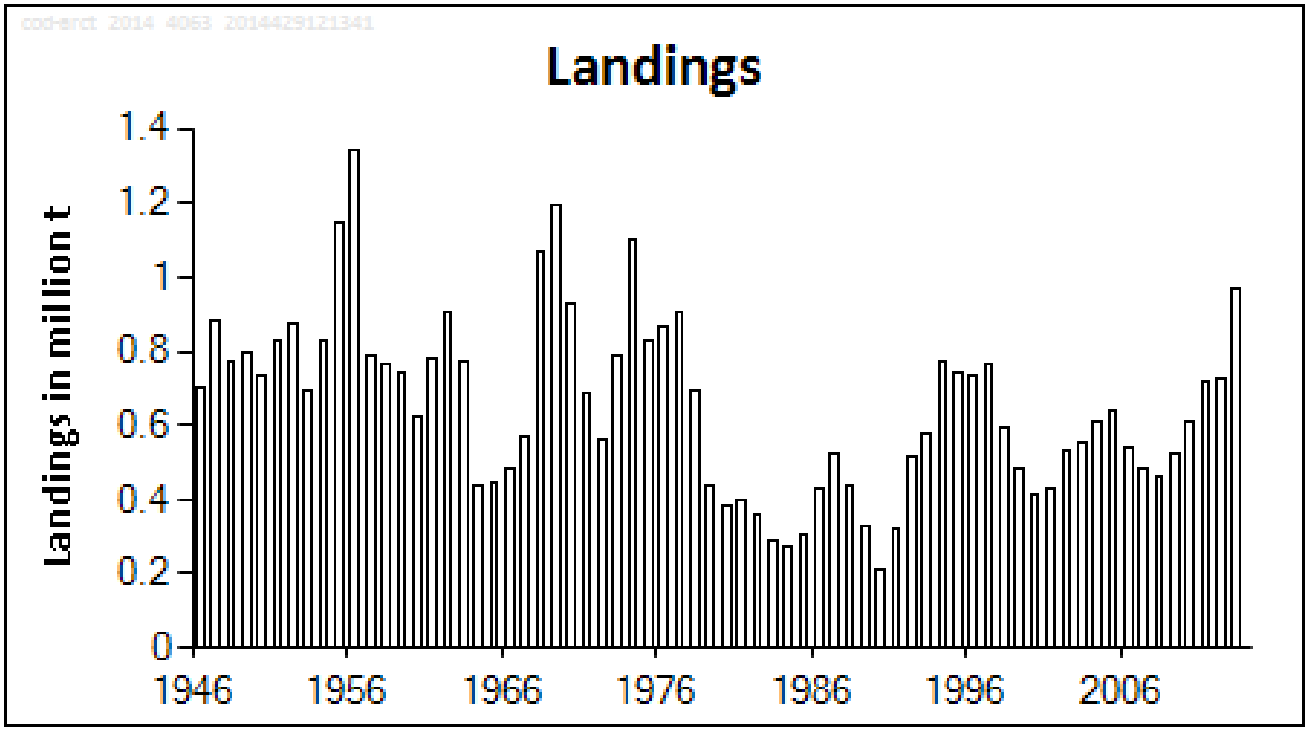
Has the management lead to more catches?

Not in the Irish Sea. The stock has been managed with quotas sinsc late 80´s. The catch has constantly declined and now there is a cod fishing ban.
More on the management in the Irish Sea: http://jonkr.mmedia.is/english/irsea.pdf



Cod saving plan implemented from 2000.
In 2003 there were 30-40 trawlers fishing for whitefish (whiting, cod, haddock) . No direct cod fishing is allowed at the present.

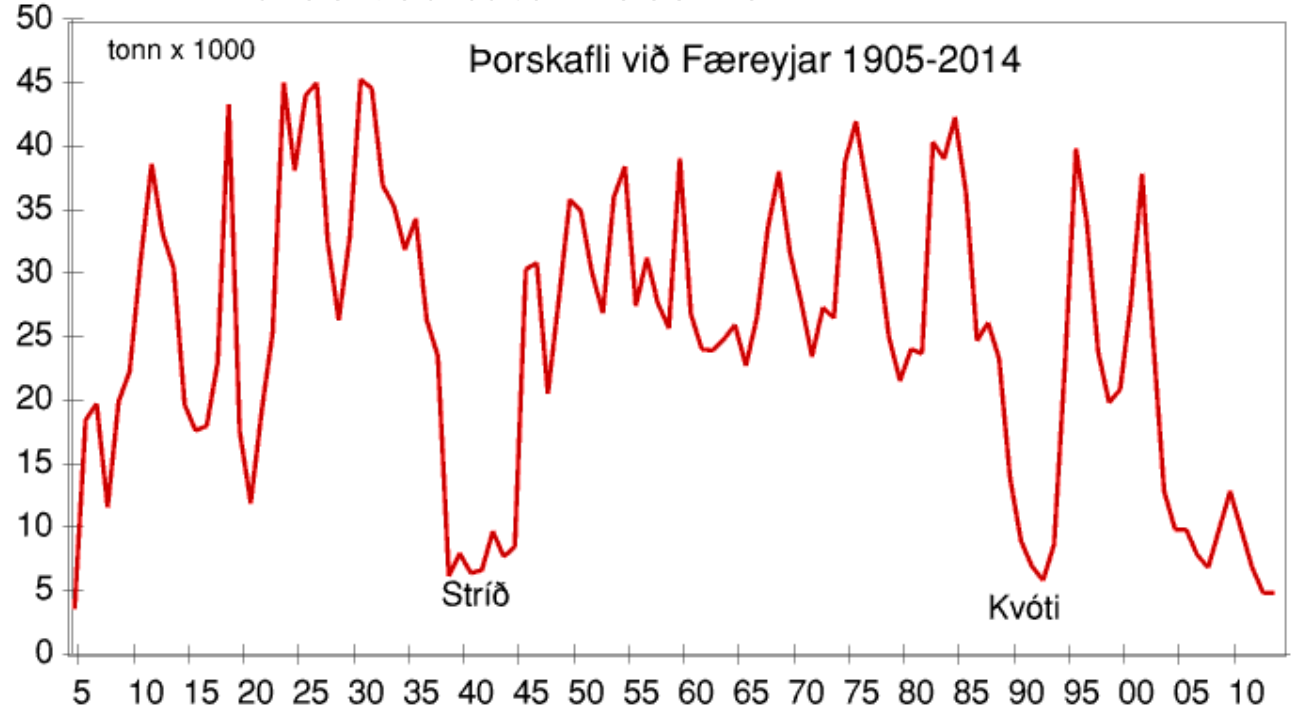
Barent Sea Cod



After 1976 foreign trawlers had to move out of the 200 nm EEZ and effort was reduced. A strong year class from 1970 was to be protected and allowed to grow big. This ended with a disaster in 1989, overcrowding of cod followed by hunger death.

Now the management policy is to catch so much Cod that it will not affect its food resource in a negative way by grazing it to heavily.

Faroe Cod catch 1905-2014

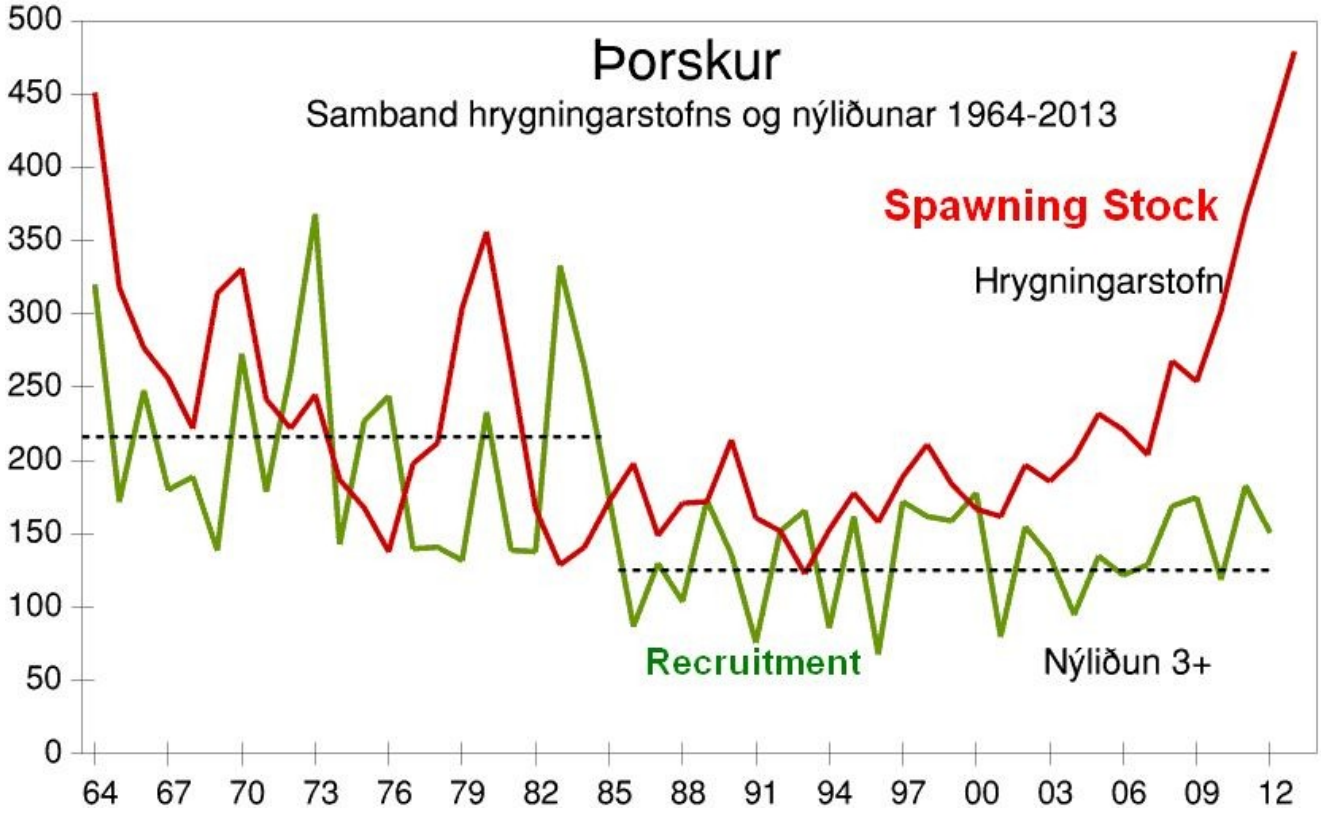


There was no increase in the cod catches after the no- fishing period during WW II 1939-1945. What was not caught during the war was forever lost.

Catches of cod before WW 2 oscillate with peaks up to 45 000 tons. It goes low in the war when foreign trawlers were absent. After the war the catches increases, with lower peaks though. As fishery limits around Faeroes are extended the oscillations increase and get deeper. Quota system is abandoned in 1996 in favor of fishing days. As more effort restrictions are increased, fewer fishing days, more protected area. The catch crashes. Possible explanation: Low harvest rate, increased fish density, overgrazing of the food resource, leading to individual food shortage, slower growth and increased mortality.

What about the recruitment?

Does a large spawning stock give higher recruitment? The simple answer is No.

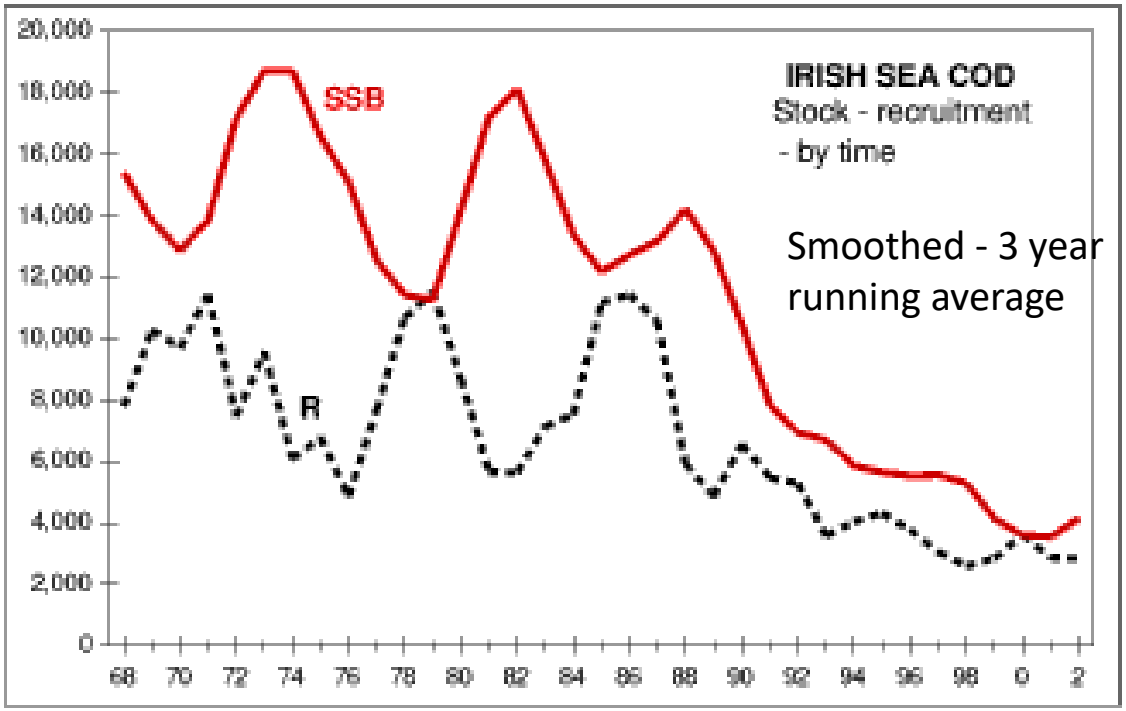


Icelandic Cod – Spawning stock and recruitment

Above is graph of spawning stock and recruitment of Icelandic cod. There is no positive relationship, rather the contrary. An interesting thing is that there is large decrease in recruitment when the quota system is implemented 1984. One possible explanation is that the stock estimates are to low under a quota fishery.

Spawning/ recruitment relationship in the Irish Sea.

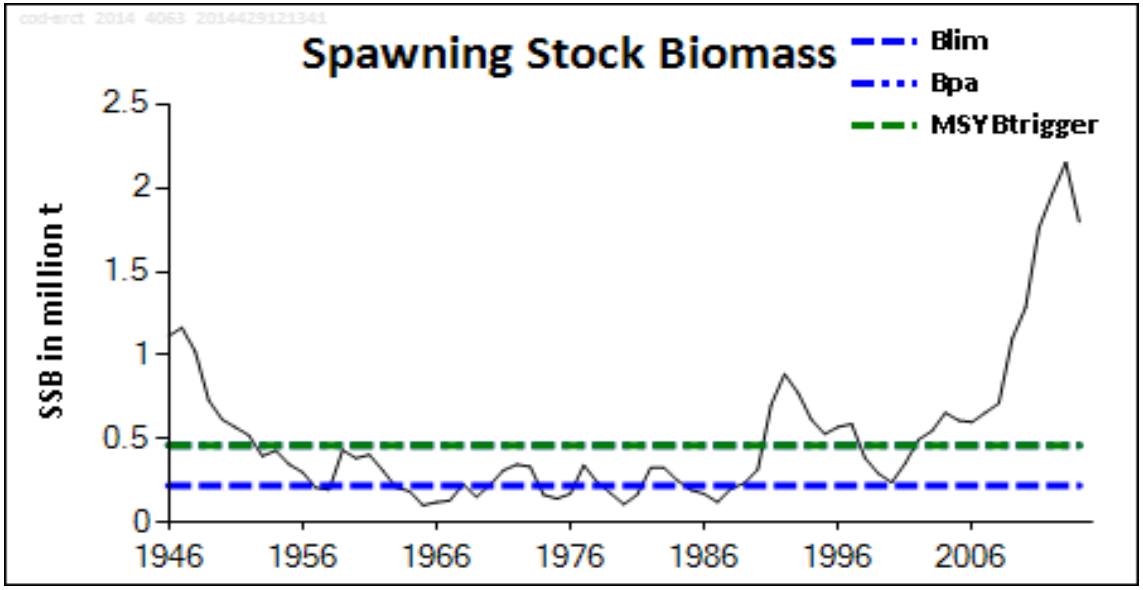
Large spawning stock gives low recruitment and vice versa.



When the fishery is unregulated, there is an inverse relationship between the spawning stock an the recruitment. When the fishery becomes regulated with quotas and cut downs, the regularity goes out of balance. The fishermen start black landings and mis- reporting to save their own skin.

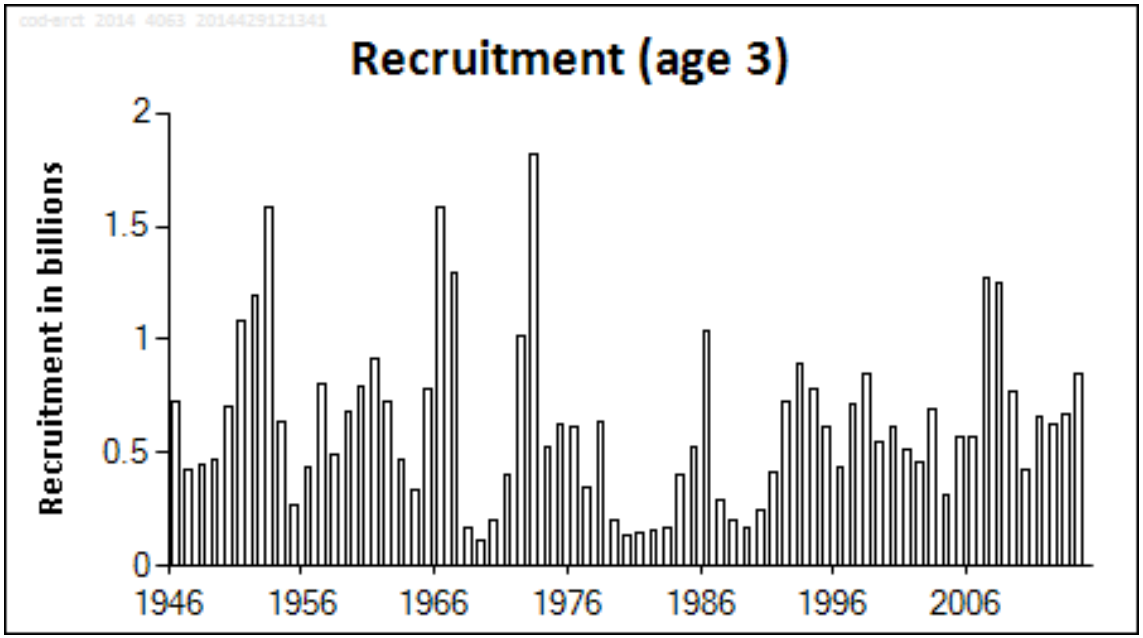
While there is a free access to the fishery the catches oscillate in a regular manner. Then spawning stock (SSB) and recruitment (R) are in anti-phase. Large SSB gives low recruitment. This can be interpreted as follows: when SSB, and the stock, is large, there is not a room for recruits. When the stock is low, there is opportunities for young fish. When active management starts in the late eighties, the system goes amok, further effort restrictions, lowering of quotas and cod saving plans have lead to closure of cod fishing in the Irish sea.

More on stock recruitment relationship: http://jonkr.mmedia.is/english/SR1-11.pdf



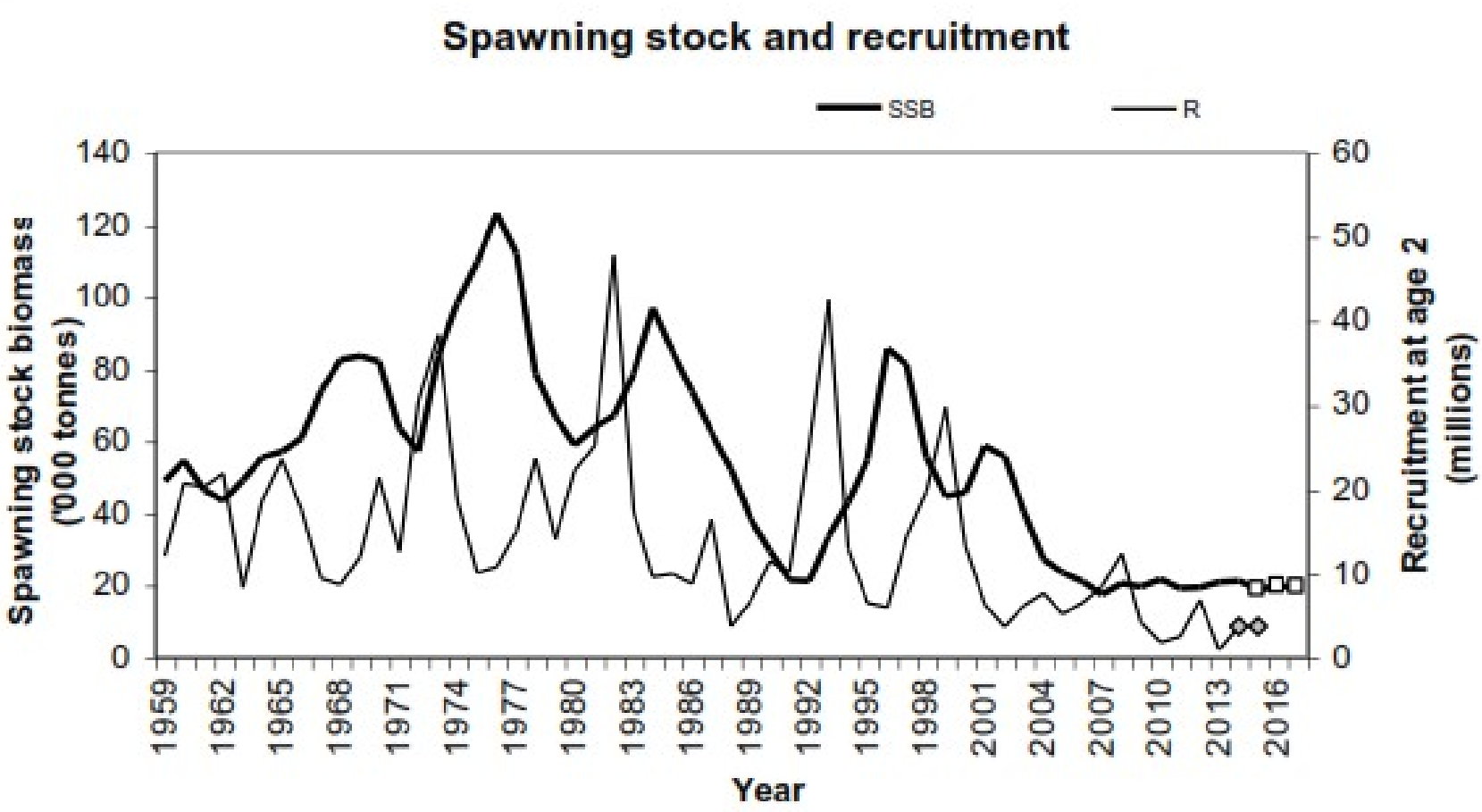
Barent Sea

Strongly growing spawning stock the last 10 years has not increased recruitment.



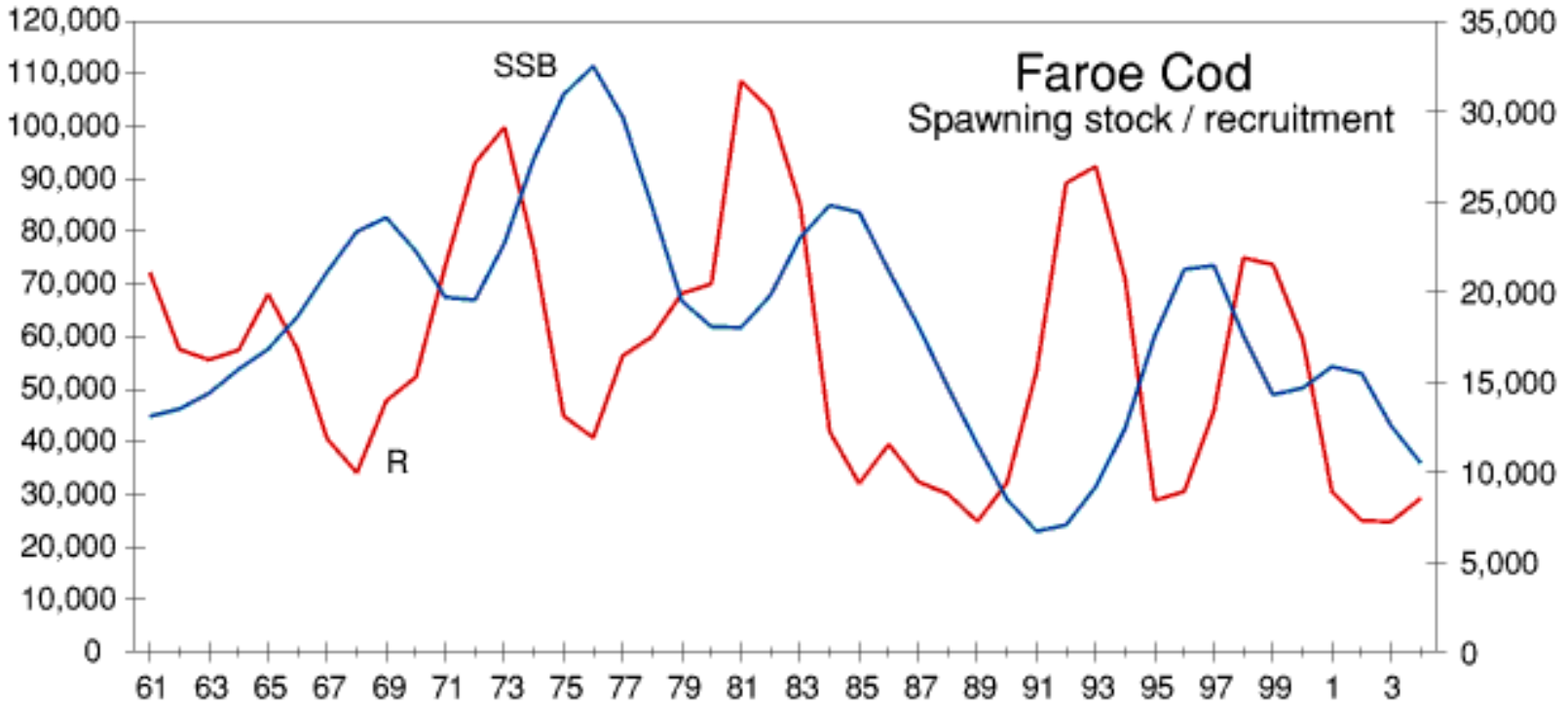
The Norwegian strategy has been to regulate the stock, with fishing, in order to protect the food resource from been eaten up by a to large a cod stock, as happened in 1998-1990.

Faroe Platau Cod - from ICES



Large spawning stock **does not** give large recruitment.
There is an inverse relationship between R and SSB.

Smoothed - 3 year running average



Smoothed data shows this more clearly: There is an inverse relationship between R and SSB.

More on this: http://jonkr.mmedia.is/english/FaroeBio-4.pdf

1994	No fishing
1995	No fishing
1996	TAC
1997	F = F(95)
1998	F = F(96)
1999	F< proposed F_{pa} (0.25)
2000	F < proposed F_{pa} (0.25)
2001	F< proposed F_{pa} (0.25)
2002	No fishing
2003	F< proposed F_{pa} (0.25)
2004	F< proposed F_{pa} (0.25)
2005	F< proposed F_{pa} (0.25)
2006	F< proposed F_{pa} (0.25)
2007	F< 0.20
2008	F_{pa}
2009	No fishing and recovery plan
2010	No fishing and recovery plan
2011	No direct fishing; minimize bycatch, implement recovery plan
2012	No direct fishing; minimize bycatch, implement recovery plan
2013	No direct fishing; minimize bycatch, implement recovery plan
2014	No direct fishing; minimize bycatch, implement recovery plan
2015	No direct fishing; minimize bycatch, implement recovery plan
2016	No direct fishing; minimize bycatch, implement recovery plan
2017	MSY approach (F≤ 0.17)

Faroe Cod advice from ICES

The advice is always the same:
Catch less

Cod catches have been low since 2004.
What has happened?

Let´s go back to 2003 and look at the situation.

Faeroe 2003: Cod was thin, obviously starving. - Fishing effort to low?

Recommendation in 2003 from Jon Kristjansson:
N.of fishing days should be increased 10-15%. It should also be considered to increase fishing pressure on saithe by increaseing n.of fishing days and decrease mesh size in trawls to 120 mm in the direct saithe fishery

Reasoning:
According to ICES, the cod- haddock- and saithe- stocks have been increasing the last 3 years which means that the fishing effort has not been able to prevent the expansion of the stocks.
The cod is generally thin and underfed, but the haddock is in good condition. It is no likely that hungry cod will increase in weight, rather morality will increase.
The cod is by all judgment decreasing. Reduction of the fishery in that situation will make things worse. Eventual reduction of the cod catch is **not due to over fishing but lack of food.**

To little fishing (*not enough fishing, cod is thin*)

Length growth, based on scale reading and back calculations.

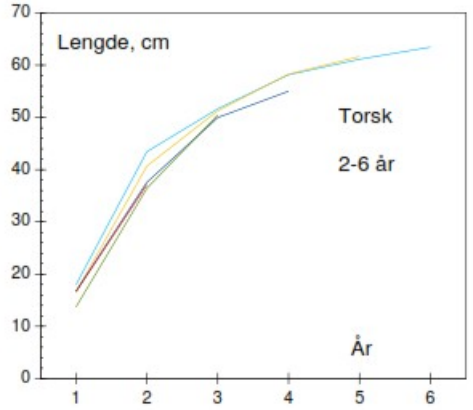


Fig. 1. Diagram av lengdeveksten av 2-6 år gammel torsk. Tallene finnes i tabell 1.

Growth of cod ceases around 60 cm. Tagging (table below) manifests this.

Merktur	FLF101488	FLF102376	FLF102360	FLF102474	FLF102349	FLF102441
Dato	25/10/02	28/10/02	28/10/02	28/10/02	28/10/02	28/10/02
Longd (cm)	51	66	67	64	60	74
PosBreidd	6156.9	6144.9	6143.7	6142.9	6143.5	6143.7
PosLongd	808.2	704.7	705	704.8	704.9	704.8
Øki	V/Mykines	V/Suðuroy	V/Suðuroy	V/Suðuroy	V/Suðuroy	V/Suðuroy
Fingin	18/10/03	21/10/03	21/10/03	21/10/03	21/10/03	21/10/03
Longd (cm)	57	66	68	67	61	75
PosBreidd	6157.7	6141.7	6145.2	6145.7	6145.4	6142.3
PosLongd	808	705.1	705.7	705.6	705.7	704.7
Vaksnir (cm)	6	0	1	3	1	1
Flutt seg (fj.)	1	3	2	3	2	1

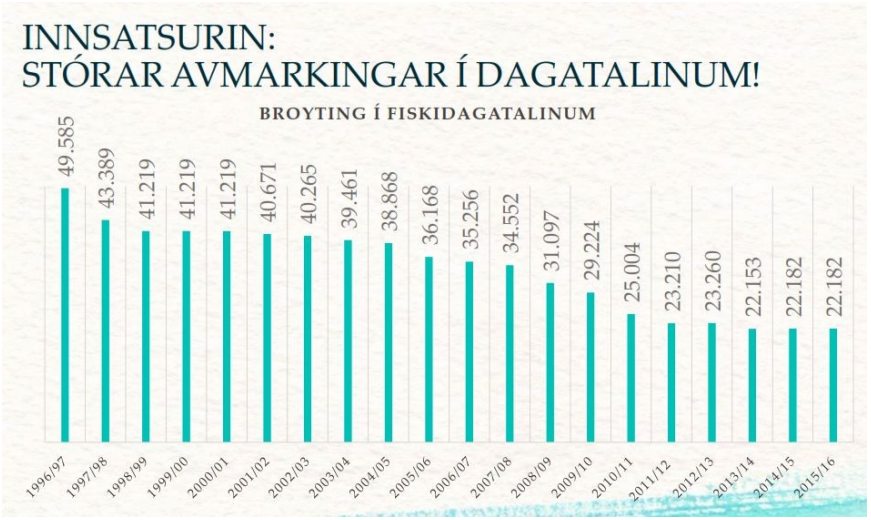
Fish 60 cm and larger grow very slowly and probably lose weigth between years.

More on growth:
http://jonkr.mmedia.is/faero/vekst04.pdf

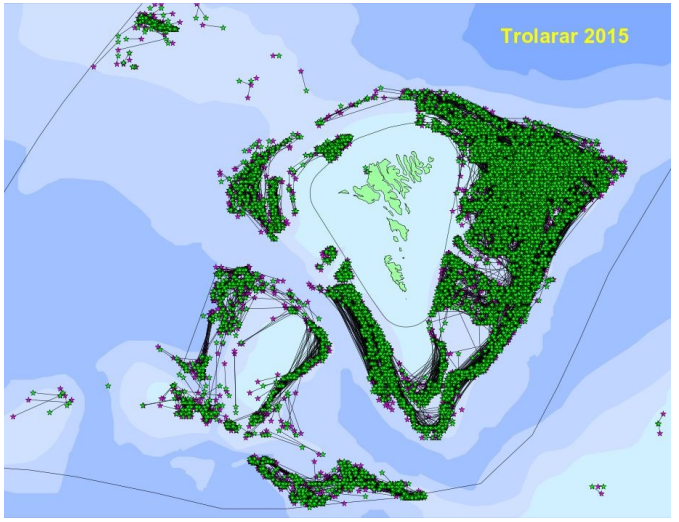
Tagging 2002.
(**Merktur**= tagging date. **Fingin**=recaptured. **Vaksnir**=growth)

The fishing effort in Faeroe has been vastly reduced since 1996,

but ICES still blames over fishing for the bad state of demersal stocks and recommends reduction in effort.



Allocated fishing days 1996-2016



Large areas are protected from trawl fishing (trawling spots indicated by green dots).

When the effort system (day's at sea) was initiated in 1996, nearly 50 000 days were allocated to the fleet. In 2015/16 n.of days were 22 000, and were cut further 15% for 2016/17. This is more than 60% reduction in fishing effort.

The fleet is also reduced: In 2007/08 there were 247 large and small vessels fishing. In 2015/16 there were 102 wessels fishing. Of the 102 fishing licences, only 72 were used.

So overfishing can hardly be blamed for the poor state of the stocks. Rather has under exploitation lead to overgrazing, resulting in hunger, retarded growth and increased natural mortality.

Change of weight by time is important – can it be explained?

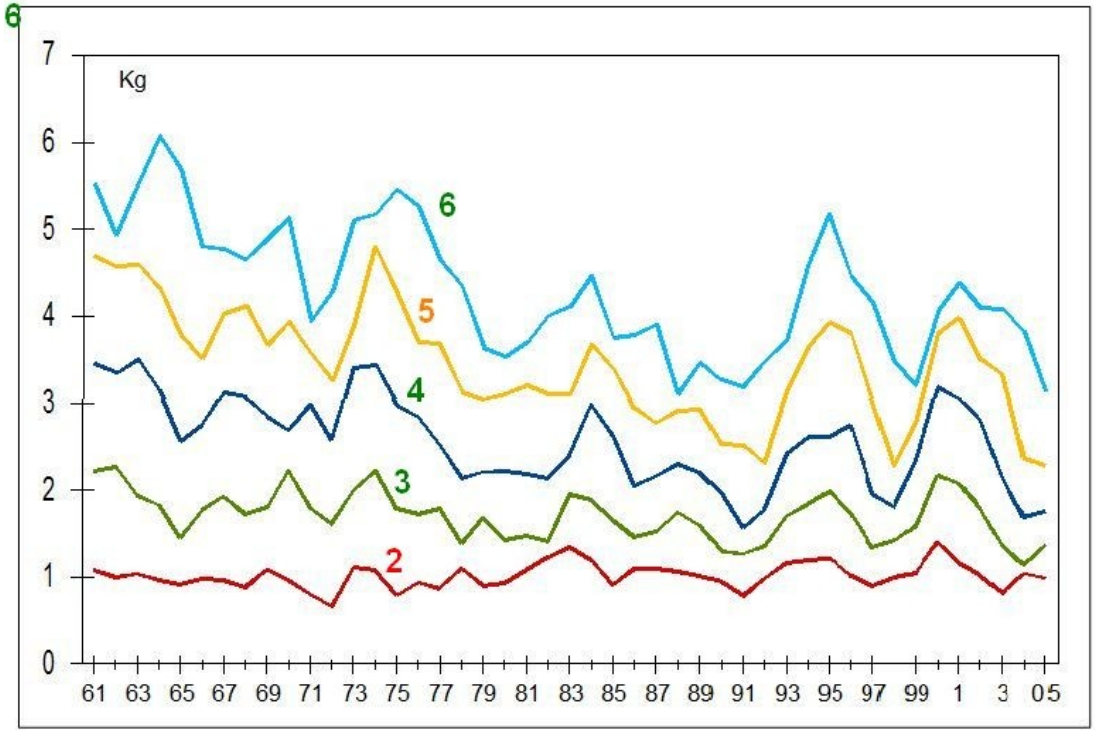


Fig. 4. Weight at age 1961-2005 (calculated from length).

Growth ceases by time

= less food per individual fish

= Reduced fishing pressure leads to ingreased n.of fish

During this period fishery limits have been extended, foreign fleets have left the grounds. This and other fish protecting measures have caused less fishing pressure and lead to denser fish populations, less food per individual fish and slower growth.

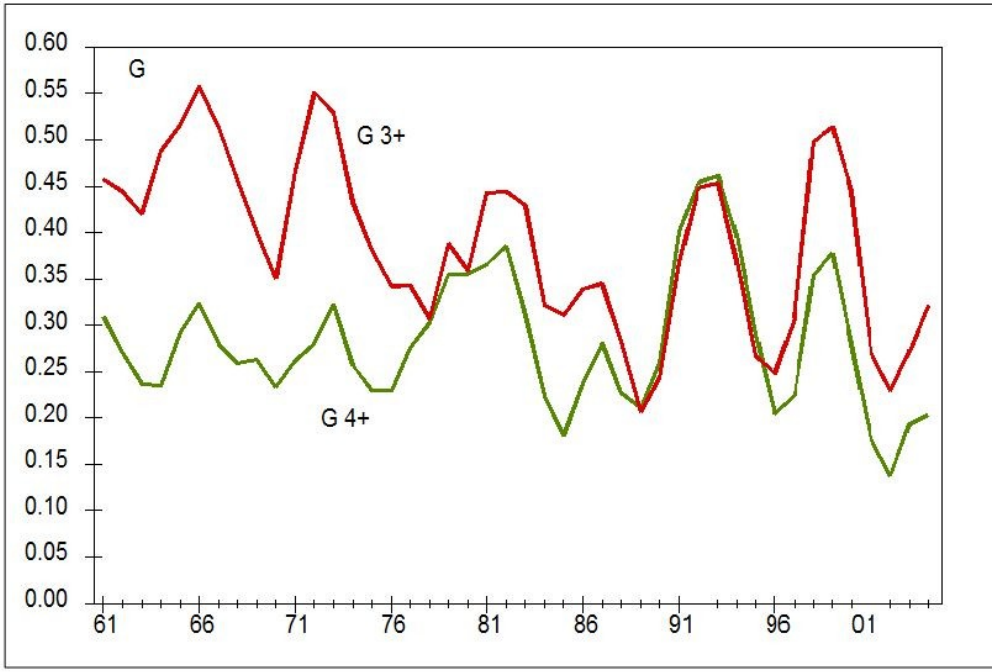


Fig. 5. Annual growth rate for 3+ and 4+ cod 1961-2005.

When the weight at age data are broken up to show the yearly growth (G) of each year class, clear oscillations by time become evident.

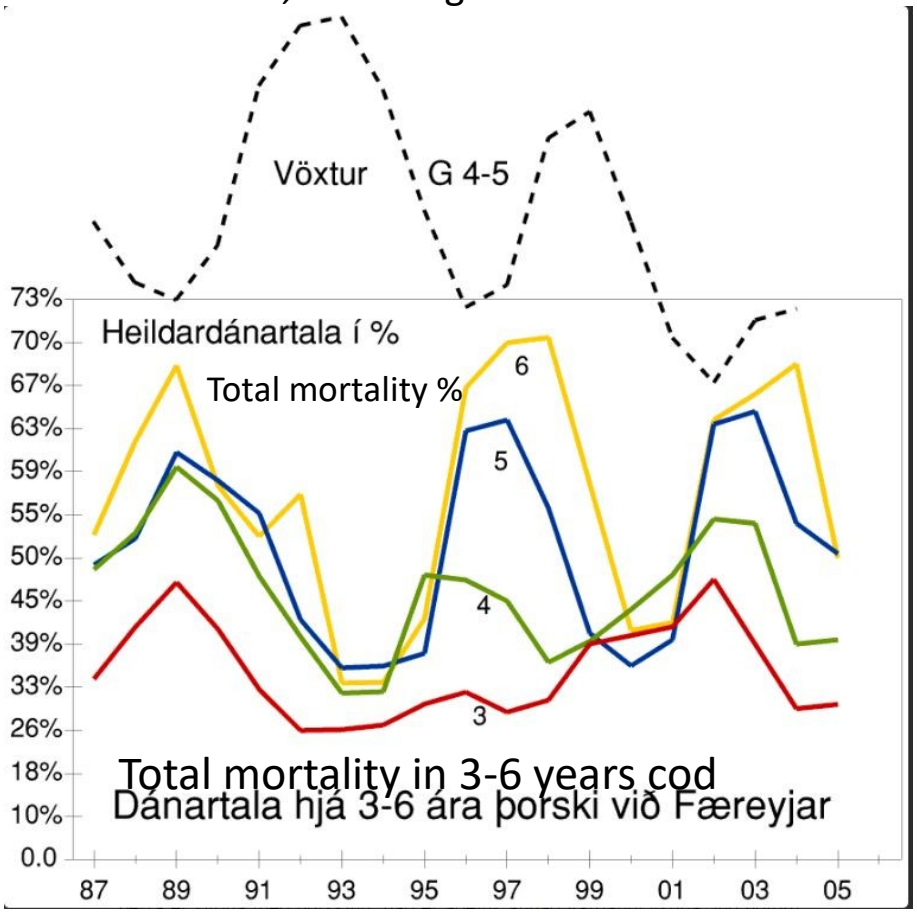
G 3+ is the annual growth from year 3 to year 4, G 4+ is the annual growth from year 4 to year 5.

The curves for 3+ and 4+ are in identical phase which means that there are good and bad growth periods.

Younger fish grow faster than older fish. In a food shortage situation smaller fish have advantage; they need less food to keep growing.

Growth rate varies regularely:
This is explained in detail here: http://jonkr.mmedia.is/english/FaroeBio-4.pdf

Growth rate; 15-35% growth for 4+ fish



The graph shows the total mortality of 3-6 year old fish by time in the Faroe Cod stock (ICES data). Superimposed, dotted line, shows growth rate G for cod between year 4 and 5.
In 1993-1994, all year classes except the 3 year class have the same mortality, 33%. The year 2000 all have the same mortality 40%.

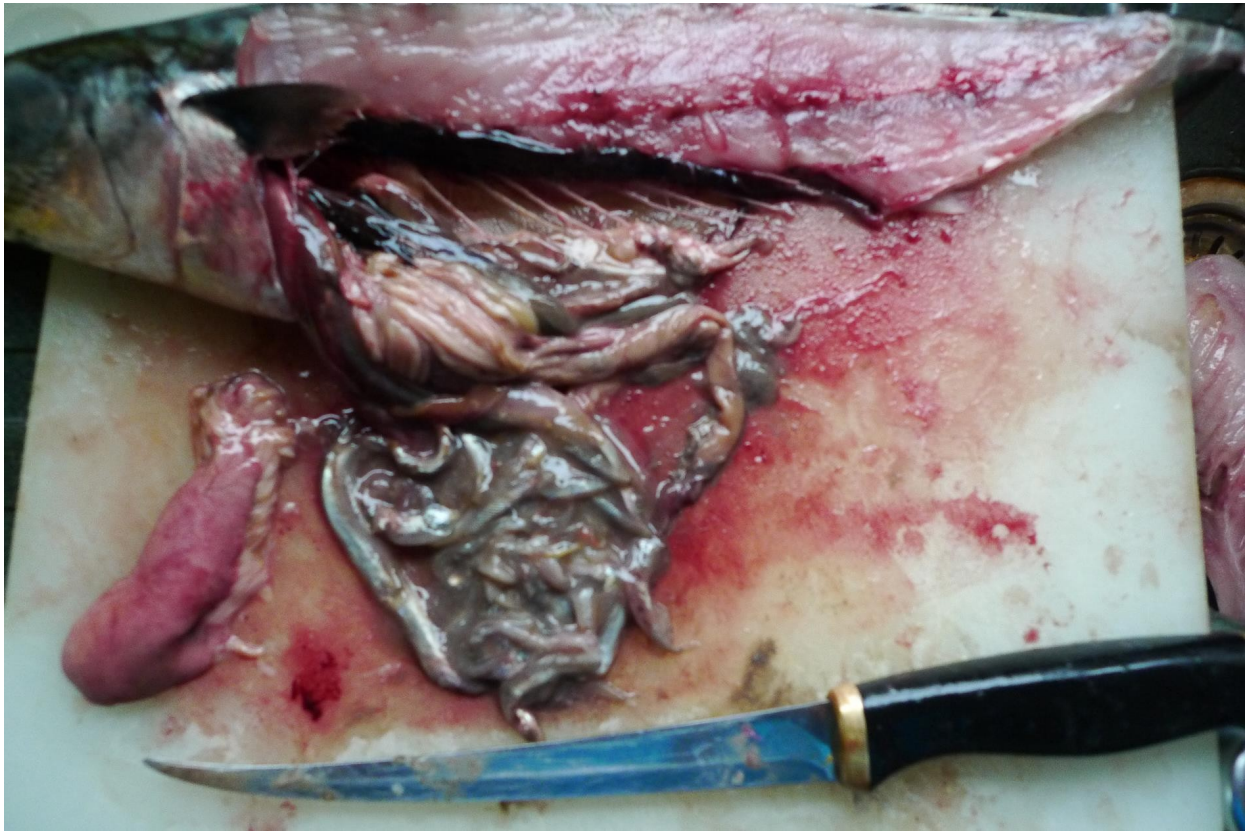
Yearly annual mortality of 6 year old varies from 33%-70%. It is low in years when the growth is good and high when the growth is slow.

As the fishing pressure is relatively stable over time, this means that the natural mortality is related to growth. But as it is a constant in the models (M=0.2 or 18%), fishing is blamed for the increased natural mortality caused by lack of food followed by slow growth.

Den totale dødlighet er sammensatt av **naturlig dødlilhet** og **fiskedødlighet Naturlig dødlighet** er satt 18% for alle aldersgrupper og fleste fiskearter.

In the models used for stock calculations, the annual natural mortality is set 18% (0,2). The graph above shows that the total mortality varies with the growth rate. As fishing effort is constant, the observed total mortality rate stems from variations in natural mortality.
Further details and explanations: http://jonkr.mmedia.is/english/FaroeBio-4.pdf

New competitor on the stage: Mackerel



Stomack content of this one caught at Iceland: Sandeels are the dominating food. Direct dompetition with codfish

Pope (the director of theMarine Institute): The Bible says, keep the fish in the sea for the meagre years.
Fishermen and banned scientist (the author) say: “Until the recruitment is eaten up and the spawners die from old age!”

Banned Scientist
- and Fishermen

Sea **full** of money- forbidden to harvest

Cannibalism can also be a problem

I end this presentation with a video taken onboard an Iclandic trawler the spring of 2016.

https://www.youtube.com/watch?v=_Zh7YkZoM-A

Thanks for the audience,

Runavik 1. September 2016
Jon Kristjansson Iceand

Back to the Fishbox web site