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Minimizing the Effects of Ghost Fishing through Reporting, Relocating and Retrieval of the Lost Fishing Gears

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Ghost fishing, caused by abandoned, lost, or discarded fishing gear, is a major contributor to marine pollution and poses serious threats to fish stocks, non-target species, and coastal ecosystems. With millions of tonnes of plastic entering the ocean each year and nearly 2% of fishing gear being lost annually, effective mitigation measures are essential. Minimizing the impacts of ghost fishing involves timely reporting of lost gear, accurately locating it using methods such as sonar, visual surveys, diver assessments, grappling, and local fisher knowledge, and retrieving or recycling the gear to stop further ecological damage besides recycling the lost fishing gear. These integrated actions help reduce marine litter, protect biodiversity, and support sustainable fisheries management.

Introduction

Plastic litter in ocean is a persistent problem due to not only its design which leads to it remaining in the marine environment for decades (Kühn et al. 2015), but also the sheer volume of litter entering the oceans annually. It is estimated that by 2040, there will be 23 – 37 million tonnes of plastic entering the oceans annually if appropriate interventions to prevent plastic pollution are not implemented soon (Pew 2020). It was esteemed that 14 million tons (Mt) of plastic end up in the oceans (IUCN, 2021) every year, part of these wastes consists of abandoned or discarded fishing gear (FAO, 2022).

Plastics are used to make durable fishing gear and are expected to last in our seas for up to 600 years. It has become evident that fishing gears which are made up of plastics when lost in marine and coastal ecosystems can contribute to declines in fish stocks cause losses not only to commercial fish stocks but also to non-target species, and facilitates the spread of invasive alien species and harmful algae. According to a recent estimation of Richardson et al. (2022), most likely nearly 2% of all fishing gears are lost to the ocean annually, which means that at least tens of thousands of commercial and recreational fishing gears are lost year by year worldwide. Hence measures have to be implemented to reduce the ghost fishing and plastic litter accumulation due to lost fishing gears has to be minimized. Minimization of the effects caused by ghost fishing can be done by (i) locating and reporting the lost fishing gear, (ii) retrieval of the lost fishing gear thereby breaking the cycle of ghost fishing gear besides (iii) recycling or remedial options for the lost fishing gears.

(i) Reporting the lost fishing gear

The first step to minimize the ghost fishing is to report that the fishing gear is lost or discarded in sea. The reporting programmes include the maintenance of a record or register which includes information on the fishing gear as either found, abandoned, lost or otherwise discarded. Reporting should be made not only to the relevant fisheries authority (flag State), but reports should be forwarded to the state in which the gear was lost (coastal State) –

especially if the lost gear poses a risk to navigation. Reports should include basic information including:

- Gear ownership;
- Type of gear;
- Any marks or identifiers;
- Date, time and position of gear loss;
- Reason for loss; weather conditions;
- other relevant information about species impacts;
- and the status of the gear (retrieved/not retrieved, disposed of, etc.) (fao, 2019a)

(ii) Locating fishing gears

After obtaining information on the lost fishing gear, the next step is to locate the lost fishing gear. The lost fishing gear location methods include:

- Sonar surveys
- Surface visual surveys
- Underwater visual surveys
- Dragging or grappling surveys
- Fisheries data and local knowledge

Acoustic sonar surveys

The lost fishing gears are located using acoustic sonar surveys which can produce an image of the lost fishing gear if it is identified in a predetermined area of the seafloor. Scanning sonar equipment is deployed at a resolution adequate to depict objects that are less than 1m in diameter. Sonar scanning can be deployed at a variety of depths and has been used to locate ALDFG in waters to 100m.

Side scan sonar scanning can cover large areas and can be deployed off of a moving vessel at low speeds. Sector scanning is appropriate for smaller areas of interest (like a harbor or rocky outcrop)**.** Side scan sonar has been used effectively to locate ALDFG in a variety of locations worldwide. In the United States, side scan sonar surveys are used to detect lost shellfish pots in Chesapeake Bay and in Puget Sound and the method has been used to locate lost nets as well.

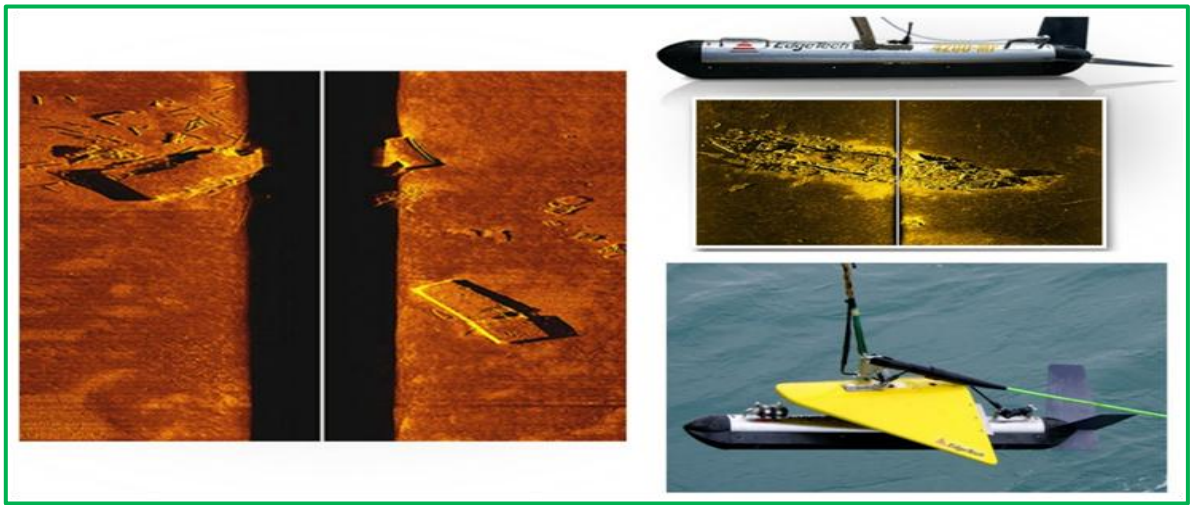

Figure 1: Acoustic sonar survey

Surface visual surveys (Boat-based surveys)

The cheapest method to locate the lost fishing gear is through visual surveys which are done by using boats. Visual surveys from boats are an excellent method to locate the buoys of lost shellfish traps or lost gillnets. However, boat-based surveys are best conducted in areas of high concentration of lost gear as fuel costs will prohibit extensive surveying in large areas with low concentrations of lost gear. This method is best used after closures of shellfish or trap-based fisheries where traps are abandoned or drift away from set locations. Many

fisheries enforcement agencies use this method to locate lost traps, with removal occurring simultaneously

Figure 2: Surface visual survey using boats

Aerial surveys

The Aerial surveys using airplanes provide aerial images to successfully locate and identify the lost fishing gear. Visual surveys from airplanes flying at low altitude have successfully located derelict shellfish pots where buoys remain on the surface of the water. This method has been used successfully off of the West Coast of Washington and Oregon to locate lost Dungeness crab pots.

Figure 3: Aerial survey

Underwater diver surveys and drop camera surveys

Using divers and underwater cameras to locate the lost fishing gears is also effective. Many programs have successfully worked with divers to survey identified areas of suspected concentrations of lost fishing gear to both provide exact locations of gear to be removed and to verify that targets. Hand signals are used to notify boat crews of the presence of gear. Drop camera surveys have been used in several locations, mostly in conjunction with diver surveys and with sonar surveys for verification. Diver surveys and drop camera surveys are limited by the visibility of the water.

Dragging or Grappling Surveys

In areas where concentrations of lost fishing gear are known or suspected to occur, systematic dragging of grapples or arrays of hooks can effectively locate gear. In some instances, removal can be accomplished immediately after location using the same grapples, or hooks to remove the gear. This method can be effective in habitats with sandy or muddy bottoms and little rugosity. In reef areas or seagrass beds, the method can cause excessive damage to marine habitats.

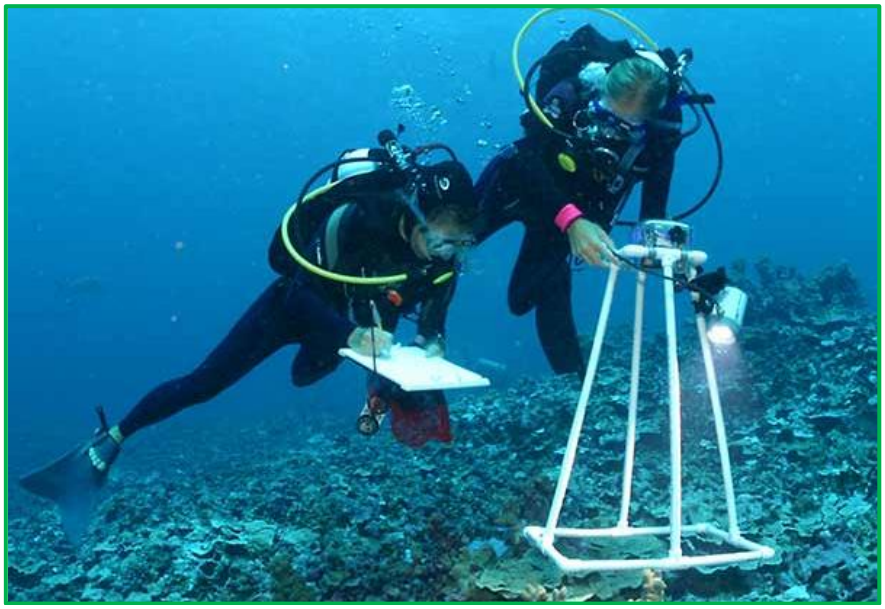

Figure 4: Underwater diver surveys

Figure 5: Grappling surveys

Accessing local knowledge of fishing gear loss

Several programs have relied on fishers to direct them to areas or locations where fishing gear is lost. Immediate reports from fishermen related to lost gear are the most reliable. Fisher and diver interviews have also proved fruitful in identifying areas or locations of concentrations of lost gear. Ocean researchers are also good sources of information. ceanographers using remotely operated vehicle or trawl surveys are likely to come across lost fishing gear and can often provide accurate locations and even visual images of gear.

Figure 6: Traditional Knowledge from local fishermen

Retrieval

The retrieval of lost gear is the only way to eliminate its negative impacts. For some fishing gear such as gillnets, retrieval is most effective as soon as possible after the gear is lost. Some nets may lose their structural integrity and fishing capacity over time, which means that waiting to retrieve the gear after weeks or even years may prove ineffective in reducing its negative impacts. For other gear such as some shellfish traps and pots, harm to species is less immediate and retrievals conducted days or weeks after the loss can still eliminate significant negative impacts to species (Antonelis et al., 2011; Butler et al., 2018). Harmful impacts related to navigational safety and habitat damage can only be eliminated by removal. They can be retrieved by using remotely operated vehicles, divers, grappling or using trawls for retrieval. Further, these lost fishing gears can be recycled into various products like Mats, socks, dress, sunglasses etc.

Conclusion

Ghost fishing continues to be a significant driver of marine biodiversity loss and a contributor to global plastic pollution, largely due to the durability and widespread use of synthetic fishing gear. As fishing gears persist for decades in the marine environment, their continued entanglement of fish, crustaceans, marine mammals, seabirds, and other organisms leads to ecological, economic, and navigational consequences. Minimizing these impacts requires a coordinated approach beginning with timely reporting of lost gear, followed by effective location and retrieval. Modern strategies such as sonar-based detection, visual surveys, diver documentation, and grappling techniques, combined with fishers' traditional ecological knowledge, significantly enhance the accuracy of locating derelict gear. Implementing these measures not only prevents ongoing ghost fishing but also supports healthier fish stocks, improves operational safety, and aligns with global commitments to reduce marine litter. Sustained collaboration between fishers, coastal authorities, scientists, and policymakers is essential to mitigate ghost fishing and protect marine ecosystems for future generations.

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