



INSTITUTE OF MARINE RESEARCH

2019/2020





Fish in the Barents Sea are moving north

Since 2004, Norwegian and Russian marine scientists have been getting to know the Barents Sea inside out through their annual surveys. Fish, birds, whales, sea cucumbers, plankton, radioactivity and microplastics are just some of the things they monitor. The surveys have resulted in several time series showing the changes taking place in this important sea. For example, we have observed that fish in the Barents Sea have moved north as a result of climate change. The data from the surveys are essential to the annual scientific advices on fishing quotas given to the authorities.



EXPORTING SCIENCE BASED MANAGEMENT

The Institute of Marine Research (IMR) is playing a growing role in key international policy processes looking at seafood within the context of global food security. The number of joint surveys with developing countries is also rising. The RV *Dr. Fridtjof Nansen* spends all of its time in the waters around Africa and in the Indian Ocean. In 2018, 240 students and researchers from 21 countries took part in its surveys, and samples were taken at 1,230 sampling stations for plankton and macroplastics.

Sissel Rogne

Professor Sissel Rogne,
Director of the Institute of Marine Research



REDUS REDUCES UNCERTAINTY
There are uncertainties associated with all aspects of monitoring and estimating fish stocks. The REDUS project is reviewing the whole workflow of the process used to assess fish populations. The aim is to produce “weather forecasts” for fish stocks that make the uncertainties just as clear as meteorologists do in their forecasts.

SUSTAINABLE HARVESTING

Cooking crabs correctly keeps the claw meat cadmium-free

Our researchers have studied the levels of the heavy metal cadmium in crabs from various parts of Norway. They have also looked at what happens to cadmium values if you freeze, defrost and cook crabs. Their research shows that the cadmium is mainly in the brown meat. There were ten times as much cadmium in the claw meat of crabs that had been cooked with their claws on, as in raw claw meat, and levels were even higher if the crabs had been frozen before cooking. If you separate the claws from the rest of the crab before freezing or cooking it, you can prevent the great majority of the cadmium from entering the claws. Remember that it is illegal to tear the claws off live crabs. You can kill crabs humanely using an awl: stab the awl into the hollow under the crab's tail and into one of its eyes.



FEW TOXINS IN TOMORROW'S FISH

Levels of heavy metals, organic toxins and other substances have been measured in three mesopelagic species: the Mueller's pearlside, the glacier lantern fish, and the spotted barracudina. Scientists found only low levels of most toxins. Mesopelagic fish are not yet fished in significant quantities, but there is growing interest in them. Experiments are also being done to see how mesopelagic fish and crustaceans can be used for human consumption. For the moment they are mainly used in fish oil, fish meal, protein supplements and animal feed.



MAKING SURE THAT SEAFOOD IS SAFE

The IMR monitors levels of unwanted substances in wild fish, molluscs and crustaceans. In addition we perform analyses of unwanted substances in farmed fish (around 13,000 each year) and fish feed on behalf of the Norwegian Food Safety Authority.



SAFE AND HEALTHY SEAFOOD



In February, celebrity chef Christopher Haatuft served up a completely new kind of salmon at his restaurant Lysverket. The salmon had been fed on insect meal instead of fish meal. The Aquafly project looked at whether insects could be a safe and healthy ingredient in fish feed. The results were clear: the salmon grew well, tasted good and were healthy.

The IMR is heavily involved in IPCC's work on the sixth assessment report on climate change. Three of the lead authors work at the IMR: ecologist Mette Skern-Mauritzen, microbiologist Knut Yngve Børshiem and fisheries oceanographer Geir Ottersen. The report is due to be published in 2021/2022.

Norwegian and Russian marine scientists have been collaborating for 60 years. In spite of the Iron Curtain during the Cold War, the two countries continued working together to manage the fish stocks in the Arctic. On 14 March, we celebrated the 60th anniversary of this partnership in Tromsø.

In March, the IMR joined the NoCGV Svalbard for a seal count on the West Ice. The researchers counted the number of harp and hooded seals. When they reached a suitable ice floe, they decided to take up the sporting challenge laid down by the coast guard vessel. The final score in the football match between the IMR and the Norwegian navy was 0–10. (Photo: Marius Vågenes Villanger/Norwegian Armed Forces)

The Minister of Fisheries Harald Tom Nesvik made his first official visit to the IMR in September. The items on the agenda included fish stock research, advisory work and fishing quotas and the traffic light system used in aquaculture.

2018 in review

Half of all newborns are at risk of iodine deficiency. This can have serious consequences. In April, 27 experts from a number of European countries signed a joint call for action, asking health authorities to ensure that European mothers and children consume enough of this important element. Our researcher Lisbeth Dahl is Norway's national contact in the Iodine Global Network.

When a Russian helicopter crashed off Svalbard last autumn, RV G.O. Sars interrupted its research mission to help search for the wreck. In September, the crew were awarded with a medal for their vital contribution. The Russian Consul-General on Spitsbergen, Vyacheslav Nikolayev, thanked Captain Svein-Roger Fredheim for the crew's fine effort.

PhD Johanna Myrseth Aarflot represented the IMR at the Researchers' Grand Prix in September. For four minutes she spoke of the world's strongest animal, the copepod, and its importance as a source of food for fish. She also explained how it is easier for fish to catch copepods in shallow waters where there is more light than further down. (Photo: Øyvind Ganesh Eknes, National Science Week in Bergen)

The big conference Science for Ocean Actions was held in Bergen in November. The government's conference was hosted by the IMR. For two days, 160 experts from 49 countries discussed the most urgent priorities to keep our oceans clean and productive for the future. They also gave specific recommendations to Prime Minister Solberg's High-level Panel on Building a Sustainable Ocean Economy.

In November, Princess Ingrid Alexandra officially named our new icebreaker RV Kronprins Haakon in Tromsø. A few weeks later, the ship left Norway on an expedition to the southern hemisphere, i.e. Antarctica. During the cruise, researchers will study the whole ecosystem, but the main goal is to survey the quantity and distribution of the Antarctic krill.

Before Christmas the government decided that the new building to house both the Directorate of Fisheries and the IMR will be built on one of three potential sites at Dokken in Bergen. "Great news", was the reaction of the IMR's Director Sissel Rogne.



Finding the paths of plastic floating along the coast

The IMR has developed techniques and tools for modelling how plastic is transported and, even more importantly, where it is most likely to accumulate. The IMR also monitors the amount of plastic in various fjords and seas. In Færder and Hvaler, two marine national parks in the counties of Vestfold and Østfold respectively, researchers took seventy-nine samples at fifteen different locations, and counted a total of 77,000 microplastic particles. As many as eighty percent of the particles probably come from asphalt and car tyres. The model for how plastic is transported showed that Østfold is most at risk of accumulating plastic from distant sources, whereas "local plastic" from rivers is generally the main problem along the rest of the coast.



MAPPING NORWAY'S KELP RESOURCES

Kelp forests provide food, shelter and a place to live for algae, fish and other species. Kelp absorbs large quantities of CO₂ that eventually ends up on the sea bed in deep waters. Kelp contains alginate, which is used in everything from medicines to food products, and it is therefore harvested by trawlers. In order to find out which areas are rich in kelp, and the proportion of kelp harvested by trawlers, our scientists have developed a biomass model for kelp.

COASTS UNDER PRESSURE – THE IMR RESPONDS

We are studying what has most impact on ecosystems in various coastal areas with high levels of human activity. This is important in order to give good advice on how to ensure the sustainable co-existence of fishing and aquaculture with oil industry activities near the coast, ocean mine waste dumping and other relevant activities. We are focusing on coastal ecology and environmental impacts, and we will increasingly make use of so-called integrated ecosystem assessments.



ECOSYSTEMS AND IMPACTS

Promising future for new aquaculture species

In a new report, our scientists have reviewed the potential for farming various species. In the short term, various codfishes (cod, saithe and haddock) are the best candidates for being produced in large quantities in sea cages. Mussels and kelp were also considered suitable species for farming. The researchers believe that Norway has good natural conditions for efficient and sustainable production of species at the bottom of the food chain.



DELOUSING AGENT AFFECTED JUVENILE LOBSTERS

The IMR finds traces of the delousing agent teflubenzuron on the sea bed around fish farms. Our researchers therefore gave juvenile lobsters realistic quantities of teflubenzuron through their food for an extended period. The lobsters developed stiff joints and antennae after changing their shell. In another experiment, scientists placed juvenile lobsters in an oblong tank with a shelter at the far end. Nineteen of them were given feed containing teflubenzuron, and nineteen were given a normal diet. The researchers timed how long it took the lobsters to find the shelter and enter it. On average, the control group spent just over five minutes finding shelter, whereas the ones that had been given delousing agent spent over 18 minutes. Two of them never even found the shelter. A reduced ability to find shelter may affect the survival rate of lobsters, because it makes them more vulnerable to predators.



IMPROVING THE TRAFFIC LIGHT SYSTEM

The IMR's sea louse model shows how sea lice spread, and it is an important part of the traffic light system used by the authorities in their management of the aquaculture industry. To verify the accuracy of the model, scientists have compared the number of sea lice on wild fish with the results of the model. The results were conclusive: the model tells us when and where wild fish will be infested with sea lice. According to the IMR's annual risk report on Norwegian aquaculture, sea lice and the genetic flow from escaped fish are the two biggest environmental hazards currently facing the Norwegian aquaculture industry.



SUSTAINABLE AQUACULTURE



Institute of Marine Research



Funding:

Of our budgeted revenues of around NOK 1,490 million in 2018, over 1,010 million came from the Ministry of Trade, Industry and Fisheries. Just under NOK 480 million came from the Research Council of Norway, the EU and other bodies that fund research.



Who we are:

The Institute of Marine Research has a total of 1,037 employees: 631 at our head office in Bergen, 71 in Tromsø, 40 at the Flødevigen research station, 45 at the Austevoll research station, and 39 at the Matre research station. In addition, we employ 211 sailors.



Vessels:

Our Research Vessels Department manages the IMR-vessels *G.O. Sars*, *Johan Hjord*, *G.M. Dannevig* and *Kristine Bonnevie*, as well as *Hans Brattström*, owned by the University of Bergen, *Dr. Fridtjof Nansen*, owned by Norad, and *Kronprins Haakon*, owned by the Norwegian Polar Institute. In addition, the 38 fishing vessels in the reference fleet regularly supply us with fishing data.



Laboratories:

The Institute of Marine Research has ten laboratories. Six of them are in Bergen, and the others are at our research stations.



Institute of Marine Research

Nordnesgaten 50, Bergen



+47 55 23 85 00



P.O. Box 1870 Nordnes
NO-5817 Bergen



post@hi.no

Follow us:



facebook.com/
havforskning-
instituttet/



youtube.com/
havforskningen



instagram.com/
havforskningen



twitter.com/
havforskningen

www.hi.no