EXPLORING COASTAL RESIDENTS' RELATIONSHIP WITH THE OCEAN AND SEALS IN NEWFOUNDLAND, CANADA

By © Monica Tais Engel

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Abstract

Humans have a deep and historical connection with the ocean. At the same time, anthropogenic activities are impacting the environment and changing the oceans' physical and biological characteristics. It is recognized that people's values and behaviours are the major factors influencing the direct (e.g., pollution, climate change) and indirect (e.g., socioeconomic, political) impacts on the ocean. This doctoral research emerged from the need to ensure that present and future generations will *get it right* when it comes to marine governance and conservation. The overarching goal is to assess individuals' relationship with the ocean through examining value orientations, beliefs, attitudes, emotions, mental images and behaviours related to marine conservation and sustainable use of marine resources.

The study was conducted across coastal communities on the island portion of the province of Newfoundland and Labrador. It is grounded in the marine social sciences and integrates disciplines such as human dimensions of natural resources and environmental psychology. Data were collected using a structured questionnaire containing both quantitative and qualitative data. A total of 776 questionnaires were completed (49% response rate).

While chapters 2 and 3 provide a broader perspective of the people/ocean relationship from

a utilitarian and conservation angle, chapter 4 addresses the issue of seal hunting, thus focusing on the use and management of a specific marine resource.

Results show that people, in general, value the ocean for its intrinsic and instrumental values, care about it, feel that they should be doing more for marine health, accept using the sea for fisheries more so than for oil and gas exploration, and fear about the future. The ways in which people imagine the ocean influence their thoughts and behaviours and reveal that the ocean is much more than a food and income provider. The ocean is *beautiful, mysterious, dangerous*; it is *blue, cold,* and *fresh*. The ocean is *fish, seals, whales* and *puffins;* it is *boats, vacation* and *relaxation*. But the ocean is also *pollution, plastics* and *greed*. The ocean is *changing*.

Keywords: Atlantic Ocean; marine social sciences; human dimensions; values; seal.

Dedication

To the people of tomorrow.

Acknowledgements

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Many thanks to my supervisor Dr. Alistair Bath and co-supervisor Dr. Jerry Vaske for the mentorship, guidance, laughs and friendship. I also would like to thank Dr. Ratana Chuenpagdee and Too Big Too Ignore for support during the first year of my program, and for the guidance in framing this project. Many thanks to the group of motivated volunteers who helped in the later stages of data collection.

Special thanks to all of my friends, family and loved ones for your love, care and support during this journey. I have you all in my heart.

Last but not least, I would like to thank the kind and friendly people of Newfoundland for their time and willingness to participate in this study and share their views about the ocean.

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Research Project Framework

This doctoral research is situated within the Ocean Frontiers Institute's Large Research Module I, Informing Governance Responses in a Changing Ocean. The Ocean Frontier Institute (OFI) was established in 2016 through a partnership led by Dalhousie University, Memorial University of Newfoundland and the University of Prince Edward Island. OFI's research focuses on examining the changes impacting the North Atlantic Ocean and providing effective solutions to resource development that are sustainable, socially acceptable and resilient to change.

The purpose of Module I is to investigate how social, ecological, economic and institutional changes impact the future of fisheries, coastal communities and the economy in Newfoundland and Labrador, and to inform governing options to help achieve a sustainable future. Module I is divided into 5 sub-modules: Access to Resources & Markets (I-1), Recruitment, Training & Retention (I-2), Perceptions, Values & Knowledge (I-3), Marine Safety (I-4), and Vulnerability & Viability (I-5). This research is situated within OFI's Module I-3, Perceptions, Values & Knowledge.

Sub-Module I-3 centers on the 'meta-order' elements of change and recognizes that human actions and decisions are at the core of the changes and solutions impacting the ocean. It focuses on investigating the wide spectrum in which people value the ocean, their beliefs and attitudes

toward certain aspects of marine issues, and the dynamic aspects of perceptions, values and knowledge of various interest groups often referred to as stakeholders. While ongoing research is investigating values and knowledge of interest groups in coastal communities in Labrador, this doctoral thesis examines people's values, beliefs, and other cognitive and behavioural components of the people/ocean relationship in the context of the island of Newfoundland. Furthermore, it investigates how coastal communities perceive the impact of seals on the local fishery and the future of the sealing industry. From broader values and perceptions toward the ocean, to specific aspects of human-seal interactions, this thesis informs OFI's sub-module I-3 about coastal communities' views of marine governance and conservation.

Co-authorship Statement

The author of this thesis has been the primary researcher behind this study, including the literature review and the design of the research proposal, the practical aspects of the research, the data collection and analysis, and the manuscript preparation.

For all manuscripts included in this thesis, the author is the primary and corresponding author. The co-authors provided significant intellectual contributions to each of the articles by critiquing data collection and analyses, by interpreting data, and by reviewing the manuscripts. The following paragraphs state the journal each manuscript has been submitted to, and the order of the co-authors after the author of this thesis.

The first manuscript (Chapter 2) titled "Value orientations and beliefs contribute to the formation of a marine conservation personal norm" was co-authored by Jerry J. Vaske (Colorado State University) and Alistair J. Bath (Memorial University). This paper was published in the *Journal for Nature Conservation*, volume 55, June 2020.

The second manuscript (Chapter 3) titled "Ocean imagery and how they relate to an individual's emotions, cognitions and pro-environmental behaviours in coastal Newfoundland, Canada" was co-authored by Alistair J. Bath (MUN) and Jerry J. Vaske (CSU). This paper was submitted to the *Journal of Environmental Psychology* and it is currently under review.

The third manuscript (Chapter 4) “Seal hunting in Newfoundland from the perspective of local people” was co-authored by Jerry J. Vaske (CSU) and Alistair J. Bath (MUN). This paper was submitted to *Marine Policy* journal and it is currently under review.

Manuscript’s figures, tables and text are formatted according to the specific requirements of the journals they were submitted.

Chapter 1. Introduction and Overview

The ocean covers 71% of our planet's surface and it is our life's support system. It influences the global weather, provides food and income for billions of people, and it is home to both minuscule and gigantic creatures. In this chapter, I present the reasons for investigating people's relationship with the ocean and with one of its most controversial creatures in the context of Newfoundland and Labrador, seals (harp, *Pagophilus groenlandicus,* and grey, *Halichoerus grypus,* seals). I start by presenting the problem the ocean is facing and why the United Nations declared the coming decade as the Decade of Ocean Science. Next, I present the theoretical rationale guiding this research and the specific objectives to address the knowledge gap previously identified – for better understanding of the concepts mentioned in the specific objectives (Section 1.3), the theoretical background (Section 1.2) is offered first. The section after gives an overview of the research design and context, where I present the study area and how I collected and analysed the data. The chapter ends with key points highlighting the importance of the research and a synopsis of the following chapters.

1.1 Understanding the problem we face

> "It is a curious situation that the sea, from which life first arose should now be threatened by the activities of one form of that life. But the sea, though changed in a sinister way, will continue to exist; the threat is rather to life itself." Rachel Carson, The Sea Around Us, 1951.

Our relationship with the ocean is complex (Rock et al., 2019). For millennia, people have conceived and used the ocean in various ways. From marine explorers and *conquistadores* to merchants and traders, civilization evolved and changed with the ocean (Rozwadowski, 2013).

We rely on the ocean as a source of food and income, and for transportation, energy and fossil fuel extraction. Currently, 17% of the global meat production comes from the sea, yet, with an ever-growing human population, it is estimated there will be a 36-74% increase in demand for sea meat by 2050 (Costello et al., 2020). According to the United Nations, the ocean supports the livelihood of more than three billion people and is responsible for over 90% of the world's trade of goods and raw materials. In 2009, about 20% of the petroleum supply came from offshore oil rigs (Steinberg, 2009); recently, more than a quarter of oil and gas are produced offshore (IEA, 2018). But the ocean provides more than food, energy and income. This salty body of water that contains 97% of the Earth's water supply is what sustains life in this planet (Steinberg, 2009).

With an average depth of 3.8km – and a maximum of about 11km (Lawrence, 2009), the ocean produces more than half of the planet's oxygen, stores 50 times more carbon dioxide that the atmosphere, and through its currents, it regulates the global climate and weather patterns (NOAA - National Oceanic and Atmospheric Administration, 2020). A healthy and sustainable

ocean is clearly vital for the survival of human and non-human life on this planet. Without sustainable fish populations, balanced ecosystems, and 'correct' surface temperatures, the ocean will destabilize and the only sound we will hear will be from cargo ships carrying goods and trash across continents.

Despite global efforts to protect the ocean and increase the number of marine protected areas from the current 7.5%[1] to 30% in 2030 (we already missed the 10% target for 2020; Aichi Biodiversity-Target 11), growing evidence points towards a rather frightening reality (IPCC, 2019). Rachel Carson (1907 – 1964), the renowned marine ecologist and environmental advocate, would be astonished to witness the degree in which we are dragging the ocean floor, exploiting fish populations, and releasing such a high concentration of carbon dioxide in the atmosphere that it is changing the ocean temperature, impacting water currents, and killing coral reefs (Almond et al., 2020).

It is hard to imagine that we would be capable of leaving such a legacy for future generations; but, the Anthropocene is here (Crutzen, 2002). Globalization and the increased demand for goods and natural resources have contributed to major impacts on marine ecosystems. Anthropogenic stressors to the ocean such as fishing, climate change, pollution, shipping, ocean mining and farming (Stock et al., 2018), have caused cumulative impacts on at least 59% of the ocean (Halpern et al., 2019). The waters off the coast of Newfoundland and Labrador are considered as highly impacted by anthropogenic activities (Halpern et al., 2008), activities that are "driven by psychological, social, economic and political processes" (Aswani et al., 2018, p. 192).

[1] Based on the World Databse on Protected Areas, a global database curated by the united Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC).

In this context, the current issue of marine conservation requires a better understanding of social processes that go beyond the economic dimension of the 'social component' (Aswani et al., 2018). Marine conservation is interdisciplinary and encompasses the protection, preservation, or restoration of the natural environment, as well as sustainable ocean use (Parsons, MacPherson, & Villagomez, 2017). Assessing individual values and behaviours and the factors that influence day-to-day decision-making processes is now a recognized need to tackle the challenges of marine governance and conservation (Aswani et al., 2018; Bennett, 2019; IPCC, 2019; Kelly, Fleming, & Pecl, 2018; Rock et al., 2019). Since "much of the world's oceans and coasts are peopled seascapes" (Bennett, 2019, p. 3), efforts toward a sustainable ocean will benefit from taking into account the human dimensions of marine management and conservation.

Despite the growing body of knowledge on marine social sciences (e.g., Bennett, 2018; Engel, Vaske, & Bath, 2020; Jefferson, Bailey, Laffoley, Richards, & Attrill, 2014; Walker-Springett et al., 2016) and on the human's cultural and historical connection with the ocean (e.g. Rozwadowski, 2018), research in the humanities and social sciences focused on marine issues is relatively scarcer in comparison to terrestrial-focused research (Dallmeyer, 2003, 2005; Hornidge & Schlüter, 2020; Rock et al., 2019; Wolf, 2003). As pointed out by Wolf (2003), "for a variety of reasons, marine ecosystems have not been at the center of environmental philosophy; we *Homo sapiens*, are land animals" (p. 29). Hornidge and Schlüter (2020) argue that we should be *deterrestrialising* the academy. According to these authors, theory production in social sciences has been heavily based on terrestrial empiricism, but to understand human/ocean relationships, theory production based on marine empiricism is needed.

The research problem this doctoral work is designed to address relates to examining the human/ocean relationships in the face of a changing ocean. The purpose of the study is to assess

marine values, beliefs, attitudes, emotions and behaviours of people who live on the edge of land and sea. It contributes to filling the gap in the human dimensions of marine issues identified by Aswani et al (2018). It addresses the need for an understanding of the diverse values and knowledge "of people closely involved with the oceans, as well as those people whose effects on the oceans occurs more indirectly through particular lifestyle choices" (Aswani et al., 2018, p. 199). Furthermore, this thesis contributes to the scientific knowledge on marine social sciences. Specifically, it attends to the urgent need for new methodologies and approaches for the marine social sciences, as pointed by the Marine Social Sciences Manifesto (Bavinck & Verrips, 2020).

Empirically, this research responds to the call from the United Nations for ocean sciences knowledge. The coming decade (2021-2030) was declared by the United Nations as the Decade of Ocean Sciences for Sustainable Development. The Decade's main goal is to help countries to achieve the 2030 Agenda for Sustainable Development, informing not only the Sustainable Development Goal 14 – Life Below Water, but other goals that carry a marine dimension (e.g., zero hunger, climate action). In Canada, Prime Minister Justin Trudeau launched a $1.5 billion National Oceans Protection Plan to tackle those major threats to marine health. In his statement, the Prime Minister made it clear that the "oceans have a profound impact on our way of life. They are vast sources of food and energy, home to unique habitat and abundant marine life, and the site of historical moments that continue to shape the world" (Ottawa, June 8, 2018; statement available at pm.gc.ca). Furthermore, the Prime Minister highlighted that Canadians are not inseparable from their oceans, coasts and seas, as people in this country rely on the ocean for jobs, recreation, trade and transportation.

Aswani et al. (2018) argue that, although globalization characterizes the Anthropocene, efforts at examining people/ocean interactions and finding ways to mitigate many of the current

environmental marine problems, require local research and solutions. Through a structured questionnaire applied to coastal residents on the island portion of the province of Newfoundland and Labrador, this research addresses some of the anthropogenic-driven environmental problems impacting the ocean from a human dimensions perspective (e.g., marine plastic pollution, fishing, oil and gas exploration). Grounded in the marine social sciences to analyze the people/ocean relationship, this research increases awareness that "society must be engaged in efforts to tackle marine conservation challenges" (Kelly et al., 2018, p. 1). In the context of Newfoundland, these challenges range from climate change, marine pollution, use of resources and collapse of fish stocks. In this sense, "Newfoundland is a warning signal, a microcosm of the planet itself" (Arms, 2004, p.12).

The next section provides a brief overview of some of the challenges of a changing ocean on the island portion of the province of Newfoundland and Labrador. Additional contextual information is provided in the following chapters.

1.1.1 The ocean in Newfoundland

"Salt water in our veins". Jenn Verma, Cod Collapse, 2019.

Newfoundlanders have deep and historical connections with the ocean. Whether through the island's fisheries, the use and admiration for marine mammals and birds, or from offshore oil and gas explorations (Sanger, 1998), residents of Newfoundland are 'ocean people'. Inhabitants of the island, however, have experienced drastic changes in the surrounding waters due to overexploitation of resources, pollution, and climate change (Bernier et al., 2018).

The Atlantic Cod stocks, for example, collapsed in the early 1990s. After centuries of intense fishing, the cod population could not be sustained, and strong regulations were imposed

(Bavington, 2010). The government instituted a cod fishing moratorium in 1992 to allow recovery time (Rose, 2007), but despite efforts, the current cod stocks remain low and the species is classified as endangered (DFO, 2019b). Serving as an important source of food and income for many Newfoundlanders and Labradoreans, the decline of Atlantic cod had profound consequences for both social and ecological systems (Rose, 2007). Many people lost their jobs and had to look for opportunities in other places.

Throughout history, Newfoundlanders have explored the cold waters from the North Atlantic in search of harvesting opportunities. Until recently, hunting seals was an important economic activity for many fishers. By the end of the 19th century, the industry was second in importance to the province (a self-governing British colony at the time), behind only the North Atlantic cod fishery (Livernois, 2010). The high demand for seal products, however, caused a severe decline of the population, and the harvest had to be controlled (Livernois, 2010).

Currently, the Northwest Atlantic harp seal population (~ 7.4 million animals) is healthy and abundant, yet still below pre-sealing levels (DFO, 2019). The grey seal population (~ 424,300 animals) is slowly recovering, particularly in the Gulf of St Lawrence, where the mortality rate and removal of seals remains high (DFO, 2019). Human-seal interactions are complex and the harvesting of seals is a controversial issue (Barry, 2005; Pannozzo, 2013). While some consider the hunting inhumane, others believe seals are overabundant and therefore the population should be controlled.

But Newfoundlanders are not only witnessing changes impacting the marine resources they have relied on for generations (e.g., decline of some fish populations); people on the island are witnessing an increase in sea water temperatures, ocean acidification, and rising sea levels (2-4mm/year in St. John's, NL. (Bernier et al., 2018). Since 2010, for instance, sea ice volumes on the

Newfoundland and Labrador Shelf (one of the three oceanographic bioregions in Atlantic Canada) have been lower than normal, while deep-water temperatures have been above normal (Bernier et al., 2018). Ocean acidification has also been recorded over the last decades, with rates generally higher than in other parts of the world (Bernier et al., 2018). Resulting from the gradual uptake of atmospheric carbon dioxide (CO_2), acidification is related to an increase of human induced CO_2 released in the atmosphere (Bernier et al., 2018), and it is a major threat to marine food webs, ecosystem productivity, fisheries and food security.

In addition to those changes, evidence continues to grow concerning the impact of plastic pollution on the sea, with microplastics being found in fish destined for human consumption (Saturno et al., 2020) and in sea birds (Provencher et al., 2014). The human influenced challenges just presented makes Newfoundland a valuable case study for examining the complexities of people/ocean relationships through a marine social sciences perspective. And, as pointed by Arms (2004), the province is a microcosm in a changing world.

1.2 Theoretical Rationale: Marine Social Sciences

There is an increase awareness that social scientists are well equipped to engage society in tackling marine conservation challenges (Kelly et al., 2018). While considerations of the human dimensions of the sea are complex (McKinley et al., 2020), Aswani et al. (2017) argue that environmental social scientists are fundamental, as they

> "study the role of humans in environmental change and examine the proximate and ultimate causation mechanisms of human environmental cognition and behaviour, cross-scale dynamics, power asymmetries in

resources use and access and approaches to practical environmental solutions from various theoretical and methodological viewpoints" (p. 193).

The Marine Social Sciences is an umbrella term framed according to the conservation social science; another broad term used to represent the diverse traditions of social science disciplines in understanding and improving conservation policy, practice and outcomes (Fig. 1; adapted from Bennet et al., 2017). When viewed in the context of ocean issues, these disciplines that range from classic conservation social science (e.g., environmental and conservation psychology) to applied conservation social science (e.g., human dimensions), enable the understanding of human/ocean relationships, both in practical methodological approaches and through explanatory conceptual framings (McKinley et al., 2020).

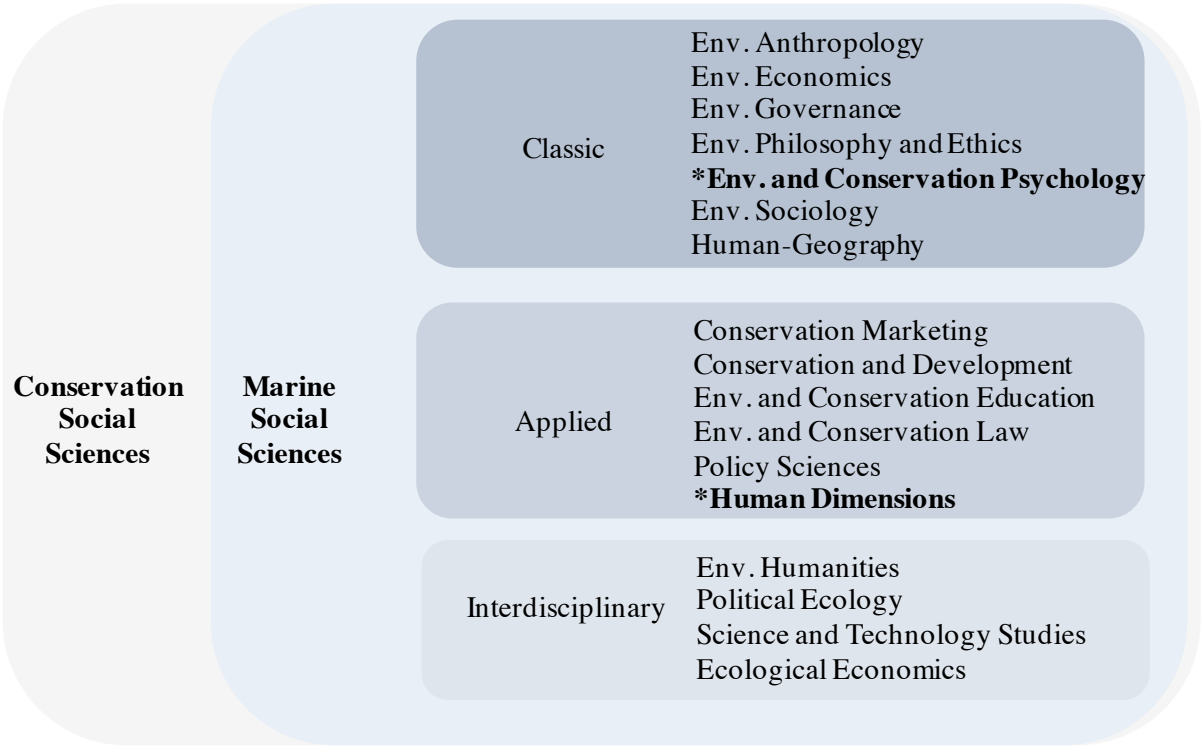

Figure 1 The conservation, and marine, social sciences disciplines - classic, applied and interdisciplinary. Asterisks in the disciplines in which this research is grounded. Adapted from Bennett et al. (2017).

Research on human dimensions (HD) is applied and interdisciplinary (Bennett et al., 2017) and recognizes that conservation issues are complex and multiple determined (Steg & Rothengatter, 2008). Traditionally, HD research has focused on sociology and social psychology to address natural resources management and conservation (Vaske & Manfredo, 2012); thus, sharing a common body of theoretical literature with other fields, like conservation and environmental psychology. The focus of conservation and environmental psychology is on the *individual*. Through different theories and predictive models, it provides information on how people respond to environmental issues and what measures are more socially acceptable, on attitude-behaviour change strategies, and on anticipating social conflict among different interest groups (Bennett et al., 2017).

The present research in situated in the marine social sciences. It is grounded on the HD and environmental psychology literature (which is heavily based on social and cognitive psychology) to examine why people do the things they do in relation to the ocean. According to cognitive sciences, a hierarchy of cognitions ranging from basic values and value orientations, to more specific norms and attitudes influence human behavior (Fig. 2; Fulton, Manfredo, & Lipscomb, 1996). These constructs vary in number and specificity. While values are less specific, fewer in number and slower to change, attitudes and behaviours are more specific to objects and situations, numerous, and faster to change.

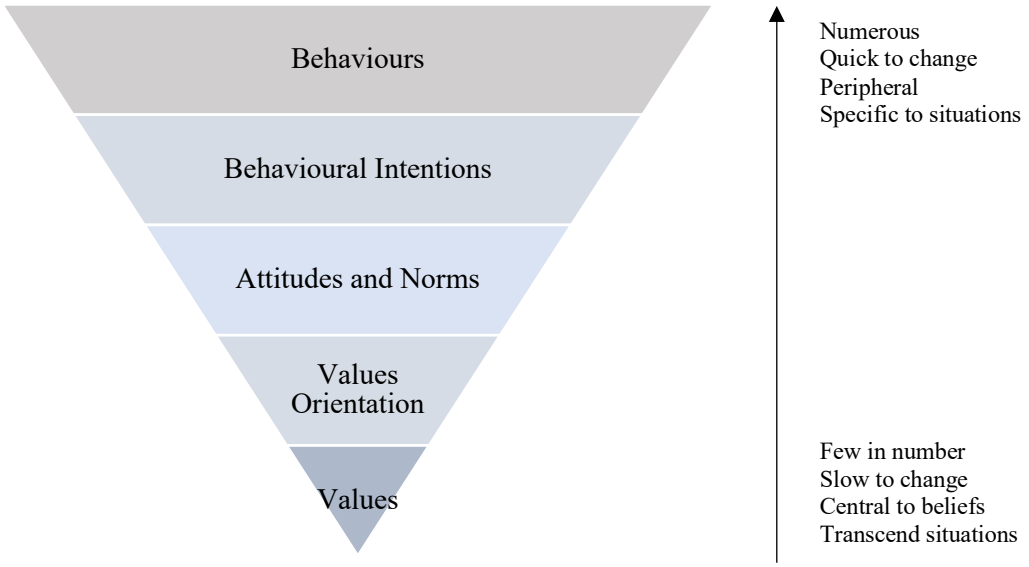

Figure 2 The cognitive hierarchy of human behaviour. Adapted from Fulton et al. (1996).

Values exist within a multi-level social structure, and for both individuals and social groups, values serve as standards of evaluation (Vaske & Manfredo, 2012). As a noun, value refers to the importance, worth or usefulness of an object, reflecting principles or standards of behavior for determining what is important in life. As a verb, values refer to people's assignment of meaning, goodness or worth, and reflects the process of valuing an object (Manfredo, 2008). The value theory assumes that values are beliefs linked to emotions that refer to desirable goals that motivate action, are trans-situational, serve as standards or criteria to evaluate actions, policies, people and events, and are ordered by relative importance that will ultimately guide actions (Vaske & Manfredo, 2012). Values, however, become less abstract when they are oriented toward an object carrying contextual meaning, for example toward the oceans (or toward seals). For the purpose of this thesis, I investigate people's value orientations toward the ocean and seals.

Different from values, attitudes are favorable or unfavorable evaluations of a general or specific object, and derive from cognitive (e.g., beliefs) and affective (e.g., emotions) components (Vaske & Manfredo, 2012). While values transcend situations, are low in number and difficult to

change, attitudes are specific to objects, numerous and fast to change. Values, attitudes and other cognitions derived from individuals and social groups are key to the understanding of the relationship between humans and the natural environment.

Other important factors influencing an individual's decision-making process include emotions, trust, and mental images. Images refer to mental representations of the ways in which people see, interpret and understand the world (Voyer et al., 2015). These images reflect memories and emotions (Leiserowitz, 2006), and may take the form of smell, taste, sound, and touch (Echtner & Ritchie, 1991).

Additional definitions of these concepts and further discussion on how they influence behaviours are presented in the chapters that follow.

Relating Theories with Manuscripts

To assess the factors that influence an individual's personal norm (see objective 1, Chapter 2), I used the Value-Belief-Norm theory (Stern, 2000). To examine ocean mental images and their influence of marine values, beliefs, emotions, attitudes and behaviours (see objective 2, Chapter 3), I based the analyses on the cognitive hierarchy of human behaviour (Fulton et al., 1996; Vaske & Donnelly, 1999). Similarly, to assess coastal resident's perceptions on seal and seal hunting, analyses were based on the cognitive hierarchy (see objective 3, Chapter 4). Details of these theories are discussed in the corresponding chapters.

1.3 Research Objectives

Within the context of marine social sciences, the overarching goal of this research thesis is to explore how coastal residents of the island portion of Newfoundland and Labrador relate to the

ocean. Here, the relationship between coastal people and the ocean refers to various ways in which individuals value the ocean, perceive the current and future state of this environment, behave, and make decisions about using and exploring marine resources. Individual's value orientation and other perceptions of marine governance and conservation, however, may differ when we change the focus of the analysis from the ecosystem to the species level; particularly if the species in question has been at the centre of political and environmental debate for decades (i.e., Barry, 2005; Pannozzo, 2013). Do people hold different values for the sea, and for the seals? Through these two distinct paths of exploring people/ocean relationships - from a broader perception of the ocean to specific views toward seals, the research is framed around three main objectives:

i. To assess the cognitive elements that make people feel morally obliged to help improve marine health; that is, the influence of marine value orientations, awareness of anthropogenic impacts on the ocean, and sense of responsibility on personal norms (i.e., feelings or moral obligation).
ii. To explore ocean mental imagery and assess the effect of these images on emotional involvement (e.g., fear about the future) and cognitions that are known to influence behaviours: value orientations, attitudes, personal norms, and acceptability for using and exploring the sea.
iii. To assess an individual's psychological constructs related to seals, seal hunting and its management, how such constructs influence public support for banning seal hunting, and to evaluate the effect of marine value orientations on values toward seals.

Each of the three specific objectives are assessed in the scientific manuscripts that follow: objective 1 in Chapter 2, objective 2 in Chapter 3, and objective 3 in Chapter 4. While the first

objective is centered on marine value orientations, the second objective focuses on ocean mental images, and the third one on individuals' perceptions on human/seal interactions. For most of the analyses in this research, the objective was also to examine differences between age groups, men and women, and urban and rural residents.

1.4 Significance of the research

This research project has practical and theoretical significance for marine and seal governance in Newfoundland, as well as for other places where people are dealing with a changing ocean and a perceived abundant species. First, it responds directly to the request of OFI's Module I-3 for an understanding of coastal people's values, perceptions and knowledge toward the sea in Newfoundland. Secondly, this research responds to the direction and recommendations of previous research in the context of marine social sciences, such as

- The recognition that individuals and the wider public are legitimate marine stakeholders (Jefferson et al., 2015; McKinley & Fletcher, 2012);
- The need to explore and explain the range of human/ocean relationships (Walker-Springett et al., 2016);
- The need for human dimensions research in ocean governance, management and conservation (Bennett, 2019);
- The need to address people's thoughts, feelings and behavior towards the ocean (Aswani et al., 2018; Jefferson et al., 2015; McKinley et al., 2020);
- The need to assess the role of marine values in guiding public involvement and personal responsibility toward the ocean (Jefferson et al., 2015; McKinley & Fletcher, 2012); particularly, the need to investigate values that are oriented

towards a particular object, like the ocean and/or seals, to predict more specific beliefs and attitudes (Vaske & Manfredo, 2012);

- The need for new methodologies and approaches in marine social sciences (Bavinck & Verrips, 2020); in this regard, this thesis uses a mixed method approach by combining quantitative and qualitative data (Small, 2011).

Discussion about the theoretical, methodological and empirical relevance of this research is outlined in Chapter 5.

1.5 Research context and design

1.5.1 Study area

The research was conducted in the island portion of the province of Newfoundland and Labrador, Canada (Fig. 3). Important economic sectors in the province include mining, oil and gas extraction (25.57% of total GDP), construction (10.24% of total GDP), real estate, rental and leasing (9.46% of total GDP), health care and social assistance (8.86% of total GDP), public administration (7.73% of total GDP), education services (5.73% of total GDP) and retail trade (5.08% of total GDP); agriculture, forestry fishing and hunting account for 1.9% of the GDP (Finance, 2020). The current population in the province is approximately 519,716 people; about 94% live on the island of Newfoundland, and 60% in rural areas of the province (Statistics Canada, 2016). There are 277 municipalities in the Province, three of which are cities, five are Inuit community governments, and 266 are towns. Among those, 216 municipalities are coastal; 182 are in Newfoundland. Of the three cities, two are coastal: St. John's and Corner Brook. Towns are considered as rural sites and cities as urban sites. This research only included residents of urban and rural coastal municipalities on Newfoundland.

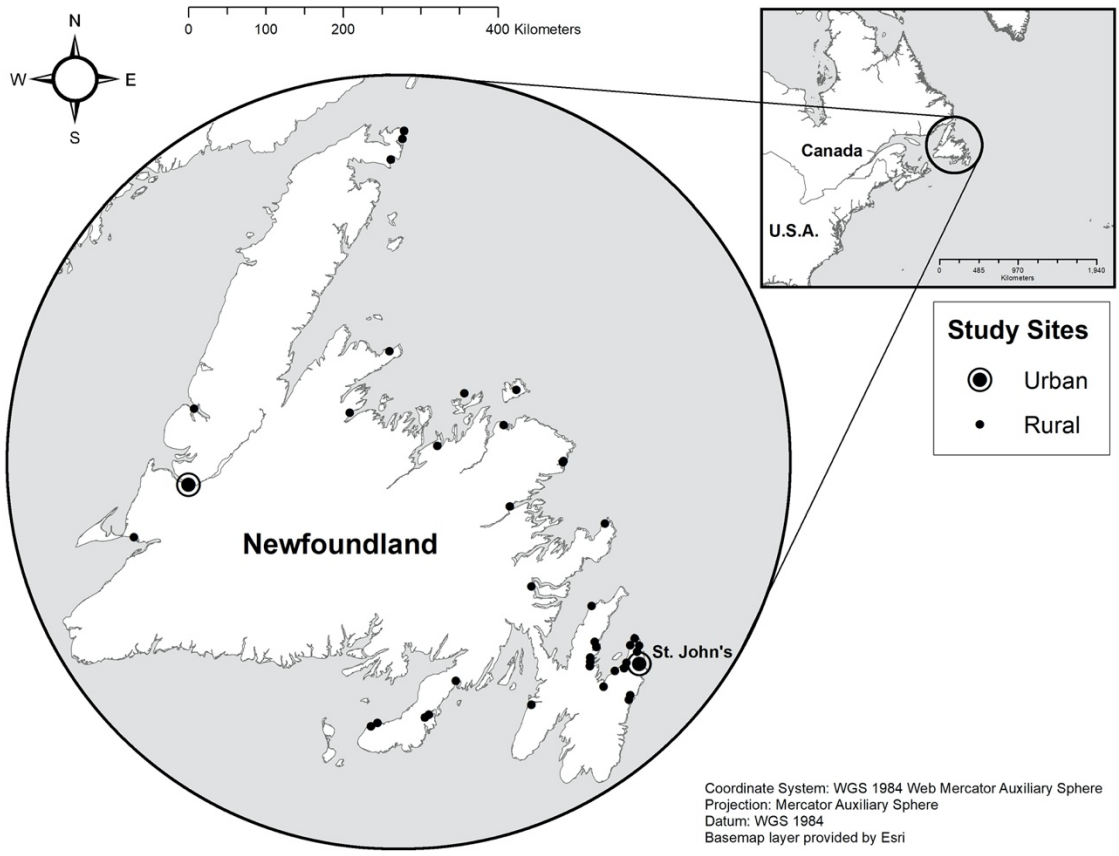

Figure 3 Map of the study area. Points indicate the communities selected for the study.

1.5.2 Research tool

Data were collected through a self-administered questionnaire containing both open-ended and closed-ended questions (see Appendix A). Closed-ended questions were often in the form of Likert-scales (Jamieson, 2017). The questionnaire covered the following sections: interactions with the ocean, perceptions about the ocean and marine life (whales, seals, and Atlantic cod), state of the ocean, things we do, marine management, perceptions about the land and the sea, and demographics. Not all of the items in the questionnaire are analyzed in this thesis. Items specific

to Atlantic cod, whales, aquaculture, marine protected areas, and perceptions of land and sea were not included here due to prioritization of specific objectives.

Prior to the data collection, a pilot of the questionnaire was conducted to adjust length and wording. The pilot was carried out with a fishery scientist familiarized with the NL's context, with a group of university students, and with three coastal residents. Ethical approval was granted by the Interdisciplinary Committee on Ethics in Human Research (ICEHR) from Memorial University. Participant's consent to use the data was obtained by completing the questionnaire. Responses were anonymous and questionnaires were grouped together with those from the same study site.

1.5.3 Data collection & analyses

Data were collected between November 2018 and March 2019 from 40 coastal municipalities: two urban and 38 rural (see Fig. 3). I selected the study sites based on a proportional distribution of the population (Statistics Canada, 2016), and targeted 400 completed questionnaires for rural and urban areas, respectively, based on a 95% confidence level and ± 5% sampling error (Vaske, 2019). Given the high number of sites across the island, I prioritized places with a target sample of at least five completed questionnaires. Due to weather conditions and access restrictions, three of these sites were not included in the study (Port Aux-Basques, Burgeo, and Harbor Breton). To compensate for those places, other municipalities were included in the sample.

A total of 1,600 questionnaires were hand-delivered (Fig. 4-a), thus increasing the likelihood of reaching the target sample size. I used a drop-off/pick-up method (Jackson-Smith et al., 2016), and only considered the research units (i.e., houses) where an adult over 18 years old accepted to participate. Research units were randomly selected. First, I used a grid map from Google Earth in each municipality. With a number generator, I selected the street(s) to start the data collection process. When there were houses on both sides of the street/road, I would start from the houses on the right side. If no one was home, I moved to the next house. If a minor opened the door, I asked for one of the parents or guardians. Questionnaires were normally retrieved the next day, and people had the option to leave the completed questionnaire at the door (Fig. 4-b). A mail option was granted upon request.

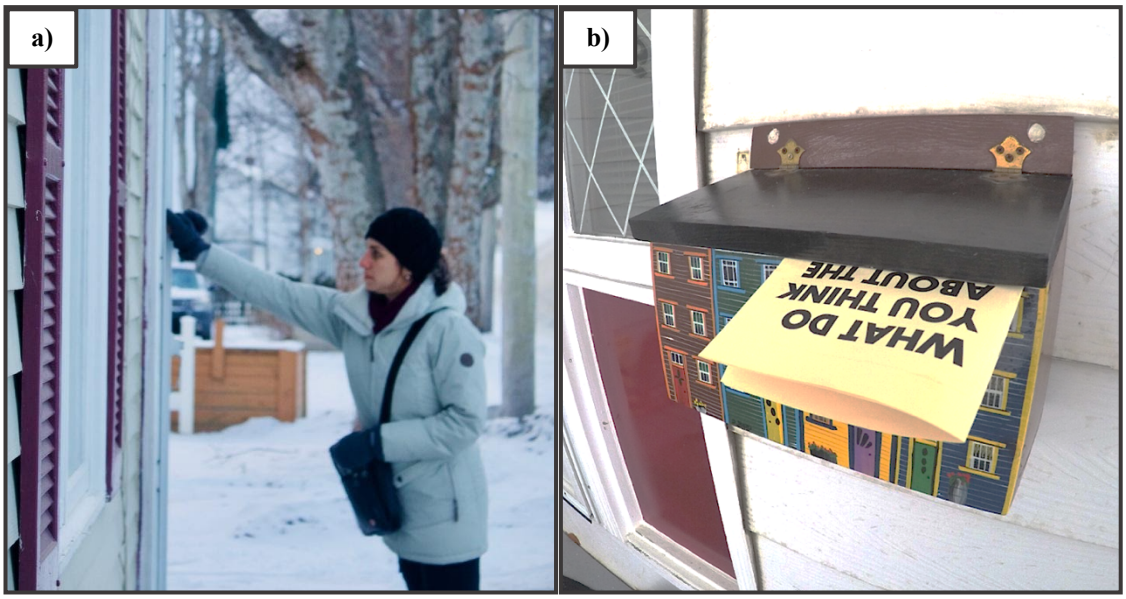

Figure 4 Data collection. a) A total of 1,600 people were personally invited to participate in the research. b) Respondents had the option to leave the completed questionnaire at the door or in the mailbox.

A total of 776 completed questionnaires returned (49% response rate). Participants were randomly selected, and the large sample allows for 95% confidence level and ± 5% sampling error (Vaske, 2019). Furthermore, the sample reflects the demographic characterizes of the population

in Newfoundland. Descriptive statistics, t-tests, analyses of variance, Pearson regression, structural equation modelling, and content analyses were used to analyze the data. To examine the internal reliability of the scales used to measure the conceptual constructs (e.g., marine value orientations, beliefs, attitudes), the Cronbach's Alpha was used where an alpha $\geq .50$ was considered as acceptable (Hinton, McMurray, & Brownlow, 2004). Further details are described in the chapters. Data were analyzed with SPSS version 26, LISREL version 10.3, and NVivo version 12.

1.6 Overview of chapters

This thesis is organized into five chapters and an appendix: this introduction, three manuscripts, and a conclusion chapter. A copy of the questionnaire is found in the appendix. Below, I present a synopsis of each chapter (adapted from the manuscript's abstracts). While chapters 2 and 3 center on higher orders of cognitions applied to a broader perspective of the ocean and its use and conservation, chapter 4 brings those higher concepts to the species level and examines the human dimensions of seal hunting (Fig. 5).

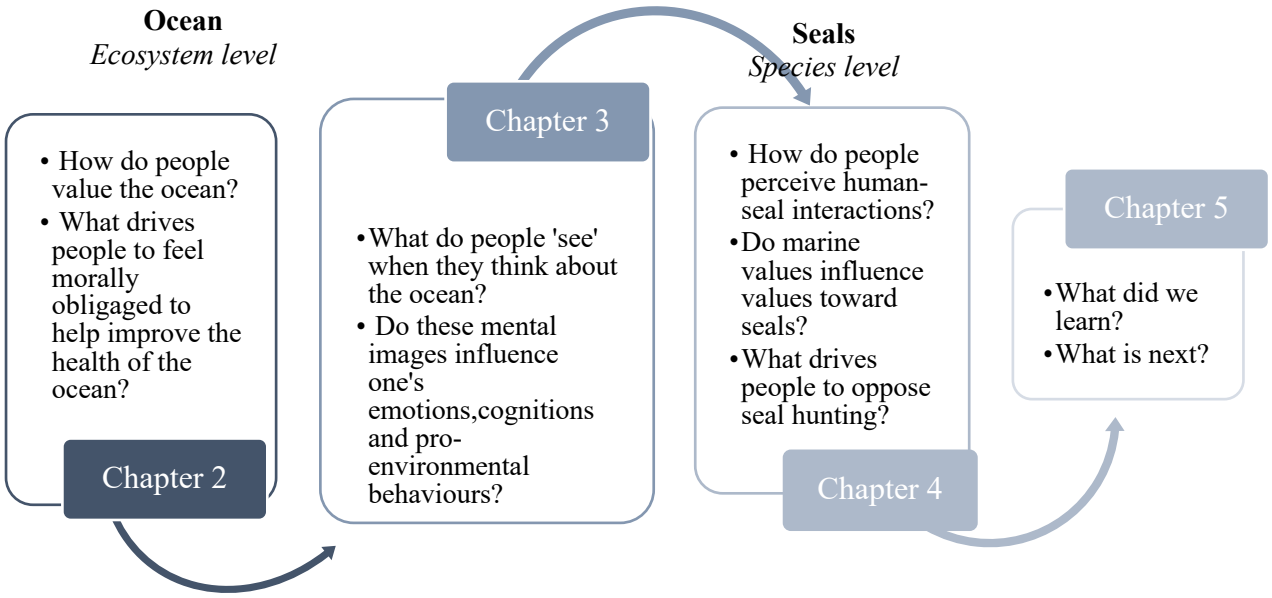

Figure 5 Schematic organization of the thesis.

1.6.1 Chapter 2

Chapter 2 explored how **marine value orientations and beliefs contribute to the formation of a marine conservation personal norm**. It is well known that direct exploitation of resources, climate change, and land pollution are the main drivers of marine degradation. Influencing these drivers are political, cultural and economic systems, which in turn are guided by people's values, beliefs, and behaviours. In this chapter, I show what prompts people to feel morally obliged to stand up and act in favour of a clean and healthy ocean.

The analysis reveals an acceptable fit for the model, and through structural equation modelling it predicted 86% of the variance in personal norms. The results show that people feel a moral obligation to act in favour of a healthy ocean when they care for the ocean (relational value), feel responsible, and are aware of the negative impacts of human actions on the marine

environment. I also demonstrated an indirect positive effect of intrinsic value, and an indirect negative effect of instrumental value orientations on personal norms. Focusing on the value of the ocean as merely a source of food and income (instrumental) to encourage people to help to improve the health of the marine environment proved inefficient. The results imply that efforts aimed at inspiring people to engage in sustainable behaviours should be grounded on relational values, such as care and concern for the ocean.

1.6.2 Chapter 3

Chapter 3 investigates **ocean imagery and how they relate to an individual's emotions, cognitions and pro-environmental behaviours**. The objective was to deconstruct mental ocean imagery and explore how these images relate to one's marine value orientations, personal norms, emotional involvement (e.g., fear about the future state of the ocean), attitudes toward sustainable use of marine resources, acceptability for ocean use, and pro-environmental behaviours.

Using a word-association technique, 1,815 images were elicited. Frequency analyses of stemmed words yielded a total of 282 distinct images. Through an inductive exploratory content analysis, four main theme dimensions emerged: *psychological impression, place identity, uses of the ocean,* and *nature*. Multiple regression models found that mental images play a role in determining how people feel, think and act toward the ocean. Furthermore, findings expand our knowledge on the social aspects of marine issues and point to a new ocean metaphor that can guide decision-making for the ocean decade that lies ahead.

1.6.3 Chapter 4

Chapter 4 explores **seal hunting in Newfoundland from the perspective of local people.** Controversies exist around seal hunting and the permanence of the activity, which is infused by

the perceived impact of seals to the local fishery and the growing population of these species off the coast of Newfoundland and Labrador. Overall, respondents valued seals for their ecological, intrinsic, cultural and instrumental values, expressed positive attitudes, believed seals were causing the decline of cod, held low trust toward the federal agency in governing the sea, did not think the hunting was cruel and supported its continuity.

Support for stopping the seal hunt was positively influenced by emotion (cruelty associated to hunting) and negatively influenced by acceptability of using seals for commercial and subsistence purposes. Statistical differences were found between rural and urban respondents. Based on these findings, I suggest that despite positive values and attitudes, seals are perceived as an abundant species that needs to be controlled. The lack of trust in the government suggests that an open dialogue is necessary for effective seal management.

1.6.4 Chapter 5

Chapter 5 integrates the previous chapters and discusses the contributions of the research findings to the field of marine social science, and marine conservation. It acknowledges some limitations of the study and points to future areas for research. The relevance of the research is discussed in the context of the UN's Decade of Ocean Science for Sustainable Development.

Chapter 2. Value orientations and beliefs contribute to the formation of a marine conservation personal norm

2.1 Introduction

Human value orientations and behaviours directly (e.g., exploitation of resources, pollution, and climate change) and indirectly (e.g., sociocultural, political, and economic systems) impact marine environments (Diaz et al., 2019). Research has encouraged society to tackle conservation challenges affecting nature and sustainable environments (Collet, 2007; Vincent, 2011; Walker-Springett et al., 2016). Promoting conservation goals related to marine issues, however, requires understanding human value orientations and beliefs toward the sea (Fletcher, Jefferson, & Mckinley, 2012; Jefferson, Bailey, Laffoley, Richards, & Attrill, 2014; Pascual et al., 2017). Knowing how people value the ocean can facilitate conservation outcomes (Fletcher et al., 2012; Jefferson et al., 2015; Tallis & Lubchenco, 2014).

Marine value orientations (MVO) correspond to a system of fundamental beliefs that give meaning to more generic and abstract values (Vaske & Manfredo, 2012). Studies on environmental

value orientations have a critical role in increasing awareness and guiding policies, as worldviews can accelerate impacts on the environment, justify it, or fail to criticize it (Dallmeyer, 2003). Research on marine value orientations are scarce (e.g., Walker-Springett et al., 2016). Most studies have focused on cost-benefit analyses or some other form of economic valuation (Larrère & Larrère, 2007). Utilitarian approaches, however, fail to recognize and embrace the complex ways humans relate to nature (Collet, 2007). Experts in marine conservation identified research priorities for public perceptions of the sea (e.g., Jefferson et al., 2015) and included studies on values and demographics among the recommendations. Despite this acknowledgement, the role of value orientations in guiding public involvement and personal responsibility remains largely unanswered (Jefferson et al., 2015; McKinley & Fletcher, 2012).

This article assessed the cognitive elements that make people feel morally obliged to help improve marine health. We examined the relationships among individuals' intrinsic, instrumental, and relational MVOs, their awareness of consequences (AC) of human impacts on the ocean, their ascription of responsibility (AR) for projecting marine health, and their moral obligation (personal norms) for pro-environmental behaviour. We also investigated the relationships between the cognitions (e.g., MVO, AC, AR, personal norms) and respondents' demographic characteristics (e.g., sex, age, place of residence). Analyses focused on coastal residents on the island of Newfoundland in Eastern Canada.

Newfoundlanders have deep and historical connections with the ocean through the island's fisheries and offshore oil and gas explorations (Sanger, 1998). Inhabitants, however, have experienced drastic changes in the surrounding waters due to exploitation of resources, pollution, and climate change (Bernier et al., 2018). The northern cod stocks, for example, collapsed in the 1990s. After centuries of intense fishing, the cod population could not be sustained, and strong

regulations were imposed (Bavington, 2010) directly impacting Newfoundland fisheries. The government instituted a cod fishing moratorium in 1992 to allow recovery time; but the current cod stocks remain low. Newfoundlanders have witnessed their ocean face increased water temperatures, ocean acidification, and rising sea levels (Bernier et al., 2018). The human influenced challenges make Newfoundland a valuable case study for examining the complexities of people / ocean relationships through an environmental psychology perspective. The method and findings presented here, however, are not limited to Newfoundland. Rather, the goal was to use the island as an example for studying human thoughts, actions, and behavioural choices in relation to marine conservation and governance, and to consider how these could be applied in a wider context.

2.1.1 Marine Value Orientations, Beliefs, and Personal Norms

Two theoretical frameworks guided this work: (1) the value-belief-norm theory of environmental behaviour (VBN; Stern, 2000), and (2) the norm activation model (Fig. 6; Schwartz, 1977). The VBN postulates that specific beliefs and personal norms mediate the relationship between value orientations and behaviour. The norm-activation model (Schwartz, 1977) predicts that people feel morally obliged to perform a specific behaviour (*personal norm*) when they feel responsible (*ascription of responsibility [AR] beliefs*) for their behavior and are aware of the consequences of their actions (*awareness of consequences [AC] beliefs*). Stern (2000) argue that these beliefs are based upon specific environmental value orientations, and together these elements determine how a person will act. This article does not investigate specific behaviour toward the ocean; instead, the focus is on understanding the moral feelings related to personal norms (i.e., whether people feel they should be doing more to help improve the health of the ocean). Moral obligations are linked to the individual's self-evaluation and self-expectations. When one's

expectations are not realized, negative self-evaluations (e.g., guilty, self-deprecation) can occur. On the other hand, when one's expectations are achieved, pride and enhanced self-esteem can result (Schwartz, 1977). The focus of this study is on people's general beliefs of moral obligation in relation to the ocean and on understanding how this can be harnessed to influence behaviour.

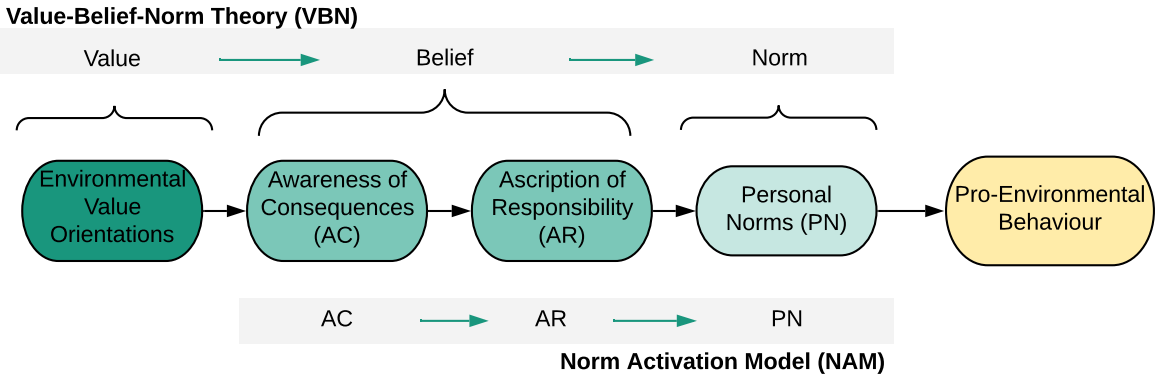

Figure 6 A schematic representation of the value-belief-norm theory and the norm activation model. The arrows indicate a direct effect between the concepts. Adapted from Stern (2000).

Empirical evidence supports this causal chain of cognitions as proposed by the VBN. For example, Vaske, Miller, Toombs, Schweizer, and Powlen (2018) found that a farmer's sense of responsibility influenced their intentions to adopt Aldo Leopold's land ethic. Similarly, Wynveen, Wynveen, and Sutton (2015) documented that responsibility beliefs influenced personal norms and willingness to adopt pro-environmental behaviour in marine protected areas. When deciding on transportation uses, Kaiser, Ranney, Hartig, and Bowler (1999) found that responsibility, and problem awareness predicted people's willingness to drive less or choose other means of transportation. Value orientations and beliefs (AC and AR) have also been found to influence personal norms and subsequently acceptability of energy policies to reduce CO_2 emissions (e.g., Groot & Steg, 2009).

Environmental value orientations are based on beliefs of the relationship between humans and nature (Steg & Groot, 2012), and have been discussed as intrinsic, instrumental and relational value orientations (Chan et al., 2016; Klain et al., 2017; Pascual et al., 2017; Tallis & Lubchenco, 2014). Intrinsic value is the value ascribed to an object for what it is and not for what it provides to people (Vucetich et al., 2015). Nature's intrinsic values reflect an environmental ideology where nature has a value in itself independent of human judgment or needs (Pascual et al., 2017; Robinson, 2011). Instrumental values, on the other hand, refer to the value attributed by humans to nature as a means to achieve a particular end; for example, valuing the ocean because it provides food and income to people. Relational values reflect preferences, principles, and virtues of relationships (i.e., people/nature) that do not originate directly from nature, but from people's relationship with nature and responsibility toward the environment (Chan et al., 2016). Relational values include expressions of care and concern for the environment (Klain et al., 2017; West et al., 2018). Care reflects a sense of protection or concern and has been examined in terms of motivations that influence moral beliefs and behaviours (West et al., 2018).

The discussion of relational values is relatively new in environmental psychology. The concept emerged to incorporate both the inherent worth of nature and environmental benefits to people (Chan et al., 2016; Pascual et al., 2017; Tallis & Lubchenco, 2014). Individual decisions are often based on the person's relationship with nature, not just the intrinsic or instrumental worth of nature (Bennett et al., 2017; Muradian & Pascual, 2018). This article assessed people's intrinsic, instrumental and relational value orientations toward the ocean, and how these values dictate people's beliefs (AC, AR) and moral feelings. Furthermore, this article examined the impact of socio-demographic factors on MVOs, AC, AR and personal norms.

We hypothesized (Fig. 7) that:

H_1: *Intrinsic MVO* will have a positive effect on ascription of responsibility;

H_2: *Intrinsic MVO* will have a positive effect on problem awareness;

H_3: *Intrinsic MVO* will have a positive effect on personal norms;

H_4: *Relational MVO* will have a positive effect on ascription of responsibility;

H_5: *Relational MVO* will have a positive effect on problem awareness;

H_6: *Relational MVO* will have a positive effect on personal norms;

H_7: *Instrumental MVO* will have a negative effect on ascription of responsibility;

H_8: *Instrumental MVO* will have a negative effect on problem awareness;

H_9: *Instrumental MVO* will have a negative effect on personal norms;

H_{10}: *Awareness of consequences* will have a positive effect on responsibility;

H_{11}: *Awareness of consequences* will have a positive effect on personal norms;

H_{12}: *Ascription of responsibility* will have a positive effect on personal norms;

H_{13}: *Values, AC, AR, and personal norms* will differ between men and women;

H_{14}: *Values, AC, AR, and personal norms* will differ between age groups; and,

H_{15}: *Values, AC, AR, and personal norms* will differ between rural and urban residents.

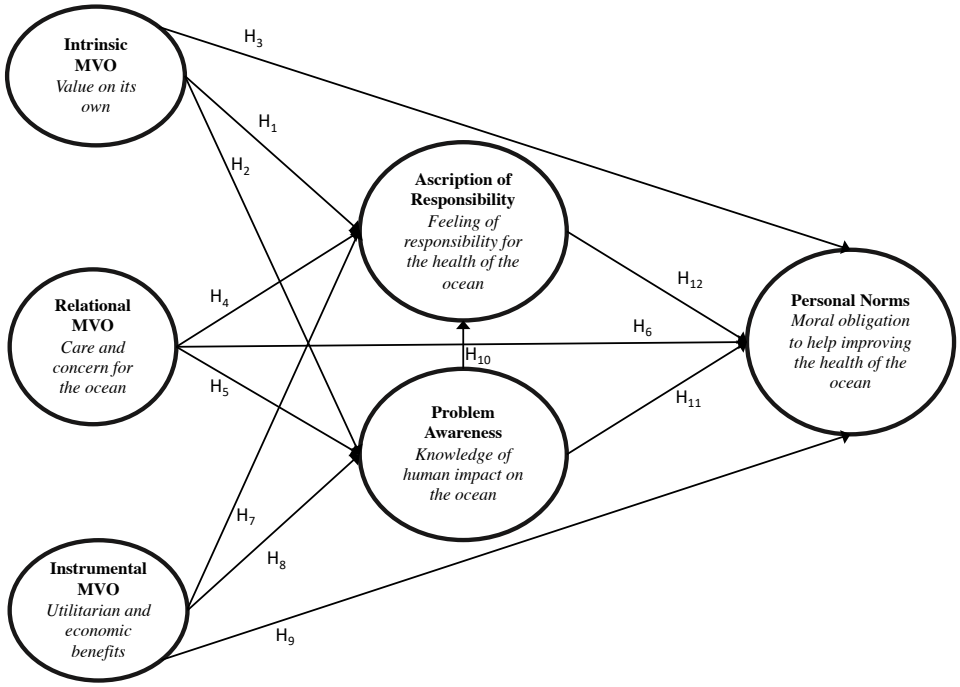

Figure 7 Path analysis between marine value orientations, awareness of consequences, ascriptions of responsibility, and personal norms for the ocean, and hypothesized relationship between the constructs.

2.2 Methods

2.2.1 Data Collection

Sampling

Data were collected through self-administered questionnaires randomly distributed to coastal residents of the island of Newfoundland, Canada (Fig. 3), between November 2018 and March 2019. Newfoundland and Labrador (NL) have approximately 520,000 inhabitants and 271 municipalities. About 94% (n = 488,000) of the residents live on the island portion of the province, and 80% (n = 216) of the municipalities are coastal (Statistics Canada, 2016). Of these municipalities, only two are considered urban coastal municipalities. We targeted 400 completed

questionnaires in rural and urban areas. Given the high number of coastal municipalities distributed across the island (approximately 182 communities), priority was given to places with a population large enough to require a minimum sample size of five respondents; therefore, a total of 40 locations were sampled (2 urban and 38 rural).

A grid was drawn on a map of each municipality and streets were numbered. A random number generator was used to select the street numbers. Adopting a drop-off / pick-up (DOPU) method (Jackson-Smith et al., 2016), questionnaires were hand-delivered to potential respondents' houses. If no one was home, the researcher moved to the next house. The person who opened the door was invited to complete the questionnaire; if a minor opened the door, the researchers asked for a parent or guardian. A time and date were arranged to collect the questionnaires, with the majority been collected the following day.

Items used for the analyses contained here were part of a questionnaire that also included questions on attitudes, trust in governing agencies, and behaviours toward marine-related issues (full questionnaire available upon request to corresponding author). For this article, only questions related to values toward the ocean, ascription of responsibility, awareness of consequences, and personal norms were included. Before distributing the questionnaires, ethical approval was granted by the Interdisciplinary Committee on Ethics in Human Research (ICEHR) from Memorial University. Consent to use the data was obtained by completing the questionnaire, thus in line with the ICHR recommendations. No personal information was asked, and responses were anonymous.

Research Instrument

Before data collection, a pilot survey was conducted; minor amendments were required to adjust length and wording of the questionnaire. For example, some items were deleted, and others rephrased to improve clarity. To assess marine value orientations, respondents rated their

levels of agreement/disagreement with two instrumental items, two relational items, and one intrinsic item (see Table 1 for details). Responses were coded on a 5-point scale ranging from strongly disagree (-2) to strongly agree (+2), with a neutral point (0). Awareness of the current human-induced problems impacting the ocean (AC) was measured with four items; ascription of responsibility (AR) included three items, and personal norms was measured with three items (see Table 2 for details). Responses ranged from strongly disagree (-2) to strongly agree (+2). Demographic questions included sex, age, and place of residence (rural or urban). Sex and place of residence were measured as dichotomous variables (0 = male and 1 = female; 0 = rural and 1 = urban). Age was measured through three age categories: young adults (age ranging between 18 and 25 years), adults (between 26 and 55 years), and older adults (over 56 years).

2.2.2 Analyses

Cronbach's alpha was used to estimate the internal reliability of the items associated with each scale containing more than one item. Independent sample *t*-tests examined differences in sex and place of residence for each of the latent constructs. One-Way Analysis of Variance (ANOVA) was used to examine the relationship between age and the latent constructs. When the variances were equal, the Bonferroni post hoc test identified significant differences between age groups; Tamhane's was used when equal variance could not be assumed. A $p \leq 0.05$ was the threshold for statistical significance.

Confirmatory factor analysis (CFA) was used to determine if the constructs provided a good fit for the data. Structural Equation Modelling (SEM) estimated interrelationships between the latent constructs and the predictive validity of the model. LISREL 10.2 was used for fitting the model using the variance-covariance matrix. We assessed the overall model fit using chi-square

divided by the degrees of freedom (χ^2 / df), the Goodness of Fit Index (GFI, with an acceptable GFI >.95), the Comparative Fit Index (CFI, with an acceptable CFI ≥.95), and the Root Mean Square Error of Approximation (RMSEA, with an acceptable RMSEA <.08; Hooper, Coughlan, & Mullen, 2008).

2.3 Results

2.3.1 Respondent Profile

Completed questionnaires were received from 776 coastal residents (49% response rate). Of those, 53% were rural, and 47% were urban coastal residents; 52% were men and 48% women. Most respondents were older adults (> 56 years; 42%), followed by adults (26 – 55 years; 40%) and young adults (18 – 25 years; 18%). Confirmatory factor analysis demonstrated an acceptable fit of the data for the latent constructs examined in this study (Tables 1 and 2).

2.3.2 Marine Value Orientations

The internal reliability of the marine value orientation scale was .89 for instrumental, and .51 for relational MVO (intrinsic MVO contained only one item). Overall, people held strong intrinsic (M = 1.58, SD ± .59), relational (M = 1.56, SD ± .54), and instrumental values (M = 1.45, SD ± .59). Approximately 97% of respondents agreed/strongly agreed the ocean has a value on its own beyond economic or nutritional benefits to people; 2% were neutral, and 1% disagreed/strongly disagreed (intrinsic MVO). Similarly, 96% of respondents agreed/strongly agreed they care about the state of the ocean and felt concern about the future of this environment (relational MVO). For the instrumental value, 96% of respondents agreed/strongly agreed that the

ocean is important because it provides food and jobs to the island; 3% were neutral and 1% disagreed.

Table 1 Results of confirmatory factor analysis of basic belief items corresponding to each marine value orientation, the reliability analyses of each scale, and the means and standard deviations for each scale and respective items.

Marine Value Orientation Dimension / Belief Item	**Factor loading**	**Item-total correlation**	**Cronbach's α**	**M[a]**	**SD[b]**
Intrinsic MVO			-	1.58	.59
INT. Oceans have a value on their own beyond economic and ecological benefits to us.	.61			1.58	.59
Instrumental MVO			.89	1.45	.59
The ocean is important because it:					
INS1. provides food for people in this province.	.85	.79		1.45	.65
INS2. produces jobs for people in this province.	.82	.84		1.44	.66
Relational MVO - Care			.51	1.56	.54
REL1. I care about the state of the ocean. *	.63	.34		1.63	.66
REL2. I'm concerned about how the ocean will look like in the future.	.76	.34		1.50	.66

[a] Mean value derived from a five-point scale ranging from strongly disagree (-2), disagree (-1), neither (0), agree (1) and strongly agree (2). [b] Standard Deviation of each mean value. * Reverse-coded item; original sentence was 'I don't care about the ocean'.

Partially supporting our hypotheses, rural and urban respondents expressed significant differences in their relational values (t (769) = 2.43, p = .01). Urban respondents held slightly stronger relational values (M = 1.61, SD ± .52) in comparison to rural residents (M = 1.52, SD ± .56). No statistically significant differences were observed within age groups nor between men and women. For instrumental values, however, significant differences were observed between rural and urban respondents (t (692) = 3.76, p < .001) and between younger and older adults (F = 3.58, p = .03). Rural (M = 1.01, SD ± .66) and older adults (M = 1.51, SD ± .65) held stronger

instrumental values than urban (M = .83, SD ± .63) and younger adults (M = 1.32, SD ± .56); adults did not differ from younger and older adults. No significant differences were found for intrinsic values based on the demographic characteristics of the sample.

2.3.3 Awareness of Consequences

We assessed awareness of human-induced marine problems through four items (α = .77; Table 2). On average, people held positive beliefs associated with the current state of the ocean and the anthropogenic impacts on marine health (M = 1.18, SD ± .55). Approximately 86% agreed/strongly agreed that the ocean is getting warmer; 4% did not believe it. Similarly, 85% believed in a global decline of fish stocks. Most respondents (97%) believed that land pollution impacts the ocean and that deep-water oil drilling to be causing marine pollution (84%).

Partially supporting our hypotheses, we found significant differences in AC between rural and urban residents (t (769) = 6.05, p < .001), and between age groups (F = 18.69, p < .001); no difference was identified between men and women. People in urban areas (M = 1.30, SD ± .54) held stronger awareness beliefs in comparison to people in rural communities (M = 1.06, SD ± .52). Older respondents were the least aware of the problems facing the ocean. Younger adults were the most aware of the problems (M = 1.45, SD ± .58) in comparison to adults (M = 1.16, SD ± .57) and older adults (M = 1.07, SD ± .54); significant difference was detected between adults and older adults.

2.3.4 Ascription of Responsibility

The reliability coefficient for AR was .66. People, in general, agreed that not only themselves but other citizens were responsible for the health of the ocean (M = 1.17, SD ± .57). People felt responsible for marine health (86% agreed/strongly agreed; M = 1.14, SD ± .82). While

86% felt personally responsible (M = 1.05, SD ± .77), a slightly higher number (94%) believed that citizens, in general, were responsible for the health of the ocean (M = 1.32, SD ± .60). Ascription of responsibility differed between urban and rural regions (t (733) = 2.95, p = .02). Urban residents were slightly more positive (M = 1.27, SD ± .52) than rural (M = 1.15, SD ± .52). No difference was observed between men and women nor between age groups.

2.3.5 Personal Norms

The reliability coefficient for personal norms was .60. On average, moral beliefs associated with one's sense of obligation to help improve the health of the ocean were positive among coastal residents (M = 1.20, SD ± .55). Most people (88%) felt they should do more to help improve the health of the ocean (M = 1.10, SD ± .70) and demand (82%) the government better ways to do it (M = 1.06, SD ± .74). Even if the government is not caring for the ocean, most people (94%) believed themselves should still be caring for it (M = 1.45, SD ± .75). No difference in personal norms was observed between age groups nor between men and women. Yet, rural and urban residents differed in their opinions (t (769) = 3.19, p = .001). Compared to rural residents (M = 1.15, SD ± .52), urban respondents (M = 1.22, SD ± .57) expressed slightly stronger moral beliefs related to taking action to improve marine health, including demanding from the government better ways to manage the ocean.

Table 2 Results of reliability analyses of belief items related to Ascription of Responsibility, Care, and Personal Norms, as well as the means and standard deviations for each scale and particular items.

Belief Dimension / Item	Factor loading	Item-total correlation	Cronbach's α	M[a]	SD[b]
Awareness of Consequences			.77	1.18	.55
PA1. The ocean is getting warmer.	.61	.56		1.10	.76
PA2. There is a global decline of fish in the ocean.	.59	.60		1.06	.75
PA3. Land pollution impacts the ocean.	.73	.62		1.45	.56
PA4. Deepwater oil drilling causes marine pollution.	.67	.55		1.08	.74
Ascription of Responsibility			.66	1.17	.57
AR1. I feel responsible for the health of the ocean.	.68	.54		1.05	.77
AR2. Even if I don't use the ocean, I feel responsible for marine health. *	.63	.46		1.14	.81
AR3. Citizens are responsible for the health of the ocean.	.67	.45		1.32	.60
Personal Norm			.60	1.20	.55
PN1. Even if the government is not caring for the health of the ocean, I feel I should. *	-	.21		1.45	.75
PN2. I feel I should do more to help improve the health of the ocean.	.77	.55		1.10	.70
PN3. I feel I should demand the government better ways to keep the health of the ocean.	.75	.51		1.06	.84

[a] Mean value derived from a five-point scale ranging from strongly disagree (-2), disagree (-1), neither (0), agree (1) and strongly agree (2). [b] Standard Deviation of each mean value.
* Reverse-coded items; original sentences were 'because I don't use the ocean, I do not feel responsible for marine health' and 'If the government is not caring for the health of the ocean, I don't feel I should either'.

2.3.6 Predicting Personal Norms Toward the Health of the Ocean

The hypothesized model assessing the interrelationships among marine value orientations and beliefs (AC, AR) explained 86% of the variance in personal norms (Fig. 8). The analysis revealed an acceptable fit for the model (x^2/df= 2.30, GFI = .97, CFI = .97, NFI = .95, and RMSEA = .04). Different from expected, intrinsic MVO did not influence ascription of

responsibility nor personal norms, rejecting hypotheses 1 and 3. Intrinsic MVO, however, positively influenced AC (β = .15, p = .05; H_2). Instrumental MVO had a negative effect on AC (β = -.10, p = .02; H_9), but did not influence AR nor personal norms, rejecting hypotheses 7 and 8. Relational MVO, on the other had a positive effect on AR (β = .38, p < .001; H_4), on AC (β = .57, p < .001; H_5), and on personal norms (β = .38, p = .001; H_6).

Awareness of the current problems facing the ocean had a direct effect on responsibility (β = .34, p < .001; H_{10}), but did not influence people's personal norms to help improve the health of the ocean, rejecting hypotheses 11. Beliefs of responsibility mediated this relationship. Ascription of responsibility directly influenced personal norms (β = .41, p = .001; H_{12}). The model explained 52% of the variance in ascription of responsibility, and at least 43% of the variance in a person's awareness of the problems facing the ocean.

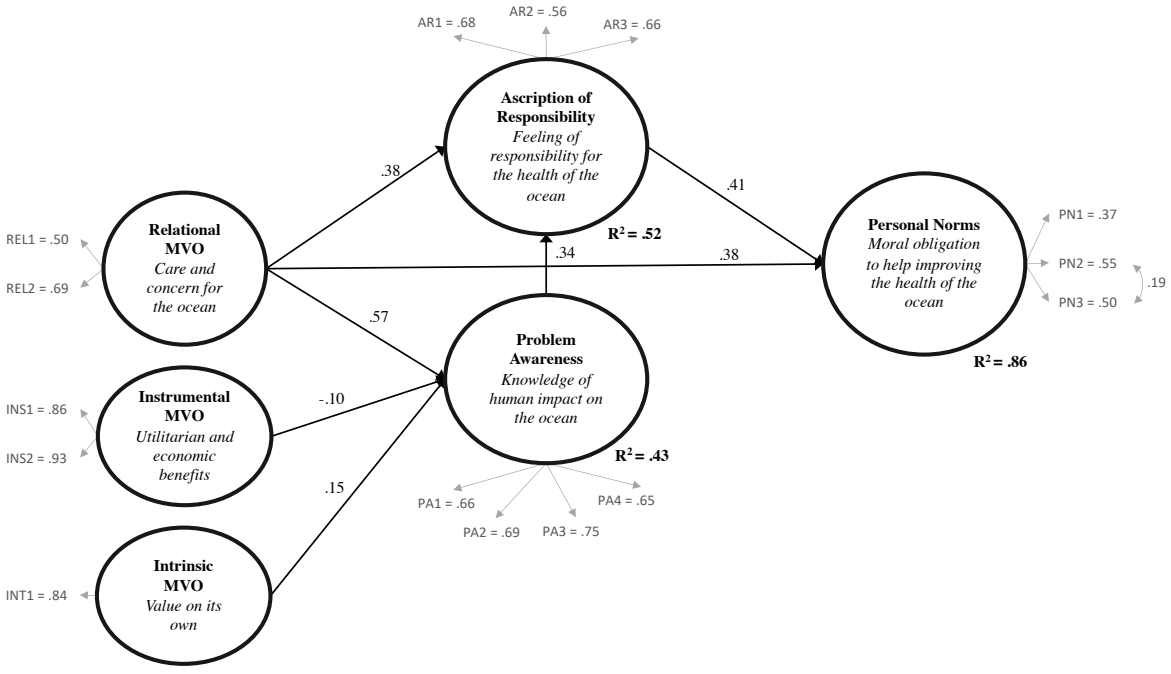

Figure 8 Mediation structural equation model showing only statistically significant paths (p < .05) between the latent constructs. Path coefficients are standardized regression coefficient.

2.4 Discussion

Findings provided empirical evidence that coastal residents around Newfoundland, in general, felt a moral obligation to act in favour of a healthy ocean, felt responsible and were aware of the negative impacts of human actions on the marine environment. Relational marine value orientations strongly predicted beliefs of responsibility and problem awareness and directly influenced personal norms. This finding supports the framework proposed by Klain et al. (2017) and expands knowledge of existing theories investigating environmental values influences on beliefs (AC, AR) and personal norms (i.e., VBN). Klain et. al. (2017) suggested that relational values may have a direct effect on responsibility and personal norms. We corroborate their hypotheses and suggest that relational values also influence problem awareness.

Although not all MVOs had significant effects on AC, AR, and personal norms, it is important to highlight that MVOs were high and positive among respondents of all ages and places. Rejecting our hypotheses, intrinsic and instrumental MVOs did not influence personal norms directly. However, minimal influence of intrinsic and instrumental MVOs on AC was observed, suggesting an indirect influence of these values on personal norms. Respondents who held stronger instrumental MVOs expressed lower levels of beliefs about the consequences of human impacts on the ocean. Awareness of consequences had a positive effect on personal norms. Respondents expressing higher levels of instrumental MVOs were likely to be less aware of the consequences of human actions on the ocean and felt less morally obligated to act toward improving the health of the marine environment. We acknowledge the merits of instrumental valuation of ecosystem services in fostering conservation plans (e.g., how much revenue a marine protected area could generate in terms of jobs, tourism, and increasing of fishing stocks); yet we argue that focusing on

the instrumental value of the ocean may be only useful in certain circumstances.

Decisions at a governmental level, for instance, are commonly based on the instrumental and monetary valuation of ecosystem services. At the individual level, however, findings show that people are concerned about the current and future state of the ocean, and that relational MVOs have greater impact on one's moral obligation to the sea. Individuals are policy channels (McKinley & Fletcher, 2012), and understanding their marine values (instrumental and non-instrumental) are key for effectively governing the ocean (Charles, 2012; Chuenpagdee & Song, 2012; Castrejón & Charles, 2013). Fragmented and centralized management and governance seldom consider the relationship between people and the ocean, thus fails to mitigate and prevent further environmental degradation (Kelly et al., 2018). This study contributes to further the understanding of how a constellation of different values and beliefs play a role in the social and cognitive aspects of marine governance by documenting, for example, that certain value orientations will have a greater impact in influencing people's willingness to engage in marine citizenship.

Nonetheless, conservation arguments based upon nature's intrinsic values should be more persuasive than instrumental arguments in motivating conservation behaviours among people (Vucetich et. al., 2015). Despite the high score of intrinsic MVOs, valuing the ocean for its inherent worth did not significantly affect personal norms nor beliefs of responsibility, and its influence on problem awareness was minimal. Environmental conservation needs to embrace the intrinsic value of nature. Relative to individual moral decisions, however, data here show that people rely on their relational values more so than in other MVOs.

This article documented how a relational value (i.e., care and concern) enhanced a person's moral feelings to the ocean. Relational value orientations, however, remain under-investigated

(West et al., 2018). Care, in the environmental context, is manifested in the reciprocal affiliation between social and ecological systems and reflects a nurturing relationship (West et al., 2018). Emphasizing a sense of care and concern for the ocean promotes feelings of moral obligation to act and ultimately, marine stewardship (Nassauer, 2011). Other relational values such kinship, connection to place, and identity (see Klain et al., 2017 for examples) were not explored here; however, it should be noted that these values may also play a role in influencing marine personal norms.

Ascription of responsibility mediated the relationship between awareness of consequences and personal norms. This finding contributes to the understanding of how the Norm Activation Model variables provide direction for conservation actions. For example, policy implementation are likely to have more effect if targeted to increasing problem awareness before focusing on beliefs of responsibility (De Groot et al., 2007), as one first needs to be cognizant of the problems impacting the ocean to feel responsible for it.

Regarding the effects of demographic characteristics on the hypothesized model, findings showed significant differences between rural and urban coastal residents' MVOs, beliefs, and personal norms. In general, urban residents held stronger relational MVOs, were more aware of the anthropogenic impacts on the ocean, ascribed more responsibility to their actions, and felt stronger moral feelings toward their personal norms. Research on the effect of place on people's environmental values and beliefs have shown divergent results. Arias-Arevalo, Martín-López and Gómez-Baggethun (2017), for example, found that rural residents expressed higher intrinsic and relational values toward aquatic ecosystems than urban residents. In contrast, Berenguer, Corraliza, and Martín (2005) documented stronger instrumental values among rural communities, but lower environmental responsibility beliefs among urban respondents. Results here corroborate

the argument that rural people, who typically rely on natural resources for their livelihood, are likely to express stronger instrumental value orientation (Jones et al., 2003). Despite their differences, both rural and urban residents expressed positive and strong MVOs, beliefs and personal norms.

Minor differences were detected between age groups. Young adults expressed higher awareness of the problems impacting the ocean and less instrumental MVOs. Wiernik, Ones, and Dilchert (2013) argue that the influence of age on environmental perceptions and values tends to vary and be inconsistent. In a meta-analysis of studies conducted between 1970 and 2010, the authors did not find any meaningful relationship between age and environmental awareness and argued that age is unlikely to have any strong influence of environmental values and concern (Wiernik et al., 2013). Results here, however, show that age may have some influence on people's perceptions of marine problems and how the ocean is valued. In the context of climate change, the American Psychological Association's task force considers age as an important variable for environmental psychology (Swim et al., 2010). While age may not have substantial effects on value orientations and other beliefs, differences between age groups do exist. For those planning marine environmental interventions in Newfoundland, for example, increasing awareness among the older generation may be a good first step towards increasing people's commitment to help improving the health of the ocean. At the same time, it is important to foster existing awareness and engagement efforts with younger generations to ensure that ocean literacy is retained and leads to sustained awareness and behaviour change for the benefit of the ocean and all living organisms.

While relational and intrinsic MVOs were similar across generations, older people expressed higher instrumental MVOs. This might be attributed to local historical connections and dependency on marine resources for subsistence and livelihood. Further research assessing the

source of information about marine issues, connection to the place, as well as educational and professional background may add to the understanding of why younger adults expressed higher marine problem awareness and lower instrumental MVOs. Sound knowledge can provide valuable theoretical insights in the field of environmental psychology, as well as clues for effective communication campaigns.

Finally, this article encourages further analyses and discussion of the social and cognitive dimensions of how humans relate to the ocean. Through the adoption of a value orientation approach, making inferences to a broader audience based on the results here would be inappropriate and statistically unrepresentative. Researchers are encouraged to further explore people/ocean relationships in other geographic areas, particularly in places suffering from acute environmental problems that have failed to engage and sustain public support and commitment in adopting new behaviours and practices. We recognize that influencing attitudes and behaviours is challenging; yet, we argue that by influencing people's emotional relationship with the ocean may lead to bigger changes that can be translated in larger political and managerial initiatives. The items used to assess marine value orientations, beliefs (AC, AR), and personal norms were designed not to be context specific. Items related to other relational values were not included in the research instrument but are recommended for future research.

2.5 Conclusion

There is an urgent need to include citizens in marine conservation and governance. The findings here contribute to the call for marine citizenship (McKinley & Fletcher, 2012); a model that recognizes individuals and their behaviours as a policy channel for marine stewardship. Decentralized marine governance will consider citizens' rights and responsibilities related to the

ocean to address marine sustainability and achieve policy goals. Results here provide important information on the cognitive component of marine citizenship from Newfoundland that can be used to inform national policy goals. The Canadian Ocean's Act (1997), for example, recognizes coastal communities as an interest group in marine governance, and requires the Government of Canada to take the views of the communities in planning and implementing marine related actions and activities. Coastal citizens in Newfoundland had a strong sense of commitment to help improving the health of the ocean, were aware of, and concerned about the state of the waters, and feel they should be doing more for marine conservation.

At a broader level, the United Nations (UN) declared the incoming decade (2021-2030) as the Decade of Ocean Science for Sustainable Development. The aim of the initiative is to expand the scientific knowledge of both social and ecological systems associated to the ocean, and to find better ways to guarantee its sustainability through an inclusive and decentralized governance approach. It calls all nations to join forces in achieving the UN's Sustainable Development Goals, particularly Goal 14 – Life Below Water. Our findings provide some relevant information that can be used to inform Canada's quest to reach these goals. In the next few years, Canada (as other signatory nations), should, among many other things, minimize marine pollution, expand the range of protected areas, and enhance the use and conservation of marine resources. To reach these goals, it is crucial to involve citizens and understand their motivations to embrace marine citizenship. By listening to coastal communities and documenting their views based on scientific evidence, we contribute to the Decade of Ocean Science, and provide empirical evidence that citizens are willing to engage in marine sustainability; at least at a broader level. Further research is needed to assess specific behavioural choices.

From a theoretical perspective, this article contributed to the development of tools to better

explain human/nature relationships and enhance participatory processes; a need suggested by Walker-Springett et al. (2016). Finally, findings validated the importance of non-instrumental approaches to conservation. For conservation efforts, for example, focusing on the value of the ocean as merely a source of food and income to encourage people to help improve the health of the marine environment proved inefficient. Relational MVOs were an essential component in our model; therefore, the focus should be in the ways people value their relationship with the ocean, particularly how they care about this environment.

Chapter 3. Ocean imagery and how they relate to an individual's emotions, cognitions and pro-environmental behaviours in coastal Newfoundland, Canada

3.1 Introduction

Humans are connected to the ocean in multiple ways. The ocean stabilizes the climate, produces oxygen, stores carbon, and provides food, energy, minerals, cultural and recreational resources. Despite the direct and indirect benefits to humans, the ocean is impacted by political, economic, social and psychological processes (Aswani et al., 2018). To minimize the impacts of human activities (e.g., unsustainable resource extraction, pollution, habitat destruction), the United Nations (UN) declared 2021-2030 as the Decade of Ocean Science for Sustainable Development (Pendleton, Visbeck, & Evans, 2019). The United Nations (UN) has urged scientists for a better understanding of the social aspect of marine use, management and conservation (Pendleton et al., 2019). Understanding how society thinks about and behaves toward the ocean is a priority for moving forward with a marine sustainability agenda (Bennett, 2019; Pendleton,

Visbeck, & Evans, 2019; Walker-Springett et al., 2016).

The study of mental images can offer insights into people's perceptions of marine issues (Jentoft et al., 2010). Mental images represent a key for a cognitive framework that defines and explains how individuals interact with the surrounding world (Song & Chuenpagdee, 2014). Mental images reflect what people feel, hear, see or taste and they define how cultures relate to the sea (Rozwadowski, 2018). Historical coastal cultures in the Indian Ocean, for instance, viewed the sea as external to society, a place for transportation and commerce with non-territorial attachment (Rozwadwski, 2018). In contrast, ancient Greeks and Romans imagined the ocean as extended imperial territories. The Vikings regarded the North Atlantic Ocean as an enclosed sea, an image that enabled them to navigate the fearsome waters bounded by the Norwegian shore, Greenland, Baffin Island, Newfoundland and Africa. While European explorers imagined the ocean as vast and unexplored, people in Oceania saw seas of islands (Rozwadwski, 2018). Throughout history, people's images of the ocean influenced their relationship with this environment, promoted trades, and the discovery of new territories.

Images play a role in marine governance in at least three ways: (1) images can lead (or mislead) decisions, (2) interest groups can hold confrontational images, and (3) different power discourses can propagate different images (Song & Chuenpagdee, 2014). Images of a plentiful ocean, for example, might lead to less restrictive fishing measures and jeopardize efforts to preserve a fishery. Certain images can reinforce dominant views within society (Jentoft et al., 2010) or provide feedback about institutional performance. For example, seascapes reflecting the ocean as an unpopulated environment versus a harvestable commodity can lead to different managerial decisions regarding what is appropriate (Aswani et al., 2018). Research shows the importance of examining images in the context of fisheries (Song & Chuenpagdee, 2014), fishers

(Sønvisen, 2014), governance systems (Song et al., 2013), marine protected areas (Chuenpagdee et al., 2020; Jentoft et al., 2012; Voyer et al., 2015), and ocean acidification (Capstick et al., 2016). Despite growing efforts to understand the people/ocean relationship from various lenses and contexts, further social research is needed for marine conservation (Aswani et al., 2018; Jefferson et al., 2015). Research on ocean imagery tends to be specific to a certain issue or situation (e.g., fisheries, MPAs), and to specific stakeholder groups (e.g., fishers, tourists). We examined ocean imagery from a broader perspective and attempt to understand how coastal residents imagine the ocean and how these mental images relate to emotion and cognitions in relation to the marine environment, and pro-environmental behaviours (PEB).

Through empirical research conducted across 40 coastal communities of Newfoundland, in Eastern Canada, our goal was to deconstruct ocean imagery and to assess how people conceptualize seascapes, that is, the image of the sea. Coastal regions are hotspots of contemporary anthropogenic changes (Aswani et al., 2018). The island of Newfoundland serves as a case study to investigate the people/ocean relationship from an environmental psychology perspective. Using a word- association technique (e.g., Pan & Li, 2011), people were invited to freely express their mental images of the ocean through keywords. This association method is a spontaneous elicitation technique that enables words (translating images) to arise naturally to the respondent (Pan & Li, 2011; Stepchenkova et al., 2009). This methodology has been used in a variety of studies, including assessing public's risk perception of nuclear waste (Slovic et al., 1991), skepticism over climate change (Smith & Leiserowitz, 2012), perception of traditional food products (Guerrero et al., 2010), and understanding public awareness about ocean acidification (Capstick et al., 2016).

3.1.1 Theoretical background: Imagery, emotions, cognitions and pro-environmental behaviour

We used the psychological literature on imagery (e.g., Wraga & Kosslyn, 2005; Waller, Schweitzer, Brunton, & Knudson, 2012; Pearson & Kosslyn, 2013), and the cognitive hierarchy of human behaviour (Fulton et al., 1996; Vaske & Donnelly, 1999) as our theoretical foundation. While the former provides knowledge on mental images and its relation to thoughts and actions, the later serves as a framework for selecting conceptual drivers of pro-environmental behaviours. According to cognitive approaches, an individual's view of the environment is influenced by emotions (Vaske & Manfredo, 2012) and organized into a cognitive hierarchy of value orientations, attitudes and norms, behavioural intentions, and behaviours (Fulton et al., 1996; Vaske & Donnelly, 1999). Because conservation means behaviour (Schultz, 2011), assessing how images relate to drivers of behaviour can improve our understanding of the people/ocean relationship.

Images are mental representations of the ways in which people see, interpret and understand the world (Voyer et al., 2015). They take the form of memory and emotions (Leiserowitz, 2006), and may include a description of some or all the senses – smell, taste, sight, sound, and touch (Echtner & Ritchie, 1991). Mental images represent the ability to imagine or re-experience objects, events or places (Pearson & Kosslyn, 2013). The cognitive sciences define mental imagery as "an internal representation that gives rise to the experience of perception in the absence of the appropriate sensory input" (Wraga & Kosslyn, 2005, p.466). As such, images differ from (although in close association with) perceptions; while the former derive from internal information, the later derive from afferent sensory information (for a review on images and perceptions see Waller et al., 2012). Images can predict outcomes of actions, create mental models, and visualize memory (Wraga & Kosslyn, 2005). When asked what comes to mind when thinking

about the ocean, words that help to visualize the sea are retrieved from memory. Those images carry information one has about the object when generating the image (Mast et al., 2012).

Mental images include ideas and words that carry either a positive or negative affect or feeling and influence preferences and decision-making (Boomsma et al., 2016; Slovic et al., 1998). They are linked to emotions (Waller et al., 2012) and are important determinants of psychological and behavioural processes (Pearson & Kosslyn, 2013; Boomsma et al., 2016). For instance, positive imagery of a marine reserve led to the adoption of pro-environmental behaviours (Abdullah et al., 2019), while negative affective imagery was associated with greater environmental concern over ocean acidification (Capstick et al., 2016) and risk perception of climate change (Smith & Leiserowitz, 2012).

In this article, we investigated the effect of ocean imagery on emotional involvement (e.g., fear) and cognitions that are known to influence behaviours: value orientations, attitudes, personal norms, and acceptability (Clayton et al., 2013; Kollmuss & Agyeman, 2002; Stoll-Kleemann, 2019). Value orientations are basic belief patterns, indicative of an underlying value (Vaske & Manfredo, 2012). Marine value orientations (MVOs) are basic beliefs regarding the relationship between people and the ocean. Three types of MVOs have been identified: (1) intrinsic (the ocean has a value beyond the benefits it provides to people), (2) relational (based on care and concern for the ocean), and (3) instrumental (associated to utilitarian and economic benefits to people; Engel et al., 2020). Value orientations are antecedents of attitudes and personal norms (Groot & Steg, 2009). In social psychologically, attitudes "serve to summarize and integrate our values and beliefs as they apply to a particular issue" (Clayton & Myers, 2009, p. 19). An attitude refers to the evaluation of an object or behaviour as either favourable or unfavourable, and has an affective and cognitive dimensions (Vaske & Manfredo, 2012). While the affective component considers

the object as positive or negative, or as good or bad, the cognitive aspect refers to beliefs associated with the attitude object; we focus on the cognitive aspect of attitudes toward sustainable uses of marine resources.

Attitudes and norms are parallel constructs that have the ability to influence behaviour. Different from attitudes, however, norms carry an obligation dimension, and can refer to either social (standards shared by members of a group) or personal norms (Vaske and Manfredo, 2012). Personal norms refer to an individual's expectations and beliefs of moral obligation to perform a specific behaviour (Schwartz, 1977). Marine personal norms can represent, for example, the moral beliefs associated with one's own expectations of doing more to improve the health of the ocean (Engel et al., 2020). Studies have shown the importance of personal norms in moderating the effect of social norms on energy consumption behaviours (Dwyer, Maki, & Rothman, 2015), and in influencing climate change mitigation behaviours in agricultural productions (Zhang et al., 2020). This sense of obligation to perform a given behaviour is influenced by values and other beliefs (see for example the value-belief-norm theory of environmental behaviour in Stern, 2000). Little is known, however, about the effect of mental images on personal norms.

Since behaviours are influenced by both cognitions and emotions (Koenig-Lewis et al., 2014), we examined the role of images on emotional involvement. Emotional involvement is a reaction toward an object or a situation. Emotions can shape attitudes and reflect one's affective relationship with the environment (Kollmuss & Agyeman, 2002). We explored fear as an emotional response to ocean degradation (Koenig-Lewis et al., 2014; Stoll-Kleemann, 2019). Fear, in this context, is a specific emotion evoked by ideas of threat and uncertainty. Fear related to how the natural environment may look in the future is also referred to as eco-anxiety and has gained attention in climate change literature for predicting behaviours (e.g., Clayton & Karazsia, 2020).

Behaviours tend to be numerous and specific to situations (Fulton et al., 1996). Pro-environmental behaviours are conscious behaviours that seek to minimize the negative impacts of actions on the environment (e.g., minimizing energy consumption, reducing waste production; Kollmuss & Agyeman, 2002). For this article, we considered behaviours that have direct and indirect impacts on the ocean and examined the acceptability for using the ocean's resources. Acceptability is the degree to which a person considers a particular action or situation as acceptable or unacceptable (Jacobs, Vaske, Dubois, & Fehres, 2014), for example, the extent in which people evaluate renewable energy projects (un)favourably (Liu et al., 2020). Acceptability is a form of non-active behaviour that affects the environment indirectly (Steg et al., 2005).

People relate to the ocean in complex ways. This article does not detail all psychological aspects of the people/ocean relationship, nor the range of behaviours that impact the ocean. Rather, we deconstruct ocean imagery and provide a starting point for further analyses on how mental constructs shape the way society understands, governs and preserves the marine realm.

3.1.2 Specific objectives and hypotheses

The objectives of this article were (1) to explore the meaning and measurement of ocean imagery, and (2) to assess the associations of imagery with emotion, cognitions and pro-environmental behaviours that directly or indirectly impact the ocean. Mental imagery influences psychological and decision-making processes, which in turn may affect the nature of people's impact on the environment (either positive or negative). We hypothesized that ocean mental images effect MVOs, personal norms, attitudes, fear, acceptability for using the ocean, and PEBs.

3.2 Methods

3.2.1 Data Collection

Data were collected between November 2018 and March 2019, through a self-administered questionnaire completed by randomly selected coastal residents of Newfoundland in eastern Canada. Approximately 94% (n = 488,000) of Newfoundland and Labrador's inhabitants live in Newfoundland, the island portion of the province. Of the 182 coastal municipalities, 2 are considered urban. Under Newfoundland and Labrador's municipal law, cities have greater autonomy from the provincial government than a town of similar size. For this article, we considered cities as urban places and towns as rural. Sampling was completed proportional to the population based on the latest census (2016). We targeted 400 completed questionnaires for urban and rural, respectively, based on a 95% confidence level and ± 5% sampling error (Vaske, 2019). Given the number of coastal municipalities, priority was given to places with a sample size larger than five, totaling 38 rural and 2 urban places.

We used a drop-off/pick-up method (Jackson-Smith et al., 2016), and only included adults older than 18 years of age. Questionnaires were primarily hand-delivered by the lead-investigator (four trained volunteers assisted in the data collection). A grid map with numbered streets was used for each sampled municipality. To select the sample units (i.e., houses), a random number generator was used. After selection of a particular street, the first house on the right side of the street was used as the starting point. In case no one was home, the field researcher moved to the next house until all targeted questionnaires were delivered. If a minor opened the door, the researcher asked for the adult in the house. People were invited to

participate in the study and a pick-up time and date was arranged; typically, the next day. Questionnaires were personally retrieved or sent by mail upon request. Before data collection, a pilot was conducted to examine the length and wording of the instrument.

Research instrument

We used an open-ended word association methodology to access ocean imagery. People listed the first three words that came to mind when thinking about the ocean. Five-point bipolar scales were used to assess cognitive items with responses ranging from strongly disagree (-2) to strongly agree (+2), with a neutral point (0). Items used to assess relational MVOs included "I care about the ocean" and "I am concerned about how the ocean will look like in the future". For instrumental MVOs, respondents were asked about the importance of the ocean in providing food for people in the province, and in producing jobs for people in the province. To assess intrinsic MVOs, people were asked if they believed the ocean has a value on its own beyond economic and ecological benefits. For moral beliefs associated to one's personal norms, people were asked if they felt they should do more to help improve the health of the ocean, if they felt they should demand the government should improve the health of the ocean, and if they (the respondent) should be doing more for the ocean. Data used to assess MVOs and personal norms were obtained from Engel et al. (2020).

Fear that people in the future will not have a healthy and clean ocean was used to assess emotional involvement. To assess attitudes toward exploring marine resources we asked people how much they agreed/disagreed in using the ocean's resources, as long as it is protected for future generations to use. To further explore people's perceptions of marine use, we asked for their acceptability of using the ocean for (1) commercial fishing, (2) recreational fishing, (3) oil and gas exploration, and (4) transportation.

To assess pro-environmental behaviour, people were asked how often they (1) used plastic bags in grocery stores, (2) put on a sweater to save energy rather than increase the house's temperature, (3) collected litter from the beach, and (4) considered that the things they buy can impact the ocean. Responses ranged from never (0), rarely (1), sometimes (2), often (3) and always (4). Demographic questions included sex (male/female), age (18-25 years, 26-55, over 56), and place of residence (rural/urban).

3.2.2 Data Analyses

We used content analysis to examine the patterns and structures of the ocean images (Stepchenkova et al., 2009). Using an inductive coding process adapted from previous research on climate change (Leiserowitz, 2003) and ocean acidification (Capstick et al., 2016), the images (i.e., words) were grouped with similar contextual meaning. First, images were grouped into sub-categories, which would include words like *puffins* and *seabirds*. From this first screening process, the sub-categories were grouped into broader categories (e.g., *biodiversity*), and later into theme dimensions (e.g., *nature*). This procedure was carried out by two independent coders before reaching a consensus on the categories and themes (80% interrater reliability). The screening and coding of words was carried out with NVivo 12. After coding the words, each category and subsequent theme were given a corresponding number. Themes were re-coded into dummy variables for further statistical analysis in SPSS v.27.

Descriptive statistics were used to describe the cognitive and behavioural variables, and to examine the range (number of different word associations) and structure (frequency of distribution) of the images. Multiple dummy variable regression models were used to examine the effect of images on emotion, cognitions and behaviours. For this analysis, we only used the most frequent imagery theme dimensions.

3.3 Results

3.3.1 Demographics: sample profile

A total of 776 coastal residents (49% response rate) from 40 different communities (2 urban and 38 rural) completed the questionnaire. About 53% of respondents were from rural coastal regions, and 47% were from urban areas. Approximately 42% of respondents were older than 56 years, 40% were adults with ages ranging between 26 and 55 years, and 18% were young adults (18 – 25 years). Fifty-two percent self-identified as male, and 48% as female. About 2% of the respondents worked for the oil and gas industry, 13% were government workers, 8% were self-employed, 13% were university students, about 2% did not work, 28% had other occupations, and 31% were retired.

3.3.2 Ocean imagery: range and structure

A total of 1,815 images were mentioned when people were asked what were the three words that come to mind when thinking about the ocean. Seventy-five percent (n = 582) of the respondents elicited three words; 78% (n = 611) associated two words with the ocean, and 80% (n = 622) at least one. Frequency analyses of stemmed words (e.g., beauty AND beautiful, and pollution AND polluted) yielded a total of 282 distinct images. Of those, the 10 most frequent were *beautiful, fishing, cold, pollution, vast, waves, water, relaxing, blue,* and *peaceful*. Figure 9 shows the images that were mentioned at least 10 or more times (n = 29); these images accounted for 68% of all the associations (n = 1,234). Of the 282 images, 137 were only mentioned once.

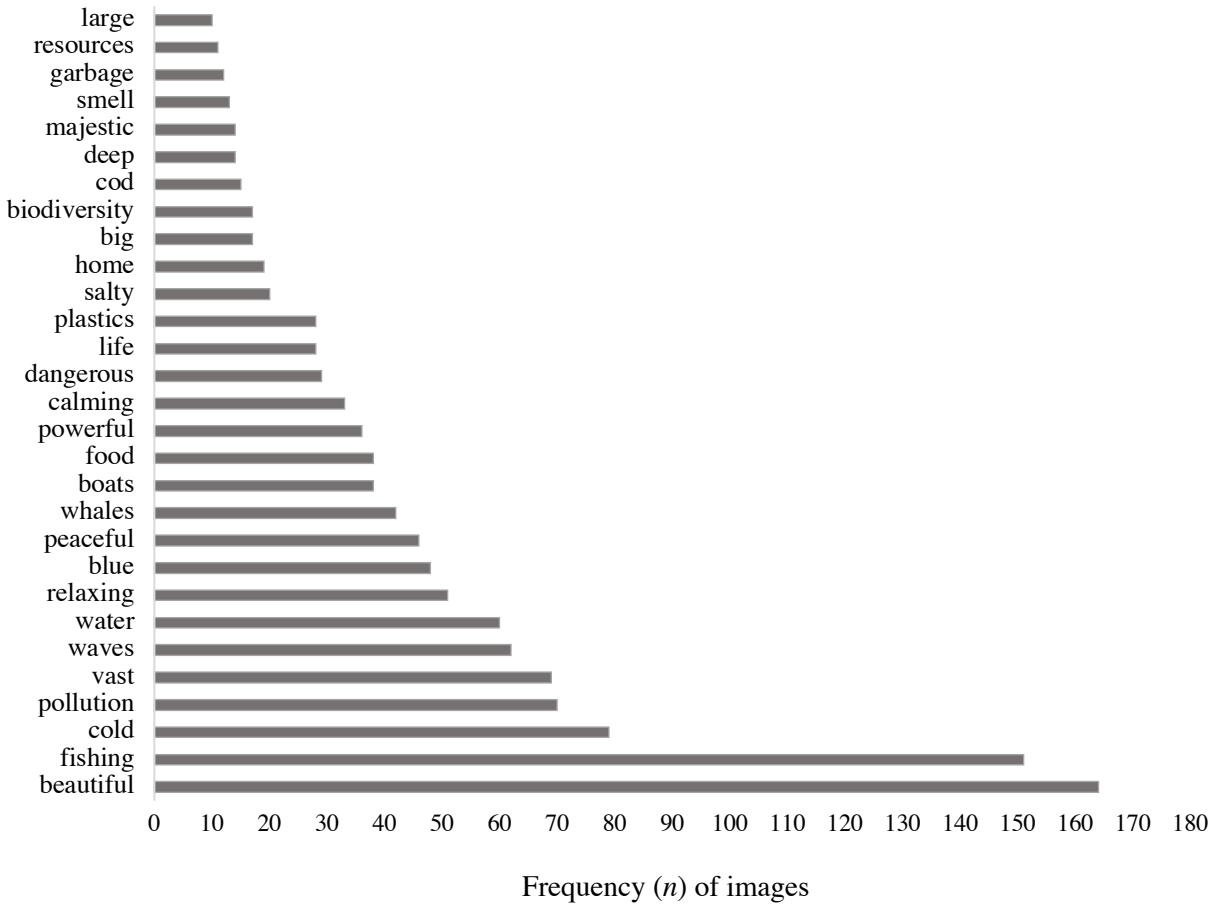

Figure 9 Frequency of images elicited ten times or more.

Using an inductive process (e.g., Andrade et al., 2016), the 282 images were coded and classified into 18 categories, and subsequently into five major theme dimensions: *psychological impression, place identity*, *uses of the ocean, nature*, and *governance* (Table 3 for details). The *psychological impression* dimension included images of positive affection (e.g., beautiful, interesting, majestic), imagination (e.g., wonder, unknown), visual impressions (e.g., big, large, deep), and sound and olfactory perceptions (e.g., perfume). *Place identity* referred to images related to physical characteristics that are often used to describe the local geography and environment (e.g., waves, rocks, wind), ocean power (e.g., rough, wild, unforgiving), and words like Newfoundland, home, and heritage. *Uses of the ocean* encompassed images associated with

fisheries and livelihood (and commercial species like lobster, cod, crab), marine transportation, recreation, and oil and gas exploration. *Nature* included images related to marine biodiversity, concern for the environment, perceptions of the anthropogenic impact on the ocean, and perceptions of ocean change. *Governance* included words related to marine management (e.g., mismanaged, overrun, unprotected). The most common imagery dimension was *psychological impression*, followed by *place identity*, *uses of the ocean, nature*, and *governance* (Table 3).

Table 3 Images related to specific categories and corresponding theme dimension.

Theme responses (percentage of total *n* = 776 responses).	**Categories**	**Example responses**
Psychological impression (69%)	Affection	Beautiful; invigorating; rewarding; inspiring; majestic; awesome; magnificent; restorative; peace.
	Visual impression	Big; large; vast; massive; immense; huge; gigantic; deep; blue; distance.
	Imagination	Solitude; wonder; mysterious; unknown.
	Sound perception	Sound.
	Olfactory impression	Perfume; fresh air; smell.
Place identity (54%)	Physical Characteristics	Beach; rocks; iceberg; water; waves; wind; tide; salt; cold.
	Ocean Power	Dangerous; tragedy; frightening; rough; scary; unforgiving; intimidating; unpredictable; power.
	Place	Home; island; Newfoundland; heritage.
Uses of the ocean (41%)	Fishing and Livelihood	Fish; fishery; fishermen; lobster; crab; resources; work; income; economy; living; hunting; seals.
	Oil and Gas Exploration	Off-shore oil.
	Transportation	Transportation; boats; ferry; ships.
	Recreation	Hike; sail; swim; surf; travel; vacation; tourism; cruise; boating.
Nature (38%)	Conservation	Respect; conserve; protect; sustainability.
	Anthropogenic impact	Garbage; waste; debris; plastics; microplastics; oil spill; overfishing.
	Biodiversity and Ecosystem	Marine life; wildlife; corals; environment; mammals; sharks; turtles; birds.
	Environmental Concern	Destroyed; degraded; abused; overexploited; endangered; polluted; dying.
	Ocean Changes	Acidification; climate change.
Governance (1%)	Management	Greed; mismanaged; unprotected.

3.3.3 Description of the cognitive, emotional, and behavioural variables

Data on MVOs and personal norms were obtained from Engel et al. (2020). In general, respondents held strong and positive instrumental (M = 1.45, SD = .59, α = .89), relational (M = 1.56, SD = .54, α = .51) and intrinsic (M = 1.58, SD = .59) MVOs, and thought they should be doing more to help improve marine health (personal norms: M = 1.20, SD = .55, α = 60). When asked about the future state of the ocean (emotional involvement), respondents, on average, feared that people in the future will not have a healthy and clean ocean.

Respondents held a positive attitude about using the ocean's resources while ensuring they are protected for future generations to use. Extracting fossil fuels, fishing, and using the ocean for transportation was generally accepted by the respondents (M = 1.03, SD = .67). While commercial and recreational fishing were widely accepted, exploring oil and gas was just slightly accepted among the respondents (Table 4). On average, respondents *sometimes* engaged in pro-environmental behaviours (M = 2.04, SD = .66). While 5% would *never* use plastic bags in grocery stores, 32% would use them *sometimes*, and about 40% would *often* or *always* use plastic bags. About 7% would *never* or *rarely* put on a sweater to save energy, yet 1 in 4 respondents would *always* do that. Approximately 15% of the respondents would *never* collect litter from the beach, 31% would *rarely* do it, and 38% would do it *sometimes*; 15% would *often* or *always* collect litter. Although not considered as a direct behaviour impacting the ocean, the things people buy have an indirect impact on the marine environment. While 33% would *never* or *rarely* think about it, 20% would *often*, and 9% would *always* consider the impact of the things they are buying.

Table 4 Reliability analyses of acceptability for using the ocean, and pro-environmental behaviours, as well as means and standard deviations for each cognitive, emotional and behavioural variables.

Cognitive, emotional and behavioural variables	*M*	*SD*	Cronbach's *α*	Item-total correlation	*α* if item deleted
Emotional involvement**: I fear people in the future will not have a health and clean ocean.	1.32	.82	-	-	-
Attitude**: We can use the ocean's resources as long as we protect it for future generations to use.	1.63	.58	-	-	-
Acceptability for using the ocean**	1.03	.67	.74	-	-
Commercial fishing	1.12	.85	-	.63	.63
Recreational fishing	1.32	.76	-	.52	.70
Oil and gas exploration	.42	1.19	-	.56	.71
Transportation	1.35	.63	-	.55	.70
Pro-environmental behaviour*:	2.04	.66	.56	-	-
Use plastic bags in grocery stores†	2.17	1.05	-	.35	.48
Reduce energy consumption at home	2.80	.94	-	.25	.55
Collect litter from the beach	1.56	1.01	-	.37	.46
Consider the impact of consumerism on the ocean	1.95	1.07	-	.39	.44

* Mean scores based on a scale from never (0), rarely (1), sometimes (2), often (3), and always (4).
** Mean scores based on a scale from strongly disagree (-2), disagree (-1), neither (0), agree (1), and strongly agree (2).
† In original form. Reverse-coded item for further analyses.

3.3.4 The influence of images on cognitions, emotional involvement, and pro-environmental behaviours

To examine the relationship between ocean imagery, cognitions, emotional involvement, and PEBs, we only considered the imagery dimensions mentioned by at least 5% of the respondents; following the cut-off point suggested by Andrade et al. (2016). A series of multiple regressions was conducted using place identity as the reference variable. As hypothesized, images

significantly affected emotional involvement, cognitions and behaviours (Table 5). Model 1 examined the influence of images on instrumental MVOs. Images related to nature, uses of the ocean, and place identity had a significant effect on instrumental MVOs (F (3) = 6.17, $p < .001$). As nature related images increased, instrumental MVOs decreased. On the other hand, as images reflecting ocean use and place identity increased, instrumental MVOs increased. Model 2 found that images related to nature, psychological impression, and place identity had a positive effect on relational MVOs (F (3) = 7.08, $p < .001$). Similarly, Model 3 found that as images related to nature, psychological impression, and place identity increased, relational MVOs increased (F (3) = 3.46, $p = .016$). Model 4 examined the effect of images on personal norms. With the exception of images associated to uses of the ocean, all other ocean images were associated with an increase in personal norms (F (3) = 5.91, $p = .001$).

Model 5 examined the effect of images on an individual's fear that people in the future will not have a healthy and clean ocean. Ocean imageries related to nature, psychological impression and place identity were associated to an increase in fear about the future state of the ocean (F (3) = 6.92, $p < .001$). Model 6 examined the effect of images on attitudes toward sustainable use of marine resources and found that images related to uses of the ocean and place identity were associated with an increase in attitudes (F (3) = 2.67, $p = .05$).

Model 7 assessed the influence of images on acceptability for using the ocean for commercial and recreational fishing, oil and gas exploration, and transportation. All but psychological impression images were significant predictors of acceptability (F (3) = 8.20, $p < .001$). More specifically, uses of the ocean and place identity images were associated with an increase in acceptability whereas nature related images were associated with a decrease in acceptability. Finally, model 8 examined the influence of images on PEBs. As expected, images

were significant predictors of behaviours and explained 7% of the variance (F (3) = 13.38, p < .001). While nature, psychological impression and place identity images were associated with an increase in the frequency in which an individual would engage in a PEB, uses of the ocean images were associated with a decrease in PEBs.

Table 5 Multiple regressions for cognitions, emotional involvement, and pro-environmental behaviours.

Independent variables ***Images***	**Dependent variables**							
	Model 1 Instrumental MVOs	**Model 2 Relational MVOs**	**Model 3 Intrinsic MVOs**	**Model 4 Personal Norms**	**Model 5 Emotional Involvement**	**Model 6 Attitude**	**Model 7 Acceptability for using the ocean**	**Model 8 Pro-environmental behaviours**
Psychological impression	.12	.16**	.18**	.17**	.16*	.04	-.05	.17**
Place identity†	1.35***	1.39***	1.40***	1.03***	1.13***	1.58***	1.16***	1.93***
Uses of the ocean	.16**	-.02	.05	-.02	-.06	.12*	.13*	-.18**
Nature	-.13*	.19***	.12*	.16**	.29***	-.07	-.21***	.22***
F	6.17***	7.08***	3.46*	5.91***	6.92***	2.67*	8.20***	13.38***
Adjusted R^2	.02	.03	.01	.02	.03	.008	.03	.06
N	625	611	619	612	610	623	625	614
Power effect*	.97	.98	.79	.96	.95	.45	.99	.99

Note: Entries are unstandardized beta coefficients.
* $p < .05$, ** $p < .01$, and *** $p < .001$.
† Reference category (=constant).

3.4 Discussion

We investigated ocean imagery and assessed how those images influenced an individual's marine value orientations, personal norms, fear about the future, attitudes toward sustainable use of marine resources, acceptability for exploring marine resources and using the ocean for transportation, and engagement in pro-environmental behaviours. Ranging from environmental concern, to affective and sensory associations, the images documented here reflected the various ways in which many coastal residents of Newfoundland see the ocean. From images like *beautiful* and *majestic*, our findings revealed a strong positive emotional bond between respondents and the sea. At the same time, the images showed the utilitarian importance of the ocean for fishing, and concern over marine pollution and degradation.

Top of mind associations offer an opportunity to assess the types of images that come to mind when people think about the ocean. Investigating ocean cognitive imagery enhanced the understanding of people/ocean relationship. In the future, however, affective imagery should be included in the analysis. Affective imagery explores the degree in which people feel that their associated images are positive or negative and are often measured using a five-point scale ranging from extremely negative to extremely positive (Slovic et al., 1998). Despite this limitation, our findings could be used for science communication. Results here, for example, contributed to better understanding the "waves of excitement and awareness" among people (McKinley et al., 2020). Our findings revealed that *plastics, micro-plastics,* and *garbage* are currently ingrained in people's minds. Having those images, however, are not necessarily translated into PEBs, as people, in general, would only sometimes collect litter from the beach or avoid plastic bags.

Only a minority of people mentioned *climate change* or *warming* when thinking about the ocean. Globally, people consider climate change as the fourth most important threat facing the oceans; pollution, fishing, and habitat alteration are the top three major threats (Lotze, Guest, O'leary, Tuda, & Wallace, 2018). In Newfoundland, approximately 8 in 10 coastal residents believe climate change is impacting the ocean (Engel et al., 2020). Although we did not ask for images related to threats, it is interesting that respondents barely connected the image they have of the sea with climate change. Perceptions can be influenced by recent and memorable events (Potts et al., 2016). The minimal association of climate change with ocean imagery suggests that despite being a threat, it may be perceived as a distant event. We anticipate that when significant environmental events become more frequent, images may change. Likewise, in times when climate change is portrayed in the mass media more frequently, the salience of climate change as an associated ocean image may increase. According to Smith and Leiserowitz (2012), the media helps to concretize issues in people's minds, as it happened with the associations between the alarmist climate change images with sensationalist television coverage depicting apocalyptic scenarios.

A geographical symbolic resonance with the ocean was observed through the use of images describing local natural features, unique characteristics to the locality, and memory; these imageries provided meaning to a strong place identity among the respondents and were considered as the second most important imagery dimension. Place identity is associated with feelings and symbolic connotations towards a specific place (Clayton & Myers, 20009). In addition to an emotional attachment to the place through history and heritage, the idea of place identity also includes the associated natural features and climate that symbolically characterize the location. The place identity dimension identified in this article included specific physical characteristics of the locality often used to identify the place (e.g., rocks, wind, iceberg), as well as emotional

perceptions of ocean power and memories of tragic events expressed in words like “tragedy” and "unforgiving”. This relatively strong emotional and cognitive bonds reveal an opportunity to explore further how these attributes may form people’s identity and, consequently, their relationship with the marine environment. For this article, we highlight the importance of the concept in the people/ocean relationship and how those images relate to cognitions, emotion and PEBs.

Images “have consequences for what we do in the real world” (Jentoft et al., 2012, p. 186). As hypothesized, our findings provided empirical evidence that ocean imagery relates to an individual’s cognitions, emotion, and PEBs. The effect of those images, however, varied in intensity and direction. In alignment with the notion of specificity between concepts (Whittaker et al., 2006), utilitarian mental images (uses of the ocean) were associated with an increase in instrumental MVOs, attitudes toward sustainable use of marine resources, and acceptability for using the ocean. The more people related the ocean with oil and gas exploration, transportation, fishing and recreation, the less likely they were in engaging in PEBs. The negative effect of ocean use images on PEBs is supported by previous research showing that people expressing higher utilitarian views of the natural world would be less likely to behave pro-environmentally (e.g., Nordlund, 2002).

Equivalent to findings from Capstick et al. (2016) who found images related to pollution and environmental harm to be related with concerns about ocean acidification, we found that nature related images had a positive effect on emotional involvement. Those images were associated with an increase in personal norms, relational and intrinsic MVOs, PEBs, and with a decrease in instrumental MVOs and acceptability for using the ocean. These findings suggest that when people have a clear understanding and vision of the anthropogenic impacts on the ocean as well as its

biodiversity, they are more likely to feel a moral obligation to improve the health of the ocean and act accordingly. Similarly, images of a beautiful, peaceful, vast and mysterious ocean related to an increase on relational and intrinsic MVOs, personal norms and PEBs. Those images were also associated with an increase in fear that people in the future will not have a clean ocean. This emotional involvement with the ocean may invoke inaction or encourage people to act (see for example the effects of climate change anxiety on behaviour in Clayton & Karazsia, 2020). Future research is encouraged to examine the effect of fear on PEBs and other cognitions. Of all variables examined in this article in relation to images, attitude towards sustainable use of marine resources was the least significant. We argue that the low variability of the model may be due to the fact that only one item was used to measure attitudes, or because those images that were not significant did not follow the same degree of specificity as attitudes.

In terms of geographical scale of this study, it is known that perceptions and connections between people and the ocean tend to be heterogeneous across nations and communities (Potts et al., 2016). For nationwide marine planning in Canada, we recommend future research to explore the human dimension of the sea across other provinces. Ocean imagery from coastal residents and other interest groups can be used to inform a broader shared understanding of how people perceive marine issues, governance, and its relation to human wellbeing and cultural survival. These are crucial social aspects to be taken into consideration when designing policy, planning marine reserves or sustainable extraction of resources (Bennett, 2019). The approach undertaken to assess ocean images in this article, although broad and non-specific to a particular aspect of marine management, conservation, or threat, highlights that perhaps the visions of the ocean as the last frontier is not prevalent within coastal communities. More than a place to be explored and conquered (Rozwadowski, 2018), the ocean may be becoming a place of reclusion and

contemplation (at least in the context of Newfoundland). From an environmental psychology perspective, these findings contribute to the knowledge on the influence of coasts to people's wellbeing (Wheeler et al., 2012). Images like *calm, tranquility, serenity* and *freedom* indicate the importance of the ocean for producing a sense of wellbeing and stress relief for coastal communities.

Despite the contribution of this article in filling knowledge gaps of social aspects of the ocean, many questions remain unanswered. For example, to what extent those images reflect inland populations' views? Is the ocean so important, affectively, to people far from it as it is for coastal communities? Certainly, place identity will not be as salient, but is there a common vision of the ocean shared by all that would have an impact in how the ocean has been treated, managed and governed? Although information on marine public perception can guide efforts for managing and conserving the ocean, translating abstract constructs from knowledge into practice requires on-the-ground engagement and further analysis. We envision our findings can contribute in forming the groundwork for more applied strategies of participatory management and conservation social marketing (Verissimo, 2019).

3.5 Conclusion

In this article we contributed mainly to the conceptual understandings of the people/ocean relationship. For society to be part of the solutions put forward to address marine degradation, we need to consider the cultural connections between people and the sea (McKinley et al., 2020), particularly from coastal communities and small-scale fisheries, who rely on the oceans for livelihood, food security, wellbeing and heritage continuity (Bennett, 2019). This exploratory article highlighted the importance of word association techniques for understanding the current

ways in which people imagine the ocean, which provides various insights into social ocean knowledge. Neilson (2018) argues that metaphors (e.g., "island of garbage", "the last frontier"), are critical for marine conservation and policy. Metaphors can be used, for example, to increase awareness of issues (like *silent spring*) that do not resonate with the public. To construct such metaphors, however, scientific knowledge of the images conjured by society must be documented and reflect the current situation (Neilson, 2018). In this article, we provided the scientific knowledge of ocean images that are shared in the context of coastal Newfoundland. These images can guide a new metaphor for marine planning and conservation. The metaphor needed represents the cultural importance of the ocean and does not have the cod fishery as the main symbol of the sea. The cod fishery was an important element in Newfoundland's history and still plays an important role in the economy and to outport communities (Bavington, 2010). Yet, the "in cod we trust" metaphor may no longer apply. The new decade should be more about affection, attachment and concern with the sea, than development.

Chapter 4. Seal hunting in Newfoundland from the perspective of local people

4.1 Introduction

Governing and managing charismatic megafauna is challenging, particularly when the species in focus is the object of profound moral debate of what is (in)humane and (un)necessary. Seals, like many other high trophic level marine predators, have a long history of human interaction. One of the most common interactions is direct predation on fish or damage to fishing gear (Cronin et al., 2014; Engel et al., 2014; Pont et al., 2016; Varjopuro, 2011). Human-seal interactions (HSI) also occur through the hunting of seals (legal and illegal), consumption of seal products, and tourism. While the hunting and consumption of seals refer to a direct form of interaction, tourism is an indirect form of HSI. But HSI goes beyond the direct/indirect interaction between people and seals; it also refers to social perceptions and interactions among people in regards to seals (Peterson et al., 2010). Understanding these perceptions have a significant effect on species conservation and policy formulation and implementation (Czech et al., 1998).

Human-wildlife interactions can be either positive or negative (Nyhus, 2016), and occur when the needs and behaviours of humans, wildlife, or both are affected (Decker et al., 2012;

Peterson et al., 2010). Conflict *with* wildlife is a negative interaction that may result from the direct competition for resources (e.g., seals feeding on Atlantic cod [*Gadus morhua*]). Conflict *over* wildlife, on the other hand, develops from disagreements among people on how wildlife ought to be governed and is often based on different value systems, beliefs and behaviours (e.g., between animal welfare groups and sealers); it results from people's interpretations of a given situation (Peterson et al., 2010). Interactions *with* or *over* seals are ultimately influenced by the social and ecological factors that influence behaviours (Dickman, 2010). Understanding the complexities of HSI is critical for effective governance; how people evaluate these interactions influence whether they want HSIs enhanced or reduced (Lischka et al., 2018).

When the perceived costs of the interactions outweigh the benefits, the species in question is often considered as "abundant" (or overabundant). An abundant species is a perception of population size relative to people's ability to tolerate the negative impacts experienced from wildlife (Conover & Dinkins, 2012). Abundant species are a social and economic phenomenon that varies among groups and individuals. For example, local fishers who regularly experience fish predation from seals may consider them as abundant, even if ecological data show otherwise, or other interest groups perceive the opposite.

Seal hunting is currently practiced in 10 countries, with most sealing taking place in Canada and Greenland. This article addressed the complexities of HSI on the island portion of the province of Newfoundland and Labrador, where most of the Canadian hunt occurs. With the decreased demand for seal products and the ban on fur, oil and meat across various countries (e.g., Regulation (EC) No 1007/2009 of the European Parliament, Trade in Seal Products, 2009), the sealing industry is not as prominent as it was in the 1900s (Fisheries and Oceans Canada, 2016; Sanger, 1998b). Over the past century, the number of seals off the coast of Newfoundland and

Labrador has fluctuated (DFO, 2020). The current number of seals, however, is not tolerable to many people who perceive seals as direct competitors for fish (Ponnozzo, 2013). Controversies around the hunting methods have also infused the debate surrounding seal hunting, particularly after the 1960s, when images of whitecoats (newborn seals with white fur) being killed on the ice were televised internationally (Barry, 2005).

Different groups advocate for different approaches to manage the growing seal population. While some lobby for cull programs to avoid further impact on fish stocks and livelihoods, animal welfare groups claim that harvesting is inhumane and unnecessary (Barry, 2005; Lavigne & Lynn, 2011). Because of social and political pressures, laws and regulations have been implemented. For example, the introduction of total allowable catch that regulates the number of animals allowed to be hunted (TAC, 1971), and the U.S. Marine Mammal Protection Act (1972) that banned the import or sale of any marine mammal products. According to the Canadian Marine Mammal Regulation (SOR/93-56), only licensed people can hunt seals, and every person who hunts for personal or commercial purposes shall report the pelt or carcasses of the seal for control (SOR/2003-103, s.8). The commercial seal hunt is supported and regulated by the Department of Fisheries and Oceans (DFO) and is bound to the Marine Mammal Regulations (MMR). In 2016, it was estimated that less than 1,000 licensed commercial sealers were active (Fisheries and Oceans Canada, 2016). It is believed that the number of people actively involved in the hunt has decreased since then.

Although the literature on seal hunting is vast (e.g., Aldworth & Harris, 2007; Daoust et al., 2014; Jackman et al., 2018; Lavigne & Lynn, 2011; Livernois, 2010), little is known about the individual-level variables (i.e., psychological constructs such as value orientations, beliefs, attitudes, emotions, social trust) in the context of seals in Newfoundland. This article examined

the role of individuals in the context of HSI by assessing an individual's psychological constructs related to seals, seal hunting and its management, and how such constructs influence public support for banning seal hunting. The objective was to assess how broader marine value orientations (MVOs) affect more specific evaluations of seals (Jones, Shaw, Ross, Witt, & Pinner, 2016; Manfredo et al., 2014). At the policy level, the goal was to contribute to policy and decision-making within the Atlantic Seal Task Team (ASTT). The ASTT is a Canadian initiative led by the federal Department of Fisheries and Oceans (DFO) to increase knowledge on seal science while considering different views and perspectives on the matter.

4.1.1 Background on Newfoundland's seal hunting

The hunting of seals (mainly harp (*Pagophilus groenlandicus*) and grey (*Halichoerus grypus*) seals) is part of Newfoundland's cultural heritage, tradition, and livelihoods that traces back centuries of history. In the 16th century, foreign vessels sailed from Europe to Newfoundland for the seal oil (Livernois, 2010). Settlers in the 18th and 19th centuries saw seals as an additional food resource in the winter and spring months when the pack ice would bring these animals closer to the coast (Sanger, 1998b). Coastal people hunted seals of all ages during this period. However, it was the young whitecoats that had a more significant commercial appeal in the 1900s when their pelts became more valuable for the fashion industry (Sanger, 1998b). The largest catches occurred in the 1800s when over 700,000 animals were hunted. Since then, the number of catches has varied significantly, and the current quota of 400,000 animals has not been reached since 2008 (Fisheries and Oceans Canada, 2016). The annual catch of harp seals has been ranging between 35,000 and 98,000 since 2009 (Fisheries and Oceans Canada, 2016).

From nets and small boats to larger sailing and steam vessels, the commercial seal hunt evolved, and seal populations fluctuated over the centuries. By the end of the 19th century, the

industry was the second in importance to the province (a self-governing British colony at the time), staying behind only to the North Atlantic cod fishery (Livernois, 2010). The high demand for seal products caused a severe decline of the population, and the harvest had to be controlled. It was not until the Second World War period, when there were no vessels commercially hunting, that the populations recovered. Between the 1950s and 1970s, however, the seal population went through another cycle of significant decline due to over-exploitation (Livernois, 2010). Currently, the Northwest Atlantic harp seal population (~ 7.4 million animals) is healthy and abundant, yet still below pre-sealing levels (DFO, 2019a). The grey seal population (~ 424,300 animals) is slowly recovering, particularly in the Gulf of St Lawrence, where the mortality rate and removal of seals are high (DFO, 2019a). Globally, both species are listed as Least Concern and their global populations are increasing (Bowen, 2016; Kovacs, 2015).

To ensure a quick and humane harvest, the hunting involves a three-step process (striking-checking-bleeding) based on recommendations of an independent group of veterinarians (B. Smith & Groupwork, 2005). The commercial seal hunt is supported and regulated by the Department of Fisheries and Oceans and is bound to the Marine Mammal Regulations (MMR). The hunting of whitecoats has been illegal since 1987, and only certified sealers can hunt. The certification includes training on humane harvesting and quality control for handling meat. Approved hunting tools include the use of regulated rifles and shotguns, clubs and hakapiks (similar to other picks). In 2016, it was estimated that less than 1000 licensed commercial sealers were active in Canada (Fisheries and Oceans Canada, 2016). It is believed that the number of people actively involved in the hunt has decreased since then.

4.1.2 Overview of theoretical background

This analysis is grounded on social psychology (Vaske & Manfredo, 2012) to investigate people's thoughts, feelings and behaviours toward seal and seal management. The cognitive hierarchy (Fulton et al., 1996; Vaske & Donnelly, 1999) is used as the theoretical framework to examine perceptions of HSI, and the motivations for people supporting a ban on seal hunting. This framework postulates that higher order cognitions, such as values and value orientations, inform more specific beliefs, which in turn influence an individual's attitudes and behaviours. Graphically represented as an inverted pyramid, the elements that inform behaviours are structured into 'hierarchy' arranged from broader to more specific cognitions.

At the base of the hierarchy are values and value orientations. Because values are broad and generic (Clayton & Myers, 2009), value orientations are better predictors of the variability in attitudes and behaviours. Value orientations represent clusters of basic beliefs 'oriented' towards the environment or a certain species. In this article, value orientations refer to marine value orientations (MVOs; Engel et al., 2020) and seal value orientations (SVOs). Specific beliefs are next in the hierarchy's pyramid. Beliefs are things people believe to be right but are not necessarily true (Vaske & Manfredo, 2012). For example, beliefs related to the impact of seals on Atlantic salmon fisheries (Butler et al., 2011). Beliefs are antecedents of attitudes, a concept used in seal management strategies (e.g., Butler et al., 2011; Jackman et al., 2018). An attitude denotes a favorable or unfavorable evaluation of an object. When the object is a specific wildlife species, the attitude is usually framed in terms of like - dislike (Vaske & Manfredo, 2012). When the species in question is harvested for food and income, wildlife governance requires further understating of how people respond to the species' management. Acceptance is a concept that has been used to examine levels of support/opposition of a given strategy, action or decision. Acceptance items

can be framed as an attitude (Waldo et al., 2020) or as a behaviour (Steg et al., 2005) that enables or promotes support (Huijts et al., 2012). In this article, acceptance is used as behaviour (i.e., public support for stopping seal hunt).

Embedded in the cognitive hierarchy are emotions; a basic mental capacity and a key component in HWIs (Jacobs, 2012). Emotions reinforce social acceptance, and can be defined as an emotional response to a stimulus (Vaske & Manfredo, 2012). Seal hunting stimulates different emotional responses in people. The emotional component in this article refers to cruelty of hunting seals.

To understand HSI, this article examined social trust in the federal government for managing the ocean. Social trust is the belief that people making management decision can be relied on (Siegrist et al., 2000, 2005). In the marine context, social trust has been examined in relation to marine protected areas (Bennett & Dearden, 2014), fisheries management (Fleming et al., 2020), marine spatial planning (Bakker et al., 2019), and coral reef management (MacKeracher et al., 2018). While social trust influences people's acceptance and approval of a given situation, the lack of trust in government authorities can hinder connections among decision-makers (Bakker et al., 2019).

4.1.3 Hypotheses

The following latent constructs were used to assess drivers of support for stopping seal hunting: MVOs, intrinsic and instrumental SVOs, beliefs about predation, emotion towards seal hunting, and acceptability for the commercial and personal use of seals. It was anticipated that MVOs had a direct and positive influence on value orientations (i.e., the way people value the ocean is likely to influence how they value seals). Acceptance for the commercial and personal

use of seals was hypothesized to be influenced by seal value orientations, beliefs about predation, and emotion towards sealing (see Fig. 10 for specific hypotheses of the model). In addition, it was expected that rural and urban residents differed in their perceptions of HSI.

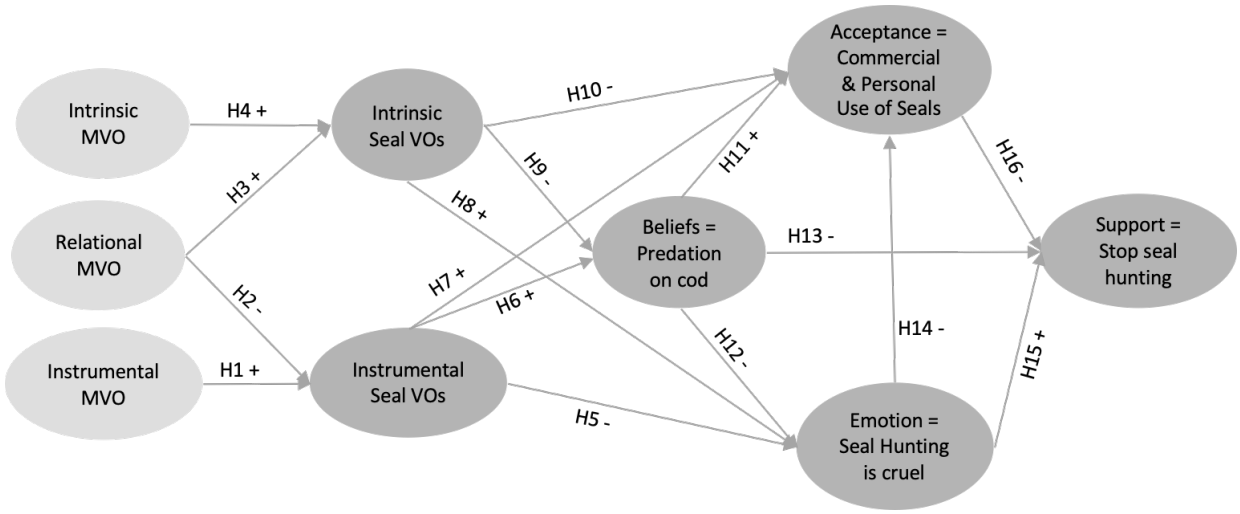

Figure 10 Path analysis between MVOs, SVOs, beliefs, emotions, acceptance and support for stopping seal hunt, and the hypothesized relationships between the constructs. Signs represent the direction of the correlation between the latent constructs.

4.2 Methods

4.2.1 Data Collection

Data were collected through a self-administered questionnaire. A drop-off/pick-up method (Jackson-Smith et al., 2016) was used in 40 (38 rural and 2 urban) randomly selected coastal municipalities in Newfoundland. Due to the high number of coastal municipalities in the island (~182) relative to population (521,542 citizens in 2019), data were collected in places proportional to the community population where the minimum required sample size was five

respondents or higher. Census data were used to estimate the number of respondents for each place, with a target total sample size of 400 completed questionnaires for urban and rural areas, thus allowing for a 95% confidence level within ±5% margin of error (Vaske, 2019). A random number generator was used, based on a numbered grid-map, to select the sample units within each municipality.

To assess aspects of HSI, people were asked how often they have engaged in seal hunting in the past year (responses ranged from not at all, just once, less than a month, at least once a month, a few times per month, or at least once a week), and whether or not they consumed seal meat (yes/no). Attitudes toward seals were assessed through a 5-point scale with responses ranging from strongly dislike (-2) to strongly like (+2), with a neutral point (0). Items used to assess SVOs, predation beliefs, emotion about hunting, acceptance for personal and commercial uses of seals, and support for banning the hunting are shown in Table 2. Responses for these items ranged from strongly disagree (-2) to strongly agree (+2), with a neutral point (0). To assess trust in the government (i.e., DFO) in managing the ocean, respondents were asked to rate the extent in which they trusted the government, with responses ranging from not at all, just a little, about half of the time, and always. Lastly, the questionnaire included an open-ended question for comments on the subject. Examples of the written comments are in section 4.3.

4.2.2 Data analysis

Independent sample *t*-tests examined the difference between urban and rural residents for all variables. For constructs with more than one item, Cronbach's Alpha estimated the internal reliability of the items associated with the scale. Structural Equation Modelling (SEM) estimated interrelationships between the latent constructs and the predictive validity of the theoretical model.

Chi-square divided by the degrees of freedom (x^2/df), the Goodness of Fit Index (GFI, with an acceptable GFI > .95), the Comparative Fit Index (CFI, with an acceptable CFI ≥.95), and the Root Mean Square Error of Approximation (RMSEA, with an acceptable RMSEA < .08; (Hooper et al., 2008) were used to assess the overall model fit. LISREL 10.3 was used for fitting the model using the variance-covariance matrix. SPSS v.26 was used for descriptive and comparative analyses.

4.3 Results

4.3.1 Responders characteristics

A total of 773 coastal residents completed the questionnaire (49% response rate). Of those, 52% were men, and 48% were women; 53% were rural, and 47% were urban residents. About 42% were older than 56 years, and 40% ranged between 26 and 55 years in age; 18% were young adults (18 – 25 years). About a third of respondents (32%) consumed seal meat. About 2% worked for the oil and gas industry, 13% were government workers, 8% were self-employed, 13% were university students, about 2% did not work, 28% had other occupations, and 31% were retired.

4.3.2 Psychological attributes

Four seal value orientations were measured: ecological, cultural, intrinsic and instrumental. On average, respondents held stronger ecological and intrinsic SVOs (Table 6). Respondents were less likely to value seals for their instrumental and cultural values; yet, 71% of the respondents agreed or strongly agreed that seals were important for the economy. Significant statistical differences were observed between urban and rural residents' values toward seals (Fig.

11). While urban residents held stronger ecological and intrinsic SVOs, rural residents held stronger cultural and instrumental SVOs.

Table 6 Mean responses and standard deviation of psychological attributes.

Psychological Attributes	**Respondents**	
	M[a]	**SD**[b]
Seal Value Orientations - SVOs		
Instrumental SVO[c]	.92	.77
• Seals are important because they provide food for people in the province.	.99	.90
• Seals are important because they produce jobs for people in the province.	.99	.89
• Seals are important because they are an important part of our economy.	.81	.97
Intrinsic SVO		
• Seals have a value on their own beyond economic and nutritional benefits to us.	1.12	.81
Cultural SVO		
• Seals are important because they are part of my cultural heritage.	.80	.97
Ecological SVO		
• Seal are important because they are part of the marine ecosystem.	1.39	.57
Attitudes toward seals		
• From strongly like to strongly dislike, how do you feel about seals.	.96	.92
Beliefs about predation		
• Seals are causing the decline of cod stocks.	.78	1.23
Acceptability for commercial and personal uses of seals[d]	1.03	.88
• It is acceptable to use seals for commercial purposes.	1.02	.96
• It is acceptable to use seals for personal purposes.	1.05	.93
Emotions toward seal hunting		
• Seal hunting is cruel.	-.90	1.08
Support to seal hunting		
• We should stop seal hunting.	-1.08	1.03

[a] Mean value derived from a five-point scale ranging from strongly disagree (-2), disagree (-1), neither (0), agree (1) and strongly agree (2).
[b] Standard Deviation of each mean value.
[c] Cronbach's Alpha = .86
[d] Cronbach's Alpha = .85

Respondents, in general, held positive attitudes toward seals. While the majority (77%) liked or strongly liked seals, 7% disliked or strongly disliked, and 16% were neutral. Urban residents held slightly more positive attitudes toward seals than rural residents (Fig. 11). On average, respondents believed that seals were contributing to the decline of cod stocks. These

beliefs are supported by comments like "[seals] are the leading cause of the destruction of our cod stocks," "seals should be culled to alleviate pressure on cod stocks," and "seal population should be managed to avoid decimation of fish species." Other factors causing the decline of cod emerged in the comments and included the commercial capelin fishery, foreign fishing, and factory trawlers. As hypothesized, urban and rural respondents differed in their beliefs; rural residents held stronger beliefs about seal predation on cod than urban respondents (Fig. 11).

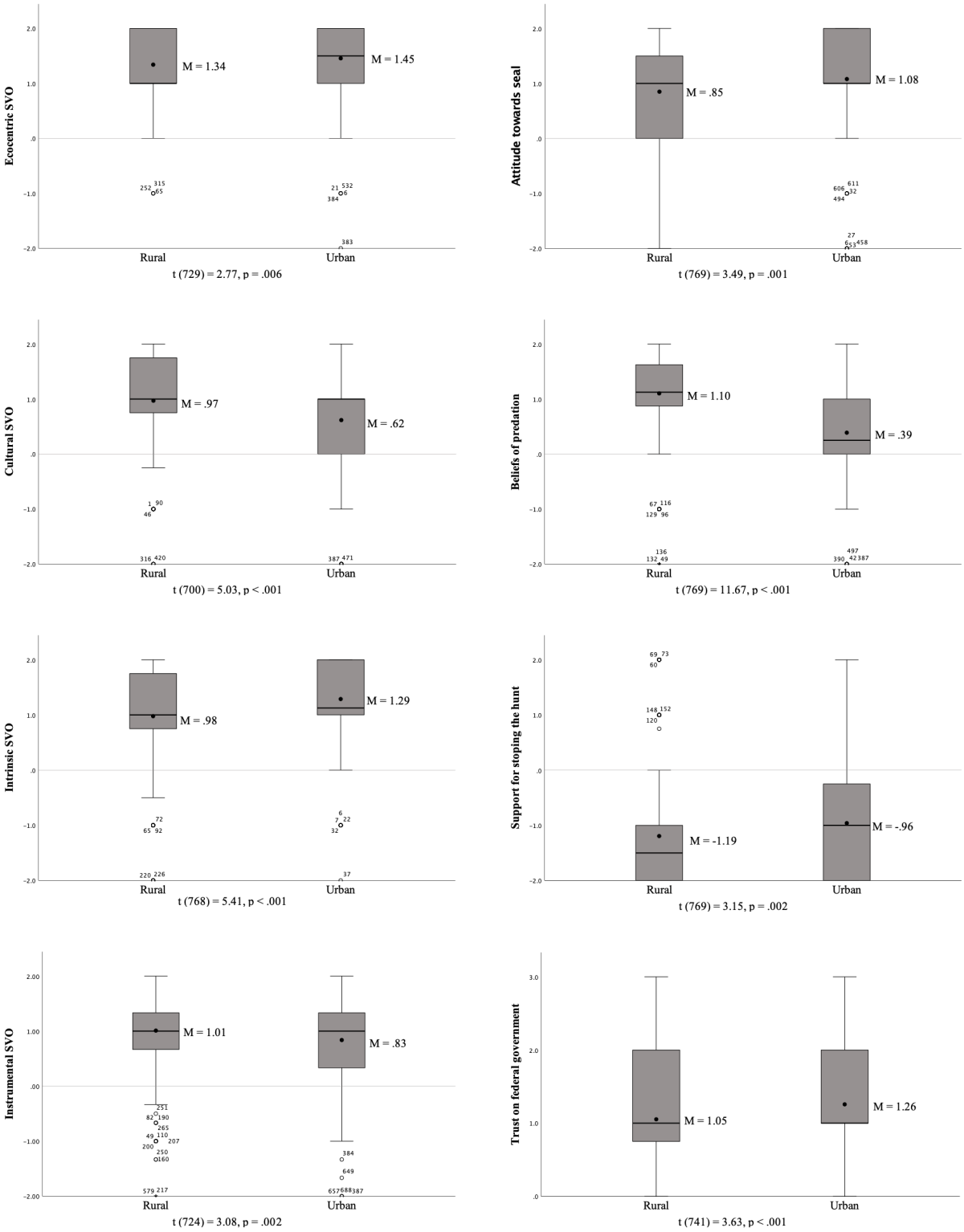

Figure 11 Box plots of the psychological attributes according to the region of residence (rural/urban). Dots inside boxes represent the mean for each group. Only variables with a significant difference between regions ($p < .05$) are shown.

Using seals for commercial and subsistence purposes was acceptable among respondents, with no significant difference between urban and rural respondents. Only 8% of the respondents did not accept using seals. Concerning specific views about seal hunting, respondents, in general, disagreed that the activity is cruel and that it should cease to exist. No significant difference between urban and rural respondents was observed for emotions, but urban residents were slightly more likely to support a cease in the seal hunt (Fig. 11). Despite these differences, people, in general, felt that hunting is not cruel and should continue. As stated by a respondent, "I do not participate in any hunt, but I believe for those cultures and families who carry on sealing as a tradition [it] should be allowed to (within reason) going forward." Others pointed out that "hunting for food is acceptable but not for sport," that "[seals] are amazing animals, but as long as we do not wipe them out entirely, we should be able to hunt them." Many agreed with hunting, "as long as it is done humanely, and the entire animal is used." Comments opposing the seal hunt included "stop the hunt," and "seal hunting may have had an economic value years ago, but not anymore; it should be kept in the past where it belongs."

Coastal residents were asked to what extent they trusted the federal government in managing the ocean in the province. About 22% did not trust the government *at all*, 43% trusted *just a little*, 32% said they trusted the federal government *about half of the time*, and 3% *always* trusted the government for managing the ocean. Rural residents expressed significantly less trust in the federal government than urban respondents (Fig. 11). Comments related to the role of the federal government in managing the ocean included a lack of effective dialogue with fishers (e.g., "the government is not listening to the commercial fishermen"), a need "to improve management of the ocean" and for "citizens and governments [to] cooperate in understanding the ocean and

marine life better for current and future generations." If there is no market for seal products, "then the government should put a bounty on them to bring the population down."

Data on MVOs were obtained from Engel et al. (2020). According to these authors, coastal residents held strong and positive relational (M = 1.56, SD = .54), intrinsic (M = 1.59, SD = .59), and instrumental (M = 1.45, SD = .59) MVOs. While there was no significant difference in intrinsic MVOs between urban and rural respondents, urban respondents were more likely to value the ocean for its relational value and less likely for its instrumental value.

4.3.3 Predicting support for a ban on seal hunting

The hypothesized model assessed the interrelationship between the cognitive and emotional constructs explained 69% of the variance in support for stopping the hunting of seals (Fig. 12). The analysis revealed an acceptable fit for the model (x^2/df= 3.31, GFI = .96, CFI = .97, NFI = .95, and RMSEA = .06). Support for stopping the harvesting was positively influenced by emotions ($\beta = .51, p < .001$; H_{15}) and negatively influenced by the acceptability for commercial and personal uses of seals ($\beta = -.34, p < .001$; H_{16}). Different from hypothesized, beliefs associated to seals as one of the drivers for the decline of cod did not influence support for stopping the harvest (H_{13}).

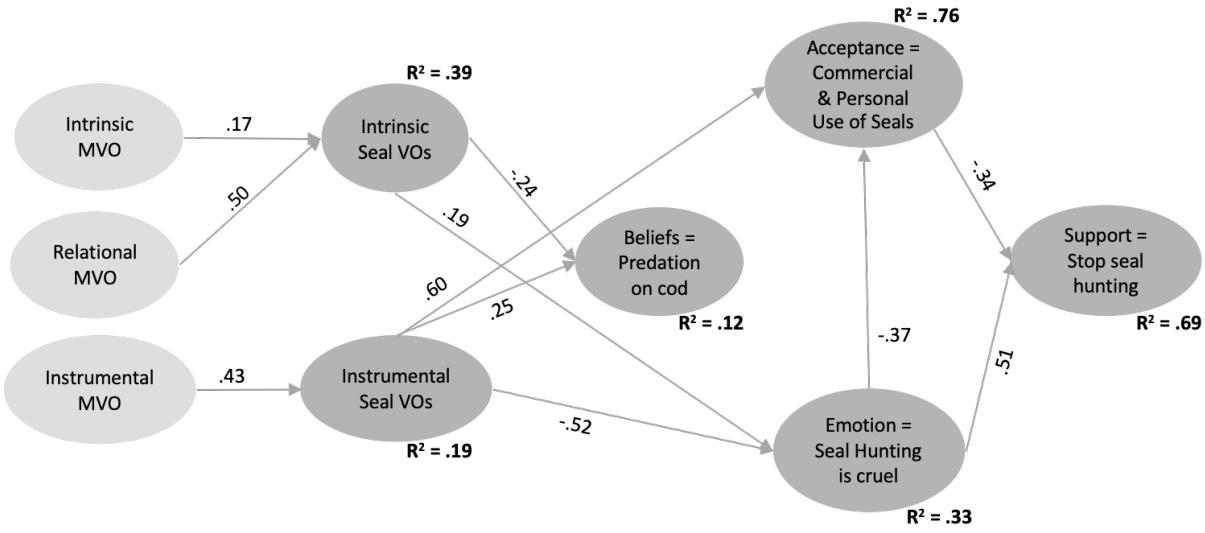

Figure 12 Path analyses showing only statistically significant paths ($p < .05$) between the latent construct. Path coefficients are standardized regression coefficients.

The model explained 76% of the variance in acceptability for the commercial and personal use of seals. Acceptability was positively influenced by instrumental SVOs ($\beta = .60$, $p < .001$; H_7), and negatively influenced by emotions ($\beta = -.37$, $p < .001$; H_{14}). Beliefs and intrinsic SVOs did not influence acceptability, thus rejecting hypotheses 11 and 10, respectively. The model explained 33% of the variance of emotions. Feeling that seal harvesting is cruel was negatively influenced by instrumental SVOs ($\beta = -.52$, $p < .001$; H_5) and positively influenced by intrinsic SVOs ($\beta = .19$, $p < .001$; H_8). Beliefs of predation on cod did not influence emotions (rejecting H_{12}). Beliefs of predation, however, were positively influenced by instrumental SVOs ($\beta = .25$, $p < .001$; H_6) and negatively influenced by intrinsic SVOs ($\beta = -.24$, $p < .001$; H_9). Instrumental MVO positively influenced instrumental SVOs ($\beta = .43$, $p < .001$; H_1); relational MVO did not influence instrumental SVOs (rejecting H_2). On the other hand, intrinsic SVOs were positively

influenced by both relational MVOs ($\beta = .50, p < .001$; H_3) and intrinsic MVOs ($\beta = .17, p = .03$; H_4).

A direct model between MVOs, SVOs and support was analyzed. Results revealed an acceptable fit for the model; however, it only explained 39% of the variance in support. In this case, a mediation model with beliefs, emotions and acceptance mediating the relationship between value orientations and support provides a more robust and accurate explanation for what drives people to support a ban on seal hunting.

4.4 Discussion

Human-seal interaction is complex, driven by emotions, and influenced by how people value the ocean. Despite positive attitudes and strong ecological and intrinsic values toward seals, respondents, in general, accepted using seals for commercial and personal purposes and did not consider the hunt a cruel activity. For most people, the hunt should not stop; yet, qualitative inputs showed a concern that the hunt should be humane and sustainable. While these concerns are supported by previous research with coastal Newfoundlanders who believed sealing is a sustainable activity and seals are harvested humanely (Bath & Engel, 2019), others question if the hunt can be morally justified (Lavigne & Lynn, 2011; Sellheim, 2016). Despite the general support for sealing, a few people (8%), however, would like to see a ban on seal hunting, citing a lack of necessity.

Support for stopping the hunt is a function of value orientations, emotions and acceptance for seal uses. As argued by Livernois (2010), the debate around ending or continuing the commercial seal hunt is emotionally driven. Findings here provide evidence that emotions related to the cruelty of the hunt directly and positively influenced support for stopping the hunt. As

predicted, those who accepted using seals were less likely to support cessation of the hunt. SVOs indirectly influenced people's support/opposition for the hunt. This results is similar to Riepe and Arlinghaus's (2014) finding that a ban in fishing was driving by value orientations and animal rights attitudes. Partially supporting the study's hypotheses, intrinsic SVOs had a positive influence on emotions and a negative influence on beliefs toward predation on Atlantic cod. Instrumental SVOs, on the other hand, hand, negatively influenced emotions but positively influenced beliefs and acceptance. The emotional and acceptance constructs increased the variance of the model from .39 to .69, thus indicating the importance of these components in understating what drives people to support a ban on sealing.

There was a strong belief that seals were causing the decline of Atlantic cod, and the federal government was not managing the situation appropriately. Evidence shows that predation by grey seals may account for up to 50% of natural cod mortality in the southern Gulf of St. Lawrence, but with an unclear effect on the low recovery of cod stocks in the area (DFO, 2020). This belief reflects the perception of an overabundance of seals, which can also be associated with sealers' motivation to hunt. According to Bath and Engel (2019), the main reason for sealers to hunt was to control the seal population, followed by cultural and economic motivations. The predatory belief, however, did not influence people's support/opposition to the seal hunt nor acceptability for using seals for commercial and personal purposes, thus rejecting both hypotheses.

Strong beliefs about predation were not surprising. When people perceive a high-profile marine species to be abundant, they tend to associate high predation rates on fish (even when the correlation is not as significant and other social [e.g., overfishing] and ecological [e.g., climate change] factors may be contributing to the decline of stocks). In Brazil, for example, fishers strongly believed sea lions were causing significant economic impacts on their activities with

high fish mortality rates and damage to fishing gear (Pont et al., 2016). While sea lions-fisher interactions were negative and predation occurred, the perceptions of these interactions were exacerbated, and the actual predation rate lower than the perceived (Machado et al., 2016; Rosa De Oliveira et al., 2020). Similarly, the majority of fishers (81%) in Scotland believed seals (harbour and grey seals) to be causing significant to moderate impact on stocks and catches, when in reality, the perceptions were highly inconsistent with actual low costs (Butler et al., 2011). While local perceptions may signal some changes in the environment, like an increase in species population or changes in behaviours patterns, it may jeopardize management and conservation efforts, as people's perceptions may create further social conflicts. Understanding and considering these perceptions when planning for conservation is paramount for effective governance of marine wildlife and resources.

Although not widely accepted (i.e., outside the local context), sealing is a traditional practice in Newfoundland and Labrador. For the hunting to be sustained as a socio-cultural and commercial activity, however, public support for hunting is necessary (Minnis, 1998). This study provides evidence of rural and urban coastal respondents supporting seal hunting. Governing a marine species that is perceived as abundant, however, does not necessarily mean encouraging its lethal control (Conover & Dinkins, 2012). Rather than increasing hunting, attention could be given to increase tolerance for the negative impacts of seals on people's livelihoods. Tolerance increases when the positive effects of HSI suppress the adverse effects. Promoting and achieving tolerance, however, is not an easy task. While some advocate for wildlife tourism as a way to increase the positive effects of HSI, sealers are unlikely to engage in the tourism sector (Bath & Engel, 2019). Further assessments and engagement with people directly interacting with seals are necessary to achieve management objectives successfully. While Bath and Engel (Bath & Engel,

2019) provided preliminary data from sealers, their sample was not representative of the group who is actively licensed in the province.

4.4.1 Management implications

The Canadian government uses a precautionary approach to govern seals. As such, it welcomes scientific-based inputs from scientists, resource managers and other stakeholders to identify management objectives and how to achieve them. Findings in this article suggest that if the objective is to control the growing population of seals, coastal residents are likely to support the hunt for use and commercialization of seals. Lack of trust in the federal governing agency, however, was detected. Therefore, to avoid further social conflicts between different interest groups, improving the trust relationship between different levels of society and institutional groups is essential. Finally, findings can be used to inform the socio-cultural and economic aspects of the seal hunt within coastal communities from Newfoundland, thus attending one of the objectives established on the current seal management plan. Despite the statistical differences between urban and rural residents, these groups, on average, shared similar views. Often it is claimed that people in urbanized areas are likely to oppose the utilization and hunt of seals (Aldworth & Harris, 2007). It may be the case of urban areas outside Newfoundland; data in this article, however, show otherwise.

4.5 Conclusion

Seals are not disliked, and people understand their ecological and intrinsic value. They are valued for reasons beyond nutritional and economic benefits, yet their instrumental and cultural importance is recognized. In general, sealing is accepted among coastal communities in

Newfoundland, and it is not seen as a cruel activity, rather, it is commonly advocated. Qualitative input has provided further evidence that some coastal residents of Newfoundland are concerned with the growing population of seals interfering in the fisheries.

The conceptual model presented here offers an understating of HSIs, with the higher order of cognitions, at a higher ecological level, influencing cognitions attributed to lower ecological levels. The application of the model to understand support for stopping the seal hunt led to the identification that more specific beliefs, emotions, and acceptance mediate the relationship between value orientations and behaviour.

To advance the comprehension of the complexities of HSIs, further research that specifically includes fishers and sealers, and an analysis of the hierarchical dynamics between individual and group hierarchies is recommended. Furthermore, given that this research was carried out in one of the most significant locations within the commercial harvesting of seals, findings may differ from places away from the coast. The cultural context in which this study was carried may not reflect the views of other Canadians.

Chapter 5. Conclusion: Towards Getting It Right

The overarching goal of the Ocean Frontier Institute's (OFI's) Module-I is *Getting It Right*. As part of Module I-3, one of the objectives of the present research is to provide data that will serve as the basis for a *Getting It Right* dialogue between different interest groups that can affect and/or be affected by decisions involving the use of marine resources. OFI's Module-I emerges from the need to build knowledge on various issues concerning fishing and coastal communities in Newfoundland and Labrador, particularly after the collapse of the Atlantic Cod and the subsequent moratorium in 1992. Aware of the current climatic and demographic changes affecting these communities, Module-I is also looking for ways to help people cope with a changing ocean and envision (and embrace) a more sustainable future. This doctoral research attends to one of the main knowledge gaps identified by Module-I: examining coastal communities' values, knowledge and perceptions. It did not specifically target fishing communities or fishing related issues because the challenges this particular group is facing relates to all of society. Without a clean and healthy ocean, there will be no fish to catch and no place to work. In this sense, this doctoral research emerged from the need to ensure that present and future generations will *get it right* when it comes to marine governance AND conservation.

This chapter begins with a discussion of how the findings from the previous three manuscripts can assist in rethinking our relationship with the ocean. Next, I highlight the main

theoretical, methodological and empirical contributions of the research in the context of marine social sciences, governance and conservation. The chapter concludes by acknowledging some limitations and challenges of conducting this research during the global COVID-19 pandemic, followed by recommendations on how to advance our understanding of the human dimensions of marine management and conservation.

5.1 Rethinking our Relationship with the Ocean

> "We need to [make sure] something is done to ensure that our children and future generations can live healthy and enjoy our beautiful ocean and environment."
>
> Resident of Placentia, Newfoundland and Labrador, 2019.

It is 2020, the year the [human] world was forced to stop due to the novel Coronavirus (COVID-19) pandemic. It has been almost a year since borders closed, aerial, maritime and terrestrial traffic declined, and people stopped moving. The world, as we knew it, slowed down. Millions of people were infected by the virus, and lives were lost. The global economy was shaken; people lost their jobs, and many are still struggling to cope with the 'new norm'. At the same time, books were, and are, being written about the implications of this historical event (e.g., Kumar et al., 2020; Rabadan, 2020; Waltner-Toews, 2020); photographers are documenting the various ways in which people are coping with the pandemic (e.g., Levine, 2020; Petersen, 2020; Zhang, 2020), and intellectuals, scientists and people alike are reflecting on the social and environmental implications of the lockdown (e.g., *In Limbo* Conversations [Isaac & Rajan, n.d.]

a blog dedicated to explore the philosophical dimensions of the pandemic).

In a recent interview given to National Geographic (Furby, 2020, August 28), Dr. Sylvia Earle, the renowned American marine biologist, argued that this is the year we were 'invited' to reflect on how we are treating the ocean. According to Dr. Earle, this is a turning point in our history – it is the time to review our actions and reflect on how we can rewrite our story with the ocean and transition from an extractive and reckless battle to a more responsible and caring relationship. Furthermore, the reduction in human activities brought about by COVID-19 may be a chance for oceans to recover from pollution, overfishing and the impacts of climate change; but it will require governments and society to actively embrace sustainable ways to explore energy and extract marine resources in a post-pandemic reality (UN, 2020).

The path towards a more sustainable future where fishing is regulated and controlled, where renewable energy replaces fossil fuels, coral reefs are thriving, and waters are protected, however, looks rather utopic. But utopia, in the words of the Uruguayan journalist Eduardo Galleano (1940 - 2015), is what makes us advance[2]. The vision of this [utopic] future, where at least 10% of coastal and marine areas are protected (i.e., Aichi Target 11, UN's Sustainable Development Goal 14 - Target 14.5), where marine pollution is reduced, and coastal people have rights and access to their resources and are involved in the decision-making processes, is what makes us advance.

Moving forward in a sustainable future and *getting it right*, however, requires an understanding and changing of human values and behaviours. Moving forward in a sustainable future and *getting it right*, however, requires an understanding and changing of human values and

[2] *Utopia lies at the horizon. When I draw nearer by two steps, it retreats two steps. If I proceed ten steps forward, it swiftly slips ten steps ahead. No matter how far I go, I can never reach it. What, then, is the purpose of utopia? It is to cause us to advance."* Utopia, by Eduardo Galeano.

behaviours – the fundamental forces behind the direct and indirect drivers of marine degradation and overexploitation (Almond et al., 2020; Diaz et al., 2019). This thesis enhances the scientific knowledge on human values, beliefs and behaviours toward the ocean and marine issues. In **chapter 2,** I investigated marine value orientations (MVOs), ascription of responsibility and awareness of consequences, and examined how these cognitive factors influence an individual's personal norms toward marine health. The theoretical model used to examine the relationship among these factor explained 86% of the variance in personal norms; that is, an individual's moral obligation to act towards a healthier ocean.

These findings corroborate with what has been proposed on the value-belief-norm theory (VBN; Stern, 2000) and provides direction to getting it right for marine conservation. Furthermore, given the difficulty to explain human behaviours, the ability to explain such a large percentage of variance, with a strong and acceptable fit model, advances the field of marine social sciences. Structural equation modelling is widely used in social sciences as a way to statistically test what is hypothesized in theory (Rahman et al., 2015). As social scientists we need to do better in identifying the drivers of human activities and indeed this is a positive step in the right direction.

Previous research has shown that environmental values, beliefs and norms have an impact on the environment; either positive or negative, depending on the nature of these constructs (e.g., Collins & Chambers, 2008; De Groot & Steg, 2008; Steg et al., 2005; Vaske et al., 2018; Zhang et al., 2020). The way people value the environment, their sense of responsibility and awareness of the consequences of their actions are drivers of human pro-environmental behaviour (e.g., De Groot & Steg, 2009; Kaiser et al., 1999; Saphores et al., 2012; Wynveen et al., 2015). With an understanding of what motivates people to feel morally obliged to engage in marine conservation and/or demand of government better ways to keep the health of the ocean, it is possible to plan

more effective communication strategies that will encourage individuals to act. Conservation means behaviours (Schultz, 2011), and if the goals and targets of the incoming decade are to be achieved, individuals, collectively, have the power to reduce the negative anthropogenic impacts on the environment, demand better policies and elect representatives with agendas in alignment with sustainable development strategies.

In **Chapter 3,** I examined the frequency in which coastal residents were engaging in pro-environmental behaviours (PEBs): not using plastics bags, reducing energy consumption, collecting litter from the beach and considering the environmental impact of the things they buy. Overall, people would *sometimes* engage in those behaviours. Recently, the Canadian Federal Government banned the use of single-use plastics. Plastic bags are no longer available at stores, which is a success for tackling marine pollution. Yet, more needs to be done. While respondents would often reduce energy consumption at home, which is associated with climate change (Akhmat et al., 2014; Natural Resources Canada, 2020), they were less likely to collect litter from the beach and consider the impact of their goods acquisitions. These findings indicate the need to rethink the strategies used to engage people in more ecologically sound behaviours. Drawing from findings in Chapter 2, efforts should focus on fostering a sense of care and responsibility for the ocean, which would have an impact on people's moral beliefs.

In addition to PEBs, I also investigated the influence of mental ocean imagery on people's MVOs, emotional involvement (fear about the future state of the ocean), attitude toward sustainable development and acceptability for using the ocean for fishery, oil and gas exploration, and transportation. The findings documented in chapter 3 show that coastal residents support recreational and commercial fishing, and marine transportation. Despite the economic relevance of the oil and gas industry in Newfoundland and Labrador (about 26% of the Province's GDP;

Statistics Canada, Provincial Economic Accounts, 2020), respondents held a slightly positive acceptance level for offshore oil and gas. Low levels of acceptability for oil and gas exploration could be related to a growing public awareness that fossil fuel extraction contributes to greenhouse gas emissions, pollution and climate change (He & Zhan, 2018; Kaiser et al., 1999; Leiserowitz, 2006; Natural Resources Canada, 2016). It may also be related to an oil spill event that happened days prior to the beginning of the data collection (see https://www.cbc.ca/news/canada/newfoundland-labrador/newfoundland-tanks-oil-spill-husky-1.4909859); an event that was frequently mentioned by respondents. In any case, as stated by a resident of Harbour Grace, it is a "*tricky situation to have oil exploration off our coasts. NL needs money as all governments do. But sometimes, more often than not, they are more fixed or obligated to cater to the needs of the oil industry than the good of our oceans and fisheries".*

While respondents feared that future generations will not have a healthy and clean ocean, they expressed positive attitudes toward sustainable development. As pointed out by one of the respondents, *"We need to use our resources responsibly and educate the people of their importance."* In the context of sustainable development, the UN's SDG-14 is about conserving and sustainably using the oceans, seas and marine resources for sustainable development. Although the SDGs are not legally binding, states are expected to adopt, take ownership of, and implement their own action plans to achieve these goals. SDG- 14 reflects paragraph 158 of The Future We Want (UN, 2012), as well as the UN's Convention on the Law of the Sea, particularly Part XII, Section 1, Article 192, which posits that "States have the obligation to protect and preserve the marine environment". In Canada, most of the indicators of Goal 14's targets are still classified as *being explored* or *under development.*

While the SDGs serve as guidelines for countries to adopt a more sustainable agenda

where environmental protection is aligned with socioeconomic development, critics of the 'sustainable development' approach argue that environmental destruction and biodiversity loss have not been avoided or mitigated with the SDGs (Zeng et al., 2020). According to those authors, the SDGs "will likely serve as a smokescreen for further environmental destruction throughout the decade" (Zeng et al., 2020, p. 795). Despite the ongoing debate on the effectiveness of the SDGs to secure a healthy environment for future generations (Amin, 2006; Hope, 2020; Sultana, 2018; Zeng et al., 2020), these goals serve as a framework for countries to develop their own agendas. Excluding people and their needs for shelter, food and income when planning for marine conservation is unrealistic. In rethinking our relationship with the ocean and imagining that [utopic] future we all want, we need to find ways to ensure that those basic needs are met while conserving the environment. It may require increased restrictions to access resources, but in the long term, the result may be a more plentiful and healthier ocean.

The images that people have of the ocean as either plentiful, mysterious or mismanaged are important factors affecting how they think and act in relation to the sea. Through a series of multiple regression models, I was able to document the influence of mental imageries on emotion, cognitions and PEBs. As discussed in chapter 3, an understanding of these mental images helps in rethinking our relationship with the ocean in at least two ways. Firstly, these images represent the 'waves of excitement and awareness' among people toward the ocean (McKinley et al., 2020), thus indicating the various ways in which coastal residents interpret the marine environment. Secondly, images "have consequences for what we do in the real world" (Jentoft et al., 2012, p. 186), meaning that these images influence our relationship with the ocean. Along the coast of Newfoundland, respondents imaged the ocean as beautiful, mysterious, dangerous; as a source of food, income and transportation. They viewed the ocean as fragile to human activities, vulnerable

to human greed, yet a powerful force of nature. As pointed by Rock et al. (2018), "we still retain some fear of it [the ocean], but we also adore it and want to be near it. We are possessive of it legally. (…) we are fascinated by its creatures and calmed and invigorated by its physicality. We are also beginning to feel culpable in its degradation and are starting to see it as fragile – because of us" (p. 6).

Some sea creatures, however, are controversial to people's views and the source of political and ideological dispute. In the context of Newfoundland, seals are seen both as a charismatic megafauna with rights to exist as any other living thing, as well as *pests*, an overabundant species that needs to be controlled. In **Chapter 4,** I investigated coastal residents' perceptions of seals and seal hunting. The goal of this chapter was also to analyze the influence of marine value orientations on more specific values toward seals – what is the connection, if any, between the way people value the ocean with the way they value its creatures?

As hypothesized, MVOs had a direct influence on seal's value orientations (SVOs). Moreover, a similar pattern was observed, thus corroborating the hypothesis that broader values towards the ocean can be reflected on more specific values oriented to marine species – to seals in this particular case. Respondents, in general, held stronger relational and intrinsic MVOs. Similarly, higher ecological and intrinsic SVOs were observed. Instrumental MVOs and SVOs were slightly less important to people. At the same time, acceptability for using seals as a nutritional and economic resource was observed. From a statistical standpoint, rural and urban respondents differed in their perceptions. Yet, both groups agreed that the seal hunt should not stop. Both rural and urban respondents, in general, did not consider seal hunting a cruel activity – something that animal welfare groups have been advocating for decades (Barry, 2005). On many issues regarding seals and their management, urban respondents hold similar views to their rural

counterparts, suggesting that there is more common ground within Newfoundland than often portrayed (Aldworth & Harris, 2007; Barry, 2005; Dauvergne & Neville, 2011).

The acceptability to utilize seals reflects the overall support for marine use described in Chapter 3. In accordance with the cognitive hierarchy of human behaviour (Fulton et al., 1996; Vaske & Donelly, 1999; Vaske & Manfredo, 2012), this utilitarian perspective towards the ocean and seals does not translate into negative attitudes toward the species nor toward a sense of carelessness for the ocean. In fact, it highlights the complexity of human/seal and human/ocean relationships. In the case of seals, one may express positive attitudes toward the species, value it for its ecological and intrinsic role in the ecosystem, and at the same time support its utilization. Foran (2018), in his book about Subjugation of Canadian Wildlife, claim that a new belief system is required for the dilemma involving wildlife and biodiversity. In regard to seal hunting, it is usually argued that supporters and opposers hold different values and belief systems (Foran, 2018; Lowe, 2008). In this thesis, I did not investigate differences between supporters and opposers. Rather, I selected a random sample of coastal residents, and the findings show high levels of ecological and intrinsic values among a population who supports seal hunting. This suggests that the conflict between seal hunting supporters and those against does not occur based on their value and belief systems, but on the fact that people hold different tolerance levels for the seals – important to say, however, that 8% of the respondents did not agree with the seal hunt and find it unnecessary.

Another important finding described in Chapter 4 refers to the low levels of trust in the government in managing the ocean. Trust is an important factor influencing social acceptance and approval of a given situation or policy (Bakker, Koning & Van Tatenhoce, 2019). Lack of trust can jeopardize efforts and intensify social conflict. In moving towards a future where the

goal is to get things right, building trust between government officials (including government scientists) and society is paramount.

In summary, this doctoral research documented the current waves of thoughts and awareness of coastal residents of Newfoundland in relation to the ocean and marine issues. It provided empirical evidence that: people care for the ocean, are aware of the anthropogenic impacts to the environment, fear that future generations will not have a clean and healthy sea, feel that they should be doing more for marine conservation, support the responsible and sustainable use of marine resources (including seals as a source of food and income), are less supportive of oil and gas development, imagine the ocean in various ways which influence their emotions, cognitions and behaviours, and lack trust in the government. Seals and the ocean are valued in many ways, and these values are not mutually exclusive.

Despite high levels of ecological, intrinsic and relational values, however, plastics are found along the coast, fish stocks are in decline, and ocean waters are warming, thus highlighting the ambivalence of human nature. Obviously, those are global issues that did not start in Newfoundland alone. Yet, these global issues require global actions. Thinking globally and acting locally is cliché, but necessary to tackle the challenges facing the ocean and all life on this planet. Furthermore, listening to the local voices is the first step in working towards solutions:

"I believe big companies should be accountable to what they do and have done to the ocean. Keeping the ocean clean is everybody's responsibility". - Resident of Corner Brook, NL, 2018.

"We need more concentrated effort to bring attention to how messy our oceans have become. More education enforcement and laws and energy put into protecting the ocean." - Resident of Corner

Brook, NL, 2018.

"I used to be a fisherperson. I think more needs to be done to recover ghost gear from the waters around our province. This is very important because there are lots of fishing gear lost every year and never recovered. It has to be impacting our marine environment." – Resident of Carbonear, NL, 2018.

"Our government needs to be taken to task on all aspects of ocean protection. But there is a balance between industry development and preserving the environment. This can all be achieved

together. Not 100% Environment or 100% industry development. Nobody wins if that happens. Share our resources!" - Resident of Bay Roberts, NL, 2018.

"We need to think about a complete ecosystem approach; land, sea and air. Stop the blaming of humans, of industry, governments etc. and focus on positive solutions." - Resident of Torbay, NL, 2018.

"Hopefully the government will make some right decisions, at some point in time. For our future!" Resident of Springdale, NL, 2019.

"I fished for 30 plus years and everything is decreasing. There are no more capelin rolling the beaches or squid to catch. Crab is getting less because the cod is eating the female snow crab and the fisher is catching all the important species that the cod needs to feed on.

Until that changes it will not get any better. Cod needs herring, shrimp, caplin, squid for food."

- Resident of Grand Banks, NL,

2019.

In the next section I highlight the main contributions of this research for marine governance and conservation in both theory and practice.

5.2 Contributions of the Research

The three manuscripts of this dissertation respond to the overarching goal of this research thesis: to explore how coastal residents of Newfoundland relate to the ocean. While chapters 2 and 3 provided a broader perspective of the people/ocean relationship from a utilitarian and conservation angle, chapter 4 addressed the issue of seal hunting, thus focusing on the use and management of a specific marine resource. In this section, I state the main theoretical, methodological and empirical contributions of the research.

5.2.1 Theoretical

Traditionally, the Value-Belief-Norm (VBN) theory has been used to predicts farmer's intentions to engage in pro-environmental behaviours (e.g., Rezaei-Moghaddam et al., 2020; Vaske et al., 2018), to predict transportation use (e.g., Kaiser et al., 1999; Leibao Zhang et al., 2020), acceptability of energy policies (e.g., De Groot & Steg, 2009), and consumers behavioural choices (e.g., Kang & Moreno, 2020; Quoquab et al., 2020). The application of the VBN in a marine context is scarce; this thesis provides further validation of its applicability on issues concerning the ocean (e.g., Wynveen et al., 2015). Through structured equation modelling, I was able to predict the factors influencing personal norms and as hypothesized, findings were

consistent with previous research investigating environmental values, beliefs and norms (e.g., De Groot & Steg, 2009; Kaiser et al., 1999; Saphores et al., 2012; Wynveen et al., 2015). In addition, this thesis contributes to the growing body of knowledge on relational values and marine values, a new and emerging field of research (Chan et al., 2016; Klain et al., 2017; Pascual et al., 2017; Tallis & Lubchenco, 2014). The theoretical statistical model used in chapter 4 offered a further understanding of the cognitive hierarchy of human behaviour (Vaske & Donnelly, 1999).

In addition, this thesis expands our comprehension of the factors influencing behaviour. The cognitive hierarchy postulates that values, value orientations, beliefs, emotions, attitudes, norms and behavioural intentions influence behaviour. Environmental psychologists argue that mental images also influence behaviour (Waller et al., 2012). In this research, I tested the relationship among some of these concepts (value orientations, beliefs, attitudes, emotions, personal norms, behaviours, and mental images), and suggest that mental images could be integrated into the cognitive hierarchy of human behaviour.

5.2.2 Methodological

I developed a marine value orientation scale modelled after wildlife value orientation scales that have proven useful in understanding people's behaviour regarding wildlife (Manfredo et al., 2003). Through this research I found that such an MVO scale can provide valuable information to understanding marine conservation issues and could be applied to other contexts investigating people and ocean relationships. Marine values are typically assessed through qualitative methods (e.g., Jentoft et al., 2012; Jones et al., 2016; Song et al., 2013; Voyer et al., 2015). I tested a quantitative scale using Likert scale items. Although still in development, the MVO scale used serves as a starting point for the development of a broader scale that

encompasses other values.

The mixed-method approach used also enhanced our understanding of people/ocean relationships. The comments provided by the respondents supplemented the quantitative data and provided a better perspective of the challenges affecting coastal communities and the surrounding waters. In this sense, it contributed to new methodologies in the marine social science (Bavinck & Verrips, 2020).

5.2.3 Empirical

This research provides a further understanding of the relationship between coastal communities and the ocean in Newfoundland. It attended to OFI's Module-I demands and contributes with information for policy and decision-makers for future governance and conservation strategies based on sustainable behavioural intentions toward the ocean and use of marine resources. Findings here also provide evidence of what *the top of mind* associations (i.e., Stepchenkova & Li, 2014) people have towards the ocean. Those mental images offer directions for communication messages targeting behavioural changes. In this regard, a growing number of scholars and conservationists have been applying conservation marketing strategies into conservation (Veríssimo, 2013, 2019; Wright et al., 2015). Images highlighting the natural aspects of the marine environment could be used in these strategies.

5.3 Research Limitations and Challenges

The research instrument included more items than those covered in this thesis. Those included: a section on Atlantic cod, further items related to awareness of marine pollution, to aquaculture and marine protected areas. Due to time constraints and also the complexities of the

people/ocean relationship, this thesis did not cover all the different aspects of people and ocean relationships in Newfoundland. Also, the research instrument did not include some important aspects of anthropogenic impacts on the ocean (e.g., ocean acidification), nor other marine species like sea birds, or specific questions about the future of the fisheries in the province. This conscious decision to explore broad issues to inform specific issues theoretically first has shown that pursuing specific issues now has much merit.

In addition, the research was restricted to the island of Newfoundland. Therefore, it cannot be extrapolated to the whole province. A larger Indigenous population live in the coastal communities of Labrador and the relationship to the ocean and is creatures may be different than from residents of the island portion of the province.

The main challenge of conducting the research was to access certain communities. Some of the places were inaccessible by road, or due to weather constraints inaccessible during the time available to collect data. Writing this thesis in the year of the COVID-19 pandemic was also challenging. The uncertainty of the current situation added an extra burden on people's mental health, and as expected, it affected my performance in writing these pages. This being said, I do complete this dissertation within the four years allocated to my PhD program on schedule. Nonetheless, while one paper has been published, due to the pandemic the review process for journals has been slower than normal and thus valuable feedback from reviewers could not be incorporated to improve the two manuscripts still under review.

5.4 Recommendations for Future Research

- Expand the analyses to Labrador, thus including coastal communities from the mainland portion of the province and Indigenous people, and even to other parts of Canada. With

data representative of the Canadian constituents from all three coasts, findings can be used in decision-making and conservation planning at the national level.

- Expand and test a revised version of the MVO scale that includes other environmental values, e.g., cultural and spiritual. The latter could specifically be developed in consultation with Indigenous peoples.
- Expand the analyses to those communities that were inaccessible for this research, including Indigenous communities in the island of Newfoundland, like the Mi'kmaq Nation. Remote coastal communities may have stronger connections to the sea as it is their mode of transportation and in difficult weather, these residents are very much cut off from the rest of the island. Furthermore, by expanding to Indigenous communities and listening to their voices and concerns about the ocean, their values and beliefs, will improve efforts toward decolonizing the relations between people and the Atlantic Ocean.
- Analyze the data collected but not included in this thesis. Given the urgency to solve marine plastics pollution, data on awareness of pollutants and other types of behaviours could be used to inform pollution mitigation strategies.
- Explore ways to develop a 'sea ethic', similar to Aldo Leopold's Land Ethic. Leopold's land ethic was developed with two dimensions, an ecological and a philosophical dimension. His vision of how to properly treat the land and all its living beings may serve as an inspiration for future research in marine social science.

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Appendix A – Research Instrument

WHAT DO YOU THINK ABOUT THE OCEAN?

Thank You For Your Cooperation In Completing The Questionnaire

Participation is Voluntary, and Responses are Anonymous and Confidential

A Study Conducted Cooperatively by:

MEMORIAL UNIVERSITY

OCEAN FRONTIER INSTITUTE

Colorado State University

NATIONAL GEOGRAPHIC

The proposal for this research has been reviewed by the Interdisciplinary Committee on Ethics in Human Research and found to be in compliance with Memorial University's ethics policy. The data collected will be kept for a minimum of five years, as per Memorial University policy on Integrity in Scholarly Research.

PEOPLE AND OCEAN

QUESTIONNAIRE

Dear resident,

We would like to invite you to take part in a study called "People and Ocean". Your participation is an important component for the understanding of people and ocean relationship in Newfoundland. You are one of a small number of people chosen at random and invited to participate in this study by completing the questionnaire.

The purpose of this study is to learn about your views and perceptions of the ocean, and your opinion about various ways to manage the sea, with the aim to provide strategies and recommendations to policy and decisions makers on marine management.

This is a four-year project developed as part of Monica Engel's doctoral dissertation involving Newfoundland residents. You are welcome to ask questions and withdraw at any time before returning not be recorded. If you do not wish to participate in the study, you are welcome to return a blank questionnaire in the sealed envelope. The questionnaires will be opened in batches, so yours will not be identified. In addition, you may skip any questions that they do not wish to answer, including the demographic questions at end.

It will take approximately 15 minutes to complete the questionnaire. Your responses will be grouped together with those of other participants and kept strictly anonymous and confidential.

If you have any questions, please feel free to contact us at 709-864-8190, or m.engel@mun.ca.

The questionnaire will be collected by the researcher.

Thank you very much for completing the questionnaire. Your input is very important.

Sincerely,

Monica Engel, PhD ABD
Project Coordinator
Memorial University

Dr. Alistair Bath
Project Supervisor
Memorial University

Instructions: Please check one box for each item.

SESSION 1. INTERACTION WITH THE OCEAN:

How often did you do these activities during the past year in Newfoundland?	Not at all	Just once	Less than once a month	At least once a month	A few times per month	At least once a week
Commercial fishing	☐	☐	☐	☐	☐	☐
Recreational fishing	☐	☐	☐	☐	☐	☐
Hiking along the coast	☐	☐	☐	☐	☐	☐
Relaxing by the ocean	☐	☐	☐	☐	☐	☐
Scuba diving	☐	☐	☐	☐	☐	☐
Sealing	☐	☐	☐	☐	☐	☐
Surfing	☐	☐	☐	☐	☐	☐
Swimming	☐	☐	☐	☐	☐	☐
Whale watching	☐	☐	☐	☐	☐	☐

Do you eat fish?
☐ Yes
☐ No

Do you eat seal meat?
☐ Yes
☐ No

Do you eat other seafood?
☐ Yes
☐ No

What are the first THREE WORDS that come to mind when you think about the ocean?

1. _____
2. _____
3. _____

SESSION 2. PERCEPTIONS ABOUT THE OCEAN AND MARINE LIFE.

Think about the ocean

To what extent do you agree or disagree with each of the following?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
It is acceptable that we use the ocean for…					
commercial fishing.	☐	☐	☐	☐	☐
recreational fishing.	☐	☐	☐	☐	☐
oil and gas exploration.	☐	☐	☐	☐	☐
transportation.	☐	☐	☐	☐	☐
leisure (surfing, scuba diving, swimming).	☐	☐	☐	☐	☐
waste disposal.	☐	☐	☐	☐	☐
our own benefit.	☐	☐	☐	☐	☐
The ocean is important because it…					
provides food for people in this province.	☐	☐	☐	☐	☐
produces jobs for people in this province.	☐	☐	☐	☐	☐
attracts tourists to the province.	☐	☐	☐	☐	☐
is sacred to me.	☐	☐	☐	☐	☐
keeps the balance of life on Earth.	☐	☐	☐	☐	☐
Oceans have a value on their own beyond economic and ecological benefits to us.	☐	☐	☐	☐	☐
We can use the ocean's resources, as long as we protect it for future generations to use.	☐	☐	☐	☐	☐
We should protect at least 10% of Canada's oceans free from any form of human use.	☐	☐	☐	☐	☐
We were meant to rule the ocean to suit our needs.	☐	☐	☐	☐	☐
We should do what is best for the ocean instead of what is best for people.	☐	☐	☐	☐	☐

3.6 Think about cod

To what extent do you agree or disagree with each of the following?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
It is acceptable that we fish cod for…					
commercial use.	☐	☐	☐	☐	☐
recreational use.	☐	☐	☐	☐	☐
Cod is important because it…					
provides food for people in this province.	☐	☐	☐	☐	☐
produces jobs for people in this province.	☐	☐	☐	☐	☐
is part of the marine ecosystem.	☐	☐	☐	☐	☐
is part of my cultural heritage.	☐	☐	☐	☐	☐
Cod have a value on their own beyond economic and nutritional benefits for us.	☐	☐	☐	☐	☐
We can continue cod fishing, as long as we protect it for future generations to fish.	☐	☐	☐	☐	☐
We can continue cod fishing, as long as we don't impact the health of the ocean.	☐	☐	☐	☐	☐
Cod fishing is cruel.	☐	☐	☐	☐	☐
Cod have the right to exist as much as we do.	☐	☐	☐	☐	☐

Over the past <u>five years</u>, do you think cod in Newfoundland and Labrador are decreasing, remaining the same, or increasing?



☐ Decreasing ☐ Remaining the same ☐ Increasing ☐ Don't know

 **IF DECREASING, what may be causing the decline?**	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Commercial fishing	☐	☐	☐	☐	☐
Recreational fishing	☐	☐	☐	☐	☐
Climate Change	☐	☐	☐	☐	☐
Offshore oil and gas exploration	☐	☐	☐	☐	☐
Seals	☐	☐	☐	☐	☐

IF INCREASING, what may be causing the increase?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Controlled fishing hunting quotas.	☐	☐	☐	☐	☐
The cod moratoria.	☐	☐	☐	☐	☐
Less people fishing hunting.	☐	☐	☐	☐	☐
Lack of predators.	☐	☐	☐	☐	☐

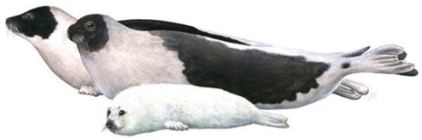
If you have any further comment about the cod fishery and/or fish in general, please feel free to share them here:

_____
_____
_____
_____

3.7 Think about humpback and right whales

To what extent do you agree or disagree with each of the following?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
It is acceptable that we use whales as touristic attractions.	☐	☐	☐	☐	☐
Whales are important because they…					
produce jobs for people in this province.	☐	☐	☐	☐	☐
are part of the marine ecosystem.	☐	☐	☐	☐	☐
are part of my cultural heritage.	☐	☐	☐	☐	☐
Whales have a value on their own beyond economic benefits to us.	☐	☐	☐	☐	☐
Right whales are a nuisance to fishers.	☐	☐	☐	☐	☐
Humpback whales are a nuisance to fishers.	☐	☐	☐	☐	☐
Whales have the right to exist as much as we do.	☐	☐	☐	☐	☐

Think about seals



To what extent do you agree or disagree with each of the following?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
It is acceptable that we use seals for…					
commercial purposes.	☐	☐	☐	☐	☐
subsistence/personal purposes.	☐	☐	☐	☐	☐
fur.	☐	☐	☐	☐	☐
food.	☐	☐	☐	☐	☐
oil.	☐	☐	☐	☐	☐
tourism attraction.	☐	☐	☐	☐	☐
Seals are important because it…					
provides food for people in this province.	☐	☐	☐	☐	☐
produces jobs for people in this province.	☐	☐	☐	☐	☐
is part of the marine ecosystem.	☐	☐	☐	☐	☐
is part of my cultural heritage.	☐	☐	☐	☐	☐
is an important part of our economy.	☐	☐	☐	☐	☐
Seals have a value on their own beyond economic and nutritional benefits to us.	☐	☐	☐	☐	☐
We can continue seal hunting, as long as we protect it for future generations to use.	☐	☐	☐	☐	☐
We can continue seal hunting, as long as we don't impact the health of the ocean.	☐	☐	☐	☐	☐
We should stop seal hunting.	☐	☐	☐	☐	☐
Seal hunting is cruel.	☐	☐	☐	☐	☐
We should seal hunt so there will be more fish available for us.	☐	☐	☐	☐	☐
Seals have the right to exist as much as we do.	☐	☐	☐	☐	☐

In general, how do you feel about the following?

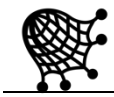
	Strongly Dislike	Dislike	Neither	Like	Strongly Like
 Seals	☐	☐	☐	☐	☐
 Right whales	☐	☐	☐	☐	☐
 Humpback whales	☐	☐	☐	☐	☐

If you have any further comment about seals and/or whales, please feel free to share them here:

_____
_____
_____
_____

SESSION 3. STATE OF THE OCEAN.

How do you feel about the health of the ocean?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
I feel responsible for the health of the ocean.	☐	☐	☐	☐	☐
Because I don't use the ocean, I do not feel responsible for the marine health.	☐	☐	☐	☐	☐
Government authorities are responsible for the health of the ocean.	☐	☐	☐	☐	☐
Citizens are responsible for the health of the ocean.	☐	☐	☐	☐	☐
I do not care about the state of the ocean.	☐	☐	☐	☐	☐
I'm concerned about how the ocean will look like in the future.	☐	☐	☐	☐	☐
I fear people in the future will not have a healthy and clean ocean.	☐	☐	☐	☐	☐
I feel we have polluted the ocean and now it is too late to do something about it.	☐	☐	☐	☐	☐

How much do you believe in the following?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
 The ocean is getting warmer.	☐	☐	☐	☐	☐
 There is a global decline of fish in the ocean.	☐	☐	☐	☐	☐
 Land pollution impact the ocean.	☐	☐	☐	☐	☐
 Deep-water oil drilling cause marine pollution.	☐	☐	☐	☐	☐
 Driving my car impact the ocean.	☐	☐	☐	☐	☐
 Noise from ships impact marine species.	☐	☐	☐	☐	☐
 Toothpaste, shampoo and soap impact the ocean.	☐	☐	☐	☐	☐
 Pet's food impact the ocean.	☐	☐	☐	☐	☐
 Plastic bags, packages and bottles impact marine species.	☐	☐	☐	☐	☐
 Drinking coffee in a disposable cup impact the ocean.	☐	☐	☐	☐	☐
 Food packaging impact the ocean.	☐	☐	☐	☐	☐
 Energy consumption impact the ocean.	☐	☐	☐	☐	☐
 House cleaning products impact the ocean.	☐	☐	☐	☐	☐
 The things we eat impact life in the ocean.	☐	☐	☐	☐	☐
 Fertilizers impact the ocean.	☐	☐	☐	☐	☐
 Lost fishing gear impact marine species.	☐	☐	☐	☐	☐

SESSION 4. THINGS WE DO.

How often do you do the following?	Never	Rarely	Sometimes	Often	Always
Buy food produced in Newfoundland.	☐	☐	☐	☐	☐
Use plastic bags in grocery stores.	☐	☐	☐	☐	☐
Drink with straws.	☐	☐	☐	☐	☐
Use ecofriendly cleaning products.	☐	☐	☐	☐	☐
Recycle.	☐	☐	☐	☐	☐
Put on a sweater rather than increase my house temperature to save energy.	☐	☐	☐	☐	☐
Dispouse garbage into the sea.	☐	☐	☐	☐	☐
Eat seafood.	☐	☐	☐	☐	☐
Buy seafood with a sustainability label.	☐	☐	☐	☐	☐
Collect litter from the beach.	☐	☐	☐	☐	☐
Consider that the things I buy can impact the ocean.	☐	☐	☐	☐	☐
Drive my car.	☐	☐	☐	☐	☐
Carpool.	☐	☐	☐	☐	☐
Engage in environmental campaigns.	☐	☐	☐	☐	☐

I am willing most of the time to…	Definitely not	Probably not	Might	Probably	Definitely
Buy food produced in Newfoundland.	☐	☐	☐	☐	☐
Buy seafood with sustainability label.	☐	☐	☐	☐	☐
Use reusable bags when doing groceries.	☐	☐	☐	☐	☐
Avoid using straws.	☐	☐	☐	☐	☐
Turn down the thermostat.	☐	☐	☐	☐	☐
Participate in a beach cleanup.	☐	☐	☐	☐	☐
Recycle.	☐	☐	☐	☐	☐
Carpool.	☐	☐	☐	☐	☐
Engage in environmental campaigns.	☐	☐	☐	☐	☐

How do you feel about the things you do?	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
If people around me are not caring for the health of the ocean, I don't feel I should either.	☐	☐	☐	☐	☐
If the government is not caring for the health of the ocean, I don't feel I should either.	☐	☐	☐	☐	☐
I feel I should do more to help improve the health of the ocean.	☐	☐	☐	☐	☐
I feel I should demand to the government better ways to keep the health of the ocean.	☐	☐	☐	☐	☐

SESSION 6. MARINE MANAGEMENT.

Overall, to what extent do you trust…	Not at all	Just a little	About half of the time	Always
Your federal government in managing the ocean in this province?	☐	☐	☐	☐
Your provincial government in managing the ocean in this province?	☐	☐	☐	☐

Below are POSSIBLE MANAGEMENT scenarios involving the ocean. We would like to know how you feel about certain management actions that could be done to address these situations.

SITUATION 1: It is announced that cod population is increasing.

Is it acceptable or unacceptable to…	Extremely Unacceptable	Unacceptable	Neither	Acceptable	Extremely Acceptable
… increase recreational cod quotas?	☐	☐	☐	☐	☐
… increase commercial cod quotas?	☐	☐	☐	☐	☐
… do nothing and keep quotas as they are?	☐	☐	☐	☐	☐

SITUATION 2:	**It is announced that seals are causing the decline of cod.**				
Is it acceptable or unacceptable to…	Extremely Unacceptable	Unacceptable	Neither	Acceptable	Extremely Acceptable
… increase seal hunting quotas?	☐	☐	☐	☐	☐
… do nothing and keep seal hunting quotas as they are?	☐	☐	☐	☐	☐

SITUATION 3:	**It is announced the implementation of a major sea-based aquaculture project in Newfoundland.**				
Is it acceptable or unacceptable to…	Extremely Unacceptable	Unacceptable	Neither	Acceptable	Extremely Acceptable
… provide subsidies for international companies to install aquaculture projects in NL?	☐	☐	☐	☐	☐
… develop aquaculture projects?	☐	☐	☐	☐	☐

SITUATION 4:	**It is announced an agreement to develop an offshore deep-water oil project in Newfoundland.**				
Is it acceptable or unacceptable to…	Extremely Unacceptable	Unacceptable	Neither	Acceptable	Extremely Acceptable
… invest in deep-water oil exploration in NL?	☐	☐	☐	☐	☐
… develop oil exploration projects?	☐	☐	☐	☐	☐

SITUATION 5:	**It is announced that a protected area is created for marine conservation.**				
Is it acceptable or unacceptable to…	Extremely Unacceptable	Unacceptable	Neither	Acceptable	Extremely Acceptable
… close the area for any human activity?	☐	☐	☐	☐	☐
… allow small-scale fishing in the area?	☐	☐	☐	☐	☐
… allow industrial fishing in the area?	☐	☐	☐	☐	☐
… allow oil exploration in the area?	☐	☐	☐	☐	☐
… allow shipping traffic in the area?	☐	☐	☐	☐	☐

If you have any comment about the way the ocean and marine life are managed in Newfoundland, please feel free to share them here:

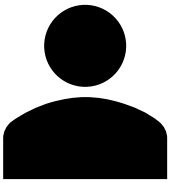
_____

SESSION 7. PERCEPTIONS ABOUT THE LAND AND THE SEA.

To what extent do you agree or disagree with the following…	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
I care about the land the same way as I care about the ocean.	☐	☐	☐	☐	☐
The land is more important to me than the ocean.	☐	☐	☐	☐	☐
The land needs better protection than the ocean.	☐	☐	☐	☐	☐
The land is more polluted than the ocean.	☐	☐	☐	☐	☐
It is more difficult to manage the ocean than the land.	☐	☐	☐	☐	☐
We should manage the ocean with the same regulations as we manage the land.	☐	☐	☐	☐	☐
We should spend more money in understanding the ocean than the land.	☐	☐	☐	☐	☐

The ocean is so vast that we don't need to worry about marine conservation.	☐	☐	☐	☐	☐

SESSION 8. A LITTLE ABOUT YOURSELF.



How old are you?

☐ 18 – 25
☐ 26 – 35
☐ 36 – 45
☐ 46 – 55
☐ 56 – 65
☐ + 66 year

Are you:

☐ Male
☐ Female
☐ Other

Where do you live? Town: _____

What is your job?

☐ Fisher
☐ Fish plant worker
☐ Do not work
☐ Work with the oil industry
☐ Government worker
☐ Retired
☐ Self employed
☐ Student
☐ Other:_____

Do you have children?

☐ Yes
☐ No

Do you have any further comments about the questionnaire, the ocean and/or any marine related issue? Please feel free to share them here: _____ *space to write.*

Thank you very much for participating and sharing your views!

Monica