Retrieval of Marine Plastic Debris in Newfoundland coastal and shallow water

Best Management Practices

Acknowledgements

This document was prepared on behalf of Clean Harbour Initiatives Sheryl Fink and Amelia Porter.

Amelia Porter is the Founder of the Animals' Researcher. She is an Environmental Scientist and a Registered Professional Biologist who supports environmental organizations by providing scientific research consulting and writing services. Sheryl Fink is the Canadian Wildlife Campaign Director for IFAW Canada. She works to identify and promote positive solutions that help wildlife and people coexist.

About Clean Harbours Initiative

Clean Harbours Initiative was founded in July 2018 by Shawn Bath, in Bay Roberts, Newfoundland.

After working for 21 years as a commercial sea urchin diver, Shawn grew increasingly troubled by the amount of trash he saw littering the bottoms of Newfoundland harbors. Tires, plastics, batteries, electronics – you name it, it was on the bottom of our ocean.

In 2018, he decided to do something about it. Since the founding of the Clean Harbours Initiative, Shawn has devoted his passion and energy to cleaning harbours around the province, with a goal of removing 100,000 tires and 10,000 ghost nets.

To date, Shawn has conducted over 50 clean-ups, removing the equivalent of 3000 car tires, dozens of ghost nets, and an estimated 120,000 lbs of ocean trash.

He also works to educate the public about threats to our ocean environment posed by marine plastics. Plastic debris breaks down in the ocean environment and also poses a hazard to fish, seabirds, and marine mammals, as ingestion can be lethal. Larger pieces of plastics can cause wildlife entanglement and fouling of boat motors.

Shawn has presented to Harbour Authorities, schools, and conducted other outreach events to bring attention to the issue of ocean trash and its impact on the marine environment and wildlife. His efforts to clean Newfoundland harbour have been featured in several broadcast and print media.

In 2020, Shawn was the recipient of the Canadian Wildlife Federation's Stan Hodgkiss Outdoorsperson of the Year Award.

For more information on Clean Harbours Initiative, visit https://cleanharboursnl.com/

Suggested citation:
Fink, S. and A. Porter (2022). Retrieval of Marine Plastic Debris in Newfoundland coastal and shallow water: Best Management Practices. Report prepared for Clean Harbours Initiative.

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Introduction

Bountiful with the longest coastline in the world, Canada is tremendously dependent on the resources and ecosystem services provided by the ocean for fisheries, shipping, tourism, and sustenance. In 2018, coastal provinces' economies were supported by Canada's oceans for 3.8% of employment and 4.1% of GDP (DFO and Statistics Canada, 2021). In particular, Newfoundland and Labrador depended the most on marine sectors in 2018, contributing to 16.8% of jobs and 30% of GDP (DFO and Statistics Canada, 2021). Considering the scale of our dependence, we have a vested interest in protecting and maintaining a healthy marine environment for today and future generations.

Marine plastic debris poses a severe threat to the Canadian social, ecological, and economic capital by negatively impacting water quality, habitat, commercial fish stocks, the safety of marine navigation, and the natural beauty of our coastal communities and recreation sites. More than 80% of plastic inputs to the ocean comes from land sources while the remainder is released at sea (Eunomia, 2016). Further, a staggering 94% of plastic entering the ocean ends up on the sea floor, but the greatest concentrations are found on global beaches (Eunomia, 2016).

In Newfoundland and Labrador, plastics account for 85% of all marine shoreline waste(Liboiron et al., 2020).. The majority of plastic waste found in Newfoundland and Labrador waters originates locally (Liboiron et al., 2020), and new evidence of dumping continues to be found (Morris et al., 2016). More than 15 times as much marine debris is found at wharf sites, mostly within 20 m of the wharf (Morris et al., 2016).

Clean Harbours Initiative works to retrieve this material and educate the public. Based on our own experience in Newfoundland and Labrador, in conjunction with information sourced from other reputable retrieval programs, this document was developed to communicate best management practices. Generous acknowledgement is given to the other retrieval programs working toward our collective goal, including the Fishing Gear Coalition of Atlantic Canada (FGCAC, 2021) and Dive Against Debris by PADI's Project Aware (Project AWARE Foundation,

2015), as they were valuable sources of information contributing to this collection of best practices. This best management practices document is intended to provide support for marine plastic debris retrieval and clean up programs around wharves, within coastal shallow water, and along shoreline beaches.

Background

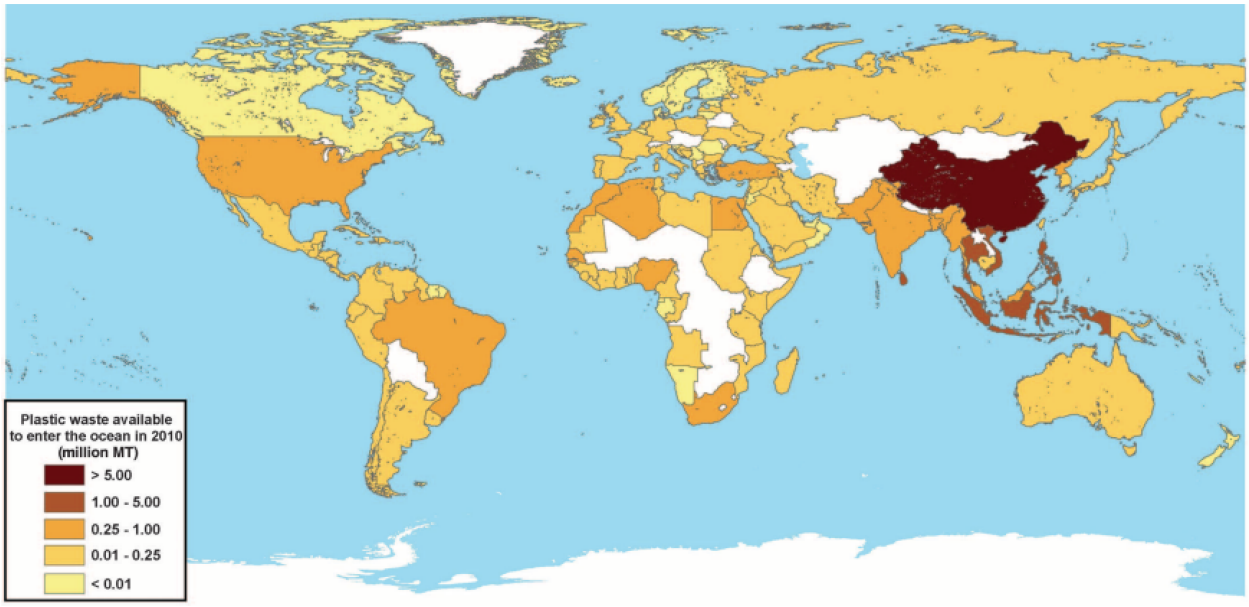
Global significance

Ocean inputs

Plastic pollution is a worldwide threat, ubiquitous throughout nearly every marine and freshwater ecosystem on the planet. It is estimated that 19 to 23 million metric tonnes of plastic waste, equating to 11% of the total generated in 2016, entered aquatic ecosystems (Borrelle et al., 2020). Predicted amounts entering rivers, lakes and oceans may reach 53 million tons by 2030, even with ambitious reduction commitments currently set by governments (Borrelle et al., 2020).

Similarly, another study calculated the mass of plastic waste inputs from land to the ocean exclusively. It was estimated that in 2010, 4.8 to 12.7 million metric tonnes of plastic entered the ocean (Jambeck et al., 2015). This was predicted to increase to 100 to 200 million metric tonnes by 2025, without any improvements to current waste management systems (Jambeck et al., 2015).

These figures demonstrate that plastic waste production is exceeding our ability to manage it. The global plastics economy would need to undergo unprecedented transformation in order to reduce plastic pollution well below these predictions (Borrelle et al., 2020). The rapid growth of synthetic plastics in waste streams necessitates a paradigm shift (Jambeck et al., 2015).



Estimated mass of mismanaged plastic waste [millions of metric tons (MT)] generated in 2010 by populations living within 50 km of the coast. Adopted from Jambeck et al. (2015).

What's more is that these estimates do not illustrate the entire equation. Inputs from fishing activities and at-sea vessels as well as natural disasters are substantial. Using remote observation, one recent study quantitatively estimated worldwide plastic gear losses from industrial fishing. Focusing on the three largest fisheries (i.e., industrial trawl, purse-seine and pelagic longline) which represent 74% of industrial fishing harvest, the researchers estimated that in 2018, 48 thousand metric tonnes of plastic gear was lost at sea (Kuczenski et al., 2022). In comparison to land sources of plastic marine debris, this source appears to be significantly less by mass, however the authors point out the disproportionate ecological and socioeconomic impacts of lost fishing gear and that other risk metrics for materials should also be characterized (Kuczenski et al., 2022). Further, the authors acknowledge that their estimates are likely on the low end since the study did not account for smaller nearshore fisheries (27% of global catch), other types of gear (6% of industrial catch) and only captured gear that is lost during use and not intentionally discarded or abandoned (Kuczenski et al., 2022).

Ocean impacts

Cumulatively, plastics in marine ecosystems are of great concern due to their persistence and impacts to the ocean, wildlife and humans. (Jambeck et al., 2015). Plastic debris are found

in coastal environments, in Arctic sea ice, and on the ocean surface and bottom (Jambeck et al., 2015). Different sized plastics present different types of harm to the environment. Most visible, macroplastics are considered larger than 5mm in size and can kill or impair animals through entanglement, pose a threat to navigation and other ocean activities, and negatively impact tourism. Microplastics, smaller than 5mm in size, are more likely to be ingested by animals.

Plastics fragment into smaller and smaller pieces as they weather, and large items will eventually result in small plastics that may be ingested by fish and other wildlife and can cause physiological, biochemical and behavioral impairments due to the chemicals released (Hohn et al., 2020; Jambeck et al., 2015). Pieces of plastics have been found in over 2200 different marine species, ranging from zooplankton to apex predators (Hohn et al., 2020).

Abandoned, Lost and Discarded Fishing Gear (ALDFG) can trap fish and other animals repeatedly for decades by catching, sinking, decaying, and floating to the surface again, known as 'ghost fishing' (Kuczenski et al., 2022). ALDFG can also cause habitat degradation, entanglements, damage in-use gear causing more loss, and cause safety and navigation hazards (Kuczenski et al., 2022).

Existing plastic ocean debris

International scientists (Eunomia, 2016; Hohn et al., 2020; Kuczenski et al., 2022) and those locally in Newfoundland and Labrador (Liboiron et al., 2020) uniformly agree that prevention through intervention at a source level is required in order to sustainably reduce plastic pollution. Nonetheless, it is critical to address currently existing ocean plastic pollution as estimates of plastics present within the ocean are immense, equating to between 27 to 67 million tonnes (Eunomia, 2016).

One study quantified where the material is deposited in the ocean by compartments (i.e. ocean surface, sea floor, and beaches) in an attempt to help policy makers and those concerned to focus efforts for the greatest impact. Findings revealed that the amounts on the ocean surface, on beaches, and on the sea floor in 2016 were respectively, 0.27, 1.4, and 25.3

million tonnes (Eunomia, 2016). Therefore, in terms of total quantity, 94% of existing plastic within the ocean is located on the sea floor (35 to 4500 metres deep).

However, taking surface area into account presents a different perspective, by comparing the concentration or density of plastic debris within these compartments. Specifically, the study reported the average density floating, on the sea floor, and on beaches in 2016 were respectively, 0.74, 70, and 2000 kg/km^2. The density of marine plastic debris is exceedingly greater on global beaches as compared to the ocean surface and sea floor. Further, comparing beaches strictly to the ocean surface where much attention has been focused, both the total amount and concentration is greater on beaches, which are also more accessible. Accordingly, the researchers suggest that the most practical measure is to focus efforts on beach clean ups (Eunomia, 2016).

It would be valuable to quantify the density within global shallow marine water, but considering the flux of plastic debris between beaches and the sea (Eunomia, 2016), and connectivity with human influence (e.g., wharves), it is expected that the density in shallow water of similar magnitude to beaches and disproportionately larger than the deep sea floor.

Similar findings are reported for amounts floating on the ocean (surface alone); Hohn et al., (2020) estimated 399,000 metric tonnes are floating on the surface, predicted to increase to 860,000 metric tonnes by 2052. Most plastic pollution enters the ocean via rivers. Modelling research shows that ocean surface water clean-up devices, such as that proposed for the Pacific Ocean garbage patch, aren't enough alone to make a significant impact on removing existing surface plastic pollution (Hohn et al., 2020). Findings instead suggest that a significant reduction of plastic debris can be achieved by a combination of barriers at river mouths and clean up devices (Hohn et al., 2020). River barriers can be significantly effective but may be difficult to implement on major shipping routes. As such, the authors conclude that the best solution is to stop producing plastics and promote alternatives (Hohn et al., 2020).

Given the magnitude of existing plastic ocean pollution, and pervasive impacts to marine ecosystems, it is imperative that we urgently work toward a collective of solutions for retrieval of plastic marine debris. Offshore, innovative research is exploring technology such as ships

using the pollution as for waste-to-energy, supplying energy and products that are processed onboard, including heat generation, electricity, water, and oil (Nevrlý et al., 2021). Nearshore, the removal of marine plastic debris from shorelines and shallow waters is important to the health of our wildlife, our fishing and tourism industries, and general community enjoyment of these areas. Private initiatives by NGOs and corporations can effectively contribute to positive outcomes by removing plastics from the ocean environments (Hohn et al., 2020). Most importantly, research demonstrates that our efforts are most practical and efficient if focused on areas where the density of plastic marine debris is highest (Eunomia, 2016). Particularly, beaches, and likely shallow waters, should be targeted.

National significance

Canada has a major plastic production industry worth $35 billion, employing nearly 100,000 workers (ECCC, 2021). Per capita, we are the world's second highest user of plastics (The International Energy Agency, 2020). Canadians toss more than 3 million tonnes of plastic every year, half of which is packaging (Environment and Climate Change Canada, 2021, July 12). Only 9% of this waste is recycled, with the remainder diverted to landfills, waste-to-energy incineration plants, and the environment (ECCC, 2022). In 2016, it is estimated 1%, or 29,000 tonnes of plastic polluted the Canadian natural environment (CCME, 2020).

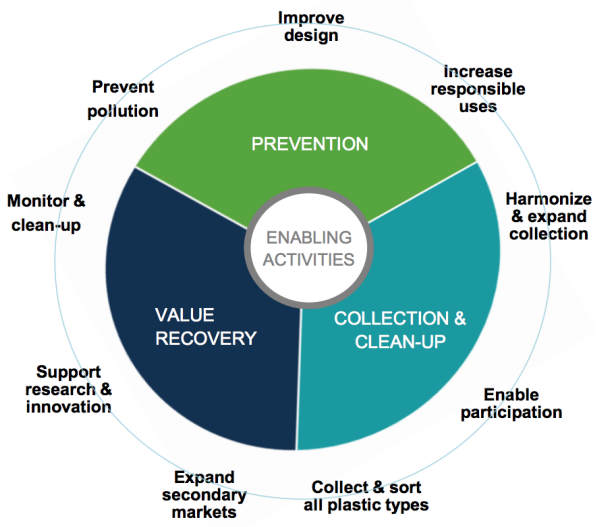
The amount of plastic waste entering the oceans from Canadian lands was estimated at 8,000 tonnes in 2010 and projected to double with inaction by 2025 (CCME, 2018). Approximately 80-90% of marine litter is composed of plastic, ranging in size and shape from microplastics to fishing gear and packaging (ECCC, 2021, July 12). Through the Great Canadian Shoreline Cleanup, volunteers have removed over 1.3 million kilograms from shorelines in the past 25 years; common items included plastic foam, wrappers and packaging, plastic bags, plastic bottles, straws and coffee cups (ECCC, 2021, July 12).

Considering that the Canadian landscape represents the longest coastline in the world and holds one-quarter of the world's freshwater, the Canadian government has recognized our responsibility and leadership role to address this wicked problem.

Ocean Plastics Charter and Canada-wide Strategy on Zero Plastic Waste

Canada led the way on the global stage by developing the Ocean Plastics Charter under our G7 presidency in 2018 (ECCC, 2021, December 9). Governments, businesses, and organizations who sign the Ocean Plastics Charter demonstrate commitment to move to sustainable production, use and management of plastics, through resource efficiency and a lifecycle approach (ECCC, 2021, December 9). To date, 28 countries have signed The Charter, in addition to a number of partners (ECCC, 2021, December 9). Canada is also investing $100 million to support developing countries in sustainable waste management systems (CCME, 2020).

Domestically, Canada is working toward reducing our plastic pollution through a number of initiatives and targets. Specifically, through the Canada-wide Strategy and Action Plan on Zero Plastic Waste, the Government of Canada is committed to achieving the goal of zero plastic waste by 2030 (ECCC, 2022). Aligning with the Ocean Plastics Charter, the strategy employs a circular economy approach to establish a framework in Canada as shown in Figure 1 (CCME, 2020). Key actions are to prevent, reduce, reuse, recover, capture and clean up plastic pollution in Canada. To date, in order to meet the commitments and move toward policy and regulation, a ban on microbeads was implemented, regulation to prohibit single-use plastics is in the early stages of development, and proposals are set to keep plastics circulating within the economy (ECCC, 2022). For example, the consultation process was recently launched for the development of regulations to require plastics be composed of 50% recycled material.

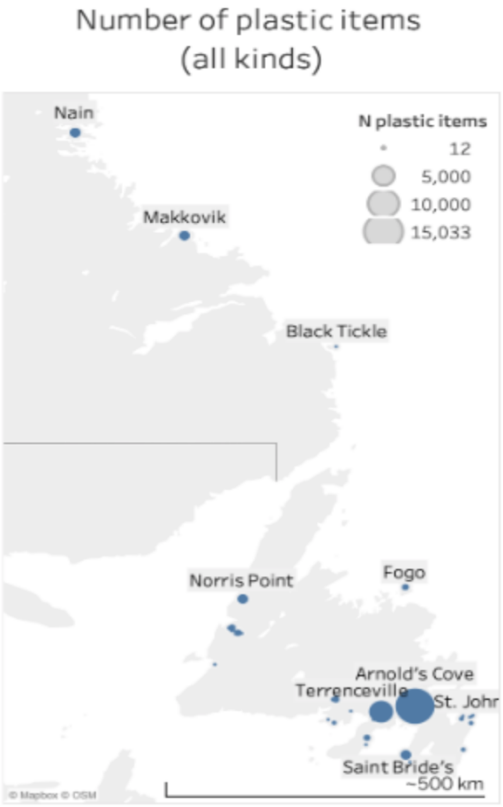


Areas of action in a circular economy approach (CCME, 2022).

Regional significance

Newfoundland and Labrador is no exception to the issue of marine plastic pollution. Plastics account for 85% of marine shoreline waste and 73% of freshwater shoreline waste (Liboiron et al., 2020). Fishing gear accounts for an average of 37% of marine shoreline plastics. Marine surface water density of plastics has increased to 5208 pieces per square kilometer (Liboiron et al., 2020). Marine plastic pollution threatens Newfoundland's marine wildlife, with 10 humpback whales and 3 minke whales entangled in fishing gear annually since 1992 (Liboiron et al.,2020). Ingested plastics have been found in many species of seabirds and fish.

The majority of plastic waste found in Newfoundland and Labrador waters originates locally (Liboiron et al., 2020), however debris from elsewhere in Atlantic Canada has also been found in Newfoundland. Newfoundland and Labrador plastic pollution flows to shorelines across the ocean and has been found in the UK, France, Ireland, Portugal and Spain (Liboiron et al., 2020).



The number of plastic items show locations of loading beaches which attract debris (Liboiron et al., 2020).

Harbours provide habitat for fish species of commercial, recreational and aboriginal significance. Despite restrictions on the dumping in the marine environment, marine debris, including plastics, continues to accumulate in Newfoundland and Labrador harbours. The extensive presence of debris in Newfoundland harbours has been reported by researchers with Fisheries and Oceans Canada (Gillis, 2017), who have noted that in some places it is nearly impossible to see the natural substrate due to the amount of trash.

Moreover, a survey conducted from 2007 to 2016 monitored 20 locations, and found that Newfoundland's marine debris problem is far from being something simply done in the past "when we didn't know better", as they continued to find new evidence of dumping (Morris et al., 2016). The study found that the highest amount of marine debris, including plastic materials, was found in harbours with wharves. More than 15 times as much debris was observed at wharf sites than those with no wharf at all. Most of the debris was observed within 20 m of the wharf (Morris et al., 2016).

The supervisor of the harbour authority in Burin, Marguerite Drake, highlights the lack of any place to dispose of nets, pots and other debris as a contributing problem (Herridge, P., 2020). Harbour authorities are subject to local waste management regulations, with a current weekly limit for pickup of 6 bags of garbage. This is clearly insufficient to recover waste from 50 or more enterprises bringing garbage in several times a week.

Plastic regulations and programs in Newfoundland

As part of Phase 1 of the Canada Wide Action Plan on Zero Waste Plastics, the Government of Canada announced it would work with provinces as well as introduce programs to hold manufacturers responsible for their waste. In response to this, the Government of Newfoundland and Labrador implemented the Plastic Retail Bag Regulation under the Environmental Protection Act (*Plastic Retail Bag Regulation, NLR 1/20*, 2020). The new regulation came into effect in October 2020 and bans the use of plastic bags.

In addition, in 2018 Newfoundland and Labrador introduced an extended producer responsibility (EPR) program for used oil and glycol involving free collection of used oil, glycol, filters and containers (Department of Municipal Affairs and Environment, 2019). EPR programs

put the onus on industry producers for the end-of-life management of products (MMSB, 2020). The used oil and glycol EPR program is governed by Newfoundland and Labrador Waste Management Regulations and MMSB (*Waste Management Regulations, NLR 59/03*, 2003). In terms of plastic waste, this program provides opportunities for return and proper management of plastic containers for the used oil, antifreeze as well as used lubricant aerosol and brake cleaner containers. Used plastic oil and antifreeze containers and pails are recycled into industrial posts, railroad crossings, plastic pipes and composite construction products (UOMA NL, 2022). Extension of similar EPR programs to manage additional plastic products would provide further solutions to reducing marine plastic debris Newfoundland and Labrador.

The role of divers

Divers are often the first to witness human impact on the marine environment, and are uniquely positioned to help report, remove, and advocate to stop marine debris at its source. The use of divers can be an efficient and low impact way to remove shallow water marine debris, but comes with a unique set of risks and safety requirements. Shallow water, dive based retrieval efforts are a dangerous process and require knowledgeable and trained individuals in order to be conducted safely.

In Newfoundland and Labrador, Clean Harbours Initiative has removed an estimated 55,000 lbs of ocean debris to date. Prominent global diving removal programs such as Dive Against Debris by PADI's Project Aware has removed 2,000,000 pieces of marine debris (Project AWARE Foundation, 2015).

What are Best Management Practices (BMPs)?

This document attempts to compile Best Management Practices (BMPs) for removal of marine plastic debris from coastal and shallow water areas. Best Management Practices (BMPs) are a combination of tools, methods and processes that are effective and practicable means of removing marine plastic debris. This document intends to help increase the effectiveness of marine debris removal projects in the future by providing insight on tools, methods, processes, communications, and other learnings from our direct experience in conducting clean-ups in NL

harbours, and from desk research and interviews with others who are conducting coastal marine debris removal efforts.

Best Management Practices

Preparation and Planning

Knowledge gathering

Collaboration with local individuals and communities to gather local knowledge about where, what, why, and how much marine plastic debris is lost is necessary to prepare for safe retrieval, and to better understand regional marine debris concentrations. Local knowledge can inform where concentrations of marine plastic debris may be located, navigational hazards, property access issues, and establish ownership. Local knowledge can be collected simply by having a conversation with locals. In some instances, this may be the only way to learn who property holders are to gain permission to access an area.

BMPs

- Identify those who are knowledgeable regarding marine debris present within coastal and shallow environments (where, what, why, and how much).
- Learn the geography of the local area and nautical elements (e.g., depths, tides and currents, wind, passageways and navigational hazards).
- Determine potential marine and property access locations.
- Seek traditional ecological knowledge from local indigenous communities.
- Acquire knowledge from local organizations and the fishing community.
- Gather scientific evidence and records from researchers, libraries and governing bodies.
- Establish focus groups for diverse perspectives and synthesis of knowledge.
- Use multiple lines of evidence (all forms of knowledge and scientific information) to create a clear representation and understanding of the area and impacts.

Public engagement and community support

Community engagement is an ongoing process that can garner support and lead to the overall success of debris retrieval efforts. There are a number of key strategies that will help to

foster community ownership of the project in order to ensure sustainability. Public understanding of the issue is important. This can be achieved through messaging and education pertaining to the impacts of plastic debris in the ocean, the importance of retrieval and the role of divers. Increasing the environmental literacy of local communities can influence attitudes and generate support. Further, making members of the public feel like every voice is heard can result in input of valuable ideas and collaborative success.

BMPs

- Define core values of the debris retrieval program.
- Raise awareness of the issue by providing public education related to ocean plastics from marine debris.
- Ensure every voice is valued by inviting the community to express ideas. Perhaps through a public survey, social media, residential conversations, events or gatherings.
- Contact all stakeholders for input including indiginous communities, residents, local organizations, businesses, the fishing community, local schools and institutions.
- Encourage contributions from the local community in the form of monetary donations (also see Funding), supplies and equipment (also see Gear preparations for shallow water retrieval), or volunteered skills and time (also see Collaborative partnership and citizen science participation).
- Foster excitement about plastic debris retrieval efforts and invite community support.
- Engagement and collaboration with local community partners, media, and other stakeholders can increase awareness of the need to reduce and remove marine plastic debris

Collaborative partnership and citizen science participation

People and public participation are central to all aspects of carrying out marine debris retrieval operations. In planning the project, determining who will carry out the important work in terms of individuals and operational capacities is essential. Given the positive nature and environmental and community benefits of such projects, the public is generally enthusiastic to help in clean up activities.

Working together with local organizations, businesses, and incorporating a citizen science approach can increase awareness, participation and support data collection efforts. Citizen science protocols must be accessible, practicable in the field, and adaptable to local conditions in order to make collaboration possible. Safety and liability must also be considered.

BMPs

- Partner with local organizations and citizens who will undertake the project through collaborative participation.
- Consider capacities for paid positions and also volunteer opportunities.
- Determine crew needs. Minimum suggested crew size is 3 (boat captain, diver, and dive spotter). If collector vessels are used, they will require their own operators. Consider having 1-2 additional divers as spotters for safety as well as a diver dedicated to video and photography for documentation and communications needs. Also consider the needs for a shore crew to assist with weighing, sorting, disposal and recording.
- Identify training and certification needs and conduct training as needed.
- Determine insurance needs and be sure that you are adequately covered for the activities you are conducting.
- Consider having participants sign a liability waiver. Be aware that this may not be a fool proof way to absolve yourself of responsibility or accountability for others if you are leading a clean up.

Data collection planning

There are numerous protocols and templates for gathering data on marine debris. Most include the type of debris removed, and weight. It will not be possible for all retrieval efforts to gather all types of data. Technical competency, the necessity of specific equipment (scales), the time involved, and environmental factors will all play a role in how much and what type of data is recorded in the field. Finally, sharing resources among other mutually interested parties (e.g., university students conducting research on microplastics) may be of interest as they may come

aboard boats to collect data for their own use as well as sharing with the retrieval program. This can contribute to cost efficiencies.

BMPs

- Design data collection sheets and establish optimal data collection methods (e.g., rite in rain paper or electronic).
- Determine what data should be acquired. At minimum, plan for recordings of debris type and weight.
- Consider recording the ocean currents to trace the origin and destination of collected plastic fishing tags (whether found on a beach or a body of water).
- Consider collection of fishing tags from shoreline cleanups, and log the data according to CLEAR Lab's project on fishing tags.
- Consider the collection of samples of fishing gear found in coastal cleanups, which can contribute to scientific studies.
- Consider the collection and analysis of sediment or biological samples (e.g., fish) to characterize the prevalence of microplastics within the marine environment.

Consider inviting other interested parties to come aboard to collect data. University academics and students, bodies governing seafood safety, or scientific organizations may wish to partner in this regard.

Implementation of Retrieval Diving

Site scoping and dive planning

Proactive planning before dives are conducted maintains efficiencies, boosts morale, and maximizes procedural comprehension. Initial planning activities entail site scoping, scheduling and personnel needs, access and permissions, and waste disposal considerations.

BMPs

- Visit dive sites in advance, if possible, to determine the following:
    - Amount and type of debris present, and the removal method required.
    - Visibility, currents, traffic, and other potential hazards.

- An ROV, such as those used by GhostGearDisappear may be a useful tool to identify underwater debris or other hazards.

- Schedule a set number of retrieval days, with appropriate allowances for inclement weather conditions.
- Allow for more time than anticipated for planning and retrieval efforts.
- Identify personnel and crew needs.
- Secure water and property access as necessary.
- Reach out to Harbour Authorities. Retrieval efforts can be affected by existing regulations and administrative constraints. It is important to establish clear communications with regulators and allow for extra time in the planning phase.
- Determine appropriate waste disposal options for retrieved materials (i.e., methods and location). Considerations may include:
    - Permission to store on the pier and mitigation of associated risks to wildlife (e.g., birds) and the public.
    - Use of rental of bins.
    - Agreement from municipal landfills.

Safety precautions

Safety is paramount to any diving operation due to the inherent dangers. Diving and debris retrieval is particularly dangerous work. Weather and wave conditions can dictate whether or not a planned dive goes forward or not. Safety should be first and foremost when retrieving tires, nets, rope, and other gear.

BMPs

Environmental Variables Safety

- Monitor wind, wave and weather forecasts. Marine debris 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. Apps and websites such as Windfinder provide information on

wind speed and direction, wave height and direction, tides and weather conditions. Determine the nearest weather station buoy to the dive site.

- Check water characteristics in advance. Check the dive site in advance for depth, substrate type, currents, or underwater obstacles. These will influence gear choices.
- Assess water clarity and visibility in advance. Visibility may depend on the time of year, for example, in April – June, when sea urchins are spawning, waters are often cloudy and not suitable for dive retrieval.

Personnel Safety

- Keep records of safety information and next-of-kin contacts of all participants.
- Complete check-ins with designated land based check-in persons upon departure, during the work if possible, and upon return.
- Conduct pre- and post-dive onshore safety meetings with a checklist of potential dangers and threats. Safety sheets should identify the location of the nearest hospital.

Physical Safety

- Put safety first, do not retrieve or haul anything that may compromise the welfare of you or your team. Safety should be first and foremost when carrying out the dangerous work of retrieving tires, nets, rope, and other gear.
- Watch for sharp wires, barnacles, and other hazardous materials that might be caught up in the debris you are attempting to retrieve.
- Take care with sharp objects that can cause a puncture wound such as syringes, broken bottles and metal cans. Before removing, carefully consider the safety of all participants. Use a strong container with a secure lid for sharp objects.
- Take care or leave in place items that may leak chemicals that could be harmful if they come into contact with your skin or equipment.

- Do not touch or remove weapons or ammunition. Mark the location and inform the authorities.

Boating and diving safety

- Follow safe boating practices and adhere to local traffic rules, speed and right of way.
- Ensure everyone on board meets applicable Transport Canada certification requirements based on the length and type of vessel. For example, Small Vessel Operator Proficiency (SVOP), Marine Emergency Duty (MED), Marine Basic First Aid, and Radio Operator Certificate.
- Ensure divers have the necessary diving certifications for this type of underwater work, as per the The Diver Certification Board of Canada (DCBC).
- Ensure all mandatory safety equipment is on board as per Transport Canada regulations. Inspect regularly (also see Gear preparations for shallow water retrieval).

Gear preparations for shallow water retrieval

It is important to identify equipment and supply needs in advance and ensure they are all in good working order and meet expiry dates. Inspection of gear and equipment in advance will allow time for any necessary repairs, replacement, refilling or battery changes. Note that the type of gear required is dependent upon the findings of the initial scoping assessment.

BMPs

- Prepare gear based on needs identified from the initial scoping assessment.
- Inspect gear in advance, allowing ample time for repairs, replacements, refilling etc.
    - Inspect cylinders annually and receive a hydrostatic test every 3-5 years.
    - Examine masks, fins, regulator hose and snorkels for cracks or tears.
    - Check your wetsuit/drysuit for frays, tears or missing stitches.

- Pack gear appropriately (e.g., in totes). Suggested gear may include (dependent on scoping assessment):
    - Dive equipment (weight belt, suit, tanks, gloves)
    - Retrieval bags for small materials (with structure to maintain opening)
    - Mesh bags for marine debris collection
    - Gloves for hand protection
    - Towing rope for tires
    - Dive flag for safety to mark your diving area at the surface
    - Waterproof digital camera to take photos or video for records and outreach
    - Knives (many placed in strategic locations on the vessel)
    - Scissors
    - GPS
    - Weighing scales (fishing or kitchen scales work well)
    - Sharps container
    - Safety equipment: PDF, first aid kit, etc. (also see 'Safety Precautions')
- Ensure all mandatory safety equipment is on board as per Transport Canada regulations.

Carrying out Retrieval Diving

Retrieval Methods

The procedures used by Clean Harbour Initiatives for retrieving macroplastics are divided into three types of activity:

1. Wharf cleanups (shoreline based, with diver);
2. Shallow water clean-ups (boat based, with divers);
3. Shoreline clean-ups (boat based, no diver).

Wharf cleanups (shoreline based, dive)

The debris found in waters around wharves are characterized by having tires (which are used as bumpers on docks), wharf sticks (creosote-soaked timbers), marine batteries, and large household items that appear to have been dumped from a pier such as toilets, bicycles, sinks, etc.

BMPs

- Retrieve debris using mesh bags and carry it to land or wharf.
- Larger items should be hauled straight up and not across the substrate to reduce possible habitat damage.
- Use a strong container with a secure lid to safely remove sharp objects.
- Use a truck and winch to facilitate the removal of tires and heavier materials once at the shoreline.

Shallow water clean-ups (boat based, dive)

Various types of marine debris are found in shallow water clean-ups. It is important to follow all boating and diving safety measures.

BMPs

- Select a vessel suitable for the body of water you are working on. Larger v-shaped hull boats such as fishing boats are appropriate for hauling debris.
- Retrieve debris using mesh bags.
- Ensure mesh bags full of debris are adequately secured on the boat.
- Use a strong container with a secure lid to safely remove sharp objects.
- Larger items should be hauled straight up and not across the substrate to reduce possible habitat damage.
- Follow recommended safety precautions (see Safety precautions).

Shoreline clean-ups (boat based)

Many gravel beaches around Newfoundland act as collection sites for marine plastic. Nets, ropes, and tarpaulins may quickly be buried in the soil through wind and wave action, and vegetation will make such materials difficult to remove. Choosing a boat that allows for optimal navigation in shallow water helps as various substrate and underwater obstacles are often encountered. Flat bottomed boats with shallow draft allows better access to shoreline and inland waters than a larger vessel, while paddles or oars reduce shoreline disturbance.

BMPs

- Use a flat bottom boat with a shallow draft (e.g., Jon boat).
- Use paddles and oars to reduce shoreline disturbance.
- Retrieve debris using mesh bags and store on the boat.
- Use a strong container with a secure lid to safely remove sharp objects.
- Wear hip or chest waders, and work gloves.
- In shallow shoreline and inland waters, detect material visually.
- Follow recommended safety precautions (see Safety precautions)

Protecting the Marine Environment

While completing dives and debris retrieval operations, take care in protecting habitat. Use good judgement to decide what to remove and what not to remove. This involves risk-benefit decisions while diving, giving considerations to the debris or material type and the natural (and artificial) habitat characteristics. Except in instances involving harassment of individual animals that may be using an item as a home (e.g., an octopus living in a discarded plastic container), it is difficult to make the case that leaving plastics in the ocean is a good idea, and there is nearly

unanimous consent that plastics should be removed from the marine environment in almost all cases. However, inert objects such as glass, concrete, and even shopping carts, that have become artificial reefs or support sea creatures may be worth leaving in place.

One topic of ongoing debate is whether it is helpful or harmful to remove inert objects such as glass bottles from the ocean floor? Those in favour of leaving them put, say they create habitat and structure for marine creatures, they do not leach toxic substances and that, in many cases, removing them could disrupt the substrate and cause more harm than good. On the other hand, glass bottles are clearly 'man-made' debris, and bottles may trap marine creatures who enter and then grow too large to escape from the narrow opening, and shards of broken glass can be dangerous to both humans and animals.

Above all, safety is your primary consideration, before any considerations to protecting the marine environment (see Safety precautions). If removing something is potentially detrimental to human safety. do not remove it.

BMPs

- Discover areas of critical habitat and identify aquatic species at risk in your area using Fishery and Ocean Canada's Aquatic Species at Risk Map. Determine and communicate the implications this may have for debris removal.
- The decision whether or not to remove human-caused debris that may provide habitat for marine creatures is a topic of ongoing debate. Suggestions include the following :
    - *Material*: consider leaving items in place if removal will cause harm to marine life, and they do not cause much harm to the environment, such as glass bottles, steel cans, concrete, and shopping carts.
    - *Location:* some sources recommend removing inert items from pristine untouched marine environments, but consider leaving them in place at artificial habitats like piers and ports where marine life is largely already displaced. In highly degraded environments, solid substrate is often lacking for habitat use, and surface areas provided by marine debris is often utilized. If the item being

removed is heavy enough that it forms part of the sea floor, and is not at risk of degrading, some suggest it may be best to leave it (Testoni, 2018).

- *Contents of the item:* remove any items leaching toxic chemicals if safe to do so. Examples include car, truck and boat batteries; oil, fuel and chemical containers; paint cans; fuel filters and; electronic equipment. If it is not safe to remove a potentially hazardous item, mark its location and report it.
- *Entanglement risk:* remove items that are likely to entangle or kill local flora and fauna if safe to do so. If secured into the substrate and difficult to remove, consider only removing accessible parts with sharp scissors and leave sections that have become overgrown.
- *Egg presence:* mark locations where eggs are attached to marine debris items and return to remove once eggs have hatched.

Recording and Documentation

Perhaps the most rewarding part of your debris retrieval program is reporting the data. There are five key steps to making your retrieval efforts count: weighing, sorting, recording, disposing, and reporting.

BMPs

Weighing

- Weigh collected debris while still in mesh bags. Depending on the goals and requirements of your retrieval program, consider weighing material types after sorting.
- Record weight in kilograms or pounds.

Sorting

- Group debris by material of construction. Suggested groupings are (Project AWARE Foundation, 2015):
  - plastic
  - metal
  - rubber
  - glass and ceramic
  - wood

- cloth
- paper/cardboard
- other debris items
- mixed materials

- Sort debris out of the wind to avoid it being blown back into the water.
- Empty your mesh bags onto a tarpaulin for ease of sorting.

Recording

- Debris collection sheets (see example developed for provincial program) or apps may be used for recording.
- Record general information including the date; participants (divers and all crew members roles); location description; coordinates; and wave conditions:
    - *Calm* (glassy to rippled) for waves 0–0.1 metres/0-4 inches high
    - *Smooth* (wavelets) for waves 0.1-0.5 metres/4-19 inches high
    - *Slight* for waves 0.5-1.25 metres/19 inches-4 feet high
    - *Moderate to rough* for waves greater than 1.25 metres/4 feet high
- Record the area surveyed (m^2). Use easy and accurate point-and-click map tools such as this one: https://www.daftlogic.com/projects-google-maps-area-calculator-tool.htm
- Describe substrate as sand, silt, gravel, rock, coral, seagrass, other.
- Report the maximum and minimum depths from which you removed debris.
- Work through each sorted pile to record all items by material of construction.
- Where possible, record the size of materials recovered in addition to weight.
- Take photos and videos. Consider that the composition of photos used for documentation and identification of debris may differ from those used for communications and social media.

Disposing

- Dispose of materials properly so they do not end up back into the ocean.

- Recycle materials according to your local area guidelines.
- Make arrangements for collection by local authorities, if available.
- Take debris to the local waste collection site or recycling facility.
- Gain permission to store materials securely at the pier, prior to collection or disposal, if needed. Sea-can storage bins can be rented.
- Contact local authorities for advice on disposing of hazardous materials such as fluorescent light tubes, cyalume light sticks, electronics, car, truck and boat batteries, filters, and containers with oil, chemicals, fuel or paint.

Reporting

- Enter your data in the free Marine Debris Tracker App, using the section most appropriate for your location.
- Debris may also be reported to other debris tracking programs such as Dive Against Debris by PADI's Project Aware (Project AWARE Foundation, 2015).
- Reach out to local, provincial and federal governments for interest in reporting findings. Local Universities or other research institutions may also be conducting studies that can use your information.

Follow-up and Evaluation

Supporting Activities

End-of-Life Plastics Management

End-of-life management of marine plastic debris is multifaceted in terms of needs and approaches. End-of-life waste management strategies are necessary to support retrieval efforts while also preventing further pollution impacts at wharves and harbours. Beyond plastics associated with fishing and users of wharves and harbours, broader solutions are necessary at

local and regional scales to restrict all plastics from entering the marine environment from communities and waterways.

Approaches to manage end-of-life marine plastics involve partnerships with harbour authorities and waste management authorities, communication and education, assessments of community needs and barriers to waste disposal, as well as provision and management of necessary collection bins.

Furthermore, plastic waste management programs, for both retrieved debris and properly disposed, should consider ways to offset costs through recycling programs or extended producer responsibility (EPR). Through EPR policy, producers are given financial and/or physical responsibility for the disposal of post-consumer products (MMSB, 2022). In Newfoundland and Labrador, there are EPR programs for waste paint and containers, electronic waste, and used oil/glycol and containers (MMSB, 2022). Atlantic Used Oil Management Association (UMOA NL) accepted products includes used plastic containers with a capacity of up to 50 litres manufactured for the purpose of holding an oil or antifreeze product (UOMA NL, 2022).

Additional end-of-life options include potential for reuse or repurposing as well as value-added manufacturing. It is encouraging that, as indicated by the FGCAC, the majority of fishing plastics in Atlantic Canada can be collected and manufactured into value-added products (FGCAC, 2021). For example, rope feedstock can be blended into plastic lumber (FGCAC, 2021). In addition, plastic containers from used oil and antifreeze that are returned through the EPR program are recycled into value-added products such as industrial posts, railroad crossings, plastic pipes and composite construction products (UOMA NL, 2022).

It should be noted that currently, much of the plastic debris retrieved during coastal and shallow water clean-ups is currently not recyclable. These items include shotgun shells, lobster bands, broken hard plastics such as jugs / bleach bottles, fish pans, buckets, and toys. As such, similar solutions (reuse, repurpose, EPR, and value-added) are needed for a number of these remaining plastic items.

BMPs

Waste Management Programs

- Implement waste management systems at wharves and harbours to (a) support ongoing waste recovery efforts of marine plastic debris (including fishing plastics), and (b) prevent end-of-life plastics (including fishing plastics) from entering the marine environment to begin with. Successful waste management, particularly at the wharf, can be accomplished through building relationships with Small Craft Harbours and Harbour Authorities.
- Partner with provincial and local waste management authorities, such as the Multi-Materials Stewardship Board (MMSB) in Newfoundland. Partnerships between those removing marine debris and waste management authorities are essential and should be supported by the provincial government. Individuals conducting clean-ups should not bear the cost of proper disposal of marine debris.
- Communicate with fishers and wharf users about the importance of recycling and proper disposal to protect the ocean as well as procedural knowledge as to how they can dispose of waste properly. This can be achieved through a combination of clear and repetitive messaging via signage, community notices, associations, gatherings, social media, etc.
- Work with harbour authorities and town councils to identify methods to reduce future plastic waste. Examples include agreements for dumpsters or recycling options, assistance in removal of plastic debris, and assessments of how plastics enter the ocean from the community and waterways with mitigating solutions (e.g., programs, education, catchment devices).
- Assess specific community needs at wharves and harbours through identification of barriers to appropriate waste disposal.
- Provide recycling bins at wharves and harbours for collection of plastic marine debris, nylon nets and rope.

- Manage collection bins by taking into consideration:
    - scheduling for collection of debris from bins;
    - transportation from bins to storage location or recycling facility;
    - separation goals and sorting of other debris and garbage in bins (rope, tires, plastic, metal, etc);

Reuse, repurpose, EPR, and value-added programs

- Return all plastic containers from used oil and antifreeze through the Used Oil/Glycol EPR program in Newfoundland and Labrador. This includes used plastic containers with a capacity of up to 50 litres manufactured for the purpose of holding an oil or antifreeze product, as well as aerosol containers used for holding oil or brake cleaner (UOMA NL, 2022). See the full list of accepted products by the Atlantic Used Oil Management Association (UMOA NL).
- Subsidize some costs through available recycling programs or extended producer responsibility (EPR) programs in your area. For example NL EPR programs for waste paint and containers, electronic waste, and used oil/glycol and containers (MMSB, 2022).
- Determine potential for reuse of plastic debris by local fishers or repurposing by local businesses.
- Divert collected fishing plastics to recycled value-added manufacturers, as described by the FGCAC. For example, rope feedstock can be blended into plastic lumber (FGCAC, 2021).
- Consider recycling challenges for tires in Newfoundland including:
    - MMSB will pick up 40+ tires, but only if they are clean and in good condition;
    - not all landfill locations have a suitable section for tire disposal.
- Consider recycling challenges for rope including:
    - ability to grind rope and netting, however this can be achieved with high capacity shredders;
    - supplying clean rope, however solutions are being developed (FGCAC, 2021).

Awareness and Education

Ongoing public education is fundamental to changing perceptions, beliefs and behavioural outcomes. People must gain awareness in regard to the impacts of plastic debris on marine wildlife and human health and safety, as well as attain knowledge for means of responsible plastic disposal practices. Awareness and education is pivotal to eradicating marine plastic debris for future generations.

BMPs

- Raise awareness of the problems of marine ocean debris, providing positive steps for action in order to avoid feelings of helplessness or despair.
- Create ongoing awareness of the issues of marine plastic debris through social media as an effective way to build partnerships and collaborations.
- Work with local communities and fishers to increase awareness on sources of marine pollution and foster open discourse to deliberate sustainable alternatives.
- Avoid blaming individuals, communities, or particular industries for being the source of plastic marine debris as it is important to focus on the overarching goal.

Funding

Sources for funding for marine debris removal vary from year to year, and there is no central location where funding opportunities are updated regularly. Potential funding opportunities may be available from the following federal and provincial sources.

Federal

- Environment and Climate Change Canada has several funding opportunities that may be applicable to marine debris removal.
- Fisheries and Oceans Canada has funding opportunities for marine and coastal restoration projects.

Provincial:

- The MMSB in Newfoundland has funding programs that may be applicable to marine debris cleanups.

- Clean Foundation supports coastal cleanup activities, primarily in NS.
- Enviro-Fest Newfoundland Power invites proposals for environmental projects that benefit communities.

Communications and Messaging

Words and images are important as they influence the way people think, feel, and act when it comes to ocean protection. Consider messaging content and language, consistency, multiple delivery methods, audience awareness and characteristics, and theoretical foundations for behavioural change.

Research on the social and behavioural science of plastics communication indicates that focusing on the *impacts* of marine plastic debris to wildlife and human health may be more compelling than simply highlighting the scale of marine plastic pollution (Borg et al., 2021). Focusing on scale may have the unintended consequence as it makes the problem behaviour seem commonplace, solidifying social norms. Therefore, for example, showing a pile of marine debris elicits less reaction than showing a bird regurgitating plastic to its young, or a whale entangled in gear. Moreover, showing *social reactions* to the impacts of marine pollution (the viewers response) may elicit further support (Borg et al., 2021).

Although clean-ups are an important and necessary activity, there is also a need to shift the dialogue from clean-ups to prevention. Identifying the sources of marine plastic debris, and taking concrete actions to reduce and eliminate it, are ultimately required.

Social norms can be used to build community support. Showing desirable behaviours may encourage others to engage in that action. Threatening, negative, or fearful messages need to be coupled with concrete and empowering information on how the audience can address the threat. Failure to do so can result in a feeling of helplessness. Success stories, and before / after photos result in more positive engagement. By demonstrating and communicating the behaviours that we want to see normalized, (such as individuals actively engaged in removing marine plastic debris), rather than what we don't want to see (individuals dumping waste into the ocean), norms can be used to encourage people to engage in positive behaviours.

BMPs

- Use the term ‘marine debris’ or ‘marine plastics’, avoiding terms like litter or trash.
- Understand the target audience.
- Focus messaging on impacts of marine plastics to wildlife and human health, not scale of the problem. Also aim to show people's reaction to the impacts.
- Use ‘ocean’ rather than ‘oceans’ to reinforce the notion of connectedness and that the ocean is part of one global system.
- Shift the dialogue beyond clean-ups to actions to prevent plastic wastes.
- Illustrate desirable behaviours to influence social norms and build community support.
- Accompany negative or fearful messages with empowering tools and information.
- Promote positive messages on social media.
- See the UNESCO Ocean Literacy Toolkit for further information on ocean communication.

Recommendations

The Government of Newfoundland and Labrador and the Multi-Materials Stewardship Board (MMSB), along with stakeholders, municipalities, organizations, business and citizens are continually working to improve waste management systems in the province. This has been demonstrated through amendments to the Waste Management Regulations, implementation of the Plastic Retail Bag Regulation, waste diversion programs (Used Beverage Container Recycling Program and Used Tire Management Program), and EPR programs for waste paint and containers, electronic waste, and used oil/glycol and containers (MMSB, 2022).

Notwithstanding this, there are still considerable improvements that are desperately needed. Broader gaps in solid waste management in Newfoundland and Labrador were identified by the Department of Municipal Affairs and Environment (MAE, 2019). Recommendations were made in the report entitled *Solid Waste Management in Newfoundland and Labrador: Finishing what we started* including proposed waste diversion goals, education campaigns, mandatory recycling, enforcement at all levels (provincial, regional, and local) to address indiscriminate dumping, and establishing an industry led program for packaging and printed paper as a priority. The report highlights that stalls to many of the Provincial Solid Waste Management Strategy goals were attributed to costs (MAE, 2019), further confirming that the provincial waste management sector at large is in need of coordinated funding efforts.

In addition to the aforementioned ongoing need for improvements to waste management in order to prevent pollution, something needs to be done about the extensive volume of existing waste within the marine environment. Specifically, the decades of marine debris that remains sitting and continues to accumulate on our coastlines and within our shallow water environment.

The recommendations herein are focused on those that pertain to capacity for marine debris removal, capacity of waste management systems at wharfs and harbours as well as prevention of plastics from entering marine environments. The Clean Harbours Initiative witnesses the destructive amounts of polluted materials within our shallow waters and coastlines and works tirelessly to retrieve substantial quantities. We hope that these recommendations will be considered and integrated within the broader provincial waste management framework.

Plastic reduction

- Prohibit non-official, man-made buoys. Fragments of plastic bottles make up a significant portion of plastic debris found on shorelines. Plastic bottles (such as those used for bleach or detergent) are often used as buoys on fishing gear, but are not adequately constructed to withstand such use. We recommend a campaign to spread awareness of the hazards of using these items as buoys, and enforcement of their prohibition. Education and enforcement would help to reduce this form of marine plastic debris.
- Plastic waste and fishing gear disposal solutions should be provided at harbours. These could include collection bins for fishing nets and rope. Collected materials could be re-used, repurposed, or recycled. One example of such a project is Steveston Harbour, which, in cooperation with 45 Harbour Authorities, is a hub for net stripping and recycling in British Columbia. Closer to home, Goodwood Plastic Products Ltd in Nova Scotia is making lumber materials from recycled plastics and exploring the use of nets.
- Extend reuse, recycling, EPR and value-added programs to plastics.
- Solutions are needed for plastics and common marine debris that currently are not recyclable. Much of the plastic debris retrieved during coastal and shallow water clean-ups include shotgun shells, lobster bands, broken hard plastics such as jugs and bleach bottles, fish pants, buckets, and toys, which are all non-recyclable and need waste diversion solutions.
- Prohibition of single-use plastics in the province.

- Increase enforcement capacity at all levels (provincial, regional, and local) to address indiscriminate dumping.
- Conduct a provincial and regional review and assessment to investigate how and where plastics are entering the marine environment, identifying common pathways and applying mitigating solutions in specifically identified inputs.

Funding and capacity

- The Government of Newfoundland and Labrador could provide better support for shoreline and shallow water clean ups.
- More capacity is needed for reclamation, transportation, and recycling of marine plastic debris and fishing gear.
- It is possible to recycle fishing plastics into usable products, such as plastic lumber. Investment should be made into supporting such initiatives and turning marine plastic debris into a value-added product.

Education

- Education on the importance of ocean stewardship, plastics reduction, and proper management of plastic waste should be included into the school curricula in Newfoundland and Labrador. Our ocean and fishing heritage should include protecting this legacy for future generations.
- Education and awareness about the impacts of marine plastic debris and ghost gear on the environment, species at risk, commercial fish stocks and human health should be increased and improved.

Innovation

- Support innovation in solving the issue of ghost gear posing threats to marine wildlife.
- Develop environmentally safe gear and non-fragmenting ropes. Currently rope is being made that is INTENDED to fragment into microplastics.

- Innovate technology for processing of more plastics as well as solving the challenges to processing traps, rope and nets for recycling.
- Increased engagement of the private sector to solve challenges.
- Supporting local use and business opportunities for recycled materials.

Other

- Find alternatives to using tires as bumpers at wharfs as there are a large quantity of tires that end up in the marine environment and make up a significant proportion of debris removed.
- Shift responsibility of used tires from MMSB to industry through an EPR program, as suggested by the Department of Municipal Affairs and Environment (MAE, 2019). This would allow additional tire sizes (e.g., ATV tires). Further, implement a tire levy for all tires entering the province (MAE, 2019).

Resources

Helpful Contacts

Marine debris removal and plastic pollution reduction

International

Professional Association of Diving Instructors (PADI) is the world's leading scuba diver training organization. Their flagship program, Dive Against Debris, claims to be the world's largest underwater cleanup on the planet and database for marine debris. The citizen science program has over 90,000 participating divers, and removed 2,000,000 pieces of marine debris. Data are reported using a map portal and analysed for scientific publication. The program includes a Resource Toolkit, Instructor Guide, Liability Release Form, Lesson Guide, Marine Debris Identification Guide, and a Guide to creating and holding events.

Canada

Plastic Oceans Canada was established in 2016 as a non-profit organization and a Registered Canadian Charity. Their mission is to solve plastic pollution. Plastic Oceans Canada creates change by advocating for Canadian businesses to take impactful steps towards eliminating their plastic pollution footprint, driving towards implementation of changes with government, producers, recyclers and consumers and supporting and implementing programs to clean our coastlines.

Great Canadian Shoreline Cleanup is a conservation program that provides Canadians across the country the opportunity to take action in their communities wherever water meets land, one bit of trash at a time.

CPAWS NL offers a wealth of information on marine debris, including the CPAWS-NL Marine Debris Database, Pledge, and Ship-to-Shore program .

Recycling and Disposal (Newfoundland and Labrador)

General waste management information

Multi-Materials Stewardship Board (MMSB) supports and promotes sustainable waste management in Newfoundland and Labrador through public education and waste diversion programs. MMSB is a Crown agency of the Government of Newfoundland and Labrador, reporting to the Minister of Environment and Climate Change.

Tire recycling

MMSB's Used Tire Management Program collects used tires and ensures they are processed in accordance with Newfoundland and Labrador's Waste Management Regulations.

Find out more about the MMSB Used Tire Management Program, see a list of accepted tires or call MMSB toll-free: 1-800-901-6672.

Used oil, antifreeze and containers

Atlantic Used Oil Management Association (UMOA NL) manages collection and processing of filters, used oils, used antifreeze, and containers (used oil and antifreeze containers as well as used lubricant aerosol and brake cleaner containers). Facilities registered with the UOMA NL accept the return of the used materials, such as mechanical workshops, car dealerships and regional waste management authorities. This is an extended producer responsibility (EPR) program governed by Waste Management Regulations and MMSB.

Metal recycling

NEWCO Metal and Auto Recycling work with over 100 municipalities in Newfoundland and Labrador recycling large pieces of scrap metal including old vehicles. Work your community to remove old wrecks from our forests, waterways and wetlands.

AIM Recycling in St. John's will take old metal for cash.

Western Waste Management NL provides scrap metal disposal, as well as other wastes.

Household waste

Rethink Waste NL provides regional resources and information on handling house house waste. Some are listed below.

Bulk Item Pick Up - Eastern Waste Management

Household Hazardous Waste - Eastern NL

Waste Recovery Facilities - Avalon Peninsula

Curb Side Recycling - Eastern NL

Bulk Item Pick Up - Western Regional Waste Management

Household Hazardous Waste - Western NL

Electronic Waste

Recycle my Cell is a national industry initiative to raise awareness about mobile device recycling. Find out how to set up a drop-off location in your community.

Recycle MY Electronics is a program of the Electronic Products Recycling Association (EPRA), a not-for-profit organization responsible for implementing and operating an industry-led and government-approved electronic products recycling program for consumers and businesses throughout Newfoundland and Labrador.

eWasteNL disassembles and processes electronic waste locally.

Illegal Dumping Surveillance and Reporting

MMSB Illegal Dumping Surveillance Assistance Program offers financial resources and technical training to support communities in developing surveillance and enforcement programs within their jurisdictions. The program was implemented in over 15 NL municipalities. Municipalities with inquiries about the program can contact MMSB at: inquiries@mmsb.nl.ca or 1-800-901-6672 (MMSB).

Crime Stoppers of Newfoundland and Labrador encourages the public to report suspicious activity involving the improper disposal of waste, including crimes in progress as well as details on illegal dumpsite locations.

Plastics Management in Newfoundland and Labrador

Current plastics recycling programs in Newfoundland and Labrador:

Newfoundland and LabradorUsed Beverage Container Recycling Program is a deposit-refund system regulated under the Waste Management Regulations and administered by MMSB. MMSB also operates a collection network of Green Depots for the recycling of used beverage containers.

Central Newfoundland Waste Management (CNWM) accepts the following plastic containers for recycling:

- beverage containers (e.g. pop and water bottles, juice jugs, juice pouches, yogurt drink bottles)
- tubs and lids (e.g. butter, sour cream, yogurt, ice cream)
- food containers and bottles (e.g. mayonnaise, ketchup, peanut butter)
- household cleaner bottles (e.g. glass cleaner, multi-purpose solution, laundry detergent, windshield wash)
- toiletry bottles (e.g. dish soap, hand sanitizer, shampoo, body wash, over-the-counter medication)
- trays and clamshells (e.g. baked goods, fruit, sandwiches)
  flower pots

NON-recyclable plastics include

- bags
- bottle caps
- bubble envelopes
- candy and granola bar wrappers
- CD and DVDs and cases
- chip and snack bags
- cutlery
- individual condiment packages
- plastic wrap and baggies
- straws

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