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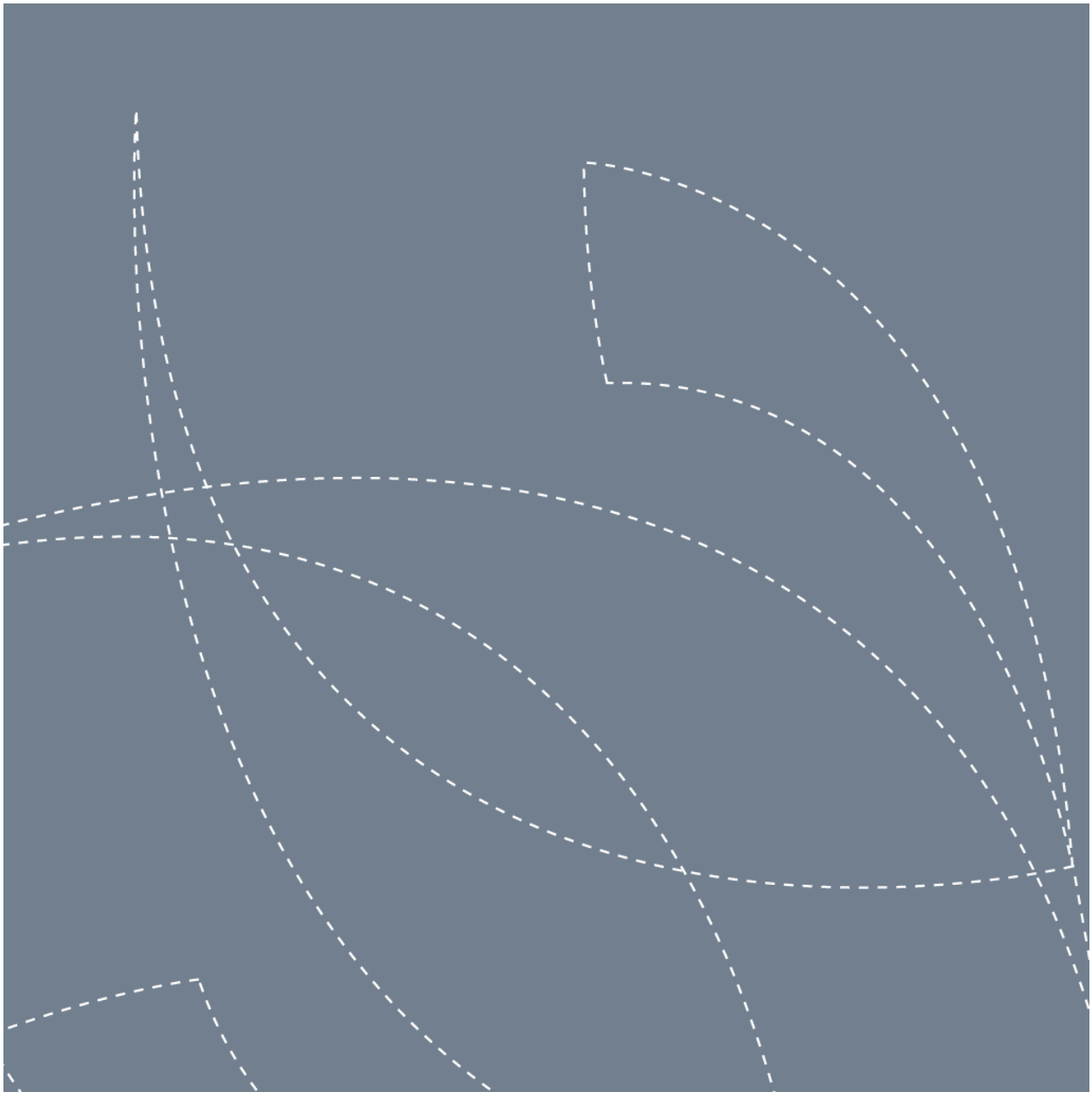
Hooked on Longline

Proceedings from a workshop on long-lining in Reykjavik October 19th and 20th 2010

Edgar Henriksen, Roger Larsen, Sveinn Margeirsson, Mike Pol, Lasse Rindahl, Bjarti Thomsen and Jonas Vidarsson



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Market Research is Nofima`s analytical business division, which provides economic analyses, foresight analyses, consumer research, market analysis and strategic consultancy. Nofima Market also offers consultancy in information logistics and traceability.

Main office in Tromsø
Muninbakken 9–13
P.O. box 6122
NO-9291 Tromsø
Norway
Tel.: +47 77 62 90 00
Fax: +47 77 62 91 00
E-mail: nofima@nofima.no

Internet: www.nofima.no

Nofima Marin AS
Muninbakken 9–13
P.O. box 6122
NO-9291 Tromsø
Norway
Tel.: +47 77 62 90 00
Fax: +47 77 62 91 00
E-mail: marked@nofima.no

Internet: www.nofima.no

Preface

The workshop “Hooked on Long-line” held in Reykjavik, Iceland October 19th and 20th 2010 was a result of cooperation between Faroese, Icelandic and Norwegian scientific institutions. The idea behind the workshop was that the scientific community as well as businesses involved in long-lining, ranging from the fishing fleet to retailers as well as ship builders and suppliers of all kinds of gear and equipment would benefit from international cooperation.

The fishing industry using longline has many positive aspects as well as a wide range of research and development (R&D) challenges. Longline is used worldwide and has adapted to local fish stocks, economy and traditions. It is energy efficient compared to other fishing methods and longline caught fish is often of high quality. Longline avoids both ghost fishing and damage to the sea bed. Thus, the fish processing industry often prefers longline caught fish, which is also of higher value in certain consumer markets.

However, higher costs, lower catch efficiency and the use of expensive bait are associated with longline as are problems with size and species selectivity and unwanted bycatch.

The workshop’s program was composed to address the spectrum of challenges that face the industry and its suppliers. In its nature an industry approach is multi disciplinary and so are the program and the presentations, as well as the suggestions for further work presented in this report.

The cooperation was made possible by funding from different sources and willing and well prepared lecturers. We like to thank the lecturers for their contributions as well as the following funding bodies:

- NORA: Nordisk Atlantsamarbejde, Torshavn, Faroe Islands
- Havstovan: Faroe Marine Research Institute
- LU: The Executive Committee for Northern Norway, Bodø, Norway. (Landselsutvalget for Nord-Norge)

Preplanning partly financed by: FHF; The Fishery and Aquaculture Industry Research Fund, Oslo, Norway.

NORA
Nordisk Atlantsamarbejde

HAVSTOVAN
FAROE MARINE RESEARCH INSTITUTE

Landsdels utvalget

FHF

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1 Why a workshop on longline?

There are many reasons why the parties involved in the cooperation want to establish a multidisciplinary international network aimed at R&D on long-lining. In the initial phase this initiative was strictly Nordic, but we chose to include participants from both sides of the North-Atlantic Ocean, for several good reasons, including:

- Similarity of fisheries, culture and challenges
- Opportunities to transfer knowledge and practices between countries and branches of science.
- Great potential in longline fisheries based on:
    - Energy efficiency.
    - Environmental friendliness.
    - High quality fish with additional potential for adding value through the processing chain.
    - Increased profitability through increased catch efficiency and improved handling of fish.
    - Manipulation of gear parameters such as bait type, hook shape, snood configuration, season and rigging (pelagic versus demersal) to influence size and species selectivity.

Based on the statements listed above the planning committee's intentions were to put together a program that shed light on the status of the present and coming challenges related to longline and long line caught fish. Hence, we invited representatives from different businesses directly and indirectly involved as well as representatives from the scientific community. The expectation was that the presentations would give an overview of current knowledge and inspire new research and development projects and international cooperation in:

- Economics, business strategies and marketing
- Technology and fish handling
- Management

2 Short summary

A short summary of points and conclusions from the lectures is presented below. The intention was not to give exact minutes, but rather to highlight some interesting points and conclusions. The lectures are presented in Chapters 0 to 21.

2.1 Different market aspects for long line caught fish in some European markets

It is argued that longline caught fish has higher quality than fish caught on other gears and the fishing method is also claimed to be sustainable. These attributes are discussed in several lectures. It is a consensus amongst Icelandic (see Chapter 13 and 14), Faroese (see Chapter 15) and Norwegian (see Chapter 5) fish processors and fish exporters that long line caught fish normally has the best quality. This positive attribute is recognised throughout the value chain and explains the demand in the market for fresh fish as well as for salted fish.

Although the sustainability of longlining is used in advertising, a relatively small portion of the consumers (about 10% in the UK market) act on this information. Consumers trust the supermarkets to give them value for money and supermarkets are in turn under strong pressure from NGOs to supply only fish harvested sustainably (see Chapter 4). However, in the business to business market for fish, quality is still the primary selling point. This emphasis on quality is true for fresh fillets from Iceland and Norway (see Chapters 5 and 13) and salted fish from Iceland and the Faroese Islands (see Chapter 14 and 16).

Rising consumer attention to environmental issues, especially in the UK, German and Swedish markets, already has a small but significant impact on consumer behaviour. This impact might become stronger and could give the longline industry an advantage. As shown in a case study of the Norwegian auto line fleet involving Life Cycle Analysis (LCA) the main contributor to carbon footprint in the seafood industry is fuel consumption in the catch operation. Compared to alternative gears like bottom trawling, auto lining of longlines consumes less fuel and consumption when coastal long lining is even lower. This information, combined with additional information about environmental impacts, is actively used by a Norwegian firm further along the value chain in marketing (see Chapter 7). If the industry chooses to increase the use of the advantages of longline caught fish in marketing, one of the elements in such a strategy should be traceability (see Chapter 6).

2.2 Technology and fish handling

The basic longline design has centuries of history – nevertheless, major technological development in general gear parameters (main line, snoods, hooks, swivels), automation of hauling and baiting operations as well as in vessel design, fish finding, navigation and communication, has occurred. The next generation, further mechanised systems are under development. Several systems are on the market, varying in the degree of automation and the dependence on shore based operations. Systems are also available for smaller coastal vessels. However, more R&D effort is needed to develop smaller and more flexible systems with special attention to automating the onshore hand baiting process (see Chapter 8 and 10).

The most technically advanced systems disconnect the snoods from the mainline, store hooks and snoods in separate magazines and use drum spools to store the mainline. This system makes multiple choices possible in material and dimensions of mainline (including monofilament), snood material, and setting method. Catch rates with these systems are promising and typically higher than with traditional autoline. The gear can easily be adapted according to season, target species, depth and other conditions, much like hand baited longlines (see Chapter 10).

Specifications for modern vessel designs for longliners will vary a great deal depending on vessel size, fishing grounds (inshore or offshore), fish preservation (fresh or frozen), fishing method (automatic or hand-baited), propulsion and flexibility in choice of alternative gears. Offshore ship owners have paid special attention to reducing the very heavy workload of the crew, with special focus on their environmental health and safety (see Chapter 8 and 9). Designs for the less specialised coastal fleet require a greater flexibility to make changing to other gears time and cost efficient. The great variations in conditions and specifications will lead to a variety of design solutions including automatic hauling systems, diesel electric propulsion, varying degrees of automation and one or more hulls.

Improving fish quality can be achieved by different technological innovations or by building in quality handling procedures in the overall vessel design as well as in the fish deck design. Results from tests of hauling wells (moonpool and AHL[8]) show several improvements compared to traditional hauling methods, including improved fish quality due to reduced gaff marks in fillets and increased catch rates and reduced unaccounted mortality due to reduced loss of fish in the hauling process. The most important improvement is increased safety and welfare for crew in rough weather from hauler rooms closed off from exposure to weather (see Chapter 9).

The important parameters when designing fish handling equipment are to ensure bleeding in water within minutes after the fish comes onboard and also to start the chilling process as soon as possible, as well as to store fish onboard in temperatures around -1 degree Celsius. These parameters result in a white fillet or salted fish, with reduced gapping thus providing the processing industry very good raw material. To monitor and secure quality through the value chain, traceability and data management systems can be used (see Chapter 11). By combining electronic logbooks, monitoring systems, reporting and communication systems, new opportunities are available to analyse, plan and manage both fish processing through the value chain as well as fishing operations. Combining these sources with historical data including geographical and seasonal variation in parameters influencing catch rates for different targeted species and fillet yield provides the industry with powerful new tools to plan fishing operations according to market demands (see Chapter 11 and 12).

2.3 Business and economy

Section 2.1 established that fish caught on longline have high standing in the market because of their quality. The industry is able to market a well bled (hence white) fish with longer shelf life and reduced waste compared to other fishing methods. Icelandic, Faroese and Norwegian firms have business strategies based on longline caught fish. However fish

[8] Automatic Longline Hauler system

quality alone is not sufficient to ensure earnings and value. Integrated production and marketing strategies supported by more or less well developed traceability systems seems to be the common strategic choice across vessel ownership (see Chapters 5, 7, 13, 14 and 15). A vertically integrated company showed interesting examples of integration of electronic systems with production and market planning (see Chapter 14). The fish processing firms sharing their experiences at the workshop all emphasized that they had competitive advantages in their markets based on reliably high quality.

Earnings in longline vessels vary between vessel sizes and countries. The inshore Norwegian fishing fleet is reduced in numbers due to management policy; higher costs compared to alternative gears have reduced the inshore longline fleet's shares of the catch of important species (see Chapter 5). The important parameters to improve earnings are the same in all longline vessels. Analyses presented showed that increasing catch efficiency by increasing catch rates per hook and number of hooks set, and controlling costs, particularly for bait, are most important to improve profitability. This conclusion was confirmed by attending skippers and future R&D development aimed at bait development[9] as well as other means for increasing efficiency and reducing cost was also emphasised (see Chapters 14 and 19).

The Greenland longline fishery is very different from Icelandic, Faroese and Norwegian fisheries. The main target species is Greenland halibut and use of smaller open boats are common. Less than 15 Greenlandic vessels are equipped with modern autoline systems. In northern areas, with solid ice during winter, longline is set from sledges using a "sliding wing". Important R&D tasks for this fleet include developing abundant polar cod as bait; development/adjustment of mechanised baiting systems for polar cod is one necessary step (see Chapter 16).

2.4 Management

Longlining, compared to alternative fishing methods like trawl and gillnet, scores best by most responsible fisheries criteria. However, this superiority is not the case in all longline fisheries around the world. Bycatch of seabirds, marine mammals, reptiles (turtles), sharks (elasmobranchs) and negative impact on vulnerable marine ecosystems are problems in some fisheries. In these, room for further improvement clearly exists both in mitigation measures and in management regimes. In the North-Atlantic longline fisheries efficient mitigation measures[10] have been developed to nearly eliminate bycatch of seabirds (mostly northern fulmar), the only serious bycatch issue in these fisheries. Bird deterrents also have a significant potential to increase catches by reducing loss of bait to bird predation during setting. Therefore, industry has an additional incentive to put these devices to use (see Chapters 18 and 19).

Quota allocation and management also affect the industry's earnings. Although the main objectives of policies are often the same - responsible and sustainable fisheries - management systems differ. In the Norwegian and Icelandic management systems, quotas

[9] Increasing catch rates and selectivity and reducing costs. Reducing use of valuable fish and development of artificial bait

[10] Bird-scaring line is the most efficient (see www.birdlife.org for factsheets on mitigation measures)

are allocated to vessels and fleet profitability is ensured by governmental structuring of the fleet. Although the systems differ, the Icelandic system is mainly an ITQ[11] system, while in the Norwegian system, a wider spectrum of regulatory instruments is used to adjust overall fishing fleet size to available stocks (see Chapters 14 and 17). The fishing day system used in the Faroese fisheries is different from the quota allocation systems in Norwegian and Icelandic fisheries. The Faroese system is believed to offer a very good solution to the discard problems in a multi species fishery, but seems to be less effective when adjusting fishing effort to the actual stock situation (see Chapter 17).

Governments also can emphasize aspects other than stock management such as responsible fishing and overall fishing fleet profitability when implementing regulatory measures. Socio-economic aspects such as maintenance of rural fishing communities and regional and income distribution are often taken into account. These considerations are common in Norway, Iceland and the Faroese Islands where different tactics to stimulate longlining in the coastal fishing fleet were developed[12] (see Chapters 17 and 20)

2.5 Feedback from representatives from the industry and scientists

After each session and at the end of the workshop the audience were given the opportunity to comment and give feedback on the lectures. In addition the program committee had further discussions. In the following section a summary of these discussions is presented.

It is obvious that the quality of line caught fish has good standing in different markets and the longline industry also argue convincingly that it contributes to responsible fishing. However, the industry has high costs and developing more cost efficient operations requires R&D. Both factors suggest that the industry should benefit from an international strategic cooperation that includes the scientific community. Representatives from the industry gave positive response to the idea of further cooperation, but did not identify who should lead the necessary initiatives, nor define the scope of a possible initiative.

Scientists at the workshop and in the planning committee discussed an international multidisciplinary scientific network. Geographically, a network should include countries around the North-Atlantic, and subjects should include all essential factors concerning longlining. Initiatives will be taken to fund such a network through traditional sources. The longline network should be aimed at sharing knowledge and generating ideas for international R&D projects and could be assisted by reference groups from the industry.

[11] Individual Transferable Quotas

[12] Quota bonus, bycatch quotas, allocation of quotas, bait supply, allocation of fishing days

The planning committee also suggested two projects that should be planned, funded and started first:

A benchmarking project comparing the situation in the long lining industry in the participating countries, comparing:

- Fleet efficiency
  - Fleet groups
    - Catch per hook
    - Size and species selectivity
- Macroeconomic parameters
  - Revenues
  - Cost
  - Profits
- “Bottlenecks”
- Raw material quality
  - Proportions of fish to high value products
  - Vessel size

A bait development project:

- Preliminary study
  - Review paper
  - Planning international cooperation
- International cooperation on bait development to:
  - Reduce the use of valuable baitfish
  - Increase size and species selectivity
  - Reduce costs

Other areas suitable for international cooperation were also discussed such as:

- Relationship between price and quality
- Increasing catch per hook
- More hooks in water or/and more catch per hook
- More cost efficient vessels
- Preserving fish quality
- New or improved methods for fish handling
- Better educated fishermen or improving pride in profession
- Improving fishing crew working conditions

3 Program

Hooked on longline

Invitation to a workshop on longlining Reykjavík, Iceland October 19th-20th 2010

Faroese, Icelandic and Norwegian scientific institutions organize a workshop in Reykjavík to discuss the challenges facing longline fisheries. Representatives from governments, businesses, NGOs and other stakeholders as well as from the scientific community are invited.

Workshop on longlining

Longlining is used worldwide and has adapted to local fish stocks, economy and traditions. Longlining is energy efficient compared to other fishing methods and longline- caught fish is often of high quality. Longlining avoids both ghost fishing and damages
to the sea bed. Thus, the fish processing industry often prefers longline-caught fish, which is also of higher value in certain consumer markets.

However, higher costs, lower catch efficiency and the use of expensive bait are associated with longlining as are problems with size and species selectivity and unwanted by-catch.

Further development of longlining is of interest, both for governments and the industry. Therefore, Faroese, Icelandic and Norwegian scientific institutions invite to a workshop in Reykjavík to address the challenges facing longline fisheries.

The objective is to channel information from the participants to the scientific community on the potential problems to address in future research and development projects. Also, an international association of interested parties will be formed.

To sign up contact:

Jónas Rúnar Viðarsson
Matís, Reykjavík, Iceland
Phone: +354 422 5107
E-mail: jonas.r.vidarsson@matis.is

The workshop will be located at
Gullhamrar
Þjóðhildarstíg 2, 113 Reykjavík

Planning committee:

Edgar Henriksen, Nofima Marked, Tromsø, Norway Phone: +47 7762 9009. E-mail: edgar.henriksen@nofima.no
Sveinn Margeirsson, Matís, Reykjavík, Iceland Phone: +354 422 5125. E-mail: sveinn.margeirsson@matis.is
Bjarti Thomsen, Havstovan, Thorshavn, Faroe islands phone: +298 211 008. E-mail: bjartit@hav.fo
Roger Larsen, BFE, UiT, Tromsø, Norway Phone +47 9766 9366, E-mail: roger.larsen@uit.no
Lasse Rindahl, BFE, UiT, Tromsø, Norway Phone: +47 9056 9476. E-mail: lasse.rindahl@sintef.no

Recommended hotel: Fosshotel Baron

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http://www.fosshotel.is/en/hotel/reykjavik_hotels.php
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Landsdels utvalget

Program: Tuesday October 19th

Chair all sessions: Mike Pol, Department of Fish and Game; Mass.,

Opening session: 08:30 – 11:15

Why a workshop on longlining?
Edgar Henriksen, Nofima Market, Norway

The UK seafood market: where does longline-caught fish fit in?
Phil McMullen, Seafish, UK

What is so good about longline-caught fish?
Terje Kjølsøy, Ålesundfisk AS, Norway

Documentation of quality and environment issues – is that useful?
Kine Mari Karlsen, Nofima Market, Norway

From Seafloor to Consumer- a value chain project for longline fishing.
Bjørn Tore Rotabakk, Nofima Mat, Norway

Discussion

Technology and fish handling: 12:00 – 16:00

What do we need to know to design the next generation longline vessels.
Lasse Rindahl, SINTEF, Norway

Development of new hauling systems.
Roger Larsen, BFE, University of Tromsø, Norway

Challenges in further development of autoline.
Christian H. Engh, Mustad Longline, Norway

Challenges in designing systems for fish handling preserving quality and value through the value chain.
Sveinn Margeirsson, Matís, Iceland

How can IT improve the fleets over all efficiency?
Kolbeinn Gunnarsson, Trackwell, Iceland

Discussion

Program: Wednesday October 20th

Might be some minor adjustments

Business and economy: 08:30 – 11:00

Is there a potential for improved earnings in the longline fleet and the value chain by marketing of the qualities of longline-caught fish?
Svavar Þór Guðmundsson, Sæmark Seafoods Ltd., Iceland

Optimizing profitability in the longline fleet. Which are the important parameters?
Erla Ósk Pétursdóttir – Vísir hf, Iceland

Longline-caught fish in the Faroese fishing industry.
Páll Gregersen, P/F PRG Export, Faroe Islands

Challenges in developing a longline fishery in Greenland.
Alfred E.R. Jacobsen, KNAPG, Greenland

Discussion

Management 12:00 – 14:00

Strength and weaknesses in the Faroese fishing days system in relation to boat owners economy.
Viberg Sørensen, the Faroese shipowners´ association.

Management regimes for fisheries with respect to efficiency and responsible fishing.
Dominic Rihan, Ireland, ICES working group on fisheries technology. and fish behavior.

Importance of gear and bait parameters on catch rates and size and species selectivity?
Svein Løkkeborg, Institute of Marine Research, Norway

What are the effects of stimulating longline fisheries with special reference to

regional
development?
Jahn Petter Johnsen, BFE, University of Tromsø

Summing up and closing: 14:15 – 15:30

4 Why a workshop on longlining?

Edgar Henriksen, Nofima Market, Norway

Long-line caught fish is popular

- High quality fish
  - High quality and better yield in processing
  - A wide range of products with longer shelf life
  - In some markets caught by hook seems to add value.
- Environmentally friendly
  - Energy efficient partly due to valuable by catch
  - No ghost fishing and no damages to the sea bed
- Socioeconomically favourable
  - High activity on shore
  - Labour intensive
  - More by catch and longer seasons

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But has higher cost, is less selective and has unwanted by-catch.

- A need and a potential to increase fleet efficiency and profitability
  - Improved catch rates and more hooks per trip
  - Reduced costs
  - Increased marked value
- A need to influence size and species selectivity
  - Improvement of vessel profitability
    - Value of catch
    - Avoid overfishing quotas
- A better understanding of how management regimes should handle fishing with long-line.

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And needs international cooperation to increase R&D

- Increased consumer popularity creates new challenges
  - Improvement of methods and documentation of environmental friendliness
  - A need to better understand market preferences
- Increased efficiency of the long-line fleet
  - Improvement of all gear parameters and fish handling
  - Auto line systems also for smaller vessels
  - Efficiency of on shore baiting operations
  - Health and Safety
- Development of management models that support certain fishing methods
  - Environmentally friendly
  - Positive socioeconomic effects
  - Positive effects further up the value chain

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Hence - an international workshop

- Idea "born" in Tromsø
  - Very easily sold to Iceland and the Faroe islands.
- A common understanding that we very often share the same challenges
  - Similar stocks, markets and cultures
    - Around the North-Atlantic
  - Same technology
- Sharing of knowledge and common bigger R&D projects
  - "Profitable" for all
  - Cooperation to put together larger programs

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To get input form the industry and form an international research network

- We think that we can benefit form broader cooperation
  - A multidisciplinary network aimed at the challenges facing long-lining (in the North-Atlantic)
    - The program reflects our understanding of the interesting topics
  - How should a network be organised?
  - And financed??
- Cooperation is always an appealing idea, but
  - Needs specific and fundable bigger projects
  - Interested parties and reasonable funding
    - From more than one source!
- Our challenge to the industry
  - Are we presenting the most interesting topics
  - What are the most urgent topics we should address

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4 The UK seafood market: where does longline-caught fish fit in?

Philip MacMullen, Seafish, UK

SEAFISH
the authority on seafood

Philip MacMullen

Head of Environment

The UK seafood market: where does longline-caught fish fit in?

supporting the seafood industry for a sustainable, profitable future

SEAFISH

supporting the seafood industry for a sustainable, profitable future

supporting the seafood industry for a sustainable, profitable future

SEAFISH

changing times

market expectations

IUU	legal	responsible	sustainable

market-based risk assessment

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The magic 'S' word

How many consumers know about sustainability?

75%

of consumers are familiar with sustainability in regards to food

How many act on this knowledge?

22% think more and change the products they purchase

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Who wants sustainable seafood?

- Seafood Choices Alliance: 75-80%
- consumers who act: ~10%

MSC recognition?

Marine Stewardship Council
Certified sustainable seafood

- recent MSC claim: 25%
- reality: ~10%

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Salmon?

supporting the seafood industry for a sustainable, profitable future

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Line-caught?

supporting the seafood industry for a sustainable, profitable future

SEAFISH

line-caught?

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what does the chilled supply chain look like for consumers?

Caught at sea

Docked

Sent to store & filleted

In-store

"I think it just comes off the boat and goes straight to the store in refrigerated lorries"

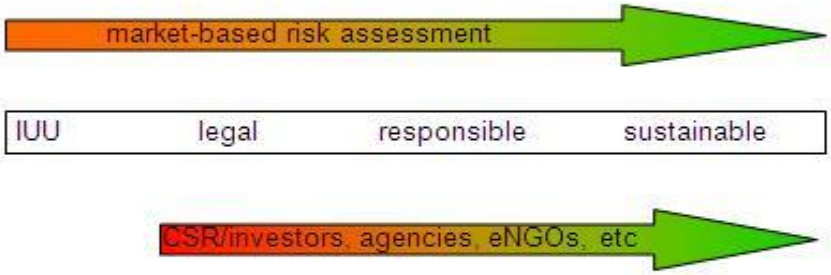
"When you think about it, how does the overseas fish get here fresh?"

- When prompted to think about the 'fresh' supply chain, respondents got very confused and concerned

lack of awareness of the supply chain

where do consumers place their trust?

changing times



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SEAFISH
the authority on seafood

So, who is in the driving seat? - the large retailers

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what do they want?

- value for money for consumers
  (= low prices & margins)
- increasingly high product specification
- maximum shelf life to reduce waste
- certification and supply chain audit
- complete traceability

All as conditions of supply

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- and what do you offer?

- niche product
- top quality
- low bycatch and discards
- low environmental impact
- low energy use

- and what do you offer?

- niche product
- top quality
- low bycatch and discards
- low environmental impact
- low energy use

do you? can you prove it?

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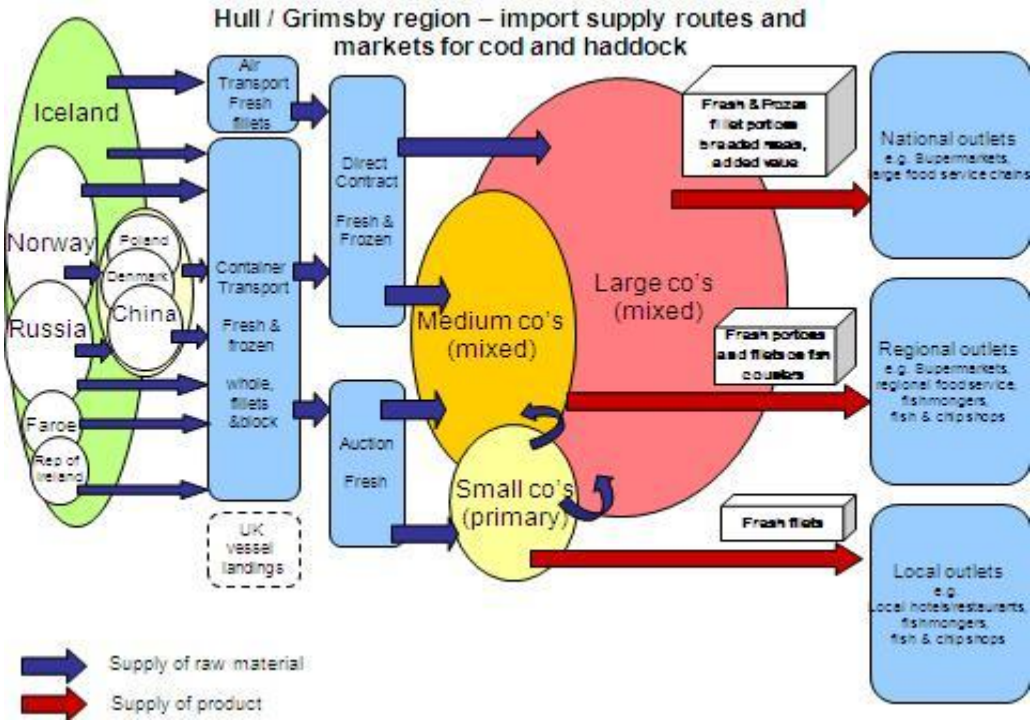
threats to reputation & market strength

- niche product
  - for how long?
  - demand is finite
  - what if supply increases?
- top quality
- low bycatch and discards
- low environmental impact
- low energy use

threats to reputation & market strength

- niche product
- top quality
  - handling and iceing
  - temperature & time records (shelf life)
  - ***full*** traceability
  - complex supply chain, feature fishermen
- low bycatch and discards
- low environmental impact
- low energy use



threats to reputation & market strength

- niche product
- top quality
- low bycatch and discards
  - need to benchmark?
  - agree protocols for birds and turtles
  - keep records
- low environmental impact
- low energy use

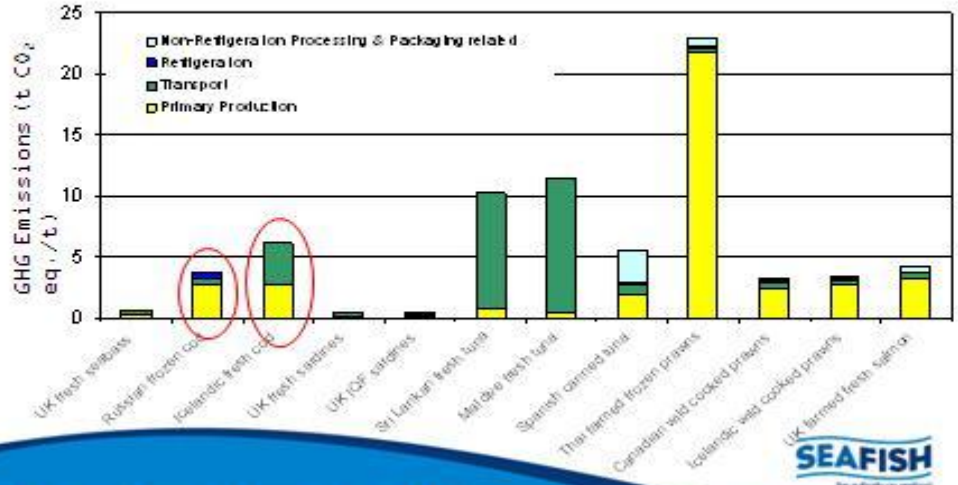
threats to reputation & market strength

- niche product
- top quality
- low bycatch and discards
- low environmental impact
  - ? check
- low energy use

threats to reputation & market strength

- niche product
- top quality
- low bycatch and discards
- low environmental impact
- low energy use
  - not just diesel
  - full life cycle analysis
  - processing & transport
  - bait

typical supply chains to the UK...



SEAFISH

supporting the seafood industry for a sustainable, profitable future

threats to reputation & market strength

- niche product
- top quality
- low bycatch and discards
- low environmental impact
- low energy use

SEAFISH

supporting the seafood industry for a sustainable, profitable future

conclusions

- currently enjoy strong position – work together to maintain it
- focus on quality – record it, demonstrate it
- agree handling protocols
- adopt conservation protocols
- increase retail shelf life
- niche identity – co-operate and use smart marketing
- improve traceability

conclusions

- currently enjoy strong position – work together to maintain it
- focus on quality – record it, demonstrate it
- agree handling protocols
- adopt conservation protocols
- increase retail shelf life
- niche identity – co-operate and use smart marketing
- improve traceability

do not be complacent!

supporting the seafood industry for a sustainable, profitable future

5 What is so good about longline-caught fish?

Terje Kjølsøy, Ålesundfisk AS, Norway

- Freshness upon landing, 1-24 hrs
- Optimal handling of the fish (bleeding, gutting, etc)
- Year around fishing possible
- Maximum product mix in production (HVP)
- Environmentally friendly fishing (seabed, etc)
- Market demand

Long lining

- Long lining is NO guarantee for 100% good quality – quality can be ruined in every type of fishery
- But the conditions for delivering the best quality is there

Quality:

- Freshness (shelf life in the fresh value chain)
- Proper gutting, bleeding and cleaning
- Stable quality / homogenous (less waste)
- Gaping and texture (maximum high value products)
- Skin colour (for shiny packed fish)

Long lining

- Many forms of long lining
- Automatic longliners – fresh 1-3 days old rawmaterial, or frozen
- Smaller long liners – normally day boats

- Pelagic long line
- Bottom long line
- Vertical longline (påleline)

Long line haddock, 1,5 hrs old

Long line haddock, 2 hrs old

Long line haddock fillet

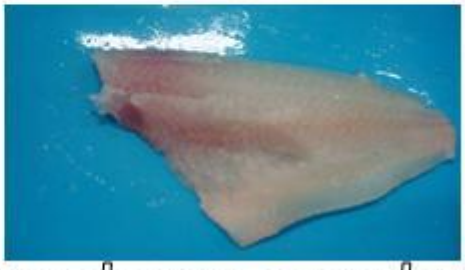
Long line haddock fillet

Long line saithe aug-10

Aalesundfish
Long line
Haddock loins

Long line
Black Halibut

However....



Bad workmanship can happen everywhere

Other fishing methods

Trawl

Purse seine

Gill net

Other fishing methods

- Most fishing methods can deliver good quality
- However, some methods have more challenges in order to reach optimal – and stable – quality

<u>Important factors:</u>

- Age of rawmaterial when landed
- Time of fishing (season, capelin/herring/spawning)
- The bleeding of the fish
- The gutting and cleanliness of the fish
- The gaping of the fish (many factors that influence this)

- In Norway the general quality of a large volume proportion of the fish landed is too poor to develop the fresh market in any large extent (on top of what is already developed)

What does this mean in economical terms?

Definitions

Grade 1 — Grade 2 — Grade 3

Comparison - good and bad quality

HADDOCK, WHOLE FILLETS	Quality 1	Quality 2	Quality 3
Rawmaterialprice 1st hand	kr 11,00	kr 8,50	kr 7,50
Yield	50 %	47 %	45 %
Rawmaterial cost	kr 22,00	kr 18,09	kr 16,67
Labour cost	kr 5,00	kr 6,50	kr 8,00
Packaging material, etc	kr 1,50	kr 1,50	kr 1,20
Other fixed costs	kr 4,00	kr 4,00	kr 5,00
Costprice	**kr 32,50**	**kr 30,09**	**kr 30,87**
Quality 1	No gaping and freshly landed		
Quality 2	Partly gaping		
Quality 3	Extensive gaping		

HADDOCK, production mix	Quality 1	Quality 2	Quality 3
Grade 1 fillets	98 %	30 %	0 %
Grade 2 fillets	2 %	50 %	45 %
Grade 3 fillets	0 %	20 %	55 %

HADDOCK, prices whole fillets	Price
Grade 1 fillets	kr 38,00
Grade 2 fillets	kr 29,00
Grade 3 fillets	kr 25,00

HADDOCK	Quality 1	Quality 2	Quality 3
Estimated sales price acchieved	kr 37,82	kr 30,90	kr 26,80
- costprice in production	kr 32,50	kr 30,09	kr 30,87
Estimated margin	kr 5,32	kr 0,81	kr (4,07)

HADDOCK - LOINS AND BLOCKS	Quality 1	Quality 2	Quality 3
Rawmaterialprice 1st hand	**kr 11,00**	**kr 8,50**	**kr 7,50**
Yield	45 %	43 %	41 %
Rawmaterial cost	kr 24,44	kr 19,77	kr 18,29
Labour cost	kr 6,50	kr 8,00	kr 9,00
Packaging material, etc	kr 2,00	kr 2,00	kr 1,20
Other fixed costs	kr 4,00	kr 4,00	kr 5,00
Costprice	**kr 36,94**	**kr 33,77**	**kr 33,49**

HADDOCK, production mix	Quality 1	Quality 2	Quality 3
Loins	45 %	25 %	5 %
Block	47 %	67 %	87 %
Pinbone	8 %	8 %	8 %

HADDOCK, prices loins and blocks	Price
Loins	kr 70,00
Blocks	kr 30,00
Pinbone	kr 12,00

HADDOCK	Quality 1	Quality 2	Quality 3
Estimated sales price acchieved	kr 46,56	kr 38,56	kr 30,56
- costprice in production	kr 36,94	kr 33,77	kr 33,49
Estimated margin	kr 9,62	kr 4,79	kr (2,93)

COD - LOINS AND BLOCKS	Quality 1	Quality 2	Quality 3
Rawmaterialprice 1st hand	**kr 17,00**	**kr 17,00**	**kr 17,00**
Yield	55 %	53 %	50 %
Rawmaterial cost	kr 30,91	kr 32,08	kr 34,00
Labour cost	kr 6,00	kr 7,00	kr 8,00
Packaging material, etc	kr 2,00	kr 2,00	kr 1,20
Other fixed costs	kr 4,00	kr 4,00	kr 5,00
Costprice	**kr 42,91**	**kr 45,08**	**kr 48,20**

COD, production mix	Quality 1	Quality 2	Quality 3
Loins	50 %	20 %	10 %
Block	42 %	72 %	82 %
Pinbone	8 %	8 %	8 %

COD prices loins and blocks	Price
Loins	kr 90,00
Blocks	kr 32,00
Pinbone	kr 12,00

COD	Quality 1	Quality 2	Quality 3
Estimated sales price acchieved	kr 59,40	kr 42,00	kr 36,20
- costprice in production	kr 42,91	kr 45,08	kr 48,20
Estimated margin	kr 16,49	kr (3,08)	kr (12,00)

Comments

- The quality of the rawmaterial is of essential importance for the economical result
- Lower rawmaterialprice for lesser quality will very seldom/never compensate for higher costs and loss of HVP%
- Bad quality will lead to more labourcost going into the product, less volume through the plant to cover fixed overheads - and combined with lower average sales price this is three factors leading to disaster
- In some markets/segments there is a demand for long line fish specifically. This often due to the "green factor" more than quality specifically
- Further development of the fresh markets (consumer packs) demands a stable and high quality with maximum remaining shelflife

- Much of the products sent to the markets today are of inferior quality
- Long line quality (and hand jigg + good purse seine) quality is needed to develop the fresh market in the future

FLEETDEVELOPMENT IN NORWAY

- Substantial changes in the fleet structure in Norway
- The changes done at sea impacts the on-shore industry structure to a high degree

Main factors:

- Fewer and larger vessels
- Increased volume of frozen H&G and less fresh landings
- Main focus on cod – with haddock and other species as a "by catch"
- 75% of the cod quota landed by end May
- With little or no cod quota left, the vessels are unable to conduct a haddock fishery for the rest of the year

Change in fleet structure 1995-2010

NORWAY TOTAL

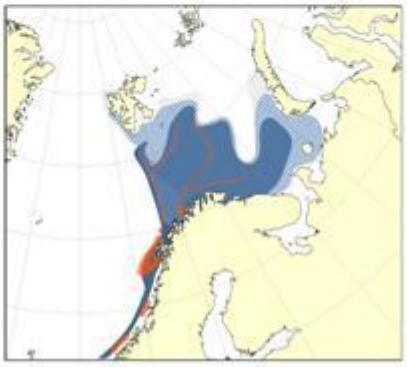
VESSEL	Y1995	Y2000	Y2005	Y2010	Change 1995-2010	In %
Under 10 m	10872	9688	4682	3674	-7198	-66 %
10-15 m	988	933	835	760	-228	-23 %
15-20 m	591	503	338	218	-373	-63 %
20-28 m	183	239	247	191	8	4 %
28 m+	372	365	245	235	-137	-37 %

Total income	1 774 116
Fuel	137 317
Productax (Fishermens sales org)	46 983
Structural tax	2 040
Connotax	3 476
Pass on/expenses	4 247
Bait, salt, etc	9 955
Social expenditures	4 797
Insurance vessel	36 399
Other insurances	17 700
Maintenance	160 733
Fishing gir	88 557
Misc costs	170 238
Foodsupplies	19 723
Salary, crew	805 830
Depreciations vessel	135 517
Depreciations fishing license	15 124
SUMMARY OF DIRECT EXPENSES	1 658 737
RESULT FROM OPERATIONS	115 378
Total finance	-114 540
PRE TAX RESULT	838
Result in % of turnover	0,05 %

Average Economical results in the fishing fleet 2007-2008

	TOTAL INCOME		TOTAL EXPENSES		RESULT FROM OPERATIONS		RESULT PRE TAX	
	2007	2008	2007	2008	2007	2008	2007	2008
8-11 metres	879 100	840 500	836 600	799 000	42 600	41 500	26 900	22 100
11-15 metres	1 990 000	1 849 600	1 861 400	1 706 700	128 600	142 900	107 100	57 100
15-20 metres	3 679 100	3 813 000	3 191 100	3 640 000	487 000	183 000	316 400	-157 100
20-28 metres	8 703 000	8 036 600	7 861 100	7 161 000	841 800	654 500	106 100	-371 400
28 m+	30 285 500	30 155 000	26 282 900	27 529 900	4 002 500	2 625 100	1 592 000	-4 500 500

NAPP, SHORT PRESENTATION



Background

- Napp is located in western part of Lofoten
- A traditional Long Line harbour
- Surrounding harbours (Sund, Ramberg, Ballstad, Reine, etc) are all typical long line locations
- There is a need to establish a more "non seasonal" fishing pattern
- The Napp-project is a cooperation between Aalesundfisk and Marine Fresh

Background

- The fresh market has the last 5 years consisted of 2 main product forms
  - Standard fresh products
  - Chilled (defrosted) products (in some markets 65%+ of the fresh sales are from chilled)

- The chilled products are solving most of the logistical challenges the standard fresh products have.
- In addition it offers a stable/secure quality and price
- The standard fresh products are variable in quality and supply and the end customers need to buy many days before they know what they have on order from the retailers
- The Superfresh concept offers a stable and high quality in a more predictable supply and will be a third option for quality focused customers

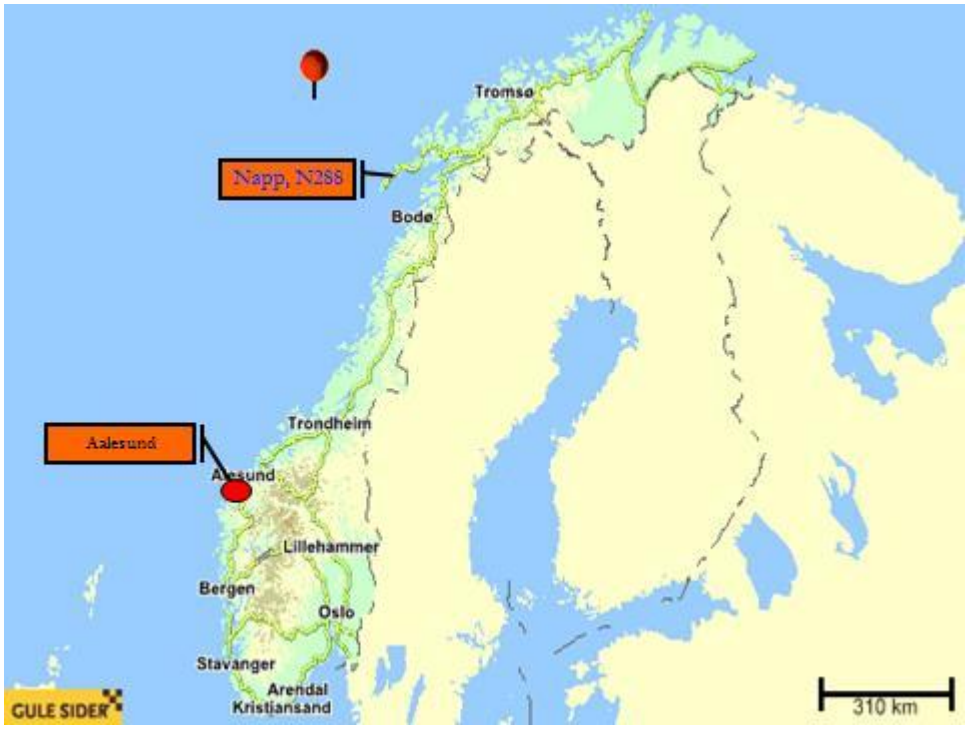
Main objective

- Supply of "Superfresh" products – based on the best available raw material from Cod, Saithe and Haddock fisheries
- Develop a "non seasonal" supply pattern
- Sustainable sourcing – based on MSC approved fisheries and environmental friendly harvesting (long line, hand jigg mainly)
- Market adapted products – fillets & portions
- Cost efficient production

Category development

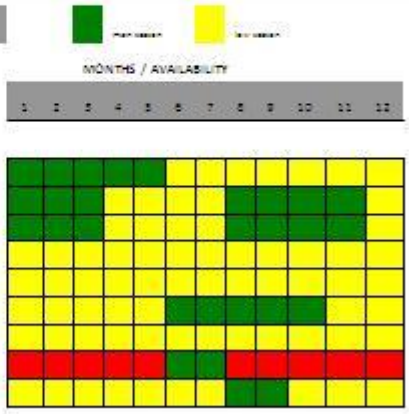
CATEGORY	Products	Attributes	Competition	Comments
SUPER FRESH	*Superfresh (max 12 hrs)*	Freshness / Superfresh	Few	
	fillets and portions	Shelf life Elimination of waste problems	Few	
	Loins	Traceability	Many	
	Supreme	Stable supply	Limited	
	Tails	Portion control (size/length)	Few	From 2011
		Fixed pricing possible	Few	Individual discussions
		MAP-ready products	Alone	
		Harvesting from sustainable (MSC) stocks	Limited	MSC from Q1/2011
		Environmental friendly fishing	Few	Long line / hand jigg

Product solutions - Napp
Price
VAP-prepexred Cod portions
Halibut
Superfresh Cod Fillets
SKREI
Superfresh Haddock Loins
Superfresh Cod loins
Superfresh Saithe Loins
Shinypacked Cod
Superfresh Haddock Fillets
Whole Catfish
Superfresh Saithe Fillets
Shinypacked Haddock
Whole Redfish
Fully iced Cod
Shinypacked Saithe
Volume


Tromsø
Napp, N288
Bodø
Trondheim
Ålesund
Ålesund
Lillehammer
Bergen
Oslo
Stavanger
Arendal
Kristiansand
GULE SIDER
310 km

SEASONALITY, NAPP (today)

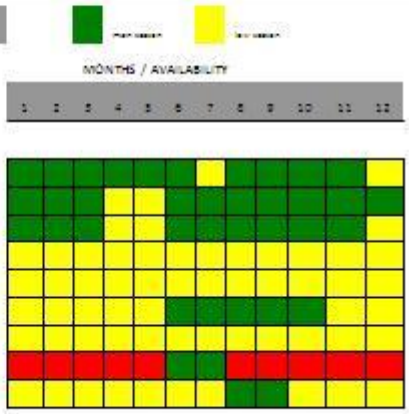
PRODUCTS - AALESUNDFISK



Specie	Status	Products
Cod	Wild/MSC	Whole+Fillets
Haddock	Wild/MSC	Whole+Fillets
Saithe	Wild/MSC	Whole+Fillets
Catfish	Wild	Whole
Redfish	Wild	Whole
Monkfish	Wild	Whole
Halibut	Wild	Whole
Greenland Halibut	Wild	Whole
Plaice	Wild	Whole

SEASONALITY, NAPP (objective 2011-2012)

PRODUCTS - AALESUNDFISK



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Catfish	Wild	Whole
Redfish	Wild	Whole
Monkfish	Wild	Whole
Halibut	Wild	Whole
Greenland Halibut	Wild	Whole
Plaice	Wild	Whole

Napp

- Pictures from the harbour and of the plant
- Built in 2004

Napp

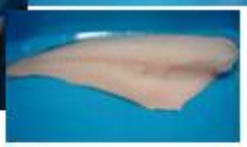
- The fleet is mainly consisting of smaller to medium sized longliners and purse seiners
- Most of the vessels deliver every day (day boats) – with fish being from 1 to 10 hrs old

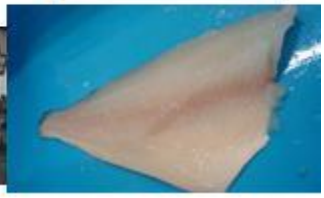
Napp

- The raw material landed from the dayboats is of high quality
- Landed from 1-10 hours after catch!

Napp

- Production starts as soon as raw material is landed (normally at 5-6 pm) and lasts until all raw material for filleting has been produced (2-4 in the morning)
- Top quality raw material processed immediately after landing.





Napp

- Project started in August 2010
- August-December a standard whole fillet line is in operation
- From December a full portioning line is in place for production of Superfresh skinless/boneless portions and loins

With the whole fish in focus!

Summary

- Our objective is to take the best raw material available and produce the fish into market adapted products without further loss of quality
- We work closely with the fishermen, to adapt and improve the quality continously
- Developing a stable supply – based on stable and high quality rawmaterial is essential for the development of the fresh white fish sector
- Along side with the quality aspects, we combine efficiency with flexibility.
- We develop the Superfresh concept in close cooperation with our main/regular customers

6 Documentation of quality and environment issues – is that useful?

Kine Mari Karlsen, Nofima Market, Norway

Content

- What is traceability?
- Two types of traceability
- Case study: Implementation of traceability for fresh captured fish
- Application of traceable information

What is traceability?

Example from a supermarket to illustrate this:

Which gear type is used to catch the fresh fish?

Which production method is used?

What is the catch area?

How can the supermarket get access to this information?

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Documentation

- This information is recorded at different places in the supply chain
- How is it possible to document this information?
- Can traceability be a tool to make this information available for the supermarket?

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What is traceability?

Traceability is a tool
to trace
product and process
information
in a systematic way

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What is systematic way?

We record information received from the vessels

We record information during the production

We send information to the customers

Information must be recorded and linked together ➤ Able to find again at a later point

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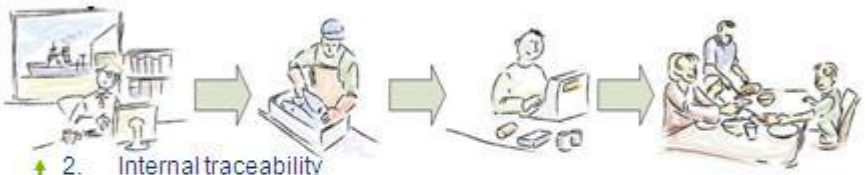
Two types of traceability

1. Chain traceability



2. Internal traceability

Ability to trace information through a supply chain

Ability to trace information within a company

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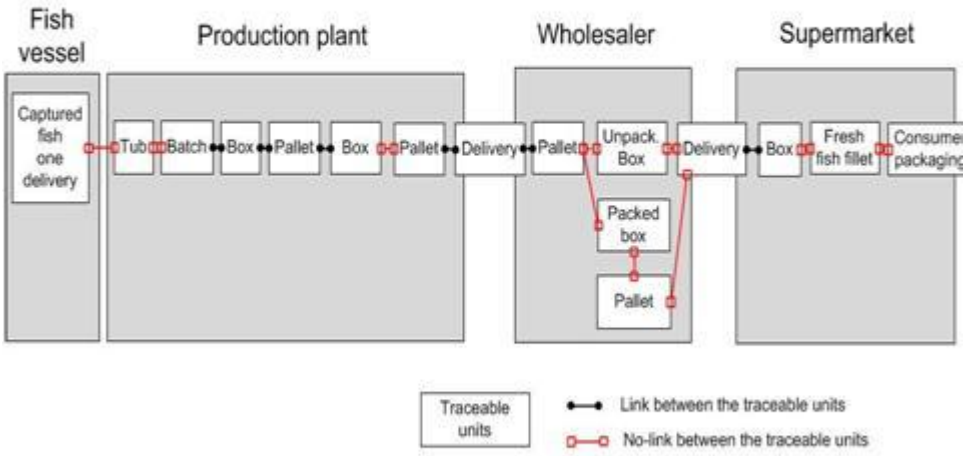
Case study: Implementation of electronic traceability



The information of the catch did not follow the fish, and it did not reach the supermarket or the consumer.

Findings

- Such implementation is complex
- Different architectures and traceability schemes are available
- A number of critical success criteria were identified - human factors are central
- Motivation is extremely important to succeed with implementation of electronic chain traceability
- A big challenge was to find optimal practical solutions
- The benefits of doing the extra work must be clear to all the actors in the chain

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Different motivations

- Supermarket wanted to get access to more information about the fresh fish they were selling
- The wholesaler wanted to keep his customer happy
- The wholesaler and the supermarket saw traceability as a tool for improved documentation of the cooling chain:
  - simpler to identify the cause of low quality, and then responsibility could be assigned
  - Better control of the material flow to achieve shorten lead and storage time of the fish
- The weakest link in this supply chain was the production plant. Can target harvesting be used to increase the motivation?

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Target harvesting

Exchange catch information

Vessel

Production plant

Coordinating the activities

The aim of target harvesting:

- To increase the profit for both links (Margeirsson, 2008)

Traceability can be a tool to get access to relevant information

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Which information to trace?

- Depending on the application of information
- Important questions:
  - Which information is relevant to trace in-house (internal traceability)?
  - Which information is relevant to exchange to the suppliers and customers (chain traceability)?

Decision: Which entity (quantity of fish) to trace?

- All traceable information must not be available to all actors in a supply chain

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Two examples

1) Documentation of gear type: Fish caught with long line must be kept separated from the fish caught with other gear types.
2) Documentation of catch date: Fish caught on different catch dates must be kept separated.

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Summary

- Documentation of quality and sustainability - useful or not?
- Probably not useful for everybody - it depends on the application of information
- Traceability is only a tool to get access to relevant information

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Thank you
Pictures from ©www.tikfoto.no
Illustrator: Oddvar Dahl ©Nofima
MARGEIRSSON, S. (2008) Processing forecast of cod - Decision making in the cod industry based on recording and analysis of value chain data. Thesis. *Faculty of Engineering. Reykjavik, Iceland, University of Iceland.*

7 From Seafloor to Consumer- a value chain project for longline fishing

Bjørn Tore Rotabakk, Nofima Mat, Norway

Background for the project

- Mustad Longline wanted to further develop the technology on their autoline system.
- Contact with the Research council of Norway resulted in a value chain project with international leading partners within fishing technology, white fish, traceability and research institutes on quality and environment on seafood.
- More info about the project and the partners: www.longlinefishing.com

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Project partners

Mustad

Nofima

Østfoldforskning

tracetracker

Forskningsrådet

DOMSTEIN

Nofima

Aim of the project

- Main goal for the project was contributing to increased environmental and resource efficiency from sustainable whitefish stocks, and maintain the high quality from seafloor to consumer.
- The project would also contribute to develop new technology and added value throughout the whole value chain for longlined white fish

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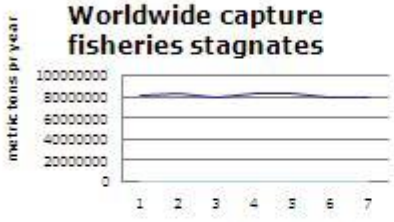
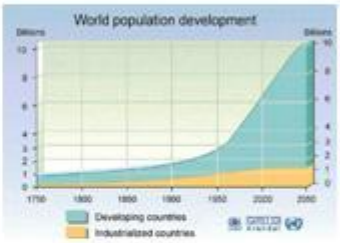
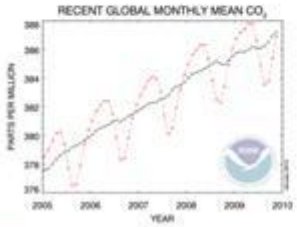
Background







IEA 'whistleblower' says peak oil nearing

The Guardian, November 2009.

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The conclusion is:

Change is necessary.

In order to feed the worlds rapidly expanding population with high nutritional value food with a limited resource base and at the same time limit the energy consumption and fossil fuel consumption we must change the way we produce food.

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How can we achieve change?

First we must document the current efficiency, then identify improvement options and measure the effect of these options. What measuring stick to use?

Environmental and resource efficiency is such a measuring stick:

Environmental impact and resource use pr kg seafood produced and delivered to the market.

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Calculating environmental and resource efficiency. Life Cycle Assessment (LCA) – of products.

- LCA: A comprehensive method where all emissions and resource consumption for the product in the value chain is added, e.g. for sea food fishing, processing, transport, storage and sale.

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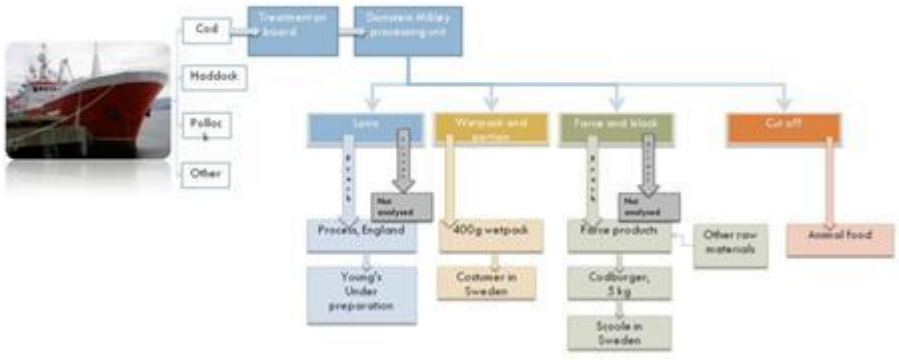
Value chains



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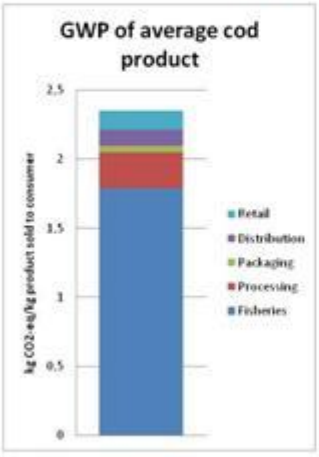
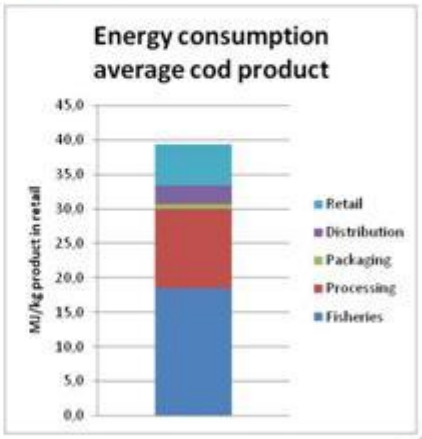
Environmental efficiency and resource use





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Is linefished cod environmentally efficient?

Since it is almost impossible to say that seafood production is sustainable or not we rephrase the question:

Is linefished cod more environmentally efficient than cod fished with other methods?

In this project we have only studied linefished cod but comparisons with results from published studies that has investigated other fishing methods or average Norwegian fisheries we have strong indications that linefished cod is environmentally efficient.

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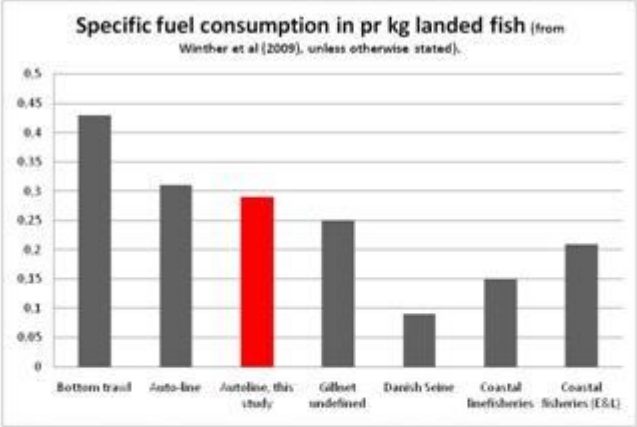
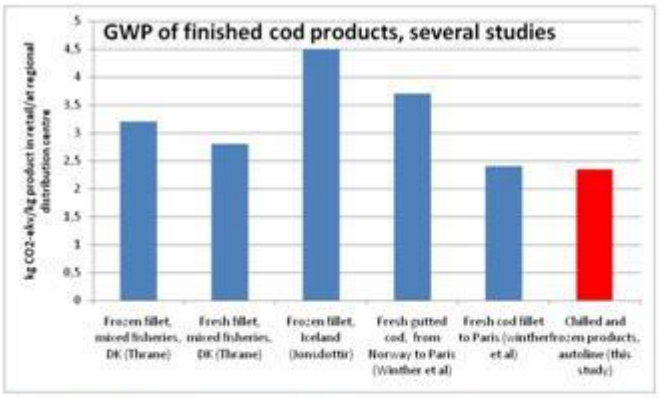


The fuel consumption in the fisheries is the most important factor for GHG emissions and a number of other environmental impacts. Autoline fisheries use considerably less energy than other fishing methods (36 % less than trawl according to Winther et al (2009), but more than coastal line fisheries because autoline fisheries take place far from the coast. Coastal line fisheries consume less energy than the average Norwegian coastal fisheries.

Nofima



Products from autoline fisheries seems to be more environmentally efficient than similar products from other countries and average Norwegian products. Norwegian studies include only the value chain until regional distribution centre in Paris. The last part of the value chain is not included. In addition the Norwegian study referred to in this diagram are average cod products, i.e. a mixture of coastal cod and North-East Arctic cod. Coastal cod require less fuel and hence gives lower GWP. Autoline caught cod in our study is only North-East Arctic cod.

Nofima

BUT:

LCA does not give a complete picture of environmental impacts. Hence more investigations are needed.

Nofima

1. Effect on fish stocks: Certification according to the ecolabels Marine Stewardship Council and KRAV shows that the fisheries are sustainable.

Nofima

2. Effect on marine biotopes and other marine organisms

Line fishing gives a low impact.

- The impact on the seafloor is probably low
- The level of "ghostfishing" is probably low
- Linefishing gives little or no poorly bled and pressure-damaged fish. Such fish are of low quality.
- All caught fish are processed to premium quality seafood.

But there are some problems:

- Some fish falls of the hooks and are not recovered. Mortality of this fish can be high.
- Some seabirds are caught and die, but very few!

Nofima

Linefishing, summary of environmental effects.

Resource consumption.

- Fuel: 0,29 litre/kg landed fish.
- Energy: 39,4 MJ/kg finished product

Environmental impact (one of several categories):

- GHG emissions: 2,35 kg CO2-eq/kg finished product

Ecosystem effects:

- Impacted seafloor: 0 m2.
- Bycatch: 11,5 %, but
- Unused bycatch: 0 %.
- Ghost fishing: 0 tonnes/year
- Lost fish: 2 % of total catch (mortality unknown).
- Seabird bycatch: 1 bird pr tonne caught fish.

Biological resource consumption:

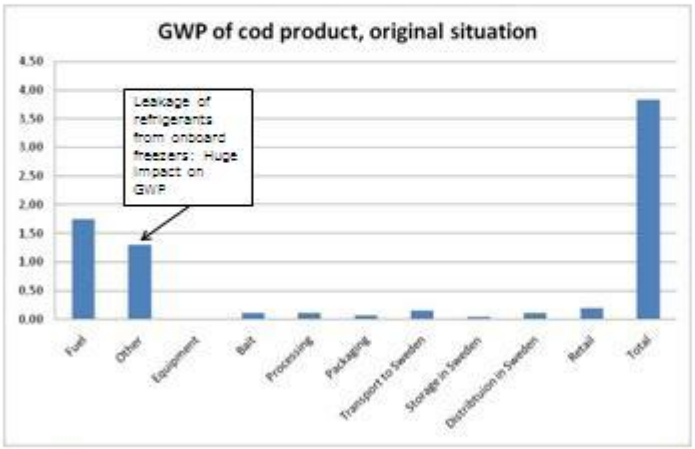
- Yield: 39,6 % of the fish goes to human consumption, 27 % to animal fodder, the rest is returned to the ocean.

Other effects:

- Potential release of toxic compounds in anti-fouling paint: 0,03 g CuO pr kg fish.
- Solid waste: 1,6 g/kg caught fish.

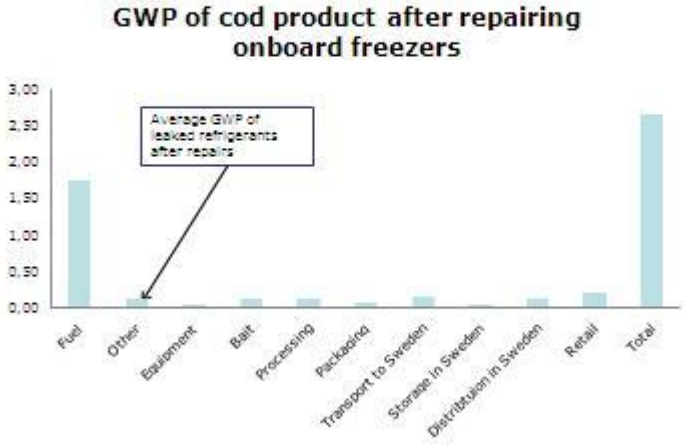
Nofima

Use of the analyses to improve environmental efficiency



Nofima

Stopping refrigerant leakages and switching to a better refrigerant will reduce GWP with 33 %!



Nofima

Results of the project – environment, quality, economy.

- GWP impact pr kg produced seafood product has been reduced by 33 %, through replacing onboard refrigerants and repairing leakages.
- Other environmental impacts have been considerably reduced by these measures, e.g. Ozone depletion.
- Other improvement measures have been identified and their effect calculated.
- Selectfish has increased the economic efficiency of linefishing by 30 % compared to traditional linefishing.
- Improvements in the processing facility has been identified.
- Studies indicate that the quality of linefished cod is better than trawled cod.
- Measures for further improvement of the quality of linefished cod has been identified.

Nofima

Nofima

Nofima

www.domstein.no

Klima:

Andre miljøeffekter:

Nedbrytning av oksygen	10,905	g CPC-11-ekv/kg produkt
Fotokjemisk oksydasjon	4,3	g C2H2-ekv/kg produkt
Forsuring	24,2	g SO2-ekv/kg produkt
Eutrofiering	3,8	g PO4-ekv/kg produkt
Energiforbruk	64,3	MJ/kg produkt
Oljeutslipp	40	%

Kontaktperson:
Forfatter: Erik Svanes
Østfoldforskning AS
Adresse: Gamle Beddingvei 2 b, 1671 Kråkerøy, Norge
Telefon: + 47 69 35 11 00
E-post: erik@ostfoldforskning.no

Referanser:
Svanes, E.: "Livsyklusanalyse (LCA) av utvalgte matprodukter med basis i ostefanget torsk". Østfoldforskning, OR 15.08. August 2008.
International Council for the Exploration of the Sea (ICES): www.ices.dk

Kråkerøy 26. august 2008
Erik Svanes

Nofima

Perspectives: How can line fisheries be further improved?

- Avoid future leakages of refrigerants.
- Increase the use of fish waste in bait production.
- Increase the selectivity by designing new bait.
- Use electricity of guaranteed origin.
- Further optimize processing and packaging.
- Improve processing yields.
- Decrease loss of fish in fisheries.

The environmental and resource efficiency of the Norwegian Seafood Industry may be considerably reduced by increasing the market share of seafood sourced from more selective, less energy consuming fishing methods with a lower impact on marine biotopes and other marine organisms.

Nofima

- from raw material

Industrial Gastronomy & Processing

- to meal

Nofima

research and development for aquaculture, fisheries and food industries

Nofima Østfoldforskning

8 What do we need to know to design the next generation longline vessels?

Lasse Rindahl, SINTEF, Norway

Introduction

- Going to provide more questions than answers
- Going to separate in two groups: Coastal vessels and offshore vessels
- Going to address both vessel design and onboard eq uipment.
- This presentation will mostly be based on experience from the Norwegian fleet.

The offshore fleet – status in Norway

- Counts about 30 vessels
- Onboard freezing
- Some combined with gillnets
- Mechanized longline
- Size of 30 to 50 meters.

Offshore fleet - Challenges in vessel design and propulsion

- Overall hull design are more or less standardized
- Propulsion is an important case at this type of vessels due to the large variations in power demand from fishing operations to long distance transit.
- Dynamic positioning during hauling

Offshore fleet - Challenges related to equipment

- Gaffing is one of the most challenging operations onboard, but will be addressed in a later presentation today.
- Automatic mending of defect hooks in the separator
- Drum based autoline
- Fish handling in the cargo hold

Coastal fleet – Status

- Hundreds of vessels
- A few vessels full time longliners, most in combination with other gears.
- Fresh fish delivered one or two days after catch.
- Mostly based on hand baited gears.
- Between 9 and 28 meters, most of them between 9 and 15 meters

Coastal fleet – Challenges related to vessel design and propulsion

- Need for speed?
- One ore more hulls?
- Conventional or diesel electric propulsion?
- Only longline or a combination with other gears?

Coastal fleet - Challenges related to equipment

- Hand baiting or autoline, or maybe something in between?
- Fish handling technology- deliver the fish gutted, round or alive?
- Hauling equipment.

What do we need to know to get started then?

Summary

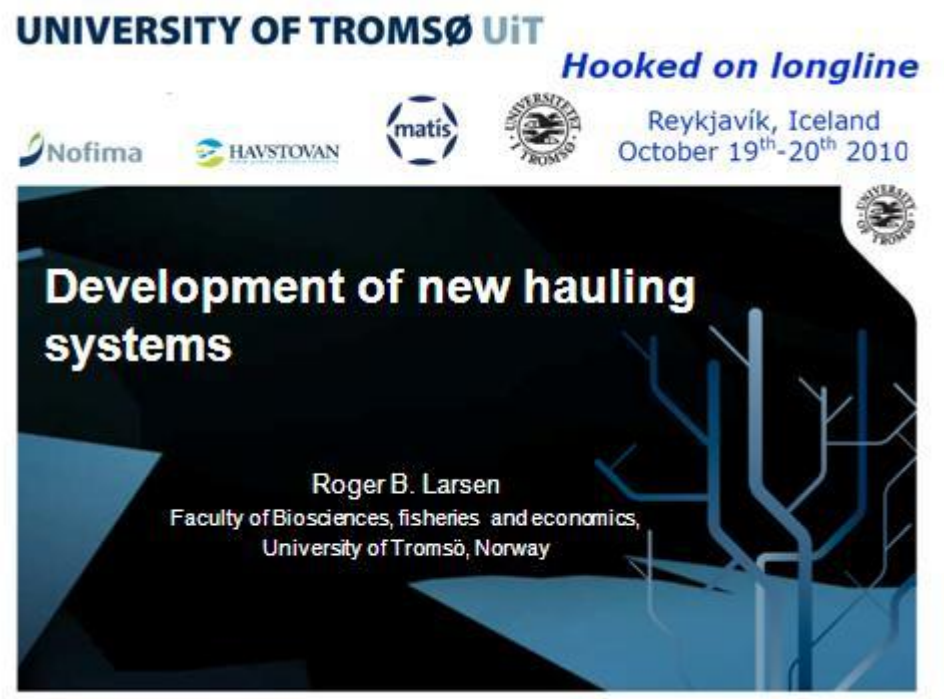
- Hull design and propulsion related to fuel efficciency
  - We need to aquire exact knowlegde of the fuel consumtion related to each operation on the vessel. This will be the necessary tool to put together the most fuel efficient tecnologies and designs.
- Need for speed? (relevant for the coastal fleet)
  - We need an evaluation of pros and cons by speed boats compared to conventional hulls.
- This is a type of vessel with very heavy workload for the crew. There will be a focus on reducing the workload for each crewmember.
  - Several important measures are in progress. What we need to do further is to approach the EHS situation systamatically to map wich areas we shoul pay effort in the future.

Summary

- Baiting the longline.
  - To further develop the automation of the longline we need to know more about wich factors that are affecting the efficciency.
  - We need to come up with solutions for the fleet with one and two crewmembers (semi automated longline)

9 Development of new hauling systems

Roger Larsen, BFE, University of Tromsø, Norway



Main goals of UIT projects 2002 - 2010 on coastal and deep sea longlining

- Improved fish quality
- Improved working conditions
- Safety on board
- Reduced unaccounted mortality
- Additional studies on parameters as bait, line thickness, line materials, snood material and hauling speed

- **Research team:** Lasse Rindahl, Roger B Larsen, Ivan Tatone +++

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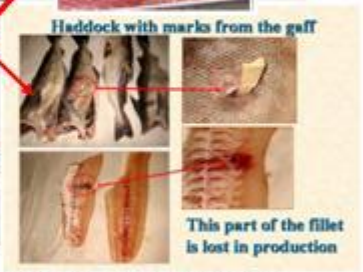
Conventional hauling method (coastal



The gaff is important in many longline fisheries to secure and de-hook the fish.

Work position might be hazardous

UNIVERSITY OF TROMSØ UIT

Smaller and coastal vessels

- In 2002 we started testing the Automatic Longline Hauler system (ALH*)
- The technology aimed at removing the gaff to improve fish quality and to improve working conditions for the (rail roller) crew
- The system (ALH) was tested with 6 coastal vessels with variable results
- Fishermen didn't achieve better price on non-gaffed fish. Currently, only 2 systems are used

* Develop by Delitek AS

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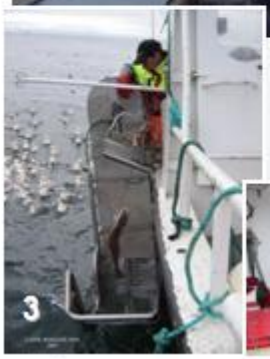
ALH experiments 2002-2006 on coastal vessels



1: Hauling a bottom set PA line with cod

2: Live fish to be kept in net-pens (2004)

3: Greenland halibut caught with PES line on board M/V "Havsvalen" (2006)

4: L. Rindahl inspecting the collapsible ALH during the 2006 experiments

6

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Conventional hauling method 2006-2007

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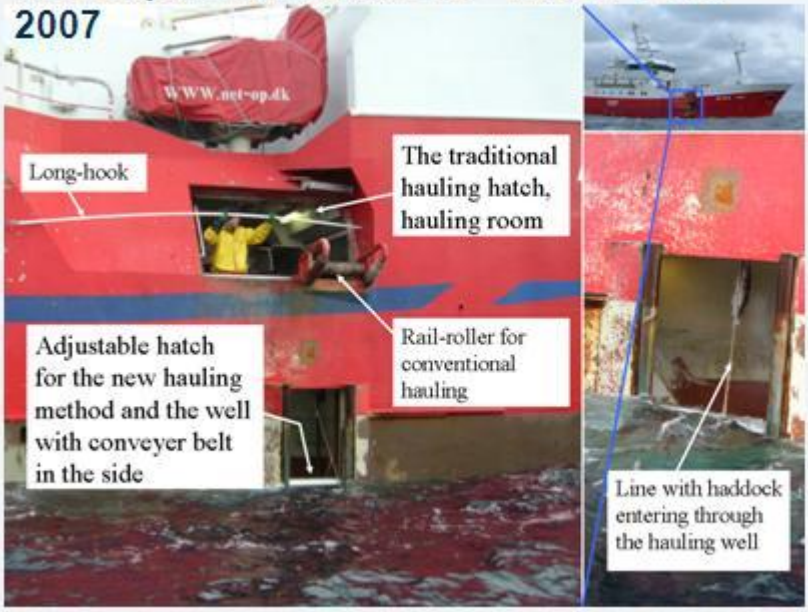
ALH experiments with M/V "Loran" 2006-2007



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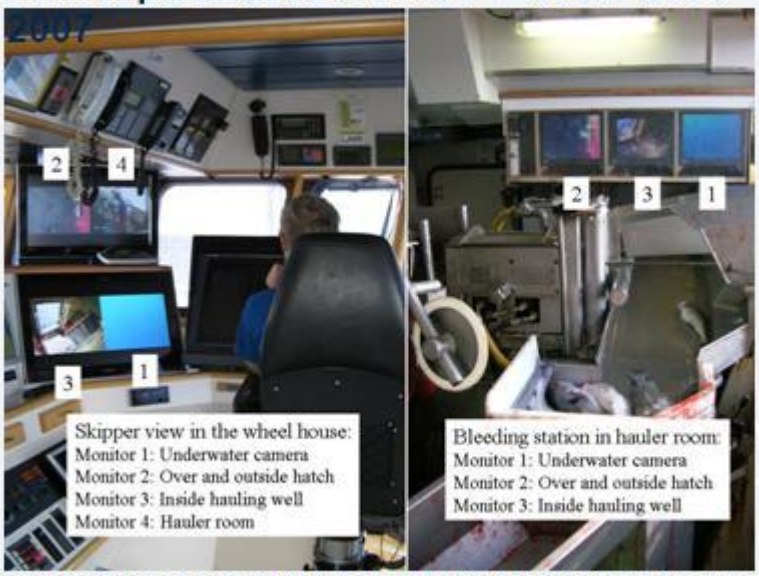
ALH experiments with M/V "Loran" 2006-2007



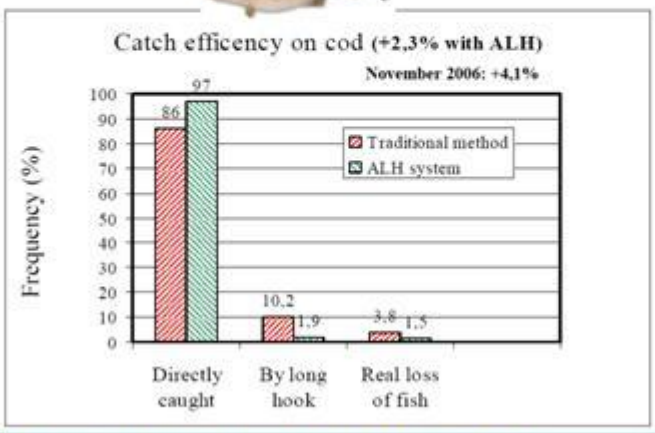
M/V "Loran" has been using the ALH since 2006 with good results

Unaccounted mortality

- A fraction of fish caught by longlining is lost on the surface during hauling
- It is believed that most "floaters" will die, hence resulting in unaccounted mortality
- High-grading during hauling would have the same effect
- Anecdotal information reports losses of 3-10%

Conventional hauling compared to ALH
M/V "Loran" 2006-2007 experiments

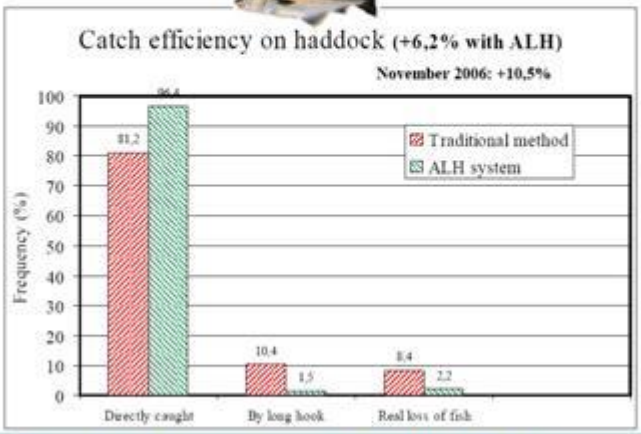
May 2007: Results on cod (*Gadus morhua*)



Improved catch = reduced unaccounted mortality

Conventional hauling compared to ALH
M/V "Loran" 2006-2007 experiments

May 2007: Results on haddock
(*Melanogrammus aeglefinus*)

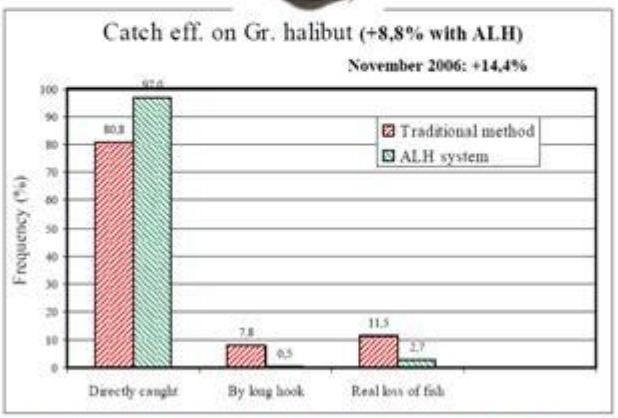


Improved catch = reduced unaccounted mortality

Conventional hauling compared to ALH M/V "Loran" 2006-2007 experiments

May 2007: Results on Greenland halibut

(Reinhardtius hippoglossoides)



Improved catch = reduced unaccounted mortality?

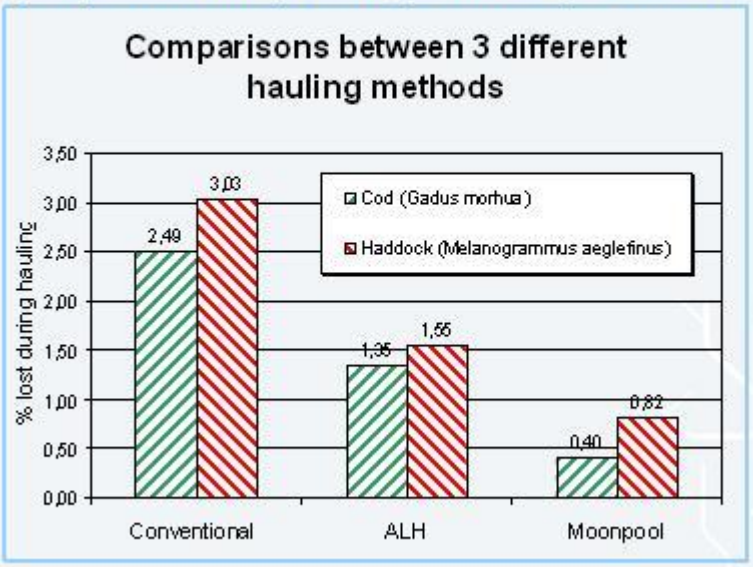
Comparisons between conventional hauling, ALH and moonpool in the deep sea fleet 2008

- Three larger mechanized longline vessels used in the same area and with equal gears November 2008

- Three different hauling methods were analyzed (i.e. conventional-, ALH- and moonpool hauling techniques)

- Focus was on unaccounted mortality, fish quality and crew safety/their working conditions

Fish lost at the surface during hauling (% by numbers) during 2008 experiments



Quality of fish through a clip-fish production chain

- Samples (N =150) of cod from the moonpool and ALH hauling* were taken through the production chain. N=100 fish was produced according to normal routines on board and N=50 directly processed (no bleeding before processed). The samples were frozen.
- A Norwegian saltfish/clipfish company treated the fish without knowing the origin following normal quality standards
- We found no reduction in quality due to gaffing or long-hook marks in the fish and no marks in the fish that could be related to the hauling methods
- It is believed that a significant fraction of fish from conventional hauling would have been downgraded (from "superior" to "universal") due to gaff- and long-hook marks.

Akse et al. 2005 reported close to 14% serious damages on gaffed fish during conventional longline hauling. We found similar results in our previous studies from coastal fishing.
*(The sample from conventional hauling was lost!)

The safety issue on board a conventional vessel (and how it was changed with ALH)

The working conditions at the rail roller can be extremely rough

M/V "Geir II" is the latest Norwegian longline vessel and she's built with a moonpool hauling unit

Conclusions

- We've shown that modern hauling methods reduces unaccounted mortality
- Quality on landed fish will be improved by removing the gaff
- Working conditions for the crew (at the rail roller) is improved with new hauling methods
- Safety and welfare for crew is improved with new hauling methods (closed hauler rooms or moonpool)

Hooked on longline

Reykjavík, Iceland
October 19th-20th 2010

Thanks for your attention!

10 Challenges in further development of autoline

Christian H. Engh, Mustad Longline, Norway

Mustad Longline

Challenges in the further development of autolining

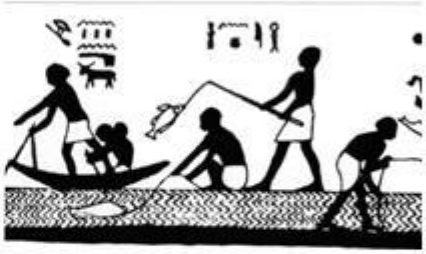
Mustad
- A better way to fish

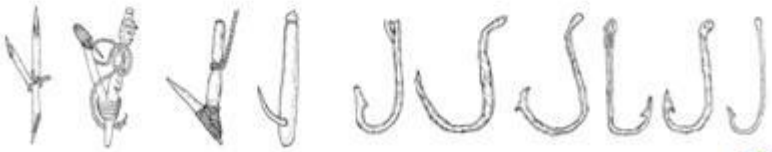
Agenda

- Mustad – a brief presentation
- History of autolining
- Autolining today
- Developments and challenges in the future

Mustad
- A better way to fish

Longlining - History





Mustad
- A better way to fish

Mustad's fish-hook machine anno 1877

Mustad
- A better way to fish

Mustad Group

- Mustad from 1832
- Familiy company in 6th. generation
- Market leader in two global niches, -sales in 160 markets
- Approx. 900 employees

Mustad
- A better way to fish

Mustad Longline AS

- Develops technology for the global longline fleet
- HQ, R&D and production in Gjøvik, Norway
- Has delivered 80% of autoline technology in use

Mustad
- A better way to fish

Gjovik □ Aalesund □ Seattle □ Iceland □ Argentina □ New Zealand □ Russia □ Greenland □ The Faroe Islands □ France

F/L Geir II

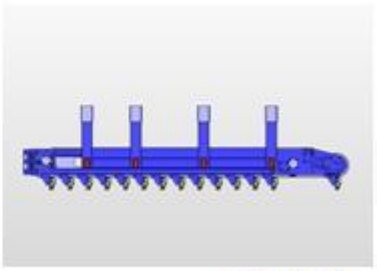
-10 years of various technological advancements, makes it interesting to build a new vessel.

Chief Engineer/Owner Arild Holmeseth, F/V Geir II

Mustad

- A better way to fish

Mag-Packer on F/L Geir II

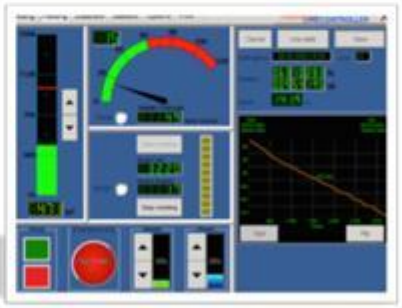


Mustad

- A better way to fish

Mustad Line Controller

- Mustad management control system for the vessels longline operation
  - Setting
  - Hauling
  - Database, statistics etc.
  - Special adaptations, fish counting
  - Internet communication, error search



Mustad
- A better way to fish

"Speed-sjark" – fishing the Icelandic way…

- 45 longline vessels since 2004
- 38' foot and up
- operating with total crew of 4
- setting 12-20.000 hooks daily
- average 100 days fishing
- catching 1.000 tons yearly

- 1 mill. USD investment – turn-key
  - Pay-back; 1,5 years (except quota)

Mustad
- A better way to fish

Technological challenges for the future

- Catch efficiency
- Space
- Flexibility
- Different bait types
- Hauling
- Less manpower
- Less gear consumption
- Bird and whale issues
- Health and safety issues
- Maintenance and service

Mustad
- A better way to fish

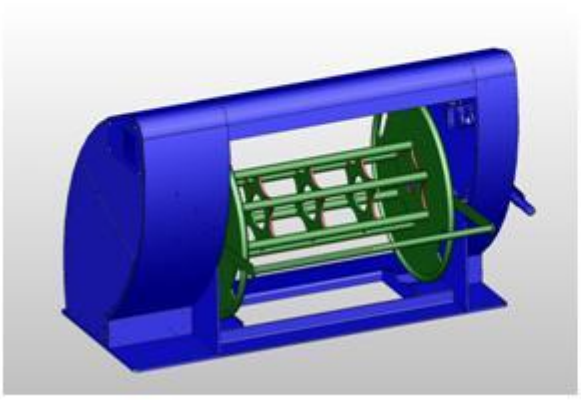
Mustad SelectFish System – For the future

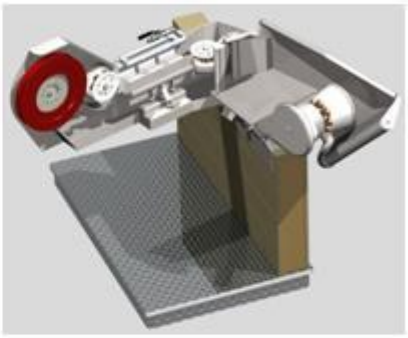
- Can operate with both monofilament line and rope line.
- Disconnects the snoods in the hauling process and connects and baits the hooks and snoods in setting position.

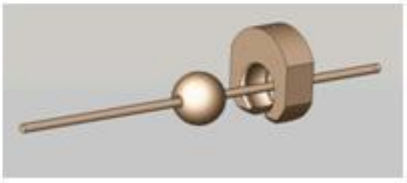
- Key system components:
  - Line Hauler
  - Drum Spool
  - Hook Separator
  - Clip connector and disconnector
  - Magazines
  - Mustad Costal Baiting machine
  - Linesetter

Mustad
- A better way to fish

SelectFish technology







Mustad
- A better way to fish

SelectFish technology

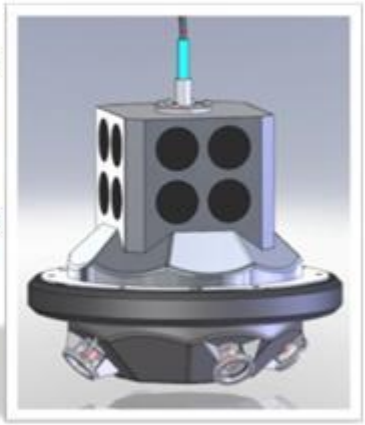
Mustad
- A better way to fish

Mustad Select Fish; Case M/S Ringskjær
RINGSKJÆR
NORD

-SelectFish makes it attractive to go into the indutry for a new generation of fishermen
Captain/owner Ole Jacob Nygård (40)

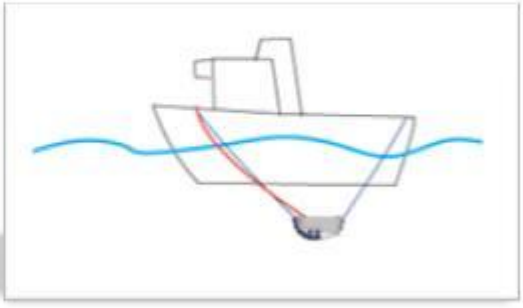
OrcaSaver

- A innovative approach to secure the catch form orcas. An extensive problem in toothfish, black cod and halibut fisheries
- Ultra sound pulses to disorient the sonar system of the orcas.
- To be lowered 8-10 m. below vessel, powered by cable
- Gradual decibel increase not to cause mammal damage
- Extensive testing in Alaska, South Georgia, Greenland and Russia (far East)
  - Reduces catch loss with 30-40%
  - Fishing Inspectors endorse the unit as orca friendly
- Lifetime 500 hours operating time



Mustad
- A better way to fish

OrcaSaver



Mustad
- A better way to fish

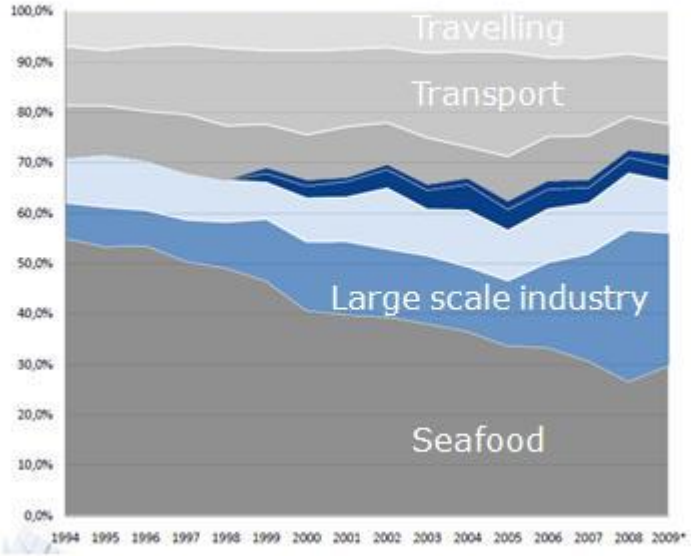
Mustad

- A better way to fish

11 Challenges in designing systems for fish handling preserving quality and value through the value chain

Sveinn Margeirsson, Matís, Iceland

Why is value important?
Icelandic export value distribution 1994-2009



Ref: Statistics Iceland and Federation of Icelandic Industries

Margin, margin and margin

Revenues of fishing

Revenues of processing

Cost of fishing

Cost of processing

Margin = Revenues – Cost

"We can not survive without good quality"

The value chain

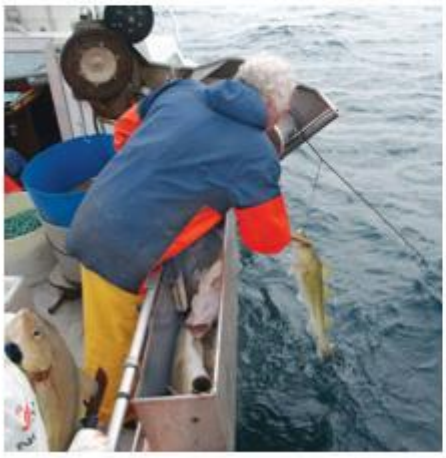
Long line caught!

Catching | Landing-Inventory | Processing | Marketing

No chain is stronger than the weakest link!

If you fall in the beginning

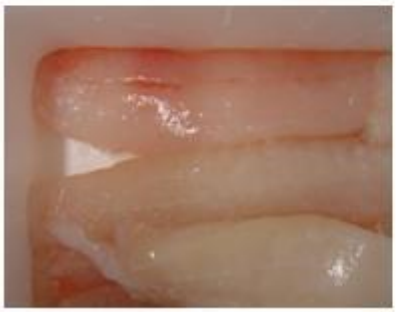
Catching | Landing-Inventory | Processing | Marketing



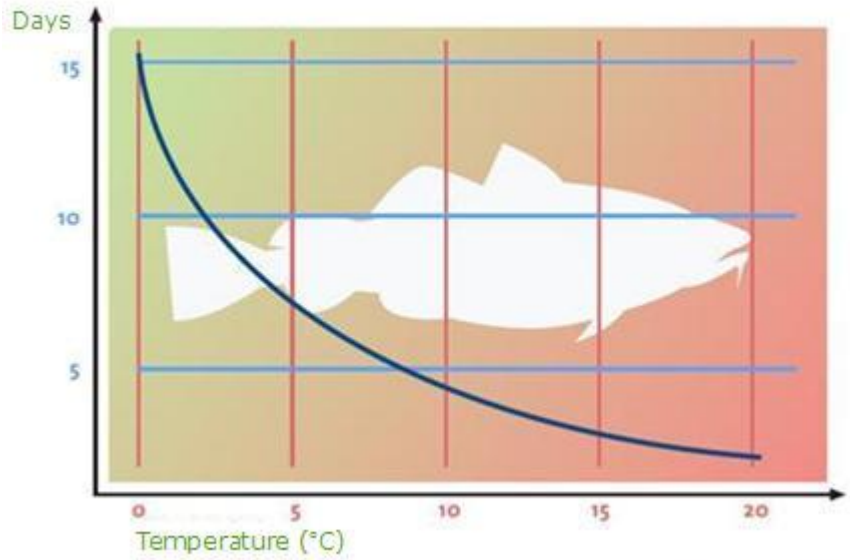
The best way to die

What is the best way to bleed?

- ☐ 6°C flowing water?
- ☐ 2°C for 10 minutes, then 15°C for 5 minutes?
- ☐ -1°C, do not ever change the bleeding water?
- ☐ The fish should not bleed?



It is good to be cool – to ensure shelf life



Keeping cool

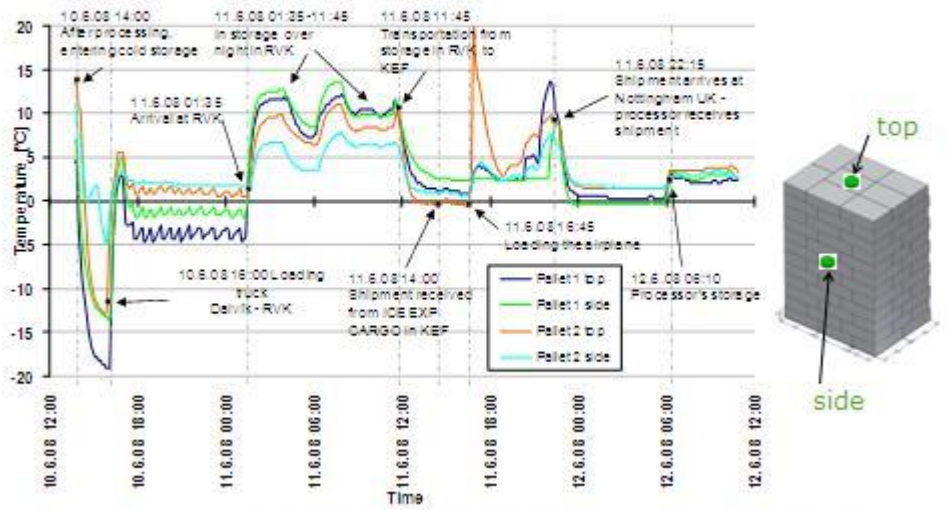
This is how we do it

Not like this!

Is small beautiful?

Are we cool enough?

Ambient air temparature.



Margeirsson, B., Arason, S., Valtýsdóttir, K.L. 2008.

The fish markets

Distribution centers

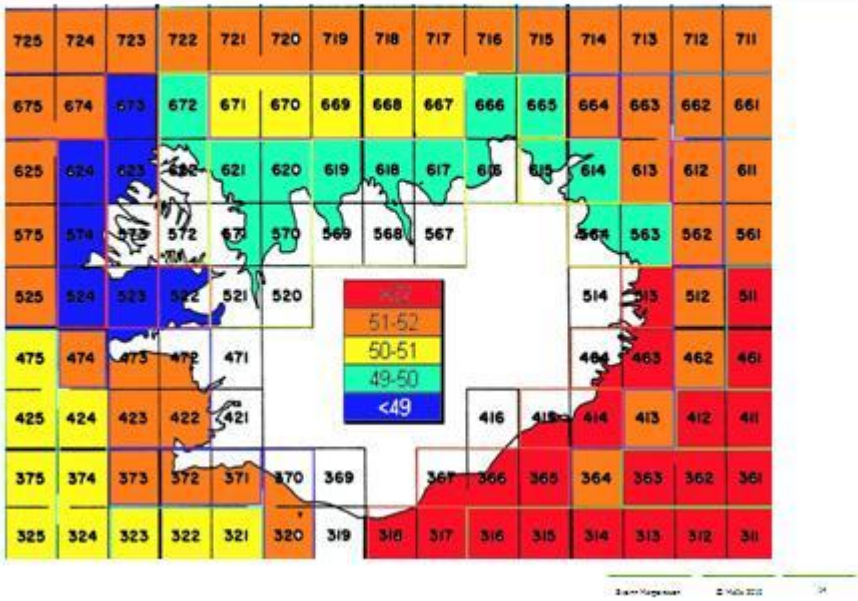
Grading

Ensuring traceability

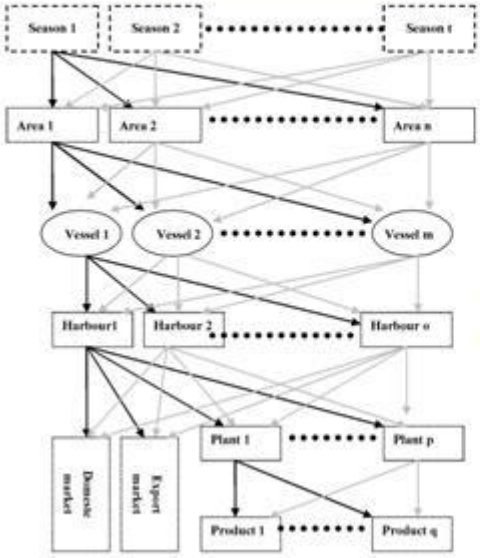
Traceability: Value chain and data management

Catching	Landing-Inventory	Processing	Marketing
Electronic log-books	Raw material stock system	Processing info system	Market info system
Catching area Season Species Size of catch	Quality of icing Days from catch Temperature Inventory	Fillet yield Total yield Defects Product mix	Orders Price Complaints

Measured fillet yield: Dec-Feb



Supporting different decisions



Decision Support

What do we need?

Need to know optimum bleeding conditions

Mechanical solutions to help maintaining quality

Temperature recordings

Full traceability
- Fish markets must be able to handle fish and data!
- IT systems that keep track – cheap, user friendly and accountable

Use the data for more efficient management of the value chain

Staff training

And lots more.....

Keyword: Collaboration!
matis
ÅSTA B
ÅSTA B

12 How can IT improve the fleets overall efficiency?

Kolbeinn Gunnarsson, Trackwell, Iceland

Some important parameters influencing efficiency

- Quality of fishing grounds
  - expected catch by species
  - flesh conditions, parasites, etc.
- Time spent fishing vs. time steaming and landing
- Bait usage
  - type and amount of bait per kg of catch
- Quality of the catch at the time of landing (age, handling)
- Price of catch
- Fuel consumption
- Etc.

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What can we do ?

- Use the Information Technology
  - to collect information on as many parameters as possible (and practical)
  - analyse the data
  - use the results to optimize our effort and minimize cost
- How do we do it?

TrackWell

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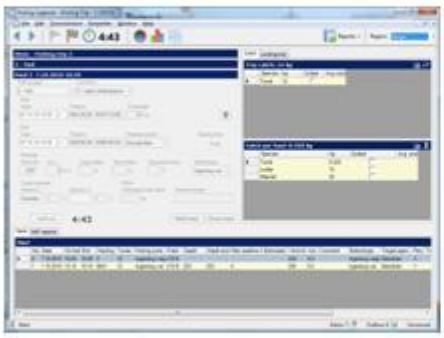
TrackWell ERS – a suite of tools to collect and analyse catch information

TrackWell

MOBILE RESOURCE MANAGEMENT

Electronic Logbook



- Registers vessels location, quantity of fish caught plus quality and environmental parameters. Stores information on the fishing gear as well.
- Reports the data to the fisheries and fishing authorities
- Supports mandatory reports to fishing authorities in Europe according to Norwegian, Icelandic and EU Common Fisheries regulations
- Enables the user to view the catch details of each vessel and history of previous trips

Product Manager

- TrackWell Product Manager is a extension to the Electronic Logbook
- It handles information on quantity and quality of the catch, i.e. the number of units (boxes or tubs) per product, condition and grade
- Sends production information automatically to the fishing company or others on-shore
- Some configurations makes Product Manager the first link in the traceability chain

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MOBILE RESOURCE MANAGEMENT

Fleet Manager

- The Fleet Manager receives data from the Electronic Logbooks and stores it in a database for further processing and analysis
- The users can extract data and statistics into a large selection of predefined reports
- Enables the user to view the catch details of each vessel and history of previous trips

Variety of reports

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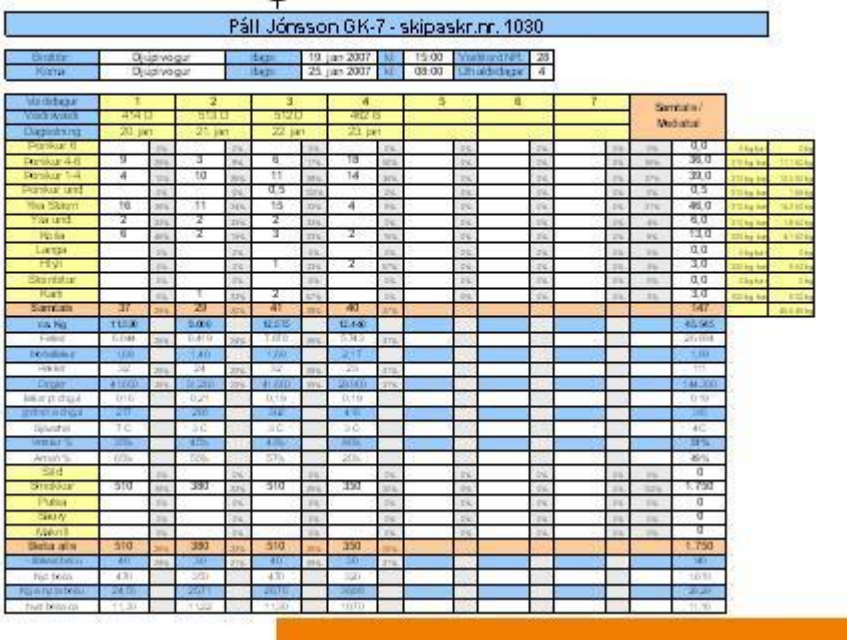

Catch Viewer

- Catch Viewer is an additional module to the Fleet Manager
- Enables the user to view the current position of each vessel in near real-time
- Location and history trails of previous trips can be viewed on a detailed Electronic Chart Display (ECDIS).
- The system allows comparison of fishing grounds and vessels over a selected time interval.

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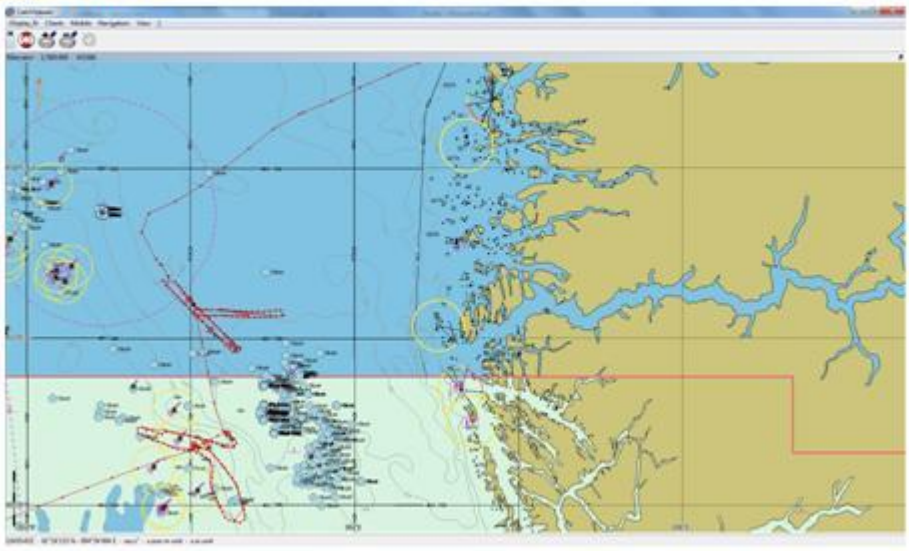
Catch Viewer



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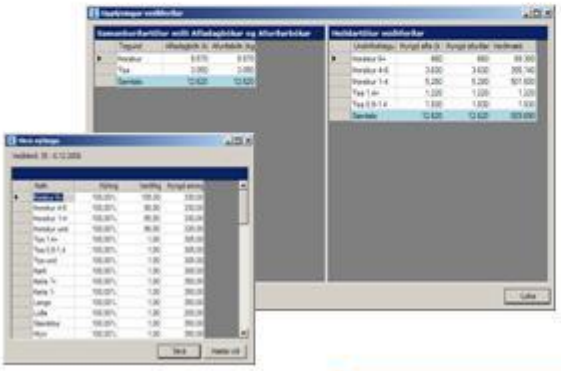
ERP Integration

- Landing report data from TrackWell to ERP system, like MicroSoft Navision, via XML-files
- Product data from ERP to TrackWell
- Automatic data transfer – less effort and fewer errors



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MOBILE RESOURCE MANAGEMENT

What do we do with the data?

- Direct the vessels to the most suitable fishing grounds
  - distance, expected catch by species, expected quality
- Use the bait combination that proves to give best results, based on experience
- Maximize the price by providing traceability information
  - detailed information on origin, age and quality of the catch provided to the processing plants / fish markets
  - higher price and / or easier to sell

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Case Study 1:

Fishing Ground Labeling

- Thorbjörn is TrackWell customer since 2005
- Operates 3 factory vessels and 4 long liners
- Fresh fish and salted fish (baccalo) processing factories
- All catch data from the vessels are collected online in the factory manager office
- Each cargo (batch) is kept separately through the processing
- Final products packaging are labeled with catch area information

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MOBILE RESOURCE MANAGEMENT

Case Study 1:

Fishing Ground Labeling

- Origin (fishing zone) labeled on every packaging

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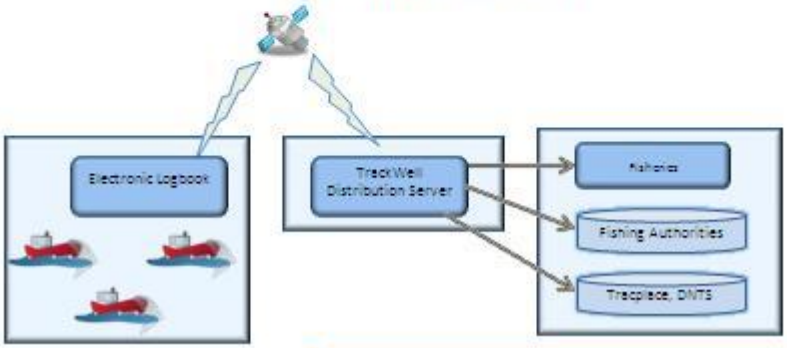
MOBILE RESOURCE MANAGEMENT

Case Study 2:

TracePlace

- TrackWell has entered into a partnership with The Federation of Fishing Vessel Owners in Faroe Island
- TrackWell supplies electronic logbooks and deliver the catch data into a common database
- Part of a pilot project in Faroe Islandfor a common database called DNTS (Digital National Traceability System)
- Data will are also forwarded to fishing authorizes and selected fishingcompanies



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MOBILE RESOURCE MANAGEMENT

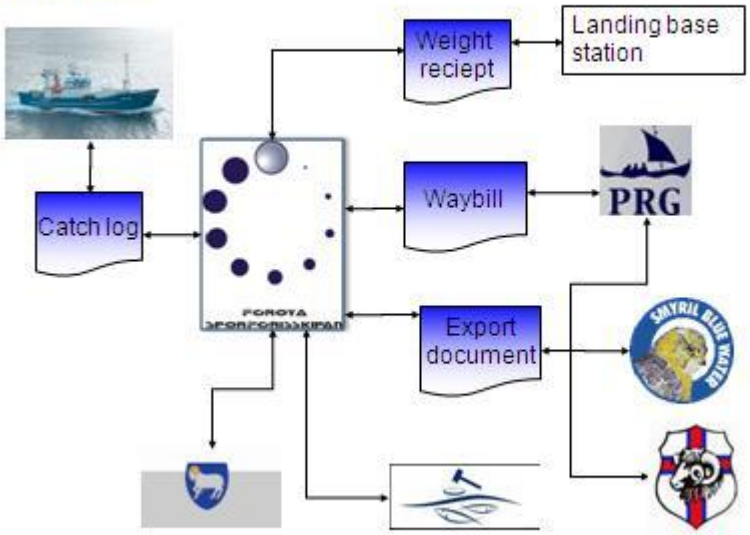
TracePlace

- Raw material received
  - Catch log from vessels
  - Weight receipt from landing base station
- Export documents
  - Waybill
  - Export report to Custom control
- Traceability documents:
  - Reception and dispatch
  - Transformations
  - Master detail
- Reports to authorities:
  - Total Catch Log
  - Crew list
  - Sales receipt (for the catch)
  - Salary to the fisherman
  - Environment reports
- Other documents
  - Invoices
  - Etc.....

TrackWell

TracePlace

MOBILE RESOURCE MANAGEMENT



TrackWell

TracePlace

MOBILE RESOURCE MANAGEMENT

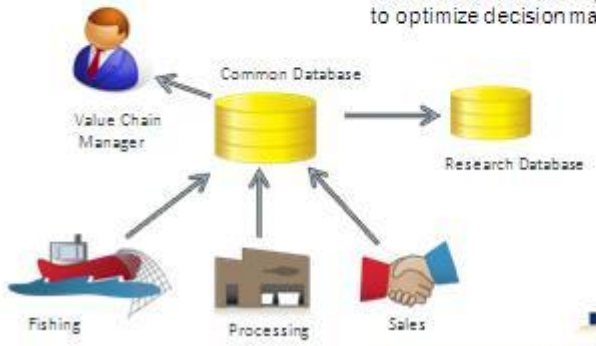
- Web interface with access control

TrackWell

MOBILE RESOURCE MANAGEMENT

Case Study 3: Value Chain Management

- FishMark – A research project on Value Chain Management
- Funded by AVS and Rannís
- TrackWell and Matís among two other suppliers together with four Icelandic fishing companies
- Information from all stages of the value chain are used to optimize decision making on fishing



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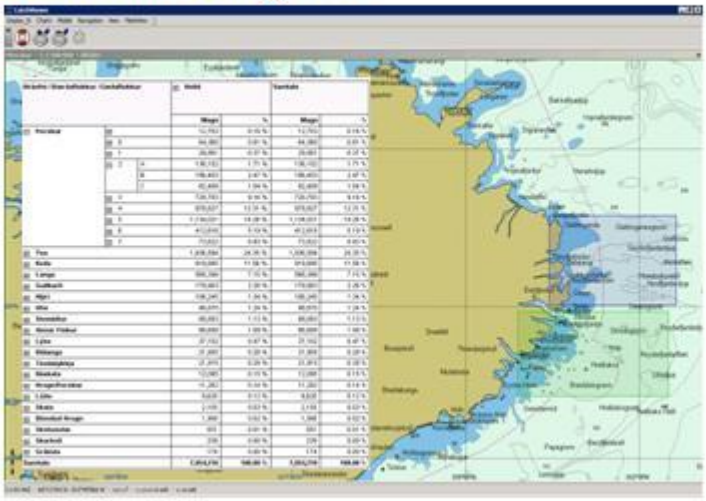
Value Chain Management

Selection of parameters – Area, time period, vessels

Value Chain Management



Total catch by species and grades

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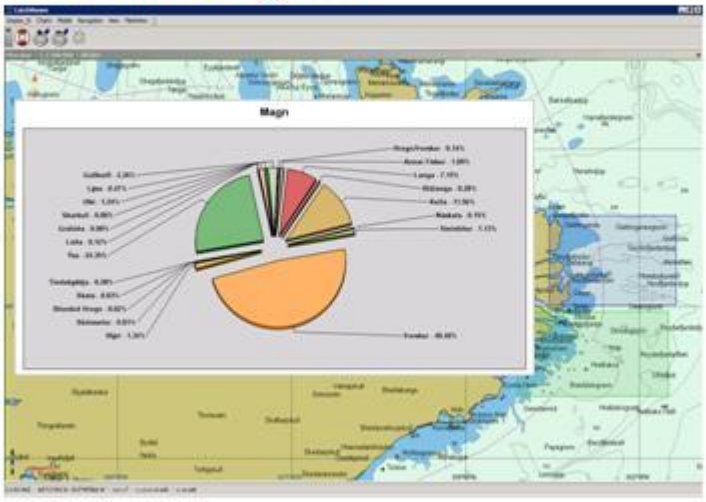
Value Chain Management

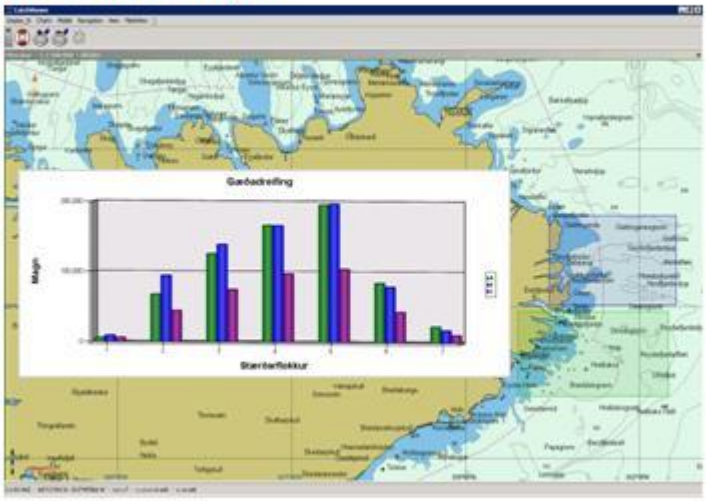


Catch by species

TrackWell

MOBILE RESOURCE MANAGEMENT

VCM- Data Analysis

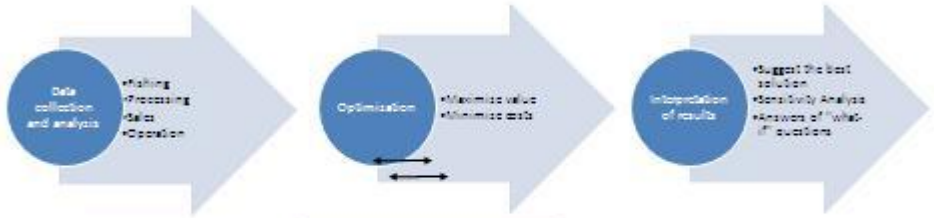


Grade and quality

TrackWell

MOBILE RESOURCE MANAGEMENT

Value Chain Management



FisHmark MATÍS

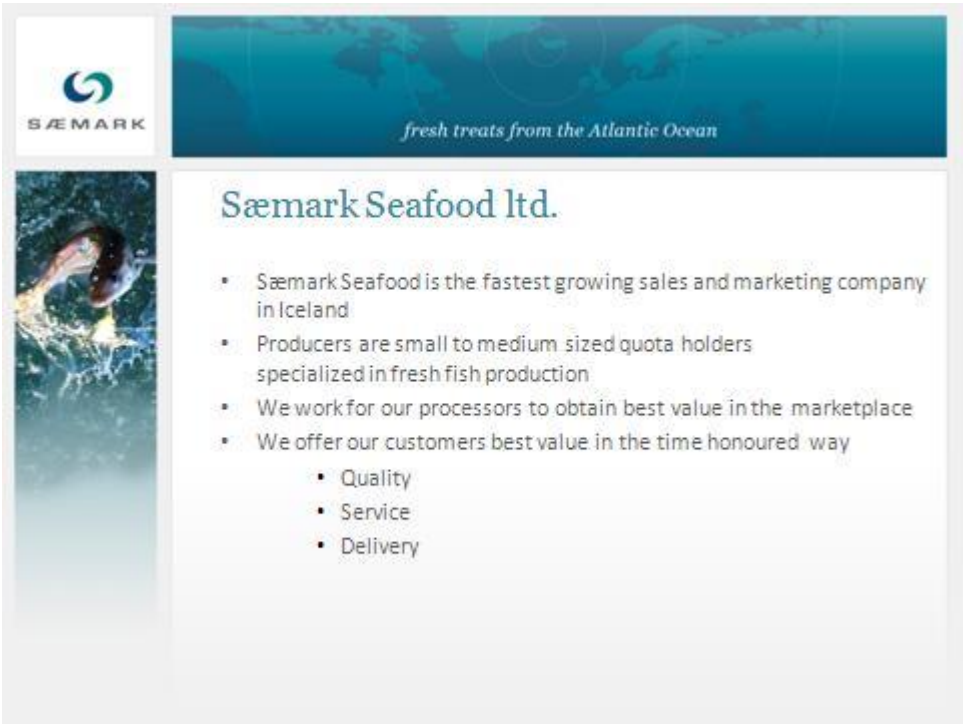
Future steps

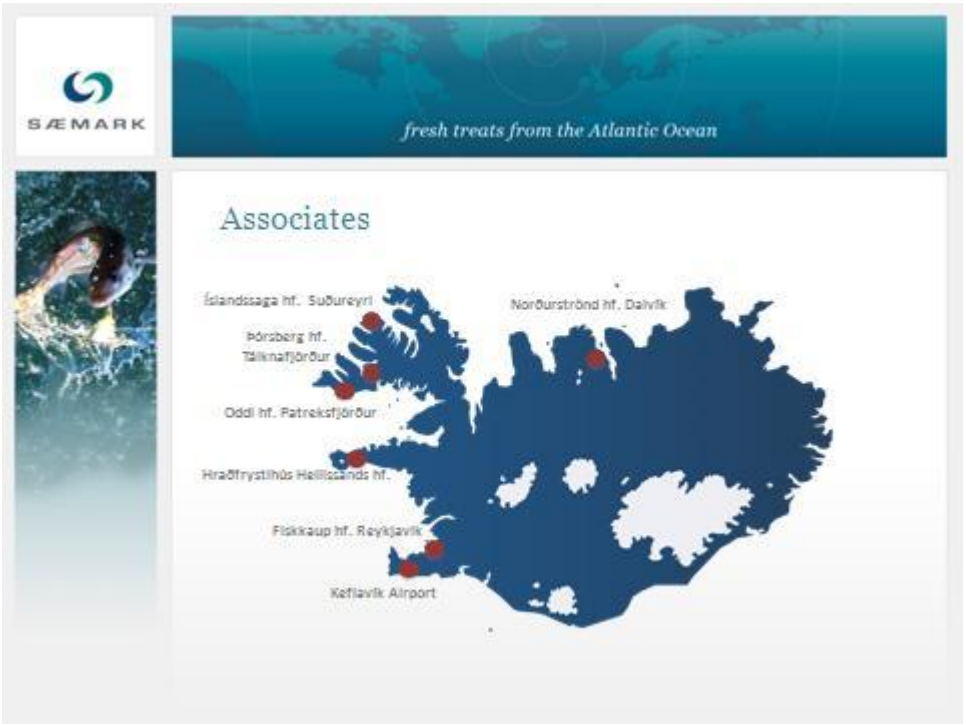
- Direct link to fish markets for detailed product information from vessels planning to sell their catch
- Optimizations tools to analyze data and suggest action
- Further registration of environmental parameters with the catch
  - meet the demands of the markets regarding sustainability and low environmental impact of the fishing
- Further steps towards full traceability end to end

- THANK YOU!

13 Is there a potential for improved earnings in the longline fleet and the value chain by marketing of the qualities of longline-caught fish?

Svavar Þór Guðmundsson, Sæmark Seafoods Ltd., Iceland




SÆMARK
fresh treats from the Atlantic Ocean
Associates
Íslandssaga hf. Suðureyri
Norðurströnd hf. Dalvík
Þórsberg hf.
Tálknafjörður
Oddi hf. Patreksfjörður
Hraðfrystihús Hellissands hf.
Fiskkaup hf. Reykjavík
Keflavík Airport

SÆMARK
fresh treats from the Atlantic Ocean
Tons
6000
5000
4000
3000
2000
1000
0
2006
2007
2008
2009
Tons

SÆMARK

fresh treats from the Atlantic Ocean

How do we create value from line caught fresh fish?

Distributors→ Retailers → Consumers

Packers

- Less Waste, higher quality, more shelf life, consistent supply

Retailers

- Visually better, consistent supply and quality, Sustainable Message

Consumers

- Looks Great, Tastes Great, Sustainably Caught (no guilt)

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fresh treats from the Atlantic Ocean

Case Study
- Line Caught Strategy for a Major Customer

Sainsbury's

Product news

Sainsbury's to sell 100% line-caught fresh cod and haddock

April 6, 2007

Oliver Knowles, Greenpeace oceans campaigner said: "Sainsbury's move to 100% line caught fresh cod and haddock once again demonstrates the company's serious commitment to eliminating destructively caught seafood from their shelves.

Ritchie Mcfee, fresh fish buyer, Sainsbury's, says: "To address this, we want to ensure we can make cod and haddock, and all species as sustainable as possible. This way our customers can continue to buy what they like, without the worry of where it's come from, and how it's been caught."

SÆMARK

fresh treats from the Atlantic Ocean

Support for line caught

SÆMARK

fresh treats from the Atlantic Ocean

Benefits

- Distributor gets a dedicated supply chain with high quality and low waste
- Retailer gets an exclusive supply chain which is difficult to copy and delivers high quality and high level of ethics and sustainability
- Consumer gets a product which delivers
  - Quality, shelf life, and no guilt to consumers
- The processor gets a regular order at a decent margin
- FINALLY the QUOTA HOLDER gets an enhanced return for his fish

SÆMARK

fresh treats from the Atlantic Ocean

- Every Box we sell shows date and area of catch
- Every box shows which vessel caught it
- Every box is destined for a specific customer who will appreciate the quality
- Every box meets specification
- When fish is $15 /kg every box must be RIGHT FIRST TIME
- When fish is $15 /kg the customer has to be MORE than satisfied.

SÆMARK

fresh treats from the Atlantic Ocean

How do we ensure maximum value?

- The supply chain has to work as a team
- There is a high level of quality control in processors, but this is kept to a common standard by our own QA Manager in Iceland
- The concept must be supported in market by the retailer and distributor. The consumer doesn´t automatically "visualise" line caught – they are thinking about a man with a rod
- The product needs to be differentiated by marketing
- Above all, the supply chain has to function 24/7, with close attention to detail and a plan A, B and C

SÆMARK

fresh treats from the Atlantic Ocean

What is the future for our business?

- Best Practice
- Carbon footprint
- Eco-labels

SÆMARK

fresh treats from the Atlantic Ocean

Thank you

14 Optimizing profitability in the longline fleet. Which are the important parameters?

Erla Ósk Pétursdóttir, Vísir hf, Iceland

VÍSIR

Optimizing Profitability in Longlining

Erla Ósk Pétursdóttir

October 20, 2010

VÍSIR

Optimizing Profitability in Longlining

1. Vísir background
2. Developments in longlining
3. Current status and future prospects

VÍSIR

Vísir hf.

- Family company
- Founded in 1965
- Headquarters in Grindavík
- Five longliners
- Four processing plants
- 300 employees

VÍSIR

3

Vísir – Fishing

- All catch is landed at nearest harbor
  - distributed to the specialized processing locations
- Vessel returns to fishing (ongoing system)
  - constant supply of product all year
- 50% of the catch is transported via truck

No.	Vessel Name	Built	Length	Width
1030	Páll Jónsson GK 7	1967	43,9	7,6
972	Kristín ÞH 157	1965	41,7	7,2
975	Sighvatur GK 57	1965	41,4	7,2
237	Fjölnir SU 57	1964	39,3	7,0
1076	Jóhanna Gísladóttir ÍS 7	1969	56,8	8,0

VÍSIR

4

Vísir´s share of total allowable catch

Specie	Tegund	Share of TAC	2010/2011
Cod	Þorskur	5,14%	6.353.909
Haddock	Ýsa	5,87%	2.292.033
Saithe	Ufsi	1,95%	775.392
Redfish	Gullkarfi	0,99%	298.458
Deepwater Redfish	Djúpkarfi	0,92%	91.539
Ling	Langa	16,64%	998.898
Tusk	Keila	46,07%	2.487.881
Catfish	Steinbítur	7,24%	701.156
Monkfish	Skötuselur	0,10%	2.203
Greysole	Grálúða	0,28%	33.283
Plaice	Skarkoli	3,52%	210.353
Sole	Þykkvalúra	1,25%	20.792
Witch	Langlúra	2,31%	27.671
American Plaice	Skrápflúra	1,79%	3.287
Limanta	Sandkoli	2,93%	13.480
Total			**14.310.335**

Total cod equivalence kg: 11.682.000

VÍSIR

Electronic Tracking System at Vísir

- Using this system since 2004, data from 1999
- Electronic Log Book - records catch data on board
- Fleet Management Systems - info observed at headquarters
- Marel Innova - records weights, yields, etc. in operations
- Navision - all information is uploaded for sales
- The communication between systems is key for traceability

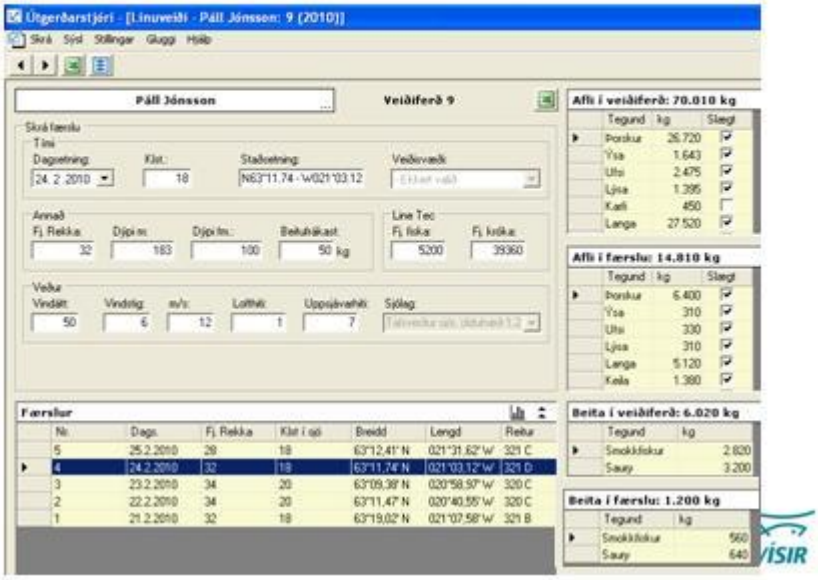
Electronic Logging

- Recorded on board:
  - Location (all routes of vessels)
  - Number of hooks
  - Number of fish
  - Bait, type, amount
  - Depth, wave height
  - Weather, course, wind speed
  - Sea and air temperature
  - Type, amount and size of fish estimated
  - Etc.

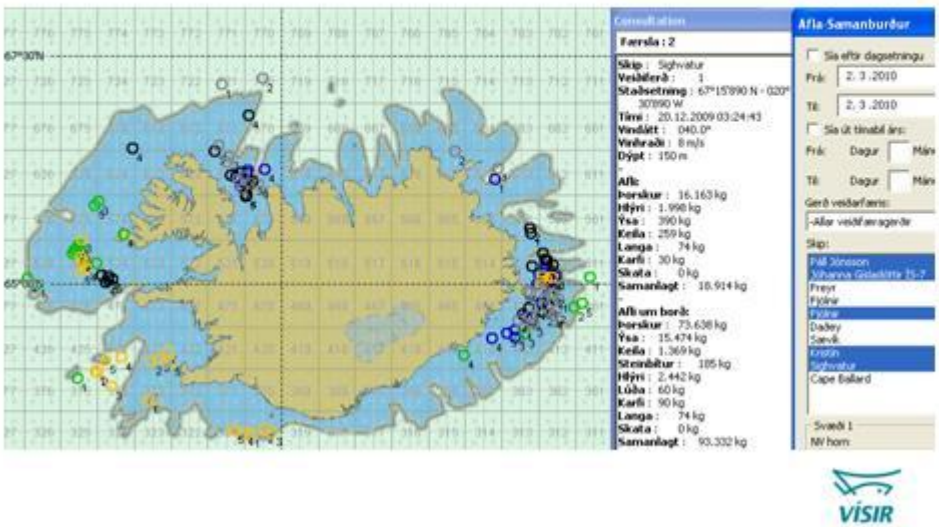
- Recording on land.
  - Size, utilisation, quality, etc.

VÍSIR

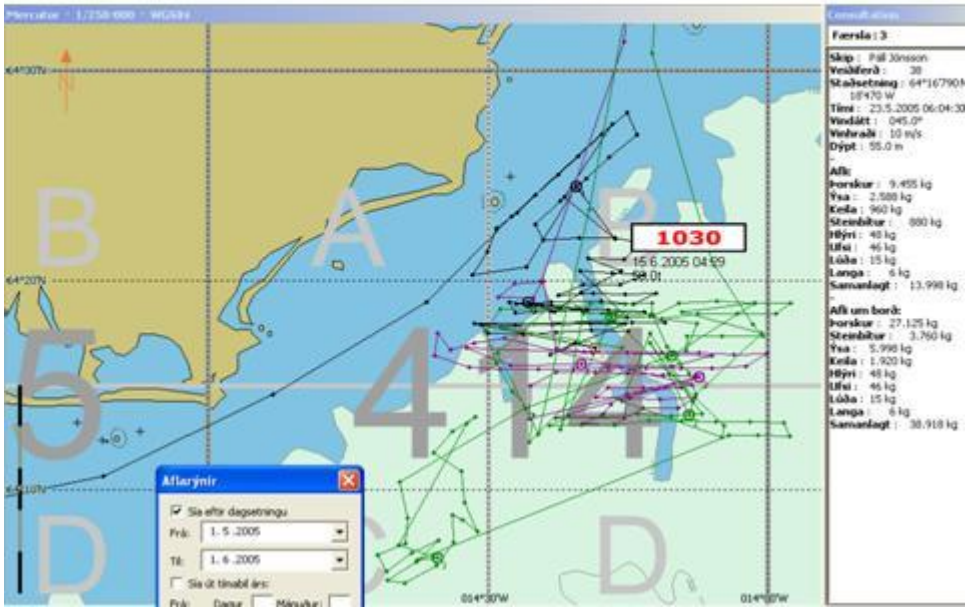
Fleet Management System



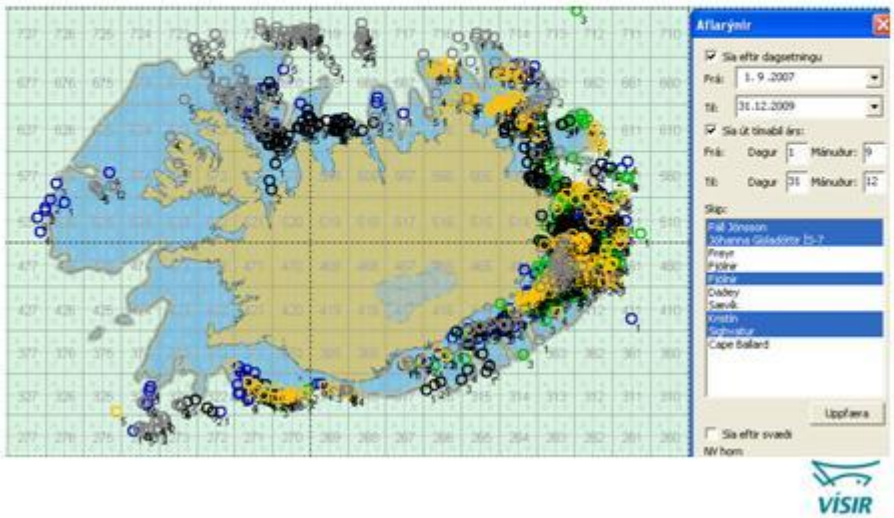
Fleet Management System Graphically



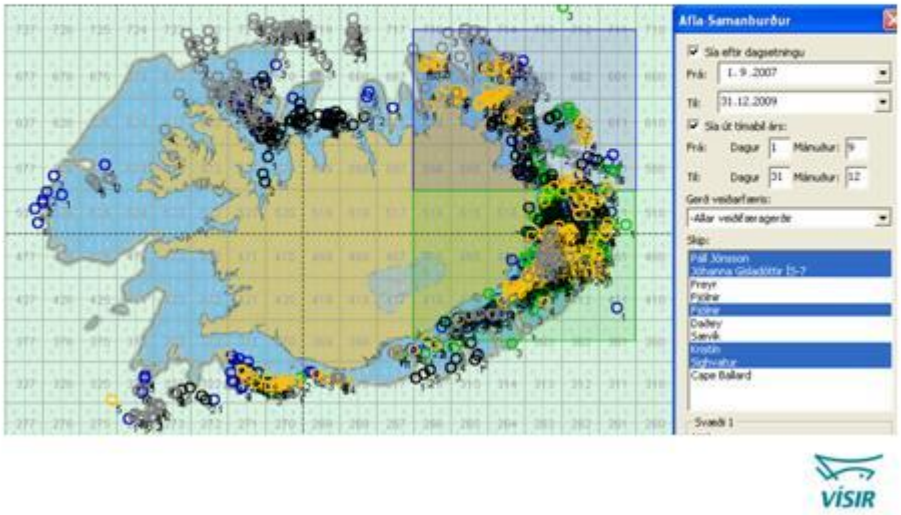
Zoom-in Pathway (Analyze the Day)



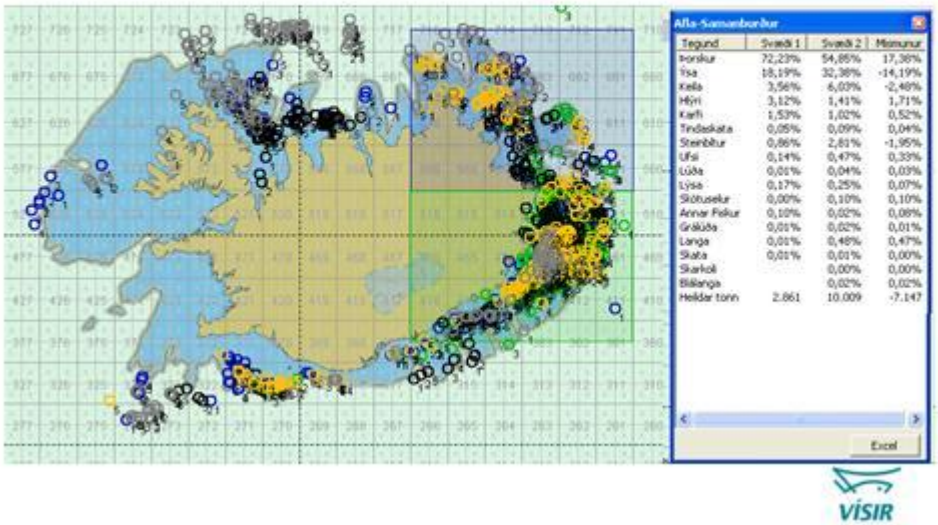
Sept – Dec, 2007 - 2009



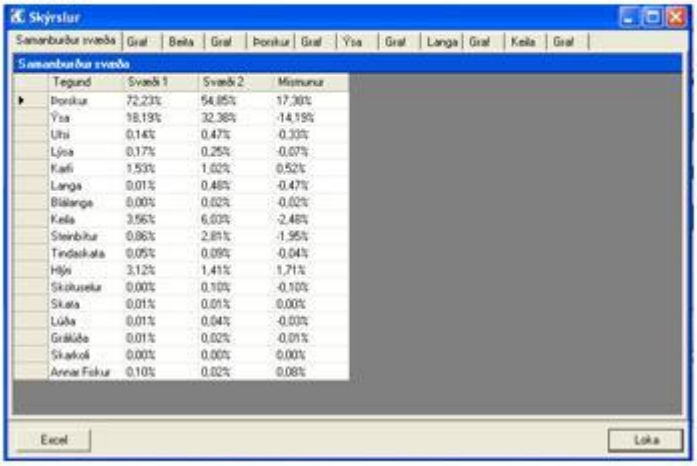
Compare Areas



Comparison Results



Result Details - Species



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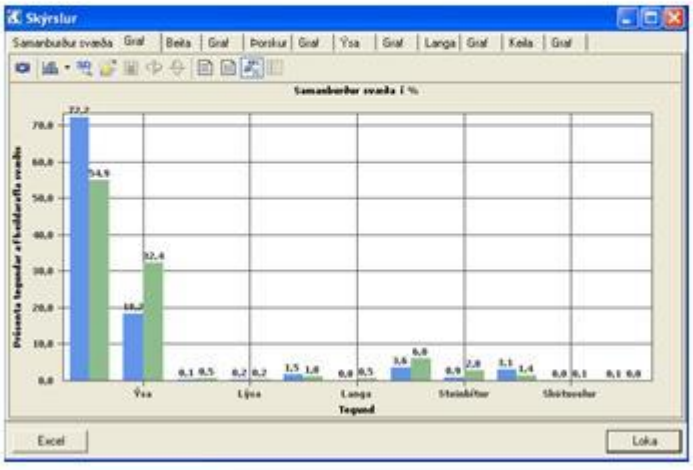
Result Details – Species Graph



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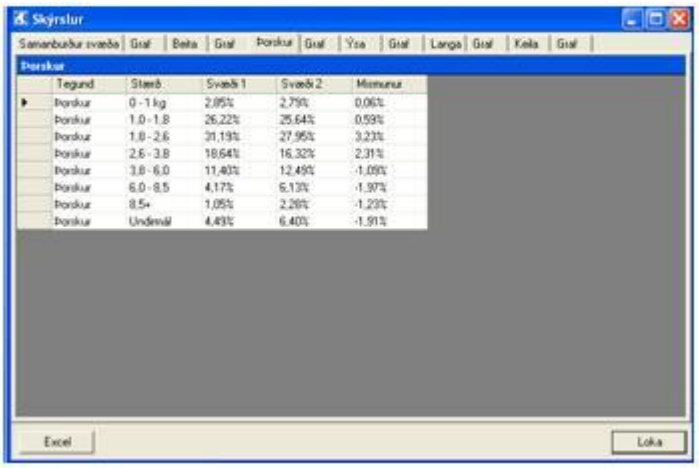
Result Details - Cod



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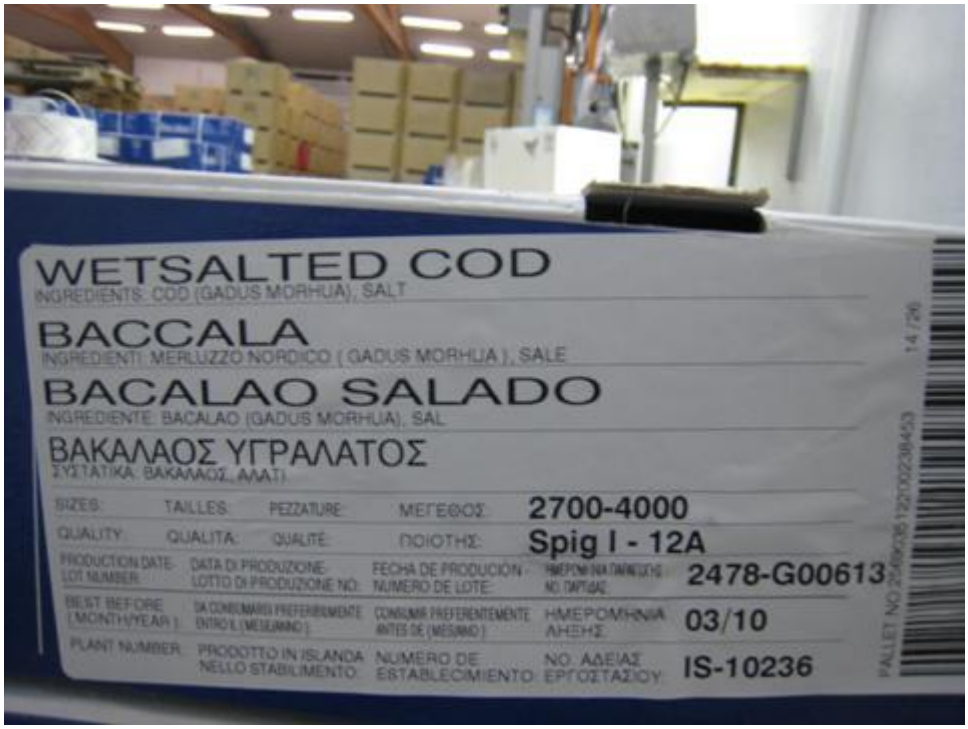
Result Details – Cod Graph

VÍSIR

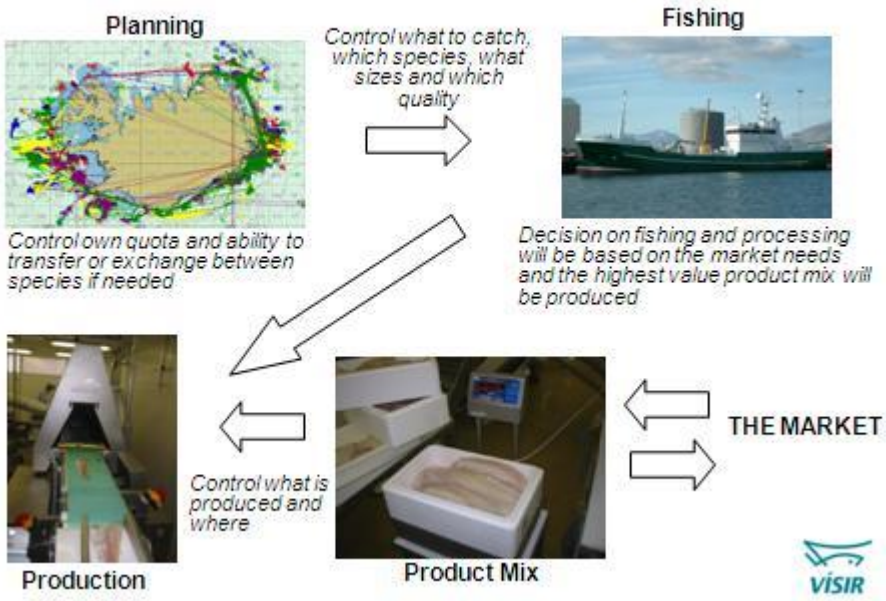
Electronic Tracking System at Vísir

- Tool for management
  - Trace product from fishing to customers
  - Track yield at each stage of process
  - Keep track of fishing areas
- System information can also be used to
  - Increase catch per hook
    - where caught, with what bait, etc.
  - Avoid low yielding fishing areas
  - Respond quickly to market conditions
    - what product mix gives the highest value
- Giving the market what it wants: traceability

VÍSIR



Maximise the Value of the Quota through Traceability



Responsible Fishing

- Traceability from fishing grounds to market is an integral part of responsible and sustainable fishing
  - Another big part is fisheries management
- Responsible parties in the Icelandic fishing industry have signed a statement on responsible fishing
- The industry has prepared a logo for products originating in Icelandic waters
- Third party certification coming, fall 2010
- More information: www.fisheries.is and www.responsiblefisheries.is

22

VÍSIR

Optimizing Profitability in Longlining

1. Vísir background
2. **Developments in longlining**
3. Current status and future prospects

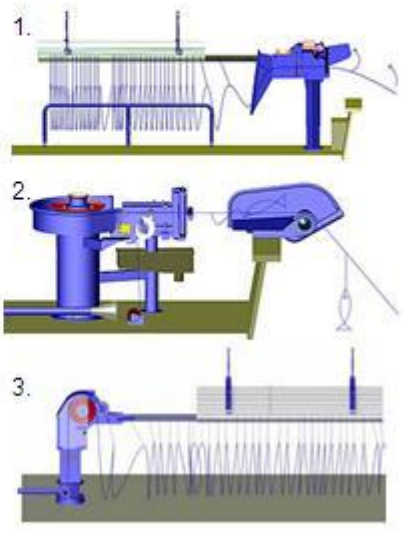
23

VÍSIR

Key developments in longlining: the Automatic Baiting Machine

- Vessels able to stay at sea longer and can go to fishing grounds further away
- This Mustad update had:
  1. Baiting machine
  2. Hauling operation
  3. Hook separator

     Gets the line ready to be used again



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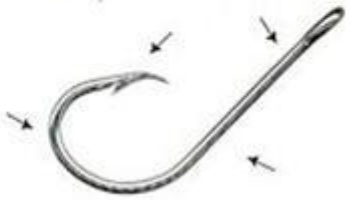
Other key developments in longlining

- Larger boats
  - Vessels able to stay at sea longer
- Better handling of the catch
- Swivels on the line
  - Hooks can spin around the line (not get tangled)
- New type of bait
- New types of hooks



15

VÍSIR

Results at Vísir

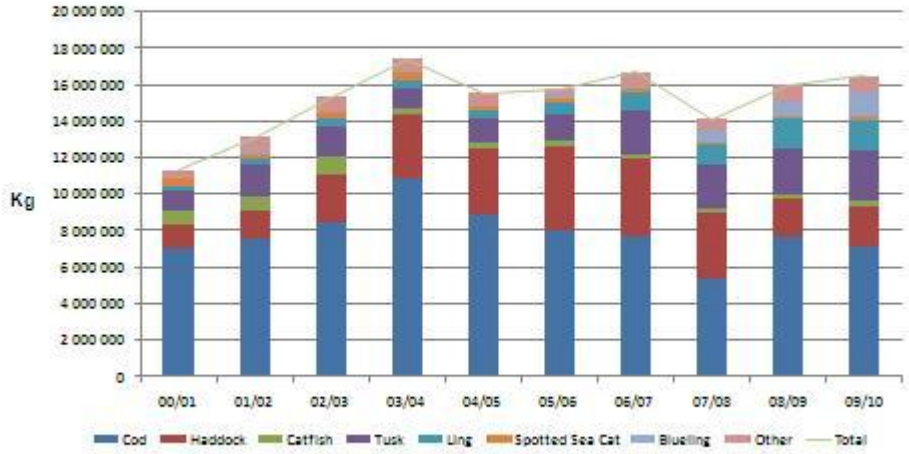
- Greater catch
  - More hooks with fewer people
  - Increased grams/hook per specie
- Bait more effective
- More effective fishing and less quota ➔ fewer boats
  - From 8 to 5 vessels last 10 years

16

VÍSIR

Total Catch per Fishing Year

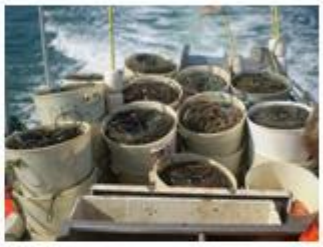
All species



VÍSIR

Comparison to the Past

- In the past it was considered good to catch 100 kg of cod (ungutted) per line
- Each line had 450 hooks
  - ➔ 220 grams/hook (ungutted)
  - ➔ 190 grams/hook (gutted)



- Today we get 500+ grams/hook in cod fishing, even up to 800 grams/hook
  - – All species: 350-400 grams/hook

28

VÍSIR

Optimizing Profitability in Longlining

1. Vísir background
2. Developments in longlining
3. **Current status and future prospects**

29

VÍSIR

Current Efforts

- Now we are focusing mostly on the bait
  - Reduce the amount of bait used
  - Be able to affect which species take the bait
- For a portion of our fishing, we have reduced the bait used from 30 grams to 10 grams
- We have also found a bait mix that catches less cod and significantly more haddock

30

VÍSIR

Bait Development

2000
- Squid
- Herring

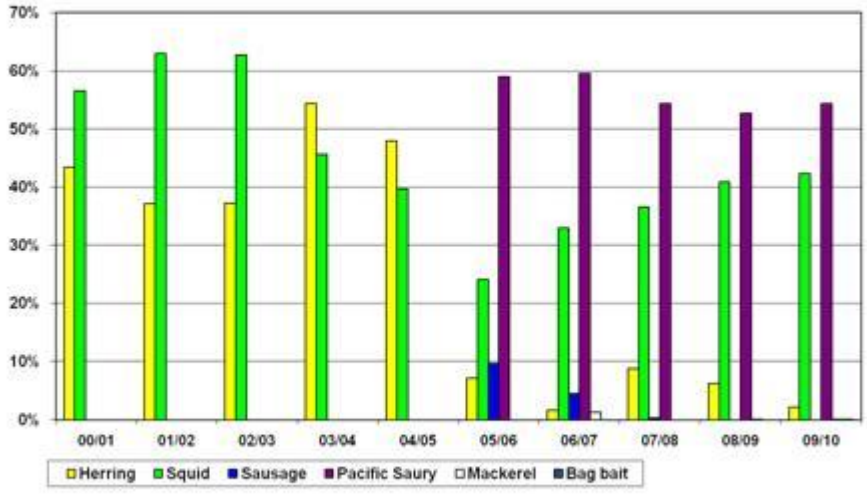
2005
- Sausage
- Mackerel
- Pacific Saury

2010
- Bag bait

31

VÍSIR

Bait Used



VÍSIR

Bag Bait

- Vísir has added a new baiting machine for bags
  - In addition to the Mustad
- Possibilities include:
  - Bait amount reduced by 2/3
  - Ability to mix bait types
  - Not be constrained by the size/shape of the fish as bait
- Purpose is to find a bait which can "select" species

33

VÍSIR

Conclusions

- Profitability in longlining is largely driven by technological advances
  - We need to continue research and development
- Information gathering is important so that we can build knowledge
- Once we have a good information base we can better optimize the profitability
  - For example, given the current market situation and our quota, where should we direct our fleet?

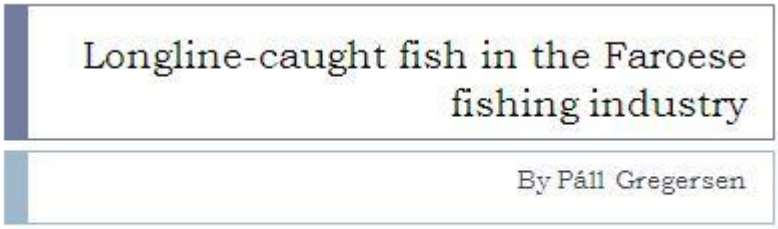
34

VÍSIR

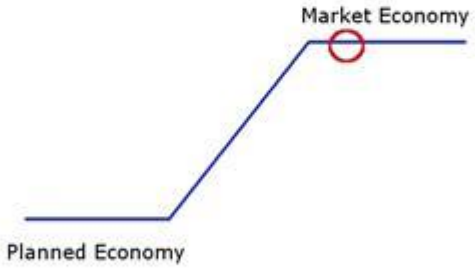
Thank you!

15 Longline-caught fish in the Faroese fishing industry

Páll Gregersen, P/F PRG Export, Faroe Island

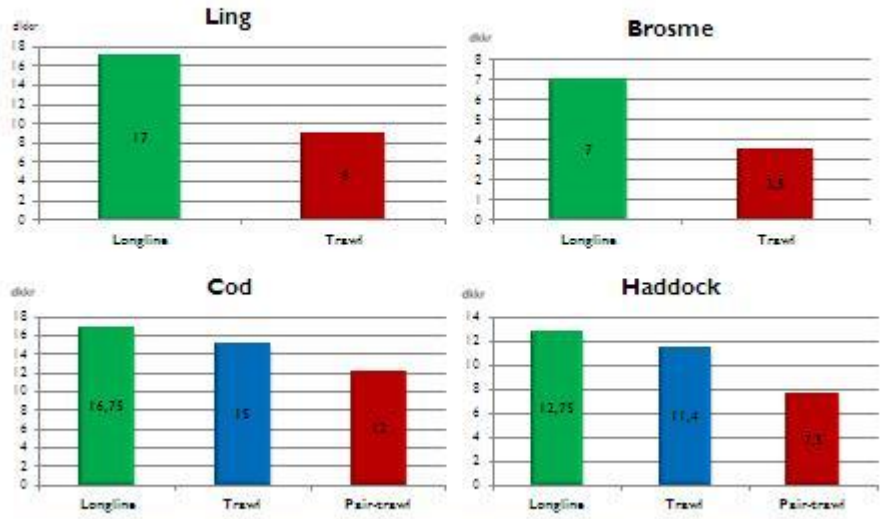


The Economy



Things done right...

Different Prices



The Difference

The Difference

The Difference

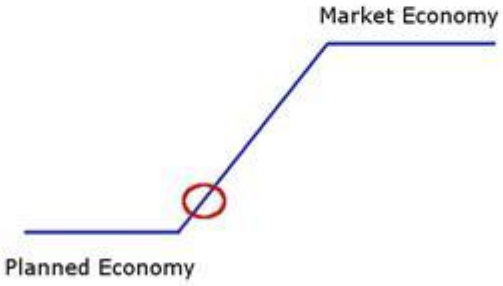
Things done wrong...

- Trips are too long
- Not bleeded
- 5 of 16 boats no proper bleeding bin
- Bleeded and gutted at the same time
- Poorly cleaned
- Poorly placed in boxes
- Too much in the boxes
- Not enough ice
- Lack of respect for the product
- Lack of education
- Mix the different days of catch when discharging
- Too much handling when sorted at shore

Why is it like this?

Desperate sellers market

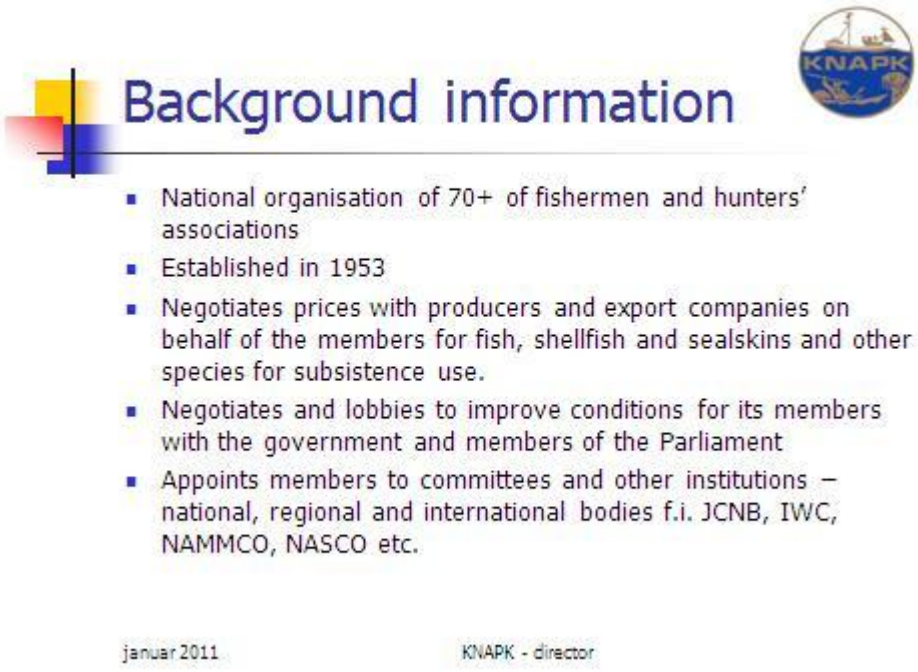
Local patriotism



What should be done?

16 Challenges in developing a longline fishery in Greenland

Alfred E.R. Jacobsen, KNAPG, Greenland



Participation

- Director Alfred ER Jakobsen
- Technical consultant for fishermen, Jens Kielsen
- Fisherman Niels Nielsen
- Executive secretary for Royal Greenland Robert Møller

Longlining in Greenland

- Longlining is used for following species:
- Greenland halibut (TAC appr. 20.000 tonnes per year).
- Cod (8.500 tonnes – mostly by bundgarn – nets)
- Catfish (annual amounts?)
- Halibut (flynder)

Greenland halibut

- 6 months a year: longlining.
- Rest of the year: gill nets in designated areas.
- Fishing is done mostly by using small open boats.
- These boats use mostly longlines with 0.8 – 3.5 mm lines. Hauling line used is mostly 1.0 mm – 3 mm.
- Less than 15 fishing vessels are equipped with modern autoline systems, mustad, beitir, soelyst, fiskevegn.
- In northern areas with solid ice during the winters – longline is used by using a homemade "sliding wing" – 1x0.5 meter.
- Baites used for fishing Greenland halibut is: Sauri, squid and to some degree capelin and polar cod.
- Polar cod is most preferable – baiting is manual.

Challenges ahead

- Project idea:
- Use polar cod as baite in future.
- Goal: Fisherman and autoline developer and/or a baiting system developer carry out a project in 2011 funded by ?.
- Benefit: High catch rates – lower costs etc.

Experience with polar cod

- Mr. Niels Nielsen is here – he can tell you more about his experience in using polar cod as baite.
- But: Baiting has to be done manually – very time consuming
- Challenge: Develop baiting system enabling to use polar cod. New product?

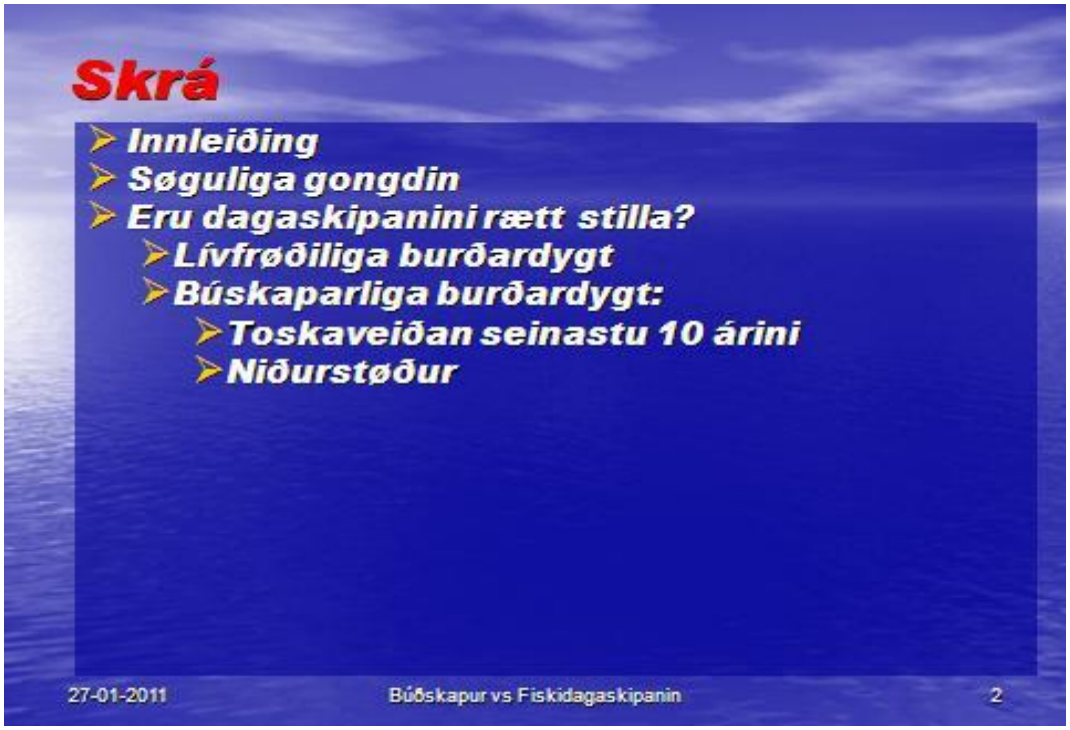
januar 2011 KNAPK - director

Qujanaq - Thank you!

januar 2011 KNAPK - director

17 Strength and weaknesses in the Faroese fishing day's system in relation to boat owner's economy

Johannes M. Olsen, the Faroese longliners organisation



Innleiðing

- Framløgan er uppbygd við eini søguligari gongd og við gjøgnumgongd av – fyrimunum við eini fiskidagaskipan og hvat manglar hjá føroyingum, at rætta uppá fyri at fáa skipanina at røkka settum málum
- Eisini eru uppskot um møguligar loysnir, sum upplegg til kjak

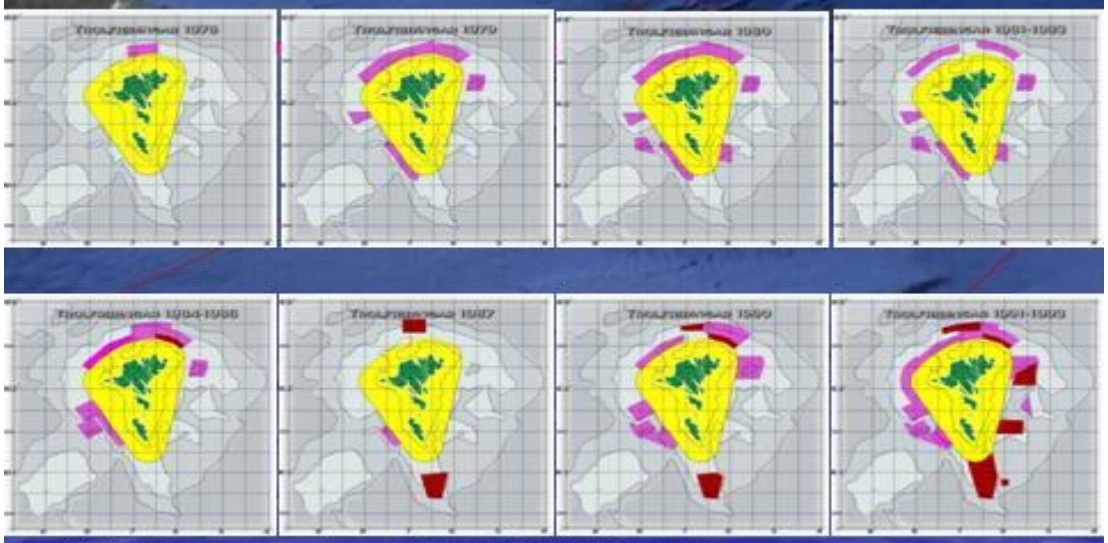
Søgulig gongd

- Fram til 70-árini varð at kalla frítt hjá føroyingum at fiska úti, sum heima. Ein og hvør, sum hevði skip, slapp at fiska bæði á føroyskum, sum frammandum fiskimiðum. Innflutningsloyvi vóru tó kravd fyri skip, sum vórðu keypt ella bygd uttanlands
- Í 1977 varð fiskimarkið flutt út á 200 fjórðingar, og stórur partur av mið- og langfaraflotanum kom heim á Føroya-grunnin at veiða. Trongligt varð á grunninum, og tá byrjaði uppbýtið av økjum, veiðihættum og skipasløgum. Áðrenn hetta hevði bert onkur kassaskipan verið fyri útlendskar trolarar
- Mitt í 80'unum vóru góð fiskiár og síðan minkaði fiskiskapurin, og frá 1988 byrjaði at minka burtur av heimaflotanum. ikki færri enn 7.800 brt. ella 62 skip fóru úr flotanum fram til 1994.
- Fleiri av heimsins fiskivinnutjóðum, teirra millum okkara grannalond fóru undir at kvotera innan fyri egið fiskimark longu í 70-árunum. Ísland fekk handilskvotur í 1987.
- Í 80'árunum byrjaði landsstýrið at gera tekniskar reguleringar, eitt nú at friða økir, víðka meksar, og seta tíðarbann fyri fiskiskapi.

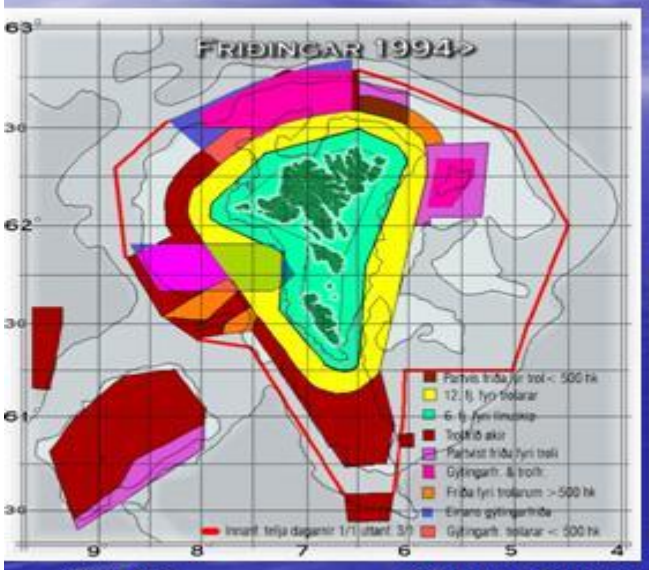
Søgulig gongd

- Tá hóttafall og fiskaloysi raktu fyrst í 90'unum, varð tosað um at seta kvotur við Føroyar. Føroyskir fiskimenn kendu til hetta aðrastaðni frá.
- Vinnan mælti staðiliga frá kvotum, tí samansetingin av fiskasløgum á Føroya-grunninum er so blandað, at hetta bar ikki til at liva undir ella halda skil á.
- Men í 1994 varð ein kvotaskipan roynd, lutvíst undir trýsti frá donskum myndugleikum, sum treyt fyri lánveitingum til Føroyar.
- Sum ikki eina ferð hevði vinnan grein í sínum málið, og kvotaskipanin varð ein "fiasko".
- Kvoturnar sum stýrisamboð miseydnaðust, men tá eydnaðist vinnuni saman við fiskifrøðingum og fiskivinnumyndugleikunum, at blíva samdir um eina fiskidagaskipan istaðin, sum løgtingið samtykti í 1996.
- Fyrimunir við dagaskipanini, ímun til kvotaskipanina:
  - at eingin fiskur verður útblakaður
  - at eingin grund er fyri at umdoypa fisk.
  - og at hagtølini fyri veiðu á føroyagrunninum verða rætt.
  - og at vit hava ikki brúk fyri fyrivarnisregluni, út frá tí, at alt sum fiska verður - verður skrásett.

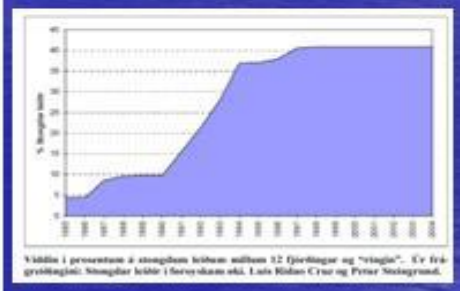
Stongd økir



Stongd økir



- 1. januar 1994 fekk Thomas Árabo alla fiskivinnuna, at seta seg saman og justera sítt ynskot, sum var komi frá politikarunum um friðingar, og myndin til vinstru visir tað fiskivinnan samdist um, tó kom ringurin, tá bátir innaru og ytruleið ikki fyrr enn 1996, saman við dagaskipanini

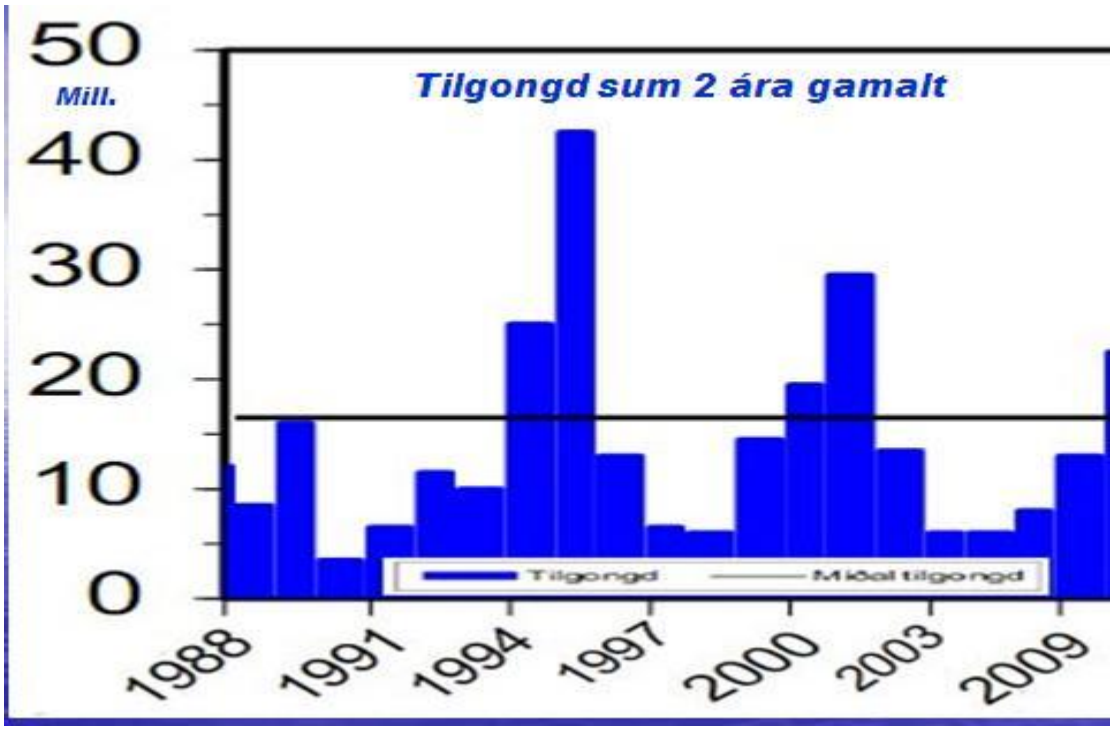


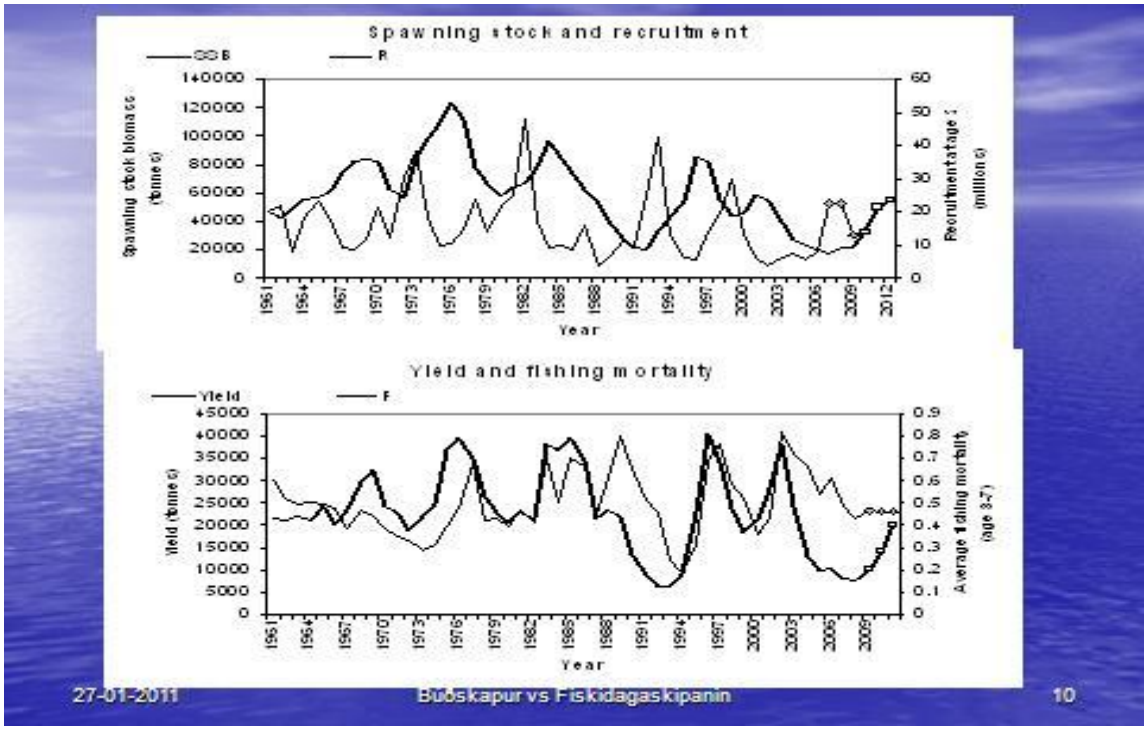
27-01-2011 Búðskapur vs Fiskidagaskipanin 7

Stongd økir – galdandi ídag

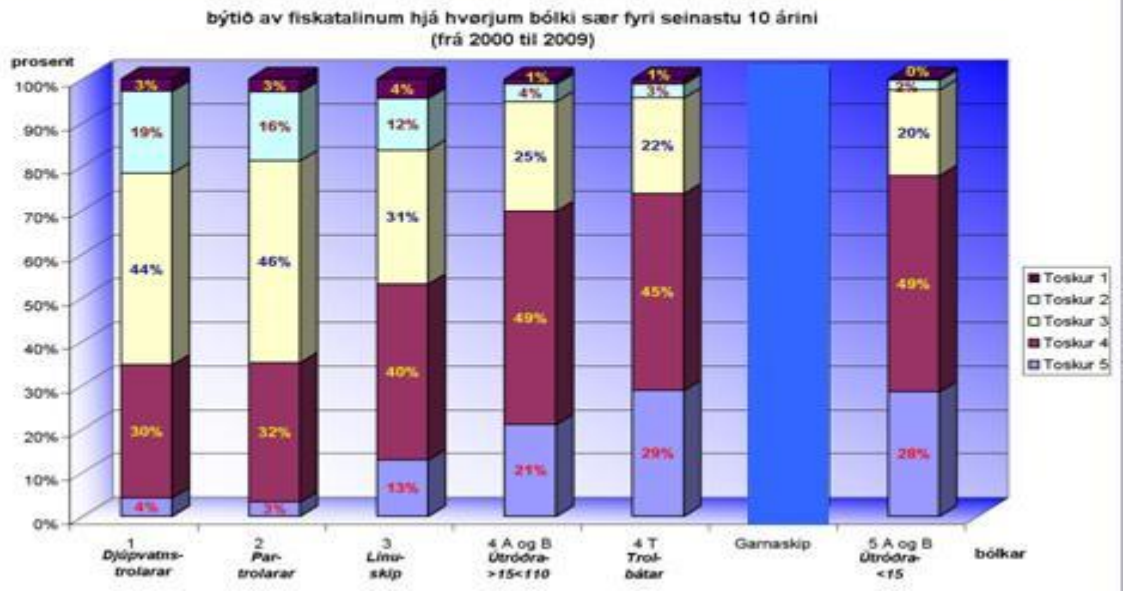
- Onkrar smáar broytingar hava verið síðan 1994, sítt nú, at linuskipini ikki kunnu koma inn um 6 fj. ur vanligu grundlinjum o.a.t.

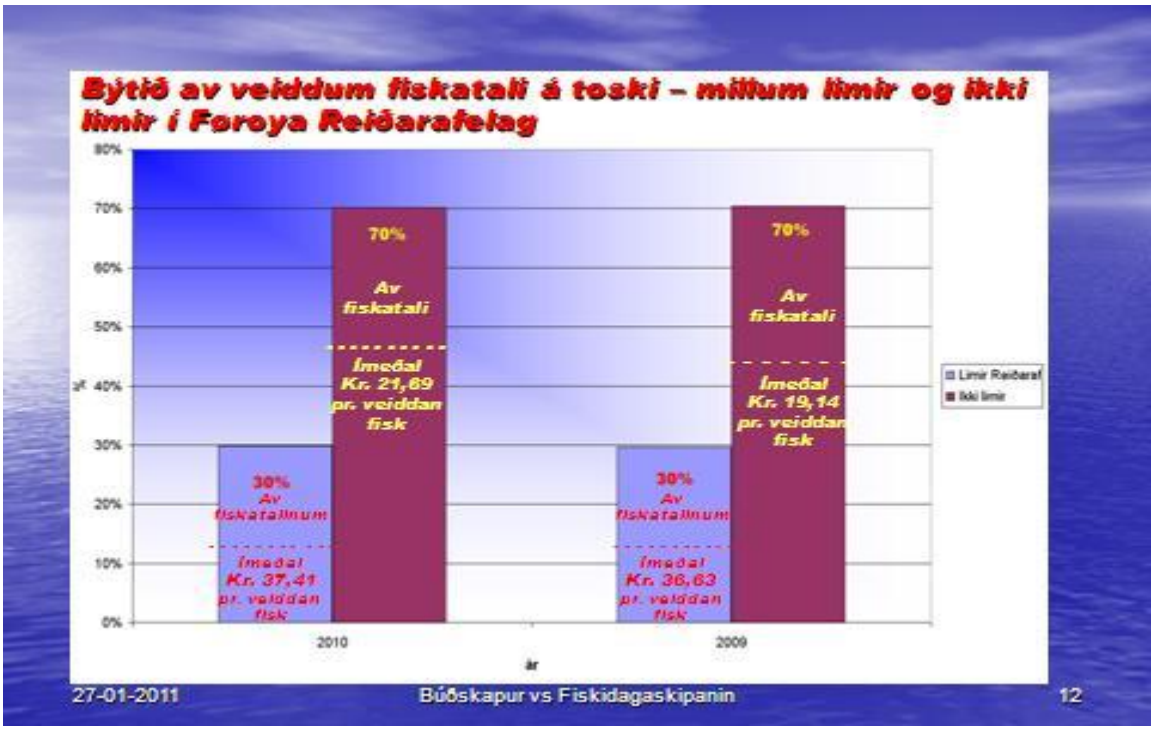
27-01-2011 Búðskapur vs Fiskidagaskipanin 8


Tilgongd sum 2 ára gamalt
Mill.
50
40
30
20
10
0
1988
1991
1994
1997
2000
2003
2009
Tilgongd
Miðal tilgongd

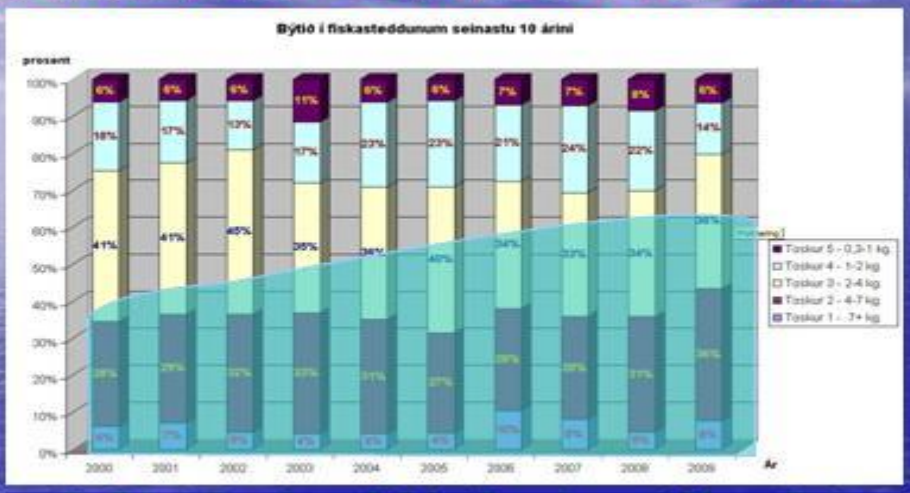

Spawning stock and recruitment
SSB
R
Spawning stock biomass (tonnes)
Recruitment at age 1 (million s)
Year
Yield and fishing mortality
Yield
F
Yield (tonnes)
Average fishing mortality (age 3-7)
Year
27-01-2011
Boðskapur vs Fiskidagaskipanin
10

Fiskatal av toski



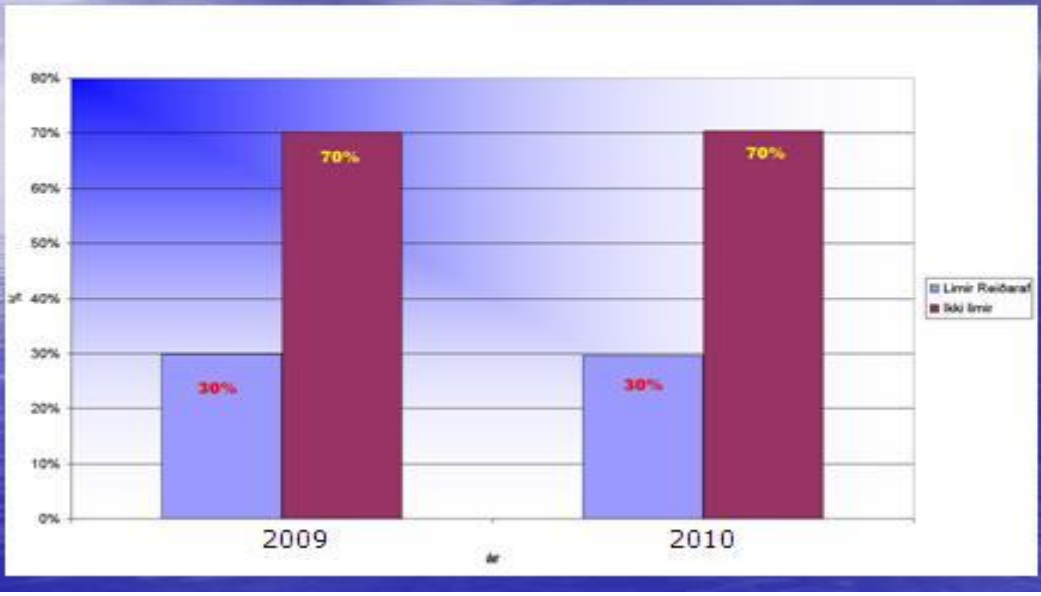


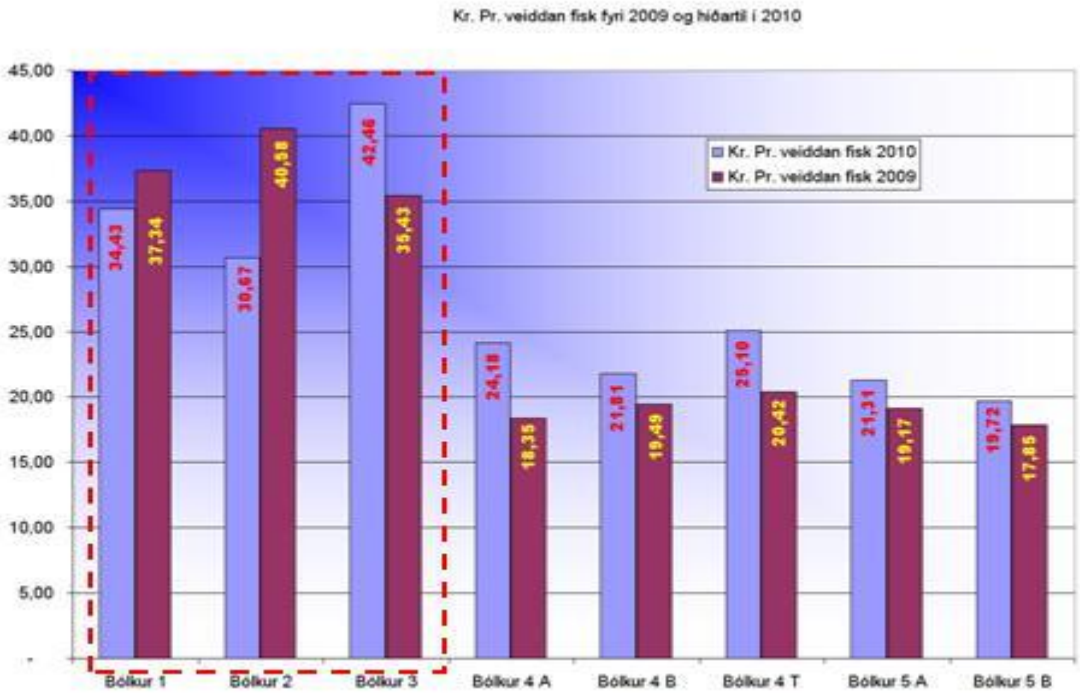
Toskaveiðan seinastu 10 árini

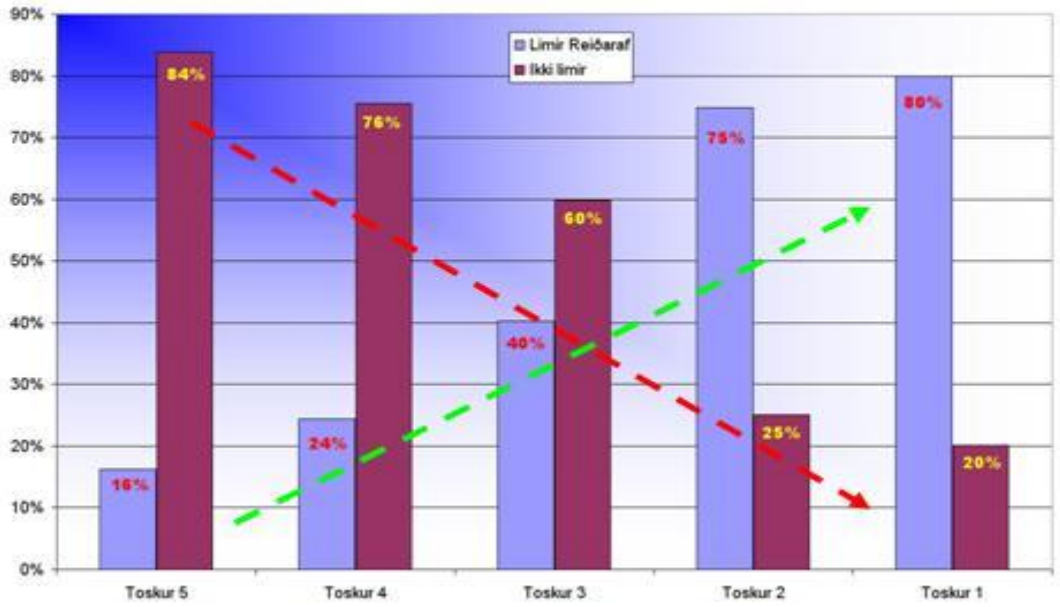


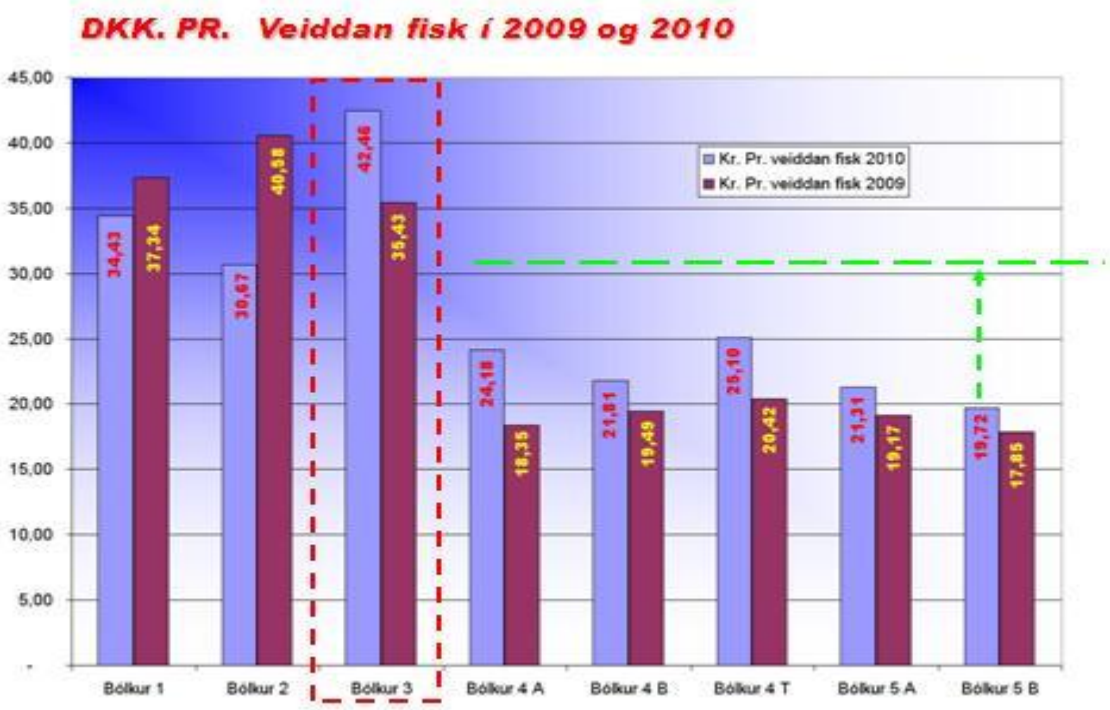
- Ungfiskur (ella toskur undir 2. kg.) liggur jamt uml. 1/3 av veiðuni
- Tað positiva út frá tølunum er, at av tí at býtið millum stoddirnar er so jamt gjøgnum árini, so sær tað ikki út til at árgangir heilt er vekk úr fiskarinum

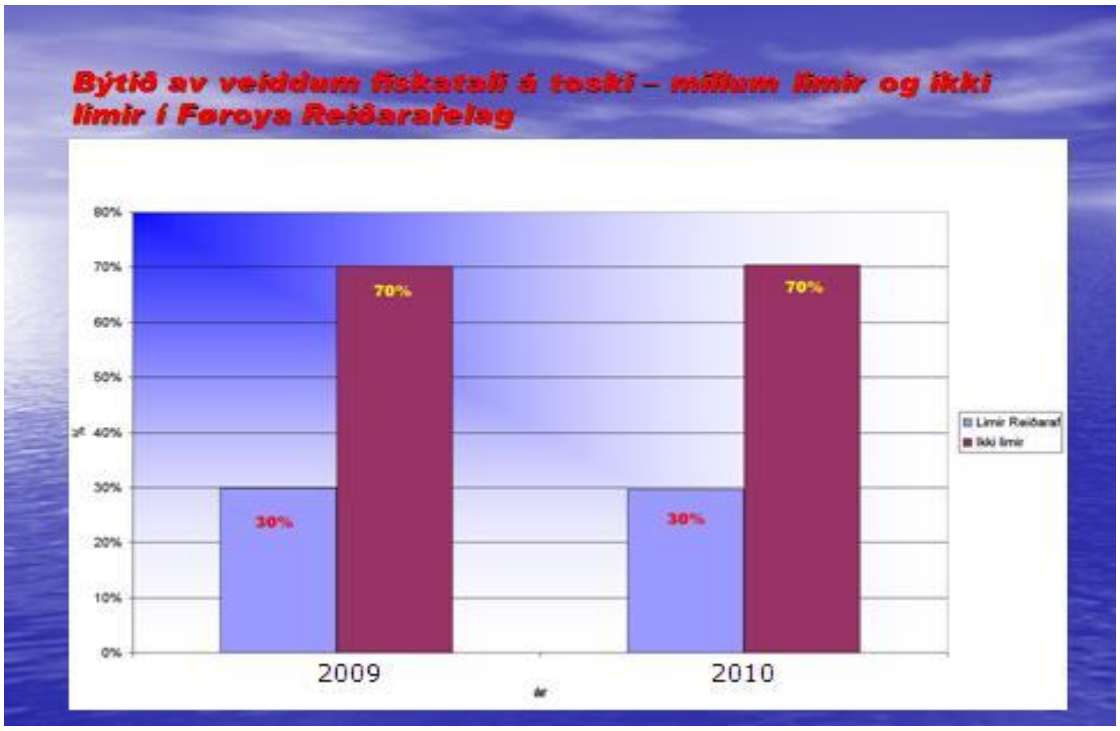
Býtið av veiddum fiskatali á toski – millum limir og ikki limir í Føroya Reiðarafelag

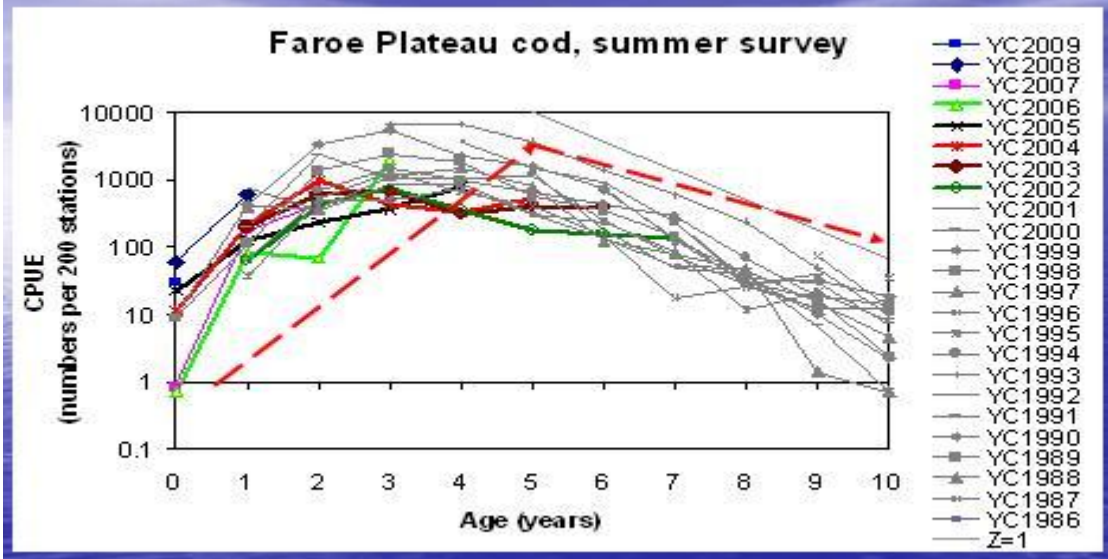



Kr. Pr. veiddan fisk fyri 2009 og hiðartil í 2010
45,00
40,00
35,00
30,00
25,00
20,00
15,00
10,00
5,00
-
Kr. Pr. veiddan fisk 2010
Kr. Pr. veiddan fisk 2009
34,43
37,34
30,67
40,58
42,46
35,43
24,18
18,35
21,81
19,49
25,10
20,42
21,31
19,17
19,72
17,85
Bólkur 1
Bólkur 2
Bólkur 3
Bólkur 4 A
Bólkur 4 B
Bólkur 4 T
Bólkur 5 A
Bólkur 5 B

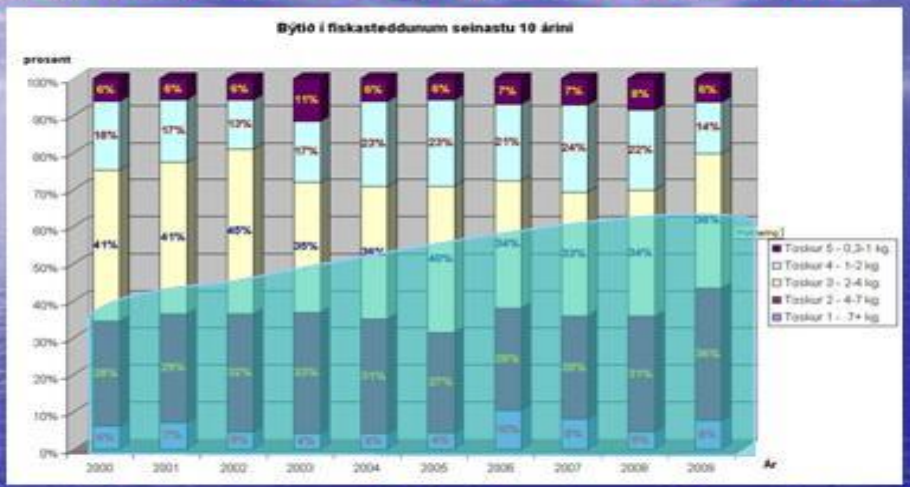

Veiða av ymisku støddunum á fiskatali á toski millum limir og ikki limir í Føroya Reiðarafelag
Veiða fyri ár 2009
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Limir Reiðaraf
Ikki limir
84%
16%
76%
24%
60%
40%
75%
25%
80%
20%
Toskur 5
Toskur 4
Toskur 3
Toskur 2
Toskur 1


DKK. PR. Veiddan fisk í 2009 og 2010
45,00
40,00
35,00
30,00
25,00
20,00
15,00
10,00
5,00
-
Kr. Pr. veiddan fisk 2010
Kr. Pr. veiddan fisk 2009
34,43
37,34
30,67
40,58
42,46
35,43
24,18
18,35
21,81
19,49
25,10
20,42
21,31
19,17
19,72
17,85
Bólkur 1
Bólkur 2
Bólkur 3
Bólkur 4 A
Bólkur 4 B
Bólkur 4 T
Bólkur 5 A
Bólkur 5 B


Býtið av veiddum fiskatali á teski – millum limir og ikki limir í Føroya Reiðarafelag
80%
70%
60%
50%
40%
30%
20%
10%
0%
70%
70%
30%
30%
2009
2010
Limir Reiðaraf
Ikki limir



Toskaveiðan seinastu 10 árini



- *Ungfiskur (ella toskur undir 2. kg.) liggur jamt uml. 1/3 av veiðuni*
- *Tað positiva út frá talunum er, at av ti at býtið millum stoddirnar er so jamt gjegnum árini, so sær tað ikki út til at árgangir heilt er vekk úr fiskarnum*

Takk fyri.
27-01-2011
Búðskapur vs Fiskidagaskipanin
21

18 Management regimes for fisheries with respect to efficiency and responsible fishing

Dominic Rihan, Ireland, ICES-FAO Working Group on Fisheries Technology and Fish Behaviour

LONGLINING – A Responsible Method?

- Dates back to early 1500s
- Criticised by the church in Norway as being too efficient (see Bjordal & Løkkeborg)
- Led to swearing, quarrels, fights & alcohol abuse
- Nowadays 5 - 10 billion hooks per year
- Big upsurge in pelagic longlining since 1992

www.bim.ie

Longlining – A Responsible Method?

Responsibl			Trawl
Size Select			+
Species Se			-
Survival af			+
Ghost fishi			++
Energy Co			--
Benthic Im			-
Fish Qualit			++
Total			2

Sou

www.bim.ie

Current Management Measures

- Specific Detailed Measures limited
- No mention of longlines in EU reg 850/98 (covers basic technical conservation measures)
- Traditional management by
  - TAC & Quotas
  - Effort
  - Closed Areas e.g. species & coral
  - Seasonal & temporal closures
- Hook limits in some areas
- Restrictions on Autoliners in Norway
- Depth limits in others
- Gear marking
- Lost gear (Norway)
- Seabird mitigation measures

www.bim.ie

A Good Fishery!

- Pacific Halibut fishery
- IFQs (transition from derby)
- Single gear fishery
- Technical Measures
  - Closed areas
  - Tori lines mandatory
- Monitoring of bycatch by CCTV
- MSC certified fishery

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A Bad Fishery!

- Patagonian Toothfish
- Southern Ocean & South America
- Widespread IUU (Illegal, Unreported, Unregulated)
- Illegal catches 5 times legal limits
- Decimated stocks
- High bycatch

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And Now the Ugly!

- Bycatch Issues
  - Seabirds
  - Marine Mammals & Reptiles
  - Elasmobranchs
  - VME (Vulnerable Marine Ecosystem) Impacts

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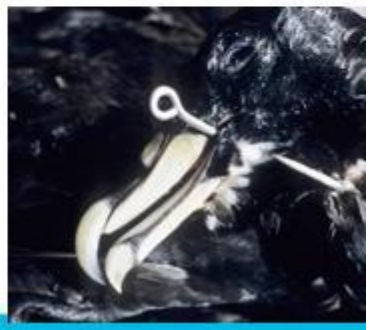
SEABIRDS

- Global Issue
- Considered a threat to 22 species (FAO), mostly albatrosses
- Affects 28 legal LL fisheries from 14 different countries
- FAO IPOA adopted 1999
- Mitigation measures used in many fisheries



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Seabird Mitigation Measures

- Night-setting longlines
- Tori or bird-scaring devices
- Line-setting devices/Baitcasters
- Weighted lines
- Modifying bait condition (Dyed)
- Offal discard modifications
- Strategic distracting discards

www.bim.ie

Marine Mammals & Reptiles

- Turtles & cetaceans
- Mainly pelagic longlines
- 200,000 loggerheads & 50,000 leatherback (2000)
- Estimated mortality 20%
- Cetacean bycatch and depredation
- Widespread issue
- Entanglement, hooking (pilot whales) & ingesting of hooks

www.bim.ie

Marine Mammal & Reptile Mitigation Measures

- Turtles
  - Circle Hooks
  - De-hookers
  - Dyed or Novel Baits
  - Setting depth
  - Decreased soak time
  - Glow rope/Flashing lightsticks
- Cetaceans
  - Reflective buoys
  - Modified ropes
  - Galvanic releases
  - Acoustic deterrents & predator sounds
  - Physical depredation mitigation devices – (PDMD) – Net sleeves protect fish while hauling

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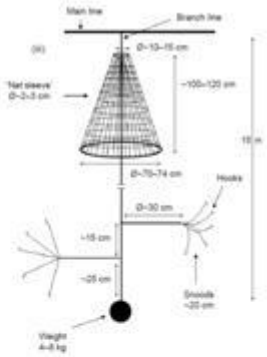
Circle Hook



Net Sleeves

De-hooker

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Elasmobranchs

- Widespread
- Pelagic & demersal longlines
- Bycatch in pelagic gear
- Shark Finning
- Deepwater sharks (Atlantic)

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Elasmobranch Mitigation Measures

- Modified bait
- Depth setting
- Electromagnetic deterrents
- Decreased soak time
- Ban on using wire traces
- Ban on fishing
- Time/area avoidance

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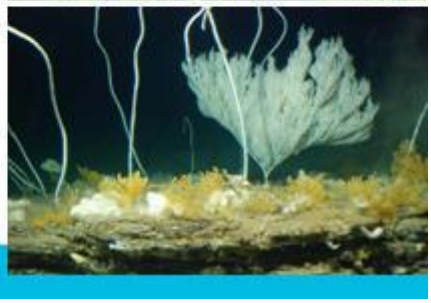
Vulnerable Marine Ecosystems

- UN Resolution 61/105 – action plan to protect high seas ecosystems
- Significant adverse impacts
- Includes longlines
- International Guidelines for the Management of Deepsea fisheries
- Impact Assessment



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Mitigation

- Extensive Closed Areas
- Move out following unexpected encounters
- Requirement for Monitoring & Mitigation plans

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Conclusions

- Is it an Environmentally Friendly Gear?
- On balance - Yes!
- Lack of specific management measures
- Candidate Burden of Proof (BOP) Management e.g. Pacific halibut
- Longlines not immune to bad press e.g. pelagic longlines & toothfish
- Issues regarding seabird, marine mammal & elasmobranch bycatch
- Emerging issues with VME's
- Image must be reckoned with

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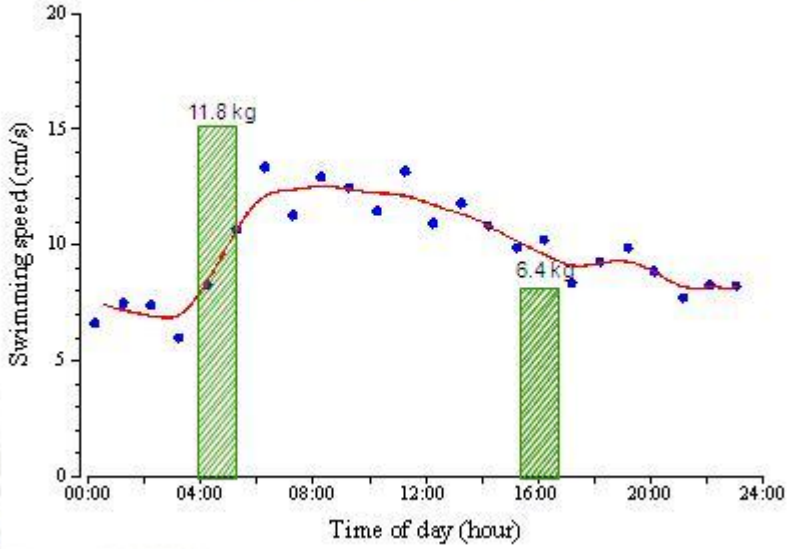
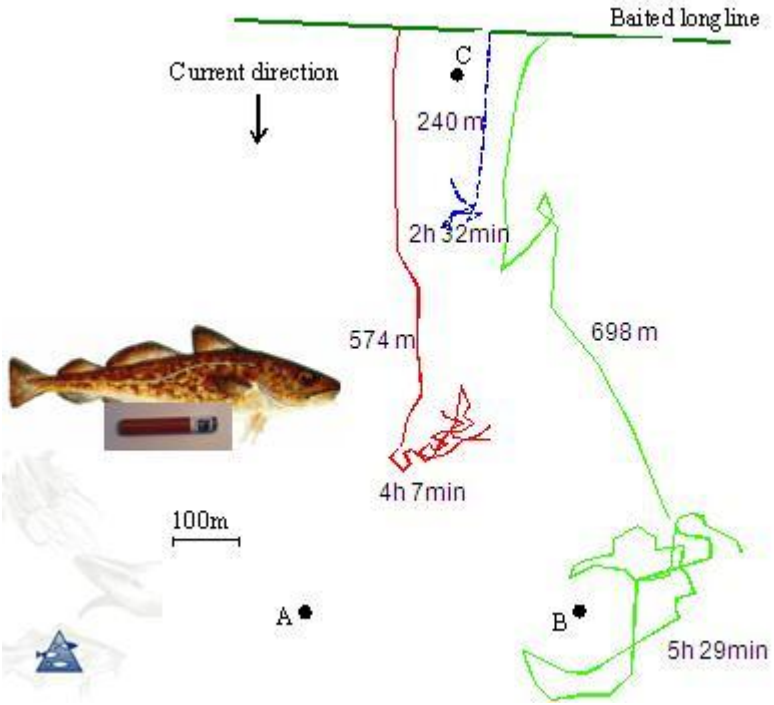
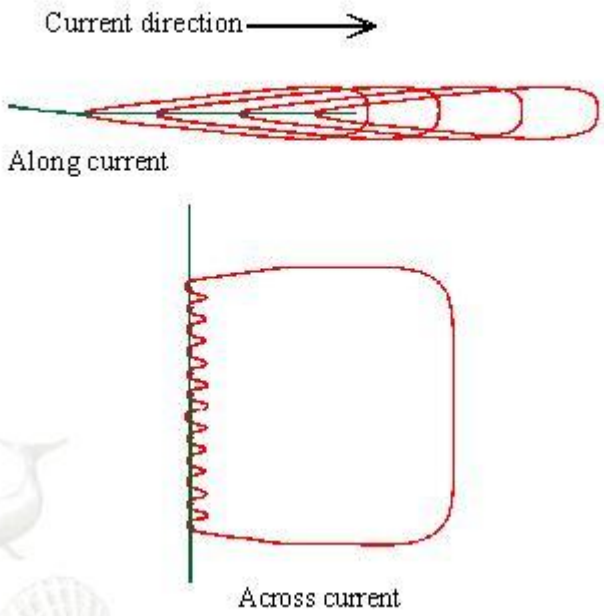
19 How do regulations in general and parameter regulations especially affect longlining?

Svein Løkkeborg, Institute of Marine Research, Norway

Feeding activity



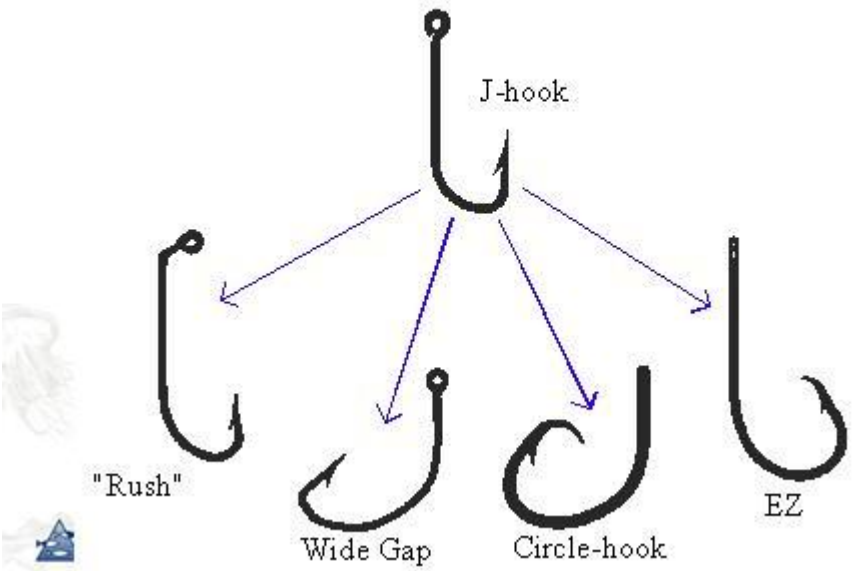




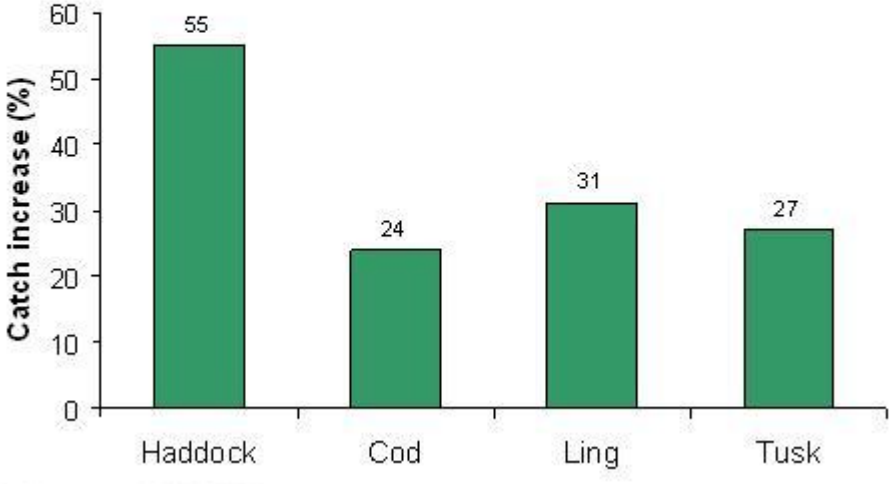
Fish behaviour – Gear operation

- Rhythms in feeding activity
  - Line setting at breakfast time
- Long distance bait location
  - Large spacing between lines
  - Relative long soak time
  - Set lines across the current
- Differences in behaviour
  - Selective fishing

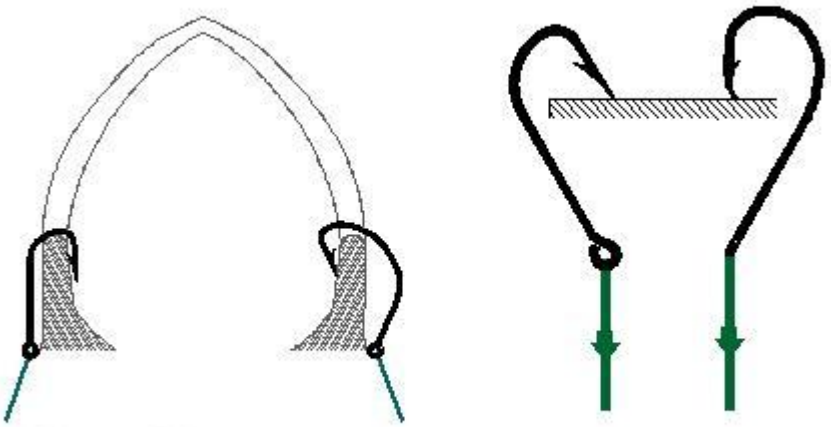
Improved hook design



Improved hook design
EZ-Baiter Circle Hook

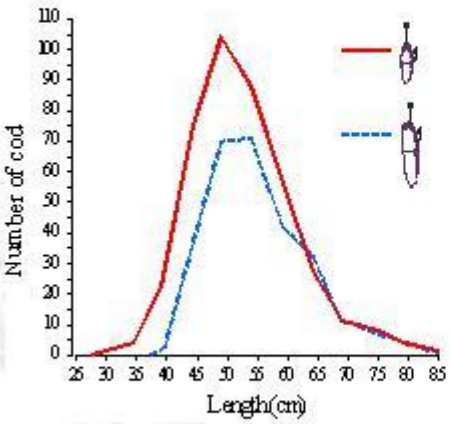


Improved hook design

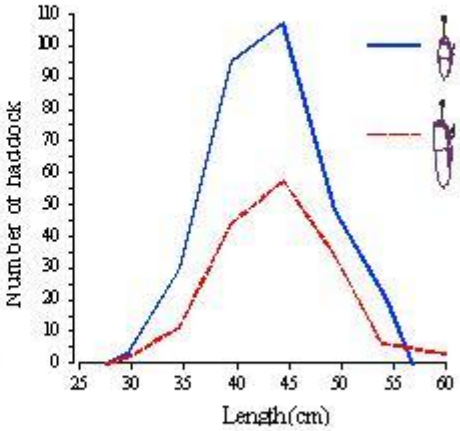


And, smaller hooks are more efficient

Cod



Haddock



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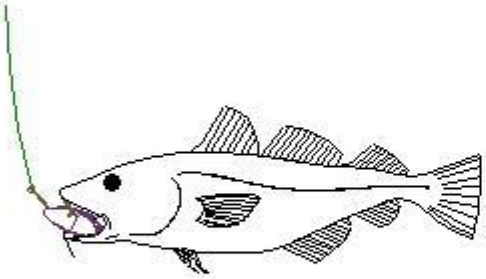
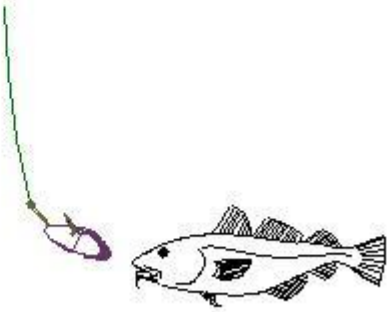
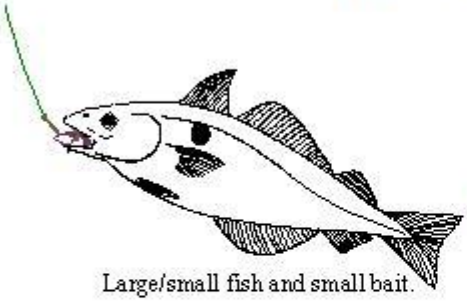


Large fish and large bait.

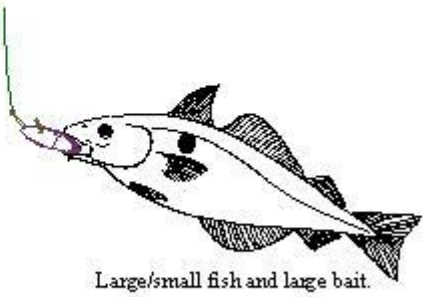


Small fish and large bait.

Haddock

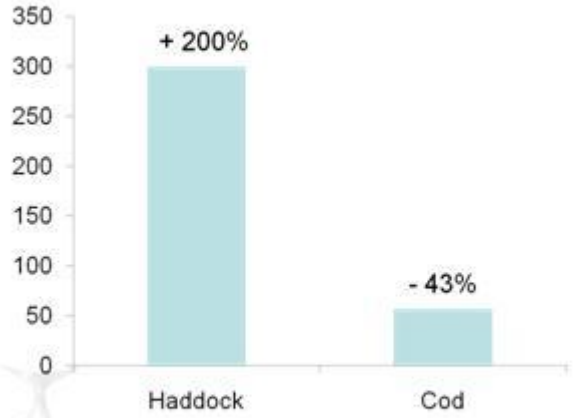


Large/small fish and small bait.



Large/small fish and large bait.

Alternative bait - Norbait

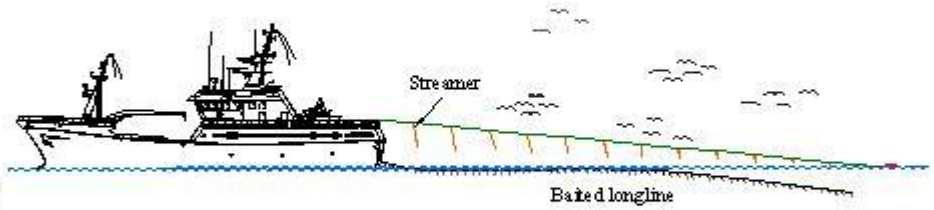


Species selective baits

Seabird bycatch - Potential solutions

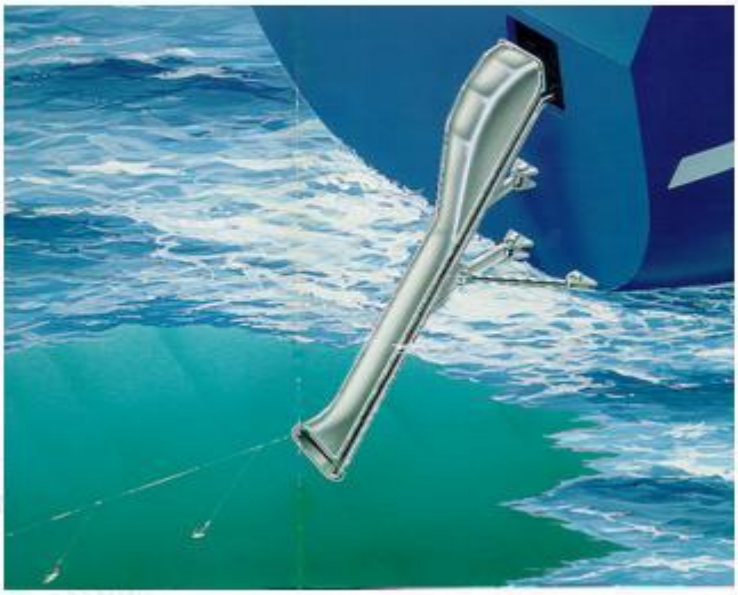
- Bird-scaring streamer line
- Underwater setting funnel
- Line shooter
- Weighted longline
- Night setting
- Strategic offal discharge

Bird-scaring line

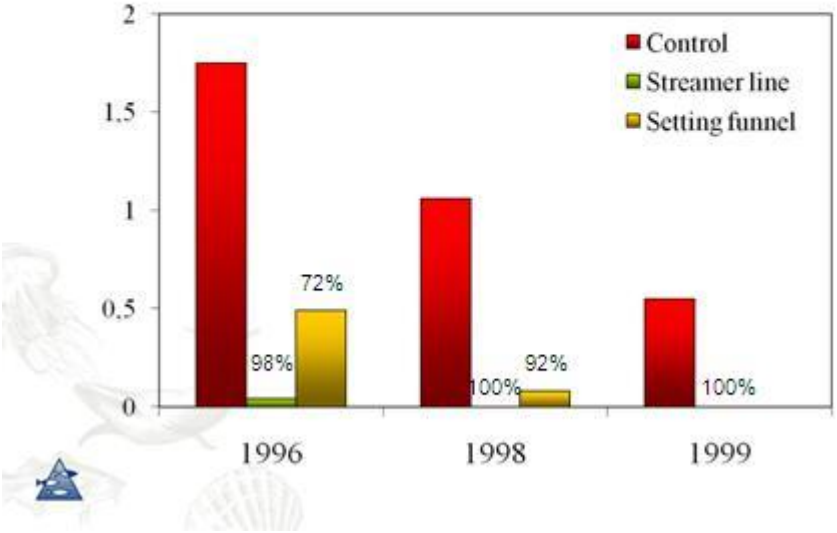


Deters birds from taking baited hooks

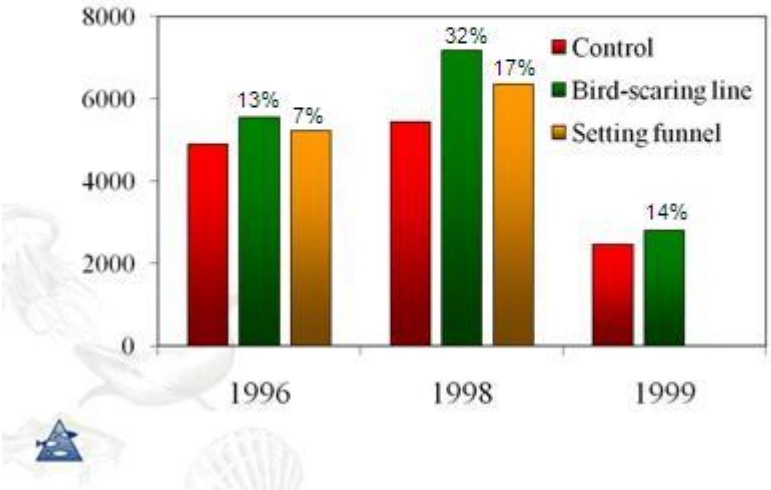
Setting Funnel



Seabirds Bycatch per 1000 hooks



Total Catches of Target Fish



The streamer line *scares* seabirds

Potential catch increases

• New hooks	+ 20-50%
• Smaller hook	+ 20%
• Smaller bait, cod	+ 20-50%
• Smaller bait, haddock	+ 30-120%
• Swivel	+ 10%
• Monofilament mainline	+ 100%
• Monofilament gangion	+ 10%
• Setting direction	+100%
• Setting time	essential
• Bird deterrents	+ 30%
• Autoline	revolution

Science gives better catches

20 What are the effects of stimulating longline fisheries with special reference to regional development?

Jahn Petter Johnsen, BFE, University of Tromsø

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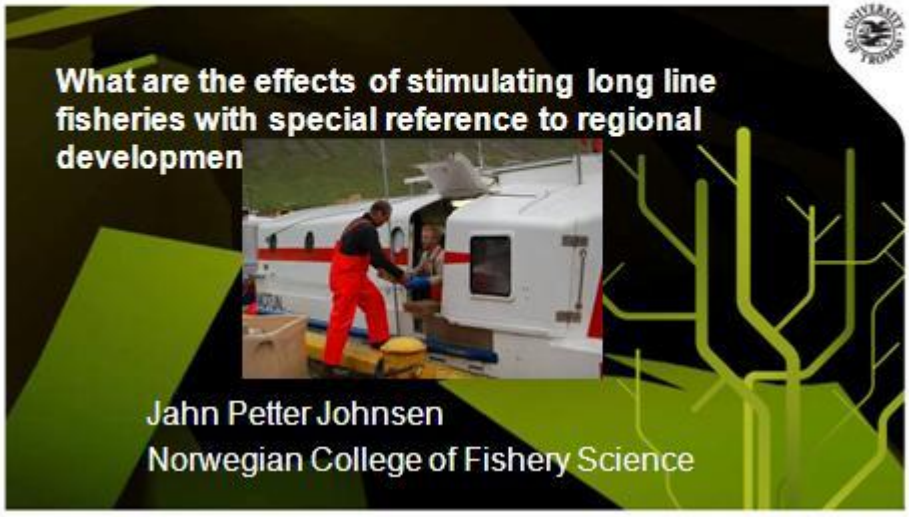

Conclusion

- The "longlining industry" (fishers, processing, gear- and vessel suppliers) will in the future have to provide information and knowledge to communicate to authorities and public that a positive development in this industry contributes to responsible fishing, fulfill EAF and good governance principles
- How:
  - Develop a strategic plan and action program for the industry
- Why:
  - Communication of interest
  - To influence structural and management policy
  - To influence research focus and research fund allocations
  - To allocate own resources in the same directions
  - Point to system weaknesses and knowledge gaps

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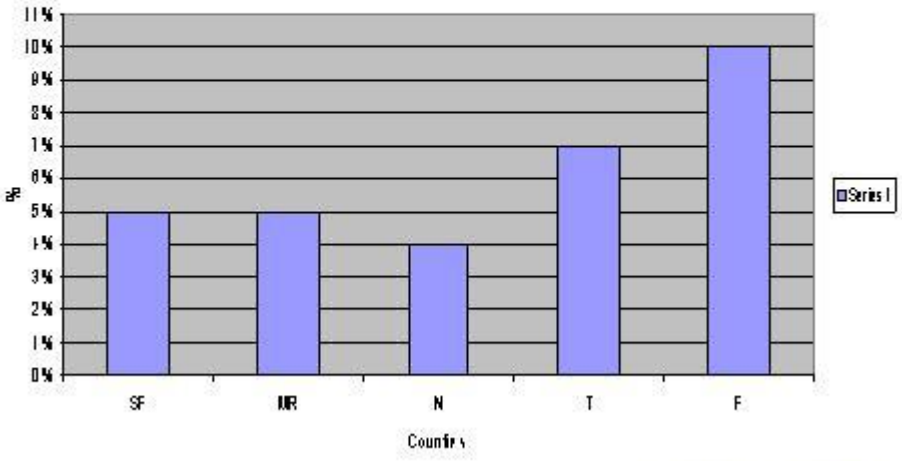
Fisheries (capture) and aquaculture share of market oriented county gross product.
Source: Statistics Norway



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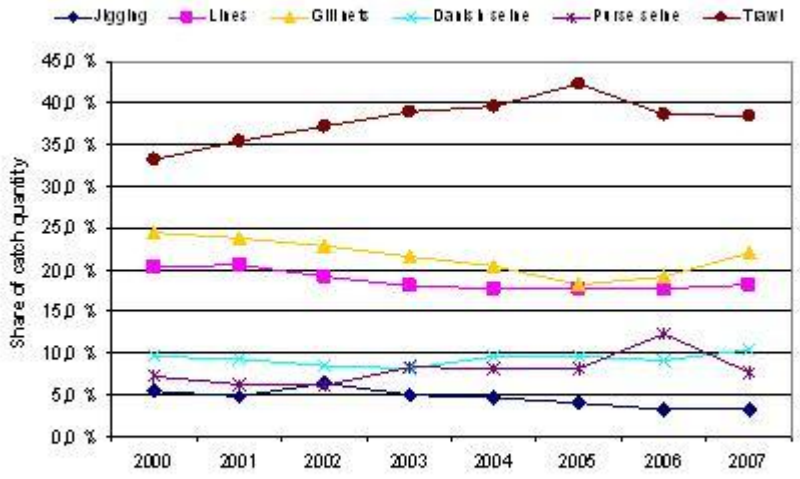

Source: Edgar Henriksen, SUROFI,
Norges Råfisklag (NRFL)

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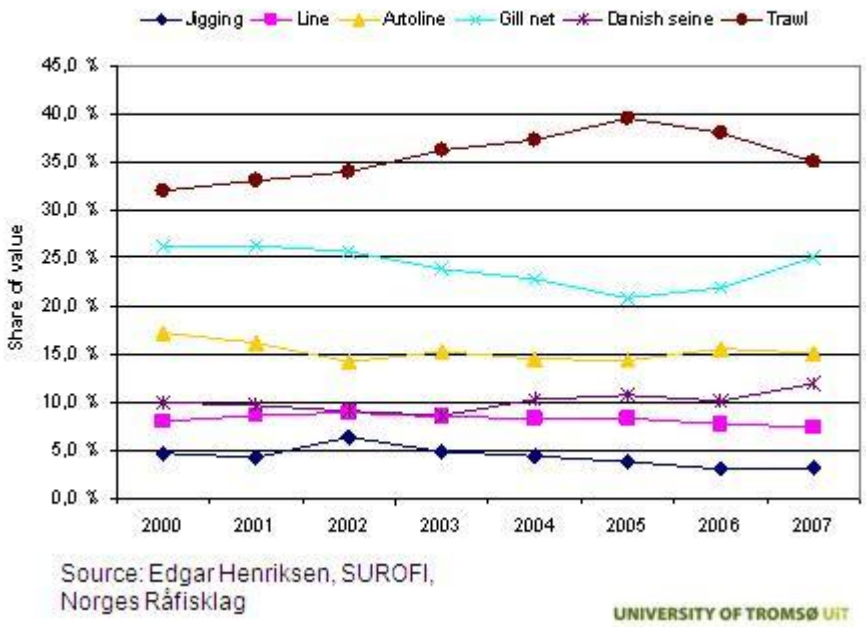
Jigging
Line
Autoline
Gill net
Danish seine
Trawl
45,0 %
40,0 %
35,0 %
30,0 %
25,0 %
20,0 %
15,0 %
10,0 %
5,0 %
0,0 %
Share of value
2000
2001
2002
2003
2004
2005
2006
2007
Source: Edgar Henriksen, SUROFI, Norges Råfisklag
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Share of catches Coastal longline Finnmark – Nordmøre (NRFL) –potential for increase?

	2008	2009
East-Finnmark	11 %	14 %
West-Finnmark	4 %	4 %
Troms	4 %	3 %
Vesterålen	6 %	6 %
Lofoten/Salten	16 %	14 %
Øvrig Nordland	3 %	3 %
Nord-Trøndelag	1 %	2 %
Sør-Trøndelag	5 %	9 %
Nord-Møre	1 %	5 %

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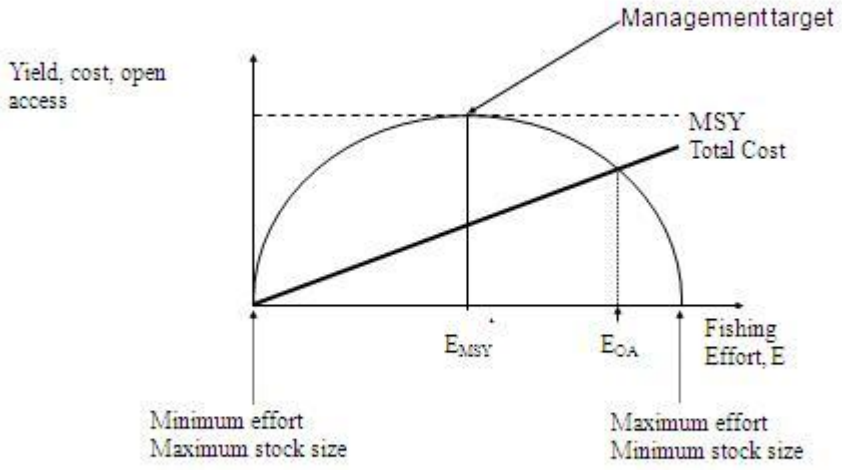
The political shift - 1990 …..

- From fisheries development policy
  - Focus on fisheries and fishing communities development - the fisher in focus
  - Management of fishermen – society relations
  - Regional policy success
- to resource management policy
  - Focus on sustainable use of resources
  - Management of fishermen – fish resource relations – fishermen's' conduct and behavior at sea
  - Reduce overcapacity
  - Different regimes for coastal and offshore fleet
  - Offshore in principle more specialized vessels

Shift in focus from yield and target orientation



Gordon-Schaefer Modellen

To ecosystem approach to fisheries management (EAF) principles

- Limit the impact from fisheries on the ecosystem
- Responsible fisheries
- More focus on biomass removed than on single species
- Maintain relationship between species
- Measures compatible across the entire distribution of the resource
- Precaution in decision-making and action
- Governance ensure ecosystem (both human and non-human) well-being and equity
- Internalise costs in the ecosystem
- EAF is implemented in European and Nordic fisheries

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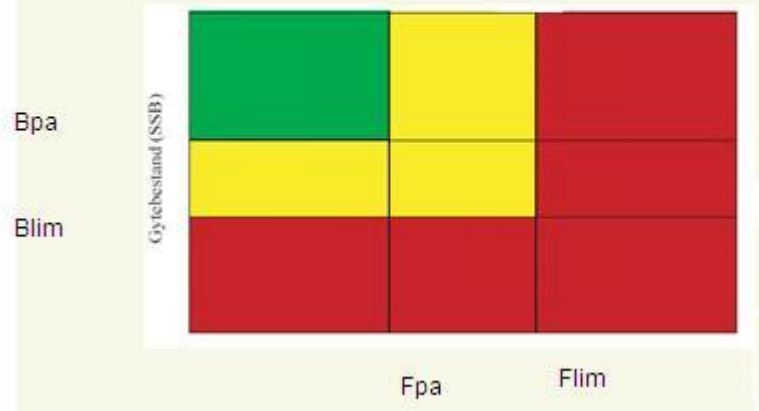
Implementation: Harvest control rules and indicator based management



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Effects

- From Government to Governance
  - Management through partnership between government and organized stakeholders
  - Government withdraw from detailed regulations
  - Towards a more responsive and adaptive system – with heavy responsibility on the industry to prove responsibility
  - Industry can produce data that is important for stock and ecosystem monitoring – research system improvement
- Micromanagement where it belongs, namely in the business, while the management system concentrates on the more general framework
- Focus on process and fishing conduct
- Certification processes and Eco labelling

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- The general framework may vary between different countries.
- F ex the Norwegian corporative system with a close cooperation between the fishermen and the state is a precondition that not only has to be taken into account, but which is actually in line with good governance principles

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The Norwegian management policy

- Success
  - resource management in terms of controlling fishing mortality
  - capacity reduction
  - allocation policy
  - legitimate, fair, transparent and participant system
- Problems
  - still structural problems in the fleet
  - recruitment
  - cod focus
  - detailed, costly and complicated system
  - heavy bureaucracy
  - Limitations on possibilities to integrate in the value chain

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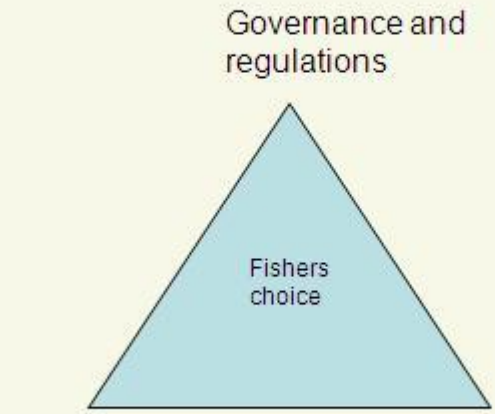
Fishermen's choice



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Choice of gear

- Offshore fleet is specialized
  - Institutionalized in the management system
- In the coastal fleet choice of gear is in principle free, but will be impacted by
  - management and regulation policy
  - market conditions
  - customs
  - fish abundance and availability
  - costs
  - More liberal regime in the future?

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Fleet structuring consequences

- In a fleet downsizing process - there will be less job positions available, surplus of labour
- Quota transactions and push towards increased efficiency and less crew – increased costs
- Recruitment of new persons can stop for a period, which in the longer run can result in:
  - Loss of a "generation" of recruits (as mentioned yesterday)
- Offshore fleet recruit from a national labour market and has a more national landing pattern, the effects of changes are dispersed to the whole society
- Where the coastal fleet have a more community based or regional recruitment pattern, fishing and landing pattern, effects will be more local or regional
- Large quantities of haddock and saithe are not fished - Undercapacity or an organizational problem?

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Challenges (in addition to what has been presented these days)

- General:
  - Maintain local fishing culture and knowledge
  - Increase value and income
  - Increase cooperation land-sea – new forms of organization
- Offshore
  - Control cost development
  - Recruit crew
- Coastal long lining
  - costs
  - recruitment of crew
  - recruitment of baiters
  - change to auto line
  - technological development – automatic land based baiting

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How to stimulate?

- Support technological development project
- Regulation - quota/by catch regimes
- Closer cooperation processing – fishing towards niches – freedom to collaborate, sharing of profits, but loss of flexibility
- Stronger integration - however strongly restricted of the institutional arrangements in Norwegian fisheries
- Modification of the institutional arrangements

- Proactive: The longlining industry with partners:
- Create a long lining forum and develop a strategic plan 2010 - 20 for development and management of the industry.
- Define a five year action program
- Use it to forward interests and to feed the authorities with information and knowledge about the challenges and the perspectives for this industry

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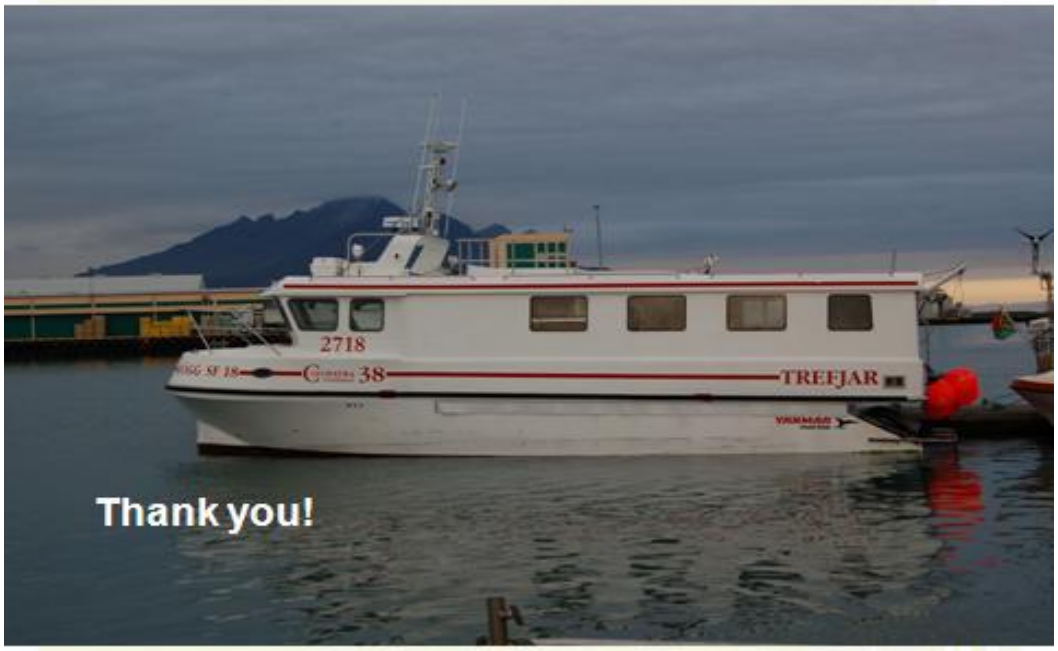

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21 Summing up

Edgar Henriksen

Strategic plan

- Is there any interest in an international cooperative programme to promote long lining?
  - Industry alone or in cooperation with the scientific community?
- International scientific network
  - A good idea and how do we involve the industry?

Right price for high quality

- How should management of stocks and fisheries be designed to gain value?
  - Were are the best practices found?
- Organising of the first hand marked
  - A Norwegian problem only?
- Marketing of high quality fish or line caught fish.
  - LCA and tracking

Reducing cost

- Increasing catch pr hook
  - Gear parameters
  - Reduce loss of fish during hauling
  - Bait
    - More effective and selective
    - Using other species or waste
    - Attractants?
- More hooks in water or/and more catch per hook
  - Improving auto line systems
  - Effective on shore baiting
- More cost efficient vessels

Preserving quality

- Management again
- New or improved methods for fish handling
- Better educated fishermen or improving pride in profession?
- Logistics – maintaining quality

Improving working conditions

- Mechanized operations
- Sheltered working position during hauling
- Shorter hours

Benchmarking

- Comparing the situation in the long lining industry in the participating countries
  - Fleet efficiency
    - Fleet groups
      - Catch per hook
      - Size and species selectivity
  - Macro numbers
    - Revenues
    - Cost
    - Profits
  - "Bottlenecks"
  - Raw material quality
    - Proportions of fish to high value products
    - Vessel size

Bait

- Need to find baits that:
  - Reduce the use of valuable fish
  - Are size and species selective
  - Reduce costs
- Preliminary study
  - Revue paper
  - Planning international cooperation
- International cooperation on bait development

22 List of participants

	Name	Company	Country	sector	
1	Jóhannus M. Olsen	Faroese longliners organisation	Faroe Islands	Fishing	
2	Bjarti Thomasen	Havstovan	Faroe Islands	Research	
3	Páll Gregersen	P/F PRG Export	Faroe Islands	Fishing/processing	
4	Alfred ER Jakobsen	KNAPK	Greenland	Fishing	
5	Jens Kielsen	KNAPK	Greenland	Fishing	
6	Niels Nielsen	KNAPK	Greenland	Fishing	
7	Robert Moeller	Royal Greenland	Greenland	Fishing/processing	
8	Páll Gunnar Pálsson	AVS	Iceland	Funding	
9	Hafsteinn Ólafsson	Beitir	Iceland	Fishing gear	
10	Þóra Bragadóttir	Beitir	Iceland	Fishing gear	
11	Sveinbjörn Jónsson	Bernskan ehf.	Iceland	Fishing gear	
~~12~~	~~Jón Kristjánsson~~	~~Fisheries Scientist - www.fiski.com~~	~~Iceland~~	~~Research/consultant~~	Did not show up at the workshop
~~13~~	~~Nanna Bára Maríasdóttir~~	~~Fisktækniskólinn í Grindavík~~	~~Iceland~~	~~Education~~	Did not show up at the workshop
14	Amanda Garner	Innovation Center Iceland	Iceland	Research/funding	
15	Daníel Þórarinsson	Isfell	Iceland	Fishing gear	
16	Óðinn Gestsson	Islandssaga	Iceland	Fishing/processing	
~~17~~	~~Haraldur Arnar Einarsson~~	~~Marine Research Institute~~	~~Iceland~~	~~Research~~	Did not show up at the workshop
18	Ólafur Arnar Ingólfsson	Marine Research Institute	Iceland	Research	
19	Ásbjörn Jónsson	Matís	Iceland	Research	
20	Björn Margeirsson	Matís	Iceland	Research	
21	Hélène Liette Lauzon	Matís	Iceland	Research	
22	Jónas R. Viðarsson	Matís	Iceland	Research	
23	Kári Pálsson	Matís	Iceland	Research	
24	Ólafur Ögmundarson	Matís	Iceland	Research	

25	Sigríður Sigurðardóttir	Matís	Iceland	Research
26	Sigurjón Arason	Matís	Iceland	Research
27	Sveinn Margeirsson	Matís	Iceland	Research
28	Frímann A. Sturluson	Navis	Iceland	Vessel design
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