

Sea Change Canada **GHOST GEAR** **(ALDFG) IN CANADA**

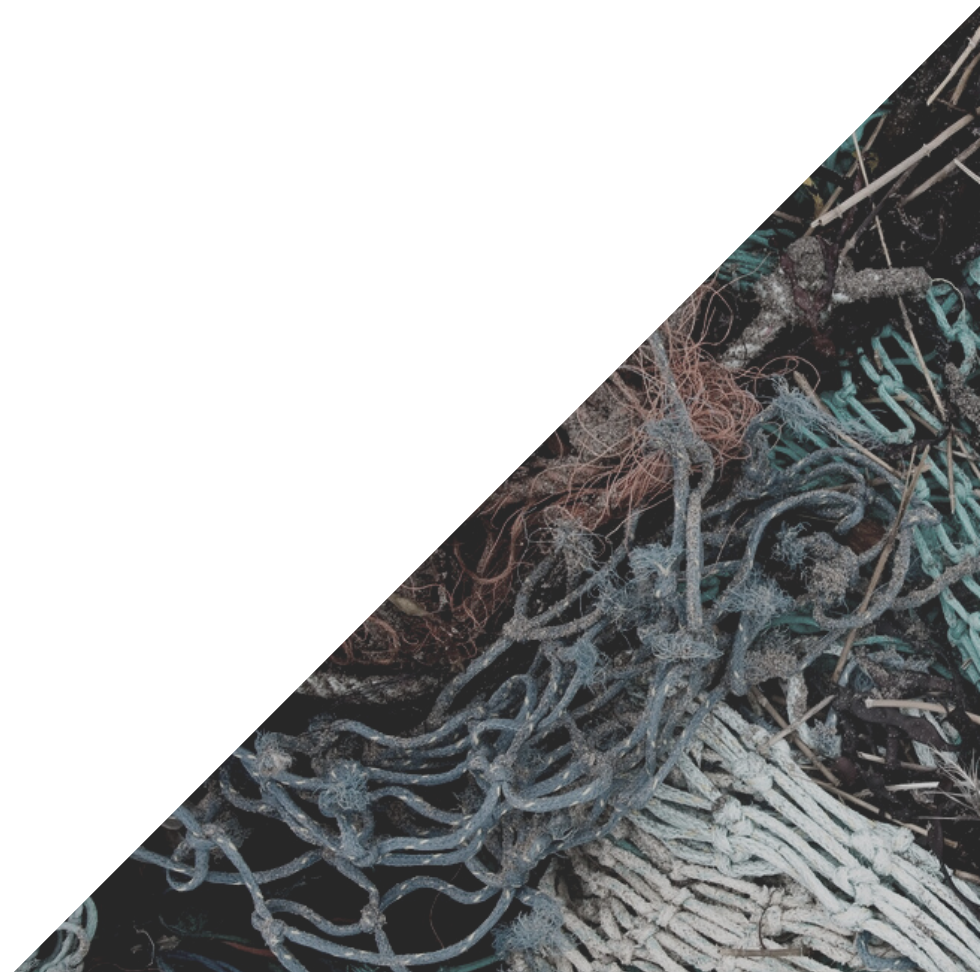


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INTRODUCTION

One of the largest and most impactful threats to our oceans is marine litter. Of the vast groups of debris polluting the oceans, ghost gear is of the most deviant, and thus exponentially harmful. Ghost gear is a term used to describe all abandoned, Lost or Discarded Fishing Gear (also commonly referred to using the acronym ALDFG) that finds its way into the oceans. ALDFG is a significant threat to our oceans, biological ecosystems, and aquatic organisms. Each year, an estimated eight million tonnes of plastic pollution enters our oceans (What is Ghost Gear, 2021). Additionally, 600,000 to 800,000 metric tonnes of ghost gear is discarded into the ocean (What is Ghost Gear, 2021). Estimations from the UN Food and Agriculture Organization (FOA) conclude that ghost gear represents 10% of all marine debris found worldwide (What is Ghost Gear, 2021).

Ghost gear includes, but is not limited to; netting, fishing line, ropes, traps, and gear from boats and aquatic farming operations. Ghost gear is commonly created as a result of gear becoming snagged on rocks or reefs on the ocean floor, intercepted or cut by boat traffic, or gear becomes entangled with other deployed fishing gear (Global ghost gear initiative, 2022). Severe weather patterns can also result in abandoned fishing gear such as hurricanes. Additionally, in some circumstances gear is intentionally cut due to crew safety concerns (Global ghost gear initiative, 2022).

The highly illegal action of intentional dumping can also be seen through abandoning aquatic harvesting equipment and fishing gear (What is Ghost Gear, 2021). These disgraceful practices typically occur on unregulated and unreported fishing vessels (IUU), or illegal aquaculture operations (What is Ghost Gear, 2021). Dumping gear in these circumstances is done in order to avoid capture by authorities (What is Ghost Gear, 2021).

Due to the fact that fishing gear is built to withstand the elements of the ocean, studies have shown that certain categories of ghost gear can persist in marine environments for up to 600 years while continuing to impact marine life (Global ghost gear initiative, 2022). Consequently, as ghost gear slowly breaks down into micro plastics, it enters the food web via organisms such as zooplankton (Global ghost gear initiative, 2022).

Ghost gear poses many critical stresses in the form of both ecological and social impacts. On the ecological front, ALDFG is know to cause negative environmental impacts, such as habitat degradation, indiscriminate fishing (also known as 'self baiting' or 'ghost fishing') and entanglements (Goodman, 2021). Benthic zones along with other areas of aquatic ecosystems have become blanketed in ghost gear, inhibiting the healthy growth and prosper of ocean habitats. Social impacts constitute the threats to the fishing and aquaculture farming industry, effects to coastal tourism and at-sea safety hazards and vessel damage (Goodman, 2021). This report will outline these impacts, along with a further explanation of ghost gear, and solutions to combat its effects.



In order to fully comprehend the extent of 600,000 - 800,000 metric tonnes of ghost gear, this weight can be compared to the Antarctic Blue Whale (otherwise known as the largest animal on the planet). Weighing 400,000 pounds [150 tonnes] and roughly 100 feet in length, an estimated 5333 Antarctic Blue Whales are the equivalent to 800,000 metric tonnes of ghost gear (WWF, 2022).

BACKGROUND

A statistical analysis of Canadian commercial fisheries in 2018 concluded that the fishing industry contributed \$3.7 billion to Canada’s economy, employing roughly 45,000 people (Loprespub, 2020). Canada’s commercial fishing industry is a significantly large sector, producing chilling amounts of ALDFG (Figures 1-4).

The aquaculture industry incorporates the rearing of fish, shellfish and aquatic plants. The cultivation of these aquatic species are conducted in controlled aquatic environments (Aquaculture, 2022). Large fishing nets, ropes, docs, facility and other various equipment are used during cultivation operations. Aquaculture farming is common on both the Pacific and Atlantic coastlines of Canada. An estimated 2% of Atlantic Canada’s fisheries traps are lost annually (Goodman, 2021). On the Pacific side, predominately off the west coast of Vancouver Island, Josh Temple, executive director of Coastal Restoration Society(CRS), stated there are possibly hundreds of abandoned aquaculture sites along the BC coast that are degraded by time and storms, representing a constant danger to fragile species and ecosystems (Kloster et al., 2022).

Commercial nets and aquaculture traps are a very common type of ghost gear that wreak havoc on oceanic environments. Within Canada’s fishing and seafood industry, **Figures 1-4** are netting and trapping techniques amongst the most common practices used (Fishing Gear Types, 2022).

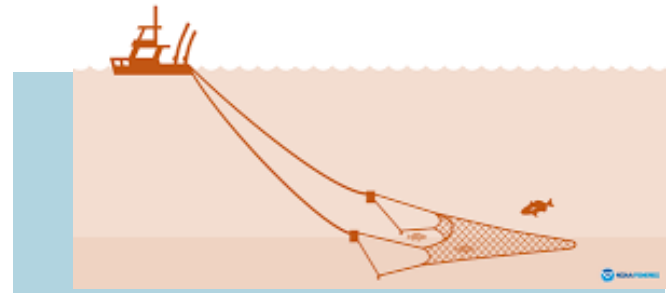


Figure 1 - Trawls: Trawling nets are dragged behind fishing boats either along the ocean floor or mid-water, trapping a large yield of fish (Fishing Gear Types, 2022).

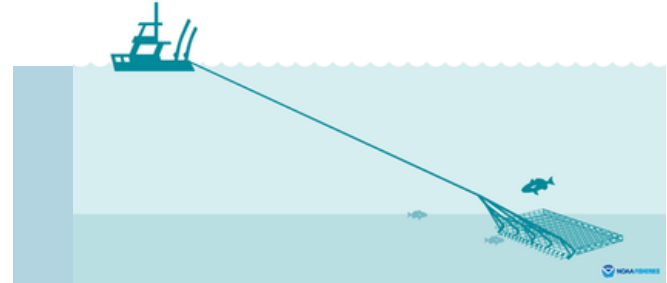


Figure 2 - Dredges: Dredging consists of nets connected to a metal structure which scrapes the ocean floor in order to collect bottom dweller species, substrate and other benthic organisms (Fishing gear Types, 2022).

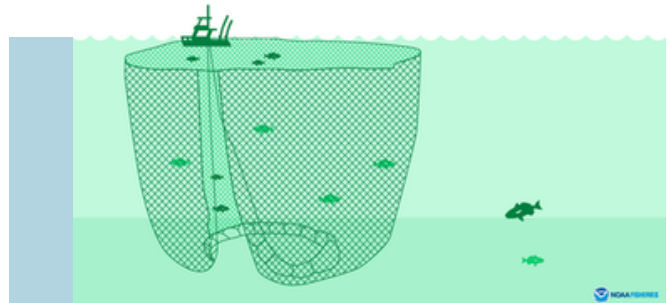


Figure 3 - Seine Nets: Bottom weighted nets are used to ‘drop-collect’ schools of fish in large quantities. 50% of commercial Salmon in Canada are caught using this technique (Fishing Gear Types, 2022).

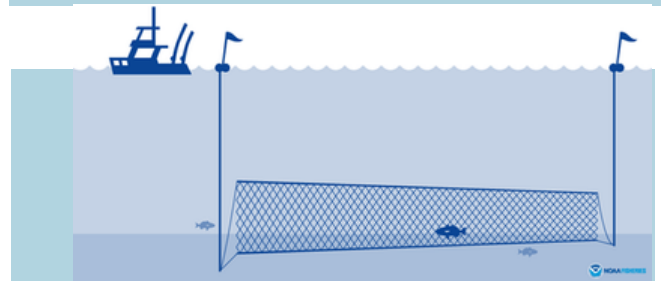
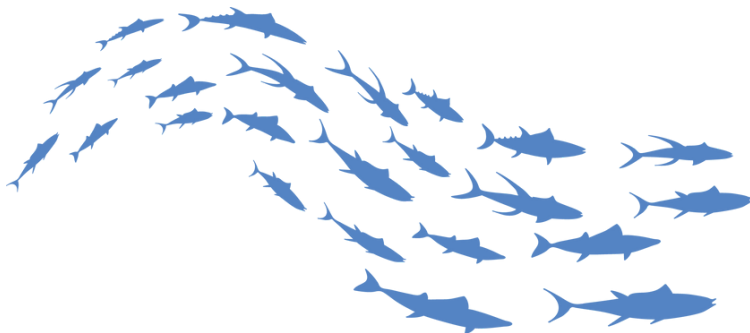


Figure 4 - Gill-nets: Wall shaped netting with mesh just large enough for fish to pass through and get snagged by their gills - hence the name ‘Gill-nets’. 25% of Canadian commercial Salmon are caught using gill-nets. (Fishing Gear Types, 2022).



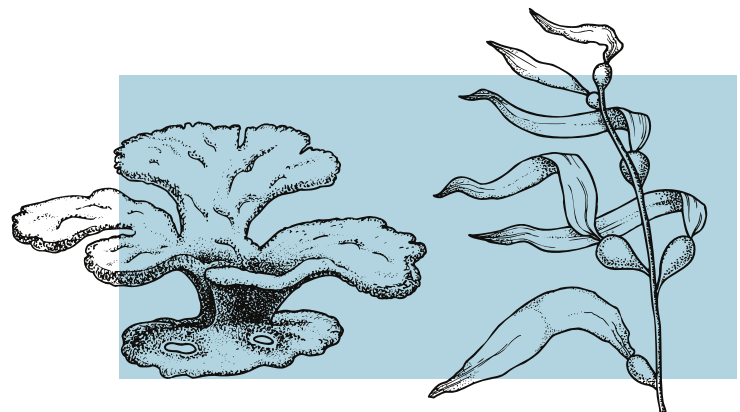
ECOLOGICAL IMPACTS

Ghost gear poses significant harm to aquatic organisms of various habitats. Once fishing and trapping gear is abandoned (a major component being large nets) ALDFG flows through currents and disperses throughout the ocean (figure 5). Discarded fishing nets account for over 46% of debris within the great pacific garbage patch, and are significantly dangerous to sea life that encounter them (Goodman, 2021). The Great Pacific Garbage Patch (also known as the eighth continent) is the largest ocean waste repository on the planet, measuring 1.6 million km² (Plastic Island in the Pacific, 2022). Aquatic organisms such as salmon, seals, and whales have frequently been found incapacitated within layers of abandoned fish nets. Netting entangles curious sea life which in turn suffocates or starves the subject. CRS's E.D. Josh Temple describes ALDFG as an extremely harmful danger to endangered mammals including the grey whale , prone to entanglements, causing exhaustion and drowning (Kloster et al., 2022).



Additional harm comes from the process of self baiting (Figure 6). Self baiting occurs when aquatic organisms become trapped within ALDFG and die (Goodman, 2021). Aquatic organisms such as ground fish or lobsters may wander into abandoned crab pots, oyster and crustacean traps in turn becoming caught themselves. The trapped organisms then attract new scavengers or predators who also become trapped, establishing an endless cycle of bycatch (Goodman, 2021). Within Canada, abandoned oyster cages and other aquaculture traps are labelled 'death traps' to marine life. These can often be found off the west coast of Vancouver Island, and are frequently seen to create instances of self baiting (Kloster et al., 2022).

Heavier materials sink deeper to the ocean floor, subsequently impacting ocean habitats within the benthic zone (Smith, 2022). Greek for, 'the depths', The benthic zone is the ecological region found at the lowest level of a body of water (Smith, 2022). When ghost gear sinks, it blankets the ocean floor. This is not only damaging the physical environment of preexisting ecosystems, but also prevents the growth of new ocean vegetation. Ocean currents continuously drag heavy debris across the sea floor, entangling and smothering fragile habitats such as coral reefs, seagrass beds and benthic algae (Smith, 2022). In addition to the physical damage caused to coral reefs and seagrass beds, ghost nets can also act as vectors of diseases to coral reefs. As the nets continue to deteriorate and break down, polyurethane chemicals are released (Gift, 2020). While debris slowly break down, micro plastics enter the food web (Gift, 2020).



SOCIAL IMPACTS

The sociological impacts due to ghost gear are a growing issue on the topic of food security. Fishing and trapping is a significant worldwide industry. Furthermore, total revenue from the fishing and seafood industry in 2022 amounts to \$544.20 billion USD, and is expected to grow by 7.44% (Fish and Seafood Worldwide, 2022). As this industry exponentially grows to meet demand, there will be an increase in large scale commercial fishing operations in order to keep up with the demand for fish.

On top of the staggering size of the commercial fishing industry, an estimated 5-30% of harvestable fish globally are trapped by ghost gear (What is Ghost Gear, 2021). Further, a study of Nova Scotia’s economic impacts of ALDFG found an annual commercial loss of between \$82,000 - \$176,000 CAD for fish harvesters within Nova Scotia (Goodman, 2021). Not only are ocean resources being exhausted, but a significant number of market quality fish and seafood are lost as a result of ALDFG. Ghost gear has quickly created challenges for maintaining the demand of fish and seafood. It is also drastically effecting economic opportunities of current and future fishers and harvesters.

Ghost gear directly interferes with ocean vessels in certain areas, impeding navigational safety while entangling vessel propellers, anchors, and deployed equipment (OECD Environment Policy, 2021). Outside the commercial fishing industry, leisure crafts are at risk of colliding with floating debris and becoming entangled. Moreover, the blockage of large commercial barge routes by floating ghost gear effects the import and exports of goods by cargo freights.

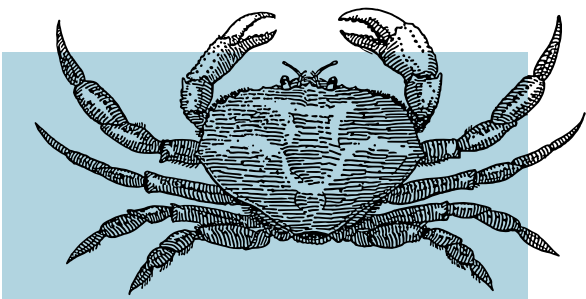
ALDFG has shown major consequence to the tourism industry of coastal-based communities. These areas count on significant economical support from tourism based on their locations. Areas with polluted beaches dismiss an interest of visiting. Therefore, economic consequences result from ghost gear, destroying the reputation of coastal communities reliant on tourism. (OECD Environment Policy, 2021).



Figure 5- Example of an abandoned Crab pot, resting in the benthic zone



Figure 6- Two crabs becoming trapped as a result of the process of self baiting



SOLUTIONS

Solutions to the matter of ghost gear are stark, as “regular retrieval is challenging due to regulatory requirements, relocation issues, and lack of resources” (Goodman, 2021). Grass-root organizations are slowly finding ways to make an impact in decreasing the amount of ghost gear in our oceans. First and foremost, the Ghost Gear Fund is a federally funded program intended to mitigate Canada’s risk of ghost fishing while promoting sustainable fishing practice in connection to ALDFG, both domestically and globally (What is Ghost Gear, 2021).

To date, the Ghost Gear Fund has granted 91 projects, using \$26.7 million in funding (What is Ghost Gear, 2021). Launched in September 2015, over 100 organizations formed the global Ghost Gear Initiative [GGGI] (Global Ghost Gear Initiatives 2022). A collective working towards the elimination of Ghost Fishing gear on an international level. The *GGGI* is now the largest cross sectoral alliance committed to driving solutions to ALDFG on the planet, with strengths lying within the diversity of its participants (Global Ghost Gear Initiative, 2022).

The Department of Fisheries and Oceans (DFO) has enforced legal requirements in order to combat ghost gear, such as mandatory reporting of lost gear to help DFO relocate and remove ALDFG from the ocean (Fisheries and Oceans Canada, 2022).

Sea Change Canada’s Coastal Champions (Figures 7-9) such as Emerald Sea Protection Society, Rugged Coast Research Society, Surfrider Foundation, Fishing Gear Coalition of Atlantic Canada and Coastal Restoration Society have all made a commitment to restoring our ocean and coastlines in many creative and effective ways. Cleaning up and restoring areas that have been impacted by ALDFG, and disposing of the debris in the most sustainable ways possible.



Figure 9: Emerald Sea Protection Society on a ghost gear recovery dive.



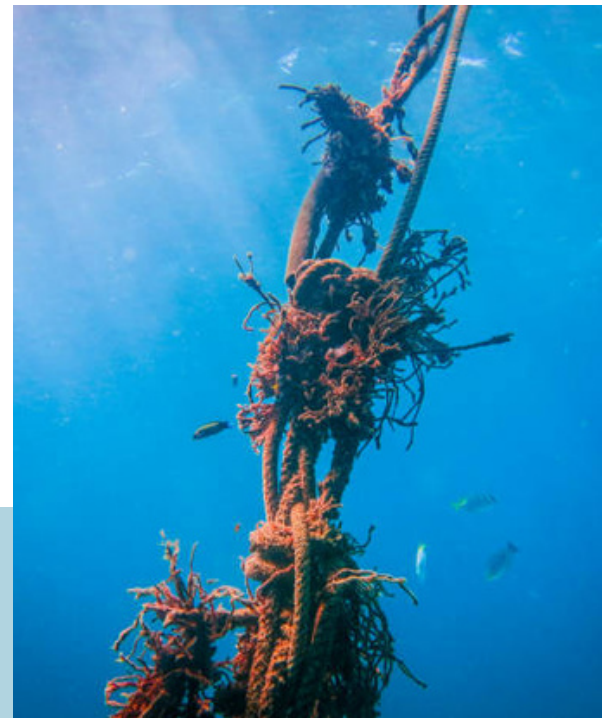
Figure 7: A Surfrider Pacific Rim volunteer recording collected ghost gear.



Figure 8: Rugged Coast Research Society members with a significant haul of recovered debris.

CONCLUSION

There are still many gaps in infrastructure and weaknesses in technological capacity and gear monitoring, contributing to the threat ghost gear poses to our ecological and social environments (Guzman, 2020). However, modern society has slowly become more environmentally conscious towards ocean issues. Between 2020 and 2021, the Worlds Ocean initiative conducted a consumer survey of 3000 people around the world on the basis of ocean health (The Economist Newspaper, 2021). When asked, 83% of the general public was both aware and concerned about issues affecting the ocean, with 60% of the public regarding plastic pollution as a top priority for restoring ocean health (The Economist Newspaper, 2021). With heightened consciousness within the public, it is essential for there to be strong collaboration between various levels of governments, fishers, NGO's, intergovernmental organizations, and researchers to tackle ghost gear social-ecological issues. Establishing prevention measures, end-of-life disposal programs, building a web of communication and continuing efforts in restoring our coastlines will help raise awareness about ghost gear and its' ecological and social impacts.



REFERENCES

Aquaculture (2022). Government of Canada. Retrieved from: <https://www.dfo-mpo.gc.ca/stats/aquaculture-eng.htm>

Fish & Seafood Worldwide (2022). Statista. Retrieved from: <https://www.statista.com/outlook/cmo/food/fish-seafood/worldwide>

Fisheries and Oceans Canada. (2022). Government of Canada launches third call for proposals under the ghost Gear Fund. Retrieved from: <https://www.canada.ca/en/fisheries-oceans/news/2022/05/government-of-canada-launches-third-call-for-proposals-under-the-ghost-gear-fund.html>

Fishing Gear Types (2022). Sea Choice. Retrieved from: <https://www.seachoice.org/info-centre/fisheries/fishing-gear-types/>

Gift, S.D. (2020). Ghost Fishing: Ecological and economic impacts, and the way forward. Aquaworld. Retrieved from: <https://aquaworld.org.ng/ghost-fishing-ecological-and-economic-impacts-and-the-way-forward/>

Global ghost gear initiative. (2022). Retrieved from: <https://www.ghostgear.org/>

Goodman, A.J., (October 2021). Retrieval of abandoned, lost and discarded fishing gear in southwest Nova Scotia, Canada: Preliminary environmental and economic impacts to the commercial lobster industry. Marine Pollution Bulletin, 171, 1-8. Retrieved From: <https://reader.elsevier.com/reader/sd/pii/S0025326X21008006?token=10B71ACD677931790510A924815C882B15C7C4C68F725766E85677759616A4A62F7CA418A5BC8D2E29A3A4FDBC702503&originRegion=us-east-1&originCreation=20221130174604>

Guzman, R. (October 2020). The Ghost Gear that Haunts the World's Oceans. ADB. Retrieved from: <https://blogs.adb.org/blog/the-ghost-gear-that-haunts-the-world-s-oceans#:~:text=The%20damage%20of%20ghost%20gear,of%20economic%20opportunities%20and%20income>

Kloster, D. (January 2022). Ghost Gear: Debris from fishing and oyster farming lurks underwater, endangering sea life. Times Colonist. Retrieved from: <https://www.timescolonist.com/islander/ghost-gear-debris-from-fishing-and-oyster-farms-lurks-underwater-endangering-sea-life-4984109>

Loprespub. (June 2020). Statistics for Canada's 2018 commercial fisheries. Retrieved from: <https://hillnotes.ca/2020/06/01/statistics-for-canadas-2018-commercial-fisheries/>

OECD Environment Policy (2021). Towards G7 Action to Combat Ghost Fishing Gear. Retrieved From: <http://www.g7.utoronto.ca/environment/2021-policy-paper-ghost-gear-report.pdf>

Plastic Island in the Pacific. (2022). The Plastic Continent Floating in the Pacific. Iberdrola. Retrieved from: <https://www.iberdrola.com/sustainability/plastic-island-in-pacific-eighth-continent>

Smith, A. (August 2022) Searching for Ghosts: Ghost Gear Research Retrieval, and Prevention. Nature Canada. Retrieved from: <https://naturecanada.ca/news/blog/searching-for-ghosts-ghost-gear-research-retrieval-and-prevention/>

The Economist Newspaper (2021). New surveys reveal heightened concern about ocean pollution. The Economist. Retrieved from; <https://ocean.economist.com/governance/articles/surveys-with-consumers-and-executives-reveal-heightened-concern-about-ocean-sustainability-knowledge-gaps>

What is Ghost Gear. (2021, June 10). Government of Canada. Retrieved from: <https://www.dfo-mpo.gc.ca/fisheries-peches/management-gestion/ghostgear-equipementfantome/what-quoi-eng.html>

WWF. (2022). Meet the Biggest Animal in the World. Retrieved From: <https://www.worldwildlife.org/stories/meet-the-biggest-animal-in-the-world>

