



NORWEGIAN FISHING VESSELS, REGULATIONS, TECHNOLOGY AND METHODS

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Disposition

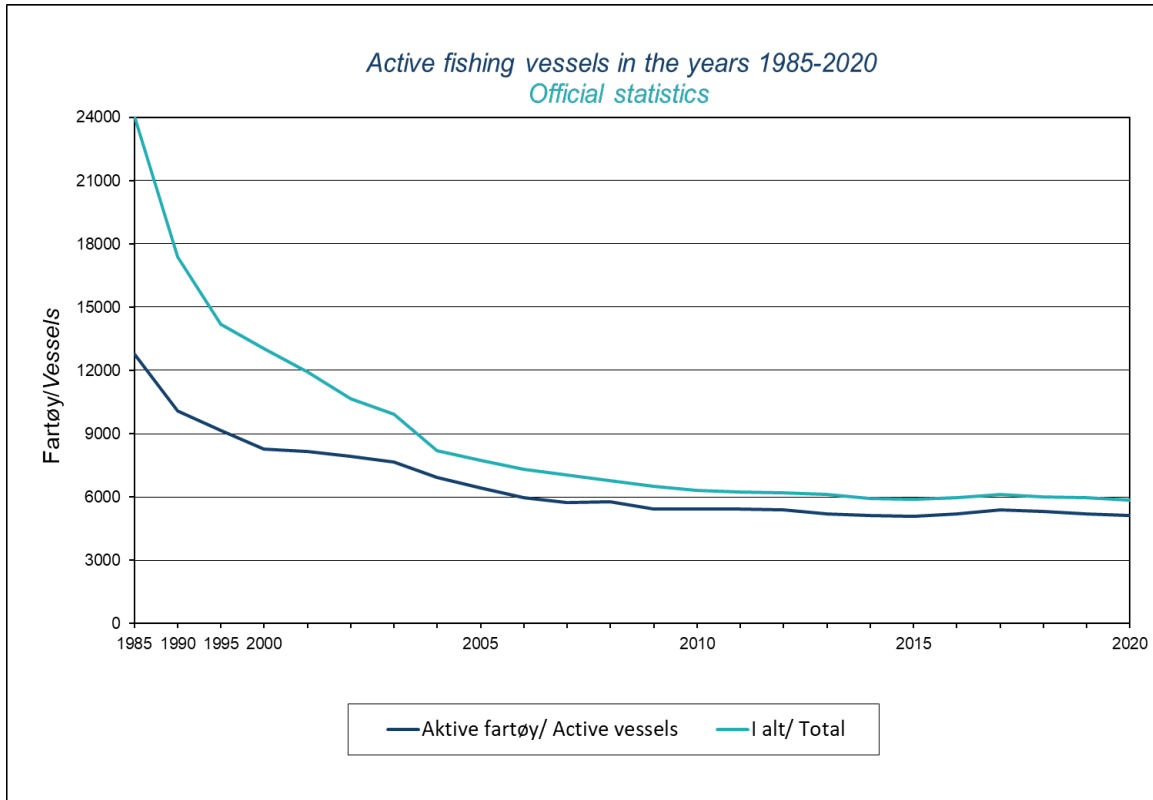
Primary objective with Cool-Fish project is to:

- Develop technology and increase knowledge for more energy efficient and climate friendly cooling, freezing and heating onboard fishing vessels.

So

- How is the fishing vessel structure, how is the fisheries regulated and how do they fish?
- What are determining the purchase & use of best available cooling, freezing, drying, evaporation and heating systems?

The Norwegian Fishing Fleet



- Norway has a technologically advanced fishing fleet, from small one-man inshore vessels to large trawlers and purse seiners
- Since 2010 the number of fishing vessels has been stable

Lenght	Below 10m	10-14,9m	15-20,9m	21-27,9m	> 28m
No. of vessels	3 164	2 348	110	104	256



The Norwegian Fishing Fleet

- Categorized into "Coastal fleet" and "Sea-going fleet"
- Coastal fleet - (originally length below 28m) max. cargo hold of 500 m³
- "Open group" - below 11m



Regulations, fishing gear etc.



- Nearly all Norwegian stocks with commercial value are regulated through total- and individual quotas, fishery licenses and permits
- The fishing fleet is highly diversified, the regulations rather complicated and use of fishing gear is related to vessel size and fishing licences & permits



Regulations, fishing gear etc.

- **"Sea-going fleet" (2020):**

264 sea-going vessels with 503 **fisheries licences*** i.a. cod-trawl, shrimp trawl, purse seine, blue whiting, pelagic and other trawl fisheries

- **"Coastal fleet" up to 500m³ l. capacity (2020):**

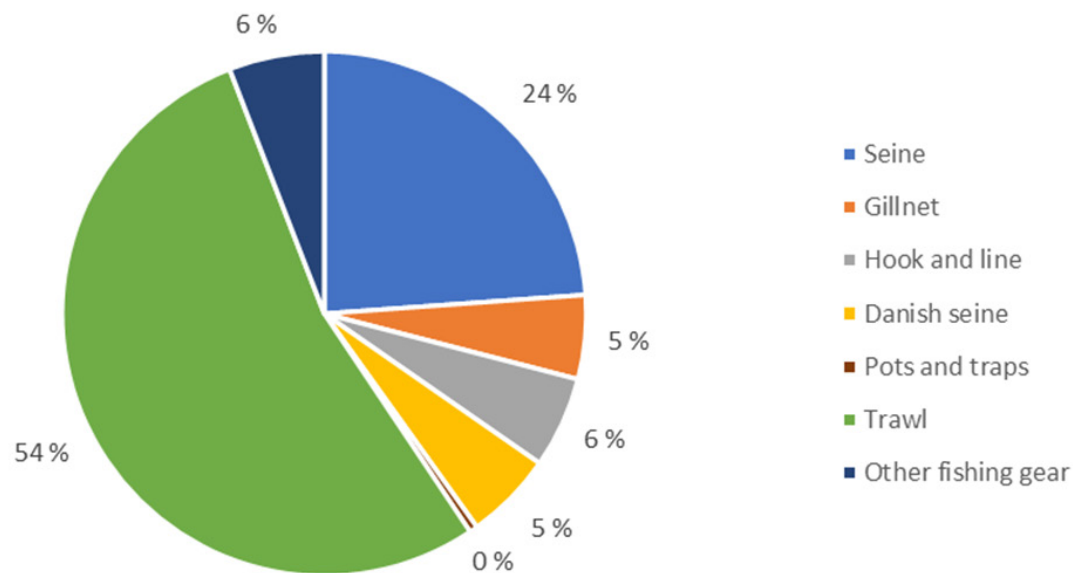
1968 vessels with various **permits*** i.a. coast-herring, coast-shrimp, cod/haddock/saithe -north, several coast-purse seine permits

- **"Open group": below 11m**

5-6% of the cod quota, guaranteed Qs + re-distribution

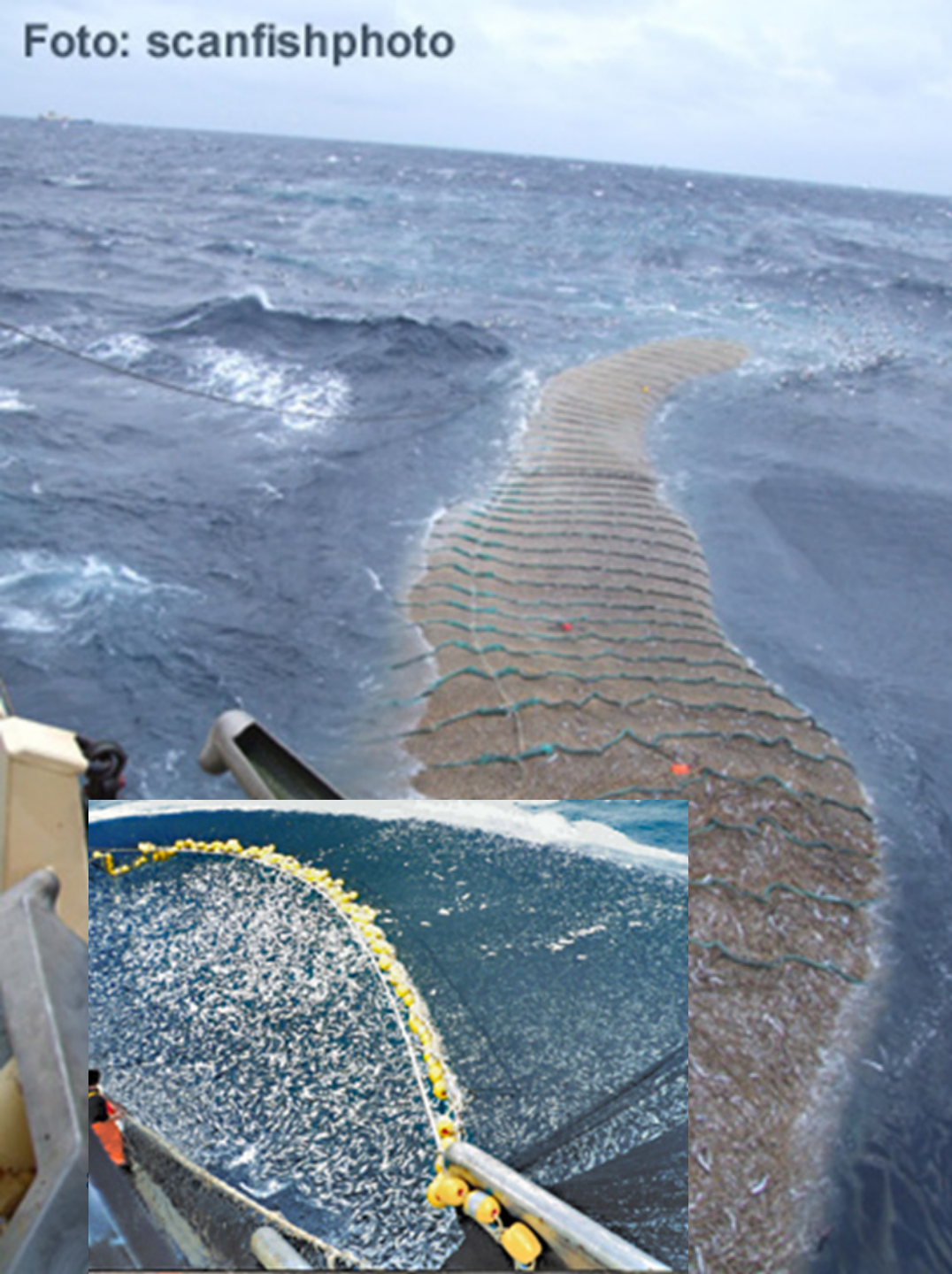
Regulations, fishing gear etc.

Total Norwegian catch by fishing gear



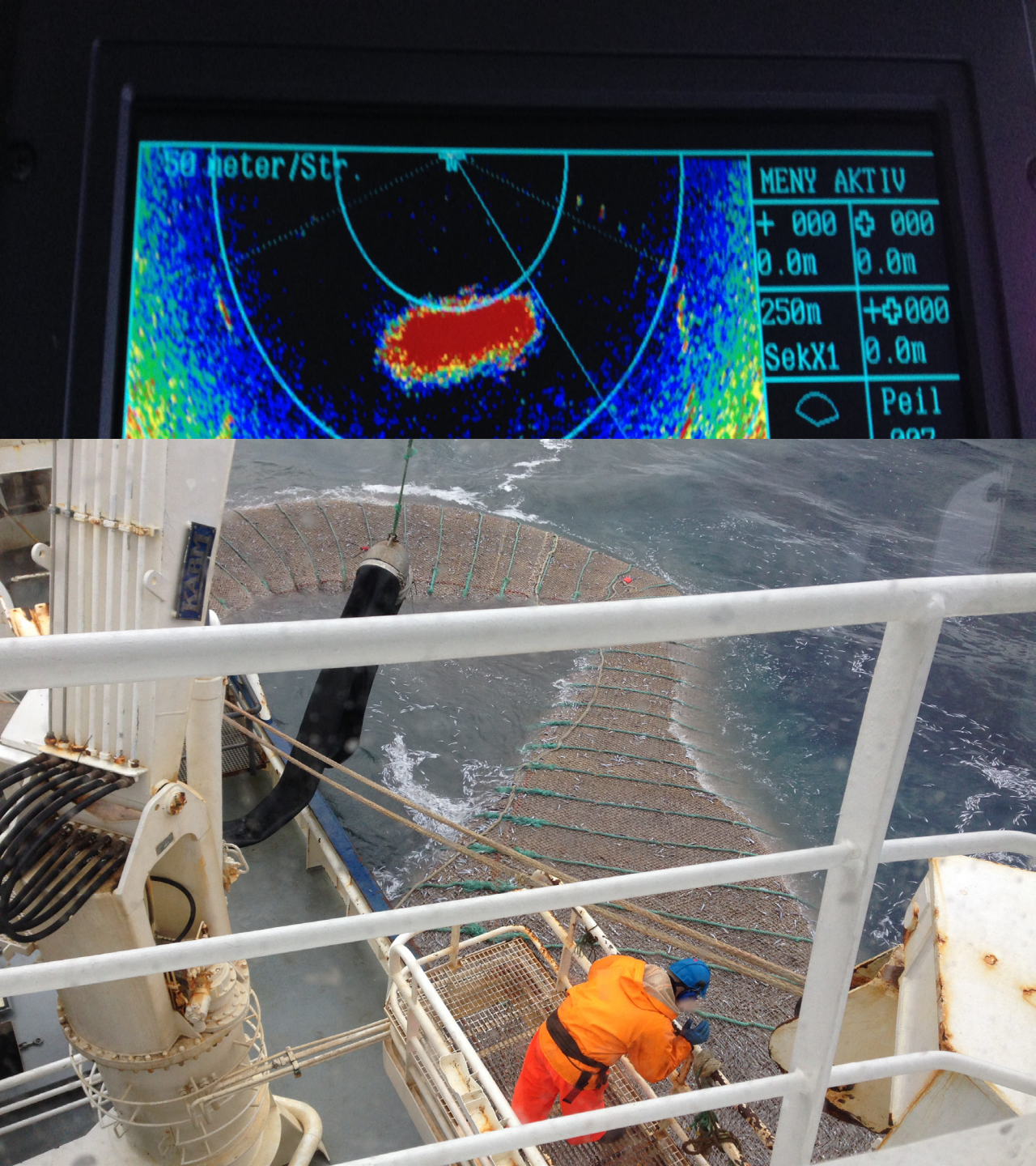
Fishing gears are commonly classified in two main categories: **passive** and **active**

- Passive the target species goes towards the gear being captured: gillnets, longlines, pots
- Active the target species are herded into the gear as in trawl, purse seine and danish seine



Fisheries and need for chilling, freezing or processing

- The use of fishing gear, as well as the species and season, determines the need for rapid on-board cooling/freezing or processing
- Pelagic trawlers and purse seiners uses advanced technology (hydroacoustics and sensors) for finding shoals of fish and regulating the size of the catch, but ..
- Nevertheless, these two gears occasionally gives considerably larger catches than expected and therefore has a need for very rapid chilling as RSW



Fisheries and need for chilling, freezing or processing

Example pelagic blue whiting fisheries, pelagic trawl:

- While the sea-surface temperature in the blue whiting fisheries with pelagic trawl west of Ireland can be 2-3 °C, the fish 300 m deeper can have 10-12 °C.
- One haul can often be 3-400 tonnes > need for rapid and controlled chilling of large volumes in RSW



Fisheries and need for chilling, freezing or processing

- Bottom trawl: medium to large catches
- Snow crab: 24/7 - continuous
- Autoline: 24/7 - continuous
- Shrimp trawling: 24/7 - continuous



Fisheries and need for chilling, freezing or processing

- The fishing grounds for Antarctic krill is 5-6 days from shore
- Krill contains active endogenous enzymes and the catch need to be deep frozen, stabilized or processed onboard (meal, protein concentrates, oil)
- To utilize the limited onboard storage capacity, water reduction (evaporation & drying) is needed
- Onboard filet production from whitefish > RRM about 65-70% need to be processed



Technology & market

- Earlier all fish was delivered fresh, iced or salted to the local industry
- Larger fishingboats and fewer fish-processing plants > need for chilling, freezing and on-board processing of the catch has increased
- On-board frozen fish and other processed seafood products has direct access to the global market
- The traditional feed application species like macerel, herring and capelin goes to the food market with even stricter need for controlled chilling/freezing



Summing up

Demand for energy efficient and climate friendly cooling, freezing and heating onboard fishing vessels driven by:

- An economic sound fishing fleet and sustainable managed resources
- Market access for fishery products
- Branding? Market the market wants to know more about the origin CO² emissions etc. of the products...
- Regulations and policies concerning emissions and greenhouse gases



Teknologi for et bedre samfunn