

Collaboration between the Institute of Marine Research, the fishing fleet and the fishing industry

Leif Nøttestad
Principal scientist (PhD)
Institute of Marine Research
Bergen, Norway



▶ Chartered vessels

- Very important supplement to our own research vessels
- More than 700 days at sea, about 2500 person days each year
- Collecting an array of scientific data from
 - comprehensive ecosystem surveys
 - pelagic fish surveys
 - whale counting
 - gear technology development

IMR charter some of the most advanced fishing vessels in Norway each summer to map the distribution and estimate abundance of mackerel in the Northeast Atlantic.



Why is this important?

- Norway through IMR has long traditions in collaborating with the fishing fleet.
- One month together at sea onboard a chartered fishing vessel do something with both fishermen and scientists.
- Foster mutual respect, understanding and common ownership between scientists and fishermen
- Norwegian fishermen have never been more interested in and knowledgeable about fisheries science than today.
- When fishermen disagree with science results, they know they have to improve existing science and involve themselves in new science to be able to influence future scientific progress, advice and management of marine resources.
- Fisheries management today is predominantly science based. The degree of freedom managers used to have to decide levels of quotas are now to a large extent limited by the scientific advice levels from e.g. ICES, ICCAT.
- Managers cannot set aside (dismiss) the scientific advice anymore or at least very seldom.



Scientific collaboration at sea

- International ecosystem surveys
- International mackerel surveys
- International herring surveys
- International blue whiting surveys
- National capelin surveys
- National sand lance surveys
- National whale counting surveys
- Antarctic krill studies in the Southern Ocean
- Acoustic technology (sonar and echosounder) surveys
- Fish capture development surveys
- Purse seine and pelagic trawling experiments
- Unaccounted mortality experiments during purse seining for herring and mackerel



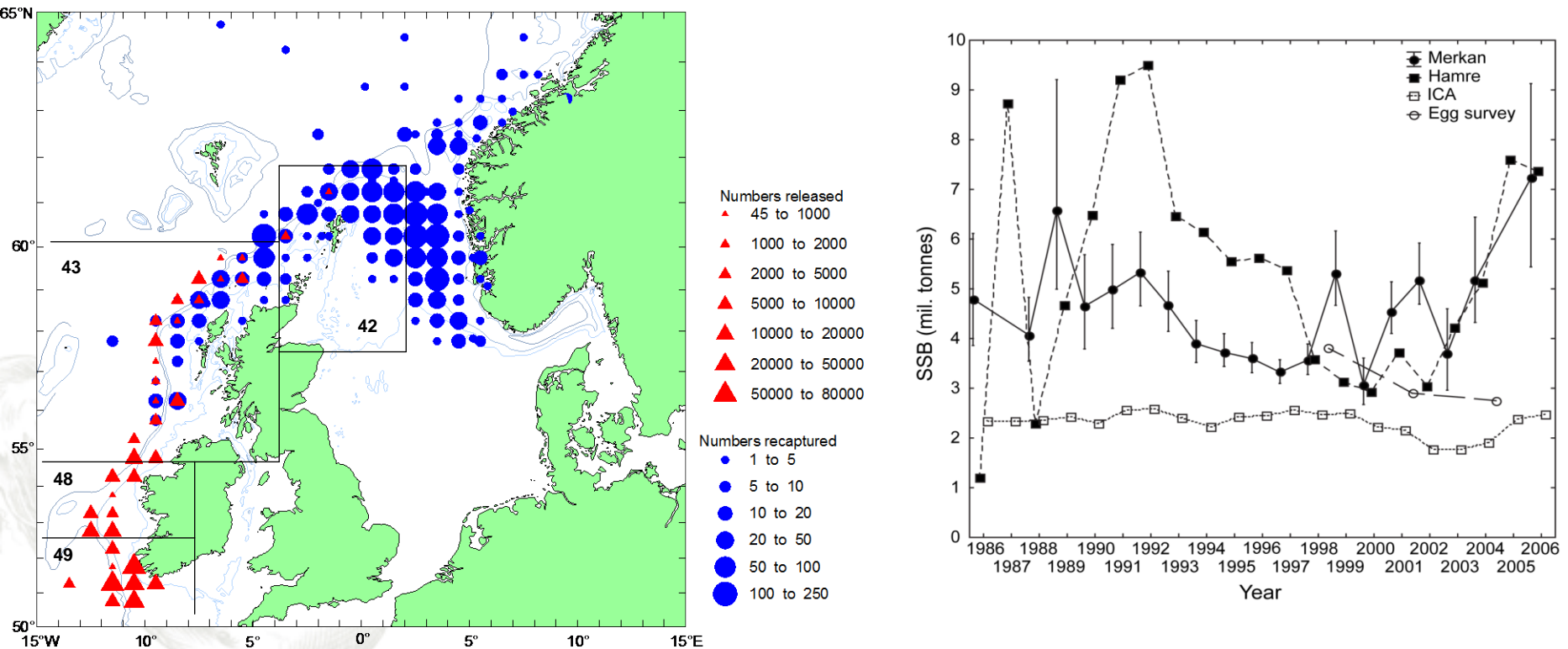
Practical examples

- Mackerel
- Herring



Tagging and recapture methodology for mackerel

Estimation from the steel tags has indicated different development in the abundance of mackerel compared to official ICES results
ICES has now accepted the data and results (1977-2006) in benchmark 2014



Tenningen, M., A. Slotte, D. Skagen 2011. Abundance estimation of Northeast Atlantic mackerel based on tag recapture data – A useful tool for stock assessment? Fisheries Research 107:68-74



New Radio-Frequency Identification (RFID) – tagging project

The Norwegian Seafood Research Fund (FHF) and Norges Sildesalgslag have contributed 3.2 mill. NOK for developing this project.

The time series started in 2011 and will be evaluated in the ICES assessment after 5 years (intermediate benchmark mackerel 2016/2017)

From 2011 to 2014 were 160018 mackerel RFID tagged



Automatic

- Date
- Time
- GPS position
- Tagging code



Manuel

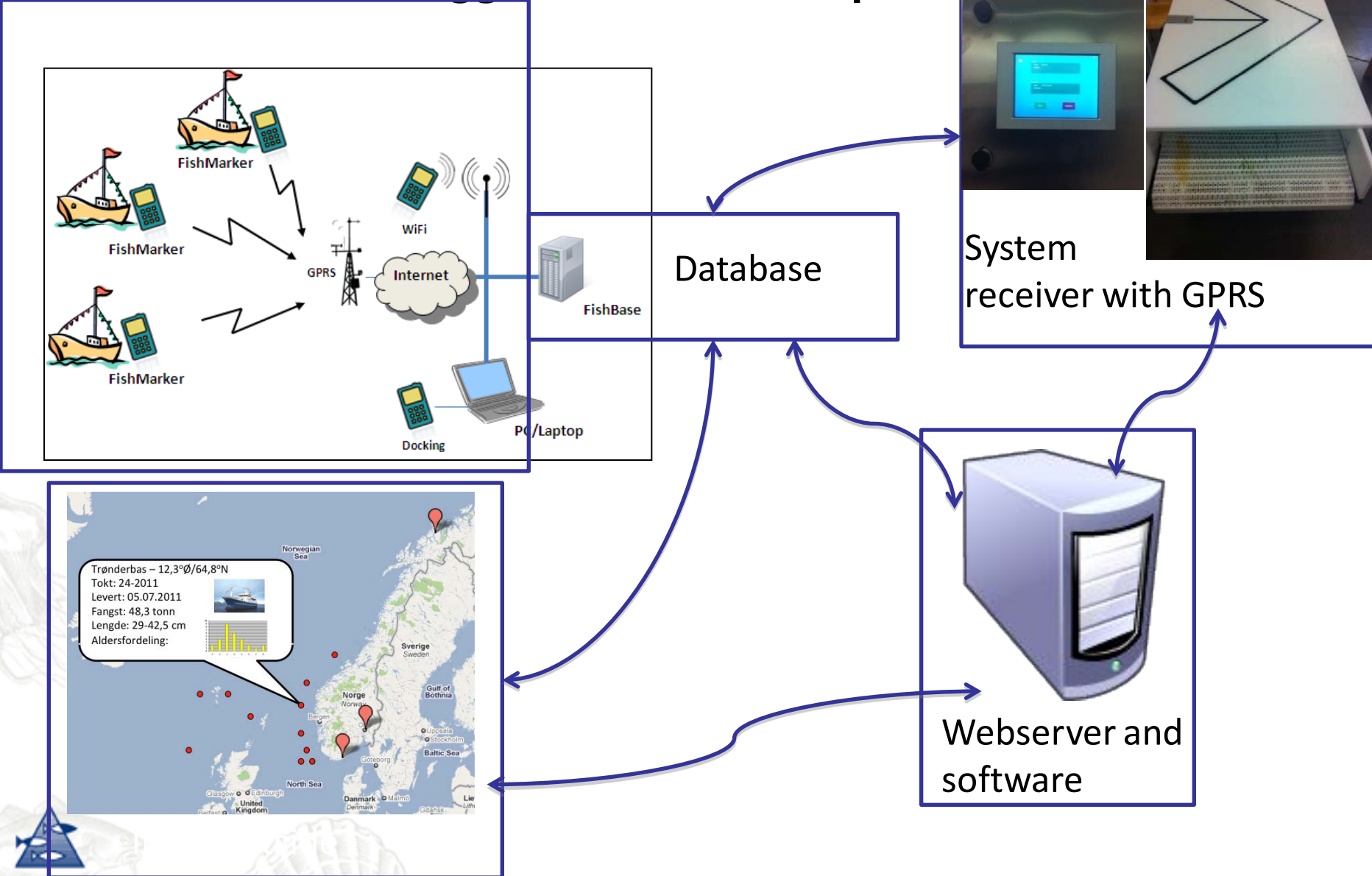
- Tagging
- Length measurements

IP67-Nomade PDAs

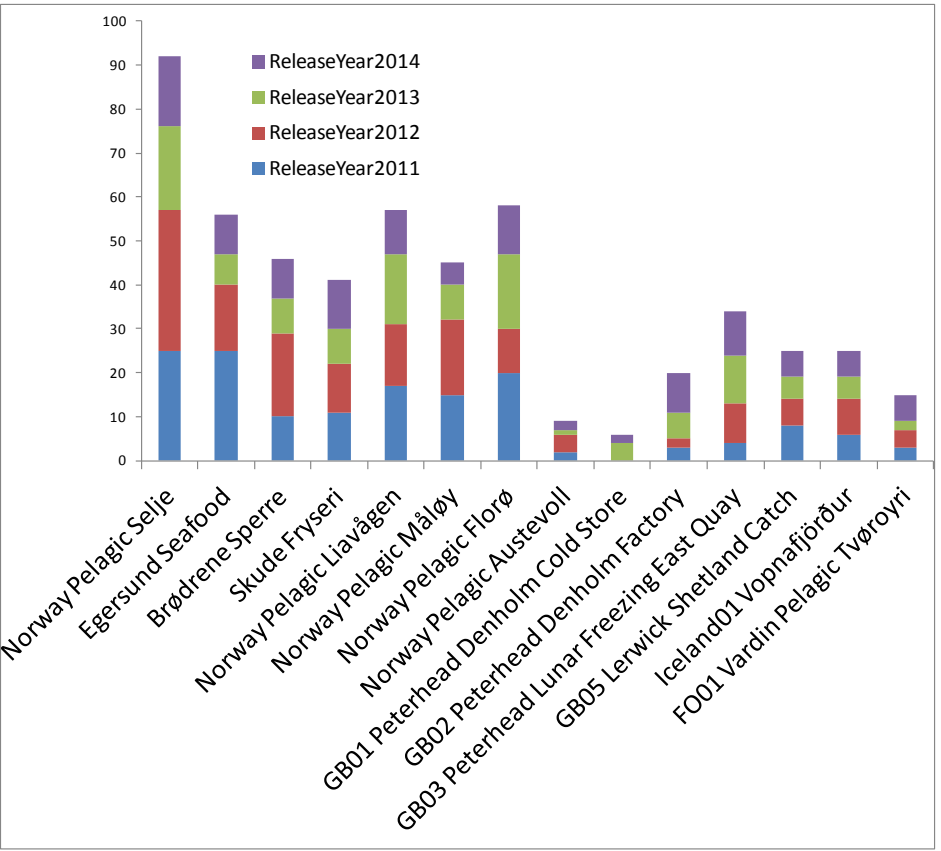
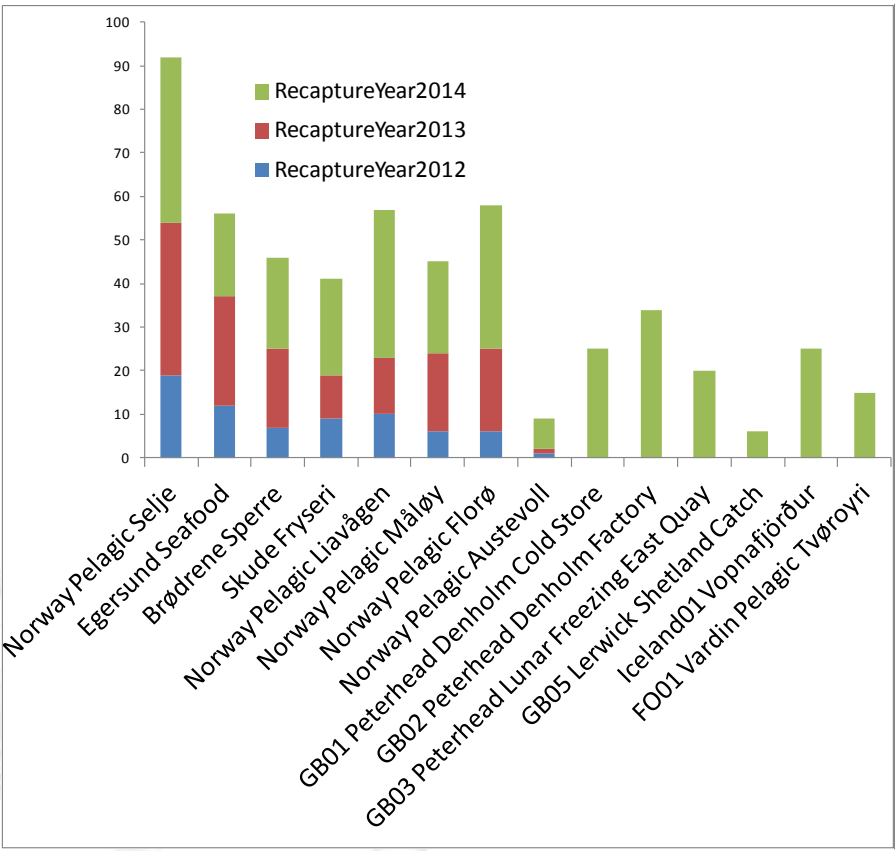


RFID-recaptures of tags from factories automatically updated in a database at IMR in Bergen.

2012-2014: 528 RFID tagged mackerel recapture

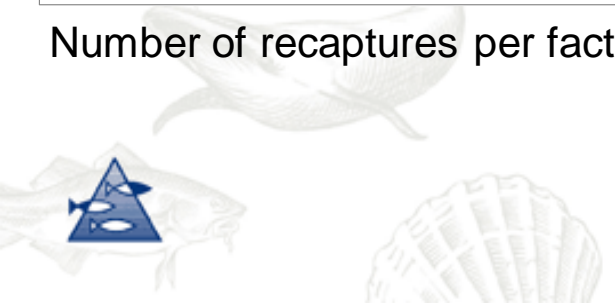


Recaptures from 8 Norwegian factories, also from fish processing factories in Scotland, Shetland, Faroe Islands and Iceland in 2015

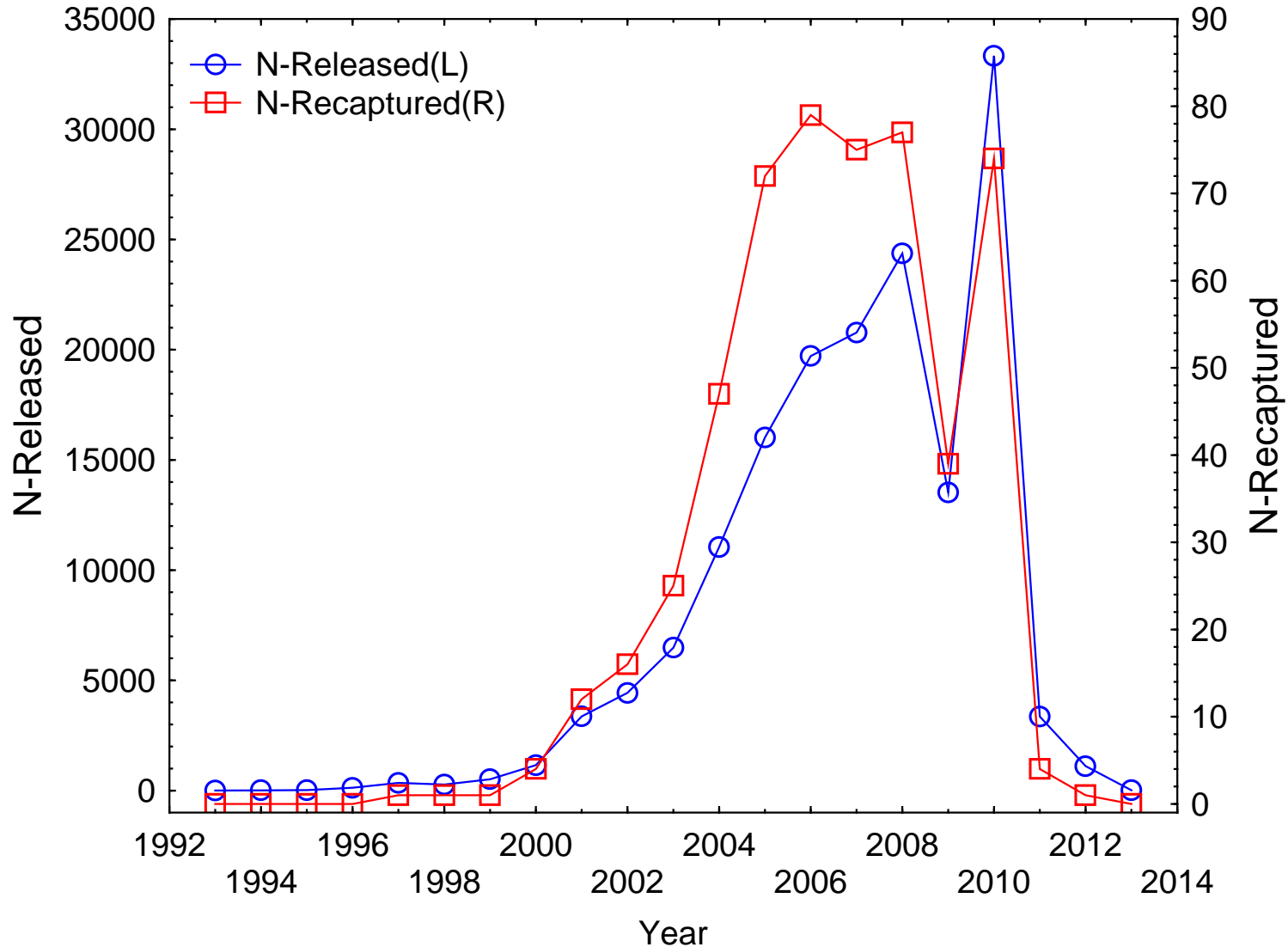


Number of recaptures per factory per year

Number of recaptures per factory and year of release.



Consistent relations between number of fish tagged and released and number of mackerel recaptured for each year class



Releases recaptures are analysed per year class

Scientific survey using chartered fishing vessels on the spawning grounds for Norwegian spring-spawning herring

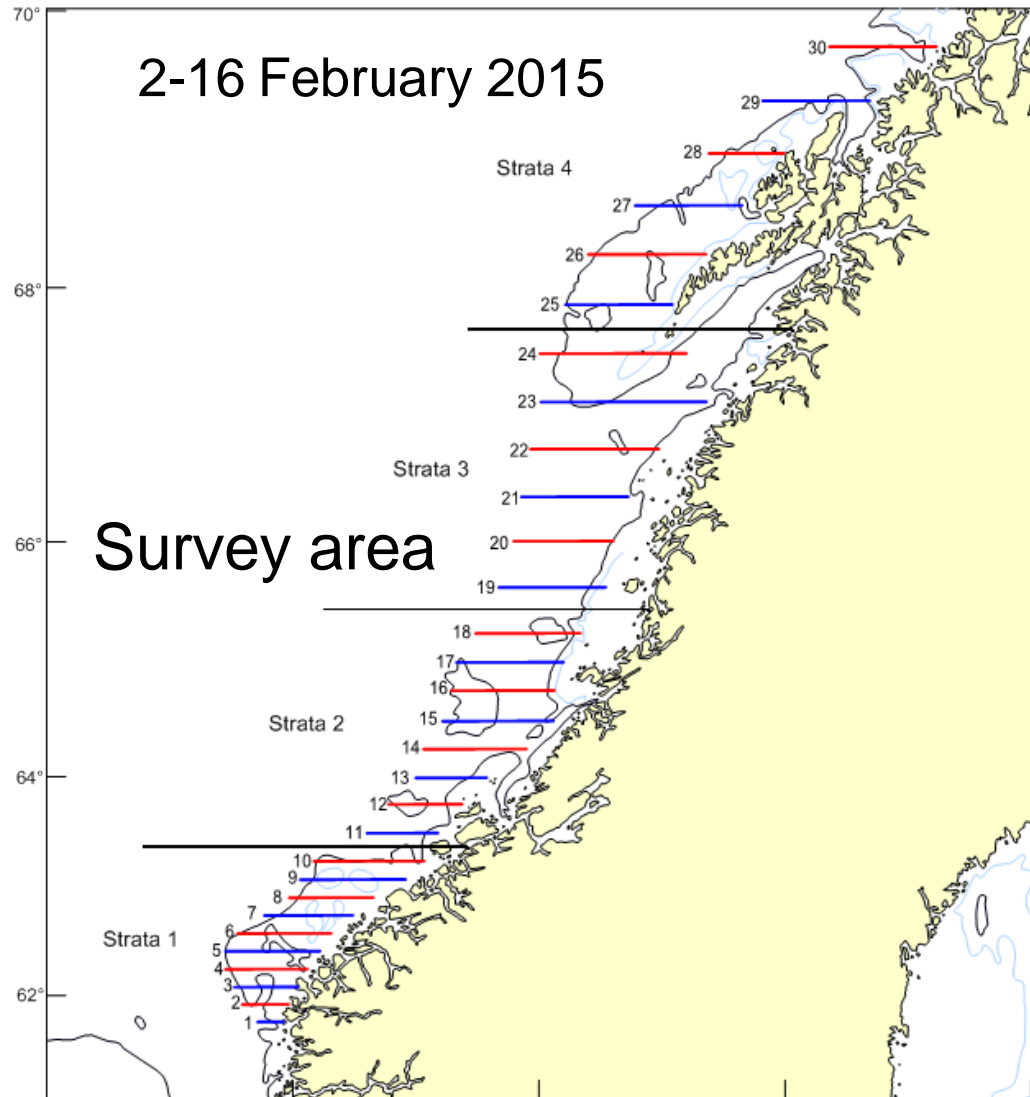
Nybo



Inger Hildur



Ligrunn



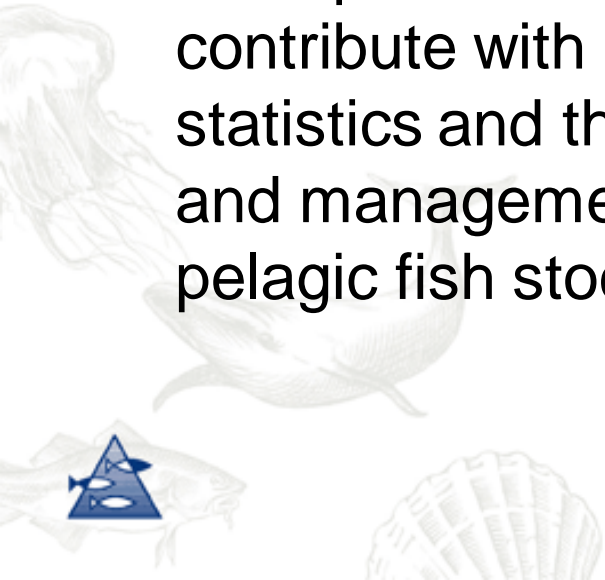
Scientific collaboration on land

- Automatic detector devices for tagged mackerel and other pelagic fish in Norway and several other countries
- Biological samples from fish processing plants
- Selected trawl and purse seine samples of pelagic fish for catch statistics in ICES



Coordination and collaboration in fish sampling

- Norges Sildesalgslag, Fiskebåt, Pelagisk Forening including fishing vessel owners and many fish factories and processing plants along the coast of Norway agreed in 2015 to closely collaborate with IMR in systematic fish sampling from commercial catches.
- All important fleet groups on pelagic fish stocks will contribute with the aim to improve the age-structured catch statistics and thereby contribute to better stock assessment and management of our most abundant and valuable pelagic fish stocks.





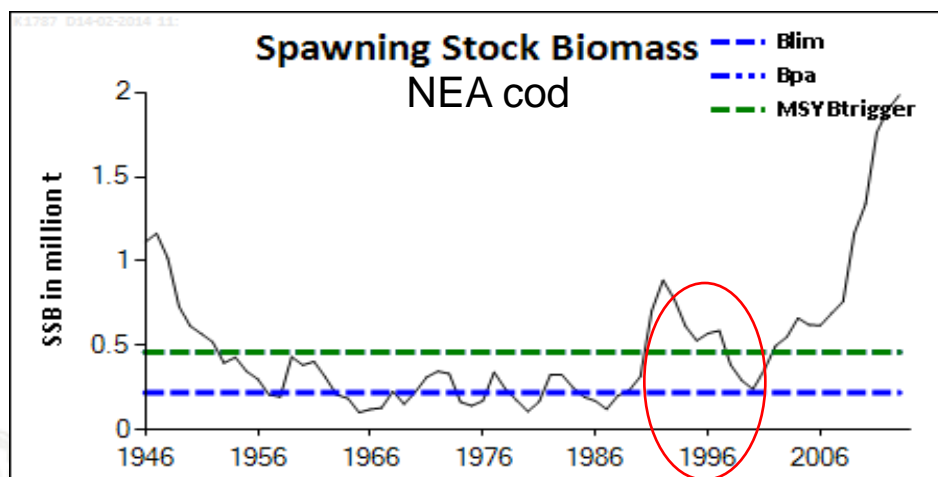
The Norwegian Reference Fleet

A trustful cooperation between fishermen and scientists



HAVFORSKNINGSINSTITUTTET
INSTITUTE OF MARINE RESEARCH

History behind the program



ICES Stock Assessment Database, 2013, ICES Copenhagen

? Quality of the ICES assessments

? Utilization of fisheries data for these stocks.

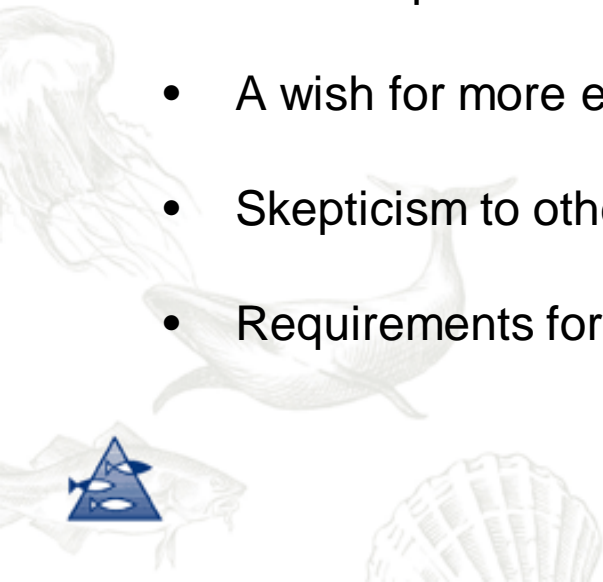
1996 and 2000

- Expert groups of fisheries researchers, managers and industry representatives were given the task of seeing how to improve the data source for stock assessments.
 - The groups concluded that IMR needed to make use of more fishery dependent data in the stock assessments.



What was the fishermen's incentive?

- Increasingly restrictive management regulations in the 1990s.
- Disagreement on quota advice (as normal!).
- The fishermen felt their opinions were not been listened to.
- A strong wish by fishermen to contribute with data and information that could improve scientific assessments.
- A wish for more effective and comprehensive data collection.
- Skepticism to other data collection methods (e.g. observers).
- Requirements for eco-labeling



What did the scientists want?

- Fill the holes in existing assessment input data with more samples from the commercial fisheries.
- Data on non or less exploited species that were not sufficiently covered by IMR's own surveys.
- Estimates for discards and bycatch of commercial and non-target species.
- Estimates for bycatch of seabirds and sea-mammals.
- Keep track on technical developments and catchability in the fisheries.
- Better communication between fishermen and scientists
- A platform of vessels with trained personnel for sampling when required.



Today's Norwegian Reference fleet

Coastal fleet



High-seas fleet

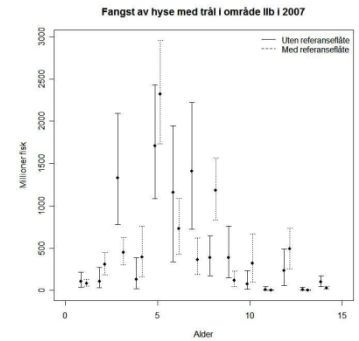


How does the Reference fleet work?

Self sampling



Fiskefangst	
Dato	Sted
2010-01-01	SKAG
2010-01-02	SKAG
2010-01-03	SKAG
2010-01-04	SKAG
2010-01-05	SKAG
2010-01-06	SKAG
2010-01-07	SKAG
2010-01-08	SKAG
2010-01-09	SKAG
2010-01-10	SKAG
2010-01-11	SKAG
2010-01-12	SKAG
2010-01-13	SKAG
2010-01-14	SKAG
2010-01-15	SKAG
2010-01-16	SKAG
2010-01-17	SKAG
2010-01-18	SKAG
2010-01-19	SKAG
2010-01-20	SKAG
2010-01-21	SKAG
2010-01-22	SKAG
2010-01-23	SKAG
2010-01-24	SKAG
2010-01-25	SKAG
2010-01-26	SKAG
2010-01-27	SKAG
2010-01-28	SKAG
2010-01-29	SKAG
2010-01-30	SKAG
2010-01-31	SKAG

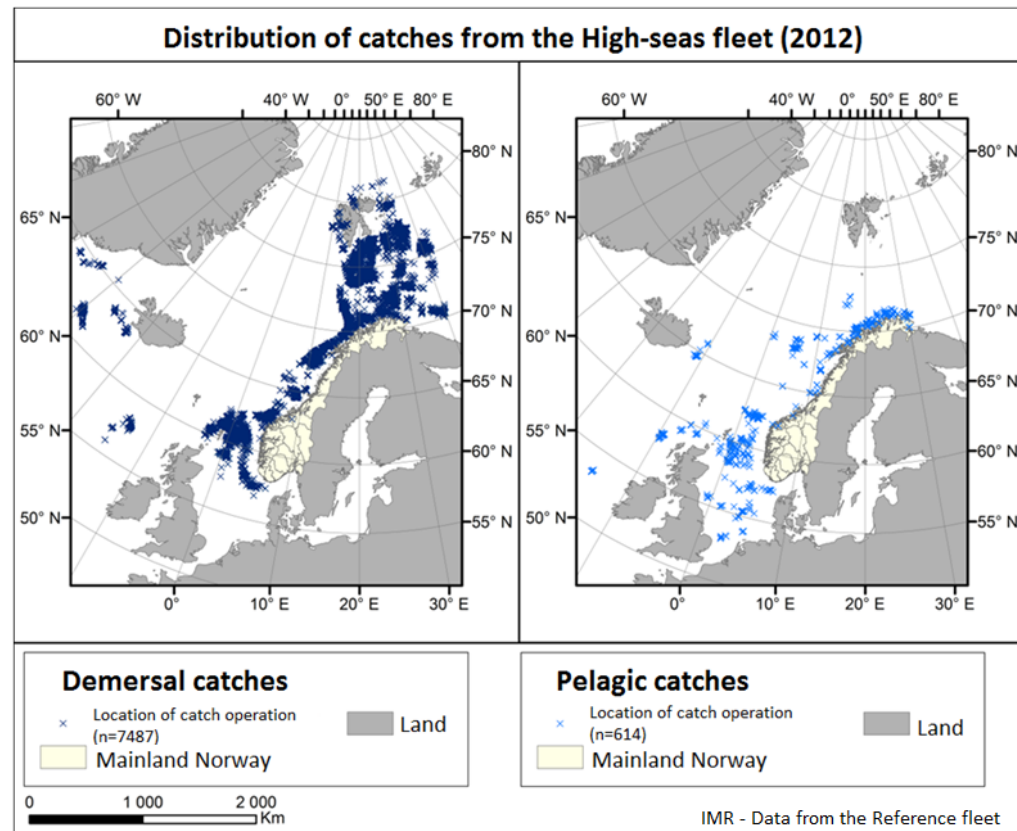


IMR supervisor



Being at the right place at the right time

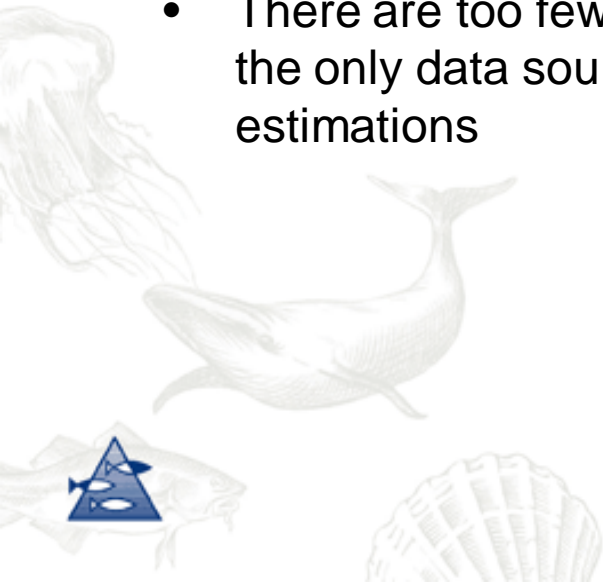
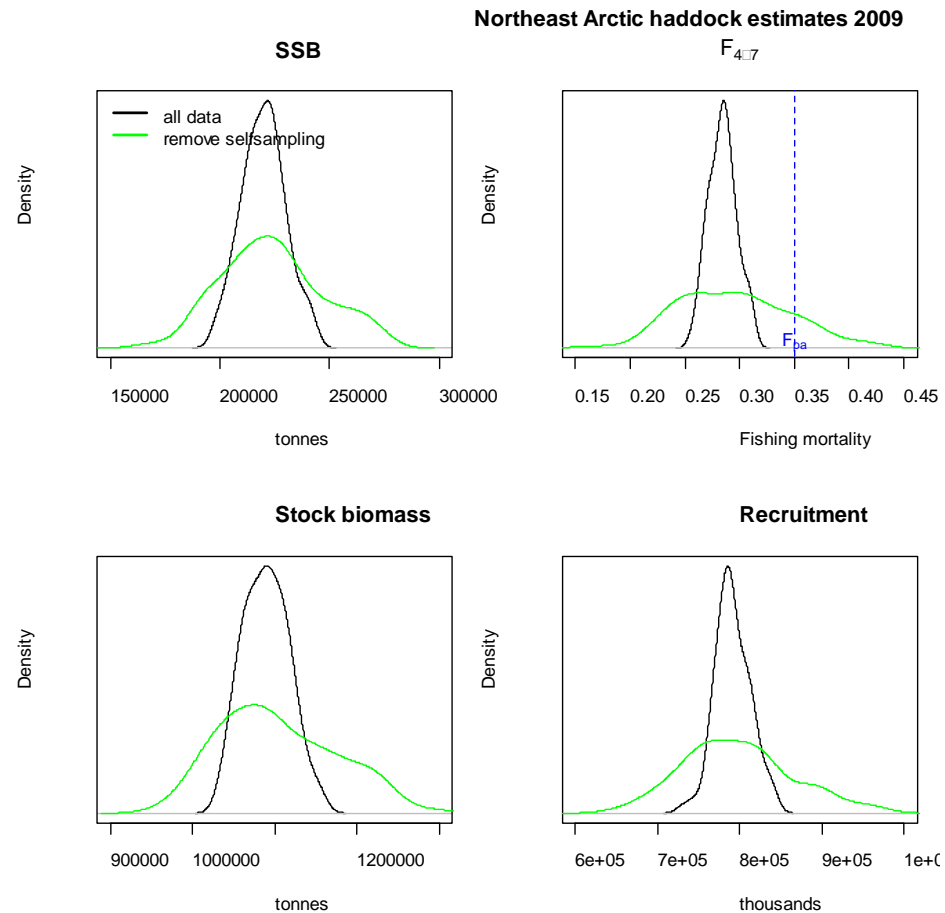
- Large coverage
Relatively low cost
- Real time communication
 - Scientists are updated on ecosystem changes as they happen
- Crew trained to do many kinds of ad hoc sampling as required



Reference fleet data is critical for better stock assessment

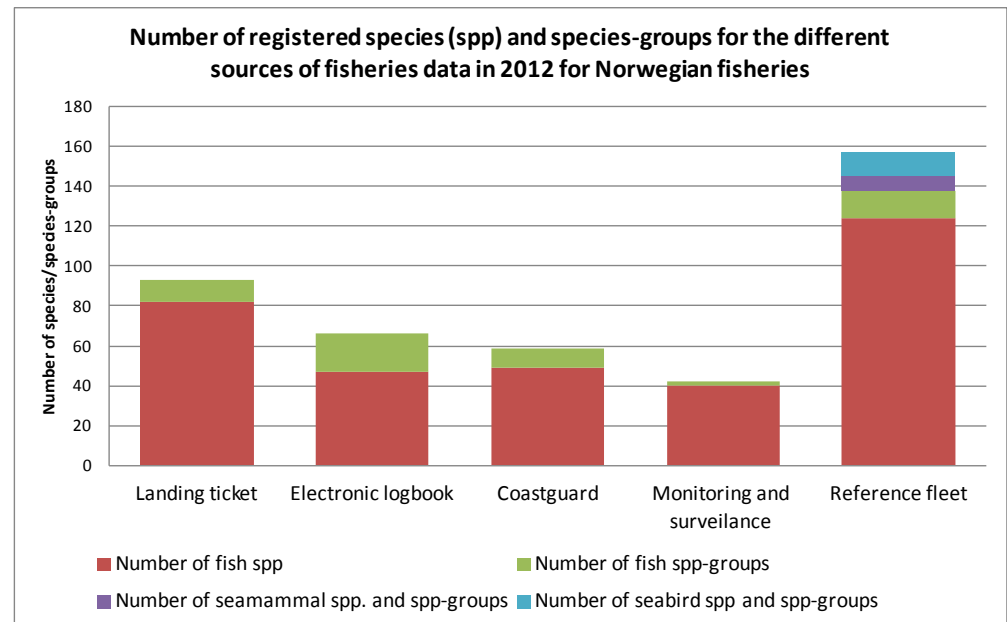
Data rich stocks

- Important data source to reduce bias and increase precision in assessments.
- There are too few vessels to be the only data source for stock estimations



Total catches and discards

- Reference fleet data gives a much better and complete overview of total catches and discards than all other sources of fisheries data
- Fishermen in the Reference fleet also register bycatches of seabirds and sea mammals
- 10 different red-listed species registered on average in 1500 fishing operations annually by the Reference fleet



Key to a good collaboration

- Regular communication
 - Weekly contact with the fishermen by telephone or e-mail
 - Visit the vessels.
 - **Annual meeting with the fleet**
- Positive feedback
 - Fishermen need to know their data makes a difference
 - Exchanging knowledge – both ways
- Team feeling
 - Ownership
 - Mutual interest
 - Common objectives
 - Respect

Confidentiality

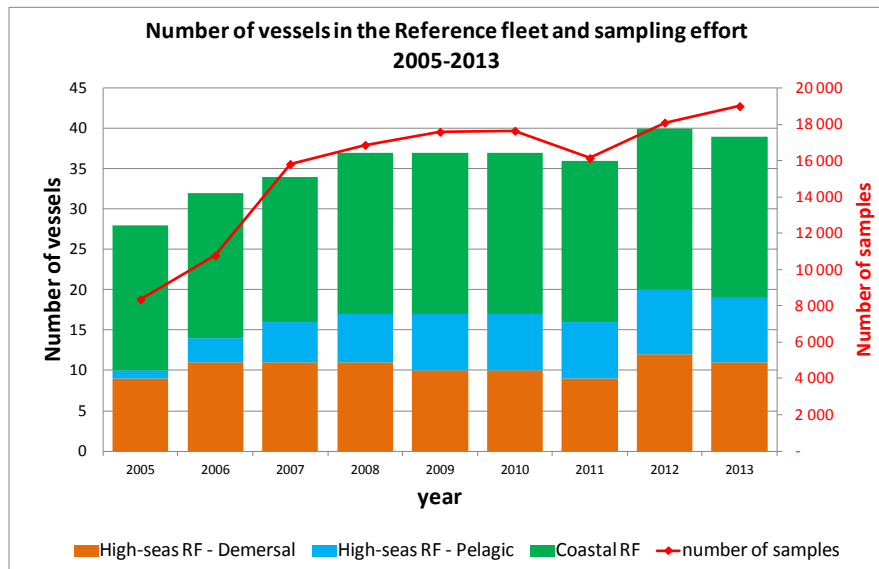
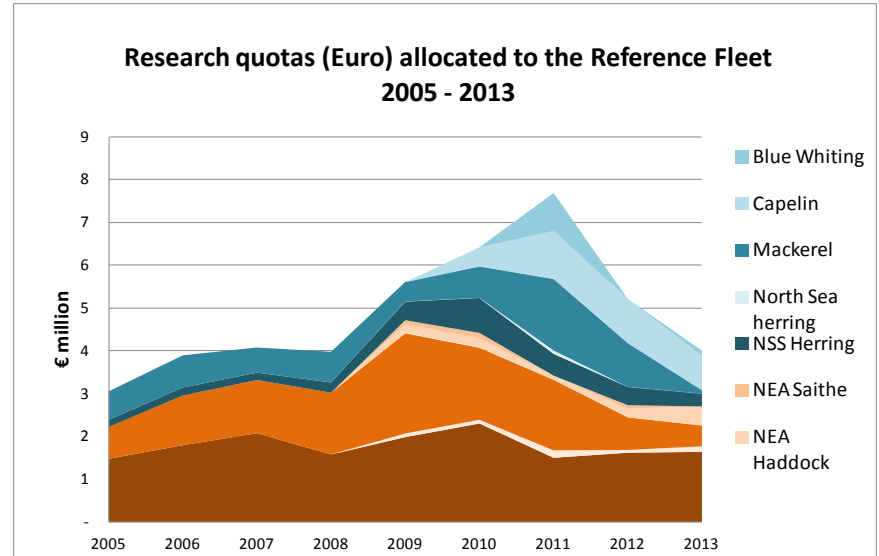
- Only anonymous data published
- Directorate of Fisheries, the Coastguard and IMR have agreed that the data shall not be used by agencies for inspection and enforcement purposes.



Financing the program

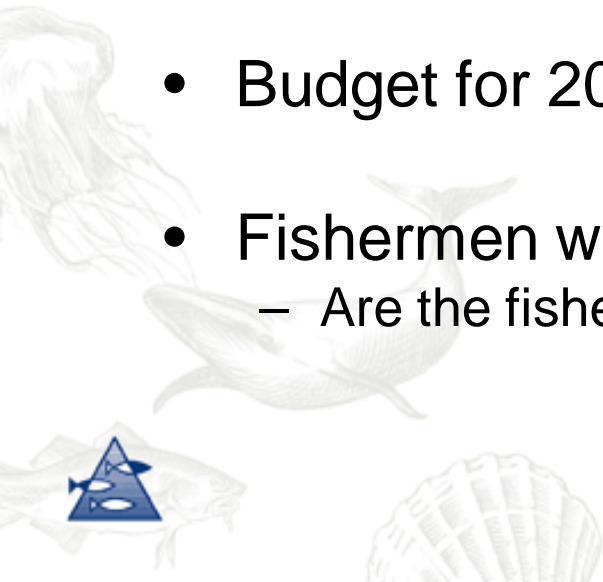
2000-2013

- Payment to the fishermen was in two parts:
 - Price per sample/data received
 - Research quota
- Self financed by the research quotas
 - 50-60% of the catch value from the quotas was paid to the fishing boat to cover the fishing and delivery costs.
 - The rest went to IMR to cover the running costs for the program.
- Advantages:
 - Value of the research quotas to the fishermen is hard to match with cash.
- Disadvantages:
 - Fish prices and quota size unpredictable.
 - Requires a lot of administration work
 - Possible bias – the research quota may directly affect the vessels usual fishing pattern



2014 and beyond

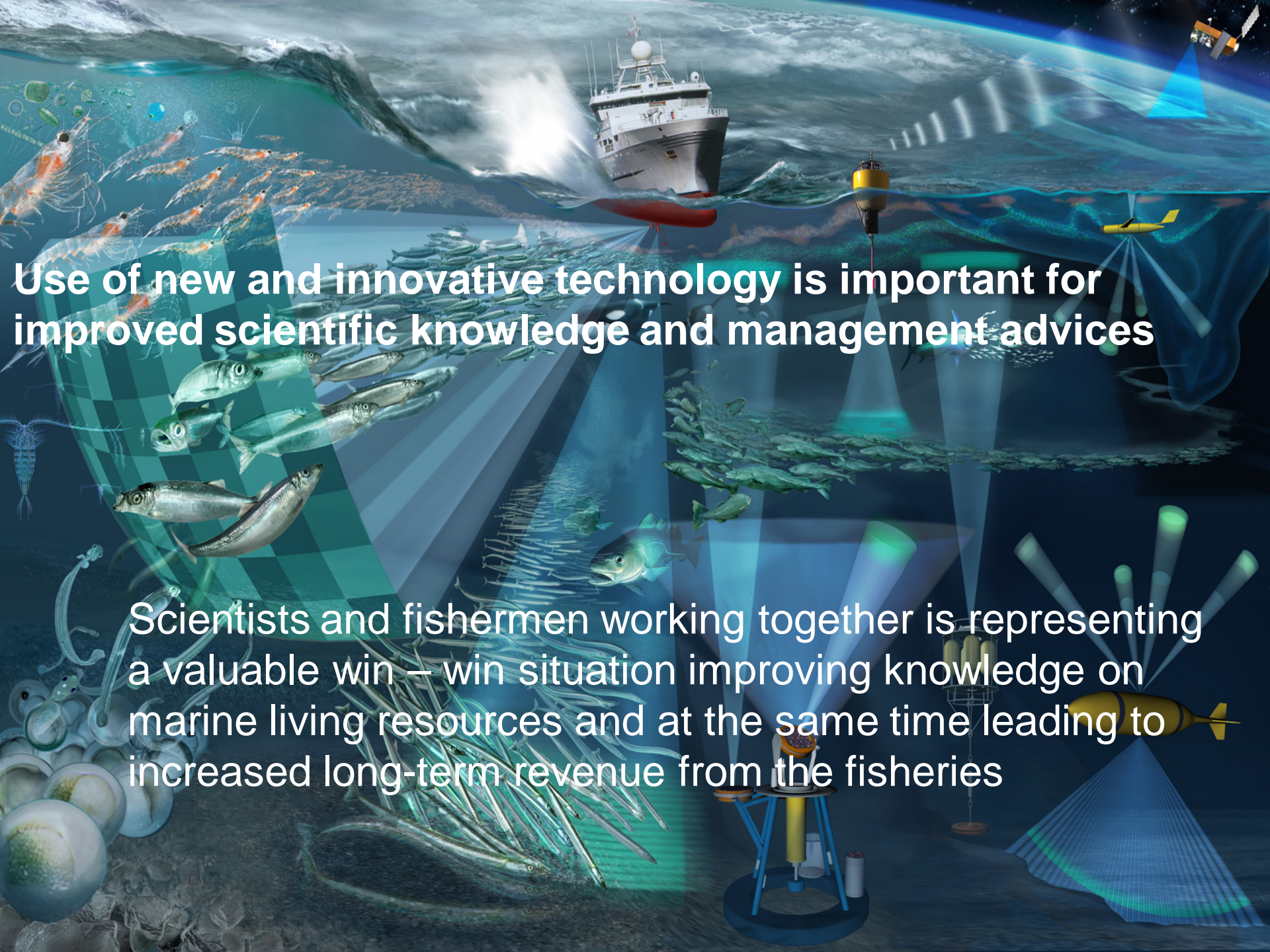
- Government has replaced research quotas as a source of research funding by a new duty on catch sales (1.15% of total catch value).
- Reference fleet program will now be financed by part of this new duty
- Budget for 2014 – NOK 17.2 million (€2.1 million)
- Fishermen will be compensated in cash not fish
 - Are the fishermen still interested?



The four main objectives of the Reference fleet program

- Long term quality controlled biological sampling of catches from commercial fisheries.
 - To contribute with representative sampling from fisheries to the research data that forms the basis for estimating length and age composition of the most important commercial stocks.
- Documenting fishing effort and species composition of the total catches, including bycatch, discards and non-commercial species.
 - To secure a data basis to document total catches and to monitor biodiversity over time.
- Access to collect samples for the fisheries on demand.
- Contribute to a better cooperation and understanding between fishermen and scientists.





Use of new and innovative technology is important for improved scientific knowledge and management advices

Scientists and fishermen working together is representing a valuable win – win situation improving knowledge on marine living resources and at the same time leading to increased long-term revenue from the fisheries

Thank you for listening!

