

Fisheries depredation experiences of the Norwegian longline fleet

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The Norwegian long-line fleet has since the mid 90s experienced an increasing problem with depredation from sperm whales (*Physeter macrocephalus*). The problems are not observed in waters close to Norway, but are experienced in areas around Greenland and in the Southern Ocean including the areas outside Argentina to the border of Brazil. The interaction was first observed in deep water fisheries, in depths from 1,000 to 3,000 m (approx. 3,000 – 10,000 feet). In these depths Norwegian long-liners are targeting Greenland halibut (*Reinhardtius hippoglossoides*) and Patagonian toothfish (*Dissostichus eleginoides*). After some years depredation from sperm whales was also observed in the fishery for Atlantic halibut (*Hippoglossus hippoglossus*) in shallower waters, and in recent years fishermen observe depredation from sperm whale during the cod fishery in depths as shallow as 300 m (1,000 feet). Fishermen also observe some depredation from killer whales west of the Mid-Atlantic Ridge, but this is not yet considered a problem.

Longlining has a long tradition for Norwegian fishermen. A direct fishery has been carried out for centuries. Fishing with hooks is one of the oldest fishing methods, stretching thousands of years back in time. Norwegian longliners started as an inshore fishery, but the vessels began to explore offshore fishing areas in the 16th century. This happened with open sailboats as far as 55-110 km offshore (30 – 60 nautical miles), and the fishing was conducted down to 400 m depth. Around 1900 steamboats became more common, and made it possible to expand to more remote areas such as the Shetland and the Faroe Islands. The further modernization of gear and boats made it possible to operate in very rough weather and in more remote places. This has resulted in many deep water fishing areas in the North Atlantic, such as the Rockall Plateau, Greenland, Barents Sea, Jan Mayen and the Reykjanes Ridge. These areas overlap with the distribution areas of many whale species, included sperm and killer whales. Despite high effort levels by fishermen, there has only been periodic depredation observed by killer whales on the Reykjanes Ridge south of Iceland and at Greenland. Depredation by sperm whales has only been observed in the waters around Greenland since the mid 90s. Depredation has never been observed east of the Mid-Atlantic Ridge despite several overlapping areas between the large toothed whales and fishing areas.

The first attempt with longlining at Greenland was done around 1850 in an inshore fishery for cod and Atlantic halibut. The fishery steadily increased and reached a peak in 1925, when a large stock of cod was found in the Davis Strait. Greenland halibut was taken as bycatch, but a directed fishery began in the late 70s. Due to smaller catches of Greenland halibut and gear modernization, the fishery changed from an inshore to an offshore fishery in the late 80s exploring the continental shelf.

Some depredation has been observed from smaller toothed whales, but it has never been considered a problem. Depredation could also occur by fish, and are especially observed by Greenland shark (*Somniosus microcephalus*). Like the whales they can almost clean a longline of fish, but the shark does this while the line is still on the seabed. Greenland sharks also remove a lot of hooks, and this makes it easy to separate this depredation from depredation by whales.

Problems with sperm whales were first observed in the mid 90s in the area around Greenland. In the beginning only a few whales were observed, and depredation happened in deep areas from 1,500 to 2,500 m. In the years to come more longline vessels observed depredation and it was also observed in shallower areas. In the beginning only the Greenland halibut fishery was involved, but because of the movement to shallower areas the depredation also occurred in the Atlantic halibut fishery. The number of observed sperm

whales also increased. In the beginning, one to two whales were observed around the boat, but after a few years the average was more around 8 whales, reaching up to 20 individuals per boat. In recent years fishermen claim that depredation by sperm whales also occurs during the cod fishery, in waters as shallow as 300 m.

Almost simultaneously with the observed depredation by sperm whales around Greenland, Norwegian fishermen experienced similar depredation in the Southern Ocean. The Patagonian toothfish fishery is similar to the Greenland halibut fishery both in terms of fishing gear used and water depth. A similar pattern was also observed in the south. A few individuals were observed in the beginning in deep areas, but depredating whales gradually moved to shallower areas and more whales around vessels were observed.

Fishermen have tried several methods to avoid sperm whales, using both active and passive methods, but they all lose their effectiveness over time. They have tried different types of sound generators and acoustical devices, such as playing killer whale sounds, and sending out noise to disrupt the sounds made by sperm whales. They have made modifications on the line to make it drift more during hauling, and some have changed their gear to a pot fishery. The line modifications had some positive effect on the catch, but the gear operating became more difficult because of entanglement. The yield using pots was too low in these deep water fisheries. Some fishermen have even tried to herd the sperm whales to other fishing areas and fishing boats. The whales would stay behind, but this was of course not very popular amongst other fishermen.

It is difficult to predict the catch loss after depredation occurred. Up to 100 % loss has been observed, although the average is less. As a result of depredation, many fishermen have given up long-line fishing around Greenland and in the Southern Ocean. Despite effort to keep whales away, yield from these abundant areas has become too low to carry on with the fishery.