Protecting Ocean Wildlife in Co-op's Seafood Supply Chain
April 2022

Fisheries and Bycatch

Bycatch, the catch of non-target species, is one of the most significant issues affecting the biological sustainability of marine fisheries. In particular, bycatch of endangered, threatened, and protected (ETP) species continues at a global and ecologically significant scale, despite an increase in the number of certified fisheries and improvement projects, and public attention to this issue.

Fisheries bycatch is a primary driver of population decline in many ETP species. These populations are at very low levels and are formally listed as endangered, threatened, or protected by international, national, and/or local jurisdictions.

Sharks and rays, seabirds, marine mammals, and sea turtles, all of which are ecologically important to ocean habitats, are at high risk of capture and harm in commercial fisheries. Many of these species are distributed across large geographic areas and overlap many fisheries. Many also have life-history characteristics that make them vulnerable to fishing-related mortality, such as slow growth, long reproductive cycles, and production of small numbers of offspring.

One-third of the world's sharks and rays are threatened with extinction, according to International Union for Conservation of Nature (IUCN) Red List criteria.

15 of the 22 species of albatross are threatened with extinction.

Less than 350 North Atlantic right whales remain in the world.

Fisheries bycatch is recognized as the greatest threat to **all seven species of sea turtles**.

Retailers and the Seafood Supply Chain Have a Key Role in Reducing Bycatch

It is imperative that retailers take action to identify bycatch problems in their own supply chains and promote measures that will eliminate lethal impacts on ocean wildlife, especially ETP species.

The bycatch of ETP species in fisheries is a major challenge to retailers that sell seafood and have commitments on sustainable sourcing or biodiversity protection. Participating in production that leads to the decline of vulnerable marine wildlife will breach these commitments and generate concern from seafood consumers who do not wish to be associated with these kinds of impacts.

Co-op and Seafood Sustainability

Co-op is a leading convenience retailer with more than 2,500 stores across the UK – one in every postal area. As a member-owned co-operative, it is guided by principles that include open membership and concern for community.

Co-op is committed to caring for the environment from which ingredients are sourced, as set out in the Co-op Future of Food ambition. To achieve this, Co-op supports credible certification where it drives change.

Co-op sources seafood using strict criteria as part of their Healthy Oceans strategy, to make sure there is fish for the future and thriving marine ecosystems.

Co-op welcomes the evaluation of risks to marine ETP species from fishery bycatch and will take action to address the issues that have been identified. Co-op will continue to collaborate with Sustainable Fisheries Partnership (SFP), Birdlife International, and Whale and Dolphin Conservation to identify and address issues in the future and ensure, through procurement policies and other measures, that the company's seafood supply chain does not present unacceptable threats to marine wildlife.

Key Findings and Recommendations

This audit identified the fisheries in the Co-op supply chain that present the highest bycatch risks to sharks and rays, seabirds, marine mammals, and sea turtles.

The risk assessment conducted as part of the audit demonstrates a range of potential bycatch impacts to ETP species from the fisheries that supply Co-op. The audit identified a number of the fisheries as having the highest potential bycatch risk. A full list of these fisheries will be incorporated into the Co-op Food Ocean Disclosure Profile (ODP).

SFP reviewed the results of the audit with Co-op to determine where they can have the most impact by encouraging improvements to reduce ETP bycatch. The following are the top findings of this analysis and the fisheries where Co-op should prioritize action:

- Alaska salmon set/drift gillnet fisheries pose a significant risk to seabirds.
- Icelandic cod/haddock gillnet and longline fisheries pose a significant risk to seabirds and marine mammals.
- Canadian (American) Lobster & UK Brown crab pot and trap fisheries pose a risk to marine mammals.

While the primary purpose of the audit was to identify fisheries where there are bycatch risks, it revealed broad and proactive actions by Co-op to promote healthy fisheries and protect marine biodiversity. For example:

- Co-op's tuna sourcing comes from fisheries with healthy stocks and that use techniques, such as pole and line, that have very minimal bycatch impacts and/or impacts on habitat.
- There were very few fisheries with threats to sea turtles or sharks and rays. The Co-op supply chain specifically avoids fishery products from fisheries that have high population-level impacts on sea turtles, such as pelagic longline fisheries in the Pacific Ocean. They also do not source from purse seine fisheries that use fish aggregating devices, which can have negative impacts on these species.
- Co-op's Healthy Oceans strategy includes sourcing from fishery improvement projects (FIPs) and fisheries certified by the Marine Stewardship Council (MSC) that have mechanisms in place to support solutions on bycatch issues.

A number of common themes also emerged from the analysis. These were presented to Co-op with the following key recommendations, for work with their suppliers across various fisheries:

- Levels of bycatch monitoring are generally poor, and there is a need to adopt higher levels of observer coverage.
- There is an urgent need for a significant increase in the levels of bycatch incident reporting (which should be regular, detailed, and standardized). Data on bycatch needs to be placed in the public domain and be available to all stakeholders.
- There is minimal effort to continuously improve bycatch reduction. Bycatch mitigation should aim to adopt best practices at all times
- There is a clear need for a systematic examination of alternative gear options in fisheries where there are high bycatch risks, e.g. move away from gillnet fisheries**.**

Co-op understands that the issues identified in the report signal a need to fully address risks to ETP species across all of its sourcing, and commits to working with suppliers to improve fishery management and implement the recommendations above.

Methodology

Sustainable Fisheries Partnership, Birdlife International, and Whale and Dolphin Conservation collaborated to develop criteria to identify fisheries that could be considered high risk for interactions with sharks and rays, seabirds, marine mammals, and sea turtles.

These criteria include:

- The conservation status of the relevant bycatch species, as determined by the International Union for Conservation of Nature (IUCN).
- Bycatch rate and evidence of impact at a population level, or high likelihood of bycatch, based on gear type and overlap with susceptible species.
- Scale of the specific bycatch problem, e.g., across the world versus limited to one fishery.
- If the fisheries impact species with a very small range.
- If the fisheries include cross-taxa bycatch.
- If Marine Stewardship Council (MSC) certification has been suspended due to non-compliance with elements of Principle 2 in the MSC Standard.

SFP reviewed and assessed all of the fisheries disclosed by the company in the Ocean Disclosure Project against these criteria. Based on this analysis, SFP identified the fisheries in the company's portfolio that represent the greatest risk for each of the four types of wildlife (sharks and rays, seabirds, marine mammals, sea turtles). At least one, and up to three, fisheries were selected in each category.

Detailed Findings of Bycatch Audit

The following briefing and sections include:

- Background on bycatch issues for each of the wildlife categories.
- The highest-risk fisheries (up to three) for each taxa and recommended monitoring and mitigation methods.

Sharks and Rays

High levels of shark bycatch have been reported in pelagic longline fisheries that target tuna and swordfish, and this is considered a major source of mortality for many species worldwide. Up to one-quarter of the total catch in some pelagic longline tuna fisheries are shark species. The most commonly caught shark species is typically the blue shark, which has a healthy population status in most of its range, though the situation is different for other commonly caught species such as shortfin mako. Many species, such as thresher and hammerhead species, are listed as vulnerable and endangered (respectively) by the IUCN or other national measures.

While sharks are primarily caught as bycatch in pelagic longline fisheries, sharks and rays can also be captured in trawls, primarily bottom trawl fisheries.[1] Basking sharks are also reported to be entangled in pot fisheries in Scotland.[2]

Trawl fisheries can also interact with bottom-dwelling species of sharks and rays.[3] For example, prawn trawl fisheries in Papua New Guinea have reported the incidental capture of 40 species of sharks and rays[4] and Indian trawl fisheries have reported interactions with various shark and ray species,[5] as have other trawl fisheries worldwide.[6]

The loss of sharks has been shown to negatively impact ecosystems, for example leading to changes in the abundance of their prey species, which can lead to a cascade of other trophic-level impacts in the ecosystem. As the number of predators decreases, prey behavior can be altered, releasing lower-trophic-level species from predation.

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High-Risk Fisheries

1) Joint demersal fisheries in the North Sea and adjacent waters (MSC-C)

This fishery interacts with several endangered, threatened, and protected (ETP) species of sharks and rays, including starry ray, thornback ray, common skate, winter skate, angel shark, spiny dogfish, and porbeagle sharks.

The specific species the fishery interacts with depends on the areas being fished, with starry ray, common skate, spurdog, and porbeagle sharks being incidentally captured in the North Sea (ICES subarea 4), starry ray, thornback ray, common skate, and spurdog in Skagerrak (ICES Division 3aN), and starry ray, thornback ray, common skate, and spurdog in Kattegat (ICES Division 3aS).[7]

Misidentification of ray species is a common problem in fisheries and may impact proper reporting. There are various management measures in place for these species, including the release of live bycatch, catch limits, bycatch reduction programs, and avoiding hotspots (specific to spiny dogfish). The MSC fishery has a condition associated with starry ray, requiring the recording of discards of this species.

Priority Recommendations

a) Require vessels to comply with the current observer program Code of Conduct and increase observer coverage on vessels, with a goal of achieving 100-percent (human and electronic) coverage within the next three years.

b) Adopt best practice bycatch-mitigation measures for vessels and ensure required species identification cards are posted on the vessel.

c) Require that all vessels collect and provide accurate data on shark and ray captures and discards to the appropriate authorities.

d) Require that vessel captains and crews attend workshops on shark and ray identification and best practices for safe handling and release, and comply with required bycatch-reduction programs.

[7] Sieben, C., Gascoigne, J., Dogget, M., Blyth-Skyrme, R., Borges, L., Seip, C., Cook, R., Bell, M., Honneland, G. and Lowenberg, U. 2019. Joint demersal fisheries in the North Sea and adjacent waters. MSC public certification report – Principle 2. Control Union Pesca, Ltd.
https://cert.msc.org/FileLoader/FileLinkDownload.asmx/GetFile?encryptedKey=6Mft6/9vE6lB7tpcpZ9xnK/h3feUhAo6LtQLHw7WSK6+77+oO8DSpy7D2iAu6DlW

Seabirds

Seabirds are vulnerable to bycatch impacts from multiple fishing gears, and this is considered the number-one threat to seabirds at sea.[8]

Perhaps best documented is bycatch in longline fisheries, which has been identified as a key driver in the decline of albatrosses since the late 1980s and early 1990s.[9, 10] Longlines continue to drive albatross declines, and also catch smaller petrel and shearwater species.[8, 11]

Longlines alone are estimated to kill at least 160,000 seabirds per year, and particular fisheries of concern are those that operate south of 20 degrees latitude (mainly Japanese and Taiwanese tuna vessels on the high seas and the domestic Brazilian tuna fleet). Other fisheries of concern include North Atlantic demersal longline fisheries for whitefish (e.g., hake targeted by predominantly Spanish vessels operating to the west of the UK and Ireland and cod/haddock targeted in Norwegian, Faroese, and Icelandic waters).[11]

While longline bycatch is better documented, gillnet fisheries were among the first to be recognized as problematic for diving seabirds, most notably driftnets.[12] The global scale of bycatch in all types of this gear is conservatively estimated to be 400,000 birds per year,[13] with the Baltic Sea, North Atlantic (particularly Iceland), and Northwest Pacific identified as hotspots.

A global estimate of seabird bycatch in trawl fleets has not been published, but preliminary analysis indicates that bycatch from fisheries from which there is data suggest that it is likely to be of a similar order of magnitude to longline fisheries.[14, 15, 16] Trawl fisheries tend to affect longer-winged species more (i.e., albatrosses), through collisions with the warp and net-sonde cables or entanglements in the nets as birds

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[13] Žydelis, R., Small, C., and French, G., 2013. The incidental catch of seabirds in gillnet fisheries: A global review. Biological Conservation, 162, 76-88.

[14] Bartle, A.J., 1991. Incidental capture of seabirds in the New Zealand and sub-Antarctic squid trawl fishery, 1990. Bird Conserv Int 1:351–359.

[15] Birdlife International, 2013. Longline fishing effort overlaps with foraging hotspots for seabirds and causes significant bycatch. Birdlife International.

[16] Fox, E., Crawford, R., Prince, S., Yates, O. and Philips, R. A *(In prep)*. Incidental mortality in trawl fisheries: A global review.

forage for discards behind vessels.[17] Again, fisheries operating south of 20 degrees latitude (i.e., overlapping with albatross) are of particular concern.

In recent years, seabird mortality in purse seine fisheries, particularly of shearwaters, has been recorded in Portugal[18] and Chile[19] and is receiving increased attention, though it has not been quantified on a global scale.[20]

High-Risk Fisheries

1) Alaska Salmon Set/Drift Gillnet Fishery

The Alaska salmon fishery was first certified under the MSC standard in 2000, with a condition to certification requiring that bycatch data in test fisheries would be collected to identify whether bycatch of mammals and seabirds might be a significant conservation issue.

Nearly 20 years later, the fishery went through a recertification process, in which conservation organizations raised concerns over seabird bycatch. Misuse of data in the assessment may have resulted in an underestimation of bycatch. The certification process used data that is highly variable in both time and space and does not specifically address the different fishing practices, nor question the data accuracy of the test fisheries used to assess bycatch.

Alcids (auks) are the species group most susceptible to bycatch in this fishery, as Alaskan waters host particularly large numbers of this group of diving birds.[21, 22, 23] One species raising particular concern is the marbled murrelet, which is listed under the US Endangered Species Act and as Endangered on the IUCN Red List.

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[21] Sullender, B. K. and Smith, M. A. 2016. Ecological Atlas of Alaska's Western Arctic. Audubon Alaska, Anchorage, AK. 71 pp.

[22] Smith, M. A. 2016. Ecological Atlas of Southeast Alaska. Audubon Alaska, Anchorage, AK. 223 pp.

[23] Babcock, E. A. and Pikitch, E. K. (2003). How much observer coverage is enough to adequately estimate bycatch? Pew Institute of Ocean Science.

Priority Recommendations

a) Implement an observer program covering a sufficient percentage of the fleet – starting with a minimum of 5 percent and increasing to a minimum of 20 percent[24] (human and electronic, human at least 5 percent) within three years. Emphasis should be on areas that reported significant seabird bycatch in the past and where areas of particular importance for seabirds overlap with gillnet fishing effort.

b) Require that all vessels collect and provide accurate data on bird captures to their respective authorities.

c) Adopt best practice bycatch-mitigation measures for vessels, where they exist, and/or conduct research trials for new bycatch-mitigation solutions (e.g., gillnets).

d) Require that vessel captains and crews attend workshops on bird identification and best practices for safe handling and release.

e) Develop incentives to reduce the bycatch of seabirds.

2) Icelandic Cod/Haddock Gillnet and Longline Fishery

The ISF Iceland Cod and ISF Iceland Haddock fisheries were both MSC certified in 2012. Combined, the Icelandic gillnet and longline fishery are estimated to ycatch ~4,000 birds each year, including 2,500 Northern fulmars, nearly 500 common guillemots, and 500 northern gannets, as well as lower numbers of species such as black guillemots, razorbills, Atlantic puffins, cormorants and shags, common loons, eider ducks, and great and lesser black-backed gulls.

The bycatch reality of this fishery is particularly worrisome for fulmars, great black-backed gulls (both endangered in Europe and/or Iceland), and common loon ("vulnerable" under Icelandic/European Red Lists), with bycatch representing 6 percent to approximately 20 percent, and 40 percent of their yearly estimated decline in adult birds, respectively.

We recognize that a series of "conditions" for the recertification of this fishery, related to seabird bycatch, has been raised over the past few years. However, it is currently unclear if measures will be implemented effectively in the fishery and deliver expected conservation outcomes.

[24] Babcock, E. A. and Pikitch, E. K. (2003). How much observer coverage is enough to adequately estimate bycatch? Pew Institute of Ocean Science.

While simple best practice measures to minimize seabird bycatch in longline fisheries exist (see ACAP Best Practice Guidelines), there are no legal requirements to use these measures (such as bird-scaring lines, line weighting, or night setting) on Icelandic longliners. For gillnetters, there are currently no widely effective technical mitigation measures, besides highly unpopular fishing restrictions within bycatch hotspots or gear switching.

Priority Recommendations

a) Require longline vessels to implement established best practice seabird bycatch-mitigation measures – notably bird-scaring lines and improved line-weighting regimes – based on testing to ensure suitability for Icelandic vessels.

b) Implement an observer program covering a sufficient percentage of the fleet – starting with a minimum of 5 percent now, with a goal of achieving 100 percent[25] (human and/or electronic) within 5 to 10 years. Early efforts should be on areas that reported significant seabird bycatch in the past and where areas of particular importance for seabirds overlap with longline/gillnet fishing efforts.

c) Require implementation of best practice mitigation measures and demonstrate continual reductions in the bycatch rate. In the absence of known bycatch -mitigation measures, solutions should be explored and a long-term strategy to tackle seabird and other taxa bycatch should be implemented within the fishery. Progressive switching of gillnetters toward vessels using longlines (or autoline), for which effective bycatch mitigation measures already exist, should also be promoted and supported.

[25] Babcock, E. A. and Pikitch, E. K. (2003). How much observer coverage is enough to adequately estimate bycatch? Pew Institute of Ocean Science.

Marine Mammals

Marine mammal bycatch data are poor in most fisheries. The latest scientific assessment (2006) calculated that many hundreds of thousands of marine mammals are killed in fisheries each year,[26] although this is likely to be an underestimate. For example, a recent review of Indian Ocean tuna gillnets determined that 4 million dolphins have been caught as bycatch since 1950.[27]

Static net fisheries (gillnets, tanglenets, etc.) are widely reported to have the biggest global impact on marine mammals.[28]

Static rope gear using pots and traps is also a problem for a range of marine mammals, particularly for baleen whales and especially for the endangered North Atlantic right whale and humpback whale. Lethal entanglements of baleen whales are, arguably, one of the worst forms of human-caused mortality in any wild animal,[29] often lasting for long periods of time and causing immense suffering.

Purse seine fisheries can also incidentally capture marine mammals. Population-level impacts have been associated with the deliberate setting of purse seine nets around dolphins in tuna fisheries in the Eastern Tropical Pacific since the 1960s.[30] Despite reduced mortality rates of dolphins to fewer than 1,000 per year in recent decades, the populations of dolphins are not showing signs of recovery,[31, 32] and the rate of calf production has been declining since the 1980s.[33] In US purse seine fisheries, species most commonly captured include bottlenose dolphins and humpback whales.[34]

Marine mammals can become entangled by trawl gear when swimming to forage or migrate, with risks differing widely among species. Species that forage on or near the seafloor are at risk of being captured or entangled in netting, groundlines, or tow lines. Pilot whales and common dolphins in the Atlantic are particularly susceptible to being caught in bottom trawls.[35]

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[26] Read, A. J., Drinker, P., and Northridge, S. 2006. Bycatch of marine mammals in U.S. and global fisheries. Conservation Biology 20: 163–169.
[27] Anderson, R., Herrera, M., Moazzam, M., Ilangakoon, A., Mustika, P. and Sutaria, D. 2020. Cetacean bycatch in Indian Ocean tuna gillnet fisheries Endangered Species Research 41: 39–53
[28] Reeves, R.R., McClellan, K. and Werner, T.B. 2013. Marine mammal bycatch in gillnet and other entangling net fisheries, 1990 to 2011. Endangered Species Research 20: 71–97.
[29] Cassoff, R.M, Moore, K.M., McLellan, W.A., Barco, S.G., Rotstein, D.S. and Moore, M.J. 2011. Lethal entanglement syndrome in baleen whales. Diseases of Aquatic Organisms 96: 175–185.
[30] Wade, P.R., Watters, G.M., Gerrodette, T. and Reilly, S.B. 2007. Depletion of spotted and spinner dolphins in the eastern tropical Pacific: modeling hypotheses for their lack of recovery. Marine Ecology Progress Series 343: 1-14.
[31] Gerrodette, T. and Forcada, J. 2005. Non-recovery of two spotted and spinner dolphin populations in the eastern tropical Pacific Ocean. Marine Ecological Progress Series 291: 1–21.
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[34] NOAA. Fishing Gear: Purse Seine https://www.fisheries.noaa.gov/national/bycatch/fishing-gear-purse-seines.
[35] Rossman, M.C. 2010. Estimated bycatch of small cetaceans in northeast US bottom trawl fishing gear during 2000–2005. Journal of Northwest Atlantic Fishery Science 42: 77–101. doi:10.2960/J.v42.m650.

Longline fisheries have very poor data on marine mammal interactions, but have been noted as a concern by some studies.[36]

High-Risk Fisheries

1) Icelandic Cod/Haddock Fisheries – Gillnet

Gillnets are used in Icelandic waters to catch cod in the winter and spring during their spawning migrations.[37] Bycatch of several species of marine mammals has been reported in the cod gillnet fishery, mainly of harbor porpoise; however, there are also records of bycatch of harbor seal, grey seal, harp seal, and white-beaked dolphin.[38]

The fishery onboard observer scheme in the fishery is led by the Marine and Freshwater Research Institute (MFRI),[39] but there is limited information on the scheme and coverage. Annual cod fishery surveys are conducted each April by the MFRI, which covers about 2 percent of the total cod gillnet effort.

Bycatch reporting is mandatory in Iceland, but the return of electronic logbooks has been low, with no marine mammal bycatch reported between 2009 to 2017 when the fishery changed to electronic logbooks. There are also some inconsistencies between observer-collected data and self-reporting.[40]

It is estimated that about 811 (95% CI: 575-1065) porpoises are bycaught in the cod gillnet fishery annually. The majority of porpoise bycatch occurred in March and April in nearshore waters.[41] Forty-six harbor seals were observed as bycatch in the cod gillnet fishery in 2015.[42] Trials of acoustic porpoise deterrents (APDs) were conducted in the cod gillnet fishery in 2017, however, there was no reduction in harbor porpoise bycatch.[43]

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[36] Werner, T.B., Northridge, S., McClellan Press, K. and Young, N. 2015. Mitigating bycatch and depredation of marine mammals in longline fisheries. ICES Journal of Marine Science 72: 1576-1586.

[37] Punt, A.E., Siple, M., Sigurðsson, G.M., Víkingsson, G., Francis, T.B., Granquist, S.M., Hammond, P.S., Heinemann, D., Long, K.J., Moore, J.E., Sepúlveda, M., Reeves, R.R., Wade, P.R., Williams, R. and Zerbini, A.N. 2020. Evaluating management strategies for marine mammal populations: an example for multiple species and multiple fishing sectors in Iceland. Canadian Journal of Fisheries and Aquatic Sciences 77: 1316–1331. https://doi.org/10.1139/cjfas-2019-0386.

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[39] https://www.hafogvatn.is/en/

[40] Medley, P.A.H., Hønneland, G. and Huntington,T., 2017. Marine Stewardship Council Fisheries Assessment, ISF Iceland Cod Fishery Public Certification Report. Report on the 1st re-assessment of the fishery. 236 pp. Available at: https://fisheries.msc.org/en/fisheries/isf-iceland-cod/@@assessments

[41] Marine and Freshwater Research Institute (MFRI). (2020). Bycatch of marine mammals and seabirds in Icelandic waters 2016-2019. Unpublished manuscript (MFRI Tech Report).

[42] Þorbjörnsson, J.G., Hauksson, E., Sigurðsson, G.M., and Granquist, S.M. 2017. Aerial census of the Icelandic harbour seal (Phoca vitulina) population in 2016: Population estimate, trends. HV 2017-009 [online]. Available at: https://www.hafogvatn.is/static/research/files/hv2017-009.pdf.

[43] Víkingsson, G.A., Granquist, S.M., Gunnlaugsson, Þ., Halldórsson, S.D., Chosson, V. and Sigurðsson, G.M. 2020. Iceland progress report on marine mammals in 2020. Submitted to NAMMCO. Available at: https://nammco.no/wp-content/uploads/2021/03/2020-nammco-iceland_progress_report.pdf.

The cod gillnet fishery is subject to the US Seafood Import Rule, requiring bycatch monitoring and mitigation standards to be comparable to US fisheries.[44] The cod gillnet fishery has been Marine Stewardship Council (MSC) certified since 2012. However, although the cod gillnet fishery is the largest source of anthropogenic mortality for harbor porpoise in Iceland, within the MSC assessment, harbor porpoise is not considered an ETP species, due to the lack of legislation covering the species in Iceland and the IUCN classification of Least Concern.[45]

The population of harbor and grey seals has declined since counts started in the early 1980s, and fisheries bycatch and targeted hunts are likely the main factors.[46] Targeted hunts have been banned since 2019 to maintain the seal populations above a set level. [47] However, there is limited work on the impact of bycatch on seal populations to date, and bycatch rates are thought to be underestimated.

Priority Recommendations

a) Consider changing gear types and avoiding gill nets if this delivers an overall reduction in bycatch incidents.

b) Increase observer coverage on vessels to at least 5 percent now, with a goal of achieving 100 percent (human and electronic) coverage within the next 5 to 10 years, and annual presentation of bycatch data to calculate a bycatch rate from each fishery. Include photos/samples of animals for more accurate assessment of bycatch species, especially for grey and harbor seals over the next three years.

c) Require implementation of best practice mitigation measures and demonstrate continual reductions in the bycatch rate.

- Measures to immediately reduce bycatch include spatial and/or temporal area closures, e.g., no coastal gillnets from March to April and further testing on the use of acoustic deterrent devices (pingers) on all gillnets to reduce harbor porpoise bycatch.
- Conduct an appropriate environmental assessment to ensure the pingers are not causing habitat displacement until other gear types can replace gillnets altogether (as in recommendation 1).

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[44] https://www.fisheries.noaa.gov/foreign/marine-mammal-protection/noaa-fisheries-establishes-international-marine-mammal-bycatch-criteria-us-imports

[45] Braulik, G., Minton , G., Amano, M. and Bjørge, A. 2020. Phocoena phocoena. The IUCN Red List of Threatened Species 2020: e.T17027A50369903. Available at: https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T17027A50369903.en.

[46] Þorbjörnsson, J.G., Hauksson, E., Sigurðsson, G.M., and Granquist, S.M. 2017. Aerial census of the Icelandic harbour seal (Phoca vitulina) population in 2016: Population estimate, trends. HV 2017-009 [online]. Available at: https://www.hafogvatn.is/static/research/files/hv2017-009.pdf.

[47] Víkingsson, G.A., Granquist, S.M., Gunnlaugsson, Þ., Halldórsson, S.D., Chosson, V. and Sigurðsson, G.M. 2020. Iceland progress report on marine mammals in 2020. Submitted to NAMMCO. Available at: https://nammco.no/wp-content/uploads/2021/03/2020-nammco-iceland_progress_report.pdf.

2) Orkney Brown Crab Fishery – Pots and Traps

Marine animal entanglements are a growing and severe problem globally, considered by the International Whaling Commission (IWC) to be the single most significant marine mammal welfare issue of our time.[48] To date, research in the fishery has focused on crab tagging, size at maturity, and discards mortality,[49] and more recently, large animal entanglements.

During the Scottish Entanglement Alliance (SEA)[50] project, interviews were conducted with 11 percent of Scottish creel fishers, and Risso's dolphins, minke whales, pilot whales, and humpback whales were all reported entangled in brown crab pots and traps. Using stranding data from 2005 to 2019, Orkney was highlighted as a hotspot for minke whale entanglements.[51]

In Scottish waters, entanglements for individual fishers are a rare occurrence (<1 per decade), but events become common when aggregated to the level of the industry. This has implications for the feasibility of certain monitoring strategies, for example, placing observers on vessels.

While there is no formal observer program, observers from the Orkney Sustainable Fisheries (OSF) and Heriot-Watt University are regularly onboard, and no entanglements have been reported to date. Marine Scotland recently introduced a license requirement for fishers to report all bycatch.

However, even a low incidence of entanglements for individual fishers may have an impact on the population of some species such as humpback and minke whales. MacLennan et al.[52] estimated that about five humpbacks and 30 minke whales become entangled annually in the Scottish creel fleet, which poses both a welfare and conservation issue, and may cause localized depletion of the minke whales. More recently, three Risso's dolphins have been reported to the Scottish Marine Animal Stranding Scheme entangled in pots and traps around Orkney. Although Risso's are classified as Least Concern by the IUCN, the population trend is unknown.[53]

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[48] International Whaling Commission. 2017. Report of the Workshop to Support the IWC's Consideration of Non-Hunting Related Aspects of Cetacean Welfare. IWC/66/WKM&WI Rep 01. 34 pp. Available: https://archive.iwc.int/pages/view.php?ref=6230&k=.
[49] http://www.orkneysustainablefisheries.co.uk/
[50] https://www.scottishentanglement.org/
[51] MacLennan, E., Leaper, R., Brownlow, A.C., Calderan, S. Jarvis, D., Hartny-Mills, L. and Ryan, C. 2020. Estimates of humpback and minke whale entanglements in Scotland. Paper presented to the International Whaling Commission Scientific Committee. SC/68B/HIM/01. 15 pp.
[52] MacLennan, E., Leaper, R., Brownlow, A.C., Calderan, S. Jarvis, D., Hartny-Mills, L. and Ryan, C. 2020. Estimates of humpback and minke whale entanglements in Scotland. Paper presented to the International Whaling Commission Scientific Committee. SC/68B/HIM/01. 15 pp.
[53] Kiszka, J. and Braulik, G. 2018. Grampus griseus. The IUCN Red List of Threatened Species 2018: e.T9461A50356660. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T9461A50356660.en.

The Orkney brown crab fishery started an assessment for MSC certification in 2017, but it was withdrawn in 2018.

Priority Recommendations

a) Prioritize the development of fishing gear technologies to reduce entanglements, e.g., on-demand gear (ropeless gear) and negatively buoyant rope.

b) Improve regulations to continually reduce entanglements, through spatial measures and creel limits as well as technical solutions.

c) Enforce reporting of entanglements.

d) Take steps to prevent gear loss, through the removal of wet storage (when unbaited traps and pots are left in-situ to mark the territory of a fishing area).

3) American Lobster Gulf of St Lawrence, Canada – Pots and Traps

The North Atlantic right whale (NARW) is the only large whale species listed as critically endangered by the IUCN Red List, with an estimated population of 336 whales,[54] of which fewer than 100 are breeding-age females.

The NARW is protected under Schedule 1 of Canada's Species At Risk Act (SARA) and as such, no person can: kill, harm, harass, capture or take, possess, collect, buy, sell or trade NARW. The Recovery Potential Assessment (RPA) for the NARW states "There is no scope for allowable human-induced mortality since population abundance is estimated as critically low and the population appears to be declining toward extinction." The national limit for the protection and rebuilding of the NARW is zero-mortality.

Entanglement in fishing gear is thought to be the primary anthropogenic threat to NARW. The NARW population has been in decline since 2010 due to vessel strikes and entanglements.[55] About 85 percent of North Atlantic right whales bear entanglement scars from interactions with fishing gear, especially pots and traps,[56] and studies have shown that large whale entanglement rates are underestimated in species like the

[54]https://www.neaq.org/about-us/news-media/press-kit/press-releases/population-of-north-atlantic-right-whales-continues-its-downward-trajectory/

[55] Pettis, H.M., Pace, R.M. III, Hamilton, P.K. 2021. North Atlantic Right Whale Consortium 2020 Annual Report Card. Report to the North Atlantic Right Whale Consortium. Available at: https://www.narwc.org/uploads/1/1/6/6/116623219/2020narwcreport_cardfinal.pdf.

[56] Knowlton, A.R., Marx, M.K., Hamilton, P.K. and Pettis, H.M. 2018. Task 2: final report on 2018 right whale entanglement scar coding efforts. pp 43-67. In: Hamilton, P.K., Knowlton, A.R., Hagbloom, M.N., Howe, K.R. Marx, M.K., Pettis, H.M., Warren, A.M. and Zani, M.A. (editors). Maintenance of the North Atlantic right whale catalogue, whale scarring and visual health databases, anthropogenic injury case studies, and near real-time matching for biopsy efforts, entangled, injured, sick, or dead right whales. Final report to the National Marine Fisheries Service, Woods Hole, MA. Available at: https://www.narwc.org/uploads/1/1/6/6/116623219/catalog_report-2020_-_final.pdf.

NARW and the endangered fin whale (Balaenoptera physalus).[57, 58]

No interactions between the American lobster fishery and blue and fin whales have been reported in the last five years. However, they cannot be excluded. Entanglement in fishing gear may cause large baleen whales to suffer for months to years, not only from the injuries caused by the entanglement but also from reduced reproductive output[59] and delayed growth rates.[60]

The Maritime Canada inshore lobster trap fishery obtained MSC certification in 2021. The fishery was previously covered under two different assessments certified in 2014 and 2015. While this is a Canadian fishery, it should be noted that the US American lobster fishery is classified by NOAA as Category I, meaning that there are frequent interactions with marine mammals.[61]

Observer coverage in the fishery is low. There are relatively strict conditions for the MSC certificate. However, the potential for NARW entanglement is a major conservation issue, and therefore, this fishery has been considered to be high risk.

Priority Recommendations

a) Support the expedited development of on-demand fishing gear technologies.

b) Expand the location and duration of areas restricted to the use of static vertical (buoy) lines when right whales are present, based on real-time observational data.

c) Require gear marking to identify the fishery, including country of origin, management area, target species, and permit number.

d) Improve enforcement and monitoring of fisheries in NARW habitats, including restricted areas.

[57] Pace, R., Williams, R., Kraus, S., Knowlton, A. and Pettis, H. 2021. Cryptic mortality of North Atlantic right whales. Conservation Science and Practice. 3:e346. https://doi.org/10.1111/csp2.346.
[58] Ramp, C., Gaspard, D., Gavrilchuk, K., Unger, M., Schleimer, A., Delarue, J., Landry, S., and Sears, R. 2021. Up in the air: drone images reveal underestimation of entanglement rates in large rorqual whales. Endangered Species Research 44: 33-44. https://doi.org/10.3354/esr01084.
[59] Van der Hoop, J., Corkeron, P. and Moore, M. 2017. Entanglement is a costly life-history stage in large whales. Ecology and Evolution 7: 92-106. doi:10.1002/ece3.2615.
[60] Stewart, J.D., Durban, J.W., Knowlton, A.R., Lynn, M.S., Fearnbach, H., Barbaro, J., Perryman, W.L., Miller, C.A. and Moore, M.J. 2021. Decreasing body lengths in North Atlantic right whales. Current Biology. 10.1016/j.cub.2021.04.067.
[61] https://www.fisheries.noaa.gov/national/marine-mammal-protection/northeast-mid-atlantic-american-lobster-trap-pot-fishery-mmp

Sea Turtles

Sea turtles are restricted to temperate and tropical seas, with loggerhead and leatherback turtles ranging into high latitudes such as Northern Europe and the northern coastline of the United States, and leatherbacks ranging into Canadian waters.[62] Fisheries in high latitudes that impact other taxa such as seabirds and marine mammals are therefore less relevant for sea turtles.

All seven species of sea turtles have a similarly complex life cycle, at the various stages of which they are subject to different threats, the most significant of which is generally considered to be fisheries bycatch. All sea turtle species are considered ETP.

Rates of development vary between and within species. For many populations, age at maturity is unclear, but is often estimated as being between 20 and 50 years.[63, 64] These uncertainties, along with low or non-existent fisheries observer coverage, confound our ability to understand the population-level impact of fisheries mortality at the different life-stages (e.g., pelagic juvenile, pelagic adult, neritic juvenile, neritic adult) of the various populations.[65]

There is no robust estimate for sea turtle bycatch worldwide because of a global paucity of data, specifically observer information; this is especially true for small-scale fisheries. However, in the Mediterranean Sea alone, over 44,000 sea turtle deaths annually are conservatively estimated.[66] In longline fisheries, global catches of 200,000 loggerhead turtles and 50,000 leatherback turtles are estimated and are attributed to declines in nest counts.[67]

Sea turtles can be caught and incidentally killed in most fishing gears, with bottom trawls, gillnets/trammel nets, and demersal and pelagic longlines being the biggest contributors, all with varying capture rates and mortality rates, depending on factors such as mesh size, bait type, soak time, etc.

[62] Hamelin, K.M., James, M.C., Ledwell, W., Huntington, J. and Martin, K. (2017) Incidental capture of leatherback sea turtles in fixed fishing gear off Atlantic Canada. Aquatic Conservation: Marine and Freshwater Ecosystems, 27, 631–642.
[63] Casale, P. (2011) Sea turtle by-catch in the Mediterranean. Fish and Fisheries, 12, 299–316.
[64] Scott, R., Marsh, R. and Hays, G.C. (2012) Life in the really slow lane: Loggerhead sea turtles mature late relative to other reptiles. Functional Ecology, 26, 227–235.
[65] Wallace, B.P., Heppell, S.S., Lewison, R.L., Kelez, S. and Crowder, L.B. (2008) Impacts of fisheries bycatch on loggerhead turtles worldwide inferred from reproductive value analyses. Journal of Applied Ecology, 45, 1076–1085.
[66] Casale, P. (2011) Sea turtle by-catch in the Mediterranean. Fish and Fisheries, 12, 299–316.
[67] Lewison, Rebecca L, Crowder, L.B., Read, A.J. andFreeman, S.A. (2004) Understanding impacts of fisheries bycatch on marine megafauna, 19.

Bycatch reviews[68, 69, 70] used the available fisheries bycatch data (from onboard observer programs) to assess the relative importance of global fisheries bycatch on sea turtles. Wallace et al.[71], also incorporated sea turtle Regional Management Units (a system developed for identifying discrete sub-populations of sea turtles that should be managed independently, all with varying population risk and threat scores[72] into their assessment. These reviews highlight the Eastern Pacific, Northwest and Southwest Atlantic, and Mediterranean regions as those with the most sea turtle captures, with most captures (60 percent) on longlines.

Regarding bycatch of vulnerable species, far more observer attention has been focused on high-seas and industrialized fisheries,[73] while observer data remains low for small-scale fisheries overall. Such fisheries may have very high impacts on sea turtle populations, as they use gillnets close to shore, where larger turtles, which have high reproductive values, are found.[74]

Conversely, although high-seas fisheries such as pelagic longlines have high capture rates, their impacts (considering life stages and populations of turtles affected, fishing effort, and mortality rate) may be significantly lower than in set nets/gillnets and trawls.[75] Specific fisheries implicated as being problematic for sea turtles are gillnets, longlines, and trawls in the Mediterranean Sea; and longlines in the West Atlantic and the Eastern Pacific Ocean. Significant data gaps exist for Africa, the Indian Ocean, Southeast Asia, and the Eastern Mediterranean[76,77].

We overlaid the Co-op fisheries with the sea turtle RMU (Regional Management Unit; a classification system developed for turtle populations to assess and monitor their conservation status according to their risk and threat levels) distributions[78] and

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[68] Lewison, Rebecca L, Crowder, L.B.,
Read, A.J. andFreeman, S.A. (2004) Understanding impacts of fisheries bycatch on marine megafauna, 19.

[69] Wallace, B.P., Lewison, R.L., Mcdonald, S.L., Mcdonald, R.K., Kot, C.Y., Kelez, S., et al. (2010) Global patterns of marine turtle bycatch. Conservation Letters, 3, 131–142.

[70] Wallace, B.P., Kot, C.Y., Dimatteo, A.D., Lee, T., Crowder, L.B. and Lewison, R.L. (2013) Impacts of fisheries bycatch on marine turtle populations worldwide: Toward conservation and research priorities. Ecosphere, 4, 1–49.

[71] Wallace, B.P., Kot, C.Y., Dimatteo, A.D., Lee, T., Crowder, L.B. and Lewison, R.L. (2013) Impacts of fisheries bycatch on marine turtle populations worldwide: Toward conservation and research priorities. Ecosphere, 4, 1–49.

[72] Wallace, B.P., DiMatteo, A.D., Bolten, A.B., Chaloupka, M.Y., Hutchinson, B.J., Abreu-Grobois, F.A., et al. (2011) Global conservation priorities for Marine turtles. PLoS ONE, 6.

[73] Lewison, R.L., Crowder, L.B., Wallace, B.P., Moore, J.E., Cox, T., Zydelis, R., et al. (2014) Global patterns of marine mammal, seabird, and sea turtle bycatch reveal taxa-specific and cumulative megafauna hotspots. Proceedings of the National Academy of Sciences of the United States of America, 111, 5271–5276.

[74] Casale, P. (2011) Sea turtle by-catch in the Mediterranean. Fish and Fisheries, 12, 299–316.

[75] Wallace, B.P., Kot, C.Y., Dimatteo, A.D., Lee, T., Crowder, L.B. and Lewison, R.L. (2013) Impacts of fisheries bycatch on marine turtle populations worldwide: Toward conservation and research priorities. Ecosphere, 4, 1–49.

[76] Wallace, B.P., Kot, C.Y., Dimatteo, A.D., Lee, T., Crowder, L.B. and Lewison, R.L. (2013) Impacts of fisheries bycatch on marine turtle populations worldwide: Toward conservation and research priorities. Ecosphere, 4, 1–49.

[77] Lewison, R.L., Crowder, L.B., Wallace, B.P., Moore, J.E., Cox, T., Zydelis, R., et al. (2014) Global patterns of marine mammal, seabird, and sea turtle bycatch reveal taxa-specific and cumulative megafauna hotspots. Proceedings of the National Academy of Sciences of the United States of America, 111, 5271–5276.

[78] Wallace, B.P., DiMatteo, A.D., Bolten, A.B., Chaloupka, M.Y., Hutchinson, B.J., Abreu-Grobois, F.A., et al. (2011) Global conservation priorities for Marine turtles. PLoS ONE, 6.

highlighted fisheries[79, 80, 81, 82] where both potential turtle bycatch and overlap with priority RMUs occurs.

We found that the Co-op supply chain avoids fishery products from fisheries that have high population-level impacts on sea turtles. For instance, there are very few longline fisheries. And, those few longline fisheries are active outside key sea turtle habitats and/or are well-managed. Most fisheries in the Co-op supply chain that might impact threatened turtle populations are using low-risk gears like purse seines (and even those are not using Fish Aggregating Devices that could pose an entanglement risk), hook and line, etc.

The situation seems favorable, and relatively no mitigative action is therefore advised. However, for the below fisheries, it would be good practice to be vigilant, monitor the situation, and encourage more data collection on sea turtle bycatch from the source fisheries.

High-Risk Fisheries

1) UK and Irish Lobster Fisheries Operating on the Continental Shelf West of the UK and Ireland, Including in the Irish Sea

Leatherback turtles, loggerhead turtles, and Kemp's ridley turtles all occur in these waters.[83] While records of stranded or captured loggerheads and Kemp's ridleys are few, leatherbacks are recorded relatively commonly.[84] Specifically, large leatherbacks can tolerate low water temperatures to exploit gelatinous plankton in this region[85] from June through October. Bycatch of these large leatherback turtles at low levels could have considerable population impacts because of their high reproductive values.[86]

Botterell et al.[87] found records of 1,683 caught or stranded leatherback turtles in the UK and Ireland, most in western waters; 135 of those were caught in nets, ropes, and lines

[79] Wallace, B.P., Heppell, S.S., Lewison, R.L., Kelez, S. and Crowder, L.B. (2008) Impacts of fisheries bycatch on loggerhead turtles worldwide inferred from reproductive value analyses. Journal of Applied Ecology, 45, 1076–1085.
[80] Wallace, B.P., Lewison, R.L., Mcdonald, S.L., Mcdonald, R.K., Kot, C.Y., Kelez, S., et al. (2010) Global patterns of marine turtle bycatch. Conservation Letters, 3, 131–142.
[81] Wallace, B.P., Kot, C.Y., Dimatteo, A.D., Lee, T., Crowder, L.B. and Lewison, R.L. (2013) Impacts of fisheries bycatch on marine turtle populations worldwide: Toward conservation and research priorities. Ecosphere, 4, 1–49.
[82] Lewison, R.L., Crowder, L.B., Wallace, B.P., Moore, J.E., Cox, T., Zydelis, R., et al. (2014) Global patterns of marine mammal, seabird, and sea turtle bycatch reveal taxa-specific and cumulative megafauna hotspots. Proceedings of the National Academy of Sciences of the United States of America, 111, 5271–5276.
[83] Wallace, B.P., DiMatteo, A.D., Bolten, A.B., Chaloupka, M.Y., Hutchinson, B.J., Abreu-Grobois, F.A., et al. (2011) Global conservation priorities for Marine turtles. PLoS ONE, 6.
[84] Botterell, Z.L.R., Godley, B.J., Penrose, R. and Witt, M.J. (2021) Long-term insights into marine turtle sightings , strandings and captures around the UK and Ireland (1910 – 2018).
[85] Witt, M.J., Broderick, A.C., Johns, D.J., Martin, C., Penrose, R., Hoogmoed, M.S. and Godley, B.J. (2007) Prey landscapes help identify potential foraging habitats for leatherback turtles in the NE Atlantic, 337, 231–243.
[86] Wallace, B.P., Kot, C.Y., Dimatteo, A.D., Lee, T., Crowder, L.B. and Lewison, R.L. (2013) Impacts of fisheries bycatch on marine turtle populations worldwide: Toward conservation and research priorities. Ecosphere, 4, 1–49.
[87] Botterell, Z.L.R., Godley, B.J., Penrose, R. and Witt, M.J. (2021) Long-term insights into marine turtle sightings , strandings and captures around the UK and Ireland (1910 – 2018).

of fishing gear. Rates of strandings and bycatch appear to fluctuate over decades,[88] probably due to the dynamic nature of gelatinous prey resource distribution.[89]

A recent decline in observations, following a peak in the 1990s, may be linked to reduced fishing effort in this region, in line with recent stock management efforts[90] resulting from climatic factors acting on prey distribution and the fluctuating latitude of a thermal tolerance barrier to leatherbacks in the north Atlantic.[91] Because of the very stochastic nature of this bycatch, it may be difficult to detect (e.g., by observers) and could be overlooked. Therefore long-term and systematic monitoring to understand leatherback turtle bycatch in these fisheries would be a welcome step.[92]

Additionally, with climate change, leatherbacks and other species are predicted to expand their ranges to higher latitudes. Bycatch may become a greater issue in UK and Irish waters, especially for leatherbacks, with the 15°C isotherm estimated to have moved north by over 100 km per decade.[93]

Priority Recommendations

We suggest that Co-op support the following research studies to gather more detailed data on the bycatch situation in these fisheries. The studies should:

a) Undertake questionnaire surveys with fishers to assess their long-term knowledge of sea turtle bycatch and identify any stochastic bycatch events that may be occurring across long time scales.

b) Establish self-monitoring among fishers (fishers report their own bycatch with logbooks and images).

While the above methods can be used to monitor large numbers of hauls without costly onboard observers, the results may underestimate bycatch magnitude, because fishers may downplay their true catches of turtles. Therefore, studies with onboard observers or the use of electronic monitoring (hauls are observed using mounted cameras) should also be promoted and incorporated into fishery improvement projects (FIPs) for these fisheries.

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[88] Botterell, Z.L.R., Godley, B.J., Penrose, R. and Witt, M.J. (2021) Long-term insights into marine turtle sightings , strandings and captures around the UK and Ireland (1910 – 2018).
[89] Witt, M.J., Broderick, A.C., Johns, D.J., Martin, C., Penrose, R., Hoogmoed, M.S. and Godley, B.J. (2007) Prey landscapes help identify potential foraging habitats for leatherback turtles in the NE Atlantic, 337, 231–243.
[90] Botterell, Z.L.R., Godley, B.J., Penrose, R. and Witt, M.J. (2021) Long-term insights into marine turtle sightings , strandings and captures around the UK and Ireland (1910 – 2018).
[91] Mcmahon, C.R. and Hays, G.C. (2006) Thermal niche, large-scale movements and implications of climate change for a critically endangered marine vertebrate. Global Change Biology, 12, 1330–1338.
[92] Witt, M.J., Broderick, A.C., Johns, D.J., Martin, C., Penrose, R., Hoogmoed, M.S. and Godley, B.J. (2007) Prey landscapes help identify potential foraging habitats for leatherback turtles in the NE Atlantic, 337, 231–243.
[93] Mcmahon, C.R. and Hays, G.C. (2006) Thermal niche, large-scale movements and implications of climate change for a critically endangered marine vertebrate. Global Change Biology, 12, 1330–1338.

2) Canadian Northern Shrimp Trawl Fisheries

Our understanding is that these bottom trawls operate north of Newfoundland, which is outside the commonly considered range of most sea turtle species. However, a draft 2017 Integrated Fisheries Management Plan Summary from the government agency Fisheries and Oceans Canada[94] states that leatherback turtles are occasionally encountered in this fishery. These reports of low-level leatherback turtle bycatch in Canadian shrimp trawls are confirmed by separate peer-reviewed studies.[95, 96]

The leatherback turtle population concerned is considered low-risk and low-threat.[97] The region may currently be of marginal importance for the species. Although, as described above for UK Atlantic trawls, climate change could see an increased prevalence of leatherback turtles and possibly loggerheads in Canadian waters, requiring vigilance.

The bycatch rates may therefore be low and may be mitigated by the obligatory use of the Nordmore grate bycatch reduction technology, which has been mandatory since the early 1990s. While this functions similarly to a turtle excluder device, the target of the device is not sea turtles and its effect on sea turtle bycatch may not be well understood, so there are some concerns with this fishery.

Additionally, federally mandated Species-At-Risk-Act (SARA) logbooks for recording leatherback turtle bycatch in all Canadian fishing fleets have been found to underestimate leatherback turtle bycatch, and more effective monitoring of leatherback turtles has been called for.[98]

MSC certification for the fleet states that catch composition is monitored by certified officials at the port of landing. However, any turtles caught are likely to be discarded, and there does not seem to be any fisher training in place on identification, handling, and proper reporting of turtles encountered in trawl nets. The most recent Lloyd's Register/MSC Surveillance report (25 May 2021: https://fisheries.msc.org/en/fisheries/canada-scotian-shelf-northern-prawn-trawl-and-trap/@@assessments) does not contain any reference to sea turtle bycatch, so it seems that little vigilance to leatherback turtle bycatch is made in the management of this fishery. This report cites an observer program, but the number of observed sets is in the low tens annually. This observer effort is far too low to provide any meaningful insight into the bycatch of leatherback turtles.

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[94] https://www.dfo-mpo.gc.ca/fisheries-peches/ifmp-gmp/shrimp-crevette/doc/shrimp-crevette-eng.pdf

[95] McAlpine, D.F., James, M.C. and Jon lien (2007) Status and Conservation of Marine Turtles in Canadian Waters. In Ecology, Conservation, and Status of Reptiles in Canada (ed C.N.L.S. and C.A. Bishop), pp. 85–112. Society for the Study of Amphibians and Reptiles.

[96] Hurtubise, J.A., Bond, E.P., Hall, K.E. and James, M.C. (2020) Evaluating mandatory reporting of marine turtle bycatch in Atlantic Canadian fisheries. Marine Policy, 121, 104084. Elsevier Ltd.

[97] Wallace, B.P., DiMatteo, A.D., Bolten, A.B., Chaloupka, M.Y., Hutchinson, B.J., Abreu-Grobois, F.A., et al. (2011) Global conservation priorities for Marine turtles. PLoS ONE, 6.

[98] Hurtubise, J.A., Bond, E.P., Hall, K.E. and James, M.C. (2020) Evaluating mandatory reporting of marine turtle bycatch in Atlantic Canadian fisheries. Marine Policy, 121, 104084. Elsevier Ltd.

Priority Recommendations

Given the concerns that we found, of low-level leatherback turtle bycatch in this trawl fishery and a lack of observer coverage, we suggest similar steps for Co-op as outlined above for the Eastern Atlantic UK fleets.

We suggest that Co-op support the following research studies to gather more detailed data on the bycatch situation in these fisheries. The studies should:

a) Undertake questionnaire surveys with fishers to assess their long-term knowledge of sea turtle bycatch and identify any stochastic bycatch events that may be occurring across long time scales.

b) Establish self-monitoring among fishers (fishers report their own bycatch with logbooks and images).

While the above methods can be used to monitor large numbers of hauls without costly onboard observers, the results may underestimate bycatch magnitude, since fishers may downplay their true catches of turtles. Therefore, studies with onboard observers or the use of electronic monitoring (hauls are observed using mounted cameras) should also be promoted and incorporated into FIPs for these fisheries.

3) Orkney Brown Crab Fishery – Pots and Traps

Over a 10-year period, interviews with fishers noted interactions with two sea turtles. Therefore, this fishery should be considered a potential concern.[99]

We suggest that Co-op support research studies to gather more detailed data on the bycatch situation in these fisheries. The studies should:

a) Undertake questionnaire surveys with fishers to assess their long-term knowledge of sea turtle bycatch and identify any stochastic bycatch events that may be occurring across long time scales.

b) Establish self-monitoring among fishers (fishers report their own bycatch with logbooks and images).

[99] MacLennan, E., Hartny-Mills, L., Read, F.L., Dolman, S.J., Philp, A., Dearing, K.E., Jarvis, D. and Brownlow, A.C. 2021. Scottish Entanglement Alliance (SEA): Understanding the scale and impacts of marine animal entanglement in the Scottish creel fishery. NatureScot Research Report No. 1268. In Press.