

# GRAND MANAN ISLAND PERCEPTIONS OF ENVIRONMENTAL PROBLEMS AND CHANGE

By

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*This thesis is dedicated to my mom Holly, my late dad Denis, and my brother Kyle, for their never-ending support and love throughout my academic career.*

## **ABSTRACT**

### **GRAND MANAN ISLAND PERCEPTIONS OF ENVIRONMENTAL PROBLEMS AND CHANGE**

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This thesis investigates the island of Grand Manan, New Brunswick. The study focuses on perceptions which residents of Grand Manan have of their natural environment, whether they see change as necessary, and what their feelings are towards potential change. The study includes discussion about methods for creating change in ways that residents support. A literature review of methods for effective environmental policy implementation was conducted. Findings discuss methods of implementing environment related rules, and what motivates personal environmentally friendly actions. Factors which influence public support for environment related rules and/or self-driven actions include: trust, education, environmental knowledge, ignorance, apathy, empathy, efficacy, uncertainty and powerlessness. These factors relate to one's personal perception and experience, and were identified in participants responses throughout the study. Information from residents was collected using one on one interviews based on a set of 11 uniform questions, plus additional discussion if required. Interview responses contain personal perceptions of the island's environment and rules, personal behaviours and practices related to the environment, perceptions about efficacy of current environmental rules, and personal ideas for methods to increase environmentally friendly behaviour amongst residents of the island. The interviews also revealed perceived barriers to creating changes on the island. Feelings of threat and resistance to change, as well as municipal communication issues were detected in many interviews. Municipal communication issues are barriers which appear to prevent residents from easily participating in common environmentally friendly behaviours such as recycling and biking to work. Participants listed methods they felt would address the existing barriers, including penalties and fees, increased environmental education, and leading by example amongst the community. Some listed ideas for initiatives that they thought would help the environment, which they felt would also be welcomed on the island. Recommendations include increasing education and communication of environmental issues, increased transparency from the waste management facility, and community involvement in creating change on the island.

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## CHAPTER 1

### Introducing the Study, and Grand Manan Island

#### 1.1. Introduction

90 minutes by ferry from the mainland, Grand Manan Island, New Brunswick, is relatively small island in the Bay of Fundy. This island is composed of several amalgamated villages, all forming Grand Manan (Village of Grand Manan, n.d.). The island has a diverse geological makeup, with variations in rock type and elevation from one end of the island to the other. Grand Manan has many species of flora and fauna which find homes in the unique ecosystems spread about the island. The history of the island is vast. Written history began upon discovery by explorers in the 15<sup>th</sup> century. Today, the island continues to rely on fishing and self-sustaining work ethic to thrive. Discussion of environmental issues on the island revolves around biodiversity, pollution, and waste management.

This chapter will also discuss the various aspects of, and reasons for this thesis. The purpose of this thesis is to discuss the Island of Grand Manan in an environmental context, and discover how perceptions of those living on the Island interact with and perceive their environment. The physical setting and environmental issues of the island will be discussed based on available literature about such topics. This section includes specifics regarding how to get to the island, and what one might expect to find while there. Human geography of Grand Manan is included, covering the history of people on the island, as well as the economy. Finally,

a look at the environmental issues on the island, such as threats to biodiversity and waste management issues present on Grand Manan will be discussed.

## **1.2. Thesis Purpose and Research Questions**

### **1.2.1. Thesis Purpose**

This thesis will provide a geographic overview of the island of Grand Manan, New Brunswick. The overview will include the people, environment, industries on the island, as well as a few environmental challenges faced by the island, as told by residents. Another aim of this thesis is to gain a perspective on how the residents of Grand Manan perceive their environment, how they interact with it, and their overall considerations for the environment as they go through their everyday lives. Focus will be placed on investigating the differences in actions carried out by individuals who have varying levels of understanding of their environment and its importance. Those who have an appreciation for their natural world will be compared against those who may not have an understanding of their environment, or who may be ignorant to the importance of the natural world. The final goal of this thesis is to investigate how knowledge affects actions, with a focus on municipal waste management policies and regulations on Grand Manan. A literature review and summary of information collected from interviews and conversations with residents of the island aims to conclude effective ways to impose policies and regulations which inspire people to understand the importance of environmental policies and regulations, rather than simply follow them because it is a requirement.

### **1.2.2. Research Questions**

There are several questions for which this thesis aims to gain insight. The first question is:

What is the ethic, or overall feeling that residents on Grand Manan have towards their environment? This question is asked in an attempt to acquire an understanding of how residents either appreciate or are indifferent towards their Island's environment. The next questions is:

According to the perspectives of residents, what are the main environmental problems on the island? The purpose of this question is to gain insight into how people feel about their island, and to attempt to view the island through their lens. The next question is:

What is the overall outlook on improving the environmental conditions of the island, and are changes seen as necessary? Responses to this question will hopefully provide information about the desire for change on the island, and if it is thought to be possible to improve from the resident's opinions. The next question is:

What is the perceived level of feasibility and effectiveness of the current environmental policies, such as municipal waste disposal policies? This will be discussed with the residents in order to gain insight as to the difficulty of following policy, and if it could be made more effective. The final question of this thesis is:

What is/are the most effective method(s) to encourage residents of communities like Grand Manan to understand and want to follow environment-related policy?



While community understanding of environmental problems the focus of this thesis, the general process of introducing new policy to communities will be discussed and researched, and various aspects will be considered when discussing how to implement policy in an effective manner which is able to invoke positive change in a community.

### **1.3. The Physical Setting of Grand Manan Island**

#### **1.3.1. Geographic Description**

Grand Manan, New Brunswick, is an island (roughly 152.8km<sup>2</sup>) located in the Bay of Fundy, southwest of Saint John, New Brunswick (Statistics Canada, 2016). To access Grand Manan, one must take the only available ferry route which departs from a small village called Black's Harbour (Heald, 2015). Grand Manan exists in what is properly defined as an archipelago but most residents and visitors refer to the whole place as "Grand Manan". The islands in this archipelago on which people reside are White Head Island, and Grand Manan Island, however the focus of this thesis will be Grand Manan Island and its residents.

The Village of Grand Manan was amalgamated in 1995, and is made up of the former villages of North Head, Grand Harbour, and Seal Cove, as well as two former service districts named Castalia and Woodward's Cove (Village of Grand Manan, n.d.). These area titles are still referred to by local people when describing places on the Island in reference to one another. There are other area titles on a map of Grand Manan that can be used to describe places such as Southern Head, which is on the southwestern part of the island; Ingalls Head, and Rocky Corner, which are more on the eastern side of the Island. These amalgamated villages are

dispersed mainly along Highway 776, which follows the southeastern side of the island. The ocean is visible from most areas along the Highway, which runs from North Head to Southern Head.

### **1.3.2. Travelling to Grand Manan**

The main ferry that is used to carry passengers and their cars from the mainland to Grand Manan is called the Grand Manan Adventure, or The Adventure, for short. The Adventure carries 82 vehicles, and up to 360 individual passengers on board (Government of New Brunswick, 2011). The crossing time is officially 90 minutes, but this voyage can take slightly more or less depending on the weather conditions. During the winter months, it is not uncommon to have to wait for the ferry's vehicle deck doors to require unthawing before being able to open and allow passengers to continue their journey. During the summer months, there is an additional ferry that operates in order to accommodate the demand of tourists visiting the island. The second ferry is called the Grand Manan V, and is commonly referred to as "the five" by locals. In the off season, there are four crossings per day (one every four hours), on the Adventure. In the summer both ferries run, allowing seven crossings per day at a rate of once every two hours (Coastal Transport, 2012). There is no fee to travel to Grand Manan via the ferry, however, there is a fee per passenger to depart from the island.

### **1.3.3. Geological Characteristics**

According to Marshall (2009), Grand Manan varies in geological formation and landform layout. The eastern portion of the island sits at a low elevation, in some places at sea level. This area consists of sedimentary rock formations, as well as volcanic metamorphic rock, both sitting

at low elevations (Fyffe et al., 2011). The low elevation of the area creates many beaches and is suitable for harbours. The main harbours on the island are in North Head, Ingalls Head, and in Seal Cove. The Eastern side of the island tends to be more dangerous for boats due to the existence of the volcanic metamorphic rock close to the surface of the water surrounding the island (Fyffe et al., 2011). The Western side of the island (also referred to as the “back of the island” by locals), differs in landscape and rock type dramatically from the Eastern side. The back of the island consists of igneous rock formations with basalt columns, which form steep hills and dramatic 100 metre cliffs towering over the shore below (Fyffe *et al.*, 2011). These differences in landform affect the layout of dwellings on the island. There are more houses on the lower eastern side due to more accessibility. The back of the island, around Dark Harbour, has small hunting and fishing camps, but these are not suitable for permanent dwelling. Because of the lack of permanent homes on the back of the island, many Grand Mananers visit their camps as a way to “get away” for a while, even though Dark Harbour may only be ten minutes from their permanent home (Marshall, 2009).

There is an interesting variation in temperature on Grand Manan, which creates what have been referred to as microclimates (Marshall, 2009). For example, the northern side of the island often has warm sunny days during the summer months, while on the very same day, the southern side of the island will often be foggy, and far cooler in temperature. This occurrence is evident when one looks at vegetation patterns on the island. Often, lupines at North Head bloom two weeks ahead of those at Southern Head and Deep Cove area. In the winter months, the temperature variation causes snow on the north side of the island to melt far faster than on

the southern side. Residents on the southern side experience snow for a longer period going into the spring than those of the Northern side (Marshall, 2009).

#### **1.3.4. Flora and Fauna**

Common vegetation on the island includes birch, tamarack, fir, maple, and spruce species. The back of the island has many salt marshes, ponds and bogs which make up unique vegetation zones (Government of New Brunswick, n.d.). In these areas one might find plants like marsh grasses, sea lavender, and orchids. There are also many different species of wildflowers all over the island, including black-eyed Susan's and lily of the valley (Grand Manan Island, n.d.). Many wild berries such as black berries and strawberries can be found throughout the island as well (Marshall, 2009).

Grand Manan has been recognized as an important habitat for breeding sea birds in the Bay of Fundy region. Some of these birds include the herring gull, common eider, double-crested cormorant, and the razorbill (Ronconi and Wong, 2003). According to the Grand Manan tourism and Chamber of Commerce website the only terrestrial species native to the island are small rodents such as the meadow vole and deer mouse. Today there are introduced species such as beavers, white tailed deer, otter, muskrat, hare, and red squirrel (Grand Manan Tourism Association and Chamber of Commerce, 2014).

### **1.4. Human and Cultural Geography**

#### **1.4.1. History of People on Grand Manan Island**

According to author and ethnographer, Joan Marshall (2009), most residents on Grand Manan have family lineages that run back many generations. The island was first reported to be

sighted by John Cabot in 1498. The earliest map including Grand Manan was published in 1558, and included the entire archipelago. The island was first described and written about in reports by Samuel de Champlain and fellow explorers in 1606. The island was first circumnavigated in 1770, by the British Captain William Owen and he described the merits of the island, including the many harbours and inlets which could be useful for harbouring vessels (Marshall, 2009).

Grand Manan did not have permanent settlement until the 18<sup>th</sup> century. Although there is no artifactual evidence, there are beliefs among historians that Passamaquoddy escapees from a Maine encampment were the first to have camps on the Island. There is additional information which suggests that the Passamaquoddy were seasonal residents, camping on the northern areas of the island in search of fish and seals during the summer months (Marshall, 2009).

Most of the earliest settlers on Grand Manan were those who left the United States during and after the American Revolution. By the 1780s, land grants were given to the few settlers that had arrived on the Island. These funds were intended to go towards improving the living conditions in order to attract more settlers. The first official permanent settlers on the island were Captain Thomas Ross and Moses Gerrish. Throughout the history of Grand Manan, the culture brought along with those who came from the United States has influenced the culture of the island today. One example of this is the Baptist church, which is still prevalent on the island today (Marshall, 2009).

The island had been fought over between the British and the United States until the treaty of Ghent re-established the borders between what is now Canada and the United States.

In 1817, the boundary commission working within this treaty declared that Grand Manan and surrounding islands are territory of the British, now of course, Canada (Grand Manan, New Brunswick, n.d.) Prior to this, Grand Manan was left out of many maps because it was uncertain which state it belonged to (Marshall, 2009).

Marshall wrote that the people of Grand Manan have continuously had strong ties to the sea. An excerpt from one source written in 1852 remarked at the hard-working and industrious people from Grand Manan. Also in this excerpt, people of the Island were described as active, tough sailors and “excellent fishermen, as well as admirable pilots for the bay” (Marshall, 2009). It has been found in historic documents that the Americans thought there were no-one better aboard a fishing vessel than a native of Grand Manan. Pilots were not the only thing important to shipping that came from the island. Many large ships were built from the forests of Grand Manan during the 19<sup>th</sup> century (Small, 1997).

There is an extensive history of shipwrecks beginning in the 1720s, resulting in great loss of life and shipping losses around the island. There have been over 300 wrecks in 200 years of written history on the Island (Grand Manan Museum, n.d.). Grand Manan sits at the entrance to the Bay of Fundy and was a very busy area once shipping, travel, and mercantilism took off between British North America and The United States. This rise in use, combined with the large amount of reefs, ledges and rocks as obstacles made the area very dangerous until the introduction of radar and global positioning technology in the 20<sup>th</sup> century (Marshall, 2009). Many families of those on Grand Manan have stories that have been passed down for generations. Many of which describe the heroic lifesaving endeavors of early settlers, and

eventually, lighthouse keepers along the shores of Grand Manan. Many islanders were ready and available to help those in trouble, and many found employment in pilotage positions to navigate around the more dangerous areas. The first lighthouse, known as Gannet Rock, was first lit in 1831 and stands to this day, although it is no longer maintained or relied on for navigation. There are several lighthouses, fog horns, and bell buoys scattered throughout the area surrounding Grand Manan, placed with the intention of warning ships of dangerous areas ahead. One of the more popular lighthouses on the island is Swallowtail Light. It was first lit in 1860, and still has a fully functional light and foghorn to this day. Much like Gannet Rock, Swallowtail is not relied upon for navigation as it was before on board navigation technology was available (Swallowtail Lighthouse, 2015).

Some of the oldest family names found here are Daggett, Small, Guptill, and Ingersoll (Marshall, 2009). In the beginning of the 19<sup>th</sup> century, the population of the island was 200. By 1861, the population was 1535. By the time the 19<sup>th</sup> century was ending the population was over 2500, which is very close to the population today. The first post office arrived in 1845, and the first ferry service was brought to the island in 1884 (Small, 1997). That same year, the first tourist establishment was opened and has operated from then to today as the Marathon Inn (Marathon, n.d.).

Historically, the people of Grand Manan have been seen as hard workers, able to support themselves independently from the mainland (Small, 1997). Today the people of Grand Manan are still described as having a culture of entrepreneurship. This points to the many businesses and hard-working people who live there today. Many work in the tourism industry,

service industries such as grocery and convenience, and of course in the fishing industry (Marshall, 2009).

## **1.5. Economic Geography**

### **1.5.1. Introduction**

The island of Grand Manan has historically been a self-sustaining industrious place, with hard-working residents (Marshall, 2009). Today this characterization continues, with people employed in the very successful fishing industries, as well as tourism, and other smaller forms of income. The main fishing industry type has evolved over the years due to changes in regulations, stocks, and costs, but today lobster fishing is the most lucrative industry on the island (Fisheries and Oceans Canada, 2020).

### **1.5.2. The Fisheries**

As stated, the main industry on Grand Manan are the fisheries. The main fisheries on the island traditionally included lobster, groundfish, and herring. Scallops, sea urchins, periwinkles, and dulse harvesting are more recent fisheries which provide income for islanders as well (Marshall, 2001). The wild fishery had been pervasive since settlers began exploiting the resource until the 1950s when commercialization of the industry began to occur. Fishing started out very close to the shores in small man-propelled wooden boats called dories. These were more effective than using large boats, due to the lack of breakwaters and protected areas to keep large ships safe from storms (Marshall, 2009). Over time, as technology improved and breakwaters and protected harbours could be built, the boats became larger and larger and fishing methods evolved. New technologies such as nylon rope, scuba diving capabilities, and



the machinery to build deep-water weirs allowed the herring industry to grow immensely, beginning in the 1950s (Marshall 2009; Marshall 2001).

### **1.5.3. Rise of Commercial Fishing and Related Challenges**

Mombourquette (2019) described that as the newly commercial fishing industry became more and more successful, there were hints of resource depletion appearing by the 1960s. This triggered an intervention of the once open wild fishing industry by the federal government, with the introduction of various conservation policies. Included in these policies were limits imposed by licensing controls. Eventually, due to the high costs associated with purchasing licenses and maintaining outfits in accordance with the new conservation regulations, fishing became increasingly less financially feasible for many on the Island. Mombourquette (2019) discussed this with locals who reported that prior to the regulations, the island's fisheries were far more diverse and they generated more income for the island's economy.

Low income from herring and groundfish triggered an individual transferrable quota (ITQ) system, which resulted in large corporations leasing or buying the licenses off local fishermen who could no longer afford to operate their fleets locally. This change in policy combined with low catch caused income for the local fishermen to continue to drop, making the operation of their businesses unaffordable. This resulted in more and more fishermen on the island being forced to sell or lease their licenses to large, off-island companies. The effects of this are sizeable. Before the ITQ system, the fishermen owned and operated their own fleets independently, and they could pay their crew and earn income, thus supporting their local economy. After the ITQ system and essentially being forced to lease or sell, many could not

afford to continue operating. Today, both the groundfishing and herring industries are majority company owned. Many locals reported that the community is far less resilient now than before, because the only remaining and successful locally owned fishing industry is lobster. Overall, the federal government's introduction of ITQ has led to regional inequalities that did not previously exist, which has large impacts on Grand Manan and other small fishing communities (Mombourquette, 2019).

#### **1.5.4. The Lobster Fishery**

The lobster industry is noted to be the only fishery on the Island which is still independently owned, and which lands increasing gross revenues since 1997. In fact, growth in the landed lobster values are greater than the losses in the other fisheries (herring and groundfish) (Mombourquette, 2019). Lobster fishing provides a healthy income for those employed. Williams and Bateman (2018) reported that during healthy years, Grand Manan lobster boats can bring in approximately 2000lbs of lobster per day. Considering the market price per pound at the time of their study was \$6.50, this means the boats can earn around \$13000 per day.

Grand Manan falls under lobster fishing area 38 (LFA38), and lobster fishing area 38b (LFA38b) which is territory disputed between Canada and United States, known as the "grey zone". Within LFA38, Grand Manan is included in Charlotte County, NB. This area is reported to make up for \$155 339 441 in total landing fishery values, and \$127 947 962 of this comes from landed lobster value, meaning lobster accounted for 82.4% of the total landed value in 2016 (Fisheries and Oceans Canada, 2020). In the past 5 years, there were on average 332 employees

aboard LFA38 lobster fishing vessels, averaging 3 crew members per vessel. From 1988 to 2017, the average price of lobster, adjusted for inflation, was \$6.61 per pound. Between 2016 and 2017 LFA38 had the highest weight in inshore lobster landings in the Maritime Region, at 46.5 tonnes of average landed weight per license. (Fisheries and Oceans Canada, 2020)

While the data shows that income and relative success of the industry is high, the costs involved are also high. A local Grand Manan resident remarked that the cost of a new lobster boat can be anywhere from \$750 000 to \$1 000 000, and the license covering LFA38 and LFA38b can cost \$1 million to \$1.2 million. The average income of a lobster boat captain is up to \$500000 per year. The share, or full time employee alongside the captain, can earn up to \$200000. The crew, which is usually hired by the day, called “the bander” and “baiter”, can make anywhere from \$300 to \$650 per day, depending on the license type. Fuel for one day on the water for a lobster boat operating at normal capacity can cost approximately \$7000 per day. According to this local, 60% of the daily earnings go to the captain, 20% go to the share, and the remaining 20% go to the boat (bait, fuel, maintenance, etc.), and the crew.

#### **1.5.5. Tourism and Other Forms of Income**

Tourism is a sector which the Island of Grand Manan benefits from economically. Tourism began early in the 1900s with summer visitors including birdwatchers, artists, and writers. Many of these visitors were seasonal, returning each year to their small summer cottages scattered throughout the island. Until 1990, the tourism industry was a minor source of income for the island. The introduction of a new vehicle-passenger ferry, which was far larger than the previous, allowed for more visitors to come to Grand Manan. Interestingly, today, most

of the tourist operations and accommodations on the island are owned by those from away, rather than locals on the island. Marshall (2001) delivers a notion of hesitancy amongst Grand Mananers towards those from away who come to the island. It has traditionally been a place of insiders and outsiders, those who have family history on the island, and those who do not. This, she says, is because of the strong sense of history and shared experience between the locals which goes back generations. Changes made by those from away often appear as a threat to the way of life on the island (Marshall, 2001). In the 1990s, the federal government provided Grand Manan with funds meant to go towards accommodations, in hopes to increase tourist activity on the island (Marshall, 2001). Those who visit the island have many options for tourist activities. Hiking and sightseeing, whale watching, beaches, museums, and historical sites are popular attractions to the island (Grand Manan Island, n.d.).

Today, tourism remains a source of income for the island, but it is not main industry which the island thrives off. Other smaller industries on the island, or industries which are operated by companies rather than residents, include dulse, salmon aquaculture, rockweed, and periwinkle harvesting (Statistics Canada, 2016); (Gheorge *et al.*, 2019).

## **1.6. Environmental Issues on Grand Manan Island**

### **1.6.1. Introduction**

The literature provides minimal insight to the environmental issues which exist on the island of Grand Manan. Many articles and reports are far outdated, and information within has not been updated. Based on the limited literature, there are several environmental issues and concerns which researchers, and residents of Grand Manan face.

### **1.6.2. North Atlantic Right Whale**

One of the more prominent issues surrounding Grand Manan, is the conservation of the North Atlantic Right Whale. The whales frequent the Grand Manan area as they migrate throughout their known region from Florida to the Bay of Fundy, to offshore Northern Newfoundland. Hinch and De Santo (2010) discussed the Grand Manan whale conservation area (GMWCA). This was designated in 1993, before marine protected areas (MPAs) and the Oceans Act came into effect. The GMWCA is still not part of Canada's federal MPA system. The authors believe that transforming the GMWCA into an MPA would increase the efficacy of protecting the North Atlantic Right Whale. The importance of saving this species is high. At the time this article was written, there were only 332 whales in the North Atlantic region (Hinch and De Santo, 2010). A more recent estimate of the North Atlantic Right Whale population was determined to be about 409, at the end of 2018 (NOAA Fisheries, n.d).

The North Atlantic Right Whale became threatened during centuries of exploitation and whaling activities. The species became endangered rapidly, so much so that in 1935 the species became globally protected from whaling activities (Hinch and De Santos, 2010). However, due to the degree of devastation carried out on the population, the species has not bounced back as expected. This is due to a few factors, including increased shipping activity in prime habitats of the whale, deaths caused by ship strikes, and entanglement with fishing gear (Hinch and De Santo, 2010). Other threats to the species which have continued to amplify in recent years include many forms of pollution: shoreline runoff, underwater noise, marine debris, oil spills, and other contaminants. Coastal development projects including construction, blasting, ocean

energy development, offshore mining and exploration are significant sources of stress to the species as well. Ship strikes, ecosystem alteration including dredging and aquaculture, and climate change, are additional threats which prevent population rejuvenation (NOAA Fisheries, n.d. and Hinch and De Santo, 2010).

### **1.6.3. Sea Birds and Migratory Birds**

A study of the seabirds in the Grand Manan archipelago determined that there are changes in seabird numbers in the area. Overall there are fluctuations in population, which differ from historical trends (Ronconi and Wong, 2003). Some of the species numbers were shown to be relatively stable, including gulls and Razorbill, but other populations, such as eiders, had been found to decrease. The changes in population were thought to be caused by human activities within the Grand Manan archipelago. Terrestrial and marine development was deemed to be a factor due to ecosystem disturbance from mechanical equipment such as excavators or weir stake drivers. The noise is one factor of this disturbance which thought to cause displacement in seabird populations. Anti-predator nets and deliberate killing by humans in order to protect industries such as herring and salmon aquaculture are factors that lead to higher mortality rates (Ronconi and Wong, 2003). Salmon aquaculture farms were also considered to be a likely cause of alterations to seabird prey distribution. In addition, spilled salmon feed for aquaculture sites is known to attract gulls, however the effects of this food on the birds are unknown. The article insinuates that human activities on and around Grand Manan Island have led to seabirds becoming dependent on human activities. For instance, the ground fishing industry was once a large component of the island's business. A bi-product of

groundfishing was offal, which would be cast to the birds to feed on. Now that the groundfishing industry is so small, a food source for the seabirds has essentially been eliminated. Grand Manan has an important bird sanctuary, used by many migrating and overwintering birds. Disruptions in the environment around the island has the potential harm these sometimes vulnerable species (Government of Canada, 2019).

#### **1.6.4. Aquaculture**

A concern held by many residents of the island lies within the relatively new aquaculture industry on Grand Manan. A report carried out by Page *et al.*, (2005) detailed the threat of infectious salmon anemia (ISA) and the implications of this disease as it spreads through salmon aquaculture operations (Page *et al.*, 2005). ISA is thought to have first appeared in South West New Brunswick (SWNB) in the late 1990s, and has been present to this day (Government of Canada, 2020). Despite the Federal Government's implementation of Bay Management Areas designed to limit the spread of the disease, it continues to infect salmon in farms throughout the region, including those on Grand Manan (Page *et al.*, 2005). The disease is difficult to contain due to the prevalent open-net system of salmon farming, as well as the ability of the disease to spread via fish waste, processing effluents, sea lice, contaminated equipment such as boats and nets, as well as being transported in sea water. For these reasons, containing ISA is nearly impossible. Preventing the disease from spreading to other farms, even as far as five kilometres from one another is not guaranteed. In fact, farms within this distance are considered to be at high risk of the spread. As more farms are added to the Grand Manan archipelago, the ability to disperse them properly becomes more difficult and the spread of ISA

becomes increasingly likely (Page *et al.*, 2005). Many residents, especially fishermen on Grand Manan, are deeply concerned about the prevalence of salmon aquaculture in the area (Marshall, 2009). Many believe that the farms threaten the health of the traditional fisheries on the island, including lobster and herring. Farms located near herring weirs are believed to impact the catchability due to disruptions in the natural environment, thought to be scaring the herring off (Marshall, 2009). Islanders also worry about the high concentrations of salmon waste beneath the cages, and how this may affect the benthic layer of the seafloor. Lobster fishermen have reported their catches from areas where salmon farms exist to taste like the salmon feed. Many take issue with the nutrient concentrations caused by salmon excrement and salmon feed surrounding the cage sites. There is ample evidence pointing to excess nutrients causing eutrophication (Folke *et al.*, 1994). A final concern many islanders have is about the spread of ISA to wild species. As mentioned, the disease can spread via flowing water and sea lice, a vector of ISA. High concentrations of these vulnerable and potentially infected salmon is concerning due to unknowns about how the disease impacts the fisheries and whether there is a threat to humans (Marshall, 2009).

#### **1.6.5. Paralytic Shellfish Toxicity**

Sephton *et al.*, (2003) reported high death volumes of Atlantic salmon off Grand Manan due to toxins which are linked to paralytic shellfish poisoning (PSP). Algal blooms consisting of *Alexandrium fundyense*, an alga known to produce toxins that cause PSP, have been found in the waters of Grand Manan. These toxins are especially lethal to salmon as well as other sea life. Mussels found growing on affected salmon site cages had toxin levels far above the regulatory



limit. PSP toxins were found in lobster tissues as well (Sephton *et al.*, 2003). The finding of PSP toxins in lobster is evidence of the toxin spreading through the food chain, as many other species such as scallops, and fin fish such as mackerel and herring are also impacted. Because of the widespread lethality, PSP threatens the local economy (Sephton *et al.*, 2003). Potential linkages between high nutrient levels and eutrophication from aquaculture activity and the role this plays in the growth of *Alexandrium fundyense* is a concern held in the Grand Manan area.

#### **1.6.6. Rockweed Harvesting**

Another relatively new economic endeavor on Grand Manan is the highly contested Rockweed harvesting industry. Rockweed has a great market value due to its versatility and high nutrient value, which makes a wonderful additive to many products around the world. Health foods, cosmetics, animal feeds, preservatives, and agricultural fertilizers are a few products in which rockweed is a staple ingredient (Marshall 1999, and Seely and Schlesinger, 2012). Rockweed forests are an important primary producer in the oceans and a vital component of the intertidal ecosystems surrounding Grand Manan. More than 30 fish species, and over 100 invertebrate species rely on the plant for habitat and food. Seabirds such as the juvenile eider duck depend on rockweed for foraging and protection, as they are too young to dive for mussels (Seely and Schlesinger, 2012). As a species already in decline, the loss of rockweed forests will continue to negatively impact the eider duck (Ronconi and Wong, 2003). Rockweed is an important element for tidal species such as snails and periwinkles. When the tide flows out and these species are left on the rocks, the rockweed provides a cool habitat until the tide returns to envelope the intertidal species once again (Seely and Schlesinger, 2012). In addition, rockweed

is an important seaweed which sequesters carbon and nitrogen from the environment. In fact, the plant has been compared to terrestrial trees due to its sequestration capabilities. In addition to its sequestration abilities, rockweed grows very slowly, and has a long lifespan of up to 400 years. For these reasons, rockweed beds have been likened to terrestrial old growth forests (Seely and Schlesinger, 2012).

The rockweed industry is a point of contention for many Grand Mananers (Grand Manan Tourism and Chamber of Commerce, 2008). The industry was brought to the island by the New Brunswick provincial government in the early 90s, in an attempt to diversify local economies. Operations began in 1996 (Marshall, 1999). The harvesting industry is run by a large company from Nova Scotia called Acadian Seaplants Ltd. This is one reason the locals find the industry problematic. The industry was brought to help the local economy, but many employees are not residents of the Island (Marshall, 1999) and (J. Brown, personal communication, November 6, 2020).

Marshall, (1999) attended one of the town meetings where the plans for the rockweed industry were being discussed. She reported that many islanders protested the introduction of the industry to the island at townhalls, via newspapers and media, and by petitioning their government. The main concerns were the economic impacts of a large company running the business rather than a locally owned operation, the unpredictability of the new industry and its potential impacts to the local fisheries, ecosystem health concerns, and concerns of overharvesting. In addition, the documentation and plans proposing the industry were vague and unclear when it came to environmental health considerations (Marshall, 1999). Many of the

concerns from locals were not given attention, and to this day the industry continues to operate on Grand Manan.

Seely and Schlesinger (2012) reported some of the impacts that coincide with rockweed harvesting. Historically, management practices in the rockweed industry have not been adequate for the prevention of overharvesting. Regulations do not approach the industry holistically, meaning the overall role of rockweed within the ecosystem is not considered an important factor of sustainability. Many harvesting operations around the world are not sustainable due to the rate and methods used (Seely and Schlesinger, 2012). As mentioned, the species has a slow growth rate, and many harvesters cut at a level that exceeds the rate of regeneration. The plant is harvested in New Brunswick by handheld cutter rakes and sickles. In order to allow the plant to continue to grow after it has been cut, there must be a certain length of the stalk left behind. The same authors reported that certain fish species consume less food in areas where rockweed has been cut and fish biomass is “very low” in areas where rockweed harvesting has taken place. Overall, the authors concluded that there is not enough known about the long term impacts, and no evidence which determines that any amount of sustainable harvest can take place (Seely and Schlesinger, 2012).

#### **1.6.7. Other Concerns**

In Joan Marshall’s (2009) book *Tides of Change*, she took note of some of the other environmental concerns around the island, including receding coastlines, and forest clear cutting (Marshall, 2009). Mombourquette reported a sense of uneasiness among fishermen on Grand Manan. Many spoke of their discomfort with the lobster fishery being the strongest

industry, and their fears related to the resiliency of the economy and ecosystem if something were to happen to the lobster (Mombourquette, 2019).

An article from the Conservation Council of New Brunswick, written by Jon MacNeill (2017) told of a Grand Manan fisher who came across a lobster with a Pepsi can imprinted into its claw. The article discussed that this is an example of the increasingly serious marine waste problem in our oceans. It is thought that in order for this particular lobster to have had the debris lodged and grown into its claw, it must have been surrounded by marine litter throughout most of its lifecycle. The article also discussed the importance of waste management and efforts to reduce litter entering the oceans. (MacNeill, 2017).

#### **1.6.8. Waste Management**

Finding information on how to recycle, what is recyclable, and any other information about the municipal waste by-laws has proven to be difficult on the island. Throughout this research, finding any information guides about waste disposal and recycling was seemingly not possible. The transfer station has a Facebook page where they discuss local events and post changes to their hours, but information on what specific services are offered is not posted.

Many residents bring their refuse to the transfer station on their own, or hire a private company to do it for them (Mananook, n.d.). Polyethylene rope from the fishing industries can also be brought to the station to be recycled (Personal Communication). There are piles of it in the storage area waiting to be taken away. All recycling takes place off-island, and must be trucked on the ferry to mainland facilities. One informal website intended to provide information to visitors includes a “services” section. The transfer stations address is listed, as

well as a note that bottles and drink cans can be recycled there, but there is no other information (Mananook, n.d.).

## Chapter 2

### Impacts of Personal Perceptions on Environment-related Behaviour

#### 2.1. Introduction

Many factors contribute to the formation of one's perceptions of the environment. Perceptions of environmental issues can be influenced by the media and individual experiences (Tsitsoni and Toma, 2013; Kwon *et al.*, 2019; Akter and Bennet 2011, and Plotnikoff *et al.*, 2004). According to Tsitsoni and Toma (2013), the media plays a significant role in influencing perceptions of environmental issues, both locally and abroad. Kwon *et al.*, (2019) reported that people's perceptions of environmental issues are impacted by their individual experiences. Education has been argued to play a role in how people perceive their environment as well. Those who grow up being taught about environmental issues may be more likely to perceive the issues around them than those who have not had any education on the subject (Sousa *et al.*, 2016). Although the correlation between knowledge of one's environment and its issues, and action is not always strong, as found by Boyes and Stanisstreet (2012).

Thompson (2004) found that western society tends to disregard the welfare of the environment, thus having less of a perception of their environment. According to this author, others' perceptions which we are exposed to in our daily lives, such as in literature, determine how we perceive our environment. An article written about perceptions of environmental issues in Ghana discussed that knowledge did not seem to be a factor in how people perceive their environment. The authors note that in places where knowledge levels are considered low, environmental issues remain a priority (White and Hunter, 2009). Local environmental

conditions are also a key part of forming perceptions. For instance, those who are affected by water pollution are more likely to see it as an important issue than those who are not exposed (White and Hunter, 2009). Place and wealth may impact perceptions of the environment as well. Those who may depend on economic development in order to earn a livable wage are said to prioritize the trade-offs associated with development, despite environmental concerns (White and Hunter, 2009). Perceptions and concern can also depend on personal factors. For example, White and Hunter (2009) wrote about how women in Nepal tend to be more aware of deforestation because they are the ones who are most often tasked with collecting fuel wood for their families. They are more likely to perceive the overall environmental issue of deforestation as a negative occurrence (White and Hunter, 2009). A final point by White and Hunter (2009) discussed how there tends to be a perceived dichotomous view of a healthy environment and economic growth. This is not often looked at as a harmonious relationship which is why residents of areas where there are high levels of economic growth or development often describe their environment as less healthy, regardless of its true condition. Because of this, political views associated with development can be a determinant factor in a person's perception of their environment. Overall, a prominent perception found was that areas with national affluence often correlate to more citizen concern for environmental health. Place with high levels of poverty which need economic development to grow economically often have residents which will support development over environmental efforts. One exception to this is when environmental issues will have a negative impact on the economy. This is when the perception of the environment being important takes precedence (White and Hunter, 2009).

Wolf and Moser (2011) discussed how understandings, perceptions, and engagement can influence someone's desire to take up environmentally friendly actions. They explain that individuals can partake in environmentally friendly behaviour with varying levels of understanding about environmental issues. Levels of understanding can range from total absence of knowledge, to complex understanding of the cause and effects of environmental issues. Others may have a full understanding of the issue and choose not to act, or they do not act because they do not know or see it as an option to reduce their contributions to such issues. The authors explained that perceptions of environmental issues are often influenced by other issues or contexts in individuals' lives. They also found that different judgements can spark from differences in gender, age, socioeconomic status, and other variables in their lives. The final aspect that Wolf and Moser discussed was engagement. They explained that effective engagement requires research to ensure that someone is being effective in their actions relative to the context they are in. For example, people must know how to recycle, based off municipal regulations in order to be effective in doing so, otherwise their waste will go to landfill. In addition, there is evidence that "ecologically minded people" feel more actively engaged with climate and environment related actions, leading to more action (Wolf and Moser, 2011).

Cook and Ma (2014) wrote about the perceptions of environment held by landowners in Utah, and discussed which factors spark action or inaction related specifically to carbon sequestration. Despite this focus, their ideas and findings can be applied to general environmental issues. Understanding attitudes is an important factor for understanding why people choose to act to benefit their environment (Cook and Ma, 2014). Attitudes towards



one's environment seem to be based on many factors including core values, factual beliefs, and cultural/social norms. The value orientation of a person influences their perceptions and actions towards their environment (Cook and Ma, 2014). For example, someone with an anthropocentric value set may not see the same issues in their environment as someone with a more biocentric value set. Attitudes towards the environment can be positive or negative when considering the importance of the issue at hand. One's value set impacts which environmental policies they find acceptable. For example, those who do not believe that there is a pollution problem are less likely to support pollution related policy. The main findings related to value sets were that those with a more biocentric value set reported more negative changes in their environment than those with a more anthropocentric value set. Those with a biocentric value set were more supportive of acting and having mitigating policies or regulations come into effect (Cook and Ma, 2014).

## **2.2. Factors Which Lead to Proactive and Constructive Environmental Acts**

Several authors discussed multiple factors that lead to people acting in a constructive manner towards the environment. Schultz (2000) conducted research that explored how traits such as empathy impact one's actions towards their environment. Through his research, he found that the types of environmental concerns people have, their perceptions, and how they act, are tied to the degree to which they see themselves as part of nature. Additional findings revealed that the attitudes that people have towards environmental issues and climate change are tied to their personal values. These results bear similar features to the findings by Cook and Ma (2014). Schultz (2000) concluded his study reporting that environmental concern is linked to

empathy for others, and that biospheric and altruistic awareness of how actions impact others is vital in encouraging environmental behaviour that will impact one's environment.

Buyts *et al.*, (2012) found in their study on climate action that engaging the public by communicating knowledge about climate change in lay terms is one of the more effective ways to increase uptake of environmentally friendly actions. They noted that understanding the context of each community and making the communication and actions for each community specific to their values and culture is important for long term participation. If all members of the community have a clear understanding of the issue, they are more likely to become personally committed to actions centered on resolving the issue (Buyts *et al.*, 2012). Tsitsoni and Toma (2013) have similar findings, concluding that in order for the public to be truly interested and invested in the resolution of an environmental issue, they must care about it and feel empowered to act in a way that can make a perceptible difference. This speaks to a common finding regarding the correlation between efficacy and willingness to take part in certain mitigation actions.

The literature often reveals that tokenistic actions are not valued by people, due to perceptions of low efficacy. Cases in which individuals are unable to see how their actions work towards resolving an environmental issue, they are less likely to want to participate. When individuals believe that they are making a difference by the actions they take, more are prone to participate enthusiastically (Tsitsoni and Toma, 2013 and Wolf and Moser, 2011). One example comes from Cinera and Krajhanzl (2013) who explored action competence of students who go to an "Eco-School" compared to a regular school. A major finding was that students who

participate in making decisions which effectively change aspects of their school environment are more confident in their actions and believe in what they are doing. This is thought to be the driver of encouraging further action. The authors linked this principle to environmental behaviour and stated that when the students feel they are contributing to positive change, they are more likely to continue participation (Cinera and Krajhanzl, 2013).

Another factor that leads people to act in environmentally friendly ways, according to Semenza *et al.*, (2011), is risk or perceived susceptibility to the effects of environmental issues. Other authors have also discussed risk and how it impacts one's willingness to act. Johnson and Scicchinato (2000) discussed how different types of issues and associated risks lead to action or inaction. They discovered that the risks associated with issues that are relatively simple to mitigate are acted upon more than risks that come from issues that are more difficult to tackle (Johnson and Scicchinato, 2000). Aitken *et al.*, (2011) found that when the perception of risk stemming from issues like climate change is high, then people are more likely to act. Compared to individuals who are ignorant to environment-related issues, people who hold concerns about environmental issues are also more likely to mitigate and be more supportive of policies which aim to address the issues (Wicker and Becken, 2013).

O'Connor *et al.*, (1999) explored the relationship that exists between risk perception and action with regard to climate change. The assumption stated in their research is that people who perceive a high risk of unfavorable events from climate change are more likely to act and support government initiatives that promote change, even if that means they will experience personal sacrifice. One of their main findings is that environmental knowledge can increase or

decrease the perception of risk, and impact environmental behaviour based on how one understands the issue. Essentially, they explain that someone with an accurate understanding of climate change or other environmental issues and the risks involved, will often act to mitigate. However, this is not always true, as a person's willingness to act is affected by a number of other factors which have been discussed by Johnson and Scicchinato (2000), Akter and Bennet (2012), Boyes and Stanisstreet (2012) and Kwon *et al.*, (2019). Scientific uncertainty and complexity of an issue often weakens an individual's understanding, which also weakens their willingness to become active. In addition, conflicting information from various sources reduces trust in those sources and ultimately leads to less action (Johnson and Scicchinato, 2000). According to Akter and Bennet (2012), exposure to mass media which increases awareness of environmental issues will increase one's willingness to act (Akter and Bennet, 2011). External beliefs, social pressure, societal norms, physical facilitators or inhibitors, as well as the level of efficacy that someone feels their actions will have, can all influence a person's willingness to act (Boyes and Stanisstreet, 2012). In their study, Kwon *et al.*, (2019) found that students were more likely to act once they felt they had a comprehensive understanding of climate change because they felt more responsible for the results of their inaction with that new knowledge.

### **2.3. Factors Which Lead to Detrimental Actions or Inaction**

Some of the factors that were regularly mentioned in the literature relate to non-action or negative action. These factors include ignorance, lack of urgency, unwillingness to accept personal hardship, and feeling powerless. These factors can all result in non-action or behaviours which are detrimental to the environment. Akter and Bennet (2011) found that

ignorance was a factor of inaction. If people are simply unaware of how their actions are negatively affecting, then there is a low likelihood that they will stop those actions. Schultz (2000), O'Connor *et al.*, (1999), and Aitken *et al.*, (2011) concluded that a lack of concern for environmental issues results in non-action and ultimately harm done to people and ecosystems if their actions are detrimental. Lack of urgency is described as a combination of ignorance and lack of risk perception, meaning that if people do not know about the issue and see no risks to themselves they have no incentive to act. Buys *et al.*, (2012) found that one major challenge to communicating risks in order to inspire and motivate action is the distance in space and in time that environmental issues often appear to have from different areas in one's surroundings. The lack of obvious issues allows people to feel a lack of urgency, and that there is no immediate threat. This determination is backed by O'Connor *et al.*, (1999), Adams and Savahl (2015), and Aitken *et al.*, (2011).

Many people are simply unwilling to let go of creature comforts and accept personal hardship in exchange for helping reduce environmental issues. Korkala *et al.*, (2014) stated that lifestyle, comfort, and consumption patterns, are often considered of higher value to people than making changes to help the environment. Rosentrater *et al.*, (2012) had similar findings, adding that the most effective policies are unfavorable to politicians because they require the public to take on some more personal hardship and give up some of the conveniences that we currently have in the developed world. This can become a deciding factor for voters, leading to elected officials altering their policy goals to stay in power (Rosentrater *et al.*, 2012).

A feeling of helplessness derived from being or feeling powerless as an individual is an additional factor that has been shown to prevent people from acting against environmental issues (Aitken *et al.*, 2011 and Kwon *et al.*, 2019). Both authors agree that even those with a high degree of environmental education and awareness of issues will give up on engaging in environmentally friendly behaviours. This often is due to feelings that individual efforts are insignificant (Aitken *et al.*, 2011, and Kwon *et al.*, 2019).

A study by Adams and Savahl (2015) investigated the environmental perceptions of adolescent children in South Africa. Participants discussed their frustrations and observations in their municipalities. They reported about how participants felt that those who were acting in detrimental ways felt indifference towards the environment and to their peers. Some described this situation manifesting as people throwing garbage on the streets when there are refuse bins nearby. Children commented that they feel that those who are littering may think that picking up the refuse is someone else's job, and thus there is no personal responsibility to properly dispose of waste. However, a major issue in the study area was that the town does not clean up after those who litter, leading to the accumulation of waste and pollution. A lack of knowledge about the environment and the consequences of ecological degradation was another reason the children felt detrimental behaviours took place in their communities. This relates to the theme which describes a culture of inconsideration, which participants felt was an important aspect to shift in order to convert to a more environmentally conscious community (Adams and Savahl, 2015). This negates what White and Hunter (2009) wrote, stating that knowledge of the environmental issues is not continually a factor in perceptions and subsequent action. Another

reason for detrimental behaviour is a lack of perception. This points to the often gradual rate of change involved in environmental degradation. Small imperceptible changes regularly go unnoticed, so lack of realization and urgency is to blame for inaction and detrimental behaviour.

In the article by Cook and Ma (2014), they discussed trust as a factor for following environmental policy. This work applied more to large-scale environmental regulations, however, the overall principle is applicable to any policy implemented by a governing body. They found that trust in the governing bodies which enforce policy is a deciding factor in how policies are followed and obeyed. An illustration of this scenario can be thought of as any instance where those who do not believe their environment is polluted do not see value in obeying pollution related policy. This indicates that regulations and policies must be enforced alongside evidence and rationale in order to garner obedience and support (Cook and Ma, 2014). This notion is backed by Johnson and Scicchinato (2000), who wrote that public trust in the enforcing and imposing bodies of policies and regulations impacts willingness of the public to act on those regulations. They add that those who do not perceive an issue in their environment will not support strong environmental regulation (Johnson and Scicchinato, 2000).

### **2.3. Methods of Motivation and Increasing Action**

Encouraging the public to partake in environmentally beneficial behaviour and action is done using various methods by groups such as government, non-profit organizations, and non-governmental organizations (NGOs). On a smaller scale, people can be motivated to act beneficially by workplace managers, school teachers, and businesses. Some methods discovered in the literature include education and information-based instruments, such as public notices

and pamphlets (Wu, 2009); imposing command and control regulations such as mandatory restrictions or laws (Taylor *et al.*, 2012); positive and/or negative economic incentives, creating/enhancing social norms, and marketing techniques. The main actor involved in environmental action on Grand Manan is the Government of New Brunswick, and the island's municipal government.

### **2.3.1. Current Methods of Motivating Environmentally Beneficial Behaviour**

Many governments use regulation and policy to enforce environmentally beneficial behaviour from individuals and groups such as corporations. These often coincide with penalties for non-compliance. For example, in the Halifax Regional Municipality (HRM) citizens are asked to sort their waste into different recyclables, compost, and garbage. Part of this policy involves the mandatory use of clear garbage bags, allowing waste collectors to view the contents of the bags. Waste will not be collected if waste is improperly sorted or arranged on the property. Limits to garbage and waste bag size and amounts are prescribed based on household size or function, this is designed to encourage residents to sort and properly dispose of their waste. Penalties are given to those who do not comply in the form of 24 hour notice compliance orders, fees and tickets which vary depending on the severity of the infraction (Halifax Regional Municipality, 2017).

On a federal level, the Canadian government has several laws associated with environmental protection, including the Canadian Environmental Protection Act, Fisheries Act, Transportation of Dangerous Goods Act, Species at Risk Act, and the Canadian Environmental Assessment Act (Tidball, *et al.*, 2019). The Canadian Environmental Protection Act is designed to



protect the environment and human health by preventing pollution. It also aims to contribute to sustainable development by protecting the environment from pollution related damage or harm (Government of Canada, 2020A). This act contains the Environmental Enforcement Act, which includes a fee regime followed by enforcement officers while issuing penalties. Motivation to obey is in the form of financial disincentive, outlined in the Enforcement Act (Government of Canada, 2020B).

Municipal governments must follow regulations created by federal and provincial government, and are granted authority to legislate specific local regulations which may apply to the municipality specifically (Tidball *et al*, 2019). Within the municipal by-laws on Grand Manan, the municipality is to follow the Canadian federal, as well as New Brunswick provincial environmental regulations. In addition, the community has municipal by-laws which mention environmental concerns in the context of regulating development on the island. By-law 39-04 provides an outline from which to garner growth of the planning areas on the island. This includes community-industry regulations and general zoning restrictions with some mention of environmental considerations. By-Law 39-04 includes general objectives surrounding many municipal matters, and some related to environmental protection. Objectives related to environment on the island include:

Discourage pollution and nuisance;

Protect surface and groundwater sources;

Discourage development on land with environmental constraints; and

Preserve and enhance traditional fisheries.

Maintaining sustainability is a major factor throughout the environment-related topics in by-law 39-04. Headings within the by-law include water protection, soil conservation, and human-made hazards. There are also proposed policies discussing sustainability of natural resources on the island such as fisheries, mining, agriculture, and forestry. Throughout the by-law there is no mention of fines, penalties, or infractions. Nor is there mention of enforcement methods or means. Residents reported no knowledge of an enforcement body for these regulations. RCMP were mentioned, however, residents did not believe they were involved with municipal by-law matters.

### **2.3.2. Efficacy of Current Methods**

There are various types of regulatory style policies investigated in the literature. In work by Taylor *et al.*, (2012), command and control, economic instruments, co-regulation and self-regulation were listed as the main types of regulatory policy.

#### **2.3.2.1. Efficacy of Command and Control**

Command and control regulation is a common feature of the environmental policies and regulations in Canada at federal and provincial levels. This style of regulation works by “imposing mandatory obligations or restrictions on the behaviour of other firms or individuals” (Taylor *et al.*, 2012, pg. 274). This is often effective since command and control regulations are enforceable by law by governments. Wu (2009), backed the benefits of command and control, stating that strong regulatory pressure involved in command and control is a major factor in improving compliance. It is thought to ensure cooperation and compliance by firms and individuals. However, the efficacy of command and control is contingent on the type and scale

of issues targeted by the regulation (Taylor *et al.*, 2012). Large-scale matters, or those which occur in areas with less resources (i.e. small towns), are often less affected by command and control regulation methods (Taylor *et al.*, 2012). Resources used to carry out monitoring and enforcement, such as enforcement officers and monitoring personnel and equipment, are required for command and control methods to operate effectively. Often these resource components are not widespread enough to handle large-scale issues systematically. In addition, small towns are often unequipped to provide space for these resources (Taylor *et al.*, 2012). This finding aligns with what Kennedy (2010) determined, explaining that regulation aimed at large groups such as industries is cheaper to enforce than regulation aimed at individuals throughout large spaces. Again, this is due to the manpower required for enforcement and monitoring (Kennedy, 2010). Further downsides of regulation which align with command and control methods were laid out by Kennedy (2010). Noted was the pattern of fragmentation in the application of command and control regulation. This refers to the ease of focusing command and control on large industries rather than on individuals, thereby allowing individual actions to go unnoticed. Another issue with regulating individuals using command and control is undesirable political unpopularity which can come from regulating individuals. Many lawmakers do not wish to take on risk in order to regulate at this level. Despite concerns with the command and control method, Kennedy (2010) holds that because of the degree to which individuals contribute to large-scale environmental issues, it is worth targeting them with command and control regulation, noting that many existing regulatory frameworks are unlikely to reach the sustainable results which they aim for (Kennedy, 2010).

### **2.3.2.2. Efficacy of Economic Incentives**

Economic incentives are another common tool used by our government as a method for increasing regulation cooperation (Government of Canada, 2013). Taylor *et al.*, (2012) explain economic instruments as those which work by encouraging voluntary behavioral changes which ultimately work towards policy goals. Particular examples include taxes, fees, subsidies and payments, tradeable permits, and green taxes (Taylor *et al.*, 2012 and Government of Canada, 2013). Economic incentives are thought to be adaptive to the needs of businesses and individuals by allowing a certain degree of elasticity in deciding how to obey the regulations (Taylor *et al.*, 2012). This adaptiveness differentiates economic incentives from command and control methods and is thought to be more cost-effective for businesses and individuals. However, Taylor *et al.*, (2012) argue that despite the flexibility of economic incentives, this method may be less effective for achieving regulation goals because of how the regulated actors choose to interact with the incentive options.

### **2.3.3. Efficacy of Education and Information-based Instruments**

While not necessarily used commonly by our government, there are a few types of information-based instruments which act to supplement the main policy methods. Information-based instruments aim to improve the actions of individuals and businesses by giving them information from which they can base their decisions and behaviours (Taylor *et al.*, 2012). Generally, the listed benefits of information-based instruments are that they are thought to be non-invasive, cost-effective, and non-coercive (Taylor *et al.*, 2012). One type of information-based instrument is called “targeted information provision”. The goal of this is to provide

tailored advice and training to individuals and businesses in order to address environmental issues in specified areas. Participants are advised information from the provisions to make better decisions which work towards the regulation goals. Wu (2009) had findings that support this information, but in a larger-scale setting. The main finding was that firms which have access to targeted information are often found over-complying with environmental regulation. Educating management and staff about regulations and issues is said to reduce instances of regulation violation. This rationale motivates the statement that educational components about the regulations and environmental issues should be included in programs that encourage compliance (Wu, 2009). However, this method can fall short in assuring changes in behaviour due to a lack of evidence of efficacy, and a high degree of difficulty in quantifying the benefits. Distinguishing where improvements come from is challenging for researchers (Taylor *et al.*, 2012).

#### **2.3.4. Efficacy of Co-regulation and Self-regulation**

An additional tool discussed by Taylor *et al.*, (2012), was co-regulation and self-regulation. Self-regulation is described as actions which are undertaken by those who are being regulated. Co-regulation is similar, but involves further government involvement. Overall, findings indicated that self-regulated and co-regulated approaches are effective when there is greater threat of harsh enforcement waiting to be imposed if improvement does not take place. These were deemed less impactful than command and control options, but could be implemented in combination with other methods to increase efficacy.

### **2.3.5. Efficacy of Community-based Social Marketing**

Kennedy (2010) had a unique take on methods which create effective uptake of environmental regulations. Among these were targets and incentives for the individual, increasing norms which focus on positive environmental behaviour, and removing the barriers to sustainable actions. The primary recommendation made to change individual actions was community-based social marketing. Kennedy (2010) explained community-based social marketing in the context of environmental regulation compliance and action as changing behaviour in communities with initiatives that are delivered with “personal level contact”. The persuasive elements of this method include removing barriers to change, promoting benefits of change, acquiring commitments from partakers, developing norms, educating using credible information in an appealing way, and using incentives to encourage beneficial behaviour and adherence to policy goals (Kennedy, 2010). Due to the unique variances in individual behaviours, and backgrounds of behaviour, understanding and analyzing target communities is an important first step before working to change behaviour.

As mentioned, some techniques which were investigated include commitment, using clear and credible information to educate, using incentives, and social norms. Commitment, especially in a public sphere, was investigated. A case study involving homes in Iowa and natural gas consumption provides an example of the results of commitment. Three houses were involved in committing to less natural gas usage in their homes over a period of time. One house was given information on how to consume less gas in their day to day lives, and the residents were told their commitment and results would be made public. Another house was

given the same information, except they were told their commitment and results would not be made public. A third house was not given information on how to reduce their usage, and were not told their results would be made public. The house with the public commitment and public results decreased their natural gas usage the most out of all three (Kennedy, 2010).

The use of incentives was tested in an additional case study. Three households were tasked to increase recycling over a period of four weeks. One house made a public commitment, and one house was offered incentives in the form of local business coupons. The final house was simply provided information leaflets on recycling. The first two groups with either commitment or an incentive increased their recycling by almost half. The final house had not significantly increased recycling efforts (Kennedy, 2010).

Social norms were discussed in another case study done by Kennedy (2010). Results determined that for topics such as energy consumption, social norms were effective in reducing overall usage. To test this, homes in a neighborhood had their energy consumption posted on their doors for community members to view. Those who were thought to be doing well received stickers of approval, and those who were not doing well did not. A social norm of decreased energy consumption embedded in a common goal to increase approval by neighbors was created, and was shown to work. However, the author did note that creating social norms and their effectiveness depends on the scope and type of issue, and may or may not be more effective if combined with other methods (Kennedy, 2010).

## Chapter 3

### Overall Findings

#### 3.1. Methods

The study uses qualitative research methods to investigate the views which Grand Manan residents have in relation to their natural environment. Non-critical interviews and casual discussions were held with a collection of residents from various locations on the island (Saldaña, 2011). Interviews were semi-structured with a set of 11 questions. Discussion material contained additional comments and questions as interviewees were provided the opportunity to elaborate on the interview questions.

After receiving approval to carry out the study from the Saint Mary's University Research Ethics Board (REB), interviews and data were collected throughout the months of August, September, and October of 2019. Included in the data are audio recordings and transcriptions of semi-structured interviews with participants. All prospective participants were made aware of the nature of the study, possible risks, and time commitment. Any concerns they might have had were addressed prior to any gathering of information. All recorded interviews and discussions were done with the informed consent of the participants, who signed consent forms prior to engaging (Saldaña, 2011). All interviews ranged from 10 to 30 minutes in length. To initiate interviews, potential participants were approached at farmers markets and other locations around the village. Other participants were approached based on suggestions from previous participants (snow-ball sampling method), and familiar residents of the island to friends and family members. A group discussion was held at the local museum in August. In



total there were 10 individual interviews and discussions, and one group discussion with 4 participants held for this study. Questionnaires and research ethics board approval can be found in the appendix at the end of the thesis document.

Participants ranged from ages 18 to 75, including both male and female identifying people. Interviews and discussions consisted of asking the participant each of the listed questions, recording their response, and adding follow up questions if needed. Questions sought information about where they reside on the island, how they perceive the natural environment around them, and environmental policies they are aware of. In addition, discussions within the interviews often moved to topics of perceived sources of pollution, reasons the condition of the island is as it is, and participants thoughts and ideas for how to improve the environmental condition of the island, as well as their personal environmental oriented actions and practices.

### **3.2. Limitations**

Due to the in-person nature of the data collection, plans to collect additional data via interviews and discussions had to be cancelled due to the onset of COVID-19 and subsequent regulations which barred access to the study site.

### **3.3. Overview of Results**

As part of the interview process, all participants were asked about their personal perspectives of their environment in their immediate area, and across the entire island in general. Participants were also asked about changes in the environment they may have noticed over time.

### **3.3.1. Overall Theme**

Many of the participants approached these questions from the point of view of litter and visible environmental concerns. Many referenced the amount of litter they see as a gauge for the overall health of the environment. The majority of participants felt that changes had occurred over time, and many felt that there were both positive and negative changes happening. Positive changes include the termination of using the wharf as a garbage dump, and introducing a more comprehensive recycling and garbage system. Negative changes include increased pollution and exhaust from fishing fleets, less use of biodegradable materials such as wood and paper, and more use of plastics and petroleum-based products which do not biodegrade. As a result of these products, residents listed visible litter on beaches and in shorelines as one of the most noticeable changes over time. Many participants pointed to the fishing industry as a major pollution source, including litter and marine waste. Several compared the state of the island to the state of urban areas, and remarked that the environmental conditions on the island are superior those in the cities.

### **3.4. Findings**

#### **3.4.1. First Impressions: Perspectives on General Environmental Condition of the Island**

One of the first questions in the questionnaire asks participants to discuss their personal perspectives on the condition of the island's environment, both around the area in which they live, and of the overall island in general. Participant #1 had extensive thoughts and comments on this question, and drew on their background as a marine biologist and long-time resident of the island. They shared that from past experience partaking in ditch cleanups in North Head,

they consider the area cleaner than one might find in an urban setting. They noted that a likely reason for better conditions on the island is that there is no municipal waste collection service and the waste station on the island is free for residents to use, so many residents are “pretty good” about bringing their garbage to the transfer station.

Participant #2 shared their perspectives. They stated that around their home in North Head, they felt the island was “marginally better than 10 years ago, but could still be improved upon”. Overall on the island, they mentioned that there are places on the island that are relatively pristine, towards the back of the island. They note that the wharves are kept pretty clean, so “it isn’t bad”. They include that are also places where things wash up on the beach from other countries, so it can be improved. “You know, one to 10, I would give it a 5”. This participant believes the island could be considered polluted, despite the overall condition being relatively good, “When you look at the plastics on the beach, the rope, fishing gear scattered everywhere, it is polluted”.

Participant #3, also from North Head, commented on the general cleanliness of the island. They mention that there are different amounts of litter in different places, at different times throughout the year. According to this person, litter on beaches tends to vary depending on time of year and location of the beach. Beaches are more littered during lobster fishing season. They also told about garbage on the side of the roads, adding that they have personally witnessed it being tossed from car windows. As a frequent hiker, the participant noted;

“Where I walk in the woods I don’t see much litter at all, because the people that tend to hike the trails where I go, don’t litter, although occasionally I do find some. Apparently if

you go on the buggy trails you'll see a lot more, but I avoid those, so I don't see it myself".

Overall, participant #3 considers the shape of the environment on Grand Manan to be decent, but holds that the island has far too much litter.

Participant #4 felt that the overall condition of the island is "fairly good", stating that it "could be worse". However, they did describe perceptible issues of litter in and around their yard. They also made note of areas around the island they believe to be littered, such as playgrounds and beaches.

Participant #5 resides in North Head, and considers the area to be in good shape despite the amount of commercial activity that takes place there. Especially when considering the close proximity of the wharf, where many of Grand Manan's fishing boats are docked. Although in good shape, they state that there is room for improvement.

When asked about how they perceive their environment on the island, participant #6 stated "Well I think it looks pretty good. I've seen it look a lot worse... Outside of the city, you just go the mainland and you've got smog, and you've got all kinds of crap. Actually I think our good ol' salt air is good for us". In response to the question of if they feel the environment is polluted, they responded that they did not feel it was polluted, aside from their neighbor who smokes and leaves butts on the ground to flow into their yard in the rain.

A resident living in the central part of the island, participant #7, felt that the area in which they live is in great shape. They credit ditch cleaners who, in the spring, go out and pick up litter from the sides of the roads and ditches. In more of a general sense, this participant

holds their opinion; “I think that we have a fairly clean environment, very, no it's more than fairly clean, it's a good environment”. They mentioned that people seem to take pride in the island’s environment, and care to clean up after themselves for the most part. They note that there are some exceptions, but overall it is in good shape.

When asked if they perceive the environment to be littered or polluted in any way, the respondent said that they do not. “I mean you're gonna find a little bit of trash around, but generally speaking, it's rockweed. You know what I mean, like rockweed washes ashore, but then it disperses, but, no I might be wrong, but from what I see, I think it's pretty good”.

From North Head, participant #8 stated that the island around where they live is “not too bad” as far as environmental quality. In general, they felt that while the overall environment of Grand Manan has improved, they believe there is room to improve significantly.

Similar to participant #1, participant #9 found the area around their home to be generally clean, with the odd trace of litter blowing by. In comparison to a city, they felt the island was in better environmental condition, “there's not a lot of pollution in most areas, and if there is pollution, it's not intense by any means”. At the same time, the participant did feel that the island’s environment could be considered polluted;

“there's a lot more litter washing up on the beaches and stuff, from the boats, and things like that. And just more things in the water, like the new weirs and things like that, and the people tending them aren’t always super environmentally conscious”.

Participant #10 had a somewhat unique perspective of the island’s environment, being highly involved in the company called Island Waste and Recycling, which handles the only transfer station and waste management facility for the island. This participant stated that they

came to the island to start helping an aquaculture company (Cooke's) to clean up plastic waste around the island, and stayed to continue to handle the island's waste. When asked about the condition of the island's environment, they responded that there are issues such as waste in the ocean and on the beaches, but on the terrestrial parts of the island, "as far as cleanliness of the island itself, it's good, it's really really good".

### **3.5. Major Environmental Issues Perceived by Residents**

#### **3.5.1. Litter**

One major observation made by residents is the amount of litter or waste seen around their homes and on the island in general. Litter content appears to be a common indicator for many residents to evaluate and make determinations about the environmental health of Grand Manan. Sources of litter, and areas where it is commonly found or sighted by residents is discussed in the following section.

##### **3.5.1.1. Sources of Litter**

Throughout each interview, the topic of litter came up as part of the questionnaire. However, litter content around the island was a frequently expanded upon topic, with observations made by many participants. Sources of litter were discussed by participants, and many had varying explanations.

###### **3.5.1.1.1. Boats, Fishing Industry, and Aquaculture Business**

Participant #1 explained that there is waste from the fishing industries present, as well as other waste items such as bottle caps and rubber bands on beaches. Participant #2 felt that

the majority of the litter on shorelines and beaches is from the fishing industry; they listed aquaculture as the first example. When asked about what they saw specifically, and why it may be there, they responded “Um, it's very evident after, for instance, a gale of wind, you see the [salmon feed] bags on the beach, you see pieces of net, you see, Styrofoam, from broken up cages that has washed ashore”.

Participant #3 has observed a higher volume of litter on beaches and in shorelines during the lobster fishing season”. In considering where the litter and waste found on beaches and shorelines comes from, this participant remarked;

“I think about 90% of it or more comes from the fishing industry. Including salmon aquaculture. You’ve got a couple of types of litter, you’ve got the type that is actually involved with the actual industry itself, so you’ve got the piping, the netting, the metal traps, and all the rope, and the buoys, and so on. And then you’ve got the kind which they throw over board. So probably lots of cigarette butts, water bottles, because they take flats and flats of water onto the boats, and probably to the cages too”. They also noted that “...what's being thrown away and dumped now is less biodegradable, so that’s an issue”. They went on to explain some of the implications of non-biodegradable materials;

“So instead of wooden lobster traps, we have metal lobster traps, and they tend to just end up mangled on the beaches, and ropes and things get caught in them and then they become a huge snarly mess, which is potentially harmful to wildlife”.

Participant # 3 is highly concerned about marine litter; “I’m sure we have more pollution on land than I’m aware of, but litter that washes up on shore is a constant and can’t be ignored”. When questioned about their thoughts on potential sources of litter on beaches and shorelines, this participant stated that much of the waste is fishery related, including “lobster bands, pieces of traps, gloves, soles of boots, rope, etc.”. They also mentioned other wastes that

seem to be random, and not related to the fishery that show up from time to time, including the bases of office chairs. They assert their dislike for this litter, and they comment that while some of the waste gets into the ocean on accident, “there are people who just don’t care and who litter with intent”.

Participant #5 shares concerns about litter on and around the island as well. When asked if they would consider the island to be polluted or littered in any way, they responded

“...comparatively to some other places I’ve been, I think it’s pretty good, I mean, we still do have a problem, and unfortunately most of that problem is marine based, rather than land based. You know once in a while you still find some litter here and there, but things have improved a lot”.

While they feel improvements have occurred, they later mentioned that more serious issues are in the ocean, citing litter and garbage from the heavy use of the waters surrounding the island. They note that this is a larger issue “...especially when fishing season is on full bore”. One of the more common types of litter this participant sees in their daily work life is from commercial fishing. They listed items ranging in size from smaller food packaging debris, to large items such as bait bags. The participant described bait bags as thick plastic bags which hold 40lbs of frozen fish bait. Considering the amount of fishing that takes place on the island, and the use of around one tonne of bait per day by some boats, the participant considers this type of litter to be a major issue. In addition to plastics, other petroleum-based products such as polyethylene ropes, vinyl on metal lobster traps, and smaller plastic pieces within the traps are of concern when they enter the environment. Aquaculture was also mentioned as a source of pollution, referring to the salmon farms around the waters of the island. The participant pointed out that although



much of the litter comes from local fishing fleets and industries, they do find items from other places:

“So we find, for example balloons and buoys with rope on them from the United States, we find them from Nova Scotia, all up the New Brunswick coast, so not to say necessarily it's Grand Manan gear but it's generally in the Gulf of Maine or the Bay of Fundy fishing gear”.

Participant #6, an elderly resident of the island, did not find litter to be a major concern, especially when comparing Grand Manan to large urban centres in Canada. Acknowledging that there is some waste on beaches and shorelines, this participant believes that the salmon aquaculture sites are to blame, citing that workers toss coffees, and equipment gets disconnected and flows to the beaches with the strong Fundy tides.

As a weir fisher, participant #7 felt that the environmental health of Grand Manan was good. Despite this belief, they did hold that there are issues of litter on the island. While they have ensured that their crew has been taught to dispose of waste from the boats properly, there are other fishing fleets who do not: “...there are still people, that as far as environment, that they don't care, and they still throw their garbage overboard. I watch it, I see it and stuff like that. But I would say it's coming off the boats”.

When asked for their opinion on the source(s) of litter on beaches and shorelines, participant #8 explained that they believe a portion of it comes from container ships which have lost loads in transport.

A young resident, age 18 (participant #9) did not see litter as a major concern compared to other environmental threats. However, they did consider litter content found around the island to be less than ideal.

“there's a lot more litter washing up on the beaches and stuff, from the boats, and things like that. And just more things in the water, like the new weirs and things like that, and the people tending them aren't always super environmentally conscious”.

Sources of pollution and environmentally degrading elements discussed by the participant include increased tourism presence in the summer months, the fishing fleets and other working boats, and recreational boats. They also noted an observed correlation between increased recreational boat usage and increased litter.

As mentioned, participant #10 holds a highly involved position in the waste transfer station, and therefore has a unique perspective on the relationship between waste and the island's environment. They have observed a decrease in waste arriving at the transfer station over time as a beneficial change for the environment, and see this as a potential sign of less consumption by island residents. However, in considering the source of the litter that is present on the island, they believe a major source to be the fishing industries. They also emphasize that it may not all come from Grand Manan. Similar to what participant #5 stated, marine litter can come from other places and land on Grand Manan as a result of being carried by the tides.

#### **3.5.1.1.3. Non-fishery Related Littering**

Participant # 3 discussed how the amounts of litter change throughout different spaces and times on the island, they state that they find litter every day they take a walk on their road by their home;

“Often it's fresh litter that's just been thrown out of a car, so beer is still fresh in the can. Soft drinks, I'll find full soft drink bottles on the beaches often that have clearly just been tossed from a fishing boat, or from the salmon cages, cause they haven't even been in the water very long. Sometimes I find McDonalds or Tim Horton containers at the end of my driveway, so they've come all the way from the mainland and dumped their garbage on my road”.

Much like participant #3, participant #4 also held concerns about terrestrial litter. They suspect the source to be from surrounding businesses, and the fact that the end of their driveway tends to be used as a smoking area, “It causes a lot of cigarette butt litter and then the litter from their food they don't dispose of properly”. Of particular concern are littered needles, which according to participant #4, have been found all over the island on beaches and playgrounds. They note that this is a major safety concern.

Participant #6 did not consider litter to be an urgent issue. However, they did state that they have observed litter in and around their yard, and in various places on the island. They believe the source of litter which they find in their yard to be from a neighbor who they witness smoking and tossing their cigarette butts on the ground in their own yard. When it rains, participant #6 finds that these butts meander into her yard from her neighbor's property. Another observation made is the existence of plastic; “Although, we didn't have plastic bags hanging from the trees”. While participant #6 did not explicitly cite a source of plastic bags hanging in trees, one could extrapolate the increased use of them in society as a primary source.

Even though participant #8 felt that the environment has gotten better on the island, they still hold that there is evidence which can be pointed to, in order to consider the island polluted. One form of evidence is litter that they see on the island. They stated that they used

to go walking with a garbage bag and pick up trash that they saw, “Used to get rather aggravating when you could fill it with the same coffee cups from the same person, and you cannot convince them not to chuck them”.

#### **3.5.1.1.4. Improper Infrastructure**

Participant #1 explained that across the island there are outdated septic systems. They list this as a contributor to the ocean debris and pollution problems because they allow waste and other flushable items such as plastic tampon applicators to be directly released into the ocean. The participant stated that this issue would be difficult to change due to the homes with problematic septic systems locations on the island, and their close proximity to other homes.

#### **3.5.2. Air Pollution**

Participant #1 emphasized a high level of concern for issues such as acidic fog and associated air pollutants. They noted that the island is “on the tailpipe of the US”. They referred to a study done by Boden College which found fog samples on and around Grand Manan to be more acidic than vinegar.

Participant #3 explained that they feel air quality has improved due to the closing of herring smoke sheds and the loss of a fertilizer plant in North Head, which used to release pungent odours into the air. They also note changes in policy around industry smokestacks in Canada, and the contribution that has made to improved air quality on the island. Although there are improvements in air quality, they make sure to note that many Grand Mananers still use wood burning stoves to heat their homes, including themselves. They feel that the smoke in the air contributes to air pollution on the island. They explain how this can complicate their

symptoms of asthma when walking near wood burning homes on days when the wind keeps the smoke low and near the ground.

### **3.5.3. Climate Change**

Participant #1 emphasized a greater concern for human induced climate change overall, which they mentioned, brings increased ocean temperatures, changes to ocean currents, and disruptions in the food supply. When commenting on the overall state of the island's environment, participant #4 included some issues known to be associated with climate change, such as increasing ocean temperatures. When asked if they perceived changes over time living on the island, participant #5 included change in overall temperature, both seasonally and in the waters. Interestingly they talked about many people on Grand Manan noticing seasonal changes as well;

“Winters aren't as cold as they used to be, we don't get as much snow as we used to. A lot of people have noticed is a shift in our whole seasons, spring seems to come later, fall seems to stay longer, so it's like that whole summer fall season has shifted around the calendar a little bit”.

Participant #7 feels that there have been changes in the island's environment over time, and speak to their attention being drawn towards higher temperatures, both in the ocean, and on land. As an experienced weir fisher, participant #7 detailed changes in the herring fishery;

“...we're finding that in the fishery that I'm in, the herring are here around the island, but they're not coming to the shore for us, and I mean to have them so close and not come into the weirs, it's, you know, and that's, we wonder if it's different layers of water temperature, if it's something that's holding the herring down and they don't wanna come in past a certain depth of water, I don't know if that's got anything to do with it”.

They also spoke of unusual changes in underwater vegetation growth patterns, and a lack of sea urchins along the back of the island, relating this back to temperature, “it's got to be the strength of the sun”. Participant #7, while clearly not denying the existence of climate change, they expressed uncertainties about the topic;

“Well it's certainly got warmer, it has certainly got warmer. We are seeing that the ocean temperature is, it is coming up. Don't know if that's to do with global warming, there's a lot of people that don't think there's a such thing as global warming”.

It may be significant to note that while notable concern around climate change and related implications were discussed by some participants, many did not mention it as a concern.

#### **3.5.4. Water Pollution**

Participant #1 has concerns about the salmon aquaculture industry on the island and it's relation to marine water health. Specific concerns include pesticide use to treat sea lice among the caged salmon, and increased eutrophication from more nutrients in the water. They explained that a major implication of eutrophication is that depending on severity, it can potentially lead to dead zones around the island.

#### **3.5.5. Other Concerns**

Participant #1 mentioned various concerns about the environment on Grand Manan. Drawing on their expertise as a marine biologist, and their deep understanding of ecosystems and ecological processes they explained changes they've noticed over time in the island's environment. Separate from the other major environmental concerns listed by participant #1 in earlier sections, another issue is that of introduced species of various beetles and insects. They explain this to be a problem brought to the island in amongst firewood chords, which many

residents use to burn and heat their homes. More issues explained by participant #1 are found in the next section.

### **3.6. Changes Perceived Over Time by Participants**

Many participants have either lived on the island for most of their lives, or have been visiting the island for many years. During their time on the island, all participants noted some changes they have observed in their environment and changes amongst personal and other's attitudes and behaviours in regard to the environment on Grand Manan.

#### **3.6.1. Positive Changes**

Participant #2 described both positive and negative aspects of change, their positive observations include;

“I think public awareness helps a great deal. People are starting to care for the environment. People certainly talk about it a lot more. And the young people I think are being taught not to throw things overboard, not to throw things out car windows, et cetera. So it all helps...”

When asked if they have perceived changes to their environment since the past, participant #3 responded “I would say it's probably cleaner than in the past...”. However, they do include the concerning fact that what they see being used in the fishing industries, and as single use materials in everyday life are less biodegradable. so that's an issue. An example they listed are the lobster traps today being made of metal and vinyl, as opposed to wood in the past which was used in the past.

Participant #8 listed positive changes observed throughout their time living on Grand Manan. They explain that there have been polluting industries which have since left the island.

They note the fish offal fertilizer plant as one of these industries, as well as the herring smoke shacks, although they comment that this was less of a significant polluter than the fertilizer plant. They note the increased air quality on the island since these industries have departed. They also mentioned a change in attitude; “I find people take more pride in what they do, the garbage isn’t dumped off the back of the wharf, garbage isn’t dumped down on the beaches, like it used to be”. They also believe that fishermen are better today than they were in the past in handling their garbage appropriately, instead of tossing it overboard. Another improvement participant #8 remarked on is; “I find since we've had garbage cans put in various places around the island I have seen people go out of their way to walk garbage to the garbage [cans]”. While they feel the island has improved, there are still reasons this participant considers the island to be polluted.

Participant #10 is highly involved in the island’s waste transfer station. They have not been living on the island for as long as most of the other participants, but they were able to note changes in waste patterns on the island. “In the last 4 years [of living here] a lot has changed. We actually generate about 1/3 the garbage we used to, and 2/3 the recycling, so it's a lot, it's huge”. No literature was available to back this claim, however given the nature of the study, this is significant.

### **3.6.2. Negative Changes**

Participant #1 drew on their knowledge as an experienced marine biologist when asked if they have noticed changes over time;



“Yes. A lot of it has to do with overfishing, and the reduction of things like groundfish, which has allowed the lobster population to increase. Temperature changes have been pretty radical, for the time, 38 years, that I’ve, since I came to Grand Manan, the fishing industry has changed the most. We don’t smoke herring anymore, most of the herring goes into salmon food and lobster bait. There has been an increase in some whale populations, but also a decrease, recently, in others like Right Whales. Humpbacks have increased. The seabirds are sometimes having great difficulty getting the right sized fish to give their chicks. Long and narrow is easier than round. The temperature and the weather is definitely a lot different. We don’t get 2 weeks of minus 20 anymore. It tends to yoyo a lot more, so it’ll be minus 20 then it’s plus 1, then it’s minus 15, and we’ll get a few of those, but we certainly don’t get two weeks like we used to. And the summers are a lot warmer. We don’t have open dumps anymore, we used to have open dumps. And that is good and bad, that’s where [herring gull chicks] went to eat, so the herring gull population is on general decline because of closing a lot of the open dumps. And the early morning chorus just isn’t there anymore, it’s very limited. The swallow population is way down. There used to be swallow nests everywhere and they’d line the powerlines when they fledged. And of course the ocean, my god, changed dramatically. The species aggregation has changed dramatically. It’s related to food supply, not only here but also elsewhere, so if there’s food lacking somewhere else but it’s still in the Bay of Fundy, we get an increase in the Bay of Fundy, but if the Bay of Fundy is lacking [food supply] and [species] are elsewhere then we get a reduction, and we’ve had all of those [increases and reductions in species aggregation due to supply of food]”.

Participant #2 continued their thought on changes, and explained the negative aspects they have perceived;

“Although, that being said, environmental as in, we’ll use the air quality for instance, people are exhausting more pollution than they did [before]. The fishing fleet for instance, with the tremendously big engines that they’re running now, and the fuel that they’re burning, is extreme compared to what it was 20 years ago. For example, the boats 20 years ago that I fished in, had 200 horsepower. Today they have 1000 horsepower. We would burn 2-3 gallons of fuel an hour, they’re burning 30 gallons an hour. They can’t be good for the environment”.

When asked about changes they may or may not have noticed within their environment over time participant #4 talked about plastic being a recent concern: “the use and “convenience” of plastic today has created an almost if not definite irreversible illness on our

planet ”. They mention the guilt they feel in purchasing items with plastic, but note the financial burden of avoiding the material.

As mentioned in the previous section, participant #8 explained both good and bad aspects of change observed in their time living on the island. Negative aspects are mostly around litter. As explained in previous sections, this participant has noticed significant litter around where they live, even going to the effort of walking with a trash bag to try to pick up as much litter as they can.

### **3.7. Conclusions**

The results show that many participants hold varying levels of awareness and concern about environmental issues on Grand Manan Island. Levels of individual concern about the environment ranged from worries about litter affecting the appearance of their lawn, to concern for large scale issues like climate change, which impacts Grand Manan as well as the rest of the world. Issues such as water and air pollution, climate change, litter, and other concerns were discussed. All participants mentioned some form of waste management issue, including litter on the sides of roads, in lawns, and on the beaches. Few mentioned climate change in explicit terms, but many noted changes they have seen happening in their environment throughout their time living on the island. Some changes that participants thought of as positive included increased awareness of the environment, increased air quality, and a loss of polluting industries from the island. Some of the negative changes mentioned included changes in biodiversity, increased water temperatures, more water and air pollution from more

intense fishing methods, higher use of plastic materials, and larger volumes of litter around the island.

As stated, waste management was one of the most discussed issues in conversations with participants. Concerns were rooted in a lack of information about how to dispose of waste properly. Many participants stated that they try their best to follow what they believe to be regulation, but many felt they did not know if their efforts were valuable because waste guidelines are not widely available or clear. One participant mentioned that they had been separating all their waste before disposing of it, but later found out their efforts were meaningless and all waste was combined at the transfer station. Issues of information availability were discussed in section 1.4.7. The concerns about a shortage of information brought forward by residents is evidence which drives the need for more clear information about their waste management facility and how best to interact with it. In discussions about the need for more information, there is a visible desire among participants to improve waste management practices, but public demand and municipal tools are lacking. One participant mentioned multiple attempts to get more information about how to dispose of their waste, but ultimately they were unsuccessful.

From this study, it can be said that there are existing perceptions of environmental problems on the island by residents. The fact that there are perceptions and awareness of the issues discussed reflects a potential desire to improve the overall environment of Grand Manan Island. Addressing how best to achieve improvement is discussed in the next section.

## Chapter 4

### Linking the Views of the Participants to the Literature

#### 4.1. Introduction

The outcomes of various methods used to increase participation in environmental actions may be difficult to predict given the breadth of research done for this particular study. However, with this research there remains room to discuss participants thoughts on what is needed to be successful with improving the environment on Grand Manan, and how this relates to the reviewed literature on policy methods. Participants discussed their thoughts on options for successful regulation implementation on the island. These options are categorized into penalty/enforcement, education, and setting examples. Discussions focused on how participants feel about current regulations, and how they themselves, and other residents might perceive new policies or regulations. There were many different thoughts on this topic, varying from optimistic views expecting be enthusiastic acceptance, to pessimistic views that many would refuse new requirements. This leads into the next section of chapter four, which outlines the participants views on potential barriers to bringing successful environmental policy on Grand Manan, including resistant mindset, distrust, and lack of information. Finally, this section will conclude with some ideas brought up by residents about environmental initiatives they would like to see on the island.

##### 4.1.1. Penalty and Enforcement

Participant #2 explained their views on what it takes for change to happen on the island in regard to new policies or regulations. They explained how in their profession working with

the fishing industry on a daily basis, they see people littering into the oceans often, expecting no consequences.

“I think this should be regulated better, with enforcement, you have to hit them in the pocketbook, that’s what hurts. I think eventually when people realize what they’re doing the majority of them will stop. When that happens our environment will start to get better. But until then it won’t. There has to be repercussions for your actions. The big companies - aquaculture, salmon, they should be accountable”.

Personally, participant #7 would welcome more environmental regulation with open arms. The idea of financial consequence was brought up. They thought that this might be a good motivator for those unwilling to oblige otherwise.

Participant #10 felt that in order to spark change in the waste management realm on the island, introducing fees for non-recyclable materials coming to the transfer station would be a start. They explained that enforcing payment for non-recyclable materials and unsorted waste would force community members to learn about the costs of consumption, adding; “...believe me, it probably wouldn’t change a lot, but it would make people realize”.

#### **4.1.2. Education and Setting Examples**

Participant #1 outlined their views on how education could be a factor in successful policies and regulations. They spoke about how environmental degradation is an urgent issue, and education would help the vast majority realize this, and connect their actions to the issue.

“Some people are on the cusp, and they just need some encouragement to be able to do it, there's a steep learning curve initially for most people cause they’re just not used to doing it, they're used to throwing stuff away and not thinking about the consequences. And the whole reduction of use is a big one, and it would be difficult. But I was super surprised when the grocery store started charging for their plastic bags, which they only did for a year or so. They had all these people coming in with reusable bags, that I would never have thought would ever reuse reusable bags. So it can happen, just certain things

may be a little more complicated to introduce. But we also don't have the luxury of time".

They added that explaining the current and potential consequences of environmental degradation on the island is important to include in that education;

"I think people need to know the consequences and what happens when you don't [improve practices]. And that human induced climate change is real, and it includes increasing ocean levels, so people are gonna lose their shoreline, they're gonna lose their property. And the extreme fluctuations in climate, and weather conditions".

Participant #2 emphasized the importance of education alongside penalty. They explained that allowing people to learn and adapt to the new rules would be beneficial, as opposed to sudden rapid change and harsh enforcement.

"Well, proper conservation has to hurt, you know it, and it's the way it is. And people are really used to pretty much on Grand Manan, doing whatever they feel they want to do, and people don't like rules and regulations, they don't like being told what to do. So it's like anything, it would come hard, but if they just did a little at a time, you know, it would help a lot. They wouldn't have to just drop the ball and enforce it immediately, all of it, but, kind of wean people into it. And you know, I think for the most part, the government seems to be trying to do that with the municipalities, and I know the building codes are changing yearly, and they seem to be structured toward the environment, and recycle, et cetera, so I think that's great".

They detailed instances where they have witnessed mindless littering by members of the fishing industry on the island;

"I work directly with the fishing industry, I see bags of rubber lobster bands dumped overboard, swept up off the deck, and just thrown overboard, and these people don't even think about it. Rubber gloves being thrown overboard that have a hole in it, and just stuff like that that's harmful to the environment, people don't think about that".

This participant felt that an increase in knowledge about the consequences of those actions would potentially make people think before they act, and hopefully create a more environmentally oriented work ethic.

Participant #3 would like to see more environmental policy on the island. They had similar views about the importance of education in relation to implementing new policy. They explain that more education would help increase policy compliance, and improve the overall health of the island by showing people how destructive their behaviour is. They would like to see environmental science programs taught in all grades as well in order to help everyone have a baseline understanding of the importance of a healthy environment.

The youngest participant, #9, felt that more education and resources would be essential in order to improve policy compliance on the island. They note that other larger cities, such as Moncton, seem to have much more complex recycling programs than Grand Manan. More education could potentially increase demand among residents to improve things like waste management. Participant #3 and #9 touched on an aspect included in the literature. Education has been argued to play a role in how people perceive and interact with their environment. Those who grow up being taught about environmental issues may be more likely to perceive and react to the issues around them, compared to those who have not had any education on the subject (Sousa *et al.*, 2016).

Participant #7 explained about their use of rope in the weir fishing industry, and how they have recently switched from poly rope to manila rope. Poly rope is made of a petroleum based material which does not break down in the water easily, making it attractive for fishing

operations. The participant explained that manila rope is plant based, so it is able to biodegrade and break down in the environment. In switching from poly to manila, the participant had their fleet take the old rope to the rope recycling container on the wharf. This is when they realized how much plastic rope was being dumped into the ocean on their behalf, before the recycling container was there;

“I just think about when I look at that pile of stuff that we've got on our building rack when we've been to the weir, and I said, just think about that, we used to throw that all in the water”.

This anecdote is an example of an increase in awareness about a detrimental behaviour, and the awareness encouraged change. Participant #7 also explained their thoughts on setting examples. They felt that by showing others how positive environmental behaviour can be easily done, more people might catch on and join in. They noted that only a few people doing good things may not show up in the grand scheme of things, but if many people partake, then down the line those acts will be noticed. This is backed by authors Cook and Ma, (2014). Attitudes towards one's environment, and subsequent actions, seem to be based on many factors including core values, factual beliefs, and cultural/social norms (Cook and Ma, 2014). Participant #7 and their crew increasing their rope recycling on the North Head wharf is an example of this. The uptake in poly rope recycling could be due to others using it and setting examples in the fishing community, potentially exhibiting a shift in social/behavioural norm on the wharf leading to more environmentally beneficial actions.

#### **4.2. Barriers**



#### **4.2.1. Sense of Resistance**

Many participants felt that there while more rules and regulations for the environment would be beneficial. However, most felt that there is an attitude or sense of resistance among the community which they saw as a barrier to change. For example participant #5 felt that more regulations would help Grand Manan's environment improve, but noted that adapting to new policies would take time for the residents. A main factor in hesitancy to change was potential cost increases. Many residents are unwilling to pay more for more rules to follow;

“I think it depends how they were framed and presented, I mean, I think a lot of people around here, because Grand Manan was, we really didn't have like building codes for example, we were way behind the game on that, and just recently we've been playing catchup to bring ourselves more in line with practices on the mainland. I think people are resistant to change so I think it would take some time, and there's also the fear of additional costs, so “how much are these changes gonna cost me?””.

#### **4.2.2. Perceived Threat**

Another potential barrier residents discussed was a perceived aversion to change. Ethnographer Joan Marshall (2001) captured this sense of hesitancy to change, and to those from away coming to the island to live, work, or tour. As written in the first section of this thesis, Marshall explained that Grand Manan has long been a place of insiders who have some sort of family history on the island, and outsiders who do not. She explains that a possible reason for this in-or-out mindset is due to a strong sense of history and shared experiences, which go back generations on the island (Marshall, 2001). Personally, spending time on the island, there are stories told that may tell about events that happened decades ago between ancestors of those telling the stories. This shared history and familiarity could help explain why

there is a sense that any changes made by outsiders can appear as a threatening to the Grand Manan community.

Participant #8 demonstrated this notion. When asked if more complex, clear, and strict regulations around waste management would be acceptable to them, they responded that they would indeed partake, without hesitation. However, when asked if they thought other islanders would agree and follow new rules as well, they explained that they felt many would not. When asked why, they continued; “Contrariness – “We never *did* have to do it””. From this, the lack of willingness to change described by Marshall (2001), is exemplified. The sense of “clique” is linked to the strong sense of history and shared experience between the “insider” residents which can be traced back through generations. The feeling of outsiders pushing for change may explain what participant #8 discussed about the hesitancy to adopt new rules about waste management on the island.

Although this participant stated they would indeed follow new waste management rules, in other situations they exemplified what they described amongst their fellow community members, about resisting new change or people. This can be sensed in the way participant #8 recalled a situation in which a home inspector was checking up on their renovations;

“...I know when we built our first house, I don’t know who came and said something about – the first thing we did was drill a well, and a fella came and said something about your septic system has to be so many feet away from your well, and I kind of looked at him and thought why, idiot, why would you put your septic, like I think they think people are stupid here”.

They described feeling a sense of invasion, and disrespect from this encounter. This sense of invasion and insult may be a factor in residents putting a wall up, and not responding to change.

Participant #9 felt that more regulation or rules of some kind were necessary to help the environment. However, they saw the island's resistance to change as a barrier. They said that more environmental regulations would likely not be taken well by many in the community, "...I don't think it would be accepted very well. A lot of the people here are very set in their ways, so it would take quite a bit to get them to change".

The eldest participant, #6, had similar descriptions about hesitancy to change. When asked if they would personally follow more strict waste management regulations, they responded that they would, but they would need to be educated on how the process works. They noted that teaching is important, and felt that just telling people what to do would not encourage participation. If more overall environmental regulations were to be introduced on Grand Manan, this participant felt that new rules would be widely disregarded;

"... this is Grand Manan, so if you get the fishermen out in the water they're gonna say [whistles] and they're gonna throw it anyway... It's like the guys in the government, they sit behind a desk and they've never been in a friggin' boat, and they're telling you what to do. They haven't got two clues".

The statements made by participant #6 and participant #9 regarding outsiders enforcing rules highlights what many participants described about feeling uneasiness, disrespect or a sense of threat when discussing changes imposed on the island by outsiders. This relates to what Cook and Ma, (2014) discussed, that trust is a factor for following environmental policy. They found that trust in governing bodies who enforce policies is a major factor in actually following and obeying those policies. This notion is backed by Johnson and Scicchinato (2000), who wrote that

trust in the imposing body who enforces regulation impacts the willingness of the public to act on those regulations.

Buys *et al.*, (2012) found that understanding the context of each community and making the communication and actions for each community specific to their values and culture, is important for long term participation. They noted that If all members of the community have a clear understanding of the issue, they are more likely to become personally committed (Buys *et al.*, 2012). Tailoring regulations to the needs of Grand Manan could be an essential factor for increasing awareness and adoption of more environmentally friendly behaviours amongst community members. Many participants felt that outsiders were imposing an air of superiority on the island, which of course, is not appreciated by residents. The literature suggests that tailoring regulations so that they suit the needs of the island and its' people would be the best course of action for a place like Grand Manan.

Tsitsoni and Toma (2013) made similar findings and concluded that in order for the public to be truly interested and invested in an environmental issue, they must care about it and be empowered to act in a way that can make a difference. Imposing regulation that is easy to understand and that is made to benefit Grand Manan's people and environment is likely to increase support. This speaks to a common finding regarding the correlation between trust, efficacy of actions, and willingness to take part in those actions.

Another aspect of resistance to regulation is outlined in the literature. White and Hunter (2009) explained that those who depend on the environment and its resources to earn income are said to prioritize the trade-offs of development despite environmental concerns (White and

Hunter, 2009). This relates to the idea brought up by participants, that the fishermen would likely ignore environmental regulations while at sea. Regulation which could potentially affect their livelihood is not expected to be accepted with open arms, and, as alluded to by participants, may possibly trigger detrimental behaviour in spite of the regulations. Because of perceived impacts of regulation on economic development, political views associated with development can be telling of a person's perceptions of their environment, and thus how they react to policy (White and Hunter, 2009).

Participant #10, highly involved with the waste management facility on the island, also felt that change was needed to help the island's environment, but was not confident in the ability of regulation. They stated;

"I don't think it would change. Again, the guys on the boats, if they're throwing their pop bottles away now, why wouldn't they after. You can regulate as much as you like. It's a personal thing here. If you do it, you do it and you get into it, and if you don't then you just don't care".

When asked if they had ideas on what might be effective, they answered in terms of waste management, suggesting a pay-as-you-go system, as mentioned in section 4.1.1;

"...you have to pay for your garbage, and not pay for your recycling, so it would be an incentive program in some way... garbage is garbage, recycle is recycle, if you don't want to pay, then you separate, if you do wanna pay, well, which, believe me, it probably wouldn't change a lot, but it would make people realize. That's the only thing that will change things here, is for people to realize how much the cost is. You have no idea the amount of garbage that comes into this place, it just blows your mind."

This response highlights what the literature includes about education and incentive. According to Buys *et al.*, (2012), if all members of the community have a clear understanding of the issue, they are more likely to become personally committed (Buys *et al.*, 2012)., Building unique

regulations that fit the target area would potentially benefit communities like Grand Manan, where blanket statements are not appreciated.

Participant #6 was asked if they have any ideas on how to improve the environment; “I wouldn’t have an idea. No idea whatsoever. Didn’t they at one time, weren’t they gonna add something to the dump down there where they could, was it burn stuff? There was something that they were talking about doing. Because if they did that, they wouldn’t have to ship as much. There was something there.”

When asked if they agreed with this potential plan, “...Yea! Because we have to pay for all those great big trucks to take all our crap to the mainland. So the more you can get rid of here, the better off you’d be”. This is an example of the need to help community members understand the importance and reason for the regulations or rules that are introduced to the community. Burning garbage has long been considered to be very polluting. As written by Johnson and Scicchinato, (2000), uncertainty and complexity in an issue can weaken understanding, which can also weaken willingness to become active. In addition, conflicting information from various sources reduces trust in information sources and ultimately leads to less action (Johnson and Scicchinato, 2000). Uncertainty and conflicting information in regard to waste management are widespread on Grand Manan, according to participants. Working with the community members, and educating them about any new policies, regulations, or practices on the island could potentially assist them in appreciating and participating in new changes.

#### **4.2.3. Gaps in the System**

Amongst those who participated in this study, none (except participant #10) had a clear idea of what could be recycled at the local transfer station. Upon further investigation, it was found that there is no clear single source of information available to the community members

about the transfer station's requirements. Free disposal could be a factor. The transfer station does not charge the community for their waste disposal, and there are currently no fees or incentives to encourage recycling on the island. Participant #10, who is involved with the transfer station, felt that fees may not be effective, but may help people understand the costs of waste disposal. Participant #10 explained that the transfer station is rigorously sorted into many different categories including fishing gear such as traps and rope, electronics, appliances, beverage containers, cardboard, metals, and plastics. However, upon discussing this with community members, there appears to be no information or reference which tells the community what the transfer station does exactly. At the station, there are labelled bins and attendants which move the waste around to sort, but there is no information on how or what to sort in advance of arriving at the station. Here lies the problem, an obscured, unclear, and confusing system. Although waste is being sorted at the station, it is being sorted as it is brought in. The community has no information on what can be sorted into which categories before arriving. Many explained that they were unsure of the rules so they did their best. This, however, does not contribute to an efficient waste management system. Wolf and Moser, (2011), wrote that in order to have effective engagement with waste management, people must know how to recycle, based off municipal regulations in order to be effective in doing so, otherwise their waste will go to landfill (Wolf and Moser, 2011). Discussion with one community revealed the difficulty in seeking out information. One community member told about their experience in which after travelling to the transfer station and the community hall in search of information about how to separate their waste, they were unable to find a clear response from

any person, or any explanatory documents or instructions to follow. This represents a gap in the waste management system on the island.

#### **4.3. Resident's Ideas**

Some of the participants discussed their ideas about potential environmental initiatives they would like to see on the island. Many of these suggestions were made based off of observations of what other towns and cities have done. While many residents claim change would be hard to implement given the common mentality on the island, several have ideas for what the community can do to be more environmentally friendly.

Participant #4 discussed a few things they would like to see on the island. They listed the benefits of a compost system;

“Another benefit I can think of would be if a compost centre was available that selling the soil back to people who want it for gardening could help with growing local foods. Even a promotional program with discounts for volunteers who else could be incentive”.

They also stated that they would like to see businesses on the island reduce their plastic usage in things like packaging and in the items they order to sell in their stores. Reusing and repurposing old items is another suggestion this participant had;

“It’s not just about creating better opportunities for waste, or prevention, it’s about shifting how the majority of our community views our waste”.

Participant #5 would like to see incentives for high efficiency woodstoves in homes on the island, as well as incentives for systems which could help increase air quality on the island, related to woodstove use. Participant #5 also hoped to see bike lanes built on the island. As



someone who bicycles to work each day, they noted this would likely increase their willingness to do so more often, and suspected others would be encouraged to do the same.

#### **4.4. Conclusions**

Participants shared their views on how best to improve the environment on Grand Manan. Enforcement and penalty methods were discussed by a few, who explained that fines and “repercussions” for detrimental actions would help increase compliance with environmental rules. Others felt that rules would be ignored, no matter what was done to enforce them. Often suggested alongside penalty, education was thought to be vital for garnering compliance with environment-related rules. Participants who held this view explained that the background information and rationale for why the rules exist should be known, so that people understand they are actively harming their environment by not complying with rules. Education alone was suggested as well. One participant felt that including environmental education in all grades would help increase appreciation for the environment, and help link detrimental actions to environmental degradation. Others felt that education combined with setting an example would help, especially in the fishing industry, where many fleets interact with one another on a daily basis at the wharf.

While many discussed these methods to increase compliance with environmental rules on the island, they also discussed barriers to change. Grand Manan Island is a community with a seemingly complex relationship to the environment and environmental rules. Based on conducted interviews, environmental issues are regularly perceived by residents, but the changes required to mitigate those issues are often met with some form of resistance. Grand

Mananers' seem to perceive some form of threat to their way of life when new rules and changes are introduced to the island. Given the long shared history of the families which have been there for generations, changes are often understandably unwelcome. Many participants alluded to a sense of hesitancy to those from away, who do not share the same history and values as native Grand Mananers'. Participants also alluded to a sense of patronization, or disrespect that can come from those from away, who come to the island and try to implement or enforce rules. Participants alluded to a sense of patronization and lack of appreciation coming from those from away who arrive and try to make changes. This sense of threat from any change, combined with obvious gaps in the community's communication resources for environment-related information, seems to contribute to growing confusion and uncertainty. Most participants discussed waste management when discussing their environment-related practices on the island. Many reported not being aware of what the transfer station does with their household waste. Several indicated a sense of distrust towards the transfer station when it came to discussing what actually with their garbage, not knowing what is recycled, what is buried, or where it is taken. Issues like this are discussed in the literature, which explains that uncertainty and lack of information are a factors which contribute to less uptake of environmentally friendly actions and compliance (Johnson and Scicchitano, 2000).

While there is an aversion to change on the island, there are many residents who would like to see improvements in environmental initiatives on the island. Some participants listed ideas such as bike lanes, incentives for efficiency, demand for less wasteful products brought to the island's stores, and a community composting facility. It is clear that change is desired on the

island, but how change is brought about is extremely significant to residents. It would seem that in order for residents to accept new changes, Grand Manan community members would need to be behind the process of implementing ideas, like those listed. Based on interview responses, creation and implementation of environmental rules, initiatives, and other changes would have to come from within the community, by the community, in order to be successful while respecting the needs of the residents, and preserving the values and history of the island itself.

## Chapter 5

### Conclusions and Recommendations

#### 5.1. Summary

The goal of this thesis was to collect information to address the research questions outlined in Chapter 1. These questions sought to invoke responses that would provide insight into how the residents of Grand Manan perceive the state of the environment on their island. They addressed the following: how residents of Grand Manan perceive their environment, what their main environmental concerns are, whether they see the need for improvements to the environment, how they feel about current environmental regulations, if they feel more environmental regulations are needed, and how to impose regulations so that they are most effective. The questions listed in Chapter 1 were the following:

- What is the ethic, or overall feeling that residents on Grand Manan have towards their environment?
- According to the perspectives of residents, what are the main environmental problems on the island?
- What is the overall outlook on improving the environmental conditions of the island, and are changes seen as necessary? ;
- What is/are the most effective method(s) to encourage residents of communities like Grand Manan to understand and want to follow environment-related policy?

In order to get a grasp on these unknowns, this thesis has explored the island of Grand Manan and provided a geographic overview of the Island's environment including its physical, human, and economic geography. A literature review in Chapter 2 investigated methods which are said to increase participation in environmentally beneficial behaviours and compliance with environmental policies. The literature shows that empathy, education and understanding, efficacy, trust, perception of risk, and ability to act are major factors in decision making which

leads to environmentally beneficial behaviours and compliance with environmental rules and regulations (Schultz *et al.*, 2000; Buys *et al.*, 2012; Tsitsoni and Toma, 2013; Semenza *et al.*, 2011; Johnson and Scicchitano, 2000 and O'Connor *et al.*, 1999). The literature also revealed factors which can lead to inaction, or actions which are detrimental to the environment: ignorance/lack of knowledge, absence of urgency, powerlessness, lack of trust, and unwillingness to change lifestyle due to perceived impending personal hardship (Akter and Bennet, 2011; Schultz, 2000; O'Connor *et al.*, 1999; Aitken *et al.*, 2011; Buys *et al.*, 2012; Rosentrater *et al.*, 2012; Cook and Ma, 2014 and Korkala *et al.*, 2014).

Chapter 3 included interview responses which touched on the perceptions that participants have toward their island and its environment. Many initially felt their environment was in good to very good condition, often using visible issues such as the existence of litter as a gauge for environmental health. Upon further discussion, the major issues that residents see on Grand Manan include issues related to the aquaculture and fishing industries, air pollution, climate change, water pollution, and other less common concerns such as species loss and invasive species. In this section, participants articulated the changes they have seen over time. Some positive changes include increased awareness of the environment, loss of some polluting industries on the island, and the shift from dumping garbage off the wharf into the ocean to using a waste management facility. Negative changes participants listed included climate change, with warmer and shorter winters, species loss, reduced air quality, more litter and pollution, and more plastic usage and waste.

Chapter 4 linked the perceptions of the participants to the literature results.

Participants' opinions regarding the necessity of increased environmental regulations were discussed, as well as ways to introduce them so that the public would accept and partake. Most participants discussed barriers they would expect if new regulations or rules were imposed on the island. Participants discussed penalties and enforcement as a means of increasing compliance with environmental rules. The main penalties brought up included monetary penalties such as fines issued for rule-breaking and fees associated with unsorted wastes. Many participants felt that education was a major factor in getting more people to follow rules and live with more environmentally friendly habits. Several provided anecdotes detailing instances where after noticeable gaps in knowledge were filled, people changed their behaviours. Another participant felt that leading by example is a meaningful and effective way to increase pro-environmental behaviour. They explained that after recycling rope from their fishing fleet, they noticed more and more fleets doing the same. While many participants felt that extra environmental rules would help improve the island, all listed barriers to change. A sense of resistance, perception of threat, and gaps in the system were all themes amongst barriers that were discussed.

Chapter 4 included a discussion of environment-related initiatives that participants would like to see emerge on the island. These ideas included bike lanes, incentives for efficient home installations, composting facilities, and reduced plastic options in local stores. These initiatives were discussed excitedly by participants. This enthusiasm demonstrates that while

there may be barriers to change, there are at least ideas and ambitions to improve amongst those who live on the island.

## **5.2. Conclusions**

It is clear that Grand Manan is a very unique place, unlike many other small towns in Canada. The people here live their lives working on and enjoying the island, and the longstanding traditions and histories are well respected amongst many residents. Places like Grand Manan, with such long shared histories, may be more likely to avoid change. However, environmental change is a major transformation that is unavoidable, even on Grand Manan. There are adaptations that need to be made in order for residents to continue living on Grand Manan, and to uphold the visions residents have of the island being a beautiful, healthy, and prosperous place to live.

The literature discussed factors which can lead to environmentally friendly behaviours, and what leads to behaviours which often are detrimental. Factors which tend to lead to positive behaviours revolve around an understanding of the environment, and understanding the rationale behind rules and policies. The literature explains that those who have high levels of empathy, holistic education, background understanding of the issue, a sense of trust in the rules and rule-makers, a perception of risk, and who have the ability to carry out environmentally beneficial behaviours are more likely to do so. Lacking these characteristics and traits often leads to inaction, or detrimental behaviours. Reasons for poor environmental interactions include ignorance, lack of knowledge and understanding of environmental issues, apathy, lack of urgency, a sense of powerlessness, unwillingness to change lifestyle, and an

absence of trust in the rules and rule-makers (Tsitsoni and Toma, (2013), Wolf and Moser, (2011), Buys *et al.*, (2012), Cinera and Krajhanzl (2013), Semenza *et al.*, (2011), Akter and Bennet (2011), Schultz (2000), and Kwon *et al.*, (2019).

In order to address these issues, and increase participation in environmentally friendly actions, a simple solution would be more education. However, the literature debates whether or not education alone can increase action (White and Hunter (2009). Many residents are aware of at least some environmental issues, however acting to address those issues is often not a top priority. There are a few participants who displayed a comprehensive understanding of environmental issues who explained they would like to do more, but feel they lack the tools required to use their knowledge effectively to improve Grand Manan's environment. Of those that make every effort to help their environment, many feel their efforts are small in the grand scheme of things. Lacking the proper resources to use one's knowledge, or feeling as though one's actions are insignificant because there are few putting effort into environmentally friendly actions, refers to the sense of powerlessness and perceived efficacy discussed in the literature. This could explain why more people on the island are not making environmentally friendly behaviours more important in their everyday lives. They may feel strongly about the issues, but are unable to do anything to help. Those who are making the most effort possible feel they are in a small group of those who care, and their actions do not seem significant overall.

Barriers to creating change on the island were discussed with the participants. Many felt that they would agree to make changes in their everyday lives in order to help the environment and follow new rules, but felt that others on the island would not be as accepting. Participants



listed reasons that change would be unwelcome, such as: perceived threat to the Grand Manan lifestyle, a sense of threat or disrespect from those who bring new change to the island, especially if they are not from the island originally, and a few participants listed additional cost as a reason to decline new rules or change.

Another issue that was discussed by a few participants was that there is no central place to get information about waste management rules. As mentioned, waste management was the most commonly discussed environmental topic in the interviews. Many participants explained how they are unsure of what the transfer station regulations are, in terms of sorting waste, and what can be brought and dealt with on the island. Except participant #10, none of the participants were aware of what happens to their waste at the station, and a few believe it is buried on the compound somewhere rather than being sorted and removed from the island. After touring the station with participant #10, it is clear that the large waste is sorted to some degree, such as appliances, lobster traps, and other large materials. However, household waste does not seem to be sorted beyond bottles and cans. There are no municipal guidelines or pamphlets which tell the resident how to sort their waste before bringing it to the transfer station, and finding this information is very difficult, if not impossible. This is an example of a barrier which could very likely be easily addressed on the island. Many participants spoke of already putting effort into sorting their waste, but felt unsure if their efforts are meaningful. If they were to receive information on the waste management process on the island, it is likely that issues of uncertainty, efficacy, understanding, and the ability to act would be immediately

addressed, and participation in things like recycling and sorting waste would increase drastically on the island.

Participants listed several methods for garnering participation and obeying environmental rules that they felt would be effective on the island. Many of these ideas align with what the literature finds to be effective. Participants listed education as a main factor, and the importance they see in receiving an explanation of the rationale behind the rules, to help people understand why they exist in the first place. Financial penalty, setting examples, and environmental education taught throughout all grades in the local school were all ideas residents felt would be effective for increasing uptake of environmentally beneficial behaviours, and rule-following. Many explained that understanding the rules and how they apply to Grand Manan specifically is important, and could help avoid the sense of threat posed by those from away making changes.

Despite a long list of barriers to change discussed by participants, creating change in a place like Grand Manan may not be as difficult as initially thought. Many residents listed ideas for environmental initiatives they would like to see on the island, including bike lanes, less wasteful products brought to the island, a composting facility, and plastic-free bulk stores. It is clear that residents are open to increasing environmentally-oriented actions, but this has to happen from within the community, for the community. As discussed with participants, an authority figure from away, arriving on the island, making changes, and telling people what to do will not be met well by residents. Avoiding hesitancy and resistance is possible, but will take more work than blanket regulations placed on the island. Grand Manan is an incredibly unique

place, and as such, implementation of rules and change needs to be done so in a way that is tailored to fit the island's needs. They must be created with the characteristics of the island and its residents in mind in order to have the best chance at being successful in improving overall environmental conditions of the island.

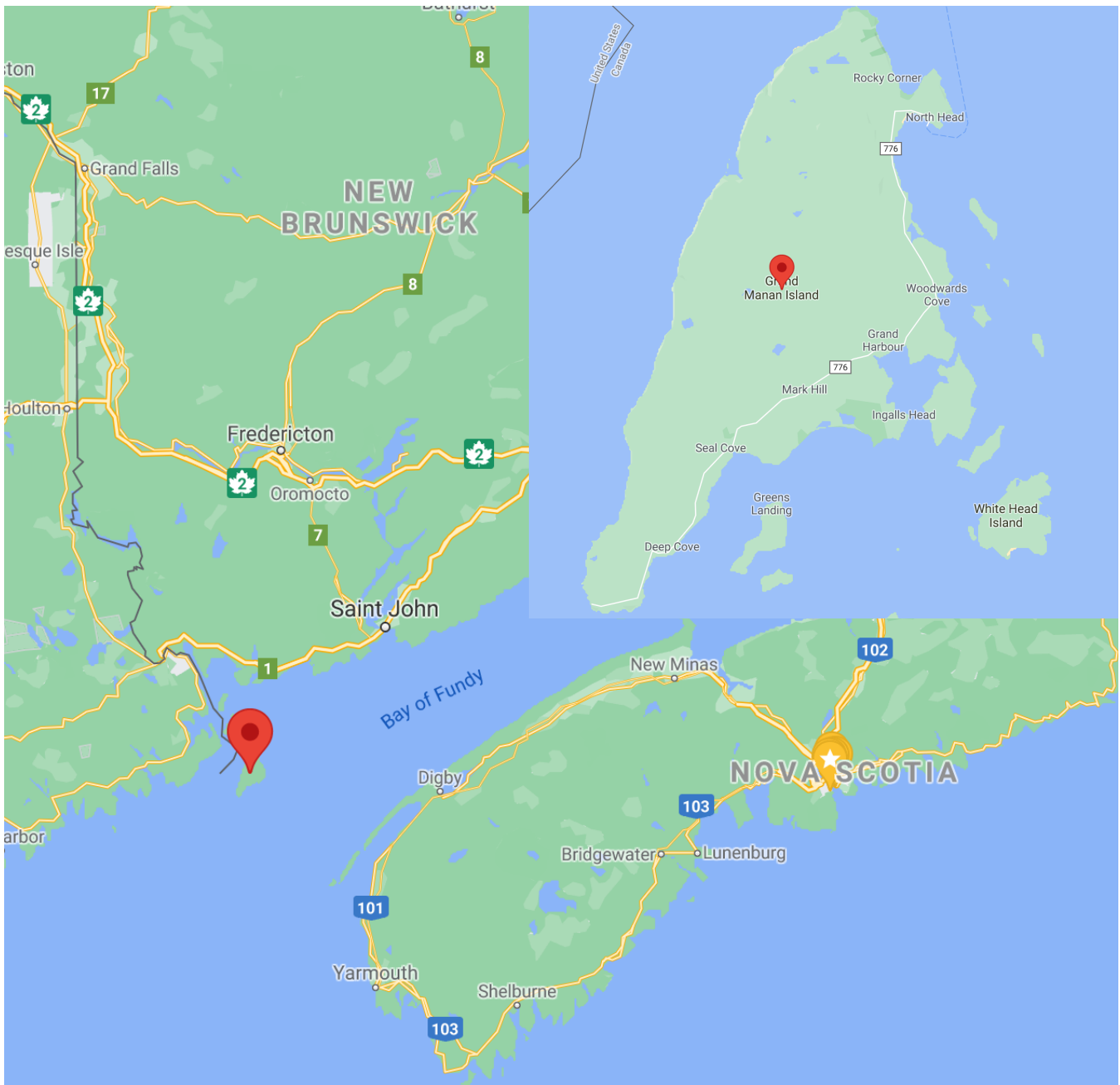
### **5.3. Recommendations**

This thesis finds that the environmental problems and changes that residents perceive on the island can be addressed in meaningful ways. In order for this to be done with the support of the island's residents, any changes made must suit the needs of the island. In order to carry out meaningful change on Grand Manan Island, this thesis recommends the following:

- Additions to municipal policy and rules regarding everyday environment-related issues, such as island waste management, should be created by residents of the island in order to best suit the needs of the island and its people.
- Public information should be provided to residents from the municipal government to help explain rationale behind changes to policies or rules, and help the residents understand rationale for such changes. This would address the question of how best to introduce policy or rule changes, and ensures that residents have as much information as possible about changes and why they are required.
- Environmental education focusing on the issues faced by Grand Manan should be included in education at the local school, and provided to all residents of the island. This will expectantly address the issues of ignorance and apathy towards the environment on the island.
- The waste management station on the island should provide detailed information regarding their operations and how best to interact with the station. This information should be transparent and discuss what is recycled at the station, how to sort waste, where to place waste when it is brought to the station, and what happens to the waste after residents drop it off. This would address the barriers of trust and education on the topic as discussed in the literature and by participants in the study. By addressing these issues, residents may feel responsible to dispose of their waste properly, and feel more confident in the efforts spent in the process.

- It is important to address the sense of resistance and perceptions of threat that residents feel when changes are introduced by those from away. To mitigate this, community initiated environmental stewardship programs may be a suitable option for the island. Needs of the island would be well understood, and consideration for the specific needs of the community would be contemplated. In addition, information to differentiate environmental issues which originate from the island (i.e. litter and water pollution), and those which originate from other places or exist on a larger scale (i.e. climate change, poor air quality, sea level rise) should be provided to address barriers to action, such as feeling powerless or overwhelmed. Many of the issues on the island can be addressed by changing simple daily practices. By providing a comparison of large and small scale issues, an opportunity exists for residents of Grand Manan to become champions for their island, promoting simple daily practices for residents to improve their environment. There is also the opportunity for community outreach to the areas surrounding the island, targeting large-scale groups by providing insight as to how the island has been impacted by large-scale issues. This provides an opportunity for the large-scale issues to be addressed in a more broad setting than just by those on the island, thereby helping to improve the overarching issues for which residents expressed concern.

Map of Grand Manan Island, New Brunswick;



(Google, n.d.)

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