STOP GHOST GEAR

THE MOST DEADLY FORM OF MARINE PLASTIC DEBRIS

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WWF

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WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

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WWF International

Rue Mauverney 28,
1196 Gland, Switzerland

www.panda.org

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CALL TO ACTION

GHOST GEAR IS THE MOST DEADLY FORM OF MARINE PLASTIC DEBRIS.

Nearly 90% of the world's marine fish stocks are now fully exploited, overexploited or depleted, while more than 3 billion people depend on fish as a major source of protein[1]. With a rising population, there is an increased demand for fish, and therefore the use of fishing gear. Gillnets, traps and pots, fish aggregation devices, and other gear types are compounding the problem of plastics in our ocean as they end up abandoned, lost or discarded. Ghost gear can continue to catch target and non-target species unselectively for years, potentially decimating important food resources as well as endangered species, such as marine mammals, seabirds, and turtles. It is the most deadly form of marine plastic debris which damages vital ocean habitats, and poses dangers to navigation and livelihoods.

While the unattended consequences of plastic use are finally beginning to receive the attention they warrant, the impacts of ghost gear are less seen and understood. This report demonstrates the scale of the problem at hand, as well as the gaps in existing legal frameworks, highlighting the need for national and international preventive policies and practices. WWF urges governments, fishing gear producers and designers, fishers, and the general public to take decisive action and stop ghost gear from drowning the ocean we all depend on.


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AS OF TODAY, THERE IS NO INTERNATIONAL TREATY IN PLACE DEDICATED TO TACKLING MARINE PLASTIC POLLUTION.

WWF CALLS ON GOVERNMENTS TO:

- **Adopt appropriate fishing gear best management practices.** The Global Ghost Gear Initiative's (GGGI) Best Practice Framework for the Management of Fishing Gear (BPF) and the Food and Agriculture Organization of the United Nations (FAO) Voluntary Guidelines on the Marking of Fishing Gear (VGMFG), serve as progressive and comprehensive guides to assess and manage fishery-specific ghost gear problems. Governments can use these documents to assess their own fisheries management practices to determine where improvements can be made.
- **Join the Global Ghost Gear Initiative.** The GGGI is the world's only global cross-sectoral alliance committed to driving solutions to the ghost gear problem. By joining the GGGI, countries will access critical technical support to address ghost gear in their national fisheries, contribute to the collective impact of GGGI and its members, and assist in developing global capacity to solve this problem throughout our ocean.
- **Support the establishment of a new treaty to stop marine plastic pollution.** Ghost gear prevention is a classic example of a global problem that requires a coordinated global response but, the current existing legal framework covering marine plastic pollution and ghost gear is fragmented and ineffective. It is abundantly clear that the problem cannot be solved on a national or regional level, or through non-binding, voluntary measures alone.

WWF CALLS ON FISHING GEAR DESIGNERS AND PRODUCERS TO:

- **Design and manufacture fishing gear that is traceable.** Designers and producers should design and build gear that is traceable through marking its key components like ropes, net panels, traps, and tracking buoys. This will allow fisheries managers to keep track of their gear, support effective recovery efforts and also help combat illegal, unreported, and unregulated (IUU) fishing which significantly contributes to gear loss. And it will allow for effective inventorying of how much gear is being used in a fishery, helping to quantify how much is lost in the ocean, and supporting market analysis for Extended Producer Responsibility (EPR) schemes.
- **Design and manufacture fishing gear that is recyclable.** Gear that is recyclable does not include mixed polymers, and is easily dismantled so recyclable components can be separated from non-recyclable components. Designers and producers should design and build fishing gear with proper recycling and end-of-life disposal in mind; and support effective EPR schemes for fishing gear.
- **Design and manufacture gear that becomes unharmful if lost at sea.** Including as much biodegradable materials in fishing gear as possible ensures that lost gear will not persist in the ocean indefinitely. Designers and producers should design traps and pots with effective escape mechanisms and include biodegradable mechanisms that allow the traps to become disabled if they are lost; and collaborate with fishers to research and test improved gear designs.

WWF CALLS ON FISHERS TO:

- **Avoid fishing gear loss through implementing fishing and gear management best practices.** Fishers should follow appropriate best practices for responsible fishing operations, including complying with spatio/temporal restrictions and sharing locations of static gear to avoid gear and vessel conflicts; marking gear with ownership details and making it more visible; and disposing of end-of-life and damaged gear appropriately in harbour facilities.
- **Report lost fishing gear and retrieve it if safe to do so.** Fishers should carry retrieval equipment on board and train crew members on safe retrieval methods; report lost fishing gear to the relevant fisheries authorities in real-time, as well as through the GGGI Ghost Gear Reporter App[2]; retrieve Fishing Aggregation Devices (FAD) that are no longer being tracked; and participate in Fishing for Litter[3] schemes if available in the area to the benefit of the marine environment and their fishing grounds.
- **Share expertise to prevent and mitigate ghost gear.** Fishers should participate in innovative fishing gear testing and share knowledge to prevent impacts from ghost gear; train new fishers on how to avoid fishing gear loss and why it's beneficial to their industry; collaborate in ghost gear retrieval programmes and help to raise awareness about the impacts of ghost gear.

WWF CALLS ON THE PUBLIC TO:

- **Engage with government representatives** to ensure that they take effective action on ghost gear in a transparent and accountable manner and support the establishment of a global binding treaty on marine plastic pollution.
- **Call on fishing gear industries and users** to demonstrate leadership in implementing preventative, mitigative, and curative measures to address the ghost gear problem wherever possible.

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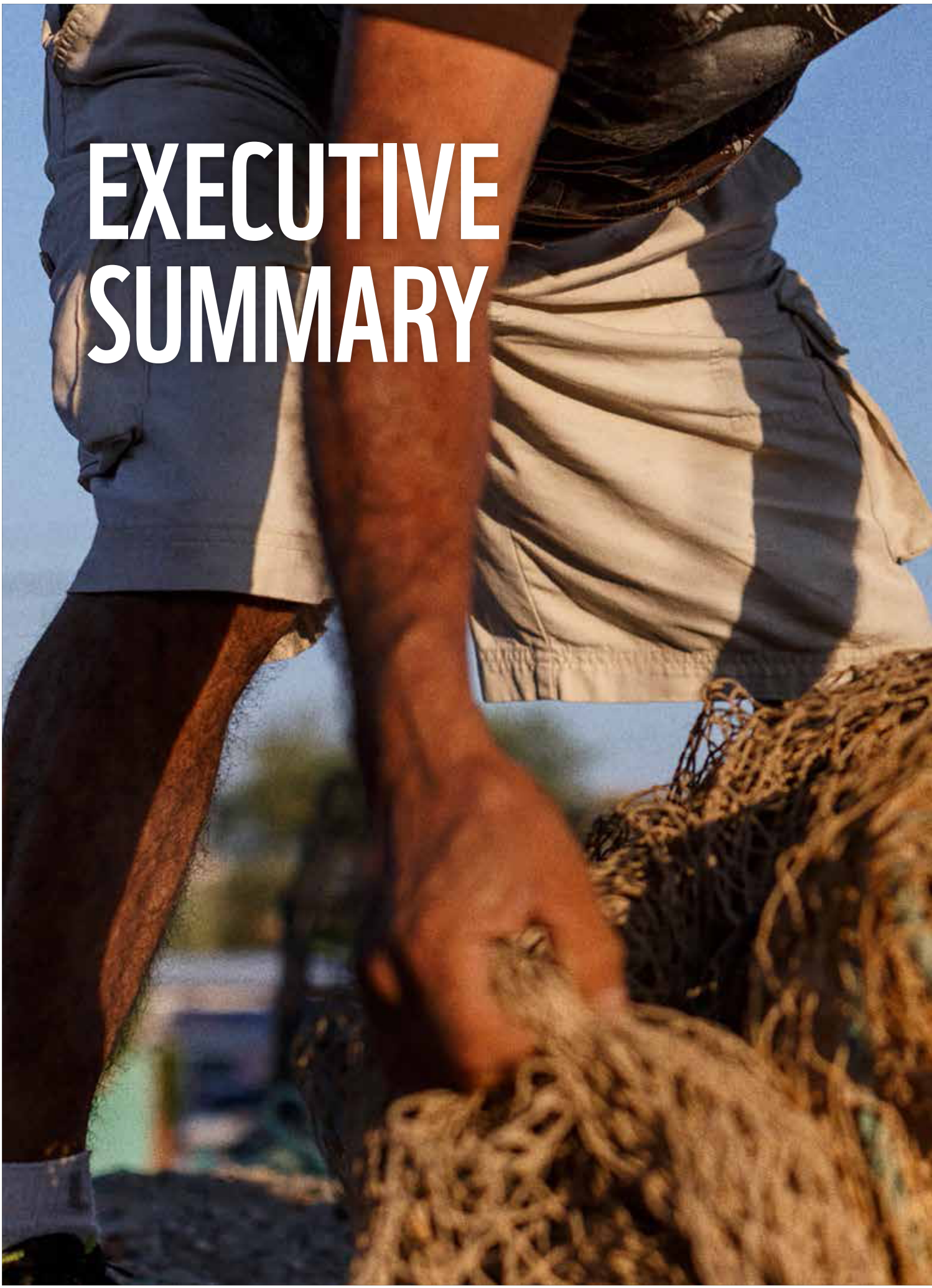
EXECUTIVE SUMMARY

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SOME STUDIES ESTIMATE THAT OVER 90% OF SPECIES CAUGHT IN GHOST GEAR ARE OF COMMERCIAL VALUE.

Eleven million tonnes of plastic ends up in the ocean every year[4]. Plastic waste pollutes every corner of the ocean, threatens aquatic wildlife, and even ends up in the seafood we eat. And despite growing awareness, the problem continues to get worse.

One of the most damaging types of marine plastic pollution is **abandoned, lost or discarded fishing gear** – commonly called **"ghost gear"**. While it's a problem that's been known for decades, only in last few years have we begun to understand the full extent of the issue – and what we can do about it.

WHAT'S THE PROBLEM?

It's estimated that **ghost gear makes up at least 10% of marine litter.** That means somewhere between **500,000 and 1 million tonnes of fishing gear gets left in the ocean every year**[5,6]. Nets, lines and ropes from fishing and shipping make up **46% of the 45,000-129,000 tonnes of plastic floating in the North Pacific Gyre**[7]**.**

Ghost gear is **the most deadly form of marine plastic debris**[8]**.** Marine debris impacts 66% of marine mammals, 50% of seabirds and all species of sea turtles – and across all species groups, ghost gear is the type most likely to prove lethal[9]. In the Gulf of Mexico, for example, abandoned gillnets have driven the vaquita porpoise to the brink of extinction – only around 10 remain.

AT LEAST 46% OF THE GREAT PACIFIC GARBAGE PATCH IS MADE OF FISHING GEAR.

Many animals that get caught or entangled within abandoned fishing lines, nets, traps and other gear die **a slow and painful death** through suffocation or exhaustion[10]. Ghost gear also **damages valuable marine habitats**[11,12,13,14]**.**

Since it's intentionally designed to ensnare and capture fish, it's hardly surprising that fishing gear continues to catch fish and other marine life even after it's been lost or discarded[15,16,17,18]. And when it's made of plastic that can take decades to break down, the effects can continue for many years. This can undermine the sustainability and economic returns from fisheries as part of their harvest is lost – some studies estimate that **over 90% of species caught in ghost gear are of commercial value**[19]. Other sectors are affected too. **Ghost gear pose a navigation hazard**, threatening the safety of mariners. And like other marine debris, ghost gear can affect **tourism** by spoiling an area's natural beauty[20].

WHAT'S THE SOLUTION?

Generally, fishers don't want to lose their gear – although a significant amount is discarded deliberately to conceal illegal, unreported and unregulated (IUU) fishing, or when it's no longer functional. For most fishers, their gear is their livelihood and can represent a considerable financial investment. But even in the best managed fisheries, fishing gear is lost or abandoned due to weather, mechanical problems or human error. A recent study estimated that **5.7% of all fishing nets, 8.6% of traps and pots, and 29% of all fishing lines used globally are abandoned, lost or discarded** into the environment[21].

Nevertheless, there are many **examples of effective actions being taken all over the world to reduce impacts from ghost gear** through collaborations between fishers, fishing industry partners, ports, NGOs, researchers, governments and intergovernmental organizations. At an international level, the Global Ghost Gear Initiative (GGGI), an alliance of more than 100 organizations including WWF, was formed in 2015.

To develop effective strategies to combat ghost gear, it's important to consider the **root causes of gear loss**, and to recognize the **safety, economic and conservation issues** fishers must work with.

Preventing fishing gear loss is the top priority, with education, voluntary measures and regulations all having a role to play. Prevention measures include **restricting** the use of high-risk gear in certain areas or times of year, **marking fishing gear** so it's clearly visible and the owner can be identified, and **improving end-of-life disposal and recycling**.

Even so, some fishing gear will inevitably get lost, so it's important to adopt **mitigation measures**. Including **biodegradable components** so the gear breaks down quickly is one effective way to prevent ghost fishing[22],[23],[24],[25],[26]. Biodegradable components are already used in some shellfish traps and fish aggregating devices (FADs), though more research is needed into biodegradable nets and other gear.

Finally, since plastic gear can have long-lasting impacts, it's important to **remove and retrieve** as much lost and abandoned gear as possible, though this can be expensive, particularly in deep-sea habitats. Programmes for reporting and retrieving lost gear already operate in some places, and "fish for litter" schemes – which reward fishers for bringing back marine debris, including ghost gear – are growing in popularity.

GLOBAL ACTION

Although **ghost gear and plastic pollution are global problems,** we don't yet have an **international treaty** dedicated to tackling the issue. Existing laws are fragmented and ineffective.

Leaders from more than 40 countries as well as more than 1.8 million people around the world have already joined the call for a global agreement on marine plastic pollution. We need more governments to support **a new UN treaty on marine plastic pollution** that includes effective **global governance of ghost gear**.

OUR GHOST GEAR PROBLEM

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Abandoned, lost, or otherwise discarded fishing gear, commonly called ghost gear, is an inevitable by-product of global fisheries that most of us never see or consider. Even fishers who spend their lives on the water rarely grasp the full harmful impacts of fishing gear that is lost during each season. But the harmful impacts of ghost gear are significant and, though the problem has been understood for decades, we are only in the last few years understanding its breadth and scale.

HOW MUCH FISHING GEAR BECOMES GHOST GEAR?

Extrapolated from land-based sources, **at least 10% of marine litter is estimated to be made up of fishing waste, which means that between 500,000 and 1 million tonnes of fishing gear are likely entering the oceans every year[27],[28].**

Many attempts to quantify the problem locally, regionally, and globally give us a convincing picture of the enormity of the problem. Studies have documented:

- 11,436 tonnes of traps and 38,535 tonnes of gillnets abandoned every year in South Korean waters[29] .
- An estimated 160,000 blue crab traps lost annually in the Chesapeake Bay between 2004 and 2008[30].
- Over 70km of gillnets lost in Canada's Greenland Halibut fishery in just five years[31]
- An estimated 5,500-10,000 gillnet pieces lost in the Baltic Sea annually between 2005 and 2008[32].
- 5% (>1300 in 2016–2017) of the 30,000 drifting FADs deployed each year in the Western Central Pacific Ocean abandoned and washed up onto nearshore habitats each year[33] .

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5.7% OF ALL FISHING NETS, 8.6% OF TRAPS AND POTS, AND 29% OF ALL FISHING LINES USED GLOBALLY ARE ABANDONED, LOST OR DISCARDED.

A recent study of global rates of fishing gear loss developed from mostly Northern hemisphere sources, estimated that 5.7% of all fishing nets, 8.6% of traps and pots, and 29% of all fishing lines used globally are abandoned, lost or discarded into the environment[34]. Attempting a similar compilation of available information from multiple sources, Lively and Good (2018)[35] estimate that one set of traps and pots is lost for every 14 used, sometimes even one set out of two used. Likewise, they estimated that each boat using gillnets could be losing between 3 and 7 panels on average each year. In regions such as the coastal waters of South Korea, where gillnets are highly popular this could be even higher, resulting in 38,525 tonnes of lost gillnets per year[36,37]. This gear loss adds to the growing mass of plastics entering our ocean every year. Indeed, in the North Pacific Gyre, nets, lines and ropes from fishing and shipping make up 46% of the 45,000-129,000 tonnes of plastic floating in this area[38].

GHOST FISHING AND ITS IMPACT ON ENDANGERED MARINE LIFE, ECOSYSTEMS AND COMMERCIALLY VALUABLE SPECIES

Ghost gear is the most deadly form of marine plastic debris[39]. Mammals, birds, and reptiles drown regularly in ghost gear. Fish and invertebrates become trapped, injured, and prey for other animals, which may also become trapped. 'Ghost fishing' is the term given to the continued fishing caused by fishing gear that has been abandoned, lost or discarded[40]. This deadly pattern of ghost fishing continues until the gear loses its integrity[41]. This usually occurs within the first year after loss, but there are observed cases of ghost gear continuing to capture and kill animals decades after being lost[42,43,44,45]. **It is a slow and painful death** for some animals. For sharks and rays, for example, major concerns have been raised from an animal welfare perspective[46].

OVER 5,400 ANIMALS FROM 40 SPECIES WERE REPORTED BEING ENTANGLED IN GHOST GEAR

While a lot of fishing gear is designed to be selective to the target species, it can capture animals indiscriminately after being lost. In the Salish Sea, it's been documented that more than 260 unique species, including marine mammals, birds, protected fish, and commercially valuable invertebrates have been observed to be entangled and killed in lost salmon gillnets. During the net recoveries in the Salish Sea, the animals observed in removed nets reflect just a snapshot of the ghost fishing mortality caused by these nets. Hardesty *et al.* (2015)[47] developed a model to project the long-term ghost fishing impacts of nets removed from the Salish Sea and estimated that the 4,500 nets removed from 2002-2009 likely killed more than 2.5 million marine invertebrates; 800,000 fish and 20,000 seabirds. Stelfox *et al.* (2016)[48] compiled information documenting that **over 5,400 animals from 40 different species of marine mammals, reptiles and elasmobranchs (sharks and rays) were recorded as being entangled in ghost gear.**

Lead pollution from sink lines used in gillnets that end up abandoned in the ocean is also an important concern for both marine life and their environment. One study found lead contamination in a harbor seal that ingested a fishing sinker, demonstrating an additional way in which ghost gear affects marine species health[49].

Lost fishing gear also damages important nearshore and marine habitats. Impacts of ghost gear vary widely from place to place, but often affect the sensitive nearshore areas, seagrass beds, macroalgae, coral reefs, and mangroves that are so important as nursery areas for numerous species[50]. Lost fishing gear breaks corals, scours bottom habitat of sessile animals, damages vegetation, builds up sediment, and smothers and impedes access to certain habitats[51,52,53,54]. Increasing exploration of deep sea habitats is documenting ghost gear accumulations in those remote locations as well[55,56,57,58,59].

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GHOST GEAR DANGERS FOR SEALS AND SEA LIONS

The entanglement by plastic pollution in the seas is a threat to at least 243 marine species[60]. Most of these entanglements appear to be caused by monofilament lines, ropes, and other fishing related equipment[61]. Even though nets can affect different species of marine mammals, it appears that sea lions and seals (scientifically known as pinnipeds) are the most susceptible. In Australia, for example, it is estimated that 1,500 Australian sea lions (*Neophoca cinerea*) die annually from entanglement with monofilament gillnets because of the overlap between shark fisheries and foraging sea lions[62].

This susceptibility may be due to their exploratory nature, especially of juveniles when they play, or due to their encounter with such debris on the coast[63]. In a population of 30,000 Australian fur seals (*Arctocephalus pusillus doriferus*) in Southern Australia, 138 entanglements were reported between1997 and 2012. 50% of the entangling objects were plastic twine or rope, which included trawl nets, and 17% were monofilament fishing lines that included gillnets. Most of the entanglements (94%) involved pups (53%) or juveniles (41%)[64].

As a natural panic reaction, these animals rotate their bodies causing more entanglement with fishing gear and end up carrying it wrapped around themselves for long periods. Sea lions and seals entangled, or even ingesting these marine debris items, can experience sudden and serious problems such as suffocation; or "chronic" effects where the impacts on the welfare of the species increase over time as infections, injuries to the skin and muscles, potentially even leading to amputation of the entangled limbs or even cutting to the bone. It is known that, depending on the material with which they have been entangled, the impact differs; for example, multifilament nets may be more prone to harboring bacteria, causing infections. In this way, their ability to move, feed and, in general, behave normally for their species is compromised. In the case of pregnant females, it can generate complications such as edema, reducing their potential for survival and fertility[65].

These estimates of animal entanglements and ingestion rates are based on the information obtained from live or recently dead animals, so are likely underestimated. The number of likely unobserved mortality of sea lions and seals entangled in ghost gear is unknown[66].

VAQUITA: THE MOST ENDANGERED MARINE MAMMAL IN THE WORLD

Restricted to a small area of relatively shallow water in the Upper Gulf of California, Mexico, lives the vaquita, the world's smallest porpoise[67]. The vaquita is now in imminent danger of extinction due to the continuous entanglements with lost and illegal gillnets set to catch the totoaba, another endangered fish whose swim bladder is prized on the black market[68]. The latest scientific estimates issued on March 2019 by the International Committee for the Recovery of the Vaquita (CIRVA) indicated that only about 10 vaquitas remain alive in 2018 (with 95% chance of the true value being between 6 and 22). The vaquita has been reduced to such low numbers as a result of bycatch in gillnets[69].

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The vaquita has been listed by the IUCN as critically endangered since 1996[70] when the population was estimated at 567 animals. Recent declines have been the most dramatic, almost half of the remaining population was lost between 2015 and 2016. Through acoustic monitoring work, it has been possible to detect the decrease in the vaquita population, estimating an average decrease of almost 50% of the population annually[71]. Unless this decline can be stopped by eliminating mortality in illegal gillnets, the vaquita will be extinct in a few years.

While fishing in the Upper Gulf of California, Mexico, is crucial for the livelihoods of local communities and, more broadly, to Mexico, unsustainable fishing is the biggest threat in the region, compromising its ability to fulfill the needs of current and future generations living there.

Since 2008, WWF has worked to promote sustainable and alternative fishing with local communities while removing ghost gear, in the Upper Gulf of California, aiming to reduce as much as possible the main threat to the vaquita. In October 2016, the Mexican government, CIRVA and WWF-Mexico, developed and implemented the first ghost net removal program, consisting in systematically locating and removing abandoned or illegal fishing gear within the vaquita protection area. A core group including international conservation bodies, researchers, NGOs, the Mexican government, and local conservation-minded fishers was formed, actively participating in the design, organization and execution of the net removal program, with the aim of removing the largest number of discarded, lost or abandoned fishing gear in the UGC.

With the support of WWF-Mexico, local communities joined the activities, expanding the ghost net removal program to recycle materials and designing and testing alternative fishing gear to eliminate gillnets in the area.

Some vaquitas are seen rarely in the area, but the question remains whether the vaquita can still be saved at this very late stage. The case of the vaquita clearly shows the dramatic impacts that ghost and illegal gillnets have in driving species to extinction, we need to act urgently to avoid more marine species to follow the same path.

ECONOMIC COSTS OF GHOST GEAR

While some ghost gear captures marine animals indiscriminately, **the targeted species is often the biggest victim of ghost fishing,** as the gear continues to capture that species as designed[72]. A variety of studies have attempted to value the loss of harvestable species to ghost fishing and the benefits to fisheries of effective management of lost fishing gear:

- Antonelis *et al.* (2011)[73] estimated 178,874 harvestable crabs valued at US$ 744,296 were lost to ghost fishing of lost crab traps in one season in the Puget Sound representing approximately 4.5% of the harvest.
- Scheld *et al.* (2016)[74] documented a blue crab harvest increase of 13,504 tonnes valued at US$ 21.3 million after removing 34,408 derelict crab traps over six years.

The economic harm caused to fishers also includes the loss of the gear itself. In one crab fishery in British Columbia, annual replacement of lost gear costs the fishery over US$ 490,000[75].

But fisheries are not the only industry to suffer economic harm from ghost gear. Ghost gear also poses navigation hazards, threatening the safety of mariners[76],[77] . Lost crab pots and lines are a recurring problem for Washington State ferries, sometimes causing extensive damage and causing ferry cancellations[78]. Economic activities like tourism can also be affected since visitors may perceive a decline in the natural beauty of an area if marine debris is present[79].

TYPES OF FISHING GEAR

While the loss of fishing gear occurs in all fisheries, regardless of whether they are artisanal or industrial, some fishing gears are more damaging than others. For example, even though trawl nets are not considered to have a high risk of ghost fishing, turtles along the shores of Australia's Gulf of Carpentaria have been entangled and killed in lost nets[80]. Even recreational angling lines can create hazards when lost in large quantities, at public fishing piers for example[81].

Previous research by GGGI has ranked ghost gear impacts with the scoring of each fishing gear based on its risk of loss and on the likelihood of harmful impacts when lost[82]. This provides a useful global perspective on the highest risk fishing gear. Gillnets, pots and traps, and FADs were ranked as the top three most harmful fishing gear. Refer to figure 1 to see a gear risk assessment.

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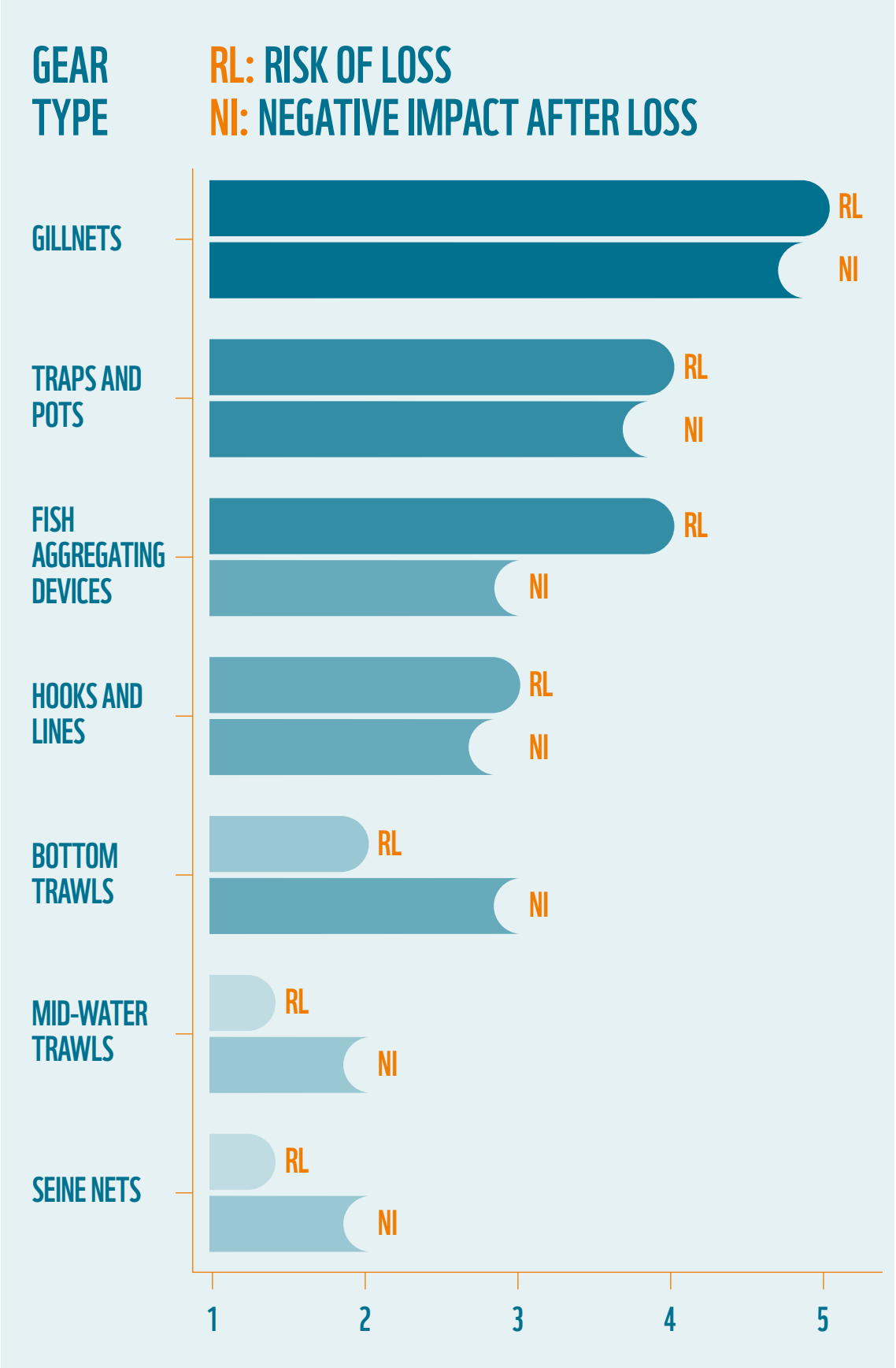
Figure 1: Gear Risk Assesment. Adapted from: Ghost Gear Initiative; Huntington, T., 2017. Best Practice Framework for the Management of Fishing Gear. A Global Ghost Gear Initiative report.



1. THE FISHING GEAR THAT CREATES THE MOST GHOST FISHING

1.1 GILLNETS are a type of passive fishing gear that works as a "wall" resting in the water as it catches fish that get gilled or entangled. There are several variants of gillnets, each with different characteristics. For example, they can be fixed or allowed to drift, they can work at different depths of the water column (surface, mid-water, bottom), and their mesh sizes can vary depending on the target species. This type of thin, mostly monofilament fishing gear is highly susceptible to getting lost, and usually is not searched for as it is cheap and easy to replace. Since this is a passive fishing gear it will continue catching fish after it gets lost, and even when the "wall" falls apart due to losing buoyancy it will still affect the ocean's seabed. Gear marking, testing alternative materials, as well as promoting incentives for recovering this type of fishing gear would help reduce its impact. See figures 2 and 3.

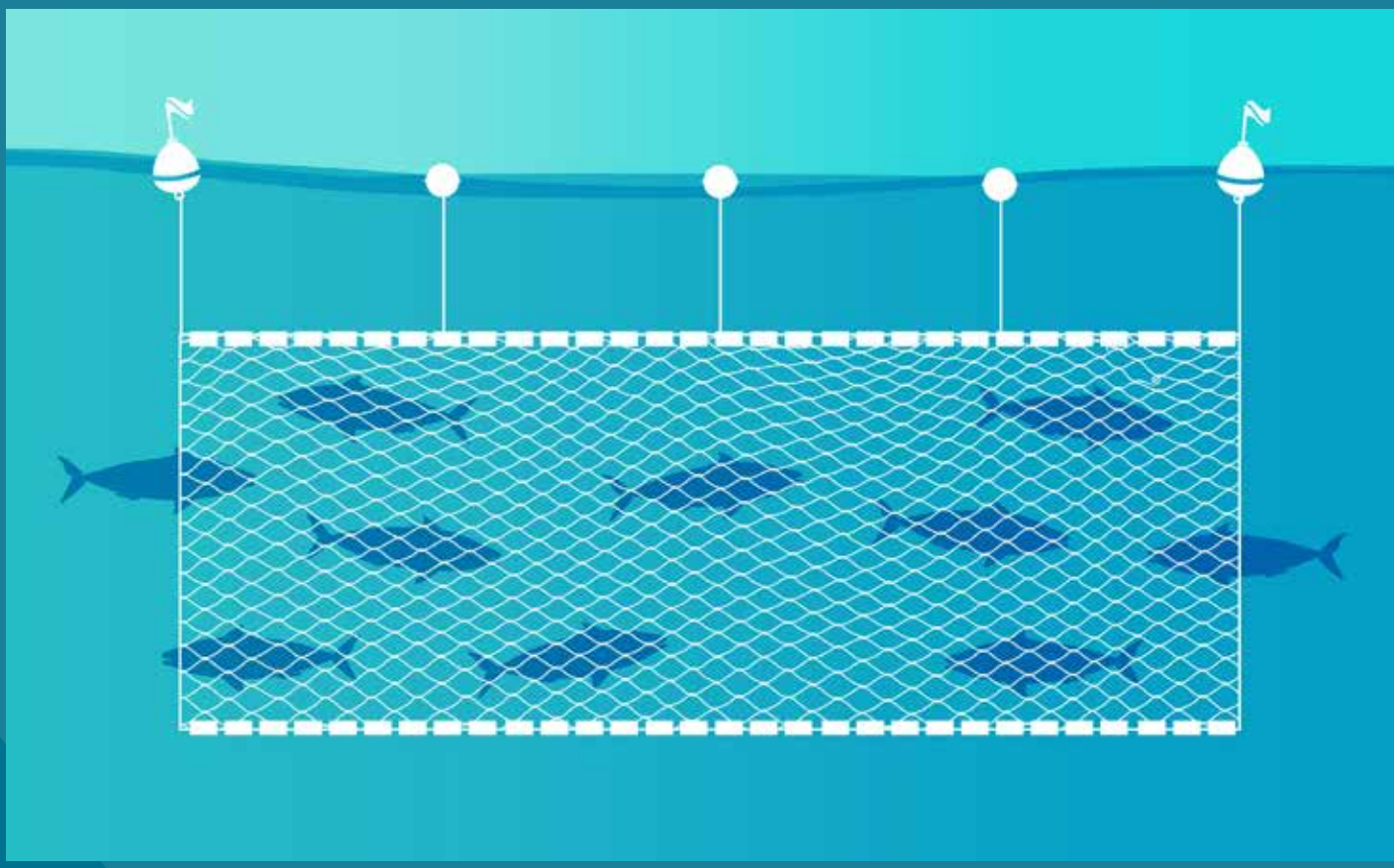


Figure 2. Gillnet placed for fishing.

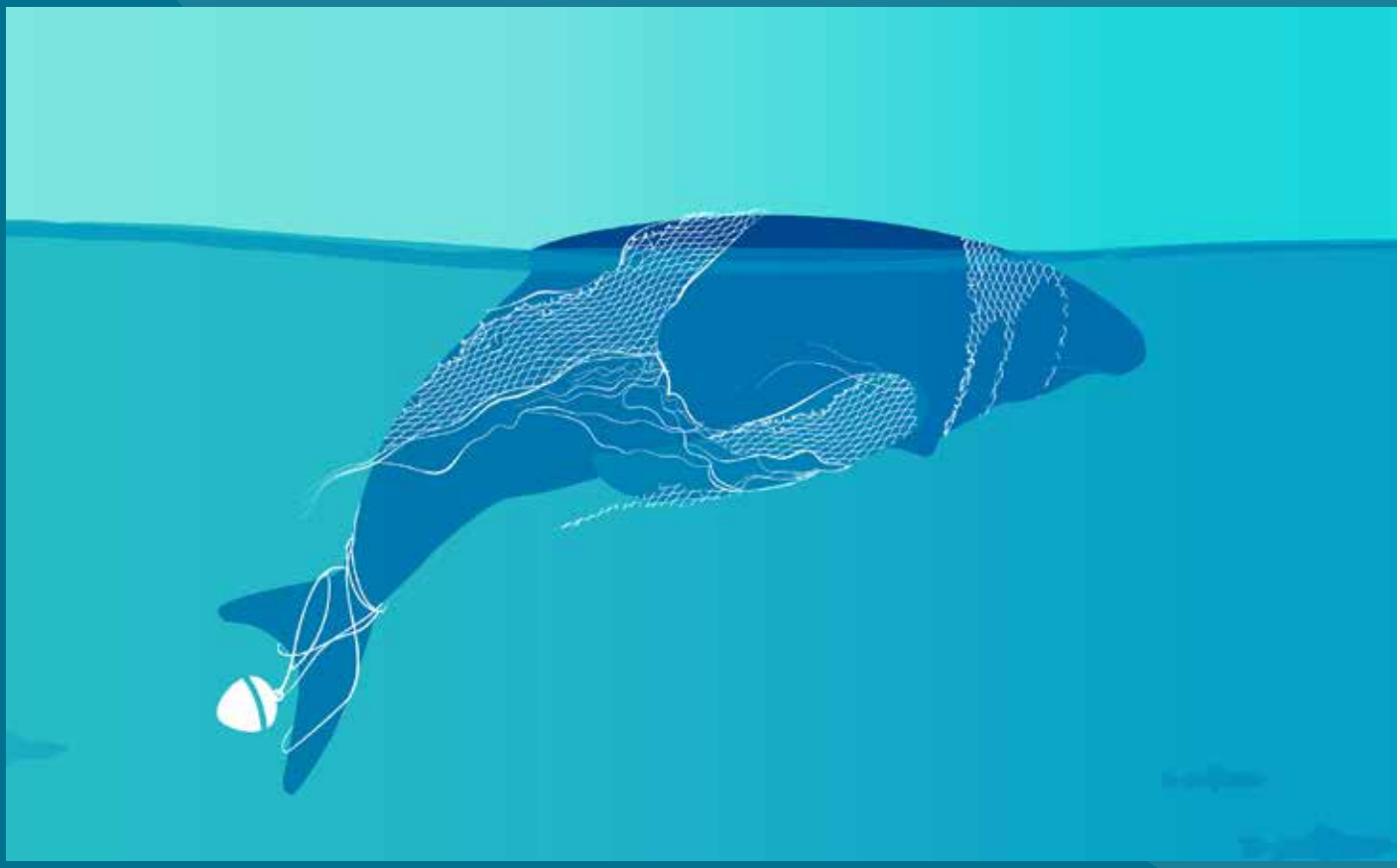


Figure 3. Whale entangled in an abandoned gillnet.

1.2 POTS AND TRAPS

have been also acknowledged as high impact ghost fishing gear. While each has a different structure, with construction materials ranging from bamboo to plastic and metal, both operate underwater and usually trap species by using bait. It is common for this type of fishing gear to get lost for similar reasons as gillnets. If lost, traps and pots keep attracting animals as they are usually baited. A feedback loop can be generated as more and more scavengers can be attracted and prey upon trapped animals. This can go on as long as the structure remains intact, but impact can continue thereafter as this fishing gear is usually tied with a buoy and entanglements can therefore still happen. For example, in some countries guidelines or even mandatory regulations have been making it obligatory to have mechanisms in place to track down and recover lost devices (such as gear marking or even GPS)[83],[84],[85]. See figures 4 and 5.

Figure 4. Pots and traps placed for fishing.

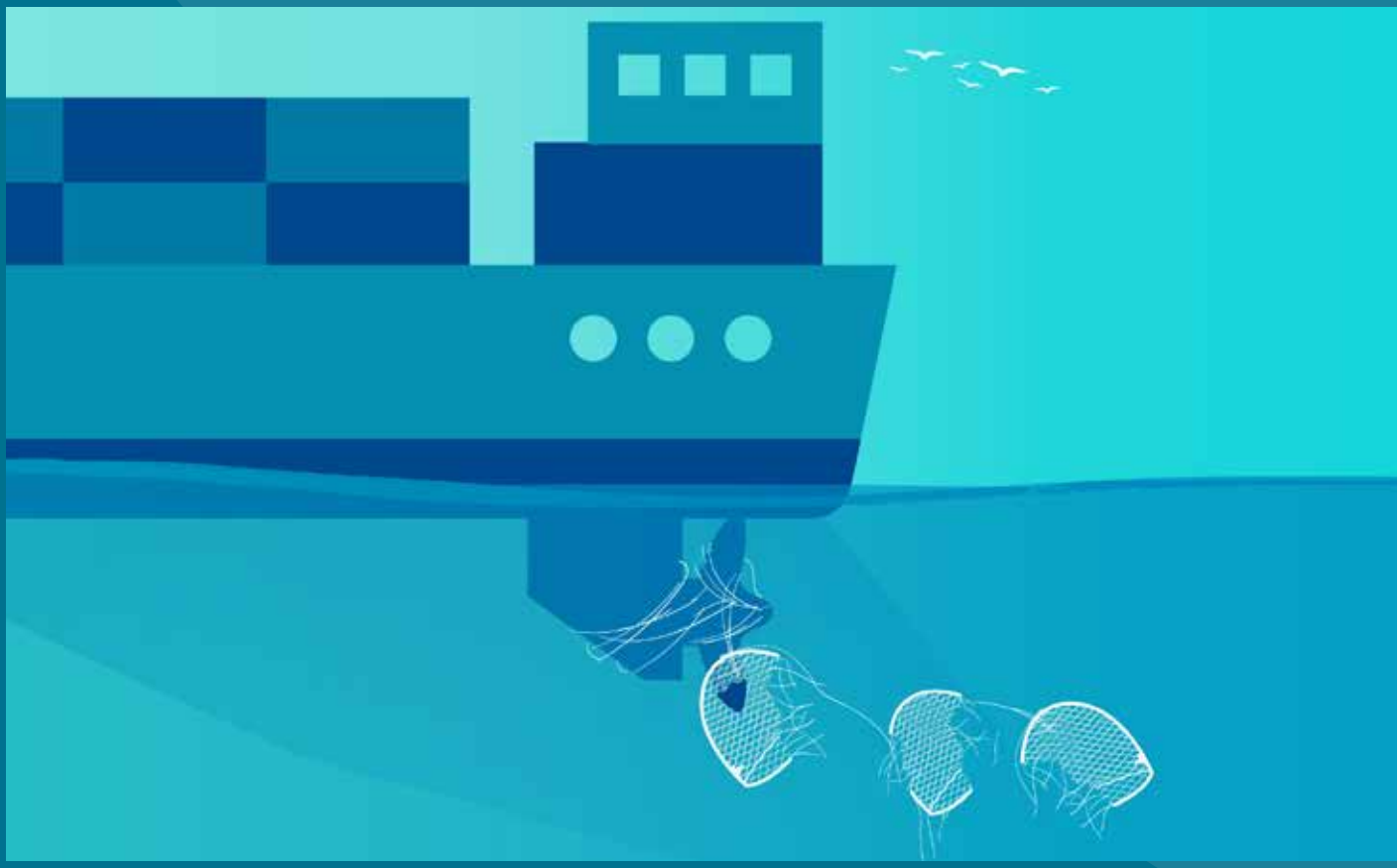


Figure 5. Navigation hazards caused by abandoned, lost or discarded pots and traps.

1.3 FISH AGGREGATION DEVICES (FADS) are used extensively in tuna fishing around the world. Fish naturally aggregate around floating objects and fishers have capitalized on this behaviour, concentrating fishing effort around floating objects and intentionally deploying floating objects to attract fish. Estimates of annual global deployments of FADs range from 45,000 to over 100,000[86]. FADs are commonly constructed using netting from old purse seines or other sources. Netting is often wrapped around rafts and also used as subsurface appendages, stretching to depths of 70m or more in some cases. Purse seine netting mesh sizes vary from 90mm to 200mm[87]. This netting can entangle fish and other animals that aggregate around the FAD as well as predators that are attracted to the aggregations of prey species. While many drifting FADs are tracked using satellite buoys, It is common practice for fishers and fishing companies to cease tracking drifting FADs, rather than recovering them, when they drift out of fishing areas[88]. Harmful impacts after the FADs are no longer being tracked or used by fishing companies include: continued entanglement of vulnerable species in FAD netting and rafts; and harmful impacts to marine and nearshore habitats of beached FADs[89],[90],[91],[92],[93],[94]. Research is currently being conducted to design biodegradable FADs which would help reduce the impact[95],[96]. See figures 6 and 7.

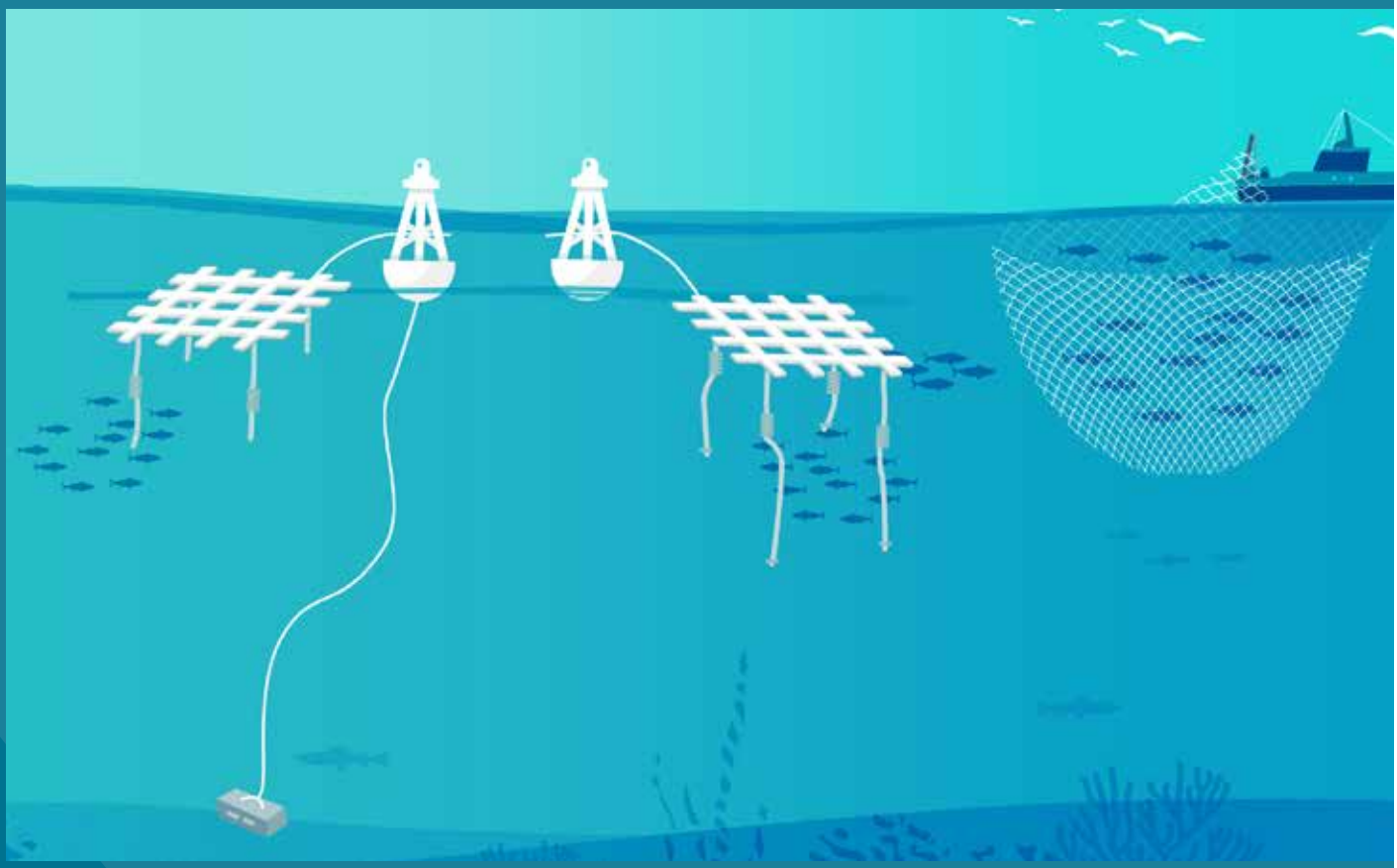


Figure 6. Fish aggregation devices (FADs) placed for fishing. On the left is an anchored FAD, the one on the right is a drifting FAD.

Figure 7. FADs transport invasive species when abandoned or lost.

2. HIGH RISK GHOST FISHING GEAR

2.1 HOOKS AND LINES

include different types and scales of fishing gear, that span from a single hook to lengthy longlines with thousands of hooks. Hand lines are relatively low risk in terms of impact, but long lines in particular can have significant impact if lost. They also vary according to the depth they operate, and whether they are anchored, left to drift or even towed. In most cases, these are passive fishing gear that may be baited to attract animals to be caught. Be it an individual handline or baited longline it is possible for them to get lost or discarded. As they can be quite cheap, they often are discarded if they get entangled or damaged. Also, in the case of longlines, they are deployed in extensive ocean areas, can be many kilometers in length, and are susceptible to being cut apart by cruising ships or even competing fishers. Even though longlines can span lengthy distances the impact they can generate when lost is less than other fishing gear, especially if they are deployed away from the surface. But if baited, hooks are more likely to keep catching fish and other species, and this can generate a feedback loop in which a bigger fish can prey upon the already baited fish. Hooks are attached to the longline through a mainline rope that is made from plastic-derived materials, which - if it is close to the surface - can harm birds or other animals that might get entangled. Sea turtles can also be trapped on baited hooks, but the invention of a curled turtle-safe hook mitigates this impact. See figures 8 and 9.

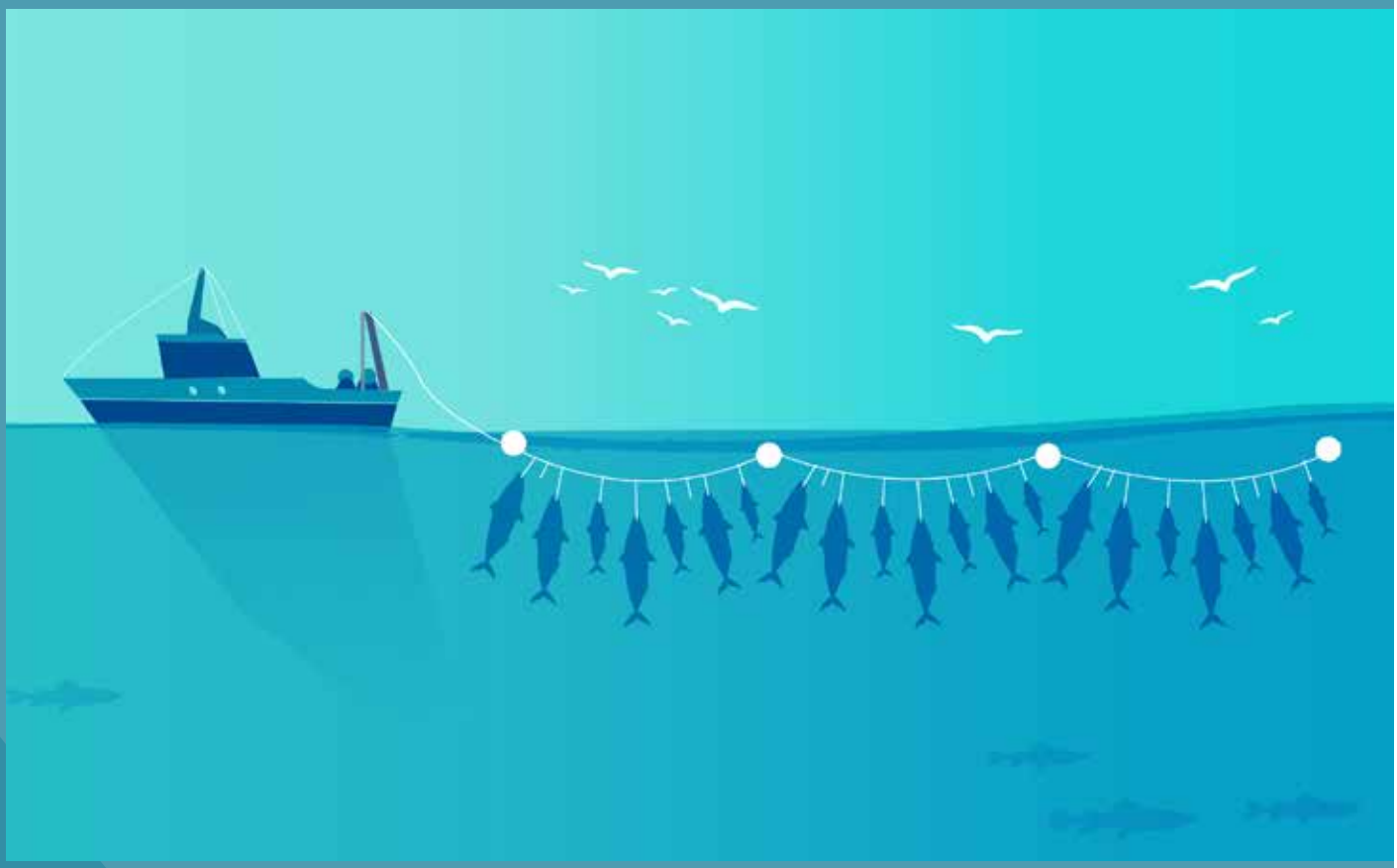


Figure 8. Longline placed for fishing.

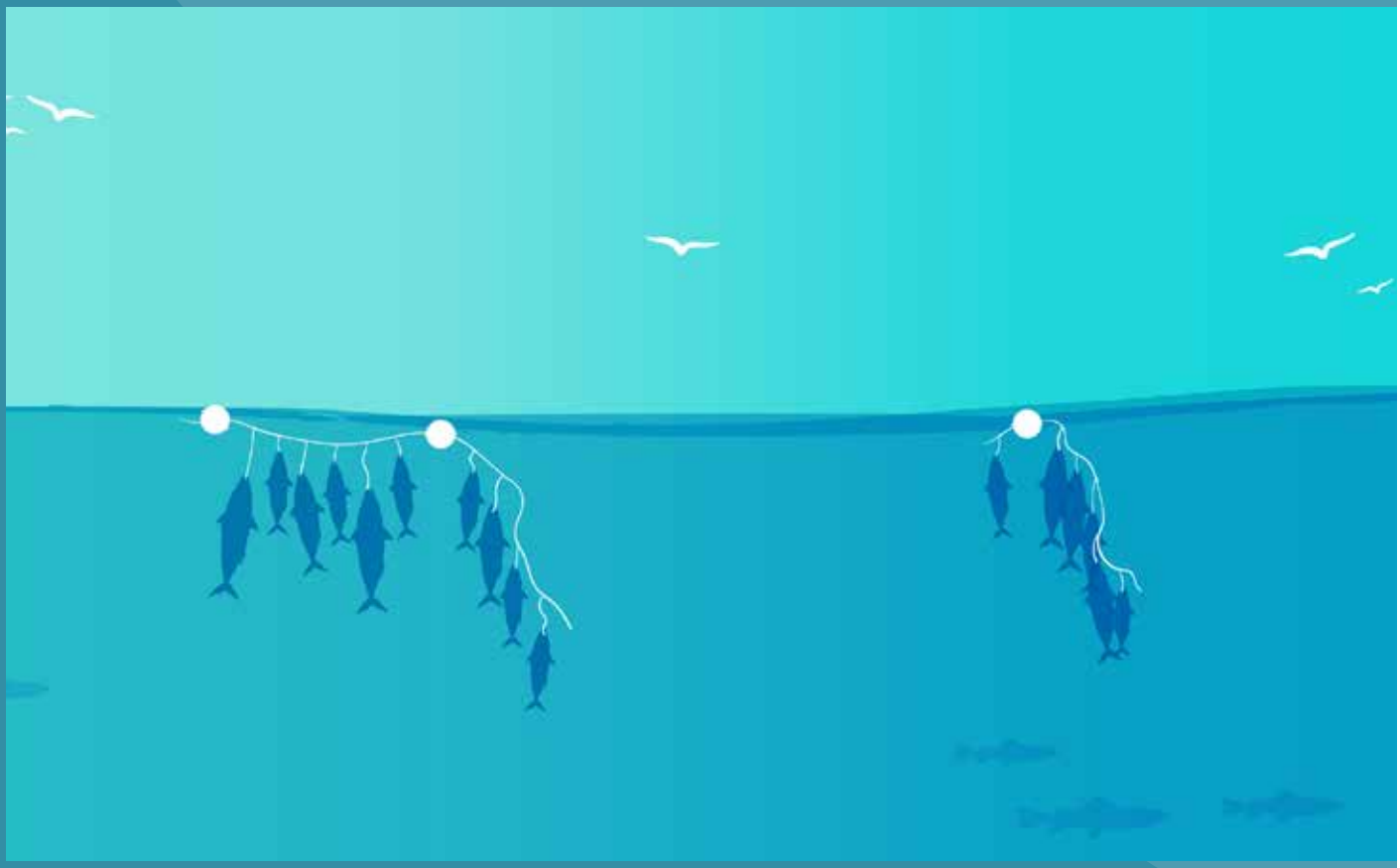


Figure 9. Abandoned longline capturing target species.

3. INTERMEDIATE RISK GHOST FISHING GEAR

3.1 TRAWL NETS are

a type of fishing gear towed by fishing vessels that catches animals with a cone-shaped "floating bag" channeling fish into the codend. Fish enter through a horizontal opening of the gear that is usually kept open with the help of a set of beams, otter boards and cables. They can be operated at different depths such as mid-water trawls or bottom trawls, the last one being able to interact with the seabed. These are active types of fishing gear as they are actively towed to seek species to catch them. These types of fishing gear are usually expensive hence fishers try to avoid losing them. With technological advancements nowadays they can have marking devices to be able to track them down if lost. However, tracking is only possible when the entire net is lost, which is very rare.

When trawling near the seabed, especially in rocky substrates, it is possible for nets to get stuck and partially lost, particularly common for bottom trawls. In this case, a portion of the whole net is torn off, which sinks towards the seabed where it can rest or be affected by bottom currents and be moved around. Because it crumples together on the seafloor, a piece of trawl netting has small chances of catching more fish, although it can still entangle other species such as crabs, and can affect the seabed through smothering. Surface trawls are typically made of polypropylen which is lighter than water. Torn fragments without weights or catch tend to float on the surface, and in this case, lost trawls can have comparably negative impacts as the FADs discussed above. See figures 10 and 11.

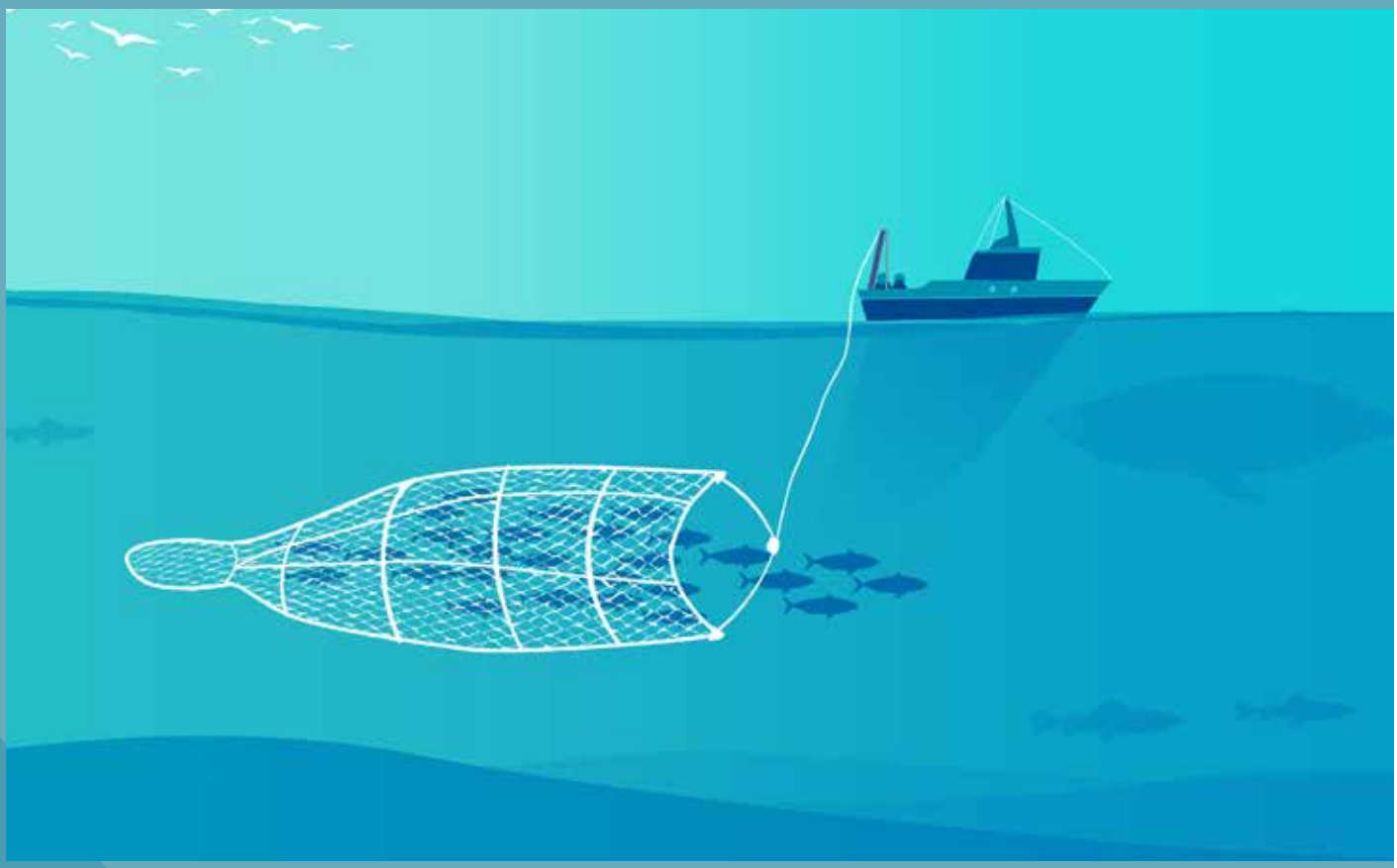


Figure 10. Trawl net in use.

Figure 11. Fragments of trawl nets smothering fragile marine ecosystems such as coral reefs.

3.2 PURSE SEINE NETS

are a type of active fishing gear that catch fish by encircling them with a net. Most of the time the net will be set and get towed by a support vessel that circles the fish shoal and it gets closed from beneath trapping the fish while getting pulled back into the ship. As they get operated mostly at the sea surface level there is little to no interaction between purse seine nets and the seabed. Sometimes during fishing operations a section of the purse seine might suffer damage and need to be cut apart but this doesn't necessarily mean it ends up in the ocean. But repair segments can unintentionally be lost when the next haul is brought up if the pieces are sitting on the working deck. Dedicated containers for repair sections are an easy mitigation measure against loss of repair segments, which is important because these segments can be several meters in size and cause similar harm on the sea surface as FADs and floating trawl segments. For example, when washed up in the beach, repair cut-outs were observed to trap Svalbard reindeer on North European beaches, which starved with their antlers trapped in netting[97]. Entire nets can be lost, however, if the school of fish is too large and heavy and/or the line holding the net aloft breaks, though this is an extremely rare occurrence. Purse seiners will make intensive attempts to recover a lost net because of its large economic value and high cost of a new purchase. If lost, this type of weighted fishing net will most likely sink towards the bottom of the sea and unless it has a somewhat large mesh size it is likely other animals might get entangled. At the seabed it might affect other forms of biodiversity, or even be moved around by bottom currents once the contained catch is degraded. See figures 12 and 13.

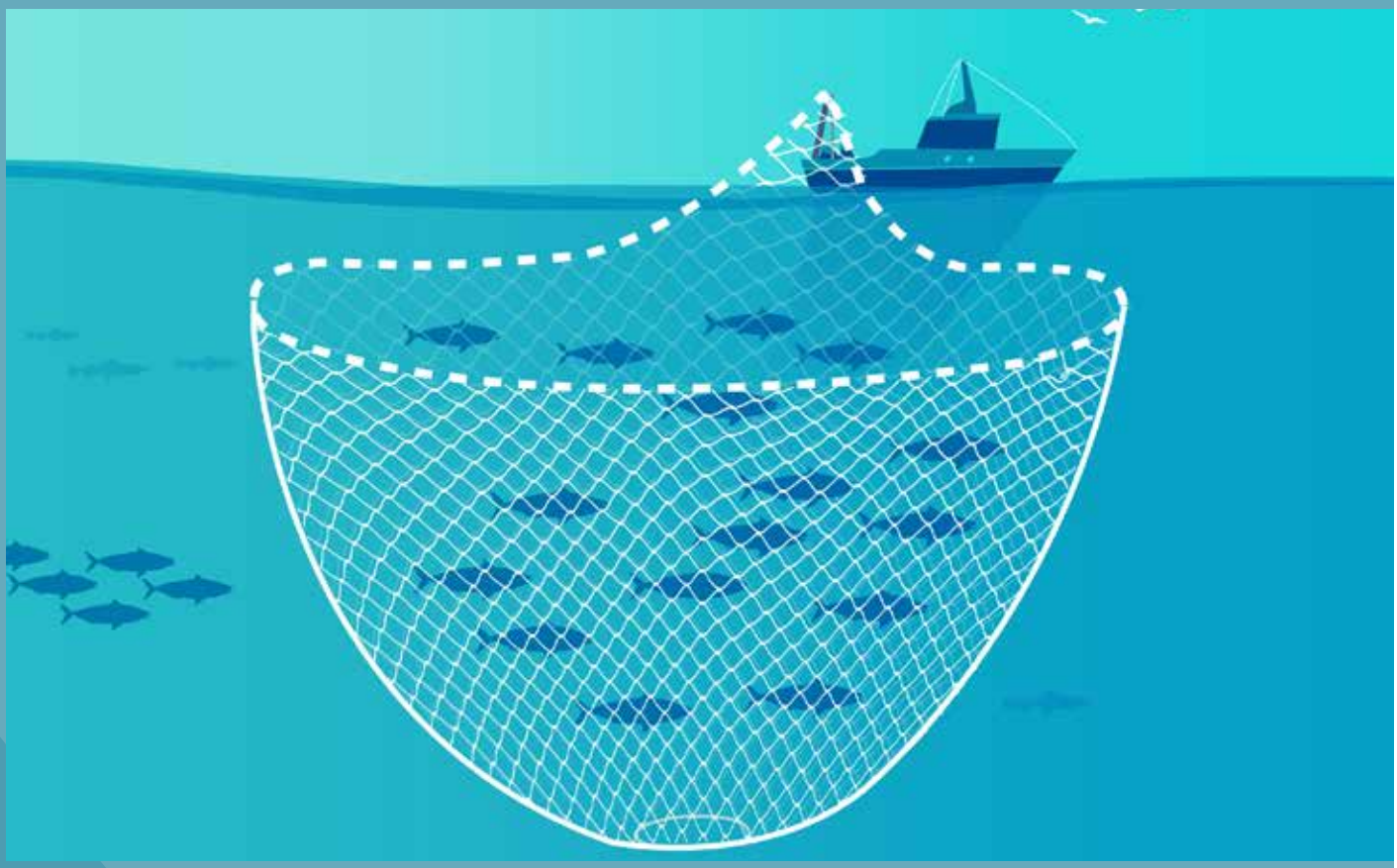


Figure 12. Purse seine nets in use.

Figure 13. Fragments of purse seine nets on the beach.

CAUSES OF FISHING GEAR LOSS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Generally fishers don't want to lose their fishing gear. It is their means of livelihood and sustenance and can represent a considerable financial investment. Nevertheless, fishing gear can be abandoned, lost, or discarded in even the best managed fishery.

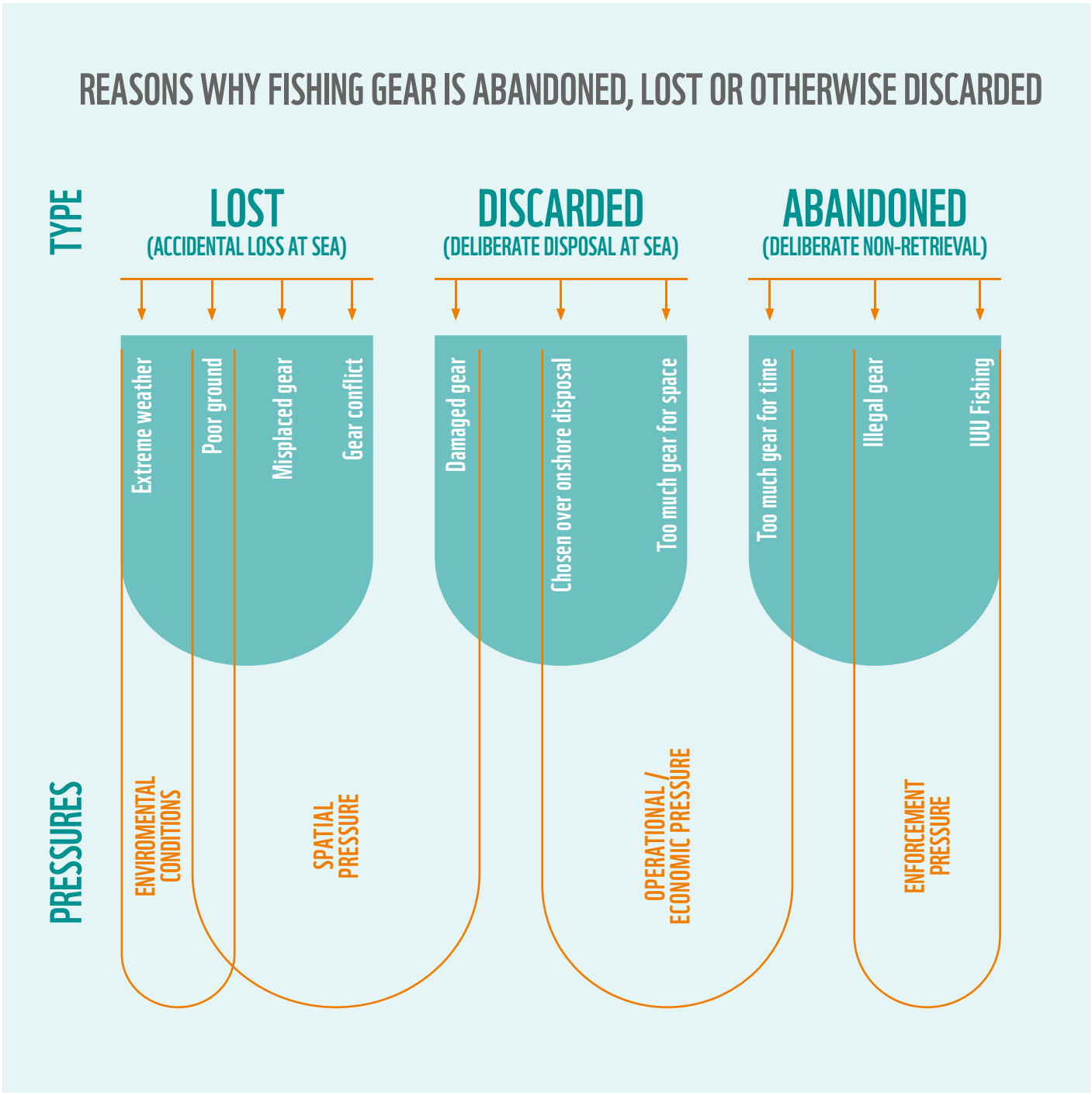
Gear is abandoned when the fisher cannot retrieve it. This happens when gear is snagged on reefs, rocks or other obstructions. Sometimes fishing gear conflicts cause snagging, e.g. when a trawl is towed across a gillnet or snags the line of a crab pot, which is then lost because it cannot be recovered without its guiding surface line. Gillnets can also be snagged and dragged by non-fishing vessels and sport boats, which can lead to displacement of gillnet sections impeding recovery by the fisher. Snagging fishing gear is identified as a major cause of loss in many coastal fisheries[98],[99],[100],[101].

Gear is considered lost if a fisher cannot locate it or has lost operational control over it. This can happen when marker buoys become detached, or tides or wave action or snagging carry fishing gear away from its deployment location[102],[103]. Interactions with active fishing gear or other vessels also cause considerable gear loss in static gear fisheries, such as lobster or crab trap and gillnet fisheries[104],[105],[106]. Other causes of loss identified by Brown *et al.* (2005)[107] for European fisheries included long soak times, fishing in deep habitats, and deploying more gear than can be hauled in regularly. Fishers in Vanuatu and Solomon Islands noted animal interactions, such as sharks destroying nets, as a leading cause of gear loss[108] .

Illegal, unreported and unregulated fishing also contributes considerable amounts of ghost gear, as illegal fishers abandon or discard fishing gear to conceal their activities. In 2017, GGGI, World Animal Protection and WWF-Mexico collaborated on a project that removed 5,200m^2 of abandoned and lost illegally set gillnets from vaquita habitat in the Gulf of California. The project illustrated the nexus between IUU and ghost gear. Other studies have documented the connection as well, though it is difficult to quantify[109],[110].

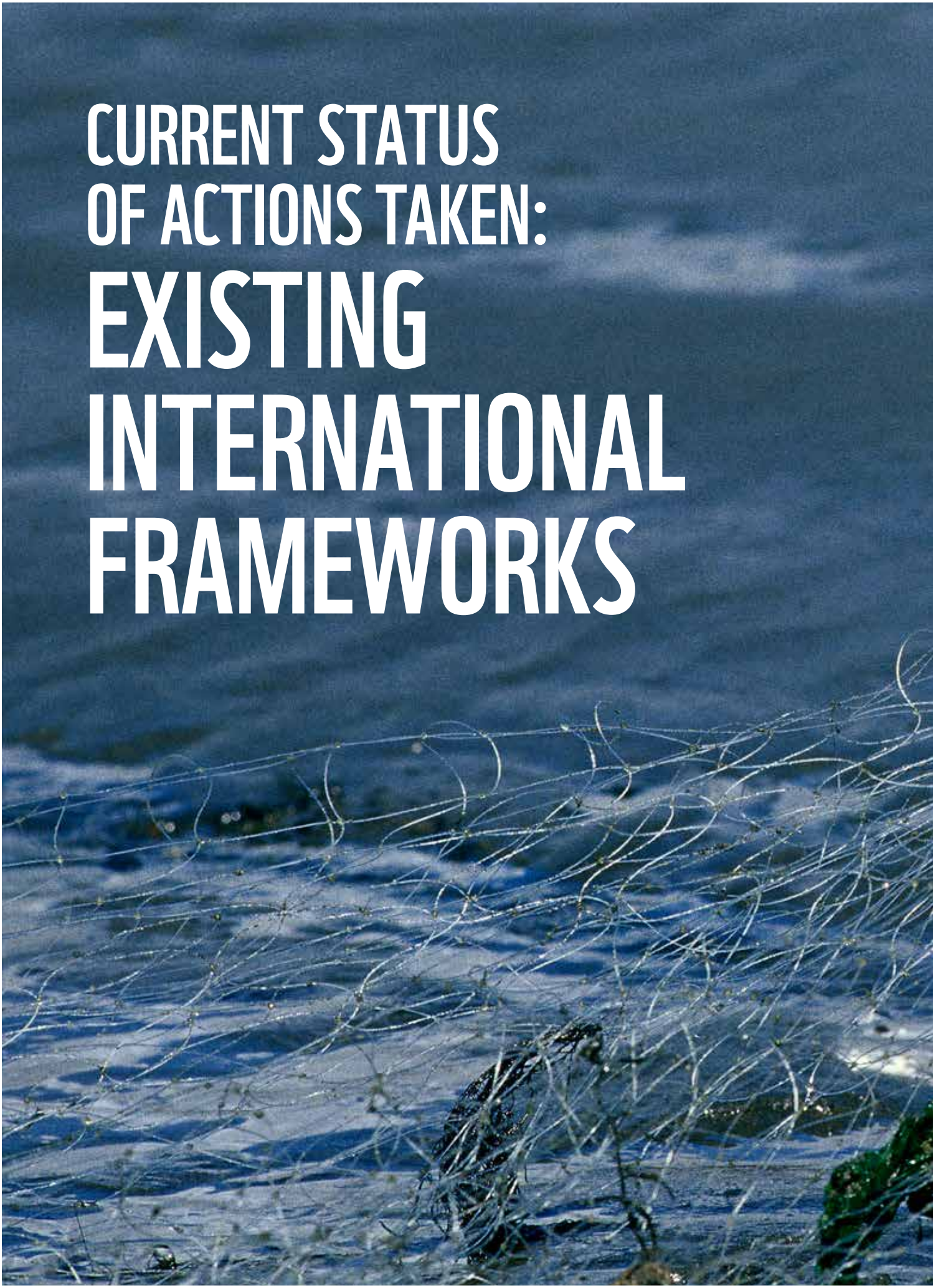
Sometimes fishing gear is also discarded into the ocean deliberately[111],[112]. This behaviour can be motivated by lack of adequate onshore disposal facilities, high disposal costs, or lack of storage space onboard. It can also result from ignorance of the harm caused by ghost gear and a habitual sense that the sea is endless.

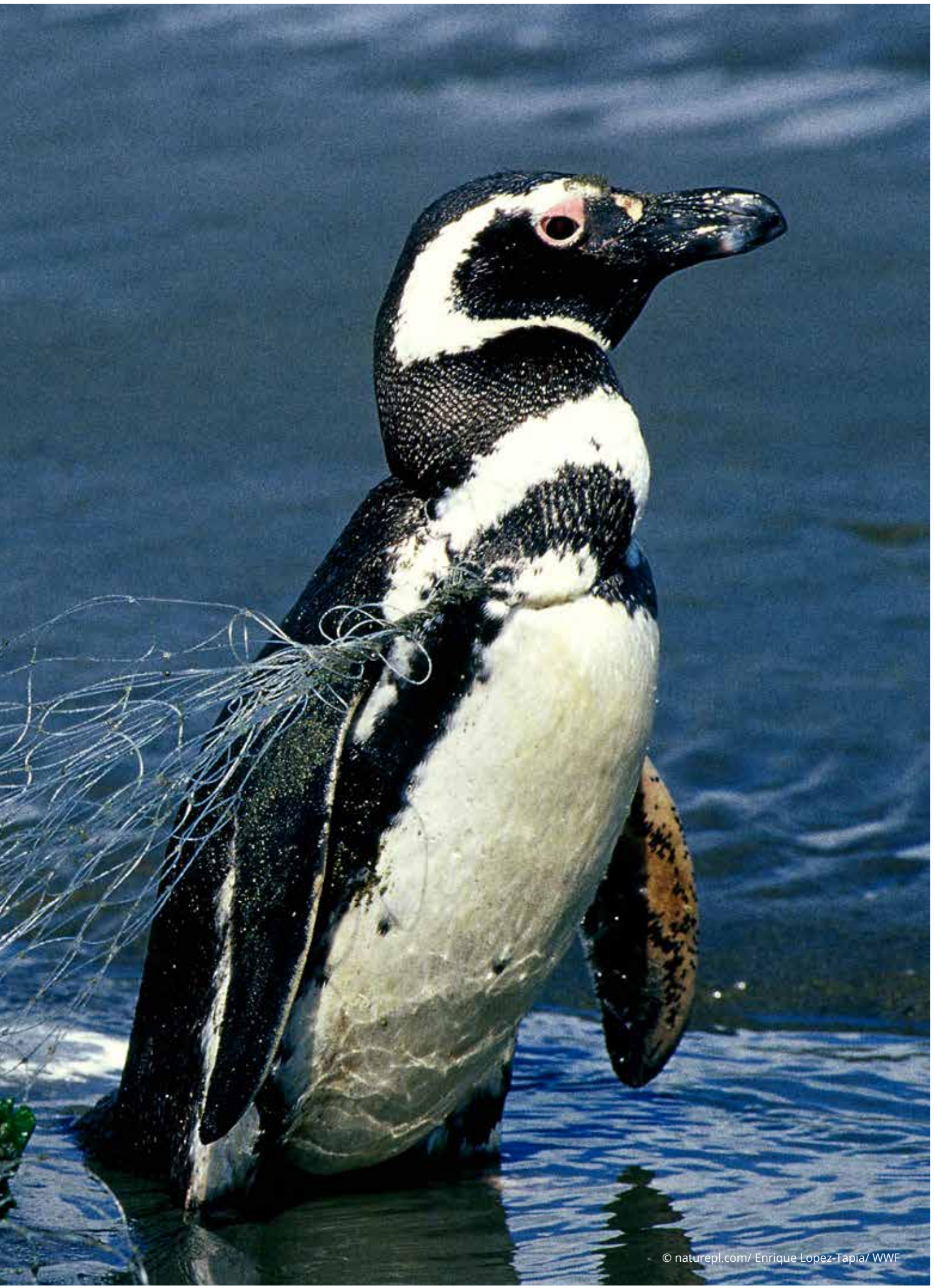
Figure 14. Reasons why fishing gear is abandoned, lost or otherwise discarded, based on MacFadyen et al. 2008.



In order to identify and implement a long-term strategic solution that reduces the problem of ghost gear, it is necessary to identify the causes and drivers of the loss and abandonment of fishing gear. Understanding why gear is lost is best approached by gathering information from fishers through structured interviews or surveys[113],[114],[115],[116]. However, direct causes for gear loss reported by fishers, such as vessel traffic conflict or snagging on obstructions can mask the underlying drivers influencing fishers behaviour. Richardson *et al.* (2018)[117] found that fisher-reported reasons for gear loss can be caused by underlying fisheries management regimes, which influence fisher behaviour. For example, gear loss from bad weather is influenced by management actions or market forces that drive fishers to fish during bad weather. Thus, **to develop effective gear loss prevention strategies, it is important to consider the root causes of gear loss. It is equally important to recognize the safety, economic, and conservation considerations that fishers must work with.**

CURRENT STATUS OF ACTIONS TAKEN: EXISTING INTERNATIONAL FRAMEWORKS

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Global policies and regional fisheries management organizations can play a key role in preventing and mitigating ghost gear through binding and voluntary measures to which member states and participating governments adhere. **Unfortunately, the existing global legal framework that considers abandoned, lost or discarded fishing gear is fragmented and ineffective.** Regional frameworks are also fragmented and while some of them cover part of the problem, many existing instruments are either limited in scope or do not provide measurable targets and timelines, making it difficult to monitor progress at the regional, national, or global level.

RELEVANT INTERNATIONAL INSTRUMENTS IN THE PREVENTION, MITIGATION AND CURE OF GHOST GEAR ARE:

- **The United Nations Convention on the Law of the Sea (UNCLOS)**[118] sets out the legal framework for all human activities in the ocean, requiring the protection and preservation of the marine environment and the obligation to take all measures necessary to prevent, reduce and control pollution from any source, including vessels and by dumping. Article 194 provides for State regulation of fishing gear by providing for licensing of fishing equipment used in waters under national jurisdiction. However, implementation and enforcement of these provisions should be strengthened at the global, regional and national levels, including through the adoption of adequate implementing legislation.

- **Convention for Prevention of Marine Pollution (MARPOL)**[119]**,** the principal convention of the International Maritime Organization (IMO) against pollution at sea, is a key international instrument to address pollution of the marine environment from ships. MARPOL obliges governments to ensure the provision of adequate reception facilities at ports and terminals for the reception of garbage without causing undue delay to ships, but the effectiveness of ships to comply with MARPOL's discharge requirements depends largely upon the availability of adequate port reception facilities. MARPOL Annex V[120] prevents garbage pollution from ships, e.g. by prohibiting dumping of ghost gear into the ocean. **The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London**

Convention)[121] and its Protocol, are also coordinated by IMO and prohibit the dumping of waste into the ocean. Yet there are implementation and compliance challenges with both agreements. In 2018, IMO's Marine Environment Protection Committee (MEPC) adopted the **IMO Action Plan to address marine plastic litter from ships[122],** which aims to enhance existing regulations and introduce new supporting measures to reduce marine plastic litter from ships. The MEPC agreed actions to be completed by 2025, which relate to all ships, including fishing vessels. However, controlling and enforcing deliberate and unintentional littering in the high seas is difficult to implement. Sanctions against littering imply that the act of littering is observed which is highly unlikely in the open ocean.

- **Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for Responsible Fisheries (Code of Conduct)[123]** is a voluntary instrument that provides the legal principles for responsible fishing and fisheries activities, including recovery and management of abandoned, lost or discarded fishing gear.

- **United Nations General Assembly (UNGA) Sustainable Development Goals (SDGs)** were set to end poverty, protect the planet and ensure prosperity for everyone by 2030. There are 17 integrated SDGs with a shared focus on a balanced development in terms of environmental, economic, and social sustainability. SDG 14 aims to conserve and sustainably use the ocean, seas and marine resources for sustainable development. By 2025, prevent and significantly reduce marine pollution of all kinds[124]. While goals and targets are not legally binding, the impact of SDG 14 on actions by States is important.

- **The Agreement for the Implementation of UNCLOS relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (United Nations Fish Stocks Agreement)[125]** includes obligations for States to minimize pollution, waste, discards, and catch by lost or abandoned gear (article 5(f)). It includes requirements for marking of fishing gear for identification in accordance with uniform and internationally recognizable vessel and gear marking systems (article 18(3)(d)). However, the implementation of the United Nations Fish Stocks Agreement is expected to happen through regional fisheries management bodies (RFMOs) and does not cover all fish stocks.

** Please refer to Annex 1 for additional international frameworks and the Ghost Gear Legislation Analysis Report for more detailed information.*

THE CASE OF REGIONAL FISHERIES MANAGEMENT BODIES (RFMOS)

RFMOs[126] provide an important legal mechanism for states to adopt measures to address ghost gear, an important source of marine plastic litter and microplastics. Many RFMOs have adopted some measures addressing ghost gear such as prohibition of the use of certain gear and/or gear marking requirements.

Gilman (2015) identifies deficits with regional fishery bodies, including RFMOs, towards effective monitoring and management of ghost gear and ghost fishing

One deficit identified is the lack of relevant binding conservation and management measures to prevent or remediate ghost gear. Only a few global and regional bodies explicitly include its monitoring and control in their mandates. There is a need to amend the mandates of the conventions and agreements of the various intergovernmental organizations to explicitly establish binding measures to monitor, prevent and remediate ghost gear and ghost fishing for marine capture fisheries.

Another deficit is the lack of standardized data collection to fill our gaps in understanding of gear loss and rates of ghost fishing. RFMOs and other managing bodies should establish standardized data collection and metrics.

Additionally, Gilman emphasizes the need for binding measures requiring the carrying of equipment to retrieve ghost gear on board fishing vessels, the establishment of reporting systems, and gear marking to increase the visibility of passive gear to avoid loss of gear due to interaction with passing vessels or active gear. Measures that require the use of commercially appropriate gear technology methods and practices that prevent and remediate ghost gear and ghost fishing, including gear designs that could contribute to reducing ghost fishing mortality, are also recommended.

The modification of marine spatial planning measures is also needed. Spatial and temporal restrictions on fishing, that prohibit the use of gillnets and trammel net gear in certain areas, must be complemented with the establishment of binding measures separating passive and mobile gear fishing activities in order to prevent gear conflicts and gear loss, or to prevent fishing in areas where there is a high probability of gear loss due to contact with underwater obstructions, such as reefs, rocks, and shipwrecks.


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Major gaps and challenges in the existing international, regional and sub-regional frameworks include[127]:

- A lack of harmonized binding standards at the global level for the mitigation of pollution by plastic waste, including ghost gear;
- A lack of global standards for research, monitoring and reporting of ghost gear, which leads to geographic gaps on the scale of the issue in many parts of the world;
- A lack of coordinated efforts to address and assess the extent of ghost gear in the marine environment, and the associated marine species, ecosystem and health risks;
- A lack of effective compliance and enforcement mechanisms;
- No global liability and compensation mechanism for pollution by plastic, including ghost gear.

EFFECTIVE ACTIONS TO ADDRESS THE PROBLEM

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THE GGGI, FORMED IN 2015, IS A GLOBAL CROSS-SECTORAL ALLIANCE COMMITTED TO DRIVING SOLUTIONS TO THE GHOST GEAR PROBLEM. THE ALLIANCE HAS BEEN TACKLING THE GHOST GEAR ISSUE BY ENGAGING MORE THAN 100 MEMBERS.

Despite the global extent of the ghost gear problem and the complexity and diversity of the world's fisheries, there are many examples of effective actions being taken to reduce impacts from ghost gear. Fisheries managers all over the world have recognized the problem of ghost gear and many have taken at least small steps to address the problem. Gilman (2015)[128] noted that 12 of 19 global and regional bodies with authority to manage ghost gear have taken some formal action to reduce ghost gear impacts. Fishers, fishing industry partners, and ports, NGOs, governments and intergovernmental organizations like FAO, UNEP, IMO, and many others around the globe are increasingly collaborating to address the problem of ghost gear. Key accomplishments include the formation of the GGGI and the development of two important guidance documents designed specifically to address ghost gear on a global scale.

- The GGGI, formed in 2015, is a global cross-sectoral alliance committed to driving solutions to the ghost gear problem. The alliance has been tackling the ghost gear issue by engaging more than 100 members from the private sector, academia, governments, and intergovernmental and non-governmental organisations. Through the work of the GGGI members, a connected framework for solutions has emerged and critical guidance on solving the problem of ghost gear have been developed.
- The **GGGI Best Practice Framework for the Management of Fishing Gear (BPF)** is a comprehensive guidance document detailing best practices for ten stakeholder groups throughout the seafood supply chain to reduce the amount of ghost gear entering our ocean[129]. It aligns closely with best practice recommendations included in other literature and key international instruments and provides a reference point for interventions throughout the supply chain specifically on the issue of ghost gear[130],[131],[132],[133].
- FAO **Voluntary Guidelines for the Marking of Fishing Gear (VGMFG)** were endorsed by FAO's Committee on Fisheries (COFI) in July, 2018[134]. The VGMFG are specifically designed to combat, minimize and eliminate ghost gear and to identify and recover lost fishing gear. Thus, the VGMFG does not focus only on marking fishing gear, but also includes sections on reporting and recovery of ghost gear.

MORE ACTION NEEDED ACROSS THREE TYPES OF APPROACHES WITH A FOCUS ON PREVENTION

To effectively address the problem of ghost gear, prevention of gear loss is most important, so preventive actions should be the top priority for governments, fishers, and fisheries managers. However, recognizing that gear loss will happen even in the best managed fisheries, we must also implement effective actions to mitigate harm from gear that is already lost and actions to retrieve lost fishing gear under some

FOR GOVERNMENTS AND INTERNATIONAL ORGANIZATIONS, POLICIES AND REGULATIONS DESIGNED TO PREVENT GEAR LOSS AND ESTABLISH ADEQUATE END-OF-LIFE FISHING GEAR DISPOSAL AND RECYCLING OPTIONS ARE APPROPRIATE PRIORITIES.

situations. Thus, national, regional and global policies and instruments must consider a combination of approaches, focusing mainly on preventing loss, then on reducing harm from lost gear (mitigation), either through gear designed to limit ghost fishing or through retrieval (curative measure), is needed for comprehensive solutions[135],[136],[137].

PREVENTIVE ACTIONS

Preventing fishing gear loss is the ultimate goal of any progressive ghost gear programmes. Prevention covers the spectrum of actions available to seafood stakeholders, from building awareness to regulatory measures and everything in between. For governments and international organizations, policies and regulations designed to prevent gear loss and establish adequate end-of-life fishing gear disposal and recycling options are appropriate priorities.

For example, **spatio/temporal separation of different fishing gears, including the prohibition of certain types of gears are powerful management tools that can prevent loss of high-risk gear and prevent gear and vessel conflicts that cause gear loss.** Many well-managed fisheries already regulate the separation of fishing sectors for reasons other than preventing ghost gear[138] and some regulations have been enacted specifically to avoid impacts from lost gear, such as the Western Central Pacific Fisheries commission prohibition of large-scale driftnets[139].

Fishing gear marking, both for visibility and for owner identification is an effective means to reduce gear conflict, loss, and facilitate recovery and identification of legal vs. illegal fishing.

Innovative solutions to end-of-life fishing gear disposal and recycling hold promise in reducing the amount of fishing gear discarded in the ocean. Many ongoing programmes, such as the Healthy Seas partnership with Aquafil and the National Fish and Wildlife Fishing for Energy Program are collecting end-of-life gear. Also, they are establishing supply chains and market demand for end-of-life gear from fisheries around the world that do not have adequate disposal options[140],[141]. The partnership between WWF-Peru and Bureo is an example of a recycling scheme providing artisanal fishers with responsible options for end-of-life gear disposal where none existed before[142].

The current actions of the European Commission and its directive on single use plastics and end-of-life fishing gear sets progressive goals of a minimum collection rate of 50% and a recycling target of 15%, both to be met by 2025, The directive requires the development of a standard on the circular design of fishing gear and to develop Extended Producer Responsibility (EPR) requirements for fishing gear producers[143].

Building awareness of the problem and of methods to reduce loss through education, training, and outreach would benefit all stakeholders in the seafood supply chain. In 2017, GGGI developed a global ghost gear database to work with existing data and improve the way data is collected. Figure 15 demonstrates the significant gaps in data collected to date.

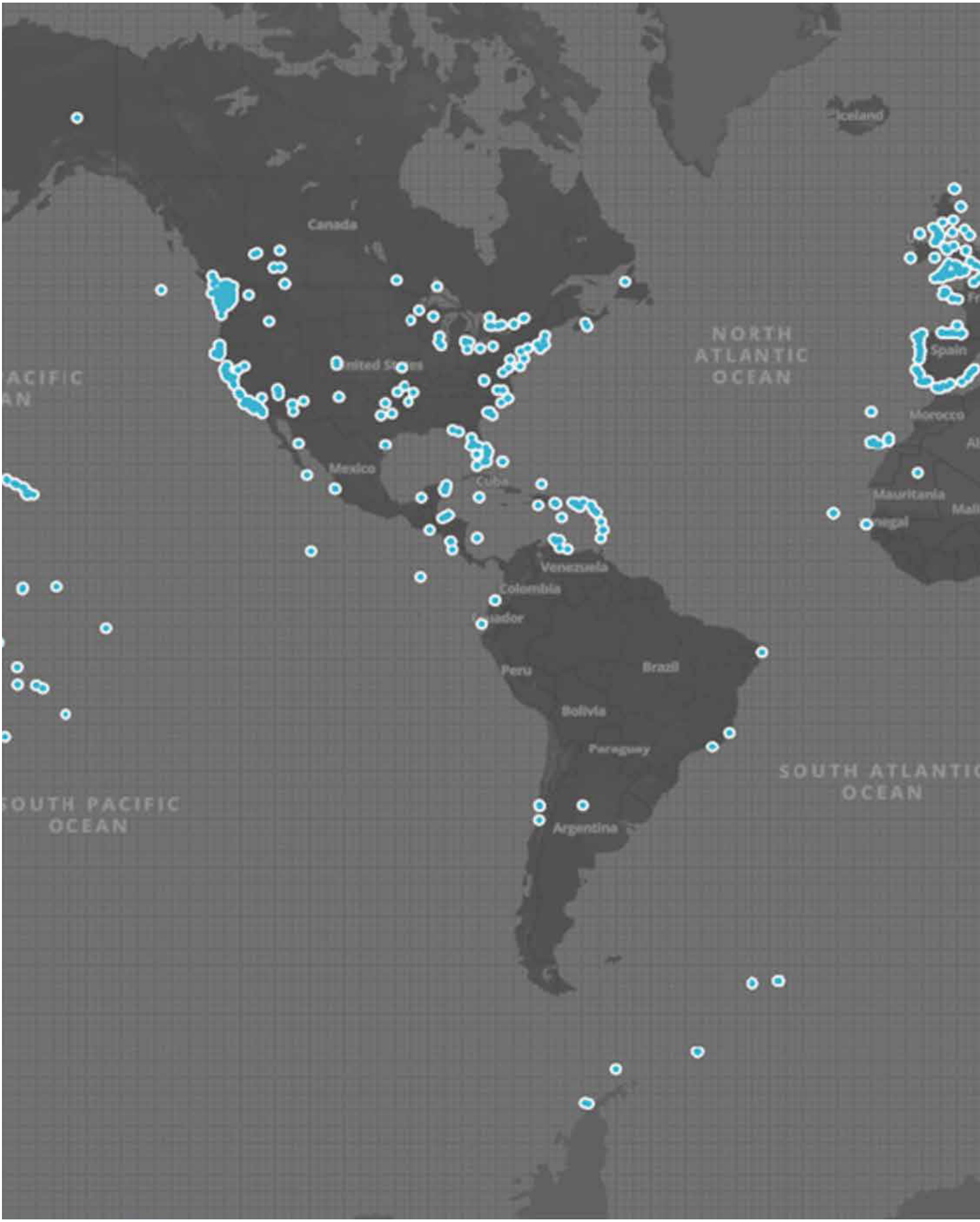
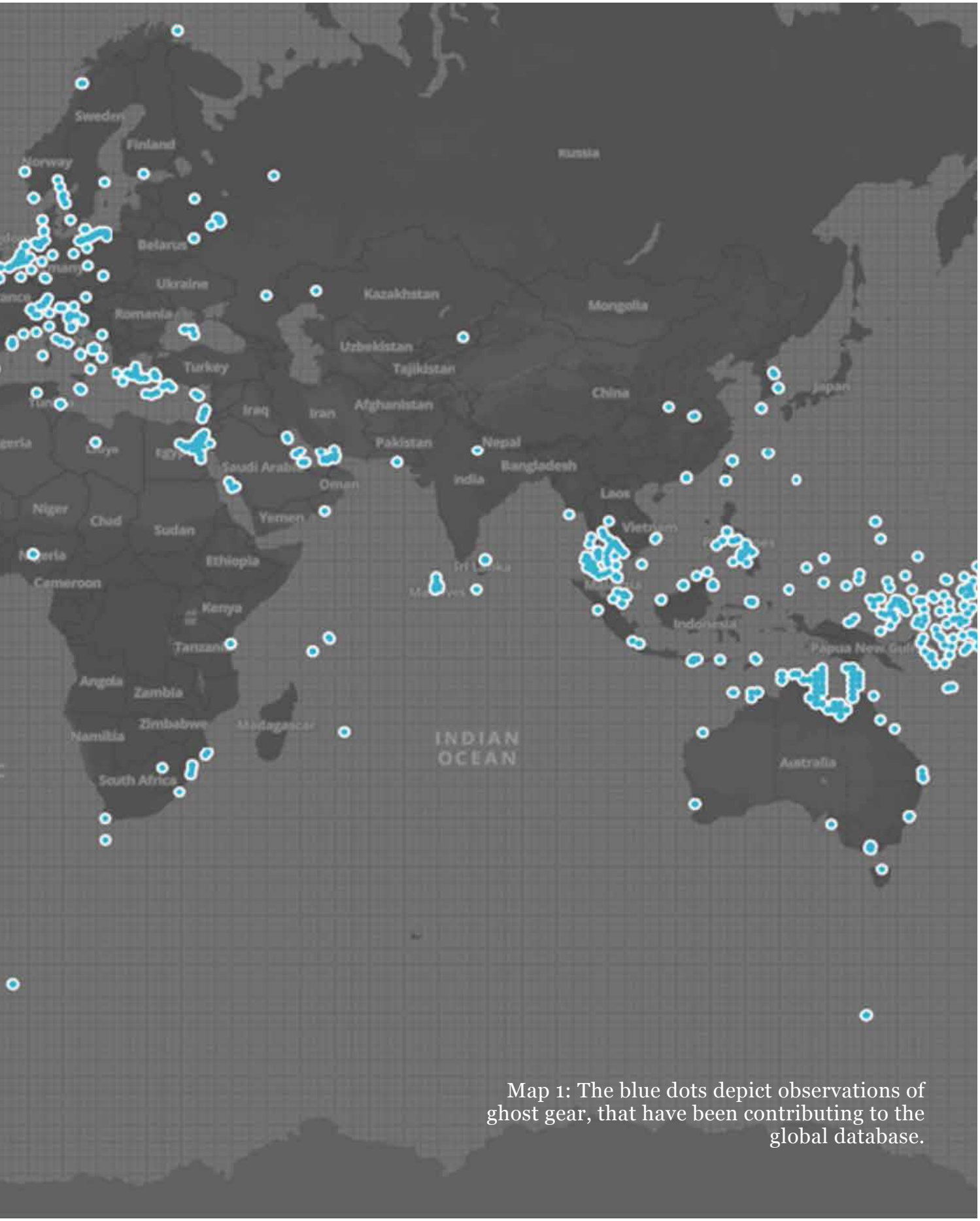


Figure 15. Observations of abandoned lost or discarded fishing gear reported in the GGGI ghost gear database.



Map 1: The blue dots depict observations of ghost gear, that have been contributing to the global database.

FISHERS SHOULD BE TRAINED AND READY TO RETRIEVE LOST FISHING GEAR TO THE EXTENT IT IS SAFE TO DO SO.

MITIGATION ACTIONS

Managing for the inevitable loss of some fishing gear also includes adopting practices to limit or mitigate ghost fishing when gear is lost. Effective methods include the inclusion of **biodegradable components** into fishing gear designs so that the gear is disabled and does not continue ghost fishing[144,145,146,147,148]. In North American shellfish fisheries, traps are commonly required to include an egress hatch that allows for target species escapement if the trap is lost. These hatches are commonly secured close with biodegradable twine (biotwine) that is designed to degrade over time if the trap is lost. This simple best practice can reduce and even eliminate ghost fishing in lost traps depending on the time it takes for the biotwine to degrade and the length of time animals can live in a lost trap without food[149].

Some FADs in current use include some biodegradable components. Completely biodegradable FADs will solve a lot of problems associated with lost and abandoned FADs[150]. Currently, three of the four Tuna RFMOs (ICCAT, IOTC and WCPFC) promote the use of biodegradable FADs, but none require their use[151]. Fishers and other organizations are testing effectiveness of biodegradable FAD designs in various ocean settings[152,153]. Biodegradable nets are still in the research stage and more work needs to be done to design other types of gears with biodegradable components[154,155]**.** Gear designers and producers can help to limit ghost fishing by advancing the use of **biodegradable materials in fishing gears.** Fishers participation in designing and testing of innovative gear designs is essential to ensure the designs are fit for purpose.

CURATIVE ACTIONS

Even in the best managed fisheries in the world, fishing gear is abandoned or lost due to weather, mechanical problems, accidents at sea or human error. Curing, or elimi-

RETRIEVAL PROGRAMMES THAT ARE MOST PROGRESSIVE INCLUDE AN EASY REPORTING SYSTEM FOR FISHERS TO REPORT LOST GEAR COMBINED WITH SYSTEMATIC RETRIEVAL OF REPORTED GEAR.

nating harm caused by ghost gear, can be achieved by removing ghost gear from the ocean. **Removing fishing gear after it is lost is the only guaranteed method to eliminate ghost fishing and other harm caused by long-lasting derelict fishing gear**. It can be very expensive, however, particularly from deep marine habitats[156],[157],[158]. Harmful impacts to marine habitats can also be significantly reduced, with relatively quick recovery of habitats documented with certain gear types in certain areas[159],[160].

There are many removal programmes operating around the world, some focusing on large collections of ghost gear that have accumulated over many years[161],[162],[163], and some systematically cleaning fishing areas on a regular basis[164],[165]. Some, like the Northwest Straits Foundation's Program in Puget Sound, provide rapid response and removal of newly lost gear (gillnets in this case)[166]. Fishers should be trained and ready to retrieve lost fishing gear to the extent it is safe to do so. The European Union already requires fishers to carry retrieval equipment and retrieve lost fishing gear or to report its loss within 24 hours if the fisher cannot retrieve it[167] .

Retrieval programmes that are most progressive include an easy reporting system for fishers to report lost gear combined with systematic retrieval of reported gear. These programmes could include rapid response and retrieval or regular, after-season clean-ups, depending on the need of the fishery and the urgency of the impacts[168],[169]. Particular attention should be paid to areas where natural disasters such as cyclones cause loss of large quantities of fishing gear. Disaster preparedness should include removing gear when storms are predicted combined with post-storm clean-up[170].

Fishing for Litter schemes, whereby fishers bring back any marine debris, including ghost gear, that they encounter during normal fishing operations, are growing in popularity. They reward fishers for helping to clean the ocean and provide easy disposal and recycling options for recovered debris[171],[172]. Such programmes require cooperation between stakeholders and coordination with ports.

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GHOST GEAR DETECTIVE

THE FIRST UNDERWATER CITIZEN SCIENCE PROGRAMME DESIGNED TO ADDRESS GHOST GEAR IN HONG KONG

Besides the modern high-rise buildings in this Asian city, Hong Kong is home to nearly 6000 marine species, which is a quarter of all the marine species in China. However, these valuable ecosystems currently face numerous threats from rampant development, unregulated fishing practices, escalating marine traffic, and marine plastic pollution. Among these issues, the problem of abandoned, lost or discarded fishing gear should not be ignored, and yet there is limited information about the actual ghost gear situation.

WWF-Hong Kong is working to address the ghost gear information gaps as an extension of their marine litter programme that started in 2013. They have designed a light-duty scientific protocol that allows participants to **document deadly marine litter encountered during recreational dives**. The programme is called: “Ghost Gear detective, an underwater citizen science programme”.

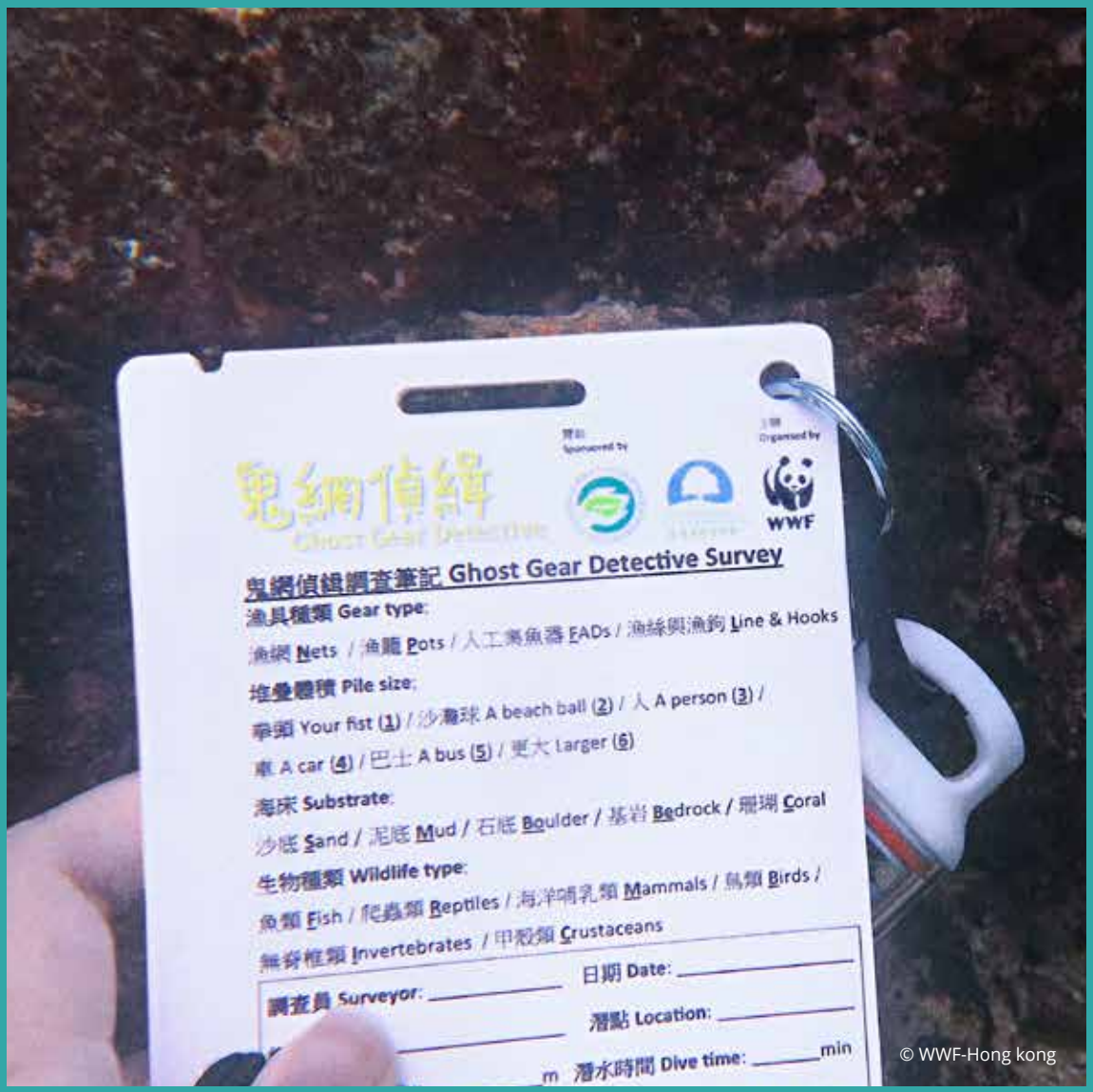
A light-duty scientific protocol, as well as innovative survey equipment, were designed to facilitate the reporting of ghost gear through an underwater citizen science programme that works with the diving community to document their findings. In 2019, 57 divers submitted 156 reports with 172 pieces of ghost gear found. **Their reports have contributed to a baseline overview of ghost gear in the region,** which allows to visualize the problem with an evidence-based approach.

With the success of Ghost Gear Detective, WWF-Hong Kong is further developing the programme into an annual citizen-monitoring project. Aiming for a self-sustainable reporting-retrieval mechanism, WWF-Hong Kong collaborates with Hong Kong Reef Check, the largest annual survey of corals in Hong Kong, to strengthen the ghost gear reporting system. Reef Check divers are encouraged to submit their ghost gear sightings in their survey dives. These reports will be reviewed by government officials to initiate retrieval operations. This approach not only raises awareness within the diving community but also provides a cost-effective monitoring approach for the government.

Apart from the reporting-retrieval mechanism, reducing the generation of ghost gear is key to solve the problem. WWF-Hong Kong is asking for marine protected areas (MPAs) to **include more regulations on fishing gear. For**

instance, restricting the use of gillnets, and prohibiting non-selective fishing practices, including trammel nets and snake cages, to lower entanglement risk to marine species, as well as developing logbooks to record fishing sites and types of gear used. These measures can help to prevent the generation of ghost gear in ecological significant sites.

Furthermore, the disposal mechanism for used fishing gear is also critical. WWF-Hong Kong is, therefore, investigating the loopholes in fishing gear disposal practice and exploring possibilities in fishing gear recycling, with determination to illustrate a comprehensive plan to tackle the ghost gear problem from a circular economy perspective.



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RED - CICLA

CREATING A CIRCULAR ECONOMY FOR ABANDONED, LOST, AND DISCARDED ARTISANAL FISHING GEAR IN THE NORTH OF PERU

Peruvian fishers can lose their gear when it becomes entangled in rocky bottoms or due to climatic and oceanographic factors. Also, when interacting with marine megafauna such as whales or sea lions or with other boats that entangle or carry gear when displayed for fishing.

Out of the sea, in ports or in the fishing communities, the lack of final disposal facilities for fishing gear and the lack of a waste management system generates pollution on the seashore along the Peruvian coast.

In search of a solution, WWF-Peru joined efforts with Bureo, a fishing net recycling company, to implement a pilot gear collection and recycling project in three communities in central and northern Peru. The project started with awareness activities conducted for fishers and building a storage facility at the port, or identifying community members to help with the collection of discarded artisanal gillnets. The voluntary collection of artisanal monofilament nets reached more than 500 kilos in a period of 6 months. In parallel, end of life fishing gear was collected from industrial fishing companies, reaching more than 100,000 kilos of multifilament fishing nets from the three largest industrial anchovy fishing companies.

These nets are now ready to be recycled into new products, such as sunglasses, skateboards, board games, and other products; replacing virgin materials, and fostering a circular economy. In turn, a portion of the funds generated from the sale of the recycled material will then be used to finance additional environmental projects and the expansion of the net collection program to more artisanal fishing communities.

The problem of ghost gear requires the participation of stakeholders all along the fishing gear supply chain. For this reason, establishment of alliances is key to reach national and global impact. This project by Bureo and WWF-Peru (both members of GGGI) is a local example of what such partnerships are capable of.

THE NEED FOR A COMPREHENSIVE GLOBAL TREATY ON MARINE PLASTIC POLLUTION

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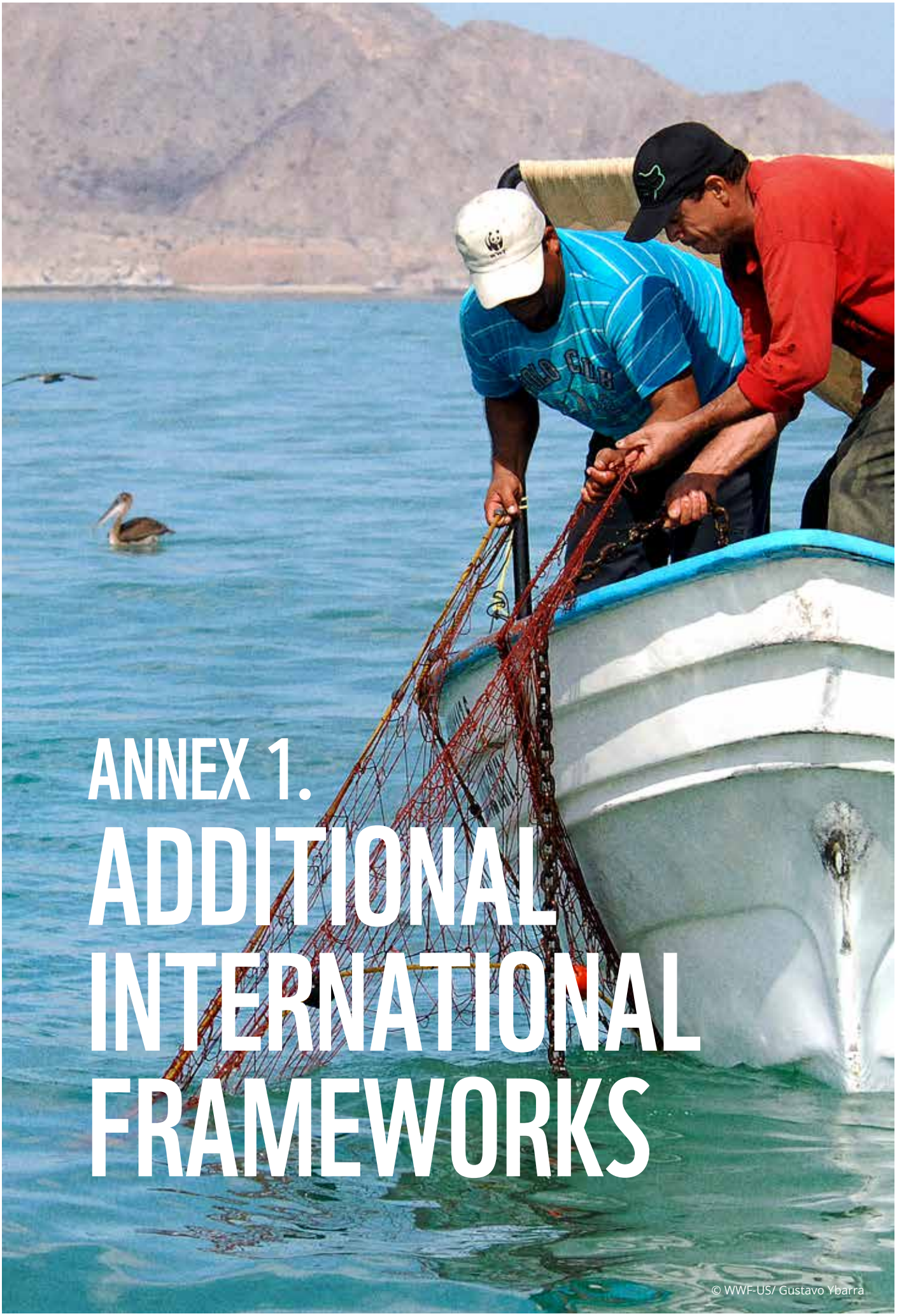
Although some progress has been made, there are glaring gaps in regulation at the global level and the existing frameworks lack articulated global targets. There is currently no obligation for states to develop and implement national action plans including the preventive, mitigation and curative measures needed to address ghost gear; no agreed standards for reporting and monitoring of plastics (including ghost gear) or for reviewing the effectiveness of implemented actions; and no global financing mechanism in place to support measures to effectively eliminate discharge of plastics into the ocean. So far, the UN Environment Assembly has adopted a total of four resolutions on marine litter and microplastics, and seeks to "prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution" by 2025 as part of the Sustainable Development Goal 14 and its target 14.1. And ghost gear is the most damaging form of all marine debris[173].

An effective global response to this crisis requires a comprehensive international treaty with clear obligations and responsibilities to prevent and reduce the influx of marine plastic pollution into the ocean. It must include ambitious targets, binding measures and sufficient support mechanisms. Such an agreement will coalesce the efforts of member states for tackling the problem of marine plastic pollution including ghost gear, establish a measure of accountability and provide non-governmental actors, including businesses, a level playing field and a harmonized legal framework against which to measure performance.

WWF RECOMMENDATION:

- The new treaty should include a clearly formulated vision of eliminating discharge of plastic into the ocean, directly or indirectly, based on the principle of precaution and in recognition of the devastating impact marine plastic pollution has already shown to have on marine ecosystems and coastal livelihoods.

It is abundantly clear that the problem cannot be solved on a national or regional level, or through non-binding, voluntary measures alone. **WWF is calling on states to begin negotiations, as soon as possible, on a new international legally binding agreement to tackle the problem of marine plastic pollution.**



ANNEX 1. ADDITIONAL INTERNATIONAL FRAMEWORKS

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THE INTERNATIONAL WHALING COMMISSION (IWC) ENCOURAGED COUNTRIES TO SUPPORT A GLOBAL GOVERNANCE MECHANISM WHICH WOULD BRING COORDINATION AND MANAGEMENT FOR THE FULL LIFE CYCLE OF PLASTICS, INCLUDING ABANDONED LOST OR DISCARDED FISHING GEAR, UNDER ONE UMBRELLA.

- Recognizing the threat of abandoned, lost and discarded fishing gear, the Parties of the **Convention on Biological Diversity (CBD)** agreed to identify options to address waste from the fishing industry and implement activities and good practices, such as deposit schemes, voluntary agreements and end-of-life recovery. However, the decision is not legally binding.

- Under the **Convention on the Conservation of Migratory Species of Wild Animals (CMS)**, two resolutions (Res.10.4 and Res.11.30) have been adopted that encourage measures to address knowledge gaps especially relating to the impacts of debris on marine species, best practice on commercial vessels, and awareness campaigns. These conservation instruments are not comprehensive, but provide supplementary measures for specific species (turtles, whales and dolphins).

- The **International Whaling Commission (IWC)** held a workshop on marine debris in December 2019, which encouraged countries to support a global governance mechanism which would bring coordination and management for the full life cycle of plastics, including abandoned lost or discarded fishing gear, under one umbrella. Additionally the IWC intends to work more closely with GGGI on these issues.

- **Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention)** provides for some regulation of the production, use and disposal of additives used in the manufacture of plastics. The application of the Stockholm Convention is limited to those plastics produced with persistent organic pollutants (POPs) listed under the Convention and may have implications for the recycling and reuse of products that contain regulated chemicals. Yet the scope of the convention is limited to certain chemicals used in plastic production.

- **Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention)** applies to transboundary movements, including by sea, of hazardous wastes, other waste, and more recently marine litter. The regional and coordinating centres of the Convention were encouraged to work on the impact of plastic waste, marine plastic litter, microplastics, and measures for prevention and environmentally sound management; still plastics aren't currently considered hazardous waste.

- **Honolulu Strategy: A Global Framework for Prevention and Management of Marine Debris (Honolulu Strategy)** developed by the UN Environment and National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program, is a voluntary framework strategy to reduce and monitor marine litter, including ghost gear, but it does not provide targets or deadlines.

- The **GloLitter Partnership Project** was launched in December 2019 by FAO and IMO. The project aims to prevent and reduce marine plastic litter from shipping and fisheries and to assist developing countries to identify opportunities to prevent and reduce marine litter in the maritime transport and fisheries sectors. The GloLitter project will help enforce existing regulations (IMO's MARPOL Annex V), promote compliance with relevant FAO instruments (Voluntary Guidelines on the Marking of Fishing Gear), and emphasize the implementation and enforcement of IMO's London Convention/London Protocol regime on dumping of wastes at sea. At country level, GloLitter aims to expand government and port management capacities; instigate legal, policy and institutional reforms; and enhance regional cooperation.

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1196 Gland, Switzerland. Tel. +41 22 364 9111. Fax. +41 22 364 0332.

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