



FISHING GEAR COALITION
OF ATLANTIC CANADA

Best Management Practice Guide for Managing Abandoned, Lost, and Discarded Fishing and Aquaculture Gear



Photo 1. Traps being hoisted up alongside a vessel by a grapple during at-sea retrieval efforts in Saint Andrews, NB. Photo credit: Fundy North Fishermen's Association.

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Photo 2 (left) and Photo 3 (right). Traps being hoisted up alongside a vessel by a grapple during at-sea retrieval efforts in Saint Andrews, NB. Photo credit: Fundy North Fishermen's Association.

Introduction

The Fishing Gear Coalition of Atlantic Canada (FGCAC) defines Best Management Practices (BMPs) as a combination of tools, methods and processes that are effective and practicable means of preventing and mitigating abandoned, lost, and discarded fishing (ALDFG) and aquaculture gear. This *Best Management Practice Guide for Managing Abandoned, Lost and Discarded Fishing and Aquaculture Gear* is intended for individuals, organizations, and businesses, within and outside of FGCAC membership, that are planning or conducting related projects in Atlantic Canada, to help increase their effectiveness by providing insight on tools, methods, and processes to manage ALDFG, end-of-life fishing and aquaculture gear.

This guide has been developed from lessons learned while conducting ghost gear retrievals and other associated work over the past 3 years across Atlantic Canada, with a focus on the Maritimes Region. It presents recommendations from the FGCAC and has received direction from the Department of Fisheries and Oceans Canada (DFO). Topics included in the guide span knowledge gathering and data collection, retrieval management with details on collaboration, planning, gear preparations and safety considerations, insight on mapping and target detection, grapples and retrieval devices, and additional considerations for end-of-life gear and ALDFG management. It also includes information on DFO's regulatory requirements for the Maritimes Region, however, regulatory information for other regions can be obtained by contacting DFO.

The BMPs included in this guide were primarily distilled from [completed](#) and [ongoing](#) projects, from [FGCAC members](#) and our greater network, that address ALDFG and aquaculture gear, with additional input from DFO. Therefore, the recommendations provided are not exhaustive, as they have partly been based on experiences from at-sea retrievals conducted by our members, which have focused mostly on the use of grapples for retrieving ALDFG in the Maritimes Region, however other methods, like scuba diving, can also be used depending on the project scope.

To ensure effective knowledge mobilization, this document will be updated periodically as the field of ALDFG management advances, and more information and insight becomes available. The FGCAC does not bear responsibility for any injuries or losses that may occur while implementing the best practices described in this document. The FGCAC welcomes receiving additional relevant insight and information from within and outside our network, which can be submitted via email to info@fgcac.org with the subject line 'BMP Insight'.

Knowledge Gathering & Data Collection

Prior to undertaking any project, information gathering is necessary to prepare for retrieval and better understand marine debris concentrations at varying scales. Collaborating with local communities and fish harvesters to capture local knowledge about who, what, where, when, why, and how much fishing gear is lost, is a strongly recommended first step. A fisher's perspective is critical to understanding long term changes in the marine environment; fish harvesters gain extensive knowledge about the environment they live and work in through personal observation and sharing experiences throughout communities and across generations. Local environmental and cultural conditions should also be part of the equation.

Local knowledge can be collected through focus groups, where small focus groups (5 to 10 people) enable more meaningful discussions. To gather local knowledge and recruit focus group participants, information about the prospective project(s) should be shared with fishing associations, harbour managers and first nations communities in the area(s) of interest. Contacts should be asked to identify knowledge experts on local fisheries and fishing grounds, and to circulate information concerning projects to prospective participants.

Other data collection considerations:

- Include data such as ocean currents to trace the origin and destination of collected plastic fishing tags (whether found on a beach or a body of water).
- Additional research can be conducted to analyze the gastrointestinal (GI) tract of commercially caught fish (such as Atlantic cod) which can help in estimating the percentage of ingested plastics and trace the source of marine pollution (e.g., fishing gear fragments such as polypropylene green nylon thread). See Civic Laboratory for Environmental Action Research's (CLEAR) methods developed for [sampling plastics in fish](#). However, this type of activity is not typically authorized under ghost gear retrieval licences and would require a separate permit.
- Retain and collect fishing tags from shoreline cleanups, and log the data according to CLEAR Lab's project on [fishing tags](#).

Retrieval Management

This section includes information that will help manage retrieval efforts on topics surrounding collaboration, education, awareness, prevention, planning, and safety considerations.

Collaboration: Education, Awareness & Prevention

- Work with other organizations that are on the water to reduce creating ghost gear. Examples include agreements for cages on propellers, avoiding travelling over trap lines, and communication when vessels are required to tow through areas where there could be potential gear to prevent lines being cut and gear dragged, thus creating more ghost gear.
- Use a collaborative engagement-based approach with fish harvesters, researchers, and governing bodies (e.g., Fisheries and Oceans Canada) to ensure sufficient communication and facilitate working efforts, detect, and identify fishing gear, especially in proximity to endangered marine species.
- Education on the importance of being good stewards of the oceans is an essential part of eliminating the threat of ghost gear for future generations.
- Educating fish harvesters and the public about responsible fishing practices and the impacts of ALDFG, especially on species-at-risk and commercial fish stocks, is essential for strong participation, engagement, and support from all stakeholders, as well as changing habits and perceptions.
- Engaging with fish harvesters directly helps improve education and awareness around environmental issues.
- Creating ongoing awareness of the issues of ghost gear through all forms of social media is effective.
- Collaborating with the local community and fish harvesters can raise awareness on sources of marine pollution and open discussions for more sustainable alternatives.

Planning

- Schedule a set number of retrieval days annually in coordination with the Department of Fisheries and Oceans Canada (DFO), including Resource Management, Small Craft Harbours, and Conservation & Protection, to facilitate regular removal of ALDFG:
 - Some groups, like Cape Breton Environmental Association, have worked with local fish harvesters to patrol for ghost gear at the end of fishing seasons.
 - Ideally, fish harvesters would conduct retrieval on a volunteer basis, however, some local fish harvesters pay into a fund to budget for gear removal.
- Retrievals should be planned outside active fixed-gear fishing seasons to avoid interfering with any active fisheries.

- Obtain the appropriate permits to conduct ghost gear work, and allow for more time than anticipated for planning and retrieval efforts:
 - A permit issued by DFO is required to conduct at-sea ghost gear retrievals in Canada, as federal regulations do not permit harvesters to have gear on board their vessel outside of the fishing season. Note that DFO’s jurisdiction is for any gear below the high tide mark. A Section 52 Scientific licence must be issued by DFO for any at-sea retrievals (i.e. retrievals below the high-tide mark) in Canadian waters. Initiate the permitting process at least 1 to 2 months in advance;
 - When filling in the information for a Section 52 (S.52) Scientific Permit, ensure all names and pertinent information for each captain / fish harvester who will be participating in the retrieval efforts are recorded. Only the fish harvesters listed on the permit can conduct retrieval efforts under the permit.
 - It is recommended to list information for a few extra fish harvesters as backups in case someone is unable to participate. Not having backups listed on the permit may cause a delay in retrieval efforts as the S.52 will have to be amended and undergo the approval process again.
 - When the permit is approved, DFO will provide “Ghost Gear Flags” (see photo 4a and 4b). These flags should be attached to any vessel involved in ghost gear retrieval activities so DFO and the public can easily identify the activity taking place.



Photo 4a (left) the Department of Fisheries and Ocean’s Ghost Gear Flag pinned to a wall, photo credit: Fundy North Fishermen’s Association, (photo 4B, right) Ghost Gear Flag on display during retrieval efforts in the Maritimes, photo credit: Al Munroe/Titan Marine.

- Be aware that retrieval efforts must follow existing regulations and administrative requirements. Therefore, it is important to establish clear communications with regulators and allow for extra time in the planning phase to ensure effective retrieval operations.
- Retrieval efforts are a slow process, allocate extra time for at-sea retrieval activities, data reporting, and associated disposal/recycling activities.
- Consider the location of where retrieved gear is stored:
 - Marked gear must be securely stored once brought to shore, as outlined in S.52 permit.
 - Biofouling will produce a foul smell, so consider a storage space with appropriate ventilation that will not disturb local operations.

Reporting

- Note that there are regional variations in reporting requirements, and further information about regional requirements can be obtained by contacting DFO for more information.
- After the S.52 permit has been issued, DFO requires captains to hail out with **2 full business days' notice** before ghost gear retrieval efforts can begin and must be done **for each day the individual/organization plans to conduct retrieval efforts**. The notice must be provided as directed in the S.52 permit, and must include the captain's name, vessel name, vessel registration number (VRN), hail in and out (timeframe when leaving and planning to return to port), and location (the area retrieval efforts are to be concentrated that day as outlined in the S.52 permit). If no ghost gear is found in that area and a decision is made to try another area, DFO must be notified before doing so. This information allows DFO time to ensure that the intended retrieval work will not interfere with any work that Resource Management, Small Craft Harbours, or Conservation and Protection may have going on in the area. If so, DFO will advise accordingly.
- **DFO requires Data Collection Forms to be filled out when conducting ghost gear retrieval efforts and will be provided by DFO.** The forms must be completed for every trip. A separate sheet is required to be filled out for each individual tow made during a trip, even if nothing is retrieved. Multiple data collection forms may be needed if retrievals on a particular day are taking place in more than one area, or multiple tows for gear are taking place.
- **DFO requires that the information from each Data Collection sheet be logged in the [online Fishing Gear Reporting System](#).** When approved for a Section 52 (S.52) Scientific Permit for the first time, you will automatically receive an email containing the link to the Fishing Gear Reporting System, a user name (the email of the person applying for the S.52 permit), and a password (password can be

changed to one of your own choosing). Any questions regarding inputting data into the online Fishing Gear Reporting System can be directed to the contact person in the email you receive with the link.

Gear Preparations & Materials for Grapple Based Retrievals

- Double-check grappling gear (tighten shackles, check towing ropes, and cable splices)
- Have 3 means of hoisting for large snarls: Main winch, boom, winch, and trap hauler
- Suggested crew size is 3 (captain and 2 crew), but also possible with 1 captain and 1 crew
- Waterproof digital camera to take photos and videos for records purposes
- Rope/grab hooks (2-3)
- Gaffs
- Wire cutters
- Chainsaw
- Knives (many placed in strategic locations on the vessel)
- Safety equipment: Personal flotation devices (PFDs), first aid kit, flares, EPIRB, immersion suits, etc.

Safety Considerations

There are inherent risks to retrieving gear, and the following considerations should be taken:

- **Put safety first, do not haul anything that may compromise the safety of the crew or the vessel.**
- Weather conditions: Gear retrieval should be conducted in good weather only. Do not attempt this in winds greater than 15 knots or sea swell greater than 1 metre.
- Ghost gear retrieval is hazardous work. Keep yourself out of harm's way when trying to retrieve large amounts of rope, cable, and other gear, in case it begins to part. Grapples can get caught down on bottom, or on large snarls of ghost gear, which can capsize a vessel. Lines and chains can let go when heavy snarls are being winched up along the side of the boat and seriously injure or cause loss of life to crew members. Large snarls can also let go once hoisted over top of the boat which can be exceedingly dangerous if a crew member happens to be standing in the way when the large snarl falls on the deck. A crew member can get caught up in the lines while working on hauling gear aboard and get pulled overboard if the gear lets go before it is aboard the vessel.
- Proper training and communication among team members are essential before and during retrieval. For safety training certification consult with [Survival Systems Training](#). Further, consult with experienced individuals or groups who have previously undertaken retrieval efforts.
- Ensure proper positioning on the vessel when hauling gear aboard. Never stand under gear being hauled aboard or gear hanging in mid-air, avoid the grapple lines, etc.

- Ensure you have the right gear for the location. Consider depth, currents, and bottom type.
- Ensure the type of gear you are attaching the grapples to is strong enough to handle the weight of potentially large snarls of gear being hauled aboard.
- Have knives/cutters stationed within reach of crew members and ensure each crew member has one accessible on their body in case the gear breaks free and falls overboard quickly. Always be prepared to cut lines. If lines begin to part, or if the grapple gets caught down and starts to capsize the vessel, cut the grapple clear from the boat. Better to lose the grapple than loss of life or vessel. If this happens, mark the location so an attempt can be made to retrieve the grapple later.
- Watch for sharp wires, barnacles, and other hazardous materials that might be caught up in the ghost gear.

Mapping & Target Detection

- It is crucial to determine precise locations of ALDFG using detection tools as it is nearly impossible to retrieve lost gear blindly by dragging a grapple without knowing precise locations of gear loss:
 - Assessing retrieval areas should consider:
 - Local knowledge of fish harvesters
 - DFO records of lost gear
 - DFO produced distribution maps of fishing effort
 - It is best to combine information from fish harvesters, DFO records of lost gear and target detection technology to identify new areas of lost gear and/or snarls.
 - Retrieval efforts should use side scan sonar (SSS), or comparable technology, if possible, to identify where gear is located before attempting retrieval. This will increase efficiency and the probability of success.
- For at-sea mapping with SSS and retrieval efforts, using a grid search pattern to locate lost gear is effective.
- It is also helpful to conduct surveys of shoreline marine debris (such as fishing gear) washed ashore to identify at-sea hotspots. Where gear is washing ashore is likely indicative of debris below the surface in adjacent waters.

Grapples & Retrieval Devices

- Patience and practice are important when grappling for ghost gear.
- Design grapples for both hard bottom/deeper water and softer bottom/shallower water.
- Grapples for retrieval should:

- Be suited for the area:
 - For soft bottom (i.e., sand, mud) and shallow water (i.e., sand, mud) use smaller, lighter grapples.
 - For hard bottom (i.e., rocky) and deep water use heavy duty grapples. A heavy-duty grapple set (10' bar plus 5 grapples) can weigh upwards of 1100lbs (10' bar weighs 350lbs+, Individual grapples - 150lbs+) so a heavy-duty A-Frame plus equal hydraulics (as used in scalloping) is required to be able to use grapples and retrieve ghost gear from deeper, rockier bottoms. The lighter grapples can be used with a trap hauler in shallow waters. Lighter grapples will not stand up to the weight of large snarls of gear.
 - When using the lighter gear with a trap hauler, 30 fathom is the recommended maximum depth for ghost gear grappling.
 - Heavier gear with a scallop bar will work for 60-70-80 fathom of water.
- Optimize the width of the drag.
- Be adapted to secure the ropes and traps hooked on it until hauled to the deck of the vessel.
- The proposed procedure for setting the grapple using a pulley and boom:
 - Deploy the safety line buoy and let the rope uncoil as the vessel keeps moving forward.
 - Lift the grapple and hold it above the water's surface.
 - Once the safety line is fully uncoiled, the grapple can be lowered in the water.
 - When there is enough slack in the retrieval line, the pulley can be moved, and the rope can be attached to the deck at the desired length. A ratio of at least three to one is recommended.
 - In areas of strong tides, grapple at slack tide (2 hours flood/2 hours ebb). 50-75% more likely to successfully retrieve ghost gear on slack tide.
 - Towing speed:
 - On soft bottom, use approximately 1.5-3 fathom of cable comparative to water depth and tow at 1.5-2.5 knots depending on the vessel.
 - On rugged bottom, use 1.2-1.5 fathom of cable comparative to water depth and tow at 0.5-1.5 knots depending on the current and the ruggedness of the bottom (the harder the bottom, the slower you go and the less cable you put out).
 - The deeper the water is, the harder it is to know exactly where the grapple is in the sweep. When 100 fathoms of rope/cable are out from the boat, the grapple could be 50ft or more in

the opposite direction of where it is perceived to be. Shallow water is easier to work in as you can keep the grapple right at the stern of the boat due to the shorter rope/cable.

- Follow a grid pattern to ensure you cover all the area when trying to retrieve ghost gear.
- The proposed procedure for hauling ALDFG:
 - Haul the grapple in using a slower rate of ascent, and watch for signs that indicate the kind of gear being hauled (increased tension in the line, traps(s), semi-floating rope, nets, etc.).
 - Secure the grapple and gear to the deck before trying to free them. Prepare quick loops and attach points ahead of time.
 - Bring retrieved items on deck one item at a time. Cut lines if needed and haul ghost gear slowly, as the rope is likely to be weak. Safety should be the priority. If the situation becomes dangerous, it might be necessary to give up on the recovery.
 - Note that gear being hauled or detected that cannot be retrieved should be documented and the information should be provided to DFO

End-of-Life Gear & ALDFG Management

- Waste management systems need to be implemented alongside retrieval efforts to responsibly manage and dispose of ALDFG.
- Working with Small Craft Harbours and Harbour Authorities is essential for effective fishing-related waste management.
- Identify barriers that inhibit proper waste disposal on a community basis to inform possible targeted and effective waste management solutions.
- Important considerations with managing ALDFG and end-of-life gear:

○ Disposal options	○ Collection	○ Cleaning biofouled
○ Safety	○ Monitoring	gear
○ Storage	○ Transportation	○ ect.
- Collected gear can either be reused by local harvesters, re-purposed by small businesses, or potentially recycled. This may require additional coordination, collection and transportation between fish harvesters and end-users.
- Research and testing are being done locally to support potential processing of fishing plastics produced in Atlantic Canada and manufacture a value-added product from them.
- Recycling challenges include: Recycling potential of ALDFG products vary, and that ALDFG products may need to be in a certain condition for recycling requirement.