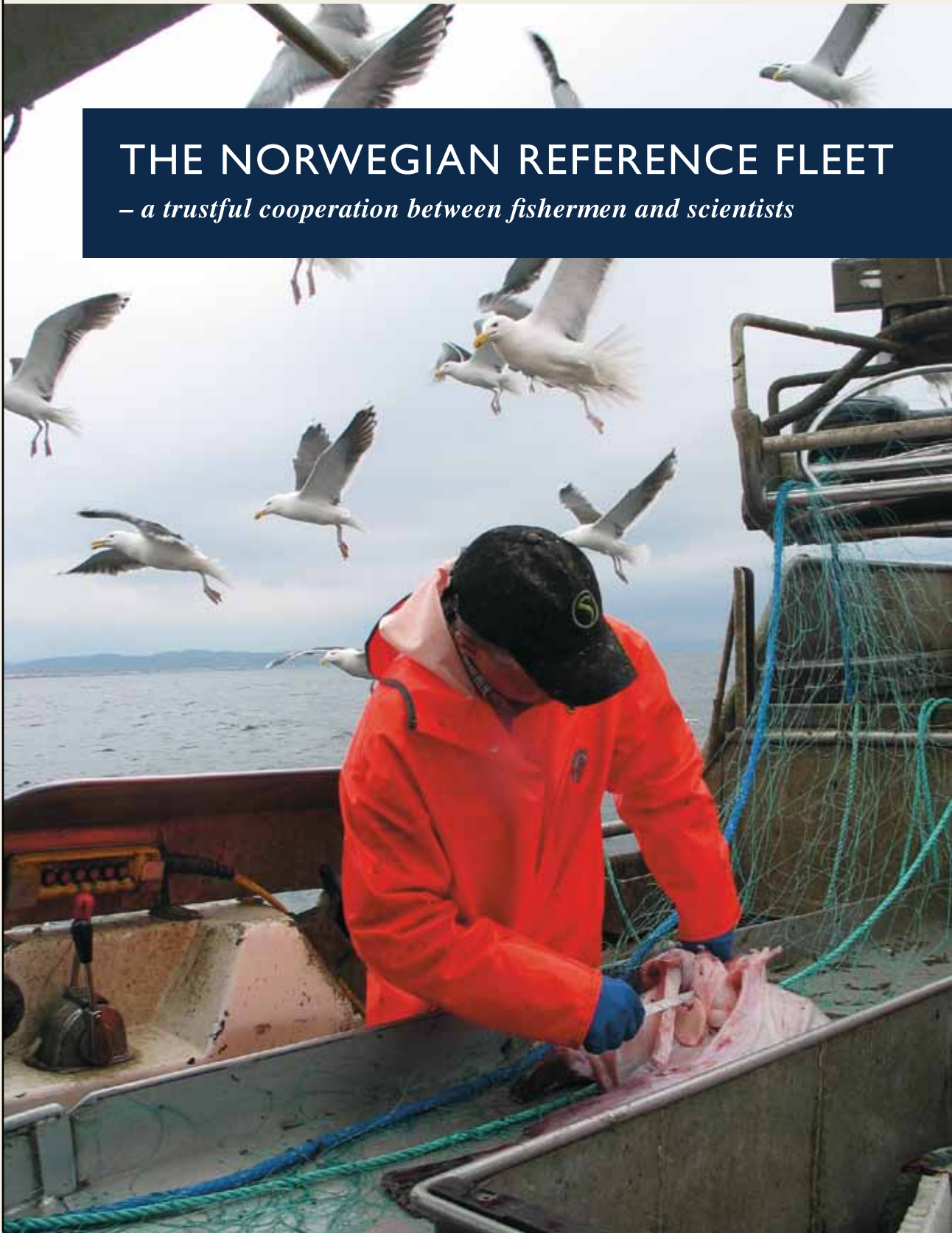


1-2010

FOCUS ON MARINE RESEARCH

THE NORWEGIAN REFERENCE FLEET

– a trustful cooperation between fishermen and scientists



INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET

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– a trustful cooperation between fishermen and scientists



It is very important that research scientists who give advice on fisheries management issues have sound knowledge about the different fisheries; how and where the fleets operate during the season, and what and how they fish. It is especially important to know how each age group is harvested since this is basic and necessary input data for many of the assessment models currently used to estimate fish stock sizes.

The Institute of Marine Research has always had a close and good cooperation with fishermen and the fishing industry. These contact and information flows have traditionally occurred by having institute personnel collect scientific samples on board fishing vessels or at ports, and on board commercial fishing vessels chartered for conducting scientific research surveys. The Reference Fleet aims to improve data collection and information flows both from and to the fishermen.



WHAT IS THE REFERENCE FLEET?

The Reference Fleet is a small group of Norwegian fishing vessels that provide the Institute of Marine Research (IMR) with detailed information about their fishing activity and catches on a regular basis. The sampling and data management procedures are similar to the system used on board IMR's research vessels. Data is used for management purposes including stock assessment.

A high-seas Reference Fleet was established in 2000 and consists of 17 vessels (see illustration on page 4). In autumn 2005 a similar coastal Reference Fleet was established along the entire Norwegian Coast from Varanger to Oslofjord (see illustration on page 6). This fleet is composed of 21 vessels (mainly gillnetters, 9–15 m long). Public announcement every fourth year opens up for replacement of the fleet and motivates fishermen involvement.

The administration and work done by the Reference Fleet is self-financed by the allocation of a minor part of the Norwegian fish quotas for research purposes. The vessel owner gets 50–60% of the quota value to cover the vessel's expenses in catching, producing and selling the fish. The other 40–50% covers the administration and running costs, and payment to the fishermen to take biological samples and data deliveries according to protocol.

Public announcement makes fishermen express genuine and motivated interest to participate





K. Arctander – Demersal trawl



Prestfjord – Demersal trawl



Skagøysund – Purse seine, danish seine



Inger Hildur – Purse seine



Geir – Longline



Eros – Purse seine, pelagic trawl



Ramoen – Demersal trawl



Atlantic – Longline



Skjongholm – Gillnet



Brennholm – Purse seine, pelagic trawl



Cetus – Industrial trawl, pelagic trawl



Nesejenta – Gillnet



Kato – Gillnet



O. Husby – Longline



Nybo – Purse seine



Leinebris – Longline, gillnet



Ringbas – Purse seine, danish seine



THE HIGH SEAS REFERENCE FLEET 2010

Vessel	Owner	Address	Reg.no.	Call sign	Length (m)	Gear
Atlantic	Atlantic Longline AS	Måløy	SF-9-B	LIYX	44,9	Longline
Brennholm	Brennholm AS	Hjellestad	H-1-BN	LIWG	75,4	Purse seine, pelagic trawl
Cetus	Cetus AS	Vedavåg	R-94-K	LLYM	41,8	Industrial trawl, pelagic trawl
Eros	Eros AS	Eggesbønes	M-60-HØ	LIVA	75,9	Purse seine, pelagic trawl
Geir	H.P. Holmeset AS	Vatne	M-123-H	LJPZ	45,6	Longline
Inger Hildur	Inger Hildur AS	Molde	M-101-F	LJUH	53,9	Purse seine
K. Arctander	Nordland Havfiske AS	Stamsund	N-7-VV	LHMF	53,1	Demersal trawl
Kato	Partrederiet Kato ANS	Myklebost	M-192-SØ	LLJC	38,2	Gillnet
Leinebris	Leinebris AS	Fosnavåg	M-505-HØ	LIWR	44,8	Longline, gillnet
Nesejenta	Nesefisk AS	Spangereid	VA-82-LS	LAVO	27,5	Gillnet
Nybo	Nybo Holding AS	Midsund	M-56-MD	LJBD	78,4	Purse seine
O. Husby	Brødrene Husby Fiskebåtrederi AS	Averøy	M-161-AV	LJQG	43,2	Longline
Prestfjord	Prestfjord AS	Sortland	N-200-Ø	JXNA	56,9	Demersal trawl
Ramoen	Ramoen AS c/o Vartdal Fiskeriselskap AS	Ålesund	M-2-VD	LMLT	66,7	Demersal trawl
Ringbas	Ringbas AS	Raudeberg	SF-2-V	LHRX	34,1	Purse seine, danish seine
Skagøysund	Skagøysund AS	Sommarøy	T-23-T	LMUR	38,1	Purse seine, danish seine
Skjongholm	Skjongholm AS	Barekstad	SF-13-F	JWZZ	26,6	Gillnet



Thor-Arild



Rubin



Ben Hur



Odd Yngve



Eggumsværing



Snarsetværing



Haldorson



Røstjenta



Oddson



Tramsegg



Vågøybuen



Rånes Viking



Skarsjøværing



Haaværbuen



Ramona



Fanøyvåg



Vesleper



Stording



Repsøy



Heimdal



Skogsøyjenta



THE COASTAL REFERENCE FLEET 2010

Vessel	Owner	Address	Reg.no.	Call sign	Length (m)	Gear
Ben Hur	Juda Ben Hur AS	Senjahopen	T-42-BG	LK6598	12,9	Danish seine, gillnet
Eggumsværing	PR Eggumsværing DA	Bøstad	N-76-VV	LK3041	15,1	Gillnet, longline
Fanøyvåg	Fanøyvåg AS	Batalden	SF-28-F	LK4154	20,9	Gillnet
Haldorson	Svein Tore Olsen	Lovund	N-58-L	LK4789	14,2	Gillnet
Heimdal	Helge N. Husevåg	Sand	R-2-SD	LK4399	11,8	Gillnet, fyke net, purse seine
Haaværbuen	Haaværbuen DA	Sandøy	M-30-SØ	LM5498	10,6	Gillnet
Odd Yngve	PR Fagertun DA	Vannareid	T-44-K	LM2864	15,0	Gillnet, pot
Oddson	Odd Ingvald Lam	Varangerbotn	F-32-N	LK3860	13,2	Gillnet, pot, longline
Ramona	Ørjan Mo	Nordheim-sund	H-48-KM	LK6606	12,1	Gillnet, handline, fyke net
Repsøy	Repsøy AS	Vedavågen	R-72-K	LK3270	13,7	Gillnet, handline
Rubin	Straumskjær AS	Båtsfjord	F-3-BD	LK8820	14,0	Gillnet, longline, pot, danish seine
Røstjenta	PR Røstjenta DA	Røst	N-24-RT	LK6977	15,0	Gillnet
Rånes Viking	Rolf Rånes	Landegode	N-300-B	LK5016	12,3	Gillnet
Skarsjøværing	Tore Stensen	Ballstad	N-4-VV	LK7126	15,0	Danish seine
Skøgsøyjenta	Gunvald Aanensen	Mandal	VA-134-M	LK5485	12,5	Gillnet, handline
Snarsetværing	PR Br. Olsen DA	Straumsjøen	N-171-BØ	LK3988	15,0	Gillnet
Stording	Stording AS	Stord	H-1-SD	LK5711	10,6	Gillnet, handline
Thor-Arild	Skarsvåg Kystfiske AS	Skarsvåg	F-204-NK	LK2234	14,9	Gillnet, danish seine, pot
Tramsegg	PR Gjetøyfisk ANS	Vevang	M-20-EE	LK7141	13,0	Gillnet
Vesleper	Anders Paulsen	Tjodalyng	V-26-L	LM7915	9,7	Gillnet, pot
Vågøybuen	Tore Vågø	Rørvik	NT-58-V	LK8734	10,7	Gillnet, pot, purse seine



SAMPLING AND EQUIPMENT

The data are collected and delivered to the IMR according to a contract that secures a proper statistical coverage for a defined number of species in time and by area. Each vessel in the high-seas Reference Fleet is equipped with an electronic fish sampling board (Scantrol)¹⁾, scales¹⁾, an otolith sampling device, a PC¹⁾ with specialized software for satellite communication, and other equipment for different research purposes. Most of the smaller vessels in the coastal Reference Fleet have only been equipped with conventional fish-length measuring boards. IMR personnel instruct the responsible contact persons on each vessel, provide training support, visit the vessels, and update the scientific equipment when necessary.

The agreement between IMR and the Reference Fleet includes an obligation for the vessels to record their catch logbooks electronically. The trawlers, danish- and purse seiners should make a complete record (including discards) of each catch, while longliners and gillnetters should

do so for one representative fleet per day and in addition for the whole day catch. The coastal fleet should make a complete record of the entire day catch.

Crew members are trained to conduct self-sampling following IMR's protocols. Biological samples include length, otoliths, genetic samples, stomachs, contaminants, tagging etc. The data are recorded electronically¹⁾ and transmitted to the IMR via a satellite link together with the electronic logbooks. This information is continuously added to the IMR's research database. There is also a direct e-mail connection between each vessel and the IMR.

Makes it possible to be at the right place at the right time

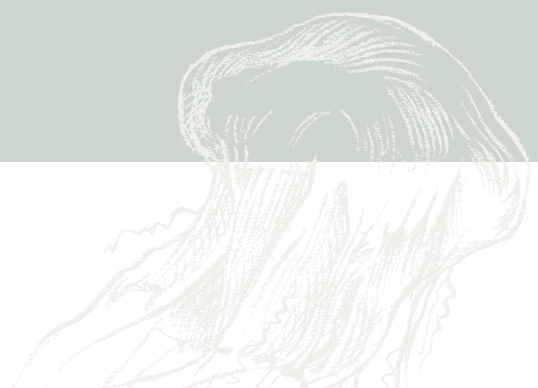
In addition, the IMR has access to data from the vessel monitoring system (satellite tracking) operated by the Norwegian Directorate of Fisheries.

The Reference Fleet may also be requested to make specific observations and collect urgently needed data, and could also be used to collect environmental- and hydrographic data if it does not hamper the normal fishing activity. The Reference Fleet makes it thus possible for the IMR to be in the right place at the right time.

¹⁾ On all high-seas vessels and the largest coastal vessels



Length measurement of anglerfish



A USEFUL DATA COLLECTION PLATFORM FOR MANY PURPOSES

- Results are mainly used for assessment purposes, e.g., for estimating total catch in tonnes by length and/or age groups in numbers, and hence improves stock assessments and fisheries management.
- Enables the IMR to allocate commercial catch sampling resources in time and space in a sound statistical way, and may thus provide higher temporal and spatial coverage for increased precision.
- Documentation of the entire catch, especially discards at a finer spatial scale.
- Provides observations of sea mammals, sea birds, crabs etc.
- Contributes to determining the effects of regulations, which again may lead to more practical and purposeful regulations.
- Provides continuous information about species that are rarely covered by research vessels (e.g., deep water species, near coast fish populations).
- A platform for testing official catch and data collecting systems and procedures (e.g., electronic log-books, reporting- and grading systems, discards).
- Updates scientists on technological developments in the fisheries.
- Reduces controversies and fosters a joint “ownership” spirit for data and results.
- Allows for fishermen’s knowledge to become available for fishery research and management purposes.
- Assist in designing projects to meet specific needs and can be adaptive.

SOME CONCERNS

- Too few vessels may be involved to cover all the métiers in all areas and seasons necessary for stock assessments.
- Vessel catch estimates may be lower than other sampling programmes especially for discards and non commercial species.
- Vessel involvement is voluntary.
- Training, quality assurance and quality control are essential for accurate data reporting.

*Provides better insight and builds
a common understanding*





KEY FACTORS

REPRESENTATIVENESS

- The Reference Fleet covers and represent the Norwegian fleet as follows: 0.1–4% based on vessel size groups; 0–15% based on gear métiers
- The fleet's catches (in tonnes) represent: Pelagic species 1–4%; Demersal species 5–8%. In addition, by-catches of non-commercial species are recorded
- Collects information from about 100 of 257 species inhabiting Norwegian waters
- The Reference Fleet's fishing behaviour in time and area can be checked and compared with the whole national fleet by using VMS data
- Catch-per-unit-effort (CPUE) of the fleet is compared with other national vessels belonging to the same métier

QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

- Institute personnel visit on board the vessels at least once a year
- Sampling protocols
- Technicians as helpmates for 2–4 vessels each including responsibility of QA/QC
- Regular testing of received data
- Checking that sampling is conducted independent of catch size

- Cross checking – comparison of sampling conducted with and without the presence of observers and inspectors

TRAINING

- Annual meetings with vessel owners and crews at the institute including small workshops for species and sex identification, maturity staging, sampling protocols etc.
- During visit on board
- Online communication by e-mail
- Exchanging electronic photos by e-mail in almost real time

REGISTRATION OF DISCARDS

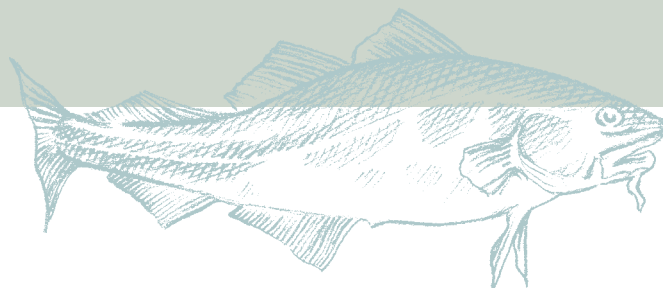
- A special code used on each catch to indicate whether discards have been recorded/sampled or not
- The crew is encouraged and paid to register all catch, including discards
- The pelagic fleet that pumps the catch directly into closed tanks are difficult to sample at sea – this is hence done inside the port site when landing the catch
- Discards may be estimated by comparing sampling at sea with sales notes and sampling at landing sites

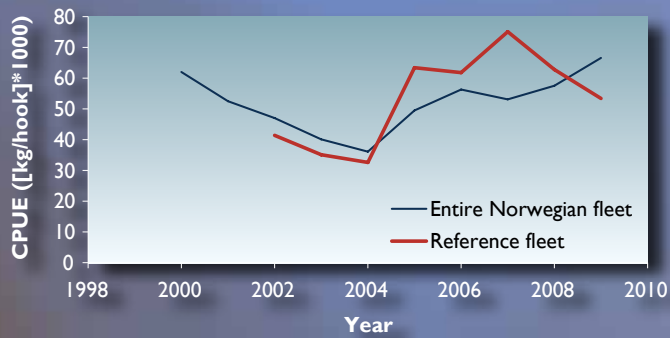
EXAMPLE OF THE VOLUME OF THE BIOLOGICAL SAMPLING:

In 2009, more than 18 000 samples were collected from different catches of more than 90 species:

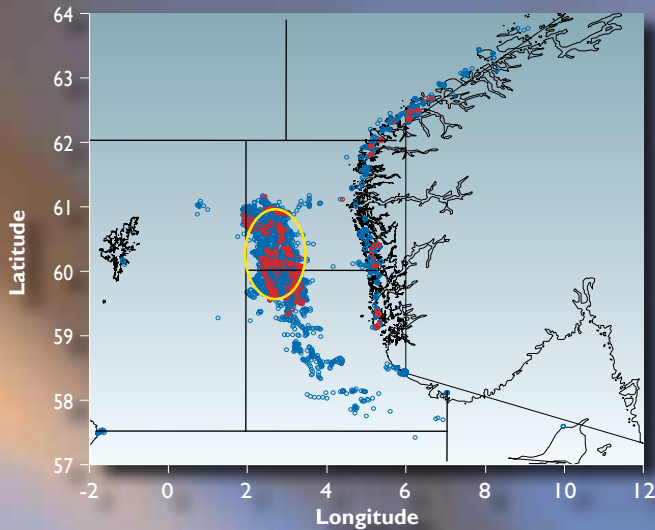
Species	Numbers length measured	Numbers length samples	Numbers otoliths (age)	Numbers otolith samples
Cod	78 167	2 145	8 044	419
Haddock	68 651	1 875	5 487	268
Saithe	34 863	1 120	2 117	116
Tusk	27 626	1 017		
Golden redfish	27 376	1 103	2 139	103
Herring	18 925	207	4 550*	91
Ling	17 995	879	1 090	55
Greenland halibut	15 776	669		
Mackerel	8 775	237	1 800	36
Anglerfish	4 546	436		

*Including scales which are collected and used for age determination of Norwegian spring-spawning herring

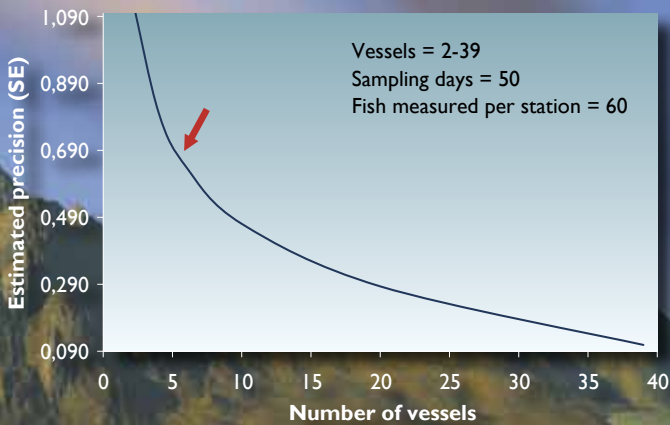




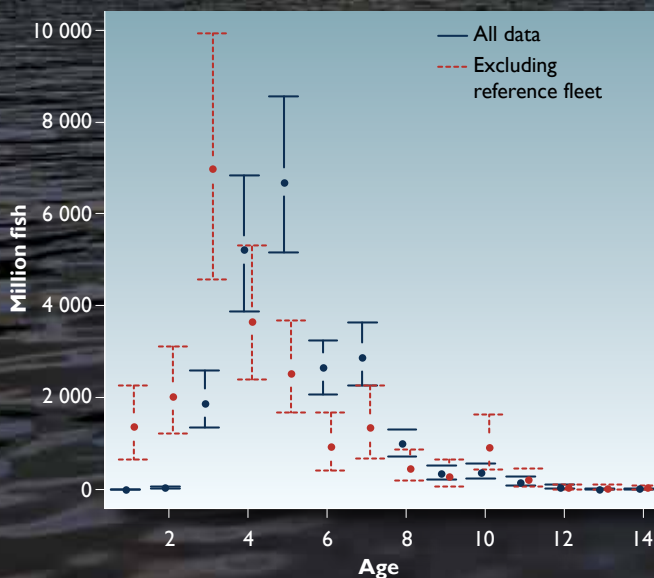
The figure compares the catch of tusk per hook north of 62°N (ICES Sub-area IIa) for the Reference fleet's 4 longline vessels (red curve) with the entire Norwegian longline fleet (34 vessels) in the same area (blue curve).



Quality control of temporal and spatial coverage using VMS data. The blue dots illustrate the Norwegian mackerel fishery in October with the red dots showing the reference fleet. The yellow circle shows the area with highest catches.



Sampling from a sufficient number of fishing vessels matters most. The figure example shows the estimated precision of the mean length in the ling fishery. The arrows denote current sampling.




Catch-in-numbers-at-age of North-East Arctic haddock incl. coefficient of variation, with and without data from the Reference Fleet, as input for stock assessment.

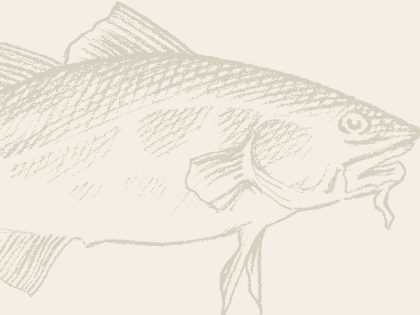
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