Cetaceans and bycatch

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What is bycatch?

Most modern fishing gear is non-selective, meaning it can catch many species in addition to its intended target species, whilst covering large distances (WWF, 2020). The term 'bycatch' itself can be perceived differently, leading to difficulties in estimating bycatch globally. To remedy this, Davies *et al*, (2009) defined bycatch as 'catch that is either unused or unmanaged'. When applied to global marine fisheries data, this definition placed bycatch as representing 40.4% of global marine catches. A recent report by the BBC has highlighted how many whales and dolphins worldwide are currently at a critical point in their future survival, with half of all species of 'conservation concern'. Entanglement in fishing gear is cited as being the most imminent threat, claiming the lives of over 300,000 cetaceans each year. More than 350 scientists and conservationists from 40 countries have expressed their concerns and have called for desperately needed global action (BBC, 2020).

Understanding the magnitude of bycatch remains difficult however, particularly in areas where there are knowledge gaps and a lack of data, meaning the true impact of fisheries is unknown. Developed and developing nations all have fisheries that interact with cetaceans (Young and Ludicello, 2007), however the impacts of bycatch may be exacerbated in countries where there is already poor fisheries management and in areas where pirate fishing ignores all regulations and mitigation measures in place (WWF, 2020). When interactions do occur, they can be fatal, causing lacerations, loss of limbs, infection, and strangulation.

Each region of the globe has a range of fisheries in operation, with each fishery employing specific gear and targeting a range of species, from those on the sea floor, to those in the water column. Fisheries may be on an industrial scale, using large vessels and modern technology, all the way down to small low-technology artisanal fisheries that serve local communities. Small scale fisheries are as dangerous as large, with numerous studies showing that gillnets commonly used in smaller fisheries often have high bycatch rates of small cetaceans (Bielli *et al*., 2020). Artisanal fisheries are also a cause of mortality to several large species of cetaceans, including humpback whales and Odontocetes in Ecuador's marine waters (Alava *et al*., 2019).

Illegal, unreported and unregulated fisheries also remain a major source of danger for many cetaceans globally. On July 20th, 2020, the recovery efforts of the Italian coastguard to free a sperm whale caught in discarded illegal fishing net was reported. It was the second time in a month that a whale had become trapped. It was reported that the whale was agitated and even named "Fury" in a nod to its efforts to free itself. The Italian coastguard had said that it had clamped down on unauthorised fishing and since January had seized more than 100 km of illegal fishing nets in the southern Tyrrhenian Sea[1].

[1]Reported by the Independent newspaper.

Which species are most impacted?

Bycatch may affect large and small cetaceans. Larger whales have low reproductive cycles and long-life histories whilst most smaller cetaceans have limited rates of increase. These factors make the recovery of local populations difficult (Tulloch *et al*, 2019). The bycatch related and probable extinction of the baiji is a prime example of this. In the 1980s the baiji, or Chinese river dolphin (*Lipotes vexillifer*), was the only species of small cetacean listed as Endangered by IUCN (Brownell *et al*., 2019). Unfortunately, there have been no sightings of the species since before 2006.

The Chinese river dolphin, or Baiji, habited the river Yangtze for 20 million years.
The Baiji was driven to extinction by humans in just 50 years.
The death of the species also sees the death of the entire antient Lipotidae family that it represented[2]

Entanglement was one of the contributing factors leading to the demise of the baiji and is currently the primary factor driving the imminent extinction of the vaquita. The vaquita (*Phocoena sinus*), a shy member of the porpoise family, has a limited range in the northern region of the Gulf of California. There are currently less than 30 vaquita remaining in the wild due to entanglement in gillnets used almost exclusively in the region to catch fish and shrimp, providing a major source of income for the local population. The illegal fishing of Totoaba[3] for the Chinese market using gillnets is also driving the bycatch of vaquitas due to their similar size (Brownell Jr *et al*., 2019).

More recent cases of cetaceans becoming entangled include that of a minke whale in Whitby, North Yorkshire. On September 25th, 2020, the Yorkshire Post reported the death of the whale which was found washed ashore close to Whitby. The corpse was examined, and it was determined that the whale had become entangled, likely in creel lines which are used to catch lobsters and crabs. The bodies of 2 further whales were sighted nearby but were thought to have been washed back out to sea. This is a known problem for minke whales elsewhere in the UK (Yorkshire Post, 2020) including porpoises, common dolphins and humpbacks off the coast of Scotland. (BBC, 2020). Another minke, an emaciated, 25 ft, young female, was found washed up on Spurn point, East Yorkshire, this October (2020). The whale's tail was tangled in a mixture of fishing line and plastic packaging material and was partially severed. She had ultimately starved due to the hampering of her ability to dive and feed and heartbreakingly, may have suffered a prolonged death (BBC, 2020).

There is some positive news to report from Canada however, which has reported no right whale deaths this year, following years of deaths. One hundred and twenty right whales have been sighted this year in Canadian waters. The absence of deaths may have resulted from new shipping traffic and fishing restrictions in the Gulf of St Lawrence, as well as a reduction in shipping activity due to the Covid-19 pandemic. Although it is too early to feel relief, it is certainly a good step forwards for right whales in Canadian waters (CBC, 2020).

[2] WDC, 2020.
[3] Totoaba is protected by the Convention on the International Trade in Endangered Species.

How is bycatch reduced?

In Europe, fisheries work collaboratively to meet their obligations under Council Regulation (EC) No. 812/2004 which governs the bycatch of cetaceans. EU legislation requires that fishing vessels use 'pingers', acoustic devices that deter cetaceans from approaching. Pingers must be safe for members of the industry to use, must take cost into account, and must be authorised and compliant. Annex I of the directive details the areas, time periods (e.g. 'all year') and fishery type, where vessels of over 12 meters or more are prohibited from using certain fishing gear without the use of pingers.

Prior to its departure from the EU, work undertaken by the UK to reduce bycatch in accordance with this regulation focused on monitoring bycatch and the development of mitigation measures. The UK also provided a compulsory annual report to the European Commission detailing the steps it has taken to reduce bycatch.

The Cetacean Bycatch Observation Scheme was a project managed by the Department for Environment, Food and Rural Affairs (DEFRA), and was performed by the Sea Mammal Research Unit based at the University of St Andrews. The project served to estimate the annual bycatch and ran from 2017 – 2019. The authors of the 2018 report, Northridge *et al,* stated that:

- The bycatch rate of porpoises was 83% lower in nets fitted with pingers since 2008 than the overall rate observed in nets fitted without pingers.
- A dedicated 339 days were spent monitoring bycatch in 2018.
- A best estimate of 1150 harbour porpoises were caught in all UK gillnets in the absence of pingers in 2018.
- By catch of harbour porpoise in relevant areas by vessels >12 m in length and equipped with pingers was estimated at 948.

From a global consideration, most of the recommendations surrounding bycatch reduction centre on the development of more selective gear or the modification of pre-existing gear. Bielli *et al* (2020) recently found similar success to pingers with visual deterrent devices. Between 2015 and 2018, LED lights were deployed on the float lines of paired gillnets during 864 fishing sets on small-scale vessels departing from three Peruvian ports. Bycatch probability per set of illuminated nets was reduced by up to 70.8 % for small cetaceans in comparison to non-illuminated, control nets.

Brownell Jr *et al* (2019) also suggest that the long-term solution to bycatch lies in the development of efficient, inexpensive, alternative fishing gear (particularly that which can replace gillnets) without jeopardising the livelihoods of fishermen. Good fishery governance and the direct involvement of fishing communities are also essential if the conservation of the most threatened populations of small cetaceans is to be successful.

In the case of the desperate and rapidly declining vaquita, scientists agree that gillnet fishing must end within vaquita habitat. In April 2015, President Peña Nieto travelled to San Felipe, one of the main fishing towns off the Gulf of California, to announce a 2-year emergency gillnet ban throughout vaquita habitat and announced that the government would pay fishermen for their loss of income (NOAA, 2020). It remains to be seen whether this ban and the engagement and financial support to local fishing communities will be enough to save the vaquita.

The Convention on Migratory Species has also released guidelines to be implemented by fisheries worldwide, for the safe handling and release of small cetaceans caught in gear. The guidelines cover a range of gear including hook-and-line, nets, and trawl fishing, at both artisanal and industrial scales. Guidelines to assist in the successful release and survival of small cetaceans will be beneficial in regions such as Peru and Pakistan, where previous reports have identified the unsafe and harmful handling of cetaceans (IUCN-CSG, 2020).

In conclusion, the issue of bycatch is very complex and no one solution is available, largely due to the scale of variety of fisheries and their associated gear. Coupled with this is the need to acknowledge that some fisheries, such as those operating in coastal communities in developing nations, operate in regions where there is a lack of robust legislation and frameworks already in place to assist with the reduction of bycatch. Such communities often rely heavily upon low-capital artisanal fishing. It can however be agreed that there is the need to push for the development of more selective gear and to continue implementing the use of effective and proven deterrent devices with existing gear e.g. pingers on nets, wherever possible. Lastly, it is essential that knowledge gaps are filled, as far as possible, in regions where fisheries overlap and interact with local or transient cetacean populations. Increased information on the effects of fisheries upon populations allows local governments and involved stakeholders to identify areas of concern and then make more informed and effective decisions to regulate and reduce bycatch in such problem areas.

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