Marine Microplastic and Nanoplastic Litter in Nova Scotia:
Confronting the Rising Tides of Plastics in our Marine Waters, Coastlines and Organisms

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ABSTRACT

According to Moore (2008), "plastics are now one of the most common and persistent pollutants in ocean waters and beaches worldwide" (p. 131). Significant increases in plastic production is a considerable driver in the amount of plastic observed in the marine environment (UNEP, 2014). It is estimated that the amount of marine litter along the coast of Nova Scotia is increasing (Grieve, 2012) with local studies finding that sea birds and mussels contain elevated levels of plastic as compared to studies completed elsewhere (Bond et al., 2014; Mathalon and Hill, 2014). Scientists confirm that marine plastics are entering the food chain with as much as 178 microplastic fibers found in a single wild Nova Scotia mussel (e.g. Bouwmeester, et al., 2015). Much of the international and federal regulations pertaining to marine litter focuses on sea-based sources of litter; however, the scientific community states that land-based activities make up approximately 80 per cent of marine litter (Andrady, 2011; Berman, 1995; Sheavly, 2005; Zhou et al., 2011; UNEP, 2005). The report ends with recommendations on how Nova Scotia can address marine litter concerns from both a local and global perspective.

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CHAPTER 1: INTRODUCTION

The purpose of this paper is to provide an overview of the current state of marine litter in Nova Scotia and establish recommendations to address marine litter in Nova Scotia's marine waters and coastlines. The scope of this study includes considerations as to the main threats and drivers that marine litter poses to human health and the environment. The scope also includes a review of raw litter results for Nova Scotia as well as a critical review of the regulatory environment pertaining to marine litter.

Though this study focuses on Nova Scotia, it also considers research that has been generated globally to establish an understanding of trends and threats that marine litter poses. The regulatory review also provides an international, national and provincial context and identifies gaps and opportunities to improve regulatory practice.

According to the United Nations Environment Programme (2009, p. 12) "Unless effective action is taken, the global marine litter problem will only continue to worsen in the years to come." As such, the international community is calling on collective and decisive action to address marine litter (Wallace and Arthur, 2014). The United National Environment Programme (UNEP) considers marine litter one of six key concerns for addressing ocean health and has established a number of regional and international treaties to address marine litter (UNEP, 2016).

Carried by wind and water currents, the transboundary nature of marine litter results in a number of regulatory challenges. Plastic litter often collects in ocean gyres within the high seas and can therefore remain floating outside of any national jurisdiction (Gold et al., 2013). Quantifying the amount of plastic litter in the ocean as well as temporal projections are challenging. There is very little robust tracking of plastic inputs into the marine environment and existing litter monitoring is fairly disjointed and inconsistent (Gold et al., 2013).

Chapter 2 of this report provides a literature review on marine plastics with an international context to provide a background on the problem and consider the main sources and drivers of marine plastics. Chapter 3 provides context to the state of marine litter in Nova Scotia both by examining raw data that was provided by the Vancouver Aquarium as well as a review existing literature that is available on Nova Scotia. Chapter 4 reviews existing international, Canadian and Nova Scotia conventions, agreements, legislation and policies to identify gaps. Chapter 5 summarizes the main conclusions as well as provides recommendations on what steps can be taken to address shoreline and marine litter in Nova Scotia.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The Secretariat of the Convention on Biological Diversity (2012) defines marine debris as "any persistent, manufactured or processed solid material discarded, disposed of, or abandoned in the marine and coastal environment" (p.8). Though composition of marine debris ranges widely (e.g. glass and metals) various studies suggest that marine debris is largely composed of plastic material. Moore (2008) states that: "plastics are now one of the most common and persistent pollutants in ocean waters and beaches worldwide" (p. 131). Derraik (2002) estimates that between 60 and 80 per cent of marine litter is composed of plastic. Shoreline litter audits have reported findings of up to 97 per cent identified as plastic (Goldstein, Titmus & Ford, 2013; Leite, Santos, Costa, & Hatje, 2014; Morritt, Stefanoudis, Pearce, Crimmen & Clark, 2014).

Ocean plastic varies from macro-sized (e.g. rope) to microscopic (e.g. synthetic lint). With exposure to sun and the marine environment, plastic will break into smaller pieces; however, it is uncertain how long plastic takes to degrade in the marine environment (da Costa, Santos, Duarte & Rocha-Santos, 2016). Consequently, some scientists and activists have coined the phrase "plastic soup" when referring to our oceans accumulation of plastic (e.g. Trouwborst, 2011).

Plastics are largely synthesized with fossil fuels with the most common types of plastics produced comprising of polyethylene, polypropylene, polyvinyl chloride, polystyrene, polyurethane and polyethylene terephthalate. Plastic density is different depending on the type of plastic which effects whether the material will float or sink in the marine environment (GESAMP, 2015).

The most common type of litter are microplastics (Kieser, 2013) which are plastic particles that, according to Hartmann, Nolte, Sorensen, Jensen and Baun (2015), are between 1μm and 1mm in length. Nanoplastics, which are less than 1μm in length (Hartmann et al., 2015), are generated from the degradation of microplastics and can also be derived from manufacturing and industrial processes (Bouwmeester, Hollman & Peters, 2015; GESAMP, 2015; Gigault, Pedrono, Maxitb & Hallec, 2016).

This chapter examines the literature pertaining to microplastics and nanoplastics to consider the key drivers and sources of marine plastics entering the environment as well as the associated biological and economic impacts.

2.2 Sources and Sinks

2.2.1 Plastic Production

Many scientists point to an inextricable link between plastic litter accumulation in our oceans and worldwide plastic production (UNEP, 2014). Certainly the issue of plastic marine debris would not exist without a steady increase in plastic production. Plastic is now a widely used commodity, found in most disposable and durable goods. World plastic production reached nearly 300 million tonnes per year in 2012 as compared to approximately 30 million tonnes in 1975 (Bouwmeester, et al., 2015; Rochman, et al., 2013; UNEP, 2014).

More than one third of produced plastic is used in packaging products (e.g. plastic bags). At least another third is used for housing materials such as plastic pipes and vinyl cladding (Andrady & Neal, 2009). The remaining plastic is utilized in the production of toys, furniture and the automotive industry. According to Green, Boots, Blockley, Rocha and Thomspon (2015), 40 per cent of plastic products in Europe are for disposable items. UNEP (2014) calculated the amount plastic packaging in products, with soft drinks as the most highly plastic packaged item. This was followed by personal care products, food, medical and pharmaceutical products (UNEP, 2014).

Coinciding with common plastic items produced, according to the Ocean Conservancy (2016), the most common litter items found on shorelines during the 2015 international shoreline cleanups were largely plastic consumer products such as bottles, straws, wrappers and plastic bags. The most common litter item found was cigarette butts, which also contain a significant quantity of plastic.

Trends in the type of litter have varied over time and coincide with consumer culture (e.g. Oakley, MacLeod, Brown & Higgins, 2008). Waste generated from fast food restaurant's represent a large amount of litter (50 per cent) removed during cleanup efforts (Clean Water Action, 2011).

2.2.2 Durability

Plastic is very durable which allows it to be utilized in many applications; however, the durability of plastic also results in its persistence in the marine environment (Bouwmeester, et al., 2015). The breakdown of plastics into organic components is slow and it is therefore anticipated that plastics will remain in the marine environment for centuries (Barnes, Galgani, Thompson & Barlaz, 2009; Thompson, Swan, Moore & vom Saal, 2009).

Biodegradable plastics have been discussed as a solution to the persistence and accumulation of litter; however, Green et al. (2015) warns that biodegradable bags do not necessarily break down as quickly in the marine environment as may be expected. Their study found that after leaving conventional as well as biodegradable bags in the water for 9 weeks, both bag types created anoxic conditions and created a barrier between the smothered sediment and the remainder of the water column. This can have severe consequences on benthic and infaunal organisms. The results of their tests were similar to the effects of eutrophication where anoxic conditions were created, thereby reducing primary production and nutrient turn over.

Furthermore, plastics produced from bio-based resources are becoming more common. That said, biodegradable plastics do not necessarily result in quicker deterioration in the marine environment since they are designed to mimic the composition and durability of conventional plastics.

2.2.3 Quantity

Quantifying the amount of plastic litter in the ocean as well as temporal projections is challenging. There is very little robust tracking of plastic inputs into the marine environment and existing litter monitoring is fairly disjointed and inconsistent (Gold, Mika, Horowitz, Herzog & Leitner, 2013). Nonetheless, there have been many recent efforts to quantify the amount of plastic litter in the marine environment.

Of the plastic produced in the world, it is estimated that about 10 per cent enters the ocean (Barnes et al., 2009). According to Jambeck et al. (2015), the quantity of plastic litter that reached our oceans in 2010 was approximately 8 million tonnes. With steady increases in plastic production, this number is only predicted to rise. For instance, by 2025 it is expect that the amount of plastic that enters the ocean annually will double from the quantity that entered in the ocean in the year 2010 (Jambeck et al., 2015). Because of the persistence of plastic combined with projected increases in production, the quantity of plastic litter into the world's oceans is predicted to increase 20-fold by 2025 (Jambeck et al., 2015).

Additional drivers in the amount of marine debris produced are population size and economic status (Jambeck et al., 2015). Jambeck et al. (2015) note that the top waste-producing countries have some of the most populated coastal areas. The study found that China ranked number one for marine debris contributor in the world in 2010, followed by Indonesia and the Philippines. Jambeck et al. (2015) warn that as developing countries grow in richness and in population, their populace will consume more products which will perpetuate marine litter issues (Singh, Laurenti, Sinha, & Frostell, 2014).

Though the United States has relatively robust waste management programs, its high population and waste production made it the 20th highest country in the world contributing to marine litter in 2010. This issue further points to the fact that marine litter and product consumption are highly linked (MacKerron, 2015).

2.2.4 Where it's Found

Marine debris is ubiquitous throughout our oceans and shorelines. Plastic debris has been found in bottom of the deepest seas as well as the most remote and inaccessible shorelines (van Cauwenberghe, Vanreusel, Mees & Janssen, 2013). However, higher concentrations of marine debris have been observed as proximity to urban areas increase (Leite et al., 2014; Goldstein et al., 2013).

Marine debris can become swept away and collected by converging ocean currents, accumulating as 'garbage patches' (C. Moore, S. Moore, Leecaster, & Weisberg, 2001) with maximum concentrations measured at 100 000 particles m^3 (Noren & Naustvoll, 2010). According to litter samples conducted by Moore et al. (2001), the North Pacific Gyre contains more plastic (by mass) than our oceans most crucial food source, plankton. The North Pacific Gyre has one of five identified ocean garbage patches in the world, including a patch that was discovered in 2010 in the North Atlantic (CBC News, 2012). Furthermore, researchers believe there is another garbage patch forming in the arctic (Bergmann, Sandhop, Schewe & D'Hert, 2015).

Coastal debris can also become trapped into local vegetation such as in the case of mangrove forests (Ivar do Sul, Costa, Silva-Cavalcanti & Araújo, 2014). Scientists have observed higher densities of marine litter as floating at the water's surface; however, there are still significant amounts of litter observed below the water's surface (Morritt et al. 2014).

2.2.5 Origins of Litter

Identifying the source of marine litter is perhaps one of the most challenging issues that face marine litter scientists. Estimations regarding origin for certain items can only be approximated as it is typically impossible to determine whether an item, such as a straw, was derived from land or a fishing vessel. However, for other items, such as balloons, it is easier to point to land-based activities. That said, there has been efforts to approximate the origins of marine litter, which will be discussed below.

Though marine litter can originate from marine-related activities, the vast majority of marine litter is thought to be generated from land-based activities (GESAMP 2001a, 2001b), accounting for about 80 per cent of marine litter (Andrady, 2011; Berman, 1995; Sheavly, 2005; Zhou et al., 2011; UNEP, 2005).

While plastic has drastically increased in production, disposal and management practices are trailing. The ocean, for many years, was considered an ideal location to dispose of garbage (GESAMP, 2015). Land-based sources of plastic include mismanaged landfills and waste facilities, recreational activities and wastewater discharge. Ocean-based sources include fishing, shipping and cruise line vessels.

In beach audits conducted by Fauziah, Liyana and Agamuthu (2015), the type of litter found was different between recreational beaches and commercial harbours. This indicates that the activities taking place at or nearby a coastal area will certainly have an effect on the type of litter along the adjacent shorelines.

2.2.5.1 Waste Management on Land

Jambeck et al. (2015) note that poor waste management and recycling programs are one of the most significant factors in determining how much marine litter is released by a geographical area. Developing countries, many of which have largely inadequate waste management systems, are considerable contributors of solid wastes to the sea (Jambeck et al., 2015).

Litter generated from materials that are intentionally discarded on the ground is another source of litter. This issue has been shown to be more prominent when public waste receptacles are either lacking or are limited in availability. Keep America Beautiful (2009) found that public littering was significantly higher as distance from a waste receptacle increased. Furthermore, river systems can transport significant quantities of marine litter from inland sources to the ocean and coastal beaches (Rech et al., 2014).

Plastics are also released directly through various industrial processes, including pellets used as abrasives in industrial and domestic applications (e.g. Fendall and Sewell, 2009). The commercial production of plastic products from virgin plastic has also been shown to be a source of plastic inputs into the marine environment when plastic pellets are released during production (Thompson & Barlaz, 2009)

2.2.5.2 Wastewater Treatment

Waste water effluent is a key source of marine litter especially in areas where wastewater treatment facilities are not present. However; even with waste water treatment, some plastics may still be released due to their small size. Browne et al. (2011) note that polyester and acrylic fibers used in consumer clothing has been found in habitats where treated sewage effluent is carried. A single garment of clothing can produce more than 1900 fibers per wash. As more synthetic materials are used in textiles, it is feared that contamination from microplastics will continue to increase. Furthremore, plastic is also released from facial cleansers and toothpastes which contain particles of microplastics that can be released into the marine environment even when effluent is processed in a waste water treatment facility (Zitko & Hanlon, 1991).

2.2.5.3 Waste Management at Sea

Waste disposed by vessels at sea has also been noted in the literature as a pressure contributing to marine debris (Ryan, Moore, van Franeker, & Moloney, 2009) but has been noted as decreasing as a critical contributor (Secretariat of the Convention on Biological Diversity, 2012). However, based on a study by Andrady (2011), 18 percent of marine litter was derived from the fishing industry.

2.3 IMPACTS

2.3.1 Biological

A wide range of studies have been completed to evaluate the effects of microplastic ingestion by specific freshwater and marine species. Some reductions in productivity, reduced feeding, reproductive effects, and mortality have been observed (Besseling, Wang, Lurling & Koelmans, 2014; Besseling, Wegner, Foekema, va den Heuvel-Greve & Koelmans, 2013; Lee, Shim, Kwon & Kang, 2013; Wright, Thompson, Galloway (2013a, b); Cole et al., 2013). A study by Rossi, Barnoud and Monticelli (2014) evaluated the impact of nanoplastic polystyrene (PS) on model biological membranes, finding that PS severely affected membrane properties which could have compromising effects on critical cell functions.

Other studies show microplastics as not affecting fitness, such as in the lugworm *Arenicola marina* (Koelmans, Besseling, Wegner & Foekema, 2013), larvae of the sea urchin *Tripneustes gratilla* (Kaposi, Mos, Kelaher & Dworjanyn, 2014), the marine isopod *Idotea emarginata* (Hamer, Gutow, Kohler & Saborowski, 2014) as well as the North Sea Cod (Koelmans, Besseling & Foekema, 2014). That said, Desforges, et al. (2015) make the argument that most studies analyzing the effect of microplastics utilize lower thresholds of plastic pollution than are likely found in the marine environment.

2.3.1.1 Zooplankton/phytoplankton

Primary producers are crucial food sources for marine environments and have been studied for microplastic and nanoplastic exposure. According to Besseling et al. (2014), nanoplastic exposure affected growth and ability to photosynthesize by the green alga *Scenedesmus obliquus*. Their study also found that nanoplastics stunted growth for *Daphnia magna* as well as reduced reproduction and generated malformations. These effects were observed at a nano-polystyrene (PS) exposure between 0.22 and 103 mg nano-PS/L. Though the plastic concentrations were higher than what has been reported in marine and fresh water environments, the results demonstrate that there is certainly a threshold whereby nanoplastic pollution can make significant impacts to primary producers in our food webs.

A study by Cole, Lindeque, Fileman, Halsband and Galloway (2015) also warn that zooplankton and phytoplankton populations are affected by marine plastics, concluding that microplastics caused reduced ingestion, reduced fecundity, as well as reduced survival in copepods.

Desforges, Galbraith and Ross (2015) found that two zooplankton species in the North Pacific ingest microplastics. Their findings support the concept that marine filter and suspension feeders are perhaps the most common consumers of marine plastics because their feeding behaviour involves filtering significant quantities of water (Kaposi, et al., 2014; Moore, 2008). Their study found that zooplankton consumed microplastics equivalent in size to their natural prey of phytoplankton. Furthemore, Desforges et al. (2015) found that zooplankton ingested higher amounts of microplastic in urban coastal areas as compared to less urban coasts.

2.3.1.2 Bivalves

Bivalves, including mussels and oysters, have been studied as they are filter feeders and many acccumulate plastics. Wegner, Besseling, Foekema, Kamermans and Koelmans (2012) found that the blue mussel will uptake nanoplastics and, while a portion was excreted as pseudofeces, some of the nanoplastics remained inside the mussel. This is concerning as nanoplastics have been shown to move from digestive tract to the circulatory system in mussels (Browne, Dissanayake, Galloway, Lowe & Thompson, 2008) and could remain present during ingestion by predators or humans.

2.3.1.3 Fish

A number of studies have considered uptake of marine plastic litter by various fish species. Jantz, Morishige, Bruland and Lepczyk (2013) conducted a study on piscivorous fish, finding that approximately 25 per cent had ingested plastic in their stomachs. Desforges et al. (2015) estimated that adult salmon in the Strait of Georgia in British Columbia ingest up to 91 particles of plastic per day. Desforges et al. (2015) argue that this is a cause for concern to human health since salmon are ecologically and economically very important.

Furthermore, king mackerel, sharpnose shark and other similar predatory fish tend to attack and lunge at food very quickly before close inspection and therefore tend to encounter and consume higher amounts of plastic. A higher proportion of plastic was found in these species as compared to other common fish found in Brazilian waters (Miranda & de Carvalho-Souza, 2016).

Studies have also been conducted that demonstrate freshwater fish mistakenly consume microplastics and that it has impacted their productivity including indications that it may lead to tumour formation (e.g. Imhof, Lvleva, Schmid, Niessner & Laforsch, 2013; Oliveira, Ribeiro, Hylland & Guilhermino, 2013; Rochman & Browne, 2013).

2.3.1.4 Turtles and Birds

Numerous research studies have described the concerns that marine debris poses to turtles and birds, which are common indicator species for marine plastic litter. Exposure of plastic to turtles through ingestion and entanglement has been described by González et al. (2014). Nearly all marine turtle species have been shown to ingest marine litter (Schuyler, Hardesty, Wilcox & Townsend, 2013). Seabirds commonly mistake plastic for food and have been shown to provide plastic debris to juveniles during feedings. Nearly every stomach of *fulmaris glacialis* (northern fulmar) examined by van Franeker et al. contained plastic (2011).

2.3.1.5 Marine Mammals

A number of studies have described concerns of fishing gear (i.e. rope) entanglement and ingestions by marine mammals. In a study by Cassoff et al. (2011), the most common entanglement issues causing North Atlantic baleen whales to perish was the result of fishing gear tangled in multiple parts of the body that resulted in the whales' inability to surface for air. Unger et al. (2016) analyzed the stomach contents of stranded sperm whales along the North Sea coast. Up to 25 kg of marine debris was removed from a single specimen and common materials found included packaging and fishing gear. Furthermore, Besseling et al. (2015) analyzed the intestines of filter feeding baleen whales finding a multitude of polymer types, such as polypropylene, polyvinylchloride, in various shapes and sizes.

2.3.1.6 Benthic Organisms

Wright et al. (2013a) note that energy reserves in marine worms were depleted by up to 50 per cent when exposed to sediments containing microscopic unplasticised polyvinylchloride. Kaposi, Mos, Kelaher and Dworjanyn (2013) studied *T. gratilla* (sea urchin) larvae and only saw an effect on larval growth when exposed to microplastic concentrations much higher than are recorded in the marine environment (based on Colton, Knapp & Burns (1974) findings of 60.6 to 5465.7 particles/km^2). Though this was considered proof that microplastic exposure does not currently concern marine larva, it does demonstrate that further increases in microplastics in the marine environment could have detrimental effects.

2.3.1.7 Ecosystem Impacts

Marine debris can act as a carrier for the introduction of invasive species that attach themselves to ocean plastic (Barnes, 2002). Goldstein, Rosengerg & Cheng (2012) found that marine litter in the North Pacific Gyre provides new habitat for *Halobates sericeus* (sea strider). In addition, nesting birds are found on clusters of marine debris in the Bay of Fundy (personal communications, Charles Skerry, March 8, 2010). Changes such as these can affect the remainder of the ecosystems by introducing invasive species to new habitat and thereby having the potential to affect native species (Gregory, 2009).

2.3.2 Vectors

2.3.2.1 Absorption of Contaminants

Plastic may contribute to the bioaccumulation of persistent organic pollutants (POPs) within marine species. Studies have demonstrated that plastic can become a vector for toxic substances such as polycyclic aromatic hydrocarbons (PAHs), bisphenol-A (BPA) and titanium dioxide since plastic debris has been shown to absorb these pollutants (Mato, et al., 2001). For instance, Velzeboer, Kwadjik and Koelmans (2014) found that PCBs are strongly absorbed to nanoplastics and microplastics.

Liu, Fokkink and Koelmans (2016) found that nano-sized polystyrene had much stronger sorption than micro-sized polystyrene. Scientists note that as the size of plastic particles becomes smaller, the ratio of its surface area compared with its volume and mass becomes higher. As such, the same quantity of plastic degraded into many nano-sized portions will have more surface area for which it can adhere contaminants when compared to the same volume of plastic in a macro-sized portions. Thus, the presence of nanoplastics as a common persistent pollutant in the marine environment increases the risks associated with uptake of other persistent contaminants by organisms as they will more efficiently carry contaminants such as PCBS or PAHs to marine organisms (Koelmans, 2015; Koelmans, et al., 2013; Velzeboer, et al., 2014)

2.3.2.2 Plastic Additives

Plastic additives, which make up approximately four per cent of the weight of plastics (Andrady & Neal, 2009) also pose a concern for our oceans. As common plastic surfactant, nonylphenol (NP), can leach from consumer plastics and can increase in concentration in tissues of organisms that consume them (Hamlin, Marciano & Down, 2015). Consumer plastics containing NP include household and personal care products. NP is also used commonly in industrial applications (Lorenc & Scheffer, 2003). Hamlin et al. (2015) found that FDA food-grade consumer plastic bags leached NP into the water and that fish exposed for 48 hours resulted in 100 per cent mortality.

Other common plastic additives include vinyl chloride, bisphenol A, PBDEs or flame retardants. Studies regarding the uptake of these chemicals by humans and other species indicate that they may have carcinogenic and neurological effects (Awara, El-Nabi & El-Gohary, 1998; ATSDR Agency for Toxic Substances and Disease Registry, 2010; Oehlmann et al., 2009; Hugo et al., 2008; Browne et al., 2013; Rochman et al., 2013).

2.3.3 Human Health

2.3.3.1 Human Intake

In areas of high concentrations of marine litter, plankton has been outnumbered by plastic debris (Moore et al. 2001). Plankton are crucial food sources for many marine organisms. Given that zooplankton and other organisms that form the basis of ocean foodwebs have been shown to consume microplastics, there is cause for concern that plastics (along with additives or persistent chemicals adhered) are accumulating in the food chain. Furthermore, there is significant evidence that microplastics can be transferred to various trophic levels (Murray & Cowie, 2011; Farrell & Nelson, 2013; Seta¨la¨, Feling-Lehtinen & Lehtiniemi, 2014; Boerger, Lattin, S. Moore & C. Moore, 2010; Eriksson & Burton, 2003; Fossi et al., 2014). As such, some studies argue that we are eating plastic-ingesting fish (Miranda & Carvalho-Souza, 2016). Furthermore, because of the persistence and quantity of plastic in the marine environment, all signs point to the fact that plastic will be in the food chain for the foreseeable future (Bouwmeester, et al., 2015).

Scallops, mussels and salmon are examples of marine species that are economically important to humans as well as a constitute a source of food. Each has been studied and shown to intake plastic during feeding (Bouwmeester, et al., 2015). van Cauwenberghe & Janssen (2014) estimate that an average portion of mussels (250g wet weight) results in the consumption of approximately 90 plastic particles. They also estimate that consuming 6 oysters (100g wet weight) results in ingesting approximately 50 particles.

Freshwater systems may be a further source of microplastic and nanoplastic ingestion in humans. Investigating this further is especially important, considering that drinking water supplies generally come from lakes, rivers, and other freshwater systems, and there are also consumable resources generated from freshwater fisheries (Gigault et al., 2016).

2.3.3.2 Human Impacts

Though it is anticipated that microplastic consumption from seafood could be harmful to human health, there is insufficient information at this time to conclude this definitively. For instance, when microplastics enter the human digestive track, it is uncertain whether intestinal uptake of the particles occur. However, according to van Cauwenberghe & Janssen (2014): “As there is a growing body of literature on plastic-associated toxicants and their transfer to exposed wildlife, threats to human health through the consumption of microplastics present in seafood are becoming apparent. (p. 69)” As such, a number of studies are calling on an urgent need to research microplastics and nanoplastics in food and the potential resulting health effects on humans (e.g. Gigault et al., 2016).

Bouwmeester et al. (2015) note that microplastic particles would perhaps only reach the blood circulation but would not likely translocate into organs. However, given that nanoplastics are smaller in size than microplastics, scientists have stated that their small size allows them to pass through biological barriers (Kashiwada, 2006) and collect in organs (von Moos, Burkhardt-Holm & Kohler, 2012), including the brain and placenta (Browne et al., 2008).

Microparticulate translocation across the gut of mammals has been observed in humans, dogs, rabbits and rodents (Hussain, Jaitley & Florence, 2001). According to Koziara, Lockman, Allen & Mumper (2003) nanoplastics can penetrate into cells through endocytotic pathways with the ability to cross the blood-brain barrier. Furthermore, Kashiwada (2006) have noted that nanoplastics can enter the chorion of fish eggs. Despite this concern, the actual harm of ingesting nanoplastics is not yet understood as no existing studies demonstrate the levels at which there is toxicity from microplastics and nanoplastics in humans (Bouwmeester et al., 2015).

However, given that plastics can be a vector for persistent chemical contaminants in the environment as well as chemicals that have been added to the plastics, if nanoplastics are able to penetrate human organs, it may increase human exposure to known carcinogens such as vinyl chloride, bisphenol A, PBDEs or flame retardants (Awara, El-Nabi & El-Gohary, 1998; ATSDR Agency for Toxic Substances and Disease Registry, 2010; Oehlmann et al., 2009; Hugo et al., 2008; Browne, Nive, Galloway, Rowland & Thompson, 2013; Rochman et al., 2013).

2.3.4 Socio-Economic Costs

The socio-economic costs associated with litter in the oceans are vast. Among them is the aesthetic displeasure of litter along coastal shorelines which can have repercussions to tourism as well as litter removal costs. Furthermore, if litter accumulates in very remote areas, it can be very expensive and/or difficult to locate and retrieve (personal communications, P. Stewart, September 11, 2011).

Plastic at sea can have a multitude of financial and logistical repercussions. Fisher and vessel operators have experienced entanglement of their propeller or engine equipment which can impact the safety and function of a vessel (Nash, 1992). Furthermore, during search and rescue operations, debris in the water can delay progress when mistaken for a missing individual that operators of trying to locate (personal communications, R. Crowell, February 11, 2011).

Efforts have been made to evaluate the financial costs associated with litter in the marine environment. Though predicted to be a conservative estimate, UNEP (2014) stated that marine pollution from litter had an estimated annual cost of $13 billion. The UNEP (2014) considered the economic losses that impact fisheries and tourism, as well as beach cleanup efforts but were unable to account for the true costs associated with marine debris as the consequences of microplastics and nanoplastics to marine life and human health are not fully understood.

CHAPTER 3: NOVA SCOTIA CONTEXT

3.1 INTRODUCTION

This section discusses trends in quantity and type of marine debris for Nova Scotia. Courtesy of the Vancouver Aquarium, detailed data records on litter cleanups from 2007 to 2015 conducted by volunteers within Nova Scotia are reviewed and analyzed. Furthermore, the results are compared with available literature on marine debris for Nova Scotia as well as contrasted with literature outside of Nova Scotia and Canada.

3.2 METHODS

The Vancouver Aquarium and WWF collaborate on delivering the Great Canadian Shoreline Cleanup which engages volunteers across the country to complete cleanups along marine and freshwater shorelines (2016). This program is a strong example of citizen science. Volunteers are provided with data sheets to record and categorize litter items to provide quantities, type and total weight of litter collected. Methodology for litter collection is adopted through a partnership with the International Coastal Cleanup initiative directed by the Ocean Conservancy which saw participation from over 100 countries and nearly 800,000 individuals in 2015 (Ocean Conservancy, 2016).

The Vancouver Aquarium and WWF provided a comprehensive guide to team coordinators to follow in effort to ensure consistencies in how data is collected and recorded (2014). However, there are several weaknesses related to the International Coastal Cleanup program data collection that deserve some discussion here. First, survey results are not collected according to scientific methods; for instance, there are no controls for ensuring that shorelines chosen for litter surveys have not been cleaned recently by another community group or (where applicable) park officials. Second, each litter cleanup is led by a volunteer group which makes it difficult to assure accuracy and consistency of litter collection methods including estimates on the weight of material collected. Third, since the program depends on the participation of volunteer coordinators and participants, program organizers cannot always guarantee that data collection sites will have sufficient volunteers to do annual cleanups. Thus, year to year comparisons on data collection and type are not as reliable. Fourth, timing of the litter cleanups may differ from one year to the next, which could impact the amount or type of litter recorded. Lastly, litter categories were only implemented in 2009 and therefore there are no litter categorizations in 2007 and 2008. Litter categories also changed in 2013 and therefore the data before and after that time period are more difficult to compare and contrast.

Despite these shortcomings, the data derived from the Great Canadian Shoreline Cleanup represents the most comprehensive and up-to-date information available on marine litter for Nova Scotia. Appendix A and B outlines the raw data provided by the Vancouver Aquarium, with Appendix A outlining litter collection results from 2007 to 2012 and Appendix B containing the results from 2013 to 2015. For the purpose of this research report, basic data computation has been completed and tabulated or depicted in graphs.

3.3 Results

In the last ten years, over 10,000 volunteers have participated in litter cleanups in Nova Scotia through the Great Canadian Shoreline Cleanup program with approximately 400 litter surveys completed. The data available for each litter collection site includes weight of garbage collected, length of the beach cleaned and number of items collected per litter category. Blank fields are when a value has not been reported by volunteer teams. Furthermore, litter categories and descriptions were changed in 2013. The data have been separated into two appendices. Therefore, there are sections of these results that will only report on results prior to 2013.

3.3.1 Quantity of Litter

Figure 1 depicts the amount of litter collected each year, expressed as the number of items and weight per kilometer of shoreline cleaned. The highest quantity and weight of litter per kilometer was collected in 2009, with 447 items and 102 kilograms per kilometer cleaned. Collection results from 2010 and 2011 saw a decline in amount of litter. These reductions also corresponded with a reduction in sample sites (approximately 25 per cent fewer sample sites). The quantity of litter collected from 2012 to 2015 are considerably more consistent than previous years.

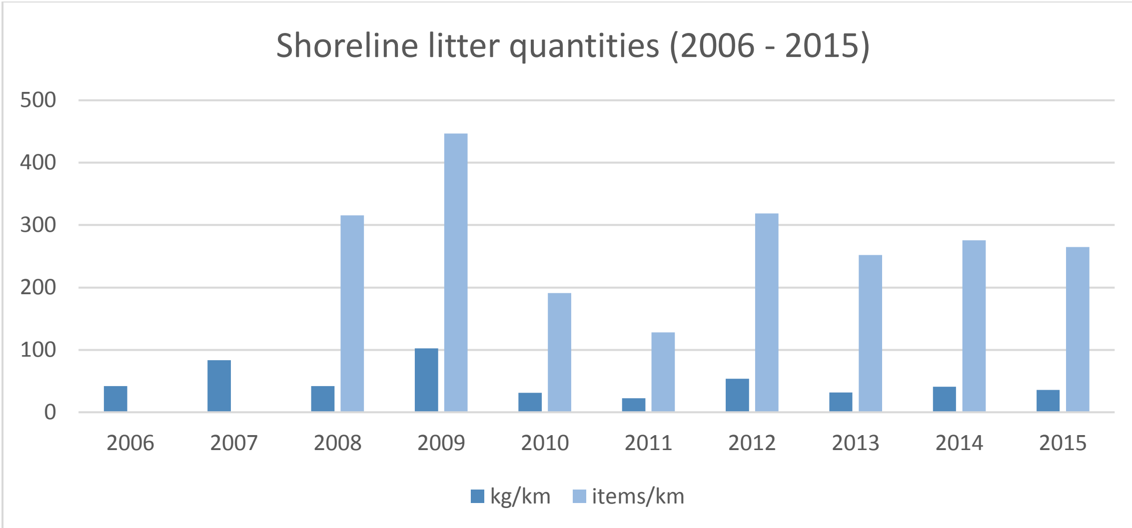

Figure 1. Litter collection results for Nova Scotia shoreline cleanups from 2006 to 2015, showing the weight and number of items per kilometer of shoreline cleaned.

3.3.2 Type of litter

Since 2008, shoreline cleanup participants have categorized each of the items collected. From 2008 to 2015, the top ten most common litter items collected on Nova Scotia shorelines are listed in Table 1.

Table 1. Top ten items found on Nova Scotia shorelines from 2008 to 2015.

Litter item (in order of most collected)	# removed	Proportion of the total items found (%)
1. Cigarettes/Cigarette Filters	44517	27.28%
2. Food Wrappers	17553	10.76%
3. Rope	14290	8.76%
4. Caps/Lids	11821	7.24%
5. Bags (Plastic)	9333	5.72%
6. other plastic/foam packaging	8541	5.23%
7. Cups, plates, etc	8401	5.15%
8. Strapping Bands	5097	3.12%
9. Straws/Stirrers	4779	2.93%
10. Beverage Bottles (plastic) 2 liter or less	4744	2.91%

Cigarette butts were the most common litter item consisting of more than one quarter of the items found on Nova Scotia shorelines. Many of the other items on the top ten list are common disposable goods (e.g. food wrappers, caps/lids, bottles, etc). Of note, two of the top ten items, rope (8.76 per cent) and strapping bands (3.12 per cent) are common items utilized in marine activities such as fishing and aquaculture. Furthermore, all items in the list are entirely or partially composed of plastic.

3.3.3 Origins of litter

Litter results from 2008 to 2012 utilized five overarching litter categories which presumes the origin of the litter items found:

- Shoreline & Recreational Activities
- Smoking-Related Activities
- Medical/Personal Hygiene
- Ocean/Waterway Activities
- Dumping Activities

The results from those years are displayed in figure 2. Nearly half the litter collected in that time period was categorized as “Shoreline and Recreational Activities” (49 per cent). The most common items within this category were one-time-use packaging items such as food wrappers (12 per cent), caps/lids (7 per cent) and plastic bags (6 per cent). Smoking-related activities were the second most common category at 25 per cent, which was mostly comprised of cigarettes/cigarette. Ocean/Waterway activities made up 19 per cent of collected items and included items such as rope (11 per cent) and strapping bands (3 per cent).

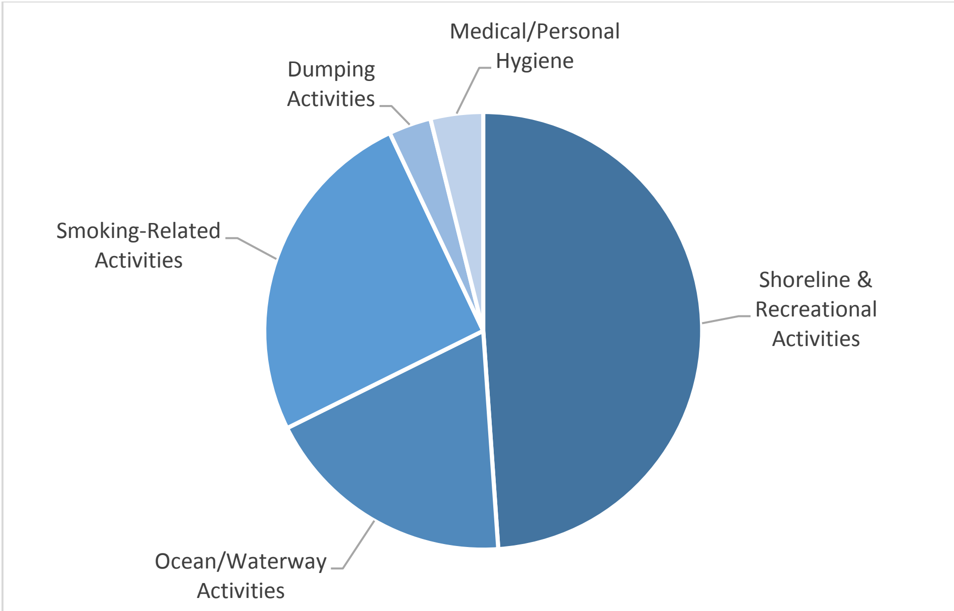

Figure 2. Proportion of litter in each category for cleanups from 2008 to 2012.

3.3.4 Proximity to urban center

Halifax shorelines were compared with all other shorelines in the province to determine whether there was a difference between the anticipated sources of litter found within the closest proximity of Nova Scotia's most populated city compared to other regions of Nova Scotia (see Figure 3). Though the author recognizes that there are other urbanized areas of Nova Scotia (including Sydney, Nova Scotia), for simplicity, only data from Halifax was pulled to compare with the remainder of the provincial data.

The results find that "other" sites had a much higher percentage of litter associated with Ocean/Waterway Activities, whereas participants of "Halifax" sites reported more than double the proportion of litter associated with Smoking-Related Activities. All remaining categories were roughly the same proportions between "Halifax" and "other" sites.

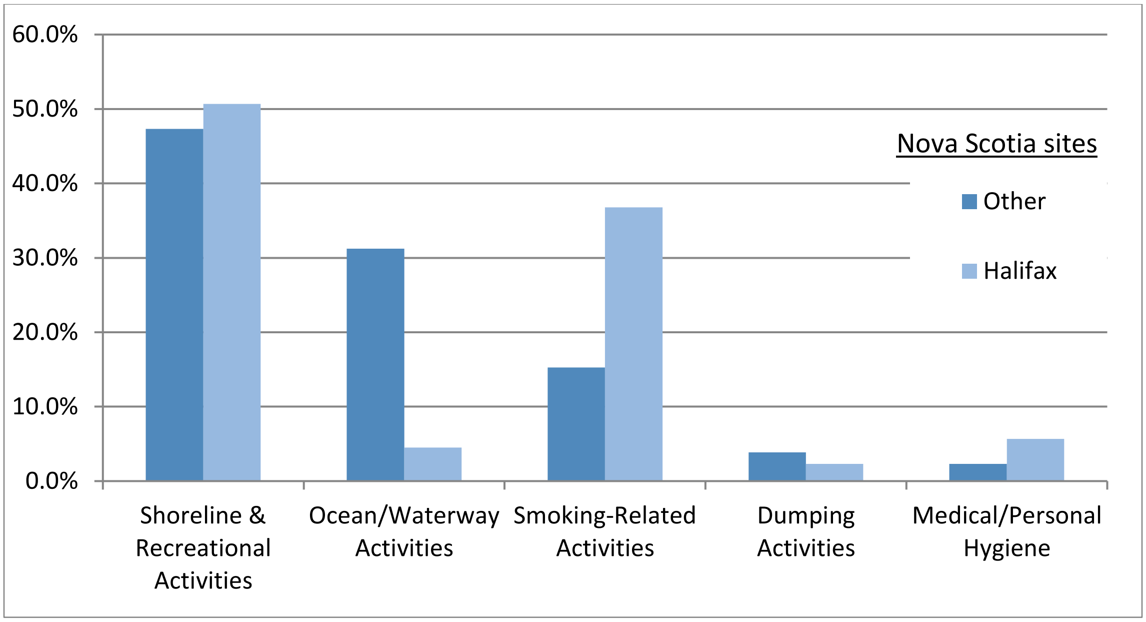

Figure 3. Percentage of the items associated with each litter category from Halifax samples sites compared with other Nova Scotia sites (2008-2012).

The top litter items (shown in Table 2) differed between Halifax and "other" sites. In "other" sites, rope was the most common item collected (18 per cent) whereas cigarettes/cigarette filters were the most common in "Halifax" sites (33 per cent).

Table 2. Top four litter items collected in Halifax and all "other" cleanup sites (2008-2012).

"other"		Halifax	
1. Rope	18%	1. Cigarettes/Cigarette Filters	33%
2. Cigarettes/Cigarette Filters	12%	2. Food Wrappers	18%
3. Caps/Lids	7%	3. Caps/Lids	6%
4. Shotgun Shells	8%	4. Bags (Plastic)	6%

The difference in weight and number of items between Halifax and "other" sites are depicted in tables 3 and 4. As listed in Table 3, "other" areas had approximately 57 per cent higher weight of litter per kilometer cleaned as "Halifax" sites. However, as shown in table 4, there was a 43 per cent higher number of items found in "Halifax" per kilometer cleaned.

Table 3. Shoreline cleanup results (2008 to 2012) demonstrating weight (kg) of litter and distance (km) for Halifax and "Other" survey sites.

	"other"	Halifax
weight (kg)	23,730	8,738
distance (km)	433	252
weight(kg)/distance (km)	55	35

Table 4. Shoreline cleanup results (2008 to 2012) demonstrating number of litter items and distance (km) for Halifax and "other" survey sites.

	"other"	Halifax
number of items	66,408	65,958
distance (km)	327	186
number of items/ distance (km)	203	355

3.4 Discussion

3.4.1 Quantity of litter

The litter data results from year-to-year suggest that there was a lower quantity (both weight and number of items) in the years 2010 and 2011. The fluctuations could be a result of the time of the year that the data was collected, severity of the weather, recording differences, increased number of hours spent cleaning, or timing of the cleanup (e.g. fall versus spring). However, the amount of litter increases in 2012 and remains relatively constant in the remaining years. Grieve (2012) states that the trend in the amount of marine debris is rising on the Scotian Shelf. The report states that more research is required to confirm this as the current literature available is anecdotal and requires current and comparative data. However, this conclusion is supported by the fact that land-based litter studies noted a 20 per cent increase in litter from 2004 to 2008 (Oakley et al., 2008).

A study by Mathalon and Hill (2014) found that microplastic fibers were common in sediments of three beaches in Halifax (HRM). Between 20 and 80 fibers of plastic were found in 10 gram samples of sediment. The amount of microplastic fibers was also measured in the guts from wild and farmed mussels, finding that there was significantly higher microplastic concentrations in farmed mussels compared to wild mussels. As high as 178 microplastic fibers were found in a single wild mussel and more than 300 fibers were found in a farmed mussels. For comparison, Mathalon and Hill (2014) found 500 times higher microplastic concentrations in mussels than microplastics concentrations reported by van Cauwenberghe & Janssen, 2014) in German mussels. In both comparative samples, depuration had not been completed. Depuration is a process where mussels (or other organisms) are placed in a clean water supply such that the organism is able to purge contaminants and impurities.

Additional research on the amount of plastic litter in Nova Scotia's marine environment comes from Bond, Provencher, Daoust & Lucas (2014) who measured plastic pollution quantities using sea birds as an indicator species in Sable Island. The study revealed that 72 per cent of sea birds from Sable Island contain plastic in their stomachs. The ecological quality objectives (EcoQO) established for plastic particles in the stomachs of seabirds is a rate of no more than 10 per cent of the sea bird population containing more than 0.1 gram of plastic in their stomachs (OSPAR, 2008). As such, the levels observed in Sable Island are considered well above the EcoQO levels. The levels were also higher than many other studies that had been completed including in British Columbia (Avery-Gomm, O'Hara, Kleine, Bowes, Wilson & Barry, 2012) and in the Netherlands (van Franeker et al.,2011). However, the proportion fell below what had been found in the English Channel (van Franeker et al., 2011).

3.4.2 Type of litter

The vast majority of litter items common on Nova Scotia shorelines were composed of plastic. This aligns with shoreline audits that have taken place elsewhere (e.g. Goldstein et al., 2013; Leite et al., 2014; Morritt et al., 2014). The overall results from Nova Scotia are similar to international results whereby cigarette butts were the most common. International results also found disposable products such as bottles, straws, wrappers and plastic bag, as common items, which was similar to Nova Scotia results.

Fishing is a common industry in Nova Scotia with over 23 thousand individuals employed in the fishing, hunting and trapping industries in 2016. The lobster fisheries is of significant economic importance in Nova Scotia (Statistics Canada, 2016). Fishing and aquaculture litter showed up as common items in Nova Scotia's litter results. Rope ranked as the third most common item with strapping bands in eighth place. Plastic strapping is a disposable packaging item that secures crates and boxes. In a study completed on Sable Island (Lucas, 1992) more than 20 per cent of litter were attributed to fishing-related activities. This included plastic strapping, rope and nets, which have been shown to do harm to marine mammals. Ten per cent of strapping found in the study was still intact as a single circular strand – with the potential of entangling marine species (Lucas, 1992). For instance, Lucas noted that approximately 100 porbeagle shark (*Lamna nasus*) were reported to have been entangled in plastic strapping, as recorded by the Atlantic Fisheries International Observers Program (unpublished observations, Fisheries & Oceans Canada). Though there are many contributing factors, it is worth noting that the porbeagle shark has been considered an endangered species since 2004 (COSEWIC 2014).

At the time of the Sable Island study (1992), disposal of garbage by ships at sea was very common, with 73 per cent of foreign and domestic offshore fishing vessels reported as regularly dumping garbage at sea. Only one per cent of vessel trips reported returning all garbage ashore (unpublished data, Fisheries & Oceans, Canada). Furthermore, it was common practice by government operated vessels to discard garbage overboard in the late 60s and early 70s (personal communications, Peter Wells, November 4, 2016).

Furthermore, Fisheries and Oceans Small Craft Harbours conducted an informal survey in 2006 and estimated that nearly 600,000 bait containers, a common packaging item used in the fisheries, were discarded at sea during fishing operations annually. Though bait containers were not one of the most common litter items, from 2008 to 2012, 667 bait containers were removed during the Ocean Conservancy's litter cleanups.

The most common litter item collected on Nova Scotia shorelines were cigarettes and cigarette filters. This is very consistent with national and international results (Novotny & Zhao, 1999). This is very concerning because cigarettes are confirmed to be toxic to fish and a hazard to human health (Slaughter et al., 2011). Furthermore, cigarette butts also contain a great deal of plastic.

Glass-products were listed as common litter items in the late 80s-90s but are much less common in current studies demonstrating changes in product packaging (Lucas, 1992). Conversely, one-time-use packaging is much more common reflecting increased production of plastic.

The common types of litter items in Nova Scotia has similarities as well as differences with the remainder of Canada as well as international results. Figure 4 shows the top ten items that volunteers reported finding during the 2015 international litter cleanup, with cigarette butts as most frequent item found. The remaining items (plastic bottles, wrappers, etc) are all common disposable items and are largely composed of plastic. Furthermore, table 5 shows common items collected in Canada for 2015 with many of the same items as the international results.

Figure 4. 2015 international cleanup results (Ocean Conservancy, 2016).

Table 5. Most common litter items collected in Canada in 2015 litter cleanups (Vancouver Aquarium & WWF, 2016b).

2015 Ranking	Item	Number of Items Collected
1	Cigarette Butts	409,417
2	Food Wrappers	93,129
3	Plastic Bottle Caps	50,904
4	Plastic Beverage Bottles	37,769
5	Beverage Cans	27,814
6	Other Plastic & Foam	27,110
7	Straws & Stirrers	27,047
8	Other Plastic Bags	25,047
9	Metal Bottle Caps	22,093
10	Plastic Grocery Bags	20,492
11	Plastic Lids	19,365
12	Paper Cups & Plates	17,819

Items found in Nova Scotia that did not show up as common items in the international and Canada-wide cleanups included fishing related items like rope and strapping bands. This is likely because there is a much higher proportion of fishing and aquaculture activity in Nova Scotia compared to the rest of Canada, as well as some of the other countries that were included in the international survey reported by Ocean Conservancy.

The New Brunswick and PEI results were the only other two provinces in Canada that reported fishing related items, such as rope, net and strapping bands, as common items in 2015 (Vancouver Aquarium, 2016a). This coincides with the fact that both New Brunswick and Prince Edward Island have considerable fishing and aquaculture industries.

3.4.3 Origins of litter

Figure 2 showed a proportion of 19 per cent of the litter as derived from ocean-based activities, whereas the remainder of the categories point to land-based activities (e.g. shoreline and recreational activities) constituting 81 per cent of the litter that was removed. This coincides with the literature that suggests 80 per cent of litter comes from land-based activities (Andrady, 2011; Berman, 1995; GESAMP, 2015; Sheavly, 2005; Zhou et al., 2011; UNEP, 2005).

However, the origins of the litter appears to differ with proximity to Halifax. Within Halifax sites, 95 per cent of litter was from land-based sources such as smoking-related activities and shoreline & recreational activities. Ocean/waterway activities only made up 5 percent of litter found within Halifax sites. Non-Halifax sites had 70 per cent from land-based sources and 30 per cent from ocean/waterway activities. This points to the fact that Halifax, with its high population and enclosed harbor, is more highly influenced by land-based activities than non-Halifax sites whereas non-Halifax sites are most impacted by Ocean/waterway activities.

3.4.4 Proximity to urban center

Litter type is notably different between Halifax and “other” areas. Cigarettes/cigarette filters were proportionally higher in quantity near the Halifax Harbour than in other parts of Nova Scotia demonstrating that cigarettes are discarded more commonly within larger urban centers. Areas outside Halifax contained more fishing related litter such as rope and strapping bands.

There was also a higher number of items per kilometer in the Halifax area as compared to “other” sites likely caused by the fact that cigarette butts were more common and are very light. Furthermore, because fishing equipment such as rope and nets tend to be quite heavy. This likely explains why there was a higher weight of litter found per kilometer in “other” sites.

Although the literature notes that there is typically more litter found on shorelines closer to urban centers (e.g. Leite et al., 2014; Goldstein et al., 2013), the results from Nova Scotia did not entirely support this. There were more items found within Halifax sites and the weight of the litter collected was lower within Halifax sites.

The results found that proximity to Halifax led to higher impacts from land-based activities. This conclusion is supported by Ross et al. (1989) who found that the majority of litter items observed along the Halifax Harbour were attributable to recreational and land-based activities. The majority of litter-type was classified as plastic items (54 per cent), although other plastic materials were also substantial (e.g. styrofoam at 12 per cent). At the time, the authors suggested that shoreline litter could be reduced by over 80 per cent if both sewage treatment and education programs were enacted. It is expected that sewage-related litter would be significantly less at this time since sewage treatment facilities are now in place throughout Halifax. However, sewage items such as tampon applicators are still reported as common on shorelines in the Halifax Harbour. They were the eleventh most common litter item found in Nova Scotia, making up approximately 2.8 per cent of items found from 2008 to 2015.

Table 6 provides a summary of data from Lucas (1992) and Ross, Parker, & Strickland (1991). In both studies, plastic items were the most common; however, fishing related materials were much more common in the Sable Island study. The results from Ross et al. (1991) found much more styrofoam than in Sable Island.

Table 6. Comparison of common shoreline litter items in the Halifax Harbour and Sable Island (Lucas, 1992; Ross et al. 1991)

Halifax Harbour	Sable Island
plastic items (54%)	plastic items (63.8%)
styrofoam (12%)	rope (16.1%)
glass (8.4%)	fishing equipment (12%)
paper and wood (5.2%)	glass (6.2%)

The contrast in litter composition between the findings from Ross et al. (1991) and Lucas (1992) show how litter composition between urban and remote shorelines differ. Since few people reside on Sable Island, litter found along the shoreline is entirely deposited from outside sources such as shipping and fishing related activities as well as materials that have drifted or been blown in (e.g. balloons) from land-based activities elsewhere.

CHAPTER 4: CONVENTIONS, AGREEMENTS, LEGISLATION AND POLICIES

The following section provides an overview of the international, federal and provincial regulatory environment as it pertains to marine litter in Canada as well as provides some analysis on the shortcomings associated with each.

4.1 INTERNATIONAL CONVENTIONS AND AGREEMENTS

According to Lucas and Cotton (2013): "nations should not undertake activities within their territory that harm others (p. 153)". As such, there is a wide variety of international treaties pertaining to environmental issues that act as a bridge between countries and regions to limit the transfer of environmental pollutants across borders. Among the international regulations, there are three legally binding treaties that Canada has ratified that are applicable to marine litter. These are outlined in the following sections as well as in table 7.

UNCLOS - *U.N. Convention on the Law of the Sea*, 10 December 1982, 1833 U.N.T.S. 3, 21 I.L.M. 1261

Referred to as the "Constitution of the Sea", UNCLOS provides a legally-binding framework for activities in the oceans and seas. The Convention, which is administered by the United Nations (UN) office in New York, includes rules for environmental protection and preservation such as duties of states to protect the oceans from all sources of pollution. UNCLOS describes marine pollution as (article 1, section 1(4)):

> The introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.

The federal lead on delivering UNCLOS in Canada is the Ministry of Global Affairs (formerly Foreign Affairs Canada), which oversees international trade and foreign policy in Canada (Government of Canada, 2015). Environment Canada, Fisheries and Oceans Canada, Transport Canada, and Natural Resources Canada are also partners in overseeing UNCLOS in Canada.

MARPOL Annex V – The Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, 1973, 17 February 1978, 94, Stat. 2297, 1340 U.N.T.S. 22484, as amended by Amendments to the Annex of the Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, 1973, July 15, 2011 (entered into force Jan. 1, 2013).

MARPOL Annex V, administered by the International Maritime Organization (IMO) in London, is a legally-binding treaty that outlines requirements for the management of waste on ships and at port reception facilities. The treaty includes restrictions on the type of garbage that is permitted to be disposed overboard, depending on the distance from a shoreline or from a designated "special area" that has been established by the Protocol. Generally, most wastes are not permitted to be discarded at sea except those outlined in regulations 4, 5 and 6 of the annex which includes food waste, animal carcasses, cleaning agents/additives and animal carcasses.

The Protocol applies to all marine vessels; however, has more specific requirements for larger vessels (such as vessels larger than 100 gross tonnes or certified to carry more than 15 persons). Larger vessels must have placards displayed outlining waste disposal requirements as well as garbage management plans that provide an overview of the waste management procedures and roles/responsibilities of the vessel crew. Lastly, regulation 10.3 outlines the requirement for large vessels to maintain a Garbage Record Book outlining the location, amount and type of waste disposed at any given time by the vessel (IMO, 2016).

London Dumping Protocol – *Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, 29 December 1972, 26 U.S.T. 2403, 1046.

The London Dumping Protocol, again administered by IMO in London, prohibits dumping of waste and other matter at sea unless authorized with a permit granted by a contracting party. In Canada, the contracting party is Environment Canada. The convention identifies specific materials as "black-listed" and therefore not authorized for dumping at sea (e.g. radioactive waste). Items under the "grey-list" may be dumped only if a special permit is granted and only under specific conditions and strict controls. Other materials outside the black and grey list require a general permit for dumping at sea (e.g. fish waste).

Washington Protocol – *Global Programme of Action for the Protection of the Marine Environment from Land-based Activities*, 3 November 1995, UNEP (OCA)/LBA/IG.2/7, 5 December 1995.

The Washington Protocol, which is also administered by IMO in London, was established at the United Nations Conference on the Environment and Development, otherwise known as the 'Rio' Conference (UNGA, 1992). Agenda 21 of the conference produced an international framework on key areas of importance for protecting the marine environment from land-based activities. This launched the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA). Every five years, the GPA produces a report to update on the progress of the protocol.

Table 6. Summary of international conventions and protocols pertaining to marine litter.

Convention or Protocol	Administrator	Description	Application
UNCLOS	UN office in New York	Legally-binding framework for activities in oceans/seas	Duties of states to protect oceans from pollution
MARPOL Annex V	IMO office in London	Legally-binding treaty on management of wastes by ships and ports	Restricts the type of garbage permitted and restricted for disposal at sea
London Dumping Protocol	IMO office in London	Prohibits dumping of waste at sea without authority	Identifies materials not authorized for dumping and other materials that require permission
Washington Protocol	IMO office in London	International framework on key areas for protecting the marine environment from land-based activities	GPA produces a progress report every 5 years

4.1.1 International law: shortcomings

As described by Gold et al. (2013), existing international marine pollution regulations lack teeth, have significant exemptions and do not address land-based activities. Gold et al. (2013, p. 8) further describes that: "their insufficient scope with respect to the main sources of plastic pollution, lack of enforceable standards, and insufficient penalties mean that no existing agreement comprehensively addresses the problem of plastic marine litter."

One of the significant shortcomings of existing international law is that it focuses primarily on ocean-based sources of litter which only makes up 20 per cent of marine litter. Though UNCLOS notes that land-based litter sources are of concern, it points to domestic (i.e. national) means for addressing the issue and does not state specific requirements for land-based litter abatement.

Another shortcoming of international litter treaties is that many contain a lack of enforceability. MARPOL Annex V contains significant exemptions including exempting naval ships, incidental loss and accidental loss. There are also jurisdictional limitations whereby if a foreign-flag state violates an international agreement, the coastal state where it took place has very limited means of enforcement and the barriers for being able to enforce it are very burdensome.

Despite approximately 150 contracting states to Annex V, there are still concerns regarding the enforcement of the regulation. This is largely because of the lack of port waste receptacles provided. Some countries have improved ship waste disposal compliance by requiring port's to supply garbage facilities (Øhlenschlæger, Newman & Farmer, 2013).

An additional shortcoming is the fact that enforcement standards, as specified within the international treaties, have significant weaknesses. The commitments within many of the international agreements allow for significant flexibility. UNCLOS uses language such as "shall endeavor" and "best practical means" to reduce marine pollution "in accordance with their capabilities."

The existing marine litter international treaties also result in insufficient enforcement tools. Even when enforced, the regulatory penalties are too insignificant to deter behaviour. Also, in the case of MARPOL Annex V, no penalties are required. Linking waste disposal to a particular vessel is difficult and it is therefore challenging to enforce certain obligations. In some regulations (MARPOL Annex V), vessels are required to track waste disposal; however, it is very difficult to ascertain whether the vessel's tracked disposal record is falsified.

The Washington Protocol was pivotal in culminating information on land-based sources of pollution and recommending mechanisms by which nations could work collectively to address issues. However, because the programme is not a legally binding convention or treaty, it lacks significant influence. For instance, Canada's National Programme of Action (NPA) for the protection of the marine environment from land-based activities, established because of the Washington Protocol, was extinguished with a change in federal leadership in Canada.

4.2 Federal legislation, regulations and policies

The following section provides an overview of existing federal department legislation, policies and publications that pertain to marine litter. A summary is also provided in table 7.

4.2.1 Transport Canada

Vessel Pollution and Dangerous Chemicals Regulations, SOR 2012, 69, under the *Canada Shipping Act*, 2001, SC 2001, c. 26

The Vessel Pollution and Dangerous Chemicals Regulations outlines requirements for a number of pollutants that may be discharged through vessel operations including air emissions, sewage, oil and garbage. Division 5 of the regulations outlines the requirements pertaining to garbage disposal, thereby operationalizing the commitments made in the MARPOL Annex V treaty. As such, many of the same requirements discussed earlier are described in the regulations including the requirement that larger vessels have placards, garbage logs and waste management plans. Furthermore, the regulations outline the garbage items that can be disposed at sea and those items and special areas where disposal is prohibited. Section 5 of the regulations outline that discharge of waste is permitted if caused by “accidental loss” or “damage to a vessel”. Other than what is required from the commitments of MARPOL Annex V, there are not additional regulations that further strengthen the requirements.

4.2.2 Environment Canada

Canadian Environmental Protection Act, 1999, SC 1999, c 33

The objective of the Canadian Environmental Protection Act (CEPA) is to contribute to sustainable development while protecting the environment, human life and health. There are two areas of the Act that speak to marine litter. Firstly, the Act operationalizes Canada’s commitment to the London Convention within sections 122 to 136 by specifying what types of waste require permits for safe disposal at sea. Furthermore, section 120 of the Act outlines the “Protection of the Marine Environment from Land-based Sources of Pollution”. As per section 120, the regulations define marine pollution as:

“the introduction by humans, directly or indirectly, of substances or energy into the sea that results, or is likely to result, in

(a) hazards to human health;

(b) harm to living resources or marine ecosystems;

> **(c)** damage to amenities; or
>
> **(d)** interference with other legitimate uses of the sea. (*pollution des mers*)"

The regulations state that the Minister of the Environment must consult with any affected government departments, including provincial or aboriginal governments, to create guidelines, codes of conduct or issue environmental objectives to prevent and reduce marine pollution from land-based sources. The legislation only permits non-regulatory actions to be conducted through delivery of this section of the act.

As a response to the mandate in section 120 of CEPA, Environment Canada created Canada's NPA for the protection of the marine environment from land-based activities. Though the NPA program is no longer active, publications remain archived on Environment Canada's website (e.g. Government of Canada, 2000). The publications that exist recognize marine litter as a contaminant of "medium concern". The report notes that marine litter comes from a variety of sources, including:

> … poorly managed or illegal waste dumps adjacent to rivers and coastal areas, windblown litter from coastal communities, resin pellets used as industrial feedstocks, and litter that is channelled to the marine and coastal environment through municipal stormwater systems and rivers. Marine litter is also caused by dumping of garbage into the marine and coastal environment by coastal communities, as well as by recreational and commercial vessels (Government of Canada, 2000, p. 113).

The NPA publication also discussed that marine litter was very visible in some parts of Canada and resulted in issues for marine life as well as economic impacts on local tourism industries (Government of Canada, 2000). The publication also noted that the quantity and contamination that marine litter caused to the environment was poorly understood. Furthermore, the report stated: "Although there is widespread aesthetic concern about litter, particularly in coastal parks, the level of biological impact associated with this type of contamination is not well documented" (Government of Canada, 2000, p. 33). This is a very dated conclusion and is no longer considered acceptable given recent research.

Species at Risk Act, SC 2002, c. 29

According to the Species at Risk Act, the Minister of Environment must commission recovery strategies and action plans for addressing protection and recovery of species that are listed as "at risk". There are a number of threatened marine species that may be affected by marine litter. One such species is the Leatherback sea turtle *(Dermochelys coriacea*) which is particularly susceptible to consuming plastic bags that are mistaken as jellyfish, which can result in blocking the gut and causing starvation. A recovery strategy for the Atlantic Leatherback Sea Turtle was written in 2006 and named plastic ingestion and entanglement as one of the impacts that need to be addressed in order to stop or reverse the decline of the species (Atlantic Leatherback Turtle Recovery Team, 2006). To date, there has not yet been an action plan created for Leatherback Sea Turtles, nor has there been any visible action to address plastic in the marine environment that threatens Leatherbacks or any other endangered species.

4.2.3 Fisheries and Oceans Canada

Fisheries Act, RSC 1985, c F-14

The Fisheries Act contains measures for the conservation and protection of fish habitat to sustain freshwater and marine fish species. The last amendment to the Fisheries Act took place April of 2016. As per section 35(1): "No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery."

There are no existing case law examples that could be identified whereby a defendant was accused of a fisheries act violation resulting from the release of garbage or litter into the marine environment. That said, it may be plausible that an instance of litter or garbage release could be attributable to "serious" harm to fish that is part of a commercial, recreational or aboriginal fishery.

Oceans Act, SC 1996, c. 31

Section 29 of the Oceans Act requires the creation Integrated Management Plans through partnership with other agencies. As such, the Eastern Scotian Shelf Integrated Management (ESSIM) Initiative was developed under the auspice of the Ocean's Act. The ESSIM developed a series of "State of the Scotian Shelf" reports outlining the current status of the marine environment. Among the reports, a Marine Waste and Debris report was created which concluded that the trend in the amount of marine debris off Nova Scotia's coastal area is rising.

However, the report stresses that more information is required to confirm this trend as the current literature and statistics available are anecdotal and comparative studies are required to confirm temporal trends (Grieve, 2012). The report also discusses the role of Environment Canada in addressing marine litter, stating that "Environment Canada has a mandated responsibility to deal with waste in the marine environment. However, there are no known federally-led programs which aim to reduce existing waste or prevent new waste accumulation" (p. 18).

Table 7. Summary of Canadian legislation, regulations and policies pertaining to marine litter.

Legislation, regulation and/or policy	Department	Description	Application
Vessel Pollution and Dangerous Chemicals Regulations	Transport Canada	Operationalizes commitments made in MARPOL Annex V	Restrictions regarding garbage disposal at sea and outlines vessel operator requirements
Canadian Environmental Protection Act	Environment Canada	Operationalizes commitment to the London Convention and the Washington Protocol	Specifies types of waste that require permits for safe disposal at sea. Outlines role in preventing and reducing marine pollution from land-based sources
Species at Risk Act	Environment Canada	Recovery strategies/action plans for species that are listed as "at risk"	Some "at risk" species (e.g. Leatherback Turtle) are impacted by marine litter
Fisheries Act	Fisheries and Oceans Canada	Measures for the conservation and protection of fish habitat	Prohibits the release of deleterious substances that impact fish part of the commercial, recreational or Aboriginal fishery
Oceans Act	Fisheries and Oceans Canada	Includes requirement that Integrated Management Plans are created	The "Marine Waste and Debris" report was generated as a component of the ESSIM initiative

4.2.4 Federal law: shortcomings

Several of the aforementioned federal regulations are the result of Canada's commitment to international treaties such as MARPOL Annex V and UNCLOS. The federal government did not go above and beyond what was required from the treaty commitments. As such, many of the drawbacks of the federal legislations and policies mirror the issues of the associated international regulations, including the lack of enforceable standards, the omission of addressing land-based litter, as well as significant exemptions.

Several reports have been produced by federal agencies that discuss the concerns and issues associated with marine litter. The effects on endangered species were described in the Leatherback Turtle Recovery Strategy as was the increasing trend and concern of litter in the Atlantic region within the State of the Ocean Report. The publications produced by the agencies have largely demonstrated a recognition of the problem but very limited action in addressing the issue through further research or policy development.

Furthermore, there is some contradictory information pertaining to which federal department in Canada is responsible for addressing marine litter. Though Environment Canada appears to have a significant role, the communications on their website state that the responsibility in addressing marine litter is shared. However, it is unclear how the roles are delineated and who is the lead in taking action. This is a very common problem among federal departments with marine responsibilities (personal communications, Peter Wells, November 4, 2016). The NPA program appeared to be an avenue for Environment Canada to work with other agencies on addressing land-based pollution; however, the program is no longer active. Furthermore, there appears to be no other efforts made by Environment Canada to reignite or replace the NPA program. This constitutes a serious omission in marine environmental protection for Canadian waters.

Despite the existence of Environment Canada's regulatory mandate to address land-based causes of marine litter, the legislation does not provide the authority to Environment Canada to create binding regulations as it pertains to marine litter. They are only able to create guidance documents and standards which may limit the ability of the agency in fully addressing the issue.

4.3 Provincial regulations and policies

Although there is debate about what constitutes the boundaries between provincial and federal departments, by and large, the marine environment is considered federal jurisdiction. However, since a projected 80 per cent of litter is expected to come from land, it is pertinent that provincial regulations are considered within the context of this report. For the purpose of this report, only Nova Scotia's provincial regulations will be reviewed.

Environment Act, SNS 1994-95, c. 1

In Nova Scotia, the Environment Act outlines very prescriptive requirements on the management of litter. Within section 99, the Minister is obligated to encourage litter prevention or reduction by:

(a) regulating waste-disposal practices at construction sites, at commercial and service outlets and at other places where litter is or may be accumulate;
(b) requiring organizers of public and private events to have available and maintain an adequate number of receptacles for recyclable and compostable materials and litter or waste disposal;
(c) regulating or prohibiting activities that result or may result in the unlawful disposal of litter or waste including the placement of flyers on vehicles, utility poles, structures or other things;
(d) regulating the disposal of waste or litter on real property or on, into or under water or ice;
(e) generally, providing for any matter that will prevent or reduce litter.

Despite these stringent regulations, a report produced by the province found that land-based litter increased by 20 per cent from 2004 to 2008 (Oakley et al., 2008). There has not been a comparative study reproduced on the state of litter in the province since this 2008 report. The province recently consulted on a changes to the solid waste regulations, including changes to litter-related regulations. (Province of Nova Scotia, 2014, p. 11):

> Nova Scotia Environment is focusing its efforts on activities with a potential for higher risk … (and may) rely on municipalities and other enforcement agencies to deal with littering issues … that may pose a lower risk to the environment. This adjustment will allow department Inspectors to focus on more complex and higher-risk environmental issues.

4.3.1 Provincial law: shortcomings

The provincial government plays a significant role in the management of litter that is generated on land. Existing regulations are very prescriptive and provide a great deal of authority for the provincial environment department to enforce regulations pertaining to litter. Nonetheless, the issues of land-based litter appears to have increased over the past number of years, indicating the need for additional resources, efforts or compliance. Despite this, the department has signaled that litter is a low-risk concern as compared to other issues that department inspectors face and are thus are considering relying on municipalities or other means to deal with littering issues.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

The issue of extraordinary quantities of marine plastic debris entering into the marine environment would not be possible without the ever increasing rates of plastic being produced combined with inadequate management of the problem. Most plastic products are consumer one-time use materials which are also the most common litter items found in shoreline assessments. The durability of plastic means that it likely persists in the marine environment for many centuries and therefore is constantly building up in our marine environments.

Scientists note that land-based litter is the most common source of marine debris, including materials from mismanaged landfills and waste facilities, recreational activities and wastewater discharge. It is well documented that organisms mistakenly consume plastics in the marine environment and some literature concludes that the exposure/consumption affects their fitness. There is a growing volume of literature demonstrating that humans are consuming organisms that contain plastic and that this may be a concern for our health and wellbeing; however, much of the research is still uncertain at this time.

When compared with larger pieces of plastics, nanoplastics can more easily accumulate in tissues and also more efficiently absorb persisent pollutants (e.g. PCBs). Financial costs associated with marine litter are given an annual price tag of $13 billion because of the many impacts associated with fisheries, tourism and the cost of cleaning up litter (UNEP, 2014).

Furthermore, the literature describing the quantity of litter in Nova Scotia demonstrates that it has been increasing over time. The amount of microplastic fibers found in Nova Scotia mussels were comparatively higher than mussels found elsewhere. The results from a study examining Sable Island seabirds found higher amounts of microplastics in their gut than is considered a healthy threshold and with quantities higher than observed in comparative studies completed in other parts of the world.

As was found in international and Canadian results, disposable plastic products and cigarette butts were very common litter items. However, Nova Scotia results found more fishing-related waste (e.g. rope and strapping bands) along shorelines. This was more prominent outside of Halifax. There were more items found on Halifax shores as compared to other shorelines in Nova Scotia; however, the weight of waste collected on Halifax shores was lower than that found elsewhere in the province.

Litter in Nova Scotia appears to have a similar origin to that found in other studies, whereby 80 per cent comes from land. However, the major urban center in Nova Scotia (Halifax) appears to be more impacted by land-based activities, whereas shorelines outside of Halifax are more impacted by fishing and other marine related activities.

Though marine litter is a coastal and ocean problem that is largely caused from land-based activities (approximately 80 per cent), international law regarding marine litter concentrates on sea-based sources. Furthermore, international regulations pertaining to ship-based garbage have a number of weaknesses including enforcement standards and allowing significant exemptions in the scope of their influence.

Because of the shortcomings of the international conventions and agreements that Canada is a signatory to, some of the existing laws, regulations and policies in Canada are relatively weak. Additional federal regulations and policies are fairly disjointed and there is a lack of clarity on roles for addressing marine litter by Federal departments which stagnates progress in Canada.

The provincial government (i.e. Nova Scotia) has a distinct role in addressing litter that is land-based. Once litter ends up in the marine environment, it largely falls under the jurisdiction of the federal government. Despite this clear link, there appears to be no federal/provincial partnership in addressing litter, pointing to another serious flaw in coastal and ocean governance in Canada.

Recommendations:

Overall recommendations that should be considered to address the issue of marine litter in Nova Scotia include:

1. As much as possible, efforts should be made to address marine litter derived from land-based sources since the majority of litter comes from the land.
2. Methods for reducing marine litter should be focused on waste reduction since the production of waste coincides with increases in marine litter – reducing single-use packaging and materials should be prioritized.
3. Marine scientists, regulators and the public should ensure that the significant financial costs associated with marine litter are also communicated to decision-makers, especially politicians.

4. Considering that there is a wide variety of sources and issues related to marine litter, the main sources and areas of highest concern should be established and prioritized. In essence, prioritize the most common or damaging types of plastic litter, especially for endangered species such as Leatherback Sea Turtles. For example, outside of Halifax, fisheries related litter is most common and is very harmful. Any work should prioritize addressing this type of litter.

Academic knowledge pertaining to marine plastics is expanding rapidly. The following recommendations pertain to areas that would be particularly beneficial to investigate in the future:

1. More research is needed to understand the effects of microplastics and nanoplastics on humans and organisms at the cellular, physiological and biochemical level.
2. Investigate whether the proximity of Nova Scotia to the US results in a higher deposition of litter that drifts from US land-based activities. This could help determine whether a regulatory treaty between countries is a valuable mechanism for addressing the issue of marine litter.
3. Many reports point to the lack of data and information available on the many aspects of marine litter; as such, monitoring and reporting should become a priority of any new initiative.
4. Given that lobsters are an economically important marine species for Nova Scotia, future academic research regarding impacts to local species could focus on the presence of plastic in lobsters. Plastic ingestion by the American lobster, *Homarus americanus,* does not appear to have been investigated within existing academic literature.

Given the significant gaps in how marine litter is addressed from a regulatory aspect, the following recommendations are suggested:

1. Contribute to the international community by addressing gaps in current international conventions and agreements to create stronger enforcement standards and reduce exemptions
2. Collaborate with Canada's neighbouring states (i.e. USA, France, Denmark) where waters are shared to address regional issues relating to marine litter, finding

common areas of concern that can be addressed collectively. This could be formally established in a regional marine debris management treaty.

3. Establish clear roles and responsibilities of existing federal agencies that describe the lead and partnering agencies in addressing marine debris – this could be established through a memorandum of understanding between departments that have a role in managing marine litter such as Environment Canada, Fisheries and Oceans Canada and Transport Canada. The NPA program, which is no longer active, would be an excellent framework for addressing marine litter issues, as well as other land-based litter issues. As such, it is recommended that this program be re-launched.

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APPENDIX A: Cleanup Data NS 2006 to 2012

										Shoreline & Recreational Activities															Ocean/Waterway Activities														Smoking-Related Activities				Dumping Activities						Medical/Personal Hygiene			
Year	City	Site Name	Latitude	Longitude	Number of People	Weight Collected (KG)	Weight Collected (LB)	Distance Cleaned (KM)	Distance Cleaned (Miles)	Bags (Paper)	Bags (Plastic)	Balloons	Beverage Bottles (plastic) 2 li	Beverage Bottles (glass)	Beverage Cans	Caps/Lids	Clothing/Shoes	Cups, plates, etc	Food Wrappers	Pull Tabs	Six-Pack Holders	Shotgun Shells	Straws/Stirrers	Toys	Bait Containers	Bleach/Cleaner	Buoys/Floats	Crab/Lobster/Fish Traps	Crates	Fishing Line	Fishing Lures/Light Sticks	Fishing Nets	Light Bulbs	Oil/Lube Bottles	Pallets	Plastic Sheeting	Rope	Strapping Bands	Cigarettes/Cigarette Filters	Cigarette Lighters	Cigar Tips	Tobacco Packaging	Appliances	Batteries	Building Materials	Car/Car Parts	55-Gallon Drums	Tires	Condoms	Diapers	Syringes	Tampons
2006	Antigonish	Gasperaux Lake			28	100		1																																												
2006	Barrington	Daniel's Head Beach			26	91		0.3																																												
2006	Bedford	Sandy Lake			48	80		6.4																																												
2006	Canning	Scott's Bay Beach			31	213		1																																												
2006	Chester	Bayswater beach			120	30		0.5																																												
2006	Cole Harbour	Conrad Beach			14	38		5.6																																												
2006	Dartmouth	Albro Lake			22	14		0.15																																												
2006	Dartmouth	Maynard Lake Beach			39	82		3.2																																												
2006	Dartmouth	Morash Park			26	25		0.7																																												
2006	Dartmouth	Morris Lake, Cole Harbour			50	21		6.4																																												
2006	Dartmouth	Penhorn Lake			23	45		2.2																																												
2006	Dartmouth	Sullivan's Pond			7	40		1																																												
2006	Donkin	Schooner Pond			43	136		0.8																																												
2006	Eastern Passage	MacCormick's Beach			40	54		1.6																																												
2006	Falmouth	Akins Marsh, Bog Road			10	45		1.5																																												
2006	Falmouth	Meadow Pond			10	45		1																																												
2006	Glace Bay	Big Glace Bay Beach			60	417		2																																												
2006	Halifax	Herring Cove			5	6		1.5																																												
2006	Halifax	Long Lake			4	23		2																																												
2006	Halifax	Lower Prospect Bay Area			19	27		3.5																																												
2006	Halifax	Northwest Arm			9	44		0.8																																												
2006	Halifax	Point Pleasant Park			9	23		1																																												
2006	Halifax	Silver Sands Beach			40	300		1																																												
2006	Halifax	Southwestern shore of Point Pleasant Park			26	3		1																																												
2006	Halifax	Williams Lake			33	91		4																																												
2006	Inverness	BELLE COTE BEACH			3	13		4																																												
2006	Isaac's Harbour	Isaac's Harbour			2	136		4																																												
2006	Liverpool	Carter's Beach			4	59		2.5																																												
2006	Lower Sackville	First Lake			50	68		0.5																																												
2006	Lower Sackville	Leaside Park, Lower Sackville			16	90		0.5																																												
2006	Lunenburg	Mason's Beach			4	7		0.5																																												
2006	Mabou	Mabou Coalmines Beach			20	87		2																																												
2006	Margaretsville	Fundy Bay shoreline, Margaretsville			12	45		1																																												
2006	Mulgrave	Town of Mulgrave Shoreline, Strait of Canso			14	385		2.4																																												
2006	Musquodoboit Harbour	Martinique Beach			6	2		1.3																																												
2006	New Glasgow	Melmerby Beach			12	10		3.2																																												
2006	Queensland	Cleveland Beach			4	30		0.5																																												
2006	Sydney	South Bar Beach			19	458		2.9																																												
2006	Sydney	Sydney River			1	136		0.8																																												
2006	Thorburn	Melmerby Provincial Park			11	1		2																																												
2006	Truro	Pleasant Valley Brook			2	23		5																																												
2006	Waverley	Powder Mill Lake			6	1		0.4																																												
2006	Yarmouth	Cape Forchu			9	27		2																																												
2007	Antigonish	Gasperaux Lake			10	30		2.00																																												
2007	Arcadia	Pinkney's Point			260	286		0.60																																												
2007	Barrington	South Side Beach			5	5		1.00																																												
2007	Bedford	Sackville river bank			16	20		1.50																																												
2007	Chester	Bayswater beach			90	90		1.00																																												
2007	Cole Harbour	Cole Harbour Brook			20	220		1.00																																												
2007	Cole Harbour	Conrad Beach			21	105		4.00																																												
2007	Cole Harbour	Rainbow Haven Beach Provincial Park			20	27		1.50																																												
2007	Dartmouth	Alderney Landing			10	320		1.00																																												
2007	Dartmouth	McNabs and Lawlor Islands Provincial Park			38	180		0.30																																												
2007	Dartmouth	Morash Park			1	14		0.35																																												
2007	Dartmouth	Morris Lake, Cole Harbour			70	9		2.00																																												
2007	Dartmouth	Penhorn Lake			4	14		0.25																																												
2007	Dartmouth	Soldiers Lake			19	0		0.50																																												
2007	Dartmouth	Stream near Micmac Mall			5	8		3.50																																												
2007	Dartmouth	Sullivan's Pond			17	14		1.50																																												
2007	Donkin	Schooner Pond			50	500		2.00																																												
2007	Eastern Passage	MacCormack's Beach			15	60		0.84																																												
2007	Glace Bay	Big Glace Bay Beach			21	280		0.80																																												
2007	Halifax	Crystal Crescent Beach			68	200		0.50																																												

Year	City	Site Name	Latitude	Longitude	Number of People	Weight Collected (KG)	Weight Collected (LB)	Distance Cleaned (KM)	Distance Cleaned (Miles)
2007	Halifax	Northwest Arm			24	6		1.00	
2007	Halifax	Point Pleasant Park			6	2		0.50	
2007	Halifax	Southwestern shore of Point Pleasant Park			30	2		0.15	
2007	Isaacs Harbour	Isaacs Harbour			5	910		6.50	
2007	Lawrencetown	Lawrencetown Beach			31	21		1.00	
2007	Liverpool	Carter's Beach			5	19		3.20	
2007	Louisbourg	Gabarus Wilderness Area			4	14		1.60	
2007	Louisbourg	Louisbourg National Historic Site			12	220		0.80	
2007	Mahon Bay	Mahone Bay			7	60		1.25	
2007	Margaretsville	Fundy Bay shoreline, Margaretsville			3	91		1.00	
2007	Mulgrave	Town of Mulgrave shoreline, Strait of Canso			29	2448		6.00	
2007	Musquodoboit Harbour	Martinique Beach			10	40		2.00	
2007	Parrsboro	Five Islands Provincial Park			2	42		3.20	
2007	Pictou Landing	Pictou Landing Fishing WHarf			18	57		2.50	
2007	Pleasant Bay	Cape Breton Highlands National Park			13	20		2.00	
2007	Port Hawkesbury	West Bay Shoreline			8	27		1.00	
2007	Port Joli	Seaside Adjunct Kejimkujik National Park			8	60		8.00	
2007	Sherbrooke	Peace Rock Brook			4	75		2.50	
2007	St. Georges Channel	St Georges Channel			6	136		5.20	
2007	Sydney	Kidstone Island			11	32		1.00	
2007	Sydney	South Bar Beach			8	272		1.50	
2007	Upper Stewiacke	Elm Valley on the Stewiacke River Clean Up			5	91		4.00	
2007	West Jeddore	Marsh Point Beach			40	45		1.00	
2007	Whycocomagh	Bras d'Or Lake at Whycocomagh			10	82		2.00	
2007	Yarmouth	Kelley's Cove			22	66		1.50	
2008	Annapolis Royal	Bay of Fundy shoreline, Parker's Cove	44.81524	-65.536778	23		396.8320716		0.62137
2008	Antigonish	Dunn Beach, Antigonish County	45.69658	-61.893196	7		50.70632026		2.1748
2008	Bedford	Sackville river bank	44.73608	-63.655193	17		55.1155655		0.93205
2008	Canning	Scot's Bay Beach	45.29807	-64.399452	90				0.93205
2008	Chester	Bayswater beach	44.51083	-64.048576	90		440.924524		0.62137
2008	Cole Harbour	Rainbow Haven Beach Provincial Park	44.64988	-63.417978	8		2.20462262		1.86411
2008	Crescent Beach	Crescent Beach, Lunenburg County	44.23327	-64.398079	20		110.231131		3.10685
2008	Dartmouth	Morash Park	44.67849	-63.527563	50		11.0231131		0.0466
2008	Dartmouth	Morris Lake, Cole Harbour	44.6607	-63.506244	45		13.22773572		1.86411
2008	Donkin	Schooner Pond	46.18901	-59.860747	40		661.386786		0.62137
2008	Eastern Passage	MacCormack's Beach	44.60684	-63.492082	30		119.0496215		0.52816
2008	Glenholme	little dyke lake	45.37415	-63.52973	8		6.61386786		0.99978
2008	Halifax	Bedford Basin, Princess Lodge	44.69941	-63.660707	16		440.924524		0.62137
2008	Halifax	Crystal Crescent Beach	44.46101	-63.617535	32		213.8483941		0.12427
2008	Halifax	Frog Pond, Purcell\'s Cove Rd., HRM	44.62568	-63.60429525	20		152.1189608		1.55342
2008	Halifax	Herring Cove	44.56989	-63.557239	7		55.1155655		0.62137
2008	Halifax	Long Lake	44.63161	-63.65294	28		77.1617917		0.62137
2008	Halifax	Lower Prospect Bay Area	44.48343	-63.811598	5		44.0924524		0.01553
2008	Halifax	Miller Lake	44.8073	-63.5991776	33		244.7131108		9.74992
2008	Halifax	Northwest Arm	44.62925	-63.595519	36		33.0693393		0.74564
2008	Halifax	Point Pleasant Park	44.6184	-63.566079	112		110.231131		1.42915
2008	Halifax	The little lake in Glenbourn Belchers Marsh	44.66877	-63.67160797	6		308.6471668		0.62137
2008	Halifax	Williams Lake	44.61967	-63.598738	21		551.155655		3.10685
2008	Ile a la Crosse	Englishtown Shoreline	46.29381	-60.54187775	16		330.693393		3.10685
2008	Liverpool	Carter's Beach	43.95093	-64.784317	8		63.93405598		1.80011
2008	Lockeport	Lockeport Crescent Beach	43.69505	-65.11837006	102		2094.391489		0.62137
2008	Lunenburg	Lunenburg waterview	44.37025	-64.309931	14		11.0231131		0.62137
2008	Margaretsville	Fundy Bay shoreline, Margaretsville	45.04999	-65.064468	21		440.924524		1.24274
2008	Mulgrave	Town of Mulgrave shoreline, Strait of Canso	45.60671	-61.387997	10		44.0924524		0.62137
2008	Musquodoboit Harbour	Martinique Beach	44.69166	-63.13242	20		44.0924524		2.48548
2008	New Glasgow	Melmerby Beach	45.62742	-62.646446	10		44.0924524		0.62137
2008	Noel	Noel Shore	45.30519	-63.74645233	5		551.155655		4.97096
2008	North Sydney	Indian Beach	46.21013	-60.24520397	16		110.231131		0.31068
2008	Pondville	Pondville Beach	45.53617	-60.977211	80		57.32018812		1.24274
2008	Pugwash	Pugwash Shoreline	45.85217	-63.664312	10		44.0924524		1.24274
2008	Queensland	Cleveland Beach	44.63068	-64.048426	13		55.1155655		1.24274
2008	Shelburne County	Shag Harbour	43.75007	-65.314236	16				0.24855
2008	Sydney	Sydney River	46.11215	-60.230012	3		220.462262		1.24274
2008	Waverley	Powder Mill Lake	44.77618	-63.608115	3		2.20462262		0.62137

Year	City	Site Name	Bags (Paper)	Bags (Plastic)	Balloons	Beverage Bottles (plastic) 2 li	Beverage Bottles (glass)	Beverage Cans	Caps/Lids	Clothing/Shoes	Cups, plates, etc	Food Wrappers	Pull Tabs	Six-Pack Holders	Shotgun Shells	Straws/Stirrers	Toys	Bait Containers	Bleach/Cleaner	Buoys/Floats	Crab/Lobster/Fish Traps	Crates	Fishing Line	Fishing Lures/Light Sticks	Fishing Nets	Light Bulbs	Oil/Lube Bottles	Pallets	Plastic Sheeting	Rope	Strapping Bands	Cigarettes/Cigarette Filters	Cigarette Lighters	Cigar Tips	Tobacco Packaging	Appliances	Batteries	Building Materials	Car/Car Parts	55-Gallon Drums	Tires	Condoms	Diapers	Syringes	Tampons
2008	Annapolis Royal	Bay of Fundy shoreline, Parker's Cove	0	0	0	20	0	12	15	3	2	3	17	0	0	0	0	0	4	3	0	0	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	Antigonish	Dunn Beach, Antigonish County	0	8	2	17	2	13	29	9	9	10	0	0	17	0	11	7	3	48	2	2	0	0	6	0	0	0	0	16	10	6	0	0	0	1	0	6	0	0	0	0	2	0	3
2008	Bedford	Sackville river bank	23	0	0	9	2	11	38	1	27	107	2	3	0	11	2	0	0	1	0	0	0	0	0	0	1	0	13	0	0	568	0	2	23	0	0	0	0	0	0	0	0	0	0
2008	Canning	Scot's Bay Beach	0	0	42	146	7	36	289	116	141	46	89	5	207	105	18	12	67	6	44	13	33	0	68	5	118	6	187	4215	406	29	28	9	8	0	5	14	9	3	4	2	1	1	117
2008	Chester	Bayswater beach	67	0	4	16	14	10	24	10	12	62	4	0	3	28	9	3	0	1	0	3	21	0	5	0	1	0	24	73	32	145	0	68	3	0	0	3	1	0	0	0	1	0	4
2008	Cole Harbour	Rainbow Haven Beach Provincial Park	0	0	0	6	0	3	20	0	16	43	0	0	22	7	2	0	0	0	0	0	0	0	0	0	0	0	0	4	1	147	1	21	18	0	0	3	0	0	0	0	0	0	1
2008	Crescent Beach	Crescent Beach, Lunenburg County	9	0	12	11	15	29	11	20	17	43	1	0	30	3	7	5	4	2	2	1	5	0	1	0	4	0	3	36	0	8	2	8	4	0	0	9	1	0	0	2	1	0	0
2008	Dartmouth	Morash Park	16	39	1	7	9	5	17	2	15	67	2	0	0	7	6	0	0	0	0	0	0	0	0	1	0	0	0	1	0	181	0	0	11	0	0	0	0	0	0	1	1	0	0
2008	Dartmouth	Morris Lake, Cole Harbour	0	0	8	16	13	24	40	13	17	167	10	0	2	11	3	0	0	1	0	0	4	0	0	0	1	0	4	9	0	851	1	4	20	0	0	0	7	0	1	1	0	0	1
2008	Donkin	Schooner Pond	14	0	0	50	27	58	167	54	43	42	5	3	80	20	7	2	5	17	22	1	17	2	32	0	2	1	48	105	55	13	4	7	5	0	12	0	0	7	10	0	0	1	51
2008	Eastern Passage	MacCormack's Beach	0	0	3	16	3	27	56	16	85	110	8	2	10	39	14	0	2	0	6	0	4	0	5	2	0	5	20	46	13	425	5	14	10	0	0	21	0	0	0	3	2	0	76
2008	Glenholme	little dyke lake	5	0	0	10	25	8	13	8	6	11	4	0	0	3	2	1	0	1	0	0	0	0	1	1	0	0	0	8	1	20	1	0	0	0	0	13	0	1	0	0	5	0	1
2008	Halifax	Bedford Basin, Princess Lodge	2	0	6	14	15	8	34	5	33	44	1	0	0	17	6	2	1	2	0	2	1	6	2	0	9	0	7	14	6	68	6	24	5	0	0	4	1	0	2	2	2	1	58
2008	Halifax	Crystal Crescent Beach	2	0	2	16	24	29	128	12	14	105	14	1	14	57	3	1	1	0	10	0	16	0	5	0	0	0	9	73	16	621	3	24	11	0	2	14	0	0	0	0	0	0	52
2008	Halifax	Frog Pond, Purcell\'s Cove Rd., HRM	0	0	0	44	3	10	28	3	21	188	5	0	0	20	3	0	0	0	0	0	0	0	0	1	1	0	0	4	0	476	0	11	11	0	1	6	3	0	1	0	1	1	2
2008	Halifax	Herring Cove	10	0	0	16	17	27	13	2	100	99	0	1	0	9	3	0	0	0	0	0	11	0	1	0	3	0	0	4	0	145	0	2	25	0	0	3	2	0	0	3	1	0	0
2008	Halifax	Long Lake	18	0	0	16	48	21	42	17	36	45	6	0	3	7	7	0	0	0	0	0	0	2	0	0	0	0	2	0	1	119	1	11	5	0	0	0	2	0	0	0	1	0	0
2008	Halifax	Lower Prospect Bay Area	0	0	0	1	0	4	9	1	0	3	3	0	0	0	0	0	0	0	1	0	3	0	0	3	0	0	1	3	4	25	0	1	3	0	0	5	0	0	0	0	0	0	2
2008	Halifax	Miller Lake	36	0	5	30	38	25	29	11	40	92	3	0	0	51	7	4	0	4	0	1	1	0	1	4	0	1	2	19	9	94	0	23	22	0	1	26	2	0	0	2	1	0	3
2008	Halifax	Northwest Arm	31	0	5	9	26	8	106	4	35	68	4	0	0	26	6	0	0	0	0	0	0	0	1	0	0	1	0	11	1	236	1	18	14	0	0	5	1	0	1	0	0	0	6
2008	Halifax	Point Pleasant Park	63	0	10	38	62	61	195	19	63	332	8	3	5	93	93	6	3	38	1	1	8	2	6	0	5	1	7	71	37	406	5	39	41	0	0	134	6	0	8	5	0	6	307
2008	Halifax	The little lake in Glenbourn Belchers Marsh	5	0	1	21	5	11	14	5	4	13	0	0	0	15	7	0	0	0	0	0	0	0	0	0	0	0	7	0	6	87	7	1	8	0	0	33	0	0	1	0	0	0	0
2008	Halifax	Williams Lake	0	150	2	30	40	60	25	10	20	150	0	3	0	5	5	0	0	0	0	0	3	2	0	0	0	2	0	0	0	300	2	0	10	0	0	3	0	0	2	0	1	0	0
2008	Ile a la Crosse	Englishtown Shoreline	6	0	2	32	16	41	85	6	7	46	0	2	23	12	1	6	10	4	2	0	15	9	27	0	4	0	1	93	84	165	3	12	8	1	3	1	0	0	1	0	0	0	1
2008	Liverpool	Carter's Beach	5	0	0	2	17	11	23	10	3	37	9	2	7	4	1	6	3	0	0	0	8	0	1	0	2	0	0	15	17	128	2	7	11	0	0	12	0	0	1	0	4	0	9
2008	Lockeport	Lockeport Crescent Beach	0	0	0	1	1	2	11	7	0	0	0	0	9	0	0	2	8	2	21	1	0	0	0	0	4	0	0	8	31	5	8	0	0	0	0	0	0	0	0	0	0	0	0
2008	Lunenburg	Lunenburg waterview	1	0	0	7	35	7	18	6	15	23	0	0	0	9	0	0	3	1	0	0	0	0	1	1	1	0	0	23	2	4	1	3	1	0	0	2	0	0	0	0	0	0	0
2008	Margaretsville	Fundy Bay shoreline, Margaretsville	6	0	16	21	13	15	77	7	14	34	5	0	26	10	0	14	6	1	4	0	1	0	22	5	3	0	0	900	200	66	0	20	0	1	0	0	0	0	0	0	0	1	4
2008	Mulgrave	Town of Mulgrave shoreline, Strait of Canso	10	63	11	16	44	6	125	8	32	52	12	1	2	20	2	0	4	2	0	0	0	0	0	3	2	3	1	18	8	42	0	0	9	2	0	3	4	0	0	0	0	0	5
2008	Musquodoboit Harbour	Martinique Beach	0	0	9	8	8	5	31	7	12	81	10	0	23	3	13	4	0	2	14	0	1	2	2	0	0	0	5	23	14	124	0	3	0	0	0	7	0	0	0	0	3	0	6
2008	New Glasgow	Melmerby Beach	0	0	0	20	5	6	50	1	9	10	0	1	0	25	5	0	0	1	1	0	0	0	0	0	0	0	0	9	16	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2008	Noel	Noel Shore	0	18	3	67	32	63	36	6	0	6	0	0	2	0	0	6	10	5	0	0	0	0	0	2	4	0	22	28	4	4	1	0	0	0	1	0	1000	0	2	0	0	0	0
2008	North Sydney	Indian Beach	0	0	0	4	0	7	46	1	35	51	11	0	1	79	1	0	1	3	3	0	0	0	2	0	1	0	0	23	16	169	5	6	0	0	0	0	0	0	0	2	1	2	20
2008	Pondville	Pondville Beach	5	0	6	2	22	9	32	4	19	36	1	0	9	18	9	1	0	2	4	0	6	4	7	0	0	0	47	48	71	98	0	3	1	0	0	4	0	0	0	0	0	0	0
2008	Pugwash	Pugwash Shoreline	0	0	0	10	30	9	2	2	19	12	4	0	2	5	4	0	0	0	0	0	1	1	2	0	0	0	4	5	4	110	0	4	1	0	0	0	0	1	1	0	3	0	0
2008	Queensland	Cleveland Beach	1	42	1	13	2	13	50	6	3	64	5	1	8	12	10	0	0	0	0	0	9	0	0	0	0	0	3	50	60	137	2	4	4	0	0	11	0	0	0	0	0	1	7
2008	Shelburne County	Shag Harbour	3	0	0	8	3	15	5	6	2	12	0	0	53	0	0	4	6	2	5	1	0	3	2	0	12	2	24	83	32	1	1	0	4	0	0	2	3	0	1	0	2	0	3
2008	Sydney	Sydney River	8	0	0	9	11	8	12	2	17	27	0	3	3	7	4	0	3	1	0	0	2	0	0	3	5	0	0	4	3	31	4	4	6	0	3	10	2	0	0	3	2	0	4
2008	Waverley	Powder Mill Lake	0	0	0	2	4	1	7	1	7	6	3	1	0	7	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	92	0	8	1	0	0	0	0	0	0	0	0	0	0

Year	City	Site Name	Latitude	Longitude	Number of People	Weight Collected (KG)	Weight Collected (LB)	Distance Cleaned (KM)	Distance Cleaned (Miles)	Bags (Paper)	Bags (Plastic)	Balloons	Beverage Bottles (plastic) 2 li	Beverage Bottles (glass)	Beverage Cans	Caps/Lids	Clothing/Shoes	Cups, plates, etc	Food Wrappers	Pull Tabs	Six-Pack Holders	Shotgun Shells	Straws/Stirrers	Toys	Bait Containers	Bleach/Cleaner	Buoys/Floats	Crab/Lobster/Fish Traps	Crates	Fishing Line	Fishing Lures/Light Sticks	Fishing Nets	Light Bulbs	Oil/Lube Bottles	Pallets	Plastic Sheeting	Rope	Strapping Bands	Cigarettes/Cigarette Filters	Cigarette Lighters	Cigar Tips	Tobacco Packaging	Appliances	Batteries	Building Materials	Car/Car Parts	55-Gallon Drums	Tires	Condoms	Diapers	Syringes	Tampons
2008	West Mabou	West Mabou Beach	46.07037	-61.50764465	35		90.38952742		0.4971	1	0	13	37	17	12	62	7	23	32	2	2	9	22	20	18	5	28	5	1	5	0	42	0	2	0	9	209	7	7	3	2	2	0	0	5	3	0	1	1	0	1	3
2008	Whycocomagh	Bras d'Or Lake at Whycocomagh	45.96821	-61.125698	9		308.6471668		1.55342	6	0	2	27	8	12	16	3	16	0	75	4	0	19	8	0	2	1	0	0	2	5	0	1	0	1	0	2	0	70	1	7	14	1	0	50	0	0	1	0	0	0	0
2008	Yarmouth	Kelley\'s Cove	43.78745	-66.13323211	8		180.7790548		1.24274	1	0	2	9	3	6	38	7	11	26	1	0	8	1	2	35	0	5	4	0	2	1	1	0	3	0	35	178	100	2	0	0	2	0	0	2	10	0	0	0	0	0	2
2009	Antigonish	Mahoneys Beach	45.70282261	-61.90349579	10		33.06878307		1.24300808	4	5	1	2	16	9	6	4	6	18	10	0	0	6	1	4	0	0	0	0	0	0	1	2	0	0	0	1	0	10	0	20	3	0	3	1	2	0	0	1	0	0	0
2009	Arichat	Babins Cove Beach	45.51146	-61.010342	4		143.29806		0.62150404	0	180	0	13	1	2	21	8	24	156	2	1	4	1	0	3	2	1	1	0	0	0	9	0	1	0	0	10	82	0	0	0	2	0	1	1	3	0	1	3	0	0	0
2009	Barrington	Hawk Beach	43.41627075	-65.61292648	150		440.9171076		1.24300808																																											
2009	Bedford	DeWolfe Park on Bedford Basin	44.723479	-63.668003	5		22.04585538		0.31075202	24	35	0	15	10	25	30	4	16	5	20	2	0	25	10	0	0	0	0	0	0	0	0	0	0	0	0	2	3	65	3	16	25	0	0	0	0	0	0	3	0	0	0
2009	Bedford	Sackville river bank	44.73608	-63.655193	26		121.2522046		0.46612803	92	60	1	26	35	46	59	7	93	70	7	1	0	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	132	0	28	15	1	0	1	1	0	2	4	0	0	0
2009	Boudreauville	Cape Auget Eco trail	45.47229015	-60.99866867	3		119.047619		0.77688005	2	74	0	31	0	34	21	53	56	10	1	0	15	0	0	19	0	2	4	0	1	0	6	0	3	0	0	31	14	1	1	0	0	0	0	22	0	0	0	0	0	0	0
2009	Bridgewater	La Havre River (Bridgewater)	44.378288	-64.518156	17		220.4585538		0.62150404	8	46	12	27	28	36	26	1	41	38	14	4	0	34	4	0	0	4	0	0	3	0	0	2	6	0	0	8	2	227	11	8	47	0	1	0	1	0	0	0	0	0	0
2009	Canning	Scot's Bay Beach	45.298075	-64.399452	13		1102.292769		0.62150404	2	32	17	14	7	12	44	14	13	15	2	0	37	6	0	0	8	2	0	5	0	1	1	4	6	0	5	100	41	7	12	7	0	0	0	0	0	0	0	0	0	0	22
2009	Dartmouth	Morash Park	44.678495	-63.527563	72		121.2522046		0.62150404																																											
2009	Dartmouth	Morris Lake, Cole Harbour	44.660709	-63.506244	53		44.09171076		1.24300808	27	51	2	25	34	19	55	5	18	115	15	6	0	24	9	2	0	0	0	0	0	0	0	0	0	0	3	3	3	637	2	267	18	0	1	3	0	0	0	6	0	0	1
2009	Dartmouth	Soldiers Lake	44.830187	-63.570843	26		39.68253968		0.093225606	0	3	0	22	2	13	21	0	0	24	0	2	1	0	0	0	0	3	0	0	1	0	0	0	0	0	0	2	0	43	4	0	7	0	0	0	0	0	0	0	0	0	0
2009	Dartmouth	Tufts Cove	44.68186684	-63.6002183	9		209.4356261		0.062150404	14	115	0	27	7	6	50	1	12	145	0	3	0	111	1	0	1	3	0	0	0	0	2	2	4	0	12	30	1	100	8	31	11	0	10	2	0	0	2	17	0	2	325
2009	Eastern Passage	MacCormack's Beach	44.606846	-63.492082	8		165.3439153		0.62150404	5	38	3	30	4	12	20	14	50	70	9	4	5	22	2	0	2	4	3	0	2	1	8	1	3	0	2	50	8	85	1	4	8	0	0	10	2	0	1	0	0	0	75
2009	Glen Haven	Micou's Island	44.633085	-63.941331	17		141.0934744		0.62150404	2	24	0	8	14	2	5	3	1	12	1	1	0	0	4	0	0	2	0	0	1	0	2	0	0	0	1	13	3	0	2	0	1	0	4	0	0	0	0	2	0	1	0
2009	Halifax	Crystal Crescent Beach	44.461016	-63.617535	20		110.2292769		0.62150404	0	0	3	19	16	61	61	24	14	117	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	Halifax	Frog Pond, Purcell\'s Cove Rd., HRM	44.62568668	-63.60429525	23		22.04585538		0.31075202	18	46	0	22	14	9	26	2	10	49	14	2	1	11	5	6	0	0	0	0	0	0	0	1	0	0	0	2	0	558	2	4	4	0	1	0	0	0	0	5	1	0	0
2009	Halifax	Herring Cove	44.569895	-63.557239	6		114.638448		0.62150404	21	26	3	11	8	7	37	2	59	42	0	0	0	18	0	0	1	1	1	0	0	0	0	0	1	0	0	11	0	81	0	0	8	1	0	4	0	0	0	3	0	0	0
2009	Halifax	Horseshoe Island	44.640048	-63.614101	32		39.68253968		0.62150404	8	71	2	3	14	5	55	2	22	103	9	1	0	40	0	0	0	0	0	0	0	0	0	0	0	0	3	21	3	541	1	19	15	0	3	8	1	0	0	7	0	0	42
2009	Halifax	Long Lake	44.631619	-63.65294	22		85.97883598		4.350528278	29	97	0	21	21	37	46	31	40	107	0	1	0	11	20	0	2	2	0	0	1	0	0	0	1	0	0	4	1	375	3	0	4	0	0	2	0	0	0	0	0	0	3
2009	Halifax	Northwest Arm	44.629253	-63.595519	14		11.02292769		0.062150404	0	5	0	20	3	2	0	0	4	10	15	2	0	20	3	0	1	0	0	0	0	0	0	0	0	0	0	3	1	100	2	20	1	0	0	0	0	0	0	0	0	0	50
2009	Halifax	Point Pleasant Park	44.618409	-63.566079	150		231.4814815		1.429459291	42	164	11	22	52	22	200	14	120	265	15	2	2	102	9	2	0	3	2	1	5	1	3	2	0	1	14	76	17	706	7	31	22	0	2	99	12	0	6	1	0	2	288
2009	Halifax	Seaview Memorial Park	44.67452781	-63.61867189	8		286.5961199		0.497203232	12	149	2	12	37	10	65	11	98	173	7	1	0	68	9	3	0	0	1	0	2	0	0	0	0	0	10	17	4	126	4	54	39	0	0	35	8	0	1	3	1	3	40
2009	Halifax	The little lake in Glenbourn Belchers Marsh	44.66877496	-63.67160797	12		220.4585538		0.31075202	5	286	5	120	22	47	127	8	49	394	0	0	0	107	9	0	0	0	0	0	0	0	0	0	2	0	15	0	60	75	0	0	64	0	0	25	0	0	0	2	2	0	0
2009	Halifax	Williams Lake	44.619677	-63.598738	20		881.8342152		1.864512119	10	50	0	50	5	50	20	5	20	100	1	1	0	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	200	1	0	6	1	0	4	1	0	0	0	0	0	1
2009	Hammonds Plains	Halfway Lake Neighbourhood Beach	44.74637129	-63.78242612	4		24.25044092		0.249844624	3	25	0	15	7	20	9	5	15	71	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	32	0	0	1	0	0	0	0	0	1	1	3	0	3
2009	Hubbards	Cleveland Beach Park	44.649482	-63.99930953	3		8.818342152		0.62150404	2	3	0	9	1	0	5	2	2	16	0	0	3	3	6	0	0	0	0	0	0	0	0	0	0	0	0	8	6	9	0	0	0	0	0	1	0	0	0	0	0	0	0
2009	Lawrencetown	Lawrencetown Beach	44.642276	-63.33429336	9		198.4126984		1.24300808	18	120	1	29	29	51	42	30	37	74	2	0	16	10	4	1	2	0	1	0	0	0	2	0	0	0	8	30	2	80	2	0	4	0	0	10	4	0	0	0	1	0	25
2009	Liverpool	Carter's Beach	43.909196	-64.823434	11		44.09171076		2.050963331	2	19	2	16	7	4	43	7	12	161	11	2	23	8	2	4	0	2	1	0	3	0	0	2	7	0	1	85	49	57	3	7	14	0	2	3	2	0	1	1	4	0	3
2009	Liverpool	Eagle Head Beach	44.06591101	-64.6133852	12		1199.294533		1.988812927	1	55	5	29	11	11	26	32	17	47	8	1	31	7	5	26	11	11	51	2	6	1	29	0	10	0	53	183	34	1	2	4	1	0	0	12	4	3	6	0	0	0	9
2009	Lower Sackville	First Lake	44.770381	-63.659506	40		440.9171076		0.31075202	87	232	0	35	58	41	98	3	284	2891	17	0	0	143	10	0	0	0	0	0	0	0	0	0	0	0	34	3	2	268	7	6	0	0	2	1	0	0	0	0	0	0	0
2009	Lower Sackville	Second Lake at the end of Metropolitan Ave	44.78482015	-63.66688728	35		19.84126984		0.93225606	11	31	3	11	34	2	14	3	11	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	2	3	0	1	0	1	0	0	1	0	0	0
2009	Lunenburg	Lunenburg waterview	44.370251	-64.309931	9		242.5044092		0.93225606	0	15	0	5	2	0	6	0	1	4	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	0	1	7	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2009	Mahon Bay	Mahone Bay	44.503974	-64.116898	8		3670.634921		0.994406464	0	0	0	3	0	7	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	1	0	0	0	0	0
2009	Mulgrave	Town of Mulgrave shoreline, Strait of Canso	45.606712	-61.387997	12		661.3756614		0.62150404	10	37	3	10	6	10	71	10	9	89	7	3	3	14	1	0	5	2	0	0	2	0	2	0	2	0	3	13	11	338	3	55	30	2	4	2	3	0	1	0	1	0	6
2009	Musquodoboit Harbour	Martinique Beach	44.691661	-63.13242	3		44.09171076		0.62150404	0	7	5	1	2	2	18	2	3	28	1	0	24	7	6	1	0	0	3	0	0	3	2	0	0	0	0	42	16	78	2	3	2	0	0	6	3	0	0	0	0	0	4
2009	North Sydney	Christie's Beach	46.23441847	-60.30464172	9		44.09171076		0.186451212																																											
2009	North Sydney	Indian Beach	46.21013081	-60.24520397	6		39.68253968		0.62150404	8	6	0	2	1	4	40	10	34	39	0	0	0	52	3	0	0	0	2	0	0	0	0	0	1	0	1	4	3	197	1	3	8	0	1	4	6	0	0	1	0	0	12
2009	Pondville	Pondville Beach	45.53617475	-60.977211	2		50.70546737		0.745804848	0	15	0	2	11	9	5	4	9	21	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	2	11	54	0	0	5	0	0	0	2	0	1	6	3	0	0
2009	Sydney	Shore Road, Whitney Pier	46.1688944	-60.19546509	16		573.1922399		0.497203232	20	116	0	30	35	16	31	7	49	28	1	0	0	5	8	1	2	3	0	0	0	0	2	2	3	0	8	9	10	0	0	0	2	2	0	5	9	0	2	8	1	0	16
2009	Sydney	South Bar Beach	46.210873	-60.201988	49		575.3968254		0.31075202	7	192	4	8	7	9	126	20	44	52	10	1	18	26	18	5	1	22	25	33	1	0	5	7	5	2	23	94	34	13	8	2	8	1	0	29	13	0	1	34	2	2	159
2009	Sydney	Sydney River	46.112159	-60.230012	7		240.2998236		0.497203232	10	127	0	30	11	21	109	8	127	292	4	2	0	67	14	0	3	1	0	0	0	0	0	0	9	0	4	7	0	149	8	14	51	2	0	16	2	0	1	14	0	1	33
2009	Waverley	Powder Mill Lake	44.776184	-63.608115	3		6.613756614		0.093225606																																											
2009	West Jeddore	Sandy Point	44.71956956	-63.00740719	5		13.22751323		1.24300808																																											
2009	West Mabou	West Mabou Beach	46.070372	-61.50764465	55		220.4585538		1.864512119																																											
2009	Whycocomagh	Bras d'Or Lake at Whycocomagh	45.968214	-61.125698	13		13.22751323		0.094468614																																											
2010	Bridgetown	Hampton Beach	44.90619516	-65.35148621	1	30		1		0	3	11	5	0	5	55	2	4	97	34	1	14	14	1	54	0	1	25	0	0	0	0	0	3	0	0	168	34	2	0	3	0	0	0	0	9	1	0	1	0	0	5
2010	Canning	Scot's Bay Beach	45.298075	-64.399452	10	175		2		0	44	18	22	16	19	100	14	41	100	0	9	57	34	0	12	7	3	0	0	17	4	2	7	30	0	2	200	64	47	1	28	12	0	6	15	0	0	0	0	0	0	37
2010	Chester	Bayswater Beach	44.51083	-64.048576	85	40		1		10	119	6	9	12	10	91	10	41	74	4	0	3	21	22	0	0	2	8	0	4	0	7	0	0	0	0	14	26	222	5	7	12	0	0	0	2	0	0	1	2	0	17
2010	Chester	Graves Island Provincial Park	44.55992787	-64.20933723	7	30		5		0	12	0	7	2	9	13	7	4	7	0	0	1	4	0	0	0	1	0	0	0	0	0	0	2	0	0	20	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	Clark's Harbour	South Side Beach	43.43709061	-65.59301376	110	1		1																																												
2010	Cole Harbour	Conrad Beach	44.644567	-63.375106	20	18		2		5	41	6	14	6	17	31	12	21	52	1	1	14	13	12	3	0	0	1	0	3	0	3	1	0	4	0	21	6	214	0	10	17	0	0	0	2	1	0	1	0	0	13
2010	Dartmouth	Alderney Landing	44.664112	-63.57028484	5	12		2		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0
2010	Dartmouth	Morris Lake, Cole Harbour	44.660709	-63.506244	60	30		3.5		24	73	0	17	21	39	37	10	26	120	7	0	0	41	5	1	1	0	0	0	6	1	0	0	1	0	2	5	0	740	2	20	32	0	0	17	4	0	0	3	0	0	7
2010	Dartmouth	Russell Lake	44.66947693	-63.52869987	7	23		0.05		30	94	0	11	7	11	52	1	123	172	5	0	0	27	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	488	0	0	36	0	0	0	0	0	0	0	0	0	0
2010	Glace Bay	Big Glace Bay Beach	46.189338	-59.88908	12	250		20		10	16	0	9	2	5	36	6	3	14	0	8	0	20	13	0	2	12	10	14	12	0	3	0	6	3	3	18	40	24	5	8	17	1	0	0	3	0	3	15	2	0	59
2010	Greenwood	Morden Beach	45.06952	-65.012283	30			1																																												
2010	Halifax	Crystal Crescent Beach	44.461016	-63.617535	11	80		3		7	28	2	8	7	11	90	12	12	96	2	0	3	32	3	3	0	1	0	0	0	0	0	0	0	0	0	38	4	845	7	1	27	0	0	3	0	0	0	1	3	0	10
2010	Halifax	Frog Pond, Purcell\'s Cove Rd., HRM	44.62568668	-63.60429525	10	5		2.5		7	44	1	7	4	9	7	3	4	88	9	0	0	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	260	0	1	8	0	1	0	0	0	0	0	1	0	0
2010	Halifax	Georges Island	44.64129986	-63.55994225	30	300		1		0	3	0	20	2	15	10	4	0	3	0	0	0	1	2	0	2	0	0	1	0	0	0	0	0	0	0	20	0	0	5	0	0	0	0	0	1	0	4	0	1	0	18
2010	Halifax	Horseshoe Island	44.640048	-63.614101	32	25		1		9	101	9	4	21	11	36	3	32	104	3	0	1	45	8	0	2	0	0	0	0	0	0	1	0	0	1	6	0	267	2	11	11	0	0	0	2	0	0	3	0	0	39
2010	Halifax	Seaview Memorial Park	44.67452781	-63.61867189	10	50		1		31	80	6	7	11	23	64	17	80	102	6	0	0	55	8	2	2	1	0	2	2	0	0	0	0	0	0	9	0	148	6	54	20	0	0	0	2	0	0	13	2	0	47
2010	Halifax	Williams Lake	44.619677	-63.598738	5	40		2																																												
2010	Hubbards	Cleveland Beach Park	44.649482	-63.99930953	43	1		1		76	109	6	18	21	12	20	7	7	31	1	0	1	8	3	3	0	1	1	0	1	0	4	0	0	0	1	18	9	148	5	31	2	0	3	13	1	0	0	0	1	0	2

Year	City	Site Name	Latitude	Longitude	Number of People	Weight Collected (KG)	Weight Collected (LB)	Distance Cleaned (KM)	Distance Cleaned (Miles)	Bags (Paper)	Bags (Plastic)	Balloons	Beverage Bottles (plastic) 2 li	Beverage Bottles (glass)	Beverage Cans	Caps/Lids	Clothing/Shoes	Cups, plates, etc	Food Wrappers	Pull Tabs	Six-Pack Holders	Shotgun Shells	Straws/Stirrers	Toys	Bait Containers	Bleach/Cleaner	Buoys/Floats	Crab/Lobster/Fish Traps	Crates	Fishing Line	Fishing Lures/Light Sticks	Fishing Nets	Light Bulbs	Oil/Lube Bottles	Pallets	Plastic Sheeting	Rope	Strapping Bands	Cigarettes/Cigarette Filters	Cigarette Lighters	Cigar Tips	Tobacco Packaging	Appliances	Batteries	Building Materials	Car/Car Parts	55-Gallon Drums	Tires	Condoms	Diapers	Syringes	Tampons
2010	Ile a la Crosse	Englishtown Shoreline	46.29381556	-60.54187775	6	75		7		4	15	7	15	4	22	47	4	12	15	10	8	36	8	3	20	2	4	3	1	14	5	2	2	4	0	1	16	24	42	3	7	13	1	1	6	3	0	1	0	0	0	21
2010	Kentville	Fundy Shore Black Rock Beach	45.152674	-64.81109619	20	90		0.5		0	25	3	23	17	2	168	5	23	32	1	1	29	5	2	2	4	7	19	0	1	1	2	0	10	0	10	200	38	1	6	1	2	0	0	11	2	0	0	0	0	0	22
2010	Lawrencetown	Lawrencetown Beach	44.642276	-63.33429336	20	40		1		6	29	3	18	13	102	52	39	32	82	7	0	9	11	6	3	0	4	2	3	2	0	0	0	0	0	3	4	2	696	2	3	6	0	0	6	2	0	0	3	2	0	2
2010	Liverpool	Carter's Beach	43.909196	-64.823434	5	25		3		11	18	0	19	13	10	22	3	17	31	4	3	3	14	3	2	1	3	2	0	0	0	0	1	4	0	0	15	11	57	2	7	9	1	3	5	0	0	0	2	12	0	5
2010	Liverpool	Eagle Head Beach	44.06591101	-64.6133852	22	300		2		9	59	3	21	8	11	12	13	9	32	0	1	11	2	3	11	0	2	5	0	7	1	15	0	1	1	19	91	24	11	0	3	0	0	0	13	1	0	0	0	1	0	0
2010	Lockeport	Lockeport Crescent Beach	43.69505912	-65.11837006	117	494		2		12	50	3	9	9	6	38	6	19	65	18	0	70	9	7	2	0	0	18	0	2	2	1	0	1	0	9	185	2	19	0	4	2	0	0	44	14	1	1	2	1	0	1
2010	Margaretsville	Margaretsville Beach	45.0499998	-65.064468	54	130		1.25		0	4	1	6	0	0	25	3	10	0	0	0	0	13	0	12	8	2	0	2	0	0	2	0	0	0	0	84	18	0	3	0	4	0	0	0	0	0	3	0	0	0	2
2010	Pictou	Waterside Beach	45.76210419	-62.77939796	20	5		1		0	2	0	0	0	4	2	2	2	12	0	0	0	2	1	10	2	2	0	0	0	0	1	0	1	0	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	Pictou Landing	Pictou Landing Fishing Wharf	45.674882	-62.6833954	15	60		5		0	3	0	3	7	12	7	1	0	3	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
2010	Port Maitland	Port Maitland Beach Provincial Park	43.989465	-66.152973	170			1																																												
2010	Pugwash	Pugwash Shoreline	45.852179	-63.664312	33	100		1		8	36	4	17	3	20	17	8	12	9	1	0	3	14	15	0	2	0	1	0	0	0	0	2	0	0	14	6	2	24	1	4	0	1	0	3	2	0	0	1	3	0	0
2010	Sydney	Dominion Beach	46.2154762	-60.03195763	56	45		1.5		0	14	1	11	2	0	24	2	5	5	0	2	0	13	1	0	0	1	3	0	1	0	1	0	0	0	0	5	7	0	3	0	0	0	0	0	1	0	3	0	0	0	1
2010	Waverley	Powder Mill Lake	44.776184	-63.608115	2	6		0.3		17	8	0	0	12	12	25	4	14	23	8	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	738	0	11	4	0	0	0	0	0	0	0	0	0	0
2010	West Jeddore	Sandy Point	44.71956956	-63.00740719	14	5		2		0	3	0	12	12	22	0	0	18	0	0	3	6	0	0	4	0	2	1	1	7	0	1	0	3	1	1	3	23	0	0	0	0	0	0	0	0	0	1	0	0	0	0
2010	West Mabou	West Mabou Beach	46.070372	-61.50764465	27	35		3																																												
2010	Whycocomagh	Malagawatch	45.83262678	-60.99609375	15	40		1.6		0	1	0	12	0	4	2	0	0	3	0	0	0	7	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
2010	Halifax	Point Pleasant Park	44.618409	-63.566079	144	74		1		32	86	4	23	48	30	146	10	26	149	20	0	1	60	11	2	0	9	0	0	7	1	2	0	0	0	5	51	4	255	5	38	8	1	1	81	0	0	4	3	0	1	125
2011	Albert Bridge	Mira Beach	46.033321	-59.96930122	11	13		2.4		20	17	2	20	20	30	60	12	17	51	26	4	0	21	3	0	1	1	0	0	0	0	0	0	0	0	0	6	1	23	0	0	0	0	1	2	1	0	0	2	5	0	1
2011	Antigonish	Chisholm Park	45.62166166	-61.99417591	75	150		2																																												
2011	Bedford	Bedford Bay behind Clearwater Seafoods	44.70709622	-63.66375446	14	200		1		0	5	0	0	20	0	0	2	0	30	0	0	0	0	2	5	0	2	0	0	5	0	0	0	3	0	0	5	5	30	1	0	0	0	0	0	0	0	1	0	0	2	20
2011	Bedford	DeWolfe Park on Bedford Basin	44.723479	-63.668003	19	45		16.09		4	7	1	7	1	3	4	0	0	3	0	0	0	2	0	3	2	2	0	1	2	0	0	0	0	0	1	3	0	200	0	0	2	0	0	0	0	0	0	0	0	0	0
2011	Berwick	Turner Brook	45.15117433	-64.81701851	21	60		3		1	10	6	29	7	14	34	1	12	10	2	0	1	4	3	2	11	4	2	4	1	0	1	8	14	0	0	83	18	1	1	0	0	0	0	3	1	0	0	0	0	0	2
2011	Canso	Canso Shoreline	45.33775774	-60.9945488	80	200		5		0	5	0	4	3	7	5	0	7	10	0	3	0	0	0	3	0	13	0	1	1	0	2	0	2	0	11	22	53	127	2	0	17	1	0	6	1	0	1	0	0	0	0
2011	Chester	Bayswater beach	44.51083	-64.048576	85	80		0.5		20	25	14	15	12	14	14	8	5	56	12	0	6	27	15	12	0	4	4	0	12	3	3	0	2	0	0	20	50	200	3	28	12	0	0	14	2	0	0	2	5	0	15
2011	Dartmouth	Alderney Landing	44.664112	-63.57028484	23	53		1		39	106	0	40	10	40	50	14	91	95	3	10	2	25	3	1	0	2	4	0	15	2	1	10	12	0	36	67	6	120	5	11	37	0	0	11	2	0	0	4	1	3	150
2011	Dartmouth	Morash Park	44.678495	-63.527563	14	5		0.25		2	13	0	2	1	0	18	4	7	42	1	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	177	0	0	8	0	0	1	0	0	0	1	0	0	0
2011	Dartmouth	Tufts Cove	44.68186684	-63.6002183	60	75		1		67	194	8	47	19	38	107	14	90	296	13	3	0	206	15	2	6	7	2	1	10	1	2	6	4	0	28	61	28	222	7	97	46	0	9	17	9	0	1	21	1	18	551
2011	Greenwood	Morden Beach	45.06952	-65.012283	10	90		3		0	17	0	37	22	26	20	3	9	12	0	0	8	5	1	2	7	14	0	0	0	0	0	0	15	0	0	66	21	12	1	0	6	0	0	2	1	0	0	1	0	2	4
2011	Halifax	Horseshoe Island	44.640048	-63.614101	19	25		1		21	83	1	8	5	5	53	0	19	77	1	2	3	57	12	0	0	3	0	0	1	1	0	7	0	0	1	18	16	401	1	25	8	0	0	11	1	0	0	2	6	2	60
2011	Halifax	Northwest Arm	44.629253	-63.595519	3	3		2																																												
2011	Halifax	Point Pleasant Park	44.618409	-63.566079	196	93		14.5		9	46	5	21	24	40	109	17	67	126	23	0	2	69	8	1	0	16	1	0	27	2	4	2	1	0	11	54	5	344	5	28	20	0	1	325	2	0	3	2	3	0	134
2011	Halifax	Seaview Memorial Park	44.67452781	-63.61867189	14	50		1		28	81	0	11	7	9	52	4	28	159	4	1	0	4	8	1	0	0	0	0	1	0	0	0	0	0	0	8	0	267	1	35	22	0	0	18	1	0	0	1	1	2	17
2011	Halls Harbour	Halls Harbour	45.20187683	-64.61892128	26	27		1		0	7	1	12	1	5	24	1	3	8	0	0	1	3	0	4	0	0	0	0	0	0	0	0	2	0	0	40	16	5	1	1	2	0	0	2	0	0	0	0	0	0	2
2011	Hubbards	Cleveland Beach Park	44.649482	-63.99930953	50	220		0.8		4	39	0	16	6	7	26	3	42	68	3	0	9	4	4	1	3	0	0	0	0	0	0	0	0	0	2	14	5	81	2	2	4	0	0	0	0	0	1	0	4	0	1
2011	Liverpool	Carter's Beach	43.909196	-64.823434	7	25		5		11	16	2	13	3	14	18	12	6	43	24	8	9	17	5	3	2	0	1	0	0	0	1	0	3	0	0	9	14	72	2	4	4	0	0	0	2	0	0	3	7	0	0
2011	Liverpool	Eagle Head Beach	44.06591101	-64.6133852	12	47		2		0	33	0	0	0	4	6	2	1	17	0	0	0	2	3	3	0	3	14	1	3	0	0	0	0	0	3	38	8	9	0	0	0	0	0	2	0	0	1	0	1	0	0
2011	Liverpool	Hunts Point Beach	43.950934	-64.784317	2	2		0.4		0	2	0	2	0	12	5	2	1	2	0	0	0	3	0	3	0	0	0	0	0	0	0	0	1	0	1	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	Lockeport	Lockeport Crescent Beach	43.69505912	-65.11837006	112	274		2		1	22	0	6	2	9	10	9	10	12	0	0	8	0	1	10	0	0	36	0	1	1	3	0	0	0	0	77	22	6	3	1	1	0	0	9	1	0	2	0	0	0	0
2011	Noel	Noel Shore	45.30519893	-63.74645233	5	45		10		0	11	42	42	0	64	37	0	16	34	23	4	0	0	0	6	5	2	0	0	0	0	0	0	2	0	0	4	0	30	0	0	8	0	0	17	5	0	2	0	0	0	0
2011	Pictou	Waterside Beach	45.76210419	-62.77939796	2			1																																												
2011	Prospect	Wagners Beach	44.48315731	-63.81116867	4	20		1		0	5	7	25	0	6	50	5	2	0	0	0	10	0	0	0	6	6	10	0	2	0	20	0	1	0	2	100	6	0	5	0	0	0	0	2	1	0	1	0	0	1	2
2011	Queensland	Queensland Beach	44.63363504	-64.03029442	20	66		1		2	17	1	9	10	12	32	9	23	116	2	0	0	10	6	1	0	0	0	1	3	0	0	0	0	0	0	11	5	456	3	12	8	0	0	16	1	0	0	0	0	0	0
2011	Shelburne	Roseway Beach	43.60609532	-65.32281339	16	150		2		4	99	4	7	5	14	31	20	28	43	0	0	94	4	3	0	2	2	9	0	1	0	1	2	2	0	3	210	33	20	0	0	3	4	1	9	7	0	3	0	0	0	1
2011	Sydney	Dominion Beach	46.2154762	-60.03195763	85	10		2		4	6	0	10	4	8	30	2	23	28	8	3	0	9	9	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	12	0	7	0	0	0	0	0	0	4	0	0	7
2011	Sydney	East bay Sandbar	46.01603874	-60.38360596	9	93		1.5		19	45	5	34	22	42	21	8	74	37	7	1	0	9	2	1	3	0	0	0	3	0	0	0	3	0	2	6	0	67	1	1	23	0	0	34	1	0	0	2	4	0	1
2011	Sydney	Sherwood Park	46.12959003	-60.16602516	92	20		5		0	10	0	12	4	7	0	3	7	37	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	0
2011	Wellington	Shubenacadie Canal (Wellington Lock)	44.863976	-63.623049	25	35		1		15	6	1	0	10	10	0	0	2	10	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	56	0	0	0	0	0	0	0	1	0	0	0	0	0
2011	West Jeddore	Sandy Point	44.71956956	-63.00740719	15	30		2		0	8	0	5	12	5	9	3	3	2	0	0	2	0	0	0	0	1	0	0	0	0	3	4	0	1	0	4	3	0	1	0	0	0	0	0	6	0	0	0	0	0	0
2011	Westmount	Petersfield Provincial Park, Sydney Harbour	46.122452	-60.215464	6	60		1		1	25	0	4	5	3	16	1	16	27	2	1	0	4	1	0	0	7	0	0	0	0	0	0	0	0	5	10	0	3	1	0	0	0	0	11	0	0	0	0	0	0	23
2011	Whycocomagh	Malagawatch	45.83262678	-60.99609375	20	150		15		1	8	0	20	5	15	25	0	10	3	0	2	10	0	3	0	0	0	2	0	0	0	0	0	0	0	0	3	0	50	0	50	5	0	0	0	0	0	1	2	0	1	0
2012	Albert Bridge	Mira Beach	46.033321	-59.96930122	4	9		1		0	8	1	5	9	12	31	10	12	42	1	0	0	12	3	0	0	0	0	0	0	0	0	0	0	0	0	8	3	400	0	23	3	0	0	1	0	0	0	2	1	0	1
2012	Amherst	Joggins Fossil Cliffs	45.76261316	-64.39155579	25	100		2		8	73	5	17	1	15	70	10	12	51	0	1	13	9	7	59	19	2	1	2	5	1	23	0	3	0	1	84	122	0	6	0	4	1	0	15	12	0	2	3	3	0	15
2012	Arcadia	Pinkney's Point	43.701133	-66.061907	215	155		0.6		37	48	8	37	42	21	175	45	63	71	64	18	157	51	14	36	37	2	12	4	10	0	37	32	13	4	10	447	309	9	8	4	7	4	23	11	15	5	10	0	110	2	5
2012	Arichat	Babins Cove Beach	45.51146	-61.010342	12	468		2.5		25	188	3	47	28	72	90	28	95	185	15	15	5	45	6	70	10	8	2	3	52	0	30	2	7	2	2	47	30	91	5	6	16	10	81	11	7	0	6	2	0	0	0
2012	Barton	Specht Beach	44.546931	-65.868788	4	18		0.5		0	2	10	2	5	20	10	7	16	8	5	1	0	15	1	5	2	1	0	1	2	0	0	0	1	1	0	25	13	0	0	0	0	0	0	2	0	0	0	0	0	0	1
2012	Bedford	Bedford Bay behind Clearwater Seafoods	44.70709622	-63.66375446	9	150		0.15		0	0	0	0	20	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0
2012	Canning	Scot's Bay Beach	45.298075	-64.399452	15	75		2		0	24	0	18	7	8	50	12	22	40	0	2	32	20	4	10	2	1	2	0	12	1	7	0	9	0	6	100	75	30	4	12	5	0	2	4	0	0	0	0	0	0	4
2012	Chester	Bayswater beach	44.51083	-64.048576	90	181		0.5		10	100	3	20	40	50	20	5	10	60	0	0	10	35	10	4	5	6	2	0	10	0	0	0	2	0	2	24	50	100	2	0	25	0	0	0	0	0	1	0	0	0	3
2012	Cole Harbour	Conrad Beach	44.644567	-63.375106	7	5		4		7	23	2	25	2	8	48	3	8	47	5	1	11	12	0	7	0	0	2	0	0	0	0	0	0	0	0	17	31	104	3	5	14	0	0	0	0	0	0	1	0	0	0
2012	Dartmouth	Albro Lake	44.686249	-63.576068	5	20		1		25	19	2	20	10	20	45	5	40	20	40	1	0	30	2	15	0	0	0	0	2	5	0	0	0	0	0	2	0	250	1	9	10	0	0	4	0	0	0	4	1	0	3
2012	Dartmouth	Tufts Cove	44.68186684	-63.6002183	30			1																																												
2012	Eastern Passage	MacCormack's Beach	44.606846	-63.492082	19	170		1		3	36	2	35	5	34	51	12	33	93	0	1	4	46	3	0	0	0	2	1	3	0	2	0	1	3	4	6	4	190	0	0	0	0	0	0	0	0	0	6	1	0	8
2012	Guysborough	Dorts Cove Beach	45.35576417	-61.46747589	10	54		1		0	0	0	10	15	10	20	4	4	10	0	0	10	0	0	1	3	0	1	0	0	1	0	0	0	0	0	0	10	10	0	0	5	0	0	0	0	0	0	1	1	0	0
2012	Halifax	Frog Pond, Purcell\'s Cove Rd., HRM	44.62568668	-63.60429525	8	20		1.4		9	51	0	5	2	19	16	6	22	76	0	0	0	15	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	350	0	0	6	0	0	1	1	0	0	0	2	0	0
2012	Halifax	Long Lake	44.631619	-63.65294	12	11		2		6	65	0	16	23	22	37	13	20	18	1	0	1	9	0	0	0	0	0	0	0	5	0	0	0	0	0	1	0	0	0	0	2	0	0	0	3	0	0	0	1	0	0
2012	Halifax	Northwest Arm	44.629253	-63.595519	6	35		0.6																																												

Year	City	Site Name	Latitude	Longitude	Number of People	Weight Collected (KG)	Weight Collected (LB)	Distance Cleaned (KM)	Distance Cleaned (Miles)	Bags (Paper)	Bags (Plastic)	Balloons	Beverage Bottles (plastic) 2 li	Beverage Bottles (glass)	Beverage Cans	Caps/Lids	Clothing/Shoes	Cups, plates, etc	Food Wrappers	Pull Tabs	Six-Pack Holders	Shotgun Shells	Straws/Stirrers	Toys	Bait Containers	Bleach/Cleaner	Buoys/Floats	Crab/Lobster/Fish Traps	Crates	Fishing Line	Fishing Lures/Light Sticks	Fishing Nets	Light Bulbs	Oil/Lube Bottles	Pallets	Plastic Sheeting	Rope	Strapping Bands	Cigarettes/Cigarette Filters	Cigarette Lighters	Cigar Tips	Tobacco Packaging	Appliances	Batteries	Building Materials	Car/Car Parts	55-Gallon Drums	Tires	Condoms	Diapers	Syringes	Tampons
2012	Halifax	Point Pleasant Park	44.618409	-63.566079	8	5		2		2	17	3	18	5	34	23	10	35	63	13	0	0	7	2	0	0	2	0	1	0	0	0	0	0	0	0	6	4	186	1	3	6	0	0	1	0	0	1	1	0	1	9
2012	Halifax	Rainbow Haven Beach Provincial Park	44.64988	-63.417978	61	25		0.8		26	96	8	39	8	22	194	37	53	286	29	1	149	88	13	0	0	0	1	0	14	0	1	0	0	0	11	26	50	1165	4	77	14	0	0	5	1	0	0	4	3	0	16
2012	Halifax	The little lake in Glenbourn Belchers Marsh	44.66877496	-63.67160797	2	5		1		0	2	0	0	1	5	3	2	0	10	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	2	0	0	0	0	0	0	0	0	0	0
2012	Halls Harbour	Halls Harbour	45.20187683	-64.61892128	50	22		2		8	52	0	8	35	6	33	14	15	27	0	0	5	14	0	0	0	0	2	0	28	0	1	0	0	4	0	39	21	90	1	30	0	0	0	0	1	0	2	6	0	0	11
2012	Lakeside	Lovett Lake	44.63904022	-63.6862421	25	225		1		0	12	0	14	5	9	16	1	15	17	4	0	0	0	4	0	36	0	0	3	0	0	0	2	0	3	2	0	11	14	0	0	6	0	0	5	2	0	0	0	0	0	0
2012	Liverpool	Eagle Head Beach	44.07062879	-64.61063862	14	26		2		2	34	0	11	0	4	5	5	0	17	0	0	1	0	1	4	0	1	8	0	1	0	4	0	0	0	4	61	32	6	0	3	0	0	0	4	0	0	0	1	4	0	0
2012	Liverpool	Hunts Point Beach	43.950934	-64.784317	2	3		0.5		0	12	0	1	1	6	6	3	2	6	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	1	22	1	63	0	1	2	0	0	2	0	0	0	0	0	0	0
2012	Lockeport	Lockeport Crescent Beach	43.69505912	-65.11837006	119	74		2		11	24	12	9	0	6	14	8	19	117	1	2	21	4	3	1	1	1	15	0	0	1	8	1	1	0	10	99	80	12	1	0	2	0	0	24	0	0	7	0	0	0	1
2012	Lower West Pubnico	Dennis Point	43.590338	-65.803814	3	90		2		0	8	1	16	2	2	10	5	10	10	0	0	3000	0	0	5	12	12	1	0	0	0	0	0	14	0	1	30	25	0	0	0	9	0	0	0	0	0	0	0	0	0	0
2012	Lunenburg	Bachman's Beach	44.321638	-64.255943	4	18		1																																												
2012	Lunenburg	Lunenburg waterview	44.370251	-64.309931	2	36		1																																												
2012	Margaretsville	Margaretsville Beach	45.0499998	-65.064468	15	45		0.5		0	0	0	0	0	6	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	25	0	0	0	0	0	0	0	0	0	0	0	0	0	20
2012	Pictou Landing	Pictou Landing Fishing WHarf	45.674882	-62.6833954	13	140		6		1	13	0	12	8	10	3	0	0	0	0	0	0	0	0	0	0	116	0	0	0	9	4	0	0	0	2	18	6	0	0	0	0	0	0	0	0	0	2	0	1	0	1
2012	Port Mouton	Carter's Beach	43.909196	-64.823434	12	24		4		8	26	0	5	2	5	17	9	19	16	11	2	6	5	3	1	0	0	0	2	0	0	0	0	3	0	0	12	15	77	2	151	7	0	0	3	0	0	1	0	3	0	7
2012	Prospect	Wagners Beach	44.48315731	-63.81116867	3	45		1		0	18	3	25	1	12	50	2	6	15	0	0	15	20	8	3	5	10	20	2	80	0	30	0	5	0	1	50	100	0	3	0	0	0	0	30	0	0	0	0	0	2	20
2012	Sambro	Weasel Cove	44.47317491	-63.60302925	1	15		1.5		0	12	1	3	0	3	0	1	1	3	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	12	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2012	Shelburne	Roseway Beach	43.60609532	-65.32281339	23	200		2		1	36	2	10	0	6	19	12	3	11	1	0	72	2	1	1	2	6	5	0	6	0	4	0	0	0	2	308	58	1	0	2	1	0	0	15	0	1	0	0	3	0	1
2012	Sydney	Dominion Beach	46.2154762	-60.03195763	90	20		1		3	20	0	12	3	0	30	1	10	24	0	0	0	6	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	2	0	0	0	0	0	0	0	0	0	0
2012	Sydney	Shore Road, Whitney Pier	46.1688944	-60.19546509	41	100		0.5																																												
2012	Timberlea	Half Mile Lake	44.65339051	-63.7430191	7	91		0.8		3	45	1	49	3	18	34	1	3	54	0	0	0	4	25	0	0	0	0	0	0	1	0	0	0	0	0	0	0	23	0	0	6	1	3	21	0	0	2	0	0	0	2
2012	Westmount	Petersfield Provincial Park, Sydney Harbour	46.122452	-60.215464	9	40		2		0	69	1	37	9	16	97	4	38	61	2	0	1	8	5	1	0	0	0	0	0	0	2	0	6	0	0	15	3	24	2	17	15	0	2	5	0	0	0	4	2	1	61
2012	Yarmouth	Cape Forchu	43.814587	-66.155033	5	300		3																																												

APPENDIX B: Cleanup Data NS 2013 to 2015

								Most Likely to Find Items																		Fishing Gear					Packaging Materials					Other Trash										Personal Hygiene				Tiny Trash		
Year	City	Site Name	Latitude	Longitude	Number of People	Weight Collected (KG)	Distance Cleaned (KM)	Cigarette Butts	Food Wrappers	Take Out/Away Containers (Plastic)	Take Out/Away Containers (Foam)	Bottle Caps (Plastic)	Bottle Caps (Metal)	Lids (Plastic)	Straws/Stirrers	Forks, Knives, Spoons	Beverage Bottles (Plastic)	Beverage Bottles (Glass)	Beverage Cans	Grocery Bags (Plastic)	Other Plastic Bags	Paper Bags	Cups & Plates (Paper)	Cups & Plates (Plastic)	Cups & Plates (Foam)	Fishing Buoys, Pots & Traps	Fishing Line (1 yard/meter = 1 piece)	Fishing Net & Pieces	Rope (1 yard/meter = 1 piece)	Fishing Lures/Light Sticks	6-Pack Holders	Other Plastic/Foam Packaging	Other Plastic Bottles	Strapping Bands	Tobacco Packaging/Wrap	Appliances	Balloons	Cigar Tips	Cigarette Lighters	Construction Materials	Fireworks	Tires	Batteries	Clothing, Shoes	Toys	Condoms	Diapers	Syringes	Tampons/Tampon Applicators	Foam Pieces	Glass Pieces	Plastic Pieces
2013	Amherst	Joggins Fossil Cliffs	45.7626132	-64.39155579	26	9	1.2	20	10	3	4	33	1	6	7	1	26	3	8	25	40	14	6	5	5	2	14	7	22	1	0	35	7	109	2	0	4	7	0	3	1	0	1	3	4	0	0	0	3	40	9	55
2013	Antigonish	Chisholm Park	45.6216617	-61.99417591	6	23	5	2	5	2	2	12	7	41	7	1	16	0	22	17	4	1	12	0	0	0	0	0	0	0	0	12	2	1	4	0	0	0	2	4	1	4	1	1	0	0	0	0	0	12	17	2
2013	Baxters Harbour	Long Beach	45.2189289	-64.55111504	12	9	4	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	1	0	0	3	4	0	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0
2013	Bedford	Bedford Bay behind Clearwater S	44.7070962	-63.66375446	10	50	1																																													
2013	Bedford	Sackville river bank	44.73608	-63.655193	20	45	2	400	20	1	1	5	50	2	2	3	1	1	12	6	0	12	6	2	1	0	0	0	0	0	1	1	0	0	6	0	0	2	0	0	0	0	0	7	0	0	0	0	0	1	4	0
2013	Canning	Scot's Bay Beach	45.298075	-64.399452	14	100	2.5	25	50	5	0	20	10	20	10	20	30	0	10	20	20	0	0	10	0	10	40	30	40	10	5	100	30	30	10	0	3	10	5	15	0	2	0	20	10	0	0	0	20	10	10	100
2013	Chapel Island First Natic	Chapel Island	45.7176864	-60.77774048	35	200	0.75	44	22	0	2	29	0	2	14	11	51	4	39	34	16	42	0	0	8	2	1	0	2	0	0	0	0	0	16	0	0	1	6	0	0	0	0	3	8	0	5	0	0	12	40	11
2013	Chester	Bayswater beach	44.51083	-64.048576	94	50	0.5	125	30	5	6	3	4	7	12	2	15	10	10	3	2	3	0	0	0	3	20	25	15	2	0	45	1	26	5	0	0	8	1	3	0	0	0	2	3	0	2	0	2	50	12	50
2013	Cole Harbour	Bissett Lake	44.6598317	-63.47672939	28	45	5	950	66	28	9	18	18	35	41	8	14	8	28	23	41	8	24	8	3	3	1	5	1	1	0	44	10	1	2	0	1	41	0	3	2	0	1	1	10	2	0	0	0	39	6	105
2013	Cole Harbour	Conrad Beach	44.644567	-63.375106	9	11	4	55	15	6	1	4	15	2	9	2	2		1	4	2					1			2			2		7	2		4					1		3	1	1			3	16	3	11
2013	Crescent Beach	Crescent Beach, Lunenburg Coun	44.23327	-64.398079	12	7	5	262	40	6	0	13	6	9	10	1	8	5	9	7	40	21	16	9	5	3	0	5	22	3	0	9	3	8	12	0	2	2	0	29	0	0	0	12	13	0	5	0	0	2	28	1
2013	Dartmouth	Russell Lake	44.6694769	-63.52869987	18	5	4.5	24	15	4	6	16	2	18	0	3	18	0	15	14	0	0	22	0	0	0	0	0	0	0	0	1	1	0	0	0	6	24	1	0	1	0	0	1	0	1	0	0	0	0	0	13
2013	Dartmouth	Sullivan's Pond	44.67288	-63.564137	40	30	3	147	63	7	0	24	0	6	16		29	7	19	5	10	6	5	4	0	0	0	0	0	0	0	8	0	1	13	0	0	7	1	2	0	0	0	2	3	2	0	0	0	15	1	62
2013	Dartmouth	Tufts Cove	44.6818668	-63.6002183	21	30	1	105	162	6	4	37	11	24	50	17	22	15	20	27	36	1	34	20	12	3	5	1	11	1	10	13	2	23	22	0	0	27	1	13	0	0	0	4	1	8	2	1	78	60	19	50
2013	Digby	Savory Park	44.5479401	-65.86681366	12	160	1																																													
2013	Falmouth	Akins Marsh, Bog Road	45.006564	-64.192085	2	10	2																																													
2013	Glace Bay	Big Glace Bay Beach	46.189338	-59.88908	22	158	1	10	16	3	2	32	2	5	14	3	34	1	26	40	22	5	23	12	0	18	2	29	34	0	0	5	4	45	0	0	2	0	2	16	0	8	1	30	10	3	4	1	9	2	1	18
2013	Grand Pre	Evangeline Beach	45.138098	-64.308729	3	3	2				1	3					3		2		2							10	6			2		6						3				1	1				2	1	7	6
2013	Halifax	Crystal Crescent Beach	44.461016	-63.617535	10	20	0.7	251	23	2	3	7	11	0	4	1	4	3	6	13	16	5	15	4	7	1	0	2	10	0	0	12	0	2	1	0	1	3	0	2	5	0	0	2	6	0	0	0	2	9	1	17
2013	Halifax	Herring Cove	44.569895	-63.557239	8	5	0.5	20	20	2	2	7		4	3		3	2	15	2	8		3	1	1			3	3		1		4							1		1		1					1	50	8	5
2013	Halifax	Horseshoe Island	44.640048	-63.614101	28	20	1	1025	43	4	2	33	17	12	20	5	10	5	3	16	43	12	37	1	7			1	2	1		57	1					21	3	4	1	1			1		1		14	25	11	62
2013	Halifax	Kidston Lake	44.596625	-63.619938	4	25	0.2	945	237	6	4	24	5	9	43	0	10	2	4	53	41	7	5	4	1	0	0	0	0	0	0	0	1	23	4	0	1	0	1	0	25	0	0	8	0	0	1	0	2	18	24	41
2013	Halifax	Long Lake	44.631619	-63.65294	9	25	1	52	11	4	2	5	5	11	14	1	8	2	8	4	42	0	1	1	0	0	1	0	1	0	0	3	0	1	0	0	0	0	0	1	0	0	0	7	8	1	0	0	1	3	2	4
2013	Halifax	Point Pleasant Park	44.618409	-63.566079	155	158	3.2	739	310	16	7	120	40	23	120	16	38	39	49	33	106	36	36	18	22	2	4	22	19	0	9	226	7	36	19	1	7	20	3	49	4	3	1	32	31	10	1	3	153	429	111	471
2013	Halifax	Seaview Memorial Park	44.6745278	-63.61867189	5	10	1	1027	15	0	0	8	0	4	3	0	0	0	4	1	9	0	3	17	0	0	2	0	0	0	0	6	0	3	0	0	1	149	0	0	0	0	1	0	1	0	0	0	2	0	0	15
2013	Halifax	Silver Sands Beach	44.603455	-63.443341	22	60	7	76	38	19	11	3		6	9	2			13		8			1	5	6	9		10		1	9	2	4	2		5		4	5	14			3					5	12	9	23
2013	Halifax	Williams Lake	44.619677	-63.598738	17	50	5	100			100																10			5		70			30					20				5						100	1000	
2013	Hubbards	Cleveland Beach Park	44.649482	-63.99930953	55	50	0.5	106	42			62	34	9	6	3	3	1	6	7	11	1	2	1	4		4	5	7		1	16	2	17	3											1			4	2	24	87
2013	Lakeside	Lovett Lake	44.6390402	-63.6862421	25	750	1	50	23	18	6			7	6		17	5		13			20		2				2			5	2	10	10							7		1	1					13		14
2013	Lawrencetown	Lawrencetown Beach	44.642276	-63.33429336	30	10	1	318	49	2	0	19	5	6	8	0	25	1	14	3	28	2	20	3	5			15	14		1	9	2	1	1	0	1	2	5	0	2	0		17	1	0	0	0	5	29	3	47
2013	Liverpool	Eagle Head Beach	44.0706288	-64.61063862	8	24	2	2	9	4	1	2	1	0	1	0	4	4	6	3	11	0	0	1	0	8	1	7	41	0	0	9	0	5	3	0	4	3	0	1	0	1	0	9	0	0	0	0	0	1	0	25
2013	Liverpool	Hunts Point Beach	43.950934	-64.784317	1	1	0.5	5	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	6	1	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	8	0	0
2013	Lockeport	Lockeport Crescent Beach	43.6950591	-65.11837006	120	0	1.5																																													
2013	Lower Sackville	Kinsman Beach	44.7767783	-63.67177963	19	24	1.5	428	146	2	3	36	10	65	66	16	17	5	7	14	34	16	57	30	4				1			25	5	5	18		2	1	2	17		1		1	2	1			2	5	31	42
2013	Lower West Pubnico	Dennis Point	43.590338	-65.803814	2	90	1					7		4		5	15	1	10	5	3					9			30				18	25			2							3	1							
2013	Lunenburg	Bachman's Beach	44.321638	-64.255943	6	2	1																																													
2013	Lunenburg	Lunenburg waterview	44.370251	-64.309931	4	5	1.5																																													
2013	Lunenburg	Mason's Beach	44.362642	-64.293365	3	7	1																																													
2013	Margaretsville	Margaretsville Beach	45.0499998	-65.064468	20	200	1	58	11	3	1	94	37	7	25	3	3	1	1	5	19					3	5	10	410	3				228			16	10	5	6	38			13		1	0	0	19	22	159	226
2013	Morden	Morden Beach	45.1040617	-64.94550705	25	110	1		20			67					10			3						1		10	30				7									1		1					32	3	20	58
2013	Mulgrave	Town of Mulgrave shoreline, Stra	45.606712	-61.387997	5	45	1.5	150	100	25	12	50	50	0	0	0	60	0	15	20	0	0	30	0	0	3	0	0	2	0	0	0	0	0	25	0	0	0	0	6	0	2	12	0	0	2	0	0	0	0	40	0
2013	Noel	Burntcoat Shoreline	45.312684	-63.80601883	10	8	3	12	4				4	4			18		2	5	4			1			1			1		3	1		1		2			4			5	2						3	30	
2013	Noel	Noel Shore	45.3051989	-63.74645233	2	3	2	3	5										3	2	3			1		1			6	2			1	1						1												4
2013	North Sydney	Indian Beach	46.2101308	-60.24520397	10	25	1	0	0	3	2	30	0	25	20	10	10	5	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	3	0	8	0	1	5	0	30	30
2013	Port Mouton	Carter's Beach	43.909196	-64.823434	23	30	8	252	48	7	9	22	8	27	14	5	43	15	22	27	19	9	41	18	11	1	6	5	17	0	3	9	7	16	13	0	0	16	2	1	2	0	0	19	3	1	11	0	9	11	16	15
2013	Queensland	Queensland Beach	44.633635	-64.03029442	4	2	1																																													
2013	Shelburne	Roseway Beach	43.6060953	-65.32281339	20	0	1																																													
2013	Sydney	Dominion Beach	46.2154762	-60.03195763	75	9	1																																													
2013	Sydney	South Bar Beach	46.210873	-60.201988	13	260	1					100		50	40		100	50	50	50	50					10			3			5	10						30			2						2	50	20		30
2013	Tantallon	Whynacht\'s Point, St Margarets	44.679334	-63.894339	7	91	3		20	1	1			3					3	2			1				6	1			1	4	1	1						2		1		1								
2013	Timberlea	Half Mile Lake	44.6533905	-63.7430191	9	10	1	93	71	13	2	28	7	16	25	0	19	10	7	64	8	0	11	2	0	0	0	0	0	0	0	6	3	1	5	0	1	5	0	1	6	0	0	4	2	0	0	0	0	8	51	8
2013	Westmount	Petersfield Provincial Park, Sydne	46.1448156	-60.21855354	3	50	3	23	68	1		62	2	18	14		17	5	5	7	46		15	6	6	2	9		4			26	3	4	2			4	1	7		1		10	3	2		1	15	48	36	72
2013	Yarmouth	Cape Forchu	43.814587	-66.155033	6	272	1	300	12	40	12	0	1	7	0	4	94	0	13	0	42	0	12	0	21	12	0	4	101	0	4	0	0	0	0	0	0	0	5	4	0	1	0	0	1	0	1	0	3	301	23	47
2014	Amherst	Joggins Fossil Cliffs	45.76261316	-64.39155579	25	34	1	1	2	1	0	9	1	4	2	1	7	0	5	3	10	0	0	5	1	3	0	21	35	1	0	14	5	46	1	1	3	0	2	3	0	0	0	7	0	0	0	0	2	18	12	38
2014	Amherst	Joggins Fossil Cliffs	45.76261316	-64.39155579	1	10	2	4	3	1	2	28	2	1	2	0	3	2	4	3	0	0	0	0	1	4	3	1	38	1	0	0	0	2	3	0	2	2	0	2	0	0	1	0	1	0	0	0	8	8	14	17
2014	Antigonish	Chisholm Park	45.62166166	-61.99417591	20	70	1				12	20	12	20		6	26	8	14	8					26						10	6		5			2		3				2									
2014	Arichat	Babins Cove Beach	45.50845221	-61.06634617	2	35	1	15	50	25	25	38	30	42	32	30	15		12	15	10	10	14	54	35	15	7	15	6	4		3	12	36	28	1				2		3	6	3	4					40	32	35
2014	Baxters Harbour	Long Beach	45.21892886	-64.55111504	10	91	1	1	9	2	0	62	2	12	6	0	28	3	6	4	35	0	1	5	2	8	4	4	362	0	1	43	19	52	1	0	0	0	1	11	2	0	0	4	2	0	0	0	19	31	1	120
2014	Bedford	Sackville river bank	44.73608	-63.655193	19	100	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2014	Bedford	Sackville river bank	44.73608	-63.655193	12	109	1	184	79	12	5	14	5	38	13	3	26	2	16	62	21	27	32	18	8	0	0	0	25	0	2	27	2	6	13	2	1	22	0	11	0	7	0	8	2	0	0	0	1	28	6	32
2014	Bridgewater	La Havre River (Bridgewater)	44.378288	-64.518156	3	20	3	50	40	0	3	22	0	3	6	1	10	0	0	8	13	2	10	4	3	0	0	0	1	1	0	0	0	0	15	0	3	3	3	2	0	0	0	0	0	0	0	0	1	150	50	50
2014	Canning	Bennett's Bay Beach	45.24250302	-64.46502686	16	50	1					45					1		1									50	50					144				6										1	20	500	6	500
2014	Chester	Bayswater beach	44.51083	-64.048576	5	45	0.5	103	71	2	1	49	7	6	8	7	12	1	5	5	14	8	18	4	3	3	1	12	25	0	0	9	0	14	5	0	0	2	0	4	1	0	0	8	2	0	5	2	3	14	3	81
2014	Cole Harbour	Bissett Lake	44.65983171	-63.47672939	15	120	2	500	50	3		11	6		24		6	5	13	25	30		5	5						2		14			10			16	3	1		3		2	2	3					5	
2014	Cole Harbour	Conrad Beach	44.644567	-63.375106	15	30	2	40	20	1	3	10	10				3	1		11	2	3	10	5	5	2	20	20	2																				5			40
2014	Crescent Beach	Crescent Beach, Lunenburg County	44.23327	-64.398079	6	15	2	80	25	1	1	13	1	34	14	1	11	3	9	6	15	2	21	4	2	4		4	10			24	1	17	15		2	1	1	3	1			18	1					1	5	50
2014	Dartmouth	Albro Lake	44.686249	-63.576068	9	50	0.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2014	Dartmouth	Frenchman Lake	44.69904353	-63.57642174	6	6	2	880	40	8	4	12	0	12	6	5	3	0	1	6	2		54	3								7			11			21	1		1											
2014	Dartmouth	Penhorn Lake	44.675337	-63.54	13	5	1	35	10						15		5		15		15			0							2										2			1	3							
2014	Dartmouth	Tufts Cove	44.68186684	-63.6002183	19	136	1	11	77	9	2	32		13	22	3	9	3	8	5	5	2	21	12	9			1	7			6	4	2	2		1	1		5				16	1	19	2	1	31	12	82	2
2014	Eastern Passage	MacCormack's Beach	44.606846	-63.492082	6	50	2	20	10	2	2	0	0	6	10	0	9	0	0	6	7	0	0	1	0	0	2	2	2	1	0	2	1	0	2		0	0	0	2	0	0	0	4	0	0	0	0	2	3	6	2
2014	Grand Pre	Evangeline Beach	45.138098	-64.308729	6	6	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2014	Halifax	Bedford Basin, Princess Lodge	44.69941	-63.660707	10	25	0.75	11	18	16	1	5	4	13	6	0	21	7	23	8	4	0	1	19	11	3	0	1	3	0	0	49	2	9	3	0	0	1	2	4	1	2	1	23	1	0	0	0	9	36	14	11
2014	Halifax	Crystal Crescent Beach	44.461016	-63.617535	13	20	3	131	25	4	0	14	10	14	8	3	10	4	12	7	11	6	4	0	3	4	2	3	13	0	0	8	0	4	5	0	3	4	0	14	0	0	0	8	1	0	0	0	3	9	10	16
2014	Halifax	Frog Pond, Purcell\'s Cove Rd., HRM	44.62568668	-63.60429525	1	1	2	45	1	1	0	1	0	0	2	3	0	0	1	0	4	0	1	3	1	0	0	0	0	0	0	3	0	0	2	0	0	0	1	0	0	0	0	1	0	0	0	0	0	5	0	2
2014	Halifax	Horseshoe Island	44.640048	-63.614101	35	40	1	829	76	14	7	20	11	18	24	6	18	8	9	22	27	7	19	7	2	0	1	0	16	0	0	20	11	3	11	0	1	23	0	9	0	0	0	12	6	3	2	0	14	26	240	83
2014	Halifax	Point Pleasant Park	44.618409	-63.566079	180	164	3.2	2092	197	10	17	92	48	31	73	18	34	38	48	20	63	22	41	41	7	4	1	6	17	4	1	62	4	17	11	0	8	23	4	23	0	7	4	24	14	9	0	2	39	79	130	325
2014	Halifax	Rainbow Haven Beach Provincial Park	44.64988	-63.417978	7	1	5	300	32			15	10		2	1		2			2		3		1		1		1					1			1	3		4	3			5	1		1			8		23
2014	Halifax	The little lake in Glenbourn Belchers Marsh	44.66877496	-63.67160797	2	1	0.5	96	20	0	0	7	0	0	3	0	0	0	0	0	6	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
2014	Halls Harbour	Halls Harbour	45.20187683	-64.61892128	5	30	0.3		3	6		7	2	4	1		18		5		1					3		1	120			5	7	39						6	1				4				1	20	1	15
2014	Hubbards	Cleveland Beach Park	44.649482	-63.99930953	50	100	0.5	94	19	1		47	13		3	6	9	2	14	3	31		7	1	2	3	2	1	2	4		12	11	7	5		6	7	3	11	2		4	9	3		3		1	19	27	87
2014	Kentville	Fundy Shore Black Rock Beach	45.17048048	-64.76170063	9	65	2.5	15	17	22	8	40	14	10	30	17	20	10	18	22	26	0	0	11	4	1	8	8	90	0	0	20	20	60	6	0	1	4	3	3	1	0	0	4	2	0	0	0	8	50	10	60
2014	Lakeside	Lovett Lake	44.63904022	-63.6862421	20	10	4	300	124	4		14	4	10	6	2	9		6	5	10		11	15	5							16	2	8	1			1		2			1	13						11		22
2014	Liverpool	Eagle Head Beach	44.07062879	-64.61063862	19	67	2	1	18	1		4	1		1		7		1	3	7		1		1	3		7	36		1	9	3	2			1	3		2		1		10						2	2	7
2014	Liverpool	Hunts Point Beach	43.950934	-64.784317	1	1	0.4	5	2	2									3									1													124									6		12
2014	Lockeport	Lockeport Crescent Beach	43.69505912	-65.11837006	120	21	2	7	8	5	0	10	5	2	2	0	4	0	3	0	15	0	0	1	0	15	0	9	25	1	0	27	0	40	0	0	3	7	0	4	1	0	0	3	1	0	1	0	0	7	1	77
2014	Lower West Pubnico	Dennis Point	43.590338	-65.803814	56	1030	4	0	10	0	0	25	0	8	0	0	65	0	40	24	30	0	0	0	0	54	0	0	300	0	0	40	110	70	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	10	0	75
2014	Mabou	Mabou Coalmines Beach	46.124653	-61.464729	24	0	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2014	Morden	Morden Beach	45.10406166	-64.94550705	12	45	1																			2	0	5	100																							
2014	Morden	Morden Beach	45.10406166	-64.94550705	15	65	1																					5	75				20																25	4		
2014	Musquodoboit Harbour	French Point	44.68879304	-63.07010651	23	9	1			4	4	6					4				5					4	2	6					5																	10		13
2014	Musquodoboit Harbour	Martinique Beach	44.691661	-63.13242	5	3	2	1	6					2	9				1		3								1					1	1		1															4
2014	New Glasgow	Melmerby Beach	45.627424	-62.646446	5	4	1.5	263	57	0	0	13	17	8	32	0	3	1	5	14	1	0	14	4	0	0	0	1	5	0	0	3	1	1	14	0	3	11	0	0	0	0	0	2	0	0	0	0	0	0	0	4
2014	Port Mouton	Carter's Beach	43.909196	-64.823434	7	14	3	485	42	10	5	20	6	18	11	9	8	3	17	27	10	12	4	3	5	1	1	9	24	0	2	16	1	13	12	0	2	11	2	9	4	0	0	8	3	1	9	0	2	12	6	18
2014	Shelburne	Roseway Beach	43.60609532	-65.32281339	16	11	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2014	Sydney	Dominion Beach	46.2154762	-60.03195763	7	15	3	3	3	2	0	20	1	5	3	1	6	5	1	3	1	1	8	1	1	6	0	0	0	0	0	10	0	4	0	0	0	0	0	7	0	2	0	7	0	0	0	0	9	5	2	16
2014	Sydney	South Bar Beach	46.210873	-60.201988	8	350	0.2		20	12	7						27	13	50			6				11	15		8		6	10	6			2	4		3	7	2	4		15	6	3	12		60			
2014	Waverley	Powder Mill Lake	44.776184	-63.608115	2	1	0.15	151	24			3	4	8	5	1	3	4					6		1		2								4			8					1	2						9	6	1
2014	Yarmouth	Cape Forchu	43.814587	-66.155033	3	12	1.6			5	8	17		3			2		4							1		3					1	2										6			1		4		6	
2015	Amherst	Dickey Brook	45.83178953	-64.19942379	18	174	0.5	9	142	1	1	8		23	7	4	13	19	21	35	35	14	53	24	3			3				28			14	1				38	1	4	1	16	21		2			9	58	41
2015	Baxters Harbour	Long Beach	45.21892886	-64.55111504	3	95	0.5	6	3	14		65	1	8	2	1	11	5	20	2	11			3	1	2	1	5	160	2		9		35	2			1			2			1	1				11	45	4	150
2015	Bedford	DeWolfe Park on Bedford Basin	44.723479	-63.668003	28	7	1	53	55	13	10	26	2	27	48	13	17	14	20	11	43	10	22	16	7			1	7		0	25	8	0	2			31	1	13		8		10	14	2	5	0	28	24	26	35
2015	Bedford	Sackville River Bank	44.73608	-63.655193	5	200	1.5	125	100	10	3	20	30	40	25	3	15	30	15	50	0	3	50	30	0	0	15	0	30	2	0	0	3	10	30	1	0	50	0	10	0	0	0	20	5	0	0	0	0	50	30	30
2015	Bedford	Moirs Pond	44.71399653	-63.67700458	10	70	0.25	253	21	4	2	6		3			9	3	4	12	19	6																						5	5					20		82
2015	Canning	Scot's Bay Beach	45.298075	-64.399452	12	215	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2015	Chester	Bayswater beach	44.51083	-64.048576	91	60	0.5	25	30	5	6	32	5	15	25	12	30	3	6	12	5	2	3	10	3	4	19	19	13	2	2	14	8	25	5	0	0	12	1	6	4	10	5	4	1	0	1	0	2	30	5	53
2015	Dartmouth	Alderney Landing	44.664112	-63.57028484	5	3	1	50	80	7	2	5	0	25	9	8	25		13	6		4		19	19										8			3	2								1		6	39		25
2015	Dartmouth	Morash Park	44.678495	-63.527563	4	15	1.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2015	Dartmouth	Sullivan's Pond	44.67288	-63.564137	10	3	1	342	32	3	4	4	8	7	5	2	3	4	2	1	0	4	0	3	0	0	0	0	0	0	0	17	0	6	4			5	3	5	0	0	2	0	0	0	0	0	0	17	28	7
2015	Dartmouth	Penhorn Lake	44.675337	-63.54	7	5	2	17	133	25	9	7		21	15	8	31	9	27	87	42	23	23	68								17	2							5				2								
2015	Eastern Passage	MacCormack's Beach	44.606846	-63.492082	26	50	8	296	53	12	7	25	3	13	37	6	7	8	20	27	42	2	8	2	4	0	28	9	11	0	0	12	0	27	34	0	0	4	0	8	2	0	0	14	0	2	0	0	2	21	39	107
2015	Falmouth	Akins Marsh, Bog Road	45.006564	-64.192085	8	80	1	136	14	19		11	1	17	9	4	2	3	2	4	8	8	61	4	2				1		1	9	6	1	9					6		2	1	10	1			1	1	6	1	35
2015	Halifax	Long Lake	44.631619	-63.65294	18	4	2.9	72	15	2	0	9	1	4	4	1	6	4	7	6	16	9	4	4	0	0	0	0	1	0	0	0	0	1	3	0	0	0	0	2	1	0	0	6	3	0	0	0	0	15	12	27
2015	Halifax	Seaview Memorial Park	44.67452781	-63.61867189	19	5	1	250	38	6	11	17	6	28	20	2	8	4	3	27	5	3	5	3		3	10	12	10			1	2	2	1			26	4	2				2				3	20	15	16	10
2015	Halifax	Frog Pond, Purcell\'s Cove Rd., HRM	44.62568668	-63.60429525	3	8	3	97	31		3	27			5		11	5	8	7	3	2	6										3					2												5	3	13
2015	Halifax	Crystal Crescent Beach	44.461016	-63.617535	11	50	5	200						2	2		5			1	1								2					2										2	2							
2015	Halifax	Point Pleasant Park	44.618409	-63.566079	157	107	1.5	800	317	14	4	84	39	30	55	17	29	46	58	21	78	19	15	7	3	0	15	3	31	1	0	109	4	25	8	2	14	8	7	87	3	1	0	36	12	0	2	1	66	211	175	267
2015	Halifax	Seaview Memorial Park	44.67452781	-63.61867189	8	35	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2015	Halifax	Point Pleasant Park	44.618409	-63.566079	53	90	10	293	94	20	199	77	19	123	69	5	39	8	24	24	69	21	37	13	34	10	3	9	31	0	1	94	16	18	16	0	5	39	4	23	0	3	0	21	6	10	0	0	144	244	33	250
2015	Halifax	Horseshoe Island	44.640048	-63.614101	12	1	0.2	56	23				1	29	26	6	6	1		2	12	1	11	3	3				2			5			2		1		1					6	2	2		1	36			
2015	Halifax	Digby Shoreline	44.63204698	-65.76278687	48	141	2	47	17	18	1	20	2	14	3	5	6	2	8	16	38	66	36	13		4		16	62		1	21	5	25	5		1	6	1	33		5		24	1						130	25

2015	Halifax	The Old Burying Ground	44.64368155	-63.57277393	10	1	1	1720																																												
2015	Halifax	Silver Sands Beach	44.603455	-63.443341	8	30	2	1	18			5	2			1	8	0	10	3	6	2	2	2	1	3	5	28	8	1		10	5	3		3				23	7	3		13					20	7	7	57
2015	Halifax	Kearney Lake Beach and Playground	44.69062362	-63.69220734	28	67	1	338	175	9	3	35	5	18	20	10	49	15	35	32	30	7	82	23	7	0	1	1	5	1	0	0	1	3	17	0	2	5	8	2	3	2	0	22	12	19	13	0	5	14	4	45
2015	Lakeside	Lovett Lake	44.63904022	-63.6862421	20	10	5	60	120			10		5			10		3				15	5	5				2			5		7			1													5	2	4
2015	Liverpool	Hunts Point Beach	43.950934	-64.784317	1	1	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2015	Louisbourg	Louisbourg National Historic Site	45.893593	-59.98209	16	453	1		17						6		43		6							15		10	10			6	2							34												
2015	Lower Sackville	First Lake	44.770381	-63.659506	33	3	2.8	78	35	11	7	6	2	1	3	1	2	0	1	2	6	0	8	0	0	2	21	2	4	0	0	0	0	0	4	0	0	0	0	0	0	0	2	3	0	0	0	0	0	7	2	9
2015	Lower Sackville	Second Lake at the end of Metropolitan Ave	44.78482015	-63.66688728	18	5	3	30	10					4	4	4							6									2							2												16	20
2015	Lower Sackville	First Lake	44.770381	-63.659506	23	9	2	0	8	4	1	4	0	14	8	5	6	0	1	12	15	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	20	16
2015	Lower West Pubnico	Dennis Point	43.590338	-65.803814	4	270	2										10		3	1					1	6			50			6	12	5										3								
2015	Morden	Morden Beach	45.10406166	-64.94550705	25	50	1																						50			5	10	5														1	12			
2015	Morden	Morden Beach	45.10406166	-64.94550705	28	280	1	1	7	12	12	71	1	7	2	1	60	0	0	1	15	3	0	2	1	12	13	2	242	0	0	79	13	21	0	0	0	0	6	10	0	0	0	13	1	4	0	0	14	60	0	9
2015	Musquodoboit Harbour	Martinique Beach	44.691661	-63.13242	8	34	4	15	16	1	0	6	2	0	1	0	2	0	1	2	1	0	1	0	1	1	0	0	2	0	0	0	0	1	0	0	1	1	1	0	0	0	0	3	0	0	0	0	1	1	0	4
2015	New Glasgow	Melmerby Beach	45.627424	-62.646446	19	21	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2015	Port Morien	Port Morien Sandbar	46.1157287	-59.88681793	9	115	0.5	55	23	2	5	20	23	3	10		18	20	12	20	8	1	10		11	13	20	5	20	5			8	2	15				2	3		8		2	5	5	9	9			12	48
2015	Port Mouton	Carter's Beach	43.909196	-64.823434	17	20	2.5	208	42	15	6	33	9	38	17	4	8	4	29	12	17	5	26	12	3	1	12	0	21	0	3	53	4	12	9	0	0	11	0	0	5	0	1	8	2	0	5	0	4	5	6	42
2015	Queensland	Queensland Beach	44.63363504	-64.03029442	55	50	0.5	891	108	21	11	60	25	64	98	8	19	12	40	28	59	38	50	27	16			1	13			24	3	4			14	34	2	2				32	13		4		1	4	8	55
2015	Shelburne	Roseway Beach	43.60609532	-65.32281339	24	25	3		1			1	14	1	2	1	10	1		1	8	3	1	2		2	1	5	30			21	4	7			1	1		4				2			1			2	2	21
2015	Yarmouth	Johns Cove	43.80322137	-66.15022659	21	120	1	25	22	4	8	56	5	15	8	5	14	5	14	13	18	2	8	1	7	22	9	5	85	0	0	31	22	95	1		1		4	15	1	1	1	9	8	2	9	1	3	72	56	124