

Workshop Notes: Methods of depredation deterrence: passive, active, temporal/synchronicity

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This workshop focused on methods to deter killer whales depredating longline and troll gear, sperm whales depredating demersal longlines, and pilot whales and other small cetaceans depredating pelagic longline gear. Passive and active methods of deterrence, the timing and synchronicity of the fishery, and trying to identify knowledge gaps that need to be filled in order to successfully deter whales from depredation were the main discussion points. Understanding how whales interact with gear was identified as a major knowledge gap.

Killer Whales and Demersal Longline Fisheries

When killer whales depredate longline gear, there are often a number of whales and they can be extremely efficient at removing fish off lines. Below is a discussion of methods of deterrence that have been attempted and their varying degrees of success, as well as ideas that may be worthwhile testing in the future.

Change the timing and/ or area of the fishery

It may be possible to change the timing of the fishery so that there is an abundance of preferred prey for killer whales. This was done in Prince William Sound, Alaska. The sablefish season was changed to the month of August, when chinook salmon, the preferred prey of killer whales, are in abundance. This reduced depredation on longline gear (see Matkin abstract, this symposium, for more details).

Changing the area of the fishery has had limited success in some areas, and yet not in others. In Australia, traveling 160 km was effective. In Alaska, fishermen had to move at least 115 km but did achieve limited success.

In British Columbia, killer whales began depredating salmon caught using trolling gear during a year when the fishing fleet was heavily concentrated in a small area. The whales learned they could easily travel from one vessel to the next. Dispersing the fishery over a larger area would reduce the rate at which whales depredate.

Long distance changes in the location of the fishery were tried in the Crozet Islands, but unsuccessfully. This year-round fishery was moved 550 km away from the old grounds, but killer whales quickly moved to the new area. Killer whales are able to hear and easily follow vessels as they move around. That said, participants felt that a spatial and temporal change may be a short term solution to the problem.

Visual cues

Hiding flags that mark the ends of the longline did not work.

Magnetism, electrical fields and currents

The group also discussed the use of magnets or electrical fields or DC current to deter whales. More research needs to be done to determine whether any of these would be feasible and effective deterrents. Studies could be done on captive whales to determine what thresholds would be necessary to generate an effect.

Acoustic deterrents

Underwater sounds may be useful in deterring whales, but much more research needs to be done. Commercially available sound sources such as the Orcasphere have been used to deter whales with limited success (see abstracts by Brotons et al., Dyb, Karyakin this symposium). Suggestions were made to incorporate squeaky 'toys' which make a sudden noise may provide a temporary deterrent. There was some feeling that turning on a sound source that produced white noise in response to whale sounds may be most effective, although at this point this technology is difficult and may be cost prohibitive. Information would also be needed as to what thresholds might be needed.

In Spain, killer whales leave when pilot whales are heard in the area. It might be possible to play pilot whale sounds to spook killer whales, but likely they will quickly habituate to the broadcast sounds. Playing sounds of killer whales from a different area is not recommended, since in the past killer whales have reacted strongly (ramming the boat) to the sounds of whales that are not part of the local community.

If a whale was tagged and tracked it might be possible to co-ordinate the use of acoustics such that sounds would only be broadcast when whales were within a certain range. This would reduce the rate at which whales become habituated to the sound.

Sperm whales

Unlike killer whales, generally there are only a small number of animals that target a vessel to depredate. They may also be less efficient than killer whales at taking the fish off the line.

Changes in fishing methods

During longlining depredation tends to happen during the middle of the haul, which may be because the line is taut at the beginning and end of the set, whereas it has a large bow during the middle. It is possible that the orientation of the fish may make them easier to remove in these circumstances. There may be modifications to the line that could be made to reduce the bowing of the line such as placing weights between the skates, which may make the line harder for the whales to manoeuvre around.

Reduced soaking time may reduce the probability of an interaction and changes in the spacing of the hooks may be worthwhile to experiment with. Deep shorter sets can be very inefficient – so there may be a happy medium where the sets are short enough to decrease depredation without being too inefficient. Experiments with knots in the line or the use of streamer lines may be worth trying as well.

Changes in fishermen's behaviour

In Sitka, Alaska, fishermen haul the gear as fast as possible when whales start to depredate. It may be better for them to drop their gear if possible.

There were different opinions on whether to discharge offal in the presence of whales. Some felt that it reduced the rate at which depredation occurred, but others felt that it encouraged depredation. In areas where depredation is not occurring, discharging offal in the presence of whales should not be done, since whales begin to associate boats with food.

Changes in the timing and/or area of the fishery

As per the discussion with killer whales, it may be worthwhile to change the timing of the fishery, or to develop a split season with an extended rest period in the middle of the season, when no gear is allowed on the grounds. Short openings may also be beneficial.

Summary

There is a need to understand the mechanics of depredation for both killer and sperm whales in order to most effectively develop deterrents to depredation. As well, a better understanding of the distribution of whales, their behaviour and biology is important. Avoiding interactions with whales, including not fishing when they are in the area and not discharging offal in their presence are key factors in deterring whales, although these may not always be practical solutions. The use of acoustics to deter whales holds much promise, both as a means to avoid depredation from happening in the first place, and in deterring it once it has begun. Much of the discussion around this was expanded in the workshop on Acoustics (this symposium).